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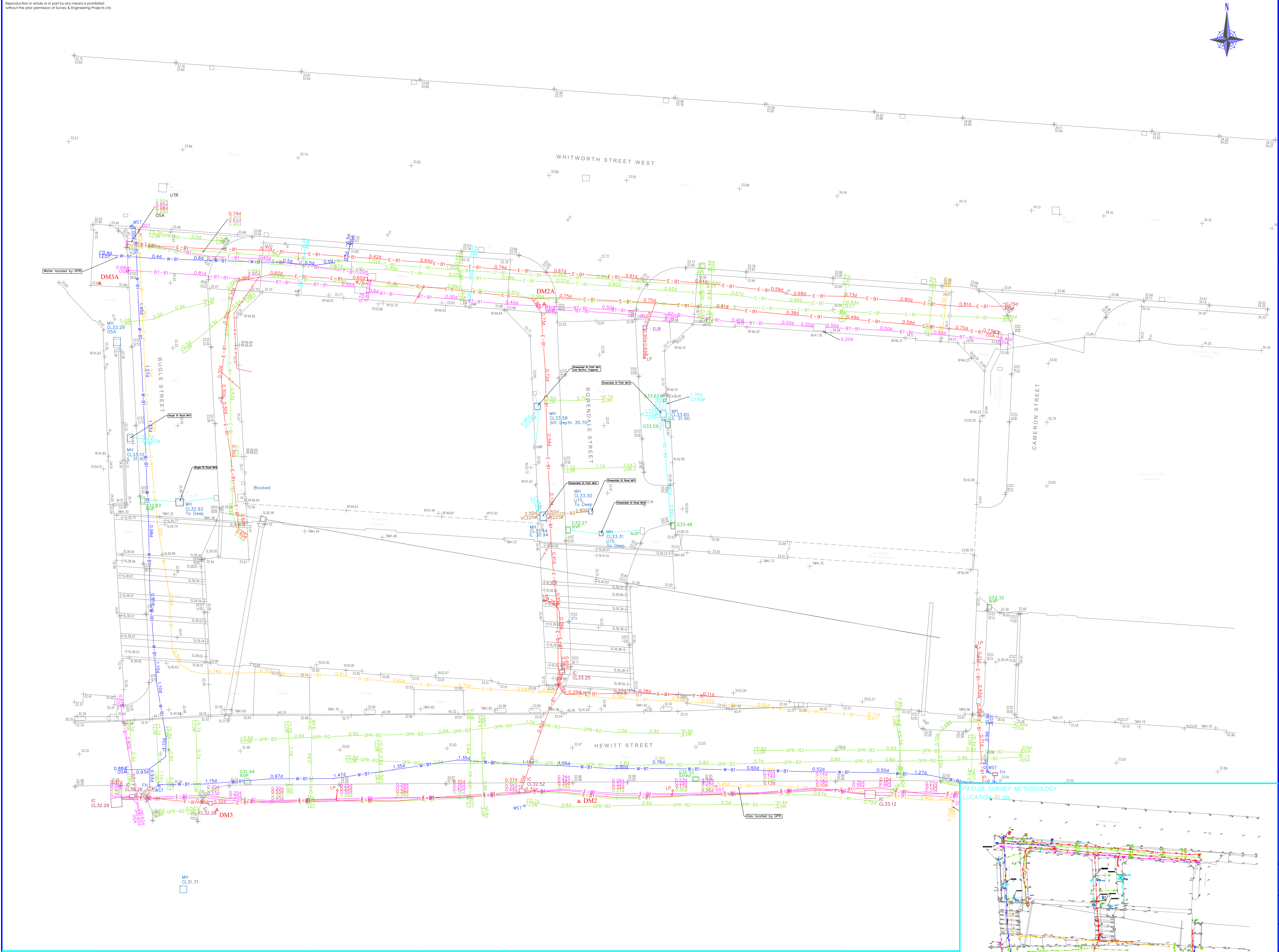

PAS128 SURVEY METHODOLOGY
LOCATION PLAN

Grid: OS National Grid
Using the OS GPS Network and applying OSTN15 Transformation and then removing the scale factor for true distances with a one–step transformation centred on **[coordinate]**

Datum: OS Level datum
Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections

NOTES

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The data presented in this drawing have been collected using a combination of the following: consultation of utility asset information, visual survey & inspection of manholes and inspection chambers; electromagnetic location techniques; ground penetrating radar, and, where applicable, trial hole excavations. These techniques have been deployed in accordance with the BSI PAS128 Specification for Underground Utility Detection, Verification and Location using the search methodologies indicated below and described in the accompanying report. This drawing should be used in conjunction with the accompanying report which details the limitations of these techniques and any hindering factors encountered during this survey.

Unless otherwise stated, all utilities shown on this plan have been surveyed using approved detectors and the connections between inspection chambers, if unable to be detected, are generally assumed to be direct unless there are indications to the contrary. The detection confidence for each utility segment is depicted in line with the PAS128 scheme outlined below. Information depicted as QL–C or QL–D cannot be guaranteed as it is based on historic utility records which can be inaccurate and incomplete.

The utility routes depicted 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, and due to the limitations of electromagnetic techniques all utility identifications should be treated with caution and verified prior to use during design/building works.

If the location or depth of utilities and features is of particular importance to a project then it is recommended that discussions are held with GEO (UK) LTD regarding any possible limitations or anomalies.

Please note that not all buried pipes, cables and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve a 100% detection rate. Where an area of utilities is likely to affect client project requirements, it is strongly recommended that a PAS128 Quality Level A verification survey is carried out

No utility mapping survey can be considered a 100% accurate depiction of the sub–surface environment, and the use of these drawings does not remove the requirement for the use of safe digging techniques at all times, in line with the requirements of HSG47 and current CDM regulations.

Station Listing

SUB-SURFACE KEY

COMBINED HEATING AND POWER	—CHP-B1—CHP-B1—CHP-B1—	
DISTRICT HEATING	—DH-B1—DH-B1—DH-B1—	
DRAINAGE COMBINED *	—CD-B1—CD-B1—CD-B1—	—>CD-B1—>CD-B1—
DRAINAGE FOUL*	—FD-B1—FD-B1—FD-B1—	—>FD-B1—>FD-B1—
DRAINAGE SURFACE*	—SD-B1—SD-B1—SD-B1—	—>SD-B1—>SD-B1—
DRAINAGE UNIDENTIFIED*	—UD-B1—UD-B1—UD-B1—	—>UD-B1—>UD-B1—

[* FLOW DIRECTION DENOTED BY ARROW (>) or (<) IF KNOWN]

ELECTRIC	—E-B1—E-B1—E-B1—
ELECTRIC LV	—LV-B1—LV-B1—LV-B1—
ELECTRIC HV	—HV-B1—HV-B1—HV-B1—
ELECTRIC STREET LIGHTING	—SL-B1—SL-B1—SL-B1—
GAS	—G-B1—G-B1—G-B1—
OIL/FUEL PIPELINE	—O-B1—O-B1—O-B1—
STREET FURNITURE CABLES	—SF-B1—SF-B1—SF-B1—
TELECOMS	—T-B1—T-B1—T-B1—
TELECOMS - FIBRE OPTIC	—FO-B1—FO-B1—FO-B1—
TELECOMS - BT	—BT-B1—BT-B1—BT-B1—
TELECOMS - VIRGIN MEDIA	—VM-B1—VM-B1—VM-B1—
TRAFFIC CONTROL	—TC-B1—TC-B1—TC-B1—
WATER	—W-B1—W-B1—W-B1—
UNIDENTIFIED UTILITY	—U-B1—U-B1—U-B1—
UNIDENTIFIED CABLES	—C-B1—C-B1—C-B1—
UNIDENTIFIED EMPTY DUCT	—X-B1—X-B1—X-B1—
GPR LINEAR FEATURE	—GPR-B2—GPR-B2—GPR-B2—

WITH EXAMPLE CONFIDENCE LEVELS

GPR AREA ANOMALY	▨
GPR AREA ANOMALY - REBAR	▦
CHAMBER EXTENTS	▨
MEASURED DEPTH BGL TO PIPE/CABLE/DUCT	0.65d
INVERT LEVEL OF PIPE/DUCT/CABLE (TO OS DATUM)	IL 12.34
SOFFIT LEVEL OF PIPE/DUCT/CABLE (TO OS DATUM)	SL 45.67
COVER LEVEL OF INSPECTION CHAMBER (TO OS DATUM)	CL 78.90
DIAMETER OF PIPE/DUCT IN MILLIMETERS	150Ø

[BGL - BELOW GROUND LEVEL]

AREA UNABLE TO BE SURVEYED DUE TO SURFACE OBSTRUCTIONS, VEGETATION OR LACK OF ACCESS	▨
TRENCH SCAR / SURFACE SCAR	▨
EXTENT OF SURVEY - BOUNDARY	⬠

UTILITY CONFIDENCE LEVELS (Listed from High to Low)

(A)	HORIZONTAL AND VERTICAL POSITION VERIFIED VISUALLY (Accuracy: Horizontal (±25mm) Vertical(±50mm)
(B1P)	HORIZONTAL AND VERTICAL POSITION DETECTED BY MULTIPLE METHODS WITH POST PROCESSING OF GPR DATA (Estimated Accuracy: ±150mm OR ±15% of detected depth)
(B1)	HORIZONTAL AND VERTICAL POSITION DETECTED BY MULTIPLE METHODS (Estimated Accuracy: ±150mm OR ±15% of detected depth)
(B2P)	HORIZONTAL AND VERTICAL POSITION DETECTED VIA POST-PROCESSED GPR (Estimated Accuracy: ±250mm OR ±40% of detected depth)
(B2)	HORIZONTAL AND VERTICAL POSITION DETECTED BY A SINGLE METHOD (Estimated Accuracy: ±250mm OR ±40% of detected depth)
(B3P)	HORIZONTAL POSITION DETECTED VIA POST-PROCESSED GPR (Estimated Accuracy: ±500mm in the Horizontal - Depth is undefined)
(B3)	HORIZONTAL POSITION DETECTED BY A SINGLE METHOD (Estimated Accuracy: ±500mm in the Horizontal - Depth is undefined)
(C)	ROUTE TRANSCRIBED FROM UTILITY ASSET PLANS AND CORRELATED TO VISUAL INDICATORS AND SURFACE FEATURES (Accuracy Undefined)
(D)	ROUTE TRANSCRIBED FROM UTILITY ASSET PLANS (Accuracy Undefined)

Rev	Date	Description	Check
-	--/--/----		--

Geographical Engineering Operations

Client
AKT_II
NEO_9_CHARLOTTE_STREET
MANCHESTER_M1_4ET

Site
CAMERON_STREET
FIRST_STREET
CITY_CENTRE_MANCHESTER
M1_5WY

Title
UTILITY_PAS128_SURVEY

Survey by	DH	Drawn by	JAS
Check by	GEO_UK_LTD	Date	JULY_24
Scale [A0 Sheet] 1:100	DWG Reference/number* G24303		Status FINAL
Project/Job No	G24303		Revision REV_ID

ABBREVIATIONS

AV	AIR VALVE	ELB	ELECTRIC BOX	IL	INVERT LEVEL	SOF	SOFFIT LEVEL	EOT	END OF TRACE
BT	BT INSPECTION COVER	ER	EARTH ROD	KO	KERB OUTLET	SV	STOP VALVE	OSA	OUT OF SURVEY AREA
CB	CONTROL BOX	EP	ELECTRICITY POLE	LP	LAMP POST	TCB	TELEPHONE CALL BOX	UTL	UNABLE TO LIFT
CCTV	CCTV CAMERA POST	FFL	FINISHED FLOOR LEVEL	MH	MANHOLE	TL	TRAFFIC LIGHT	UTS	UNABLE TO SONDE
COM	COMMUNICATIONS COVER	FH	FIRE HYDRANT	MKR	MARKER	TLB	TRAFFIC LIGHT BOX	UTT	UNABLE TO TRACE
CTV	CABLE TV COVER	G	GULLY	OP	OUTFALL PIPE	TP	TELEGRAPH POLE	UTR	UNABLE TO RAISE
DC	DRAINAGE CHANNEL	GLT	GROUND LIGHT	PN	PYLON	WM	WATER METER	BLK	BLOCKED
DP	DOWN PIPE	GST	GAS TAP	PP	PETROL PUMP	WO	WATER OUTLET	NFH	NO FURTHER GPR CONTACTS
DR	DRAIN	GSV	GAS VALVE	RE	RODDING EYE	WST	WATER STOP TAP	BD	BACKDROP PIPE
EIC	ELEC INSPECTION COVER	IC	INSPECTION COVER	RWP	RAINWATER PIPE	WSV	WATER STOP VALVE	NVP	NO VISIBLE PIPE
								ToP	TOP OF PIPE
								⊔	EOT SYMBOL
								S/L	SIGNAL LOSS

FENCE TYPES:

AM	ARMCO	PC	POST & CHAIN
BW	BARBED WIRE	PI	POST & IRON RAIL
CB	CLOSE BOARDED	PR	POST & RAIL
CI	CORRUGATED IRON	PW	POST & WIRE
CL	CHAIN LINK	SP	STEEL PALISADE
CP	CHESTNUT PALING	WM	WIRE MESH
IR	IRON RAILING		
IW	INTERWOVEN		

DUCT FORMATION

1W:	○	1 WAY SINGLE DUCT
2W:	○○	2 WAY FLAT
2W: 1/2	○ ○	2 WAY: 1 WIDE, 2 DEEP
4W: 2/2	○○ ○○	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	○○○ ○○○	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	○○○○ ○○○○ ○○○○	12 WAY: 4 WIDE, 3 DEEP

NB: TO BE ADAPTED TO FOR EACH CHAMBER

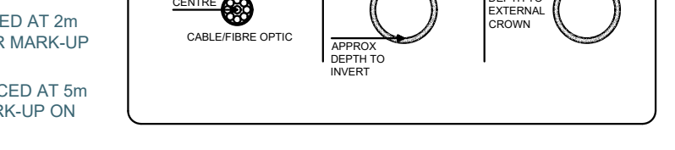
PAS128 SURVEY METHODOLOGY KEY

THIS SURVEY HAS BEEN CARRIED OUT IN ACCORDANCE WITH THE PAS128 SPECIFICATION FOR UNDERGROUND UTILITY DETECTION, VERIFICATION & LOCATION. THE SPECIFICATION ALLOWS FOR A RANGE OF TECHNIQUES AND METHODS OF VARYING INTENSITY TO BE DEPLOYED. THE COLOUR CODED SCHEME INDICATES WHERE DIFFERENT SURVEY METHODOLOGIES HAVE BEEN USED ON SITE, AND THE LIST BELOW IDENTIFIES EQUIPMENT USED TO OBTAIN THE SURVEY RESULTS.
NB: PLEASE SEE ACCOMPANYING REPORT FOR FULL DETAILS.

ELECTROMAGNETIC DETECTION	GROUND PENETRATING RADAR	TOTAL STATION	GPS/GNSS
Equipment name	Equipment name	Equipment name	Equipment name
Equipment name	Equipment name	Equipment name	Equipment name
Equipment name	Equipment name	Equipment name	Equipment name

▦	M4P - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 0.5m INTERVALS. GPR SURVEY GRID AT 0.5m INTERVALS OR HIGH DENSITY ARRAY. POST PROCESSING OF GPR DATA.	▨	M4 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 0.5m INTERVALS. GPR SURVEY GRID AT 0.5m INTERVALS. GPR MARK-UP ON SITE
▦	M3P - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 1m INTERVALS. GPR SURVEY GRID AT 1m INTERVALS OR HIGH DENSITY ARRAY. POST PROCESSING OF GPR DATA.	▨	M3 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 1m INTERVALS. GPR SURVEY GRID AT 1m INTERVALS. GPR MARK-UP ON SITE.
▦	M2P - EML SEARCH TRANSECT AT 5m INTERVALS - TRACED AT 2m INTERVALS. GPR SURVEY GRID AT 2m INTERVALS OR HIGH DENSITY ARRAY. POST PROCESSING OF GPR DATA.	▨	M2 - EML SEARCH TRANSECT AT 5m INTERVALS - TRACED AT 2m INTERVALS. GPR SURVEY GRID AT 2m INTERVALS. GPR MARK-UP ON SITE.
▦	M1P - EML SEARCH TRANSECT AT 10m INTERVALS - TRACED AT 5m INTERVALS. GPR SURVEY AS APPROPRIATE. POST PROCESSING OF GPR DATA.	▨	M1 - EML SEARCH TRANSECT AT 10m INTERVALS - TRACED AT 5m INTERVALS. GPR SURVEY AS APPROPRIATE. GPR MARK-UP ON SITE

TYPICAL FEATURE DEPTH ANNOTATION


ELECTRO-MAGNETIC DETECTION
APPROX. DEPTH TO CENTRE
CABLE/FIBRE OPTIC
GRAVITY DRAIN (VISUAL OBSERVATION)
APPROX DEPTH TO INVERT
GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN