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**WAT-G-007**

**EASR Guidance: Borehole construction and decommissioning best practice**

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# Purpose and scope

This document provides information and guidance for anyone undertaking the construction and decommissioning of a borehole which requires an authorisation under The Environmental Authorisations (Scotland) Regulations.

This document does not cover the discharge of groundwater that arises during the construction or extension of a borehole or well.

This guidance does not cover any other permissions that may be required.

# Understanding the activity

The construction of a borehole includes:

* The drilling of the borehole.
* The installation of pipe, called casing, and grout around it to seal the gap.
* The installation of a cap on top of the borehole.

Decommissioning of a borehole means backfilling and/or sealing the borehole.

Once the borehole has been fully and satisfactorily decommissioned an authorisation is no longer required. Before you decommission your borehole you can contact SEPA to see if they would wish to use it as a monitoring borehole.

# Construction best practice

## 3.1 Location

* Locate any water supply borehole away from pollution sources such as sewage discharges so the water quality is as good as possible.

## 3.2 Drilling fluids and equipment

* Use clean water or air as a drilling fluid if possible.
* Ensure the drilling equipment if free from contamination. For example, it has it has not been previously used to drill boreholes on contaminated sites or been lying on ground occupied by livestock.
* You should ensure drilling muds are collected following use and are not allowed to run-off.

## 3.3 Casing

* The casing should be designed to suit the ground conditions and installation depth to avoid collapse.
* The casing should extend to the aquifer layer that is targeted to prevent collapse of unstable ground, controlled artesian flow and the ingress of contaminated groundwater into the borehole.
* The casing diameter should be large enough to allow the installation of a dip tub as well as a rising main and power cable if applicable.
* Do allow a gap between the casing and edge of the drilled hole to allow effective grouting.

## 3.4 Grouting

* The annulus between the casing and side of the borehole should be grouted from the base of the permanent casing up to the surface.
* Do allow the grout to fully set for at least 24 hours before drilling recommences.

## 3.5 Borehole top and cap

* The top of the borehole should be above ground if possible.
* The borehole top should be located in a pump house or a protected area not subject to traffic if possible.
* The borehole cap should be adequate to avoid the entry of pollutants into groundwater and avoid the loss of groundwater.
* If it is necessary to have the borehole top in an inspection chamber it must not allow water ingress. You must also consider any health and safety implications.

## 3.6 Flow meter and sample tap

* For abstraction boreholes a sample tap should be located close to the source and before treatment.

## 3.7 Record keeping

* The Water (Scotland) Act 1980 requires you to keep record and submit information to British Geological Survey (BGS). The [National Geoscience Data Centre - British Geological Survey](https://www.bgs.ac.uk/geological-data/national-geoscience-data-centre/) webpage provide more detail.

# Decommissioning Best Practice

## 4.1 Preparation

* Remove any pumps, pipework, dip tube and other obstructions that may interfere with the sealing of the borehole.
* Examine the state of the casing. Where the casing is broken, corroded or grouting has failed it may be necessary to remove those materials in order to prevent flow of groundwater around the outside of the borehole. Take care to avoid the collapse of the borehole walls, particularly in unconsolidated materials.

## 4.2 Backfilling

* Use clean, uncontaminated materials such as pea gravel, sand, shingle, concrete, bentonite, cement grout and uncontaminated rock.
* You should normally restore the ground as closely as possible to its pre-drilled condition or backfill the borehole with low permeability materials.
* Check the materials used to backfill the borehole suit the geochemical nature of the ground. For example, phenol contamination may prevent bentonite grout from curing.
* Select and introduce any materials so that no accidental “bridging” or voids occur.
* Carefully monitor the volume of materials used to check if the material is escaping out of the borehole.

## 4.3 Backfilling wide or deep boreholes

* A permanent bridging seal, or plug can be used within the borehole and the borehole can only be backfilled above this. This reduces the amount of material required.
* Place the seal so that the open borehole beneath the bridging seal spans no more than a single aquifer unit. This prevents the flow of groundwater between different aquifers.
* Allow the seal to set before backfilling above this.
* Backfill artesian boreholes to prevent loss of the loss of groundwater.

## 4.4 Sealing the top of a borehole

* Fill the top 2 metres of the borehole with cement, concrete or bentonite grout to create an impermeable plug.
* Install a concrete cap.

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