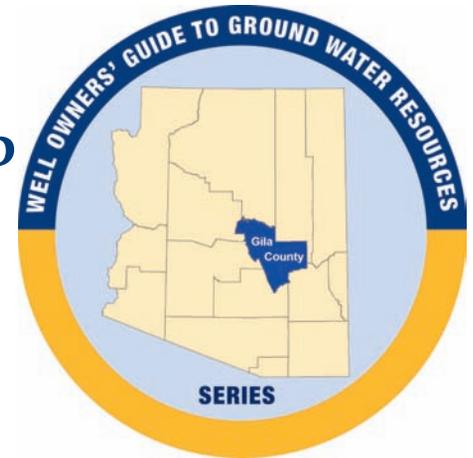


WELL OWNERS' GUIDE TO GROUND WATER RESOURCES IN GILA COUNTY

Kristine Uhlman, Chris Jones, Rachel Hill



What is a Water Resource?

An individual in an industrialized urban society may use from one million to five million gallons of water during their lifetime. If the share of industrial, agricultural, and recreational usage is counted, the total amount of water may exceed ten million gallons per capita. Water resources are those sources of water that meet the need of the individual and society, and the value of that resource is dependent on demand and availability.

Our arid climate, coupled with increasing demands on water supply and the over-allocation of surface water resources, forces much of Gila County to rely on ground water wells for potable use. This primer has been prepared to provide the homeowner with a basic understanding of where your water comes from in Gila County, and for the well-based water-supply system owner to understand some of the vulnerabilities of their water supply.

Arizona Department of Water Resources

Fresh water is a renewable resource, with every rain drop and snowflake that does not evaporate contributing to availability, yet groundwater pumping already exceeds recharge in some Arizona aquifers. The Arizona Groundwater Management Act (Title 45 of the Arizona Revised Statutes) was passed in 1980 to help address the issue of water supplies across Arizona. The Act set up a comprehensive management framework and established the Arizona Department of Water Resources (ADWR) to administer the Act's provisions. In several urban and agricultural locations across the state where significant ground water depletion was acknowledged, the Act designated Active Management Areas (AMAs) to manage ground water. The 5 AMAs include Prescott, Phoenix, Pinal, Tucson, and Santa Cruz – there are no AMAs within Gila County.

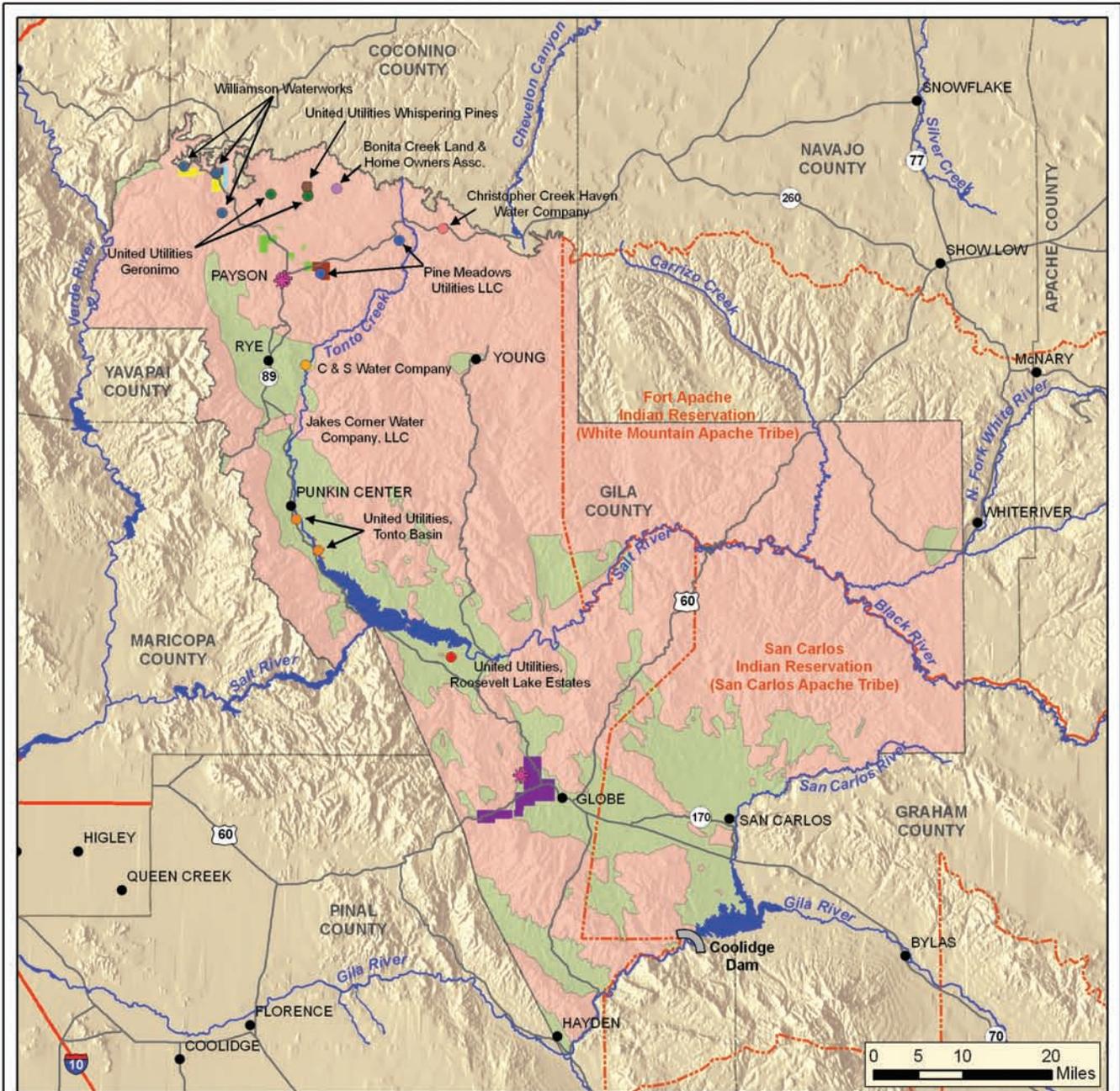
Within the AMAs, private domestic wells equipped with a pump of 35 gallons per minute (gpm) capacity, or less, and for which less than 2 acres are irrigated, are exempt from reporting water use. Outside of designated AMAs, there are no pumping restrictions on domestic wells.

All wells are permitted through ADWR. Under ARS § 45-594, ADWR promulgated construction standards for new wells and replacement wells, the deepening and abandonment of existing wells and the capping of open wells. Before anyone can drill a new well or deepen or modify an existing well, that person must obtain authorization from ADWR. The well must meet minimum construction standards and must be drilled by a licensed well drilling contractor. (ADWR, 2008)

Public Water Providers in Gila County

A Public Water System provides water for human consumption through pipes or other constructed conveyances and has at least fifteen service connections, or regularly services at least twenty-five persons for at least sixty days a year. There are 15 public water providers across Gila County, most located near population centers and housing developments (Figure 1). The Arizona Department of Environmental Quality (ADEQ) regulates all public water systems involved in the collection, storage, testing, treatment or distribution of potable water. Although municipal public systems, including Payson and Globe, are managed by the city or town council and water improvement districts are governed by the county in which they operate, they must still meet regulatory standards set by ADEQ.

ADEQ specifically, and the state of Arizona in general, have no regulatory authority on tribal lands such as the San Carlos Indian Reservation located partially within Gila County. EPA Region 9 is responsible for Drinking Water program regulations of towns such as San Carlos.



Legend

- Environmental Sites Within Gila County
- Major Cities
- Dam
- Major Roads
- Interstate Highways
- Major Rivers
- Major Lakes
- County Boundaries
- Native American Lands Within Gila County

Consolidated vs Unconsolidated Sedimentary Deposits

- Consolidated
- Unconsolidated

Gila County Water Providers (ADWR 2004)*

- Arizona Water Company Miami
- Bonita Creek Land & Homeowners Assoc.
- C & S Water Company
- Christopher Creek Haven Water Company
- E & R Water Company
- E & R Water Company Pine System

- Jakes Corner Water System
- Payson Water Company, Inc.
- Pine Meadows Utilities, LLC
- United Utilities
- United Utilities Geronimo & Whispering
- United Utilities Roosevelt Lake Estates
- United Utilities Tonto Basin
- United Utilities Whispering Pines
- Williamson Waterworks

* This is a partial listing of the water providers in Gila County. For a complete listing, please visit the County Extension Office.



Figure 1: Gila County Water Providers

Shared Wells

If a well does not meet the criteria of a Public Water System but serves more than one household, this is a Private Shared Well System. **There is no agency that enforces or regulates Private Shared Well agreements, and the agreement is considered a civil matter between neighbors.** In some circumstances, if the service of water from a well is off the premises, the well may be subject to regulation by the Arizona Corporation Commission (ACC). The ACC is the regulatory authority with jurisdiction over private water (and sewer) companies as well as investor-owned utilities.

Exempt Wells

Private, domestic wells are classified as ‘exempt wells’ because they are **exempt from reporting requirements and regulation.** Within Gila County there are approximately 5,680 exempt wells registered with ADWR (Figure 2).

While some of these wells are drilled in subdivisions requiring hydrologic analysis prior to permitting, many are drilled on lots created through ‘lot splits’ for which no hydrologic analysis is conducted. A lot split, or “land division” by Arizona statute, is land in an unincorporated area of a county that has been divided into five or fewer parcels, any of which is ten acres or smaller in size. Once platted, the land divider is able to build and sell houses on the divided land even through a reliable water supply might not be available.

In most circumstances county boards of supervisors do not have the discretion to prevent a lot split from occurring. A lot split must be approved if the divider’s application meets certain minimum requirements outlined in statute, regardless of water availability.

Lot split and subdivision statutes are increasingly being examined for potential changes to provide tighter management of ground water resources. The reason for this is the common tie between lot splits and exempt wells – wherever there is a lot split, there is likely to be an unregulated, exempt well that provides water to the homeowner.

No agency regulates water supply or quality in exempt wells. For this reason, well-based water-supply system owners must realize their responsibility to understand the vulnerabilities of their personal water supply and commit to monitoring the quality of their water.

Ground Water Quality in Gila County

Ground water quality is considered excellent in most of the county. Occasionally, coliform bacteria, nitrates and fluoride exceed recommended criteria in isolated wells. Arsenic has been found in ground water east of Globe, and radon in wells around Timber Camp. Pathogens from on-site sewage disposal systems have been detected in ground water and pose the primary public health concern. Other concerns include naturally occurring high salinity, agricultural pesticides, and localized fuel or industrial solvent leaks (EPA). There have been incidents of pollutants originating from mining activities being detected in water supplies. See Figure 1 for the location of environmental cleanup sites in Gila County.

An aquifer is an underground geologic formation capable of yielding or transmitting usable quantities of water to a well or spring. Depending on the geologic formation, water is typically held in subsurface fractures and cracks of rock, or in interconnected pores and void spaces between grains of sand and gravel or soil. Aquifer material types include both **unconsolidated** and **consolidated** rock materials, examples of which range from the unconsolidated alluvial sands and gravels of Pumpkin Center and the Gila Conglomerate of Miami, Globe and San Carlos, to the dense consolidated granite of Payson and the basalts southwest of Pine and Strawberry (Figure 2). Sedimentary rocks, such as the layered sandstone and limestone cliffs visible as you approach Globe from the south along State Route 77, combine the characteristics of both consolidated and unconsolidated materials, with water transmitted through both the porous sand and the fractures and cracks of the rock.

Of these two aquifer types, ground water is filtered through porous void spaces as “porous flow”, or in fractures and cracks as “fractured flow”, and/or in a combination of these flow types in sedimentary rock. Fractured flow can rapidly transmit contaminants through the subsurface as there is little opportunity for natural filtration of pollutants. Porous sands allow for more filtration of the water, and more natural protection from land surface contaminants seeping through the soils. It is important to understand which flow type is prevalent in your aquifer to protect your water supply from contamination.

Ground water in contact with naturally occurring minerals in the rocks and alluvium will dissolve and transport these minerals to your well and water supply. In Gila County, the most common naturally occurring water supply contaminant is elevated salinity from geologic sedimentary formations that were deposited in ancient saline marine environments. The Salt River derives its name from salt springs along its course.

Nitrate: Nitrate contamination is most often caused by human activity on the land, and has been linked to irrigated agriculture, concentrated livestock facilities, large turf areas and septic systems. Gila County requires a 100 foot set-back between a water supply well and sewage disposal system (such as a septic tank and leach field), but in areas of shallow ground water or consolidated rock aquifers, this may provide insufficient protection (Figure 3).

Several areas in the Gila County have exhibited elevated nitrate levels, including Payson, Pumpkin Center, Hayden and the Globe-Miami area. If your property is near an agricultural field or farm, or if your property was ever farmed in its history, you may be at risk of elevated nitrate in your well water. You are also at greater risk of water contamination if you don’t know the location of your leach field – or your neighbor’s leach field – in relation to your well location.

Ground Water Availability: The most common water supply well system problem across Arizona is dropping ground water elevations. If the water table drops below the well casing, water mixes with air; flow becomes turbulent and may erode silts and sand into your well. In an uncased, bedrock well, as the water table drops and air is introduced into formerly saturated cracks and fractures, turbulent flow begins to erode the aquifer.

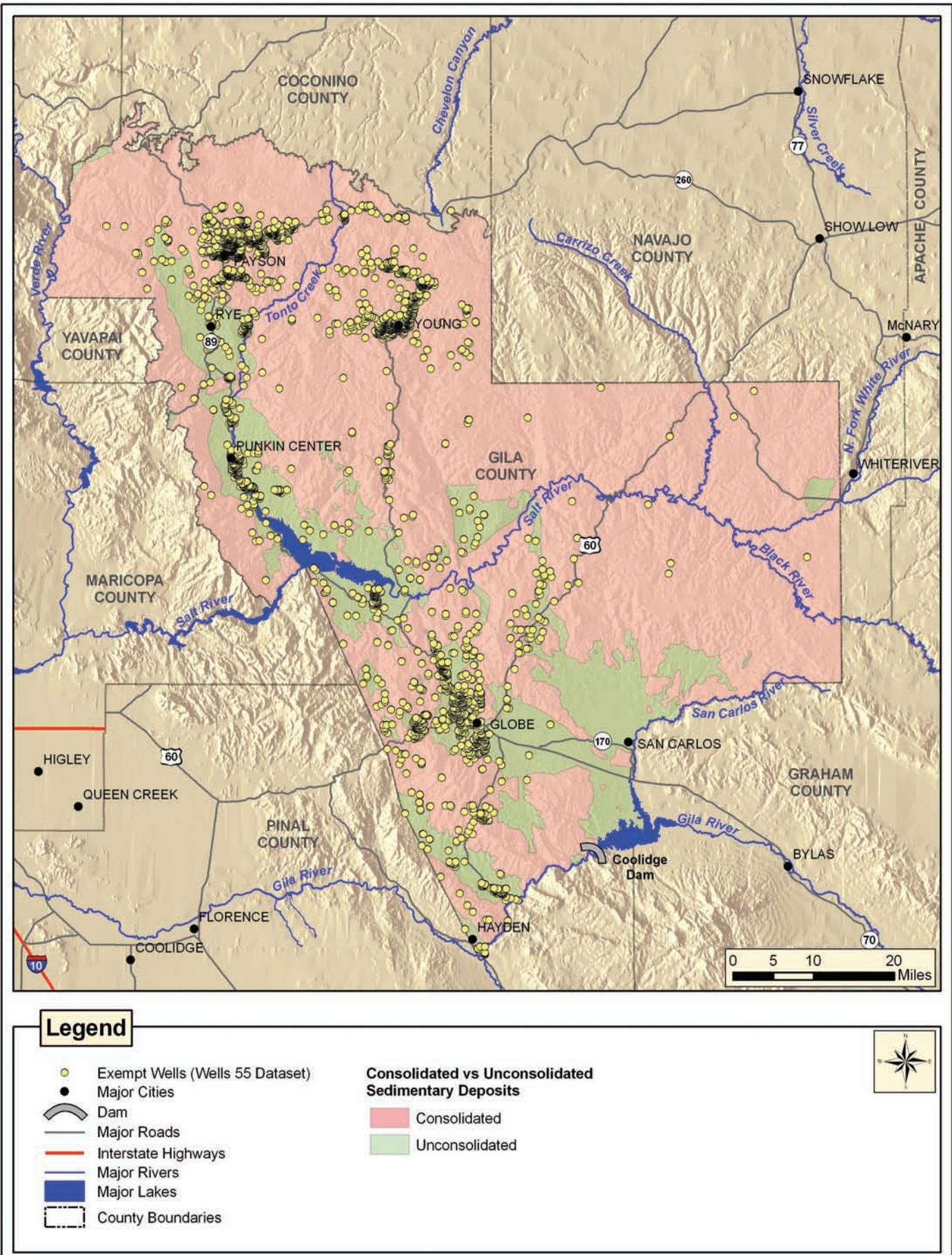


Figure 2: Gila County Aquifer Types

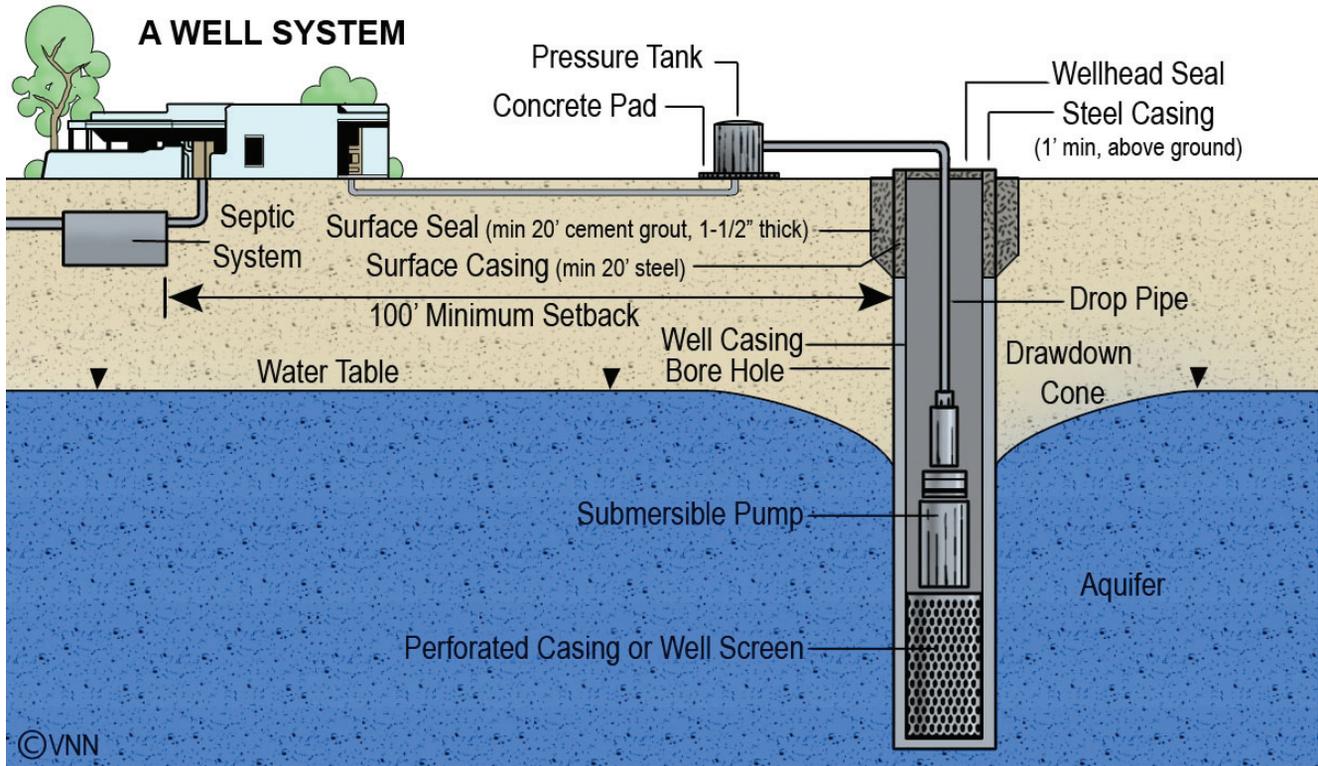


Figure 3. Base Well Diagram. Adapted from ADWR Well Owners Guide

The first sign of system failure (and dropping ground water elevations) is the build-up of sediment in tanks, pipes, and plumbing fixtures. If the well continues to pump gritty sands, the pump itself will grind to a stop and will need to be replaced.

These simple steps will help protect your system and water quality

- Always use an Arizona licensed well driller and pump installer when a well is constructed, a pump is installed, or the system is serviced.
- Be aware of the geology of your aquifer. Know that a well installed in consolidated rock is more vulnerable to contaminant transport, whereas an unconsolidated aquifer provides more filtering capacity. If a known contaminant release occurs in your neighborhood—such as a hazardous waste spill or a leaky underground gasoline storage tank—your well may be at risk. The geology of your aquifer may protect your water supply—or may make your well more vulnerable to contamination.
- Practice well head protection. Keep hazardous chemicals, such as paint, degreasers, fertilizer, pesticides, kerosene, and motor oil away from your well head.
- Periodically check the well cover or well cap to ensure it is in good repair. Do not allow surface water to puddle near your well. If necessary, construct berms around the well to divert surface runoff away from the wellhead.
- Always maintain separation between your well and buildings, septic systems, chemical storage facilities, garage, or car maintenance area. Your professional contractor will know the rules on appropriate distances for new construction. The Arizona Water Well Association maintains a list of licensed contractors at: <http://azwwa.org/contractors/>.
- Don't dispose of chemicals in your septic system, and read the label of any cleaners or additives advertised for septic systems. De-greasers contain industrial solvents that persist in the environment and may seep into the aquifer.
- Don't allow back-siphonage. Install a back-flow preventor on outdoor hoses, when mixing pesticides, fertilizers, or other chemicals. Don't put the hose inside the tank or container, and never leave the hose in standing water.
- When landscaping, keep the top of the well casing at least one foot above the ground (grade). For proper drainage the grade should slope away from your well.
- A damaged casing could jeopardize the sanitary protection

of your well. Don't pile landscaping or construction materials near your well.

- Be aware of changes in your well, the area around your well, or the smell, taste or color of your water.
- Monitor the sediment build-up in your toilet tank. If the sediment is soft and does not feel gritty if wetted and rubbed in the palm of your hand, this is not of concern unless you notice a significant increase in volume. If the sediment is gritty, or if you notice sand in the tank, contact a licensed well pump installer. Soft, fine clays will feel smooth and slick, whereas grit wears down pumps and plumbing!
- An annual well maintenance check, including water quality testing, is recommended. The water quality should be checked any time there is a contaminant release nearby, or if you observe a change in taste, odor, or appearance, or anytime a water supply system (such as pump replacement) is serviced.

Testing your well water: Cooperative Extension recommends well owners test their water annually for bacteria, nitrates, arsenic, and radon. More frequent testing may be needed if:

- Your well is located in a consolidated rock aquifer where contaminants can be rapidly transmitted to your well and a new contamination source occurs for any reason.
- There is a change in the taste, odor, or appearance of the well water.
- Your well occasionally goes dry or if the ground water elevations are dropping – the change in chemistry in the aquifer may release naturally occurring minerals, such as arsenic.
- After your well has been chlorinated – the change in chemistry in the aquifer due to the introduction of chlorine may release naturally occurring minerals, such as arsenic.
- Family members or house guests have recurrent incidents of gastrointestinal illness.
- An infant is living in the home; infants are more susceptible to nitrates and other contaminants.
- You wish to monitor the efficiency and performance of a home water treatment equipment.

For more information on wellhead protection, pollution prevention, and well disinfection see the University of Arizona publication, *Arizona Well Owner's Guide to Water Supply* at: <http://cals.arizona.edu/pubs/water/az1485.pdf> /

A list of Arizona Department of Health Services licensed

commercial drinking water laboratories can be found at: <http://www.azdhs.gov/lab>

State and County Contacts / Links

Arizona Department of Environmental Quality – Water Quality Division (ADEQ) <http://www.azdeq.gov>

- Gives Gila County the regulatory authority to do inspections (in most counties ADEQ does them directly)
- Gets involved when more than 25 people are served or 15 hook-ups are connected onto a shared well (in which case, the group is considered a water provider)

Arizona Department of Water Resources (ADWR) www.azwater.gov

- Grants permits for existing wells older than 1980.
- Provides information on well construction regulations: (http://www.azwater.gov/dwr/Content/Find_by_Program/Wells/Practical_Guide_for_web_07_06.pdf)
- Has information on Assured/Adequate Water Supply: <http://www.azwater.gov/dwr/WaterManagement/Content/OAAWS/default.asp>

Gila County www.co.gila.az.us/



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THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
TUCSON, ARIZONA 85721

KRISTINE UHLMAN, RG
Area Assistant Agent, Natural Resources

RACHEL HILL
Graduate Student - Landscape Architecture, University of Arizona

CHRIS JONES
*Associate Agent, Agriculture Natural Resources, Gila County
Cooperative Extension*

CONTACT:
KRISTINE UHLMAN
kuhlman@ag.arizona.edu

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