PRIVATE WELL WATER IN CONNECTICUT

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Publication #26: Private Wells - Types & 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 867,000 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. Check with your Local Health Department to find out whether there are water quality problems specific to your area. It is also a good idea to ask your neighbors whether they have ever had water quality problems. The Connecticut Department of Public Health (DPH) Private Well Program is also a resource for questions about private well testing. DPH's Environmental and Occupational Health Assessment Program is a resource for questions about safe limits of chemicals in water and health concerns.

So, what exactly is a well, where is it located and what can you do to maintain it? Simply put, your well is an excavation 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 The Connecticut Well Drilling Code. Additionally there are regulations in the Connecticut Public Health Code dealing with wells. A Connecticut (CT) 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, refer to the CT Department of Consumer Protection (CT DCP) website and CT Department of Public Health, Private Well Program website. Additionally, all new private water supply wells must be tested in accordance with Section 19-13-B101 of the Regulations of Connecticut State Agencies.

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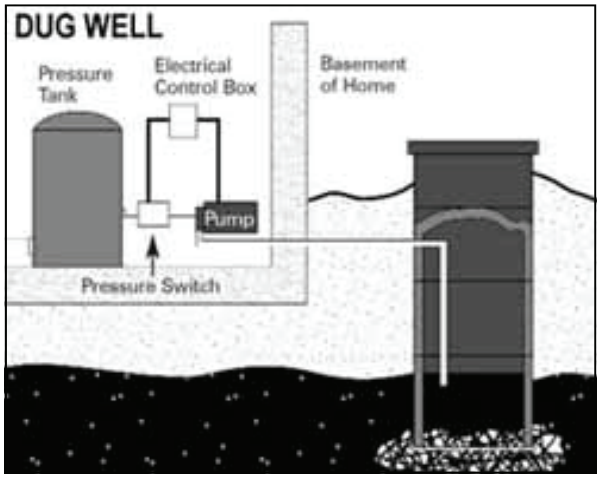
Dug Wells

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 cover of wood, stone, or concrete. Since it is so difficult to dig beneath the groundwater table, dug wells are 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 be constructed to 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 cover that extends at least six inches above the ground. The dug well cover should be made of substantial reinforced concrete that overlaps the casing diameter by at least two inches.
- 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.
- Any new dug wells that are constructed must meet the requirements outlined in Sections 19-13-B51 (a) through (m) of the Regulations of Connecticut State Agencies.

Land activities around a dug well can contaminate it if precautions are not taken. Examples of potentially harmful activities include disposal of household chemicals or oil on the ground or down the drain, leaking fluids from car or other vehicle maintenance, failing septic systems, lawn fertilization and pesticide application, roadway runoff, and pet or livestock waste. To help protect the water quality of your dug well, monitor the activities performed around it and reduce or eliminate any potential contamination sources.

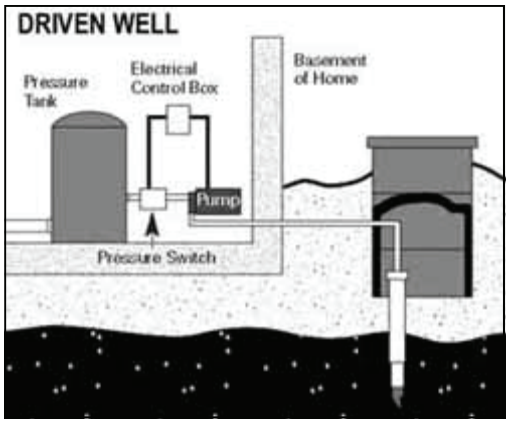
While dug wells have been used as a household water supply source for many years, they are mostly found at older homes. If you are using a dug well on your property there is a greater likelihood it may go dry during a drought or if the water table drops. Homeowners with a dug well should consider replacing it with a properly constructed drilled well. Drilled wells typically provide a more reliable source of supply with better water quality and quantity.

Driven (point) wells

Like dug wells, driven wells also 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 two to three inch 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 installed in one of two places: on top of the well or in a pump house.
- An access well pit is usually dug around the well point down to the frost line and a water discharge pipe that extends from the pump house is joined to the well pipe with a fitting.
- The well and pit are capped with the same kind of large-diameter pre-cast concrete tiles used for a dug well. The pit should be gravity drained and not subject to flooding.

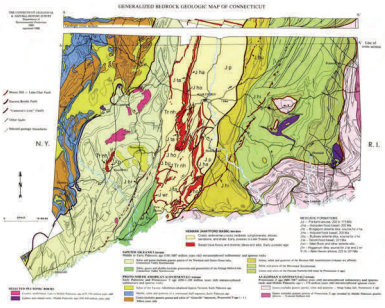


Although deeper than dug wells, driven wells are still relatively shallow and have a moderate-to-high risk of contamination from nearby land activities. To minimize this risk, the well pit cover should be a tight-fitting concrete curb and cap with no cracks and should sit about one foot above the ground. Slope the ground away from the well so that surface water will not pond around the well. If the driven well is in a pit, 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.

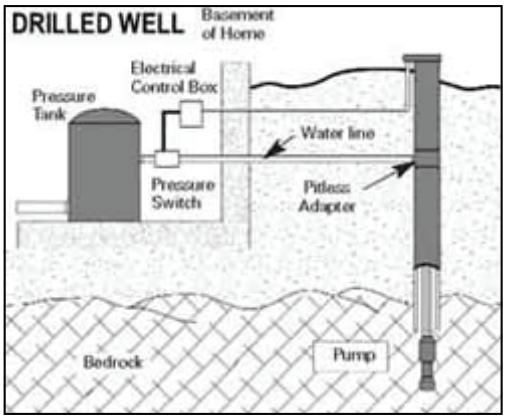
Protecting the water quality requires that you maintain proper well construction and monitor your activities around the well. It is also important to follow the same land use precautions around the driven well as described under dug wells.

Drilled Wells

Most drilled wells in Connecticut penetrate 100 or more 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 should be constructed of steel pipe, typically six inches in diameter that extends into the bedrock to prevent shallow groundwater from entering the well. By law, the casing typically has to extend at least 20 feet into the ground and extend at least six inches above final grade at the ground surface. A sealant, such as cement grout or bentonite clay, should be used to grout the annular space between the bedrock and the well's casing. The well is capped to prevent surface water from entering the well.
- Submersible pumps are most commonly used in drilled wells and are installed inside the well casing and are located near the bottom of the well. Wells with a shallow water table may use a jet pump that is typically located inside the home. Pumps require special wiring and electrical service. Water lines and electrical conduits associated with the pump should have watertight connections at the well casing and well cap. Well pumps should be installed and serviced by a qualified professional licensed by the Department of Consumer Protection.
- Most wells drilled after the 1960's incorporate a pitless adapter designed to provide a watertight connection 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 allows the water pipe between the well and your home to be protected from freezing.
- Older drilled wells constructed prior to the 1960's may lack some of these sanitary features. For more information on how to modernize the construction of your well, refer to Publication #23: *Well Casing Extensions*.

Hydrofracking a Drilled Well

Hydrofracking 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 in diameter, sticking up above the ground's surface and topped with a metal or hard plastic cap, then you likely have found your drilled well. If you find a large cement well cap that is typically three feet in diameter at the ground's surface, it could be a dug, driven or older drilled well inside a well pit. To determine what's below the cement cap, you should refer to the Well's Completion Report. If one is not available you should remove the cap carefully for inspection.

Keep in mind that if the well is a dug well, removing the heavy cement cap will expose the water in the well to the environment; therefore precautions need to be taken to avoid contamination. If this is the case, after the cap to your dug well is removed, you should consider properly disinfecting your well and water system. Refer to Publication #27: *Disinfection Procedure for Private Wells* for instructions. If you see an open hole with water standing in it, you have a dug well. If you see a pit with a two to three inch diameter pipe, it is a driven well. If you see a six to eight inch pipe in a pit, you have an older drilled well.

Some poorly constructed well pits may be flooded and filled with water so you also need to look for a well casing submerged below the water. If this is the case, please refer to Publication #23: *Well Casing Extensions* for information on how to modernize the construction of your well. A copy of the Well Drilling Permit and/or Well Completion Report can also be of assistance when locating your private well. If you do not have a copy of your completion report, refer to Circular Letter 2014-27 Well Completion Reports.

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 one to two 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 CT DCP should complete new well construction, repairs to existing wells, and hydrofracking. CT DCP regulates the construction of private wells through The Connecticut Well Drilling Code. These regulations along with the Sections 19-13-B51 (a) through (m) of the Regulations of Connecticut State Agencies (RCSA) detail procedures for the siting and construction of new wells, the improvement or abandonment of old wells, and provides for registration of well drillers and pump installers. Since 1969 all registered well drillers are required to file well drilling completion reports with the Connecticut Department of Energy & Environmental Protection (CT DEEP). New well owners should maintain a copy of the well completion report for their own files.

Five Important Ways to Protect Your Private Well Water

1. Proper Location - Locate new private wells as far away from potential contamination sources as possible. Section 19-13-B51(d) of the RCSA specifies the distance a private well must be from potential sources of pollution.

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. Things to look for:

   - The well casing extends above grade by at least six inches.
   - Cracked, corroded, or damaged well casing.
   - Cracked or missing well cap.
   - Settling or cracking of surface seals. You should not be able to move the well casing when applying hand pressure.

* Keep accurate records of well maintenance, such as disinfection or hydrofracking.
* Inspect your well at least annually; consider an inspection by a professional (i.e. registered well driller) every 3 to 5 years.
* Do not allow surface water to pond around the well. Slope the area around the well to drain surface runoff away from the well.

3. Keep Contaminants Away - Keep potential contaminants as far away as possible from your well.

   - Do not mix or use pesticides, fertilizers, herbicides, degreasers, fuels, or other hazardous materials near the well.
   - 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.
   - If you have a septic system, make sure it is properly maintained. The CT DPH recommends pumping your septic tank every 3-5 years. More frequent pumping should occur if your tank is undersized, if you use a garbage disposal or have a large family. For more information refer to the CT DPH, Environmental Engineering-Subsurface Sewage webpage: www.ct.gov/dph/subsurfacesewage.
   - Never flush gasoline, motor oils, automotive chemicals, painting chemicals solvents, or any other hazardous materials down the sink or toilet into a septic system.
   - Do not allow waste oils or gasoline to get into soil.
   - Make sure home heating tanks are above ground, have secondary containment, or are located inside the concrete foundation of your basement.
   - Never do automotive maintenance or repair on exposed soils in your yard.
   - Do not dispose of wastes in dry wells or abandoned wells.

4. Seal Abandoned Wells - Abandoned and unused wells are a potential source of groundwater contamination as they provide direct access or a 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. Well drilling Statutes Section 25-128 and Regulations of Connecticut State Agencies Sections 25-128-56 and 25-128-57 require that a Connecticut registered well driller properly abandon wells in accordance with methods prescribed.

5. Test Your Private Well Water! - Test your well annually for basic parameters: total coliform bacteria, nitrate, nitrite, physical parameters (color, odor, turbidity, pH) and other parameters of concern. Also consider testing whenever you notice a change in taste, color, or odor of your private well water. For more information see Publication #24: Private Well Testing.