



CASE STUDY

PROJECT SUMMARY

Victoria Viaduct, a busy main road in the centre of Carlisle, was closed to vehicles and pedestrians after several tonnes of loose masonry were identified at a former hotel building. The building was deemed a significant hazard and remediation measures to secure the building structure were implemented immediately. As part of the remediation measures there was a requirement for heavy plant to be deployed. LandScope were commissioned to carry out a specialist ground survey to identify any potential weak spots within the ground due to the presence of tunnels, ducts, buried obstructions and utility infrastructure below the site. LandScope completed a full utility and GPR survey of the building perimeter and surrounding access routes to aid with the deployment plan for the heavy machinery.

RESOURCES



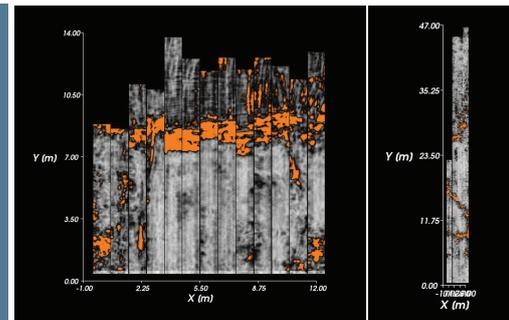
FIELD ACQUISITION

- IDS Stream C Array
- RD8000
- Trimble S6 Total Station
- Trimble RIO GNSS Receiver
- Manhole Inspection Kit
- Cobra and Sonde



OFFICE PROCESSING

- Trimble Business Centre
- AutoCAD
- GRED HD



Example GPR Time Slice Showing Interpreted Utility Services

PROJECT PHASES

- 1 **DESKTOP SURVEY**
Acquisition of stats and creation of desktop study to inform site work.
- 2 **SITE SURVEY**
Cover lifting, RD survey and IDS Stream C GPR collection.
- 3 **OFFICE PROCESSING**
UFR collation, positioning and processing of GPR data in GRED.

THE DETAIL

LandScope completed a PAS128 utility survey Type D (desktop utility records search) and Type B (Detection) to method M4P with the aim of achieving the highest possible PAS128 quality levels. Method M4P specifies the densest level of survey grid for a PAS128 survey.

LandScope began the survey works by visually inspecting all manhole chambers and tracing the utility infrastructure with Electromagnetic Location (EML) techniques for cables and a radio Sonde for drainage pipes.

Due to the requirement to locate all potential in-ground weak spots, LandScope deployed the IDS Stream C GPR array. The Stream C array is approximately 1m wide and contains 34 separate antennas. The antennas are arranged in two orientations (dual polarised) to allow for location of utilities in both directions whilst only needing to pass the system in one direction. This is ideal for linear roads and pavements and ensures rapid data collection. The dense antenna spacing of the array meant that GPR data was collected at an approximate 12.5cm line spacing for the entire surface area, allowing even small-scale defects to be detected. The GPR array was positioned using a total station to ensure that data was geo-referenced to the highest obtainable accuracies.

All data was taken back to LandScope's head office for advanced processing, filtering and interpretation. A combined 3D AutoCAD drawing was then produced showing the interpretation of all techniques to allow for a simplified combined subsurface model to be provided to the client for further analysis.

enquiries@land-scope.com

www.land-scope.com