WELLness

A GUIDE TO YOUR WATER WELL

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INTRODUCTION

There are over 40,000 water wells in Sonoma County, the second most of any County in California. These wells pump groundwater from underground reservoirs called aquifers that serve many community needs, such as drinking, landscape irrigation, agriculture, and manufacturing.

Poorly constructed or improperly maintained wells can provide conduits for harmful contaminants to enter the groundwater, reducing its quality and posing a threat to the environment and users of water. Because of the importance of having a safe supply of groundwater for drinking and other purposes, it is in everyone's interest to learn as much as possible about taking care of our wells and the groundwater they provide us.

The Sonoma County Division of Environmental Health Services originally developed this booklet in 2002 to serve as a resource to owners and operators of water wells in Sonoma County. This booklet was updated in 2010 with input from the County of Sonoma Permit and Resource Management Department, Sonoma County Water Agency, and the Technical Advisory Committee for the Sonoma Valley Groundwater Management Program. These materials are intended to provide basic knowledge that will help you understand your groundwater resources, your well, how to measure and track your well's water-level, how to prevent contamination of your well and what to do if you find that your well water is contaminated. We hope you find this information valuable.

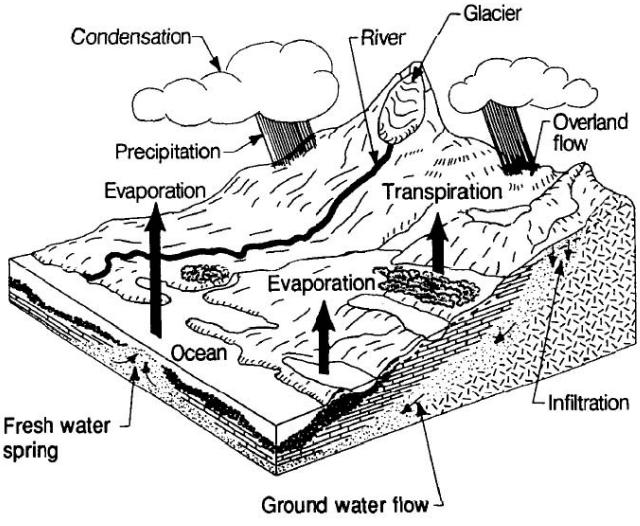
Please keep in mind that this material is in no way intended to be a substitute for professional consultation or advice. It serves as an educational tool to increase your knowledge and awareness of groundwater and to provide additional sources of information.

If you have any questions, comments or suggestions on how we can continue to improve these materials, please contact the Sonoma County Department of Health Services at:

475 Aviation Blvd., Suite 220
Santa Rosa, CA 95403
(707) 565-6565
www.sonoma-county.org/health/eh

WHERE DOES GROUNDWATER COME FROM?

The hydrologic cycle is a complex process that moves water from the earth's surface, into the atmosphere and back to earth again as rain or snow.



Over millennia the water falling as rain or snow, moving through rivers and streams, seeps underground to become groundwater. Groundwater is stored in underground reservoirs called aquifers. The word aquifer comes from the Latin words, "Aqua" (water), and "fer" (to carry).

While water can be stored and pumped out of aquifers when needed (similar to surface water reservoirs), an aquifer is much more complex than a surface water reservoir because it is a 3-dimensional structure made of diverse rock and sediment types, and the groundwater surface and flow patterns over time are not directly visible. Additionally, unlike a surface water reservoir which can be filled and emptied relatively quickly, groundwater reservoirs take longer to extract water from and much longer to fill. A myth held by many is that groundwater exists as fast-moving underground 'rivers'. While underground rivers do occur in some regions of the world, literally as limestone caves or lava tubes, there are no such rivers of water known to exist in the Coast Ranges of California or Sonoma County. Instead, groundwater flows very slowly through the pore spaces of the aquifer (much like a sponge). The velocity that groundwater flows through a given aquifer depends on the size of the pores in the soil or rock, the connections between these spaces, and the difference in groundwater elevation (hydraulic head or pressure gradient), but is typically measured in terms of feet per year.

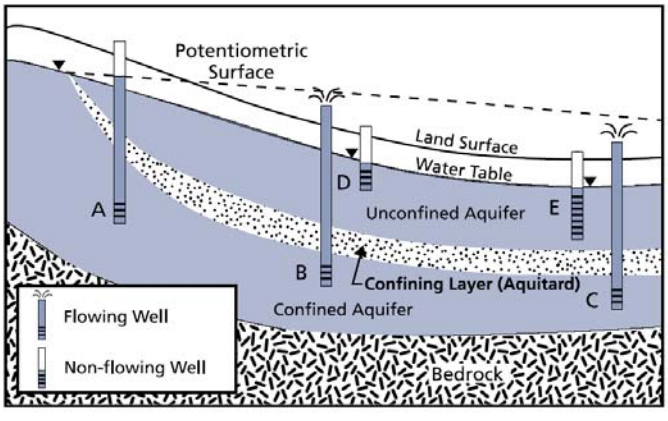
Groundwater comes to the surface of the earth in different ways. It surfaces naturally out of springs, discharges into lakes and streams, or is pumped out of the ground through water wells. Over 50% of drinking water used in the United States comes from water wells. To ensure that future generations have access to this extremely valuable resource, we need to increase our understanding of our local groundwater, water wells and how to maintain our wells.

Types of Aquifers of Sonoma County

Sedimentary aquifers consist of gravel, sand, silt and clay (sediments), with spaces between the grains of sediments forming pores through which the groundwater collects and moves. Sedimentary aquifers may have moderate to good well yields (on the order of tens to hundreds of gallons per minute or more), with higher yields occurring in sand- and gravel-rich aquifers (larger pore spaces) and lower yields occurring in silt- and clay-rich aquifers (smaller pore spaces). Examples of sedimentary aquifers in Sonoma County occur in the Santa Rosa Valley Groundwater Basin, Sonoma Valley Groundwater Basin, Alexander Valley, Russian River Valley, and Wilson Grove Formation Highlands.

Volcanic aquifers are highly variable with groundwater typically collecting and moving through fractures, weathered bedding surfaces, and porous tuff (volcanic ash) deposits. Volcanic aquifers have poor to moderate yields (typically ranging from less than ten to 50 gallons per minute). Areas of volcanic aquifers in Sonoma County occur in Sonoma Valley, the Sonoma Mountain area and northeast of Santa Rosa.

In bedrock, such as granitic and metamorphic rocks, there is no pore space when the rock is formed. Porosity in granitic and metamorphic rocks comes only when the rock is fractured or sheared. The well yield of fractured bedrock aquifers can be highly variable, but is generally much lower (on the order of several gallons per minute). While fractured bedrock does not form principal aquifers in Sonoma County, in areas where other aquifers are absent such as a large portion of northwestern Sonoma County, fractured bedrock may provide enough water for individual domestic supplies (commonly in the range of one to five gallons per minute).



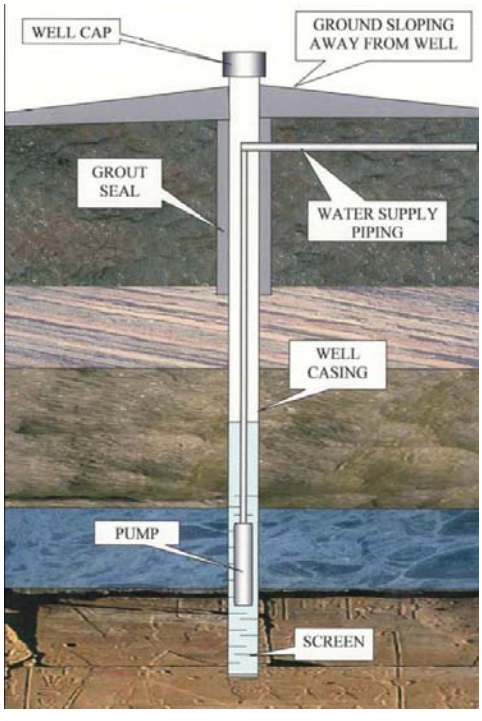
Aquifers can be either unconfined or confined, depending upon the geologic formations and underground water pressure. Unconfined aquifers are covered by permeable geologic formations, and typically receive recharge directly from the infiltration of rainfall and surface water. The water level in a well constructed within an unconfined aquifer will be at the same elevation as the water table. Confined aquifers are covered ("confined") by low permeability geologic materials such as clay (an aquitard), and are not directly recharged by surface infiltration. The groundwater in a confined aquifer is under pressure, and a well penetrating the confined aquifer will rise to a level equal to the aquifer pressure (termed the potentiometric surface, which is typically some point above the confining layer). When the groundwater from a confined aquifer flows under aquifer pressure to the ground surface, it is known as a "flowing artesian well."

Want more information?

California Department of Water Resources Website at:
www.water.ca.gov/groundwater/

WHAT IS A WELL ? HOW ARE THEY BUILT ?

Simply stated, a well is a specially engineered borehole drilled into the earth to obtain water. Plastic or metal well casing is cemented in place in the borehole and a pump is installed to pump the water out. Wells need to be constructed by a C-57 licensed well driller.



The driller notes the type and depth of material that the borehole passes through during drilling. This information is recorded on a well driller's log that is provided to the homeowner and submitted to the Well & Septic Division of the Sonoma County Permit and Resources Management Department (Sonoma County's permitting agency for water wells) and to the California Department of Water Resources. By State statute, a well log is considered a confidential document that can only be released for public review with the well owner's written permission.

After the borehole has been drilled, steel or plastic pipe called well casing is installed. The well casing houses the pumping equipment and prevents the wall of the well from collapsing. Where water is located in unconsolidated sedimentary aquifers, the casing has thin perforations and is called the well screen. To keep fine sediment from entering the well screen, the well driller also installs a sand or gravel filter pack between the well screen and the borehole wall. In fractured bedrock aquifers, a well screen and filter pack may not be necessary and is not always installed.

To prevent poor quality water at the ground surface from getting to the groundwater, the driller installs a cement or bentonite clay sealing material (grout seal) to form an annular seal between the blank casing and the borehole. The annular seal is extended up to the surface from a depth of at least 20 feet. After the pump is installed, an outward sloping concrete pad can be formed on the ground surface. This concrete pad prevents physical objects, and polluted surface water from entering the well. The well casing typically extends at least one foot above the ground and is sealed with a bolted-down well cap. This is called the wellhead. It is also important to include a small diameter (i.e., one-inch) sounding tube inside the well casing to facilitate unobstructed collection of groundwater levels.

Shortly after the well is installed, the well is developed, which involves removing drilling fluids, any sediments from drilling, and enough water from the well so that the groundwater runs clear and free of fine sediment. While the well is being developed, the quantity of water pumped and the groundwater level are usually measured. This is called a Yield Test and provides information on what the expected yield of the well may be.

Before hooking up the water supply to the customer's plumbing system, the well is disinfected and remains capped to provide sanitary protection.

RULES FOR CONSTRUCTING WELLS IN SONOMA COUNTY

Because improperly constructed wells, including hand-dug wells and some older wells, may allow contaminants to enter the well and our local groundwater aquifers, laws are in place to govern the construction, modification, destruction or abandonment of wells in Sonoma County**.**

Permits for new wells, modifications of existing wells, or destruction of existing wells must be obtained from the Sonoma County Permit and Resources Management Division's (PRMD) Well & Septic Office at (707) 565-1900. www.sonoma-county.org/prmd/faq/well-septic.htm

A C-57 licensed contractor must perform work on wells in California. Be sure to check with any potential contractor to make sure they have this license. You can also check with California Consumer Affairs online: www2.cslb.ca.gov/OnlineServices/CheckLicense/LicenseRequest.asp

Want to learn more about the laws and regulations for water wells?

Read the Sonoma County Code, Chapter 25B (copies available at PRMD) for an in-depth description of local rules and regulations:

http://library.municode.com/HTML/16331/level1/C25B.html

Read California Standards for Wells available for download at the Department of Water Resources website:
www.water.ca.gov/groundwater/well_info_and_other/well_standards.cfm

WHAT ARE THE NATURAL CAUSES OF WELL WATER CONTAMINATION?

Water wells can be contaminated by numerous natural substances. Hazardous substances may exist naturally in rocks and soils. Below are a few of the more common natural causes of well water contamination.

Nitrates and Nitrites - found naturally in air and soil, nitrogen compounds provide an essential nutrient for plant and animal growth. Nitrates and nitrites may be created by natural sources in the environment including the breakdown of plants and animal wastes, although the higher levels of nitrate contamination of groundwater has generally been found to be anthropogenic (human caused) in origin, as described in the following section.

Fluoride - high levels of naturally occurring fluoride can be present in groundwater.

Radionuclides - radionuclides are radioactive elements such as uranium and radium. These elements are often present in underlying rock. Radon, a gas by-product of the breakdown of uranium, can be transported via the household water supply and contribute to increased radon levels in the home.

Metals - underground aquifer materials may contain metals such as arsenic, boron, cadmium, chromium, lead and selenium. These naturally occurring elements may dissolve into groundwater and are only problematic when detected above certain concentrations (see page 16 for a summary of some of these concentration thresholds).

Microorganisms - bacteria, viruses and parasites are commonly found in shallow unconfined groundwater aquifers.

Animals - small animals and insects seek water and shelter in improperly sealed or constructed wells. If wells are not properly constructed and maintained, their waste materials can contaminate groundwater.

Dust and Other Organic Debris - if wells are not properly constructed and maintained dust and organic matter such as leaves, grass and twigs that carry bacteria can find their way into wells and contaminate groundwater, .

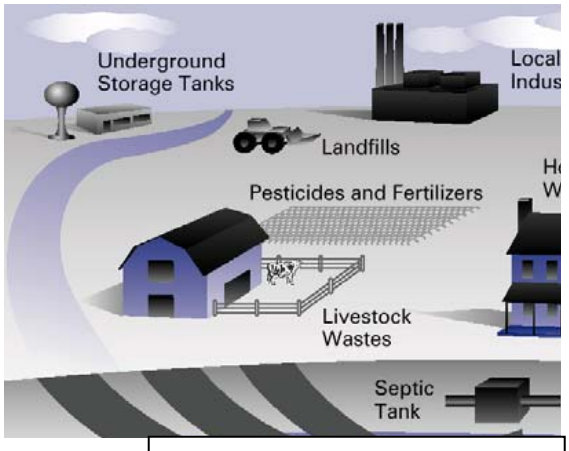
Want to learn more about groundwater and how it can be contaminated?

Hazardous Substances Research Center at Michigan State University:
www.envirotools.org/factsheets/groundwater.shtml

American Ground Water Trust:
www.agwt.org

WHAT ARE THE HUMAN CAUSES OF WELL WATER CONTAMINATION?[2]

The picture to the right shows several general categories of human activities that can potentially contaminate groundwater. Some of the more common contaminants and sources of contamination are discussed below.



Graphic from EPA's "Drinking Water From Household Wells"

Nitrates and Nitrites – They occur from human sewage disposal systems, confined animal feeding operations, and application of chemical fertilizers for agriculture. The amount of nitrate in groundwater is typically related to the land use activities in the upstream portion of the watershed or land overlying the aquifer.

Microorganisms - Contamination from bacteria, parasites or viruses is frequently caused by faulty sewage disposal systems or faulty well construction. A properly constructed, adequately cased and sealed water well usually obtains water at sufficient depth at which bacteria are no longer present. Bacteria are usually filtered out or die off as water slowly infiltrates and moves underground; however, bacteria can impact very shallow groundwater within highly permeable aquifers.

Metals - Mining, construction or industrial practices and can release metals into groundwater.

Fertilizers, Herbicides and Pesticides - Hundreds of different chemical products have important uses in agriculture and landscaping. Application to agricultural or urban land can release chemicals from these products into groundwater.

Industrial Products and Wastes - Many chemicals are widely used in local businesses and industry. Solvent plumes containing Perchloroethylene (PCE), Trichloroethylene (TCE) and Carbon Tetrachloride from industrial and commercial sites have been discovered in Sonoma County. Additionally, gasoline and its constituents methyl tertiary butyl ether (MTBE), benzene, toluene, ethylbenzene and xylene (BTEX) are common contaminants found in Sonoma County groundwater, generally originating from sites with leaking underground fuel storage tanks.

Household Wastes, Personal Care Products and Pharmaceuticals - Cleaning solvents, paint thinners, soaps, detergents, personal care products such as make up and prescription drugs can pose a threat to groundwater. These materials can reach the groundwater through improper disposal into sewage disposal systems or if disposed directly to the ground.

Lead and Copper – Household plumbing materials are one the most common source of contamination in drinking water.

Water Treatment Chemicals – improperly handling common water treatment chemicals, such as corrosion inhibitors or disinfectants, for example chlorine, can cause contamination in drinking water.

HOW DO I TAKE CARE OF MY WELL

Maintaining your well is essential to ensuring a safe and reliable supply of water. Here are some useful tips:

Maintaining Complete Well Records

Keeping complete records of your well's construction and maintenance history is a key part of maintaining your well and preventing contamination. Below are a few standard types of records that you can keep to ensure the best possible health and performance of your well.

Drillers Log - This document describes the well location, construction of the well, the borehole geology, and the depth that water is drawn from (the perforated or screened interval). The well drillers log may also contain important information on the well yield. It is a very important document for a landowner to keep safe and to use for troubleshooting problems. Licensed contractors are required by law to provide the well owner and the State of California Department of Water Resources a copy of this log after construction. In California well drillers logs are considered confidential and may only be released to the public with permission from the well owner.

Well Pumping Test Data for Well Performance - Periodically conduct a pumping test of your well to measure the amount of water it produces. It is important information to assess well performance periodically, as the well casing and filter pack can plug as the well ages, resulting in decreased ability for the well to produce water. This can also occur if the aquifer system groundwater level declines, as there is a shorter water column in the well to produce from. The well is pumped at a known, constant discharge rate, typically the highest rate possible, and the water level in the well is measured during the pumping every few minutes. Contact a C-57 licensed drilling contractor or groundwater professional for assistance.

Distribution Map - It is important to have an accurate map of the locations of the well and water-related infrastructure on the property. If you share a well with neighbors or if you purchase or sell a property, this information is useful to prevent unneeded exploration or harm to infrastructure. Being able to promptly locate the infrastructure is also important in case emergency repairs are necessary.

Water Level Data - Measurement of the level of groundwater in the well should be collected at least twice a year, spring and fall. The water level in the well is typically measured by a specially designed piece of equipment consisting of a long measuring tape with electrical wiring inside or a graduated electrical cord wound onto a reel, with an electronic probe at the end. The probe is lowered through the small access hole on the well head until the probe beeps, indicating the probe has reached water in the well, and the distance from the well head to the probe is observed on the probe tape and recorded. The water level should not be measured while the well is pumping, and ideally should be collected after the well has remained idle overnight. This information is very important to understand any short- and long-term trends in the aquifer and sustainability of your water supply. Water level information is also important to insure proper pump location, well operation, and signs of well deterioration. Information on a voluntary groundwater-level measurement program in Sonoma Valley is available at www.sonomacountywater.org/svgroundwater.

Water Quality Data - Keep records of all water quality testing data. This will allow you to compare data over time to identify potential problems with water quality. Having your water periodically tested to monitor water quality is encouraged. In addition, all drinking water wells

should be tested for bacteria annually or after any maintenance or replacement work that involves well equipment.

Maintenance Records - Keep all receipts and records of data collected, and maintenance work performed on the well.

Conducting a Wellhead Inspection

It is important that you conduct a visual inspection of your well at least twice a year. Here are some tips to help you with the inspection:

- Make sure the well cap is in place and tight fitting.
- Look for openings through which contaminants can enter the well. Plug or seal openings immediately.
- Look for cracks in the concrete pad through which surface water may enter. Seal cracks or pour a new concrete pad.
- Look for water flowing out of the top of the well. Contact a C-57 licensed contractor to make repairs.
- Remove weeds, leaves and other material from around your well.
- Keep all household chemicals (e.g., gasoline, cleaning products, pool chemicals) away from the wellhead and clean up any spills promptly.

Wells not in use for a period of one year are considered abandoned by the State of California. Abandoned wells, by law, are required to be destroyed. See "Destroying Unused Wells" on the following page for procedures.

If you have an inactive standby well and are not required to destroy it, turn on the pump a few times per year to ensure proper function.

Monitor Deteriorating Well Performance

Well performance can decline over time as equipment ages and groundwater levels fluctuate. Common contributors to a decline in well performance include:

- Change in groundwater levels.
- Mineral encrustation or bacterial encrustation of the well screen.
- Corrosion of well casing.
- Physical plugging of well screen, filter pack and surrounding soils by silt and other fine particles.

- Allowing the groundwater level to lower to within the screened interval of the well during pumping.

- Overpumping the well such that the groundwater level falls below the pump or pump suction.

- Pump malfunction or improper pump sizing.

Many of these problems can be prevented or minimized by proper well design and construction, pump sizing, monitoring and maintenance. If not allowed to progress too far, most well performance issues can be corrected. To prevent or correct performance problems work with a C-57 licensed water well and/or pump contractor.

Destroying Unused Wells

Wells not in use for a period of one year are considered abandoned by the State of California. To eliminate the potential of an abandoned well acting as a vertical pathway for contamination, the well needs to be destroyed by removing or perforating the well casing and filling the entire well casing with cement- or bentonite-based sealing materials. A C-57 licensed contractor must perform well destruction work under permit from the County of Sonoma Permit and Resource Management Department.

Protect Your Well Structure

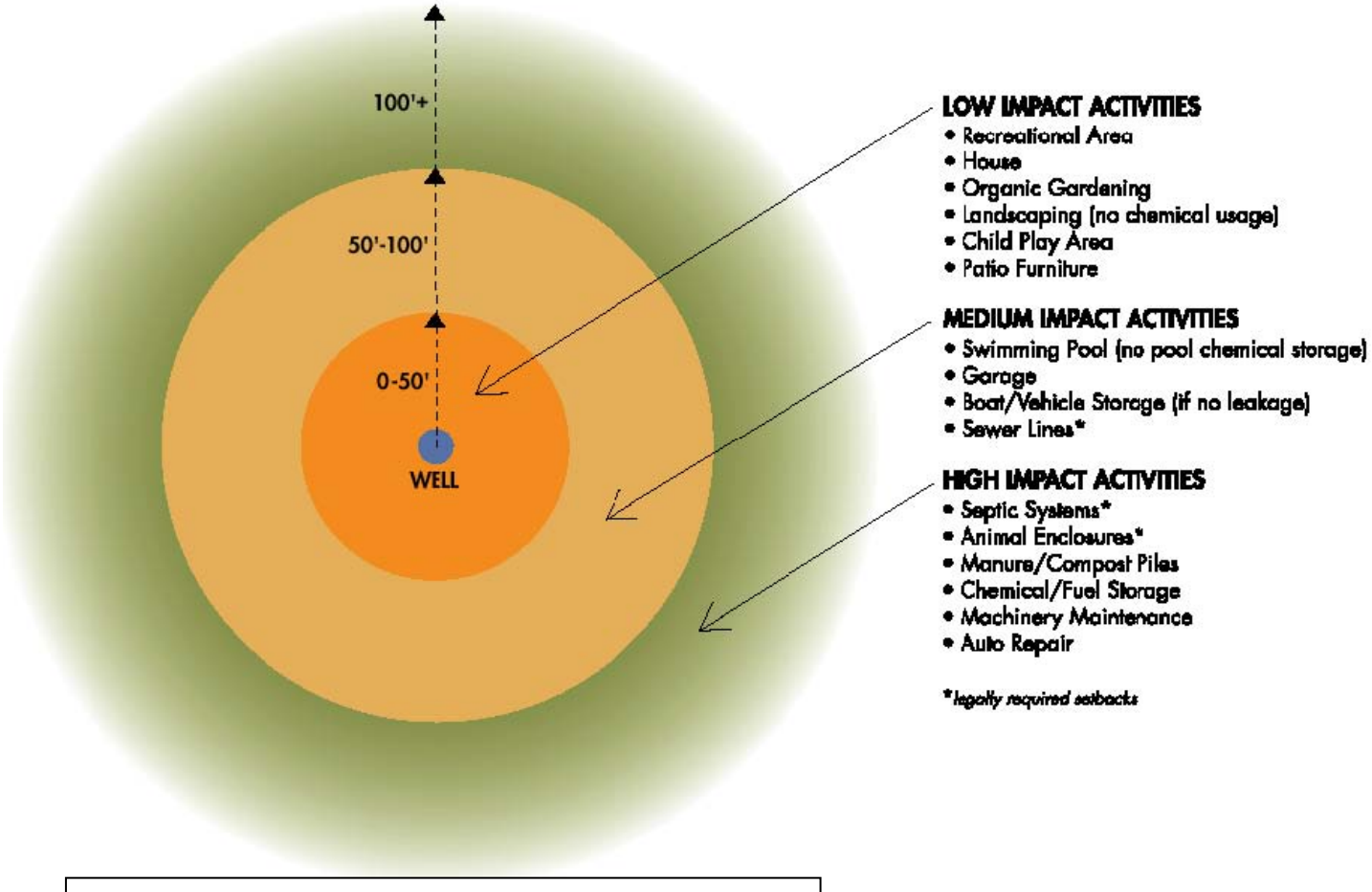
Protect your well from costly physical damage by building a small structure or fence around the well, designed to ensure continued ease of access for periodic well inspection and maintenance activities. Put a lock on the well enclosure to minimize the potential for vandalism.

Hand Dug Wells

Hand dug wells are risky, highly subject to contamination, and present a safety hazard. Hand dug wells should be replaced by a new well constructed with a minimum 20-foot annular seal. Similar to an abandoned well, hand dug wells must be destroyed under permit from the County of Sonoma Permit and Resource Management Department.

Maintaining Well Setback Distances[3]

It is important to carefully manage your activities around the well and water supply infrastructure. The following diagram is meant to serve as a guide for your decisions and activities around the well.



From Santa Clara Valley Water District's "A Guide for the Private Well Owner"

To learn more about wells:

Visit www.wellowner.org, sponsored by the National Ground Water Association.

Reducing the Use of Hazardous Materials around the Well[4]

To further prevent groundwater contamination, consider reducing the amount of hazardous substances used around the home or well. Here are some tips suggested by the Sonoma County Waste Management Agency:

- **Restrict the use of household products marked Poison or Danger** By law, hazardous products must have warning labels. These products can cause groundwater contamination if not properly handled.
- **Reduce the Need for Garden and Yard Pesticides** Many pesticides are poisons that can seep through the soil to groundwater aquifers.
- **Use Less Toxic Cleaners** Some cleaners contain very hazardous ingredients that can burn your eyes, skin and lungs. Look for safer name-brand substitutes at your grocery store, or use simple alternatives such as baking soda and vinegar.
- **Do Not Store Toxic Chemicals in Your Well House**

Want to learn more about recycling and reducing your use of hazardous substances around the home?

Visit the Sonoma County Waste Management Agency's website: www.recyclenow.org or call their Eco-Desk Hotline at (707)-565-DESK (3375) email address?

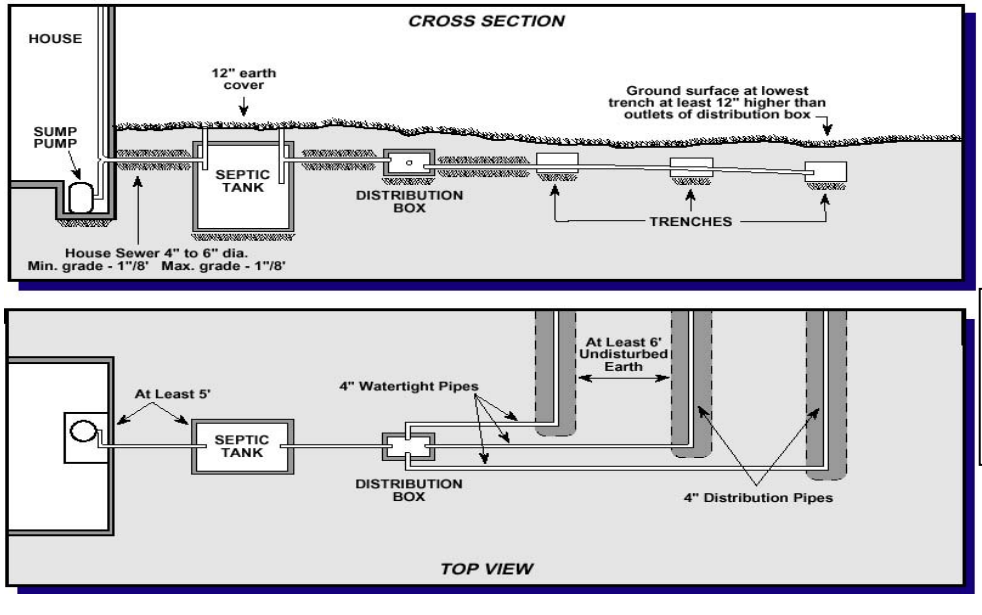
Maintaining your Septic System

Your home's septic system is an on-site sewage disposal and treatment system for your home's wastewater. Sewage disposal systems that are properly designed, constructed and maintained are very effective and pose little risk of contaminating groundwater. If improperly designed, constructed or maintained, they can, however, pose a risk for contaminating groundwater with harmful nitrates, bacteria and viruses.

If you have a sewage disposal system, understand that whatever goes down the drain may find its way into groundwater. A 100 ft. setback between the septic tank and the well provides relatively good protection against viruses and bacteria. However there is no setback for solvents, photography chemicals, paint, automotive wastes, or hazardous art supplies that may not break down or filter easily. Here are a few tips to ensure the proper function of your sewage disposal system:

- Inspect and have your septic tank pumped every three to five years by a licensed and experienced professional.
- Do not dispose of foreign objects in the system.
- Do not put toxic chemicals or pharmaceutical products down drains.
- Avoid disposing of cooking greases and solids into the system, as these may lead to system clogs.
- Do not park vehicles over leach/drain field.

If you observe a green or soggy area around the leach field or sewage disposal tank call an inspector from Sonoma County Permit and Resource Management Department (PRMD).



Graphic courtesy of State of California Department of Water Resources.

Want more information on sewage disposal systems?

Contact the Well and Septic Office of the Sonoma County PRMD at (707) 565-1900
or visit the National Small Flows Clearinghouse Website:
www.nesc.wvu.edu/wastewater.cfm

HOW DO I KNOW IF MY WELL IS CONTAMINATED?

Many substances that contaminate water can be noticed without chemical testing. Below are some of the most easily observed water conditions. Recognizing these conditions can help prevent more serious problems and provide direction regarding what types of laboratory analysis may be needed.

Visible

- Scale, scum or encrustation may be caused by calcium or magnesium salts in water.
- Unclear/turbid water may be caused by dirt, clay salts, silt or rust in water.
- Green stains on sinks or faucets may be caused by high acidity.
- Brown or black stains may be due to high levels of manganese (Mn) and/or iron (Fe).
- Blue water or blue deposits on fixtures may be due to high levels of copper (Cu), especially if coupled with corrosive water.
- Orange-red water or stains on sinks, dishwasher or clothes in wash may be due to dissolved iron in water.
- Cloudy, colored or frothy water may be due to suspended particulates, poorly working pump or filters, sewage waste or detergents.
- Plumbing system with older lead pipes, fittings or solder joints may cause lead (Pb), cadmium (Cd) and/or zinc to leach from lead pipes, fittings or solder joints.
- Corroding water heaters or metal pipes may be due to corrosive water.

Taste

- Salty or brackish taste may be due to high sodium content in water.
- Alkali/soapy taste may be due to dissolved alkaline minerals in water.
- Metallic taste may be due to acidity or high iron content in water.
- Chemical taste may be due to volatile or semivolatile organic compounds (VOCs) or pesticides.

Smell

- A rotten egg odor may be caused by dissolved hydrogen sulfide gas or certain bacteria in water. Turpentine odor in water may be due to the gasoline additive methyl tertiary butyl ether (MTBE).
- A detergent odor and water that foams when drawn could be seepage from sewage disposal tanks into your groundwater well.
- A musty/earthy smell or rotting flesh smell may be caused by decaying organic matter in water.

HOW DO I TEST MY WELL FOR WATER QUALITY?

Although your water may taste and smell fine, the only way to know for sure that your water is safe is by testing it. Harmful bacteria or chemicals that you cannot see, smell or taste could be present. There are many tests that can be performed on your well water to determine its water quality. This is a list of the most commonly performed tests and their recommended testing frequencies. Because bacteria and nitrate are the most common contaminants of well water, they should be tested most frequently. The minerals test is recommended for the purposes of developing a baseline understanding of your water and as a way to indicate water quality changes.

Bacteria - Test at least twice a year. If the lab report shows the presence of total coliform bacteria, look for the cause, eliminate it if possible, and continue to test the water at an increased frequency. You may consider installing a treatment system such as reverse osmosis, chemical disinfection or ultraviolet radiation. Consult a water treatment professional for more advice. (Total Coliform and Fecal Coliform), EPA Colilert Method

Nitrates – Test every five years) If the results are greater than or equal to 45 mg/l (as nitrate) or 10mg/l (as nitrogen), install a treatment device or find an alternative water supply. Increase the testing frequency. Filtration using reverse osmosis will remove some of the nitrate. Consult a water treatment professional for more advice. EPA Method 200 series

Minerals and Metals - Test mineral levels in your water every five years OR if taste, color, or odor, change or if commercial/industrial development increases in the area. Most water testing companies offer a group minerals test for all of these. Be sure to compare the current results with previous results. EPA Method 200 series

State of California Maximum Contaminant Levels for Drinking Water

Aluminum(Al) 1.0 mg/l	Arsenic (As) 0.01 mg/l
Barium (Ba) 1.0 mg/l	Cadmium (Cd), 0.005 mg/l
Chromium (Cr) 0.05 mg/l	Fluoride(F), 2.0 mg/l
Iron (Fe), 0.3 mg/l	Lead (Pb), .015 mg/l
Manganese (Mn), 0.05 mg/l	Mercury (Hg), 0.002 mg/l
Selenium (Se), 0.05 mg/l	Silver (Ag) 0.1 mg/l

If mineral levels are greater than or equal to the levels above, you should install a treatment system or determine an alternative supply of water. An appropriate treatment system is dependent on the minerals you are interested in removing. Consult a water treatment professional for more advice.

Petroleum Hydrocarbons - Test every three to five years. There is no drinking water standard for petroleum hydrocarbons. However, if petroleum hydrocarbons are suspected or detected at all, then the well also should be tested for benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl tertiary butyl ether (MTBE) which do have standards. If petroleum hydrocarbons, BTEX or MTBE are detected then the County of Sonoma Environmental Health Division should be contacted at (707) 565-6565 for advice. Petroleum hydrocarbons by EPA Method 8015 and BTEX/MTBE by EPA Method 8260.

Solvents - Test every three to five years. Each solvent (e.g., perchloroethylene, trichloroethylene, carbon tetrachloride) has a specific drinking water standard. If solvents are detected then the County of Sonoma Environmental Health Division should be contacted at (707) 565-6565 for advice. Volatile Organic Compounds (solvents) by EPA Method 8260.

Pesticides or Herbicides – Test every three to five years. Each pesticide has a specific drinking water standard. If pesticides are detected then the County of Sonoma Environmental Health Division should be contacted at (707) 565-6565 for advice. Organichlorine Pesticides by EPA Method 8080. Herbicides by EPA Method 8150.

Laboratories Certified by the State of California Department of Health Services for Bacterial and/or Chemical Analysis

www.sonoma-county.org/health/eh/pdf/lab_list.pdf

Alpha Analytical Laboratories
208 Mason St
Ukiah, CA 95482
(707) 468-0401

Analytical Sciences
110 Liberty St.
Petaluma, CA 94952
(707) 769-3128

Brelje & Race Laboratories, Inc.
425 South E St.
Santa Rosa, CA 95404
(707) 544-8807

CalTest Analytical
1885 North Kelly Rd.
Napa, CA 94558
(707) 258-4000

Sonoma County Public Health Laboratory
(bacteriological water testing only)
3313 Chanate Road
Santa Rosa CA 95404
(707) 565-4711

For information on laboratories certified by the California Department of Health Services: www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls

HOW DO I TREAT MY WELL FOR BACTERIAL CONTAMINATION?

What If My Total Coliform Test Results Are Positive?

Step 1. First, try to determine where the contamination came from. The table below lists some possible problems and some recommended corrective actions. Some problems you may be able to fix yourself, while others, marked by an asterisk (*), legally require the assistance of a C-57 licensed well contractor.

Problem	Potential Solution
The well is newly constructed, or maintenance or repair was recently done. The pump was primed with impure water.	Go to **Step 2** below.
There is standing water around the well or water draining toward the well.	Re-grade around the well so the ground slopes away from your well.
The concrete well pad is cracked or separated from the well casing.	Re-pour pad or fix and seal all cracks and gaps.
The well is not completely sealed against surface water, insects, or other foreign matter.	Replace any missing plugs, cap any open pipes, and seal any openings, gaps or cracks. *Contact a licensed well contractor to replace or install a new wellhead gasket.
The storage tank is dirty or unprotected.	Contact a water system contractor to clean and seal.
There are cross-connections in the plumbing system.	Make sure that your plumbing is not connected to another source of water that may be contaminated (e.g. a defunct community water system).
There is not adequate back-flow protection.	Install a back-flow prevention device on every outdoor faucet (available at most hardware and plumbing supply stores). *Contact a licensed well contractor to ensure that there is proper back-flow protection within the well.
There are dead-end or unused water lines connected to the plumbing system.	Flush lines regularly or remove any unused lines or sections of the water system.
The well casing is corroded. There is sediment at the bottom of the well.	*Contact a licensed well contractor to assess and repair.
The well casing is perforated too high or the sanitary seal is not adequate.	*Contact a licensed well contractor to drill a new well and to properly destroy the old well.

Note: Information and Table from Santa Clara County Water District's "A Guide for the Private Well Owner".

Step 2. Once you have located and eliminated the source of the bacteria, disinfect the system. For instructions on how to properly disinfect your well and distribution system, visit the County of Sonoma Environmental Health at www.sonoma-county.org/health/eh/pdf/well_disinfection.pdf or call a licensed water system contractor.

Step 3. IMPORTANT: before drinking the water, test a new sample for total coliform bacteria. If the results are still positive, start at step one again.

Want More Information? Visit the website of the American Ground Water Trust for an online workbook on bacteria in the well: www.agwt.org/bacteria.htm

HOW DO I TREAT MY WELL FOR NON-BACTERIAL CONTAMINATION?

This guide presents treatment options available for non-bacterial contaminants. Not all water treatment systems work for every contaminant or water type. Once installed most systems require routine maintenance to continue performing properly. It is strongly recommended that you talk with a water treatment professional about your specific situation to assure that the system you are considering will work for your needs. To ensure that any treatment device considered is certified as to its effectiveness by the State of California, contact the Sonoma County Department of Health Services, Division of Environmental Health at (707) 565-6565 or visit www.cdph.ca.gov/certlic/device/Pages/watertreatmentdevices.aspx for a list of certified treatment devices.

The following Table is provided to identify some water treatment techniques for common water quality problems. Well owners are encouraged to contact the Sonoma County Department of Health Services, Division of Environmental Health at (707) 565-6565 or the Well and Septic Office of the Sonoma County PRMD at (707) 565-1900 to determine current regulations and requirements pertaining to treatment for water wells.

Contaminant	Activated Alumina Filters	Activated Carbon Filters	Granular Ferric Hydroxide Adsorption	Mechanical Filtration	Oxidizing Filters	Ozonation	Reverse Osmosis
Arsenic	X		X				X
Asbestos		X					X
Benzene		X					X
Chlorine		X					
Color		X			X	X	
Flouride	X						X
Hardness							
Hydrogen Sulfide		X			X		
Inorganics, minerals (some)							X
Iron/Manganese-dissolved					X		
Iron/Manganese- insoluble				X	X		
Lead							X
Mercury		X					X
MTBE		X					
Nitrate							X
Odor and taste		X			X	X	X
Pesticides (some)		X				X	X
Salt							X
Sand, silt, clay (turbidity)				X			
Uranium	X						
Volatile organic compounds		X					X

LOCAL GOVERNMENT

Sonoma County Permit and Resource Management Division

Well and Septic Office
2550 Ventura Ave.
Santa Rosa,CA 95403
(707) 565-1900 http://www.sonoma-county.org/prmd/

Contact regarding:

- Well construction, repairs, abandonment and destruction permitting.
- On-site sewage disposal systems (Septic Systems).

Sonoma County Department of Health Services Division of Environmental Health

3273 Airway Drive, Suite D
Santa Rosa, CA 95403-2097
(707) 565-6565 http://www.sonoma-county.org/health/eh

Contact regarding:

- Water systems between 5 and 15 connections.
- Drinking water standards and health risks.
- State certified testing laboratories.
- Well and drinking water system disinfection.

Sonoma County Water Agency

Sonoma Valley Ground Water Management Program
www.scwa.ca.gov/projects/svgroundwater/
Contact Marcus Trotta, SCWA (707) 547-1978

Contact regarding:

- Regional groundwater studies and groundwater management in Sonoma County.

Household Hazardous Waste Disposal

Sonoma County Waste Management Agency
Eco-Desk Hotline at (707) 565-DESK (3375)
www.recyclenow.org

Contact regarding:

- Identification, disposal and recycling of hazardous materials
- Drop-Off Locations

STATE AND REGIONAL GOVERNMENT

California Department of Public Health (CADPH)

The Division of Drinking Water and Environmental Management (DDWEM) is responsible for the regulation and monitoring of public water systems serving 15 or more homes.
(916) 323-6111 www.cdph.ca.gov/programs/Pages/DDWEM.aspx

California Department of Water Resources (DWR)

The Department of Water Resources provides information on groundwater management issues throughout California. The web page has a list of useful publications on groundwater.
(916) 227-7590 www.water.ca.gov/

Department of Toxic Substances Control (DTSC)

The Department of Toxic Substances Control can help answer questions about what is a hazardous waste, how to reduce household hazardous waste, where to report spills and illegal dumping, as well as provide information on specific hazardous waste disposal or handling facilities. They also provide information regarding specific chemicals and health effects.
(916) 324-1788 www.dtsc.ca.gov

Regional Water Quality Control Board- North Coast Region (NCRWQCB)

The North Coast Regional Water Quality Control Board 5550 Skylane Boulevard, Suite A, Santa Rosa, California 95403
(707) 576-2220 www.swrcb.ca.gov/rwqcb1/index.html

Regional Water Quality Control Board- San Francisco Bay Region (SFRWQCB)

San Francisco Bay Regional Water Quality Control Board 1515 Clay Street, Ste 1400 Oakland, California 94612
(510) 622-2300 www.swrcb.ca.gov/rwqcb2/index.html

FEDERAL GOVERNMENT

USEPA Safe Drinking Water Hotline

The U. S. Environmental Protection Agency's Safe Drinking Water Hotline is available to help the public, and state and local officials understand the regulations and programs developed in response to the Safe Drinking Water Act. The hotline and web page also provide information on testing and protecting private well water and where to find more information.
(800) 426-4791 http://www.epa.gov/privatewells/index2.html

Food and Drug Administration (FDA)

Among other things, the Food and Drug Administration regulates the bottled water industry. Contact the FDA if you have questions about the safety or regulation of bottled water.
(800) 532-4440 www.fda.gov

PRIVATE ORGANIZATIONS

American Ground Water Trust (AGWT)

The mission of the American Ground Water Trust is to protect ground water, promote public awareness of the environmental and economic importance of ground water, and provide accurate information to assist public participation in water resources decisions and management. AGWT provides specialist conferences, public health workshops, a free publication, "The American Well Owner", educational resources via hard copy and online, and a toll free consumer hotline.

(800) 423-7748. www.agwt.org

California Groundwater Association (CGA)

The California Groundwater Association (CGA) is a non-profit organization. Its members include water well drilling and pump contractors, suppliers and manufacturers, geologists, engineers, hydrologists, government employees and others working in the groundwater field throughout California. Contact CGA for information on the quantity, quality and availability of California's groundwater resources.
(707) 578-4408 www.groundh2o.org

The Groundwater Foundation (GWF)

The Groundwater Foundation is a not-for-profit organization that is dedicated to informing the public about groundwater resources. They provide numerous educational programs and publications for all ages on the importance of groundwater and groundwater protection. The GWF also offers recognition and support for Groundwater Guardian Communities and Affiliates.
(800) 858-4844 www.groundwater.org

National Ground Water Association (NGWA)

The National Ground Water Association is a not-for-profit organization whose mission is to enhance the skills and credibility of all groundwater professionals, develop and exchange industry knowledge, and promote the groundwater industry and understanding of groundwater resources. Contact the NGWA for information on groundwater studies and publications nationwide, answers to frequently asked questions about groundwater, and the latest groundwater news and legislation.
(800) 551-7379 www.ngwa.org

National Small Flows Clearinghouse (NSFC)

The National Small Flows Clearinghouse is funded by the U.S. Environmental Protection Agency to provide small communities with technical assistance on waste- water issues and groundwater quality in general. Contact the NSFC if you have questions about on site sewage disposal system design, installation or maintenance.
(800) 624-8301 www.estd.wvu.edu/nsfc/NSFC_homepage.html

National Well Owner Association (NWOA)

The National Well Owners Association is an online association providing comprehensive and up-to-date information on the construction and maintenance of water wells.
(800) 749-0234 www.wqa.org