

Healthy Drinking Waters

for

M A S S A C H U S E T T S

Safe and healthy lives in safe and healthy communities

Drinking Water Wells

When you turn on the faucet to get a drink or to take a shower, do you know where your water comes from? More than half a million Massachusetts residents depend upon private wells for drinking water drawn from groundwater. 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.

Private wells are not currently regulated by the U.S. Environmental Protection Agency (EPA). 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.

Well Construction

In Massachusetts a well driller registered with Massachusetts Department of Conservation and Recreation (DCR) well must complete new well construction or any alteration to an existing well. DCR's jurisdiction over wells includes driller registration, and the collection of data concerning well location and construction. Prior to drilling any well, the driller is responsible for contacting the municipality in which he is doing work to obtain any local permitting and well construction require-



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ments. Within thirty days of well completion the driller is required to submit a well completion report to DCR's Division of Water Supply Protection, and to the local municipality. Make sure you get a copy of this report. Know who drilled the well, what type of well it is, who installed the pump, how the system works, and what maintenance it needs.

For more information on private well construction and maintenance, see MassDEP's Private Well Guidelines on the MassDEP website at <http://www.mass.gov/dep/water/drinking/privatew.htm>

Three basic types of wells are common in Massachusetts: dug wells, driven wells, and drilled wells.

Dug wells

Dug wells are holes in the ground dug by shovel or backhoe. Historically, a dug well



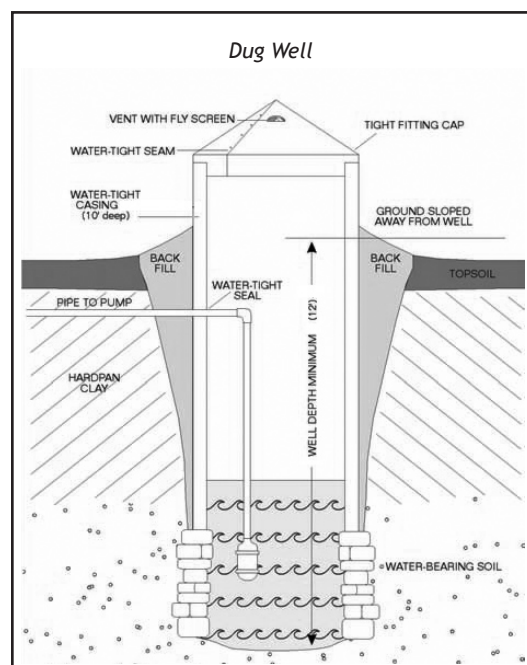
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was excavated below the groundwater table until incoming water exceeded the digger's bailing rate. The well was then lined (cased) with stones, brick, tile, or other material to prevent collapse. It was covered with a cap of wood, stone, or concrete. Since it is so difficult to dig beneath the groundwater table, dug wells are not very deep. Typically, they are only 10 to 30 feet deep. Being so shallow, dug wells have the highest risk of becoming contaminated. To minimize the likelihood of contamination, your dug well should have certain features. These features help 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 precast concrete) 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



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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 too expensive. If you have a dug well on your property and are using it for drinking water, check to make sure it is properly covered and sealed. Another problem relating to the shallowness of a dug well is that it may go dry during drought when the groundwater table drops.

Driven (sand-point) wells

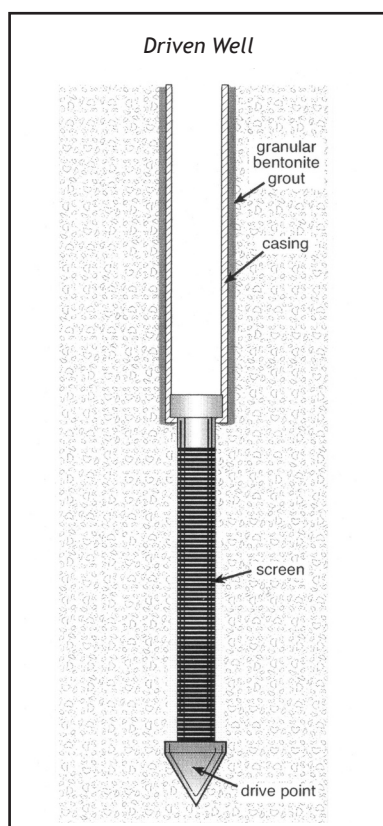
Like dug wells, driven wells pull water from the water-saturated zone above the bedrock. Driven wells can be deeper than dug wells. They are typically 30 to 50 feet deep and are usually located in areas with thick sand and gravel deposits where the groundwater table

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is within 15 feet of the ground's surface. In the proper geologic setting, driven wells can be easy and relatively inexpensive to install.

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 filters 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.



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- 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.

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 a foot above the ground. Slope the ground away from the well so that surface water will not pond around the well. If there's a pit above the well, either to hold the pump or to access the fitting, you may also 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

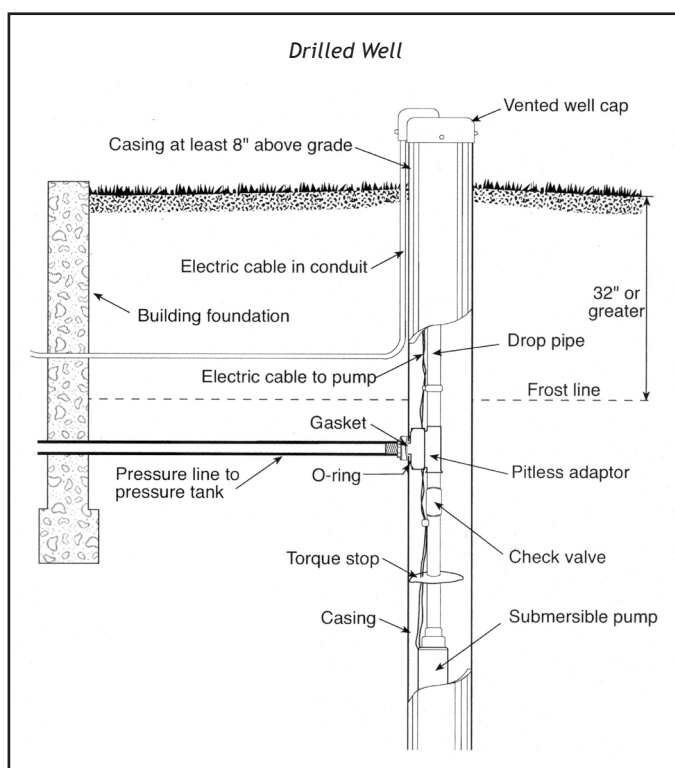
Many drilled wells in Massachusetts penetrate 100-400 feet into bedrock. To serve as a water supply, a drilled well must intersect bedrock fractures containing groundwater. Hydrofracturing is a process that applies water or air under pressure into your well to open up existing fractures near your well 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.

Drilled Well Construction

Most wells drilled today incorporate a number of construction features to help protect water quality.

- The casing is usually metal or plastic pipe,

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six inches in diameter that extends into the bedrock to prevent shallow groundwater from entering the well. The casing should also extend a foot or two above the ground's surface. A sealant, such as cement grout should be poured along the outside of the casing to the top of the well. 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.
- Most modern drilled wells incorporate a pitless adaptor 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 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 out-moded type of construction does not provide the same degree of protection from surface contamination. Also, older wells may not have a pitless adaptor to provide a seal at the point of discharge from the well.

5 Ways to Protect Your Drinking Water Well

1. Proper Location

In general, locate a new well as far away from potential contamination sources as possible. Under the Title 5 regulations, Massachusetts Department of Environmental Protection (MassDEP) regulates the distance a private well should be from some potential contamination sources, including:

- 50 feet from septic tank and distribution box
- 100 feet from septic system leaching field
- 50 feet from building sewer line

Local Board of Health regulations may also dictate the distance from livestock pens or animals waste storage, as is the Town of Barnstable where the setback is 100 feet, or the distance from a roadway, as in the Town of Eastham where the setback is 25 feet.

2. Proper Construction

A well driller registered with Massachusetts Department of Conservation and Recreation (DCR) must be hired to complete new well

construction or any alteration to an existing well in Massachusetts. DCR's jurisdiction over wells includes driller registration, and the collection of data concerning well location and construction. Prior to drilling any well, the driller is responsible for contacting the municipality in which he is doing work to obtain any local permitting and well construction requirements. Within thirty days of well completion the driller is required to submit a well completion report to DCR's Division of Water Supply Protection, and to the local municipality. Make sure you obtain a copy of this report for your records.

For more information on private well construction and maintenance, see MassDEP's Private Well Guidelines on the MassDEP website at <http://www.state.ma.us/dep/brp/dws/privwell.htm>

3. Backflow Prevention

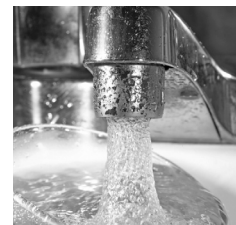
Use backflow prevention devices on all outside faucets with hose connections. This is especially important if you fill pesticide sprayers or other chemical containers. Backflow devices prevent these chemicals from being drawn into the household water supply in the event of a drop in water pressure. You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

4. Sealing Abandoned Wells

Abandoned and unused wells are a potential source of groundwater 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. Mass DCR's regulations require that a registered well driller properly abandon unused wells.

5. Testing Well Water

Testing your drinking water will tell you what is in your water at the time the sample is collected. Test results from 6 months ago represent the water quality at that well 6 months ago. The levels of most naturally occurring contaminants stay fairly consistent, or slowly increase or decrease over time, or have a seasonal fluctuation, depending on water levels.



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Resources

UMass Extension

This fact sheet is one in a series on drinking water wells, testing, protection, common contaminants, and home water treatment methods available on-line at the University of Massachusetts website:

http://www.umass.edu/nrec/watershed_water_quality/watershed_online_docs.html
and Cape Cod Cooperative Extension:
508-375-6699

<http://www.capecodextension.org>

MA Department of Environmental Protection, Division of Environmental Analysis

Offers assistance, information on testing and state certified laboratories: 617-292-5770
For a listing of MassDEP certified private laboratories in Massachusetts:
<http://www.mass.gov/dep/service/compliance/wespub02.htm>

U.S. Environmental Protection Agency, New England Office

Information and education on where drinking water comes from; drinking water testing and national laws; and how to prevent contamination:
<http://www.epa.gov/ne/eco/drinkwater>

US Environmental Protection Agency

For a complete list of primary and secondary drinking water standards:
<http://www.epa.gov/safewater>

MA Department of Conservation and Recreation, Division of Water Supply Protection

Maintains listing of registered well drillers, information on well location and construction: 617-626-1409
<http://www.mass.gov/dcr/waterSupply/welldrill/index.htm>

NSF International

The NSF International has tested and certified treatment systems since 1965. For information on water treatment systems: 800-NSF-MARK (800-673-6275)
<http://www.nsf.org/consumer/>

Water Quality Association

The Water Quality Association is a not-for-profit international trade association representing the household, commercial, industrial, and small community water treatment industry. For information on water quality contaminants and treatment systems:
<http://www.wqa.org>



UMass Extension



United States
Environmental Protection
Agency New England

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