



CONSTRUCTING AND SEALING WELLS IN MANITOBA

Information for Well Drillers and Well Sealers

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CONSTRUCTING AND SEALING WELLS IN MANITOBA

Information for Well Drillers and Well Sealers

About 35 to 40 per cent of Manitobans rely on groundwater for drinking, household use, geothermal use, industry, farming or irrigation. Since groundwater is an essential resource for many Manitobans, it's important that wells and test holes are constructed and sealed to standards that protect the environmental quality of Manitoba's aquifers and groundwater, and human health and safety.

This document provides information for well drillers and well sealers on constructing and sealing wells and test holes in Manitoba. The official Statutes and Regulations must be consulted for all purposes of interpreting and applying the law.

Water Well Legislation

Manitoba's Groundwater and Water Well Act

Well construction and well sealing in Manitoba is governed under the Groundwater and Water Well Act and its supporting regulations.

- 1) Groundwater and Water Well (General Matters) Regulation which deals with matters such as specifying classes of well drilling contractors, licensing of well drilling contractors, liability insurance, contamination found during the construction or sealing of wells, permits, well construction and well sealing reports, and availability of groundwater information.
- 2) Well Standards Regulation which sets out the rules for the construction and sealing of wells and test holes.

The act means Manitoba's Groundwater and Water Well Act.

The act and regulations came into force on January 1, 2017. They replace the previous Ground Water and Water Well Act and Well Drilling Regulation that were introduced in the 1960s.

The act applies to the construction and sealing of different types of wells such as:

- water supply wells, including dug and sand point wells
- wells constructed to serve the geothermal industry
- geotechnical wells to serve the construction industry
- monitoring wells to serve the environmental sector

The construction requirements contained in the act and regulations are not retroactive to wells constructed prior to January 1, 2017. Matters dealing with construction prior to this time can be addressed through the issuance of well construction or well sealing orders if the well is deemed a risk to human health or safety, or if it adversely affects any property, groundwater or other feature of the environment.

The act does not apply to:

- (a) a well or test hole to which the Mines and Minerals Act applies.
- (b) a well or test hole to which the Oil and Gas Act applies.

Administration of the Act

Manitoba's Department of Sustainable Development (referred to as the department) is responsible for administering the Groundwater and Water Well Act and its supporting regulations. The director of Manitoba's Water Science and Watershed Management branch along with supporting staff from within the Groundwater Management Section administers the act on behalf of the Minister of Sustainable Development.

Well Construction and Well Sealing in Manitoba

The meaning of construct and sealing

The term construct applies to wells and test holes, and refers to any work in relation to the digging, drilling, installing, modifying or repairing of a well or test hole. It includes the partial sealing of a well or test hole, but does not include:

- a minor modification or repair of a well such as replacing a well cap or a pump.
- the complete sealing of an abandoned well.

The term sealing means the act of filling a well or a test hole with a material or a mixture of materials in a manner that is sufficient to prevent the vertical movement of water or other substances within the well or test hole. It does not include the partial sealing of a well, such as sealing the bottom portion of a well.

Definition of a well

The definition of a well is:

- (a) an opening made by drilling or digging into the ground, and into which a permanent well casing is installed for the purpose of obtaining groundwater – whether or not groundwater is obtained – or for information gathering purposes on groundwater or an aquifer, including the following:
- (i) **test wells** - a temporary well drilled or dug for the purpose of obtaining information such as thermal properties, in respect of groundwater or an aquifer.
 - (ii) **monitoring wells** - used for the purpose of collecting groundwater information such as groundwater level, quality or temperature.

An **environmental well** is a type of monitoring well used for the purpose of obtaining information on soil or groundwater contamination, or for remediation of contaminated groundwater.



Drilling a provincial groundwater monitoring well

(iii) **production wells** - used for water supply purposes, including one or more of the following purposes: domestic, agricultural, irrigation, municipal, commercial or industrial.

(iv) **dewatering wells** - used to lower groundwater levels for construction purposes, that allows for the construction of, or any use of, an underground space.

(v) **open loop geothermal wells** - a source or return well used in an open loop geothermal system in which there is a transfer of water between the well and an aquifer.

(vi) **flowing artesian wells** - water rises above the surface of the ground, either continuously or intermittently.

(b) **closed loop geothermal wells** - used for heat exchange in a closed loop geothermal system in which there is no transfer of water between the well and an aquifer.

(c) **geotechnical wells** - used for the purpose of obtaining information on soil and groundwater for geotechnical or engineering work.

(d) **injection wells** - constructed for the purpose of:

(i) disposing of saline or waste water

(ii) injecting water into an aquifer for storage or any other purpose but does not include an open loop geothermal well.

Any related equipment, materials and attachments that allow a well to function such as a pump, an electrical conduit or a pitless adapter are also considered part of the well.



Constructing a large diameter production well



Constructing a flowing artesian well



Drilling an auger hole for a closed loop geothermal system

Definition of a test hole

A test hole is defined as a temporary hole that:

- (a) is drilled or dug for the purpose of obtaining information – including information on thermal properties – in relation to soil, bedrock, groundwater or an aquifer.
- (b) does not have a permanent well casing installed.

People who can construct a well or test hole

Only individuals who are licensed as well drilling contractors under the act, or who are employed by a licensed well drilling contractor can construct wells or test holes in Manitoba. Any person who constructs a well or test hole in the employment of a licensed well drilling contractor is considered a licensed well driller.

A well or test hole can also be constructed under the following conditions:

- By an individual constructing his/her own well or test hole, provided:
 - o the equipment is owned or operated by the individual, on land that the individual owns, or on which the individual operates an agricultural operation
 - o the well or test hole is for the purpose of obtaining water for domestic purposes, or for the purposes of an agricultural operation
 - o the rate of water use is less than 25,000 litres per day
 - o the well construction work is done in accordance with the standards developed for the construction of wells
- a professional engineer or professional geoscientist constructing a test hole, test well or monitoring well, using equipment operated by the engineer or geoscientist.

A person installing a pump or hooking up a well for water distribution purposes does not require a well drilling contractor licence, or need to be employed by a person holding a well drilling contractor licence. (S)he must, however, adhere to the standards developed for the construction of wells such as the materials used in the construction or servicing of a well, installation of a flow control device, venting a well, connecting to a well casing for water distribution purposes and disinfection of a well for domestic purposes.

Well construction under Manitoba's Labour Mobility Act

Manitoba's Labour Mobility Act allows licensed and certified well drillers from other Canadian jurisdictions to practice their occupation in Manitoba in accordance with Chapter 7 (Labour Mobility) of the Agreement on Internal Trade. Under this situation, a well driller must still apply for a Manitoba well drilling contractor licence so that the department can assess his/her experience and qualifications.



Drilling a test hole using an auger drill rig

People who can seal a well or test hole

Only well drilling contractors licensed under the act can seal a flowing artesian well or test hole, an injection well, a contaminated well, or a well or test hole containing saline water. Other than these exceptions, any person can seal a well or test hole as long as (s)he adheres to the standards developed for the sealing of wells and test holes. However, due to a layperson's general lack of knowledge and experience, and difficulties that might arise during the sealing process, it is recommended that a Manitoba licensed well contractor or experienced well sealer be retained for any well sealing work.

Abandoned well means a well or test hole not in present use and not maintained for future use, and includes a well or test hole declared to be an abandoned well under the act.



Sealing an abandoned water well

Permits for constructing or sealing a well

Permits are not required for the construction or sealing of a well or test hole under the act, except if the well is an injection well. To enquire about a permit to construct or seal an injection well, contact Groundwater Management by telephone at 204-945-6959 or by email at groundwater@gov.mb.ca.

A permit may also be required under these other Manitoba acts:

The Water Rights Act

There may be a requirement to obtain a permit prior to undertaking any test drilling or well construction if a well is to be used for:

- municipal, industrial, or other purposes.
- domestic, agricultural or irrigation purposes where the consumption exceeds 25,000 litres (5,500 imperial gallons) per day.

Permit information can be obtained by contacting Manitoba Sustainable Development, Water Use Licensing at 204-945-3983 or by email at wateruse@gov.mb.ca.

For information on the water rights licensing process, go to www.manitoba.ca and search for Obtaining a Water Rights Licence.

The Environment Act

A permit must be obtained prior to drilling, modifying or sealing a well in the Rockwood Sensitive Area (refer to map in Appendices) under the Rockwood Sensitive Area Regulation of the Environment Act. Permit information can be obtained by contacting Manitoba Sustainable Development at 204-785-5030.

For information on the trichloroethylene (TCE) contamination in the Rockwood Sensitive Area, go to www.manitoba.ca and search for TCE in Rockwood Fact Sheet.

The Provincial Parks Act

A permit must be obtained prior to drilling/constructing a well in a provincial park. Permit information can be obtained by contacting Manitoba Sustainable Development, Parks and Protected Services, at 204-945-8872.

The Municipal Act

Any person drilling or sealing a well should also check with the municipality in which the well is being drilled or sealed to determine if there are any municipal bylaws regulating the drilling or sealing of wells.

Contact information for Manitoba municipalities is available at www.manitoba.ca/ia/contactus/pubs/manitoba_municipalities.pdf

Well Drilling Contractor Licences

Classes of well drilling contractors

There are four classes of well drilling contractors in Manitoba. The classes and their authorized activities are provided below.

Class of Well Drilling Contractor	Authorized Activities
Class 1 (water well)	<ul style="list-style-type: none">• construct – using well drilling equipment – the following types of wells (unless otherwise specified in a licence):<ul style="list-style-type: none">• test wells• monitoring wells• production wells• dewatering wells• open loop geothermal wells• closed loop geothermal wells• flowing artesian wells• geotechnical wells• injection wells• sand point wells
Class 2 (closed loop geothermal)	<ul style="list-style-type: none">• construct closed loop geothermal wells
Class 3 (well digging)	<ul style="list-style-type: none">• construct – by means of digging with non-powered equipment, a backhoe or a power shovel – the following types of wells (unless otherwise specified in a licence):<ul style="list-style-type: none">• test wells• monitoring wells• production wells• dewatering wells• geotechnical wells
Class 4 (other well construction)	<ul style="list-style-type: none">• construct a type of well described in a licence, by the methods or with the equipment specified in the licence (such as a sand point well)

The classes of well drilling contractors are based on the need for legislation to apply to all types of water supply wells, including dug and sand point wells, wells constructed to serve the geothermal industry, geotechnical wells to serve the construction industry, and monitoring wells to serve the environmental sector. The construction of piles and caissons do not fall under the jurisdiction of the act unless they are used for the purpose of a test hole or well.

The construction of closed loop geothermal wells is included under both Class 1 and Class 2, and sand point wells under both Class 1 and Class 4. This gives traditional water well drilling contractors, specific closed loop geothermal well drilling contractors, and sand point installers the ability to construct these types of wells under their respective class, without requiring more than one licence for these activities.

Licensing and certification requirements

All classes of well drilling contractors must obtain a well drilling contractor licence. The licence can apply to an individual well driller, or to a corporation or partnership that employs well drillers. Failure to obtain a licence will result in a fine and possibly refusal of a licence.

The regulatory measures for the certification of persons qualified to construct or seal a well or test hole have not yet been proclaimed under the act. In the meantime, any person constructing, or sealing a well or test hole must adhere to the standards developed for the construction and sealing of wells, and test holes, as set out in the supporting regulations.

Duration of a licence

Well drilling contractor licences are issued and renewed on an annual basis. A licence expires on December 31 of the year for which it was issued or renewed unless an earlier date is specified, or a licence is cancelled.

Terms and conditions of a licence

Well drilling contractors must:

- maintain, in good working order, the equipment owned, leased or otherwise possessed for the purpose of carrying on their business.
- maintain, at all times, liability insurance with a minimum coverage limit of \$2 million per claim.
- meet any other terms or conditions specified in the licence.

Obtaining a licence – application for licence or renewal of licence

The licensing process consists of the following steps:

1. Obtain an application form by contacting Groundwater Management by telephone at 204-945-6959 or by email at groundwater@gov.mb.ca.

Forms are also available online:

- Application for licence (new well drilling contractor)
 - Application for renewal of licence (existing well drilling contractor)
2. Fill out the application form. The application must include all information required by the form.
 3. Submit the application form.
 - The application must include:
 - (a) proof that the applicant has liability insurance with a minimum coverage limit of \$2 million per claim
 - (b) a cheque for the prescribed licence or licence renewal fee

Class of Well Drilling Contractor	Amount
Class 1 (water well)	\$100
Class 2 (closed loop geothermal)	\$100
Class 3 (well digging)	\$50
Class 4 (other well construction)	\$50

- Mail to:

Groundwater Management Section
RE: Well Contractor Drilling Licence
Box 18
200 Saulteaux Crescent
Winnipeg, MB R3J 3W3

Any questions regarding the application process can be directed to Groundwater Management, by telephone at 204-945-6959 or by email at groundwater@gov.mb.ca.

Well Construction and Well Sealing Reports

Reporting requirements

Except as specified below, a well drilling contractor or well sealer is responsible for providing a well construction or well sealing report to a well owner and to the Groundwater Management Section at:

Groundwater Management Section
Box 18
200 Saulteaux Crescent
Winnipeg, MB R3J 3W3

This must be done within 45 days of completing the construction of a new well or a test hole, modifying an existing well, or sealing a well or test hole.

Exceptions:

- Submission of reports are not required for the construction or sealing of an environmental well or test hole, or a geotechnical well or test hole, unless:
 - (a) the well or test hole intersects an aquifer.
 - (b) the depth of the well or test hole exceeds 30 metres (98.4 feet).
 - (c) the well or test hole encounters bedrock.

The criteria for submission of a report under (a), (b) or (c) above:

- o allows for the collection of data for wells or test holes under various conditions to aid in the understanding of geologic and hydrogeologic conditions in Manitoba.
- o excludes many reports from wells and test holes that pose little risk to groundwater and aquifers, and the unnecessary collection of redundant information from these types of wells.
- Submission of well construction reports for closed loop geothermal wells are not required at this time. Reporting requirements will be established at a later date through stakeholder consultation.

Well construction and well sealing reports must be in the form specified by regulation. The completed reports must contain all the information set out on the form, be legible and signed. The information is required for ensuring that the construction or sealing of a well or test hole meets the standards set out by regulation, for assessing well construction, well sealing or water quality related problems, and for input into the provinces water well database.

Blank paper and fillable electronic well construction and well sealing reports can be obtained by contacting Groundwater Management by telephone at 204-945-6959 or by email at groundwater@gov.mb.ca.

If a test hole is sealed immediately after it is drilled, the required information relating to the sealing may be included in the well construction report rather than completing a separate well sealing report.



Field log

Any person preparing a report must keep a field log, while:

- constructing a well or test hole
- sealing or partially sealing a well or test hole

The field log must contain the necessary information to complete the report and be available at the site for inspection.

General Construction and Sealing Requirements

General construction and sealing requirements apply to all wells and test holes. Requirements include:

Contamination found during construction or sealing of a well or test hole

If, during the construction or sealing of a well or test hole, contamination or suspected contamination of groundwater or soil adjacent to groundwater is found (such as observing a hydrocarbon product or detecting a hydrocarbon odour in the soil or water), the person performing the work must immediately:

- (a) stop the construction or sealing of the well or test hole
- (b) report the finding of contamination or suspected contamination by calling Manitoba's emergency response office at 204-944-4888

The construction or sealing work cannot resume unless authorized by the department. The requirements of (a) and (b) above do not apply in respect to the construction or sealing of an environmental well or environmental test hole.

Well protection in designated flood areas

If a well is located within a designated flood area the well drilling contractor should ensure that the well owner is aware that it is the owner's responsibility to ensure their well complies with one of the following flood protection measures:

- (a) the well is within a designated diking system

There are currently two designated flood areas in Manitoba:

- Red River Valley designated flood area
- Lower Red River designated flood area

For maps of the designated flood areas, go to www.manitoba.ca and search for Designated Flood Area Map.

Information on Manitoba's designated flood areas and flood protection levels can be obtained by contacting Water Management Planning and Standards at 204-945-6474.

- (b) the elevation of the site on which the well is located is above the flood protection level
- (c) the well is within a dike that has been constructed in accordance with the criteria illustrated in Schedule D of the Designated Flood Area Regulation
- (d) the well:
 - (i) is covered with a watertight cap or other approved cover
 - (ii) has any electrical conduit or other appurtenance connected to or associated with it, and any other opening into the well, plugged or covered in such a manner that flood water cannot enter the well

Commencing January 1, 2017, any well construction must comply with the above measures. Wells constructed prior to January 1, 2017, must be in compliance with the flood protection measures by January 1, 2019.

Interconnection of geologic formations

A well or test hole must be constructed or sealed in a manner which prevents the interconnection or mixing of groundwater having distinctively different characteristics within the same aquifer or different aquifers. Specifically:

- A well or test hole must not be constructed or sealed in a manner that allows the interconnection or mixing of groundwater between the Winnipeg Formation and any overlying aquifer, including aquifers within the Stonewall, Stony Mountain or Red River Formations.

Winnipeg Formation means the shale, sandstone and sands of the Ordovician Winnipeg Formation.

This measure is intended to help curb the degradation of water quality and hydraulic head conditions in carbonate rock and sandstone aquifers.



Well located on a pad above the flood protection level
(Photo credit – Google Earth, October 2014)



Well protected by a dike
(Photo credit – The Canadian Press, March 2013)



Flood protected well constructed with a watertight cap, snorkel well cap vent and cap cable seal

Flowing artesian conditions

The following measures apply to the control of flow from a flowing artesian well or test hole:

- Before beginning the construction or sealing of a well or test hole, the person performing the work must determine if the area has a history of flowing artesian conditions and whether it is likely or reasonably possible that flowing artesian conditions will occur.
- If it is likely or reasonably possible that flowing artesian conditions will occur, the person constructing or sealing the well or test hole must construct or seal it in a manner that allows for control of flow from the well or test hole.
- If, during construction of a well or test hole, it becomes a flowing artesian well or a flowing artesian test hole, the person constructing the well or test hole must ensure that, for the remainder of the construction period and upon completion of construction, any uncontrolled flow of water from the well or test hole is promptly brought under control.
- If, during the remainder of the construction period or upon completion of construction, any uncontrolled flow of water from the flowing artesian well or flowing artesian test hole cannot promptly be brought under control, the person performing — or who has completed — the construction:
 - (a) must immediately notify the department about the situation
 - (b) is, for greater certainty, responsible for bringing the flow under control and for all costs related to bringing it under control
- The department can issue a well construction or well sealing order in relation to the uncontrolled flow of water from a flowing artesian well, a flowing artesian test hole, or at a site where either is under construction.

Information on flowing wells

The province's Flowing and High Water Levels in Manitoba Wells map, in addition to its water well database of information, are available as useful tools in assessing flowing artesian conditions.

Enquiries about the map and water well database can be obtained by contacting Groundwater Management by telephone at 204-945-6959 or by email at groundwater@gov.mb.ca.

Materials and additives

All materials and additives used in the construction, sealing, rehabilitation, maintenance or servicing of a well or test hole must:

- be suitable for potable water use
- comply with generally accepted industry standards and practices

Generally accepted industry standards and practices means a practice or a standard that is consistent with proper and accepted practices and standards established and followed within the well construction industry.

- meet or exceed any specifications set out for that material or additive by the Canadian Standards Association (CSA), the American Society for Testing and Materials (ASTM), American Water Works Association (AWWA) or the National Sanitation Foundation (NSF)
- be applied and used as recommended by the manufacturer, if it is manufactured
- be clean and free of contamination
- be stable within the geochemical surroundings it is used
- not impair the quality of water with which it comes in contact

These measures will ensure minimum and consistent standards for the types of materials and additives used. The types and quantities of materials or additives used must be recorded on a well construction or well sealing report.

Source water for construction and sealing

Only water from a licensed public water system, or semi-public water system, or from a groundwater source that is chlorinated can be used in the construction, sealing, rehabilitation, maintenance or servicing of:

- (a) a production well or an open loop geothermal well, if the well is used for producing water for domestic purposes.
- (b) a test hole or test well for the purpose of obtaining information on a well described in clause (a)
- (c) any other type of well or test hole within 100 metres (328 feet) of a well described in clause (a)

The water must contain a minimum 10 mg/L free chlorine at all times and be stored and conveyed in clean, sanitary tanks and water lines. These requirements minimize the introduction of contamination into a well or aquifer and subsequently minimizes risk to human health.

Free chlorine means chlorine, excluding combined chlorine, that remains in water after disinfection has occurred. The concentration of free chlorine should be measured using chlorine test strips.

Conditions subject to immediate sealing

The following conditions are subject to the immediate sealing of a well or test hole by the person who performed or is performing the work:

- a test hole from which the required information has been obtained, unless the test hole is being used for the construction of a well
- the construction of a well or test hole that is not completed due to a construction problem or any other reason
- a dry well or test hole, unless the well or test hole is being used for the construction of a closed loop geothermal well, monitoring well or a geotechnical well
- a well or test hole that is found to have been constructed in contravention of any provision of the act or regulations, unless steps are immediately taken that result in bringing the well or test hole into compliance

Community Water Supply Loading Stations

Many municipalities in Manitoba maintain water supply loading stations for agricultural water use. Most often the water supply is from a groundwater source and is untreated water. Groundwater from a loading station is an acceptable source of water for the construction or sealing of a well or test hole for domestic purposes, providing the person doing the work chlorinates the water to ensure it contains a minimum of 10 mg/L free chlorine at all times.

Information and permission/access to water supply loading stations can be obtained by contacting the municipality.

Contact information for Manitoba municipalities can be found at:
www.manitoba.ca/ia/contactus/pubs/manitoba_municipalities.pdf



Standards for the Construction of Wells

Well construction standards apply to all wells and test holes – with the following exception:

- Other than the requirement that a closed loop geothermal well must be located at least 1.5 metres (five feet) from any property boundary, the well construction standards do not apply to closed loop geothermal wells. Standards specific to the construction of closed loop geothermal wells will be addressed in future regulation developed under the act.

Standards include:

Locating a well

A well must be located at least 1.5 metres (five feet) from any property boundary and in accordance with minimum setback distances from sources of contamination including sewage disposal, livestock manure, fuel storage tanks and pesticide and fertilizer storage areas (refer to table in Appendices). The setback distances specified for sewage disposal and livestock manure are complementary to those specified in applicable regulations under the Environment Act.

The well must also be located so that it is accessible for cleaning, treatment, maintenance, repair, testing, inspection and visual examination. The ground around the well must also be satisfactorily sloped to promote drainage away from the well.

Well Pits

Wells constructed for domestic purposes cannot be located inside a well pit or later be modified to include a well pit. A well pit can be used for other non-domestic purposes and must meet the construction criteria set out in the Well Standards Regulation.

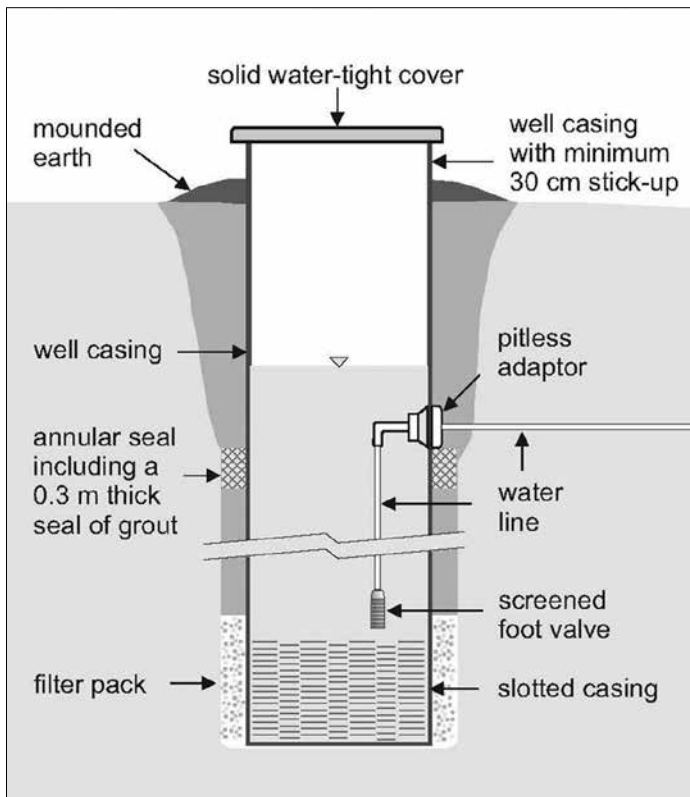


Well located inside of a well pit

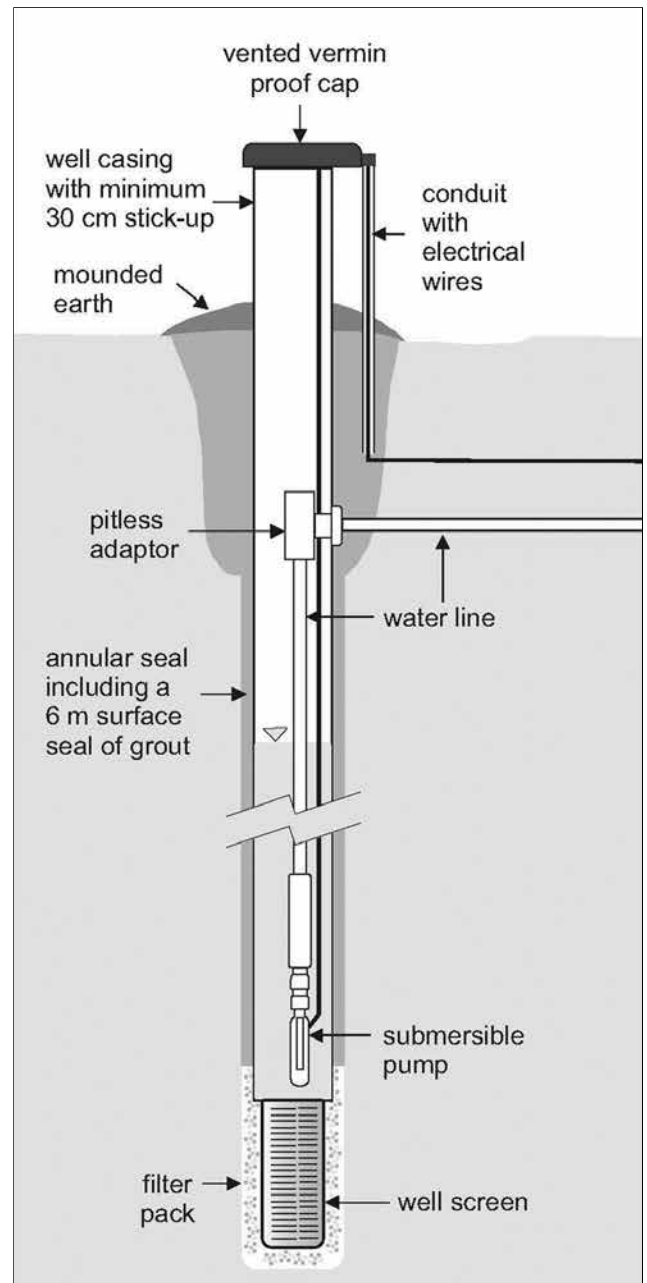
Well pit means a pit constructed below the ground surface for the purpose of housing a well.

Depth of well casing

A well casing – other than a monitoring well or a geotechnical well – must extend to a depth of at least six metres (20 feet) below the surface of the ground unless the only useful aquifer available necessitates a shallower depth for the well casing. This measure, along with sealing requirements for the annular space, will help prevent the rapid downward movement of surface water or other substances into a well.



Typical construction of a bored (large diameter) well



Typical construction of a drilled well in a sand and gravel aquifer

Sealing of annular space

Following are the measures for sealing an annular space:

- The annular space outside a well casing must not be less than 25 millimetres (one inch) in width, excluding wells for which the construction method does not create an annular space.
- Grout, filter pack and native materials, excluding organic soil materials, can be used to backfill an annular space. Specific requirements for the placement of a surface seal of grout and materials for sealing flowing wells are provided on the following page.
- Slurry grout must be forced from the bottom to the top of the annular space to be sealed. Any grout that has settled or subsided after placement must be topped-up to its original level.
- The backfill material must have a permeability equal to or less than the native materials that were removed from the same depth interval within the well.



Open annular space outside a well casing

Grout means a low permeability material and includes:

- granular bentonite grout
- slurry grout, which includes suitable mixtures of cement or high-solids bentonite grout with fresh water that can be forced through a tremie line or other method of grout placement, and which may also include additives to meet certain grouting requirements



Examples of granular bentonite grout

Filter pack means granular material that is placed in the annular space surrounding a well screen to prevent formation material from entering the screen. The top of the filter pack:

- can be extended above a well screen to compensate for any settling that may occur during well development.
- must be more than six metres (20 feet) from the ground surface, unless:
 - o the only useful aquifer is less than this depth in which case the filter pack must not be placed closer than 2.5 metres (8.2 feet) from ground surface
 - o the well is a dewatering well



Placement of slurry grout using a tremie line
(Photo credit – National Driller, August 2012)

Native material means the drill cuttings from a well or the excavated material from a dug well, and local excavated material including clay, granular soil and crushed rock. The material must be:

- stored separately during construction, kept free from contamination, and placed in the same relative positions they originally occupied
- placed continuously within the annular space, without bridging

- A surface seal of grout must be placed in the topmost portion of an annular space outside a well casing to prevent the rapid downward movement of water and other substances. The placement of the surface seal depends on the well type and casing depth, as noted below:

Surface seal in a drilled well

If the depth of the well casing is:

- six metres (20 feet) or less, the annular space must be filled continuously with grout from the bottom of the casing to the established ground surface
- greater than six metres (20 feet), the top six metres (20 feet) of annular space must be filled continuously with grout to the established ground surface

Surface seal in a bored or dug (large diameter) well:

A minimum 0.3 metres (1 foot) thick annular seal of grout must be placed at a depth not exceeding three metres (10 feet) below the ground surface. Typically, this is just beneath the base of a pitless adapter or unit, if such is used in the well construction.

- If a pitless adapter or unit is added to a well that has a surface seal, the surface seal must be replaced with native material or with backfill material that has a permeability equal to or less than the native materials that were removed.
- If the well is a flowing artesian well, cement grout or a suitable mixture of sand-cement or bentonite-cement grout must be used to seal the entire annular space outside the well casing, subject to the following conditions:
 - The cement must be a sulphate-resistant cement (type HS).
 - A non-sulphate-resistant cement may be used under extreme circumstances such as the encounter of unexpected or difficult flowing well conditions that require immediate sealing, but prohibit the procurement and use of high-sulphate-resistant cement.
 - The amount of bentonite must not exceed six per cent by weight of the cement's content.
 - Granular material may be used to aid in the backfilling of the annular space when slurry grout has or may become lost due to the presence of voids, fractures, cavities or zones of lost circulation.



Example of high-sulfate-resistant cement

Well covers and venting

A well must be covered with a well cap, well lid or a sanitary well seal. The well cover must be:

- made of durable materials that do not deteriorate in sunlight
- sized to fit securely to the top of the well casing
- insect- and vermin-proof

If there are any appurtenances that enter into the well, such as tubing or power cables, the well cover must incorporate adequate openings, which have been properly sealed, to accommodate them.

If a hand pump, hydrant or a similar device is installed on a well:

- The device must be mounted to the well casing or a pump mounting sleeve in a manner that seals the top of the well casing, to prevent entry of surface water or other foreign material into the well.
- The well must have a splash pad.

A well must also be vented to the outside atmosphere in a manner that will safely disperse all gases from the well casing and allow air to enter and exit the well casing during its pumping cycle.

Flowing artesian well - flow control device

Upon completing the construction of a flowing artesian well, the well drilling contractor is responsible for installing a flow control device that is capable of stopping the discharge of water from within the well casing, and withstanding the freezing of water in the well casing. If a person other than the well drilling contractor is hooking up the well for water distribution purposes, then that person is responsible for installing a flow control device that is suitable for the pumping equipment installed in the well.

Well casing stick-up and extensions

A well casing – other than a monitoring well, a geotechnical well, or a well in a well pit – must extend at least 30 centimetres (one foot) above any finished surface or the established ground surface when the well is completed.

If a well casing needs to be extended to meet a height requirement, or for another purpose:

- The casing must be structurally sound.
- The casing connection joint must be watertight and capable of withstanding frost heave.
- Connections must be completed in accordance with generally accepted industry standards and practices.

Rubber couplings cannot be used in the extension of a casing.



Well cap on a drilled well



Well lid on a bored well
(Photo Credit: Manitoba Water Well Association)



Sanitary well seal on a drilled well



Hand pump with a concrete splash pad

Developing a well

Prior to completion of a well, the well must be developed to remove drill cuttings and drilling fluids from the intake zone (the well screen or open hole portion) of the well. If the well cannot be developed to a sediment-free state, the well drilling contractor must verbally notify the well owner and record this information on the well construction report. Unless an agreement is made with the well owner, these requirements do not apply to monitoring wells and geotechnical wells, or in circumstances where the discharge of groundwater during development may create a contamination problem.

Well yield test

A well yield test must be performed on a production well or an open loop geothermal well:

- that is newly constructed
- whose yield may have changed as a result of a well repair, rehabilitation or modification

The test is to be performed:

- after the well has been sufficiently developed
- by discharging water from the well at a near-constant rate by means of a pump, air-lifting method, bailer or other suitable means
- for a minimum duration of one hour unless the yield cannot be sustained, in which case a recovery test should be completed



Developing a well by air lifting

Well Yield Test (see note 9), Date of Test: Day _____ Month _____ Year 20 _____ <input type="checkbox"/> Same as date of well completion Static Water Level Before Test _____ feet <input type="checkbox"/> bgs <input type="checkbox"/> ags Method of Test: <input type="checkbox"/> pumping <input type="checkbox"/> air lift <input type="checkbox"/> bailing <input type="checkbox"/> recovery <input type="checkbox"/> other (specify) _____ Water level at end of test _____ feet <input type="checkbox"/> bgs <input type="checkbox"/> ags Length of test _____ hours _____ minutes Estimated rate of discharge _____ <input type="checkbox"/> IGPM <input type="checkbox"/> USGPM

Well yield test – reporting requirements on the well construction report

This is not a formal pumping test but a specified period of pumping or recovery to determine a pump-setting depth and pumping rate for the well. The person who constructs, repairs, rehabilitates or modifies the well must perform the test.

Recommended Pumping Rate: _____ <input type="checkbox"/> IGPM <input type="checkbox"/> USGPM with pump intake at _____ feet bgs; Will your company be installing a pump?: <input type="checkbox"/> Yes <input type="checkbox"/> No

Pumping rate/pump-setting depth – reporting requirements on the well construction report

The requirement for a well yield test does not apply if a formal pumping test is being performed to obtain well yield information as a licensing requirement under the Water Rights Act. This exemption allows the timely submission of a well construction report within the required period of 45 days.

Well hook-up and disinfection

The connection to the well casing for water distribution purposes must be watertight, and be made with a commercially-manufactured pitless adapter or unit, or a commercially-manufactured well seal. If the well is under flowing artesian conditions, it must be designed to control the flow of water from the well and, if required, be vented to the outside atmosphere in a manner that will safely disperse all gases.

Upon completing construction of a well for domestic use, the person who constructed the well must:

- disinfect the well so that a concentration between 50 and 200 mg/l of available chlorine is present throughout the water in the well
- maintain the concentration in the well for a period of at least 12 hours

Disposal of debris, drill cuttings and drilling fluid

A person constructing or sealing a well or test hole must promptly remove and properly dispose of all well construction and well sealing debris from the well or test hole site.

Debris includes any leftover, broken or discarded material, litter or refuse. It does not include drill cuttings or drilling fluid.

If an agreement is made with the well owner to remove drill cuttings or drilling fluid from the well or test hole site, the person responsible for removal must dispose of them in a manner that does not harm the environment. Drill cuttings or drilling fluid cannot be disposed of by depositing them into an onsite wastewater management system, such as a holding tank, septic tank or pit privy.

GPS coordinates

The GPS coordinates of a well or test hole must be measured as latitude and longitude coordinates, and the coordinates must be recorded on a well report.

GPS: (see note 4), Accuracy +/- _____ <input type="checkbox"/> feet <input type="checkbox"/> metres
Latitude (decimal degrees) _____
Longitude (decimal degrees) _____

GPS – reporting requirements on the well construction report

Well identification tag

A well drilling contractor must affix a well identification (ID) tag to

- a newly constructed well
- an existing well (that does not have a well ID tag) that has been modified or rehabilitated

Well ID tags should not be affixed to an environmental and geotechnical well unless:

- the well intersects an aquifer.
- the depth of the well exceeds 30 metres (98.4 feet).
- the well is completed into bedrock

The well ID tag assigns a unique identification number to the well.

The number of the well ID tag must be recorded on the well construction report.

Well ID tags can be obtained by contacting Groundwater Management by telephone at 204-945-6959 or by email at groundwater@gov.mb.ca.



Example of Well ID Tag

Standards for the Sealing of Test Holes and Abandoned Wells

Well sealing standards apply to all test holes and abandoned wells. Standards include:

Materials

Grout, filter pack and native materials, excluding organic soil materials, can be used to seal a test hole or abandoned well. The material must be placed in a manner that is sufficient to prevent the vertical movement of water or other substances in the test hole or well.

The sealing materials must be placed continuously without bridging. If slurry grout is used, it must be forced from the bottom to the top of the test hole or well being sealed. Any grout that has settled or subsided after placement must be topped-up to its original level.

Surface Seal

A surface seal of grout must be placed in the topmost 1.5 metres (five feet) of a test hole, or remaining cased portion of an abandoned well. This is to prevent the upper portion of the test hole or well from acting as a potential pathway for the rapid downward movement of water or other substances.

Grout means a low permeability material and includes:

- granular bentonite grout
- slurry grout, which includes suitable mixtures of cement or high-solids bentonite grout with fresh water that can be forced through a tremie line or other method of grout placement, and which may also include additives to meet certain grouting requirements

Small-diameter test holes and wells

A test hole or abandoned well having an inside diameter of 51 millimetres (two inches) or less and a depth greater than nine metres (30 feet) – not including a flowing artesian test hole or well – must be sealed using slurry grout over the full length of the test hole or well. This measure reduces the risk of bridging sealing material in small diameter, deep test holes and wells.

Flowing artesian test holes and wells

Cement grout or a suitable mixture of sand-cement or bentonite-cement grout must be used to seal the entire length of any flowing artesian test hole or abandoned well, subject to the following conditions:

- The cement must be a sulphate-resistant cement (type HS).
- A non-sulphate-resistant cement may be used under extreme circumstances such as the encounter of unexpected or difficult flowing well conditions that require immediate sealing, but prohibit the procurement and use of high-sulphate-resistant cement.
- The amount of bentonite must not exceed six per cent by weight of the cement's content.
- Granular material may be used to aid in the sealing when slurry grout has or may become lost due to the presence of voids, fractures, cavities or zones of lost circulation.



Sealing a small-diameter well using slurry grout

Sealing of service lines

Any service line to an abandoned well must be disconnected or sealed in a manner that prevents the movement of water or any other substance within the line.

Equipment, debris and obstructions

Any equipment, debris or obstruction in a test hole, or abandoned well must be removed before sealing. If such cannot be removed, and the sealing is not being done under the authority of a well drilling contractor, a professional engineer or professional geoscientist, then the owner of the land on which the test hole or well is located must retain one of these professionals so that (s)he may determine the method required to properly seal the test hole or well. Information about any equipment, debris or obstruction not removed from a test hole or well must be reported for a:

- test hole, on a well construction report
- well, on a well sealing report

Well Pits

If the abandoned well to be sealed is located in a well pit, the owner of the land upon which the well is located is responsible for ensuring:

- the well pit cribbing is removed unless:
 - its method of construction does not permit removal, or permits only partial removal of the cribbing or
 - to do so may cause any neighbouring structure to be destabilized, damaged or to become a risk to human health or safety
- the remaining excavation is properly backfilled to ground surface.

Information on whether any well-pit cribbing was present, whether it was completely or partially removed, and on the backfilling of a well pit, must be reported on a well sealing report.



Removing a well pit cribbing

Enforcement of the Act

Whenever possible, an educational approach will be taken to implement the act. In addition, the department's well drilling liaison officer will work closely with industry and the public to implement the legislation. However, consistent with other provincial legislation, substantial fines will apply for cases of obvious non-compliance. Protecting groundwater and aquifers is a priority of the act.

Offences

A person is guilty of an offence who:

- contravenes a provision of the act
- fails to comply with an order made under the act, or with a term or condition of a well drilling contractor licence, or any other authorization issued under the act.
- knowingly makes a false or misleading statement to the minister, the director, a well drilling officer or any other person acting under the authority of the act
- knowingly makes a false or misleading statement in an application, report, record or any other document given or required under the act.
- hinders, obstructs or interferes with, or attempts to hinder, obstruct or interfere with, the minister, the director, a well drilling officer or any other person acting under the authority of the act
- conceals or destroys, or attempts to conceal or destroy, any record, information or thing relevant to an inspection or investigation under the act.

Penalties

Except as provided in the act, a person who is guilty of an offence is liable on summary conviction:

- for a first offence, to a fine of not more than \$50,000 or imprisonment for a term of not more than six months, or both.
- for each subsequent offence, to a fine of not more than \$100,000 or imprisonment for a term of not more than one year, or both.

A corporation that is guilty of an offence under the act is liable on summary conviction:

- for a first offence, to a fine of not more than \$500,000
- for each subsequent offence, to a fine of not more than \$1,000,000

Contact Us

Any questions or concerns regarding the construction, sealing or maintenance of a well or on the Groundwater and Water Well Act and its regulations can be directed to Groundwater Management by telephone at 204-945-6959 or by email at groundwater@gov.mb.ca.

Appendices

Domestic Purposes

Under the Groundwater and Water Well Act:

Domestic purposes, in relation to the use of water, means one or more of the following purposes:

- (a) household purposes
- (b) sanitary purposes;
- (c) the watering of lawns or gardens;
- (d) the watering of livestock or poultry

Agricultural Operation

Under the Farm Practices Protection Act:

An agricultural operation means an agricultural, aquacultural, horticultural or silvicultural operation that is carried on in the expectation of gain or reward, and includes:

- (a) the tillage of land
- (b) the production of agricultural crops, including hay and forages
- (c) the production of horticultural crops, including vegetables, fruit, mushrooms, sod, trees, shrubs and greenhouse crops
- (d) the raising of livestock, including poultry
- (e) the production of eggs, milk and honey
- (f) the raising of game animals, fur-bearing animals, game birds, bees and fish
- (g) the operation of agricultural machinery and equipment
- (h) the process necessary to prepare a farm product for distribution from the farm gate
- (i) the application of fertilizers, manure, soil amendments and pesticides, including ground and aerial application
- (j) the storage, use or disposal of organic wastes for farm purposes

Saline Water

Under the Groundwater and Water Well (General Matters) Regulation:

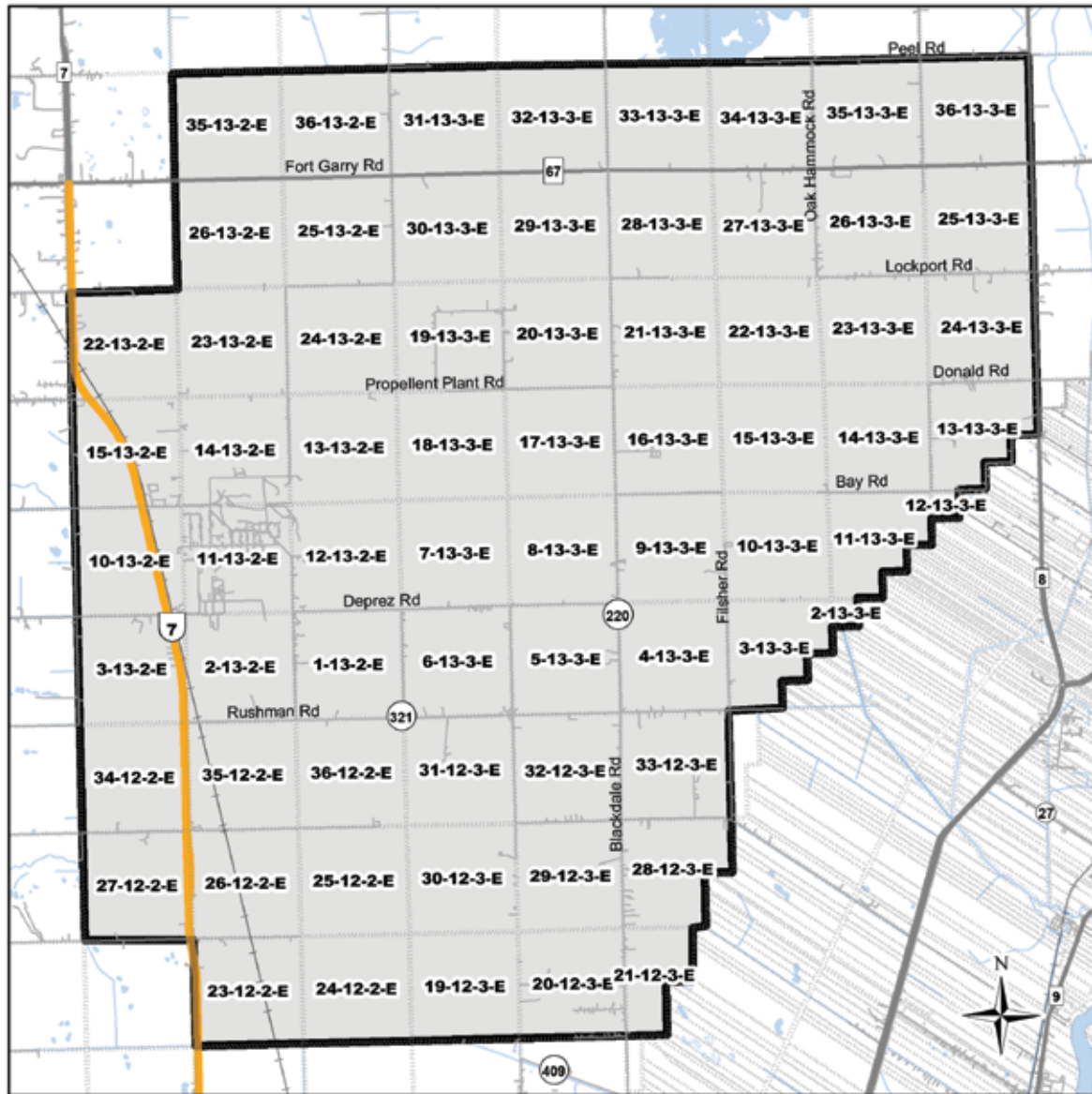
Saline water means, in relation to the sealing of a well, water that has

- (a) a concentration of total dissolved solids in excess of 3,500 mg/l; or
- (b) an equivalent electrical conductivity in excess of 5,000 micro-Siemens/cm.

Power Shovel

A power shovel is typically a larger version of a backhoe, and can often scoop forward in an upward direction.

Rockwood Sensitive Area Map



Map of Rockwood Sensitive Area in Section- Township- Range Format

Extent of Rockwood Sensitive Area as prescribed by *The Environment Act*:

Rockwood Sensitive Area Regulation(121/94):
Section 2, Designation of Rockwood Sensitive Area



Table of Minimum Setback Distances

Feature	Minimum distance that a well must be setback from the feature (not including a monitoring well or a geotechnical well)
Property boundary	<ul style="list-style-type: none"> • 1.5 m (5 ft)
Human grave or mausoleum	<ul style="list-style-type: none"> • 15 m (50 ft), if the well is constructed with at least 6 m (20 ft) of casing below ground surface • 30 m (100 ft), for all other wells
Septic tank ¹ (including an aerobic treatment unit ¹)	<ul style="list-style-type: none"> • 8 m (26 ft)
Disposal field ¹	<ul style="list-style-type: none"> • 15 m (50 ft), if the well is constructed with at least 6 m (20 ft) of casing below ground surface • 30 m (100 ft), for all other wells
Greywater pit ¹	<ul style="list-style-type: none"> • 15 m (50 ft), if the well is constructed with at least 6 m (20 ft) of casing below ground surface • 30 m (100 ft), for all other wells
Pit privy ¹	<ul style="list-style-type: none"> • 15 m (50 ft), if the well is constructed with at least 6 m (20 ft) of casing below ground surface • 30 m (100 ft), for all other wells
Vault privy ¹ or Pail privy ¹	<ul style="list-style-type: none"> • 8 m (26 ft)
Manure storage facility ²	<ul style="list-style-type: none"> • 100 m (328 ft)
Confined livestock area ² comprised of more than 10 animal units ²	<ul style="list-style-type: none"> • 100 m (328 ft)
Underground fuel storage tank	<ul style="list-style-type: none"> • 15 m (50 ft), if the well is constructed with at least 6 m (20 ft) of casing below ground surface • 30 m (100 ft), for all other wells
Above-ground fuel storage tank	<ul style="list-style-type: none"> • 15 m (50 ft), if the fuel tank storage area has secondary containment • 30 m (100 ft), in all other cases
Pesticide storage area	<ul style="list-style-type: none"> • 15 m (50 ft), if the pesticide storage area has secondary containment • 30 m (100 ft), in all other cases
Fertilizer storage area	<ul style="list-style-type: none"> • 15 m (50 ft), if the fertilizer storage area has secondary containment • 30 m (100 ft), in all other cases

Minimum Setback Distances

Footnotes:

¹ As defined in the Onsite Wastewater Management Systems Regulation, M.R. 83/2003.

² As defined in the Livestock Manure and Mortalities Management Regulation, M.R. 42/98.

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