

KERING GROUP – A CASE STUDY

Some people relish real engineering challenges and the directors of Ground Source Consult (GSC) definitely fall into this category. Having delivered a hugely complex open loop ground source heat exchange system for Prada at their flagship Old Bond Street store, it didn't take too long for another high end fashion label to seek out GSC's technical know-how. Kering, a world leader in apparel and accessories, developing brands such as Gucci, Saint Laurent, Alexander McQueen and Puma to name a few, were looking for ways of introducing renewable technology to their new London office. Working again with ESA Engineering (Milan), GSC set to work to see how ground source technology could deliver the required targets at the site.



Image 1 - Rig inside hoarding

Firstly, in January 2014 GSC carried out a feasibility report, it concluded that it was not possible to install multiple closed loop boreholes since the building occupied the whole plot. In addition, it was also going to be almost impossible to introduce an open loop system because there was only one extremely limited position available to drill anything at all! Traditionally, open loop systems require two boreholes – one for abstraction and one for recharge of spent water. Furthermore, the feasibility report proved that the Jubilee Line tunnel ran only 8m away (and at a depth of 40m) from the only place where drilling could take place! Even these obstacles did not stop GSC from searching for a solution.

On a previous project, GSC engineers were able to modify an existing ground source system by using a single open loop borehole to both extract and recharge water.

Would this offer a potential way forward for GSC at Kering? Iain Howley, director of GSC and project leader; "The site in Mayfair presented unique problems. We were faced with very limited space, a London Underground tunnel and a really busy street. The building heating and cooling loads

were reasonably sizeable at 90kW so a flow of 3.5 l/sec was needed to service the peak load". The question was - could a single well approach also work here?

GSC's head of hydrogeology, and thermal modeller, Zeb Etheridge, conducted an investigation into whether the building could be serviced by a single well. 3D aquifer thermal models were constructed largely with the detail that had been generated from The Scott's Restaurant site some 250m away – a project delivered by the same GSC team nearly 10 years ago.

The models showed that if GSC could take advantage of the fracture characteristics within the natural make-up of the upper chalk strata, there was a chance that vertical separation could be achieved with a 'packer' tool, a piece of equipment traditionally used to test different horizons of deep wells in the oil and gas industry. GSC presented their solution to the client and then the team set to work.

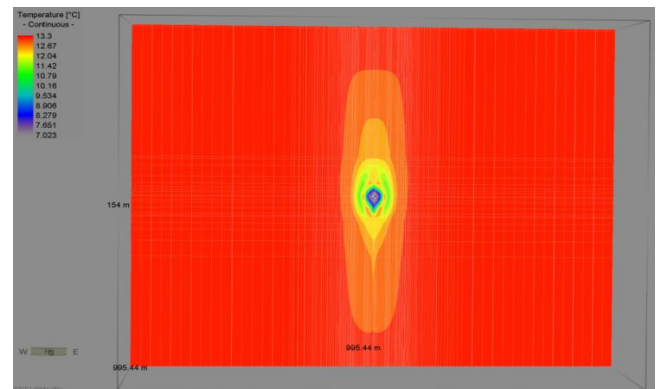


Image 2 – heat model graphic illustration

Whilst applications were made to the Environment Agency, discussions continued with Transport for London engineers confirming that the 135m deep borehole next to their train tunnel would have no material effect on its infrastructure. TFL and the EA were both satisfied with GSC's delivery approach for installing the borehole and the team turned their attention to physically drilling the borehole.

The site is in a very busy part of town and drilling needed to take place from the footpath over an existing basement vault. The team needed to install temporary supporting struts to take the weight of the rig and equipment. Meetings were held with the neighbours, the landlord - Grosvenor Estates, TFL and Westminster City Council. GSC needed to set up the rig whilst maintaining safe and reasonable access for

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both vehicular and pedestrian traffic including the temporary relocation of a taxi rank. Keeping adequate access to adjacent businesses was also hugely important and specialist bespoke equipment was needed to reduce the site footprint to a minimum.

With the designs complete and the project delivery strategy agreed, GSC invited tender from reputable and skilled contractors to drill the borehole and undertake the complex testing procedure. GSC appointed Drilling & Servicing Co Ltd to drill and develop the borehole and WJ Groundwater Ltd were engaged to carry out the testing works.

Co-Director Andy Howley; “It was very important for us to take the theoretical findings that Zeb came up with in his modelling exercises and validate them as far as possible with actual results. In order to achieve this, firstly GSC engaged European Geophysical Services Ltd to complete a suite of geophysical logs (including special high resolution optical images of the borehole) to understand where water flowed through the ground via the natural fractures and fissures. Understanding where these fractures were, and how big they were, played a large part of the subsequent design of permanent down hole equipment”.

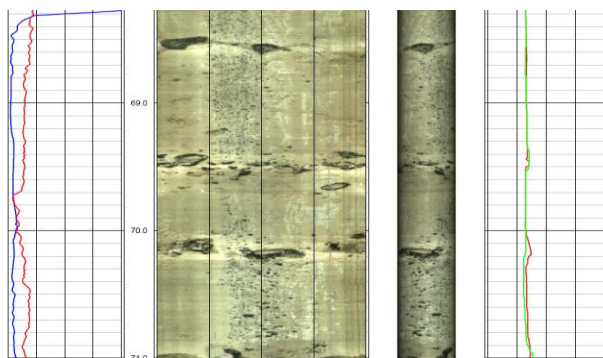


Image 3 – Geophysical Logging Image

The critical element was to identify a zone within the open section of the borehole (c.90m below ground) where a ‘solid’ section of chalk had fractures below it, from which water could be extracted, and fractures above it, to where spent water could be discharged.

Several points within the borehole were identified as potential areas where the packer could be placed and further testing using fluorescent dyes as a tracer, to replicate heat movement, proved the optimum point for final placement.

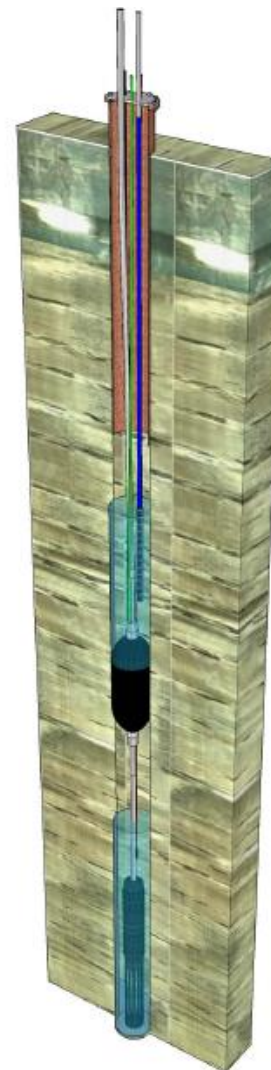


Image 4 – profile of installed equipment

The borehole was fully tested and commissioned in September 2014 and will put into service in February 2015.

Howley; “This system was even more complex than the installation we carried out at Prada a couple of years ago – but again, it’s the type of challenge in which we really like to get involved. It is very satisfying for all of involved when you consider that the only type of ground source system that Kering could have was the ‘Ground Source Consult Ltd single well open loop system’ and we are incredibly pleased and especially proud to have delivered the system to Kering” .

Iain & Andy Howley are Directors and Co-owners of Ground Source Consult Ltd