WATER RESOURCES

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

Water Supply Inventory

The following describes water supplies in the Rio Verde Foothills planning area:

Surface Water

The planning area is drained by numerous washes that flow towards the Verde River. Dry washes in the planning area flow only in response to rainfall events and may overtop during heavy rainfall events. Flooding is more likely to occur during the monsoon season lasting from July through September, but may also occur during the winter storms from December through February.

The **Verde River**, which flows year-round, originates in Chino Valley north of Prescott and enters Maricopa County north of Horseshoe Dam, west of the Mazatzal Mountains. The Verde River drains an area over 7,000 square miles and meanders a distance of about 140 miles from Sullivan Lake south to its confluence with the Salt River, southeast of Fountain Hills. The Verde's flow is regulated by Horseshoe Dam and Bartlett Dam, northeast of the study area. These reservoirs, operated by the Salt River Project, provide flood control and water for agricultural, industrial, and municipal use in the Phoenix area. The average annual flow of the Verde River above the confluence with the Salt was 456,400 acre-feet from 1962-1990.[19]

Central Arizona Project

Currently, no water from the Central Arizona Project (CAP) is being used in the planning area. Vista Verde, a new master-planned community, will be the first development in the planning area to use CAP exchange water.

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 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

[19] Corkhill, Edwin et al. A Regional Groundwater Flow Model of the Salt River Valley – Phase I, Phoenix Active Management Area. Arizona Department of Water Resources, Phoenix, 1993

utilization of CAP water supplies in Arizona will be reached by the year 2040.

Several jurisdictions bordering or near the planning area have CAP allocations. The City of Scottsdale has a current (as of September 3, 2004) annual CAP allocation of 51,129 acre-feet of water for municipal and industrial (M&I) purposes.[20] Scottsdale gets about 63 percent of its drinking water from the Colorado River through CAP aqueducts, 32 percent from city wells, and five percent from Salt River Project. All golf courses along Pima Road north of Loop 101 receive reclaimed water and some CAP water. Any future golf courses are required to provide their own renewable surface water supply in order to locate in Scottsdale. The City of Scottsdale charges every new development in Scottsdale a water resources acquisition fee, which is used to buy surface water supplies like CAP water. In 2003, Scottsdale recharged nearly 6,000 acre-feet of treated CAP water and reclaimed water at its Water Campus. Scottsdale's goal is to replace any groundwater pumped with groundwater recharge, as required by the Arizona Department of Water Resources.

Rio Verde Utilities, Inc. has an annual CAP allocation of 812 acre-feet for M&I purposes. The utility company obtains its CAP allocation through an exchange agreement with Salt River Project. Wells in the lower aquifer contain fluoride levels that exceed drinking water standards. High quality water from the upper aquifer near the Verde River is blended with water in the lower aquifer to bring fluoride levels down. Rio Verde Utilities, Inc. has a total of nine wells. Vista Verde will receive its potable water from Rio Verde Utilities, Inc. beginning in 2004.

The Fort McDowell Indian Community (FMIC) has an annual CAP allocation of 18,233 acre-feet. Under a 1990 federal agreement, the FMIC is provided an annual entitlement of 35,950 acre-feet of water from the Verde River and CAP. The 18,233 acre-feet of CAP in the water budget may be leased for 100 years or less off-reservation within Pima, Pinal, and Maricopa counties. A lease of 4,300 acre-feet to Phoenix has already been signed. This settlement also creates a minimum stream flow on the Lower Verde River of 100 cubic feet per second (cfs).

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. The entire study area is within the Phoenix Active Management Area (AMA). Within the AMA, The Arizona Department of Water Resources (ADWR) 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

[20] An acre-foot of water contains approximately 326,000 gallons and is roughly the amount of water needed to serve a family of five for one year.

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.

The planning area lies within the **Fountain Hills Subbasin**, one of seven groundwater subbasins in the Phoenix AMA. Located in the northeastern part of the Phoenix AMA, the subbasin covers approximately 360 square miles, all of which drains into the lower part of the Verde River. The subbasin includes the Rio Verde Foothills study area, Fort McDowell Yavapai Nation, the Town of Fountain Hills, and the developments of Rio Verde and Tonto Verde. The amount of recoverable groundwater in the Fountain Hills Subbasin has not been quantified.

Depth to bedrock (solid rock) in the Fountain Hills Subbasin ranges from a few feet near the basin margins to over 1,200 feet near its center. The regional aquifer consists of two distinct hydrogeological units: an older basin-fill sequence and unconsolidated alluvium deposited by the Verde River. The unconsolidated alluvium that underlies the modern floodplain of the Verde River is approximately one mile wide and at least 90 feet thick.[21] The alluvium, which is the principal source of groundwater, is composed mostly of gravel and sand, with floodplains of sandy silt. Water in these aquifers occurs in small pores between the grains of sediment.

The composition of the older basin-fill is not well defined due to a lack of subsurface data. Data from 1977 indicated that wells drilled in this unit yield from a few tens to several hundred gallons of water per minute. At the time of the Arizona Water Resources Assessment report (1994) there were very few wells in the Fountain Hills Subbasin and groundwater conditions were not well defined. The general direction of the groundwater flow is from north to south, parallel to the axis of the subbasin. Available information suggests that the regional aquifer in the Fountain Hills Subbasin is not connected to adjacent subbasins. According to ADWR, the unconsolidated alluvium is hydraulically connected to the Verde River. Local studies and conditions are discussed at the end of this section.

Until recently, groundwater pumping in the Fountain Hills Subbasin was relatively minimal. In 1922, the City of Phoenix began diverting groundwater from the Verde River alluvium for municipal water supply, and a few years later the City installed a number of wells. Currently, groundwater is pumped by Chaparral City Water Company (for Fountain Hills), Rio Verde and Tonto Verde master-planned communities, and an increasing number of domestic wells. Almost all of the groundwater pumping occurs in the southern region of the subbasin. Approximately 2,600 acre-feet of groundwater were pumped in 1990. Groundwater pumping from individual wells in the planning area is addressed later in this chapter.

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

A new private water company, the Water Utility of Northern Scottsdale (no affiliation with the City of Scottsdale), was initiated in 2001 to serve the Granite Mountain Ranch subdivision and was later expanded to serve Rio Mountain Estates subdivision, less than one mile to the east. The water company has drilled three wells. Well #1 was drilled in December 1997 to a depth of 1,000 feet; has a 6" casing that is perforated from 800 to 1,000 feet; and was recorded as having a depth to water of 560 feet. Drilling records were not available for the other two wells.

Long-term water level records are not available for the subbasin; however, available information suggests that water levels have not been significantly affected by groundwater pumping. Depth to groundwater in 1982 ranged from 16 feet below land surface in the Verde river floodplain south of Bartlett Dam to 490 feet below land surface near the McDowell Mountains.10 In 1998, depth to groundwater ranged from 19 feet below land surface in the Verde River floodplain south of Bartlett Dam to over 500 feet below land surface near the McDowell Mountains.[22] ADWR has one monitoring well near Jomax Road and 144th Street. Between 1983 and 1998, the well experienced a high average decline rate of 3.6 feet per year.

In the Fountain Hills Subbasin, sources of groundwater recharge (additions to the aquifer) include streambed recharge from the Verde and Salt Rivers and their tributaries, and mountain-front recharge. Sources of groundwater discharge (depleting the aquifer) include groundwater pumping, discharge to the Verde and Salt Rivers, and usage by phreatophytes (water-loving plants with roots that extend into the water table) distributed along the Verde and Salt Rivers.

ADWR conducted depth to bedrock studies in 2000 that reveal preliminary groundwater conditions in the planning area. A hydrologic boundary is estimated to occur near 136th Street, where hard rock gives way to a trough-like structure (east of 136th Street) filled with decomposed and fractured granites. Groundwater tends to accumulate in this sediment-filled trough. Preliminary studies indicate a thick, clay layer that begins roughly in the center region of the planning area, functioning as an opposite edge of the trough. Groundwater is difficult to find east of this region, until the clay transitions to alluvium near the Verde River. In addition, ADWR estimates two cones of depression beginning to form within the trough. Lowering of the groundwater table occurs in times of long-term drought and in response to significant pumpage. On the positive side, the trough and cones of depression are replenished by rainfall and sheetflow that washes across the desert and runs off hardrock northwest of the trough. Natural recharge potential is reduced when washes are channelized, land is paved, or vegetation removed.

[22] Third Management Plan for Phoenix Active Management Area (2000-2010). Arizona Department of Water Resources, 1999

Effluent (Treated Wastewater)

In the Phoenix AMA, effluent is used for landscape irrigation (mainly golf courses), cooling purposes at power plants, irrigation of crops, and 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. Effluent production in urbanized areas of Maricopa County is increasing. In 1990, effluent production and use in the Phoenix AMA was 202,700 acre-feet and 89,757 acre-feet respectively. In 1998, that increased to 257,000 acre-feet and 175,083 acre-feet respectively. By 2010, it is projected that 374,000 acre-feet of effluent will be generated annually. Looking at percent utilization, effluent use in the Phoenix AMA has increased from approximately 20% in 1985 to approximately 60% in 1998.[23]

The Rio Verde Services, Inc. wastewater treatment plant has a maximum capacity of 700,000 gallons per day. In 2003, the plant treated over 56 million gallons of effluent. Effluent flow is higher during winter months and lower in summer months. This fluctuation is attributed to seasonal usage from retirement communities where many residents leave during the hot summer months. All treated effluent is used to water golf courses and to fill lakes.

Rio Verde Services Inc. serves the communities of Rio Verde and Tonto Verde, and will begin serving Vista Verde. Treated effluent will be used for irrigation, as well as water from existing non-potable wells. The irrigation requirement for the 27-hole course will be 662 acre-feet per year. Initially, as new grass is established, the average daily demand will be approximately 750,000 gallons per day. The average daily demand is expected to diminish to approximately 600,000 gallons per day.

The City of Scottsdale uses effluent on all golf courses north of Loop 101 on Pima Road. For a short time, the City of Scottsdale operated a wastewater treatment plant located at Alma School Road and Dynamite Boulevard, approximately three miles west of the planning area. This plant was decommissioned in 1996 when Scottsdale built the Water Campus on Pima Road, north of Bell Road. Sewer, potable water, and treated effluent lines now run from the Water Campus to the Troon North development at Alma School Road and Dynamite Boulevard. The Water Campus wastewater treatment plant has an annual average capacity of 12 million gallons per day. In 2003, the plant treated 4.36 billion gallons of effluent. Three billions gallons were reused for landscape irrigation (mostly golf courses), and over one billion gallons were recharged underground near the Water Campus.

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

Water Supply Analysis

This section provides an analysis of historical and future groundwater use in the planning area. Recoverable groundwater amounts for the Fountain Hills Subbasin have not been quantified. Updates to this area plan will provide new information that may be available from groundwater studies.

Historical Water Demand

Historical water use is 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 home use 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 or belong to a city, town, or private water company.

Table 19 shows historic well pumpage in acre-feet for non-exempt (regulated) wells. 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. There are only a few of these large capacity wells in the planning area. The largest producing well, owned by the Water Utility of Northern Scottsdale (no affiliation with the City of Scottsdale), pumped a total of 60.27 acre-feet of groundwater in 2001, for hydrotest purposes and development of Granite Mountain Ranch and Rio Mountain Estates subdivisions. Several non-exempt wells west of 144th Street and south of Rio Verde Drive were drilled in 2000 but were cancelled. Well pumpage data for 2002 is not available.

Table 19: Non-Exempt Well Pumpage

Year Reported	1997	1998	1999	2000	2001	2002	2003
Acre-Feet	0.30	0.00	0.00	0.00	60.27	0.00	5.57

*Note: Only four non-exempt wells in the planning area reported water withdrawals from 1997-2003. These were under hydro-testing permits or recovery well permits.

According to the Groundwater Code[24], a city, town, or private water company has the right to withdraw and transport groundwater within its service area for the benefit of landowners and residents. ADWR classifies water providers that deliver 250 acre-feet or less for non-irrigation use annually as small municipal providers.

[24] A.R.S. § 45-492

The average per capita use rate among small municipal providers is estimated to be 223 gallons per person per day. Small providers are required to use water efficiently, but are not assigned specific conservation requirements. Large providers that serve more than 250 acre-feet of water annually are regulated for compliance with specific conservation requirements.

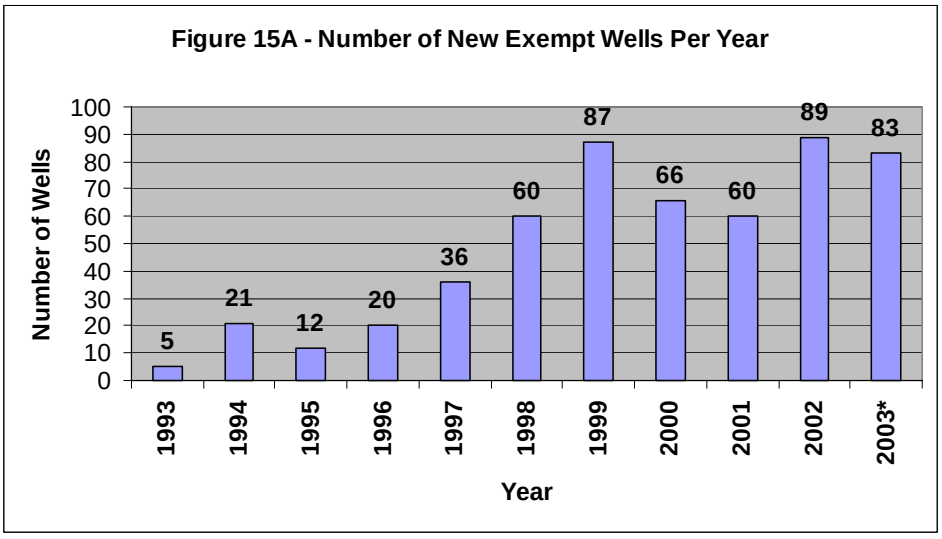
Table 20 shows historic pumpage from smaller, exempt wells in the planning area. From 1982 to 1993, 25 exempt wells were reported as drilled in the planning area. By the end of 2003, a total of 564 wells had been drilled. Because they are exempt from reporting water withdrawals to ADWR, it is assumed that each exempt well pumps one acre-foot of water per year for either domestic (residential) uses or stock watering purposes.

Table 20: Exempt Well Pumpage (Acre-Feet)

Year Reported	1993	2003	% Change
Estimated Acre-Feet	25	564	>2000%

Note: Exempt well pumpage estimate based on assumption of 1 acre-foot/year pumped per exempt well.

Figure 15A – Number of New Exempt Wells Per Year illustrates the increase in the number of new wells that have been drilled in the planning area. The number of new wells being drilled roughly parallels the number of new homes being built. A map of well locations is provided in **Figure 15B-Existing Wells**.



*January 1, 2003 through November 10, 2003
Source: Arizona Department of Water Resources

Projected Water Demand

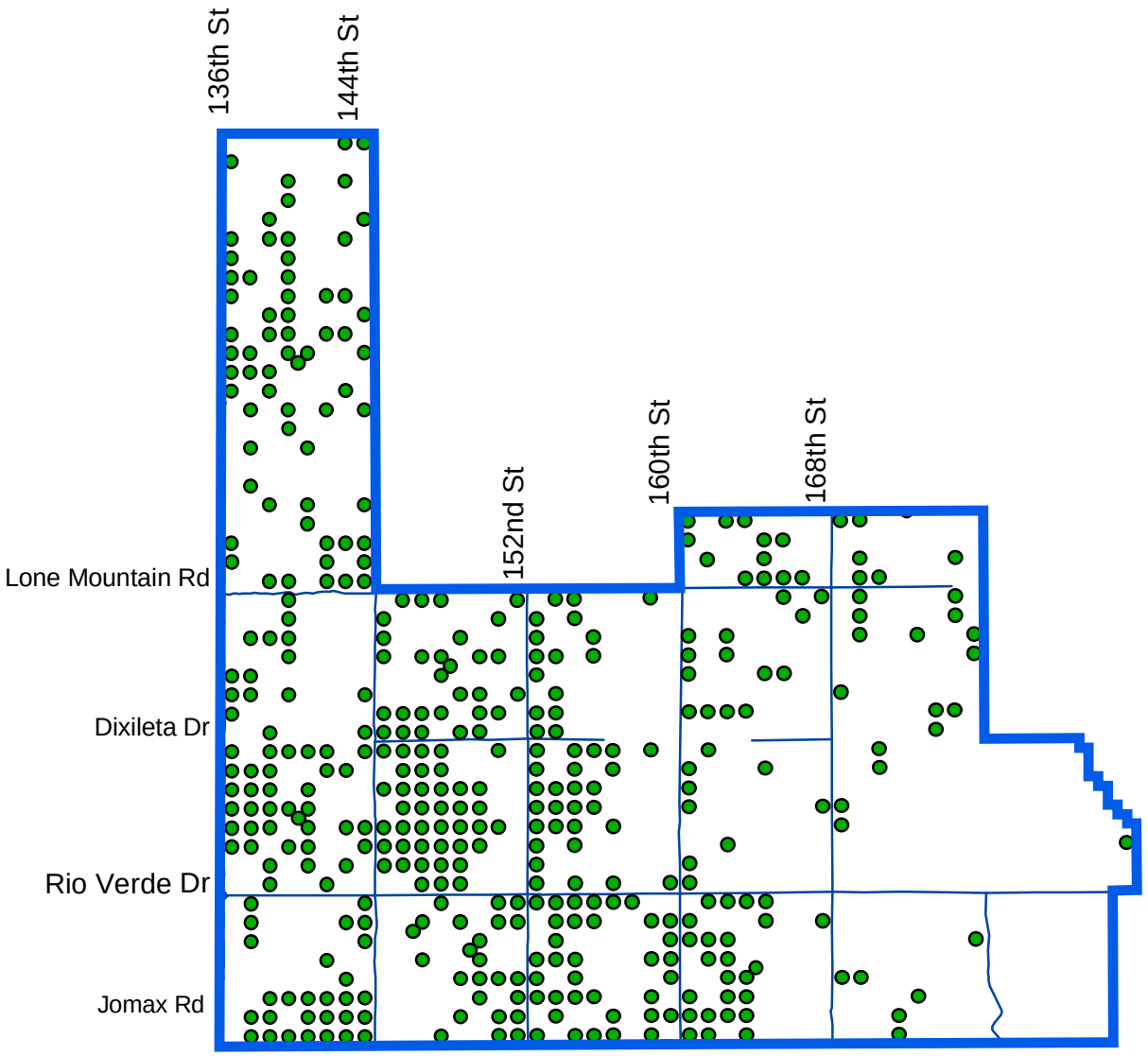
Water demand projections in the planning area were estimated using an estimate of new homes projected to be built in the planning area. In the Rio Verde Foothills planning area, an average of 117 homes per year were built between 1999 and 2003. Assuming this rate continues, an estimated 1,990 new homes could be built by the year 2020. Adding the existing 750 homes results in a total of approximately 2,700 homes (6,700 persons) by 2020, not including Vista Verde, which will be served by Rio Verde Utilities, Inc.

For this projection, an average per capita use rate of 110 gallons per day (gpd) is used as an assumption for the planning area. This was the per capita residential use rate of Cave Creek Water Company in 1995. ADWR will require Cave Creek Water Company to maintain a residential gallons per capita per day rate of no more than 109 between 2005-2009. Assuming a similar average use rate, one can estimate the quantity of water that could be needed for residential use in the planning area by 2020:

- 110 gal. per person per day x 365 days = 40,150 gal. per person per year
- 40,150 gal. per person per year / 325,851 gal. per acre-foot = 0.123 acre-foot/person/year
- 0.123 acre-foot/person/year x 6,700 persons = 824 acre-feet per year (needed by 2020)

This estimate does not include other water uses such as dust control, pasture watering, or stock watering. Many factors can influence residential water demand, including landscaping (native vs. non-native), swimming pools, and low-flow plumbing fixtures. The average per capita use rate of 223 gpd for small providers is too high to use as an assumption for the planning area since some small providers use water on golf courses, parks, and schools. ADWR conservation requirements set Desert Hills Water Company's residential gallons per capita per day rate at 101 between 2005-2009. Water companies' service areas in Cave Creek and Desert Hills are rural residential, similar to the planning area.

Since most single-lot residences have an exempt well, the number of wells in the area should roughly match the number of homes in the planning area. Some residences rely on shared wells or haul water to their homes, lowering the total number of wells. Some ranching and equestrian operations have wells, adding to the total number of wells. From 1982 through 2003, ADWR records report a total of 564 wells drilled in the planning area. Some of these wells may not be used, but they were drilled. Maricopa County residential building records indicate there are



Existing Wells

Figure 15B

Location of Well

Arterial Streets

Planning Area Boundary

0.5 0 0.5 1 Miles

Maricopa County Planning and Development Department

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approximately 750 homes in the planning area as of the end of 2003. This results in a ratio of approximately 0.75 wells per home. Using this ratio, one can roughly correlate the projected number of new homes to the projected number of new wells and their pumpage, as shown below in **Table 21**. The estimate is based on an assumption of 1 acre-foot/year pumped per well and 0.75 wells per home. Projecting a total of 2,700 homes in 2020 could result in 2,025 acre-feet of water pumped in 2020. Exempt well water use may include residential, pasture, and stock watering.

Table 22-Projected Non-Exempt Well Pumpage is the amount of withdrawn groundwater reported by the local water company in 2003 and the expected build-out demand by the two new subdivisions in 2020. Combined, the total amount of groundwater projected to be withdrawn by all wells in the planning area in 2020 is 2,118 acre-feet.

Table 21: Projected Exempt Well Pumpage *

	2003	2020
Single-lot residential wells	564 AF/YEAR	2,025 AF/YEAR

*Projections based on historical trend in number of new single-lot residences added between 1999-2003, and a ratio of approximately 0.75 wells per home.

Table 22: Projected Non-Exempt Well Pumpage

	2003[1]	2020[2]
GRANITE MOUNTAIN RANCH	5.57 AF/YEAR	49.08 AF/YEAR
RIO MOUNTAIN RANCH	0	43.68 AF/YEAR
TOTAL	5.57 AF/YEAR	92.76 AF/YEAR

[1] 2003 well pumpage based on Water Utility of Northern Scottsdale's Annual Water Use report.
[2] Projected annual build-out demand per Certificates of 100-year Assured Water Supply

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 are documented in the Phoenix AMA and cause water quality problems, flooding, and damage to well casings and building foundations. No significant land subsidence has been documented in the Rio Verde Foothills planning area.

Projected Water Level Trends

Substantial water level decreases have been documented in the Carefree and North Scottsdale area, northwest of the planning area. The Carefree Subbasin has experienced water level declines exceeding 10 to 12 feet per year due to growth and development. Projected decline rates of up to eight feet per year have been projected for the extreme north Scottsdale area.20 Drought conditions can contribute to lowered aquifer levels. Maricopa County is currently in its ninth year of drought, and if drought conditions persist, local aquifers could experience lower water table depths. Seasonal changes in pumping rates also cause local fluctuations in groundwater levels.

While Arizona's Groundwater Management Act and the Assured Water Supply (AWS) rules provide one of the strongest groundwater regulatory programs in the nation, they do not have the regulatory authority to prevent legal groundwater pumping. For example, new exempt wells can continue to be drilled for residential uses and do not require well impact analyses. All new subdivisions in the Phoenix AMA must demonstrate the use of renewable supplies or join the Central Arizona Replenishment District if they plan to use groundwater. Although groundwater will be recharged into AMA aquifers, it may not replenish the local aquifer from which it was withdrawn. Also, the AWS rules allow groundwater levels to decline to 1,000 feet below land surface over 100 years; a level that could mean irreversible damage to the aquifer. These issues are addressed in ADWR's Third Management Plan and have been identified as issues that the Department will examine.

Population growth is a significant factor in projecting future demands on an aquifer. The Rio Verde Foothills Area Plan recommends maintaining the current low density of one or less homes per acre. Even with this restriction, each landowner could potentially divide their land into one-acre parcels, resulting in over 8,000 homes that could be built in the planning area (not including approved subdivisions). Until more is known about the availability of water in this area, landowners and developers should be aware of the impact that new development may have on water supplies. Many planning area property owners feel that the area will not support any new golf courses, and it appears that water supplies are not sufficient to develop golf courses in the planning area, excluding the Vista Verde golf course that will be supplied by Rio Verde Services, Inc.

Water Availability

Residents report that water is generally less available and drilling more expensive in the eastern portion of the planning area than in the western area. Several residents have built homes in this area; some have successfully drilled wells and others must haul water to their homes. Development in the east will likely continue to be slower than the west. Vista Verde is the exception, since it will be served by

Rio Verde Services, Inc. In response to the water availability problem, some residents are pursuing the formation of a domestic water improvement district, which requires approval by the Maricopa County Board of Supervisors. Residents are exploring alternative sources of water that could be used to serve this area, such as drilling deep wells that would produce enough water to serve a neighborhood, or entering into a water exchange agreement with the Salt River Project that could enable surface water to be used. Should a dependable source of water be developed, this would provide increased incentives for land division, home construction, and subdivision applications, and possibly pressures for increased density. In addition, creation of a large water improvement district would require an update of this area plan.

Water Quality

Groundwater quality data indicate that most of the groundwater in the Fountain Hills Subbasin is suitable for most uses, including domestic use. Deeper aquifer wells in the Rio Verde Services area have higher than recommended fluoride levels. These levels are lowered to meet drinking water standards by mixing with high quality water from the upper aquifer near the Verde River. Water quality tests for the Water Utility of Northern Scottsdale (no affiliation with the City of Scottsdale) well #2 indicate a fluoride concentration of 1.4 mg/l, below the recommended standard of 2.0 mg/l. Tests indicate less than 2 parts per billion (ppb) arsenic, well below the new standard of 10 ppb arsenic. A nitrate concentration of 1.6 mg/l was found in the tested well, below the standard of 10 mg/l.

In Maricopa County, agriculture, industry, construction, wastewater treatment plants, motorized recreation, landfills, and resource extraction are the primary contributors to surface water pollution. In the planning area, possible sources of pollutants include livestock operations, construction sites, fertilizers, and septic systems. If deep percolation water reaches the groundwater, the upper part of the aquifer can be contaminated.

Best management practices, such as waste disposal plans for livestock operations, can reduce the quantity of pollutants entering drainage ways. Maricopa County Environmental Services Department now requires the use of leach trenches for residential septic systems in the planning area, due to unique soil properties, to prevent aquifer contamination. Prior to 2001, seepage pits with depths of 30 feet or more were allowed; however, new state Aquifer Protection Program rules require that disposal systems be designed to prevent any movement of pollutants into the aquifer. The new shallow systems (no deeper than 60") result in a higher quality of water that goes back into the ground. Any future commercial projects in the planning area will be required to have a public wastewater system; septic systems will not be allowed.

Proposed drinking water standards for arsenic, radon, and uranium have major implications for groundwater supplies. In the central Arizona basins, proposed standards for radon and uranium are more likely to be exceeded than for arsenic. Many public water systems are required to treat drinking water to decrease concentrations of these substances. A more in-depth discussion of water quality in the Rio Verde Foothills planning area may be found in the Environmental Effects element of this plan.

Riparian Habitats

There are no true riparian habitats in the planning area, although some desert wash habitats are considered semi-riparian. Trees and shrubs in desert wash habitats are generally taller and denser than those of surrounding desert habitats and support more bird species than other habitats, with the exception of riparian. Dense vegetation also provides food and cover for other wildlife. Riparian areas can be negatively affected by diversion of the natural water channel or excessive drawdown of an aquifer. Desert wash habitats should be protected for their habitat value, flood mitigating functions, and recharge potential.

True riparian habitat is located along the Verde River. Preserving healthy riparian habitat along the Verde is critical to maintaining the high water quality present in the river.

Use 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 Vista Verde master-planned development will receive water from Rio Verde Services, Inc., which is outside of the planning area. Rio Verde Services obtains water from shallow wells near the Verde River (considered surface water) and deeper wells, considered groundwater. Vista Verde will use treated effluent to water its golf courses and landscaping. No other surface water or treated effluent is currently being used in the planning area.

Assured Water Supply

To ensure protection of future water supplies, 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 program helps minimize groundwater use where feasible.

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. The Arizona Department of Water Resources (ADWR) administers the Assured Water Supply program.

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 is to maximize the use of renewable supplies. However, it is possible for the subdivisions or water providers to pump groundwater to serve a development if the subdivision or water provider enrolls in 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. Subdivisions and water providers pay an annual assessment to the CAGRD based on the amount of groundwater used. No recharge sites are located in the Rio Verde Foothills area.

Granite Mountain Ranch obtained a Certificate of AWS from ADWR in March 2000 and Rio Mountain Estates obtained a Certificate in October 2001. Maricopa County does not approve final subdivision plats until an AWS certificate is provided by the applicant.

Effluent Use

Effluent production in the metropolitan Phoenix area is increasing with population. The 91st Avenue wastewater treatment plant (WWTP) accounts for most of the effluent production within the Phoenix area. Although remote, effluent is being used on golf courses a few miles west of the planning area, and will be used on Vista Verde golf courses at the east end of the planning area. The two newest subdivisions in the planning area are planned for low density rural residential with individual septic systems, so no effluent will be produced.

Supplying Future Population

On a regional scale, effluent treatment will continue to be enhanced, making it an increasingly valuable source of water. In June 2001, the Arizona Department of Environmental Quality adopted new standards that allow private residential reuse of gray water if certain standards are met.[25]

Groundwater will likely be the primary source of water used in the Rio Verde

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

Foothills area. Treated effluent and poor quality groundwater will be supplied by Rio Verde Services Inc. for landscaping uses in the Vista Verde master-planned community. Central Arizona Project (CAP) water, while not currently used in the planning area, could potentially be exchanged with SRP for surface water from the Verde River, similar to the water exchange program Rio Verde Services has in place to serve their customers. Future water resource planning in the Rio Verde Foothills area will need to be coordinated with regional planning efforts to consider water quantity, quality, conservation methods, and flood control issues.