



CAR Licences for Deep Boreholes - Information Requirements

For Consultation

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1. Purpose and Scope of this Guidance

This guidance is directed at anybody planning to drill and operate a deep borehole in Scotland. A deep borehole is one that is drilled to or below a depth of 200m.

All deep boreholes require a licence under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) from the Scottish Environment Protection Agency (SEPA). This document is designed to help developers with their application by setting out the minimum information SEPA require to review a deep borehole licence application.

2. Background

CAR allows SEPA to control activities which are, amongst other things:

- liable to cause pollution of the water environment; or
- result in the direct or indirect discharge, and any activity likely to cause a direct or indirect discharge, into groundwater of any hazardous substance or other pollutant.

Deep boreholes generally pose a higher risk to the water environment than shallower boreholes. This is because if they are inappropriately constructed, maintained or decommissioned these boreholes can act as potential pathways for deeper, poorer quality groundwater to migrate into shallow aquifer systems.

In the years leading up to 2013 there was increased interest in drilling deep boreholes. At that time SEPA agreed that, because of the higher risk they posed to the water environment, a CAR Licence would be required to drill boreholes to or below a depth of 200m from the 1st April 2013.

3. CAR Charges

Information on application fees is available on the SEPA website:

http://www.sepa.org.uk/media/219047/guidance_cs2016.pdf

Where a number of boreholes are being drilled as part of a well-field we will consider if multiple borehole construction and operation can be treated as a CAR single activity where:

- the boreholes are drilled within a small geographic area (each borehole is within 150m of another borehole in the well-field);
- there are no lateral wells;
- activities associated with the boreholes are not likely to require further demonstration of the integrity of the borehole. For example boreholes subject to high pressure fracking or high levels of heat associated with underground coal gasification.

4. Information Requirements

This section outlines the information SEPA will require from applicants for deep borehole licence applications.

To determine an application¹ SEPA has to review the effects of the proposal on the water environment and those who use it. Applicants must provide the information SEPA reasonably requires to review the acceptability of the proposal. If it is deemed that there are no unacceptable risks to the water environment then a licence can be issued to allow borehole construction and operation and to apply any required conditions e.g. relating to maintenance or monitoring and interpretive reporting.

As the information required depends on the environmental risk posed by the proposal the requirements set out in this document are indicative and additional information may be required in some cases. The best way of making sure you provide the appropriate level of information and environmental monitoring required is to get in touch with the relevant SEPA office well in advance of submitting your application.

The information to support the deep borehole licence application should be provided in the form of a Method Statement including a Monitoring Plan where required. The Method Statement should show how you will carry out the work in a way that protects the water environment including how the construction will adequately isolate the borehole target formation from other groundwater units as this is crucial to limiting risks to the water environment.²

As part of a licence application for a deep borehole the information set out in Table 1 (Annex 1), Information required for deep borehole construction, should be supplied as a minimum. It is split into two columns – information required for lower risk boreholes and that for higher risk boreholes.

- Lower risk boreholes: A lower risk borehole is deemed to be one which is fully backfilled and de-commissioned within 14 days of being constructed. It also includes boreholes that are drilled for the purposes of closed loop geothermal systems³ and the pipework involved is fully cemented in place within 14 days of being drilled. Less detailed information is normally required to assess these applications than that for higher risk boreholes.
- Higher risk boreholes: These are all other deep boreholes not deemed to be lower risk (see bullet above). More detailed information is required to assess the risks to the water environment from these boreholes to that for lower risk boreholes. For a subset⁴ of these higher risk boreholes the Method Statement

¹ SEPA has up to a maximum of 4 months to determine a CAR licence. Supplying adequate information will help ensure an efficient reviewing process.

² SEPA uses the Source-Pathway-Receptor approach to determine risk whereby; potential contamination from the activity would be the 'source' and that via 'pathways' created by the boreholes or pathways within the hydrogeological system, identified 'receptors' such as groundwater, surface water or ecosystems could be impacted.

Useful information and guidance on this approach can be found in the following documents;

- [SEPA Position Statement: WAT-PS-10 'Assigning Groundwater Assessment Criteria for Pollutant Inputs, version 2.1', June 2011](#), more specifically Chapter 5 of this document
- Guide to Good Practice for the Development of Conceptual Models and Application of Mathematical Models of Contaminant Transport Processes in the Subsurface, Environment Agency, July 2001

³ A closed loop system is one which does not involve abstraction or discharges to the water environment. They work by circulating a fluid around a closed system with one part of the circuit in groundwater and one part connected to a heat pump in the building to be heated or cooled.

⁴ Where: i) the borehole will encounter significant methane accumulations; ii) there are sensitive receptors nearby that may be impacted; or iii) the borehole will be subject to high pressure fracturing or high level of heat associated with underground coal gasification.

should be based on a detailed Hydrogeological Risk Assessment, supported by a Conceptual Site Model (CSM). This should be completed by a Groundwater Specialist.

A CAR application form for a deep borehole licence and guidance on how to fill it in can be obtained on the SEPA website:

www.sepa.org.uk/water/water_regulation/car_application_forms.aspx

In most cases the licence can be surrendered once the borehole is decommissioned to the satisfaction of SEPA. The SEPA licence surrender procedure, which is included in SEPA guidance WAT-RM-09⁵, should be followed in this case. In some cases post decommissioning monitoring may be required and therefore licence surrender cannot take place until this has been completed. For example where there is lower confidence in the integrity of the borehole following decommissioning.

5. Monitoring for Radioactive substances

The Radioactive Substances Act (RSA) does not normally apply to borehole construction. It will apply to maintenance activities or groundwater abstraction where waste is generated and the waste:

- arises from a specified “NORM industrial activity”; and
- exceeds the concentration of those radionuclides exceed those specified in RSA⁶

NORM industrial activities includes, amongst other things, the production of oil and gas, activities related to coal mine de-watering plants and removal and management of radioactive scales and precipitates from equipment associated with industrial activities. It therefore includes the abstraction of groundwater associated with coal bed methane and shale gas extraction but not the abstraction of water for geothermal purposes.

With this in mind, if you are likely to undertake an activity that may fall within RSA then you should determine the concentration of any naturally occurring radionuclides in any substance to be extracted from the borehole as this information will help inform whether an authorisation under RSA will be required⁷. Note this is not part of the CAR authorisation.

⁵ http://www.sepa.org.uk/media/149710/wat_rm_09.pdf

⁶ For more details see the Government guidance on the scope of and exemptions from the radioactive substances legislation in the UK (September 2011) <https://www.gov.uk/government/publications/guidance-on-the-scope-of-and-exemptions-from-the-radioactive-substances-legislation-in-the-uk> or Joint Regulators guidance for NORM industrial activities on how to comply with the radioactive substances exemption regime <http://www.sepa.org.uk/regulations/radioactive-substances/guidance-and-reports/>

⁷ <http://www.sepa.org.uk/regulations/radioactive-substances/regulation-and-legislation/>

Annex 1 - Information required for deep borehole construction applications*Table 1: Information required for deep borehole construction applications*

Risk		Lower risk boreholes	Higher risk Boreholes
Description		Temporary boreholes and closed loop geothermal boreholes	Other Deep boreholes
Purpose and use			
1.	The purpose of the borehole.	✓	✓
2.	Any future proposed controlled activities associated with the borehole e.g. discharge, abstractions.		✓
Construction details			
3.	Location of each borehole (including national grid reference).	✓	✓
4.	Proposed date when borehole drilling will commence.	✓	✓
5.	Depth and diameter	✓	✓
6.	Depth, direction and distance of any horizontal drilling (if applicable)		✓
7.	Drilling methodology including details of drilling fluids.	✓	✓
8.	Casing type, depth and diameters ⁸ .		✓
9.	Details of casing cement including method of cementing, type of cement and depth over which casing is cemented.		✓

⁸ Boreholes should be designed as far as possible so that remedial action can be undertaken if required.

10.	Schematic of the borehole construction.	✓	✓
11.	Details of an approach for: <ul style="list-style-type: none"> • minimising and managing drilling fluid loss; • managing artesian groundwater flow; • managing any variance from anticipated grout volumes; • managing any methane encountered. 	✓	✓
Hydrogeology			
12.	Details and a schematic (including type and depth) of the strata through which the borehole will be drilled.	✓	✓
13.	Details of any relevant pathways such as nearby faults, mineworkings or other deep boreholes (including proposals for appropriate stand-off distances from these features).	✓	✓
14.	Details of any receptors - please complete a water features survey (see Annex 3).	✓	✓
15.	A hydrogeological risk assessment of the risks posed to the water environment.	✓ ⁵	✓ ⁹

⁹ This should show how the construction will adequately isolate the borehole target formation from other groundwater so as to protect the Water Environment. A more detailed assessment will normally be required where: i) the borehole will encounter significant methane accumulations; ii) there are sensitive receptors nearby that may be impacted; or iii) the borehole will be subject to high pressure fracturing or high level of heat associated with underground coal gasification

Proposals for Baseline Monitoring			
16.	<p>Proposals for baseline monitoring should be linked to the development of a conceptual site model (CSM).</p> <p>The monitoring locations, parameters and frequencies are linked to the risk posed to the water environment. This may include baseline groundwater monitoring and/or baseline monitoring of other relevant receptors.</p> <p>The baseline monitoring should allow for characterisation of the natural variation of the water environment for parameters such as salinity, methane, hydrocarbons and metals, so that ongoing monitoring can report changes against the established baseline. Note the list of parameters is not exhaustive; there may be local water sensitivities, which should be identified as part of your CSM. Early discussion with SEPA is recommended to clarify appropriate level of environmental monitoring.</p> <p>Groundwater monitoring borehole(s) are likely to be required where:</p> <ul style="list-style-type: none"> the proposal involves a large number of deep boreholes drilled as part of a wellfield; where nearby sensitive water features have been identified e.g. abstraction boreholes or groundwater dependent wetlands; or where methane extraction is to take place. <p>Where an existing appropriate borehole is present this may be utilised.</p> <p>The location and construction details of any monitoring boreholes should be provided. Monitoring of flow or levels may be required for water features, including neighbouring abstractions.</p>	Not normally ¹⁰	✓

¹⁰ Baseline monitoring may be required for temporary boreholes where they are drilled close to sensitive receptors.

Integrity testing			
17.	Integrity testing to confirm that the borehole has been adequately constructed ¹¹ . For example cement bond logs and pressure testing of the casing.		✓
18.	Plans for maintaining the integrity of the borehole for the life cycle of the borehole.		✓
Proposals for Ongoing monitoring			
19.	Proposals for ongoing monitoring following construction to verify that the integrity of the borehole is maintained and that there are no unacceptable impacts on the water environment should be provided. This may include groundwater monitoring and/or monitoring of other relevant receptors. Groundwater chemistry analysis and the monitoring of flow and level in water features would normally be similar to that undertaken at the baseline stage.		✓
20.	Details of action to be taken if: <ul style="list-style-type: none"> there are early warning signs that the borehole is not functioning adequately e.g. detected via requisite monitoring; any significant adverse environmental impact occurs. 		✓
Decommissioning and sealing			
21.	Proposed lifespan of the borehole.	✓	✓
22.	Plans for temporary sealing the borehole when it is out of use prior to final decommissioning. This should include reasons and associated time periods.		✓

¹¹ In line with using Industry Best Practice; The Oil & Gas UK 'Well Life Cycle Integrity Guidelines' and 'Guidelines on the Abandonment of Wells', and International ISO: 16530 Standards on Well Integrity.

23.	Decommissioning plans These should be submitted with the application. For higher risk boreholes they would normally include integrity testing prior to decommissioning. They should also show how the integrity of the well following decommissioning will be demonstrated. ⁷	✓	✓
Proposals for post decommissioning monitoring			
24.	Proposals for post – decommissioning monitoring should be provided. This is required to verify that the decommissioning has been appropriately carried out and that there are no unacceptable risks to the water environment.		✓
25.	Details of action to be taken if: <ul style="list-style-type: none"> • there are early warning signs that the borehole is not functioning adequately e.g. detected via requisite monitoring; • any significant adverse environmental impact occurs. 		✓

Annex 2 - Water Features Survey

A Water Feature survey should be completed for licence applications. To complete the water features survey any of the water features listed in Table 2 which are present within, or intersected by, a circle of radius 850m should be detailed on the water feature survey identification form [WAT-FORM-10](#)¹² and identified on an up-to-date map of convenient scale, preferably one based on the Ordnance Survey Landplan® 1:10 000 series. Note that where horizontal drilling has taken place the water feature survey will need to take account of both the surface position and the position of the horizontal extent of the borehole.

A walk-over survey is required to identify some of the water features including wetlands. Guidance on how to complete the survey for wetlands is included in Table 2. Some of the features can be identified by using local knowledge and maps and a consultant is not normally required to undertake this survey.

SEPA holds information on the location of abstractions and discharges registered or licenced under CAR. Other organisations, such as Scottish Natural Heritage, British Geological Survey and the local authorities, may also have relevant information, and some useful addresses are given in Annex 3.

Table 2: Water features to be identified within the radius of the water features survey

	Water features to be identified within the radius of the water features survey
1.	Rivers, burns or streams (including river control structures, ie weirs, locks, sluices).
2.	Lochs, lochans or ponds with a surface area of more than 50m ² or where their ecology or use could be adversely impacted (including fish farms and water sports areas).
3.	Canals, navigation channels or reservoirs.
4.	Seepage pits (catchpits for springs).
5.	Wetlands. To identify wetlands a site walkover will be necessary. This need not be by someone with professional training at this stage, although further investigations may be necessary. The survey should be completed using the Scottish Functional Wetland Typology Guidance . This includes guidance on how to complete a walkover survey and identify general wetland types.
6.	Coastlines and coastal lagoons.
7.	Areas of saline or areas of potentially contaminated groundwater.
8.	Boreholes and wells, specifying use and construction details.
9.	Surface water and groundwater abstractions.
10.	Springs and seepages.

¹² <http://www.sepa.org.uk/regulations/water/abstractions/>

	Water features to be identified within the radius of the water features survey
11.	Large discharges to surface waters (eg water utility water treatment works).

Annex 3 – Useful Addresses

SEPA

SEPA holds information on the location of abstractions and discharges registered or licenced under CAR. <http://www.sepa.org.uk/contact/>

Local authorities

Your local authority may keep a register of all households that are not on public mains supply and will have a register of some abstractions of less than 10 m³/day. They may also hold information on local and UK biodiversity action plans and local conservation areas.

Scottish Water

Scottish Water holds information on the location of those public water supplies administered by them.

Scottish Water
PO Box 8855
Edinburgh
EH10 6YQ
www.scottishwater.co.uk

Scottish Natural Heritage (SNH)

SNH can supply details of Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Sites of Special Scientific Interest (SSSIs) that lie within the area of influence of your proposed abstraction.

12 Hope Terrace
Edinburgh
EH9 2AS
www.snh.gov.uk

The British Geological Survey (BGS)

BGS can supply information concerning the location of some boreholes but, as it is not obligatory to register boreholes less than 50 feet deep, its database is not exhaustive.

Murchison House,
West Mains Road,
Edinburgh
EH9 3LA
www.bgs.ac.uk

The Coal Authority (CA)

The CA can supply information on historic coal mining activities that may have resulted in groundwater of poor quality.

The Coal Authority
200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG
www.coal.gov.uk