GPR for Watertable Investigations

Alpha Geoscience has been operating in the Ground Penetrating Radar (GPR) market for 10 years and during this time have collected a considerable amount of interesting GPR data.

This case study was undertaken on one of the sand islands off Brisbane to determine the position and depth of the watertable on the island.

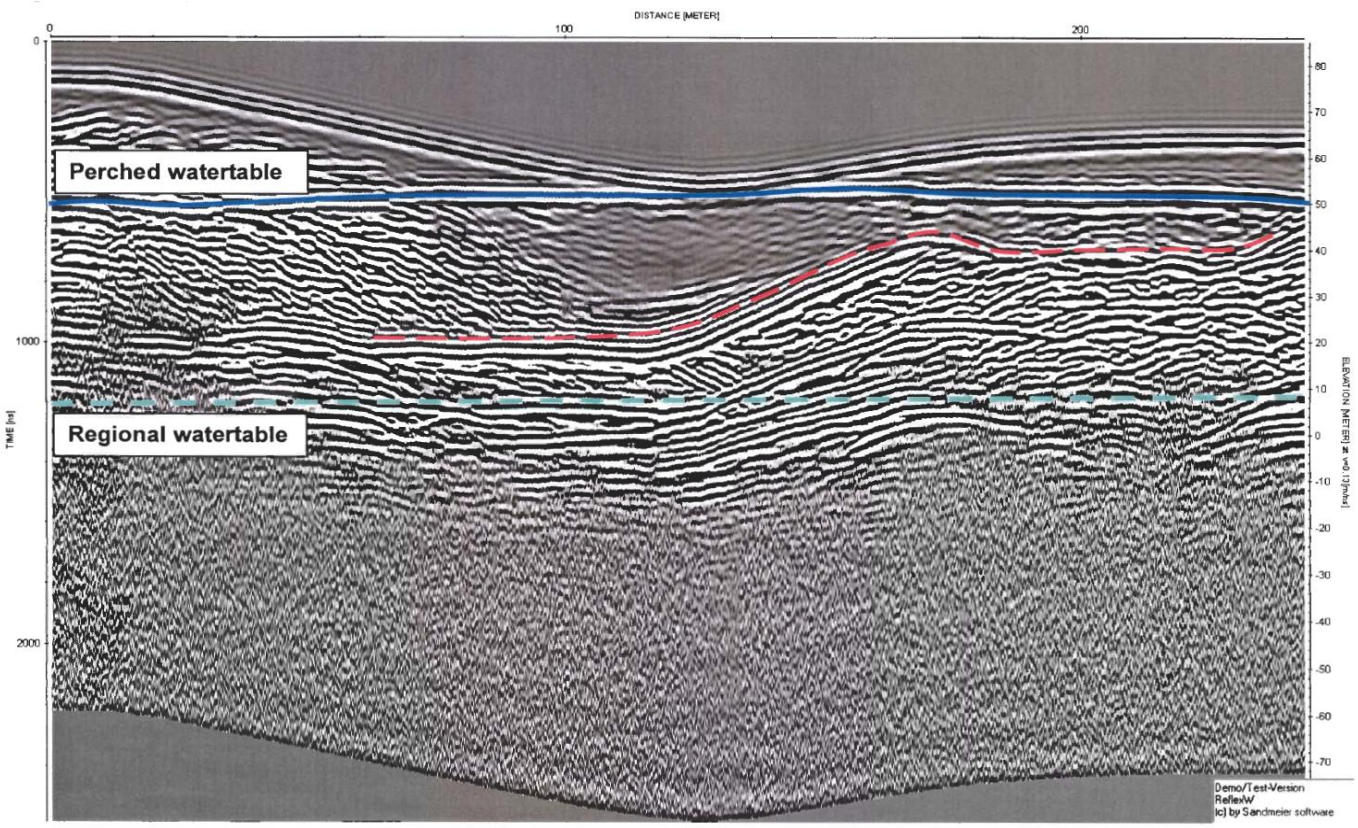
Equipment Used

This GPR data was collected with a Mala Geoscience (of Sweden) CUII Control Unit with the Rough Terrain Antenna (RTA) with a frequency of 25 MHz. The data was acquired on a Mala CX11 monitor for display and storage purposes. DGPS or 'cotton reel odometer' can be used with the system for positional control.

General Comments

This section has been terrain corrected so the first reflector is the ground surface, the layer that has been marked in blue, is the perched watertable and the aqua boundary is the deeper watertable, defined as the regional watertable.

The depth of investigation of the GPR is estimated to be 65-70 metres with the sand bedding being able to be viewed down to approximately that depth.



The layering marked in red shows a major unconformity in the dune sand deposits with differing sand layering above than below. There is clear evidence of cross-bedding in the section as well.

Another interesting feature in this section is the loss of signal in the near surface (to about 20 metres in depth, in the middle of the section. This appears to be due to a conductive layer in the lower elevation, which is most probably due to fine sediments being collected in this area.

Conclusion

In the past, it has been assumed that GPR would penetrate to approximately 30 metres in ideal conditions.

With the advent of the RTA Antenna the collection of low frequency GPR has been made considerably easier using the 'in-line' geometry of the unit. It should be noted that using the in-line geometry, the near surface reflectors will not be as clear and defined, however the deeper reflectors will be better defined. The inline geometry will also reduce the surface reflectors due to less energy from these items being transmitted to the receiver.

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