

Costco Croyden

BREEAM Industrial Building of the year 2008



A new 12,975m² cash and carry membership warehouse for Costco incorporates an EarthEnergy system to help meet the Croydon planning requirement that 10% of new developments' energy is provided from on-site renewable sources.

A 600kW closed-loop ground source heat pump system was selected to meet the heating and cooling requirements of the development. The closed loop ground collector of 10 x 8 boreholes is installed under the car park. Interconnected manifold pits collect the boreholes together, with the main flow and return pipe work taken underground into the building. The ground loop flow is connected directly via a ground side buffer tank to the 10 roof mounted, reversible, water to air Trane heat pumps.

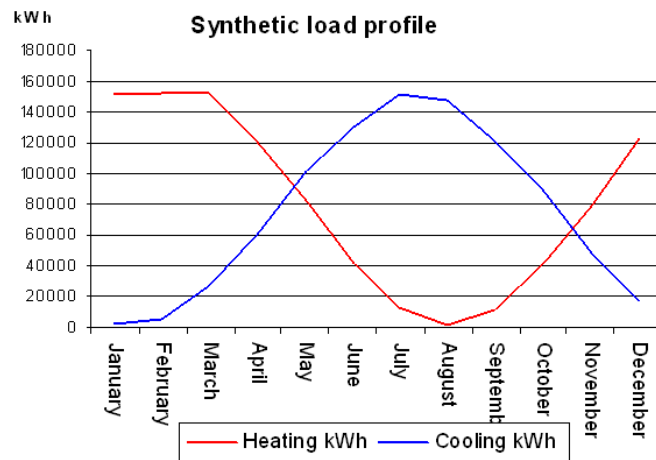
This use of geothermal energy is a world first for Costco, reducing the warehouse's CO₂ emissions while maintaining comfortable conditions for customers and staff throughout the year.

Unlike many other awards, the BREEAM Awards recognise developments that have been independently certified and given an objective BREEAM rating, the pre-requirement being an 'Excellent' score. Costco, Croyden BREEAM Score: 77.45%

System Objectives

To design and provide a borehole field capable of providing capacity for 645kW Heating and 601kW Cooling to be operated. To design and provide suitable circulator pumps to operate at 50% capacity with full operational capacity of 150% allowing for redundancy.

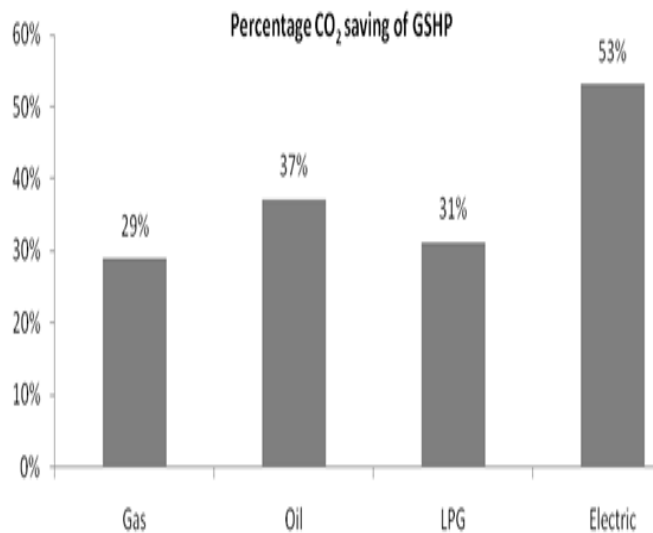
System Performance Graph



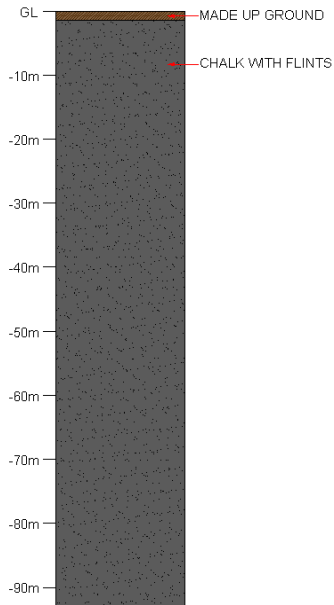
Environmental Benefits

The EarthEnergy system characteristically has a very long life, requires no routine annual maintenance and reduces CO₂ emissions by 40 – 60%, when compared with a traditional heating system. The ground source heat pump used in the project was expected to reduce the kgCO₂/kWh_{heating} from 0.2 to 0.11, a reduction of 45%.

CO₂ Savings Comparison Chart



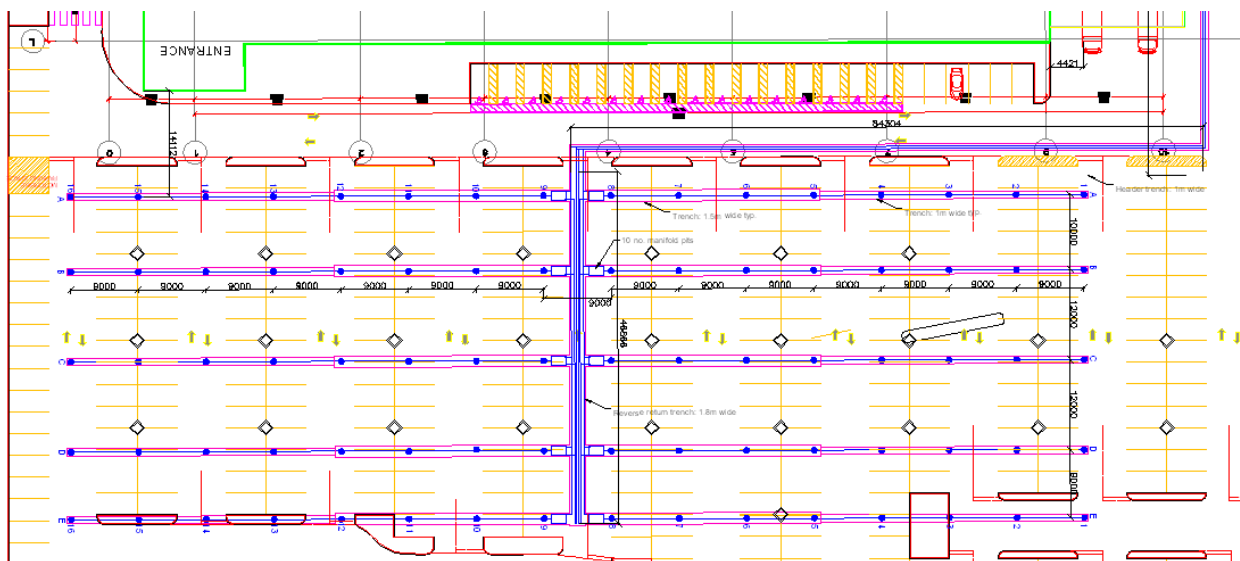
Geology – Drilling Conditions



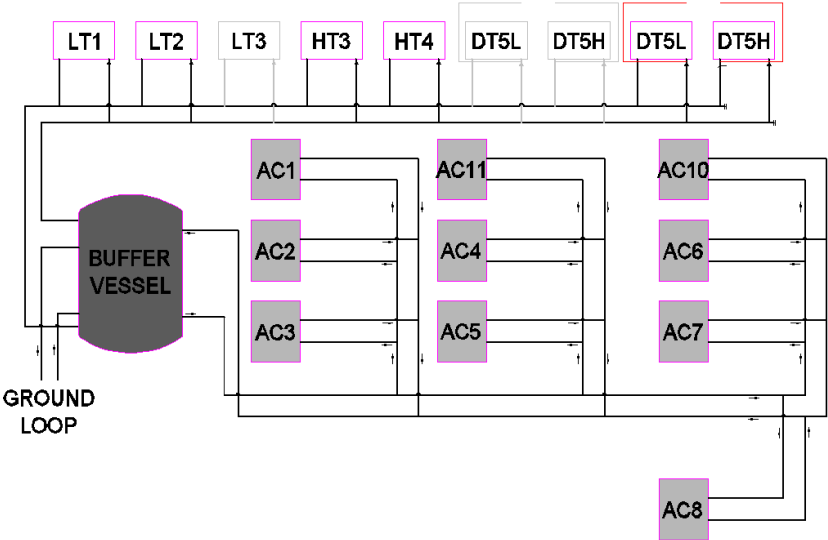
Thermal Conductivity

The on site testing of the thermal conductivity suggests that the value of 1.99 W/mK should be achievable. The thermal contact resistance should be in the region of 0.1 mK/W allowing the loads of 645kW Heating and 601kW Cooling to be operated on an 80 borehole field.

External Arrangement Drawing



Installed System Schematic



Site Works Information



The installation went well and we had up to three of our drilling rigs operating at any one time. We managed to stick to the planned timescale in drilling the 80 No. 90m boreholes and supplied and installed the pre-fabricated manholes and the ground loop array pipework.



We had some difficulty towards the end of the project where we had not initially planned to assemble the ground side pump set which was not previously mentioned during the tender process however we designed a support structure with custom brackets to support the three pumps and delivered it to site within a short period of time to ensure the contract and timescale did not fall behind the agreed principle contractors requirements.

