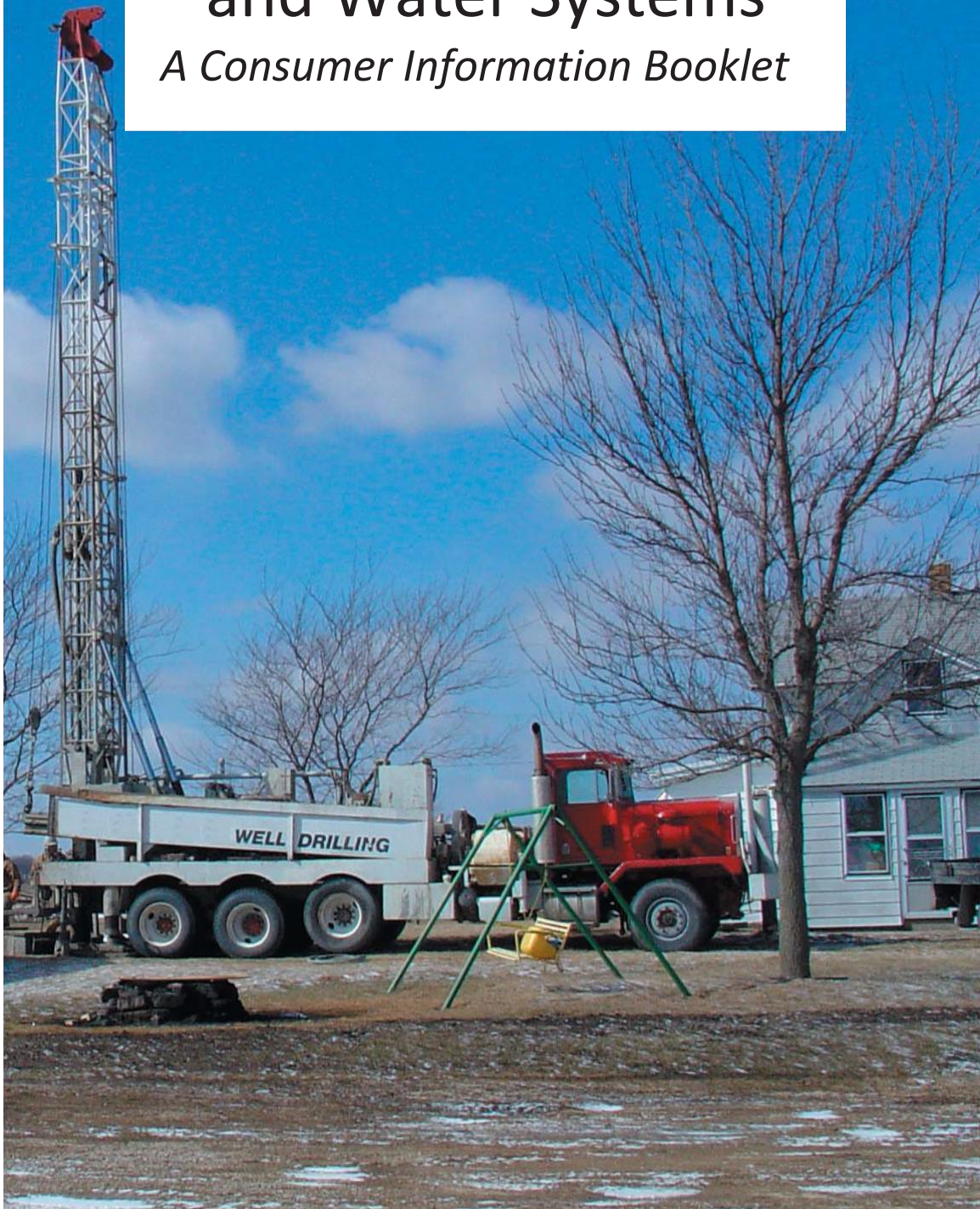


# Non-Public Water Wells and Water Systems

*A Consumer Information Booklet*



# **Non-Public Water Wells and Water Systems**

## ***A Consumer Information Booklet***

Prepared by  
Iowa Department of Natural Resources  
and  
Well Contractors Council  
(per Iowa Code 455B.190A Well Contractor Certification Program)

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This consumer information booklet contains information regarding *\*well construction*, well maintenance, *well plugging*, *pump services*, and Iowa groundwater laws. According to Iowa law, this booklet shall be supplied by *certified well contractors* at no cost to potential customers prior to the initiation of *well services*. The cost of this booklet is paid for by your private water well construction permit fees.

\*Certain terms are italicized at first use and defined in the glossary.

## Why should I read this booklet?

It is your responsibility as a well owner, or prospective well owner, of a *non-public (private)* water supply well to ensure that all well services are performed according to Iowa law. These laws were implemented to protect your health, the health of your family, as well as the public health by protecting our groundwater resources. New well construction and *well reconstruction* requires a permit. If you live in a county that issues permits for *well drilling services*, the local county sanitarian will review the proposed well drilling services that require a permit. However, the county sanitarian cannot be at the well site all the time, and not all well services require a permit. As a well owner, you need some basic information about well construction, water supply, water system maintenance, *well reconstruction* and *rehabilitation*, and well plugging. This booklet will help you protect the safety of your drinking water and your investment.

## What are the well owner requirements under Iowa law?

### 1. New well construction.

- A new non-public (private) water well requires a permit from either the county permitting authority (usually the county sanitarian) or the Iowa Department of Natural Resources (DNR), or both.
- New wells must be constructed by a certified well contractor.
- Owners of new, repaired, or rehabilitated wells are responsible for submitting a water sample to a *certified laboratory* for *coliform bacteria* and *nitrate* analysis. The water sample shall be collected between 10 days and 30 days after the well is put into service. The results shall be submitted to the *administrative authority*.

### 2. Well reconstruction.

- Well reconstruction or rehabilitation may require a permit - check with your county sanitarian.
- All well reconstruction work must be performed by a certified well contractor.
- Owners of new, repaired, or rehabilitated wells are responsible for submitting a water sample to a certified laboratory for coliform bacteria and nitrate analysis. The water sample shall be collected between 10 days and 30 days after the well is put into service. The results shall be submitted to the administrative authority.

### 3. Well repair.

- No permit is required for well repair. Examples of “well repair” include replacing a *well screen* with one of identical diameter and length, replacing a *pitless unit*, or acidizing a well.
- All well repair work must be performed by a certified well contractor.

### 4. Pump services.

- No permit is required for pump services. Pump services include the installation, repair, and maintenance of water systems including the pump, drop pipe for the well pump, electrical wiring from the pump to the electrical panel, piping from the well to the pressure tank, pitless unit or adapter; modification of the upper ten feet of the well; physical or chemical cleaning of the well.
- All pump services must be performed by a certified well contractor.

### 5. Well plugging.

- The owner of an abandoned well is responsible for ensuring that the abandoned well is plugged properly.
- Well plugging services must be performed by a certified well contractor.
- It is the responsibility of an abandoned well owner to certify that the well has been properly plugged using DNR Form 542-1226 “Abandoned Water Well Plugging Record.”

### 6. Services by homeowner.

- Under current regulations, well owners may perform any well services on their own well or water supply systems.
- Any work performed by the well owner must adhere to all current construction, pump installation, or well plugging standards. Appropriate permits must be obtained, and any required forms shall be submitted to the administrative authority.

### 7. Heat pump wells.

- Heat pump wells (geothermal loops) are required to be permitted and installed as stated in the Iowa well construction rules, “Nonpublic Water Supply Wells,” as found in Iowa Administrative Code 567-49. Contact your local county sanitarian or the Iowa DNR for more information.



## What are the responsibilities of a certified well contractor?

Well drilling services and pump services must be performed by a certified well contractor. A certified well contractor is an individual who has successfully passed an examination prescribed by the Iowa DNR to determine the qualifications to perform well drilling services or pump services. In addition to passing an examination, certified well contractors need to earn continuing education units (CEUs) in two-year periods. The certified well contractor must be present at the well site and be in direct charge of the well services being performed or provided.

- All well services shall be performed by a certified well contractor except that an individual may perform well services on their own property. However, all well work must meet code requirements.
- A list of certified well contractors may be obtained by contacting your county sanitarian, or contacting the DNR at 515-402-7981, or by using the [Iowa Wells Information System \(IWIS\)](#) to search for them. In IWIS, go the “Search Menu” and select “Well Contractors.” You can search by well contractor type: well driller, pump installer, or well plugger, or leave that section blank and it will show all types of well contractors.

## What types of wells are found in Iowa?

- *Small-diameter drilled wells* (Class 2 wells) are usually 2-16 inches in diameter *cased* with steel or plastic pipe. These wells draw water from sand and gravel deposits (Figure 1) or from *bedrock aquifers* (Figure 2). These wells are the most common wells in Iowa and are generally found throughout the state.
- *Large-diameter bored or augered wells* (Class 1 wells) usually found in western, southern, and central Iowa draw water from either small sand deposits or from where the loess and glacial till meet. Older, large-diameter, hand dug wells were usually cased with brick or field stone. Bored or augered wells were constructed with clay tile or concrete tile. These older, large-diameter wells that do not utilize a buried slab often produce water that is high in coliform bacteria and nitrate. Figure 3 shows a large-diameter well that uses buried-slab construction as required by code.
- *Sandpoint wells* (Class 3 wells) draw water from shallow sand and gravel deposits. Sandpoint wells are constructed by driving a pipe with a well point into these deposits. A screen allows the groundwater to enter the pipe and be pumped to the surface (Figure 4). Shallow sandpoint wells are usually driven into shallow unprotected aquifers and may be susceptible to contamination.

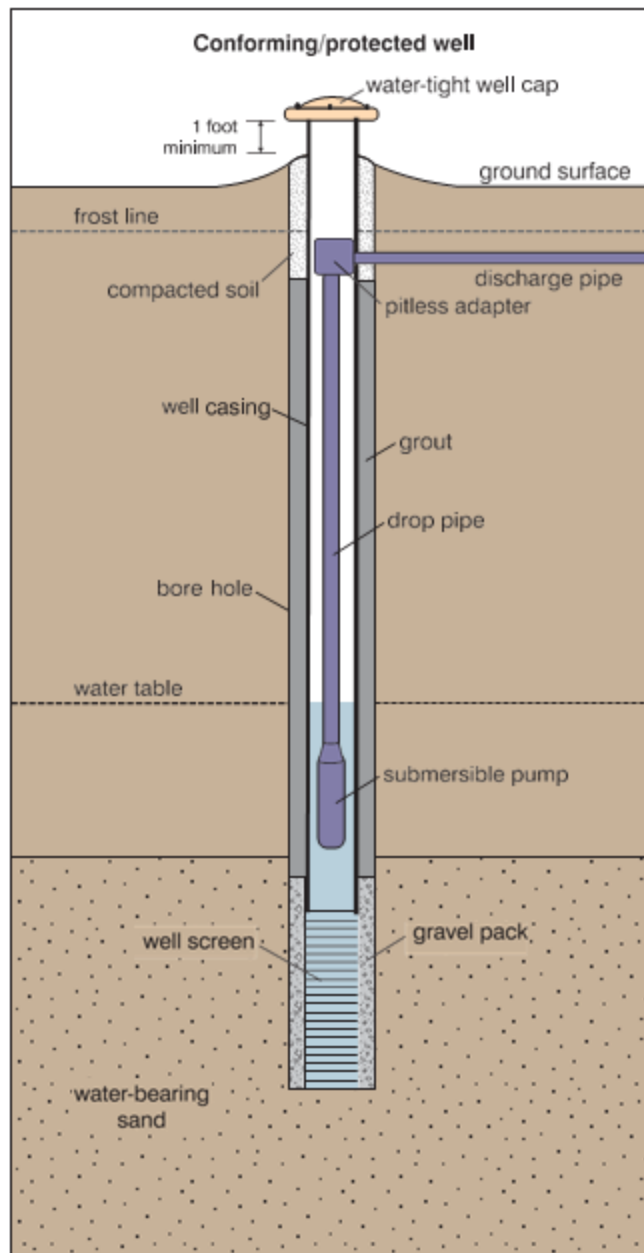
## What do I need to know about well construction and pump installation rules?

### Well Permit

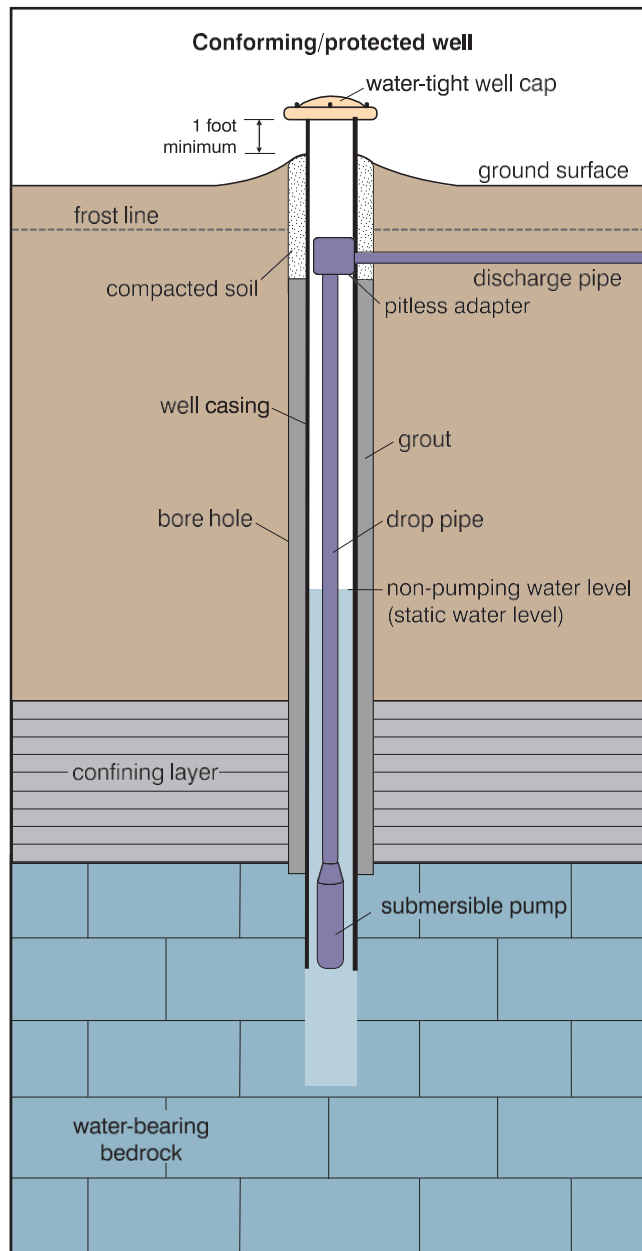
A non-public (private) water well construction permit must be obtained by the owner before drilling a new well or reconstructing an old well. These permits are issued by the county in those counties which the DNR has given authority to issue permits.

Contact your local health department to see who issues well construction permits.

The administrative authority has the right to visit well sites during any phase of the work without prior notice. The administrative authority requires the issuance of permits and the submission of water well logs. It is the responsibility of the landowner or the land- owner’s agent and the certified well contractor to ensure that a well construction permit has been issued prior to the initiation of well services, when required.



**Figure 1. Drilled well tapping water-bearing sand.**



**Figure 2. Drilled well tapping water-bearing bedrock.**

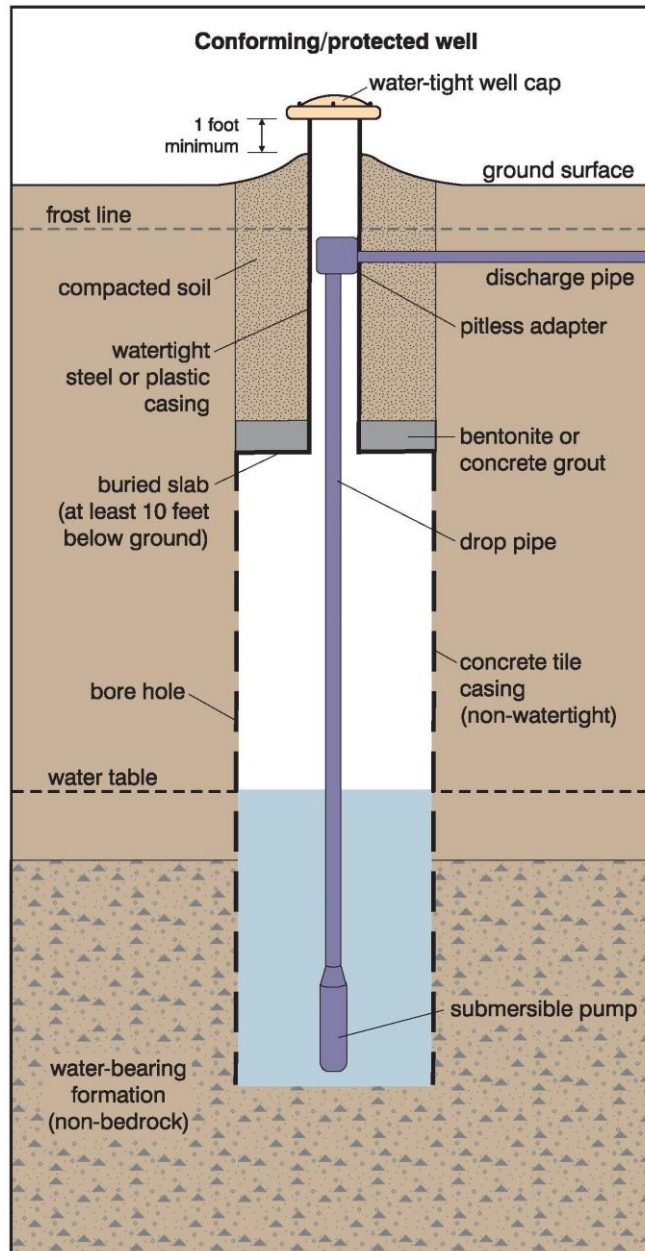


Figure 3. Buried slab design for bored well.



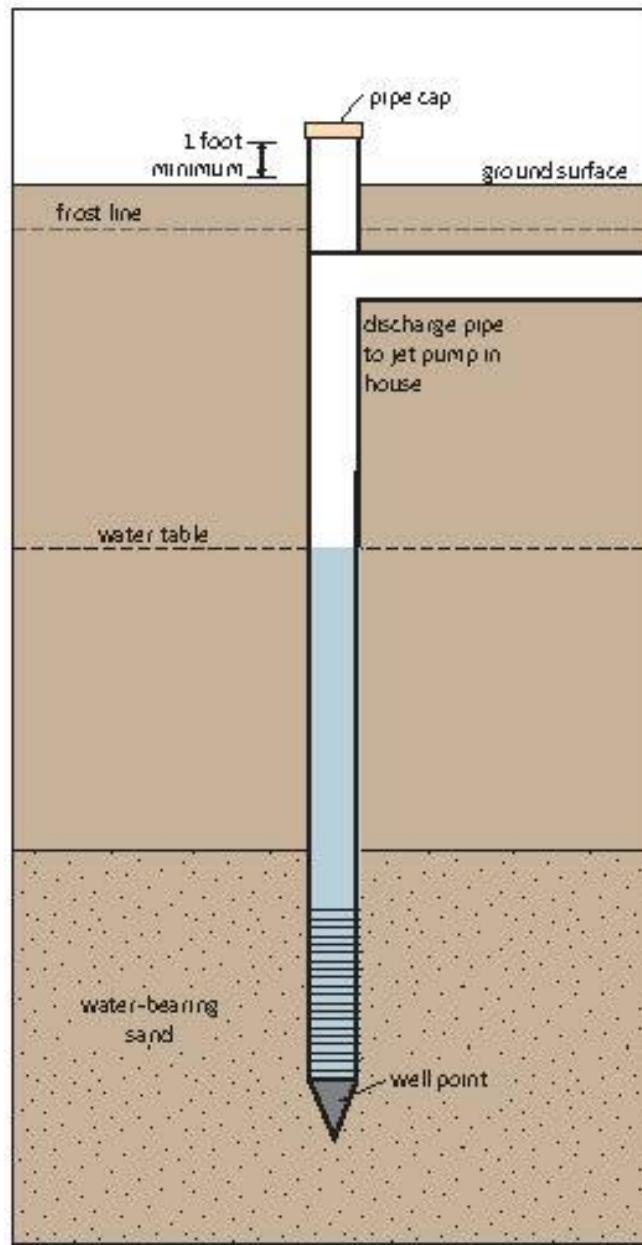


Figure 4. Sandpoint well.

#### Separation distances from sources of contamination

Iowa rules and regulations require that newly constructed private wells be separated from sources of contamination, such as feedlots, septic tanks and lateral fields, sewers, drainage wells, abandoned wells, and areas where fertilizers, chemicals or spraying materials are mixed or stored. Iowa rules (Chapter 567-49.8) specify the minimum separation distances allowable (Table 1).

Other sources of contamination, such as refuse disposal sites and buried oil and gasoline storage tanks must be evaluated on a case-by-case basis. Contact your county sanitarian or the DNR to determine the minimum separation distance for these potential sources of contamination.

Before you drill a new well, you need to know if any of these sources of contamination are located on or near your property, and if so, where.

#### Other standards on well location

Wells **shall not** be located in basements or pits. The area around the well must be graded so that the surface drainage runs away from the well, and the well casing must extend at least 12 inches above ground to prevent surface water from

running into it. In areas that are known to flood, the well casing must extend at least 12 inches above the 100-year flood level.

### Grouting and materials used in construction

*Grout* is a sealant material placed in the annular space (the space between the well casing and the bore hole). Grout prevents surface water from running down the outside of the casing and entering the well and the groundwater (Figure 5). Proper grouting is one of the most important factors in well construction, and Iowa rules and regulations contain minimum standards for grouting the well casing. The rules and regulations also contain minimum materials standards for casing, *pitless adapters*, and pumps.

**Table 1. Private Well Separation Distances**

Structure or Source of Contamination	Required Minimum Lateral Distance as Measured Horizontally on the Ground Surface (feet)	
	Private Wells	
	Deep Well <sup>1</sup>	Shallow Well <sup>1</sup>
<b>WELLS:</b>		
Public wells:		
Public water supply well - deep or shallow	200	400
Below-ground level finished water storage facility	50	
Private wells:		
Existing private wells that do not conform to 567—Chapter 49	100	
Existing private wells that conform to 567—Chapter 49	10	
<b>WASTEWATER DISPOSAL SYSTEMS:</b>		
PSDSs and onsite treatment systems - closed portion <sup>2</sup>	50	
PSDSs and onsite treatment systems - open portion <sup>2</sup>	100	
Wastewater treatment works <sup>3, 4, 5</sup>	400	
<b>CHEMICALS:</b>		
Transmission pipelines (including but not limited to fertilizer, liquid petroleum, or anhydrous ammonia) <sup>6</sup>	100	200
Chemical and mineral storage or preparation areas, including areas for spray materials, commercial fertilizers, or chemicals that may contaminate groundwater, except for liquid propane gas (LPG)	150	
Liquid hydrocarbon storage tanks, except for LPG	100	
LPG storage tanks	15	
<b>ANIMALS:</b>		
Animal enclosures (such as confinement buildings or open feedlots)	100	200
Animal Wastes:		
Storage basins or lagoons, or runoff control basins	1000 <sup>5</sup>	
Solids stockpiles, solids settling facilities, or storage tanks	100	200
<b>WATERBODIES:</b>		
Flowing streams, ponds, lakes, reservoirs, wetlands, or drainage channels <sup>7</sup>	25	
<b>MISCELLANEOUS</b>		
Anaerobic lagoons <sup>5</sup>	1000 <sup>8</sup>	
Solid waste landfills and disposal sites <sup>8</sup>	1000	
Roadside ditches and road rights-of-way	15	
Cisterns, well pits (containing a well head), yard hydrants, or frost pits	10	

Structure or Source of Contamination	Required Minimum Lateral Distance as Measured Horizontally on the Ground Surface (feet)	
	Private Wells	
	Deep Well <sup>1</sup>	Shallow Well <sup>1</sup>
Property lines <sup>9</sup>	4	
Land application of septage <sup>10</sup>	500	
Land application of sewage sludge	200	
<b>CONVEYANCES:<sup>11</sup></b>		
Gravity sanitary sewers and sanitary sewer force mains including those carrying water treatment plant wastes:		
Water main materials <sup>12</sup>	25 <sup>13</sup>	
Standard sanitary sewer materials <sup>12</sup>	50 <sup>13</sup>	
Storm sewers, general minimums	10	
Independent clear water drains or pump house floor drains	10	
Building sewer service lines and laterals <sup>14</sup>	10	

<sup>1</sup>Deep and shallow wells are defined in rule 567—40.2(455B).

<sup>2</sup>PSDS (private sewage disposal system) is defined in 567—subrule 69.1(2). For the purposes of this table, “onsite treatment system” includes any wastewater treatment system not included in the definition of a PSDS (i.e., provides treatment or disposal of domestic sewage from more than four dwelling units or 16 or more individuals on a continuing basis) that is utilizing wastewater treatment technologies described in 567—Chapter 69 to treat domestic waste. Closed portion refers to the part of a treatment system that is fully contained and does not allow effluent or pretreated effluent to enter soil or groundwater (e.g., septic tank or impervious vault toilet). Open portion refers to the part of a treatment system that allows effluent or pretreated effluent to discharge into soil or groundwater for treatment or disposal (e.g., soil absorption system or unlined ISSF system). These SDs also apply to septic systems that are not considered privately owned.

<sup>3</sup>For the purposes of this table, “wastewater treatment works” includes lagoons and mechanical treatment plants as described in this superscript. The term “lagoons” includes aerated lagoon systems, advanced aerated lagoon systems, and waste stabilization lagoons, as defined in 567—subrule 81.1(1), and holding ponds, equalization basins, and sludge digestion or holding tanks, as described in the Iowa Wastewater Facilities Design Standards (IWFDS). The term does not include lagoons used to dispose of water treatment plant wastes and anaerobic lagoons used for animal wastes (as noted in superscript 5). The SD from lagoons shall be measured from the water surface. The term “mechanical treatment plants” includes activated sludge systems and fixed film biological treatment systems, as defined in 567—subrule 81.1(1), and any other wastewater disposal system that is not a PSDS, an onsite treatment system, or a lagoon.

<sup>4</sup>The SD between an existing, nonpotable, deep or shallow private well and an industrial treatment works may be reduced from 400 feet to 200 feet to accommodate the expansion of an existing industrial treatment works, provided the well and the treatment works share the same ownership.

<sup>5</sup>The 400-foot SD between a private well and an anaerobic lagoon, earthen manure storage basin, earthen manure slurry storage basin, or runoff control basin shall be 1,000 feet. If an applicant for a private well construction permit demonstrates through percolation testing that the seepage loss through the lagoon or basin does not exceed 1/16 inch per day (0.0625 inch/day), the SD shall be 400 feet. The percolation test shall meet the requirements of ASTM D1587/D1587M-15 and 567—subrule 65.15(11).

<sup>6</sup>These private well SDs apply only if a more restrictive setback is not set by the pipeline owner.

<sup>7</sup>Includes drainage channels that may have a direct connection to the groundwater table or a surface water.

<sup>8</sup>Solid waste, when referring to landfills and disposal sites, means garbage, refuse, rubbish, and other similar discarded solid or semisolid materials, including but not limited to such materials resulting from industrial, commercial, agricultural, and domestic activities.

<sup>9</sup>This distance applies unless a mutual easement is signed and recorded by both parties.

<sup>10</sup>Septage shall be land applied in accordance with 567—Chapter 68.

<sup>11</sup>The SDs are dependent upon two factors: the type of piping that is in the existing sewer or drain, as noted in the table, and that the piping was properly installed in accordance with the standards.

<sup>12</sup>These are the type of materials or pipe used to construct the type of sewer, main, or drain as specified, in accordance with 567—subrule 43.3(2) and Section 2.4 of the IWFDS.

<sup>13</sup>The 25- and 50-foot SDs do not apply to private closed-loop geothermal wells. The SD between closed-loop geothermal systems and both gravity sanitary sewers and sanitary sewer force mains shall be 10 feet.

<sup>14</sup>The SD for building sewer service lines and laterals shall be considered the minimum distance when constructing sewer lines and

shall be increased where possible to provide better protection.

### **Depth**

Wells shall be cased and grouted to depths that will protect the well from contamination by coliform bacteria, nitrate, and other contaminants that are found in surface water or in shallow groundwater. Ask your certified well contractor, county sanitarian, or the Iowa Geological Survey how deep your well will have to be cased and grouted to provide safe drinking water.

### **Disinfection**

Certified well contractors must use chlorinated water during well construction to prevent contamination of the new well with coliform and *iron bacteria*. The well contractor must disinfect the well with a chlorine solution after well construction, reconstruction, or pump installation or repair in order to disinfect the entire system. This water must be pumped throughout the entire water distribution system to properly disinfect the system.

### **Water testing**

The owner of a new, repaired, or rehabilitated well **shall be responsible** for submitting a water sample to a certified laboratory for coliform bacteria and nitrate analysis. The water sample shall be collected between 10 days and 30 days after a well is put in service following well construction, repair, or rehabilitation. The analysis must be done by an approved testing laboratory. A list of certified laboratories is available by contacting the [DNR Certified Labs](#) webpage. The results shall be submitted to the administrative authority.

The certified well drilling contractor may be willing to collect the water sample for you after well construction. In some counties, the county sanitarian issuing the well permit will collect these water samples. The owner should clarify who will collect the water sample and submit the results.

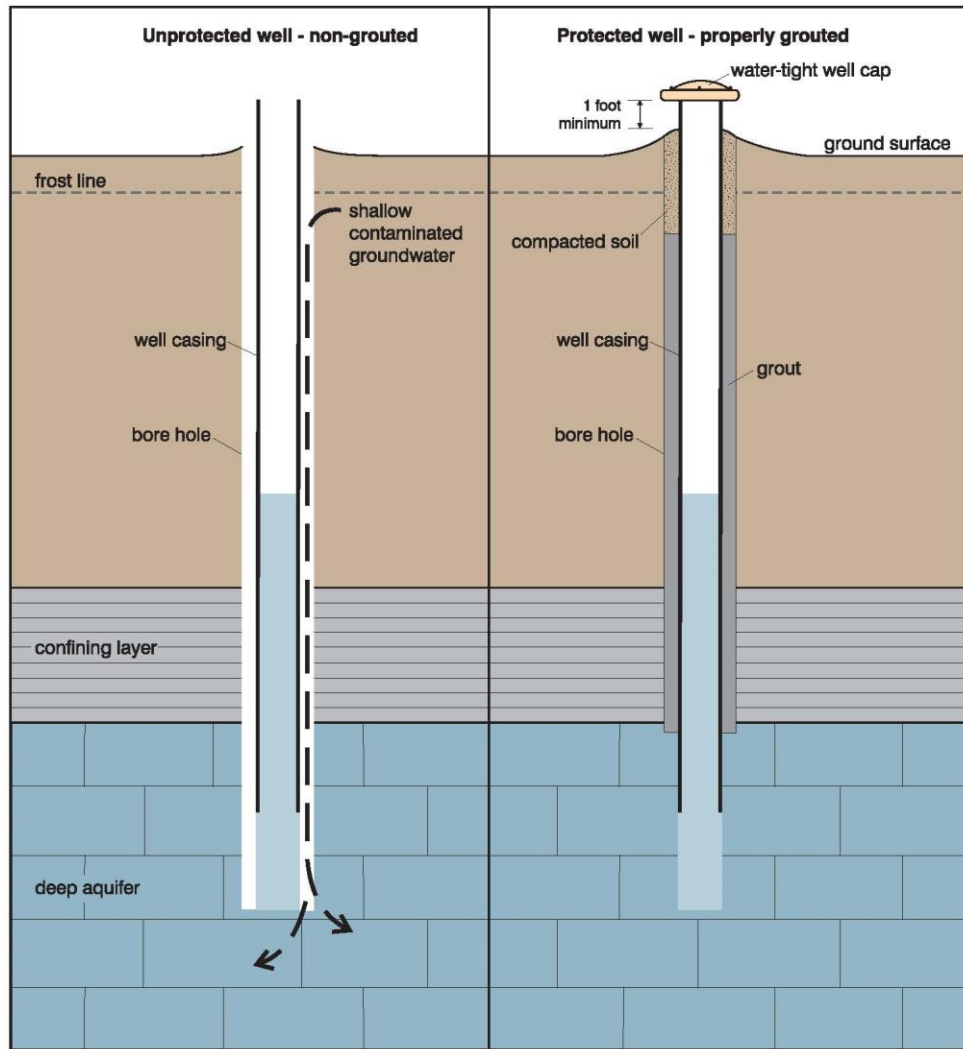


Figure 5. Grouted wells help block contaminant migration from shallow groundwater into deeper aquifers.

### Pump services

Certified *pump installers* shall follow appropriate rules and regulations for installing, rehabilitating, or repairing water systems. If pump services are performed on a well with a contamination problem, the well must be fully repaired to comply with all appropriate rules and regulations. If pump services are performed on a well that does not have a contamination problem, the well may be put back into service without complying with appropriate rules and regulations. However, certified pump installers must notify the well owner in writing of the well defects that do not comply with appropriate rules and regulations along with recommendations on how to repair those defects.

### Well drilling services

Certified well drilling contractors shall follow appropriate rules and regulations for well construction, rehabilitation, or reconstruction.

### Water distribution system design

The water distribution system design and construction are important to ensure that your well will provide safe drinking water (Figure 6). The distribution system from the well to the house shall be installed by a certified pump installer:

- **Pump.** The installation of pumps shall be designed and installed so that the pump and its surroundings are in a sanitary condition. Pumps must be properly sized to provide the necessary volume of water, where obtainable, for an adequate water supply. Pumps must be installed in such a manner as to provide adequate protection of the water supply against contamination from any sources. The pump must be accessible for maintenance, repair, and removal.
- **Piping.** Piping shall be made of an approved material. The drop pipe or the pump shall have a properly installed check valve.

- Wiring. Pump wiring must meet National Electric Code requirements and secured according to appropriate rules and regulations.
- Pitless units/adapters. Pitless adapters and pitless units must conform to standards.
- Well caps or seals. Wells must have a sanitary well cap (properly vented and screened) or well seal. Any openings must be properly sealed and factory installed.
- Sampling faucets. In order to collect samples from the well, sampling faucets are required between the well and pressure tank. The minimum height for the sampling faucet shall be 12 inches above the floor.
- Hydropneumatic (pressure) tanks. Pressure tanks must be properly sized and operated at the minimum pressure according to the manufacturer's recommendation. Buried pressure tanks will not be allowed after July 1, 2009. Buried vaults and above ground structures that do not contain the well are permitted if they meet construction standards, including being a minimum of 10 feet from the well head.

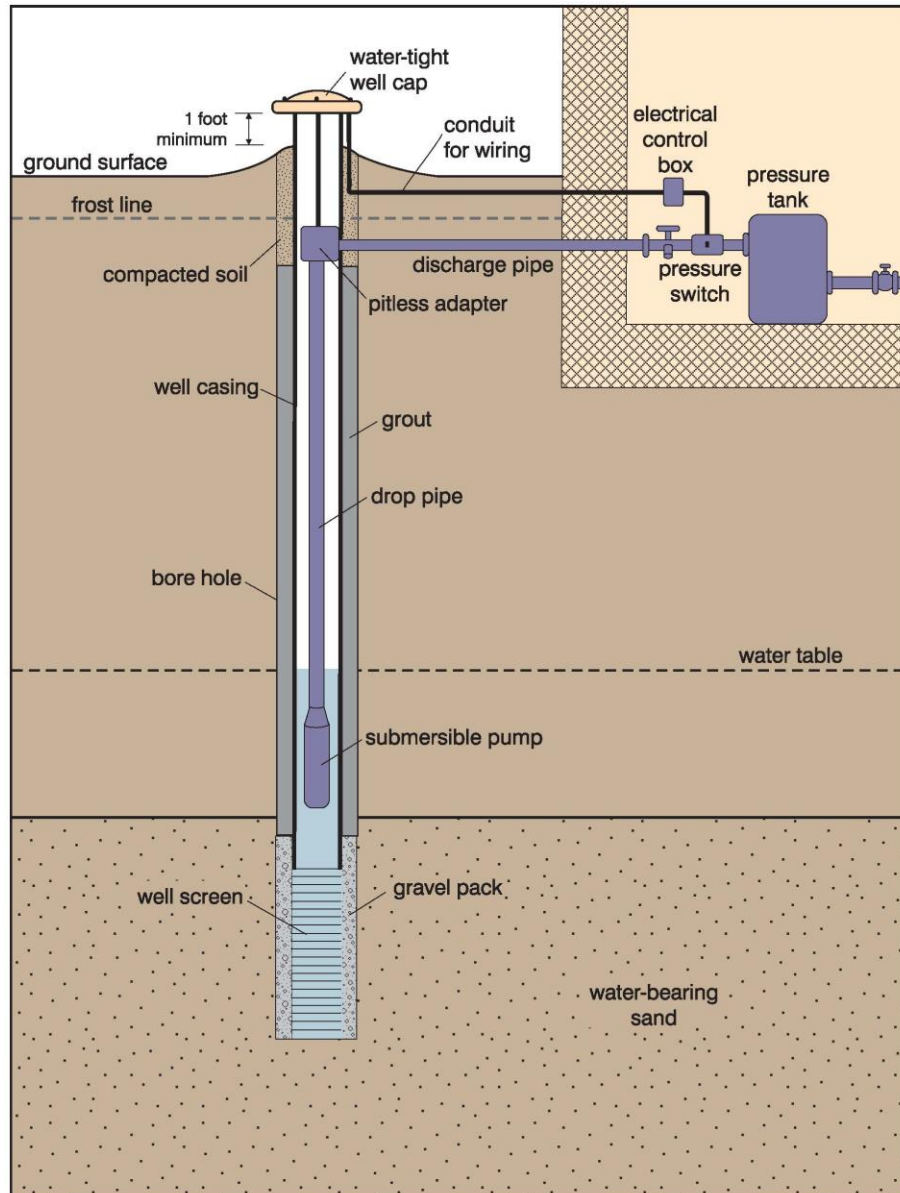


Figure 6. Distribution system. A typical domestic well installation with the discharge pipe extending into the home.

## What else should I know before I drill a new well?

### Water quantity

You should consider all present and potential water uses when determining how much water you need. Some family water uses that you should consider are the following:

- Dishwasher and washing machine.



- Multiple bathrooms.
- Lawn and garden.
- Livestock.
- Spas, hot tubs, and swimming pools.

As a rule of thumb, you will probably need 100 gallons of water per day per person for your family needs. You will need to provide more water if you have a swimming pool, lawn or garden irrigation, or a farming or commercial operation. Check with your certified well contractor, swimming pool contractor, plumbing contractor, or extension livestock specialist to determine how much water you will need for these uses.

Your certified well contractor, county sanitarian, or the Iowa Geological Survey should be able to tell you how much water can be obtained from available aquifers in your area.

### **Water quality**

Private water supply wells are not currently required to meet any drinking water standards set by the EPA or the State of Iowa. Before you drill a new well you should inquire if specific contaminants like nitrate, bacteria, *sulfur*, *fluoride*, *arsenic*, *radionuclide*, or *lead* may be a problem, or if you are in an area where highly mineralized water may be a problem. Your certified well contractor, your county sanitarian, or the Iowa Geological Survey may be able to tell you what the typical water quality is for aquifers in your area. You will find definitions for the contaminants listed above, additional listings for resources, and contact information for listed agencies at the back of this booklet.

### **Price**

You should consult certified well contractors to get an approximate estimate of costs for well drilling and pump services. You should ask prospective contractors to prepare detailed cost estimates for the following (not all items are needed for every well):

- Drilling: cost per foot and estimated number of feet to access the desired aquifer.
- Casing: type of casing, cost per foot, and estimated number of feet.
- Grout: grouting depth, type and amount of grout.
- Screen: type of screen, estimated number of feet of screen, ease of rehabilitation or cleaning of screen.
- *Gravel pack*: type, thickness, and amount of gravel pack.
- Well development (cleaning out the well in order to produce clear water).
- Disinfection.
- Well cap: type and cost.
- Cost of other materials such as drive shoes, seals, etc.
- Pitless unit.
- Pumping equipment.
- Test pumping.
- Pressure tank.
- Electrical service from the well to the pump electrical panel. e Piping from the well to the valve of the distribution system.
- Water treatment equipment.
- Water quality test: you, the well owner, are responsible for submitting the water sample and reporting the results to the administrative authority. Many certified well contractors will collect the required water sample and submit it for you for the required coliform bacteria and nitrate analysis.

When comparing costs between different contractors, remember that cheaper is not always better. Ask certified well contractors to explain why their prices are higher or lower. If the estimate sounds too good to be true, it probably is. Do not feel pressured to make a decision the same day you receive an estimate. If you are not comfortable with making a decision immediately, ask the certified well contractor to return on another day after you have had time to think about your decision.

### Selecting a certified well contractor

Choose a well contractor who is certified by the DNR to perform well drilling services. Choose a pump installer who is certified by the DNR to perform pump services. Ask for the well contractor's certification number and then contact your county sanitarian or DNR to inquire about the areas in which the well contractor is certified. Contractor certification and status can also be checked using the [Iowa Wells Information System \(IWIS\)](#) to search for them. In IWIS, go the "Search Menu" and select "Well Contractors." You can search by well contractor type: well driller, pump installer, or well plugger, or leave that section blank and it will show all types of well contractors.

After you have chosen a certified well drilling contractor and pump installer, you should ask for a written contract detailing the costs and services that will be included in well construction or pump installation before the work begins. In addition, be sure that you or your well contractor have obtained a well permit before beginning work.

### Completing the job

Keep copies of all contracts, payment records, and correspondence. Ask for a copy of the well log and pump installation log to keep with your records. The well log shows the geologic formations that the well passes through, the depth of the well, type of grout, length of casing, water level, and other well construction information. This log provides valuable information if your well needs repairs; did the well contractor save drill cutting samples from your well to give to the Iowa Geological Survey for future reference? The pump information will be valuable when routine pump maintenance is performed.

### How should I maintain my new well?

Once you have spent the money to drill a new well, you need to carefully maintain the well to protect your investment in safe drinking water.

### Periodic water testing

You can receive free annual water testing for bacteria, nitrate, manganese, and arsenic by contacting your local county health department and scheduling a sample collection. The county will collect the sample, send it to a certified lab, and contact you with the results free of charge thanks to the state's Private Well Grants program. The DNR recommends that every private well is sampled for bacteria and nitrate at least once per year. The sample should be taken from the tap where you get water for drinking and cooking. You should also have your water tested if you notice a sudden change in the water's color, taste, or odor. The results of your water tests should be kept in a safe place with the other records of the well.

### Interpreting water test results

If the sample was collected properly, the presence of total coliform bacteria in your water sample usually indicates that a structural defect in your water distribution system or in your well is allowing contamination to enter. The presence of coliform bacteria in a water sample taken from the sampling faucet of a new well may indicate that the well needs to be *shock chlorinated* again. New wells may need to be shock chlorinated more than once to thoroughly disinfect all of the materials used in well construction and pump installation, including the complete water distribution system, old water lines, water softeners, and other components. The presence of *fecal coliform bacteria* or *E.coli* in your drinking water indicates that human or animal waste may be present in your distribution system or well. The acceptable result for drinking water safety is "none detected" (e.g., "absent" or less than the detection limit such as "<1") for both total and fecal coliform (or *E. coli*) bacteria.

Your county sanitarian or certified well contractor is available to help troubleshoot well construction and water system problems. Or you can inspect the well according to the guidelines listed below. Arrange to have any problems corrected and have the well disinfected. Retest the water after you can no longer smell or taste any chlorine.

Nitrate test results are expressed as nitrate (NO<sub>3</sub>) or as nitrate-nitrogen (NO<sub>3</sub>-N). If your test results are expressed as nitrate, then the safe level for infants is 45 parts per million (ppm), or milligrams per liter (mg/L), or less. If the test results are expressed as nitrate- nitrogen, then the safe level is 10 parts per million (ppm), or milligrams per liter (mg/L), or less. If the nitrate in your water exceeds these levels, it is unsafe for infants under six months old to drink the water or eat food or drink beverages prepared with this water.

Test results should be compared from year-to-year for trends, such as increasing nitrate concentrations, and should be used in conjunction with an annual inspection of your well and water distribution system to determine if you have a water system problem.

### Record of household water quality tests

Use the checklist in (Table 2) to keep track of yearly water-quality test results in order to determine if there are water-quality issues which need addressing.

**Table 2. Yearly water-quality test results.**

Testing Date	Nitrate (NO <sub>3</sub> -N) (10 mg/L)* NO <sub>3</sub> (45mg/L)*	Total Coliform Bacteria (present / absent)*	Fecal Coliform or E. coli Bacteria - if tested (present / absent)*	Other

\*If greater than acceptable limits, address the problem immediately.  
mg/L = milligrams per Liter

### Inspecting new wells, pump installations, and distribution systems

You should inspect your well and pump installation using the following guidelines at the same time that you test your water every year - even if your water test from this year or previous years is safe.

- Casing: Are there holes or cracks visible in the casing above the ground? Is the casing vertical?
- Well Cap: Is the well cap loose or are there openings on the well cap where surface water or insects could get into the well?
- The wire conduit should be intact. Are there any bare or exposed wires visible?
- Has the landscape around the well settled or changed so that surface water runs toward the well?
- Pump and pressure tank: Is your water pressure often low or fluctuating? Do you ever turn on the faucet, and there is no water, or it runs very slowly?
- Have any contamination sources, such as a feedlot, pesticide mixing site, or other potential source of contamination been located close to your well since construction was completed? Does runoff from these locations drain towards your well?

If the answer to any of these questions is yes, then your well and water distribution system **may be developing problems which could someday compromise your drinking water quality**. You may be developing problems with nitrate or pesticide contamination. The defects found by your inspection should be corrected to ensure the safety of your drinking water. Contact your county sanitarian or certified well contractor for guidance to correcting identified defects.

### **What to do when a well has been flooded**

New wells shall have the casing at least 12 inches above established grade or the 100-year flood level, whichever is higher. However, if your well does flood, restore it by doing the following after the waters have receded:

- Pump as much water from the well as possible to flush the well and water distribution system of any contamination. Pumping should continue until the water is clear and free of unusual odors.
- Have a certified well contractor extend the water tight well casing at least one-foot above the flood level and cap the well according to rules and regulations.
- Have the well inspected for other construction or water system problems, and correct any problems that are found.
- Have the well shock chlorinated to disinfect the well. Pump the chlorinated water through the entire water distribution system and leave set for at least 12 hours. Flush the system with clean water until the chlorine odor is gone.
- After the chlorine odor is gone, sample the well water for total coliform bacteria to ensure that the water is bacterially safe to drink.
- Sample again after a week to ensure that the contamination has not returned.

### **How should I maintain my older well?**

Wells that were constructed prior to the adoption of well construction rules and regulations, or were constructed in areas that did not issue well construction permits at the local level, may require more careful inspection and maintenance than newly constructed wells to ensure a safe water supply. These wells should be tested for coliform bacteria and nitrate at least once each year (see “Interpreting water test results”). These wells must be checked very carefully for construction defects. The best way to accomplish this is to contact a certified well contractor or your county sanitarian.

### **Well rehabilitation**

Many older wells can be repaired to correct the construction problems that may be causing unsafe water test results. In many cases, repair of these wells is less expensive than drilling a new well and is a more permanent solution than installing a water treatment system. Your well will be easier to repair if you have a well log or other construction records available. These records can be examined to see what might be causing the problems with your well.

Wells cased with large diameter concrete tile are often contaminated with coliform bacteria since these wells are usually not grouted and the joints between the tile segments allow seepage water to enter the well from very shallow depths (less than 10 feet). The bacterial contamination can often be eliminated by converting these wells to “buried-slab” construction. In “buried-slab” construction, the top 10 feet of concrete tile is removed and replaced with small diameter plastic or steel casing. A pitless adapter is installed so that the well pit can be eliminated, and a properly installed well cap is installed on the steel or plastic casing. This design usually eliminates bacterial contamination since the top 10 feet of the well casing is now water-tight. Figure 3 shows a well that has been repaired with buried slab construction.

Likewise, wells in frost pits can be converted to safe water supplies by extending the waterproof casing to 12 inches above ground level, installing a pitless adapter, and by filling the pit with soil compacted around the casing and sloped away from the well.

### **Disinfection (shock chlorination)**

Wells that have been repaired or rehabilitated or had a pump replaced or repaired are required to be disinfected by the certified well contractor before returning the well to service. Wells that have been flooded should also be disinfected. Disinfection rules and regulations specify chlorine solutions and general methods for ensuring that the chlorine solution accomplishes the desired disinfection. This procedure must be done carefully to avoid causing problems with the well pump or water system.

If you wish to shock chlorinate your own well, you should contact your certified well contractor or county sanitarian for assistance. Improper shock chlorination techniques can cause damage to the well components.

Ten days after the water system has been flushed of all chlorine residual (this may take two - three days), collect a water sample and have it analyzed for coliform bacteria by an approved laboratory. A list of these laboratories is available by contacting the DNR. Shock chlorination of a well that still has well construction, pump installation, or water distribution problems **will not** permanently correct a coliform bacteria problem.

### **Water treatment systems**

Water treatment systems can be used to remove health-related contaminants, such as coliform bacteria and nitrate, or aesthetic constituent such as hardness, iron, and iron bacteria from well water. Water treatment systems should be considered for health-related contaminants only after other options are evaluated. First, talk to a certified well contractor to determine if repair of the well, pump, or distribution system defects is feasible. If not, examine the cost of a replacement well and determine if it is likely that a new well would produce safe water or investigate the potential of connecting to a public water supply. The State Hygienic Laboratory (SHL) also has information on water treatment systems. Please review their [“Home Treatment Systems” booklet](#) for more information.

### **What should I do with an abandoned well?**

Iowa rules and regulations require that abandoned wells be properly plugged within 90 days of abandonment. Consult your local county sanitarian or certified well contractor for the proper well plugging procedures. **You, the well owner, must certify** to the DNR on the proper form that the abandoned well has been plugged in accordance with these rules and regulations. The county’s designated agent or a certified well contractor must also confirm on this form that the well has been properly plugged. The form may be obtained from the county sanitarian or the DNR.

### **How do I file a complaint about a well contractor?**

You may file a complaint regarding a certified well contractor by contacting the county sanitarian that issues non-public (private) well permits or by contacting the Iowa Department of Natural Resources, 502 E 9<sup>th</sup> St, Des Moines IA 50319 (515-402-7981). The complaint must include:

- The name and address of the certified well contractor.
- The details of the action(s) taken by the certified well contractor that appears to be in violation of the well contractor certification, well construction, or pump installation rules and regulations.
- Where and when the violation took place.

All complaints will be investigated. You may ask to receive a copy of the report and final disposition of the complaint.

### **Where can I get more information?**

If you want more detailed information about well contractor certification, well construction, pump installation, well abandonment, or related topics, such as water-quality, aquifer, or well maintenance information, you can contact the following agencies or groups:

#### **Local health departments (county sanitarians)**

For information about local well construction regulations, water testing, well plugging, and well inspection services, contact your county sanitarian or environmental health official. You can find their contact information on the [DNR’s Private Well Program - Well Testing](#) webpage.

#### **Iowa Department of Natural Resources (DNR)**

Water Supply Engineering Section, 6200 Park Ave Ste 200, Des Moines, IA 50321; <https://iowadnr.gov/Environmental-Protection/Water-Quality/Private-Well-Program>

For information about state regulations for private wells or a listing of certified well contractors call 515-402-7981.

**Iowa Geological Survey**

300 Trowbridge Hall, Iowa City, IA 52242-1319; <https://iowageologicalsurvey.uiowa.edu/>

For information about aquifers, hydrogeology, water quantity, water quality, or wells, call 319-335-1575.

**Iowa Department of Health and Human Services (HHS)**

321 E 12<sup>th</sup> St, Des Moines IA 50319; <https://hhs.iowa.gov/>

For information about health effects of contaminants found in drinking water 800-972-2017.

Consumer information pamphlet “Residential Water Treatment Systems” is also available.

**State Hygienic Laboratory (SHL)**

2490 Crosspark Rd, Coralville IA 52241; <http://www.shl.uiowa.edu/>;

Private Wells: <http://shl.uiowa.edu/env/privatewell/grantstocounties.xml>

For information about testing your water, the interpretation of test results, and water treatment systems, call 319-335-4500.

**Iowa State University Extension and Outreach - Private Well Stewardship Program**

339 Science II, Ames IA 50011; 515-294-5963; <https://naturalresources.extension.iastate.edu/private-well-stewardship-program>

For information about water testing, well construction, water quality, well condition and maintenance.

**Iowa Farm Bureau**

5400 University Ave, West Des Moines IA 50266; 515-225-5400; <https://www.iowafarmbureau.com/Article/FarmASyst>

Farm\*A\*Syst program provides information on agricultural and water systems (required membership).

**Iowa Administrative Code (IAC)**

Legislative Services Agency; 515-281-3568; <https://www.legis.iowa.gov/law/administrativeRules/agencies>

- Requirements for properly plugging abandoned wells (IAC567-Chapter 39).
- Private well testing, reconstruction, and plugging - Iowa Private Well Grants (IAC641- Chapter 24).
- Nonpublic water wells - permits and construction (IAC567-Chapter 49).
- Well contractor certification (IAC567-Chapter 82).

**Certified well contractors**

Call the DNR at 515-402-7981 for a listing of Iowa certified well drillers, pump installers, and well pluggers.

Use the [Iowa Wells Information System \(IWIS\)](#) to search for them. In IWIS, go the “Search Menu” and select “Well Contractors.” You can search by well contractor type: well driller, pump installer, or well plugger, or leave that section blank and it will show all types of well contractors.

**Related organizations and other sources of information**

- Iowa Water Well Association (IWWA); 1080 Jordan Creek Pkwy Ste 106C, West Des Moines IA 50266; 515-284-7055; [info@iwwa.org](mailto:info@iwwa.org); <https://www.iwwa.org/>
- Iowa Environmental Health Association (IEHA); [Iowa.EHA@gmail.com](mailto:Iowa.EHA@gmail.com); <https://www.ieha.net/>
- Iowa Groundwater Association (IGWA); <https://www.igwa.org/>
- National Ground Water Association (NGWA); 601 Dempsey Rd, Westerville OH 43081; 800-551-7379; [ngwa@ngwa.org](mailto:ngwa@ngwa.org); <http://www.ngwa.org>
- American Ground Water Trust (AGWT); 50 Pleasant St Ste 2, Concord NH 03301; 603-228-5444; [trustinfo@agwt.org](mailto:trustinfo@agwt.org); <https://agwt.org/>
- Water Systems Council; 1101 30<sup>th</sup> St NW Ste 500; Washington, DC 20007; 202-625-4387; [wsc@watersystemscouncil.org](mailto:wsc@watersystemscouncil.org); <https://www.watersystemscouncil.org/>
- Environmental Protection Agency (EPA); <https://www.epa.gov/ground-water-and-drinking-water>, for publications on private drinking water wells.
- Centers for Disease Control and Prevention (CDC), 1600 Clifton Rd, Atlanta GA 30333; Public Inquiries: 800-232-4636; <https://www.cdc.gov/>



## Glossary of Terms

**administrative authority** - the local board of health.

**aquifer** - a water-bearing geologic formation capable of yielding a usable quantity of water to a well or spring.

**arsenic** - a naturally occurring element that occurs at low levels in some of Iowa's soils and bedrocks. There are water supply wells in Iowa that have been found to contain levels of arsenic above the current Environmental Protection Agency public water maximum contaminant level of 0.010 mg/L (10 µg/L or parts per billion.) Long-term exposure to arsenic can cause the darkening of skin, the appearance of small corns or warts, and has been linked to skin cancer. Prolonged exposure to arsenic at high levels can result in nervous and digestive system problems. The Environmental Protection Agency recommends that any water supply with more than 0.010 mg/L (10 µg/L) of arsenic not be used as a long term source of water for drinking or cooking. Because arsenic is not easily absorbed through the skin and doesn't evaporate from water, exposure to arsenic from household uses such as bathing, washing dishes and laundry is minimal. Further information on arsenic and drinking water can be found at this web site:  
<http://www.epa.gov/safewater/arsenic/basicinformation.html>.

**bedrock** - solid rock that underlies soil or other unconsolidated surficial earth materials.

**casing** - a tubular retaining structure installed in an excavated hole to maintain the well opening.

**certified well contractor** - a well contractor who has successfully passed an examination prescribed by the Iowa Department of Natural Resources to determine the applicant's qualifications to perform well drilling services, pump services, or well plugging services.

**certified laboratory** - a laboratory that demonstrates to the satisfaction of the Iowa Department of Natural Resources its ability to consistently produce valid data within acceptable limits as specified within the Department's requirements for certification, and meets the minimum requirements of all rules and regulations and all applicable regulatory requirements.

**coliform bacteria (or total coliform bacteria)** - a group of microorganisms that are normally present in soil, surface water, and sewage. Testing for this group is used to indicate the sanitary quality of drinking water. As a group they are referred to as "indicator" bacteria because their presence indicates contamination from one of these sources and, thus, indicate the water is not safe to drink. The presence of coliform bacteria implies that the system has been compromised and other harmful organisms may already be present or have the opportunity to enter the system.

***E.coli*** - abbreviated name for a type of bacteria called *Escherichia coli* that is the predominant fecal coliform bacteria in animal or human intestines. Their presence in drinking water may indicate contamination from a sewage source and, thus, indicate the water is not safe to drink. The presence of coliform bacteria in a water system indicates vulnerability to contamination and ineffective disinfection whereas the presence of *E. coli* indicates fecal pollution. People drinking water with these bacteria are at increased risk of contracting a waterborne disease.

**fecal coliform bacteria** - group of microorganisms that are normally present in human and animal sewage. Their presence in drinking water may indicate contamination from this source and, thus, indicate the water is not safe to drink. Fecal coliform bacteria is a subset of the total coliform bacteria group.

**fluoride** - a naturally occurring element in Iowa's groundwater. Although considered an essential element at low levels in the promotion of dental health, prolonged exposure to high fluoride levels in drinking water can increase the risk of bone disease. The Environmental Protection Agency has established an MCL for fluoride at 4.0 mg/l in public water systems. Regular consumption of water with fluoride levels greater than 2.0 mg/L by young children may cause dental fluorosis in the developing teeth. Dental fluorosis is a cosmetic defect of the teeth ranging from opaque white spots to brown stains. It has no effect on general health or the function of the teeth. The DNR recommends that any water supply that contains more than 4.0 mg/L of fluoride not be used as a long term source of water for drinking or cooking.

In addition, children under nine years of age should not drink water that contains more than 2.0 mg/L of fluoride.

Further information about fluoride and drinking water can be found on the EPA's website:

<https://www.epa.gov/sdwa/fluoride-risk-assessment-and-relative-source-contribution>

**gravel pack** - gravel or sand placed opposite a water-bearing sand or gravel formation to prevent or retard the movement of loose sand grains into the well bore.

**grout** - slurry mixture of cement or bentonite and water that can be pumped through a pipe and placed as a protective fill or seal during well construction.

**iron bacteria** - group of microorganisms that occur naturally in soil, some shallow aquifers, and surface water. These microorganisms utilize iron compounds for their energy needs and can produce large amounts of orange-brown slime. These organisms do not pose a health threat. This group is also referred to as "nuisance bacteria" because these microorganisms can cause severe plugging, fouling, and odor problems in the well, distribution, and treatment systems.

**large-diameter bored or augered wells (Class 1 Wells)** - a well 100 feet or less in depth and 18 inches or more in diameter.

**lead** - a naturally occurring element that can be found in specific geologic conditions in northeast Iowa. Most of Iowa's aquifers do not contribute to lead in drinking water although some groundwater can be corrosive and cause any lead materials used in the plumbing of the home to slowly dissolve into the water contained in the plumbing. Lead in drinking water can also come from the corrosion of plumbing materials within the home. Long term exposure of lead reduces the functions of the nervous system, can cause anemia, and damage the brain and kidneys. The Environmental Protection Agency has established a "take action" level for lead in public water supplies of 0.015 mg/L. Further information on lead and drinking water can be found on the EPA's website: <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water>

**nitrate** - NO<sub>3</sub>. The major sources of nitrate in groundwater include fertilizers, animal manure, seepage from septic systems, soil mineralization, legume fixation, and atmospheric fallout from combustion of fossil fuel. Background levels of nitrate in groundwater may reach 3 mg/L because of natural decomposition and soil bacteria. Higher nitrate levels are associated with anthropogenic (man-made) sources. The Environmental Protection Agency (EPA) established an MCL of 10 mg/L for nitrate-nitrogen (45 mg/L as nitrate [NO<sub>3</sub>]) in public water systems because infants are particularly susceptible to nitrate and may develop the life-threatening disorder called methemoglobinemia (blue-baby syndrome).

**non-public (private) well** - a well that does not supply a public water supply. (A public water supply is a system that has at least 15 service connections or regularly serves an average of at least 25 individuals daily for at least 60 days out of the year.)

**pitless adapter/pitless unit** - sanitary devices, that prevent the entrance of contaminants to the well, which attach to openings in the well casing for the purpose of conducting water from the well to the water system.

**pump installer** - a person certified by the Iowa Department of Natural Resources to perform pump services.

**pump services** - the installation, repair, and maintenance of water systems; modification of the upper terminus (upper 10 feet) of a well; well plugging; well rehabilitation; or the construction of Class 3 wells.

**radionuclide** - a naturally occurring radioactive element that can be found within specific aquifers in Iowa. Radionuclides are a consequence of the decay of uranium-238 and thorium-232. The decay happens because radioactive atoms have too much energy, and they release or transfer that energy. The energy that is released during this decay is called ionizing radiation and can be classified as alpha particles, beta particles, or gamma rays. Long term exposure to ionizing radiation can lead to several types of cancer. Although most radioactive contaminants in Iowa's groundwater are at levels that are low enough that they are not considered a public health concern, there are several types of radionuclides that are used as indicators for regulatory action for public drinking water supplies. The Environmental Protection Agency has

established a public drinking water MCL for radionuclides of combined Radium 226 and 228 at 5 pCi/L (Picocuries per Liter). Further information on radionuclides and drinking water can be found on the EPA's website:

<https://www.epa.gov/radiation/radionuclides>

**sandpoint wells (Class 3 Wells)** - 50 feet or less in depth and having a casing inside diameter of 2 inches or less, constructed by joining a screened drive point with lengths of pipe and driving the assembly into a shallow sand and gravel aquifer.

**shock chlorination** - the process of adding a high level of chlorine to a well in order to kill bacteria and, thus, disinfect the entire water system by using a concentrated chlorine solution and pumping it throughout the entire distribution system.

**small-diameter drilled wells (Class 2 Wells)** - a well more than 100 feet in depth or less than 18 inches in diameter or a bedrock well.

**sulfur, sulfates, and sulfides** - naturally occurring forms of sulfur which can be found in some of Iowa's groundwater and are generally considered nuisance contaminants because of the "rotten egg" smell and the unpleasant taste that they can give to the water. Although not usually a significant health risk, high concentrations of sulfate ( $\text{SO}_4^-$ ) may be associated with diarrhea. For this reason, and for aesthetic reasons related to taste and odor, the Environmental Protection Agency currently has established a secondary drinking-water standard for Public Water Supplies of 250 milligrams per liter (mg/L) sulfate. Hydrogen sulfide gas ( $\text{H}_2\text{S}$ ) can be present in well water. A few tenths of a milligram per liter of hydrogen sulfide can cause drinking water to have a rotten-egg odor. Although unpleasant to smell, hydrogen sulfide gas in water is generally not harmful to health. Further information on sulfur can be found on the EPA's website:

<https://www.epa.gov/sdwa/secondary-drinking-water-standards-guidance-nuisance-chemicals>

**water-bearing** - (see aquifer).

**well cap** - a tight-fitting cover at the top of the casing to prevent contaminated water or other material from entering the well.

**well construction** - constructing a water well and installing necessary casing, screen, liners, grout, seals, and other appurtenances.

**well driller** - a person certified by the Iowa Department of Natural Resources to perform well drilling services.

**well drilling services** - new well construction, well reconstruction, well repair, well rehabilitation, installation of pitless equipment, or well plugging.

**well plugging** - the closure of an abandoned well by procedures which will permanently seal the well from contamination by surface drainage and permanently prevent the well from contaminating an aquifer. This involves the proper application of filling and sealing materials.

**well reconstruction** - modifying the original construction of a well. Reconstruction includes, but is not limited to, deepening the well, installing a liner, installing or replacing a screen with one of a different diameter or length, installing a pitless adapter, extending the casing, or hydrofracturing a well. Replacing a screen with one of identical diameter and length or replacing a pitless adapter would be considered repair, not reconstruction.

**well rehabilitation** - the physical or chemical cleaning of a well.

**well screen** - a screen installed in wells to permit sand-free water to flow into the well; the slot size opening of the well screen is sized to prevent formation sand from entering the well bore.

**well services** - both well drilling services and pump services.

## General Well Information

IWIS Permit Number: \_\_\_\_\_ IWIS Well Number: \_\_\_\_\_

Year of construction: \_\_\_\_\_ ☐ Actual ☐ Approximate

Well diameter: \_\_\_\_\_ Inches      ☐ Actual      ☐ Approximate

Depth of well: \_\_\_\_\_ Feet ☐ Actual ☐ Approximate

Well water level (static water level): \_\_\_\_\_ Feet      Date: \_\_\_\_\_

## Well pump information

Depth to pump: \_\_\_\_\_ Feet                      Pump capacity \_\_\_\_\_ GPM

Pump horsepower: \_\_\_\_\_ Pump Voltage: \_\_\_\_\_

Notes regarding well (well location, historical service information, well service provider, etc.):

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Available from: Iowa Department of Natural Resources 6200 Park Ave Ste 200, Des Moines, IA 50321, (515) 725-8200