

# APPENDIX 1

Chart showing 'Levels of Survey'

Levels of Survey	Maximum survey transect spacing	Typical application	Limitations
<p><b>LEVEL 1</b></p> <p>Desk top survey involving a search of existing utility records. This can be consolidated onto one plan in CAD and overlain onto base mapping as an option. Can be used to target more detailed fieldwork</p>	N/A	<p>Low cost assessment of site to demonstrate extent of services. If carried out by the client then this should be made available to the survey contractor</p>	<p>Low level of accuracy – may totally omit some types of utilities and may be in schematic format. Old or redundant utilities are likely not to be shown. Utilities on private land such as schools &amp; hospitals also not usually shown</p>
<p><b>LEVEL 2</b></p> <p>A visual 'walk-over' survey carried out as a site visit. This would normally be in addition to a Level 1 survey and act as a reconnaissance on large projects to advise on the letting of the main utility survey. The site visit would be much enhanced if the results of the Level 1 survey were to hand for the walk over survey</p>	N/A	<p>Such a reconnaissance survey will advise the client on the most appropriate way to fulfil the survey objectives. It will allow the methodology of any further survey work to be carefully determined using the most appropriate techniques so making the follow up detailed survey cost effective and timely</p>	<p>This is an advisory survey only so no on site mark up or CAD plans would be produced. However, photographs are usually taken during the visit which should be submitted with the report</p>

Levels of Survey	Maximum survey transect spacing	Typical application	Limitations
<p><b>LEVEL 3</b></p> <p>Electro-magnetic location survey in passive and active mode with located services being marked onto ground surface. Includes cover lifting to allow line threading / sonding. Recorded manhole survey can be added as an option. Advisable to have Levels 1 &amp; 2 surveys carried out in addition</p>	<p>EML passive transects to be defined by the client but ideally 0.5m centres orthogonally or less in busy urban contexts, 1m centres orthogonally in suburban situations and 2m centres orthogonally in rural locations</p> <p>EML active tracing will be determined by the number of utilities within the area and the access available</p> <p>A corridor along the perimeter of large brownfield and rural sites may be surveyed using EML techniques to determine utility entry and exit points</p>	<p>A lower cost site assessment mainly useful for locating cables, ferrous pipes, ducts and gravity drainage. Useful for siting trial trenches or boreholes</p> <p>The surveying of the perimeters of large brownfield and rural sites will allow an assessment to be made of what utilities are entering the site</p>	<p>Will not detect inaccessible non-metallic mains and services. Unless specified, record plans of survey results may not be produced</p>
<p><b>LEVEL 4</b></p> <p>A Level 3 survey but with the addition of ground probing radar (GPR) in stake out mode to supplement EML results. Advisable to have Levels 1 &amp; 2 surveys carried out in addition</p>	<p>EML transects as Level 3 above</p> <p>GPR transects should be orthogonal at spacings of 0.5m in busy urban junctions and 1m on linear urban roads. In rural locations GPR should be deployed using 1m centres across and 1m along the highway. In open areas such as parks and playing fields orthogonal spacing can be increased to 5m</p> <p>The perimeters of large brownfield and rural sites may be surveyed using GPR with at least three parallel transects 0.5m apart to locate non-metallic utility entry and exit points</p>	<p>To be used as above but where non-ferrous pipes may be expected</p>	<p>Increased likelihood of detecting non-ferrous pipes and ducts. Unless specified record plans of survey results may not be produced</p>

Levels of Survey	Maximum survey transect spacing	Typical application	Limitations
<p><b>LEVEL 5</b></p> <p>A Level 3 survey but with recorded close centred GPR over an agreed % of the whole site complete with post data collection processing, analysis and interpretation. Line &amp; depth marked onto digital site plans in CAD</p>	<p>EML as Level 3 above</p> <p>GPR to be maximum 0.5m centres orthogonally in busy urban situations down to 2m centres orthogonally in rural highways. In open spaces such as parks and playing fields orthogonal spacing can be increased to 5m but client to determine % coverage with GPR and where it is to be located</p>	<p>Better understanding of complex areas as close centred GPR being deployed</p>	<p>Not all areas being covered by close centred GPR</p>
<p><b>LEVEL 6</b></p> <p>A Level 3 survey but with the addition of recorded GPR survey over 100% of the site with post data collection processing, analysis and interpretation. Line &amp; depth marked onto digital site plans in CAD. Intrusive trial holes to verify results can be added as an option</p>	<p>EML as Level 3 above</p> <p>GPR to be maximum 0.5m centres orthogonally in busy urban situations down to 2m centres orthogonally in rural highways. In open spaces such as parks and playing fields orthogonal spacing can be increased to 5m. All with 100% area coverage</p>	<p>The most comprehensive level of survey</p>	<p>Highest expectation of picking up all services and other underground obstructions. Intrusive investigation on selected targeted areas will verify results</p>

### Key

LEVEL 1 & LEVEL 2	Preliminary/ reconnaissance levels of survey
LEVEL 3 & LEVEL 4	Moderate cost surveys with limited detection and reporting capability
LEVEL 5 & LEVEL 6	The most comprehensive levels of survey and reporting