Fresh supply of water

A Massenza rig becomes part of the drilling solution for a 400m-deep water well in complex soil conditions in the town of Monterotondo Scalo in central Italy

Back in March this year, Larciano-headquartered water-well company Ragionieri Loriano di Ragionieri Alessandro was contracted to drill a well on a site in the town of Monterotondo Scalo in the metropolitan city of Rome to provide a source of water for the washing of freshly picked fruits and vegetables.

The site is in Media Valle del Tevere, which geologically and structurally corresponds to a great part of the Graben del Paglia-Tevere, a complex valley of tectonic origin, filled with powerful sequences, mainly terrigenous sediments deposited in the Pleiocene-Pleistocene era.

The basin fill consists of marine sediment, but also of transition and continental origins. The maximum thickness of the deposits, estimated on the basis of gravity and drilling data, ranges from a minimum of approximately 300m up to between 800m and 1,000m.

On this basis, the Ragionieri company had to find a drilling solution that would satisfy the client from an economic point of view and at the same time guarantee adequate production use; a flow rate of 8-10L/s was requested.

DRILLING SOLUTION

The contractor's proposal, which led to the company winning the bid, included using a reverse-circulation (RC) mud-drilling technique, where it is possible to install large-diameter, medium to deep wells, without encountering problems with the complex alluvial soils and rock while maintaining a high feed speed.

The mud-circulation system included pumping down the drilling fluid between the borehole and the rods. The drill cuttings produced by the tricone bit were then recirculated back up inside the rods to the head of the works and into a settling tank. The cuttings were then allowed to settle out of suspension and the fluid was reused.

The drilling was performed for about 200m with an initial diameter of 35 7/16in (900mm), and was continued for another 200m with a diameter of 19 11/16in (500mm). At the end of the operation, a tube of carbon steel with a diameter of 13 31/32in (355mm) was inserted into the formed hole.

The decision to drill a large-diameter hole and then to insert a tube, which was one third of the size, created an installation with the following requirements:

- fill the interspace between borehole and production

Above: a new source of water successfully drilled

Ragionieri's job site in Monterotondo Scalo, Rome

column, so as to keep the hole open and prevent any caving;
- reduce or eliminate the entry of sand into the well during the pumping phases;
- allow greater functionality of the filter;
- increase the permeability of the aquifer near the hole;
- bring down losses of hydraulic load; and
- establish a gradual transition speed between the aquifer formation and filters.

ITALIAN RIG

For the job Ragionieri used a Massenza MI25 drilling rig that had the combined size, performance and technical features required for the hydraulic pull-up and torque.

The MI25 has a box-type mast of 10.3m length and a capacity of 34,300daN powered by a 400kW engine; with a pull-up of 24,500daN and a rotary head with a maximum torque of 23,500Nm

and maximum speed of 120rpm, it can perform drilling up to 600m.

The Ragionieri MI25 is equipped with a duplex mud pump that can provide 2,200L/m at 110 bar.

The project produced approximately 120m³ of waste tailings, which were disposed of in an authorised landfill.

The well development was

carried out with an air-lift system, in order to improve the hydraulic characteristics of the well-aquifer system. This technique has ensured a final operating capacity equal to the 9L/s that had been specified by the client.

With the Massenza rig combined with the thorough preparatory geological studies undertaken in the planning, designing and execution phases, Ragionieri Loriano Di Ragionieri Alessandro was able to satisfy the customer's requirements in regards to both the yield and efficiency of the well and the execution time (about 2.5 months).

Far left: the MI25 rig performing with a reverse-circulation system

Near left: MI25, with 24,500daN, drilling a 400m water well