INVENTORY AND ANALYSIS

Demographic Characteristics and Projections

This portion of the Rainbow Valley Area Plan includes analysis of existing demographic and land use conditions.

Planning Area Growth and Change

The original Little Rainbow Valley Planning Area encompassed approximately 48 square miles. Due to anticipated residential growth south of the original planning area and comments received during the public participation process, the study area was extended south to the northern boundary of the Sonoran Desert National Monument. The extended area adds approximately 34 square miles, bringing the total area of the updated planning area to approximately 82 square miles. **Figure 2-Original Plan Boundary** shows the geographical extent of the old plan versus the expanded area of the updated plan. Demographic figures for the original plan have been retained to help ensure historical accuracy.

Population and Demographic Characteristics: Rainbow Valley Planning Area

This section highlights historic and projected population and housing unit data to the year 2010. Census data is reviewed for the original planning area, the extended planning area, and for Maricopa County as a whole. Population projections are derived from Maricopa County, the Arizona Department of Economic Security, and Maricopa Association of Governments models, and estimates are based on present and historic census figures and trends. The Rainbow Valley planning area analyzes parts of the incorporated communities of Buckeye and Goodyear.

Table 1 shows historic and projected population that was prepared for the 1992 Little Rainbow Valley Land Use Plan, and adds updated population figures available from the 2000 U.S. Census. Alternative scenarios for projected population are discussed later in this section under *Future Population and Housing Trends*.

Table 2 shows historic and projected population in the extended planning area that includes the new area south of Germann Road. Housing unit data from the 1992 Area Plan is provided in **Table 3** while updated housing unit data is shown in **Table 4.**

Based on 1999 MAG projections, Persons per Occupied Resident Housing Unit (PPOH) for both the Town of Buckeye and Clearwater Utilities Water Co. (local water providers) was 3.02. A conservative population growth rate of 1.9% per year was assumed, which is the annual increase in unincorporated Maricopa County.

As of this writing, 2000 Census figures were not available for housing units at the area plan level. The method of estimating housing units used in **Table 4** was to start with population and divide by a Persons per Occupied Housing Unit. This results in an estimated number of housing units. Other available information can also be useful to project trends in housing units. For example, Clearwater Utilities Water Co. (**Figure 3-Water Service Areas**) keeps records of numbers of households in the service area. There were 463 occupied households as of October 27,1995 census data. By July 1, 1999 there were 625 occupied households, representing an increase of approximately 44 households per year in that service area (a higher rate of increase than the projections in **Table 3**). However, the planning area also contains slower growing areas that are outside of water service areas. **Table 5** provides persons per household data, and **Table 6** provides current population distribution by age and sex for the updated planning area. **Table 7** shows the most recent available data for median income in the planning area region.

Historical Population Analysis

In 1985, the Little Rainbow Valley planning area's population was 859. By 1990, total population had increased 101 percent to 1,727. By 2000, population had increased 107 percent over 10 years to 3,582. It is important to note that these figures pertain to the original planning area. As shown in Table 1, Census 2000 data shows that planning area population grew faster than projections identified in the 1992 Little Rainbow Valley Land Use Plan.

Table 5
Persons Per Household

	Census 1985	Census 1990	Census 1995	Census 2000
1992 Little Rainbow Valley Land Use Plan	3.19	2.95	Not Available	3.0
2003 Rainbow Valley Area Plan	Not Available	3.0	Not Available	3.0
Maricopa County	2.12	2.23	2.12	2.67

Source: Little Rainbow Valley Land Use Plan; 2000 U.S. Census

Table 6
Population Distribution by Age and Gender

	Gender		Age Cohort				
	Male	Female	Under 5	5-17	18-54	55-85	85 >
2003 Rainbow Valley Area Plan [1]	55	45	7%	20%	58%	15%	< 1%
Maricopa County [2]	50	50	8%	19%	54%	18%	1%

1. U.S. Census Bureau Zip Code Tabulation Area (ZCTA) Zip Code Data
2. 2000 U.S. Census Bureau data
(Note: ZCTAs are not U.S. Postal Service ZIP Codes. ZCTAs are approximate area representations of United States Postal Service ZIP Code service areas.

Table 7
1990 Median Income

Area	Median Household Income
2003 Rainbow Valley Area Plan	$40,976
Maricopa County	$30,797

Source: 1990 U.S. Census

In 1990, population in the extended planning area (south of Germann Road) was 338, decreasing by 155 to 183 people in 2000. Although a small amount of population was gained by extending the planning area, growth rates in the original area versus the extended area are dramatically different. The Rainbow Valley planning area includes a small amount of the Estrella Mountain Ranch community along its central eastern border. Higher density residential subdivisions contained in that community add population to the planning area.

Through analysis of 2000 Census data and corrections for census block population data by use of aerial photographs, a total population of 3,765 was calculated for the updated Rainbow Valley planning area. This represents an increase of 82.3 percent in population from 1990 to 2000. In comparison, Maricopa County's growth rate from 1990 to 2000 was 44.8 percent.

Historical Housing Unit Analysis

As shown in **Table 3**, in 1985 there were only 269 housing units in the original Little Rainbow Valley planning area. By 1990, this number had increased 117 percent to 584 units. Between 1990 and 2000, housing units increased 104 percent to 1194. The majority of housing is located south of Elliot Road and north of Ray Road. When including the extended planning area (**Table 4**), between 1990 and 2000 housing units increased 82 percent to 1255 units. Housing unit growth south of Germann Road has been very slow with an actual decrease in population.

Growth in Estrella Mountain Ranch started in the early 1990s. The portion of Estrella Mountain Ranch within the planning area (west of the Citrus Road alignment) contained only a handful of homes prior to 1990. The Beazer Homes subdivision at the northwest corner of Elliot Road and San Gabriel Street is nearly built out, with building beginning in 1998. Subdivisions to the south of Elliot Road at this location are less than 50 percent built out.

Future Population and Housing Trends

The Rainbow Valley Area Plan update represents an important and timely approach to Southwest Valley planning. Considering the rapid expansion projected for the Southwest Valley it is critical to consider a slightly more regional scope for projecting future conditions. Population projections vary widely depending on the method of projection and assumptions about future conditions.

The historical growth rate for updated Rainbow Valley planning area from 1990 to 2000 was 82.3%. Using a simple linear regression method to project future population, the planning area would have a population of 6,864 by 2010 and a

population of 12,516 by 2020. This is a higher and probably more realistic projection than the conservative growth rate (used in Table 2) of 1.9% per year that results in a projected population of only 4,719 by 2020. These two different population projection scenarios are summarized in **Table 8**.

Factors that are likely to affect future population growth, housing trends, and expansion in the Rainbow Valley planning area are discussed in the *Growth Areas* and *Cost of Development* sections of this area plan.

Table 8
Population Growth Scenarios

Scenario	Census 2000	Projection 2005	Projection 2010	Projection 2015	Projection 2020
A (conservative rate)	3,765	4,137	4,545	4,631	4,719
% of County Total	Less than 1%	Less than 1%	Less than 1%	Less than 1%	Less than 1%
B (historical rate)	3,765	5,315	6,865	9,690	12,516
% of County Total	Less than 1%	Less than 1%	Less than 1%	Less than 1%	Less than 1%
Maricopa County	3,072,149	3,329,561	3,709,566	4,101,784	4,516,090

Note: Scenario A based on assumed 1.9% annual increase in unincorporated Maricopa County.
Scenario B based on historical growth rate in Rainbow Valley from 1990-2000

LAND USE

Existing Land Use and Development

The Rainbow Valley planning area has historically experienced slow growth relative to the core urbanizing areas of Maricopa County. The 82 square mile planning area is bounded on the north by Southern Avenue, on the south by the El Paso Gasline Road, on the east by Citrus Road, and on the west by Rainbow Road. Land use patterns vary from large blocks of farm and dairy land north of the Gila River and in the southern region of the planning area to undeveloped open space coinciding with floodplains and areas of steep slopes. Rural residential development has primarily occurred in the flatter, central portion of the region. A more in-depth analysis of land use is contained in the following sections:

1. Land Development Patterns
2. Zoning Regulations
3. Public Land Ownership
4. Public Facilities and Utilities
5. Special Planning Concerns

Land Development Patterns

Figure 4 - Existing Land Use illustrates the variety of land use patterns that exist within this region. A significant amount of the Rainbow Valley planning area is comprised of open space, which is defined in the Open Space element of this Area Plan. These open space areas are predominantly Bureau of Land Management (BLM) managed lands (25.7 sq. mi.). The Arizona State Land Department is the next largest public landowner with 8.45 sq. mi. available for sale or lease. Four public school sites are located in the planning area, two of them in the Estrella Mountain Ranch community.

The remainder of this area is privately owned land that is mostly farmland, undeveloped desert, floodplains, or scattered, low-density residential development. Agricultural land uses, including dairy operations, comprise roughly one-quarter of the total land area. The portion of the planning area north of the Gila River contains some of the prime agricultural land in the valley and has a long history of intensive agricultural use; predominately citrus, cotton, and alfalfa. Much of the agricultural land north of the river includes dairy operations, many of which are expanding in the number of animals and in size. A large portion of the farmland in the southern region has been abandoned due to lowering of the groundwater table.

A small amount of industrial uses are located between MC-85 and Southern Avenue. These include steel fabricating, farm supply, trucking, and chemical mixing industries. The largest of these is a steel joist fabricating facility. In August 1999, the Maricopa

County Board of Supervisors approved a request to rezone 103.6 acres from Rural-43 to Ind-3 Industrial Unit Plan of Development (I.U.P.D.). Located south of Southern Avenue and north of the rail line, between Dean and Rainbow Roads, the facility is planned to be developed in two phases. The first phase involves construction of the joist manufacturing facility, while the second phase involves later development of the west portion of the site with other compatible industrial uses. An I.U.P.D. requires that a precise plan of development be submitted to the Planning and Zoning Commission and the Board of Supervisors before any development will be permitted.

The eastern portion of the planning area is made up of the growing community of Estrella Mountain Ranch, located in the City of Goodyear. This community will be discussed further in *Special Planning Concerns*. Presently, most of this area is undeveloped Sonoran Desert. In addition, the Town of Buckeye has a few small annexed areas in the northernmost region of the planning area. The incorporated communities of Goodyear and Buckeye are included in this area plan because of their impact on Rainbow Valley. However, growth in these areas will be governed by the general plans of the incorporated communities and not by Maricopa County's Comprehensive Plan or area plans.

Zoning Regulations

The planning area includes a variety of zoning districts that Maricopa County enforces through its adopted zoning ordinance. Established zoning district categories are found in *Appendix B-Zoning District Categories* along with an existing zoning map shown in **Figure 16**.

Public Land Ownership

Figure 5-Land Ownership identifies publicly held property in the Rainbow Valley planning area. Public property includes areas managed by the federal government, the State of Arizona, and Maricopa County. Lands owned by the Flood Control District of Maricopa County (FCDMC) are not shown on the land ownership map but generally correspond to the Gila River floodway.

Federal Land

The United State Department of Interior, BLM administers all of the federal land in the planning area. The majority of the approximately 16,445 acres of BLM land is located in the southwest portion of the planning area, which also contains some non-developable steep topography. Some smaller tracts are located along the Gila River and near Pecos Road, east of Tuthill Road. Primary economic uses of BLM land in this area are agriculture, livestock grazing, mining, and recreation.[1]

[1] USDI Bureau of Land Management. Lower Gila South Resource Management Plan, Environmental Impact Statement, Phoenix District, Arizona, August 1985

BLM land management is governed by the 1976 *Federal Land Policy and Management Act,* which declares it is the policy of the United States to retain public lands in federal ownership unless it is determined, through a land use plan, that disposal of a particular parcel will serve the national interest. Such parcels can be made available for sale if they meet one of three criteria: 1) they are scattered, isolated tracts that are difficult or uneconomical to manage; 2) they were acquired for a specific purpose and are no longer needed for the original purpose; or 3) disposal of the land serves important public objectives such as community or economic development.

According to BLM's *Lower Gila South Resource Management Plan/Environmental Impact Statement*, each land case is evaluated on a case-by-case basis. When determined that a land disposal action is in the public interest, it may take place through state and private exchanges and sales. Other forms of disposal such as Recreation and Public Purpose would also be an appropriate form of disposal. The main goal of land exchanges is to allow the BLM to acquire lands that will help support wildlife, wilderness, and recreation values on the public lands. It also reduces costs and improves public land management. Amendments to resource management plans could result in additional land exchanges and/or sales in the future.

In the past, large tracts of BLM land have been sold for community development in Maricopa County. For example in 1962, a private developer traded several hundred acres of ocean-front lands north of San Francisco (which became part of Point Reyes National Seashore) in exchange for over 6,000 acres of BLM desert lands northeast of Phoenix. In 1968, a working cattle ranch sold 4,500 additional acres in this area to the developer and by 1969 construction began on the new Town of Fountain Hills. In the mid-1980s, over 1,600 acres of BLM land at the base of the Estrella Foothills was acquired by private interests for inclusion in the Estrella Mountain Ranch development. Additional examples of exchanges include lands on which parts of the City of Peoria, and the communities of Mobile and Sun Valley have been developed. A recent proposed land exchange could create private lands through a complex property exchange in Yavapai County. If the exchange is made, thousands of acres of private land in the Prescott National Forest would be consolidated into public use for environmental interests, while the seller would receive thousands of acres of federal lands near Dewey, Humboldt, and Mayer in Yavapai County.

State Land

The Arizona State Land Department (ASLD) administers approximately 5,400 acres of State Trust land throughout the planning area. Development will likely occur in these areas when the ASLD provides lease contracts or offers land for sale. The mission of the ASLD is discussed in the Growth Areas element of this area plan. In accordance with state law, certain State Trust lands in the Rainbow Valley

planning area may be eligible for reclassification for conservation under the 1996 (amended in 1997, 1998, and 1999) Arizona Preserve Initiative (API). The API is designed to encourage preservation of select parcels of State Trust land in and around urban areas for open space to benefit future generations. State law details a process by which Trust land can be leased for up to 50 years or sold for conservation purposes. Leases and sales must occur at public auction.

Conservation is defined in the API as "protection of the natural assets of State Trust land for the long-term benefit of the land, the beneficiaries, lessees, the public, and unique resources such as open space, scenic beauty, protected plants, wildlife, archaeology, and multiple use values." Under Arizona Revised Statutes §37-312, eligible State Trust lands are those that are located in and around urban areas within certain distances of incorporated municipalities.

The Arizona Game and Fish Department (AGFD) manages a 14.55-acre state wildlife area south of the Gila River on Dean Road.

Maricopa County

The FCDMC owns approximately 440 acres of land within a 1000-foot corridor in the Gila River floodway in the planning area.

Public Facilities and Utilities

This section reviews the various public and private utilities and facilities in the Rainbow Valley planning area. This assessment is not intended to provide a detailed, in-depth analysis of operations or specific service programs. Rather, it provides an overview of existing conditions to help determine how current services can help support increased development. **Figure 6** identifies existing facilities and utilities.

This review is organized into eight subsections:

- Water Distribution Systems
- Sanitary Sewer System
- Sheriff's Department
- Fire Protection and Medical Emergencies
- Educational Facilities
- Libraries
- Parks and Open Space
- Landfills

Water Distribution Systems

Domestic water for certain portions of the Rainbow Valley planning area is supplied by Clearwater Utilities Company and Grandview Rancheros Water Company. The

locations of these water companies' service areas are illustrated in **Figure 3-Water Service Areas**. Domestic water is obtained from private water companies, private wells, or hauled water. One hundred percent of the planning area's domestic water supply comes from groundwater aquifers beneath Rainbow Valley and surrounding areas. In the future, domestic and industrial uses near the Town of Buckeye may receive water from the Town's water system. An in-depth discussion of water resources is found in the Water Resource element of this Area Plan, while information on water quality is provided in the Environmental Resources element.

Most of the agricultural water supply is obtained from the Buckeye Irrigation District (BID), which purchases treated effluent from the City of Phoenix. Most of the surface water used in the BID is effluent, while a smaller percentage is pumped groundwater. Some of the agricultural areas in the northern portion of the planning area receive water from the Roosevelt Irrigation District, which purchases water from Salt River Project, pumps groundwater, and obtains effluent through an exchange with the City of Phoenix.

Sanitary Sewer System

There are currently no community sewer systems in the planning area. Existing residential development operates on septic systems.

Sheriff's Department

The Maricopa County Sheriff's Department, located at 102 West Madison Street in downtown Phoenix, serves the unincorporated areas of Maricopa County. The Department has the responsibility of providing basic patrol, investigative, and detention services to contract towns, cities, and unincorporated communities in the county. Presently, the Sheriff's Department main station located in Avondale serves the unincorporated community of Rainbow Valley.

Fire Protection and Medical Emergencies

Beginning in January 2002, the Phoenix Fire Department dispatches staff to the Rainbow Valley planning area for medical emergencies. The Phoenix Fire Department also dispatches staff to the planning area for fire emergencies. Fire protection in the planning area is also provided by the Buckeye Valley Rural Fire District, the Buckeye Fire Department (Station 1 at 404 S. Miller; Station 2 at 22526 W. Durango), and Rural Metro Corporation. Fire protection includes coverage provided by volunteers who work out of a station at Arlington Road and Hermit Road.

Educational Facilities

Liberty Elementary School District operates three elementary schools serving kindergarten through eighth grade in the Rainbow Valley planning area. Liberty Elementary School is located at 199th Avenue and MC-85; Estrella Mountain

Elementary School	Opening Date	1990-1991 Enrollment	March, 2002 Enrollment
Liberty Elementary	August, 1910	650	730
Estrella Mountain Elementary	August, 1989	283	511
Rainbow Valley Elementary	August, 2001	Not Available	551

Elementary School is located at San Miguel and Elliot Road; and Rainbow Valley Elementary School is located at Narramore and Garnet Roads. The table above indicates opening dates and enrollment figures for each of these elementary schools.

The Buckeye Union High School District operates two high schools that serve 9th through 12th graders in the planning area. High school students in the planning area have historically attended Buckeye Union High School in Buckeye. Buckeye Union High had an enrollment of 1,369 during the 1999-2000 school year. Estrella Foothills High School, located in the Estrella Mountain Ranch community on Estrella Parkway south of San Miguel Road, opened in August 2001 with a freshman class enrollment of 152. Estrella Foothills plans to add one grade each year until all four grades are attending and anticipates eventually serving 1,750 students. Post-secondary educational facilities outside the planning area but within commuting distance include Estrella Mountain Community College in Avondale and Arizona State University West in northwest Phoenix.

Libraries

The Maricopa County Library District provides library service to all residents of Maricopa County. County libraries near the planning area include locations in Litchfield Park and Laveen. The Outreach Bookmobile service visits unserved and underserved areas of the valley, including Estrella Mountain Ranch and Mobile Elementary School.

Parks and Open Space

As discussed in the Open Space element of this Area Plan, the planning area contains abundant open space. There are no public parks in the planning area.

Landfills

There are no landfills in the planning area. A solid waste transfer station is located in the planning area at 17795 South Rainbow Valley Road in Goodyear. There is a small per bag fee; current days of operation are Thursdays and Saturdays.

Special Planning Concerns

Rainbow Valley's unique geographic setting in the Gila River valley provides both opportunities and constraints. Constraints include flooding problems, limited routes out of the area, and a high water table increased further by surplus effluent. On the other hand, the Gila River and surrounding mountain ranges provide many opportunities. Productive farmland supports agriculture; the river provides a natural buffer to the rural community; and there are rich opportunities to protect open space, plan for trails, and ensure a high quality of life.

The Rainbow Valley planning area has historically experienced slow growth. This is rapidly changing with aggressive development of master-planned communities like Estrella Mountain Ranch in south Goodyear as well as other new subdivisions north of the planning area. The population growth rate of the planning area surpassed projections made in 1992, and the projected growth rate over the next 10 years may be even greater than last 10 years. With rapid growth comes other concerns such as traffic congestion, air pollution, and environmental degradation. Preparing for orderly, timely, and compatible growth is an important component of the Rainbow Valley Area Plan.

The planning area's location adjacent to Buckeye is another important planning issue. Buckeye is also forecasting aggressive growth, which will require coordination with infrastructure and existing land uses in the planning area. Portions of the northwest planning area will likely be annexed by Buckeye.

Two planned subdivisions within water service areas will add several hundred residents in the near future. While subdivision regulations require carefully planned traffic circulation, adequate planning for drainage, water supply, power, and other health and safety requirements, lot splits have minimal requirements. Minor land division is the legal division of land into no more than five lots without having to comply with state subdivision laws. The creation of a subdivision through circumvention of existing land division requirements is known as a "wildcat subdivision." Early in the lot splitting process, problems may not be apparent, but as the splits continue and more homes are built, both minor land division and wildcat subdivisions can create haphazard conditions, dusty roads, and costly services. A balance needs to be achieved between private-property rights of a landowner to divide and sell rural lots and the need for sound community growth.

Proposed Developments

Several residential developments are planned within the study area. In July 2001, the Maricopa County Board of Supervisors approved a final plat for Southwest Desert Estates, a 32-lot single-family residential subdivision (40.24 acres) in the Rural-43

zoning district, south of Elliot Road and west of Rainbow Valley Road. In November 2002, the Board of Supervisors approved a final plat for Rainbow Valley Ranch, a 49-lot single-family subdivision (approximately 49 acres) in the R1-35 zoning district, south of Telegram Road and east of 209th Avenue.

To the east of the planning area and along the northeast boundary are the foothills of the Estrella Mountains. This area is changing rapidly with the development of the master-planned community of Estrella Mountain Ranch in Goodyear. This 19,400-acre development is one of the largest master-planned communities in Arizona. The 1998 Estrella Mountain Ranch Area Plan projects having 65,425 dwelling units at build-out with an anticipated total population of approximately 189,000. Sales for a fourth active village began in 2002.

During 2001, home sales in the West Valley outpaced home sales in the East Valley for the first time in more than a decade. Affordability is the main reason residents opted to buy homes on the west side. Many of the homes are priced less than the median new home price. Future growth in Buckeye and Goodyear will have a significant impact on accelerating growth in the Rainbow Valley planning area.

The *Southwest Valley Transportation Study* (1996) notes that although the Southwest Valley has a moderate industrial base, these new developments will function largely as "bedroom communities" with many residents commuting to jobs throughout the Valley, thereby increasing the demands on I-10 and the arterial street network. Substantial industrial development, such as the Airport Commerce Center near the Phoenix-Goodyear Airport, is also anticipated. A considerable amount of residential and commercial development is occurring within the City of Goodyear, whose 135 square mile planning area was only about 10 percent developed in1996. The Town of Buckeye also contains a large amount of developable land and has pursued an aggressive annexation policy.

Future Land Use Definitions and Guidelines

Definitions and guidelines are included to give a better understanding of the land use discussions. In addition, for each land use designation the corresponding definitions and guidelines help assure consistent interpretation. Land use categories in the Rainbow Valley Area Plan are in agreement with the Maricopa County Comprehensive Plan, and the system of regional land use standards. Future land uses are illustrated in **Figure 15** in the Appendix.

Future Land Use Analysis

An analysis of future land use development patterns in the Rainbow Valley planning area follow each definition. While the goals, objectives, and policies are the basis of the area's desired future land use pattern, the ultimate development pattern is

tempered by recognition of these existing development activities and established patterns. This includes consideration for land uses and features outside the planning area that might affect desired future development patterns. In addition, adopted municipal land use plans of Buckeye, Goodyear, and Estrella Mountain Ranch were considered during the analysis of land uses.

State law requires that all rezonings be consistent with the adopted county plan. As such, changes in zoning for specific areas or land parcels must be evaluated in relation to overall advancement of plan goals, objectives, and policies. Guidelines following the land use definitions are used to help ensure that the intent and integrity of the Rainbow Valley Area Plan is retained.

Open Space Land Use Definitions and Guidelines

The preservation of open space in rural areas is an important consideration in the Rainbow Valley Area Plan. In addition, the Growing Smarter Law of 1998 requires that Maricopa County plan for the acquisition and preservation of open space. An inventory and analysis of open space is found in the *Open Space* element of this area plan.

The Open Space category denotes areas best suited for open space and recreation. It includes uses such as parks, recreation and scenic areas, and drainage. Residential development of one (1) dwelling unit per acre or less is permitted in certain open space areas, provided development in environmentally sensitive areas like steep slopes, floodplains, and significant wildlife and plant habitats, is in compliance with all applicable federal, state, and county regulations.

The Maricopa County Comprehensive Plan defines two types of open space: Dedicated and Proposed. These categories as well as potential preservation techniques are described in the Open Space element of this area plan. Dedicated Open Space areas are those under public ownership such as county parks and Federally designated wilderness areas and national monuments. Other BLM administered lands can and will be exchanged or sold in the future. Proposed Open Spaces are areas that have been identified for potential open space and recreational purposes and are intended to be managed to protect public access and encourage environmental preservation. However, all private and State Trust Land set forth in this area plan as proposed open space may be developed at residential densities of one (1) residential dwelling unit per acre – subject to applicable planning and zoning regulations – unless it is added to the public domain or protected using other techniques that respect private property rights. The same principle applies to BLM land if exchanged or sold in the future.

Open Space Land Use Analysis

A significant amount of land in the planning area is designated as open space. The largest concentrations of open space lands are located along the Gila River floodplain, Waterman Wash, and in the more rugged western and southern regions of the planning area administered by the BLM. A separate agricultural land use category is not included in the Rainbow Valley Land Use plan. Lands suitable for agricultural use (cultivation, growing crops, and the production and maintenance of livestock) are included in both the Open Space and Residential land use categories. Historically, agriculture has been one of the County's most important industries and has a long established presence in Rainbow Valley. Although much of Maricopa County's agricultural land is being converted to urban uses, little agricultural land is likely to develop in the Rainbow Valley planning area since a large portion of farm and dairy land is located in the Gila River floodplain and floodway. While floodplains outside of the floodway (the "flood fringe") can be developed, new development in major 100-year floodplains is discouraged by Maricopa County. Floodplain permits require detailed hydrologic studies and any proposed improvements must conform to the County's Floodplain Regulations.

Residential Land Use Definitions and Guidelines

Eye to the Future 2020, the Maricopa County Comprehensive Plan, outlines 24 land use categories, five of which are residential. The Rainbow Valley Area Plan contains only two residential land use categories, although additional categories are permitted within Development Master Plans (DMPs) that allow higher density development. In addition, other "uses by right," such as schools, churches, and farm uses are permitted in residential land use categories although special consideration should be given to their specific locations. As with all types of development, care should be given to ensure appropriate preservation of environmental and cultural features such as hillsides, washes, archaeological sites, and other sensitive areas.

In unincorporated Maricopa County, residential density within any given project is calculated based upon the overall gross acreage of the site. With respect to the Rainbow Valley Area Plan land use map, the Rural land use category includes some land zoned as R1-35 (allows greater than 1.0 dwelling unit per acre). It is important to note that land use designations do not supercede existing zoning. Land use designations are intended to guide future development; however, existing zoning entitlements are not affected.

Rural (0-1.0 Dwelling Units per Acre)

The rural category identifies areas where single family residential development is desirable, but urban services such as sewer, water, schools, parks, roads, and emergency services are limited or nonexistent. Suitability is determined based on location, access, existing land use patterns, and natural or human constraints.

Densities greater than 1.0 dwelling unit per acre may be permitted in new development, but only if areas of lower densities offset the increase such that an average of no more than 1.0 dwelling unit per acre is maintained. Uses in this category include agriculture and single family residential.

Large Lot Residential (greater than 1.0 but less than or equal to 2.0 Dwelling Units per Acre)

The large lot residential category denotes areas where single family residential development is desirable and urban services such as sewer, water, schools, parks, and fire and police protection may only be partially available or be required as an improvement district. Suitability is based on location, access, existing land use patterns, and natural and human constraints. Densities greater than 2.0 dwelling units per acre may be permitted in new development, but only if areas of lower densities offset the increase such that an average of no more than 2.0 dwelling units per acre is maintained. A community sewer and water system will be required for developments above 1.0 dwelling unit per acre and may be required for those below 1.0 dwelling unit per acre depending on preexisting conditions.

Residential Land Use Analysis

Several significant principles guide residential development in the Rainbow Valley Area Plan. Particular consideration is given to the continuance of the existing rural lifestyle, the preservation of hillsides and floodplains, and compatibility with the natural environment in order to protect public health, safety, and general welfare. Therefore, only residential development at very low densities (1.0 du/acre or less) is intended for most of the planning area unless part of a development master planned community. Residents who choose a rural lifestyle, outside of a DMP, should not expect urban services in the unincorporated areas.

Development Master Plans

Master planned communities have long been a preferred type of development in Maricopa County because they promote quality standards of prudent and sustainable land use. The County advocates using DMPs to allow flexibility in the master planning of large tracts of unincorporated land. DMPs provide opportunities for creative design and development techniques, and generally require a high level of commitment to ensuring they have adequate facilities and infrastructure to serve their residents' needs. Master planned communities have the potential to provide mixed land use opportunities, a range of housing choices, open space and recreational opportunities, and a multi-modal transportation system connected to schools, parks, retail, and employment centers. A more complete discussion of DMPs may be found in the *Eye to the Future 2020*, Maricopa County's Comprehensive Plan and the County's *Development Master Plan Guidelines*.

While future DMPs can be developed at any location in the unincorporated County, appropriate development guidelines would vary depending on the individual circumstances of each DMP and the goals, objectives, and policies set forth in the Comprehensive Plan. In addition, a DMP developer must demonstrate how the project will impact the affected Area Plan, both positively and negatively, at project buildout. While most land in the planning area is currently rural in nature, a DMP would be urban in scale and use. To urbanize an area, a DMP will be required to establish urban level services. Adequate proximity to employment and commercial support services is an important factor. Water supply is the most restricting factor for a DMP. If an adequate water supply cannot be obtained, an urban project cannot be realized. Any owner/developer wishing to urbanize a rural area will have to address the aforementioned constraints before any large scale planning or development can occur.

Development Agreements and DMPs

Development agreements are voluntary arrangements between local governments and developers concerning the design and construction of specific development projects. These agreements protect projects from changes in laws and regulations, while allowing governments to obtain specified exactions to ensure infrastructure construction and reinforce local planning efforts. Development agreements offer a way to reduce developers' risk while simultaneously increasing government's ability to guide local development.

Commercial Land Use Definitions

The Rainbow Valley Area Plan contains only one commercial land use category, 'Neighborhood Retail Center'. Commercial categories at the County level vary according to intensity, location, and trade area. Due to the rural nature of the planning area, urban level services are not required for this small-scale commercial land use. However, uses should be appropriate for the services available. The Comprehensive Plan's definition of 'Neighborhood Retail Center' includes a broad range of developments with total building area up to 100,000 square feet. However, given the rural nature of the Rainbow Valley planning area, this plan envisions small commercial developments with total building area in the range of 5,000 to 20,000 square feet.

The Future Land Use map (Figure 15) indicates a commercial node at the Jackrabbit Trail and MC-85 intersection, both principle arterials. This location is consistent with the goal of locating commercial uses at major intersections and is compatible with Buckeye's land use plan which designates this intersection as commercial. Additional commercial nodes south of the Gila River may be feasible in the future based on local residents' needs. However, the commercial use would have to have direct

access on an arterial street at a major intersection of arterials, should have a total building area of not more than 20,000 square feet, and should conform to the commercial land use guidelines listed below.

Neighborhood Retail Center – NRC (formerly called 'Convenience Commercial)
The Neighborhood Retail Center category identifies convenience commercial areas for the location of small shops and services that benefit local residents. This category permits developments with a total building area of less than 100,000 square feet and is designated in areas having more rural character. (The Rainbow Valley Area Plan refines this definition above).

Commercial Land Use Guidelines

The following guidelines assist land use planning as it relates to the commercial land use designation:

- Commercial activities include appropriate service and retail uses. These uses may be permitted in neighborhood retail centers, but only on a scale compatible with adjacent residential development. Appropriate uses might include a feed store, neighborhood convenience store, and veterinary clinic, for example.
- All commercial development should be landscaped utilizing themes that are related to, and cohesive with, adjacent development. Landscaped easements along public rights-of-way using shrubs, trees, and/or earth berming will be provided and installed at the time of street construction. Both on-site and off-site signs should be controlled in terms of location, maximum size, height, and lighting.
- Large scale commercial uses such as "big box" developments are not permitted in the Neighborhood Retail Center category.
- Commercial uses should be located at the intersections of arterial streets.

Commercial Land Use Analysis

Commercial development should be carefully planned so as not to negatively impact traffic patterns and land uses, should not create additional safety hazards for non-motorized traffic around schools, and should consider the visual impact on the surrounding community. Mountain views in the Rainbow Valley area should be protected in particular through the use of generous buffering, judicious placement of structures, as well as reasonable height limitations on structures and signs associated with commercial use.

Employment Center Land Use Definitions

Employment Center categories denote areas for the concentration of major employers. Each category varies according to intensity and impact on adjacent areas, and access to arterial roads is an important consideration. There is only one employment center land use category allowed in the Rainbow Valley planning area.

Industrial Employment Centers (formerly called 'Light Industrial Center)

The Industrial Employment Centers category identifies locations for major employment centers. Uses permitted in this category include general warehousing, storage, distribution activities, and general manufacturing. Compatibility with adjacent current and future land use is an important consideration, and developments within this category are subject to plan review and approval.

Employment Center Land Use Guidelines

The following guidelines help govern all land use planning as it relates to the Employment Center land use designation:

- Proposed uses must be appropriate for the type of employment center in which they are located.
- Uses identified in the Industrial category shall be encouraged to locate along principal transportation routes such as identified roads of regional significance (Tuthill Road/Jackrabbit Trail corridor and MC-85). These uses may be required to provide appropriate landscaping to buffer from surrounding land uses, and adequate buffering, landscaping, and screening may also be required to minimize impacts on public views.

Employment Center Land Use Analysis

The lack of employment centers is evident in the Rainbow Valley planning area. Because this region will experience significant population growth over the next two decades, residents will require employment opportunities close to their homes. Approximately 1,800 residents were employed in the planning area in 2000, mostly in the industrial and retail sectors. In addition, since geographical constraints prevent the addition of north-south roads, providing residents the opportunity to work near their homes will help reduce traffic congestion, reduce commute times, improve air quality, and create more efficient land use patterns. Therefore, several employment cores are identified to help serve the needs of current and future residents. One area is along Southern Avenue between Rainbow and Airport roads, where existing industrial uses are located. Additional opportunities would be along MC-85. A future employment node (Light Industrial and Community Commercial) is identified in Goodyear's land use plan (see Figure 12) along Rainbow Valley Road, south of Ray

Road, in the Estrella Mountain Ranch community. Lack of employment centers in the planning area currently is not a significant issue considering local residents' access to employment in surrounding communities such as Buckeye, Goodyear, and Estrella Mountain Ranch.

Buffering and Transitional Land Use Guidelines

When two or more types of land uses are shown on the Rainbow Valley Area Plan or are approved as part of a Development Master Plan, buffering and/or transitional land uses may be necessary. Buffering may consist of open space placed between two incompatible land uses, density transitions, walls, berms, landscaped setbacks, or other recognized methods. Buffering is required for intensive uses where a less intensive use already exists, or where the Rainbow Valley Area Plan shows a less intense use adjacent to a more intense use. The use of transitional land uses consists of placing uses of intermediate intensity between two different types of land uses. Situations which may require transitional land use include:

- Low density, single family residential development adjacent to multi-family development in a master planned community such as Estrella Mountain Ranch.
- Single or multi-family development adjacent to commercial or industrial land uses in a DMP or other mixed-use development.
- Residential development, commercial, or industrial land uses adjacent to areas with significant environmental features, landforms, washes, and plant communities. Very low density rural residential development could serve as a transitional use between sensitive environmental features and more intensive uses.

In cases where buffering is necessary, these and other methods may be considered:

- Open space areas of native vegetation
- Arterial or collector streets with landscaping (where streets already exist)
- Major utility corridor easements with native vegetation (where easements already exist)
- Block walls, landscaping, earth berms
- Any combination of the above

Facilities and Services

The Rainbow Valley planning area contains a combination of a few rural subdivisions mixed with scattered low density residential development. Facilities and services currently available to rural subdivisions include potable water service, emergency fire/medical service, sheriff's office patrol, and reasonable access to elementary schools. Facilities not currently available to the planning area include community

sewer, parks, libraries, junior high schools, and senior high schools. More remote residences have to cope with longer distances to receive fire/medical service, sheriff's office patrol, and elementary schools; and do not receive potable water service. Some remote residences do not receive electricity.

As noted in the Cost of Development element, Maricopa County encourages urban type growth (i.e. commercial, employment, and residential density greater than 1 dwelling unit per acre) within the Urban Service Area (USA) where services, infrastructure, and facilities are readily available to serve resident's needs. The USA is not delineated on the land use map. Rather, it is defined by the ability of a jurisdiction, improvement district, or private entity to provide infrastructure and appropriate urban services to a specific site or project. The USA is considered suitable for higher density development, as well as an area considered efficient to expend public infrastructure funds. At present there are no USAs in the planning area.

For rural development outside the USA, a range of facilities, infrastructure, and services may not be required and will be reviewed by the County on a case-by-case basis. Although each development must be considered on its own merits, **Table 9-Facility Standards** provides reference guidelines that should be used when determining and sizing necessary facilities. Park and recreation facility standards are contained in a separate table in the Open Space element.

In a rural community such as Rainbow Valley, facilities like schools would be needed even for a relatively small population, whereas, a community library may not be needed until the distant future.

Table 9 Facility Standards		
Type	**Standard**	**Source**
Libraries		
Regional Library	**40,000 - 50,000 sq. ft / 80,000 -125,000 persons**	**Planning for Implementation for the Maricopa County Library District, 1990**
Community Library	**15,000 - 20,000 sq. ft / 30,000 -50,000 persons**	**ibid**
Neighborhood Library	**3,000 - 5,000 sq. ft / 10,000 - 20,000 persons**	**ibid**
Educational Facilities*		
Elementary Schools	**8 - 12 acres; 1 school / 1,500 - 5,000 persons**	**U.S. Dept Health, Education, Welfare; Urban Planning & Design Criteria, 3rd Edition**
Junior High School	**20 - 25 acres; 1 school / 1,000 - 16,000 persons**	**ibid**
Senior High School	**30 - 45 acres; 1 school / 14,000 - 25,000 persons**	**ibid**

* These standards are provided as a base reference for the area plan. The respective school districts determine standards for all facilities within their districts. Consultation with these school districts is recommended.

TRANSPORTATION

This portion of the Rainbow Valley Area Plan analyzes existing transportation plans, studies, programs, public transit service issues, and provides an inventory of the area's roadway system.

Existing Transportation Plans

Transportation System Plan

The mission of the Maricopa County Department of Transportation (MCDOT) is to provide a quality transportation system for the citizens of Maricopa County. The Transportation System Plan (TSP) was adopted by the Board of Supervisors in December of 1997, as the transportation element of Maricopa County's Comprehensive Plan 2020. It states that the transportation network should support the safe and efficient movement of goods and people, be environmentally compatible with surrounding conditions, and supportive of economic development activities. The TSP helps evaluate regional transportation system impacts; helps identify funding and maintenance priorities; and organizes roadways under MCDOT's jurisdiction into primary, secondary, and local roads.

According to the Maricopa County Transportation System Plan, primary roads satisfy the underlying principle to serve regional travel and constitute a seamless system crossing jurisdictional boundaries. They are either Maricopa Association of Governments (MAG) Roads of Regional Significance, or are of major importance to the county roadway system.

MAG developed the Roads of Regional Significance (RRS) concept, and has assigned this designation to a limited number of key arterials whose primary function is to provide mobility within the urbanized area by supplementing and interchanging with the freeway system. Roads of regional significance are expected to receive priority for improvement to a regional standard, where feasible. A six-lane divided roadway with 140 feet of right-of-way is the ultimate design standard for urban RRS. The Tuthill Road/Jackrabbit Trail corridor is a Primary Roadway in the MCDOT Transportation System Plan, and is a RRS according to MAG. This route is one of three north-south Primary Roadway facilities that connect MC-85 and Interstate 10 (I-10). The roadway also provides a bridged crossing of the Gila River. The other RRS in the Rainbow Valley planning area is MC-85 (Buckeye Road), the principal arterial serving east-west traffic in the northern portion of the planning area.

Maricopa County Major Streets and Routes Plan

The TSP includes a Planning and Management chapter, which contains a section that calls for the preparation of a Maricopa County Major Streets and Routes Plan (MSRP). This plan was completed and adopted April 18, 2001. The MSRP designates

and maps street widths and route overlays for all primary and secondary roads in the Maricopa County roadway system. The Plan includes two components: A Street Classification Atlas and a Policy Document to support the Atlas.

The functional classification system used by Maricopa County to classify County streets includes six classifications: expressway/freeway, principal arterial, minor arterial, major collector, minor collector, and local street. These roadway classifications are identified in **Figure 7-Future Street Classification System.** Typical geometric design standards are illustrated in cross-section in the MSRP. Current street classifications for streets in the Rainbow Valley area are provided in the *Inventory* section of this chapter.

The MSRP defines the components of the future functional classification system as follows:

Expressway/Freeway

An expressway/freeway provides for the expeditious movement of large volumes of through traffic; is a divided roadway and is not intended to provide access to abutting land; will have complete separation of opposing traffic flows; and will have grade separated intersections or at-grade, signalized intersections at a minimum of one-mile spacing.

There are no expressways/freeways in the planning area. The closest, Interstate-10, is located five miles north of the planning area.

Principal Arterial Street

A principal arterial street provides for long distance traffic movement within Maricopa County or between Maricopa County and urban areas. Service to abutting land is limited. Access is controlled through frontage roads and raised medians, as well as the spacing and location of driveways and intersections. Opposing traffic flows are separated often by a raised median. The ultimate cross section is four to six lanes in width and includes bike lanes.

In the planning area, principal arterials include Airport Road (north of MC-85), Jackrabbit Trail (north of Elliot Road), and MC-85.

Minor Arterial Street

A minor arterial street provides for moderately long distance traffic movement within Maricopa County or between Maricopa County and urban areas. Moderate access is provided to abutting land. Access is controlled through frontage roads, raised medians, and the spacing and location of driveways and intersections. A raised median or a continuous left-turn lane separates opposing traffic flows. The ultimate

cross section is four lanes in width and includes bike lanes. In the planning area, minor arterials include Rainbow, Dean, Airport (south of MC-85), Tuthill (south of Elliot Road), and Rainbow Valley Roads; Southern Avenue, Beloat, Elliot, Narramore, Ray, Germann, Ocotillo, Perryville, Arlington, and Riggs Roads.

Major Collector Street

A major collector street provides for short distance (less than three miles) traffic movement; primarily functions to collect and distribute traffic between local streets or high volume traffic generators and arterial streets; and provides direct access to abutting land. Raised medians and the spacing and location of intersections and driveways may control some access. A major collector is two to three lanes in width and includes bike lanes.

The only major collector segment in the planning area is Tuthill Road (south of Germann Road).

Minor Collector Street

A minor collector street provides for short distance (less than three miles) traffic movement; primarily functions to collect and distribute traffic between local streets and arterial streets; and provides direct access to abutting land. The spacing and location of intersections and driveways may control some access. A minor collector is two lanes in width.

There are two minor collector segments in the planning area: Perryville Road (between Germann and Queen Creek Roads), and a portion of Queen Creek Road.

Local Street

A local street provides for direct access to residential, commercial, or other abutting and,and for local traffic movements. Local streets connect to collector or arterial streets. A local street is a two-lane roadway.Examples would include Cheyenne, Teepee, Kaibab, and Garnet Roads.

Transportation Overlays

The TSP introduces the concept of overlays for the roadway system within the County, stating "overlays acknowledge the special importance of roads for purposes other than mobility."

Scenic/Recreational Overlay

The scenic/recreational overlay acknowledges the need to minimize impacts to, or preserve, characteristics of a road's environment, or it recognizes a road's importance

as access to recreational facilities. Characteristics such as design speeds, right-of-way, cuts and fills, existing vegetation and viewsheds will be carefully analyzed for these roadways.

No roadways in the planning area are designated with a scenic/recreational overlay by the MSRP.

Public Transportation Overlay

The public transportation overlay identifies potential regional rail or bus rapid transit Corridors.

The Southern Pacific Railroad line just north of MC-85 was designated with a public transportation overlay by the MSRP.

AZTech Overlay

The AZTech overlay recognizes the special importance of roadways and corridors to implement transportation-related technology. The AZTech overlay identifies corridors where technology will be incorporated to improve transportation service.

No roadways in the planning area are designated with the AZTech overlay by the MSRP.

Oversize Load Overlay

The oversize load overlay identifies routes designed for usage by oversize vehicles and restricted routes where oversize vehicle use is discouraged. An oversize load is defined as a vehicle having a gross weight of over 160,000 pounds or having dimensions larger than one of the following:

- 120 feet in length
- 14 feet in width?
- 16 feet in height

The MSRP identifies two roadways in the planning area with an oversize load overlay. They are MC-85 throughout the corridor and Jackrabbit Trail north of MC-85.

There are no roadways in the planning area identified as being restricted.

School Safety Overlay

The school safety overlay identifies sites where special design or operational criteria will be implemented to provide for safety.

The MSRP identifies one school safety overlay in the planning area. It is Liberty Elementary School located at the intersection of MC-85 and Liberty School Road (203rd Avenue).

Roads of Regional Significance (RRS) Overlay

The Roads of Regional Significance (RRS) concept and design guidelines were adopted by the MAG Regional Council in the spring of 1991, and by the Maricopa County Board of Supervisors in October 1992. Further analysis of this concept was completed in January 1996. The concept is a system of upgraded streets and roads to improve mobility in the urban areas, as well as into and out of the region. The adopted RRS concept includes Urban and Gateway routes. Urban routes are designed to complement the freeway system and are three to six miles apart. The concept facilitates the development of a system of routes with higher design standards and higher speeds that will help ensure regional mobility. Gateway routes provide access to the region and need protection to maintain free flow access in and out of the region.

The MSRP identifies two roadways in the planning area with an RRS overlay. They are MC-85 throughout the corridor and Jackrabbit Trail north of MC-85.

Emergency Management Overlay

The emergency management overlay identifies roadways that are of special importance in case of emergencies or catastrophes at the Palo Verde Nuclear Generation Station.

The planning area lies outside the ten-mile radius surrounding the Palo Verde Nuclear Generation Station. No roads in the planning area are identified by the TSP as being emergency evacuation routes.

Southwest Valley Transportation Study

The Southwest Valley Transportation Study (SWVTS) was completed in June 1997 for MCDOT, the cities of Avondale, Goodyear, Litchfield Park, Tolleson, and the Town of Buckeye. The purpose of the study was to develop a 25-year multimodal transportation plan for the entire area, plus a community plan for each jurisdiction. This study, which encompasses nearly all of the Rainbow Valley planning area, developed a comprehensive, multimodal transportation plan consisting of short, medium, and long-range transportation improvements. The SWVTS identified several key issues, including:

- Preservation of existing lifestyles (generally rural) in established communities, including supporting a balanced, multi-modal transportation system that will serve people rather than just automobiles.

- Improvement of all-weather access across major streams and drainageways, including the Gila River.
- Recognizing the importance of MC-85 as a key east-west arterial across the entire Southwest Valley. As such, supporting coordinated planning by the County and other jurisdictions for the ultimate function, cross-section, and appearance of MC-85.

Rural Maricopa Transit Development Program

In 1997, Maricopa County completed the *Rural Maricopa County Transit Development Progra*m. The purpose of this study was to identify transit needs and ways to provide additional transit options in rural Maricopa County. The study also identified several important recommendations, including:

- Having Maricopa County serve as the lead agency in establishing public transit service from rural to urban areas.
- Implementing a pilot transit program between Gila Bend, Buckeye, and Phoenix. Once operations prove successful; establish a similar program along the Wickenburg Highway.
- Continuing support for a regional transportation system through service coordination.

MCDOT Bicycle Transportation System Plan

With the adoption of the MCDOT Bicycle Transportation System Plan on May 19, 1999 by the Board of Supervisors, Maricopa County recognized bicycling as a viable transportation mode and actively works toward improving the transportation network to increase access and safety for bicyclists. MCDOT includes bicycle facilities on all County roadways as described in the Roadway Design Manual and the Pavement Marking Manual. The standard cross section for all County arterial and collector streets includes bike lanes.

The 1999 plan identified 473 miles of County roads for the addition of on-road bicycle facilities. This network reflects a backbone for bicycle facilities to prioritize investment and guide project development. The component of the identified bicycle network within the Rainbow Valley Area Plan is MC-85.

Maricopa County Regional Trail System Plan

The Board of Supervisors adopted Phase One of the Maricopa County Regional Trail System Plan on September 4, 2002. Their vision is to connect the majestic open spaces of the Maricopa County Regional Parks with a nonmotorized trail system. Phases Two and Three are expected to be completed by June 2004. The Rainbow Valley Area Plan lies within the study area included in Phase Three.

Jackrabbit Trail/Tuthill Road Corridor Improvement Study

Due to recent development in the area and the potential for future development, Jackrabbit Trail/Tuthill Road was selected by MCDOT for a corridor study. Published in January 2001, the *Access Control and Corridor Improvement Study, Jackrabbit Trail/Tuthill Road, Germann Road to Indian School Road* was prepared by MCDOT. Finalized in 2001, this document provides MCDOT and local jurisdictions guidance when imposing stipulations on developers for improvements adjacent to this corridor. Detailed changes proposed for the corridor are described in the corridor study, however several significant recommendations are discussed below.

Based on traffic analysis and projections generated by MCDOT, Jackrabbit Trail/ Tuthill Road will require widening to provide two lanes in each direction of travel from Thomas Road to I-10 and from MC-85 to Elliot Road by Design Year 2010. This will require widening or construction of a new bridge crossing of the Gila River. A preferred alternative was selected for the Elliot Road to MC-85 (Gila River Crossing) segment. The preferred alternative would construct a new parallel bridge upstream of the existing bridge. The existing bridge (constructed in the early 1980s) would carry two lanes of southbound traffic while the new bridge would carry two lanes of northbound traffic. This alternative would realign Jackrabbit Trail to the west, between MC-85 and the Gila River. The intersections of Jackrabbit Trail/Tuthill Road with Elliot Road and with Beloat Road will require signalization. Based on traffic projections for the route, the study determined that all of these improvements will be required by 2010.

Loop 303 Initial Design Concept Report

MCDOT, in association with the City of Goodyear, is developing an Initial Design Concept Report for State Route Loop 303 (SR 303L) from MC-85 to Indian School Road. The southern boundary of this project lies about 1.5 miles northeast of the Rainbow Valley planning area.

Loop 303 Corridor Study (Riggs Road to MC-85)

MCDOT has begun a corridor study to evaluate the extension of Loop 303 south to Riggs Road. The study area will include the eastern edge of the Rainbow Valley planning area. When this plan is completed and adopted by the Maricopa County Board of Supervisors, the findings will become part of the next Rainbow Valley Area Plan update. Additionally, the City of Goodyear is updating their general plan, which will also impact the Rainbow Valley planning area. When the City of Goodyear adopts their general plan update, the findings should also be incorporated in the next Rainbow Valley Area Plan update.

Maricopa Association of Governments Transportation Plans

The Regional Transportation Plan (RTP) was initiated in 2001 and is scheduled for completion by 2004. It represents the first comprehensive review of transportation investment needs for the region since the early 1960s. When completed, it will provide a broad framework for the future development of the regional transportation system, one designed to accommodate the growth expected over the next several decades.

The Long Range Transportation Plan (LRTP) identifies specific transportation facilities and services to be constructed or provided in the next twenty years. The LRTP is updated annually and is fiscally constrained, so only includes projects for which funding is currently available or reasonably expected.

MAG's Transportation Improvement Program (TIP) is a five year schedule of specific projects to be constructed across the Maricopa County region.

Existing Conditions

Transportation Improvement Program

Roadway investment decisions by MCDOT are based on a fundamental principle: to provide the right transportation system, at the right time, and for the right cost. To achieve this vision, Maricopa County develops an annual Transportation Improvement Program (TIP) to identify project funding priorities for the next five years. In other words, each year new projects are added to the fifth year, while previously programmed projects move up a year in the schedule.

As a structured finance plan, the TIP determines future road expansions and improvements. There are two projects in the Rainbow Valley planning area identified in the 2002-2007 Transportation Improvement Plan. Scour monitoring sensors will be installed on the Tuthill Road Bridge at the Gila River during the spring of 2003. A Design Concept Report (DCR) will be prepared to establish 30 percent design parameters for the eventual construction of a four lane roadway with a raised center median on MC-85 from Airport Road to Jackrabbit Trail.

Average Daily Traffic Counts

The MCDOT website provides average daily traffic count data on many major streets. **Table 10** summarizes traffic count information for some major roads in the Rainbow Valley study area. Also, see **Figure 7** (Future Street Classification) for traffic counts.

Table 10
Average Daily Traffic Counts

Street	*Location*	*Year 1995*	*Year 2000*	*% Change*
Airport Road	North of Beloat Road	374	257	-31%
Airport Road	North of Elliot Road	0	81	n/a
Airport Road	North of MC 85	276	431	56%
Airport Road	North of Narramore Rd.	191	437	129%
Arlington Road	East of Airport Road	156	333	113%
Beloat Road	East of Rainbow Road	783	1533	96%
Beloat Road	East of Tuthill Road	925	1675	81%
Beloat Road	East of Airport Road	1173	1686	44%
Dean Road	South of MC 85	248	327	32%
Dean Road	North of MC 85	328	293	-10%
Elliot Road	East of Airport Road	420	820	95%
Elliot Road	East of Tuthill Road	572	1577	176%
Jackrabbit Trail	North of MC85	1262	2208	75%
MC 85	East of Airport Road	5138	6462	26%
Perryville Road	North of MC 85	221	214	-3%
Rainbow Road	North of Beloat Road	55	223	305%
Rainbow Road	South of Southern Ave.	859	1083	26%
Rainbow Valley Rd.	North of Narramore Rd.	490	1466	199%
Southern Avenue	East of Jackrabbit Trail	203	232	14%
Tuthill Road	South of Beloat Road	2578	4489	74%
Tuthill Road	North of Beloat Road	109	82	-25%
Tuthill Road	North of Narramore Rd.	1620	2674	65%

Dust Abatement

MCDOT is paving numerous County maintained dirt roads as an effort to reduce dust. The Environmental Protection Agency (EPA) imposed the 1998 Federal Implementation Plan for PM-10 nonattainment in Maricopa County, requiring dust control measures for publicly maintained roads with more than 250 vehicles per day. EPA indicated in the fall of 1999 that the measures submitted with the Serious Area Plan for PM-10 were inadequate and needed additional measures. Maricopa County proceeded to obtain MAG approval for CMAQ (Congestion Management and Air Quality) funding to assist with paving dirt roads, and has included this as a committed measure in the revised serious area plan submitted February 2000.

MCDOT maintains nearly 800 miles of unpaved roads in Maricopa County. There are many more unpaved roads within the County that are private roads and it is the responsibility of the property owners to maintain or pave these roads. MCDOT is able to help property owners set up improvement districts to manage and finance paving and maintenance projects. Plans are underway to pave more than 60 miles of highly traveled, unpaved County roads over the next three years (beginning in 2001) to help relieve some dust problems. Funding constraints currently limit paving projects to those dirt roads with approximately 150 vehicles per day and higher. **Table 11** lists the recently completed and planned paving schedule for roads in the planning area.

Table 11
Proposed Paving Schedule

Phase	*Road*	*Start*	*End*
1	Gopher Road	Rustler Road	Narramore Road
1	Hermit Road	Ray Road	Rainbow Road
1	Hermit Road	Zuni Road	Arlington Road
1	Hermit Road	Arlington Road	Tuthill Road
1	Hermit Road	Rainbow Trail	Watermann Lane
1	Watermann Lane	Arlington Road	Hermit Road
2	Garnet Road	Teepee Road	Kaibab Road
2	Garnet Road	Kaibab Road	Narramore Road
2	Telegram Path Road	207th Avenue	Tuthill Road
2	Telegram Path Road	Airport Road	207th Avenue

Street Lighting

Under MCDOT policies, there are four methods available to establish street lighting:

- Establishing a Street Lighting Improvement District by local citizens
- A private lighting agreement between a private citizen and the power company
- Street lights at signalized intersections provided by MCDOT (unless there is an overhead utility conflict)
- Lighting established pursuant to Night Accident History, which requires approval of the County Traffic Engineer.

Existing Transportation System

In general, the existing roadway system is based on a grid with arterials spaced at one-mile intervals. This network is incomplete outside the established urbanized areas, with many gaps that reflect both the sparse development and the river barriers that have few bridged crossings.

The Rainbow Valley planning area roadway system consists of principal arterials, minor arterials, major collectors, minor collectors, and local streets. Using national classification terminology, these systems are classified based on the trips served and the operational characteristics of the streets or highways. Streets in the planning area that were built prior to MCDOT standards may not possess the pavement width, number of lanes, bike lanes, or shoulders that are reflected in today's standard cross sections. Cross sections may be urban or rural. Rural cross sections do not include curb, gutter, or sidewalk.

Current Functional Classification

County roadways, except local, and their current functional classification are listed in **Table 12**.

Bicycle and Pedestrian Facilities

Bicyclists and pedestrians have access to all of the roadways in the planning area. In most cases, bike lanes or shoulders will be added during construction, reconstruction, or widening of existing roadways. Sidewalks will be constructed when an urban cross section is used. However, there is currently no continuous or integrated bikeway or pedestrian system serving the study area as a whole. Within the Rainbow Valley planning area, the MCDOT Bicycle Transportation System Plan identifies MC-85 as a component of the regional bicycle network.

The *Southwest Valley Transportation Study* includes a Long-Range Non-Motorized Transportation Plan indicating potential bike and pedestrian use areas. The plan depicts multi-use paths along the Roosevelt Irrigation District and Buckeye Canal banks to link Buckeye with Goodyear and the Tres Rios Greenbelt in Avondale.

Table 12
Functional Classificiation

Road	Functional Classification
Airport Road	urban minor collector (north of Beloat Rd.)
	rural collector (south of Elliot Rd.
Arlington Road	urban minor collector (east of Rainbow Valley Rd.)
	rural collector (west of Rainbow Valley Rd.)
Dean Road	urban minor collector (north of Beloat Rd.)
	rural collector (south of Eagle Mountain Rd.)
Elliot Road	rural collector
Jackrabbit Trail	urban major collector
MC 85	urban principal arterial
Narramore Road	urban minor collector (east of Rainbow Valley Rd.)
	rural collector (west of Rainbow Valley Rd.)
Perryville Road	urban major collector
Rainbow Road	urban minor collector (south of MC 85)
Rainbow Valley Road	urban minor collector
Riggs Road	urban minor collector (east of 175th Ave.)
	urban rural collector (west of Perryville Rd.)
Southern Avenue	urban major collector
Tuthill Road	rural collector

Off-road bikeways are planned along the Gila River. Phase Three of the Maricopa County Regional Trail System Plan will be evaluating potential trail corridors within the planning area.

Transit and Rail Services

There are currently no local bus routes serving the Southwest Study Area. The closest facility, a shared-use park-and-ride lot at the southwest corner of Dysart Road and Van Buren Street in Avondale, is about 15 miles away. Route 560 provides

four eastbound and four westbound trips per day on weekdays only. Passengers may use Route 560 to make local trips between Goodyear, Avondale, Tolleson and Westridge Mall in Phoenix. Transfers to local routes are available at Westridge and Downtown Phoenix.

Greyhound Lines operates a few inter-city bus trips between Phoenix and southern California that serve Buckeye, Tolleson, and Avondale. Two to three eastbound and westbound trips per day stop at each location. Passengers may make connections in Phoenix for other destinations.

Maricopa County Human Services Department, Special Transportation Services (STS), offers transportation service to elderly, disabled, and low-income individuals. The service is provided Monday - Friday, 8:00 am to 4:00 pm. Reservations are made in advance and trips are provided on a space available basis. Trips can be for medical appointments, dialysis, shopping/personal, adult day care, social service appointments, and recreational. STS also provides senior transportation to local Senior Centers and delivers noon meals to homebound individuals.

Maricopa County Public Health Department, Office of Family Health, offers transportation service to certain special needs clients, based on availability of vans. For example, the Babymobile is a 14-passenger van used to transport women to their prenatal care visits or to transport a child to a doctor appointment.

A Southern Pacific Railroad line crosses the entire Southwest Valley Study Area in an east-west direction, generally parallel to and north of MC-85. This line has been used exclusively for local freight service since June of 1996.

ENVIRONMENT / ENVIRONMENTAL EFFECTS

This section combines an environmental overview of the study area in terms of the physical and natural environment with the state mandated Environmental Effects element. The Environmental Effects element complies with requirements of the Growing Smarter Act, and helps ensure that planning for future development in Maricopa County is consistent with federal, state, and local requirements for air quality, water quality, and other elements affecting the environment. This section addresses anticipated effects that development may have on air quality, water quality, noise abatement, visual quality, and sensitive plant and wildlife species. The report is organized into the following sections:

Physical Environment

- Physical Setting
- Topography
- Climate
- Soils
- Geology
- Vegetation
- Wildlife

Environment Effects

- Sensitive Species and Habitat
- Visual Character
- Air Quality
- Noise
- Archaeology
- Water Quality
- Hazardous Material
- Emergency Management

Physical Environment

Physical Setting

The Rainbow Valley Planning Area, as illustrated in **Figure 8-Physical Setting**, is located in the south central portion of Maricopa County. The planning area extends north from the newly created Sonoran Desert National Monument, to the agricultural fields north of the Gila River, and extends west from the slopes of the Buckeye Hills to the foothills of the Sierra Estrella Mountains.

The original Little Rainbow Valley Planning Area encompassed approximately 48 square miles and was bounded on the north by Southern Avenue, on the south by Germann Road, on the east by Citrus Road, and on the west by Rainbow Road. Due to residential growth south of the original planning area, anticipated future growth, and comments received during the public participation process, the study area was extended south to the northern boundary of the Sonoran Desert National Monument, as shown in **Figure 2- Original Plan Boundary**. The extended area adds approximately 34 square miles, bringing the total area to approximately 82 square miles.

Topography

Rural, natural desert, and riparian scenes characterize the typical landscapes in the Rainbow Valley planning area. Most of the rural scenes are composed of low-density residential development or cropland and most of the natural scenes are composed of desert foothills where Palo Verde-Saguaro habitat is found. The Gila River runs through the northern end of the planning area, creating a physical division with cropland to the north of the river and desert to the south. The Gila River floodplain forms a broad band, averaging one mile across, of dense riparian vegetation, alternating with sand bars.

Figure 9-Elevation shows general elevations within the planning area, which range from 840 feet above sea level along the Gila River, to 1,774 feet above sea level near the western boundary. Terrain within the planning area ranges from rock outcrops and mountains found along the eastern and western portions to alluvium found in the central and northern portions. Slopes range from less than one percent in many areas, to greater than 15 percent in the Sierra Estrella foothills and Buckeye Hills region. The area generally slopes toward the Gila River. Approximately 91 percent of the land contains slopes between zero to one percent, five percent of the planning area has slopes between one to fifteen percent, and four percent is sloped at 15 percent or greater. Much of the north, central and southern planning area is relatively flat. The extended planning area, south of Germann Road, is composed of gently sloping desert with large expanses of leveled agricultural land in the east.

Climate

Climate in the planning area is similar to the Phoenix metropolitan area with generally mild fall, winter, and spring seasons and hot, dry summer weather. Precipitation averages between 7 and 9 inches annually, but can vary significantly from year to year. Precipitation can be three times greater in wet years than in dry years. Most of the precipitation occurs in the winter months and in July, August, and September. From mid to late summer, moist air from the Gulf of Mexico influences weather patterns. From November through March, the region is impacted by storm systems

from the Pacific Ocean and the Northwest. Storms in both seasons can create flooding and drainage problems depending on their intensity and duration. **Table 13-Average Monthly Climate Summary**, summarizes monthly temperature and precipitation levels in the planning area.

Soils

Soil types and their location have a direct effect on potential land uses. Indeed, development type, quality, and character can be significantly influenced by soil properties. Important soil properties include permeability, compaction, shear strength, shrink-swell potential, plasticity, salinity, susceptibility to erosion, corrosiveness, and the amount and type of cementation.

Soil types are normally categorized by *associations*. Soil associations describe a group of soils that occur in a repeating pattern, and usually consist of one or more dominant soil along with at least one minor soil. The association is usually named for the major soil it represents. There are ten major soil associations in the Rainbow Valley study area, and their characteristics are described later in this section. Because

Table 13
Average Monthly Climate Summary

Month	Average Maximum Temperature (F)	Average Minimum Temperature (F)	Average Total Precipiation (inches)
January	68.8	37.6	0.85
February	73.9	41.1	0.8
March	79.7	45.6	0.92
April	87.7	50.9	0.33
May	96.3	58.7	0.14
June	106.1	67.2	0.14
July	108.8	75.3	0.7
August	106.5	74.5	1.23
September	101.1	66.9	0.7
October	90.4	54.6	0.67
November	74.9	41.6	0.77
December	68.7	37.1	0.9
Annual	**88.8**	**54.4**	**8.15**

soil characteristics vary, testing should be done prior to development to determine if soils pose problems for septic tanks, water and sewer lines, and/or building and road foundations. **Figure 10-Soil Associations** illustrates the ten major soil associations in the planning area. These soils and their characteristics are as follows:

A) Gilman-Estrella-Avondale Association: Well-drained soils consisting of deep, moderate permeable, coarse to fine, loamy material formed in mixed recent alluvium on floodplains, low terraces, and alluvial fans.

B) Antho-Valencia Association: Well-drained soils on nearly level sandy loams on valley plains and low stream terraces.

C) Carrizo-Brios Association: Deep and excessively drained soils on floodplains, alluvial fans, stream channels, and low stream terraces. Slopes range from 0 to 3 percent and permeability is very rapid.

D) Torrifluvents Association: Nearly level to gently sloping soils that are gravelly, cobbly, and stony throughout on recent alluvial fans at the base of mountains.

E) Rillito-Gunsight-Perryville Association: Well-drained soils on nearly level to moderately steep gravelly loams and loams on old alluvial fans and valley plains.

F) Laveen-Coolidge Association: Well-drained soil on nearly level sandy and clay loams on old alluvial fans and valley plains.

G) Casa Grande-Harqua Association: Well-drained soils on nearly level to sloping, saline-alkali, sandy, and gravelly clay loams on valley plains.

H) Cherioni-Rock Outcrop Association: Well-drained soils on gently sloping to very steep, very gravelly loams and rock outcrop mountains, buttes, and low hills.

I) Ebon-Pinamt-Tremant-Association: Nearly level to gently sloping gravelly loams, very cobbly loams, and gravelly clay loams on old alluvial fans at the base of mountains.

J) Pinal Series: Shallow, well-drained soils on old alluvial fans and stream terraces over a silica-lime cemented hardpan. Slopes range from 0 to 3 percent.

The four primary soil properties that effect development suitability are permeability, available water capacity, shrink-swell potential, and corrosivity. **Table 14** categorizes the degree of constraint associated with the type of development activity for each soil association.

Permeability

Refers to the rate at which water moves through soil and is usually determined by soil texture. Soils with slow permeability pose severe limitations for septic tank absorption fields. Soils with slow permeability do not allow adequate absorption of effluent from tile or perforated pipe into natural soil.

Available Water Capacity

Refers to the amount of water a soil can hold which is available for plants. The ability of soil to hold water helps determine the type of plants that can be used for landscaping and lawns. It should be noted that these soil limitations do not prevent the use of imported topsoil for landscaping purposes provided that it has a high available water capacity.

Shrink-Swell Potential

Identifies the capacity of a soil to expand or shrink as the moisture content is increased or decreased. Soils with a high percentage of clay tend to have a high shrink-swell capacity, which can contribute to structural problems for buildings and roads.

Corrosivity

Refers to a soil's capacity to induce chemical reactions that will corrode or weaken metals and concrete. Corrosive soils may create problems for underground utilities if installed unprotected.

Geology

General geology within the Rainbow Valley planning area consists of sedimentary and metamorphic rocks. Sedimentary rocks, such as limestone, shale and sandstone, originate from other rocks broken up over time by weathering and erosion or dissolved by running water. The silt, sand, and gravel deposits found in the Gila River are examples of sedimentary rock that has not solidified. Metamorphic rocks, forming the core of many Basin and Range mountains, were formed from older rocks that have been subjected to great heat and pressure, usually deep below the earth. The Sierra Estrella range is a long, northwest-southeast ridge of gneiss, schist, and granite, all of which are classified as older Precambrian rocks, estimated to be two to three billion years old. The eastern end of Buckeye Hills is composed of the same rock types.[2]

[2] Chronic, Halka. Roadside Geology of Arizona. Mountain Press Publishing Co., Missoula, 1983

Vegetation

The Rainbow Valley planning area is located in the Sonoran Desert and includes three general types of native plant communities: Palo Verde-Saguaro, Creosote, and Riparian. In addition to native vegetation, the planning area includes agriculture and residential landscapes.

The Palo Verde-Saguaro community, also known as "Upper Sonoran" vegetation, is found in the undeveloped mountainous areas surrounding and within the planning area and is the most scenic of the Sonoran Desert plant communities. This community is composed of small trees including Palo Verde (*Cercidium* spp.), Catclaw (*Acacia* spp.), and Mesquite (*Prosopis* spp.); shrubs such as Creosote (*Larrea tridentata*), Bursage (*Ambrosia deltoidea*), and Saltbush (*Atriplex* spp.); and cacti including the Giant Saguaro (*Carnegiea gigantea*), Barrel (*Ferocactus acanthodes*), Hedgehog (*Echinocereus engelmannii*), Prickly Pear (*Opuntia* spp.), and Cholla (*Opuntia* spp.). The Palo Verde-Saguaro community is rich in species diversity and supports a number of wildlife species. In addition, this vegetative community provides scenic quality that enhances the overall area and should be protected wherever possible.

The Creosote Community is located in valleys and on the lower, more arid central portion of the planning area. Creosote Bush and Bursage are the dominant plants of this community, which is transitional between the Palo Verde and Mesquite communities found along local drainage ways. The even stature and spacing of plants, produces a uniform landscape over large areas. Larger shrubs, cacti, and trees are absent, except along washes where Ironwood (*Olneya tesota*), Mesquite, Palo Verde, and Catclaw may grow. The ironwood tree plays an important role in supporting the biodiversity of over 500 Sonoran Desert plant and animal species.[3] This plant community is also moderately disturbed by development of mobile home lots, which predominate in this particular region of the planning area.

The Riparian Community is found along the Gila River that bisects the northern portion of the planning area and along Waterman Wash that runs north to the Gila River, bisecting the west central portion of the planning area. The highest concentration of riparian habitat along Waterman Wash is found in the southernmost portion of the wash. Riparian habitat provides an abundance of lush vegetation that supports various local and migrant wildlife and fish species.

The Riparian Community is concentrated along drainage channels and expands in areas of shallow groundwater. This community is generally composed of tall, dense stands of Mesquite, Catclaw, Desert Willow (*Chilopsis linearis*), Blue Palo Verde,

[3] Pima County. Sonoran Desert Conservation Plan. Tucson. 1998

changing to Walnut (*Juglans major*), Goodding Willow (*Salix gooddingii*), Sycamore (*Platanus wrightii*), Arizona Ash (*Fraxinus velutina*), Canyon Hackberry (*Celtis reticulata*), and Cottonwood (*Populus fremontii*) as soil moisture, content, elevation, and level of drainage increase. Sycamore and Walnut trees do not occur naturally in the planning area but grow along streams at higher elevations. Salt Cedar (*Tamarix* spp.), a non-native species, is also predominant in all areas of the riparian community. Salt Cedar stands have lower wildlife value than native riparian species and habitats.

The Riparian Community exhibits high scenic quality and is unique within the desert. These areas are especially important for the control of erosion, natural flood control, and as habitat for wildlife that includes some endangered species. Due to the unique functions and values of the riparian habitats, they should be preserved.

Most of the planning area north of the Gila River is composed of agriculture, including livestock pastures. The southernmost region of the planning area contains a patchwork of natural desert carved by numerous narrow washes; irrigated farmland; and abandoned farmland. Maricopa County aerial photographs clearly show the heavily veined pattern of arroyos carrying runoff from mountains south of the area towards Waterman Wash and the Gila River. Each arroyo is dotted with desert trees and shrubs. Irrigated farmland consists primarily of agronomic crops such as alfalfa, cotton, and small grains. Abandoned farmland is sparsely dotted with non-native plants that typically invade disturbed soil.

The last category of vegetation is residential landscapes. As observed from Maricopa County's aerial photographs and trips to the region, there are a variety of residential landscapes. Viewed from above, the one-mile street pattern is evident. Typically, each quarter section (160 acres) is subdivided into 32 rectangular lots, each 5 acres in size. Washes, although not continuous, are still a dominant feature where present. Vegetation on many of the home lots is sparse or nonexistent. A number of lots have retained some native desert vegetation and a few have planted groves of shade trees or dense stands of riparian vegetation. In areas where vegetation has been removed, the natural beauty of the region and the flood mitigating capacity is at risk of being lost. Future residential development should seek to preserve native vegetation, revegetate areas such as abandoned roads, and consider requiring building envelopes that would place a limit on the area around the home that may be disturbed. The building envelope concept would not need to apply to livestock corrals or pastures. Some rural Arizona communities have initiated a program, modeled after the Town of Oro Valley's *Save-A-Plant Program*, where planners and citizens rescue cactuses and other plants and replant them in parks and neighborhoods.

The following is a partial list of some of the generally accepted common names of Arizona protected native plants which, by law can only be moved from one location to another after applying for a state permit.[4] Removing or destroying protected species from public and private property requires notification to the Arizona Department of Agriculture (http://agriculture.state.az.us/PSD/nativeplants.htm)

Cacti:
Barrel
Cholla
Hedgehog
Mammillaria
Night Blooming Cereus
Pin Cushion
Prickly Pear
Saguaro

Other Plants:
Agave (Century Plant)
Crucifixion Thorn
Desert Holly
Desert Spoon (Sotol)
Ironwood Tree
Jerusalem Thorn
Mesquite
Ocotillo
Palo Verde
Smoke Tree
Yucca

Wildlife

Three wildlife habitats, the Palo Verde-Saguaro, Creosote, and Riparian Communities, are found in the Rainbow Valley planning area. The Creosote and Palo Verde habitat compose the majority of the area. The *Jackrabbit Trail/Tuthill Road Corridor Study* describes the following wildlife conditions: "*The rich diversity of available resources because of the combination of grain-crops, the surrounding undeveloped desert, the Gila River, Waterman Wash and canals, provide a matrix of foraging and breeding opportunities, and travel corridors. Species that might be found to occur within the study area include transitional big-horn sheep, javelina, mule deer, raptors, a variety of seasonally migrant song birds, and a vast array of small mammals, amphibians, and reptiles.*" [5]

The Sierra Estrella Mountains, Buckeye Hills, and the Gila River border the planning area. This encourages migration of larger animals from the unpopulated natural areas. The southwest corner of the planning area contains a sparse range of Desert Bighorn sheep with a density of 0.1 to 0.5 sheep per square mile. The entire planning area is considered a primary range for Gambel Quail, with the exception of the mountainous areas at the east central and southwestern corners of the planning area.

[4] Arizona Revised Statutes, Title 3, Chapter 7, Article 1
[5] Maricopa County Department of Transportation. Access Control and Corridor Improvement Study, Jackrabbit Trail/Tuthill Road, Germann Road to Indian School Road, January 2001

Within the desert habitats, higher concentrations of wildlife live along the local drainage ways and within the riparian habitats. These drainage corridors also function as movement corridors for the wildlife, including the larger animals such as javelina, mule deer, and desert bighorn sheep. The Arizona Game and Fish Department (AGFD) recommends protecting corridors that connect important habitat areas to facilitate wildlife movement between desert mountain ranges and other habitat areas.

Higher concentrations of birds live within the drainage ways, including the White Wing Dove, Inca Dove, and the Peregrine Falcon. Riparian habitats are especially important breeding grounds within the desert. Marshy areas along the Gila River provide habitat for the Yuma Clapper Rail, a federally endangered species that is discussed in the *Sensitive Species and Habitat* section below.

Many species of reptile are found within the Rainbow Valley planning area. Some of these include the Whiptale Lizard, Gopher Snake, Desert Tortoise and Desert Horned Lizard.

High scenic quality, the presence of endangered wildlife species, and high sensitivity to development are characteristics of the Palo Verde-Saguaro habitat located in the mountainous areas bordering and within the planning area. To preserve this habitat, limited or no development should occur and recreational use and motor vehicle access should be confined to designated areas. Conservation and preservation of local drainage ways could also help provide some habitat preservation.

Additionally, the Gila River and Waterman Wash 100-year flood plains should be considered for protection from new development and portions of these corridors may be selected for revitalization including revegetation and habitat restoration.

Environment Effects

Sensitive Species and Habitat

The Arizona Game and Fish Department's (AGFD) Heritage Data Management System lists the following sensitive species that may occur in the planning area.

Species	Federal Status	State Status
Western Yellow-Billed Cuckoo	C, S	WSC
Yuma Clapper Rail	LE	WSC
Sonoran Desert Tortoise	SC	WSC
Western Least Bittern	SC	WSC

C = Candidate Endangered or Threatened (U.S. Fish & Wildlife Service)
S = Sensitive (U.S. Fish & Wildlife Service)
SC = Species of Concern (U.S. Fish & Wildlife Service)
LE = Endangered (Federal Endangered Species Act)
WSC = Wildlife Species of Concern (Arizona Game & Fish Department)

The Jackrabbit Trail/Tuthill Rd Corridor Study also identifies several special status species which may occur within the corridor study area, most of which is in the Rainbow Valley study area. The corridor study found potential habitat for listed endangered and threatened species within the study area along the Gila River watershed and Waterman Wash. Based on identified habitats, the study concludes that Southwestern Willow Flycatcher, Yuma clapper rail, razorback sucker, cactus ferruginous pygmy owl, Gila topminnow, and bonytail chub could occur within the study area. Further, the corridor study states that a biological assessment, and coordination with the Arizona Game & Fish Department and the United States Fish & Wildlife Service (USFWS) may be required if any future project actions encroach on the riparian vegetation and/or channels associated with the Gila River or Waterman Wash.

The Western Yellow-Billed Cuckoo is a neo-tropical migrant (about 12" long) which winters in South America. The decline of riparian, or streamside, habitat is contributing to the bird's decline. River restoration has been identified as an important management need.

The Yuma Clapper Rail, a marsh bird (8 to 9" tall) with a short tail, long legs, and short rounded wings, is federally endangered and a state species of concern. The Rail can be found along the Colorado, lower Gila, and Salt rivers below the Verde/ Salt River confluence. This species has consistently been detected in the Tres Rios study area, just east of the Rainbow Valley study area. Primary reasons for concern are that the Yuma Clapper Rail is very susceptible to modifications of wetland habitat, such as channelization, bank stabilization, and water impoundments. In addition, its prey base, including crayfish, is vulnerable to pesticide and heavy metal poisoning.

The Western Least Bittern is a tiny (11-14"), secretive heron that inhabits freshwater marshes where cattails and reeds are found. It is listed as a Species of Concern by the USFWS.

Southwest Willow Flycatcher is a small (less than 6" in length) bird that makes its home in dense streamside habitats. Its breeding range includes areas along the middle Gila River. Extensive population reductions since the 1800s appear to have been caused by habitat loss (conversion or destruction of native riparian habitats), with nest predation and brown-headed cowbird parasitism as additional threats. Management needs have been identified as: protection of existing willow-cottonwood thickets, and restoration where such habitats have already been destroyed along rivers and streams; continuation of ongoing statewide surveys and monitoring coordinated by AGFD; and research into habitat requirements and relationships with other species.

The Cactus Ferruginous Pygmy-Owl was listed as endangered in Arizona in 1997; critical habitat was designated in 1999 in Arizona. Historically, its breeding range included south-central Arizona habitats of riparian cottonwood forest and mesquite bosques with less common occurrence in the Sonoran desertscrub communities. The public lands in the Rainbow Valley planning area are within the historic distribution of the endangered cactus ferruginous pygmy-owl. Any surface disturbing activity on public land needs at least a two year lead time to facilitate required clearances for this species.[6] This small owl has not been detected in the Tres Rios study area since 1898, when it occurred in the cottonwood riparian forest near the confluence of the Gila and Salt rivers. Most recent sitings have occurred in northwest Tucson/ Marana area.

In general, most of the planning area is Desert Tortoise habitat.6 In the late 1980s, a unique community of Desert Tortoise was surveyed and located by biologists of the AGFD in the northeast corner of the planning area. Current AGFD Heritage Data Management System records indicate that Sonoran desert tortoise may be present within the planning area. Sonoran desert tortoise occurs primarily on rocky slopes and is known to use dry watercourses to move between habitats. Potential impacts to sensitive species, including tortoises would include disturbance of riparian habitats by activities such as agricultural development, sand and gravel operations in the flood plain, or intense recreational use such as off-highway vehicles. The AGFD has developed guidelines for handling Sonoran desert tortoises encountered on development projects. The AGFD should be contacted during the planning stages of any project that may affect desert tortoises.

[6] Bureau of Land Management, Phoenix Office. Personal communication, 2001

Visual Character

Visual resources in the planning area range from green farmland in the north to low density rural residential areas south of the Gila River to undisturbed desert lands laced with sandy washes in the southwestern reaches. The following visual characteristics are described as viewed primarily from Jackrabbit Trail/Tuthill Road, Rainbow Valley Road, and Riggs Road.

Primary visual elements in foreground areas (along the roadside) north of the Gila River include agricultural fields, dairies, irrigation ditches, roadway shoulders, and other man-made features. The most notable features of the dairies are rows of narrow shade-structures. Middleground areas, approximately one mile from the roadway, generally include additional agricultural land. In the distant background are views of the White Tank Mountains to the north, North Maricopa Mountains to the south, Sierra Estrella Mountains to the east, and Buckeye Hills to the west.

South of the Gila River contains foreground elements such as manufactured homes on large parcels, sparse Sonoran Desert vegetation, small washes lined with trees, and the broad, sandy expanse of Waterman Wash that Rainbow Valley Road (paved) crosses. Waterman Wash is densely lined with Desert Broom, Palo Verde, Salt Cedar, and Mesquite. Middleground elements are composed of Sonoran Desert vegetation, several hilly landforms, and a few wooden telephone pole corridors. Desert vegetation is primarily Creosote Bush, with scattered Palo Verde trees, and infrequent but large Saguaro cactuses. The distant background features the same mountain views as described above plus the 500kV electric transmission towers and lines that run through the planning area.

From Rainbow Valley Road near Riggs Road, foreground elements include irrigation ditches, pump equipment, wooden telephone poles, a few abandoned farm labor shacks, abandoned farmland to the west, and actively farmed land to the east. The middleground is additional flat farmland. Distant views are of Sierra Estrella Mountains less than 10 miles to the east, and North Maricopa Mountains approximately three miles to the south. Traveling west on Riggs Road, foreground and middleground elements are mostly undisturbed Sonoran Desert broken up by sandy washes lined with large Ironwood and other desert trees. The dominant background features, closer now, are the rugged North and South Maricopa Mountains.

Air Quality

The Environmental Protection Agency (EPA) is the federal agency in charge of setting air quality standards to protect public health and welfare. National Ambient Air Quality Standards (NAAQS) have been set for six criteria pollutants (carbon monoxide, nitrogen dioxide, particulate matter, ozone, sulfur dioxide, and lead). States are

required to adopt ambient air quality standards, which are at least as stringent as the federal NAAQS. However, state standards may be more stringent. Arizona has adopted the federal NAAQS for the six criteria pollutants. The Arizona Department of Environmental Quality (ADEQ) is the state agency responsible for compliance and enforcement for all portable sources of air pollution within the state and all stationary sources outside Maricopa, Pinal, and Pima counties. The Maricopa Association of Governments is responsible for maintaining plans and addressing problems with carbon monoxide (CO), ozone (O_3), and particulate matter (PM_{10})within Maricopa County. The Maricopa County Air Quality Division issues air quality permits to regulated businesses, monitors ambient air for pollutants, writes the Maricopa County Air Pollution Control Rules & Regulations, and determines facility compliance. The Division sets the long range direction for clean air within Maricopa County.

The EPA normally designates nonattainment areas only after air quality standards are exceeded for several consecutive years. Maricopa County has been designated as a nonattainment area for CO, O_3, and PM_{10}. The Rainbow Valley planning area is within the nonattainment boundary, except for the southernmost tip, south of Riggs Road.

CO is an odorless, colorless, toxic gas formed when carbon-containing compounds or fuels are burned incompletely. The primary sources of CO are on-road mobile sources (e.g. automobiles and trucks), non-road mobile sources (e.g. lawn and garden equipment, construction, farm, recreational equipment, aircraft, and trains), area sources (e.g. fuel combustion, on-site incineration, open burning, fire places and woodstoves), and point sources (e.g. industrial, manufacturing, and electrical power generating facilities. CO pollution can reach unhealthy levels in Maricopa County during the winter.

At ground level, O_3 is a primary component of photochemical smog. It presents a serious health threat to people suffering from respiratory disease. The primary emission sources include volatile organic carbons and nitrogen oxides from point, nonroad, area, stationary, motor vehicle and biogenic sources (certain types of vegetation including citrus and eucalyptus). O_3 can reach unhealthy levels in Maricopa County during the summer.

PM_{10} refers to fine particulate matter suspended in the atmosphere. These particles have a diameter equal to or less than 10 micrometers. When inhaled, the fine particles can be deposited in the lungs, resulting in difficult breathing, inducement of bronchitis, aggravation of existing respiratory diseases, and permanent lung damage. Earthmoving and windblown emissions from unpaved parking lots, agricultural areas, construction sites, disturbed open areas, and industrial sites are the predominate causes of exceedences of air quality standards.

In the Rainbow Valley area, sources of dust include unpaved roads; trucks, ATVs, and other traffic; vacant agricultural fields, and construction sites. Maricopa County has implemented several air pollution control programs including Agricultural Best Management Practices (BMP), Clean-Burning Fireplace Ordinance, Clean Burning Gasoline, Fugitive Dust, and transportation-related programs. On May 29, 1998, Governor Hull signed Senate Bill 1427, which establishes a state process to develop, implement, and enforce agricultural best management practices designed to reduce fugitive dust in the Phoenix area. In May 2000, the agricultural BMP committee adopted the Agricultural PM_{10} General Permit. The general permit requires that a commercial farmer implement at least one BMP to control PM_{10} for each of the following three categories: tillage and harvest, non-cropland and cropland. The general permit required a commercial farmer to comply by Dec. 31, 2001.

Noise

Prolonged exposure to loud noise can cause general community annoyance and reductions in property values. In the Rainbow Valley planning area, the primary sources of noise are vehicular traffic, the railroad, and ATV use. While there are several airports in Maricopa County, no major flight paths cross over the planning area. Luke Air Force Base flight patterns occur a few miles north of the planning area and may occasionally cross over the area. MAG has identified Noise Contours delineating areas of significant noise impacts around the air base. The closest of these contours is approximately 3.5 miles north of the planning area. State law recognizes a larger area around Luke Air Force Base known as the *Territory in the Vicinity of a Military Airport*. It is defined as the area 10 miles to the north, south and west and four miles to the east parallel from the center of the main runway. The southern boundary is located roughly at Citrus Road and the Southern Pacific Railroad tracks, which is less than a mile north of the northeast corner (outside) of the Rainbow Valley planning area. Within this area, ARS §28-8481A requires that Maricopa County adopt and enforce planning and zoning regulations to assure development compatible with the high noise and accident potential from military aircraft.

Archaeology

Arizona, and especially Maricopa County, has one of the highest concentrations of archaeological sites in the United States and possibly the world. There have been over 800 Hohokam sites recorded just within the Salt River Valley. The State Historic Preservation Office (SHPO) has detailed information on file for site locations and surveys that have been conducted in the planning area. For the protection of the resource, only members of federal, state, or local government agencies can examine the files. If a federal or state agency is involved in a project that will affect an undisturbed area, that agency is required to consult with the SHPO to determine if

any historic or archeological properties exist in the project area and/or if a survey is necessary. Although no systematic reconnaissance field survey of the county has been conducted, preliminary studies indicate high potential for significant archaeological resources in portions of the planning area, including the Gila River basins. The SHPO, in cooperation with federal, state, and other agencies is developing a statewide electronic database to provide comprehensive survey information of all historic sites in Arizona. Given the high potential for sensitive sites, prior to development, excavation, or grading an archaeological/historical review should be performed to determine an area's full archaeological potential, and preservation precautions should be taken where necessary.

Water Quality

Approximately two-thirds of the Rainbow Valley planning area lies within the West Salt River Valley Subbasin (WSRV). Groundwater quality in most areas of the WSRV subbasin is suitable for most uses, including domestic use. However, poor-quality restricts groundwater use in many areas. Activities including animal-feeding operations, use of agricultural fertilizers and pesticides, and WWTP outflow contribute to groundwater contamination. Because contaminants typically infiltrate from the surface, most of the poor quality groundwater is in the upper unit. The quality of deep, older groundwater typically has not been affected by human activities.

Total dissolved solids (TDS) is an indicator of salinity or hardness of the water. From the perspective of human health, dissolved solids are less of a concern than pesticides or nitrates, for example. Dissolved solids are considered secondary contaminants that affect taste, smell, and appearance of drinking water. However, even when used only for irrigation, high levels of TDS can be harmful to crops and to wildlife. Dissolved solids continue to accumulate in the central Arizona basins, brought in from streamflow, effluent and Central Arizona Project water (outside of the planning area). As irrigation water evaporates, salts become even more concentrated, building up in soils and groundwater. To prevent crop damage, excess irrigation water is commonly applied to leach the salts out of the root zone. There is a concern that if this deep-percolation reaches the groundwater, the upper part of the aquifer could be contaminated by dissolved solids, nutrients, and pesticide residues.

The highest total dissolved solids concentrations in the Phoenix AMA are found near the Salt and Gila rivers and in the WSRV subbasin.[7] Sulfate distribution also occurs in highest concentrations along the Gila River near Buckeye. Sulfate occurs naturally, however, elevated concentrations can result from the leaching of industrial wastes

[7] Third Management Plan 2000-2010 Phoenix Active Management Area. Arizona Department of Water Resources, December 1999

and agricultural fertilizers. The high concentration of total dissolved solids and sulfate is attributed to agricultural irrigation and effluent discharge into the Gila and Salt rivers. In addition, the Luke Salt Dome is a possible source of high salinity.[8]

Nitrate concentrations in West Salt River Valley groundwater are among the highest in the nation.[1] High nitrate concentrations are found in the southern part of the WSRV, with the highest concentrations in agricultural areas near West Phoenix, Glendale, Buckeye, and near Chandler.[8] Because nitrate stimulates plant growth, it is typically regarded as a desirable constituent for agricultural and turf irrigation. As such, effluent is often sought as a source of irrigation water, enabling the reduction or elimination of nitrogen fertilizer in some cases. Excessive nitrate levels in drinking water are a health concern for children and adults. High nitrate concentrations can result in "blue-baby syndrome," in which oxygen levels in the blood of infants are dangerously low. Birth defects also have been attributed to high nitrate concentrations. In adults, high nitrate concentrations have been associated with cancer.9 Maps indicating ADEQ well test results (since 1990) indicate a site along Waterman Wash that shows excessive amounts of nitrates and total dissolved solids. Nitrate concentration exceeded the Maximum Contaminant Level (MCL) set by national primary drinking water regulations. Water containing levels of nitrate-nitrogen above the MCL of 10 mg/l cannot be delivered as a drinking water supply. Excessive dissolved solids only affect taste, odor, and color.

Volatile organic compounds (VOCs) occur in groundwater near west Phoenix, the Phoenix Goodyear Airport, and in landfills along the Salt River. The VOCs detected in the WSRV were either refrigerants, solvents, or gasoline additives. VOCs have been identified as a major concern for groundwater contamination in Arizona. Trichloromethane (chloroform) was the most commonly detected VOC in the nation and in a central Arizona basins study. It is a by-product created during the use of chlorine to disinfect water, a solvent, and a by-product of carbon tetrachloride.

Some pesticides and metals are found in localized areas such as near landfills and agricultural areas. A USGS study conducted between 1995 and 1998 detected ten pesticides in all nine monitoring wells in an agricultural land-use study area along the Gila River, east and west of Waterman Wash (within the Rainbow Valley study area). This was the largest number of pesticides detected in a study of three basins within central Arizona. Even though a number of pesticides were detected, concentrations of the pesticides did not exceed drinking water standards or guidelines.[9]

[8] Tres Rios Feasibility Study, Maricopa County, Arizona. U.S. Army Corps of Engineers, Los Angeles, 2000

[9] Water Quality in the Central Arizona Basins 1995-98 (Circular 1213). U.S. Geological Survey, Reston, Virginia, 2000

Surface water pollutants can originate from both single point sources such as a pipe or ditch, and non-point sources such as runoff from agricultural fields, construction sites and urban development. In Maricopa County, agriculture, industry, construction, wastewater treatment plants, motorized recreation, landfills, and resource extraction are the primary contributors to surface water pollution. Metals, TDS, turbidity, suspended solids, pathogens, and pesticides are contaminants associated with surface water pollution. Nutrient concentrations at effluent-dependent sites such as the Gila River are elevated because the effluent discharged into the river is a major source of nitrogen and phosphorous.9 In the West Salt River Valley (Middle Gila River region) primary sources of nutrients are fertilizers, livestock-feeding operations, sewer and septic systems. Best management practices and regulation of point-source pollution are methods to reduce the quantity of nutrients entering streams.9 Regulatory agencies and environmental legislation have resulted in greater attention to the mitigation of existing pollution problems and the prevention and mitigation of future problems.

In the spring of 1995, the City of Phoenix began construction on the Tres Rios Wetlands project. Located at the convergence of the Salt, Gila, and Agua Fria rivers, the project is designed to enhance water treatment from the wastewater treatment plant, create wildlife habitat, and provide flood protection for downstream communities such as Rainbow Valley. Other opportunities for improving local water quality should be explored, such as improving wastewater treatment systems for dairies. Researchers from the University of Arizona College of Agriculture and Life Sciences are developing guidelines for dairy operators throughout arid regions of the country on how to build constructed wetlands to improve wastewater treatment systems and decrease water use.

The quality of CAP water, although naturally high in dissolved solids, is acceptable for most uses with appropriate treatment. CAP water is not currently used in the planning area.

Additional information on water quality in Maricopa County is available in the Water Resource element of *Eye to the Future 2020*, the Maricopa County Comprehensive Plan. A discussion of water quality issues in the West Salt River Valley is presented in the Water Resources section of this area plan.

Hazardous Material

ADEQ's Emergency Response Unit responds to hazardous material and pollutant releases that pose an immediate threat to public safety. The Unit directly provides for containment and proper disposal of materials when responsible parties are not capable of doing so. They also operate the statewide hazardous substance spill

reporting network. Some examples of reported hazardous material incidences in the Rainbow Valley planning area from November 1996 through April 2000 include: a natural gas leak and fire at the El Paso Natural Gas pipeline; cutting oil release from 14 drums; containerized drug lab chemicals; and a sulfuric acid spill (50-100 gallons) from a tanker.

Emergency Management

Disasters may be caused by winds, floods, flash floods, releases of deadly chemicals, fire, and snow (at higher elevations). State level response to disasters or emergency situations are conducted in the State Emergency Operations Center (SEOC). Direction and control of resources are coordinated by the Arizona Division of Emergency Management (ADEM). Communication of emergency information to the public is coordinated with local emergency management officials and media representatives. Emergency information aids in saving lives, reducing injuries and the impact of disasters on people and property.

The Governor may proclaim a state of emergency after a political subdivision has passed a resolution stating that an emergency exists in the jurisdiction(s) and it is above and beyond their capability. The Governor has an annual Emergency Fund of $4 million, administered by the ADEM, to cover the costs of emergencies and disasters. In some cases, if an emergency is beyond the capability of the State and local governments, the Governor will request federal assistance from FEMA through the President of the United States.

ECONOMIC DEVELOPMENT

Social and Economic Characteristics

The social and economic characteristics of the Rainbow Valley planning area are described in the following five sections:

- Area Economy/Economic Base
- Housing
- Residential, Commercial, and Industrial Demand
- Economic Base Potential
- Policy Implications

Area Economy/Economic Base

Two types of markets provide income and employment within any economy. The local market, or the non-basic sector, sells products to consumers within a city or area, and the export market, or basic sector, which sells products to consumers outside a city or area. Economic theory purports that a region must produce and export goods and/or services to an outside market in order to increase local income.

The economic base of the Rainbow Valley planning area consists mainly of agricultural land uses in the northern portion of the planning area. Recently, a steel fabricating facility was constructed in the northwest corner of the planning area, north of the Southern Pacific rail line. The facility plans to employ 75 to 80 people and will consist of 96,600 square feet. The planning area economy is closely linked to the larger Phoenix metropolitan area. Major local employers near the planning area provide a variety of jobs although many residents work outside the West Valley. Among the area's industries are those in high-tech/aerospace, distribution, transportation, and manufacturing. **Table 15** shows some of the area's primary employment activities.

Employment figures for the year 2000 were developed by MAG, including two Traffic Analysis Zone (TAZ) areas in the central and most populated area of Rainbow Valley. **Table 16** provides a breakdown of total employment in this area. In this table, retail and industrial areas appear to be the top two employment categories.

At the county level, since the mid-1990s Maricopa County's economic growth has been strong with considerable increases in both employment and personal per capita income. However, the rate of employment growth is expected to slow over the next five years. Significant slowing is projected in non-trade services (i.e. non-wholesale and retail), where employment growth is forecast to slow from a 10.4% annualized rate in 1996 to an annualized rate of 3.3% between 2001 and 2006.

Table 15 Primary Employment Activities			
Buckeye Area		**Goodyear Area**	
Major Private Employer	***Major Public Employer***	***Major Private Employer***	***Major Public Employer***
Quincy Joist (steel manufacturing)	Town of Buckeye	Lockheed Martin	Arizona Department of Corrections (Perryville Prison)
Wal-Mart (distribution center)	Buckeye Union High School District; Buckeye Elementary School District	Cavco (manufactured homes)	Luke Air Force Base
Schult Homes Corp (manufactured homes)	Arizona Department of Corrections	TIMCO (aircraft manufacturing)	City of Goodyear
Rip Griffin Travel Center	Palo Verde Nuclear Generating Station	Rubbermaid (plastic home products)	School districts (3) (primary schools and secondary schools)
H-Four Farms			

Source: Greater Phoenix Economic Council, 2001; Arizona Department of Commerce
Employers listed may be located near the Rainbow Valley planning area.

Table 16 MAG Socioeconomic Date - Base 2000 Employment						
Area	***Retail***	***Office***	***Industrial***	***Public***	***Other***	***Total Employment***
TAZ 145	165	0	0	0	105	270
TAZ 1901	43	5	175	43	50	316
Totals	208	5	175	43	155	586
Total % in employment category	35.5	1	30	7	26.5	N/A

Source: Draft MAG POPTAC data, April 2002

Note: TAZ refers to "Traffic Analysis Zones," a geographical unit used by the Maricopa Association of Governments to determine statistical measurements. TAZ 145 and 1901 are located in the Rainbow Valley Area Plan

Besides a slowdown in employment growth, a longer term trend at the County, state, and national level is an increase in workforce age. Over the next twenty years, the number of younger workers available to replace older workers will decline, creating a possible shortage of workers. Whereas growth in the number of working adults (ages 25 to 55) will increase by about 34% between 2000 and 2020, the number of people over the age of 60 will increase by 104%.

Agriculture

The northern portion of the planning area contains some of the prime agricultural land in the Valley and has a long history of intensive agricultural use; predominately citrus, cotton, and alfalfa. There is the potential for some of this land to be converted to residential uses; however, a significant portion of this agricultural land lies in the Gila River floodplain. As such, it will likely continue to be farmed. Agricultural land in the southern portion of the planning area may continue to be farmed, but the tendency in this area since the mid-1990s has been a decline in the number of acres farmed. Dairies, however, are expanding in size of operation and number of animals. Growing feed for dairy cows is also increasing. A number of dairies are located along the Gila River, Waterman Wash, and in the southern portion of the planning area.

While agriculture contributes significantly to the economic base of the planning area, it is not one of the top employers. Opportunities may exist for local farms to diversify to include more mutually beneficial community activities such as U-pick gardens, produce stands, organic farming, festivals, and tours. Waste materials from local dairy farms and municipal yard waste could be used to enrich soil for organic farming. This type of agri-tourism could benefit the economic development of the local community and compliment future planning efforts such as the El Rio Master Plan along the Gila River.

Luke Air Force Base

One of the West Valley's largest employers is Luke Air Force Base. As the world's largest fighter-pilot training base, Luke has considerable economic impact on the West Valley, the Phoenix metropolitan area, and the State of Arizona. However, urban encroachment may threaten Luke's future mission, which could prove economically detrimental to the region and state. Located approximately 10 miles north of the planning area, a number of residents are employed at Luke.

Palo Verde Nuclear Generating Station

Located approximately 20 miles west of the planning area, the Palo Verde Nuclear Generating Station is a major employer of area residents. The plant, covering 4,050 acres, generates more electricity annually than any other U.S. power plant of any

kind. The three-unit, 3,921-megawatt nuclear plant generated 32,095,426 megawatt-hours of electricity in 1999. The station is operated by Arizona Public Service Company and co-owned by several other energy companies in Arizona, California, and New Mexico.

Economic Development Corridors

The planning area is approximately 5 miles south of Interstate 10, a major trucking route to the Los Angeles area. In addition, Maricopa County Highway 85, which runs through the planning area, connects to State Route 85, providing access to either Interstate 10 or Interstate 8, a major route to the San Diego area markets. The Southern Pacific rail line also runs through the northwest corner of the Rainbow Valley planning area, providing rail access to industrial sites. State Route 85 has been identified as a potential segment of the future CANAMEX Corridor that will connect Canada to Mexico. Currently, the majority of truck traffic travels in an east/west direction along Interstate 10, primarily between Texas and California.

Housing

Over the last several years, growth in the Phoenix metropolitan area housing market has been strong. A steady increase in residential building permits within the planning area reflects a similar trend. Although home prices continue to increase, the West Valley remains more affordable than other valley locations. While reasonably priced in relation to other major metropolitan areas, housing affordability for low-income residents is becoming a problem in Maricopa County. This is due not only to a significant increase in home prices, but also because the availability of affordable rental units has decreased.

A recent report on rural housing in the United States predicts that the need for adequate and affordable rental housing in rural areas will become greater with the booming elderly population, a growth in single-person households, and a greater gentrification of rural communities.[10] Manufactured homes, also called mobile homes, continue to be one of the nation's fastest growing housing types. Manufactured homes comprise one-quarter of all new housing starts in the United States, generally more in rural areas. The greatest attraction of manufactured homes is their low cost. This is appealing to many young and first time home-buyers and retirees. The HAC study notes that while there is no question that manufactured homes are an important and growing housing option for many rural families, concerns about quality and investment value of this type of housing still persist. In December 2000, Congress approved major legislation, the Manufactured Housing Improvement Act that requires states to establish new programs for construction and safety standards, and to develop a dispute resolution process within five years of the law's enactment.

[10] Why Housing Matters – HAC's 2000 Report on the State of the Nation's Rural Housing. Housing Assistance Council, Washington, D.C., December 2000

The trend towards manufactured homes in the unincorporated Rainbow Valley planning area is illustrated in **Table 17**. Indeed, two companies that build manufactured homes are among the top employers in Buckeye and Goodyear. In 1990, manufactured homes accounted for 12.5% of new residential completions in Rainbow Valley. By 2000, manufactured homes accounted for 81% of new residential completions. **Figure 11-Residential Completions**, illustrates the distribution of new housing in the planning area. A corresponding table follows this map.

Characteristics of existing housing stock, for the central portion of the planning area, can be obtained by looking at Clearwater Utilities water company housing unit information from 1995 to 1999. In 1995, the 463 occupied households served by the water company consisted of 428 single-family units, 4 townhouse/condo units, 0 apartments, and 31 mobile homes. Between October 28, 1995 and June 30, 1999, 29 single-family units were added, 0 townhouse/condo or apartment units, and 160 mobile home units were added. This data also indicates a trend toward mobile homes (mostly double-wides) over conventional single-family dwellings in the central region of the Rainbow Valley planning area.

An additional indicator of housing unit projections and demand is approved final subdivision plats in the planning area. In 2001, a final plat for Southwest Desert Estates, a 32-lot single-family residential subdivision, was approved by the Maricopa County Board of Supervisors. The new subdivision is being built at the southwest corner of Elliot and Rainbow Valley Roads. In November 2002, the Board of Supervisors approved a final plat for Rainbow Valley Ranch, a 49-lot subdivision near Narramore Road and 207th Avenue. These homes are conventional single-family dwellings rather than manufactured homes.

Personal Income

In the Rainbow Valley planning area, median household income grew from $14,714 in 1980 to $40,976 in 1990. This was substantially higher than median household income for Maricopa County in 1990, which was $30,797. This statistic includes some incorporated portions of the planning area. As of this writing, data was not available for the year 2000.

Growth in per capita personal income in Maricopa County is expected to slow to an average annual rate of 3.1% over the next five years compared to between 1996 and 2001 when per capita income was growing at an average annual rate of 4.8%.

Construction and Real Estate

Over the past several years, Maricopa County has been one of the nation's leaders in residential construction. The planning area reflects a similar pattern to the County's

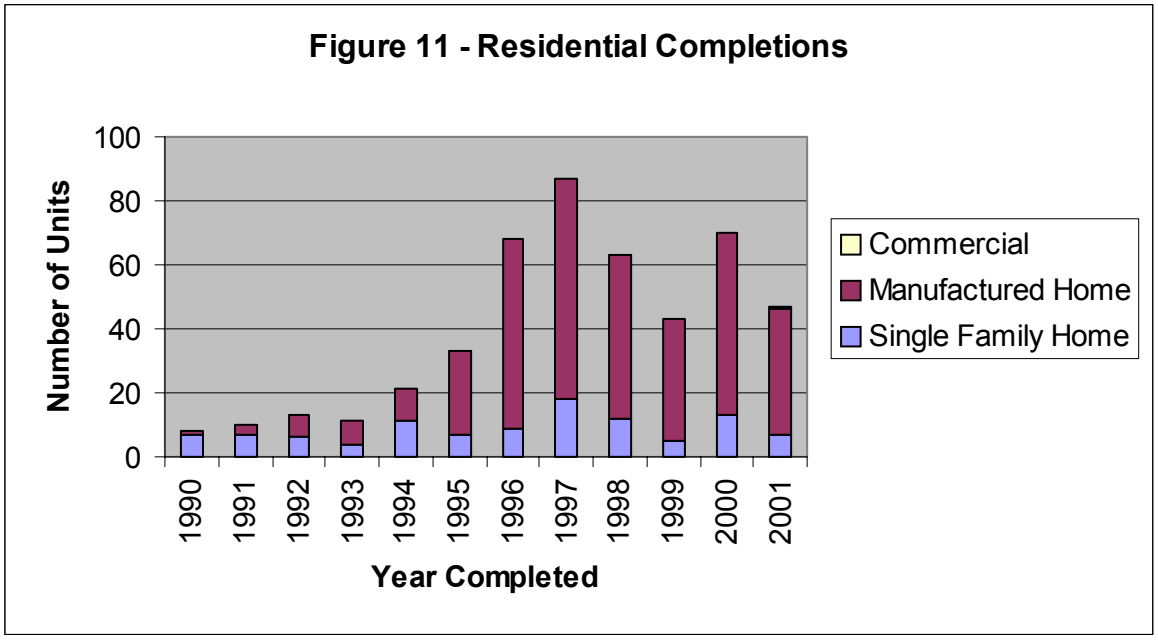


Table 17 Residential Completions by Type			
Type	**1990**	**1995**	**2000**
Site built single family	7	7	13
Manufactured single family	1	26	57
Total	8	33	70

Source: Maricopa County Planning and Development Department

in that residential permits have remained relatively high since the mid-1990s . In 1990, there were 8 residential completions in unincorporated Rainbow Valley, composed of 7 single family homes and 1 manufactured home. Building activity peaked in 1997 with 87 residential completions (18 single family and 69 manufactured homes). In 2001, there were 46 residential completions (7 single family and 39 manufactured homes). Current economic conditions are slowing residential permit activity, and forecasts for 2002 and 2003 show that total annual permits will decrease slightly in Maricopa County.

Since October 1999, there was only one non-residential permit approved (for a commercial dairy expansion) in the rural residential/farm area near Airport and Beloat Roads. One industrial zoning case was approved in August 1999 for a 104 net acre industrial site south of Southern Avenue, between Dean and Airport Roads. The first phase of development consists of approximately 34 net acres to permit the development of a steel joist manufacturing facility.

Residential, Commercial, and Industrial Demand

Residential, commercial, and industrial demand calculations can be found in the Growth Areas element of this area plan. Estimates for the amount of land needed to accommodate future land uses are also provided in the Growth Areas element.

Economic Base Potential

As it did 10 years ago, the economic base of this approximate 82-square mile planning area consists mainly of agricultural land use in the northern portion of the planning area. Recently, approximately 100 acres in the northwest corner of the planning area was rezoned to industrial use. The site is currently being developed as a steel fabricating facility. In addition, there are a few businesses operating under special use permits including sand and gravel operations, dog kennels, chemical mixing plants, and boarding stables. The remainder of the planning area consists of vacant desert land. A large amount of this land is publicly owned by the BLM and the State.

Access to the planning area from the Phoenix Metropolitan Area to the north and northeast is limited to an all weather bridge across the Gila River at Jackrabbit Trail. Access to Rainbow Valley from the Estrella Mountain Ranch community to the east is limited to taking the Estrella Parkway bridge south over the Gila River and then continuing on Elliot Road, which runs west into the planning area.

Western Maricopa Enterprise Zone

Another important economic feature is the Western Maricopa Enterprise Zone (WMEZ). The WMEZ is a state-authorized program/alliance of 14 political jurisdictions, established to generate employment through incentives and tax credits. The WMEZ covers a 5,600 square mile area of western Maricopa County, including a portion of the Rainbow Valley planning area along MC-85 highway. The WMEZ can play an important part in any comprehensive economic development strategy.

Policy Implications

During data analysis, Maricopa County identified several important economic and social considerations that are addressed in the Area Plan:

Employment Corridors

The Town of Buckeye's land use plan designates a General Commerce district located between the Southern Pacific railroad tracks and Southern Avenue, from Apache to Dean Roads. The district includes the northwestern corner of the Rainbow Valley planning area. The General Commerce district is designed to accommodate commercial, employment, and compatible industrial uses. In addition, Buckeye's new Growth Areas element designates the Southern Pacific rail line as an employment corridor that offers excellent freight service for a variety of agricultural and manufacturing/distribution activities. The corridor is convenient to Buckeye's residential growth areas and will likely draw workers from Rainbow Valley as well. As growth and development increase, additional locations for future employment corridors will need to be identified, and should provide diverse employment opportunities to create a better jobs/housing balance.

Commercial Development

Currently there is very little commercial development in the planning area. The 1992 Little Rainbow Valley land use plan designated three potential "Commercial" nodes. No commercial zoning or development has taken place at these nodes over the last 10 years; however there has been recent interest in developing a neighborhood commercial node at the Tuthill and Narramore Road intersection, which was not a designated commercial node in 1992. The Town of Buckeye's land use plan designates a commercial node at Jackrabbit Trail and MC-85, both Roads of Regional Significance. Projected growth in the planning area would appear to allow additional commercial designation during the period covering this plan update. Future commercial development should be sited and designed such that the activities present will not detrimentally affect adjacent residential neighborhoods, as described in the Land Use section of this area plan.

Residential Development

Continued residential development will also impact the region's environment and character. Policies and land use guidelines should be developed to encourage suitable locations for new residences and to help ensure that appropriate access and services are provided. In addition, a variety of incentives, such as transfer of development rights, flexible standard agreements, and voluntary development agreements can be used to preserve sensitive areas and important agricultural land, and reward developers. Affordable housing is needed now and in the future along with appropriate services to attract workers to the area, including employees needed for the Lewis Prison on State Route 85.

Coordinated and Comprehensive Economic Development Strategy

If the planning area continues to grow at the rapid pace of the 1990s, cooperative and coordinated strategies will be necessary to successfully expand and diversify the local economy. Maricopa County should actively participate in and support such strategies and programs.

GROWTH AREAS

Introduction

In 1998, the State of Arizona passed the Growing Smarter Act to ensure the wise management of growth and protect our state's natural heritage. Among other elements, Maricopa County is now required to include a plan for growth areas. Specifically, Maricopa County must identify those areas, if any, that are particularly suitable for planned multi-modal transportation and infrastructure expansion and improvements designed to support a planned concentration of a variety of land uses. This includes residential, office/employment, commercial, tourism, and industrial uses. This mixed use planning must include policies and strategies designed to:

- Make automobile, transit, and other multi-modal circulation more efficient
- Make infrastructure expansion more economical
- Provide for rational land development patterns
- Conserve significant natural resources and open space areas within growth areas, and coordinate their location to similar areas outside of growth areas
- Promote timely and financially sound infrastructure expansion

The Growth Areas element is important to Maricopa County's future because it allows Maricopa County to accommodate growth in an orderly and fiscally responsible manner that is sensitive to the natural environment and residents' quality of life. This is the type of growth that will keep Maricopa County economically, socially, and environmentally successful for many years to come. For a County perspective on growth areas, please refer to the *Eye to the Future 2020* Growth Areas element.

Development Pattern Analysis

Past

An early history of the West Valley region is described in the Introduction section of this area plan. In 1985, Maricopa County began collecting data for the first Little Rainbow Valley Area Plan. Demographic research for the first area plan includes population figures going back to 1970. In 1970, the Little Rainbow Valley planning area had an estimated population of 554 in 168 households. Resident population increased relatively slowly until the mid-1980s, when more rapid growth took effect. In 1985, there was a population of 952 in 292 households and by 2000 this had increased to a population of 3,582 in 1,194 households (for the original planning area). These more recent population figures include population in a portion of the City of Goodyear that is now the western edge of the Estrella Mountain Ranch community, and several small, incorporated portions of the Town of Buckeye. However, the majority of this population resides in unincorporated Maricopa County.

Present

Today, Maricopa County is one of the fastest growing counties in the United States. In addition, with a current population of over 3 million residents (compared to 120,000 in 1940) it is also one of the largest. Growth continues throughout Maricopa County in both incorporated and unincorporated areas. Over the last couple of decades, much of the growth in unincorporated Maricopa County occurred in the southeast, the far northeast, and the near northwest portions of the Phoenix metropolitan area. However, recent trends show unincorporated development moving farther southwest (including the Rainbow Valley community), west, and north of the metropolitan area. With adoption of *Eye to the Future 2020* in 1997, Maricopa County is also experiencing increasing use of large-scale master planned communities (Development Master Plans). These Development Master Plans tend to be large, self-sustaining communities with mixed land uses.

Future

Given its strong economy, mild climate, and quality of life, Maricopa County is expected to continue growing rapidly over the next several decades. Whereas it took Maricopa County over 100 years to reach approximately 3 million in population, DES projections show population rising to approximately 4.5 million by 2020, and more than doubling to 7 million over the next 50 years. Development over the next 20 years will continue to shift from southeast Maricopa County to areas in the southwest, west, and north portions of the metropolitan area. Growth is also expected along existing and new transportation facilities. This includes Interstate highways (I-10 and I-17), as well as the expanded metropolitan freeway system (Loop 101, Loop 202, Loop 303, and Wickenburg Highway).

Projections for growth in the Rainbow Valley planning area range from a very conservative population projection of 4,719 in 2020 to a more realistic population figure of 12,516 in 2020. Expansion and improvements to the Interstate highway and metropolitan freeway system, as well as transportation improvements in the planning area will contribute to rapid growth in the northern part of the planning area over the next 20 years.

Projected Population and Land Use

Using historic population data, future population projections for the Rainbow Valley planning area are established using a trend extrapolation model. Calculations for land absorption include both the incorporated and unincorporated planning area. To determine projected population and land use for the planning area, several assumptions were made:

- 10-year growth rate of 82.3% (consistent with planning area increase from 1990 to 2000)
- 3.02 persons per occupied household (per MAG projections)
- One household equates to a single dwelling unit
- Average residential density per gross acre equals 1.0 dwelling unit (typical)
- 8 acres per 1,000 population for commercial land use (typical)
- 8 acres per 1,000 population for industrial land use (per Maricopa County Subdivision Regulations-Administrative Guidelines, 1990)

Residential Demand

The Rainbow Valley planning area (including incorporated areas) had a population of 3,765 in 2000. Assuming a continuance of the historic population growth rate, the planning area will increase by approximately 8,750 persons by the year 2020. At 3.02 persons per household, the planning area will add approximately 2,900 dwelling units over the next 20 years. Based on one dwelling unit per acre, this equates to approximately 2,900 acres of additional land needed to accommodate future residential development through the year 2020. This can be accommodated by the amount of land currently under private ownership.

Although land is available to accommodate future growth at one dwelling unit per acre, there will likely be a variety of densities of residential development. A significant number of the projected dwelling units are likely to occur in Estrella Mountain Ranch at densities ranging from one to 12+ dwelling units per acre as shown in **Figure 12-General Plan Land Uses**. There is also high potential for continued rural and some large lot residential growth in the central unincorporated portion of the planning area (between Elliot and Ray Roads). The northwest corner of the planning area, which is planned for large lot residential, has the potential to accommodate up to two dwelling units per acre. An area adjacent to Estrella Mountain Ranch, between Ocotillo and Chandler Heights Roads could also accommodate up to two dwelling units per acre. Scattered rural residential development will likely continue at a low rate in the southern planning area and the agricultural area north of the Gila River because of distance from existing services, limitations on development in the flood plain, and existing farm and dairy uses.

Commercial Demand

Estimated commercial land use demand is based on projected resident population increase. Based on a projected 12,516 planning area residents by the year 2020 and the commercial land use ratio listed above, it is estimated that a minimum of approximately 100 acres of commercial land would be needed to support area population in 2020. Historically, there has been very little demand for commercial uses in the Rainbow Valley planning area. With several commercial nodes and a

large employment area designated in the Estrella Mountain Ranch land use plan, little commercial development is likely to occur in the unincorporated planning area in the near future. In 1992 there were approximately 5 acres of commercially zoned property. At present, approximately 32 acres of commercially zoned property exists in the planning area. However, there do not appear to be any commercial buildings in use on the properties. The commercial zoned parcels occur near Perryville Road and MC-85 plus two parcels (each less than 2.5 acres) near Riggs and Rainbow Valley roads.

Industrial Demand

Demand for industrial land is calculated using the same method as commercial land. Based on a year 2020 resident population of 12,516, a minimum of approximately 100 acres of industrial land would be required. In 1992, there were approximately 45 acres of industrial zoning. At present, there are approximately 127 acres of industrial zoned property in the planning area. Most of the industrial zoned parcels have some industrial development such as chemical mixing facilities and a steel joist manufacturing facility. Industrial locations generally serve as major employment centers. The current amount of industrial zoned property appears to be sufficient to accommodate future population through 2020.

When commercial and industrial land use needs are combined with residential land use needs, the Rainbow Valley planning area will need to provide approximately 2,970 additional acres of land for growth and development. It is important to note that these numbers should be used as a guide rather than definitive criteria. Various factors, such as changing annexation patterns, economic conditions, demographic conditions, and land use patterns can alter population growth in the planning area. However, this overview does provide an historical foundation for determining future needs.

Growth Areas Issues and Considerations

Included in this section is an overview of public issues, identified during the public participation process, regarding growth. Also included is a review of some potential physical, built, and jurisdictional considerations that may affect future growth and development patterns.

Growth Area Issues

Stakeholders involved in the planning process were very helpful in identifying a variety of growth-related issues and concerns. A list of some of the most frequently identified local concerns is includes the following:

- Discourage lot splits that create access problems or that are illegal.
- Increase the level of local law enforcement.
- An improved bridge or additional crossing at the Gila River will be needed to accommodate growth and increased traffic.
- The Sonoran Desert National Monument needs to be considered when planning for future growth areas and open space planning.
- Ensure that the Sonoran Desert National Monument and other public open space areas continue to be accessible for a variety of recreational uses.
- Several important planning efforts occurring in the Rainbow Valley planning area need to be coordinated between long range planners, transportation planners, El Rio planning, and other County and State departments.
- Limit residential growth to one dwelling unit per acre maximum.

Growth Area Considerations

Besides public attitudes about growth, there are also potential natural, built, and ownership constraints to growth. While not necessarily a complete list, this section presents a brief overview of some of these possible constraints.

Physical Considerations

Topography

The Gila River runs through the northern end of the planning area, creating a physical division with cropland to the north of the river and primarily desert to the south. The Gila River floodplain forms a broad band, averaging one mile across, of dense riparian vegetation, alternating with sand bars. Terrain within the planning area varies from rock outcrops and mountains found along the eastern and western portions to alluvium found in the central and northern portions. Slopes range from less than 1% in many areas, to greater than 15 % in the Sierra Estrella foothills and Buckeye Hills region. Much of the north, central and southern planning area is relatively flat. South of Germann Road, the land is composed of gently sloping desert with large expanses of leveled agricultural land.

Maricopa County encourages the preservation of significant slope areas, especially those above 15%. For areas over 15% slope, the Maricopa County Zoning Ordinance provides guidelines for development to protect public health, safety, and welfare, and to minimize the impacts to the existing character of such areas.

Floodplains

Floodplains are those areas that are susceptible to flooding during significant rain events. The most common delineation is the Federal Emergency Management

Agency 100-year floodplain. The 100-year flood is defined as the flood level having a 1% chance of occurring within a year. It is important to note that the 100-year flood may occur more often than once every 100-years, and that it is not the maximum flood that can occur along a waterway.

Flooding typically occurs in major drainages, but can also occur in and along canals. Within the Rainbow Valley planning area, there are approximately 15 linear miles (7 miles Gila River plus 8 miles Waterman Wash) and approximately 3,445 acres of land within the 100-year floodplain. An additional 4,820 acres are located within the floodway, which is a particular area of the floodplain that has restrictions on the type of development that can occur. *Eye to the Future 2020* contains policies that discourage development within the 100-year floodplain.

Subsidence and Earth Fissures

In areas where extensive pumping has significantly lowered groundwater levels, subsidence and cracking of the land surface can occur. Groundwater depletion can make it economically infeasible to pump water in some cases. Land subsidence and earth fissuring have been documented in certain portions of Maricopa County and have caused water quality problems, flooding, damage to well casings and building foundations. Although water levels in the southern portion of the planning area have been declining since the 1950s, no significant land subsidence has been documented in the Rainbow Valley planning area. However, major subsidence-related problems have occurred in a 140 square mile area near Luke Air Force Base, approximately 10 miles north of the planning area.

Water Supply

Water in the planning area comes from both ground and surface sources. Groundwater is found in two subbasins that are partially located within the planning area: the West Salt River Valley and Rainbow Valley subbasins. Groundwater supply and depth varies widely throughout the planning area. There are certain areas where because of geology, hydrogeology and drainage, the condition of waterlogging exists. In these areas groundwater levels are so high that land use problems can be created if not addressed. Other regions within the planning area have experienced significant lowering of groundwater levels.

Irrigation districts are the largest users of groundwater in the planning area. In 2000, approximately 16,490 acre-feet of groundwater was withdrawn by all users. Projections for 2010 indicate that approximately 18,838 acre-feet will be pumped. The major determinant of groundwater pumping will be how many agricultural acres are in production in 2010.

Surface water is also available in the planning area, delivered through a system of canals and diverted from the Gila River for irrigation. The majority of water in the Gila River comes from effluent (treated wastewater) produced upstream at the 91st Avenue Wastewater Treatment Plant. Effluent dependent streams have several potential benefits, including a supply of good quality water that can help support wildlife habitat and provide community amenities such as hiking, wildlife viewing, and environmental education opportunities. Colorado River water is not available in the planning area, nor will it be in the foreseeable future due to cost and distance from distribution facilities. A more in-depth discussion of water supply is found in the Water Resources element.

Vegetation and Wildlife Habitat

The Rainbow Valley planning area currently contains abundant open space, which supports a large variety of animals and plants. Located in the Sonoran Desert, three general types of native plant communities are represented.

The Palo Verde-Saguaro community, also known as "Upper Sonoran" vegetation, is found in the undeveloped mountainous areas surrounding and within the planning area and is the most scenic of the Sonoran Desert plant communities. This community supports a mixture of desert shrubs, trees, and cacti, including the Giant Saguaro. The Creosote Community is located in valleys and on the lower, more arid central portion of the planning area. Creosote Bush and Bursage are the dominant plants of this community, where trees are absent except along local washes. The Riparian Community is found along the Gila River and Waterman Wash. This community is generally composed of tall, dense stands of Mesquite, Catclaw, Blue Palo Verde, plus an assortment of water dependent trees such as Cottonwood. The Riparian Community displays high scenic quality and contains higher concentrations of wildlife than any other of the desert habitats. Most of the planning area is potential habitat for the Desert Tortoise, a protected species, which is threatened by intense recreational use of off-highway vehicles.

A variety of federal and state laws that protect biological resources help govern development. This includes the Endangered Species Act, the Clean Water Act, the National Environmental Protection Act (NEPA), and the Arizona Native Plant law. A more complete discussion of vegetation and wildlife is found in the *Environmental Effects* element report of this area plan.

Built Considerations

Infrastructure and Services

One of the principles of *Eye to the Future 2020* is ensuring that growth occurs in an orderly and fiscally responsible manner. This includes ensuring that necessary

infrastructure and services such as roads, utilities, schools, police, fire, and medical facilities are available to meet the needs of future residents. The availability of infrastructure and services can dictate the type and timing of future development, particularly with urban development. This generally refers to residential densities greater than one dwelling unit per acre. This subject is discussed in more detail in the Cost of Development element.

For much of the development within the Rainbow Valley planning area, a full compliment of facilities and services has not been required and is usually not expected by the prospective resident, with the exception of adequate streets, bridges, law enforcement, fire protection services, and more recently, schools. However, with the rapid increase in residential development over the last 10 years and continued development in the future, the planning area will be faced with situations where community sewer and water service is required and other facilities expected, depending on the character and magnitude of development. A facilities standards table, which provides reference guidelines for determining necessary facilities, is provided in the *Land Use* report of this area plan. Park and recreation facility standards are provided in this plan's *Open Space* report.

Noise Generating Operations

Careful consideration must also be given to noise generating operations. Significant and sustained noise can affect health, sleep, and learning patterns. Prolonged exposure to loud noise can cause general community annoyance and possibly a reduction in property values.

The Rainbow Valley planning area can generally be characterized as a quiet, rural area. The primary sources of noise in the planning area are vehicular traffic, the railroad, occasional flyovers by aircraft associated with Luke Air Force Base, and ATV use. Several residents identified mini-bikes and ATVs as a source of irritating noise, particularly in the evening.

Flood Control

The location of existing and future flood control structures can impact the location and type of future development. While flood control structures minimize the impacts of floods on human safety, health, and welfare, they can also influence where specific development is and is not appropriate. The Flood Control District of Maricopa County conducts comprehensive watershed studies throughout the County. Plans are then prepared based on hydraulic analyses, future land use development, and environmental considerations. The plans incorporate information provided by watershed studies and recommend specific, project-oriented solutions for flooding problems. Flood Control planning studies specific to the planning area are discussed in the Open Space element of this area plan.

Ownership Considerations

Besides potential physical and built constraints, land ownership can also impact growth and development. Of the 82 square miles in the Rainbow Valley planning area, about 59% is held in private ownership. This compares with approximately 29% private ownership in Maricopa County as a whole. Of the remaining land in the planning area, approximately 31% is managed by the Federal government (Department of Interior), and 10% by the State of Arizona. The remaining land is controlled by various entities, including the Flood Control District of Maricopa County. A brief overview of land ownership is included below.

Federal

The Department of Interior (BLM) manages approximately 16,440 acres in the planning area. Many of these areas will not be available for development. However, portions of BLM land may be available for either disposal or trade since many of these areas are administered according to the 1976 Federal Land Policy and Management Act, discussed in the Land Use element of this area plan.

State

The State of Arizona owns approximately 5,400 acres of land in the planning area. Under state charter, the Arizona State Land Department has the responsibility on behalf of beneficiaries to assure the highest and best use of the Trust lands. The Federal Enabling Act and State Constitution mandate that fair market value must be obtained from all Trust land transactions, which include sales and commercial leasing. All revenues derived from the sale of Trust lands are placed in a fund which is administered by the State Treasurer. Trust beneficiaries include the public schools, colleges, hospitals, charitable institutions, and specialized schools as well as others. Given this well defined mission, development can and does occur on state-owned land. In addition to Trust lands, the State owns a 7.7-acre parcel managed by the AGFD near the Waterman Wash/Gila River confluence.

Maricopa County

The FCDMC owns about 440 acres of land in the Gila River floodplain of the planning area. Because most of this land is located in a hazardous area known as the floodway, only limited private and recreational uses are allowed. Some examples of allowed uses within a floodway (subject to obtaining a floodplain use permit) include sand and gravel operations, corrals and shade structures, golf courses, picnic grounds, wildlife preserves, farming, parking and loading areas, and hiking trails. Buildings are not permitted within the floodway.[11]

[11] Floodplain Regulations for Maricopa County. Flood Control District of Maricopa County, 2000

Development Considerations: Conclusion

The potential constraints identified in this section will continue to affect the amount, type, and location of future development. Indeed, some of these constraints make development impossible, while others may only have a minimal effect. However, the combination of these potential constraints will continue to guide public and private decision makers in future land use decisions.

Growth Area Opportunities

Based primarily on the need for services and infrastructure, Maricopa County has identified areas where growth and development should occur over the next several years.

General Plan Development Areas

The General Plan Development Area (GPDA) is unincorporated area that is likely to be annexed by a city or town in the future, and is therefore included in an adopted municipal general plan. These municipal general plans often provide specific recommendations for proposed land use. Future growth is encouraged within GPDAs for several reasons outlined in *Eye to the Future 2020 – Growth Areas Element*. Buckeye's and Goodyear's general plan areas are illustrated in **Figure 12-General Plan Land Uses**.

There is a significant amount of land along the eastern side of the Rainbow Valley planning area that has already been incorporated by the City of Goodyear. Goodyear's current general plan does not indicate further annexation of unincorporated land within the planning area. Areas adjacent to Estrella Mountain Ranch subdivisions may be suitable for higher density residential development in the unincorporated planning area, keeping in mind that growth in this part of the planning area may not occur for 10 years or more. For example, land between Narramore and Ray roads and between Ocotillo and Chandler Heights roads along the border of Goodyear may be suitable for large lot residential (1 to 2 du/acre). This would serve as transitional density between Goodyear's planned commercial, light industrial, and low to medium residential densities and the unincorporated rural land uses in this area.

The Town of Buckeye currently has five relatively small annexed areas in the far north end of the planning area. In addition, Buckeye's general plan overlaps a portion of the Rainbow Valley planning area. These general plan areas will therefore be considered as potential growth areas, likely to be annexed in the future. Buckeye's general plan area includes the area between Southern Avenue and the Gila River, between Rainbow Road and Perryville Road. Buckeye's future land uses in this area include planned community, planned residential, rural residential, general commerce,

convenience commercial, and special uses**.** The Rainbow Valley future land use map (Figure 17) considers Buckeye's land use designations where the designation is consistent with the County's long range planning policies.

Urban Growth Opportunities

County Area Plans include areas that are generally located outside of a municipal general plan. However, urban growth opportunities do exist in specifically identified locations within these plans. These locations of higher intensity use (i.e. commercial, industrial, mixed use, and residential density greater than 1 dwelling unit per acre) were selected based on municipal general plans as well as residents' input during the planning process. With respect to the Rainbow Valley Area Plan, one area identified for urban growth is located north of the Gila River within Buckeye's general plan area. This area is near Town of Buckeye infrastructure and services that could potentially support higher intensity development. Another area identified for urban growth is within the R1-35 zoned region south of the Gila River, generally between Airport Road and Garnet Road. The R1-35 zoned area is located within a private water utility service area, thus providing a critical service for slightly higher intensity residential development. In addition, unincorporated areas adjacent to planned development in Estrella Mountain Ranch have potential for slightly higher intensity uses, depending on the availability of services and support by the community.

Those portions of the Area Plans that are not designated for higher intensity are expected to develop in a more rural nature. Some requirements of the Growing Smarter law that relate to growth areas and may be implemented in this area plan are discussed below.

Areas identified as GPDAs and growth areas are suitable for certain multi-modal transportation systems. Although the Rainbow Valley planning area is more rural and isolated from urban growth than other parts of the Valley, development is moving closer to this area. Further, Interstate-10 is approximately 6 miles north of MC-85 and Jackrabbit Trail, providing a direct link to the Phoenix metropolitan area. Multi-modal systems in this region could include expanding bus transit facilities such as community circulators (using smaller neighborhood friendly vehicles) to suburban areas. Other potential multi-modal opportunities include encouragement of bicycling, walking, and telecommuting as a replacement for some vehicle trips. Rational land development patterns include efficient placement of employment and services that improve transportation efficiency and reduce the need for automobile travel.

Another advantage of encouraging development in designated growth areas is the savings to taxpayers. Although landowners may legally split a parcel up to 5 times and sell lots for new homes without having to pave streets or provide other basic

services, this practice results in the community paying more to supply services to these areas. For example, Pima County conducted a study in 2000 which found that sheriff's department services for wildcat subdivisions cost tens of thousands of dollars more per square mile than they bring to the county in tax revenue. Smart growth, on the other hand, can lower infrastructure costs and tax bills.

Planning for integration of open space areas and conservation of significant natural resources in growth areas can have long-lasting effects on a community's quality of life and can minimize environmental impacts of development. Examples in the planning area may include integrating open space areas such as the Gila River and Waterman Wash corridors into a regional open space plan.

Development Master Plans

Eye to the Future 2020 recognizes Development Master Plans (DMPs), also known as master planned communities, as a preferred type of development because of the opportunity to provide mixed land uses—an important component of the Growing Smarter requirements. Historically, DMPs have been allowed throughout Maricopa County. As such, Maricopa County will continue to evaluate DMPs on an individual basis to determine if they provide mixed use, multi-modal development opportunities as encouraged under Growing Smarter, and that they either have or will provide the necessary infrastructure and services to support urban type development.

Growth Area Opportunities: Conclusion

With the recognition of General Plan Development Areas, specific locations within County Area Plans, and mixed use DMPs as growth opportunities, Maricopa County reaffirms its commitment to orderly and fiscally responsible growth that is consistent with requirements of the Growing Smarter law. These growth opportunities also reaffirm Maricopa County's long-standing policy of coordination and cooperation with incorporated municipalities. Although these areas represent the best opportunities for urban style growth, future development will still be evaluated on an individual basis in concert with the potential constraints noted in this report. Also, because the areas best suited for mixed use and multi-modal urban growth will continue to change, Maricopa County will periodically review these growth areas and make changes to them as necessary.

OPEN SPACE ELEMENT

The Open Space element complies with the requirements of the Growing Smarter Act by providing an inventory of open space areas; an analysis of future needs; policies and strategies for managing, protecting and acquiring additional open space areas; and promoting a regional system of integrated open space and recreational resources. There are abundant opportunities for planning for major corridors and open space areas in Rainbow Valley that will protect sensitive lands while allowing for future community growth and development. This section addresses open space issues in and around the Rainbow Valley planning area. For a County-wide perspective on open space issues, refer to the *Eye to the Future 2020 – Open Space Element*.

Background Plans

It is important to consider a number of regional and local open space planning efforts that may be relevant to Rainbow Valley open space and recreation planning.

Goodyear's General Plan

The Rainbow Valley planning area includes part of the western edge of the City of Goodyear. The Goodyear Land Use Plan contains a core open space plan that establishes major corridors that will create a network as future developments tie into it. The open space system includes Estrella Mountain Regional Park, the Gila and Agua Fria Rivers, and the Roosevelt Canal. Designated open space in Estrella Mountain Ranch ties into Goodyear's open space plan. Lands adjacent to the Gila River and hillside areas near the Estrella Mountains are designated as Sensitive Land Areas where low density residential or employment uses are permitted.

One of Goodyear's goals is to establish an open space trail system throughout the City with links to surrounding communities. Related objectives include preserving the Gila and Agua Fria Rivers and developing them as community recreational areas. Another goal stated in Goodyear's General Plan is to preserve agricultural land and natural desert environments. Policies established to support this goal include applying objectives and policies from the *Desert Spaces* plan (discussed below) that are applicable in evaluating development proposals.

Estrella Mountain Ranch Area Plan

The Estrella Mountain Ranch Area Plan includes a Concept Open Space and Recreation Plan. This plan addresses open space, natural open space, passive recreation, active recreation, neighborhood parks, wash areas, hillside areas, and trails. The Estrella Mountain Ranch Area Plan identifies approximately 25 to 30 percent of the total land area as open space, including hillside areas, washes, easements, and improved active park and golf course areas. Waterman Wash is shown as a

conceptual multi-purpose trail extending from the southern reaches of Estrella Mountain Ranch and continuing into Rainbow Valley. Two other unnamed washes within the Estrella Mountain Ranch planning area are designated conceptual multi-purpose trails, both leading to the Gila River.

Types of trails contained in the Estrella Mountain Ranch planning area include *primary* (occur along primary community roadways), secondary (occur along secondary community roadways), and natural trails (occur along utility easement corridors and certain hillside areas). Multi-purpose trails are planned to occur along major washes within the community and are used to connect off-site areas with the Estrella Mountain Ranch community. Cross sections illustrate each type of trail, including horizontal dimensions for equestrian trails, concrete walks, bike lanes, roads, and natural trails.

Buckeye's Open Space Element

Scenic protection, farmland conservancy and protection of natural land and water resources are addressed in Buckeye's open space recommendations. The Town's open space element refers to MAG's *Desert Spaces* and *Environmentally Sensitive Development Areas: Policies and Guidelines* as sources that will provide useful references when planning for future open space. Buckeye intends to prepare a Parks and Recreation Master Plan that will address both a regional open space strategy and a plan for long-range municipal system recreational needs for persons of all ages. El Rio, the multi-purpose riparian preserve planned along the Gila River, is considered a top priority for the Town of Buckeye's open space improvements. This goal includes an emphasis on water features intended to attract tourism and support community economic development.

Desert Spaces - An Open Space Plan for the Maricopa Association of Governments

The Maricopa Association of Government's Regional Council adopted the *Desert Spaces* plan on October 25, 1995. The plan provides a non-regulatory framework for decision making and coordinating local and regional efforts toward establishing a viable open space system. The *Desert Spaces* plan identifies and recommends conservation and management strategies for natural resources and open spaces critical to the quality of life in Maricopa County. The foundation of the plan is existing parks and preserves.

Desert Spaces plan seeks to preserve, protect and enhance the mountains and foothills; rivers and washes; canals and cultural sites, upland desert vegetation, wildlife habitat, and existing parks and preserves. Mountain areas in the system include the Usery, White Tank, New River, McDowell, Estrella, Heiroglyphic, Deem, Hedgepeth, and Union Hills mountains. The primary rivers and washes in the system

are the Salt, Gila, Verde, Agua Fria, and New Rivers, and parts of the Cave and Skunk Creeks and Hassayampa River. Also established in the plan are trails, which primarily follow rivers, washes, and canals and allow the public to enjoy a diversity of open spaces. Proposed trails are seen as linking and integrating existing parks and preserves throughout the region to each other. The plan encourages infill development in urbanized areas to reduce the need to develop undisturbed open space.

Two basic management approaches, based on pubic comments, are identified in the *Desert Spaces* plan for protecting priority areas and resources. *Conservation Areas* are public and private lands with outstanding open space value. Lands in this category are recommended for protection from development and its effects through policy amendment, easements, restrictions, and/or acquisition. An example within the Rainbow Valley planning area includes land in the Gila River flood plain. *Retention Areas* are public and private lands with high open space value and are recommended for sensitive development regulation. Examples include lands near Waterman Wash and Buckeye Hills. Approximately two-thirds of Maricopa County lands are not categorized (i.e., urbanized areas or areas with lower resource values).

Area Drainage Master Plans and Watercourse Master Plans, Maricopa County

The FCDMC conducts a proactive program of regional flood control studies called Area Drainage Master Studies, which identify existing flood-prone areas and project future conditions. Area Drainage Master Plans (ADMPs) are being prepared for all developable portions of the county. The ADMPs will develop plans to mitigate flood hazards in the study area. Water Course Master Plans (WCMPs) are similar to ADMPs, except that a WCMP has more of a focus on the management of a particular river or wash and its banks and flood zones, while an ADMP focuses on flooding issues over a wider drainage area. The District has made a commitment that new flood control projects not only protect people and property, but also provide opportunities for multiple uses such as natural habitat protection, recreational facilities, and aesthetically pleasing designs.

There are two FCDMC projects within the boundaries of the Rainbow Valley planning area. The *El Rio Watercourse Master Plan* extends 17 miles along the Gila River, from the confluence of the Agua Fria River westward to State Route 85. Partners for the project include Maricopa County, Buckeye, Avondale, and Goodyear. The project began as a restoration effort to return the Gila River to its natural state while accomplishing the goal of improved flood control. Currently, the river is choked with salt cedar bushes and has become the dumping place for trash, abandoned automobiles and appliances. With the efforts of the FCDMC and partnering cities, the river could not only become beautiful again, but could also become a recreational corridor that brings high-end economic development to West Valley communities.

The *White Tanks/Agua Fria Area Drainage Master Plan* extends from Deer Valley Road south to the Gila River, and from El Mirage Road west to Dean Road. Originally written 10 years ago, an updated plan is necessary due to increased growth and changes in existing flood control structures. Areas of flooding occur at Interstate 10, the railroad tracks, and at the Roosevelt and Buckeye irrigation canals. Alternatives are being developed to address flooding problems, keeping in mind objectives that include hydraulic performance, water quality, funding and cost sharing, coordination with other projects (e.g. El Rio), environmental impacts, and public safety.

Maricopa County Regional Trail System Plan

On September 4, 2002, the Board of Supervisors adopted the Maricopa County Regional Trail System: Phase One. The trail system's goals are to connect the County Park System, link recreational corridors around the Valley, and help preserve open space in the community. The project will capitalize on existing right-of-ways such as canals, parks, utility corridors, and flood control projects. The Maricopa County Trail Commission is developing community partnerships to make the program a reality. Phase One studied the connections between White Tank Mountain Regional Park, Lake Pleasant Regional Park, Cave Creek Recreation Area, and Spur Cross Ranch Conservation Area. The Rainbow Valley area will be included with Phase Three, expected to be finished by June 2004. When completed, a large non-motorized loop will be created around the County with spurs branching off into important open space and recreation areas. Some of the planned projects identified for possible incorporation in the regional trail system in or near the Rainbow Valley study area include:

- Maricopa County Regional Park System (e.g., Estrella Mountain Park)
- Sun Circle Trail (adopted by Maricopa County June, 1964)
- Desert Spaces Plan (adopted by MAG October, 1995; see discussion on pg. 73)
- West Valley Recreation Corridor (along the Agua Fria and New rivers)
- Tres Rios Master Plan (about 10 miles east of the Rainbow Valley study area; see pg. 80)
- El Rio Master Plan (along the Gila River; see description at top of this page)

Existing and planned trails identified for the system cross through many jurisdictions, communities, and properties, so partnerships and agreements are important to creating the regional trail. Maricopa County will serve as the facilitator to bring all the different links together. Many types of recreational opportunities are anticipated for the trail system, including biking, walking, jogging, and horseback riding.

Regional Off-Street System (ROSS) Plan

The ROSS Plan (2001), initiated by the MAG, reveals a region-wide system of off-street paths and trails for non-motorized transportation. Easements associated with canal banks, utility line easements, and flood control channels intersect numerous arterial streets where local daily destinations are typically located. The goal of the ROSS Plan is to help make bicycling and walking viable options for daily travel using off-street opportunities.

Open Space Issues

Research of Maricopa County open space documents, as well as input from local stakeholders, have identified the following regional and Rainbow Valley open space issues:

- Agricultural preservation has been identified as an important component for surrounding communities (Buckeye and Goodyear). However, questions as to how and where to preserve these lands are unresolved.
- Regional connectivity and linkages are important for both recreation and wildlife.
- Education is important for recognition of the economic and quality of life benefits of open space.
- Environmentally sensitive areas including mountains and slopes; rivers and washes; historic, cultural, and archeological resources; view corridors; Sonoran Desert; and wildlife habitat and ecosystems need to be protected.
- Land use planning adjacent to the Sonoran Desert National Monument needs to be compatible with protection of the monument.
- Buffers and/or transitional land uses between communities and potentially conflicting land uses are important in rural areas on the fringe of growing metropolitan areas.
- Implementation of existing plans is important (i.e., *Desert Spaces* plan; Maricopa County Regional Trail System Plan; proposed El Rio Master Plan).
- As BLM's role as a steward of open space becomes more important, BLM will need to update land use plans to reflect contemporary open space needs of communities. (BLM recently began an update process for its Phoenix South Resource Management Plan).
- BLM has a one-mile wide utility corridor paralleling the northern boundary of the Sonoran Desert National Monument, coinciding with the El Paso Natural Gas pipeline. There is potential for multiple power lines or pipelines to be located in that area, possibly resulting in negative scenic or other environmental impacts. Utility corridors may also provide positive functions such as buffering protected open space lands from development and/or serving as part of a multiple-use trail system.

Open Space Inventory

Dedicated Open Space

Dedicated open spaces are areas under public ownership, excluding State Trust and BLM lands, which have unique environmental and physical qualities. In Maricopa County, dedicated open space exists as regional parks, wilderness areas, wildlife areas, national monuments, and the Tonto National Forest. Proposed open space will be discussed later in this section.

For this inventory, open space is separated into seven categories, which are derived from the National Recreation and Park Association (NRPA):

Neighborhood Parks

A neighborhood park is defined as an area of 15 or more acres which is suitable for intense recreational activities. No dedicated neighborhood parks are located in the Rainbow Valley planning area.

Community parks

Community park is defined as an area 25 acres or larger that has a diverse environmental quality and may include areas suitable for intense recreational activities. No dedicated community parks are located in the planning area.

Regional Parks and Recreation Areas

A regional park is defined as an area 1,000 acres or larger that is suitable for nature-oriented recreation. Although there are no regional parks within the planning area, Estrella Mountain Regional Park is located less than 10 miles from the planning area. Estrella Mountain Regional Park, encompassing 19,840 acres, offers many amenities such as playground equipment, two lighted ball fields, 65 acres of grass with 10 covered ramadas, picnic tables, grills, restrooms, an 18-hole golf course, and a rodeo arena. In addition, the park has seven recreational vehicle campsites and over 33 miles of trails for hiking, mountain biking, and horseback riding. Buckeye Hills Park is approximately 10 miles from the planning area on State Route 85. This 4,474-acre County park offers picnic facilities, a small shooting range, and a staging area for horseback riding.

Special Use Parks

Special use parks may include plazas, civic malls, town squares, historical sites, small parks, botanical gardens, zoos, fairgrounds, outdoor museums, or outdoor amphitheaters. Estrella Mountain Regional Park is one example of a regional park containing special use areas (i.e. the rodeo arena). No special use parks are located in Rainbow Valley.

Conservancy Areas

The NRPA defines conservancy area to mean the protection and management of natural or cultural environments with recreational use as a secondary objective. Conservancy areas within Maricopa County include municipal preserves and open spaces, federally administered wildlife areas, congressionally designated wilderness areas administered by the BLM and the United States Department of Agriculture Forest Service (USFS), and other lands managed for conservation purposes by the BLM or the USFS.

The Sonoran Desert National Monument was established by President Clinton in January 2001. The BLM is currently developing a management plan for the new monument. For purposes of this project, the Rainbow Valley planning area was extended southward to the monument's north boundary. The outer boundaries of the monument encompass approximately 486,603 acres of federal land. The Sonoran Desert National Monument is a functioning desert ecosystem with an extraordinary array of biological, scientific, and historic resources. The area's biological resources include a spectacular diversity of plant and animal species. The BLM's interim management policy allows existing livestock grazing and existing mineral leases to continue. No new mineral leases or mining claims can be made. Hunting and fishing activities are to be coordinated with the State to ensure public safety. Motorized vehicle use may only occur on designated roads. Recreation and other similar uses are generally not affected by the monument designation. Monument designation would not apply to those parcels of state and private land contained within the boundaries of the monument, but does apply to all federal land.

The North and South Maricopa Mountains (managed by BLM) were designated as wilderness areas in 1990, and are now incorporated within the Sonoran Desert National Monument. These low-elevation mountain ranges can be seen from the planning area as a sweeping, rugged backdrop to Rainbow Valley. Areas designated as wilderness are protected and managed to preserve natural conditions and enable visitors to experience solitude and freedom. This requires policies that are more restrictive in nature, such as excluding motor vehicles and motorized equipment, limiting the size of groups and number of pack animals, and keeping the area essentially roadless. Hunting and fishing activities are governed by appropriate State laws.

The AGFD manages Public Land Order (PLO) 1015 lands that are near the Gila River corridor under a 1954 cooperative agreement with the USFWS as waterfowl habitat.

Linear Parks

A linear park (which can include trails) is defined as an area developed for one or more varying modes of recreational travel, such as hiking, biking, horseback

riding, winter sports such as cross-country skiing, canoeing, and pleasure driving. The Maricopa County Parks and Recreation Department maintains over 150 miles of trails within the existing regional parks, including the 33 miles of trails in Estrella Mountain Regional Park. Other public lands, such as BLM wilderness areas also have extensive trail systems. Maricopa County does not yet have a comprehensive trail system that connects regional parks and conservancy areas. However, the Maricopa County Regional Trail System, discussed earlier in the *Background Plans* section, will connect County parks in a large loop throughout the County.

Other Regional Open Space

Several other open spaces in Maricopa County may be considered important, but are not necessarily dedicated or publicly accessible. These areas include golf courses, agriculture, and designated open space in DMPs and new power plant projects. While most of the land in this category is not accessible to the public, it is nonetheless important for visual and aesthetic purposes.

Located adjacent to the eastern boundary of the Rainbow Valley planning area, Estrella Mountain Ranch Golf Course is a public 18-hole course. It is located in the Goodyear community of Estrella Mountain Ranch. Agricultural lands in the Rainbow Valley planning area are a significant open space resource. These lands are important for their visual resource value, play a significant role in the area's history, and are a dominant feature of the rural landscape character.

The Maricopa County Planning and Development Department will continue its long standing policy of coordinating and assisting the Maricopa County Parks and Recreation Department to determine when and where park expansion and/or acquisition would best serve county residents.

Needs Assessment

Research has shown that open space protection is one of the most important public policy issues for Maricopa County residents. For example, in a 1999 general population survey conducted by Arizona State University open space was viewed as an important priority by 93% of the population. In addition, a survey from the Maricopa Association of Government's *Valley Vision 2025* plan identifies that open space preservation ranked third in importance for regional issues. Recent research has documented the importance of physical activity in helping to prevent diseases such as heart disease, diabetes, obesity, asthma, and depression. Planning in advance to ensure there is room for bicycle, equestrian, and pedestrian trails will help make certain that citizens have access to safe and welcoming activities.[12]

[12] Creating A Healthy Environment: The Impact of the Built Environment on Public Health. Centers for Disease Control and Prevention, November 2001

Open Space Analysis

Open space and trail needs will become more important as the Rainbow Valley planning area experiences growth and development. Currently, there is ample open space within the planning area. Population growth is influenced by many variables, including the state of the economy, completion of freeway systems, and availability of natural resources such as water. As such, it is difficult to predict what the population of the planning area will be in 2010. Using the historic population increase in Rainbow Valley (83% increase between 1990 and 2000), the planning area could be expected to have a population of approximately 6,800 in 2010. **Table 18**, identifies standards based on NRPA recommendations. The Rainbow Valley community may wish to implement some of these standards as the community becomes more densely populated and the need for recreation and open space increases.

Table 18
Parks and Recreation Facilities Standards

Type	Space Requirements	Source
Minimal park standards	6.25 - 10.5 acres/1,000 persons	National Recreation and Park Association, Individual Park Type Standards
Playlots	0.1 - 0.3 acres/1,000 persons	Ibid
Neighborhood playgrounds	2 acres/1,000 persons	Ibid
Neighborhood park	2 acres/1,000 persons	Ibid
Community playfield	1 acre/1,000	Ibid
Major community park	5 acres/1,000 - 10,000 persons	Ibid
Open space	.75 - 1 acre/1,000 persons	Ibid
Youth baseball	1.2 acres/5,000 persons	Ibid
Basketball	7,280 sq. ft./5,000 persons	Ibid
Swimming pool	2 acres/20,000 perons	Ibid
Regional open space	15.2 acres/1,000 persons*	National Recreation and Park Association
	25 acres/1,000 persons	Maricopa County Open Space Study (1970)

The Rainbow Valley planning area currently does not have any community parks or dedicated open space. The planning area is bordered by a number of mountains including the Estrella Mountains (foothills) to the east, the North Maricopa Mountains to the south, and a portion of the Buckeye Hills to the west. Although these mountain areas are outside the planning area, they are accessible to planning area residents. In addition, areas along the Gila River provide activities such as picnicking and bird watching. At the same time, some areas along the Gila River have been used as illegal dump sites and are used by motorbike and all-terrain vehicle (ATV) riders.

There are approximately 16,445 acres (25.7 square miles) of BLM land within the planning area, mostly undeveloped and in its natural condition. These public lands are managed for multiple uses and provide diverse recreational opportunities. Mining and grazing claims are found in some areas. Retention of BLM lands that are adjacent to the Sonoran Desert National Monument is desirable because they would serve as a buffer between the monument and future development.

Approximately 5,400 acres (8.45 square miles) of land is owned by the Arizona State Land Department. State Trust land is currently undeveloped desert scattered through the central and southeastern portions of the planning area. The largest block of unincorporated trust land (1,555 acres) is in the central portion of the planning area, south of Ray Road, and contains several hills. A 1,541-acre block of trust land, south of Queen Creek, is within Goodyear's incorporated area. It should be noted that State Trust land may be acquired and set aside for conservation purposes, otherwise the lands might be purchased privately and developed. The AFGD owns a 14.55-acre state wildlife area south of the Gila River on Dean Road.

Although Rainbow Valley does not have any public recreational facilities such as parks and sports fields, the Liberty Elementary School District has a long-standing commitment to sharing their facilities with public groups for recreational purposes. The Liberty and Estrella Mountain Elementary Schools are currently used by organizations such as YMCA, Little League, Boy/Girl Scouts, private gymnastics instruction, and exercise classes. Similar uses are anticipated by the School District for Rainbow Valley Elementary School, opened in August 2001. Rainbow Valley Elementary School includes a large, modern gymnasium that currently allows some community uses on the weekends. There are seven acres of irrigated, level fields, currently including a softball field and a baseball field. Space also exists for a football/soccer field. These facilities would be available to public groups depending on application and eligibility. Any organized group regularly using school facilities must have a liability insurance policy naming the school as the covered party. This can be obtained through the school for a relatively nominal fee for smaller groups.

Proposed Open Space

Eye to the Future 2020, the Maricopa County Comprehensive Plan, separates proposed open space into publicly-owned proposed open space and privately-owned proposed open space. Proposed open spaces are areas that, if acquired for the public domain, are intended to be planned and managed to protect, maintain, and enhance their intrinsic value for recreational, aesthetic, and biological purposes. It is recommended that proposed open space be protected from development and its effects through policy amendments, easements, restrictions, and/or acquisition. Two-thirds of the privately-owned land proposed as open space in unincorporated Maricopa County is either in the 100-year floodplain or located on slopes over 15%. Most of the remaining one-third is State Trust land. All privately-owned and State Trust land may be developed unless added to the public domain or protected using other techniques that respect property rights.

The *Desert Spaces* concept plan considers the Salt and Gila Rivers as the spine of the open space system and other regionally significant rivers and washes as arms that reach out and connect major open space destinations. Canals and off-road trails connect components of the open space system, and they function as open spaces providing visual relief from urban development. Implementation of canal projects will require close collaboration with the Salt River Project and other irrigation districts such as the Buckeye and Roosevelt Irrigation Districts. *Desert Spaces* plan recommends a policy of joining the canals and trails to create a system that connects regional open space resources. In particular, the plan recommends completion of the Sun Circle Trail and its integration with the canal system to connect regional open space resources. Policies also include on-road bicycle paths to provide connections to Maricopa County Regional Parks and other major open space destinations when necessary.

The *Desert Spaces* plan identifies significant opportunities for protecting public access, developing trails, and linking existing parks in areas adjacent to Estrella Mountain Regional Park and Buckeye Hills Recreation Area. Lands near Waterman Wash and Buckeye Hills are identified in the *Desert Spaces* plan as lands that should be managed as retention areas. Development is allowed if it is sensitive to maintaining open space resources and values.

In addition to the above open space system opportunities, MAG's *Regional Off-Street System Plan* (ROSS) identifies flood control structures and rights-of-way, utility easements, freeway rights-of-way and railway corridors as potential routes. Due to liability concerns with some corridors, ROSS identifies solutions for potential issues, such as using abandoned railroad lines and negotiating on a case-by-case basis for both canal banks and railway corridors.

There are significant opportunities in the Rainbow Valley planning area for regional connectivity including the Gila River, Waterman Wash, canal systems, utility corridors, and a railway corridor. The Gila River has been used heavily by humans for thousands of years, as reflected in the rich and diverse array of prehistoric and historic sites that remain. Several canal systems have been constructed throughout the Southwest Valley farming region, generally oriented in an east-west direction. The Roosevelt Irrigation District (RID) Canal is located just north of the planning area. Located south of the RID canal is the Buckeye Canal, which runs through the northwestern corner of the planning area. The Buckeye Canal also parallels the Southern Pacific Railroad in this area. The Arlington Canal is located south of the Buckeye Canal between MC-85 and the Gila River. Waterman Wash runs diagonally through farmland, natural desert, dairy operations, and finally residential landscapes until it reaches the Gila River.

As discussed previously, farmland is an important open space resource. As such, some rural communities are interested in preserving remaining farmland uses. Predominantly in private ownership, there is no guarantee that these farmland uses will remain. In much of the West Valley, agricultural land is being replaced by development. In the southern end of the Rainbow Valley planning area, there are large tracts of abandoned farmland. Barren agricultural lands are prone to extensive wind erosion, contributing to respiratory illnesses in humans and livestock. If revegetated, these lands could potentially support recreational uses such as bird watching, hiking, or hunting, and could help connect wildlife habitat.

Questions regarding how to fund revegetation efforts and how to preserve active farmland remain unanswered. A number of power plants planned west of Rainbow Valley, near the Palo Verde generating station, have purchased several thousand acres of water property, much of it fallow or retired farmland. Several of these energy companies intend to implement revegetation programs that will restore the lands to beneficial uses for wildlife and the surrounding environment. These efforts could provide useful examples of land reclamation for other retired farmlands in Maricopa County.

Land Ownership Considerations

Federal Land

The BLM preserves open space by managing public lands for multiple uses, including recreation, livestock grazing, and mining, and by conserving natural, historical, cultural, scenic and other resources found on public lands.[13] The disposal of public

[13] Bureau of Land Management, http://www.blm.gov

lands is authorized through sales and exchanges as directed by the 1976 Federal Land Policy and Management Act, discussed in the Land Use element of this area plan.

Thirty-one percent of land in the Rainbow Valley planning area is managed by the BLM. With growing pressure on open space, BLM's role as a steward of open space has become more important. Once remote federal lands are now within a short drive of urban areas. BLM's land use plans need to be updated to reflect contemporary open space needs. Community sentiment can influence BLM's management plans. Once BLM land within unincorporated Maricopa County is sold or traded, that land maintains the underlying zoning designation, and loses BLM's management status. The Future Land Use Map (Figure 17) reflects this by showing proposed open space as a light green color with tan stripes, indicating the underlying Rural Residential zoning. It is important to note that BLM has a one mile wide utility corridor abutting the Sonoran Desert National Monument, in the planning area. This is currently used as a natural gas pipeline route. However, the route is identified by the Salt River Project as part of the Palo Verde-Saguaro 500kV line and the future Jojoba-Pinal West 500kV line — part of the Southwest Valley transmission project.

State Land

Under state charter, the Arizona State Land Department has the responsibility on behalf of beneficiaries to assure the highest and best use of the trust lands. As described in the Growth Areas element, this results in the sale and development of state-owned land. In 1996, the Arizona Preserve Initiative (API) was enacted by the state legislature to give the Land Department authority to reclassify, lease, and sell state trust lands in and around urban areas to local governments and nonprofit organizations as open space for conservation purposes. This process is further explained in the Land Use element. In 1997, amendments to the API created a public-private matching grant program under the State Parks Board for acquisition or lease of trust lands for conservation.

Access to Open Space Areas and Resources

The *Desert Spaces Plan* identifies that for people in rural areas of the county access to natural open space is more important than accessing developed parks. In these areas there is a general perception of "impermanence" of access to open lands and new development often closes off access. For example, some privately held lands that were once accessible for open space are now closed off. *Desert Spaces-Environmentally Sensitive Development Areas -Policies and Design Guidelines* (2000) recommends developing safe public access to passive recreational activities and trails linking open spaces, between existing park facilities and new development areas. The ROSS plan recommends providing sufficient, convenient access, which is highly visible.

Open Space Protection Techniques

There are a number of techniques used by jurisdictions for protecting and/or acquiring open space. The following is a list of some of these techniques:

- Arizona Preserve Initiative
- Land Dedication
- Cluster Development
- Land Exchange
- Conservation Easements
- Lease Agreements
- Property Conveyance
- Performance Zoning
- Density Bonuses
- Planned Unit Development
- Design Guidelines
- Federal Land Management
- Slope/Hillside Ordinance
- Fee Simple Purchase
- Transfer of Development Rights
- Impact Fees

(A description of these techniques can be found in the Open Space Element of *Eye to the Future 2020*, Maricopa County's comprehensive plan.)

WATER RESOURCES

Water supply and quality are important considerations in planning for future growth. Growing Smarter Plus requires that Maricopa County address water resources by including in its comprehensive plan an inventory of county water supplies, as well as calculations of historic and projected water demand. This section describes the physical aspects of rivers, streams, groundwater basins and subbasins in the Rainbow Valley planning area, as well as historic and projected water demand, future water supply and policy implications.

Water Supply Inventory

The following information describes water supplies in the Rainbow Valley planning area:

Surface Water

The planning area includes segments of the Gila River and Waterman Wash. Although there are no storage reservoirs in the planning area, water in the Gila River is affected by a reservoir system in the north and northeast region of Maricopa County that includes the Salt, Verde, and Gila rivers upstream.

The **Gila River** originates in western New Mexico and enters Maricopa County east of the Sierra Estrella Mountains. The river drains most of southern and central Arizona. Before joining the Salt River, the Gila is regulated by Ashurst-Hayden Dam, which diverts water for the San Carlos Irrigation Project. Historically, the river would flow in the spring due to winter rains and melting snow, and in summer following monsoon rains.[14]

Base flows in the Gila River ceased in 1957 due to dams and diversions upstream. Flows returned to the river beginning in 1962 as the result of effluent discharge from wastewater treatment plants in west Phoenix. The Buckeye Irrigation Company and the Arlington Canal Company divert much of this water for agricultural irrigation, while some is diverted for use by the Palo Verde Generating Station near Wintersburg. The Gila River also flows in response to flood events and releases from upstream reservoirs.

Waterman Wash, which drains the Rainbow Valley Subbasin, originates ten miles west of the unincorporated community of Mobile in the southwestern part of the County. Stormwater originating in the Estrella Mountains is conveyed to Waterman Wash and ultimately to the Gila River. The total drainage area encompasses 1,800

[14] Arizona Department of Water Resources, http://www.adwr.state.az.us/AZWaterInfo

square miles. The average annual flow is believed to be quite small, running for a brief time only during heavy rainfall events. Peak flow rates for Waterman Wash at Tuthill Road are estimated to be 12,661 cubic feet per second (cfs) for the 50-year frequency storm event and 17,805 cfs for the 100-year event.

As discussed in the Open Space element, the FCDMC conducts studies of drainage areas throughout developable portions of the County. These studies delineate existing floodplains, help develop corrective measures to potential flooding problems, and proposed storm water management plans. There are portions of three different Area Drainage Master Plans within the planning area: *Rainbow Valley/Waterman Wash (a future study)*, *White Tanks/Agua Fria*, and *Buckeye/Sun Valley*. The *El Rio Watercourse Master Plan* is located along the Gila River between the Agua Fria River confluence and the Hassayampa River confluence.

Central Arizona Project

Currently, no water from the Central Arizona Project (CAP) is being used in the planning area. Since 1985, Colorado River water has been transported to the Phoenix area via the Central Arizona Project canal. The CAP was constructed to help Arizona conserve its groundwater supplies by importing surface water. The relatively high cost of CAP water and lack of infrastructure needed to convey this water to users who are far from the CAP aqueduct prevents widespread use. However, it is projected that full utilization of CAP water supplies in Arizona will be reached by the year 2040.

The City of Goodyear has a current (2002) annual CAP allocation of 3,381 acre-feet, plus an additional 7,100 acre-feet was allocated to the city as a result of the Gila River adjudication process. Goodyear does not currently use its CAP water directly, but stores the water through an agreement with the Tonopah Irrigation and Maricopa Water Districts. This is accomplished through a 'Groundwater Savings Facility' mechanism, which allows an entity to store CAP water today and pump groundwater in the future through long-term storage credits. Goodyear's current source of potable (drinking) water is entirely from wells.

Groundwater

The primary source of water in the planning area is groundwater. The withdrawal and use of groundwater is governed by the 1980 Arizona Groundwater Management Act, enacted in response to serious water level declines in certain areas of Arizona. The entire study area is within the Phoenix Active Management Area (AMA). Within the AMA, The Arizona Department of Resources oversees the groundwater rights system; prohibits the development of new farmland; requires new subdivisions to have long-term, dependable supplies; and requires measuring and reporting of

groundwater withdrawals. These provisions were put into place in order to help the Phoenix area achieve safe-yield by 2025. To achieve safe yield, the amount of groundwater pumped from AMA aquifers on an average annual basis must not exceed the amount that is naturally or artificially recharged.

There are eight subbasins in Maricopa County, two that have portions within the planning area. A portion of the West Salt River Valley subbasin extends into the northern two-thirds of the Rainbow Valley study area, while a portion of the Rainbow Valley Subbasin extends into the southern one-third of the planning area.

The **West Salt River Valley Subbasin** (WSRV) is located in the western part of the Phoenix AMA and covers approximately 1,330 square miles. Three hydrogeologic units are recognized within the water-bearing strata of the basin: an upper sand and gravel unit, a middle silt and clay unit, and a lower conglomerate unit.[15]

Prior to development, groundwater flowed toward and along the Salt and Gila rivers and into the southern part of the Hassayampa sub-basin near Arlington. In addition, there was groundwater inflow from the East Salt River Valley between the Papago Buttes and the South Mountains. Although groundwater still flows from the WSRV into the southern part of the Hassayampa sub-basin, most of the groundwater flows toward two large cones of depression, located in the Luke area and in the Deer Valley area, created by groundwater pumping for agricultural or municipal use.15 Sources of groundwater recharge include natural recharge from flood flows in ephemeral streams and along mountain fronts, and from agricultural and urban irrigation, canals, effluent, and artificial lakes.

Since the late 1800s, irrigation wells have been developed to support the agricultural economy. To date, hundreds of high-capacity irrigation wells, many to depths of over 1,000 feet, have been drilled for both irrigation and municipal use. In 1990, approximately 481,000 acre-feet of groundwater were pumped from the WSRV.15

Because of groundwater development, water levels have declined significantly, especially in areas impacted by excessive pumping for agricultural or municipal supply. Water levels fluctuate over time in response to periods of heavy rainfall and runoff, or conversely, in response to drought. Water levels in the Deer Valley and Luke Air Force Base area declined by more than 300 feet between 1923 and 1977. From 1976 to 1983, during a period of abundant surface water supply, changes in water levels ranged from a decline of 34 feet in the cone of depression in Deer Valley to a rise of 65 feet northeast of Buckeye. In 1991, the volume of groundwater in storage in the WSRV was estimated at 59,000,000 acre-feet to a depth of 1,200 feet.

[15] Arizona Water Resources Assessment. Arizona Department of Water Resources, Phoenix, 1994

Along the Gila River west of Goodyear, depth to groundwater may range from as shallow as four feet to 20 feet below land surface. In the Buckeye area, shallow groundwater conditions have caused waterlogging problems, with detrimental effects on crops. The Buckeye Irrigation Company operates several dewatering wells to lower the groundwater table to prevent waterlogging of farmland.8 Despite extensive groundwater pumping, waterlogging problems persist because of the high volume of treated effluent discharged into the Salt River by the City of Phoenix 91st Avenue wastewater treatment plant.

Located in the southwestern region of Maricopa County, the **Rainbow Valley Subbasin** covers approximately 420 square miles and mainly consists of undeveloped desert land in the south and agricultural land in the north. The subbasin is drained by Waterman Wash, an ephemeral stream originating in the southern part of the subbasin. Groundwater flow in the southern part of the Rainbow Subbasin is in a northwesterly direction. In the northern part of the subbasin all groundwater flows towards an extensive cone of depression (southeast of the original planning area) created by groundwater pumping for agricultural irrigation. Groundwater recharge sources include natural recharge in streambeds from flood flows in Waterman Wash, mountain front recharge, and incidental recharge from agricultural irrigation.

Almost all groundwater pumpage in the Rainbow Valley Subbasin occurs in the developed agricultural area in the northern part of the subbasin. It is evident that groundwater withdrawal, particularly in the north, exceeds groundwater recharge. Water levels in the subbasin began declining in the 1950s, as the amount of land under cultivation increased, and had declined by as much as 200 feet by 1982 in the north.

In 1998, depth to groundwater in the Rainbow Valley Subbasin ranged from 120 feet below land surface near the Buckeye Hills to over 400 feet near the cone of depression and further south in the Mobile Valley. The amount of recoverable groundwater in the Rainbow Valley Subbasin has not been quantified.

Effluent (Treated Wastewater)

In the Phoenix AMA, effluent is used for landscape irrigation (mainly golf courses), cooling purposes at the Palo Verde Nuclear Generating Station, irrigation of crops, and the creation of riparian areas downstream from the 91st Avenue wastewater treatment plant. Effluent production in rural areas is typically low to nonexistent due to the higher occurrence of septic systems than in urban areas. Effluent production in urbanized areas of Maricopa County is increasing as the population increases. In 1990, effluent production in the Phoenix AMA was 202,700 acre-feet and 89,757 acre-feet was used. In 1998, that increased to 257,000 acre-feet

produced and 175,083 acre-feet used. By 2010, it is projected that 374,000 acre-feet of effluent will be generated per year. Looking at percent utilization, effluent use in the Phoenix AMA has increased from approximately 20% in 1985 to approximately 60% in 1998.[16]

East of Rainbow Valley, the City of Goodyear operates a wastewater treatment plant with a capacity to treat three million gallons per day (MGD). The effluent is currently used for recharge. Future plans are to increase the plant's capacity to treat 21 MGD. There are also two smaller wastewater treatment plants in Goodyear: the Corgett Basin plant with a treatment capacity of 0.80 MGD; and the Loral Defense System plant that can treat up to 0.45 MGD.

Northwest of the planning area, the Town of Buckeye has a wastewater treatment plant that can treat up to 0.60 MGD. The effluent is used for agricultural irrigation or discharged into the river. In Rainbow Valley, some effluent generated by the 91st Avenue wastewater treatment plant is used for agricultural irrigation in the northern end of the planning area.

Water Supply Analysis

Total water supplies for the study area were determined by estimating the amount of groundwater available in portions of subbasins that lie within the planning area. The volume of groundwater in storage in the WSRV subbasin was estimated at 59 million acre-feet (af) in 1991. The Rainbow Valley planning area contains approximately 2.67 percent of the WSRV area. Based on the 2.67 percentage of 59 million acre-feet, the planning area contains an estimated 1.6 million acre-feet of groundwater (1,580,579 af). The remainder of the Rainbow Valley planning area lies within the Rainbow Valley subbasin, where recoverable groundwater amounts have not been quantified.

Historical Water Demand

Historical water use can be estimated more accurately than groundwater supplies because of well records and pumping data recorded by the Arizona Department of Water Resources (ADWR). ADWR divides wells into two reporting categories: *exempt* and *non-exempt*. *Exempt wells* are those with a pump capacity of 35 gallons per minute or less and are exempt from ADWR reporting requirements. These smaller wells are generally for domestic or stock watering purposes. *Non-exempt wells* are those with a pump capacity of greater than 35 gallons per minute and are required to report annual pumpage if within an active management area. Most non-exempt wells are used for agricultural irrigation. **Tables 19** and **20** show historic well

[16] Renewable Supplies Issues #1: Availability, Reliability & Utilization of Renewable Supplies. Governor's Water Management Commission-Technical Advisory Committee, Phoenix, Arizona, November 2000

Table 19 Non-Exempt Well Pumpage (acre-feet)			
	1990	**2000**	**% change**
1992 Little Rainbow Valley planning area	11,975	14,202	+19
2003 extended planning area	4,538	1,886	- 58*

* Significant decrease occurred after 1995 due to agricultural fields taken out of production. Use leveled off to approximately 1,464 acre-feet per year during 1996-2000. All non-exempt wells in extended planning area are for irrigation use.

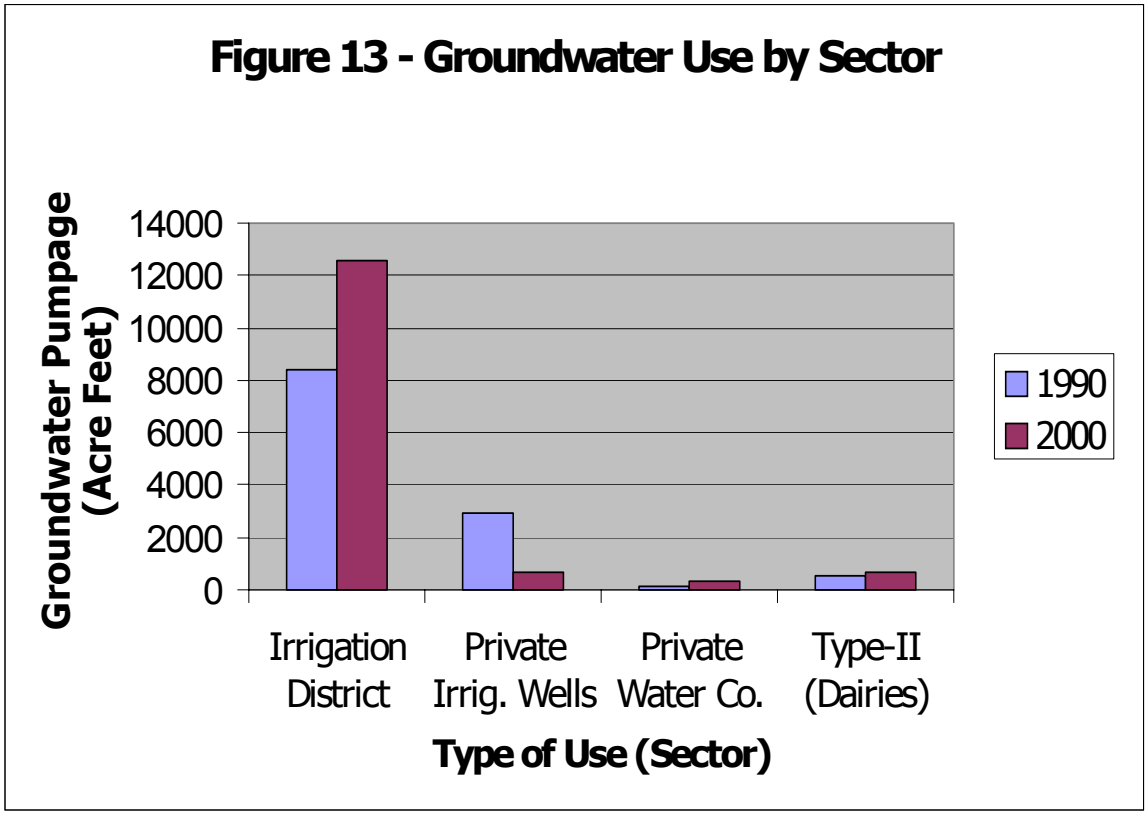
Table 20 Exempt Well Pumpage (acre-feet)			
	1990	**2000**	**% change**
1992 Little Rainbow Valley planning area	264	377	+ 43
2003 extended planning area	10	25	+ 150

Note: Exempt well pumpage estimate based on assumption of one acre-foot per year pumped per exempt well.

Combined totals	16,787	16,490	-2%

pumpage in acre-feet. One acre-foot of water contains about 326,000 gallons and is roughly the amount of water needed to serve a family of five for one year.

Figure 13 - Groundwater Use by Sector shows several trends between 1990 and 2000 in the planning area. In particular, irrigation districts have significantly increased pumpage (+50%), while private irrigation wells have significantly decreased pumpage (-78%). Groundwater use by water companies (residential uses) has increased 166% while dairy operations have increased groundwater use by +23%.



In 2000, irrigation districts accounted for about 88% of total groundwater pumpage. Private irrigation wells used about 5% of total water pumped, dairies approximately 5%, and water companies(residential uses) approximately 2% of total groundwater pumpage.

Projected Water Demand

Water demand projections in the planning area were estimated using a different technique to fit the characteristics of each subarea. For the Rainbow Valley planning area, projected non-exempt water use for 2010 was estimated based on historic water use trends between 1990 and 2000. Non-exempt wells in the original planning area are a combination of irrigation use, industrial use (mostly dairy operations), and water providers (for residential use).

For the extended planning area, all non-exempt well pumpage is for irrigation use. Between 1990 and 2000, seven out of twelve irrigation wells stopped pumping water. Aerial photos confirm that agricultural fields appear to be out of production in the location of these wells. Therefore, projected pumpage (**Table 21**) was based on average water use between the years 1996 and 2000, when pumpage leveled off to a more even rate.

Table 21 Projected Non-Exempt Well Pumpage (acre-feet)		
	2000	**2010**
1992 Little Rainbow Valley planning area	14,202	16,844*
2003 extended planning area	1,886	1,464**

* Projection based on historical pumpage increase from 1990-2000
** Projection based on average irrigation use between 1996-2000

Table 22 Projected Exempt Well Pumpage (acre-feet)*		
	2000	**2010**
1992 Little Rainbow Valley planning area	377	490
2003 extended planning area	25	40

* Projections based on historical trend in number of new exempt wells added between 1990 and 2000

Projected exempt well pumpage (**Table 22**) was based on the number of new exempt wells added in each planning area between 1990 and 2000. That number was added to the existing number of wells in 2000 for the estimated total in 2010. The assumption for exempt wells is that each exempt well pumps approximately one acre-foot per year. Distribution of well locations is shown in **Figure 14**.

ISSUES

Land Subsidence and Earth Fissures

In areas where extensive pumping has significantly lowered groundwater levels, subsidence and cracking of the land surface can occur. Groundwater depletion can

make it economically infeasible to pump water in some cases. Land subsidence and earth fissuring have been documented in the Phoenix AMA and have caused water quality problems, flooding, and damage to well casings and building foundations. No significant land subsidence has been documented in the Rainbow Valley planning area. However, major subsidence-related problems have occurred in a 140 square mile area near Luke Air Force Base, approximately 10 miles north of the planning area.

Water Quality

Groundwater quality in most areas of the West Salt River Valley subbasin is suitable for most uses, including domestic use. However, poor-quality water contaminated by human activities restricts groundwater use in many areas. Agricultural irrigation, dairy operations, and effluent discharge contribute to high concentrations of total dissolved solids, nitrate, and sulfate along the Gila River. If deep percolation water reaches the groundwater, the upper part of the aquifer can be contaminated.

In Maricopa County, agriculture, industry, construction, wastewater treatment plants, motorized recreation, landfills, and resource extraction are the primary contributors to surface water pollution. Data collected between 1995 and 1998 by the U.S. Geological Survey National Water-Quality Assessment Program indicate that dissolved solids are accumulating in basins with agricultural and urban irrigation. In 1997, streams and the CAP canal brought about 1.76 million tons of dissolved solids (salts) into the Basin and Range Lowlands, but only 0.48 million tons left the area in streams. The remaining 1.28 million tons are accumulating in soils, the unsaturated zone, and groundwater in irrigated agricultural and urban areas. When plants are irrigated, 50 to 80 percent of the water evaporates or is transpired by plants. Over time this increases the concentration of salts in soils and groundwater. Farmers, scientists, and policy makers are addressing this significant issue of salt accumulation.

Proposed drinking water standards for arsenic, radon, and uranium have major implications for groundwater supplies across the nation. In the central Arizona basins, proposed standards for radon and uranium are more likely to be exceeded than for arsenic. Many public water systems will be required to treat their water to decrease concentrations of these substances with costs probably passed on to water users.

A more in-depth discussion of water quality in the Rainbow Valley planning area may be found in the Environmental Effects element of this area plan.

Riparian Habitats

Some riparian habitats are dependent on continuous effluent and groundwater supplies. Effluent-dependent urban streams like the Gila River are valuable water

resources; however, the water quality is poorer than non-agricultural/urban streams. Agricultural chemicals used more than 30 years ago persist in streams and streambed sediment. Insecticide and nitrate concentrations in streams in the West Salt River Valley are among the highest in the nation. Although streams in this area are not used for drinking water, the water quality presents a hazard to aquatic life. One local project, a few miles upstream of the planning area, is making efforts to improve the quality of water in the Salt/Gila River. In the spring of 1995, construction began on the Tres Rios Wetlands project. Located at the convergence of the Salt, Gila, and Agua Fria rivers, the project is designed to enhance water treatment from the wastewater treatment plant, create wildlife habitat, and provide flood protection for downstream residents. The El Rio Vision watercourse master plan will provide opportunities for restoring riparian habitat along the Gila River in the future.

Utilization of Renewable Supplies

Groundwater is the primary source of water used in the planning area. In most cases, groundwater is less expensive and easier to obtain than renewable supplies such as surface water or effluent. The surface water in the planning area is primarily effluent that is further degraded by agricultural runoff. Considering this, constraints to using poor quality surface water include the high cost of treating the water to usable standards, transportation costs, and sometimes an absence of legal rights to use the water. Water that is high in dissolved solids and nitrates may be an appropriate use for certain industrial needs, such as cooling towers or materials washing.

Assured Water Supply

As a way to ensure protection of future water supplies and consumer protection, the 1980 Groundwater Code included Assured Water Supply (AWS) provisions. The 1980 Code prohibits the sale or lease of subdivided land in an Active Management Area without demonstrating that there is sufficient water of adequate quality for at least 100 years. A subdivision is defined in state law as land divided into six or more parcels with at least one parcel having an area of less than 36 acres. This includes subdivisions for residential, commercial, or industrial uses.

The AWS provisions were strengthened with the adoption of the Assured Water Supply Rules in February 1995. Applicants must now demonstrate the use of renewable supplies to meet most of the demand of the development for 100 years. Renewable supplies include surface water, Central Arizona Project water, and effluent. The 1995 Rules also raised the physical availability depth-to-water standard from 1,200 to 1,000 feet below land surface.

There are several ways in which a subdivision or a water provider can meet the "consistency with the management goal" requirement, including using renewable

supplies and/or extinguishing groundwater rights. The intent of this goal is to maximize the use of renewable supplies. However, it is possible for the subdivision or water provider to pump groundwater to serve a development if the subdivision or water provider enrolls as a member of the Central Arizona Groundwater Replenishment District (CAGRD). The CAGRD will then recharge CAP water into AMA aquifers to replace "excess" groundwater used by its members. However, replenishment does not necessarily take place within the same subbasin from which groundwater was withdrawn. The subdivision or provider will pay an annual assessment to the CAGRD based on the amount of groundwater used. No recharge sites are located in Rainbow Valley.

Effluent Use

The 91st Avenue waste water treatment plant (WWTP) accounts for most of the effluent production within the Phoenix AMA. Up to 60,000 acre-feet per year are piped from the plant to the Palo Verde Nuclear Generating Station for cooling water. Another 30,000 acre-feet of effluent are contracted to the Buckeye Water Conservation and Drainage District for irrigation. Approximately 53,000 acre-feet per year flows out of the Phoenix AMA in the Salt and Gila River channels. Currently, this remaining effluent contributes to natural recharge, supports a riparian area, and also contributes to the Buckeye waterlogged area. Evaporation in open water areas is another source of effluent outflow.

Irrigation diversions often divert all of the water in the Gila River. Records for the U.S. Geological Survey gage located two miles downstream of the Buckeye Irrigation diversion show no flow for many days when there was effluent discharged from upstream WWTPs. The gage is located a few miles upstream of the study area. The result is that often the only flow downstream of the irrigation diversion is groundwater that has surfaced, since this portion of the Gila River is a gaining stream, where the groundwater table is at a higher level than the surface of the riverbed. In this environment, groundwater seeps into the streambed. Surfacing groundwater is supplemented by agricultural drainage discharge.

Effluent water quality has improved as a result of treatment enhancements at the plant. Discharged effluent meets state numerical water quality criteria, as well as known toxicological benchmarks.

Supplying Future Population

In the future, effluent treatment will continue to be enhanced, making it an increasingly valuable source of water where available. In June 2001, the Arizona Department of Environmental Quality adopted new standards that allow private residential reuse of gray water if certain conditions are met.[17]

[17] Arizona Administrative Code R18-9-711, Reclaimed Water General Permit for Residential Use

Groundwater and surface water (including effluent) supplied by irrigation districts will likely continue to be the sole sources of water used in the Rainbow Valley area. Central Arizona Project (CAP) water, while not currently used in the planning area, could possibly be a future source of water.

Future water resource planning in the Rainbow Valley area will need to be coordinated with regional planning efforts to consider water quantity, quality, conservation methods, and flood control issues.

COST OF DEVELOPMENT

This section provides an overview of fiscal considerations relating to future growth in the Rainbow Valley planning area and Maricopa County in general. The Cost of Development element is one of several new elements being added to *Eye to the Future 2020*, the Maricopa County Comprehensive Plan, to comply with the requirements of the Growing Smarter and Growing Smarter Plus Acts. Policies and strategies will be identified that Maricopa County will use to require development to pay its fair share toward the cost of additional public facility needs generated by new development. In addition, existing techniques are identified that can be used to fund additional public services associated with new development, and policies to ensure that any funding mechanism(s) bear a reasonable relationship to the financial burden imposed on the County.

Cost of Development goals and policies will have to be integrated with other plan elements, particularly the Growth Areas element. The Cost of Development element as presented in the updated Rainbow Valley Area Plan will provide the preliminary basis for more detailed future studies of funding techniques and public costs.

Existing and Future Conditions: Demographics

The Rainbow Valley planning area's population grew from 2,065 in 1990 to 3,765 in 2000. This represents an increase of 82.3% during the 1990s. Density (persons per square mile) in the planning area did not increase significantly. By comparison, the City of Goodyear's population increase during the 1990s was 202%, while the Town of Buckeye's population increase during the same time was approximately 47%. Further, Maricopa County's growth rate from 1990 to 2000 was 44.8%, and was the fastest growing county in the United States in the 1990s, adding over 950,000 people in ten years. Maricopa County's current population exceeds 3 million.

Significant population growth is expected to continue, and the Arizona Department of Economic Security projects the County population will top 4.5 million by the year 2020, and 6.2 million by 2040. If population continues growing in the Rainbow Valley planning area as it did during the 1990s, it could increase to 12,516 people by 2020.

Besides population growth, demographic characteristics is also an important consideration because it can affect revenues from sales taxes, residential property taxes, vehicle taxes, and user fees, as well as expenditures for services like health care, education, social services, and various types of infrastructure. 2000 Census data show that the Rainbow Valley planning area population is 55% male and 45% female. Age distribution is similar to Maricopa County figures with a slightly higher

percentage of 18 to 54 year olds (58%, versus 54% at County level) in the planning area and a slightly lower percentage in the 55 to 85 year category (15%,versus 18% at County level). In Maricopa County, by 2040 the percentage of persons under 50 is expected to decrease approximately 10%, while the percentage of population over the age of 50 is expected to increase by approximately 10%.

Over the next several decades Maricopa County's population will not only become older, it will become more diverse. This is likely to be reflected in the Rainbow Valley planning area as well. In the planning area, the percentage of those who classify themselves as being of Hispanic origin increased from approximately 21% in 1990 to approximately 25% in 2000. Those identifying themselves as "White, Not Hispanic" increased from 62% in 1990 to 69.5% in 2000. During that same period, the proportion of "Black or African-American" increased slightly from 1.5% to 2.2%. "American Indian and Alaskan Native" increased slightly from 0.5% in 1990 to 1.5% in 2000. The Little Rainbow Valley Area Plan (1992) reflected a large category (15%) of "Other" ethnic composition, while 2000 Census data indicate less than 1% "Other," a small proportion of "Asian" at approximately 1%, and "Hawaiian or Other Pacific Islander" at 0.2%. The smaller category of "Other" in the Census 2000 could be due to additional race categories added for the 2000 census. In 1990, people who reported a Hispanic or Latino ethnicity and did not mark a specific race category were classified in "Other race." Census 2000 write-in responses were all reviewed, coded, and tabulated as specific race categories.

Existing and Future Conditions: Economics

Some highlights from the *Eye to the Future 2020* Cost of Development element are included in the following discussions as well as information pertaining to the Rainbow Valley planning area when available. Information on employment, and construction and real estate can be found in the Economic Development section of this area plan.

Issues and Considerations

- As growth occurs in Maricopa County—primarily at the urban fringe—the cost to service development in rural areas such as Rainbow Valley generally increases.
- The projected slowdown in employment growth and personal income growth over the next several years could affect growth patterns and County service costs to unincorporated rural areas.
- Maricopa County's diversifying and aging population might affect County revenues and expenditures with respect to providing County services in unincorporated rural areas. New programs may need to be created to serve the diversifying and aging population.

- The forecasted slowdown in the construction and real estate market could decrease County revenues. An economic slowdown could affect growth patterns and service requirements in Rainbow Valley and Estrella Mountain Ranch.
- Certain basic costs of development are higher in rural areas like Rainbow Valley than in urban areas. For example, road maintenance, new schools, school busing, and emergency services such as fire, sheriff coverage, and medical are generally more expensive to develop and maintain in rural areas. Costs associated with growth are higher for scattered development that is farther from existing services than development that is close to services and designed with higher densities or cluster designs.

Available Funding Techniques

It is important to identify all of the financial mechanisms legally available to local governments (including Maricopa County) to help fund the additional public service costs of new development. A listing of these techniques is provided in this section. An in depth discussion of these funding techniques is included in *Eye to the Future 2020* Cost of Development element at the following website address: www.maricopa.gov/planning/compln/growing.asp

- Property Tax
- Specialty/Industry Tax
- User Fees
- Bonds
- Lease Purchase Finance
- Dedication
- Development Agreement
- Intergovernmental Agreement
- Development Fee/Exaction
- Special Districts

Improvement District

For example, if a neighborhood was interested in forming a district to improve local infrastructure within unincorporated Maricopa County, it would first submit a request for a petition to the Office of the Superintendent of Streets at 2901 W. Durango, Phoenix (602 506-8798), outlining the improvements desired (e.g., street paving, water or sewer lines, street lights, etc.). A petition, which includes the district boundary and a cost estimate, would then be returned for the citizen group to obtain signatures of either a majority of persons owning real property within the district or the owners of 51% or more of the real property within the district. Proceedings and hearings as required by state law are conducted with the Maricopa

County Board of Supervisors serving as the Board of Directors of the district. This process takes a minimum of eight months to complete. The process of organizing an improvement district is outlined in the Maricopa County Department of Transportation website at www.mcdot.maricopa.gov/pm10/faqs.htm.

Current Cost Sharing Efforts

Although Maricopa County does not have an impact fee ordinance, there are ways in which new development is required to pay for and provide facilities and services associated with growth. A brief discussion of these efforts follows.

Urban Service Area

The Urban Service Area exists as part of *Eye to the Future 2020*, the Maricopa County Comprehensive Plan, and helps guide decision making to coordinate future development with urbanizing areas. It is based on the necessity for services and infrastructure to establish and maintain a high quality of life. The Urban Service Area doesn't exist as a designation on a map. Rather, it is based on the ability of new development to provide infrastructure and appropriate urban services to future residents at a particular location. The type of new development referred to here includes higher intensity uses such as residential densities greater than 1 dwelling unit per acre, commercial, industrial, and mixed use development. The Rainbow Valley planning area is not expected to see these higher intensity uses for at least 10 years. However, if at some point in the future a master planned community were proposed for example, it would have to demonstrate (at a minimum) that the following infrastructure and services exist or will be provided by the development:

- All necessary roads
- All necessary flood control structures
- Adequate utilities, including water, sewer, electric, and natural gas
- Adequate capacity and appropriate proximity to elementary, middle, and high schools
- Appropriate emergency service (police and fire) facilities and response time
- Adequate library facilities within appropriate proximity
- Adequate supply and proximity to parks
- Appropriate proximity to or supply of commercial and large-scale employment opportunities
- Appropriate proximity to hospital and emergency medical facilities
- Adequacy and proximity to multi-modal transportation facilities

Development Agreements

As identified earlier, development agreements are contractual arrangements between local governments and property owners regarding land use and infrastructure. Maricopa County frequently uses development agreements, especially with respect

to large, master planned communities, to ensure adequate road infrastructure is available for future residents.

Stipulations

Stipulations are conditions or restrictions placed upon the approval of entitlements granted to landowners. Stipulations cover a wide range of issues, including requirements for the services, infrastructure, and facilities associated with a particular project. These stipulations frequently set conditions in order to begin or continue construction.

Voluntary Contributions

Developer donations and contributions are another way in which new development helps pay for infrastructure and service costs. Voluntary contributions have been used for a variety of services, including monetary donations for regional parks and libraries, as well as property and monetary donations for schools and emergency service facilities. Contributions are beneficial because they are usually amenable to both the public and private stakeholders.

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