

Best Practices for Dug Wells

Water Stewardship Information Series



A dug well is not typically recommended; however, in some instances a dug well can provide water where it is limited and a shallow aquifer is the only source. The purpose of this brochure is to provide home owners and excavators with best practices for dug water supply wells.

What is a dug well?

Dug (or excavated) wells are shallow, typically less than 50 feet (15 m) deep and 3 feet (1 m) wide (see Figure 1). They are relatively inexpensive to construct as they are commonly dug using excavators, backhoes or power shovels. Unfortunately, the shallow depth of a dug well makes them vulnerable to contamination and susceptible to lowered water levels from drought, neighbouring well interference, and local changes in drainage.



Figure 1: A typical dug well

How do I choose a location for my dug well?

To minimize water quality and quantity impacts, dug wells should be at least 10 feet (3 m) deep and sited away from surface water sources. Surface water can carry contaminants from the land surface into your well and the aquifer.

Provincial regulations require a well to be sited away from possible sources of contamination; at least 20 feet (6 m) from the nearest building, 100 feet (30 m) from any probable source of contamination (e.g., septic tank or drain field, storage of chemicals including paints and pesticides, animal manure, parked cars, etc.), and 400 feet (120 m) from a cemetery or dumping ground (e.g., landfill) (see Figure 2).

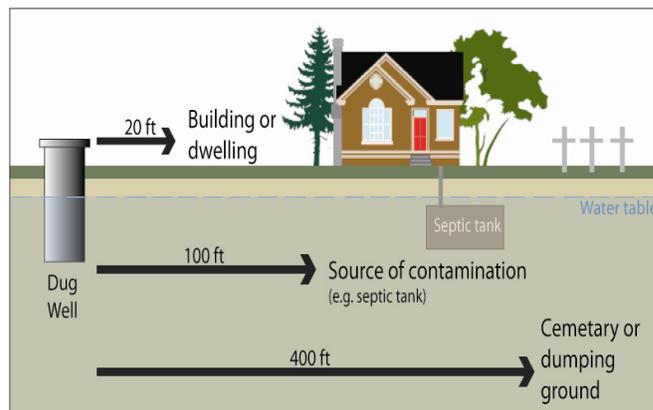


Figure 2: Regulated setbacks from potential contamination sources

How do I properly construct a dug well?

Anyone can construct a dug well less than 50 feet (15 m) deep; any deeper requires a registered qualified well driller. However, the person constructing the well must be familiar with and follow the provincial construction standards in the Ground Water Protection Regulation (see Figure 3):

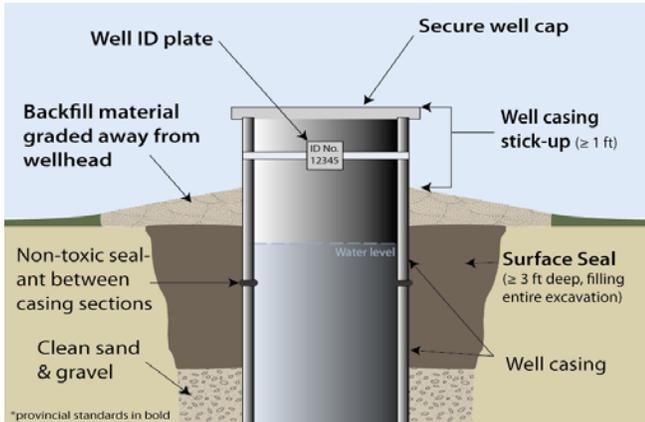


Figure 3: Properly constructed dug well

Well casing stick-up: prevents flooding of the well by being at least 1 foot (30 cm) above the ground (see Figure 4). It is recommended that all openings in the casing (e.g., seams) be sealed with a non-toxic sealant suitable for potable water.

Surface seal: prevents contaminants from moving along the outside of the casing into the aquifer. The surface seal must fill the entire excavation around the well, be at least 3 feet (1 m) in depth, and be made of low-permeable materials, like bentonite clay, available from many building suppliers.

Secure well cap: prevents the direct and unintended entry of contaminants, persons or animals into the well.

Graded wellhead area: reduces the potential for contamination by directing water away and preventing it from ponding around the wellhead.

Well identification plate: allows the well to be easily identified. This metal ID plate must be visible and securely attached to the well or nearby post, pump house or building (to request an ID plate for your well email GroundWater@gov.bc.ca).

Well pump: must be installed by a qualified well pump installer.



Figure 4: Two foot stick-up

Should I fill out a well log?

Well logs provide valuable information about groundwater in your area. Excavators, or the person digging the well, should complete a well log at the time of construction (forms are available at http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/wells.html) and submit it to the Ministry of Environment for inclusion into the provincial WELLS database (GroundWater@gov.bc.ca or PO Box 9362, Stn Prov Gov, Victoria BC, V8T 9M2). You can view well records in the WELLS database at http://www.env.gov.bc.ca/wsd/data_searches/wells/index.html.

What is a secure well cap for a dug well?

An improperly covered well is more vulnerable to contamination and presents a safety hazard (see Figure 5). The Ground Water Protection Regulation requires all wells be fitted with secure, vermin-proof well caps to prevent the direct and unintended entry of contaminants, persons or animals into the well. Dug well caps are usually concrete or metal sheeting and can either be purchased at a local building supply store or custom made (see Figure 6).



Figure 5: Improperly covered wells



Figure 6: Secure well caps

How can I maintain or improve an existing dug well?

Dug well owners are responsible for maintaining their wells and assessing whether they are susceptible to contamination due to their location or condition. A dug well should be properly closed and replaced if it is located near a permanent source of contamination (e.g., a septic tank or drain field), if the yield or water quality is poor, or if the casing is in poor condition or made of wood or stone cribbing. Otherwise, there are several ways to maintain or improve an existing dug well (see Figure 7 for some common dug well problems):

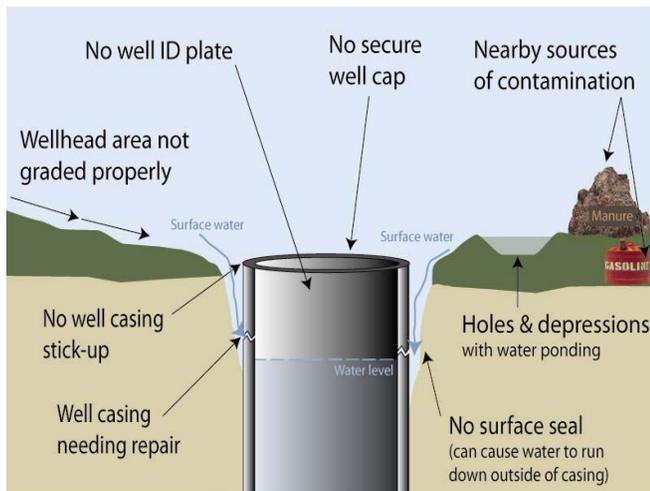


Figure 7: Common dug well issues

Repair or replace well casing. If cracks are visible in the well casing or if water is seeping into the well through the casing (see Figure 8), excavate around the well to repair or replace the casing. Extend the casing one foot or more above the ground. Seal all openings in the casing with a non-toxic sealant suitable for potable water and install a surface seal.

Repair or install surface seal. Holes or depressions around the wellhead may indicate an improper or non-existent surface seal. The owner of a well with a surface seal is required to maintain the integrity of the seal and repair it if it is damaged. The owner of a well without a surface seal may want to consider installing one. To repair or install a surface seal, excavate to the required minimum depth of 3 feet (1 m) and at least 1 foot (0.3 m) out around the casing. Fill the entire hole using a low-permeable sealant, like bentonite or properly compacted clay, and then grade the wellhead area.

Install or replace well cap. If water can seep through the well cap or the well does not have a cap, owners are required to install one.

Re-grade wellhead area. If water is ponding around the wellhead, grade the ground area around the well to direct surface run-off away from the wellhead.

Clear wellhead area. If there is debris and hazardous materials (e.g., gas cans, fertilizers, etc.) near the well, clear the area and make sure the well is marked so that it is not inadvertently damaged.



Figure 8: Water able to seep into well through the casing

What can I do to make sure my water is safe?

Well location is a major factor in well water safety (refer back to Figure 2). Wells must not be too close to potential sources of contamination (see Figure 9). Do not use your well for dumping, storing or mixing materials; it may impact the water quality of your well, nearby wells and the aquifer.

Regular testing by an analytical laboratory is important for dug wells since they are susceptible to contamination. The Ministry of Health also recommends that drinking water from dug wells be treated by disinfection, especially after any work is done on the well, such as casing or surface seal repair. For increased safety, a filtration system could be added. For information on the health and safety requirements of your well contact your local Health Authority or refer to the Water Well Disinfection brochure (http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/brochures_forms.html).



Figure 9: Dug well (in well house) near culvert & busy road

What can I do if I have a dug well that is no longer in use?

Unused wells that are not properly deactivated or closed pose a threat to an aquifer's water quality. A well not in use for 5 years must be temporarily deactivated, or permanently closed after 10 years. It is illegal to fill a well with garbage or junk. To deactivate a well, a secure cap must be installed, it must be readily accessible for inspection purposes, and it must be maintained in a safe and sanitary condition to prevent damage to the well and to protect the aquifer.

To properly close a well, the movement of water along the inside or outside of the well must be stopped. Any known water-bearing zones must be sealed off and the top of the well must be plugged with at least 3 feet (1 m) of sealant material. If the well does not have a casing, fill the entire depth with alternating layers of sealant and backfill materials (see Figure 10). Sealant layers must be a minimum of 3 feet (1 m) thick and at maximum intervals of 20 feet (6 m) apart. It is recommended that this closure method also be used for a cased well, as casings may be left in place. Mound backfill on top of the filled well to direct water away. Anyone is authorized to close a dug well that is less than 50 feet (15 m) deep; any deeper requires a qualified well driller.

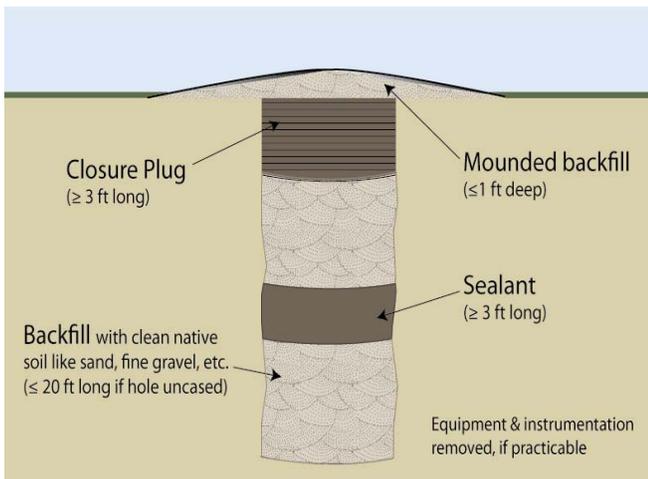


Figure 10: Example closure method for an uncased dug well

The person responsible for closing the well must remove the identification plate (if one is attached), complete a closure report (available at http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/wells.html), and submit them to the Ministry of Environment (GroundWater@gov.bc.ca or PO Box 9362, Stn Prov Gov, Victoria BC, V8T 9M2).

Anyone working inside a dug well must follow WorkSafeBC rules for confined space entry.



For further information

Registry of qualified well drillers/pump installers, well construction/closure report forms, and the WELLS database: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/wells.html

Provincial construction standards: Ground Water Protection Regulation and Water Act: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/index.html

WorkSafeBC requirements for confined spaces: <http://www2.worksafebc.com/topics/confinedspaces/home.asp>

Health safety standards: contact your local Health Authority (look in your local phone directory).

Public Health Act (http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_08028_01).

Health Hazard Regulation (http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/216_2011).



Photos by Mike Simpson, Peter Epp, Skye Thomson, Regional District of Nanaimo, Jillian Kelly, Sylvia Barroso, Laurie Lyons, & Patrick Farmer.