Key to exploratory hole symbols and abbreviations

SAMPLE TYPES

ACM - Asbestos sample
AMAL - Amalgamated sample
B - Bulk disturbed sample
BLK - Block sample
C - Core sample
CBR - CBR test sample
D - Disturbed sample
ES - Environmental sample
EW - Environmental water sample
G - Gas sample
J - Jar sample
L - Liner sample
TW - Pushed thin wall sample
U - Undisturbed sample
UT - Undisturbed thin wall sample
W - Water sample

IN-SITU TESTS

HV - Hand shear vane
HV(r) - Hand shear vane residual
PID - Photo ionisation detector
PP - Hand penetrometer
SPT - Standard penetration test
SPT(C) - SPT using cone

GROUNDWATER

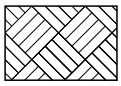

Groundwater strike

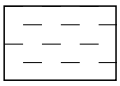

Groundwater rest level

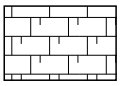
ROTARY CORE DETAILS

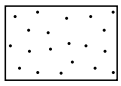
TCR - Total core recovery (%)
SCR - Solid core recovery (%)
RQD - Rock quality designation (%)
FI - Fracture index
NI - Non-intact core
AZCL - Assumed zone of core loss

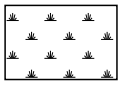
LEGEND

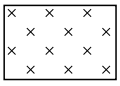

Topsoil

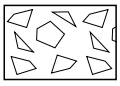

Clay

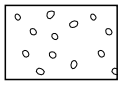

Chalk

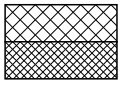

Sand backfill

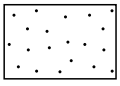

Peat

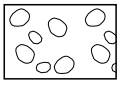

Silt

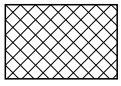

Breccia

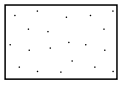

Gravel backfill

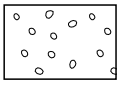

Made ground [cohesive]

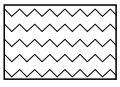

Sand

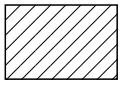

Conglomerate

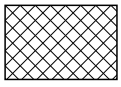

Arisings

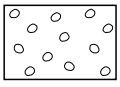

Concrete

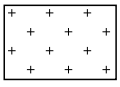

Gravel

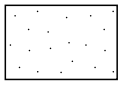

Metamorphic

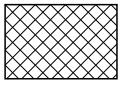

Bentonite

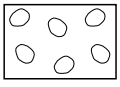

Wood


Cobbles


Igneous

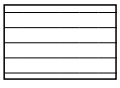

Concrete


Brick

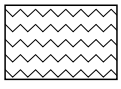

Boulders

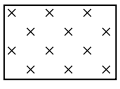

Grout


Bituminous material

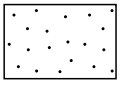

Mudstone


Plain pipe

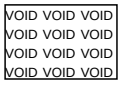

Gypsum


Siltstone

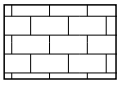

Coal


Sandstone


Slotted pipe



Void


Limestone

Borehole Log

BH100

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP	331711.91	667784.38	59.35	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-07	2019-05-09

Client
National Roads

Consultant
Pebble Consulting

Contractor
Pebble Drilling

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.00	D 1			(0.30)		TOPSOIL: Dark brown slightly gravelly fine to coarse sand with occasional rootlets.
		0.00	ES 2					
		0.00-0.30	B 3		59.05	0.30		
		0.30	D 4					Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of sandstone and mudstone.
		0.30	ES 5			(0.50)		
		0.30-0.80	B 7					
		0.50	ES 6		58.55	0.80		
		0.80	D 8					Soft brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and mudstone.
		0.80	ES 9					
		0.80-1.20	B 12			(0.70)		
		1.00	D 10					
		1.00	ES 11					
		1.20	SPT	N=14 (1,0/1,1,5,7)	57.85	1.50		
		1.20-1.65	D 13					Firm greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and mudstone.
		1.20-1.70	B 14					
		1.50	D 15					
		1.50	ES 16					
		2.00	D 17					
		2.20-2.65	U 18	Blows: 50, Recovery: 56%				
		3.00	D 19			(3.15)		
		3.20	SPT	N=36 (5,7/11,8,9,8)				
		3.20-3.65	D 20					
		3.20-3.70	B 21					
		4.00	D 22					
		4.20-4.65	U 23	Blows: 47, Recovery: 56%				
					54.70	4.65		Stiff grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and mudstone. Cobbles are subangular of sandstone.
		5.00	D 24					
		5.20	SPT	N=38 (5,7/8,8,9,13)				
		5.20-5.65	D 25					
		5.20-5.70	B 26			(1.86)		
		6.00	D 27					
		6.50	SPT(C)	N=50 (25,0/50 for 0mm)	52.84	6.51		*End of Borehole at 6.51m*

Remarks
Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. Borehole terminated due to an obstruction.

Method, Plant, Stability, Dimensions — **Logger**

0.00 - 1.20m IP Insulated Hand Tools — CR
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 6.51m CP Dando 3000 — CR

Checked By: Tom **Approved By:** Tracee

Borehole Log

BH100

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP	331711.91	667784.38	59.35	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-07	2019-05-09

Client	Consultant	Contractor
National Roads	Pebble Consulting	Pebble Drilling

Hole Diameter

Base Depth (m)	Hole Diameter (mm)	Remarks
6.51	200	

Casing Diameter

Base Depth (m)	Casing Diameter (mm)	Remarks
6.50	200	

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
1.20	3.00	0.00	2019-05-07T12:30	Seepage

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
1.20	1.00	10	
1.20	1.00	15	
1.20	1.00	20	
1.20	1.00	5	

Chiselling

Top Depth (m)	Base Depth (m)	Time Taken	Remarks
6.50	6.50	01:00	Obstruction

Drilling Progress

Depth (m)	Casing Depth (m)	Water Level (m)	Date and Time	Remarks
4.65	4.65	Dry	2019-05-07T17:30	End of Shift
4.65	4.65	4.40	2019-05-08T07:30	Start of Shift
6.50	6.50	6.20	2019-05-08T17:30	End of Shift
6.50	6.50	0.70	2019-05-09T07:30	Start of Shift
6.51	6.50	6.00	2019-05-09T17:30	End of Hole

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	1.20	1.00	AR359	63	N=14 (1,0/1,1,5,7)
3.20 (S)	3.20	Dry	AR359	63	N=36 (5,7/11,8,9,8)
5.20 (S)	5.20	5.00	AR359	63	N=38 (5,7/8,8,9,13)
6.50 (C)	6.50	6.00	AR359	63	N=50 (25,0/50 for 0mm)

Continued on next page

Remarks

Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. Borehole terminated due to an obstruction.

Method, Plant, Stability, Dimensions **Logger**

0.00 - 1.20m IP Insulated Hand Tools CR

Stable

Inclination: 90°

1.20 - 6.51m CP Dando 3000 CR

Checked By: Tom **Approved By:** Tracee

Borehole Log

BH100

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP	331711.91	667784.38	59.35	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-07	2019-05-09

Client	Consultant	Contractor
National Roads	Pebble Consulting	Pebble Drilling

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	ES		
	B		
	D		
	ES		
	B		
	ES		
	B		
	D		
	ES		
	D		
	ES		
	D		
	B		
	D		
	ES		
	D		
	U		
	D		
	D		
	B		
	D		
	U		
	D		
	D		
	B		
	D		

Depth Related Remarks

Top Depth (m)	Base Depth (m)	Remarks
0.00	1.20	Position CAT scanned before and during excavation. No underground services encountered.

Remarks

Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. Borehole terminated due to an obstruction.

Method, Plant, Stability, Dimensions **Logger**

0.00 - 1.20m IP Insulated Hand Tools CR
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 6.51m CP Dando 3000 CR

Checked By: Tom **Approved By:** Tracee

Trial Pit

TP43

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	332082.86	667809.02	57.34	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-04-02	2019-04-02

Client
National Roads

Consultant
Pebble Consulting

Contractor
Pebble Drilling

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.05-0.10	D 1		57.24	(0.10) 0.10		MADE GROUND: Topsoil of brown slightly gravelly slightly clayey fine to coarse sand with occasional rootlets. Gravel sized fragments are angular to subrounded fine to coarse of brick, sandstone and rare concrete.
		0.30-0.40	D 2			(0.45)		
		0.30-0.40	ES 3					
		0.30-0.40	B 4		56.79	0.55		
		0.60-0.70	D 5					MADE GROUND: Black and dark grey sandy clayey angular to subrounded fine to coarse gravel sized fragments of brick, sandstone, concrete, metal, wood and coal with low cobble content. Sand sized fragments are fine to coarse. Cobble sized fragments are subangular of sandstone, brick and concrete.
		0.60-0.70	ES 6					
		0.60-0.70	B 7					
		1.10-1.20	ES 8			(1.05)		
								at 0.20m 1 No steel rope (20mm diameter) up to 1.50m long (0.20m)
					55.74	1.60		
		1.70-1.80	ES 10					MADE GROUND: Dark brown occasionally black very sandy clayey subangular to rounded fine to coarse gravel sized fragments of sandstone, mudstone, brick, concrete and coal with medium cobble and boulder content. Sand is fine to coarse. Cobble sized fragments are subangular to rounded of sandstone and concrete. Boulder sized fragments are subangular of concrete and sandstone (up to 700mm x 250mm x 100mm).
		1.70-1.80	LB 11					
		1.70-1.80	D 9			(1.00)		
	▼	2.60	D 12		54.74	2.60		Yellowish brown very sandy silty subrounded to rounded fine to coarse GRAVEL of sandstone, mudstone and occasional coal with low cobble content. Sand is fine to coarse. Cobbles are rounded of sandstone.
								End of Trial Pit at 2.60m

Remarks
Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. ACoW present during excavation. 3. All sides similar. 4. Trial pit terminated due to collapse. 5. Photographs taken prior to backfill.

Method, Plant, Stability, Dimensions
0.00 - 2.60m TP JCB 3CX
Collapse of faces A and C from 1.60m to 2.60m
Inclination: 90° ***Orientation:*** 310°
L = 2.70m
W = 1.60m

Logger
AS

Checked By: Tom **Approved By:** Tracee

Trial Pit

TP43

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	332082.86	667809.02	57.34	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-04-02	2019-04-02

Client	Consultant	Contractor
National Roads	Pebble Consulting	Pebble Drilling

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
2.60			2019-04-02T11:30	Seepage

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
2.60	2.60	10	
2.60	2.60	15	
2.60	2.60	20	
2.60	2.60	5	

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	D		
	ES		
	B		
	D		
	ES		
	B		
	ES		
	ES		
	LB		
	D		
	D		

Depth Related Remarks

Top Depth (m)	Base Depth (m)	Remarks
0.00	1.20	Position CAT scanned before and during excavation. No underground services encountered.
1.60	2.60	Length (Sides B and D) 0.60m.

Remarks

Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. ACoW present during excavation. 3. All sides similar. 4. Trial pit terminated due to collapse. 5. Photographs taken prior to backfill.

Method, Plant, Stability, Dimensions

0.00 - 2.60m TP JCB 3CX
Collapse of faces A and C from 1.60m to 2.60m
Inclination: 90° ***Orientation:*** 310°

L = 2.70m

W = 1.60m

Logger

AS

Checked By: Tom **Approved By:** Tracee

Borehole Log

BH109

Sheet 1 of 5

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client
National Roads

Consultant
Pebble Consulting

Contractor
Pebble Drilling

Inst/ Backfill	Water Levels	Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)	Frac FI	Level (m)	Depth (thickness) (m)	Legend	Description
		0.00	D 1								(0.30)		TOPSOIL: Dark brown slightly gravelly slightly clayey fine to coarse sand.
		0.00	ES 2							60.53	0.30		
		0.00-0.30	B 3										Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and mudstone.
		0.30	D 4										
		0.30	ES 5										
		0.30-1.00	B 7								(0.70)		
		0.50	HV	88,81,80 (kPa)									
		0.50	HV(r)	30,28,28 (kPa)									
		0.50	ES 6							59.83	1.00		
		1.00	HV	41,37,39 (kPa)									Soft brown mottled grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and mudstone. Cobbles are subangular to subrounded of sandstone.
		1.00	HV(r)	19,15,16 (kPa)									
		1.00	D 8										
		1.00	ES 9										
		1.20	SPT	N=6 (1,1/1,2,1,2)							(1.20)		
		1.20-1.65	D 10										
		1.20-1.70	B 11										
		2.00	D 12										
		2.00	ES 13										
		2.20	D 15							58.63	2.20		
		2.20	ES 16										
		2.20-2.65	U 14	Blows: 36, Recovery: 100%									Firm grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and mudstone. Cobbles are subangular to subrounded of sandstone.
													from 2.20m to 3.00m gravel is fine to medium (2.20 - 3.00m)
		3.00	D 17										
		3.00	ES 18										
		3.20	SPT	N=29 (5,7/6,6,9,8)									
		3.20-3.65	D 19										
		3.20-3.70	B 20										
		4.00	D 21										
		4.20-4.65	U 22	Blows: 56, Recovery: 67%									
		5.00	D 23										
		5.20	SPT	N=24 (4,7/6,6,5,7)							(5.80)		
		5.20-5.65	D 24										
		5.20-5.70	B 25										
		6.00	D 26										
		6.20-6.65	U 27	Blows: 54, Recovery: 100%									
		7.00	D 28										
		7.20	SPT	N=36 (7,5/8,8,11,9)									
		7.20-7.65	D 29										
		7.20-7.70	B 30										
		8.00	D 31							52.83	8.00		
		8.20	SPT(C)	N=18 (4,3/5,4,3,6)									Soft grey brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of sandstone and mudstone.
		8.20-8.70	B 32								(1.00)		
		9.00	D 33							51.83	9.00		
		9.00-9.70	B 34										Firm dark grey slightly sandy CLAY with occasional specks of black organic material. Sand is fine to coarse.
											(0.70)		
		9.70	SPT(C)	N=50 (13,12/17,21,22 for 165mm)						51.13	9.70 (0.70)		Very dense brown sandy slightly clayey angular to
		9.70	D 35										

Continued on next page

Remarks
Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. Gas alarm used to monitor borehole location during rotary drilling. No elevated gas levels detected during borehole formation. 3. 19mm vane used to carry out hand vane tests.

Checked By: Tom **Approved By:** Tracee

Method, Plant, Stability, Dimensions **Logger**

0.00 - 1.20m IP Insulated Hand Tools CR
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 13.00m CP Dando 3000 CR
13.00 - 14.00m RC Soilmec SM8G CR
31.30 - 42.70m RC Soilmec SM8G CR

Borehole Log

BH109

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client National Roads

Consultant Pebble Consulting

Contractor Pebble Drilling

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Coring: Core Run	TCR (%)	SCR (%)	RQD (%)	Frac FI	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		9.70-10.20	B 36										subrounded fine to coarse GRAVEL of sandstone and mudstone with low cobble content. Sand is fine to coarse. Cobbles are angular to subrounded of sandstone and mudstone.
		10.00	D 37										
		10.20	SPT(C)	N=22 (13,11/6,7,5,4)									
		10.20-10.70	B 38							50.43	10.40		
		10.40	D 39										
													Reddish brown slightly gravelly slightly silty fine to coarse SAND. Gravel is subangular to subrounded fine to medium of sandstone and mudstone.
		11.00	D 40								(1.30)		
										49.13	11.70		
		11.70	SPT	N=31 (9,8/7,9,7,8)									Extremely weak brown mottled white medium grained SANDSTONE. Recovered as subangular coarse gravel and cobble sized fragments.
		11.70-12.15	D 41										
		11.70-12.20	B 42										
		12.00	D 43								(1.30)		
		13.00	SPT	N=50 (25,0/50 for 60mm)					NI	47.83	13.00 (0.18)		
		13.00-13.11	D 44							47.65	13.18		Extremely weak white stained light brown medium grained SANDSTONE. Recovered as non intact core (fine to coarse sand and subangular fine to coarse gravel sized fragments).
		13.00-14.00	C 45		13.00 14.00	94	53	0	25		(0.48)		
										47.17	13.66		Medium strong thinly laminated white stained light brown medium grained micaceous SANDSTONE. Discontinuities: 1) 10-20 degrees extremely closely to closely spaced undulating rough.
		14.00-15.00	C 46										
		14.30-14.36	CS 46.1		14.00 15.00	90	65	11	15		(1.70)		*from 13.18m to 13.35m with extremely closely spaced thin laminations of extremely weak light grey mudstone (13.18 - 13.35m)*
													from 13.35m to 13.42m 1 No discontinuity 70 degrees undulating rough (13.35 - 13.42m)
									NI				
									NR				
		15.00-16.00	C 47						NI				*from 13.51m to 13.55m recovered as non intact core (angular fine to coarse gravel sized fragments)*
									25				
					15.00 16.00	75	50	10	21	45.47	15.36		*from 13.63m to 16.66m recovered as non intact core (angular fine to coarse gravel sized fragments)*
		15.64-15.74	CS 47.1						NR				
		16.00-16.50	C 48										Medium strong thinly laminated white and purple stained light brown medium grained micaceous SANDSTONE. Discontinuities: 1) 0-10 degrees very closely to closely spaced planar rough locally with reddish brown clay infill. 2) 80 degrees widely spaced undulating rough stained reddish brown.
					16.00 16.50	100	92	0			(2.02)		
		16.50-18.00	C 49						14				*from 13.90m to 13.94m recovered as non intact core (angular fine to coarse gravel sized fragments)*
		16.92-17.02	CS 49.1										*from 13.94m to 14.00m assumed zone of core loss (13.94 - 14.00m)*
					16.50 18.00	77	53	7	NI	43.45	17.38		
									NR		(0.34)		*from 14.22m to 14.25m extremely weak (14.22 - 14.25m)*
										43.11	17.72		*from 14.56m to 14.61m extremely weak light grey mudstone (14.56 - 14.61m)*
									15	42.91	(0.20) 17.92		
		18.00-19.00	C 50						4		(0.24)		*from 14.79m to 14.90m recovered as non intact core (angular coarse gravel sized fragments)*
										42.67	18.16		
					18.00 19.00	80	15	15	NI				*from 14.90m to 15.00m assumed zone of core loss (14.90 - 15.00m)*
									NR				*from 15.00m to 15.20m recovered as non intact core (sandy angular fine to coarse gravel sized fragments)*
		19.00-19.50	C 51								(2.24)		
					19.00 19.50	90	0	0	NI				Weak thinly bedded yellowish white medium grained SANDSTONE with rare reddish brown inclusions (2mm x 5mm to 10mm x 12mm) of siltstone. Discontinuities: 1) 0-10 degrees very closely to closely spaced undulating rough with localised brown staining.
		19.50-20.00	C 52										
					19.50 20.00	100	30	20	0				
									NI				

Continued on next page

Remarks

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Checked By: Tom **Approved By:** Tracee

Method, Plant, Stability, Dimensions

0.00 - 1.20m IP Insulated Hand Tools
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 13.00m CP Dando 3000
13.00 - 14.00m RC Soilmec SM8G
31.30 - 42.70m RC Soilmec SM8G

Logger

CR
CR
CR
CR

Borehole Log

BH109

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client	Consultant	Contractor
National Roads	Pebble Consulting	Pebble Drilling

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Coring: Core Run	TCR (%)	SCR (%)	RQD (%)	Frac FI	Level (m)	Depth (thickness) (m)	Legend	Strata: Description
		20.00-20.20	C 53		20.00 20.20	100	0	0					*from 15.75m to 16.00m assumed zone of core loss (15.75 - 16.00m)*
		20.20-21.20	C 54		20.20 21.20	97	57	49	5	40.43	20.40 (0.20)		*from 16.80m to 16.85m recovered as non intact core (sandy subangular fine to coarse gravel sized fragments)*
									NI	40.23	20.60		*from 17.03m to 17.10m recovered as non intact core (sandy subangular fine to coarse gravel sized fragments)*
									0	39.76	(0.47) 21.07		*from 17.26m to 17.38m recovered as non intact core (very sandy subangular fine to coarse gravel sized fragments)*
		21.20-22.40	C 55		21.20 22.40	98	0	0	NI		(1.33)		Assumed zone of core loss. Weak SANDSTONE. (Driller's description)
		22.40-24.20	C 56		22.40 24.20	97	31	14	20	38.43	22.40		Weak yellowish white medium grained SANDSTONE with abundant reddish brown inclusions (from 1mm x 1mm to 10mm x 10mm). Discontinuities: 1) 0-10 degrees very closely to closely spaced undulating rough with brown staining.
									NI		(0.91)		Strong grey medium grained SANDSTONE.
									13				*at 18.00m 1 No discontinuity 5 degrees planar rough with reddish brown staining (18.00m)*
									NI	37.52	23.31		Extremely weak cream stained reddish brown medium grained SANDSTONE. Recovered as non intact core (fine to coarse sand and subangular fine to coarse gravel sized fragments with low cobble content).
									0		(0.53)		*from 18.80m to 19.00m assumed zone of core loss (18.80 - 19.00m)*
									NI	36.99	23.84		*from 19.45m to 19.50m assumed zone of core loss (19.45 - 19.50m)*
									7				*from 19.50m to 19.55m intact core (19.50 - 19.55m)*
		24.20-25.70	C 57		24.20 25.70	99	49	13	NI		(0.91)		*from 19.82m to 19.92m intact core (19.82 - 19.92m)*
									17	36.08	24.75		Extremely weak reddish brown medium grained SANDSTONE.
									NI		(0.53)		*from 20.45m to 20.53m 1 No discontinuity 45 degrees planar rough (20.45 - 20.53m)*
										35.55	25.28		Extremely weak grey stained dark reddish brown MUDSTONE.
		25.70-27.20	C 58		25.70 27.20	98	60	13	14		(1.89)		*from 20.60m to 20.70m recovered as non intact core (sandy gravelly clay)*
													Extremely weak light grey stained reddish brown MUDSTONE. Recovered as non intact core (gravelly clay).
									NI	33.66	27.17		Weak thinly laminated greenish grey stained dark reddish brown MUDSTONE. Discontinuities: 1) 0-5 degrees very closely to closely spaced planar smooth with reddish brown staining.
		27.20-28.80	C 59		27.20 28.80	99	49	13	>25		(0.47)		*from 22.46m to 22.50m recovered as non intact core (subangular fine to coarse gravel sized fragments)*
										33.19	27.64		*from 22.56m to 22.59m recovered as non intact core (clayey subangular fine to coarse gravel sized fragments)*
									17		(1.05)		*from 22.64m to 22.70m recovered as non intact core (very clayey angular to subangular fine to coarse gravel sized fragments)*
										32.14	28.69		*from 22.85m to 23.07m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)*
		28.80-29.80	C 60		28.80 29.80	100	56	52	12		(0.69)		Weak thinly laminated greenish grey stained dark reddish brown MUDSTONE. Recovered as non intact core (angular fine to coarse gravel sized fragments).
									13	31.45	29.38		*from 23.51m to 23.61m intact core (23.51 - 23.61m)*
									NI		(0.82)		*from 23.71m to 23.77m intact core (23.71 - 23.77m)*
		29.80-31.30	C 61		29.80 31.30	93	30	11	17 NR 13				

Continued on next page

Remarks

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Method, Plant, Stability, Dimensions

0.00 - 1.20m IP Insulated Hand Tools
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 13.00m CP Dando 3000
13.00 - 14.00m RC Soilmec SM8G
31.30 - 42.70m RC Soilmec SM8G

Logger

CR
CR
CR
CR

Checked By: Tom **Approved By:** Tracee

Borehole Log

BH109

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client National Roads

Consultant Pebble Consulting

Contractor Pebble Drilling

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Coring: Core Run	TCR (%)	SCR (%)	RQD (%)	Frac FI	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
										30.63	30.20		Medium strong thinly laminated greenish grey stained dark reddish brown MUDSTONE. Discontinuities: 1) 0-5 degrees very closely to closely spaced planar smooth with reddish brown staining.
									NI		(0.32)		
										30.31	30.52		
									5		(0.23)		
										30.08	30.75		
									NI		(0.30)		
										29.78	31.05		
									12		(0.41)		
		31.30-32.70	C 62							29.37	31.46		
					31.30 32.70	95	75	49	9		(1.24)		*from 23.84m to 23.93m extremely closely spaced silty laminations (23.84 - 23.93m)*
													from 23.84m to 24.10m discontinuities set 1) medium spaced (23.84 - 24.10m)
													from 24.26m to 24.39m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)
													from 24.52m to 24.56m recovered as non intact core (angular fine to coarse gravel sized fragments)
													from 24.65m to 24.73m recovered as non intact core (angular fine to coarse gravel)
		32.70-34.20	C 63							28.13	32.70		Medium strong thinly laminated greenish grey stained dark reddish brown MUDSTONE. Recovered as non intact core (clayey angular fine to coarse gravel sized fragments).
									10				
									NI				Strong thinly laminated grey silty fine grained micaceous SANDSTONE with closely to medium spaced thick laminations to very thin beds of medium strong thinly laminated grey mudstone. Discontinuities: 1) 10 degrees very closely to closely spaced planar rough locally with reddish brown staining.
					32.70 34.20	98	89	50	10		(1.90)		*from 25.47m to 25.54m recovered as non intact core (angular fine to coarse gravel sized fragments)*
													from 25.60m to 25.66m 1 No discontinuity 70 degrees planar rough (25.60 - 25.66m)
		34.20-35.10	C 64							26.23	34.60		*from 25.70m to 25.78m recovered as non intact core (angular coarse gravel sized fragments)*
					34.20 35.10	97	43	26					
									NI		(1.05)		*from 25.78m to 25.85m 1 No discontinuity 70 degrees planar rough (25.78 - 25.85m)*
		35.10-36.60	C 65										*from 25.85m to 25.92m 2 No closely spaced discontinuities set 1) with clay infill (25.85 - 25.92m)*
										25.18	35.65		
					35.10 36.60	100	39	33	17		(0.40)		*from 26.75m to 26.87m 1 No discontinuity 80 degrees planar rough (26.75 - 26.87m)*
									NI	24.78	36.05		*from 26.95m to 26.99m recovered as non intact core (angular fine to coarse gravel sized fragments)*
													from 27.07m to 27.17m recovered as non intact core (angular fine to coarse gravel sized fragments)
		36.60-38.05	C 66						4				Weak thinly laminated black bright COAL. Discontinuities: 1) 0-10 degrees very closely spaced planar rough stepped.
					36.60 38.05	100	100	92					*from 27.17m to 27.30m dull coal (27.17 - 27.30m)*
													from 27.31m to 27.64m 2 No discontinuities 80 degrees stepped rough (27.31 - 27.64m)
									5		(6.65)		Weak to medium strong thinly laminated black dull and bright COAL. Discontinuities: 1) 0-10 degrees very closely to closely spaced planar rough stepped.
		38.05-39.50	C 67										*from 27.64m to 27.66m strong black carbonaceous mudstone (27.64 - 27.66m)*
					38.05 39.50	100	97	97	2				*from 28.01m to 28.12m strong black carbonaceous mudstone (28.01 - 28.12m)*
													from 28.47m to 28.66m strong black carbonaceous mudstone (28.47 - 28.66m)
													from 28.60m to 28.69m recovered as non intact core (angular fine to coarse gravel sized fragments)
		39.50-41.10	C 68										Medium strong thinly laminated grey silty micaceous
					39.50 41.10	100	94	74	6				

Continued on next page

Remarks

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Checked By: Tom **Approved By:** Tracee

Method, Plant, Stability, Dimensions — **Logger**

0.00 - 1.20m IP Insulated Hand Tools — CR
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 13.00m CP Dando 3000 — CR
13.00 - 14.00m RC Soilmec SM8G — CR
31.30 - 42.70m RC Soilmec SM8G — CR

Borehole Log

BH109

Sheet 5 of 5

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client
National Roads

Consultant
Pebble Consulting

Contractor
Pebble Drilling

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Coring: Core Run	Coring: TCR (%)	Coring: SCR (%)	Coring: RQD (%)	Frac: FI	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		41.10-42.70	C 69										MUDSTONE with extremely closely spaced thin to thick laminations of cream fine grained sandstone. Discontinuities: 1) 5-15 degrees very closely to closely spaced undulating rough. *from 28.69m to 28.76m greyish brown (possible seat earth)* *from 29.25m to 29.32m 1 No discontinuity 70-90 degrees undulating rough (29.25 - 29.32m)*
					41.10 42.70	100	100	100	2 6 2	18.13	42.70		Weak thinly laminated dark grey MUDSTONE. Discontinuities: 1) 5-15 degrees very closely to closely spaced planar smooth . *from 29.54m to 29.68m recovered as non intact core (angular fine to coarse gravel sized fragments)* *from 29.80m to 29.90m assumed zone of core loss (29.80 - 29.90m)*
													Very weak thinly laminated black bright COAL. Recovered as non intact core (angular fine to coarse gravel and cobble sized fragments).
													Strong black carbonaceous MUDSTONE. *at 30.69m 1 No discontinuity 0 degrees undulating smooth (30.69m)*
													Very weak black dull COAL. Recovered as non intact core (angular fine to coarse gravel sized fragments).
													Extremely weak thinly laminated dark grey MUDSTONE. Discontinuities: 1) 0-10 degrees very closely to closely spaced undulating smooth. (Possible seat earth) *from 31.14m to 31.30m medium strong (31.14 - 31.30m)*
													Strong thinly laminated cream fine grained micaceous SANDSTONE with closely to medium spaced thin beds with extremely closely spaced dark grey micaceous laminations. Discontinuities: 1) 10-20 degrees closely spaced undulating rough. *from 31.46m to 31.56m grey and with 1 No discontinuity 80 degrees undulating rough (31.46 - 31.56m)* *from 31.74m to 31.79m 2 No discontinuities very closely spaced 70 degrees and 90 degrees undulating rough (31.74 - 31.79m)* *from 31.74m to 31.83m discontinuities set 1) very closely spaced (31.74 - 31.83m)* *from 31.86m to 32.10m discontinuities set 1) medium spaced (31.86 - 32.10m)*
													Medium strong thinly to medium bedded light grey and grey fine to medium grained SANDSTONE with closely to medium spaced very thin to thin beds of weak dark grey silty mudstone. Discontinuities: 1) 0-5 degrees closely to medium spaced planar smooth. *from 32.90m to 33.00m recovered as non intact core (angular fine to coarse gravel sized fragments)* *from 33.30m to 33.47m with occasional dark grey inclusions (from 5mm x 5mm to 10mm x 30mm) of mudstone (33.30 - 33.47m)* *from 34.50m to 34.60m with some orangish brown staining (34.50 - 34.60m)*
													Very weak grey silty MUDSTONE with occasional plant remains. Recovered as non intact core (very gravelly silty clay. Gravel is angular fine to coarse). *from 34.75m to 34.80m weak, intact core (34.75 - 34.80m)*

40.5 41.0 41.5 42.0 42.5 43.0 43.5 44.0 44.5 45.0 45.5 46.0 46.5 47.0 47.5 48.0 48.5 49.0 49.5 50.0

Remarks
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Method, Plant, Stability, Dimensions — **Logger**

0.00 - 1.20m IP Insulated Hand Tools — CR
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 13.00m CP Dando 3000 — CR
13.00 - 14.00m RC Soilmec SM8G — CR
31.30 - 42.70m RC Soilmec SM8G — CR

Checked By: Tom **Approved By:** Tracee

Borehole Log

BH109

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client	Consultant	Contractor
National Roads	Pebble Consulting	Pebble Drilling

Hole Diameter

Base Depth (m)	Hole Diameter (mm)	Remarks
13.00	200	
32.00	146	
42.70	121	

Casing Diameter

Base Depth (m)	Casing Diameter (mm)	Remarks
13.00	150	
13.00	200	
32.00	146	

Chiselling

Top Depth (m)	Base Depth (m)	Time Taken	Remarks
12.60	13.00	01:00	Hard Strata

Drilling Progress

Depth (m)	Casing Depth (m)	Water Level (m)	Date and Time	Remarks
7.70	7.70	7.00	2019-05-02T17:30	End of Shift
7.70	7.70	7.00	2019-05-03T07:30	Start of Shift
13.00	13.00	12.20	2019-05-03T17:25	End of Shift
13.00	13.00	10.00	2019-05-07T07:30	Start of Shift
13.00	13.00	10.00	2019-05-07T11:00	End of CP
13.00	13.00	12.50	2019-05-08T10:30	Start of Rotary
21.20	13.00	17.90	2019-05-08T17:30	End of Shift
21.20	13.00	15.40	2019-05-09T07:30	Start of Shift
34.20	21.20	16.80	2019-05-09T17:30	End of Shift
34.20	21.20	15.40	2019-05-10T07:30	Start of Shift
42.70	32.00	16.10	2019-05-10T17:30	End of Shift
42.70	32.00	15.40	2019-05-13T07:30	Start of Shift
42.70	32.00	NR	2019-05-13T17:30	End of Hole

Flush

Top Depth (m)	Base Depth (m)	Type	Return (min %)	Return (max %)	Remarks
13.00	27.20	AIR/MIST	100	100	
27.20	28.80	AIR/MIST	100	100	
28.80	29.80	AIR/MIST	100	100	
29.80	31.30	AIR/MIST	100	100	
31.30	42.70	AIR/MIST	100	100	

Water Added

Top Depth (m)	Base Depth (m)	Volume Added	Method	Remarks
1.20	3.00		CP	

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	1.20	Dry	AR359	63	N=6 (1,1/1,2,1,2)
3.20 (S)	3.20	3.00	AR359	63	N=29 (5,7/6,6,9,8)
5.20 (S)	5.20	Dry	AR359	63	N=24 (4,7/6,6,5,7)
7.20 (S)	7.20	7.00	AR359	63	N=36 (7,5/8,8,11,9)
8.20 (C)	8.20	Dry	AR359	63	N=18 (4,3/5,4,3,6)
9.70 (C)	9.70	9.40	AR359	63	N=50 (13,12/17,21,22 for 165mm)
10.20 (C)	10.20	10.00	AR359	63	N=22 (13,11/6,7,5,4)
11.70 (S)	11.70	11.00	AR359	63	N=31 (9,8/7,9,7,8)
13.00 (S)	13.00	12.20	AR359	63	N=50 (25,0/50 for 60mm)

Continued on next page

Remarks

Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. Gas alarm used to monitor borehole location during rotary drilling. No elevated gas levels detected during borehole formation. 3. 19mm vane used to carry out hand vane tests.

Checked By: Tom **Approved By:** Tracee

Method, Plant, Stability, Dimensions **Logger**

0.00 - 1.20m IP Insulated Hand Tools CR
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 13.00m CP Dando 3000 CR
13.00 - 14.00m RC Soilmec SM8G CR
31.30 - 42.70m RC Soilmec SM8G CR

Borehole Log

BH109

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client	Consultant	Contractor
National Roads	Pebble Consulting	Pebble Drilling

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	ES		
	B		
	D		
	ES		
	B		
	ES		
	D		
	ES		
	D		
	B		
	D		
	ES		
	U		
	D		
	ES		
	D		
	ES		
	D		
	B		
	D		
	U		
	D		
	D		
	B		
	D		
	U		
	D		
	D		
	B		
	D		
	B		
	D		
	B		
	D		
	B		
	D		
	B		
	D		
	D		
	D		
	B		
	D		
	D		
	C		
	C		
	CS		
	C		

Continued on next page

Remarks

Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. Gas alarm used to monitor borehole location during rotary drilling. No elevated gas levels detected during borehole formation. 3. 19mm vane used to carry out hand vane tests.

Checked By: Tom **Approved By:** Tracee

Method, Plant, Stability, Dimensions | **Logger**

0.00 - 1.20m IP Insulated Hand Tools — CR
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 13.00m CP Dando 3000 — CR
13.00 - 14.00m RC Soilmec SM8G — CR
31.30 - 42.70m RC Soilmec SM8G — CR

Borehole Log

BH109

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client	Consultant	Contractor
National Roads	Pebble Consulting	Pebble Drilling

Sample Details (continued)

Sample ID	Type	Water Level (m)	Remarks
	CS		
	C		
	C		
	CS		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		
	C		

Depth Related Remarks

Top Depth (m)	Base Depth (m)	Remarks
0.00	1.20	Position CAT scanned before and during excavation. No underground services encountered.
1.20	3.00	Water added to assist drilling.

Remarks

Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. Gas alarm used to monitor borehole location during rotary drilling. No elevated gas levels detected during borehole formation. 3. 19mm vane used to carry out hand vane tests.

Checked By: Tom **Approved By:** Tracee

Method, Plant, Stability, Dimensions **Logger**

0.00 - 1.20m IP Insulated Hand Tools CR
Stable
Inclination: 90°
L = 0.50m
W = 0.50m

1.20 - 13.00m CP Dando 3000 CR
13.00 - 14.00m RC Soilmec SM8G CR
31.30 - 42.70m RC Soilmec SM8G CR

Borehole Log

BH109
PHOTO PAGE

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client	Consultant	Contractor
National Roads	Pebble Consulting	Pebble Drilling

Photo of some logs

Remarks
Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. Gas alarm used to monitor borehole location during rotary drilling. No elevated gas levels detected during borehole formation. 3. 19mm vane used to carry out hand vane tests.

Checked By: Tom **Approved By:** Tracee

Method, Plant, Stability, Dimensions			Logger
0.00 - 1.20m	IP	Insulated Hand Tools	CR
Stable			
Inclination: 90°			
L = 0.50m			
W = 0.50m			
1.20 - 13.00m	CP	Dando 3000	CR
13.00 - 14.00m	RC	Soilmec SM8G	CR
31.30 - 42.70m	RC	Soilmec SM8G	CR

Borehole Log

BH109
PHOTO PAGE

Hole Type	Easting	Northing	Ground Level (m)	Scale
IP+CP+RC	331690.05	667747.45	60.83	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2019-05-02	2019-05-13

Client	Consultant	Contractor
National Roads	Pebble Consulting	Pebble Drilling

Remarks
Contains data supplied by Natural Environment Research Council. 1. PAS 128 survey undertaken. 2. Gas alarm used to monitor borehole location during rotary drilling. No elevated gas levels detected during borehole formation. 3. 19mm vane used to carry out hand vane tests.

Checked By: Tom **Approved By:** Tracee

Method, Plant, Stability, Dimensions			Logger
0.00 - 1.20m	IP	Insulated Hand Tools	CR
Stable			
Inclination: 90°			
L = 0.50m			
W = 0.50m			
1.20 - 13.00m	CP	Dando 3000	CR
13.00 - 14.00m	RC	Soilmec SM8G	CR
31.30 - 42.70m	RC	Soilmec SM8G	CR

Dynamic Probe

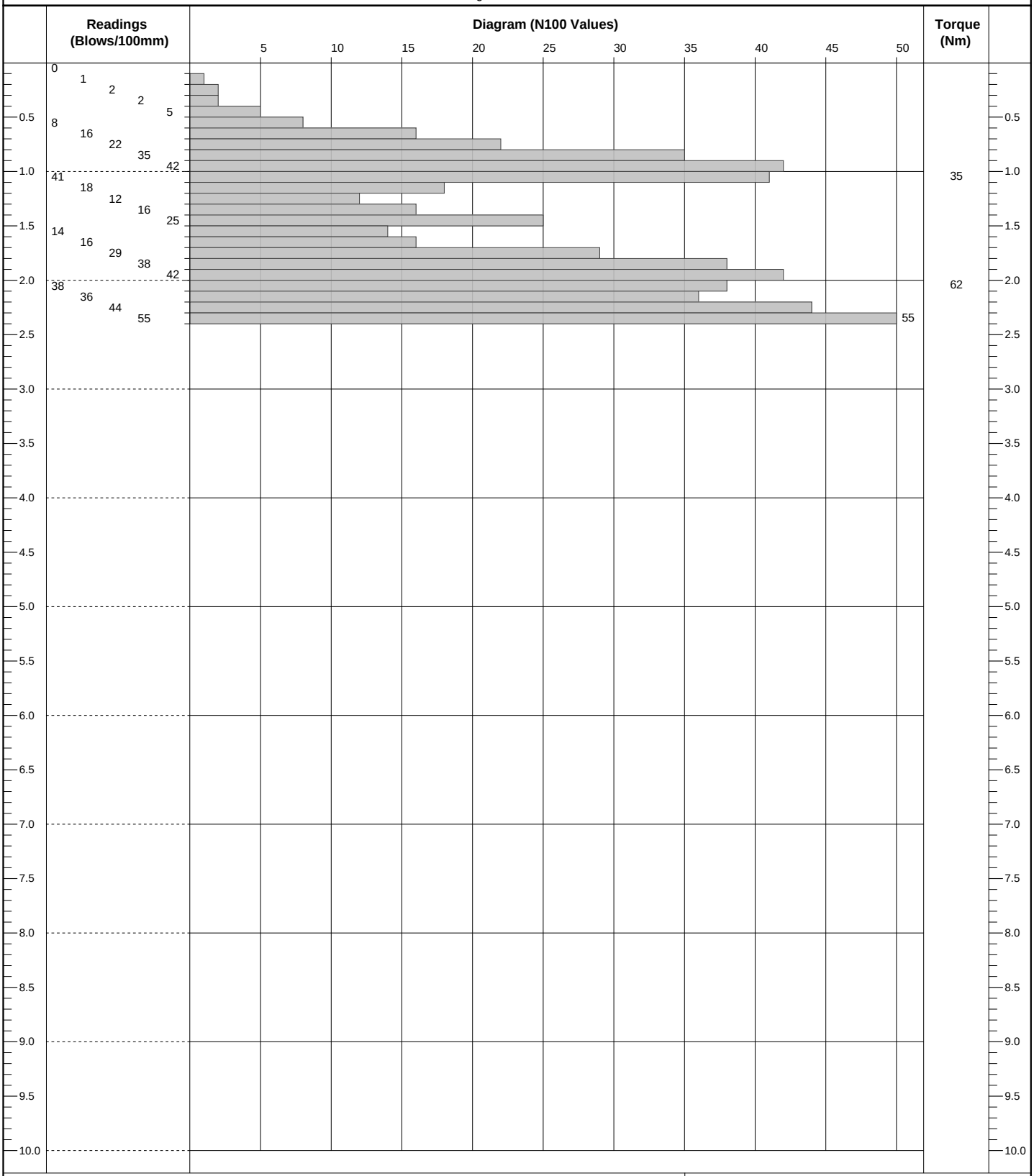
DP01

Sheet 1 of 1

Probe Type	Easting	Northing	Ground Level (m)	Scale
DPSH	431680.00	431565.00	55.80	1:50

Project Name	Project No.	Start Date	End Date
A123 Roundabout Improvement	ABC123	2024-03-12	2024-03-12

Client	Consultant	Contractor
National Roads	The Soil Engineers	The Soil Contractors



Remarks
Terminated due to an obstruction

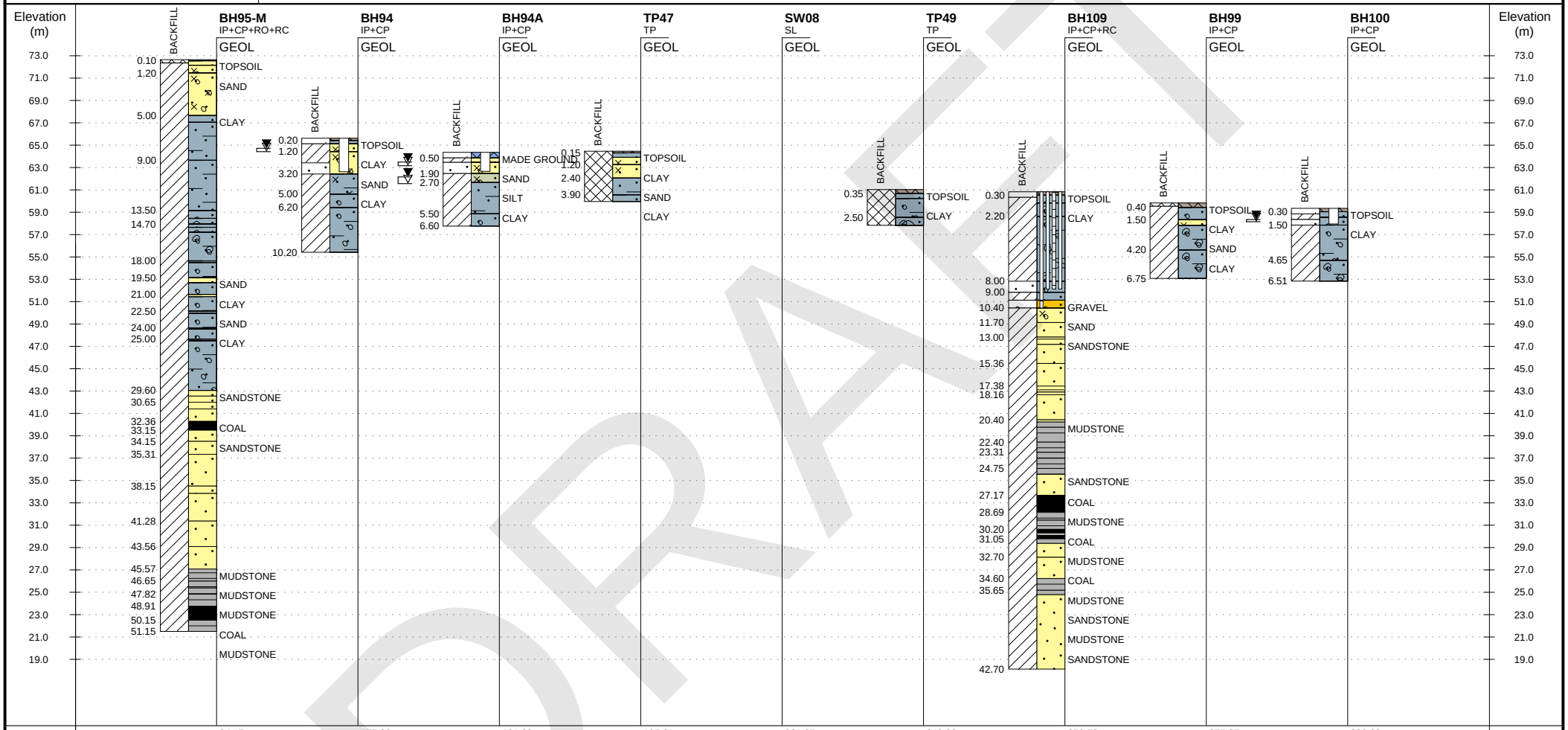
Method, Plant
0.00 - 2.40m DP Dynamic probe

Logger
BW

Hammer Weight (kg)	63.0
Hammer Drop (mm)	750
Cone Diameter (mm)	50
Cone Angle	90
Rod Diameter (mm)	35
Damper	None

Demo Section

Project Name A123 Roundabout Improvement	**Project No.** ABC123	**Vertical Scale** 1:503	**Horizontal Scale** NOT SCALED
Client National Roads	**Consultant** Pebble Consulting	**Contractor** Pebble Drilling	



TOPSOIL · MADE GROUND · CLAY · SILT · SAND · GRAVEL · MUDSTONE · SANDSTONE

COAL · Sand Backfill · Gravel Backfill · Bentonite · Arisings · Concrete

WATER LEVELS: REST · STRIKE