Groundwater Protection Regulation: Guidance Manual

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BRITISH COLUMBIA

NAME OF POLICY:	Groundwater Protection Regulation: Guidance Manual
APPLICATION:	Information for professionals and industry as a guide to various provisions regulating groundwater protection in British Columbia
ISSUANCE:	Executive Director, Water Protection and Sustainability Branch, Ministry of Environment and Climate Change Strategy, and Director, Water Management Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development
IMPLEMENTATION:	FLNR, ENV
LEGISLATIVE REFERENCES:	*Water Sustainability Act* (Ch. 15, S.B.C 2014) [WSA] Water Sustainability Regulation (B.C. Reg. 36/2016, as amended) [WSR] Groundwater Protection Regulation (B.C. Reg 39/2016, as amended)
RELATIONSHIP TO PREVIOUS POLICIES:	This manual is intended to provide information to the public on the various provisions regulating groundwater protection in British Columbia.
POLICY AMENDMENT PROCESS:	To amend this manual, a request must be made in writing to the Executive Director, Water Protection and Sustainability Branch, Ministry of Environment and Climate Change Strategy and the Director, Water Management Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

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May 17, 2019
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ACRONYM LIST

C&E	Compliance & Enforcement
CSA	Canadian Standards Association
CSR	Contaminated Sites Regulation
DWPA	*Drinking Water Protection Act*
EMA	*Environmental Management Act*
ENV	Ministry of Environment and Climate Change Strategy
FLNR	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
GWPR	Groundwater Protection Regulation
HHR	Health Hazards Regulation (*Public Health Act*)
ID	Identification
m	Metres
WSA	*Water Sustainability Act*
WTN	Well Tag Number

Contents

1. INTRODUCTION

This manual provides a brief summary of:

1. requirements of the *Water Sustainability Act* (*WSA*) and the Groundwater Protection Regulation (GWPR) related to groundwater protection; and
2. the Ministry of Environment and Climate Change Strategy (ENV) and Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNR) policies associated with these groundwater protection requirements.

The manual also briefly describes pertinent groundwater protection requirements from other provincial legislation.

There are four sections to this manual:

1. Introduction;
2. Regulatory context;
3. Definition of key terms from the *WSA* and GWPR; and
4. Provisions for groundwater protection.

The purpose of this manual is to provide a topically organized summary of the provisions contained in the *WSA* and GWPR, as well as applicable portions of the *Drinking Water Protection Act* (DWPA) (Sections 16 and 23) and Health Hazard Regulation (HHR) (Section 8, under the *Public Health Act*).

Most of the content summarized in this manual is informed by the *WSA* and GWPR. It is important to note that, while every effort has been made to provide extensive reference to the legislation, not every section of the *WSA* or GWPR of relevance to groundwater protection is discussed herein. **As a caution, users of this manual should refer directly to the *WSA* and GWPR prior to taking action(s) to make sure they are consulting the most current version of applicable laws**. Where the contents of this manual differs from the *WSA*, the GWPR, or other referenced legislation, the provisions in those enactments take precedence over the guidance provided in this manual.

As noted, this manual provides an overview of pertinent legislation (Acts and regulations), key definitions and requirements. For subject matters discussed in the manual, the relevant sections of the *WSA* and GWPR are noted, and information on related policy and procedures are provided where applicable.

2. REGULATORY CONTEXT

2.1 *Water Sustainability Act* (*WSA*)

The *WSA* came into force on February 29, 2016, and is a key component of the ongoing efforts to modernize the management of water resources in British Columbia. The *WSA*, the *Water Users' Communities Act*, and the *Riparian Areas Protection Act*, along with a set of key regulations, repealed and replaced the former *Water Act*, *Fish Protection Act*, and the associated regulations, enabling the government to continue program operations, and to bring groundwater, other than for excluded domestic users, into the Province's water rights allocation scheme. Most of the provisions of the *Water Act* and *Fish Protection Act* were combined within the *WSA*. Also, there were consequential amendments to other statutes, including to the *Water Protection Act.*

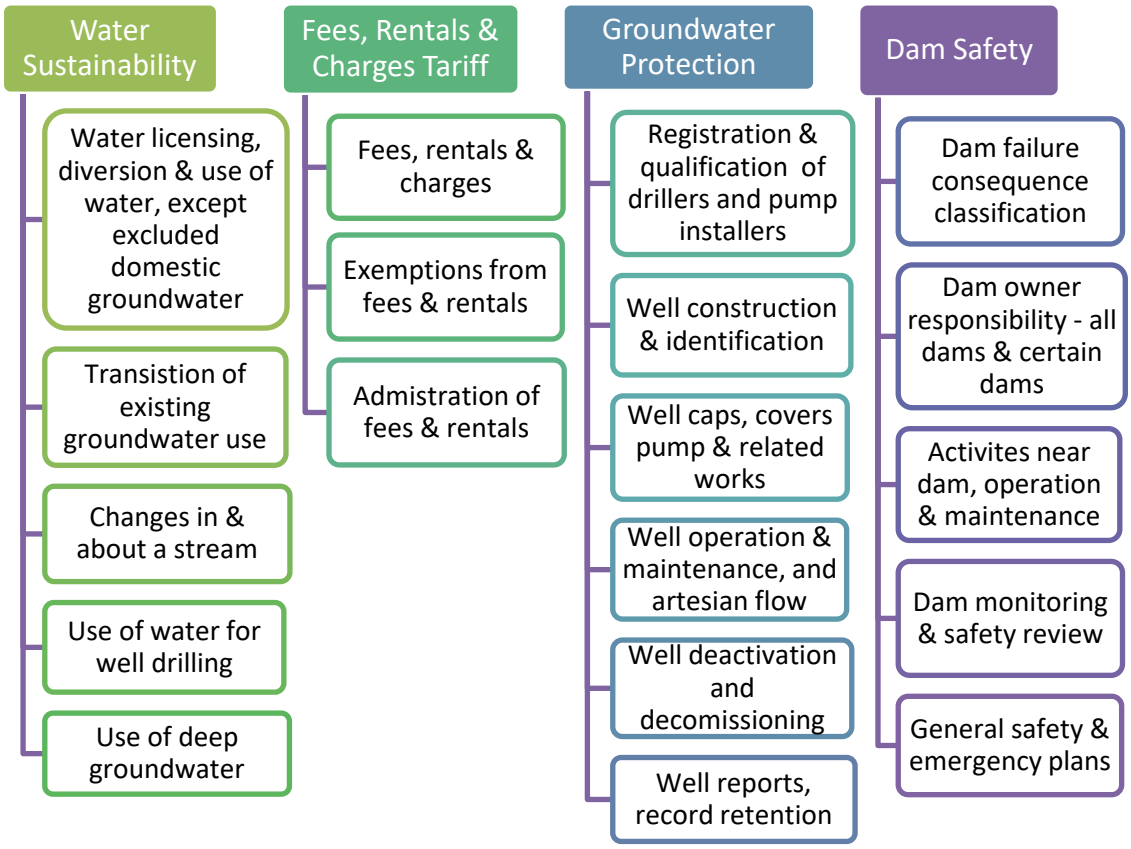
The *WSA* and its supporting regulations continue the water rights allocation scheme (based on priority of rights) that existed under the *Water Act* (*WA*), and maintains most of that *Water Act*'s regulatory features with the addition of new measures designed to enable the Province to respond to existing and emerging pressures on water resources. These new measures include those intended to protect aquatic ecosystem health, manage water use during periods of scarcity, and regulate groundwater use.

Some planned aspects of new groundwater regulatory tools, such as drilling authorizations, are under development by government personnel and are not addressed in this manual. In addition to the Water Districts Regulation (which describes and divides the province into water districts and precincts), for administration of the *WSA*, there are four main regulations under the *WSA* (Figure 2.1):

1. Water Sustainability Regulation,
2. Water Sustainability Fees, Rentals and Charges Tariff Regulation,
3. Groundwater Protection Regulation (GWPR),
4. Dam Safety Regulation.

This manual focuses primarily on groundwater protection requirements laid out in the *WSA* and GWPR. The GWPR includes qualifications and registration requirements for well drillers and well pump installers, requirements for the construction, deactivation, and decommissioning of wells, obligations of well owners with respect to the operation and maintenance of wells, and requirements for well reports.

Figure 2.1 Summary of Key Parts in Regulations Associated with the Water Sustainability Act



2.2 Other Statutes

Other provincial statutes may also contain provisions that relate directly or indirectly to groundwater protection. For example, the HHR (under the *Public Health Act*) and the DWPA (and Drinking Water Protection Regulation) directly impose requirements on well siting. Other provincial legislation can impose requirements that are intended to protect other features or values (e.g., the environment) and indirectly protect groundwater. An example would be the *Environmental Management Act* (EMA) and its associated regulations (e.g., Contaminated Sites Regulation [CSR]). Some of the groundwater protection requirements from those statutes are also described. It should be understood that these other references are not exhaustive.

The province's duty to consult First Nations is triggered where it contemplates an action or decision that may have adverse impacts on Aboriginal Interests (claimed or proven Aboriginal or treaty rights). The following link provides information on provincial policy for consulting with First Nations and related procedures: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/consulting-with-first-nations/first-nations/legal_obligations_when_consulting_with_first_nations.pdf.

Any required consultation should follow the provincial policy when making any water-related authorization decisions, unless there is an agreement with the First Nation that governs consultation on the type of decision at issue. Visit the "Consulting with First Nations" webpage for updated information and links: https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations.

3. DEFINITION OF KEY TERMS IN WSA AND GWPR

The *WSA*, GWPR and other legislation provide definitions of many terms. The following section includes those definitions and/or a brief outline of particular concepts. For certainty, an up-to-date version of the legislation itself should also be consulted.

Please note that:

- terms defined in statutory provisions are underlined and shown in blue;
- definitions, paraphrased from the legislation, are shown in "*quotations and italicized*" text; and
- later on in the text of this report, other terms used to describe particular concepts are also shown in blue but are not underlined.

Also, where legislation is only paraphrased, please consult the legislation directly for complete definitions.

3.1 Activities Related to Wells

The following is a list of paraphrased definitions from the *WSA* and GWPR with focus on activities related to wells.

Component	Definition	Act/Reg. and Section
alter[1]	*"in relation to a well, means* *(a) undertake a structural change to a well related to the well's depth, diameter or screen assembly ,* *(b) install a surface seal in a well that does not have one, or* *(c) hydrofracture a well to enhance groundwater supply from the well"*	*WSA* S.1(1)
construct	*"in relation to a well, means* *(a) drill the well,* *(b) alter the well,* *(c) develop the well,* *(d) repair or maintain the well,* *(e) inject water or any other substance into the well, or* *(f) construct, install, replace, repair, alter or remove works that relate to*	*WSA* S.1(1)

	groundwater or the well"	
deactivate	*"in relation to works, means take the works out of service temporarily"*	*WSA* S.1(1)
decommission	*"in relation to works, means take the works out of service permanently"*	*WSA* S.1(1)
divert	*"(a) in relation to water in a stream, cause the water to leave the stream channel, whether to cause the water to flow into another stream channel or a reservoir or otherwise, and* *(b) in relation to water in an aquifer, cause the water to leave the aquifer,* *and includes extract or impound water from a stream or an aquifer"*	*WSA* S.1(1)
drill	*"in relation to a well, means make the well by drilling, boring, driving, jetting or excavating"*	*WSA* S.1(1)
develop	*"in relation to a well, means remove from an aquifer the fine sediment and other organic or inorganic material that immediately surrounds the well screen, the drill hole or the intake area at the bottom of the well"*	GWPR S.1(1)
modify	*"means make a change, other than an alteration, to a well or wellhead"*	GWPR S.1(1)
rehabilitate	*"in relation to a well, means use chemical, mechanical or physical methods to improve or restore the capacity of the well to produce groundwater"*	GWPR S.1(1)

1. GWPR S.28(1) contains an exclusion to the definition of "alter" for that Division in the GWPR (e.g., in that Division, "alter" does not include the installation of a surface seal).

3.2 Allow to be Introduced

WSA S.59 states that a person must not introduce, allow to be introduced or cause to be introduced foreign matter (as listed) into a well. While "allow to be introduced" is not specifically defined in the WSA, this phrase pertains to the introduction of foreign matter into a well, which is prohibited (*WSA* S.59). It might be understood as prohibiting actions by a person that indirectly permit or which result in the introduction of foreign matter into a well and which could have been prevented. An example might be a land owner who stores leaking paint tins near a well.

3.3 Aquifer

WSA S.1(1) of the defines the term aquifer to mean:

> *"(a) a geological formation,*
>
> *(b) a group of geological formations, or*
>
> *(c) a part of one or more geological formations*
>
> *that is groundwater bearing and capable of storing, transmitting and yielding groundwater".*

GWPR S.1(1) also defines an unconsolidated aquifer as meaning "*an aquifer composed of sediment, such as gravel or sand*".

In plain language, an aquifer is essentially a water bearing geological formation, which is capable of storing, transmitting and yielding groundwater at times during the year or from time to time. Such aquifers might supply active water supply wells, yield water to springs and/or be found in the Aquifer Classification Database.

3.4 Closure Plug

GWPR S.1(1) defines closure plug to mean "*the sealant placed in the uppermost portion of a well that is being decommissioned*".

3.5 Designated Officials

Government officials can be designated under the *WSA* to have statutory authority to exercise the powers and perform the duties described in their designations (see *WSA* S.114). *WSA* S.1(1) also defines certain of these terms by reference to *WSA* S.114 (e.g., "comptroller", "engineer", "officer", "water manager"). Some of these officials may also have additional powers (*WSA* S.114(8)) and (9). The table below lists some of these officials:

Official	Definition	Act and Section
Assistant Water Manager	*"the minister may designate* *a) a public service employee or an employee of a government corporation as an assistant water manager, or* *b) a class of public service employee or class of employee of a government corporation as assistant water managers"*	*WSA* S.114(4)
Comptroller	*"the minister may designate a public service employee as the Comptroller of Water Rights"*	*WSA* S.1(1) and S.114(1)
Deputy Comptroller	*"the minister may designate a public service employee or an employee of a government corporation as a Deputy Comptroller of Water Rights".*	*WSA* S.114(2)
Drinking Water Officer	*"the same meaning as in section 1 [definitions] of the Drinking Water Protection Act"*	*WSA* S.1(1)
	"means a drinking water officer under section 3 [drinking water officers]" (of the DWPA)	*DWPA* S.1(1)
	"3(1) Unless another person is appointed under subsection (2), the drinking water officer for an area is *(a) the person appointed by the medical health officer as the drinking water officer, or* *(b) if no appointment is made under paragraph (a), the medical health*	*DWPA* S.3

	officer. *(2) The minister may, by order, appoint persons, by name or by title, as drinking water officers and establish the area of their jurisdiction.* *(3) In determining the qualifications for appointments under subsection (2), the minister must consult with the Provincial health officer.* *(4) Subject to the regulations, a drinking water officer may, in writing, delegate to any person a power or duty of the drinking water officer under this or another enactment."*	
Engineer	*"except in the definition of 'professional' in WSA S.48 [definitions for Division 3 of Part 3], means a person designated as an engineer under S.114 (5) [administration]". To be so designated by the comptroller under that section must be a professional engineer, professional geoscientist or hold limited licence under the Engineers and Geoscientists Act and be acting within the scope of that licence.*	*WSA* S.1(1) and S.114(5)
Officer	*"(a) the comptroller may designate for the purposes of this Act a public service employee (or class of them) or an employee of a government corporation (or a class of them) as an officer.* *The definition of "officer" also includes "(b) a conservation officer as defined in section 1 (1) [definitions] of the EMA"* *Also Natural Resource Officers (Natural Resource Compliance Act and Natural Resource Officer Authority Regulation)*	*WSA* S.1(1) and S.114(6)
Water Manager	*"the minister may designate* *a) a public service employee or an employee of a government corporation as a water manager, or* *b) a class of public service employee or class of employee of a government corporation as water managers"*	*WSA* S.1(1) and S.114(3)

3.6 Direct Supervision

WSA S.48(2) of the states that "*a person's actions are directly supervised by another person if that other person is responsible for the control and conduct of the person's actions*".

The supervising person should be appropriately qualified, and in a position to provide directions at appropriate stages throughout the activity to ensure that any work meets the requirements of the *WSA* and GWPR. Depending on the circumstances at the site and the complexity of work to be undertaken, this may require, in some cases, physical presence by the supervising person on the site at all times of

the work. In other instances, periodic review at appropriate times and stages of the work may be sufficient if the supervised person is experienced, well qualified and has been adequately instructed.

3.7 Flowing Artesian Well

GWPR S.1(2) defines flowing artesian well as meaning "*a well in which water, without the aid of a well pump,*

> *(a) rises above the surface of the ground or the top of the casing, if any, and*
>
> *(b) flows, either continuously or periodically.*"

3.8 Foreign Matter

WSA S.59 states that a person must not introduce, allow to be introduced, or cause to be introduced foreign matter into a well. GWPR S.1(1) defines foreign matter to mean "*a thing, matter or substance described in section 59(1)(a) to (g) [prohibition on introducing foreign matter into well] of the Act and includes the substances prescribed under section 2 of this regulation*."

From *WSA* S.59(1), foreign matter in relation to a well includes:

"*a. Refuse*

b. Carcasses

c. Human or animal waste

d. Pesticides or fertilizers

e. Material from construction or demolition

f. A prescribed matter or substance

g. Another contaminant, clay, silt, rock or a similar material, or another matter or substance, in such amounts or in such a matter as to cause or to be likely to cause a significant adverse impact on

i. The quality of water in

- *The well*
- *Another well that diverts water from the same aquifer*
- *Another aquifer, or*
- *A stream that is hydraulically connected to an aquifer referred to in the bullets above, or*

ii. The existing uses made of the water from

- *The well*
- *Another well that diverts water from the same aquifer*
- *Another aquifer, or*
- *A stream that is hydraulically connected to an aquifer referred to in the bullets above.*

GWPR S.2 further prescribes particular substances as foreign matter for the purposes of *WSA* S.59:

" a. Paints and paint products

b. Liquid fuels

c. Fuel additives

d. Lubricants, other than water

e. Solvents, other than water

f. Herbicides and fungicides

g. Flood waters and flood debris"

3.9 Groundwater

WSA S.1(1) defines groundwater as "*water naturally occurring below the surface of the ground*".

3.10 Owner and Well Owner

The *WSA* refers to both the well owner (owner of a well) and the owner of land on which a well is located. Often these will be the same person, but in some cases the well may be located on land owned by another person. For example, wells may be located on public land or private land (owned by another person) under an easement or statutory right of way.

The term owner is defined in *WSA* S.1(1) as, "*in relation to land, a mine or an undertaking in British Columbia, means a person who*

a) is entitled to possession of the land, mine or undertaking, or

b) has a substantial interest in the land, mine or undertaking."

WSA S.1(1) also defines "undertaking" as, "*a project, including all land and other property acquired or to be acquired in connection with the project and the general scheme for the acquisition, maintenance and operation of the works for the project, for*

a) the diversion, carriage, use and sale of water, or

b) the sale of power produced from water,

the water use purpose of which water is referred to in an application or authorization".

DWPA S.1 also defines owner in relation to a water supply system as including

"*(a) a person who is*

(i) responsible for the ongoing operation of the water supply system, or

(ii) in charge of managing that operation, and

(b) if

(i) parts of the water supply system are owned by different persons, or

(ii) all or part of the system is jointly owned by different persons, all of those persons".

3.11 Permanent

Permanent is defined under GWPR S.1(1) as:

> "*(a) in relation to a well, a well that is intended to be in service for a period of more than 90 days after construction, and*
>
> *(b) in relation to a well pump, a well pump that is intended to remain installed in a well for a period of more than 90 days after installation"*

3.12 Person Responsible

WSA S.48(1) defines the person responsible with respect to constructing a well, installing a well pump, conducting a flow test, or decommissioning a well as meaning:

> *(a) if the activity is supervised by a professional,*
>
> *(b) if paragraph (a) does not apply and the activity is supervised or performed by a well driller or a well pump installer who is qualified to supervise or perform that activity, that well driller or well pump installer,*
>
> *(c) if neither paragraph (a) nor (b) applies, a person who performs the activity in the ordinary course of that person's business, and*
>
> *(d) if none of paragraphs (a), (b) or (c) applies, the person on whose behalf the activity is performed".*

3.13 Professional

WSA S.48 defines a professional, as:

> "*(a) a professional engineer, or a professional geoscientist, who is registered or licensed under the Engineers and Geoscientists Act, or*
>
> *(b) a holder of a limited licence under the Engineers and Geoscientists Act acting within the scope of the limited licence*".

3.14 Qualified

WSA S.48 defines qualified, in respect of an activity in relation to a well or well pump, as:

> "*(a) for a well driller, means a well driller who has the qualifications prescribed as required to perform or supervise the activity in relation to the well or well pump, and*
>
> *(b) for a well pump installer, means a well pump installer who has the qualifications prescribed as required to perform or supervise the activity in relation to the well or well pump"*

The qualifications for prescribed activities are further described in Section 14 to 16 of the GWPR and summarized in Section 4 of this manual.

3.15 Register and Registration number

The register is defined in GWPR S.1(1) as "*a register of registered persons maintained by the comptroller as described in section 7, in respect of (a) registered well drillers, or (b) registered well pump installers*".

These registers identify all registered well drillers and well pump installers authorized to operate in British Columbia.

Registration number is also defined in GWPR S.1(1), and means the number recorded in the respective registers by the comptroller for a specified well driller or well pump installer.

3.16 Sealant

Under GWPR S.1(1), sealant means "*a sealing material or mixture of sealing materials that is*

(a) less permeable than the surrounding geological formation to be sealed,

(b) appropriate for the particular soil and water conditions, and

(c) non-toxic and does not have an adverse impact on the quality of the groundwater in an aquifer or a well".

3.17 Shut-In Pressure

Defined in GWPR S.1(1), shut-in pressure, in relation to a flowing artesian well, means

"*(a) the water pressure after the artesian flow has been stopped, or*

(b) the height of the water above the top of the production casing or above the surface of the ground after the artesian flow has been stopped".

3.18 Temporary

Defined in GWPR S.1(1) as meaning "*(a) in relation to a well, a well that is intended to be in service for a period of not more than 90 days after construction, and (b) in relation to a well pump, a well pump that is intended to remain installed in a well for a period of not more than 90 days after installation".*

3.19 Under Control

This term applies to artesian flow. *WSA* S.52 specifies that "*artesian flow of a well is under control when*

(a) the artesian flow

(i) is clear of sediment,

(ii) is entirely conveyed through the well's production casing to the wellhead, if the well has a production casing,

(iii) may be mechanically stopped for an indefinite period in a manner that prevents leakage onto the surface of the ground or into another aquifer penetrated by the well, and

(iv) does not pose a threat to property, public safety or the environment, or

(b) if the artesian flow cannot be controlled in accordance with paragraph (a), the well is decommissioned

(i) in accordance with the regulations [GWPR],

(ii) by a person authorized under section 49 [restrictions on constructing or decommissioning wells], and

(iii) in a manner that allows no artesian flow at the surface of the ground or leakage into another aquifer penetrated by the well."

3.20 Water Supplier and Water Supply System

DWPR S.1 defines a water supplier as "*the owner of a water supply system*", where a water supply system means "*a domestic water system, other than*

(a) a domestic water system that serves only one single-family residence, and

(b) equipment, works, or facilities prescribed by regulation as being excluded."

3.21 Wells and Types of Wells

Under *WSA* S.1(1), a well is defined as: "*an artificial opening in the ground made for the purpose of*

(a) exploring for or diverting groundwater,

(b) testing or measuring groundwater,

(c) recharging or dewatering an aquifer,

(d) groundwater remediation,

(e) use as a monitoring well,

(f) use as a closed-loop geoexchange well, or

(g) use as a geotechnical well,

but does not include

(h) an artificial opening, other than a water source well, to which the Geothermal Resources Act or the Oil and Gas Activities Act applies, or

(i) an artificial opening of a prescribed class, made for a prescribed purpose or in prescribed circumstances"

GWPR S.3 also specifies that *"The following artificial openings in the ground are excluded from the definition of "well" in section 1 [definitions] of the Act:*

(a) the following artificial openings made for the purpose of drainage:

(i) drains, including building perimeter drains, curtain drains, French drains and backfilled soakaway pits;

(ii) sumps in buildings that are part of the drainage systems of the buildings;

(iii) ditches or infiltration trenches of a shallow and linear nature;

(b) prefabricated vertical drains, vertical strip drains, wick drains and sand drains made for the purpose of facilitating soil consolidation prior to building construction;

(c) seismic relief holes, including stone columns and stone densification points, made for the purpose of dissipating excess water pressure caused by seismic activity;

(d) drill holes made for the purpose of mineral exploration."

GWPR S.4 states that *"(1) The following are exempt from the requirements of this regulation and of Division 3 [Wells and Groundwater Protection] of Part 3 of the Act:*

(a) water source wells [S.1 of WSA refers to definition in S.1 of the Petroleum and Natural Gas Act] that are used to divert deep groundwater in the subject area, as "deep groundwater" and "subject area" are defined in section 51 of the Water Sustainability Regulation, and from which wells deep groundwater is used for an oil and gas purpose in the subject area;

(b) drainage wells;

(c) horizontal closed-loop geoexchange wells that are less than 5 metres (m) deep;

(d) test pits.

(2) Despite subsection (1), the following provisions apply in relation to the wells referred to in that subsection:

(a) Part 8 [Artesian Flow];

(b) sections 74 (2) [decommissioning boreholes and test pits] and 80 [well decommission reports for flowing artesian wells];

(c) sections 52 [controlling artesian flow during construction], 53 [controlling flowing artesian well], 57 (3) (b) [well reports in prescribed circumstances], 59 [prohibition on introducing foreign matter into well], 60 [remediation orders in relation to foreign matter into well] and 61 [wells on Crown land] of the Act."

WSA S.48(1) also indicates that a well "*includes any casing, screen, drive shoe, packer, riser pipe, cap, valve, grout, liner and seal relating to a well.*"

GWPR S.5 identifies well classes and subclasses, and states that*:*

"(1) For the purposes of this regulation, each of the following is a class of well:

(a) water supply wells;

(b) monitoring wells;

(c) recharge wells;

(d) injection wells;

(e) dewatering wells;

(f) remediation wells;

(g) geotechnical wells;

(h) closed-loop geoexchange wells.

(2) For the purposes of this regulation, each of the following is a subclass of the geotechnical well class:

(a) boreholes;

(b) test pits."

The *WSA* and GWPR also define several specific well types, summarized in the table below.

Well Type	**Definition**	**Act/Reg. and Section**
Borehole	*"means a drilled geotechnical well, other than a test pit, that is intended to remain in service for a period of not more than 30 days after construction"*	GWPR S.1(1)
Geotechnical well	*"means a well, other than a monitoring well or a well that is used to divert groundwater, that is drilled for the purpose of obtaining geotechnical, hydrological, hydrochemical or stratigraphical information"*	*WSA* S.1(1)
Monitoring well	*"means a well that (a) is used or intended to be used for the purpose of monitoring, observing, testing, measuring or assessing* *(i) the level, quantity or quality of groundwater, or* *(ii) subsurface conditions, including geophysical conditions, and* *(b) is not used or intended to be used for the purpose of* *(i) exploring for or diverting groundwater for a water use purpose, or* *(ii) injecting water or any other substance into groundwater on an ongoing basis"*	*WSA* S.1
Closed-loop geoexchange well	*"means a well, other than an open-loop geoexchange well, used or intended to be used for the purpose of heat exchange in a closed-loop geoexchange system, in which there is no transfer of water between an aquifer and the well"*	GWPR S.1(1)
Dewatering well	*"means a well used or intended to be used for the purpose of diverting or conveying groundwater by pumping in order to* *(a) facilitate an excavation,* *(b) stabilize an area of land, a building or any other improvement, or* *(c) reduce water pressure in a geological formation;"*	GWPR S.1(1)
Drainage well	*"means a well used or intended to be used for the purpose of diverting or conveying groundwater by the force of gravity and without pumping in order to*	GWPR S.1(1)

	(a) facilitate an excavation, *(b) stabilize an area of land, a building or any other improvement, or* *(c) reduce water pressure in a geological formation;"*	
Excavated well	*"means a well, commonly known as a dug well, excavated by* *(a) digging in unconsolidated materials using manual or mechanical methods, or* *(b) blasting in consolidated materials"*	GWPR S.1(1)
Injection well	*"means a well used or intended to be used for the purpose of conveying water into a geological formation with the aid of a well pump"*	GWPR S.1(1)
Open-loop geoexchange Well	*"means a water supply well that is used or intended to be used for the purpose of heat exchange in an open-loop geoexchange system in which there is a transfer of water between an aquifer and the well"*	GWPR S.1(1)
Recharge well	*"means a well used or intended to be used for the purpose of conveying water into a geological formation without the aid of a well pump and includes soakaway pits that are unfilled and cased"*	GWPR S.1(1)
Remediation well	*"means a well that is used or intended to be used for the purpose of groundwater remediation, including the removal or treatment of contaminants that have entered an aquifer"*	GWPR S.1(1)
Test Pit	*"means an excavated geotechnical well that is intended to remain in service for a period of not more than 30 days after construction"*	GWPR S.1(1)
Water Source Well	*"has the same meaning as in section 1* [definitions] *of the Petroleum and Natural Gas Act" (PNGA)*	*WSA* S.1(1)
	"a hole in the ground drilled to obtain water for the purpose of injecting water into an underground formation in connection with the production of petroleum or natural gas"	PNGA S.1
Water supply well	*"means a well used or intended to be used for the purpose of exploring for, diverting or using groundwater, and includes a water source well, but does not include a drainage well, dewatering well or remediation well"*	GWPR S.1(1)

3.22 Well Components

The *WSA* and GWPR also define several well components summarized in the table below.

Component	Definition	Act/Reg. and Section
Annular space	*"means (a) an open space between the outside of the casing of a well and the surrounding geological formation, or* *(b) an open space between 2 or more casings in the same well"*	GWPR S.1(1)

Backfill Materials	*means*: *"(a) uncontaminated natural geological materials,* *(b) uncontaminated drill cuttings, or* *(c) uncontaminated non-toxic synthetic materials"* where used to backfill space in or around a borehole or well.	GWPR S.1(1)
Casing	*"means the piping or tubing installed in a well to support the sides of the well and includes production casing and surface casing"*	GWPR S.1(1)
Casing stick-up	*"in relation to a well, means the length of the production casing in the well that is above* *(a) the surface of the ground adjacent to the well, or* *(b) the floor of the well sump, pump house or well pit"*	GWPR S.1(1)
Drive shoe	*"means a commercially-manufactured, forged or tempered steel sleeve with a cutting edge attached to the bottom of a drive pipe or casing to act as a cutting edge or protector for the lower edge of the drive pipe or casing during drilling"*	GWPR S.1(1)
Liner	*"means piping or tubing installed in a well to protect the well pump or other works in the well from damage"*	GWPR S.1(1)
Pitless adapter	*"means a mechanical device attached to a casing for the underground conveyance of water to or from a well"*	GWPR S.1(1)
Production casing	*"in relation to a well, means the innermost pipe, tubing or other material installed in the well to support the sides of the well, but does not include a well liner or surface casing"*	*WSA* S.1(1)
Screen assembly	*"in relation to a well, means* *(a) a screen in the well,* *(b) a closed bottom, and* *(c) any other related components, including a riser pipe, packer, screen blank or tail pipe, that are required for* *(i) the method or type of installation of the screen, or* *(ii) the nature of the geological formation"*	GWPR S.1(1)
Sounding tube	*"means a tube that enables the groundwater level in a well to be measured".*	GWPR S.1(1)
Surface casing	*"means a casing that surrounds the production casing of a well".*	GWPR S.1(1)
Surface seal	*"means a sealant that* *(a) is installed in the annular space around the outside of the outermost casing and between multiple casings, and* *(b) extends to or just below the surface of the ground"*	GWPR S.1(1)

Well cap	*"means a secure cap or lid that prevents vermin, contaminants, debris or other foreign objects or substances from entering the interior of the production casing, and includes a sanitary well seal"*	*WSA* S.1(1)
Well cover	*"means a secure cover, lid or structure that prevents vermin, contaminants, debris or other foreign objects or substances from entering the well"*	*WSA* S.1(1)
Wellhead	*"means(a) the physical structure, facility, well cover, adapter or device* *(i) that is at the top of, or at the side and near the top of, a well, and* *(ii) from or through which groundwater flows or is pumped from the well, and* *(b) any casing, well cap, valve, grout, liner, seal, vent or drain relating to the well, but does not include a well pump or a pump house"*	*WSA* S.1(1)
Well pit	*"means an excavated artificial opening in the ground, lined with concrete, metal or wood, that contains a wellhead that is below the surface of the ground"*	GWPR S.1(1)
Well pump	*"means a pump that* *(a) is at or in a well, and* *(b) is used or intended to be used for the purposes of* *(i) diverting groundwater from a well,* *(ii) adding water to a well to recharge the well or an aquifer, or* *(iii) dewatering an aquifer"*	*WSA* S.1(1)

3.23 Works

The term works is defined in *WSA* S.1(1), and for the purpose of groundwater, means:

> *"(a) anything that can be or is used for:*
>
> *(i) diverting, storing, measuring, conserving, conveying, retarding the flow of, confining or using water,*
>
> *(ii) producing, measuring, transmitting or using electricity*
>
> *(iii) collecting, conveying or disposing of sewage or garbage, or*
>
> *(iv) preventing or extinguishing fires*
>
> *…*
>
> *(e) access roads to any of the works referred to in paragraphs (a) to (d) or (f)(i), and*
>
> *(f) wells and works related to wells, including*
>
> *(i) wellheads,*
>
> *(ii) anything that can be or is used for injecting or otherwise adding water or any other substance to a well,*

(iii) anything that can be or is used for constructing, deactivating or decommissioning a well,

(iv) anything that can be or is used for exploring for, testing, diverting or monitoring groundwater,

(v) anything that can be or is used for disinfecting a well,

(vi) an injection system attached to a work that is used for conveying, from a well, groundwater that will be used for applying fertilizers or pesticides,

(vii) anything that can be or is used in relation to a monitoring well or a well made for the purpose of groundwater remediation".

4. PROVISIONS FOR GROUNDWATER PROTECTION

The following sections summarize specific groundwater protection provisions from corresponding parts or sections of the *WSA* and GWPR and other relevant legislation. The following sections are structured to reference the relevant provisions of the statute and the regulation and to briefly summarize the purpose and requirements. These sections may also discuss other considerations and suggest reference information.

4.1 Restrictions on Well Activities and Qualifications

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.49	Restrictions on constructing or decommissioning wells and related activities
	S.50	Restrictions respecting well pumps and flow tests
	S.51	Proof of qualifications and insurance
GWPR	S.14	Qualifications for activities in relation to wells – well drillers
	S.15	Qualifications for activities in relation to artesian flow – well drillers
	S.16	Qualifications for activities in relation to wells – well pump installers
	S.17	No restriction on who may decommission certain wells

PURPOSE

The following summary of requirements (marked with an "X") is intended to provide guidance regarding who may undertake specified activities in relation to a well or well pump and to indicate when those activities should be undertaken by appropriately qualified and registered persons. The statutory provisions should also be consulted for specifics regarding particular requirements.

SUMMARY OF REQUIREMENTS

Activity	Persons authorized to undertake activity				Comments / exclusions
	Registered well driller[1]	Registered Well pump installer	Professional[2]	Supervised Person[3]	
Well construction	X (other than closed loop geo-exchange wells unless so qualified)		X[4]	X	Does not apply to: • decommissioning of shallow wells (< 5 m), that are not flowing artesian wells • excavating, constructing, deactivating or decommissioning of shallow excavated wells (< 15 m) that are not flowing artesian wells • constructing or decommissioning geotechnical wells that do not penetrate an aquifer • a well owner installing, replacing or repairing a flow meter, well cap, well cover, valve, or vent that is part of the wellhead and accessible at the ground surface on their own well. • a well owner deactivating or disinfecting their own well
Well decommissioning, deactivation	X	X[5]	X[4]	X	
Well disinfection[6]	X	X	X	X	
Wellhead / well pump installation, maintenance, repair, removal	X	X	X	X	Does not apply to: • Installing a well pump in a monitoring well, closed-loop geoexchange well, or geotechnical well • a well owner disinfecting their own well after a well pump is installed
Flow testing and well disinfection	X	X	X	X	

1. Qualified and registered for the class of wells in which the activity is being undertaken (see further discussion on next page)
2. A professional with competency in hydrogeology or geotechnical engineering
3. A person who is under the direct supervision of a registered person for those activities
4. A professional may supervise the indicated activity
5. A well pump installer may decommission or deactivate a well, other than a flowing artesian well
6. For a water supply well, person responsible for permanent pump installation or temporary pump removal must disinfect the well

Well drillers are only qualified to construct and alter a well in the well class for which they are classified:

Well type	Well Driller registered prior to Feb 29, 2017	Water Well Driller	*Geotechnical or Environmental Well Driller*	Geo-exchange Well Driller
Any, except closed-loop geoexchange well	X	X		
Monitoring, Geotechnical and remediation wells	X	X	X	
Closed-loop geoexchange well	X			X

The requirements for application for registration for well drillers are discussed in the next section (Registration of well drillers and well pump installers).

Proof of qualifications must be immediately provided to a designated official upon request.

A person who is performing or directly supervising the above activities must immediately provide proof that the person is so qualified to a designated official (the comptroller, a water manager, engineer, officer, or a drinking water officer) upon request. In the case of a well driller or well pump installer, that proof would be the identification card provided by the comptroller on registration, which must be made available to a designated official upon request.

They must also provide proof of qualifications to a person who is engaging their services when asked.

CROSS REFERENCE AND ADDITIONAL RESOURCES

Register of Well Drillers:
(http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/wells/applications/well_drillers_reg.pdf)

Register of Well Pump Installers:

(http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/wells/applications/pump_install_reg.pdf)

4.2 Registration of Well Drillers and Well Pump Installers

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.51	Proof of qualifications and insurance
GWPR	S.7	Register of well drillers and well pump installers
	S.8	Application for registration as well driller
	S.9	Registration and classification of well driller
	S.10	Application for registration as well pump installer
	S.11	Registration of well pump installer
	S.12	Notice to comptroller
	S.13	Proof of qualifications – identification card

PURPOSE

To provide that persons undertaking well drilling and well pump installation have the specified qualifications and are registered with the Province.

SUMMARY OF REQUIREMENTS

The comptroller is required to:

- maintain a register of well drillers and a register of well pump installers who are authorized to operate in British Columbia;
- make the list of well drillers and well pump installers publically available;
- classify well drillers into classes as one or more of the following: water well driller, geoexchange driller, or geotechnical/environmental driller;
- issue an identification card, which identifies the person as a well driller (and references the class(es) they are qualified to work on) or as a well pump installer; and,
- remove registrants who fail to meet registration requirements or are no longer working as a well driller or well pump installer in Canada.

The new registration requirements and well driller classifications also apply to previous registrants. Those registrants will have been classified and issued ID cards.

The application process and requirements for well drillers and well pump installers are briefly discussed in the following section of this report.

Well drillers and well pump installers are required to:

- Only undertake well drilling or well pump installation activities for which their registration qualifies them;
- Advise the comptroller within 60 days if there are any changes with their registration information or if they cease to work in Canada as a well driller or a well pump installer;

- Immediately provide their proof of qualifications (identification card), when requested by a designated official, if undertaking well drilling or well pump installation activity; and
- Provide proof of qualifications if requested by a person engaging that well driller or well pump installer (proof of insurance is not required at this point) (WSA S.51).

DISCUSSION

Topics discussed in this section			
#	**Discussion**	**Source**	**Section**
4.2.1.1	General considerations for application	GWPR	S.8, S.10
4.2.1.2	Notice to comptroller and inability to locate registered persons	GWPR	S.12
4.2.1.3	Identification cards	GWPR	S.13

General considerations for applications for registration

When registering a person as a well driller or well pump installer, the comptroller reviews the application for registration to determine whether the applicant has the applicable certification required by the GWPR. The comptroller does not assess or certify the quality of the work undertaken by that person.

Applicants for registration must provide proof of age (minimum 19 years) and proof of qualification. For a well driller proof of qualification includes (GWPR S.8(2)(b)):

> *"(i) a Certificate of Qualification as a Water Well Driller issued by the Province of British Columbia;*
>
> *(ii) a Certificate of Qualification as a Geoexchange Driller issued by the Province of British Columbia;*
>
> *(iii) a Certificate of Qualification as a Geotechnical/Environmental Driller issued by the Province of British Columbia;*
>
> *(iv) a certificate issued by another province or territory of Canada that is equivalent to a certificate referred to in subparagraph (i), (ii) or (iii);*
>
> *(v) a certificate as a Ground Water Drilling Technician issued by the Canadian Ground Water Association [CGWA] before April 26, 2013."*

For a well pump installer proof of qualification includes (GWPR S.10(2b):

> "*(i) a Certificate of Qualification as a Well Pump Installer issued by the Province of British Columbia;*
>
> *(ii) a certificate issued by another province or territory of Canada that is equivalent to a certificate referred to in subparagraph (i);*

(iii) a certificate as a Ground Water Pump Technician issued by the Canadian Ground Water Association before April 26, 2013."

If the comptroller approves the application for registration as a well driller or well pump installer based on the applicant meeting the applicable certification required, ENV staff will mail the registrant an acceptance letter signed by the comptroller and an identification card.

There is no fee for registration for an identification card issued by the comptroller or for a replacement card.

Notice to comptroller and inability to locate registered persons

Registered well drillers and well pump installers are required to advise the comptroller in writing within 60 days of any change of their information (e.g., contact details) included in the register or if they are no longer actively working in Canada as a well driller or well pump installer.

If notice is not provided and ENV staff are unable to locate that individual, the comptroller may consider that this person is no longer actively working in Canada, which would be grounds to remove them from the appropriate register.

Identification cards

A registered well driller or a registered well pump installer must carry an identification card issued by the comptroller. If a registered well driller or well pump installer loses their identification card they may advise ENV staff (groundwater@gov.bc.ca) and a replacement card will be issued at no cost.

PROCESS

Application Requirements

To be eligible for registration a person must meet the requirements of the GWPR and submit the required information. The requirements for registration are that the person be at least 19 years of age and must have proof of qualifications (as described above in the *General considerations for applications for registration* section above).

Registering and Classifying Applications

Application forms are sent to the Comptroller of Water Rights' (comptroller) office. The applications are then processed by ENV staff for the Deputy Comptroller's approval.

If further information is necessary to consider an application, the Deputy Comptroller or staff will advise the applicant accordingly. ENV staff will take steps to confirm employment history where relevant to proof of qualifications. Certification will be reviewed to ensure it is up-to-date, including maintenance of any requirement for registration (where applicable).

Where registration is accepted, the applicant will be provided with a letter confirming acceptance of registration as a registered well driller or a letter confirming acceptance of registration as a registered well pump installer, as applicable. If the registration is not accepted written reasons will be provided in

the response letter for the refusal to register, including information on certification required to become registered.

Accepted applicants will have their names and contact information included in the Register of Well Drillers or the Register of Well Pump Installers. Such persons will also be issued an Identification Card.

4.3 Well Construction and Protection

4.3.1 Well Siting

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
GWPR	S.18	Siting of water supply wells and permanent dewatering wells
	S.19	Siting of recharge wells and injection wells
HHR[1]	S.8	Distance of wells from possible source of contamination

PURPOSE

To provide that proposed water supply wells, permanent dewatering wells, recharge wells, and injection wells are properly designed and/or located (sited) to reduce the potential for adverse impacts to existing water supply wells, from adjacent potential sources of contamination, or on groundwater quality.

SUMMARY OF REQUIREMENTS

Overview of Requirements		
Well type	**Requirement**	**Comment(s)**
1. Siting		
Water supply well	Minimum 120 m from cemetery or dumping ground[1]	Clarification on "dumping ground" in Policy Section
	Minimum 30 m from source of probable contamination[1]	Clarification on "probable contamination" in Policy Section
	Minimum 15 m from existing water supply well[2]	Alternative siting possible, if accepted by engineer
	Minimum 6 m from private dwelling[1]	Exceptions discussed later
Permanent dewatering well	Minimum 15 m from existing water supply well[2]	Alternative siting possible, if accepted by engineer
Recharge or injection well	Designed by a professional so it does not cause a significant adverse impact on the quality of water in an aquifer or in another well that diverts water from the aquifer[(3)]	Clarification on "significant adverse impact" in Policy section below

	Infiltration point is above the water table at all times[3] Constructed in accordance with design[3]	Alternative design possible, if accepted by engineer
2. Reporting		
All permanent wells	Well construction reports must be completed by the person responsible for drilling the well	If applicable, must include alternative specifications or design, and any terms and conditions specified by the engineer[4]
Recharge and injection wells	Professional must prepare as-built drawings. Design and drawings must be retained until well decommissioning[3]	

1. HHR S.8
2. GWPR S.18
3. GWPR S.19
4. GWPR S.18

A more detailed discussion of these requirements is provided below.

Siting of *water supply wells*

GWPR S.18 states that proposed water supply wells must be sited not less than 15 m from any part of an existing water supply well unless:

- the existing water supply well is not in use and is not intended to be in use, or
- the owner of the proposed well also owns the existing well and only one additional well is proposed to be drilled, or
- the proposed well is sited in accordance with alternative specifications, where the alternative specifications for siting the well must be:
    - prepared by a professional with competency in hydrogeology and demonstrate that the existing uses of the existing water supply well will not be adversely affected;
    - submitted to the engineer prior to drilling the proposed well; and
    - accepted by the engineer and the engineer may specify terms and conditions.

The person responsible must drill the well in accordance with the accepted alternative specifications for siting the well and any terms and conditions specified by the engineer.

HHR S.8 states that water supply wells installed on or after July 20, 1917 must also be more than:

- 30 m from any probable source of contamination;
- 6 m from a private dwelling; and

Contamination from a potential source may be 'impossible' based on physical or hydrogeological setting. For example, if the potential source of contamination is downgradient and at much lower elevation, or is separated by a hydrological barrier such as a thick, intact confining layer or installed barrier to flow.

- 120 m from a cemetery or dumping ground, unless contamination from the cemetery or dumping ground is impossible because of the physical conformation of the area.

For water supply wells installed before July 20, 1917 and that are less than those prescribed setback distances (i.e., less than 30 m, 6 m or 120 m from probable contaminant sources, private dwellings or cemeteries and dumping grounds, respectively), the person controlling the well must:

- remove any source of contamination within those distances, or
- decommission the well in accordance with the GWPR. Decommissioning requirement does not apply if there is no other reason to abandon the well except for proximity to a private dwelling.

Siting of permanent dewatering wells

GWPR S.18 states that proposed permanent dewatering wells must be sited not less than 15 m from any part of an existing water supply well, unless:

- the existing water supply well is not in use and is not intended to be in use, or
- the owner of the proposed well also owns the existing well and only one additional well is proposed to be drilled, or
- the proposed well is sited in accordance with alternative specifications, where the alternative specifications for siting the well must be:
    - prepared by a professional with competency in hydrogeology and demonstrate that the existing uses of the existing water supply well will not be adversely affected,
    - submitted to the engineer prior to drilling the proposed well, and
    - accepted by the engineer, and the engineer may specify terms and conditions.

The person responsible must drill the well in accordance with the accepted alternative specifications for siting the well and any terms and conditions specified by the engineer.

Siting of recharge wells and injection wells

GWPR S.19 states that before a recharge well or injection well can be constructed for the purpose of conveying urban runoff into the ground, it must be:

- designed by a professional with competency in hydrogeology or geotechnical engineering, and
- the professional must:
    - design the proposed well so that it does not cause a significant adverse impact on the quality of water in an aquifer or in another well that diverts water from the aquifer, and
    - specify the following minimum distances in the design:
        i. horizontal distances between the proposed well and any existing water supply wells, and

ii. vertical distance between the point of infiltration of the proposed well and the water table to ensure that the point of infiltration is above the water table at all times unless, and

- the well must be designed and constructed in accordance with an alternate design that has been submitted to and accepted by the engineer.

If an alternate design is proposed for a recharge well or injection well where the infiltration point of treated water is below the seasonal high water table, the design must be submitted to the engineer. The engineer may accept the design and specify terms and conditions on the acceptance and may determine whether to exempt the well from the minimum vertical distance specification.

The owner of the recharge well or injection well must ensure that:

- the person responsible constructs the well in accordance with the design;
- if applicable, the person responsible constructs the well in accordance with an accepted alternative design and any terms and conditions specified by the engineer;
- the professional prepares as-built drawings of the well; and
- the design and as-built drawings are retained until the well is decommissioned.

Well construction reports must be completed by the person responsible for drilling the well. The well construction report for any wells drilled in accordance with alternative specifications or design must include those accepted alternative specifications or design and any terms and conditions specified by the engineer.

4.3.2 Casings and Liners

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
GWPR	S.20	Casings and liners – general requirements
	S.21	Thermoplastic casings and liners for water supply wells

PURPOSE

This section describes the requirements for casing and liner materials. In the case of thermoplastic liners, the certifications required to install such a casing or liner in a well used for drinking water. These requirements promote the selection of materials that reduce the potential for adverse impacts to groundwater quality or existing water supply wells from adjacent sources of contamination.

SUMMARY OF REQUIREMENTS

If a well casing or liner is used in a well for drinking water use, they must be:

- new material or used material in like-new condition (GWPR S.20);
- approved or certified by Canadian Standards Association (CSA), Underwriters' Laboratories of Canada, ASTM International, or NSF International, if composed of thermoplastic materials and used in a water supply well (GWPR S.21); and,
- strong enough to withstand pressures or forces exerted on them during installation and subsequent well operation (GWPR S.20).

4.3.3 Surface Seals

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
GWPR	S.22	Surface seal – general requirements
	S.23	Surface seal – water supply wells
	S.24	Multiple annular spaces
	S.25	Sealing closed-loop geoexchange wells
	S.26	Backfill materials above surface seal
	S.27	Surface sealing for alterations
	Schedule 5	Figures relating to wells

PURPOSE

To describe requirements for surface seals and maximum lengths of backfill materials allowable above a surface seal. The objective is to help prevent the entry of any foreign matter from the surface of the ground into the well, or the aquifer via an unsealed annular space around the well casing if penetrated by the well.

SUMMARY OF REQUIREMENTS

The person responsible for drilling or altering a well with one or more casings must complete or alter the well such that it has an effective, permanent, and continuous surface seal in all annular spaces. As shown in the figures below (taken from GWPR Schedule 5) these seals must be (GWPR S.22 and S. 23):

(1) within 0.3 m of ground surface (i.e., no more than 0.3 m of backfill material above the surface seal) (GWPR S.26);
(2) a minimum width or thickness of 2.54 cm, including the wall thickness of any surface casing left permanently in place; or in all annular spaces of the well (e.g., the entire width of excavated materials around any annular space created around a surface casing) (GWPR S.22); and,
(3) a minimum length of:
    a. 1 m;
    b. for a water supply well (GWPR S.23);
        i. 5 m, unless the depth is insufficient (in which case the surface seal must be the greatest possible length up to 5 m); or,
        ii. the method of drilling is by driving (in which case the surface seal must be a minimum of 1 m in length); and,
        iii. if bedrock is encountered at or within 5 m of the surface of the ground, the surface seal must extend to a minimum of 1 m into competent bedrock (therefore, the required surface seal length may be longer than 5 m) except if the well is driven (see ii);

c. for a closed-loop geoexchange well the entire length of the ground loop from the bottom upward (GWPR S.25).

Openings or joints in the well within the length of the surface seal are also required to be made watertight with non-toxic materials (GWPR S.22).

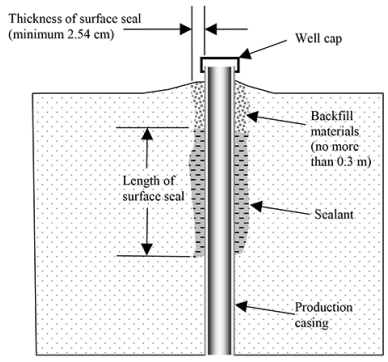


Figure 1. *No surface casing*

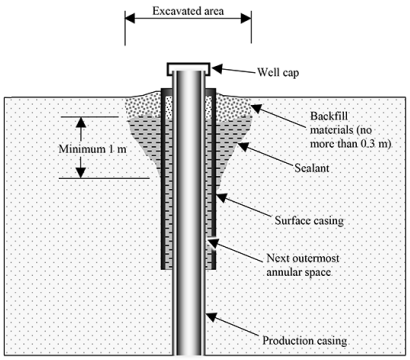


Figure 2. *Surface casing with annular space around casing*

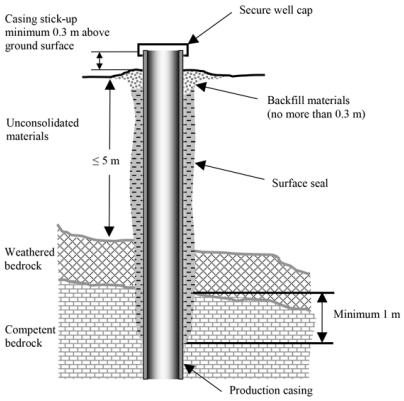


Figure 3. *Water supply well and shallow bedrock (<5 m)*

Ref: Schedule 5, GWPR

4.3.4 Well Caps and Well Covers

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.54	Well caps or well covers
GWPR	S.38	Well caps
	S.39	Maintenance and attachment of well caps or steel plates
	S.40	Well covers
	S.41	Maintenance and installation of well covers
	S.42	Custom-designed well caps and well covers

PURPOSE

To describe who is responsible for well cap and well cover installation, maintenance and replacement, and the specifications to meet in order to reduce the potential for entry of floodwater, ponded water or any foreign matter into the well or aquifer via the well casing.

SUMMARY OF REQUIREMENTS

Promptly after drilling or altering a well the person responsible must securely attach a well cap to the top of the production casing. Exempt from this requirement are geotechnical wells, closed-loop geoexchange wells, or water supply wells with a hand pump that meets the requirements for a well cap (*WSA* S.54 and GWPR S.38). If the production casing is below ground surface the person responsible must also install a well cover at or above ground surface.

The well cap and well cover must (GWPR S.38):

- Prevent entry of any water at ground surface, including floodwater, ponded water, as well as foreign matter, persons, or animals into the well; and,
- Be commercially manufactured or fabricated from suitably durable material. A steel plate welded to the top of the casing may be used as a temporary well cap for a well that is not yet in service.

Well caps must also prevent or minimize artesian flow from the well. If the well has multiple casings the well cap must be permanent, watertight, and attached to all casings at the top of the annular space (GWPR S.38).

Well owners must ensure that a well cap or well cover is securely attached to the production casing, meets the requirements outlined above, and is maintained in good operating condition. If it is not practicable for a well owner to attach a well cap or well cover that meets the requirements above, the well owner must engage a well driller, well pump installer, or professional to design and attach a well cap or well cover that meets the requirements above (GWPR S.39, 41, 42).

Well caps and well covers must not be removed except for: inspecting, developing, disinfecting, maintaining, repairing, or altering a well; inspecting, maintaining, repairing, replacing or altering works;

installing, re-installing, removing or testing a well pump; conducting a flow test; measuring water levels; collecting water samples; or undertaking similar activities that require temporary removal of a well cap or well cover. If removed, the well cap or well cover must be replaced as soon as practicable after completing the work. Well caps and well covers must not be destroyed, damaged or tampered with (WSA S.54).

4.3.5 Wellhead Completion

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
GWPR	S.33	Casing stick-up
	S.34	Protection of thermoplastic casings
	S.35	Slope of surface of ground around wellhead
	S.36	Well pit restrictions – water supply wells
	S.37	Drainage away from wellhead – construction of wells in well sumps, pump houses or well pits

PURPOSE

To describe requirements related to the design and completion of a wellhead to reduce the potential for water infiltration at the wellhead and adverse impacts to the quality of water in an aquifer.

SUMMARY OF REQUIREMENTS

Overview of Requirements		
Wellhead Component	**Requirement for person responsible for drilling or altering a well**	**Comment(s)**
Casing stick-up	Stick-up must extend a minimum of 0.3 m above the ground surface or floor of the well sump, pump house, or well pit (i.e., where the well is installed in a sump, pump house, or well pit) (GWPR S.33)	Does not apply to geotechnical wells, closed-loop geoexchange wells, temporary dewatering wells, or monitoring wells[1]
Thermoplastic casings	Thermoplastic casing above the ground surface is protected from damage or material breakdown (GWPR S.34)	For additional details on thermoplastic casings and liners for water supply wells see GWPR S.21
Slope of ground surface around wellhead	Ground surface around the wellhead must be sloped to prevent ponding of water around the wellhead or in the area disturbed during drilling (GWPR S.35)	For additional details related to slope of surface and ground around wellhead see GWPR S.35
Well pits	A well pit must not be constructed for a new water supply well, or added to an existing water supply well, unless designed by a professional[2] as described below. (GWPR S.36)	If designed by a professional[2], the professional[2]must: (i) supervise construction; (ii) prepare as-built drawings of the well pit; and (iii) submit the design and as-built drawings to the owner and
	Upon altering an existing water supply well in an existing well pit, the well pit must be brought into compliance with this part. To be brought into compliance, the well pit must either be removed, or be designed by a	

	professional[2] as herein described (GWPR S.36).	comptroller within 90 days after construction (GWPR S.36). Under GWPR s. 81, the well owner must keep any as-built drawings until the well is decommissioned.
	If designed by a professional[2], water must not pond in the well pit and water must be conveyed away in a manner that is not likely to adversely impact the quality of water in an aquifer (GWPR S.26).	
Well sump, pump house, or well pit	Must be designed and constructed so that water entering the sump, pump house or well pit is conveyed away from the wellhead (GWPR S.37).	Does not apply to a monitoring well, if the well is designed by a professional[2] and constructed in accordance with that design (GWPR S.37 (2)). If designed by a professional[2] the design must prevent adverse impacts on the quality of water in an aquifer (GWPR S.37)

NOTE: 1: Refers to monitoring wells drilled under the supervision of a professional who has competency in hydrogeology or geotechnical engineering

2: who has competency in hydrogeology or geotechnical engineering

4.3.6 Development, Well Yield Testing, and Disinfection

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
GWPR	S.28	Development and screens — water supply wells
	S.29	Use of certain substances — water supply wells
	S.30	Disinfection of water supply wells
	S.31	Well yield tests and reports
	S.32	Pumping tests

PURPOSE

To provide that well screens are appropriately designed, installed and developed so as to not cause ground subsidence or residual groundwater quality impacts, that well yield tests are completed and reported, and that pumping tests are designed and conducted by professionals with competency in hydrogeology.

SUMMARY OF REQUIREMENTS

Overview of Requirements for Person Responsible[1]		
Activity	**Summary of Requirement**	**Comment(s)**
Designing and installing screen assembly in water supply wells	The person responsible[1] for drilling or altering[2] a water supply well in an unconsolidated aquifer must equip the well with a screen assembly that (GWPR S.28): • is securely attached to the production casing, • is composed of durable material with strength suited to the particular soil and water conditions encountered, and • has appropriate sized slot openings so that the well depth does not change due to sand or other unconsolidated material being drawn in during operation of the well or building up in the well.	Screen assembly not required for excavated wells or if the gravel or other unconsolidated materials naturally exposed at the well bottom are coarse enough to allow the water supply well to be developed so that the bottom of the production casing is stable, and the well depth does not change as a result of sand or other unconsolidated material being drawn in during operation of the well or building up in the production casing.
Developing water supply wells	The person responsible[1] for drilling, altering[2], or rehabilitating a water supply well must develop the well in a manner that prevents significant collapse of the ground surface around the well or damage to the surface seal of the well during development or operation of the well (GWPR S.28).	
Using certain	The person responsible[1] for drilling, altering[2],	

substances in water supply wells	developing, or rehabilitating a water supply well may introduce acids, lubricants, bactericides, or other similar substances into the well for these activities (GWPR S.29).	
	If acids, lubricants, bactericides, or other similar substance are used, the person responsible for performing the activity must: • promptly remove groundwater from the well until the remaining concentrations of these substances in the remaining groundwater in the well would not prevent the use of the water supply well; and • dispose of groundwater removed from the well without causing a threat to the aquatic ecosystem of a stream, or an aquifer, or to property, public safety or the environment	
Disinfecting water supply wells	The person responsible[1] for drilling, altering[2], developing, or rehabilitating a water supply well, must disinfect the groundwater in the well promptly after performing the activity to destroy micro-organisms introduced by the activity (GWPR S.30).	
Well yield testing in water supply wells and permanent dewatering wells	The person responsible for drilling or altering[2]a water supply well or a permanent dewatering well, must conduct a well yield test (GWPR S.31).	A well yield test is not required if there is insufficient water in the well to conduct the test Well yield test results must be included in the well construction report.

NOTE: 1. Persons responsible for activity must be registered to undertake activity and do so in accordance with GWPR (S.14(1)).
2. In this division, "alter" does not include the installation of a surface seal (GWPR, S.28).

If a well owner is required to carry out a pumping test as part of an application or order, a professional with competency in hydrogeology must design the test, directly supervise or perform the test, and interpret the results of the test. That professional may install a temporary well pump to carry out the pumping test (GWPR S.32).

4.3.7 Well Pumps and Related Works

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
GWPR	S.43	Definition of "related works"
	S.44	Well pump installation — general requirements
	S.45	Pitless adapter installation, replacement or repair
	S.46	Thermoplastic liner, drop pipes and sounding tubes for water supply wells
	S.47	Devices to prevent flow of water back into well
	S.48	Sealing after installation of well pump or related works
	S.49	Modification of wellhead
	S.50	Use of non-toxic lubricants and solvents
	S.51	Hand pumps in water supply wells
	S.52	Disinfection of water supply wells after well pump activities

PURPOSE

To provide that well pump installation, replacement, or repair does not have a significant adverse impact on groundwater quality or create conditions that could result in significant adverse impacts to groundwater quality in an aquifer.

SUMMARY OF REQUIREMENTS

The person responsible for installing a well pump or related works must ensure that the surface seal is not impacted (i.e., replace or repair the surface seal if required to meet the requirements of the GWPR) and disinfect the well after well pump installation or removal. Specific requirements for well pump components are outlined in the table below.

Component	Requirements for person responsible for installation, replacement or repair
Well pump	GWPR S.44 • Ensure no damage to or movement of casing during installation or operation of the well pump • Ensure the well pump is protected by a liner if the well is unstable • Install the well pump and related works in a manner that prevents entry of any foreign matter into the well and allows the well, well pump, and related works to be properly disinfected
	GWPR S.48 • If the installation of a well pump or related works damages the surface seal, repair, or replace the surface seal. • If the installation of a well pump or related works creates a visible annular space between the outermost casing and the surrounding geological formation, seal the annular space with sealant.

	After installing a permanent well pump, equip the well with a device to prevent flow of water back into the well (GWPR S.47)
	After installing a permanent well pump or removing a temporary well pump, disinfect the groundwater in the well to destroy any micro-organisms introduced (GWPR S.52)
Pitless adapter	GWPR S.45 • Ensure that the pitless adapter is constructed with materials not likely to have a significant adverse impact on water quality • Ensure that the pitless adapter is installed in a manner that will prevent corrosion of metal • Ensure that the connection or seal between the pitless adapter and the production casing is watertight
Thermoplastic liner, drop pipes and sounding tubes	If installed in water supply wells, these components must be approved or certified for use for drinking water by: CSA, Underwriters Laboratories of Canada, ASTM International, NSF International (GWPR S.46).
Wellhead	If modified to allow installation of a well pump or related works, the wellhead must continue to meet GWPR requirements and, in the case of a professional design for a well pit, remain compliant with wellhead requirements in that design (e.g., professional's design for a well pit if present) (GWPR S.49)
Lubricants and solvents	Lubricants and solvents may be used for well pump installation, maintenance, or repair if non-toxic (GWPR S.50)
Hand pumps	Must meet requirements for well caps or be upgraded or replaced to meet those requirements by March 1, 2018 (GWPR S.51)

4.3.8 Well Identification

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.55	Well Identification
GWPR	S.53	Attachment of well identification plates by person responsible for drilling or alteration
	S.54	Attachment of well identification plates by owner of well supplying water supply system
	S.55	Well identification plate attachment
	S.56	Protection and replacement of well identification plates
	Schedule 6	Table relating to well identification plates and well reports

PURPOSE

To identify new water supply wells, recharge wells (if drilled or bored), injection wells (if drilled or bored), permanent dewatering wells, and existing wells for water supply systems so that each such well can be related to its record in the GWELLS database.

SUMMARY OF REQUIREMENTS

Well identification plates (ID plates) must be securely attached to all water supply wells.

In addition, they must be securely attached to recharge wells (if drilled or bored) and injection wells (if drilled or bored), and to permanent dewatering wells constructed after the *WSA* and GWPR came into force (i.e., for recharge wells, injection wells, and dewatering wells requirement is to promptly attach them on completing drilling or alteration) (GWPR S.53). Well ID plates must be plainly visible (GWPR S.54).

> Each water supply well, recharge well, injection well, and dewatering well must have its own ID plate, even if present in a single protective casing.

Well ID plates are supplied by the comptroller and must be installed by the person responsible for drilling the well. If an ID plate is not already attached to a well, a person responsible for altering that well or the owner of a well for a water supply system must attach an ID plate.

Well ID plates must be securely attached to the casing, well cap, or well cover so that the ID number is plainly visible. If the ID plate cannot be securely attached to those well components, the ID plate may be securely attached to the discharge pipe, the pump motor housing, the stand at the top of the well, the pump house, or a nearby post.

A person responsible for drilling or altering a well must report the ID plate number for that well on the well construction report they are required to submit.

An owner of a water supply system well, who attaches an ID plate must complete a well identification report and submit a copy of it to the comptroller within 90 days of attaching the ID plate.

Well owners are required to ensure that ID plates are protected from physical damage and remain plainly visible, report missing or damaged ID plates to the comptroller within 30 days of discovering the loss or damage, request a replacement ID plate, and to promptly attach replacement ID plates if supplied by the comptroller.

PROCESS

Obtaining ID plates

Well ID plates are available without charge from groundwater@gov.bc.ca. Replacements for missing or damaged ID plates are also issued free of charge.

Processing of well construction reports and well decommission reports or well identification reports (Schedule 2) and assigning a well tag number (WTN)

A WTN is a unique number assigned to a record for a well (a well record) when a well construction report or well decommission report is entered into the Province's GWELLS Application (GWELLS database). The WTN is different from the well ID plate number.

The well ID plate number is the number stamped on the ID plate which is attached to the well casing or pump house. The well ID plate number is not unique to that ID plate since the ID plate can be replaced if lost or damaged with a well ID plate with the same number.

For every well construction report or well decommission report received (including those voluntarily submitted, and those for which no ID plate is required) and every well identification report (Schedule 2) received, the ENV staff will enter the information in the GWELLS database. The well will have a WTN generated by the system (if a well record does not already exist in the GWELLS database).

4.3.9 Well Identification Reports and Well Construction Reports

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.55	Well identification
	S.56	Well reports
GWPR	S.75	Well identification reports by owner of well supplying water supply system
	S.76	Well construction reports submitted to both comptroller and well owner
	S.77	Well construction reports submitted to well owner only
	S. 81	Retention of records
	Schedule 2	Information in well identification reports
	Schedule 3	Information in well construction reports
	Schedule 6	Table relating to well identification plates and well reports

PURPOSE

Specify the requirements for the provision of well identification reports and well construction reports to the comptroller and well owner based on the type of well, as listed in Schedule 6 of the GWPR.

SUMMARY OF REQUIREMENTS

The following table outlines the person responsible to submit well identification reports and well construction reports within 90 days of attachment or completion of drilling or altering.

Report	Person responsible for report submission	Report must be submitted to
Well identification report (GWPR S.75)	Owner of a well that supplies a water supply system	Comptroller
Well construction report (GWPR S.76, S.77)	Person responsible for drilling or altering a: ▪ Water supply well ▪ Recharge well made by drilling/boring or injection well made by drilling/boring ▪ Permanent dewatering well ▪ Closed-loop geoexchange well[1] ▪ All flowing artesian wells	Comptroller and well owner
	Person responsible for drilling or altering a: ▪ Permanent monitoring well ▪ Permanent remediation well ▪ Geotechnical borehole	Well owner

NOTE: 1: only one well construction report per geoexchange system is to be sent to the comptroller and a report for every well in that system is to be sent to the well owner, as per the table in Schedule 6 of the GWPR.

These reports must contain the information outlined in Schedule 2 or 3 of the GWPR (as applicable) and as indicated on the "well identification report for water supply system" form or "well construction / decommission / alteration report" form.

These reports must be submitted within 90 days of attaching an ID plate (for well identification report) or within 90 days of drilling or altering the well (for well construction report).

The person responsible for drilling or altering a well must also retain the well construction report for at least 10 years. The well owner must keep every well identification report and well construction report related to the well until the well is decommissioned.

CROSS REFERENCES AND ADDITIONAL RESOURCES

Well identification report for water supply system (Schedule 2) form:
http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-wells/schedule_2_well_identification_report_for_wss_gwpr2.pdf

Well construction report form: http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-wells/well_construct_close_form.pdf

4.4 Artesian Flow

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.52	Controlling artesian flow during construction
	S.53	Controlling flowing artesian well
GWPR	S.15	Qualifications for activities in relation to artesian flow – well drillers
	S.66	Additional requirements – stopping or controlling artesian flow
	S.67	Report on artesian flow management
	S.68	Maintenance of equipment installed to control artesian flow
	S. 76	Well construction reports submitted to both comptroller and well owner
	S. 80	Well decommission reports for flowing artesian wells
	Schedule 1	Information in Artesian Flow Management Reports
	Schedule 6	Table Relating to Well Identification Plates and Well Reports

4.4.1 Controlling Artesian Flow

PURPOSE

To describe who is responsible for controlling artesian flow conditions when/where they are encountered, the role of well drillers who are registered in undertaking this work including activities that must be undertaken and reporting requirements, additional requirements for stopping or bringing artesian flow under control, and maintenance of equipment installed to control artesian flow.

Section 1(2) of the GWPR defines a flowing artesian well as "*a well in which water, without the aid of a well pump:*

a. rises above the surface of the ground or the top of the casing, if any; and,

b. flows, either continuously or periodically

SUMMARY OF REQUIREMENTS

Person	Requirement(s)	Relevant Section
A well driller or professional	While constructing a well or supervising the construction of a well: • if they encounter artesian conditions, they must ensure as soon as practicable, that any artesian flow is stopped or brought under control, or • If the flowing artesian well is likely to flow periodically, they must ensure as soon as possible, that steps are taken to ensure artesian flow will be stopped or brought under control during those periods	*WSA* S.52(2)
	If they encounter artesian flow or take steps to stop or bring artesian	*WSA* S.52(4)

	flow under control they must notify the well owner and the land owner of the encounter and any steps taken	
A person other than a well driller or professional, while constructing a well	If they encounter flowing artesian conditions or artesian conditions while constructing a well that indicate the artesian well is likely to flow periodically, they must notify the well owner, they must ensure together with the well owner, that a well driller who is registered[1] in respect of the activity or a professional is engaged and complies with *WSA* S.52(2) (e.g., to stop or bring that artesian flow under control) (see above)	*WSA* S.52(3)
A well owner or land owner (if the well owner is unknown)	They must engage a registered[1] well driller or professional to stop or bring the artesian flow under control (e.g., and complies with *WSA* S.52(2))	*WSA* S.52(3)
	If the well driller or professional engaged under either WSA S.52(2) or S.52(3) is unable to stop or bring the flow under control, they must engage another registered[1] well driller who is qualified in respect of the activity or professional to comply with *WSA* S.52(2).	*WSA* S.52(5)
	For an existing flowing artesian well, they must engage a registered[1] well driller who is qualified in respect of the activity or professional and ensure that the well driller or professional stops the flow of that well or brings the flow of that well under control.	*WSA* S.53
A person responsible for stopping or controlling artesian flow (registered[1] well driller or professional)	They must comply with any applicable regulations and any directions of an engineer in relation to stopping or controlling the flow	*WSA* S.52(7)
	They must configure the wellhead or equip the well with a device that prevents the flow of water back into the well	GWPR S.66(a)
	They must measure the shut-in pressure or static water level and record that measurement on a well construction report	GWPR S.66(b)
A flowing artesian well owner	They must ensure that equipment installed to bring the artesian flow under control is: • maintained so that artesian flow remains under control; • maintained so as to prevent the flow of water back into the well; and, • protected from damage caused by freezing	GWPR S.68 (a) and (b)
	They must ensure that equipment installed to bring the artesian flow under control is only removed for an activity that requires its temporary removal (e.g., inspecting, repairing or replacing equipment) and where removed ensure that it is promptly replaced	GWPR S.68 (c) and (d)
A person responsible for decommissioning a flowing artesian well (registered[1] well	If a flowing artesian well is decommissioned or if artesian flow is encountered during the decommissioning of a well the person responsible for decommissioning the well must complete and submit a well decommission report to both the comptroller and the owner of	GWPR S.80

driller or professional)	the well.	
A decision maker (comptroller or a water manager)	If satisfied based on the report of a professional[2] that due to exceptional circumstances it is not practicable to bring artesian flow under control but that flow can be managed in another manner without posing a threat to property, public safety, or the environment, the artesian flow may be brought under control in accordance with comptroller or water manager directions, if they are satisfied that (based on the report of a professional[2]): • it is not practicable to bring artesian flow under control (due to exceptional circumstances), and • the artesian flow can be managed in another manner without posing a threat to property, public safety, or the environment	*WSA* S.52(6)
A professional[2] preparing a report for the purposes of WSA S.52(6)	When preparing a report for the purposes of *WSA* S.52(6), they must: • assess the artesian flow conditions of the well, and record the assessment of the artesian flow conditions; • ensure the report includes the information in GWPR Schedule 1; and, • submit the report to the decision maker as soon as practicable after the assessment of the artesian flow conditions.	GWPR S.67

NOTE: 1. GWPR S.15 defines qualifications for well drillers for activities in relation to artesian flow
2. The professional must have competency in the field of hydrogeology or geotechnical engineering.

4.4.2 Artesian Flow Management Reports

PURPOSE

To describe information that should be included in reports provided by professionals that are to be submitted to a decision maker in support of a request that artesian flow be managed in another manner (as discussed above).

SUMMARY OF INFORMATION TO BE INCLUDED – *WSA* S.52(6) / GWPR S.67

If due to exceptional circumstances it is not practicable to bring artesian flow under control, a professional may prepare a report proposing that the artesian flow be managed in another manner (provided the flow can be managed in another manner without posing a threat to property, public safety, or the environment) and submit the report to the decision maker (comptroller or water manager).

If the decision maker is satisfied (based on the professional's report) that the artesian flow can be managed in another manner without posing a threat to property, public safety, or the environment, the artesian flow may be brought under control in accordance with the directions of the decision maker.

This professional must have competency in the field of hydrogeology or geotechnical engineering, assess the artesian flow conditions of the flowing artesian well, and record the assessment of the artesian flow conditions.

The report must be submitted as soon as practicable after the assessment of the artesian flow conditions and provide information set out in Schedule 1 of the GWPR. The type of information required under Schedule 1 includes:

- information regarding the owner, as well as location, identification, and description of the well;
- an assessment of artesian flow;
- details regarding actions taken to mitigate or remediate damage caused by artesian flow;
- the reasons for the failure of the attempts to stop or bring the artesian flow under control;
- the plan and details for bringing the flow under control;
- an evaluation of the proposed manner of managing the artesian flow and the exceptional circumstances that make it not practicable to stop or bring the artesian flow under control;
- the method by which the flow of water will be prevented from flowing back into the well;
- other options, if any, for managing the artesian flow other than the proposed manner;
- any potential threats or impacts to property, public safety, the environment, the aquifer, and other water users that may be posed by the proposed manner and options to mitigate those impacts;
- estimated costs of managing the artesian flow in accordance with the proposed manner including maintenance and monitoring costs that may be anticipated;
- an evaluation of the risks and consequences of the proposed manner of managing the artesian flow as compared to other options;
- an evaluation of the likelihood that the proposed manner of managing the artesian flow will satisfy the requirements of the *WSA*; and,
- the professional's contact information and experience with controlling or managing artesian flow.

Please consult Schedule 1 of the GWPR for further details.

4.5 Well Operation and Maintenance

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.130 (1c)	Regulations respecting groundwater and groundwater works
GWPR	S.58	General operating requirements for well and area around wellhead
	S.59	Drainage away from wellhead – maintenance of wells in well sumps, pump houses or well pits
	S.60	Operation of water supply wells and permanent dewatering wells with alternative specifications
	S.61	Conveyance of urban runoff – recharge wells and injection wells
	S.62	Storage near water supply wells
	S.63	Protection of water supply system wells from entry of foreign matter and physical damage
	S.64	Maintenance of surface seal
	S.65	Maintenance of casing and stick-up

PURPOSE

To describe what is expected of well owners in respect of operation and maintenance of their well and wellhead.

SUMMARY OF REQUIRED OPERATION AND MAINTENANCE

A well owner is expected to meet the following requirements pertaining to well maintenance and operation, summarized in the following table.

Component	Maintenance requirement – **Well owner must ensure that:**	Relevant Section
Well and area around wellhead	The ground surface is sloped so that water does not pond around the wellhead	GWPR S.58 (1)
	Well and wellhead area is maintained to prevent entry of foreign matter into well	GWPR S.58 (1)
	Repairs promptly undertaken to maintain well and wellhead in good operating condition	GWPR S.58 (1)
	Access to well and wellhead is maintained for inspection and clear of obstructions	GWPR S.58 (2)
Well in well sump, pump house or well pit	Water entering sump, pump house, or well pit is conveyed away from the wellhead	GWPR S.59
Wells with	Water supply or permanent dewatering well is completed, equipped,	GWPR S.60

alternate specifications	and maintained in accordance with accepted alternative specifications and any terms and conditions, if specified by the engineer	
Recharge or injection well	Well for purpose of conveying urban runoff into the ground is completed, equipped, and maintained in accordance with its design and any terms and conditions and so that the well does not cause a significant adverse impact on water quality in an aquifer or in another well in the aquifer	GWPR S.61
Storage near water supply well	No foreign matter is stored or accumulated within 3 m of a water supply wellhead	GWPR S.62 (1)
	No foreign matter outside of the 3 m zone can travel to within 3 m of the wellhead	GWPR S.62 (2)
Protection of water supply system well	Well for purpose of supplying water supply system is completed, equipped, and maintained to prevent any foreign matter from entering from the ground surface into the well directly or through an annular space	GWPR S.63 (1)
	Wellhead is protected from physical damage due to flood debris, ice, or erosion	GWPR S.63 (2)
Surface seal	The surface seal integrity is maintained	GWPR S.64 (1)
	Any visible annular space (e.g., gaps) around the outermost casing of the well is sealed with sealant	GWPR S.64 (2)
	All visible openings in closed-loop geoexchange well casing are sealed with sealant	GWPR S.64 (1)
Casing and stick-up	Production casing is maintained so that it remains continuous and stickup is > 0.3 m above ground surface adjacent to well or floor of sump, pump house, or well pit	GWPR S.65 (1)
	Production casing is repaired or replaced if damaged to meet requirements and ensure thermoplastic casing is protected from damage or material breakdown	GWPR S.64 (2)

4.6 Prohibition on Introducing Foreign Matter into a Well

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
GWPR	S.63	Protection of water supply systems from entry of foreign matter and physical damage
WSA	S.59	Prohibition on introducing foreign matter into well
	S.60	Remediation orders in relation to foreign matter in well

PURPOSE

In considering prohibition on introducing foreign matter into a well under the *WSA*, review the requirements for protecting wells from the introduction of foreign materials, and consider authority to authorize remediation or mitigation actions and under what conditions.

SUMMARY OF WHAT IS CONSIDERED FOREIGN MATTER

A person must not introduce, allow to be introduced, or cause to be introduced foreign matter into a well. Under the *WSA* and GWPR the following is considered foreign matter:

- Refuse
- Carcasses
- Human or animal waste
- Pesticides or fertilizers
- Material from construction or demolition
- A prescribed matter or substance (GWPR S.2)
    - Paints and paint products
    - Liquid fuels
    - Fuel additives
    - Lubricants, other than water
    - Solvents, other than water
    - Herbicides and fungicides
    - Flood waters and flood debris
- Another contaminant, clay, silt, rock, a similar material, or another matter or substance in such amounts or in such a matter as to cause or to be likely to cause a significant adverse impact on the quality of water in or the existing uses made of the water from:

In the GWPR, foreign matter "means a thing, matter or substance described in Section S.59 (1) (a) to (g) of the Act (*prohibition on introducing foreign matter into well*) and includes the substances prescribed under section 2 of the GWPR

- The well
- Another well that diverts water from the same aquifer
- Another aquifer, or
- A stream that is hydraulically connected to an aquifer referred to in the bullets above.

Section S.59 (2) of the *WSA* outlines the following exemptions to what may be introduced, allowed to be introduced, or cause to be introduced into a well by a person. Those requirements do not apply with respect to:

- A well owner in the proper operation, disinfection, maintenance, repair, deactivating, or decommissioning of a well in accordance with the regulations;
- A well made for the purposes of groundwater remediation;
- Activities authorized or required under an enactment;
- A prescribed activity undertaken in accordance with any terms and conditions prescribed by regulation; or,
- A prescribed contaminant, matter, or substance.

Section 60 of *WSA* describes the engineer's authority with respect to remediation orders in relation to the introduction of foreign matter into a well or removal of foreign matter from a well or requiring measures to remediate or mitigate the effects of introduction.

4.7 Decommissioning or Deactivating a Well

4.7.1 Deactivating a Well

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.56	Decommissioning or deactivating well
GWPR	S.69	Deactivating or decommissioning wells — general
	S.70	Requirements for deactivating wells

PURPOSE

To describe when, how, and by whom a well must be deactivated.

SUMMARY OF REQUIREMENTS

Deactivation of a well must be done by the person responsible (WSA S.49) in accordance with the GWPR section 69 and 70, by:

- A well driller who is deactivating a class of well for which they are qualified based on their classification;
- A professional with competency in hydrogeology or geotechnical engineering;
- A person acting under the direct supervision of one of the above persons;
- A person deactivating their own well, and,
- Anyone, if the well is:
    - not a flowing artesian well, and
    - a horizontal closed-loop geoexchange well less than 5 m deep or an excavated well of less than 15 m depth.

Wells must be deactivated as soon as practicable if unused (e.g., not in service) for 5 years. Flowing artesian wells managed in accordance with S.52 (6) or S.53 (3) of *WSA* are subject to deactivation, when it is possible to do so in accordance with the recommendations of a professional as accepted by an engineer.

Deactivation requirements are summarized in the table below.

Well types	**Deactivation requirement(s)**
Water supply, injection, dewatering, and remediation	Shut off power supply to pump or remove or disconnect manual pump handle
Flowing artesian well, in	Prevent backflow into well

addition to the above	stop artesian flow through casing
	prevent leakage of artesian flow at surface or into another aquifer
Closed-loop geoexchange	Take out of operation any equipment used for geoexchange system
Monitoring well	Take out of operation any equipment used for monitoring
Recharge well	Install equipment that prevents water, contaminants and foreign matter from entering the well from the top of the well

4.7.2 Decommissioning a Well

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.56	Decommissioning or deactivating well
GWPR	S.69	Deactivating or decommissioning wells — general
	S.71	Requirements for decommissioning wells
	S.72	Alternative specifications for decommissioning wells

PURPOSE

To describe when, how, and by whom a well must be decommissioned.

SUMMARY OF REQUIREMENTS

Decommissioning of wells and temporary wells must be done by the person responsible (*WSA* S.49) in accordance with the GWPR S.69, S.71, and S.72, by:

- A well driller who is decommissioning a class of well for which they are qualified based on their classification;
- A professional with competency in hydrogeology or geotechnical engineering;
- A person acting under the direct supervision of one of the above persons; and,
- Anyone, if not a flowing artesian well and is:
    - a horizontal closed-loop geoexchange well less than 5 m deep;
    - the well was excavated and is less than 15 m deep; or,
    - a geotechnical well that does not penetrate an aquifer.

Wells are considered to not be in service if unused for 5 years. Not in service wells must be deactivated or decommissioned as soon as practicable.

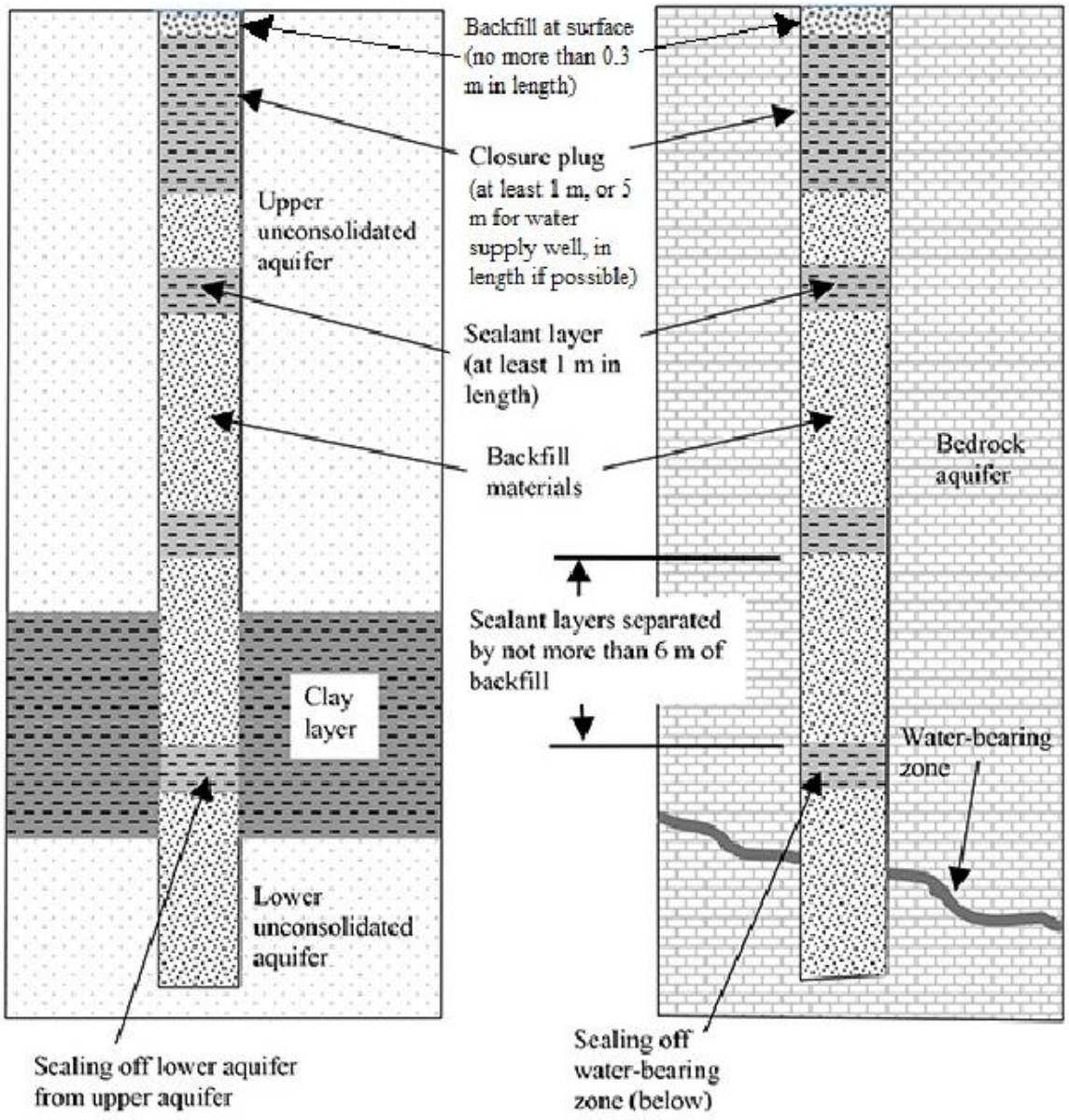
Deactivated wells that are not in service for 5 years must also be decommissioned as soon as practicable, unless the comptroller or water manager considers the well to be properly maintained as a deactivated well for later use, in which case the decision maker may extend that period.

Decommissioning requirements are summarized below:

Well types	**Decommissioning requirement(s)**	**Notes**
All wells	Remove pump and works from well, if practicable	Casings may be left in place
	Uncased portions of the well must have minimum 1 metre layers of sealant, separated by no more than 6 m of backfill, throughout those portions, to ensure physical integrity and continuity of seal[1]	
	Fill the well throughout its depth with sealant and backfill to prevent movement of liquid in well, annular space between outer casing and formation, and between casings[1]	See figure on next page
	Seal off different water bearing zones/aquifers to prevent groundwater mixing[1]	
	Install to extent possible >5 m (water supply wells) or >1 m (other wells) closure plug[1]	
	Closure plug may be overlain by up to 0.3 m of backfill at surface[1] while still meeting required length of closure plug	
	Seal off all points of liquid entry or openings into well with sealant	
Flowing artesian	Prevent backflow into well	
	Stop artesian flow through casing	
	Prevent leakage of artesian flow at surface or into another aquifer	
Closed-loop geoexchange	Remove circulation fluids from ground loops in the system	

NOTE: 1: Alternative specifications may be accepted (see next page for details)

The figure below illustrates the sealing and closure plug requirements for decommissioning.



Reference: GWPR, Schedule 5, Figure 4

CROSS REFERENCES AND ADDITIONAL RESOURCES

WSA S.49 – restrictions on decommissioning wells and related activities and *WSA* section 93 – powers of engineers and officers.

Well construction/closure/alteration forms: (http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-wells/well_construct_close_form_lithology.pdf)

4.7.3 Temporary Wells, Boreholes, and Test Pits

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.56	Decommissioning or deactivating well
GWPR	S.69	Deactivating or decommissioning wells — general
	S.73	Decommissioning temporary wells
	S.74	Decommissioning boreholes and test pits

PURPOSE

To describe when, how, and by whom a temporary well, borehole, or test pit well must be decommissioned.

SUMMARY OF REQUIREMENTS

Decommissioning of temporary wells must be done by the person responsible (*WSA* S.49) in accordance with the GWPR, by:

- A well driller who is decommissioning a class of well for which they are qualified based on their classification;
- A professional with competency in hydrogeology or geotechnical engineering;
- A person acting under the direct supervision of one of the above persons; and
- Anyone, if:
    - not a flowing artesian well,
    - a horizontal closed-loop geoexchange well less than 5 m deep,
    - the well was excavated and is less than 15 m deep; or
    - a geotechnical well that does not penetrate an aquifer.

Temporary wells must be decommissioned within the time frame specified in the table below.

Temporary well type	**Maximum Time to undertake decommissioning**	**Decommissioning Requirement(s)**
Temporary well	90 days after drilling is completed	Decommission as for decommissioning a well (previous section) *or* Make into a permanent well that meets the requirements of the WSA and GWPR for that class of permanent well
Borehole	30 days after drilling is	Decommission as for decommissioning a well (previous section) *or*

	completed	Make into a temporary or permanent well that meets the requirements of the WSA and GWPR for that class of temporary or permanent well
Test pit	30 days after excavation is completed	Backfill with backfill materials

4.7.4 Well Decommission Reports

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
WSA	S.56	Decommissioning or deactivating well
	S.57	Well Reports
GWPR	S.69	Deactivating or decommissioning wells — general
	S.70	Requirements for deactivating wells
	S.71	Requirements for decommissioning wells
	S.72	Alternative specifications for decommissioning wells
	S.73	Decommissioning temporary wells
	S.74	Decommissioning boreholes and test pits
	Schedule 4	Information in well decommission reports
	Schedule 6	Table relating to well identification plates and well reports

PURPOSE

To describe requirements for reporting on the decommissioning of wells including when reports are required to be provided to the well owner or the well owner and the comptroller. Requirements for reporting on the decommissioning of flowing artesian wells are also stated.

SUMMARY OF REQUIREMENTS

Well decommission reports must be submitted to the comptroller and/or well owner (see table below) within 90 days of decommissioning by the person responsible for decommissioning.

Well type	**Report submission**		**Report retention time by person responsible for decommissioning**
	Comptroller	**Well owner**	
Water supply	Yes	yes	10 years
Permanent monitoring		Yes	10 years
Recharge (made by drilling or boring) or injection	Yes	Yes	10 years

(made by drilling or boring)			
Permanent dewatering	yes	Yes	10 years
Permanent remediation		Yes	10 years
Geotechnical		Yes	10 years
Closed-loop geoexchange	Yes	Yes	10 years
All flowing artesian wells	Yes	Yes	As above, based on class of well

4.7.5 Retention of Records

Relevant Provisions		
Act / Regulation	**Section**	**Section Title**
GWPR	S.81	Retention of records

PURPOSE

To describe the requirements for retention of records.

SUMMARY OF REQUIREMENTS

Well owners are required to retain records for a minimum period of time, specified in the table below.

Well type	**Record Type**	**Record retention time**
All wells	Well identification report	Until well is decommissioned
	Well construction report	
	Flow test reports	
	Well decommission report	Minimum of 10 years after decommissioning
Injection well	As-built drawings	Until well is decommissioned
A well in a well pit	As-built drawings	

If and when a well owner conveys or disposes of their interest in a well, the well owner is required to transfer all well information and records in their custody and control to the new well owner or other person to whom the interest in the well is conveyed or otherwise disposed.