



General Overview of Ground Heat Exchanger Types & Installation

Part 1

Ireland Workshop – 25th April 2019
Red Cow Moran Hotel



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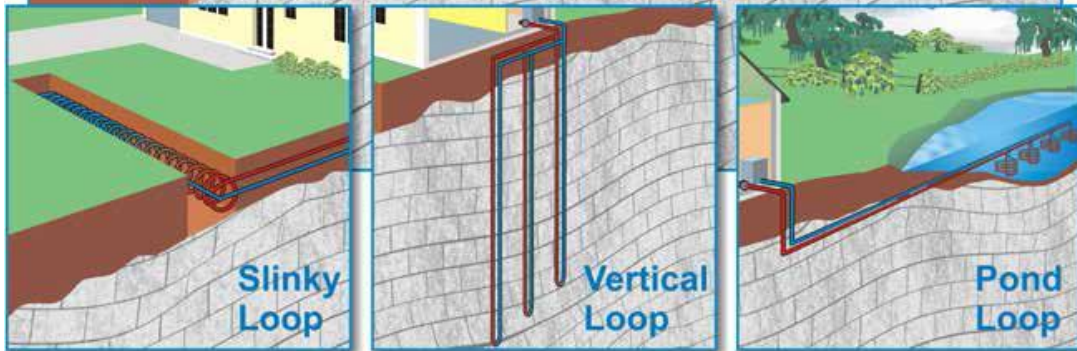
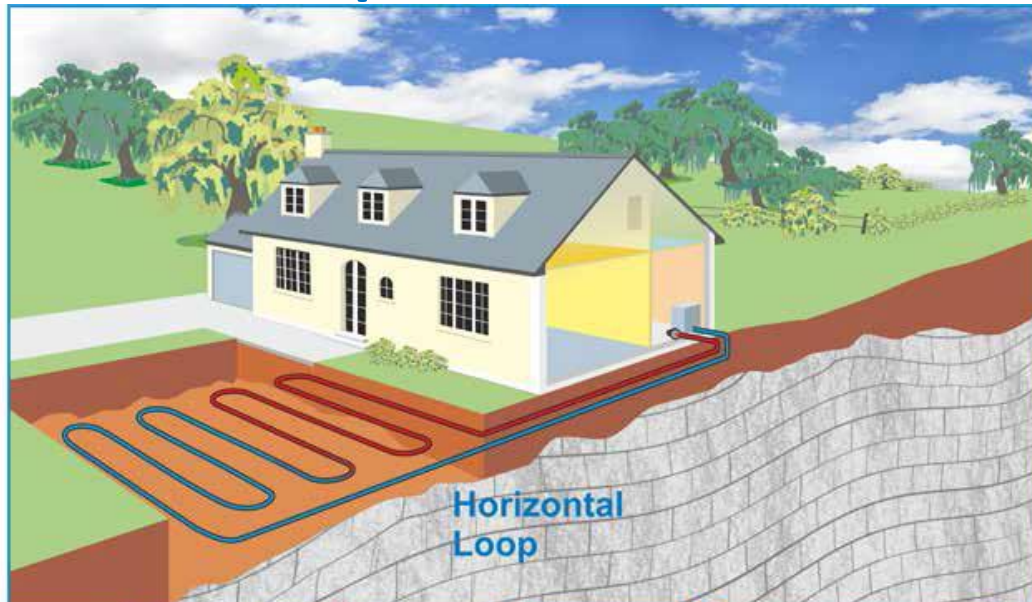
GA n. 657982-
Duration: 4 years – Start June 1 2015
Total project budget: 5.804.847,50 €
EU contribution: 4.844.652,00 €





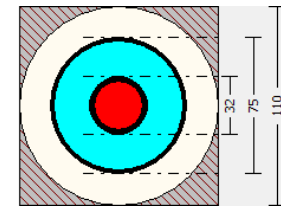
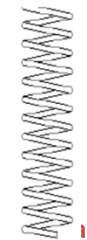
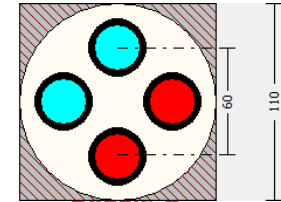
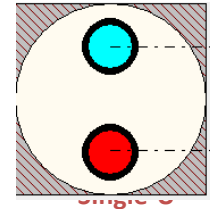
- GSHE Types
- Closed Loop Heat Exchangers
 - Single –U
 - Double-U
- Drilling and Installation
- Conclusions

Closed Loop



Source GSI, 2015

- Vertical Collectors:

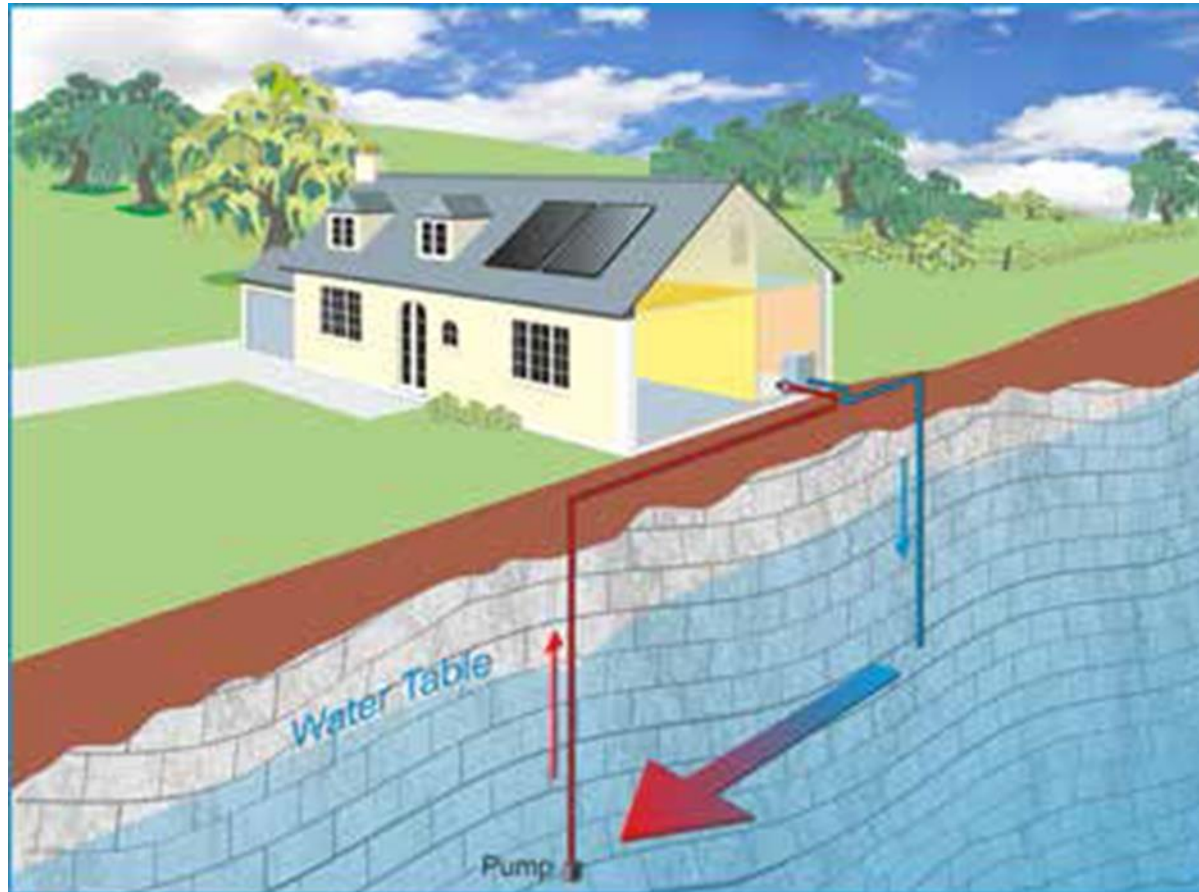


- Horizontal Collectors:



©SlimJim

Open Loop



Source GSI, 2015



Single - U

Double - U

Drilling Methodologies in Ireland

Considerations

Installation in Accordance with IS EN17628:2015

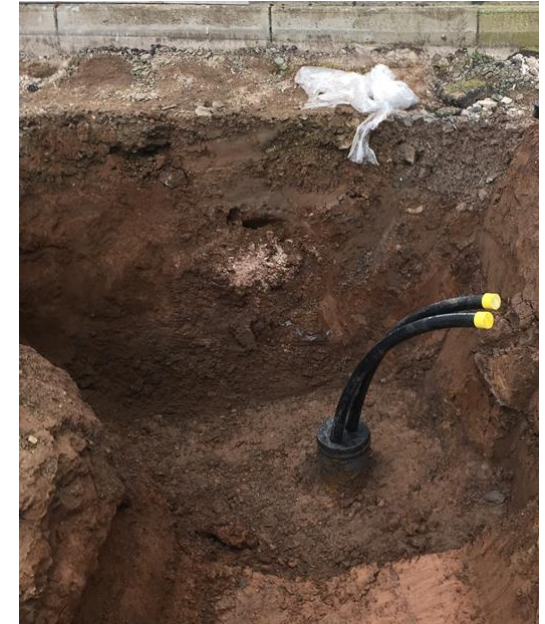


Key requirements

- Drilling & Casing
- Installation of the probe & protection
- Use of decoiler
- Installation of grout tube

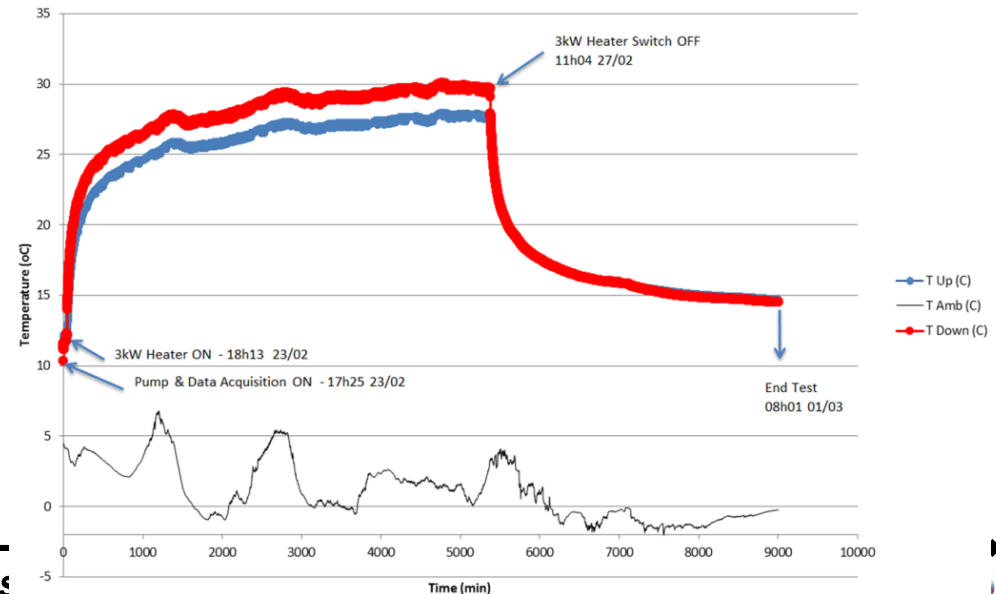
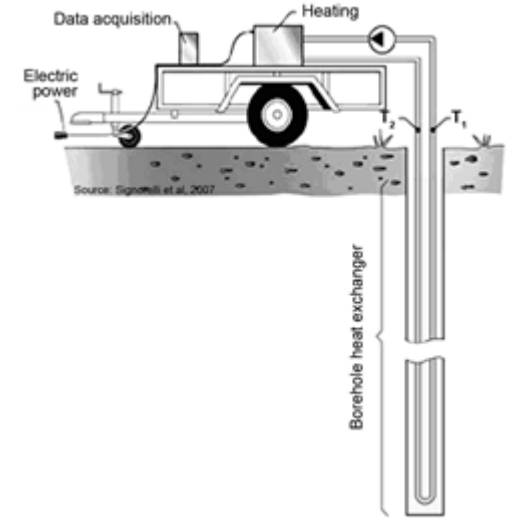
Grouting

- Collector Material Selection - PE100 SDR11
- Grouting Annular Space – T.C. ≥ 2 W mK-1
- Grouting Methodology
- Mixer Type
- Injection Point



Thermal Response Testing

- Geo-Thermal Response Testing
- ≥ 72 hour period
- Confirm
- Thermal Conductivity of the Ground
- Borehole Thermal Resistance



Pressure Testing (BS EN805 & SN 546384/6)

- Starting Pressure
- Test Steps
- Flow Testing
- Adequate flow rate
- Pressure Monitoring

BHE length	Density of grout suspension				
	1200 kg/m ³	1400 kg/m ³	1600 kg/m ³	1800 kg/m ³	2000 kg/m ³
60m	8.0 bar	8.0 bar	9.0 bar	10.0 bar	11.0 bar
80m	8.0 bar	9.0 bar	10.0 bar	12.0 bar	14.0 bar
100m	8.0 bar	9.0 bar	11.0 bar	14.0 bar	17.0 bar
120m	8.0 bar	10.0 bar	13.0 bar	17.0 bar	21.0 bar
140m	8.0 bar	11.0 bar	15.0 bar	19.0 bar	24.0 bar
160m	9.0 bar	12.0 bar	17.0 bar	22.0 bar	27.0 bar
180m	9.0 bar	13.0 bar	19.0 bar	25.0 bar	31.0 bar
200m	9.0 bar	14.0 bar	21.0 bar	27.0 bar	34.0 bar



Surface Pipework Connection

- Collector Material Selection - PE100 SDR11
- Fusion Joints (BS EN12201)
- Record of Fittings and Pipe Barcodes
- Trenching Material



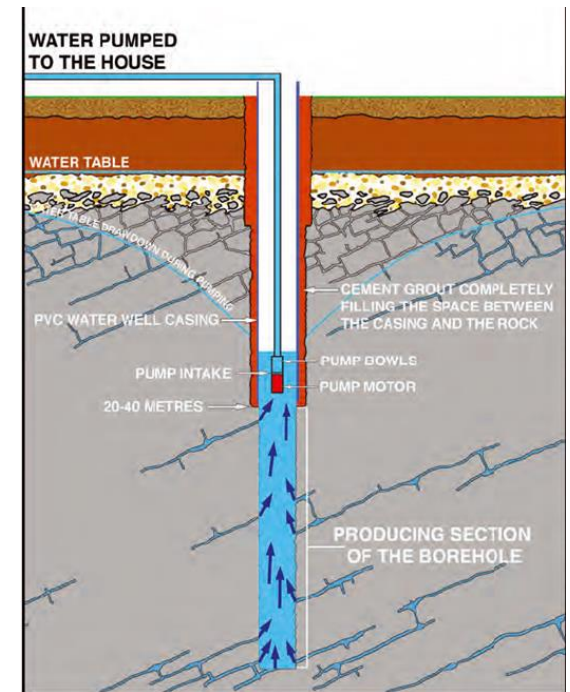
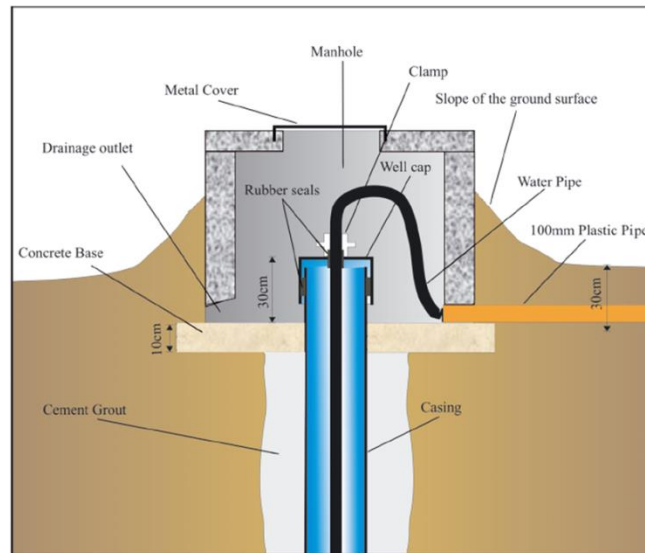
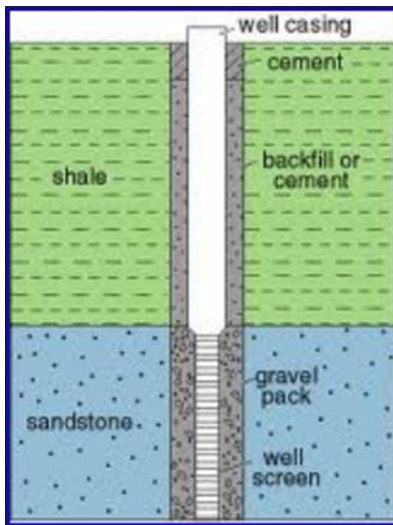


Wonder Years Childcare - IOY 2013
44 kW Heating

Cliffs of Moher Visitor Centre - IOY 2013
160kW- H&C

Borehole Construction

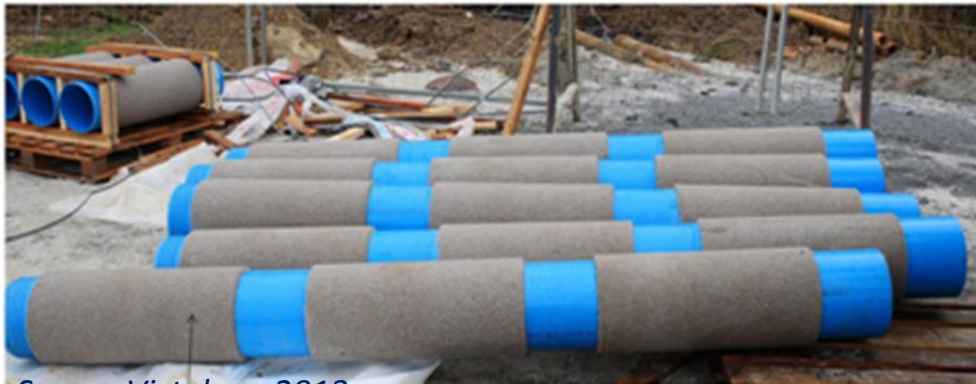
- Production Borehole Design
- Preventing Aquifer Cross Contamination
- Construction of Pump Chamber
- Well Head Completion
- Water Treatment



Source IGI, 2011

Case Study Example - Vistakon

- Cooling Capacity 890 kW
- Annual Cooling Energy 953 MWh/a
- Flow rate 15 l/s
- Input 11.5oC
- Output 19oC

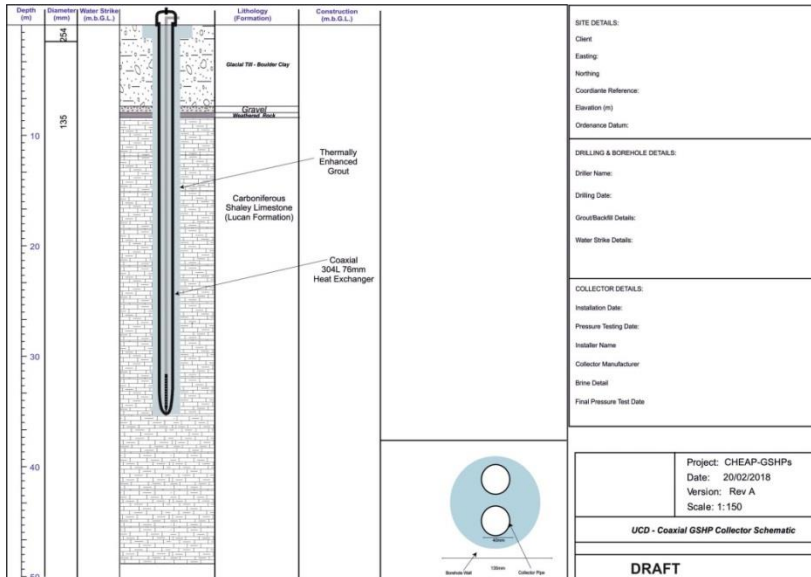
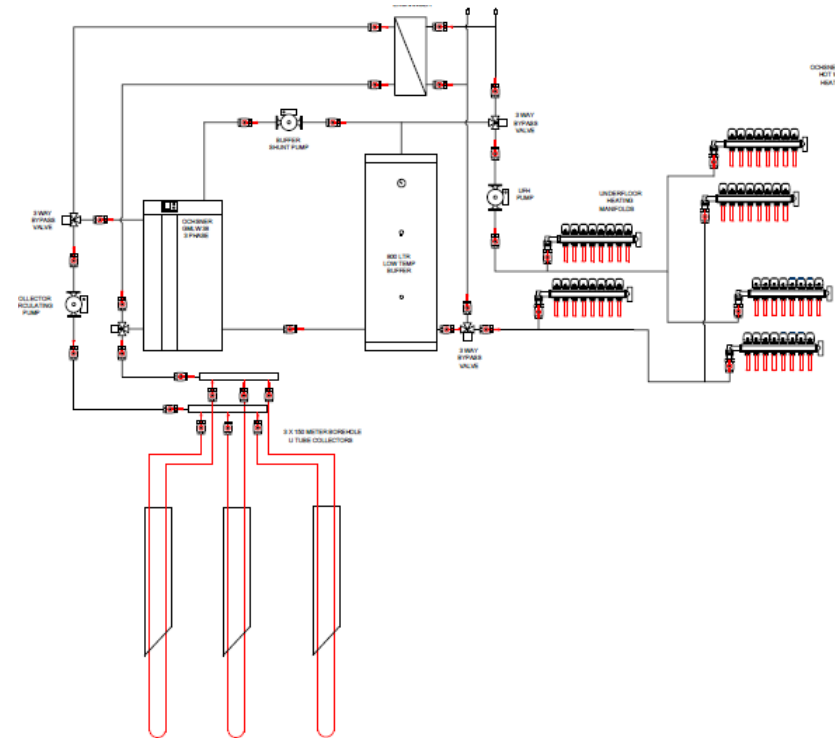


Source Vistakon, 2013



Hand Over Documents

- Design Model Details
- Borehole Logs/Records
- Testing Records
- As Built Drawings



Maintenance Requirements

- Closed Loop Systems
 - Glycol Concentration (top up)
 - Biocide Testing
- Open Loop Systems
 - Cleaning of Production Screens
 - Water Chemistry & Treatment
- Collector Monitoring
 - Temperature
 - Flow Rate
 - Pressure



Conclusions