

This pamphlet contains general information for owners of flowing artesian wells in British Columbia. The pamphlet does not replace professional knowledge or experience or the laws set out in the [Water Sustainability Act](#) (WSA) and its associated regulations such as the [Groundwater Protection Regulation](#) (GWPR). Statutes and regulations are paraphrased in this document but are available on the website ([see additional information](#)).

A well owner should have a basic understanding of:

- » the main components of a well
- » what a flowing artesian well is;
- » the risks associated with a flowing artesian well;
- » flowing artesian well maintenance requirements;
- » legislation governing well drilling, well pump installation, and construction and maintenance of a flowing artesian well.

What is a Flowing Artesian Well?

The definition of a well under WSA includes: any casing, screen, drive shoe, packer, riser pipe, cap, valve, grout, liner and seal relating to a well. Well design may vary based on site specific conditions and professional consultation. Descriptions of common well components can be found in the [Groundwater Protection Regulation Guidance Manual](#) (see Figure 1, and [additional information](#)).

FIGURE 1 Basic components of an artesian well.

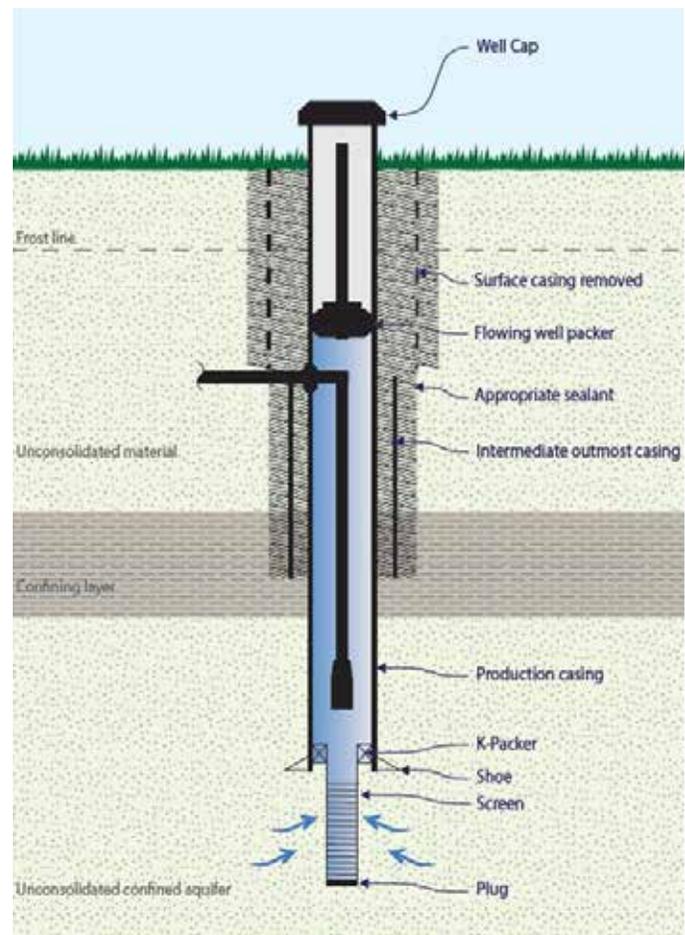
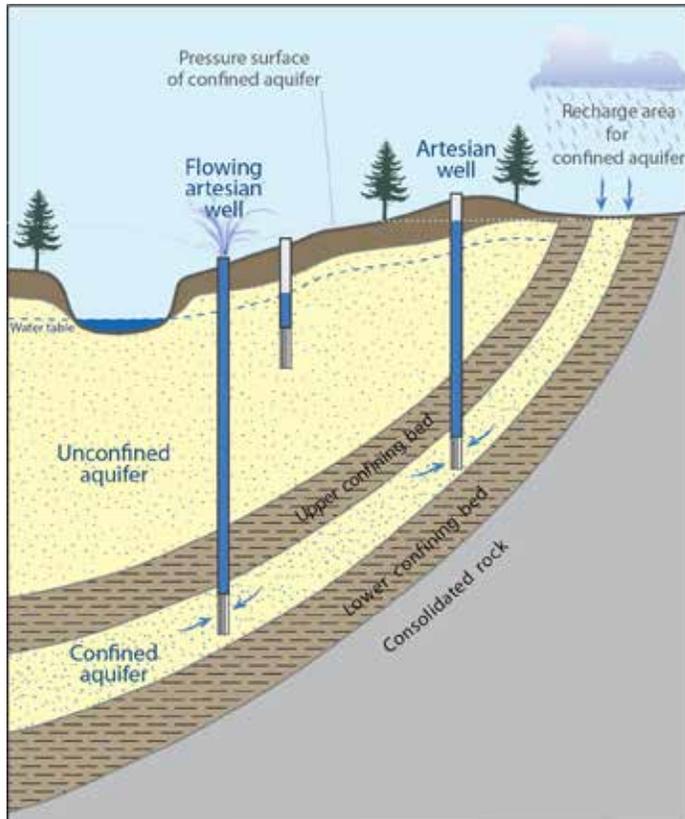


FIGURE 2 Geological and topographical controls affecting artesian and flowing artesian wells.



A well is artesian if the aquifer pressure raises the water column in the well casing above the aquifer level. A flowing artesian well is when the aquifer pressure forces the groundwater to rise in the well casing above the land surface naturally without using a pump. A flowing artesian well may flow on an intermittent or a continuous basis. Figure 2 shows the differences between an artesian well and a flowing artesian well, as not all artesian wells are considered flowing.

Before You Drill: Predicting Flow

Predicting the volume and rate of flow from a well is difficult. The volume and rate of flow depends on the upward pressure and can only be estimated before a well is drilled. Artesian conditions can happen unexpectedly during drilling. The registered well driller and/or professional needs to consider the probability of encountering artesian conditions and should construct a well that exceeds minimum well construction standards to ensure that the flow from an artesian well can be controlled and contained within the well casing, and to mitigate the risk of a breakout. A breakout is when the flow from the well casing cannot be controlled (see Figure 3) or the groundwater flows upward to the ground surface along the outside of the well casing. A breakout may result in flooding, erosion, aquatic habitat impacts, ground subsidence, sinkhole development or flow between different aquifers.

FIGURE 3 Uncontrolled flowing artesian well.



Controlling and Reporting Flowing Artesian Wells

The regulatory requirements for controlling and reporting on flowing artesian wells are described in WSA s.52, s.53, s.57, and GWPR Part 8, Part 10. If a registered water well driller or professional encounters artesian conditions when constructing a well (or supervising the construction of a well), they must ensure that any artesian flow is stopped or brought under control and notify the well owner (and the land owner, if different from the well owner) of the steps taken to do so. If the registered water well driller or professional fails to stop or control the artesian flow, it is the well owner's responsibility to hire another registered water well driller or professional to ensure that the artesian flow is stopped or brought under control. If the artesian flow cannot be controlled, the person responsible should contact FrontCounter BC and ask to speak with a regional hydrogeologist for advice.

A flowing artesian well is considered under control when the entire flow is conducted through the production casing to the wellhead and the flow can be stopped indefinitely without leaking onto the ground surface or into another aquifer penetrated by the well. Care must be taken when stopping or controlling artesian flow in an older well because of an inadequate surface seal and/or well casing corrosion may lead to a breakout. The well should be decommissioned if artesian flow is observed outside of the well casing and/or there is property damage or environmental impacts.

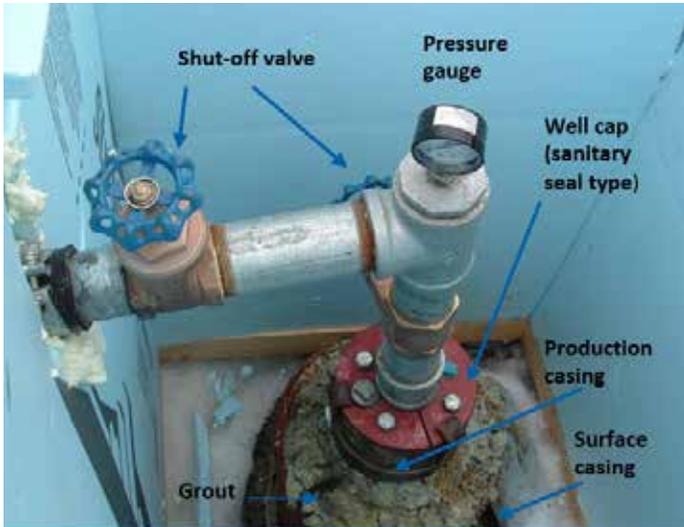
Stopping or controlling artesian flow prevents the wasting of groundwater. Wasted groundwater can have significant impacts including lowering artesian pressure in the aquifer, affecting neighbouring well water supply, and reducing flow at critical natural discharge points, such as springs or streams.

Once artesian flow is stopped or controlled, the wellhead should be protected from freezing to avoid damage and breakout. A registered water well driller or professional can advise on the best protection to maintain control and prevent freezing. For wells with low artesian pressure, groundwater may be contained below the frost line by mechanical means such as a well packer (see Figure 4). A flowing artesian well under higher pressure requires an engineered wellhead with an insulated and/or heated shelter to protect against freezing (see Figure 5).

FIGURE 4 Installation of a well packer in a low pressure flowing artesian well with sanitary seal well cap



FIGURE 5 Completed high pressure flowing artesian well.



Flowing artesian well construction and decommission reports must be submitted to the Province and the well owner. All work on a flowing artesian well must be completed by a qualified person with artesian well experience as stipulated in the WSA and GWPR s15. Professionals must be registered with the Engineers and Geoscientists British Columbia and should have competency in hydrogeology or geotechnical engineering (see [additional information](#)). Water well drillers and well pump installers must be registered with the Province (see [additional information](#)).

ADDITIONAL INFORMATION

Water Statutes and regulations:

<https://www.bclaws.gov.bc.ca/civix/content/complete/statreg/901199259/1401584569/?xsl=/templates/browse.xsl>

Groundwater Protection

Regulation Guidance Manual:

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-rights/gwpr_guidance_manual_signed.pdf

Registry of water well drillers and well pump installers:

<https://apps.nrs.gov.bc.ca/gwells/registries>

A listing of groundwater consultants (professionals who are registered with the Engineers and Geoscientists British Columbia with competency in hydrogeology or geotechnical engineering):

<https://www.egbc.ca/>

FrontCounter BC: for all authorization approvals such as water license, short-term use of water, changes in and about a stream, etc.

1-877-855-3222, Home - Natural Resource Online Services (gov.bc.ca)

Report a Natural Resource Violation:

1-877-952-RAPP or 1-877-952-7277

Report Natural Resource Violations - Province of British Columbia (gov.bc.ca)

Regional Groundwater Staff:

<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/groundwater-wells-aquifers/groundwater-wells/regional-groundwater-contacts>

Photos by Andarge Baye, Emilia Young, Mike Simpson, Laurie Lyons, Thierry Carriou

