

Case Study: Drilling with Environment Canterbury, New Zealand

In a country where there are normally mountains and rivers between you and your neighbour a small drilling system like our Lost Cone Set comes into its own. I had the pleasure of training a team from Environment Canterbury led by Bryan Todd in the use of the lost cone set to install shallow water monitoring piezometers in the Canterbury region.

The Canterbury region on the South Island is marked by grassy plains, clear lakes and snow-capped mountains. Its largest city, Christchurch, hosts the well-known riverside Botanic Gardens but is still recovering after the earthquakes in 2010 and 2011. To the west of the region, Aoraki Mount Cook National Park hosts New Zealand's highest mountain as well as 27 km-long Tasman Glacier. With 42,200 square kilometres of diverse landscapes including major lakes and river systems and some of its most productive farmland, Canterbury is New Zealand's largest region.

The typical soil conditions in the area are quite variable but it is not uncommon to encounter glacial silts and gravel layers making manual drilling more tricky. The depth of the groundwater is typically 3 to 4 meters but higher levels of pollution caused by a huge expansion in dairy farming throughout the South Island which requires the intensive use of water, is putting

increased pressure on environmental monitoring by the authorities who have a statutory responsibility under the Resource Management Act and the Local Government Act to protect water quality and quantity.

Environment Canterbury is the regional council working with the people of the City to manage the region's air, water and land. They are committed to care for Canterbury's resources and achieve a sustainable environment while promoting the region's economic, social and cultural well-being. Working in partnership with communities they encourage the management of natural and physical resources by using innovative, cost-effective and technically excellent approaches to monitoring and research that ensures any decision making is based on high quality information and results.

In the past Bryan and his team: Shaun Thomsen, David Evans, Tim McDougall and Shaun Philip have used drilling contractors to install wells but, with a need to install shallow monitoring wells on a more regular basis, the team were looking for a more flexible solution.

The Lost Cone Drilling Set will do just that. It is a fast and efficient way to install a monitoring well and it

works particularly well in stony soils and gravels. A specially designed cone is mechanically hammered into the soil to produce a very straight bore hole. Using this equipment makes it easier to reach depths up to 10m because the cone is slightly wider in diameter than the casing so reduces friction during extraction. The environmentally sensitive cone, made from non-toxic iron, is left in the soil after drilling.

A further advantage is the compactness and portability of the kit in this large region, indeed I am surprised that there are not more of these smaller drilling kits about not just on the South Island but through the rest of New Zealand. They are ideal for drilling in less accessible areas.

Training was a pleasure with these guys. They are clearly well versed in plant machinery but very attentive and respectful of special instructions. The key with this kit as always is a patient and methodical approach. Keep the site clear and tidy at all times, know where your hands and feet are at all times. Let the kit drill down under its own weight.

In some conditions, as the casings are hammered down, they have a tendency to unwind slightly which reduces the hammering impact and can potentially damage threads. We overcame this hurdle by 'slow dancing' around the drill in a clockwise fashion to ensure a tight thread - but not too tight. On site the kit was slow to push through the compacted silt layers at 2 meters down but as conditions eased, moved more confidently and from 0 to 8m only takes us about 45 minutes. With a large team in the training session we take advantage of hands and use four people on the extraction equipment. The lesson being with more

bodies and extra kit in the immediate area it becomes even more important to work methodically.

When all the casing is extracted and a fresh 32mm piezometer left in its place (placed inside the casing before extraction) the only thing left to do is road test David's new Peristaltic Pump. Our Peristaltic Pump is the perfect complement to this type of monitoring well installation. It can lift water from up to 9m below ground level and requires only the tubing to be installed in the well. It also happens to be the easiest pump to use in conjunction with a flow cell and water quality meter like the YSI Pro Plus to test water quality across a range of parameters. Additionally, the team have also updated their sampling capabilities with a Stainless Steel Geosub impeller type pump for jobs which require sampling from greater depths (up to 45m head of water) or where a large volume is required.

Following our very productive training session I was delighted to host Bryan and his family back on my home turf of Wanaka. Bryan, on vacation in the area, dropped into our office to see behind the scenes our set-up and range of equipment available. Typically this was also during my holiday but, being at home with the kids, I was able to meet up with Bryan over a beer or two to discuss the coast to coast, north to south, island to island that defines New Zealand. For those of us lucky enough to live and work here there is an ocean of fascinating country and culture that's unparalleled and unspoiled. It is clear that Bryan and his team at ECAN are proud to be part of the industry that maintains and protects this amazing country. So are we!

