

HAVANT THICKET WINTER STORAGE RESERVOIR

FACTUAL REPORT ON GROUND INVESTIGATION

Report No A9031-19

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Carried out for:
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Report A9031-19

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1 INTRODUCTION

SOCOTEC UK Limited was commissioned in November 2019 by Portsmouth Water Limited (Portsmouth Water), to carry out a ground investigation in Havant, Hampshire. The investigation was required to obtain information for a proposed reservoir, Havant Thicket Winter Storage Reservoir (HTWSR).

The Investigation Supervisor on behalf of Portsmouth Water was Atkins.

The scope of the investigation was specified by Atkins and comprised cable percussion and rotary boreholes, trial pits, in situ testing, monitoring, laboratory testing and reporting. The investigation was performed in accordance with the contract specification, and the general requirements of BS 5930 (2015), BS EN 1997-2 (2007), BS EN ISO 22475-1 (2006) and other relevant related standards identified below. The fieldwork took place between 4 November 2019 and 30 January 2020.

This report presents the factual records of the fieldwork, monitoring and laboratory testing. The information is also presented as digital data as defined in AGS (2017).

2 SITE SETTING

2.1 Location and Description

The proposed HTWSR site lies within a shallow valley located between Havant, Leigh Park and Rowlands Castle, approximate 3.2 km north of Havant town centre, Hampshire. The National Grid reference for the site is SU 715 097. See Site Location Plan in Appendix A.

The site has an area of approximately 160 Hectares and comprises predominantly open grassland, with some woodland, hedgerows and ditches. The site is mostly utilised for animal grazing with public access retained via a bridleway across the middle of the site, with a permissive path around most of the perimeter of the site and along 'The Avenue'.

To the north and west the site is bounded by wooded areas, the A3(M) is beyond to the west. To the east is Red Hill, a residential area, and to the south is the town of Havant.

2.2 Published Geology

The published geological map of the area, (BGS sheet 316, 1998) and the BGS Geoindex Onshore Online viewer (2020) show the site partially underlain by Head Deposits comprising clay, silt, sand and gravel. This covers an area across the centre of the site, with localised areas around the remainder of the site.

The underlying bedrock is shown to be the London Clay Formation.

Information provided by Atkins indicates that the geology of the site comprises Quaternary deposits of Head, underlain sequentially by the London Clay, Harwich and Reading Formations. The Culver Chalk Formation underlies the entire site.



3 FIELDWORK

3.1 General

The exploratory hole locations were selected by Atkins and set out by SOCOTEC from co-ordinates provided. The as-dug co-ordinates and ground elevations were surveyed by SOCOTEC, using GPS equipment, to National Grid and Ordnance Datum. In accordance with the specification, co-ordinates are to be the nearest 0.5 m and elevations are to the nearest 0.05 m OD. The locations are shown on the Site Plan in Appendix A.

The fieldwork was carried out during a period of heavy rain and strong winds, which contributed to some challenging working conditions. As a consequence, surface conditions across the site were very wet, with some areas of standing water. The conditions resulted in difficult access across much of the site, and led to significant rutting in places.

3.2 Exploratory Holes

An Exploratory Hole Summary is presented in Appendix B, including details of hole types, depths, dates and additional comments on installations and other relevant remarks. A table summarising the quantity and depths of the holes is also presented below.

TABLE 1 : SUMMARY OF EXPLORATORY HOLES

TYPE	QUANTITY	DEPTH RANGE (m)
Cable Percussion Boring	20	2.50-34.45
Rotary Core Drilling (including dynamic sampling and rotary open hole drilling)	4	38.50-72.20
Trial Pits	17	1.50-4.50

The exploratory hole logs are presented in Appendix B. These include descriptions of the strata encountered together with details of the equipment and methods used, sampling and field testing carried out, water depths and other field observations. Explanation of the terms and abbreviations used on the logs is given in the Key to Exploratory Hole Records in Appendix B, along with other explanatory information. Soil and rock material descriptions are in accordance with BS EN ISO 14688-1 (2018), BS EN ISO 14689 (2018) and the guidance of BS 5930 (2015).



Standard penetration tests (SPT) in the boreholes were carried out in accordance with BS EN ISO 22476-3+A1 (2011) and the SPT hammer energy ratio certificates are included in Appendix B. The results are presented on the logs as uncorrected N values.

Split tube sample descriptions were carried out on undisturbed samples from boreholes ATK-BH-01 and ATK-BH-02, as scheduled by Atkins. The samples were extruded from the sample tubes, then photographed before and after splitting; the sample descriptions are presented in Appendix B.

Twelve shallow trial pits were undertaken adjacent to selected exploratory holes to facilitate the recovery of topsoil samples; the trial pits were nominally located within 1 m of the original exploratory holes, on areas not previously excavated. The trial pits have been designated the same ID as the corresponding exploratory holes, plus the suffix "-TSS", e.g. ATK-CP-09-TSS. Logs are not included for these trial pits as they were not extended below the topsoil, however details are included in the Exploratory Hole Summary in Appendix B and in the AGS data.

The trial pits designated with the nomenclature "TPM" were specified to be for man entry. However, due to the ground conditions the technique was amended, and they were carried out as standard machine excavated trial pits. After excavation, trial pit ATK-TPM-05 was allowed to stand open overnight to assess the short term stability. The trial pit was suitably fenced and protected at the surface to prevent access. On inspection the following day, the pit was noted to have collapsed on all faces.

Photographs of the rotary drilled cores, trial pits and split samples are presented in Appendix G.

On completion of the fieldwork, geotechnical samples were transported to the Doncaster laboratory of SOCOTEC for testing and temporary retention. Geoenvironmental samples were transported from site directly to the SOCOTEC laboratory at Bretby, near Burton upon Trent.



3.3 Field Testing

3.3.1 Variable Head Permeability Testing

Variable head permeability testing, including both rising and falling head tests, were carried out in general accordance with BS EN ISO 22282-2 (2012). Tests were carried out in selected boreholes, at depths specified by Atkins, and also in selected installations during the post fieldwork monitoring. A summary of the testing is presented in the table below and the results are presented in Appendix C.

TABLE 2 : SUMMARY OF VARIABLE HEAD TESTING

BOREHOLE	TESTS IN BOREHOLES (DURING FIELDWORK)			TESTS IN INSTALLATIONS (POST FIELDWORK)	
	TEST NO.	DEPTH (m BGL)	DATE	TEST NO.	DATE
ATK-CP-01	1	3.00	07-Nov-2019	2	28-Jan-2020
ATK-CP-02	1	1.90	08-Nov-2019	3	30-Jan-2020
	2	7.00	01-Nov-2019		
ATK-CP-03	1	5.50	06-Dec-2019	-	
ATK-CP-04	1	5.00	15-Nov-2019	3	29-Jan-2020
	2	11.50	18-Nov-2019		
ATK-CP-05	1	7.50	20-Nov-2019	3	29-Jan-2020
	2	13.00	21-Nov-2019		
ATK-CP-06	1	2.00	04-Dec-2019	2	30-Jan-2020
ATK-CP-10	1	11.00	22-Nov-2019	-	
ATK-CP-12	-			1	29-Jan-2020
ATK-CP-13A	-			1	29-Jan-2020
ATK-CP-15	1	16.00	02-Dec-2019	2	30-Jan-2020
ATK-CP-16	-			1	29-Jan-2020
ATK-RC-01	-			1	04-Feb-2020
ATK-RC-02	-			1	30-Jan-2020
ATK-RC-02A	-			1	30-Jan-2020
ATK-RC-03	-			1	30-Jan-2020

3.3.2 Soakaway (Infiltration) Testing

Two soakaway tests were scheduled to be undertaken in shallow hand excavated trial pits adjacent to trial pits ATK-TP-05 and ATK-TP-07, the pits were excavated and designated ATK-TP-05i and ATK-TP-07i.

Temporary standpipes, nominally 50 mm diameter, were installed in the trials pits and the annulus filled with a gravel filter, as detailed on the trial pits logs.

Due to the saturated nature of the shallow strata, the groundwater in the pits was recorded rising before commencement of the tests (before filling with water by the technician). The tests were therefore cancelled in agreement with Atkins.

3.4 Groundwater Monitoring

Groundwater monitoring instrumentation was installed in selected boreholes, as specified by Atkins; details are shown on the relevant borehole logs and summarised in Appendix D.

The design and type of some instrumentation was changed by Atkins during the fieldwork, informed by the findings as works progressed. This included the installation of vibrating wire piezometers (VWPs) in three boreholes.

After completion SOCOTEC were instructed to install data-loggers in selected installations. This included data-loggers for the three exploratory holes installed with VWPs, and diver data-loggers in each of the standpipes and standpipe piezometers.

Records of monitoring carried out by SOCOTEC during and after the fieldwork period are presented in Appendix D.

The installation records, calibration certificates and initial readings, recorded by SOCOTEC, for the VWPs are presented in Appendix D. SOCOTEC were not required to download data from the data-loggers during monitoring.

4 LABORATORY TESTING

4.1 Geotechnical Testing

Geotechnical laboratory testing was scheduled by Atkins and was carried out in accordance with BS 1377 (1990), BS EN ISO 17892 (2014) Part 1 and 2 and ISRM (2007) unless otherwise stated within the test report. The testing is summarised below and the results are presented in Appendix E.

The table below presents the quantities of tests scheduled.

TABLE 3 : SUMMARY OF GEOTECHNICAL LABORATORY TESTING

TYPE	QUANTITY
Water Content Determination	167
Atterberg Limit Determination	154
Particle Size Distribution Analysis	71
Particle Density	1
Linear Density	2
Determination of Shrinkage Characteristics	16
Light Compaction - 2.5 kg rammer	52
Heavy Compaction - 4.5 kg rammer	8
Moisture Condition Value (MCV) Test	41
Moisture Condition Value (MCV) / Moisture Content	30
Unconsolidated Undrained Triaxial Compression Tests	38
Shear Strength by Pilcon Hand method	294
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure	11
One Dimensional Consolidation Test	15
Determination of Permeability in a Triaxial Cell	9
Small Shear Box	10
Determination of residual shear strength using ring shear apparatus	4
Determination of Dispersibility - Pinhole Method	24
Determination of Dispersibility – Dispersion Method	In progress (26)
Chemical Testing – BRE Suite	12

At the time of reporting testing of samples for Dispersibility (by Dispersion Method) were ongoing; the results will be issued as an Addendum report when complete.

4.2 Geoenvironmental Testing

Geoenvironmental laboratory testing was scheduled by Atkins on the soil samples recovered during the fieldwork, and water samples taken by SOCOTEC from the installations. The results are presented in Appendix F.

There were some samples which were reported as having deviated due to holding times being exceeded; alternative samples were recovered and further testing carried. The results for the deviant samples have been excluded from the report.

Six soil samples were screened for the possible presence of asbestos, no asbestos fibres were identified.

4.3 Topsoil Analysis

A suite of analysis was scheduled by Atkins on samples of topsoil recovered during the fieldwork, testing was in accordance with BS 3882 : 2015. The results are presented in Appendix F.



5 REFERENCES

- AGS : 2017 : Electronic transfer of geotechnical and geoenvironmental data (Edition 4.0.4 February 2017). Association of Geotechnical and Geoenvironmental Specialists.
- BGS England and Wales Sheet 316 : 1998 : Fareham. 1:50000 geological map (solid and drift). British Geological Survey.
- BGS GeoIndex Onshore : 2020. www.bgs.ac.uk. British Geological Survey.
- BRE Special Digest 1 : 2005 : Concrete in aggressive ground. Building Research Establishment.
- BS 1377 : 1990 : Methods of test for soils for civil engineering purposes. British Standards Institution.
- BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution.
- BS EN 1997-2 : 2007 : Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.
- BS EN ISO 14688-1 : 2018 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description
- BS EN ISO 14688-2 : 2018 : Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification
- BS EN ISO 14689 : 2018 : Geotechnical investigation and testing - Identification and classification of rock - Part 1 Identification and description
- BS EN ISO 17892-1 : 2014 : Geotechnical investigation and testing – Laboratory Testing of soil – Determination of water content.
- BS EN ISO 17892-2 : 2014 : Geotechnical investigation and testing – Laboratory Testing of soil – Determination of bulk density.
- BS EN ISO 22282-1:2012 : Geotechnical investigation and testing – Geohydraulic testing – Part 1 General rules
- BS EN ISO 22282-2:2012 : Geotechnical investigation and testing – Geohydraulic testing – Part 2 Water permeability tests in a borehole using open systems
- BS EN ISO 22475-1 : 2006 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution. British Standards Institution.
- BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing - Part 3 Standard penetration test. British Standards Institution.
- ISRM : 2007 : The Complete ISRM Suggested Methods for Rock Characterisation, Testing and Monitoring (1974-2006). Commission on Testing Methods, International Society for Rock Mechanics (Editors Ulusay R & Hudson JA).
- BS 3882 : 2015 : Specification for Topsoil



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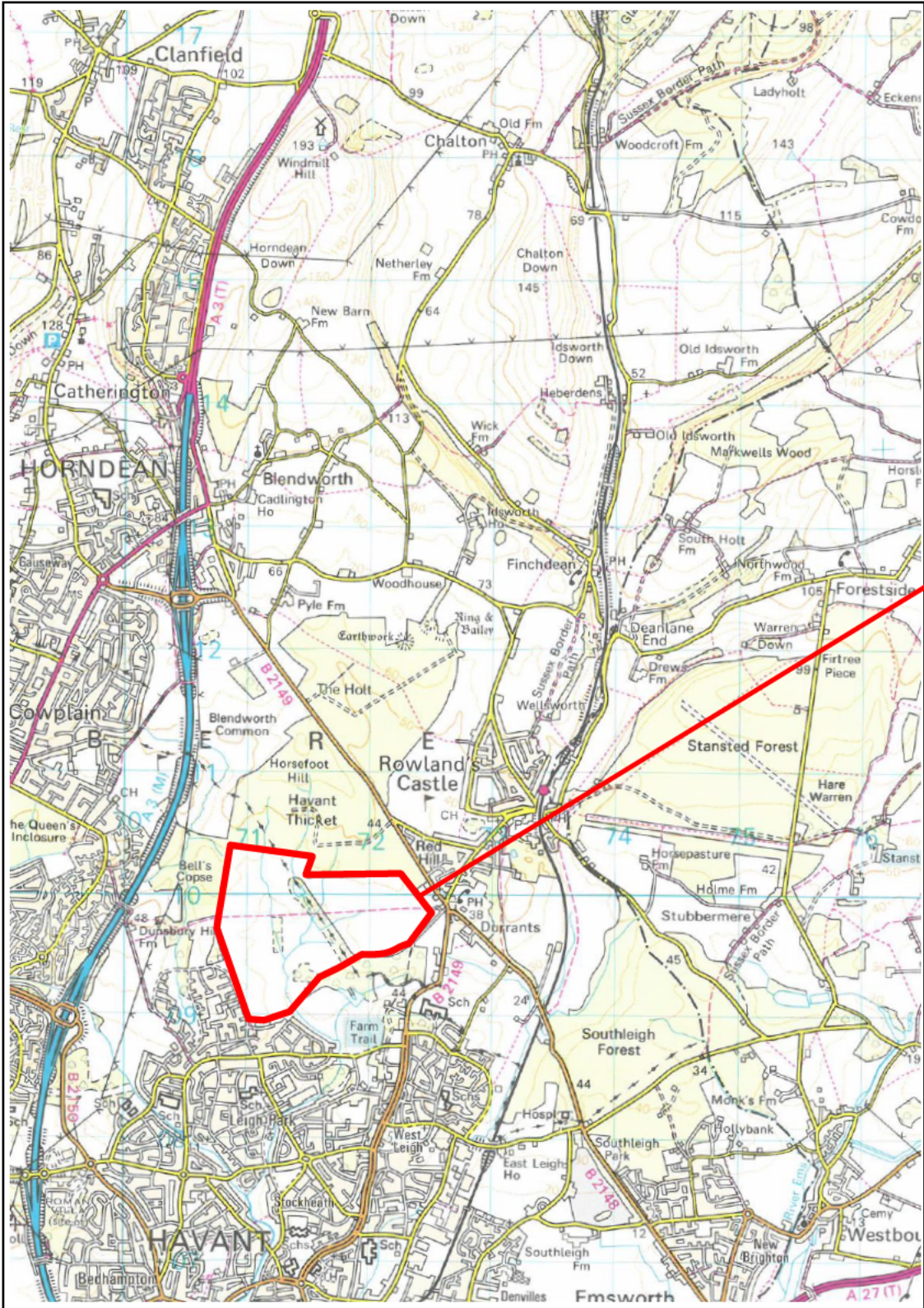
APPENDIX A

FIGURES AND DRAWINGS

Site Location Plan
Site Plan

A1
A2

Site Location Plan



**THE
SITE**
(APPROXIMATE
BOUNDARY)

Reproduced from the 1992 Ordnance Survey 1:50 000 scale Landranger map No 197 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office, © Crown copyright, Environmental Services Group Limited. All rights reserved. Licence Number 100006060

Notes: Scale 1 50 000	Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water	Figure A1
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APPENDIX B

EXPLORATORY HOLE RECORDS

Exploratory Hole Summary	B1
Key to Exploratory Hole Records	Key
SPT Hammer Energy Ratio Report	JD02, JD04, RD01 and TH70
Borehole Logs	ATK-BH-01 and ATK-BH-02 ATK-CP-01 to ATK-CP-16, ATK-CP-07A and ATK-CP-13A ATK-RC-01 to ATK-RC-03
Trial Pit Logs	ATK-TP-01 to ATK-TP-08 ATK-TPM-02 to ATK-TPM-05
Split Tube Sample Description:	
ATK-BH-01	UT6, UT8, UT10, UT16, UT18, UT20, UT22, UT24, UT26 and UT27
ATK-BH-02	UT5, UT7, UT8, UT9, UT11, UT17, UT19 and UT21

Exploratory Hole Summary

Table:		Contract No.					Contract:		
B1		A9031-19					HAVANT THICKET WINTER STORAGE RESERVOIR		
Hole ID	Scheduled Depth (m)	Ground Level (mOD)	Hole Type	Top Depth (m)	Base Depth (m)	Start Date	End Date	Monitoring Well	Remarks
ATK-BH-01	10.00	25.73	CP	0.00	12.00	2019-12-09	2019-12-10	✓	
ATK-BH-02	10.00	21.45	CP	0.00	9.20	2019-12-12	2019-12-16	✓	
ATK-CP-01	35.00	37.45	CP	0.00	30.30	2019-11-07	2019-11-12	✓	Terminated due to hard strata.
ATK-CP-02	30.00	30.03	CP	0.00	34.45	2019-11-08	2019-11-14	✓	
ATK-CP-02-TSS	-	30.03	TP	0.00	0.40	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-CP-02. No log included.
ATK-CP-03	20.00	22.72	CP	0.00	9.00	2019-12-05	2019-12-06	-	Terminated due to possible artesian groundwater in deeper strata.
ATK-CP-04	20.00	24.90	CP	0.00	12.20	2019-11-15	2019-11-18	✓	Terminated due to hard strata.
ATK-CP-05	20.00	27.91	CP	0.00	20.00	2019-11-19	2019-11-21	✓	
ATK-CP-06	15.00	34.73	CP	0.00	14.80	2019-12-04	2019-12-05	✓	
ATK-CP-07	10.00	38.75	CP	0.00	2.70	2019-11-26	2019-11-26	-	Borehole terminated due to hard strata, relocated and designated ATK-CP-07A.
ATK-CP-07A	10.00	38.66	CP	0.00	10.35	2019-11-26	2019-11-28	-	
ATK-CP-07-TSS	-	38.75	TP	0.00	0.20	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-CP-07. No log included.
ATK-CP-08	10.00	38.47	CP	0.00	10.44	2019-11-26	2019-11-27	-	
ATK-CP-08-TSS	-	38.47	TP	0.00	0.20	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-CP-08. No log included.
ATK-CP-09	10.00	39.17	CP	0.00	10.10	2019-11-27	2019-11-28	-	
ATK-CP-09-TSS	-	39.17	TP	0.00	0.20	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-CP-09. No log included.
ATK-CP-10	15.00	36.10	CP	0.00	11.50	2019-11-21	2019-11-22	-	Terminated due to hard strata.
ATK-CP-11	10.00	26.15	CP	0.00	11.26	2019-12-17	2019-12-17	✓	
ATK-CP-12	10.00	26.90	CP	0.00	10.45	2019-11-18	2019-11-20	✓	
ATK-CP-13	10.00	29.91	CP	0.00	2.50	2019-11-22	2019-11-22	-	Borehole terminated due to obstruction, relocated and designated ATK-CP-13A.
ATK-CP-13A	10.00	29.75	CP	0.00	10.50	2019-11-25	2019-11-25	✓	
ATK-CP-13-TSS	-	29.91	TP	0.00	0.10	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-CP-13. No log included.
ATK-CP-14	15.00	33.61	CP	0.00	5.40	2019-12-11	2019-12-11	-	Borehole terminated due to slow progress. Unable to safely relocate rig, location cancelled.

Exploratory Hole Summary

Table:		Contract No.					Contract:		
B1		A9031-19					HAVANT THICKET WINTER STORAGE RESERVOIR		
Hole ID	Scheduled Depth (m)	Ground Level (mOD)	Hole Type	Top Depth (m)	Base Depth (m)	Start Date	End Date	Monitoring Well	Remarks
ATK-CP-15	30.00	33.45	CP	0.00	30.28	2019-11-28	2019-12-04	✓	
ATK-CP-16	-	37.70	CP	0.00	10.45	2019-12-17	2019-12-18	✓	Panel of experts additional hole.
ATK-RC-01	35.00	40.53	DS	0.00	4.50	2019-12-03	2019-12-03	✓	
			RC	4.50	38.50	2019-12-04	2019-12-09		
ATK-RC-01-TSS	-	40.53	TP	0.00	0.40	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-RC-01. No log included.
ATK-RC-02	60.00	39.87	CP	0.00	6.50	2019-11-13	2019-11-13	✓	Relocated and designated ATK-RC-02A for improved core recovery.
			RC	6.50	72.20	2019-11-18	2019-12-12		
ATK-RC-02A	60.00	39.85	RO	0.00	6.30	2019-12-13	2019-12-13	✓	Carried out to recover additional core.
			RC	6.30	40.00	2019-12-13	2019-12-17		
ATK-RC-03	40.00	31.52	DS	0.00	10.00	2019-12-16	2019-12-17	✓	
			RO	10.00	45.00	2019-12-18	2019-12-18		
			RC	45.00	48.00	2019-12-18	2019-12-18		

Exploratory Hole Summary

Table:		Contract No.					Contract:		
B1		A9031-19					HAVANT THICKET WINTER STORAGE RESERVOIR		
Hole ID	Scheduled Depth (m)	Ground Level (mOD)	Hole Type	Top Depth (m)	Base Depth (m)	Start Date	End Date	Monitoring Well	Remarks
ATK-TP-01	4.50	32.55	TP	0.00	3.70	2019-11-13	2019-11-13	-	Terminated due to instability of long faces.
ATK-TP-02	4.50	26.62	TP	0.00	2.50	2019-11-12	2019-11-12	-	
ATK-TP-03	4.50	25.37	TP	0.00	3.80	2019-11-14	2019-11-14	-	
ATK-TP-04	4.50	33.39	TP	0.00	3.40	2019-11-26	2019-11-26	-	Unstable below 3.00 m.
ATK-TP-04-TSS	-	33.39	TP	0.00	0.20	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-TP-04. No log included.
ATK-TP-05	4.50	32.57	TP	0.00	2.00	2019-11-26	2019-11-26	-	Unstable below 2.00 m.
ATK-TP-05i	1.50	32.43	TP	0.00	1.50	2019-12-05	2019-12-05	-	Carried out adjacent to ATK-TP05 to undertake Soakaway Infiltration Test.
ATK-TP-05-TSS	-	32.57	TP	0.00	0.30	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-TP-05. No log included.
ATK-TP-06	4.50	32.07	TP	0.00	3.60	2019-12-10	2019-12-10	-	
ATK-TP-06-TSS	-	32.07	TP	0.00	0.10	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-TP-06. No log included.
ATK-TP-07	4.50	34.55	TP	0.00	1.70	2019-11-26	2019-11-26	-	Terminated due to instability of long faces.
ATK-TP-07i	1.50	34.52	TP	0.00	1.50	2019-12-05	2019-12-05	-	Carried out adjacent to ATK-TP07 to undertake Soakaway Infiltration Test.
ATK-TP-07-TSS	-	34.55	TP	0.00	0.30	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-TP-07. No log included.
ATK-TP-08	4.50	34.01	TP	0.00	2.50	2019-11-27	2019-11-27	-	Unstable below 2.50 m.
ATK-TP-08-TSS	-	34.01	TP	0.00	0.30	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-TP-08. No log included.
ATK-TPM-01	6.50	-	TP	Descoped during fieldwork.					
ATK-TPM-02	6.50	21.79	TP	0.00	3.70	2019-12-02	2019-12-02	-	
ATK-TPM-03	6.50	23.36	TP	0.00	3.80	2019-11-30	2019-11-30	-	
ATK-TPM-04	6.50	23.04	TP	0.00	3.90	2019-12-02	2019-12-02	-	
ATK-TPM-05	6.50	26.86	TP	0.00	4.50	2019-11-20	2019-11-20	-	TPM used to assess stability for possible man entry.
ATK-TPM-05-TSS	-	26.86	TP	0.00	0.30	2019-12-10	2019-12-10	-	Undertaken to recover topsoil sample after completion of ATK-TP-05. No log included.
ATK-TPM-06	6.50	-	TP	Descoped during fieldwork.					
ATK-TPM-07	6.50	-	TP	Descoped during fieldwork.					



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Key to Exploratory Hole Records

SAMPLES

Undisturbed

U	Driven tube sample	} nominally 100 mm diameter and full recovery unless otherwise stated
UT	Driven thin wall tube sample	
TW	Pushed thin wall tube sample	
P	Pushed piston sample	
L	Liner sample from dynamic (windowless) sampling. Full recovery unless otherwise stated	
CBR	CBR mould sample	
BLK	Block sample	
C / CS	Core sample (from rotary core) taken for laboratory testing.	
AMAL	Amalgamated sample	

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample

	Environmental chemistry samples (in more than one container where appropriate)
ES	Soil sample
EW	Water sample

Comments

Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that, while an attempt was made to take a tube sample, there was no recovery.

Samples taken from borehole installations (ie water or gas) after hole construction are not shown on the exploratory hole logs.

Specimens for point load testing undertaken on site (or other non-lab location) are not shown on the log.

IN SITU TESTS

SPT S or SPT C	Standard Penetration Test, open shoe (S) or solid cone (C)
----------------	--

The Standard Penetration Test is defined in BS EN ISO 22476-3:2005+A1:2011. The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self-weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 the total blow count beyond the seating drive is given (without the N = prefix).

IV	<i>in situ</i> vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Permeability tests (KFH = falling head, KRH = rising head; KPI = packer inflow); results provided in Field Records column (one value per stage for packer tests)

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930:2015

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacing measurements are presented.
NI	Non-intact - used where the core is fragmented (ie no Solid Core).
NA	Not-applicable - used where a measurement is not applicable (eg. If, SCR and RQD in non-rock materials).

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered in the following run (length in m)
AZCL	Assessed zone of core loss

GROUNDWATER



Groundwater entry
Depth to groundwater after standing period

Notes:

See report text for full references of standards.

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Sheet 1 of 3

Key to Exploratory Hole Records

INSTALLATION

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

Standpipe/ piezometer

The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:

SP	Standpipe				
SPIE	Standpipe piezometer	Plain		Slotted	Piezometer
PPIE	Pneumatic piezometer	Pipe		Pipe	Tip
EPIE	Electronic piezometer				

Inclinometer or Slip Indicator

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

ICE	The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:
ICM	Biaxial inclinometer
SLIP	Inclinometer tubing for use with probe Slip indicator

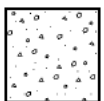
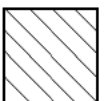
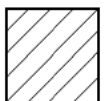
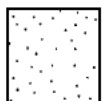
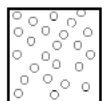
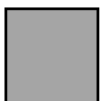
Settlement Points or Pressure Cells

The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column. The type of instrument installed is indicated by a code in the Legend column:

ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point
EPCE	Electronic embedment pressure cell
PPCE	Electronic push in pressure cell

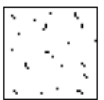
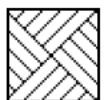
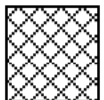
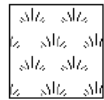
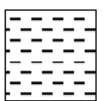
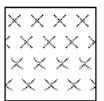
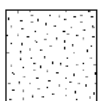
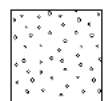
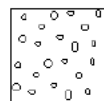
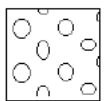
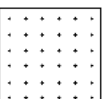
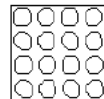
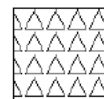
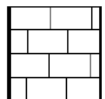
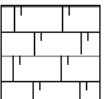
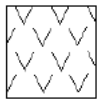
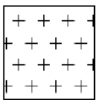
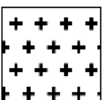
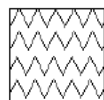
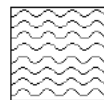
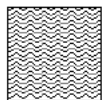
INSTALLATION / BACKFILL LEGENDS

A legend describing the installation is shown in the rightmost column. Legend symbols used to describe the backfill materials are indicated below.

Macadam	Concrete	Grout	Bentonite	Sand	Gravel	Arising
						

STRATUM LEGENDS

The legend symbols used for graphical representation of soils, rocks and other materials on the borehole logs are shown below. For soils with significant proportions of secondary soil types, a combination of two or more symbols may be used.

Macadam	Concrete	Topsoil	Made Ground / Fill	Peat	Void or No Information	
						
Clay	Silt	Sand	Gravel	Cobbles	Boulders	Coal
						
Mudstone	Siltstone	Sandstone	Conglomerate	Breccia	Limestone	Chalk
						
Igneous (Fine)	Igneous (Med)	Igneous (Coarse)	Metamorphic (Fine)	Metamorphic (Med)	Metamorphic (Coarse)	Tuff
						

Notes:

See report text for full references of standards.

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Key to Exploratory Hole Records

NOTES

- 1 Soils and rocks are described in accordance with BS EN ISO 14688-1:2018 and 14689-1:2018 respectively and the guidance of BS 5930:2015.
- 2 For fine soils, consistency determined during description is reported for those strata where undisturbed samples are available. Where the logger considers that the sample may not be representative of the condition in situ, for whatever reason, the reported consistency is given in brackets. The reliability of the sample is indicated by Probably or Possibly as appropriate. Hence (Probably firm) indicates the logger is reasonably confident of the assessment, but (Possibly firm) means less certainty. Where the samples available are too disturbed to allow a reasonable assessment of the in situ condition, no consistency is given.
- 3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs. However, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.
- 4 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.
- 5 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures.
- 6 Observations of discernible groundwater entries during the advancement of the exploratory hole are given at the foot of the log and in the Legend column. The absence of a recorded groundwater entry should not, however, be interpreted as a groundwater level below the base of the borehole. Under certain conditions groundwater entry may not be observed, for instance, drilling with water flush or overwater, or boring at a rate faster than water can accumulate in the borehole. Similarly, where water entry observations do exist, groundwater may also be present at higher elevations in the ground than where recorded in the borehole. In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.
- 7 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.

REFERENCES

- 1 BS EN ISO 14688-1:2018 : Geotechnical investigation and testing - Identification and classification of soil. Part 1 Identification and description. British Standards Institution
- 2 BS EN ISO 14689-1 : 2018 : Geotechnical investigation and testing - Identification and classification of rock. Part 1 Identification and description. British Standards Institution
- 3 BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing. Part 3 Standard penetration test. British Standards Institution
- 4 BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution

Notes:

See report text for full references of standards.

Updated October 2018

Project

Project No.

Carried out for

Key

Sheet 3 of 3

SPT Calibration Report



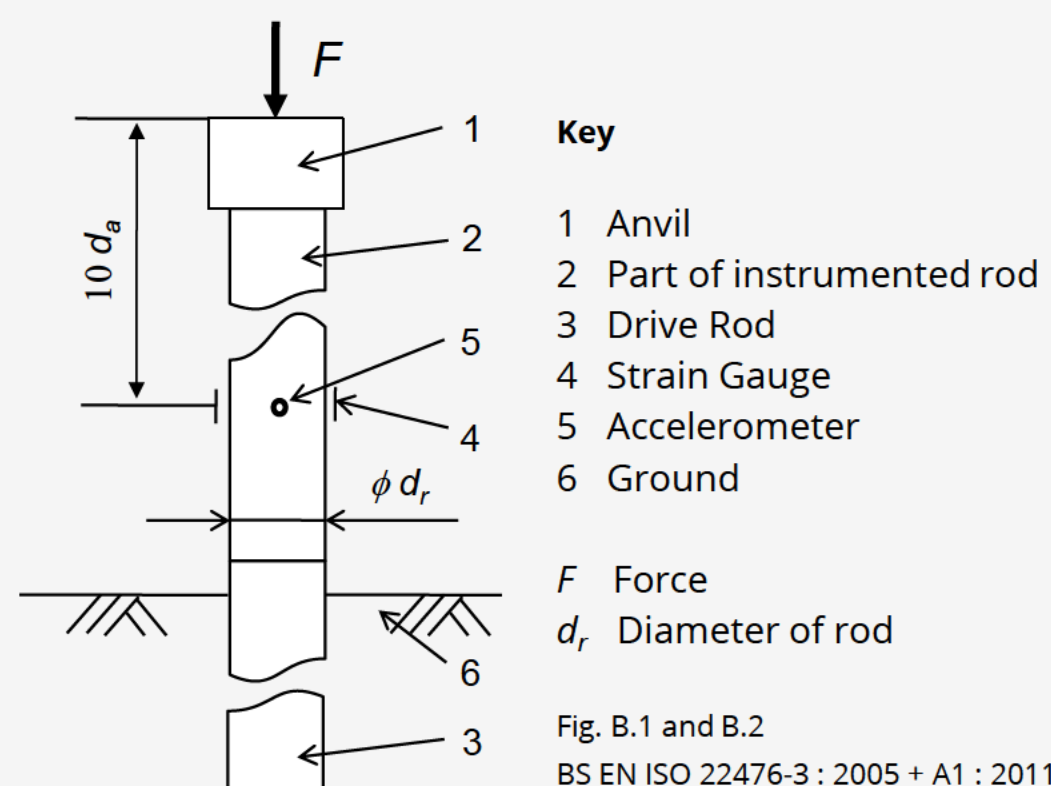
Hammer Energy Measurement Report

Type of Hammer SPT HAMMER
Client JACKSON DRILLING
Test No EQU2194

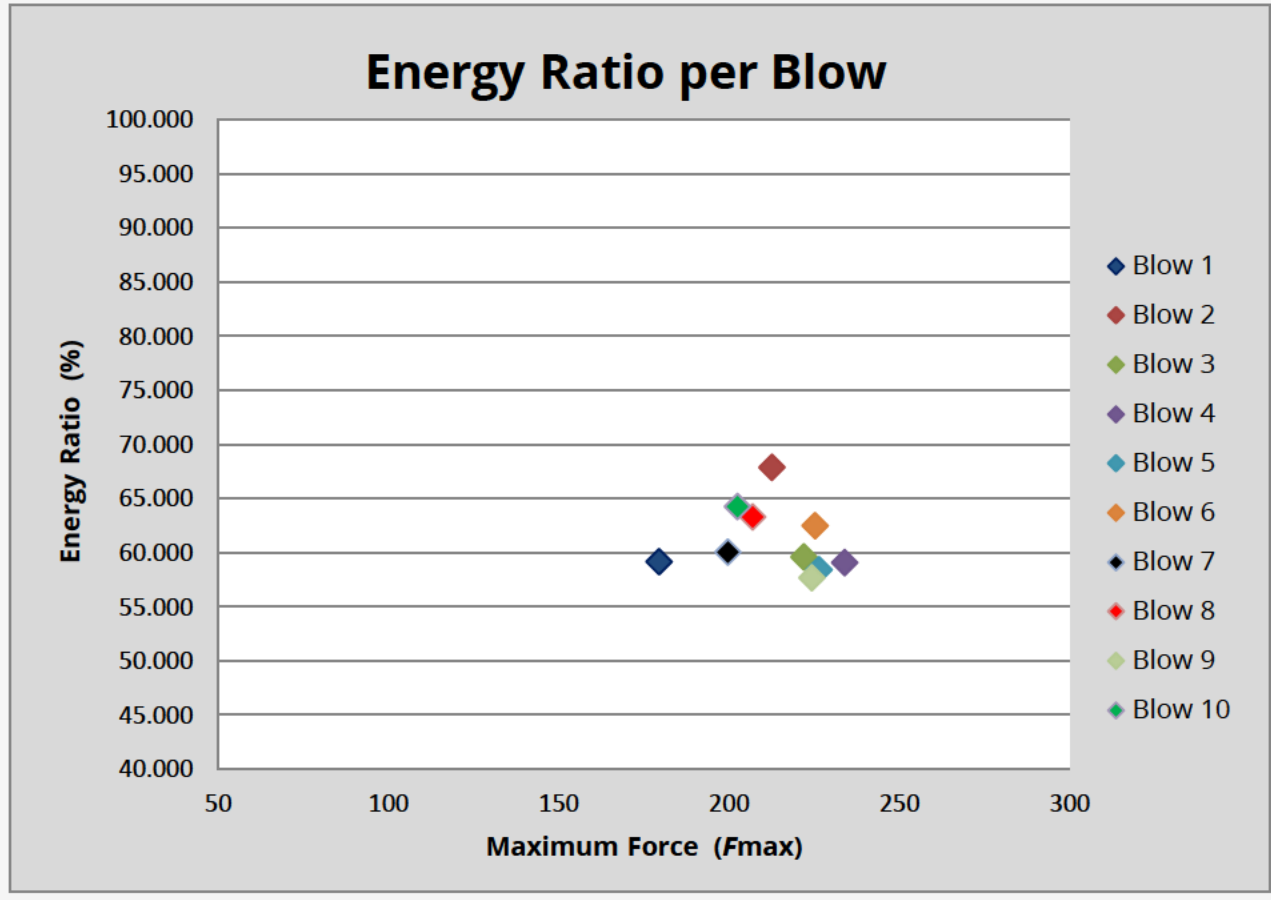
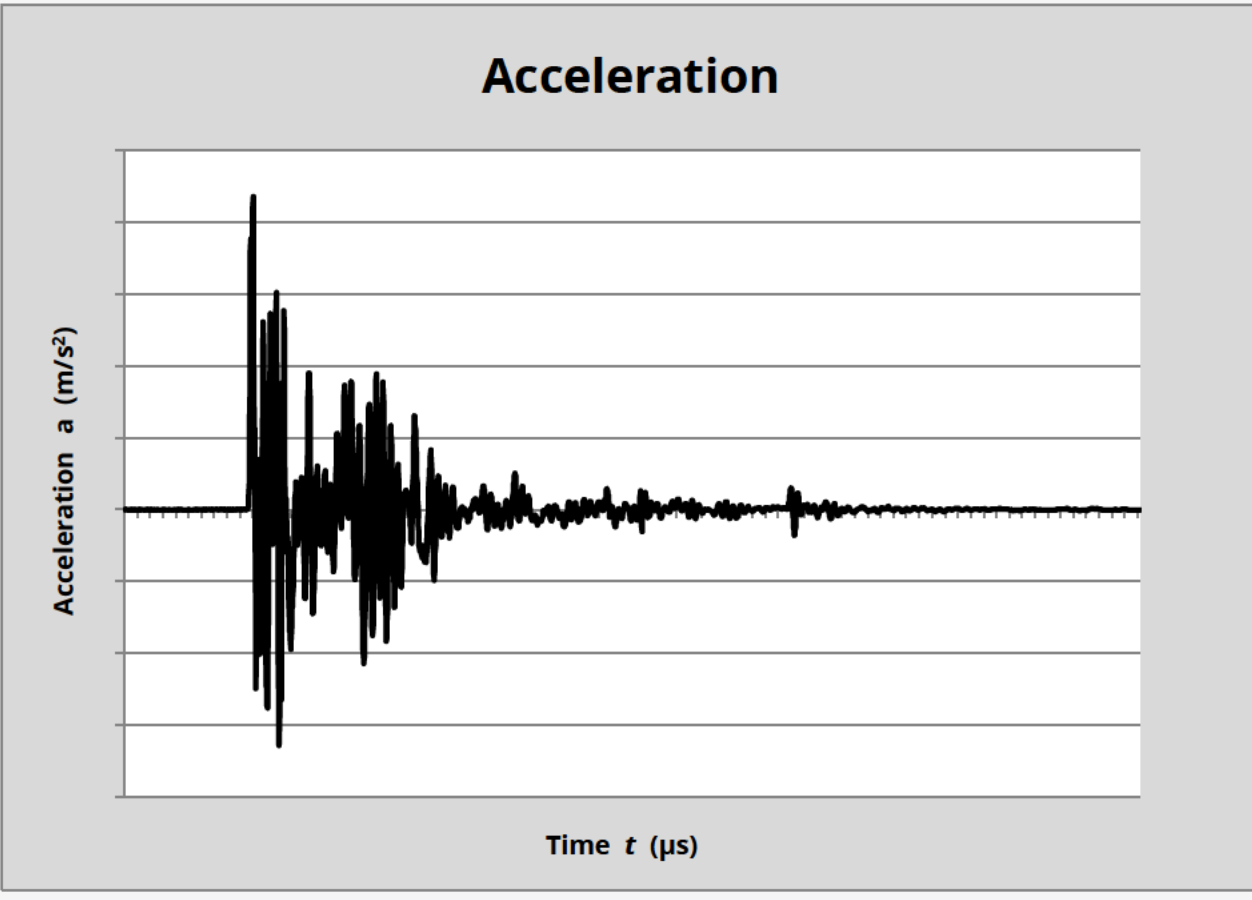
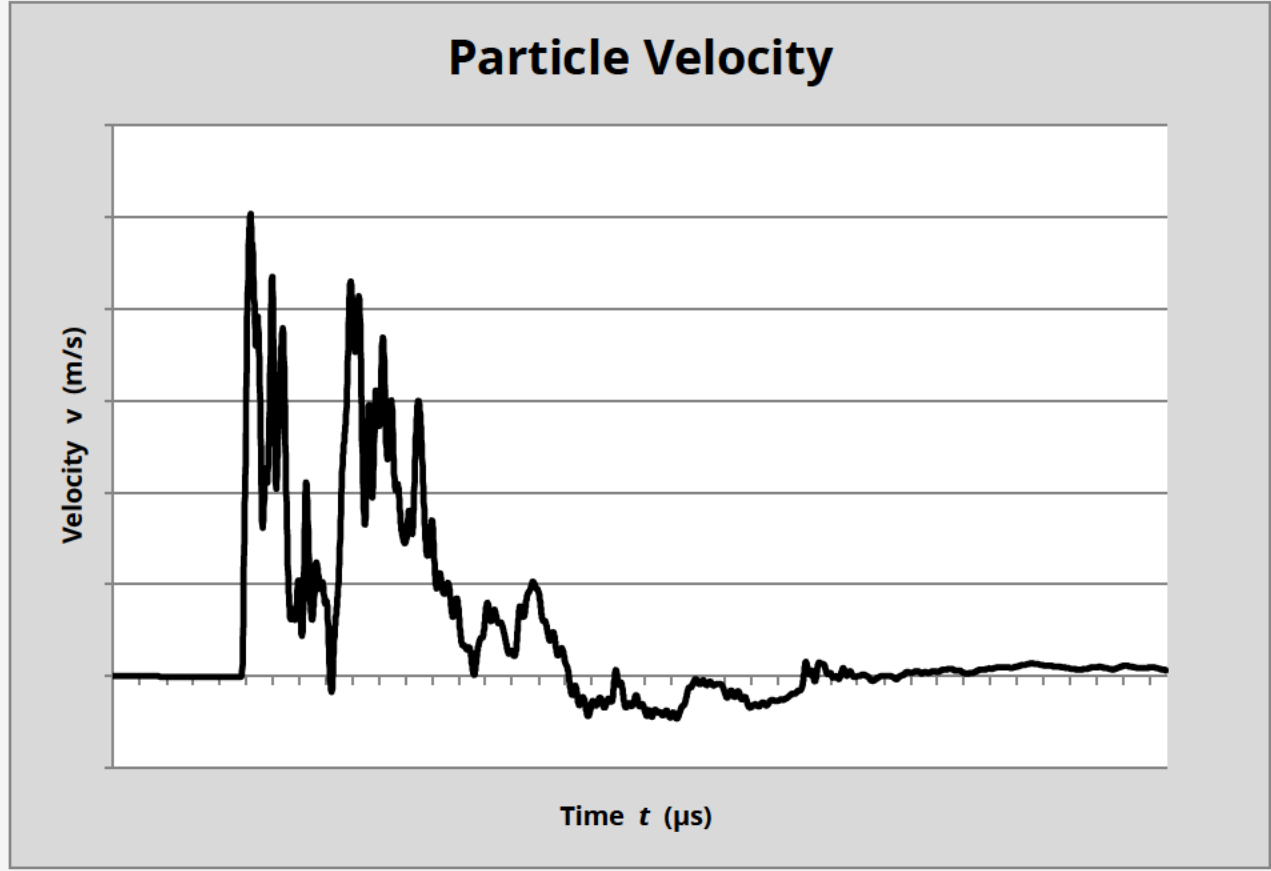
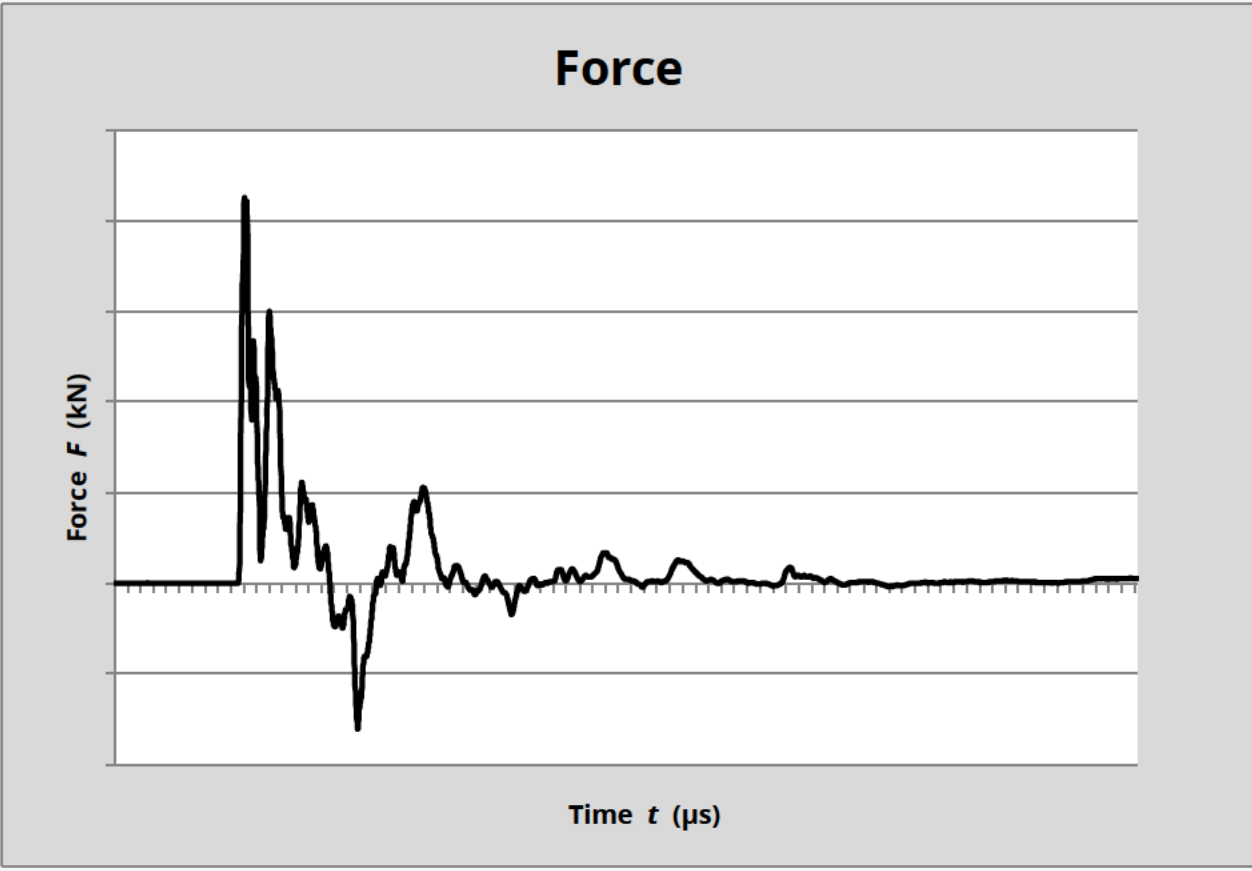
Test Depth (m) 6.90
Mass of hammer $m = 63.5\text{kg}$
Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter $d_r = 0.052\text{ m}$
Length of instrumented rod 0.558 m
Area $A = 11.61\text{ cm}^2$
Modulus $E_a = 206843\text{ MPa}$



DATE OF TEST	VALID UNTIL	HAMMER ID
19/12/2018	19/12/2019	JD02



Observations:
1.

$E_{\text{meas}} = 0.288\text{ kN-m}$
 $E_{\text{theor}} = 0.473\text{ kN-m}$

Energy Ratio = $\frac{E_{\text{meas}}}{E_{\text{theor}}}$

EQUIPE GROUP
60.95%
© Copyright 2018

Equipe SPT Analyzer Operators: AF

Prepared by:	Checked by:	Date: 20/12/2018
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SPT Calibration Report

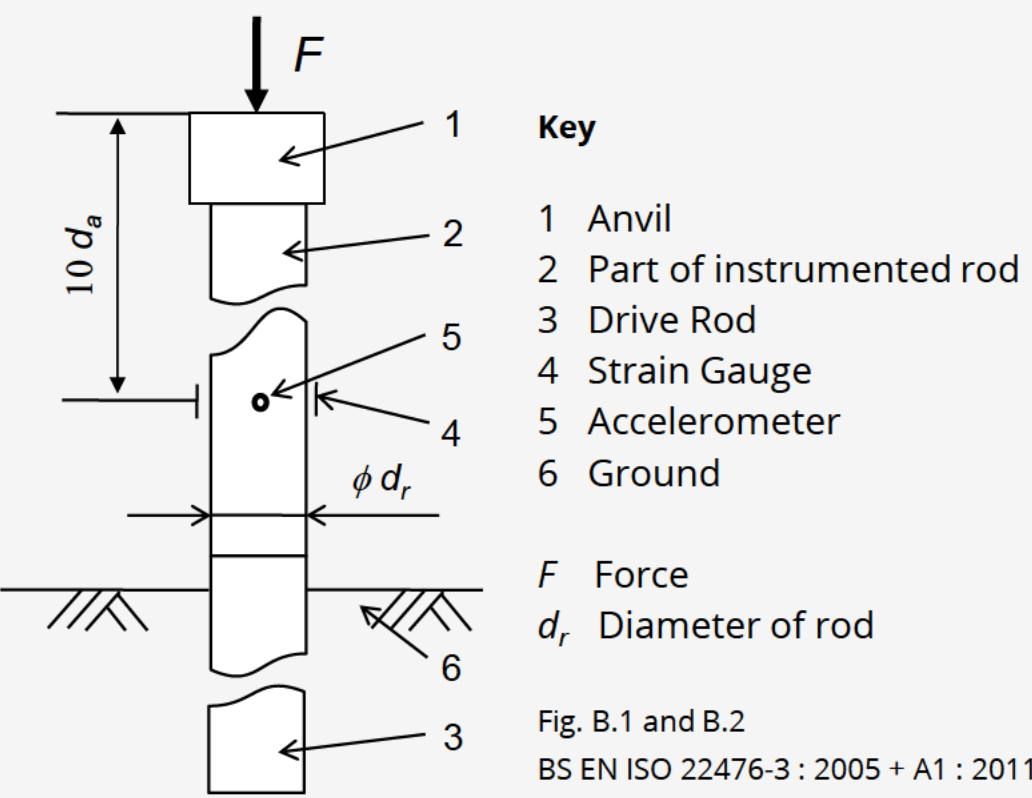
Hammer Energy Measurement Report

Type of Hammer SPT HAMMER
Client JACKSON DRILLING
Test No EQU2193

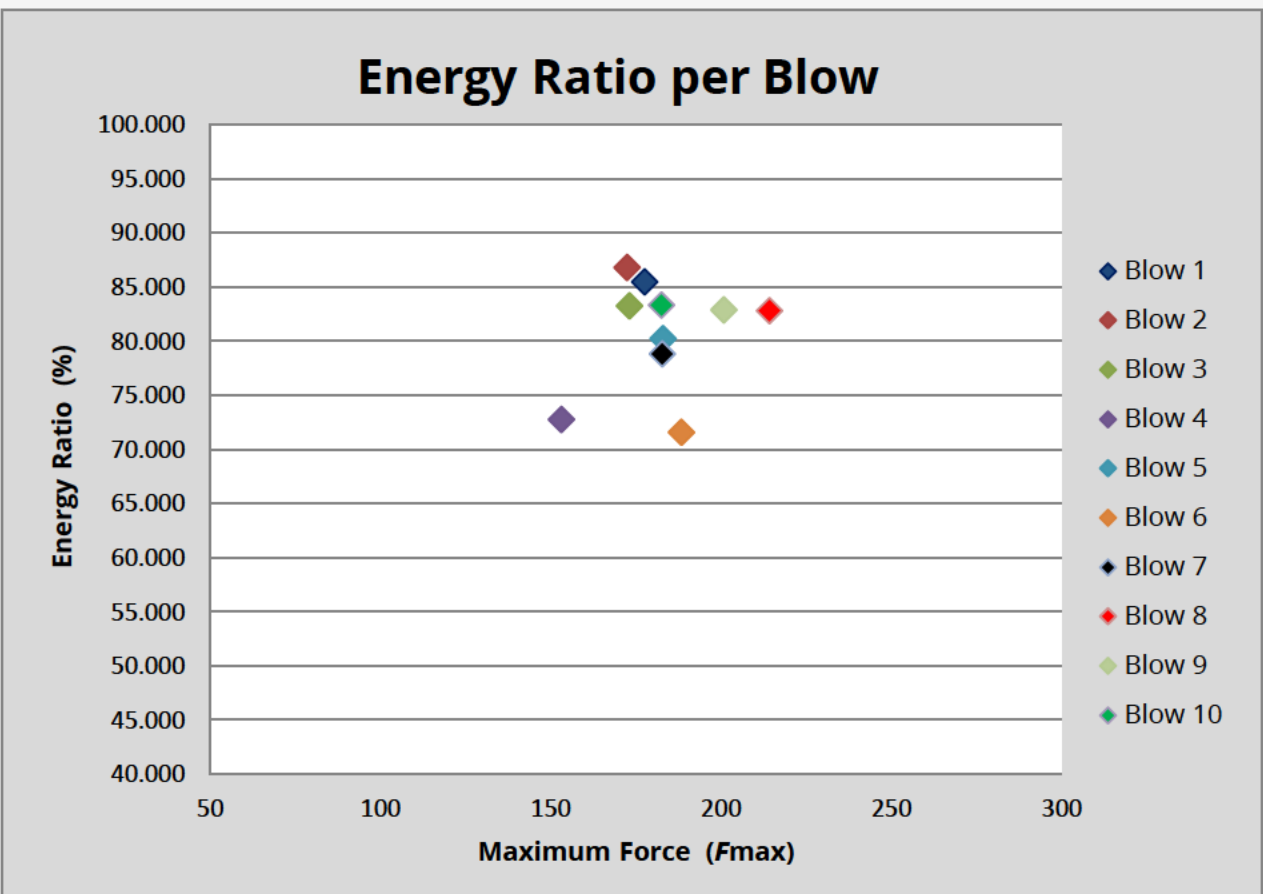
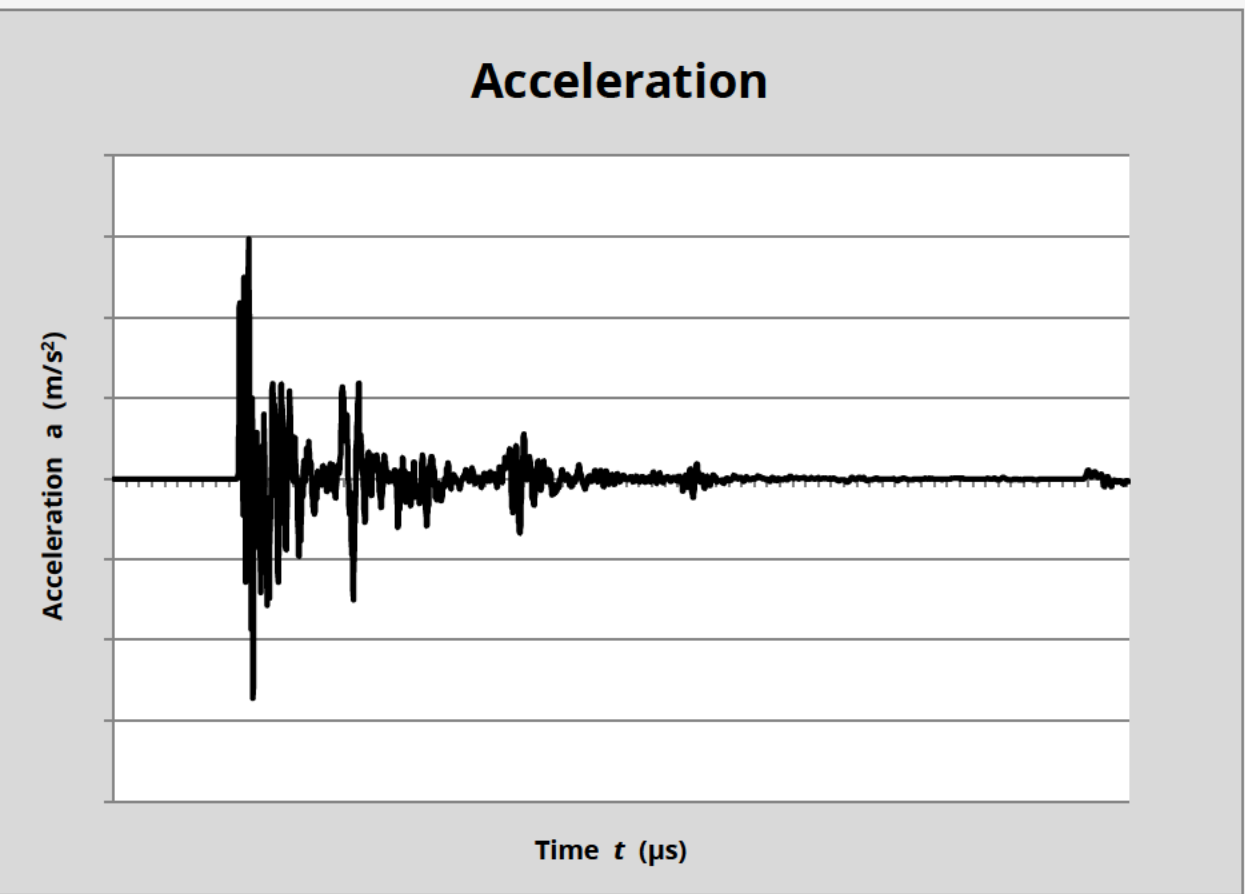
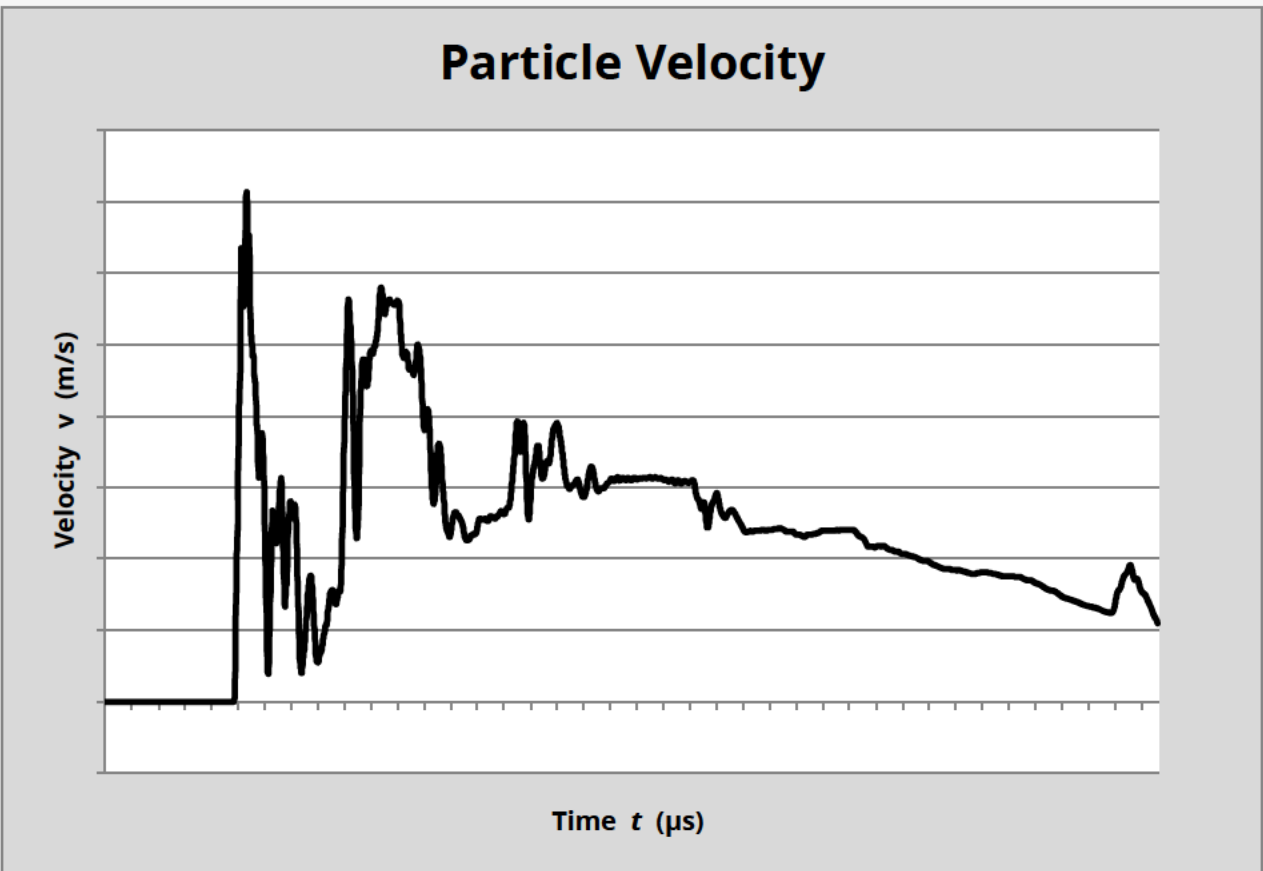
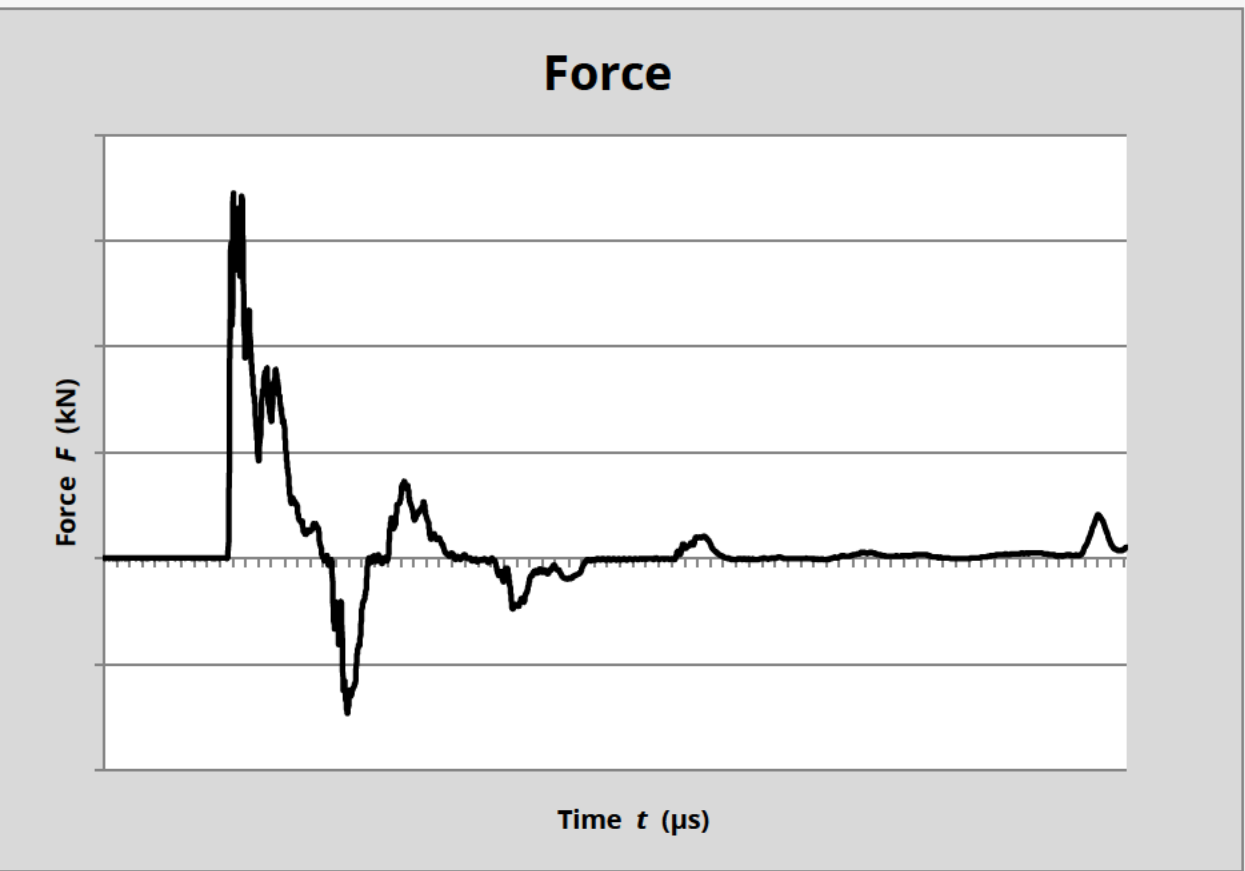
Test Depth (m) 6.70
Mass of hammer $m = 63.5\text{kg}$
Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter $d_r = 0.052\text{ m}$
Length of instrumented rod 0.558 m
Area $A = 11.61\text{ cm}^2$
Modulus $E_a = 206843\text{ MPa}$



DATE OF TEST	VALID UNTIL	HAMMER ID
19/12/2018	19/12/2019	JD04



Observations:

1.

$E_{\text{meas}} = 0.381\text{ kN-m}$
 $E_{\text{theor}} = 0.473\text{ kN-m}$

Energy Ratio = $\frac{E_{\text{meas}}}{E_{\text{theor}}}$ **80.47%**
© Copyright 2018

Equipe SPT Analyzer Operators: AF

Prepared by:

[Signature]
20/12/2018

Checked by:

[Signature]
20/12/2018

Date:

20/12/2018



SPT Calibration Report

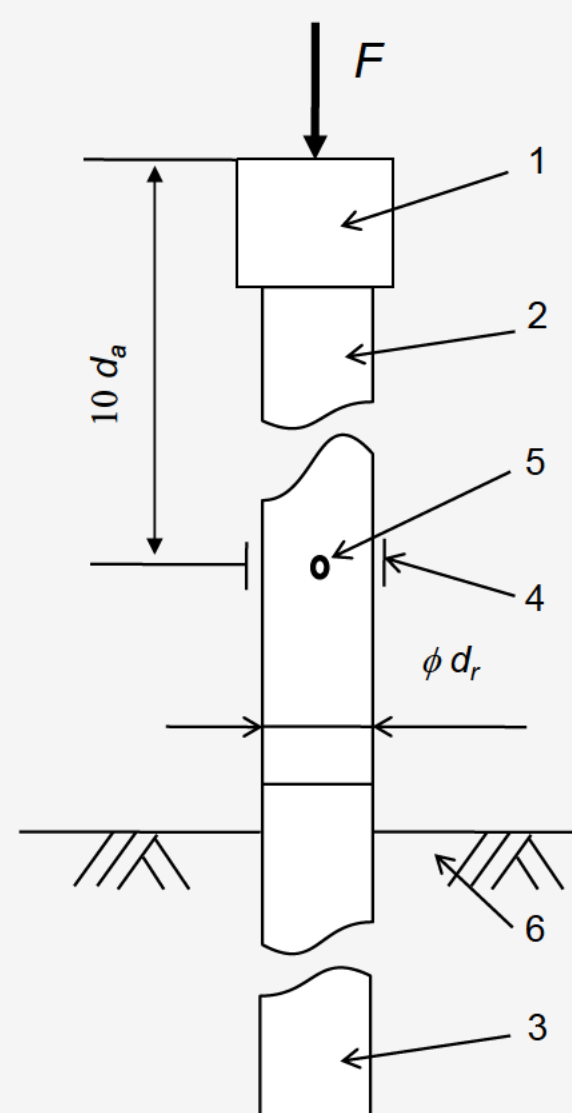
Hammer Energy Measurement Report

Type of Hammer SPT HAMMER
Test No EQU2270
Client JACKSON DRILLING

Test Depth (m) 8.40
Mass of hammer $m = 63.5\text{kg}$
Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter $d_r = 0.052\text{ m}$
Length of instrumented rod 0.558 m
Area $A = 11.61\text{ cm}^2$
Modulus $E_a = 206843\text{ MPa}$



Key

- 1 Anvil
- 2 Part of instrumented rod
- 3 Drive Rod
- 4 Strain Gauge
- 5 Accelerometer
- 6 Ground

F Force
 d_r Diameter of rod

Fig. B.1 and B.2
BS EN ISO 22476-3 : 2005 + A1 : 2011

DATE OF TEST VALID UNTIL HAMMER ID

09/01/2019 09/01/2020 RD02

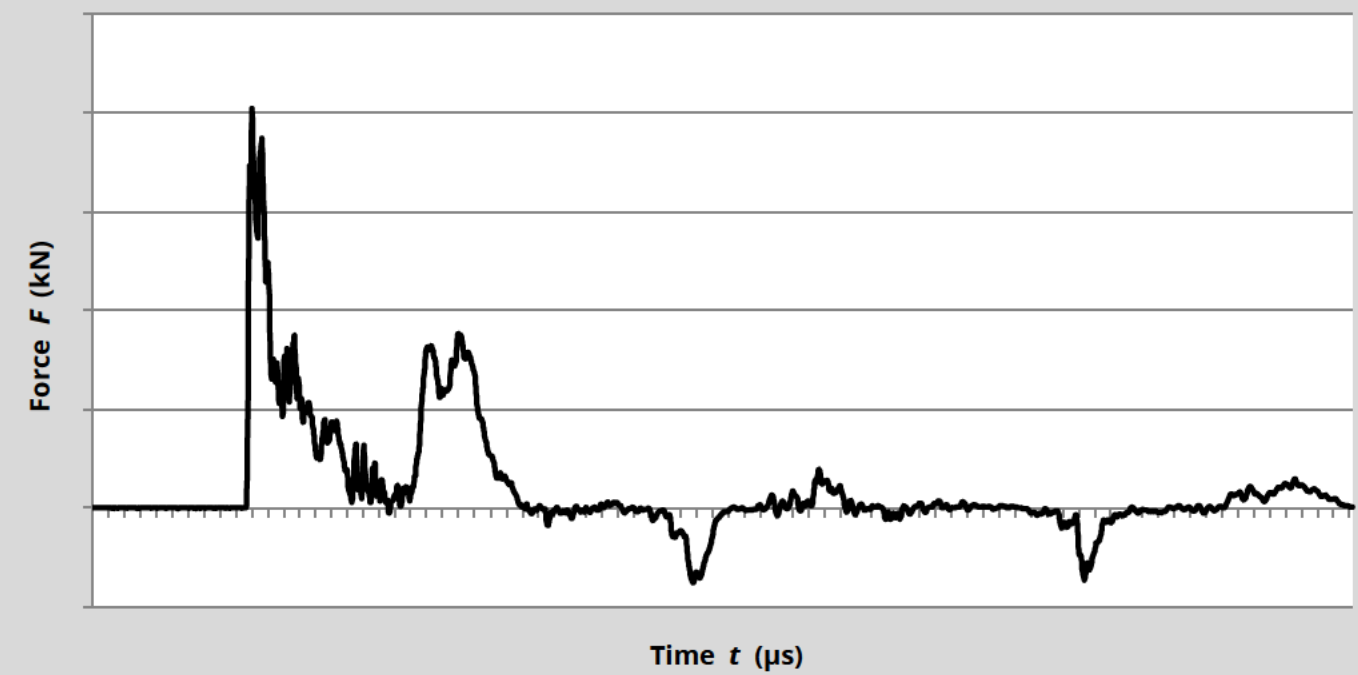
Observations:

1.

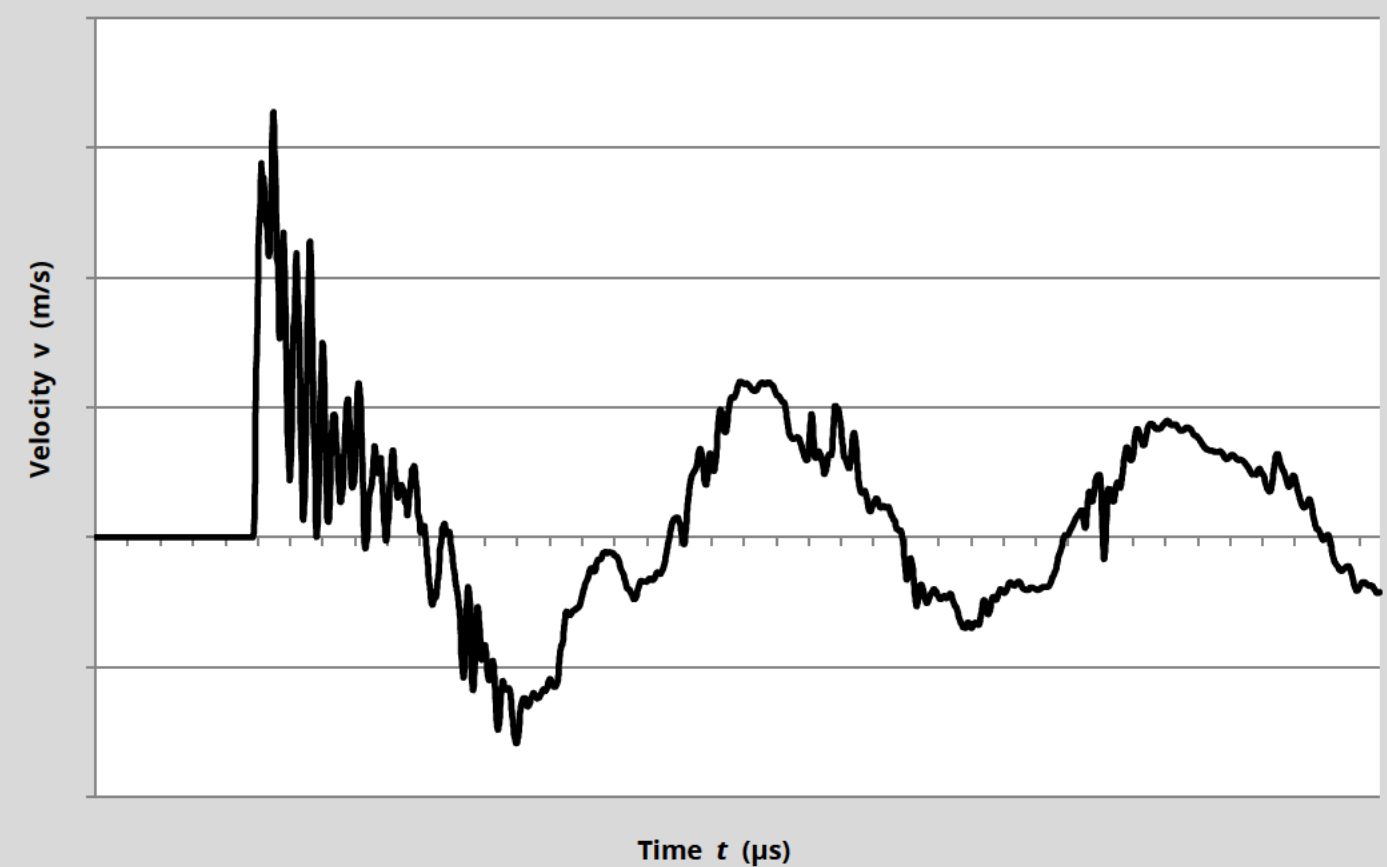
$E_{\text{meas}} = 0.367\text{ kN-m}$

$E_{\text{theor}} = 0.473\text{ kN-m}$

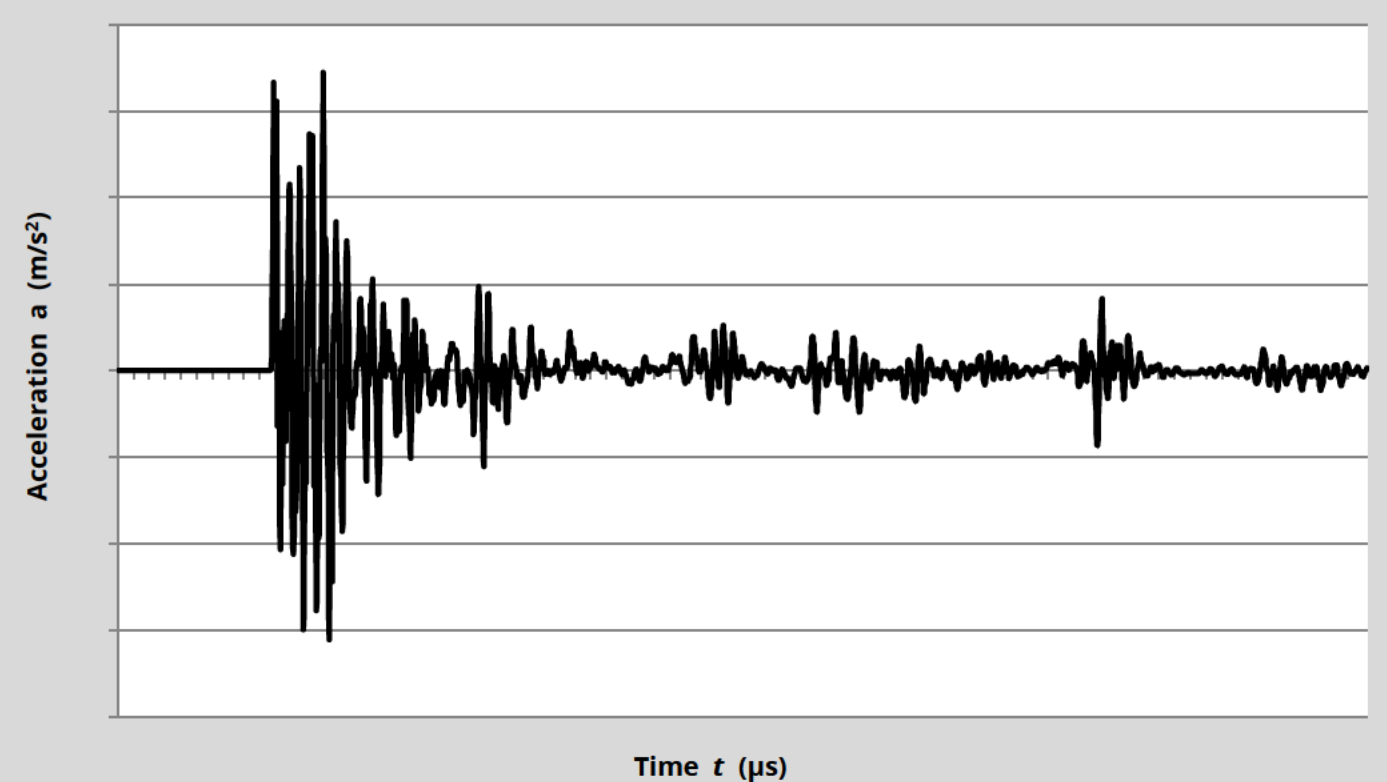
Force



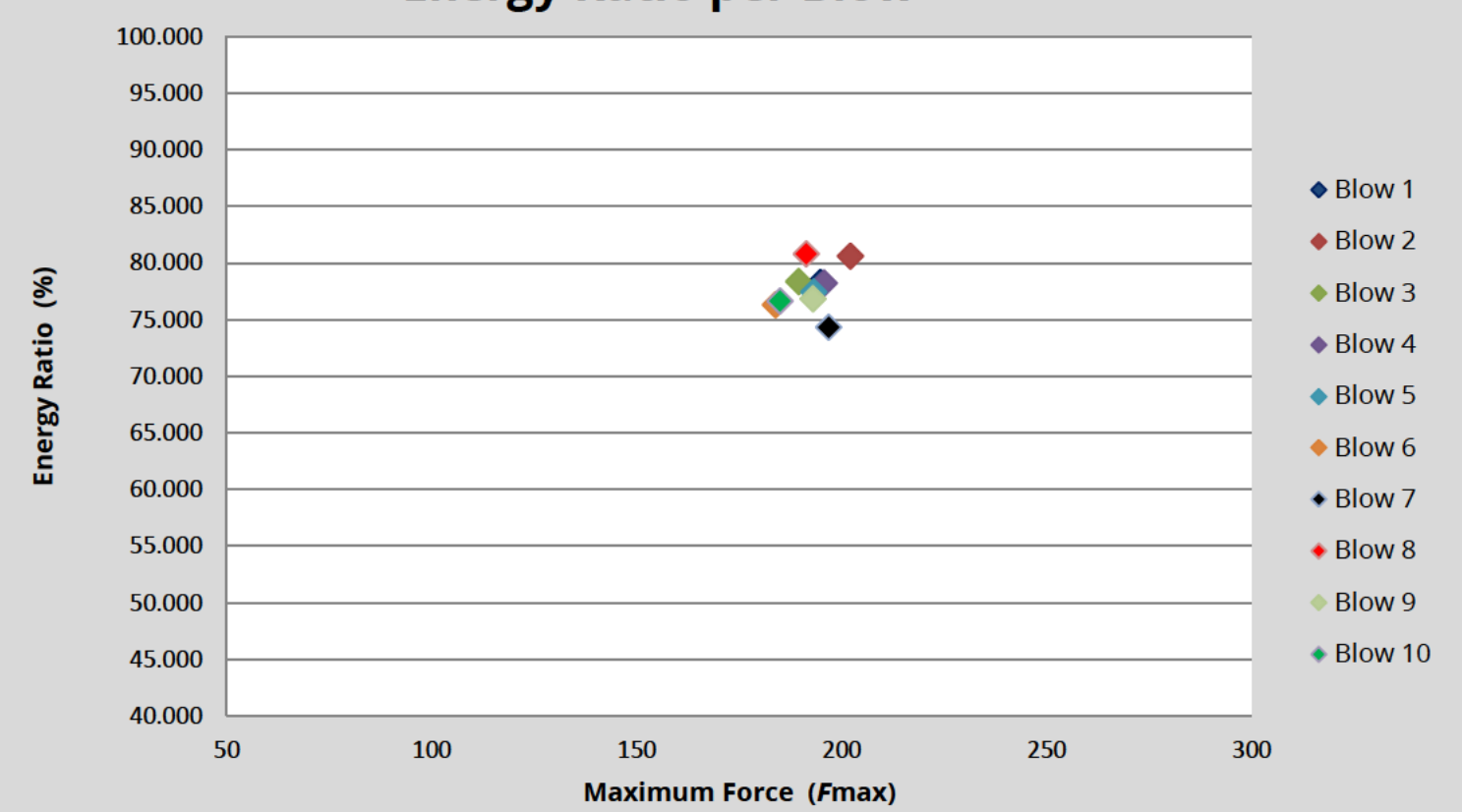
Particle Velocity



Acceleration



Energy Ratio per Blow



$$\text{Energy Ratio (Er)} = \frac{E_{\text{meas}}}{E_{\text{theor}}}$$

77.52%
© COPYRIGHT 2019

Equipe SPT Analyzer Operator

AF

Certificate prepared by

[Signature]

Certificate checked by

[Signature]

Certificate date

18/01/2019

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: TH70
Test Date: 18/10/2019
Report Date: 18/10/2019
File Name: TH70.spt
Test Operator: JL

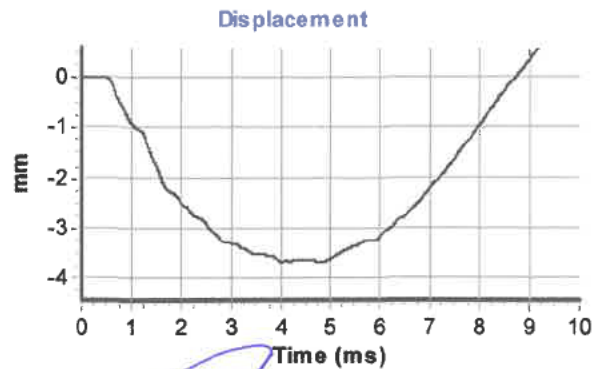
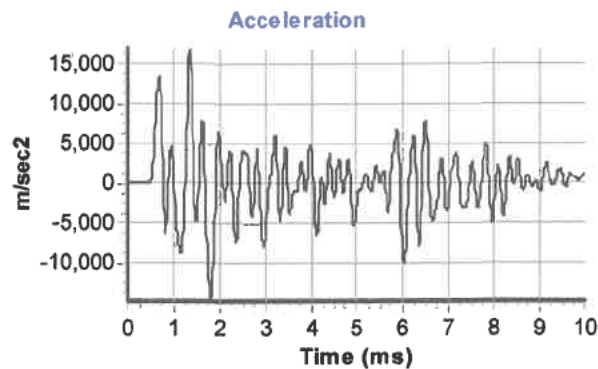
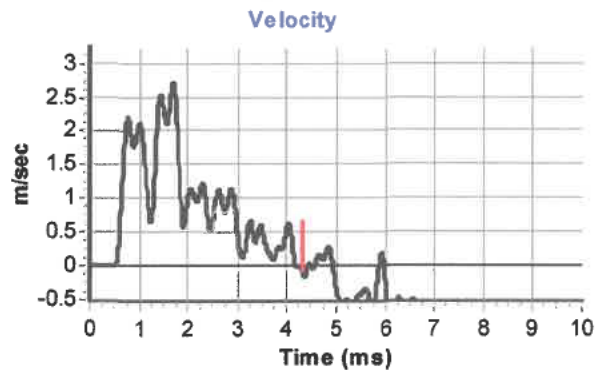
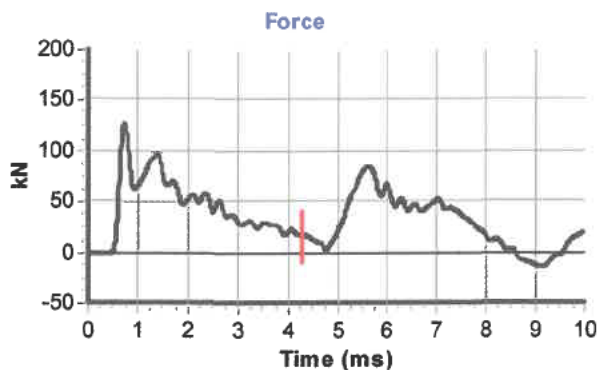
Instrumented Rod Data

Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.2
Assumed Modulus E_a (GPa): 210
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location



Calculations

Area of Rod A (mm²): 931
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 302

Energy Ratio E_r (%): **64**

Signed: S. HOWARTH
Title: FITTER

The recommended calibration interval is 12 months

Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks		Depth from	to	Diameter	Casing Depth	Ground Level	25.73 mOD
Logged	RP/FC	09/12/2019	Dando 2000 / Cable percussion boring.		1.20	12.00	150	1.70	Coordinates (m)	E 471199.06
Checked	MS	End	SPT Hammer ID: JD02. Rod type: Whitworth.						National Grid	N 109325.94
Approved	TC	10/12/2019	Vibrating wire piezometers installed at 7.00m and 11.00m on completion.							

Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.05 - 0.10	LB 1	0.00-1.20 Hand excavated inspection pit.			TOPSOIL.		0.10 (0.10)		
0.05 - 0.10	LB 2				Soft brownish grey, mottled orange and brown, slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse of flint.		(0.40)		
0.10 - 0.30	B 4								
0.30	D 3								
0.50 - 1.00	B 5				Soft to firm brownish grey, mottled orangish brown, slightly sandy slightly gravelly silty CLAY.		0.50 (0.50)		
1.00	UT 6	11 blows 80% rec		Dry		1.00-1.20 fine to coarse gravel of mudstone	1.00 24.73		
1.50	UT 8	20 blows 100% rec	1.50	Dry	Soft to firm greyish brown, mottled orangish brown and bluish grey, slightly sandy CLAY. Sand is fine to coarse. Rare roots (up to 5mm) and occasional rootlets (20x20mm). Rare pockets of selenite crystals (up to 10mm).	1.42-1.45 dark orangish brown slightly sandy gravelly clay lens. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone	(1.33)		
1.50	D 7								
2.00	UT 10	21 blows 100% rec	1.70	Dry		1.50 firm to stiff 1.54-1.95 rare pockets (up to 60x2mm)	2.33 23.40		
2.00	D 9					2.03-2.09 firm 2.09-2.33 very soft, frequent rootlets 2.19 1 no. pocket (50x10mm) of dark brown rootlets			
2.50	UT 12	25 blows No Recovery	1.70	Dry	Stiff, locally fissured brown, mottled dark grey and bluish grey, slightly sandy CLAY. Rare plant/organic material. Rare selenite crystals. Rare shell fragments (20x5mm). Fissures are randomly orientated, extremely closely spaced, planar, smooth.		(1.77)		
2.50	D 11								
2.50 - 3.00	B 13								
3.00	UT 14	28 blows No Recovery	1.70	Dry					
3.00 - 3.50	B 15								
3.50	UT 16	28 blows 100% rec	1.70	Dry					
4.10	UT 18	28 blows 100% rec	1.70	Dry	Firm to stiff friable, locally fissured, orangish grey and brown, mottled bluish grey, slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of ironstone and siltstone. Fissures are horizontal to 5 degree and 85 to 90 degree, extremely closely spaced, planar, smooth.	4.93 local pockets (up to 20mm) of dark grey, mottled orangish brown, silt	4.10 21.63		
4.10	D 17						(0.77)		
4.70	UT 20	100% rec	1.70	Dry					
4.70	D 19								
5.30	UT 22	29 blows 75% rec	09/12/19 1.70	1630 Dry	Stiff to very stiff, locally fissured, dark brownish grey silty slightly micaceous CLAY. Rare shell fragments (up to 2x5mm). Fissures are horizontal to 5 degree and randomly orientated, extremely closely spaced, planar, smooth.	5.50 very stiff	4.87 20.86		
5.30	D 21		10/12/19 1.70	0715 Dry					
5.90	UT 24	30 blows 90% rec	1.70	Dry		5.90 rare pockets (up to 20x5mm) of light grey silt, locally indistinctly laminated			
5.90	D 23								
6.50	UT 26	30 blows 90% rec	1.70	Dry		6.21 1 no. pocket (up to 20mm) of light grey fine sand/ silt			
6.50	D 25								
7.00	UT 27	33 blows 100% rec	1.70	Dry		6.29 frequent shell fragments (up to 20mm)			
7.60	UT 29	35 blows 100% rec	1.70	Dry		6.75 1 no. pocket (up to 25mm) of dark grey silt and fine sand			
7.60	D 28					6.89-6.92 1 no. pocket (up to 20mm) of dark grey silt and fine sand			
8.20	D 30								
8.30	UT 31	35 blows 100% rec	1.70	Dry			(6.73)		
8.80	UT 33	38 blows 100% rec	1.70	Dry					
8.80	D 32								
9.40	UT 34	40 blows	1.70	Dry					

Groundwater Entries			Depth Related Remarks		Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins) Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole	ATK-BH-01	
Scale 1:50	Project No.	A9031-19		Sheet 1 of 2		
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Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks			Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	25.73 mOD
Logged	RP/FC	09/12/2019	Dando 2000 / Cable percussion boring.			1.20	12.00	150	1.70	Coordinates (m)	E 471199.06
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth.							National Grid	N 109325.94
Approved	TC	10/12/2019	Vibrating wire piezometers installed at 7.00m and 11.00m on completion.								
Samples and Tests						Strata Description					
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill		
10.00 10.00	UT 38 D 35	41 blows 100% rec	1.70	Dry	Stiff to very stiff, locally fissured, dark brownish grey silty slightly micaceous CLAY. Rare shell fragments (up to 2x5mm). Fissures are horizontal to 5 degree and randomly orientated, extremely closely spaced, planar, smooth.	10.00 local pockets (up to 50x10mm) of fine sand and silt					
10.50	UT 37	43 blows 100% rec	1.70	Dry							
11.00	UT 38	46 blows	1.70	Dry							
11.60 11.60	UT 40 D 39	47 blows 89% rec	1.70 10/12/19	Dry 1630	Very stiff, locally indistinctly laminated, dark grey slightly sandy silty CLAY. Sand is fine to medium.		11.60 (0.40)				
12.00	D 41		1.70	Dry							
END OF EXPLORATORY HOLE							12.00	13.73			
Groundwater Entries						Depth Related Remarks			Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project			Borehole		
Scale 1:50						HAVANT THICKET WINTER STORAGE RESERVOIR			ATK-BH-01		
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09/04/2020 20 47 07						A9031-19					
						Carried out for			Portsmouth Water		

Borehole Log



Drilled AR Logged FC Checked MS Approved TC	Start 12/12/2019 End 16/12/2019	Equipment, Methods and Remarks Dando 2000. Cable percussion boring. SPT Hammer ID: JD02. Rod type: Whitworth. Vibrating wire piezometer installed at 4.00 m on completion.	Depth from (m) 1.20	to (m) 9.20	Diameter (mm) 150	Casing Depth (m) 4.50	Ground Level 21.45 mOD Coordinates (m) E 471397.98 National Grid N 109170.99		
Samples and Tests			Strata Description						
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 - 0.30	B 1	0.00-1.20 Hand excavated inspection pit.			TOPSOIL.		0.10 (0.10) 21.35		
0.30 - 0.50	B 2				Dark brown sandy CLAY. Frequent rootlets.		0.20 (0.10) 21.25		
0.50 - 0.80	B 3				Firm greyish brown and orangish brown slightly sandy CLAY.				
0.80 - 1.20	B 4						(1.00)		
1.20	UT 5	10 blows 75% rec	1.20	Dry	Firm orangish brown, mottled grey, slightly sandy CLAY. Frequent plant material (up to 40mm).	1.52 rare subangular to rounded gravel of mudstone and sandstone (up to 20mm)	1.20 20.25		
1.80	UT 7	22 blows 85% rec	1.70	Dry	Firm orangish brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of quartzite, chert and mudstone. Rare rootlets (up to 40mm) and plant material.	1.92-1.99 brown and grey slightly sand clayey subangular to subrounded fine to coarse gravel of mudstone, siltstone and chert	1.80 19.65		
2.30	UT 8	24 blows 100% rec	1.70	Dry		1.99-2.04 orangish brown fine to coarse sand	(0.63) 19.02		
2.80	UT 9	30 blows 80% rec	1.70	Dry	Firm to stiff greyish brown, mottled orangish brown, slightly sandy CLAY. Rare pockets (up to 20mm) of white sand/silt.	2.80-3.40 rare subangular fine to coarse gravel of chert and mudstone	(0.97) 18.05		
3.40	UT 11	30 blows 100% rec	3.00	Damp	Stiff, locally fissured, brown, mottled bluish grey, silty CLAY. Fissures are horizontal to 5 degree, randomly orientated, extremely closely spaced, planar, smooth.	3.44-3.47 rare subangular coarse gravel of chert	3.40 18.05		
4.00	UT 13	50 blows No Recovery	3.00	Damp		3.70 orangish brown lenses (up to 10mm) of fine to medium sand	(1.70)		
4.00 - 4.60	D 12 B 14					3.78 1 no. pocket (up to 20mm) of grey fine sand/silt			
4.80 - 5.05	SPTS D 15	N=6 (1,1/1,2,1,2)	4.50	Dry		4.00 grey, locally mottled brown			
4.80 - 5.10	B 16		12/12/19	1330 Dry					
5.10	UT 17	28 blows 70% rec	16/12/19	0745 Dry	Very stiff, locally fissured, grey slightly sandy silty slightly micaceous CLAY with occasional pockets/ lenses (up to 35mm) of dark grey fine sand and silt. Fissures are horizontal to 5 degree, extremely closely spaced, planar, smooth.	6.20 locally indistinctly laminated	5.10 16.35		
5.70	UT 19	32 blows 70% rec	4.50	Dry		6.38 1 no. fossil fragment (35x20mm)			
6.20	UT 21	35 blows 70% rec	4.50	Dry			(4.10)		
6.80	UT 23	36 blows 100% rec	4.50	Dry					
7.40	UT 25	38 blows	4.50	Dry					
8.00	UT 27	40 blows	4.50	Dry					
8.50	D 28								
8.60	UT 29	43 blows	4.50	Dry					
9.20	D 30		16/12/19	1530 Dry	END OF EXPLORATORY HOLE		9.20 12.25		
Groundwater Entries No. Depth Strike (m) Remarks 1 0.40 Seepage.			Depth Sealed (m)		Depth Related Remarks Depths (m) Remarks		Hard Boring Depths (m) Duration (mins) Tools used 4.00 - 4.20 30 Chisel		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20 47 08					Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water		Borehole ATK-BH-02 Sheet 1 of 1		

Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks		Depth from	to	Diameter	Casing Depth	Ground Level	37.45 mOD	
Logged	RT	07/11/2019	Dando 2000. Cable percussion boring. SPT Hammer ID: JD02, Rod type: Whitworth. Terminated due to hard strata. Standpipe piezometer installed on completion.		1.20	30.00	250	6.50	Coordinates (m)	E 470921.01	
Checked	MS	End			30.00	30.30	150	30.00	National Grid	N 109351.98	
Approved	TC	12/11/2019								Inclination	

Samples and Tests				Strata Description					
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 - 0.30	B 1	0.00-1.20 Hand excavated inspection pit.			Soft brown slightly sandy CLAY with frequent rootlets.		0.05 (0.00)		
0.30 - 0.50	B 2				(TOPSOIL)		(0.45)		
0.50	D 3				Soft orangish brown slightly sandy CLAY with frequent pockets (up to 5mm) of orange fine silt.		0.50		
0.50 - 0.80	B 4				Soft to firm orangish brown, mottled light brown, slightly sandy CLAY with frequent pockets (up to 5mm) of orange fine silt. Rare fine gravel.		(0.70)		
0.80 - 1.20	B 5								
1.00	D 6								
1.20 - 1.65	SPTS	N=7 (1,1/1,2,2,2)		Damp	Firm orangish brown, mottled light brown, slightly sandy silty CLAY. Frequent pockets (up to 5mm) of orange silt and fine sand.		1.20		
1.20 - 1.65	D 7						(0.80)		
1.20 - 1.70	B 8								
1.70 - 2.00	B 9								
2.00 - 3.00	Falling Head	k=1.4E-6 m/s	2.00	Dry	Firm to stiff light brown, mottled orangish brown and light grey, slightly sandy silty CLAY. Frequent pockets of orange silt and fine sand. Occasional pockets (up to 5mm) of black silt. Occasional partings (up to 1mm) of orange and light brown fine sand. Slightly pyritic.		2.00		
2.00	UT 11	11 blows 100% rec							
2.00	D 10								
2.50	EW 2								
2.50	EW 3								
2.50	D 12								
2.50 - 3.00	B 13								
3.00 - 3.45	SPTS	N=7 (1,1/1,1,3,2)	3.00	Dry			(2.00)		
3.00	EW 1								
3.00	D 14								
3.00	D 15								
3.00 - 3.50	B 16								
3.40 - 4.00	Rising Head	k=2.8E-9 m/s							
3.50 - 4.00	B 17								
4.00	UT 19	17 blows 100% rec	4.00	Dry	Stiff to very stiff dark grey, occasionally mottled light grey, slightly sandy CLAY. Occasional light grey lenses/layers (up to 5mm) of fine sand. Pyritic.		4.00		
4.00	D 18								
4.50	D 20		07/11/19	1750					
4.50 - 5.00	B 21		11/11/19	0730		4.50-5.00 becoming stiff with occasional shell fragments present			
			4.00	6.20		5.00-8.00 stiff to very stiff			
5.00 - 5.45	SPTS	N=15 (1,2/3,4,4,4)	5.00	Damp			(2.50)		
5.00 - 5.45	D 22								
5.00 - 5.50	B 23								
5.50 - 6.00	B 24								
6.00	UT 26	22 blows 100% rec	6.00	Dry		6.00-6.50 becoming very stiff			
6.00	D 25								
6.50	D 27								
6.50 - 7.00	B 28						6.50		
6.80	W 55						30.95		
7.00 - 7.45	SPTS	N=14 (1,2/3,3,4,4)	6.50	Dry	Stiff dark grey with occasional light grey mottling slightly sandy silty CLAY. Occasional light grey lenses/layers (up to 60mm) of silty fine Sand. Pyritic. Occasional shell fragments present.				
7.00	D 29								
7.00	D 30								
7.00 - 7.50	B 31					7.00-8.00 no shell fragments observed			
7.50 - 8.00	B 32								
8.00	UT 34	25 blows 100% rec	6.50	Dry		8.00-11.50 occasional shell fragments present			
8.00	D 33								
8.50	D 35								
8.50 - 9.00	B 36								
9.00 - 9.45	SPTS	N=23 (2,3/5,6,6,6)	6.50	Dry			(5.50)		
9.00	D 37								
9.00	D 38								
9.00 - 9.50	B 39								
9.50 - 10.00	B 40								

Groundwater Entries				Depth Related Remarks		Hard Boring	
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins) Tools used
1	0.90	Seepage					

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project HAVANT THICKET WINTER STORAGE RESERVOIR

Project No. A9031-19

Carried out for Portsmouth Water

Borehole

ATK-CP-01

Sheet 1 of 4

Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	37.45 mOD
Logged	RT	07/11/2019	Dando 2000. Cable percussion boring.	1.20	30.00	250	6.50	Coordinates (m)	E 470921.01
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth.	30.00	30.30	150	30.00	National Grid	N 109351.98
Approved	TC	12/11/2019	Terminated due to hard strata. Standpipe piezometer installed on completion.						

Samples and Tests					Strata Description			Inclination	
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
10.00 10.00	UT 42 D 41	26 blows 100% rec	6.50	Dry	Stiff dark grey with occasional light grey mottling slightly sandy silty CLAY. Occasional light grey lenses/layers (up to 60mm) of silty fine Sand. Pyritic. Occasional shell fragments present.				
10.50 10.50 - 11.00	D 43 B 44								
11.00 11.00 - 11.50	D 45 B 46								
11.50 - 11.95 11.50 11.50 - 12.00	SPTS D 47 B 48	N=20 (3,3/4,5,5,6)	6.50	Dry		11.50-12.00 stiff			
12.00 12.00 - 12.50	D 49 B 50				Stiff to very stiff dark grey, occasionally mottled grey, silty CLAY. Occasional grey lenses/layers (up to 60mm) of silt.		12.00		25.45
12.50 - 13.00	B 51								
13.00 13.00	UT 53 D 52	26 blows 100% rec	6.50	Dry					
13.50 13.50 - 14.00	D 54 B 56								
14.00 14.00 - 14.50	D 57 B 58								(5.00)
14.50 - 14.95 14.50 14.50 - 15.00	SPTS D 59 B 60	N=24 (3,4/5,6,6,7)	6.50	Dry					
15.00 15.00 - 15.50	D 61 B 62								
15.50 - 16.00	B 63								
16.00 16.00	UT 65 D 64	31 blows	6.50	Dry					17.00
16.50 16.50 - 17.00	D 66 B 67								
17.00 17.00 - 17.50	D 68 B 69								
17.50 - 17.95 17.50 - 17.95 17.50 - 18.00	SPTS D 70 B 71	N=24 (3,4/5,6,6,7)	6.50	Dry		17.50-18.00 occasional lenses/ layers of grey silt			
18.00 18.00 - 18.50	D 72 B 73					18.00-24.50 fissures present (randomly orientated and extremely closely spaced), occasional fissure faces have silt dusting locally slightly polished			20.45
18.50 - 19.00	B 74					18.50-19.00 occasional light grey to grey lenses/ layers of silt			
19.00 19.00	UT 76 D 75	33 blows	6.50	Dry					
19.50 19.50 - 20.00	D 77 B 78								

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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.		Project		HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole	
Scale 1:50		Project No.		A9031-19		ATK-CP-01	
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Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	37.45 mOD
Logged	RT	07/11/2019	Dando 2000. Cable percussion boring.	1.20	30.00	250	6.50	Coordinates (m)	E 470921.01
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth.	30.00	30.30	150	30.00	National Grid	N 109351.98
Approved	TC	12/11/2019	Terminated due to hard strata. Standpipe piezometer installed on completion.						

Samples and Tests				Strata Description				Inclination	
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
20.00 20.00 - 20.50	D 79 B 80				Stiff to very stiff thinly laminated dark grey, mottled grey, silty CLAY. Pyritic.				
20.50 - 20.95 20.50 20.50 - 21.00	SPTS D 81 B 82	N=26 (4,6/6,6,7,7)	6.50	Dry					
21.00 21.00 - 21.50	D 83 B 84								
21.50 - 22.00	B 85						(9.00)		
22.00 22.00	UT 87 D 86	36 blows 100% rec	6.50	Dry					
22.50 22.50 - 23.00	D 88 B 89								
23.00 23.00 - 23.50	D 90 B 91								
23.50 - 23.95 23.50 23.50 - 24.00	SPTS D 92 B 93	N=34 (5,7/8,8,9,9)	6.50	Dry		23.50 becoming very stiff			
24.00 24.00 - 24.50	D 94 B 95								
24.50 - 25.00	B 96								
25.00 25.00	UT 98 D 97	38 blows 100% rec	6.50	Dry	Very stiff fissured dark grey sandy silty CLAY. Sand is fine. Pyritic. Fissures are randomly orientated, extremely closely spaced, occasional silty sand dustings. Rare slightly polished faces. Occasional shell fragments present. Very stiff fissured dark grey, occasionally mottled light grey, sandy silty CLAY. Sand is fine. Occasional light grey lenses/layers (up to 5mm) of silty sand. Pyritic. Fissures are randomly orientated, extremely closely spaced, occasional silty sand dustings on surfaces. Rare slightly polished faces. Rare shell fragments (up to 60mm).				
25.50 25.50 - 26.00	D 99 B 100		11/11/19 6.50	1730 Dry					
26.00 26.00 - 26.50	D 101 B 102		12/11/19 6.50	0730 21.50			26.00 11.45 (0.50)		
26.50 - 26.95 26.50 26.50 26.50 - 27.00	SPTS D 109 B 103 B 104	N=36 (5,7/8,9,9,10)	6.50	Dry			26.50 10.95		
27.00 27.00 - 27.50	D 105 B 106								
27.50 - 28.00	B 107								
28.00	UT 108	39 blows 100% rec	6.50	Dry			(3.00)		
28.50 - 29.00	B 110					28.50 possible burrow structure			
29.00 29.00 - 29.50	D 111 B 112								
29.50 - 29.95 29.50 29.50 - 30.00	SPTS D 113 B 114	N=33 (6,7/8,8,8,9)	6.50	Dry			29.50 0.05 7.95 (0.75)		

Groundwater Entries				Depth Related Remarks				Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks			Depths (m)	Duration (mins)	Tools used
2	30.00	Rose to 23.80 m after 20 minutes.								

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20:49:05		Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water		Borehole ATK-CP-01 Sheet 3 of 4	
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Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	37.45 mOD		
Logged	RT	07/11/2019	Dando 2000. Cable percussion boring.			(m)	(m)	(mm)	(m)	Coordinates (m)	E 470921.01		
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth.			1.20	30.00	250	6.50	National Grid	N 109351.98		
Approved	TC	12/11/2019	Terminated due to hard strata. Standpipe piezometer installed on completion.			30.00	30.30	150	30.00				
Samples and Tests						Strata Description						Inclination	
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level (Thickness)	Legend	Backfill				
			Casing	Water									
			12/11/19	1730	Firm to stiff dark grey sandy silty CLAY. Sand is	30.20-30.30 driller notes cemented shells	30.30	7.15					
			30.00	23.80	fine. Pyritic. Occasional shell fragments.								
					END OF EXPLORATORY HOLE								
Groundwater Entries			Depth Related Remarks			Hard Boring							
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used				
							30.20 - 30.20	30	Chisel				
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project					Borehole			
Scale 1:50					HAVANT THICKET WINTER STORAGE RESERVOIR					ATK-CP-01			
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09/04/2020 20:49:05					A9031-19								
					Carried out for								
					Portsmouth Water								

Borehole Log



Drilled DS Logged PC Checked MS Approved TC	Start 08/11/2019 End 14/11/2019	Equipment, Methods and Remarks Dando 250D. Cable percussion boring. SPT Hammer ID: JD04, Rod type: Whitworth. Standpipe piezometer installed on completion.	Depth from (m) 1.20 30.00	to (m) 30.00 34.45	Diameter (mm) 200 150	Casing Depth (m) 30.00 32.50	Ground Level 30.03 mOD Coordinates (m) E 471172.00 National Grid N 109034.97		
Samples and Tests			Strata Description						
Depth (m)	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.20	D 1	0.00-1.20 Hand excavated inspection pit.			Brown gravelly slightly clayey fine to medium SAND. Gravel is subrounded to subangular fine to coarse of Flint. (TOPSOIL)		(0.40)		
0.40	D 2				Orangish brown, mottled dark brown and brown, gravelly silty fine to medium SAND. Gravel is subangular to subrounded fine to coarse of flint.		0.40 29.63		
0.40 - 1.00	B 3						(0.80)		
1.20 - 1.65	SPTS	N=20 (2,2/2,4,7,7)		Dry	Medium dense orangish brown, mottled light grey and reddish brown, slightly gravelly clayey fine to medium SAND. Gravel is subrounded fine to coarse of cemented sands.		1.20 28.83		
1.20 - 1.45	D 4								
1.20 - 1.70	B 5								
1.70 - 2.00	D 6		08/11/19	1400		1.70-2.50 Orangish brown and reddish brown mottled.			
2.00 - 2.45	SPTS	2.00-5.00 Water added. N=12 (2,2/3,3,3,3)	2.00	Dry			(1.80)		
2.00 - 2.45	D 7		11/11/19	0730					
2.50 - 3.00	D 9		2.00	2.50		2.50-3.00 Orangish brown with light grey and reddish brown mottling.			
2.50 - 3.00	B 8								
3.00 - 3.45	SPTS	N=9 (1,2/2,1,2,4)	3.00	0.50	Loose orangish brown, mottled reddish brown and light greyish brown, clayey fine to medium SAND.		3.00 27.03		
3.00 - 3.45	D 10						(0.50)		
3.00 - 3.50	B 11								
3.50 - 4.00	D 12				Soft orangish brown, mottled greyish brown, sandy CLAY. Sand is fine to medium.		3.50 26.53		
4.00 - 4.45	SPTS	N=7 (1,1/2,1,2,2)	4.00	0.50		4.00-4.50 Occasional reddish brown mottling.	(1.50)		
4.00 - 4.45	D 13								
4.00 - 4.50	B 14								
4.50 - 5.00	D 15								
5.00 - 5.45	SPTS	N=8 (2,1/1,2,1,2)	5.00	0.50	Soft to firm dark grey slightly sandy to sandy CLAY. Sand is fine. Pyritic.		5.00 25.03		
5.00 - 5.45	D 16								
5.00 - 5.50	B 17								
5.50 - 6.00	D 18								
6.00 - 6.45	SPTS	N=4 (1,1/1,1,1,1)	6.00	Dry		6.00-6.50 Occasional black pockets (up to 60mm) of silt.	(2.45)		
6.00 - 6.45	D 19								
6.00 - 6.50	B 20								
6.50 - 7.00	Falling Head	k=1.5E-6 m/s							
6.50 - 7.00	D 21								
7.00 - 7.45	UT 22	41 blows 100% rec	7.00	Dry					
7.45	D 23				Firm to stiff dark grey sandy CLAY. Sand is fine. Possible fissures present. Pyritic.		7.45 22.58		
7.50 - 8.00	B 24								
8.00 - 8.45	SPTS	N=14 (1,2/2,3,4,5)	11/11/19	1730		8.00-9.00 Possible thin laminations. Occasional shell fragments (up to 60mm).	(1.55)		
8.00 - 8.45	D 25		8.00	Dry		8.50-9.00 Occasional pockets (up to 60mm) of black silt.			
8.00 - 8.50	B 26		12/11/19	0730					
8.50 - 9.00	D 27		8.00	7.50					
8.50 - 9.00	B 28								
9.00 - 9.45	UT 29	55 blows 100% rec	9.00	8.50	Stiff to very stiff dark grey, mottled grey to greyish brown, slightly sandy silty CLAY. Sand is fine. Occasional grey to greyish brown lenses/layers (up to 60mm) of silty pyritic sand.		9.00 21.03		
9.45	D 30					9.45-10.50 Occasional shell fragments.			
9.50 - 10.00	B 31								
Groundwater Entries No. Depth Strike (m) Remarks			Depth Related Remarks Depths (m) Remarks			Hard Boring Depths (m) Duration (mins) Tools used			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20:49:06			Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water			Borehole ATK-CP-02 Sheet 1 of 4			

Drilled	DS	Start	Equipment, Methods and Remarks			Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	30.03 mOD	
Logged	PC	08/11/2019	Dando 2500. Cable percussion boring.			1.20	30.00	200	30.00	Coordinates (m)	E 471172.00	
Checked	MS	End	SPT Hammer ID: JD04, Rod type: Whitworth.			30.00	34.45	150	32.50	National Grid	N 109034.97	
Approved	TC	14/11/2019	Standpipe piezometer installed on completion.									
Samples and Tests						Strata Description				Inclination		
Depth		Type & No.	Records	Date Casing	Time Water	Main		Detail	Depth, Level (Thickness)	Legend	Backfill	
10.00 - 10.45 10.00 - 10.45 10.00 - 10.50		SPTS D 32 B 33	N=20 (3,3/3,5,8,8)	10.00	9.00	Stiff to very stiff dark grey, mottled grey to greyish brown, slightly sandy silty CLAY. Sand is fine. Occasional grey to greyish brown lenses/layers (up to 60mm) of silty pyritic sand.		10.50-12.00 Fissures are randomly orientated and extremely closely spaced.	(3.00)			
10.50 - 11.00 10.50 - 11.00		D 35 B 34										
11.00 - 11.50		B 36										
11.50 - 11.95		UT 37	81 blows 100% rec	11.50	10.80							
11.95 12.00 - 12.50		D 38 B 39				Stiff to very stiff fissured dark grey with occasional light grey to greyish brown sandy silty CLAY. Sand is fine grained. Occasional light grey to greyish brown lenses/layers of silt. Pyritic. Fissures are randomly orientated, extremely closely spaced, occasional faces have silty sandy dustings.		12.00-12.50 Occasional shell fragments.	12.00	18.03		
12.50 - 13.00 12.50 - 13.00		D 41 B 40										
13.00 - 13.45 13.00 - 13.45 13.00 - 13.50		SPTS D 42 B 43	N=22 (3,4/4,5,5,8)	13.50	Dry							
13.50 - 14.00 13.50 - 14.00		D 45 B 44										
14.00 - 14.50		B 46						13.50-14.00 Indistinctly thinly laminated				
14.50 - 14.95		UT 47	56 blows 100% rec	14.00	Dry							
14.95 15.00 - 15.50		D 48 B 49										
15.50 - 16.00 15.50 - 16.00		D 51 B 50										
16.00 - 16.45 16.00 - 16.45 16.00 - 16.50		SPTS D 52 B 53	N=25 (4,5/5,6,7,7)	14.00	Dry			14.00-22.45 Rare to occasional shell fragments (up to 60mm).				
16.50 - 17.00 16.50 - 17.00		D 55 B 54										
17.00 - 17.50		B 56										
17.50 - 17.95		UT 57	64 blows 100% rec	14.00	Dry							
17.95 18.00 - 18.50		D 58 B 59										
18.50 - 19.00 18.50 - 19.00		D 61 B 60										
19.00 - 19.45 19.00 - 19.45 19.00 - 19.50		SPTS D 62 B 63	N=27 (3,6/5,7,8,7)	14.00	Dry							
19.50 - 20.00 19.50 - 20.00		D 65 B 64										
								19.00-19.50 Possible subhorizontal lamination.				
Groundwater Entries						Depth Related Remarks				Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)		Depths (m)		Remarks	Depths (m)	Duration (mins)	Tools used	
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project				Borehole		
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Scale 1:50						Project No. A9031-19				Sheet 2 of 4		
AGS						Carried out for Portsmouth Water						

Drilled	DS	Start	Equipment, Methods and Remarks			Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	30.03 mOD					
Logged	PC	08/11/2019	Dando 2500. Cable percussion boring.			1.20	30.00	200	30.00	Coordinates (m)	E 471172.00					
Checked	MS	End	SPT Hammer ID: JD04, Rod type: Whitworth. Standpipe piezometer installed on completion.			30.00	34.45	150	32.50	National Grid	N 109034.97					
Approved	TC	14/11/2019														
Samples and Tests						Strata Description				Inclination						
Depth		Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill						
20.00 - 20.50		B 66				Stiff to very stiff fissured dark grey with occasional light grey to greyish brown sandy silty CLAY. Sand is fine grained. Occasional light grey to greyish brown lenses/layers of silt. Pyritic. Fissures are randomly orientated, extremely closely spaced, occasional faces have silty sandy dustings.										
20.50 - 20.95		UT 67	98 blows 100% rec	14.00	Dry											
20.95		D 68														
21.00 - 21.50		B 69														
21.50 - 22.00		D 71														
21.50 - 22.00		B 70														
22.00 - 22.45		SPTS	N=32 (2,7/8,7,8,9)	12/11/19	1730											
22.00 - 22.45		D 72		14.00	Dry											
22.00 - 22.50		B 73		13/11/19	0730											
22.00 - 22.50		B 73		14.00	17.50											
22.50 - 23.00		D 75				Very stiff fissured indistinctly thinly laminated dark grey with occasional grey to brownish grey and light grey silty CLAY. Pyritic. Fissures are randomly orientated, extremely closely spaced, slightly polished with occasional silt dustings. Occasional light grey lenses/layers of silt.										
22.50 - 23.00		B 74														
23.00 - 23.50		B 76														
23.50 - 23.95		UT 77	90 blows 100% rec	14.00	Dry											
23.95		D 78														
24.00 - 24.50		B 79														
24.50 - 25.00		D 81														
24.50 - 25.00		B 80														
25.00 - 25.45		SPTS	N=50 (5,6/9,11,14,16)	14.00	Dry											
25.00 - 25.45		D 82														
25.00 - 25.50		B 83														
25.50 - 26.00		D 85				24.50-25.00 Slightly pyritic. Silt is grey to dark grey. Rare shell fragments present. 25.00-25.44 Distinctly subhorizontal laminations.										
25.50 - 26.00		B 84														
26.00 - 26.50		B 86														
26.50 - 26.90		UT 87	100 blows 89% rec	14.00	Dry											
26.90		D 88														
27.00 - 27.50		B 89														
27.50 - 28.00		D 91														
27.50 - 28.00		B 90														
28.00 - 28.45		SPTS	N=42 (5,6/8,8,11,15)	14.00	Dry											
28.00 - 28.45		D 92														
28.00 - 28.50		B 93														
28.50 - 29.00		D 95				26.90-29.00 Rare shell fragments present 28.00-28.45 Distinctly thinly laminated. 28.50-29.50 stiff to very stiff.										
28.50 - 29.00		B 94														
29.00 - 29.50		B 96														
29.50 - 29.95		UT 97	84 blows 100% rec	14.00	Dry											
29.95		D 98		13/11/19	1730											
29.95		D 98		14.00	Dry											
							Very stiff dark grey fissured indistinctly to distinctly thinly laminated silty CLAY. Pyritic. Fissures are randomly orientated and extremely closely spaced.									
Groundwater Entries						Depth Related Remarks		Hard Boring								
No.	Depth Strike (m)	Remarks	Depth Sealed (m)		Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used							
					29.50 - 33.50	Slow drilling - 4 hours.										
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole								
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Scale 1:50						Carried out for Portsmouth Water		Sheet 3 of 4								

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Drilled	DS	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	30.03 mOD
Logged	PC	08/11/2019	Dando 2500. Cable percussion boring.			1.20	30.00	200	30.00	Coordinates (m)	E 471172.00
Checked	MS	End	SPT Hammer ID: JD04, Rod type: Whitworth. Standpipe piezometer installed on completion.			30.00	34.45	150	32.50	National Grid	N 109034.97
Approved	TC	14/11/2019								Inclination	
Samples and Tests						Strata Description					
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level (Thickness)	Legend	Backfill		
			Casing	Water							
30.00 - 30.50	B 99		14/11/19	0730	Very stiff dark grey fissured indistinctly to distinctly thinly laminated silty CLAY. Pyritic. Fissures are randomly orientated and extremely closely spaced.	31.00-31.50 Occasional partings (2mm thick) of light grey fine sand.	(5.00)				
30.50 - 31.00	D 101		14.00	28.00							
30.50 - 31.00	B 100										
31.00 - 31.38	SPTS	>49 (7,12/17,16,16 for 75mm)	31.00	27.00							
31.00 - 31.35	D 102										
31.00 - 31.50	B 103										
31.50 - 32.00	D 105				32.70 Rare shell fragments (<5mm) and rare infilled burrows (2mm x 5mm)						
31.50 - 32.00	B 104										
32.00 - 32.50	B 106										
32.50 - 32.70	UT 107	100 blows 44% rec	32.50	28.00							
32.70	D 108										
33.00 - 33.50	B 109										
33.50 - 34.00	Rising Head	k=3.2E-7 m/s			33.50-34.00 Slightly sandy. Occasional lenses (10mm x 10mm) of light grey fine sand.						
33.50 - 34.00	D 110										
34.00 - 34.45	SPTS	N=14 (2,2/1,2,4,7)	32.50	15.10	Medium dense dark grey clayey fine SAND.		34.00	-3.97	1		
34.00 - 34.45	D 111		14/11/19	1730			(0.45)				
			32.50	15.10	END OF EXPLORATORY HOLE		34.45	-4.42			

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Drilled	AR	Start	Equipment, Methods and Remarks			Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	22.72 mOD
Logged	RP	05/12/2019	Dando 2000. Cable percussion boring.			1.20	9.00	150	1.70	Coordinates (m)	E 471272.01
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth.							National Grid	N 109271.03
Approved	TC	06/12/2019	Terminated due to possible artesian groundwater in deeper strata.								
Samples and Tests						Strata Description					
Depth		Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)		Legend	Backfill
0.10 - 0.30		B 1	0.00-1.20 Hand excavated inspection pit.			Red and greyish brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		0.10 (0.10)			
0.30 - 0.50		B 2						(0.40)			
0.50		D 3						22.22			
0.50 - 0.80		B 4									
0.80 - 1.20		B 5									
1.20		UT 7	12 blows	05/12/19	1630 Dry	Soft to firm yellowish brown/grey mottled sandy silty CLAY. Sand is yellowish brown and orangish fine to coarse with rare subangular fine to coarse gravel of chert.		1.20 21.52			
1.20		D 6						(0.50)			
1.70		D 8	N=9 (1,1/2,2,2,3)	06/12/19	0745 Dry	Firm to stiff grey and brown, mottled yellowish brown and brown, slightly sandy CLAY. Sand is fine to coarse. Rare white crystals of gypsum/ selenite. Roots and rootlets.		1.70 21.02			
1.70 - 2.00		B 9									
2.00 - 2.45		SPTS									
2.00		D 10									
2.00		D 11									
2.00 - 2.50		B 12									
2.50 - 3.00		B 13									
3.00 - 3.45		UT 15						21 blows 84% rec	1.70		
3.00		D 14	(1.00)								
3.50 - 4.00		B 16	N=12 (1,2/3,3,3,3)	1.70	Dry	Stiff dark grey silty CLAY. Rare pyrite flecks.		4.50 18.22			
4.00 - 4.45		SPTS									
4.00		D 17									
4.00		D 18									
4.00 - 4.50		B 19									
4.50 - 5.00		B 20	25 blows 100% rec	1.70	Dry		6.00-6.50 firm	6.00 14.72			
5.00 - 5.45		UT 22									
5.00		D 21									
5.50		D 23									
5.50 - 6.00		B 24									
6.00 - 6.45		SPTS	N=15 (2,3/3,4,4,4)	1.70	Dry	Stiff to very stiff dark grey slightly sandy CLAY. Sand is fine. Occasional pyrite flecks.	6.50-7.00 firm to stiff	7.00 13.72			
6.00		D 25									
6.00		D 26									
6.00 - 6.50		B 27									
6.50 - 7.00		B 28									
7.00 - 7.45		UT 30	25 blows 89% rec	1.70	Dry		7.45 stiff to very stiff	8.00 13.72			
7.00		D 29									
7.50		D 31									
7.50 - 8.00		B 32									
8.00 - 8.45		SPTS						N=18 (3,3/4,4,5,5)	1.70		
8.00		D 33									
8.00		D 34									
8.00 - 8.50		B 35									
8.50 - 9.00		B 36									
9.00		D 37		06/12/19	1630 Dry						
Groundwater Entries						Depth Related Remarks			Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)		Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project HAVANT THICKET WINTER STORAGE RESERVOIR			Borehole		
Scale 1:50						Project No. A9031-19			ATK-CP-03		
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Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks		Depth from	to	Diameter	Casing Depth	Ground Level	24.90 mOD	
Logged	RP	15/11/2019	Dando 2000. Cable percussion boring.		1.20	11.50	200	6.50	Coordinates (m)	E 471400.99	
Checked	MS	End	SPT Hammer ID: JD02. Rod type: Whitworth.		11.50	12.20	150	6.50	National Grid	N 109385.98	
Approved	TC	18/11/2019	Terminated due to hard strata. Standpipe piezometer installed on completion.								

Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level	Legend	Backfill
			Casing	Water			(Thickness)		
0.10 - 0.30	B 1	0.00-1.20 Hand excavated inspection pit.			Soft to firm brown, mottled light grey and orangish brown and brown, occasionally mottled reddish brown, sandy CLAY. Sand is fine to coarse. Occasional degraded gravel size wood fragments. Rare roots and rootlets (up to 10mm).		(0.50)		
0.30 - 0.50	B 2						0.50 24.40		
0.50	HV	p 72kPa, r 37kPa			(TOPSOIL)				
0.50	D 3				Firm light greyish, mottled orangish brown, CLAY. Occasional gravel size wood fragments. Roots and rootlets.		(0.70)		
0.50 - 0.80	B 4						1.20 23.70		
0.80 - 1.20	B 6						(0.50)		
1.00	D 5						1.70 23.20		
1.20 - 1.65	SPTS	N=3 (1,0/0,1,1,1)		Damp	Firm to stiff brown, mottled orangish brown, slightly sandy CLAY. Slightly pyritic. Sand is fine to medium.		(0.50)		
1.20	D 7						1.70 23.20		
1.20 - 1.70	B 8						(0.50)		
1.70 - 2.00	B 9				Stiff brown, mottled light grey and orangish brown, CLAY.		2.00-2.50 possible gypsum present indistinctly to distinctly thinly laminated		
2.00	UT 11	11 blows 67% rec	1.70	Dry			(0.80)		
2.00	D 10						2.50 22.40		
2.50	D 12				Stiff fissured brown, mottled light grey, occasionally mottled orangish brown and reddish brown, slightly sandy CLAY with white gypsum crystals. Sand is fine to medium. Fissures are subvertical to randomly orientated, extremely closely spaced. Slightly polished faces. Slightly pyritic.		(0.50)		
2.50 - 3.00	B 13						3.00 21.90		
3.00 - 3.45	SPTS	N=12 (2,1/2,3,4,3)	3.00	Dry	Stiff brown, mottled grey and orangish brown, occasionally mottled black, slightly sandy silty CLAY. Sand is fine to medium. Occasional black layers/pockets (up to 5mm) of silt and degraded wood. Occasional white gypsum. Pyritic.		(1.00)		
3.00	D 14						3.50 indistinctly thinly laminated fissured		
3.00	D 15						4.00 20.90		
3.00 - 3.50	B 16						(2.00)		
3.50 - 4.00	B 17				Stiff fissured dark grey slightly sandy slightly gravelly CLAY. Pyritic. Fissures are randomly orientated, extremely closely spaced and rough.		6.00 18.90		
4.00	UT 19	19 blows 100% rec	3.00	Dry			(0.50)		
4.00	D 18						6.50 18.40		
4.50 - 5.00	B 20						(2.50)		
5.00 - 5.45	SPTS	N=17 (2,3/4,4,4,5)	15/11/19 4.50	1730 Dry			7.00 dark grey slightly silty clay		
5.00	D 21		18/11/19 4.50	0730 Dry			(2.50)		
5.00	D 22						8.00 occasional pockets of silty fine sand		
5.00 - 5.50	B 23						8.50 rare shell fragments		
5.50 - 6.00	B 24						9.00 15.90		
6.00	UT 26	23 blows 100% rec	4.50	Dry	Stiff to very stiff dark grey sandy silty CLAY. Sand is fine to medium. Pyritic.		(1.00)		
6.00	D 25						10.00 14.90		
6.50	D 27								
6.50 - 7.00	B 28				Stiff to very stiff fissured dark grey, mottled grey and light grey, slightly sandy silty CLAY. Sand is fine to medium. Rare light grey pockets (up to 60mm) of silty sand. Pyritic. Fissures are randomly orientated, extremely closely to very closely spaced with occasional silt dustings. Locally slightly polished.				
7.00 - 7.45	SPTS	N=21 (3,4/4,5,6,6)	4.50	Dry					
7.00	D 29								
7.00	D 30								
7.00 - 7.50	B 31								
7.50 - 8.00	B 32								
8.00	UT 34	25 blows 100% rec	6.50	Dry					
8.00	D 33								
8.50	D 35								
8.50 - 9.00	B 36								
9.00 - 9.45	SPTS	N=20 (3,3/4,5,5,6)	6.50	Dry	Stiff to very stiff fissured dark grey, occasionally mottled light grey, slightly sandy silty CLAY. Sand is fine. Occasional light grey lenses/layers (up to 5mm) of silt and occasional silty sand. Pyritic. Fissures are randomly orientated, extremely closely spaced with occasional silty sand dustings. Locally slightly polished.				
9.00	D 37								
9.00	D 38								
9.00 - 9.50	B 39								
9.50 - 10.00	B 40								

Groundwater Entries			Depth Related Remarks		Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	HAVANT THICKET WINTER STORAGE RESERVOIR	Borehole	ATK-CP-04
Scale 1:50	Project No.	A9031-19		
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09/04/2020 20:49:07				

Drilled	AR	Start	Equipment, Methods and Remarks			Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	24.90 mOD
Logged	RP	15/11/2019	Dando 2000. Cable percussion boring.			1.20	11.50	200	6.50	Coordinates (m)	E 471400.99
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth. Terminated due to hard strata.			11.50	12.20	150	6.50	National Grid	N 109385.98
Approved	TC	18/11/2019	Standpipe piezometer installed on completion.								
Samples and Tests						Strata Description					
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level (Thickness)	Legend	Backfill		
			Casing	Water							
10.00	UT 42	27 blows 87% rec	8.50	Dry	Stiff to very stiff fissured dark grey, mottled light grey, sandy silty CLAY. Sand is fine. Pyritic. Fissures are randomly orientated, extremely closely spaced with locally polished faces. Rare shell fragments. Occasional light grey lenses/ layers (up to 5mm) of silt grading to silty sand.	10.50 occasional grey silty lenses/ layers. Rare shell fragments	(1.00)				
10.00	D 41										
10.50	D 43										
10.50 - 11.00	B 44										
11.00 - 12.20	Rising Head	k=1.2E-6 m/s			Stiff to very stiff dark grey, mottled grey, slightly gravelly sandy CLAY. Sand is fine. Gravel is rounded fine to coarse of flint. Pyritic.		11.00 13.90				
11.00	D 45										
11.00 - 11.50	B 46				Stiff dark grey, occasionally mottled black, sandy gravelly CLAY. Sand is fine. Gravel is angular to subangular fine to coarse of fossiliferous limestone.		11.50 13.40				
11.50 - 11.80	SPTS	>50 (3,5/31,19 for 75mm)	8.50	Dry							
11.50	D 47		18/11/19	1730							
11.50 - 12.00	B 48		8.50	1.20							
12.00	D 49				Strong massive dark grey and grey fine to medium grained fossiliferous L. MESTONE. Recovered as subangular coarse gravel and cobbles.		12.00 12.90				
12.20	D 50										
12.20	W 51										
					END OF EXPLORATORY HOLE						

Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks		Depth from	to	Diameter	Casing Depth	Ground Level	27.91 mOD	
Logged	RP	19/11/2019	Dando 2000. Cable percussion boring.		1.20	9.50	200	9.50	Coordinates (m)	E 471706.01	
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth.		9.50	20.00	150	13.00	National Grid	N 109490.01	
Approved	TC	22/11/2019	Standpipe piezometer installed on completion.								

Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level	Legend	Backfill
			Casing	Water			(Thickness)		
0.10 - 0.30	B 1	0.00-1.20 Hand excavated inspection pit.			Dark brown slightly sandy CLAY. (TOPSOIL)		0.10 (0.10)	27.81	
0.30 - 0.50	B 2				Firm fissured light grey, mottled orangish brown, slightly sandy, locally organic, CLAY. Frequent rootlets.		(1.10)		
0.50	D 3				Fissures are randomly orientated.				
0.50 - 0.80	B 4								
0.80 - 1.20	B 6								
1.00	D 5		19/11/19	1730					
1.20 - 1.65	SPTS	N=5 (1,0/1,1,1,2)		Dry					
1.20	D 7		20/11/19	0745	Firm orangish brown to brown, mottled light grey, CLAY with occasional roots and rootlets (up to 10mm).		1.20	26.71	
1.20 - 1.70	B 8			Dry			(0.80)		
1.70 - 2.00	B 9					1.70-2.00 brown mottled orangish brown and light grey			
2.00	UT 11	16 blows 89% rec	1.70	Dry	Firm brown, mottled orangish brown and light grey, slightly sandy CLAY. Sand is fine to coarse. Pyrite flecks.		2.00	25.91	
2.00	D 10						(0.50)		
2.20	EW 2								
2.50	D 12				Stiff brown and dark grey, mottled brownish grey and orangish brown, slightly sandy CLAY. Sand is fine to medium. Pyrite flecks (up to 5mm). Occasional gypsum crystals.		2.50	25.41	
2.50 - 3.00	B 13					3.00 indistinctly thinly laminated	(1.50)		
3.00 - 3.45	SPTS	N=10 (1,2/2,3,2,3)	3.00	Dry					
3.00	D 14								
3.00	D 15								
3.00 - 3.50	B 16								
3.50 - 4.00	B 17								
4.00	UT 19	23 blows 100% rec	3.00	Dry	Stiff dark grey very sandy silty CLAY. Sand is fine to medium. Pyrite flecks.		4.00	23.91	
4.00	D 18						(0.50)		
4.50	EW 3				Stiff to very stiff dark grey slightly gravelly sandy CLAY. Sand is fine to medium. Rare to occasional black subrounded fine to coarse gravel of flint. Pyrite flecks.		4.50	23.41	
4.50 - 5.00	B 20					5.00 stiff to very stiff clay layer			
5.00 - 5.45	SPTS	N=18 (2,3/4,5,5)	3.00	Dry					
5.00	D 21					5.50-6.00 slightly sandy	(1.95)		
5.00	D 22								
5.00 - 5.50	B 23								
5.50 - 6.00	B 24								
6.00	EW 1	26 blows 100% rec	3.00	Dry					
6.00	UT 26					6.50 rare light grey pockets of silty fine sand	6.45	21.46	
6.00	D 25								
6.50	D 27				Stiff to very stiff dark grey slightly sandy silty CLAY. Sand is fine to medium. Pyrite flecks.				
6.50 - 7.00	B 28						(1.55)		
7.00 - 7.45	SPTS	N=22 (3,3/4,5,6,7)	3.00	Dry					
7.00	D 29								
7.00	D 30								
7.00 - 7.50	B 31								
7.50 - 8.00	B 32								
8.00	UT 34	26 blows	3.00	Dry	Stiff dark grey silty CLAY. Pyrite flecks.		8.00	19.91	
8.00	D 33					8.50 very stiff	(1.00)		
8.50 - 9.00	B 35								
9.00 - 9.45	SPTS	N=38 (4,7/8,8,10,12)	3.00	Dry	Stiff dark grey slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is black rounded fine to coarse of flint. Occasional shell fragments.		9.00	18.91	
9.00	D 36						(1.00)		
9.00	B 37								
9.00 - 9.50	B 38								
							10.00	17.94	

Groundwater Entries			Depth Related Remarks		Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)
1	9.50	Rose to 5.60 m after 20 minutes.				9.90 - 10.00	30
							Tools used
							Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole	ATK-CP-05
Scale 1:50	Project No.	A9031-19			
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Sheet 1 of 2

Borehole Log



Drilled AR Logged RP Checked MS Approved TC	Start 19/11/2019 End 22/11/2019	Equipment, Methods and Remarks Dando 2000. Cable percussion boring. SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion.	Depth from (m) 1.20 9.50	to (m) 9.50 20.00	Diameter (mm) 200 150	Casing Depth (m) 9.50 13.00	Ground Level 27.91 mOD Coordinates (m) E 471706.01 National Grid N 109490.01			
Samples and Tests			Strata Description							
Depth 10.00 - 10.17 10.00 - 11.00 10.00 10.00 10.00 - 10.50 10.50 - 11.00	Type & No. SPYC Rising Head D 39 B 40 B 41 B 42	Records >52 (25 for 20mm/29,23 for 75mm) k=1.1E-6 m/s	Date Casing 10.00	Time Water 7.00	Main Recovered as soft dark grey slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is dark grey and black rounded to subangular fine to coarse of flint and limestone.		Detail 10.00 medium strong dark grey fine to medium limestone cobble 10.00-10.17 SPT may be affected by cobble.	Depth, Level (Thickness) (1.00)	Legend	Backfill
11.00 11.20 - 11.50	D 43 B 44		20/11/19 10.00	1730 7.00	Firm dark grey sandy silty CLAY. Sand is fine. Rare shell fragments. Pyritic flecks.			11.00 16.91 (0.20) 11.20 16.71		
11.50	UT 45	31 blows 78% rec	11.50	Damp	Very stiff reddish brown and light grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is grey subangular to subrounded fine to coarse of cemented sandstone.					
12.00 12.00 - 12.50	D 46 B 47						12.00 purple, mottled yellowish brown and orangish brown			
12.50 - 13.00	B 48						12.50 red and purple mottled			
13.00 - 13.45 13.00 13.00 13.00 - 13.50 13.50 - 14.00	SPTS D 49 D 50 B 51 B 52	N=26 (5,6/6,7,7,8)	13.00	Damp			13.50 stiff to very stiff	(3.80)		
14.00 14.00 - 14.50	D 53 B 54									
14.50	UT 55	40 blows 64% rec	13.00	10.00						
15.00 15.00 - 15.50	D 56 B 57				Very stiff red, light purple, pink, and light grey mottled with occasional yellowish brown mottling, slightly sandy CLAY. Sand is fine to medium.			15.00 12.91 (0.50)		
15.50 - 16.00	B 58				Stiff to very stiff reddish brown, light red, pink and light grey mottled with occasional yellowish brown mottling CLAY.			15.50 12.41		
16.00 - 16.38 16.00 16.00 16.00 - 16.50 16.50 - 17.00	SPTS D 59 D 60 B 61 B 62	>50 (5,7/11,17,22 for 75mm)	13.00	10.00			16.00 very stiff			
17.00 17.00 - 17.50	D 63 B 64									
17.50	UT 65	46 blows 56% rec	13.00	10.00				(4.50)		
17.90 18.00 - 18.50	D 66 B 67									
18.50 - 19.00	B 68									
19.00 - 19.35 19.00 19.00 19.00 - 19.50 19.50 - 20.00	SPTS D 69 D 70 B 71 B 72	>50 (7,10/15,19,16 for 50mm)	13.00	10.50			18.20 recovered as firm to stiff			
			21/11/19 13.00	1730 Damp						
					END OF EXPLORATORY HOLE			20.00 7.91		
Groundwater Entries No. Depth Strike (m) Remarks			Depth Sealed (m)		Depth Related Remarks Depths (m) Remarks 13.00 Water added.		Hard Boring Depths (m) Duration (mins) Tools used			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water		Borehole ATK-CP-05 Sheet 2 of 2			



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Drilled	DS	Start	Equipment, Methods and Remarks			Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	34.73 mOD
Logged	RP	04/12/2019	Dando 250. Cable percussion boring. SPT Hammer ID: JD04, Rod type: Whitworth. Standpipe installed on completion.			1.20	14.80	200	4.50	Coordinates (m)	E 472454.54
Checked	MS	End								National Grid	N 109746.65
Approved	TC	05/12/2019									
Samples and Tests						Strata Description					
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill		
0.10 0.10 0.10 0.30 0.30 0.30 0.50 0.50 0.50	PID ES 2 B 1 PID ES 4 B 3 PID ES 6 B 5	0.00-1.20 Hand excavated inspection pit. 0.2 ppmv 0.1 ppmv 0.2 ppmv			Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint. Occasional roots and rootlets (up to 10mm). (TOPSOIL) Soft brown and light grey, mottled orangish brown, slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint.		(0.30) 0.30 34.43 (0.20) 0.50 34.23				
0.81 - 3.50 1.00 1.00 1.00 1.00 1.00 1.00 1.20 - 1.65 1.20 - 1.65 1.50 - 2.00 1.50 - 2.00 1.50 - 2.00 2.00 - 2.45 2.00 - 2.45 2.50 2.50 2.50 - 3.00	Rising Head PID ES 8 EW 1 EW 2 EW 3 B 7 SPTS D 9 Falling Head D 11 B 10 SPTS D 12 PID ES 14 B 13	k=2.4E-7 m/s 0.4 ppmv N=12 (4,5/4,3,2,3) k=4.8E-7 m/s N=25 (2,3/4,5,7,9) 0.0 ppmv		Dry	Firm light grey, mottled orangish brown and brown, slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse of flint. Cobbles are subrounded of flint.	1.50-2.00 stiff	(1.50)				
3.00 - 3.45 3.00 - 3.45 3.00 - 3.50	SPTS D 15 B 16	N=16 (8,8/4,3,4,5)			Medium dense brown, mottled orangish brown, fine to medium SAND.		2.00 32.73 (0.50)				
3.50 - 4.00 3.50 - 4.00	D 18 B 17				Firm to stiff dark grey, occasionally mottled brown, sandy silty CLAY. Sand is fine.		2.50 32.23 (1.00)				
4.00 4.00 4.00 - 4.45	PID ES 19 UT 20	0.1 ppmv 42 blows 100% rec			Stiff to very stiff light, mottled grey and red, slightly sandy CLAY. Sand is fine to coarse. Occasional angular fine to coarse gravel size clasts of mudstone.		3.50 31.23 (0.95)				
4.45 4.50 - 5.00	D 21 B 22				Stiff to very stiff, mottled grey and red, CLAY.		4.45 30.28 (0.55)				
5.00 - 5.45 5.00 - 5.45 5.00 - 5.50	SPTS D 23 B 24	N=20 (2,2/4,4,5,7)		Dry	Very stiff light grey, mottled red, occasionally mottled yellowish brown, CLAY.		5.00 29.73				
5.50 - 6.00 5.50 - 6.00	D 26 B 25										
6.00 - 6.45 6.45 6.50 - 7.00	UT 27 D 28 B 29	48 blows 100% rec		Dry		6.00-7.00 occasional subangular ironstone and mudstone gravel size fragments	(2.00)				
7.00 - 7.45 7.00 - 7.45 7.00 - 7.50	SPTS D 30 B 31	N=26 (3,4/4,7,6,9)		Dry	Stiff to very stiff grey red, mottled pink and occasional yellowish brown mottling, slightly sandy CLAY. Sand is fine.		7.00 27.73				
7.50 - 8.00 7.50 - 8.00	D 33 B 32		04/12/19 4.50	1630 Dry			(1.45)				
8.00 - 8.45 8.45 8.50 - 9.00	UT 34 D 35 B 36	63 blows 100% rec		Dry			8.45 26.28 (0.55)				
9.00 - 9.45 9.00 - 9.45 9.00 - 9.50	SPTS D 37 B 38	N=30 (3,5/5,6,8,11)		Dry	Very stiff red and light grey with occasional yellowish brown and pink mottling, slightly sandy silty CLAY. Sand is fine to coarse.		9.00 25.73				
9.50 - 10.00 9.50 - 10.00	D 40 B 39										
Groundwater Entries						Depth Related Remarks		Hard Boring			
No.	Depth Strike (m)	Remarks	Depth Sealed (m)		Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used		
1	2.00	Rose to 1.80 m after 20 minutes.	3.50		2.00 - 3.50	Water added.					
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole			
Scale 1:50						Project No. A9031-19		ATK-CP-06			
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Borehole Log



Drilled DS	Start	Equipment, Methods and Remarks			Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	34.73 mOD		
Logged RP	04/12/2019	Dando 250. Cable percussion boring.			1.20	14.80	200	4.50	Coordinates (m)	E 472454.54		
Checked MS	End	SPT Hammer ID: JD04, Rod type: Whitworth.							National Grid	N 109746.65		
Approved TC	05/12/2019	Standpipe installed on completion.										
Samples and Tests					Strata Description							
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill			
10.00 - 10.45	UT 41	84 blows 100% rec	4.50	Dry	Very stiff red and light grey with occasional yellowish brown and pink mottling, slightly sandy silty CLAY. Sand is fine to coarse.	10.50-11.50 sand is fine	(2.50)					
10.45	D 42											
10.50 - 11.00	B 43											
11.00 - 11.50	B 44											
11.50 - 11.95	SPTS	N=46 (6,6/8,11,12,15)	4.50	Dry	Very stiff red, mottled occasionally light grey and yellowish brown and brown, silty CLAY.		11.50 23.23					
11.50 - 11.95	D 45											
11.50 - 12.00	B 46						(0.50)					
12.00 - 12.50	D 48											
12.00 - 12.50	B 47				Very stiff light grey, yellowish brown and brown, mottled red and pink sandy CLAY. Sand is fine.		12.00 22.73					
12.50 - 13.00	D 50											
12.50 - 13.00	B 49											
13.00 - 13.40	UT 51	100 blows 89% rec	4.50	Dry								
13.40	D 52						(2.74)					
13.50 - 14.00	B 53											
14.00 - 14.50	D 55											
14.00 - 14.50	B 54											
14.50 - 14.80	SPTS	>50 (4,8/27,23 for 75mm)	4.50 05/12/19	Dry 1630	Light grey fine to medium SAND.		14.50 10.06					
14.50 - 14.80	D 56										4.50	Dry
					END OF EXPLORATORY HOLE							
Groundwater Entries					Depth Related Remarks			Hard Boring				
No.	Depth Strike (m)	Remarks	Depth Sealed (m)		Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project HAVANT THICKET WINTER STORAGE RESERVOIR			Borehole				
Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20:49:09					Project No. A9031-19			ATK-CP-06				
					Carried out for Portsmouth Water			Sheet 2 of 2				

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Drilled	DS	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	38.66 mOD	
Logged	JF	26/11/2019	Dando 2500. Cable percussion boring.			(m)	(m)	(mm)	(m)	Coordinates (m)	E 471031.54	
Checked	MS	End	SPT Hammer ID: JD04, Rod type: Whitworth.			1.20	10.35	200	4.50	National Grid	N 110231.31	
Approved	TC	28/11/2019										
Samples and Tests						Strata Description						
Depth		Type & No.	Records	Date Casing	Time Water	Main		Detail	Depth, Level (Thickness)		Legend	Backfill
0.20 - 0.50		B 1	0.00-1.20 Hand excavated inspection pit.			TOPSOIL.			(0.20) 38.46			
0.50 - 1.00		B 2				Firm orangish brown, mottled grey, slightly sandy CLAY with frequent rootlets. Sand is fine to coarse.						
1.20 - 1.65 1.20 - 1.65		SPTS D 3	N=10 (1,1/2,2,3,3)	1.20	Dry			1.00 becoming stiff 1.00-2.45 sand is orangish brown fine to medium	(2.25)			
1.50 - 2.00 1.50 - 2.00		D 5 B 4										
2.00 - 2.45 2.00 - 2.45		SPTS D 6	N=44 (2,2/7,19,11,7)	2.00	Dry							
2.50 - 3.00 2.50 - 3.00		D 8 B 7	N=12 (1,2/3,3,3,3)	2.00	0800 Dry	Yellowish brown sandy clayey angular to subangular fine to coarse GRAVEL of flint, limestone and sandstone with low cobble content. Cobbles are subrounded of sandstone.		2.45-2.50 yellowish brown clayey fine to coarse sand	2.45 36.21			
3.00 - 3.45 3.00 - 3.45 3.00 - 3.50		SPTS D 9 B 10		3.00	Dry	Stiff to very stiff yellowish brown sandy CLAY. Sand is fine to coarse. Occasional lenses (<1mm) of grey silty fine sand.		3.00-3.50 soft to firm	3.00 35.66			
3.50 - 4.00 3.50 - 4.00		D 12 B 11		4.00	Dry			3.50-4.00 rare subangular gravel (<10mm) of sandstone 3.50-4.45 firm to stiff reddish brown mottled greyish brown				
4.00 - 4.45		UT 13	84 blows 100% rec	4.00	Dry			4.45-5.00 stiff				
4.45 4.50 - 5.00 4.50 - 5.00		D 14 D 16 B 15		4.50	Dry			5.00-8.00 very stiff				
5.00 - 5.45 5.00 - 5.45 5.00 - 5.50		SPTS D 17 B 18	N=36 (4,3/6,7,10,13)	4.50	Dry							
5.50 - 6.00 5.50 - 6.00		D 20 B 19		4.50	Dry							
6.00 - 6.40		UT 21	100 blows 88% rec	4.50	Dry							
6.40 6.50 - 7.00		D 22 B 23		4.50	Dry			7.00-10.35 slightly sandy	(7.35)			
7.00 - 7.45 7.00 - 7.45 7.00 - 7.50		SPTS D 24 B 25	N=37 (2,5/7,8,10,12)	4.50	Dry							
7.50 - 8.00 7.50 - 8.00		D 27 B 26		4.50	Dry							
8.00 - 8.35		UT 28	100 blows 84% rec	4.50	Dry							
8.38 8.50 - 9.00		D 29 B 30		4.50	Dry							
9.00 - 9.45 9.00 - 9.45 9.00 - 9.50		SPTS D 31 B 32	N=44 (5,6/8,8,13,15)	4.50	Dry							
9.50 - 10.00 9.50 - 10.00		D 34 B 33										
Groundwater Entries						Depth Related Remarks				Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth	Sealed (m)	Depths (m)	Remarks			Depths (m)	Duration (mins)	Tools used
										2.50 - 3.00	90	Chisel
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project HAVANT THICKET WINTER STORAGE RESERVOIR				Borehole		
Scale 1:50						Project No. A9031-19				ATK-CP-07A		
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Drilled	PD	Start	Equipment, Methods and Remarks		Depth from	to	Diameter	Casing Depth	Ground Level	38.47 mOD				
Logged	RP	26/11/2019	Dando 175. Cable percussion boring. SPT Hammer ID: TH70, Rod type: 54mm Whitworth.		(m)	(m)	(mm)	(m)	Coordinates (m)	E 471756.98				
Checked	MS	End			1.20	10.44	200	3.20	National Grid	N 110144.07				
Approved	TC	27/11/2019												
Samples and Tests					Strata Description									
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level (Thickness)	Legend	Backfill					
			Casing	Water										
0.20	D 1	0.00-1.20 Hand excavated inspection pit.			TOPSOIL		(0.20)							
0.20 - 0.50	B 2				Soft brown and orangish brown mottled light grey and greyish brown, slightly sandy CLAY. Sand is fine to coarse.		0.20			38.27				
0.50	D 3				Brown, orangish brown, mottled greyish brown, clayey fine to medium SAND.		(0.30)			37.97				
0.50 - 1.00	B 4						(0.70)							
1.00	D 5	N=3 (1,0/1,0,1,1)	1.20	Damp	Soft to firm brown and orangish brown mottled sandy CLAY. Sand is fine to medium.	1.65-2.20 rare orangish brown medium to coarse gravel size fragments of cemented sand	(1.20)	37.27						
1.20 - 1.65	SPTS						71 blows 100% rec			2.20	Damp	Stiff to very stiff red and light grey mottled slightly sandy CLAY. Sand is fine to coarse.	(1.45)	
1.20	D 6													
1.20 - 1.65	B 7													
1.65 - 2.20	B 8	N=14 (1,1/2,4,4,4)	3.20	Dry	Very stiff red and grey, occasionally mottled yellowish brown and orangish brown, slightly sandy CLAY.	5.20 grey with red and pink mottling	5.65	32.82						
2.20 - 2.65	UT 9									100 blows 22% rec	3.20	Dry	6.50 light grey with red and pink mottling	(4.79)
2.65	D 10													
2.65 - 3.20	B 11													
3.20 - 3.65	SPTS	N=18 (2,2/3,4,4,7)	3.20	Dry										
3.20	D 12													
3.20 - 3.65	B 13													
3.65 - 4.20	B 14													
4.20 - 4.65	UT 15	100 blows 78% rec	3.20	Dry										
4.65	D 16													
4.65 - 5.20	B 17													
5.20 - 5.65	SPTS										N=27 (3,4/6,6,7,8)	3.20	Dry	
5.20	D 18													
5.20 - 5.65	B 19													
5.65 - 6.20	B 20													
6.20 - 6.50	UT 21	100 blows 50% rec	3.20	Dry										
6.50 - 6.95	SPTS										9.65	D 32		
6.50	D 22													
6.50 - 7.20	B 24													
7.20 - 7.65	UT 25	N=45 (2,6/7,10,13,15)	3.20	Dry										
7.65	D 26													
7.65 - 8.20	B 27													
8.20 - 8.65	SPTS										100 blows 50% rec	3.20	Dry	
8.20	D 28													
8.20 - 8.65	B 29													
8.65 - 9.20	B 30													
9.20 - 9.65	UT 31	N=45 (2,6/7,10,13,15)	3.20	Dry										
9.65	D 32													
9.65 - 10.00	B 33													
Groundwater Entries					Depth Related Remarks			Hard Boring						
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used					
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project HAVANT THICKET WINTER STORAGE RESERVOIR			Borehole						
Scale 1:50					Project No. A9031-19			ATK-CP-08						
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Drilled	PD	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	39.17 mOD		
Logged	RP	27/11/2019	Dando 175. Cable percussion boring.			(m)	(m)	(mm)	(m)	Coordinates (m)	E 472187.70		
Checked	MS	End	SPT Hammer ID: TH70, Rod type: 54mm Whitworth.							National Grid	N 110054.34		
Approved	TC	28/11/2019											
Samples and Tests						Strata Description							
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill				
0.20 0.30 - 0.50 0.50	D 1 B 2 D 3	0.00-1.20 Hand excavated inspection pit.			Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint. TOPSOIL.		(0.20) 0.20 38.97						
0.80 0.80 - 1.20	D 4 B 5		27/11/19	1800 Damp	Soft to firm brown and grey, mottled orangish brown, sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint.		(0.60) 0.80 38.37						
1.20 - 1.65 1.20 1.20 - 1.65	SPTS D 6 B 7	N=29 (4,4/5,7,8,9)	28/11/19	0800 Damp	Orangish brown, mottled light grey, slightly gravelly clayey fine to medium SAND. Gravel is subangular to subrounded fine to coarse of flint.		(0.40) 1.20 37.97						
1.65 - 2.20	B 8				Medium dense brown, mottled orangish brown and light grey, slightly gravelly clayey fine to coarse SAND.		(1.00)						
2.20 - 2.65 2.20 2.20 - 2.65 2.65 - 3.20	SPTS D 9 B 10 B 11	N=4 (2,2/1,1,1,1)	2.20	Damp	Soft to firm dark grey sandy CLAY. Sand is fine to medium. Pyrite flecks present.		2.20 36.97 (1.00)						
3.20 - 3.50 3.20 - 3.50	UT NR B 13	100 blows No Recovery	3.20	Dry	Stiff to very stiff light grey, mottled red and pink, occasionally mottled yellowish brown, CLAY. Rare gravel size clasts (up to 60mm) of medium strong mudstone.		3.20 35.97 (0.30)						
3.50 - 3.95 3.50 3.50 - 4.20	SPTS D 14 B 15	N=17 (1,2/4,4,4,5)	3.20	Dry	Stiff to very stiff light grey, mottled red and pink, occasionally mottled yellowish brown, slightly sandy CLAY.		3.50 35.67						
4.20 - 4.65	UT 16	100 blows 100% rec	3.20	Dry									
4.65 4.65 - 5.20	D 17 B 18												
5.20 - 5.65 5.20 5.20 - 5.65 5.65 - 6.20	SPTS D 19 B 20 B 21	N=19 (1,2/4,4,5,6)	3.20	Dry		5.20-5.65 light grey, mottled red, occasionally mottled yellowish brown							
6.20 - 6.65	UT NR	100 blows No Recovery	3.20	Dry									
6.50 - 6.95 6.50 6.50 - 6.95 6.95 - 7.20	SPTS D 23 B 24 B 25	N=32 (2,5/5,8,9,10)	3.20	Dry		6.50 occasionally mottled brown	(6.60)						
7.20 - 7.65	UT 26	100 blows 67% rec	3.20	Dry									
7.65 7.65 - 8.20	D 27 B 28												
8.20 - 8.65 8.20 8.20 - 8.65 8.65 - 9.20	SPTS D 29 B 30 B 31	N=20 (2,3/4,5,5,6)	3.20	Dry		8.65-9.20 red and pink, mottled light grey, occasionally mottled yellowish brown and brown							
9.20 - 9.65	UT 32	100 blows 100% rec	3.20	Dry									
9.65 - 10.10 9.65 9.65	SPTS D 33 D 34	N=38 (3,3/6,10,11,11)	3.20	Dry									
			28/11/19 3.20	1800 Dry									
Groundwater Entries					Depth Related Remarks			Hard Boring					
No.	Depth Strike (m)	Remarks	Depth Sealed (m)		Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used				
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project HAVANT THICKET WINTER STORAGE RESERVOIR			Borehole					
Scale 1:50					Project No. A9031-19			ATK-CP-09					
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Borehole Log



Drilled DS	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	36.10 mOD
Logged PC/RP	21/11/2019	Dando 2500. Cable percussion boring. SPT Hammer ID: JD04, Rod type: Whitworth. Terminated due to hard strata.	1.20	11.50	200	11.50	Coordinates (m)	E 470923.96
Checked MS	End						National Grid	N 109944.04
Approved TC	22/11/2019							

Samples and Tests				Strata Description					
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.50	D 1 B 2	0.00-1.20 Hand excavated inspection pit.			Very soft brown sandy CLAY with abundant rootlets. (TOPSOIL)		0.10 (0.10) 36.00		
0.50 0.50 - 1.00	HV B 3	p 63kPa, r 32kPa			Firm, mottled orangish brown and grey, slightly sandy CLAY.		(1.10)		
1.20 - 1.65 1.20	UT 5 D 4	16 blows 100% rec		Dry	Firm to stiff light brown and light grey, mottled orangish brown, CLAY.	1.00 becoming stiff	1.20 34.90 (0.45)		
1.65 1.65 - 2.00	D 6 B 7				Stiff mottled brown and grey with some orangish brown mottling, slightly sandy silty CLAY. Sand is fine. Pyrite flecks.		1.65 34.45		
2.00 - 2.45 2.00 - 2.45 2.00 - 2.50	SPTS D 8 B 9	N=12 (2,3/2,4,3,3)	2.00	Dry		2.50-3.00 occasional grey mottling	(1.35)		
2.50 - 3.00 2.50 - 3.00	D 11 B 10								
3.00 - 3.45	UT 12	50 blows 100% rec	3.00	Dry	Stiff brown, mottled orangish brown, CLAY. Rare gypsum crystals.		3.00 33.10		
3.45 3.50 - 4.00	D 13 B 14					3.50-4.00 slightly sandy, sand is fine	(1.00)		
4.00 - 4.45 4.00 - 4.45 4.00 - 4.50	SPTS D 15 B 16	N=26 (3,3/4,7,7,8)	4.00	Dry	Very stiff brownish grey and brown, mottled orangish brown slightly sandy silty CLAY. Sand is fine. Occasional orangish brown lenses/pockets (up to 60mm) of silty sand. Pyrite flecks.		4.00 32.10		
4.50 - 5.00 4.50 - 5.00	D 18 B 17						(1.00)		
5.00 - 5.45	UT 19	53 blows 100% rec	5.00	Dry	Stiff to very stiff dark grey silty CLAY. Rare to occasional selenite crystals (up to 20mm).		5.00 31.10		
5.45 5.50 - 6.00	D 20 B 21					5.50-6.00 pyrite pieces	(1.00)		
6.00 - 6.45 6.00 - 6.45 6.00 - 6.50	SPTS D 22 B 23	N=19 (2,3/4,5,4,6)	6.00	Dry	Stiff to very stiff dark grey slightly sandy silty CLAY. Sand is fine. Rare selenite crystals (up to 2mm). Pyrite flecks.		6.00 30.10		
6.50 - 7.00 6.50 - 7.00	D 25 B 24						(1.45)		
7.00 - 7.45	UT 26	81 blows 100% rec	7.00	Dry		7.00 rare pockets of yellow silt			
7.45 7.50 - 8.00	D 27 B 28				Stiff to very stiff dark grey sandy silty CLAY. Sand is fine. Pyrite flecks.		7.45 28.65 (0.55)		
8.00 - 8.45 8.00 - 8.45 8.00 - 8.50	SPTS D 29 B 30	N=35 (6,7/7,8,10,10)	8.00	Dry	Stiff to very stiff dark grey sandy to very sandy silty CLAY. Sand is fine.		8.00 28.10		
8.50 - 9.00 8.50 - 9.00	D 32 B 31					8.50-9.00 grey slightly sandy, sand is fine	(1.00)		
9.00 - 9.45	UT 33	89 blows 100% rec	9.00	Dry	Very stiff dark grey CLAY.		9.00 27.10 (0.50)		
9.45 9.50 - 10.00	D 34 B 35				Stiff to very stiff dark grey silty CLAY. Rare light grey pockets (up to 60mm) of silt.		9.50 26.60 (0.50)		

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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20:49:11			Project Project No. Carried out for	HAVANT THICKET WINTER STORAGE RESERVOIR A9031-19 Portsmouth Water	Borehole ATK-CP-10 Sheet 1 of 2
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Drilled	AR	Start	Equipment, Methods and Remarks		Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	26.15 mOD
Logged	FC	17/12/2019	Dando 2000. Cable percussion boring. SPT Hammer ID: JD02, Rod type: Whitworth. Vibrating Wire Piezometer installed at 11.20 m on completion.		1.20	11.26	150	1.70	Coordinates (m)	E 471174.97
Checked	MS	End							National Grid	N 109519.93
Approved	TC	17/12/2019								
Samples and Tests					Strata Description					
Depth		Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 - 0.30		B 1	0.00-1.20 Hand excavated inspection pit.			Soft to firm light brown slightly sandy CLAY with frequent rootlets.		0.10 (0.10) 26.05		
0.30 - 0.50		B 2				Firm greyish brown, mottled orangish brown, CLAY with rare organic material and rootlets.		(1.10)		
0.50		D 3								
0.50 - 0.80		B 4								
0.80 - 1.20		B 5								
1.20 - 1.85		SPTS	N=4 (1,0/1,1,1,1)		Dry	Firm to stiff bluish grey, mottled brown and orangish brown, slightly sandy CLAY.		1.20 24.95		
1.20		D 6								
1.20		D 7								
1.20 - 1.70		B 8								
1.70 - 2.00		B 9						(1.40)		
2.00		UT 11	16 blows	1.70	Dry		2.00 local pockets (up to 30x30mm) of orangish brown fine to medium sand			
2.00		D 10								
2.60		D 12				Stiff bluish grey, locally mottled white and orangish brown, silty CLAY. Pockets (up to 20x10mm) of selinite crystals, and fine to medium sand (up to 30x10mm). Rare organic material.		2.60 23.55		
2.60 - 3.00		B 13						(0.90)		
3.00 - 3.45		SPTS	N=9 (1,2/2,2,2,3)	1.70	Dry	Stiff to very stiff dark grey silty CLAY.		3.50 22.65		
3.00		D 14								
3.00		D 15								
3.00 - 3.50		B 16								
3.50 - 4.00		B 17								
4.00		UT 19	25 blows	1.70	Dry			(1.50)		
4.00		D 18								
4.60		D 20					4.60 very stiff local pockets (up to 20x20mm) of fine to medium sand and silt			
4.60 - 5.00		B 21				Stiff dark grey slightly sandy silty CLAY.		5.00 21.15		
5.00 - 5.45		SPTS	N=14 (2,2/3,3,4,4)	1.70	Dry		5.50 locally sandy			
5.00		D 22								
5.00		D 23								
5.00 - 5.50		B 24								
5.50 - 6.00		B 25								
6.00		UT 27	30 blows	1.70	Dry			(2.00)		
6.00		D 26								
6.60		D 28					6.60 indistinctly laminated			
6.60 - 7.00		B 29								
7.00 - 7.45		SPTS	N=14 (2,1/3,3,4,4)	1.70	Dry	Very stiff dark grey slightly sandy silty CLAY.		7.00 19.15		
7.00		D 30					7.00-7.50 local pockets (up to 20x20mm) of fine to medium sand			
7.00		D 31								
7.00 - 7.50		B 32						(1.60)		
7.50 - 8.00		B 33								
8.00		UT 35	33 blows	1.70	Dry					
8.00		D 34								
8.60		D 36						8.60		
8.60		B 37				Stiff to very stiff dark grey sandy silty CLAY.		17.55		
9.00 - 9.45		SPTS	N=17 (2,3/4,4,4,5)	1.70	Dry					
9.00		D 38								
9.00		D 39								
9.00 - 9.50		B 40								
9.50 - 10.00		B 41						(2.00)		
							10.00 very stiff dark grey silty clay			
Groundwater Entries					Depth Related Remarks			Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)			Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project HAVANT THICKET WINTER STORAGE RESERVOIR			Borehole		
Scale 1:50					Project No. A9031-19			ATK-CP-11		
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AGS										

Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	26.15 mOD
Logged	FC	17/12/2019	Dando 2000. Cable percussion boring.			1.20	11.26	150	1.70	Coordinates (m)	E 471174.97
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth.							National Grid	N 109519.93
Approved	TC	17/12/2019	Vibrating Wire Piezometer installed at 11.20 m on completion.								
Samples and Tests						Strata Description					
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level (Thickness)	Legend	Backfill		
			Casing	Water							
10.00 10.00	UT 43 D 42	50 blows	1.70	Dry	Stiff to very stiff dark grey sandy silty CLAY.						
10.60 10.60 - 11.00	D 44 B 45				Dark grey clayey fine to medium SAND.		10.60 (0.66)				
11.00 - 11.26 11.00	SPTS D 46	>50 (15,10 for 35mm/26,24 for 75mm)	1.70 17/12/19 1.70	1630 2.50	END OF EXPLORATORY HOLE		11.26 14.89				
Groundwater Entries						Depth Related Remarks		Hard Boring			
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used		
1	11.10		Rose to 2.50 m after 20 minutes.								
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project		Borehole			
Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20 49 12						Project		ATK-CP-11			
AGS						Project No.		Sheet 2 of 2			
						Carried out for					
						Portsmouth Water					

Borehole Log



Drilled DS Logged RP Checked MS Approved TC	Start 18/11/2019 End 20/11/2019	Equipment, Methods and Remarks Dando 2500. Cable percussion boring. SPT Hammer ID: JD04, Rod type: Whitworth. Standpipe piezometer installed on completion.	Depth from (m) 1.20	to (m) 10.45	Diameter (mm) 200	Casing Depth (m) 6.00	Ground Level 26.90 mOD Coordinates (m) E 471174.96 National Grid N 109782.99		
Samples and Tests			Strata Description						
Depth 0.00 - 0.30 0.00 - 0.30 0.30 - 0.90 0.30 - 0.90 0.50	Type & No. D 2 B 1 D 4 B 3 HV	Records 0.00-1.20 Hand excavated inspection pit. p 41kPa, r 11kPa	Date Casing 18/11/19	Time Water 1730	Main Soft to firm, mottled orangish brown and light grey sandy CLAY. Sand is fine to coarse. Rare roots and rootlets (<5mm). Firm to stiff grey, mottled orangish brown and brown, slightly sandy CLAY. Sand is fine to medium. Rare roots and rootlets (<5mm).	Detail (0.30) 0.30 26.60 (0.60) 0.90 26.00 (0.30) 1.20 25.70	Depth, Level (Thickness) (0.30) 0.30 26.60 (0.60) 0.90 26.00 (0.30) 1.20 25.70	Legend 1	Backfill 1
0.90 - 1.20 0.90 - 1.20 1.00 1.20 - 1.65 1.20 - 1.65 1.20 - 1.70	D 4B B 4A EW 1 SPTS D 5 B 6	N=6 (1,1/1,2,1,2)	19/11/19	0730 Dry	Stiff grey, mottled orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of flint. Firm orangish brown, mottled light grey slightly sandy CLAY. Sand is fine to medium. Pyritic flecks.	(1.30) 2.00 24.40 (0.50) 2.50 24.40	2	2	
1.70 - 2.00 1.90 2.00 - 2.45	D 7 EW 2 UT 8	23 blows 100% rec	2.00	Dry	Stiff dark grey, mottled brown, CLAY. Pyrite flecks.	3.50 rare shell fragments (up to 60mm) (1.00) 3.00 23.90 (1.00) 4.00 22.90 (0.50) 4.50 22.40	2	2	
2.50 2.50 - 3.00 2.50 - 3.00	EW 3 D 10 B 9	N=16 (1,1/3,3,5,5)	3.00	Dry	Stiff dark grey slightly gravelly sandy CLAY. Sand is fine. Gravel is dark grey and black rounded of flint. Pyrite flecks.	(0.95) 5.45 21.45 (1.55) 7.00 19.90	2	2	
3.00 - 3.45 3.00 - 3.45 3.00 - 3.50	SPTS D 11 B 12	N=21 (3,3/5,5,5,8) k=1.1E-6 m/s	4.00	2.90	Medium dense dark grey very clayey fine SAND. Pyrite flecks.	(0.50) 4.50 22.40	2	2	
3.50 - 4.00 3.50 - 4.00	D 14 B 13	N=21 (3,3/5,5,5,8) k=1.1E-6 m/s	4.00	2.90	Soft to firm dark grey sandy CLAY. Sand is fine. Pyrite flecks.	(0.95) 5.45 21.45	2	2	
4.00 - 4.45 4.00 - 5.00 4.00 - 4.45 4.00 - 4.50	SPTS Rising Head D 15 B 16	N=21 (3,3/5,5,5,8) k=1.1E-6 m/s	4.00	2.90	Medium dense dark grey very clayey fine SAND. Pyrite flecks.	(0.50) 4.50 22.40	2	2	
4.50 - 5.00 4.50 - 5.00	D 18 B 17	N=21 (3,3/5,5,5,8) k=1.1E-6 m/s	4.00	2.90	Soft to firm dark grey sandy CLAY. Sand is fine. Pyrite flecks.	(0.95) 5.45 21.45	2	2	
5.00 - 5.45	UT 19	89 blows 100% rec	5.00	Dry	Stiff to very stiff red and light grey mottled with purple mottling slightly sandy CLAY.	(0.95) 5.45 21.45	2	2	
5.50 5.50 - 6.00 5.50 - 6.00	D 20 D 22 B 21	N=32 (3,5/6,5,10,11)	6.00	Dry	Stiff to very stiff red to reddish brown and light grey mottled, occasional brown and yellowish brown, CLAY.	(1.55) 7.00 19.90	2	2	
6.00 - 6.45 6.00 - 6.45 6.00 - 6.50	SPTS D 23 B 24	N=32 (3,5/6,5,10,11)	6.00	Dry	Stiff to very stiff red to reddish brown and light grey mottled, occasional brown and yellowish brown, CLAY.	(1.55) 7.00 19.90	2	2	
6.50 - 7.00 6.50 - 7.00	D 26 B 25	N=32 (3,5/6,5,10,11)	6.00	Dry	Stiff to very stiff red to reddish brown and light grey mottled, occasional brown and yellowish brown, CLAY.	(1.55) 7.00 19.90	2	2	
7.00 - 7.45	UT 27	89 blows 100% rec	7.00	Dry	Stiff to very stiff red to reddish brown and light grey mottled, occasional brown and yellowish brown, CLAY.	(1.55) 7.00 19.90	2	2	
7.50 - 8.00 7.50 - 8.00	D 29 B 28	N=50 (5,8/9,13,17,11)	6.00	Dry	Stiff to very stiff red to reddish brown and light grey mottled, occasional brown and yellowish brown, CLAY.	(1.55) 7.00 19.90	2	2	
8.00 - 8.45 8.00 - 8.40 8.00 - 8.50	SPTS D 30 B 31	N=50 (5,8/9,13,17,11)	6.00	Dry	Stiff to very stiff red to reddish brown and light grey mottled, occasional brown and yellowish brown, CLAY.	(1.55) 7.00 19.90	2	2	
8.50 - 9.00 8.50 - 9.00	D 33 B 32	N=50 (5,8/9,13,17,11)	6.00	Dry	Stiff to very stiff red to reddish brown and light grey mottled, occasional brown and yellowish brown, CLAY.	(1.55) 7.00 19.90	2	2	
9.00 - 9.45	UT 34	79 blows 100% rec	6.00	Dry	Very stiff red and light grey, mottled yellowish brown and orangish brown, CLAY.	(1.45) 9.00 17.90	2	2	
9.45 9.50 - 10.00 9.50 - 10.00	D 35 D 37 B 36	N=50 (5,8/9,13,17,11)	6.00	Dry	Very stiff red and light grey, mottled yellowish brown and orangish brown, CLAY.	(1.45) 9.00 17.90	2	2	
Groundwater Entries No. Depth Strike (m) Remarks 1 0.50 Rose to 0.20 m after 20 minutes. 2 3.50 Rose to 2.90 m after 20 minutes.			Depth Sealed (m) 5.00		Depth Related Remarks Depths (m) Remarks		Hard Boring Depths (m) Duration (mins) Tools used		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. © Copyright SOCOTEC UK Limited Scale 1:50 09/04/2020 20:49:12			Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water				Borehole ATK-CP-12 Sheet 1 of 2		

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Drilled	AR	Start	Equipment, Methods and Remarks		Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	29.75 mOD
Logged	JA	25/11/2019	Dando 2000. Cable percussion boring. SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion.		1.20	10.50	200	4.50	Coordinates (m)	E 471447.76
Checked	MS	End							National Grid	N 109812.48
Approved	TC	25/11/2019								
Samples and Tests					Strata Description					
Depth		Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 - 0.30		B 1	0.00-1.20 Hand excavated inspection pit.			TOPSOIL		0.10 (0.10) 29.65		
0.30 - 0.50		B 2				Soft to firm yellowish brown gravelly CLAY. Gravel is angular to subangular fine to coarse of chert and flint.		(0.40)		
0.50		D 3								
0.50 - 0.80		B 4				Soft to firm orangish brown and grey slightly sandy CLAY. Frequent rootlets.		0.50 29.25		
0.80 - 1.00		B 5								
1.20		UT 7	12 blows	1.20	Damp			(1.50)		
1.20		D 6								
1.70		D 8								
1.70 - 2.00		B 9								
2.00 - 2.45		SPTC	N=16 (2,3/3,4,4,5)	1.70	Damp	Firm orangish brown, mottled grey, slightly sandy to sandy CLAY.	2.00-2.50 occasional subrounded fine to coarse gravel of flint	2.00 27.75		
2.00		D 10								
2.00		D 11								
2.00 - 2.50		B 12								
2.50 - 3.00		B 13								
3.00 - 3.45		SPTS	N=11 (1,2/2,3,3,3)	3.00	1.40		3.00-4.00 firm to stiff with pockets of fine to medium orange brown sand (up to 25mm)	(2.00)		
3.00		D 14								
3.00		D 15								
3.00 - 3.50		B 16								
3.50 - 4.50		Rising Head	k=5.2E-8 m/s							
3.50 - 4.00		B 17								
4.00		UT 19	21 blows	4.00	Dry	Firm greyish brown sandy CLAY.		4.00 25.75		
4.00		D 18						(0.50)		
4.50		D 20				Firm to stiff, mottled red and grey, slightly sandy CLAY.		4.50 25.25		
4.50 - 5.00		B 21								
5.00 - 5.45		SPTS	N=18 (2,4/4,4,5,5)	4.50	Dry					
5.00		D 22								
5.00		D 23								
5.00 - 5.50		B 24								
5.50 - 6.00		B 25								
6.00		UT 27	30 blows	4.50	Dry					
6.00		D 26								
6.30		D 28								
6.50 - 7.00		B 29								
7.00 - 7.45		SPTS	N=25 (3,4/5,6,7,7)	4.50	Dry					
7.00		D 30								
7.00		D 31								
7.00 - 7.50		B 32								
7.50 - 8.00		B 33						(6.00)		
8.00		UT 35	38 blows	4.50	Dry		8.00 very stiff			
8.00		D 34								
8.50		D 36					8.50-9.00 occasional angular to subangular fine to coarse gravel of mudstone			
8.50 - 9.00		B 37								
9.00 - 9.45		SPTS	N=22 (2,3/3,6,6,7)	4.50	Dry					
9.00		D 38								
9.00		D 39								
9.00 - 9.50		B 40								
9.50 - 10.00		B 41								
Groundwater Entries					Depth Related Remarks			Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	
1	2.50		Rose to 1.40 m after 20 minutes.							
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project HAVANT THICKET WINTER STORAGE RESERVOIR			Borehole		
Scale 1:50					Project No. A9031-19			ATK-CP-13A		
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Drilled	DS	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	33.61 mOD
Logged	PC/FC	11/12/2019	Dando 2500. Cable percussion boring. SPT Hammer ID: JD04, Rod type: Whitworth.			(m)	(m)	(mm)	(m)	Coordinates (m)	E 472014.00
Checked	MS	End	Borehole terminated due to hard strata / slow progress. Attempted to relocate but unable to erect rig safely due to soft ground conditions, location cancelled.			1.20	5.00	200	4.50	National Grid	N 109691.03
Approved	TC	11/12/2019									
Samples and Tests						Strata Description					
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level (Thickness)	Legend	Backfill		
			Casing	Water							
0.10 0.10 - 0.50	D 1 B 2	0.00-1.20 Hand excavated inspection pit.			Very soft slightly gravelly sandy CLAY. Gravel is subangular fine to coarse of flint. Frequent rootlets. (TOPSOIL)		0.10 (0.10) 33.51				
0.50 0.50 - 1.00	HV B 3	p 56kPa, r 20kPa					Firm to stiff, mottled orange and brown, locally grey, slightly sandy silty CLAY with occasional rootlets.				
1.20 - 1.65 1.20 - 1.65	SPTS D 4	N=9 (1,1/1,2,3,3)	1.20	Dry		1.20-1.65 local pockets (up to 10x10mm) of dark grey organic material					
1.50 - 2.00 1.50 - 2.00	D 6 B 5										
2.00 - 2.45	UT 7	11 blows 100% rec	2.00	Dry			(3.60)				
2.45 2.50 - 3.00	D 8 B 9										
3.00 - 3.45 3.00 - 3.45 3.00 - 3.50	SPTS D 10 B 11	N=8 (1,1/1,2,2,3)	3.00	Dry		3.00-3.45 locally mottled dark orangish brown pockets (up to 20x20mm) of fine to medium sand					
3.70 - 4.00 3.70 - 4.00	D 12 B 13				Firm to stiff dark grey slightly sandy silty CLAY. Sand is fine to medium.		3.70 29.91				
4.00 - 4.45	UT 14	39 blows 100% rec	4.00	Dry			(0.75)				
4.45 4.50 - 5.00	D 15 B 16				Stiff dark grey silty CLAY. Local pockets (up to 20x10mm) of light grey fine sand and silt.		4.45 29.16				
5.00 - 5.40 5.00 - 5.40	SPTS D 17	>50 (3,7/9,12,14,15 for 30mm)	4.50 11/12/19 4.50	Dry 1630 Dry	Stiff dark grey silty CLAY. Local pockets (up to 20x10mm) of light grey fine sand and silt. Rare sand and gravel of flint.		5.00 28.61 (0.40)				
					END OF EXPLORATORY HOLE		5.40 28.21				
Groundwater Entries					Depth Related Remarks		Hard Boring				
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used		
1	1.00		Seepage.				5.30 - 5.50	90	Chisel		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project		Borehole				
Scale 1:50					Project		ATK-CP-14				
© Copyright SOCOTEC UK Limited					Project No.						
AGS					Carried out for						
					HAVANT THICKET WINTER STORAGE RESERVOIR						
					A9031-19						
					Portsmouth Water						
							Sheet 1 of 1				

Borehole Log



Drilled	AR	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	33.45 mOD
Logged	FC	28/11/2019	Dando 2000. Cable percussion boring.	1.20	16.00	200	16.00	Coordinates (m)	E 470810.97
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth.	16.00	30.28	150	30.00	National Grid	N 109674.00
Approved	TC	05/12/2019	Standpipe piezometer installed on completion.						

Samples and Tests				Strata Description					
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level	Legend	Backfill
			Casing	Water			(Thickness)		
0.10 - 0.30	B 1	0.00-1.20 Hand excavated inspection pit.			TOPSOIL.		0.10 (0.10) 33.35		
0.30 - 0.50	B 2				Soft to firm grey and brown, mottled orangish brown, silty CLAY with abundant rootlets.				
0.50	D 3					0.50-1.20 slightly sandy	(1.10)		
0.50 - 0.80	B 4								
0.80 - 1.00	B 5								
1.20	UT 7	8 blows 67% rec		Damp	Soft, becoming firm, yellowish brown, mottled grey, slightly sandy CLAY. Sand is fine to medium.	1.50 bluish grey and firm clay	1.20 32.25		
1.20	D 6								
1.50 - 2.00	B 8								
2.00 - 2.45	SPTS	N=4 (1,0/0,1,1,2)	1.70	Dry		2.00 Stiff brownish grey mottled grey clay with occasional fine gravel of white selenite and fine lenticular light brown sand.	(2.30)		
2.00	D 10								
2.00 - 2.50	B 11					2.50 Sand is orangish brown fine to medium.			
2.50 - 3.00	B 12								
3.00	UT 14	19 blows 67% rec	3.00	Dry					
3.00	D 13								
3.50 - 4.00	B 15				Stiff light brown, mottled orangish brown and grey, sandy CLAY with occasional lenses (up to 60mm) of fine sand.		3.50 29.95		
4.00 - 4.45	SPTS	N=12 (1,2/2,3,3,4)	3.00	Dry			(1.00)		
4.00	D 16								
4.00 - 4.50	B 18								
4.50 - 5.00	B 19				Stiff to very stiff orangish brown mottled grey CLAY with partings (up to 1mm) of fine orangish brown sand.		4.50 28.95		
5.00	UT 21	24 blows	28/11/19	0745			(1.00)		
5.00	D 20		29/11/19	0745					
5.50	D 22								
5.50 - 6.00	B 23				Stiff grey, locally silty, CLAY. Occasional silt horizontal lenses of light grey silt.		5.50 27.95		
6.00 - 6.45	SPTS	N=37 (1,1/2,3,21,11)	4.50	Dry		6.00 Very stiff dark grey clay and slightly silty.			
6.00	D 24								
6.00 - 6.50	B 26								
6.50 - 7.00	B 27								
7.00	UT 29	30 blows	6.00	Dry					
7.00	D 28								
7.50	D 30					7.50-8.00 Slightly pyritic.			
7.50 - 8.00	B 31								
8.00 - 8.45	SPTS	N=16 (2,3/3,4,4,5)	6.00	Dry		8.00 Dark grey mottled brown.	(5.70)		
8.00	D 32								
8.00 - 8.50	B 34								
8.50 - 9.00	B 35								
9.00	UT 37	34 blows	6.00	Dry		9.00 Slightly sandy. (Fine light brown sand).			
9.00	D 36								
9.50	D 38					9.50-10.00 Slightly pyritic and sandy.			
9.50 - 10.00	B 39								

Groundwater Entries				Depth Related Remarks				Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks		Depths (m)	Duration (mins)	Tools used
1	0.80		Seepage							

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.		Project		HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole	
Scale 1:50		Project No.		A9031-19		ATK-CP-15	
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Borehole Log



Drilled AR	Start	Equipment, Methods and Remarks		Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	33.45 mOD
Logged FC	28/11/2019	Dando 2000. Cable percussion boring. SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion.		1.20	16.00	200	16.00	Coordinates (m)	E 470810.97
Checked MS	End			16.00	30.28	150	30.00	National Grid	N 109674.00
Approved TC	05/12/2019								

Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
10.00	D 40				Stiff grey, locally silty, CLAY. Occasional silt horizontal lenses of light grey silt.				
10.00 - 10.50	B 41								
10.50 - 10.95	SPTS D 42	N=19 (2,3/4,4,5,6)	6.00	Dry					
10.50 - 11.00	B 43								
11.00	D 44		29/11/19	1630	Stiff dark grey, occasionally mottled light grey, sandy silty CLAY. Sand is fine to medium.		11.20		
11.00 - 11.50	B 45		6.00	Dry			22.25		
11.50 - 12.00	B 46		02/12/19	0745					
12.00	UT 48	34 blows	6.00	Dry		12.00 Thinly laminated.			
12.00	D 47								
12.50	D 49								
12.50 - 13.00	B 50					12.50 Stiff to very stiff dark grey brownish silty clay.	(2.80)		
13.00	D 51				Stiff dark grey, occasionally mottled light grey, sandy silty CLAY. Sand is fine to medium.				
13.00 - 13.50	B 52								
13.50 - 13.95	SPTS D 53	N=20 (3,4/4,5,5,6)	6.00	Dry					
13.50 - 14.00	B 54					13.50 Slightly sandy. Sand is fine light grey.			
14.00	D 55								
14.00 - 14.50	B 56								
14.50 - 15.00	B 57				Stiff grey brown silty CLAY, becoming sandy. Sand is fine light grey and brown.		14.00		
15.00	UT 59	37 blows	6.00	Dry			19.45		
15.00	D 58								
15.50	D 60					15.50-16.00 Very stiff.	(2.00)		
15.50 - 16.00	B 61								
16.00	D 62								
16.00 - 16.50	B 63				Dense dark grey slightly silty angular to subangular fine to coarse GRAVEL of mudstone.		16.00		
16.50 - 16.82	SPTC B 64	>50 (6,9/17,21,12 for 20mm)	16.50	5.00			17.45		
16.50 - 16.80	B 65		02/12/19	1630					
16.50 - 16.80	B 65		16.50	5.00		16.00-16.50 Recovered as firm grey silty clay occasional mottling.			
17.00	D 66		03/12/19	0745					
17.50 - 18.50	Rising Head B 67	k=5.5E-9 m/s							
17.50 - 18.00						17.40-18.00 Soft to firm silty clay.	(2.00)		
18.00 - 18.45	SPTS D 68	N=23 (3,4/5,6,6,6)	18.00	Dry					
18.00 - 18.50	B 69								
18.00 - 18.50	B 70				Firm to stiff, mottled red, brown and grey slightly sandy CLAY. Sand is yellowish brown fine and lenticular (up to 1mm thickness).		18.00		
18.50 - 19.00	B 71						15.45		
19.00	D 72								
19.00 - 19.50	B 73				Stiff grey brown silty CLAY, becoming sandy. Sand is fine light grey and brown.		19.00		
19.50 - 19.95	SPTS D 74	N=33 (5,6/7,8,8,10)	19.50	Dry			14.45		
19.50 - 20.00	B 75								

Groundwater Entries			Depth Related Remarks		Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)
				16.00	Water added.	16.50 - 16.80	75
						16.80 - 17.40	105
							Tools used
							Chisel
							Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole
Scale 1:50	Project No.	A9031-19		ATK-CP-15
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Drilled AR		Start		Equipment, Methods and Remarks				Depth from (m)		to (m)		Diameter (mm)		Casing Depth (m)		Ground Level		33.45 mOD		
Logged FC		28/11/2019		Dando 2000. Cable percussion boring.				1.20		16.00		200		16.00		Coordinates (m)		E 470810.97		
Checked MS		End		SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion.				16.00		30.28		150		30.00		National Grid		N 109674.00		
Approved TC		05/12/2019																		
Samples and Tests								Strata Description												
Depth		Type & No.		Records		Date Casing		Time Water		Main			Detail		Depth, Level (Thickness)		Legend		Backfill	
20.00 20.00 - 20.50		D 76 B 77								Stiff grey brown silty CLAY, becoming sandy. Sand is fine light grey and brown.			20.00 Firm.							
20.50 - 21.00		B 78											20.50-21.00 Recovered as soft to firm.							
21.00 21.00		UT 80 D 79		43 blows		21.00		7.70												
21.30 21.30 - 21.80		D 81 B 82																		
21.80 - 22.02 21.80		SPTS D 83		>50 (15,10 for 20mm/26,24 for 50mm)		03/12/19 21.00		1630 8.00					21.80 Slightly silty.							
21.80 - 22.50		B 84				04/12/19 21.00		0745												
22.50 22.50 - 23.00		UT 85 B 86		50 blows No Recovery		22.50		7.00							(7.50)					
23.00 23.00 - 23.50		D 87 B 88																		
23.50 - 24.00		B 89																		
24.00 - 24.32 24.00		SPTS D 90		>50 (8,12/15,15,20 for 24mm)		24.00		8.00												
24.00 - 24.50		D 91 B 92																		
24.50 - 25.00		B 93																		
25.00 25.00 - 25.50		D 94 B 95																		
25.50 - 25.95 25.50		SPTS D 96		N=50 (8,9/10,12,13,15)		25.50		8.00					25.50-26.50 Recovered as dense to very dense reddish brown clayey fine to coarse sand.							
25.50 - 26.00		B 97																		
26.00 - 26.50		B 98																		
26.50 - 27.00		B 99								Very stiff reddish brown slightly sandy CLAY. Sand is fine to medium.			26.50		6.95					
27.00 - 27.39 27.00		SPTS D 100		>50 (10,14/15,15,19,1 for 18mm)		27.00		8.00		Very stiff grey reddish brown very sandy CLAY. Sand is fine to coarse and light grey.			27.00		6.45					
27.00 - 27.50		D 101 B 102																		
27.50 - 28.00		B 103																		
28.00 - 28.50		B 104													(2.50)					
28.50 - 28.80 28.50		SPTS D 105		>50 (15,10 for 35mm/19,27,4 for 28.5mm)		28.00		8.00												
28.50 - 29.00		B 106																		
29.00 - 29.50		B 107								Firm light grey very sandy CLAY. Sand is fine to coarse.			29.50		3.95					
															(0.78)					
Groundwater Entries										Depth Related Remarks					Hard Boring					
No.		Depth Strike (m)		Remarks		Depth Sealed (m)		Depths (m)		Remarks		Depths (m)		Duration (mins)		Tools used				
2		21.20		Rose to 13.00 m after 20 minutes.				21.80 - 22.30		Slow progress (60mins).										
								24.00 - 24.60		Slow progress (60mins).										
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.										Project HAVANT THICKET WINTER STORAGE RESERVOIR					Borehole					
Scale 1:50										Project No. A9031-19					ATK-CP-15					
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Borehole Log



Drilled DS Logged FC Checked MS Approved TC	Start 17/12/2019 End 18/12/2019	Equipment, Methods and Remarks Dando 250D. Cable percussion boring. SPT Hammer ID: JD04, Rod type: Whitworth. Standpipe installed on completion. Panel of experts additional hole.	Depth from (m) 1.20	to (m) 10.45	Diameter (mm) 200	Casing Depth (m) 3.00	Ground Level 37.70 mOD Coordinates (m) E 471309.51 National Grid N 110205.64		
Samples and Tests			Strata Description						
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.50 - 1.00	B 1	0.00-1.20 Hand excavated inspection pit.			Very soft to soft orangish brown sandy to very sandy CLAY with frequent rootlets.		(1.00)		
1.00 - 1.20	B 2				Dark grey angular to subangular coarse GRAVEL of weak Limestone.		1.00 36.70		
1.30 - 2.50	Rising Head	k=2.8E-6 m/s					(0.50)		
1.50 - 2.00	D 3				Very loose orangish brown very sandy clayey angular to subangular fine to coarse GRAVEL of limestone with medium cobble content. Cobbles are subangular of limestone.		1.50 36.20		
1.70 - 2.00	B 3a	1.70-2.50 Water added.					(1.00)		
2.00 - 2.45	SPTS	N=1 (1,0/0,1,0,0)	2.00	1.70					
2.50	ES 4a				Firm to stiff, red, mottled grey and bluish grey, silty CLAY.		2.50 35.20		
2.50 - 3.00	D 5								
2.50 - 3.00	B 4								
3.00 - 3.45	UT 6	21 blows 100% rec	3.00	1.00					
3.00	D 7								
3.50	ES 8a					3.50-4.00 soft to firm			
3.50 - 4.00	D 9								
3.50 - 4.00	B 8								
4.00 - 4.45	SPTS	N=16 (1,2/2,3,5,6)	3.00	1.00					
4.00	D 10								
4.00 - 4.50	B 11								
4.50	ES 12a								
4.50 - 5.00	D 13								
4.50 - 5.00	B 12								
5.00 - 5.45	UT 14	53 blows 100% rec	3.00	1.00					
			17/12/19	1630					
5.45	D 15		3.00	1.00					
5.50 - 6.00	B 16		18/12/19	0730		5.45 very stiff 5.50-6.00 mottled purple and dark reddish brown			
			3.00						
6.00 - 6.45	SPTS	N=21 (2,2/4,4,7,8)	3.00						
6.00 - 6.45	D 17								
6.00 - 6.50	B 18								
6.50 - 7.00	B 19						(7.95)		
7.00 - 7.45	UT 21	82 blows 100% rec	3.00						
7.00	D 20								
7.45	D 22								
7.50 - 8.00	B 23								
8.00 - 8.45	SPTS	N=40 (3,3/7,8,10,15)	3.00						
8.00 - 8.45	D 24								
8.00 - 8.50	B 25								
8.50 - 9.00	D 27								
8.50 - 9.00	B 26								
9.00 - 9.45	UT 28	100 blows 89% rec	3.00						
9.50	D 29								
9.50 - 10.00	B 30								
Groundwater Entries No. Depth Strike (m) Remarks 1 2.00 Rose to 1.70 m after 20 minutes.			Depth Sealed (m) 2.50		Depth Related Remarks Depths (m) Remarks		Hard Boring Depths (m) Duration (mins) Tools used 1.00 - 1.70 120 Chisel		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water				Borehole ATK-CP-16 Sheet 1 of 2		
Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20 49 15									

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Borehole Log



Drilled	KW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	40.53 mOD
Logged	RP	03/12/2019	Comacchio 205. Dynamic sampling to 4.50 m. Rotary core drilling (GBS size) using air mist flush. Client instructed no samples to be taken below 21.00m. 37.34 to 37.71m, drill damaged core.			1.20	3.50	117	3.00	Coordinates (m)	E 471206.01
Checked	MS	End	Standpipe piezometer installed on completion.			3.50	4.50	102	4.50	National Grid	N 110331.98
Approved	TC	10/12/2019				4.50	38.50	146	6.00		

Samples and Tests						Strata Description					
Depth	TOR SCR R&D	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill	
0.20	D 1		0.00-1.20 Hand excavated inspection pit.			Brown slightly gravelly sandy CLAY. Gravel is subangular to rounded fine to coarse of flint and chert. Frequent rootlets.		(0.40)			
0.40	D 2					(TOPSOIL)		0.40 40.13			
0.40 - 0.80	B 3					Soft to firm orangish brown very sandy CLAY.	0.60-0.80 frequent rounded medium to coarse gravel of black flint	(0.80)			
0.80 - 1.20	B 4							1.20 39.33			
1.20 - 2.50	L		100% rec, diameter 117mm			Firm brown, mottled grey and orangish brown sandy CLAY. Sand is fine.		(1.12)			
1.70 - 1.80	D 5							2.32 (0.10) 38.21			
2.30 - 2.40	D 6					Firm to stiff brown, mottled grey and orangish brown, slightly sandy CLAY. Sand is fine.		2.42 (0.08) 38.11			
2.50 - 2.60	D 7		100% rec, diameter 117mm			Orangish brown, mottled reddish brown and dark brown/purple, clayey fine to coarse SAND.		2.50 (0.10) 38.03			
2.50 - 3.50	L					Stiff red, mottled brown and purple, sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular fine to coarse of ironstone.		2.60 37.93			
3.10 - 3.20	D 8					Firm to stiff red and grey, occasionally mottled yellowish brown and brown, silty CLAY.		(1.90)			
3.50 - 4.50	L		100% rec, diameter 102mm					4.50 36.03			
4.00 - 4.10	D 9							(0.60)			
4.40 - 4.50	D 10			03/12/19 3.00	1630 0.80			5.10 35.43			
4.70 - 4.80			D 11	04/12/19 3.00	0800 0.00	Stiff red and grey, occasionally mottled yellowish brown and brown, slightly sandy CLAY. Sand is fine to coarse. Rare fine to coarse gravel size clasts of ironstone/mudstone.		5.30 35.23			
4.50 - 6.00	100 NA NA		D 12			Firm red and grey, occasionally mottled yellowish brown and brown, slightly sandy CLAY. Sand is fine to coarse. Rare fine to coarse gravel size clasts of ironstone/mudstone.		(0.35)			
5.40 - 5.50						Stiff red and grey, occasionally mottled, yellowish brown, slightly sandy CLAY. Sand is fine to coarse.		5.65 34.88			
5.90 - 6.00			D 13					(1.85)			
6.20 - 6.30			D 13A			Very stiff red and grey, occasionally mottled, yellowish brown, slightly sandy CLAY. Sand is fine to coarse.		7.50 33.03			
6.40 - 6.80			CS 14					(0.60)			
6.00 - 7.50	89 NA NA							8.10 32.43			
7.10 - 7.20			D 15					(2.40)			
7.70 - 7.80			D 16			Stiff to very stiff red, grey and pink, occasionally mottled yellowish brown and brown, slightly sandy CLAY. Sand is fine to coarse.					
8.20 - 8.30	100 NA NA		D 17			Very stiff red and grey, mottled pink and yellowish brown, CLAY.					
7.50 - 9.00											
8.80 - 8.90			D 18								
9.00 - 9.40			CS 19								
9.00 - 10.50	100 NA NA										
9.90 - 10.00			D 20								

Groundwater Entries				Depth Related Remarks				Hard Boring			
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used			
1	0.80	Remained at 0.80 m after 20 minutes. Seepage.									

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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09/04/2020 20 50 20

Project HAVANT THICKET WINTER STORAGE RESERVOIR

Project No. A9031-19

Carried out for Portsmouth Water

Borehole

ATK-RC-01

Sheet 1 of 4

Borehole Log



Drilled	KW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	40.53 mOD
Logged	RP	03/12/2019	Comacchio 205. Dynamic sampling to 4.50 m. Rotary core drilling (GBS size) using air mist flush. Client instructed no samples to be taken below 21.00m. 37.34 to 37.71m, drill damaged core.			1.20	3.50	117	3.00	Coordinates (m)	E 471206.01
Checked	MS	End	Standpipe piezometer installed on completion.			3.50	4.50	102	4.50	National Grid	N 110331.98
Approved	TC	10/12/2019				4.50	38.50	146	6.00		

Samples and Tests					Strata Description					
Depth	TCR SCR RSD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
10.30 - 10.40			D 21			Very stiff red and grey, mottled pink and yellowish brown, CLAY.				
10.90 - 11.00			D 22			Stiff to very stiff red and grey, occasionally mottled yellowish brown and brown, slightly sandy CLAY. Sand is fine to medium. Occasional gravel size pockets of yellowish brown and red sand.	11.00 very stiff red and grey, mottled brown	10.50 30.03		
10.50 - 12.00	100 NA NA		D 23					(1.50)		
11.40 - 11.50			D 24							
11.90 - 12.00			D 25			Firm to stiff brown, mottled grey, very sandy to sandy CLAY. Sand is fine to medium.		12.00 28.53		
12.50 - 12.80			D 26					(1.30)		
12.00 - 13.50	97 NA NA		CS 26							
12.90 - 13.30			D 27			Brown, mottled light grey, clayey fine to medium SAND.		13.30 27.23		
13.30 - 13.40			D 28			Stiff to very stiff brown, mottled grey, sandy CLAY. Sand is fine to medium.	13.50-13.70 red and grey, mottled yellowish brown	(0.20) 27.03		
13.50 - 13.80			D 29			Brown, mottled grey, fine to medium SAND.		(0.34) 26.69		
14.10 - 14.20			D 30					(0.51)		
13.50 - 15.00	91 NA NA		D 31			Stiff to very stiff brown, mottled grey, slightly sandy CLAY. Sand is fine to medium.	14.86-15.00 AZCL	14.35 26.18		
14.70 - 14.80			D 32					(1.21)		
15.00 - 15.10			D 33			Very stiff grey and red, mottled brown and yellowish brown, CLAY.	15.60 possible 20 degree rough polished fissure	15.56 24.97		
15.55 - 15.85	59 NA NA		D 34			Assessed Zone of Core Loss. Driller notes clay with sand.		(0.33) 24.64		
15.00 - 16.50			D 35	04/12/19 6.00	1630			(0.61)		
16.80 - 16.70			D 36	05/12/19 6.00	0800 4.70	Very stiff grey and red, mottled brown and yellowish brown, CLAY.		16.50 24.03		
16.50 - 17.25	100 NA NA		D 37							
16.90 - 17.25			D 38							
17.50 - 17.80	84 NA NA		D 39			Very stiff red and grey, mottled pink, yellowish brown and brown, slightly sandy CLAY. Sand is fine to medium.		19.40 21.13		
17.25 - 18.00								(1.00)		
18.30 - 18.40										
18.00 - 19.50	100 NA NA									
18.80 - 18.90										
19.30 - 19.40										
19.50 - 19.60										

Groundwater Entries				Depth Related Remarks		Hard Boring		
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole	ATK-RC-01
Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20 50 20	Project No.	A9031-19			
	Carried out for	Portsmouth Water			Sheet 2 of 4

Borehole Log



Drilled	KW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	40.53 mOD
Logged	RP	03/12/2019	Comacchio 205. Dynamic sampling to 4.50 m. Rotary core drilling (GBS size) using air mist flush. Client instructed no samples to be taken below 21.00m. 37.34 to 37.71m, drill damaged core.			1.20	3.50	117	3.00	Coordinates (m)	E 471206.01
Checked	MS	End	Standpipe piezometer installed on completion.			3.50	4.50	102	4.50	National Grid	N 110331.98
Approved	TC	10/12/2019				4.50	38.50	146	6.00		

Samples and Tests						Strata Description					
Depth	TOR SCR RGO	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill	
20.00 - 20.40			CS 40			Very stiff red and grey, mottled pink, yellowish brown and brown, slightly sandy CLAY. Sand is fine to medium.		20.40 20.13			
19.50 - 21.00	100 NA NA					Very stiff red and grey, mottled yellowish brown and brown, sandy CLAY. Sand is fine to medium.					
20.70 - 20.80			D 41					(1.30)			
			Flush: 4.50 - 38.50 Air/mist 100%								
21.00 - 22.50	100 NA NA					Brown, mottled grey, clayey fine to medium SAND.		21.70 18.83			
								(0.64)			
						Very stiff grey, mottled brown, sandy CLAY. Sand is fine to medium.		22.34 18.19			
						Brown, mottled grey, slightly clayey fine to medium SAND.		22.42 18.11			
						Very stiff brown and grey, mottled red and pink, slightly sandy to sandy CLAY. Sand is fine to medium.		22.60 17.93			
22.50 - 24.00	100 NA NA						23.40-23.60 sandy to very sandy				
						Grey, mottled brown, slightly clayey fine to medium SAND. Rare pockets (up to 5mm) of black silt.		23.60 16.93			
						Very stiff brown, mottled grey, slightly sandy CLAY. Sand is fine to medium.		24.05 16.48			
						Very stiff grey, mottled brown, sandy to very sandy CLAY. Sand is fine to medium with occasional horizontal to 10 degree grey and brown layers of fine to medium sand.		24.16 16.37			
24.00 - 25.50	100 NA NA	- NA -						(0.84)			
						Very stiff grey and red, mottled yellowish brown, slightly sandy CLAY. Sand is fine to medium. Rare gravel size subrounded clasts of weak ironstone.		25.00 15.53			
						Very stiff grey, mottled yellowish brown, slightly sandy CLAY. Sand is fine.	25.30 possible up to 30 degree very closely spaced polished fissures	(0.50)			
						Very stiff yellowish brown and reddish pink, mottled grey, slightly sandy CLAY. Sand is fine.	25.50-25.60 30, 70 and 50 degree very closely spaced polished to slightly polished fissures	25.50 15.03			
25.50 - 27.00	100 NA NA							(0.20)			
								25.70 14.83			
								(2.70)			
27.00 - 28.50	100 NA NA						27.80 grey, mottled red and yellowish brown				
				05/12/19 6.00	1630	Very stiff grey, mottled red and yellowish brown, very sandy CLAY. Sand is fine to medium.		28.40 12.13			
				06/12/19 0800		Red slightly clayey fine to medium SAND.		28.50 12.03			
				06/12/19 6.00	4.75	Grey fine to medium SAND.	28.73-28.75 dark grey slightly clayey sand band	28.62 11.91			
						Very stiff grey and red, mottled pink and brown, slightly sandy to sandy CLAY. Sand is fine to medium.		(0.28)			
28.50 - 30.00	93 NA NA							28.90 11.63			
							29.30-29.41 AZCL	(0.90)			
						Very stiff dark grey, mottled red, CLAY.		29.80 10.73			

Groundwater Entries				Depth Related Remarks		Hard Boring		
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	HAVANT THICKET WINTER STORAGE RESERVOIR			Borehole	ATK-RC-01
Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20 50 20	Project No.	A9031-19				
	Carried out for	Portsmouth Water				Sheet 3 of 4

Borehole Log



Drilled KW Logged RP Checked MS Approved TC	Start 03/12/2019 End 10/12/2019	Equipment, Methods and Remarks Comacchio 205. Dynamic sampling to 4.50 m. Rotary core drilling (GBS size) using air mist flush. Client instructed no samples to be taken below 21.00m. 37.34 to 37.71m, drill damaged core. Standpipe piezometer installed on completion.	Depth from (m) 1.20 3.50 4.50	to (m) 3.50 4.50 38.50	Diameter (mm) 117 102 146	Casing Depth (m) 3.00 4.50 6.00	Ground Level 40.53 mOD Coordinates (m) E 471206.01 National Grid N 110331.98			
Samples and Tests			Strata Description							
Depth (m)	TCR SCR RGD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
30.00 - 31.50	88 NA NA					Very stiff dark grey, mottled red, CLAY.	30.07 30 degree slightly polished planar fissure 30.23 5 degree planar slightly polished fissure 30.46 40 degree undulating slightly polished fissure 30.95 20 degree undulating slightly polished fissure 31.07 40 degree undulating slightly polished fissure	(1.70)		
31.50 - 33.00	87 NA NA	NA		08/12/19 6.00	1230	Very stiff friable dark grey and black, mottled red and yellow, CLAY.	31.62-31.70 extremely closely spaced rough slightly polished to polished fissure/jointing dips of 20, 60 and 30 degree 32.02 70 degree planar undulating slightly polished fissure	31.50 9.03 (1.10)		
33.00 - 34.50	100 NA NA			09/12/19 6.00	0800 4.80	Very stiff grey, mottled red, CLAY.	32.28 50 degree planar slightly polished fissure 32.80-33.00 AZCL	32.60 7.93 (0.40)		
34.50 - 35.00	100 NA NA					Very stiff grey and yellowish brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of flint.	33.44 45 degree planar rough joint	33.00 7.53 (0.44)		
35.00 - 35.50	100 100 58		Falling Head k=4.0E-8 m/s			Very stiff grey and yellowish brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of flint. Glauconitic.	33.79 6.74 (0.20)			
35.50 - 36.50	100 93 86					Very stiff bluish grey, mottled yellowish brown, very sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of flint. Glauconitic.	33.99 6.54 (0.10)			
36.50 - 37.00	100 93 86					Medium strong medium density white CHALK. Very stiff friable light brown slightly sandy CLAY with low cobble content. Sand is fine to coarse. Cobbles are angular to subangular of chalk.	34.32 6.21 (0.11)			
37.00 - 38.50	90 46 46	NI 250 600		09/12/19 6.00	1630	Very stiff bluish grey, mottled yellowish brown, slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular fine to coarse of chalk.	34.43 6.10 (0.17)			
						Stiff dark grey and brown, mottled red, slightly sandy CLAY.	34.60 5.93 (0.40)			
						Very stiff greenish grey, mottled pink, red and yellowish brown, sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse of flint.	35.00 5.53			
						Medium strong high density white CHALK with rare black flint cobbles. Fractures are horizontal, widely spaced, undulating, rough, faint black speckling on surfaces, locally orangish brown staining.	35.33 0 degree undulating rough joint open up to 5mm clayey infill			
						END OF EXPLORATORY HOLE	35.99-36.02 black fractured flint band with light grey marl infill 36.20-36.30 black flint band or shattered cobble 36.82 0 degree undulating rough joint with faint black speckled staining open up to 5mm (possible drilling induced) 37.24-37.34 black flint band or fracture nodule 37.71-37.78 black flint cobble 37.81-37.85 band of black flint or fractured flint nodule 38.15 0 degree planar to undulating rough joint clean and tight 38.35-38.50 AZCL	38.50 2.03		
Groundwater Entries No. Depth Strike Remarks			Depth Sealed	Depth Related Remarks Depths (m) Remarks		Hard Boring Depths (m) Duration (mins) Tools used				
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole ATK-RC-01 Sheet 4 of 4					
Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20 50 20			Project No. A9031-19							
Carried out for Portsmouth Water										

Borehole Log



Drilled	AR/KW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	39.87 mOD
Logged	JF/RP	13/11/2019	Dando 2000/Fraste XL/Beretta T41. Cable percussion boring to 6.50 m/Rotary core drilling (GBS size) using air mist flush to 72.20m.			1.20	6.50	200	6.00	Coordinates (m)	E 470984.99
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion. Relocated and designated ATK-RC-02A for improved core recovery.			6.50	72.20	146	58.00	National Grid	N 109166.01
Approved	TC	12/12/2019									

Samples and Tests				Strata Description					
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 - 0.30	B 1	0.00-1.20 Hand excavated inspection pit.			Brown gravelly clayey fine to medium SAND. Gravel is subrounded to subangular fine to coarse of Flint. Occasional roots and rootlets.		(0.50)		
0.30 - 0.50	B 2								
0.50	D 3								
0.50 - 0.80	B 4				Orangish brown, mottled brown, slightly clayey silty fine to medium SAND. Rare roots and rootlets.	0.50-0.80 occasional light grey mottling	0.50 39.37		
0.80 - 1.50	B 5						(0.70)		
1.00	D 6								
1.20 - 1.65	SPTS	N=21 (2,3/5,5,5,6)		Dry	Medium dense orangish brown clayey fine SAND. Slightly pyritic.		1.20 38.67		
1.20 - 1.70	B 8						(0.80)		
1.50	D 7								
1.70 - 2.00	B 9					1.70-2.00 slightly gravelly			
2.00 - 2.45	SPTS	2.00-5.00 Water added. N=14 (1,3/3,3,4,4)	2.00	Dry	Medium dense orangish brown clayey fine to medium SAND.		2.00 37.87		
2.00	D 10								
2.00	D 11						(1.50)		
2.00 - 2.50	B 12								
2.50 - 3.00	B 13								
3.00 - 3.45	SPTS	N=17 (1,3/3,4,4,6)	3.00	1.50					
3.00	D 14								
3.00	D 15								
3.00 - 3.50	B 16								
3.50 - 4.00	B 17				Soft orangish brown sandy CLAY. Sand is fine.		3.50 36.37		
							(0.50)		
4.00 - 4.45	SPTS	N=15 (2,3/3,3,4,5)	4.00	2.50	Medium dense orangish brown clayey to very clayey fine SAND. Pyritic.		4.00 35.87		
4.00	D 18						(1.00)		
4.00	D 19								
4.00 - 4.50	B 20								
4.50 - 5.00	B 21					4.50-5.00 light brown mottling			
5.00 - 5.45	SPTS	N=17 (2,3/4,4,4,5)	5.00	Dry	Firm brown, mottled orangish brown, sandy CLAY. Sand is fine. Pyritic.		5.00 34.87		
5.00	D 22						(1.00)		
5.00	D 23								
5.00 - 5.50	B 24								
5.50 - 6.00	B 25								
6.00 - 6.45	UT 27	19 blows 100% rec	6.00	Dry	Firm to stiff dark grey sandy CLAY. Sand is fine. Pyritic. Rare gravel size shell fragments.		6.00 33.87		
6.00	D 26						(0.50)		
6.50			13/11/19	1730					
6.50			18/11/19	0800					
6.50 - 7.00	0 NA NA	D 28	6.00	Dry	NO RECOVERY. Driller notes clay.		6.50 33.37		
7.00 - 7.50	0 NA NA						(2.00)		
7.50 - 8.50	0 NA NA								
8.50 - 8.70		D 28A							
8.50 - 10.00	24 NA NA				Minimal recovery. Recovered core comprises dark grey silty CLAY with 3 no. cobbles of dark grey claystone.		8.50 31.37		
		Flush: 6.50 - 13.00 Air/mist 100%							

Depth	TCR	SCR	RGD	IF	Records	Date	Time

Groundwater Entries			Depth Related Remarks		Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	HAVANT THICKET WINTER STORAGE RESERVOIR	Borehole	ATK-RC-02
Scale 1:50	Project No.	A9031-19		
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09/04/2020 20 50 21				

ATK-RC-02

Sheet 1 of 8

Borehole Log



Drilled AR/KW Logged JF/RP Checked MS Approved TC	Start 13/11/2019 End 12/12/2019	Equipment, Methods and Remarks Dando 2000/Fraste XL. Beretta T41. Cable percussion boring to 6.50 m. Rotary core drilling (GBS size) using air mist flush to 72.20m. SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion. Relocated and designated ATK-RC-02A for improved core recovery.	Depth from (m) 1.20 6.50	to (m) 6.50 72.20	Diameter (mm) 200 146	Casing Depth (m) 6.00 58.00	Ground Level 39.87 mOD Coordinates (m) E 470984.99 National Grid N 109166.01			
Samples and Tests			Strata Description							
Depth	TCR SCR RGD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
10.00 - 11.50	0 NA NA					Minimal recovery. Recovered core comprises dark grey silty CLAY with 3 no. cobbles of dark grey claystone.				
11.50 - 11.70			D 29							
11.50 - 12.00	48 NA NA								(6.50)	
12.00 - 13.00	29 NA NA									
12.80 - 13.00			D 30	18/11/19 6.00	1730 Dry					
13.00 - 13.50	100 NA NA		D 31	20/11/19 6.00	0800					
13.30 - 13.50										
13.50 - 15.00	33 NA NA									
14.50 - 14.70			B 32							
14.70			B 33							
15.00 - 15.20		- NA	D 34			Stiff to very stiff dark brownish grey silty CLAY with occasional partings and lenses (<3mm) of light brown silt and fine sand.		15.00	24.87	
15.00 - 16.50	97 NA NA		D 35							
15.76 - 16.20										
16.50 - 18.00	0 NA NA						16.20-16.50 pyritised claystone nodule (40x40x25mm) and occasional shells (bivalves) 16.50-18.00 no recovery driller notes clay			
18.00 - 18.20			D 36	20/11/19 6.00	1730					
18.00 - 18.75	20 NA NA			21/11/19 6.00	0800			(5.50)		
18.75 - 19.50	13 NA NA			21/11/19 18.00	1730					
				26/11/19 18.00	0800 Dry					
Groundwater Entries No. Depth Strike Remarks			Depth Sealed			Depth Related Remarks Depths (m) Remarks		Hard Boring Depths (m) Duration (mins) Tools used		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole		
Project No. A9031-19						Project No. A9031-19		ATK-RC-02		
Carried out for Portsmouth Water						Carried out for Portsmouth Water		Sheet 2 of 8		



Borehole Log



Drilled	AR/KW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	39.87 mOD		
Logged	JF/RP	13/11/2019	Dando 2000/Fraste XL Beretta T41. Cable percussion boring to 6.50 m. Rotary core drilling (GBS size) using air mist flush to 72.20m.			1.20	6.50	200	6.00	Coordinates (m)	E 470984.99		
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion. Relocated and designated ATK-RC-02A for improved core recovery.			6.50	72.20	146	58.00	National Grid	N 109166.01		
Approved	TC	12/12/2019											

Samples and Tests						Strata Description					
Depth	TOR SCR R&D	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill	
20.50 - 20.60			D 37			Stiff to very stiff dark brownish grey silty CLAY with occasional partings and lenses (<3mm) of light brown silt and fine sand.		20.50 19.37			
20.50 - 21.60	100 NA NA		Flush: 20.50 - 21.60 Air/ mist 90% D 38			Stiff dark grey silty CLAY with occasional subangular coarse gravel of siltstone and claystone. Recovered as dark grey silty clay.	20.90-21.60 lenses/ horizon (<2mm silty sand) 21.30-21.60 yellowish brown lenses of fine sand 21.30-21.90 rare shell (bivalve) (<30mm) 21.35-21.60 thinly laminated, rare polish surfaces 21.80-22.00 randomly orientated laminations	(2.60)			
21.10 - 21.20											
21.62 - 21.78			CS 39								
21.80 - 21.90			D 40								
21.60 - 23.10	100 NA NA		Flush: 21.60 - 23.10 Air/ mist 75% D 41 CS 42	26/11/19 19.50	1630 Dry						
22.40 - 22.50											
22.59 - 23.00											
23.00 - 23.10			D 43	27/11/19 19.50	0800 10.10	Stiff to very stiff grey silty CLAY with occasional partings and lenses (<2mm) of silty sand. Sand is light grey/brown and fine.	23.00-23.10 rare shell (<10mm) fan shaped alluvial flow 23.10-24.10 slight fissuring	23.10 16.77			
23.10 - 24.20			D 44								
23.10 - 24.60	13 NA NA		Flush: 23.10 - 24.60 Air/ mist 85%								
24.66 - 24.94											
24.66 - 24.94			CS 45								
24.60 - 25.35	100 NA NA	- NA -	Flush: 24.60 - 25.35 Air/ mist 90% D 46				25.00-25.10 indistinctly laminated 25.35-25.70 indistinctly laminated	(4.50)			
25.00 - 25.10											
25.60 - 25.70	100 NA NA		D 47								
25.35 - 26.10			Flush: 25.35 - 26.10 Air/ mist 70%								
26.20 - 26.30			D 48				26.10-26.20 slightly laminated 26.50-26.70 whitish/ light brown lens (<1mm) of fine sand 27.20 cobble of mudstone				
26.74 - 27.00	93 NA NA		CS 49								
26.10 - 27.60			Flush: 26.10 - 27.60 Air/ mist 75%								
27.50 - 27.60			D 50				27.60-28.80 (<3mm) cross cut wave structures	27.60 12.27			
28.10 - 28.20			D 51			Stiff to very stiff dark grey CLAY with occasional horizontal partings (<2mm) of light silt.					
27.60 - 29.10	67 NA NA		Flush: 27.60 - 29.10 Air/ mist 90%					(1.50)			
28.70 - 28.80			D 52								
29.60 - 29.70											
29.70 - 29.90	83 NA NA		D 53			Stiff indistinctly laminated dark grey silty CLAY. Laminae are horizontal of light grey silt.	29.50-29.80 rare shells (bivalves)	29.10 10.77			
29.10 - 30.60			CS 54					(1.27)			
			Flush: 29.10 - 30.60 Air/ mist 60%								

Groundwater Entries				Depth Related Remarks				Hard Boring			
No.	Depth	Strike	Remarks	Depth Sealed	Depths (m)	Remarks		Depths (m)	Duration (mins)	Tools used	

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.		Project		HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole	
Scale 1:50		Project No.		A9031-19		ATK-RC-02	
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Borehole Log



Drilled	AR/KW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	39.87 mOD			
Logged	JF/RP	13/11/2019	Dando 2000/Fraste XL Beretta T41. Cable percussion boring to 6.50 m. Rotary core drilling (GBS size) using air mist flush to 72.20m.			1.20	6.50	200	6.00	Coordinates (m)	E 470984.99			
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion. Relocated and designated ATK-RC-02A for improved core recovery.			6.50	72.20	146	58.00	National Grid	N 109166.01			
Approved	TC	12/12/2019												

Samples and Tests						Strata Description					
Depth	TOR SCR R&D	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill	
30.20 - 30.30			D 55	27/11/19 19.50	1640 21.10	Stiff indistinctly laminated dark grey silty CLAY. Laminiae are horizontal of light grey silt.					
				28/11/19 19.50	0830 9.80	Stiff to very stiff dark grey silty CLAY with occasional faint laminations of rare fibrous lignite.	30.37-30.60 AZCL	30.37	9.50		
30.80 - 30.90			D 56				30.60-30.80 finely laminated				
							31.00 rare fibrous lignite		(1.73)		
30.60 - 32.10 31.40 - 31.50	100 NA NA		D 57				31.40-32.10 stiff				
32.00 - 32.10			D 58								
						Stiff to very stiff dark grey CLAY with occasional faint laminations.		32.10	7.77		
32.50 - 32.60 32.60 - 32.75			D 59 CS 60				32.46-32.50 angular to subangular fine gravel of mudstone (8x4mm) (<1mm thickness)		(1.50)		
32.10 - 33.60	93 NA NA		D 61				32.60-32.70 cross-cut laminations (<10mm)				
							32.98-33.02 fibrous lignite in a sandy micaceous silt				
33.60 - 33.70 33.70 - 33.99			D 62 CS 63			Very stiff dark grey silty CLAY with occasional gravel size shells and lignite.	33.10-33.60 slightly sandy. Sand is light grey and fine	33.60	6.27		
							33.20-33.30 thinly laminated		(1.20)		
33.60 - 35.10 34.40 - 34.50	93 NA NA		D 64				34.50 rare shells (<7mm) bivalves				
							34.55 rare shells (<1mm) belemnites and black lignite (70x20x5mm)	34.80	5.07		
35.10 - 35.20		- NA -	D 65			Dense grey and dark grey very clayey fine to coarse SAND.	34.60 very sandy clay. Sand is light brownish grey and fine to coarse, becoming clayey fine to medium sand	35.00	4.87		
35.42 - 35.65			CS 66				35.00-35.10 AZCL		(1.60)		
35.70 - 35.80 35.10 - 36.60	93 NA NA		D 67				35.80 occasional shells				
36.20 - 36.30			D 68								
						Assessed Zone of Core Loss. Driller notes dark grey SAND with black pebbles.	36.40 light grey sandy clay with rare subrounded gravel of flint pebbles (5 to 10mm)	36.60	3.27		
36.60 - 38.10	17 NA NA								(1.30)		
37.90 - 38.00			D 69	28/11/19 19.50	1800 23.10	Stiff brownish grey sandy CLAY with subrounded gravel of flint (<50x30x30mm). Sand is fine.	38.00 sand is fine and greyish brown	37.90	1.97		
				29/11/19 19.50	0815 7.90	Recovered as soft to firm dark grey sandy silty CLAY. Sand is fine to medium. Occasional subangular cobbles of mudstone.	38.10-39.40 driller reported green sand. Possible clayey sand? sand was consolidated	38.10	1.77		
38.50 - 38.60			D 70								
38.10 - 39.60 39.10 - 39.20	40 NA NA		Flush: 38.10 - 39.60 Air/ mist 65% D 72						(1.50)		
39.73 - 39.94 39.95 - 41.05			CS 71 D 73			Stiff grey and reddish brown sandy silty CLAY. Sand is fine.	39.40 cobbles of mudstone (100x40mm) (80x60x30mm)	39.60	0.27		

Groundwater Entries				Depth Related Remarks		Hard Boring		
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Project

Project No.

Carried out for

HAVANT THICKET WINTER STORAGE RESERVOIR

A9031-19

Portsmouth Water

Borehole

ATK-RC-02

Sheet 4 of 8

Drilled	AR/KW	Start	Equipment, Methods and Remarks				Depth from	to	Diameter	Casing Depth	Ground Level	39.87 mOD	
Logged	JF/RP	13/11/2019	Dando 2000/Fraste XL. Beretta T41. Cable percussion boring to 6.50 m. Rotary core drilling (GBS size) using air mist flush to 72.20m.				(m)	(m)	(mm)	(m)	Coordinates (m)	E 470984.99	
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion. Relocated and designated ATK-RC-02A for improved core recovery.				6.50	72.20	200	6.00	National Grid	N 109186.01	
Approved	TC	12/12/2019							146	58.00			
Samples and Tests							Strata Description						
Depth	TCR SCR RGD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill			
39.60 - 41.10	100 NA NA	-	Flush: 39.60 - 41.10 Air/ mist 90%	29/11/19 41.40	1200 23.70	Stiff grey and reddish brown sandy silty CLAY. Sand is fine.	41.67 stiff	(1.54)					
41.10 - 42.20	91 NA NA			03/12/19 41.40	0830 Dry	Firm to stiff grey slightly gravelly CLAY. Gravel is subrounded coarse of fossiliferous mudstone.		41.14 -1.27 (0.35)					
42.20 - 43.70	97 NA NA			41.49 -1.62 (0.28)	Firm red, mottled pink and grey, CLAY. Rare selenite crystals (2-3mm).	41.77 -1.90 (0.43)							
					Very stiff pink, mottled red and grey and yellowish brown, CLAY.								
					Very stiff brown, mottled grey, CLAY.								
43.70 - 45.20	100 NA NA			42.20 -2.33	Very stiff brown, mottled grey, CLAY.	43.70 -3.83							
								Very stiff brown, mottled grey sandy silty CLAY. Sand is fine. Occasional pockets/lenses (up to 60mm) of grey silty fine sand.					45.20 -5.33
46.70 - 48.20	100 NA NA			04/12/19 41.40	0800 9.10	Very stiff brown slightly sandy to sandy CLAY. Sand is fine to medium.		47.14 -7.27					
													Brown clayey fine to medium SAND.
48.20 - 49.70	33 NA NA	04/12/19 46.50	1700 Dry	Weak grey, mottled brownish grey, fine to medium grained SANDSTONE. Recovered as subangular cobbles. Assessed Zone of Core Loss. Driller notes Lambeth Sands.	48.58 -8.71 48.70 -8.83								
						05/12/19 46.50	0800 10.20	49.70-51.20 no recovery	(2.50)				
Groundwater Entries						Depth Related Remarks		Hard Boring					
No.	Depth	Strike	Remarks	Depth Sealed		Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used			
						52.70 - 54.20	Top 150mm is falling/spoil.						
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project		Borehole					
Scale 1:50						Project No.		ATK-RC-02					
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AGS						HAVANT THICKET WINTER STORAGE RESERVOIR							
						A9031-19							
						Portsmouth Water							

Borehole Log



Drilled	AR/KW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	39.87 mOD
Logged	JF/RP	13/11/2019	Dando 2000/Fraste XL. Beretta T41. Cable percussion boring to 6.50 m. Rotary core drilling (GBS size) using air mist flush to 72.20m.			1.20	6.50	200	6.00	Coordinates (m)	E 470984.99
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion. Relocated and designated ATK-RC-02A for improved core recovery.			6.50	72.20	146	58.00	National Grid	N 109166.01
Approved	TC	12/12/2019									

Samples and Tests					Strata Description					
Depth	TOR SCR RGO	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
49.70 - 51.20	0 NA NA					Assessed Zone of Core Loss. Driller notes Lambeth Sands.				
			Flush: 49.70 - 52.70 Air/ mist 60%							
51.20 - 52.70	100 NA NA					Brown, mottled greyish brown, slightly gravelly clayey fine to medium SAND. Gravel is subangular fine to coarse of sandstone/cemented sand. Rare pockets (10-20mm) of grey clay.		51.20 -11.33 (0.85)		
						Grey clayey fine to medium SAND. Rare to occasional thin black lenses (up to 1mm) of black clay/organics.	52.20-52.35 stiff to very stiff grey slightly sandy clay. Sand is fine to medium 52.70-52.90 stiff to very stiff grey slightly sandy CLAY. Sand is fine to medium. Occasional thin black lenses/ pockets (up to 2mm) of clay/organics	52.05 -12.18 (1.73)		
52.70 - 54.20	72 NA NA		Flush: 52.70 - 54.20 Air/ mist 25%			Assessed Zone of Core Loss. Driller notes sands.		53.78 -13.91 (0.42)		
						NO RECOVERY. Driller notes sands.		54.20 -14.33		
54.20 - 55.70	0 NA NA	- NA -	Flush: 54.20 - 55.70 Air/ mist 20%							
55.70 - 57.20	0 NA NA		Flush: 55.70 - 57.20 Air/ mist 10%							
				05/12/19 49.20	1600 22.40					
57.20 - 58.00	0 NA NA			06/12/19 49.20	0800 9.10					
				06/12/19 58.00	1115 Dry					
58.00 - 58.70	100 NA NA			09/12/19 58.00	0800 12.20	Firm to stiff red, mottled grey, CLAY. Very stiff red, mottled brown and grey, CLAY.	58.15 possible horizontal undulating clean tight fissure	58.00 (0.15) -18.13 58.15 -18.28		
58.70 - 60.20	85 NA NA									
				09/12/19 58.00	1500 0.00	Very stiff dark grey, mottled red, CLAY.		59.80 -19.93 (0.40)		

Groundwater Entries				Depth Related Remarks		Hard Boring		
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Project HAVANT THICKET WINTER STORAGE RESERVOIR

Project No. A9031-19

Carried out for Portsmouth Water

Borehole

ATK-RC-02

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Borehole Log



Drilled	AR/KW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	39.87 mOD		
Logged	JF/RP	13/11/2019	Dando 2000/Fraste XL. Beretta T41. Cable percussion boring to 6.50 m. Rotary core drilling (GBS size) using air mist flush to 72.20m.			1.20	6.50	200	6.00	Coordinates (m)	E 470984.99		
Checked	MS	End	SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion. Relocated and designated ATK-RC-02A for improved core recovery.			6.50	72.20	146	58.00	National Grid	N 109166.01		
Approved	TC	12/12/2019											

Samples and Tests				Strata Description						
Depth	TCR SCR RSD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
60.20 - 61.70	100 NA NA			10/12/19	0800	Very stiff dark grey, mottled red, CLAY.	59.95 possible 0 to 10 degree undulating tight fissure/joint with polished face	60.20 -20.33		
				58.00	10.10	Very stiff friable dark grey, mottled red, yellow and yellowish brown, CLAY.	59.97-60.00 AZCL	(0.80)		
61.70 - 63.20	87 NA NA					Very stiff slightly friable purple, mottled red, grey, yellow and yellowish brown, CLAY.	61.70-62.70 purple and grey, mottled red and yellowish brown	61.00 -21.13		
								(1.70)		
63.20 - 64.70	100 NA NA					Assessed Zone of Core Loss. Driller notes clays with sand bands.		62.70 -22.83		
								(0.85)		
64.70 - 66.20	91 NA NA	NA	Flush: 58.00 - 72.20 Air/ mist 100%			Very stiff red, mottled grey, pink and yellowish brown, slightly sandy CLAY. Sand is fine to medium.		63.55 -23.68		
								(0.65)		
66.20 - 67.70	100 NA NA					Very stiff red and reddish brown, mottled grey and yellowish brown, slightly sandy CLAY. Sand is fine to medium.		64.20 -24.33		
								(0.55)		
67.70 - 69.20	100 NA NA					Very stiff grey, mottled brown, slightly sandy CLAY. Sand is fine to medium.		64.75 -24.88		
								(0.15)		
69.20 - 70.70	100 100 73	10 130 250				Very stiff grey, mottled brown CLAY.		64.90 -25.03		
								(0.40)		
70.70 - 72.20						Very stiff grey, mottled brown and yellowish brown, CLAY.		65.30 -25.43		
								(0.67)		
72.20 - 73.70				10/12/19	1645	Dark grey and black, mottled yellow and yellowish brown LIGNITE.	65.75-65.94 extremely weak to very stiff grey clay.	65.97 -26.10		
				58.00	16.90	Soft red and grey, mottled brown, CLAY.	65.94-65.97 extremely weak to very stiff black clay	(0.23)		
73.70 - 75.20							66.12-66.20 no recovery	66.20 -26.33		
								(1.33)		
75.20 - 76.70						Weak indistinctly thinly laminated black lignified material LIGNITE. Organic odour.		67.20-67.53 mottled pink and purple		
								67.53 -27.66		
76.70 - 78.20						Soft yellowish brown, mottled brown, dark brown and black, CLAY. Rare pocket clasts of black lignified material.	67.61-67.66 pyrite rich section nodules (2-5mm) and thin lenses (up to 2mm)	67.66 -27.79		
								(0.40)		
78.20 - 79.70						Very stiff grey, mottled red and yellowish brown, CLAY.	67.66-67.70 very stiff dark grey and brown mottled red clay	68.06 -28.19		
								(0.46)		
79.70 - 81.20						Extremely weak grey, mottled yellowish brown, MUDSTONE. Recovered as slightly sandy clayey angular to subangular fine to coarse gravel. Sand is fine to coarse.	68.25-68.42 pale grey marl present on surface	68.52 -28.65		
								(0.18)		
81.20 - 82.70						Brown, dark grey and black angular to subangular fine to coarse GRAVEL of flint with medium cobble content. Cobbles are subangular of flint.	68.27 coarse gravel size angular flint or fracture flint band/ nodule present	68.70 -28.83		
								(0.42)		
82.70 - 84.20						Very stiff greenish grey, mottled yellowish brown, sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is angular fine to coarse of flint. Cobbles are angular to subangular	68.35 possible 30 degree planar fissure with slightly polished face	68.78 -28.91		
								(1.40)		

Groundwater Entries				Depth Related Remarks		Hard Boring		
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Project

Project No.

Carried out for

HAVANT THICKET WINTER STORAGE RESERVOIR

A9031-19

Portsmouth Water

Borehole

ATK-RC-02

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Borehole Log



Drilled AR/KW Logged JF/RP Checked MS Approved TC	Start 13/11/2019 End 12/12/2019	Equipment, Methods and Remarks Dando 2000/Fraste XL. Beretta T41. Cable percussion boring to 6.50 m. Rotary core drilling (GBS size) using air mist flush to 72.20m. SPT Hammer ID: JD02, Rod type: Whitworth. Standpipe piezometer installed on completion. Relocated and designated ATK-RC-02A for improved core recovery.	Depth from (m) 1.20 6.50	to (m) 6.50 72.20	Diameter (mm) 200 146	Casing Depth (m) 6.00 58.00	Ground Level 39.87 mOD Coordinates (m) E 470984.99 National Grid N 109166.01				
Samples and Tests			Strata Description								
Depth 70.70 - 72.20	TCR SCR RGD 100 36 27	If 60 180 300	Records/Samples	Date Casing 12/12/19 58.00	Time Water 1700	Main Very stiff greenish grey, mottled yellowish brown, sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is angular fine to coarse of flint. Cobbles are angular to subangular of flint. Weak high density light grey CHALK with occasional coarse gravel size subangular to subrounded black flint. Weak high density white with some orange and yellowish orange staining CHALK. Occasional coarse gravel and subrounded cobbles of black flint with white rind some pitting on surfaces. Joints are: 1. horizontal, irregular, rough and tight with occasional brown staining. 2. 10 degree, planar, rough and clean. 3. 30 degree, undulating, rough, clean. 4. 80 degree, undulating, tight with orange staining. END OF EXPLORATORY HOLE		Detail 69.69 horizontal stepped rough clean tight joint 70.03 horizontal irregular rough clay veneer open joint 70.44 horizontal undulating/irregular rough clean open joint 70.56 30 degree undulating rough clean tight joint 70.70-70.79 fragmented zone drilling induced, some orange staining of surfaces 70.79-71.60 80 degree undulating tight joint with orange staining 70.98 10 degree planar rough clean tight joint 71.51 horizontal planar rough clean right joint 71.63 horizontal rough open joint with orange staining and brown clay veneer 71.77 horizontal irregular rough tight joint with some orange and brown staining 72.09 10 degree undulating rough clean tight joint	Depth, Level (Thickness) 70.60 -30.73 (1.60) 72.20 -32.33	Legend	Backfill
Groundwater Entries No. Depth Strike Remarks			Depth Related Remarks Depth Sealed Depths (m) Remarks		Hard Boring Depths (m) Duration (mins) Tools used						
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 09/04/2020 20 50 22			Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water			Borehole ATK-RC-02 Sheet 8 of 8					

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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Scale 1:50

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Drilled	MM	Start	Equipment, Methods and Remarks				Depth from	to	Diameter	Casing Depth	Ground Level	39.85 mOD
Logged	RP	13/12/2019	Beretta T41. Rotary core drilling (GBS size) using air mist flush from 6.20 to 20.00m. Rotary open hole drilling from 1.20 to 6.20m, 8.10 to 9.10m and 20.00 to 40.00m.				(m)	(m)	(mm)	(m)	Coordinates (m)	E 470980.17
Checked	MS	End	Carried out to recover additional core.				1.20	6.20	150	6.20	National Grid	N 109161.84
Approved	TC	17/12/2019	Standpipe piezometer installed on completion.				6.20	20.00	150	12.00		
							20.00	40.00	100	12.00		
Samples and Tests							Strata Description					
Depth	TCR SCR RGD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill		
9.60 - 11.10	73 NA NA					Very stiff dark grey, dark brown and grey silty CLAY. Pyrite flecks. Occasional gravel size shell and shell fragments.	10.70-11.10 AZCL	(1.70)				
11.10 - 12.60	100 NA NA					Very stiff dark grey, dark brown and grey silty CLAY. Pyrite flecks. Occasional gravel size shell and shelly material present. Rare thin pockets (up to 2mm) of dark grey silt.		11.10 28.75				
12.60 - 14.10	100 NA NA		Flush: 6.20 - 20.00 Air/mist 100%					(3.00)				
14.10 - 15.60	100 NA NA	- NA				Very stiff dark grey, dark brown and grey silty CLAY. Pyrite flecks. Rare shell fragments. Occasional thin horizontal pocket (up to 2mm) of pale grey silt. Locally with horizontal indistinctly thin laminations.		14.10 25.75				
15.60 - 17.10	100 NA NA							(3.00)				
17.10 - 18.60	100 NA NA			16/12/19 9.00	1530 9.10	Very stiff dark grey, dark brown and grey silty CLAY. Pyrite flecks. Rare shell fragments. Rare to occasional thin pockets (up to 2mm) of pale grey silt.		17.10 22.75				
18.60 - 20.10	93 NA NA			17/12/19 9.00	0800 11.20			(3.00)				
			20.00-40.00 Rotary open hole drilling.									
Groundwater Entries						Depth Related Remarks		Hard Boring				
No.	Depth	Strike	Remarks	Depth Sealed		Depths (m) Remarks		Depths (m)	Duration (mins)	Tools used		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project		Borehole				
Scale 1:50						HAVANT THICKET WINTER STORAGE RESERVOIR		ATK-RC-02A				
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AGS						Carried out for						
						Portsmouth Water		Sheet 2 of 4				

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Drilled	MM	Start	Equipment, Methods and Remarks				Depth from	to	Diameter	Casing Depth	Ground Level	39.85 mOD
Logged	RP	13/12/2019	Beretta T41.				(m)	(m)	(mm)	(m)	Coordinates (m)	E 470980.17
Checked	MS	End	Rotary core drilling (GBS size) using air mist flush from 6.20 to 20.00m. Rotary open hole drilling from 1.20 to 6.20m, 8.10 to 9.10m and 20.00 to 40.00m.				1.20	6.20	150	6.20	National Grid	N 109161.64
Approved	TC	17/12/2019	Carried out to recover additional core.				6.20	20.00	150	12.00		
			Standpipe piezometer installed on completion.				20.00	40.00	100	12.00		
Samples and Tests							Strata Description					
Depth	TCR SCR RGD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill		
38.00 - 40.00			Rising Head k=6.1E-8 m/s			London CLAY. (Drillers description)						
				17/12/19 12.00	1430 15.10	Woolwich and Reading CLAY. (Drillers description)		39.10 0.75 (0.90)				
						END OF EXPLORATORY HOLE		40.00 0.15				
Groundwater Entries						Depth Related Remarks		Hard Boring				
No.	Depth Strike	Remarks	Depth Sealed			Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole				
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Borehole Log



Drilled	GW	Start	Equipment, Methods and Remarks		Depth from	to	Diameter	Casing Depth	Ground Level	31.52 mOD
Logged	RT	16/12/2019	Comacchio Geo 802 HT. Dynamic sampling to 10.00m. Rotary open hole drilling from 10.00 to 45.00m. Rotary core drilling (GBS size) with water flush to 48.00m.		1.20	4.00	200	4.00	Coordinates (m)	E 472339.94
Checked	MS	End			4.00	10.00	150	10.00	National Grid	N 109598.99
Approved	TC	19/12/2019	Standpipe piezometer installed on completion.		10.00	45.00	143	10.00		
					45.00	48.00	146	10.00		

Samples and Tests					Strata Description					
Depth	TOR SCR R&D	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.20	ES 1		0.00-1.20 Hand excavated inspection pit.			Very soft brownish TOPSOIL.		(0.30)		
0.50	ES 2					Soft brown CLAY		0.30 31.22		
1.00	ES 3			16/12/19	1645	Firm brown CLAY.		(0.50)		
1.20 - 2.00	L		56% rec, diameter 117mm	17/12/19	0800	Firm to stiff brown, mottled orange and grey, slightly sandy CLAY. Sand is fine to coarse. Frequent pockets (<5mm) and partings (<2mm) of orange fine sand.		0.80 30.72		
2.00 - 3.00	L		100% rec, diameter 117mm			Stiff dark brown, mottled grey, CLAY with occasional pockets (<5mm) of orangish fine sand. Rare pockets of poorly cemented sand. Rare nodules of hard brown claystone (fine to medium gravel sized from 2.7m).	2.70-3.00 Rare shell fragments (<2mm). 2.80-3.00 Slightly sandy. Sand is fine to medium.	(0.40)		
3.00 - 4.00	L		90% rec, diameter 117mm			Stiff dark grey slightly sandy CLAY. Sand is fine to medium.		1.20 30.32		
4.00 - 4.50	L		60% rec, diameter 117mm			Stiff dark grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is rounded medium to coarse of flint. Frequent lenses (<10mm) of dark grey fine to medium sand.		(0.80)		
4.50 - 6.00	L		6% rec, diameter 117mm			Weak very thinly bedded (<6mm) dark grey fine to medium grained L. MESTONE.	4.40-4.60 Grey fine to coarse sand. 4.00-5.90 1 no. 5mm bluish grey limestone cobble.	2.00 29.52		
6.00 - 6.75	L		100% rec, diameter 117mm			No recovery of fine material. Driller notes very dense fine grey SAND.		(1.00)		
6.75 - 7.50	L		100% rec, diameter 117mm			Stiff to very stiff, locally fissured, bluish grey, mottled red, dark reddish brown and greenish brown CLAY. Fissures are subhorizontal and subvertical, smooth, undulating, slightly polished and occasionally filled with soft grey clay.		3.00 28.52		
7.50 - 9.00	L		90% rec, diameter 117mm			Flush: 4.00 - 10.00 Water 90%		(0.52)		
9.00 - 10.00	L		90% rec, diameter 117mm					3.52 28.00		
								(0.48)		
								4.00 27.52		
								(0.60)		
								4.60 26.92		
								(1.30)		
								5.90 25.62		
								(4.10)		
								8.60-9.00 Dark reddish brown nodules of extremely weak claystone/poorly cemented clay.		
								10.00 21.52		

Groundwater Entries				Depth Related Remarks		Hard Boring		
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	HAVANT THICKET WINTER STORAGE RESERVOIR		Borehole	ATK-RC-03
Scale 1:50	Project No.	A9031-19			
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Borehole Log



Drilled	GW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	31.52 mOD
Logged	RT	16/12/2019	Comacchio Geo 802 HT. Dynamic sampling to 10.00m. Rotary open hole drilling from 10.00 to 45.00m. Rotary core drilling (GBS size) with water flush to 48.00m.			1.20	4.00	200	4.00	Coordinates (m)	E 472339.94
Checked	MS	End				4.00	10.00	150	10.00	National Grid	N 109598.99
Approved	TC	19/12/2019	Standpipe piezometer installed on completion.			10.00	45.00	143	10.00		
						45.00	48.00	146	10.00		

Samples and Tests						Strata Description					
Depth	TCR SCR RSD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill	
						Very stiff red, mottled grey, CLAY. (Drillers description)					
						Very stiff brownish CLAY. (Drillers description)		31.00 0.52			
								(5.00)			
						Strong white CHALK. (Drillers description)		36.00 -4.48			

Groundwater Entries				Depth Related Remarks				Hard Boring			
No.	Depth	Strike	Remarks	Depth Sealed	Depths (m)	Remarks		Depths (m)	Duration (mins)	Tools used	

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Project HAVANT THICKET WINTER STORAGE RESERVOIR

Project No. A9031-19

Carried out for Portsmouth Water

Borehole

ATK-RC-03

Sheet 4 of 5

Borehole Log



Drilled	GW	Start	Equipment, Methods and Remarks			Depth from	to	Diameter	Casing Depth	Ground Level	31.52 mOD
Logged	RT	16/12/2019	Comacchio Geo 802 HT. Dynamic sampling to 10.00m. Rotary open hole drilling from 10.00 to 45.00m. Rotary core drilling (GBS size) with water flush to 48.00m.			1.20	4.00	200	4.00	Coordinates (m)	E 472339.94
Checked	MS	End				4.00	10.00	150	10.00	National Grid	N 109598.99
Approved	TC	19/12/2019	Standpipe piezometer installed on completion.			10.00	45.00	143	10.00		
						45.00	48.00	146	10.00		
Samples and Tests						Strata Description					
Depth	TOR SCR R&D	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill	
						Strong white CHALK. (Drillers description)		(9.00)			
45.00 - 46.50	92 77 73					Weak to medium strong high density white CHALK. Occasional subrounded gravel size fragments (up to 50mm) of rinded black flint. Fractures are horizontal, medium to widely spaced, planar, rough, locally with clay smearing. Rare light brown and light grey staining.	45.00-45.12 AZCL 45.12-45.32 very weak partially NI with frequent subangular cobble size fragments and rinded black flint	45.00 -13.48			
46.50 - 48.00	83 73 67	NI 250 600	Flush: 46.50 - 48.00 Water 90%	18/12/19 10.00	1700 3.58		46.50-46.75 AZCL 47.37-47.54 partially NI with frequent subangular gravel size fragments of black flint 47.70-47.72 horizontal planar rough joint with up to 5mm light grey clay infill (marl band)	(3.00) 48.00 -16.48			
						END OF EXPLORATORY HOLE					
Groundwater Entries						Depth Related Remarks		Hard Boring			
No.	Depth	Strike	Remarks	Depth Sealed		Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. © Copyright SOCOTEC UK Limited Scale 1:50 09/04/2020 20 50 24						Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water		Borehole ATK-RC-03 Sheet 5 of 5			

Trial Pit Log



Logged FC Checked MS Approved TC	Start 13/11/2019 End 13/11/2019	Equipment, Methods and Remarks JCB 360. Machine excavated.	Dimension and Orientation Width 0.60 m Length 2.10 m 	Ground Level 32.55 mOD Coordinates (m) E 470977.05 National Grid N 109834.00
Samples and Tests		Strata Description		
Depth	Type & No.	Records	Main	Detail 0.80-1.70 rare organic material 0.90 slip surface 20/320 degree planar smooth
0.20 0.40 0.40 0.50 0.50 - 0.60 0.90 1.00 1.00 - 1.20 1.50 1.60 - 1.80 1.70 2.80 2.80 - 2.90 3.00 3.00 - 3.10 3.10	ES1 HV D2 ES3 B4 HV ES6 D7 B8 HV B10 D9 D11 B12 D13 B14 ES15	p 71kPa, r 30kPa p 52kPa, r 20kPa p 83kPa, r 35kPa 13/11/19	Light brown slightly sandy CLAY. Frequent rootlets. (TOPSOIL) Firm, locally soft, dark greyish brown, mottled orangish brown, slightly sandy CLAY. Rare subrounded fine to coarse gravel of quartzite. Firm to stiff friable dark greyish brown slightly sandy slightly gravelly CLAY with occasional pockets of very stiff clay up to 30mm by 30mm. Very stiff fissured dark greyish brown silty CLAY. Fissures are randomly orientated, closely spaced and planar	(0.30) 0.30 32.25 (1.40) 1.70 30.85 (1.20) 2.90 29.65 (0.80) 3.70 28.85
			END OF EXPLORATORY HOLE	
Groundwater Entries		Remarks		
No. 1 2	Depth Strike (m) 0.50 2.00	Remarks Seepage. Seepage.	Depth (m) 0.50 2.00	Remarks Stable None Sunny
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 09/04/2020 20:52:08		Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water		Trial Pit ATK-TP-01 Sheet 1 of 1

Trial Pit Log



Logged FC Checked MS Approved TC		Start 12/11/2019 End 12/11/2019	Equipment, Methods and Remarks JCB 360. Machine excavated. Terminated due to instability of long faces.	Dimension and Orientation Width 0.60 m Length 2.70 m A B C D 145 (Deg)		Ground Level 26.62 mOD Coordinates (m) E 471177.03 National Grid N 109634.04											
Samples and Tests			Strata Description														
Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill										
0.30	ES1	p 150kPa, r N/A	Light brown slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of chert and quartzite. Frequent rootlets. (TOPSOIL)	1.20-2.50 stiff, indistinctly laminated	(0.40)		1										
0.50 0.50 0.50 - 0.70	HV ES2 B3		Firm greyish brown, mottled orangish brown, slightly sandy CLAY. Occasional plant material. Rare rootlets below 1 00m. Rare subangular to rounded fine to coarse gravel of quartzite and chert.		0.40 26.22												
1.00 1.00 1.20 1.30 - 1.40	HV ES4 D5 B6		p 168kPa, r N/A		(2.10)												
2.20 2.20 - 2.40	D7 B8	12/11/19	END OF EXPLORATORY HOLE		2.50 24.12												
Groundwater Entries <table><tr><th>No.</th><th>Depth Strike (m)</th><th>Remarks</th></tr><tr><td>1</td><td>0.50</td><td>Rapid ingress.</td></tr></table>			No.	Depth Strike (m)	Remarks	1	0.50	Rapid ingress.	Remarks <table><tr><th>Depth (m)</th><th>Remarks</th></tr><tr><td>2.50</td><td>Pit terminated due to side wall collapse below 2.50m.</td></tr></table>		Depth (m)	Remarks	2.50	Pit terminated due to side wall collapse below 2.50m.	Stability Unstable below 2.50m Shoring None Weather Raining		
No.	Depth Strike (m)	Remarks															
1	0.50	Rapid ingress.															
Depth (m)	Remarks																
2.50	Pit terminated due to side wall collapse below 2.50m.																
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 09/04/2020 20:52:08			Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water		Trial Pit ATK-TP-02 Sheet 1 of 1												

Trial Pit Log



Logged FC Checked MS Approved TC		Start 14/11/2019 End 14/11/2019	Equipment, Methods and Remarks JCB 360. Machine excavated.	Dimension and Orientation Width 0.60 m Length 2.90 m 		Ground Level 25.37 mOD Coordinates (m) E 471340.97 National Grid N 109609.02		
Samples and Tests			Strata Description					
Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill	
0.20	ES1	p 63kPa, r 24kPa	Light brownish grey sandy CLAY with rare subangular fine to coarse gravel of chert and quartzite. Frequent rootlets.	0.90 dark brown organic lens (up to 400mm)	(0.25)			
0.40	HV		Firm light grey, mottled orangish brown, slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to medium of chert and quartzite.		0.25 25.12			
0.50	ES3							(0.55)
0.50 - 0.60	D2 B4							0.80 24.57
0.90	HV	p 61kPa, r 27kPa	Firm to stiff light grey, mottled orangish brown, slightly gravelly CLAY.	1.20 slip surface 22/048 degree planar smooth	(1.40)			
0.90	D5							
0.90 - 1.00	B6							
1.00	ES7							
1.20	HV	p 61kPa, r 26kPa						
1.60	D8	p 102kPa, r 39kPa	Stiff friable, locally indistinctly laminated, greyish brown slightly sandy slightly gravelly CLAY with occasional pockets of very stiff clay (up to 30x30mm)		2.20 23.17			
1.60 - 1.70	B9				(0.80)			
2.20	D10				3.00 22.37			
2.20 - 2.40	B11				(0.80)			
2.30	HV							
3.10	D12	14/11/19	Very stiff fissured dark greyish brown silty CLAY. Fissures are randomly orientated, extremely closely spaced and planar.					
3.10 - 3.20	B13							
3.40	ES14							
			END OF EXPLORATORY HOLE		3.80 21.57			
Groundwater Entries No. Depth Strike (m) Remarks 1 0.50 Seepage.			Remarks Depth (m) Remarks		Stability Stable Shoring None Weather Foggy			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 09/04/2020 20:52:08			Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water		Trial Pit ATK-TP-03 Sheet 1 of 1			

Logged FC		Start 26/11/2019		Equipment, Methods and Remarks JCB 360. Machine excavated.		Dimension and Orientation Width 0.60 m Length 2.70 m		Ground Level Coordinates (m) National Grid		
Checked MS		End 26/11/2019				A B C 220 (Deg)		33.39 mOD E 471527.78 N 110022.73		
Approved TC										
Samples and Tests				Strata Description						
Depth		Type & No.	Records	Main		Detail	Depth, Level (Thickness)		Legend	Backfill
0.10		ES1		Dark brown slightly gravelly sandy CLAY. Gravel is rounded fine to coarse of flint and quartzite. (TOPSOIL)			(0.20)			
0.30 - 0.40		B3		Soft light grey, mottled orangish brown, sandy silty CLAY.			0.20 33.19			
0.40		D2								
0.50		ES4								
1.00		ES6								
1.00 - 1.20		B5				1.00-1.30 firm to stiff				
1.20		D7								
1.40		D9		Stiff dark brown and grey slightly sandy silty CLAY.			1.30 32.09			
1.40 - 1.50		B8								
1.50		HV	p 80kPa, r 43kPa				(0.50)			
1.80 - 2.00		B10		Stiff grey, mottled orange, CLAY.			1.80 31.59			
2.00		HV								
2.00		D11	p 137kPa, r N/A							
3.00		D13								
3.00 - 3.10		B12								
			26/11/19							
				END OF EXPLORATORY HOLE			3.40 29.99			

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Trial Pit Log



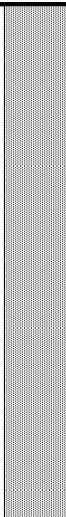
Logged PC Checked MS Approved TC		Start 05/12/2019 End 05/12/2019	Equipment, Methods and Remarks Hand excavated for infiltration test. Temporary monitoring pipe installed with diver data logger. Unable to undertake test due to ingress of groundwater.	Dimension and Orientation Width 0.50 m Length 0.50 m 	Ground Level 32.43 mOD Coordinates (m) E 471737.76 National Grid N 109937.78
Samples and Tests			Strata Description		
Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness) Legend Backfill
			Soft brown slightly gravelly very sandy CLAY. Gravel is angular fine to coarse of flint. (TOPSOIL)		(0.40) 0.40 32.03 (0.30) 0.70 31.73 (0.80) 1.50 30.93
		05/12/19	Firm, mottled orange and brown, locally grey, gravelly CLAY. Gravel is subrounded to rounded fine to coarse of black flint. Orange and brown, locally grey, silty fine to coarse SAND.		
			END OF EXPLORATORY HOLE		
Groundwater Entries No. Depth Strike (m) Remarks 1 1.40 Seepage.			Remarks Depth (m) Remarks		Stability Unstable below 1.30m Shoring None Weather Dry, cold
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 09/04/2020 20 52 09			Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water		Trial Pit ATK-TP-05i Sheet 1 of 1

Trial Pit Log



Logged PC Checked MS Approved TC		Start 10/12/2019 End 10/12/2019	Equipment, Methods and Remarks JCB 360. Machine excavated. No hand vane after 2.00m due to nature of recovered material.	Dimension and Orientation Width 0.60 m Length 2.40 m A D B C ➔ 352 (Deg)		Ground Level 32.07 mOD Coordinates (m) E 471915.96 National Grid N 109671.02	
Samples and Tests			Strata Description				
Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10	ES2 D1	p 63kPa, r 28kPa	Soft brown slightly gravelly sandy CLAY. Gravel is angular medium to coarse of flint. Frequent rootlets. (TOPSOIL)	0.10-0.40 frequent rootlets	0.10 31.97		
0.30 0.30 - 0.80	ES3 B4		Soft to firm greyish brown, mottled orange, sandy, locally very sandy, CLAY.	0.20-0.40 rare subangular coarse gravel of flint	(0.80)		
0.50 0.50 0.50	HV ES6 D5		Firm orangish brown, mottled grey, slightly sandy CLAY.	0.90 rare roots (up to 10mm diameter) 1.00 occasional pockets (up to 30mm) of fine to medium sand	0.90 31.17		
0.90 0.90 - 1.20 1.00 1.00	D7 B8 HV ES9	p 68kPa, r 29kPa			(1.10)		
1.90 2.00 2.00 - 2.40	HV D10 B11	p 74kPa, r 32kPa	Stiff brownish grey, locally mottled orange, slightly sandy silty CLAY.		2.00 30.07		
3.00 3.00 - 3.50	D12 B13		Very stiff grey sandy CLAY. Occasional pockets of silty fine to medium sand (up to 30mm).		3.30 28.77		
3.60	D14	10/12/19	END OF EXPLORATORY HOLE		3.60 28.47		
Groundwater Entries			Remarks		Stability		
No.	Depth Strike (m)	Remarks	Depth (m)	Remarks	Shoring		
1	0.00	Seepage from ground level.			Collapse of Face A below 1.80m		
					Weather Wet, cold and windy		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project HAVANT THICKET WINTER STORAGE RESERVOIR		Trial Pit		
Scale 1:25			Project No. A9031-19		ATK-TP-06		
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Logged FC		Start 26/11/2019	Equipment, Methods and Remarks JCB 360. Machine excavated. Terminated due to instability of long faces.		Dimension and Orientation Width 0.60 m Length 2.50 m A B C ➔ 349 (Deg)		Ground Level 34.55 mOD	
Checked MS		End 26/11/2019					Coordinates (m) E 472068.72	
Approved TC							National Grid N 109901.56	
Samples and Tests			Strata Description					
Depth	Type & No.	Records	Main		Detail	Depth, Level (Thickness)	Legend	Backfill
0.20	ES1	p 20kPa, r 12kPa	Dark brownish grey slightly gravelly sandy CLAY. Gravel is rounded fine to coarse of flint. (TOPSOIL)			(0.30)		
0.40 - 0.50	B2		Soft grey, mottled orangish brown, sandy gravelly CLAY with high cobble content. Gravel is rounded fine to coarse of flint. Cobbles are rounded of flint.			0.30 34.25		
0.50	HV					(0.60)		
0.50	ES4							
0.50	D3							
0.85 - 0.90	B6	26/11/19	Grey and light orangish brown silty fine to coarse SAND with occasional pockets (up to 500mm) of firm light grey sandy silty clay.			0.90 33.65		1
0.90	D5							
1.00	ES7							
1.60	D8		END OF EXPLORATORY HOLE					
1.60 - 1.70	B9							
						1.70 32.85		
Groundwater Entries			Remarks			Stability Unstable below 1.50m		
No.	Depth	Strike (m)	Remarks			Shoring None		
1	1.00		Seepage.			Weather Raining		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project HAVANT THICKET WINTER STORAGE RESERVOIR			Trial Pit		
Scale 1:25			Project No. A9031-19			ATK-TP-07		
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Logged PC		Start 05/12/2019	Equipment, Methods and Remarks		Dimension and Orientation		Ground Level 34.52 mOD	
Checked MS		End 05/12/2019	Hand excavated for infiltration test. Temporary monitoring pipe installed with diver data logger. Unable to undertake test due to ingress of groundwater.		Width 0.50 m Length 0.50 m		Coordinates (m) E 472084.89	
Approved TC		05/12/2019			A B C D ➔ 348 (Deg)		National Grid N 109901.11	
Samples and Tests			Strata Description					
Depth	Type & No.	Records	Main		Detail	Depth, Level (Thickness)	Legend	Backfill
			Brown slightly gravelly sandy CLAY. Gravel is angular to rounded fine to coarse of flint. Frequent rootlets. (TOPSOIL)			(0.30)		
			Soft brown and grey, mottled orangish brown, gravelly CLAY. Gravel is subrounded to rounded fine to coarse of black flint. 1no. rounded cobble of black flint.			0.30 34.22 (0.50)		1
			Orange and brown, locally grey, silty fine to medium SAND.			0.80 33.72 (0.70)		2
		05/12/19						
			END OF EXPLORATORY HOLE			1.50 33.02		
Groundwater Entries			Remarks			Stability		
No.	Depth	Strike (m)	Remarks		Depth (m)	Unstable below 0.80m		
1	0.50		Seepage.			Shoring None		
2	1.20		Seepage.			Weather Dry, cold		
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project HAVANT THICKET WINTER STORAGE RESERVOIR			Trial Pit		
Scale 1:25 © Copyright SOCOTEC UK Limited 09/04/2020 20:52:10			Project No. A9031-19 Carried out for Portsmouth Water			ATK-TP-07i Sheet 1 of 1		

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Trial Pit Log



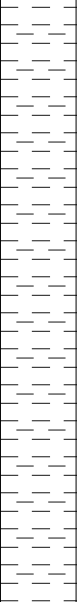
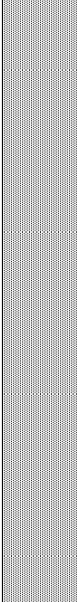
LoggedFC CheckedMS ApprovedTC		Start02/12/2019 End02/12/2019	Equipment, Methods and Remarks JCB 3CX. Machine excavated.		Dimension and Orientation Width0.40 m Length2.80 m A D C B ➔ 326 (Deg)		Ground Level21.79 mOD Coordinates (m)E 471251.91 National GridN 109067.03	
Samples and Tests			Strata Description					
Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill	
0.20	ES1	p 76kPa, r 40kPa	Dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of flint. (TOPSOIL)	0.90-1.10 gravel lens. Gravel is subrounded to rounded fine to coarse of chert, flint and quartzite 1.20 shear surface subhorizontal planar and undulating	(0.30)			
0.40 - 0.50	B2		Firm grey, mottled orangish brown, slightly sandy CLAY.		0.3021.49			
0.50	HV ES4 D3				(1.00)			
0.50								
1.00	HV ES5 D7 B6	p 95kPa, r 39kPa			1.3020.49		1	
1.00			Firm to stiff friable light bluish grey, locally mottled dark grey and brown, CLAY.					
1.00								
1.00 - 1.10								
1.60	HV D8 B9	p 92kPa, r 22kPa		1.60-1.70 slightly sandy			2	
1.60								
1.60 - 1.70				2.10 locally rounded cobbles of siltstone				
					(2.40)			
2.70	D10 B11	p 148kPa, r 29kPa						
2.70 - 2.80								
3.00	HV							
3.50	D12 B13	02/12/19						
3.50 - 3.60								
			END OF EXPLORATORY HOLE		3.7018.09			
Groundwater Entries			Remarks		Stability			
No.	Depth Strike (m)	Remarks	Depth (m)	Remarks	Stable			
1	1.50	Seepage.			ShoringNone			
2	2.50	Slight water ingress.			WeatherSunny			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			ProjectHAVANT THICKET WINTER STORAGE RESERVOIR		Trial Pit			
Scale1:25 © Copyright SOCOTEC UK Limited 09/04/2020 20:52:10			Project No.A9031-19 Carried out forPortsmouth Water		ATK-TPM-02 Sheet 1 of 1			

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LoggedFC		Start30/11/2019		Equipment, Methods and RemarksJCB 360. Machine excavated.		Dimension and OrientationWidth0.60 m Length2.60 m		A B C 160 (Deg)		Ground Level23.36 mOD	
CheckedMS		End30/11/2019								Coordinates (m)E 471256.07	
ApprovedTC										National GridN 109371.99	
Samples and Tests						Strata Description					
Depth		Type & No.		Records		Main		Detail		Depth, Level (Thickness)	
0.30		ES1				Dark brown slightly sandy CLAY. (TOPSOIL)				(0.35)	
0.40 - 0.50		B3A				Soft to firm grey, mottled orangish brown, locally slightly sandy CLAY.				0.3523.01	
0.50		HV		p 50kPa, r 34kPa						(0.95)	
0.50		ES3									
0.50		D2						0.80 possible shear surface 20/343 degree planar smooth 0.90-1.30 firm to stiff			
1.00		ES4									
1.20		HV		p 71kPa, r 37kPa		Soft light grey, mottled greyish brown, slightly sandy CLAY.				1.3022.06	
1.60		HV		p 39kPa, r 9kPa						(1.10)	
1.60		D5									
1.60 - 1.70		B6									
2.50		D7				Firm friable grey, mottled orangish brown, slightly sandy gravelly CLAY with low cobble content. Gravel is subrounded to rounded fine to coarse of flint. Cobbles are rounded of flint.				2.4020.96	
2.50 - 2.60		B8								(0.30)	
2.80		D9				Stiff grey, locally mottled orangish brown, CLAY.				2.7020.66	
2.80 - 2.90		D10								(1.10)	
3.60		D11		30/11/19damp				3.50 light grey			
3.60 - 3.70		B12									
						END OF EXPLORATORY HOLE				3.8019.56	
Groundwater Entries						Remarks				Stability	
No.		Depth (m)		Remarks		Depth (m)		Remarks		Stable	
1		1.60		Slight water ingress.						ShoringNone	
										WeatherSunny	
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						ProjectHAVANT THICKET WINTER STORAGE RESERVOIR				Trial Pit	
Scale1:25						Project No.A9031-19				ATK-TPM-03	
© Copyright SOCOTEC UK Limited						Carried out forPortsmouth Water				Sheet 1 of 1	

Trial Pit Log



Logged FC Checked MS Approved TC		Start 02/12/2019 End 02/12/2019	Equipment, Methods and Remarks JCB 3CX. Machine excavated.	Dimension and Orientation Width 0.60 m Length 2.70 m A D B C ➔ 191 (Deg)		Ground Level 23.04 mOD Coordinates (m) E 471433.05 National Grid N 109242.02												
Samples and Tests			Strata Description															
Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill											
0.20	ES1	p 58kPa, r 30kPa	Dark brown sandy slightly organic CLAY. Rare subangular to rounded fine to coarse gravel of flint. (TOPSOIL)		(0.30)													
0.50 0.50 0.50 0.50 - 0.60	HV ES2 D3 B4		Soft to firm light grey, mottled orangish brown, CLAY. Locally slightly sandy. Rare organic material (up to 40x20mm).		0.30 22.74													
1.00 1.00	HV ES5				(2.00)													
1.50 1.50 - 1.60	D6 B7																	
2.40 - 2.50 2.50	B9 D8	p 69kPa, r 30kPa	Stiff friable bluish grey, locally mottled dark brown, CLAY.		2.30 20.74													
3.60 3.60 - 3.70	D10 B11		3.40-3.50 gravel lens. Gravel is rounded fine to coarse of siltstone		(1.60)													
		02/12/19 2.40	END OF EXPLORATORY HOLE		3.90 19.14													
Groundwater Entries <table><tr><th>No.</th><th>Depth</th><th>Strike (m)</th><th>Remarks</th></tr><tr><td>1</td><td>0.50</td><td></td><td>Slight ingress.</td></tr></table>			No.	Depth	Strike (m)	Remarks	1	0.50		Slight ingress.	Remarks <table><tr><th>Depth (m)</th><th>Remarks</th></tr><tr><td></td><td></td></tr></table>		Depth (m)	Remarks			Stability Stable Shoring None Weather Sunny	
No.	Depth	Strike (m)	Remarks															
1	0.50		Slight ingress.															
Depth (m)	Remarks																	
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 09/04/2020 20 52 11			Project HAVANT THICKET WINTER STORAGE RESERVOIR Project No. A9031-19 Carried out for Portsmouth Water		Trial Pit ATK-TPM-04 Sheet 1 of 1													

Trial Pit Log



Logged FC Checked MS Approved TC		Start 20/11/2019 End 20/11/2019	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated. TPM used to assess stability for man entry possibility.	Dimension and Orientation Width 0.60 m Length 8.00 m A B C D ➔ 259 (Deg)		Ground Level 26.86 mOD Coordinates (m) E 471577.01 National Grid N 109532.98	
Samples and Tests			Strata Description				
Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10	ES1		Dark brown slightly sandy CLAY with frequent roots (up to 5mm). (TOPSOIL)		(0.30)		
0.40 - 0.50	B2		Firm light grey, mottled orangish brown, slightly sandy CLAY. Rare organic material.		0.30 26.56		
0.50	ES3						
0.70 - 1.00	B4						
1.00	ES6						
1.00	D5			0.80 shear surface 20/240 degree planar smooth	(1.60)		
1.50	D7						
1.60 - 1.70	B8						
1.70	D9						
2.00 - 2.20	B10		Stiff, locally very stiff, friable dark grey, mottled dark brown, CLAY.		1.90 24.96		
2.20	D10A			2.20 sandy	(1.00)		
2.90 - 3.00	B12		Very stiff fissured, locally indistinctly laminated, dark grey CLAY. Fissures are randomly orientated, very closely spaced, planar, smooth.		2.90 23.96		
3.00	D11				(0.40)		
3.30 - 3.40	B15		Very stiff indistinctly laminated dark grey silty CLAY.		3.30 23.56		
3.40	ES13						
3.40	D14				(1.20)		
4.40	D16	20/11/19					
4.40 - 4.50	B17						
			END OF EXPLORATORY HOLE		4.50 22.36		
Groundwater Entries			Remarks		Stability Stable		
No.	Depth Strike (m)	Remarks	Depth (m)	Remarks	Shoring None		
1	0.50	Seepage.			Weather Cloudy, fair		
2	1.00	Medium inflow.					
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project HAVANT THICKET WINTER STORAGE RESERVOIR		Trial Pit		
Scale 1:25 © Copyright SOCOTEC UK Limited 09/04/2020 20 52 11			Project No. A9031-19		ATK-TPM-05		
			Carried out for Portsmouth Water		Sheet 1 of 1		

Split Tube Sample Description

Borehole No	ATK-BH-01		
Sample No	6		
Sample Depth, mBGL	1.00	-	1.45
Sample Type	UT		

Description

1.00 - 1.09m, No recovery.

1.09 - 1.45m

Soft to firm brown, mottled bluish grey, CLAY with occasional rootlets (up to 20x2mm).

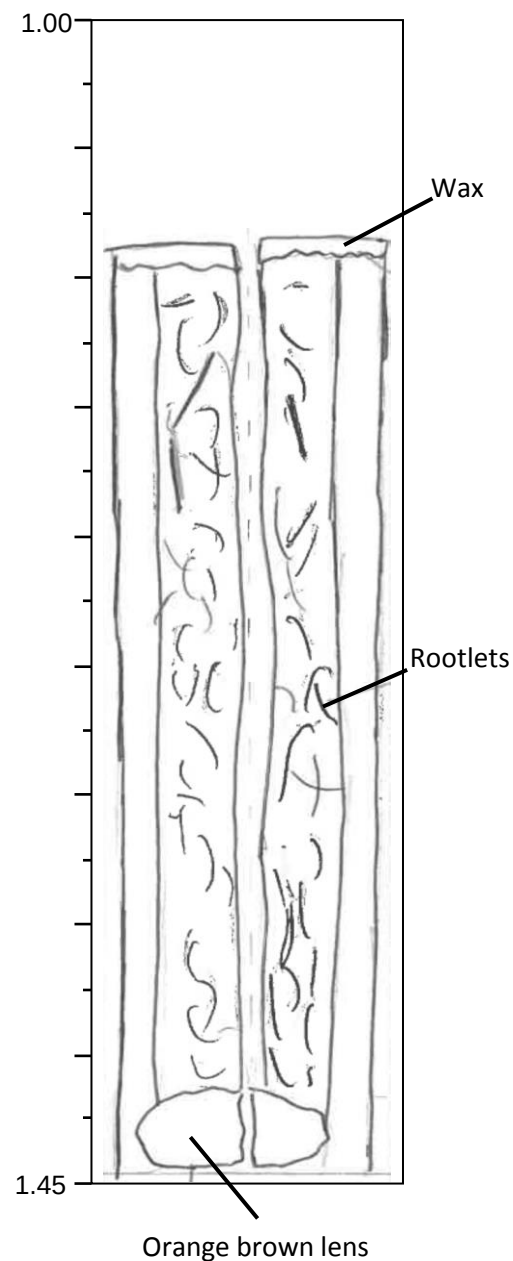
Detail:

1.42 - 1.45m

Dark orangish brown slightly sandy slightly gravelly clay lens. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone.

Remarks:

0.36m recovery. 10mm of wax at top of sample.



Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-01-UT6

Split Tube Sample Description

Borehole No	ATK-BH-01		
Sample No	8		
Sample Depth, mBGL	1.50	-	1.95
Sample Type	UT		

Description

1.50 - 1.54m, No recovery.

1.54 - 1.95m

Firm to stiff brown, mottled bluish grey, CLAY. Rare rootlets (up to 60x2mm).

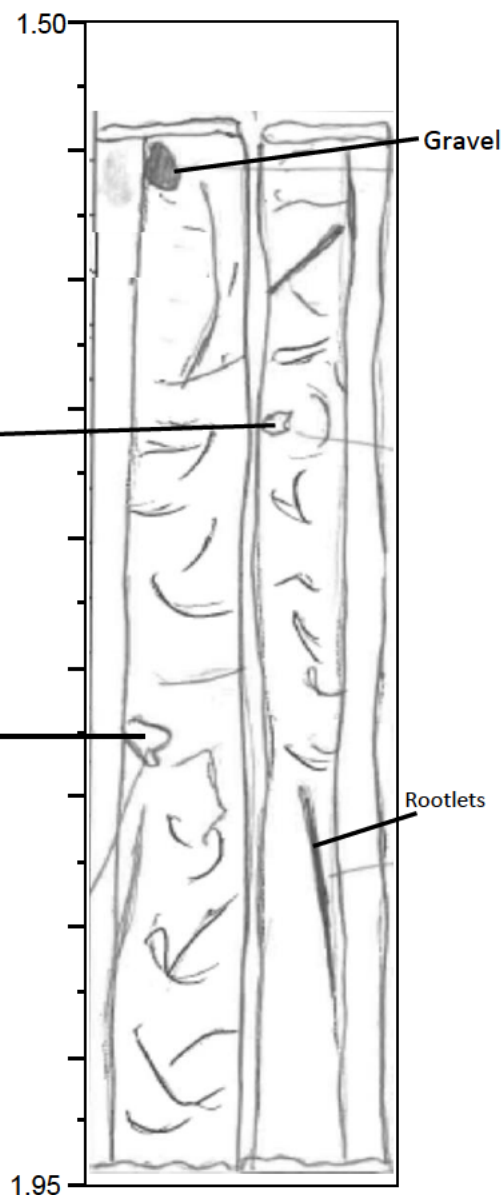
Detail:

1.66m

Pocket (5x10mm) of white fine to coarse selenite crystals.

1.78m

Pocket (10x10mm) of white fine to coarse selenite crystals.



Remarks:

0.41m recovery. 5mm of wax at top and base.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-01-UT8

Split Tube Sample Description

Borehole No	ATK-BH-01		
Sample No	10		
Sample Depth, mBGL	2.00	-	2.45
Sample Type	UT		

Description

2.00 - 2.03m, No recovery.

2.03 - 2.09m

Firm brown, mottled bluish grey, CLAY.

2.09 - 2.33m

Very soft brown, locally mottled bluish grey, silty CLAY with frequent rootlets.

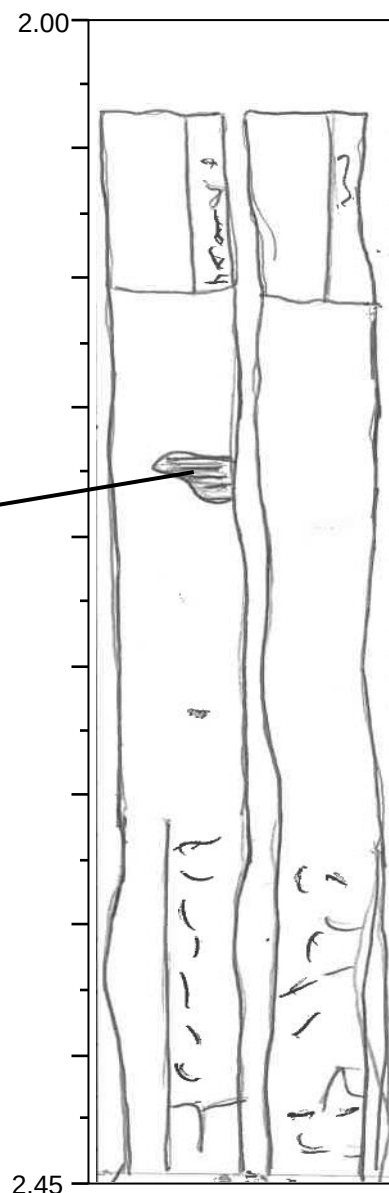
Detail:

2.19m

Pocket (50x10mm) of dark brown rootlets, 0.5 degree orientation.

2.33 - 2.45m

Firm to stiff, locally fissured, orangish brown, mottled bluish grey, CLAY. Fissures are randomly orientated, extremely closely spaced, planar, smooth.



Remarks:

0.42m recovery. 5mm of wax at top and base.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-01-UT10

Split Tube Sample Description

Borehole No	ATK-BH-01		
Sample No	16		
Sample Depth, mBGL	3.50	-	3.95
Sample Type	UT		

Description

3.50 - 3.52m, No recovery.

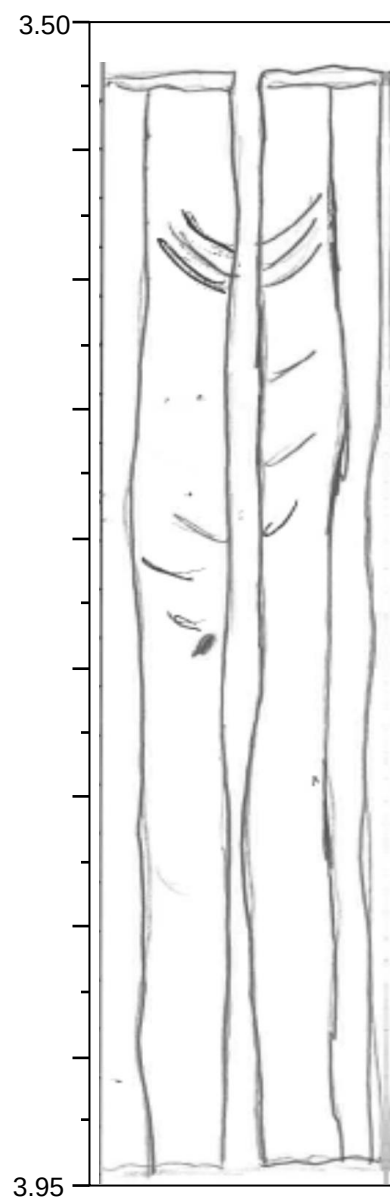
3.52 - 3.95m

Stiff indistinctly laminated orangish brown, locally mottled bluish grey, slightly sandy CLAY. Rare selenite crystals.

Detail:

3.72m

White shell fragment (20x5mm).



Remarks:

0.43m recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-01-UT16

Split Tube Sample Description

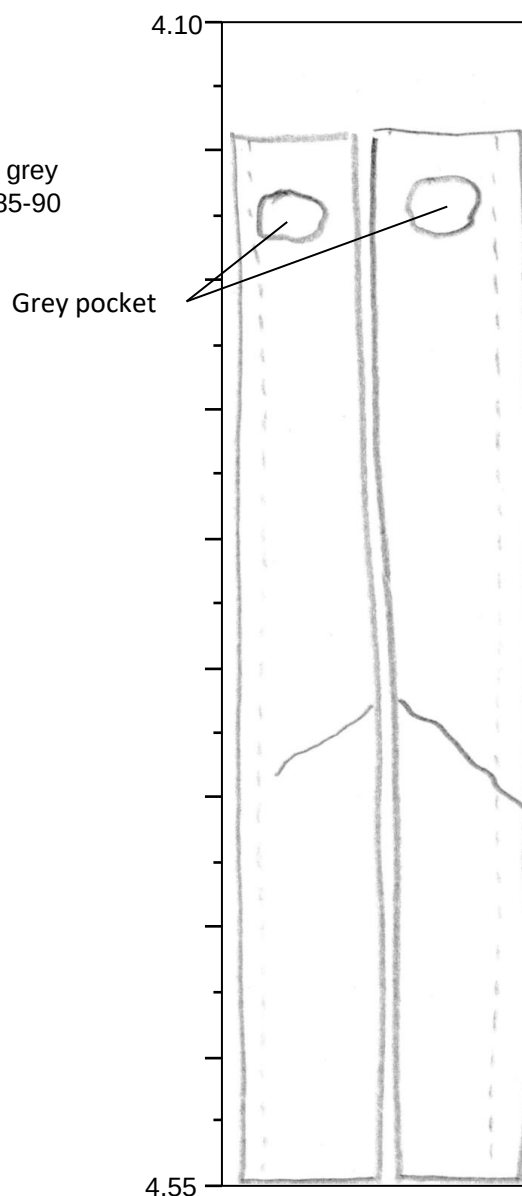
Borehole No	ATK-BH-01		
Sample No	18		
Sample Depth, mBGL	4.10	-	4.55
Sample Type	UT		

Description

4.10 - 4.14m, No recovery.

4.14 - 4.55m

Firm to stiff, locally fissured, greyish brown, mottled bluish grey and orangish brown, CLAY. Fissures are 0-5 degree and 85-90 degree, extremely closely spaced, planar, smooth.



Remarks:

0.41m recovery.

Notes:	Project	HAVANT THICKET WINTER STORAGE	Figure ATK-BH-01-UT18
	Project No.	A9031-19	
	Carried out for	Portsmouth Water	

Split Tube Sample Description

Borehole No	ATK-BH-01		
Sample No	20		
Sample Depth, mBGL	4.70	-	5.15
Sample Type	UT		

Description

4.70 - 4.74m, No recovery.

4.74 - 4.87m

Soft to firm brown, locally mottled orangish brown, CLAY.

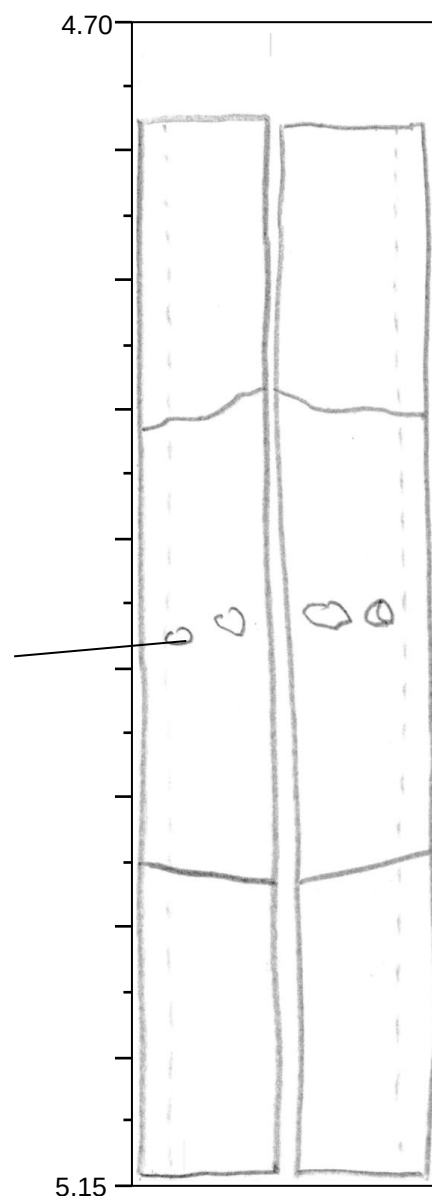
4.87 - 5.15m

Stiff to very stiff indistinctly laminated dark greyish brown silty CLAY.

Detail:

4.93m

Local pockets (up to 20x15mm) of dark grey, mottled orangish brown, silt.



Remarks:

0.41m recovery.

Notes:	Project	HAVANT THICKET WINTER STORAGE	Figure ATK-BH-01-UT20
	Project No.	A9031-19	
	Carried out for	Portsmouth Water	

Split Tube Sample Description

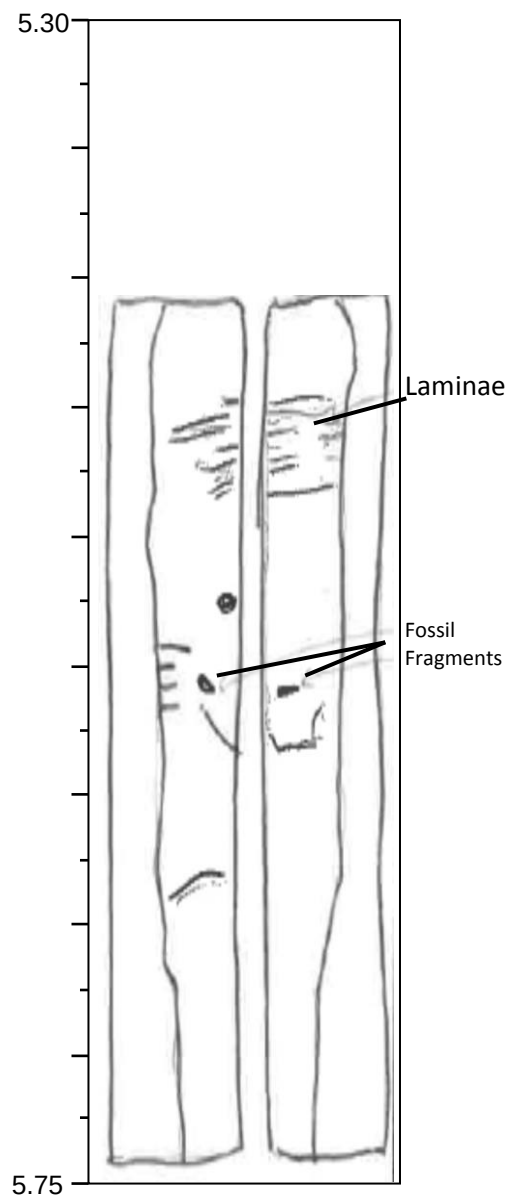
Borehole No	ATK-BH-01		
Sample No	22		
Sample Depth, mBGL	5.30	-	5.75
Sample Type	UT		

Description

5.30 - 5.41m, No recovery.

5.41 - 5.75m,

Very stiff indistinctly laminated, locally fissured, slightly micaceous dark brownish grey silty CLAY. Fissures are randomly orientated, extremely closely spaced, planar, smooth. Rare shell fragments (up to 2x5mm).



Remarks:

0.34m recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-01-UT22

Split Tube Sample Description

Borehole No	ATK-BH-01		
Sample No	24		
Sample Depth, mBGL	5.90	-	6.35
Sample Type	UT		

Description

5.90 - 5.95m, No recovery.

5.95 - 6.00m,
Very soft to soft greyish brown and brown CLAY.

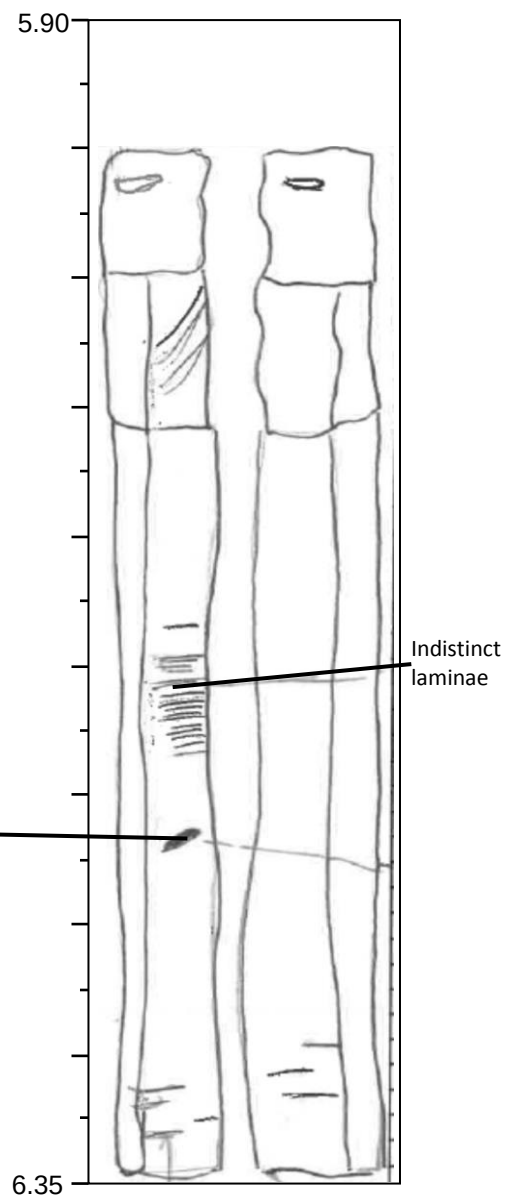
6.00 - 6.06m,
Stiff bluish grey silty CLAY.

6.06 - 6.35m,
Very stiff indistinctly laminated greyish brown silty CLAY.

Detail:
6.21m,
Pocket (up to 20x5mm) of light grey fine sand/silt.

6.29m,
Frequent shell fragments (up to 20x10mm).

Remarks:
0.40m recovery. Wax within first 10mm.



Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-01-UT24

Split Tube Sample Description

Borehole No	ATK-BH-01		
Sample No	26		
Sample Depth, mBGL	6.50	-	6.95
Sample Type	UT		

Description

6.50 - 6.56m, No recovery.

6.56 - 6.95m

Very stiff fissured slightly micaceous dark brownish grey silty CLAY. Fissures are randomly orientated, extremely closely spaced, planar, smooth.

6.75m

Pocket (25x7mm) of dark grey silt and fine sand.

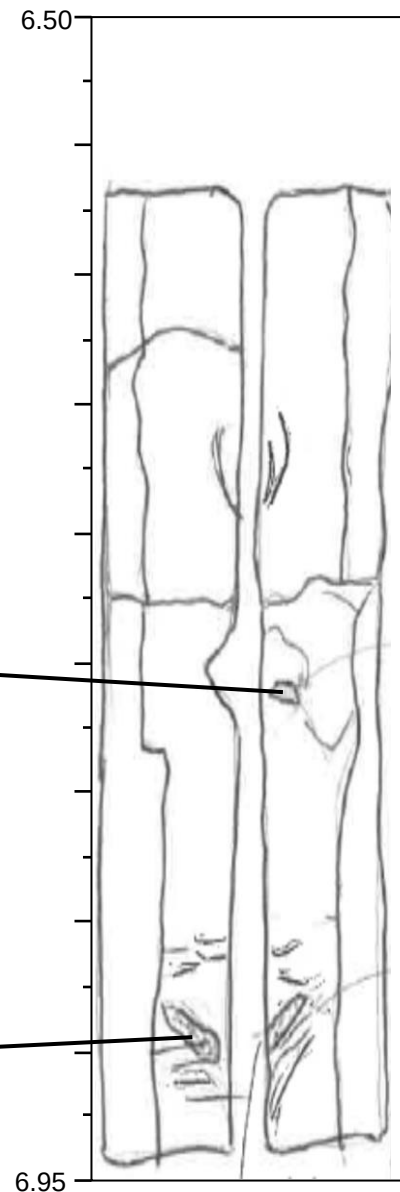
Detail:

6.80 - 6.95m

Indistinct laminations.

6.89 - 6.92m

Pocket (20x20mm) of dark grey silt and fine sand.



Remarks:

0.39m recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-01-UT26

Split Tube Sample Description

Borehole No	ATK-BH-01		
Sample No	27		
Sample Depth, mBGL	7.00	-	7.45
Sample Type	UT		

Description

7.00 - 7.03m, No recovery.

7.03 - 7.25m

Firm, locally soft, greyish brown silty CLAY.

7.25 - 7.45m

Very stiff indistinctly laminated slightly micaceous dark greyish brown silty CLAY.



Remarks:

0.42m recovery. 90mm of wax in top of sample.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-01-UT27

SOCOTEC

Figure
ATK-BH-02-UT5

Split Tube Sample Description

Borehole No	ATK-BH-02		
Sample No	7		
Sample Depth, mBGL	1.80	-	2.30
Sample Type	UT		

Description

1.80 - 1.92m, No recovery.

1.92 to 1.99m

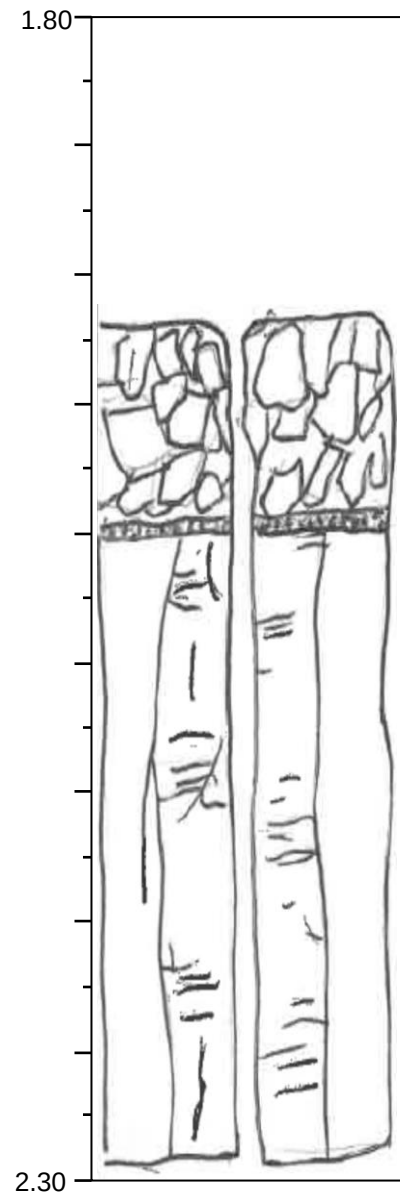
Brown and grey slightly sandy clayey subangular to subrounded fine to coarse GRAVEL of mudstone, siltstone and chert.

1.99 to 2.04m

Orangish brown fine to coarse SAND.

2.04 to 2.30m

Firm to stiff, locally indistinctly laminated, brown and grey CLAY.
Rare subangular to subrounded fine to medium gravel of mudstone and siltstone. Rare plant material (up to 40x2mm).



Remarks:

0.38m recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-02-UT7

Split Tube Sample Description

Borehole No	ATK-BH-02		
Sample No	8		
Sample Depth, mBGL	2.30	-	2.75
Sample Type	UT		

Description

2.30 - 2.35m, No recovery.

2.35 to 2.43m

Very soft brown gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and chert. Occasional plant material/rootlets (up to 30x2mm).

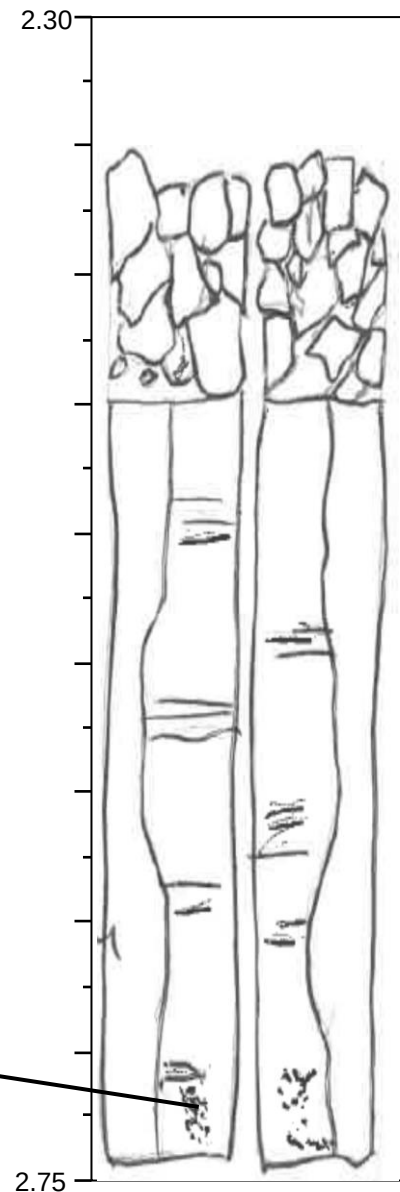
2.43 to 2.75m

Firm to stiff, locally indistinctly laminated, brown and grey CLAY.

Detail:

2.69 to 2.75m

Rare pockets/partings (up to 20x15mm) of white sand/silt.



Remarks:

0.40m recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-02-UT8

Split Tube Sample Description

Borehole No	ATK-BH-02		
Sample No	9		
Sample Depth, mBGL	2.80	-	3.25
Sample Type	UT		

Description

2.80 to 2.88m, No recovery.

2.88 to 3.02m

Very soft brown gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone, siltstone and chert.

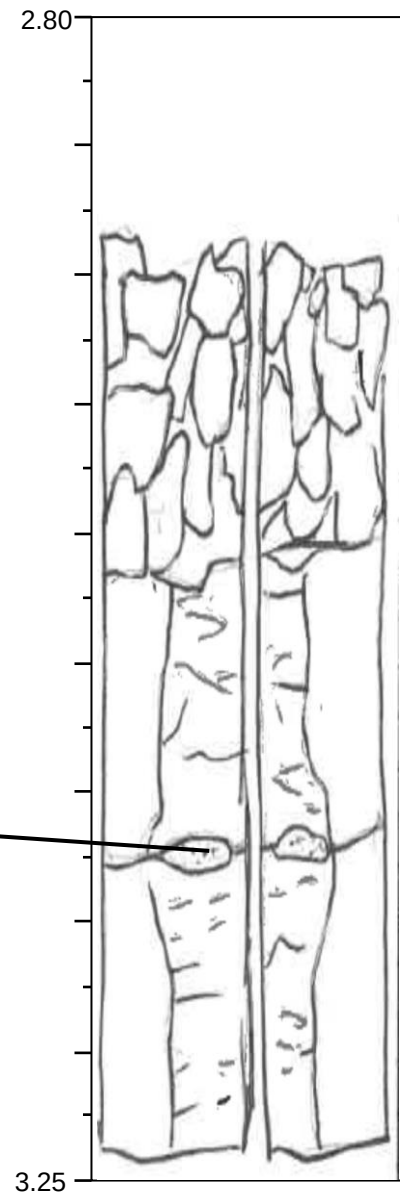
3.02 to 3.25m

Stiff brown, mottled grey, CLAY.

Detail:

3.12m

Pocket (30x20mm) of orangish brown slightly sandy slightly gravelly clay. Gravel is subangular fine to coarse of mudstone and sandstone.



Remarks:

0.37m recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-02-UT9

Split Tube Sample Description

Borehole No	ATK-BH-02		
Sample No	11		
Sample Depth, mBGL	3.40	-	3.95
Sample Type	UT		

Description

3.40 to 3.44m, No recovery.

3.44 to 3.95m

Indistinctly laminated, locally fissured, brown, mottled bluish grey, silty CLAY. Fissures are 0 to 5 degree, subhorizontal and subvertical, extremely closely spaced, planar, smooth.

Detail:

3.44 to 3.47m

Rare subangular coarse gravel of chert.

Detail:

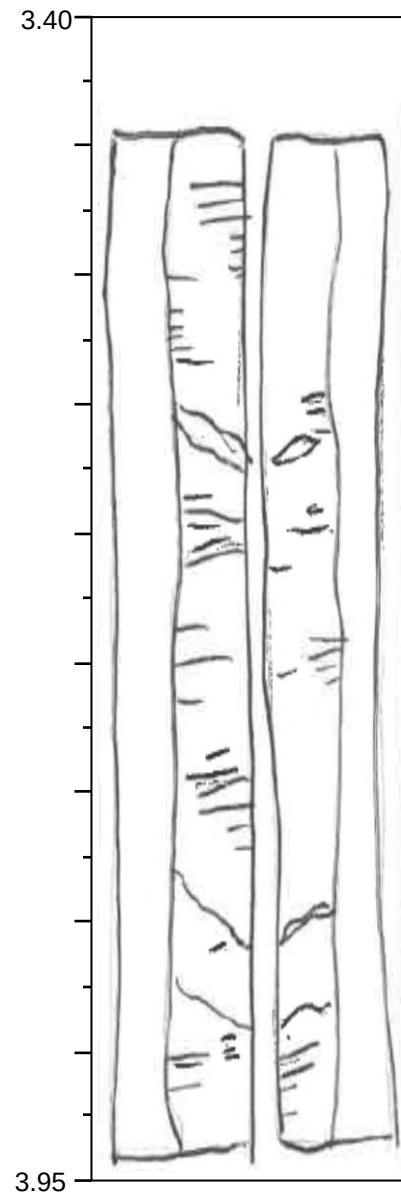
3.70m,

Orangish brown lenses (up to 10x5mm) of fine to medium sand.

Detail:

3.78m,

Pocket (20x20mm) of grey fine sand/silt.



Remarks:

0.41m recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-02-UT11

Split Tube Sample Description

Borehole No	ATK-BH-02		
Sample No	17		
Sample Depth, mBGL	5.10	-	5.55
Sample Type	UT		

Description

5.10 to 5.24m, No recovery.

5.24 to 5.55m

Stiff to very stiff indistinctly laminated, locally fissured, slightly micaceous silty CLAY. Fissures are 0 to 5 degree, extremely closely spaced, planar, smooth. Local pockets/lenses (up to 20x25mm) of dark grey fine sand and silt.



Remarks:

0.31 recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-02-UT17

Split Tube Sample Description

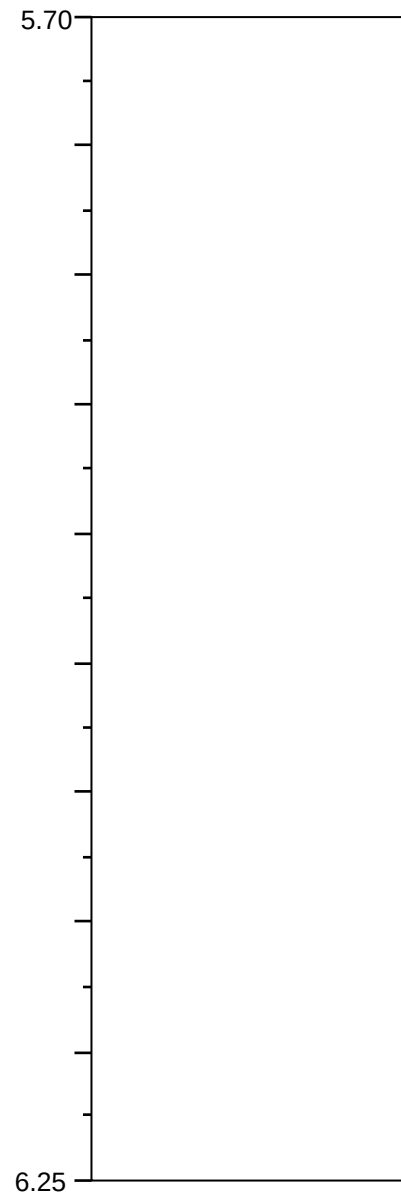
Borehole No	ATK-BH-02		
Sample No	19		
Sample Depth, mBGL	5.70	-	6.25
Sample Type	UT		

Description

5.70 to 5.95m, No recovery.

5.95 to 6.25m

Very stiff indistinctly laminated slightly micaceous slightly sandy silty CLAY. Sand is fine to medium. Rare pockets (up to 15x10mm) of dark grey fine sand and silt.



Remarks:

0.30m recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-02-UT19

Split Tube Sample Description

Borehole No	ATK-BH-02		
Sample No	21		
Sample Depth, mBGL	6.20	-	6.65
Sample Type	UT		

Description

6.20 to 6.32m, No recovery.

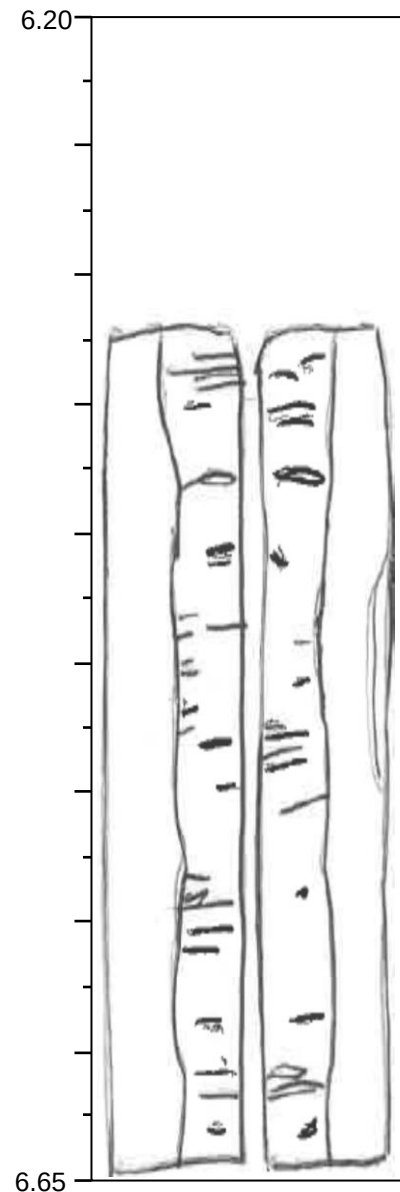
6.32 to 6.65m

Very stiff indistinctly laminated dark grey slightly micaceous slightly sandy silty CLAY. Sand is fine to medium. Rare pockets (up to 20x35mm) of silt and fine sand.

Detail:

6.38m

1no. fossil fragment (35x20mm).



Remarks:

0.33m recovery.

Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Figure
ATK-BH-02-UT21



APPENDIX C

FIELD TESTING

Variable Head Permeability Tests

ATK-CP-01T1 and T2
ATK-CP-02T1, T2 and T3
ATK-CP-03T1
ATK-CP-04T1, T2 and T3
ATK-CP-05T1, T2 and T3
ATK-CP-06T1 and T2
ATK-CP-10T1
ATK-CP-12T1
ATK-CP-13AT1
ATK-CP-15T1 and T2
ATK-CP-16T1
ATK-RC-01T1
ATK-RC-02T1
ATK-RC-02aT1
ATK-RC-03T1

Head Ratio against Time

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
5	0.95
10	0.90
15	0.85
20	0.80
25	0.75
30	0.70
35	0.65
40	0.60
45	0.55
50	0.50
55	0.45
60	0.40

Head Ratio against Time

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
5	0.99
10	0.99
15	0.99
20	0.98
25	0.98
30	0.98
35	0.98
40	0.98
45	0.98
50	0.98
55	0.98
60	0.98

The graph displays the head ratio H_t/H_0 on a logarithmic scale against elapsed time t in minutes. The y-axis ranges from 0.10 to 1.00, and the x-axis ranges from 0 to 70 minutes. All data points are plotted at a head ratio of 1.00, indicating no head loss over time.

Elapsed Time, t (mins)	Head Ratio, H_t/H_0
0	1.00
1	1.00
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
15	1.00
20	1.00
25	1.00
30	1.00
35	1.00
40	1.00
45	1.00
50	1.00
55	1.00
60	1.00

Head Ratio against Time

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
1	1.00
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
15	0.98
20	0.95
25	0.92
30	0.88
35	0.85
40	0.82
45	0.78
50	0.72
55	0.68
60	0.55

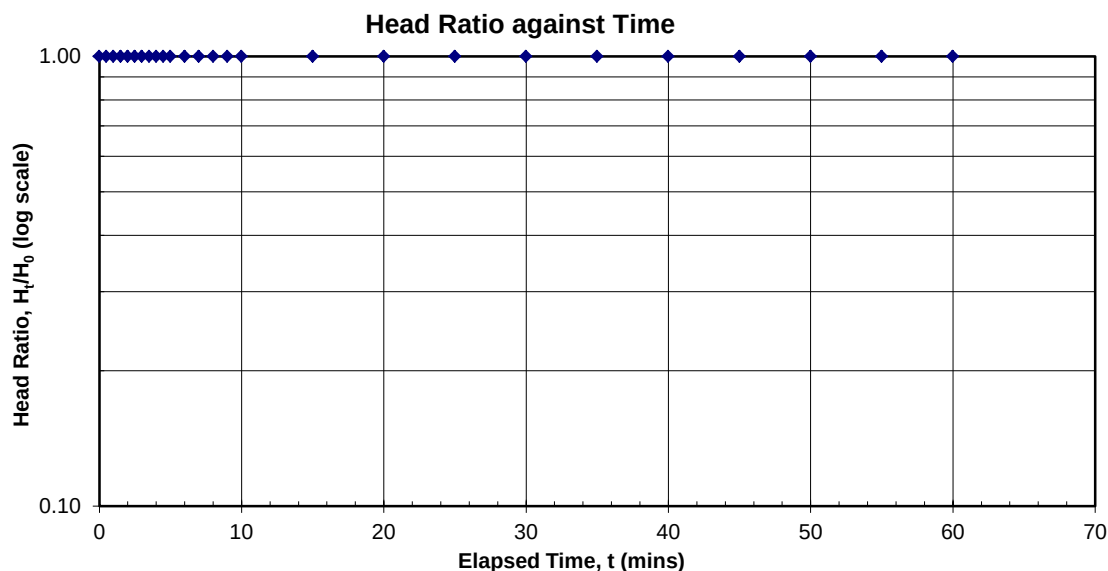
Head Ratio against Time

The graph displays the decay of the head ratio over time. The initial linear portion of the data (from t=0 to approximately t=20) is fitted with a straight line on this semi-log scale, indicating a constant rate of decay. Subsequent data points show a slower rate of decay, deviating from the initial linear trend.

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
1	0.95
2	0.90
3	0.85
4	0.80
5	0.75
6	0.70
7	0.65
8	0.60
9	0.55
10	0.50
15	0.40
20	0.35
25	0.30
30	0.28
35	0.27
40	0.26
45	0.25
50	0.24
55	0.23

Variable Head Permeability Test

LOCATION TYPE Borehole TEST TYPE Falling Head DETAILS OF TEST ZONE: <table style="width: 100%;"> <tr> <td>Depth of casing</td> <td style="text-align: right;">1.70 m BGL</td> </tr> <tr> <td>Depth of borehole</td> <td style="text-align: right;">5.50 m BGL</td> </tr> <tr> <td>Diameter of borehole (D)</td> <td style="text-align: right;">150 mm</td> </tr> <tr> <td>Height of casing above ground level (datum)</td> <td style="text-align: right;">0.00 m</td> </tr> </table>	Depth of casing	1.70 m BGL	Depth of borehole	5.50 m BGL	Diameter of borehole (D)	150 mm	Height of casing above ground level (datum)	0.00 m	BOREHOLE No. ATK-CP-03 TEST NUMBER 1 DATE OF TEST 06-Dec-19 TEST ZONE CONDITIONS <table style="width: 100%;"> <tr> <td>Diameter of response zone (D)</td> <td style="text-align: right;">150 mm</td> </tr> <tr> <td>Length of response zone (L)</td> <td style="text-align: right;">3800 mm</td> </tr> <tr> <td>Well point or hole extended in uniform soil (8)</td> <td></td> </tr> <tr> <td>Shape factor (F) after Hvorslev (1951)</td> <td style="text-align: right;">6.08 m</td> </tr> </table>	Diameter of response zone (D)	150 mm	Length of response zone (L)	3800 mm	Well point or hole extended in uniform soil (8)		Shape factor (F) after Hvorslev (1951)	6.08 m																																																																																																										
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Testing: PC
 Checked: TC
 Approved:

Notes:

Project HAVANT THICKET WINTER STORAGE

Project No. A9031-19

Carried out for Portsmouth Water

Test
ATK-CP-03T1

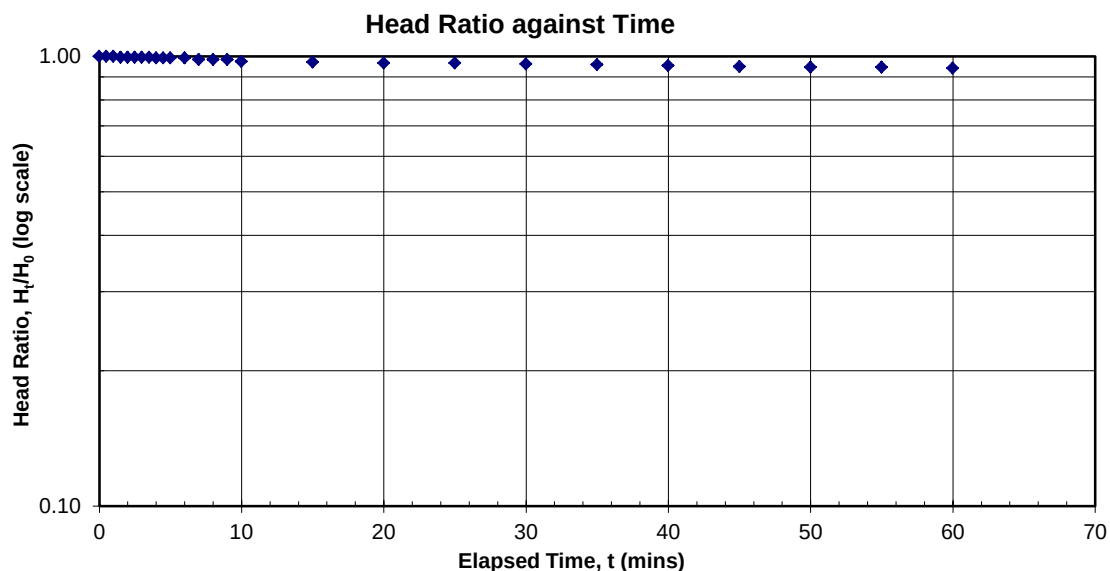
SOCOTEC

The graph displays the head ratio H_t/H_0 on a logarithmic scale against elapsed time t in minutes. The y-axis ranges from 0.10 to 1.00, and the x-axis ranges from 0 to 70 minutes. The data points, represented by blue diamonds, show a constant head ratio of 1.00 throughout the entire 70-minute period.

Elapsed Time, t (mins)	Head Ratio, H_t/H_0
0	1.00
1	1.00
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
15	1.00
20	1.00
25	1.00
30	1.00
35	1.00
40	1.00
45	1.00
50	1.00
55	1.00
60	1.00

Variable Head Permeability Test

LOCATION TYPE Borehole TEST TYPE Falling Head DETAILS OF TEST ZONE: <table style="width: 100%;"> <tr> <td>Depth of casing</td> <td style="text-align: right;">4.50 m BGL</td> </tr> <tr> <td>Depth of borehole</td> <td style="text-align: right;">11.50 m BGL</td> </tr> <tr> <td>Diameter of borehole (D)</td> <td style="text-align: right;">200 mm</td> </tr> <tr> <td>Height of casing above ground level (datum)</td> <td style="text-align: right;">0.00 m</td> </tr> </table>	Depth of casing	4.50 m BGL	Depth of borehole	11.50 m BGL	Diameter of borehole (D)	200 mm	Height of casing above ground level (datum)	0.00 m	BOREHOLE No. ATK-CP-04 TEST NUMBER 2 DATE OF TEST 18-Nov-19 TEST ZONE CONDITIONS <table style="width: 100%;"> <tr> <td>Diameter of response zone (D)</td> <td style="text-align: right;">200 mm</td> </tr> <tr> <td>Length of response zone (L)</td> <td style="text-align: right;">7000 mm</td> </tr> <tr> <td>Well point or hole extended in uniform soil (8)</td> <td></td> </tr> <tr> <td>Shape factor (F) after Hvorslev (1951)</td> <td style="text-align: right;">10.35 m</td> </tr> </table>	Diameter of response zone (D)	200 mm	Length of response zone (L)	7000 mm	Well point or hole extended in uniform soil (8)		Shape factor (F) after Hvorslev (1951)	10.35 m																																																																																																										
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Testing: PC
Checked: TC
Approved:

Notes:

Project HAVANT THICKET WATER STORAGE

Project No. A9031-19

Carried out for Portsmouth Water

Test
ATK-CP-04T2

The graph shows the relationship between the head ratio and elapsed time. The data points follow a linear trend on the semi-logarithmic plot, indicating a constant rate of head loss. A solid black line is drawn through the initial data points, representing the theoretical decay curve.

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
0.5	0.85
1.0	0.72
1.5	0.60
2.0	0.50
2.5	0.42
3.0	0.38
3.5	0.35
4.0	0.33
4.5	0.32
5.0	0.31
6.0	0.30
7.0	0.29
8.0	0.28
9.0	0.27
10.0	0.27
15.0	0.27

Head Ratio against Time

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
1	1.00
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
15	1.00
20	1.00
25	1.00
30	1.00
35	1.00
40	1.00
45	1.00
50	1.00
55	1.00
60	1.00

The graph displays the head ratio H_t/H_0 on a logarithmic scale against elapsed time t in minutes. The y-axis ranges from 0.10 to 1.00, and the x-axis ranges from 0 to 70 minutes. A horizontal line is drawn at $H_t/H_0 = 1.00$. All data points, marked with blue diamonds, lie exactly on this line, indicating that the head ratio remained constant at 1.00 throughout the entire 60-minute test period.

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
1	1.00
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
15	1.00
20	1.00
25	1.00
30	1.00
35	1.00
40	1.00
45	1.00
50	1.00
55	1.00
60	1.00

Head Ratio against Time

The graph illustrates the decay of the head ratio over time. The initial phase shows a linear relationship on the log scale, indicating exponential decay. The data points are as follows:

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
1	0.60
2	0.40
3	0.30
4	0.25
5	0.20
6	0.15
7	0.12
8	0.10
9	0.08
10	0.07
11	0.06
15	0.01
20	0.007
25	0.005
30	0.005
35	0.005
40	0.005
45	0.003
50	0.002
55	0.002

Head Ratio against Time

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
1	1.00
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
15	0.99
20	0.98
25	0.97
30	0.96
35	0.95
40	0.94
45	0.93
50	0.92
55	0.91
60	0.90

Head Ratio against Time

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
1	0.85
2	0.75
3	0.68
4	0.62
5	0.58
6	0.55
7	0.52
8	0.50
9	0.48
10	0.46
15	0.40
20	0.35
25	0.20
30	0.15
35	0.10
40	0.10
45	0.08
50	0.08
55	0.08
60	0.08

SOCOTEC

Head Ratio against Time

The graph displays the head ratio H_t/H_0 on a logarithmic y-axis against elapsed time t in minutes on a linear x-axis. The y-axis ranges from 0.10 to 1.00, and the x-axis ranges from 0 to 70 minutes. The data points, marked with blue diamonds, remain consistently at a head ratio of 1.00 throughout the 60-minute test period.

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
1	1.00
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
15	1.00
20	1.00
25	1.00
30	1.00
35	1.00
40	1.00
45	1.00
50	1.00
55	1.00
60	1.00

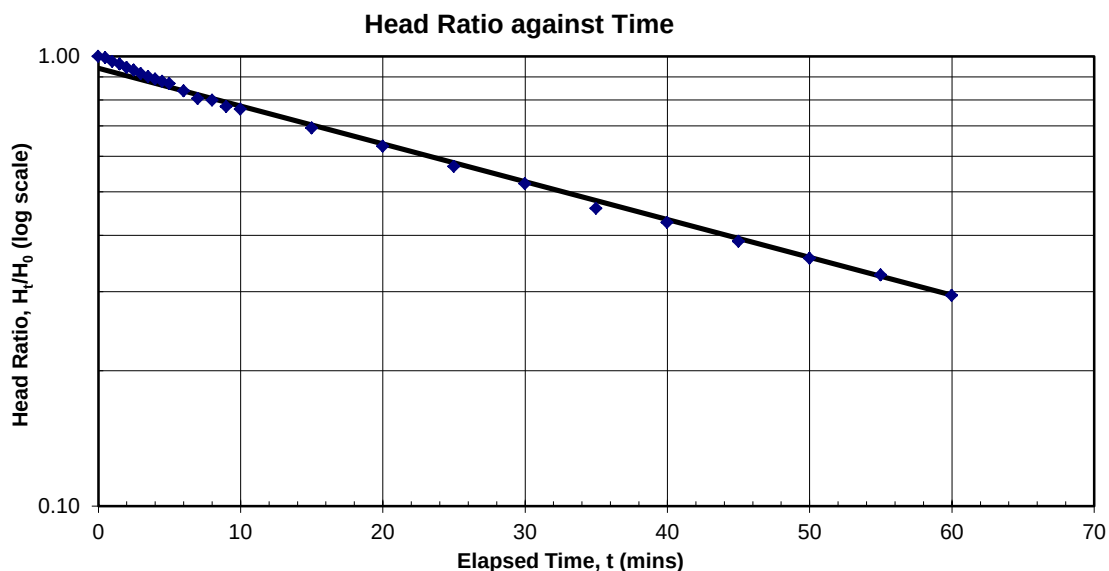
Head Ratio against Time

The graph illustrates the relationship between the head ratio and elapsed time. The y-axis is a logarithmic scale for the head ratio H_t/H_0 , ranging from 0.00 to 1.00. The x-axis represents elapsed time t in minutes, ranging from 0 to 35. A series of data points (blue diamonds) shows a rapid initial decrease in head ratio, which levels off after approximately 10 minutes. A solid black line is drawn through the initial data points, indicating a linear relationship on the log scale.

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
1	0.80
2	0.60
3	0.45
4	0.35
5	0.25
6	0.18
7	0.13
8	0.09
9	0.07
10	0.05
15	0.01
20	0.005
25	0.003

Variable Head Permeability Test

LOCATION TYPE Standpipe TEST TYPE Rising Head DETAILS OF TEST ZONE: <table style="width: 100%;"> <tr> <td>Top of response zone</td> <td style="text-align: right;">3.50 m BGL</td> </tr> <tr> <td>Base of response zone</td> <td style="text-align: right;">4.50 m BGL</td> </tr> <tr> <td>Diameter of borehole (D)</td> <td style="text-align: right;">200 mm</td> </tr> <tr> <td>Height of tubing above ground level (datum)</td> <td style="text-align: right;">0.67 m</td> </tr> <tr> <td>Diameter of standpipe tubing</td> <td style="text-align: right;">25 mm</td> </tr> </table>	Top of response zone	3.50 m BGL	Base of response zone	4.50 m BGL	Diameter of borehole (D)	200 mm	Height of tubing above ground level (datum)	0.67 m	Diameter of standpipe tubing	25 mm	BOREHOLE No. ATK-CP-13A TEST NUMBER 1 DATE OF TEST 29-Jan-20 TEST ZONE CONDITIONS <table style="width: 100%;"> <tr> <td>Diameter of response zone (D)</td> <td style="text-align: right;">200 mm</td> </tr> <tr> <td>Length of response zone (L)</td> <td style="text-align: right;">1000 mm</td> </tr> <tr> <td>Standpipe piezometer</td> <td></td> </tr> <tr> <td>Shape factor (F) after Hvorslev (1951)</td> <td style="text-align: right;">3.06 m</td> </tr> </table>	Diameter of response zone (D)	200 mm	Length of response zone (L)	1000 mm	Standpipe piezometer		Shape factor (F) after Hvorslev (1951)	3.06 m																																																																																																												
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TEST DATA <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Elapsed time, t (minutes)</th> <th>Depth to water below datum (m)</th> <th>Head, H_t (m)</th> <th>Head Ratio H_t/H_0</th> </tr> </thead> <tbody> <tr><td>0</td><td>4.30</td><td>3.09</td><td>1.00</td></tr> <tr><td>0.5</td><td>4.28</td><td>3.07</td><td>0.99</td></tr> <tr><td>1</td><td>4.22</td><td>3.01</td><td>0.97</td></tr> <tr><td>1.5</td><td>4.18</td><td>2.97</td><td>0.96</td></tr> <tr><td>2</td><td>4.13</td><td>2.92</td><td>0.94</td></tr> <tr><td>2.5</td><td>4.09</td><td>2.88</td><td>0.93</td></tr> <tr><td>3</td><td>4.04</td><td>2.83</td><td>0.92</td></tr> <tr><td>3.5</td><td>4.00</td><td>2.79</td><td>0.90</td></tr> <tr><td>4</td><td>3.96</td><td>2.75</td><td>0.89</td></tr> <tr><td>4.5</td><td>3.93</td><td>2.72</td><td>0.88</td></tr> <tr><td>5</td><td>3.90</td><td>2.69</td><td>0.87</td></tr> <tr><td>6</td><td>3.80</td><td>2.59</td><td>0.84</td></tr> <tr><td>7</td><td>3.70</td><td>2.49</td><td>0.81</td></tr> <tr><td>8</td><td>3.68</td><td>2.47</td><td>0.80</td></tr> <tr><td>9</td><td>3.60</td><td>2.39</td><td>0.77</td></tr> <tr><td>10</td><td>3.57</td><td>2.36</td><td>0.76</td></tr> <tr><td>15</td><td>3.35</td><td>2.14</td><td>0.69</td></tr> <tr><td>20</td><td>3.16</td><td>1.95</td><td>0.63</td></tr> <tr><td>25</td><td>2.97</td><td>1.76</td><td>0.57</td></tr> <tr><td>30</td><td>2.82</td><td>1.61</td><td>0.52</td></tr> <tr><td>35</td><td>2.63</td><td>1.42</td><td>0.46</td></tr> <tr><td>40</td><td>2.53</td><td>1.32</td><td>0.43</td></tr> <tr><td>45</td><td>2.41</td><td>1.20</td><td>0.39</td></tr> <tr><td>50</td><td>2.31</td><td>1.10</td><td>0.36</td></tr> <tr><td>55</td><td>2.22</td><td>1.01</td><td>0.33</td></tr> <tr><td>60</td><td>2.12</td><td>0.91</td><td>0.29</td></tr> </tbody> </table>	Elapsed time, t (minutes)	Depth to water below datum (m)	Head, H_t (m)	Head Ratio H_t/H_0	0	4.30	3.09	1.00	0.5	4.28	3.07	0.99	1	4.22	3.01	0.97	1.5	4.18	2.97	0.96	2	4.13	2.92	0.94	2.5	4.09	2.88	0.93	3	4.04	2.83	0.92	3.5	4.00	2.79	0.90	4	3.96	2.75	0.89	4.5	3.93	2.72	0.88	5	3.90	2.69	0.87	6	3.80	2.59	0.84	7	3.70	2.49	0.81	8	3.68	2.47	0.80	9	3.60	2.39	0.77	10	3.57	2.36	0.76	15	3.35	2.14	0.69	20	3.16	1.95	0.63	25	2.97	1.76	0.57	30	2.82	1.61	0.52	35	2.63	1.42	0.46	40	2.53	1.32	0.43	45	2.41	1.20	0.39	50	2.31	1.10	0.36	55	2.22	1.01	0.33	60	2.12	0.91	0.29	GROUNDWATER CONDITIONS <table style="width: 100%;"> <tr> <td>Depth to groundwater prior to test</td> <td style="text-align: right;">0.54 m BGL</td> </tr> <tr> <td>Groundwater level for analysis</td> <td style="text-align: right;">0.54 m BGL</td> </tr> <tr> <td colspan="2">(Based on groundwater depth prior to test)</td> </tr> </table> CALCULATED VALUES Permeability calculation based on BS EN ISO 22282-2 : 2012 Section B.4.2 (Hvorslev method - general approach) <table style="width: 100%;"> <tr> <td>Differential head at start of test, H_0</td> <td style="text-align: right;">3.09 m</td> </tr> <tr> <td>Differential head at end of test, H_t</td> <td style="text-align: right;">0.91 m</td> </tr> <tr> <td>Time elapsed at end of test</td> <td style="text-align: right;">60 mins</td> </tr> <tr> <td>Proportion of test recovery</td> <td style="text-align: right;">71 %</td> </tr> </table> Coordinates of best fit line to data: <table style="width: 100%;"> <tr> <td>$t_1 = 0.0$ mins</td> <td style="text-align: right;">$H_1/H_0 = 0.940$</td> </tr> <tr> <td>$t_2 = 60.0$ mins</td> <td style="text-align: right;">$H_2/H_0 = 0.294$</td> </tr> </table> Permeability (k) = 5.2E-08 m/sec REMARKS Test did not achieve 75% recovery, calculated permeability should be used with caution.	Depth to groundwater prior to test	0.54 m BGL	Groundwater level for analysis	0.54 m BGL	(Based on groundwater depth prior to test)		Differential head at start of test, H_0	3.09 m	Differential head at end of test, H_t	0.91 m	Time elapsed at end of test	60 mins	Proportion of test recovery	71 %	$t_1 = 0.0$ mins	$H_1/H_0 = 0.940$	$t_2 = 60.0$ mins	$H_2/H_0 = 0.294$
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Testing: PC
Checked: TC
Approved:

Notes:

Project HAVANT THICKET WINTER STORAGE

Project No. A9031-19

Carried out for Portsmouth Water

Test
ATK-CP-13AT1

SOCOTEC

The graph displays the head ratio H_t/H_0 on a logarithmic scale against elapsed time t in minutes. The y-axis ranges from 0.10 to 1.00, and the x-axis ranges from 0 to 70 minutes. The data points, represented by blue diamonds, remain consistently at a head ratio of 1.00 throughout the 70-minute period, indicating no head loss.

Elapsed Time, t (mins)	Head Ratio, H_t/H_0
0	1.00
1	1.00
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
15	1.00
20	1.00
25	1.00
30	1.00
35	1.00
40	1.00
45	1.00
50	1.00
55	1.00
60	1.00

SOCOTEC

Head Ratio against Time

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
5	0.99
10	0.98
15	0.97
20	0.96
25	0.95
30	0.94
35	0.93
40	0.92
45	0.91
50	0.90
55	0.89
60	0.88

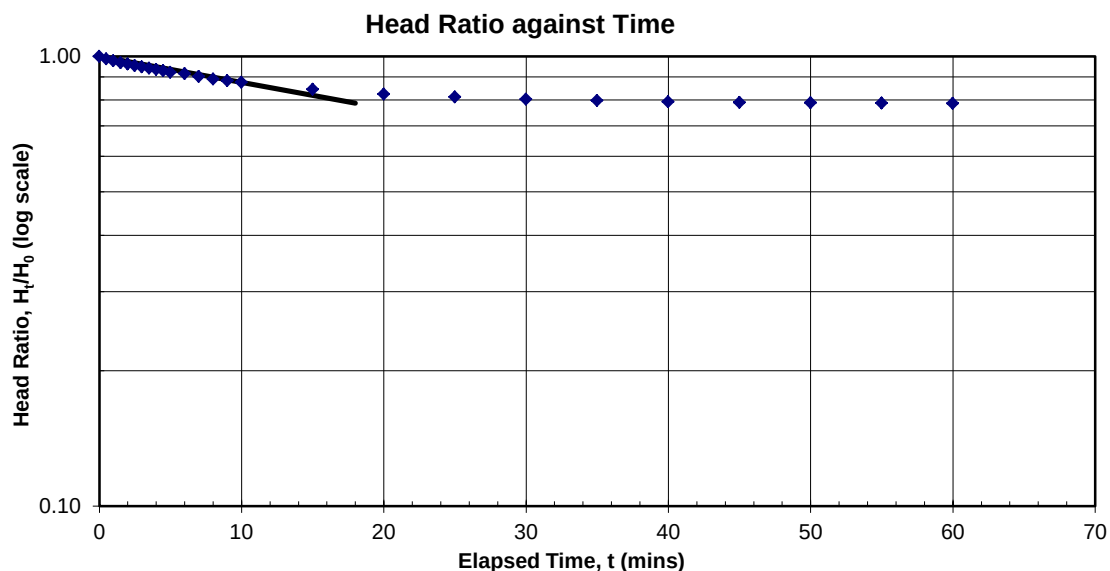
Head Ratio against Time

The graph displays the decay of the head ratio over time. The initial linear portion of the curve (from t=0 to approximately t=4 minutes) is highlighted with a black line, indicating a constant rate of decay on the logarithmic scale.

Elapsed Time, t (mins)	Head Ratio, H_t/H_0 (log scale)
0	1.00
0.5	0.70
1.0	0.50
1.5	0.40
2.0	0.35
2.5	0.30
3.0	0.28
3.5	0.28
4.0	0.28
4.5	0.28
5.0	0.25
6.0	0.25
7.0	0.25
8.0	0.20
9.0	0.20
10.0	0.15
15.0	0.10
20.0	0.05

Variable Head Permeability Test

LOCATION TYPE Standpipe TEST TYPE Falling Head DETAILS OF TEST ZONE: <table style="width: 100%;"> <tr> <td>Top of response zone</td> <td style="text-align: right;">35.50 m BGL</td> </tr> <tr> <td>Base of response zone</td> <td style="text-align: right;">36.50 m BGL</td> </tr> <tr> <td>Diameter of borehole (D)</td> <td style="text-align: right;">146 mm</td> </tr> <tr> <td>Height of tubing above ground level (datum)</td> <td style="text-align: right;">0.44 m</td> </tr> <tr> <td>Diameter of standpipe tubing</td> <td style="text-align: right;">25 mm</td> </tr> </table>	Top of response zone	35.50 m BGL	Base of response zone	36.50 m BGL	Diameter of borehole (D)	146 mm	Height of tubing above ground level (datum)	0.44 m	Diameter of standpipe tubing	25 mm	BOREHOLE No. ATK-RC-01 TEST NUMBER 1 DATE OF TEST 04-Feb-20 TEST ZONE CONDITIONS <table style="width: 100%;"> <tr> <td>Diameter of response zone (D)</td> <td style="text-align: right;">146 mm</td> </tr> <tr> <td>Length of response zone (L)</td> <td style="text-align: right;">1000 mm</td> </tr> <tr> <td>Standpipe piezometer</td> <td></td> </tr> <tr> <td>Shape factor (F) after Hvorslev (1951)</td> <td style="text-align: right;">2.71 m</td> </tr> </table>	Diameter of response zone (D)	146 mm	Length of response zone (L)	1000 mm	Standpipe piezometer		Shape factor (F) after Hvorslev (1951)	2.71 m																																																																																																										
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Testing: Checked:
Approved:

Notes:

Project

HAVANT THICKET WINTER STORAGE

Project No.

A9031-19

Carried out for

Portsmouth Water

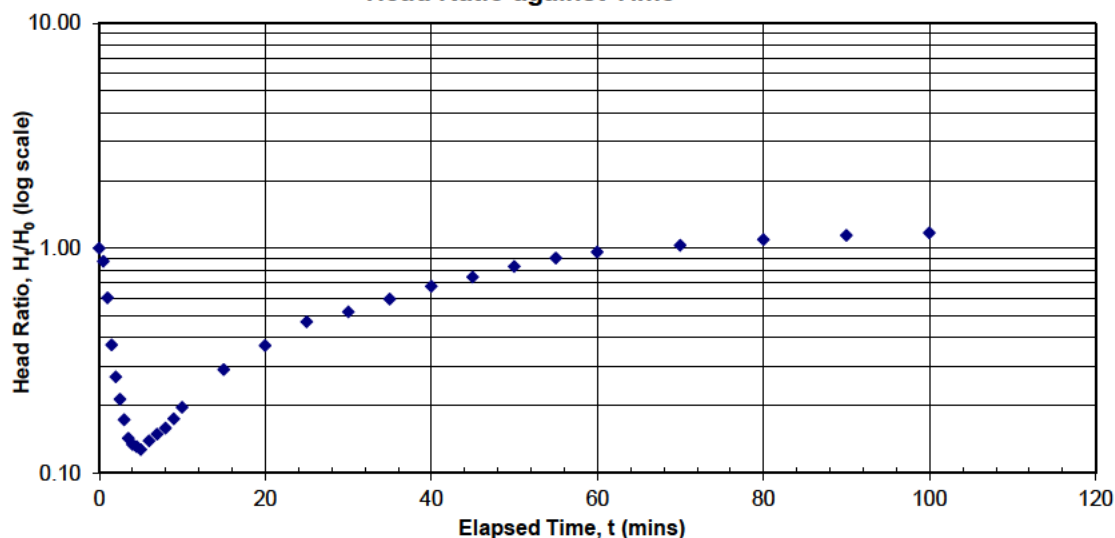
Test

ATK-RC-01T1

Variable Head Permeability Test

LOCATION TYPE Standpipe TEST TYPE Falling Head DETAILS OF TEST ZONE: Top of response zone 68.90 m BGL Base of response zone 72.00 m BGL Diameter of borehole (D) 150 mm Height of tubing above ground level (datum) 0.67 m Diameter of standpipe tubing 25 mm	BOREHOLE No. ATK-RC-02 TEST NUMBER 1 DATE OF TEST 30-Jan-20 TEST ZONE CONDITIONS Diameter of response zone (D) 150 mm Length of response zone (L) 3100 mm Standpipe piezometer Shape factor (F) after Hvorslev (1951) 5.96 m																																																																																																																												
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Head Ratio against Time



Testing: PC
Checked: PC
Approved:

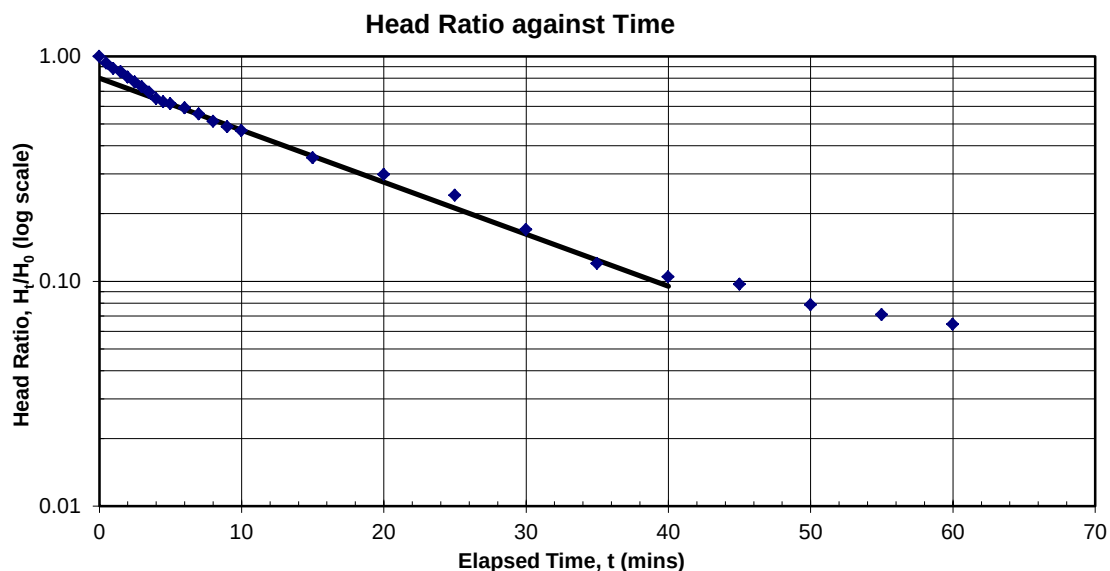
Notes:

Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

Test
ATK-RC-02T1

Variable Head Permeability Test

LOCATION TYPE Standpipe TEST TYPE Rising Head DETAILS OF TEST ZONE: <table style="width: 100%;"> <tr> <td>Top of response zone</td> <td style="text-align: right;">36.00 m BGL</td> </tr> <tr> <td>Base of response zone</td> <td style="text-align: right;">40.00 m BGL</td> </tr> <tr> <td>Diameter of borehole (D)</td> <td style="text-align: right;">150 mm</td> </tr> <tr> <td>Height of tubing above ground level (datum)</td> <td style="text-align: right;">0.74 m</td> </tr> <tr> <td>Diameter of standpipe tubing</td> <td style="text-align: right;">25 mm</td> </tr> </table>	Top of response zone	36.00 m BGL	Base of response zone	40.00 m BGL	Diameter of borehole (D)	150 mm	Height of tubing above ground level (datum)	0.74 m	Diameter of standpipe tubing	25 mm	BOREHOLE No. ATK-RC-02A TEST NUMBER 1 DATE OF TEST 30-Jan-20 TEST ZONE CONDITIONS <table style="width: 100%;"> <tr> <td>Diameter of response zone (D)</td> <td style="text-align: right;">150 mm</td> </tr> <tr> <td>Length of response zone (L)</td> <td style="text-align: right;">4000 mm</td> </tr> <tr> <td>Standpipe piezometer</td> <td></td> </tr> <tr> <td>Shape factor (F) after Hvorslev (1951)</td> <td style="text-align: right;">7.20 m</td> </tr> </table>	Diameter of response zone (D)	150 mm	Length of response zone (L)	4000 mm	Standpipe piezometer		Shape factor (F) after Hvorslev (1951)	7.20 m																																																																																																												
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Testing: PC
Checked: TC
Approved:

Notes:

Project HAVANT THICKET WINTER STORAGE

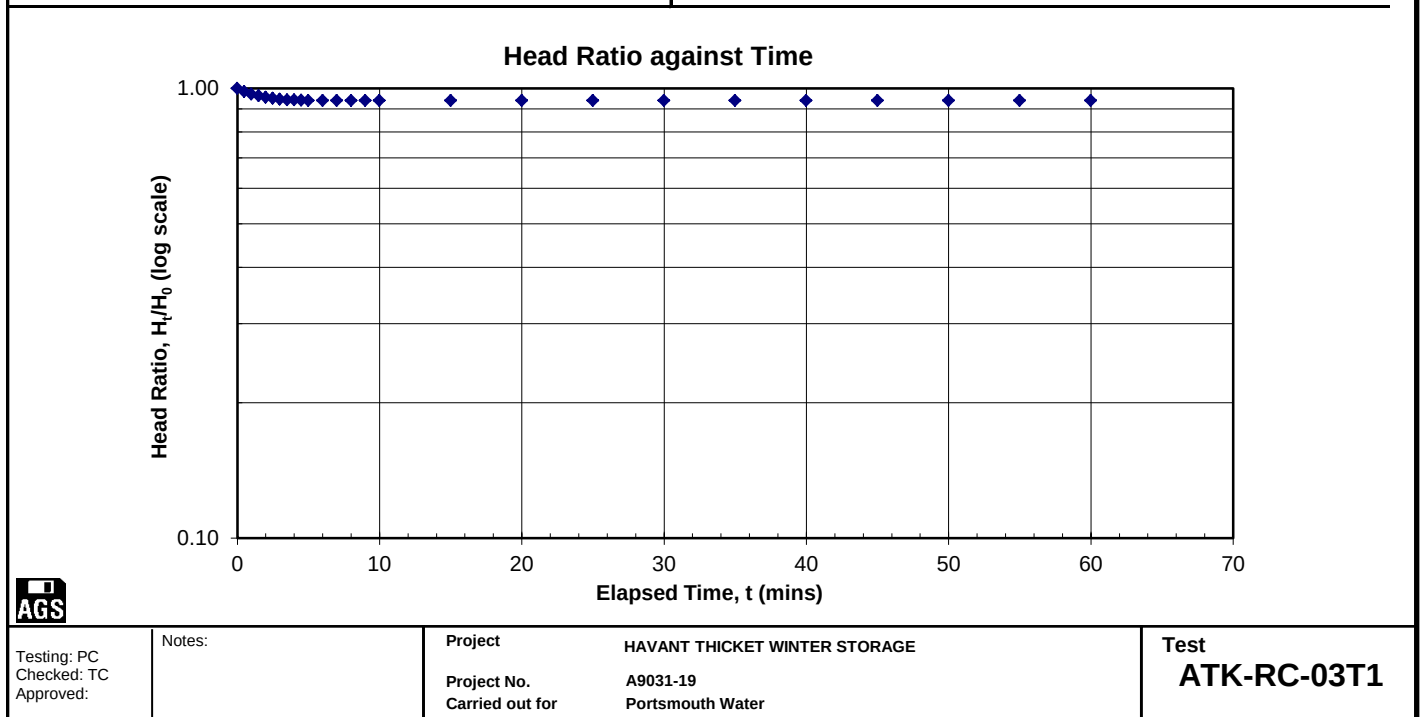
Project No. A9031-19

Carried out for Portsmouth Water

Test ATK-RC-02AT1

Variable Head Permeability Test

LOCATION TYPE Standpipe TEST TYPE Falling Head DETAILS OF TEST ZONE: <table style="width: 100%;"> <tr> <td>Top of response zone</td> <td style="text-align: right;">43.00 m BGL</td> </tr> <tr> <td>Base of response zone</td> <td style="text-align: right;">48.00 m BGL</td> </tr> <tr> <td>Diameter of borehole (D)</td> <td style="text-align: right;">150 mm</td> </tr> <tr> <td>Height of tubing above ground level (datum)</td> <td style="text-align: right;">0.75 m</td> </tr> <tr> <td>Diameter of standpipe tubing</td> <td style="text-align: right;">25 mm</td> </tr> </table>	Top of response zone	43.00 m BGL	Base of response zone	48.00 m BGL	Diameter of borehole (D)	150 mm	Height of tubing above ground level (datum)	0.75 m	Diameter of standpipe tubing	25 mm	BOREHOLE No. ATK-RC-03 TEST NUMBER 1 DATE OF TEST 30-Jan-20 TEST ZONE CONDITIONS <table style="width: 100%;"> <tr> <td>Diameter of response zone (D)</td> <td style="text-align: right;">150 mm</td> </tr> <tr> <td>Length of response zone (L)</td> <td style="text-align: right;">5000 mm</td> </tr> <tr> <td>Standpipe piezometer</td> <td></td> </tr> <tr> <td>Shape factor (F) after Hvorslev (1951)</td> <td style="text-align: right;">8.53 m</td> </tr> </table>	Diameter of response zone (D)	150 mm	Length of response zone (L)	5000 mm	Standpipe piezometer		Shape factor (F) after Hvorslev (1951)	8.53 m																																																																																																						
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APPENDIX D

INSTRUMENTATION AND MONITORING

Monitoring Installation Details

Table D1

Groundwater Monitoring

Table D2

VWP Calculation and Report Sheets, with VWP Calibration
Certificates

ATK-BH-01 (S), 346208

ATK-BH-01 (D), 346219

ATK-BH-02 (S), 346209

ATK-BH-02 (D), 346220

ATK-CP-11 (1), 346197

Groundwater Monitoring Installations Summary

Instrument Reference	Instrument Type (See Notes)	Installation Date, dd/mm/yyyy	Pipe Diameter, mm	Instrument Base, mbgl	Response Zone Range, mbgl	Pipe Top Details	Headworks	Remarks
ATK-BH-01 (S)	EPIE	10/12/2019	-	7.00	-	-	Raised cover	
ATK-BH-01 (D)	EPIE	10/12/2019	-	11.00	-	-		
ATK-BH-02 (S)	EPIE	16/12/2019	-	4.00	-	-	Raised cover	
ATK-BH-02 (D)	EPIE	16/12/2019	-	8.50	-	-		
ATK-CP-01 (1)	SPIE	12/11/2019	25	3.90	3.40 to 4.00	Cap	Raised cover	
ATK-CP-02 (1)	SPIE	14/11/2019	19	33.90	33.50 to 34.00	Cap	Raised cover	
ATK-CP-04 (1)	SPIE	19/11/2019	25	11.80	11.00 to 12.20	Cap	Raised cover	
ATK-CP-05 (1)	SPIE	21/11/2019	25	10.70	10.00 to 11.00	Cap	Raised cover	
ATK-CP-06 (1)	SP	04/12/2019	50	3.50	0.50 to 3.50	Cap	Raised cover	
ATK-CP-11 (1)	EPIE	17/12/2019	-	11.20	-	-	Raised cover	
ATK-CP-12 (1)	SPIE	20/11/2019	25	4.50	4.00 to 5.00	Cap	Raised cover	
ATK-CP-13A (1)	SPIE	25/11/2019	19	4.00	3.50 to 4.50	Cap	Raised cover	
ATK-CP-15 (1)	SPIE	04/12/2019	19	18.00	17.50 to 18.50	Cap	Raised cover	
ATK-CP-16 (1)	SP	18/12/2019	50	2.50	1.30 to 2.50	Cap	Raised cover	
ATK-RC-01 (1)	SPIE	10/12/2019	19	36.00	35.50 to 36.50	Cap	Raised cover	
ATK-RC-02 (1)	SPIE	11/12/2019	25	70.90	68.90 to 71.90	Cap	Embed cover	
ATK-RC-02A (1)	SPIE	18/12/2019	25	39.00	36.00 to 40.00	Cap	Raised cover	
ATK-RC-03 (1)	SPIE	18/12/2019	25	45.00	43.00 to 48.00	Cap	Raised cover	

Groundwater Monitoring

Instrument Reference	Instrument Type	Instrument Base, mbgl	Date dd/mm/yyyy	Time hh:mm:ss	Groundwater depth, mbgl	Groundwater level, mOD	Comments
ATK-CP-01 (1)	SPIE	3.90	03/12/2019	09:28:00	1.14	36.31	
			04/12/2019	11:15:00	1.15	36.30	
			09/12/2019	14:25:00	1.12	36.33	
			09/01/2020	13:20:00	0.98	36.47	
			14/01/2020	11:45:00	1.30	36.15	GW sample recovered
			28/01/2020	14:00:00	1.14	36.31	
			29/01/2020	10:14:00	2.45	35.00	GW sample recovered
			11/02/2020	16:32:00	1.31	36.14	GW sample recovered
ATK-CP-02 (1)	SPIE	33.90	20/11/2019	00:00:00	5.67	24.36	
			03/12/2019	09:00:00	5.95	24.08	
			04/12/2019	11:30:00	5.95	24.08	
			09/12/2019	13:30:00	4.60	25.43	
			11/12/2019	00:00:00	4.04	25.99	
			08/01/2020	14:55:00	0.05	29.98	
			14/01/2020	00:00:00	4.44	25.59	
			30/01/2020	10:02:00	4.63	25.40	
			12/02/2020	10:19:00	2.56	27.47	
ATK-CP-04 (1)	SPIE	11.80	03/12/2019	10:45:00	-0.20	25.10	Artesian
			04/12/2019	10:45:00	-0.18	25.08	Artesian
			09/12/2019	13:45:00	-0.20	25.10	Artesian
			08/01/2020	16:17:00	-0.23	25.13	Artesian
			09/01/2020	09:30:00	-0.20	25.10	Artesian
			14/01/2020	00:00:00	-0.38	25.28	Artesian
			28/01/2020	16:15:00	-0.48	25.38	Artesian
			29/01/2020	10:40:00	-0.48	25.38	Artesian
11/02/2020	11:05:00	-0.48	25.38	Artesian			
ATK-CP-05 (1)	SPIE	10.70	03/12/2019	10:30:00	2.24	25.67	
			04/12/2019	10:30:00	2.24	25.67	
			09/12/2019	13:55:00	2.13	25.78	
			09/01/2020	10:28:00	2.28	25.63	
			14/01/2020	10:15:00	2.20	25.71	GW sample recovered
			29/01/2020	11:30:00	2.20	25.71	GW sample recovered
			11/02/2020	13:32:00	2.18	25.73	GW sample recovered
ATK-CP-06 (1)	SP	3.50	11/12/2019	00:00:00	0.70	34.03	
			10/01/2020	08:50:00	0.70	34.03	
			14/01/2020	13:00:00	0.73	34.00	GW sample recovered
			30/01/2020	16:10:00	0.81	33.92	GW sample recovered
			11/02/2020	17:52:00	0.81	33.92	GW sample recovered
ATK-CP-12 (1)	SPIE	4.50	03/12/2019	09:50:00	-0.05	26.95	Artesian
			04/12/2019	09:50:00	0.00	26.90	
			09/12/2019	14:15:00	0.00	26.90	
			09/01/2020	11:49:00	0.05	26.85	
			14/01/2020	11:15:00	0.18	26.72	GW sample recovered
			28/01/2020	15:32:00	0.19	26.71	
			29/01/2020	16:45:00	0.16	26.74	GW sample recovered
			11/02/2020	15:15:00	0.19	26.71	GW sample recovered

Notes: Type: SP - Standpipe, SP E - Standpipe Piezometer, HP E - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Vibrating Wire Piezometer, PWEL - Pumping Well



ProjectHAVANT THICKET WINTER STORAGE
Project No.A9031-19
Carried out forPortsmouth Water

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Groundwater Monitoring

Instrument Reference	Instrument Type	Instrument Base, mbgl	Date Time dd/mm/yyyy hh:mm:ss	Groundwater depth, mbgl	Groundwater level, mOD	Comments
ATK-CP-13A (1)	SPIE	4.00	03/12/2019 10:10:00	-0.05	29.80	Artesian
			04/12/2019 10:10:00	0.54	29.21	
			09/12/2019 14:00:00	0.75	29.00	
			09/01/2020 11:12:00	0.50	29.25	
			14/01/2020 00:00:00	0.51	29.24	
			29/01/2020 13:00:00	0.54	29.21	
			12/02/2020 10:50:00	0.57	29.18	
ATK-CP-15 (1)	SPIE	18.00	09/01/2020 12:30:00	3.09	30.36	
			14/01/2020 00:00:00	3.02	30.43	
			30/01/2020 08:22:00	2.94	30.51	
			11/02/2020 11:57:00	2.97	30.48	
ATK-CP-16 (1)	SP	2.50	10/01/2020 10:30:00	0.22	37.48	
			14/01/2020 00:00:00	0.30	37.40	
			29/01/2020 14:30:00	0.37	37.33	
			11/02/2020 12:20:00	0.46	37.24	
ATK-RC-01 (1)	SPIE	36.00	11/12/2019 00:00:00	33.02	7.51	
			10/01/2020 09:50:00	27.00	13.53	
			14/01/2020 00:00:00	23.21	17.32	
			29/01/2020 15:30:00	25.50	15.03	
			04/02/2020 00:00:00	20.33	20.20	
			11/02/2020 12:31:00	7.23	33.30	
ATK-RC-02 (1)	SPIE	70.90	08/01/2020 13:27:00	22.10	17.77	
			09/01/2020 13:56:00	18.60	21.27	
			14/01/2020 00:00:00	19.46	20.41	
			30/01/2020 11:15:00	20.95	18.92	
			12/02/2020 09:50:00	22.36	17.51	
ATK-RC-02A (1)	SPIE	39.00	08/01/2020 12:55:00	1.52	38.33	
			14/01/2020 00:00:00	1.35	38.50	
			30/01/2020 11:30:00	1.11	38.74	
			12/02/2020 09:17:00	1.36	38.49	
ATK-RC-03 (1)	SPIE	45.00	09/01/2020 15:50:00	12.60	18.92	
			14/01/2020 00:00:00	12.82	18.70	
			30/01/2020 15:10:00	12.90	18.62	
			12/02/2020 14:35:00	6.55	24.97	

Notes: Type: SP - Standpipe, SP E - Standpipe Piezometer, HP E - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Vibrating Wire Piezometer, PWEL - Pumping Well



Project HAVANT THICKET WINTER STORAGE
Project No. A9031-19
Carried out for Portsmouth Water

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VWP CALCULATION AND REPORT SHEET



Contract No.:	Contract:	Carried out for:
A9031-19	HAVANT THICKET WINTER STORAGE RESERVOIR	Portsmouth Water

Borehole installation details

Instrument ref.	ATK-BH-01 (S)
Date installed.	10-Dec-19
Data logger ref.	

Ground level, mOD	25.73
Installation depth, mbgl	7.00

VWP details

Make	Geosense
Serial No	346208

Model	VWP-3200
Calibration Factor in kPa	0.059474595
	Linear (G) kPa/digit

Zero reading

Date	06-Dec-19
Time	09:51
Remark	

Period	Linear
	10071.9

Calibration

Gauge factor	Units
60.78303609	mH2O

Date / Time	Reading		Calculated pressure, mH2O	Groundwater depth, mbgl	Groundwater level, mOD
	Period	Linear			
Calibration zero		10089.1	-0.10		
In borehole		10042.2	0.18	6.82	18.91
After grouting		10019.4	0.32	6.68	19.05
28/01/2020		9082.7	6.01	0.99	24.74
11/02/2020 16:05		9084.2	6.00	1.00	24.73
11/02/2020 16:06		9084.8	6.00	1.00	24.73

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LOW PRESSURE VW PIEZOMETER LAE CALIBRATION

Model	VWP-3200	Cal date	28/10/2019	SN.	8233
Serial	346208	Baro	1014.0	Readout No.	2108
Works ID	G7 11 74	Temp °C	20	R/O Cal. date	03/06/2019

Applied pressure		Readings [digit]			Calculated Pressure		Error % fso	
psi	kPa	1st Cycle	2nd Cycle	avg.[digit]	lin.[kPa]	polyn.[kPa]	linear	polynomial
0.000	0.000	10071.9	10071.0	10071.4	0.15	0.00	0.09%	0.00%
5.004	34.500	9494.8	9493.8	9494.3	34.48	34.51	-0.01%	0.00%
10.007	69.000	8916.2	8915.4	8915.8	68.88	69.00	-0.07%	0.00%
15.011	103.500	8336.3	8335.5	8335.9	103.37	103.50	-0.07%	0.00%
20.015	138.000	7754.6	7754.1	7754.3	137.96	137.99	-0.02%	0.00%
25.018	172.500	7171.1	7170.7	7170.9	172.66	172.51	0.09%	0.00%

Calibration of Fluke Pressure Controller PPC4EX S/N: 8233 valid from 8th May 2019. Certificate of Calibration No 61189, Chamois
Metrology UKAS No 0822

CALIBRATION FACTORS

Linear factor (k)

kPa per digit
-0.059474595

psi per digit
-0.008626

mH ₂ O per digit
-0.006065

Polynomial factors

A
B
C

kPa
-1.38506E-07
-0.057086409

psi
-2.00878E-08
-0.008279

mH ₂ O
-1.4124E-08
-0.005821

Thermal factor (T)

kPa per °C
0.16084251

psi per °C
0.023327413

mH ₂ O per °C
0.016401

Note: Digits are Hz² x 10⁻³ units.

(please consult the User Manuals for conversion of alternative reading units)

Polynomial calculation [kPa] = A * (Reading)² + B * (Reading) + C + T * (Current Temp - Site Zero Temp)

C = -A*(Site Zero Reading²) - B*(Site Zero Reading)

Linear calc = k (kPa) * (Current Reading - Site Zero Reading) + T * (Current Temp - Site Zero Temp)

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VWP CALCULATION AND REPORT SHEET



Contract No.: A9031-19	Contract: HAVANT THICKET WINTER STORAGE RESERVOIR	Carried out for: Portsmouth Water
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Borehole installation details

Instrument ref.	ATK-BH-01 (D)
Date installed.	10-Dec-19
Data logger ref.	

Ground level, mOD	25.73
Installation depth, mbgl	11.00

VWP details

Make	Geosense
Serial No	346219

Model	VWP-3200
Calibration Factor in kPa	0.055092182
	Linear (G) kPa/digit

Zero reading

Date	06-Dec-19
Time	10:00
Remark	

Period	Linear
	9622.6

Calibration

Gauge factor	Units
56.30421	mH2O

Date / Time	Reading		Calculated pressure, mH2O	Groundwater depth, mbgl	Groundwater level, mOD
	Period	Linear			
Calibration zero		9650.5	-0.16		
In borehole		9595.3	0.15	10.85	14.88
After grouting		9526.0	0.54	10.46	15.27
28/01/2020		7914.0	9.62	1.38	24.35
11/02/2020 16:15		7905.7	9.67	1.33	24.40
11/02/2020 16:16		7904.5	9.67	1.33	24.40

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LOW PRESSURE VW PIEZOMETER LAE CALIBRATION

Model	VWP-3200	Cal date	28/10/2019	SN.	8233
Serial	346219	Baro	1014.0	Readout No.	2108
Works ID	G7 11 85	Temp °C	20	R/O Cal. date	03/06/2019

Applied pressure		Readings [digit]			Calculated Pressure		Error % fso	
psi	kPa	1st Cycle	2nd Cycle	avg.[digit]	lin.[kPa]	polyn.[kPa]	linear	polynomial
0.000	0.000	9622.6	9620.0	9621.3	0.27	0.00	0.16%	0.00%
5.004	34.500	9002.2	8999.9	9001.0	34.44	34.50	-0.03%	0.00%
10.007	69.000	8378.8	8376.6	8377.7	68.78	69.00	-0.13%	0.00%
15.011	103.500	7752.4	7750.8	7751.6	103.28	103.50	-0.13%	0.00%
20.015	138.000	7122.9	7121.5	7122.2	137.95	138.01	-0.03%	0.01%
25.018	172.500	6490.8	6489.8	6490.3	172.77	172.50	0.15%	0.00%

Calibration of Fluke Pressure Controller PPC4EX S/N: 8233 valid from 8th May 2019. Certificate of Calibration No 61189, Chamois
Metrology UKAS No 0822

CALIBRATION FACTORS

Linear factor (k)

kPa per digit
-0.055092182

psi per digit
-0.007990

mH ₂ O per digit
-0.005618

Polynomial factors

A
B
C

kPa
-2.07396E-07
-0.051750632

psi
-3.00791E-08
-0.007506

mH ₂ O
-2.1148E-08
-0.005277

Thermal factor (T)

kPa per °C
0.26021356

psi per °C
0.037739458

mH ₂ O per °C
0.026534

Note: Digits are Hz² x 10⁻³ units.

(please consult the User Manuals for conversion of alternative reading units)

Polynomial calculation [kPa] = A * (Reading)² + B * (Reading) + C + T * (Current Temp - Site Zero Temp)

C = -A*(Site Zero Reading²) - B*(Site Zero Reading)

Linear calc = k (kPa) * (Current Reading - Site Zero Reading) + T * (Current Temp - Site Zero Temp)

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VWP CALCULATION AND REPORT SHEET



Contract No.:	Contract:	Carried out for:
A9031-19	HAVANT THICKET WINTER STORAGE RESERVOIR	Portsmouth Water

Borehole installation details

Instrument ref.	ATK-BH-02 (S)
Date installed.	16-Dec-19
Data logger ref.	

Ground level, mOD	21.45
Installation depth, mbgl	4.50

VWP details

Make	Geosense
Serial No	346209

Model	VWP-3200
Calibration Factor in kPa	0.055535676
	Linear (G) kPa/digit

Zero reading

Date	06-Dec-19
Time	09:41
Remark	

Period	Linear
	10493.6

Calibration

Gauge factor	Units
56.75746087	mH2O

Date / Time	Reading		Calculated pressure, mH2O	Groundwater depth, mbgl	Groundwater level, mOD
	Period	Linear			
Calibration zero		10515.5	-0.12		
In borehole		10482.3	0.06	4.44	17.01
After grouting		9661.1	4.73	-0.23	21.68
28/01/2020		9708.0	4.46	0.04	21.41
11/02/2020 14:34		9715.7	4.42	0.08	21.37
11/02/2020 14:35		9716.9	4.41	0.09	21.36
11/02/2020 14:36		9716.9	4.41	0.09	21.36
11/02/2020 14:37		9716.9	4.41	0.09	21.36

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LOW PRESSURE VW PIEZOMETER LAE CALIBRATION

Model	VWP-3200	Cal date	28/10/2019	SN.	8233
Serial	346209	Baro	1014.0	Readout No.	2108
Works ID	G7 11 75	Temp °C	20	R/O Cal. date	03/06/2019

Applied pressure		Readings [digit]			Calculated Pressure		Error % fso	
psi	kPa	1st Cycle	2nd Cycle	avg.[digit]	lin.[kPa]	polyn.[kPa]	linear	polynomial
0.000	0.000	10494.1	10493.1	10493.6	0.20	0.00	0.11%	0.00%
5.004	34.500	9877.1	9875.8	9876.5	34.47	34.51	-0.02%	0.00%
10.007	69.000	9258.1	9256.9	9257.5	68.84	69.00	-0.09%	0.00%
15.011	103.500	8636.9	8635.9	8636.4	103.33	103.50	-0.10%	0.00%
20.015	138.000	8013.5	8012.6	8013.0	137.95	138.00	-0.03%	0.00%
25.018	172.500	7387.7	7386.9	7387.3	172.70	172.50	0.12%	0.00%

Calibration of Fluke Pressure Controller PPC4EX S/N: 8233 valid from 8th May 2019. Certificate of Calibration No 61189, Chamois
Metrology UKAS No 0822

CALIBRATION FACTORS

Linear factor (k)

kPa per digit
-0.055535676

psi per digit
-0.008054

mH ₂ O per digit
-0.005663

Polynomial factors

A
B
C

kPa
-1.55812E-07
-0.052749569

psi
-2.25979E-08
-0.007650

mH ₂ O
-1.5888E-08
-0.005379

Thermal factor (T)

kPa per °C
0.173058225

psi per °C
0.02509909

mH ₂ O per °C
0.017647

Note: Digits are Hz² x 10⁻³ units.

(please consult the User Manuals for conversion of alternative reading units)

Polynomial calculation [kPa] = A * (Reading)² + B * (Reading) + C + T * (Current Temp - Site Zero Temp)

C = -A*(Site Zero Reading²) - B*(Site Zero Reading)

Linear calc = k (kPa) * (Current Reading - Site Zero Reading) + T * (Current Temp - Site Zero Temp)

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VWP CALCULATION AND REPORT SHEET



Contract No.:	Contract:	Carried out for:
A9031-19	HAVANT THICKET WINTER STORAGE RESERVOIR	Portsmouth Water

Borehole installation details

Instrument ref.	ATK-BH-02 (D)
Date installed.	16-Dec-19
Data logger ref.	

Ground level, mOD	21.45
Installation depth, mbgl	8.50

VWP details

Make	Geosense
Serial No	346220

Model	VWP-3200
Calibration Factor in kPa	0.05022757
	Linear (G) kPa/digit

Zero reading

Date	06-Dec-19
Time	09:41
Remark	

Period	Linear
	10623.6

Calibration

Gauge factor	Units
51.33257654	mH2O

Date / Time	Reading		Calculated pressure, mH2O	Groundwater depth, mbgl	Groundwater level, mOD
	Period	Linear			
Calibration zero		10641.5	-0.09		
In borehole		10314.7	1.59	6.91	14.54
After grouting		10233.9	2.00	6.50	14.95
28/01/2020		8894.5	8.88	-0.38	21.83
11/02/2020 14:51		8864.9	9.03	-0.53	21.98
11/02/2020 14:52		8866.1	9.02	-0.52	21.97
11/02/2020 14:53		8864.9	9.03	-0.53	21.98

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LOW PRESSURE VW PIEZOMETER LAE CALIBRATION

Model	VWP-3200	Cal date	28/10/2019	SN.	8233
Serial	346220	Baro	1014.0	Readout No.	2108
Works ID	G7 11 86	Temp °C	20	R/O Cal. date	03/06/2019

Applied pressure		Readings [digit]			Calculated Pressure		Error % fso	
psi	kPa	1st Cycle	2nd Cycle	avg.[digit]	lin.[kPa]	polyn.[kPa]	linear	polynomial
0.000	0.000	10624.3	10622.8	10623.6	0.33	0.00	0.19%	0.00%
5.004	34.500	9945.4	9943.8	9944.6	34.44	34.50	-0.04%	0.00%
10.007	69.000	9262.6	9261.2	9261.9	68.72	68.99	-0.16%	-0.01%
15.011	103.500	8575.3	8574.2	8574.8	103.24	103.51	-0.15%	0.00%
20.015	138.000	7884.5	7883.6	7884.0	137.93	138.00	-0.04%	0.00%
25.018	172.500	7189.7	7188.9	7189.3	172.83	172.50	0.19%	0.00%

Calibration of Fluke Pressure Controller PPC4EX S/N: 8233 valid from 8th May 2019. Certificate of Calibration No 61189, Chamois
Metrology UKAS No 0822

CALIBRATION FACTORS

Linear factor (k)

kPa per digit
-0.05022757

psi per digit
-0.007285

mH ₂ O per digit
-0.005122

Polynomial factors

A
B
C

kPa
-2.11085E-07
-0.046467445

psi
-3.06142E-08
-0.006739

mH ₂ O
-2.1525E-08
-0.004738

Thermal factor (T)

kPa per °C
0.171598773

psi per °C
0.024887422

mH ₂ O per °C
0.017498

Note: Digits are Hz² x 10⁻³ units.

(please consult the User Manuals for conversion of alternative reading units)

Polynomial calculation [kPa] = A * (Reading)² + B * (Reading) + C + T * (Current Temp - Site Zero Temp)

C = -A*(Site Zero Reading)² - B*(Site Zero Reading)

Linear calc = k (kPa) * (Current Reading - Site Zero Reading) + T * (Current Temp - Site Zero Temp)

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VWP CALCULATION AND REPORT SHEET



Contract No.:	Contract:	Carried out for:
A9031-19	HAVANT THICKET WINTER STORAGE RESERVOIR	Portsmouth Water

Borehole installation details

Instrument ref.	ATK-CP-11 (1)
Date installed.	18-Dec-19
Data logger ref.	

Ground level, mOD	26.15
Installation depth, mbgl	11.00

VWP details

Make	Geosense
Serial No	346197

Model	VWP-3200
Calibration Factor in kPa	0.049154584
	Linear (G) kPa/digit

Zero reading

Date	16-Dec-19
Time	13:29
Remark	

Period	Linear
	9848.1

Calibration

Gauge factor	Units
50.23598485	mH2O

Date / Time	Reading		Calculated pressure, mH2O	Groundwater depth, mbgl	Groundwater level, mOD
	Period	Linear			
Calibration zero		9837.5	0.05		
In borehole		8873.0	4.90	6.10	20.05
After grouting		8861.4	4.96	6.04	20.11
28/01/2020		7628.4	11.15	-0.15	26.30
28/01/2020 15:23		7627.5	11.16	-0.16	26.31
28/01/2020 15:24		7627.0	11.16	-0.16	26.31
28/01/2020 15:25		7627.0	11.16	-0.16	26.31

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LOW PRESSURE VW PIEZOMETER LAE CALIBRATION

Model	VWP-3200	Cal date	28/10/2019	SN.	8233
Serial	346197	Baro	1014.0	Readout No.	2108
Works ID	G7 11 63	Temp °C	20	R/O Cal. date	03/06/2019

Applied pressure		Readings [digit]			Calculated Pressure		Error % fso	
psi	kPa	1st Cycle	2nd Cycle	avg.[digit]	lin.[kPa]	polyn.[kPa]	linear	polynomial
0.000	0.000	9850.1	9846.0	9848.1	0.31	0.00	0.18%	0.00%
5.004	34.500	9155.6	9151.5	9153.6	34.45	34.51	-0.03%	0.01%
10.007	69.000	8457.8	8454.0	8455.9	68.74	68.99	-0.15%	0.00%
15.011	103.500	7755.6	7752.6	7754.1	103.24	103.49	-0.15%	0.00%
20.015	138.000	7049.4	7046.8	7048.1	137.94	138.01	-0.03%	0.00%
25.018	172.500	6339.7	6337.7	6338.7	172.81	172.50	0.18%	0.00%

Calibration of Fluke Pressure Controller PPC4EX S/N: 8233 valid from 8th May 2019. Certificate of Calibration No 61189, Chamois
Metrology UKAS No 0822

CALIBRATION FACTORS

Linear factor (k)

kPa per digit
-0.049154584

psi per digit
-0.007129

mH ₂ O per digit
-0.005012

Polynomial factors

A
B
C

kPa
-1.91981E-07
-0.046046961

psi
-2.78435E-08
-0.006678

mH ₂ O
-1.9577E-08
-0.004695

Thermal factor (T)

kPa per °C
0.451714903

psi per °C
0.065513402

mH ₂ O per °C
0.046062

Note: Digits are Hz² x 10⁻³ units.

(please consult the User Manuals for conversion of alternative reading units)

Polynomial calculation [kPa] = A * (Reading)² + B * (Reading) + C + T * (Current Temp - Site Zero Temp)

C = -A*(Site Zero Reading²) - B*(Site Zero Reading)

Linear calc = k (kPa) * (Current Reading - Site Zero Reading) + T * (Current Temp - Site Zero Temp)

THIS CERTIFICATE IS VALID ONLY WHEN CARRYING THE
OFFICIAL ORIGINAL STAMP OF GEOSSENSE BELOW



APPENDIX E

GEOTECHNICAL LABORATORY TEST RESULTS

Index Properties – Summary of Results	INDX (6 sheets)
Particle Size Distribution Analyses	PSD (71 sheets)
Determination of Shrinkage Characteristics – Summary of Results	LINS (1 sheet)
Dry Density / Moisture Content Relationship (Light Compaction - 2.5 kg rammer)	COMPL (52 sheets)
Dry Density / Moisture Content Relationship (Heavy Compaction - 4.5 kg rammer)	COMPH (8 sheets)
Moisture Condition Value (MCV) Test	MCV (41 sheets)
Moisture Condition Value (MCV) / Moisture Content	MCVREL (60 sheets)
Shear Strength by Pilcon Hand method – Summary of Results	HV (13 sheets)
Unconsolidated Undrained Triaxial Compression Tests – Summary of Results	UUSUM (2 sheets)
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Determination of Dispersibility - Pinhole Method	24 Reports
Test Report – Chemical Tests	EFS/205161 to EFS/201167

INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample				Soil Description	ρ	ρ_d	W	< 425 μ m sieve	W_L	W_P	I_p	ρ_s	Remarks
	No.	Depth (m)		type										
		from	to			Mg/m3	%	%	%	%		Mg/m3		
ATK-BH-01	5	0.50	1.00	B	Brown slightly sandy slightly gravelly CLAY.			26.9*						
ATK-BH-01	6	1.00		UT	Brown slightly sandy CLAY			23.7*	100 n	69 a	31	38		
ATK-BH-01	8	1.50		UT	Brown slightly sandy CLAY			33.2*	100 n	73 a	33	40		
ATK-BH-01	10	2.00		UT	Brown slightly sandy CLAY			44.8*	100 n	72 a	27	45		
ATK-BH-01	16	3.50		UT	Brown slightly sandy CLAY			26.7*	100 n	76 a	30	46		
ATK-BH-01	18	4.10		UT	Brown slightly sandy CLAY			32.2*	100 n	75 a	30	45		
ATK-BH-01	20	4.70		UT	Brown slightly sandy CLAY			46.3*	100 s	77 a	31	46		
ATK-BH-01	22	5.30		UT	Brown slightly sandy CLAY			27.4*	100 n	65 a	30	35		
ATK-BH-01	24	5.90		UT	Dark brown slightly sandy CLAY			26.6*	100 n	70 a	30	40		
ATK-BH-01	26	6.50		UT	Brown slightly sandy CLAY			29.9*	100 n	69 a	26	43		
ATK-BH-01	27	7.00		UT	Brown slightly sandy CLAY			36.3*	100 n	71 a	28	43		
ATK-BH-02	3	0.50	0.80	B	Brown slightly sandy CLAY.			43.0*	99 n	72 a	33	39		
ATK-BH-02	5	1.20		UT	Grey brown slightly sandy slightly gravelly CLAY			27.5*	93 s	60 a	24	36		
ATK-BH-02	7	1.80		UT	Brown slightly gravelly slightly sandy CLAY			22.9*	88 s	69 a	26	43		
ATK-BH-02	8	2.30		UT	Light brown slightly sandy gravelly CLAY			22.8*	60 s	67 a	26	41		
ATK-BH-02	9	2.80		UT	Brown slightly sandy CLAY			31.4*	100 s	75 a	30	45		
ATK-BH-02	11	3.40		UT	Brown slightly sandy CLAY			33.5*	100 n	79 a	34	45		
ATK-BH-02	17	5.10		UT	Brown slightly sandy CLAY.			27.5*	100 n	73 a	28	45		
ATK-BH-02	19	5.70		UT	Dark grey slightly sandy CLAY			30.1*	100 n	68 a	32	36		
ATK-BH-02	21	6.20		UT	Dark grey slightly sandy CLAY			29.2*	100 n	73 a	29	44		
ATK-CP-01	3	0.50		D	Brown slightly sandy CLAY			24.3*	100 n	53 a	24	29		
ATK-CP-01	7	1.20	1.65	D	Brown very sandy very silty CLAY			27.3*	100 s	47 b	22	25		
ATK-CP-01	11	2.00		UT	Firm yellowish brown slightly sandy silty CLAY.			29.5*	100 n	50 a	23	27		
ATK-CP-01	12	2.50		D	Brown slightly gravelly very sandy silty CLAY.			27.9*						
ATK-CP-01	15	3.00		D	Brown very sandy silty CLAY			35.8*	100 n	51 a	28	23		
ATK-CP-01	19	4.00		UT	Stiff greyish brown slightly sandy silty CLAY.			23.6*	100 n	57 a	26	31		
ATK-CP-01	26	6.00		UT	Firm greyish brown slightly sandy silty CLAY			22.7*	100 n	53 a	25	28		
ATK-CP-01	34	8.00		UT	Stiff friable greyish brown slightly sandy silty CLAY.			22.6*	100 n	62 a	26	36		
ATK-CP-01	53	13.00		UT	Stiff thinly laminated greyish brown slightly sandy CLAY.			25.1*	100 n	67 a	27	40		
ATK-CP-01	65	16.00		UT	Very stiff thinly laminated greyish brown slightly sandy CLAY.			26.5*	100 n	79 a	32	47		
ATK-CP-02	15	4.50	5.00	D	Brown sandy CLAY			36.6*	100 n	39 a	21	18		

General notes:

All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : ρ bulk density, linear

W_L Liquid limit

W_P Plastic limit

<425 μ m preparation

ρ_s particle density

ρ_d dry density

a 4 point cone test

NP non - plastic

n from natural soil

-g = gas jar

w moisture content

b 1 point cone test

IP Plasticity Index

s sieved specimen

-p = small pycnometer

* test carried out to BS EN ISO 17892

h removed by hand

QA Ref
SLR 1
Rev 2.94
Mar 17



Project No A9031-19

Project Name HAVANT THICKET WATER STORAGE

Figure

INDX

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INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample				Soil Description	ρ	ρ_d	W	< 425 μ m sieve	W _L	W _P	I _p	ρ_s	Remarks
	No.	Depth (m)		type										
		from	to			Mg/m3	%	%	%	%	Mg/m3			
ATK-CP-02	16	5 00	5.45	D	Dark grey brown slightly sandy CLAY			27.6*	100 n	44 a	19	25		
ATK-CP-02	19	6 00	6.45	D	Dark grey brown slightly sandy CLAY			27.3*	100 n	46 a	19	27		
ATK-CP-02	22	7 00	7.45	UT	Soft brown slightly sandy silty CLAY			24.4*	100 n	47 a	23	24		
ATK-CP-02	29	9 00	9.45	UT	Stiff greyish brown slightly sandy silty CLAY.			23.6*	100 n	49 a	25	24		
ATK-CP-02	37	11.50	11 95	UT	Stiff friable greyish brown slightly sandy silty CLAY.			21.8*	100 n	46 a	22	24		
ATK-CP-02	47	14.50	14 95	UT	Firm brown laminated slightly sandy CLAY			24.8*	100 n	62 a	28	34		
ATK-CP-02	57	17.50	17 95	UT	Firm to stiff brownish grey slightly sandy CLAY.			26.7*	100 n	65 a	25	40		
ATK-CP-03	7	1 20		UT	Firm to stiff brown slightly sandy slightly gravelly CLAY.			28.8*	100 n	69 a	26	43		
ATK-CP-03	15	3 00	3.45	UT	Very stiff brown slightly sandy CLAY.			33.1*	100 n	75 a	32	43		
ATK-CP-03	22	5 00	5.45	UT	Firm greyish brown slightly sandy CLAY.			29.8*	100 n	71 a	28	43		
ATK-CP-03	30	7 00	7.45	UT	Firm brown slightly sandy CLAY.			30.1*	100 n	72 a	28	44		
ATK-CP-04	5	1 00		D	Brown mottled grey slightly sandy silty CLAY			41.2*	100 n	81 a	31	50		
ATK-CP-04	11	2 00		UT	Firm brown slightly sandy CLAY.			32.1*	100 n	73 a	29	44		
ATK-CP-04	13	2 50	3.00	B	Brown slightly sandy CLAY.			31.2*						
ATK-CP-04	19	4 00		UT	Firm laminated brown silty CLAY			29.3*	100 n	71 a	28	43		
ATK-CP-04	26	6 00		UT	Firm to stiff greyish brown slightly sandy silty CLAY.			25.4*	100 n	55 a	22	33		
ATK-CP-04	34	8 00		UT	Stiff laminated brown silty CLAY.			25.4*	100 n	68 a	31	37		
ATK-CP-04	42	10.00		UT	Firm to stiff greyish brown slightly sandy CLAY.			24.1*	100 n	60 a	24	36		
ATK-CP-05	5	1 00		D	Brown mottled grey slightly sandy silty CLAY			36.4*	100 n	80 a	31	49		
ATK-CP-05	11	2 00		UT	Firm to stiff greyish brown mottled orangish brown slightly sandy CLAY.			32.5*	100 n	72 a	30	42		
ATK-CP-05	19	4 00		UT	Stiff brown slightly sandy silty CLAY			27.9*	100 n	64 a	26	38		
ATK-CP-05	26	6 00		UT	Firm to stiff greyish brown slightly sandy silty CLAY.			22.6*	100 n	55 a	23	32		
ATK-CP-05	34	8 00		UT	Stiff brown slightly sandy silty CLAY			24.0*	100 n	63 a	26	37		
ATK-CP-05	45	11.50		UT	Very stiff reddish brown mottled grey slightly sandy CLAY.			14.3*	100 n	45 a	17	28		
ATK-CP-05	55	14.50		UT	Firm to stiff light brownish grey mottled reddish brown slightly sandy silty CLAY.			17.4*	100 n	52 a	21	31		
ATK-CP-05	65	17.50		UT	Very stiff reddish brown mottled grey slightly sandy CLAY.			14.9*	100 n	45 a	20	25		
ATK-CP-06	9	1 20	1.65	D	Grey reddish brown slightly sandy GRAVEL			6.2*		b	NP			
ATK-CP-06	15	3 00	3.45	D	Dark brown slightly gravelly slightly sandy CLAY			21.1*	87 s	38 b	17	21		
ATK-CP-06	20	4 00	4.45	UT	Firm red and grey mottled slightly sandy CLAY			26.0*	100 n	57 a	23	34		
ATK-CP-06	27	6 00	6.45	UT	Firm multicoloured slightly sandy CLAY.			19.8*	100 n	55 a	21	34		
ATK-CP-06	34	8 00	8.45	UT	Stiff multicoloured slightly sandy CLAY.			13.7*	100 n	46 a	17	29		

General notes:

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Key : ρ bulk density, linear

W_L Liquid limit

W_P Plastic limit

<425 μ m preparation

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ρ_d dry density

a 4 point cone test

NP non - plastic

n from natural soil

-g = gas jar

w moisture content

b 1 point cone test

IP Plasticity Index

s sieved specimen

-p = small pycnometer

* test carried out to BS EN ISO 17892

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HAVANT THICKET WATER STORAGE

Figure

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INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample				Soil Description	ρ	ρ_d	W	< 425 μ m sieve	W_L	W_P	I_p	ρ_s	Remarks
	No.	Depth (m)		type										
		from	to			Mg/m3	%	%	%	%	Mg/m3			
ATK-CP-06	41	10.00	10.45	UT	Firm to stiff reddish brown mottled grey slightly sandy CLAY.			19.1*	100 n	43 a	20	23		
ATK-CP-06	51	13.00	13.40	UT	Stiff reddish brown mottled grey slightly sandy CLAY.			15.8*	100 n	44 a	21	23		
ATK-CP-07	7	2.00	2.45	UT	Brown slightly sandy CLAY.			29.4*						
ATK-CP-07A	3	1.20	1.65	D	Reddish brown slightly sandy gravelly CLAY.			26.6*						
ATK-CP-07A	5	1.50	2.00	D	Light brown slightly sandy CLAY			43.2*	100 n	49 a	22	27		
ATK-CP-07A	12	3.50	4.00	D	Grey and reddish brown slightly sandy slightly gravelly CLAY.			19.5*						
ATK-CP-07A	13	4.00	4.45	UT	Very stiff reddish brown mottled grey slightly sandy CLAY.			19.3*	100 n	51 a	22	29		
ATK-CP-07A	21	6.00	6.40	UT	Very stiff reddish brown mottled grey slightly sandy CLAY.			11.6*	100 n	35 a	15	20		
ATK-CP-07A	22	6.40	6.40	D	Grey and reddish brown slightly sandy CLAY.			10.9*						
ATK-CP-07A	28	8.00	8.35	UT	Very stiff grey mottled reddish brown slightly sandy CLAY.			17.9*	100 n	57 a	22	35		
ATK-CP-07A	34	9.50	10.00	D	Reddish brown slightly sandy CLAY			21.1*	100 n	47 a	19	28		
ATK-CP-07A	35	10.00	10.35	UT	Very stiff reddish brown mottled grey and brown slightly sandy CLAY.			15.7*	100 n	51 a	20	31		
ATK-CP-08	9	2.20	2.65	UT	Firm brown slightly sandy silty CLAY.			25.5*	100 n	45 a	22	23		
ATK-CP-08	10	2.65		D	Red brown grey slightly sandy slightly gravelly CLAY			21.0*	91 s	50 a	22	28		
ATK-CP-08	15	4.20	4.65	UT	Very stiff reddish brown slightly sandy CLAY.			20.0*	100 n	58 a	24	34	2.79-p	
ATK-CP-08	26	7.65		D	Reddish grey slightly sandy CLAY			19.4*	100 n	54 a	24	30		
ATK-CP-09	4	0.80		D	Brown slightly gravelly sandy silty CLAY			34.1*	88 n	37 a	26	11		
ATK-CP-09	14	3.50		D	Grey reddish brown slightly sandy CLAY			19.2*	100 n	43 a	19	24		
ATK-CP-09	16	4.20	4.65	UT	Stiff reddish brown mottled grey slightly sandy CLAY.			19.9*	100 n	56 a	23	33		
ATK-CP-09	27	7.65		D	Reddish grey slightly sandy CLAY			21.4*	100 n	61 a	25	36		
ATK-CP-10	5	1.20	1.65	UT	Brown slightly sandy CLAY.			32.2*	100 n	63 a	28	35		
ATK-CP-10	12	3.00	3.45	UT	Stiff brown slightly sandy CLAY.			31.5*	100 n	74 a	29	45		
ATK-CP-10	18	4.50	5.00	D	Brown slightly sandy silty CLAY			28.1*	96 n	60 a	24	36		
ATK-CP-10	19	5.00	5.45	UT	Firm grey slightly sandy CLAY.			29.3*	100 n	78 a	31	47		
ATK-CP-10	26	7.00	7.45	UT	Very stiff thinly laminated dark brown slightly sandy CLAY.			23.5*	100 n	65 a	25	40		
ATK-CP-11	11	2.00		UT	Stiff light brown mottled grey slightly sandy CLAY.			30.3*	100 n	70 a	27	43		
ATK-CP-11	19	4.00		UT	Firm to stiff greyish brown slightly sandy CLAY			25.9*	100 n	76 a	32	44		
ATK-CP-11	27	6.00		UT	Firm laminated CLAY with silt on laminae.			29.4*	100 n	71 a	27	44		
ATK-CP-11	35	8.00		UT	Stiff greyish brown slightly sandy silty CLAY.			20.3*	100 n	57 a	23	34		
ATK-CP-11	43	10.00		UT	Very stiff thinly laminated greyish brown slightly sandy CLAY.			23.4*	100 n	63 a	30	33		
ATK-CP-12	5	1.20	1.65	D	Brown sandy CLAY.			26.7*						

General notes:

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Key : ρ bulk density, linear

W_L Liquid limit

W_P Plastic limit

<425 μ m preparation

ρ_s particle density

ρ_d dry density

a 4 point cone test

NP non - plastic

n from natural soil

-g = gas jar

w moisture content

b 1 point cone test

IP Plasticity Index

s sieved specimen

-p = small pycnometer

* test carried out to BS EN ISO 17892

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HAVANT THICKET WATER STORAGE

Figure

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Hole No.	Sample				Soil Description	ρ	ρ_d	W	< 425 μ m sieve	W_L	W_P	I_P	ρ_s	Remarks
	No.	Depth (m)		type										
		from	to			Mg/m3	%	%	%	%	Mg/m3			
ATK-CP-12	8	2 00	2.45	UT	Brown slightly sandy CLAY.			38.8*	100 n	61 a	25	36		
ATK-CP-12	11	3 00	3.45	D	Red brown slightly gravelly slightly sandy CLAY			28.8*	97 s	42 a	19	23		
ATK-CP-12	19	5 00	5.45	UT	Reddish brown mottled grey slightly gravelly CLAY.			16.6*	77 s	38 a	17	21		
ATK-CP-12	23	6 00	6.45	D	Reddish grey slightly sandy CLAY				100 s	44 b	17	27		
ATK-CP-12	24	6 00	6.50	B	Grey and reddish brown slightly sandy CLAY.			16.1*						
ATK-CP-13A	4	0 50	0.80	B	Brown slightly sandy CLAY.			34.8*						
ATK-CP-13A	6	1 20		D	Brown mottled grey sandy silty CLAY			44.0*	100 n	80 a	29	51		
ATK-CP-13A	14	3 00		D	Brown slightly gravelly very sandy very silty CLAY			35.4*	100 n	60 a	27	33		
ATK-CP-13A	19	4 00		UT	Firm multicoloured slightly sandy slightly gravelly CLAY.			20.2*	90 n	45 a	21	24		
ATK-CP-13A	27	6 00		UT	Soft reddish brown mottled grey slightly sandy CLAY becoming stiff towards base.			18.3*	92 n	47 a	18	29		
ATK-CP-13A	35	8 00		UT	Stiff reddish brown mottled grey slightly sandy CLAY.			16.8*	89 n	48 a	21	27		
ATK-CP-13A	43	10.00		UT	Very stiff reddish brown mottled grey slightly sandy CLAY.			17.7*	100 n	51 a	20	31		
ATK-CP-14	3	0 50	1.00	B	Brown slightly sandy CLAY.			13.4*						
ATK-CP-14	7	2 00	2.45	UT	Soft to firm brown slightly sandy CLAY.	1.89	1 35	40.4*						
ATK-CP-14	14	4 00	4.45	UT	Stiff greyish brown slightly sandy silty CLAY.	2.06	1 69	22.1*						
ATK-CP-14	17	5 00	5.40	D	Dark brown slightly gravelly sandy CLAY				62 s	48 b	20	28		
ATK-CP-15	4	0 50	0.80	B	Brown slightly sandy CLAY.			38.2*	100 n	73 a	27	46		
ATK-CP-15	7	1 20		UT	Firm brown slightly sandy slightly gravelly CLAY.			30.9*						
ATK-CP-15	14	3 00		UT	Firm to stiff brown slightly sandy CLAY.			31.2*	100 n	70 a	31	39		
ATK-CP-15	21	5 00		UT	Firm laminated greyish brown CLAY with silt on laminae.			30.1*	100 n	72 a	32	40		
ATK-CP-15	29	7 00		UT	Firm to stiff dark greyish brown silty CLAY.			29.9*	100 n	71 a	28	43		
ATK-CP-15	37	9 00		UT	Very stiff thinly laminated dark brown slightly sandy CLAY.			26.8*	100 n	73 a	27	46		
ATK-CP-15	48	12.00		UT	Very stiff thinly laminated dark brown slightly sandy CLAY.			25.8*	100 n	72 a	31	41		
ATK-CP-15	59	15.00		UT	Stiff thinly laminated dark brown slightly sandy CLAY.			24.5*	100 n	64 a	26	38		
ATK-CP-15	80	21.00		UT	Very stiff reddish brown slightly sandy CLAY.			10.4*	100 n	32 a	15	17		
ATK-CP-16	6	3 00		UT	Firm to stiff reddish brown mottled grey slightly sandy CLAY.			23.6*	100 n	56 a	22	34		
ATK-CP-16	21	7 00	7.45	UT	Very stiff reddish brown mottled grey slightly sandy CLAY.			18.1*	100 n	59 a	23	36		
ATK-CP-16	28	9 00	9.45	UT	Very stiff brown mottled grey slightly sandy CLAY.			18.3*	100 n	54 a	23	31		
ATK-RC-02	7	1 50		D	Brown slightly gravelly sandy CLAY.			20.2*	97 s	29 a	21	8		
ATK-RC-02	15	3 00		D	Brown silty SAND.			21.9*		b	NP			
ATK-RC-02	19	4 00		D	Brown sandy silty CLAY			24.2*	100 s	32 b	24	8		

General notes:

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Key : ρ bulk density, linear

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Figure

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	No.	Depth (m)		type										
		from	to			Mg/m3	%	%	%	%	Mg/m3			
ATK-RC-02	23	5.00		D	Brown sandy silty CLAY			26.5*	88 s	36 b	22	14		
ATK-RC-02	27	6.00		UT	Firm greyish brown slightly sandy silty CLAY.			24.0*	100 n	42 a	19	23		
ATK-TP-01	2	0.40		D	Brown slightly gravelly slightly sandy CLAY			37.9*	92 n	67 a	28	39		
ATK-TP-01	7	1.00		D	Brown slightly sandy silty CLAY			35.1*	100 n	77 a	33	44		
ATK-TP-01	11	2.80		D	Brown silty slightly sandy CLAY			32.4*	100 n	71 a	32	39		
ATK-TP-01	13	3.00		D	Brown sandy silty CLAY			27.8*	100 n	63 a	29	34		
ATK-TP-02	3	0.50	0.70	B	Brown slightly sandy CLAY			38.3*	100 n	70 a	29	41		
ATK-TP-02	5	1.20		D	Brown orangish slightly sandy CLAY			32.7*	100 n	68 a	29	39		
ATK-TP-02	7	2.20		D	Brown slightly sandy silty CLAY			31.7*	100 n	66 a	29	37		
ATK-TP-03	2	0.50		D	Brown slightly sandy silty CLAY			31.7*	100 n	63 a	22	41		
ATK-TP-03	5	0.90		D	Brown slightly sandy slightly gravelly CLAY			39.0*	96 n	68 a	27	41		
ATK-TP-03	8	1.60		D	Brown slightly sandy CLAY			26.9*	100 n	56 a	25	31		
ATK-TP-03	10	2.20		D	Brown slightly sandy silty CLAY			33.1*	100 n	73 a	30	43		
ATK-TP-03	12	3.10		D	Dark brown slightly sandy CLAY			23.5*	100 n	53 a	21	32		
ATK-TP-04	2	0.40		D	Brown slightly sandy CLAY.			34.5*	100 s	43 a	22	21		
ATK-TP-04	9	1.40		D	Brown slightly sandy CLAY			30.8*	100 s	60 a	23	37		
ATK-TP-04	11	2.00		D	Reddish brown slightly sandy CLAY			26.9*	100 n	59 a	24	35		
ATK-TP-04	13	3.00		D	Reddish brown slightly sandy CLAY			25.4*	100 n	50 a	22	28		
ATK-TP-05	2	0.50		D	Brown slightly clayey SAND.			26.6*		b	NP			
ATK-TP-05	5	1.00		D	Brown SAND.			24.9*		b	NP			
ATK-TP-06	4	0.30	0.80	B	Brown slightly sandy silty CLAY.			36.1*	98 n	53 a	26	27		
ATK-TP-06	7	0.90		D	Brown slightly sandy CLAY			36.4*	100 n	75 a	32	43		
ATK-TP-06	10	2.00		D	Brown slightly sandy CLAY			30.9*	99 s	70 b	26	44		
ATK-TP-06	12	3.00		D	Brown slightly sandy CLAY			27.5*	100 n	59 a	25	34		
ATK-TP-07	3	0.50		D	Greyish brown slightly sandy slightly gravelly CLAY.			21.0*	74 s	45 a	22	23		
ATK-TP-07	5	0.90		D	Orangish brown slightly sandy silty CLAY			36.1*	100 n	75 a	31	44		
ATK-TP-08	3	0.30		D	Brown orangish slightly gravelly slightly sandy CLAY			37.4*	99 n	77 a	33	44		
ATK-TP-08	7	0.90		D	Brown mottled grey slightly sandy gravelly CLAY			17.3*	50 s	57 b	24	33		
ATK-TP-08	10	1.50		D	Brown silty SAND.			27.6*		b	NP			
ATK-TPM-02	3	0.50		D	Light brown slightly sandy slightly gravelly CLAY			22.5*	99 n	53 a	21	32		
ATK-TPM-02	7	1.00		D	Brown slightly sandy slightly gravelly CLAY.			21.2*						

General notes:

All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : ρ bulk density, linear

W_L Liquid limit

W_P Plastic limit

<425 μ m preparation

ρ_s particle density

ρ_d dry density

a 4 point cone test

NP non - plastic

n from natural soil

-g = gas jar

w moisture content

b 1 point cone test

IP Plasticity Index

s sieved specimen

-p = small pycnometer

* test carried out to BS EN ISO 17892

QA Ref
SLR 1
Rev 2.94
Mar 17



Project No

A9031-19

Project Name

HAVANT THICKET WATER STORAGE

Figure

INDX

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INDEX PROPERTIES - SUMMARY OF RESULTS

[illegible]

General notes:

All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : ρ = bulk density, linear

w_l Liquid limit

WP Plastic limit

<425um preparation

ps particle density

pd dry density

a 4 point cone test

NP non - plastic

n from natural soil

 $-q = q_{\text{gas jar}}$

w moisture content

b 1 point cone test

IP Plasticity Index

s sieved specimen

-p = small pycnometer

* test carried out to BS EN ISO 17892

h removed by hand

QA Ref
SLR 1
Rev 2.94
Mar 17



Project No A9031-19

Project Name HAVANT THICKET WATER STORAGE

Figure

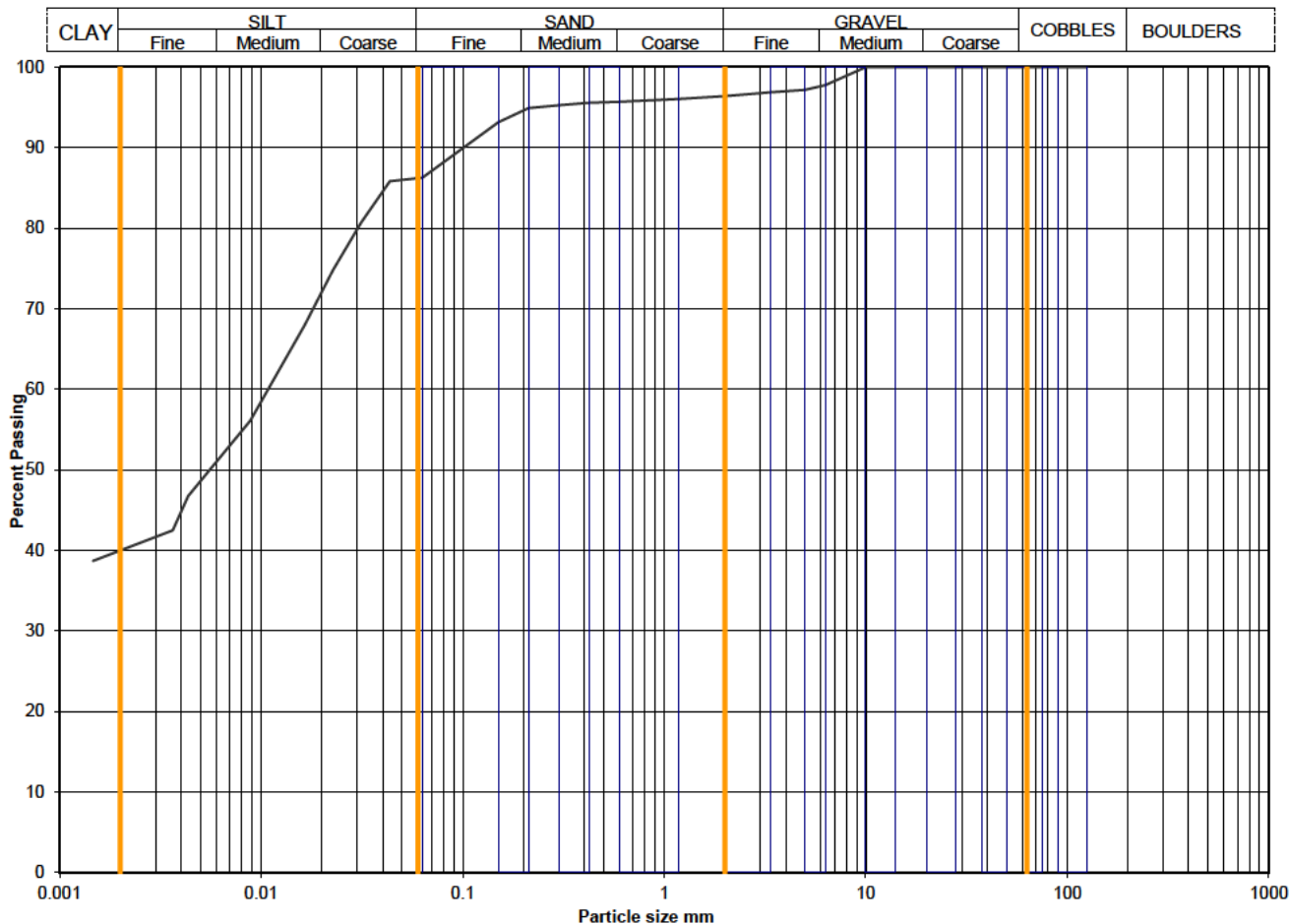
INDX

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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-BH-01
	A9031-1920191213100633	Sample Depth (m BGL)	0.50 - 1.00
		Sample Type and No	B5
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	86
90	100	0.0435	86
75	100	0.0314	81
63	100	0.0227	75
50	100	0.0164	68
37.5	100	0.0088	56
28	100	0.0043	47
20	100	0.0036	42
14	100	0.0015	39
10	100		
6.3	98		
5.0	97		
3.35	97		
2.00	96		
1.18	96		
0.600	96		
0.425	96		
0.300	95		
0.212	95		
0.150	93		
0.063	86		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.9

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	3.5	3.5
	Silt	10.2	10.2
	Clay	46.3	46.3
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2.9
Rev 2.21
Jul 17



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Project Name HAVANT THICKET WATER STORAGE

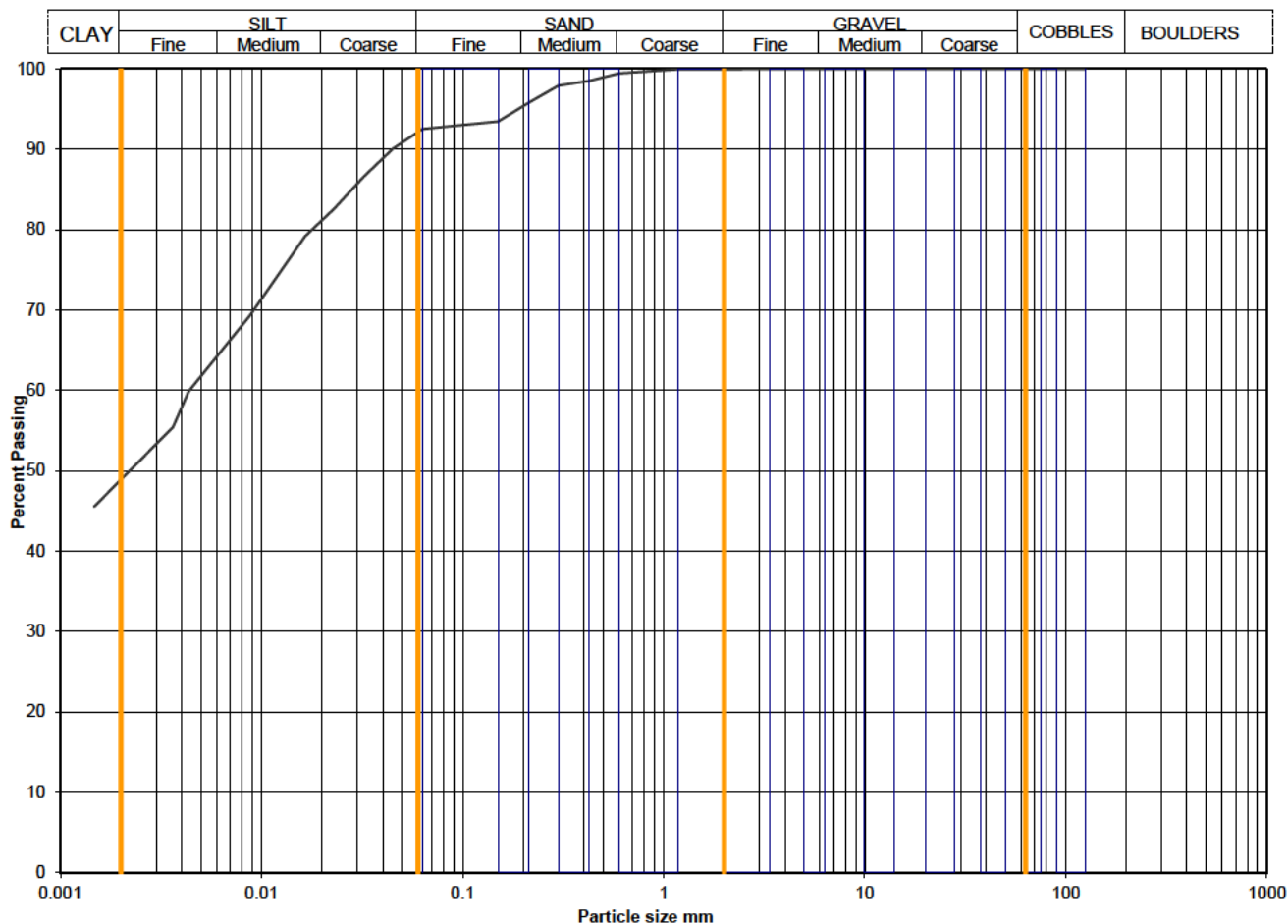
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-BH-02
	A9031-1920191218095028	Sample Depth (m BGL)	0.50 - 0.80
		Sample Type and No	B3
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	93
90	100	0.0449	90
75	100	0.0321	87
63	100	0.0230	83
50	100	0.0164	79
37.5	100	0.0087	69
28	100	0.0043	60
20	100	0.0036	55
14	100	0.0015	46
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	99	Particle density, Mg/m3	
0.425	99	2.65 assumed	
0.300	98	Dry mass of sample, kg	
0.212	96	0.3	
0.150	93		
0.063	93		

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.0	0.0
	Silt	7.5	7.5
	Clay	43.6	43.6
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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Project Name HAVANT THICKET WATER STORAGE

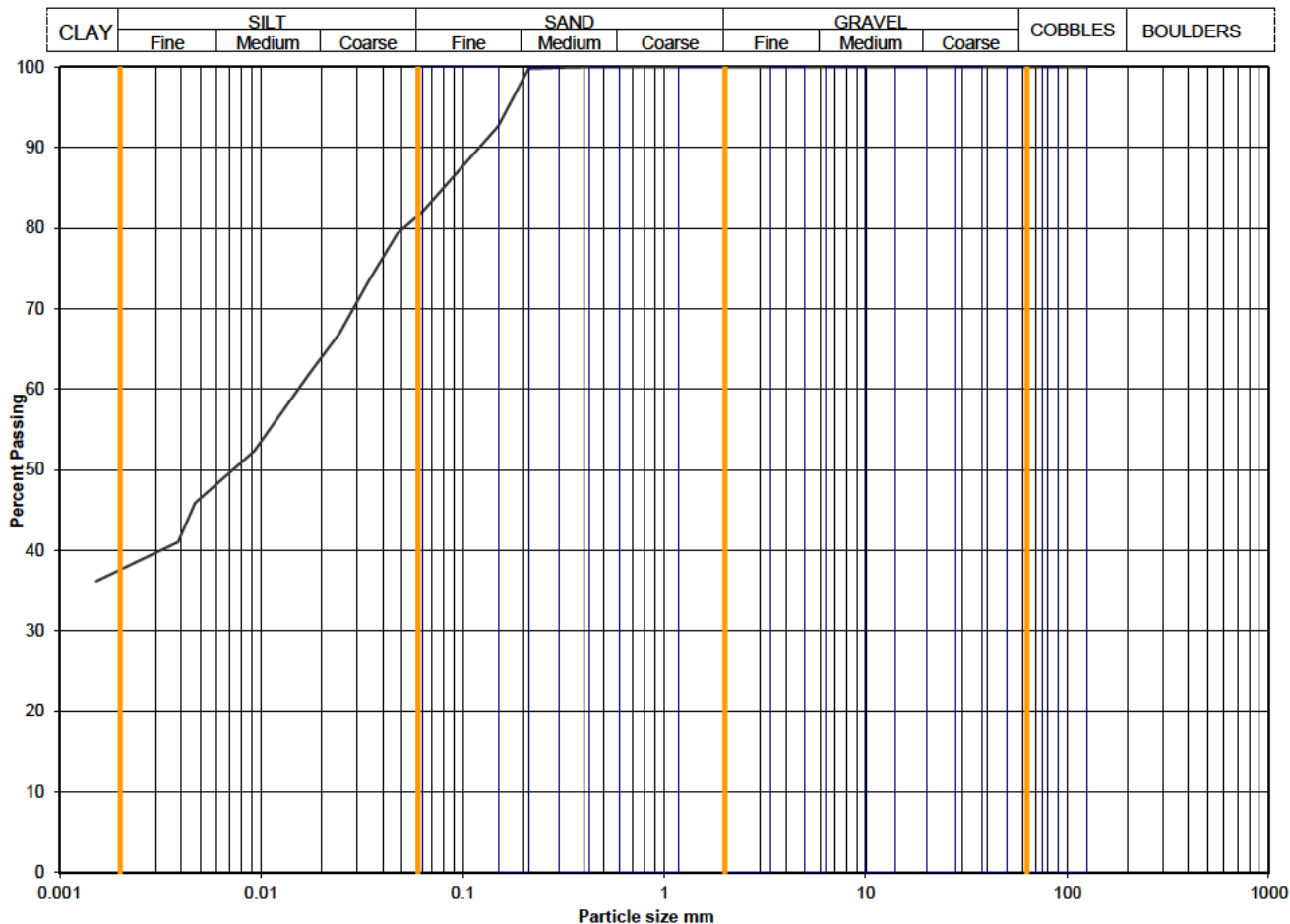
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-01
	A9031-19-20191107112613	Sample Depth (m BGL)	0.50 - 0.80
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	82
90	100	0.0474	79
75	100	0.0340	73
63	100	0.0245	67
50	100	0.0175	62
37.5	100	0.0093	52
28	100	0.0047	46
20	100	0.0039	41
14	100	0.0015	36
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	93		
0.063	82		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
12.8

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	18.0	18.0
	Silt	44.4	44.4
	Clay	37.6	37.6

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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Project Name HAVANT THICKET WATER STORAGE

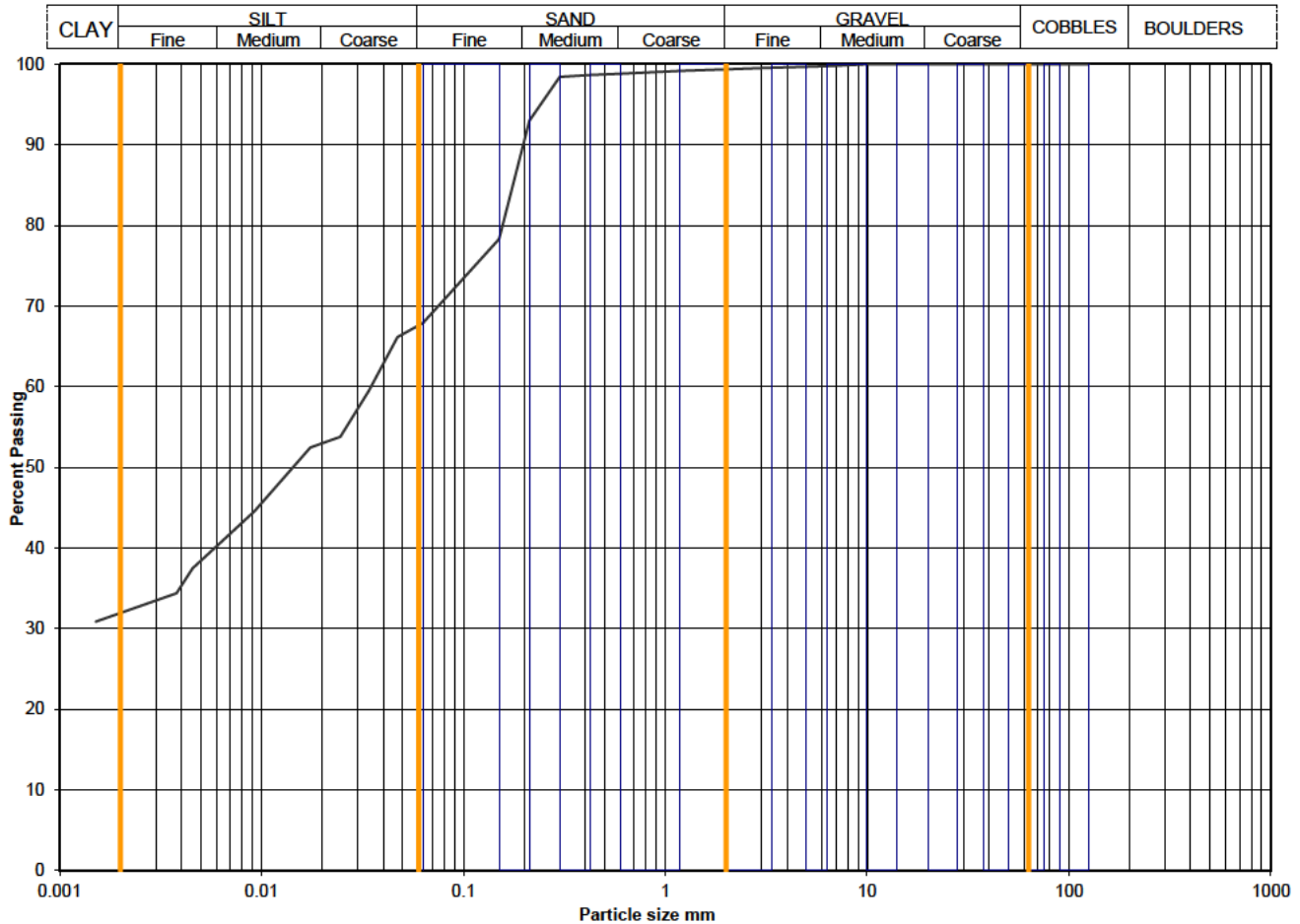
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-01
	A9031-1920191112122811	Sample Depth (m BGL)	1.20 - 1.70
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	68
90	100	0.0472	66
75	100	0.0341	60
63	100	0.0245	54
50	100	0.0174	52
37.5	100	0.0092	45
28	100	0.0045	37
20	100	0.0038	34
14	100	0.0015	31
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	99		
1.18	99		
0.600	99	Particle density, Mg/m3	
0.425	99	2.65	assumed
0.300	98		
0.212	93	Dry mass of sample, kg	
0.150	78	13.0	
0.063	68		

Soil description	Brown slightly sandy slightly gravelly silty CLAY with rootlets.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.6	0.6
	Silt	31.5	31.5
	Clay	36.0	36.0
*<60mm values to aid description only		31.9	31.9

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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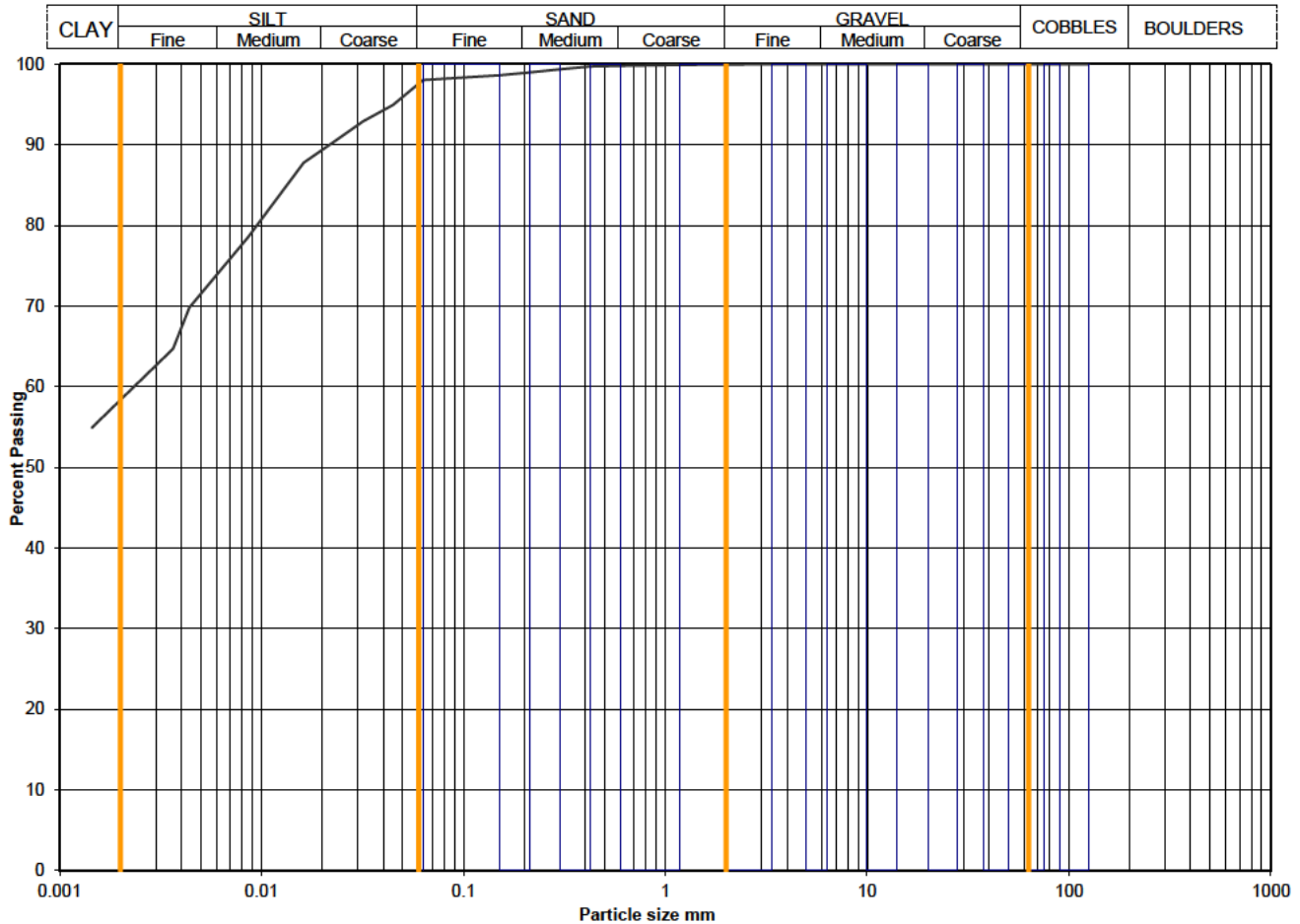
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-01
	A9031-1920191112122901	Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B13
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	98
90	100	0.0447	95
75	100	0.0318	93
63	100	0.0227	90
50	100	0.0162	88
37.5	100	0.0086	79
28	100	0.0044	70
20	100	0.0036	65
14	100	0.0014	55
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	99		
0.212	99		
0.150	99		
0.063	98		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.4

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.0	0.0
	Silt	1.9	1.9
	Clay	39.7	39.7
*<60mm values to aid description only		58.4	58.4

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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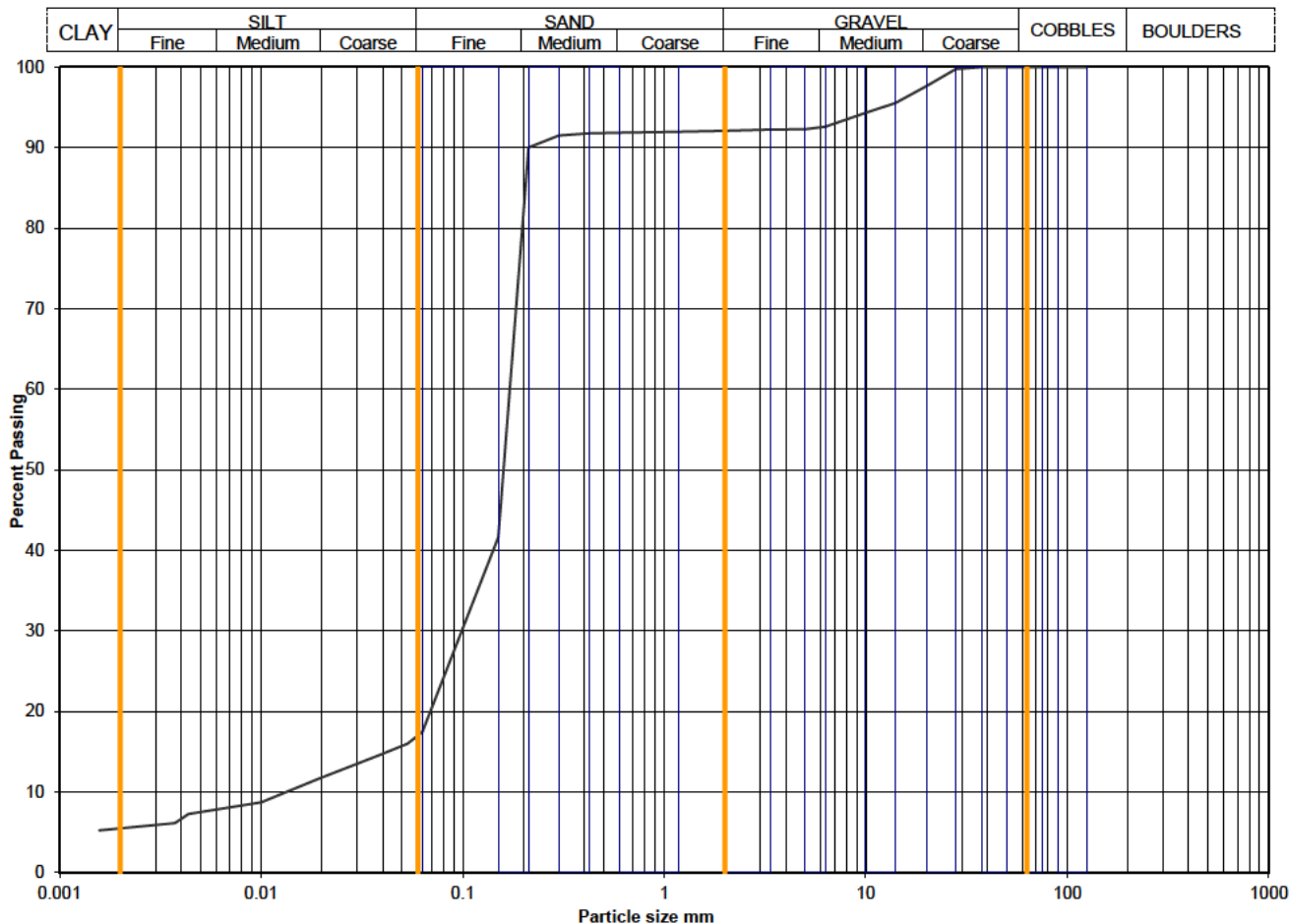
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-02
	A9031-19-20191108103105	Sample Depth (m BGL)	0.40 - 1.00
		Sample Type and No	B3
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	17
90	100	0.0533	16
75	100	0.0379	15
63	100	0.0269	13
50	100	0.0192	12
37.5	100	0.0100	9
28	100	0.0044	7
20	98	0.0037	6
14	96	0.0016	5
10	94		
6.3	93		
5.0	92		
3.35	92		
2.00	92		
1.18	92		
0.600	92	Particle density, Mg/m3	
0.425	92	2.65	assumed
0.300	92		
0.212	90	Dry mass of sample, kg	
0.150	42	15.8	
0.063	17		

Soil description	Brown gravelly silty SAND.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	7.9	7.9
	Silt	74.7	74.7
	Clay	11.9	11.9
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	13
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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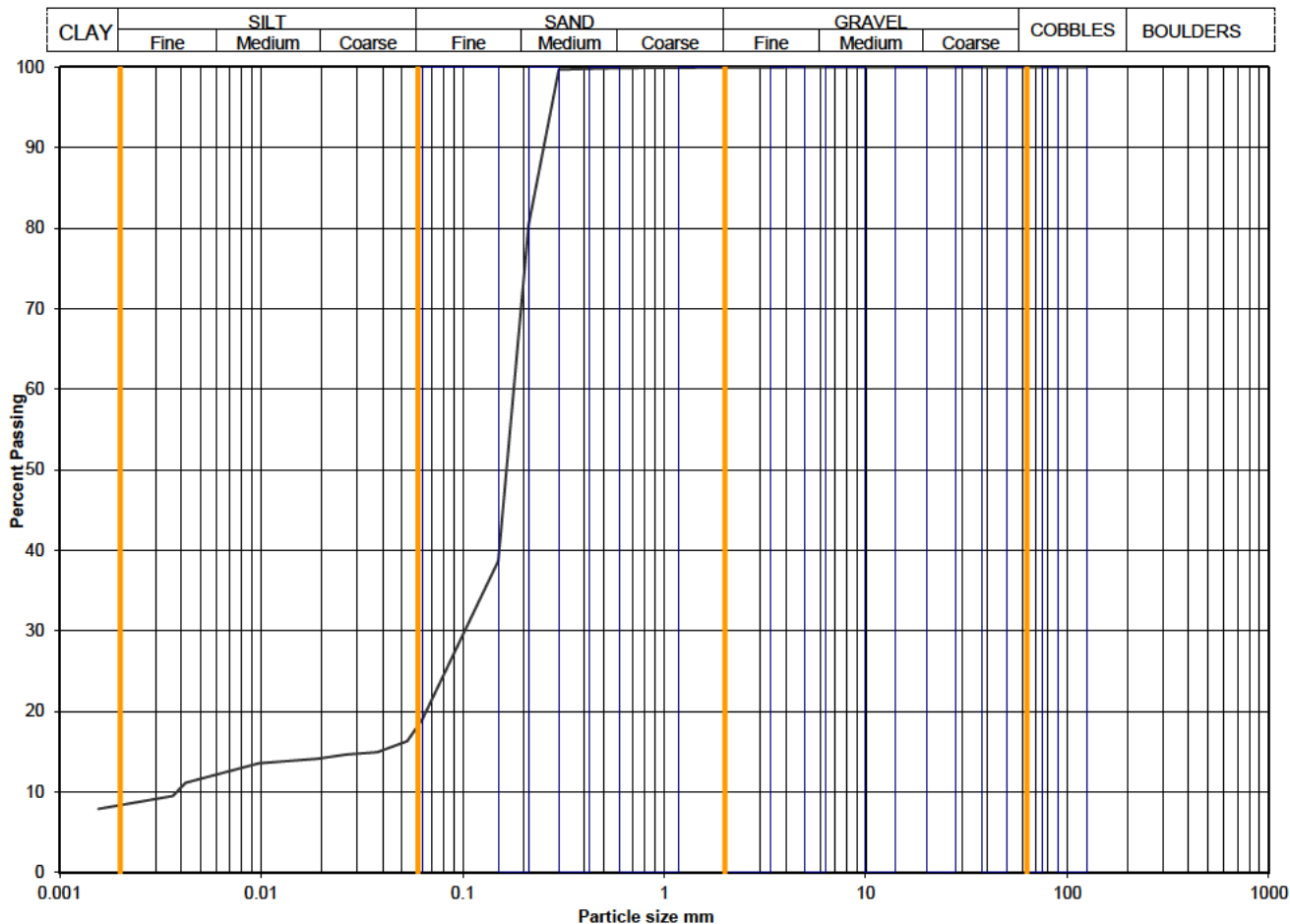
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-02
	A9031-1920191112124237	Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	19
90	100	0.0530	16
75	100	0.0377	15
63	100	0.0267	15
50	100	0.0189	14
37.5	100	0.0098	14
28	100	0.0042	11
20	100	0.0036	9
14	100	0.0016	8
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65 assumed	
0.300	100	Dry mass of sample, kg	
0.212	80	15.0	
0.150	39		
0.063	19		

Soil description	Brown clayey SAND.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	81.1	81.1
	Silt	10.6	10.6
	Clay	8.3	8.3

*<60mm values to aid description only

Uniformity Coefficient	D60 / D10	47
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.21
Jul 17



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Project Name HAVANT THICKET WATER STORAGE

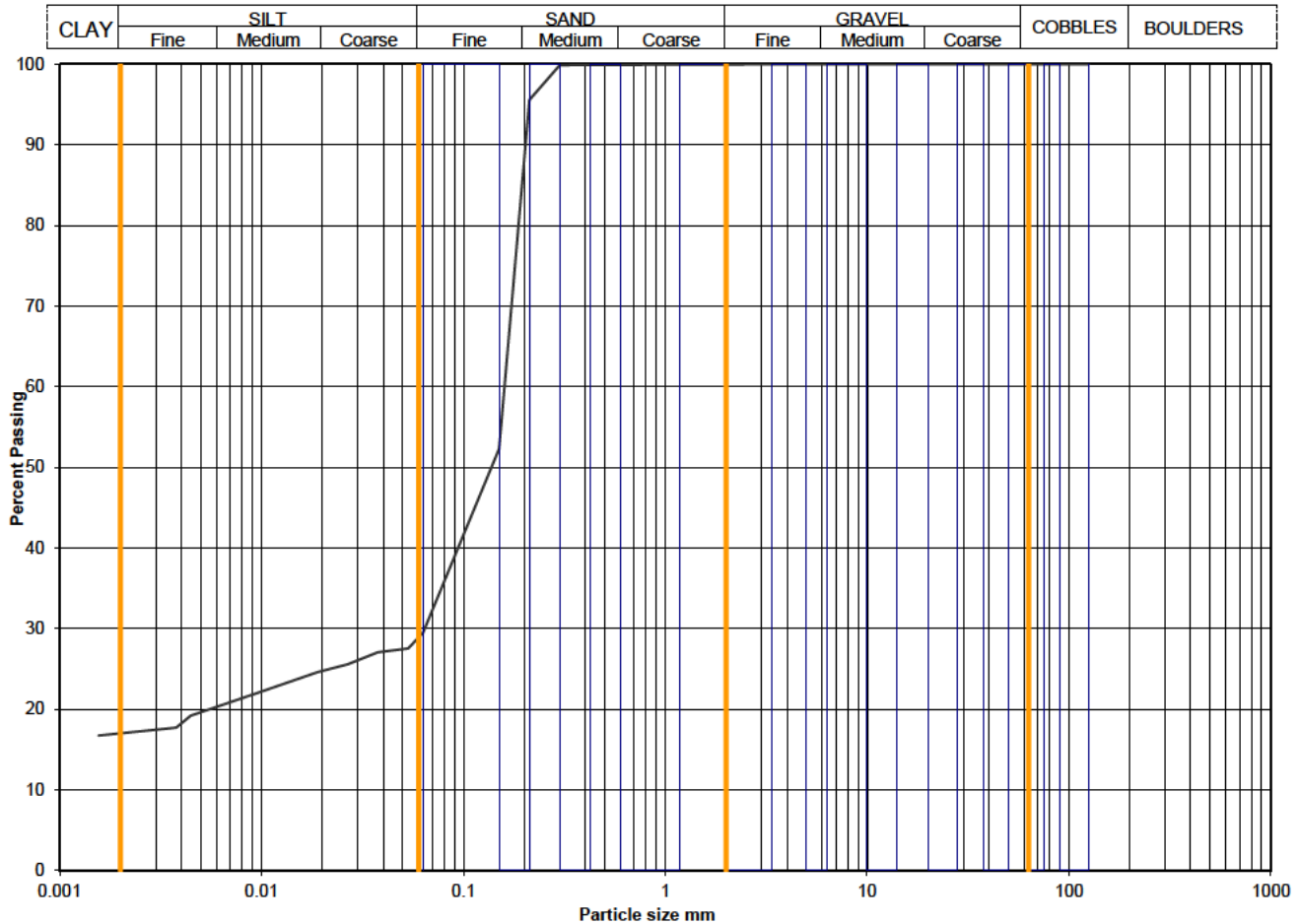
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-02
	A9031-1920191112124251	Sample Depth (m BGL)	3.00 - 3.50
		Sample Type and No	B11
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	29
90	100	0.0532	28
75	100	0.0377	27
63	100	0.0267	26
50	100	0.0189	25
37.5	100	0.0098	22
28	100	0.0045	19
20	100	0.0038	18
14	100	0.0016	17
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	96		
0.150	52		
0.063	29		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
16.7

Soil description	Brown silty SAND.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	70.5	70.5
	Silt	12.5	12.5
	Clay	17.0	17.0

Uniformity Coefficient	D60 / D10	Not applicable
------------------------	-----------	----------------

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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Rev 2.21
Jul 17



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Project Name HAVANT THICKET WATER STORAGE

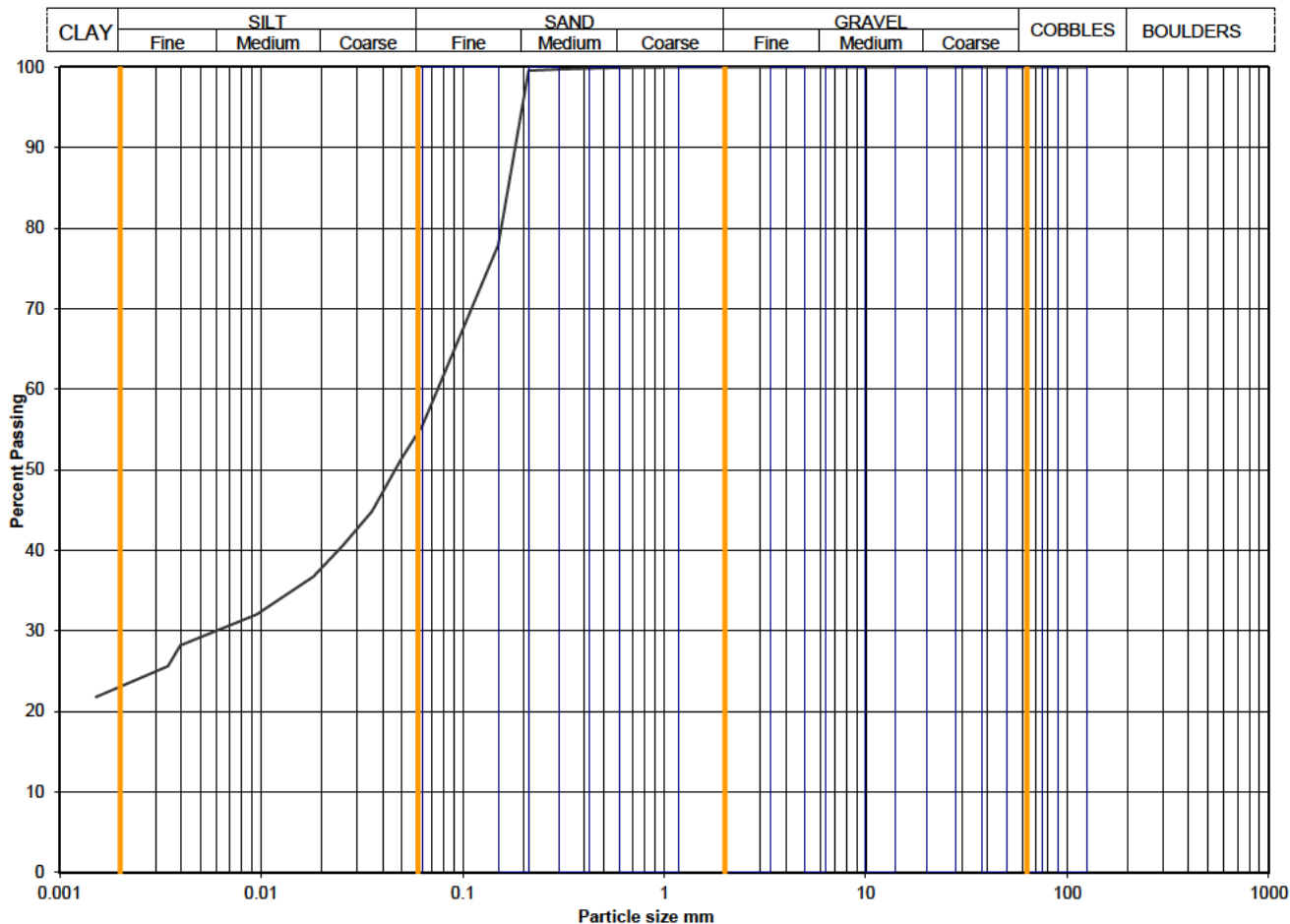
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-02
	A9031-1920191112124310	Sample Depth (m BGL)	4.00 - 4.50
		Sample Type and No	B14
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	55
90	100	0.0492	51
75	100	0.0355	45
63	100	0.0254	41
50	100	0.0182	37
37.5	100	0.0095	32
28	100	0.0040	28
20	100	0.0034	26
14	100	0.0015	22
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	78		
0.063	55		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
13.1

Soil description	Grey and brown sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	44.5	44.5
	Silt	32.4	32.4
	Clay	23.1	23.1

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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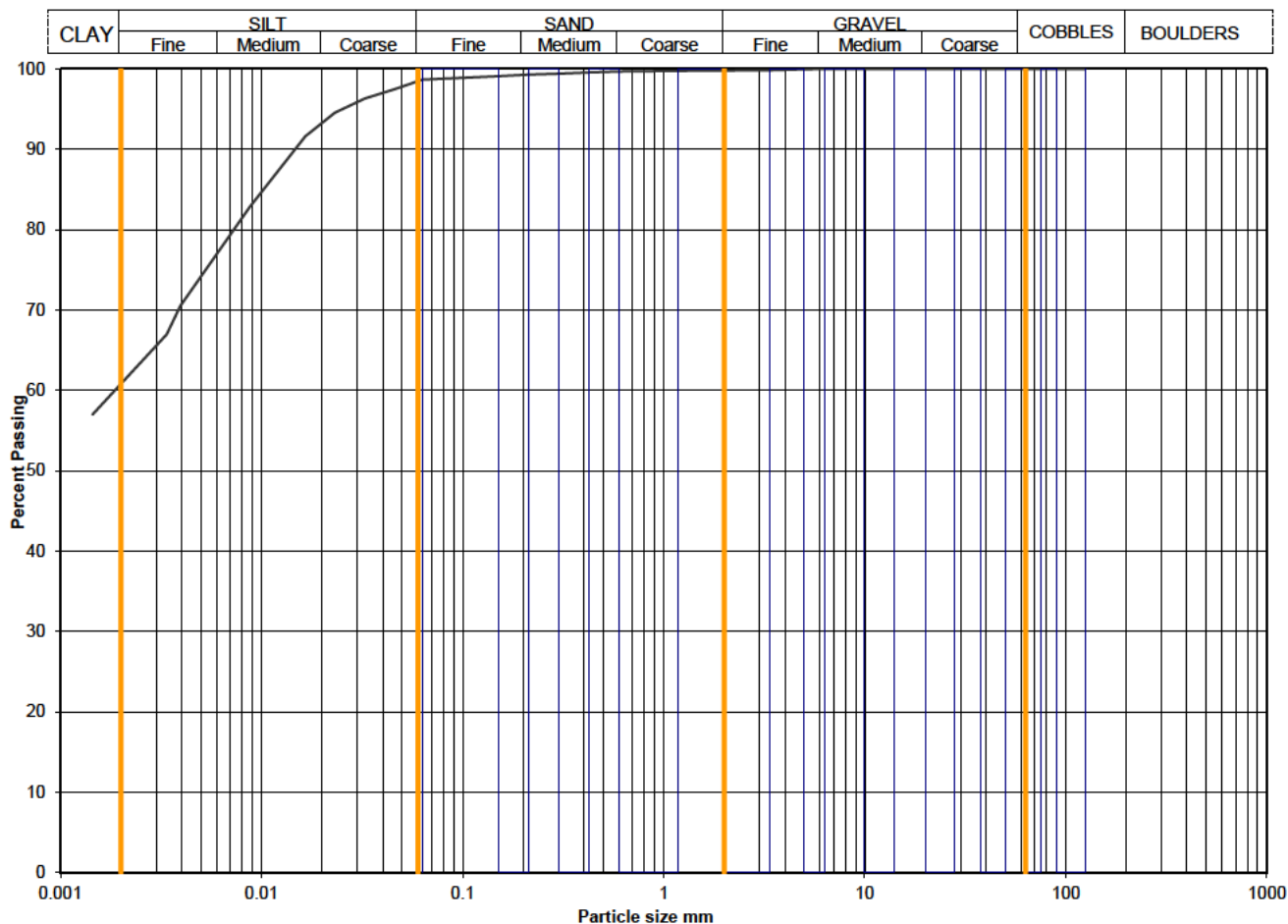
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-03
	A9031-1920191212034428	Sample Depth (m BGL)	2.00 - 2.50
		Sample Type and No	B12
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	99
90	100	0.0461	98
75	100	0.0327	96
63	100	0.0232	95
50	100	0.0165	92
37.5	100	0.0087	83
28	100	0.0039	70
20	100	0.0034	67
14	100	0.0014	57
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	99		
0.212	99		
0.150	99		
0.063	99		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.3

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.2	0.2
	Silt	1.1	1.1
	Clay	37.9	37.9
*<60mm values to aid description only		60.8	60.8

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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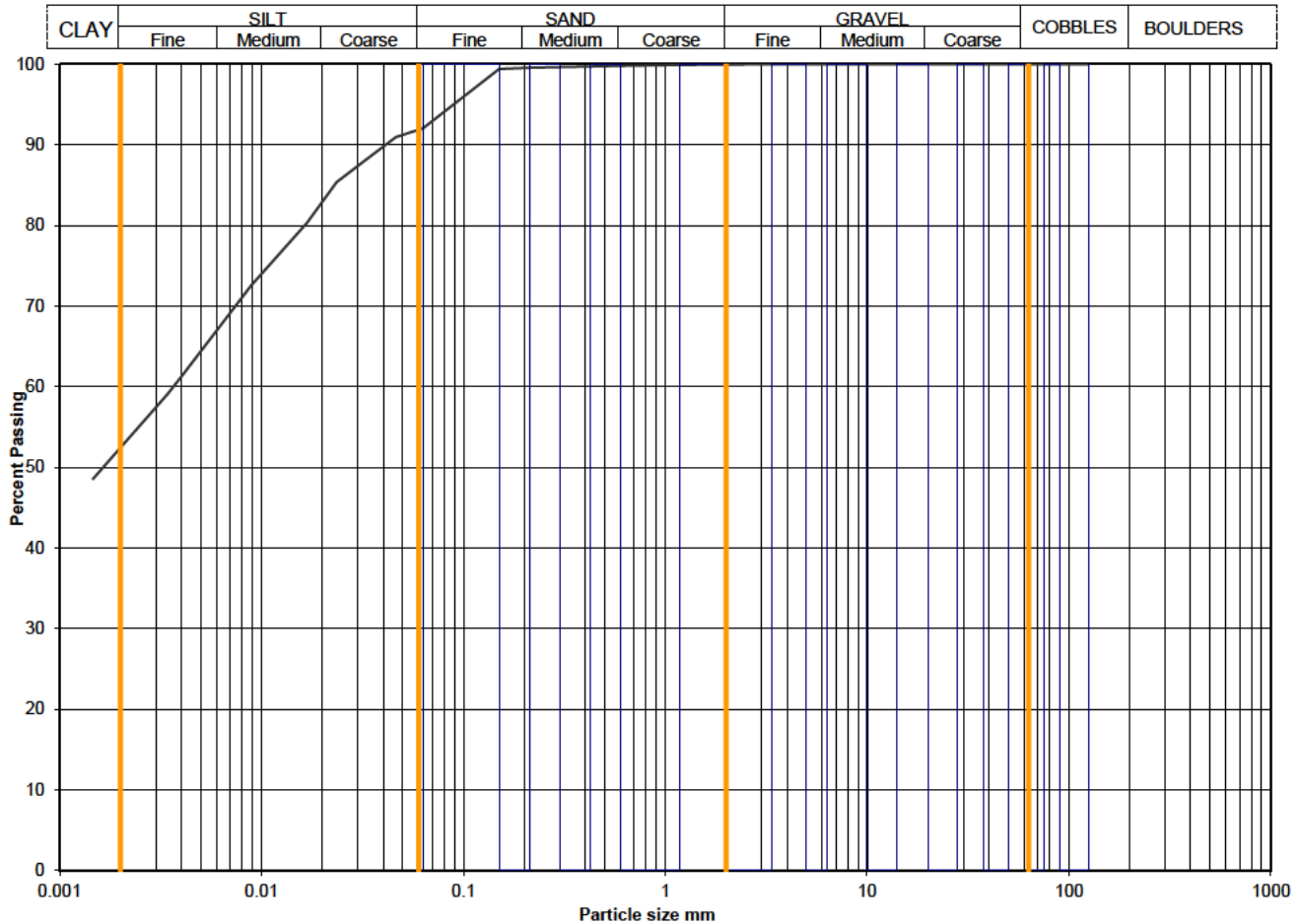
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-04
	A9031-1920191118090121	Sample Depth (m BGL)	1.20 - 1.70
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	92
90	100	0.0463	91
75	100	0.0330	88
63	100	0.0235	85
50	100	0.0168	80
37.5	100	0.0089	73
28	100	0.0040	61
20	100	0.0034	59
14	100	0.0015	49
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	99		
0.063	92		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.5

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	8.0	8.0
	Silt	39.6	39.6
	Clay	52.4	52.4

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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Project Name HAVANT THICKET WATER STORAGE

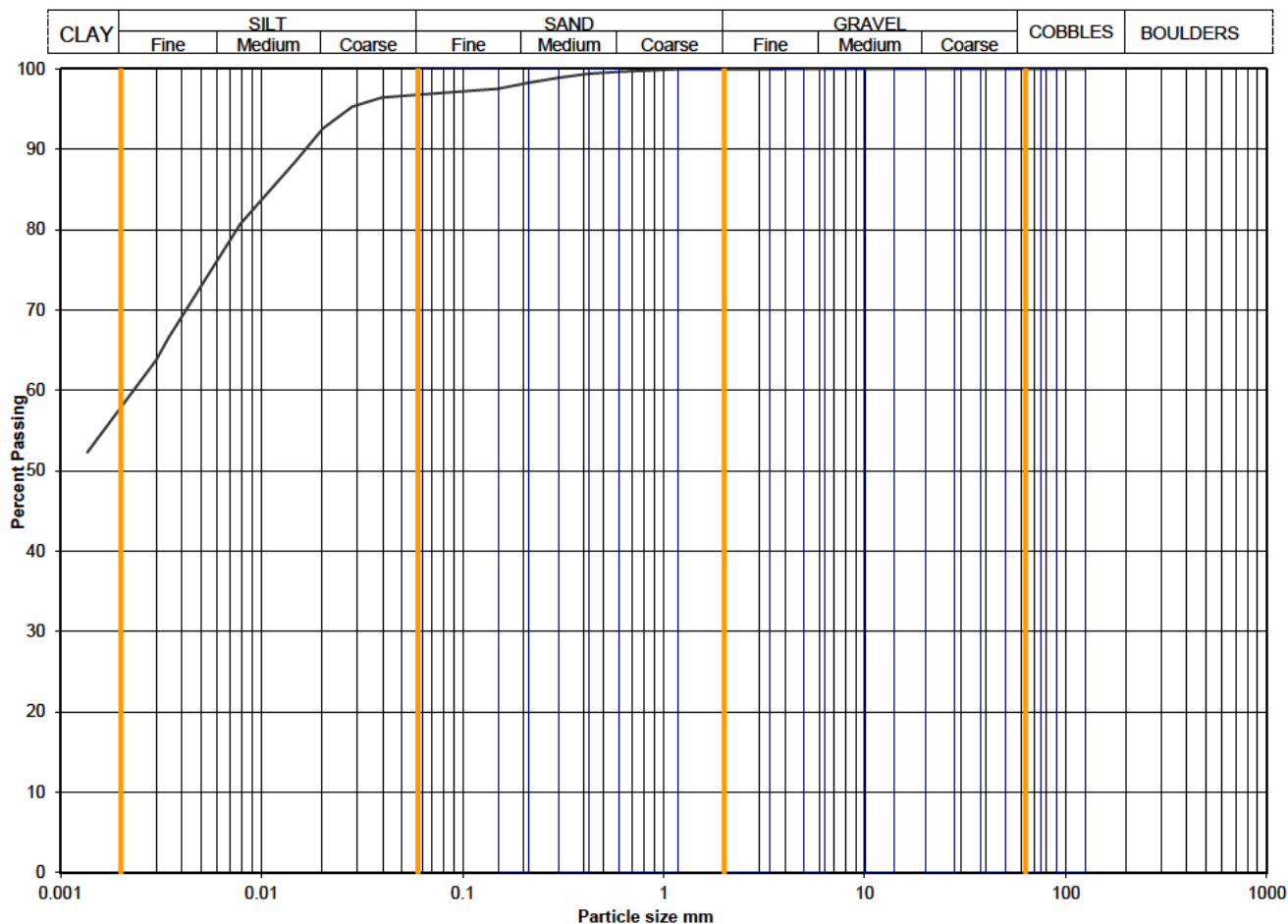
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-04
	A9031-1920191118090257	Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B13
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0397	96
75	100	0.0282	95
63	100	0.0202	93
50	100	0.0146	88
37.5	100	0.0078	81
28	100	0.0034	66
20	100	0.0030	64
14	100	0.0014	52
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	99		
0.300	99		
0.212	98		
0.150	98		
0.063	97		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.4

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.0	0.0
	Silt	3.2	3.2
	Clay	38.9	38.9
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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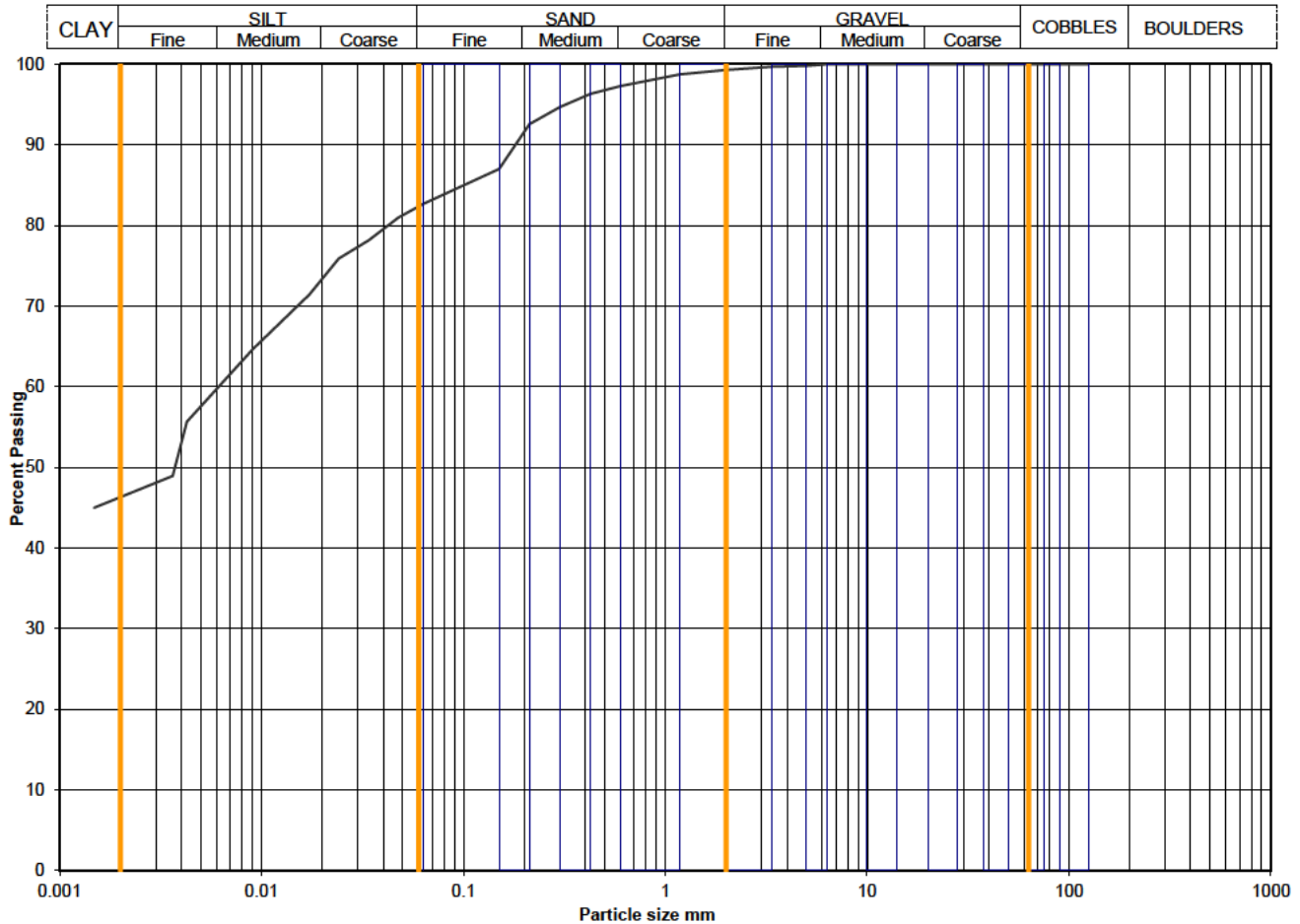
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-04
	A9031-1920191118090336	Sample Depth (m BGL)	4.50 - 5.00
		Sample Type and No	B20
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	83
90	100	0.0476	81
75	100	0.0339	78
63	100	0.0241	76
50	100	0.0172	71
37.5	100	0.0090	65
28	100	0.0043	56
20	100	0.0036	49
14	100	0.0015	45
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	99		
1.18	99		
0.600	97		
0.425	96		
0.300	95		
0.212	93		
0.150	87		
0.063	83		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
3.2

Soil description	Grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.6	0.6
	Silt	16.7	16.7
	Clay	36.4	36.4
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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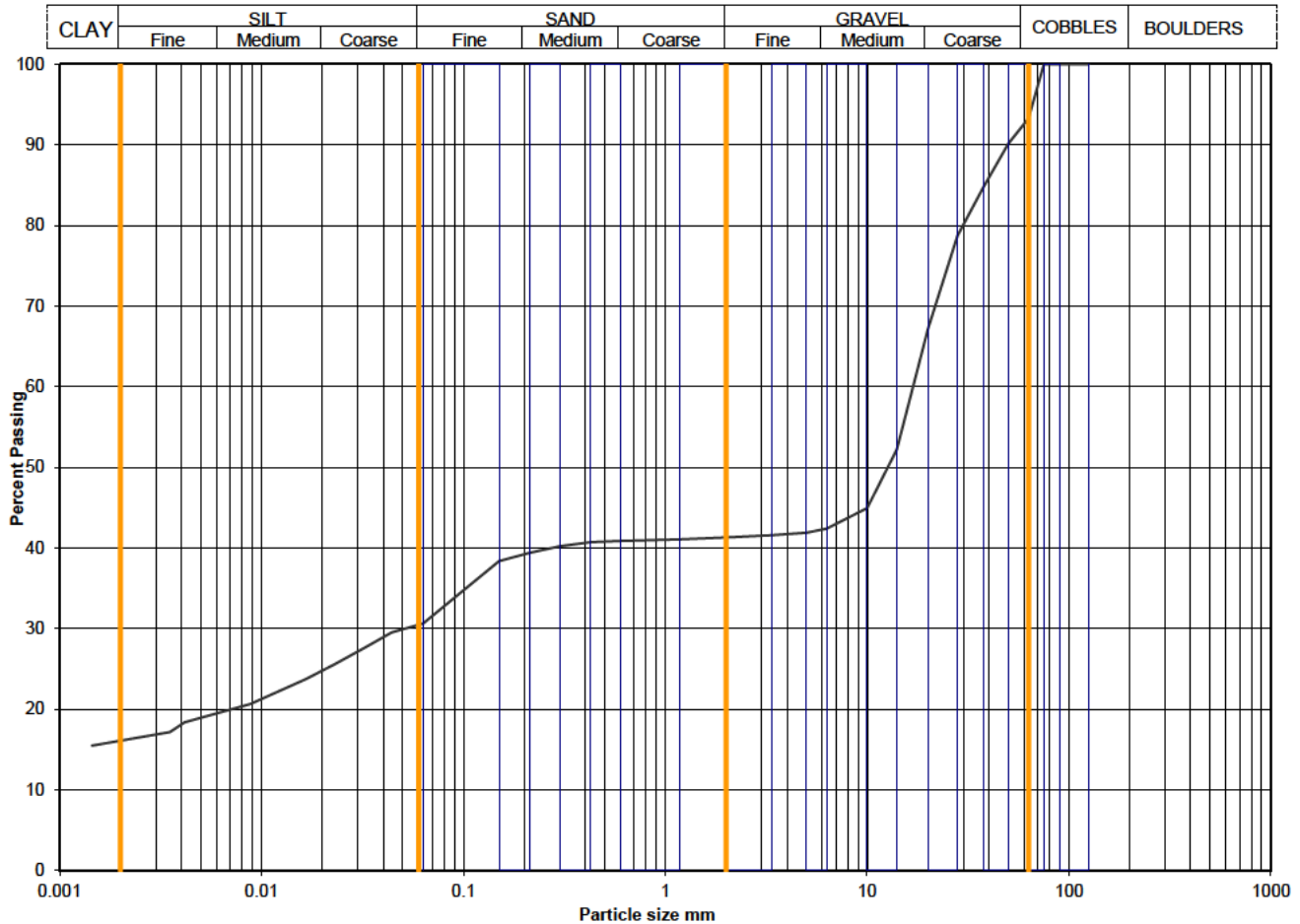
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-06
	A9031-1920191205122237	Sample Depth (m BGL)	1.00
		Sample Type and No	B7
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	31
90	100	0.0441	30
75	100	0.0319	28
63	93	0.0230	26
50	90	0.0166	24
37.5	85	0.0088	21
28	79	0.0042	18
20	67	0.0035	17
14	52	0.0014	15
10	45		
6.3	42		
5.0	42		
3.35	42		
2.00	41		
1.18	41		
0.600	41		
0.425	41		
0.300	40		
0.212	39		
0.150	38		
0.063	31		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
13.2

Soil description	Light brown slightly sandy gravelly CLAY with two cobbles.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	6.7	0.0
	Sand	52.0	55.7
	Silt	10.7	11.5
	Clay	14.5	15.5
*<60mm values to aid description only		16.1	17.3

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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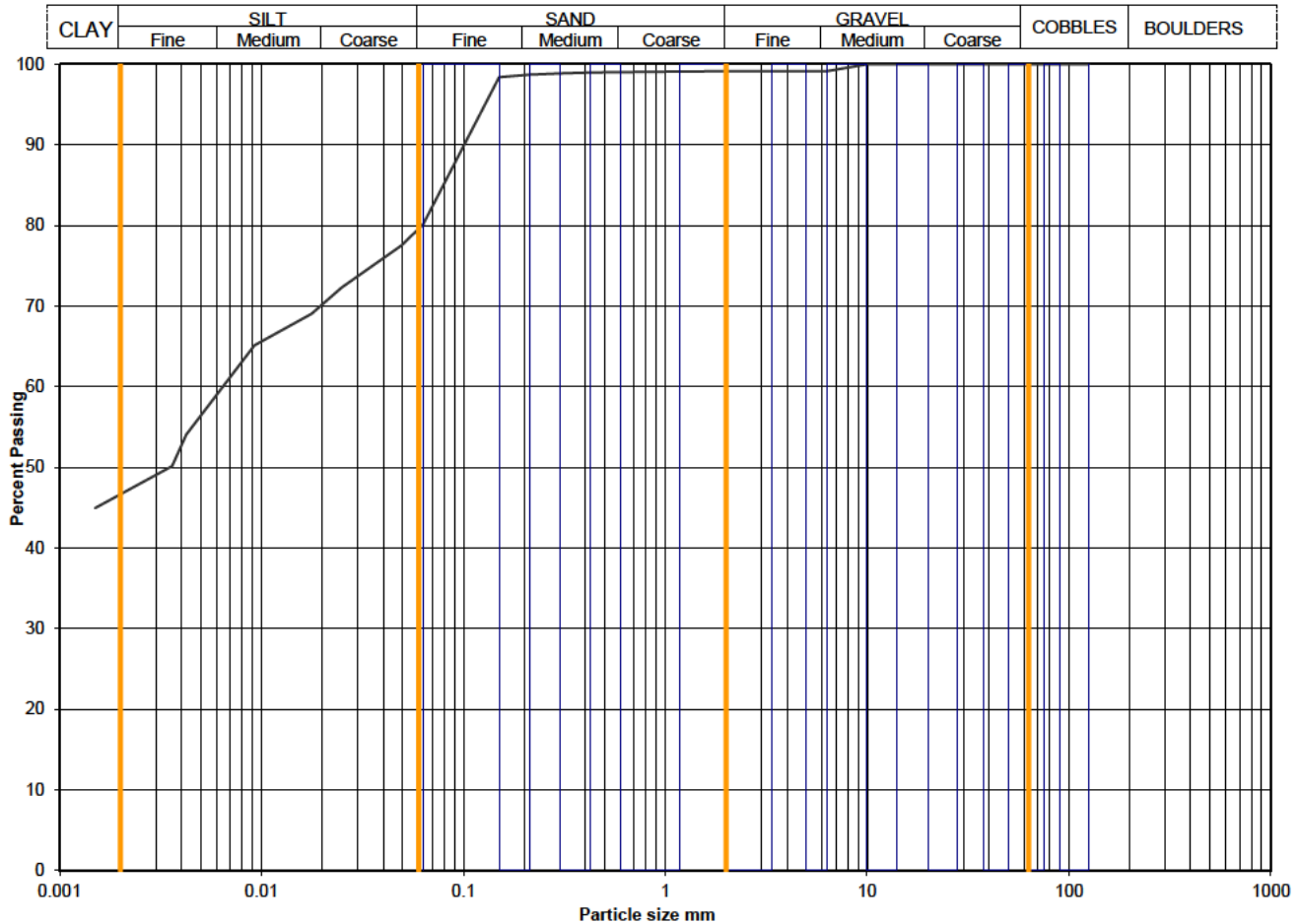
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-07A
	A9031-1920191128092135	Sample Depth (m BGL)	1.50 - 2.00
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	80
90	100	0.0493	78
75	100	0.0350	75
63	100	0.0249	72
50	100	0.0177	69
37.5	100	0.0092	65
28	100	0.0042	54
20	100	0.0036	50
14	100	0.0015	45
10	100		
6.3	99		
5.0	99		
3.35	99		
2.00	99		
1.18	99		
0.600	99	Particle density, Mg/m3	
0.425	99	2.65	assumed
0.300	99		
0.212	99	Dry mass of sample, kg	
0.150	98	0.4	
0.063	80		

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.9	0.9
	Silt	19.0	19.0
	Clay	33.4	33.4
*<60mm values to aid description only		46.7	46.7

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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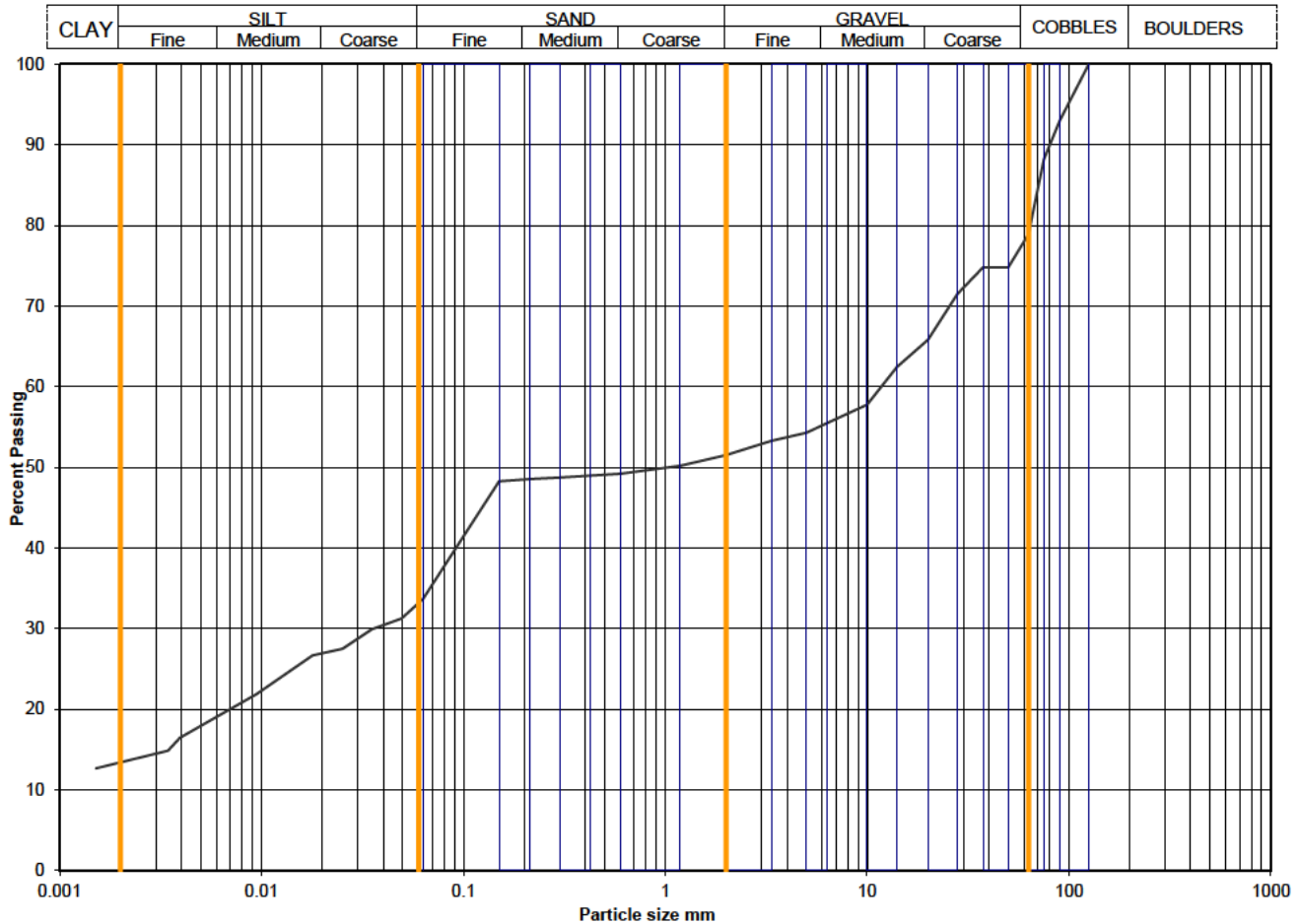
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-07A
	A9031-1920191209025238	Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B7
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	34
90	93	0.0495	31
75	88	0.0352	30
63	79	0.0252	27
50	75	0.0179	27
37.5	75	0.0094	22
28	72	0.0039	16
20	66	0.0034	15
14	62	0.0015	13
10	58		
6.3	55		
5.0	54		
3.35	53		
2.00	52		
1.18	50		
0.600	49		
0.425	49		
0.300	49		
0.212	49		
0.150	48		
0.063	34		

Particle density, Mg/m3
2.65 assumed
Dry mass of sample, kg
17.5

Soil description	Brown slightly sandy slightly gravelly CLAY with five cobbles.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	21.1	0.0
	Sand	27.4	34.7
	Silt	17.8	22.6
	Clay	20.3	25.7
*<60mm values to aid description only		13.4	17.0

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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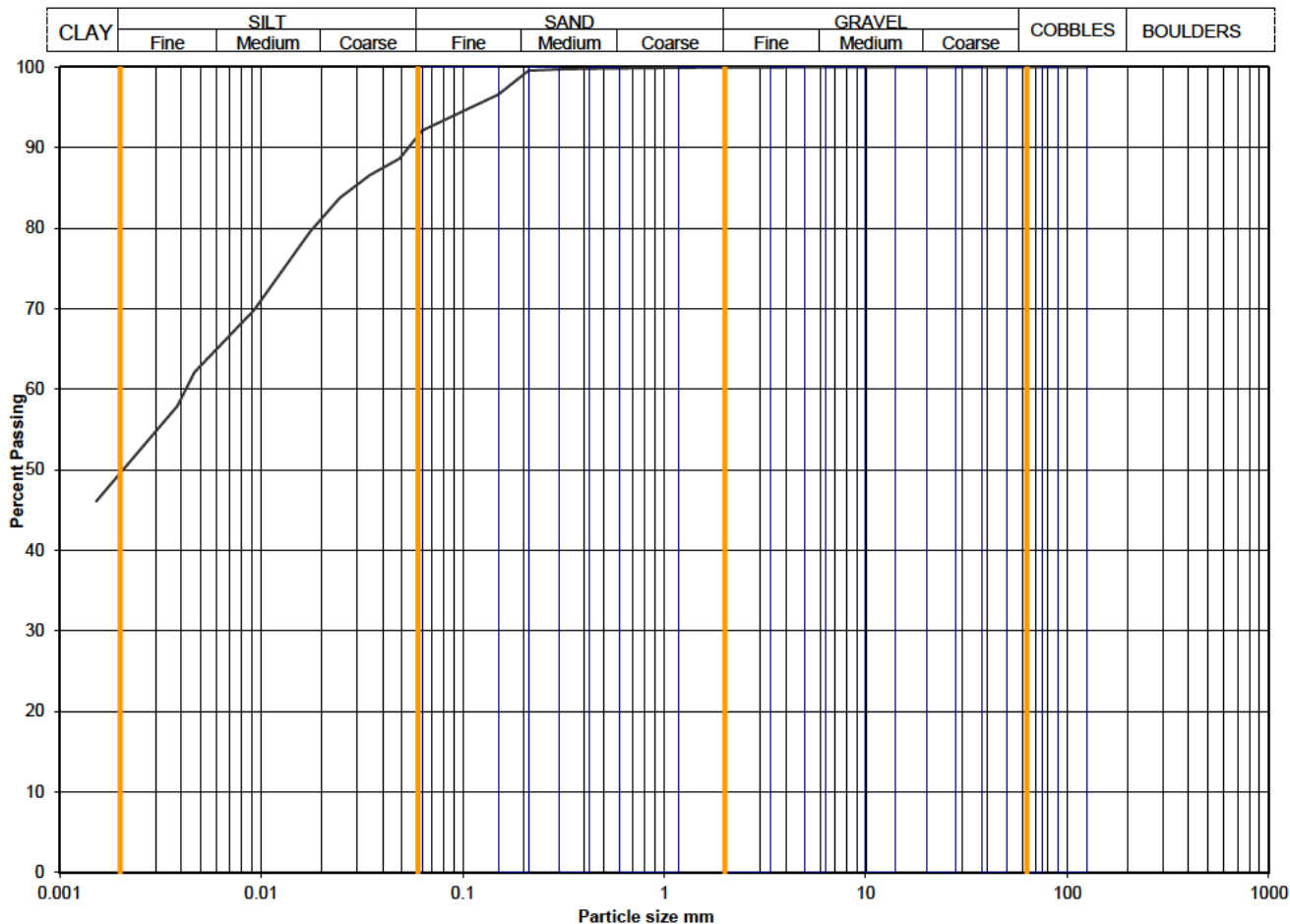
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-07A
	A9031-1920191209025731	Sample Depth (m BGL)	4.50 - 5.00
		Sample Type and No	D16
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	92
90	100	0.0487	89
75	100	0.0346	87
63	100	0.0246	84
50	100	0.0175	80
37.5	100	0.0092	70
28	100	0.0047	62
20	100	0.0038	58
14	100	0.0015	46
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	97		
0.063	92		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.8

Soil description	Grey and reddish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	7.8	7.8
	Silt	42.6	42.6
	Clay	49.6	49.6

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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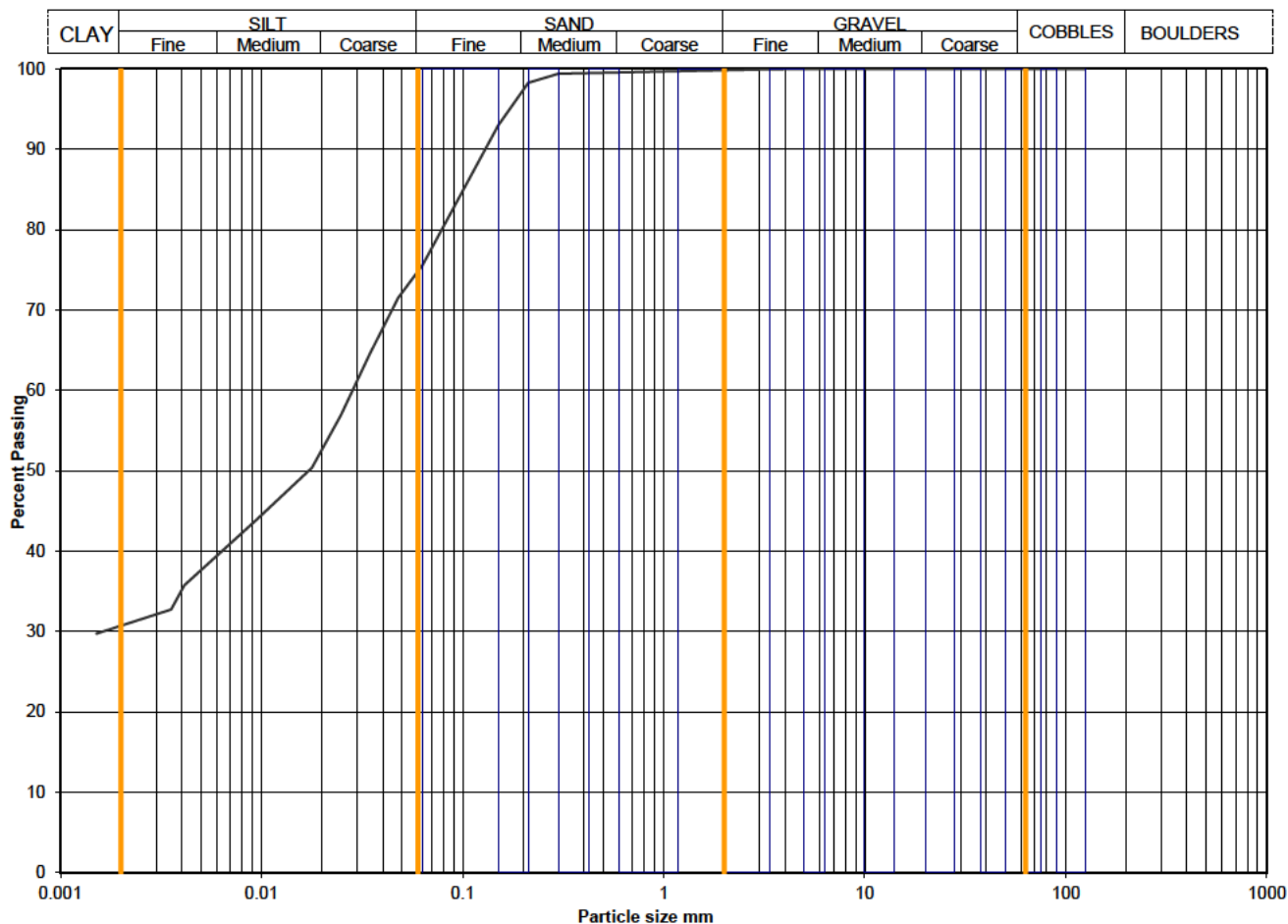
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-07A
	A9031-1920191209025855	Sample Depth (m BGL)	6.00 - 6.40
		Sample Type and No	UT21
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	76
90	100	0.0477	72
75	100	0.0344	64
63	100	0.0248	57
50	100	0.0178	50
37.5	100	0.0094	44
28	100	0.0041	36
20	100	0.0036	33
14	100	0.0015	30
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	99		
0.212	98		
0.150	93		
0.063	76		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.7

Soil description	Very stiff reddish brown mottled grey slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.2	0.2
	Silt	24.3	24.3
	Clay	44.8	44.8
*<60mm values to aid description only		30.7	30.7

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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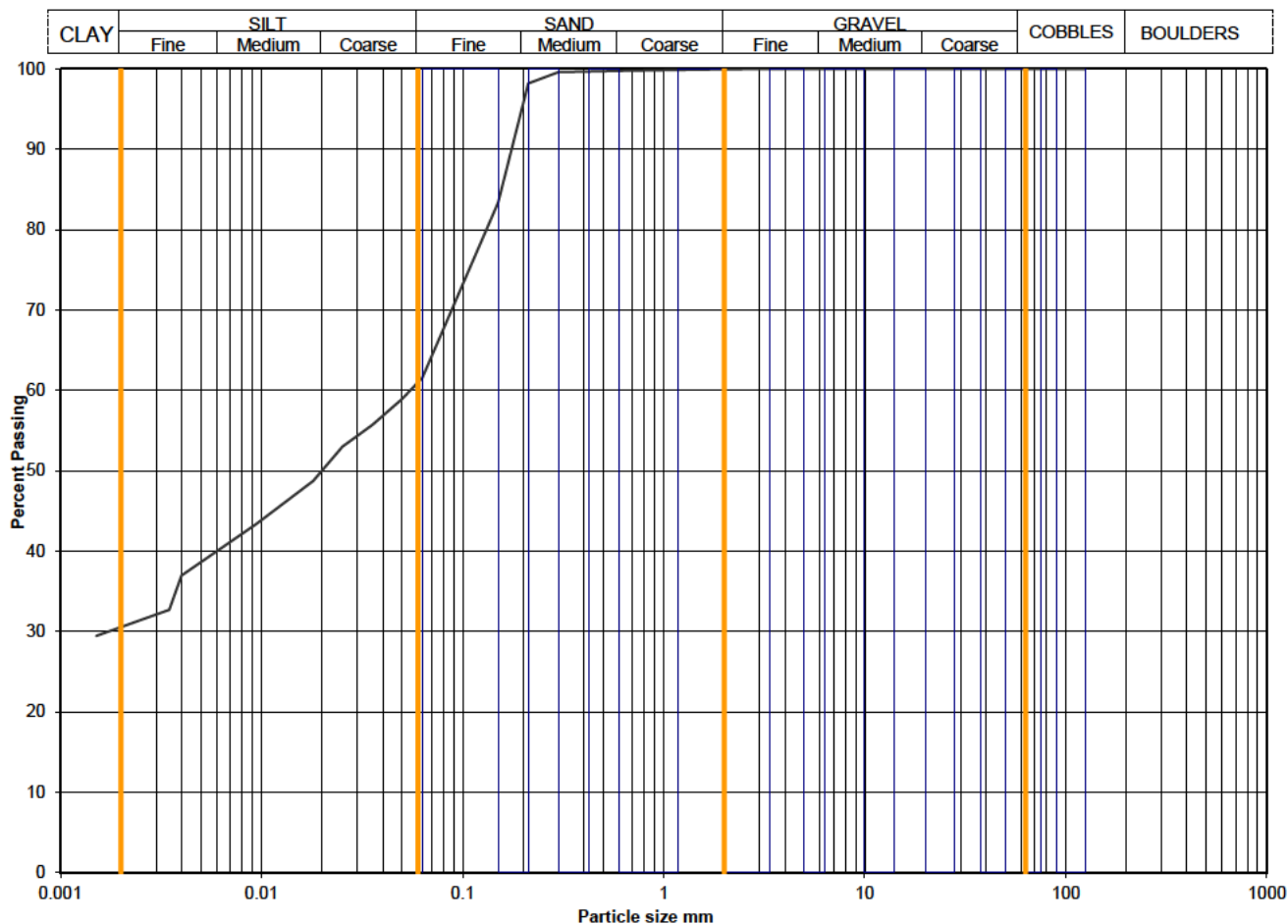
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-07A
	A9031-1920191209025920	Sample Depth (m BGL)	6.50 - 7.00
		Sample Type and No	B23
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	62
90	100	0.0498	59
75	100	0.0355	56
63	100	0.0253	53
50	100	0.0181	49
37.5	100	0.0094	43
28	100	0.0040	37
20	100	0.0035	33
14	100	0.0015	29
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	98		
0.150	83		
0.063	62		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.7

Soil description	Grey and reddish brown sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	38.5	38.5
	Silt	31.0	31.0
	Clay	30.5	30.5

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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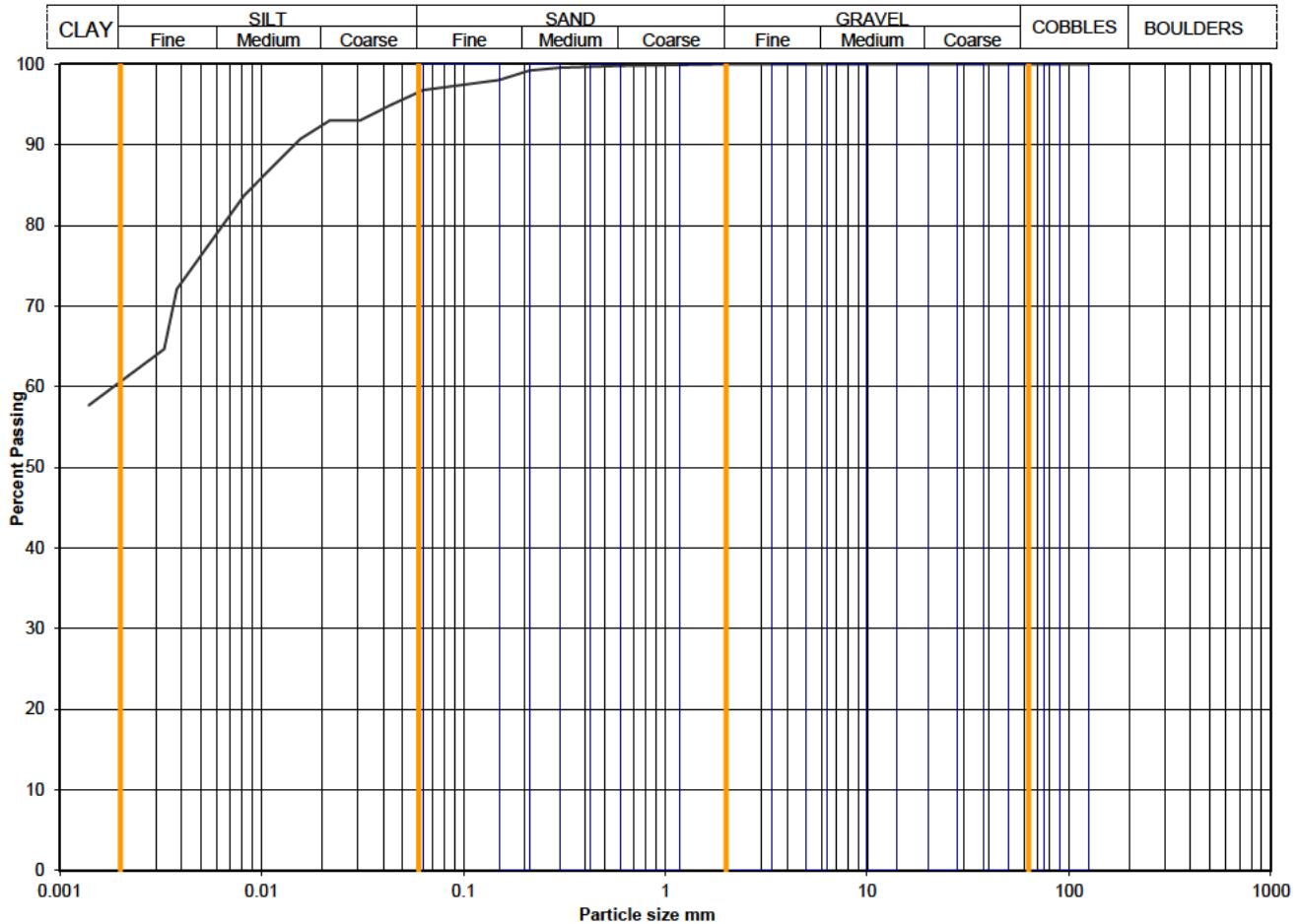
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-07A
	A9031-1920191209030030	Sample Depth (m BGL)	8.00 - 8.35
		Sample Type and No	UT28
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0433	95
75	100	0.0308	93
63	100	0.0218	93
50	100	0.0156	91
37.5	100	0.0082	84
28	100	0.0038	72
20	100	0.0033	65
14	100	0.0014	58
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	99		
0.150	98		
0.063	97		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.5

Soil description	Very stiff grey mottled reddish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.0	0.0
	Silt	3.2	3.2
	Clay	36.2	36.2
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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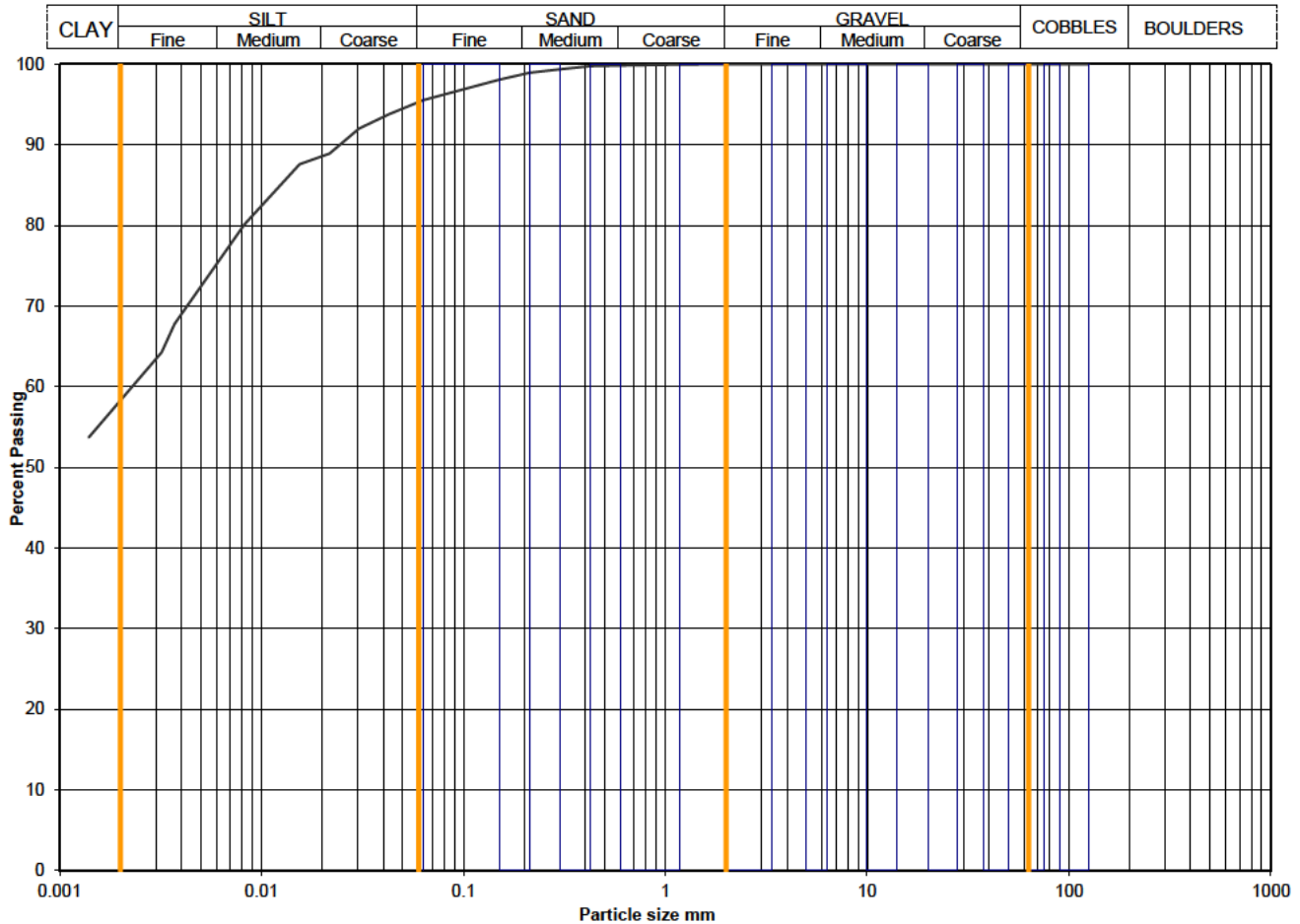
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-07A
	A9031-1920191209030213	Sample Depth (m BGL)	8.50 - 9.00
		Sample Type and No	B30
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	96
90	100	0.0426	94
75	100	0.0304	92
63	100	0.0217	89
50	100	0.0154	88
37.5	100	0.0082	80
28	100	0.0037	68
20	100	0.0032	64
14	100	0.0014	54
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65	assumed
0.300	99		
0.212	99	Dry mass of sample, kg	
0.150	98	0.6	
0.063	96		

Soil description	Grey and reddish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	4.5	4.5
	Silt	37.2	37.2
	Clay	58.3	58.3

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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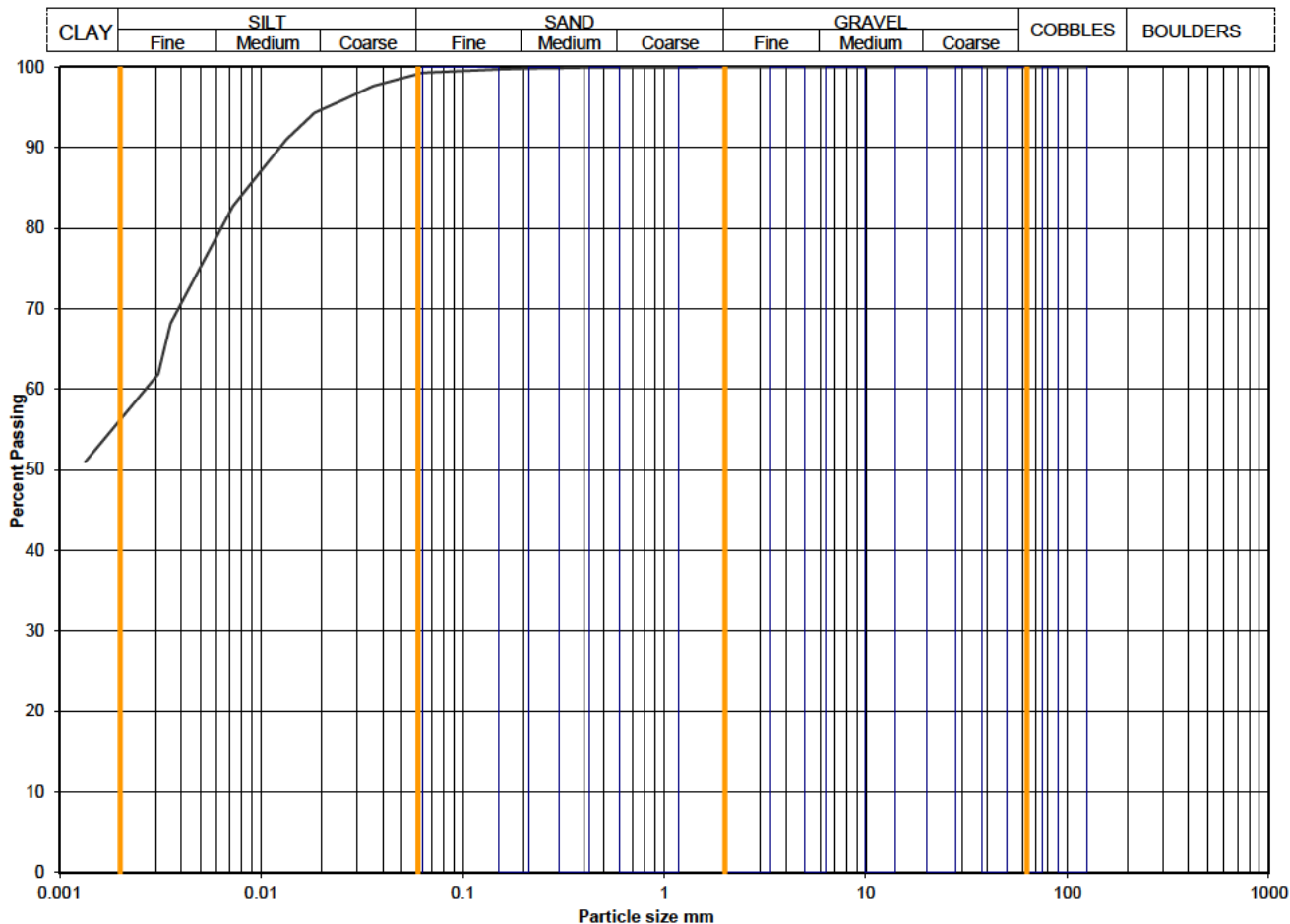
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-07A
	A9031-1920191209030543	Sample Depth (m BGL)	10.00 - 10.35
		Sample Type and No	UT35
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	99
90	100	0.0359	98
75	100	0.0257	96
63	100	0.0184	94
50	100	0.0133	91
37.5	100	0.0073	83
28	100	0.0035	68
20	100	0.0031	62
14	100	0.0013	51
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	100		
0.063	99		

Particle density, Mg/m3

2.65 assumed

Dry mass of sample, kg

0.7

Soil description	Very stiff reddish brown mottled grey and brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.0	0.0
	Silt	0.7	0.7
	Clay	43.1	43.1
*<60mm values to aid description only		56.2	56.2

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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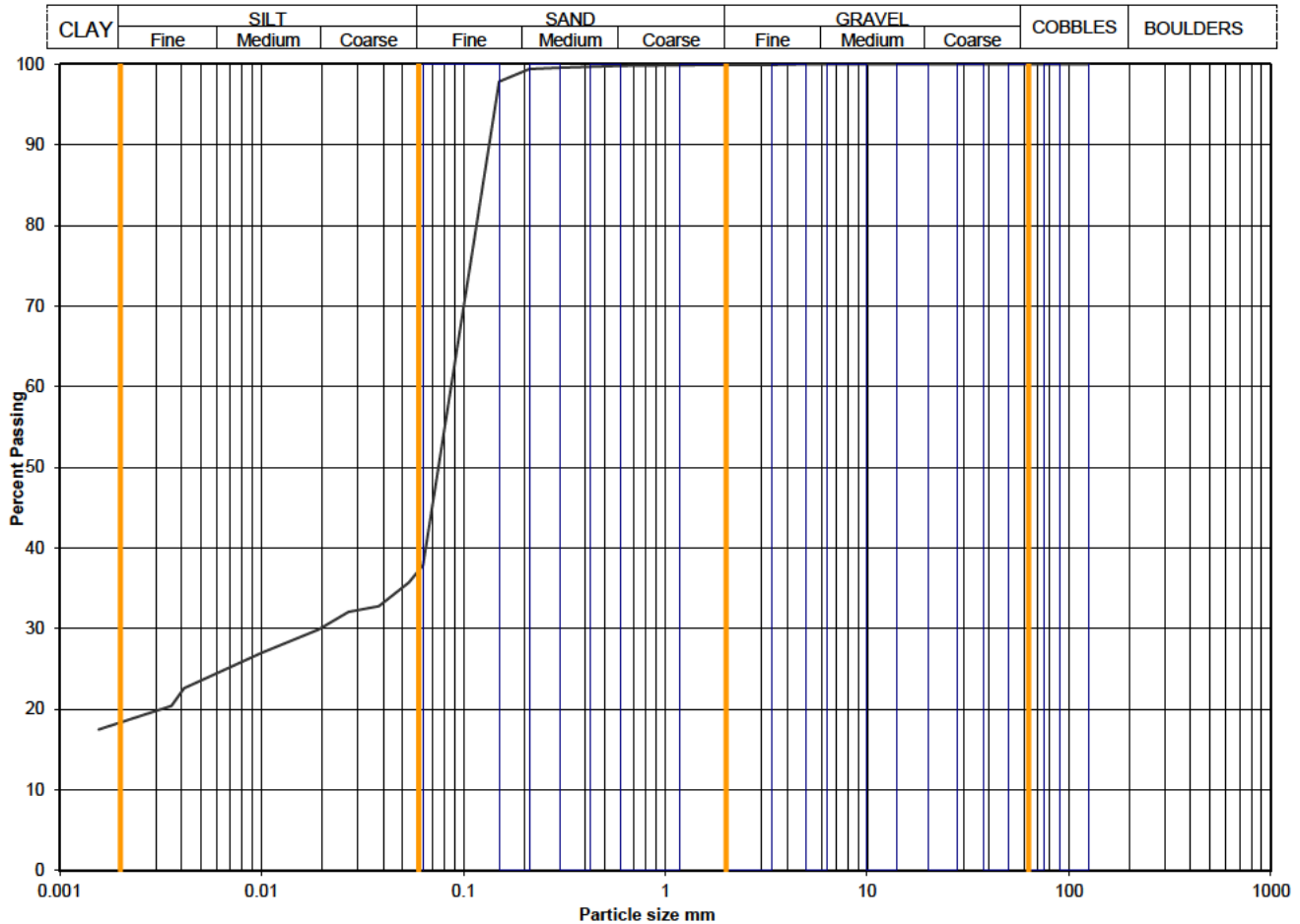
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-08
	A9031-19-20191126041753	Sample Depth (m BGL)	0.50 - 1.00
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	38
90	100	0.0536	36
75	100	0.0381	33
63	100	0.0270	32
50	100	0.0191	30
37.5	100	0.0099	27
28	100	0.0041	23
20	100	0.0036	20
14	100	0.0016	17
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65	assumed
0.300	100		
0.212	99	Dry mass of sample, kg	
0.150	98	0.6	
0.063	38		

Soil description	Grey and brown sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	62.1	62.1
	Silt	19.5	19.5
	Clay	18.4	18.4

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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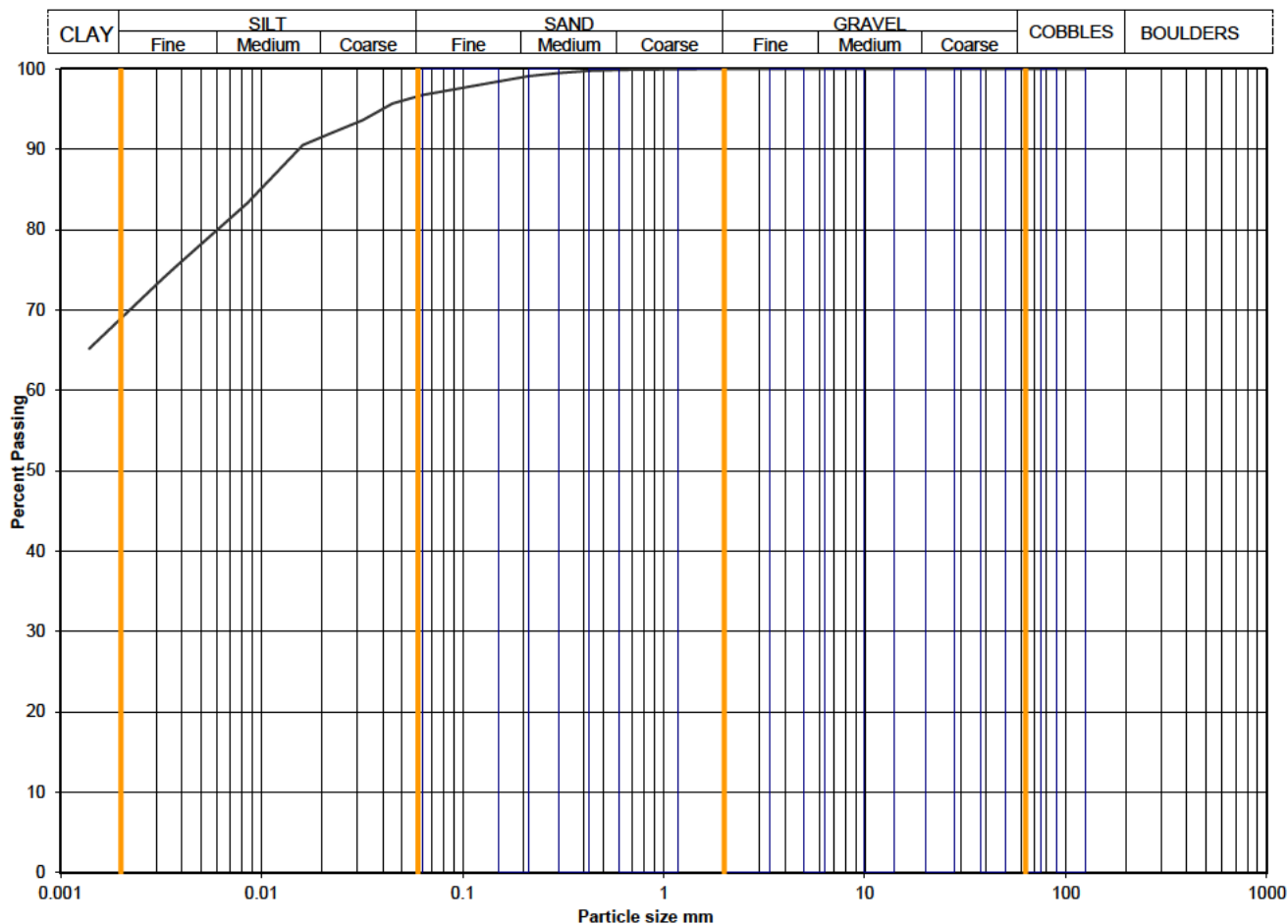
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-08
	A9031-19-20191126042408	Sample Depth (m BGL)	4.65 - 5.20
		Sample Type and No	B17
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0447	96
75	100	0.0318	94
63	100	0.0226	92
50	100	0.0161	91
37.5	100	0.0085	83
28	100	0.0038	76
20	100	0.0032	74
14	100	0.0014	65
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65	assumed
0.300	100		
0.212	99	Dry mass of sample, kg	
0.150	98	0.6	
0.063	97		

Soil description	Grey and reddish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.0	0.0
	Silt	3.2	3.2
	Clay	27.8	27.8
*<60mm values to aid description only		69.0	69.0

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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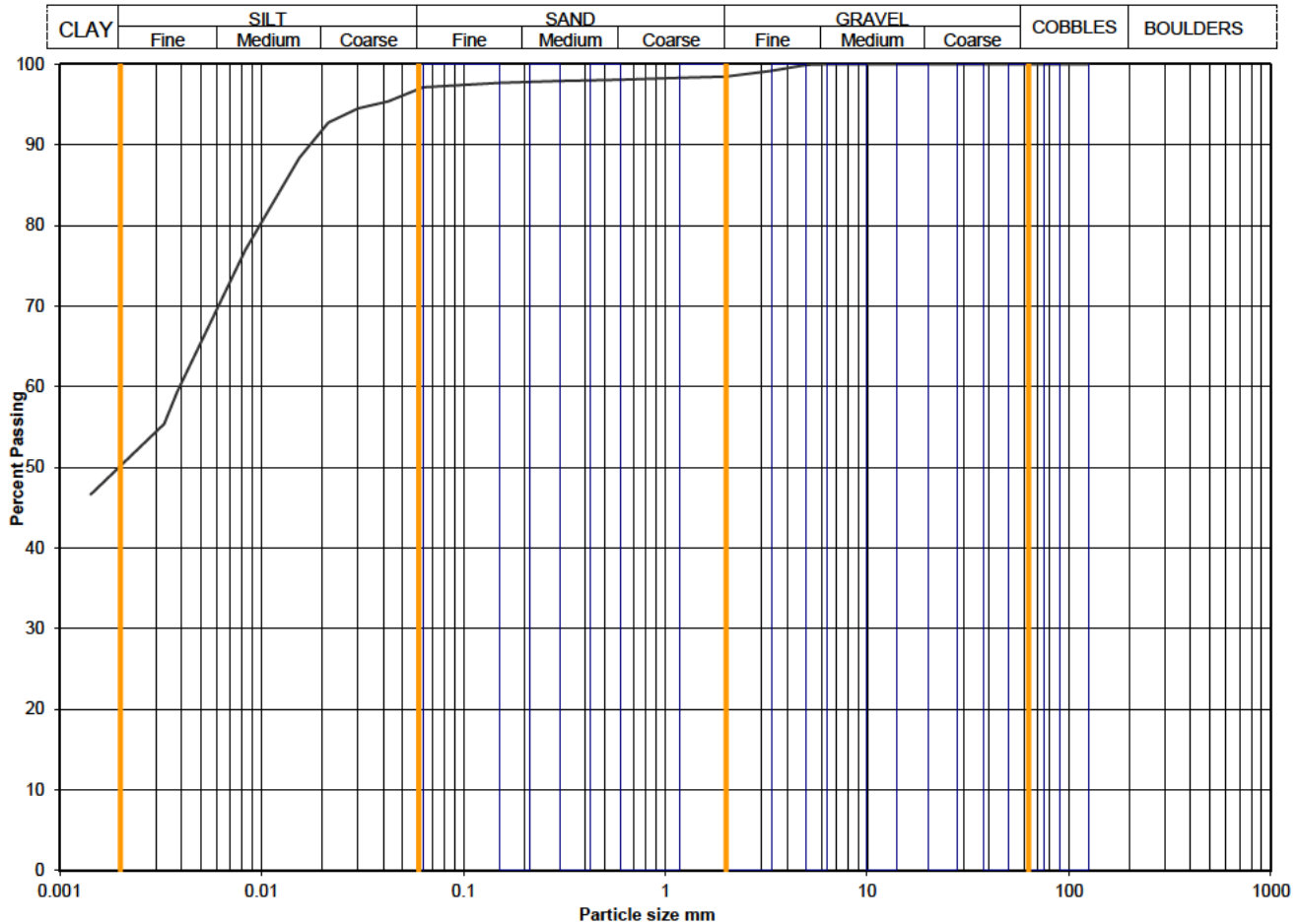
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-08
	A9031-19-20191126042844	Sample Depth (m BGL)	6.50 - 7.20
		Sample Type and No	B24
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0423	95
75	100	0.0300	95
63	100	0.0214	93
50	100	0.0154	88
37.5	100	0.0083	77
28	100	0.0038	59
20	100	0.0033	55
14	100	0.0014	47
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	98		
0.600	98		
0.425	98		
0.300	98		
0.212	98		
0.150	98		
0.063	97		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.5

Soil description	Grey and reddish brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	1.5	1.5
	Silt	1.3	1.3
	Clay	47.0	47.0
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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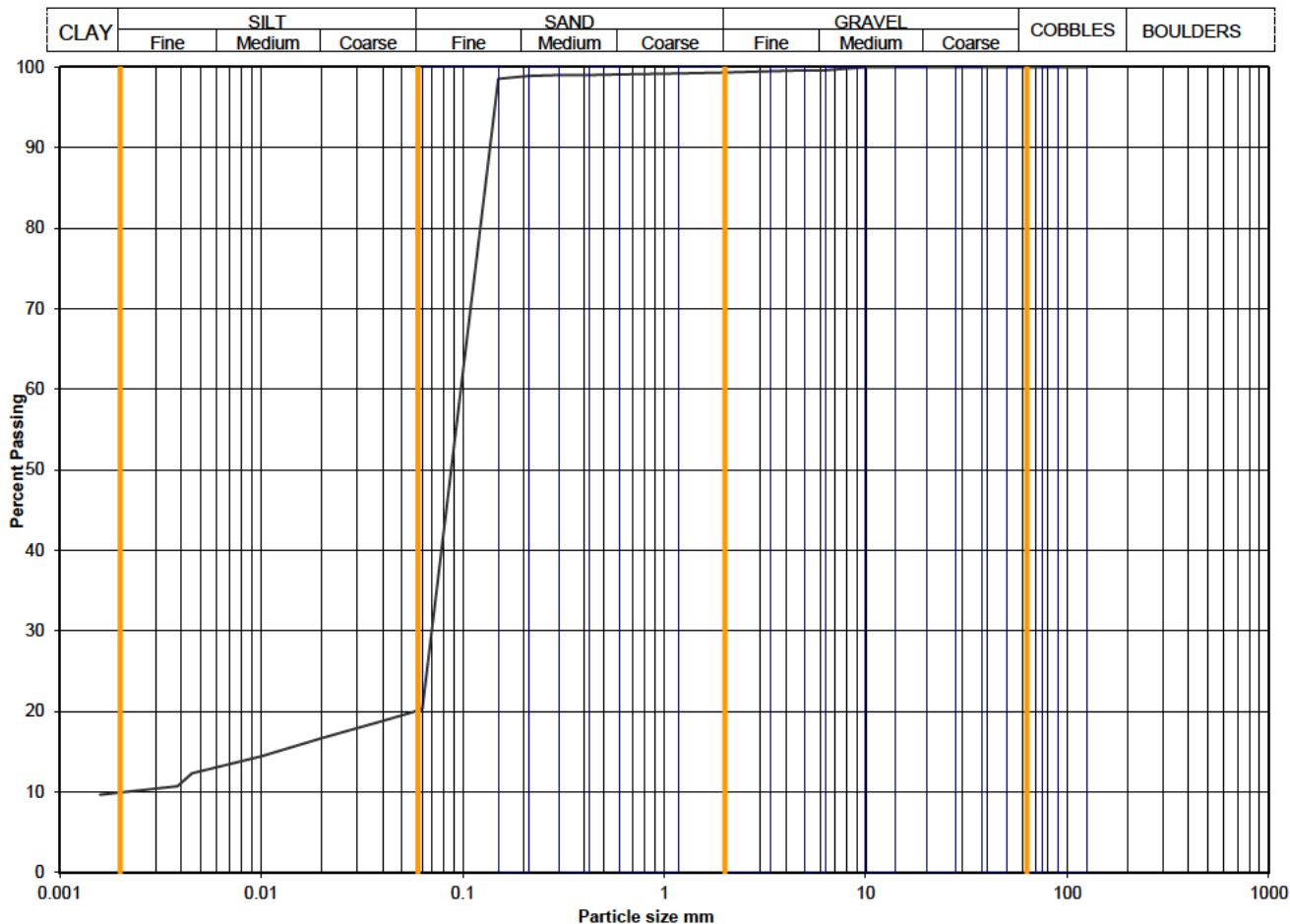
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-09
	A9031-19-20191129105647	Sample Depth (m BGL)	1.65 - 2.20
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	20
90	100	0.0544	20
75	100	0.0385	19
63	100	0.0273	18
50	100	0.0193	17
37.5	100	0.0100	14
28	100	0.0045	12
20	100	0.0038	11
14	100	0.0016	10
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	99		
0.600	99	Particle density, Mg/m3	
0.425	99	2.65	assumed
0.300	99		
0.212	99	Dry mass of sample, kg	
0.150	99	0.6	
0.063	20		

Soil description	Brown slightly gravelly very clayey SAND.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.6	0.6
	Silt	79.1	79.1
	Clay	10.4	10.4
*<60mm values to aid description only		9.9	9.9

Uniformity Coefficient	D60 / D10	45
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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Project Name HAVANT THICKET WATER STORAGE

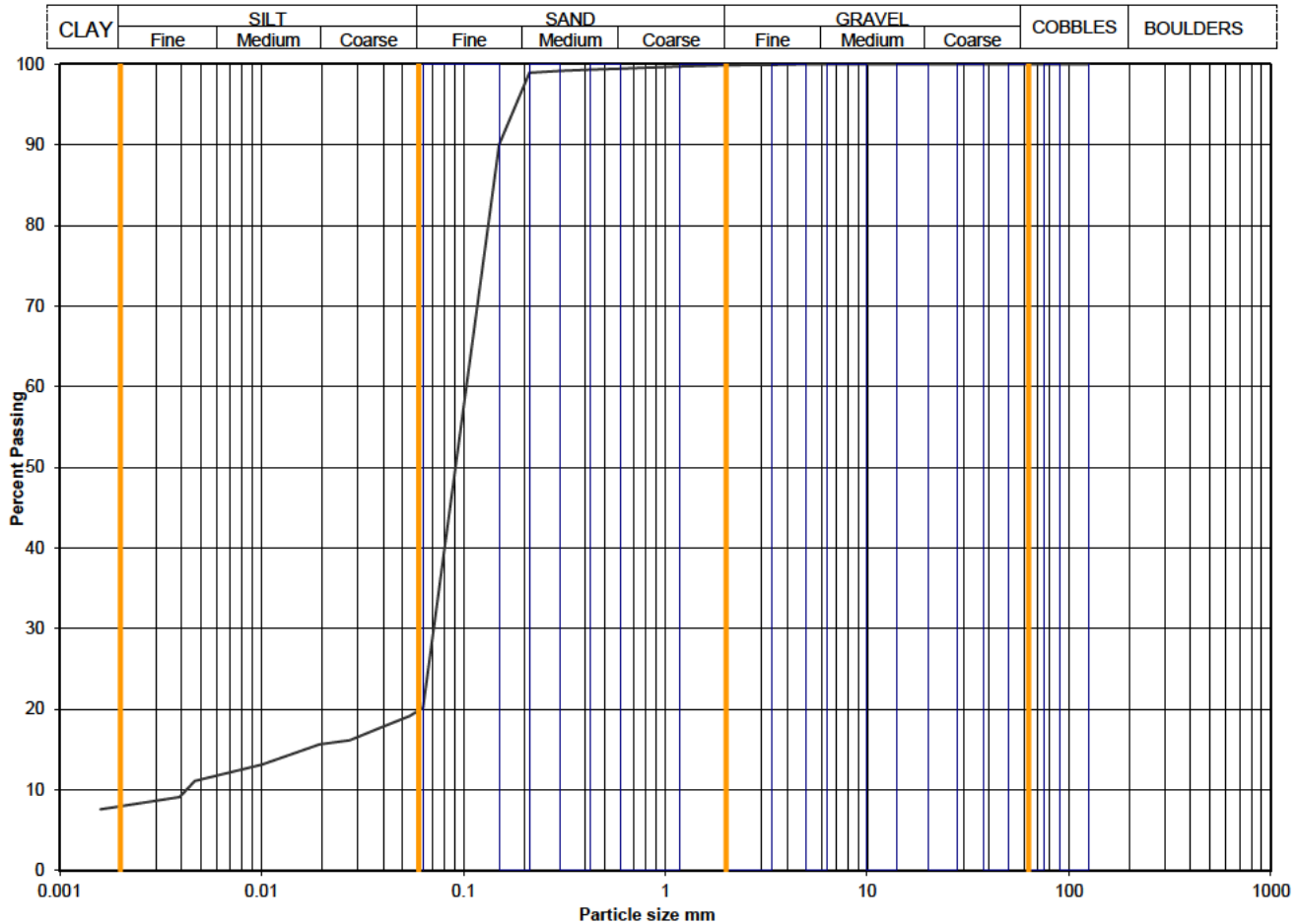
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-09
	A9031-19-20191129105757	Sample Depth (m BGL)	2.20 - 2.65
		Sample Type and No	B10
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	20
90	100	0.0543	19
75	100	0.0385	18
63	100	0.0273	16
50	100	0.0193	16
37.5	100	0.0100	13
28	100	0.0047	11
20	100	0.0039	9
14	100	0.0016	8
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	99	Particle density, Mg/m3	
0.425	99	2.65 assumed	
0.300	99	Dry mass of sample, kg	
0.212	99	0.7	
0.150	90		
0.063	20		

Soil description	Brown clayey SAND.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.2	0.2
	Silt	79.7	79.7
	Clay	12.2	12.2
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	24
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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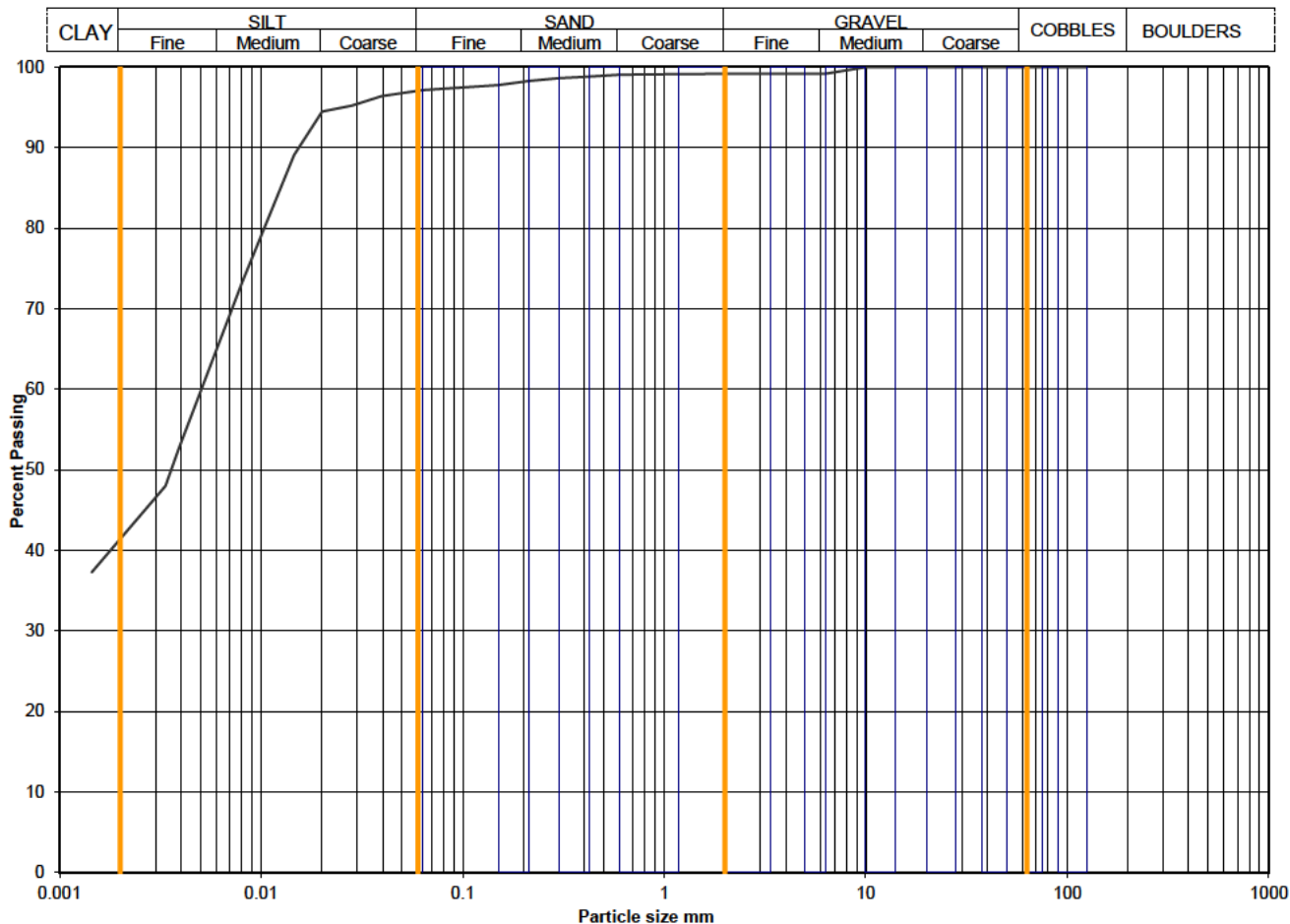
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-09
	A9031-19-20191129110324	Sample Depth (m BGL)	3.50 - 4.20
		Sample Type and No	B15
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0397	96
75	100	0.0282	95
63	100	0.0200	94
50	100	0.0146	89
37.5	100	0.0081	73
28	100	0.0039	53
20	100	0.0034	48
14	100	0.0014	37
10	100		
6.3	99		
5.0	99		
3.35	99		
2.00	99		
1.18	99		
0.600	99	Particle density, Mg/m3	
0.425	99	2.65	assumed
0.300	99		
0.212	98	Dry mass of sample, kg	
0.150	98	0.6	
0.063	97		

Soil description	Grey and reddish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.8	0.8
	Silt	2.0	2.0
	Clay	55.8	55.8
*<60mm values to aid description only		41.4	41.4

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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Project Name HAVANT THICKET WATER STORAGE

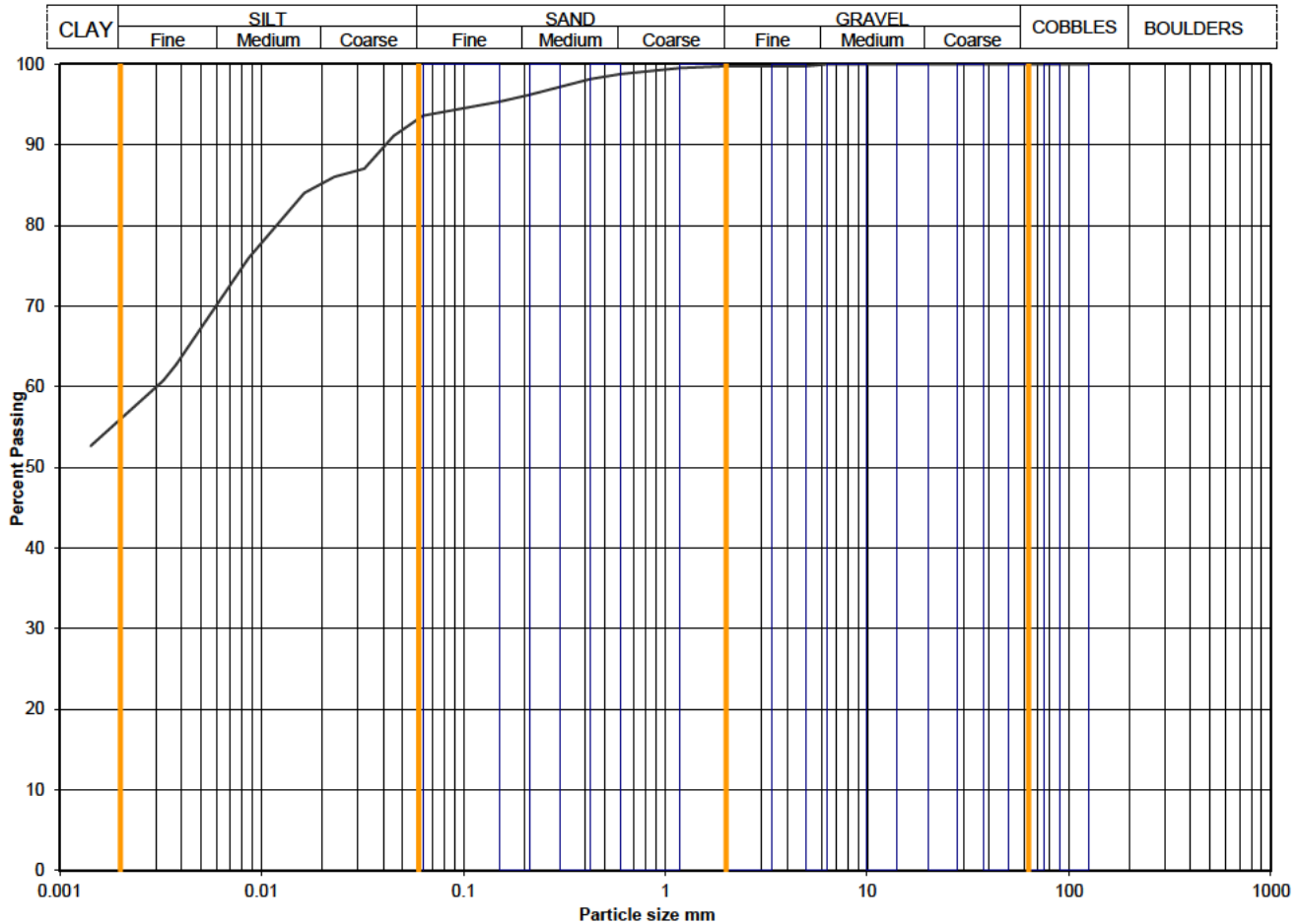
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-09
	A9031-19-20191129110553	Sample Depth (m BGL)	5.20 - 5.65
		Sample Type and No	B20
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	94
90	100	0.0451	91
75	100	0.0323	87
63	100	0.0229	86
50	100	0.0163	84
37.5	100	0.0086	76
28	100	0.0038	63
20	100	0.0033	61
14	100	0.0014	53
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	99	Particle density, Mg/m3	
0.425	98	2.65 assumed	
0.300	97	Dry mass of sample, kg	
0.212	96	0.5	
0.150	95		
0.063	94		

Soil description	Grey and reddish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.1	0.1
	Silt	6.2	6.2
	Clay	37.7	37.7
*<60mm values to aid description only		56.0	56.0

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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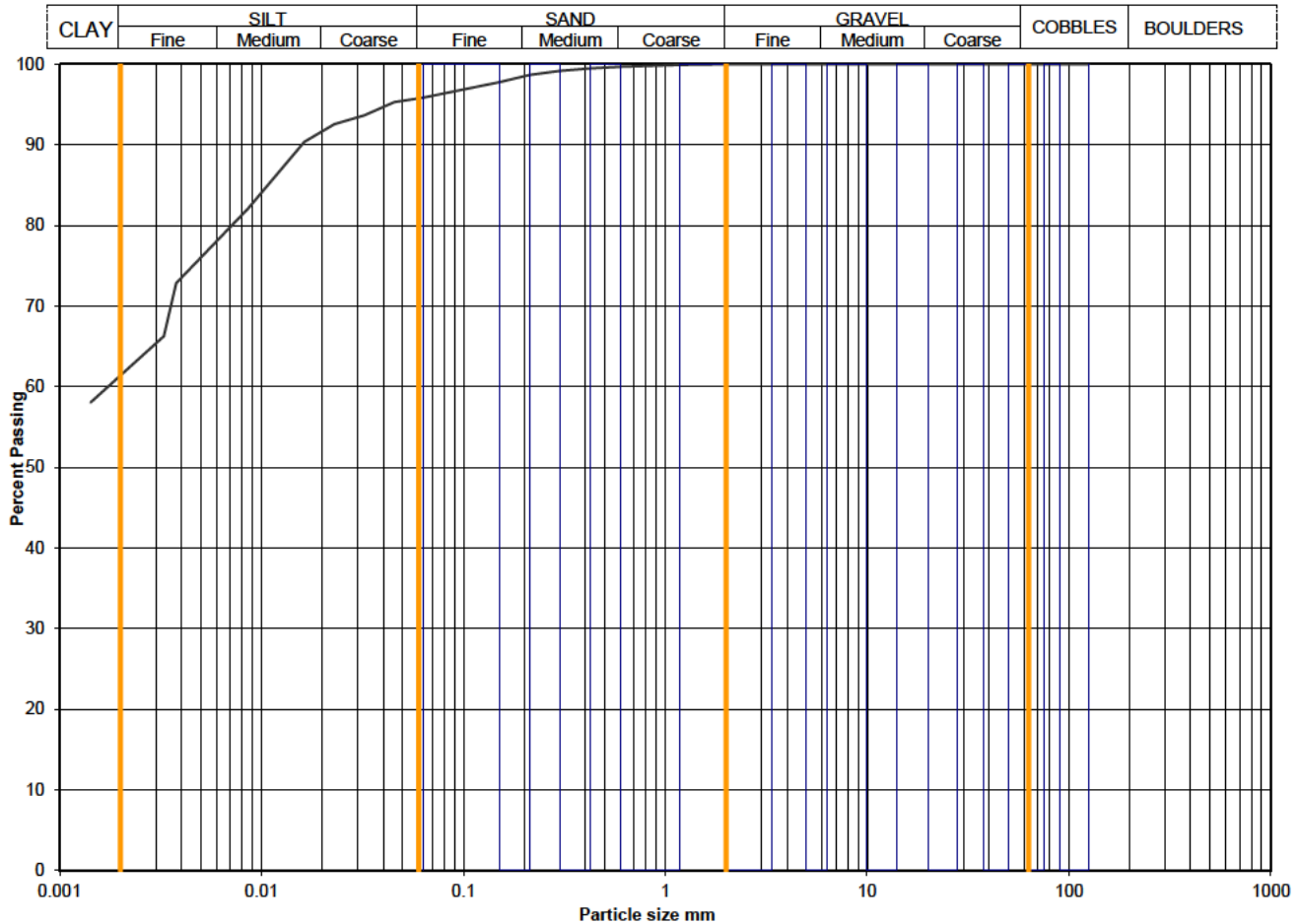
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-09
	A9031-19-20191129111213	Sample Depth (m BGL)	8.20 - 8.65
		Sample Type and No	B30
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	96
90	100	0.0455	95
75	100	0.0323	94
63	100	0.0229	93
50	100	0.0163	90
37.5	100	0.0086	82
28	100	0.0038	73
20	100	0.0033	66
14	100	0.0014	58
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65	assumed
0.300	99		
0.212	99	Dry mass of sample, kg	
0.150	98	0.6	
0.063	96		

Soil description	Grey and reddish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	4.2	4.2
	Silt	34.4	34.4
	Clay	61.4	61.4

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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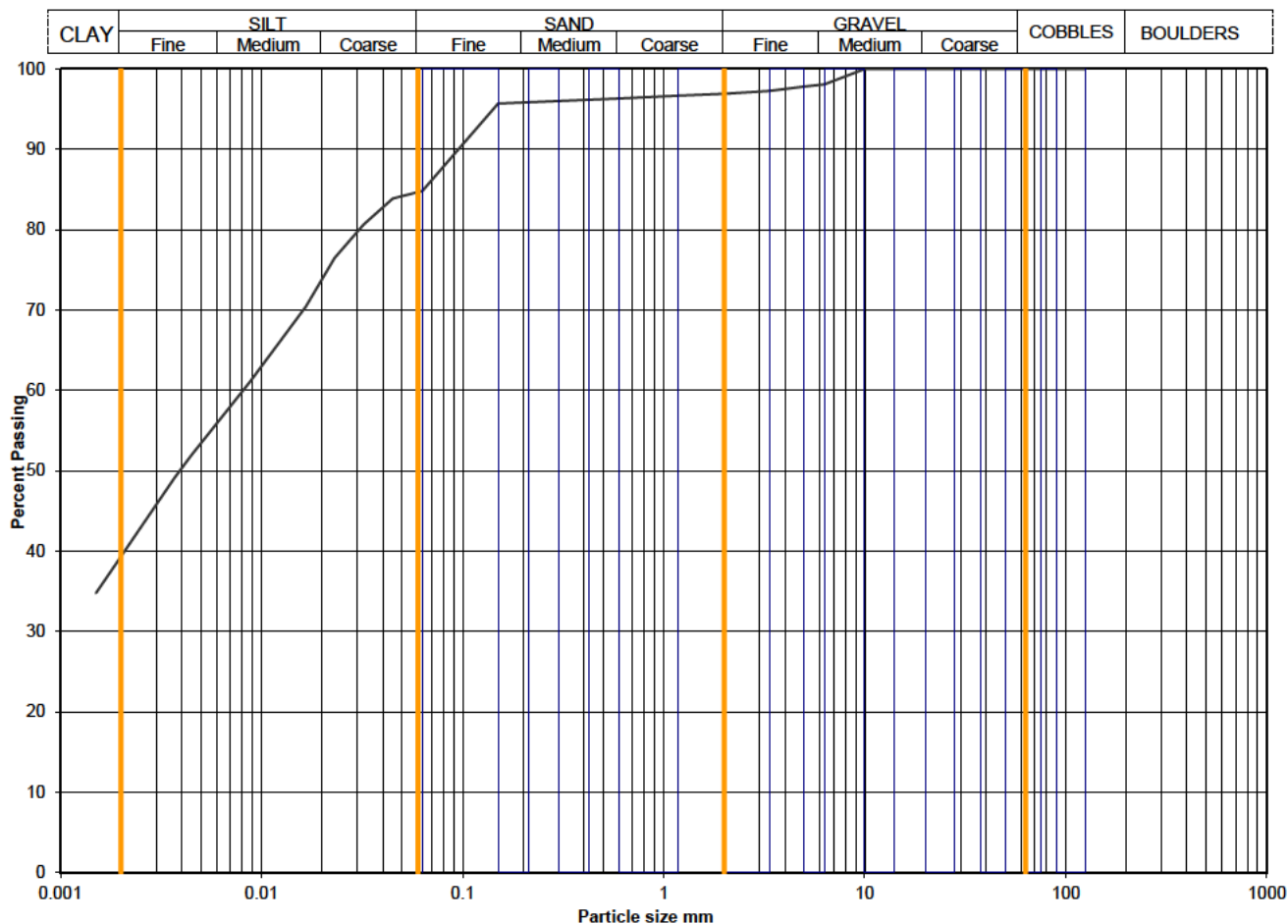
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-10
	A9031-1920191122011737	Sample Depth (m BGL)	4.50 - 5.00
		Sample Type and No	B17
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	85
90	100	0.0450	84
75	100	0.0322	81
63	100	0.0231	76
50	100	0.0166	70
37.5	100	0.0088	61
28	100	0.0045	52
20	100	0.0037	49
14	100	0.0015	35
10	100		
6.3	98		
5.0	98		
3.35	97		
2.00	97		
1.18	97		
0.600	96		
0.425	96		
0.300	96		
0.212	96		
0.150	96		
0.063	85		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.5

Soil description	Brown and dark grey slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	3.0	3.0
	Silt	12.1	12.1
	Clay	45.5	45.5
*<60mm values to aid description only		39.4	39.4

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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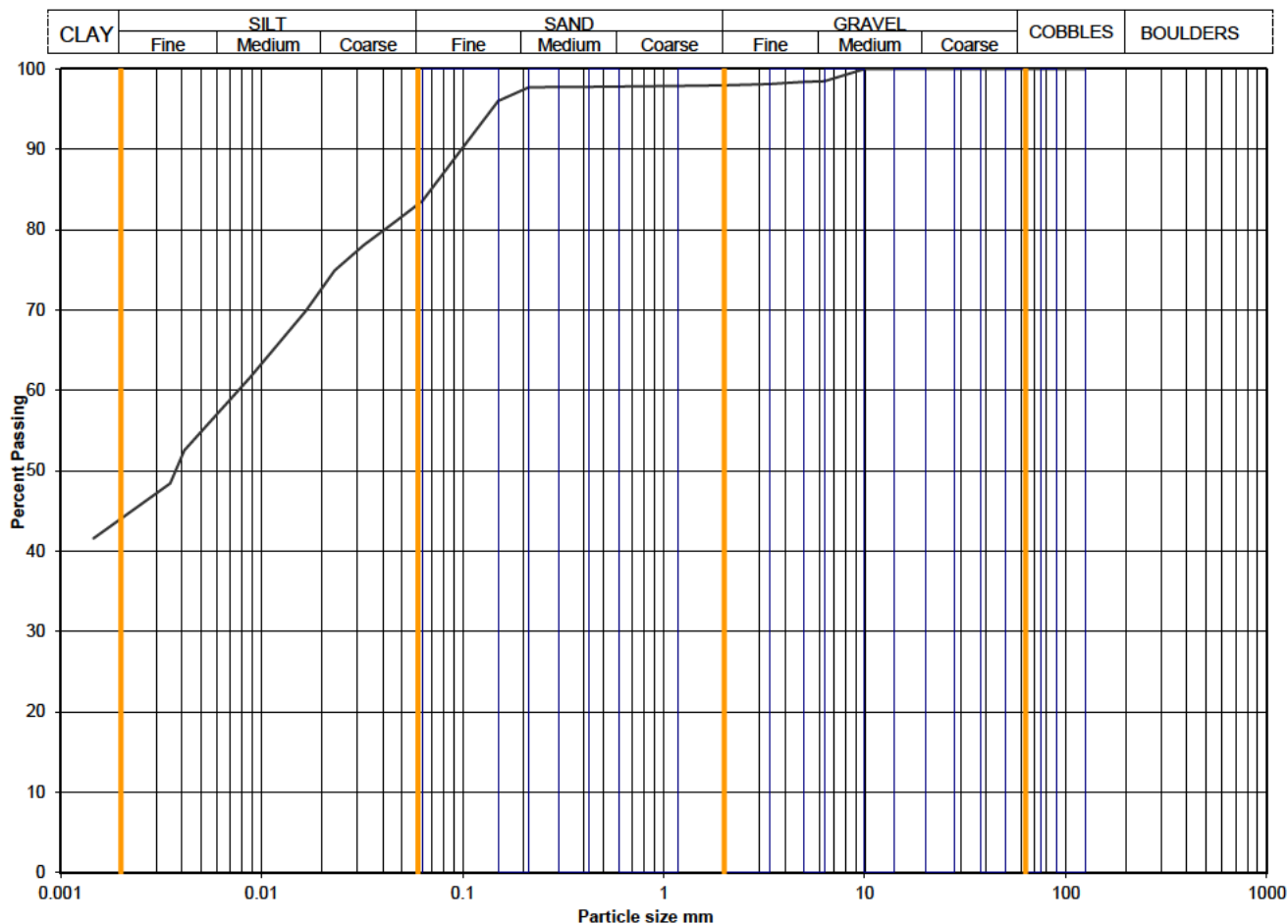
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-10
	A9031-1920191122013441	Sample Depth (m BGL)	6.50 - 7.00
		Sample Type and No	B24
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	84
90	100	0.0453	81
75	100	0.0323	78
63	100	0.0231	75
50	100	0.0166	70
37.5	100	0.0088	62
28	100	0.0041	53
20	100	0.0035	48
14	100	0.0015	42
10	100		
6.3	98		
5.0	98		
3.35	98		
2.00	98		
1.18	98		
0.600	98		
0.425	98		
0.300	98		
0.212	98		
0.150	96		
0.063	84		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.5

Soil description	Dark grey slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	2.0	2.0
	Silt	14.4	14.4
	Clay	39.6	39.6
* <60mm values to aid description only		44.0	44.0

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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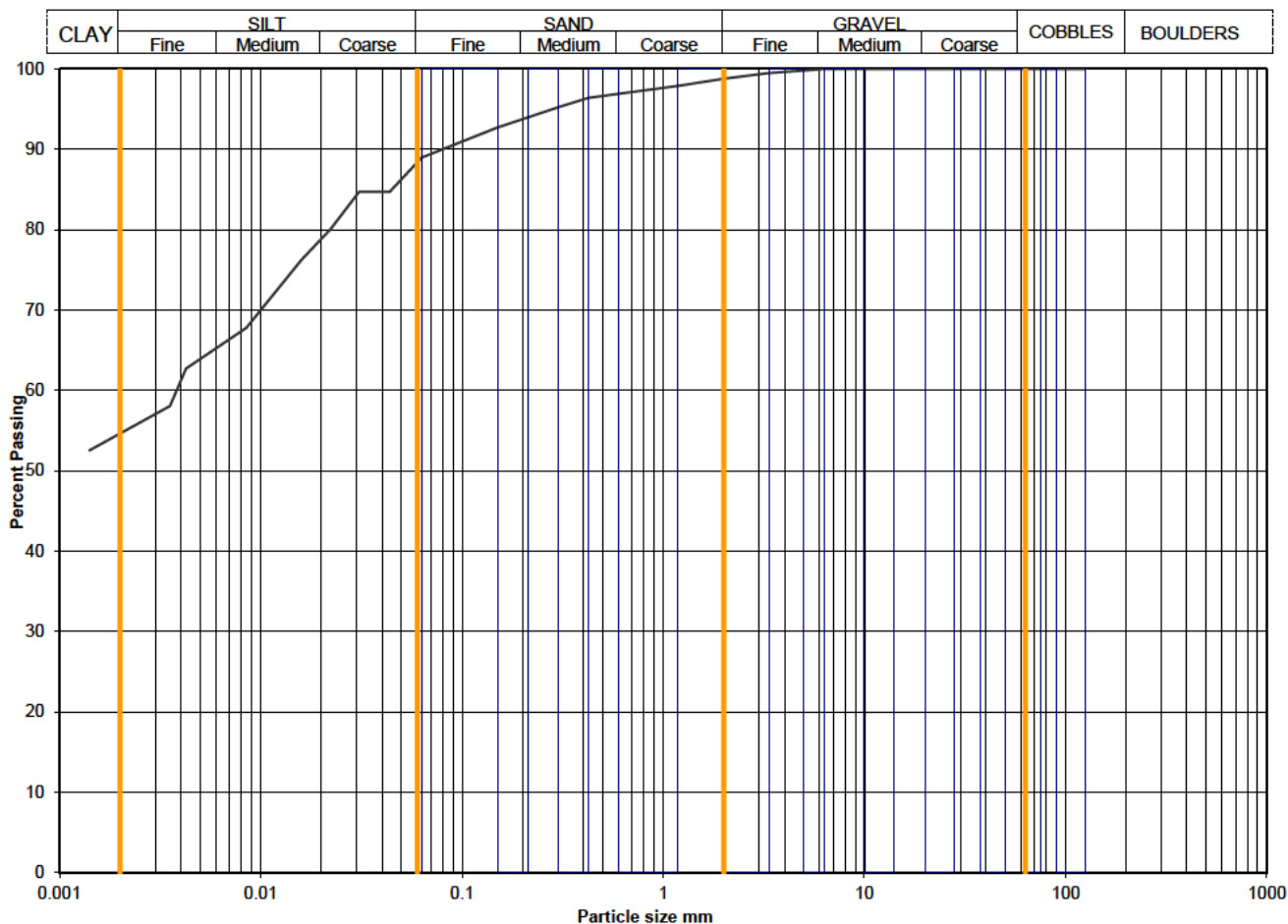
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-11
	A9031-1920191219104933	Sample Depth (m BGL)	1.20 - 1.70
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	89
90	100	0.0436	85
75	100	0.0308	85
63	100	0.0222	80
50	100	0.0159	76
37.5	100	0.0085	68
28	100	0.0042	63
20	100	0.0035	58
14	100	0.0014	53
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	98		
0.600	97		
0.425	96		
0.300	95		
0.212	94		
0.150	93		
0.063	89		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
5.1

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	1.2	1.2
	Silt	9.9	9.9
	Clay	34.3	34.3
*<60mm values to aid description only		54.6	54.6

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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Project Name HAVANT THICKET WATER STORAGE

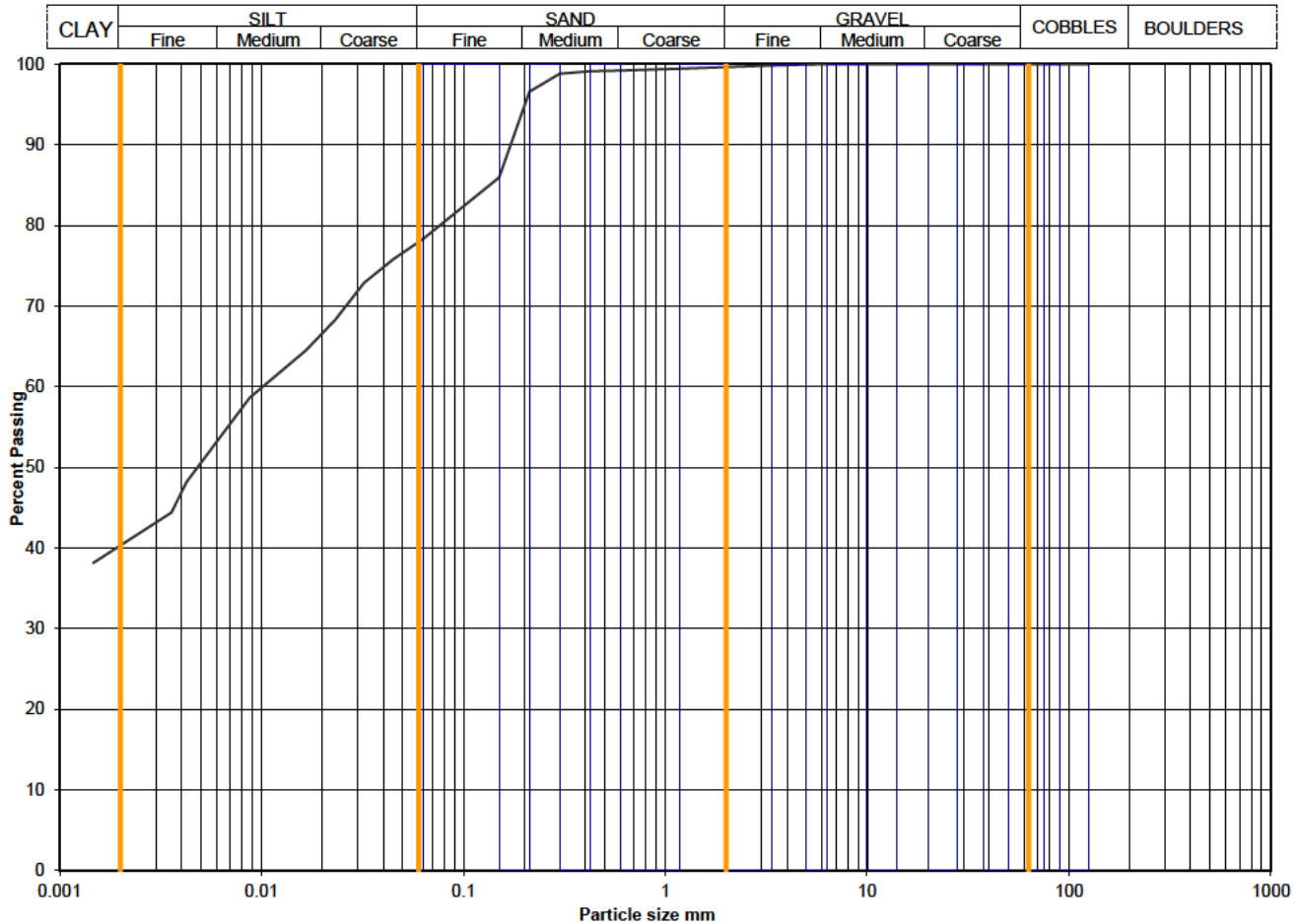
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-11
	A9031-1920191219105135	Sample Depth (m BGL)	5.00 - 5.50
		Sample Type and No	B24
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	78
90	100	0.0450	76
75	100	0.0322	73
63	100	0.0231	68
50	100	0.0166	65
37.5	100	0.0087	59
28	100	0.0042	48
20	100	0.0036	44
14	100	0.0015	38
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99		
0.600	99		
0.425	99		
0.300	99		
0.212	97		
0.150	86		
0.063	78		

Particle density, Mg/m3
2.65 assumed
Dry mass of sample, kg
5.2

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.4	0.4
	Silt	21.3	21.3
	Clay	38.0	38.0
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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Project No A9031-19
Project Name HAVANT THICKET WATER STORAGE

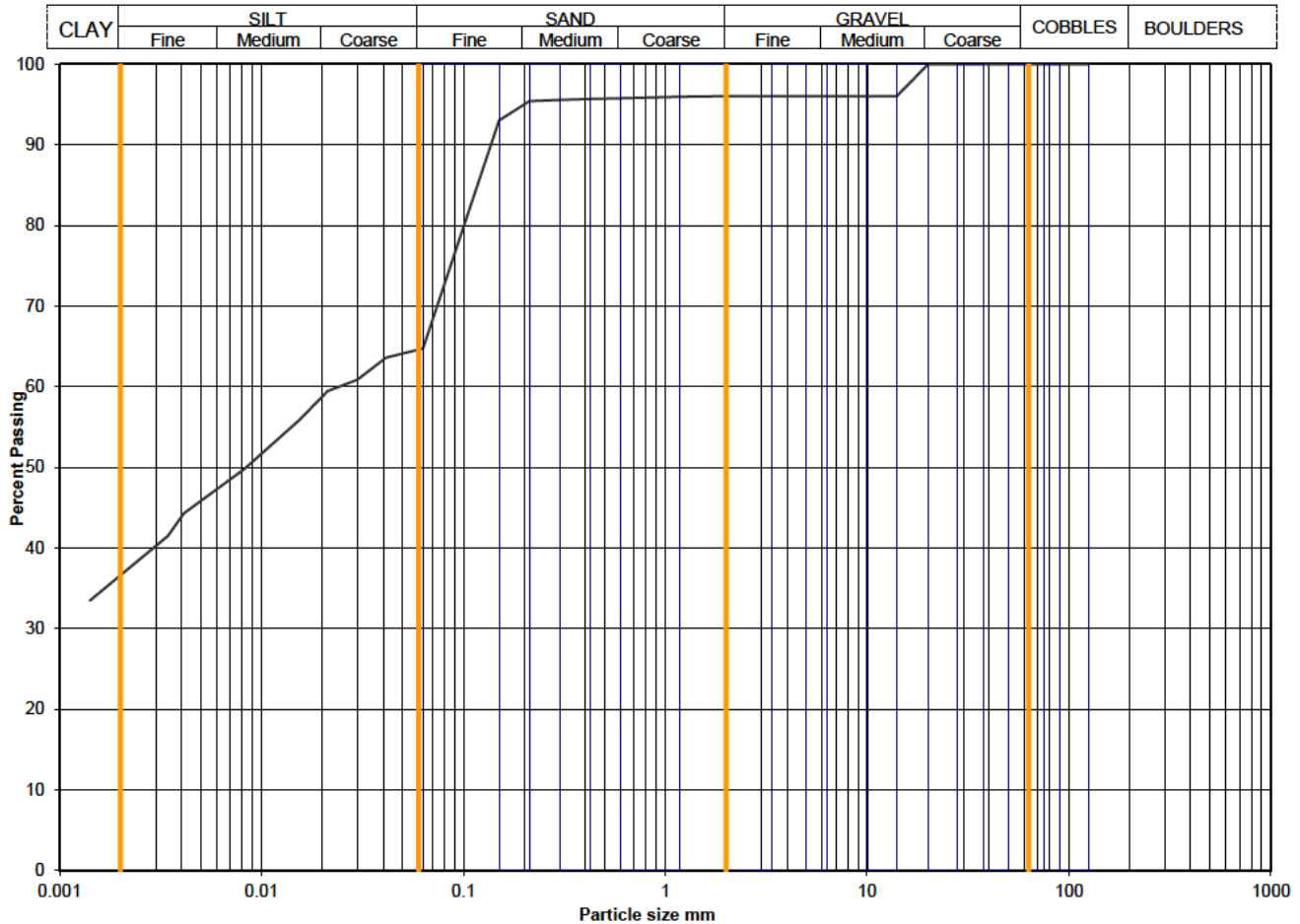
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-12
	A9031-1920191121112258	Sample Depth (m BGL)	1.20 - 1.70
		Sample Type and No	B6
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	65
90	100	0.0413	64
75	100	0.0298	61
63	100	0.0212	59
50	100	0.0154	56
37.5	100	0.0082	50
28	100	0.0041	44
20	100	0.0034	41
14	96	0.0014	33
10	96		
6.3	96		
5.0	96		
3.35	96		
2.00	96		
1.18	96		
0.600	96	Particle density, Mg/m3	
0.425	96	2.65	assumed
0.300	96		
0.212	95	Dry mass of sample, kg	
0.150	93	0.4	
0.063	65		

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	4.0	4.0
	Silt	31.3	31.3
	Clay	28.1	28.1
*<60mm values to aid description only		36.6	36.6

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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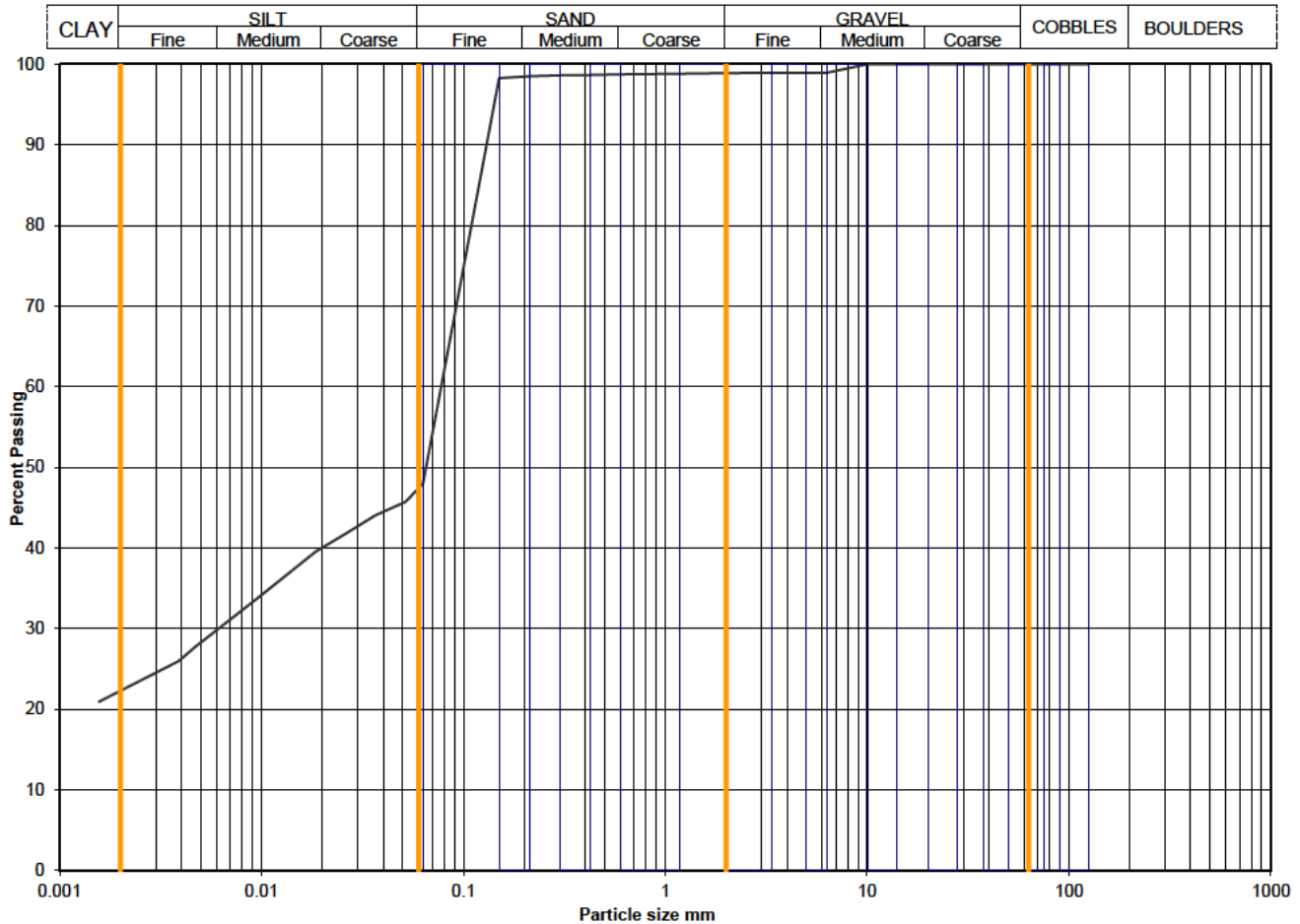
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-12
	A9031-1920191121112406	Sample Depth (m BGL)	4.00 - 4.50
		Sample Type and No	B16
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	48
90	100	0.0517	46
75	100	0.0367	44
63	100	0.0261	42
50	100	0.0185	40
37.5	100	0.0097	34
28	100	0.0047	28
20	100	0.0039	26
14	100	0.0016	21
10	100		
6.3	99		
5.0	99		
3.35	99		
2.00	99		
1.18	99		
0.600	99	Particle density, Mg/m3	
0.425	99	2.65	assumed
0.300	99		
0.212	99	Dry mass of sample, kg	
0.150	98	0.6	
0.063	48		

Soil description	Dark grey sandy silty CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	1.1	1.1
	Silt	50.9	50.9
	Clay	25.7	25.7
*<60mm values to aid description only		22.3	22.3

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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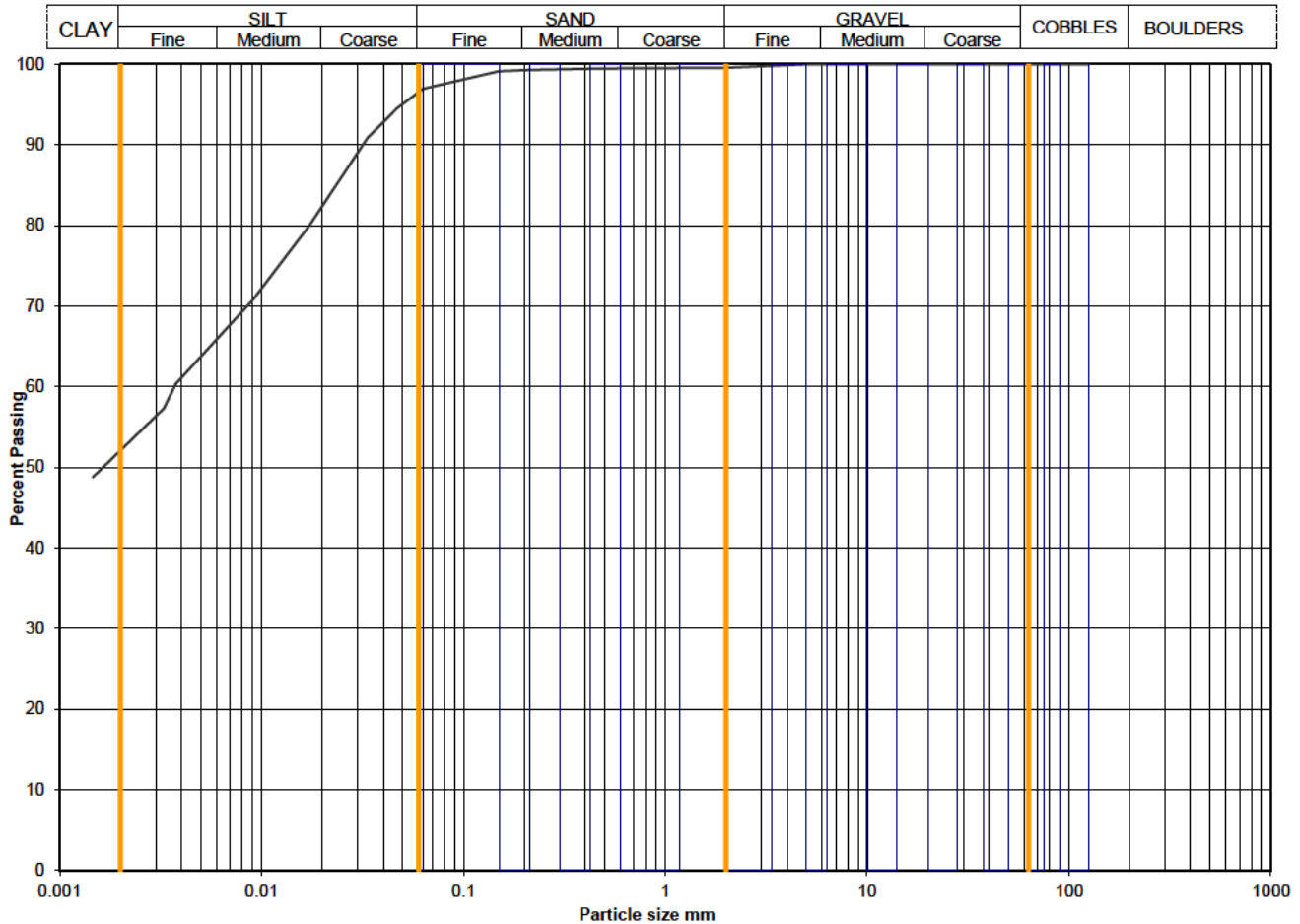
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-12
	A9031-1920191121112453	Sample Depth (m BGL)	6.00 - 6.50
		Sample Type and No	B24
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0468	95
75	100	0.0334	91
63	100	0.0239	85
50	100	0.0171	80
37.5	100	0.0090	71
28	100	0.0038	60
20	100	0.0033	57
14	100	0.0015	49
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	99	Particle density, Mg/m3	
0.425	99	2.65 assumed	
0.300	99	Dry mass of sample, kg	
0.212	99	0.6	
0.150	99		
0.063	97		

Soil description	Grey and reddish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.5	0.5
	Silt	2.6	2.6
	Clay	44.8	44.8
*<60mm values to aid description only		52.1	52.1

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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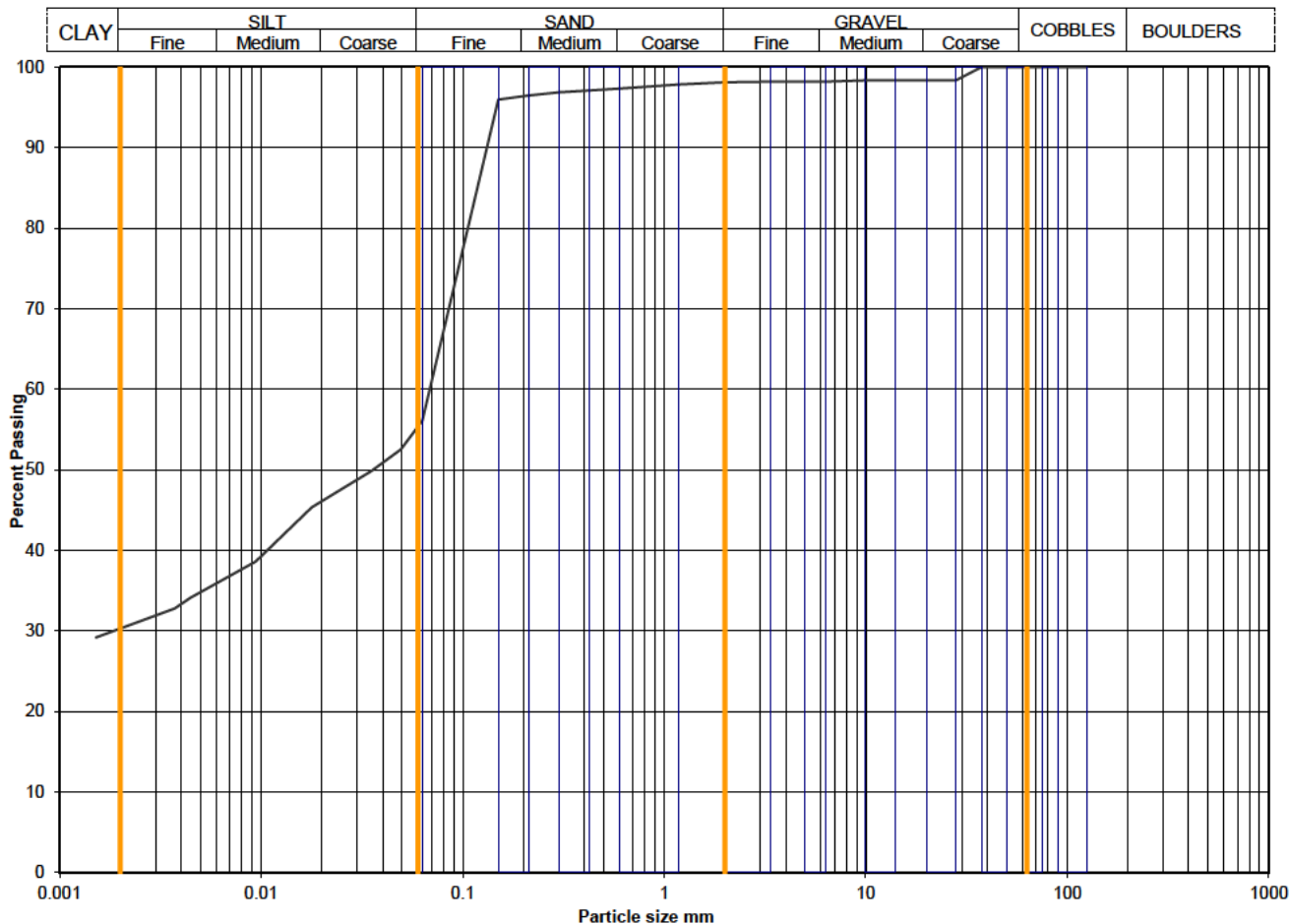
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-13A
	A9031-1920191127033721	Sample Depth (m BGL)	2.00 - 2.50
		Sample Type and No	B12
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	56
90	100	0.0494	53
75	100	0.0352	50
63	100	0.0251	48
50	100	0.0178	45
37.5	100	0.0094	39
28	98	0.0045	34
20	98	0.0037	33
14	98	0.0015	29
10	98		
6.3	98		
5.0	98		
3.35	98		
2.00	98		
1.18	98		
0.600	97	Particle density, Mg/m3	
0.425	97	2.65 assumed	
0.300	97	Dry mass of sample, kg	
0.212	96	3.4	
0.150	96		
0.063	56		

Soil description	Brown slightly gravelly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	1.9	1.9
	Silt	42.0	42.0
	Clay	25.8	25.8
*<60mm values to aid description only		30.3	30.3

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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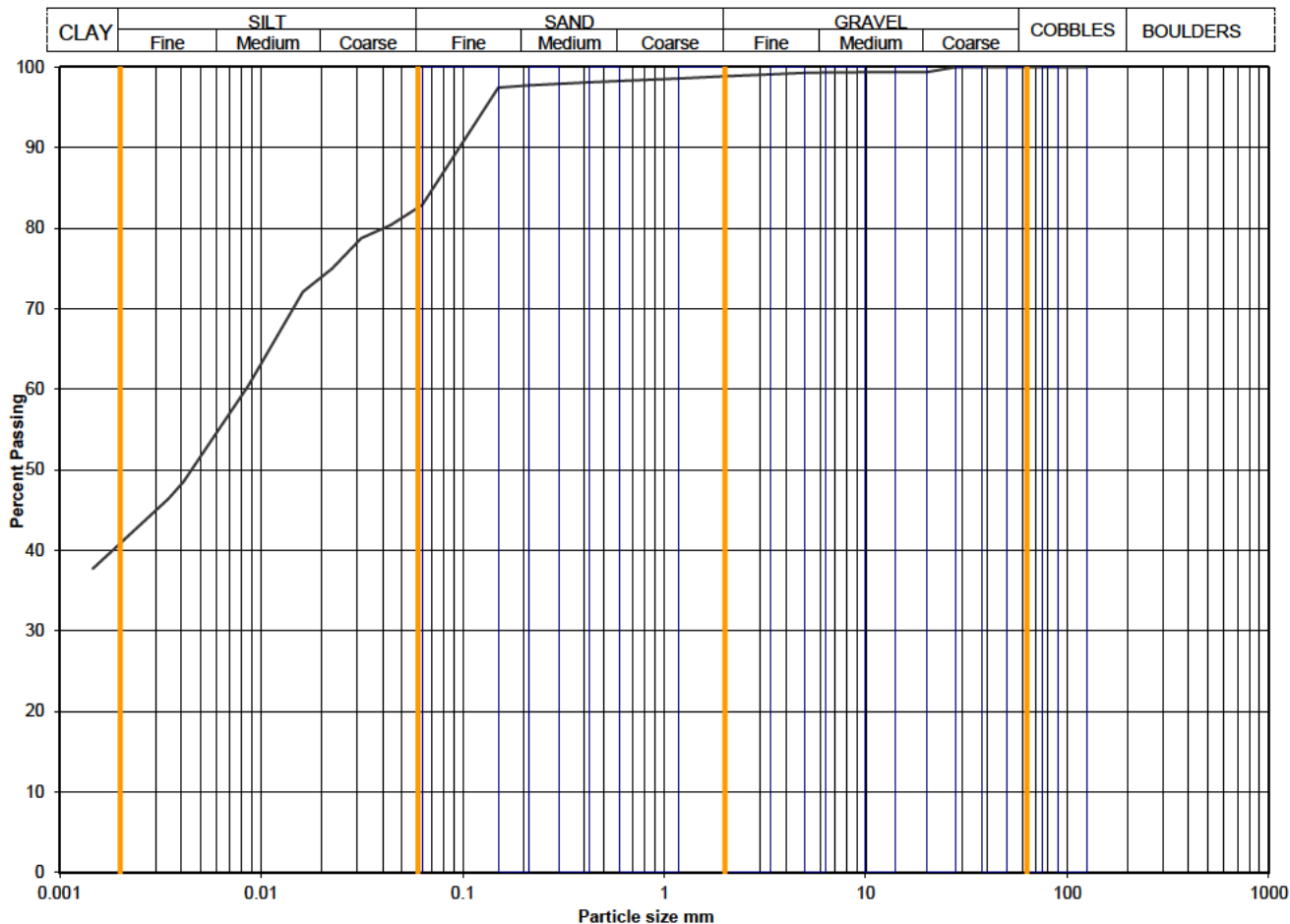
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-13A
	A9031-1920191127033803	Sample Depth (m BGL)	4.50 - 5.00
		Sample Type and No	B21
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	83
90	100	0.0441	80
75	100	0.0314	79
63	100	0.0225	75
50	100	0.0161	72
37.5	100	0.0087	61
28	100	0.0041	48
20	99	0.0035	46
14	99	0.0015	38
10	99		
6.3	99		
5.0	99		
3.35	99		
2.00	99		
1.18	99		
0.600	98	Particle density, Mg/m3	
0.425	98	2.65	assumed
0.300	98		
0.212	98	Dry mass of sample, kg	
0.150	97	10.4	
0.063	83		

Soil description	Grey and reddish brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	1.1	1.1
	Silt	16.0	16.0
	Clay	42.0	42.0
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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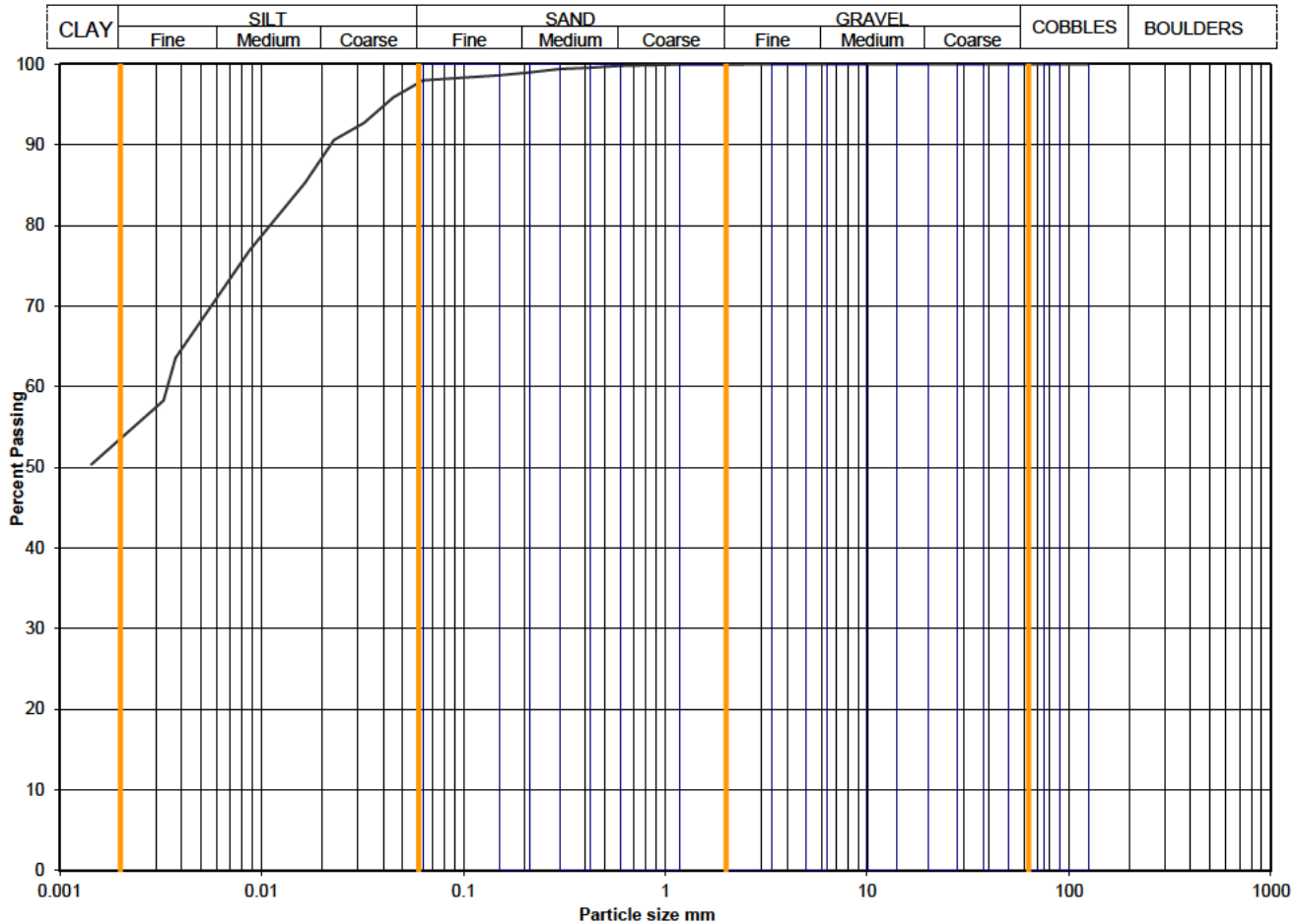
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-14
	A9031-1920191218101937	Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B9
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	98
90	100	0.0450	96
75	100	0.0321	93
63	100	0.0229	91
50	100	0.0164	85
37.5	100	0.0087	77
28	100	0.0038	64
20	100	0.0033	58
14	100	0.0014	50
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65	assumed
0.300	99		
0.212	99	Dry mass of sample, kg	
0.150	99	0.4	
0.063	98		

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.0	0.0
	Silt	2.0	2.0
	Clay	44.5	44.5
*<60mm values to aid description only		53.5	53.5

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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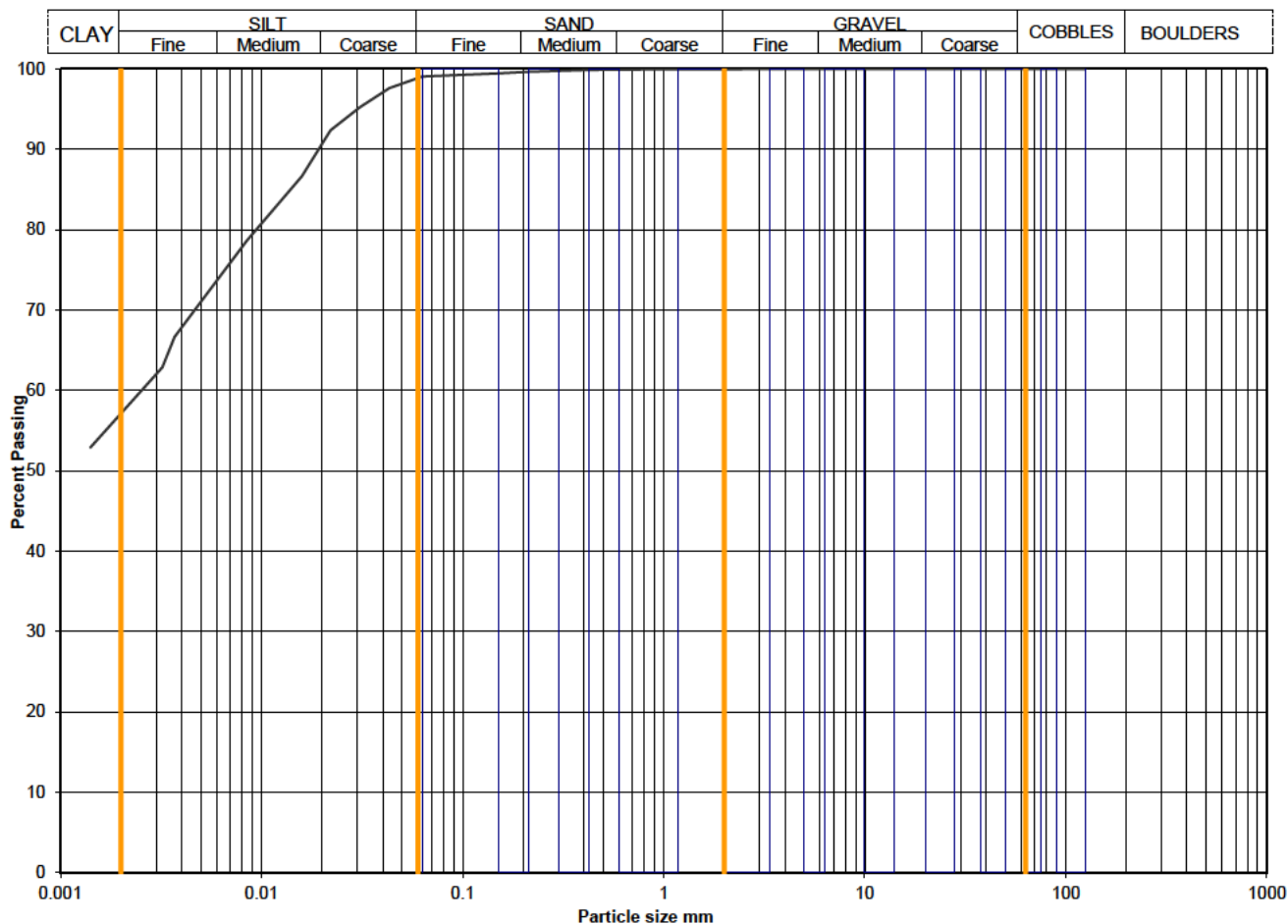
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-15
	A9031-1920191212110228	Sample Depth (m BGL)	0.50 - 0.80
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	99
90	100	0.0433	98
75	100	0.0308	95
63	100	0.0220	92
50	100	0.0159	87
37.5	100	0.0084	79
28	100	0.0037	67
20	100	0.0032	63
14	100	0.0014	53
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	99		
0.063	99		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.3

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.0	0.0
	Silt	41.9	41.9
	Clay	57.1	57.1

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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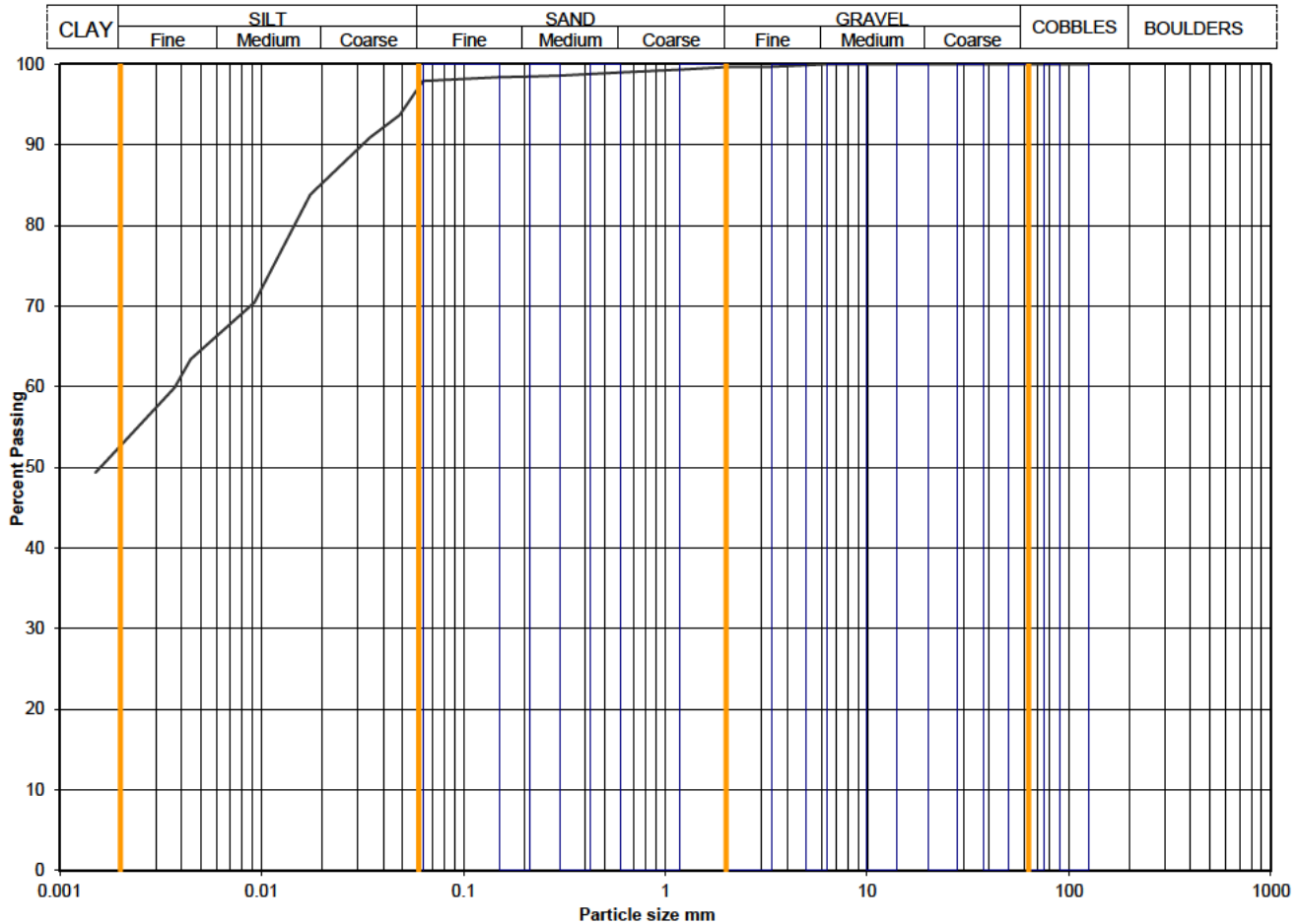
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-15
	A9031-1920191212110418	Sample Depth (m BGL)	2.00 - 2.50
		Sample Type and No	B11
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	98
90	100	0.0483	94
75	100	0.0344	91
63	100	0.0245	87
50	100	0.0174	84
37.5	100	0.0092	70
28	100	0.0044	63
20	100	0.0037	60
14	100	0.0015	49
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99		
0.600	99		
0.425	99		
0.300	99		
0.212	98		
0.150	98		
0.063	98		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.4

Soil description	Grey and brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.3	0.3
	Silt	1.7	1.7
	Clay	45.3	45.3
*<60mm values to aid description only		52.7	52.7

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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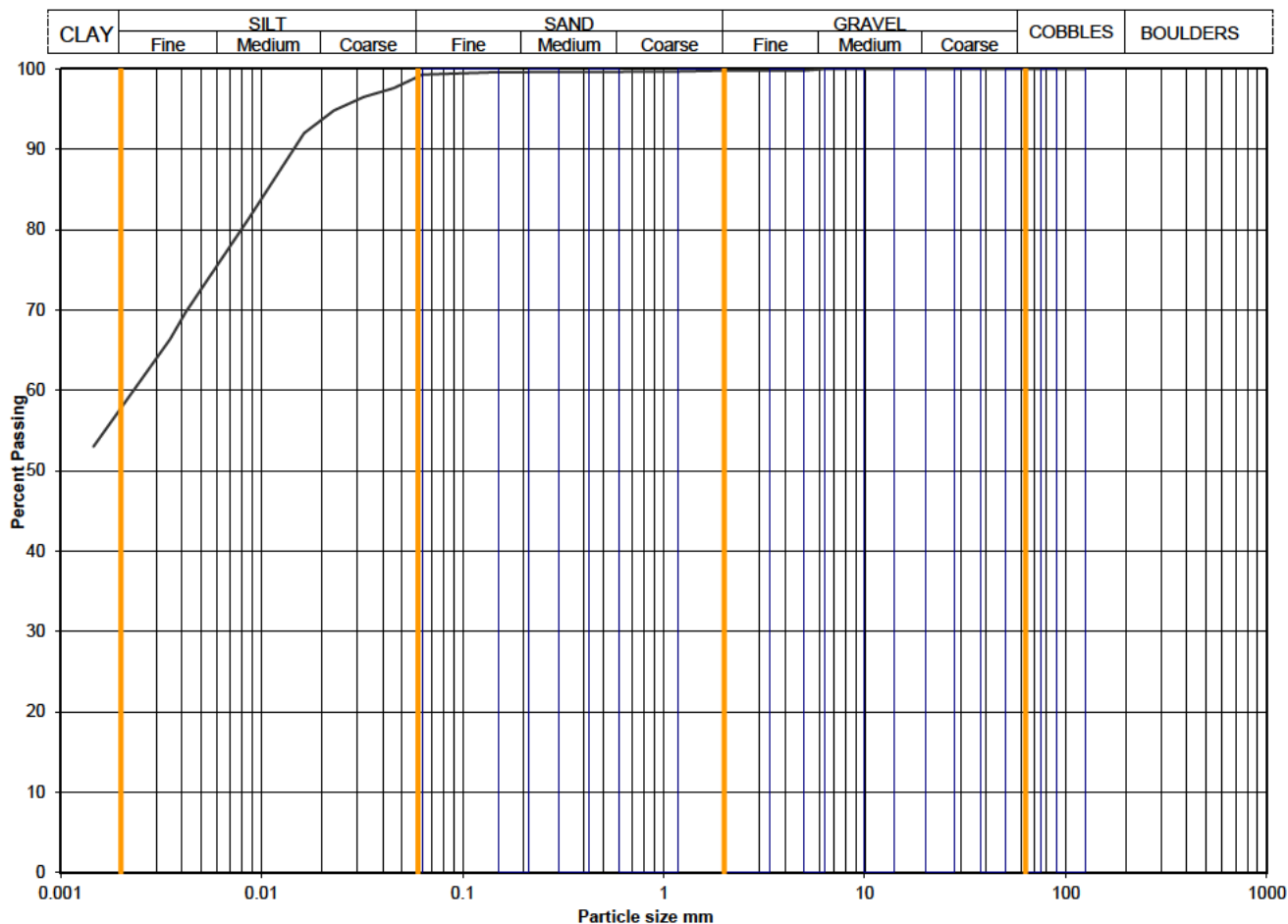
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-15
	A9031-1920191204052617	Sample Depth (m BGL)	6.00 - 6.50
		Sample Type and No	B26
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	99
90	100	0.0454	98
75	100	0.0322	97
63	100	0.0229	95
50	100	0.0163	92
37.5	100	0.0087	81
28	100	0.0042	70
20	100	0.0035	66
14	100	0.0015	53
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	100		
0.063	99		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.3

Soil description	Dark greyish brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.2	0.2
	Silt	0.5	0.5
	Clay	41.5	41.5
*<60mm values to aid description only		57.8	57.8

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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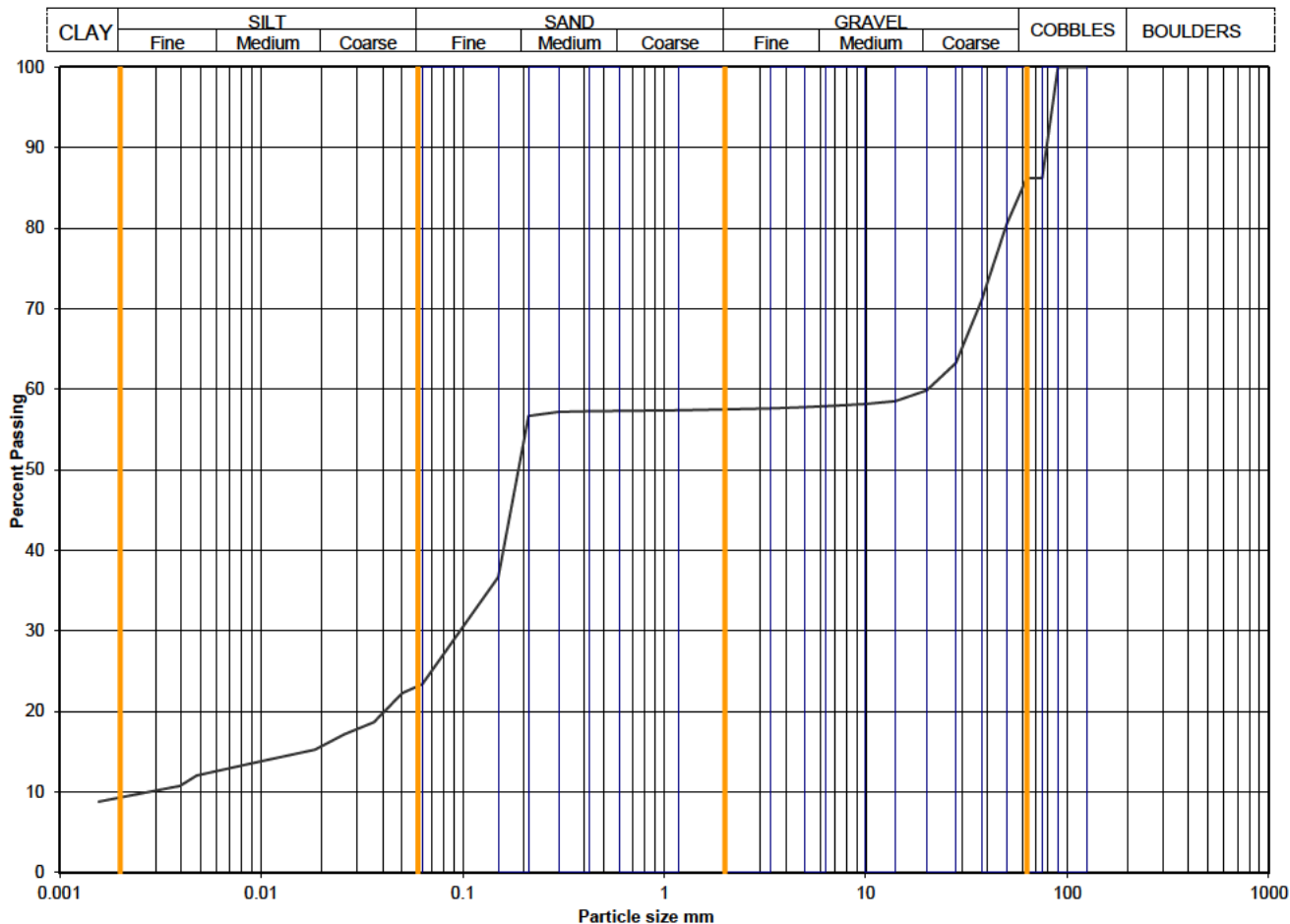
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-16
	A9031-1920191219115944	Sample Depth (m BGL)	1.70 - 2.00
		Sample Type and No	B3a
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	23
90	100	0.0502	22
75	86	0.0363	19
63	86	0.0259	17
50	80	0.0185	15
37.5	71	0.0096	14
28	63	0.0048	12
20	60	0.0040	11
14	59	0.0016	9
10	58		
6.3	58		
5.0	58		
3.35	58		
2.00	57		
1.18	57		
0.600	57	Particle density, Mg/m3	
0.425	57	2.65	assumed
0.300	57		
0.212	57	Dry mass of sample, kg	
0.150	37	7.1	
0.063	23		

Soil description	Brown sandy very clayey GRAVEL with one cobble.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	13.8	0.0
	Sand	28.7	33.3
	Silt	34.1	39.6
	Clay	14.1	16.4
*<60mm values to aid description only		9.3	10.8

Uniformity Coefficient	D60 / D10	7252
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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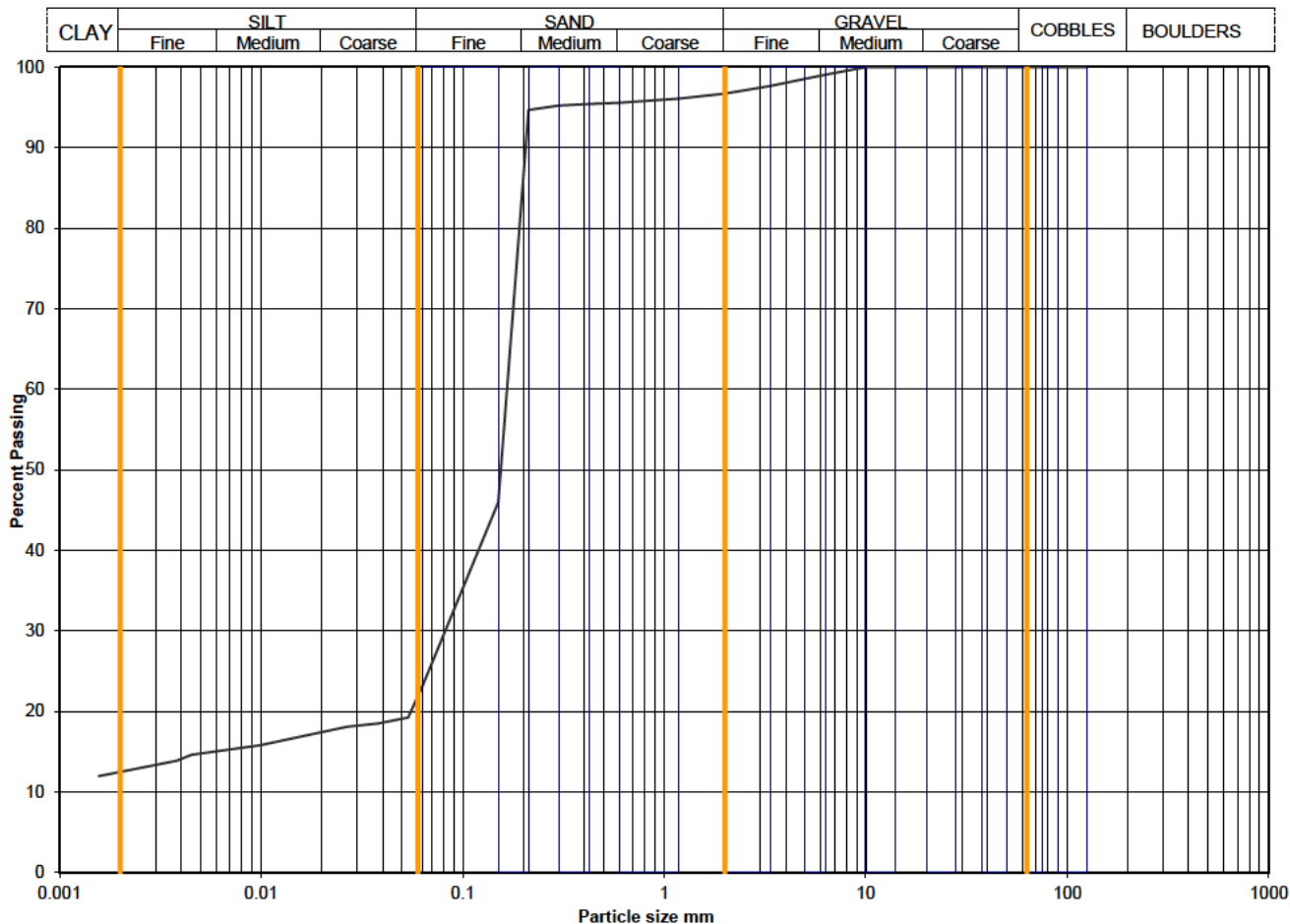
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-RC-02
	A9031-1920191114123624	Sample Depth (m BGL)	1.70 - 2.00
		Sample Type and No	B9
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	23
90	100	0.0536	19
75	100	0.0380	18
63	100	0.0269	18
50	100	0.0191	17
37.5	100	0.0099	16
28	100	0.0045	15
20	100	0.0038	14
14	100	0.0016	12
10	100		
6.3	99		
5.0	99		
3.35	98		
2.00	97		
1.18	96		
0.600	96		
0.425	95		
0.300	95		
0.212	95		
0.150	46		
0.063	23		

Particle density, Mg/m3

2.65 assumed

Dry mass of sample, kg

7.2

Soil description	Brown slightly gravelly silty SAND.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	3.3	3.3
	Silt	73.6	73.6
	Clay	10.6	10.6
*<60mm values to aid description only		12.5	12.5

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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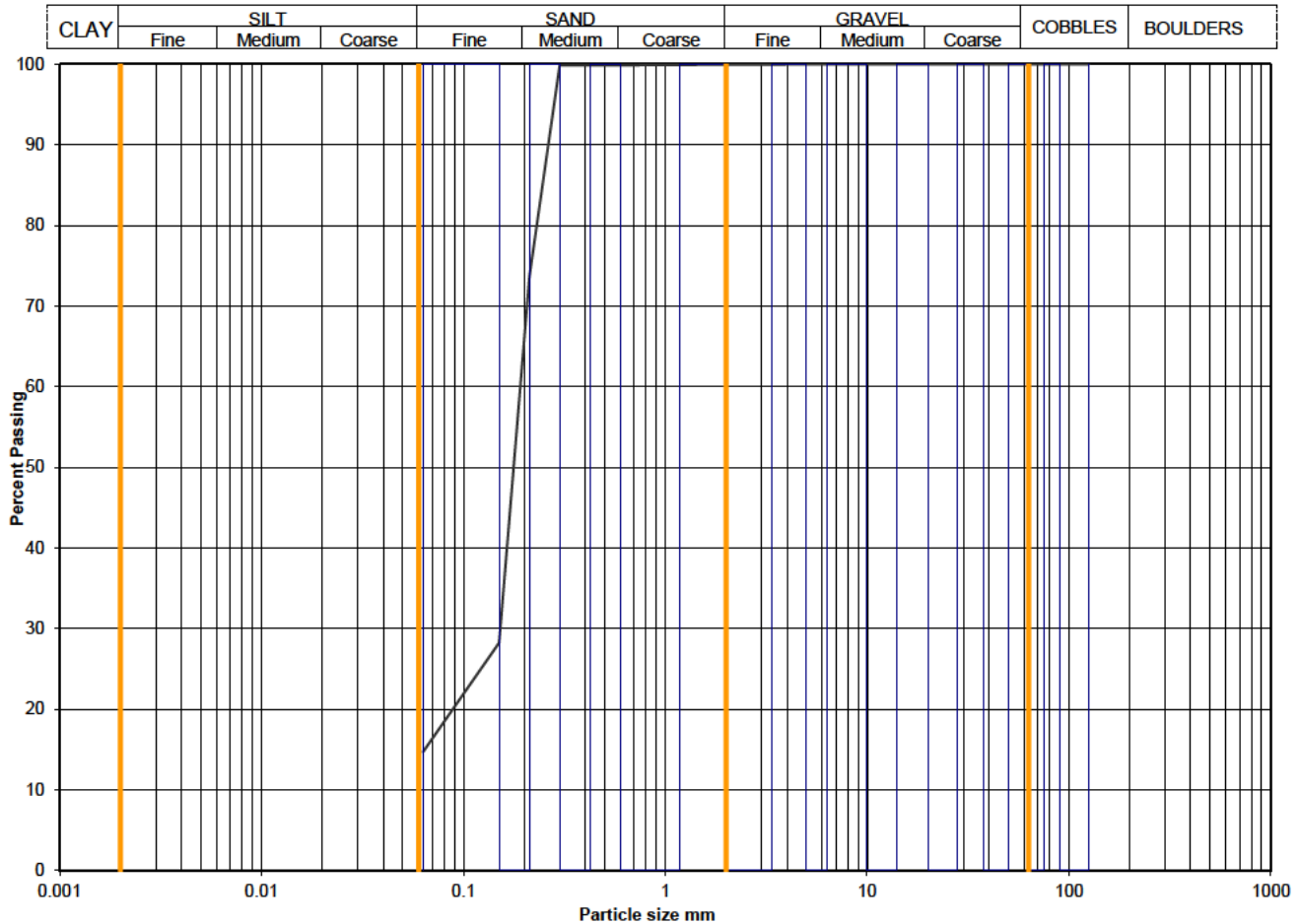
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-RC-02
	A9031-1920191114123636	Sample Depth (m BGL)	2.00 - 2.50
		Sample Type and No	B12
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	74		
0.150	28		
0.063	15		

Soil description	Brown clayey SAND.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	85.3	85.3
	Silt	silt+clay =	
	Clay	14.7	14.7

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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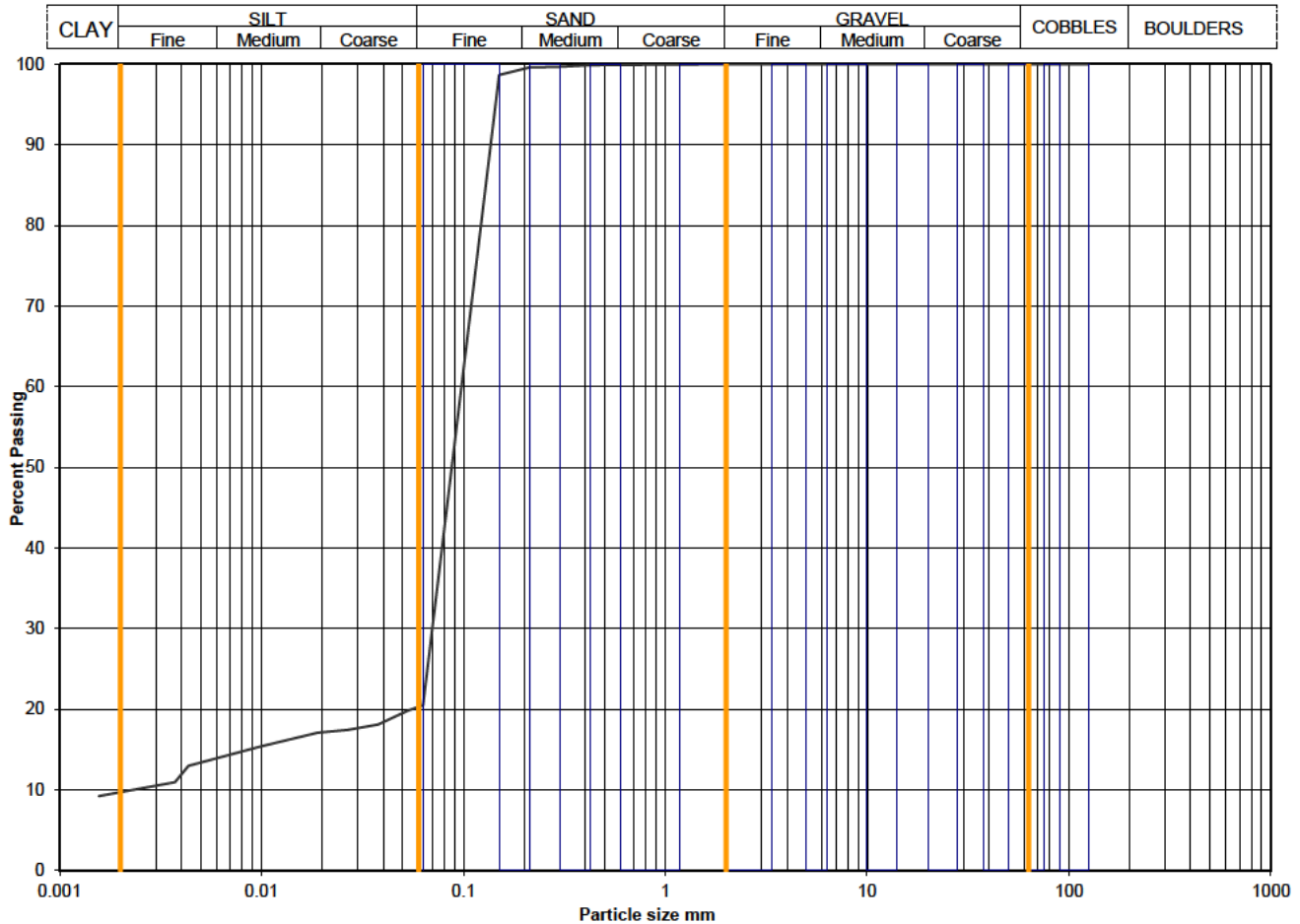
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-RC-02
	A9031-1920191114123653	Sample Depth (m BGL)	3.00 - 3.50
		Sample Type and No	B16
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	20
90	100	0.0531	20
75	100	0.0378	18
63	100	0.0268	17
50	100	0.0189	17
37.5	100	0.0098	15
28	100	0.0043	13
20	100	0.0037	11
14	100	0.0016	9
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65 assumed	
0.300	100	Dry mass of sample, kg	
0.212	100	1.8	
0.150	99		
0.063	20		

Soil description	Brown clayey SAND.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	79.5	79.5
	Silt	10.8	10.8
	Clay	9.7	9.7

*<60mm values to aid description only

Uniformity Coefficient	D60 / D10	42
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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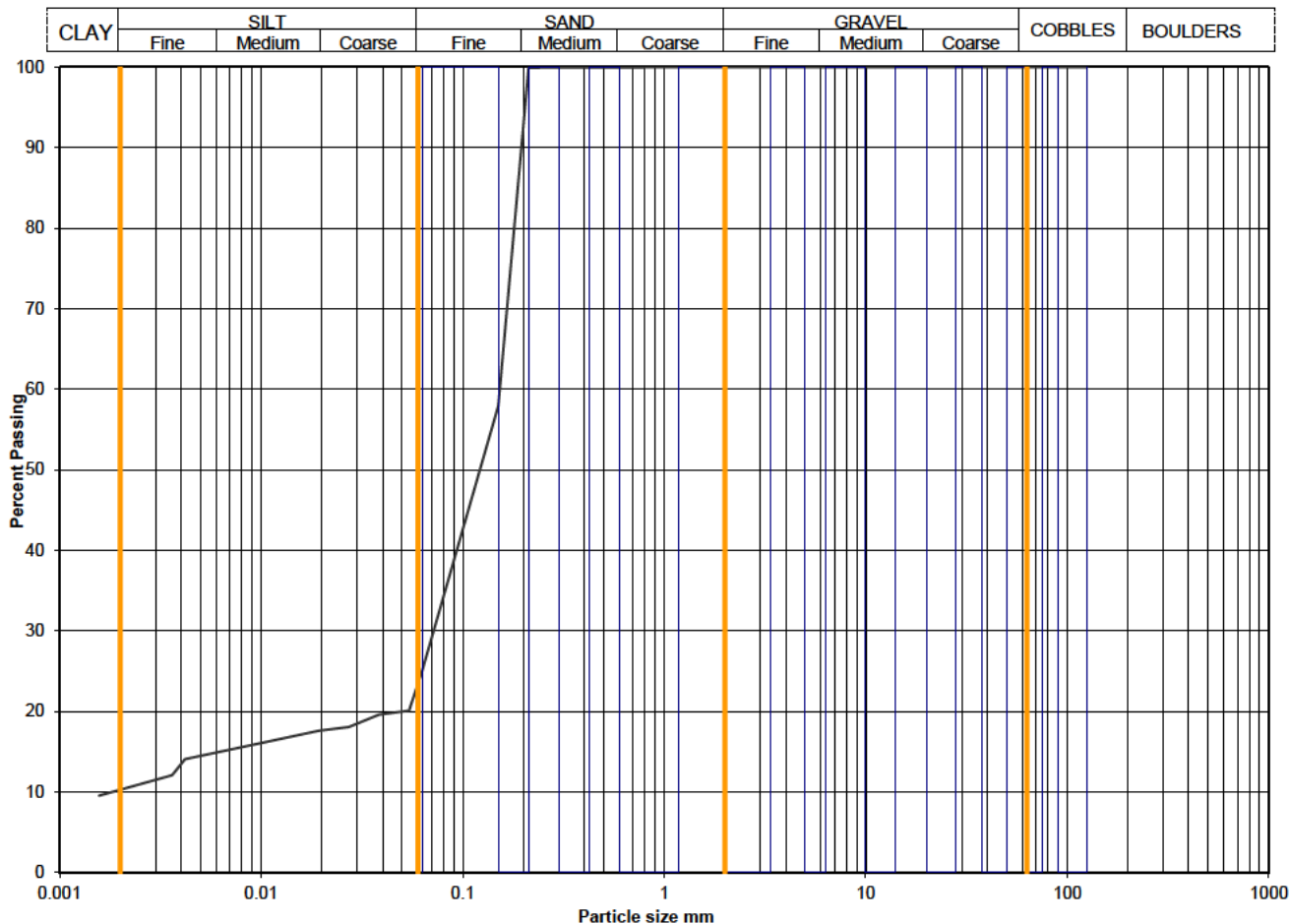
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-RC-02
	A9031-1920191114123710	Sample Depth (m BGL)	4.00 - 4.50
		Sample Type and No	B20
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	25
90	100	0.0542	20
75	100	0.0384	20
63	100	0.0272	18
50	100	0.0193	18
37.5	100	0.0100	16
28	100	0.0042	14
20	100	0.0036	12
14	100	0.0016	10
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	58		
0.063	25		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
8.8

Soil description	Brown very clayey SAND.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	74.9	74.9
	Silt	14.8	14.8
	Clay	10.3	10.3

Uniformity Coefficient	D60 / D10	83
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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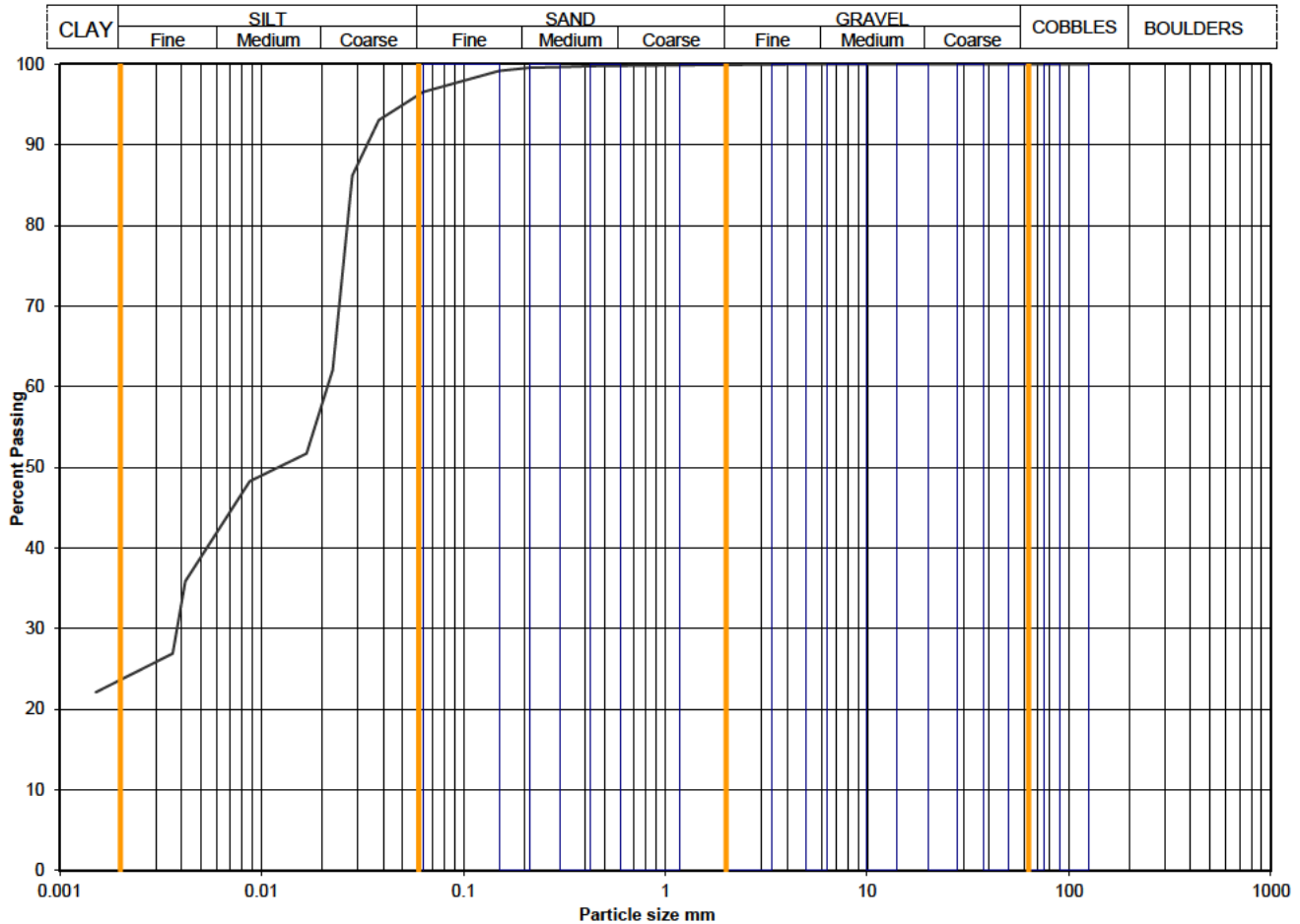
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-01
	A9031-1920191114114654	Sample Depth (m BGL)	1.00 - 1.20
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0381	93
75	100	0.0281	86
63	100	0.0225	62
50	100	0.0167	52
37.5	100	0.0087	48
28	100	0.0042	36
20	100	0.0036	27
14	100	0.0015	22
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	99		
0.063	97		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
9.5

Soil description	Brown slightly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.1	0.1
	Silt	3.4	3.4
	Clay	72.9	72.9
*<60mm values to aid description only		23.6	23.6

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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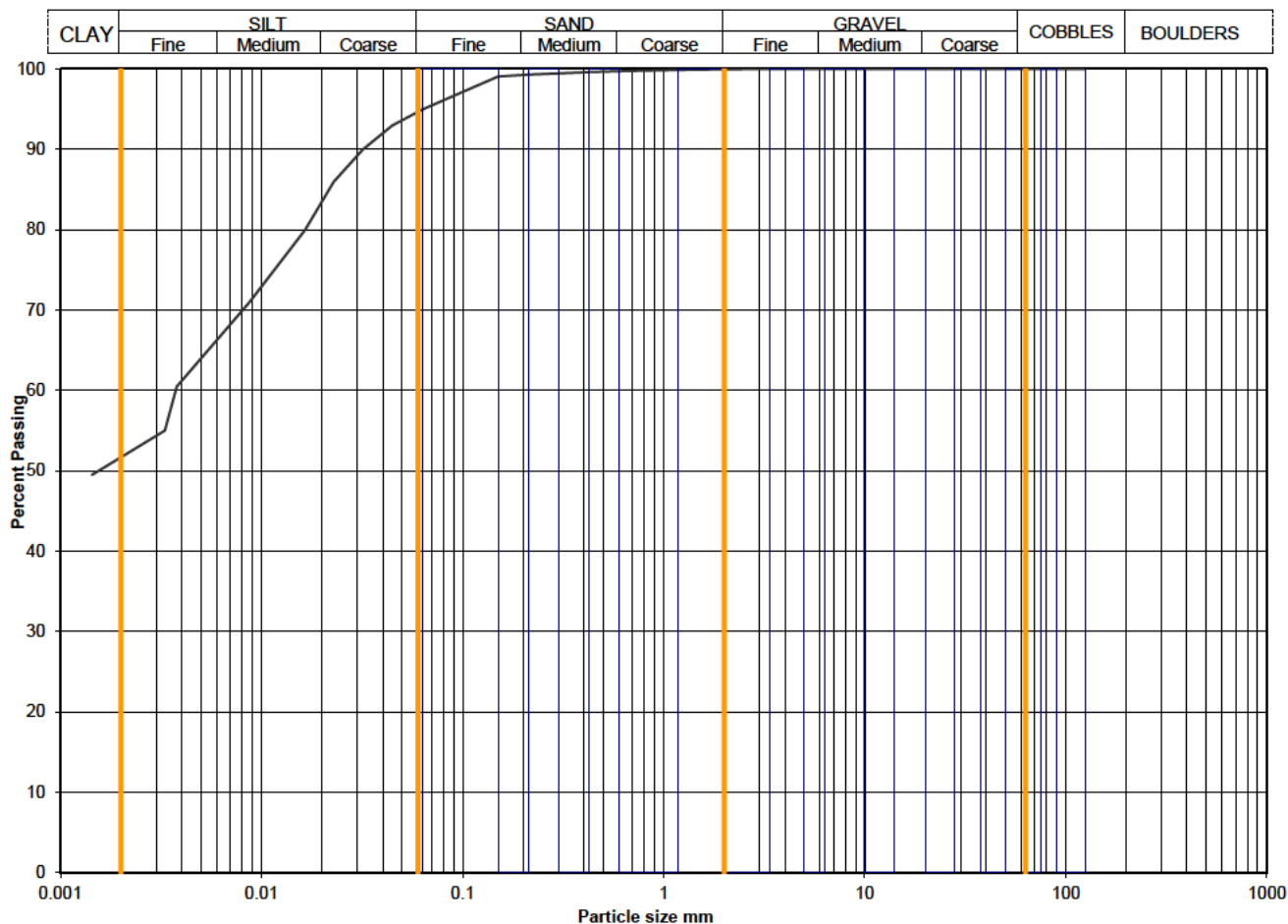
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-01
	A9031-1920191114114711	Sample Depth (m BGL)	2.80 - 2.90
		Sample Type and No	B12
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	95
90	100	0.0446	93
75	100	0.0319	90
63	100	0.0228	86
50	100	0.0164	80
37.5	100	0.0087	71
28	100	0.0038	60
20	100	0.0033	55
14	100	0.0014	49
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	99		
0.212	99		
0.150	99		
0.063	95		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
6.9

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	5.0	5.0
	Silt	43.3	43.3
	Clay	51.7	51.7

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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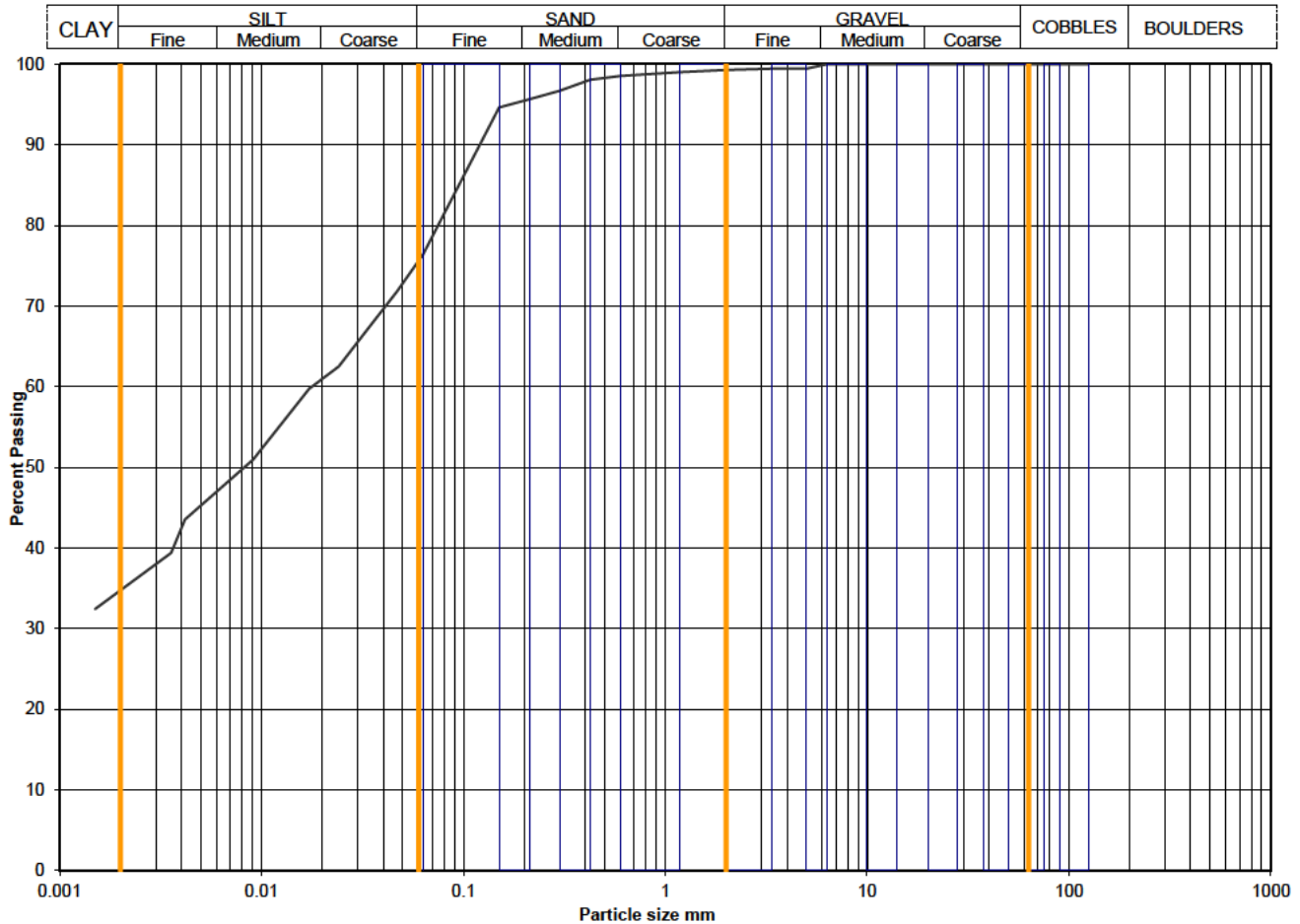
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-02
	A9031-1920191113101637	Sample Depth (m BGL)	2.20 - 2.40
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	76
90	100	0.0468	72
75	100	0.0336	67
63	100	0.0241	63
50	100	0.0172	60
37.5	100	0.0091	51
28	100	0.0042	44
20	100	0.0036	39
14	100	0.0015	32
10	100		
6.3	100		
5.0	99		
3.35	99		
2.00	99		
1.18	99		
0.600	99		
0.425	98		
0.300	97		
0.212	96		
0.150	95		
0.063	76		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
0.4

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.7	0.7
	Silt	22.9	22.9
	Clay	41.7	41.7

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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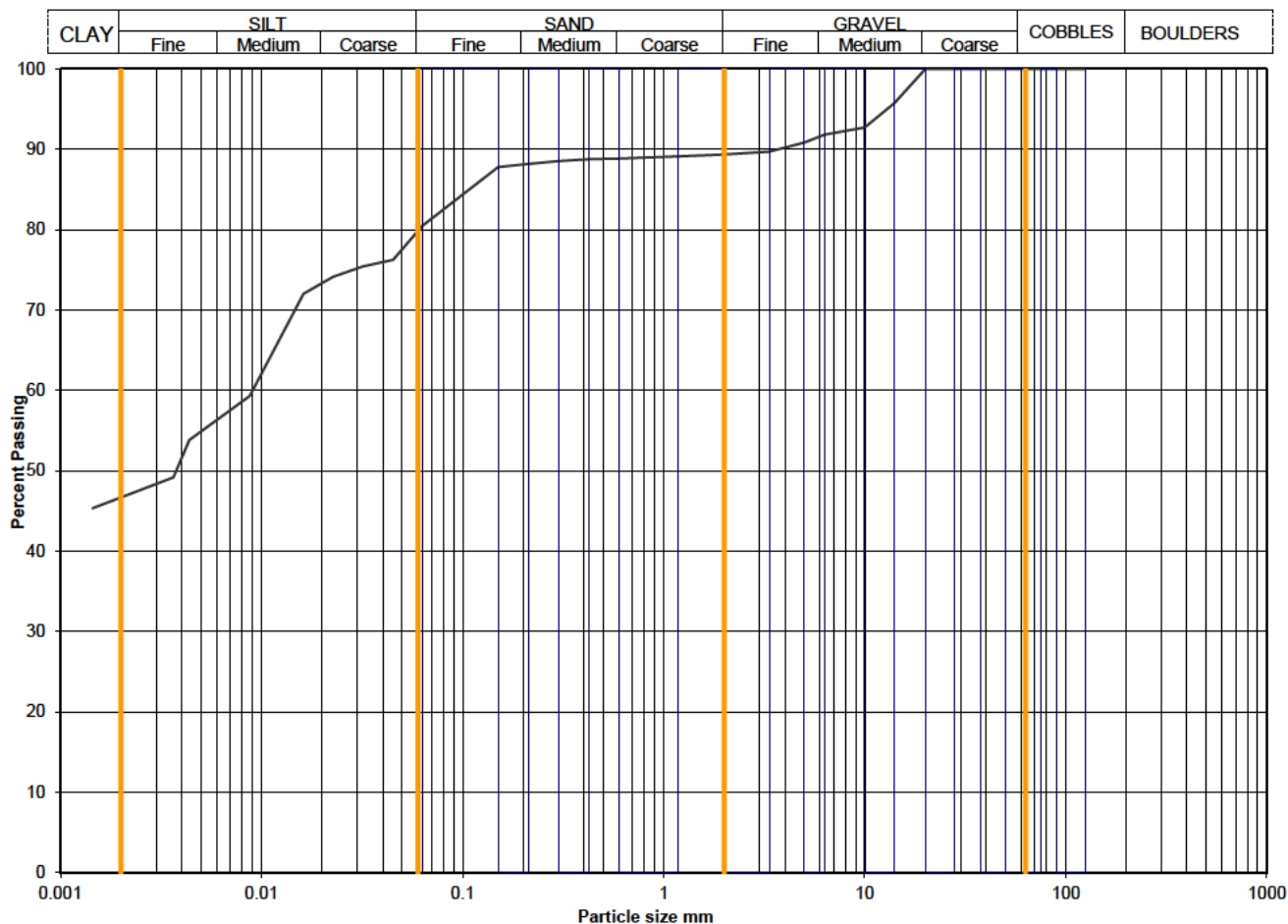
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-03
	A9031-1920191115080831	Sample Depth (m BGL)	0.50 - 0.60
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	80
90	100	0.0451	76
75	100	0.0320	75
63	100	0.0227	74
50	100	0.0162	72
37.5	100	0.0087	59
28	100	0.0044	54
20	100	0.0036	49
14	96	0.0014	45
10	93		
6.3	92		
5.0	91		
3.35	90		
2.00	89		
1.18	89		
0.600	89		
0.425	89		
0.300	89		
0.212	88		
0.150	88		
0.063	80		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
13.2

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	10.6	10.6
	Silt	8.9	8.9
	Clay	33.8	33.8
*<60mm values to aid description only		46.7	46.7

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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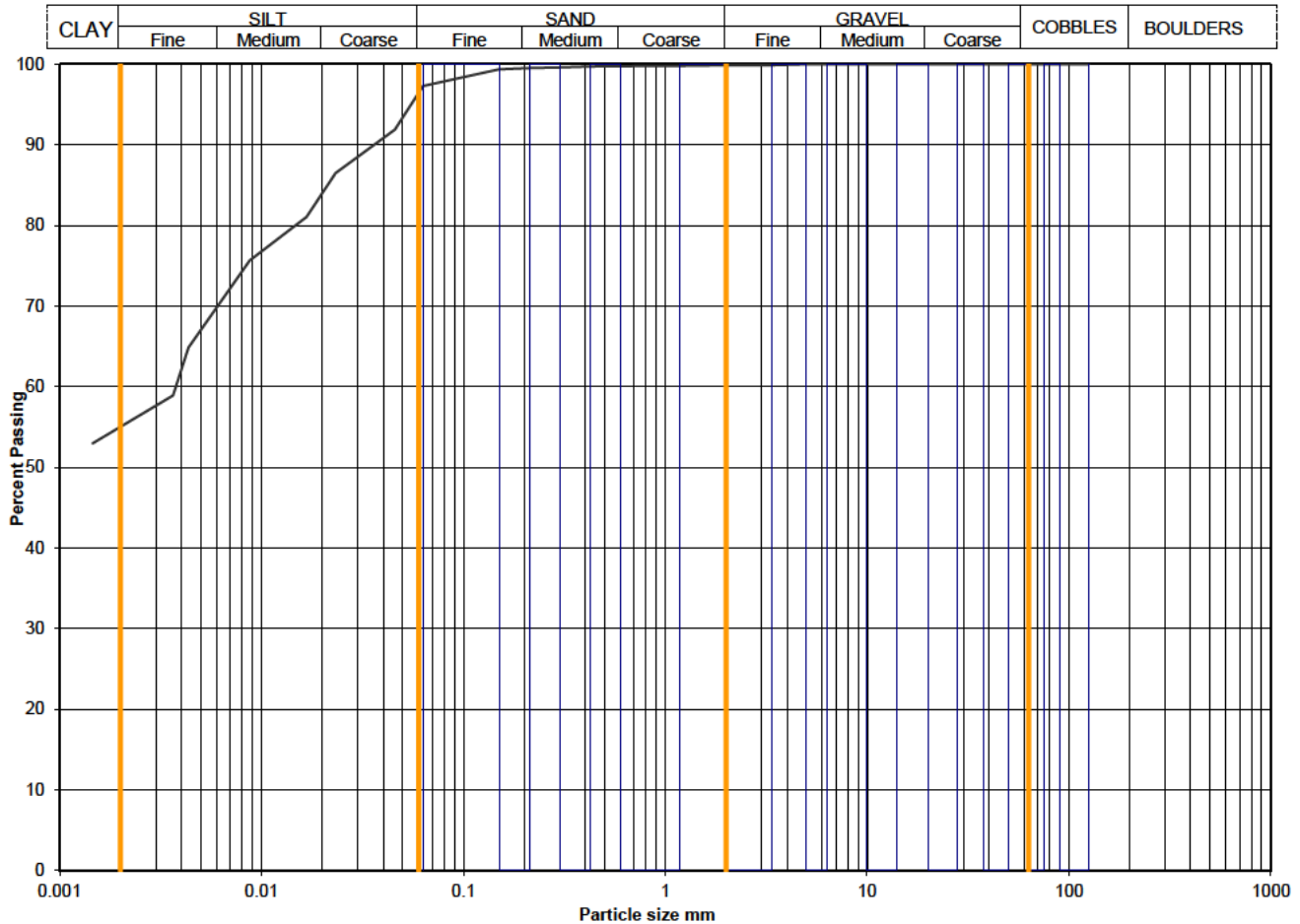
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-03
	A9031-1920191115080841	Sample Depth (m BGL)	0.90 - 1.00
		Sample Type and No	B6
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0458	92
75	100	0.0326	89
63	100	0.0232	86
50	100	0.0167	81
37.5	100	0.0087	76
28	100	0.0043	65
20	100	0.0036	59
14	100	0.0015	53
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	99		
0.063	97		

Particle density, Mg/m3
2.65 assumed
Dry mass of sample, kg
7.3

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.1	0.1
	Silt	2.6	2.6
	Clay	42.3	42.3
*<60mm values to aid description only		55.0	55.0

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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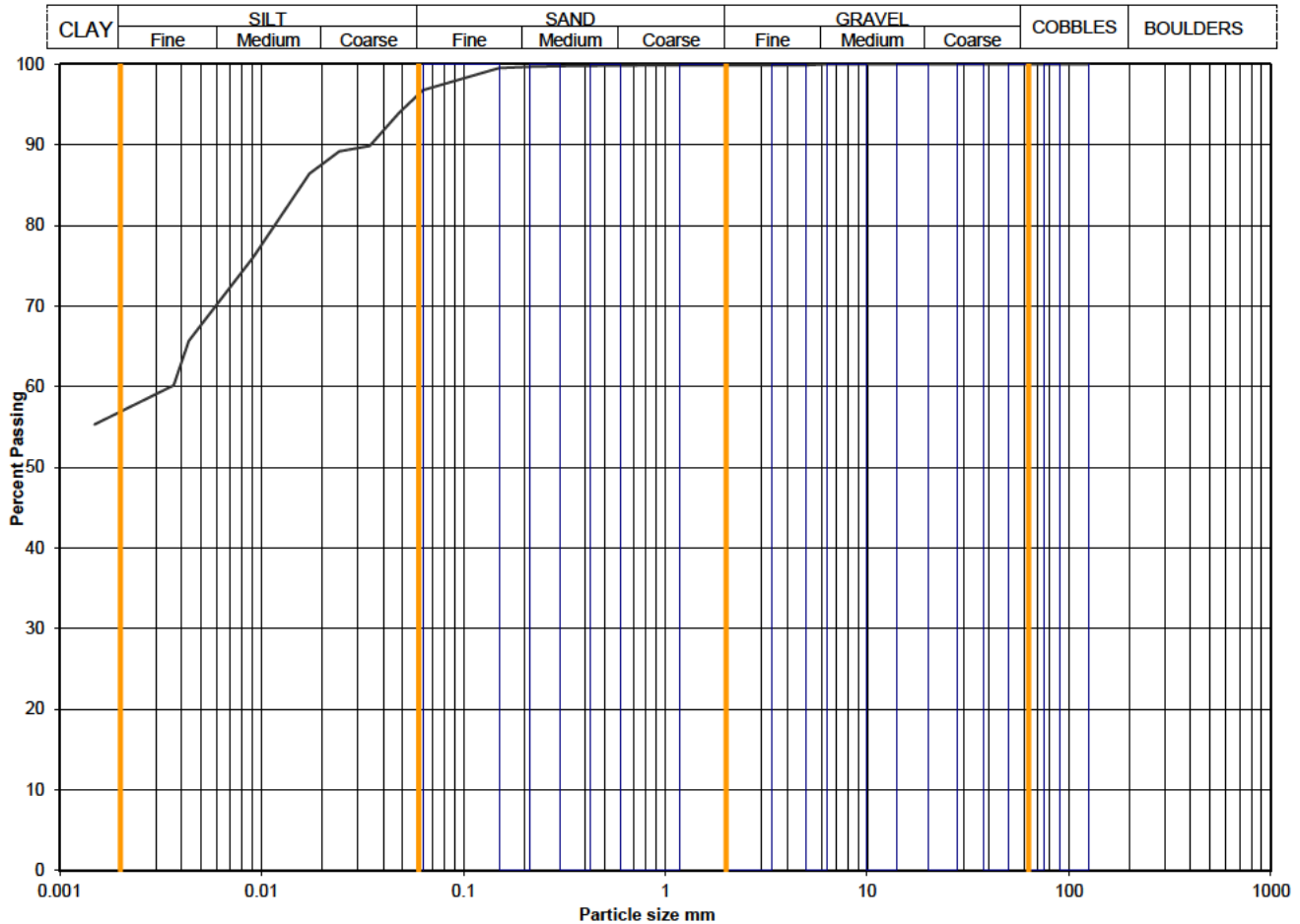
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-03
	A9031-1920191115080900	Sample Depth (m BGL)	2.20 - 2.40
		Sample Type and No	B11
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	97
90	100	0.0481	94
75	100	0.0343	90
63	100	0.0243	89
50	100	0.0173	86
37.5	100	0.0091	76
28	100	0.0044	66
20	100	0.0037	60
14	100	0.0015	55
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	100		
0.063	97		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
8.4

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.1	0.1
	Silt	3.1	3.1
	Clay	39.9	39.9
*<60mm values to aid description only		56.9	56.9

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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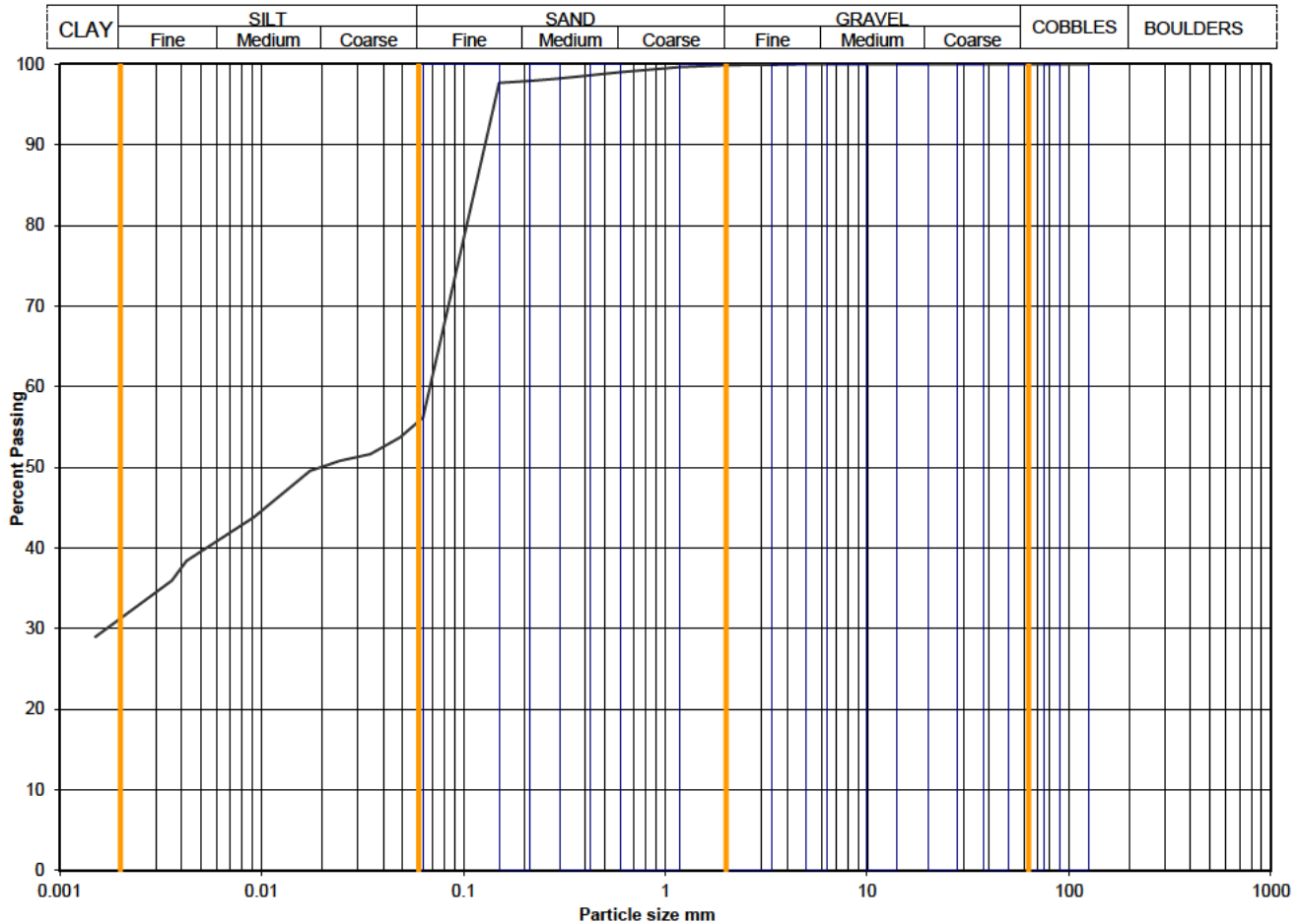
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-04
	A9031-1920191127041409	Sample Depth (m BGL)	1.00 - 1.20
		Sample Type and No	B5
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	56
90	100	0.0485	54
75	100	0.0345	52
63	100	0.0245	51
50	100	0.0174	50
37.5	100	0.0091	44
28	100	0.0042	38
20	100	0.0036	36
14	100	0.0015	29
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	99	Particle density, Mg/m3 2.65 assumed	
0.425	99		
0.300	98		
0.212	98		
0.150	98	Dry mass of sample, kg 10.1	
0.063	56		

Soil description	Brown sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.2	0.2
	Silt	43.7	43.7
	Clay	24.9	24.9
*<60mm values to aid description only		31.2	31.2

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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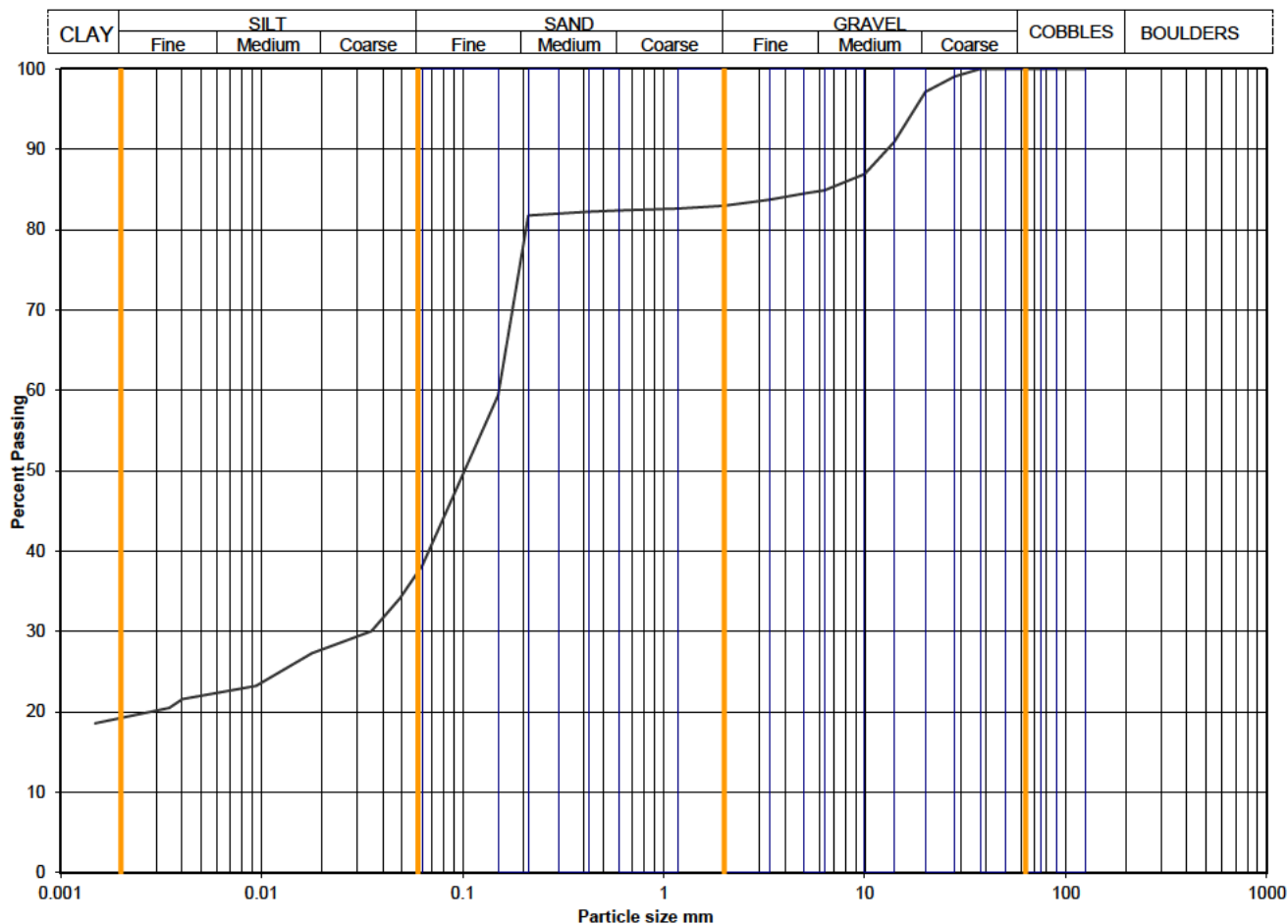
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-05
	A9031-1920191127042148	Sample Depth (m BGL)	0.40 - 0.50
		Sample Type and No	B3
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	38
90	100	0.0489	34
75	100	0.0352	30
63	100	0.0251	29
50	100	0.0178	27
37.5	100	0.0094	23
28	99	0.0040	22
20	97	0.0035	20
14	91	0.0015	19
10	87		
6.3	85		
5.0	85		
3.35	84		
2.00	83		
1.18	83		
0.600	82		
0.425	82		
0.300	82		
0.212	82		
0.150	59		
0.063	38		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
11.2

Soil description	Brown slightly gravelly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	17.0	17.0
	Silt	44.8	44.8
	Clay	19.0	19.0
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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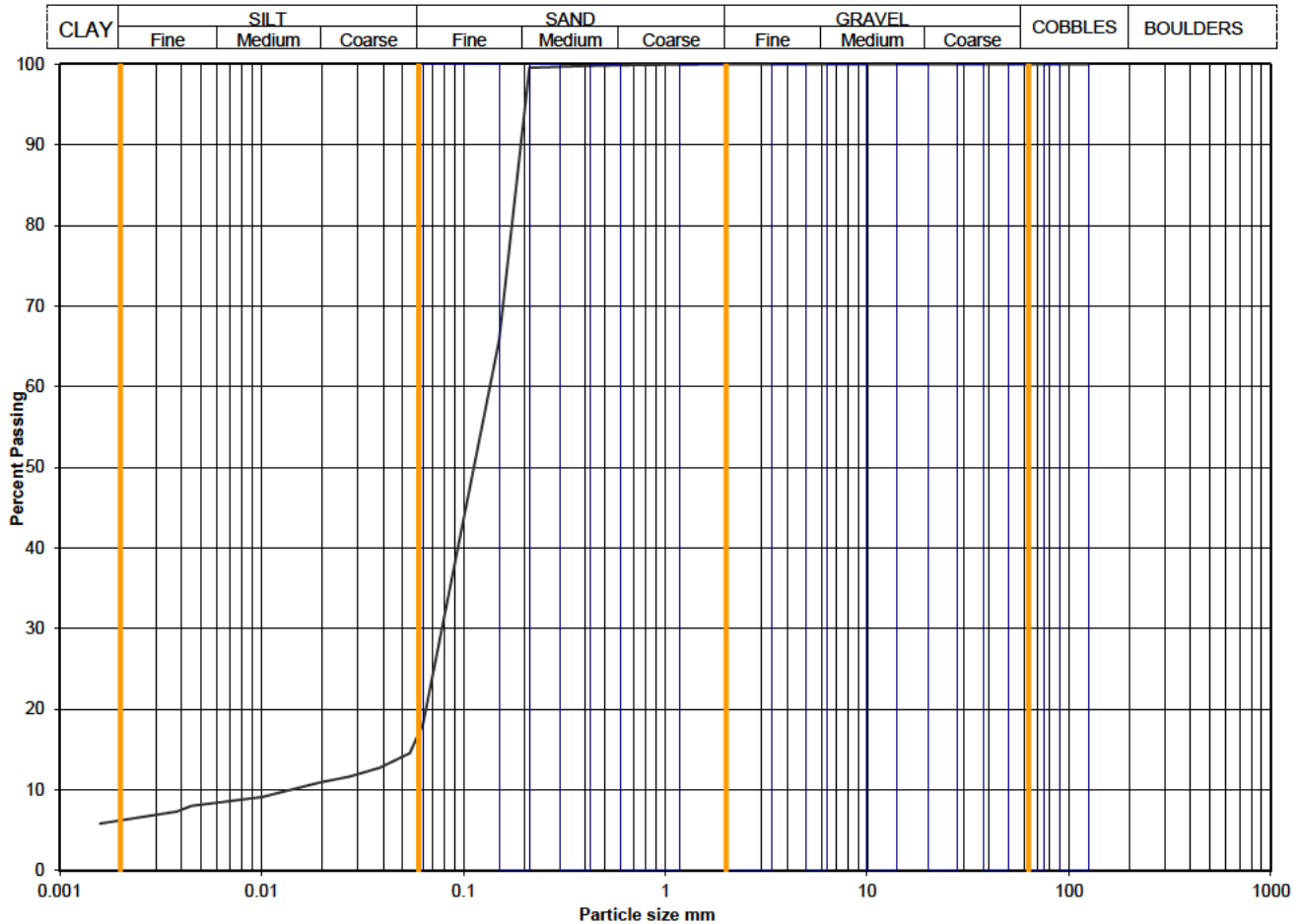
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-05
	A9031-1920191127042207	Sample Depth (m BGL)	0.90 - 1.00
		Sample Type and No	B6
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	18
90	100	0.0542	15
75	100	0.0385	13
63	100	0.0273	12
50	100	0.0194	11
37.5	100	0.0101	9
28	100	0.0045	8
20	100	0.0038	7
14	100	0.0016	6
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65	assumed
0.300	100		
0.212	100	Dry mass of sample, kg	
0.150	66	11.4	
0.063	18		

Soil description	Brown clayey SAND.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	81.8	81.8
	Silt	12.0	12.0
	Clay	6.2	6.2
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	10
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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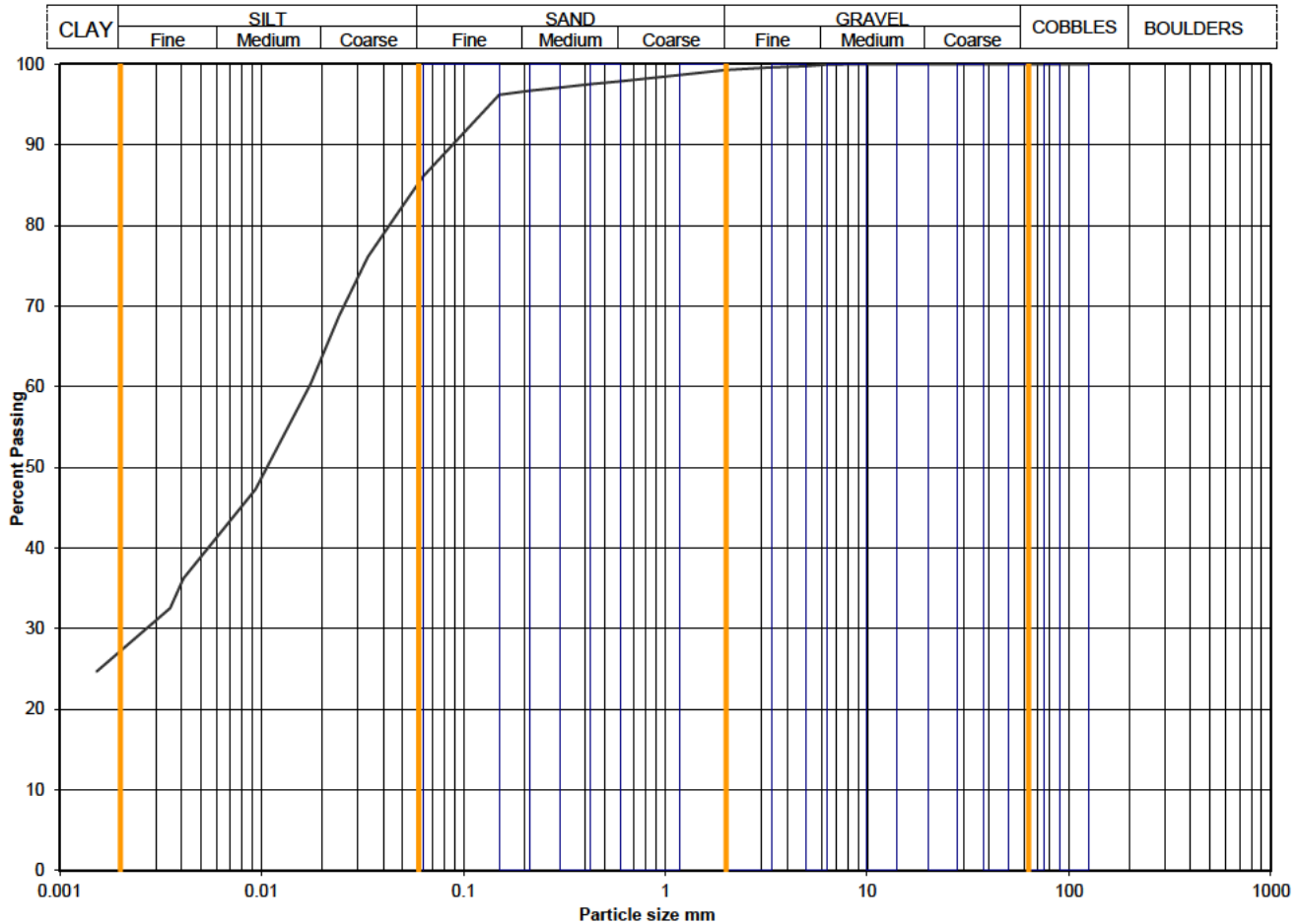
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-06
	A9031-1920191211040013	Sample Depth (m BGL)	0.30 - 0.80
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	86
90	100	0.0468	81
75	100	0.0336	76
63	100	0.0242	69
50	100	0.0175	60
37.5	100	0.0093	47
28	100	0.0041	36
20	100	0.0035	33
14	100	0.0015	25
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	99		
1.18	99		
0.600	98		
0.425	98		
0.300	97		
0.212	97		
0.150	96		
0.063	86		

Particle density, Mg/m3
2.65 assumed
Dry mass of sample, kg
15.8

Soil description	Brown slightly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.7	0.7
	Silt	13.2	13.2
	Clay	58.9	58.9
*<60mm values to aid description only		27.2	27.2

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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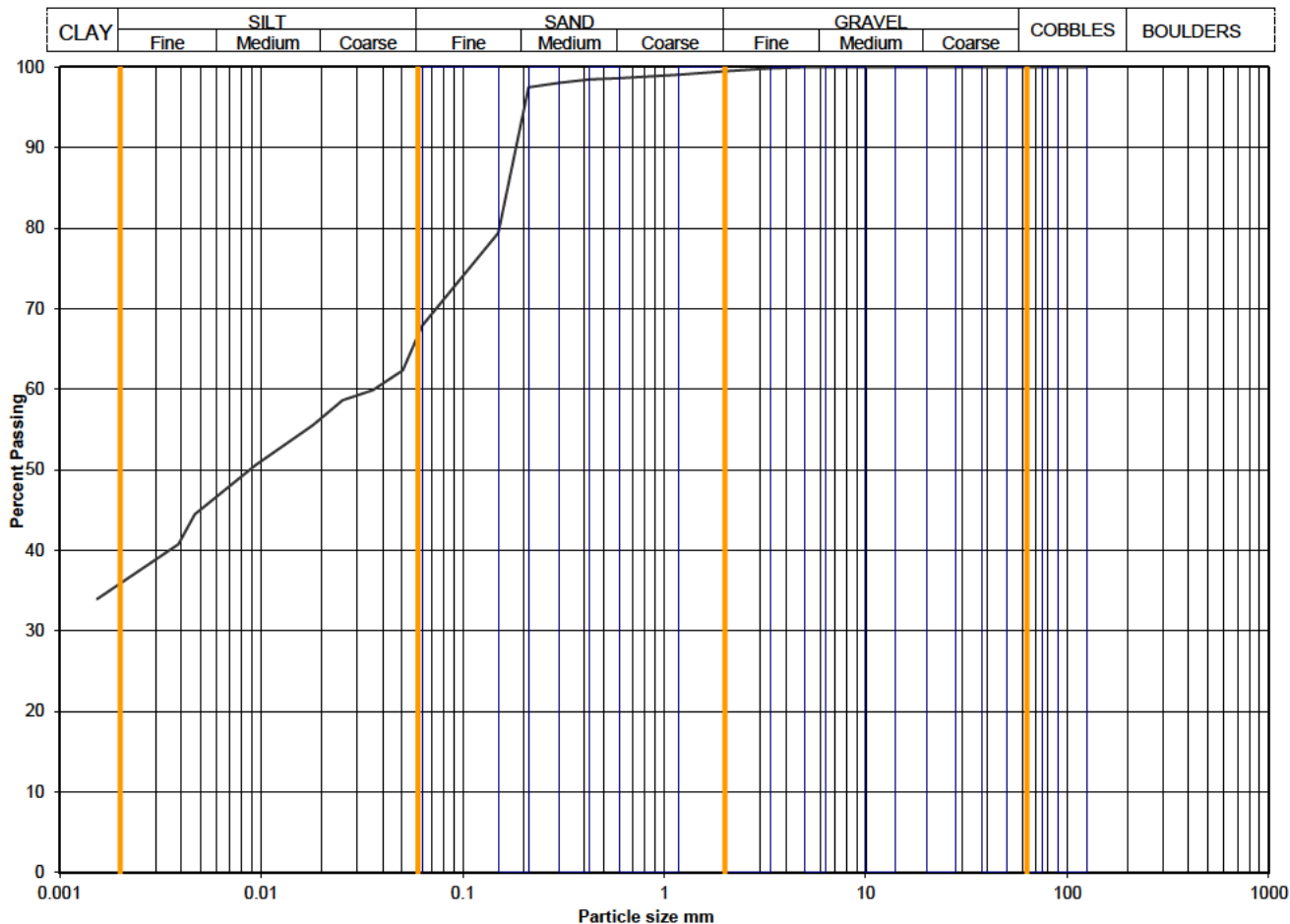
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-06
	A9031-1920191211040158	Sample Depth (m BGL)	3.00 - 3.50
		Sample Type and No	B13
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	68
90	100	0.0504	62
75	100	0.0358	60
63	100	0.0254	59
50	100	0.0181	56
37.5	100	0.0094	51
28	100	0.0047	44
20	100	0.0039	41
14	100	0.0015	34
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99	Particle density, Mg/m3 2.65 assumed	
0.600	99		
0.425	98		
0.300	98		
0.212	98	Dry mass of sample, kg 10.8	
0.150	79		
0.063	68		

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions * <60mm values to aid description only	Cobbles / boulders	Whole	* <60mm
	Gravel	0.0	0.0
	Sand	0.5	0.5
	Silt	31.6	31.6
	Clay	32.0	32.0
		35.9	35.9

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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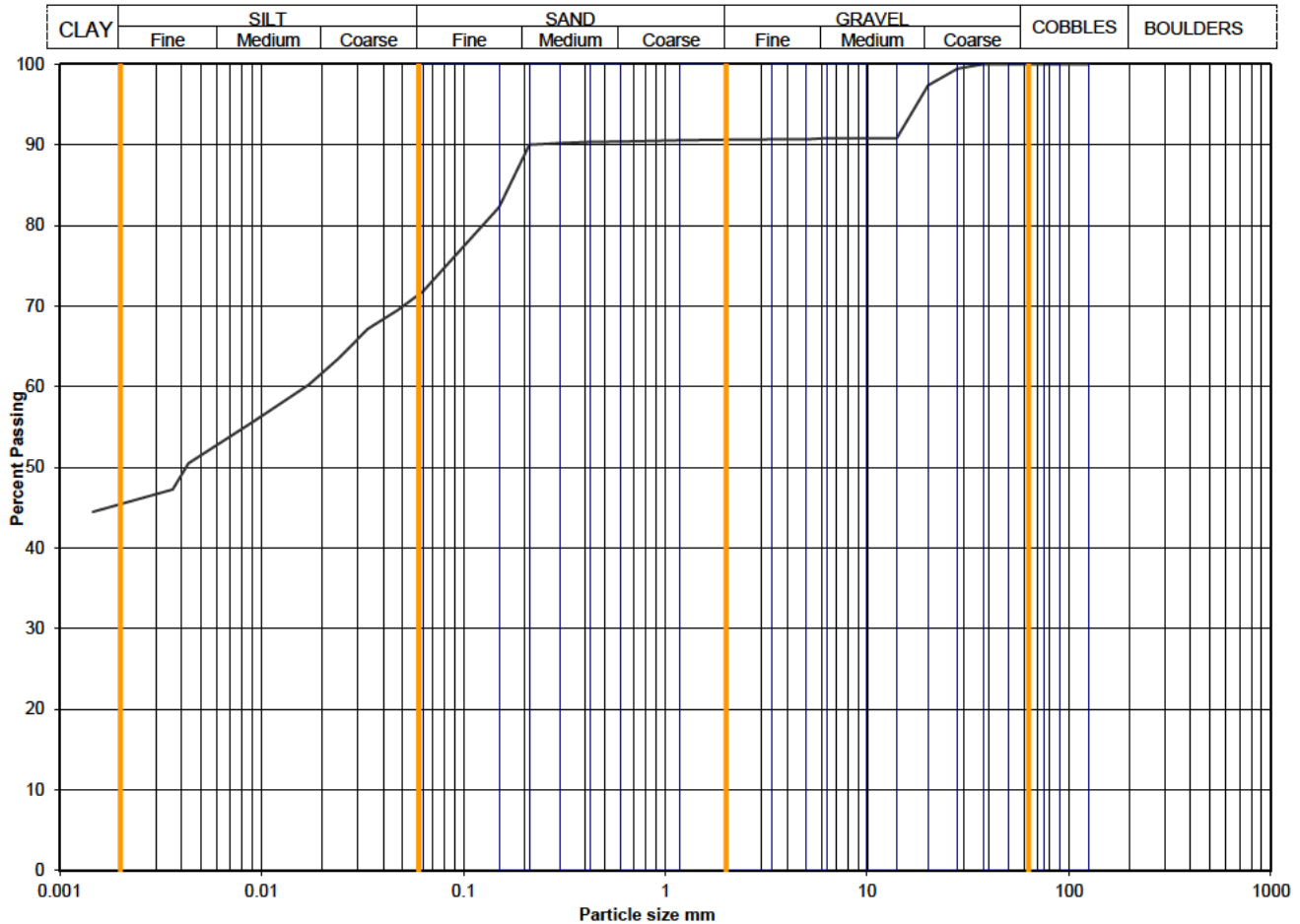
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-07
	A9031-1920191127042548	Sample Depth (m BGL)	0.85 - 0.90
		Sample Type and No	B6
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	72
90	100	0.0472	69
75	100	0.0336	67
63	100	0.0240	63
50	100	0.0172	60
37.5	100	0.0090	56
28	99	0.0043	51
20	97	0.0036	47
14	91	0.0015	44
10	91		
6.3	91		
5.0	91		
3.35	91		
2.00	91		
1.18	91		
0.600	90	Particle density, Mg/m3	
0.425	90	2.65	assumed
0.300	90		
0.212	90	Dry mass of sample, kg	
0.150	82	9.2	
0.063	72		

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	9.4	9.4
	Silt	18.8	18.8
	Clay	26.4	26.4
*<60mm values to aid description only		45.4	45.4

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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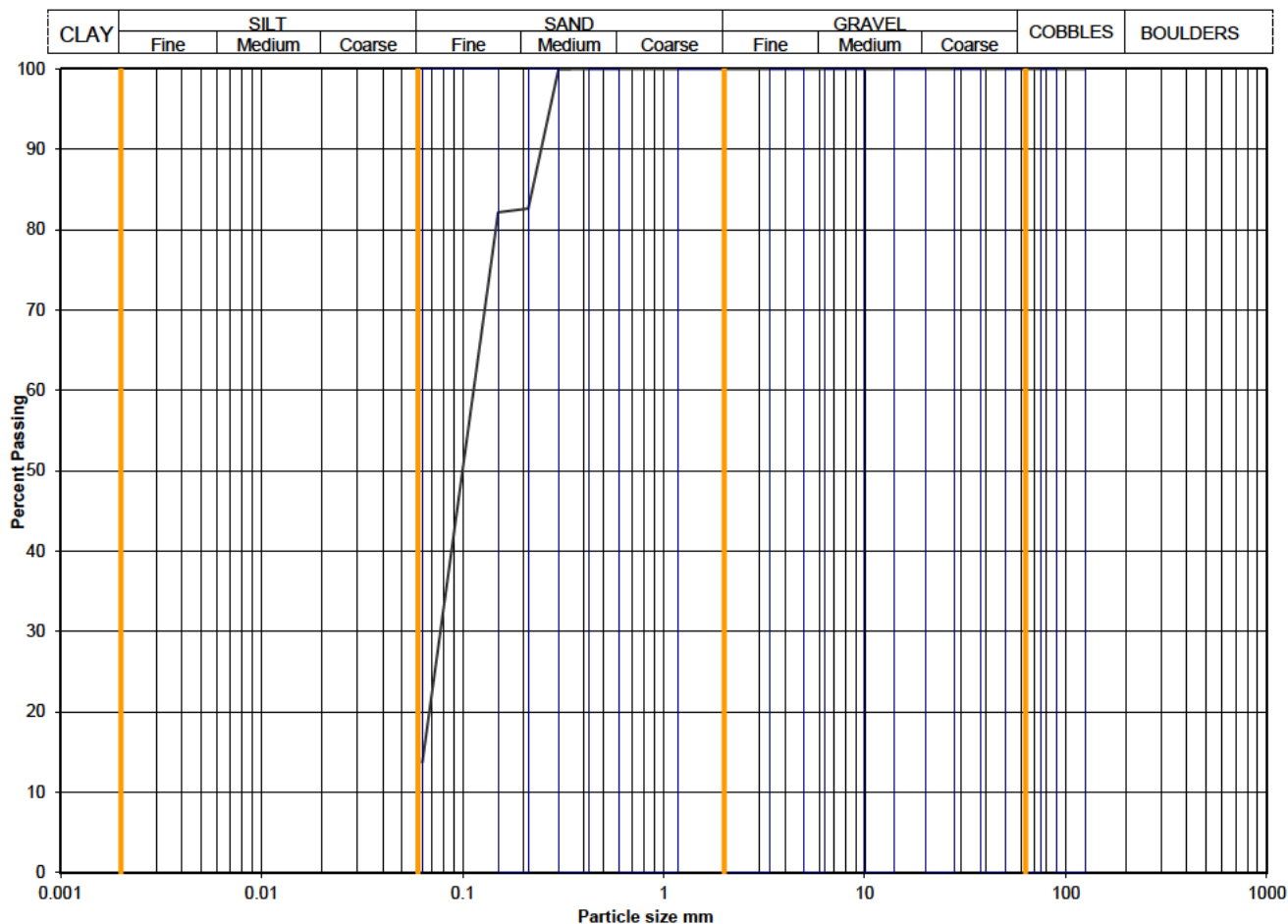
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-07
	A9031-1920191127042601	Sample Depth (m BGL)	1.60 - 1.70
		Sample Type and No	B9
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	83		
0.150	82		
0.063	14		
		Dry mass of sample, kg	
		8.6	

Soil description	Brown clayey SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	86.3	86.3
	Silt	silt+clay =	
	Clay	13.7	13.7
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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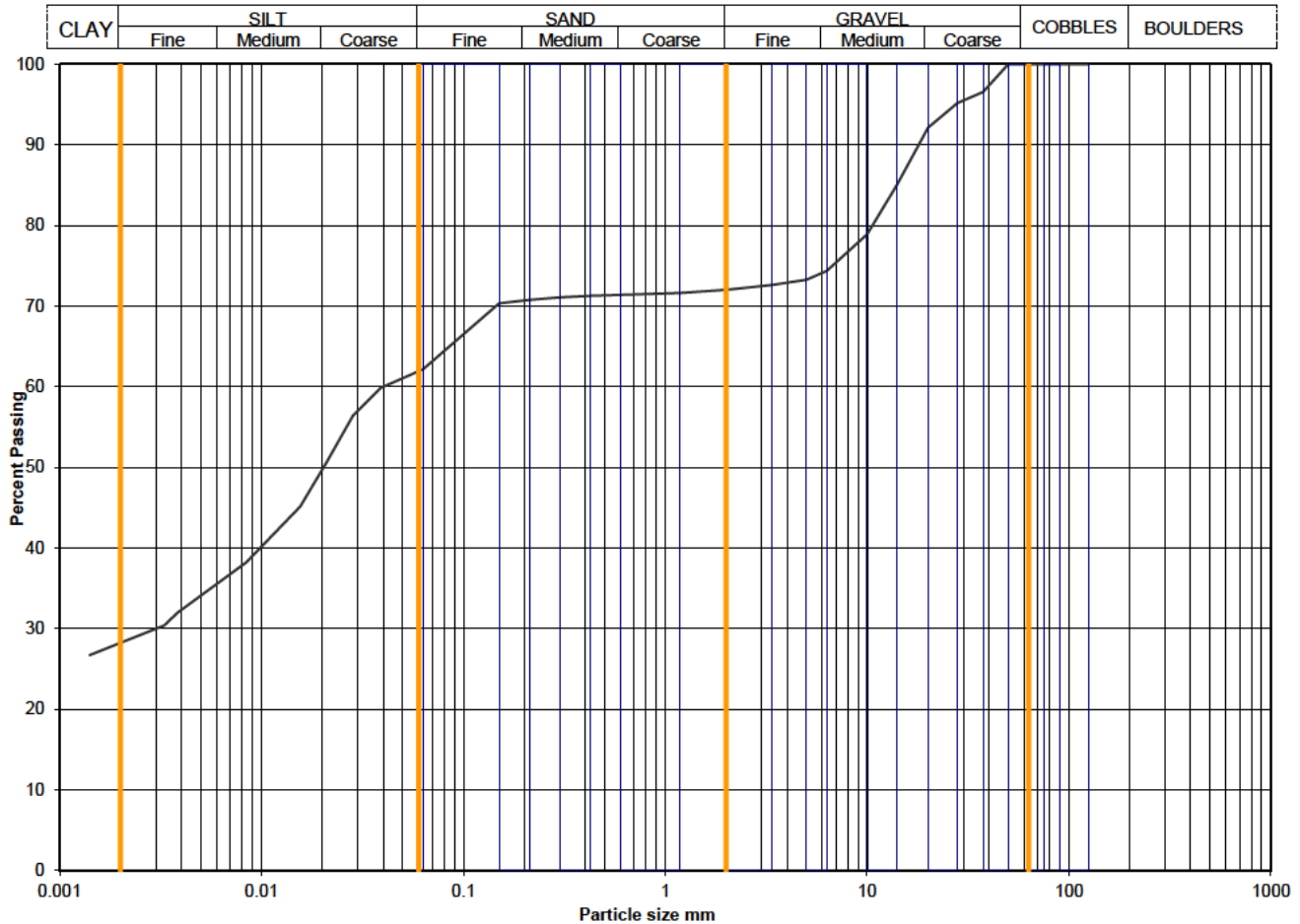
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-08
	A9031-1920191204021804	Sample Depth (m BGL)	0.20 - 0.30
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	62
90	100	0.0389	60
75	100	0.0284	56
63	100	0.0211	51
50	100	0.0155	45
37.5	97	0.0084	38
28	95	0.0038	32
20	92	0.0033	30
14	85	0.0014	27
10	79		
6.3	74		
5.0	73		
3.35	73		
2.00	72		
1.18	72		
0.600	71		
0.425	71		
0.300	71		
0.212	71		
0.150	70		
0.063	62		

Particle density, Mg/m3
2.65 assumed
Dry mass of sample, kg
11.1

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	28.0	28.0
	Silt	9.9	9.9
	Clay	33.9	33.9
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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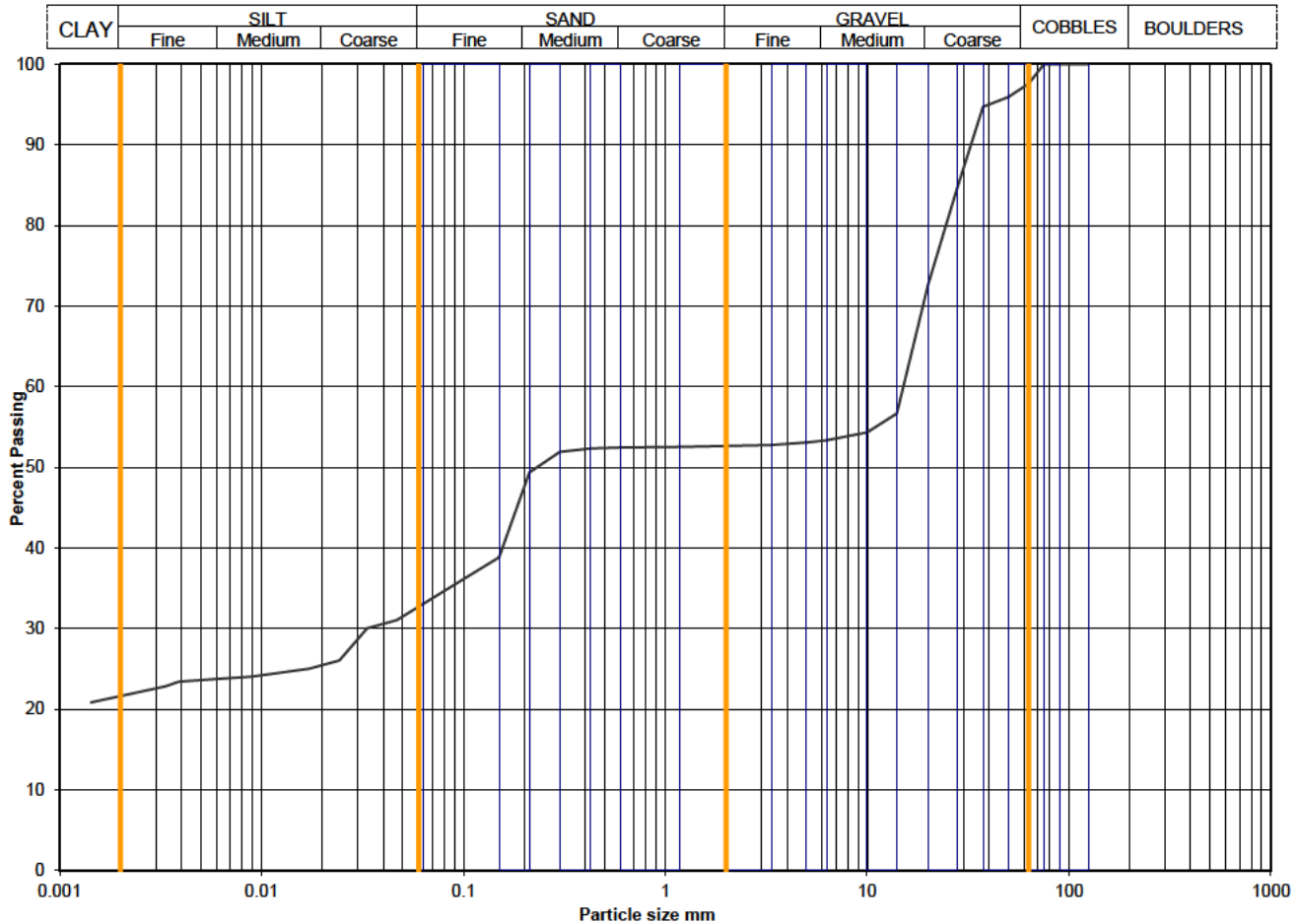
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-08
	A9031-1920191204021819	Sample Depth (m BGL)	0.90 - 1.00
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	33
90	100	0.0468	31
75	100	0.0334	30
63	98	0.0243	26
50	96	0.0173	25
37.5	95	0.0090	24
28	85	0.0039	23
20	73	0.0033	23
14	57	0.0014	21
10	54		
6.3	53		
5.0	53		
3.35	53		
2.00	53		
1.18	53		
0.600	52	Particle density, Mg/m3	
0.425	52	2.65	assumed
0.300	52		
0.212	49	Dry mass of sample, kg	
0.150	39	16.8	
0.063	33		

Soil description	Brown slightly sandy gravelly CLAY with one cobble.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	2.4	0.0
	Sand	45.0	46.1
	Silt	19.6	20.1
	Clay	11.4	11.7
*<60mm values to aid description only		21.6	22.1

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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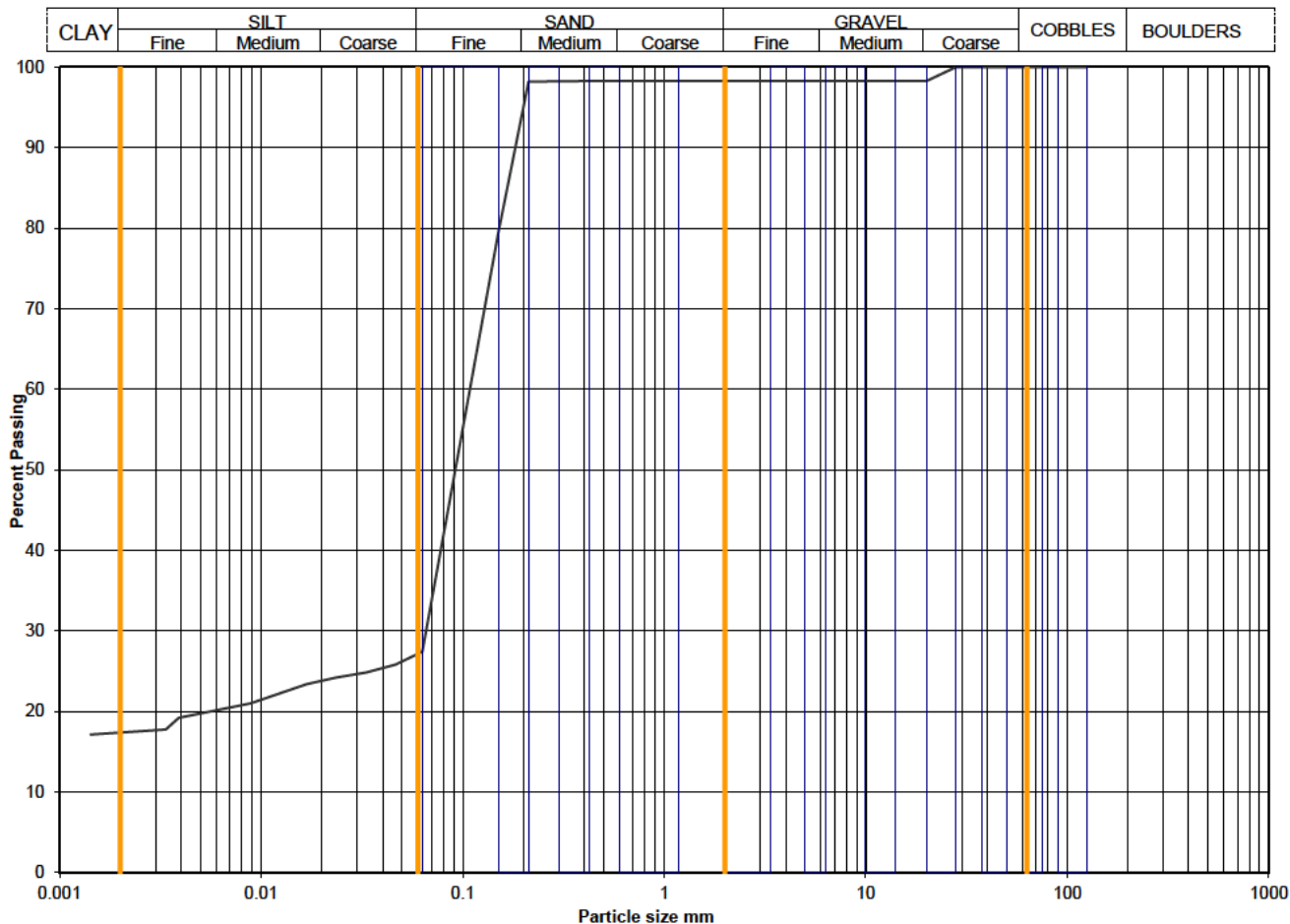
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TP-08
	A9031-1920191204021828	Sample Depth (m BGL)	1.50
		Sample Type and No	B11
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	27
90	100	0.0465	26
75	100	0.0332	25
63	100	0.0236	24
50	100	0.0168	23
37.5	100	0.0089	21
28	100	0.0039	19
20	98	0.0034	18
14	98	0.0014	17
10	98		
6.3	98		
5.0	98		
3.35	98		
2.00	98		
1.18	98		
0.600	98	Particle density, Mg/m3	
0.425	98	2.65	assumed
0.300	98		
0.212	98	Dry mass of sample, kg	
0.150	79	4.9	
0.063	27		

Soil description	Brown slightly gravelly very clayey SAND.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	1.6	1.6
	Silt	70.9	70.9
	Clay	10.1	10.1
*<60mm values to aid description only		17.4	17.4

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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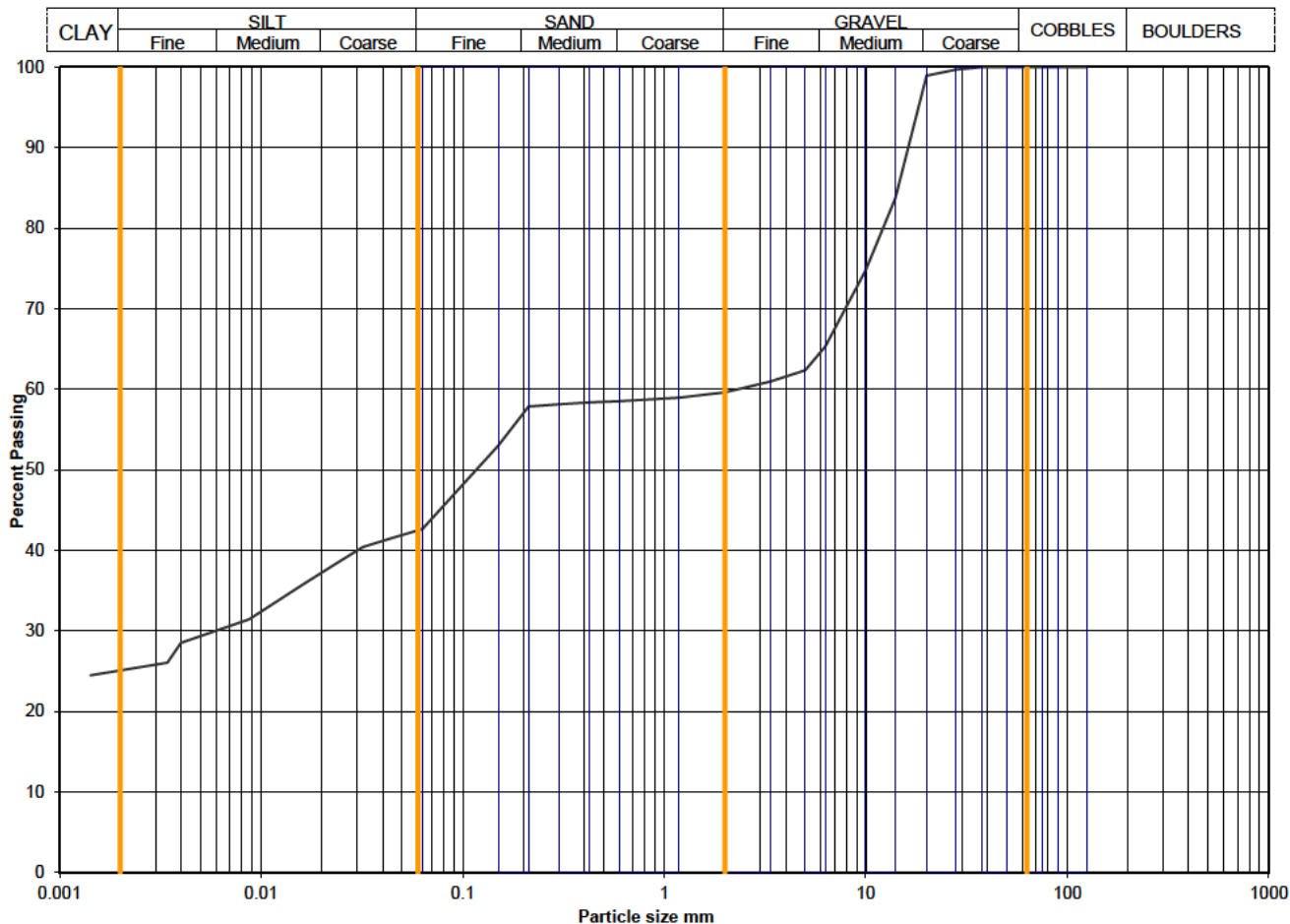
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TPM-02
	A9031-1920191204015231	Sample Depth (m BGL)	1.00 - 1.10
		Sample Type and No	B6
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	43
90	100	0.0447	42
75	100	0.0319	40
63	100	0.0229	38
50	100	0.0164	36
37.5	100	0.0087	31
28	100	0.0040	29
20	99	0.0034	26
14	84	0.0014	24
10	75		
6.3	65		
5.0	62		
3.35	61		
2.00	60		
1.18	59		
0.600	59		
0.425	58		
0.300	58		
0.212	58		
0.150	53		
0.063	43		

Particle density, Mg/m3
2.65 assumed
Dry mass of sample, kg
10.7

Soil description	Brown slightly sandy gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	40.3	40.3
	Silt	17.0	17.0
	Clay	17.6	17.6
*<60mm values to aid description only		25.1	25.1

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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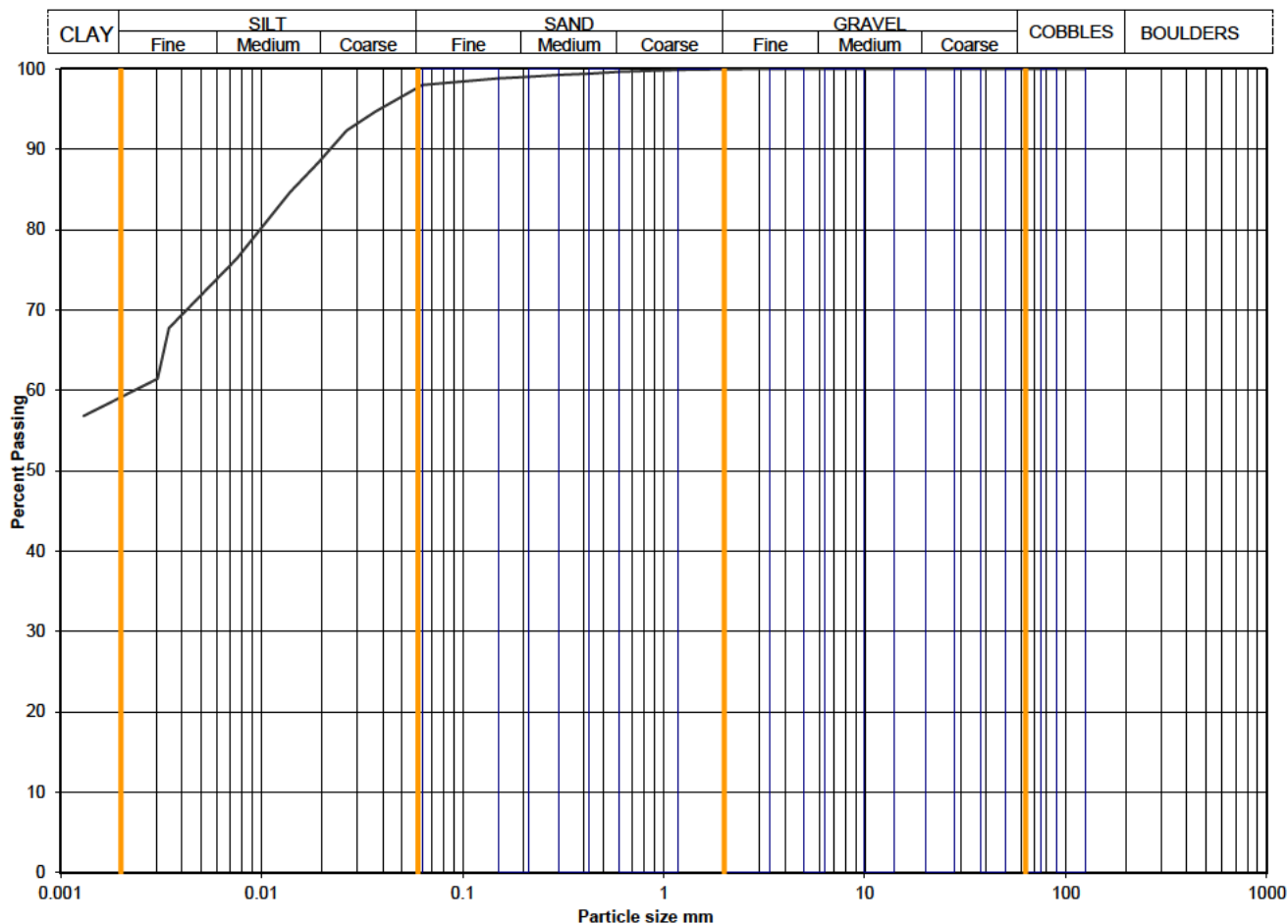
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TPM-02
	A9031-1920191204015240	Sample Depth (m BGL)	1.60 - 1.70
		Sample Type and No	B9
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	98
90	100	0.0368	95
75	100	0.0264	92
63	100	0.0192	88
50	100	0.0139	85
37.5	100	0.0075	76
28	100	0.0035	68
20	100	0.0030	61
14	100	0.0013	57
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	99	2.65	assumed
0.300	99		
0.212	99	Dry mass of sample, kg	
0.150	99	9.2	
0.063	98		

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	0.0	0.0
	Silt	2.0	2.0
	Clay	38.8	38.8
*<60mm values to aid description only		59.2	59.2

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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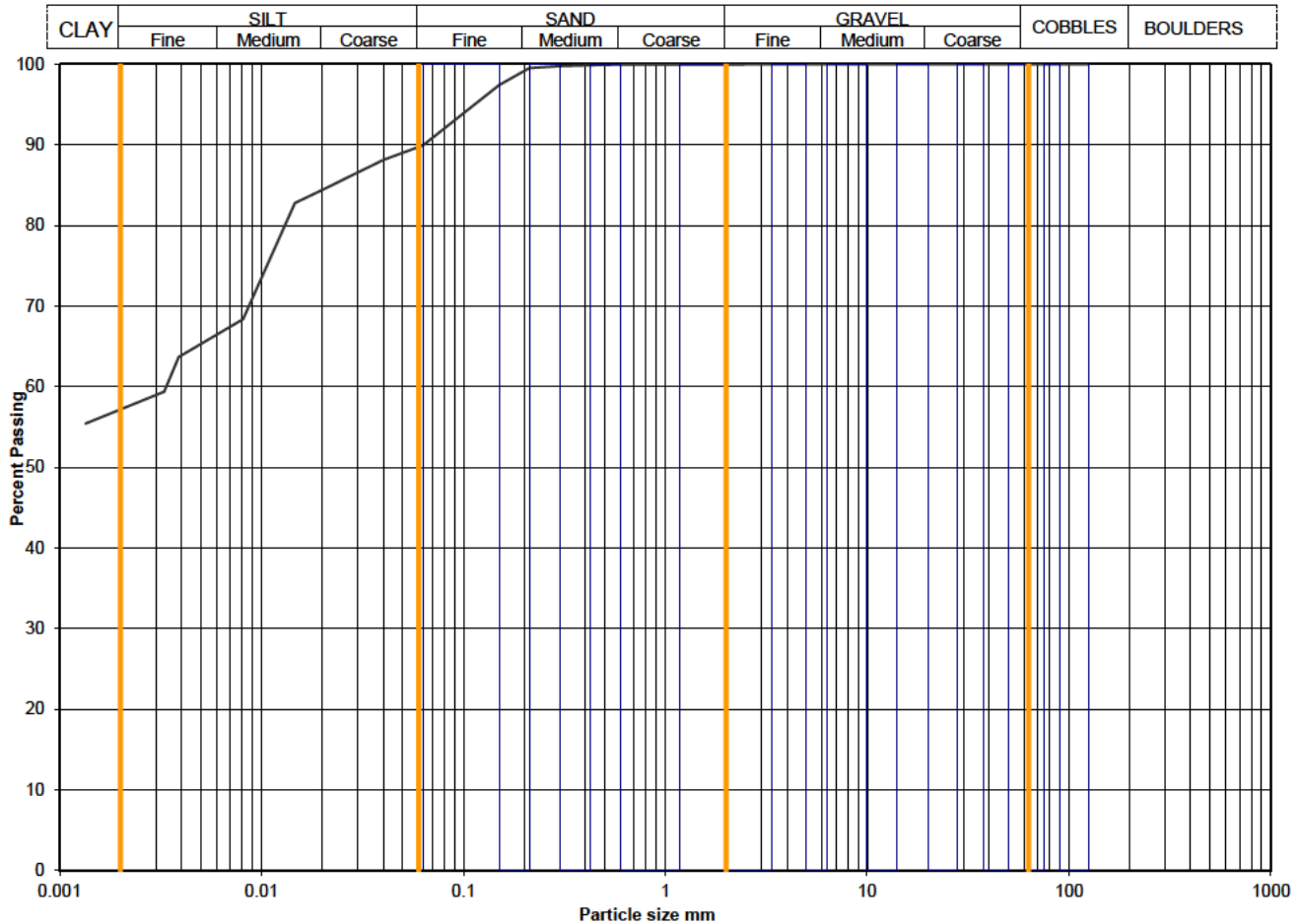
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TPM-03
	A9031-1920191204104300	Sample Depth (m BGL)	0.40 - 0.50
		Sample Type and No	B3A
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	90
90	100	0.0402	88
75	100	0.0287	86
63	100	0.0205	85
50	100	0.0146	83
37.5	100	0.0081	68
28	100	0.0039	64
20	100	0.0033	59
14	100	0.0013	55
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	100		
0.212	100		
0.150	97		
0.063	90		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
14.6

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	10.0	10.0
	Silt	32.8	32.8
	Clay	57.2	57.2

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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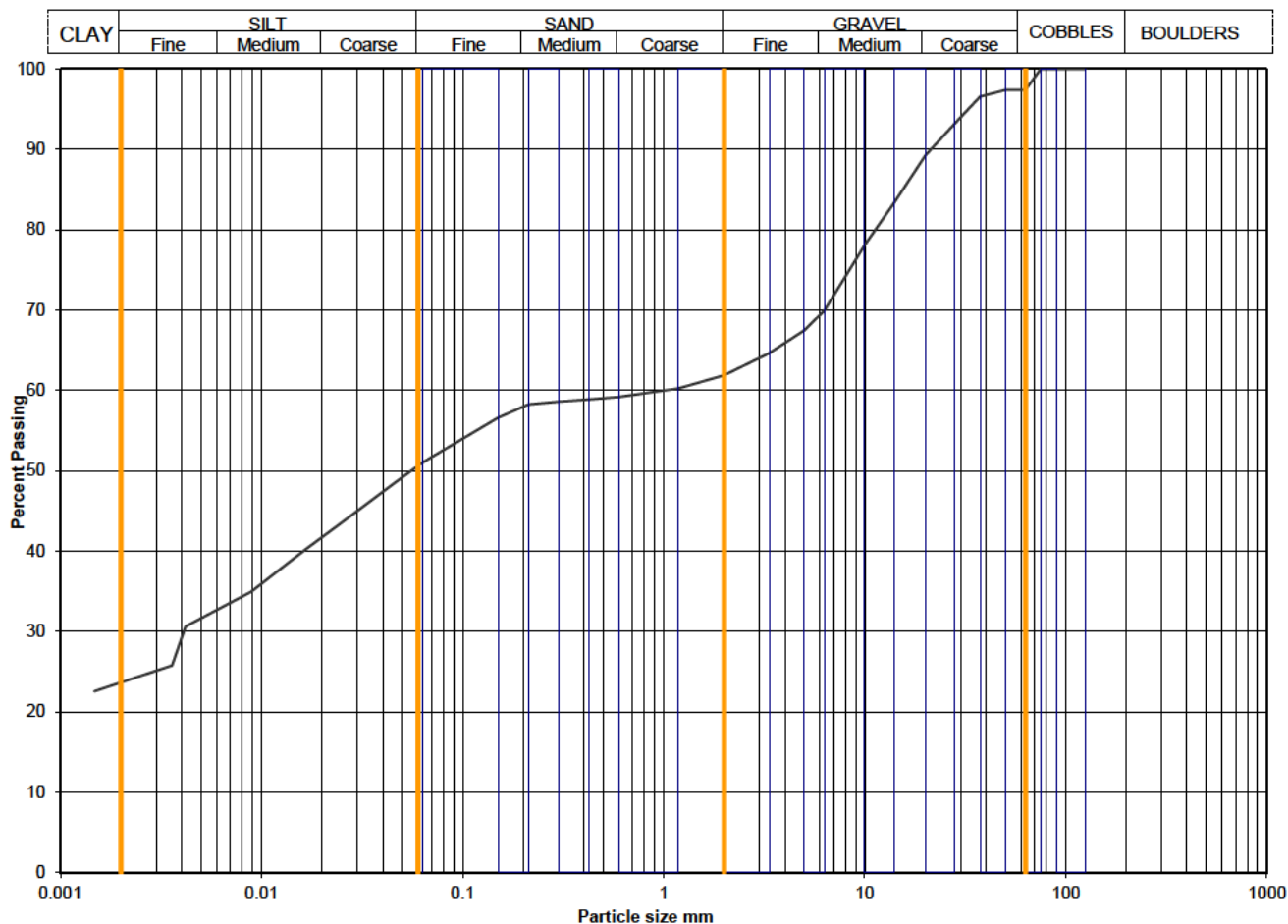
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TPM-03
	A9031-1920191204110916	Sample Depth (m BGL)	2.50 - 2.60
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	51
90	100	0.0451	48
75	100	0.0324	46
63	97	0.0232	43
50	97	0.0167	40
37.5	97	0.0089	35
28	93	0.0042	31
20	89	0.0036	26
14	83	0.0015	23
10	78		
6.3	70		
5.0	67		
3.35	65		
2.00	62		
1.18	60		
0.600	59		
0.425	59		
0.300	59		
0.212	58		
0.150	57		
0.063	51		

Particle density, Mg/m3
2.65 assumed

Dry mass of sample, kg
14.6

Soil description	Brown slightly sandy gravelly CLAY with one cobble.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	2.5	0.0
	Sand	35.5	36.4
	Silt	10.9	11.2
	Clay	27.4	28.1
*<60mm values to aid description only		23.7	24.3

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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Sample Details:	SAMPLE ID:		Hole No	ATK-TPM-04	
	A9031-1920191204125101		Sample Depth (m BGL)	1.50 - 1.60	
			Sample Type and No	B7	
			Specimen Ref		

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		

Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	99
90	100	0.0381	96
75	100	0.0271	95
63	100	0.0193	94
50	100	0.0139	90
37.5	100	0.0073	86
28	100	0.0036	78
20	100	0.0031	70
14	100	0.0013	59
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65 assumed	
0.300	100	Dry mass of sample, kg	
0.212	99	8.9	
0.150	99		
0.063	99		

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	* $\leq$ 60mm
		0.0	0.0
		0.1	0.1
		0.8	0.8
		34.8	34.8
		64.3	64.3

* $\leq$ 60mm values to aid description only

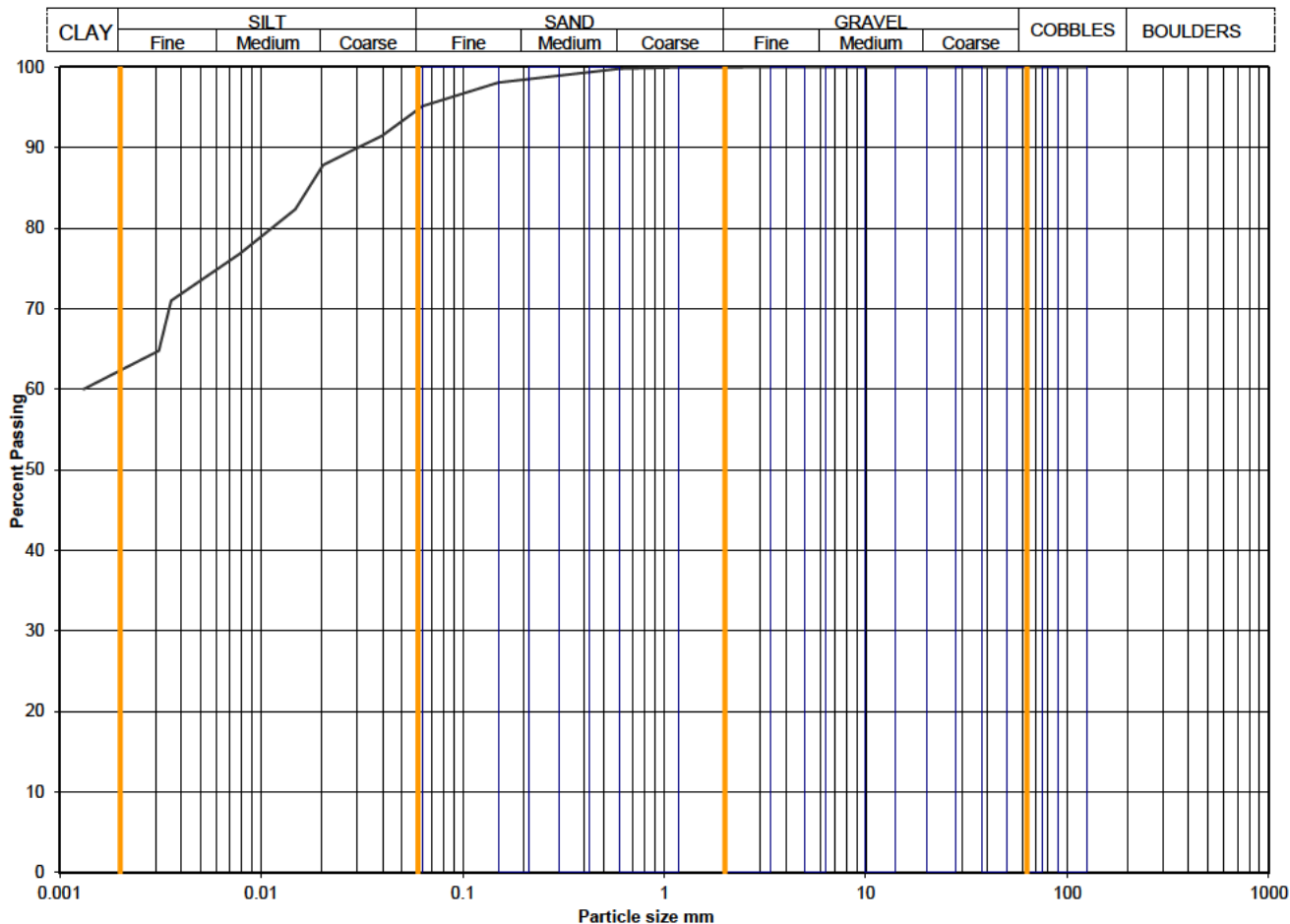
Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 2.21 Jul 17		Project No A9031-19 Project Name HAVANT THICKET WATER STORAGE	Figure PSD
		Printed: 28/02/2020 09:13	

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TPM-05
	A9031-19-20191120031821	Sample Depth (m BGL)	0.70 - 1.00
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	95
90	100	0.0397	91
75	100	0.0284	90
63	100	0.0203	88
50	100	0.0148	82
37.5	100	0.0078	77
28	100	0.0036	71
20	100	0.0031	65
14	100	0.0013	60
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	99	2.65 assumed	
0.300	99	Dry mass of sample, kg	
0.212	99	5.8	
0.150	98		
0.063	95		

Soil description	Brown slightly sandy CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	4.9	4.9
	Silt	32.8	32.8
	Clay	62.3	62.3
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
------------------------	-----------	----------------

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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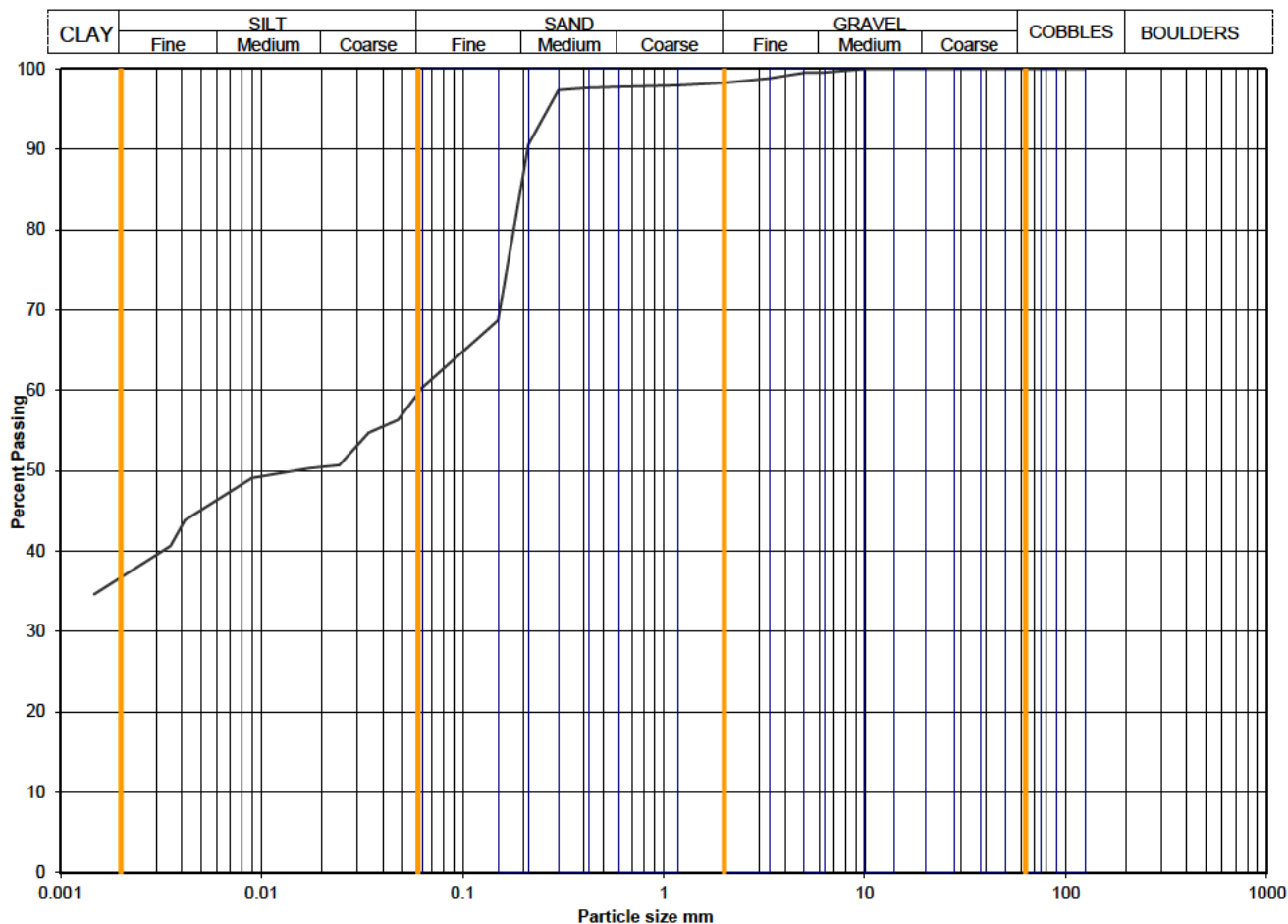
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	ATK-TPM-05
	A9031-19-20191120032104	Sample Depth (m BGL)	2.20 - 2.20
		Sample Type and No	D101
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	60
90	100	0.0479	56
75	100	0.0340	55
63	100	0.0244	51
50	100	0.0173	50
37.5	100	0.0090	49
28	100	0.0042	44
20	100	0.0035	41
14	100	0.0015	35
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	98		
1.18	98		
0.600	98		
0.425	98		
0.300	97		
0.212	91		
0.150	69		
0.063	60		

Particle density, Mg/m3
2.65 assumed
Dry mass of sample, kg
0.6

Soil description	Brown slightly gravelly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0.0	0.0
	Sand	1.8	1.8
	Silt	37.9	37.9
	Clay	23.6	23.6
*<60mm values to aid description only			

Uniformity Coefficient	D60 / D10	Not applicable
------------------------	-----------	----------------

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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DETERMINATION OF SHRINKAGE CHARACTERISTICS - SUMMARY OF RESULTS

Hole No.	Sample				Sample Description	Sample Preparation	<425 Micro %	Linear Shrinkage %	Remarks
	No.	Depth (m)		type					
ATK-CP-06	20	4.00	4.45	UT	Firm red and grey mottled slightly sandy CLAY	Natural	100	15	
ATK-CP-06	27	6.00	6.45	UT	Firm multicoloured slightly sandy CLAY.	Natural	100	14	
ATK-CP-07A	21	6.00	6.40	UT	Very stiff reddish brown mottled grey slightly sandy CLAY.	Natural	100	10	
ATK-CP-07A	28	8.00	8.35	UT	Very stiff grey mottled reddish brown slightly sandy CLAY.	Natural	100	14	
ATK-CP-07A	35	10.00	10.35	UT	Very stiff reddish brown mottled grey and brown slightly sandy CLAY.	Natural	100	10	
ATK-CP-08	15	4.20	4.65	UT	Very stiff reddish brown slightly sandy CLAY.	Natural	100	14	
ATK-CP-09	16	4.20	4.65	UT	Stiff reddish brown mottled grey slightly sandy CLAY.	Natural	100	13	
ATK-CP-10	26	7.00	7.45	UT	Very stiff thinly laminated dark brown slightly sandy CLAY.	Natural	100	17	
ATK-CP-11	19	4.00		UT	Firm to stiff greyish brown slightly sandy CLAY	Natural	100	16	
ATK-CP-11	27	6.00		UT	Firm laminated CLAY with silt on laminae.	Natural	100	15	
ATK-CP-12	24	6.00	6.50	B	Grey and reddish brown slightly sandy CLAY.	Natural	100	14	
ATK-CP-14	17	5.00	5.40	D	Dark brown slightly gravelly sandy CLAY	Washed	68	13	
ATK-CP-15	29	7.00		UT	Firm to stiff dark greyish brown silty CLAY.	Natural	100	17	
ATK-CP-16	21	7.00	7.45	UT	Very stiff reddish brown mottled grey slightly sandy CLAY.	Natural	100	13	
ATK-TP-06	7	0.90		D	Brown slightly sandy CLAY	Natural	100	14	
ATK-TP-06	12	3.00		D	Brown slightly sandy CLAY	Natural	100	16	

Test Method : BS 1377 : Part 2 : 1990 : Section 6.5

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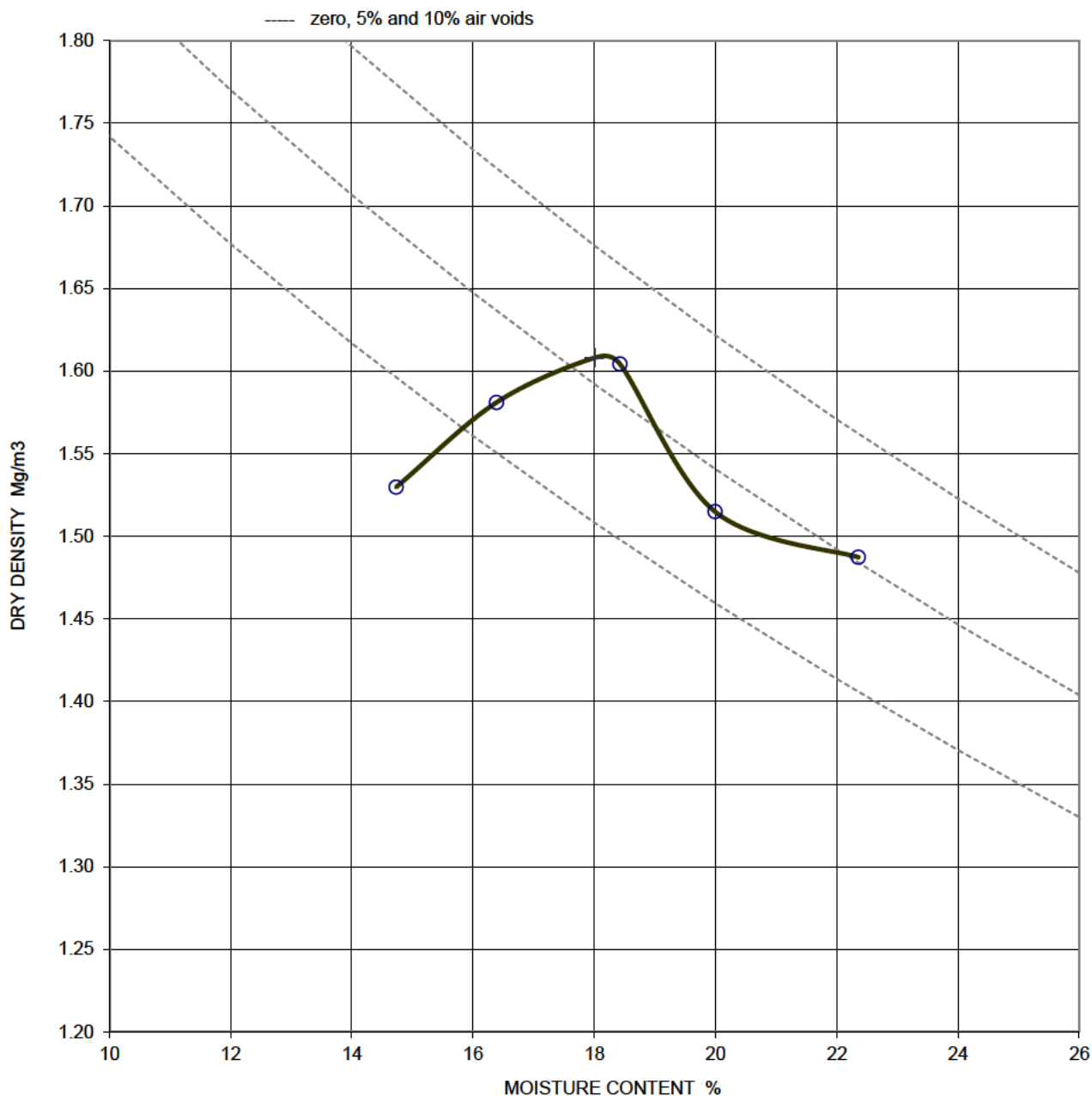
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-BH-02
	A9031-1920191218095028	Sample Depth (m BGL)	0.50 - 0.80
		Sample Type and No	B3
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.40 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.61

Optimum moisture content, %
18

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SLD 4, 3.3/4
Rev 2.5
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Project Name HAVANT THICKET WATER STORAGE

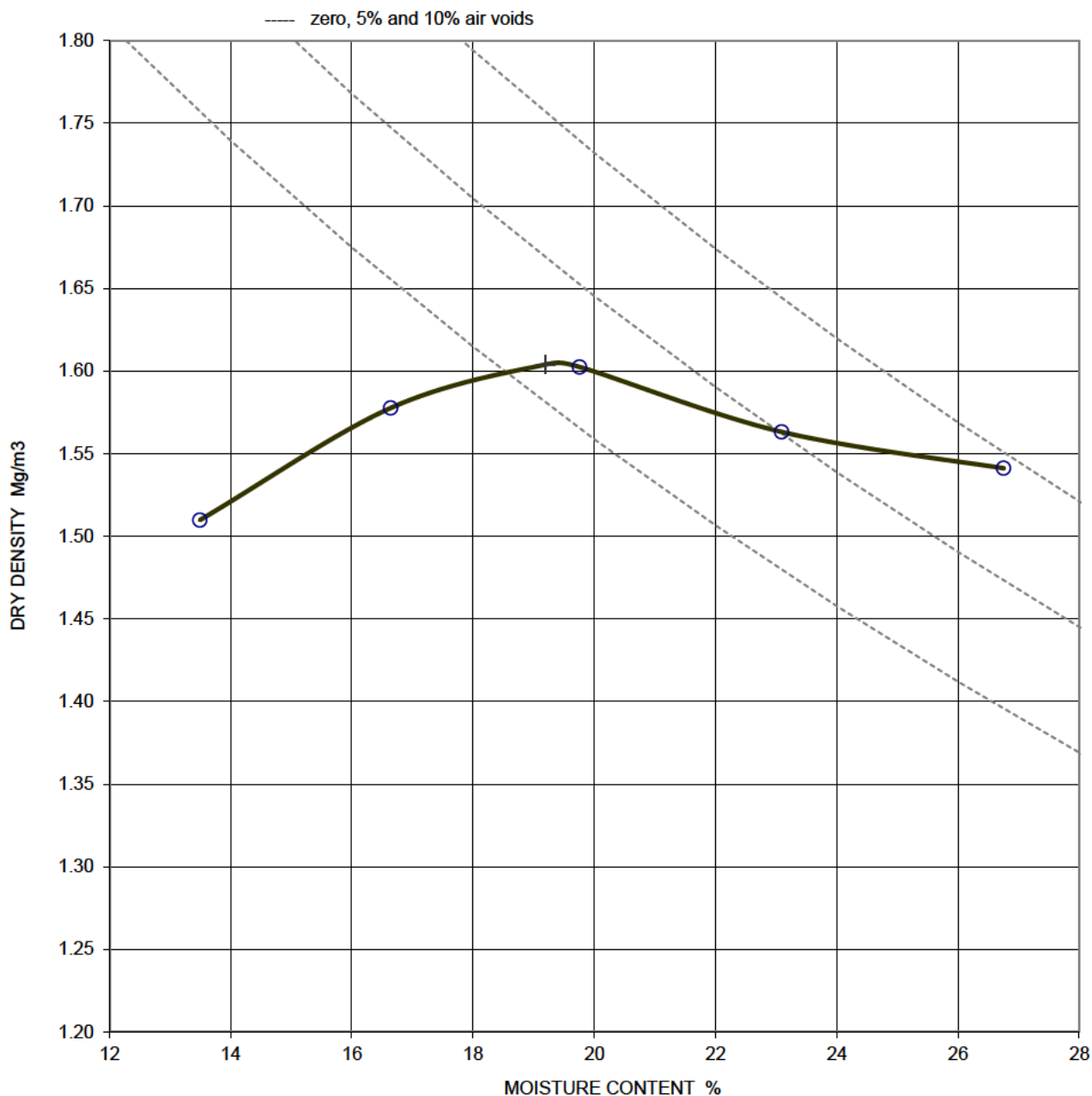
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-01
	A9031-19-20191107112613	Sample Depth (m BGL)	0.50 - 0.80
		Sample Type and No	B4
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould
 Preparation Original material was natural, single sample tested
 Material > 37.5mm 0 %
 Material < 37.5mm > 20mm 0 %
 Particle density 2.65 assumed
 Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.60
 Optimum moisture content, %
19

QA Ref
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 Sep 17



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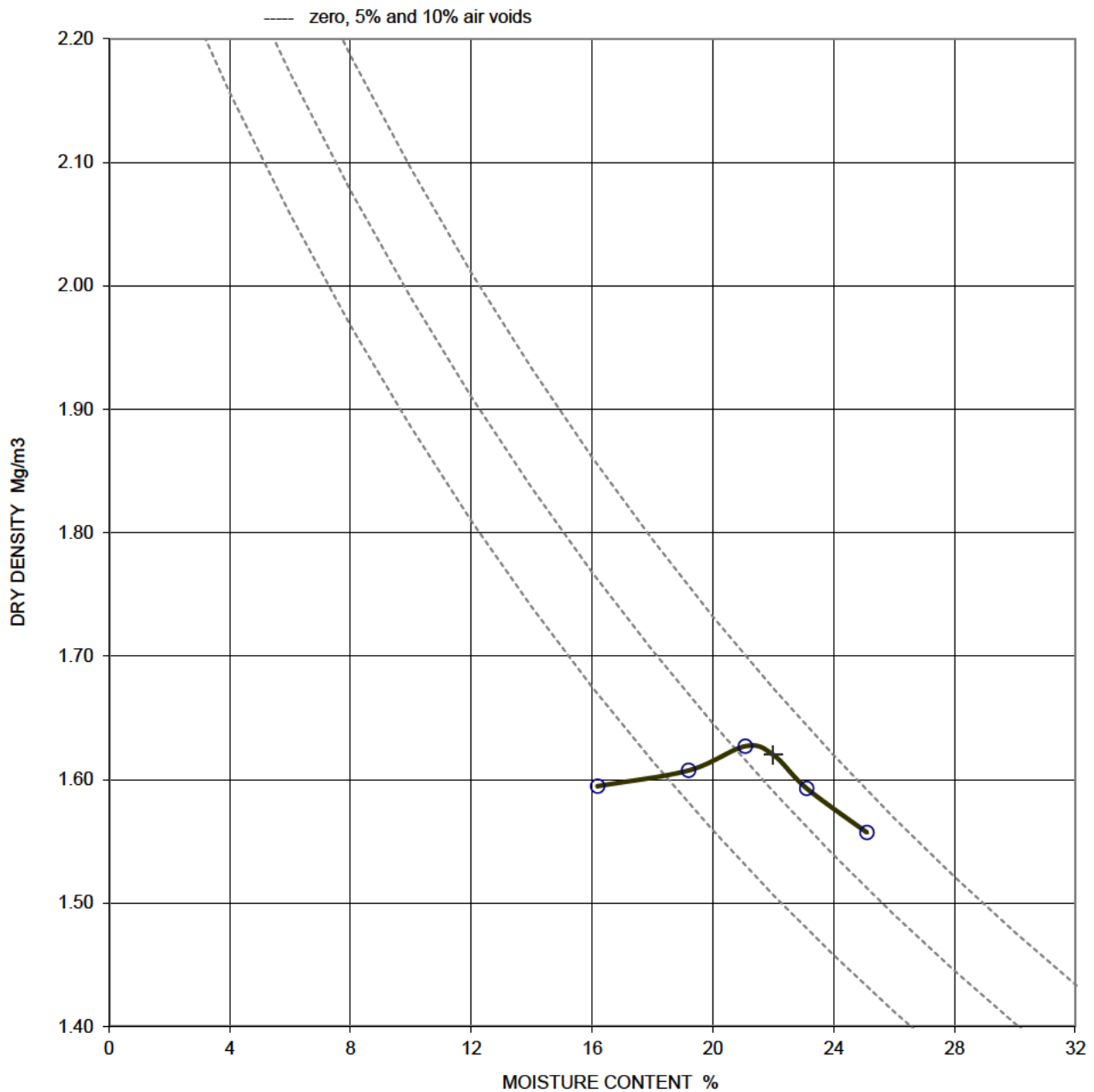
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-01
	A9031-1920191112122921	Sample Depth (m BGL)	3.50 - 4.00
		Sample Type and No	B17
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.65 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³

1.62

Optimum moisture content, %

22

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SLD 4, 3.3/4
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Project Name HAVANT THICKET WATER STORAGE

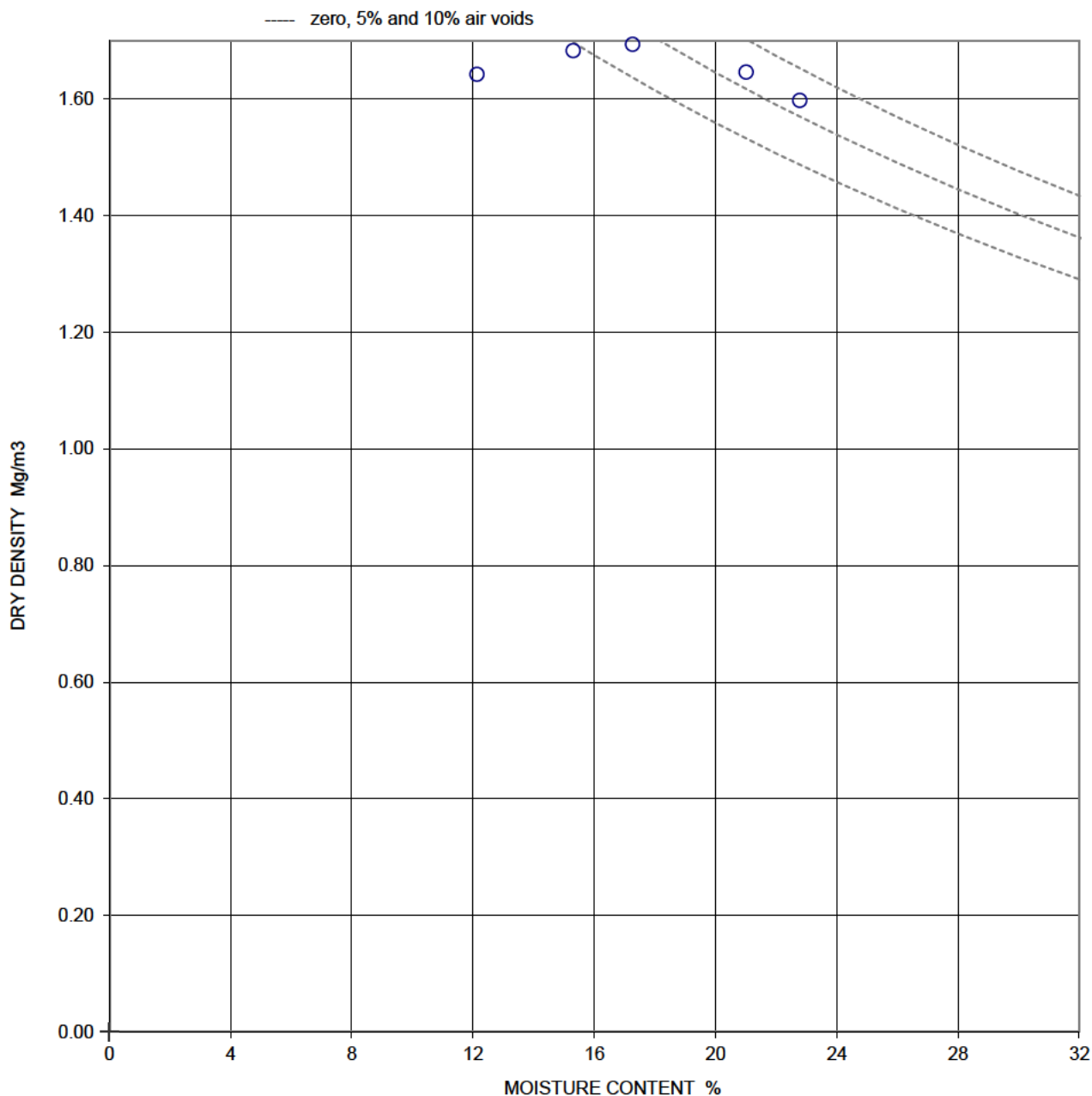
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-02
	A9031-1920191112122012	Sample Depth (m BGL)	1.20 - 1.70
		Sample Type and No	B5
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould
 Preparation Original material was natural, single sample tested
 Material > 37.5mm 0 %
 Material < 37.5mm > 20mm 0 %
 Particle density 2.65 assumed
 Remarks

Derived Parameters +

Maximum dry density, Mg/m3
0.00
 Optimum moisture content, %

QA Ref
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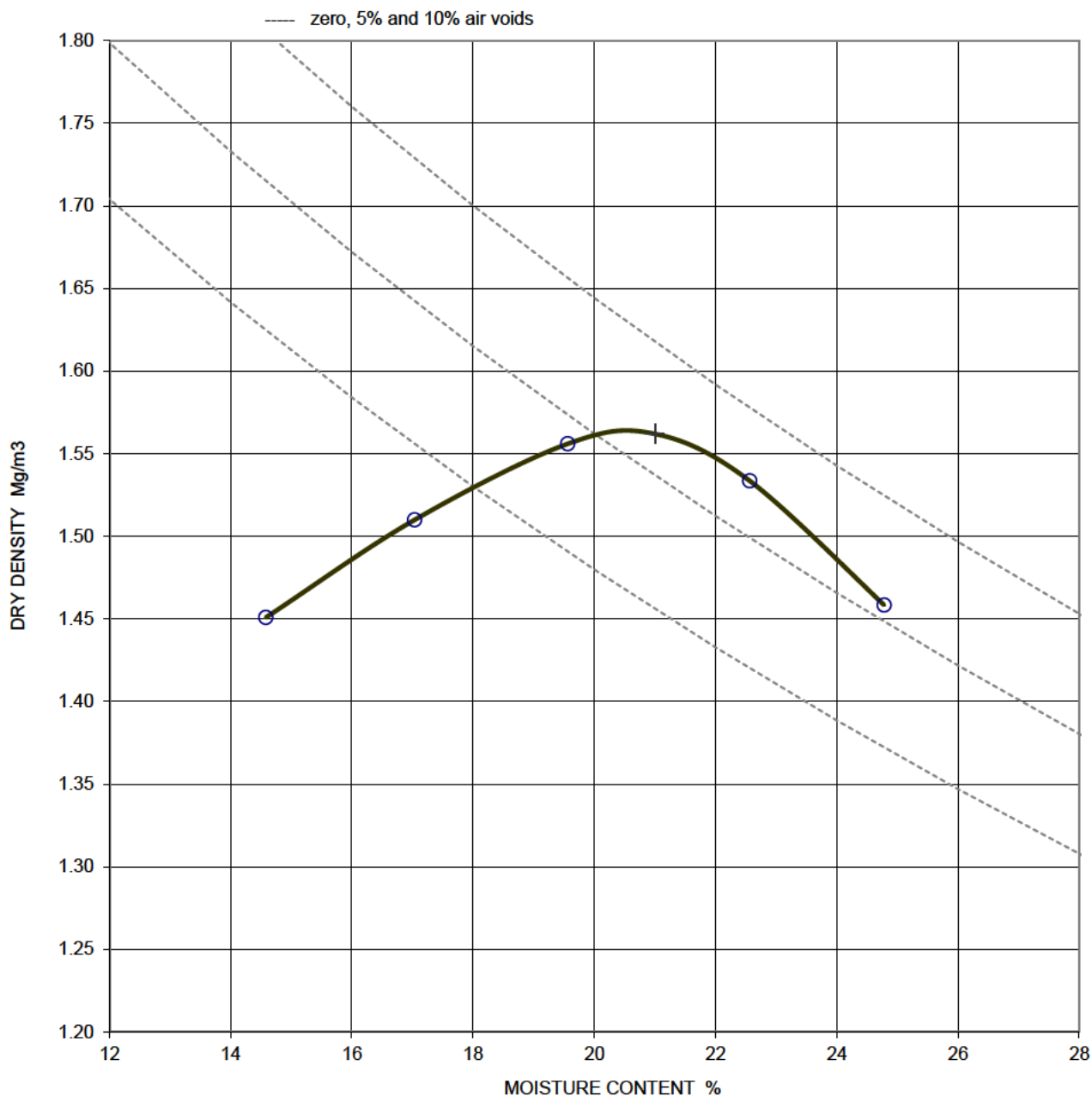
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-03
	A9031-1920191212034428	Sample Depth (m BGL)	2.00 - 2.50
		Sample Type and No	B12
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.45 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³

1.56

Optimum moisture content, %

21

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Figure

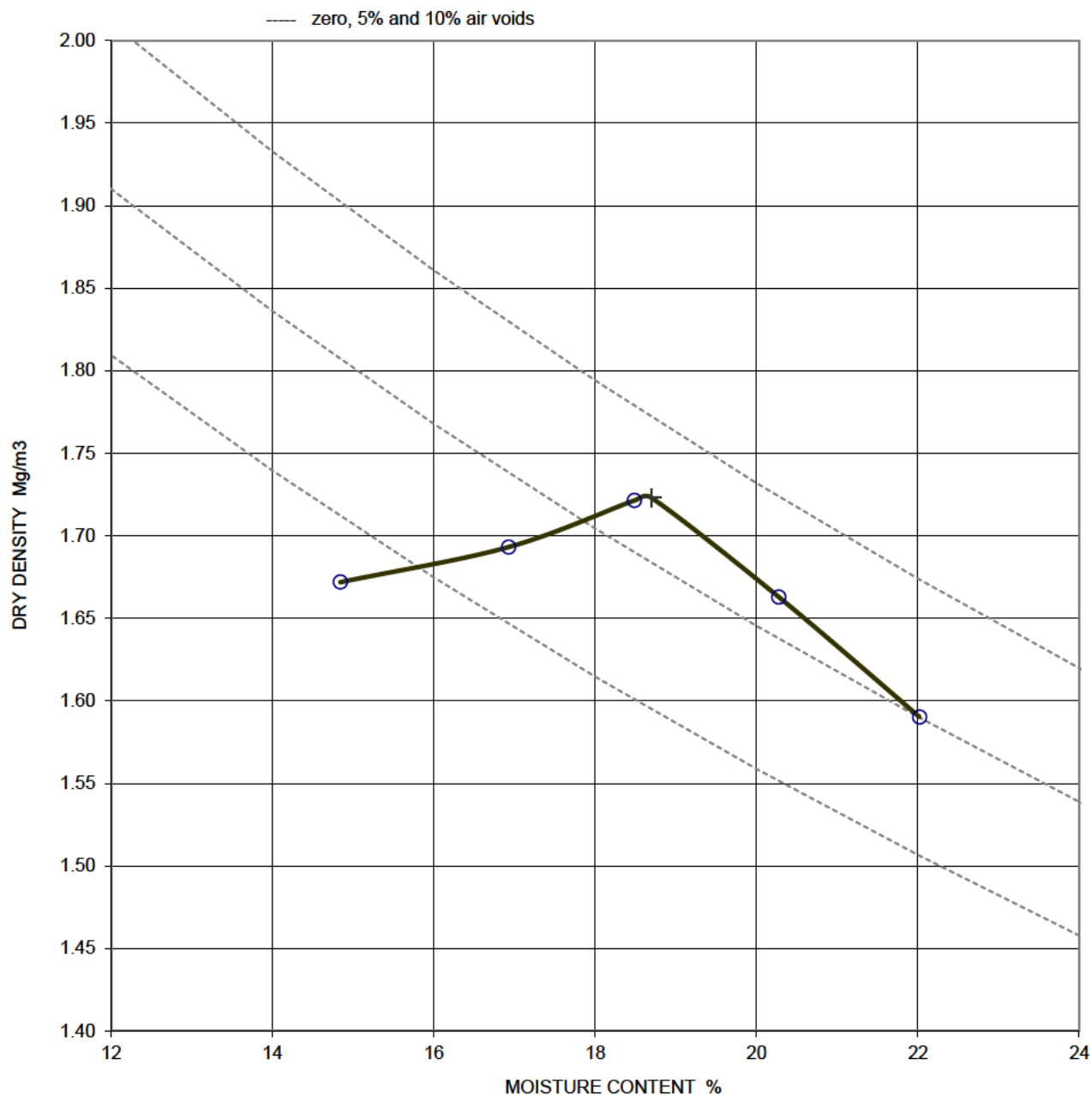
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-04
	A9031-1920191118090111	Sample Depth (m BGL)	0.80 - 1.20
		Sample Type and No	B6
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould
 Preparation Original material was natural, single sample tested
 Material > 37.5mm 0 %
 Material < 37.5mm > 20mm 0 %
 Particle density 2.65 assumed
 Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.72
 Optimum moisture content, %
19

QA Ref
 SLD 4, 3.3/4
 Rev 2.5
 Sep 17



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 Project Name HAVANT THICKET WATER STORAGE

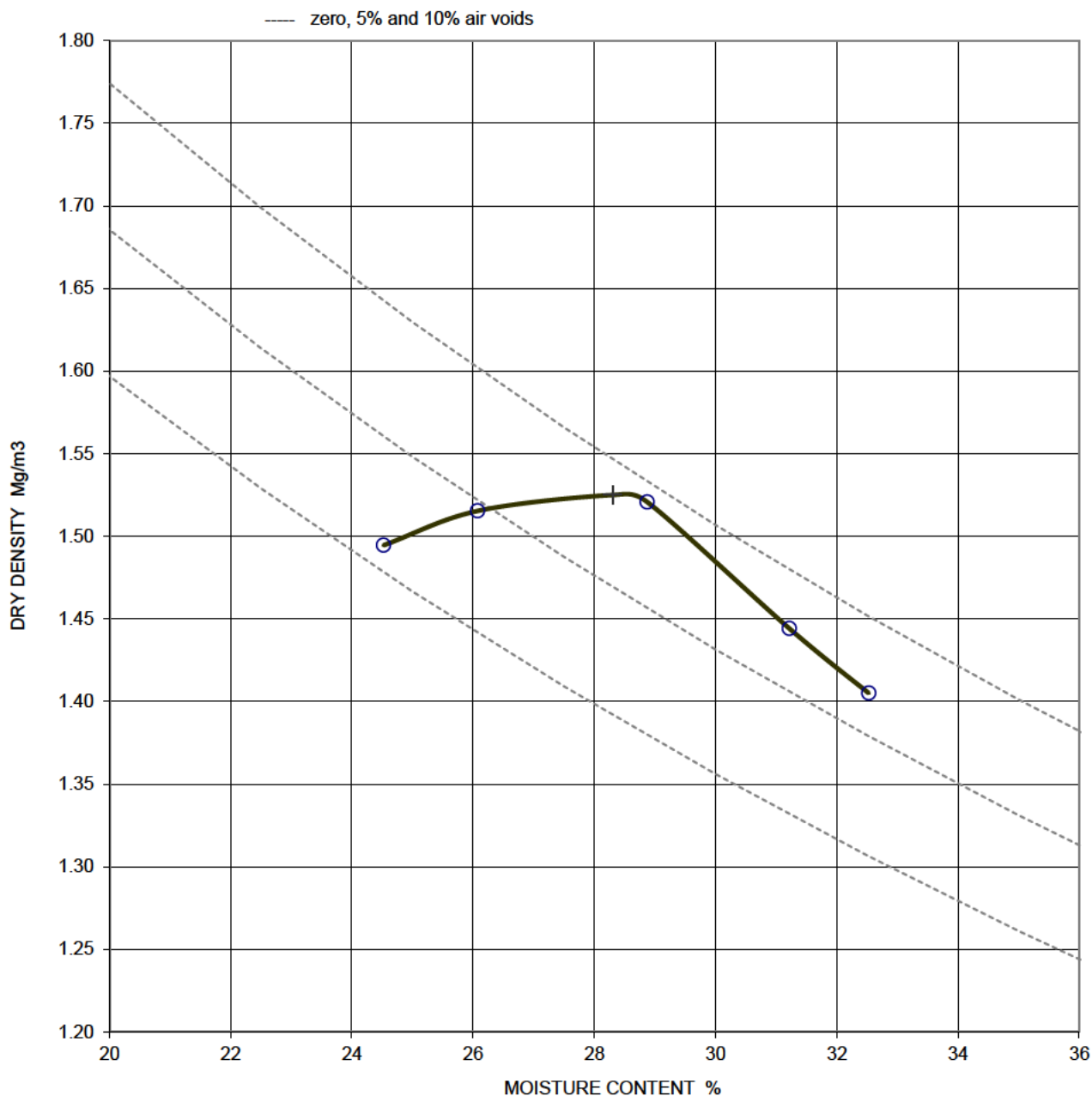
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-04
	A9031-1920191118090257	Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B13
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.75 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.53

Optimum moisture content, %
28

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SLD 4, 3.3/4
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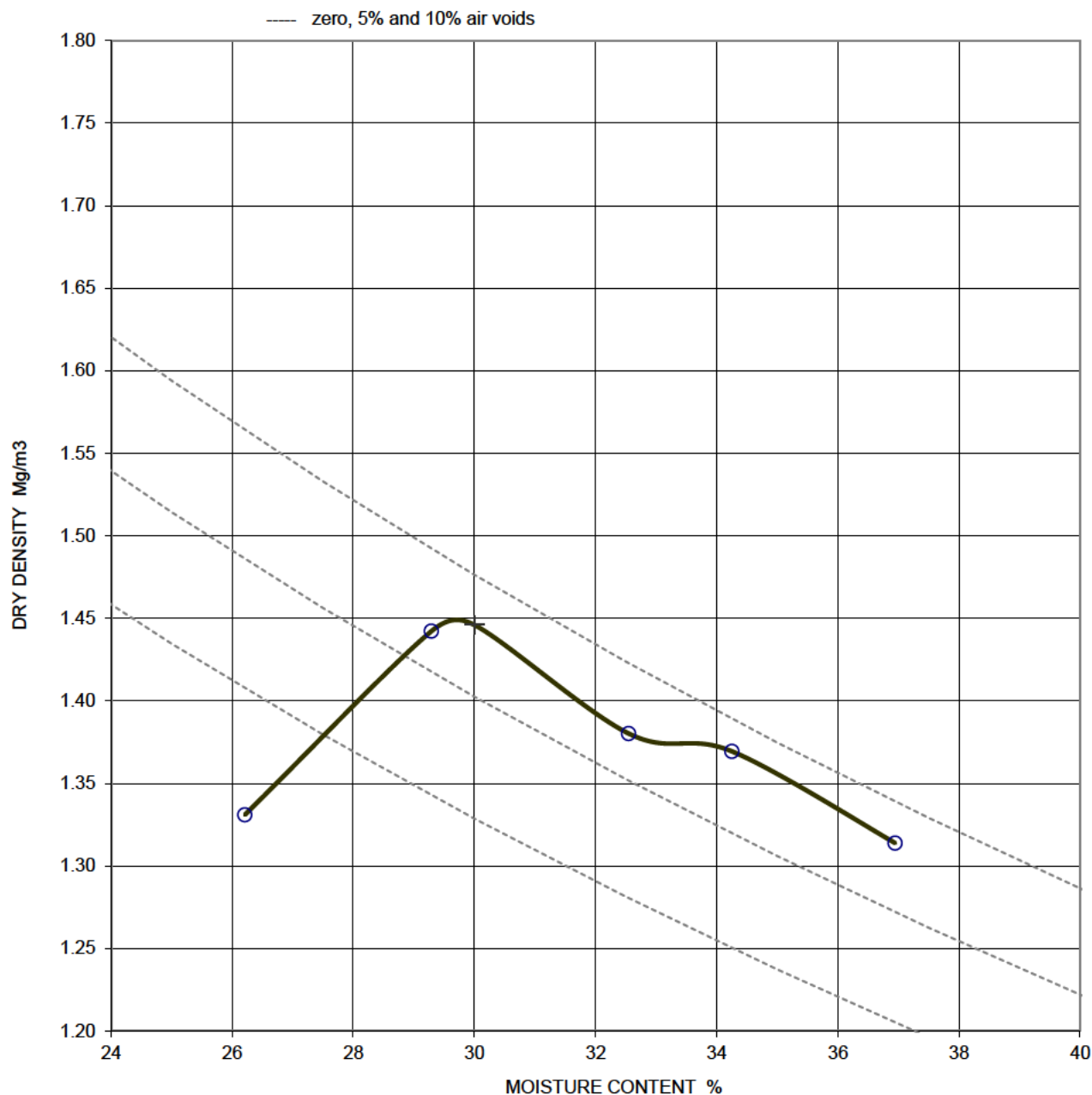
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-05
	A9031-1920191121112036	Sample Depth (m BGL)	0.80 - 1.20
		Sample Type and No	B6
		Specimen Ref	



Soil description Brown slightly sandy slightly gravelly CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould
 Preparation Original material was natural, single sample tested
 Material > 37.5mm 0 %
 Material < 37.5mm > 20mm 0 %
 Particle density 2.65 assumed
 Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.45
 Optimum moisture content, %
30

QA Ref
 SLD 4, 3.3/4
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 Project Name HAVANT THICKET WATER STORAGE

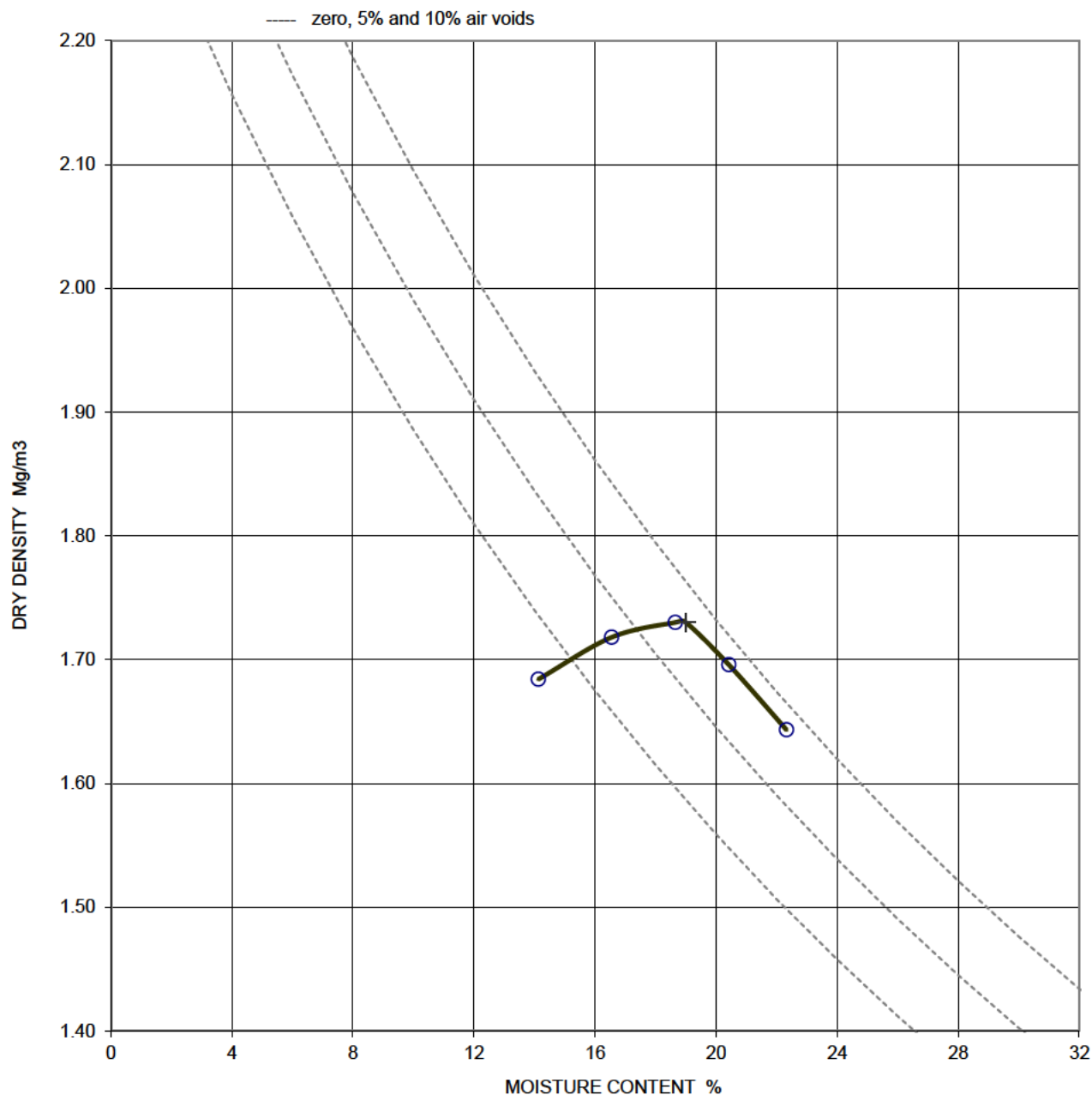
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-06
	A9031-1920191205122237	Sample Depth (m BGL)	1
		Sample Type and No	B7
		Specimen Ref	



Soil description Light brown slightly sandy gravelly CLAY with two cobbles.

Test method BS 1377:part 4:1990: clause 3.6, 2.5 kg rammer in a CBR mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 12 %

Material < 37.5mm > 20mm 22 %

Particle density 2.65 assumed

Remarks

Grading Zone X

Derived Parameters +

Maximum dry density, Mg/m³
1.73

Optimum moisture content, %
19

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SLD 4, 3.3/4
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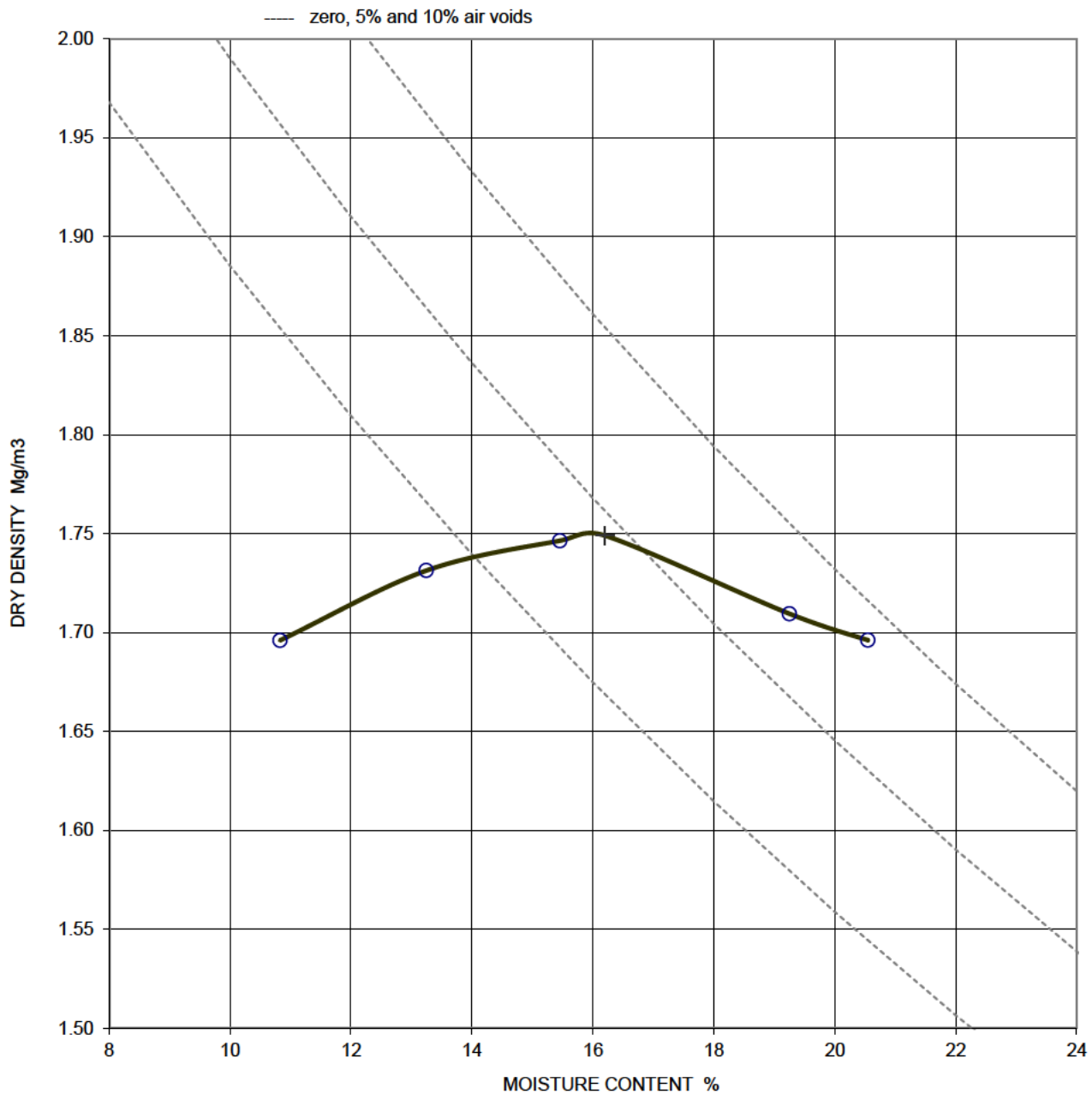
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-06
	A9031-1920191205122329	Sample Depth (m BGL)	3.00 - 3.50
		Sample Type and No	B16
		Specimen Ref	



Soil description Dark brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould
 Preparation Original material was natural, single sample tested
 Material > 37.5mm 0 %
 Material < 37.5mm > 20mm 0 %
 Particle density 2.65 assumed
 Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.75
 Optimum moisture content, %
16

QA Ref
 SLD 4, 3.3/4
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 Project Name HAVANT THICKET WATER STORAGE

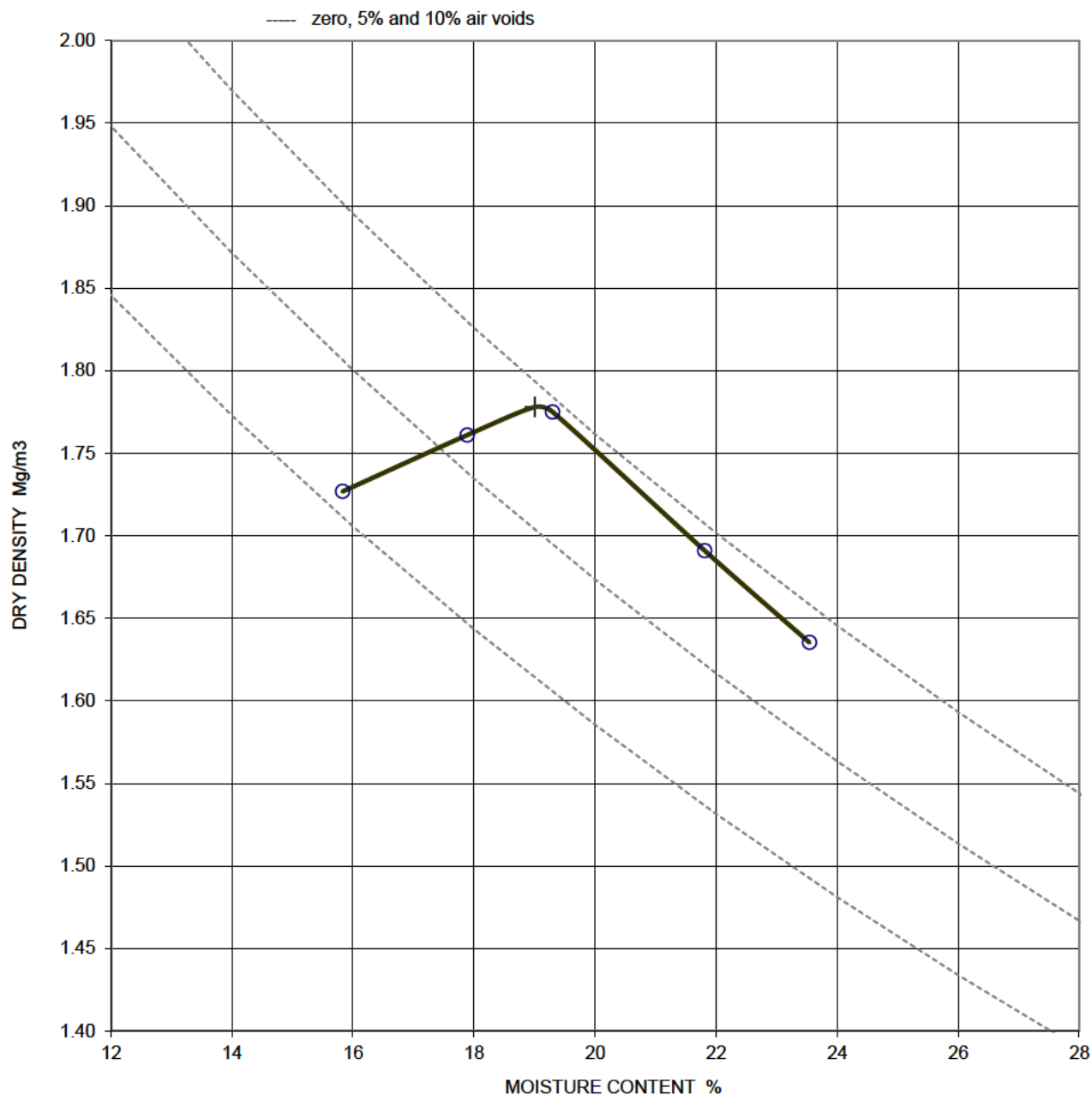
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-07A
	A9031-1920191209030426	Sample Depth (m BGL)	9.00 - 9.50
		Sample Type and No	B32
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.72 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.78

Optimum moisture content, %
19

QA Ref
SLD 4, 3.3/4
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Project Name HAVANT THICKET WATER STORAGE

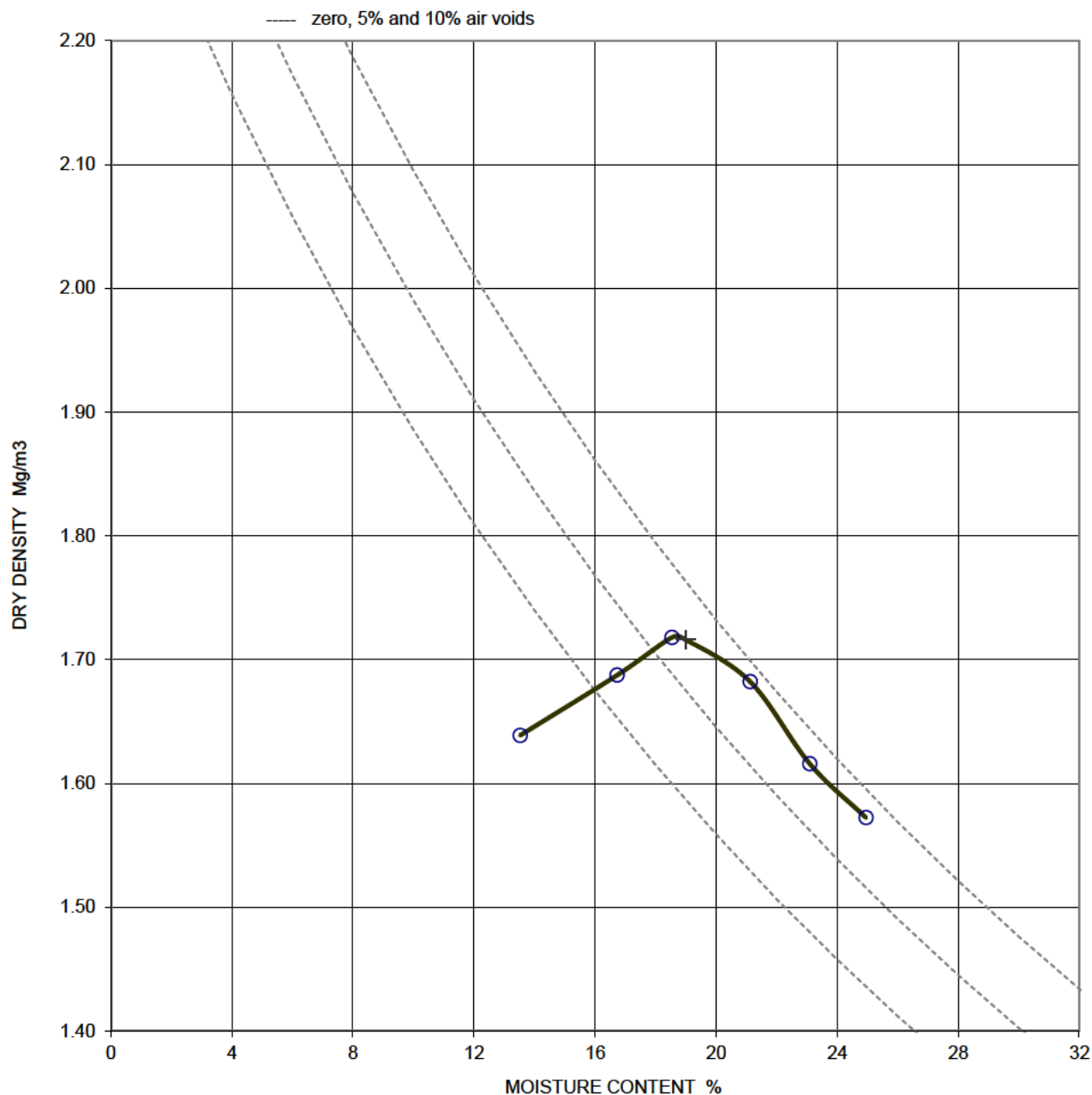
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-08
	A9031-19-20191126042048	Sample Depth (m BGL)	2.65 - 3.20
		Sample Type and No	B11
		Specimen Ref	



Soil description

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould
 Preparation Original material was natural, single sample tested
 Material > 37.5mm 0 %
 Material < 37.5mm > 20mm 2 %
 Particle density 2.65 assumed
 Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.72
 Optimum moisture content, %
19

QA Ref
 SLD 4, 3.3/4
 Rev 2.5
 Sep 17



Project No A9031-19
 Project Name HAVANT THICKET WATER STORAGE

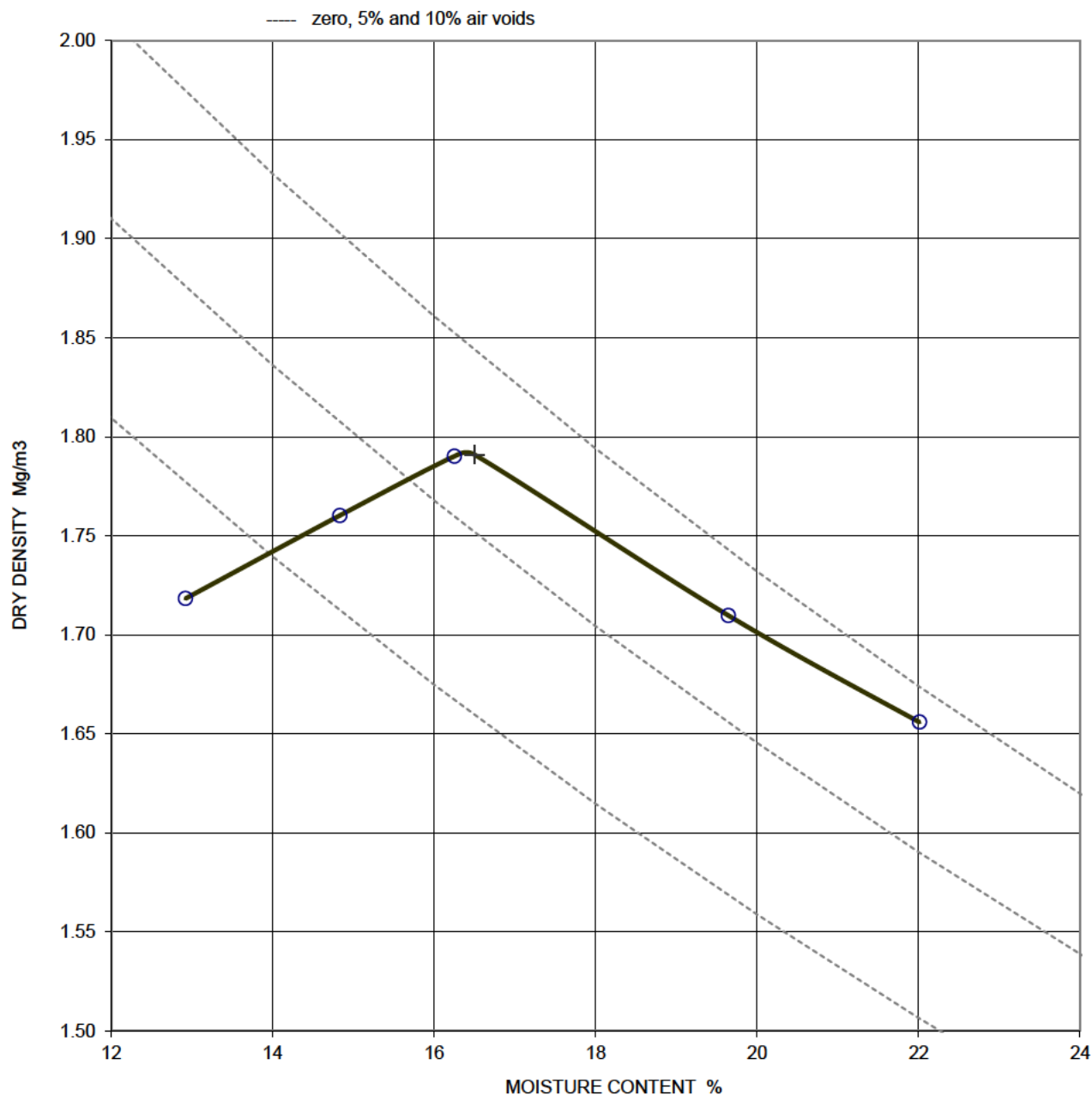
Figure
COMPL

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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	ATK-CP-08
	A9031-1920191205104608	Sample Depth (m BGL)	7.65 - 8.20
		Sample Type and No	B27
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.65 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.79

Optimum moisture content, %
17

QA Ref
SLD 4, 3.3/4
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Figure
COMPL

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