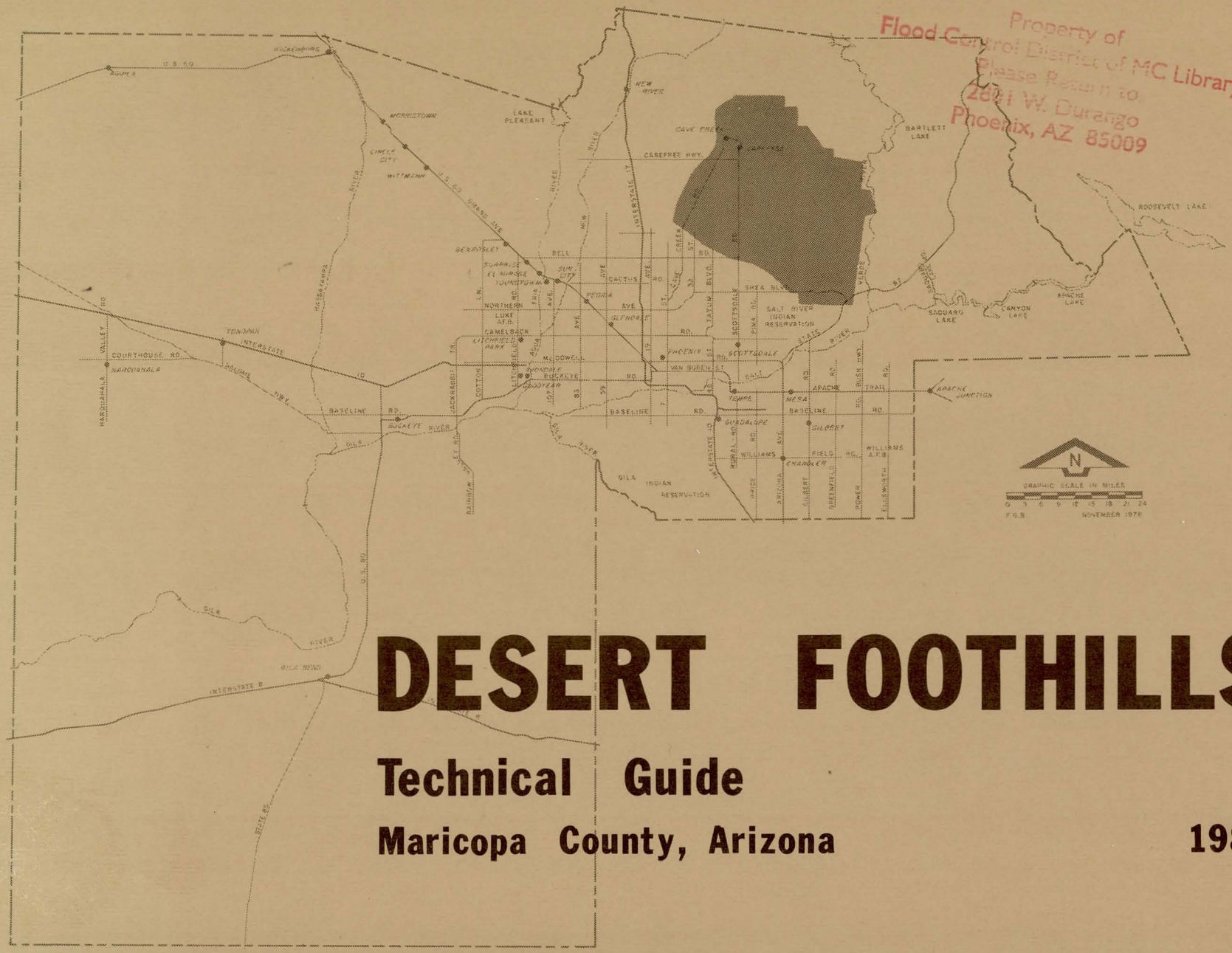

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DESERT FOOTHILLS

Technical Guide

Maricopa County, Arizona **1982**

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MEMORANDUM

TO: Public Officials Concerned with the Desert Foothills Area

FROM: Dudley Onderdonk, Principal Planner DO

SUBJECT: DESERT FOOTHILLS TECHNICAL GUIDE

Please accept this complementary copy of the Desert Foothills Technical Guide. The Guide contains information concerning the history, existing conditions and future trends in the study area. It represents the largest collection of facts and figures ever collected on the area. Over 100 pages and several maps are contained in the document.

While every effort was made to collect timely and accurate information there may be instances where conditions have changed. Please let us know if you find any serious errors.

Additional copies of the Technical Guide are available to the public from the Department of Planning and Development for $8.00.

DO/na

DESERT FOOTHILLS
TECHNICAL GUIDE

PREPARED BY

MARICOPA COUNTY DEPARTMENT
OF PLANNING AND DEVELOPMENT

APRIL, 1982

COUNTY ADMINISTRATION BUILDING
111 SOUTH 3rd AVENUE ROOM 300
PHOENIX, ARIZONA 85003

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DESERT FOOTHILLS TECHNICAL GUIDE

PART ONE

Natural Setting

I

INTRODUCTION

CHAPTER I

INTRODUCTION

Purpose

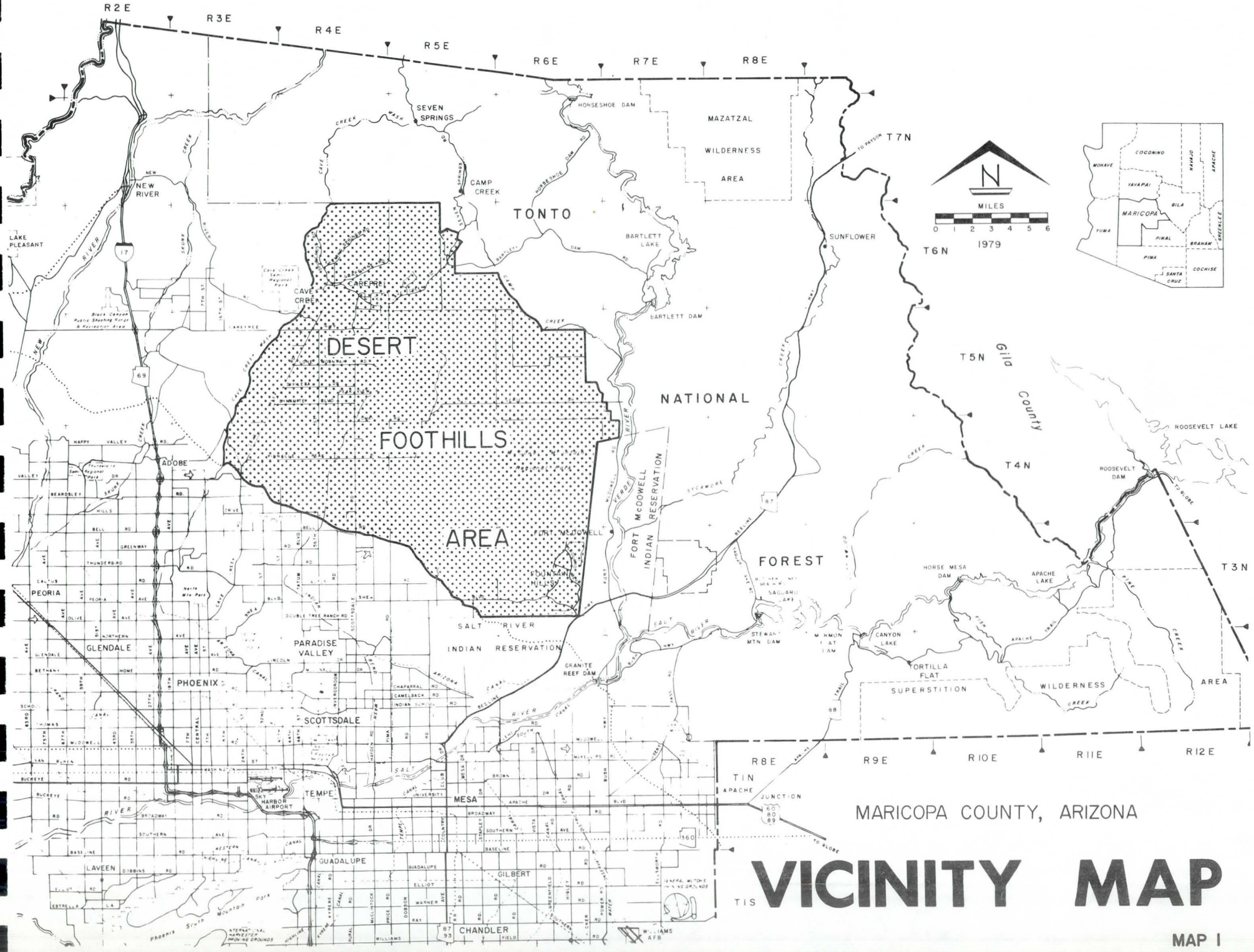
The Desert Foothills Technical Guide is a supplement to the Desert Foothills Policy and Development Guide. Both documents provide technical and policy guidance to decision-makers. The Policy Guide serves as a land development guide or plan for anticipated development. The Technical Guide provides specific background information about the Desert Foothills area. This information will prove useful to both public officials and private developers who make important land use decisions that affect the area. The Technical Guide provides the rationale for the development patterns recommended in the Policy Guide. The Technical Guide contains a wide variety of information concerning the natural and man-made features of the Desert Foothills Area.

Area Description

The Desert Foothills is a diverse 323 square mile area in the northeast part of Maricopa County. It is bounded on the west by Cave Creek Wash, on the south by the Central Arizona Project and Salt River Indian Reservation, on the east by the fort McDowell Indian Reservation and the Tonto National Forest, and on the north by the Tonto National Forest. The planning area includes the unincorporated communities of Cave Creek, Carefree, Pinnacle Peak, Rio Verde, and Fountain Hills. In order to maintain continuity with adjacent areas, portions of the cities of Scottsdale and Phoenix located north of the Central Arizona Project are included in the planning area.

Although originally conceived as a plan for the northeast area of the County, the planning area was enlarged to include Fountain Hills and Rio Verde. The boundaries of the area were defined by natural and man-made features as well as governmental units. See Map 1.

In order to better understand the Desert Foothills, the overall area was divided into ten subareas. Each subarea has its own community identity and separate land use policies. (See Desert Foothills Subarea Map on page 27 in the Policy and Development Guide.) All of the chapters of the Technical Guide have a relationship to both the Desert Foothills overall, and the distinct subareas.



MARICOPA COUNTY, ARIZONA

VICINITY MAP

MAP I

II

TOPOGRAPHY

Chapter II

TOPOGRAPHY

Elevation

The Desert Foothills area is located south and east of the New River Mountain Range. The McDowell Mountains run northwest and divide the area by creating two broad alluvial fans. The larger alluvial fan extends from the New River Mountains in a southwesterly direction and drops from a maximum elevation of 3,315 feet to a low of 1,400 within 21 miles. The second alluvial fan is located on the east side of the McDowells. It runs southeasterly toward the Verde River. This fan drops from a maximum height of 3,200 feet to a low of 1,500 feet within 10 miles.

Major topographic features in the Desert Foothills include:

		Elevation
a.	McDowell Peak	4,034 feet
b.	Lone Mountain	3,372 feet
c.	Pinnacle Peak	3,069 feet
d.	Black Mountain	3,398 feet

Slope in the Desert Foothills

The Generalized Slope Characteristics map shows the percent of slope for the Desert Foothills area. Slope is one of several geological constraints that control land development. The slope categories shown on Map 2 were selected to represent the limits imposed by steep slopes on future land development.

Slope Measurement

Slope is a measurement which defines changes in elevation. The formula for determining slope is:

$$\text{Slope} = \frac{\text{Change in Elevation (feet)}}{\text{Horizontal Distance (feet)}} \times 100$$

Slope is measured in percent. A slope of one (1%) percent indicates a one foot change in elevation for each 100 feet of horizontal distance, a ten (10%) percent slope is a ten foot rise in 100 feet of horizontal distance. Figure 1 compares various slopes.

2-10% (Gentle Slopes) Areas with a slope of two percent (2%) to ten percent (10%) can usually be developed for residential use and some types of commercial and industrial uses. Land in the upper range of this slope category requires careful site planning to be effectively used. Railroad tracks seldom exceed a three (3%) percent slope. Commercial trucks can only negotiate slopes of seven (7%) percent.

10-20% (Moderate Slopes) Sites within the ten (10%) percent to twenty (20%) percent category can accomodate low density residential development with appropriate site planning. Limited multi-family residential uses may be feasible in the lower range of this category. Increasing construction problems in the upper range generally preclude development. A seventeen (17%) percent slope is the absolute maximum for normal vehicles.

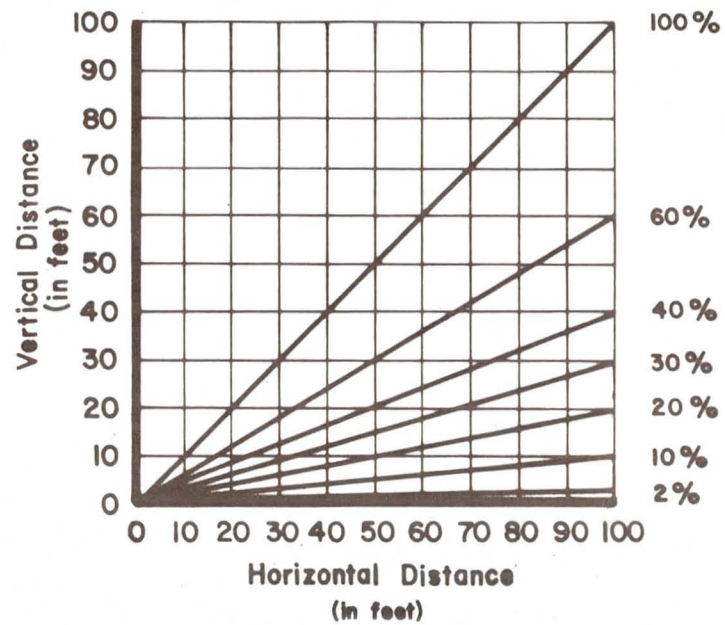
20% and Greater (Steep Slopes) Severe economic, environmental, and engineering constraints occur when slopes exceed twenty (20%) percent. Slopes of this grade require special site planning and reinforcement just to meet the building code. Single houses can be scattered along a slope of this grade, but rows of houses and apartments will require regrading of the site. It is recommended that no development occur on slopes over 25%. At this slope even the underlying soil and rock are unstable.

Approximately seventy-five (75%) percent of the Desert Foohills area has a slope of less than ten (10%) percent. Approximately six (6%) percent has a slope of 10 to 20 percent and nineteen (19%) percent of the area has slopes greater than twenty (20%) percent. The majority of the mountains rise sharply upward from the valley floor and become more steep near the peaks.

Nearly all of the County's agricultural development is located on land with slopes of less than two (2%) percent. However, a significant amount of urban development has occurred in the 2 to 10 percent category, particularly in the Phoenix-Paradise Valley area and in the Desert Foothills.

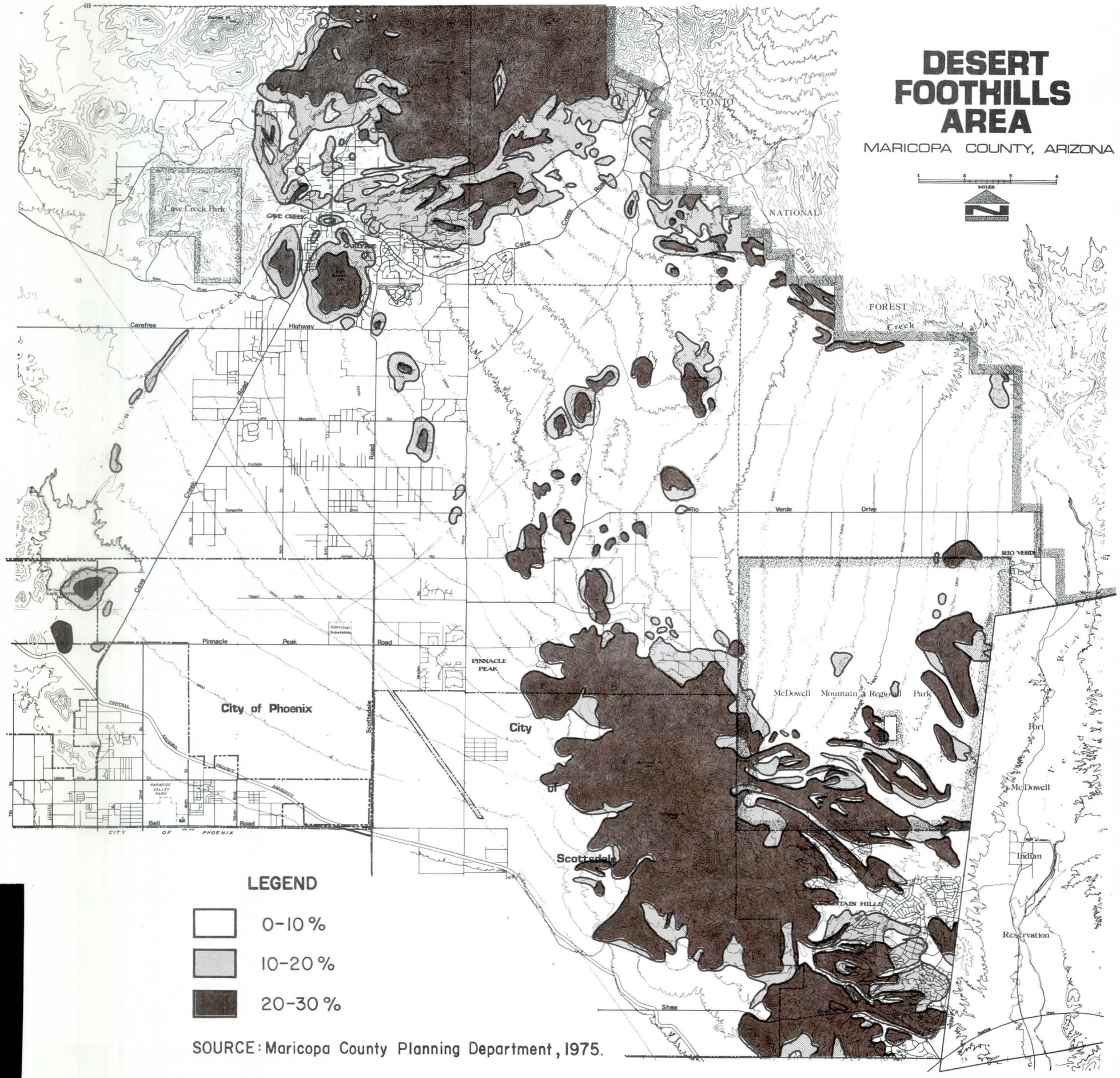
FIGURE I

SLOPE COMPARISONS



DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



SOURCE: Maricopa County Planning Department, 1975.

GENERALIZED SLOPE

MAP 2

Development Constraints

Slopes up to five (5%) percent can be used for cultivated agriculture if the appropriate soil conditions are present. Also, these shallow slopes are well suited for intensive urban development; such as high density residential, commercial and industrial uses. Lower density or large lot residential development can be accommodated on slopes up to ten (10%) percent. When slopes exceed ten (10%) percent, construction costs and public services become difficult to provide. The installation of utilities and other facilities requires sensitive site planning. As slopes approach twenty (20%) percent additional problems become apparent. Even builders of single family homes encounter economic, environmental and engineering constraints. Among the problems encountered on steep slopes are: few suitable building sites, access limitation, thin soils, rock falls and drainage problems. Urban development on steep slopes causes erosion when the ground cover is disturbed which results in permanent scarring of the hillside.

The disposal of sanitary sewage is a serious problem in hillside development. Most isolated hillside homes depend upon private septic systems. Hillside septic systems are more subject to failure than systems on flat land because hillside soils are thin and not generally suitable for the disposal of wastewater. Also, it is difficult to build and maintain septic systems on the unstable steep slopes. Public sanitary sewer systems that use centralized collection and treatment are very expensive to construct in hillside areas. Engineering and construction costs are exceptionally high on hillside lots.

The land area devoted to streets is greater on steep slopes than at lower grades. Hillside streets are relatively longer because the street must follow the topography. When the area is subdivided many large irregular lots must be created above and below the street to allow for a relatively level homesite. Street construction in hilly areas requires expensive cut and fill operations in addition to careful engineering. Failure to properly engineer the road can cause a landslide. Road design standards must be carefully used to prevent blind intersections and other safety hazards on steep slopes. Many cars can not climb steep hills over seven (7%) percent. The maximum grade for large trucks is less than 3-5%. Therefore, roads in rough areas must twist and turn if they are to provide access to hillside lots.

Fire protection and water supply are difficult to provide on steep slopes. To provide adequate water pressure for fire protection separate lift stations at 100-foot intervals must be provided. Furthermore, the system must be specifically designed to prevent excessive pressure at the bottom of the slope. These extra facilities are expensive. Fire protection problems are further compounded by streets and driveways that lack adequate turnaround space or are too narrow or steep to accommodate standard fire fighting vehicles.

It is more difficult and expensive to provide police protection to large widely scattered lots in mountainous areas. It requires more miles of driving to patrol the same number of dwelling units than in the valleys.

Aside from safety and cost considerations, undisturbed steep slopes and hillsides have aesthetic value. Scarring from roads, cuts and fills, as well as building pads detract from the landscape. Steep slopes can serve as a backdrop to urban areas. They provide a setting for development in the valley. Such areas create a sense of place by physically defining and separating neighborhoods from one another. Steep slopes, if undeveloped, can give an expression of openness greater than actually provided by the land area above. Hillside development needs specific regulations and policies which should be included in a comprehensive Hillside Ordinance.

III

GEOLOGY

CHAPTER III

GEOLOGY

Introduction

Planners are concerned with geology because in urban areas the use of the earth is intense and society has a large investment in streets, homes, dams, etc. which must be protected. Complex engineering projects must be protected against potentially destructive geologic processes. Lives and money can be saved if projects are designed with full geologic knowledge. Land use planning that does not consider geologic data will not be sound and can even be dangerous.

Geology broadly defined can include the subjects of other chapters of this guide including topography, soils, water resources, and drainage. This chapter is limited to the earth itself.

The underlying rocks and their structure can be of great importance. However, even the best site planning and engineering is futile if uninformed landowners modify the original design. The principle problems are: 1) failure to maintain drains; 2) changing or diverting drainage; 3) building and cutting on steep slopes; 4) overwatering lawns and gardens; and 5) poor placement of buildings, pools and septic tanks. Every site has some geologic hazard potential, but for the most part these risks can be avoided.

Geologic History

The Desert Foothills area lies within the Sonoran Desert region of the Basin and Range physiographic province. This region is characterized by wide, essentially flat alluvium filled valleys surrounded by rugged, low relief mountain ranges.

The geology of the Foothills is relatively complex from the standpoint of structure and variety of rock types. A major characteristic is the dominance of very old rocks (Precambrian) and relatively young rocks (late Mesozoic and Cenozoic). The complex structure of the mountain ranges was caused by three mountain building periods. During the mountain building perids the rocks were folded, faulted or broken, and subjected to volcanic action. This changed the chemical composition of many of the rocks themselves.

The most recent mountain building period, the "Laramide Revolution", began over 63 million years ago and continued until approximatly one million years ago. During this period, stresses within the earth resulted in the widespread warping, folding, and faulting of the land surface as well as uplifting, subsidence, and intrusive and extrusive igneous activity. Deep basins surrounded by block faulted mountains were the result.

Since the end of Laramide activity, the geology of the Foothills has been dominated by the erosion of the mountains and alluvial sedimentation in the basins.

The thickness, vertical sequence, and lateral variation of these basin deposits has been determined by the intermittent uplift, subsidence, and volcanic activity which has occurred within the last 1 million years and by changing drainage patterns. Today, the area is relatively stable in terms of overt geologic activity although the process of erosion and sedimentation continues. (USDI, 1977, p. 10).

The results are intricately sculptured mountain ranges, wide deeply filled alluvial basins and broad smooth piedmont slopes.

General Geology

The Desert Foothills area is situated on a broad alluvium filled valley that is partially surrounded on two sides by highland bedrock. (See Map 3). The basin continues to the west as part of the Salt River Valley, but it is interrupted by the Phoenix Mountains.

The alluvial deposits range in depth from a few feet near the mountains to over 1,200 feet in the majority of the Paradise Basin. The alluvium which fills the basin consists of heterogeneous deposits of clay, sand, silt, gravel, and boulders which were derived from the surrounding highland bedrock. In general, these deposits are coarser near the mountains than in the central part of the basin. The mountain ranges surrounding the area are primarily composed of consolidated igneous and metamorphic rocks.

Precambrian schist in the Phoenix and McDowell mountains border the recent Quaternary and Tertiary sediments in Paradise Valley. The eastern peaks of the McDowell mountains are Precambrian granite which descends into the Quaternary sediments of the Verde Valley. (Materials Inventory of Maricopa County p 7.) Also See Map 4.

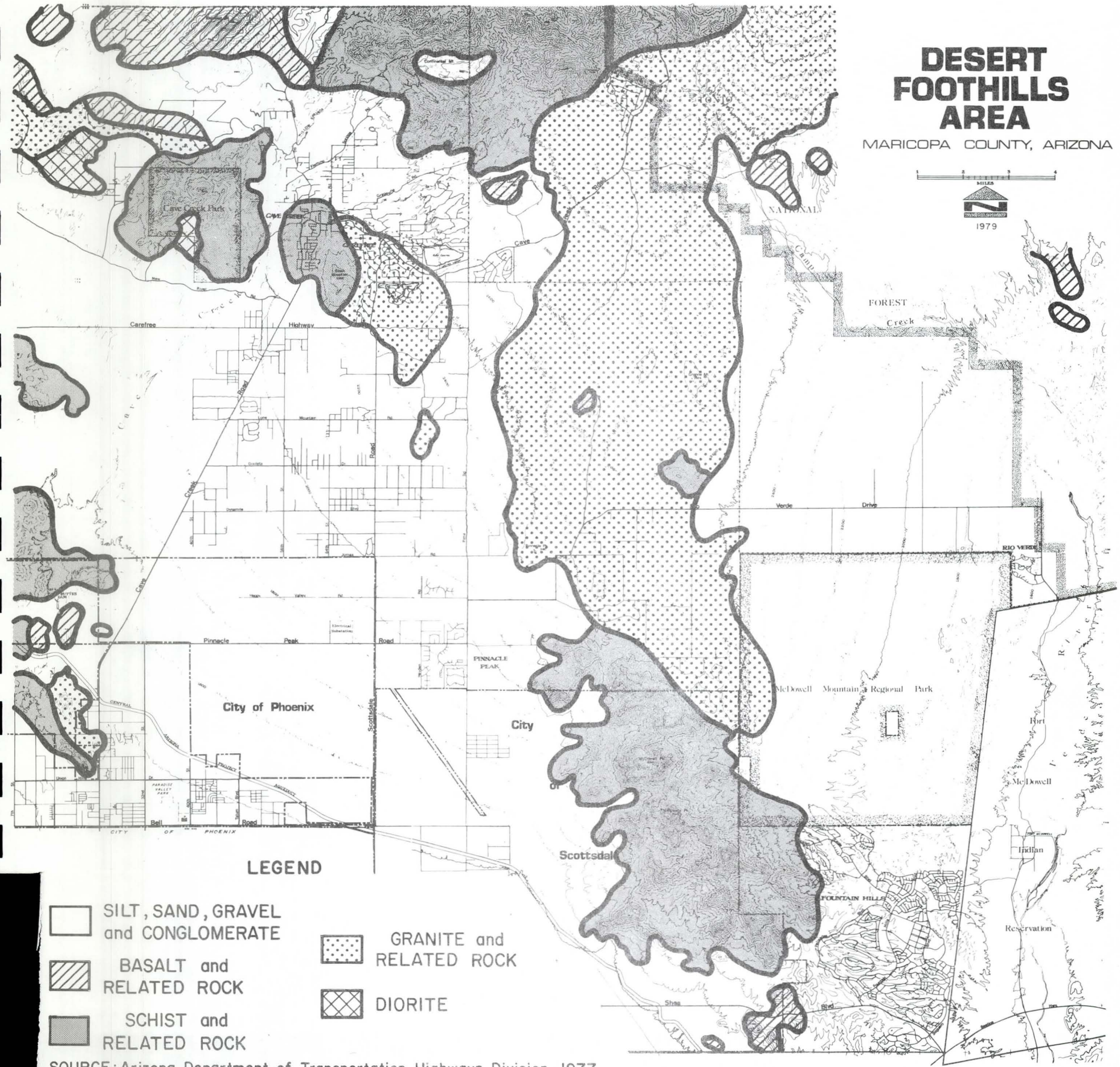
Earthquakes

Earthquakes are not common in Maricopa County. On a scale of 0 to 3 contained in the Uniform Building Code (UBC) Maricopa County is rated 2. This means that the potential exists for moderate damage to occur from relatively intense earthquakes. During such an earthquake, structural damage might be widespread, but it would be considerable only in poorly built or designed structures. (International Conference of Building Officials, 1979, p. 145).

Damage can result not only from the initial shaking, but also from earthquake induced phenomenon such as rock falls on steep slopes, earth fissures in alluvium, and groundwater disturbances. (University of Arizona, Arizona Bureau of Geology and Mineral Technology, 1979).

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA

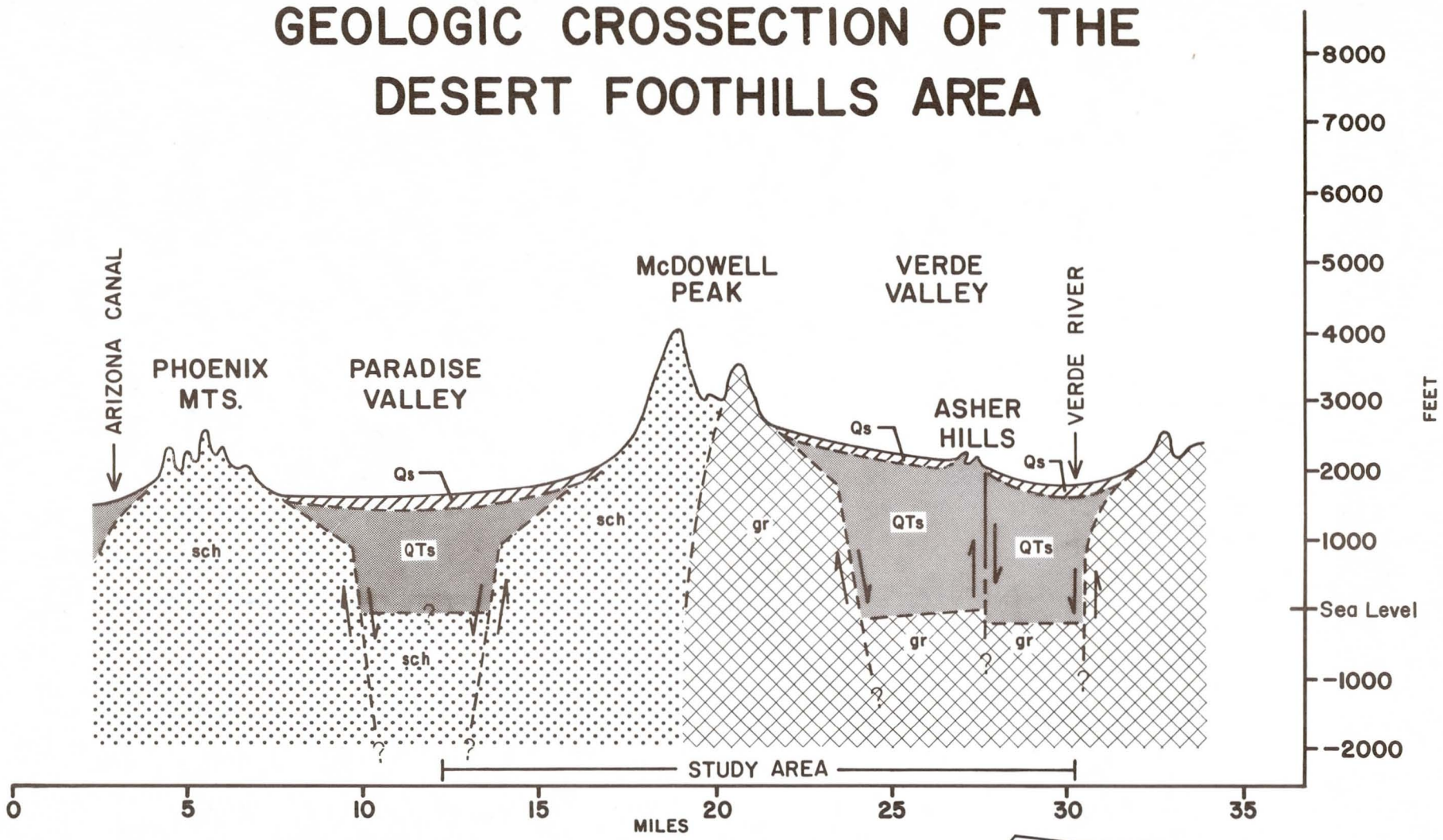


SOURCE: Arizona Department of Transportation, Highways Division, 1977.

GENERAL GEOLOGY

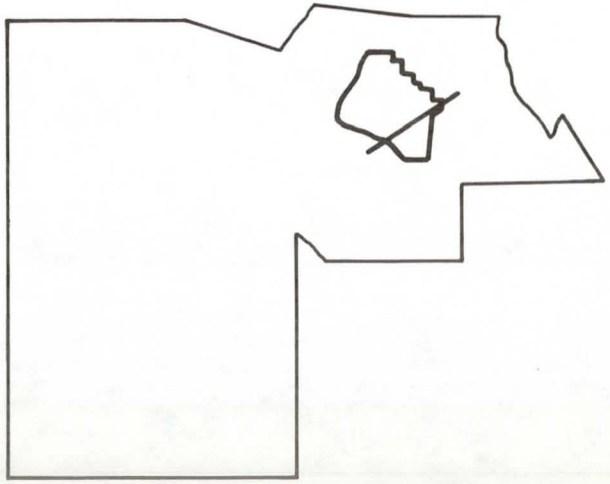
MAP 3

GEOLOGIC CROSSECTION OF THE DESERT FOOTHILLS AREA



LEGEND

Qs — QUATERNARY SEDIMENTS	QTs — QUATERNARY-TERTIARY SEDIMENTS
gr — GRANITE	sch — SCHIST



SOURCE: Arizona Department of Transportation, Highways Division, 1977.

MAP 4

During the past century a few damaging earthquakes have occurred in Arizona near Flagstaff, Prescott, and Yuma. No record exists of earthquakes in Central Maricopa County, although the shock waves of earthquakes outside this region have been felt.

The geologic map of Arizona shows no surface faults in the Central Maricopa County Area (Arizona Bureau of Mines and U.S. Geological Survey, 1969). Since the majority of earthquakes which have occurred in the State have been associated with known faults, this region appears to be relatively stable.

Within the Desert Foothills any visible evidence of fault lines has long been obscured by the process of erosion and sedimentation. A number of potential faults have been inferred from geophysical studies, however, no evidence exists to suggest they have been active in recent history.

Land Subsidence and Earth Fissures

Land subsidence is a growing problem in south central Arizona. Most subsidence can be traced to the intensive pumping of the groundwater supply and the resulting declines in the groundwater level. This is most often associated with dense urban or irrigated agricultural land uses. When porous alluvial rocks are dewatered, the weight of the overlying rock compreses them and the ground cracks or sinks. There is no evidence of land subsidence or earth fissuring in the Foothills nevertheless, there is evidence of land subsidence in neighboring Paradise Valley.

Land subsidence and fissures can create community development problems. When subsidence occurs, the capacity of the underlying rocks to store water is reduced making pumping more difficult. Subsidence changes the slope of the land surface which affects irrigation systems, flood control projects and local drainage patterns. Land subsidence can cause well casings to fail and damage surface structures. Earth fissures at the surface have damaged highways, railroads, utilities, irrigation systems, sewage facilities, recreational facilities and buildings in Arizona. (Laney, 1980).

Mineral Resources

In the late 1800's the Cave Creek community served miners in search of gold, silver and other precious metals. Several small mines were scattered along what is now the south boundary of the Tonto National Forest. In more recent years mines were established to search for mercury and uranium. At present there are no active mines or quarries in the Desert Foothills.

IV

SOILS

CHAPTER IV

SOILS

Introduction

Planners are concerned with soils because they serve as the platform for urban development. Not only are soils important for agricultural land uses they also can greatly influence the structural stability of major improvements such as roads, homes, and even sports stadiums.

Soils result from the weathering or breakdown of the rock in the area. The soils in the Desert Foothills area were derived from the surrounding highland bedrock. Over centuries the bedrock was physically and chemically attacked, reduced to small fragments, and transported by water runoff into the valley. Eventually the rock fragments were mixed with organic materials to form soil.

Soil forms near the earth's surface in definable layers called horizons. Each horizon differs in terms of mineral and organic content, thickness, and structural composition. Collectively soil horizons make up the soil profile. The characteristics of the soil profile at any given location reflect the influence of: 1) the geology; 2) climate; 3) vegetation; 4) topography; and 5) time.

The number of horizons in a soil profile, their thickness, the texture (relative amounts of stone, gravel, sand, silt, and clay), and other physical and chemical characteristics of soils allow their identification and classification. Certain properties of individual soil types influence their proper use and management. Important properties of soils include: permeability, compaction characteristics, shear strength, shrink swell potential, plasticity, salinity, susceptibility to erosion, corrosiveness, and amount and type of cementation.

The United States Department of Agriculture, Soil Conservation Service, has mapped the location of soils throughout Maricopa County. They also identified the significant properties of these soils as they relate to urban development and soil management. The Soil Conservation Service has determined the limitations of specific soils for septic tank absorption fields, sewage lagoons, sanitary landfills, excavations, ponds and reservoirs, dikes and levees, roads, construction, and crop yield and irrigation practices. This information is often used by engineers, developers, farmers, and land planners as a guide to local soil conditions.

Study Area Soils

The soil associations in Desert Foothills are listed in Table 1. A soil association represents a combination of different soils that occur in recognized repeating patterns. It does not show the type of soil at any particular location, since soil depth, rock material,

TABLE 1

SOIL ASSOCIATIONS

ASSOCIATION NAME	PERCENT OF STUDY AREA	SQUARE MILES
Gilman-Estrella-Avondale	4.0	13
Carefree-Beardsley-Sun City	1.2	4
Sun City-Cavelt	0.3	1
Antho-Tremant-Pinamt	13.0	42
Ebon-Pinamt-Tremant	41.5	134
Cherioni-Gachado Rock Outcrop	14.9	48
Gran Usery Rock Outcrop	17.6	57
Cellar-Lehman-Camborthids Rock Outcrop	3.1	10
Torrifluvents	2.2	7
Rillito-Gunsight-Pinal	2.2	7
TOTAL	100.0	323

Source: Maricopa County Planning Department, 1979

TABLE 2

DESERT FOOTHILLS SOIL ASSOCIATIONS

1. Gilman-Estrella-Avondale This association consists of deep, well drained, moderately permeable coarse to fine-loamy soils formed in mixed recent alluvium on floodplains, low terraces, and alluvial fans.

2. Carefree-Beardsley-Sun City This association consists of very shallow to deep, well drained, very slowly permeable clayey and fine-loamy soils formed in mixed alluvium on fans and terraces. A hard cemented pan occurs in the Beardsley soils at 20"-40", and in the Sun City soils at 8"-20".

3. Sun City-Cavelt This association consists of very shallow to shallow, well drained, slowly to moderately permeable loamy to fine-loamy soils (with a lime cemented hardpan within 20" in the Cavelt soils) formed in mixed alluvium on old fans and terraces. A cemented hard pan occurs at 10"-46" in the Cavelt soils, and at 8"-20" in the Suncity soils.

4. Antho-Tremant-Pinamt This association consists of deep, well drained, moderately slowly to moderately rapidly permeable coarse-loamy, fine loamy, and loamy skeletal soils formed in granitic and mixed alluvium on old fans, floodplains, and low terraces.

5. Ebon-Pinamt-Tremant This association consists of deep, well drained, slowly to moderately permeable fine-loamy, loamy-skeletal, and clayey-skeletal soils formed in old mixed alluvium on old fans.

6. Cherioni-Gachado-Rock-Outcrop This association consists of shallow, well drained, slowly permeable loamy skeletal soils formed in residuum from volcanic rocks on low hills and the toe slopes of hills and mountains. At about 9" there is a duripan resting on andesite, basalt or conglomerate bedrock.

7. Gran-Usery-Rock Outcrop This association consists of shallow to moderately deep, well drained, slowly permeable gravelly clay and gravelly loam soils on nearly level to very steep mountain slopes over highly weathered granite bedrock.

8. Cellar-Lehman-Camborthids-Rock Outcrop This association consists of shallow, gently sloping very steeply sloping, very rocky sand loamy to very gravelly clayey soils forming on granite hills. There are large outcropings of bedrock.

9. Torrifluvents This association is highly varied in its makeup, and is composed of recent alluvium in river bottoms and creeks.

10. Rillito-Gunsight-Pinal This association consists of shallow to deep, well drained, moderately permeable coarse loamy to loamy-skeletal soils formed in old mixed alluvium on fans and terraces. A hard cemented pan exists in the Pinal soils at a depth of 8"-20".

Source: Maricopa County Department of Planning and Development, 1977

TABLE 3

SOIL LIMITATIONS

	ASSOCIATION NAME		SEPTIC TANK ABSORBTION FIELDS	SEWAGE LAGOONS	SANITARY LANDFILLS	DWELLINGS WITHOUT BASEMENTS	N.IR	IR.	RECREATION POTENTIAL
1	Gilman-estrella-Avondale (50-10-10)**	*	+ pm	+ sg;S:fd	* M:fd	+ ss,ls;S:fd	7	2	+ td,tc
2	Carefree-Beardsley-Sun City (60-25-10)	x	x cp,ps	+ ss;S:cp	x cp,tc,A=L	x ss,ls	7	na	x tc,td,st,ps
3	Sun City-Cavelt (60-25)	+	x cp,ps	x cp	x cp	x cp,sl	7	na	x st,sl
4	Antho-Tremant-Pinamt (40-25-20)	*	* M:15+sp,fd	x sg,st	x sg;A=M:sg	* M:8+sp;S:fd	7	2*	+ st,ts,tc
5	Ebon-Pinamt-Tremant (32-20-16)	*	+ ps	x sg,st	x tc,st,sg	+ ss,ls	7	2*	x st
6	Cherioni-Gachado-Rock Outcrop (35-15-35)	*	x dr,ps	x sl,cp	x dr;A=L	x dr	7	na	x cs,coarse grvl, M:picnic, trails
7	Gran-Usery-Rock Outcrop (35-35-20)	*	x dr,sp	dr,sp	dr;A=L	x dr	7	na	x
8	Cellar-Lehman-Camborthids-Rock Outcrop (30-20-20-30)	*	x dr,p,sp	x dr,sp	x sp,dr,lt	x dr,sp	7	na	x sp,st,ps

* Becomes less suitable easily with changes in slope.
** The percentages of the soils that make up the association. If the sum is less than 100%, the rest of the association is of soils other than those mentioned in the association name.

Explanation of the symbols used in this table:
A-area type landfill (trench type is described first); bs-blowing soil: cf-coarse fragments; cp-cemented pan; cs-cobble on surface; dr-depth to rock; fd-floods; L-slight limitations; ls-low strength; lt-large stones; M-moderate limitation; pm-permeability; ps-perks slowly; S-severe limitation; sg-seepage; sl-shallow; sp-slope; ss-shrink/swell; st-small stones; tc-too clayey; td-too dusty; ts-too sandy. All references such as 8-10, 15+, etc. are references to slope.

* SLIGHT LIMITATION (with shrink/swell-LOW)
\+ MODERATE LIMITATION (with shrink/swell-MODERATE)
x SEVERE LIMITATION (with shrink/swell-HIGH)

Source: Maricopa County Planning and Development, 1977.

slope and other characteristics often change quickly over short distances. However, Soil Associations do indicate broad patterns of soil development which are associated with major landforms.

The major soil within the area is Ebon-Pinamt-Tremant. Ebon soils are characterized as stony (55-85%), clayey (20-60%), with significant slope, and they restrict development. Permeability is slow, runoff is medium, and the erosion hazard is slight to moderate. The shrink-swell factor is moderate for dwellings with or without basements. This means that cracks will probably develop in new buildings. These cracks, while not dangerous, can be a nuisance to the homeowner. See Table 2.

Soil Limitations

It is beyond the scope of the report to attempt to identify the suitability of soils within the Desert Foothills area for all potential land uses. Instead, the limitations that local soils pose for septic tank fields, and construction are representative of soil conditions within the area. See Table 3.

Limitations To Development

The location of soils which pose potential constraints to the use of septic tanks and construction of residential dwelling units is shown in Map 5. The severity of the constraints has been classified into three categories - slight, moderate, and severe. These are defined as follows:

Slight: Few or no limitations to use.

Moderate: Limitations exist which reduce the desirability of the soil for the specified use. The cost of corrective measures and careful planning, design, and management are important considerations.

Severe: Properties or features are present which make these soils undesireable for the specified use. Limitations are serious enough that the cost of overcoming them may be too high to justify the intended use.

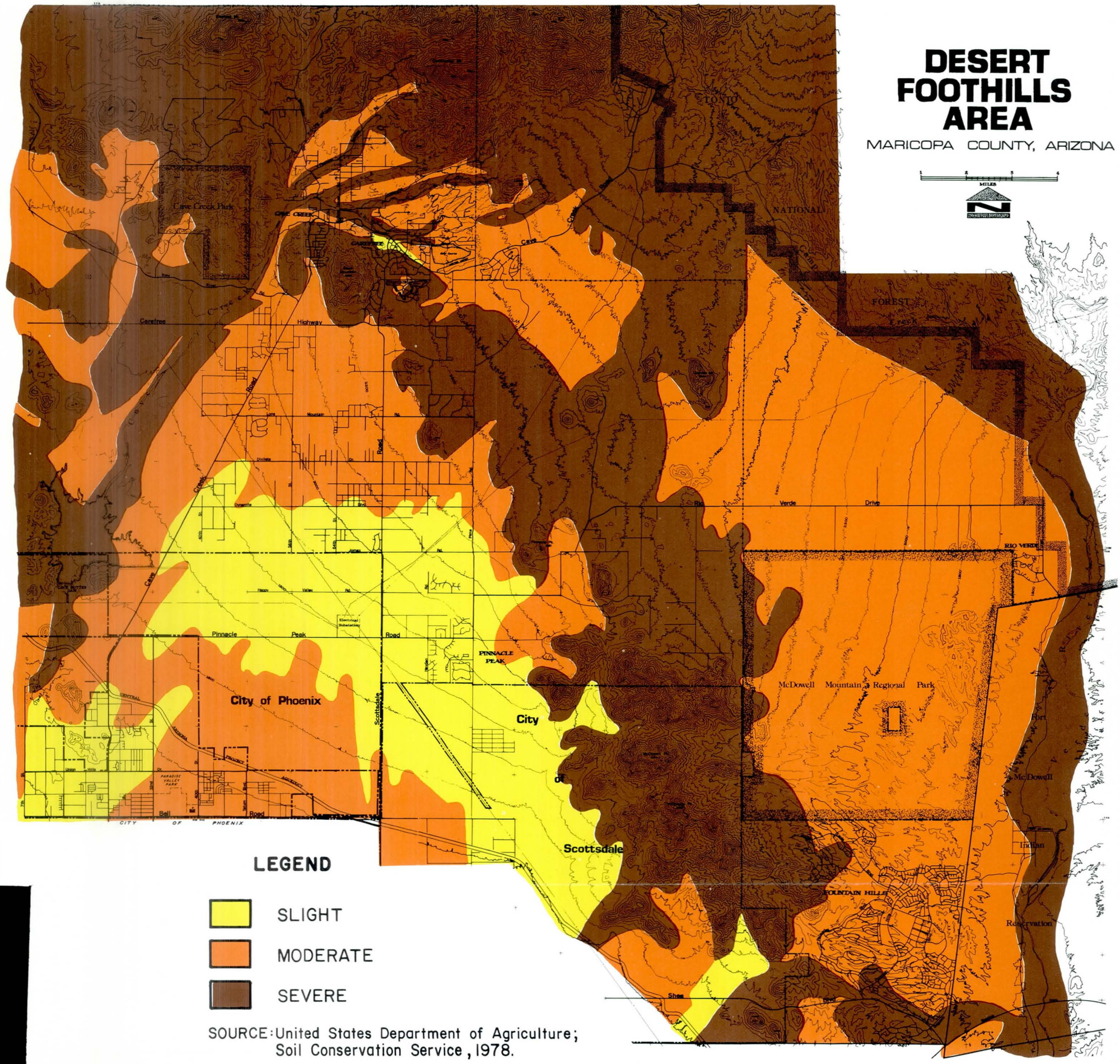
Development Limitations for building construction and septic systems include impermeable soils, the presence of caliche, flooding hazards, shallow bedrock, shrink-swell potential and steep slopes. (SCS, 1977). Map 5 represents the Soil Conservation Services assessment of a soil's ability to support urban development. This map should prove useful as a general guide to soil constraints in the Desert Foothills. Individual sites may vary and specific soil investigations are recommended prior to development (SCS, 1977).

Agricultural Suitability

While some of the soils in the Desert Foothills area may have potential for agricultural uses there are serious constraints. Areas covered by rock outcrops, slopes over 5%, and flooding

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



LEGEND

- SLIGHT
- MODERATE
- SEVERE

SOURCE: United States Department of Agriculture; Soil Conservation Service, 1978.

SOIL LIMITATIONS

MAP 5

problems all reduce the agricultural potential of the Foothills. The greatest constraint is water. A dependable water supply of sufficient quality and quantity is not available for irrigated agriculture. Unless state water laws are amended the Desert Foothills have little potential for agriculture.

V

CLIMATE

CHAPTER V

CLIMATE

The semi-arid climate of the Desert Foothills is characterized by low annual rainfall and humidity. Daytime temperatures are extreme throughout the summer months. The winters are mild and sunny, although nighttime temperatures may drop below freezing during the coldest months. Gentle winds prevail, with occasional summer thunderstorms. Overall the climate in the Foothills is more mild and a little wetter than in Phoenix. The area is sometimes referred to as the green part of the County.

Temperature

Temperature data for the study area is recorded at the Carefree Weather Station. Average monthly temperature extremes at this location are shown in Figure 2. Carefree is usually about 5° F cooler than the rest of the County.

Daytime temperatures reach or exceed 90° or above about 139 days each year. From early June until mid-September the average daily maximum temperature exceeds 95° F although temperatures above 105° F are uncommon. Average nighttime lows during the summer range from the mid 60's to the mid 70's. The warmest month is July.

From November through March the average daily maximum temperatures range from the high 60's to the low 70's, although temperatures above 80° F do occur. During the winter months the average nighttime lows range from the mid 30's to the low 40's. An average of 16 days each year reach minimum temperatures of freezing or below. Temperatures below zero have never been recorded. The coldest months are usually December and January.

Transitional periods between the heat of summer and the coolness of winter generally occur between September and November and March and May, Freezing temperatures normally do not occur before the last part of November or later than the first part of March. Temperatures above 105° F have never occurred earlier than the end of May or later than the middle of September.

Daily maximum and minimum temperatures can differ as much as 30° F. The greatest fluctuations occur in late spring and early summer when the air is dry. The least fluctuation occurs during the warmest and the coldest months of July and August and December and January respectively (NOAA, 1976).

Precipitation

Precipitation within the study area averages 12 inches annually. However, as in all desert climates, this amount is highly variable. Since 1961, annual precipitation at the Carefree Weather Station has ranged from less than 9 inches to over 21 inches. (See Figure 2.)

Monthly precipitation averages recorded at the Carefree Station are shown in Figure 2.

Most precipitation occurs in two seasons. The first is from November to March when the area is subjected to winter storms from the Pacific Ocean. During the winter months cloudy skies and intermittent showers can continue for several days. At other times, the area may have little precipitation until spring. Snowfall is rare, but light falls do occasionally occur in the mountains above 2,500 feet. (U.S.D.A., 1977, p. 114).

The second period occurs in July, August, and September when the area experiences thunderstorms caused by moist air moving into Arizona from the Gulf of Mexico or the Gulf of California. These storms usually occur between 8 p.m. and midnight and are extremely variable in their intensity and location. Summer thunderstorms often produce substantial amounts of rainfall in short periods of time. On the average, August has more precipitation than any other month of the year. (U.S.D.I., 1977, p. 114).

In Arizona, winter storms are most severe in the higher elevations of the regional watersheds. When combined with snow melt, they can create a high flood potential for the Cave Creek Wash and Verde Rivers. Summer thunderstorms may cause localized drainage problems due to the large rains which occur in short periods. Of course any intense storm may cause flooding.

Humidity

In Arizona the relative humidity fluctuates throughout the day. The highest readings occur around sunrise while the lowest are recorded during the early evening.

Maricopa County enjoys a low average annual relative humidity. Relative humidity readings taken at Phoenix Sky Harbor Airport, located approximately 20 miles southwest of the study area are presented in Figure 2. Relative humidity is not recorded at the Carefree Weather Station.

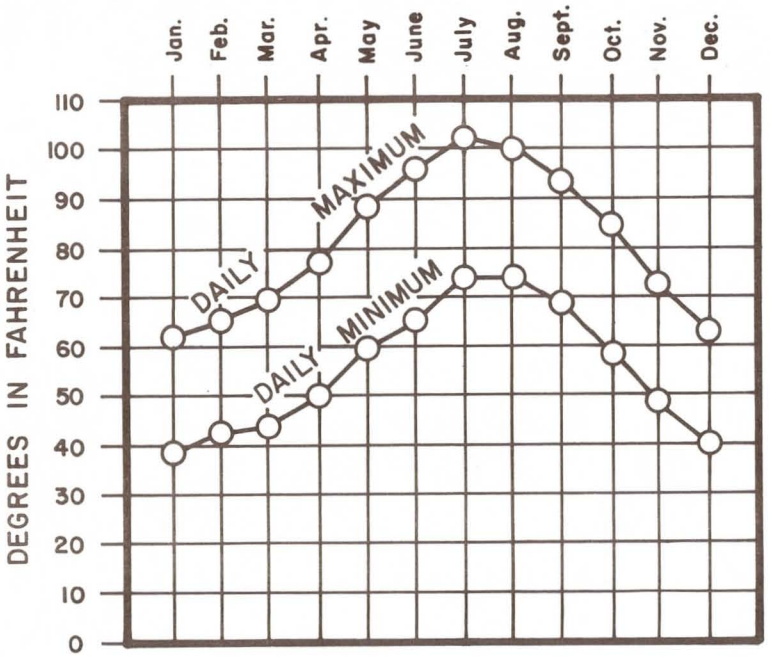
Relative humidity is highest during the winter months. It drops considerably during the warmer, drier months of March, April, May, and June. Summer rains temporarily increase the relative humidity during July and August, but it is still much lower than for the December-January period.

The maximum relative humidity ranges from 68% in December to about 35% in May and June. Minimum readings range from 34% in December to 12% in May and June. Overall monthly averages range from a high of 52% in December to a low of about 21% in May and June.

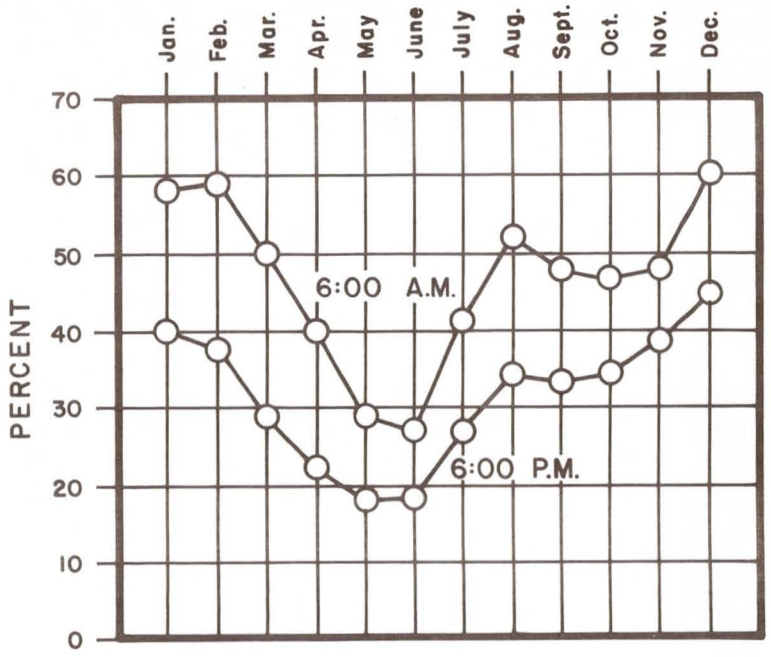
FIGURE 2

SUMMARY OF CLIMATE

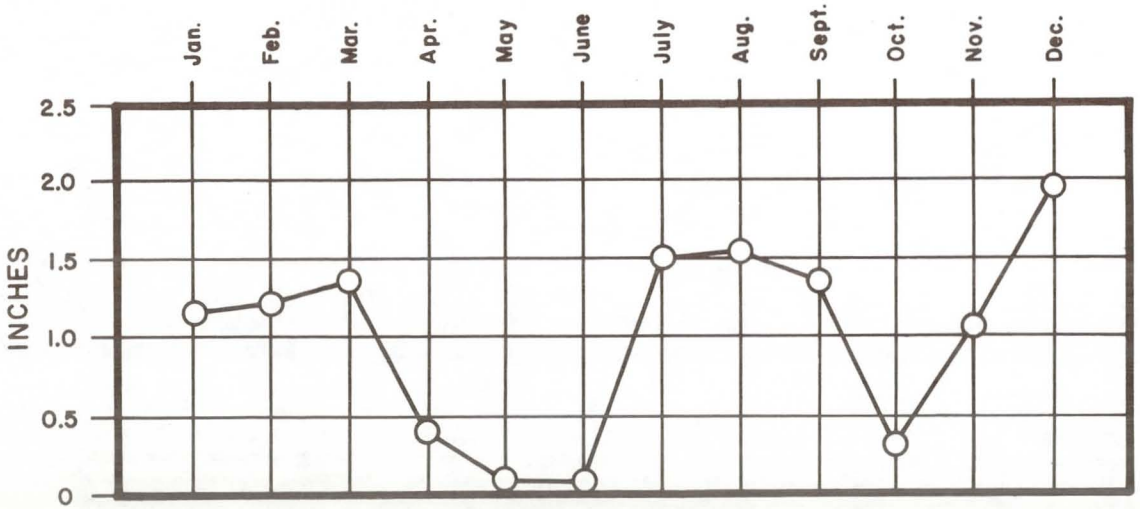
CAREFREE WEATHER STATION MEANS, 1961-1972



TEMPERATURE



HUMIDITY



PRECIPITATION

SOURCE: National Oceanic and Atmospheric Administration, 1981.

Wind

Local windflows in Maricopa County are controlled by the daily heating and cooling of the earth's surface. As the sun rises in the morning, east facing mountain slopes are heated causing the air to flow. In turn, south facing and west facing slopes become heated and change the direction of air flow throughout the day. The slopes cool after sunset causing the surrounding air to cool and flow downhill.

Within the Foothills, the daily "mountain-valley wind shift" is controlled by the orientation of local slopes. Usually, wind direction alternates between north and south throughout the Foothills though the regional patterns are greatly modified by local conditions. Regional alterations in wind flows result from the low pressure systems which cross the state in the winter and spring months and by thunderstorms in the summer season. (ASU, 1978, p. 66).

Light winds prevail throughout the Central Maricopa County averaging 6 1/2 miles per hour annually at Sky Harbor Airport in Phoenix. The highest daytime velocities are normally reported in the spring while the strongest nighttime winds occur in midsummer. Peak gusts seldom exceed 50 miles per hour. The strong gusting winds which frequently preceed summer thunderstorms are often accompanied by blowing dust. (NOAA, 1979).

"Dust devils" or "thermals" are common throughout the area especially during the late spring and summer months when they form over the hot desert floor . These "miniature tornadoes" are the result of local differential heating. Although normally harmless spires of dust, some do cause minor damage.

Wind damage in Maricopa County is slight compared to that found in the tornado and hurricane belts in the midwest, east, and southeastern portions of the United States. Tornadoes and damaging windstorms have occurred, however, this is not considered a high risk area.

Sunshine

Arizona is seldom affected by persistent cloud cover and receives more sunshine than any other part of the United States (ASU, 1978, p. 34). The Phoenix area receives over 80% of the average annual sunshine possible. Smaller percentages of sunshine are received during the rainy seasons than during the drier months. The minimum monthly average is 77% in December and the maximum is 94% in June. (U.S.D.A., S.C.S., 1977, p. 115).

Evaporation

In desert climates with low humidity and rainfall the evaporation of water from soils and water bodies is substantial. The average evaporation rate from water bodies is six (6) acre feet per year. Understandably, the maximum amount of evaporation occurs during the summer months. (Arizona Water Commission, Phase 1, 1975).

VI

DRAINAGE

CHAPTER VI

DRAINAGE

General Drainage Characteristics

The Desert Foothills area contains three drainage basins: the Cave Creek basin, the Indian Bend Wash basin, and the Verde River basin. Both the Cave Creek and Indian Bend Wash basins are found west of the McDowell Mountains and flow southwest. The Verde River basin on the east side of the McDowells drains to south and east toward the Verde River.

The Cave Creek drainage basin is the largest in the Foothills. Runoff from the north collects in well defined washes and drains southwest in Cave Creek Wash to Cave Buttes Dam. The Cave Creek drainage basin occupies 138 square miles of the Foothills. Elevations in the basin range from 4,900 feet to 1,230 feet.

The Indian Bend Wash basin originates in the McDowell Mountains immediately east and south of the Cave Creek basin. The Indian Bend Basin contains many small washes which carry sheets of water runoff south across the alluvial valley to the CAP.

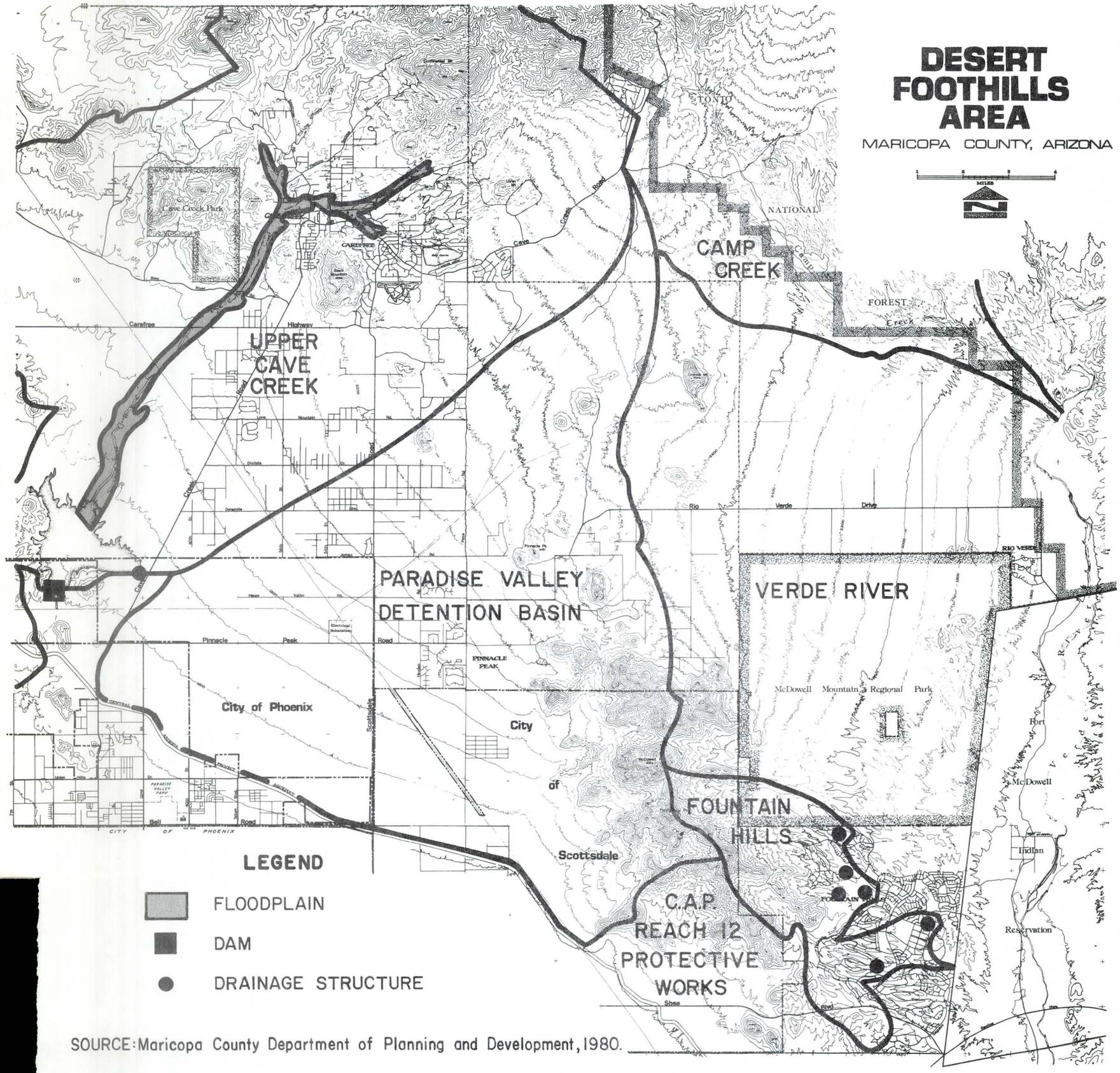
The eastern side of the McDowells drain into the Verde River Basin which flows almost due south from the Bartlett Reservoir to its confluence with the Salt River.

In the Desert Foothills drainage problems are the result of rain from short, intense thunderstorms or gentle rain falling continuously for several days. Several drainage control structures were erected to control stormwater runoff. The location of the major structures are shown on Map 6.

Cave Buttes Dam

The Cave Buttes Dam, was completed in 1979 as a project of the Army Corps of Engineers. It is a major element of the New River and Phoenix flood control and recreation program. The dam is maintained and operated by the Maricopa County Flood Control District. The dam is a rolled earthfilled structure with a length of 2,275 feet, a height of 109 feet and a width of 20 feet. The Cave Buttes Dam provides protection for 32,100 acres of land downstream including downtown Phoenix.

Cave Buttes Dam has a storage capacity of 46,600 acre feet on 1,820 acres of land. The design and storage capacity is sufficient to handle a 100 year flood. No permanent pool of water will be retained in the dam reservoir, but in the event of a 100 year flood it would take 48 days to empty the reservoir.



SOURCE: Maricopa County Department of Planning and Development, 1980.

GENERALIZED DRAINAGE

MAP 6

The reservoir area can be used for recreation. Proposed uses for the reservoir include group camping, picnicking, equestrian riding and training, field dog activities, and hiking and riding trails. (New River and Phoenix Stream Design Memorandum No. 4). Further discussion of the recreational aspects of the project is included in Chapter XIII Community Facilities.

Cave Creek Dam

The present Cave Creek Dam was built in 1923 as the result of the 1921 flood which swept through Phoenix and flooded the State Capital. Cave Creek Dam, located north of Cave Buttes Dam, consists of 38 reinforced concrete arches and stands 52 feet above the ground. The dam originally had a storage capacity of 14,000 acre feet.

Although the old Cave Creek Dam is within new Cave Buttes reservoir the dam will not be removed. The dam will be retained as a historical landmark and it has been nominated for the National Register of Historical Places.

Central Arizona Project Paradise Valley Flood Detention Dikes

The Bureau of Reclamation completed construction of the Paradise Valley flood detention dikes in 1977. This effort by the Bureau of Reclamation was part of the protective works for the Granite Reef Aqueduct's 13 mile long Reach 11. The dikes stretch from Cave Creek Road southeasterly to the west slope of the McDowell Mountains west of 108th Street.

The dikes have varying side slopes to give an irregular appearance with an average base width of 230 feet. The dikes have a maximum height of 36 feet and average crest width of 14 feet. The height of the structure was calculated by combining the accumulated volume of 100 years of sediment with two major floods. This will allow the dike to retain water under the most severe conditions.

The right-of-way acquisition for the Flood Detention Dikes accomodates flooding under the most severe conditions. The width of the temporary water basin created by flooding ranges from 1,000 feet to 2,500 feet. The original dike design was changed to allow for projected upstream development. (Granite Reef Aqueduct Final EIS)

Other Drainage Improvements

The Fountain Hills Master Drainage Plan includes seven flood control structures on major washes within the development. The structures are designed to control the downstream flow on washes as they flow to the southeast toward the Verde River. Six of the structures have been built with the seventh, located south of Shea Boulevard dependent on future development. See Map 6. The drainage problems associated with development in mountainous areas are compounded as runoff volumes increase. The streets of developments in these areas often carry substantial water runoff. This can create hazards under the flash floods common to the area.

VII

WATER RESOURCES

CHAPTER VII.

WATER RESOURCES

Introduction

Access to adequate water resources is critical for urban growth and development in Maricopa County. The quantity, quality, distribution and cost of water is of special concern in an arid environment. This chapter addresses the quantity, quality, and distribution of water resources within the study area.

The primary source of water within the Desert Foothills area, and within Maricopa County generally is groundwater. These underground reserves are supplemented by natural river flows, treated wastewater, and limited groundwater imports which are used for irrigation.

Water distribution within the Desert Foothills is by private domestic water franchises. Private wells also provide both domestic and irrigation water to individual parcels. Water franchises are discussed in Chapter XIII Community Facilities.

Subsurface Geology

The Desert Foothills is underlaid by alluvium which is the principal source of groundwater. The underlying bedrock is essentially non-water bearing and provides only localized supplies of groundwater of limited quality.

The alluvial deposits vary in thickness from 0 feet along the base of the mountains to an estimated 5,100 feet in Paradise Valley, west of the study area. In places the alluvial deposits may be as much as 10,000 feet thick. Bedrock has been reported in wells logs in the area. An oil test well located in T4N, R4E, penetrated bedrock at a depth of 5,150 feet, while a water test well in Section 2 T3N, R4E, outside the Foothills logged bedrock at a depth of 3,270 feet. (U.S.D.I. page 40).

Three layers of alluvial deposits have been identified in the basin: 1) an upper alluvial unit, 2) a middle fine-grained unit, and 3) the lower conglomerate unit. Each has separate aquifer or water carrying characteristics.

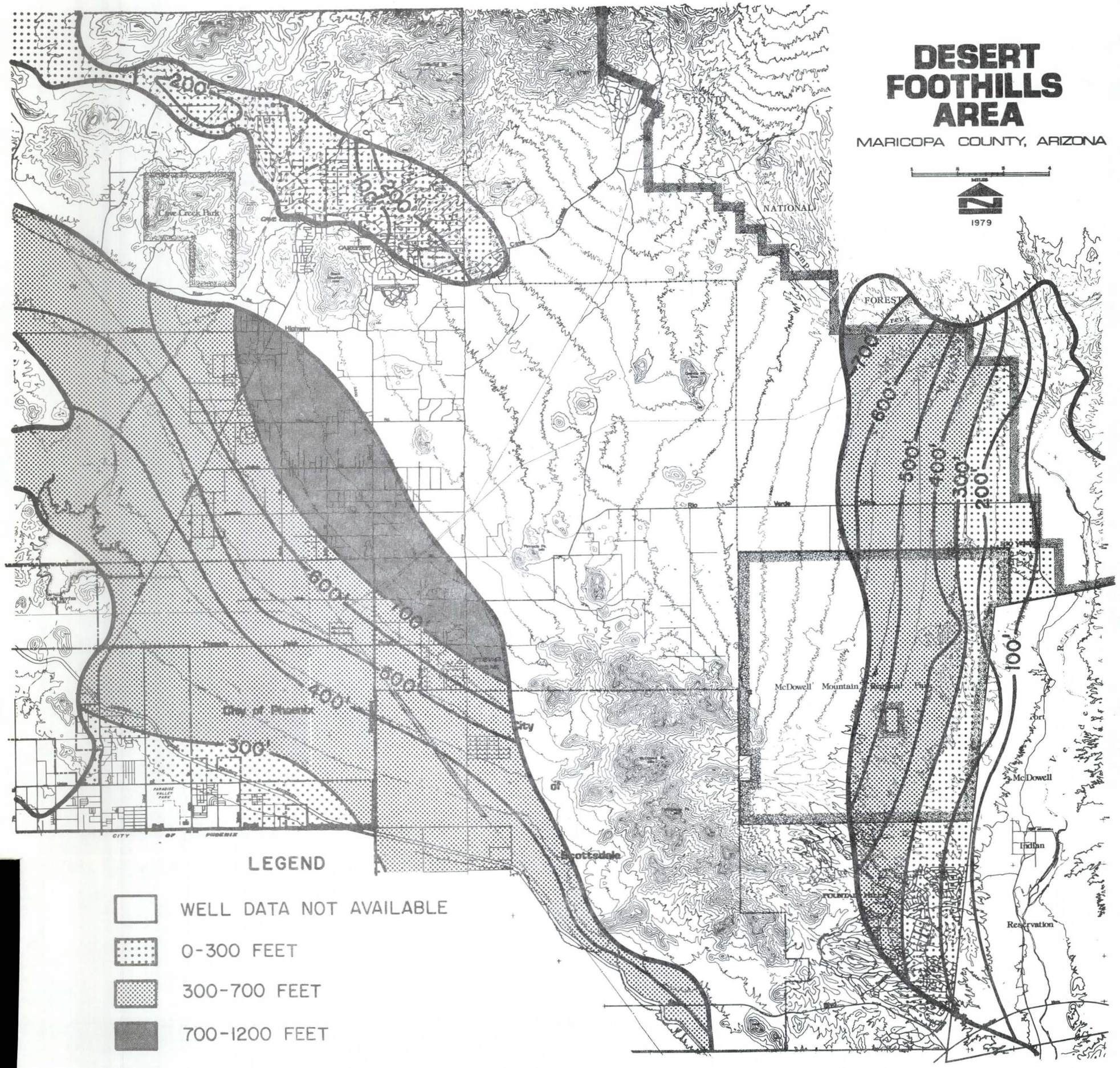
The upper alluvial unit is the major source of groundwater. The sedimentary deposits in this layer are generally unconsolidated and groundwater is unconfined although confined or perched conditions may occur locally. This layer ranges in thickness from 0 feet at the edges of the basin to over 1,100 feet outside the study area. (U.S.D.I., 1976, p. 40).

The middle fine grained unit separates the two main water-bearing units and acts as a barrier. The sedimentary deposits in this layer are highly impermeable and impede the flow of groundwater. Groundwater in this unit generally occurs under confined or semi-confined conditions. Thickness of this unit ranges from 0 feet near the edges of the basin to 2,000 feet or more outside the study area.

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA

1979



SOURCE: Osterkamp, U.S.G.S. Folio Map I-845-D, 1973.

DEPTH TO WATER IN WELLS

MAP 7

The middle fine grained unit is characterized by fine sand and silty clay upper section, a mid section with silt, clay, and evaporites, and a lower section made up primarily of evaporites. The evaporites reported include selemite, gypsum, and anhydrite. Groundwater in this unit is often too salty for any use.

The lower conglomerate unit also contains groundwater. Groundwater is confined where the middle fine grained unit overlies the lower conglomerate unit. Where the fine grained unit is missing, only one body is recognized. At the southeast portion of the study area an older conglomerate of Cretaceous - Tertiary age has been identified. Some wells in the older conglomerate are an important source of groundwater. The thickness of this unit ranges from 0 feet to 2,000 feet or more, the thickest sections occur in the deep portion of the basin outside the area.

Depth To Groundwater

The water table within Desert Foothills ranges from less than 100 feet near the Cave Creek/Verde River to over 800 feet deep northwest of the McDowell Mountains. The depth to water in 1977 is shown on Map 7.

A depth of 1,200 feet is considered to be the economic maximum for municipal wells. (Arizona Water Plan, Phase I, p. 54). These limits are dictated by pumping costs and pump efficiencies. The practical depth may depend on well construction, acquifer yields, and water quality and vary from area to area as shown in Table 4.

Seasonal changes in pumping rates cause local fluctuations in groundwater levels. Generally, there is a temporary decline from a spring peak to a fall low with subsequent recovery the following spring. Both seasonal and long term fluctuations also respond to wet and dry climatic cycles. Recharge from occasional stream flow can increase the groundwater level in localized wells.

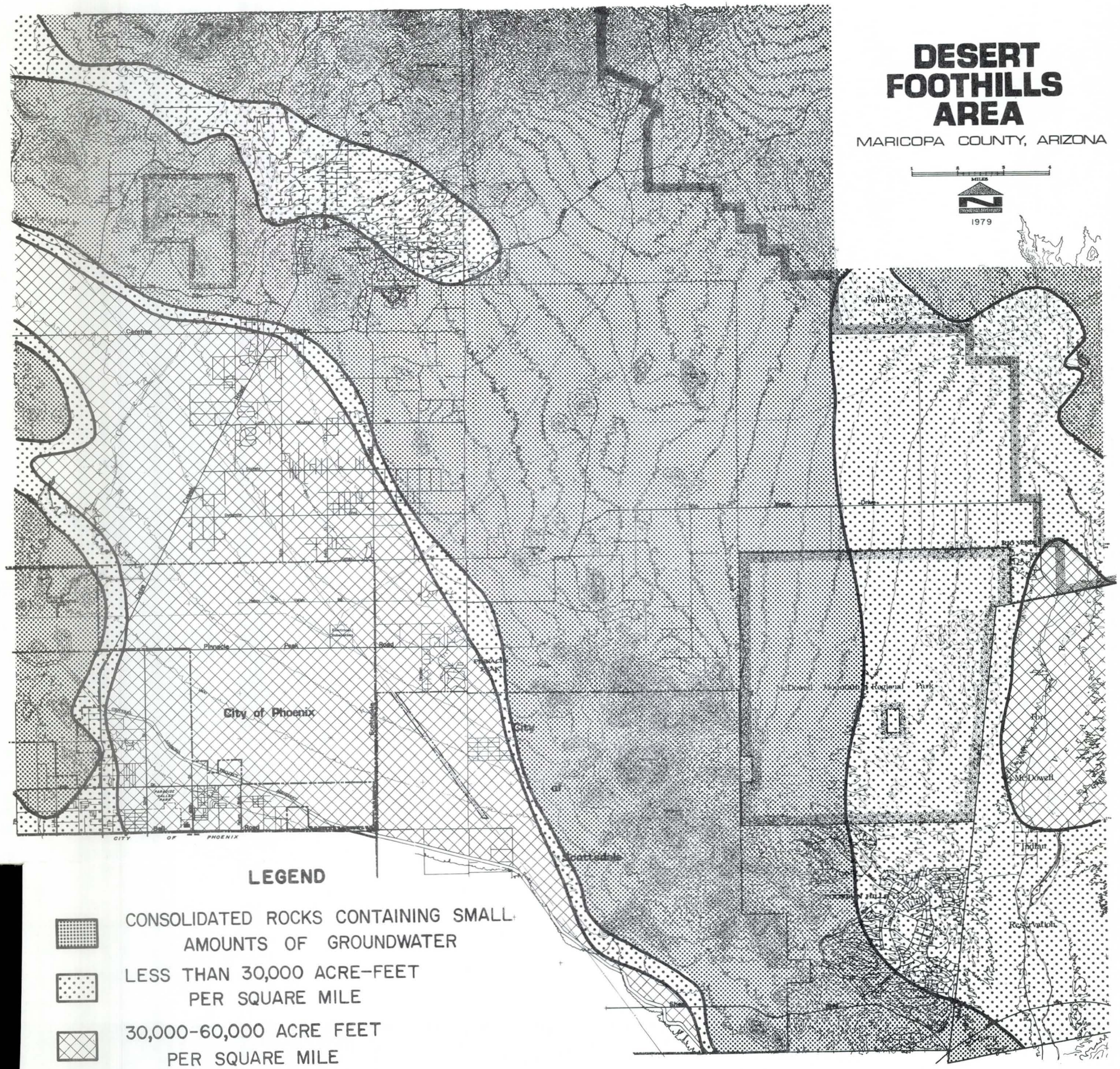
Distribution of Recoverable Groundwater

In 1976, the USGS estimated that 4 million acre feet of recoverable groundwater was available beneath Desert Foothills. Although substantial groundwater is present, its distribution and depth vary widely. The overall distribution of groundwater reserves is shown on Map 8.

These estimates are useful for comparison, however, they should not be considered to be site specific because they contain assumptions which do not necessarily reflect local conditions. The assumptions are: 1) that the Desert Foothills Area is a closed basin and does not receive subsurface inflow or surface recharge; 2) that the geologic conditions and groundwater storage are similar throughout the Desert Foothills; 3) that well recharge areas are limited to the subarea.

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



LEGEND

- CONSOLIDATED ROCKS CONTAINING SMALL AMOUNTS OF GROUNDWATER
- LESS THAN 30,000 ACRE-FEET PER SQUARE MILE
- 30,000-60,000 ACRE FEET PER SQUARE MILE

SOURCE: Osterkamp & Ross, U.S.G.S. Folio Map I-845-K, 1976.

DISTRIBUTION OF RECOVERABLE GROUNDWATER

MAP 8

In 1973, groundwater in storage ranged from 30,000 acre feet per square mile to 60,000 acre feet per square mile. Only 3% of the stored groundwater is less than 300 feet below the surface. Approximately 36% is located between 300 feet and 700 feet and roughly 61% is between 700 feet and 1,200 feet in depth. The most important shallow reserves are located in the Cave Creek basin, adjacent to the Verde River, and along the Central Arizona Project between Cave Creek Road and Scottsdale Road.

TABLE 4

WELL CHARACTERISTICS BY SUBAREA

SUBAREA	NUMBER WELLS IN STUDY	AVERAGE DEPTH in feet	TOTAL Yield GPM
Carefree	14	383.4	917
Cave Creek	28	207.8	1,951
Fountain Hills	5	732.0	8,970
Lone Mountain	5	984.0	2,972
Northeast	2	513.5	26
Phoenix	1	1,285.0	55
Pinnacle Peak	2	900.0	411
Rio Verde	3	713.0	2,359

An Introduction to Groundwater Quality

The quality of water limits its usefulness and affects the cost. Most water can be treated to make it useful for some purpose. However, the cost and feasibility of overcoming severe water problems can be prohibitively expensive.

All water users can tolerate some impurities. The standards of quality required for different uses varies. Certain contaminants that might make water undesireable for human consumption may still be permitted for irrigation or industrial purposes. Poor quality water can be diluted with water from other sources to allow its use without costly treatment.

Contaminants

Groundwater quality can be affected by inorganic, organic, microbiologic, and radiological contaminants from either natural or man-made sources. Within the Desert Foothills, the most important threats to water quality are natural inorganic contaminants. The long term application of irrigation water, particularly from sewage effluent, and other man-made influences, may be of future concern. Both Phoenix and Scottsdale were forced to close wells that are contaminated from what many believe is a man-made source.

Domestic Water

The U.S. Environmental Protection Agency (EPA) and the Arizona Department of Health regulations set standards for domestic water supplies. These standards limit contaminants which can be a health hazard. Two regulated inorganic chemical contaminants are fluoride and nitrate. Both were identified in groundwater within the Desert Foothills study area.

Small amounts of flouride in drinking water strengthens teeth and helps prevent tooth decay. When ingested by children in sufficient quantities, however, flouride can cause the mottling of teeth. Excessive concentrations of nitrate can cause methemoglobinemia or cyanosis in infants. (Osterkamp, 1974). The maximum contaminant level for fluorides is 1.4 milligrams per litre for the Phoenix area. The standard for nitrates is 10.0 milligrams per litre. (MAG Schmidt, 1978).

Also, significant levels of total dissolved solids (TSD) are found in groundwater in portions of the area. TDS refers to the quantity of salt or minerals in solution in water. While suspended minerals and other materials are normally found in all water, in high concentrations they can seriously affect water quality.

Water use can be limited by the concentration of dissolved solids, or by the type of salt and mineral solids in solution. Generally water that contains less than 500 mg/l of TDS is preferred for use as public drinking water. Water containing greater quantities of TDS is not harmful, however, treatment is required to overcome bad taste when concentrations exceed 1,000 mg/l (Kister, 1974).

Hardness is caused by calcium and magnesium in water. Hardness reduces the effectiveness of soap and causes incrustations on pipes, utensils, and appliances. While it is not considered a health hazard, water supplies that contain more than 150-170 mg/l of hardness would benefit from a softening system. (Osterkamp).

INDUSTRIAL USE

The effect of total dissolved solids and hardness on industrial uses varies. Most water can be made suitable for industrial uses. Nevertheless, the cost of treatment is the major limitation to industrial use, especially when extremely high water quality is required. (Kister, 1974).

Factors Affecting Groundwater Quality

There are four levels of groundwater quality found in the study area. From the surface to deepest point they include:

1. Shallow perched water bodies of poor quality in the upper alluvial unit;

2. The upper alluvial unit which contains unconfined poor quality water.

3. The middle fine grained unit containing semi-confined poor quality water; and

4. The lower conglomerate unit containing relatively good quality groundwater. (CAP p. 97).

Pumped well water is a blend of different quality water from various depths. Water enters a well from all sections of the shaft. Water pumped from a well is usually a mixture of good and poor quality water from all the rocks that the well shaft passes through. As a result of well water blending, water pumped from a well does not necessarily indicate water quality in the underlying basin.

Groundwater quality can be affected by depth, well yields, and pump discharge rates. The pumping rate affects both the water level and water quality in a well. It is possible to pump water out of a well faster than it can be replaced. When this occurs much of the last water pumped has a high mineral content which can create water quality problems. (MAG 208).

There are three natural causes of contaminated groundwater:

1) Contaminated surface water which sinks into the ground to become contaminated groundwater. Surface water can become contaminated as runoff flows over soils with a high salt or mineral content.

2) High salt or mineral content in the rocks overlying the water table. As water sinks through this zone the water can pick up minerals.

3) The geologic composition of the aquifer or water bearing zone itself. If minerals are present in rocks that hold water, the water from these rocks will have some of the characteristics of the surrounding geology.

Groundwater in the Desert Foothills area is often contaminated with fluorides, nitrates, alkalies, chromium, solids, calcium and magnesium. Map 9 shows the distribution of hardness within the study area as determined by Osterkamp in 1974. Map 10 shows the distribution of total dissolved solids (TDS) in 1965 as determined by Kister in 1974. Both maps are generalized and are not indications of groundwater quality in any particular well.

Among the contaminants which occasionally appear in local water supplies fluorides, dissolved solids and special chemicals are of greatest concern.

Fluorides

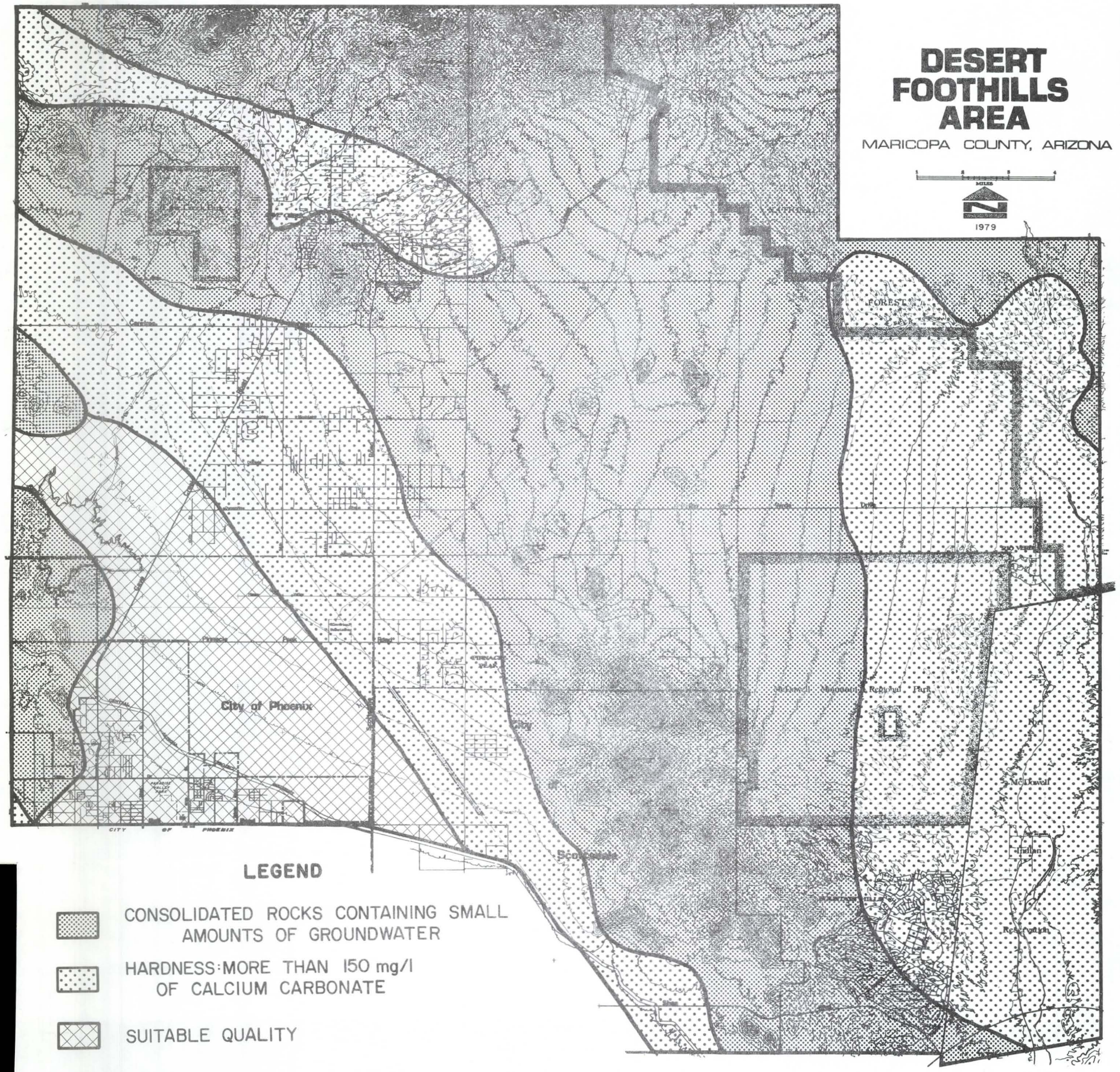
Safe fluroide concentrations in drinking water change with the average daily high air temperatures. The U.S. Public Health Service recommends that fluoride concentrations in the valley not exceed an upper limit of 1.4 mg/l with an optimum concentration of 0.7 mg/l (USPHS 1962). In the Desert Foothills, groundwater fluoride concentrations generally range from 0.3 to 1.2 mg/l with an average of about 0.8 mg/l. Fluoride concentrations as high as 5.8 mg/l were reported from wells in bedrock. No pattern of unsafe wells can be identified in the Desert Foothills. (Groundwater in Paradise Valley, Maricopa County, Arizona Arteaga, et. al., page 31, and Map 61-1-E).

Total Dissolved Solids

Most wells in the Desert Foothills yield water containing more than 600 mg/l of dissolved solids. This exceeds the 500 mg/l standard set by the U.S. Public Health Service. High levels of dissolved solids cause high hardness, alkalinity, and pH levels. While generally not a health hazard, high levels of dissolved solids cause incrustration in pipes and cooking utensils. Several methods are available commercially to remove dissolved solids from domestic water. (GWPVMCA p. 31 Arteaga).

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



LEGEND

- CONSOLIDATED ROCKS CONTAINING SMALL AMOUNTS OF GROUNDWATER
- HARDNESS: MORE THAN 150 mg/l OF CALCIUM CARBONATE
- SUITABLE QUALITY

SOURCE: Osterkamp, U.S.G.S. Folio Map I-845-F, 1974.

CHEMICAL QUALITY OF GROUNDWATER

MAP 9

Miscellaneous Chemicals

In the Desert Foothills, nearly all other chemical concentrations (copper, iron, manganese, arsenic, zinc, lead, silver, mercury, cadmium, and selenium), present no health problems. Only certain chromium concentrations are high and exceed the allowable limit of 0.5 mg/l. Wells having high chromium levels are located in T3N, R5E, Section 18, 19 just outside the Foothills. Chromium is the result of natural chromium present in the aquifer. Local conditions in the groundwater convert natural chromium in the rocks to water-soluble chromium which enters the groundwater. This form of chromium is a cumulative poison, and is a major potential health hazard. (Geological Investigation Services May, G1-1-e).

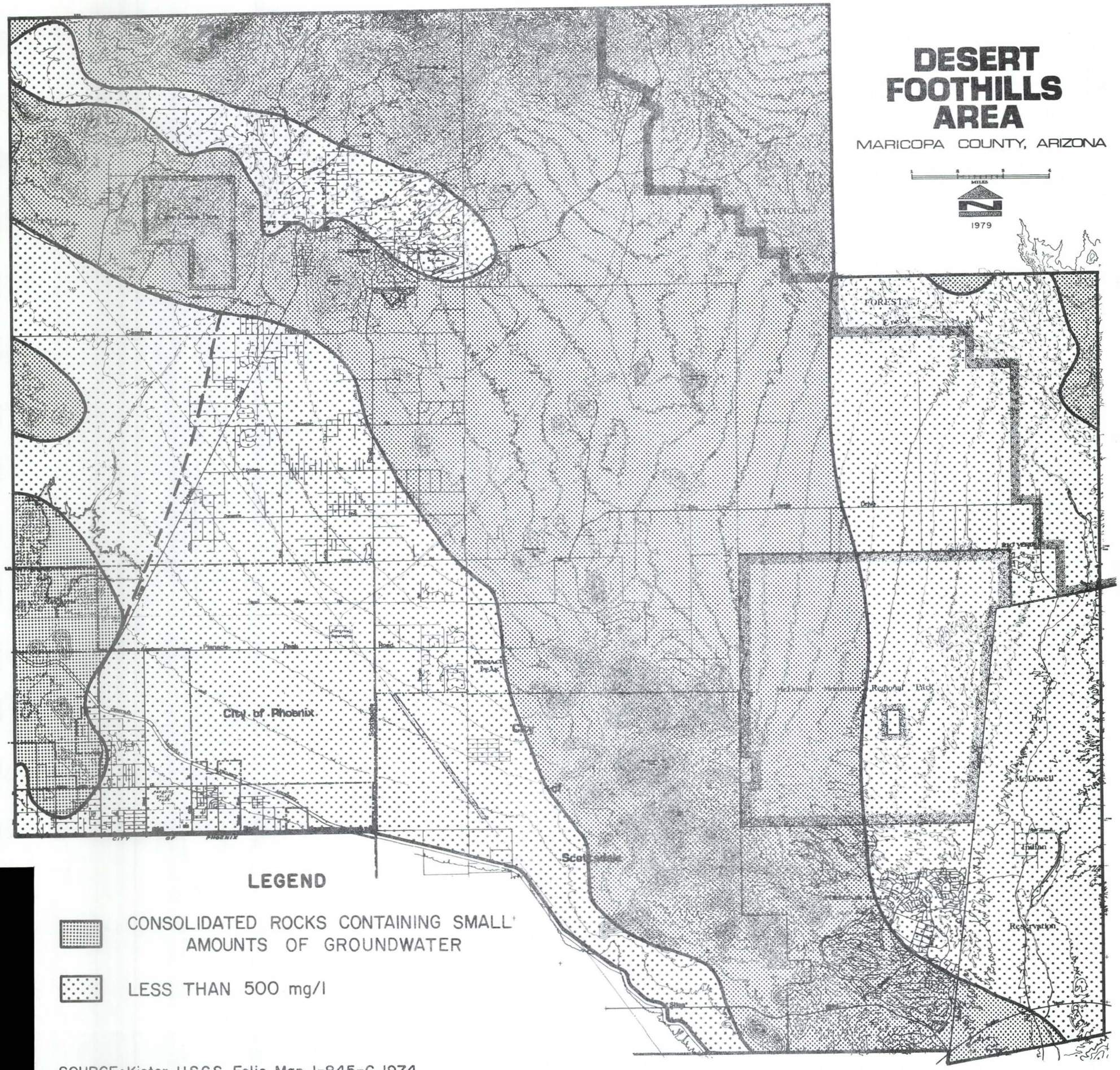
Groundwater Movement

Historically groundwater movement in the Desert Fothills generally followed the watershed with water originating in the north and slowly moving south toward the Salt River. Subsurface inflow was primarily from Cave Creek and the Granite Reef Dam. The Salt River drained the remaining subsurface outflow. (Central Arizona Project p. 42).

Over time, groundwater pumping for residential uses created a pumping trough north of the Salt River near Scottsdale along with a large cone of depression in Central Paradise Valley. While subsurface inflow into the area continues along Salt River and Cave Creek, subsurface outflow into the Phoenix-Buckeye area stopped. This evidence suggests that more ground water is pumped in the Foothills than is replaced. In addition, the water tables may drop in the Phoenix-Buckeye basin because subsurface inflows were eliminated. (Central Arizona Project, p. 43, 49. Unnamed sources p. 38).

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



LEGEND

CONSOLIDATED ROCKS CONTAINING SMALL AMOUNTS OF GROUNDWATER

LESS THAN 500 mg/l

SOURCE: Kister, U.S.G.S. Folio Map I-845-G, 1974.

DISSOLVED SOLIDS IN GROUNDWATER

MAP 10

Future Water Resources

The principle source of water within the foreseeable future will continue to be groundwater. However, the Central Arizona Project will have the potential to create significant long term impact in the area.

THE CENTRAL ARIZONA PROJECT

The Central Arizona Project will carry Colorado River Water from Lake Havasu to central and southern Arizona and could provide a major new source of water to the study area. The first deliveries to the Phoenix area from the Granite Reef Aqueduct are scheduled to take place in 1985.

The Arizona Water Commission estimates that a total dependable supply of 1.5 million acre-feet of water will be available annually to CAP contractors during the first years of operation. This amount will decrease to about 1.1 million acre feet per year by the year 2020 as the states on the upper Colorado River Basin develop their entitlements to Colorado River water and thus reduce the amount of water available to Arizona. (Arizona Water Commission, 1977, p. 15).

Water from the CAP must be allocated to the Indian Reservations as well as non-Indian municipal, industrial, and agricultural contractors in the project area. Naturally, all potential requests for CAP water cannot be satisfied. Indian Reservations have first right to CAP water. They are followed by municipal and industrial users. Non-Indian farmers have last right to CAP water.

The ultimate authority for allocation of CAP water rests with the U.S. Secretary of Interior. The final allocation of CAP water to individual service contractors has not been made. Consequently, the amount of water, if any, which will be available to the study area is not known at this time.

The CAP was envisioned as a means of utilizing Arizona's remaining entitlement to Colorado River Water and to minimize groundwater overdraft by substituting surface waters. Consequently, the use of CAP water is not unrestricted.

Federal requirements dictate that water delivered from the project for agriculture must be used on lands with a recent history of irrigation. Groundwater pumping for irrigation in the contractors service area must be reduced each year by an amount equal to the quantity of project water delivered that year. These provisions are intended to effectively restrict new agricultural development in CAP service areas. Thus, the use of non-Indian CAP water allocated for irrigation is to achieve a balance in the supply-demand groundwater reserves to minimize future overdrafting of groundwater in area rather than to allow additional exploitation of groundwater resources. (p. 51 Waterplan, 1978).

Table 5 provides a list of CAP applicants and primarily allocations.

TABLE 5

CENTRAL ARIZONA PROJECT
REQUESTED ALLOCATIONS BY WATER USERS
IN DESERT FOOTHILLS AREA

		ACRE FEET OF WATER	
APPLICANT	YEAR	APPLICANT REQUEST	STAFF RECOMMENDATION
Carefree Ranch	1985	6,000	61
	2034	6,000	954
Carefree Water Company	1985	2,250	0
	2034	3,410	400
Cave Creek Water Company	1985	182	182
	2034	1,600	1,600
Desert Ranch Water Company	1985	1,760	14
	2034	3,000	139
Fountain Hills	1985	5,876	1,540
Chaparral Water Company	2034	8,099	6,978
Ironwood Water Company	1985	240	126
	2034	4,140	393
N. Valley Water Company	1985	126	126
	2034	393	393
Pinnacle Paradise	1985	1,568	0
	2034	1,568	90
Rio Verde	1985	1,028	145
	2034	2,470	812
TOTAL	1985	19,030	2,194
	3034	30,680	11,759

Source: Arizona Department of Water Resources, January, 1982.

VIII

VEGETATION & WILDLIFE

CHAPTER VIII

VEGETATION AND WILDLIFE

Natural Plant Communities

The Desert Foothills area is within the Sonoran Desert. Paloverde-saguaro, creosotebush, and desert saltbush are the native plant communities in this arid region. Scattered areas of deciduous riparian forest also occur. The native vegetation of the Sonoran Desert extends to altitudes of about 3,000 feet on gentle slopes and to 4,500 feet on steep southerly slopes. Riparian vegetation is found along stream channels and other areas with sufficient water. (Turner, 1974). This type of vegetation is limited in the study area being located primarily near the Verde River. The generalized pattern of natural vegetation is shown on Map 11. Table 6 is a catalogue of plants commonly found in the Desert Foothills.

There are four distinct kinds of vegetation in the Desert Foothills. The three categories within the Palo Verde community include palo verde/saguaro, palo verde/ironwood/mesquite, and palo verde/triangle bursage. These areas are characterized by small trees such as foothill paloverde and ironwood, several species of cacti including saguaro, ocotillo, fishhook, hedgehog, cholla, and prickly pear. Once this vegetation has been disturbed it is often invaded by desert broom, mustard, and annual grasses. The general location of the saguaro and bursage classifications vegetation is on outwash plains and dry mountain slopes. The palo verde/ironwood/mesquite is found along the Verde River where water permits larger tree growth. Catclaw, desert willow, and cottonwoods are mixed with the blue paloverde and mesquite trees. The height and density of this vegetation varies with the changes in available moisture.

The cholla/creosotebush community is characterized by the dominant creosotebush. It may be accompanied by white bursage or a course bunchgrass called big galleta. The larger shrubs, cacti, and trees are absent, except along washes where trees or shrub common to the palo verde community may occur.

Figure 3 shows the succession of plant communities with changes in altitude.

The Paloverde-Saguaro plant community is the most scenic local desert vegetation. The giant saguaro cactus, which has become a symbol of Arizona, is common in this plant community. Most desert vegetation is very fragile. Once disturbed it is likely to die or be invaded by exotic plants not native to the area. In order to preserve the natural environment urban development must be compatible with the physical capabilities of the land. A more detailed description of each plant community is contained in Table 7.

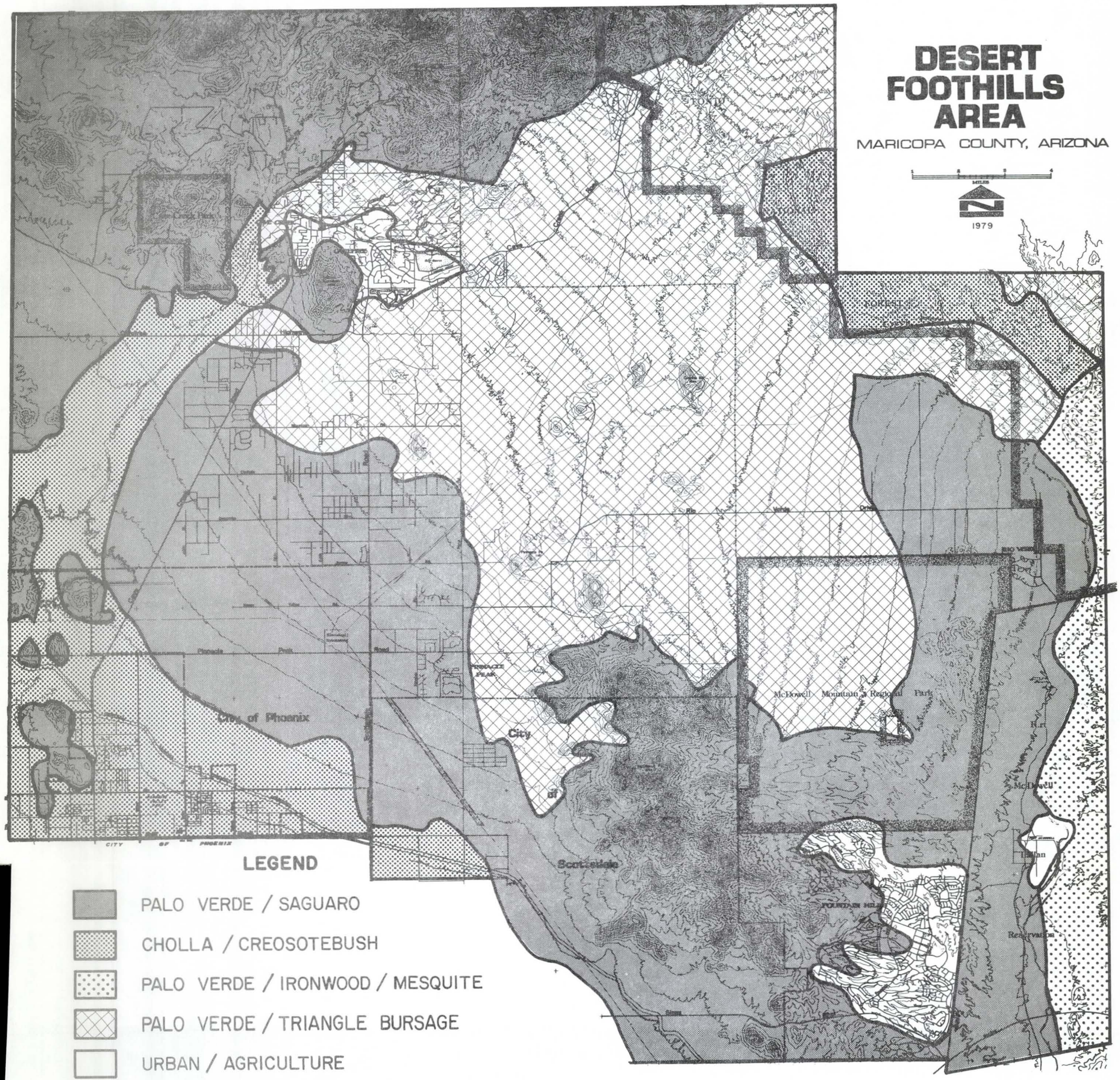
TABLE 6

PLANTS FOUND IN THE
DESERT FOOTHILLS

COMMON NAME	BOTANICAL NAME	PLANT FAMILY
Mormon Tea	Ephedra Nevadanensis	Joint-Fir
Mexican Tea	Ephedra Trifurca	Joint-Fir
Blue Yucca	Yucca Baccata	Lily
Soap Tree Yucca	Yucca Elata	Lily
Arizona Black Walnut	Juqlans Rupestris	Walnut
Desert Hackberry	Celtis Pallida	Elm
Western Hackberry	Celtis Reticulata	Elm
Sagebrush	Antriplex Polycarpa	Goosefoot
Red Barberry	Berberis Haematocarpa	Barberry
Arizona Sycamore	Platanus Wrightii	Sycamore
Crossosoma	Crossosoma Bigelovii	Crossosoma
White Thorn Mescat	Acacia Constricta	Pea
Cat Claw	Acacia Greggii	Pea
Fairy Duster	Calliandra Eriophylla	Pea
Blue Palo Verde	Cercidium Floridum	Pea
Foothill Palo Verde	Cercidium Microphyllum	Pea
White Ratany	Krameria Grayi	Pea
Ratany	Krameria Parvifolia	Pea
Desert Ironwood	Olneya Tesota	Pea
Velvet Mesquite	Prosopis Juliflora	Pea
Creosote Bush	Larrea Tridentata	Caltrop
Turpentine Bloom	Thamnosma Montana	Rue
Crucifixion Thorn	Canotia Holocantha	Bittersweet
Jojoba	Simmondsia Chinensis	Boxwood
Menodora	Menodora Scabra	Olive
Pale Lycium	Lycium Pallidum	Potato
Bush Pentstemon	Pentstemon Microphyllus	Figwort
Western Desert Willow	Chilopsis Linearis	Bignonia
Desert Honeysuckle	Anisacanthus Thurberi	Thorn
Goldenhead	Acamptopappus Sphaerocephalus	Sunflower

COMMON NAME	BOTANICAL NAME	PLANT FAMILY
Snakeweed	Guitierrezia Lucida	Sunflower
Turpentine Bush	Aplopappus Laricifolius	Sunflower
Desert-Broom	Baccharis Sarothroides	Sunflower
Thread Leaf Groundsel	Senecio Longilobus	Sunflower
Chill Weed	Baccharis Pteronoides	Sunflower
Brittle Bush	Encelia Farinosa	Sunflower
Bur Sage	Franseria Deltoides	Sunflower
Burro Bush	Hymenoclea Monogyra	Sunflower
Desert Prickly Pear	Opuntia Engelmannii	Cactus
Silver Dollar Cactus	Opuntia Chlorotica	Cactus
Buckhorn Cholla	Opuntia Acanthocarpa	Cactus
Teddy Bear Cholla	Opuntia Bigelovii	Cactus
Smooth Chain Fruit Cholla	Opuntia Fulgida	Cactus
Desert Christmas Cactus	Opuntia Leptocaulis	Cactus
High Region Cholla	Opuntia Whipplei	Cactus
Bush Cholla	Opuntia Arbuscula	Cactus
Sweet Potatoe Cactus	Peniocereus Greggii	Cactus
Saguaro	Carnegiea Gigantea	Cactus
Strawberry Hedgehog	Echinocereus Englemannii	Cactus
Candy Barrel Cactus	Ferocactus Wizlizeni	Cactus
Beehive Cactus	Coryphantha Arizonica	Cactus
Ocotillo	Fouguieria Splendens	Candlewood

Source: Desert Foothills Scenic Drive, 1966



SOURCE: Range Management Staff; Oregon State University, 1971.

GENERALIZED NATURAL VEGETATION

MAP II

TABLE 7

NATIVE PLANT COMMUNITIES

TYPE VEGETATION	DESCRIPTION	GENERAL LOCATION
Paloverde-Saguaro Community	Composed of small trees, such as foothill paloverde and ironwood; shrubs, such as creosote and bursage; and the giant saguaro and several other species of cacti such as the fishhook cactus, hedgehog cactus, cholla, and prickly pear. Probably the most scenic local desert vegetation. Once disturbed it is likely to be invaded by desert broom, species of mustard, and annual grasses.	Outwash plains and dry mountain slopes above the creosotebush community.
Creosotebush Community	Creosotebush is the dominant plant often accompanied by white bursage or a course bunchgrass called big galleta. The even stature and spacing of the plants and the simplicity of the community produces a monotonous, uniform landscape. The larger shrubs, cacti, and trees are absent, except along washes where ironwood, mesquite, paloverde, and catclaw may persist.	Flat terrain on slightly tilted plains and lower outwash plains surrounding mountains. These areas are more arid than those occupied by the Paloverde-Saguaro Community.
Desert Saltbush Community	Desert saltbush is the dominant plant. This gray 2 to 5 foot tall shrub grows in thick stands along with seep weed and pickle weed. Other saltbush species such as chasimo may be present. Mesquite is a common subordinate species and saguaro cactus is a rare member of the community. Areas that support this community are monotonous in appearance because of the uniform composition of the vegetaion.	Alluvium filled valleys and the bottomlands along the Salt-Gila River. Because of extensive agricultural development, this vegetation is now rare in the bottomlands.
Deciduous Riparian Forest	At altitudes below 4,000 feet mesquite, catclaw, desert willow, and blue paloverde prevail, although other species are often present such as willows and cottonwoods. Salt cedar was introduced by man in the 1930's. The plants may be tall and grow in dense stands. Maximum height and density are attained in habitats of abundant moisture.	Along stream channels and their terraces and in areas of shallow groundwater or other water source. Salt Cedar has become prominent along stream channels. Mesquite is common in artificially created habitats such as irrigation overflows and in stormwater retention areas.

Source: Turner, 1974.

Protected Native Plants

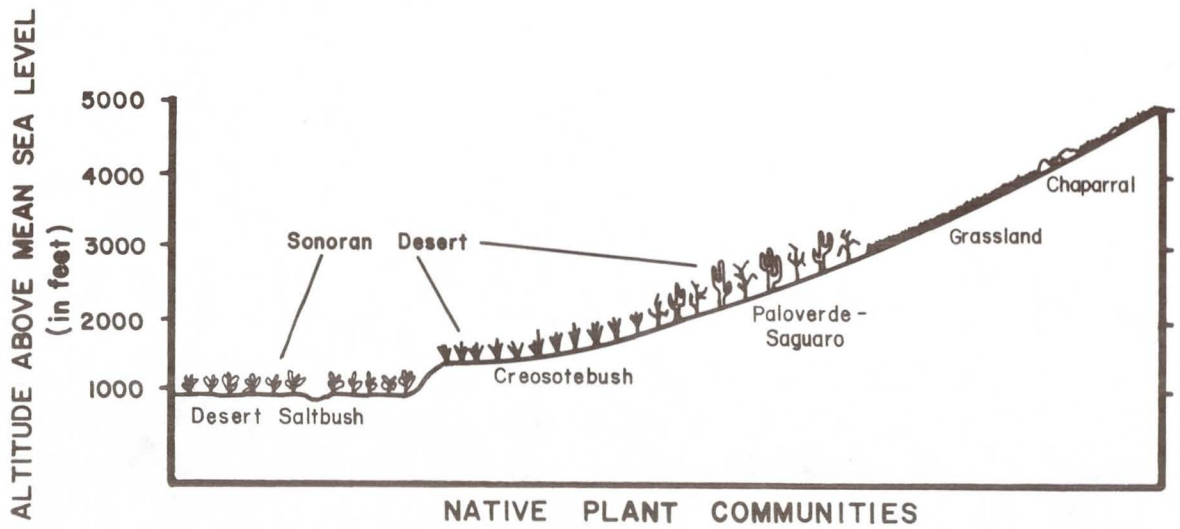
Arizona has many rare and unusual native plants. Most of them are many years old and cannot be replaced. Therefore, many native plants are protected by law and can only be removed after a permit has been obtained from the State.

The authority for native plant preservation is found in the Arizona Revised Statutes, Chapter 7, Article 1, Protection, Sec. 3-901-908. (Revised July 28, 1981). Section 3-903 states: "The Board of Supervisors of each County is authorized to adopt and enforce Ordinances not in conflict with law for the preservation of protected groups of plants".

The protection of native plants has traditionally been the responsibility of the Arizona Commissioner of Agriculture and Horticulture. It is largely a notification process which identifies when the removal or destruction of protected native plants is anticipated. A landowner has the right to move or destroy any native plant growing on his land, but he must notify the Agriculture and Horticulture Commission 30 days prior to the action. The State often can arrange a move which will benefit the landowner and save the vegetation.

FIGURE 3

NATIVE PLANT COMMUNITIES



SOURCE: Turner, 1974.

If relocation arrangements are not made by the State the landowner may destroy the plants. The State process requires permits for all protected plants relocated from one site to another. The State goal is to prevent "cactus rustling" from public and private lands, and facilitate the relocation of protected plants.

The most common native plants protected by law are:

CACTUS

Barrel	Night-blooming Cereus (Sweet-potato Cactus)
Beehive	Pincushion
Button	Pineapple
Cholla	Prickly Pear
Hedgehog	Rainbow
Mesa Verde	Saguaro
Needle "Mulee"	

OTHER PLANTS:

Agave	Hen and Chickens
Bristle-cone Pine	Joshua Trees
Century Plants	Octillo
Crucifixion Thorn	Smoke Tree
Desert Holly	Western Redbud
Desert Spoon (Sotol)	Yucca
Flannel Bush	

The City of Scottsdale's Native Plant Preservation Regulations expand on the Basic Arizona Native Plant Protection laws. Scottsdale adopted their regulations after construction grading destroyed native plants in the northeast section of the community. The Scottsdale Ordinance requires that plant materials be retained in their natural setting unless the City's Development Review Board specifically authorizes their removal. Site plans are to be designed to minimize tree removal. If it is necessary to remove plants, relocation or replacement may substitute for retention. Plants protected include all cacti and seven desert trees. The cactus must be six feet high and the trees must measure four inches caliper or greater to be considered. Cacti can be relocated realitvely easily. Most desert trees cannot be relocated due to their extensive root system. This results in many desert trees being replaced with new trees of a similar variety. The vegetation protection efforts are included as stipulations to zoning approval. The primary enforcement effort involves field engineering review at the time of the major grading.

Violation of the tree preservation requirement results in a suspension of building inspection until the developer pays a fine. Money from the fine is used to replace and maintain the lost plant materials, and to pay the city for related administrative costs. The developer would then be required to enter into an agreement with a landscaping service to provide for the ongoing replacement and maintenance of the plants.

Wildlife

"Wildlife" in the Desert Foothills refers to all animals, with the exception of domesticated livestock. Wildlife, in this sense, includes such diverse forms as fish, birds, lizards, deer, insects, and soil microorganisms. Most ecologists believe that the stability and quality of an ecosystem increases as the number of different living organisms increase. The diversity of wildlife, then, plays an important role in stabilizing the ecosystems within which man must live.

The values of wildlife are not always obvious, either to the layman or to the trained scientist. Some values are known and include the economic value of hunting, fishing and fur trapping; the biological value of insect predation, flower pollination, and carrion removal; the esthetic values of bird watching, photographing or observing the native desert animal life.

The Desert Foothills originally supported a diverse wildlife population. With continuing urbanization, the traditional wildlife habitats (which are closely associated with the native plant communities) were displaced. As the native plant communities changed so did the wildlife. Large native animals moved to higher ground in the relative safety of the Tonto National Forest and the McDowell Mountains. While native wildlife continues to some extent in all the natural plant communities, the richest habitats are in the native Paloverde-Saguaro and Desert Riparian plant communities.

Intense urban development in some parts of the Desert Foothills has already limited wildlife, although some species flourish under more urban conditions.

As the Phoenix metropolitan area expands into rural areas, the impact on native wildlife is in the form of harassment of the species. Motorcyclists and all terrain vehicle travel is increasing and, while difficult to quantify, has resulted in disturbed nest sites, fawn abandonment, and destruction of habitat. The degree of destruction is not known.

The bald eagle is an endangered bird that once was common in parts of the foothills. The Big Horn Sheep, Mule Deer, and Javelina also have retreated into the mountains on the north and eastern edge of the foothills. (Arizona Game and Fish Commission, 1979).

Many species of wildlife are unique to the Sonoran Desert and are found no other place in the world. Most of these are lizards, toads, geckoes and small mammals. While not a major economic contributor to the area they are none-the-less important in attracting people to the unusual flora and fauna of the Sonoran desert.

A complete listing of all living organism is in the Foothills would be a lengthy document and is beyond the scope of this report. The following lists are representative of the diversity of species of wildlife found in the project area.

Mammals

Beaver	Rare
Ariz. gray squirrel	Common
Javelina	Common
Sonoran antelope	Rare
White-tailed deer	Common
Raccon	Common
Desert mule deer	Common
Ringtail	Common
Mountain lion	Rare
Coati	Rare
Bobcat	Common
Badger	Common
Coyote	Common
Skunks	Common
Gray fox	Common
Cottontail rabbit	Common
Kit fox	Rare
Jack rabbit	Common
Black bear	Common
Porcupine	Common
Abert's squirrel	Common
Desert bighorn sheep	Rare

There are many species of rats, mice, gophers, bats, ground squirrels, and chipmunks in the area.

Some of the more common species are:

Rock Squirrel	Kangaroo Rat
Pocket Gopher	Desert Pocket Mouse
Cactus Mouse	Harris Antelope Squirrel

Birds

White-winged dove
Mearns' quail
Inca dove
Cactus Wren
Mourning dove
Desert Sparrow
Gambel's quail
Mockingbird Blackbird
Some shore, wading and marsh birds
Starlings
Robin Band-tailed pigeon
Black throated sparrow
Gila woodpecker
Roadrunner
Plus a host of perching birds

Reptiles and Amphibians

There are approximately 29 species of lizards, 29 species of snakes, 15 species of toads and frogs, and one species of salamander.

Common desert species which may be present in the study area are:

Spadefoot Toad
Desert Iguana
Whiptail Lizard
Gopher Snake
Desert Horned Lizard

Rare and endangered Species

The project area has several rare and endangered species of wildlife.

Species	Location
Prairie falcon	Entire area
Peregrin falcon	Entire area
Bald eagle	Riparian zones on Verde River
Osprey	Riparian zones on Verde River
Gray hawk	North-northeast areas
Black hawk	North-northeast areas
Spike dance (fish)	In Verde River

Source: Hohokam Conservation District Action Plan, 1974.

Riparian Habitats

Riparian habitats are attractive to wildlife particularly birds. The vegetation in desert washes, retention areas, and other surface waters supports a wider variety of wildlife than might otherwise be expected. This is especially true for game birds such as the mourning dove, whitewing dove, and gambel quail. The major riparian habitat in the Desert Foothills is found along the Verde River east of the McDowell Mountains. The Verde River flows south from the Tonto National Forest past the planned community of Rio Verde and through the Fort McDowell Indian Reservation.

DESERT FOOTHILLS TECHNICAL GUIDE

PART TWO

Man - Made Setting

IX

LAND USE

CHAPTER IX

LAND USE

Existing and Future Land Use

Land use is an important issue in the Desert Foothills. The timing, intensity and distribution of land uses in the Foothills provided the original impetus for the Desert Foothills planning effort.

Present Land Use

The overall character of the Foothills is vacant rural rangeland and desert. There is, however, a steady transition to more urban uses, primarily single family residential.

In 1978, 5,555 acres or 2.62% of the total 323 square miles in the Desert Foothills area was developed. Of this, by far the most common use was single-family residential. Other uses supplement the rural residential households, they include small areas of commercial, industrial, public use, and agricultural (horse stables, pastures, and arenas) activities. Commercial uses in the area can be divided into two categories: general and tourist/resort or special facilities. Examples of the latter category include the Southwest Movie Studio, resort hotels, and unique commercial facilities which are primarily dependent upon patronage from outside the area. (Table 8 reviews the land uses in the Foothills). These uses are shown on page 16 of the Policy Guide. The existing and future land uses are also contained in the Policy Guide.

Table 8

EXISTING LAND USE

	Acres	% of Total Planning Area
Single-Family Residential	4,003	1.90%
Mobile Home Residential	320	0.15%
Multi-Family Residential	60	0.02%
Commercial	202	0.09%
Industrial	120	0.05%
Public & Semi-Public	700	0.34%
Agriculture (Pastures & Stables)	150	0.07%
TOTAL	5,555	2.62%

Source: Maricopa County Planning Department, 1979.

The present centers of urban activity are the unincorporated communities of Cave Creek and Carefree in addition to the planned developments of Pinnacle Peak, Fountain Hills and Rio Verde.

At present Cave Creek, Carefree and Fountain Hills contain the only intense urban development in the form of multi-family apartments and townhouses. Unlike most of Maricopa County, mobile homes are rare in the Foothills and these are concentrated in the Cave Creek and Lone Mountain subareas. Commercial activities are present in the older unincorporated communities as well as in the new planned developments.

Table 9 ranks the Desert Foothills subareas by size and Table 10 shows the 1980 land uses of each subarea. These subareas are the same as shown on page 27 of the Policy Guide.

TABLE 9

LAND USE SUBAREAS

SUBAREA	SQUARE MILES	PERCENT
Northeast	81.7	25.4
Lone Mountain	30.8	9.5
Phoenix	27.8	8.6
Carefree	19.7	6.1
Fountain Hills	19.0	5.9
North Scottsdale	16.2	5.0
Pinnacle Peak	15.0	4.6
Cave Creek	7.7	2.4
East Scottsdale	5.1	1.6
Rio Verde	3.3	1.0
OTHER		
Mountains and Drainage Areas	63.7	19.7
Park	33.0	10.2
TOTAL AREA	323.0	100.0

TABLE 10

EXISTING LAND USE BY SUBAREA

SUBAREA	SF*	MF	MH	C	I	P
Pinnacle Peak	116			4		Park G.C.
Northeast	119		1			
Rio Verde	179			3		G.C.
Lone Mountain	389		120			
Cave Creek	422	108	96	x		School
Carefree	390	138		x	x	G.C. Air
North C-C	17					
Fountain Hills	450	539		x	x	G.C.
East Scottsdale	9					
TOTAL	1,991	785	217			

*Key

SF - Single Family
MF - Multi-Family
MH - Mobile Home
C - Commercial
P - Public
I - Industrial

Future land Use

Two plans were prepared which address future land use patterns in the Desert Foothills.

On July 23, 1980 the Maricopa Association of Governments adopted a Guide for Regional Development and Transportation. The regional development plan contained in the guide provides an overview of projected development in Central Maricopa County. While the plan does not differentiate among land uses, it does suggest that the Cave Creek-Carefree and Fountain Hills areas are expected to grow at least until the year 2000.

In July, 1979 the Maricopa County Board of Supervisors adopted The Desert Foothills Policy and Development Guide. The Guide adopted specific goals, objectives and policies with respect to future land use. Overall, the Guide calls for rural low density land uses supplemented by more intense uses near existing or planned activity centers. Lands directly north of the Central Arizona Project adjacent to Phoenix and Scottsdale will be planned by the adjoining community. The County will continue to act as planning coordinator for these areas until specific plans are developed. See Table 11.

TABLE 11

FUTURE LAND USE

SUBAREA	LAND USE
Northeast	Rural Residential
Lone Mountain	Low Density Residential, Special Commercial
Cave Creek	North - Rural Residential Central - Commercial along Cave Creek Road South - Low density residential
Pinnacle Peak	Primary commercial, special commercial, rural and low density residential.
North Scottsdale	To be planned by City of Scottsdale
Phoenix	To be planned by City of Phoenix
East Scottsdale	Low density residential
Fountain Hills	Primary commercial, industrial and medium density residential
Carefree	Primary commercial. Rural and low density residential
Rio Verde	Planned low density residential.

EXISTING ZONING

The unincorporated portions of the Desert Foothills are subject to the regulations of the Maricopa County Zoning Ordinance. Sixteen separate zoning classes are present in the study area. Table 12 lists these zoning districts and the acreage and percent of the study area included in each district. The zoning districts in the Foothills include the following categories:

Rural

Approximately 178,312 acres or 278.61 square miles of the study area are zoned Rural 190, Rural 70, Rural 43, or Rural Estate-43 in the City of Scottsdale. Most of the land within these zoning districts is vacant desert or used for grazing.

Residential

Eight residential densities ranging from R1-35 to R-5 are present in the study area. These eight residential zones encompass 27,188 acres or 42.48 square miles. Most of this zoning is in the Fountain Hills, Cave Creek, or Carefree subareas.

Commercial

Commercial acreage encompasses 960 acres or 1.5 square miles of the study area. Four of the County's five commercial zoning classifications are found in the Desert Foothills. These include C-S, Planned Shopping Center, C-1 Neighborhood Commercial, C-2 Intermediate Commercial and C-3 General Commercial. Important commercial facilities within the area include the Southwest Movie Studio and Rawhide mock western town.

Industrial

Industrial zoning in the Desert Foothills area is limited to 260 acres. All the Industrial Zoning is Ind-I Planned Industrial. Included in this district are portions of the Southwest Movie Studio, Carefree Airport, and industrial zoning in Fountain Hills.

Federal, State Agencies

Significant areas of the Desert Foothills are under the control of either federal or state agencies and therefore are not bound by County zoning.

TABLE 12

EXISTING ZONING

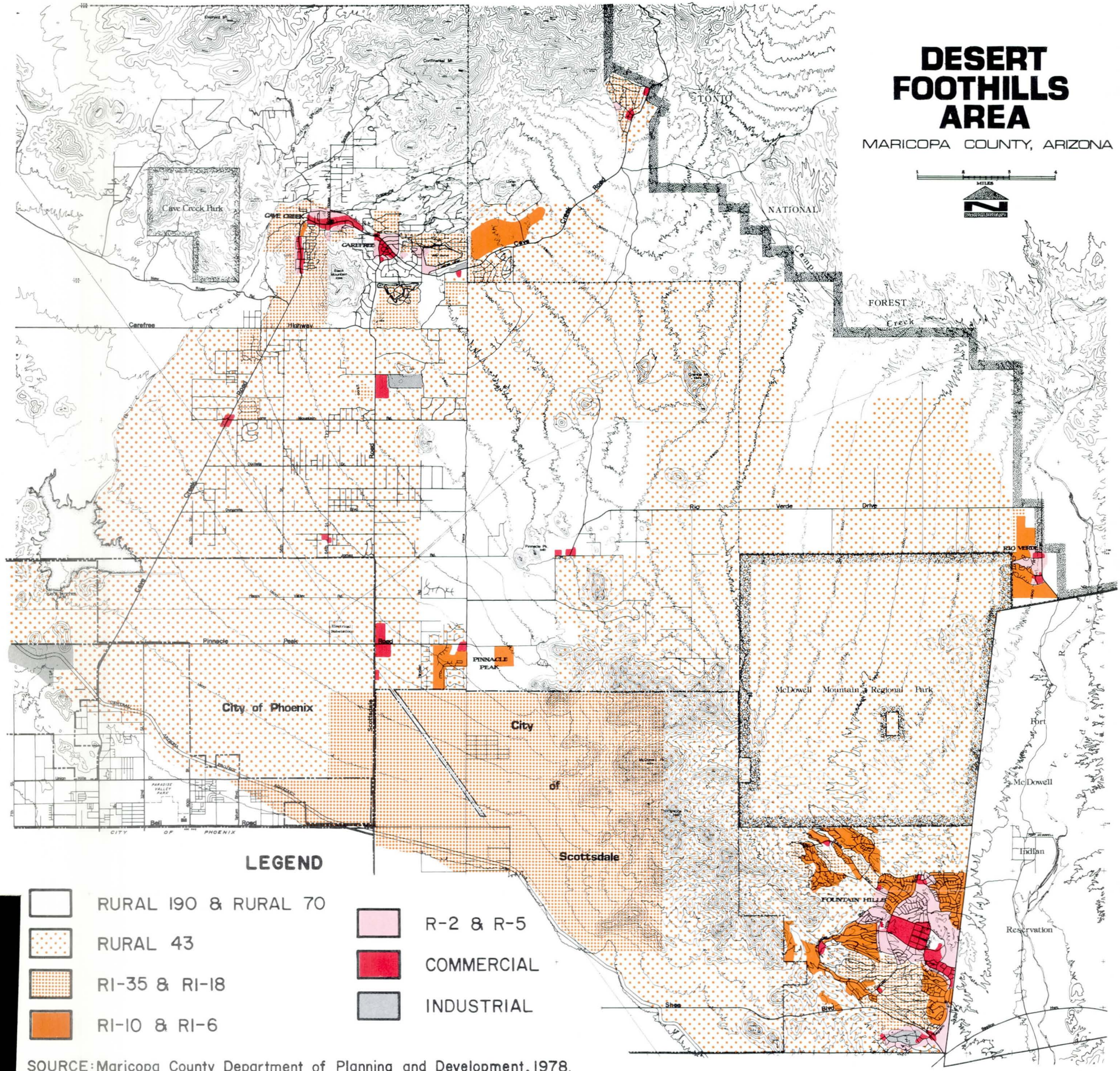
ZONING DISTRICT	ACREAGE	SQUARE MILES	PERCENT
Rural			
Rural-190	26,135	40.8	12.64
Rural-70	5,815	9.1	2.81
Rural-43 and RE-43	146,362	228.7	70.80
	178,312	278.6	86.25
Residential			
R1-35	20,147	31.5	9.75
R1-18	1,805	2.8	0.87
R1-10	1,430	2.2	0.69
R1-8	2,105	3.3	1.02
R-2	260	.4	0.13
R-3	587	.9	0.28
R-4	360	.6	0.18
R-5	494	.8	0.24
	27,188	42.5	13.16
Commercial			
C-S	5	.0	0.00
C-1	185	.3	0.09
C-2	690	1.1	0.33
C-3	80	.1	0.04
	960	1.5	.46
Industrial			
Ind-I	260	.4	0.13
	206,720	323.0	100.00

June, 1979.

The Maricopa County Zoning Ordinance does not contain a specific zoning classification for schools, public facilities, fire stations, library, parks, and golf courses, etc. These uses are permitted in all rural, residential and commercial zoning districts. See Map 12 (Existing Zoning).

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



SOURCE: Maricopa County Department of Planning and Development, 1978.

EXISTING ZONING

MAP 12

Land Use

A large portion of the Desert Foothills area is held in public ownership. In 1978, approximately 214 square miles, or 66% of the study area, was in public ownership. This ownership is as follows:

Bureau of Land Management	7 sq. mi.
Bureau of Reclamation	4 sq. mi.
State Land Department	110 sq. mi.
Maricopa County (Parks & Landfills)	33 sq. mi.
Flood Control District	41 sq. mi.
Tonto National Forest	19 sq. mi.
TOTAL	214 sq. mi.

The Desert Foothills area also includes some areas held in permanent preservation as park areas or drainageways. These include:

McDowell Mountain Regional Park	33 sq. mi.
Central Arizona Project Retention Area	2 sq. mi.
Cave Creek Wash and Cave Buttes Dam Retention Area	7 sq. mi.

The patterns of public land ownership will have a great impact on the future of the Foothills. This section contains a brief background of each public agency and its management responsibility in the study area. A map of Public Land Ownership is found on page 18 of the Policy Guide.

Arizona State Land Department

The State Land Department is trustee for 110 square miles or 34% of land in the Desert Foothills. As the largest single landowner in the Foothills the management, lease, trade or sale of State lands is of great concern. The state obtained the land from the Federal government or it was granted to the State in the Arizona Enabling Act.

The Land Department is empowered to lease, trade or sell State land selected as suitable for sale at a public auction. Other governmental agencies may purchase land from the state without an auction. In all sales the minimum price is the appraised value of the land.

Until the passage of the Urban Trust Lands Act in September, 1981, the outright sale of State land was rare. The Urban Lands Act encourages the State Land Department to sell or lease land for commercial and residential development. The State Land Department is charged with the planning and management of the land as both an investment and a resource. State lands are to be managed to promote orderly development near existing communities. The Act establishes a cooperative state-local planning process which will control the ultimate disposition of the land.

Maricopa County Flood Control District

This special district is an independent body devoted to flood control. It is somewhat unique in that its governing board has the same membership as the Maricopa County Board of Supervisors, however, it has a separate administration and financing authority which is not part of the County. To date the Flood Control District has concentrated on public improvements such as dikes, channelization and other structural means to control flooding.

Maricopa County

The Maricopa County Regional Park system is one of the largest in the nation. Two regional parks are found in the Foothills-Cave Creek and McDowell Mountains. Regional parks are large unspoiled preserves designed for passive recreational activities. Maricopa County also has a landfill site in the area. (See Map 16).

Tonto National Forest

The northeastern portion of the Foothills contain parts of the largest National Forest in Arizona. This National Forest has the plants and animals characteristic of the high Sonoran deserts. National Forests are owned by the Federal government and managed by the U.S. Forest Service. The Forest Service is charged with using the natural resources in the forest to meet local needs without reducing the productivity of the land.

Bureau of Land Management

The Bureau of Land Management (BLM) is the main caretaker of Federal land in Maricopa County. BLM lands are generally found in the low desert and less accessible parts of the County including parts of the Desert Foothills. The principal activities taking place on BLM lands are range development, wildlife management, resource development and recreation.

Bureau of Reclamation

The Bureau of Reclamation has jurisdiction over lands adjacent to the Central Arizona Project canal in the Foothills. The Bureau is not a land management agency. It only uses land as the foundation for multipurpose water resource development projects. The Bureau generally delegates the on-going management of its projects to other agencies.

Fort McDowell Indian Reservatiion

The Desert Foothills is bordered on the east by the Fort McDowell Indian Reservation. The Reservation borders the planned communities of Rio Verde and Fountain Hills as well as the McDowell Mountain Regional Park. The Bureau of Indian Affairs (BIA) holds the land in the McDowell Reservation in trust for the Indians. The Indians themselves have jurisdiction over all reservation land. While most reservation land is used for farming or grazing, reservation land can be leased to the general public.

Private Owners

Much of the private land outside the established communities is held in large tracts by single owners. Many of these were once parts of large ranches which no longer use the area for cattle grazing.

X

DEVELOPMENT TRENDS

CHAPTER X

DEVELOPMENT TRENDS

The Desert Foothills is undergoing a transition from open desert to other more urban uses. Most of the urban development in the Foothills is concentrated in small planned projects and existing communities. Additional residential, commercial and office development is anticipated. It is expected that over time a greater variety of housing including multi-family uses will be located in the existing activity centers. Most of these areas are already zoned for more intense land uses. Several tourist/resort and special commercial uses, developed away from the present activity centers, also may expand.

Unlike much of the County, many of the developments in the Desert Foothills tend to be large planned residential subdivisions supplemented by small scale commercial facilities.

SUBDIVISIONS

As depicted on Map 13 the majority of subdivision activity has been concentrated within the Carefree, Cave Creek, Pinnacle Peak, and Fountain Hills subareas. Of the 217 subdivisions recorded before 1980 in the Desert Foothills 70% are located in these rapid growth areas. (Refer to Table 13).

LARGE SCALE DEVELOPMENTS

Nine large scale developments (450 acres or greater) have been approved by the Board of Supervisors between 1958 and 1980. (Refer to Map 14). Construction has begun in all developments except the Highlands at Pinnacle Peak which was approved in July, of 1979. The majority of the development has occurred in Carefree, Carefree Ranch, Boulders, Pinnacle Peak, and Fountain Hills. (Refer to Table 14). A short review of each large scale development follows:

THE BOULDERS CAREFREE

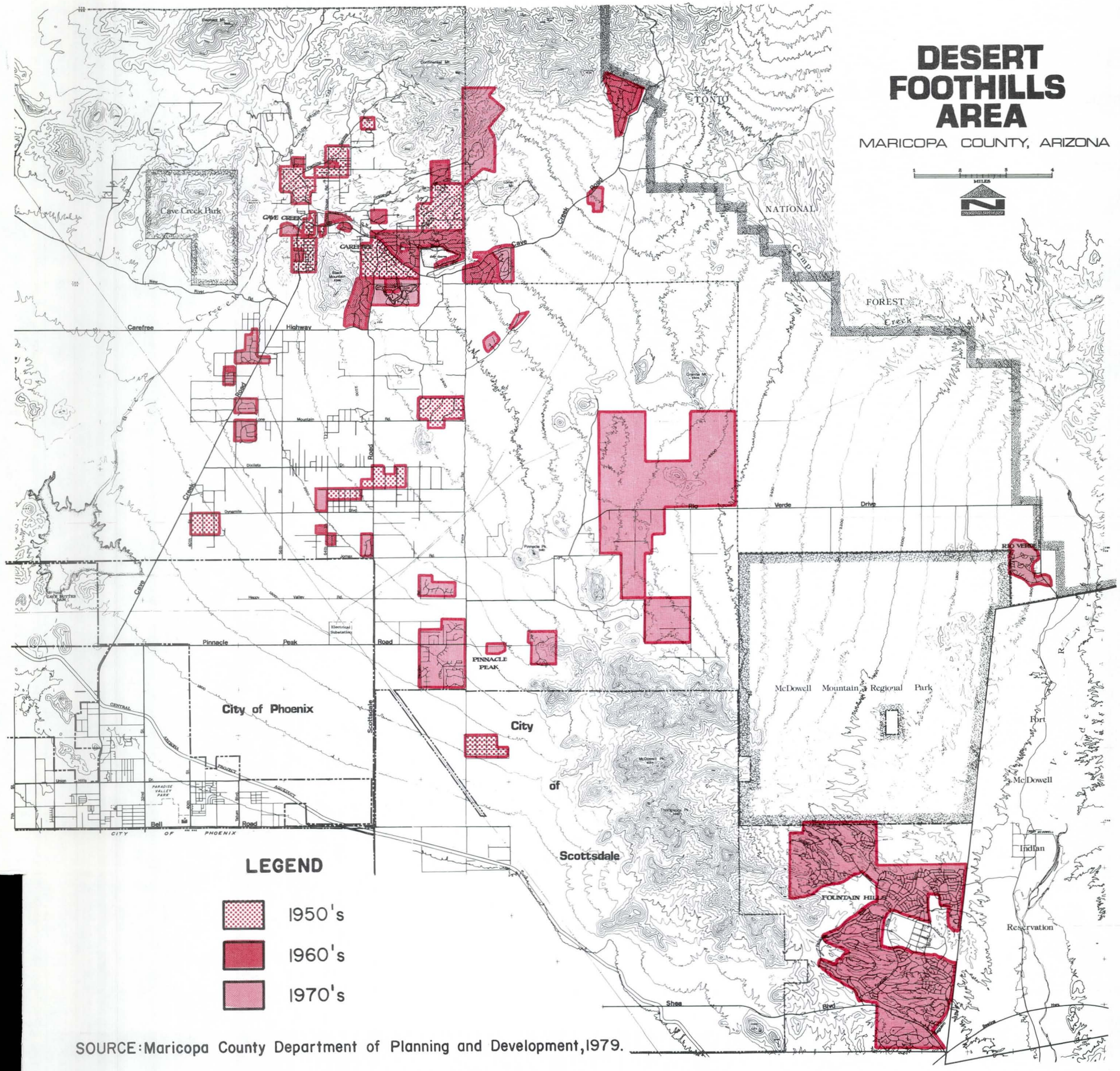
The Boulders Development is an expansion of a project which originated in 1970. The development has now expanded south to include a total of 1,336 acres near Carefree. The development is projected to include a mixture of housing types with a total of 1,336 units. A resort with related commercial facilities is also included in the Boulders Master Plan.

CAREFREE

The community of Carefree dates back to before the turn of the century. In the late 1950's a large development and resort was approved adjacent to the old community. This

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



SOURCE: Maricopa County Department of Planning and Development, 1979.

RECORDED RESIDENTIAL SUBDIVISIONS

MAP 13

TABLE 13

RECORDED SUBDIVISIONS

NUMBER OF SUBDIVISION PLATS

SUBAREA	1940's	1950's	1960's	1970's	TOTAL
Carefree-Cave Creek	2	18	20	12	52
Lone Mountain	0	4	3	9	16
Northeast	0	0	0	1	1
Rio Verde	0	0	0	9	9
Phoenix	2	11	15	15	43
Pinnacle Peak	0	1	1	19	21
North Scottsdale					
East Scottsdale					
Fountain Hills	0	0	0	75	75
TOTAL	4	34	39	140	217

NUMBER OF RESIDENTIAL LOTS

Carefree-Cave Creek	29	698	953	466	2,146
Lone Mountain	0	155	53	431	639
Northeast	0	0	0	36	36
Rio Verde	0	0	0	502	502
Phoenix	48	698	423	1,267	2,436
Pinnacle Peak	0	140	64	757	961
North Scottsdale					
East Scottsdale					
Fountain Hills	0	0	0	7,356	7,356
TOTAL	77	1,691	1,493	10,815	14,076

Source: Maricopa County Planning Department, 1979.

project received some notoriety when film stars established winter homes here. The original development was planned to be over 1,400 acres of residential and convenience commercial development.

CAREFREE RANCH

The Carefree Ranch General Plan was approved in 1974. It presented conceptual plans for a 10,000 acre development. The proposed development included over 10,000 dwelling units with major industrial and commercial facilities. Actual construction within Carefree Ranch has been limited to large lot residential subdivisions. The nature of the developments surrounding the Carefree Ranch suggest a continuation of this trend.

DESERT RANCH

Desert Ranch is a planned resort complex with surrounding residential development. A special use permit for the resort was approved in June, 1974. As of 1980 the developer controlled 640 acres. Development was limited to two subdivisions totaling 39 lots with little actual construction. The developer intends to subdivide the balance of his holdings and eventually expand to adjacent state owned land.

HIGHLANDS AT PINNACLE PEAK

The County recently reviewed a proposal for a planned development near Pinnacle Peak. The Highlands at Pinnacle Peak was originally approved in 1979 and revised in 1980. This 826 acre project is designed to provide homes for over 2,000 people.

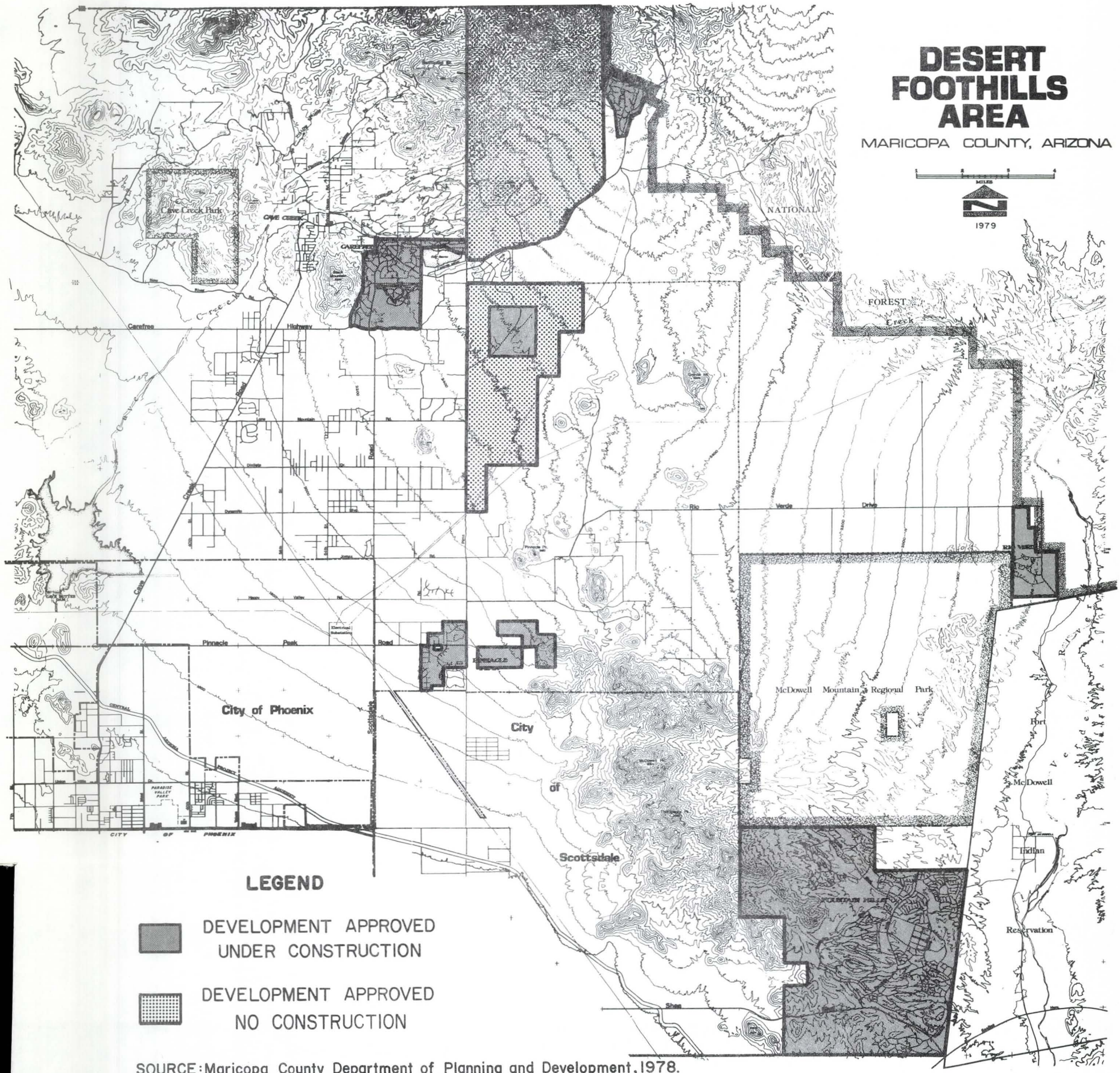
FOUNTAIN HILLS

The Fountain Hills master plan encompasses a total of 12,060 acres. The area is on the eastern slope of the McDowell Mountains between the City of Scottsdale and the Fort McDowell Indian Reservation on the west and east, and generally between the McDowell Mountain Regional Park and the Salt River-Pima Indian Community on the north and south. The site is noted for its steep slopes and spectacular mountain scenery.

5,444 acres have been platted since 1970 when the master plan was first approved. The plan included 3,526 acres of residential, 205 acres of commercial, 56 acres of industrial, 350 acres of open space and 1,307 acres of roads and washes. Only about half the ultimate development has been platted. The census reported that in 1980 Fountain Hills had a population of just under 3,800 residents living in 1,500 dwelling units.

PINNACLE PEAK VILLAGE

The Pinnacle Peak Village development began in 1969 with several subdivisions along Pinnacle Peak Road between Hayden and Pima Roads. The original Master Development Plan for Pinnacle Peak was approved by the Board of Supervisors on June 3, 1974. An Amended Pinnacle Peak Master Plan was approved by the



SOURCE: Maricopa County Department of Planning and Development, 1978.

LARGE SCALE DEVELOPMENTS

MAP 14

TABLE 14

LARGE SCALE DEVELOPMENTS (1980)

NAME OF DEVELOPMENT	DATE APPROVED	GROSS ACRES	DESIGN POPULATION
Boulders Carefree	October, 1973 Revised, 1980	1,336	3,000
Carefree	1958	1,400	2,000
Carefree Ranch	June, 1974	9,400	26,000
Desert Ranch	June, 1974	640	1,600
Highlands at Pinnacle Peak	1979 Revised 1980	826	2,000
Fountain Hills	November, 1970	12,000	70,000
Pinnacle Peak	June, 1974	1,370	4,340
Rio Verde	March, 1972 Revised 1979	928	2,800
Tonto Hills	January, 1961	450	550

Planning and Zoning Commission on June 6, 1976. Both plans called for a total of 1,400 dwelling units with the amendment shifting densities and expanding the golf courses. The land originally devoted to industrial, commercial, and institutional uses was excessive in view of the population potential of the surrounding area. This development established the pattern for the Pinnacle Peak Subarea.

RIO VERDE

The original Rio Verde Master Plan for 869 acres was approved in 1971. This residential development provided a mixture of densities surrounding a golf course. The master plan was revised in 1973, 1976 and again in 1978. The overall density of the development declined as multi-family areas were converted to single family. The original master plan included R-3 zoning to allow for townhouse development, but most of this area was rezoned to R1-8 for single family development. The dwelling units included in this revision decreased from 3,460 to 1,406.

The most recent revision of the master plan was approved on April 23, 1979. It completes the third and final phase of the project. The first two phases covered 282 acres and the final phase includes 645 acres with the total development area covering 928 acres.

The proposed zoning included in the 1979 revision resulted in residential densities including R1-8 (R.U.P.D.), R1-35, and R-3 (R.U.P.D.). The projected total population for the development is 2,812 based on 1,406 dwelling units. It is expected that the ultimate population will be reached by the year 2000.

TONTO HILLS

Tonto Hills is one of the older large scale planned develpments in the Foothills. Originally approved in 1961 the large lot development covers 450 acres with a design population of 550. This development adjoins the Tonto National Forest. Development has slowed in recent years due to water problems.

DESERT RANCH

Desert Ranch is a planned resort complex with surrounding residential development. A special use permit for the resort was approved in June, 1974. As of 1980 the developer controlled 640 acres. Development was limited to two subdivisions totaling 39 lots with little actual construction. The developer intends to subdivide the balance of his holdings and eventually expand on the adjacent State owned lands.

XI

POPULATION & HOUSING

CHAPTER XI

POPULATION AND HOUSING

The Desert Foothills Area is a sparsely populated area of Maricopa County characterized by scattered low density residential development. Five community areas can be identified: Cave Creek, Carefree, Pinnacle Peak, Rio Verde, and Fountain Hills.

The Desert Foothills is one of the fastest growing areas of Maricopa County. It is estimated that in 1980 there were almost 9,300 people living in almost 4,823 housing units.

The 1978 population for the area was 7,724 people residing in 2,993 dwelling units. This population estimate was based on a land use survey conducted by the County Planning staff in the summer of 1978. Table 15 represents the 1978 population and dwelling units by identified subareas.

Both figures represent a sizeable increase from an estimated 450 residents in 1960 or 1,600 residents in 1965.

TABLE 15

1978 POPULATION AND DWELLING UNITS

SUBAREA	EXISTING POPULATION	EXISTING DWELLING UNITS
Cave Creek	1,565	626
Carefree	1,320	528
Fountain Hills	2,700	989
Lone Mountain	50	20
Pinnacle Peak	302	116
North Scottsdale	0	0
East Scottsdale	23	9
Rio Verde	450	179
Phoenix	0	0
*Mountains (north of Cave Creek and Carefree)	42	17
TOTAL	7,724	2,993

Source: Maricopa County Planning Department, 1978.

*Not designated as a subarea

The 1980 census data for the Foothills is available in two forms. First, each major unincorporated community or census designated place was counted. In the Desert Foothills the census identified three urban communities as reported in the Table below:

TABLE 16

1980 POPULATION BY COMMUNITY

COMMUNITY	POPULATION
Carefree	984
Cave Creek	1,577
Fountain Hills	2,773
TOTAL	5,334

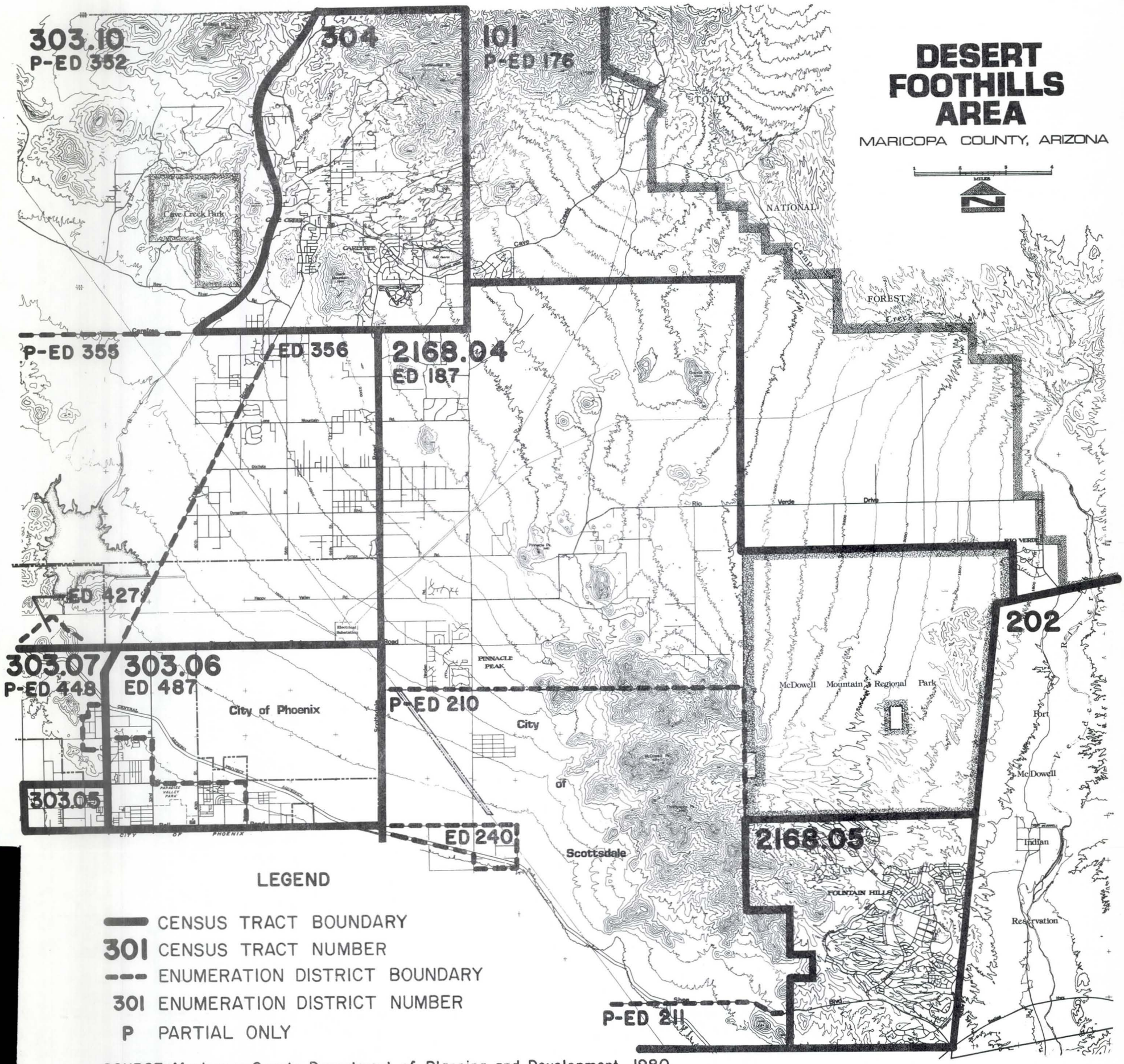
Census Data is also available by geographic area. The Census Bureau divided Maricopa County into tracts and smaller enumeration districts. Unfortunately these districts do not coincide with the boundaries of the Desert Foothills. See Map 15. Table 17 shows the 1980 population and housing count for each district in the Foothills.

The Desert Foothills is somewhat unique because it has a growing number of second or vacation homes and several resorts. At the time of the April, 1980 Census over 18% of the housing units in the Foothills were vacant.

The residents of the Foothills are predominantly urban in their lifestyle. Over three-fourths of the residents live in comparatively urban settings in Cave Creek, Carefree, Fountain Hills, Rio Verde or Pinnacle Peak. There is some scattered rural large lot development, but new development is occurring in planned communities. This urban lifestyle is reinforced by the high cost of housing and fewer mobile homes than other parts of the County.

Population growth in the Desert Foothills is expected to continue. The area should experience steady growth well into the year 2000. It is projected by the year 2000 that the Desert Foothills Area will have approximately 50,000 residents. This projection by five year increments as follows:

1980	1985	1990	1995	2000
9,282	13,260	19,000	31,400	50,000



SOURCE: Maricopa County Department of Planning and Development, 1980.

CENSUS TRACTS AND ENUMERATION DISTRICTS

MAP 15

TABLE 17

1980 CENSUS AND HOUSING DATA

CENSUS TRACT	ENUMERATION DISTRICT	POPULATION	HOUSING UNITS	VACANT UNITS
101	176	59	56	31
303.10	335	483	187	14
	356	1,259	459	33
	427	15	6	0
303.06	487	180	96	13
303.07	448	573	333	79
304	--	2,773	1,429	305
2168.04	187	237	255	25
	210	456	301	18
	211	476	163	5
	240	0	0	0
2168.05	--	2,771	1,538	351
TOTAL		9,282	4,823	874

Source: U.S. Department of Commerce, Bureau of the Census, 1980. (Preliminary Counts)

XII

ECONOMIC DEVELOPMENT

CHAPTER XII

ECONOMIC DEVELOPMENT

The Desert Foothills is primarily a low density area at the fringe of metropolitan Phoenix. As such the area has a limited economic base. There are almost no agricultural or industrial enterprises in the Foothills. Ranching has declined in importance.

Only a few small scattered commercial enterprises are available to serve the primary needs of residents. Commercial facilities are available at Cave Creek, Carefree, Pinnacle Peak, Rio Verde and Fountain Hills. A wide range of commercial activities are available in adjoining Scottsdale and Phoenix.

The Foothills also is served by resorts or special commercial facilities. The Carefree Inn is the only operating resort in the Foothills. Several resorts have been proposed, yet none were constructed. Table 18 lists the resorts proposed for the Desert Foothills.

Table 18

RESORTS IN THE DESERT FOOTHILLS

Name	Location	Status
Carefree Inn	Carefree	Existing
Pinnacle Peak Village East	Pinnacle Peak	Proposed
Highlands of Pinnacle Peak	Pinnacle Peak	Proposed
Fountain Hills	Fountain Hills	Proposed
Quarter Circle Ranch	Carefree	Proposed
Desert Ranch	Carefree	Proposed
Rancho Manana	Cave Creek	Proposed
Boulders Carefree	Carefree	Proposed
Carefree Ranch	Carefree	Proposed

The Desert Foothills serves as home for several unique commercial and quasi-commercial endeavors. Rawhide is a western oriented day resort. Among the western activities available are horseback riding, sight seeing, trail rides, cookouts, and rodeos. The Carefree Movie Studio uses the desert landscape as a backdrop for its productions. The Foothills is also home to Taliesin West. Originally constructed by Frank Lloyd Wright and now operated by Taliesin Associated Architects, this facility serves as a winter home and school for architects.

Future economic activities in the Foothills will probably be limited. The established centers may expand from convenience to neighborhood scale and a few new convenience centers may arise. Guest ranches, resorts and other special interest features now approved may be built. Future employment centers are planned near the Deer Valley, Carefree, and Scottsdale airports. For more information concerning economic trends please refer to the Policy and Development Guide pages 48-50.

XIII

COMMUNITY FACILITIES

CHAPTER XIII

COMMUNITY FACILITIES IN THE DESERT FOOTHILLS

The Desert Foothills is a large and sparsely settled area. Most community facilities are concentrated in two general areas, Cave Creek/Carefree and Fountain Hills. Map 16 shows the location of the major community facilities designed to serve the public. Other, more specialized community and recreational centers are available in many of the planned developments in the area.

COUNTY LIBRARIES

The County Library provides free library service to all residents of Maricopa County. In the Desert Foothills materials are circulated through two branch libraries, one in Cave Creek the other in Fountain Hills. These two libraries are part of the much larger Maricopa County system. The County has over 185,000 volumes which are available on interlibrary loan to all the small branch libraries.

Under the library program, Maricopa County will provide support for a local library if the local community is willing to bear some of the cost. The County will provide a librarian, give some financial support, supply some books and help with programming small libraries. The local libraries in the Foothills benefit from many hours of volunteer support and local donations.

The Desert Foothills Library, located near the corner of School House Road and Cave Creek Road, serves the Cave Creek/Carefree area. The library is conveniently located near the Cave Creek Elementary School and operates out of a relatively new building. The Fountain Hills library presently operates out of a trailer at 16810 Avenue of the Fountains. A fund raising drive is now underway to build a new library near the Community Center.

TABLE 19

LIBRARIES IN THE DESERT FOOTHILLS

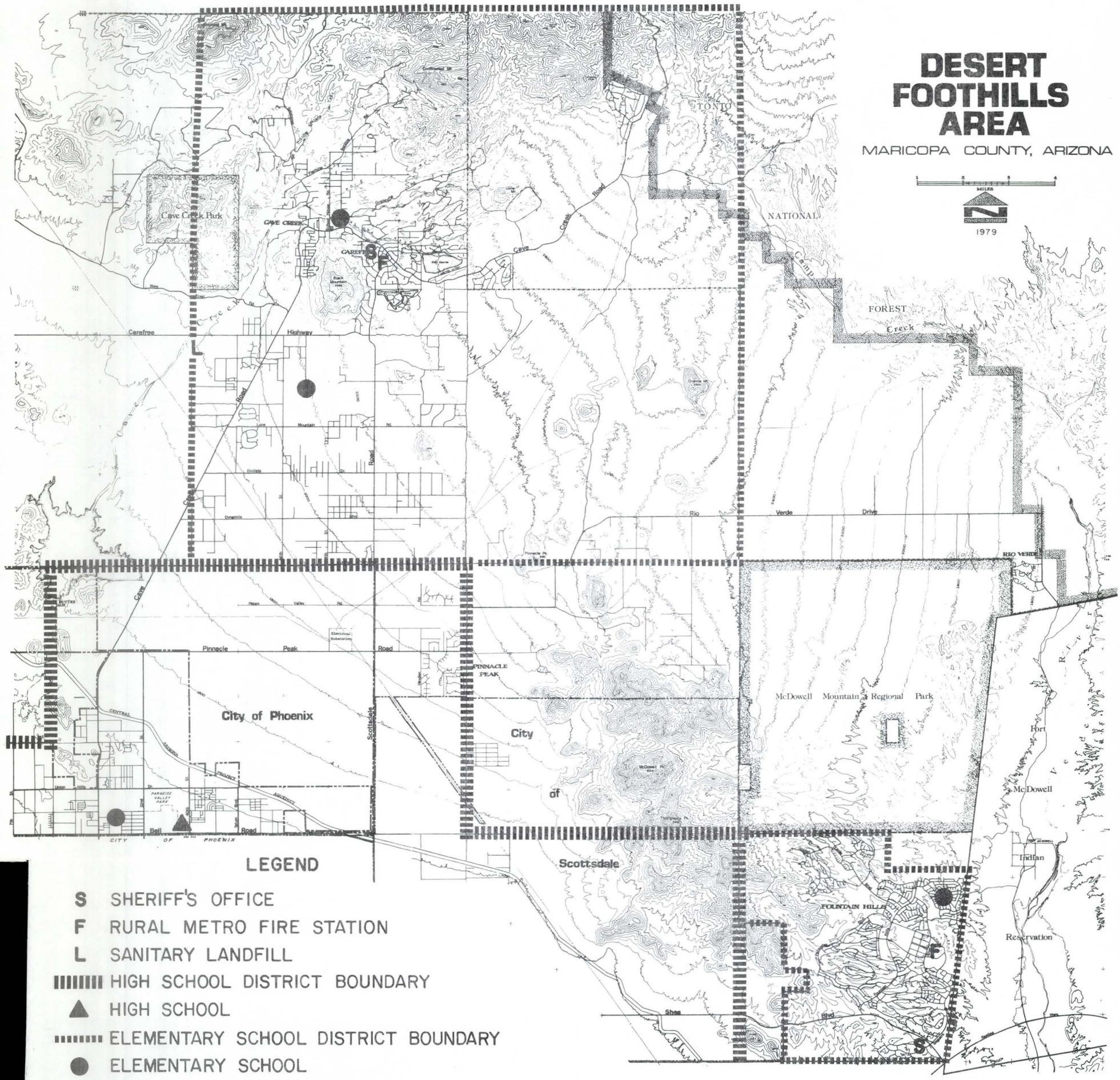
LIBRARY	SIZE OF COLLECTION	COUNTY BOOKS IN COLLECTION	CIRCULATION PER YEAR
Desert Foothills	10,000+	6,700	55,000
Fountain Hills	10,000+	9,500	29,000

Source: Maricopa County Library

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA

1979



LEGEND

- S SHERIFF'S OFFICE
- F RURAL METRO FIRE STATION
- L SANITARY LANDFILL
- HIGH SCHOOL DISTRICT BOUNDARY
- ▲ HIGH SCHOOL
- ELEMENTARY SCHOOL DISTRICT BOUNDARY
- ● ELEMENTARY SCHOOL

SOURCE: Maricopa County Department of Planning and Development, 1979.

PUBLIC FACILITIES

MAP 16

Both the Desert Foothills and Fountain Hills libraries are experiencing rapid growth in circulation. During the past year growth increased 30% at both facilities. Table 19 provides additional library information.

Maricopa County also has a bookmobile which has been used to serve the library needs of the more isolated areas of the Foothills.

POLICE AND FIRE

Police protection for the unincorporated portions of the Desert Foothills is provided by the Maricopa County Sheriff's Office. Only small portions of the Foothills are incorporated and therefore receive police protection from Phoenix or Scottsdale.

Two Sheriff's office substations, one in Carefree and a second in Fountain Hills, serve the area. The Carefree substation is found near Cave Creek Road just west of Scottsdale Road. The substation in Fountain Hills is located near Shea Boulevard just west of its intersection with the Beeline Highway. Response times vary according to the size of the patrol beat. In general, beats closest to the substation have the shortest response time.

The Rural Metro Fire Department operates three fire stations which serve the Foothills.

	Station Number	Area Address
#12	Scottsdale Airport	13655 N. Scottsdale Rd.
#13	Fountain Hills	16957 Coyote Drive
#15	Carefree	7174 Sleepy Hollow Dr.

Rural Metro provides emergency services to both subscribers and non subscribers. Most Rural Metro service is provided within a ten mile radius of each station. The Department does respond to areas outside of this zone. However, it is difficult to provide adequate fire protection services in the more remote areas due to travel distance and water availability. Response time becomes critical when calls exceed ten miles. Although tank trucks respond to fires when required, a local water supply system with adequate pressure to fight fires is needed in developed areas.

Fire insurance ratings indicate the risk of fire damage. A low rating (1) indicates less risk than a high rating (10). Among the rating factors are: the availability of service in a given area, whether or not the property owner subscribes to a fire service, the availability of an adequate permanent water supply, hydrant spacing, and proximity to a fire station. Fire insurance ratings are reflected in the price of homeowner's or renters insurance.

Fire insurance ratings in the Desert Foothills are generally high. Even the planned communities with five hydrants and an adequate water supply, have ratings of 8 or more. Ratings of 10, the highest risk category are common throughout most of the Foothills.

PUBLIC SCHOOL FACILITIES

School districts are special units of government that are directed by a local school board elected by residents of the district. School districts receive financial support from several sources including the federal and state government as well as local property taxes.

The three types of school districts in Maricopa County are:

1. Elementary Districts - these include elementary schools only;

2. Union Districts - These include only high schools but encompass one or more elementary districts;

3. Unified Districts - These have both high schools and elementary schools.

Only Elementary Districts are present in the Foothills. Some small portions of the Desert Foothills are in unorganized school districts. Property owners in unorganized districts do not receive educational services nor do they pay taxes to a school district. Residents of unorganized school districts must pay tuition to send their children to other neighboring school districts.

Currently three public schools serve the Desert Foothills area, Black Mountain School, Cave Creek School, and Fountain Hills Elementary School. (See Map 16). The capacity of the Cave Creek school is approximately 210 students. The Black Mountain School's capacity is 372 which includes space in portable classrooms. Both schools serve students from kindergarten to the eighth grade. The Fountain Hills facility with enrollment over 400 was recently expanded and has adequate capacity for growth. A total of 9 school sites within Fountain Hills have been donated by the developer to accomodate future growth. Currently Fountain Hills junior high and high school students are transported as tuition students to schools in Mesa. Ultimate projected population with require a new middle school and high school.

Currently high school students within the Cave Creek School district go to Paradise Valley High School, Chapparral High School, or Saguaro High School outside the Foothills. Most high school students attend Paradise Valley High with the remainder attending Chapparral or Saguaro.

The Cave Creek School District plans to open a new junior high school for the 1982-1983 school year. This would result in a shift of school responsibilities. Cave Creek School would serve grades 1-3, Black Mountain School 4-6 and the Black Mountain Junior High grades 7-9. There are also plans to seek voter approval of a new high school district for the Cave Creek area. If the vote is favorable, the new Black Mountain Junior High will be expanded to serve high school students.

Enrollment Trends

Enrollment within the Cave Creek School District has continued to increase at all grade levels. (Table 20). Past growth trends were influenced by new families with high school age children entering the district. This resulted in most of the district's new students attending high schools outside the Cave Creek District. The enrollment growth in the lower grades has been smaller. Recent trends have shifted somewhat as younger families with younger children enter the district. This has increased the demand for schools serving the lower grades and provides a basis for a future high school in the Cave Creek School District.

TABLE 20

CAVE CREEK SCHOOL DISTRICT
ENROLLMENT TRENDS

YEAR	*ELEMENTARY	HIGH SCHOOL	TOTAL	PERCENTAGE CHANGE
1975-1976	410	165	575	-
1976-1977	435	192	627	+ 9.04%
1977-1978	454	223	677	+ 7.38%
1978-1979	507	290	797	+17.72%
1979-1980	553	241	794	-
1980-1981	569	278	847	+ 6.67%
1981-1982	581	260	841	-

*Kindergarten-8th Grade

Source: Cave Creek School District

PARK AND RECREATIONAL FACILITIES

The Desert Foothills Area includes some of the most spectacular scenery in Maricopa County. The area is noted for the beauty of the native desert vegetation, numerous scenic vistas and mountain parks, variety in topography and unspoiled desert. Much of this land is in public ownership to protect the land and provide opportunities for outdoor recreation.

Permanent open space in the Foothills is provided by a system of parks and a national forest.

Tonto National Forest

The Tonto National Forest was established by the Federal Government in 1903 as the largest of the seven (7) national forests in Arizona. The Tonto National Forest embraces 2,900,000 acres of rugged Country from the cactus desert northwest of Carefree to the pine mountains just below the Mogollon Rim. The Forest covers 671,427 acres or 11% of Maricopa County. The many lakes, wilderness and scenic areas in the Forest provide a variety of recreational opportunities.

Lakes are the magnet that draws thousands of visitors to the forest each year. Two reservoirs in the Tonto National Forest near the Desert Foothills are Horseshoe Dam 13 miles northeast of Carefree and Bartlett Dam 8 miles north of the McDowell Mountain Regional Park. Both Dams are on the Verde River.

The U.S. Forest Service, with regional offices in Carefree manages the Tonto National Forest. Plans are underway to expand recreational opportunities by adding camps, picnic grounds, and other facilities in high use areas. At the same time, the Forest Service is seeking to expand the boundaries of the wilderness areas.

Black Mountain Park

Black Mountain Park is a small rugged natural area surrounding the peak of Black Mountain. While the slope of the land is too steep for most recreational activities the natural area serves to preclude development high on Black Mountain and provides an aesthetic backdrop to development in Cave Creek and Carefree.

Cave Creek and McDowell Mountain Park

Maricopa County operates the largest County park system in the United States. It is the philosophy of the County to provide relatively large regional parks to supplement local facilities in cities and towns. Regional parks are not a substitute for local facilities. Regional parks are designed to provide open space and conserve natural resources and they are not as intensively used as local parks.

Cave Creek Park contains 2,592 acres of land located northwest of the community of Cave Creek. The park is noted for its complex geology and it was once the site of an unsuccessful gold mine. At present the park is undeveloped although a master plan for the site calls for $400,000 in improvements. Facilities needed at the Cave Creek Recreation Area include a caretaker's residence, a rodeo arena, picnic and camping areas, hiking and horse trails, nature and history centers and comfort stations. Large resorts planned for the Cave Creek-Carefree area anticipate using the park for horseback riding.

McDowell Mountain Regional Park is the second largest park in the County, is located on the southeastern edge of the Foothills. The Park's 20,942 acres is the best example of desert cattle range close to the Phoenix urban area. The Park has only limited facilities, however, plans are underway to upgrade access roads and other facilities. This park is a popular horseback riding area.

Desert Foothills Scenic Drive

The Desert Foothills Scenic Drive is a 17 mile scenic corridor developed along portions of Scottsdale and Cave Creek Roads north of Pinnacle Peak Road. The Drive was established as the result of close cooperation between the Cave Creek Improvement Association, individuals and governmental agencies. The Drive is intended to serve as an attractive natural desert highway.

In order to preserve the desert landscape, Maricopa County adopted an Ordinance in 1969 which requires generous building setback lines along the highway. Interested citizens in the Cave Creek/Carefree area have installed attractive identification signs which highlight native plants along the highways. Over

50 native plants representing 20 plant families can be found along the drive. The Desert Foothills Scenic Drive will protect the fragile desert and serve to educate travelers for years to come.

FUTURE PARK AND RECREATION FACILITIES

While the Desert Foothills is already well endowed with a number of natural features plans are underway for man-made improvements which will provide additional opportunities for outdoor recreation.

Scenic Corridors

Portions of the Desert Foothills hold potential for future scenic corridors which would preserve scenic vistas, topographic features, and natural desert vegetation. An unnamed scenic corridor has been identified which follows Shea Boulevard from Scottsdale to Fountain Hills. Other scenic corridors under consideration include Rio Verde Drive and Pinnacle Peak Road. Development along these corridors should only be encouraged if it is compatible with the area's natural resources.

Granite Reef Aqueduct Recreation Area

The Granite Reef Aqueduct section of the Central Arizona Project (CAP) forms the southern boundary of the Phoenix subarea of the Desert Foothills. To protect the aqueduct from floodwaters, a dike was built on the north side. As a result, approximately 2,000 acres will be needed as open space for floodwater retention.

The maintenance of this open space for floodwater retention will not preclude its use for recreational purposes. The Phoenix Parks and Recreation Department, in conjunction with the City of Scottsdale, Maricopa County, and the Bureau of Reclamation, has proposed the preservation of this open space for recreational purposes. Known as the Granite Reef Recreational Area, this open space belt would extend along the north edge of the dike from Cave Creek Road on the west to Taliesin West in Scottsdale. Regional horseback riding and hiking trails, camping facilities, and sports facilities are proposed on the land that will be included in the CAP.

Cave Buttes Dam

The Cave Buttes Dam was constructed downstream from the old Cave Creek Dam. It is an earth structure over 100 feet high with three smaller dikes. The reservoir will hold over 46,000 acre feet of water and flood 1,820 acres. The water detention basin extends into the western portion of the Desert Foothills study area and provides a good location for recreational activities that require large areas of relatively flat land. Planned facilities include group camping areas, individual and group picnicking, hiking and riding trails, equestrian activities, dog training areas, and a golf course with small lakes.

Hiking and Riding Trails

In addition to the parks, the Desert Foothills area offers many possibilities for local hiking, bicycling, and horseback riding trails along washes or through other scenic areas. A number of the potential trails within the area could be tied into the system of regional trails maintained by the Maricopa County Park and Recreation Department.

The City of Phoenix has proposed a number of trails in the Paradise Valley Area Plan which could cross the Central Arizona Project and continue along washes or other open space easements within the Desert Foothills area. The City of Scottsdale has adopted several trail locations in the study area as part of its General Plan.

The Maricopa County Hiking and Riding Trails Committee have called for a systematic program for the development of trails for riding, bicycling, hiking and nature walks. The specific trails called for in the Foothills are:

- Cave Creek Wash from Cave Creek Dam to the Tonto National Forest
- Along the CAP from Cave Creek Dam to the Granite Reef Dam
- From Scottsdale Airport to Rio Verde via the McDowell Mountain Park
- Carefree to Bartlett Dam and Horseshoe Dam

Such trails, whether of a local or regional nature, would allow maximum use and enjoyment of the distinct natural features of this area. The Committee has set development standards for existing and new trails as well as for the multiple use of trails. Also the Committee is concerned about:

1) Creating an uninterrupted trail passage whenever new roads are built

2) Retaining natural drainage systems in public ownership to provide open uninterrupted trails.

3) Restricting trails to horseback riding, hiking or biking. No motorized vehicles should be permitted on trails.

Adequate funding and the acquisition of right-of-ways continue to present problems to the implementation of a County-wide trail system.

UTILITIES AND RELATED SERVICES

Electrical Services

The Salt River Project (SRP) and Arizona Public Service (APS) both provide electrical service to portions of the Desert Foothills.

The Salt River Project is a special governmental district with a Board of Directors elected by the landowners in the District. SRP generates or purchases electricity and sends it to Phoenix Area distribution centers such as Pinnacle Peak. At the distribution centers the voltage is stepped down for the smaller local transmission lines.

A major regional electrical substation is located in the City of Phoenix near the intersection of Pinnacle Peak and Scottsdale Roads. The Pinnacle Peak substation serves as a distribution hub for major long distance high voltage transmission lines which cross the Foothills. Five major transmission lines fan out from the APS substation. Their directions are: 1) north/northeast, passing near the Tonto Hills subdivision and on through the Tonto National Forest; 2) northeast, passing north of Rio Verde and into the Tonto National Forest; 3) southeast into the City of Scottsdale; 4) west through the City of Phoenix; and 5) northwest passing west of Cave Creek Park and on through New River.

APS and SRP both have established service extension policies. Generally, electrical service will be extended to new areas whenever it is economically feasible. If certain criteria are not met, then a line extension charge may be assessed.

Natural Gas

Portions of the Desert Foothills are served by natural gas. In March 1966, the Black Mountain Gas Company turned on natural gas in the Cave Creek/Carefree area, having run lines into Carefree and Cave Creek and bringing a main across Carefree Highway from the El Paso Gas Line west of the Black Canyon Freeway.

Fluctuation in natural gas availability and increasing cost due to deregulation may limit future service. For outlying areas, propane gas service is available from local suppliers.

Telephone Service

Telephone service within the study area is provided by the Mountain States Telephone and Telegraph Company. Service is normally available in all but the most remote sites. The expansion of telephone service depends on the level of residential and commercial development in a particular area. Mountain Bell uses both long range and short range planning to estimate service needs for any given area. Long range service needs are forecasted using economic and demographic projections. Immediate expansion needs are estimated by regularly checking with local developers. Rapidly changing conditions caused by fluctuating housing markets or

unplanned development can lead to unforseen delays in providing a new development with service. (Forecasting Division, Mountain Bell).

Water and Sewer Systems

Individual septic and water supply systems are intended to serve low density residential and commercial development. Individual water and septic systems should not be permitted in areas where extensive urban development is anticipated. Urban development requires a central sewerage collection and treatment system as well as a central water system.

Domestic Water

As of 1980 the Arizona Corporation Commission had granted Certificates of Convenience and Necessity for 13 water districts in the Desert Foothills. The boundaries of these districts are shown on Map 17. All the water districts serving the unincorporated portions of the Foothills are franchised by the Maricopa County Board of Supervisors and licensed by the County Health Department. The Maricopa County Health Department also conducts regular inspections of private water companies. No public systems serve the area.

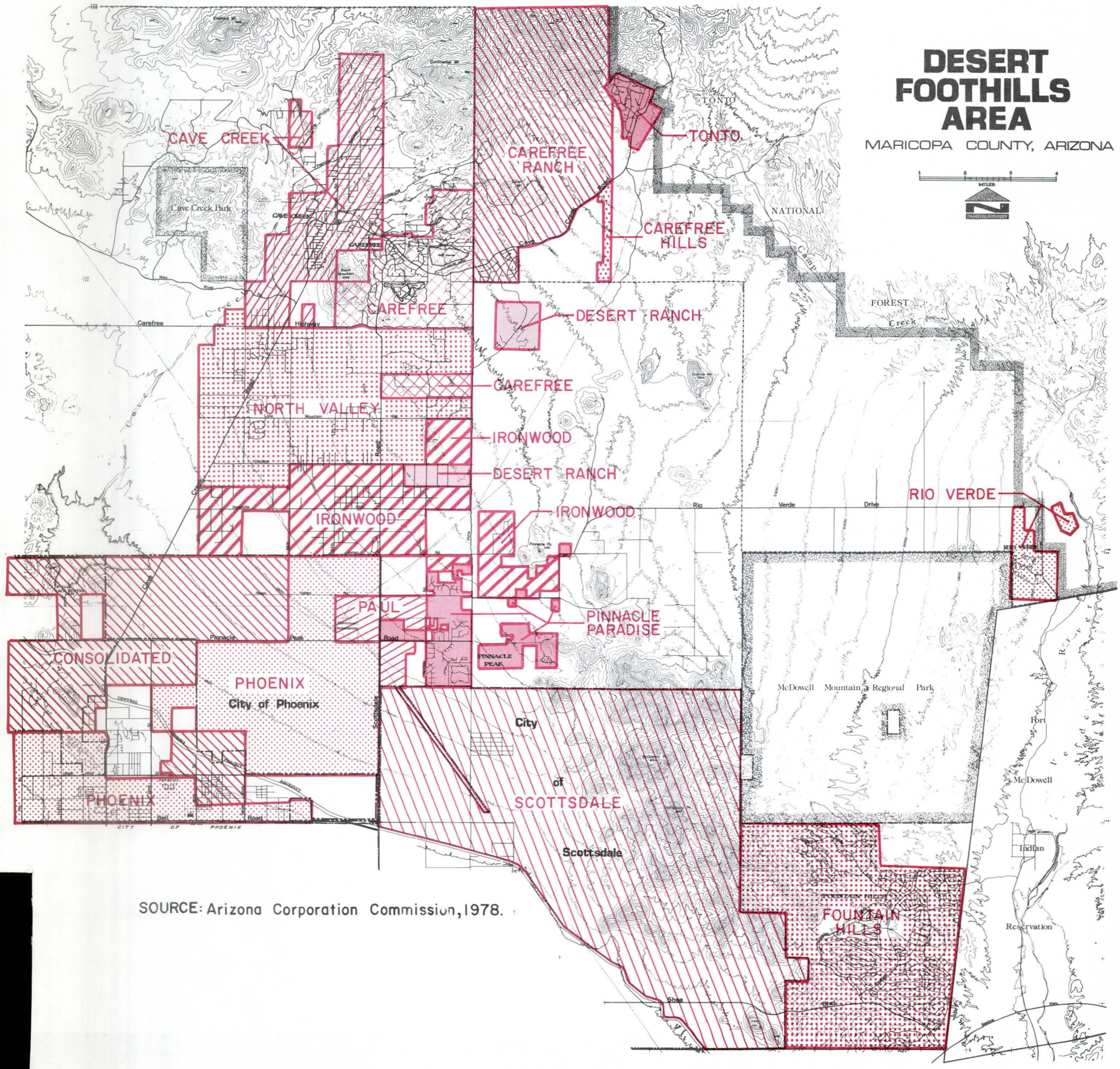
Private water companies within the study area are listed in Table 21. They vary in service area size from only a few acres to several thousand acres. Many serve only small scattered developments and some are inoperative at this time.

Private water companies are classified as public utility corporations. Consequently, the service rates charged by private water companies are set by the Arizona Corporation Commission which also establishes rules and regulations governing the operation and business transactions of these companies. Municipal service rates are set by the respective city or town.

The groundwater legislation adopted in July, 1980 does not allow future subdivision activity unless an area has an assured 100 year water supply. This determination is made according to established procedures available from the Arizona Department of Water Resources.

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



SOURCE: Arizona Corporation Commission, 1978.

WATER FRANCHISE DISTRICTS

MAP 17

TABLE 21

WATER FRANCHISE DISTRICTS

DISTRICT	ACRES	SQUARE MILES
Cave Creek	5,460	8.5
Carefree	4,900	7.7
Carefree Ranch	9,300	14.5
Tonto	700	1.1
Carefree Hills	210	0.3
Desert Ranch	1,120	1.8
North Valley	10,960	17.1
Ironwood	6,960	10.9
Pinnacle Paradise	2,480	3.9
Rio Verde	1,000	1.6
Paul	1,400	2.2
Chaparral	12,000	18.7
Consolidated	6,720	10.5
TOTAL	63,210	98.8

Source: Maricopa County Planning Department, 1979.

Wastewater Treatment

In built up areas of the Foothills it is common to find a privately owned central water system serving a development with individual septic systems. While this arrangement allows for slightly higher densities than individual water and sewer systems, public health requirements dictate that adequate space be provided between the septic tank fields and any dwelling. Once provisions are made for individual utility service, later service by central utilities are very expensive.

Small "package" sewer plants which economically serve 75-500 homes also serve urban densities in isolated areas of the Foothills. Several small "package"plants have been proposed or are operating to serve resorts or master planned communities in Foothills:

Carefree/Cave Creek

At present, two small privately owned treatment plants with a combined capacity of 0.14 mgd serve the communities of Carefree and Cave Creek. The plants operate as extended aeration units with oxidation ponds that discharge to golf course irrigation ponds. One plant has a capacity of 0.12 mgd and serves the downtown Carefree and Boulders areas. The other small plant has a capacity of 0.015 mgd and serves a residential development. By the year 2000, Carefree is projected to have a population of 5,400, requiring treatment of 0.5 mgd; Cave Creek is projected to have a population of 3,600 and flows of 0.3 mgd. To meet population growth and prevent health hazards wastewater treatment service will have to be expanded in the Carefree/Cave Creek area and an appropriate disposal/reuse option selected. Analysis showns that it would not be economical for the area to be connected into a single regional system.

Fountain Hills

The Fountain Hills Sanitary District operates a recently built (1974) modified activated sludge secondary treatment facility. The capacity of the facility is 0.5 mgd. Population for Fountain Hills is expected to reach 22,500 by the year 2000, requiring treatment capacity of 2.0 mgd. The plant has no discharge permit; effluent is reused for golf course irrigation.

Other Package Systems

The planned community of Rio Verde and the Rawhide commercial recreation center are served by small package plants. Other package plants are planned for developments in the Pinnacle Peak area.

According to the MAG-208 Small Treatment Plant Study, small plants are a practical and feasible although expensive alternative to large centralized collection systems. Among the advantages of small plants are low initial cost, ease of installation and ease of expansion. Critics of small plants point out that small plants have high operating costs, are difficult to maintain, have operational problems, and are difficult to regulate. MAG is presently preparing a report concerning small treatment plants, including the number, location, and size of the facilities.

Scattered low density rural development in the County may be served by individual on-site septic tanks. Septic tanks are private self-contained sewage disposal systems. In a septic system, wastewater is changed by the action of bacteria into harmless gasses and liquids. This treatment approach will only work with small amounts of sewage spread over certain soil types. Large scale or "community septic systems" are to be avoided. Past experience, engineering practice and bacteriological research have proved that the old-time sewage cesspools or sewage lagoons are a menace to health and a nuisance to surrounding property owners. All septic and sanitary sewerage treatment systems are covered by the Maricopa County Health Code which is administered by the County Health Department.

XIV

TRANSPORTATION

CHAPTER IVX

TRANSPORTATION

The transportation system serving an area contributes to long-term development trends. Within the Desert Foothills the transportation system provides basic access to the various subareas. The area's low residential densities and distant location make any type of mass transit service premature. The aviation services in the area include Scottsdale Municipal Airport and the private Carefree Airport. The primary role of the major street and highway system in the Desert Foothills area is providing access to the Phoenix urban area.

Highways

The Maricopa County Highway Department builds and maintains over 3,600 miles of roads. More than 2,000 miles are paved in the County along with 15 miles of landscaped medians. The activities of the County Highway Department are especially important in the Desert Foothills because there are no State highways or municipal roads in the area.

As a rural sparsely settled area the paved and unpaved roads maintained by the County are critical to the area's transportation needs. The present road network in the study area reflects the grid street system common to the Phoenix Metropolitan area. Under this system most of the traffic is carried on major section line roads. The basic road network is expanded by extending and later paving each section road. This approach provides the maximum accessibility to a widely scattered population. In some cases, topography and public land ownership have resulted in variations from the gridiron alignment.

All the roads in the Desert Foothills are maintained by the County Highway Department except for private roads serving some individual homes and planned developments. The planned community of Fountain Hills is somewhat unique in that its internal street system is built and maintained by a special road districts. The districts are an independent special governmental units governed by their own elected Board.

Streets and Highway Classification

Streets and highways can be classified according to ownership or according to their capacity. Since almost all the roads in the Desert Foothills are under the jurisdiction of the County Highway Department it is more meaningful to classify streets according to their intended use.

Individual streets and highways do not function independently. They are interconnected to form a transportation network. This network plays a dual role in providing both access to

property and travel mobility. Property access is required at both ends of any trip. On the other hand, mobility can be provided at different levels, usually called "levels of service".

In order to provide different levels of service, a street hierarchy has been established. Local streets emphasize the land access function. Regional or arterial streets emphasize mobility through the area. Collector streets try to provide balanced service. A more detailed explanation is outlined below.

A Functional Classification of streets

Arterial - This class of street brings traffic to and from the expressway and serves those major movements of traffic within or through the urban area that are not served by expressways. Arterials handle trips between different areas of the city or County and should form an integrated system. The length of the typical trip on the system should exceed one mile.

Collector - This class of street serves internal traffic movements within a city or County area, such as a subdivision, and connects this area with the arterial system. Collectors do not handle long through trips. In gridiron street patterns, such as the Desert Foothills, a street of several miles in length may serve as a collector rather than an arterial if the predominant use is to reach the next junction with an arterial and then turn off.

Local - The sole function of local streets is to provide access to adjacent land or to collector roads. These streets account for a large percentage of the total street mileage of the city and County, but carry a small proportion of the vehicle miles of travel.

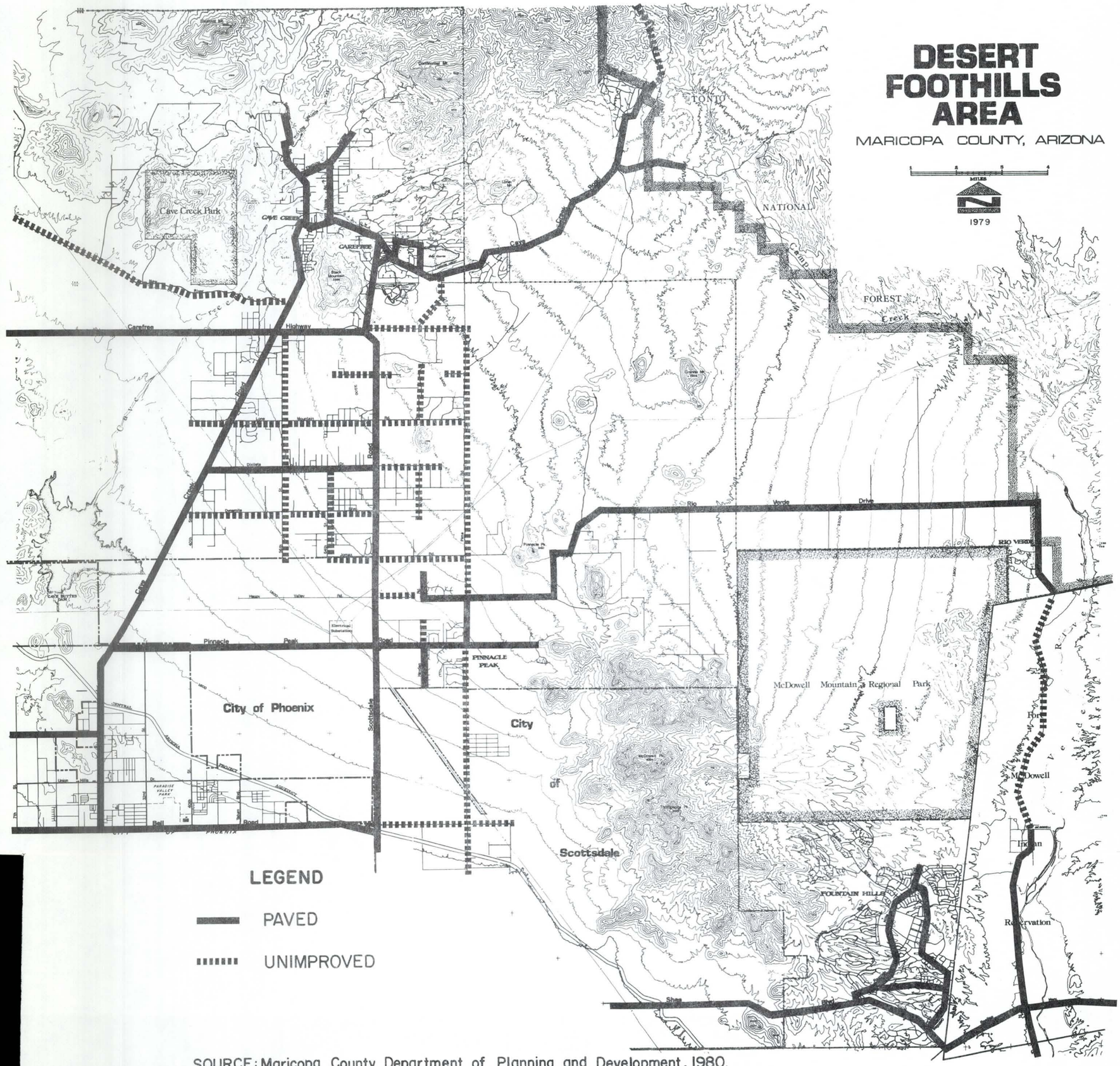
A good transportation system should support land use objectives while providing improved traffic circulation. The design of the street system should reflect the classification concept and the desired land use objectives for each subarea.

Scottsdale Road, Cave Creek Road, and Shea Boulevard serve as the major arterials for the area. Carefree Highway also serves as a major arterial for traffic moving to I-17 or the northwestern segment of the metropolitan area. Rio Verde is a minor arterial which provides access to the Rio Verde development. Most of the remaining major streets within the area serve as collectors.

Street Condition and Use

The existing road surfaces of major streets is shown on Map 18. It reflects the major streets and the unimproved collector streets between Cave Creek Road and Pima Road. Many of the local residential streets within the area have improved surfaces.

The County Highway Department has measured traffic volumes along major routes in the Foothills. One of the best overall measures of traffic volume is ADT (Average Daily Traffic). ADT represents the typical daily traffic volume on various County roads. See Map 19. Table 22 lists the major streets in the Foothills according to traffic volume.



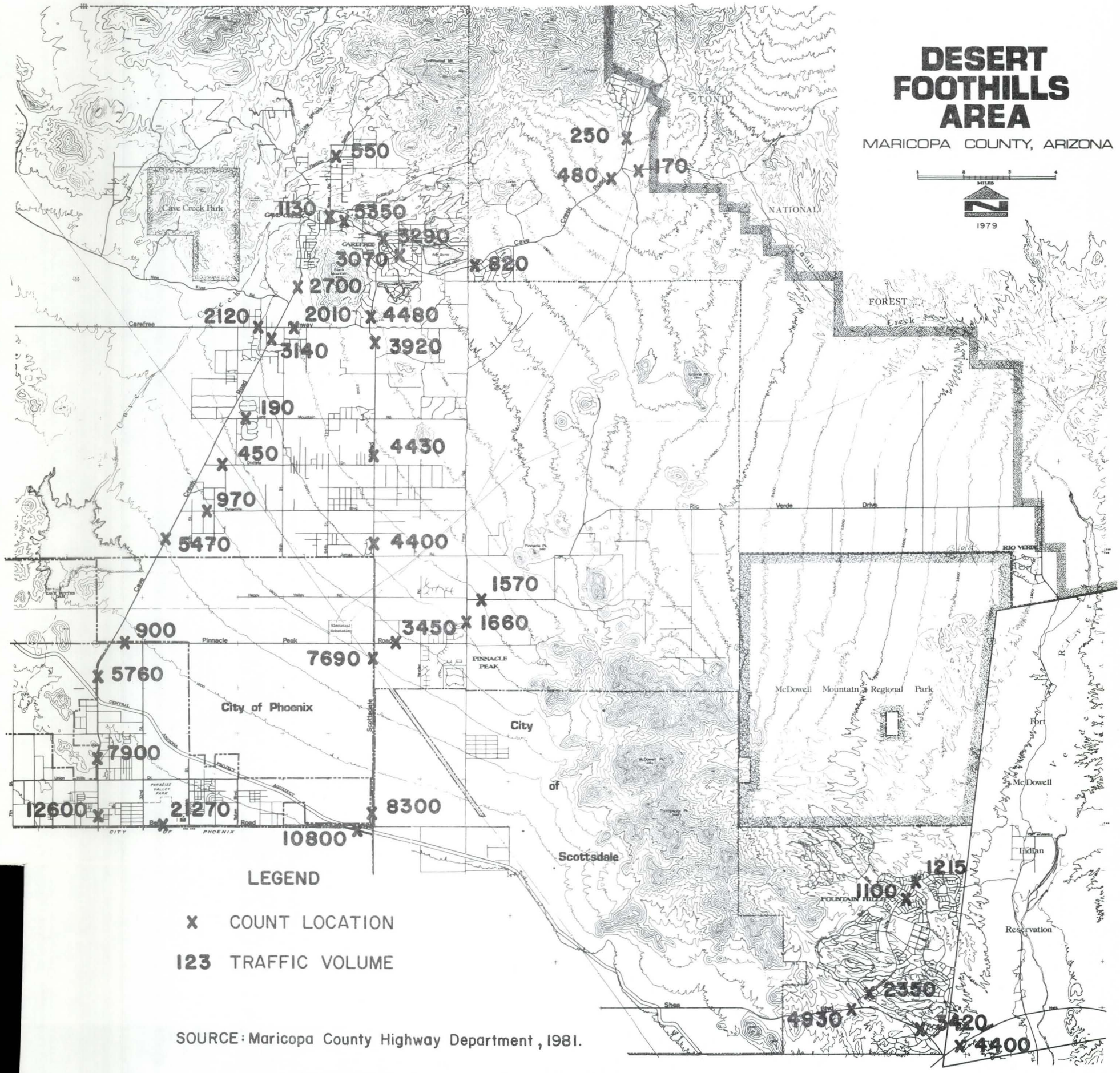
SOURCE: Maricopa County Department of Planning and Development, 1980.

EXISTING ROAD SURFACES

MAP 18

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



LEGEND

X COUNT LOCATION

123 TRAFFIC VOLUME

SOURCE: Maricopa County Highway Department, 1981.

AVERAGE DAILY TRAFFIC

MAP 19

TABLE 22

(1980) TRAFFIC VOLUMES

STREET	ADT
Beeline Highway	18,900
Scottsdale Road	6,900
Cave Creek Road	4,500
Tom Darlington Drive	3,700
Shea Boulevard	3,400
Saguaro Boulevard	3,200
Pinnacle Peak	2,800
Carefree Highway	2,000
Fountain Hills Drive	1,800

No other streets in the Foothills north of the Central Arizona Project have more than 1,000 ADT.

Transportation Problems in the Foothills

The Desert Foothills faces several ongoing transportation problems. Many of the area's collector and minor streets are unimproved. While not all streets need to be improved, all collector streets should be improved and elevated over the major washes.

The grid street system so prevalent in the Phoenix area is incomplete in the Foothills. There are many gaps or links missing in the street system. These gaps are caused by the topography or the extensive state or private landholdings in the Foothills. This makes access to some land holdings more difficult.

Street Right-of-Way is another concern. Roads have developed in areas without adequate right-of-way for their existing and projected traffic. In many developing areas questions of legal access further complicate the picture. A comprehensive study of existing and future right-of way needs would be useful for future planning and it could ensure that all property had access to a public street.

Planned Highway Improvements

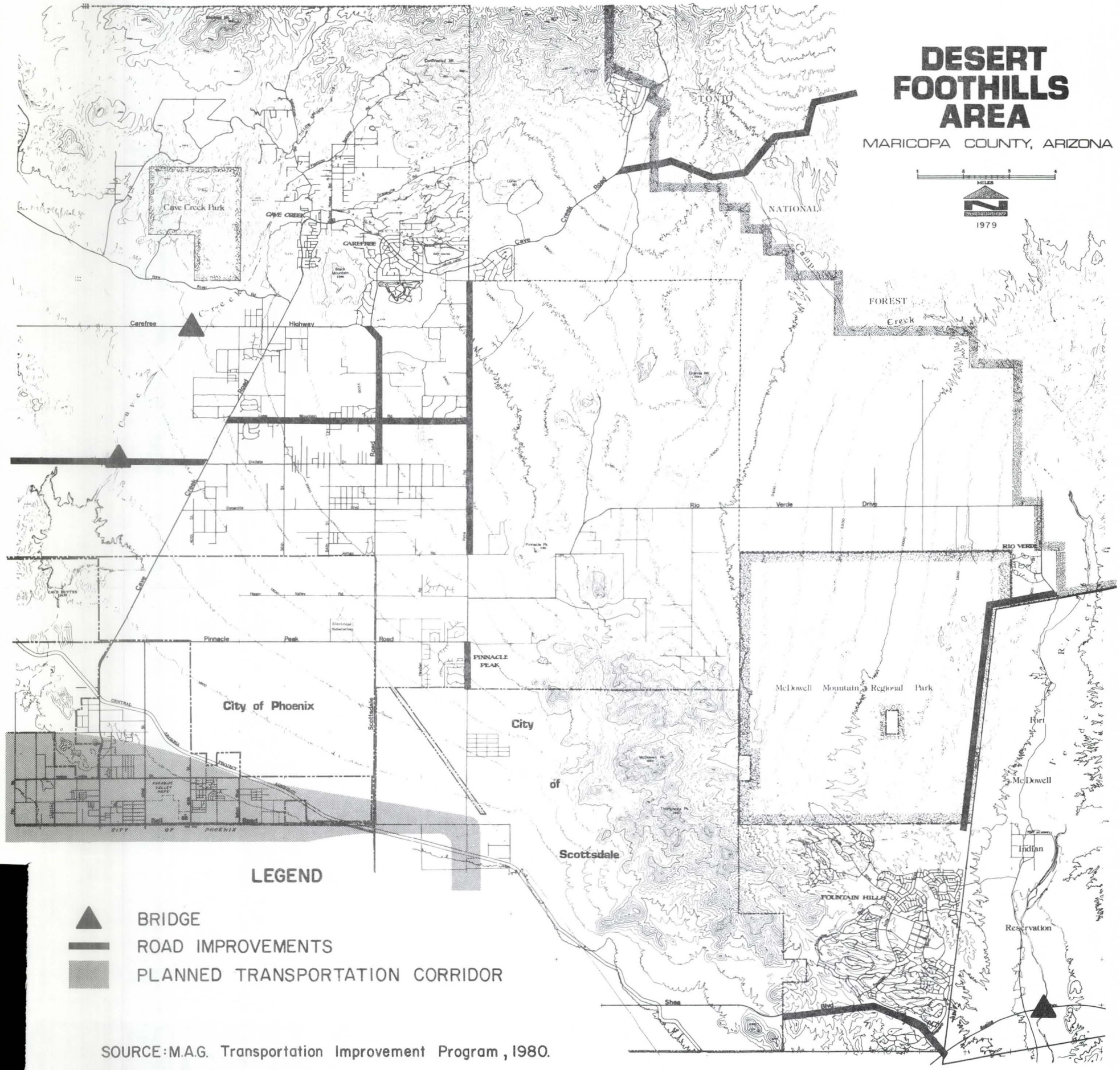
The Maricopa County Highway Department is responsible for the present highway network in the Desert Foothills. The grid approach was adopted by the Highway Department because it is flexible and can accomodate new growth in any direction. Now that the basic pattern is set, major new roads will follow the basic highway grid.

Major road paving, bridge, and resurfacing work are programmed yearly and are contained in the MAG-Transportation Improvement Program. Funding for these improvements will come from a variety of federal, state, and local sources. Map 20 shows transportation improvements programmed for the Desert Foothills over the next five years.

Major highway improvements of regional significance are planned at a regional level. Regional transportation planning is conducted by the Arizona Department of Transportation (ADOT) through an agreement for services with the Maricopa Association of Governments (MAG). The staff provided by ADOT is known as the Maricopa Association of Governments

DESERT FOOTHILLS AREA

MARICOPA COUNTY, ARIZONA



LEGEND

- BRIDGE
- ROAD IMPROVEMENTS
- PLANNED TRANSPORTATION CORRIDOR

SOURCE: M.A.G. Transportation Improvement Program, 1980.

PROGRAMMED TRANSPORTATION IMPROVEMENTS

MAP 20

Transportation and Planning Office (MAGTPO). MAG, as the designated Metropolitan Planning Organization, provides the forum for cooperative planning by all jurisdictions within the County.

The Transportation System Plan was adopted in 1980 by the MAG Regional Council as part of the Guide for Regional Development and Transportation. Of special importance to the Foothills is the Long-Range Transportation System Plan. This plan identifies highway corridors which will provide for anticipated travel needs to and beyond the year 2000. These corridors will eventually lead to roads which will become part of the State Highway System. One future State Highway corridor passes through the Foothills.

The outer loop transportation corridor is planned as a semi-circular bypass around Phoenix. It is anticipated that a freeway will be developed along the corridor. The corridor is well defined as it passes through the Foothills. Beginning at the Price/Superstition interchange in Mesa, the east leg of the outer loop corridor extends north on the Price/Pima Road alignment through the center of the Foothills. The corridor extends northward until it turns west on an alignment between Beardsley and Greenway Roads (the north loop) and parallels Bell Road until it intersects with I-17. See Map 20. Implementation of the outer loop plan will greatly improve access to the Foothills from all the east valley.

Aviation

The Desert Foothills is directly served by the Carefree Airport located three miles east of Carefree. This private airport has a 3,900 ft. runway and serves as home for 30 aircraft. It is anticipated that the airport will continue to accomodate air traffic to the year 2000. The following table shows MAG estimates of future airport operation. See Table 23.

TABLE 23

OPERATIONS AT CAREFREE AIRPORT

	1977 Actual	1985	1990	2000
Based Aircraft	29	35	47	88
Annual Operations	20,500	24,700	33,200	62,200
Peak Hour Operations	24	29	39	57

Source: Bucher and Willis, 1981

Carefree airport has little potential for expansion. The airport is constrained beyond its present boundaries by adjacent residential development.

The Carefree Airport has major community and land use conflicts that become increasingly serious when expansion options are studied. Residential development adjacent to the

airport on the north precludes expansion in that direction while a local highway parallels the airport on the south limiting major runway expansion. Pima Road, a proposed major north-south arterial street would be in direct conflict with any major runway extension project. Increased demand for development in the surrounding area will cause adverse community and land use impacts with relationship to the airport. Even with the installation of additional navigation aids and increased paving, the Carefree Airport is limited to a maximum of 100 planes.

Since the continuing operation of the Carefree Airport cannot be assured, other potential airport sites in the Desert Foothills have been investigated. Since the Foothills contain several small diameter hills and numerous washes few adequate airport sites are available.

None of the potential sites are as safe or secure as the Scottsdale Municipal Airport at the southern border of the Desert Foothills. This is the fourth busiest airport in the County with a full range of aircraft services.

XV

CULTURAL RESOURCES

CHAPTER XV

CULTURAL RESOURCES

Archaeological Resources

Various nomadic Indian tribes inhabited the areas now known as Arizona and Maricopa County from as early as 9,000 B.C. Very little is known as to who these ancient people were, where they were going, or what they carried with them.

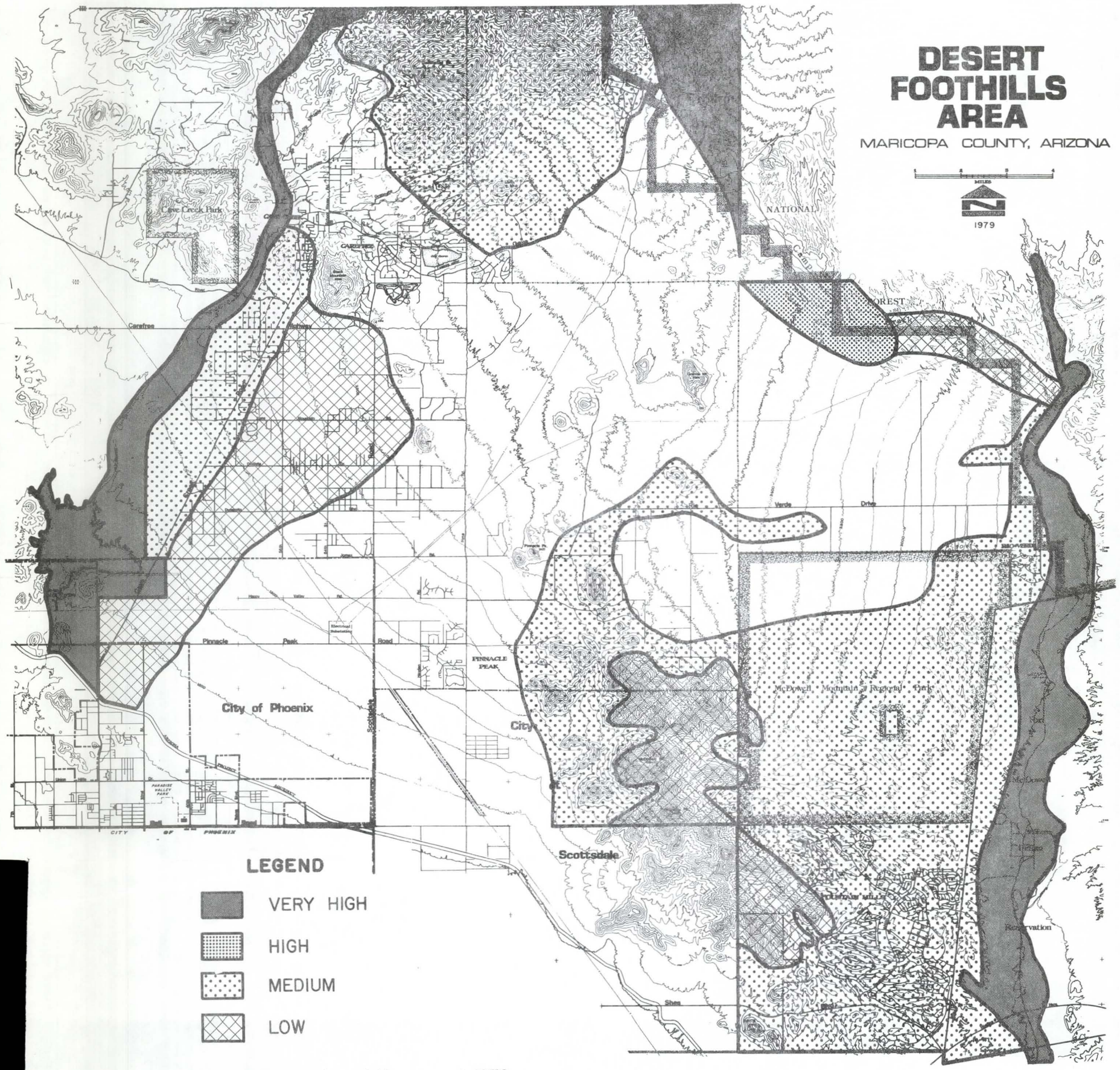
The first known permanent settlers in Maricopa County were the canal builders or Hohokam Indians. These people are believed to have migrated from Mexico around 200 to 300 A.D. into much of central and southern Arizona. Their agrarian culture flourished in the Salt River Valley until about 1400 to 1450 A.D. when they abandoned the valley for unknown reasons.

The Hohokam initially planted their crops on the river terraces and depended on the periodic flooding of the Gila and Salt Rivers to irrigate their fields. Later, canal irrigation was introduced. Over 250 miles of canals were eventually built in the Phoenix metropolitan area. The largest of these canals was thirty feet wide and seven feet deep.

At the earliest stages of development, the Hohokam lived in small farming communities which were widely distributed over the region. As cultural development continued, they gradually became concentrated into fewer and larger villages. Their dwellings evolved from pit houses, to structures built above ground, to villages which were eventually walled. Some of the most characteristic traits of the Hohokam included waddle and daub houses with sunken floors, cremation of the dead, the construction of large earthen structures such as platform mounds and ball courts, the manufacture of clay figurines, shell and stone jewelry and tools, and painted pottery. (Beard MAG Memo #1).

Over 800 Hohokam sites have been recorded within the Salt River valley. The majority of these sites are located along major rivers, their tributaries, and adjacent low lying stream terraces. These remains vary from seasonal villages to large permanent habitation sites. Many have been destroyed due to urbanization and agricultural development or are badly vandalized. A small percentage have been preserved or carefully studied.

A complete survey of all potential archaeological sites in Maricopa County has never been completed. However, preliminary studies indicate that the potential for significant archaeological resources is extremely high in certain portions of the Desert Foothills. These are shown on Map 21.



SOURCE: Bureau of Land Management, 1978.

ARCHAEOLOGICAL RESOURCE POTENTIAL

MAP 21

Land development is a mixed blessing for those concerned with preserving archaeological resources. While construction crews often discover important sites, they also bury or build over some sites. Vandalism and the improper exploration of important sites is a continuing problem. Since archaeological resources are irreplaceable, anyone finding traces of earlier civilizations is encouraged to contact the Arizona State Historic Preservation Office in Phoenix. A staff Archaeologist is available to review important findings.

Also, the Foothills Archaeology Chapter of the Arizona Archaeology Society is active in the planning area. Robert K. Patterson, president of the Foothills chapter, is familiar with most of the prehistoric sites in the Cave Creek Wash. While many sites are on private land, two sites open to the public are in Cave Creek Regional Park and a second small pit house on Vermeersch Road in Cave Creek. Several archaeological sites are reported to be in the Tonto National Forest.

Historical Background

The history of the Desert Foothills is typically southwest. The land was originally occupied by Indians, fought over for cattle and sheep grazing rights, mined by prospectors, later abandoned to be followed by modern communities.

The basic natural resources of the Salt River Valley - water, soil and climate continued to attract the cultures that followed the Hohokam.

Because of the difficulties with warring Indian tribes to the south, the Spaniards and later the Mexican settlers never penetrated the Salt River Valley. When permanent Anglo-American settlement of the area began after the Civil War the land now occupied by the cities of Phoenix, Scottsdale, Tempe and Mesa was essentially vacant. Fort McDowell, establisehd in 1865, was the only fort ever in existence in Maricopa County. The fort has had special historical significance in the settlement and development of the Salt River Valley. The remains of the fort itself are found on the Fort McDowell Indian Reservation one and one half miles southeast of the park boundary.

The cattle industry acquired a foothold in the Foothills shortly after the completion of Fort McDowell. Cattle ranchers roamed the area as early as 1870 grazing small herds of cattle, while Apache, Pima and Maricopa Indians still made hunting expeditions into the area.

Following the first cattlemen were the mining prospectors, who dug deep down into the hills of the area. As early as 1876, William Brechet established a mining claim "The Phoenix Gold Mine." This was one of the biggest mining operations in Cave Creek. The early mining period brought a great boom to Cave Creek; many houses were built and saloons and ice cream parlors could be found around the cottonwood center. At one time the population of Cave Creek exceed that of Phoenix. It is estimated that over $250,000 in gold, silver and other metals were mined near Cave Creek.

Around 1882, R.S. Cartwright and his two sons started cattle raising in the Cave Creek area on a large scale and were soon followed by many other families from Phoenix.

In 1898, Bob Scott drove the first sheep into Bloody Basin and the area soon became a major grazing area for sheep. The importance of grassland for the cattlemen and sheepherders was parallel with the quest for mineral deposits by the early prospectors, and conflicts of property rights arose quite frequently.

The first school teaching position in the area was presented to Mr. Alfred C. Lockwood in 1879. He began his teaching career in a one-room board and batten school house and later became one of Arizona's most respected Supreme Court Judges.

Lon Mergargee started out as one of the early cattlemen of the Cave Creek area, but the long drought from 1894 to 1904 ended Lon's dream. He turned his thoughts and time to painting and became a well-known artist of the Southwest.

In 1886, one of the first land surveys was made by the Lynville Family, who made an extensive survey of their land and found several survey markings from early settlers. In 1909, the Cave Creek township was first surveyed by the Federal Government and at that time homestead rights to other settlers were established, however, the drought of 1894 and the depletion of mineral deposits in the mines caused many of the prospectors and cattlemen to leave. The village folded back, houses and recreation places were moved, and Cave Creek became a quiet town.

In 1903, the Tonto National Forest was established and became a recreational and outing area for many Phoenix residents. This in turn created a spark of life in Cave Creek as the Cave Creek road was the principal means of access to the National Forest.

In 1935, the construction of Bartlett Dam started and was soon followed by the construction of Horseshoe Dam. The roads to these dam sites ran through Cave Creek and once again Cave Creek expanded overnight with construction gang camps, restaurants and saloons. As in the prospectors' and cattlemen's day it was a busy, noisy place. But with the completion of the dams in 1941 Cave Creek folded back to become a small town.

After World War II, several veterans who were looking for a quiet out-of-the-way place to live located in Cave Creek. In 1949, the newly-formed Cave Creek Association established a united community effort in working out a program with the County Highway Department and succeeded in raising the necessary funds through private subscription to supplement the County for the paving of Cave Creek Road to Phoenix. This put Cave Creek within 40 minutes of downtown Phoenix and opened up the area to many Phoenicians for weekend and summer homes.

From 1950 onward the Cave Creek Association has served as an advocate for the preservation of the desert. The following quote appeared in the April, 1950 issue of Arizona Highways "...a conclusion has been reached by the residents. In the Cave Creek Valley is an exceptional bit of unspoiled desert, which through wise guidance and development should be saved and preserved by those of larger or small means who appreciate its unique natural values." From "Cave Creek" by Nora Woods, published in Arizona Highways, April, 1950.

In 1958, the planning of Carefree as a new community began. Actual development and construction followed immediately in 1959. This development renewed interest and growth in the general Cave Creek area which once again grew in population. The Carefree development includes homes and varied facilities such as the Carefree Inn, the Desert Forest Golf Course, the Carefree Airport and a planned retail service center.

In 1963, the International Restaurant and the Carefree Inn were opened and apartment accommodations for about 70 units were built. This sparked the area once again. The Carefree Inn has now become internationally known.

In March of 1966, the Black Mountain Gas Company turned on natural gas in the area, having run lines in Carefree and Cave Creek and bringing a main across Carefree Highway from the El Paso Gas Line west of the Black Canyon Freeway.

During more recent years the Cave Creek-Carefree area has become the site of large planned residential developments. The area has become the site of exclusive custom houses and several proposed resorts. The residents of the area continue to have a stong local identification and they actively participate in community affairs.

XVI
SELECTED REFERENCES

CHAPTER XVI

DESERT FOOTHILLS
SELECTED REFERENCES AND RESOURCES

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