

**DRAFT
PROPOSAL TO ESCALATE THE DRILLING OF DEEP BOREHOLES FROM A
GBR TO A COMPLEX LICENCE.**

1. Introduction

This paper explains why the construction of deep boreholes presents a high risk to the water environment. It proposes that, because this activity does not fit well into the established CAR regulatory regime (which was designed for typical abstraction boreholes), we escalate the level of authorisation from GBR to a complex licence.

This approach has been developed in conjunction with the Water Resources (Paul Butler), National Air Unit (Emma Taylor), Lin Bunten and David Harley.

Approval for this approach is sought

2. Risks to the Water Environment from Deep Borehole Drilling

There are hundreds of vertical groundwater abstraction boreholes in Scotland. Most are less than 100m deep.

Recently there has been an upsurge in interest in coal bed methane (CBM) and shale gas exploration and production in Scotland. Figure 1 shows the areas (in purple) which have a Petroleum and Exploration Licence (PEDL) which has been issued by DECC. The red dots show where boreholes have already been drilled for shale gas or CBM exploration or production.

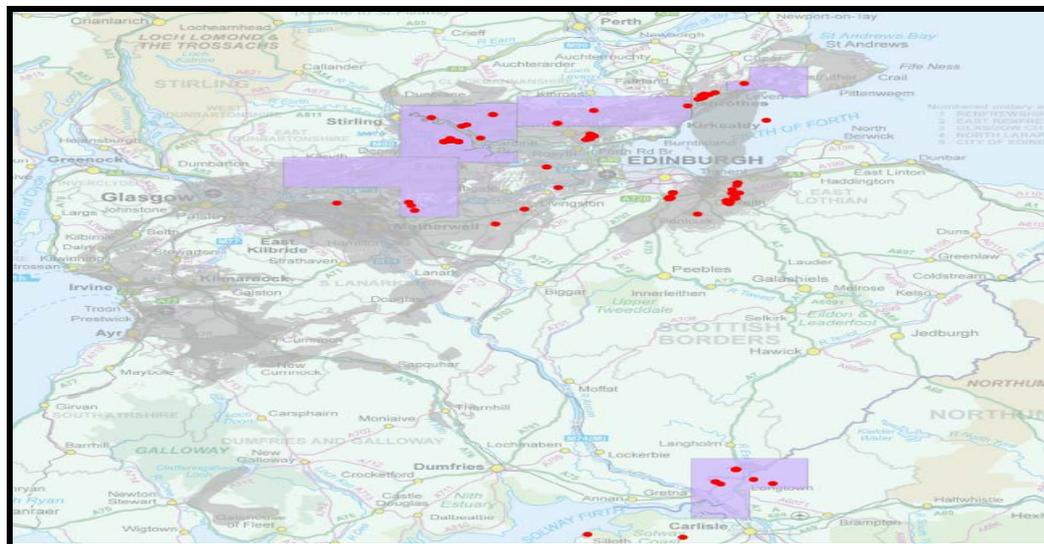


Figure 1: Areas in Scotland which have a PEDL and where boreholes have been drilled for shale gas or CBM exploration or production.

CBM and shale gas exploration and production requires the drilling of deep boreholes, up to 2500m deep, using directional drilling techniques. The use of directional drilling means that, in contrast to normal vertical drilling, large areas of land are affected by the drilling. Figure 2 shows a typical directional well, and Figure 3 gives an example of a plan view of the area underlain by a CBM directional borehole.

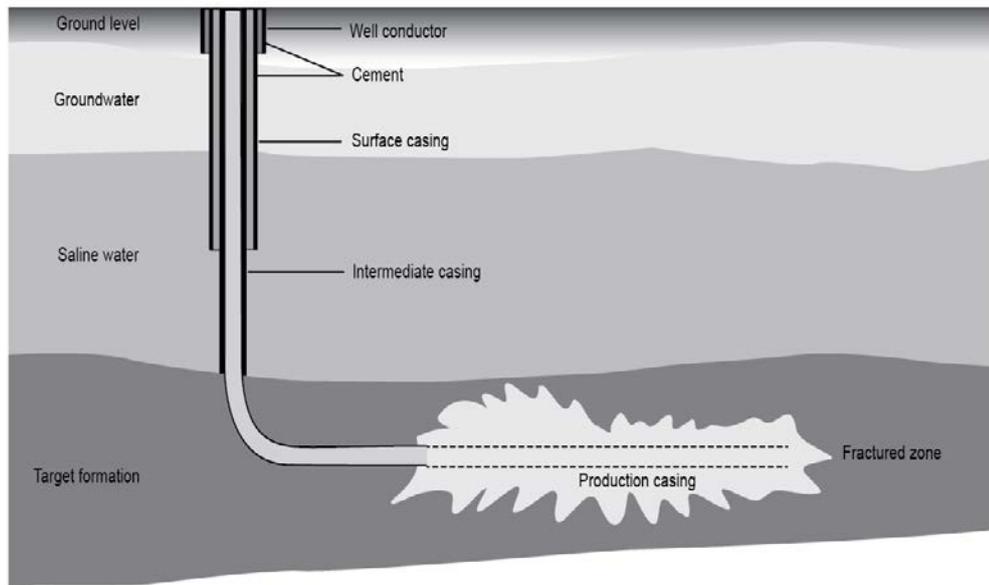


Figure 2: Schematic of a directionally drilled well

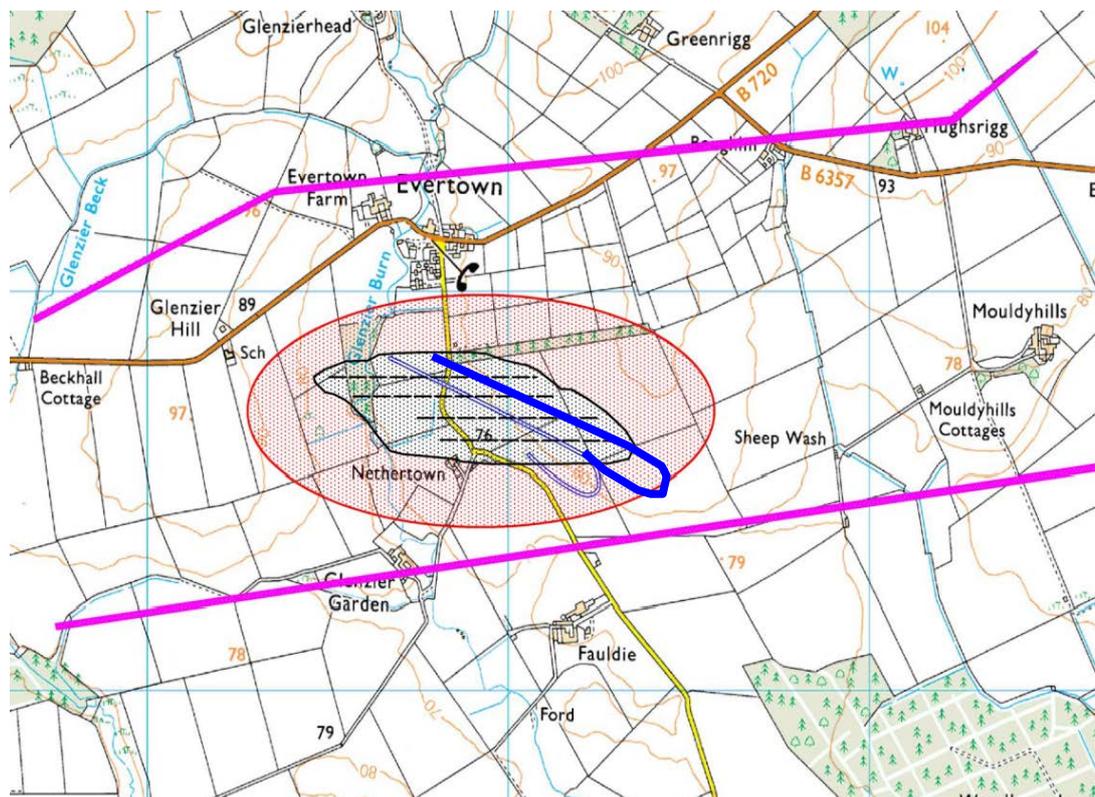


Figure 3: Example of area underlain by a CBM borehole (borehole shown in blue)

The construction of these deeper and more complex boreholes pose a higher risk to the water environment than normal groundwater abstraction boreholes because:

- They are drilled to greater depths and encounter deep saline waters which can contaminate the more potable upper aquifers and other abstractions if the borehole is not adequately constructed;

- Boreholes drilled for unconventional gas often involve the introduction of fracking fluids into the deep groundwater to allow methane to be extracted. These substances need to be adequately contained and not be allowed to leak into other parts of the groundwater system;
- Directional drilling means that a large area below ground is impacted horizontally as well as vertically.

Poor borehole construction has been identified by SEPA at two out of the three CBM developer's sites in Scotland. At one site near Canonbie, four wells were constructed with casing that was not cemented between 100m and 400m below ground level. This potentially allowed saline waters from the Coal Measures at the bottom of this uncemented zone to travel up to and contaminate the Permian Sandstone aquifer at the top of this zone. Figure 4 demonstrates this.

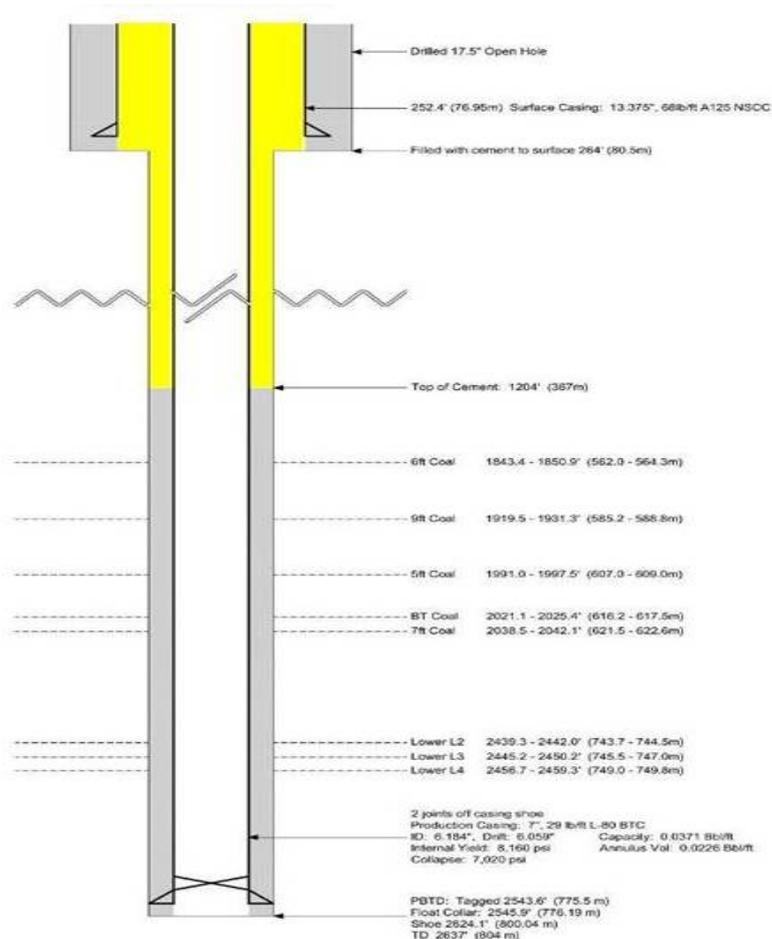


Figure 4: Example of poor borehole construction - no cement between 100m and 400m below ground level.

At another site near Cumbernauld, only the top 100m was proposed to be cased and cemented. Construction would have connected the base of the upper aquifer (from which a drinks company had a nearby licence to abstract water) with the more saline waters below (see figure 5).

Where no abstraction is proposed, or where the volume is below the 50m³/d threshold for a simple licence, then SEPA has been influencing borehole construction through the planning regime

4. Regulatory Recommendation

Due to the risks to the environment posed by deep boreholes, many of which abstract minimal or no water, this activity does not fit well into the established CAR regulatory regime, designed for typical abstraction boreholes. It is therefore proposed that we escalate the level of authorisation from GBR to complex licence for deep (>200m) borehole construction.

The main benefits would be that:

- The level of authorisation would better align with the risks posed to the environment from this activity;
- Licensing would allow us to assess details of the borehole construction and impose any conditions necessary;
- SEPA would be able to cost recover for our time. Currently we sometimes get the opportunity to comment on the construction via the planning process or informally. However, this is not consistently applied and the amount of work put into assessing these activities is considerable with no real requirement for the Planning Authorities to take on board our comments;
- We would not be using the planning regime to control environmental issues we can regulate under CAR.

There should be only a minimal increase in workload as a result of this change as we are already seeing many of these proposals under planning anyway.

This approach will also apply to deep boreholes (>200m) drilled for geothermal energy recovery, in which there is increasing interest.

The licence applies to the construction of the borehole. Once it is drilled and completed then the licence could be surrendered. In line with the engineering regime subsistence charges will not be applied as the activity occurs over a set period and is unlikely to be placed on the SEPA monitoring plan.

This approach will need to be incorporated into SEPA guidance.

5. Actions required

The WLPRSG are asked to agree that:

Due to the higher environmental risks which deep borehole drilling poses to the water environment that the authorisation of the construction of deep boreholes (>200m in depth) should be escalated from a GBR to complex licence level. This is regardless of whether groundwater is to be abstracted from them.

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