

Guidelines for the Decommissioning (abandonment) of Groundwater Wells and Boreholes

Version 2.1, May 2021

The objectives of groundwater well decommissioning are: to prevent surface water infiltration into an aquifer using the well as a pathway; to prevent the vertical movement of water within a well bore; and to remove any physical hazards a well may pose. These Guidelines outline the procedures and materials used for groundwater well decommissioning that are approved by the New Brunswick Department of Environment and Local Government (DELG). The requirements presented below are for the decommissioning of drilled wells (Section 2.0), dug wells (Section 3.0), and monitoring wells (Section 4.0). These Guidelines do not apply to oil and gas wells.

1.0 Regulatory Authority

The *Water Well Regulation - Clean Water Act* (90-79), Section 27 states that: “27 Where a well is not in use and its continued existence might constitute a safety hazard or allow a contaminant to enter the aquifer, the owner of the well shall fill and seal the well using a method approved by the Minister sufficient to prevent the vertical movement of water in the well.”

2.0 Drilled Wells

Drilled wells consist of a hole bored into the ground with a casing installed to prevent the collapse of the borehole walls. Examples include: wells drilled to extract potable water (i.e. domestic, municipal), industrial wells, artesian wells, heat pump wells, observation/monitoring wells, recovery wells, and test holes (i.e. exploratory). The observation/monitoring wells referred to in this section represent deeper drilled observation/monitoring wells with a standard casing (e.g. >5 in. diameter); it does not apply to shallow monitoring wells used for environmental site assessments.

2.1 Decommissioning Requirements

Drilled wells must be decommissioned by a licensed water well contractor who holds a valid New Brunswick Water Well Contractors Permit.

Decommissioning a drilled well involves completely filling in the well. The following are the general steps to be followed:

1. If the well has a well tag attached, remove the tag. Pull any pumps, wires, and any other equipment that is in the well.
2. Remove the well casing if feasible.
3. Fill in the well using one of the two acceptable methods below:
 - a. The entire well can be filled with bentonite clay or bentonite grout. A suitable uncontaminated material (i.e. sand, drill cuttings,) can also be used by placing it opposite the aquifers or water bearing fracture zones with bentonite grout placed opposite impermeable zones between the aquifers.
 - b. If the distance between the aquifers is such that it is impractical to fill the borehole with grout for the entire length, suitable uncontaminated material may be used to fill the borehole provided that bentonite grout plugs of no less than 1.5 m (5 ft) in thickness are placed within every 5.0 m (15 ft) interval of fill between the aquifers or water bearing fracture zones. Every attempt should be made to seal off two different aquifers with a grout plug.
4. If the casing is left in the borehole then the following conditions apply:
 - The casing shall be cut off a minimum of 1.0 m (3 ft) below ground surface.
 - A bentonite plug (3.0 m or 10 ft in thickness) shall be placed straddling the position of the casing drive shoe seal or the bottom of the casing where it seats in the rock, such that approximately 0.5 to 1.0 m (1.5 to 3 ft) of bentonite is inside the casing.
 - If the casing is less than or equal to 10.0 m (30 ft), the entire casing shall be filled with grout.
5. Whether the casing is pulled from the well or cut off below ground surface, at a minimum the top 3.0 m (10 ft) of the well hole shall be filled with bentonite grout. In certain cases, the very top of the well may need to be capped with concrete.
6. Once the well has been decommissioned, the well owner must notify the DELG of the well decommissioning by email at WaterWellInformation2@gnb.ca. The email should

include the location of the well (civic address and PID), the well tag number, and the name of the licensed water well contractor that completed the decommissioning.

2.2 Special cases

There are special conditions, such as the occurrence of salt water impacts, contamination, or flowing wells (artesian conditions), that may require alternative site-specific decommissioning methods and/or materials. In these cases, the well decommissioning must be overseen by a Site Professional licensed by the New Brunswick Association of Professional Engineers and Geoscientists (APEGNB) to practice in New Brunswick. The Site Professional shall determine the best method to decommission the well which meets the main objectives of these Guidelines. Any decommissioning materials used must be able to form an effective plug/well seal, not impair the quality of the groundwater, and be stable in the presence of any contaminants and/or salt water.

3.0 Dug Wells

A dug well means a shallow well constructed by digging, either manually or mechanically.

To decommission a dug well, the well should be backfilled with suitable uncontaminated material (i.e. sand, drill cuttings, clean fill) to 0.5 m (1.5 ft) below the static water level. A bentonite or grout seal should extend from this level to 0.5 m (1.5 ft) above the water table. The remaining cavity should be filled with suitable uncontaminated material that should extend to within 1.0 m (3 ft) below the final ground surface, and 0.5 m (1.5 ft) bentonite or grout seal should be placed on top. The remaining space must then be filled with impervious natural material (e.g. clay, hardpan) or native soil and slightly mounded to prevent surface water runoff from entering the well. Finally, the top cover should be seeded or overlaid by sod to establish ground cover, or the disturbed area must be stabilized to prevent erosion. If the water table is close to the land surface, the lower bentonite plug should extend to 1.0 m (3 ft) below ground surface.

4.0 Monitoring Wells

This section applies to monitoring wells used for monitoring purposes only, not wells used for potable or water supply purposes. For deeper drilled observation/monitoring wells with a

standard casing (e.g. >5 in. diameter), decommissioning must be carried out as per the requirements in Section 2.0 Drilled Wells.

Monitoring wells are often used for environmental site assessment and for tracking water levels and/or water quality. Groundwater monitoring is used in many sectors, such as contaminated sites, landfills, composting and other waste management facilities, mine sites, industrial operations, aquaculture facilities.

Property/facility owners are required to decommission any monitoring wells once they are no longer in active use. For contaminated sites, the Responsible Party or owner of the contaminated site is required by the DELG to have monitoring wells decommissioned upon completion of the Management Process outlined in the Department's most current version of the **"Guideline for the Management of Contaminated Sites"** (<https://atlanticrbca.com/new-brunswick/>).

All monitoring wells must be decommissioned under the direction of a Site Professional licensed by the APEGNB to practice in New Brunswick. Monitoring wells must be decommissioned as soon as is practicable.

4.1 Decommissioning Requirements

The approved decommissioning method for single monitoring wells, with an intact bentonite seal in the annulus, and which intersect a shallow groundwater table located in surficial deposits/weathered bedrock, is as follows:

1. Remove the casing and cap, or, if it cannot be removed, cut it off 1.0 m (3 ft) below the ground surface.
2. Fill the remaining hole (or casing if it hasn't been removed) to 0.6 m below the ground surface with bentonite pellets or chips while tamping to prevent bridging of the chips or bentonite. Ensure that the bentonite is properly saturated to provide an effective seal.
3. Fill the remainder of the hole with silica sand or overburden material to surface.

4.2 Special cases

The Site Professional must submit a site-specific decommissioning plan to the DELG for the following types of monitoring wells:

1. Groundwater contains chloride concentrations in excess of 10,000 mg/L;
2. Multilevel (nested) well installations;
3. Monitoring wells which may compromise the effectiveness of a low-permeability geological unit which overlies a water-bearing unit;
4. Shallow monitoring wells greater than 150 mm in diameter (not deeper drilled observation/monitoring wells);
5. Monitoring wells lacking an intact bentonite seal in the annulus; and,
6. Any other type of monitoring well installation which does not meet the definition for a single monitoring well above.

The site-specific decommissioning plan must include the following:

1. A site plan showing the monitoring well locations;
2. Monitoring well logs indicating geological strata and water table elevations;
3. A drawing of the proposed decommissioned well design;
4. Rationale for the design which includes consideration of hydrogeological factors and mitigation of risks to the environment; and,
5. Methodology for decommissioning including the types of materials and techniques to be used.

If available, other optional information such as geological cross-sections or reference documents should be included.

The decommissioning plan must be submitted to an appropriate contact at the DELG for review and approval.

4.3 Reporting

The Site Professional will advise the DELG, in writing to an appropriate contact, upon completion of the monitoring well decommissioning. The reporting must contain the client name, Site Professional responsible, DELG file number (if applicable), site name and location,

monitoring well identification, depth and diameter of well, list of materials used, and decommissioning method with grouting information (sealed zones). If the casing was not removed, the Site Professional must provide the details as to why this was not done.

4.4 Boreholes

Boreholes may be drilled as part of a geotechnical investigation or environmental site assessment and includes holes advanced to collect soil samples or rock cores and characterize the local geology. Boreholes that are advanced into the ground and are not developed into a monitoring well are to be backfilled with the clean drill cuttings, or other material of equal or lower permeability. The back-filling material must be compacted and a mound placed over the hole to allow for future settling. Boreholes in which a monitoring well is not installed shall be decommissioned immediately upon completion of the relevant site investigation activities.

5.0 Contact Information

For any questions please contact:

elq/eql-info@gnb.ca

Phone: (506) 444-5149

Mailing Address:

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