

# Galleries to Calories (G2C) Site Development Guide



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Galleries to Calories (G2C) is a research collaboration between the University of Edinburgh and a team comprising UK renewable energy experts and international academic researchers.

The G2C project focuses on the potential of Scotland's historic mine workings to provide heating, cooling and energy storage to Scotland's businesses and homes.

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## What is the Galleries to Calories (G2C) project?

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Galleries to Calories (G2C) comprises industry, academic and national research partners from Scotland, USA, and Ireland, aiming to demonstrate for the first time the use of legacy mine workings as recycled heat storage and transport networks to provide managed sustainable regional recharge of low enthalpy (< 40°C) geothermal heat.

G2C will undertake in-depth geological, hydrogeological, and geochemical site characterisation, an assessment of the sustainable thermal resource management for different development scenarios, development of socially based economic models, investigation into the legal aspects of subsurface heat ownership models and technical consideration of its wider application to European and US coal and mineral mines.

The long-term objective of the project is to provide heating and cooling services, including:

- ❖ Cooling for the Advanced Computing Facility at Easter Bush Campus, Midlothian.
- ❖ Heating and cooling to local commercial sites, via minewater fed water heat-source pumps.
- ❖ Providing heating and cooling for local or regional heat networks, providing energy to homes and businesses.
- ❖ Enabling energy storage, where excess heat generation may be stored underground and transported via mine networks for later use.

## Why are we drilling now?

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As we are seeking to use old coal mines, the G2C project requires access via boreholes to the mine workings. Boreholes are small holes drilled vertically in the ground providing an access route into the mines. We are drilling now because:

1. We need to get a better understanding of the geology and how easy it is for us to drill to our target depth of c. 175 m.
2. We need to perform tests on the borehole - known as thermal response testing, or TRT - to be able to accurately model the heat energy we will be able to extract from underground.
3. We want to understand the chemical properties of the mine water and the physical properties of the mines themselves, which will be done via abstraction of water from a borehole and carefully monitoring the others "downstream" where water exists the mines.
4. We want to understand how water (and heat) flow through the mine workings, from our boreholes to the various locations where mine water exits to the surface.
5. We will also carry out hydraulic testing to understand the flow pathways in the subsurface

What's great is that the test borehole can be capped and covered up, and then can become the first borehole for the new system whenever we are ready!

## Who is doing the work?

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**TownRock Energy** is the project lead and geothermal specialist, responsible for specifying the location and design of the boreholes and conducting analysis of the borehole data.

**The University of Edinburgh** is a project partner and the site owner, with an interest in using minewater heating and cooling for university properties.

A **drilling contractor** will be procured by the project team. Staff will be present throughout the drilling operation, with members of the TownRock Energy team present for the drilling and testing stages.

**What works are taking place and how long will it last?**

The works involve drilling, grouting, and testing the borehole. The drilling programme will take up to up to 7 working weeks (Monday to Friday, between 8am to 4pm). The key activities, and approximate duration, are as follows:

1. Site mobilisation (arrival on site with equipment and setting up): 1 day.
2. Drilling (drilling down to the target depth): boreholes up to 5 days each.
3. Widening the abstraction borehole: up to two weeks.
4. Grouting (installing casing and pipework and casing into the borehole and filling the borehole with grout from the bottom of the borehole to the surface): 1 - 2 days per borehole.
5. Drying (allowing the grout to set for 50 hours): 2 days.
6. Testing: up to 6 months.
7. Demobilisation (removing all equipment and site reinstatement): 2 - 3 days.



## Where is the drilling taking place?

The approximate location is shown on the aerial map, below. The exact location will be determined on site, in discussions with the site owner and the geothermal engineers. The selected site will allow access to mine workings and has been chosen to minimise disruption and impact on local people. A safe distance of 10m from the drilling rig must be observed at all times except for those in the project team certified under the Construction Skills Certification Scheme (CSCS).



## What about the impacts?

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The main impact will be the noise of the drilling rig and the generator. Drilling activities will be limited to working hours (0800 to 1600 Monday to Friday). The noise of the drilling will be most noticeable during the first stage of drilling of the borehole and the noise from the generator will be most noticeable during the testing phase. The intervening distance will ensure the noise impacts are within permissible thresholds, but that's not to say you won't be able to hear it.

There will be some 'cuttings' produced as part of the drilling process. These are pieces of rock that will come to the surface in a controlled manner during the drilling and will allow the on-site geologist to get a better understanding of the geology.

Water will be used for the drilling, and this will be provided from the nearest available water supply. Water will be recirculated around the drilling rig and borehole using a separation system. A settlement pit with catch pits will be provided around the perimeter of the excavation area to attenuate any water run-off. Wastewater and spoil will be reused or recycled or disposed of off-site. Clarified water will be sampled and analysed before discharge to adjacent foul water manhole, to ensure compliance with Water Authority Conditions.

The Contractor's activities are regulated by the Scottish Environment Protection Agency, and Risk Assessment Method Statements specific to this work will be prepared to avoid, minimise, or mitigate any impacts which could occur from operations involving plant and machinery. All site operatives are suitably qualified and are members of the Ground Source Heat Pump Association (GSHPA). Site activities will be managed to ensure no public access within a minimum of 10 m for the duration of the works.

**PLEASE NOTE:** This drilling activity is very different to hydraulic fracturing, better known as 'Fracking'. Fracking is a method of extraction that is used to harvest shale gas and is unrelated to thermal energy production. Fracking involves fluids consisting of water, sand and chemicals being injected at high pressure into rocks containing shale gas to create openings which allow the gas to be released. Here, we are removing water from the ground and letting it return unpressurised to assess the thermal resource. It does not involve having to break into geographic formations in the same way that fracking does.

## Who can I contact for more information?

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There is lots of useful information on the website of the Ground Source Heat Pump Association <https://gshp.org.uk>

Alternatively, feel free to contact members of the G2C project team:

**David Walls**, Drilling Manager: [david.walls@townrock.com](mailto:david.walls@townrock.com)

**Rhys Watkins**, Community Liaison: [rhys.w@scene.community](mailto:rhys.w@scene.community)