

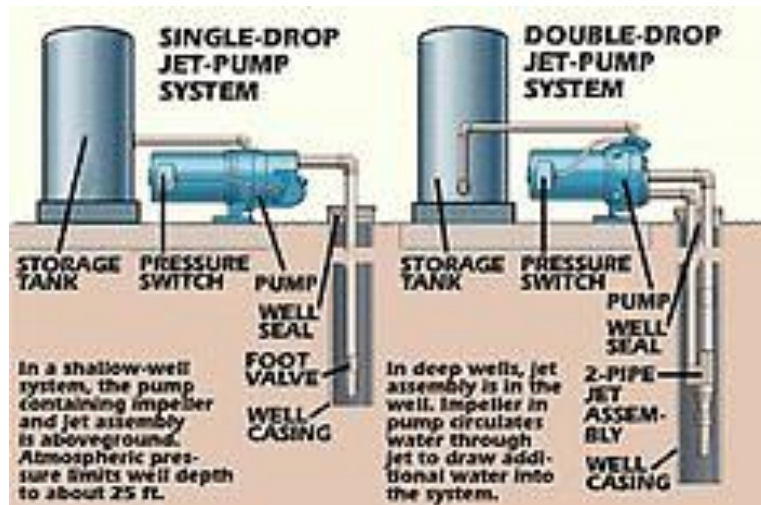


- **Dug wells** - Historically, dug wells were excavated by hand shovel to below the water table until incoming water exceeded the digger's bailing rate. The well was lined with stones, bricks, tile, or other material to prevent collapse, and was covered with a cap of wood, stone, or concrete tile. Typically, they are only *10 to 30 feet deep*. Being so shallow, dug wells have the highest risk of becoming contaminated. To minimize the likelihood of contamination, your dug well should have certain features.
- **Driven wells** - are constructed by driving a small-diameter pipe into shallow water-bearing sand or gravel. Usually a screened well point is attached to the bottom of the casing before driving. These wells are relatively simple and economical to construct, but they can tap only shallow water and are easily contaminated from nearby surface sources because they are not sealed with grouting material. Hand-driven wells usually are only around 30 feet deep; *machine-driven wells can be 50 feet deep or more*.
- **Drilled wells** - Drilled wells are constructed by either cable tool (percussion) or rotary-drilling machines. Drilled wells that penetrate unconsolidated material require installation of casing and a screen to prevent inflow of sediment and collapse. *They can be drilled more than 1,000 feet deep.* .

Artesian wells are drilled wells but because the aquifer that is tapped into is under pressure the water is naturally forced out of the drilled well.



## Very Basic Pumps for Shallow and Deep Wells



There you have it, some basics about the types of wells and some quick diagrams on how water gets out of the well. But what does a system look like?

Shallow Well System usually has the well next to the pressure tank. That means that there may not be a well head to locate. The Head is buried outside some place. Shallow pumps sometimes use a single jet (sucks up water like a straw) or a double jet. See the diagram. The circulating water creates a powerful suction to draw the water up. The pump sends the water into a pressure storage tank.



A submersible pump for deep wells has the pump deep in the well near the source. See the diagram in the previous Drilled well section for the diagram.

For both types of pumps, the supply of water to a pressure storage tank is based on demand. Low pressure 30 or 40 psi triggers the solenoid and tells the pump to fill the pressure storage tank. At about 50 to 60 psi the solenoid stops the pump. Pressure storage tanks maintain the water pressure in the home.

## Well Casing/Caps

So, what is that odd metal pipe sticking up in the middle of the lawn? That is the well casing. It has very specific requirements. That said, it surprises us just how often those requirements are not followed.

*Here we have a* well casing is at least 12" above the ground. The Cap is a sealed sanitary well cap. This keeps all the critters and bug out.



A modern well head rises about a foot above grade and is tightly capped to keep out contaminants. The smaller PVC pipe protects the wiring for the submersible pump.

*Notice that this cap is a different style from the one above. This one keeps the rain out, but potentially offers access to all the critters we spoke about. This includes microscopic ones too. To make it worse, it is only a few inches above the ground.*



**Non-Sanitary Well Cap**



## Well Contamination

This is a serious issue. Contaminants can travel great distances underground or above ground. Seepage into the ground or from buried stuff. Areas that have home close together such as seasonal homes that have been converted to all year residence are prime examples. These homes may have been sighted in their lots before requirements were defined or we much more relaxed. Maybe the home is located near working farms or a neighbor that really likes their lawn to be green. Where do you suppose all those fertilizers end up? A good chance they are in your pasta water or the glass of water you just took with your aspirin for the headache.

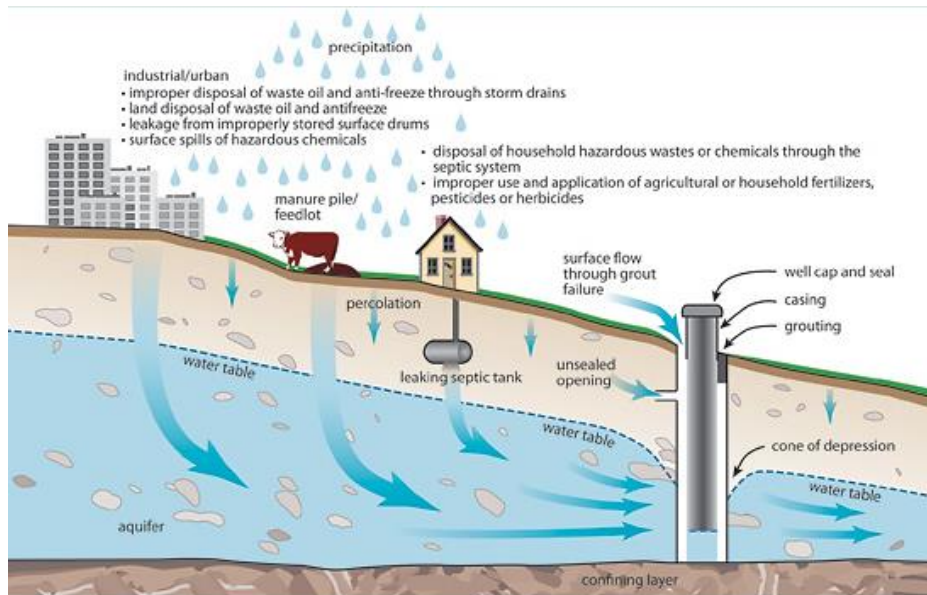
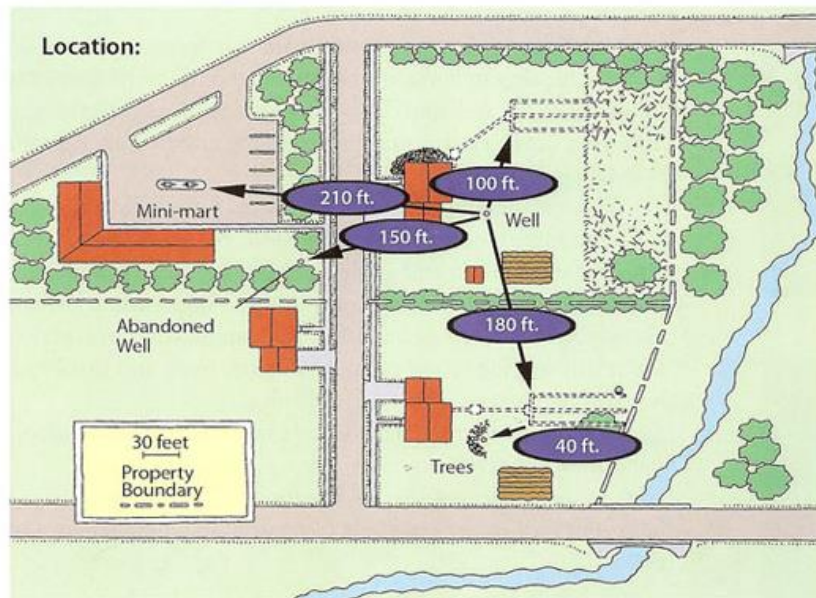


Figure 4.6: Well contamination sources profile. Source: Montana Department of Natural Resources Conservation

This diagram shows distances wells have to be from potential contaminators. Notice that the distance shown here may not be applicable in your Town. But, it gives you an idea of what you must be aware of.



*Do a site survey to identify any potential contaminant sources to your well.*

## How do you Start Inspecting the Well?

How do you start inspecting the well and still work within the SOP for NY? Look at this list. Some applies, some does not, but the point is to become aware of the potential pollutants that you can see.

### Outside:

- Locate well head and identify the relative distances these bullet points are from the well head.
  - Sanitary cap?
  - 12 to 18" above the ground?
  - Exposed casing in satisfactory condition?
- Locate Septic (if possible)
- Is there livestock nearby?
- Are pesticides being used on nearby agricultural crops or nurseries?
- Do you use lawn fertilizers near the well?
- Is your well downstream from your own or a neighbor's septic system?
- Is your well located near a road that is frequently salted or sprayed with de-icers during winter months?
- Do you or your neighbors dispose of household waste or used motor oil in the backyard, even in small amounts?

### Inside:

- Shallow or deep well
- Pressure gauge is working
- Test the hi and low pressures to determine if the pump cycles properly. s/b about a 20-psi difference. (Run the water)
- Any unusual noises?
- Turn off valve between the pressure tank and the well and or the house and the tank.
- Age and condition of the pressure tank and the pump if visible
- Pressure in the house is satisfactory
- Water purification systems attached. Outside of our SOP, but a note should be made that they are there
  - UV light
  - Particulate filter
  - Water softener
  - Chlorinator / Peroxide injectors and holding and scrubbing tanks
  - Radon aerator mitigation system

### Sources:

- ✚ <https://wellowner.org/basics/types-of-wells/>
- ✚ <https://www.nachi.org/privatewaterwells.htm>
- ✚ <https://sswm.info/sswm-university-course/module-4-sustainable-water-supply/further-resources-water-sources-hardware/well-development-%26-rehabilitation>
- ✚ <https://buildingadvisor.com/buying-land/water-wells/completing-the-well-system/>
- ✚ [http://www.flatheadwatershed.org/water/usage\\_drinking.shtml](http://www.flatheadwatershed.org/water/usage_drinking.shtml)
- ✚ [https://en.wikipedia.org/wiki/Groundwater\\_pollution](https://en.wikipedia.org/wiki/Groundwater_pollution)
- ✚ [https://www.usgs.gov/special-topic/water-science-school/science/groundwater-wells?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/special-topic/water-science-school/science/groundwater-wells?qt-science_center_objects=0#qt-science_center_objects)