



Your Water Well System - A System of Choice



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Your Water Well System - A System of Choice

***Congratulations!** If you are reading this booklet you either have a private water well system or are planning to have one constructed. Your water well system is a valuable asset to your property as it can provide you a quality source of drinking water that you control. Because the water well system is yours, you decide what treatments, if any, you want. You decide when you want to use your water and how you want to use it.*

A properly constructed water well system is a privilege that many people don't have. It can provide fresh, naturally filtered water allowing you to make decisions for safeguarding your family's health.

Your water well system taps into nature's greatest treasure – cool, clean groundwater. This precious resource will serve you every day for cooking, washing, and supplying safe drinking water. Of course, along with the benefits comes a certain amount of responsibility. As an owner, you must ensure that your water well system is properly maintained and is kept in good condition. After all, it's an asset to your property and one you want to protect.

This book provides information on groundwater, your water well system, maintenance and best practices for its protection. It can not be stressed enough that as a water well system owner there are certain ongoing responsibilities you must take. Maintenance of your water well system is as important as maintenance of your house or car. Some things you will be able to do yourself while others are best left to professionals.

The Illinois Association of Groundwater Professionals recommends contacting a licensed water well professional to establish a schedule for routine inspection and maintenance for your water well system.





The Association of Groundwater Professionals is especially appreciative for the financial support to publish this booklet from the following:



Atlas Copco



The originator of the diaphragm water well pressure tank

Amtrol



Franklin Electric



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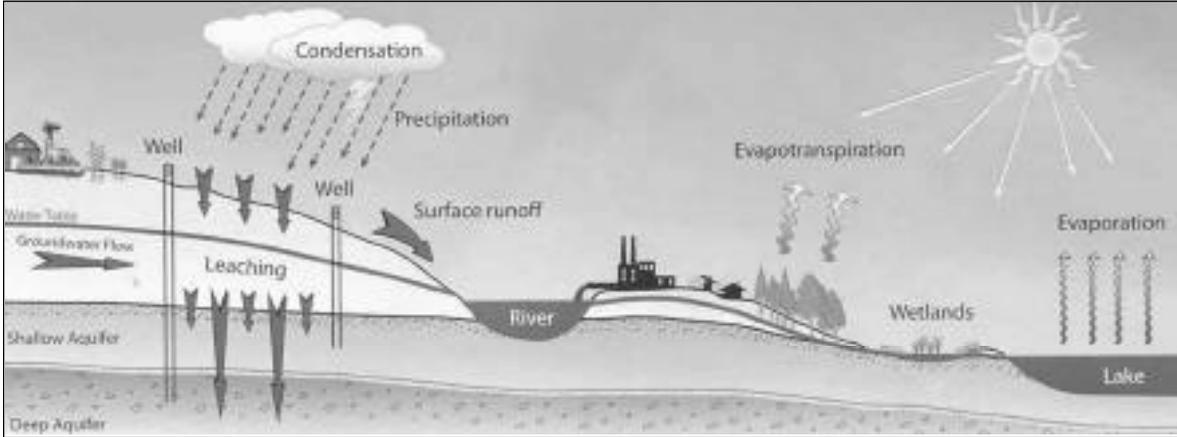
We also appreciate and thank the many IAGP members who gave input into this booklet.

Booklet designed by: Olga Lindsay, Lindsaydesigngroup, Marseilles, IL

Approximately 47% of the US population depends on groundwater for drinking water. In Illinois, 813 million gallons of groundwater are used daily through public and private water well systems. With so many depending on groundwater, it is critical that everyone take a best practice approach in the utilization and protection of this essential resource.



Groundwater Basics



Hydrological Cycle chart courtesy of Illinois State Water Survey

HYDROLOGICAL CYCLE

The groundwater your water well system draws from originates from surface water and precipitation, including rain and melting snow that has infiltrated the earth, filling the cracks and open spaces in the rocks and the soil. The water percolates, or moves down, through the soil until it reaches a level where all of the available space is completely filled with water. This is called the zone of saturation. The water contained in this zone of saturation is called groundwater and the uppermost limit of this zone is known as the water table. Saturated layers below the water table that store and transmit significant quantities of groundwater – i.e., enough to supply a water well system – are called aquifers.

In general, groundwater for domestic use is bacteriologically safe in its natural state. All surface bodies of water are unsafe until disinfectants are used to treat them. Illinois is fortunate to have a generous supply of groundwater though its quality and quantity can vary as a result of the glacial activity of the last Ice Age. Groundwater will flow towards a pumping water well; therefore it is important to keep the area around your water well free of possible contaminants. Be aware of potential hazards: livestock waste, poorly maintained septic systems, area industries, surface runoff, flooding potential, etc. In general, groundwater moves very slowly from a few inches a day to a few feet per day. As a water well system owner, you need to be vigilant in protecting your groundwater supply. Once an aquifer is contaminated, it can take a very long time to recover, if ever.

The Illinois Department of Public Health, Division of Environmental Health, oversees private, semi-private and non-community well systems with water well permits, codes and contractor licensure.



A Water Well System

- Before Construction Begins
- How Much Water Will You Need?
- Water Well Location
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- Water Well Construction
- Typical Construction Method for Domestic Water Well
- Water Well Development
- Grouting
- Large-Diameter Bored Water Wells (Buried Slab)
- Water Well Caps and Seals
- Flood Areas
- Installing the Water Well Pumping System
- Sampling Tap at Pressure Tank
- Disinfecting and Testing Your Water
- The Life of Your Water Well System
- Upgrading Your Water Well System
- Upgrade Your Water Well or Construct a New One?
- Water Well Pits
- Sealing Abandoned Water Wells

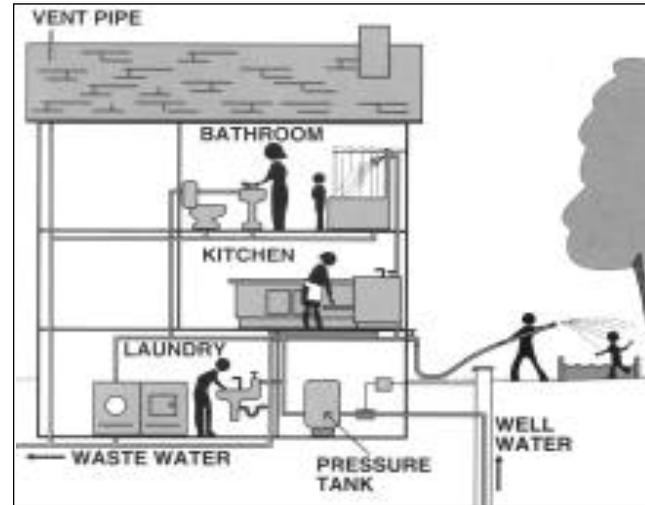


Before Construction Begins

By law, only an Illinois licensed water well contractor can construct a water well. **By law**, only a licensed pump installer can install your water supply system, i.e. tank, pump and controls. It is important to consult your contractor to validate a current license status. Planning your water supply system, its design, and application is essential. Plan to meet with your licensed contractor to discuss your water needs for lawn irrigation, pools, ponds, spas, multiple bathroom fixtures, hot tubs, livestock, or commercial, agricultural or industrial use. Since multiple factors can come into play, call your licensed professional for input and advice. Planning will save a lot of time, disappointment and dollars.

How Much Water Will You Need?

Households are using more water than ever before. Life styles, appliances and high volume bathroom fixtures add significantly to a household's water usage and need to be factored into the water well system design ahead of time. You don't want to create your beautiful new home only to discover that the production capacity of your water system can't deliver the amount of water your appliances demand. Consulting with your licensed professional in advance of construction can't be stressed enough.



House Cross Section drawing courtesy of American Ground Water Trust



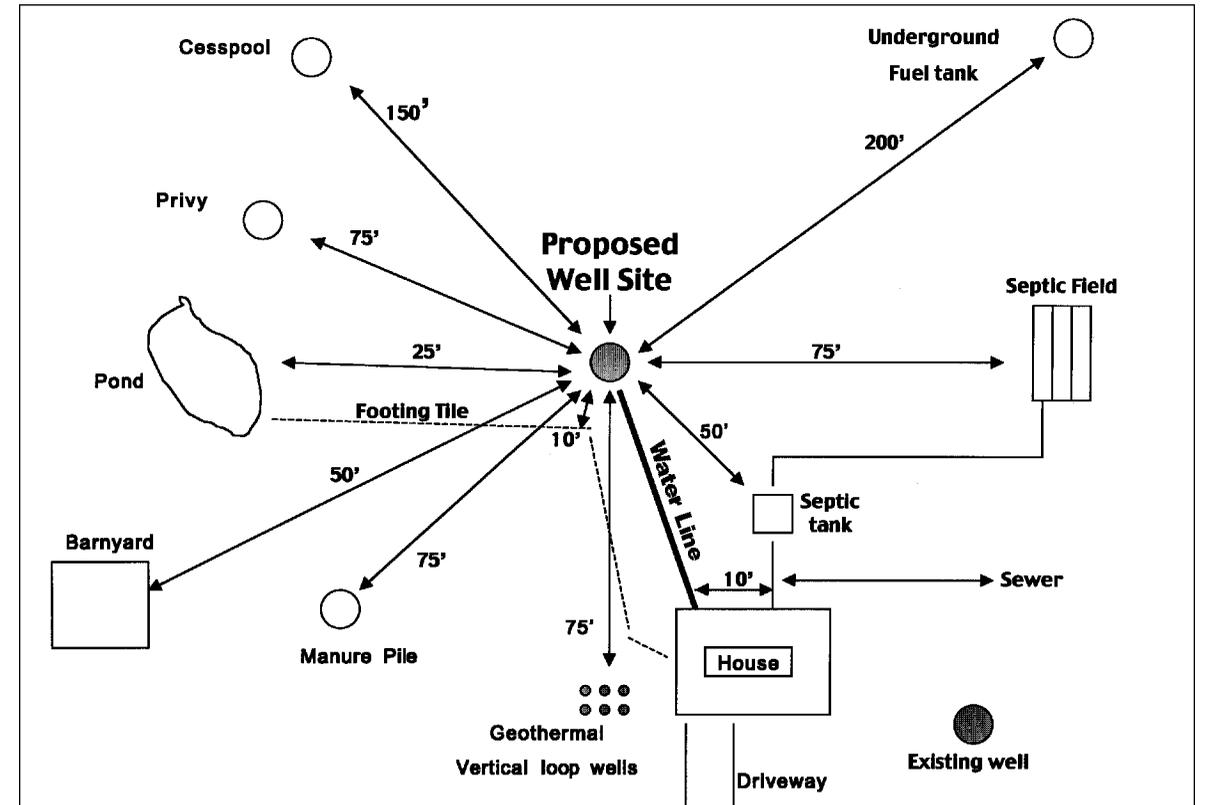
Your well is an important asset to your property, so why not show it off!

Water Well Location

The Illinois Water Well Construction Code sets parameters as to where a water well can be located to protect against potential contamination.

Generally, if you are constructing a new water well, think carefully about the best location:

- **High point of land** where run-off and other potential contaminants drain away from the water well head. The area nearby can be landscaped and contoured to help direct run-off from the water well. Never plant trees, shrubs or flowers directly against the water well.
- **Ease of access** for construction and periodic maintenance.
- **Required Set-backs:** Illinois code requires certain distances from potential sources of contamination.
- **Visibility** further protects against accidental damage to the wellhead.



Access and Visibility

Keep your well visible. You don't want it being hit by vehicles nor do you want to use chemicals near it. Illinois enjoys a generous supply of groundwater, although it is not always evenly distributed. Depth to aquifers also will vary. Interestingly, variation can occur at distances of a few feet. It just depends on Mother Nature. Illinois is fortunate to have an abundance of geological information on file at the State Water Survey and the State Geological Survey. This data comes from water well construction logs submitted by the water well contractor. Records go back before 1890.

Set-backs (minimum distances for owner occupied residences)

Common set-backs that separated a water well from potential contaminant sources as follows:

Septic tank	50 feet
Barnyard or animal confinement lot	50 feet
Manure piles	75 feet
Pits, Crawl Spaces or Basements	5 feet
Lakes, Ponds, Streams	25 feet
Closed-loop (geothermal) wells	75 feet or 200 feet (neighboring)

Water Well Construction

Over the years, water well design has improved to reflect advances in technology and our understanding of potential pathways of contamination. The Illinois Water Well Construction Code, established in 1959, and the Illinois Water Well Pump Installation Code, established in 1972, are periodically modified to reflect industry advancements. The Illinois Department of Public Health, Division of Environmental Health, oversees private, semi-private and non-community well systems. Individuals that construct or service water well systems must be licensed in Illinois and attend continuing education sessions.

Illinois requires a water well permit to construct or modify a water well and sometimes to seal one (varies by county). The permit is issued by the local health department upon payment of the appropriate fee and submission of a completed permit application.

Generally, the licensed contractor applies for the permit on behalf of the well owner since the licensed contractor must sign the water well permit application. After the water well is completed, the licensed contractor must complete a Construction Report and submit it to the health department. You should be provided with a copy of both these documents. Keep them along with any other water well documents and service records you are given as they provide important information should your well require service.

PERMIT FEE: \$108.00
DO NOT SEND CASH

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
APPLICATION FOR PERMIT TO CONSTRUCT OR DEEPEN A WATER WELL

INCOMPLETE APPLICATIONS WILL BE RETURNED INSTRUCTIONS ON REVERSE SIDE

1. Well Owner - Current Mailing Address
Name _____
Address _____
City/State/ZIP _____
Telephone Number _____

2. Well Contractor License # _____
Name _____
Address _____
City/State/ZIP _____
Telephone Number _____

3. Well Site: County _____ Township _____
Address _____ City _____ Lot # _____
Land ID # _____ Subdivision _____
Section _____ Township _____ Range _____ 1/4 of the _____ 1/4 of the _____ 1/4
Directions to Site _____
(If more space is needed see reverse side or place on additional sheet.)

4. Propose to: Construct or Deepen a Bored Driven Drilled
A. Private B. Semi-Private C. Non-Community Public Well
Proposed Use: Irrigation Domestic Commercial Livestock Other _____
Well Diameter _____ in. Estimated Depth _____ ft. Estimated Depth to Rock _____ ft.
Anticipated Aquifer: Sand and Gravel Limestone Sandstone Other _____

Typical Construction Method For Domestic Water Well

Drilled water wells are the most common form of water well construction in Illinois. The underlying geology (bedrock or sand/gravel) will change slightly the materials used in construction.

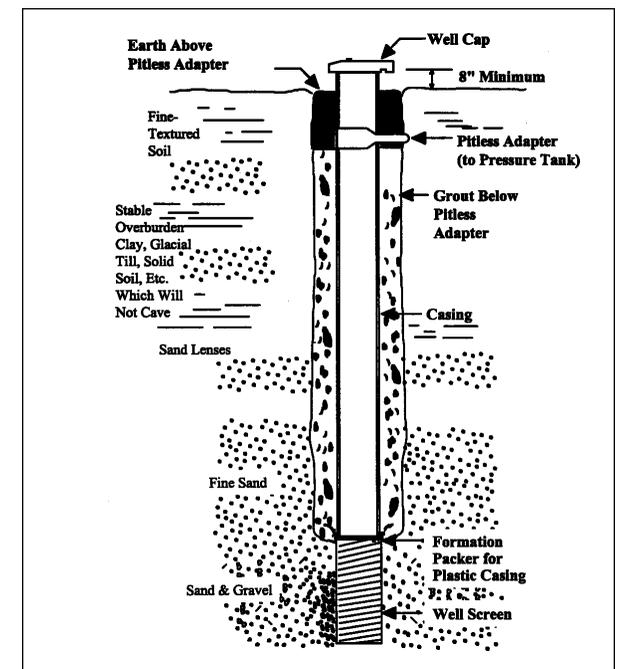
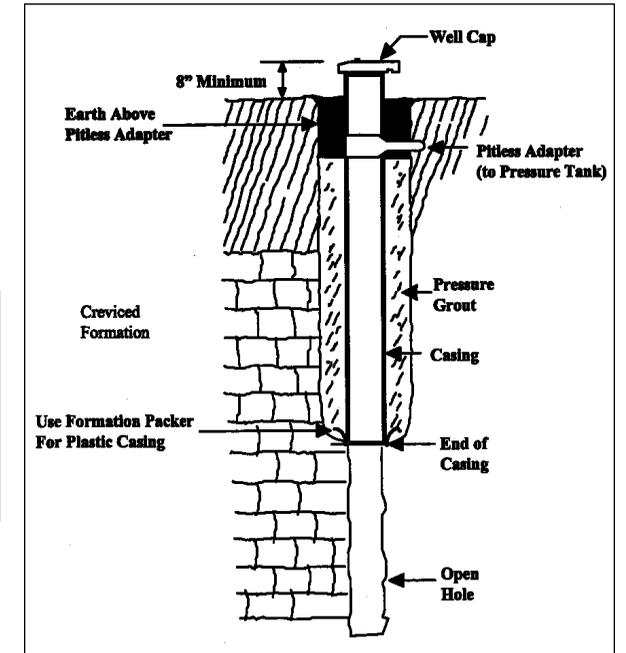
Drilled Well Typical Characteristics

- 4-6 inches in diameter
- 125-300 feet deep
(but can be as much as 1000 feet)
- Drilling method either rotary or cable tool
- PVC or steel casing

Bedrock (consolidated formation) Water wells have the PVC or steel water well casing firmly set into the bedrock which seals off all the geological material above the bedrock. No well screen is needed.

Sand and Gravel (unconsolidated formation) Water wells are cased with either PVC or steel; casing the entire depth of the borehole and finished into the sand and gravel aquifer with a well screen which allows water to pass through while holding back sand and gravel particles in the aquifer. The driller will analyze the drill cuttings to determine the appropriate size screen and placement.

The water well casing on all water wells must extend a minimum of 8 inches above finished grade and be finished with an Illinois approved well cap or seal that is water tight, vermin proof, vented and removable only with tools. The annular space between the water well casing and the borehole must then be pressure grouted in place to provide a watertight seal against surface contaminants entering the well.



Drawings from the Illinois Water Well Construction Code

Water Well Development

Once the water well is drilled, it is developed to provide clear, sediment-free water. The process is done either by pumping or surging with air. An undeveloped water well can affect the production capacity of the water well and/or cause premature wearing out of the pump. *Proper development takes time and adds to the total cost of the well but pays for itself by extending the life of your system.*

After development, a pump test is done to determine the capacity the water well has for producing water. This information is then used to determine an appropriately sized pumping system to adequately meet the household's peak demand. The original capacity of your water well and water levels are another important piece of information that you should keep with your water well records.



Grouting

Bentonite or neat cement are the approved grouting materials in Illinois. Grouting serves as protection against run-off, surface water, and near-surface waters that could otherwise travel down the outside of the water well casing and contaminate the aquifer.

By code, all drilled water wells must be pressure grouted from bottom to just below the pitless adapter. Once the pitless adapter is installed, the remaining open annular space between the water well casing and the excavation created for the installation of the pitless adapter is filled with packed earth. When finished, mounding earth around the wellhead allows for drainage away from it. Watch for subsidence or cracking of the earth around the water well casing as a sign that the annular seal has been compromised.

Components of a Water Well System:

- Casing
- Screen
- Drop pipe
- Pump
- Electrical Wire
- Well cap or seal
- Pitless Adapter
- Grout
- Tank
- Pressure Switch
- Sampling Tap

By code components must be Illinois approved

Large-Diameter Bored Water Wells (Buried Slab)

Bored water wells are generally in areas where groundwater is captured in small lenses with low flow rates. These water wells average 24-36 inches in diameter and are usually no more than 65 feet deep. The large diameter of these water wells gives them a high storage capacity which off-sets their slow production rate.

Perforated fiberglass or concrete tiles are the Illinois approved casing options for bored wells. The annular space between the borehole and water well casing is filled with washed and disinfected pea gravel.

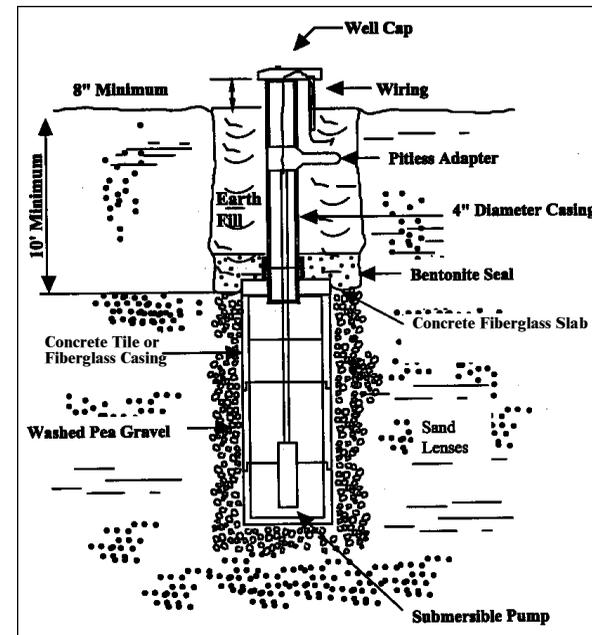
Normally, the bored water well is finished with a buried slab (lid) set at a minimum of 10 feet below grade. A manufactured hole in the lid provides for water well casing, a minimum of 4 inches in diameter, to fit securely into the buried lid and extend the required 8 inches (minimum) above grade. The water well casing is then finished with an approved well cap and pitless adapter.



Bored well construction with fiberglass casing.



Bored well construction with concrete tiles.



Drawing from the Illinois Water Well Construction Code

Illinois Code requires that a minimum of one foot of bentonite be placed on top of the buried slab or lid to protect against infiltration of surface containments into the newly disturbed soil. Packed earth is then used to fill in the hole above the lid. Because of the nature of bored wells, development is rarely necessary.



Water Well Caps and Seals

By code, the water well casing must extend at minimum 8 inches above grade level.

- Always keep the area immediately surrounding your water well clear of plants or grass.

- Never cut the casing down. This helps to keep airborne plant and animal particles from entering your water well.

An Illinois approved water well cap or seal is required for your water well. *Approved caps and seals are water-tight, vented, vermin-proof and must be applied with tools.*

A Word of Caution: *It's not uncommon to find non-approved water well caps available for sale in hardware or home builder stores. Act safely when it comes to your water well and always consult with a licensed water well contractor first. If a cap or seal is cracked, broken, or in some way faulty, before replacing it, have your water well cleaned and disinfected. It's hard to believe but minuscule organic particles can easily contaminate your well water.*



This well head does not meet code and presents a serious risk to users.

Flood Areas

If your water well is located in an area subject to flooding, the water well casing must extend at minimum 24 inches above any maximum known flood level. Any time a water well has been subjected to standing water above the casing, the water well needs to be thoroughly flushed, disinfected and then tested.

Installing the Water Well Pumping System

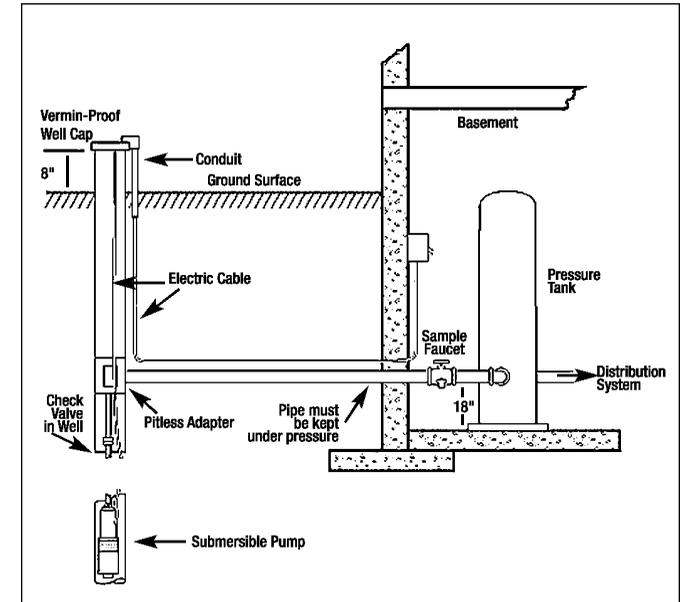
Once your water well is constructed and the yield of the water well determined, your licensed professional pump installation contractor will select the appropriate size pumping system. You should have already discussed your house plans (number and types of rooms, fixtures that require water usage, house placement on lot, the number of occupants, and landscaping). A water line going into the house will penetrate the water well casing below frost level via an Illinois approved pitless adapter. The water line is pressurized at the point of attachment with the water well casing.

Once the water line is installed, the upper portion of the borehole is filled with packed earth and mounded to offset settling and to provide drainage away from well.

A Word of Caution: *It's not uncommon to find non-approved pitless adapters and other water well components for sale in hardware or home builder stores. Don't compromise your water well system by allowing non-conforming construction and/or materials to be used. Always work with a licensed professional contractor when it comes to your water well.*

Sampling Tap at Pressure Tank

Illinois Water Well Pump Code requires a water sampling tap to be installed at least 18 inches above the floor in a convenient location between the water well and the pressure tank. A water sample taken at the sampling tap indicates the quality of the water in your well.



Disinfecting and Testing Your Water

Code requires that disinfection take place after the drilling process is completed and after the pump is installed. This helps prevent any bacterial contamination that may have occurred during the drilling process. Disinfection is also necessary anytime repair work is performed upon the system. This includes changing the pressure tank.

A Word of Caution: *Far too often water well professionals see the damage caused by improper chlorination done by water well owners and that is why this booklet does not include a “how to” on water well disinfection. Frequent chlorination is not a good maintenance practice. Not only does over chlorination cause corrosion of water well components, it also allows for ingesting an unnecessary amount of chlorine. Leave water well disinfection and chlorination to the professionals. You may feel you’re saving money by doing what appears to be a simple procedure, but in reality you are more likely to shorten the life expectancy of the components of your water well system.*

The Life of Your Water Well System

Like all mechanical equipment, there becomes an unserviceable failure and replacement date. Proper water system design combined with an installation by a skilled and licensed contractor will insure many years of cost effective and maintenance free operation. Water with high iron content and other mineralization as well as high demand affect the system life. Your licensed water well or pump installation contractor may offer selected materials suited for your particular application. Simply . . . an annual or bi-annual call for advice or a service inspection will prevent a premature failure.

With good maintenance, one could expect 20-30 years of service from your water well and 8-10 years from your pump and pressure system.

Upgrading Your Water Well System

If you have an older system, it is possible, even likely that your water well does not meet current construction standards described in the preceding section. What should you do?

Checking your water well:

- Check that the water well casing extends at least 8 inches above grade (or 24 inches above maximum high water level in areas where flooding occurs.)
- Check for loose-fitting caps as they allow “foreign material” such as vermin, insects, and decaying plant material to enter your water well and contaminate it.
- Check to see if the water well casing is structurally sound, is straight and can’t be moved.

If your water well has any of the above problems or if you have noticed a change in the taste, smell or pressure, arrange for a service call by a licensed professional contractor to replace faulty visible water well components and to do an overall inspection of your water well system including a water test.

Not only is this good maintenance to protect your investment, it’s necessary for the sake of your family’s health and safety and the security of your drinking water source.

Upgrade Your Water Well or Construct a New One?

If there are water quality problems with your existing water well, one option is to drill a new water well.

A new water well may be the best way to go if your existing water well is:

- Badly located, too close to permanent sources of contamination, or at risk from flooding.
- Not producing adequate water supplies.
- Substandard and cannot be upgraded for technical or regulatory reasons.
 - Old hand-dug water wells – these should be replaced immediately.
 - Shallow water wells less than 20 feet deep.
 - Older water wells without routine maintenance where water samples continuously test positive.

Talk over your options with an Illinois licensed professional contractor who is experienced with upgrades and familiar with conditions in your area.



Water Well Pits

No new water well pits are allowed under Illinois code. Prior to development of the pitless adapter, water well pits were commonly used to protect waterline connections from freezing. However, water well pits are no longer considered safe because they often fill with surface water and debris, leading to contamination. On new water wells, the water well casing must extend a minimum of 8 inches above ground level. A pitless adapter is installed providing a pressure seal between the water well casing and the waterline going into the house below the frost line.

Existing water well pits are accepted if:

- They are structurally sound and watertight.
- Water well casing extends at least 12 inches above the pit or basement floor.
- An approved water well seal is in place.
- Pit has a watertight manhole cover.

Sealing Abandoned Water Wells

By Illinois definition: Abandoned Water Well means a water or monitoring well which is no longer used to supply water/or which is in such a state of disrepair that the well or boring has the potential for transmitting contaminants into an aquifer or otherwise threatens the public health or safety.

Code requires abandoned wells to be sealed within 30 days.

An abandoned water well can put your own water supply as well as neighboring water wells in jeopardy of contamination. A water well that is no longer used and not maintained can become a direct pipeline for surface water or run-off to reach the aquifer.

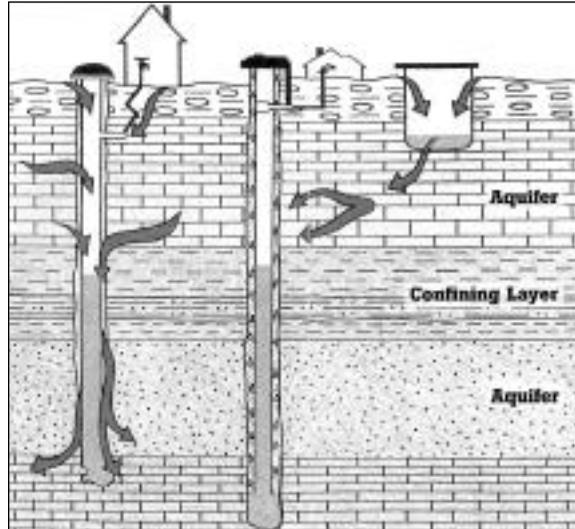
Abandoned water wells are also a serious threat to the health and safety for humans and animals. There are plenty of real life stories of children and livestock falling into abandoned water wells. Unfortunately, not all end on a positive note.

Illinois law requires the owner of an abandoned water well to seal it within 30 days in accordance with the procedures established in the water well construction code. Contact your local health department or a licensed professional water well contractor should you know of abandoned water wells on your property or in the area.

Don't try to seal your own water well – it is not as easy as it seems.

The Illinois water well construction code details the materials and procedures appropriate for sealing drilled, bored and hand dug water wells. In addition, knowledge of the history and specifics of the water well along with other environmental factors play an important role in the sealing plan design. Each sealing is unique. Some water wells, depending on the circumstance, may need to be thoroughly cleaned before sealing, and of course, all must be disinfected. Your local health department is a good resource and should be your first contact.

Simply filling up an unused well with sand, gravel, stones, debris, or garbage is not appropriate and can add contaminants to the groundwater and can negatively effect other wells in the area.



Drawing courtesy of Illinois Water Well Sealing Coalition



Abandoned water wells, as pictured on this page can put your own water supply as well as neighboring water wells in jeopardy of contamination.

Abandoned water wells are also a serious threat to the health and safety for humans and animals who can fall into them by accident.





Water Well System Maintenance

- A Maintenance Check List for Your Water Well System
- Chemicals and Fuels
- Septic Systems
- Gardens
- Underground Storage Tanks
- Above-Ground Storage Tanks
- Abandoned Tanks
- Animal Wastes
- Water Well Inspection Check List

A Maintenance Check List for Your Water Well System

Your Water Well System Will Provide Many Years of Service when given proper maintenance. Remember regular maintenance not only extends the life of your water well system, it protects your investment as well as the health of you and your family.

As a responsible water well owner, you need to carry out a simple yet regular program of water well system maintenance.

1. Guard the water well head by keeping surface contaminants away.
2. Visually inspect the outer area around the wellhead or tank for any structural damage.
3. Take a water sample on an annual basis.
4. Consider a service maintenance program by a licensed professional contractor.



Keep these contaminants away from your well:

- Pet and livestock wastes
- Gasoline, diesel, home-heating fuels
- Pesticides and fertilizers (chemical or natural)
- Other hazardous chemicals, including paint, solvents, barbecue starter fluid, etc.
- De-icers (used to melt ice on roads, driveways, sidewalks)
- Any other substance you don't want in your family's drinking water



Chemicals and Fuels

Any chemical or fuel spills that infiltrate the ground can contaminate your drinking water source. Check that gasoline, pesticides, and other chemicals are stored in proper containers designed to help prevent spills or leakage. Don't store these materials anywhere near your water well.



- Refuel lawnmowers and other machinery a safe distance from the water well. (One gallon of gasoline can contaminate 1 million gallons of groundwater.) Refuel over hard surfaces to help prevent infiltration of spills.
- Change the oil in your vehicle on a sealed surface such as pavement or concrete away from the water well.
- Clean up spills with an absorbent material (clean sand or kitty litter) and remove to a Household Hazardous Waste depository. Keep a bucket nearby for quick access when spills occur. Never hose down spills.

Septic Systems

- Septic systems should be located down grade and away from your water well.
- Older systems should be checked by an Illinois licensed on-site waste water contractor to make sure they are in compliance with the Septic Code.
- Septic systems must be regularly maintained to ensure proper working order. The number one failure of septic systems is that they are not properly maintained or they are abused. Keep chemicals other than human waste out of the system. Pump out your septic tank every two or three years, or ask your licensed septic professional to specify an appropriate pump-out frequency. This may vary depending on your soil type, type of septic system and variables. Keep your system in good running order.

Gardens

Eliminate gardens adjacent to your water well. It is best to keep the well head free from all vegetation. Don't use fertilizers or pesticides near your water well. While imitation rocks made to cover the water well head are on the market, your water well is a very valuable asset to your property so *Why Not Show It Off!*

Underground Storage Tanks

Underground storage tanks and associated pipes and fittings may leak, especially if they are over 15 years old or lack corrosion protection. Underground storage tanks are a special concern if the water table is shallow or if the tank is close to your water well (or surface water). If possible, replace underground tanks with above-ground storage within proper spill/leak containment.

Above-Ground Storage Tanks

If storage tanks are required, keep them as far as possible from your water well. They should be a minimum of 75 feet away or more depending on the specifics of your water well.

Abandoned Tanks

Look for evidence of abandoned tanks that pre-date your ownership, including pipes sticking out of the ground. An abandoned tank may still contain harmful liquids that will leak as the tank corrodes.



Animal Wastes

Livestock and pet wastes are a serious potential threat to groundwater, as the Walkerton Ontario tragedy showed. Adopt best management practices as promoted by the set-back minimums in the Illinois Water Well Construction code. Ensuring the safety of your water supply is your responsibility.



Water Well Inspection Check List

The Illinois Association of Groundwater Professionals recommends that you conduct a visual inspection of your water well system at least once a year. If you suspect a problem with your well water system or have concerns about it, contact your local health department or a licensed professional immediately.

✓ Access

Water wells in pits, basements, or where the well head is buried should be upgraded and brought into compliance with the Illinois Codes. Depending on the circumstances, it may not be required that your water well be brought up to code immediately, but only a licensed professional contractor can determine that. To ensure your safety and protect your asset (your water well) have a licensed professional contractor do a comprehensive water well inspection and take a water sample.



Power lines severely restricts access to service this well and presents an extremely dangerous situation for a service crew.

✓ Water Well Cap

Check the water well cap for signs of cracking or damage and get it replaced immediately if there is a problem. It should require tools to firmly attach it to the casing. The vent should face the ground and be properly screened to keep out insects. Only air should enter. Clean the air vent regularly to remove debris and moisture. Do not allow plants and grass clippings to accumulate around the water well casing.

Modification to the water well cap for any reason is not allowed by code. If treatment is warranted, make sure that your treatment specialist is experienced in water well systems. Your water system is not the same as the system of a public water supply from the standpoint that your system has been designed specifically for you and is unique to your property. If your water well contractor doesn't do water treatment, then make sure he recommends someone that understands private water well systems.

✓ Annular Seal

Look for any subsidence or cracking between the drill hole and the water well casing. A depression in the ground around the edge of the water well casing can indicate that the grout has shrunk or collapsed. It is a bad sign if you can move the water well casing around by pushing it. Cracking and gaps allow run-off and surface water to move down the outside of the water well casing and contaminate your drinking water. A faulty annular seal should be repaired immediately by a licensed professional water well contractor.



✓ Water Well Casing

Look for any external signs of damage, cracking, or dislocation of your water well casing, e.g., due to vehicle damage. It is not advised under any circumstance to remove the water well cap or seal. Visibility is limited and you could easily cause contamination or damage, especially if you have a submersible pump. Inspection of the water well's interior is something only a licensed professional contractor should do.



✓ Water Well Pit

Water Well pits can be very dangerous as noxious gases can readily accumulate in them. Inspecting a water well pit requires awareness of this dangerous potential. Remove the cover from your water well pit and look for water, debris, vermin, etc. Do not enter the water well pit or breathe the gases which may fill the water well pit. The water well pit should be clean and dry. If water or other material has entered the well pit, your well water is at a high risk of contamination. It is critical you call a licensed professional contractor immediately. It is also important that children do not gain access to a well pit.



Water Quality

- What Could Affect the Quality of My Water?
- Water Testing
- How To Take A Water Sample
- Bacterial Contamination
- Positive Test Results
- Treatment Systems

What Could Affect the Quality of My Water?

Groundwater may contain natural occurring minerals that are not desirable as well as impurities that are a result of human activity or pollution. Groundwater movement may pick up magnesium, calcium and chlorides found in the soil. Arsenic, boron, selenium or radon may also be naturally occurring.

Even though your water may appear to be fine, there are many possible contaminants that you can't taste, see, or smell. Public water supplies are required by law to be tested on a regular basis. As a responsible private well owner, you should do the same. *The Illinois Association of Groundwater Professionals recommends having a water test at minimum of once a year.*

Typical water tests in Illinois are for Coliform bacteria and nitrates. Depending on known or suspected concerns in your area, other tests for minerals, metals or chemicals might be appropriate. Check with your local health department when in doubt.

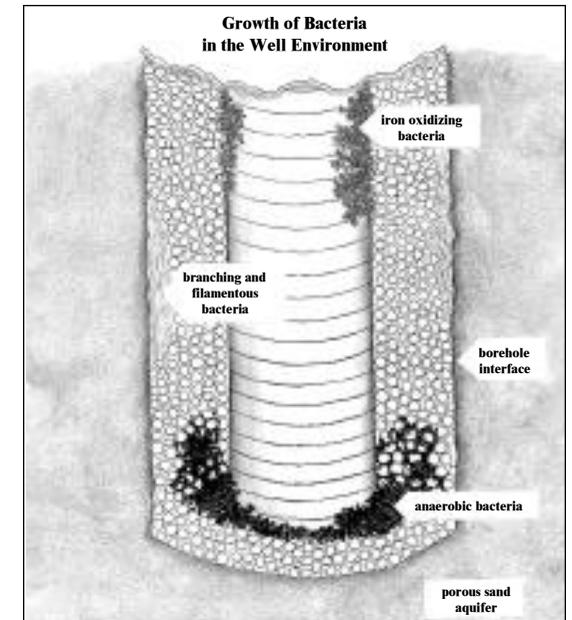
Common minerals, organisms and chemicals that can affect quality and safety:

- Coliforms are bacteria and in themselves are not harmful. They are used as an indicator for other harmful bacteria generally found with them. In Illinois water tests standards are for "0 Coliform." ALWAYS ask for a count of coliform present on the results of a water sample. If your water sample comes back positive, a count is an important diagnostic tool. A count of 4 or 5 is a much different situation that a count of "too numerous to count."

- E.coli is one strain of bacteria associated with human and animal fecal matter. Any detectable presence of E.coli in your water means your groundwater is unsafe for drinking without treatment such as boiling.

- Nitrates are not bacteria, but an end result of a chemical reaction. Its presence can be the result of commercial fertilizers and human or animal wastes. Infants less than six months old can become sick from drinking formula or eating cereals made with water high in nitrates. Nitrate reduces the amount of oxygen in the blood, resulting in blue baby syndrome. It can even be fatal for young children, the elderly or anyone with an impaired immune system.

- Iron and/or sulfur bacteria is one of the most abundant minerals in the earth's crust and is very common in groundwater. Too much iron makes the



Drawing from Water Systems Engineering Inc.

water look reddish-brown, can stain laundry and change the taste of your water. Also common are iron and sulfur bacteria which combine with minerals in the water (typically calcium or manganese) to produce slime deposits or corrosive gas. Iron and sulfur bacteria are not harmful but can clog pipes and fixtures, produce odors, and provide a habitat for other bacteria such as coliform bacteria.

Water Testing

It is recommended that you test your well water annually for bacteria including total coliforms and E.coli. Keep and record water well testing results.

Test regularly even if your water seems fine, because you can't always taste, smell or see bacteria or other contaminants. Don't rely on your neighbor's test results – water wells that are only a few steps apart can have different water quality.

Besides routine testing, you should also test when any of the following occur:

- Changes in water quality, including taste, odor, and appearance.
- Regular users experience unexplained health problems that may be water-related.
- After any plumbing work.
- After flooding.
- After well or water system maintenance.

How to Take a Water Sample

The following rules apply to routine sampling for coliforms and E.coli. For other tests, follow the sampling rules provided by the testing laboratory.

- Use the water sample bottle provided by your testing facility (if the sample bottle contains a granular residue, don't rinse! It was intentionally put there by the testing lab.)
- Don't touch the bottle lip, inside of lid, or inside of bottle – never set the lid down.
- Don't rinse out the bottle.
- Select a non-swivel tap if possible – remove aerators and other attachments from your tap.
- Run cold tap water for at least 10 minutes. If a swivel tap is used, don't move it.
- Fill the sample bottle to the indicator line directly from the tap without changing the flow of the water or moving the faucet head (overflowing the bottle risks losing the preservative that comes in the bottle).
- Replace the cap tightly and complete the form that came with the bottle.
- Store in a cool place away from direct sunlight.
- Return the sample and form to the health unit or laboratory within 24 hours of collection.

Bacterial Contamination

If you get a serious adverse test result – or have any reason to believe your water is dangerously contaminated – take immediate action.

Positive Test Results

Any time a water test comes back positive, stop drinking the water from the tap unless you boil it first. Again, your local health department is a good resource.

Retake a water sample to rule out sampling error, a common cause of positive test results. Also take a sample from both the sampling tap at the water well tank and from a point of use faucet being careful to follow good sampling techniques.

Treatment Systems

Sometimes the groundwater, while plentiful, may need to be treated to acquire the quality you desire. There are a number of treatment systems available to solve almost any problem. An important thing to consider when treatment is needed is the knowledge of the treatment installer. Make sure that person has a good understanding of water well systems. Look for a licensed professional contractor who offers water treatment or can make referrals to treatment specialists knowledgeable on water well applications.



Sampling error is frequently the reason a routine water sample is positive. Any time a water sample is positive, make sure sampling error is not to blame.



Hiring A Contractor

Any construction will only be as sound as the people who perform the work. A licensed professional should never be selected by price alone. Here are a number of things you should keep in mind when selecting a licensed professional contractor:

- Ask to see the Illinois Department of Public Health (IDPH) issued license and confirm that it is current. Illinois requires continuing education hours for license renewal. Illinois Construction Code requires a license to drill wells and install pumps.
- Get more than one bid.
- Get written bids which include: description of the proposed work (e.g., expected well depth, unit rates, extra services) and an estimate of the total cost.
- Ask for a certificate of insurance before the contract is signed and work is begun.
- Did the contractor answer all your questions and were all options explained thoroughly?
- Ask for the expectations of water quality and quantity in your area.
- Does the contractor offer maintenance and repair services?
- Get a signed agreement in writing if there are any changes in the work and cost.
- Pay promptly when the work is completed as described in the agreement.
- Your local health department is a resource for contractors working in your county and on specific groundwater issues. You can also contact the **Illinois Association of Groundwater Professionals (IAGP)** at 800-990-2209 or go online at www.iagp.org for a listing of current licensed professional in your area.



In Illinois, license numbers for water well contractors (drillers) have a 092 prefix while licensed water well pump installation contractors (pump installers) have a 101 prefix. Licenses that begin with 102 are combination of both licenses.



Resources

Source Protection – The Bigger Picture

After making a check of your own backyard regarding potential contaminants, you should also support actions to protect all sources of drinking water for your community.

Municipal land-use plans need to identify vulnerable ground and surface waters. Land-use plans should provide the necessary protection through controls on the location, amount, and type of development. In Illinois we are fortunate to have many groundwater information resources available to us. A reference list is provided below.

Major sources of contamination need to be curbed, like polluting industries and urban and agricultural run-off. Programs need to be in place to reduce risks of groundwater contamination from abandoned water wells, open excavations, quarries, and contaminated sites. Get involved in protecting sources of drinking water for your community.



General Resources and Contacts:

Illinois Department of Public Health,
Div. of Environmental Health, Water Well Program
525 W. Jefferson St., Springfield, IL 62761-0001
Ph: 217-782-5830 www.idph.state.il.us

Illinois State Geological Survey
615 E. Peabody Dr., Champaign, IL 61820
Ph: 217-333-4747 www.isgs.uiuc.edu

Illinois State Water Survey
2204 Griffith Dr., Champaign, IL 61820-7495
Ph: 217-333-9043 www.sws.uiuc.edu/

Illinois Environmental Protection Agency
www.epa.state.il.us

National Ground Water Association
601 Dempsey Rd., Westerville, OH 43081
Ph: 800-551-7379 www.ngwa.org

American Ground Water Trust
16 Centre St., Concord, NH 03301
Ph: 800-423-7748 www.agwt.org

**A properly constructed water well system
will be a dependable source of
good safe potable water.**

