# Indiana Farmstead Assessment

## Drinking Water Well

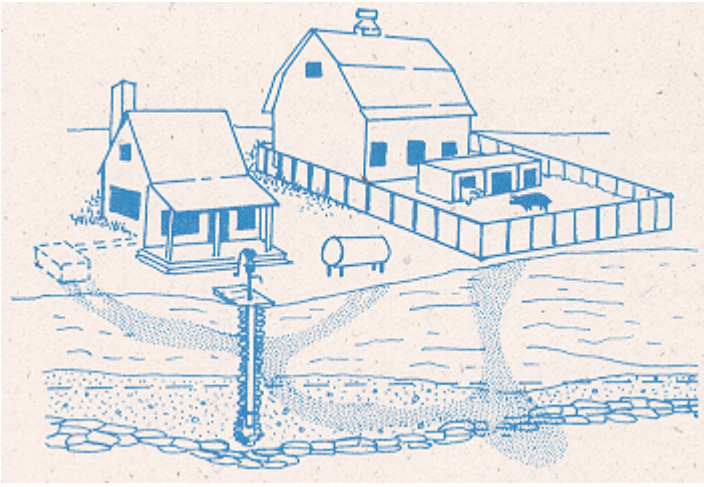


## Drinking Water Well Survey

### Well location

Whether a well taps water just below the ground or hundreds of feet deep, its location on top of the ground is a crucial safety factor. A well downhill from a livestock yard,a leaking tank or a failing septic system runs a greater risk of contamination than a well on the uphill side of these pollution sources.

Surface slope does not always indicate the direction a pollutant might flow once it gets into the ground. In shallow aquifers, groundwater often flows in the same direction as surface water. If the aquifer supplying water to your farmstead well is deep below the surface though, its slope may be different than the land surface. To find out more about groundwater movement on your farm contact the Department of Natural Resources, Groundwater section (see Contacts section at the end of this fact sheet).



## Separation distances

Many states encourage good well location by requiring minimum separation distances from potential pollution sources, thus using the natural protection provided by soil. Currently, Indiana law does not require separation distances from farm stead activities and structures; however, some recommended distances offered by the Indiana State Board of Health are specified in Table 1. Provide as much separation distance as possible between your well and any potential contamination source especially if your farmstead is on highly permeable soils or thin soil overlying limestone bedrock, or if the contamination source or activity presents a high risk of contamination.

Simply separating your well from a contamination source may reduce the chance of pollution, but it does not guarantee that the well will be safe. Whether or not drinking water is affected, groundwater contamination is a violation of Indiana law (IC 13-1-3-8).Stormwater and groundwater can carry pollutants such as bacteria, petroleum products and pesticides from one place to another. Wells located in the path of polluted water run a risk of contamination from surface water leaking into an improperly sealed well. Wells can also become contaminated if pollutants travel through the aquifer from another location where contamination has occurred.

## Well casing

The space between the casing and the sides of the borehole could provide a direct channel for surface water (and pollutants) to reach the aquifer. To seal off that channel, the driller fills the space with grout (cement or a volcanic clay called bentonite, depending on the geologic materials encountered). Both grout and casing prevent pollutants from seeping into the well.

You can visually inspect the condition of your well casing for holes or cracks at the surface, or down the inside of the casing with alight. If you can move the casing around by pushing against it, you may have a problem with your well casing's ability to keep out contaminants. In areas of shallow (less than 20feet from surface) fractured bedrock, check on the condition of your well casing by listening for water running down into the well. (Pump should not be running.) If you do hear water,there could be a crack or hole in the casing, or the casing does not extend down to the water level in the well. Either situation is risky.

New wells in Indiana must have a mini-mum of 25 feet of casing to ensure that surface water is filtered through soil and geologic materials before entering the well (310 IAC). The well construction rules (310 IAC 16) also require that at least 12 inches of casing pipe extend above the final grade of the land. This prevents surface water from running down the casing or on top of the cap and into the well.

## Well cap

To prevent contaminants from flowing down the inside of the well casing, the driller should install a tight-fitting, vermin-proof well cap. The cap should be installed in a manner to prevent easy removal by children, entry by insects or surface water, and have a screened vent incorporated into it so that air can enter the well.Check the well cap to see that it's in place and tightly secured. Wiring should be in the conduit.If your well has a vent, be sure that it faces the ground, is tightly connected to the well cap or seal, and is properly screened to keep insects out.

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Table 1. Recommended Separation Distances Between a Well and
         Potential Farmstead Sources of Contamination
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5   feet    buildings

10  feet    clear water drain, cistern

15  feet    property line, sanitary or storm sewer, connected foundation
            drain

25  feet    surface water, private residential fuel oil tank

50  feet    septic tank, wastewater holding tank, livestock pen or yard,
            manure pile, milkhouse floor drain, silo, sanitary or
            storm sewer

100 feet    surface or subsurface tanks used to store chemicals
            (gasoline, benzene, fuel oil, fertilizer, etc.) absorption
            field,solid or liquid manure holding tank

500 feet    septage or treated sludge disposal area, wastewater storage
            pond, spray irrigation waste disposal site

1500 feet   uncovered salt or salt mixture storage

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Indiana State Board of Health Bulletin PW 2 "Standards for
Construction of Private Water Wells and Water Systems."
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## Well age

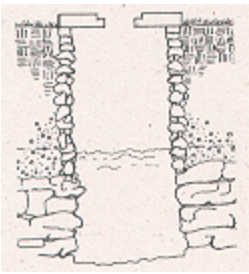
Well age is an important factor in predicting the likelihood of high nitrate concentrations in drinking water. In Indiana, a sampling of private wells showed a correlation between well age and depth and nitrate concentration. A well constructed more than 70 years ago is likely to be a shallow dug well and probably surrounded by many potential contamination sources. Older well pumps are more likely to leak lubricating oils which can get into the well. Older wells are e also more likely to have thinner casing that maybe corroded. Even well casing that is only 30 to 40 years old is subject to corrosion and perforation.If you have an older well, you may want to have it inspected by a qualified well driller.

## Well type

Dug wells pose the highest risk of drinking water supply contamination because they are shallow and often poorly protected from surface water. A dug well is a large diameter hole (usually more than 2 feet wide), often constructed by hand.

Driven-point (sand point) wells pose a moderate to high risk because they tend to be shallow. They are constructed by driving assembled lengths of pipe into the ground. These wells are normally smaller in diameter (2 inches or less) and less than 50 feet deep. They can only be installed in areas of relatively loose soils, such as sand.

All other types of wells, including those constructed by a combination of jetting and driving, are drilled wells. Drilled wells for farm use are commonly 4 to 8 inches in diameter.


Dug well

## Well Depth

Shallow wells draw from the ground water nearest the land surface, which may be directly affected by farmstead activities. Polluted surface water can infiltrate into the soil and quickly affect a shallow well that was not properly constructed or is located in a coarse-textured soil that easily conducts water. Deeper wells are more protected from surface contamination by the soil. Many potential contaminants are sorbed by soil particles and degraded by soil microorganisms before reaching the groundwater tapped by a deep well.

Local geologic conditions determine how susceptible an aquifer is to contamination from surface activities. Aquifers located near the surface are more vulnerable to potential contamination. The type of soil material overlying an aquifer also influences its vulnerability. Generally, course-textured soils over a shallow aquifer allow less protection than deep, fine-textured soils overlying a deep aquifer. Thick clay soils help to "filter" groundwater by slowing water movement and allowing more time for potential contaminants to dissipate before reaching a water well.

Aquifers of sand and gravel allow water to pass through quickly and can be easily contaminated by polluted recharge water. In fractured bedrock, or karst areas, water moves between cracks and channels. Pollutants follow these same channels and enter directly into the aquifer. In contrast, water movement in deep bedrock aquifers is very slow. The groundwater supplying deep wells may have traveled a considerable distance underground over a long time, offering greater protection to the well water quality.

## Backflow prevention

Backflow can occur when the water pressure in a hose or hydrant reverses the direction of flow. This commonly occurs when a hose is submerged in liquid and the hydrant is shut off; some of the liquid flows back through the hose to the water source. This can be particularly dangerous when the liquid contains drinking water contaminants. Prevent backflow contamination by installing an anti-backflow device at the hydrant. The inexpensive device is a simple oneway flow valve available from hardware stores.

## Water testing

You the landowner are responsible for having your well water tested. Although you cannot have your water tested for every conceivable pollutant, some basic tests can indicate whether or not other problems exist. Consult your local health department on how to test your water. Extension publications WQ 1, 3 and 4,available from your county Cooperative Extension office may also help.

The Cooperative Extension Service recommends at a minimum, testing your water annually for bacteria and nitrate. A good initial set oftests for a private well also includes hardness, alkalinity, pH, conductivity and chloride. Use an EPA certified laboratory.

Changes in your water quality, such as cloudiness, after a storm may indicate that surface water is contaminating your well. Check your well construction and pump. Divert any surface water that pools away from the well head. Test the water again soon after a storm.

It is also important to record test results and to note changes in water quality over time. In addition to water analysis test results, you should keep records of a few other things to tell what is happening with your water system.These include well construction details and dates, and results of maintenance intervals for the well and pump.

## New wells

New wells are expensive but they are a good investment for the future. Getting the most from such an investment means locating the well away from contamination sources and working to maintain the quality of the well.Here are some simple guidelines:

- Follow the state's recommended mini-mum separation distances.
- Locate your well on ground higher than surrounding pollution sources such as fuel tanks, livestock yards, septic systems or pesticide mixing areas. Where practical, locate the well as far as possible from pollution sources, but no closer than the minimum separation distances.
- If necessary, build soil up around the well so that all surface water drains away from it. Avoid areas that are prone-to flooding.
- Make the well accessible for pump repair, cleaning, testing and inspection.
- Hire a competent, licensed well driller and pump installer. Make sure the driller Disinfects the well with chlorine after construction and provides you with detailed information about the well's depth and construction.

## Abandoned wells

Many farms have unused wells. Old homesites or shallow wells once pumped by wind mills are common. No one knows how many of these wells are in Indiana, although estimates range in the tens of thousands. Pipes sticking out of the ground around the farmstead, an area where a farmstead used to be or under an old windmill are the obvious places for finding abandoned wells.

You may not know the history of your property, and abandoned well locations may not be obvious. A depression in the ground may indicate an old well. Also, wells were often drilled in basements of houses, under front steps or near old cisterns.

If not properly plugged, these wells can provide a direct conduit for surface water carrying pollutants to groundwater without filtering through soil, or allow contaminant movement from one aquifer to another. In addition to being a threat to groundwater, large open wells pose safety hazards for small children and animals.

Wells that have not been used for more than five years or are in a state of disrepair, are required to be sealed (IC 25-39). Sealing means securing a watertight cap to the top of the casing. Plugging means filling the casing with cement orbentonite clay. Plugging abandoned wells is strongly recommended.

## Well maintenance

Good maintenance includes testing the water every year, keeping the well area clean and accessible, and keeping pollutants as far away as possible. Well equipment doesn't last forever. Every 10 to 20 years,

your well may require mechanical attention from a qualified well driller or pump installer.

Existing wells were most likely located according to traditional practice or regulations in place at the time of construction. While these wells are still legal, you may want to consider how yours conforms to current standards, which incorporate new knowledge about groundwater contamination and well water.

## Authors

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## Contacts and References

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Certified well water testing laboratories

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  Indiana State Board of Health (ISBH)
  1330 W. Michigan Street
  Indianapolis, IN  46206
  317/633-0237
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  Purdue University Cooperative
  Extension Service 888/EXT-INFO or your local office
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Interpreting well water test results

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  Indiana Department of Environmental
  Management (IDEM)
  Groundwater Section
  P.O. Box 6015 Indianapolis, IN  46206-6015
  317/233-3445
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  Indiana State Board of Health
  1330 W. Michigan Street
  Indianapolis, IN  46206
  317/633-0237
-------------------------------------------------------------------------
  Purdue University Cooperative Extension Service
  888/EXT-INFO or your local office
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Drinking water quality standards

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  U.S. Environmental Protection Agency
  Safe Drinking Water Hotline
  800/426-4791
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  Indiana Department of EnvironmentalManagement (IDEM)
  Groundwater Section
  P.O. Box 6015
  Indianapolis, IN  46206-6015
  317/233-3445
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Approved water treatment devices

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National Sanitation Federation, Int'l.
P.O. Box 130140
Ann Arbor, MI 48113-0140
313/769-8010

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Indiana Water Quality Association
Call to report questionable sales, services
or products317/846-2155

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Locating possible sources of contamination

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Indiana Department of EnvironmentalManagement (IDEM)
Groundwater Section
P.O. Box 6015 Indianapolis, IN 46206-6015
317/233-3445

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Indiana Department of Natural Resources(IDNR)
Division of Water
402 W. Washington Street Indianapolis, IN 46204
317/232-4160

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Purdue University Cooperative Extension Service
888/EXT-INFO or your local office

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Well construction or inspection

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Indiana Department of Natural Resources(IDNR)
Division of Water
402 W. Washington Street
Indianapolis, IN 46204
317/232-4160

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Indiana Well Drilling Contractors Assoc.
6530 Westminster Drive
Noblesville, IN 46060
765/773-6927

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Well abandonment

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Indiana Department of Natural Resources(IDNR)
Division of Water
402 W. Washington Street Indianapolis, IN 46204
317/232-4160

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Purdue University Cooperative Extension Service
888/EXT-INFO or your local office

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What to read about...

Groundwater

- WQ-2 What is Groundwater?
- Groundwater: Indiana's Unseen Re-source
- Groundwater Education System(CD ROM)

Wells, private water systems

- MWPS-14 Private Water Systems Handbook
- Private Drinking Water Systems(CD ROM)
- Well Location and Condition (CD ROM)
- V-AY-11 Plug It Up! A Landowner's Guide to Plugging Abandoned Wells

Contamination, testing and interpretation

- WQ-1 Water Testing Laboratories
- WQ-3 How to Take a Water Sample
- WQ-4 Why Test Your Water?
- WQ-5 Interpreting Water Test Results
- Nitrate and Pesticides in Private Wells ofIndiana

Well abandonment

- WQ-21 Plugging Abandoned Wells:A Landowner's Guide

## Sources:

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1. Purdue University Cooperative Extension
   offices or
   Media Distribution Center
   301 South 2nd Street
   Lafayette, IN 47901-1232
   765/494-6794 or 1-888/EXT-INFO

2. Hoosier Environmental Council
   P.O. Box 1145
   Indianapolis, IN  46206-1145
   317/636-8282

3. Indiana Farm Bureau, Inc.P.O. Box 1290
   Indianapolis, IN  46206
   317/692-7851

4. Center for Technology Transfer and
   Pollution Prevention
   1146 Agricultural and Biological Engineering Building
   West Lafayette, IN 47907-1154
   765/494-1172
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Click below for survey 1

Drinking Water Well Survey

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