

AE1951

# Protecting Your Water Source: What's the Condition of Your Water Well?

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Have you ever stopped and looked very carefully at the location, appearance and construction of your well?

Potentially, all private water wells can become contaminated. Often, the contamination source will be within 100 feet of the well. That is about the maximum distance water will flow through the ground to a low-volume household well.

To test if your well is contaminated, have the water (directly from the well) tested for nitrates and bacteria. A list of certified water testing laboratories in North Dakota can be found in NDSU Extension publication WQ1341, "Drinking Water Quality: Testing and Interpreting Your Results." You can obtain a copy at any of NDSU Extension's county offices or online at <https://tinyurl.com/InterpretWaterTestResults>.

Testing is the only sure way to know what substances are present in your household water. In addition to testing for nitrates and bacteria every three years, you also should test for the dissolved minerals that generally cause the most problems for homeowners, such as arsenic, iron, manganese, as well as

hardness and the total amount of dissolved minerals (TDS).

Some contaminants, such as tannins from coal veins, may change the color of the water or cause a disagreeable smell, such as hydrogen sulfide (rotten egg odor). These usually are not harmful to your health but can make the water unusable in the home unless some type of water treatment system is installed. However, some contaminants such as bacteria or high levels

of nitrates and arsenic may be quite serious.

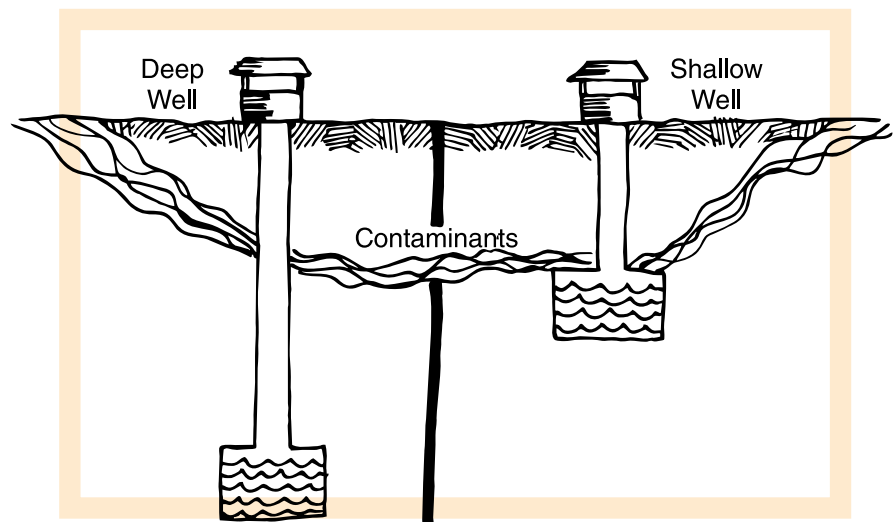
If any coliform bacteria are detected or the sample has levels of nitrate or arsenic that exceed the maximum contaminate level (MCL), the water-testing lab will notify you as soon as possible (make sure to include your phone number with the sample).

If your well does test positive for bacteria and/or elevated nitrates, here are some questions to ask:

## 1 Are potential sources of pollution near the well?

Ideally, your household well should be uphill from any potential contamination source. Your well should be at least 100 feet from any of these common sources of contamination: septic tanks and drainfields, barnyards, feedlots, manure piles, silage piles, outhouses and cesspools. Other possible contamination sources are garbage disposal sites and excavations. All of these can produce bacteria and/or nitrates.

Water from these sources can get into the groundwater near the well and flow to the well from normal daily pumping.



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## Is the depth of your well less than 50 feet?

Well depth has a significant effect on potential water contamination. Contaminants that infiltrate from the surface are more likely to reach the groundwater of a shallow well than a deep well.

Through the years, wells often were constructed with one of these methods:

- Hand dug or bored (larger diameter)
- Driven, commonly called “sand points”
- Drilled using the rotary or cable-tool method

Dug or bored wells are easy to identify because their diameter can vary from 18 inches to more than 3 feet. These wells have been shown to have the greatest risk of contamination because they are shallow and generally have porous casing materials.

The well casing is the material that keeps the well hole from collapsing. Dug or bored wells can have cylindrical metal or concrete sections, wood staves and sometimes rocks mixed with concrete as casing materials.

Because dug wells have porous casings, shallow water can get into the well and roots can create openings in the casing that allow rodents and other creatures to get into the well. Dead rodents and snakes have been found in dug wells and become the source for a positive bacterial test.

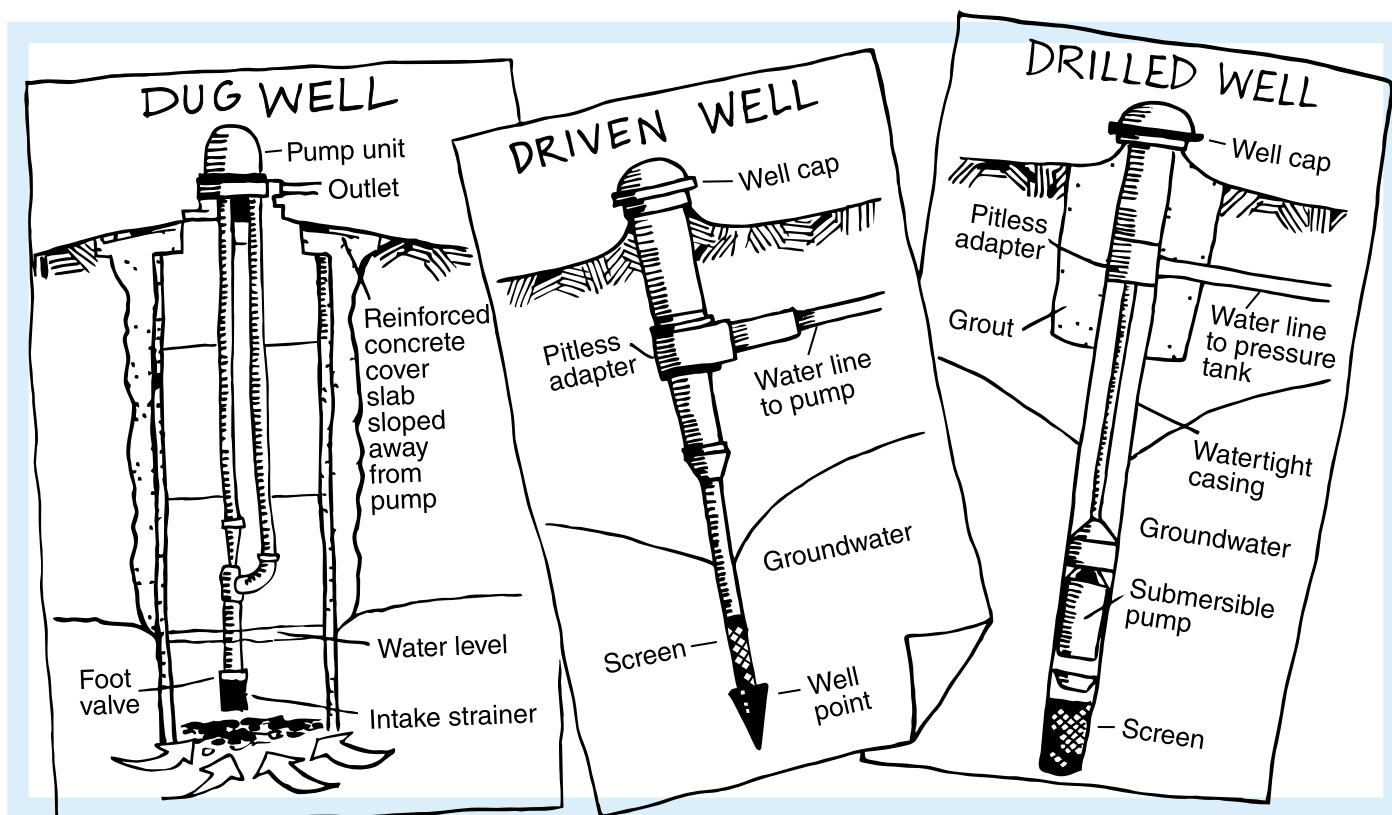
Driven wells are usually 2 inches in diameter, less than 50 feet deep and typically installed in sandy areas. Their contamination risk is generally not as high as in a dug well.

Drilled wells are the most common and generally the least susceptible to contamination. They are typically 4 or 5 inches in diameter with a metal or plastic casing. The casing will extend to the surface and a cap that may be red, black or have a galvanized color (gray). Because they are usually more than 50 feet deep, they are less susceptible to contaminated water from the surface.

# 3

## Was the well constructed more than 30 years ago?

The age of the well can contribute to potential contamination problems. As the well materials age, they are likely to have structural problems such as holes in the cover or casing or even collapsed casings. If trees or shrubs have grown up near the well, it may contain a large quantity of roots that can plug the pump.



# 4

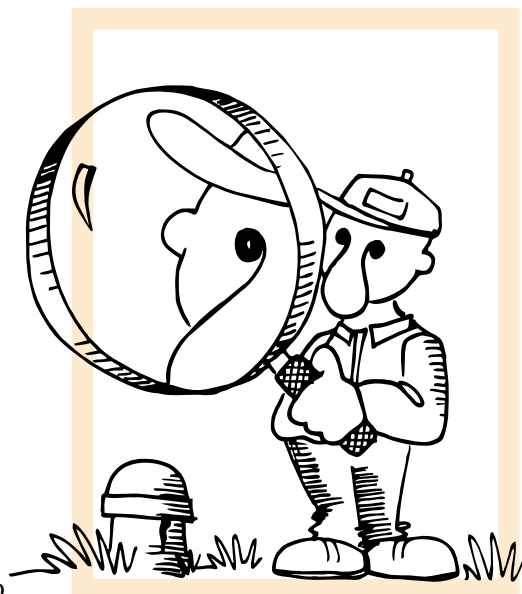
## Does the casing or cover of the well have any cracks or holes?

The well casing keeps soil out of the well so the water can be pumped. Checking the casing annually for cracks or holes on the outside and the inside is advisable.

To prevent contaminants from entering the well, a vermin-proof cap or cover must be on the well. If the well has a pump mounted on the cover, it usually has a pipe extending into the well. The annulus (ring-shaped piece) around the pipe should be sealed and covered with a protective flashing.

The cover should be watertight and sealed to the casing to prevent rodents and other animals from entering the well casing. On large-diameter wells, the cover should have a sealed and locked access hole.

To see the inside of the well casing, remove the cap (drilled and driven wells) or the cover of the access hole. Use a powerful flashlight to inspect the condition of the casing inside the well. If you hear water running when the pump is not operating, it could be entering through a crack or hole lower in the well. In large-diameter wells, look for roots or other accumulated debris.

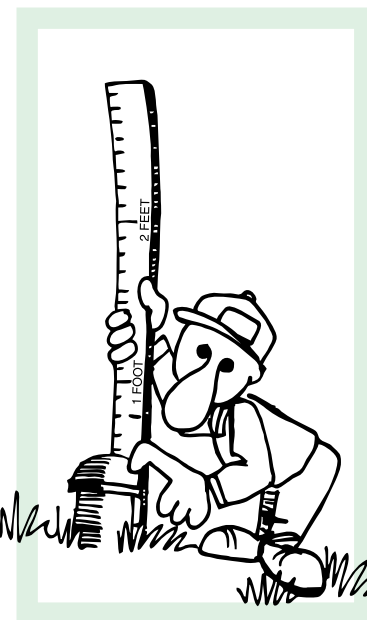


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## Is the top of the well casing less than 12 inches above ground level?

In North Dakota, the well casing or cap (if the well has one) is required to project not less than 12 inches above the final ground elevation. In areas subject to flooding, the top of the casing, cap or well cover must be at least 2 feet above the highest known floodwaters elevation and surrounded with earth fill (North Dakota Administrative Code Section 33-18).

The purpose of these requirements is to ensure that surface water doesn't flow into the well through the top. If your well does not meet these requirements, the contamination risk to your drinking water is higher.



# 6

## Is the well in a pit?

Wells often were constructed in pits to protect them from freezing during the winter. However, wells in pits are more easily flooded during excessive precipitation events or from snowmelt water. In addition, they can be inundated when groundwater rises into the pit.

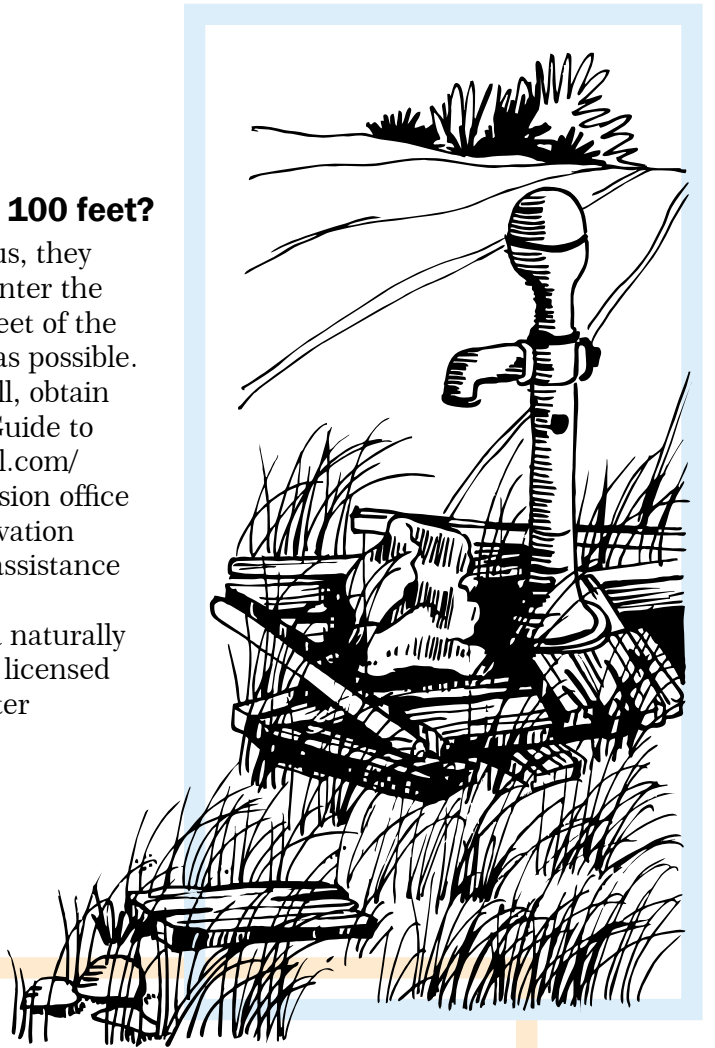
Wells in pits should be modified such that the top of the well casing is at least 12 inches above ground level and the pit is properly filled. Freeze protection can be provided with an insulated well house. A more common adaptation is to extend the well casing to above the ground surface. But before filling the pit, install a pitless adaptor on the well casing below frost depth (about 8 feet). The house water pipe connects to the pitless adaptor below ground.

## **7** Are any open abandoned wells within 100 feet?

Abandoned wells can be a safety hazard. Plus, they provide a direct route for contaminants to enter the groundwater. Abandoned wells within 200 feet of the operational well should be plugged as soon as possible.

For information on how to fill an abandoned well, obtain a copy of NDSU Extension publication AE966, “A Guide to Plugging Abandoned Wells,” online at <https://tinyurl.com/PluggingAbandonedWells-NDSU> or from the Extension office in your county. Also, the Natural Resources Conservation Service (NRCS) has information and may provide assistance for plugging wells.

According to the North Dakota Century Code, a naturally flowing well (artesian well) must to be plugged by a licensed well driller. Check with the North Dakota State Water Commission at [www.bwwc.nd.gov/index.html](http://www.bwwc.nd.gov/index.html).



### **Related Publications**

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WQ1031 “Water Softening (Ion Exchange)”

WQ1352 “What’s Wrong With My Water? Choosing the Right Test”

WQ1341 “Drinking Water Quality: Testing and Interpreting Your Results”

WQ1614 “Baseline Water Quality in Areas of Oil Development”

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