



BeSafe



BeWell

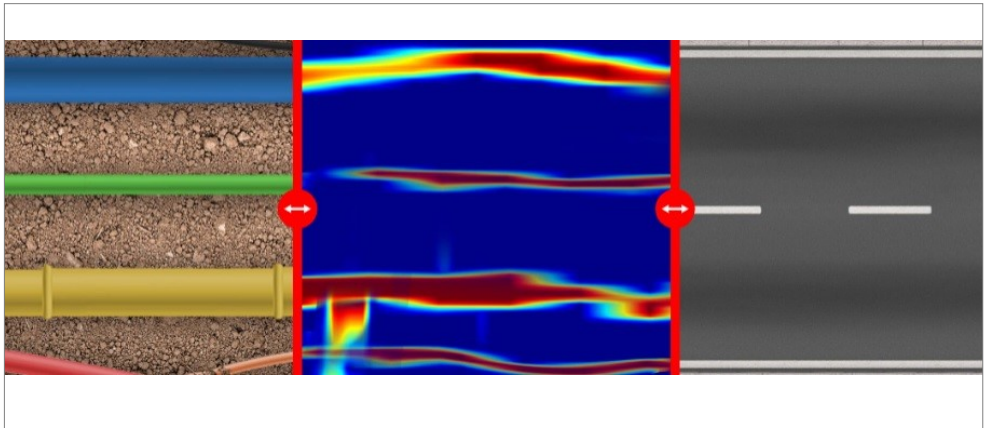


BeGreen

High quality utility
information eliminating
service strikes

Eliminating Harm Case Study

Leica DSX ground penetrating radar to assist with identifying underground utilities



Background

The M6 J21a-26 SMP involves the upgrade of a 10 mile stretch of motorway between Warrington and Wigan to all lane running. The Leica DSX GPR was utilised on the scheme to complement the cable avoidance tools already in use.

Challenges

A common challenge that is faced with improvement schemes is the identification and protection of underground utilities, of which there are often many due to the nature of these type of projects.

The use of CAT & Genny locators is well embedded in the industry however they do have their limitations. This can range from incorrectly interpreting signals to not identifying the utility at all, which is often the case when it comes to polyethylene pipes.

The impact and cost of striking services is significant, at its worst it can have catastrophic consequences and result in the loss of life. Uncharted services that are discovered that do not result in a strike can also halt the works to carry out investigations. Therefore the cost of understanding what is within the ground before you start work should not be underestimated.

The use of GPR should not be seen as a alternative product but rather be considered as another tool for the

toolbox. The more tools we have at our disposal, the greater the likelihood that all underground utilities are correctly identified.

Unlike conventional GPR systems the Leica DSX automates data analysis and creates a 3D utility map (as shown in the centre of the picture above). This allows the user to understand the data, confirming presence and depth of utilities without relying on the expertise of interpreting the signals. Thus enabling site personnel with basic training to identify utilities such as water pipes.



Limitations

GPR uses electromagnetic radiation and measures the reflective signals to interpret changes in ground conditions. The properties of the ground can significantly impact the penetration depth. We found the GPR worked well up to 3m depth.

It relies on the user pushing the tool along the ground which can be a problem on rough terrain.

Benefits

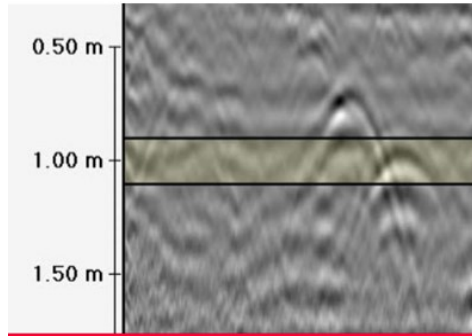
A scenario occurred on the M6 project whereby the project team were unable to confirm the presence of a known united utilities (UU) water main. This was raised to UU, however their non-emergency response time was greater than two weeks which had the potential to delay the earthworks programme.

Following the deployment of the GPR, the service was identified in a different location to that recorded on the stats drawings and with UU's permission, trial holes were carried out to verify its location and an accurate exclusion zone was established.

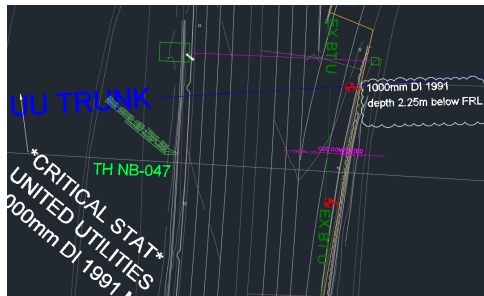
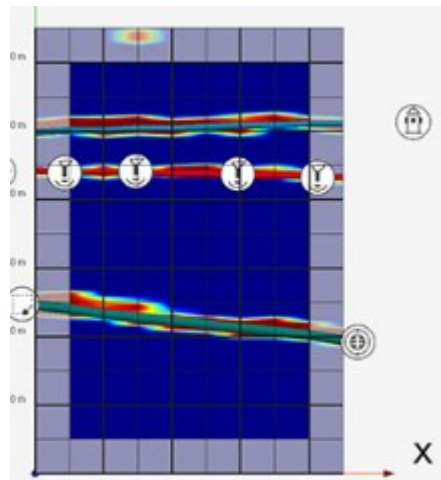
This method has been repeated for all other critical stats on the scheme and all data recorded by the GPR has been added the stats CAD file, including the approximate depth of the utilities. This has helped verify the information which is already known and lower the risk associated with working in proximity with known services in addition to the benefits of helping identify uncharted utilities.

The DSX GPR interprets the signal data received into a more user friendly representation of the assets in the ground.

This picture shows the raw data reviewed by the GPR.



This picture shows the output from the Leica DSX.



Above is the stats CAD file showing the UU asset this was enter from the GPR's GPS data.

Key Benefit 1

Supports the identification of underground utilities. Particularly non-metallic utilities.

Key Benefit 2

Can be used to support de-clashing the design with existing ground features.

Key Benefit 3

Easy to use alongside existing cable avoidance tools.

Results/ Next Steps

The scheme continues to use the Leica DSX GPR to fully survey areas on site prior to mobilisation to confirm the stats drawings and help identify any unknown services.

Cost

Leica DSX circa £21,000

Leica GS07 GNSS NetRover circa £17,000

Hire together £500 per week

Conclusion

The GPR is not a replacement to other location devices but can be used in conjunction with other tools. In a motorway environment it has limited uses due to the unevenness of the terrain in the verge and utilities over 3m deep.

However, in the urban environment locating assets beneath paths and roads, where cables are usually at a shallow depth the GPR will be a very good tool to use.

Information

<https://leica-geosystems.com/en-gb/products/detection-systems/utility-detection-solutions/leica-dsx-utility-detection-solution>



National Highways Project Manager, David Cook said:

"The use of Ground Penetrating Radar to compliment the use of radio detection for identification of buried services greatly reduces the risk of service strikes"