



SUBSURFACE UTILITY MAPPING

GPR grid surveying on a street in New York City

 **Sensors & Software**

GPR grid survey was conducted on a busy intersection in New York City. The survey successfully located and differentiated between a PVC natural gas main and an underlying cast iron water line.

GPR can be a powerful tool for mapping the location and depth of metallic, non-metallic, plastic, concrete and asbestos-concrete utilities. Mapping with GPR to systematically cover an area can quickly reveal the distribution and character of multiple buried utilities. GPR surveys on regular grids are now recommended in Subsurface Utility Engineering (SUE) projects. This case study illustrates the detection of a PVC natural gas main and an underlying cast iron water line.

Plastic and cast iron pipes are not readily located by traditional methods. This site in New York City was one where the location of plastic gas mains and cast iron water lines were in question. Construction design and planning called for completion of Level B SUE mapping of potential conflicts with existing utilities.

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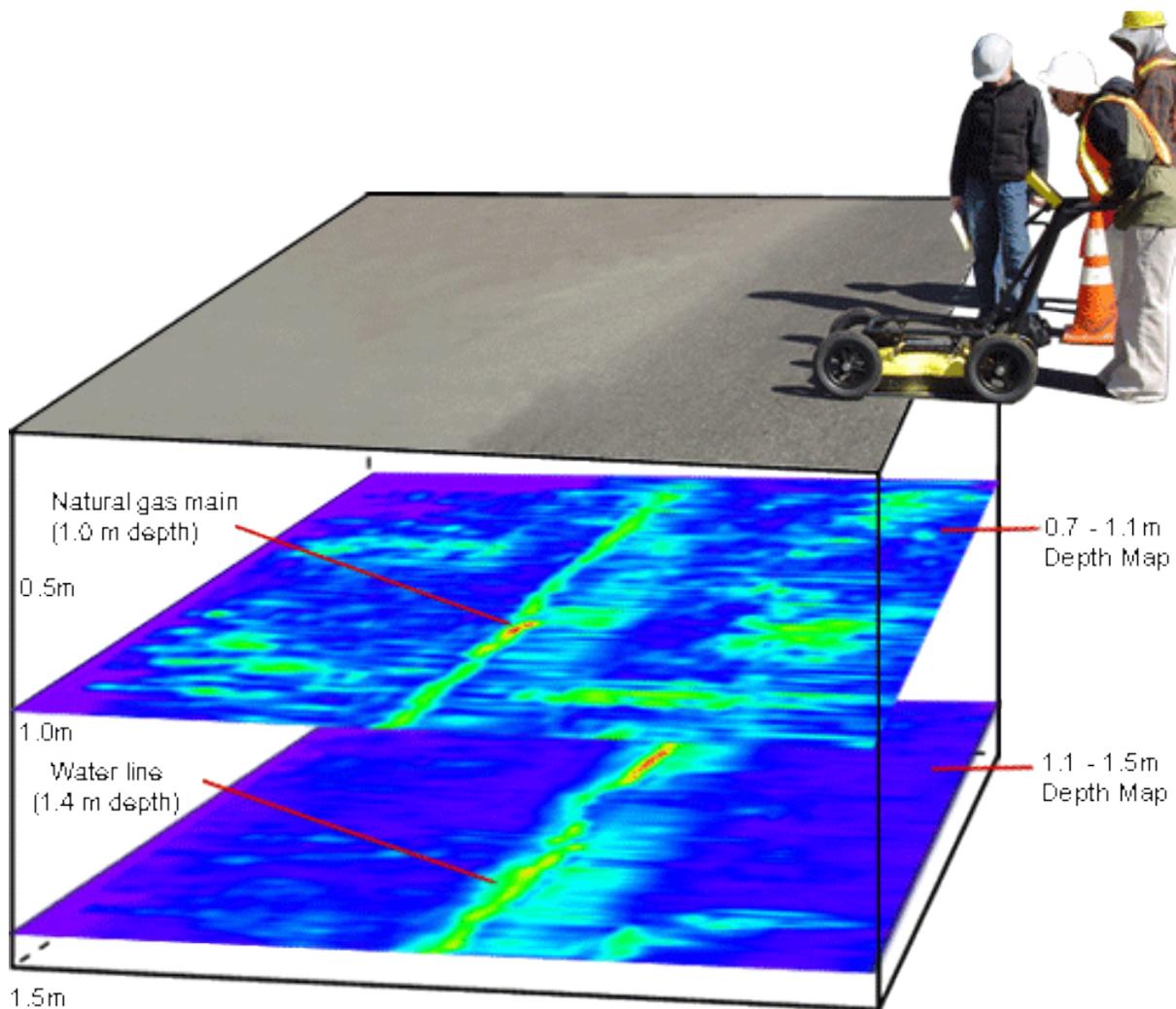
GPR was selected as the method of investigation since it could detect both metallic and non-metallic utilities. To make a complete study, the locating team used a grid survey approach to create a full subsurface view of the critical area.

A Noggin 250 MHz GPR in the SmartCart configuration was used. The 250 MHz system provided the optimal trade-off between depth of exploration and target resolution. The SmartCart provided quick and easy maneuvering of the GPR. (Alternatively an LMX200 GPR system could have been used to get the same result.)

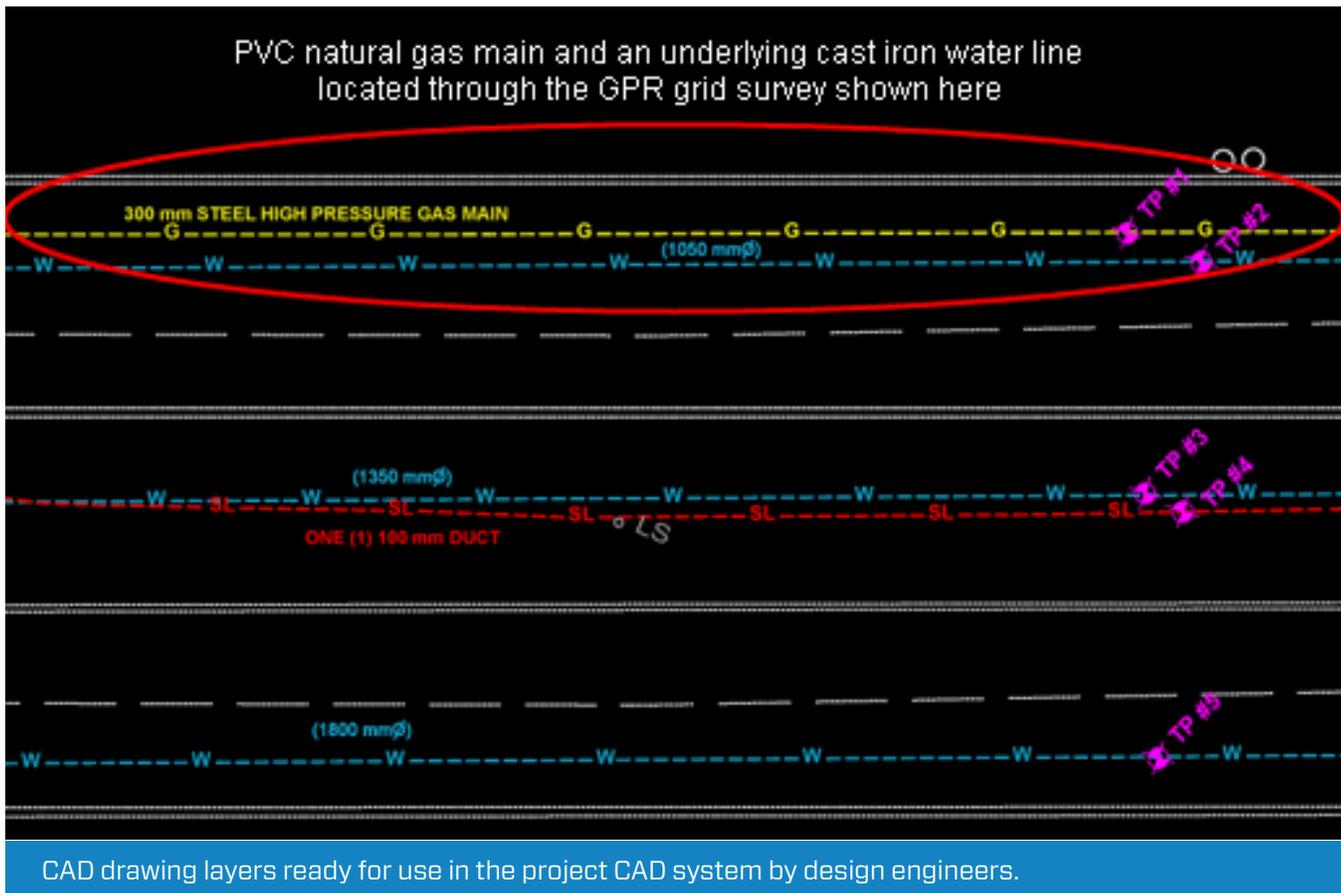
An 8 m by 23 m rectangular grid was established and GPR data were acquired on bi-directional lines to cover the area at 0.5m line spacing. All data were acquired in 45 minutes.

Depth slice maps were created on site and allowed in-field marking of both the gas and water line location for vacuum exposure if further Level A SUE evaluation was needed.

Using the EKKO_Project software, the GPR images were converted to CAD drawing layers ready for import into the project design CAD system.



Depth slice images showing the located utilities as well as indicated soil disturbances or composition variations. The strong linear features clearly indicate the buried pipe position and depth.



This example of using GPR to assist on a SUE requirement illustrates how many GPR users are deploying systems to address such problems around the world. Key results to note:

- GPR was a practical solution when no other method could locate these utilities.
- SmartCart Noggin configurations are optimized for rapid grid surveying
- The field crew were easily trained in the whole methodology in less than a day
- Creation of depth slices on-site made interpretation & marking quick and easy
- The whole project was completed by a 2 person crew in less than 0.5 day
- CAD layer drawings were created to add to the engineering design
- GPR image mapping results can also help locate take-offs, bell-joints and laterals

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