

PRIVATE DRINKING WATER IN CONNECTICUT

Publication Date: May 2009

Publication No. 26: Private Drinking Water Wells Types of Construction



When you turn on the faucet to get a drink or to take a shower, do you know where your water comes from? It is estimated that approximately 400,000 Connecticut citizens drink groundwater supplied by a private well on their property. Groundwater is water beneath the earth's surface that fills and saturates the spaces between sediment particles as well as the cracks and crevices within bedrock. When rain falls or snow melts some of the water percolates into the ground and becomes part of the groundwater.

The U.S. Environmental Protection Agency (EPA) does not regulate private wells. As an individual well owner, you are responsible for the quality of your own water. Individual well owners do not benefit from the public health safeguards provided by a regulated and regularly tested public water supply system. Responsibility for wellhead protection, adequate well maintenance, and water testing falls on the homeowner. Although your first call should be to your Local Health Department with water quality concerns, the Connecticut Department of Public Health's Environmental Health Section can also assist private well owners.

So, what exactly is a well, where is it located and what can you do to maintain it? Simply put, your well is a circular hole that extends into the earth until it reaches an underground water-bearing formation known as an aquifer. Three basic types of wells are common in Connecticut; dug wells, driven wells and drilled wells.

Well Construction

The Connecticut Department of Consumer Protection regulates the construction of private wells through their well drilling regulations. Additionally there are regulations in the Connecticut Public Health Code dealing with wells. A Connecticut registered well driller should install a new well or improve or repair an existing well. These professionals are knowledgeable of the well construction specifications. For more information on these specifications, see the Department of Public Health and Consumer Protection's websites. Additionally, all new wells, at a minimum, have to be tested in accordance with Section 19-13-B101 of the Connecticut Public Health Code.



Dug Wells

Dug wells are holes in the ground dug by shovel or backhoe. Historically, a dug well was excavated below the groundwater table until incoming water exceeded the digger's bailing rate. The well was then lined (cased) with stones, brick, tile, or other material to prevent collapse. It was covered with a cap of wood, stone, or concrete. Since it is so difficult to dig beneath the groundwater table, dug wells are not very deep,



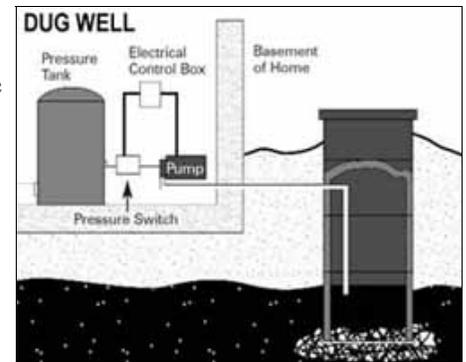
Produced by The State of Connecticut Department of Public Health
Environmental Health Section, Private Well Program
450 Capitol Avenue, MS#51REC, PO Box 340308, Hartford, CT 06134
Phone: 860-509-7296 Fax: 860-509-7295



typically only 10 to 30 feet deep. Dug wells have the highest risk of becoming contaminated because they are so shallow. To minimize the likelihood of contamination, your dug well should have certain features to help prevent contaminants from traveling along the outside of the casing or through the casing and into the well.

Dug Well Construction

- The well should be cased with a watertight material (for example, tongue-and-groove pre-cast concrete drainage tiles) and a cement grout or bentonite clay sealant poured along the outside of the casing to the top of the well.
- The well should be covered by a concrete curb and cap that stands about a foot above the ground.
- The land surface around the well should be mounded so that surface water runs away from the well and is not allowed to pond around the outside of the wellhead.
- Ideally, the pump for your well should be inside your home or in a separate pump house, rather than in a pit next to the well.



Land activities around a dug well can contaminate it. Examples include disposal of household chemicals or oil on the ground or down the drain, car or other vehicle maintenance, failing septic systems, lawn fertilization and pesticide application, roadway runoff, and pet or livestock waste. Protecting the water quality of your dug well means that you must monitor activities around it and reduce or eliminate potential contamination sources.

While dug wells have been used as a household water supply source for many years, most are “relics” of older homes, dug before drilling equipment was readily available or when drilling was considered expensive. If you are using a dug well on your property there is a greater likelihood it may go dry during a drought or if the water table drops. Construction requirements for dug wells are covered in Section 19-13-B51 of the Connecticut Public Health Code (PHC).

Driven (sand-point) Wells

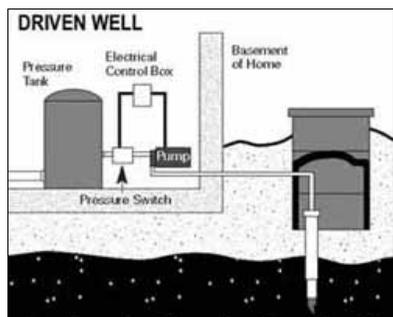


Like dug wells, driven wells pull water from the water-saturated zone above the bedrock. Driven wells can be deeper than dug wells, typically 30 to 50 feet deep. Driven wells are usually located in areas with thick sand and gravel deposits where the groundwater table is within 15 feet of the surface. In the proper geologic setting, driven wells can be easy and relatively inexpensive to install, although there may be limited locations where these wells could be located in Connecticut. The soil conditions must be such that little if any large rocks, boulders or large outcroppings exist, otherwise this type of well would not be feasible.

Driven Well Construction

- Assembled lengths of 2” to 3” diameter metal pipes are driven into the ground. A screened “well point” located at the end of the pipe helps drive the pipe through the sand and gravel. The screen allows water to enter the well and filter out sediment.
- The pump for the well is in one of two places: on top of the well or in the house.
- An access pit is usually dug around the well down to the frost line and a water discharge pipe to the house is joined to the well pipe with a fitting.

- The well and pit are capped with the same kind of large-diameter concrete tile used for a dug well. The access pit may be cased with pre-cast concrete tiles. The pit should be gravity drained and not subject to flooding.



Although deeper than dug wells, driven wells are still relatively shallow and have a moderate-to-high risk of contamination from nearby land activities. To minimize this risk, the well cover should be a tight-fitting concrete curb and cap with no cracks and should sit about one foot above the ground. Slope the ground away from the well so that surface water will not pond around the well. If there is a pit above the well, either to hold the pump or to access the fitting, you may be able to pour a grout sealant along the outside of the well pipe.

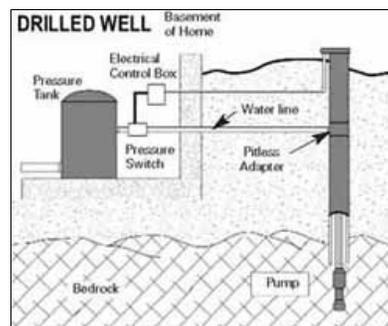
Protecting the water quality requires that you maintain proper well construction and monitor your activities around the well. It is also important to follow the same land use precautions around the driven well as described under dug wells.

Drilled Wells

Most drilled wells in Connecticut penetrate 100-400 feet into the bedrock. Bedrock found at or near the surface is commonly called ledge. A drilled well must intersect bedrock fractures containing groundwater to serve as a water supply.

Drilled Well Construction

- Most wells drilled today incorporate a number of construction features to help protect water quality.
- The casing is usually metal pipe, six inches in diameter that extends into the bedrock to prevent shallow groundwater from entering the well. By law, the casing has to extend at least 20 feet into the ground. The casing should also extend at least six inches above final grade of the ground's surface. A sealant, such as cement grout or bentonite clay, should be used to grout the well to the top of the well's casing. The well is capped to prevent surface water from entering the well.
- Submersible pumps located near the bottom of the well, are most commonly used in drilled wells. Wells with a shallow water table may feature a jet pump located inside the home. Pumps require special wiring and electrical service. Well pumps should be installed and serviced by a qualified professional licensed by the Department of Consumer Protection.
- Most modern drilled wells incorporate a pitless adapter designed to provide a sanitary seal at the point where the discharge water line leaves the well to enter your home. The device attaches directly to the casing below the frost line and provides a watertight subsurface connection, protecting the well from the frost and contamination.
- Older drilled wells may lack some of these sanitary features. The well pipe used was often 8, 10, or 12 inches in diameter and covered with a concrete well cap either at or below the ground's surface. This outmoded type of construction does not provide the same degree of protection from surface contamination. Also, older wells may not have a pitless adapter to provide a seal at the point of discharge from the well.



Hydrofracturing a Drilled Well

Hydrofracturing is a process that applies water or air under pressure into your well to open up existing fractures near your well and can even create new ones. Often this can increase the yield of your well. This process can be applied to new wells with insufficient yield and to improve the quantity of older wells.

Locating Your Well



Locating your well is the first step to protection. Start by walking around your yard. If you discover a metal pipe, six or eight inches wide, sticking up above the ground's surface and topped with a metal cap, then you have a drilled well. If you find a large cement well cap about three to five feet in diameter at the ground's surface, it could be a dug, driven or older drilled well. To determine what's below the cement cap, remove it. If you see an open hole with water standing in it, you have a dug well; if you see a pit with a pipe and/or pump at the bottom of the pit, you have either a driven or older drilled well.

If you've looked and can't find your well or still aren't sure what kind you have, consider enlisting the help of a registered well driller or someone with a metal detector. Even dug wells contain metal fittings and pipe that can be picked up by a metal detector. The original cover of an older well may be covered by topsoil, grass or other vegetation. If this is the case, it is recommended that the well is located and repaired with some additional casing, extending 1 to 2 feet above the ground surface, and properly capped. In some cases, old wells may be located in the basement of your home.

A well driller registered with the Department of Consumer Protection (DCP) should complete new well construction, repairs to existing wells, and hydrofracturing. DCP regulates the construction of private wells through the well drilling code. These regulations along with the Connecticut Public Health Code (PHC) detail procedures for the siting and construction of new wells, the improvement or abandonment of old wells, and provide for registration of well drillers and pump installers. Since 1969 all registered well drillers are required to file well drilling reports with the Connecticut Department of Environmental Protection (DEP). An agent of your local health department signs the well permit. New well owners should maintain a copy of the well driller's report for their own files.

Six Important Ways to Protect Your Drinking Water Well

1. Proper Location

Locate a new well as far away from potential contamination sources as possible. CT DPH regulates the distance a private well should be from some potential contamination sources. Sources are identified in PHC Section 19-13-B51.

2. Proper Construction

Construction of a new well or maintenance of an existing well should be performed by a well driller or pump installer registered with the CT DCP. Periodically inspect exposed parts of the well. Look for:

- Cracks, corrosion, or damaged well casing
- Cracked or missing well cap
- Settling or cracking of surface seals. When placing your hands on the well, you should not be able to move it.



- * Keep accurate records of well maintenance, such as disinfection or sediment removal
- * Inspect your well at least annually; consider an inspection by a professional every 3 to 5 years (well driller, local health authorities, state health department, etc.)
- * Slope the area around the well to drain surface runoff away from the well. Do not allow surface water to pond around the well.

3. Keep Contaminants Away

Keep potential contaminants as far away as possible from your well.



- Avoid mixing or using pesticides, fertilizers, herbicides, degreasers, fuels, and other pollutants near the well.
- Do not dispose of wastes in dry wells or abandoned wells.
- Inspect your septic system every 1-3 years and pump as needed.
- Never dispose of hazardous materials in the septic system
- Do not allow runoff from the road, driveway or rooftop to pond around the well. Keep the area around the well clear and free of debris.
- Keep pet waste, dog runs and other livestock away from the well.

4. Prevent Backflow

Use backflow prevention devices on all outside faucets with hose connections. This is especially important if you fill pesticide sprayers, other chemical container or swimming pools. Backflow devices prevent these chemicals from being drawn into the household water supply in the event of a drop in water pressure. You can purchase backflow prevention devices at a hardware store.

5. Seal Abandoned Wells

Abandoned and unused wells are a potential source of ground water contamination as they provide a direct access or conduit from the ground surface to the groundwater source. They can also be a safety hazard on your property. These wells should be properly sealed when no longer in use. The well drilling code regulations state that a Connecticut registered well driller should properly abandon wells.

6. Test Well Water

Test your well semi-annually (spring/fall) for nitrates, bacteria, physical parameters (color, odor, turbidity, pH) and other constituents of concern. Test whenever you notice a change in taste, color, or odor of your drinking water. For more information see Publication # 24 *Residential Well Water Testing*.



For more information please click on the following links:

EPA Office of Groundwater and Drinking Water

<http://www.epa.gov/ogwdw/>

EPA New England

<http://www.epa.gov/region01/>

Adapted from *Healthy Drinking Waters for Rhode Islanders*, University of Rhode Island Cooperative Extension, April 2003.