

A Ground Penetrating Radar (GPR) survey was conducted at Snowman House and Caterbridge on Abbey Road in London. The survey objective was to search for evidence of buried services and obstructions as part of a PAS M39 survey. The survey used a GSSI Dual Frequency Radar system in conjunction with 300MHz and 800MHz antennae giving a depth of penetration of approximately 1.5 metres.

Most ground conditions contain electrically contrasting layers, which produce reflection events on the GPR profiles. Features such as soil or fill boundaries provide the background signals around unusual features such as pipes. Processing and interpretation procedures are designed to separate the reflections into various target categories, and then map the different reflection types on to a plan diagram. This process involves the interpretation of each individual radar profile, followed by an areal interpretation of all the radar profiles. Features identified across several profiles are interpolated in areas where the data is well constrained. The survey results are presented as a plan interpretation in Drawing No. 1. The data interpretation identified five significant categories of radar targets which are described below:

i) **Probable pipe/service**
A radar profile orthogonal or at a high angle to a length of pipe or service typically produces a moderate amplitude, steeply curved or hyperbolic reflection response which should be discernible against background reflections. The service position is located at the apex of the hyperbola. At low angles of intersection between survey lines and pipe tracks, the resultant planar reflection response is more ambiguous and can be difficult to identify. Pipe tracks are identified by the recognition of alignments of similar reflections between adjacent parallel profiles. The plan interpretation displays the position of interpreted pipe tracks. The classification of a probable service is based on dual method detection by GPR and utility detection equipment.

ii) **Possible pipe/service**
This target category is broadly similar to the probable pipe/service category described above. The main difference is that the service has been detected only by GPR.

iii) **Anomalous layer**
Anomalous layers occur as well defined, moderate to high amplitude, planar, sometimes more irregular reflections, with weak evidence of edge scattering. Anomalous layers are distinct compositional layers within the subsurface which may correspond to constructed planar features such as foundations; or discrete layers within the ground.

iv) **Disturbed ground / possible obstruction**
Areas identified as disturbed ground generally appear as zones of moderate amplitude, irregular, reflections with broken layering. In some cases, there is evidence of a more chaotic internal structure, resulting from interaction between individual reflections. Disturbed ground can be associated with discrete changes in ground composition, backfilled excavations or partially demolished structures.

v) **Area of reinforcement**
Single rebars and other steelwork within concrete structures normally appear as high amplitude reflections on GPR records, caused by the strong electrical contrast between concrete and steel. A radar profile perpendicular or at a high angle to the length of a single rebar, produces a reflection with a characteristic hyperbolic geometry. Reinforcing mesh reflection responses are generally more complicated, due to interference from overlapping reflections between adjacent rebars.

UTILITY SERVICE IDENTIFICATION	
Utility Name	Symbol
Water	Blue line
Gas	Red line
Electricity	Yellow line
Telecommunications	Green line
Other	Black line
Unknown	Grey line

SYMBOLIC SERVICE IDENTIFICATION	
Service Name	Symbol
Water	Blue circle
Gas	Red circle
Electricity	Yellow circle
Telecommunications	Green circle
Other	Black circle
Unknown	Grey circle

GENERAL NOTES

Locations continue outside of the survey area. Any point marks outside of the area are for investigative purposes only and may not represent the full extent of the sub-surface utilities.

Only sub-surface utility information is provided. Above ground utility information may be shown where it directly impacts on the survey.

When logs indicate a utility exists but which cannot be positively confirmed with the technology, an assumed circle (ADC) is recorded. All assumed service locations (ADC) have been highlighted with a background yellow colour for visual enhancement.

Depth does not represent actual depth or service utility depth. Depth is an estimated value based on the depth of the reflection. Service depth is not recorded and such information is a utility survey service reference point. Service depth should be confirmed by independent means.

Vertical Reference Position - Vertical position (depth) is relative to the top of the utility profile and is measured in GPR units. The vertical position should not be used as an accuracy in ground level. The vertical position is measured from the top of the utility profile and is not a true vertical measurement. The vertical position is measured from the top of the utility profile and is not a true vertical measurement. The vertical position is measured from the top of the utility profile and is not a true vertical measurement.

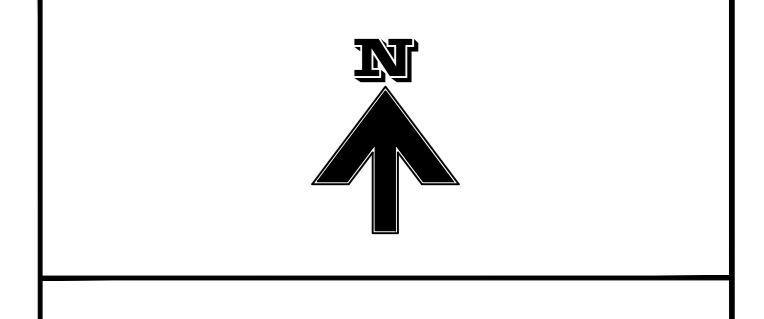
Accuracy - Background points are used to mark out the position of the utility. Before any work is undertaken, the location of the utility should be confirmed by independent means. The accuracy of the location of the utility is dependent on the quality of the data and the accuracy of the interpretation of the data. The accuracy of the location of the utility is dependent on the quality of the data and the accuracy of the interpretation of the data.

The results of this survey are provided as an indication of the subsurface. Utilities have been identified only as probable locations and the performance can be affected by ground level and the position of the utility. The location of the utility is dependent on the quality of the data and the accuracy of the interpretation of the data.

Some services may be located on the survey but have not been identified by observation and measurement from the surface and are not confirmed. Where precise service details will be critical to the proposed design, service and approval, the client should be advised that the location of the utility is dependent on the quality of the data and the accuracy of the interpretation of the data.

Interpretation of the information provided by a utility survey and statutory plans. Inaccurate work should be undertaken with extreme caution and in accordance with HSE Guidelines - HSG87 Avoiding Danger from Underground Services.

Information added from post processed GPR	
Probable pipe / service	(Blue line)
Possible pipe / service	(Red line)
Anomalous layer	(Orange shaded area)
Disturbed ground / possible obstruction	(Grey shaded area)
Area of reinforcement	(Black shaded area)



SHEET LAYOUT

Sheet 01

Rev	Notes	Drawn	Date
1	Additional Area Checked, Stats Corrected	LP	23/09

Notes: Grid Origin and Level Datum are referenced to clients drawing "WRS2002-METRA-EXT-X-DR-X-001" which has been inserted into this model for background reference.

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UTILITY SURVEY

Client: **WATES**

Project: **ABBAY AREA PHASE 2**

Date Completed: **AUGUST 2019** Post Code: **NW6 4DP**

Surveyed: **LPBK** Scale: **1:200@A0**

Drawn: **LP**

Checked: **ME**

Dwg No: **01** Job No: **C2019/223** Rev: **1**

Air Monitoring Installation sketch 02 - After possession of site.