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BEING A PROACTIVE OWNER OF A DOMESTIC WELL

FREQUENTLY ASKED QUESTIONS

What does it mean to be a proactive owner of a domestic well?

- A domestic well owner recognizes that securing a reliable good quality supply of drinking water from groundwater has a large degree of personal responsibility and can potentially be costly.
- A domestic well owner should approach well ownership just as they would other aspects of home upkeep and improvement such as with a septic system, roof, heating and air conditioning unit, or other personal living costs. This includes having a financial strategy to address potential problems should they occur.
- A domestic well owner is sufficiently informed to foresee a potential problem with their domestic well and address it before their water supply is jeopardized or interrupted.

What are the basic components of a domestic well water system and how does it all work?

Figure 1 illustrates the basic domestic well system components for a modern well. It consists of a **casing** that is placed in the drilled bore hole to maintain the well opening. The casing is usually carbon steel or can be plastic. **Bentonite or clay grout** is placed in the bore hole on the outside of the casing to confine the groundwater to the zone underground where it originates, and to prevent contaminants from other zones from mixing with the water. The top of the casing is capped with an approved **well cap** so that it snugly fits and prevents debris, insects, and small animals from finding their way into the well.

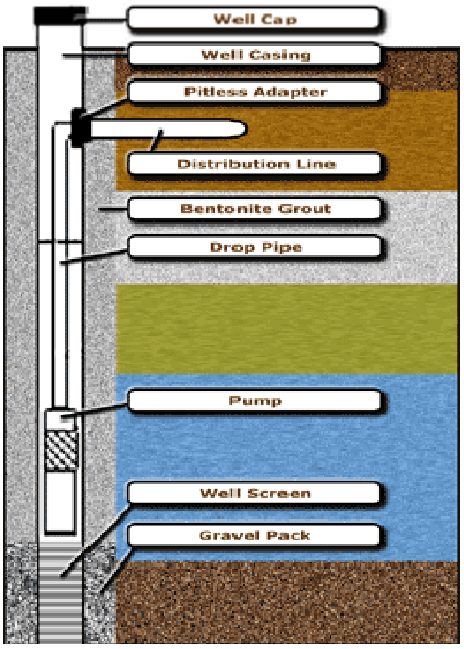

Figure 1. Basic well system components. Courtesy of wellowner.org.

Well screens are located in portions of the well casing adjacent to gravel and sand layers that were observed as the well was drilled. Usually these soil layers will provide the most water into the well. The well screens allow water to enter the well so it can be pumped and also act as a filter preventing or limiting sediment from entering the well and

still maintain the well opening. There are different types of well screens available for domestic wells such as mill slot, louver screen, and wire wrap (Fig. 2). Mill slot and wire wrap are more common.

Figure 2. *Mill slot, louver, and wire wrap screen (left to right).*

A **gravel pack filter** (Fig. 3) may also be constructed adjacent to the well screens on the outside of the well casing to increase the effective radius of the well in the main water bearing strata and to provide additional filtering of the water.

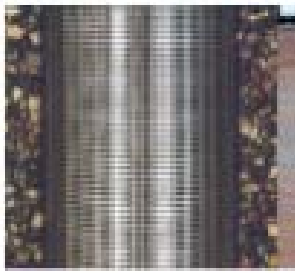

Figure 3*. Wire wrap screen with gravel pack filter.*

Historically, hundreds of open bottom wells have be constructed in the northern Sacramento Valley. The only entry point for water into the well is through an open cavity at the bottom of the well casing. These wells are the least expensive because they do not require well screens or gravel packs. However, they can lead to more wear on pumps due to sand and other abrasives and they may require more well development (pumping) to secure domestic water that is not turbid. While it is not known to occur often, it is also possible for the open cavity to collapse and reduce water entry and access for pumping.

After the well has been constructed a **submersible electric motor and pump** are lowered into the well below the surface of the groundwater to lift the water. The motor and pump are attached to a **drop pipe** inside the well casing so that the pump and motor can be retrieved for maintenance and repairs. The pump consists of a screened intake for the water to enter the pump, and then pump bowls or impellers spin and provide centrifugal force to lift the water to the surface (Fig. 4). The pump discharge is connected to a **distribution line** which conveys the water to ground surface. A **pitless adapter** provides a sanitary and frost proof seal between the well casing and the water line running to the well owner's house.

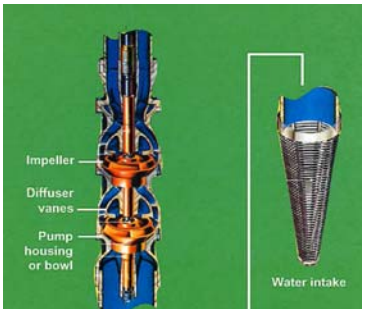

Figure 4*. Example pump bowls and water intake screen. Submersible motor not shown.*

A **bladder pressure tank** (Fig. 5) is installed into the water distribution line to the home. It provides a source of water and pressure to various household devices that are used intermittently so that the pump in the well does not have to turn on and off every time there is a need for water. This increases the life of the motor and the pump in the well.

The most common bladder pressure tanks consist of a balloon that partially occupies the space inside an air tight tank. The balloon fills with water when the pump in the well runs. The rest of the tank that is not occupied by the balloon when it is filled with water is filled with compressed air that is pre-charged to usually 40 to 50 psi. The pressure is regulated with a cutoff pressure switch. When water is

Figure 5. *Example bladder pressure (blue) tank.*

demanded in the home, the pre-charged air pressure inside the tank forces water from the balloon into the home piping system and delivers it to a faucet, toilet, or shower head. When the water in the bladder nears empty, the air pressure inside the tank decreases because air space is freed up as the bladder empties. The air pressure inside the tank drops to the pressure level set at the pressure switch, and the switch triggers power to the pump in the well to turn on and re-fill the bladder in the tank. This cycle is repeated to deliver water throughout a home over the course of a day.

Besides understanding the components of a domestic well system, what information do I need to foresee a potential water supply problem?

- **Age of well**. The age of a well is often indicative of the likelihood that a well owner could encounter a problem with the water system, although this is not always the case as groundwater conditions may affect well production. Older wells are likely to be more shallow and not as well suited for the added competition of groundwater resulting from growth and change over time. They may be constructed with inferior drilling methods and design features. The mechanical parts associated with the pump are likely to have more wear and tear, and there is greater chance of well failure due to corrosion and well collapse.
- **Well depth and depth of well screens**. Knowing the depth of a domestic well and how it is constructed or where the well screens are located is critical. Having this information allows the owner to determine how the well is designed to intercept water and anticipate how close groundwater levels are from dropping to levels where it can no longer enter the well.
- **Depth of submersible pump in the well.** The depth that the pump is set in the well can be compared to the depth of the well screens or well. By comparing them, a well owner will have a sense of how much flexibility there may be to lower the depth that the pump is set in a well as a means of addressing declining groundwater levels.
- **Groundwater level measurements.** Knowing the depth to groundwater in a domestic well or in the vicinity of the well can be compared to the depth of the well screens, the total well depth, and to the depth that the pump is set. A comparison of these pieces of information will give a domestic well owner a sense of whether groundwater levels are approaching levels that may require setting the pump deeper or whether a more substantial cost to deepen or replace the well may lie ahead. Routine measurements (approximately every three months) of groundwater levels can give an indication of how much the groundwater conditions are changing and how quickly a problem might be approaching. Seasonal fluctuations usually occur. Groundwater levels will typically be shallower in the spring after winter and spring groundwater recharge. They will usually be deepest in the summer when water demand is highest, especially if measured while a pump is operating. Groundwater levels usually begin to recover in the Fall and winter. The extent of recovery depends on the amount of rainfall and snowpack received.

How do I acquire well construction, groundwater level, and pump setting information?

- A confidential well completion report for an existing well can be acquired by contacting the Department of Water Resources Northern Region at (530)-529-7300 or access the request form at: **http://www.water.ca.gov/pubs/groundwater/well_completion_report_request-owner/wcr_request_owner_20110518.pdf.** A well completion report lists the location of the well, when it was drilled, and the texture and structure of the soil formations that were observed while dr. The soil descriptions help identify the soil layers that will yield more water and where to locate the well screens. It also lists the well construction, such as how deep the casing is, where the perforated interval is to intercept groundwater, if the well is open hole at the bottom, what the wellhead protection is, etc. It will also indicate the depth to groundwater at the time the well was constructed so it is possible to tell how much the groundwater conditions may have changed since its construction, and it may give the maximum flow rate pumped from the well soon after it was constructed.
- Information about groundwater levels at or near your domestic well will help answer questions about how deep a well should be to provide water reliably and how deep to position the pump inside the well so it will lift water reliably for many years ahead. To access groundwater level information for your area refer to the California Statewide Groundwater Elevation Monitoring (CASGEM) program at: http://www.water.ca.gov/groundwater/casgem/online_system.cfm or the California Water Data Library at **http://www.water.ca.gov/waterdatalibrary/index.cfm.** Alternatively, it is possible to learn how to measure groundwater levels in your own domestic well. This will be a topic of another group of frequently asked questions.
- A well owner will have to rely upon their own recordkeeping to know the depth that a pump is set in a well. It is usually provided at the time a pump has been installed or repaired. If no record of the depth that the pump is set in the well exists, it will require pulling the pump and resetting the depth to acquire this information.

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