

## Domestic Water Boreholes & Deep Geothermal Wells

Dwellings which cannot easily be connected to mains water will often choose to have a domestic water borehole installed. This fact sheet has been designed to answer the common questions from people with a domestic water borehole located near to a geothermal power project.

### What is the difference between deep geothermal wells and domestic water boreholes?

There are many differences between deep geothermal wells and domestic water boreholes. Deep geothermal wells are cased in steel and cement from the surface for approximately  $\frac{3}{4}$  of their depth and bring geothermal fluid contained in fractures at 4,000-5,000m depth to the surface. After the hot fluid has been used to produce renewable electricity, the water is reinjected underground to approximately 2,500m depth. In comparison, domestic water boreholes are rarely more than 200m deep and are cased with either steel or plastic with either an open hole section or perforated cased section in the part of the rock which contains the fresh water. The water from domestic boreholes is not deposited back underground, therefore the water extracted from a borehole is not replenished by the borehole user.

### Can water in domestic boreholes get contaminated?

\*Farming is an important industry in Cornwall, and this has a potential impact on the quality of private borehole water supplies. Use of pesticides can affect water quality, as can the presence of livestock.

\**Cornwall Council: Private Water Supplies Webpage*

The geology of Cornwall also impacts on the quality of the groundwater. High levels of manganese, iron and arsenic have all been recorded in water samples taken from private borehole water supplies due to the natural presence of these within the rock.

### What effect will geothermal drilling have on groundwater?

Geothermal developments must follow regulations and guidance from the Environment Agency to ensure that groundwater is not impacted by drilling or operations. At first, a pilot hole is drilled approximately 30" wide and 11m deep and cased with a steel cylinder, to stabilise the top of the well. Air is used to extract the debris, so no fluid is injected or extracted. The next section of the well is then drilled to approximately 900m. In this section, clean water is used to lubricate the drill bit and

No water is extracted from the ground at these depths; therefore, borehole water supply is never depleted. As drilling continues, the well is cased with more steel and cement to around 3,000m, effectively sealing of the entire well from ground water and preventing any possible interaction of well fluid with groundwater.

### How is domestic borehole water kept safe?

\*The majority of Cornwall's private borehole water supplies are used for human consumption. Private water supplies can be used for purely domestic purposes such as cooking and washing, or for large scale commercial operations such as farming or breweries. Ensuring clean, safe drinking water is the biggest concern and this is achieved in several ways including protecting the source and secondary treatment, such as filtration and disinfection. Private water supplies are regulated by national legislation:

- [Water Industry Act 1991](#)
- [Private Water Supplies Regulations 2016](#)

\**Cornwall Council: Private Water Supplies Webpage*

Cornwall Council provides a useful [leaflet explaining the basics of the Private Water Supplies Regulations 2016](#).

### What should I do if I think the water from my domestic water borehole is contaminated?

If you think the water from your domestic borehole is contaminated, do not consume the water until you have received professional advice, either from your borehole supplier or Cornwall Council.

### How does the depth of a domestic water borehole compare to deep geothermal wells?

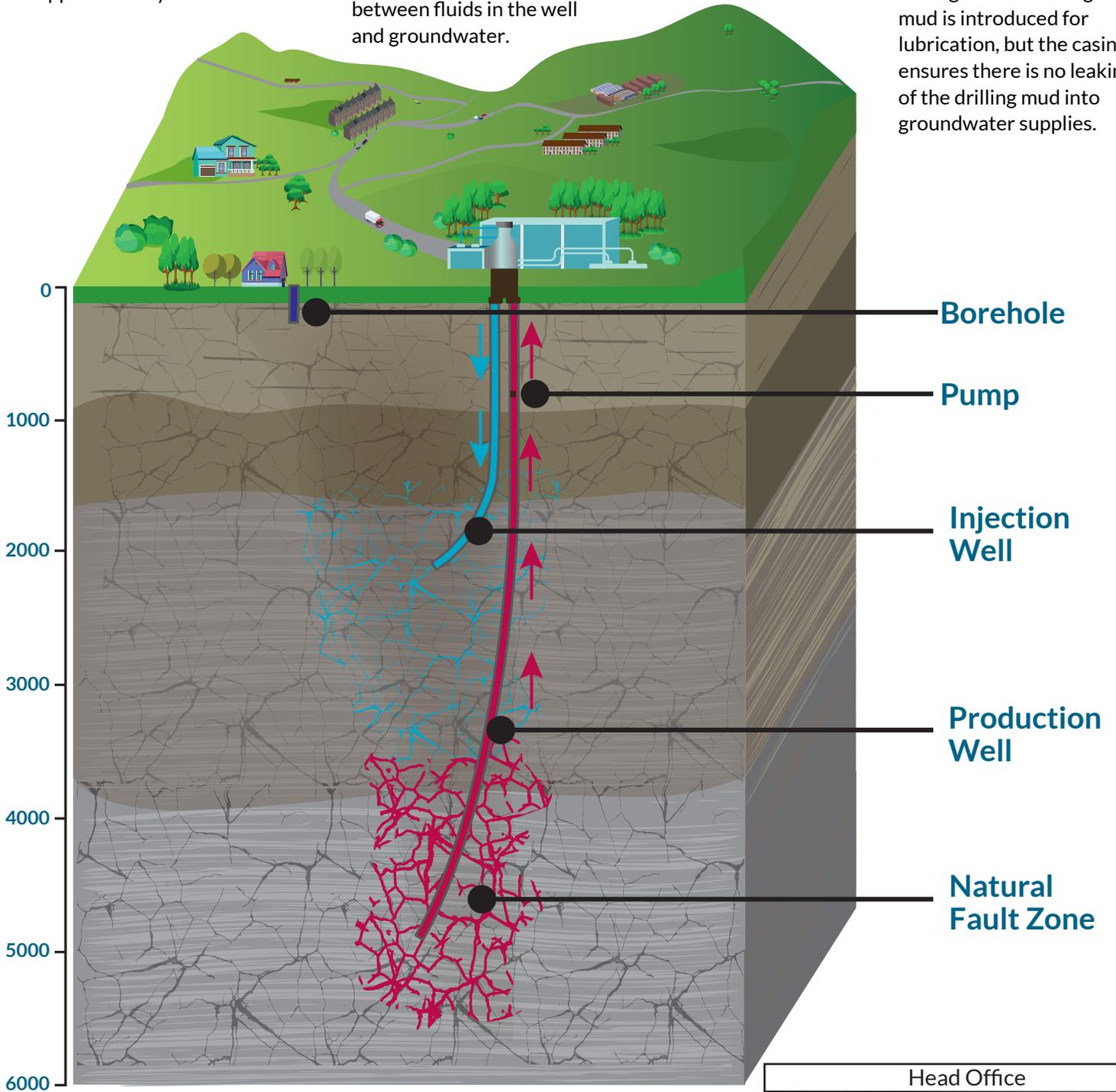
The diagram on the next page shows that the used geothermal fluid is deposited underground more than 2,000m below the maximum depth of a domestic water borehole. The geothermal reservoir is separate to groundwater as it is contained in fractures approximately 5,000m below the borehole so there is no possibility of the geothermal well taking the water from the borehole. Also, the bottom of the geothermal wells will be around 800m away from the top of the wells

The diagram below depicts a domestic borehole compared with a geothermal doublet (1 production & 1 injection well):

The average depth of a domestic borehole is approximately 65m

The geothermal wells are cased in steel and cement for  $\frac{3}{4}$  of their length, ensuring no interaction between fluids in the well and groundwater.

Water is used for drilling until the well is cased to 900m. After this, biodegradable drilling mud is introduced for lubrication, but the casing ensures there is no leaking of the drilling mud into groundwater supplies.



For more information about geothermal developments, please visit our website [geothermalengineering.co.uk](http://geothermalengineering.co.uk) or follow us on social media. You can also contact us directly using the following details:

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