

Protect Groundwater Quality: Minimize the Risks

Groundwater is an important natural resource in Alberta. Many farmers and small towns rely on wells to provide drinking water for both domestic and livestock use. Groundwater, however, is vulnerable to contamination from activities around wells and sometimes activities on the land.

Groundwater is water that occupies the pore spaces in soil and rocks. It originates as precipitation that moves down through the soil and can be stored in aquifers.

Aquifers are geologic deposits capable of producing water in quantities sufficient for use by humans, livestock or industry. Unconfined aquifers or water table aquifers are close to the ground surface while confined aquifers are overlain by geologic deposits of low permeability, such as clay or shale.

Confined aquifers are porous layers of rock (i.e. sandstone) trapped between layers of less porous rock. Most rural wells in Alberta are supplied by deep, confined aquifers. Unconfined aquifers are more sensitive to contamination from activities on the land surface.

Confined aquifers can be contaminated by activities around a well.

Groundwater contamination

Groundwater quality is influenced by natural conditions and human activities, and pollution can occur through direct or indirect contamination.

A well can be a direct conduit from the land surface to an aquifer. Thus, activities around a well can directly contaminate groundwater. Direct contamination of a well

and an aquifer can result from spills beside wells, improperly sealed well casings or abandoned wells, flooded well pits or back-siphoning from pesticide mixing tanks.

Indirect contamination can come from leaking sewage systems, fertilizer or manure spreading and pesticide spraying. Since nitrate-nitrogen is very mobile in soil, leaking septic systems or spreading manure or fertilizers at rates that exceed crop uptake of nitrogen can result in groundwater contamination over time.

Similarly, pesticides that are relatively persistent and mobile as well as pesticide application on highly permeable soils can also contaminate groundwater. Point source pollution like pesticide or fertilizer spills around a well is the greatest risk for groundwater contamination.

*It is less costly
to protect
groundwater
than to clean
it up.*

Protect water resources

Groundwater is a vital resource on the farm. Prevention of contamination is the key to protecting the quality of groundwater.

Prevent direct contamination of wells and aquifers:

- **Ensure wells are properly sealed and cased.** Poorly constructed casings allow surface water to seep along the outside of the casing into groundwater. Contaminated surface water or shallow groundwater can collect in well pits. Eliminate well pits in older wells.

- **Locate wells up-slope and away from sources of contaminants.** Locate wells away and up-slope from septic systems, manure storage areas and feedlots. Maximizing the distance between the well and contaminant sources minimizes the risk of contamination. Divert any runoff away from the well.
- **Fill sprayers from nurse tanks away from wells or other sources of water.** Mix pesticides in the sprayer or nurse tank away from the well. This method reduces the risk of back-siphoning pesticides into the well and contaminating groundwater.
- **Properly plug abandoned and unused wells.** Abandoned wells are a serious risk to groundwater quality. Improperly plugged wells can act as a direct conduit for contaminants to reach groundwater. Use bentonite products to properly plug or seal unused or abandoned wells.

Prevent indirect contamination of wells and aquifers:

- **Apply manure and fertilizers to meet crop nutrient needs.** Over-application of manure and fertilizers can result in excess nitrate leaching to groundwater. Apply manure at recommended rates according to soil and manure nutrient content as well as crop demand. Ensure adequate land is available for spreading at appropriate rates.
- **Maintain septic systems.** Septic systems can pollute wells when placed too close to the well, when not properly maintained or when not properly installed. Make sure the septic tank is cleaned out regularly.

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More information

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