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Edition No.1 2020

Geothermal heating works to the new Gippsland Recreation and Aquatic Centre (GRAC) Traralgon (VIC)

Planned Gippsland Aquatic Center, Labrobe, Victoria, Australia (source: Peddle Thorp Architects)

GRAC geothermal heating project description

For the Latrobe City Council, the new **G**ippsland **R**ecreation and **A**quatic **C**entre (**GRAC**) in Traralgon (Victoria) has been developed (www.latrobe.vic.gov.au/grac).

Designed to have a strong sustainability focus, the GRAC is the first public aquatic facility in Victoria to incorporate a geothermal heating system to warm up the GRAC pools. This geothermal heating system is utilising **The Latrobe Valley aquifers**, which have abundant heat, with geothermal gradients up to 7.3˚C/100 mtr. and are ideal for direct use for geothermal heating.

This environmentally friendly, sustainable geothermal energy source is a key component of this project. It will assist in significantly reducing the carbon footprint while also aiding in substantial energy costs savings every year.

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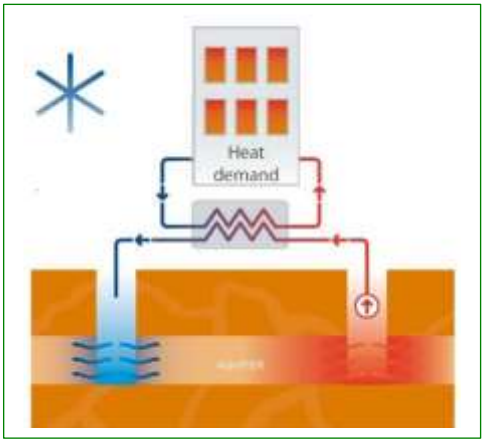
The geothermal **production bore** taps into the aquifer below Traralgon and provides access to ground water located between 636 and 642 mtr. below ground. The water temperature at this depth is approximately 65˚C-68˚C.
The bore holes have an internal diameter of 200mm. A submersible pump was installed down the hole to extract this hot geothermal water and deliver it to plate heat exchangers, located in the GRAC plant room.

The new development at the GRAC site has a low temperature, circulating treated closed loop heating water system on the other side of the heat exchangers to distribute the heat to the various air handling plants and swimming pool water.

After the geothermal heat energy from the bore water has been transferred, via the plate heat exchangers, to the low temperature circulating closed loop heating water system, the heat-depleted bore water of about 40˚C is reinjected down, via the **injection bore**, back into the Latrobe Valley aquifer.
The injection bore, is located 450 metres west of the GRAC and screened at 562-610 mtr. depth.



The geothermal temperatures of 68˚C exceeded expectations. The approx. ≤ 350 ML/year of circulating geothermal groundwater will provide approx. ≤ 2.8 MW of geothermal energy as low-cost and low-carbon pool-water heating and space heating to the GRAC facility.

Rockwater Consultant Hydrogeologists was the principal consultant for the geothermal component of this project. Rockwater designed, supervised and commissioned the geothermal production- and injection- bore for the GRAC project.

The mechanical consultant was **NDY** (Norman Disney & Young).

The production- and the injection bore were drilled by local drilling contractor **Drilltec** from Morwell (VIC).

Contracted local plumbers were **Millers Plumbing** from Morwell (VIC), installing the flow and return pipework between the boundary of the GRAC construction site and the geothermal plant room of the GRAC development, **Laser Plumbing** Traralgon (VIC), installing the return pipework from the GRAC site boundary back to the injection bore and **AusGeothermal** Traralgon (VIC) installing all of the bore head and plant room works.

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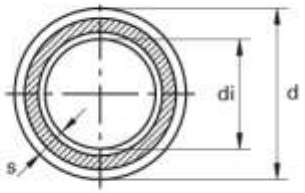
Buried pipe selection

The geothermal heating water, flow and return, is being conveyed through buried pipelines. The buried pipe system had to meet the following specifications:

- The pipe material had to be suitable for in ground geothermal heating, conveying geothermal water of 68˚C (max.), in combination with a water pressure of 1,000 kPa (10 bar) (max.) and with a calculated design life of 50 years.
- Non-corroding (internal and external) and durable pipe material.
- The pipe material had to be chemically resistant against the various minerals in the geothermal bore water.
- Good insulation features (low thermal conductivity); pre-insulated, only if needed.
- Pipes sizes required were DN80 and DN200.
- The pipe had to be somewhat flexible.
- Easy and proven jointing method.

Thanks to their special material properties, the **aquatherm green pipes SDR9 MF RP** met the GRAC geothermal heating water requirements.



- For the required DN80 pipe the **aquatherm green pipe SDR9 MF RP** Ø110x12.3 (d_i = 85.4mm) was selected.
  - Jointing method: socket fusion.
  - Empty pipe weight: 4.40 kg/mtr. Water content: 5.725 L/mtr.
- For the required DN200 pipe the **aquatherm green pipe SDR9 MF RP** Ø250x27.9 (d_i = 194.2mm) was selected.
  - Jointing method: butt welding.
  - Empty pipe weight: 19.74 kg/mtr. Water content: 29.605 L/mtr.

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Having a low thermal conductivity (**λ = 0.15 W/mK** vs **λ = 384 W/mK for Copper** or **λ = 50 W/mK for Steel**), (pre-)insulating of the buried **aquatherm green pipe SDR9 MF RP** was no longer required.

Some other special material properties of the **aquatherm green pipes SDR9 MF RP**:

1. The **aquatherm green pipes SDR9 MF RP** is made of a corrosion resistant material, being PP-R (Polypropylene Random Copolymer).
   This eliminates future internal or external corrosion issues and provides longevity.
2. Less pipe roughness = 0.0070 mm (less friction head loss; smaller pumps).
3. Recyclable material.
4. Light in weight (density = 1,000 kg/m^3); **8x** lighter than **Steel**, **9x** lighter than **Copper**.
   This might save hiring a crane to lift the pipes.
5. Aquatherm manufactures its own glass-fibre reinforced polypropylene composite.
   Our three-layer pipes are extruded with a fibre-reinforced middle layer that strengthens the pipe and restricts expansion and contraction. Linear expansion coefficient (α= 0.035 mm/mK).
6. Since the thermal expansion forces of the **aquatherm green pipes SDR9 MF RP** are less than for metal pipes, for in ground pipework, **no thrust blocks are required**.
7. Very good chemical resistance.
8. High impact strength and ring stiffness.
9. Easy processing (socket fusion and butt welding).

In total 192 metres (L= 4 mtr.) of pipe and fittings of **aquatherm green pipe SDR9 MF RP** Ø110 and 197.2 metres (L= 5.8 mtr.) of pipe and fittings of **aquatherm green pipe SDR9 MF RP** Ø250 were supplied by Aquatherm Australia for the pipework within the boundary of the GRAC construction site.

In total 545.2 metres (L= 5.8 mtr.) of pipe and fittings of **aquatherm green pipe SDR9 MF RP** Ø250 were supplied by Aquatherm for the return pipework from the GRAC site boundary to the injection bore.

All the **aquatherm green pipe SDR9 MF RP** pipes and fittings were supplied ex Germany, via 20' sea freight containers, directly on site. Free training on site, site support and required socket fusion- and butt welding- tools were provided by Aquatherm technicians.

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For more information about the **aquatherm green pipe SDR9 MF RP** pipe, please visit our websites (www.aquatherm.com.au and www.aquatherm.de) or simply call us on: 02 9774 1172.

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