
SECTION 4.10

WATER RESOURCES ELEMENT

The Water Resources Element of the Pinetop-Lakeside/Navajo County Regional Plan is presented in the following sections:

- 4.10.1 Introduction
- 4.10.2 Population and Housing Projections: the Basis of Water Demand
- 4.10.3 Water Resources Inventory
- 4.10.4 Water Uses
- 4.10.5 Water Resources Issues
- 4.10.6 Water Resources Goals, Objections and Policies

4.10.1 INTRODUCTION

The Pinetop-Lakeside Water Resources Element of the General Plan is intended to plan for the best long-term use of groundwater and surface water resources to serve the Town's growing population and economy and to protect the natural environment. The Water Resources Element is required by Arizona Revised Statute (ARS) §9-461.05-9.C.5. According to the statute, the required contents of the element are:

- 5. A water resources element that addresses:
 - (a) The currently available surface water, groundwater and effluent supplies.
 - (b) An analysis of how the future growth projected in the general plan will be adequately served by the legally and physically available water supply or a plan to obtain additional necessary water supplies.

The Town of Pinetop-Lakeside has an active interest in all water resource-related issues that may affect residents and visitors. Still, given that the Town has no municipal water utility, its role in implementation is likely to be more limited than that of communities which have a municipal water utility. The Town's recently adopted General Plan sets out the following objectives for Town involvement in water planning:

- Develop a comprehensive program to continually evaluate and protect public and private water supplies;
- Identify programs for watershed protection and wellhead protection as planning priorities;
- Participate in studies to quantify the water supply relative to anticipated growth and development needs; and
- Work with providers to improve the systems in all areas where it is financially feasible to serve existing and future development.

The Town of Pinetop-Lakeside's planning area is served by eight water providers and by private wells. Water supplies have been adequate to provide for both domestic and agricultural needs and maintain an adequate surplus for recreation and habitat preservation (Esswein, pers. comm.). The two providers who distribute the bulk of the water are planning how to meet water demand at least through the year 2020, the planning horizon, or end year of the Town of Pinetop-Lakeside General Plan. This element's planning horizon is also 2020. While there is little concern about the adequacy of the resource through the year 2020, there are many reasons to begin to consider the future beyond 2020. The most obvious is to check whether there is any evidence that the area might shift abruptly from an adequate water supply to an inadequate water supply soon after 2020.

Another compelling reason to look further into the future is because the time horizon for water planning has become increasingly long in many other geographic areas. For example, in the groundwater Active Management Areas (AMAs) that include most of urban Arizona, legislation requires water providers or developers to establish whether a 100-year supply of water exists before a new subdivision occurs (12 Arizona Administrative Code [AAC] 7 §R-1215-2016R12-15-224, adopted February 7, 1995). If a lack of assured water supply discourages development in other areas of the state, developers may be relatively more interested in the Town's potential to absorb new residences and businesses.

The Greater Arizona Development Authority provided grant funding for the preparation of this element. The Town's intention to work with water providers to develop water infrastructure that serves the demand related to both residential and economic development is consistent with the funding support. The Town is one of four municipal members of the White Mountain Regional Development Corporation; all four member municipalities are within the Silver Creek watershed, which is in turn a part of the Little Colorado River system¹. There is, therefore, an economic development interest that coincides geographically with the shared water resource.

This element was prepared during the time period November 2001 to August 2002. The element is to be an amendment to the General Plan, whose original elements were adopted by the Town's voters in March 2001.

The General Plan is actually the same document as the Town of Pinetop-Lakeside/Navajo County Regional Plan. Still, because of the differences in planning legislation between counties and municipalities, the Regional Plan spells out items that must, by law, be handled differently by Navajo County and the Town.

¹ A watershed boundary is defined as the area's tributary to its major stream, which in this case is Silver Creek. While groundwater supplies the bulk of the domestic water throughout the Silver Creek watershed, the watershed still serves as a reasonable study area. The topography and geology dictate that the aquifers underlying the Silver Creek watershed receive nearly all of their water from precipitation within the watershed boundary.

The planning area for the regional plan extends south and southwest to the Mogollon Rim, northwest to the City of Show Low, east to the Apache County line, and north to a line 1 mile north of the boundary with the City of Show Low. Background studies for this Water Resources Element report information for the entire regional planning area.

The adopted Town of Pinetop-Lakeside General Plan includes the following elements, some of which are required by state law and some of which are discretionary:

- Land Use
- Circulation
- Economic Development
- Community Facilities and Services
- Environmental Planning
- Housing
- Open Space/Recreation
- Cost of Development
- Growth Area

The Water Resources Element has been prepared so as to be an integral part of the General Plan, and has been structured so as to correspond to the other elements of the Plan in several ways. References to related topics in other elements of the Plan appear in this Water Resources Element as appropriate. Citations include the title of the specified element and subsection name and number. Topics covered elsewhere in the Plan that are particularly relevant to the Water Resources Element are:

- Population projections in the Land Use Element (Section 4.1.2, Existing Setting);
- The land use plan map and buildout land distribution statistics in the Land Use Element (Section 4.1.3, Land Use Plan Map and Buildout Analysis);
- Guidelines for new business attraction in the Economic Development Element (Section 4.1.3, Guiding Principles for Determining Desirable Business and Industry);
- Various portions of the Community Facilities and Services Element, including:
 - Potable water supply existing conditions description, issues, and assessment (Section 4.4.3, Existing Conditions)
 - Overall community facilities goals and objectives, and
 - Specific water policies and programs (Section 4.4.4, Goals, Objectives, Evaluation Measures, Policies, and Programs).
- Various portions of the Environmental Planning Element, including:
 - Inventory and assessment of geologic characteristics and hydrology (Section 4.5.2, Natural Resources Inventory and Assessment)
 - Overall environmental planning goals and objectives, and
 - Specific surface and groundwater protection objectives, policies, and programs (Section 4.5.4, Environmental Planning Goals, Objectives, Evaluation Measures, Policies, and Programs).
- Inventory of open space areas in the Open Space/Recreation Element (Section 4.7.4, Inventory of Important Open Space/Recreational Areas), including:
 - Jacques Marsh,
 - Billy Creek Drainage; and

- The objective to preserve and expand existing open space areas, as defined in the Open Space/Recreation Element (Section 4.7.6, Open Space/Recreation Goals, Objectives, Evaluation Measures, Policies, and Programs).

4.10.2 POPULATION AND HOUSING PROJECTIONS: THE BASIS OF WATER DEMAND

Over a year passed between the time that the General Plan was approved by voters (after adoption by the Town Council) and the completion of this element. The Town's development is proceeding in accordance with the Plan and at a pace similar to the projections found in the Plan.

Decennial Census data for the year 2000 and Arizona Department of Economic Security estimates provide confirmation that short-term population trends match the projections. Census statistics appear below, along with comparisons between the projections appearing in the General Plan and the Census figures.

**Table 4.10-1
Population Comparison - Pinetop-Lakeside Town and Navajo County**

Place	1980	1990	2000	<i>2000 Census</i>	<i>2001 Estimate</i>	2010	2020
Pinetop-Lakeside	2,315	2,422	3,688	3,582	3,680	4,090	4,193
Navajo County	67,629	77,658	88,900	97,470	99,780	99,975	111,950

Sources: Town of Pinetop-Lakeside Land Use Element, Section 4.1.2, Existing Setting; U.S. Census Bureau, Census 2000 Summary File 1; and Arizona Department of Economic Security, November 2001.

The 2000 Census total population for the Town was slightly lower, at 3,582, than the 3,688 that had been projected previously. Meanwhile, Navajo County overall reported a 2000 Census population higher than projected.

The numbers of building permits (Table 4.10-2) have varied from year to year over the past 4 years, as is to be expected in any small town. It is notable that 2001 was a banner year for commercial construction in the Town.

**Table 4.10-2
Total Building Permits and Valuation (\$ Millions)**

Total Permits	1998	1999	2000	2001
Residential	46	67	66	56
	\$8.6	\$9.1	\$9.8	\$10.2
Commercial	9	8	10	15
	\$1.2	\$1.3	\$1.3	\$3.0

Source: Town of Pinetop-Lakeside Community Development Department 2002

The most detailed General Plan demographic projections covered the regional planning area. Those projections are reproduced in Table 4.10-3, below. Population projections appear first, followed by the residential land consumption needs corresponding to the projections (Table 4.10-4).

**Table 4.10-3
Regional Planning Area Population Projections 1995–2020**

Growth Scenario	1995	2000	2010	2020
Slow Growth (1.1%)	8,991	9,486	10,475	11,464
Medium Growth (3.5%)	8,991	10,564	13,711	16,858
High Growth (7%)	8,991	12,138	18,432	24,725

Source: Town of Pinetop-Lakeside Land Use Element, Section 4.1.2, Existing Setting

**Table 4.10-4
Residential Land Consumption Until 2020 (Permanent Residents)**

Growth Scenario	New Residents	Persons per Household	New Housing Units	Land Area Needed at:		
				1 unit per acre	3 units per acre	5 units per acre
Slow Growth (1.1%)	2,473	2.5	989	989	330	198
Medium Growth (3.5%)	7,687	2.5	3,075	3,075	1,025	615
High Growth (7%)	15,734	2.5	6,294	6,294	2,098	1,259

Source: Town of Pinetop-Lakeside Land Use Element, Section 4.1.2, Existing Setting

In complying with the water resources element component of state planning legislation, the Town seeks to determine how areas now in the Town or to be annexed by the Town would be adequately served by water service. The only prospective annexation area as of 2002 is the ðWagon Wheelö area.

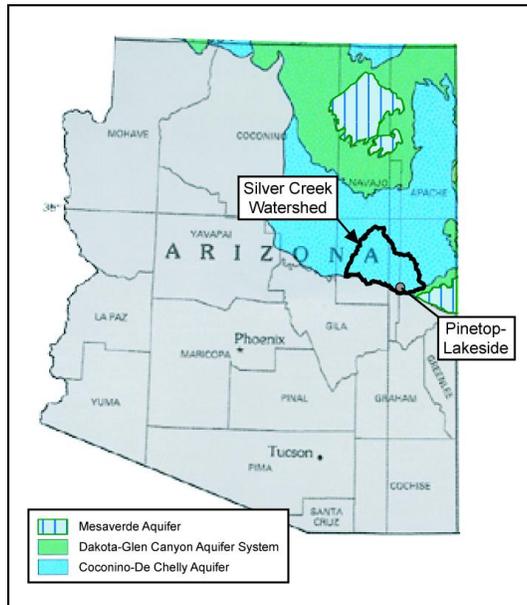
4.10.3 WATER RESOURCES INVENTORY

GROUNDWATER

Currently, the Town's domestic water needs are entirely served by groundwater. Active wells tap both the deep Coconino aquifer and the shallower Pinetop-Lakeside aquifer. The Coconino aquifer is a principal aquifer not only for the town of Pinetop-Lakeside but also for much of northeast Arizona (Exhibit 4.10-1).

EXHIBIT 4.10-1

IMPORTANT AQUIFERS OF THE COLORADO PLATEAU

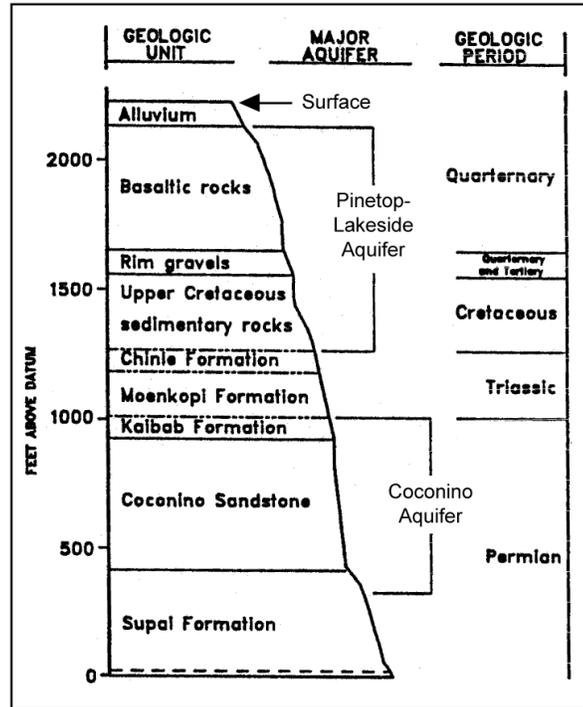


Source: U.S. Geological Survey 1991

The rocks comprising the aquifers are shown in a geologic cross-section that also indicates their depths and ages (Figure 2). The Pinetop-Lakeside aquifer is set off as a separate aquifer throughout some of the planning area, because water cannot travel downward from its strata to reach the impermeable Moenkopi and Chinle formations.

EXHIBIT 4.10-2

GEOLOGIC COMPOSITION OF THE PINETOP-LAKESIDE AND COCONINO AQUIFERS



Source: Arizona Department of Water Resources 1990

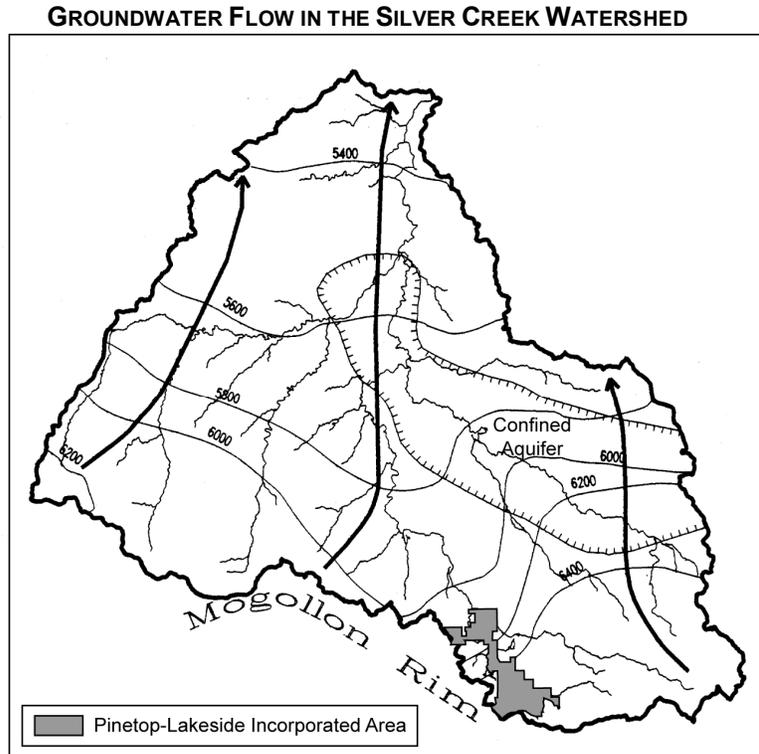
In most of the Pinetop-Lakeside planning area, the Moenkopi and Chinle formations are not present, so precipitation and snowmelt percolate downward to the Coconino aquifer. Stream channels and the impounded lakes also contribute water to the Coconino aquifer.

Both the Pinetop-Lakeside and Coconino aquifers are fed by the relatively significant amounts of annual precipitation the White Mountain region receives. The seasonality of the precipitation is somewhat different from patterns in the bulk of the state (where summer and winter bring the only significant rain). During July and August, precipitation in the area of the Town tends to occur as brief but intense, localized thunderstorms. The period of late fall is historically the second wet season, with precipitation occurring as region-wide gentle rains. From November through March, snow can contribute to large volumes of spring runoff. There is just slightly less precipitation in winter and spring than in summer and fall.

Until recently, most wells in the planning area had been drilled into the Pinetop-Lakeside aquifer. This situation has been changing over the past few years with the development of additional wells by the Pinetop Water Community Facilities District and the Arizona Water Company. Those two providers, who provide the bulk of domestic water in the planning area, drill to the Coconino aquifer for all new wells, at depths averaging 1,000 feet. Two wells developed in the past 5 years to a depth of approximately 1,000 feet yield 400 to 500 gallons per minute (gpm).

The Town's location on the Mogollon Rim figures prominently in describing the water resource situation. The edge of the Rim is elevated, much as is the lip of a saucer. The land generally falls away to the north of the Rim, and both surface and groundwater flow from the Rim toward the north. Coconino aquifer groundwater elevations (potentiometric surface contours) and flow throughout the Silver Creek watershed are depicted in Exhibit 4.10-3.

EXHIBIT 4.10-3



This groundwater flow pattern, from the Pinetop-Lakeside area toward the north, indicates the travel of water as well as any materials dissolved in the water. Wells drawing water from this aquifer yield between 50 and 2,500 gpm. The water is of good chemical quality and is suitable for most uses (Arizona Department of Water Resources 1990).

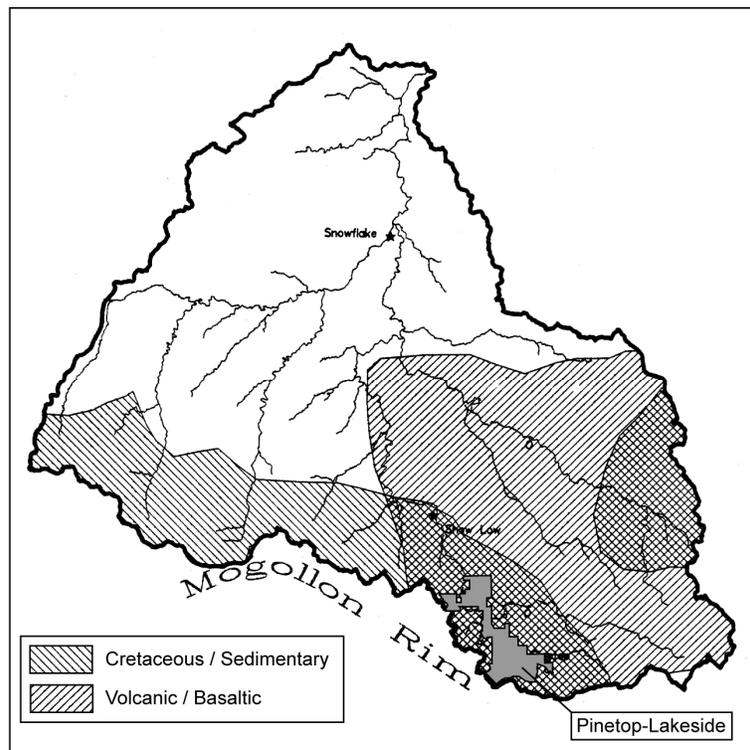
The Coconino aquifer is unconfined throughout the Town's planning area, meaning that it is directly overlain by permeable rocks and soil. An unconfined aquifer may be recharged by infiltration over the whole area underlain by the aquifer because there is no barrier to stop the downward flow of water from the surface.

However, just north of the planning area is a large area where the Coconino aquifer is confined. A confined aquifer is bounded above and below by low-permeability formations. Water in a confined aquifer may be under considerable pressure from

overlying rocks, and the water level may therefore be restricted by such formations at a level below where it would be if unconfined. Water in wells penetrating a confined aquifer may rise to levels above the top of the aquifer. Such water levels define an artesian pressure surface (Wallin 1997). While the confined area is outside of the Town's planning area, it is adjacent to some road corridors in the region and its potential to deliver water at high yields is important to the region.

While new wells are generally not being developed to tap the Pinetop-Lakeside aquifer, this shallower aquifer (Exhibit 4.10-4) is still the source of domestic water for a substantial number of homes and businesses in the area.

EXHIBIT 4.10-4
THE PINETOP-LAKESIDE AQUIFER



Source: Arizona Department of Water Resources 1990

Well yields in the volcanic portions of the Pinetop-Lakeside aquifer are highly variable, with a maximum of 350 gpm. Yields in the sedimentary rocks are typically less than 50 gpm. There has been a net decline in the water table in portions of the shallow aquifer in recent years. Water that is not tapped infiltrates through to the Coconino aquifer or is discharged to the surface water system via the many seeps and springs in the area (Arizona Department of Water Resources 1990).

Water from the Pinetop-Lakeside aquifer is of satisfactory chemical quality for most uses, with the water from the volcanic portions of higher quality than that drawn from the sedimentary areas.

STREAMS AND LAKES

Surface water resources are important to the Town's economy, aesthetics, and environmental quality. The two major creeks within town limits, Walnut Creek and Billy Creek, are tributaries of Show Low Creek, which is in turn a tributary of Silver Creek (Exhibit 4.10-5).

Streams in the area are fed directly by precipitation and by discharges from the Pinetop-Lakeside aquifer through springs and seeps. The numerous springs have played an important role in the cultural development of the region, historically supplying water for irrigation, domestic, recreation, and livestock purposes.

Pinetop Springs supplies water to the Arizona Game and Fish Department's (AGFD's) Pinetop Hatchery and to the Show Low Pinetop Woodlands Irrigation Company by way of Billy Creek. Miller Draw and Thompson Spring above Billy Creek also feed the creek, which is an intermittent stream. Big Springs, the largest group of springs in the area, supplies water to the Big Springs Natural Area, Walnut Creek, and Rainbow Lake. The ditches below Rainbow Lake, which were dug in 1903, are a water diversion maintained by the Show Low Pinetop Woodlands Irrigation Company. Adair Springs provides water to minor irrigation uses in addition to eventually supplying some of the water in Rainbow Lake. Lower Porter Creek/Show Low Creek is fed by Porter Springs. Its irrigated property is now part of the Apache-Sitgreaves National Forest and is no longer actively managed for irrigation (Arizona Department of Water Resources 1990).

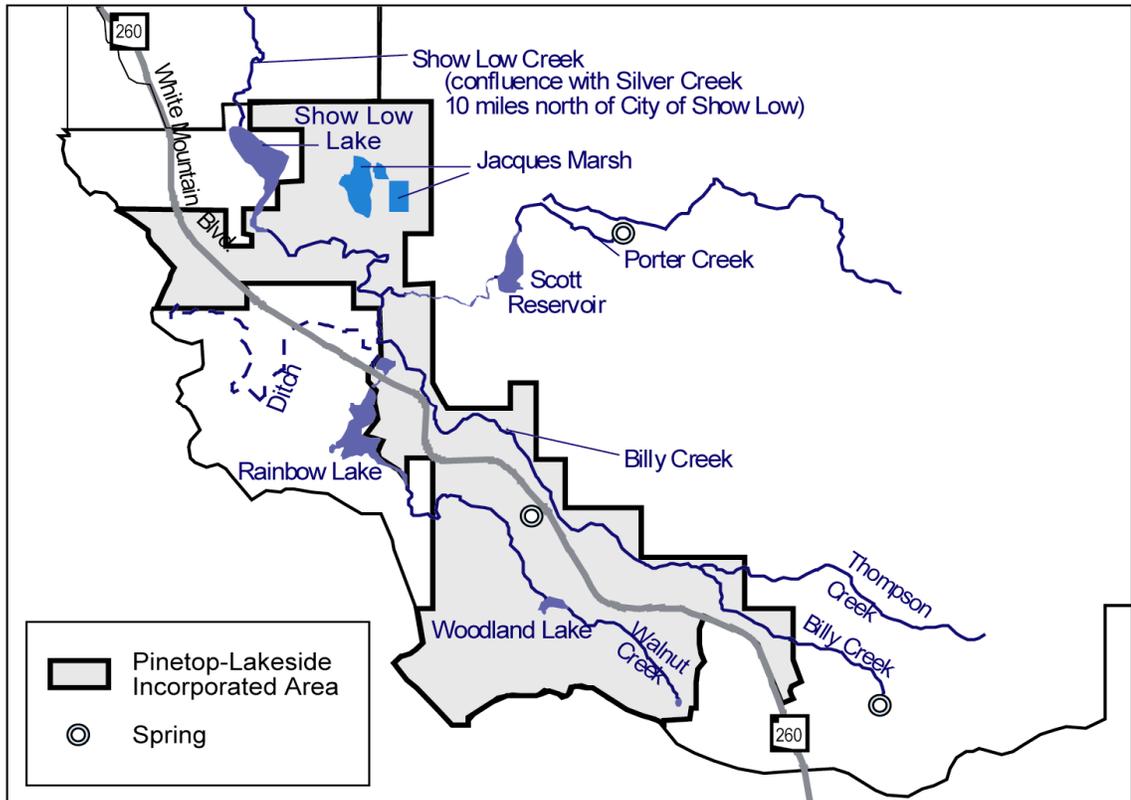
EFFLUENT

The Pinetop-Lakeside Sanitary District and its operations are described in the Community Facilities and Services Element of the General Plan. The District's wastewater treatment capacity remains at 2.0 million gallons per day in its secondary treatment plant, as stated in the General Plan. The present operating load, while remaining at 900,000 gallons per day in the winter months, has increased for the past few years to 1.2 million gallons per day in the summer tourism season. The summer operating load growth rate is a steady 3% per year.

The effluent, once treated at the secondary treatment plant, flows to the Jacques Marsh manmade wetland. As described more fully in the General Plan, the marsh is an important wildlife habitat and outdoor classroom.

EXHIBIT 4.10-5

SIGNIFICANT SURFACE WATER RESOURCES IN THE PINETOP-LAKESIDE PLANNING AREA



4.10.4 WATER USES

DOMESTIC WATER SERVICE

All of the Town of Pinetop-Lakeside's planning area is within a water service area (Exhibit 4.10-6). The distribution system for the larger providers, Pinetop Water Company and Arizona Water Company, comprises mains and lines with a capacity to reach most of the planning area's land parcels. The systems are entirely gravity-fed. Although all lands are within a service area, numerous homes and businesses obtain their water from private wells.

By type of entity, the providers are:

- Community Facilities District
 - Pinetop Water Company
- Improvement District
 - Porter Creek Domestic Water Improvement District
 - White Mountain Summer Home Water Improvement District
 - Porter Mountain Domestic Water Improvement District

- ❑ Ponderosa Domestic Water Improvement District
- ❑ Misty Mountain Domestic Water Improvement District
- ❑ Sky-Hi Domestic Water Improvement District
- ❑ Wonderland Acres Domestic Water Improvement District
- Private Company
 - ❑ Arizona Water Company, Lakeside
 - ❑ Pineview Land and Water Company

All water providers participate in the emergency interconnect plan. For example, Pinetop Water Company is connected to Arizona Water Company's system and to the White Mountain Improvement District. Water providers also coordinate with the fire departments.

Pinetop Water Company is a community facilities district (CFD) within Town boundaries, chartered by the Town and governed by a Board of Directors. The Arizona Department of Environmental Quality (ADEQ) is the major regulating agency for such CFDs. Pinetop Water owns the land dedicated to its wells. Prospective land purchases will provide enough wells, in the right locations, to supply the entire district area.

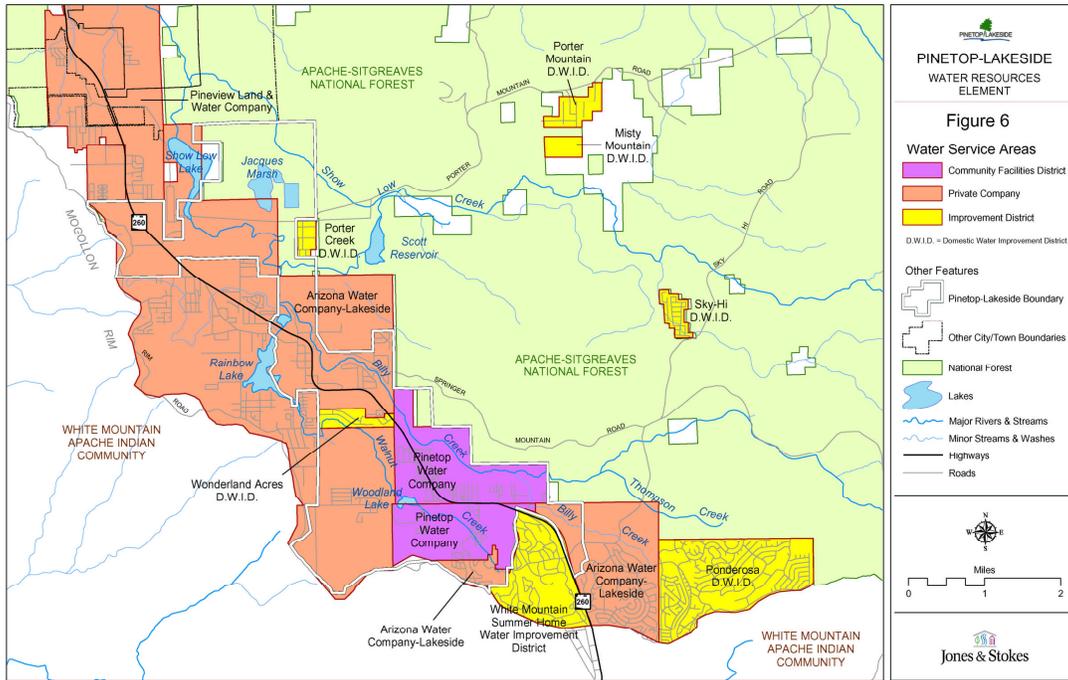
Arizona Water Company provides water in the Lakeside area of the Town and to many of the planned developments within the planning area. These developments are located east of Town in the unincorporated County.

Water distributed by both Arizona Water Company and Pinetop Water Company meets current water quality standards. Treatment is limited to chlorination. Because chlorination is performed by each company at individual well sites, there is currently no perceived need for a treatment plant.

While the Town does not work directly with the water providers to deliver water, the Town sometimes serves a coordinating role related to the water infrastructure. For example, the Town worked with a natural gas utility as it sited some gas lines to provide compatible water line locations at the same time.

EXHIBIT 4.10-6

WATER SERVICE AREAS



IRRIGATION

Show Low Pinetop Woodlands Irrigation Company is the modern name for the entity begun when pioneers filed for the water rights to Pinetop Springs in 1878. The irrigation company has held the water rights continuously ever since (Adams and Hanson pers. comm.). For a period of time, the Show Low and Pinetop Woodlands areas were separate companies; their recent reunification has provided for a common set of rights for all users on the same watershed. There are 48 shareholders in the Pinetop area, and 31 in the Woodland area. The irrigation season actually refers to a limited number of hours when irrigation occurs (312 hours of water in the Pinetop area and 181 hours in the Woodland area). There are no plans to add any new areas, pipes, or ditches to the irrigation district. All irrigated lands are directly adjacent to the system. When irrigated acreage is sold to become a subdivision, its shares may be distributed in the subdivision. Usually a few of the new lot owners purchase the shares, rather than all owners receiving proportionate shares. As a practical matter, the shares may not be broken down into increments smaller than 1 hour.

Irrigated lands are still used for pasture, orchards, and gardens. The amount of commercial agriculture is declining, yet some townspeople are part-time commercial farmers. Two of the springs yield water of a quality that is appropriate for domestic use, but the amount of water is too little for the springs to be seriously considered as a domestic water source. Occasionally the springs have periods of no flow, particularly in times of extended drought.

The irrigation season is for a limited time period early in the year. Once the season ends, the water is permitted to flow from Pinetop ditch to Woodland and Rainbow Lakes until those lakes spill over. Approximately 3 miles of the irrigation system has been converted from ditches to closed pipes. Piping has corrected seepage loss from the ditches, and is beneficial for irrigation purposes as a low-maintenance solution, with little evaporation and no opportunity for water theft.

Lakeside Irrigation System is an irrigation district dating from the early 1900s that derives its flow from Adair Spring, in the Walnut Creek watershed (Larson pers. comm.). There are 45 shareholders who hold 360 share hours in total. The district has no plans for changes to its current area or configuration. The majority of the system is piped, beginning at the spring and continuing to the northwest. The irrigated lands are east of Rainbow Lake, on the east and west side of highway 260. Lakeside Irrigation System does not provide water for any other purpose, such as the recreational lakes.

RECREATIONAL USE OF WATER

Woodland Lake, Rainbow Lake, and Scott Reservoir are popular recreational lakes that are key tourist amenities in the Town. All three lakes support populations of sunfish, crappie, rainbow trout, brown trout, largemouth bass, and channel catfish, and are stocked in the fall and spring by AGFD with channel catfish fingerlings and rainbow trout. Each lake has its own character. Woodland Lake Park features a 4-mile loop trail beginning at the spillway and passing through Big Springs. Scott Reservoir is on U.S. Forest Service (USFS) land, while Rainbow Lake is surrounded by residences (some of which are tourist cabins). Boating, whether related to fishing or not, is a popular activity on all three lakes. Boat motors on Woodland Lake and Scott Reservoir are limited to electric power, while motors used on Rainbow Lake are restricted to a maximum of 8 horsepower.

Show Low Pinetop Woodlands Irrigation Company supplies water to the lakes. The irrigation company's commitment to the recreational lakes is set out in several written agreements with the Town and with the Apache-Sitgreaves National Forest.

RIPARIAN AREAS AND OTHER HABITATS

The Arizona Riparian Inventory and Mapping Project was conducted in response to the Waters-Riparian Protection Program signed into law in 1992, amending ARS 45-101. The project was mandated to identify, classify, and map riparian areas within the state; identify and map land ownership; and identify existing options for protecting riparian areas in each ownership category that might be available under existing state and federal laws (Valencia et al. 1993). Few permanent protection measures came out of the project, but its identification of certain riparian areas did raise public awareness of their existence and value. The project documents substantial riparian habitat along several of the creeks in the Pinetop-Lakeside planning area.

AGFD conducted extensive stream surveys on the USFS portions of Walnut Creek and Billy Creek starting in 1997 (Lopez pers. comm.). Those surveys focused on fish and

aquatic habitat inventories, but included a riparian component where riparian size was measured and riparian condition (health) was evaluated. In addition, the U.S. Fish and Wildlife Service has conducted inventories of Proper Functioning Condition (the Bureau of Land Management process of determining riparian condition) throughout Apache-Sitgreaves National Forest.

Surface water is gained from permanent springs a short distance downstream of Woodland Lake, and natural permanent water is found from the confluence with Adair Spring down to Rainbow Lake. Big Springs (Big Springs Natural Area) adds a significant amount of permanent water in this portion. This small area supports the only population of native fish in the entire Show Low Creek watershed, which includes Billy Creek and Walnut Creek. The riparian area and wetlands around Big Springs are in good health due to the permanence of water and the non-consumptive use at the Natural Area. (Lopez pers. comm.)

FIRE PROTECTION

The most serious fire threat to the Town is the threat of a catastrophic forest fire, as was very recently demonstrated by the close approach of the Rodeo-Chediski conflagration. Contrary to popular belief, the vegetation that represents fuel is not densest within the Apache-Sitgreaves National Forest. Instead, the vegetation in Town is denser than it is on forestlands or on the White Mountain Apache Reservation. Particularly in recent years, the Town has taken significant steps to educate residents on the danger and encourage thinning of vegetation surrounding residences. Officials have worked to disseminate the message of fire awareness in the *Town Citizen* newsletter, on the Town website, and in public forums. The 2020 Vision Town Hall held in October 2001, for example, focused extensively on protecting homes and property from wildfire threats. In addition, the Pinetop Fire Department has been extremely active in promoting fire awareness through local educational programs, and spearheaded the initiative to host a "Firewise" regional conference to be held at Hon-Dah on June 28, 2002. Due to impacts from the Rodeo-Chediski fire, however, the conference has now been rescheduled for later this year.

A "one burning period" fire could very realistically burn through the Town of Pinetop-Lakeside. In a computer modeling exercise in 1999, a hypothetical fire sparked at Woodland Road and Woodland Lake Road burned out of control and went through some subdivisions, into the forest, and burned out the electric substation that supplies the electric power to the water system. It was determined at the time that the most likely forest fire threat would approach the Town from below the Mogollon Rim on the White Mountain Indian Reservation, just as the Rodeo-Chediski blaze did in areas to the west of Town.

After the difficult fire season in 2000, Congress increased the 80% funding levels of previous years and fully funded USFS for fire protection at what was then perceived (pre-Rodeo-Chediski) to be adequate levels. Some USFS projects were also funded through the states, some of which are active in or near the Town. For example, the University of

Arizona extension agency in Navajo County used grant funding to treat 100 acres (several 1- to 15-acre lots) for hazard prevention, and added a hazard prevention educator to its staff. A new position in the Arizona State Land Department Forestry Division, Pinetop Office, was to provide advisory services in wildland/urban interface.

The Pinetop and Lakeside Fire Departments coordinate firefighting efforts with one another and with the USFS. More coordination happens as required in dry years (e.g., 1999, 2000, and 2001), with less coordination in wetter years. An USFS weather station (one of 24 in the Arizona-New Mexico bistate area) is located in the Lakeside District of Apache-Sitgreaves National Forest. The USFS informs the local fire districts when there is a red flag warning, meaning dangerous fire weather conditions exist. Additional restrictions on open flame (including smoking outdoors) are then posted and enforced. The Pinetop and Lakeside Fire Departments are specifically tasked with responding to fire events within the Town boundaries. In addition to fighting structure fires, members of the two fire companies are specifically cross-trained to fight fires in the urban interface between populated areas and forest. The departments typically extinguish a number of brushfires in any given year. Water to fight most fires is typically drawn from water district hydrants, although the fire companies also employ a total of five tanker vehicles that are used to transport water to areas of Town that lack adequate hydrant coverage and to forest areas devoid of hydrants.

A major wildfire can have far-reaching consequences for surface, groundwater, and municipal water supplies. Ash and other debris can foul streams and reservoirs, and various naturally occurring chemicals released by burning, such as nitrogen, manganese, and phosphorous, can alter oxygen levels in water supplies and potentially lead to algae blooms, which may then result in fish kills. Though designed to be non-toxic to humans, fire retardants and other agents used by firefighters may also enter the water supply and affect water quality or taste. In addition, the destruction of vegetative cover may dramatically increase stormwater runoff and sediment loads, and heighten the risk of flash flooding. As the U.S. Geological Survey notes, following an intense fire, all vegetation may be destroyed; also, the organic material in the soil may be burned away or may decompose into water-repellent substances that prevent water from percolating into the soil. Even normal rainfall may result in unusual erosion or flooding from a burned area [and] heavy rain can produce destructive debris flows (2002).

4.10.5 WATER RESOURCES ISSUES

TOWN'S LIMITED ROLE IN WATER RESOURCES

The Town neither owns nor manages a water utility. That fact means that the Town has neither the authority nor responsibility to monitor the details of water supply on an ongoing basis. The area in which the Town is located is not an Arizona Department of Water Resources (ADWR) Active Management Area (AMA) for groundwater protection purposes. That fact means that some information on water supply that would be publicly available in an AMA is not available to the Town (see below).

While there is much that the Town can contribute to the management of water resources, most of its actions will call for the voluntary involvement of other entities, some of whom have responsibility for the water supply, and others who have elected to take an interest in water issues.

PROJECTED DOMESTIC WATER SUPPLY AND DEMAND

While water availability has been a critical concern in the development of Arizona, there are some areas of the state where the supply of groundwater has continuously exceeded the demand for groundwater. Pinetop-Lakeside is one such area. The concern about the depletion of groundwater in most of the urbanizing areas of the state led to the Groundwater Management Act of 1980 and the geographic definition of several AMAs. In the AMAs, water providers or developers must document that a 100-year supply of water exists before a new subdivision occurs. There are no such requirements outside of AMAs, in areas such as Pinetop-Lakeside.

In Pinetop-Lakeside as in other areas, water providers monitor water levels in existing domestic water supply wells as a routine part of their business. ADWR also monitors water levels in test wells; some deep wells owned by the two largest water providers serve as test wells.

Water levels have dropped in some of those wells drilled to the shallower Pinetop-Lakeside aquifer. Other wells, drilled deeper into the shallower aquifer, show no drop in the water level. Still, new well development undertaken by the two largest water providers is in the deep Coconino aquifer. A comparison of water levels in one of the deeper wells over the 10-year period from 1992 to 2002 shows no drop in the water level and shows satisfactory sustained yields.

The domestic water demand projections calculated for this element are based upon the population and housing projections that appeared in the General Plan.

**Table 4.10-5
Town and Regional Planning Area Domestic Water Demand Projections 2000–2020**

Place	Year		
	2000	2010	2020
Population Projection			
Pinetop-Lakeside Town	3,688	4,090	4,193
Pinetop-Lakeside Regional Planning Area			
Slow Growth (1.1%)	9,486	10,475	11,464
Medium Growth (3.5%)	10,564	13,711	16,858
High Growth (7%)	12,138	18,432	24,725
Water Consumption (gallons), Low Consumption Rate (100 gallons/day/capita):			
Pinetop-Lakeside Town	368,800	409,000	419,300

Pinetop-Lakeside Regional Planning Area			
Slow Growth (1.1%)	948,600	1,047,500	1,146,400
Medium Growth (3.5%)	1,056,400	1,371,100	1,685,800
High Growth (7%)	1,213,800	1,843,200	2,472,500
Water Consumption (gallons), High Consumption Rate (175 gallons/day/capita)			
Pinetop-Lakeside Town	645,400	715,750	733,775
Pinetop-Lakeside Regional Planning Area			
Slow Growth (1.1%)	1,660,050	1,833,125	2,006,200
Medium Growth (3.5%)	1,848,700	2,399,425	2,950,150
High Growth (7%)	2,124,150	3,225,600	4,326,875

A consumption rate of 100 gallons/day/capita represents conservative water use. The City of Show Low noted a city water consumption rate equivalent to 110 gallons/day/capita in its *Water Gazette* (Summer 2001). A rate of 175 to 180 gallons/day/capita is widely quoted as a level of consumption that combines domestic, commercial, and industrial use in a municipality. For example, the 175 gallons/day/capita rate of consumption is equal to the combined municipal and industrial consumption rate of City of Phoenix, according to *Growth on the Coconino Plateau: Potential Impacts of a Water Pipeline for the Region*.

WATER DISTRIBUTION SYSTEM

There is not currently an optimal match between water facility locations - especially hydrant locations - and development patterns.

Officials have noted that not all areas designated for economic development meet the Town's standards for the presence and spacing of hydrants. The mapping of the Arizona Water Company system (Exhibit 4.10-7) was accomplished concurrently with the preparation of this element. The map indicates the distribution system. The areas designated for commercial development are generally adjacent to highway 260 and other business development is planned for the 40-acre industrial park at Porter Mountain Road and Commerce Drive.

Past history in the Town and other Arizona communities would indicate that the larger providers will gradually expand their service areas to convey water to those currently served by individual wells and to acquire small water providers. No specific plans for such expansion or acquisition were mentioned, however, during the preparation of this element.

IRRIGATION

The Show Low Pinetop Woodlands Irrigation Company and the Lakeside Irrigation System have held their respective water rights continuously, and they will continue to do so. The irrigation companies provide water to a fixed area of land for a fixed number of irrigation hours per year and it is not foreseen that they would ever expand to obtain the

rights to any additional sources. The irrigation companies supply water to the recreational lakes, by written agreement with the Town and the USFS.

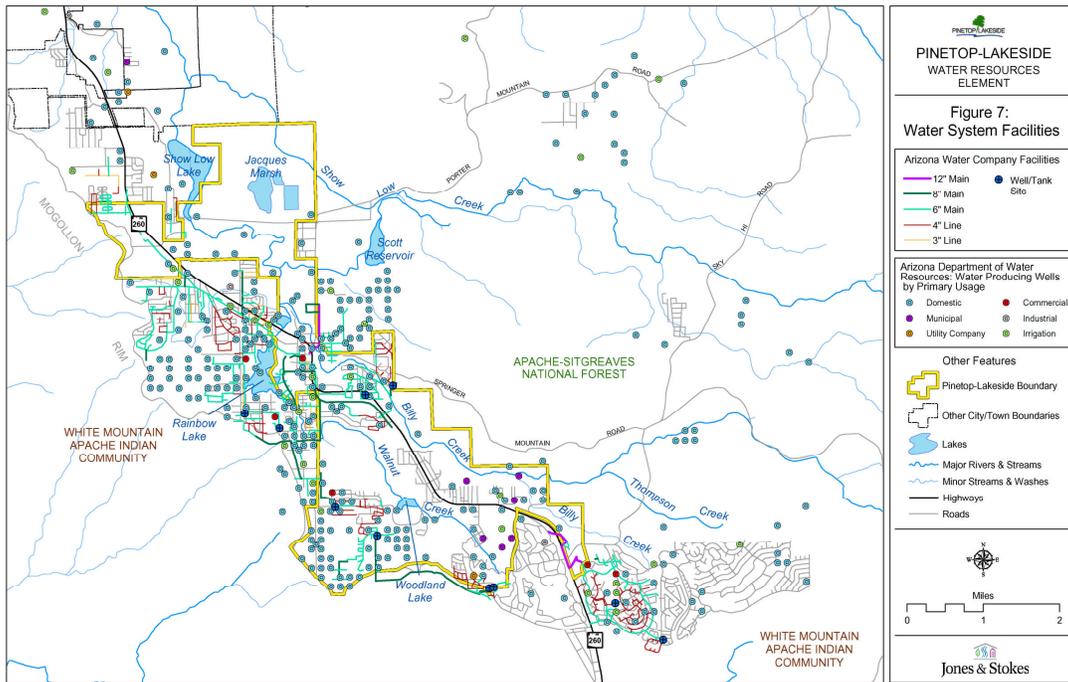
The continuing drought has resulted in reduced water flow from Pinetop, Adair, and Thompson Springs. The shallow aquifer from which the springs flow has also been tapped by many wells in recent years. The result during the summer of 2002 is that some of the creek areas have become stagnant, and riparian flora and fauna have been compromised.

EFFLUENT

Effluent may represent an important supply of water. Effluent may be used for irrigation purposes following secondary treatment; in some communities, effluent is even treated to potable water standards. Currently, most of the effluent from the Pinetop-Lakeside Sanitary District's treatment plant flows to the Jacques Marsh manmade wetland. A small amount of effluent is used for irrigation of the landscaping at the Sanitary District facility.

It is not anticipated that any of the flow to the Jacques Marsh manmade wetland would be diverted to other uses. However, if residential growth remains at current rates and business growth accelerates, expansion of the treatment plant's capacity could be in demand in 10 to 15 years. Presumably, various uses could be considered for the additional effluent at that time.

**EXHIBIT 4.10-7
WATER SYSTEM FACILITIES**



RECREATIONAL USE OF WATER

There are no issues with regard to the recreational use of water that are independent of the overall recreation issues discussed in the Open Space Element of the General Plan. The Open Space Element cites the following issue regarding water as used for recreation: Woodland Lake Park is now owned by the USFS, but it comprises lands that are below USFS standards for the USFS system. It is subject to sale for residential or commercial development based on "highest and best use." The Town has obtained temporary veto power over any sale to a private developer, but the Town does not yet have the resources to assure permanent control of the lands.

RIPARIAN AREAS AND OTHER HABITATS

Riparian areas along Billy Creek are affected by the diversion of its upstream waters by the Show Low Pinetop Woodlands Irrigation Company, an irrigation district. The district has held the legal water rights for many years, and is awaiting the long-delayed outcome of the General Adjudication of the Little Colorado River System and Source for further clarification of its rights.

In the late 1990s, the Show Low Creek Watershed Partnership was formed to bring interested parties together with the Town to find ways to improve the watershed by putting conservation measures in place and to modernize the irrigation system. Participants included representatives from the Town, the Show Low Pinetop Woodlands Irrigation Company, the Lakeside Irrigation District, the USFS, AGFD, and the City of Show Low.

The various parties involved educated one another effectively concerning both the legal and natural environmental situation. Billy Creek was flowing throughout its length through most of that time, helped by some years of average and above-average precipitation. Given the lack of a crisis and the lack of staffing, the committee became inactive. As of 2002, the severe drought has stressed Billy Creek. The Show Low Pinetop Woodlands Irrigation Company has not offered to voluntarily return flow to the creek by opening its diversion gates. Discussion of its condition in Town Council meetings has not led to agreement to reconvene any ongoing committee or other forum on Billy Creek or riparian areas in general.

FIRE PROTECTION

Now that the public and officials have witnessed a truly catastrophic forest fire in close proximity to the Town, the newly heightened awareness could translate into progress toward strengthening partnerships for fire prevention and suppression. Specifically, residents are now likely to be more supportive of spending on more hydrants, and may be responsive to the idea of revising town zoning/building ordinances to better fireproof structures. As more is learned about how a major fire like the Rodeo-Chediski can impact water quality, the Town may well need to integrate post-fire water protection programs into its emergency preparedness plans.

4.10.6 WATER RESOURCES GOALS, POLICIES, AND IMPLEMENTATION PROGRAM**GOAL FOR WATER SUPPLY**

The Town of Pinetop-Lakeside will work with the water service providers to assure that the demand for water through the year 2020 will be met by an adequate groundwater supply delivered by an effective distribution system.

POLICY FOR TOWN AS INFORMATION SOURCE

The Town will continue to develop the existing information base on water demand, supply, and distribution systems as a basis for the coordination of the Town government's role in land use planning with the private water providers' role in supplying water.

IMPLEMENTATION PROGRAM TO CONTINUE INFORMATION DEVELOPMENT

The Town will continuously expand the databases that portray the water supply and water distribution systems. Provider information for water providers beyond the Arizona Water Company should be obtained to enable depiction of the entire system. ADWR data used for this element should be updated on a routine basis with the most current ADWR information. Prior to the preparation of this water resources element, the water supply and distribution system information base was at scattered locations, and much of the information was prepared such that it could only be understood by a technical audience. The initial development of an integrated information base that may be understood by the general public was a major component of this element.

POLICY FOR TOWN IN ASSESSING REGIONAL WATER SUPPLY

The Town will advocate for planning for the sustainable development of the White Mountains Region and northeastern Arizona, including supply and demand studies of the Coconino Aquifer as one important component.

IMPLEMENTATION OF REGIONAL WATER SUPPLY AND SUSTAINABLE DEVELOPMENT STUDIES

The Town appears to be in the enviable position of having a plentiful long-term groundwater supply. The Arizona Water Company and the Pinetop Water Company monitor the status of their deep wells and have found no evidence of depletion of the Coconino Aquifer.

The Town's current water demand is at about 370,000 gallons per day, and the regional planning area's water demand is at about 1,000,000 gallons per day. By 2020, depending upon the population growth rate and the rate of water consumption, the Town's water demand will likely increase to between 420,000 and 730,000 gallons per day, and the region's water demand will increase to between 1,150,000 and 4,330,000 gallons per day.

Given the apparent adequacy of the groundwater resource, it might appear that there is little need for the Town to be concerned with the aquifer's carrying capacity. There are many reasons, however, for the Town to participate in regional initiatives concerning sustainable development, including consideration of the aquifer's capacity. Some of those reasons are:

- New development throughout the entire area underlain by the Coconino aquifer will compete for the Coconino water resource.
- Users of some shallower aquifers that are experiencing depletion will switch to the deep Coconino aquifer, representing another new demand on the aquifer.
- The current water supply deficits in communities such as Williams, the effects of groundwater pumping on springs in the Grand Canyon, and other concerns in the north-central Arizona portion of the Colorado Plateau have led to two major studies of potential future water supply (Arizona State University, Morrison Institute 2001; Rocky Mountain Institute 2002). Both studies emphasize the relationships among water resource, other ecosystem, and economic factors in defining sustainable growth in the region. The Town and other areas in northeastern Arizona do not have an equivalent research base for planning decisions. The Pinetop-Lakeside area may be an area of water surplus, but it is within a region of water deficits where the search for additional water resources ranges far and wide.

GOAL FOR SURFACE WATER PROTECTION AND USE

The Town of Pinetop-Lakeside will work with those entities interested in and responsible for the various uses of the Town's lakes and streams to assure the continuation and enhancement of those uses and the protection of water quality.

POLICY FOR FLOW PROTECTION

Adequate flow in the streams and adequate water levels in the lakes is important for recreation, habitat, irrigation, and fire protection.

IMPLEMENTATION OF FLOW PROTECTION

The Town of Pinetop-Lakeside participates in the Arizona Rural Watershed Alliance Program (ARWA); a Town staff member is the contact for the Show Low Creek alliance. Any renewed initiative similar to the former Show Low Creek Watershed Partnership would now have the network of the ARWA as a new resource. The ARWA is part of the program set up by ADWR to carry out its responsibility for water resource planning statewide. The Watershed Alliances may be named according to their surface water resources, yet the planning approach is an integrated one that takes into account the interaction between the surface and groundwater resources of each area.

POLICY FOR WATER QUALITY

The environmental planning element of the adopted General Plan includes a policy to "promote land use development activities in important groundwater recharge areas that are consistent with the water quality objectives of State and Federal agencies." The implementation program stated below would protect wellheads, which must be a large part of any overall program to protect the aquifers.

Implementation of Water Quality Protection

The environmental planning element of the adopted General Plan calls for the following program: "The Town and County development review process shall incorporate water protection strategies and plans of DEQ, DWR, and other governmental entities."

In 1997, ADEQ adopted a U.S. Environmental Protection Agency-required statewide wellhead protection program, which instituted a voluntary component for Arizona communities (Arizona Department of Environmental Quality 1997). While the main purpose of the program is to protect groundwater wellheads, a wellhead protection area is both the surface and subsurface area surrounding a water well and the protection measures affect the surface water source as well as the groundwater source.

The City of Show Low and the Town of Wickenburg, two communities which have municipal water utilities, have adopted wellhead protection programs. The Town of Pinetop-Lakeside would not be protecting its own capital assets by instituting a wellhead protection program. Such a program could offer much to the Town, but must be undertaken in cooperation with the local private water providers. In Show Low, private water providers to portions of the planning area were partners in development of the program.

POLICY FOR FIRE PROTECTION

The Town will work with water providers and the fire departments to assure that the facilities required for municipal fire protection are available to existing and new development. In addition, the cooperative arrangements among the Town, the fire departments, and the Apache-Sitgreaves National Forest will be enhanced. In the Town's developed areas, landowners will be educated to carry out fire prevention measures on a lot-by-lot basis.

IMPLEMENTATION OF FIRE PROTECTION

The Town will continue to require sufficient hydrants for new development and to correct deficiencies in the provision of hydrants in the redevelopment area. The threat of the Rodeo-Chediski fire has made residents aware that structures would benefit from better fireproofing, and the Town will propose additional zoning and building ordinance requirements to accomplish the fireproofing. Post-fire water protection programs will be incorporated into the Town's emergency preparedness plans.