

PAS128:2014

Utility Survey

Slindon Gateway, Walbetron, BN18 0SG

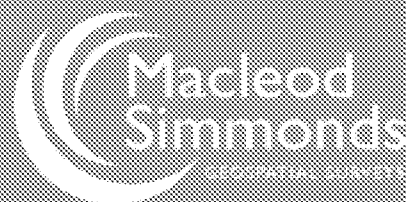
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REPORT

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1. Introduction

The data provided by this survey will be used to inform designs, prior to construction, to limit, if not completely negate unexpected, buried encounters, during the construction phase of the scheme. The approach taken in producing this survey has been specifically designed to maximise the quality of information presented, whilst minimising disruption to the local area during the data collection phase.

The survey is supplied as a reference for highway improvement design works and to aid in any excavations, helping to avoid utility strikes in accordance with HSG47. Although these results are designed to be used in conjunction with HSG47, the use of these survey results do not in any way negate the need to follow the guidance described within HSG47.

1.1. Survey Objectives

The key objectives of this survey are as follows:

1. To locate, position and map all detectable buried structures, utilities and features within the survey area.
2. To minimise any disruption to local pedestrian and vehicular traffic during the data acquisition phase.
3. To provide the client with pertinent details of the subsurface environment (where detectable) that could in any way affect the delivery of the scheme.
4. To deliver the results of this survey within the agreed timeframe and to fully meet the PAS128 specification agreed.
5. To deliver a 2D Model and Written Report

This report is to be read in conjunction with Macleod Simmonds PAS128:2014 M2p survey, drawing number 'MSLP211690_01 SLINDON GATEWAY PAS128.dwg'



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1.2. Survey Area

Below image displays the extent of the survey area. The highlighted section in blue is the area where the Electromagnetic Location (EML) and Ground Probing Radar (GPR) survey was conducted. A safety zone, which expanded the distance 1.2 metres from the edge of the carriageway was removed from the survey area for safety reasons.

Some areas which were densely vegetated were omitted from the survey.



Slindon Gateway Survey Area Extent

1.3. Control

All data is referenced to the survey grid derived from the client supplied topographical survey, drawing number '240021_EX_ExistingSurvey_Rev0.dwg'.

Control information has not been checked for accuracy other than checking positions of control points local to the survey instrument 'setups' required to facilitate this survey.

1.4. Deliverables

Below is a table of the deliverables from this project, displaying each deliverables reference/name, the type/content of the deliverable, and the date it will be issued.

	Reference/Name	Type/Content	Date Issued	Authorised
No.1	MSLP211690_01 SLINDON GATEWAY PAS128	2d digital CAD file	16/11/2021	CMH
No.2	MSLP211690_02 SLINDON GATEWAY PAS128 SURVEY REPORT	Digital PDF file	16/11/2021	CMH
No.3	MSLP211690_03 SLINDON GATEWAY STATS	Digital PDF file	16/11/2021	CMH



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2. Survey Methods

This section will describe the Electro Magnetic Location (EML) and the Ground Penetrating Radar survey methods which were utilised within this survey.

2.1. Electro Magnetic Location (EML) Survey Method

Electro Magnetic Location (EML) technology was employed to trace every service encountered within the site area. All utilities located in this manner were marked on the grounds surface using temporary site marking paint, prior to being geographically positioned by robotic total station.

All utility related inspection covers, with or where relevant immediately outside of the survey area were lifted, photographed, and investigated, where possible and safe to do so. Where empty ducts were found, a 6mm flexible tracing cable was inserted and subsequently traced above the ground via a direct connection method. The expected maximum depth of detection for the tracing cable is 6 meters (20ft). All chamber information was recorded from the surface without man-entry.

Next, direct connection was used to trace all encountered conductive services as well as from above ground apparatus such as lamp posts, stop valves and hydrants where possible.

Lastly, induction and passive modes were then employed to search the area for power carrying and conductive utilities, in addition to the direct connection methodology. It must be taken into consideration though, that utilities located 'passively' cannot be identified as singular or multiple utilities following the detected line, unless they exit the ground or enter an inspection chamber within the site extents.

However, the following must be taken into consideration with the EML Survey method.

Firstly, the EML method cannot be relied upon to define whether a detected utility is alive or dead.

Secondly, non-metallic utilities cannot be detected unless via an inserted conductive tracing cable or sonde (which requires access to the pipe/duct).

Additionally, well balanced or pot ended electrical cables are unlikely to be detected even if 'live'.

Also, deep drainage that cannot be traced due to physical or safety related access limitations. Is sound tested for connectivity between cover positions. This connectivity is shown on the CAD deliverable using a B4 quality code.

Depth indications can be inaccurate using this technique, EML & GPR depth indications are differentiated on the CAD deliverable. Also, EML can produce confusing results as signals can easily jump to adjacent utility lines, potentially resulting in mis-identified utility types.

Finally, any undetectable domestic connections will be shown on the CAD drawing with a B4 quality code.



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2.2. Ground Penetrating Radar (GPR) Survey Method

Conventional Post Processed GPR deployment:

An IDS DS2000 was used to collect an orthogonal grid of GPR measurements within the required areas. These measurements were recorded at 2m intervals. All data collected at the time of survey was recorded along with its coordinated positions and returned to the office for post survey analysis.

However, the following must be taken into consideration in regard to the GPR survey method.

Firstly, it is unlikely that GPR can detect services with a diameter which is less than 10% of its depth. Therefore, deep services, small diameter pipes and un-ducted cables may be difficult to detect using this approach. Also, closely spaced pipes/cables may not always be separately identified.

Secondly, depicted GPR routes may reflect the routes of multiple cables or pipes. It is not always possible to differentiate between buried construction features, utilities and other subsurface linear features, therefore it is possible that some features shown are not utility related.

Next, ground conditions such as, wet clay, reinforced concrete, foam concrete and material types which have a high conductivity level, can reduced detection capabilities. Additionally, the performance of the radar can also be reduced by signal scattering in heterogeneous conditions.

Furthermore, depths to cellars or extended chambers may relate to the actual void within the structure rather than the structure itself. Additional caution should be taken around detected objects of its nature, especially if potentially shallower depths will affect the intended works.

Finally, utility identification, where possible, is only indicative. Also, any information depicted as QL-B4 is assumed and may be inaccurate or incomplete.

3. Appraisal of EML Survey Results

The notes below are recorded on site at the time of survey and detail where utilities could not be detected but are believed to present within the site area. Where possible these routes have either been added from records information or their positions assumed from reinstatement scars or other surface features present. These items carry an undefined vertical/horizontal accuracy with an increased risk of uncertainty. It is strongly recommended that all records and assumed route information depicted on the supplied survey drawing be verified by other means, if their locations pose a potential risk to excavation or design integrity for this scheme.

3.1. Site Specific Survey Notes

Some areas could not be surveyed with EML or GPR, due to dense vegetation, see the following images below.



Dense Bush to the North of the Survey Site – Unable to EML and GPR



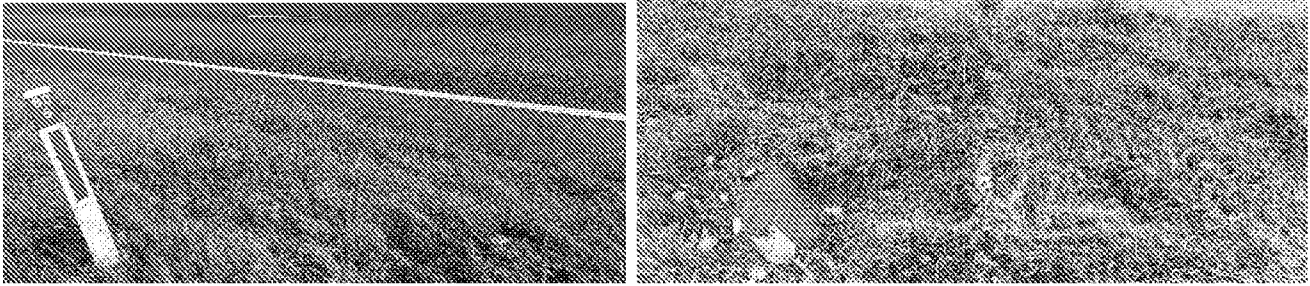
Dense Vegetation to the West of the Survey Site – Unable to GPR



A power radio search highlighted the presence of an unknown electrical signal which seemed to cross the survey area, from the safety zone boundary and into the large shrub area, heading towards the residential building.

There were two covers within the survey site which were unsafe to lift, due to them being within the 1.2 metre safety zones from the dual carriageway, see images below.

Covers Unsafe to Lift



Finally, to the north-western section of the survey area, there is a scar at the edge of the road. However, despite using passive search methods around this scar, no utilities were picked up within close proximity to it.

3.2. Electric

All the inspection covers which were safe to be lifted, where electric covers. There is a low voltage run which enters in the south of the site from the safety zone. This then crosses the road to the west of the site, where it then curves round with the kerb bend, and then exits the site boundary.

There was an LV box in the site area, which was fed from IC_KW2. LV cables came out from this box and fed three of the nearby street lighting. This was discovered by clipping onto the LV box and sending a signal through the cables. Also, cables from IC_KW cross the road, one at the entrance to the adjacent residential property, and the other cross Dukes Road in the middle. Both these LV feeds fed the street lighting in the north-western section of the survey area.

3.3. Water

There were no water valves, fire hydrants, stop clocks or domestic connections found within the site area. There are no water pipes shown on the water records for this area.

3.4. Gas

There were no gas valves, or any domestic connections found within the site area. There are no gas pipes shown on the gas records for this area.

3.5. B.T.

There were no BT inspection covers, nor domestic connections found within the site area. However, from the records, there is a BT run which enters into the residential property, which was GPR detected.

3.6. Communications

No communication inspection covers were lifted during the survey. Also, no domestic connections were found within the survey area.



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3.7. Drainage

No drainage (storm, foul, or combined) inspection covers were found within the site area. However, there was a rodding eye cover which was located at the northwest section of the survey area. However, this could not be traced, as it was heavily silted, see image below. There were no drainage pipes shown on the drainage records for this area.

Heavily Silted Rodding Eye in Northwest Section of Survey Site

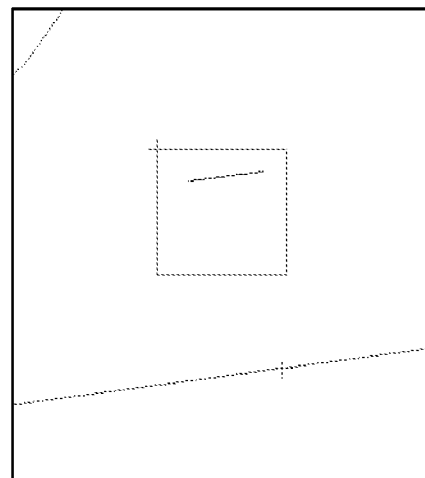
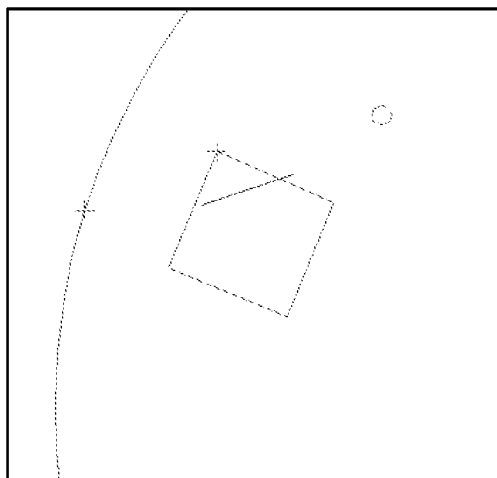


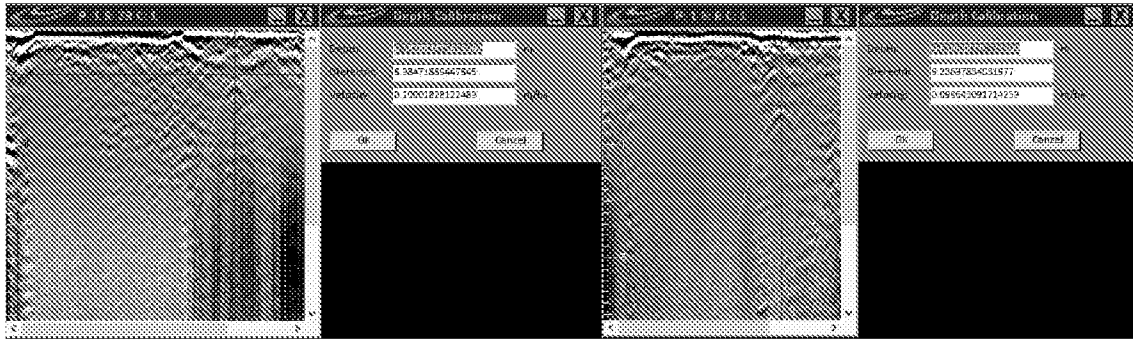
4. Appraisal of GPR Survey Results

4.1. Site Specific Survey Notes

At this site location the GPR signal penetrated to a minimum effective depth of 1.40m and a maximum effective depth of 1.68m.

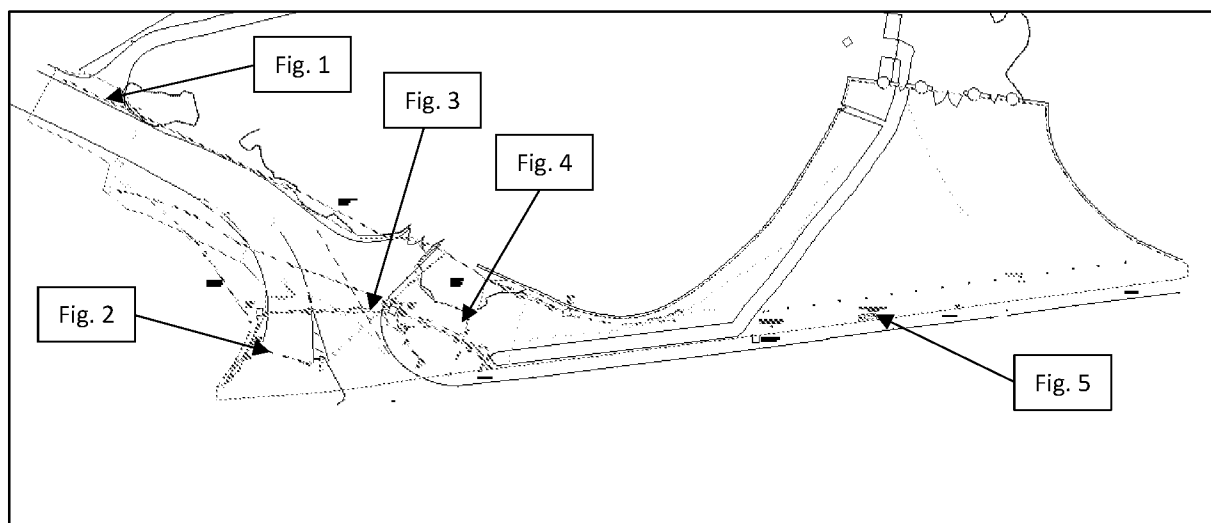
4.2. Calibration Data & Positional Checks





Where possible The GPR velocity has been calibrated where possible using the hyperbola fitting method. This has given consistent calibrations of approximately 0.10m/ns.

4.3. Interesting Results & Data Examples



- Figure 1 shows an LV detected in this location.
- Figure 2 shows a linear target detected by the GPR.
- Figure 3 shows 3 targets detected by the GPR on this scanline.
- Figure 4 shows a deep electric detected in this location.
- Figure 5 shows a structure detected at the Southern edge of the site.

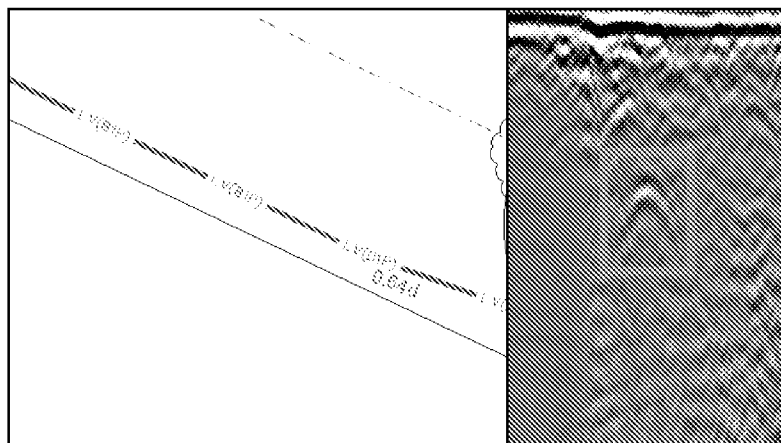


FIGURE 1 - LV

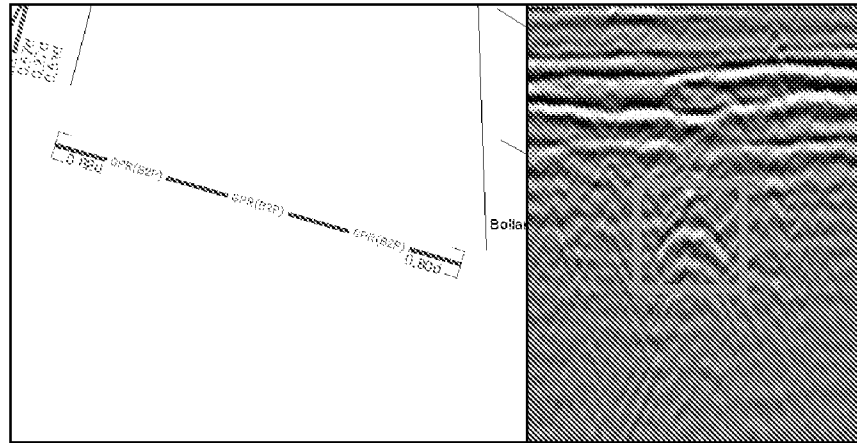


FIGURE 2 - GPR TARGET

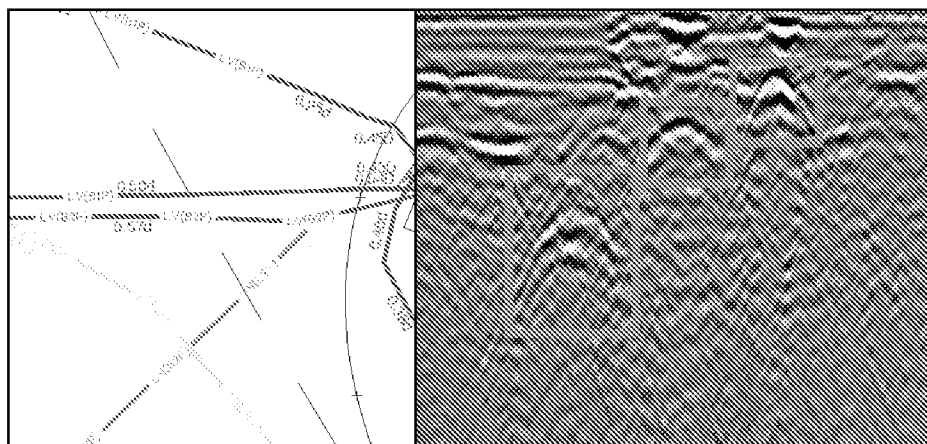


FIGURE 3 - 3 VISIBLE TARGETS

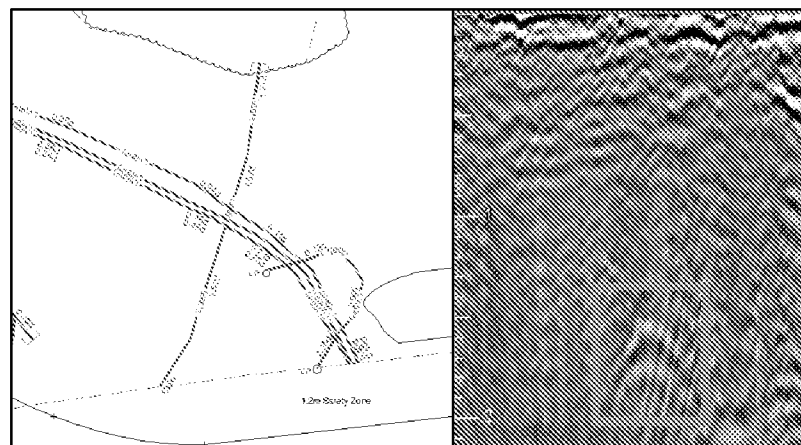


FIGURE 4 - DEEP ELECTRIC

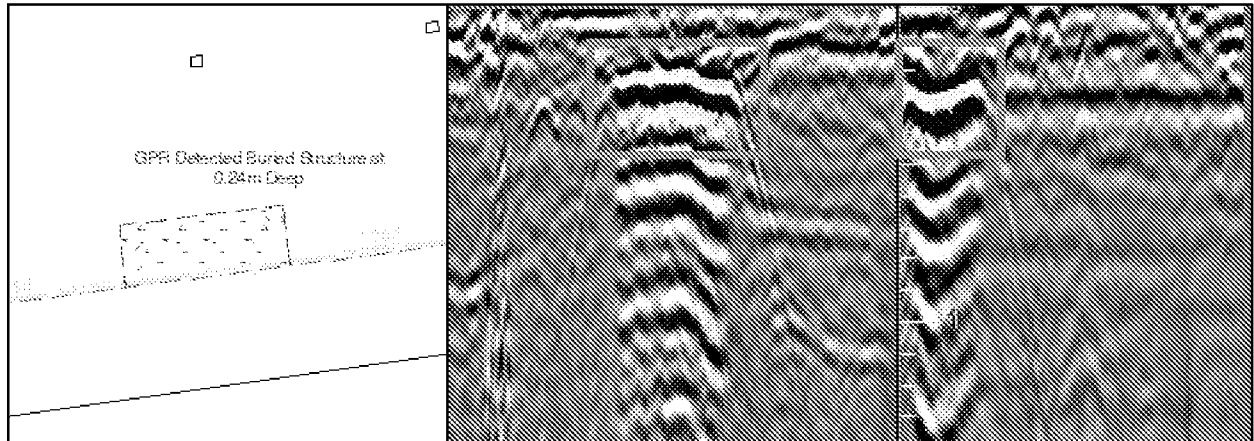
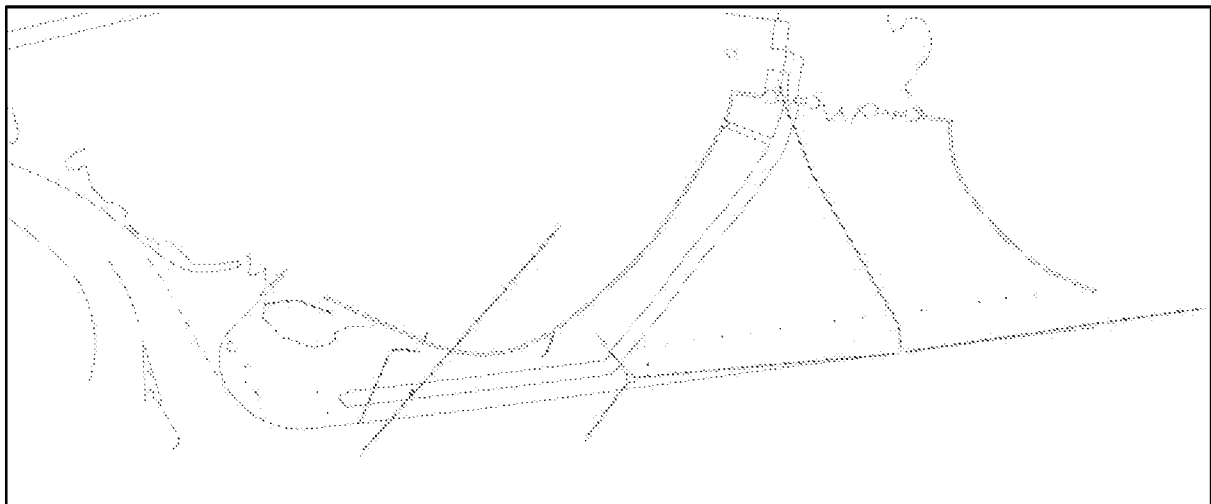


FIGURE 5 - STRUCTURE

5. Information Appended from Records

Information obtained on 4th November 2021

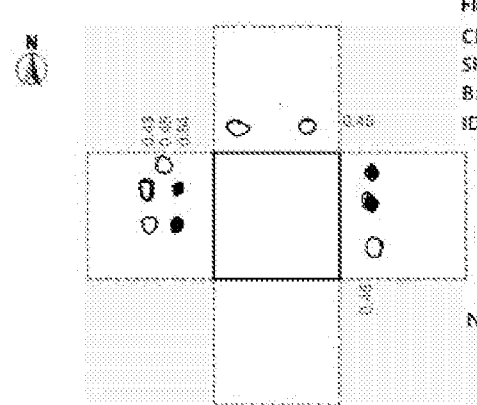
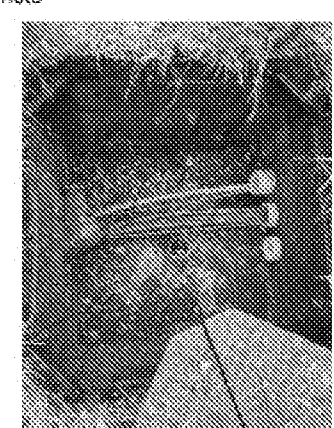
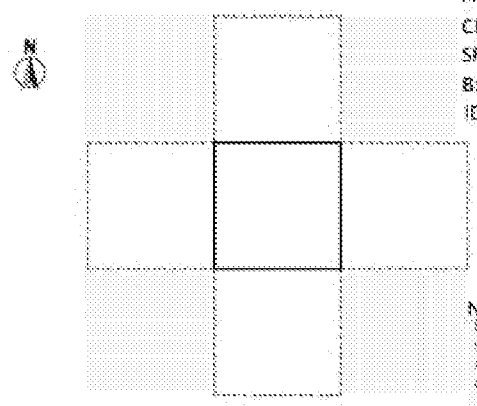
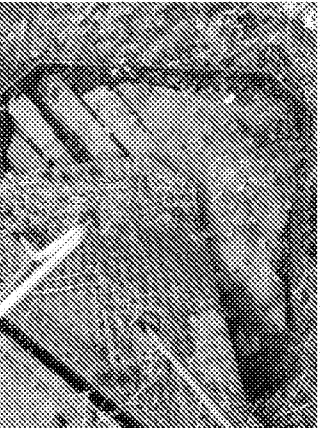
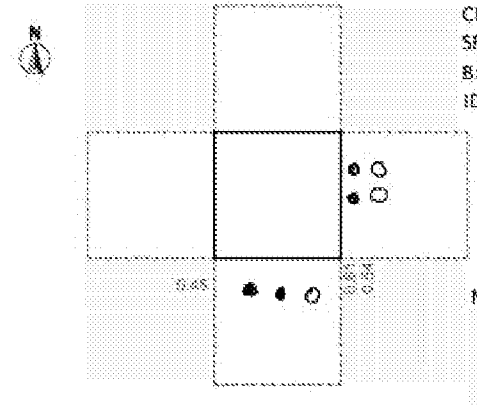


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6. Site sketches

Below are the site sketches for the three covers which were safe to lift.

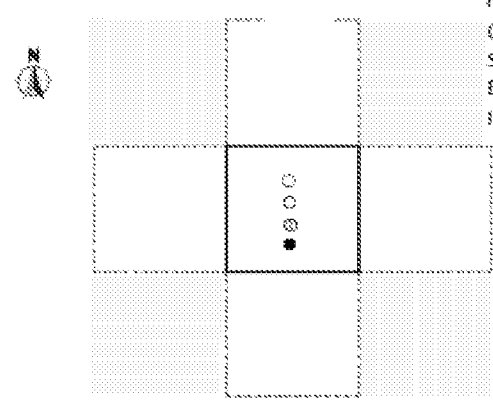
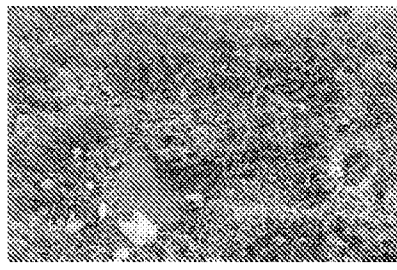
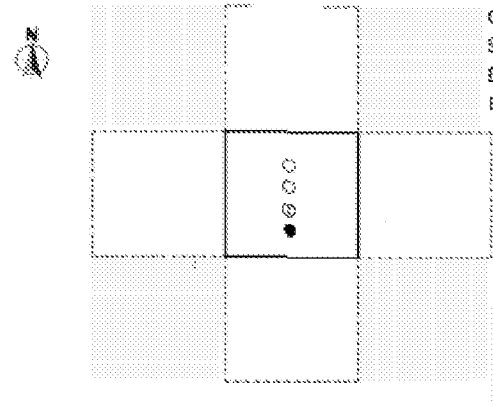
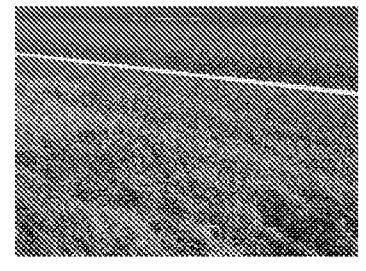
Site Sketches for Pits KW1 to KW3

Job Number: MSLP211960		Site Name: Slindon Gateway
Date: 23/10/21		Completed By: KW
Pit No: KW1 Service Type: Electric Silted: Flooded: CD: 0.73 SF: B: ID:  Notes:	Pit Photo 	
Pit No: KW2 Service Type: Electric Silted: ✓ Flooded: CD: SF: B: ID:  Notes: Heavily silted; unable to see any cables in chamber.	Pit Photo 	
Pit No: KW3 Service Type: Electric Silted: Flooded: CD: 0.72 SF: B: ID:  Notes:	Pit Photo 	

Site



Sketches for Site KW4 and KW5

Job Number: MSLP211980		Site Name: Slindon Gateway	
Date: 28/10/21		Completed By: KJV	
Pit No: KW4 Service Type: Electric ☒ Silted: Flooded: CD: SF: B: ID:  Notes:		Pit Photo 	
Pit No: KW5 Service Type: British Telecom ☒ Silted: Flooded: CD: SF: B: ID:  Notes:		Pit Photo 	

7. Conclusions & Recommendations

We recommend that all records and assumed route information depicted on the supplied survey drawing be verified by other means, to establish their actual location before any design or excavations are undertaken.

The results shown on the CAD model accompanying this written report accurately depict the features detected using Ground Probing Radar and Electro Magnetic Locator technology at this location.

If any of the information presented is of concern with regards to the successful delivery of your scheme, we recommend contacting one of our team members to discuss the issue in detail. It is often possible to extract further information from GPR data, using non-standard processing techniques, if a specific question is being asked.

8. Advisory Notes

1. Despite using the very latest technology combined with highly experienced and qualified personnel, it is still possible that 100% detection has not been achieved. This survey data should be used in accordance with the guidance given within HSG47 and in compliance with current, relevant, CDM regulations.
2. The survey drawings and report should be read in conjunction with PAS 128:2014 Specification for underground utility detection, verification and location. This document is available from the British Standards Institute.
3. Information depicted as QL-C or QL-D and QL-B4 is based on historic utility records or assumed routes which can be inaccurate and incomplete.
4. Depicted service routes may reflect the routes of multiple cables or pipes. It is not always possible to differentiate between buried construction features, utilities and other subsurface linear features; it is therefore possible that some features shown are not utility related.
5. Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR techniques, where encountered, routes will be described as assumed (B4) based on surface evidence (pipe risers, valves, etc).
6. Unloaded, perfectly balanced or pot ended electric cables may not be detectable using Electromagnetic Locators.
7. EML signal distortion may occur at survey works within close proximity of electric substations and overhead power lines. All reasonable efforts are made to verify our results using GPR when such situations are encountered.
8. All Pipe / duct sizes have been recorded from surface inspection (without man-entry) or taken from record information. Where pipe sizes cannot be verified appropriate notes are added to the survey drawing.
9. The correct identification of the utility types cannot be 100% guaranteed. Identification is based on covers encountered, record information, source or destination and nature of the detection.
10. Where possible, the ownership of Inspection covers has been derived from information on the covers or from cable tags. This does not necessarily mean that they use or are sole users of the apparatus.

All utilities detected by Macleod Simmonds should be considered live unless confirmed otherwise by client or service provider.