UK GEOSPATIAL SURVEYING

(Cadmap Limited www.cadmap.co.uk)

PAS 128:2022

UNDERGROUND UTILITY SURVEY METHODOLOGY & QUALITY LEVEL GUIDE

A simple visual guide to Survey Types, Quality Levels (QL) and Methodologies (M1–M4)

D	C	B	A
DESKTOP	RECONNAISSANCE	DETECTION	VERIFICATION

The key message: PAS 128 does not simply mean “GPR survey”. It provides a structured way to define what information was available, what was detected, how it was detected, how confidently it was located, and where physical verification is required.

Prepared as an easy-to-understand industry reference for developers, designers, engineers, contractors and survey professionals.

1. THE PAS 128 WORKFLOW

Think of PAS 128 as a journey from **information → site evidence → geophysical detection → physical verification**.

TYPE	WHAT IT MEANS IN PLAIN ENGLISH	OUTPUT / QUALITY
D	**Desktop Utility Records Search** Existing utility/asset records are gathered and reviewed. This is information from records — not proof of what is physically underground.	**QL-D** Location is not independently verified in the ground.
C	**Site Reconnaissance** Records are compared with visible evidence such as chambers, covers, street furniture, topographic features or reinstatement scars.	**QL-C** Useful evidence, but not a geophysical detection of the buried utility.
B	**Detection Survey** Geophysical techniques are used to detect and locate utilities. PAS 128 requires a combination of GPR and EML for Type B detection.	**QL-B4 → QL-B1** Confidence and positional accuracy increase depending on what was detected and the supporting evidence.
A	**Verification Survey** The utility is physically exposed/inspected and its position is measured. This can confirm critical design or clash points.	**QL-A** Highest PAS 128 quality level; typically ±50 mm horizontal and vertical location accuracy.

Remember

Survey Type ≠ Quality Level ≠ Methodology.
D/C/B/A describe the type of survey. QL-D/QL-C/QL-B4…B1/QL-A describe the resulting quality of utility information. M1–M4 describe the effort/search methodology used for Type B detection.

2. QUALITY LEVELS — THE SIMPLE VERSION

Each utility segment should be assigned the appropriate quality level based on how it was established and the confidence/accuracy achieved.

QUALITY	PLAIN-ENGLISH MEANING	LOCATION ACCURACY / CONFIDENCE
QL-D	Records only	Undefined — record information only.
QL-C	Supported by site reconnaissance	Undefined — position supported by visible/site evidence, not geophysical detection.
QL-B4	Suspected / assumed route, not detected	Undefined. Detection was attempted but the utility was not detected; it may remain an assumed route.
QL-B3	Detected horizontally, but no reliable depth	Horizontal position: ±500 mm. No reliable depth measurement.
QL-B2	Detected horizontally and vertically with reasonable confidence	Horizontal: ±250 mm. Vertical: ±40% of detected depth.
QL-B1	Higher-confidence 3D detection	Horizontal: ±150 mm. Vertical: ±15% of detected depth.
QL-A	Physically verified utility	Horizontal: ±50 mm. Vertical: ±50 mm, where exposed/inspected and measured.

Important: these are simplified client-facing descriptions. PAS 128 contains detailed conditions, notes and requirements affecting how quality levels are determined and reported.

What does the “P” mean?

B1P, B2P and B3P indicate that post-processing has been applied to the Type B detection data. Post-processing can support more detailed analysis and interpretation of collected GPR data. QL-B4 does not receive a P suffix.

3. M1–M4 — HOW MUCH SEARCH EFFORT?

The M-code is about the **search methodology and coverage effort**. It is not a substitute for the QL achieved.

METHOD	TYPICAL SEARCH RESOLUTION	PLAIN-ENGLISH USE
M1	EML transects generally ≤10 m; when following a trace ≤5 m. GPR generally ≤5 m grid/appropriate array approach.	Lower-density / undeveloped areas. Lower search effort than M2–M4.
M2	EML generally ≤5 m; when following a trace ≤2 m. GPR generally ≤2 m grid/appropriate array approach.	Suburban or moderately serviced areas.
M3	EML generally ≤2 m; when following a trace ≤1 m. GPR generally ≤1 m grid/appropriate array approach.	Busy urban areas or higher-risk clearance applications.
M4	EML generally ≤2 m; when following a trace ≤0.5 m. GPR generally ≤0.5 m orthogonal / suitable multichannel full-coverage approach.	Highly congested areas where greater search effort is justified.

A useful way to remember it

M1 → M4 = increasing search effort / tighter coverage.
B4 → B1 = increasing confidence/quality of detected utility information.
A = physical verification.

Post-processing

The “P” suffix denotes post-processing for applicable Type B methodologies. PAS 128 also provides guidance on when post-processing should be used; higher-effort surveys may warrant more detailed processing and interpretation.

Method selection should reflect utility density, project risk, intended use of the data and the client’s required confidence — not simply the cheapest or highest code.

4. WHAT SHOULD A CLIENT ASK FOR?

Instead of simply asking for “a PAS 128 survey”, define the information you actually need.

PROJECT QUESTION	WHAT TO SPECIFY / DISCUSS
What stage is the project at?	Planning, feasibility, detailed design, construction, excavation/permit-to-break-ground or asset management?
How congested is the site?	Consider whether M1, M2, M3 or M4 search effort is appropriate for the expected utility density and risk.
What confidence is required?	Specify the required QL outcome where appropriate: B1/B2/B3/B4, with QL-A verification at critical locations where needed.
Are records available?	Provide available utility records and other relevant information. Type D is the foundation for Type B planning.
Are there critical clashes?	Identify piling, foundations, crossings, tie-ins, deep excavation, drilling or other areas where physical verification may be required.
What deliverables are required?	Agree CAD/GIS/PDF formats, survey control, utility attributes, depths, annotations, quality levels, metadata and limitations.

A simple specification example

“Undertake a PAS 128:2022 Type B utility detection survey using an agreed M-code appropriate to site conditions, with the required QL levels identified for the project. Identify locations requiring Type A verification and report all limitations, assumptions and quality levels on the deliverables.”

This wording is deliberately generic. The final scope should be agreed with the competent survey practitioner and tailored to the project.

5. PAS 128 CHEAT SHEET

If you only remember one page, remember this:

D	C	B	A
RECORDS	RECONNAISSANCE	DETECTION	VERIFICATION
QL-D	QL-C	QL-B4 → B1	QL-A

TERM	REMEMBER IT AS…
QL-D	Records
QL-C	Records + visible/site evidence
QL-B4	Expected but not detected / assumed route
QL-B3	Detected horizontally; no reliable depth
QL-B2	Detected horizontally + vertically, ±250 mm / ±40% depth
QL-B1	Higher-confidence 3D detection, ±150 mm / ±15% depth
QL-A	Physically verified, ±50 mm horizontal/vertical
M1–M4	Search effort / coverage methodology — increasing from M1 to M4
P	Post-processing applied to applicable Type B survey methodology

Source note

Based on PAS 128:2022 and the TSA Client Guide to BS EN PAS 128:2022, Issue 3 (May 2025). This document is an explanatory aid and is not a replacement for the PAS 128 specification. PAS 128:2022 is the current BSI edition; PAS 128:2014 was superseded in April 2022.

UK GEOSPATIAL SURVEYING • GEOSPATIAL • UTILITY MAPPING • GPR • LAND SURVEYING

Document created by Mr Michael Brett @ Cadmap Ltd - www.cadmap.co.uk 2026