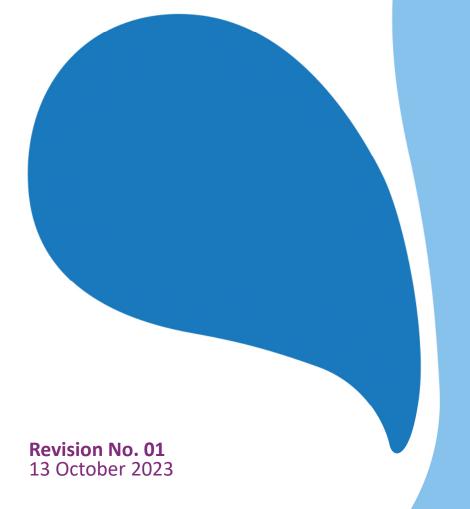


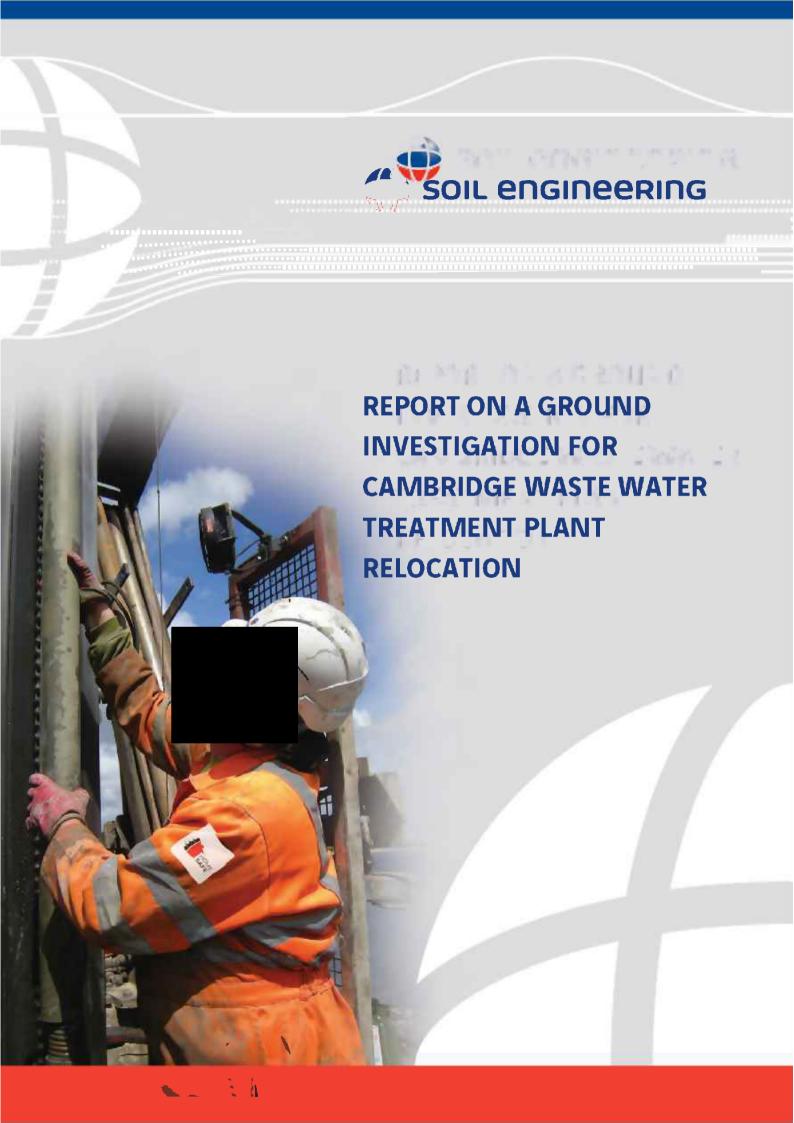
Cambridge Waste Water Treatment Plant Relocation Project Anglian Water Services Limited

Appendix 14.7: Ground Investigation Report for Cambridge Waste Water Treatment Plant – Part 1

Application Document Reference: 5.4.14.7 PINS Project Reference: WW010003

APFP Regulation No. 5(2)a







REPORT QUALITY ASSURANCE SHEET

TITLE: REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

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03	23/08/2022	Final for comment
04	12/09/2022	Final following completion of laboratory testing
05	10/10/2022	Final following completed testing for comment
06	25/01/2023	Final following comments

This report is not to be used for contractual or engineering purposes unless this sheet is signed where indicated by both the originator of the report and the approver, and the report is designated "Final" on this report quality assurance sheet.

Opinions and interpretations expressed in the report are outside the scope of UKAS accreditation.

This report has been prepared for the sole internal use and reliance of the named Employer. This report should not be relied upon or transferred to any other parties without the express written authorisation of Soil Engineering. If an unauthorised third party comes into possession of the report, they rely on it at their peril and Soil Engineering owes them no duty of care and skill.

Internal Form Information: Report No. SE-RRG-F-001 Issue.Revision Number 4.00 Issue Date 05/07/2021

REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

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Site Location Plan

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- Cable Percussion and Rotary Drilling Records
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APPENDIX 1: NOTES ON FIELDWORK, LOGGING AND LABORATORY TESTING

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APPENDIX 2: CALIBRATION CERTIFICATES

REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

1.0 INTRODUCTION

In July 2021 Soil Engineering Geoservices Ltd were instructed by Barhale Limited (The Employer) to carry out a ground investigation for the Cambridge Waste Water Treatment Plant Relocation project. The investigation was specified by Mott MacDonald Bentley Limited (The Engineer) and directly supervised on site by Sweco Limited (The Investigation Supervisor).

It is proposed to construct a new waste water treatment works in the eastern end of the site with two pipelines extended westwards, one terminating at the River Cam; the second extending beyond the river to the existing sewage treatment works in Milton, Cambridge.

The investigation comprised the formation of cable percussion boreholes, rotary cored boreholes and rotary open hole boreholes together with trial pitting and in situ testing.

An instruction was received from the Employer to stop all intrusive works on Friday 18th October 2021. At this stage of the fieldworks, fifty rotary boreholes of the fifty-six scheduled rotary boreholes had been completed, twelve of the fourteen scheduled cable percussion boreholes had been completed and one was in progress, and all twenty six of the scheduled trial pits excavations had been completed.

This factual report presents the results of the fieldwork and laboratory testing undertaken together with information on the ground and groundwater conditions encountered; the fieldwork was carried out between 13th July 2021 and 18 h October 2021 in accordance with the project specification¹.

The works were resumed on 28th March 2022 to complete the the outstanding boreholes. These works are collectively known as Phase B and a separate report has been issued for Phase B.

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¹ Specification for Ground Investigation: Cambridge Waste Water Treatment Plant Relocation: Mott MacDonald @One Alliance: April 2021: Doc Ref CWWTPR Specification for Ground Investigation Works Rev3 Issue for Tender

REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

2.0 PURPOSE, SCOPE AND REPORT FORMAT

2.1 Purpose

The purpose of this investigation was to provide information to assist the design and construction of a new waste water treatment works together with a 2.5km length sewer tunnel, including access shafts and a 1.7km length final effluent pipeline with outfall structure, access roads and diversion of the Fen Ditton Rising Main. This information was obtained from a combination of intrusive and non-intrusive investigation techniques and laboratory testing.

2.2 Scope of Work

The scope of the investigation was as follows:

- To form fifty-six rotary boreholes
- To undertake a total of twenty-seven pressuremeter tests
- To undertake four in situ geophysical tests
- To form fourteen cable percussive boreholes
- To install gas and/or groundwater monitoring points in selected boreholes
- To form twenty-six machine excavated trial pits.
- To undertake in situ California Bearing Ratio tests in each of the trial pits
- To undertake seven plate load bearing tests
- To undertake a pumping test including the formation of pump and monitoring wells
- To monitor gas and/or groundwater monitoring points during and after the fieldwork
- To survey the as-built position of each of the exploratory hole locations
- To undertake geotechnical laboratory testing
- To undertake geochemical laboratory testing
- To undertake environmental laboratory testing
- Provision of factual report containing all findings from the investigation and including core and trial pit photographs
- Provision of electronic data.

Several changes to the proposed scope of works were made by the Engineer during the fieldwork period, these are summarised below.

- Cancellation of a number of proposed packer tests due to minimal water intake of the ground observed in packer tests undertaken to-date
- The Engineer instructed the installation of additional standpipes to the original specification to enable additional permeability testing
- Following formation and installation of the pump test well locations, the Engineer required that due to change in design, additional pumping test wells were drilled and pump test carried out at an alternative location. Therefore, all four pump test boreholes were re-drilled in a new location and labelled with the suffix 'b'
- Addition of four rotary open holes to facilitate in situ testing
- Cancellation of one geophysical test location



REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

2.3 Limitations

This report has been prepared in accordance with the project specification. Soil Engineering accepts no liability for any deficiencies in the report that arise from the specification's non-compliance with either European or British Standards. This particularly applies to exploratory hole spacings and depths and to the scope of laboratory testing.

It should be noted that the investigation data on which this report is based is only indicative of the actual ground, groundwater and ground gas conditions that exist at the locations of the exploratory holes and may not be representative of the conditions that exist on the site as a whole.

2.4 Report Format

This factual report is presented in the following format:

- Written description of fieldwork, laboratory testing and investigation results.
- Section A: Field Records including exploratory hole logs, in situ test results and gas and/or groundwater monitoring results
- Section B: Laboratory Test Results from geotechnical, geochemical and environmental testing laboratories
- Section C: Drawings including exploratory hole location plans.
- Section D: Photographs from core and trial pits
- Appendix 1: General Notes on fieldwork, the logging of soil, made ground, rock and geochemical testing.
- Appendix 2: Calibration Certificates

The sources of information used in the compilation of this report are detailed in the footnotes at the base of the page upon which they are first referenced.

REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

3.0 DESK STUDY INFORMATION

3.1 Scope of Study

A formal comprehensive (phase I) desk study was not requested by the Engineer for this investigation. The following sections however provide general details of site location and description as well as site geology as ascertained from published maps and memoirs, together with details of any previous investigation carried out on the site.

3.2 Site Location and Description

The site of the proposed new sewage treatment works will be located within existing arable land east of Horningsea Road. The outfall structure and final effluent pipeline extends from this new structure, north of the existing A14 and terminates at the River Cam. The proposed sewer tunnel extends westwards from the new treatment works south of the existing A14, across the River Cam and terminates within the existing sewage treatment works on Cowley Road.

FIGURE 1: SITE LOCATION PLAN

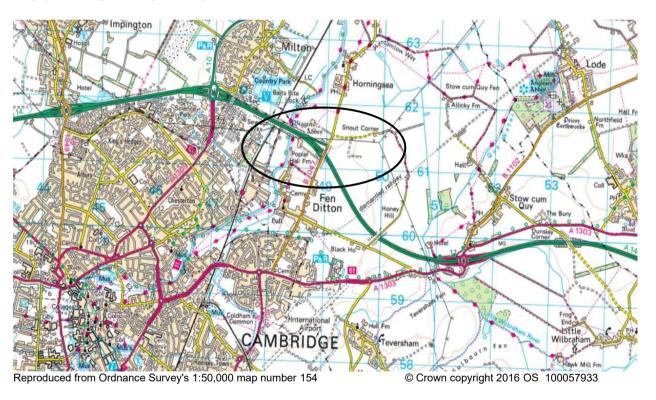




TABLE 1: SITE LOCATION DETAILS

Postcode	CB5 8TB
Approximate National Grid Reference	TL 496 612
Northern Boundary	Open arable land
Eastern Boundary	Open arable land
Southern Boundary	Open arable land
Western Boundary	Residential / Industrial
Approximate Ground Level (m AOD)	3.85 – 11.75

3.3 Geology

From the available information on the 1:50,000 scale Geological Survey map of the area² the site east of the River Cam is shown to be underlain by the lower part of the Grey Chalk subgroup (formerly known as Lower Chalk) of Cretaceous age with deposits of Alluvium indicated within the vicinity of the River Cam. The area of the existing sewage treatment works is shown to be underlain by River Terrace Deposits underlain by the Gault Formation of Cretaceous age. The Lower Greensand Group underlies the Gault Formation.

3.4 Previous Investigations

The Engineer has supplied a report on a ground investigation for Cambridge Waste Water Treatment Plant Relocation undertaken by AF Howland Associates in November 2020. The investigation comprised the formation of five wireline rotary cored boreholes using a Pioneer multipurpose rig, progressed initially by dynamic sampling until competent material was encountered that necessitated completion of the hole by wireline coring methods. Boreholes were formed to depths of between 30.00m and 40.50m and encountered various deposits of Chalk, fissured Clay, Sandstone and Mudstone with overlying superficial deposits of clay and granular materials.

² Sheet 188: 1981, Solid and Drift edition for Cambridge

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REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

4.0 FIELDWORK

4.1 Scope of Fieldwork

The scope of the fieldwork was specified by the Engineer and was undertaken in general accordance with Eurocodes³ and, where there is no conflict, also with BS 5930⁴. Soil and rock logging has been undertaken in accordance with the relevant European Standards^{5,6,7}. The exploratory hole locations were set out initially by the Engineer however in accordance with the project specification, Soil Engineering were required to survey the as-built exploratory hole locations.

Across the full site, rotary cored boreholes were formed from the base of the inspection pit with the exception of BH_TUN_006 which was formed from the base of a cable percussion borehole. Four rotary open hole boreholes were formed along the route of the sewer tunnel in the vicinity of rotary cored holes to facilitate in situ testing. Cable percussion boreholes were formed in the vicinity of selected rotary borehole locations in order to provide SPT profiles for design purposes. Various permeability tests were also scheduled during formation of both rotary and cable percussion boreholes. The pump test boreholes were formed both by rotary coring and rotary open hole drilling methods.

Trial pits were formed in the area of the proposed treatment works and route of the final effluent pipeline where in situ strength, permeability, bearing capacity and pavement design tests were also undertaken.

The exploratory hole locations are shown on the site plan presented in Section C of this report.

Details of the works undertaken are summarised in Table 2 below.

TABLE 2: SUMMARY OF ROTARY HOLE LOCATIONS

Borehole ID	Scheduled Depth / (Depth Achieved) [m]	Variable Head Tests	Packer Testing	Downhole Televiewer / Geophysics Testing	Pressuremeter Testing
BH_FE_001	15 (15.90)	✓			
BH_FE_002	10 (10)				
BH_FE_003	10 (10)				
BH_FE_004A	15 (15)				
BH_FE_005	15 (15)				
BH_FE_006	10 (10)				
BH_OUT_001	20 (20)				
BH_STW_001	15 (15.40)				
			·		

³ Eurocode 7 Part 2 (BS EN 1997-2: 2007)

⁷ BS EN ISO 14689-1: 2018: Geotechnical Investigation and testing – Identification and Classification of Rock – Part 1: Identification and description.

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⁴ BS 5930: 2015 + A1 2020: Code of Practice for Site Investigation. British Standards Institution

⁵ BS EN ISO 14688-1: 2018: Geotechnical Investigation and testing – Identification and Classification of Soil – Part 1: Identification and Description.

⁶ BS EN ISO 14688-2: 2018: Geotechnical Investigation and testing – Identification and Classification of Soil – Part 2: Principles for a Classification



Borehole ID	Scheduled Depth /	Variable Head	Packer	Downhole	Pressuremeter
	(Depth Achieved) [m]	Tests	Testing	Televiewer / Geophysics Testing	Testing
BH_STW_003A	10 (10)	1 (2no. in Schedule2)	√		
BH_STW_004	15 (15.10)	Í			
BH_STW_005A	30 (30)				
BH_STW_006	15 (15)				✓
BH_STW_007	15 (15.10)				
BH_STW_009	30 (30)				
BH_STW_010A	30 (30.20)				
BH_STW_011A	30 (30.20)				√
BH_STW_012A	30 (30.35)				√
BH_STW_013A	50 (48.45)	✓		Geophysics Only	
BH_STW_013C	12 (13.10)		√	_	
BH_STW_014	30 (30)				
BH_STW_015	30 (30.20)				
BH_STW_016	30 (30.20)				
BH_STW_017	15 (15)				
BH_STW_018	30 (30)	1 (2no. i <mark>n</mark> Schedule2)		✓	
BH_STW_019A	30 (30)	Í			✓
BH_STW_020	30 (30.20)				✓
BH_STW_021	15 (15)				✓
BH_STW_022A	50 (50)	✓	√		
BH_STW_023	15 (15.30)				
BH_STW_024	15 (15)				
BH_STW_025	15 (15.05)				
BH_STW_026	15 (15)				
BH_STW_031A	15 (15)				
BH_TUN_001A	35 (35)	1 (2no. in Schedule2)	√		
BH_TUN_001PM	(18)				✓
BH_TUN_002	30 (30)				
BH_TUN_003	30 (30)				
BH_TUN_004c	30 (30)				
BH_TUN_005Ab	30 (30)				
BH_TUN_006	40 (40)	1 (2no. in Schedule2)			
BH_TUN_006PM	(18)		✓		✓
BH_TUN_007	30 (30.20)				
BH_TUN_011	40 (42.50)				
BH_TUN_011PM	(24.5)				
BH_TUN_015	30 (30.20)				

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Borehole ID	Scheduled Depth / (Depth Achieved) [m]	Variable Head Tests	Packer Testing	Downhole Televiewer / Geophysics Testing	Pressuremeter Testing
BH_TUN_016	30 (30.20)				
BH_TUN_017	30 (30.20)				
BH_TUN_018	50 (49.50)	1 (2no. in Schedule2)		✓	
BH_TUN_018PM	(27.50)				✓
BH_TPS_001	15 (15.10)				
BH_TPS_001b	13 (13.70)				
BH_TPS_002	15 (15.20)				
BH_TPS_002b	13 (13.20)				
BH_TPS_003	15 (15.20)				
BH_TPS_003b	13 (13.30)				
BH_TPS_004	15 (15.20)				
BH_TPS_004b	13 (13.30)			_	

TABLE 3: SUMMARY OF CABLE PERCUSSION HOLE LOCATIONS

Borehole ID	Scheduled Depth / (Depth Achieved) [m]	Variable Head Tests (during borehole formation)	Standard Penetration Tests
BH_STW_003B	10 (10)		✓
BH_STW_005B	30 (30)	1 (2no. in Schedule2)	✓
BH_STW_010B	30 (30)		✓
BH_STW_011B	30 (30)		✓
BH_STW_012B	30 (30)		✓
BH_STW_013B	30 (30)	1 (2no. in Schedule2)	✓
BH_STW_019B	30 (11.20*)		✓
BH_STW_022B	30 (30)		✓
BH_STW_031B	15 (30)		✓
BH_TUN_001B	35 (35)		✓
BH_TUN_005B	30 (30)		✓
BH_FE_004B	15 (15)		✓
BH_TUN_006	Base of made ground		



TABLE 4: SUMMARY OF TRIAL PIT HOLE LOCATIONS

Borehole ID	Scheduled	Soakaway	Hand Vane	California	Plate Load
	Depth / (Depth	Testing	Testing	Bearing Ratio	Tests
TP_FE_001	Achieved) [m] 3 (2.5)	✓	√	Tests	
TP_FE_002	3 (2.2)	√	· ·	·	
TP_FE_003	3 (2.8)	,	<u>,</u> ✓	·	
TP_FE_004	3 (3)		√	√	
TP_FE_005	3 (3)		✓	✓	
TP FE 006	3(3)		✓	✓	
TP_STW_003	3 (3)	✓	√	√	
TP_STW_004	3 (3)		✓	✓	
BH_STW_005	3 (3)		✓	✓	✓
BH_STW_006	3 (3)		✓	√	
TP_STW_007	3 (3)		✓	✓	
TP_STW_010	3 (3)		✓	✓	
TP_STW_011	3 (3)		✓	✓	
TP_STW_012	3 (3)		✓	✓	✓
TP_STW_013	3 (3)	✓	✓	✓	
TP_STW_014	3 (3)		✓	✓	✓
TP_STW_015	3 (3)		✓	✓	✓
TP_STW_016	3 (3.10)	✓	✓	✓	✓
TP_STW_017	3 (3)		✓	✓	
TP_STW_018	3 (3)	>	✓	✓	✓
TP_STW_019	3 (3)		✓	✓	✓
TP_STW_020	3 (3)		✓	✓	
TP_STW_021	3 (3)		✓	✓	
TP_STW_022	3 (3)	✓	✓	✓	
TP_STW_031	3 (3)	✓	✓	✓	
TP_STW_032	3 (3)		✓	✓	

In general, hole numbers commence with the hole type (BH, TP, IP) followed by an abbreviation of either STW (Sewage Treatment Works), FE (Final Effluent) or TUN (sewage Tunnel) and then a final identification number. Where there is a suffix of 'A' for a rotary borehole, this indicates that a cable percussion borehole has been scheduled nearby with the suffix 'B'. All cable percussion boreholes have a suffix 'B'. Where there is a suffix 'PM' this indicates a rotary open hole formed to facilitate in situ testing close to a rotary cored borehole with the same number identification.

Where multiple attempts were made to form a borehole at each location, a standard approach was not adopted on site. BH_STW_013C is an additional borehole formed in the vicinity of BH_STW_013A solely to facilitate the scheduled packer testing at this location. BH_TUN_004c represents the successful attempt to form an inspection pit to facilitate drilling to depth at this location and there are seven additional inspection pit logs at this location. BH_TUN_005Ab represents the successful attempt to form an inspection pit to facilitate drilling to depth following a failed attempt at IP_TUN_005A.

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It should be noted that BH_OUT_001 was originally labelled as BH_OUT_01A in the specification.

Backfill of the exploratory holes, including the installation of monitoring instrumentation, was undertaken in accordance with the specification and as instructed by the Engineer. Details of the backfill material used, and where relevant pipe construction, are provided on the individual exploratory hole logs presented in Section A of this report. Trial pits and trenches were backfilled with arisings placed in reverse order to excavation.

4.2 Inspection Pits

In order to reduce the risk of damaging buried services, the location of each exploratory hole was scanned using a cable avoidance tool (CAT) immediately prior to breaking ground. As a further precaution, an inspection pit was hand excavated to a depth of 1.20m at each location during which further scans were taken with the CAT at 300mm intervals to the base of each pit.

An additional inspection pit was instructed by the Engineer and designated IP_TUN_006 for the purposes of recovering large bulk disturbed samples for geotechnical laboratory testing. The inspection pit was located on the top of a man-made earth bund located within the existing sewage treatment works.

Additional inspection pits were formed at locations designated BH_TUN_004 and BH_TUN_005A due to buried obstructions and cable avoidance tools signals preventing work to continue safely. The details of all inspection pits are presented in Section A of this report.

Small disturbed samples for environmental testing were also obtained at locations specified by the engineer in a variety of glass and/or plastic containers as required by the project specification. These were kept refrigerated after collection and in order to meet sample holding times, were dispatched to the testing laboratory within twenty four hours of sampling.

4.3 Cable Percussion Boreholes

A total of twelve boreholes, see Table 3 for hole designations, were formed to depths between 10.00m and 35.00m. It should be noted that BH_STW_019B was abandoned at 11.20m due to the site instruction to halt all drilling works. In addition, a further cable percussion borehole designated BH_TUN_006 was formed to 7.50m in order to facilitate rotary coring to the scheduled depth.

Boreholes were formed using conventional light cable percussion techniques together with 200mm and 150mm diameter temporary steel casings. The boreholes were all formed in order to obtain an SPT profile of the underlying ground to aid geotechnical design and to obtain samples for laboratory testing. Five of the boreholes were also used for the installation of ground monitoring wells.

Standard Penetration Tests were carried out at 1m intervals throughout boring operations as specified by the Engineer. The results of these tests are given as a Standard Penetration "N" value or as a blow count for a given penetration at the appropriate position on the borehole logs.

Representative disturbed samples of all materials encountered were obtained and these were placed in sealed containers for transport to the laboratory.

The samples recovered from the boreholes were described by an Engineering Geologist in

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REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

accordance with the terminology presented in Appendix 1 of this report. A detailed description of all strata encountered, groundwater conditions and the position and type of samples taken are included on the borehole logs presented in Section A of this report.

4.4 Rotary Drilling

A total of seven boreholes were formed using rotary open hole drilling methods. These included three pump test location boreholes BH_TPS_002b to BH_TPS_004b inclusive, formed to a depth of 13.30m using a tricone steel toothed rock roller drill bit with air mist flush to produce a hole diameter of 150mm. In addition, four open hole boreholes were formed close to existing locations to facilitate in situ testing. These four boreholes BH_TUN_001PM, BH_TUN_006PM, BH_TUN11PM and BH_TUN_018PM were formed to depths between 18.00m and 31.00m using either a PCD, tricone rock roller or drag bit together with air mist flush to produce a hole diameter between 146mm and 150mm.

In order to obtain information on the solid geology beneath the site, fifty boreholes were formed using rotary core drilling techniques to depths between 10.00m and 50.00m using either a Geobore S, HWF or SWF triple tube core barrel together with a protective semi rigid plastic liner and a Polycrystalline Diamond (PCD) core bit with air mist or water flush to produce cores of either 102mm, 73mm or 107mm nominal diameter.

Details of the strata encountered are given on the borehole logs along with the Engineering Geologist's assessment of Total Core Recovery (TCR), Solid Core Recovery (SCR), and Rock Quality Designation (RQD) each expressed as a percentage of the individual core runs. Where applicable a fracture spacing (I_f) has also been determined and this information is given on the logs.

The symbols and abbreviations used on the rotary borehole logs are explained on the exploratory hole log legend and notation sheet presented in Section A of this report.

The core samples recovered were photographed, sampled and described by an Engineering Geologist in accordance with the terminology presented in Appendix 1 of this report. The borehole logs are presented in Section A of this report and core photographic records are presented in Section D of this report.

Sub-samples of the core were obtained at depths specified by The Engineer and were taken by an Engineering Geologist once detailed logging of the core had been completed. Core subsamples selected were wrapped in alternating layers of plastic film and wax then wrapped in protective plastic and placed into core boxes for secure onward transport to the laboratory. These undisturbed samples were given the sample type CS whilst disturbed samples taken from the core that were placed within a plastic tub or plastic bag were given the sample types: CD and CB respectively and any samples taken from the core for environmental purposes were given the sample type CES. Prior to transport to the laboratory, the samples were protected from the elements at all times in temporary site accommodation.

4.5 Trial Pits

Twenty-six trial pits were excavated using a JCB type backhoe excavator to depths between 2.20m and 3.10m. Six trial pits were formed along the route of the proposed final effluent sewer, these were designated TP_FE_001 to TP_FE_006 inclusive. The remaining twenty locations were formed within the footprint of the proposed sewage treatment works and designated

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TP STW 003 to TP STW 022 inclusive and TP STW 031 and TP STW 032.

The trial pits were formed to assess the mass soil fabric of near surface natural deposits, to facilitate in situ strength and permeability testing and to obtain soil samples for geo environmental and geotechnical laboratory testing.

Small disturbed samples for environmental testing were also obtained at locations specified by the engineer in a variety of glass and/or plastic containers as required by the project specification. In order to meet sample holding times, samples were dispatched to the testing laboratory within twenty four hours of sampling.

The trial pits were not shored and were logged from the surface by an Engineering Geologist. The Engineering Geologist provided a detailed description of the ground conditions encountered in each pit and also obtained disturbed soil samples at regular intervals for geotechnical and chemical analysis. The strata encountered in the trial pits are described on the trial pit logs presented in Section A of this report and the location of each of the trial pits is indicated on the site plan presented in Section C of this report. Trial pit photographs are included in Section D of this report

4.6 In situ Testing

4.6.1 Standard Penetration Testing

Standard Penetration Tests⁸ were carried out in all of the cable percussive boreholes using either a split spoon sampler or a solid 60° cone.

The test consists of driving a 50mm external diameter split barrel sampler into the soil using a 63.5kg hammer dropping 760mm. In coarse granular soils or in rock, the split barrel may be replaced by a solid cone. The penetration resistance is expressed as the number of blows required to obtain 300mm penetration, below an initial seating drive of 150mm through any disturbed ground at the bottom of the borehole. The number of blows for the 300mm test drive penetration is recorded on the borehole logs as the "N" value. A full record of the number of blows required to drive the sampler at 75mm intervals throughout the total 450mm drive is also tabulated along with the groundwater level and borehole casing depth at the time of test.

Where the test drive is terminated before full (300mm) penetration, the number of blows for the partial test drive (usually 50) and the penetration of the sampler within the test drive are recorded. If the total seating drive penetration is equal to or less than 150mm, then the number of blows (usually 25) and the depth of penetration within the initial seating penetration are recorded on the borehole logs.

The tests are carried out using automatic trip hammers that have been calibrated. The hammer ID and energy ratio are recorded on the 'header page' of each log and calibration certificates for the hammers used on the project are contained in Appendix 2 of this report. It should be noted that the "N" values reported on the logs are uncorrected for hammer energy efficiency.

The results of the tests are given as a Standard Penetration "N" value or as a blow count for a given penetration at the appropriate position on the relevant exploratory hole logs presented in Section A of this report.

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⁸ BS EN ISO 22476-3:2005 + A1: 2011: Geotechnical Investigation and Testing - Field Testing - Part 3: Standard Penetration Test.

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4.6.2 Downhole Televiewer Survey

A total of three downhole optical and acoustic televiewer surveys were carried out by specialist subcontractor European Geophysical Services Limited. Testing was carried out in boreholes BH_STW_013A, BH_STW_018 and BH_TUN_018.

Prior to the survey a controlled flushing of the boreholes was carried out using clean water to purge the borehole of drilling debris, the water column was left to settle and the casing was retracted to a predetermined depth to allow the logging to be completed.

The results of these surveys are presented in the European Geophysical Services Limited report, presented in Section A of this report.

4.6.3 Downhole Geophysics Testing

Downhole geophysics tests were carried out in two boreholes, BH_STW_018 and BH_TUN_018. The tests undertaken comprised, in addition to the downhole televiewer survey described above, 3-arm calliper, which measures three diameters of the borehole and natural gamma, which measures naturally occurring gamma in rocks and sediments.

The tests were undertaken by specialist subcontractor European Geophysical Services Limited. Prior to logging a controlled flushing of the boreholes was carried out using clean water to purge the borehole of drilling debris, the water column was left to settle and the casing was retracted to a predetermined depth to allow the logging to be completed.

The results of these tests are presented in the European Geophysical Services Limited report, presented in Section A of this report.

4.6.4 Packer Testing

Packer testing was required in order to provide detailed information on the permeability of the ground at discrete depths. Packer tests were performed in accordance with BS22282-39 in five boreholes designated BH_STW_003A, BH_STW_013C, BH_STW_022, BH_TUN_001A and BH_TUN_006PM. Test depths were specified by the Engineer and at a frequency of one or two tests per borehole. Each test used double packers to isolate the test zone into which, once the packers were inflated to the required pressure, water was pumped and the flow rate measured. This was repeated for a number of pressure increments (typically five).

Test results are calculated in accordance with the method described in BS5930:1999¹⁰ and are presented in Section A of this report.

4.6.5 Variable Head Permeability Testing

In accordance with the specification, falling head permeability tests were undertaken during formation of the following boreholes, BH_FE_001, BH_STW_003A, BH_STW_005B, BH_STW_013A, BH_STW_013B, BH_STW_018, BH_STW_022A, BH_TUN_001A, BH_TUN_006, BH_TUN_018.

 $^{^{10}}$ BS5930:1999 . Code of Practice for Site Investigations

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⁹ BS EN ISO 22282-2:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 2: Water permeability tests in a borehole using open systems

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In accordance with an Engineer's instruction, both rising and falling head tests were undertaken in the groundwater installations of the following boreholes, BH_STW_005A, BH_STW_010B, BH_STW_011B, BH_STW_022B, BH_STW_031B, BH_TUN_005B, BH_TUN_016 and BH_TUN_018.

The tests were undertaken in accordance with BS EN ISO 22282-2 with shape factor (F) derived from BS EN ISO 22282-1:2012 Annex B¹¹

The results of the variable head testing are presented in Section A of this report.

4.6.6 Pressuremeter Testing

Pressuremeter tests were undertaken in boreholes; BH_STW_006, BH_STW_001A, BH_STW_012A, BH_STW_019, BH_STW_020, BH_STW_021, BH_TUN_001PM, BH_TUN_006PM, BH_TUN_011PM and BH_TUN_018PM by Cambridge Insitu Limited.

Pressuremeter tests were carried out using either a high-pressure dilatometer (HPD) or self-boring pressuremeter dependant on the in situ ground conditions encountered at each scheduled test depth. Test depths were scheduled by the Engineer immediately prior to formation of each exploratory hole. Pressuremeter testing was undertaken within the borehole during coring with the exception of boreholes with a 'PM' suffix, where a separate, open hole, was formed exclusively for the pressuremeter testing.

The results of the pressuremeter testing are presented in Cambridge Insitu's report, presented in Section A of this report.

4.6.7 Hand Vane Testing

In order to provide an approximate undrained shear strength of the cohesive soils encountered within the trial pits, hand vane testing was undertaken at 0.5m intervals where suitable cohesive material was encountered. Tests were undertaken in material recovered and contained within the excavation bucket.

The results of the hand vane testing are presented in Section A of this report.

4.6.8 Soakaway Testing

In accordance with the specification, nine soakaway tests designated TP_FE_001, TP_FE_002 test 1 and 2, TP_STW_003, TP_STW_013, TP_STW_016, TP_STW_018, TP_STW_022 and TP_STW_031 were undertaken in trial pits across the site. The tests were undertaken in accordance with BRE Digest 365¹².

The results of the soakaway testing are presented in Section A of this report.

4.6.9 California Bearing Ratio Tests

In accordance with the specification and in order to obtain an indication of the thickness of subbase required to support a flexible road pavement, one in situ California Bearing Ratio (CBR) test

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¹¹ BS EN ISO 22282-2:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 1: General Rules

¹² BRE Digest 365 'Soakaway Design'. 2016.

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was carried out within each trial pit except TP_STW_005 where two tests were undertaken due to the failure of the first test. A portable jack and load frame were utilised on site with a JCB type mechanical excavator providing the reaction force. The test was performed at a depth of 0.50m in accordance with BS 1377: 1990: Part 9¹³.

The results of CBR testing are presented in Section A of this report.

4.6.10 Plate Load Tests

Seven plate load tests were undertaken in accordance with the specification and in order to provide information both on the settlement characteristics and to determine the bearing capacity of the ground in locations within the proposed footprint of the sewage treatment works.

These tests were carried out by a nominated sub-contractor, Construction Testing Solutions, close to existing trial pit locations. Tests were designated TP_STW_005, TP_STW_012, TP_STW_014, TP_STW_015, TP_STW_016, TP_STW_018 and TP_STW_019.

A 600mm diameter plate was used together with a minimum of three dial gauges and a reaction force was provided by a 25t tracked mechanical excavator. Incremental load tests were performed in accordance with the specification, and as instructed immediately prior to testing by the Client. The increases and decreases in load varied in the number of increments at each test location. Starting pressures varied between 20kN/m² and 21kN/m² and finished between 496kN/m² and 621kN/m².

The results of the plate load tests are presented in Section A of this report.

4.6.11 Photo Ionisation Detection

In order to determine the presence or otherwise of volatile organic compounds, all environmental samples were subject to head space testing using a photo ionisation detector (PID).

Test results are presented in Section A of this report.

4.6.12 Pumping Tests

Pump tests were undertaken in boreholes BH_TPS_001b to BH_TPS_004b which were formed to depths of 13.70m in BH_TPS_001b and 13.30m for boreholes BH_TPS_002b to BH TPS 004b, inclusive. These holes were formed for the pump test in accordance with BS EN ISO 22282-4:2012 and BS ISO 14686:2003. The pump tests were completed under consent 'Consent to investigate a groundwater source' under consent number: 660/12/952 at the site of: Land to the south of Low Fen Drove Way, off Horningsea Road, Horningsea: dated 08/07/2021.

The pumping tests were undertaken by specialist subcontractor Stuart Wells Limited, which comprised equipment testing, a series of six step tests undertaken in each of the four abstraction wells, a constant rate test followed by recovery monitoring. The first two days of the constant rate test was undertaken at a flow rate of 0.36l/s, however, this flow rate was subsequently reduced to 0.25l/s, in agreement with the Engineer, in order to maintain the well for the full duration of the test.

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¹³ BS 1377: 1990: Part 9: Methods of Test for Soils For Civil Engineering Purposes. British Standards Institution



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The results of the pumping tests are presented in Stuart Well's report, in Section A of this report.

4.7 Installations

A full summary of boreholes and their respective groundwater installations are summarised in Table 5 below.

TABLE 5: SUMMARY OF GROUNDWATER INSTALLATIONS

Borehole ID	Installation	Install	Distance	Slotted	Response	Response
	Number	Туре	(mBGL)	Section	Zone Top	Zone Base
				(mBGL)	(mBGL)	(mBGL)
BH_FE_001	S1	SP	3.90	1.50-3.50	1.50	3.90
BH_FE_002	S1	SP	5.00	1.50-4.00	1.50	5.00
BH_STW_001	S1	SP	9.50	2.00-9.00	1.50	9.50
BH_STW_005A	S1	SP	10.00	1.50-9.50	0.50	10.00
BH_STW_009	S1	SP	12.00	1.50-11.50	1.50	12.00
BH_STW_009	G1	SP	12.00	1.50-3.00	1.50	12.00
BH_STW_010B	S1	SP	12.00	11.50-12.00	11.50	12.00
BH_STW_011B	S1	SP	9.70	1.50-9.20	1.50	9.70
BH_STW_013C	G1	SP	1.50	0.50-1.50	0.50	1.50
BH_STW_015	S1	န	12.00	1.50 <mark>-1</mark> 2.00	1.50	12.00
BH STW 015	G1	SP	1.50	1.50-3.00	1.50	12.00
BH_STW_018	S1	SP	12.20	1.50-11.70	1.50	12.20
BH_STW_022A	G1	SP	2.00	1.00-2.00	1.00	2.00
BH_STW_022B	S1	SP	11.70	11.30-11.70	0.70	11.70
BH_STW_023	S1	SP	14.50	2.00-14.00	2.00	14.50
BH_STW_024	S1	SP	11.50	1.50-11.00	1.50	11.50
BH_STW_025	S1	SP	9.00	2.00-8.50	2.00	9.00
BH STW 026	S1	SP	10.00	1.50-9.50	1.50	10.00
BH_STW_031B	S1	SP	13.60	13.10-13.60	13.10	13.60
BH_TUN_001A	S1	SP	4.75	1.25-4.25	1.25	4.75
BH_TUN_001PM	G1	SP	1.50	0.50-1.50	0.50	1.50
BH_TUN_005B	S1	SP	10.00	7.00 <mark>-1</mark> 0.00	7.00	10.00
BH_TUN_006	S1	ဂ တ	6.00	1.50-6.00	1.50	6.00
BH_TUN_006	G1	SP	3.50	1.50-3.50	1.50	6.00
BH TUN 011	S1	SP	5.00	1.50-5.00	1.50	5.00
BH_TUN_011	G1	SP	5.00	1.50-2.50	1.50	5.00
BH_TUN_016	S1	S S	10.80	1.50-10.30	1.50	10.80
BH_TUN_018	S1	SP	10.20	1.50-9.70	1.50	10.20
BH_TPS_001b	S1	SP	13.70	4.00-12.00	0.00	13.70
BH TPS 002b	S1	SP	13.30	4.00-12.00	0.00	13.30
BH TPS 003b	S1	SP	13.30	4.00-12.00	0.00	13.30
BH_TPS_004b	S1	SP	13.30	3.85-11.85	0.00	13.30
Notes: SD - Standi	ino 61 – 0:	en un de ces	المدالمة مالمة	n C1 – Caa ina	tallation	

Notes: SP = Standpipe , S1 = Groundwater installation, G1 = Gas installation



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Both slotted 19mm and 50mm diameter UPVC tubes were installed in each of the boreholes listed in Table 5 above. The tubing was slotted over various depths with the slotted section being surrounded by a pea gravel response zone with a bentonite seal placed above and below. A metal stopcock cover was concreted into place on each of the installations and a plastic cap.

Seven installations were installed with a gas valve to facilitate long-term gas and groundwater monitoring, these were BH_STW_009, BH_STW_013C, BH_STW_015, BH_STW_022A, BH_TUN_001PM, BH_TUN_006 and BH_TUN_011. In each case a gas bung was placed onto a 19mm standpipe.

The original pump test locations designated BH_TPS_001 to BH_TPS_004 inclusive, have been omitted from Table 5 above for clarity.

A schematic of each installation is shown on the relevant exploratory hole log presented in Section A of this report.

4.8 Groundwater and Gas Monitoring

In accordance with the specification, monitoring of groundwater in all of the boreholes scheduled for installation was carried out at weekly intervals during the fieldwork period. Groundwater monitoring was undertaken using a standard electronic dip tape.

Seven boreholes BH_STW_009, BH_STW_013C, BH_STW_015, BH_STW_022A, BH_TUN_001PM, BH_TUN_006 and BH_TUN_011 were installed with a gas and groundwater monitoring standpipe. Following installation, monitoring for methane, carbon dioxide, carbon monoxide, hydrogen sulphide and oxygen gases was carried out using a Geotechnical Instruments GA5000 gas analyser. The gas analyser calibration certificate is included in Appendix 2 of this report.

The results of the groundwater and gas monitoring are presented in Section A of this report.

4.9 Surveying

Following completion of the fieldworks an 'as built' survey of each exploratory hole was undertaken by SEGL. Co-ordinates and elevations were established using Leica GPS equipment and were related to the Ordnance Survey Active Rinex Network.

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5.0 LABORATORY TESTING

5.1 Scope of Testing

All geotechnical (soil, rock and chemical) and environmental testing was specified and scheduled by the Engineer. The scope of the testing was required to assist the Engineer in geotechnical design and in establishing any potential site contamination levels.

At the time of writing, laboratory testing is still underway; all available results have been included within this report.

5.2 Geotechnical Soils Testing

In order to provide an indication of the properties of soils encountered within the site, geotechnical soil testing was undertaken on selected samples. The programme of laboratory testing was carried out generally in accordance with BS 1377¹⁴ and BS EN ISO 17892¹⁵. The testing was carried out by Terra Tek Site Investigation and Laboratory Services Limited, a UKAS accredited testing laboratory No 0126. The testing undertaken and the standards used are summarised in Table 6 below.

TABLE 6: SUMMARY OF SOILS TESTING

Test Name	Standard and Part	Year
General Requirements and Sample Preparation	BS 1377 -1	2016
Determination of Water Content	BS EN ISO 17892 -1	2014
Determination of Bulk Density	BS EN ISO 17892 -2	2014
Determination of Particle Density	BS EN ISO 17892 -3	2015
Determination of Liquid and Plastic Limits	BS EN ISO 17892 -12	2018
Determination of Particle Size Distribution	BS EN ISO 17892 -4	2016
Determination of Carbonate Content in soil	BS EN ISO 10693	2014
Determination of Organic Matter by Titrimetry	BS 1377 -3	1990
Determination of Saturated Moisture Content of Chalk	BS 1377 -3.3	1990
Determination of Dry Density/Moisture Content Relationship	BS 1377 -3.4	1990
Determination of Moisture Condition Value	BS 1377 -4.5	1990
Determination of Chalk Crushing Value	BS 1377 -4.6	1990
Determination of California Bearing Ratio	BS 1377 -4.7	1990
Determination of One-dimensional Consolidation Properties	BS 1377 -5.3	1990
Determination of Dispersibility	BS 1377 -6.3	1990
Determination of Dispersion by Double Hydrometer Test	BS 1377 -6.4	1990
Determination of Linear Shrinkage	BS 1377 -6.5	1990
Determination of CBR (2.5Kgr)	BS 1377 -7.2.4	1990
Determination of Unconfined Compressive Strength	BS 1377 -7.2	1990
Determination of Shear Strength by Direct Shear (small	BS1377 -7.4	1990
shearbox apparatus)		
Determination of Shear Strength by Direct Shear (large	BS1377 -7.5	1990
shearbox apparatus)		

 $^{^{14}}$ BS 1377: 1990: Parts 1 to 9: Methods of Test for Soils For Civil Engineering Purposes. British Standards Institution

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¹⁵ BS EN ISO 17892 Geotechnical Investigation and Testing – Laboratory Testing of Soil



Determination of Undrained Shear Strength in Triaxial	BS1377 -9	1990
Compression without measurement of pore pressure		
(multistage method)		
Determination of Consolidated Shear Strength in Triaxial	BS1377 -9	1990
Compression with measurement of pore pressure		
Determination of Permeability by Constant Head Method	BS1377 -Clause 5	1990
Determination of swelling pressure	BS1377 -3.0	1990
Frost Heave of Soil	BS812-124	2009
X-Ray Diffraction	BS EN13925-3	2005

Results are given on the reports from Terra Tek presented in Section B of this report.

5.3 Geotechnical Rock Testing

In order to provide an indication of the properties of the solid geology encountered within the site, geotechnical rock testing was undertaken on selected core samples. The programme of laboratory testing was carried out generally in accordance with ISRM suggested Methods^{16,17}. The testing was carried out by Terra Tek Site Investigation and Laboratory Services Limited, a UKAS accredited testing laboratory No 0126.

TABLE 7: SUMMARY OF ROCK TESTING

Test Name	Standard
Determining Water Content	ISRM Suggested Methods 1974-2006
Determining Porosity/Density	ISRM Suggested Methods 1974-2006
Determination of the Uniaxial Compressive Strength	ISRM Suggested Methods 1974-2006

Results are given on the reports from Terra Tek and SEGL presented in Section B of this report.

5.4 Geotechnical Chemical Testing

In order to assess concrete requirements from BRE Special Digest No 1¹⁸, geotechnical chemical testing was undertaken on selected samples. The testing was carried out by Terra Tek Site Investigation and Laboratory Services Limited, a UKAS accredited testing laboratory No 0126.

The samples were prepared in general accordance with BS 1377 Part 3, although final analysis of total sulfate was performed using ICP and aqueous extract using Ion Chromatography.

5.5 Environmental Testing

In order to establish any potential contamination across the site, a programme of environmental testing was scheduled by the Engineer. Testing was carried out by Chemtest, a UKAS accredited testing laboratory No. 2183.

TABLE 8: SUMMARY OF ENVIRONMENTAL TEST SUITES

¹⁸ BRE Special Digest 1: 2005: Concrete in Aggressive Ground, BRE Construction Division.

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¹⁶ ISRM 2007 The complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006, Ulusay, R. and Hudson, J.A. (Eds).

¹⁷ ISRM 2015 The ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 2007-2014. Ulusay, R. (Ed).



ony, Arsenic, Asbestos Screen, Barium, Beryllium, Boron, Benzene, ne, Ethylbenzene, m xylene, p xylene, o xylene, Cadmium, Chromium (VI), Copper, Cyanide (Free), Fraction of Organic Carbon, Iron, Lead, anese, Inorganic Mercury, Methylmercury, Elemental Mercury, odenum, Nickel, pH, Phenols, BTEX, TPH, PAH (16 USEPA), ium, Sulphate Total (as SO ₄), Sulphur, Vanadium, VOCs (Speciated)
(VI), Copper, Cyanide (Free), Fraction of Organic Carbon, Iron, Lead, anese, Inorganic Mercury, Methylmercury, Elemental Mercury, odenum, Nickel, pH, Phenols, BTEX, TPH, PAH (16 USEPA),
ic (dissolved), Ammoniacal Nitrogen, Antimony (Dissolved), Barium
olved), Beryllium (Dissolved), Boron (Dissolved), Cadmium
olved), Calcium (Dissolved), Calcium (Dissolved), Chloride, Chromium (V) (Dissolved), Copper (Dissolved), Cyanide (Free), Cyanide plex), Fluoride, Iron (Dissolved), Lead (Dissolved), Magnesium olved), Manganese (Dissolved), Mercury (Dissolved), Molybdenum olved), Nickel (Dissolved), pH, Phenol, Cresols, Dimethylphenols, thylphenols, Selenium (Dissolved), Sulphate (as SO ₄), Vanadium olved), Zinc (Dissolved)

Testing was carried out in accordance with the methods identified in the test reports.

The results of the environmental testing are presented in Section B of this report.

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6.0 RESULTS OF THE INVESTIGATION

6.1 Scope of Commentary

The results of this investigation appear to broadly concur with the published geology summarised in Section 3.3 of this report and also with the information presented in the previous investigation carried out on this site and referenced in Section 3.4 of this report. The following sections are only intended to provide a brief commentary on the ground conditions encountered during this investigation whilst the logs presented in Section A of this report give a detailed account of all the strata observed.

The ground conditions encountered in the deeper exploratory holes, namely, rotary cored boreholes and cable percussion boreholes are summarised in Table 9 below.

TABLE 9: SUMMARY OF GROUND CONDITIONS IN ROTARY HOLE LOCATIONS

Borehole ID	Depth Achieved (m)	Topsoil	Made Ground	Superficial Deposits	West Melbury Chalk Formation	Cambridge Greensand Formation	Gault Formation	Lower Greensand Formation
BH_FE_0 01	15.90	√		✓			✓	
BH_FE_0 02	10	>		√	~	~	~	
BH_FE_0 03	10	\		√	~	~	~	
BH_FE_0 04A	15	✓		✓	4	✓	✓	
BH_FE_0 05	15	✓		√	✓	✓	✓	
BH_FE_0 06	10	√		✓	√			
BH_OUT _001	20	>		~			~	
BH_STW 001	15.40	√		✓	√	√	✓	
BH_STW 003A	10	✓		✓	4			
BH_STW _004	15.10	\		✓	√	✓	✓	
BH_STW _005A	30	√		√	✓	√	✓	
BH_STW 006	15	~		✓	*	*	✓	
BH_STW 007	15.10	~		√	*	*	*	
BH_STW 009	30	~			~	~	√	
BH_STW 010A	30.20	\		√	√		√	
BH_STW _011A	30.20	*		✓	√	~	✓	
BH_STW _012A	30.35		*		*	4	✓	
BH_STW 013A	48.45	✓	_	✓	√	√	✓	√

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Borehole	Depth	Topsoil	Made	Superficial	West	Cambridge	Gault	Lower
ID	Achieved (m)		Ground	Deposits	Melbury Chalk Formation	Greensand Formation	Formation	Greensand Formation
BH_STW 013C	13.10	✓		✓	✓		✓	
BH_STW _014	30	✓		✓	✓	✓	✓	
BH_STW _015	30.20	✓		✓	✓	✓	✓	
BH_STW 016	30.20	✓		✓	✓	✓	✓	
BH_STW 017	15	~		✓	✓	✓	✓	
BH_STW 018	30	✓		✓	✓	✓	✓	
BH_STW _019A	30	✓		✓	✓		✓	
BH_STW _020	30.20	✓		✓	✓		✓	
BH_STW 021	15	\		✓	✓		✓	
BH_STW 022A	50	√		✓	✓	✓	✓	✓
BH_STW 023	15.30	✓		✓	✓	✓		
BH_STW _024	15	✓		✓	√	✓	✓	
BH_STW _025	15.05	✓		✓	√	✓	1	
BH_STW 026	15	>			✓	✓	\	
BH_STW 031A	15	√			✓	✓	√	
BH_TUN 001A	35	√	~				√	✓
BH_TUN 002	30		~	✓			√	
BH_TUN _003	30	\	~	✓			~	
BH_TUN 004c	30	\		✓			*	
BH_TUN 005Ab	30		√	✓			~	
BH_TUN 006	40		√	✓			✓	✓
BH_TUN 007	30.20	\					~	
BH_TUN _011	42.50	✓		✓	✓	✓	✓	✓
BH_TUN _015	30.20	\		✓	✓	✓	√	
BH_TUN 016	30.20	✓		✓	✓		✓	
BH_TUN 017	30.20	*			✓	✓	√	
BH_TUN _018	49.50	√		✓	✓	✓	✓	√
BH_TPS _001	15.10	√		✓	✓	✓	✓	

soil engineering

REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

Borehole ID	Depth Achieved (m)	Topsoil	Made Ground	Superficial Deposits	West Melbury Chalk Formation	Cambridge Greensand Formation	Gault Formation	Lower Greensand Formation
BH_TPS 001b	13.70	*		√	\	√	~	
BH_TPS _002	15.20	\		~	~	√	~	
BH_TPS _002b	13.20	*					✓	
BH_TPS 003	15.20	*		√	4	4	✓	
BH_TPS 004	15.20	*		*	4	4	*	

TABLE 10 – SUMMARY OF GROUND CONDITIONS IN CABLE PERCUSSION HOLE LOCATIONS

Borehole ID	Depth Achieved (m)	Topsoil	Made Ground	Superficial Deposits	West Melbury Chalk Formation	Cambridge Greensand Formation	Gault Formation	Lower Greensand Formation
BH_STW _003B	10	✓		✓	✓			
BH_STW _005B	30	✓		✓	✓		✓	
BH_STW 010B	30	✓		✓	√	4	1	
BH_STW 011B	30	✓			✓		1	
BH_STW 012B	30			√	✓	ļ	1	
BH_STW _013B	30	✓			✓		√	
BH_STW _019B	11.20*	✓		✓	✓			
BH_STW 022B	30	✓		✓	✓	✓	-	
BH_STW 031B	30	✓			✓	4	✓	
BH_TUN 001B	35		✓	✓			✓	✓
BH_TUN _005B	30		✓	√			✓	
BH_FE_ 004B	15	✓		✓	✓		✓	

TABLE 11 - SUMMARY OF GROUND CONDITIONS IN TRIAL PIT HOLE LOCATIONS

Borehole ID	Depth Achieved	Topsoil	Made	Superficial	West Melbury	Gault
	(m)		Ground	Deposits	Chalk Formation	Formation
TP_FE_001	2.5	√		4		
TP_FE_002	2.2			√		₹
TP_FE_003	2.8	✓			✓	
TP_FE_004	3.0	1			√	
TP_FE_005	3.0		✓		√	
TP_FE_006	3.0	✓		✓	✓	

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Borehole ID	Scheduled Depth / (Depth Achieved) [m]	Topsoil	Made Ground	Superficial Deposits	West Melbury Chalk Formation	Gault Formation
TP_STW_003	3.0	✓			√ "	
TP_STW_004	3.0		√	✓	✓	
TP_STW_005	3.0		✓		✓	
TP_STW_006	3.0	√		√	✓	
TP_STW_007	3.0	✓		✓	✓	
TP_STW_010	3.0	✓		✓	✓	
TP_STW_011	3.0		✓		✓	
TP_STW_012	3.0	√		1	✓	
TP_STW_013	3.0	✓			✓	
TP_STW_014	3.0			✓	✓	
TP_STW_015	3.0	✓			✓	
TP_STW_016	3.1	✓		√	✓	
TP_STW_017	3.0			✓	✓	
TP_STW_018	3.0	✓		✓	✓	
TP_STW_019	3.0	✓			✓	
TP_STW_020	3.0	✓		√	✓	
TP_STW_021	3.0		✓	✓	✓	
TP_STW_022	3.0	✓		✓	✓	
TP_STW_031	3.0	√			✓	
TP_STW_032	3.0	√			✓	

6.2 Topsoil

Topsoil was encountered from ground level in the majority of the exploratory holes formed across the site to a maximum depth of 0.60m. Where found, this generally comprised dark brown slightly sandy slightly gravelly clay where the gravel portion consisted of flint.

6.3 Made Ground

Made ground was encountered in fifteen exploratory hole locations predominantly from ground level to a maximum of 1.80m depth. This is with the exception of BH_TUN_006 and BH_TUN_006PM where made ground was encountered to depths of 4.00m and 4.20m respectively.

Made Ground encountered varied in composition across the site. Where encountered in BH_TUN_001A to BH_TUN_005Ab, this was generally described as either sandy gravelly clay or sandy gravel where gravel sized fragments comprised brick, concrete, glass, mudstone, porcelain and flint.

Both BH_TUN_006 and IP_TUN_006 were formed through a raised man-made earth bund. This material was seen to comprise dark brown sandy slightly gravelly clay where gravel sized fragments comprised flint and sandstone.

Where Made Ground was encountered in TP locations and BH_STW_012A this generally comprised brown sandy gravelly clay, similar to that of topsoil, together with man-made brick fragments. Made Ground was recorded to a maximum of 1.80m depth in TP FE 004.

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REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

6.4 Superficial Deposits

Superficial deposits were encountered beneath topsoil and made ground in the majority of the exploratory holes formed across the site and generally comprised a variable sequence of gravelly sands, sand and gravel and sandy gravelly clays.

The greatest thicknesses of these deposits were encountered in the western end of the site in boreholes designated BH_TUN_001A to BH_TUN_006, inclusive and in borehole BH_OUT_001.

The deposits encountered in boreholes designated BH_TUN_001A to BH_TUN_006, inclusive, could be considered as River Terrace Deposits, which comprised a variable sequence of sands and gravels.

The material encountered in BH_OUT_001 could be considered as Alluvium, where the material was described as dark grey mottled sandy gravelly clay.

The Superficial Deposits in the eastern end of the site in exploratory holes designated 'FE' and 'STW' could be considered as a reworked material of the underlying West Melbury Chalk Formation.

6.5 Cretaceous Deposits

6.5.1 West Melbury Chalk Formation

The West Melbury Chalk Formation was encountered in all boreholes formed in the eastern end of the site. It should be noted that the material encountered comprised either, calcareous clay, calcareous siltstone or calcareous mudstone. It was agreed with the Engineer that this material should be described as Chalk and classified using the CIRIA Guide C574.

The Chalk was described as both a structureless matrix and clast supported Chalk with a CIRIA Grade Dm or Dc and structured intact Chalk with various CIRIA grades from A to C and suffix of 1 to 5. Predominantly, the formation was described as structureless Grade Dm overlying structured, Grade B3 and B4 Chalk to depth.

The West Melbury Chalk Formation was recorded to deepest depth of 14.25m in borehole BH_STW_023. Where the base of the formation was proven, either Cambridge Greensand Member or Gault Formation deposits were encountered directly below.

6.5.2 Cambridge Greensand Member

The Cambridge Greensand Member was encountered at the base of the West Melbury Chalk Formation in twenty-four boreholes with a designation of either 'FE' or 'STW'. Where described, this member of the West Melbury Chalk Formation generally comprised dark greenish grey slightly sandy slightly gravelly clay where the gravel portion consisted of coprolite nodules. The Cambridge Greensand Member was recorded to deepest depth of 15.30m in borehole BH_STW_023. Where the base of the Cambridge Greensand Member was proven, the Gault Formation was encountered directly below.

6.5.3 Gault Formation



REPORT ON A GROUND INVESTIGATION FOR CAMBRIDGE WASTE WATER TREATMENT PLANT RELOCATION

The Gault Formation was encountered in the majority of boreholes across the site and within TP_FE_002, either directly underlying the West Melbury Chalk Formation in the eastern part of the site in the 'FE' and 'STW' boreholes or underlying Superficial Deposits in the western part of the site in the 'TUN' boreholes. Generally this formation comprised fissured thinly laminated dark grey clay with occasional phosphatic and siltstone nodules. Deposits were generally classified as partially weathered where mottling or staining of fissures was observed or unweathered.

The Gault Formation was recorded to deepest depth of 47.60m in borehole BH_STW_022A. Where the base of the Gault Formation was proven, the Lower Greensand Formation was encountered directly below.

6.5.4 Lower Greensand Formation

The Lower Greensand Formation was encountered in boreholes designated BH_STW_013A, BH_STW_022A, BH_TUN_001A, BH_TUN_001B, BH_TUN_006, BH_TUN_011 and BH_TUN_018. Where described, this formation generally comprised either dark greenish grey sandy gravelly glauconitic clay where gravel consisted of flint or dark greenish grey clayey gravelly fine sand. The base of the Lower Greensand Formation was not proven in any exploratory hole.

6.6 Groundwater

Groundwater was encountered during drilling in some of the boreholes at various depths. A summary of exploratory hole groundwater inflows is given in Table 1 in Section A, whilst the logs presented in Section A of this report provide full details of all groundwater information.

6.7 Results of CBR Testing

A total of twenty-seven California Bearing Ratio tests were undertaken which yielded CBR values in the range 2.7% to 27% for the chosen test depth of 0.50m. Further information regarding these tests is given on the individual test sheets presented in Section A of this report.

6.8 Groundwater Monitoring

Groundwater levels recorded during the fieldwork period in the eastern end of the site were generally between 2m and 5m below ground level whilst those recorded in the western end of the site were generally between 1m and 2m below ground level. The results of the groundwater monitoring undertaken weekly during the fieldwork period are presented in Section A of this report.

6.9 Gas Monitoring

Monitoring of gas levels commenced following cessation of the fieldwork period and produced no detectable levels of hydrogen sulfide and encountered detectable levels of methane, carbon dioxide, carbon monoxide and oxygen. During monitoring of BH_STW_009, levels of carbon dioxide were recorded between 1.8% and 1.9% with oxygen levels between 18.6% and 20.4%. Elevated lower explosive limits of methane were detected during monitoring rounds one and three in BH_TUN_006 between 4% and 6%. During monitoring of BH_TUN_001PM, elevated levels of carbon dioxide were recorded between 2.6% and 3.0% with oxygen levels of between 13.4% and 15.4%. The results of the gas monitoring are presented in Section A of this report.

For further information about the services provided by Soil Engineering Geoservices Limited, visit our website www.soil-engineering.co.uk

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SUPPORTING FACTUAL DATA

or appointed values as name

SECTION A

Exploratory Hole Records and Field Data

THE STATE OF FLOOR CONTROLS IN I

EXPLORATORY HOLE LOG LEGEND AND NOTATION SHEET

SECTION AS TO LEGE TO PRODUCE TO BE SEEN.

SECTION A EXPLORATORY HOLE LOG LEGENDS

CODE	DESCRIPTION	LEGEND CODE	DESCRIPTION	LEGEND
101	Topsoil	806	Coal	美铁
102	Made Ground	807	Breccia	
104	Concrete	808	Conglomerate	D0000 D0000
201	Clay	809	Fine Grained Igneous	
301	Silt	××××× 810	Medium Grained Ign <mark>eous</mark>	++++
401	Sand	811	Coarse Grained Igneous	****
501	Gravel	812	Fine Grained Metamorphic	
601	Peat	stle stle stle 813	Coarse / Medium Grained Metamorphic	
701	Cobbles	a O ª o a c	Evaporite	
730	Boulders	Mws	Mine Workings	
801	Mudstone	904	Grout	
802	Siltstone	******* 905 ****** ******	Arisings	
803	Sandstone	BLK	Zone of No Recovery	
804	Limestone	WTR	Water	
805	Chalk	types are re	soils types comprise a mixture of particle presented graphically on the exploratory the legends shown on this sheet.	sizes. These soil hole logs by





SECTION A: EXPLORATORY HOLE LOG LEGENDS

SAMP	LING NOTATION	IN SITU	TEST NOTATION
u	Undisturbed U100 or U38 sample (size given on log)	SPT	Standard Penetration Test with a Split Spoon
		SPT(C)	Standard Penetration Test with a Cone
uT	Thin wall open drive tube sampler (size given on log)	С	Cone Penetration Test
Р	Piston Sample	NP	No Penetration for SPT or SPT(C)
BLK	Block Sample	٧	Vane Test
М	Mazier Sample	HV	Hand Vane
TW	Thin Walled Sample	HP	Hand Penetrometer
L	Liner Sample obtained from windowless sampler	CBR	California Bearing Ratio Test
		К	Permeability Test
D	Small Disturbed Sample		(test type not differentiated)
В	Bulk Disturbed Sample	Pr	Pressuremeter Test
LB	Large Bulk Disturbed Sample	OTHER N	IOTATION
С	Core Sample	TCR	Total Core Recovery
ES	Environmental Soil Sample	SCR	Solid Core Recovery
EW	Environmental Water Sample	Jen	Solid Core Recovery
w	Water Sample	RQD	Rock Quality Designation
	8 1 2 2	FI	Fracture Index
UF	No Recovery in U Sample	lf	Fracture Spacing
UTF	No Recovery in UT Sample	."	, active optioning
	10.0	NI	Non Intact
PF	No Recovery in P Sample	NA	Data Not Applicable
TWF	No Recovery in TW Sample	NR	Data Not Recorded
		GRAPHIC	IS USED
			Standing water level
			Joining bar indicates level risen
			Waterstrike level



SUPPORTING FACTUAL DATA

or appointed values as name

SECTION A

Exploratory Hole Records and Field Data

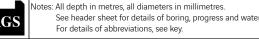
CERT TRESCUES SU AND TREATA

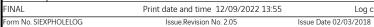
CABLE PERCUSSION AND ROTARY DRILLING RECORDS

Project	Name	Can	nbridge	Waste	e Wa	ater Tre	atment	Plant F	Reloca	tion				_					Н	lole ID	
Project	No.	TE8	364											Exp	olorato	ry Hole	Log		ВН	FE_0	01
Engine	er		tt Mac[Ber	ntley															
Employ Ground L			nale Lin BmOD	nited					Caradia			8559.20E	201022	2011			C.::4		She OSGB	et 1 of	1
Date Star			8/2021						Coordin Date Co			/08/2021		.5011			Grid Incli	nation		m horizoi	ntal
Тор	Base		Date Ti				ne End F		Logge				ant Used	Shori	ng Used P	it Stability			Remark		
0.00 1.20	1.20 15.90	IP RC		021 11:00 021 12:00		18/08/202 19/08/202		BC BC	DT CJ	Geobo			ated hand to macchio 205		lone	Stable					
					PRC	GRESS										WATER	STRIKE	ς			
Date :	Time	Depth	Depth	Dep	th	Jane		Rema	arks			Date	Time	Depth	Depth	Depth	Water	Time		Remarl	ks
18/08/20 19/08/20		6.90 6.90	6.90 6.90	1.20 Dry) E	nd of Shift Start of Shif								Strike	Casing	Sealed	Rose To	Elapsed	+		
19/08/20		0.00	0.00	Dry			Complete, B	lorehole Co	mplete												
				ARIF P	FRCI	USSION	DETAILS									SPT D	ETAILS				
Depth	Depth	Tim	e Start	Durat	\neg	Too			Rema	ırks		Depth			Reporte	d Result		Hammer Serial Number	Energy	Depth	Depth
Тор	Base											Тор	Туре		<u> </u>			Number	Ratio	Casing	Water
				PΩTΔ	DV FI	LUSH DE	ZIIAT					_									
Depth	Depth	Flu:	sh Type	Flu	sh	Flush	IAILS		Remark	s											
Top 1.20	Base 15.90		R/MIST	Ret		Colour Grey															
HOLE DI	AMETER	CASING	DIAMET	ER			DYNAM	IC SAM	PLING												
Depth Base	Diamete	Depth Base		ter Deptl	n Top	Depth Base	Diamete	r Dura		Sample Recovery	Run Referenc	e									
15.90	146	15.90	146																		
		Re	N DETAII		Pipe	e Pipe		PE CONS	T		_	Depth	Depth	1	DEI	PTH RELA					
Distance 3.90	ID S1	Type '``	Top 1.50	Base 3.90	Ref Pipe	f Ref	Top 0.00	Base 1.50	Diame 50	PLAIN	ре Туре	Тор	Base				Re	marks			
						Pipe 1 Pipe 1	1.50 3.50	3.50 3.90	50 50	SLOT PLAII											
				RΔ	CKFI	LL DETA	IIS									LOCATIO	N DETAI	ıs			
Depth	Depth		Descri		2. VI I			Rer	marks								narks				
-0.50 0.00	0.00 0.50	Upstandi	ng cover																		
0.50 0.50 1.50	1.00	Concrete Bentonite Gravel ba	е																		
3.90	15.90	Bentonite																			
	Note						millimetr		ator										4		
AGS	5		tails of al				g, progres	oo anu W	atcl.												
FINAL	CIEVEL : C	CUDD.		Prir			ne 12/09	9/2022 1		l 2	+- 22/22		ked by E	avid Ho	ward						RING
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Project Name	Cambridge Waste Water Treatment	Plant	: Relocat	ion										Hole ID	
								Explo	rato	у Но	le Lo	og -		DIL EE C	104
Project No.	TE8364													BH_FE_C)01
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 1 of	2
Ground Level		rdinate	s	5485592	20E, 2616	23.30	N		Gri	d	OS	GB		SHEEL TO	
Hole Type	IP+RC Incli	nation			honzonta										
		gu		Depth	Datum	rike		Sampling		왕	8			In Situ Test	Install-
	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike	_		1	TCR/Sample Recovery %	SC R/Blows	8	<u> </u>	Details	ation
TOPSOIL: Brown sig	htly sandy slightly gravelly CLAY. Gravel is angular	₹	\$(/ <i>\$</i> (\$)			-	D1	Details 0.05-0.10	Dia.	₽ 2	8			K 0.00 - 1.20	••• °•
	o medium of flint and quartz. Sand is fine to			(0.30) 0.30	3.78		ES 2	2 0.20 -0.25							
(TOP) [TOPSOIL]		1		:			D4	0.10-0.40 0.40-0.50							
is angular to subrou	gravelly sandy CLAY. Sand is fine to coarse. Gravel nded fine to medium of mixed lithologies and			(0.70)				5 0.50 -0.55 0.40-0. 80							
flint. (SUPD) [SUPERFICIA	L DEPOSITS]		,	100 -	3.08		B 9	0.80-1.20							
	m occasional cobbles of flint	1		1.20	2.88		D7	1.00-1.10 B 1.10-1.20	┝						
	tly clayey sandy GRAVEL Sand is fine to coarse. subrounded fine to coarse of mixed lithologies							114-124						12	
and flint. (SUPD) [SUPERFICIA	L DEPOSITSI														
	and GRAVEL of flint (Driller's description)						C 10	0 1.20 -2.40	102	0					
(our b) faur ent leiri	22.03.4			-											
													NR		
				(2.70)											
				Ξ.				1.00 1 3.00	102	0					
			N.				EW	2 3.00 1 2.40-3.90		"					1.3
				-			"	1 2.40-3.00						10	
				:											
	ey CLAY. Fissures are horizontal to subhorizontal closely spaced, planar and undulating, smooth			3.90 ·	0.18									·	
and polished, and su	ibvertical to vertical, medium to widely spaced,		F												}
(<7mm x 11mm) and	ar, smooth and polished. Rare siltstone nodules drare coprolites (<10mm x 15mm).		F_=_	-											
(GLT) [GAULT FORM.	ATION		F===				CI	2 3.90-5.40	102	93					}
			F	2											
				:											
from 5.30m to 5.40i	m assumed zone of core loss								⊢] \
				7					102	87					}
from 6.35m to 6.55i	m recovered as soft, probably drilling induced			:			C 1	3 5.40-6.90							
		_		:											1
from 8.70m to 6.90s	m assumed zone of core loss	Pere													}
		Unweathered		(7.15)									NA		†
		3													}
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							C 1	5 8.40-9.90	102	100					
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1 200	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		APOTOS												
FINAL	For details of abbreviations, see key.												SOI	r eudinee	PRING
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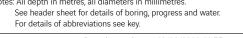
Project Name	Cambridge Waste Water Treatment	: Plant							Hole ID					
Drainet No	TE8364			Exploi	rator	у Но	le Lo	g		BH_FE_0	₀₁			
Project No. Engineer	Mott MacDonald Bentley												DII_FL_U	
Employer	Barhale Limited												Sheet 2 of 2	2
Ground Level Hole Type		ordinate ination			20E, 2616 horizonta		I	Gri	d	OS	GB			
Tiole Type	THE THE			Depth			Clin-		ple /%	WS				
	Description of Strata	Weathering	Legend	(Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
	ey CLAY. Fissures are horizontal to subhorizontal closely spaced, planar and undulating, smooth	>				>	Details	Dia.	T B	0)				
and polished, and su undulating and plan	bvertical to vertical, medium to widely spaced, ar, smooth and polished. Rare siltstone nodules		<u> </u>											
(<7mm x 11mm) and (GLT) [GAULT FORMA	I rare coprolites (<10mm x 15mm). ATION]						C 16 9.90-11.40	102	77					
				11.05	-6.97									-
(GLT) [GAULT FORMA	re loss. Grey CLAY (Driller's description) ATION]			(0.35)	7.22							NR		-
	ey CLAY. Fissures are horizontal to subhorizontal closely spaced, planar, smooth and polished, and,			11.40	-7.32]	
smooth and polished	al, medium spaced, undulating and planar, d. Rare siltstone nodules (<6mm x 10mm) and													
rare coprolites (<8m (GLT) [GAULT FORM				-			C 17 11.40-12.90	102	100				-	-
														-
			<u> </u>	_									-	
				(4.20) -								NA	-	
from 13.80m to 13.9	00m very stiff						C 18 12.90-14.40	102	100					
				-									-	-
			<u> </u>											
					-		C 19 14.40-15.90	102	80					
				15.60	-11.52									
(GLT) [GAULT FORMA	•		<u> </u>	(0.30) 15.90	-11.82							NR		
Complete at 1	5.90m. Termination Reason: Achieved Scheduled Dep h			-									-	
				-									-	
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— •	All I. d													
AGS	All depth in metres, all diameters in millimetr See header sheet for details of boring, progre		water.											
FINIAL	For details of abbreviations, see key. Print date and time, 12/0	ked by David Howard	d				SOI	L enginee	RING					





Log checked by David Howard

Project	Name	Can	nbridge \	Naste V	Vater Tre	eatment	Plant F	Relocati	on									H	lole ID	
Б.,	N.I	TE8	267										Exp	lorato	ry Hole	Log		ДЦ	FE_0	Λ 2
Project Enginee			t MacDo	onald B	entley													וום	.i L0	UZ
Employ	er	Bark	nale Limi																et 1 of 1	1
Ground L Date Star			4mOD 8/2021					Coordina			21.40E, 2	261601.0	NOC			Grid		OSGB		
Top	Base	_	Date Tim	ne Start	Date Tir	ne End F		Date Con			8/2021 it Plar	nt Used	Shorir	ng Used	Pit Stability		ination	Remark	(S	
0.00	1.20 10.00	IP RC	12/08/202	1 10:15	12/08/20	21 10:50	RL RL	DT SAN	Geobore S		Insulate	d hand too	- 1	one	Stable				-	
									(146)											
			T 5 .1		ROGRESS	5							D (1	I B	WATER					
Date 1		Depth	Depth Casing	Depth Water			Rema	ırks			Date T	ime	Depth Strike	Depth Casing		Water Rose T		d	Remark	(S
12/08/202 13/08/202 13/08/202	21 07:30	10.00 10.00	10.00 10.00 0.00	Dry Dry	End of Shif Start of shi	ft	arabala Car	loto												
13/08/202	21 10:00	0.00	0.00	Dry	Installation	Complete, B	orehole Col	mpiete												
			CA	 \BLE PER	CUSSION	DETAILS									SPT D	ETAILS				
Depth Top	Depth Base	Tim	e Start	Duration	Too	ol		Remar	ks		Depth Top	Test Type		Report	ed Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
.op	2400											.,,,,,						Hatio	caomig	- Tracer
				DOTABV	FLUSH D	ETAILS														
Depth	Depth	Flu	sh Type	Flush	Flush			Remarks												
Top 1.20	2.30	Al	R/MIST	Return 0	Grey															
2.30 3.80	3.80 10.00		R/MIST R/MIST	0	White Grey															
HOLE DI	AMETER	CASING	DIAMETER	₹		DYNAM	IC SAM	PLING												
Depth Base	Diamete	Depth Base	Diamete	r Depth To	Depth Base	Diamete	r Dura		mple covery Re	Run										
10.00	146	10.00	146		Dusc				covery ite	iciciicc										
	INSTA		N DETAILS			PI	PE CONS	STRUCTIO	ON					DE	PTH RELA	TED REN	/IARKS			
Distance	ID .	Туре Re	sponse Res		ipe Pipe Ref Ref	Тор	Base	Diamete	r Pipe	Туре	Depth Top	Depth Base				Re	marks			
5.00	S1	SP	1.50	5.00 Pi	pe 1 Pipe 1 Pipe 1	0.00 1.50	1.50 4.00	50 50	PLAIN SLOTTED											
					Pipe 1	4.00	5.00	50	PLAIN											
		,	•	BACK	FILL DETA	AILS							•		LOCATIO	n deta	ILS			
Depth Top	Depth Base		Descrip	tion			Ren	narks							Ren	narks				
-0.50 0.00	0.00 0.50	Upstandi	-																	
0.50 0.70 1.50	0.70 1.50 5.00	Gravel ba Bentonite Gravel ba	•																	
5.00	10.00	Bentonite																		
AGS			pth in met eader shee					ater.												
			tails of abb	oreviation	s see key.															DICC
FINAL				Print c	late and ti	me 12/09	9/2022 1	3.55		I c	og checke	ed by D	avid Hov	ward			30	C C 1	sinee	-KII IG





Form No. SIEXPHOLEHDR

Print date and time 12/09/2022 13:55 Issue Date 22/06/2016 Issue.Revision No. 2.02

Log checked by David Howard

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	поп										Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	ole Lo	og		BH_FE_0	ነበኃ
Engineer	Mott MacDonald Bentley													вп_гс_с)UZ
Employer	Barhale Limited													Sheet 1 of	2
round Level		ordi nate		548721.	40E, 2616	01.00	N		Gri	id	O:	SGB			
lole Type	IP+RC Ind	ination		.V.			_			⊕ ×c	1000			1	T
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Bbws	RGO	<u> </u>	In Situ Test Details	Insta
		We	par chican	ness)	Level	Ş		Details	Dia.	75 % 80 %	8CR	*		Details	atio
	wm slightly sandy slightly gravelly CLAY. Gravel is nded fine to medium of flint and quartz. Sand is fine			(0.30)	=			0.05-0.10 2							
	t roots and rootlets.	1		0.30 0.40	6.54 6.54		В3	0.10-0.40 0.40-0.50							4 6
Firm brown slightl	y gravelly sandy CLAY Gravel is angular to o medium. Sand is fine to coarse.	1		0.50 - (0.40)	6.54		ES S	5 0.50 -0.55							
(SUPD) [SUPERFICE	AL DEPOSITS)	4	77.4	0.90	6.54			0.40-0.80							
(SUPD) [SUPERFICE				(0.30) T	6.54			0.80-1. 20 1.00-1. 10							-
	lightly gravelly sandy CLAY. Gravel is angular to medium of mixed lithologies and flint. Sand is fine	Grade		1.20	0.34		ES	1.10-1.20	102	60					
to coarse. (SUPD) [SUPERFICE	AL DEPOSITS]			(0.70)	‡		C 10	0 1.20-1 .70	102	80					
	as Soft light brown to greyish slightly gravelly CLAY Gravel is angular to subrounded fine to	Grad # Oc		1.90	6.54										
medium of mixed	lithologies and flint. (possible Grade Dm) ELBURY CHALK FORMATION]	Dr. Dr.					C 1	1 1.70 -2.30	102	67			NA	15	
Structureless CHA	LK composed of GRAVEL Gravel is weak low	-		(0.80)	‡										
and frequent fine (gular to subrounded coarse of calcareous siltstone gravel sized fragments of flint. (CIRIA Grade Dc)	Grade	111		3									13	-
from 1.50m to 1.7	ELBURY CHALK FORMATION] Om assumed zone of core loss	-		2.70	6.54							8		9	
	LK composed of firm fissured buff gravelly gravel is subangular fine of chalk. Fissures are			-	1		 C1:	2 2.30-3.80	102	33				13	1:1
	izontal to subhorizontal planar and smooth infilled ments of chalk and flint. (CIRIA Grade Dm)		717	(1.10)	-		"	200-200		"			NR		1.4
(WMCK) [WEST M	ELBURY CHALK FORMATION] Om assumed zone of core loss				}									16	1.1
Assumed zone of o	core loss. Light grey Chalk/Chalk with gravel		TI		.										
	ELBURY CHALK FORMATION]	P S	77	3.BO 4.00 -	6.54 6.54								NA	1] . [
	LK composed of very stiff buff gravelly calcareous angular to rounded medium to coarse of chalk and	Г		4.10	6.54		EW	1 4.00							
coprolite. (CIRIA Gi (WMCK) [WEST M	rade Dm) ELBURY CHALK FORMATION]	1	111		‡										
	grey CLAY Fissures are horizontal very closely ooth, infill localised yellowish orange starning.	1		(1.20)]		C 1	3 3.80-5.30	102	33			NR	33	
Occasional coarse	gravel sized coprolite. DGE GREENSAND MEMBER]			(1.20)	}										
Assumed zone of o	core loss. CHALK with Clay bands. (Driller's	8		=	-		EW	2 5.00							-
	ELBURY CHALK FORMATION]	_		5.30	6.54				\vdash		-			-	}
Firm thinly laminar subrounded copro	ted dark grey CLAY. Occasional coarse gravel sized lite.	2			}										
(GLT) [GAULT FORM from 5.79m to 5.7	AATION] Sm fissure, 0 to 30 degrees undulating rough	athered	F==		†										
		ly We	F==:	(1.33)	3		C1	4 5.30-6.80	102	100					-
		Partia	F==												
			E		1										
Very stiff thinly lan	ninated dark grey CLAY with occasional coarse			6.63	6.54										N
(GLT) [GAULT FORM			====	- 4											-
			F		1										
			F==	١.	}										1
at 7 55m fissure 0	to 10 degrees undulating smooth closed				1		61	5 6.80-8.30	102	100			NA		
		2	F===	_	1										1
		sthere	===	(3.17)	}										7
		Inwes	F==	(700 <u>-</u> 65)	‡				\vdash						
		2	<u> </u>	•											1
					}										
				-			C 16	6 8.30-9.80	102	100				,	
					1										
			<u> </u>		}										1
Very staff fissured a	lark grey CLAY Fissures are extremely to very	11.		9.80	6.54										
,	g -y	100		10.00	6.54	\vdash	1 61	7 9.80-10.00	102	100					
Notes	s. All depth in metres, all diameters in millimetre	 es.		<u> </u>					1			<u> </u>	T	4	
AGS	See header sheet for details of boring, progres		water.												
INAL	For details of abbreviations, see key.	\mn=-	1255				_1	no Decided to					SOI	L engine	SBIN
INAL om No SIEXPHOLE	Print date and time 12/09 ELOG Issue Revision No. 2.09		1322	Issue Date	Lo e 02/03/20		ckedi	by David Howa	a					f the Bachy Soletan	

Project Name	Cambridge Waste Water Treatr	nent l	Plant	Relocat	ion								Hole ID		
Project No.	TE8364							Exploi	rator	у Но	le Lo	g		BH_FE_0	<u>02</u>
Engineer	Mott MacDonald Bentley														
Employer	Barhale Limited				F (0704	05.0040		.						Sheet 2 of 2	2
Ground Level Hole Type	+6.54mOD IP+RC	Coord	dinate nation	S	548721.4	OE, 2616	01.00N	l .	Gri	d	OS	GB			
,,					Depth	Datum	rike	Sampling		nple y %	SWC			In Situ Test	Install-
	Description of Strata		Weathering	Legend	(Thick- ness)	Level	Waterstrike	Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	Ψ.	Details	ation
Very stiff fissured da	rk grey CLAY. Fissures are extremely to very ontal to subhorizontal planar rough and		>				>	Details	Dia.	T. H.	0,				
subvertical planar ar (GLT) [GAULT FORM	nd rough.				-									-	
Complete at 1	0.00m. Termination Reason: Achieve Scheduled Dep h	d			-									-	
	Concadiod Bop II													_	
					-									-	
					-									-	
					- -									-	
					-									-	
					-										
					-										
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					-									-	
														-	
					-										
					-									-	
													1		
ACS	All depth in metres, all diameters in milli See header sheet for details of boring, p	metres rogress	s. and v	vater.											
FINAL	For details of abbreviations, see key.	12/00/	ากวา	12·EE		la:	o chco	ked by David Howar	4				so	IL enginee	RING

Print date and time 12/09/2022 13:55

Log checked by David Howard

Part of the Bachy Soletanche Group

FINAL

Project Project	No.	TE83	-		Vater Trea	atment	Plant R	(eloca	tion				Exp	lorator	y Hole l	Log			FE_0	03
Enginee Employ			nale Limi		intiey													She	et 1 of 1	1
Ground L			4mOD					Coordin	nates	548	881.30E,	261572	.10N			Grid		OSGB	<u> </u>	
Date Star	ted		8/2021						ompleted		08/2021						nation			
Тор	Base				Date Tim				er Barrel Typ	pe Drill I		nt Used	- 1	-	t Stability			Remark	(S	
0.00 1.20	1.20 10.00	IP RC	13/08/202 13/08/202		13/08/2021 16/08/2021		RL RL	DT SAN	Geobore 9 (146)	S PCD		ted Hand To		lone	Stable					
				PF	OGRESS										WATER :	STRIKE!				
Date 1	Гime	Depth	Depth	Depth			Rema	ırks			Date ⁻	Time	Depth	Depth	Depth	Water	Time		Remark	(S
13/08/202	21 17:30	2.00	2.00		End of Shift					$\overline{}$	-		Strike	Casing	Sealed	Rose To	Elapsed	1		
16/08/202 16/08/202	21 07:30	2.00	2.00	Dry Dry	Start of shift	t nplete; Boreho	ole Comple	te							SPT D	DETAILS				
Depth	Depth	Time						D-m/	1	-	Depth	Test		wto.			Hammer Serial	Energy	Depth	Depth
Тор	Base	ПП	e Start	Duration	Tool	\dashv		Rema	arks		Тор	Туре	<u> </u>	Reported	J Kesuit	\longrightarrow	Number	Ratio	Casing	Water
Denth	Depth Base 3.50 10.00	AIF AIR	sh Type R/MIST R/MIST	Flush Return 0 0	White Grey	DYNAMI Diameter	IC SAMI	tion	Sample	Run										
	INIST/	ALL ATIO	N DETAILS		<u> </u>	DIE	PE CONS	TBLICT	TON					DED	TH RELAT	TED DEM	ADKC			
Distance		Re	esponse Res	sponse Pi	pe Pipe		Base	Diamet		Type	Depth	Depth			TITIKLLAI		marks			
Distance				Base R	ef Ref	Тор	Base	Diamet	ter Pipe	: Туре	Top	Base								
Donth	Donth			BACK	FILL DETAI	ILS									LOCATION	N DETAIL	.S			
Depth Top 0.00	Depth Base 10.00	Grout	Descrip	tion			Ren	narks							Rem	narks				
AGS		See he		t for detail breviations	meters in its of boring s see key.	g, progress	s and wa				Log check	ked by [David Hov	ward			SOI	L end	Ginee	RING
Form No C					- D	n No. 2.02			Janua Data			<u> </u>					_	- (1) - 5 - 1		

C

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion									Hole ID	
Project No.	TE8364						Explo	rato	у Но	le Lo	og		BH_FE_C	03
Engineer	Mott MacDonald Bentley													
Employer	Barhale Limited	P. A		F (0001	205 2045	70.401					200		Sheet 1 of	1
Ground Level Hole Type		rdinate nation		548881.3	30E, 2615	/2.10N	N.	Gri	d	O:	SGB			
Поте туре	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test	Install-
	·	Wea		ness)	Level	Wate	Details	Dia.	TCR/ Reco	SCR	~		Details	ation
	n slightly sandy slightly gravelly CLAY. Gravel is ed fine to medium of flint. Sand is fine to coarse.			0.16	6.04		D 1 0.05-0.10 ES 2 0.20-0.25							
Frequent rootlets an	d roots (<6mm diameter).	1		(0.54)			B 3 0.10-0.40							
	avelly sandy CLAY. Gravel is angular to						D 4 0.40-0.50 ES 5 0.50-0.55							
subrounded mediun (SUPD) [SUPERFICIA	n to coarse of flint. Sand is fine to coarse.	1		0.70	6.04		B 6 0.40-0.80							
CHALK recovered as	firm light grey slightly gravelly sandy calcareous			(0.50)	-		B 9 0.80-1.20							
CLAY. Gravel is angu is fine to coarse.	lar to subrounded medium to coarse of flint. Sand			1.20	6.04		D 7 1.00-1.10 ES 8 1.10-1.20							
(WMCK) [WEST MEL	BURY CHALK FORMATION]	1		(0.30)			25 8 1.10-1.20					NA		
calcareous CLAY. (CII	Composed of stiff grey locally stained yellow	Λ		1.50 -	6.04		C 10 1.20-2.00	102	38			NR		
	BURY CHALK FORMATION] re loss. Chalky CLAY (Driller's Description)			(0.50)										
(WMCK) [WEST MEL	BURY CHALK FORMATION]			2.00 -	6.04									-
	Composed of stiff thinly bedded grey slightly CLAY. Gravel is angular to subangular fine to	E		(0.45)								NA		1
medium of extremel	y weak low density calcareous siltstone and flint.	Grade Dm		2.45	6.04									1
(CIRIA Grade Dm) (WMCK) (WEST MEL	BURY CHALK FORMATION] /	Grac												
Assumed zone of co	re loss. Chalky CLAY. (Driller's Description)						C 11 2.00-3.50	102	30			NR		
(WINICK) [WEST MEL	BURY CHALK FORMATION]		 	(1.05)										
			1											
				3.50 -	6.04									1
	Composed of stiff thinly bedded grey slightly CLAY. Gravel is angular to subangular fine to			3.68	6.04									7
medium of extremel	y weak low density calcareous siltstone and flint.	Λ		3.84	6.04									}
(CIRIA Grade Dm)	BURY CHALK FORMATION]			-			C 12 3.50-4.50	102	100					}:::::::::
Stiff dark grey mottle	ed greenish-grey CLAY with occasional		E-=-											}======================================
	ded fine to medium gravel of coprolite. GE GREENSAND MEMBER]													}=======
Stiff to very stiff dark	grey mottled dark green glauconitic CLAY. Gravel			(1.61)										
is subrounded fine of (GLT) [GAULT FORM)														
			<u> </u>	-										
							C 13 4.50-6.00	102	97					
Very stiff fissured da	rk grey CLAY with occasional subrounded to			5.45	6.04									<u> </u>
rounded fine gravel	of coprolite. Fissures are very closely spaced to													=======================================
closely spaced inclir (GLT) [GAULT FORM	ned planar and rough. ATION1													
	•			-										
			<u></u>											
												NA		
							C 14 6.00-7.50	102	93					
					-		C 14 0.00-7.30	102	33					
				-									,	
		pe	<u></u>	(4.05)										-
		Unweathered	F											
		Inwe												100000000
				-										
							C 15 7.50-9.00	102	93					-
			<u> </u>	_										
			<u></u>											
														-
			<u></u>	-									,	7
														}
Assumed zone of co	re loss. Grey CLAY. (Driller's Description)	-		9.50 -	6.04		C 16 9.00-10.00	102	50			ND		
(GLT) [GAULT FORM				(0.50)								NR		
				10.00	6.04									
Complete at 1	0.00m. Termination Reason: Achieved Scheduled Dep h			10.00	0.01									
	3aa.aa 23p													
	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water											
	For details of abbreviations, see key.	o anta												
FINAL	Print date and time 12/09	/2022	13:55		Lo	g chec	ked by David Howa	rd				SOI	L engine	PRING
Form No. SIEXPHOLEL				Issue Date	02/03/20	-						Part o	f the Bachy Soletan	che Group

Project	Name	e Car	nbridge	e Waste	e Wa	ater Tre	atment	Plant F	Reloca	tion				_					Н	ole ID	
Project	No	TE8	364											Exp	olorator	y Hole	Log	l F	SH F	E_00)4A
Engine			tt Mac	Donald	l Ber	ntley													·		<i>3</i> 17 (
Employ	er		hale Lir	nited																et 1 of :	1
Ground L			0mOD						Coordin			49059.10E		5.10N			Grid	-4:	OSGB		-4-1
Date Star Top	Base		08/2021 Date T	ime Sta	ırt Γ	ate Tim	ne End R		Date Co			.8/08/2021 ill Bit Pla	ant Use	d Shorii	na Used Pi	it Stability	Inclin		90 TO Remark	m horizor	ntai
0.00 1.20	1.20 15.00	IP	17/08/	2021 08:00 2021 09:00)	17/08/202 18/08/202	1 09:00	BC BC	DT SAN	N		NA Insula	ted Hand	Tools N	lone	Stable			tion pit: H		
1.20	15.00	, KC	17/08/	2021 09.00		16/06/202	1 10.00	ьс	SAIN	(14		Coi	naccino 2	J5							
					PRC	GRESS										WATER	STRIKES	;			
Date	Time	Depth	Depti Casin					Rema	ırks			Date	Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed		Remark	K S
17/08/20 18/08/20		15.00 15.00	15.00 15.00	Dry	/ E	nd of Shift Start of shift								Julke	Casing	Jealeu	Nose 10	ыарзец			
18/08/20		0.00	0.00	Dry	, E		plete; Boreh	nole Comple	ete												
				CABLE P	PERC	USSION	DETAILS									SPT D	ETAILS				
Depth	Depth		ne Start	Durat	tion	Tool			Rema	arks		Depth			Reporte	d Result	Ha	ammer Serial Number	Energy	Depth	Depth
Тор	Base											Тор	Туре					reamber	Ratio	Casing	Water
						LUSH DE	TAILS														
Depth Top	Depth Base		ısh Type	Flu Ret		Flush Colour		F	Remark	s											
1.20	15.00	А	IR/MIST	10	00	Grey															
HOLE DI	AMETE	R CASING	G DIAME	TER			DYNAM	IC SAM	PLING												
Depth	Diamet	er Depth		eter Dept	h Top	Depth	Diamete	r Durat		Sample											
Base 15.00	146	15.00	:	'		Base				Recover	y Referer	nce									
	INIC	TALLATIO	AL DETA	1.6		1	DII	DE CONG	TDUCT	ION					DEF	TII DELA	EED DENA	ADIC			
D: 1		TALLATIO	esponse		Pipe	e Pipe		PE CONS	T		· -	Depth	Dept	h	DEF	TH RELA					
Distance	ID	Type "	Тор	Base	Ref		Тор	Base	Diame	ter P	іре Туре	Тор	Base	2			Ren	narks			
Depth	Depth	. 1		BA	CKFI	LL DETA	ILS									LOCATIO	N DETAIL	S			
Тор	Base		Desci	ription				Ren	narks							Ren	narks				
0.00	15.00	Grout																			
	No	tes: All de																			
AGS	3		eader she etails of a				g, progres	ss and wa	ater.												
FINAL	-						ne 12/09	9/2022 1	3:55			Log chec	ked bv	David Ho	ward			SOII	L end	sinee	RING
Form No. 9	SIEXPHO	LEHDR					n No. 2.02			Issue D	ate 22/06		-,					Part	of the Back	ny Soletanch	e Group

Project Name	Cambridge Waste Water Treatment	t Plan	t Reloca	tion										Hole ID	
Project No.	TE8364							Explo	orator	ry Ho	ole Lo	og		BH_FE_0	ı∩∡∆
Engineer	Mott MacDonald Bentley														
Employer	Barhale Limited					10		<u> </u>		-		:25		Sheet 1 of	2
Ground Level Hole Type		ordinate dination			.10E, 2615 n horizonta		N		Gri	ıd	OS	SGB			ı
noie type	IF+nC		_	Depth	TIOTIZOTIC	1	\top			e %	- s	\top		<u> </u>	\top
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u></u>	In Situ Test Details	Install- ation
		We		ness)	LCVC.	Wat	Ę	Details	Dia.	TCR	SCF			Dota	auc
angular to subroun	wn slightly sandy slightly gravelly clay. Gravel is nded fine to medium of flint. Sand is fine to coarse.			(0.32)	1			1 0.05-0.10 3 0.20-0.25							
Frequent rootlets a	and roots (<6mm diameter).	\downarrow	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	0.32	6.28		B 2	2 0.10-0.40 4 0.40-0.50							
Firm grey slightly g	gravelly sandy CLAY. Gravel is angular to	1		,	1		ES (6 0.50-0.55							
subrounded mediu (SUPD) [SUPERFICIA	um to coarse of flint. Sand is fine to coarse. IAL DEPOSITS]			(0.88)	1		B 5	5 0.40-0.80							
				-	-			7 0.80-1.20 8 1.00-1.10							-
	LK composed of stiff grey gravelly calcareous CLAY.	+	F	1.20	5.40			9 1.10-1.20			<u> </u>	+		-	
	o subangular fine of extremely weak low density ne. (CIRIA Grade Dm)] (2.20)	1										-
	ELBURY CHALK FORMATION]			(0.80)	1		C 1	10 1.20-2.00	102	81			NA		12222222
	00m assumed zone of core loss.			2.00 -	4.60							l			
	LK composed of stiff grey gravelly calcareous CLAY. o subangular fine of extremely weak low density	7		(0.30)	4.00										-
calcareous siltstone	ne and flint. (CIRIA Grade Dm)	λ		2.30	4.30									-	
Assumed zone of co	ELBURY CHALK FORMATION] core loss. Grey CLAY. (Driller's Description)	_ ال	<u> </u>	-	-										
	ELBURY CHALK FORMATION]	e Dm		-	1		C 1	11 2.00-3.50	102	20			NR		
		Grade I	<u> </u>	(1.20)	-										-
			<u>L</u>	-	1										
			<u> </u>	3.50	3.10										1
	LK composed of stiff grey gravelly calcareous CLAY. o subangular fine of extremely weak low density	7		3.50	2.88							\top	NA	1	7
calcareous siltstone	ne and flint. (CIRIA Grade Dm)	Λ		3.12	2.00									7	
Assumed zone of co	ELBURY CHALK FORMATION] core loss. Grey CLAY. (Driller's Description)	⁷	==	(0.78)	-		C 1	12 3.50-4.50	102	23			NR		-
(WMCK) [WEST ME	ELBURY CHALK FORMATION]		F] ` ′ ·	1										
Firm dark grey mg	ttled greenish-grey glauconitic CLAY with	+	-	4.50	2.10				<u> </u>			┼	 	_	-
occasional subroun	nded to rounded fine gravel of coprolite.		F	(0.38)	1										
	DGE GREENSAND MEMBER] / laminated dark grey CLAY with occasional	+	+-	4.88	1.72										
subrounded to rour	unded fine gravel of coprolite. Fissures are very spaced horizontal to subhorizontal planar and]										
smooth and subver	rtical to vertical planar and smooth.		<u>L</u>	-]		C 1	13 4.50-6.00	102	100					
(GLT) [GAULT FORM	MATION]		F	-	-										
			F_=_	1	1										
			<u> </u>	1 -	1				<u> </u>		₩	┼	-		-
				1	1										
			<u> </u>	1	1										
			F	1]					1220					
			F	-]		C 1	14 6.00-7.50	102	100]
					-										-
		lered		-	1								NA		
		Unweathered	<u>L</u>	(10.12)	1				\vdash	<u> </u>	—	↓	-		-
		Uhv	F	-	1										-
			<u> </u>	1	1										1222222
			<u> </u>	-	1										7
	.67m with inclined, closely to medium spaced, planar		F]	1		C 1	15 7.50-9.00	102	97					-
and smooth fissure			F	-] :	-										-
				-]										
]				L	<u> </u>		\perp	_		}
			<u>L</u>	-	-										
from 9.26m to 15.0	00m Very stiff.		F		1										
			F_=_		1				102	100					-
			<u> </u>	1	1		C 1	16 9.00-10.50							
		+	+	1-	1-	—	+		+	┼	₩	┼	┼		
		\perp		<u></u>		<u></u>	\perp		\perp		<u></u>		<u> </u>		
	s: All depth in metres, all diameters in millimetr See header sheet for details of boring, progre		water												
AGS	For details of abbreviations, see key.	55 un.	Water.												
FINAL	Print date and time 12/0	9/2022	2 13:55		Lo	g cher	cked	by David Howa	ırd				SO	IL engine	ering

Part of the Bachy Soletanche Group

Issue.Revision No. 2.05

Form No. SIEXPHOLELOG

Project Name	Cambridge Waste Water Treatn	nent Pla	ant l	Relocat	ion										Hole ID	
Project No.	TE8364								Explo	rator	у Но	ile Lo	g		BH_FE_0	04A
Engineer Employer	Mott MacDonald Bentley Barhale Limited														Sheet 2 of	2
Ground Level	+6.60mOD	Coordin				10E, 2615		V		Gri	d	OS	GB			
Hole Type	IP+RC Description of Strata	Inclinat	ering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	Inio	TCR/Sample Recovery %	SCR/Blows	RQD	<u></u>	In Situ Test Details	Install- ation
	aminated dark grey CLAY with occasional		\$						Details	Dia.	2 &	Š				
subrounded to roun closely to closely sp smooth and subvert (GLT) [GAULT FORM	ded fine gravel of coprolite. Fissures are very aced horizontal to subhorizontal planar and tical to vertical planar and smooth.		M		15.00	-8.40	M N	C 18	Details 10.50-12.00 12.00-13.50	102 102	100					
AGS Notes:	. or actains or approvations, see key.													SOI	L enginee	RING
1 11 N/AL	riiii date and time	12/UJ/ZU	/LZ 1			LO	y unec	ven n)	Daviu Howah	u				1 -		

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	e Car	nbridge	e Waste	e Wa	ater Tre	atment	Plant F	Reloca	ation					_					H	łole ID	
Project	No.	TE8	364												Exp	olorato	ry Hole	Log		3H_I	FE00)4B
Engine			tt Macl		Ber	ntley																
Employ Ground L			hale Lir 1mOD	nited					Coordii	natos		E/0/	059.30E,	261521	E 10N			Grid		She OSGB	et 1 of 1	1
Date Star			08/2021						Date C				033.30L,	20132.	J.1014				nation		m horizor	ntal
Тор	Base		Date T				ne End R							nt Use		-	it Stability	,		Remarl	ks	
0.00 1.20	1.20 15.00	СР		2021 15:00 2021 08:15		31/08/202 01/09/202		Danny Cundill Danny Cundill	SAN	ſ	NA	NA		ed hand t		lone	Stable					
					PRO	GRESS											WATER	STRIKE	S			
Date :	Time	Depth	Depth	Dep	th	GILLOO		Rema	rks				Date ¹	Time	Depth Strike	Depth	Depth	Water Rose To	Time		Remark	(S
31/08/20: 01/09/20:		1.20 1.20	1.20 1.20	g Wat Dry Dry	/ E	nd of Shift tart of shift							01/09/20	21 09:30	2.90	Casing 2.90	4.00	2.30	Elapsed 20	Slow		
01/09/20. 02/09/20.	21 17:30	15.00 0.00	5.20 0.00	Dry Dry	/ D	rilling Con		nole Comple	ete													
				CABLE P	PERCL	JSSION	DETAILS										SPT D	ETAILS				
Depth Top	Depth Base	1 Tim	ne Start	Durat		Too			Rem	arks			Depth Top	Test Type		Reporte	d Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
Depth Top	Depth Base		ish Type	Flu Ret	ısh	LUSH DE Flush Colour	TAILS		Remark				1.20 2.20 4.20 4.20 5.20 6.20 7.20 9.20 10.70 12.20 13.70	999999999999	N=9 (1,2:2, N=9 (1,1:2, N=9 (1,1:2, N=14 (1,2:3, N=16 (2,2:3, N=26 (2,3:3, N=27 (3,3:3, N=29 (3,3:3, N=33 (4,5:3, N=34 (4,6:3,3)	2,2,3) 2,3,2) 3,3,4,4) 3,3,4,6) 4,5,6,7) 4,6,7,9) 4,6,8,9) 5,6,8,10) 6,8,9,10) 7,7,9,10)			AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501	75 75 75 75 75 75 75 75 75 75 75 75	1.20 2.20 3.20 4.20 5.20 5.20 5.20 5.20 5.20 5.20 5.20 5	Dry Dry 2.50 3.50 Dry
Depth Base	Diamet	er Depti Base		ter Dept	h Top	Depth Base	Diameter	r Durat		Sample	le Ru											
15.00	200	5.20	200				DII	PE CONS								DE	PTH RELA	TED DEN	VADKS			
Distance			esponse	Response			Тор	Base	Diame		Pipe Typ	pe	Depth	Dept		52.	· · · · · · · · · · · · · · · · · · ·		marks			
		7,7	Тор	Base	Ref		·						Тор	Base								
Depth	Depth	1	D-		CKFI	LL DETA	ILS		aarl.								LOCATIO		LS			
Top 0.00	Base 15.00		Descr	ription				Ren	narks								Ren	narks				
AGS		See h	eader she	eet for d	etails	of borin	millimetr g, progres		ater.													
FINAL Form No. 9	SIEADITO													ked by	David Ho	ward					dinee	
POITH INO. S	"LVLU	FLIIDK			ISSU	e.nevisioi	1 INU. Z.UZ			issue L	∪aιe ∠∠/(UU/2U	110						Part	or rue gac	rry soletanch	e aroup

Project Name	Cambridge Waste Water Treatn	nent Pl	lant	Relocat	ion				F. 1	. w.c. ±	اليم	اما			Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley								Explo	oratoi	ry Ho	oie Lo	og		BH_FE_0	04B
mployer	Barhale Limited														Sheet 1 of	2
iround Level Iole Type	+6.61mOD IP+CP	Coordi Inclina			549059.3 90° from	30E, 2615 horizonta		N		Gri	id	09	SGB			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	T _D .	TCR/Sample Recovery %	SCR/Blows	RQD	¥	In Situ Test Details	Instal
angular to subangu	brown slightly sandy gravelly CLAY. Gravel is ular fine to medium of flint and quartz. Sand is		5		(0.30)		>	D1 0.1 B2 0.2		Dia.	2 &	S				
(TOP) [TOPSOIL] Firm light grey slight	nt buried roots and rootlets. ghtly gravelly sandy CLAY. Gravel is subangular of coarse of flint. Sand is fine to coarse.	to			0.30	6.31		D3 0.4 B4 0.5	0							
(SUPD) [SUPERFICIA					(0.90)			B 5 1.0	0-1.20							-
orange and brown	as: Soft yellowish grey locally stained yellowish calcareous CLAY with occasional subrounded gravel of coprolite.	1			1.20 - - -	5.41		D6 1.2 B7 1.2	0-1.65						SPT(S) N=9 (1,2:2,2,3,2) 1.20	
	ELBURY CHÁLK FORMATION]		1					07 1.2	0-1.70							
			1					D8 2.2	0-2.65						SPT(S) N=9 (1,1:2,2,2,3) 2.20	
					(2.80)			B 9 2.2 W 10 2								
					- - -			D 11 3.	00						SPT(S) N=9 (1,1:2,2,3,2)	
					- -			D 12 3. B 13 3.							3.20	
brown fossilised fra	y laminated dark grey CLAY with occasional dar ragments (1mm x 3mm). Fissures are planar an				4.00	2.61		D14 4.	00						SPT(S) N=14	
smooth. (GLT) [GAULT FORM	MATION]			 	-			D 15 4. B 16 4.							(1,2:3,3,4,4) 4.20	
					: -										SPT(S) N=16	
				 	-			D 17 5. B 18 5.							(2,2:3,3,4,6) 5.20	
								D 19 6. B 20 6.							SPT(S) N=22 (2,3:4,5,6,7) 6.20	
					(11.00) –			B 20 0.	20 0.70							
					. (11.00)			D 21 7.	20-7.65						SPT(S) N=26 (2,3:4,6,7,9) 7.20	
					-			B 22 7.	20-7.70						7.20	
					- :										SPT(S) N=27 (3,3:4,6,8,9)	
								D 23 8. B 24 8.							8.20	
					<u>-</u>										SPT(S) N=29	
					-			D 25 9. B 26 9.							(3,3:5,6,8,10) 9.20	
					-											
Notes	s: All depth in metres, all diameters in milli	metres														
AGS	See header sheet for details of boring, properties of abbreviations, see key.	rogress a												SO	L engine	חופי
INAL orm No. SIEXPHOLE	Print date and time : ELOG Issue.Revision N		.022 1	13:55	Issue Date		~	ked by E	David Howa	ra					f the Bachy Soletan	



Project Name	Cambridge Waste Water Treatr	ment Pla	ant	Relocat	ion										Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley								Explo	rator	у Но	le Lc	9		BH_FE_0	04B
Employer	Barhale Limited														Sheet 2 of	2
Ground Level Hole Type	+6.61mOD IP+CP	Coordir Inclinat		S		30E, 2615. horizonta		N		Gri	d	OS	GB			
Troic Type	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>"</u>	In Situ Test Details	Install- ation
brown fossilised frag	aminated dark grey CLAY with occasional da gments (1mm x 3mm). Fissures are planar an	rk nd			-											
smooth. (GLT) [GAULT FORM	ATION]				-											
															SPT(S) N=33 (4,5:6,8,9,10)	
					_				10.70-11.15 10.70-11.20						10.70	
					-											
				<u> </u>											SPT(S) N=33 (4,5:7,7,9,10)	
				<u> </u>	-				12.20-12.65 12.20-12.70						12.20	
					-											
					-											
															SPT(S) N=34 (4,6:7,8,9,10) 13.70	
					_				13.70-14.15 13.70-14.20						13.70	
Complete at 1	15.00m. Termination Reason: Achieve	ed			15.00 –	-8.39										
5 ,	Scheduled Dep h]
					-											
]
					-											-
					-]
]
					-											-
					-											-
					-											
]
					-											1
					-											
																-
																1
					-											1
.	All I al construction of the construction of t															
ACS	All depth in metres, all diameters in mill See header sheet for details of boring, p		nd v	vater.												
FINAL	For details of abbreviations, see key.	12/09/20	122	12.55		Lo	n chec	ked by	David Howar	Ч				SOI	L engine	RING

Log checked by David Howard

Issue Date 02/03/2018

Part of the Bachy Soletanche Group

FINAL

Form No. SIEXPHOLELOG

Print date and time 12/09/2022 13:55

Project	Name	Car	nbridge	e Waste	Wa	ter Tre	atment	Plant F	Reloca	ation					_					Н	ole ID	
Project	No.	TE8	364												Exp	olorato	ry Hole	Log		BH_	FE_0	05
Engine	er		tt Mac		Ben	itley																
Employ Ground L			hale Lir _{6mOD}	nited					Coordii	nates		5492	02.60F	261513.	.60N			Grid		OSGB	et 1 of 1	1
Date Star			8/2021							omplet	ed		8/2021						nation			
Top 0.00	Base	Туре	Date T	ime Stai		ate Tim	ne End R	Rig Crew	Logge	er Barre	Н Туре	Drill B		nt Used ted Hand To		ng Used F Ione	Pit Stability Stable	/		Remark	(S	
1.20	1.20	RC RC		2021 12:10		10/08/202 12/08/202		RL RL	MV		pore S 46)	PCD		ed Hand 16 nacchio 205		ione	Stable					
					PRO	GRESS											WATER	STRIKE	S			
Date ⁻	Time	Depth	Depth					Rema	rks				Date	Time	Depth Strike	Depth Casing		Water Rose To	Time Elapsed	1	Remark	ΚS
10/08/20 11/08/20 11/08/20 11/08/20 12/08/20	21 07:30 21 17:30	6.50 6.50 15.00 0.00	6.50 6.50 15.00 0.00	0.00 5.00 0.00	St Er	nd of Shift tart of shift nd of Shift ackfill Com	plete; Boreł	nole Comple	ete													
				CABLE P	ERCL	JSSION	DETAILS										SPT [DETAILS				
Depth Top	Depth Base	Tim	ne Start	Durati	on	Tool			Rem	arks			Depth Top	Test Type		Reporte	ed Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
Depth Top 120 8.00	Depth Base 8.00 15.00	A	ish Type IR/MIST IR/MIST	ROTAF Flus Retu 0 0	sh ırn	USH DE Flush Colour White Grey	TAILS		Remark	ks												
HOLE DI	AMETER	CASING	G DIAMET	TER			DYNAM	IC SAM	PLING	i												
Depth Base	Diamete	Dont	Diame	ter Depth	Тор	Depth Base	Diamete		tion	Sample		un										
15.00	146	15.00				Базе				Necover	y Kerei	ience										
			N DETAI		Pipe	Pipe	PII	PE CONS	1				Depth	Depth	1	DE	PTH RELA	TED REN	MARKS			
Distance	ID .	Туре	Top	Base	Ref		Тор	Base	Diame	eter P	Pipe Ty	ре	Тор	Base				Re	marks			
				RΔ(-KEII	LL DETA	II S										LOCATIO	N DETAI	ıs			
Depth	Depth		Desci	ription	vi 1L			Rer	narks									narks				
7op 0.00	15.00	Grout		<u> </u>																		
AGS	Note	See h		eet for de bbreviati	tails ons s	of boring see key.	millimetr g, progres	ss and wa											501	I AD	Sinee	מפוסכ
FINAL Form No. 9	SIEXPHOL	EHDR		Prin			ne 12/09 n No. 2.02	9/2022 1	ქ: 55	Issue D	ate 22/		-	ked by [avid Ho	ward					ny Soletanch	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
								Explo	ratoı	у Но	le Lo	g			.O.F
Project No. Engineer	TE8364 Mott MacDonald Bentley													BH_FE_C	105
Employer	Barhale Limited													Sheet 1 of	2
Ground Level	+7.86mOD Coo	rdinate	!S	549202.6	60E, 2615	13.60	N		Gri	d	09	GB			
Hole Type	IP+RC Incli	nation													
		Weathering		Depth	Datum	trike		Sampling		TCR/Sample Recovery %	swo			In Situ Test	Install-
	Description of Strata	eathe	Legend	(Thick- ness)	Level	Waterstrike			T=.	R/Sar ecove	SCR/Blows	RQD	±	Details	ation
TOPSOIL: Dark brow	n slightly sandy slightly gravelly CLAY. Gravel	3	X//XX///			3	D 1	Details 0.05-0.10	Dia.	2 %	Š				
	ded fine to medium of flint. Sand is fine to coarse.			(0.30) 0.30	7.86		ES 2	2 0.20-0.25							}
(TOP) [TOPSOIL]		1		(0.40) -				0.10-0.40 0.40-0.50							
	sandy slightly gravelly CLAY. Gravel is angular to medium of flint and quartz. Sand is fine to coarse.	<u> </u>		0.70	7.86			5 0.50-0.55 0.40-0.80							
\(SUPD) [SUPERFICIA Structureless CHALF	L DEPOSITS] K composed of very stiff light greyish brown	Ί		(0.50)				0.40-0.80 0.80-1.20							-
slightly gravelly sand	dy calcareous CLAY. Gravel is angular to nedium of extremely weak calcareous siltstone			1.20	7.86		D 8	1.00-1.10							
and flint. (CIRIA Grad	de Dm)	P G					ES 8	8 1.10-1.20							
	LBURY CHALK FORMATION] K composed of firm light grey slightly gravelly	Grade Dm					C 1	0 1.20-2.00	103	100					
	avel is subangular to subrounded fine to medium ow density calcareous siltstone. (CIRIA Grade Dm)		HH	(1.04)									NA]
	LBURY CHALK FORMATION]			-										-	
Very weak medium	density light grey CHALK composed of calcareous			2.24	7.86										
	inuities are very closely spaced randomly nd rough occasionally stained orange, (CIRIA	9 B4											20		
Grade B4)		Grade B4		(0.76)			C 1	1 2.00-3.50	103	97	51	0	40 60		
	LBURY CHALK FORMATION]	Ĺ		3.00 -	7.86		CI	1 2.00-3.30							}=====
	K composed of stiff light grey gravelly calcareous ngular to subrounded fine to medium of	ء													
	density calcareous siltstone. (CIRIA Grade Dm)	Grade Dm		(0.83)									NA		
(**************************************	,	Gra													1
Very weak to weak r	medium density light grey CHALK composed of			3.83	7.86										
calcareous SILTSTON	NE. Discontinuities are 0-40 degrees very closely edium spaced planar and rough occasionally			-											
slightly stained oran	nge and occasional calcareous silt infill (<3mm)						C 1	2 3.50-5.00	103	87	78	67			
Grade B3)	ındulating and rough rare stained orange. (CIRIA			-											-
	LBURY CHALK FORMATION]														
from 4.80m to 5.00i	m assumed zone of core loss.	B3		_									40		
		Grade E		(2.67)									110 220		-
		Ū											220		}
							C 1	3 500 650	102	100	02				
							C I	3 5.00-6.50	103	100	93	55			
				-										-	-
															}
	ore loss. Greyish CHALK. (Driller's Description).			6.50 -	7.86										
(WMCK) [WEST MEI	LBURY CHALK FORMATION]	_													
		Grade Dm		(1.10)									NR		
		Gra					C 1	4 6.50-8.00	103	27					
				-											<u> </u>
	slightly sandy CLAY with frequent pockets(<3mm			7.60	7.86										
(WMCK) [CAMBRID	e sand. Sand is fine to medium. GE GREENSAND MEMBER]		F	7.80	7.86										}
very closely spaced	rk grey CLAY. Fissures are extremely closely to randomly orientated planar and smooth		F_=_												
occasionally slightly siltstone.	polished. Rare nodules (<6mm x <12mm) of		F_=_:]				F 0.00 0.00	100	25					
(GLT) [GAULT FORM	ATION]		<u> </u>				C 1	5 8.00-9.00	103	85					1
from 8.85m to 9 00a	m assumed zone of core loss.		<u> </u>	(1.90)											-
			<u> </u>	-											
from 9.20m to 9.60r	m 1no. 90degrees fissure planar and smooth														}
			<u> </u>	-			C 1	6 9.00-10.00	103	82					-
	inly laminated dark grey CLAY. Fissures are	1		9.70	7.86										
0-30degrees closely	to medium spaced planar and smooth and		 	•											1
	All depth in metres, all diameters in millimetre		1	I	I	<u> </u>	1			<u> </u>	1	I			1
	See header sheet for details of boring, progres For details of abbreviations, see key.	s and	water.												
FINAL	Print date and time 12/09	/2022	13:55		Lo	a cher	ked l	by David Howar	d				SOI	L engine	RING
Form No. SIEXPHOLEL				Issue Date	02/03/20			,	•				Part o	f the Bachy Soletand	he Group

Project Name	Cambridge Waste Water Treatm	ent Plar	nt Reloca	tion										Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo	g		BH_FE_C	005
Engineer	Mott MacDonald Bentley													DI 11 L0	,03
Employer	Barhale Limited													Sheet 2 of	2
Ground Level Hole Type	+7.86mOD IP+RC	Coordina		549202.0	60E, 2615	13.601	N		Gri	d	OS	GB			
	Description of Strata	Weathering			Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
Vanuatiff facured thi	inhy laminated dayly avery CLAV Figures ave	We		ness)	Level	Wat		Details	Dia.	TCR	SCF			Details	
0-30degrees closely	inly laminated dark grey CLAY. Fissures are to medium spaced planar and smooth and r and smooth. Rare nodules (<8mm x <12mm)	of	E-E-]											
siltstone. (GLT) [GAULT FORMA			<u> </u>												<u></u>
	Om assumed zone of core loss.			1			C 17	10.00-11.50	103	100					
				-											
			F_=_	1											
from 11.55m to 11.6	66m 1 No. discontinuity 60 degrees planar smooth		E-E-												
polished	, , ,			1											
				-									NA		
		ered		1			C 18	11.50-13.00	103	93					
		Unweathered	E-E-	(5.30) -											
polished	78m 1 No. discontinuity 60 degrees planar smooth 00m assumed zone of core loss.	'n													
from 12.90m to 13.0	ourn assumed zone of core loss.		==	-											
				1											
from 13.45m to 13.5	50m thickly laminated			1					400						
			<u> </u>	1			C 19	13.00-14.50	103	83					
			E-E-	-											
from 14.25m to 14.5	50m assumed zone of core loss.												NR		
				1			C 20	14.50-15.00	103	80			NA		
	00m assumed zone of core loss.	_		15.00 -	7.86										
Complete at 1	5.00m. Termination Reason: Achieved Scheduled Dep h														
															-
				-											-
				-											-
															<u> </u>
				-											-
]
				-											-
				-										,]
															=
															-
				_											
															=
]
															<u> </u>
												-			
	All depth in metres, all diameters in millin		1	1	1	<u> </u>	1		1	<u> </u>					1
	See header sheet for details of boring, pro For details of abbreviations, see key.	ogress and	l water.												
FINAL Print date and time 12/09/2022 13:55 Log checked Inform No. SIEXPHOLELOG Issue Revision No. 2.05 Issue Date 02/03/2018									d				so	IL engine	PRING
Form No. SIEXPHOLEL	OG Issue.Revision No							Part	of the Bachy Soletan	che Group					



Project	Name	Carr	nbridg	e Wast	e Wa	ater Tre	atment	: Plant I	Reloc	ation	1				Ev.m	lovotou	مامالية	امما		Н	łole ID	
Project		TE8													Exp	ioratoi	y Hole	Log		BH_	FE_0	06
Engine				:Donald mited	d Ber	ntley														Sho	et 1 of 1	1
Employ Ground L			mOD	mileu					Coord	dinates	3	5493	18.20E,	 261491.9	90N			Grid	L	OSGB	<u>et 1 01 .</u>	
Date Star	ted	09/0	8/2021							Compl			8/2021						ination			
Top 0.00	Base 1.20	Туре		Time Sta /2021 11:3		Date Tim 09/08/202	ne End F	Rig Crew	Logg		rrel Type	Drill B		nt Used		g Used P	it Stability Stable	'		Remark	(S	
1.20	10.00	RC		/2021 12:30		10/08/202		RL	AL	Ge	eobore S (146)	PCD		acchio 205			Gable					
Date '	Timo	Depth	Dept	h Dep		OGRESS		Rema	orke				Date '	Time	Depth	Depth	WATER Depth	STRIKE Water			Remark	
09/08/20	21 17:30	6.50	Casir 6.50	Dr	у Е	End of Shift		Keine	31 NS				Date	IIIIe	Strike	Casing	Sealed	Rose T	o Elapse	d		
10/08/20 10/08/20		6.50 0.00	6.50 0.00			Start of shifi Backfill Com	t nplete; Borel	hole Compl	ete													
				CABLE I	PERCI	USSION	DETAILS										SPT D	ETAILS				
Depth Top	Depth Base	Tim	e Start	Dura	tion	Too	I		Ren	narks			Depth Top	Test Type		Reporte	d Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
				ROTA	ARY FI	LUSH DE	ETAILS															
Depth Top	Depth Base	Flus	sh Type		ush turn	Flush Colour			Remai	rks												
1.20	10.00	All	R/MIST		0	White																
	AMETER	CASING		TER			DYNAM	IIC SAM	PLIN													
Depth Base 10.00	Diamete 146	r Depth Base 10.00	Diam 14	eter Dept	th Top	Depth Base	Diamete	er Dura	ition	Samp Recov	ple F very Refe	Run erence										
D: .		ALLATIOI		ILS Respons	e Pipe	e Pipe		PE CONS	т -				Depth	Depth		DEI	PTH RELAT					
Distance	ID	Type	Тор	Base	Ref		Тор	Base	Diam	neter	Pipe Ty	ype	Тор	Base				Re	emarks			
		,		B/	ACKFI	ILL DETA	ILS	•									LOCATIO	n deta	ILS			
Depth Top 0.00	Depth Base 10.00	Bentonite		ription				Rer	marks								Ren	narks				
AGS		See he	ader sh		letails	of borin	millimeti g, progre		ater.													NDIE:
FINAL Form No. 9	SIEXPHOL	EHDR		Pri		te and tir ue.Revisio	me 12/09 n No. 2.02	9/2022 1	.3:55	SSUE	e Date 22		-	ked by Da	avid Hov	vard					hy Soletanche	
	L				ادد،	0+13101				.oout		, 201	-							Dat	,	oup

Project Name	Cambridge Waste Water Treatment	Plant	Reloca	tion										Hole ID	
Drainet No	TF02C/							Explo	ratoı	у Но	le Lo	g		ם בב ת	n06
Project No. Engineer	TE8364 Mott MacDonald Bentley													BH_FE_C	000
Employer	Barhale Limited													Sheet 1 of	1
Ground Level	+9.67mOD Coo	rdinate	es	549318.	20E, 2614	91.901	V		Gri	d	OS	GB	·		
Hole Type	IP+RC Incli	nation	1		1					I				T	1
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	Tn:-	TCR/Sample Recovery %	SCR/Blows	RQD	Ŧ	In Situ Test Details	Install- ation
TOPSOIL: Dark brow	n slightly sandy slightly gravelly clay. Gravel is	>	X//XV/			>	D1	Details 0.00-0.10	Dia.	2 &	S				-
angular to subround (TOP) [TOPSOIL]	led fine to coarse of flint. Sand is fine to coarse.			(0.35) 0.35	9.67			2 0.20-0.25 0.10-0.40							
	nish yellow sandy gravelly CLAY. Sand is fine to pangular to subrounded fine and medium of			-			D 4	0.40-0.50 5 0.50-0.55							
mudstone, chalk and (SUPD) [SUPERFICIA				(0.85)				0.40-0.80							
71	,			-				0.80-1.20 1.00-1.10							
	reyish white and greyish brown CHALK composed			1.20	9.67			3 1.10-1.20							
(WMCK) [WEST MEL	ONE. (unable to determine CIRIA Grade) LBURY CHALK FORMATION]			(0.80)					102	100	44	44			
from 1.60m to 2.00r fine to coarse grave	m non intact core (recovered as angular to subangular I sized fragments)			(0.00)			C 1	0 1.20-2.00	102	100		"	NI		
Weak low density Cl	HALK composed of greyish white and greyish			2.00 -	9.67										
	d orangish brown calcareous SILTSTONE. (unable														
	LBURY CHALK FORMATION]				-										
				(1.60)			C 1	1 2.00-3.50	102	100			NI 1200		
				-									1200		
from 3.40m to 3.60r fine to coarse gravel	m non intact core (recovered as angular to subangular														
Very weak to weak le	ow density greyish brown locally stained orange f calcareous SILTSTONE. Discontinuities are		HH	3.60	9.67									-	
horizontal to subhor	izontal closely to medium spaced planar rough			_											
planar and rough wi	n staining, inclined closely to medium spaced th clay infill (<1mm) and reddish brown staining.						C 1	2 3.50-5.00	102	93	67	29			
	LBURY CHALK FORMATION]														
from 4.00m to 4.15r fine to coarse grave	m non intact core (recovered as angular to subangular I sized fragments)														
															1
		ę							102	100	68	62			
		de B2/3		(4.64)			C 1	3 5.00-6.50	102	100			NI 200		
		Grade		1	-								400		
				1	-										
				1			C 1	4 6.50-8.00	102	97	59	45			
				1			C 1	4 0.30-8.00	102	31	33	43			-
				1											
				8.24	9.67										
	osed of grey locally dark grey calcareous inuities are 25 degrees medium spaced planar			(0.46)	3.07								630 630		-
	1mm). (unable to determine CIRIA Grade) LBURY CHALK FORMATION]			8.70	9.67		6.1	5 8.00-9.50	102	93	72	61	630		
	osed of dark grey calcareous SILTSTONE. to 10 degrees extremely closely to closely spaced	B3			-		CI	5 6.00-9.50	102	95	73	61	150		-
planar smooth clean	n. 2) 65 to 75 degrees planar smooth with clay ravel infill (<1mm). (Probably CIRIA Grade B3)	Grade E		(0.80)									150 170	-	
	LBURY CHALK FORMATION]	9			0.07								110		
	n white CHALK (Driller's Description) LBURY CHALK FORMATION]			9.50 -	9.67										
	,			(0.50)					102	0					-
Complete at 1	10.00m. Termination Reason: Achieved Scheduled Dep h			10.00	9.67										
	ocheduled Dep II														
	All depth in metres, all diameters in millimetre		tor												
	See header sheet for details of boring, progres For details of abbreviations, see key.	s and	water.												
FINAL	Print date and time 12/09		13:55			0	ked l	y David Howar	ď				SOI	r eugine	RING
Form No. SIEXPHOLEL	OG Issue.Revision No. 2.05			Issue Date	02/03/20	18						_	Part o	f the Bachy Soletano	he Group

Project	Name	Ca	mbridg	e Waste	e Wat	ter Tre	atment	Plant F	Relocat	tion											Н	ole ID	
Project	No	TE	3364													Exp	lorator	y Hole I	Log		RH C	DUT_	001
Engine				Donald	Bent	tley														-	JI IC)	001
Employ			hale Li	mited								=										et 1 of 1	1
Ground L Date Star			36mOD 08/2021						Coordin Date Co		eted		38.40E, 8/2021		21.80	UN			Grid Inclir	nation	OSGB 90° f o	m horizor	ntal
Тор	Base		Date 1	ime Sta			ne End F	Rig Crew	Logge			Drill B		ant U	sed	Shorin	g Used Pi	t Stability			Remark		
0.00 1.20	1.20 20.00	IP RC		/2021 15:00 /2021 16:00		9/08/202		BC BC/RL	DT SAN	Geol	bore S	NA PCD		ted Han nacchio		s No	one	Stable					
					DDO	CDECC												\A/ATED	CTDIVE				
Date ⁻	Time	Dept	h Dept			GRESS		Rema	rke				Date	Time		Depth	Depth	WATER Depth	Water	Time		Remark	/c
19/08/202	21 17:30	1.20	0.00	1.03	En	nd of Shift		Kerria	i No				Date	111116	· !	Strike	Casing	Sealed	Rose To	Elapsed	i	Keman	
20/08/202	21 15:00	1.20 8.70	0.00 8.70	1.20) En	art of shift id of Shift																	
23/08/202 23/08/202 24/08/202	21 17:30	8.70 20.00 20.00	8.70 20.00 20.00	2.50) En	art of shift id of Shift art of shift																	
24/08/202		0.00	20.01	4.00			plete; Boreh	nole Comple	ete														
				CABLE P	ERCU	ISSION	DETAILS											SPT D	ETAILS				
Depth Top	Depth Base	Tir	ne Start	Durat	ion	Tool			Rema	ırks			Depth Top	Tes Typ			Reported	d Result	Н	ammer Serial Number	Energy Ratio	Depth Casing	Depth Water
				ROTAI	RY FLI	USH DE	TAILS																
Depth Top	Depth Base	FI	ush Type	Flu		Flush Colour		F	Remark	s													
1.20 8.70	8.70 20.00		AIR/MIST AIR/MIST	10	10	Grey																	
						,																	
HOLE DI	AMETE	R CASIN	G DIAME	TER			DYNAM	IC SAM	PLING														
Depth Base	Diamete	Dept Bas		eter Depth	1 Тор	Depth Base	Diamete	r Durat		Sample	le R ery Refe	lun erence											
20.00	146	20.0		6							1												
	INS		ON DETA		I		PII	PE CONS	TRUCT	ION							DEP	TH RELAT	ED REM	ARKS			
Distance	ID	Туре	Response Top	Response Base	Pipe Ref	Pipe Ref	Тор	Base	Diamet	ter F	Pipe Ty	уре	Depth Top		pth ase				Rer	narks			
Danah	Danah			BA	CKFIL	L DETA	ILS											LOCATIO	N DETAIL	.S			
Depth Top 0.00	Depth Base		Desc	ription				Ren	narks									Rem	narks				
0.00	20.00	Grout																					
	1						-12-																
AGS	Not			netres, all leet for de					ater.														
	4			abbreviat	ions se	ee key.														-	1.00		אטופר
FINAL Form No. 9	SIEXPHO	LEHDR		Prir			ne 12/09 n No. 2.02	9/2022 13		SSIJA F	Date 22	/06/201	og chec 16	ked by	y Dav	vid Hov	vard					SINEE	
					.oout					L		, 20-	-							1 41	Dat	,	

Project Name	Cambridge Waste Water Treatm	ent Pla	nt Relocat	ion									Hole ID	
Project No.	TE8364						Exp	olorato	ry Ho	le Lo	og		BH_OUT_	001
Engineer	Mott MacDonald Bentley												ni_oui_	.001
Employer	Barhale Limited												Sheet 1 of	3
Ground Level		Coordina			40E, 2616		N	Gr	id	09	SGB			
Hole Type	IP+RC	Inclination	1		horizonta				9 v	T (0				
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	g Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test Details	Install- ation
	n slightly sandy slightly gravelly CLAY. Gravel i led fine to medium of flint. Sand is fine to coars			(0.30)			D 1 0.05-0.40							
Occasional roots. (TOP) [TOPSOIL]		1	<u> </u>	0.30 (0.30)	3.56		ES 2 0.20-0.25							
Firm greyish brown	slightly gravelly sandy CLAY. Sand is fine to	_/		0.60	3.26		B 3 0.10-0.40 D 4 0.40-0.50							
(SUPD) [SUPERFICIA		/		(0.60)			ES 5 0.50-0.55 B 6 0.40-0.80							
	htly gravelly sandy CLAY. Sand is fine to coarse subrounded fine to medium of mixed lithologi			-			B 9 0.80-1.20 D 7 1.00-1.20							
(SUPD) [SUPERFICIA		_/		1.20	2.66		ES 8 1.10-1.20							
description)			F_=_									NR		-
(SUPD) [SUPERFICIA	L DEPOSITS]		F_=_	(0.90)	}		C 10 1.20-2.20	102	10					
				_										
	led yellowish brown sandy gravelly CLAY. Sand			2.10	1.76							NA		
flint.	el is subangular to subrounded medium to coar	rse		2.30	1.56							ND		
(SUPD) [ALLUV UM] Assumed zone of co	re loss. Grey CLAY (Driller's description)	-/		(0.68)			C 11 2.20-3.20	102	22			NR		
(SUPD) [ALLUV UM]	, , ,		===				0 11 2:20 0:20	1302						
	ed orangish brown sandy gravelly CLAY. Sand is			2.98 _	0.88									
flint.	e is subangular to subrounded line to medium		ered	3.20	0.66									-
(SUPD) [ALLUV UM] Firm fissured thinly	laminated dark yellowish grey CLAY. Fissures a	Partially	Veathered	(0.50)			C 12 3.20-3.70	102	100					-
randomly orientated (GLT) [GAULT FORM	l extremely closely spaced planar smooth. ATION1		<u> </u>	3.70	0.16						\vdash			
Firm fissured thickly	r laminated dark grey CLAY. Fissures are randor y closely spaced planar smooth.	nly	<u> </u>	-			C 13 3.70-4.20	102	100					-
(GLT) [GAULT FORM														
				(1.35)]
												NA		
							C 14 4.20-5.70	102	93					
	laminated dark grey CLAY. Fissures are randon	nly		5.05	-1.19									-
orientated extremely (GLT) [GAULT FORM	y closely spaced planar smooth. ATION]		<u> </u>											
from E 60m to E 70r	m assumed zone of core loss.		<u> </u>	-										
110111 3.30111 10 3.701	in assumed zone of core loss.		<u> </u>	(1.35)										
			F_=_	-										
	re loss. Grey CLAY (Driller's Description)			6.40	-2.54		C 15 5.70-7.20	102	47					-
(GLT) [GAULT FORM	ATION			(0.80)								NR		
				(0.00)										
Vary stiff fissured th	ickly laminated dark grey CLAY with rare nodul	96		7.20	-3.34									
of siltstone (10mm x	(10mm). Fissures are randomly orientated		<u> </u>											
extremely closely sp (GLT) [GAULT FORM	ATION]			(0.90)								NA		
from 7.20m to 7.40r	n stiff						C 16 7.20-8.70	102	60					
Assumed zone of co	re loss. Grey CLAY (Driller's Description)	-		8.10	-4.24		5 25 7.20-0.70	102					,	
(GLT) [GAULT FORM			<u> </u>	(0.60)								NR		}
			<u> </u>] ` ^ -	1									+======================================
	ickly laminated dark grey CLAY with rare nodul	es		8.70	-4.84									
extremely closely sp				910	-5.24							NA		-
(GLT) [GAULT FORM/ Very stiff fissured thi	ATION] inly and thickly laminated dark grey CLAY with	-1	E	9: 1 9	-5.29			100	20					-
occasional nodules	of siltstone (<15mm x 15mm). Fissures are I closely to very closely spaced planar smooth.	- /	F-I-	(1.05)	1		C 17 8.70-10.20	102	30			NR		-
(Unweathered) (GLT) [GAULT FORM			[-	(1.05)]									1
	re loss. Grey CLAY (Driller's description)	$-\!\!\!\perp$												-
Notes:	All depth in metres, all diameters in millin	netres			<u> </u>									
AGS	See header sheet for details of boring, pro For details of abbreviations, see key.		d water.											
FINAL	Print date and time 1	2/09/201	72 12-55		10	n char	ked by David Ho	ward				SOI	L engine	RING
Form No. SIEXPHOLEL			10.00	Issue Date	202/03/20		a by David 1101	.,,,,,,					f the Bachy Soletand	



Project Name	Cambridge Waste Water Treatm	ent Plar	it Reloca	tion									Hole ID	
Project No.	TE8364						Explo	ratoı	у Но	le Lo	og		BH_OUT_	001
Engineer Employer	Mott MacDonald Bentley Barhale Limited												Sheet 2 of	
Ground Level	+3.86mOD	Coordina	es		40E, 2616		N .	Gri	d	09	SGB			
Hole Type	IP+RC	Inclinatio		90° from	horizonta	_	T		- C:				1	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
	ore loss. Grey CLAY (Driller's description)		+	-		_	Details	Dia.		0,				
	FORMATION] hinly and thickly laminated dark grey CLAY with of siltstone (<15mm x 15mm). Fissures are		===	10.20	-6.34									
randomly orientate (Unweathered)	d closely to very closely spaced planar smooth.		<u> </u>	-										
(GLT) [GAULT CLAY	FORMATION]		E-E-	-]	1		C 18 10.20-11.70	102	93					
				(1.70)	-									
				1	1									
from 11.60m to 11	70m assumed zone of core loss.]	-							NA		
	hinly and thickly laminated dark grey CLAY with	1		11.90	-8.04									
subhorizontal with	f siltstone. Fissures are generally horizontal to occasional vertical to subvertical very closely		<u> </u>		-									
spaced planar smo (GLT) [GAULT FORM	oth, occasional dusting of silt. MATION]		F_=	(1.30)]		C 19 11.70-13.20	102	83					
			E-E-	- (1.50)	1									
at 12.85m one cop from 12.95m to 13	orolite (10mm x 20mm) 3.20m assumed zone of core loss.		<u> </u>	-] -]									-
	CLAY (Driller's Description)		==	13.20	-9.34								_	
(GLT) [GAULT FORM	MATION]				-									
				-								NR		
			<u> </u>	(1.50)	1		C 20 13.20-14.70	102	0			NK		
			<u> </u>	-	1									
			<u> </u>	-	-									
	hinly and thickly laminated dark grey CLAY with) p		14.70	-10.84								-	
subhorizontal close	stone (10mm x 20mm). Fissures are horizontal ely spaced planar smooth with occasional dusti			-										
of silt. (GLT) [GAULT FORM	MATION]	P		(0.90)]									
				15.60	-11.74		C 21 14.70-16.20	102	90					
nodules of siltston	hickly laminated dark grey CLAY with occasiona e (10mm x 20mm). Fissures are horizontal to			15.00] -11./4									
undulating polishe	sionally 45 degrees closely to very closely spac d, with frequent silt infill.	ed	F_=_	-	1									
(GLT) [GAULT FORM	MATION]		E-E-	-]										
					1							NA		
				-	-									
				(2.80) -	-		C 22 16.20-17.70	102	97					-
			<u> </u>	-	}									
			<u> </u>	-]									-
			E-E-	-]]									
			E	-	-									-
	L C CIAVID III I I I I			18.40	-14.54		C 22 47 70 40 00	100	/-					
Assumed zone of c (GLT) [GAULT FORM	ore loss. Grey CLAY (Driller's description) MATION]			- -	-		C 23 17.70-19.20	102	47			NR		
				(0.80)]									
			F_=_	19.20	-15.34									
(10mm x 20mm). F	ark grey CLAY with frequent nodules of siltston issures are generally horizontal to subhorizonta	ıl	E_=	(0.50)	-13.54							NA		
planar smooth.	ertical to subvertical closely to very closely space	ed		19.70	-15.84		C 24 19.20-20.00	102	63			יאע		
(GLT) [GAULT FORM Assumed zone of c	MATION] ore loss. Grey CLAY (Driller's description)	-1		(0.30)	1							NR		
				20.00	16.14									
AGS Notes	: All depth in metres, all diameters in millir See header sheet for details of boring, pro		l water.	•	•				•					·
	For details of abbreviations, see key.	2/00/202	2 12·EF		1 -	o cho	-kad by David Harre	rd				SOI	L engine	ering
FINAL	Print date and time 1	.2/03/202	L 13.33		LO	y cned	ked by David Howa	u				1		



Form No. SIEXPHOLELOG

Project Name	Cambridge Waste Water Treatr	ment Plar	nt Reloca	tion								Hole ID	
Project No.	TE8364						Explo	oratory l	Hole Lo	og	l E	BH_OUT_	001
Ingineer	Mott MacDonald Bentley Barhale Limited											Sheet 3 of 3	
Employer Ground Level	+3.86mOD	Coordina	tes	548438.4	40E, 2616	21.80N		Grid	0:	SGB		Sheet 3 of 3	3
Hole Type	IP+RC	Inclination			horizonta								
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia. TCR/Sample	Recovery % SCR/Blows	RQD	Ħ	In Situ Test Details	Install- ation
Assumed zone of co	ore loss. Grey CLAY (Driller's description)												
(GLT) [GAULT FORM. Complete at 2	ATION] 20.00m. Termination Reason: Achieve Scheduled Dep h	ad /											
AGS Notes:	All depth in metres, all diameters in mill See header sheet for details of boring, p	imetres.	d water										
AGS	For details of abbreviations, see key. Print date and time	l by David Howa	ard .			SOI	L enginee	RING					

Log checked by David Howard

Issue Date 02/03/2018

Part of the Bachy Soletanche Group

FINAL

Form No. SIEXPHOLELOG

Print date and time 12/09/2022 13:55

Project	Name	Can	nbridge	Waste V	Nater [*]	Treatr	nent	Plant I	Reloca	ation												H	Hole ID	
Project	No	TF8	364													Ехр	lorato	ory H	ole	Log		RH 9	STW_	001
Engine			tt MacD	onald B	entley																	DI 1C	, i v v	001
Employ			hale Lim																			She	eet 1 of :	1
Ground L			1mOD						Coordi				223.10E		82.70	NC				Gric		OSGB		
Date Star Top	ted Base		7/2021 Date Tir	ne Start	Date '	Time F	nd R	ig Crew	Date C	<u> </u>			07/2021 Rit Pla	ant Us	sed	Shorin	g Used	Dit St:	hility		nation	90°f c	om horizor ke	ntal
0.00	1.20	IP	16/07/20	021 12:30	16/07	2021 13: 2021 17:	30	MM	AL		NA	NA	Insula	ted Han	d Tools		-	Sta				Keman		
1.20	15.40	RC	20/07/20	021 07:30	20/07	2021 17	30	MM	DH		obore S 146)	PCD	50	oilmec S	M8									
				PI	ROGRE	SS										1		W	ATER	STRIKE	S			
Date ⁻	Time	Depth	Depth Casing	Depth Water				Rema	arks				Date	Time		Depth Strike	Depth Casin		epth ealed	Water Rose T			Remark	ks
16/07/202 20/07/202		1.20 1.20	0.00 0.00	Dry Dry	End of S										+	JUIKE	Casin	9 3	saicu	itose i	Біарзі	su		
20/07/202	21 17:30	15.40 0.00	2.00 0.00	8.00 Dry	Drilling	Complete	e plete, Bo	orehole Co	mplete															
			С	ABLE PER	cussi	ON DE	TAILS											:	SPT D	ETAILS				
Depth Top	Depth Base	Tim	ne Start	Duratio	n 1	Tool			Rem	arks			Depth Top	Tes Typ	- 1		Report	ed Re	sult		Hammer Seria Number	Energy Ratio	Depth Casing	Depth Water
				ROTARY	FLUSH	DFTAI	LS																	
Depth	Depth	Flu	ısh Type	Flush	Flu	sh			Remar	ks														
Top 1.20	7.70	A	IR/MIST	Return 90	Wh	te																		
7.70	15.40	A	IR/MIST	90	Gre	ey																		
HOLEDI	VVVETED	CVSIVIO	G DIAMETI	ED.		DVI	\ \ \ \ \	IC SAM	DLING	<u> </u>														
Depth	Diameter	Denth	.	er Depth To	Dep	th	ameter			Samp	le	Run												
Base 2.00	150	Base 2.00	150	er Deptii i	OP Bas	se Di	ameter	Dura	luon	Recove	ery Ref	ference												
15.40	146	15.40																						
																							<u></u>	
Di-t		lp.	N DETAIL		Pipe Pi	oe _		PE CONS	1		D:	5.e-	Depth	Dei	pth		DE	EPIH	KELAĪ	TED REN				
Distance 9.50	ID S1	Type "	Top 1.50	Base I	Ref Rei	ef I	op .00	Base 2.00	Diame 50		Pipe 1	lype	Тор		ise					Re	marks			
0.50	01		1.55	0.00	Pip	e1 2	.00	9.00 9.50	50 50	SL	OTTED AIN													
Depth	Depth	1			(FILL DI	ETAILS												LOC		N DETA	LS			
Top -0.50	Base 0.00	United and	Descri	ption				Rer	marks										Rem	narks				
0.00 0.50	0.50 0.50 1.50	Concrete																						
1.50 9.50	9.50 15.40	Gravel be	ackfill																					
			pth in me eader she						ater.															
AGS	For details of abbreviations see key.																							
FINAL												.og chec	ked by	y Dav	vid How	vard				SO	ir eu	Ginee	RING	

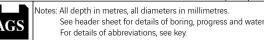
Issue Revision No. 2.02 Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatment	Plant	t Relocat	ion										Hole ID	
	TEAR							Explo	rato	ry Ho	le Lo	og -	١,	OLL CTIAL	004
Project No.	TE8364												1	3H_STW_	_001
Eng <mark>i</mark> neer Employe <mark>r</mark>	Mott MacDonald Bentley Barhale Limited													Sheet 1 of	2
Ground Level		dinate	es	549223	10E, 2613	82 70ľ	N		Gri	id	OS	GB		SHEEL I OI	
Hole Type		nation			honzonta					_					
		ē		Depth		9)6		0		8 %	80				
	Description of Strata	Werhering	Legend	(Thick-	Datum Level	Muterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	PG .	쁘	In Situ Test Details	Install- ation
		¥		ness)		*		Details	Dia.	£ ₹	Ŗ	52-50		Dom.	didon
	m slightly sandy slightly gravelly CLAY. Gravel is ted fine to medium of flint. Sand is fine to coarse.			0.10	9.41										
Occasional roots (TOP) [TOPSOIL]	1			(0.60)	1		ES 1	0.30-0.35							
Soft to firm dark bro	own stightly gravelly sandy CLAY Sand is fine and		7					0.50-0.55 0.50-0.55							
medium. Gravel is so \ flint.	ubangular to subrounded fine and medium of			0.70	8.81			0.70-0.75							
(SUPD) [SUPERFICIA				(0.50)	1		B6	100-110							-10
	elly clayey fine to coarse SAND, Gravel is ounded fine and medium of first.	_	7.	1.20	8.31			100-110	\vdash					-	
\(\(\(\superset\)(SUPERFICIA\) Structureless CHALE	AL DEPOSITS] K composed of firm fissured buff calcareous CLAY.	_	1 1				53.3	1.00-1.10							
Fissures are 0 to 40	degrees extremely closely to very closely spaced	E	<u> </u>	(0.70)					102	86					
planar smooth occas (CIRIA Grade Dm)	sionally stained light yellow and dark brown	Grade		1.90	7.61		C8	1.20-2.20	102	-					
	LBURY CHALK FORMATION] m assumed zone of cere loss		1 - 12	(0.30)										15	
Structureless CHALF	K composed of subangular fine to coarse GRAVEL	N.	7.1	2.20	7.31										
	weak low density off-white stained yellow and ILTSTONE. (CIRIA Grade Dc)		3 1		1									32	
(WMCK) (WEST MEI	LBURY CHALK FORMATION] m very weak, locally intact and with light brown		7 7 7	(1.00)	1										. H
staining							C9	2.20-3.70	102	100					
	K composed of buff slightly gravelly calcareous ilar to subangular fine and medium of very weak						"	220 0.10					NA	5.	
	Ilk. Recovered as very soft. (CIRIA Grade Dm) LBURY CHALK FORMATION]	8	E F	3.20	6.31										
Structureless CHALI	K composed of stiff to very stiff fissured greyish	Grade		-	1									100	
	AY. Fissures are randomly oriented very closely smooth and occasionally striated. (CIRIA Grade	Š	1 1						\vdash						
Dm)	LBURY CHALK FORMATION)		, ,	(1.62) -	1]
at 3 38m with orang	gish brown surface staining		1	(4.04)			C 10	370-4.70	102	100				90	
orangish brown cha	m very weak low density greyish white locally stained IK with rare thin laminations of grey clay. Recovered				1										I.H.
as non intact core (a fragments)	angular to subangular fine to coarse gravel sized		1 1											18	F
			ET	4.82	4.69							- 1			
	ity greyish white CHALK composed of calcareous inuities 1) 0 to 30 degrees closely to medium		41 12	É										8	
	oth stained dark orangish brown. (CIRIA Grade B3) LBURY CHALK FORMATION]	m	P. F.				C 11	470-5.70	102	100	33	82	60		
from 5.09m to 5.45e	m 1 No. discontinuity 90 degrees undulating smooth	Grade 83	1	(1.18)									170	15	Η.
occasionally stained	a ight brown	8	10		}								250	53	
			TI		}										
Structureless CHALF	K composed of very stiff fissured greyish white		1.1	6.00 -	3.51							2			
	sures are randomly orientated closely locally very closely spaced planar smooth occasionally	E	1 1				C 12	5.70-6.70	102	100	30	30			: +
stained brown. (CIRI	A Grade Dm)	Grade D	7.37.31	(0.95)	1								NA	85	: F
(WMCK) [WEST MEI	LBURY CHALK FORMATION]	8			1										
			P. P.	6.95	2.56										1 1
	aty light grey CHALK composed of calcareous dium spaced thin beds of structureless chalk		rara	1			.,,	6.70-7.70	102	400	_ ا				
	ssured grey calcareous clay. Fissures are 0 to 40 curved smooth occasionally polished.		li II	1	1		"	0.10-7.10	102	100	0	0] . F.
	randomly oriented very closely to closely spaced		7 1		}									52	1
planar smooth occas Grade B4)	sionally stained dark brown. (Probably CIRIA	2	1	(1.75)			1		\vdash				NI 40		
(WMCK) (WEST MEI	LBURY CHALK FORMATION]	Grade	7.1	(1.75)	1		FW:	1 800					80	s	
intact core (subange	m with grangish brown staining and recovered as non ular fine to coarse gravel sized fragments)		TI		1	Ī									1. H
subangular fine to c	m recovered as non intact core (clayey angular to coarse gravel sized fragments)		150				C 14	7.70-9.00	102	77	11	11		51	1 1
	m recovered as non intact core (angular to subangular		T T				100					3		20	
fine to coarse grave Assumed zone of co	el sized fragments) ve loss, Mari CHALK (Driller's description)		1 1	8 70 (0 30)	0.81							1	NR		
	LBURY CHALK FORMATION] ity grey CHALK composed of calcareous			9.00 -	0.51				<u> </u>					- 2	-
SILTSTONE. Recover	red as non intact core (angular to subangular fine			9.20	0.31		l					9	NI	-	
	ed fragments). (CIRIA Grade - unable to determine) / LBURY CHALK FORMATION]			9.40	0.11				102	67	0	0		12	
Very stiff dark grey (CLAY with occasional subangular to subrounded			(0.60)	}	İ			102	ui	ן י		NA	100	
	I size fragments of coprolite. GE GREENSAND MEMBER]						C 15	9.00-10.50							
				10.00	0.10		t		T						
	All depth in metres, all diameters in millimetre		1				_								1
A	See header sheet for details of boring, progress For details of abbreviations, see key.	s and	water.												
		רייניני	1255		1 -	n ob -	- امراد	u Dovid Harry	od.				SOI	L enginee	RING
FINAL Form No. SIEXPHOLEI	Print date and time 12/09.			Ieeua Data	LO 02/03/20		ked D	y David Howai	u					of the Rachy Soletane	

Project Name	Cambridge Waste Water Treatm	ent P	lant	Relocat	tion										Hole ID	
D : . N	TF000/								Exploi	rator	у Но	le Lo	g		DII CTM	001
Project No. Engineer	TE8364 Mott MacDonald Bentley														BH_STW_	OOT
Employer	Barhale Limited														Sheet 2 of	2
Ground Level	+9.51mOD	Coord		S		10E, 2613		V		Gri	d	OS	GB	·		
Hole Type	IP+RC	Inclina				horizonta					e 9	(0				-
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	۳	In Situ Test Details	Install- ation
	nly and thickly laminated dark grey CLAY. degrees very closely to closely spaced planar				(0.50)									NR		
(GLT) [GAULT FORMA					10.50	-0.99										
No recovery. CLAY (D (GLT) [GAULT FORMA	ATION]	/		<u> </u>												
Fissures are 0 to 20 of	nly and thickly laminated dark grey CLAY. degrees, rarely 90 degrees, very closely to clos	sely	thered	<u> </u>	(4.40)			C 16	10.50-11.50	102	76				_	
spaced planar smoot pyrite.	th polished clean. Rare nodules (<10mm) of		Unweathered		(1.12)									NA		-
(GLT) [GAULT FORMA from 11.26m to 11.5	ATION] 60m assumed zone of core loss		ם													
	AY (Driller's description)				11.62	-2.11		C 17	11.50-12.00	102	24		-	ND		
(GLT) [GAULT FORMA	•				(0.38) 12.00 -	-2.49								NR		
Fissures are 0 to 20 o	nly and thickly laminated dark grey CLAY. degrees, rarely 90 degrees, very closely to closely	sely		<u></u>												
pyrite.	th polished clean. Rare nodules (<10mm) of															
(GLT) [GAULT FORMA at 12.55m 1 No. rou	ATION] nded siltstone nodule (<15mm)					-		C 18	12.00-13.50	102	100					
				<u> </u>	-										_	
				<u></u>												
			red		-											
			Unweathered		(3.40)									NA		
at 13.84m 1 No. ligh	t greyish brown siltstone nodule (<20mm)		Unw	<u> </u>	-			C 19	13.50-14.50	102	100				_	
from 14.32m to 14.4 undulating smooth p	iOm with closely spaced fissures 70 degrees polished				-	-										-
				E-E-												
					-			C 20	14.50-15.40	102	84				-	
from 15 26m to 15 4	iOm assumed zone of core loss			<u> </u>												
	5.40m. Termination Reason: Achieved				15.40	-5.89									·	
	Scheduled Dep h															
					-	-									-	1
]
					-											1
]
															-	1
]
					-											1
																-
					-										-	1
					:											-
					-											1
																1
					-										-	1
					:											-
					-											1
					:	-										1
																1
	All depth in metres, all diameters in millir See header sheet for details of boring, pro			water.	•		•			•			· · · · · ·			



FINAL

Form No. SIEXPHOLELOG



Log checked by David Howard

Project	Name	Car	nbridge	Waste \	Nater Tre	atment	Plant l	Relocati	ion										H	lole ID	
		TEO	264											Ехр	lorato	ry Hole	Log	-)	T\A/ 0	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
Project Enginee			364 tt Mac	Donald E	entlev														5H_5	TW_C	JU3A
Employ			hale Lir		criticy														She	et 1 of 1	1
Ground Le		+10.	25mOD					Coordina	ates	549	432.90E	, 261	353.7	0N			Grid		OSGB		
Date Start			8/2021		D . T	- I	· ·	Date Cor			09/2021			h		D: 0: 1:1::		nation	D 1		
Top 0.00	Base 1.20	IP	26/08/	me Start 2021 14:30	26/08/202	1 15:15	CH	DT	NA	NA	Insul		and tools	1	g Used one	Pit Stability Stable	1		Remark	KS	
1.20	10.00	RC	26/08/	2021 15:05	01/09/202	1 09:45	СН	CJ	Geobore (146)	S PCD	S	oilmec	SM6								
				P	ROGRESS						<u> </u>					WATER	STRIKE	'S			
Date 1	īme	Depth	Depth	Depth	TO GIVE SO		Rema	arks			Date	Tim		Depth	Depth	n Depth	Water	Time		Remark	rs.
26/08/202	1 17:30	5.50	5.50	5.30	End of Shift		- Norma				27/08/2			Strike 7.00	Casing 7.00	g Sealed	Rose To 5.69	Elapse 20	d	rterriari	
27/08/202 27/08/202	1 10:05	5.50 7.00	5.50 7.00	5.20 1.00	Start of shift End of Shift																
31/08/202 31/08/202	117:30	7.00	7.00 10.00	5.60 5.60	Start of shift End of Shift																
01/09/202 01/09/202		10.00 0.00	10.00 0.00	5.60 Dry	Start of shift Backfill Com		nole Compl	ete													
			١.,	 Cable Per	CUSSION	DETAILS										SPT D	ETAILS				
Depth Top	Depth Base	Tim	ne Start	Duratio	n Tool			Remai	rks		Depth Top	- 1	est rpe		Report	ed Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
юр	Dase										юр	119	pe						Katio	Casing	vvalei
	D				FLUSH DE	TAILS															
Depth Top	Depth Base	FIU	ish Type	Flush Returi	Colour			Remarks													
1.20 2.40	2.40 7.00	A	IR/MIST IR/MIST	100 100	White Grey																
7.00	10.00	A	IR/MIST	100	White																
HOLE DIA	AMETE	R CASING	G DIAME	ER		DYNAM	IC SAM	PLING													
Depth Base	Diamete	Depti Base		ter Depth T	op Depth Base	Diameter	r Dura		ample ecovery R	Run											
10.00	146	1.40 10.00	150						,												
		10.00	140																		
	INST	ALLATIO	N DETAI	LS		PII	PE CONS	STRUCTI	ON						DE	PTH RELAT	TED REN	//ARKS			
Distance	ID	Type R	esponse l Top		Pipe Pipe Ref Ref	Тор	Base	Diamete	er Pipe	Туре	Depth Top		epth Base				Re	marks			
			юр	Dase	itei itei						юр		Jase								
				BAC	FILL DETA	ILS	<u> </u>					1_				LOCATIO	N DETAI	LS			
Depth	Depth		Descr	iption			Rer	marks									narks				
Top 0.00	Base 10.00	Grout		<u>'</u>							1. Rising a	and fall	ling hea	d test und	lertaken o	during progress		le.			
	No	مود ۱۱۸ م	nth in m	otros all di	ameters in	millimot	-ac]									(A)	
AGS	INOI	See h	eader sh	eet for deta	ils of borin			ater.													
		For de	etails of a	bbreviation				0.55										50	II en	GINEE	פוחפ
FINAL Form No. S	IEXPHO	LEHDR			date and tir ssue.Revision		1/2022 1		sue Date		Log ched	cked l	by Da	vid Hov	vard					hy Soletanche	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	g		H_STW_(702 V
Engineer	Mott MacDonald Bentley													11_3177_(JUSA
Employer	Barhale Limited													Sheet 1 of	2
Ground Level		rdinate	S	549432.9	90E, 2613	53.701	N		Gri	d	OS	GB			
Hole Type	IP+RC Incli	nation				4)				0 .0					
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test	Install-
	·	Wea		ness)	Level	Wate		Details	Dia.	TCR/ Reco	SCR	~		Details	ation
	vn slightly gravelly sandy CLAY. Gravel is angular to coarse of flint. Sand is fine to coarse.			(0.30)				0.05-0.10 2 0.20-0.25							
(TOP) [TOPSOIL]	gravelly sandy CLAY. Sand is fine to coarse. Gravel	1		0.30	10.25		В3	0.10-0.40 0.40-0.50							
	unded fine to medium of flint.		· · · · ·	(0.40) - 0.70	10.25		ES 5	5 0.50-0.55]
CHALK recovered as	s firm greyish slightly gravelly sandy calcareous	1		(0.50)	10:20			0.40-0.80							
medium of flint.	coarse. Gravel is angular to subrounded fine to			1	10.25			0.80-1.20 1.00-1.10						-	
Structureless CHALI	LBURY CHALK FORMATION] K composed of stiff greyish brown slightly gravelly	٦	7 7	1.20	10.25		ES 8	3 1.10-1.20							
	avel is subangular to subrounded fine and ak calcareous mudstone. (CIRIA Grade Dm)	Grade Dm	1 1	(0.75)			C 10	0 1.20-1.90	102	100			NA	K 1.45 - 7.00	
(WMCK) [WEST ME	LBURY CHALK FORMATION]	g	1 1] :	1										
	density greyish brown CHALK composed of			1.95	10.25			1 100 0 10	400	400	45	0		-	
extremely closely to	ONE. Discontinuities: 1) randomly orientated overy closely spaced planar undulating smooth	B4		1			C 1.	1 1.90-2.40	102	100	15	0	NI		
	LBÙRY CHALK FORMATION]	Grade	1 1	(0.98)									30 40		}
to coarse gravel size	m non intact recovered as angular to subangular fine ed fragments with brown staining on fracture surfaces.		1 1] :											
	K composed of stiff to very stiff greyish brown		T' T'	2.93	10.25										
	CLAY. Gravel is subangular fine to coarse of very udstone. (CIRIA Grade Dm)]		C 1	2 2.40-4.00	102	100	27	0			
(WMCK) [WEST ME	LBURY CHALK FORMATION]			1 :											
				1 :										K 3.70 - 5.30	
		۶]	-									K 3.70 - 5.30 K 3.70 - 5.30	
from 4.16m to 4.40	m medium bed of very weak medium density	Grade Dm		(2.47)									NA	K 3.70 - 5.30 K 3.70 - 5.30	
brownish grey calca		Gra		1 :											
					-							_			
				1 :			C 1:	3 4.00-5.50	102	100	0	0			
				-										-	-
				5.40	10.25										
calcareous MUDSTO	density greyish brown CHALK composed of ONE. Discontinuities: 1) 0 to 35 degrees very	4		1 :											
	ar undulating smooth brown staining. 2) 60 to 90 y to closely spaced planar undulating smooth	de B3/4		(0.88)									NI 60		
brown staining. (CIF (WMCK) [WEST ME	RIA Grade B3/4) LBURY CHALK FORMATION]	Grade											70	-	
Structureless CHALI	K composed of very stiff greyish brown gravelly	ے	 	6.28	10.25		C 14	4 5.50-7.00	102	100	22	11		K 6.20 - 7.80	
	avel is subangular fine to coarse of very weak ne. (CIRIA Grade Dm)	Grade Dm		(0.56)	1								NA		-
(WMCK) [WEST ME	LBURY CHALK FORMATION]			6.84	10.25										
calcareous MUDSTO	density greyish brown CHALK composed of ONE. (unable to determine CIRIA Grade)	rterm		(0.49)	1	•							490 490	-	
` ,,	LBURY CHALK FORMATION]	Underterm ined		7.33	10.25								490		
	K composed of stiff to very stiff gravelly avel is subangular medium and coarse of very			1.33	10.23										
weak calcareous mu	udstone. (CIRIA Grade Dm) LBURY CHALK FORMATION]	Grade Dm		(0.86)	1				102	100	53	22	NA		1
	m thin bed of very weak medium density brownish	Grac		1	1										
from 7.69m to 7.78 chalk composed of	m thin bed of very weak low density brownish grey calcareous mudstone	 		8.19	10.25										
Very weak medium	density light grey CHALK composed of calcareous ntinuities: 1) 55 to 90 degrees very closely to	e B4		(0.60)	}								20		1
	ar undulating smooth brown staining clay infill.	Grade		(0.69)	1								50 180		
(WMCK) [WEST ME	LBURY CHALK FORMATION] In thin bed of weak high density light grey calcareous	 		8.88	10.25										
mudstone	density light grey CHALK composed of calcareous			-	-				100	100	-				
MUDSTONE with ra	are shell fragment (<5mm x 8mm). Discontinuities: closely to medium spaced planar undulating	Grade A2		(1.12)	1				102	100	63	56	NI 220		
smooth clean. (CIRI	A Grade A2)	Grac		1 ` ´ :	1								280		1
	LBURY CHALK FORMATION] im thin bed of structureless chalk composed of stiff			1 :											
				10.00	10.25		1								
Notes:	All depth in metres, all diameters in millimetre		1	1		1	1		1	ı	1	ıl			1
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.	s and v	water.												
FINAL	Print date and time 12/09	/2022	13:55		Lo	g chec	cked h	oy David Howar	rd				SOI	L engine	RING
Form No. SIEXPHOLEL				Issue Date	202/03/20	-		,					Part o	f the Bachy Soletand	che Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion									Hole ID	
Project No.	TE8364						Exploi	ator	у Но	le Lo	g	l R	H_STW_0	υ3Λ
Engineer	Mott MacDonald Bentley												11_3100_0	
Employer	Barhale Limited												Sheet 2 of 2	2
Ground Level		dinate	S	549432.9	00E, 2613	53.70N		Gri	d	OS	GB			
Hole Type	IP+RC Incli	nation		Depth		ě			e %	S/				
	Description of Strata	Weathering	Legend	(Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
MUDSTONE with ra 1) 60 to 90 degrees: smooth clean. (CIRI) (WMCK) [WEST MEI from 8.91m to 9.06: slightly gravelly calcal at 9.48m fossilised: from 9.53m to 9.66: gravelly calcareous medium of very we from 9.76m to 9.92: and coarse gravel si from 9.82m to 9.90: composed of calcar Complete at 1	LBURY CHALK FORMATION] In thin bed of structureless chalk composed of stiff careous clay, Gravel is subangular to subrounded fine eous mudstone shell fragment (-5mm x 8mm) In thin bed of structureless chalk composed of stiff clay, Gravel is subangular to subrounded fine and ak mudstone In non intact core recovered as subangular medium ized fragments of calcareous mudstone In thin bed of weak high density light grey chalk		water											
AGS	For details of abbreviations, see key. Print date and time 12/09.				Lo	g check	ed by David Howard	d				SOI	L enginee	RING
							,					1		,

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	Carr	nbridge \	Waste V	Vater Tr	eatmer	nt Plant F	Relocat	ion				T						H	Hole ID	
Project	No	TE8:	364											Exp	lorato	ory Hole I	Log	F	RH S	TW_0)03B
Engine			tt MacD	onald B	entley														<i>/</i> 10		.005
Employ			nale Lim	ited																eet 1 of 1	1
Ground L Date Star			25mOD 9/2021					Coordina Date Co				9.80E, . 2021	261353	3.00N			Grid Incli	I ination	OSGB 90° f c	om horizon	ntal
Тор	Base		Date Tin	ne Start	Date Ti	me End	Rig Crew		Barrel Typ				nt Use	d Shorir	ng Used	Pit Stability			Remark		
0.00	1.20	IP	02/09/20:			021 12:00	Danny Cundill	SAN					ed hand to		lone	Stable					
1.20	10.00	CP	02/09/20	21 12:00	02/09/20	021 17:30	Danny Cundill	SAN				Dai	ndo 2000								
											\Box										
D	<u>.</u>	D	Depth	Depth	ROGRES	<u>S</u>					-			Depth	Depth	WATER h Depth	STRIKE Water			- I	
Date 02/09/202		Depth 0.00	Casing 0.00	Water	Start of sh	nift	Rema	irks				Date 1	11me 21 15:00	Strike 7.10	Casin	g Sealed	Rose To		ed Mediun	Remark	is
02/09/202 03/09/202	21 17:30	10.00 0.00	2.20 0.00	5.30 Dry	Drilling Co	omplete	rehole Comple	ete													
			CA	ABLE PER	cussioi	N DETAIL	.S						T			SPT D	ETAILS				
Depth Top	Depth Base	Tim	e Start	Duration	т То	ol		Rema	rks		-	epth Top	Test Type			ted Result		Hammer Seria Number	Energy Ratio	Depth Casing	Depth Water
											2	1.20 2.20	S	N=28 (5,6:8 N=19 (3,4:4	4,4,5,6)			AR3501 AR3501	75 75	1.20 2.20	Dry Dry
											4	3.20 4.20 5.20	S S S	N=30 (4,5:6 N=26 (3,5:6 N=20 (3,3:4	6,6,7,7)			AR3501 AR3501 AR3501	75 75 75	2.20 2.20 2.20	Dry Dry Dry
											- 6	6.20 7.20	S S	N=28 (4,5:5 50/235mm	5,5,8,10) n (8,10:12,1	15,15,8/10mm)		AR3501 AR3501	75 75	2.20	Dry 5.30
												8.20 9.20	S S	50/230mm	n (7,12:13,1	15,16,6/5mm) 5,15,16,4/0mm)		AR3501 AR3501	75 75	2.20 2.20	5.30 5.30
				ROTARY	LUSH [DETAILS					1										
Depth	Depth Base	Flu	sh Type	Flush Return	Flush			Remarks	S		1										
Тор	base			Return	Colou	+					1										
HOLE DI	AMETER	CASING	3 DIAMETE	.R		DYNA	MIC SAM	PLING			1										
Depth Base	Diameter	Depth Base		er Depth To	Depth Base		ter Dura		Sample ecovery R	Run											
10.00	200	2.20	200	+	Dase	+		-	ecovery K	elelelice											
	INST	L ALLATIO	N DETAILS	5			PIPE CONS	STRUCTI	ON		T			,I	DI	EPTH RELAT	ED REN	/IARKS			
Distance	ID 1	Type Re	esponse Re Top		ipe Pipe Ref Ref		Base	Diamet	er Pipe	Туре		epth Top	Depth Base				Re	marks			
						1															
				BACK	FILL DET	TAILS					T				-	LOCATION	N DETAI	LS			
Depth Top	Depth Base		Descrip	otion			Rer	marks								Rem	narks				
0.00	10.00	Grout	-	-		-							=		-			-		-	
	L																				
			pth in met																-		
AGS	1		eader shee tails of abl				ress and wa	ater.													
FINAL				Print c	late and 1	time 12/	09/2022 1	3:55			Log	check	ed by	David Hov	ward			SO	ır en	ginee	RING

Issue Revision No. 2.02 Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Form No. SIEXPHOLEHDR

Hole ID Project Name Cambridge Waste Water Treatment Plant Relocation **Exploratory Hole Log** BH_STW_003B Project No. TE8364 Mott MacDonald Bentley Engineer Barhale Limited Employer Sheet 1 of 1 Ground Level +10.25mOD 549429.80E, 261353.00N Grid OSGB Coordinates IP+CP Hole Type Inclination 90° from horizontal Depth TCR/Sampl Recovery 9 Sampling In Situ Test Install-R Description of Strata (Thick Legend ш Level Details ation ness) Details Dia. TOPSOIL: Dark brown slightly sandy slightly gravelly CLAY with frequent root, rootlet and plant materials. Gravel is angular to D1 0.10 B 2 0.10-0.20 10.05 0.20 subangular fine to coarse of flint. Sand is fine to coarse. D 3 0.30 (TOP) [TOPSOIL]
Stiff light orangish brown slightly sandy slightly gravelly CLAY with B 4 0.40-0.70 (0.70)occasional rootlets. Gravel is angular to subangular fine to coarse of chalk and flint. Sand is fine to coarse. 0.90 9.35 D 5 0.90 (SUPD) [SUPERFICIAL DEPOSITS] CHALK recovered as stiff light greyish brown slightly sandy slightly gravelly calcareous CLAY with occasional very soft light grey clay (0.30)B 6 1.00-1.20 1 20 9.05 SPT(S) N=28 (5,6:8,9,6,5) laminations. Gravel is subangular to subrounded of chalk and flint. D 7 1.20-1.65 1.20 Sand is fine to medium. B 8 1.20-1.70 (WMCK) [WEST MELBURY CHALK FORMATION]
CHALK recovered as firm to stiff light grey calcareous CLAY.
(WMCK) [WEST MELBURY CHALK FORMATION] D 9 2.00 SPT(S) N=19 (3,4:4,4,5,6) 2.20 D 10 2.20-2.65 B 11 2.20-2.70 (3.00)D 12 3.00 SPT(S) N=30 (4,5:6,7,8,9) D 13 3.20-3.65 3.20 B 14 3.20-3.70 D 15 4.00 6.05 SPT(S) N=26 4.20 CHALK recovered as very stiff fissured light grey localised yellowish orange stained calcareous CLAY. Fissures are very closely to closely (3,5:6,6,7,7) D 16 4.20-4.65 4.20 spaced planar and rough.
(WMCK) [WEST MELBURY CHALK FORMATION] B 17 4.20-4.70 D 18 5.00 SPT(S) N=20 (3,3:4,5,5,6) D 19 5.20-5.65 5 20 B 20 5.20-5.70 D 21 600 SPT(S) N=28 (4,5:5,5,8,10) D 22 6.20-6.65 6.20 B 23 6.20-6.70 D 24 7.00 (5.80) W 25 7.10 SPT(S) 50/235mm (8.10:12.15.15.8/1 D 26 7.20-7.59 0mm) B 27 7.20-7.70 7 20 D 28 8.00 SPT(S) 50/230mm (7,12:13,15,16,6/5 D 29 8.20-8.58 mm) B 30 8.20-8.70 8.20 D 31 9.00 SPT(S) 50/225mm (10,12:15,15,16,4/ D 32 9.20-9.58 0mm) B 33 9.20-9.70 9.20 D 34 10.00 10.00 Complete at 10.00m. Termination Reason: Achieved Scheduled Dep h Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. **AGS** For details of abbreviations, see key. SOIL ENGINEERING Log checked by David Howard



Project	Name	Car	nbridge	Waste	Wat	er Tre	atment	: Plant I	Reloca	ation					Г	1 4				F	łole ID	
Project	No.	TE8	364												Exp	iorato	ry Hole	Log		BH S	STW_	004
Engine		Мо	tt Mac[onald	Bent	ley														_		
Employ			hale Lin	nited																	et 1 of	1
Ground L Date Star			46mOD 08/2021						Coordi	nates Complete		19403.2 1708/20		61143.1	.ON			Grid	i ination	OSGB		
Top	Base	Type		me Star	t Da	te Tim	e End I	Rig Crew			Type Dril			t Used	Shorin	g Used	Pit Stability		IIIadon	Remarl	KS .	
0.00	1.20	IP		021 14:45		5/08/2021		Colin Howard	PS	N			sulated	d hand tool		one	Stable					
1.20	15.10	RC	05/08/2	021 15:15	09	9/08/202	1 17:00	Colin Howard	MV	Geobo (14		CD	Soilm	nec SM6								
						GRESS					·						WATER			ı		
Date		Depth	Casing	Wate	r			Rema	arks				ate Ti	ime	Depth Strike	Depth Casin		Water Rose T	o Elapse	d	Remarl	ks
05/08/20 06/08/20	21 07:30	2.80 2.80	0.00 2.70	Dry Dry	Star	d of Shift rt of shift						06/0	8/2021	1 09:20	6.50	2.70		4.49	20	Medium	1	
06/08/20 09/08/20 09/08/20	21 12:00	13.45 13.45	2.70 2.70	4.50 4.50	Star	d of Shift rt of shift Iling com																
09/08/20		15.10 0.00	2.70 0.00	4.50				hole Compl	ete													
Depth	Depth	Τ -		ABLE PE	\neg							Dej	pth	Test				ETAILS	Hammer Seria	Energy	Depth	Depth
Тор	Base	lin	ne Start	Duration	on	Tool			Rem	arks		To		Туре		Report	ed Result		Number	Ratio	Casing	Water
				ROTAR	Y FLU	ISH DE	TAILS															
Depth Top	Depth Base	Flu	ısh Type	Flus Retu		Flush Colour			Remar	ks												
1.20 2.80	2.80 10.25		IR/MIST IR/MIST	100)	Brown White																
10.25	15.10		IR/MIST	100		Grey																
HOLE DI	AMETER	RICASINO	G DIAMET	ER			OYNAM	IC SAM	PLING	ì												
Depth	Diamete	Depth	h Diamet	ter Depth		Depth	Diamete		tion	Sample												
Base 2.70	150	Base 2.70	150	о Ворин	ТОР	Base	Diamoto			Recovery	/ Reference	e										
15.10	146	15.10	146																			
	INIOT	111 1710	N DETAIL			1		DE CONT	270116	TION							PTH RELAT		******			
D:-4		lp	esponse R		Pipe	Pipe		PE CONS	T	1	T	Dej	pth	Depth		DE	PIH KELAI					
Distance	ID	Type "	Тор	Base	Ref	Ref	Тор	Base	Diame	eter Pi	ре Туре	To	р	Base				Re	marks			
Depth	Depth	1			KFILL	L DETAI	LS										LOCATIO		ILS			
Тор	Base		Descri	ption				Rer	narks								Ren	narks				
0.00	15.10	Grout																				
	Note		epth in me																			
AGS	8		eader she etails of al				g, progre	ss and w	ater.													
FINAL							ne 12/0	9/2022 1	3:55			Log c	hecke	ed by Da	ıvid Hov	vard			so	ıL en	ginee	RING
Form No. 9	SIEXPHOL	.EHDR			Issue.	.Revisior	No. 2.02			Issue Da	ate 22/06/								Pa	rt of the Bac	hy Soletanch	ne Group

Project Name	Cambridge Waste Water Treatment	: Plan	t Relocat	tion										Hole ID	
, N	-							Explo	rato	у Но	le Lo	og		OLL CT\A/	007
Project No. Engineer	TE8364 Mott MacDonald Bentley													BH_STW_	_004
Employer	Barhale Limited													Sheet 1 of	2
Ground Level		ordinate	es	549403.2	20E, 2611	.43.101	N		Gri	d	09	SGB			
Hole Type	IP+RC Inc	linatior	1												
		ering	l	Depth	Datum	trike		Sampling		TCR/Sample Recovery %	lows	D		In Situ Test	Install-
	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike		Details	Dia.	CR/Sa Recove	SCR/Blows	RQD	<u></u>	Details	ation
TOPSOIL: Dark brov	vn slightly gravelly slightly sandy CLAY. Gravel is	>	XXXXX	-		>	D1	0.05-0.10	Dia.	F 4	0,				
subangular to subro coarse.	ounded fine to medium of flint. Sand is fine to			(0.40)				2 0.20-0.25 0.10-0.40							
(TOP) [TOPSOIL]	aroun aliabeth aroually CLAV with law ashbla	4	<u> </u>	(0.30)	10.46		D 4	0.40-0.50							-
	prown slightly gravelly CLAY with low cobble ubangular to subrounded fine and medium of	<u> </u>		0.70	10.46			5 0.50-0.55 0.40-0.80							
mudstone and flint. (SUPD) [SUPERFICIA	. Cobbles are subangular of flint.	Grade Dm		(0.50)											
Structureless CHAL	K composed of stiff light brown and off white	Grac	<u> </u>	1.20	10.46			0.80-1.20 1.00-1.10							
	y calcareous CLAY. Gravel is subangular to d medium of flint. (CIRIA Grade Dm)	I	<u> </u>	1.20	10.40		ES 8	3 1.10-1.20							}======
	LBURY CHALK FORMATION] v density light greyish brown locally stained	/		-			C 10	0 1.20-1.90	102	86	59	54			-
orangish brown CH	ALK composed of calcareous SILTSTONE. Possibly			1											
CIRIA Grade C2 (WMCK) (WEST ME	ELBURY CHALK FORMATION			(1.57) -									NI 300		-
	Om assumed zone of core loss Om recovered as non intact core (subangular to			1									850		
subrounded fine ar	nd medium gravel sized fragments) (Drilling induced) continuity 5 degrees planar smooth stained orange and						C 1	1 1.90-2.80	102	100	94	94			
infilled with clay (>				1											-
	coarse gravel sized fragments) with light yellowish	\vdash		2.77	10.46										
Extremely weak to	very weak low density light greyish brown mottled	'	<u> </u>	-	}										
	ALK composed of calcareous SILTSTONE. to 20 degrees very closely to closely spaced														}
undulating smooth	and rough stained orangish brown and locally	B3/4											NI		
(WMCK) [WEST ME	nfill (<3mm) (CIRIA Grade B3/4) ELBURY CHALK FORMATION]	Grade		(1.58)			C 12	2 2.80-4.35	102	100	37	6	60 100		
to coarse gravel siz		5													
from 3.01m to 3.20 to coarse gravel siz	Om recovered as non intact core (clayey subangular fine zed fragments)			-											-
from 3.20m to 3.35 from 3.35m to 3.45	5m extremely weak 5m with abundant orangish brown staining and			4.35	10.46										
generally recovered sized fragments)	d as non intact core (subangular fine to coarse gravel	1													-
	Om recovered as non intact core (subangular fine to	/			}										
from 3.80m to 4.00 from 4.16m to 4.35	Om extremely weak	23		_									NI		-
Very weak low dens	sity light greyish brown occasionally stained	Grade B2/3	H	(1.61)			C 1	3 4.35-5.85	102	100	100	100	200		-
	ALK composed of calcareous SILTSTONE. to 20 degrees closely to medium spaced	Grac											510		
	locally clay smeared. (CIRIA Grade B2/3). ELBURY CHALK FORMATION]			1 -											-
` ' '	•			1	1										
medium gravel size		+		5.96	10.46										
	sity off white to light greyish brown rarely stained ALK composed of calcareous SILSTONE. Possibly		 		}										
CIRIA Grade B1.	ELBURY CHALK FORMATION]] .											}
(WIVICK) [WEST IVIE	ELBURY CHALK FORWIATION						C 1	4 5.85-7.35	102	95	88	88			
								4 3.03-1.33							
at 7.07m 1 No. disc	continuity 15 degrees undulating smooth with localised			-											
orange surface stai	ining (possibly drilling induced)		 	(2.74)									NI 680		
				ļ .	}								1110		1
	5m recovered as non intact core (subangular fine to			1	1										
staining	fragments) and with abundant orangish brown			1 _	1										
from 7.75m to 7.80	Om 1 No. discontinuity 80 degrees planar smooth with brown and black surface staining			1	1		C 1	5 7.35-8.85	102	100	89	89			
	2m recovered as non intact core (clayey subangular fine			1	1										
_	Om with abundant reddish brown staining and very]	1										
closely spaced disc	continuities 65 degrees planar smooth	1		8.70	10.46									1	-
stained orangish br	density off white to light brownish grey rarely rown CHALK composed of calcareous SILTSTONE.			-	1										-
Possibly CIRIA Grad (WMCK) [WEST ME	le B2. ELBURY CHALK FORMATION]			(1.13)	1										
from 9.20m to 9.25	5m recovered as non intact core (very clayey angular to d medium gravel sized fragments)			<u> </u>	1			C 0.0F 40.55	102	100	94	94			
				1	1		C 10	6 8.85-10.25							
	Om 1 No. discontinuity 70 degrees planar rough with brown staining and infilled (<3mm) with fine gravel			9.83	10.46										
Notes	: All depth in metres, all diameters in millimetr	es				1					<u> </u>		1		1
AGS	See header sheet for details of boring, progre		water.												
7.00	For details of abbreviations, see key.													LADGISC	20100
FINAL	Print date and time 12/0		13:55	1			cked b	oy David Howa	rd					L engine	
Form No. SIEXPHOLEI	LOG Issue.Revision No. 2.0	5		Issue Date	e 02/03/20	18							Part o	f the Bachy Soletand	che Group

Project Name	Cambridge Waste Water Treatmen	t Plant	t Relocat	ion										Hole ID	
Drainet No	TE8364							Explo	rato	у Но	ole Lo	og		N/T2 LIC	00%
Project No. Engineer	Mott MacDonald Bentley												[BH_STW_	_004
Employer	Barhale Limited													Sheet 2 of	2
Ground Level	+10.46mOD Co	ordinate	es	549403.2	20E, 2611	43.10N	N		Gri	d	09	SGB			
Hole Type	IP+RC Inc	lination	1				1			0 -	1			1	1
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test	Install-
	Bescription of Strata	Weat	Legena	ness)	Level	Wate		Details	Dia.	TCR/S Reco	SCR	₩	_	Details	ation
	density off white to light brownish grey rarely own CHALK composed of calcareous SILTSTONE.		<u> </u>	(0.42)	40.1-							П			
Possibly CIRIA Grade				10.25	10.46										
from 9.70m to 9.80r	m 1 No. discontinuity 70 degrees planar rough with brown staining and infilled (<3mm) with fine gravel	1		(0.82)									NI		
sized fragments of		4		(===)									430 500		
SILTSTONE. No disco	ontinuities identified. CIRIA Grade - unable to			11.07	10.46		C 17	7 10.25-11.75	102	91	72	69			7
	LBURY CHALK FORMATION]	11		(0.43)											
subangular fine to o	25m recovered as non intact core (angular to coarse gravel and cobble sized fragments)	J		11.50 -	10.46									-	-
composed of calcare	medium to high density light grey CHALK eous SILTSTONE. No discontinuities identified.			11.75	10.46										
CIRIA Grade - unabl (WMCK) [WEST MEI	e to determine. LBURY CHALK FORMATION]		<u></u>	(0.50) -			C 18	8 11.75-12.25	102	100					-
to coarse gravel size				12.25	10.46										
structureless chalk	07m extremely weak low density, locally grading to composed of gravelly calcareous clay		<u></u>												
Very weak medium	density grey CHALK composed of calcareous assional fragments (<5-10mm) of coprolite. CIRIA		E_=_												
Grade - unable to de	etermine. LBURY CHALK FORMATION]		F_=_	_			C 19	9 12.25-13.45	102	100					
	continuity 20 degrees planar smooth and with clay														
Very stiff dark green	ish grey glauconitic sandy CLAY. Sand is fine. With subangular fragments of coprolites (<30mm).	1			-								NA		
(WMCK) [CAMBRID	GE GREENSAND MEMBER]		<u> </u>	(2.85)											
Very stiff dark green	75m assumed zone of core loss uish grey slightly glauconitic CLAY.	1		` ′											
	ork grey CLAY with occasional rounded nodules of	1	<u> </u>	-	-										-
	siltstone (<5mm). Fissures are randomly paced planar smooth.		<u> </u>				C 20	0 13.45-15.10	102	97					}
(GLT) [GAULT FORM	ATION]		<u> </u>												-
				- 15.10	10.46										
Complete at 1	15.10m. Termination Reason: Achieved Scheduled Dep h			10.10	100										-
	·														-
]
				-											_
]
]
															-
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															-
]
			1												1
<u> </u>															
	All depth in metres, all diameters in millimetres see header sheet for details of boring, progre		water.												
	For details of abbreviations, see key.														
FINAL	Print date and time 12/0		13:55			-	ked b	y David Howar	d					it engine	
Form No. SIEXPHOLEL	.OG Issue.Revision No. 2.0	5		Issue Date	02/03/20	18						_	Part o	of the Bachy Soletan	che Group



Project	Name	Cam	nbridge	Waste V	Nat∈	er Trea	atment	: Plant F	Relocation	on									\top	Н	lole ID	
Project	Ma	TE83	264												Ехр	lorato	ry Hole	Log		≀⊢ ς⁻	ΓW_0	\ \∩5Δ
Enginee				Donald B	Bentl	ley														/I IJ	v v o	USF
Employ	er		nale Lim	nited																	et 1 of 1	L
Ground L Date Star			0mOD 9/2021						Coordinat Date Corr			531.39E 09/2021		.127.88	3N			Grid Incli	d ination	OSGB 90° f oi	m horizon	ntal
Тор	Base	Туре	Date Tir	me Start				Rig Crew	Logger			Bit Pla	ant U		1	-	Pit Stability	_		Remark		
0.00 1.20	1.20 30.00	IP RC		021 14:00 021 07:30		/09/2021 /09/2021		PS TW	DT AY	Geobore S (146)	PCD		ated Ha T46 Ber	and Tools retta	s No	one	Stable					
	I		I							(170)												
	I		I																			I
	I		I																			
				P	L ROG	RESS											WATER	STRIKE	:S			
Date 1	Гіте	Depth	Depth Casing					Rema	ırks			Date	Time		Depth Strike	Depth Casing		Water Rose To			Remark	.s
20/09/202 21/09/202	21 07:30	1.20 1.20	0.00 0.00	Dry Dry	End Start	of Shift rt of Shift	t					21/09/2	021 10		6.40	2.20	1	4.62	20	1		
21/09/202 22/09/202 22/09/202	21 07:30	23.20 23.20 10.00	3.00 3.00 3.00	5.21 3.28 2.84	Start	of Shift of Shift of Shift																
23/09/202	21 07:30	10.00 10.00 0.00	3.00 0.00	3.48	Start	rt of Shift		Borehole Cor	mplete													
		I																				
		I																				
		l																				
		l																				
Donth	Donth		С	ABLE PER	₹CUS	SION	DETAILS					Donth		est			SPT D	DETAILS		Energy	Donth	Donth
Depth Top	Depth Base	Time	e Start	Duratio	n	Tool			Remark	(S		Depth Top	- 1	/pe		Reporte	ed Result		Hammer Serial Number	Ratio	Depth Casing	Depth Water
	I																			'		
	I																			[
	I																			'		
	L																			'		
Depth	Depth			ROTARY		ISH DE	TAILS													'		
Top 0.00	Base 30.00		sh Type	Returr 100	n C	Colour		F	Remarks											'		
0.00	1	1	0.000	100		a.oy																
	I					ļ														'		1
	I					ļ														'		1
	I					ļ																
HOLE DI	AMETER	CASING	DIAMETE	ER			 DYNAV	IIC SAM	PLING											'		1
Depth Base	Diameter	Depth Base	Diamet	ter Depth To		Depth Base	Diamete	er Durat		imple covery Rei	Run									'		
3.00 30.00	150 146	3.00 30.00	150 146	+		5400		+		2010.9 110.												
	I					ļ														'		1
	I					ļ														'		1
			Ш.,																			
		Do	N DETAIL		Pipe	Pipe		T .	TRUCTIC	T	_	Depth	I Di	epth		DE	PTH RELAT					
Distance 10.00		іуре	Top 1.00	Base I	Ref	Ref Pipe 1	Top 0.00	Base 1.50	Diameter 50	r Pipe	Гуре	Тор		Base	<u> </u>			Re	emarks			
						Pipe 1	1.50	9.50	50	SLOTTED												
				BACI	 KFILL	DETAI	ILS										LOCATIO	N DETA	ILS			
Depth Top	Depth Base	\Box	Descri					Ren	narks									marks				
-0.50 0.00	0.00 0.50	Upstandin Concrete				\vdash																
0.50 1.00	1.00 10.00	Bentonite Gravel bac																				
10.00	30.00	Grout																				
	I																					
AGS				etres, all di et for deta					ater.											4		
		For det	tails of ab	obreviation																II AD	Sinee	PING
FINAL				Print (ate a	and tim	ne 12/09	9/2022 13	3:55		L	og chec	cked b	by Dav	vid Hov	vard			30	IC CIT	שאווונ	KILIG

Issue.Revision No. 2.02 Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatme	nt Plan	t Relocat	tion									Hole ID	
Project No.	TE8364						Expl	orato	ry Ho	ole Lo	og		H_STW_0	ነብፍ
Eng <mark>inee</mark> r	Mott MacDonald Bentley												U_3144_4	<i>J</i> U3
Employer	Barhale Limited												Sheet 1 of	3
Ground Level	+9.30mOD C	oordinat	es	549531.	39E, 2611	27.88	N .	Gr	id	O:	SGB			
Hole Type	IP+RC II	clination	n T	90° from	honzonta				1 -					
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Alaterstrike	Sampling		TCR/Sample Recovery %	pwa	RGD	<u></u>	In Situ Test	Inst
	Description of Strate	Weat	Logena	ness)	Level	Vater Parter	Details	Dia	Recor.	SCR/Blown	×	_	Details	ati
	wn slightly gravelly sandy CLAY Gravel is angular	10.7	W/W	(0.30)	+	Ħ	D1 0.05-0.10	-						0.0
subrounded fine to (TOP) [TOPSOIL]		,		0.30	9.00	Ī	B2 0.10-0.40							
	y gravelly sandy CLAY, Gravel is angular to coarse of mixed lithologies including flint.			(0.35)	}		D3 0.40-0.50 B4 0.40-0.80							*a-
(SUPD) [SUPERFICE		_/	1	0.65	8.65		24 0.40-0.00							
Gravel is angular to	o subrounded fine to coarse of mixed lithologies		1 1	(0.55)	1		B 6 0.80-1.20						K 1.00 - 10.00	
including flint. (WMCK) [WEST MI	ELBURY CHALK FORMATION]	-	1	1.20	8 10		D5 1.00-1.10	\vdash					K 1.00 - 10.00	
	K composed of soft yellowish brown gravelly ravel is subangular fine to medium of calcareous	Par E	1	(0.42)]							NA	172	
siltstone (CIRIA Gr	ade Dm)	_		1.62	7.68		C7 120-220	102	100	23	0		-	
from 1.20m to 1.3	ELBURY CHALK FORMATION] Am angular to subangular coarse film	_ g a		(0.36)								10		1
	w density yellowish brown CHALK composed of WNE Discontinuities: 1) randomly orientated		Post S	1.98 . (0.33)	7.32							NI		H
	o very closely spaced planar undulating smooth staining and silt infill (<3mm) (incipient fractures)	1-	1 1	2.31	6.99									
(CIRIA Grade B4)	ELBURY CHALK FORMATION]	Grade 84		(0.63)	-							10 25	12	
Recovered as non i	intact core (angular to subangular medium to	-∥ §		(0.00)	‡							30		
	extremely weak low density yellowish brown ge staining), (unable to determine CIRIA Grade)		 	2.94	6.36	1	C 8 2.20-3.70	102	100	55	51		9	
	ELBURY CHALK FORMATION] w density yellowish brown CHALK composed of	-1		1]									
calcareous SILTSTO	NE. Discontinuities: 1) randomly orientated	1	,	1 .]								16	
rough with orange	to very closely spaced planar undulating smooth staining and silt infill (<3mm) (incipient fractures)	1			‡									
(CIRIA Grade B4) (WMCK) [WEST MI	ELBURY CHALK FORMATION]	1			1									
Very weak low to n	nedium density yellowish brown CHALK compose TONE Discontinuities: 1) 0-15 degrees closely to	d"			3								- 03	
medium spaced ur	ndulating rough with orange staining. 2) randomly				}			122		_				1
	ely closely to very closely spaced planar undulatin le staining incipient fractures. (CIRIA Grade 83)	(0)		(3.38)	1	V	C9 3.70-5.20	102	100	87	87	NI 140)8	
	ELBURY CHALK FORMATION] 6m structureless chalk composed of soft yellowish	Grade	, , , ,	, (0.00)	1							590		
brown gravelty cal (probably drilling i	careous siltstone. Gravel is subangular fine to medium induced)		<u> </u>	-]								9	
	8m recovered as non intact core (angular to subangular avel sized fragments of very weak low to medium			1	}			\vdash]
from 5,43m to 5,5	brown calcareous siltstone) 6m recovered as partially non intact core (angular		<u> </u>		1								9	
	gravel sized fragments of very weak low to medium brown calcareous siltstone)				1								5.0	
				1]			102	100	73	67			3
	9m recovered as partially non intact core (angular gravel sized fragments of very weak low to medium			•	}		C 10 5.20-6.70						3.	
density yellowish	brown calcareous siltstone) medium density light grey CHALK composed of			6.32	2.98	•					8		-	
calcareous SILTSTO	NE Discontinuities: 1) 0-20 degrees closely local	ly m	1 1	1	1							***	(5)	
B3)	idulating rough with orange staining. (CIRIA Grad	Grade 83		[1.01)]							110 170		
(WMCK) [WEST MI	ELBURY CHALK FORMATION]	Ğ										390		
			77	7.33	1.97						2			
	very weak low to medium density light grey of calcareous SILTSTONE. Discontinuities: 1] 0–20	35	T I	1.	ļ		C 11 6.70-8.20	102	100	66	47	NI		
	ly to closely spaced planar undulating smooth (<3mm), 2) randomly orientated extremely close	ga de Gange		(0.55)]							40 50		
	oed planar undulating smooth rough with sift infil	. —	1	7.BB	142								s	
(WMCK) [WEST MI	ELBURY CHALK FORMATION]	te A3	T	(0.74)	‡							30 110		
subangular fine to	7m recovered as partially non intact core (angular to medium gravel)	Grade		18091-1900	1							180	55	- F
	sity light grey CHALK composed of calcareous runurues. 1) 0-30 degrees closely spaced	_		8.62	0.68						9			
undulating smooth (WMCK) [WEST MI	i. (CIRIA Grade A3) ELBURY CHALK FORMATION]	Grade 84		(0.50)	1		C 12 820-9.70	102	100	70	58	35		
	8m 1 No. discontinuity 80-90 degrees undulating rough Om extremely weak low density	- 5		9.12	0.18		C 12 B20-3:10	102	100	"	Ja	50		
Extremely weak to	very weak low density light grey CHALK compositions. TONE, Discontinuities: 1) randomly orientated	d			}] [
extremely closely t	to very closely spaced planar undulating smooth		T I		}								78	
	ELBURY CHALK FORMATION]			1	1									
from 8.96m to 9.1	2m recovered as partially non intact core (angular to	-	1		1	\vdash		+		-	1			
						1								
						1								
						1								
Notes	s. All depth in metres, all diameters in millime	tres.				<u> </u>	l		1		1	Т		
AGS	See header sheet for details of boring, prog		water.											
INAL	For details of abbreviations, see key. Print date and time 12.	ייים ביי	7 1255		1-	o cha-	- Variet I In	ard				SOI	L enginee	RIC
FINAL Form No. SIEXPHOLE			C 13.33	Issue Dat	LO 2 02/03/20		ked by David Howa	311/1					of the Bachy Soletane	

Project Name	Cambridge Waste Water Treatm	ent Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	og .	R	H_STW_()))))
Engineer	Mott MacDonald Bentley													11_3177_(JUJA
Employer	Barhale Limited													Sheet 2 of	3
Ground Level		Coordinate	es	549531.3	39E, 2611	27.881	N		Gri	d	09	GB .			
Hole Type	IP+RC	Inclination		90° from	horizonta I					0 -					1
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
of calcareous SILTS1 extremely closely tc rough clean, (CIRIA (WMCK) [WEST ME from 8.96m to 9.12 subrounded fine to Weak medium to hi calcareous SILTSTOI widely spaced plana A2) (WMCK) [WEST ME from 9.38m to 9.45 gravel)	LBURY CHALK FORMATION] Im recovered as partially non intact core (angular to	Grade A2		(1.80) _ 10.92 _ 11.10	-1.62 -1.80		C 13	9.70-11.20	102	100	79	73	NI 230 740		
coarse grave) (prot Firm grey sandy CL 10mm). (WMCK) [CAMBRID from 10.92m to 11. from 11.03m to 11. gravel of calcareou Very stiff fissured th degrees very closely occasionally polishe undulating smooth medium spaced pla planar undulating p (GLT) [GAULT FORM	ably drilling induced) AY with frequent phosphatic nodules (<30mm node) AY with frequent phosphatic nodules (<30mm node) GE GREENSAND MEMBER] 03m frequent phosphatic nodules (<30mm x 10mm) 10m light grey slightly clayey sandy fine to medium s siltstone with phosphatic nodules (<30mm x 10mm) inly laminated dark grey CLAY. Fissures: 1) 5-10 ty to closely spaced planar undulating smooth ed. 2) 30-40 degrees closely spaced planar frequently polished. 3) 70-80 degrees closely t mar undulating smooth polished. 4) 90 degrees olished.	0						11.20-12.70	102						
				(10.60)			C 16	14.20-15.70	102	100					
at 16.00m 2 No. lig	ht grey coprolites (<10mm)						C 17	15.70-17.20	102	100					
at 17.70m 1 No. bla	ack lignite nodule and lignite thin band (<2mm)			-			C 18	17.20-18.70	102	100					
				-			C 19	18.70-20.20	102	100					
AGS Notes:	All depth in metres, all diameters in millin See header sheet for details of boring, pro For details of abbreviations, see key.	gress and				n choo	ckad b	v. David Howari	d				SOI	L enginee	ering

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project Name	Cambridge Waste Water Treatme	nt Plar	nt Reloca	tion									Hole ID	
Project No.	TE8364						Explo	rato	ry Ho	ole Lo	og	l _R	H_STW_(005A
Engineer	Mott MacDonald Bentley													
Employer	Barhale Limited			E (0E24)	205 2011	27.001					200		Sheet 3 of	3
Ground Level Hole Type		oordina nclinatio			39E, 2611 horizonta		Į	Gri	ıa	O:	SGB			
71	Description of Strata	Weathering		Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>"</u>	In Situ Test Details	Install- ation
	ninly laminated dark grey CLAY. Fissures: 1) 5-10 y to closely spaced planar undulating smooth		<u> </u>		-	_	Botano	Dia.						-
occasionally polishe undulating smooth medium spaced pla planar undulating p (GLT) [GAULT FORM	ed. 2) 30-40 degrees closely spaced planar frequently polished. 3) 70-80 degrees closely to nar undulating smooth polished. 4) 90 degrees olished. ATION]			21.70	-12.40		C 20 20.20-21.70	102	100					
brown phosphatic n fragments (<2mm x 25-70 degrees and smooth very tight a (GLT) [GAULT FORM		ır		-	-12.40		C 21 21.70-23.20	102	100					
				-			C 22 23.20-24.70	102	100					
from 25.80m to 26. and polished	03m 1 No. fissure inclined (70 degrees) planar smooth	Unweathered		(6.60) -			C 23 24.70-26.20	102	100			NA		
				-			C 24 26.20-27.70	102	100					
very stiff fissured lig (<2mm x 40mm). Fi and 85-90 degrees) very tight and locall	ght greenish grey CLAY with rare shell fragments ssures are horizontal and vertical (0-10 degrees I very closely to medium spaced planar smooth Iy polished.			28.30	-19.00		C 25 27.70-29.20	102	100					
	ATION] 10m with frequent possibly inoceramid shell x 25mm) of extremely weak light brown mudstone			(1.70)	- - - - - - - -		C 26 29.20-30.00	102	100					
Complete at 3	30.00m. Termination Reason: Achieved Scheduled Dep h		<u> </u>	30.00	- 20.70									=======
AGS Notes: FINAL Form No. SIEXPHOLEL	All depth in metres, all diameters in millime See header sheet for details of boring, prog For details of abbreviations, see key. Print date and time 12/ .OG Issue.Revision No. 2	ress and '09/202		Issue Date	Lo e 02/03/20	-	ked by David Howa	rd					L enginee	

Project	Name	Can	mbridge	Waste \	Nater [*]	Treatr	ment	Plant F	₹elocati	ion											Hole ID	
Project	No.	TE8	3364											E)	xplora	itory	Hole	Log		BH S	STW_0	005B
Engine	er	Mot	tt MacD		entley	/																
Employ Ground L			hale Lim	ited					Coordina		549	521 40	E, 26112	25 40N				Grid		Sh	neet 1 of	1
Date Star			09/2021						Date Cor			09/202							lination		,	
Top 0.00	Base	IP	06/09/20		06/09/	/2021 09	9:00	DC	SAN	Barrel Type	Drill B	Insul	lant Us lated hand	d tools	oring Use		Stability Stable	/	Ins	Rema		
1.20	30.00	СР	06/09/20)21 09:00	07/09/)/2021 17	7:30	DC	SAN			1	Dando 200)0								l
				ļ																		I
1				ļ																		ļ
Data.	T:	Dontk	Depth	PF Depth	ROGRE	ESS		Domr	1-0			Date		Dept	th De	pth \	WATER Depth	STRIKI Wate		e	Domar	.1,,,
Date 7	21 17:30	Depth 13.00	Casing 11.60	Water Dry	End of S			Rema	ırks		\dashv		e Time 2021 11:40	Strik	ce Cas	sing .20	Sealed 11.30	Rose T	Го Elaps	ed	Remar	ks ———
07/09/202 07/09/202		13.00 0.00	11.60 0.00	9.00 Dry	Start of Backfill		te; Boreh	nole Comple	ete													I
																						ļ
																						I
																						ļ
																						ļ
																						ļ
			c	ABLE PER	RCUSSI	ON DE	DETAILS SPT DI											DETAILS				
Depth	Depth	Tin	ne Start	Duration	Т	Tool			Remar	rks		Depth	- 1		Rep	orted	Result	/	Hammer Seri Number			Depth
Тор	Base	+		+	+		+					1.20 2.20	Type S S	N=18 (2	2,3:4,4,5,5) 2,3:4,5,6,6))			AR3501 AR3501	75 75	1.20 2.20	Dry Dry
												3.20 4.20	S S	N=33 (2 N=25 (3	2,5:9,8,8,8) 3,4:4,6,8,7))			AR3501 AR3501	75 75	3.20 4.20	Dry Dry
												5.20 6.20 7.20	S S S	N=28 (3	2,2:4,5,4,4) 3,5:6,7,7,8) 4,5:5,7,8,9))			AR3501 AR3501 AR3501	75 75 75	5.20 6.20 7.20	Dry 4.80 4.80
												8.20 9.20	S S	N=17 (2 N=17 (1	2,2:3,4,5,5) 1,3:4,4,4,5))			AR3501 AR3501 AR3501	75 75	8.20 9.20	4.80 4.80 4.80
				ROTARY	 ' FLUSH	1 DETA	AILS					10.70 12.20	S S	N=28 (3 N=25 (4	3,5:6,7,7,8) 4,5:5,6,7,7))			AR3501 AR3501	75 75	10.70 11.60	4.80 Dry
Depth Top	Depth Base	Flu	ush Type	Flush	Flus	ısh	-		Remarks			13.70 15.20 16.70	S	N=33 (4	3,4:6,7,8,9) 4,6:7,8,9,9) 4,7:9,9,10,1)			AR3501 AR3501 AR3501	75 75 75	11.60 11.60 11.60	10.50 14.00 15.20
106	Dasc			Necu.	1 0010	Jui						18.20 19.70	S S	N=47 (5 N=50 (5	5,6:9,11,12, 5,8:10,13,13	2,15) 13,14)	- C /F0mm		AR3501 AR3501	75 75	11.60 11.60	17.40 18.50
												21.20 22.70 24.20	S S	50/250r 50/240r	mm (5,7:10 mm (6,9:11 mm (6,8:12	1,14,16, 2,14,17,	9/25mm) 7/15mm))	AR3501 AR3501 AR3501	75 75 75	11.60 11.60 11.60	20.20 21.00 23.40
												25.70 27.20	S S	50/225r 50/225r	mm (6,8:12 mm (7,9:12	2,17,21,0 2,16,22,0	0/0mm) 0/0mm)		AR3501 AR3501	75 75	11.60 11.60	23.90 26.10
												28.70	S	50/220r	mm (7,10:1	13,17,20)/70mm)		AR3501	75	11.60	27.50
HOLE DIA		Denth	G DIAMETE		. Dep	nth		IC SAMI	١ ٥	Sample F	Run											
Base 30.00	Diameter 200	r Base	Diamete	ter Depth To	op Bas		Diameter	r Durat		ecovery Refe												
30.00	200	11.00	200																			
	INST/	L ALLATIO	N DETAIL	 .S	+		PIF	E CON!	STRUCTION	ON						DEPT	H RELA	TED REI	 MARKS			
Distance	ID 1	Туре	tesponse Re		Pipe Pip	ipe . lef	Тор	Base	Diamete	er Pipe Ty	ype	Depth Top	n Dep Bas					Re	emarks			
			104	Duss		51				+			-									
								I														
	I <u> </u>				L			ı <u></u>														
Donth	Donth			BACK	KFILL DE	ETAILS	;									LO	OCATIO	n deta	ILS			
Depth Top 0.00	Depth Base 30.00	Grout	Descrip	ption	\perp			Ren	marks								Ren	marks				
0.00	30.00	Grout																				
	Note	es: All de	epth in me	tres, all di	ameter	s in mi	illimetre	 es.											\neg		4	
AGS		See he	eader shee etails of ab	et for deta	ails of bo	oring, p			ater.													
FINAL						-	12/09	9/2022 13	3:55			og che	cked by	/ David H					sc	IL er	ngine	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Issue.Revision No. 2.02

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion									Hole ID	
D : N	T5000 /						Explo	rato	ry Ho	ole Lo	og			20ED
Project No. Engineer	TE8364 Mott MacDonald Bentley											B	H_STW_0	JU5B
Employer	Barhale Limited												Sheet 1 of	3
Ground Level	+9.31mOD Coord	dinate	!S	549531.4	40E, 2611	25.401	N I	Gr	rid	09	SGB			
Hole Type	IP+CP Inclin	nation							,					
	B	Weathering	l	Depth	Datum	strike	Sampling		TCR/Sample Recovery %	lows	D		In Situ Test	Install-
	Description of Strata	Veath	Legend	(Thick- ness)	Level	Waterstrike	Details	Dia.	CR/Sa Recove	SCR/Blows	RQD	Ŧ	Details	ation
	n slightly sandy gravelly CLAY with occasional	_		(0.30)		-	D1 0.10	Dia		-				
Sand is fine to coars	avel is angular to subangular fine to coarse of flint. se			0.30	9.31		B 2 0.10-0.30 ES 3 0.30							1
\(TOP) [TOPSOIL] Stiff brown slightly s	sandy gravelly CLAY with occasional rootlet.			(0.60)			D 4 0.35 ES 5 0.50]
Gravel is angular to coarse.	subangular fine to coarse of flint sand is fine to						B 6 0.50-0.80							
(SUPD) [SUPERFICIA	AL DEPOSITS] s stiff light brownish grey locally stained yellowish			0.90	9.31		D 7 0.90 ES 8 1.00							
orange slightly grav	elly calcareous CLAY. Gravel is angular to			:			B 9 1.00-1.20						SPT(S) N=18 (2,3:4,4,5,5)	
subangular medium (WMCK) [WEST ME	i to coarse of flint. LBURY CHALK FORMATION]			(1.30)			D 10 1.20-1.65 B 11 1.20-1.70						1.20	
				(1.00)			511 1.20 1.70							1
							D 12 2.00							
CHALK recovered as	s stiff to very stiff light brownish grey locally			2.20	9.31								SPT(S) N=21	1
stained yellowish or	range slightly gravelly calcareous CLAY. Gravel is						D 13 2.20-2.65						(2,3:4,5,6,6) 2.20]
	lar medium to coarse of flint. LBURY CHALK FORMATION]						B 14 2.20-2.70							
							D45 200							
							D 15 3.00						SPT(S) N=33	
							D 16 3.20-3.65						(2,5:9,8,8,8)	-
				-			B 17 3.20-3.70						3.20	-
				-			D 18 4.00							
				(4.00)									SPT(S) N=25 (3,4:4,6,8,7)	
				-			D 19 4.20-4.65 B 20 4.20-4.70						4.20	-
							D 21 5.00							
													SPT(S) N=17	
							D 22 5.20-5.65						(2,2:4,5,4,4) 5.20	_
							B 23 5.20-5.70							
							D 24 6.00							
				6.20	9.31	•	W 25 6.20						SPT(S) N=28]::::::::::
fine to coarse of calc							D 26 6.20-6.65						(3,5:6,7,7,8) 6.20	
(WMCK) [WEST MEI	LBURY CHALK FORMATION]						B 27 6.20-6.70						K 6.20	
				(2.00)			D 28 7.00						CDT(C) N 20	-
				(2.00)			D 29 7.20-7.65						SPT(S) N=29 (4,5:5,7,8,9)]
				-			B 30 7.20-7.70						7.20	-
				-			D 31 8.00							
	s very stiff grey very gravelly calcareous CLAY with			8.20	9.31								SPT(S) N=17 (2,2:3,4,5,5)	
	ntent. Gravel is subangular to subrounded fine to very weak siltstone. Cobbles are very weak to			-			D 32 8.20-8.65 B 33 8.20-8.70						8.20	
	o rounded and tabular of calcareous siltstone. LBURY CHALK FORMATION]													
' ' '	•			_			D 34 9.00							
				(2.50)									SPT(S) N=17	
							D 35 9.20-9.65						(1,3:4,4,4,5) 9.20]
			HH	:			B 36 9.20-9.70							
							D 37 10.00							
							D 37 10.00							
												<u> </u>		
	All depth in metres, all diameters in millimetres See header sheet for details of boring, progress		water											
AGS	For details of abbreviations, see key.	, unu 1	.vacol.											
FINAL	Print date and time 12/09/	′2022	13:55				ked by David Howa	rd					L engine	
Form No. SIEXPHOLEL	.OG Issue.Revision No. 2.05			Issue Date	02/03/20	18						Part o	f the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	ole Lo	og	В	H_STW_0	005B
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 2 of	3
Ground Level		rdinate	es	549531.4	40E, 2611	25.401	V		Gr	id	09	SGB			
Hole Type	IP+CP Incli	nation	1	ı	ı		1				1	1		1	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	Ħ	In Situ Test Details	Install- ation
	s very stiff grey very gravelly calcareous CLAY with ntent. Gravel is subangular to subrounded fine to														
coarse of chalk and	very weak siltstone. Cobbles are very weak to o rounded and tabular of calcareous siltstone.														
(WMCK) [WEST ME	LBURY CHALK FORMATION]			10.70	9.31									SPT(S) N=28	
Gravel is subangula	s very stiff grey very gravelly calcareous CLAY. Ir to subrounded fine to coarse of very weak						D 3	8 10.70-11.15						(3,5:6,7,7,8) 10.70	
calcareous siltstone (WMCK) [WEST ME	e and coprolite. EBURY CHALK FORMATION]			(0.60) –			В3	9 10.70-11.20							
	d dark grey CLAY with rare fossil (5x10) and	1		11.30	9.31		D 4	0 11.30							
(GLT) [GAULT FORM.	ravel size fragments of very weak brown siltstone. IATION]		<u> </u>]											
			F												
			E	-										SPT(S) N=25	
			E==				D 4	1 12.20-12.65						(4,5:5,6,7,7) 12.20	
			E=	-				2 12.20-12.70						12.20	1
				-											
				(3.90)											
				-										CDT(0) N. 00	
							D.4	3 13.70-14.15						SPT(S) N=30 (3,4:6,7,8,9)	
				-				4 13.70-14.20						13.70	
]
				-											-
			<u> </u>	-										-	
	inated dark grey CLAY with rare fossil (5x10) and ze fragments of very weak brown siltstone.	1	==:	15.20	9.31									SPT(S) N=33 (4,6:7,8,9,9)	
(GLT) [GAULT FORM			<u></u>	-				5 15.20-15.65 6 15.20-15.70						15.20	
			F_=_	:											
			E_=_	-										-	
			E-E-												
				-											
			<u></u>											SPT(S) N=40 (4,7:9,9,10,12)	
			<u></u>	-				7 16.70-17.15 8 16.70-17.20						16.70	
			<u></u>	-											
			<u> </u>	_											
			<u></u>											SPT(S) N=47 (5,6:9,11,12,15)	
				-				9 18.20-18.65 0 18.20-18.70						18.20	
			<u> </u>												
			F-I-] _:											-
			E												
			<u> </u>	-											-
			<u> </u>											SPT(S) N=50 (5,8:10,13,13,14)	1
			<u> </u>	-				1 19.70-20.15 2 19.70-20.20						19.70	-
Notes:	: All depth in metres, all diameters in millimetre	s.													
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.	s and											50'	L engine	אסופכ
FINAL Form No. SIEXPHOLEL	Print date and time 12/09 LOG Issue.Revision No. 2.05		13:55	Issue Date	Lo 02/03/20		ked l	by David Howar	d					of the Bachy Soletano	

Project Name	Cambridge Waste Water Treatm	nent Plar	nt Relocat	tion									\top	Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	le Lo	og	В	H_STW_0)05B
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 3 of 3	3
Ground Level	+9.31mOD	Coordina		549531.4	40E, 2611	25.40N	N		Gri	id	09	SGB			
Hole Type	IP+CP	Inclinatio		Donath		l e				9 %	<u>δ</u>				
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	Ы	In Situ Test Details	Install- ation
occasional gravel siz	inated dark grey CLAY with rare fossil (5x10) and ze fragments of very weak brown siltstone.	nd	<u></u>											-	
(GLT) [GAULT FORM	ATIONJ		E] -	-									-	
]	
			<u> </u>	-											
			<u> </u>				D 5	3 21.20-21.63						SPT(S) 53/275mm - (5,7:10,13,14,16/5	
				-				4 21.20-21.70						0mm) 21.20	[
			E-=-] :										-	
				-	-									-	
]]	
			<u> </u>											SPT(S) 50/250mm - (6,9:11,14,16,9/25	
			<u> </u>	-				5 22.70-23.10 6 22.70-23.20						mm) _ 22.70 -	
			E]										-	
			<u> </u>	-										-	
			<u> </u>											-	
			<u> </u>] -]									SPT(S) 50/240mm	
			<u> </u>	-				7 24.20-24.59 3 24.20-24.70						(6,8:12,14,17,7/15 mm)	
			E-E-] :			0.50	5 24.20 24.70						24.20	
				(14.80)										-	
			<u> </u>											-	
			<u> </u>]	
			<u> </u>				D 5	9 25.70-26.08						SPT(S) 50/225mm - (6,8:12,17,21,0/0	
			<u> </u>	<u> </u>			B 60	25.70-26.20						mm) _ 25.70 -	
			E-=-]										-	
			<u> </u>	-										-	
]	
			<u> </u>											SPT(S) 50/225mm - (7,9:12,16,22,0/0	
			<u> </u>	-				1 27.20-27.58 2 27.20-27.70						mm) _ 27.20 -	
				1 :										-	
			E-=-	-											
					-]	
				-										SPT(S) 50/220mm	
			E-E-					3 28.70-29.07 4 28.70-29.20						(7,10:13,17,20/70 mm)	
			<u> </u>					7 28.70-23.20						28.70	
			E-=-	-										-	
			<u> </u>]	
Complete at 3	30.00m. Termination Reason: Achieved	d	+	30.00	9.31									-	
	Scheduled Dep h														
ACS	All depth in metres, all diameters in milli See header sheet for details of boring, pr For details of abbreviations, see key.		d water.				•		•						



Project Nar	me	Cam	bridge	Waste \	Nater Tre	atment	Plant F	Relocat	ion				_					Н	ole ID	
Project No.		TE83	364										Exp	lorator	y Hole	Log	E	3H_S	TW_0	006
Engineer				onald B	Bentley															
Employer Ground Level			ale Lim	nited				Coordin	atos	54	9502.50E,	261260	10N			Grid		She OSGB	et 1 of 1	L
Date Started			3/2021					Date Co			/08/2021	, 201200.	.1014				nation		m horizon	ital
Тор Ва				me Start								nt Used			t Stability	,		Remark	S	
0.00 1.2 1.20 15.		IP RC		021 13:00 021 07:30	04/08/202 06/08/202		aul McCoy aul McCoy	MM MM	NA Geobo			ted hand to ilmec SM8	ols N	one	Stable					
				P	ROGRESS										WATER	STRIKE	S			
Date Time		Depth	Depth Casing	Depth Water			Rema	rks			Date	Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	ı	Remark	:s
04/08/2021 17: 05/08/2021 07: 05/08/2021 17: 06/08/2021 07: 06/08/2021 07: 06/08/2021 13:0	:30 :30 :30 :00	1.20 1.20 11.50 11.50 15.00 0.00	0.00 0.00 11.50 11.50 0.00	Dry Dry 0.00 0.00 0.00 Dry	End of Shift Start of Shift End of Shift Start of Shift Drilling Cor Backfill Cor	t : t	nole Comple	ete												
				ARI F PFF	RCUSSION	DETAILS									SPT D	ETAILS				
	pth ase	Time	e Start	Duratio	1			Rema	rks		Depth Top	Test Type		Reported		17.1.25	lammer Serial Number	Energy Ratio	Depth Casing	Depth Water
Top Ba 120 15. HOLE DIAME Depth Base Diam	epth ase 0.00	W		Flush Return 100	Colour Grey	DYNAM Diamete	IC SAM	tion	Sample	Run Referenc	e									
IN	VSTAL	LLATION	N DETAIL	.S		PII	PE CONS	TRUCT	ION					DEP	TH RELAT	TED REM	IARKS			
Distance ID	Ту		sponse Ro		Pipe Pipe Ref Ref	Тор	Base	Diamet	er Pi	ре Туре	Depth Top	Depth Base				Re	marks			
			ТОР	Base	KEI KEI	·					2.20 7.10 7.50	3.20 7.50 9.00	Self bori	ing Pressurer ng pressurer cket drilled	meter Test meter test fa	iled				
Depth Dep	pth				KFILL DETA	ILS									LOCATIO		LS			
Top Ba	ase	Grout	Descri	ption			Ren	narks							Ren	narks				
FINAL Form No. SIEXPH		See he For det	ader she	et for deta obreviation Print o	ameters in ails of borin as see key. date and tin	ng, progres	ss and wa	3:55	۵۱۱۵۵ ا	ite 22/06/;	Log chec	ked by [David Hov	ward					SINEE by Soletanche	

Project Name	Cambridge Waste Water Treatment	Plant	t Relocat	ion									Hole ID	
Droinet No	TE8364						Explo	rator	у Но	le Lo	g		BH_STW_	006
Project No. Engineer	Mott MacDonald Bentley											-	011_3177_	.000
Employer	Barhale Limited												Sheet 1 of	2
Ground Level		rdinate			50E, 2612		I	Gri	d	OS	GB			
Hole Type	IP+RC Incl	ination	1		horizonta	_			م و	s				
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test	Install-
		Weat		ness)	Level	Wate	Details	Dia.	TCR/	SCR	~		Details	ation
	n slightly gravelly sandy CLAY. Gravel is unded fine to coarse of flint. Sand is fine to			(0.34)			D 1 0.05-0.10 ES 2 0.20-0.25							
coarse. \(TOP) [TOPSOIL]				0.34	9.05		B 3 0.10-0.40							
Stiff greyish light bro	own slightly gravelly CLAY with low cobble agular to subrounded fine to medium of flint and	'		(0.46)			D 4 0.40-0.50 ES 5 0.50-0.55							
calcareous mudston	e. Cobbles are subangular of flint.	\downarrow		0.80	8.59		B 6 0.40-0.80							
	stiff light brown and greyish white slightly	/		(0.40) -			B 9 0.80-1.20 D 7 1.00-1.10							-
	ous CLAY with low cobble content. Gravel is unded fine to medium of flint and calcareous			1.20	8.19		ES 8 1.10-1.20							
	are subangular of flint. .BURY CHALK FORMATION]	ے ا		-										
Structureless CHALK	Comprised of soft yellowish and greyish brown	Grade Dm		(1.00)			C 10 1.20-2.20	103	77			NA		
	BURY CHALK FORMATION]	6		_										
	m assumed zone of core loss (Driller's description)			2.20	7.19									
(WMCK) [WEST MEL	BURY CHALK FORMATION]											ND		
				(1.00)				103	0			NR	WRSBP 2.70	
				3.20	6.19									
brown calcareous Cl	Composed of firm to stiff yellowish and greyish LAY (CIRIA Grade Dm)	P		;										
(WMCK) [WEST MEI	BURY CHALK FORMATION]	Grade		(0.63)			C 11 3.20-4.10	103	89	19	19	NA		
Extremely weak low	density light greyish brown CHALK composed of			3.83	5.56						_			
calcareous SILTSTON	NE (Unable to determine CIRIA Grade) BURY CHALK FORMATION]			-										-
	m assumed zone of core loss													
from 4.50m to 4.60r	n weak			-								110		-
				(1.77)			C 12 4.10-5.60	103	84	0.4		1020 1020		
				-			C 12 4.10-5.60	103	84	84	84	1020		-
from 5.20m to 5.25r	m 1 No. discontinuity 30 degrees planar rough with													
gravel infill (<2mm)	m assumed zone of core loss													
	density light grey CHALK composed of calcareous			5.60	3.79							200		
	to determine CIRIA Grade) .BURY CHALK FORMATION]			(0.60)								260 260		
gravel infill (<2mm)				6.20	3.19							340	•	
	re loss. CHALK (Driller's description) _BURY CHALK FORMATION]			0.20	3.13		C 13 5.60-7.10	103	40	40	40			
, ,,	,		<u> </u>	(0.90)										-
												NR		
	(5.11)			7.10	2.29									
	(Driller's description) BURY CHALK FORMATION]			(0.40)				103	0					
Very weak to weak r	nedium to high density light grey CHALK	+		7.50	1.89			-						-
composed of very th	ninly bedded calcareous SILTSTONE. LO to 30 degrees closely to medium spaced planar	_												
rough locally gravel	infilled (<2mm). (CIRIA Grade B3)	de B3		(1.00) -									HPD 8.00	
from 7.55m to 7.90r	BURY CHALK FORMATION] n non intact core (recovered as subangular to	Grade					C 14 7.50-9.00	76	97	63	30	NI 120		-
	coarse gravel sized fragments)			8.50 -	0.89							120		
	density grey CHALK composed of calcareous inuities are 10 to 20 degrees closely spaced	Grade A3		(0.50)										
planar smooth clean	ı. (CIRIA Grade A3) .BURY CHALK FORMATION]	Grad] ` ` :										
Weak high density g	rey CHALK composed of thinly bedded			9.00 -	0.39									-
(WMCK) [WEST MEL	NE. (Unable to determine CIRIA Grade) LBURY CHALK FORMATION]											NI		
gravel sized fragme				(1.70) -			C 15 9.00-10.00	103	100	90	75	190 1260		
at 9.44m 1 No. disco	ontinuity a degrees			1]									1
		+	+											
Notes:	All depth in metres, all diameters in millimetre	es.	1	<u> </u>	<u> </u>	<u> </u>		1	<u> </u>					1
AGS	See header sheet for details of boring, progre- For details of abbreviations, see key.		water.											



Project Name	Cambridge Waste Water Treatr	nent P	lant	Relocat	ion										Hole ID	
Project No.	TE8364				Explo	rator	у Но	le Lo	g		BH_STW_	റ്റെ				
Engineer	Mott MacDonald Bentley														7 ו ע	000
Employer	Barhale Limited														Sheet 2 of	2
Ground Level Hole Type	+9.39mOD IP+RC	Coordi				60E, 26120 horizonta		V		Gri	d	OS	GB			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
	rey CHALK composed of thinly bedded IE. (Unable to determine CIRIA Grade)		_		-				Betails	Dia.						-
	BURY CHALK FORMATION]				-]
					10.70 -	-1.31		6.16	10.00 11.50	102	100	.7	/7			
(WMCK) [CAMBRIDG	ish grey slightly sandy glauconitic CLAY. GE GREENSAND MEMBER] Om occasional subrounded to rounded fine to	}			10.90	-1.51		C 16	10.00-11.50	103	100	47	47			
medium gravel of co Stiff to very stiff dark	pprolite	/		<u> </u>	-											
(GLT) [GAULT FORMA					-											1
					-											
					-										-	
at 12 20m 1 No. puri	ite nodule (<2mm) and disarticulated bivalve shells							C 17	11.50-13.00	103	87					1
	5m very closely spaced fissures 0 to 10 degrees				-											
from 12.70m to 13.0	00m assumed zone of core loss		Unweathered		-									NA		
					(4.10)										-	
					-											
					-			C 18	13.00-14.10	103	100					-
from 14.10m to 14.2	3m 1 No. fissure 70 degrees planar smooth clean				-										-	
					-											
					-			C 19	14.10-15.00	103	89					
	00m assumed zone of core loss				15.00 -	-5.61										
Complete at 1	5.00m. Termination Reason: Achieve Scheduled Dep h	ea			-											-
					-											1
					-											
					-										-	-
					-											-
					-											1
					-											
					-										-	
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																-
					_										-	
					-											-
					-											-
					-											-
					-											1
	All depth in metres, all diameters in milli See header sheet for details of boring, p		and u	vater.												
	For details of abbreviations, see key.													NO.00		
FINAL Print date and time 12/09/2022 13:55 Log checked I Form No. SIEXPHOLELOG Issue Revision No. 2.05 Issue Date 02/03/2018							ked by	David Howar	d					of the Bachy Soletand		

Project	Name	Car	nbridge	e Waste	e Wa	ater Tre	atment	Plant F	Reloca	ation					_					Н	lole ID	
Project	No	TE8	364												Exp	olorato	ry Hole	Log	F	3H S	TW_	007
Engine			tt Mac	Donald	Ber	ntley																001
Employ	er er		hale Lir	nited																	et 1 of 1	1
Ground L Date Star			.8mOD 09/2021						Coordi Date C		tod		543.80E, 19/2021	261323	.90N			Grid	nation	OSGB	m horizor	ntal .
Top	Base		Date T	ime Sta	rt D	ate Tim	ne End F							nt Use	d Shorir	ng Used P	it Stability			Remark		ıtaı
0.00 1.20	1.20 15.10	IP RC	01/09/	2021 13:00 2021 14:00		01/09/202	1 14:00	TW TW	DT AY	1	NA bore S	NA PCD	Insulat	ted hand to		lone	Stable					
			Depti			GRESS									Depth	Depth	WATER Depth	STRIKE Water	S Time			
Date 01/09/20		Depth 1.60	Casin	Wate	er	nd of Shift		Rema	ırks				Date 02/09/20		Strike 7.30	Casing 2.00		Rose To		Not seale	Remark	(S
02/09/20:	21 07:30	1.60 1.60 15.10	1.50 1.50 2.00	Dry Dry 4.50	s	tart of shift Start of shift Orilling Com							02/09/20	121 00:00	7.30	2.00		4.00	20	Not seal	ea.	
02/09/20	21 17:30	0.00	0.00	1.00			plete; Boreh	nole Comple	ete													
																				1		
				CABLE P	ERCL	USSION	DETAILS										SPT D	ETAILS				
Depth Top	Depth Base	Tin	ne Start	Durat	ion	Tool			Rem	arks			Depth Top	Test Type		Reporte	d Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
ТОР	Dase				+								юр	Туре						Katio	Casing	vvater
Depth	Depth	T =.		ROTAL Flu		LUSH DE	IAILS															
Top 1.20	Base 9.60	FIL	ISh Type	Retu 10	ırn	Colour		-	Remarl	ks												
9.60	15.10		IR/MIST	10		Grey																
1101 F DI	A	2 01011					D)/81484	10 000 0	DUNG													
HOLE DI		Dont	h		_ [Depth	DYNAM			Sample	e Ri	un										
Base 2.00	Diamete 150	Base	Diame	ter Depth	1 lop	Base	Diamete	r Dura	tion		ry Refer	rence										
15.10	146																					
	INICT	ALL ATIC	AL DETAI	1.6		1	DII	PE CONS	STDU 6	TION						DE	PTH RELAT		AADIG			
Dictanco		lo.	N DETA		Pipe			Base	Diame		Pipe Ty	no	Depth	Depth	1	DE	PIN KELA		marks			
Distance	וטו	Type '`	Тор	Base	Ref	Ref	Тор	Dase	Diairie	stei r	Pipe iy	pe	Тор	Base				ке	IIIaiks			
				DA	CIZEI	LL DETA	u c										LOCATIO	N DETAI	1.0			
Depth	Depth		Docci		CNFI	LL DETA	ILS	Don	narks									narks	LS			
Top 0.00	Base 15.10	Grout	Desci	ription				Rei	IIdiks								Ken	Idiks				
	Not	es. All d	enth in m	etres all	diam	neters in	millimetr	es														
AGS	3	See h	eader sh	eet for de	etails	of boring	g, progres		ater.													
EINIAI		For de	etails of a			-	ne 12/09	3/2022 1	3.EE			1 -	oo obasi	kad bu "	Javid He	word			soi	L end	sinee	RING
FINAL Form No. 9	SIEXPHOL	.EHDR		riin		e and tin ie.Revisior		,, ZUZZ I	رد.ب	Issue [Date 22/			rea nà 1	David Ho	vvaiU					ny Soletanch	

Project Name	Cambridge Waste Water Treatmen	nt Plant	t Relocat	ion									Hole ID	
Project No.	TE8364						Explo	rator	у Но	le Lo	g	l B	H_STW_	007
Engineer	Mott MacDonald Bentley													
Employer Ground Level	Barhale Limited +9.18mOD C	oordinate	25	5496438	30E, 2613	23 901	<u> </u>	Gri	d	OS	GB		Sheet 1 of	2
Hole Type		nclination			horizonta		v	GII	u	00	,ab			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	F	In Situ Test Details	Install- ation
(TOP) [TOPSOIL] Firm brown slightly gravel is subangular (SUPD) [SUPERFICIAl Firm light greyish broarse. Gravel is ang	own slightly gravelly sandy CLAY. Sand is fine to ular to subrounded fine to coarse of flint.			(0.30) 0.30 (0.80) 1.10 1.20	8.88 8.08 7.98		D1 0.05-0.10 ES 2 0.20-0.25 B3 0.10-0.40 D4 0.40-0.50 ES 5 0.50-0.55 B6 0.40-0.80 B9 0.80-1.20 D7 1.00-1.10 ES 8 1.10-1.20							
(SUPD) [SUPERFICIA] Recovered as: Multion medium to coarse G	coloured slightly clayey angular to subrounded	-/	-	(0.60)			C 10 1.20-1.60	102	50					1
(SUPD) [SUPERFICIA			V. ;	1.80	7.38		C 11 1.60-2.10	102	90					
Structureless CHALK yellowish brown and gravelly calcareous to subrounded fine t calcareous siltstone. (WMCK) [WEST MEL from 2.00m to 2.10f] Structureless CHALK calcareous CLAY with density yellowish brown of the calcareous CLAY with calcareous CLAY calcareous CLAY with density yellowish brown of the calcareous CLAY with density yellowish brown of the calcareous CLAY with density angular to select the calcareous CLAY with density GLAY Grade Dm)	composed of soft to firm light grey with orangish brown staining slightly sandy slightly LAV Sand is fine to medium. Gravel is subangula o medium of extremely weak low density grey (CIRIA Grade Dm) BURY CHALK FORMATION] n assumed zone of core loss (composed of firm yellowish brown gravelly h medium spaced thin beds of very weak low own chalk composed of calcareous siltstone. subangular medium of extremely weak chalk.	ar Dude Dm		(1.19)	6.19		C 12 2.10-3.60	102	90			NA		
	BURY CHALK FORMATION] n assumed zone of core loss	Grad		(2.49)			C 13 3.60-5.10	102	100					
calcareous SILTSTON spaced planar smoot spaced planar smoot (CIRIA Grade C3) (WMCK) [WEST MEL	density yellowish brown CHALK composed of IE. Discontinuities 1) 0 to 20 degrees closely th with silt infill (-3mm). 2) 70 degrees medium th with silt infill (-3mm) and with orange stainin BURY CHALK FORMATION]	Grade C3		(1.20)	3.70		C 14 5.10-6.60	102	87	23	17	NI 80 140		
Gravel is angular to s medium density cha	Composed of firm light grey gravelly CLAY. subrounded fine to coarse of very weak low to lk. (CIRIA Grade Dm) BURY CHALK FORMATION]	Grade Dm		(1.42)	2.50	•	C 15 6.60-8.10	102	100	0	0	NA		
SILTSTONE. Disconti medium spaced, unc (WMCK) [WEST MEL from 8.59m to 8.757 angular to subangul density grey chalk c Structureless CHALK CLAY, Gravel is angul medium density cha (WMCK) [WEST MEL from 9.04m to 9.20r calcareous siltstone from 9.30m to 9.40r	ity light grey CHALK composed of calcareous nuities 1) 0 to 20 degrees closely spaced, locally fuliating smooth. (CIRIA Grade A3) BURY CHALK FORMATION] n structureless chalk composed of slightly clayey ar medium to coarse gravel. Gravel is very weak low omposed of calcareous siltstone. Matrix is light grey. Composed of firm light grey gravelly calcareous far to subangular medium of very weak low to lik. (CIRIA Grade Dm) BURY CHALK FORMATION] n weak medium density light grey chalk composed of n structureless chalk composed of slightly clayey ar medium and coarse gravel. Gravel is very weak low			8.10 (0.65) - 8.75 (0.65) - 9.40 - 9.60	0.43 -0.22 -0.42		C 16 8.10-9.60	102	93	19	19	NI 70 240		
AGS	All depth in metres, all diameters in millime See header sheet for details of boring, prog For details of abbreviations, see key. Print date and time 12/	ress and			Lo	g chec	ked by David Howai	rd				SOII	L enginee	ering

Issue.Revision No. 2.05 Issue Date 02/03/2018

Form No. SIEXPHOLELOG



Project Name	Cambridge Waste Water Treatm	nent Pla	ant	Relocat	ion										Hole ID	
Project No.	TE8364								Exploi	rator	у Но	le Lo	9	F	BH_STW_	007
Engineer	Mott MacDonald Bentley															
Employer Ground Level	Barhale Limited +9.18mOD	Coordir	nates		549643.8	INE 2613	23 901	N.		Gri	Н	OS	GB		Sheet 2 of 2	2
Hole Type	IP+RC	Inclinat		,		horizonta		•		an	u	03	uв			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	±	In Situ Test Details	Install- ation
	Composed of firm light grey gravelly calcared lar to subangular medium of very weak low to	ous			-											
medium density cha (WMCK) [WEST MEI from 9.30m to 9.40r angular to subangul density light grey cl grey. Stiff grey CLAY with (WMCK) [CAMBRID from 9.50m to 9.60r	Ilk. (CIRIA Grade Dm) BURY CHALK FORMATION] n structureless chalk composed of slightly clayey lar medium and coarse gravel . Gravel is very weak lov nalk composed of calcareous siltstone. Matrix is light frequent coprolites (<30mm x 10mm). GE GREENSAND MEMBER] n assumed zone of core loss ey CLAY with rare fossilised coprolites (<20mr	w						C 17	9.60-11.10	102	100				-	
10mm). Fissures are	randomly orientated extremely closely to ver- lating and planar, smooth, polished.				(5.50)			C 18	11.10-12.60	102	100			NA	- - - -	
								C 19	12.60-14.10	102	100					
Complete at 1	5.10m. Termination Reason: Achieved	1			15.10	-5.92		C 20	14.10-15.10	102	100				-	
															-	
	All depth in metres, all diameters in millii See header sheet for details of boring, pr		nd w	vater												
AGS	For details of abbreviations, see key. Print date and time 1					Log	g chec	ked by	David Howard					SOI	L enginee	RING

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	Cam	nbridge '	Waste \	Nate	r Trea	tment	Plant F	Relocation	on			\Box								ŀ	Hole ID	
Project	NIO	TE83	364												Exp	lorato	ory F	łole l	Log		RH (STW_(NN9
Enginee			tt MacD	onald E	}entle	ey															טוו_כ) I V V	103
Employ	er er		nale Lim	ited																		eet 1 of 1	L
Ground Lo Date Start			04mOD 17/2021						Coordinat Date Com			374.10E, :)7/2021	26093	33.60)N				Grid Incli	d ination	OSGB		
Top	Base			me Start	Date	e Tim	e End R			Barrel Type			nt Us	sed	Shorin	ng Used	Pit St	ability		Hation	Remarl	ks	
0.00 1.20	1.20 30.00	IP RC	28/07/20 29/07/20	021 16:00	28/0	07/2021 07/2021	L 17:30	CB CB	MM MM	NA Geobore S	NA	Insulate	ted hand Imec SN	d tools		one	l	able					
									 	(146)				•									
					2061												10/		CTDINE				
Date 1	Time	Depth	Depth	Depth	ROGF	₹E55		Rema				Date 1	Time		Depth	Dept	th C	Depth	STRIKE Water	r Time		Remark	
28/07/202	21 17:30	1.20	Casing 0.00	Dry		of Shift							IIIIe	S	Strike	Casin	ıg S	Sealed	Rose To	o Elapse	±d		S
29/07/202 29/07/202	21 17:30	1.20 21.20	0.00 2.85	Dry 21.10	End o	of Shift																	I
30/07/202 30/07/202 02/08/202	21 15:30	21.20 30.00 0.00	2.85 2.85 0.00	21.00 4.82	Drillir	t of Shift ing Comp allation Co	plete	orehole Con	mnlete														ا
02,00,20	.110.00	0.00	0.00		Hiosa.	llation c.	Jinpieco, c.	Jienoie ec	Присс														ا
		i																					١
		ı																					ا
		ı																					ا
			С	ABLE PER	₹CUSS	SION [DETAILS	-										SPT D	ETAILS				
Depth Top	Depth Base	Tim	e Start	Duratio	n	Tool			Remark	ks		Depth Top	Test Type			Report	ted R	esult		Hammer Seria Number	Energy Ratio	Depth Casing	Depth Water
, , , ,		†		+	+				-	-		104	-7-	+							1.00.	Cuoning	*****
	l																			l			
	l																			l			
	l																			l			
																				l			
Depth	Depth			ROTARY		SH DET	[AILS													l			
Тор	Base		sh Type	Return	n Co	olour	<u> </u>	F	Remarks											l			
1.20 6.20 7.70	6.20 7.70 9.20	AIF	IR/MIST IR/MIST IR/MIST	90 90 90	0	White Grey White														l			
9.20	30.00		IR/MIST	90		Grey														l			
	l																			l			
	ı						ĺ													ı			
	I					ļ	İ													l			
L	AMETER		DIAMETE	≟R			MANY	IC SAMI												l			
Depth Base	Diameter	r Depth Base	Diamete	ter Depth To		Depth Base	Diameter	r Durat		ample ecovery Ref	Run ference									l			
2.85 30.00	150 146	2.85 30.00	150 146																	l			
	l																			l			
	l																			l			
	l																			l			
<u> </u>	INSTA	ALLATIO	N DETAIL:	.S	\top		PIF	PE CONS	STRUCTIO	ON						D	EPTH	RELAT	TED REM	JARKS			
Distance	ID T	Type Re	esponse Re Top			Pipe Ref	Тор	Base	Diamete	er Pipe	Туре	Depth Top	Dep						Re	marks			
12.00 12.00	S1 G1	SP SP	1.50	12.00 Pi	ipe 1 P	Pipe 1 Pipe 2	0.00 0.00	1.50 1.50	50 19	PLAIN PLAIN			 -										
-					P	Pipe 2 Pipe 1	1.50 1.50	3.00 11.50	19 50	SLOTTED SLOTTED					ı								
						Pipe 1	11.50	12.00	50	PLAIN					ı								
				BACI	L KFILL	DETAIL	L.S										LO	CATIO	N DETAI	ILS			
Depth	Depth	$\overline{}$	Descrip					Rer	marks										narks				
-0.50	0.00	Upstandir	ing cover		\rightarrow	 							-				-						
0.00 0.50	0.50 0.75	Concrete Gravel ba	ackfill																				
0.75 1.50 12.00	1.50 12.00 30.00	Bentonite Gravel ba				Coment	t / Bentonite	- Grout															
12.00	30.00	Giode				Ceme	/ Demo	3 Glout															
	l																						
	Note	: All de	pth in met	troc all d		ore in r														\neg			
AGS		See he	eader shee	et for deta	ails of I	boring			ater.														
		For det	tails of ab																	_ <	III en	GINEE	יפוחפ
FINAL				Print r	date a	and tim	ie 12/09	9/2022 13	3:55		Lr	og check	red by	/ Dav	∕id Hov	vard				30	ic ciii	Sirice	KIIIG

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Issue.Revision No. 2.02

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatmen	nt Plan	t Reloca	tion										Hole ID	
	·							Explo	rato	ry Ho	le Lo	og	_		
Project No.	TE8364												E	3H_STW_	_009
Engi <mark>neer</mark> Employer	Mott MacDonald Bentley Barhale Limited													Sheet 1 of	9
Ground Level		pordinat	es	549374	10E, 2609	33.60	N I		Gri	id	O:	SGB		SHEEL I OI	3
Hole Type		clination		0.007.	204 2001				-						
,,		<u>ş</u>		Depth	Ι	şķ	Π	Compling		8 %	Ę				Τ
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	8	<u> </u>	In Situ Test Details	Instal
Tanan D		*	92224723	ness)		₿	<u> </u>	Details	Dia	₽ &	×				- 17
(TOP) [TOPSOIL]	lightly gravelly fine to medium SAND.			(0.50)	‡			0.05 -0.10 0.20 -0.25							,
				3	‡		В3	0.10-0.50							
	LK composed of soft to firm greyish white gravelly		T. II	0.50	11.04	1		0.50 -0.55 0.60 -0.65							
mudstone. (CIRIA		Grade Dm	Ti II	(0.70)]			0.50-1.00							1
(WMCK) (WEST M	IELBURY CHALK FORMATION]	Ě		rd -	}			100-110						9	-
	n density light greyish brown locally stained		1	1.20	11.04		ES 8	110-120	\vdash			 		-	1 1000
	HALK composed of calcareous SILTSTONE. 10 degrees medium to widely spaced stepped and	.		d .	1										
undulating rough	clean (Possibly CIRIA Grade A2) IELBURY CHALK FORMATION]			ī	1		C9	1.20-2.20	102	100	97	97			
(ANNICIÓ (ME21 M	IELBURY CHALK FORMATION]		1,000		1										141
				<u> </u>	7										-
	35m recovered as non intact core (subangular to to coarse gravel sized fragments)		1 1	4	}										HH
	•		1	(2.50)	}									13	-
			li li	4]										: #
				d.	-		C 10	2.20-3.70	102	97	87	87		8	1
			40	d	1										1-17:
				d	1										1.
			<u>, l, l, </u>	ת	1									15	1.1
	70m recovered as non intact core (subangular medium to ed fragments) (Drilling induced)	/	<u> </u>	3.70	11.04								NI		1 H
	k medium to high density light greyish brown ingish brown CHALK composed of calcareous	_	1 1	<u></u> .	1								450 950		18
SILTSTONE Discor	ntinuities. 1) 10 to 20 degrees medium spaced			4	1								930		17
	n. (Possibly CIRIA Grade A1) IELBURY CHALK FORMATION]		1	4]		C 11	3.70-5.20	102	100	87	87			
			1	[}									,12	
			3.45.0	ľ	}										
	20m recovered as non-intact core (subangular to		- 1											=	1 4.
subrounded fine t	to coarse gravel sized fragments)		P E	(3.00)	1				\vdash						1 1.
					1										1 11.
			7 7	_	1		C 12	5.20-6.20	102	92	83	83			1 1
			<u>l, l, </u>	1	1										
	Oden assumed some of ones loss			4 7	1										1:11
nom 6.12m to 6.2	20m assumed zone of core loss		T	4	1										11:
				Ц .]] H
Very weak to weal	k medium to high density light gray CHALK	+		6.70	11.04									-	18:
	areous SILTSTONE with closely spaced dark grey ne (<5-25mm x <5mm-50mm). Discontinuities: 1)		1, 1,	r :			C 13	6.20-7.70	102	99	76	75		8	14
40 to 60 degrees r	medium spaced planar smooth stained orangish		1, 1,	7	1										1 1.
	ravel infill (<2mm). (CIRIA Grade B2) IELBURY CHALK FORMATION]		T E	, ה	1										1.1
			1	<u>'</u>	1										14.
		\$ B2	<u> </u>	(2.28)	†								NI 240		: 1
		Grade	1	Į ()	1								330		11
			7	4	1										11:
gravel sized fragn	32m recovered as non intact core (angular fine to coarse nents)			d	1		C 14	770-9.20	102	98	70	57		53	3
				i	}] []
			2 D	П	}] [
	n density light grey and grey CHALK composed of	+	1	8.98	11.04							- 8			-: ⊞::
	ONE. Discontinuities: 1) 25 to 30 degrees closely ooth stained orangish brown. 2) 50 to 70 degrees	"	L all	4	1				\vdash						: H.
medium to widely	spaced stained orangish brown and with gravel	Ge 83	1 1	(1.72)	1				1				NI 160		₽H:
	IELBURY CHALK FORMATION]	Grade	<u> </u>	4	‡				102	100	89	66	260		110
	25m recovered as non intact core (aubangular to to coarse gravel sized fragments)		1	4	1		C15	9.20-10.70							1.1
								1 10.00							
B B N N N N N N N N N N	and decade to make all discourse the state of												<u> </u>		
ACS	All depth in metres, all diameters in millime See header sheet for details of boring, prog		water.												
AGO	For details of abbreviations, see key.														
FINAL	Print date and time 12/	09/2022	13:55		Lc	xg chec	cked b	y David Howa	rd				501	r engine	erinc
Form No. SIEXPHOL	ELOG Issue.Revision No. 2	05		Issue Dat	e 02/03/2(11R							Part	of the Bachy Soletan	cha Groun

Project Name	Cambridge Waste Water Treatm	ent Plar	t Reloca	tion										Hole ID	
								Explo	rato	ry Ho	le Lo	og			
Project No.	TE8364											_	E	3H_STW_	_009
Eng <mark>i</mark> neer	Mott MacDonald Bentley														_
Employer	Barhale Limited	C!'		E/027/	105 2600	22.60						~~		Sheet 2 of	3
Ground Level Hole Type	+11.04mOD IP+RC	Coordina		349314.	10E, 2609	#33.0UI	N		Gri	ка	O.	SGB			
role type	ii Tike			D		9	т			₽ ×	100	Π			Т
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Watenstrike		Sampling		Samp	SCR/Blows	Q.	ш.	In Situ Test	Install-
_		Š		ness)	Level	뢇		Details	Dia	TCR/Sample Recovery %	ğ	°		Details	ation
	n density light grey and grey CHALK composed on the composed of the composed o		1 1												, ,
spaced planar smoo	oth stained orangish brown. 2) 50 to 70 degree	s	1 1	4	-										1:11:
infill (<3mm), (CIRIA	spaced stained orangish brown and with gravel A Grade B3)			d .	1										1-1
(WMCK) (WEST ME	ELBURY CHALK FORMATION] I density light grey and grey CHALK composed (1 1	10.70	11.04				\vdash					1	
calcareous SILTSTO	NE. Discontinuities: 1) 10 to 30 degrees mediu		<u> </u>		1									-	
	oth clean, (CIRIA Grade A2) ELBURY CHALK FORMATION]		T T		‡										1
	odule (<10mm) of siltstone	2	1 1	,	1		c1	6 10.70-12.20	102	100	69	67	NI		
from 11.60m to 11	I. 70m 1 No. discontinuity 75 degrees planar smooth	Grade A2		(1.75)	1		-					"	210		
clean		ਭ	1.1	4	}								350		
from 12 05m to 12	2.20m recovered as non intact core (subangular to		<u> </u>	4										18	
subrounded fine to	o coarse gravel sized fragments)		1	4	1				\vdash						•
with extremely clo	2.45m becoming slightly sandy, locally glauconitic and usely spaced thick laminations to very thin beds of dark	_ }_	250	12.45	11.04										*****
	ey slightly sandy glauconitic CLAY Sand is fine.			12.70	11.04									100	11133771
	DGE GREENSAND MEMBER] 2.58m with occasional medium to coarse gravel sized	Λ	<u> </u>		1		c1	7 12.20-1370	102	100	17	14			
fragments of copic				,	1		١",	. 12.20-13 10	""	100	-"				-
predominantly 30 c	degrees closely spaced planar smooth.			:	1										
(GLT) [GAULT FORM	MATION		===		1										-
					1				\vdash						773732
				(2.50)	}										********
					1										
			F==		_		١.,								*****
			<u> </u>		1		[61	8 13.70-15.20	102	100					45551050
			<u> </u>		1										
			<u> </u>												
Striff fissured dark o	grey glauconitic CLAY. Fissures are 25 to 40 degi	2995		15.20	11.04				\vdash						
medium to widely	spaced planar smooth and polished.		F]	}										
(GLT) [GAULT FORM	MATION			<u> </u>	}										
]		l		l						
				•			C1	9 15.20-16.70	102	100					
			F==	-	1										
			===		1										100000
			<u> </u>	•	‡										32303550
			<u> </u>		1										
at 17.02m 1 No. no	odule (<15mm) of siltstone		-=-	1	1										-
			<u> </u>	-	1										
					}		C2	0 16.70-18.20	102	97					12124000
					1										
				_	1										
			F==		1										
			===		1									2.	7777777
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			<u> </u>		1		C2	1 18.20-19.70	102	97					
				1]										
				1 .]										-
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				-	1										*******
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B L .	All death is more and at the line					<u> </u>							Ь		
ACS	 All depth in metres, all diameters in millingsee header sheet for details of boring, pro 		water.												
200	For details of abbreviations, see key.						_								
FINAL	Print date and time 1		2 13:55				cked	by David Howa	rd					r engine	
Form No SIEXPHOLE	LOG Issue Revision No	. 2.05		Issue Dat	e 02/03/20	18							Part c	of the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatme	ent F	lant	Relocat	ion			Т							Hole ID	
Project No.	TE8364								Exploi	rator	у Но	le Lo	g		BH_STW_	009
Engineer	Mott MacDonald Bentley															
Employer Ground Level	Barhale Limited +11.04mOD	Coord	inate	s	549374	10E, 2609	33.601	J		Gri	d	09	GB		Sheet 3 of	3
Hole Type		Inclin		,	3 1337 1	101, 2003	33.001	•		GII	u		, GB			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test Details	Install- ation
	rey glauconitic CLAY. Fissures are 25 to 40 degri paced planar smooth and polished.	ees														-
(GLT) [GAULT FORM	ATION]				-			C 22	19.70-21.20	102	100					
at 22.15m 1 No. no	dule (<30mm) of siltstone							C 23	21.20-22.70	102	100				-	
from 23.50m to 23.	80m slightly sandy. Sand is fine				-			C 24	22.70-24.20	102	100				-	
			Unweathered		(14.80) -			C 25	24.20-25.70	102	100			NA	-	
					-			C 26	25.70-27.20	102	98				-	
from 28.40m to 28.	50m 1 No. fissure 70 degrees planar smooth							C 27	27.20-28.70	102	97				-	
					30.00	11.04		C 28	28.70-30.00	102	96				-	
Complete at 3	30.00m. Termination Reason: Achieved Scheduled Dep h				30.00	11.04										
	All depth in metres, all diameters in milling															



FINAL

For details of abbreviations, see key.

Print date and time 12/09/2022 13:55

Log checked by David Howard

Form No. SIEXPHOLELOG Issue.Revision No. 2.05 Issue Date 02/03/2018



Project	Name	Can	nbridge	Waste V	Nater Tre	atment	Plant I	Reloca	tion										Н	lole ID	
Project	No	TE8	364											Exp	lorato	ry Hole	Log		RH S	TW_C	110A
Enginee			tt MacD	onald B	entley													-	л <u>і_</u> С	1 V V C	10/1
Employ	er		hale Lim	iited				0		570		- 201	222.6				0			et 1 of 1	1
Ground Lo Date Start			17mOD 9/2021					Coordin Date Co	nates ompleted		9493.80I '09/202:		023.6	0N			Grid	l ination	OSGB 90° f o	m horizon	ntal
Тор	Base	Туре	Date Tir					Logge	Barrel Ty	pe Drill	Bit Pl	lant U			-	Pit Stability			Remark		
0.00 1.20	1.20 30.20	IP RC		021 16:30 021 07:30	08/09/202 10/09/202		CB CB	DT CJ	NA Geobore	NA PCE		lated har Soilmec S		s No	one	Stable					
									(146)												
					ROGRESS											WATER	STRIKE	:S			
Date 1	Time	Depth	Depth	Depth			Rema	arks			Date	e Time		Depth	Depth	Depth	Water	Time		Remark	KS.
08/09/202 09/09/202		1.20 1.20	0.00 0.00	Dry Dry	End of Shift Start of Shift								+	Strike	Casing	Sealed	Rose T	o Elapse	a		
09/09/202 10/09/202	21 17:30	27.20 27.20	2.75 2.75	4.15 3.60	End of Shift Start of Shift																
10/09/202	21 15:30	30.20			Backfill Com	ıplete; Boreh	iole Compl	ete													
		<u> </u>		ARI F PFF	RCUSSION	DETAILS										SPT D	ETAILS				
Depth	Depth	Tim	ne Start	Duration	1			Rema	arks		Depth				Report	ed Result		Hammer Seria Number	Energy	Depth	Depth
Тор	Base	+			+						Тор	Тур	pe		•			Number	Ratio	Casing	Water
				POTARY	 	TAILS					-										
Depth	Depth	Flu	sh Type	Flush	Flush	TAILS		Remark	's		•										
Top 1.20	9.20	Al	IR/MIST	Return 90	White	-					-										
9.20	30.20	Al	IR/MIST	90	Grey																
HOLE DI	AMETER	CASING	G DIAMETE	ER .		DYNAM	IC SAM	PLING			-										
Depth Base	Diameter	r Depth Base		er Depth To	Depth Base	Diameter	r Dura		Sample Recovery	Run Reference											
30.20	146	2.75	150	+	+		+		,		-										
	INSTA		N DETAIL		y: B: I	PII	PE CONS	STRUCT	ION		D 1				DE	PTH RELAT	TED REM	/IARKS			
Distance	ID .	Type Re	esponse Re Top		Pipe Pipe Ref Ref	Тор	Base	Diame	ter Pip	е Туре	Depth Top		epth Base				Re	marks			
Depth	Depth				KFILL DETA	ILS										LOCATIO		LS			
Top 0.00	Base 30.20	Grout	Descri	ption	+		Rer	marks			ļ					Ren	narks				
0.00		urout																			
	Note	es: All de	oth in me	tres, all di	ameters in	millimetr	es.											\top			
AGS		See he	eader shee	et for deta	ails of boring			ater.													
FINAL	=		talls Of all		date and tin	ne 12/09	9/2022 1	3:55			Log che	cked t	ov Da	vid Hov	vard			so	ıL end	ginee	RING
Form No. S	SIEXPHOL	EHDR			ssue.Revisior				Issue Date		-		, 50					Pr	rt of the Bac	hy Soletanche	e Group

Project Name	Cambridge Waste Water Treatmer	t Plan	t Relocat	ion									Hole ID	
Project No.	TE8364						Explo	orato	у Но	le Lo)g	l _R	H_STW_(1101
Engineer	Mott MacDonald Bentley												11_3177_0	JIUA
Employer	Barhale Limited												Sheet 1 of	4
Ground Level		ordinate			30E, 2610		N	Gri	d	09	SGB			
Hole Type	IP+RC Inc	clination 5	1		horizonta				<u>a</u> %	s				1
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum Level	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test Details	Install- ation
		Wea		ness)	Level	Wat	Details	Dia.	TCR	SCR			Details	ation
angular to subround	n slightly sandy slightly gravelly CLAY. Gravel is led fine to medium of flint. Sand is fine to coarse.			(0.30)			D 1 0.05-0.10 B 2 0.10-0.40							
Occasional roots. (TOP) [TOPSOIL]		/	×//×//	0.30	9.87		D 3 0.40-0.50							<u></u>
	ghtly gravelly sandy CLAY. Gravel is angular to	~		(0.00)			B 4 0.40-0.80							
(SUPD) [SUPERFICIA				(0.90)										
				1.20	8.97		B 6 0.80-1.20 D 5 1.00-1.10							
	yish brown slightly sandy slightly gravelly and is fine. Gravel is angular to subrounded fine to			1.20	0.91									}
coarse of flint. (SUPD) [SUPERFICIA				(0.65)										
	-			1.85	8.32		C 7 1.20-2.20	102	95					
calcareous CLAY. Gra	K composed of stiff greyish brown gravelly avel is angular to subangular fine to coarse of very	,		-										
(WMCK) [WEST MEI	idstone. (CIRIA Grade Dm) _BURY CHALK FORMATION]													
from 2.15m to 2.20i	n assumed zone of core loss													
							C 8 2.20-3.20	102	95					
				_										
from 3.15m to 3.20i	n assumed zone of core loss							_						
at 3.41m thin lamin	ation of orangish brown silt (<2mm)													
							C 9 3.20-4.70	102	100					
		- M												
		Grade		(4.84)								NA		
												IVA		-
				-]
from 5.44m to 5.51	n very stiff			-			C 10 4.70-6.20	102	100					
from 5.85m to 5.95i	n firm			-										-
from 6.20m to 6.39	m thin bed of very weak medium density chalk]				_						
composed of calcar														
Very weak medium	density greyish brown CHALK composed of			6.69	3.48									
calcareous MUDSTO	ONE. (unable to determine CIRIA Grade)			(0.58) _			C 11 6.20-7.70	102	100	51	51			
(WINCK) [WEST MEI	BURY CHALK FORMATION]			1 1										}
	Composed of very stiff greyish brown gravelly avel is angular to subangular fine to coarse of very	, g		7.27	2.90									
weak calcareous mu	idstone. (CIRIA Grade Dm)	Grade		(0.43) -	2 / 7									-
	BURY CHALK FORMATION] preyish brown CHALK composed of calcareous			7.70	2.47							F0		
	tinuities: 1) very closely to closely spaced mooth with brown staining. 2) 60-85 degrees	Grade B		(0.72)								50 90		
closely spaced undu B3)	lating smooth with brown staining. (CIRIA Grade	Ġ										150		-
(WMCK) [WEST MEI	BURY CHALK FORMATION]	٦		8.42	1.75		C 12 7.70-9.20	102	100	42	42		-	
very stiff gravelly ca	n medium bed of structureless chalk composed of Icareous clay. Gravel is angular to subangular fine to calcareous mudstone	Grade Dm		(0.65)										
Structureless CHALF	composed of very stiff gravelly calcareous CLAY.			9.07	1.10									
mudstone. (CIRIA Gr		· /		(0.34)	1.10			-				NA		
	_BURY CHALK FORMATION] ight grey CHALK composed of calcareous	/		9.41	0.76									}
	to determine CIRIA Grade) BURY CHALK FORMATION	de Dm		(0.64)				102	100	57	57			
	Composed of stiff gravelly calcareous CLAY.	Grade					C 13 9.20-10.70							
										L				
	All depth in metres, all diameters in millimet													
	See header sheet for details of boring, progr For details of abbreviations, see key.	ess and	water.											
FINAL	Print date and time 12/0	09/2022	13:55		Lo	g chec	ked by David Howa	ard				SOI	L engine	RING
Form No. SIEXPHOLEL				Issue Date	02/03/20							Part o	f the Bachy Soletand	he Group



Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Drainet No	TF02C/							Explo	ratoı	у Но	le Lo	og	l D	LL CT\A/ /	010A
Project No. Engineer	TE8364 Mott MacDonald Bentley													H_STW_0	JIUA
Employer	Barhale Limited													Sheet 2 of	4
Ground Level	+10.17mOD Coor	rdinate	!S	549493.8	30E, 2610	23.601	N		Gri	d	09	GB			
Hole Type	IP+RC Incli	nation	ı	90° from	horizonta	I	ı			ı				1	_
	D (0.)	Weathering	l	Depth	Datum	strike		Sampling		TCR/Sample Recovery %	lows			In Situ Test	Install-
	Description of Strata	Veath	Legend	(Thick- ness)	Level	Waterstrike		Details	Dia.	CR/Sa Recove	SCR/Blows	RQD	<u>u</u>	Details	ation
	Composed of stiff gravelly calcareous CLAY.			10.05	0.12			Details	Dia.		, 	\vdash		-	
mudstone. (CIRIA Gr															
	LBURY CHALK FORMATION] density light grey CHALK composed of calcareous			-											1
	ntinuities: 1) 5-10 degrees widely spaced planar -90 degrees medium spaced undulating planar	e A1		(4.00)									250		
smooth clean.	LBURY CHALK FORMATION]	Grade A1		(1.69)									670 750		
(WINCK) [WEST MEE	EBURT CHALK FORWATION;														
	53m thin bed of structureless chalk composed of stiff						C 14	4 10.70-12.20	102	100	69	69			
weak calcareous mu				11.74	-1.57									_	1
	glauconitic CLAY with abundant fossilised (4mm) and rare fossilised shell fragments (4mm		<u> </u>	(0.31)	1.00]
x 6mm). CAMBRIDG (GLT) [GAULT FORM	ie Greensand member Ation1 /	1		12.05	-1.88										
Stiff fissured dark gr	ey CLAY with rare nodules of siltstone (11mm x extremely closely to closely spaced planar		<u> </u>]
undulating smooth (GLT) [GAULT FORM	polished.		<u> </u>												
(GLI) [GAULI FORIVIA	ATION		<u> </u>				C 15	5 12.20-13.70	102	100					
			<u> </u>												7
			<u> </u>												
				-											
				(3.83) _											-
				-			C 16	5 13.70-15.20	102	100					-
				:											
				-											_
				-											-
	rk grey CLAY with rare nodules of siltstone			15.88	-5.71		C 17	7 15.20-16.70	102	100					-
closely to closely spa	subhorizontal to horizontal fissures are very aced planar undulating smooth clean.														
(GLT) [GAULT FORM	ATION]														}
				(1.57)											
from 17 19m to 17 /	45m 1 No. 90 degrees fissure planar polished													,	}
				17.45	-7.28		C 18	3 16.70-18.20	102	100					
	rk grey CLAY with rare nodules of siltstone (9mm re randomly orientated planar undulating smooth														
polished. (GLT) [GAULT FORM/	ATION]		<u> </u>	(0.79)											
				-											-
	rk grey CLAY with rare nodules of siltstone (6mm re randomly orientated planar undulating smooth.			18.24	-8.07										}
(GLT) [GAULT FORM				(0.72)											
			<u> </u>]											-
	rk grey CLAY with rare nodules of siltstone			18.96	-8.79		C 19	9 18.20-19.70	102	100					-
closely to closely spa	ssures are subhorizontal to horizontal extremely aced planar undulating smooth polished and		<u> </u>]											
polished.	al medium spaced planar undulating smooth			-											-
(GLT) [GAULT FORM	ATION]														
												\vdash			
Notes:	All depth in metres, all diameters in millimetre	<u> </u>													
AGS	See header sheet for details of boring, progres		water.												
	For details of abbreviations, see key.	/2251	12.55					D					SOI	L engine	Blue
FINAL Form No. SIEXPHOLEL	Print date and time 12/09 OG Issue.Revision No. 2.05		13:55	Issue Date	Lo: :02/03/20		ked b	y David Howar	a					f the Bachy Soletan	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
								Explo	ratoı	у Но	le Lo	og			2404
Project No.	TE8364												B	H_STW_()10A
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 3 of	4
Ground Level		rdinate	!S	549493.8	30E, 2610	23.601	N L		Gri	d	09	GB		311000 3 01	
Hole Type	IP+RC Incli	nation			horizonta										
		ring		Depth	Datum	rike		Sampling		nple y %	SWC			In Situ Test	Install-
	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike				TCR/Sample Recovery %	SCR/Blows	RQD	4	Details	ation
Verv stiff fissured da	ark grey CLAY with rare nodules of siltstone	3		11033)		>		Details	Dia.	2 %	Š				
(10mm x 16mm). Fis	ssures are subhorizontal to horizontal extremely aced planar undulating smooth polished and														
	al medium spaced planar undulating smooth		<u> </u>	-			C 20	19.70-21.20	400	400					-
(GLT) [GAULT FORM.	ATION]								102	100					
															-
from 21.45m to 21.	47m occasional coprolites (<8mm x 13mm)														}
11011/21.45111 to 21.5	47 III Occasional coprofices (commix 131mm)		<u> </u>	:											
			<u> </u>	:			C 21	1 21.20-22.70	102	100					-
			<u> </u>	-										-	-
			<u></u>												-
			<u></u>	-											-
			F	(0.04)											
			F	(6.91)										-	
			E-E-	:											
			<u> </u>	-			C 22	2 22.70-24.20	102	100					1
			<u> </u>												
			<u> </u>												
			E]
			<u> </u>												
			<u> </u>												
			<u> </u>				C 23	3 24.20-25.70	102	100			NA]
			<u> </u>										IVA		
			<u> </u>												
			<u> </u>]
Very stiff fissured da	ark grey CLAY with rare nodules of siltstone	-	===	25.87	-15.70										
(<11mm x 16mm). F	issures are randomly orientated extremely closely		<u> </u>	-										-	-
(GLT) [GAULT FORM.	ed planar undulating smooth polished. ATION]		<u> </u>												}======
			<u> </u>	(1.45)			C 22	4 25.70-27.20	102	100					
			<u></u>												
from 27.05m to 27	32m 1 No. 85 degrees fissure planar polished		<u></u>	-										-	
				27.32	-17.15										
(<11mm x 16mm) a	ark grey CLAY with rare nodule of siltstone nd rare fossilised shell fragments (4mm x 8mm).		<u> </u>	-											
Fissures are random (GLT) [GAULT FORM.	nly orientated undulating planar smooth polished. ATION]		<u></u>												
				_			C 25	5 27.20-28.70	102	100					
			<u> </u>												}
			<u></u>												
			<u> </u>	(2.88)											
			<u></u>												
			<u></u>											-	
	d shell fragment (4mm x 5mm) d shell fragment (4mm x 8mm)		<u> </u>	:			C 26	5 28.70-30.20	102	100					
at 29.42m fossilised	s shell fragment (4mm x 8mm)		F_=_				0 20	20.70-30.20							
			F_=_												
			† <u> </u>												
	All depth in metres, all diameters in millimetre			•			•		•						•
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.	s and v	water.												
FINAL	Print date and time 12/09	/2022	13:55		Lo	g chea	cked h	y David Howar	d				SOI	L engine	RING
Form No. SIEXPHOLEL				Issue Date	02/03/20	-		,					Part o	f the Bachy Soletand	he Group

Project Name	Cambridge Waste Water Treatn	nent P	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							E	Explor	ator	у Но	le Lo	g	l R	H_STW_C	10A
Engineer	Mott MacDonald Bentley]		
Employer Ground Level	Barhale Limited +10.17mOD	Cd	1:		F/0/02 0	005 2010	2001			C		00	GB		Sheet 4 of 4	′
Ground Lever Hole Type	IP+RC	Coord Inclina		5		30E, 26102 horizonta		ı		Grid	1	US	GB			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Details		Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
(<11mm x 16mm) a Fissures are random (GLT) [GAULT FORM at 29.99m fossilised	ork grey CLAY with rare nodule of siltstone nd rare fossilised shell fragments (4mm x 8m orly orientated undulating planar smooth polis	hed.	Weatherin	Legend	(Thick-		Waterstrik			Dia.	TCR/Sampl	SCRBlow.	RQD RQD	ш		
Notes:	All depth in metres, all diameters in milli	imetres.			<u> </u>											
AGS	See header sheet for details of boring, progress and water. For details of abbreviations, see key. NAL Print date and time 12/09/2022 13:55 Log check													SOI	L enginee	RING
Form No. SIEXPHOLEI		18	, 544						Part o	of the Bachy Soletanc	he Group					

Project	Name	Carr	ıbridge	Waste V	Vater Tre	atment	Plant f	Relocat	ion				\top					$\overline{}$	H	łole ID	
			_											Exp	lorato	ry Hole	Log				100
Project Engine		TE83		onald Be	antlay													R	H_5	TW_0	10B
Enginee Employ			nale Lim		Hitley														She	et 1 of 1	1
Ground L			26mOD					Coordin	ates	54	9493	3.73E, 2	61023	3.34N			Grio	1	OSGB		
Date Star	1		0/2021					Date Co			//10/2			· L	·			ination		m horizon	ıtal
Top 0.00	Base 1.20	IP	Date Tin 01/10/20	021 09:00	Date Tin 01/10/202	21 10:00	DS	AM	NA	N.	A I	Insulated		Tools No	ng Used F one	Pit Stability Stable	4		Remark	(S	
1.20	30.00	СР	01/10/20	21 10:00	07/10/202	:1 11:30	DC	AM	NA	N.	A	Dano	do 2000	′							
			I																		I
			I																		١
			I																		
				PF	ROGRESS	<u>_</u>					T^{\perp}					WATER	STRIKE	S			
Date 1	Time	Depth	Depth Casing	Depth Water			Rema	arks			D	Date Ti	ime	Depth Strike	Depth Casing		Water Rose T			Remark	(S
01/10/202		7.00 7.00	7.00 7.00	Dry 4.20	End of Shift Start of Shif						\dagger			3011.0	Cusing	000.00	Noce .	J Liupoc.	+		
04/10/202 05/10/202	21 17:30 21 07:30	16.50 16.50	13.00 13.00	4.50 4.50	End of Shift Start of Shif	t ft															١
05/10/202 06/10/202 06/10/202	21 07:30	30.00 30.00 12.00	13.00 13.00 12.00	4.50 4.50 0.50	End of Shift Start of Shift End of Shift	ft															١
07/10/202 07/10/202 07/10/202	21 07:30	12.00	12.00	0.50	Start of Shif		Borehole Co	mplete													١
																					١
																					١
																					١
				ARI F PFR	CUSSION	DETAILS					+					SPT F	DETAILS				
Depth	Depth	Tim	e Start	Duration	I			Rema	ırks			epth	Test	T	Report	ed Result	<u></u>	Hammer Serial	Energy	Depth	Depth
Тор	Base	+-		-	 	+					1	Top 1.50 2.50	Type S S	N=32 (4,6:7 N=34 (5,6:7	7,7,8,10)			AR3501 AR3501	75 75	1.50 2.50	Dry Dry
											3. 4.	3.50 4.50	S S	N=41 (3,4:6 N=36 (4,5:6	5,10,10,15) 5,8,9,13)			AR3501 AR3501	75 75	3.50 4.50	Dry Dry
											5. 6.	5.50 6.50	S S	N=35 (4,4:8 N=29 (4,5:6	3,7,9,11) 5,6,8,9)			AR3501 AR3501	75 75	5.50 6.50	Dry Dry
											8	7.50 8.50 9.50	S S S	N=27 (3,4:5 N=32 (4,5:7 N=34 (4,6:7	7,8,8,9)			AR3501 AR3501 AR3501	75 75 75	7.50 8.50 9.50	4.50 4.50 4.50
	<u></u>	<u></u>		DOTADV	FILICH D	TTAII C					10 12	.0.50 .2.00	S S	N=28 (3,5:6 N=25 (2,3:4	5,7,7,8) 4,6,7,8)			AR3501 AR3501	75 75	10.50 12.00	5.00 4.50
Depth	Depth	T Flur	sh Type	Flush				Remarks			13	.3.50 .5.00	S S	N=32 (3,4:6 N=39 (3,5:8	5,8,9,9) 3,9,10,12)			AR3501 AR3501	75 75	13.00 13.00	4.50 4.50
Тор	Base			Return	Colour	+		Norma	•		18	.6.50 .8.00 .9.50	S S S	N=46 (5,7:1 N=47 (3,6:8 50/285mm	3,10,12,17)		١	AR3501 AR3501 AR3501	75 75 75	13.00 13.00 13.00	4.50 4.50 4.50
											21 22	1.00 2.50	S S	50/280mm 50/270mm	ı (7,9:11,13, ı (6,8:11,14,	,15,11/55mm ,16,9/45mm))	AR3501 AR3501	75 75	13.00 13.00	4.50 4.50
											25	4.00 5.50 7.00	S S S	50/235mm	(7,9:12,14,	,17,10/45mm ,18,6/10mm) 5,17,6/10mm		AR3501 AR3501 AR3501	75 75 75	13.00 13.00 13.00	4.50 4.50 4.50
												8.50	S	50/230mm	(8,9:13,15	,18,4/5mm)	'	AR3501 AR3501	75	13.00	4.50
																			ı		
HOLE DI	AMETER	CASING	DIAMETE	:R		DYNAM	IIC SAM	PLING			1								I		
Depth Base	Diameter	Depth Base	Diamete	er Depth To	Depth Base	Diamete	er Dura		Sample lecovery	Run Referenc	.e								ı		
30.00	200	13.00	200																ı		
																			ı		
																			ı		
		<u> </u>									╽										
D: .		Re	N DETAILS		ipe Pipe		PE CONS				De	epth	Deptl	h	DE	PTH RELA					
Distance 12.00		iype	Тор	Base R	Ref Ref	Top 0.00	Base 11.50	Diamet 50	PLAIN	ре Туре		Тор	Base				Re	emarks			
					Pipe 1	11.50	12.00	50	SLOTTE	ED											
				BACK	FILL DETA	All S	<u></u>				+					LOCATIO	N DETA	II S			
Depth	Depth	\Box	Descrip				Rer	marks									marks				
-0.50 0.00	0.00 0.50	Upstandin Concrete	ng cover		+						+							-			
0.50 0.70	0.70 11.50	Gravel bad Bentonite	ckfill																		
11.50 12.00	12.00 30.00	Gravel bad Bentonite	ckfill																		
	Note				ameters in														-		
AGS	1			obreviation	ils of borin is see key.	g, progres	SS allu W	atei.											•		
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Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Issue.Revision No. 2.02

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatment	Plant	: Relocat	ion										Hole ID	
Project No.	TE8364							Exploi	ratoi	у Но	le Lo	9	R	H_STW_(110R
Eng <mark>in</mark> eer	Mott MacDonald Bentley													0	3100
Employe <mark>r</mark>	Barhale Limited													Sheet 1 of	3
Ground Level Hole Type		dinate nation			73E, 2610: honzonta		N		Gri	d	OS	GB			
пов туре	ireci iiiciii	_		Depth	TRAIZUITA		Г				Ę.				Т
	Description of Strata	Weathering	Legend	(Thick- ness)	Datum Level	Waterstrike	_	Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	80	<u></u>	In Situ Test Details	Install- ation
	m slightly gravelly sandy CLAY. Sand is fine to	~	W(W)			-		0.05	Dia	Ĕ Œ	· ·				- ° 6 ° 5
quartzite.	gular to subrounded fine to medium of fiint and			(0.40) 0.40	9.86		D3	0.05-0.30 0.3 0							0 0
	gravelly sandy CLAY Sand is fine to coarse. Gravel			0.60	9.66			0.30-0.60 0.60							
(SUPD) SUPERFICIAL				(0.50)			B 6	0.60-1.00							
	avelly CLAY, Sand is fine to coarse. Gravel is led fine to coarse of first and quartzite.			1.10	9.16		D 7	1.10						,	
(SUPD) SUPERFICIAL CHALK recovered as	L DEPOSITS) / very stiff light greyish brown slightly gravelly		1.1	(0.40)			B 8	1.10-1.50							
	AY. Sand is fine to coarse, Gravel is angular to medium of flint and calcareous siltstone			1.50 -	8.76									SPT(S) N=32 (4,6.7,7,8,10)	
	LBURY CHALK FORMATION] Stiff light grey mottled brown slightly gravelly		1 1					1.50-1.95 0 1.50-2.00						150	
	AY Sand is fine to coarse. Gravel is angular to coarse very weak medium density calcareous		<u> </u>	2											
siltstone.	LBURY CHALK FORMATION)														
(7	-										SPT(S) N=34 (5,6:7,8,8,11)	
			1					1 2.50-2.95 2 2.50-3.00						2.50	
			1 1	-										,	
			7 7												
			J. J.	-										SPT(S) N=41 (3,4:6,10,10,15)	
								3 3.50-3.95 4 3.50-4.00						3.50	
				-											
			7 35												
				-										SPT(S) N=36 (4,5:6,8,9,13)	
				(6.50)				5 4.50-4.95 6 4.50-5.00						4.50	
			I, in a little	2											
				-										SPT(S) N=35 (4,4:8,7,9,11)	
								7 5.50-5.95 8 5.50-6.00						5.50	
			T T	Ħ											
			-1-1												
from 6 50m to 8 50m	m gravelly		7 7 7	-										SPT(S) N=29 (4,5:6,6,8,9)	-
								9 6.50-6.95 0 6.50-7.00						6.50	
			<u> </u>	1											
			1	-										SPT(S) N=27 (3,4:5,6,7,9)	
			Tr. Tr					1 7.50-7.95 2 7.50-8.00						7.50	
	very stiff grey slightly sandy gravelly calcareous	1		8.00 -	2.26										
coarse very weak me	coarse. Gravel is angular to subrounded fine to edium density calcareous siltstone.														
(MMCK) MEZ MET	LBURY CHALK FORMATION]		1 1	-										SPT(S) N=32 (4,5:7,8,8,9)	
			PT					3 8.50-8.95 4 8.50-9.00						8.50	
				(3.40) =											
				:										SPT(S) N=34 (4,6:7,8,9,10)	
								5 9.50-9.95 6 9.50-10.00						9.50	
							T		T						C707 (7)77
Notze	All depth in metres, all diameters in millimetre	s											1	4	
AGS	See header sheet for details of boring, progress		water.												
FINAL	For details of abbreviations, see key. Print date and time 12/09.	13:55		lo	g chex	;kerl !	by					SOI	L engine	RING	
Form No SIEXPHOLEU				Issue Date	02/03/20			•					Part o	f the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatme	nt Plant	Relocat	ion										Hole ID	
	·							Exploi	rato	ry Ho	le Lo	og			
Project No.	TE8364												B	H_STW_0)10B
Eng <mark>inee</mark> r	Mott MacDonald Bentley														
Employer Ground Large	Barhale Limited +1026mOD C	oordinate	<u> </u>	540402	72E 2610	22241			Gri	id	0	SGB		Sheet 2 of	3
Ground Level Hole Type		ociumation			73E, 2610. honzonta		4		GII	u	O.	жав			
того турс					T RATIFICATION OF THE PARTY OF					8 %	le.				
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u></u>	In Situ Test Details	Install- ation
		Wea		ness)	DEVE	Wat		Details	Dia	75 %	ä	_		Details	audi
	very stiff grey slightly sandy gravelly calcareous coarse. Gravel is angular to subrounded fine to														
coarse very weak me	edium density calcareous siltstone. LBURY CHALK FORMATION]			:										:	
(MAIN CIV) (MAEST INIEL	EBUKT CHALK FORINGION]		7 1											SPT(S) N=28 (3,5;6,7,7,8)	
1								7 10.50-10.95 8 10.50-11.00						10.50	
				-										-	
			d _{oe} I w	:										:	
	y sandy CLAY Sand is fine to medium. Frequent			11.40	-114		D2	9 11.40						K 11.50 - 12.00	
(WMCK) [CAMBRID	biack phosphate nodules (<20mm). GE GREENSAND MEMBER]			(0.50)										K 11.50 - 12.00	
Very stiff fissured thi	inly laminated dark grey CLAY. Fissures are	_	= = :	11.90	-1.64		D3	0 11.90						SPT(S) N=25 -	
	i extremely closely to closely spaced undulating			:			n3	1 12.00-12.45						(2,3:4,6,7,8)	
(GLT) [GAULT FORM/				:				2 12.00-12.50						12.00	
			<u> </u>											:	
			F===	7										-	
			===	:											
from 13 50m to 140	00m slightly sandy. Sand is fine			-										SPT(S) N=32	
								3 13.50-13.95						(3,4-6,8,9,9) 13.50	
				_			B3	4 13.50-14.00]	
] :	
				_											
				-										SPT(S) N=39 - (3,5:8,9,10,12)	
			===	:				5 15.00-15.45 6 15.00-15.50						15.00	
			===	-											
			===												
			===	-											
														SPT(S) N=46 -	
				:			 n 3	7 16.50-16.95						(5,7:10,10,11,15) 16.50	
			<u> </u>					8 16.50-17.00						16.50	
				- 1											
			F												
				•										;	
				:											
				-										SPT(S) N=47	
								9 18.00-18.45						(3,6:8,10,12,17) 18.00	
				<u>:</u>			84	0 18.00-18.50] :	
			===	:										:	
			===	:										arrio) so mos	
			====				۱.,	1 19.5 0 -19. 9 4						SPT(S) 50/285mm (4,8-10,12,15,13/6	
				:				2 19.50-19.94 2 19.50-20.00						0mm) 19.50	
			† -				T		H						annin V
							1								
<u></u>						L			L						
Contract Con	All depth in metres, all diameters in millime		******												
	See header sheet for details of boring, prog For details of abbreviations, see key.	iess and	water.												
FINAL Print date and time 12/09/2022 13:55 Log checked by													SOI	r eudiuse	RING
Form No. SIEXPHOLEIG	OG Issue Revision No. 2	05		leeua Data	02/03/20	18							Part o	f the Rachy Soletano	ha Grovin

Project Name	Cambridge Waste Water Treatr	ment Plan	t Relocat	ion									Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley						Ехр	lorato	ry Ho	le Lo	9	В	H_STW_0	10B
Employer	Barhale Limited												Sheet 3 of 3	3
Ground Level Hole Type	+10.26mOD IP+CP	Coordinate Inclination			3E, 26102 horizonta		N	Gr	id	OS	GB			
пос туре	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
				-									-	
				-			D 43 21.00-21.43 B 44 21.00-21.50						SPT(S) 50/280mm- (7,9:11,13,15,11/5 5mm) 21.00	
from 22.50m to 23.0	00m slightly sandy. Sand is fine			-			D 45 22.50-22.90 B 46 22.50-23.00						SPT(S) 50/270mm- (6,8:11,14,16,9/45 mm) 22.50	
							D 47 24.00-24.42 B 48 24.00-24.50						SPT(S) 50/270mm- (7,8:10,13,17,10/4* 5mm) 24.00	
				(18.10) -			D 49 25.50-25.88 B 50 25.50-26.00						SPT(S) 50/235mm- (7,9:12,14,18,6/10 mm) 25.50	
from 27.00m to 30.0	00m very stiff						D 51 27.00-27.30 B 52 27.00-27.50						SPT(S) 50/235mm- (8,10:12,15,17,6/1 0mm) 27.00	
from 28.50m to 29.0	00m slightly sandy. Sand is fine						D 53 28.50-28.8t B 54 28.50-29.00						SPT(S) 50/230mm- (8,9:13,15,18,4/5 mm) 28.50	
Complete at 3	30.00m. Termination Reason: Achieve Scheduled Dep h	ed		30.00	19.74		D 55 30.00						-	
Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.														
FINAL Form No. SIEXPHOLEL	ked by						IL ENGINEE of the Bachy Soletanch							

Project	Name	Can	nbridge	Waste '	Water Tre	atment	t Plant l	Relocat	ion										Н	lole ID	
Project	No	TF8	364										Ex	plorat	ory l	Hole I	Log	l R	H 5	ΓW_C	11Δ
Enginee				Donald E	Bentley														11_5		, , ,
Employ			hale Lin	nited																et 1 of 1	1
Ground L Date Star			3mOD)8/2021					Coordina Date Co	ates mpleted		643.40E, 09/2021		16.60N				Grid	nation	OSGB	m horizor	ntal
Top	Base	Туре		me Start	Date Tin	ne End	Rig Crew		·			ant Us	sed Shor	ing Used	Pit S	tability		Hation	Remark		itai
0.00	1.20	IP		021 09:00	31/08/202		Craig Blackett	DT	NA	NA		ted han		None	St	table					
1.20	12.20	RC		021 10:00	31/08/202		Craig Blackett	AL	Geobore (146)			ilmec SI									
12.20	14.50	RC RC		021 09:45	01/09/202		Craig Blackett	AL AL	HWF	PCD		ilmec SI									
14.50 21.20	21.20	RO		021 11:00	01/09/202		Craig Blackett Craig	CB	Geobore : (146) NA	S PCD Drag E		ilmec SI ilmec SI									
21.20			02/00/2	.021 00.00	02,00,202	2 00.10	Blackett	0.5		Diag :	J										
			Depth		ROGRESS								Depth	Dep		/ATER Depth	STRIKE Water	S Time			
Date 31/08/202		Depth 12.20	Casing	Water	End of Shift		Rema	arks			Date 31/08/20		Strike			Sealed	Rose To			Remark noted, incre	
01/09/202	21 07:30	12.20 12.20 21.20	1.45 1.40 2.50	3.10 2.80 3.30	Start of shift	t					31/08/20	JZ1 11:3	4.00				0.00	"		ise not recor	
02/09/202	21 07:30	21.20 30.20	2.50 2.50	3.20 3.70	Start of shif Drilling Con	t															
03/09/202 03/09/202		30.20 0.00	2.50 0.00	3.40	Start of shif Backfill Con		hole Compl	ete													
			(ABLE PEI	RCUSSION	DETAILS	;									SPT D	ETAILS				
Depth Top	Depth Base	Tim	ne Start	Duratio	n Too	ı		Rema	rks		Depth Top	Tes		Repoi	rted R	esult		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
юр	Dase										юр	Тур	e						Ratio	Casing	vvatei
Depth	Depth	1		ROTAR\ Flush	/ FLUSH DE	TAILS															
Top 1.20	Base 7.70		ISh Type	Retur 90				Remarks	S												
7.70	30.20		IR/MIST	90	Grey																
HOLE DI	AMETER			ER		DYNAM	IIC SAM		`ammla	Run	-										
Depth Base	Diamete	Base	Diame	ter Depth 1	Top Depth Base	Diamete	er Dura		Sample ecovery R												
2.50 30.20	150 146	2.50	150																		
<u> </u>	1	IR.	N DETAII		Pipe Pipe		PE CONS				Depth	De	nth		EPTH	I RELAT	ED REN				
Distance	ID .	Type "	Top		Ref Ref	Тор	Base	Diamet	er Pipe	Туре	Тор	Ba	se			T	Re	marks			
											3.80 12.20 13.80	3.5 13. 13.	.20 Self B	Pressure Di oring Press Pressure Di	suremet	er Test at	tempted. A	borted at 12	.80m due to	o no penetra	tion
											21.70	21.		oring Press							
Depth	Depth	1			KFILL DETA	ILS									LO		N DETAI	LS			
Тор	Base	Grave	Descr	iption			Rer	narks								Rem	narks				
0.00	30.20	Grout																			
<u> </u>																					
					iameters in ails of borin			ater.													
AGS					ns see key.	J., J.															010-
FINAL Form No. S	ILADI IO.	TIIDD			date and tir				ssue Date			ked by	/ David H	oward						sinee	
∎roim No. S	ICAPHUL	FUNK			Issue.Revisio	11 INO. 2.UZ		ı	ssue Date	ZZ/U0/2(ΛTΩ							Par	ι or the Bacl	ny Soletanch	aroup

Project Name	Cambridge Waste Water Treatment	Plant	Reloca	tion										Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo	g	R	H_STW_0	111Λ
Engineer	Mott MacDonald Bentley													11_3177_(JIIA
Employer	Barhale Limited													Sheet 1 of	4
Ground Level		dinate			40E, 2611		N		Gri	d	OS	GB			
Hole Type	IP+RC+RO Incli	nation	1		horizonta					0 0				<u> </u>	
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test	Install-
	·	Wear		ness)	Level	Wate		Details	Dia.	TCR/	SCR	~		Details	ation
	n slightly sandy slightly gravelly CLAY. Gravel is ded fine to medium of flint. Sand is fine to coarse.			(0.35)				0.05-0.10 2 0.20-0.25							
Occasional roots. \((TOP) [TOPSOIL]	,	1		0.35	8.58		В3	0.10-0.40 0.40-0.50							
Firm brown slightly	gravelly sandy CLAY. Sand is fine and medium. subrounded fine to coarse of flint.	_		0.58	8.35		ES !	5 0.50-0.55						,	
(SUPD) [SUPERFICIA	L DEPOSITS]			(0.62)			B 6	0.40-0.80							
gravelly sandy CLAY.	K composed of firm light greyish brown slightly Sand is fine and medium. Gravel is angular to			-				0.80-1.20 1.00-1.10						-	-
	coarse of flint. (CIRIA Grade Dm) LBURY CHALK FORMATION] /	1		1.20 (0.40)	7.73		ES 8	3 1.10-1.20							}
	K composed of firm yellowish grey slightly sandy N. Sand is fine and medium. Gravel is subangular			1.60	7.33										
	to coarse of flint and extremely weak chalk. (CIRIA						C 1	0 1.20-2.20	102	100					
(WMCK) (WEST MEI	LBURY CHALK FORMATION]			-										-	
gravelly calcareous	K composed of firm yellowish grey slightly CLAY. Gravel is subangular to subrounded fine to														
	weak chalk. (CIRIA Grade Dm) LBURY CHALK FORMATION]	Grade Dm		(1.80) -											
		Grad		1											
				-									NA	-	
				1											
Structureless CHAL	K composed of stiff yellowish grey mottled and			3.40	5.53		C 1	1 2.20-4.60	102	79					
	areous CLAY with closely spaced thin beds of density yellowish grey chalk composed of														
calcareous siltstone				(1.20)		∇								HPD 3.80	
(WIVICIO) [WEST WILL	EBURT CHARKTONIMATION;			(1.20) -	1									-	
				1											
Very weak low dens	ity yellowish grey CHALK composed of calcareous			4.60	4.33		C 1	2 4.60-4.70	102	100	100	100		•	-
SILTSTONE with med	dium spaced medium beds of stiff yellowish grey continuities 1) 5 to 35 degrees medium spaced			1	1										
undulating rough w	ith slight orangish brown staining. (CIRIA Grade			-										-	
B2) (WMCK) [WEST MEI	LBURY CHALK FORMATION]			1											
				-			C 1	3 4.70-6.20	102	100	100	85			
				(2.85)									100 300	-	
				1									700		
															-
				-			C 1	4 6.20-7.70	102	100	100	100		-	
		Grade B2													
Weak high density o	grey CHALK composed of grey calcareous	Grad		7.45	1.48							-]
SILTSTONE with med	dium spaced thin beds of stiff grey calcareous 1) 10 to 45 degrees medium spaced undulating														
smooth with clay int	fill. (CIRIA Grade B2)														
(WMCK) [WEST MEI	LBURY CHALK FORMATION]														
							C 1	5 7.70-9.20	102	100	80	60			
				(245)						100			50	,]]
				(3.15)									286 530		
				-										-	
]
				-					102	100	83	67			
					1										
				-			C 1	6 9.20-10.70							
	All depth in metres, all diameters in millimetre		1	1	1		1		1	1					1
	See header sheet for details of boring, progres For details of abbreviations, see key.	s and v	water.												
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Form No. SIEXPHOLEL				Issue Date	202/03/20	-		,					Part o	f the Bachy Soletand	he Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Droiget No	TEOOCA							Explo	rato	у Но	le Lo	og		LI CT\A/ (Λ11 Λ
Project No. Engineer	TE8364 Mott MacDonald Bentley													H_STW_0	OTTH
Employer	Barhale Limited													Sheet 2 of	4
Ground Level	+8.93mOD Coo	rdinate	es	549643.4	40E, 2611	16.601	V		Gri	d	09	GB			
Hole Type	IP+RC+RO Incl	ination		90° from	horizonta		1			ı				T	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test Details	Install- ation
	grey CHALK composed of grey calcareous														-
clay. Discontinuities	dium spaced thin beds of stiff grey calcareous 1) 10 to 45 degrees medium spaced undulating														
	LBURY CHALK FORMATION]			10.60	-1.67										
	grey slightly sandy slightly gravelly CLAY. Sand is angular to subrounded fine to coarse of black			(0.30) 10.90	-1.97										
coprolite. (WMCK) [CAMBRID	GE GREENSAND MEMBER]	1		10.50	-1.51										-
Stiff fissured dark gr	rey CLAY with occasional nodules of siltstone Fissures are 0 to 10 degrees extremely closely		<u></u>		-										-
spaced planar smoo (GLT) [GAULT FORM	oth polished.						C 17	10.70-12.20	102	93					-
(GEI) [GAGEI FORIVI	ATON		<u></u>												
				_	-										-
			<u></u>												
			<u></u>	-											-
					-										
				(4.80)											
				(4.60)			C 18	3 12.20-14.50	73	96				HPD 13.50	
			<u></u>												-
			<u></u>												
			<u></u>												
				:	-		C 19	14.50-15.20	102	100					
				-											
	60m with rare nodules of pyrite (40mm x 55mm). degrees closely spaced.				-								NA		
				15.70	-6.77										
(<15mm x <20mm).	ark grey CLAY with occasional nodules of siltstone Fissures are 0 to 25 degrees closely spaced		<u></u>	15.70	0.77		C 20	15.20-16.70	102	100					-
planar smooth polis (GLT) [GAULT FORM.				-											7
			<u> </u>												
			E-I-	-											-
			E-I-				6.31	16 70 10 20	102	100					
			E-I-	-	-		C 2.	16.70-18.20	102	100					-
			E	(5.50)											
			E	-											-
				-	-										-
				_			C 22	18.20-19.70	102	100					-
			<u> </u>	:											
				-											-
				:	-										
															1
Notes:	All depth in metres, all diameters in millimetre	es.													
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.		water.												
FINAL	Print date and time 12/09	9/2022	13:55		Lo	g chec	ked h	y David Howar	d				SOI	L engine	ering
Form No. SIEXPHOLEL				Issue Date	02/03/20	-	1	,					Part o	f the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatme	ent Plai	nt Reloca	tion									Hole ID	
Project No.	TE8364						Explo	orato	ry Ho	le Lo	og	R	H_STW_0	711Δ
Engineer	Mott MacDonald Bentley												11_3100_0	JIIA
Employer	Barhale Limited												Sheet 3 of	4
Ground Level Hole Type		Coordina Inclination			40E, 2611 horizonta		N	Gr	id	O:	SGB			
поте туре	IF+RC+RO			Depth		_			음 %	۸s				
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike	Sampling	_	TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test Details	Install- ation
Very stiff fissured da	ark grey CLAY with occasional nodules of siltsto			ness)		Ň	Details	Dia.	TCF Re	SC				
	Fissures are 0 to 25 degrees closely spaced		<u> </u>	-										
(GLT) [GAULT FORM.			==		-		C 22 10 70 21 20							-
			F	-	1		C 23 19.70-21.20	102	100					
			F	-										-
Potany open hole de	rilling. Grey CLAY. (Driller's description)			21.20	-12.27									
(GLT) [GAULT FORM.			<u> </u>	-	1									
			<u> </u>	(1.00)]							NR	WRSBP 21.70	
			F	- (2.55)	-								1111051 22110	
			F-=-	22.20	-13.27									-
	ark grey CLAY with occasional nodules of siltsto Fissures are 0 to 25 degrees closely spaced	ne	F	- 22.20	-13.27		624 2222 2270	100	400					
planar smooth polis (GLT) [GAULT FORM.	hed.		F-=-	-	-		C 24 22.20-22.70	102	100					
(GEI) [GAGEI TORRIN	Allonj		F	-	1									
			<u> </u>	-]									
			<u> </u>	-										
			<u> </u>		1		C 25 22.70-24.20	102	100					
			<u> </u>	-]									
					1									
			<u></u>	(3.90)	1									
]]
			<u> </u>	_	1		C 26 24.20-25.70	102	100					
				-]									
			<u></u>	-										
from 25.50m to 25.55mm)	60m with rare fossilised shell fragments (<5mm x		<u></u>		1									
Simily				-]									
Vansatiff dayle avail	CLAY with rare nodules of siltstone (<15mm x			26.10	-17.17							NA		
20mm).			<u></u>	-	1									
(GLT) [GAULT FORM.	ATIONJ		<u> </u>	-]		C 27 25.70-27.20	102	100					
			<u> </u>	_	-									
			<u> </u>		1									
			<u> </u>	-]									}
from 27 E0m to 27	60m with rare fossilised shell fragments (5mm x 5mm)		<u> </u>	(2.80)	-									
110111 27.30111 to 27.5	oom with rate rossilised shell hagments (Shiin X Shiin)		F_=		1									
			F_=]		C 28 27.20-28.70	102	100					
			F	-	-									
			F	-	-									
			<u> </u>]									1
	The state of the s			28.90	-19.97									
occasional fossilised	ark brownish grey slightly sandy CLAY with d shell fragments (10mm x 15mm). Sand is fine.			-	1									
(GLT) [GAULT FORM.	ATIONJ]			102	100]
				(1.30)	-		C 29 28.70-30.20							
					1									
				4	1			+						1
Notes:	All depth in metres, all diameters in millim	netres				<u> </u>								
AGS	See header sheet for details of boring, pro		d water.											
	For details of abbreviations, see key.	2 /02 /22	12.12.55				Lade B 100					SOI	L engine	BIUG
FINAL Form No. SIEXPHOLEL	Print date and time 12 OG Issue.Revision No.		.∠ 13:55	Issue Dat	Lo e 02/03/20	_	ked by David Howa	ıu					of the Bachy Soletand	

Project Name	Cambridge Waste Water Treatn	nent Plar	nt Reloca	tion									Hole ID	
Project No.	TE8364						Explo	rator	у Но	le Lo	og	l R	BH_STW_C	1114
Engineer	Mott MacDonald Bentley											"	011_3100_0	,,,,,,
Employer	Barhale Limited												Sheet 4 of	4
Ground Level	+8.93mOD	Coordina			40E, 2611 horizonta			Gri	d	OS	GB			
Hole Type	IP+RC+RO	Inclinatio		Depth	norizonta				e %	s.				
	Description of Strata	Weathering	Legend		Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
occasional fossilised	rk brownish grey slightly sandy CLAY with I shell fragments (10mm x 15mm). Sand is fin	ne.		30.20	-21.27									
(GLT) [GAULT FORM)	ATION] 80.20m. Termination Reason: Achieve Scheduled Dep h	/I			1									
·	Scheduled Dep h													
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Notes:	All depth in metres, all diameters in milli	imetres												\Box
ACS	See header sheet for details of boring, pr													
FINAL	For details of abbreviations, see key. Print date and time	12/09/202	2 13:55		Lo	g check	ed by David Howar	d				so	ıL enginee	RING

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	Cam	ıbridge	Waste \	Nater Tr	eatme	nt Plant F	Relocati	on										H	lole ID	
Project	NI.	TE83	264											Exp	lorato	ry Hole	Log	_B	μς ⁻	TW_C	11R
Enginee			t MacD	onald E	entley														1 13	1 0 0 C	110
Employ	er		ale Lim	ited																et 1 of 1	L
Ground L Date Star		+8.93	mOD 9/2021					Coordina Data Cor			50.20E, 9/2021		.12.30	NC			Gric		OSGB	m horizor	ıtal
Top	Base			ne Start	Date Ti	me Enc	Rig Crew	Date Cor Logger	Barrel Type			nt Us	sed	Shorin	g Used I	Pit Stability		nation	Remark		ILdI
0.00 1.20	1.20 30.00	IP CP	15/09/20 15/09/20	21 16:00	15/09/20 21/09/20	21 17:00	DC DC	AM	NA NA	NA NA	Insula	ted han ando 20	d tools		one	Stable					
1.20	1		20, 00, 20	21 11.00	21/00/20	21 10.00		7.00													
	L																				
			Donth		ROGRES	5							- I r	Depth	Depth	WATER Depth	STRIKE Water		1		
Date 1		Depth 2.00	Depth Casing 2.00	Depth Water	End of Shi		Rema	ırks			Date 16/09/20		` <u>:</u>	Strike 4.20	Casing 4.20		Rose To		Medium	Remark	is .
16/09/202 16/09/202	21 07:30	2.00 2.00 20.20	2.00 2.00 11.60	Dry Dry Dry	Start of Shi	ift					16/09/20	121 09:0	,0	4.20	4.20	10.70	3.00	20	iviedium	1	
17/09/202 17/09/202	21 07:30	20.20 30.00	11.60 11.60	3.50 3.50	Start of Sh End of Shi	ift															
20/09/202	21 17:30	30.00 9.70	11.60 9.70	3.50 1.00	Start of Sh End of Shi	ft															
21/09/202 21/09/202		9.70 0.00	9.70	1.00	Start of Sh Installatio		e, Borehole Cor	mplete													
			C	ABLE PER	CUSSION	I DETAI	LS									SPT D	ETAILS				
Depth Top	Depth Base	Time	e Start	Duratio	n To	ol		Remar	ks		Depth Top	Tes Typ			Report	ed Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
											1.20 2.20	S S	N=	=10 (2,2:2 =25 (3,4:5	,6,7,7)			AR3501 AR3501	75 75	1.20 2.20	Dry Dry
											3.20 4.20 5.20	S S S	N=	=24 (2,4:5 =29 (4,5:7 =26 (3,4:5	,7,7,8)			AR3501 AR3501 AR3501	75 75 75	3.20 4.20 5.20	Dry 3.00 3.00
											6.20 7.20	S	N=	=26 (4,5:6 =28 (4,5:6	,7,6,7)			AR3501 AR3501	75 75	6.20 7.20	3.00 3.00
											8.20 9.20	S S	N= N=	=34 (4,6:7 =36 (5,6:7	7,8,10,9) 7,9,10,10)			AR3501 AR3501	75 75	8.20 9.20	3.00 3.00
				ROTARY	 Flush [ETAILS					10.70 12.20 13.70	S S S	N=	=23 (3,4:6 =29 (4,6:8 =31 (5,6:7	,7,7,7)			AR3501 AR3501 AR3501	75 75 75	10.70 11.60 11.60	5.00 Dry Dry
Depth Top	Depth Base	Flus	sh Type	Flush Returi				Remarks			15.20 16.70	S	N=	=32 (5,6:7 =35 (4,5:8	,8,9,8)			AR3501 AR3501	75 75	11.60 11.60	Dry Dry
тор				Retur	Colou						18.20 19.70	S S	N=		,10,12,12)			AR3501 AR3501	75 75	11.60 11.60	Dry Dry
											21.20 22.70 24.20	S S	N=	=54 (7,9:1	(,10,11,14) 0,12,15,17 1,10:11 1		a)	AR3501 AR3501 AR3501	75 75 75	11.60 11.60 11.60	3.50 3.50 3.50
											25.70 27.20	S	50	/250mm	(6,9:12,14	,16,8/25mm) .4,17,6/5mm)	,	AR3501 AR3501	75 75	11.60 11.60	3.50 3.50
											28.70	S	50.	/225mm	(9,11:14,1	.5,17,4/0mm)		AR3501	75	11.60	3.50
	AMETER		DIAMETE	:R			MIC SAM														
Depth Base	Diameter	Depth Base		er Depth T	op Depth Base	Diame	eter Dura			Run ference											
30.00	200	11.60	200																		
			N DETAIL		Pipe Pipe	T	PIPE CONS	TRUCTION	T		Depth	l Dei	pth		DE	PTH RELA					
Distance 9.70		ype		Base	Ref Ref	Іор	Base	Diamete 50	PLAIN	Туре	Тор	Ba					Re	marks			
9.70	21	26	1.50	9.70	ipe 1 Pipe 1 Pipe 1		9.20	50	SLOTTED												
						<u> </u>															
Depth	Depth				(FILL DET	AILS										LOCATIO		LS			
Top -0.50	Base 0.00	Upstandir	Descrip	otion			Rer	narks								Ren	narks				
0.00 0.50	0.50 0.80	Concrete Gravel ba	ckfill																		
0.80 1.50	1.50 9.70	Bentonite Gravel ba																			
9.70	30.00	Grout																			
	Note	s: All der	nth in me	tres all di	ameters i	n millim	etres														
AGS		See he	ader shee	et for deta	ils of bori	ng, prog	ress and wa	ater.													
FINAL	=	roi aei	ans of ab		ns see key		/09/2022 1	2.55		I o	n chec	kad by	, Day	vid Hov	ward			SOI	L en	ginee	RING

Log checked by David Howard

Part of the Bachy Soletanche Group

Issue Date 22/06/2016

FINAL

Form No. SIEXPHOLEHDR

Print date and time 12/09/2022 13:55

Project Name	Cambridge Waste Water Treatme	ent Plan	t Reloca	tion									Hole ID	
Project No.	TE8364						Explo	rator	y Ho	le Lo	og -	l _D	H_STW_	011D
Eng <mark>inee</mark> r	Mott MacDonald Bentley												U_3144_	OTID
Employer	Barhale Limited												Sheet 1 of	3
Ground Level		Coordinat	es	549650.	20E, 2611	12.30	1	Gri	d	OS	GB	•		
Hole Type	IP+CP	Inclinatio	n T		honzonta	1			م ف				<u> </u>	т —
1	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	g G	<u>u</u>	In Situ Test	Install-
		X.		ness)	Level	Ş.	Details	Dia.	75 88 80 80	ğ	~		Details	ation
	on stightly sandy slightly gravelly CLAY. Sand is the subangular to subrounded fine to coarse.	ine		(0,30)	:		D1 0.10 B2 0.10-0.20							.00
(TOP) [TOPSOIL]	vn slightly sandy gravelly CLAY. Sand is fine to	_/	V//////	0,30 (0,30)	8.63		D 3 0.30 B 4 0.30-0.50							
	igular to subrounded fine to coarse.		+ 1-1	0.60	8.33		D 5 0.60							
CHALK recovered as	s very stiff light brownish grey locally stained			}	1		B 6 0.60-1.00							
to subrounded fine		lar			3								SPT(S) N=10	3
(WMCK) (WEST ME	ELBURY CHALK FORMATION]		1 1	(1.40)]		D7 120-165						(2,22,2,3,3)	
				•	1		B8 120-170						K 1.50 - 9.70	- 300
]								K 1.50 - 9.70 K 1.50 - 9.70], [];
	s stiff fissured light grey mottled brown slightly			2.00	6.93		D9 200							
to subrounded fine	areous clay. Sand is fine to coarse. Gravel is angu to coarse of flint and extremely weak low densi	ty]]		D 10 2.20-2.65						SPT(S) N=25 (3,4:5,6,7,7)]: ;
very closely spaced	e. Fissures are 10–30 degrees extremely closely I undulating rough randomly orientated.	Srade Dm		(1.20)	-		B 11 2.20-2.70						2.20	
(WMCK) (WEST ME	ELBURY CHALK FORMATION]	8			1									
			والوالو			몬	D 12 3.00							
	is stiff fissured light grey mottled brown slightly elly calcareous clay. Sand is fine to coarse. Grave		7 7	3.20	5.73								SPT(S) N=24 (2,4:5,6,6,7)	
angular to subround	ded fine to coarse of very weak medium density]		D 13 3.20-3.65 B 14 3.20-3.70						3.20	
spaced płanar undu	e Fissures are extremely closely to very closely ulating rough 80-90 degrees, 5-10 degrees		7 7		1									
randomly orientates (WMCK) [WEST ME	id. Elbury Chalk Formation]		7 7				D 15 4.00							
from 4.20m to 7.00 siltstone	Om gravelly subrounded calcareous medium density		7 7	1	1								SPT(S) N=29 (4,5:7,7,7,8)	
CHLBLARS			7	, .	-		D 16 4.20-4.65 B 17 4.20-4.70						4.20	
			<u> </u>	1	1									
		Grade Dm	1000	(3.80)			D18 5.00						5	
		9	ין יין		1								SPT(S) N=26 (3,4:5,6,7,8)	
					}		D 19 5.20-5.65 B 20 5.20-5.70						5.20	- Tallar
			J' I'	1	‡									
			r r				D 21 6.00							
					1								SPT(S) N=26 (4,5:6,7,6,7)	
					-		D 22 6.20-6.65 B 23 6.20-6.70						6.20	
				1]									
CHALK recovered as	is very stiff fissured slightly sandy gravelly		1 1	7.00	1.93		D 24 7.00							-
catcareous clay. San	nd is fine to medium. Gravel is angular to coarse of very weak medium density calcareou]								SPT(S) N=28 (4,5:6,7,8,7)	
siltstone. Fissures a	are randomly orientated extremely closely to ver ulating planar rough.			1 .	1		D 25 7.20-7.65 B 26 7.20-7.70						7.20	
	ELBURY CHALK FORMATION]			1]									
				4 4	-		D 27 8.00							₩
		_		1]								SPT(S) N=34 (4,6:7,8,10,9)	7
		Grade Dm		(3.70)	1		D 28 8.20-8.65 B 29 8.20-8.70						8.20	
		8		-]		D 15 010-0.70							
			1, 1,		-		D 30 9.00							
			 	}]								SPT(S) N=36	
			<u> </u>		1		D 31 9.20-9.65 B 32 9.20-9.70						(5,6:7,9,10,10) 9.20	
				1	•		B 32 920-9.70							
				1	1		D 33 10 00	_						*******
Notes.	: Al <mark>l depth in metres, all diameters in millin</mark> See header sheet for details of boring, pro		water	<u> </u>	1	<u> </u>	l		<u> </u>					
AGS	For details of abbreviations, see key.													
FINAL	Print date and time 1		2 13:55	low-s D			ked by David Howa	rd					L ENGINE	
Form No SIEXPHOLEI	LOG Issue.Revision No.	4.03		issue Dat	e 02/03/20	10						i Parto	of the Bachy Soletan	uie Group

Project Name	Cambridge Waste Water Treatme	ent Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo	g	В	H_STW_0)11B
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 2 of 3	3
Ground Level		Coordinate	!S	549650.2	20E, 2611	12.301	N		Gri	d	OS	GB			
Hole Type	IP+CP	Inclination		90° from	horizonta	l	1								
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
calcareous clay. Sand subrounded fine to siltstone. Fissures as closely spaced undu (WMCK) [WEST ME]. Stiff fissured dark grid degrees extremely crough smooth occas (GLIT) [GAULIT FORM/	.BURY CHALK FORMATION] ey CLAY. Fissures are 5-20 degrees and 80-90 losely to very closely spaced planar undulating ionally polished. ATION]	s ry		10.70	-1.77	M	D 36	10.70-11.15 10.70-11.20 12.00 12.20-12.65 12.20-12.70	Dia.	TC Re	38			SPT(S) N=23 (3,4:6,5,6:6) 10.70	
from 13.70m to 30.0	00m very stiff			-				13.70-14.15 13.70-14.20						SPT(S) N=31 (5,6:7,8,8,8) 13.70 _	
								15.20-15.65 15.20-15.70						SPT(S) N=32 (5,6:7,8,9,8) 15.20	
				-				16.70-17.15 16.70-17.20						SPT(S) N=35 (4,5:8,9,8,10) 16.70 _	
								18.20-18.65 18.20-18.70						SPT(s) N=35 (5,7:7,8,9,11) 18.20	
				-				19.70-20.15 19.70-20.20						SPT(S) N=43 (6,8:9,10,12,12) 19.70	
AGS	All depth in metres, all diameters in millin See header sheet for details of boring, pro For details of abbreviations, see key.	gress and				0.0000	l lead by	David Howar	1		<u> </u>		SOI	L enginee	RING



Project Name	Cambridge Waste Water Treatn	nent Pl	ant	Relocat	ion									Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley							Explo	rator	у Но	ile Lc	og	В	H_STW_0	11B
Employer	Barhale Limited													Sheet 3 of 3	
Ground Level	+8.93mOD	Coordi		;		0E, 26111		V	Gri	d	OS	GB			
Hole Type	IP+CP Description of Strata	Inclina	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	ш	In Situ Test Details	Install- ation
	ey CLAY. Fissures are 5-20 degrees and 80-90	0	>				>	Details	Dia.	Ε. Θ.	0,			-	
degrees extremely of rough smooth occas (GLT) [GAULT FORM	closely to very closely spaced planar undulationally polished.							D 49 21.20-21.65 B 50 21.20-21.70 D 51 22.70-23.15 B 52 22.70-23.20						SPT(s) N=44 (6,7:9,10,11,14) 21.20 SPT(s) N=54 (7,9:10,12,15,17) 22.70	
					(19.30)			D 53 24.20-24.64 B 54 24.20-24.70						(7,10:11,13,15,11/1 65mm) _ 24.20	
								D 55 25.70-26.10 B 56 25.70-26.20						(6,9:12,14,16,8/25 - mm) 25.70	
								D 57 27.20-27.58 B 58 27.20-27.70						SPI(S) 50/230mm (8,10:13,14,17,6/5 mm) 27.20	
						21.07		D 59 28.70-29.08 B 60 28.70-29.20						SPT(S) 50/225mm- (9,11:14,15,17,4/0 imm)	
	30.00m. Termination Reason: Achieve Scheduled Dep h				30.00	21.01		Ø01 SU.9U							
AGS	All depth in metres, all diameters in milli See header sheet for details of boring, p For details of abbreviations, see key.	rogress a											50'	L ADGISSO	
FINAL	Print date and time	12/09/2	022 1	13:55		Log	g chec	ked by David Howar	rd				501	r euginee	KIIIG

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	Carr	nbridge	Waste V	Nater Tre	atment	Plant I	Reloca	ition										Н	lole ID	
Project	No	TE8	364											Exp	lorato	ry Hole	Log		RH S	TW_C	112Д
Enginee				onald B	entley													-)i i <u> </u>	1 V V C	/
Employe	er		nale Lim	ited				04:.				205.20	11000	-011						et 1 of 1	1
Ground Le Date Start			2mOD 8/2021					Coordin Date Co	nates ompleted		19712.9 2/08/20	90E, 26 021	i1183.5	30N			Gric Incli	d ination	OSGB		
Тор	Base	Туре	Date Tir				-	Logge	er Barrel T	Type Drill	l Bit	Plant		- 1	-	Pit Stability			Remark	(S	
0.00	1.20	IP DC		021 14:30	09/08/2021 12/08/2021		Craig Blackett	DT AL (NAV	NA / Goobo			nsulated I Soilme		ls No	one	Stable					
1.20	30.35	RC	09/06/20	021 16:00	12/08/202		Craig Blackett	AL/MV	Geobor (146		ו	50IIIIe	C SIVIO								
				ļ																	
				P!	ROGRESS						\top					WATER	STRIKE	ES .			
Date T	Гіте	Depth	Depth Casing	Depth Water	T		Rema	arks			Da	ate Tin	ne	Depth Strike	Depth Casing	n Depth	Water Rose T	r Time		Remark	(S
09/08/202 10/08/202	21 07:30	1.20 1.20	0.00 0.00	Dry Dry	End of Shift Start of shift	t					+		\dashv	June	Cuome	J 500.00	Noss .	О пара	iu		
10/08/202 11/08/202	21 17:30 21 07:30	8.70 8.70	8.70 8.70	1.20 1.20	End of Shift Start of shift	t															
11/08/202 12/08/202 12/08/202	21 07:30	21.35 21.35 0.00	21.35 21.35 0.00	2.80 2.25	End of Shift Start of shift Backfill Com	t	alo Compl	lata													
12,00,20	:1 10.55	0.00	0.00		Dackini co	piete, porc	ioie co	ere													
			C.	ABLE PEF	RCUSSION	DETAILS					-					SPT D	ETAILS				
Depth Top	Depth Base	Tim	e Start	Duration	n Tool			Rema	arks		Dep To		Test Type		Report	ed Result		Hammer Seria Number	Energy Ratio	Depth Casing	Depth Water
												`\									
<u> </u>					 Flush de	TAILS					1										
Depth Top	Depth Base	Flu	sh Type	Flush Return				Remark	(S		7										
1.20 6.70	6.70 8.70	V	NATER NATER	90 50	White White						1										
8.70 11.20	11.20 30.35		IR/MIST IR/MIST	90 90	White Grey																
Depth		Denth	DIAMETE		Denth	DYNAM			Sample	Run	=										
Base 4.40	Diameter 150	Base 4.40		er Depth To	op Base	Diameter	r Dura		Recovery	Referenc	e										
30.35	146	30.35	146																		
	INST/	L ALLATIO	N DETAIL:	.S		PIF	PE CONS	STRUCT	ΓΙΟΝ		+				DE	PTH RELAT	 ΓED REN	MARKS			
Distance	ID 1	Туре Ре	esponse Re Top		Pipe Pipe Ref Ref	Тор	Base	Diame	eter Pip	ре Туре	Dep To		Depth Base				Re	emarks			
								1			4.2	20	4.20 7.70			remeter Test tometer test					
											13.2	.20	13.20	Self Borir	ıg Pressur	remeter Test					
Danah	Danah			BACK	KFILL DETAI	ILS										LOCATIO	N DETA	ILS			
Depth Top 0.00	Depth Base 30.35	Grout	Descrip	otion	\perp		Rer	marks								Rem	narks				
0.00	30.35	Grout																			
	Note	s: All de	nth in me	tres, all di	ameters in	millimetr	es.														
AGS		See he	eader shee		ails of boring			ater.													
FINAL		Tor de	Lans Or ab		date and tin	 ne 12/09	9/2022 1	3:55			Loa cl	hecked	bv Da	avid How	vard			so	ıL end	ginee	RING
Form No. S	IEXPHOL	EHDR			ssue.Revisior				Issue Dat	te 22/06/2			_, _,					Pa	rt of the Bac	hy Soletanche	e Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion			\neg							Hole ID	
	-							Explo	rator	у Но	le Lo	g		LL CTIAL (012A
Project No. Engineer	TE8364 Mott MacDonald Bentley												B	H_STW_(JIZA
Employer	Barhale Limited									_	_			Sheet 1 of	4
Ground Level		rdinate nation		549712.9	90E, 2611	83.301	V		Gri	d	OS	GB			
Hole Type	IP+RC mon		T	Depth		ě	$\overline{}$	- 4:		ele %	٧s				T
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test Details	Install- ation
MADE GROUND: D:	ark brown slightly gravelly sandy clay with	×		ness)	-	Š	D1	Details 0.05	Dia.	TCF	SC			<u> </u>	
frequent rootlets. Sa angular to subround	and is fine to coarse. Gravel sized fragments are ded fine to medium of flint, quartz and brick.			(0.50)	-		ES 2	2 0.20 0.20-0.40							
	K composed of stiff light grey slightly gravelly	1		0.50	8.12			0.50 5 0.60							1
fine to coarse of flin	s fine to coarse. Gravel is angular to subrounded nt and extremely weak chalk composed of			(0.70)	<u> </u>		В6	0.50-0.80 0.90							
siltstone. (WMCK) [WEST ME	ELBURY CHALK FORMATION]			130			ES 8	8 1.00 1.00-1.20						-	7
brown gravelly calca	K composed of stiff light grey stained orangish- areous CLAY. Gravel is subangular to subrounded	e Dm		1.20 (0.50)	8.12		-	1.00 1.20					NA	1	
Grade Dm)	very weak low density calcareous siltstone. (CIRIA	Grade Dm		1.70	8.12		C1	0 1.20-2.20	102	100	0	0	IVA		
Very weak medium	ELBURY CHALK FORMATION] density light grey CHALK composed of calcareous	1		1./~	0.12			0 1.20-2.20	102	100	Ĭ				
SILTSTONE. Discont very closely spaced	tinuities are 1) 0-30 degrees extremely closely to I planar rough occasionally stained orange. 2)	B4/5		7.42	1								15	-	
orange. (CIRIA Grad		Grade B4/5		(1.13)	:								20 60		
(WMCK) [WEST ME	ELBURY CHALK FORMATION]	-] :	-										
	density light grey CHALK composed of calcareous tinuities are 0-20 degrees very closely to closely	\vdash	井井	2.83	8.12		C 1	1 2.20-3.70	102	100	100	47		1 .	
spaced planar rough	h with rare orange staining. (CIRIA Grade B3) ELBURY CHALK FORMATION]	Grade B3		(0.87)	1								40 200		
(viviony (vivion inic		Gra] ` _	-								200		-
	light grey gravelly calcareous CLAY. Gravel is	\vdash		3.70	8.12									-	
density calcareous	medium of extremely weak slow and medium siltstone. (possible Grade Dm)			(0.45)	1								NA		-
Assumed zone of co	ELBURY CHALK FORMATION] ore loss. CHALK (Driller's Description)	1		4.15	8.12									WRSBP 4.20	
(WMCK) [WEST ME	ELBURY CHALK FORMATION]			-	1		C 1	2 3.70-5.20	102	30	16	16	NR		-
				(1.05)	1										
				_	-									-	
	medium density light grey CHALK composed of NE. Discontinuities are 1) 0-20 degrees very		井井	5.20	8.12									-	
closely to closely sp	paced planar and rough occasionally stained egrees closely spaced planar and rough			1 -	1										
	d orange. 3) 70-90 degrees widely spaced planar nally stained orange. (CIRIA Grade B3)]	-		C 1	3 5.20-6.70	102	99	99	76			
(WMCK) [WEST ME	ELBURY CHALK FORMATION]			-	1			0 0.20 0.10	102	""				-	
				:	1										
				1 -	-										
] :	1									,	
] :	1										
		B3			-								20		
		Grade B3		(6.10)	1		C 1	4 6.70-8.70	73	100	100	77	160 200	HPD 7.70	
				1 -	-										-
]	-										
				-	1										
				:	-										
				-	1									-	-
]	1		C 1!	5 8.70-9.70	102	100	100	87			
					-										
					1										
	All I al control in the control in t						\perp								
AGS Notes:	: All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water.												
	For details of abbreviations, see key. Print date and time 12/09.	/2022	12.55				alcod I	au David Hausa	al				SOI	L engine	ering
FINAL Form No. SIEXPHOLEL			15.55	Issue Date	e 02/03/20		, Keu I	by David Howar	u					of the Bachy Soletano	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo	og	 B	H_STW_()12A
Engineer	Mott MacDonald Bentley													0.,,	J 12/ (
Employer	Barhale Limited													Sheet 2 of	4
Ground Level		rdinate	!S	549712.9	90E, 2611	108.88	V		Gri	d	09	GB			
Hole Type	IP+RC Incli	nation		1			l			0 0				I	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	۳	In Situ Test Details	Install- ation
	medium density light grey CHALK composed of NE. Discontinuities are 1) 0-20 degrees very														:
closely to closely sp	paced planar and rough occasionally stained egrees closely spaced planar and rough						C 16	9.70-11.20							
occasionally stained	d orange. 3) 70-90 degrees widely spaced planar						010	5.70 11.20	102	100	100	89]
	ally stained orange. (CIRIA Grade B3) LBURY CHALK FORMATION]														
				-											-
Very stiff dark grey	gravelly CLAY. Gravel is subrounded medium to			11.30	8.12										
coarse of coprolites				11.43	8.12										
Very stiff fissured th	ninly laminated dark grey CLAY. Fissures are 0-40														
70-90 degrees med	y to closely spaced planar undulating smooth and lium spaced planar and smooth.			(1.02)			C 17	11.20-12.70	102	83					
(GLT) [GAULT FORM	ATION]														}
Assumed zone of co	ore loss. Grey CLAY (Driller's Description).			12.45	8.12										-
(GLT) [GAULT FORM			F_=_	:											
			F_=_	(0.98)											
			F_=_:	:										WRSBP 13.20	
V	sinh landing to did all and CLAV Figures and 0.40			13.43	8.12		C 18	3 12.70-13.85	102	28					
degrees very closely	ninly laminated dark grey CLAY. Fissures are 0-40 y to closely spaced planar undulating smooth and		<u> </u>	-]]
(GLT) [GAULT FORM			<u> </u>												
from 13.85m to 16.	85m occasional nodules of siltstone (5mm x 5mm).		<u> </u>	-											-
]
				-			C 19	3 13.85-15.35	102	100					-
				:											
				-											
															}
															-
			<u> </u>												
			<u> </u>												
			<u></u>				C 20	15.35-16.85	102	100					
				:											
			F	(8.12)											
			E-E-	(6.12)											
			<u> </u>	-											-
			<u> </u>]
			<u> </u>	_			C 21	16.85-18.35	102	100					
			<u> </u>												
			<u> </u>	-											[
			<u> </u>												
			<u> </u>	-											<u> </u>
			<u></u>												
from 18.85m to 21.	55m rare nodules (<5mm x 5mm) of pyrite.		<u> </u>												}
			<u> </u>				C 22	2 18.35-19.85	102	100					
			<u></u>												
	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		vater.	<u>I</u>	I	<u> </u>	1		I	<u> </u>	<u> </u>				1
AGS	For details of abbreviations, see key.														NO.55
FINAL	Print date and time 12/09.		13:55	1 2		~	ked b	y David Howar	d					L engine	
Form No. SIEXPHOLEI	LOG Issue.Revision No. 2.05			issue Date	02/03/20	18							Part o	f the Bachy Soletand	ne Group

Project Name	Cambridge Waste Water Treatmer	nt Plan	t Reloca	tion			\neg						\neg	Hole ID	
								Explo	rator	ry Hc	ole Lo	og			2424
Project No. Engineer	TE8364 Mott MacDonald Bentley												R	H_STW_C)12A
Employer	Barhale Limited													Sheet 3 of	4
Ground Level		oordinate		549712.9	90E, 2611	.83.30N	N		Gri	d	09	SGB	_		
Hole Type	IP+RC In	nclination	_	Τ	Τ	T ey				<u>%</u> ه	Γ _ω			T	$\overline{}$
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test	Install-
	·	Wes		ness)	Level	Wat		Details	Dia.	TCR/ Rec	SCR	, r		Details	ation
degrees very closely	hinly laminated dark grey CLAY. Fissures are 0-40 ly to closely spaced planar undulating smooth and	\Box	<u> </u>	-					T		Γ	$\lceil \rceil$	_		
	dium spaced planar and smooth.		- <u>-</u> -	1	1										
	•		F=-	-]		C 23	3 19.85-21.35	102	100					
from 20.85m to 21	1.45m 2 No. nodules (<5mm x 5mm) of siltstone.		E]	_									_]
			E]	-										
			F=_	21 55]						\vdash	\vdash			-
(5 x 7mm) of siltsto	hinly laminated dark grey CLAY with rare nodules one. Fissures are 0 to 30 degrees closely to mediur	m	F	21.55	8.12										
spaced planar rough (GLT) [GAULT FORM	jh.		F		1									_	
	4.35m rare nodules (5mm x 7mm) of siltstone.		F_=_	1 .]		C 24	4 21.35-22.85	102	100					
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			<u> </u>]										
			<u> </u>	(2.80)	-							\vdash		_	
			F_=_	<u></u>	1										
			F		-										
			F_ <u>-</u> _]		C 25	5 22.85-24.35	102	100					
			F]	-										
			E- <u>-</u> -	-]										
Very stiff fissured th	hinly laminated grey CLAY. Fissures are 0 to 30	-		24.35	8.12							\vdash			
degrees closely spa (GLT) [GAULT FORM	aced planar smooth.	_	L- <u>-</u> -	-]										
	•	Unweathered	<u></u>	-	‡								NΙΛ		
		Jnwea	<u> </u>	-]		C 26	6 24.35-25.85	102	100			NA		
]	<u> </u>		-										
			<u> </u>]										
from 25.85m to 26	5.50m occasional nodules of siltstone (<5mm x 5mm)		<u> </u>	1	1						-	\vdash			
			F	-	-									-	
			E==-	1 .	1									,	
			E]	1		C 27	7 25.85-27.35	102	100					
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			F	(6.00)	}										-
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			E- <u>-</u> -	-] .	1				102	100					-
			<u></u>	-]		C 29	9 28.85-30.35						-	
				·	-										
	s: All depth in metres, all diameters in millime See header sheet for details of boring, progr						T								
AGS							" ancinos	יכיםכ							
FINAL	Print date and time 12/	ked b	by David Howar	rd				SOI	ır enginee	RING					

Issue Date 02/03/2018

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

oject Name	Cambridge Waste Water Treat	ment Pla	nt Reloca	tion									Hole ID	
oject No.	TE8364				Explo	orato	ry Ho	le Lo	og	В	H_STW_0	012/		
gineer nployer	Mott MacDonald Bentley Barhale Limited												Sheet 4 of	4
ound Level le Type	+8.12mOD IP+RC	Coordina Inclination		549712.	90E, 2611	.83.30N		Gri	id	OS	GB			
71	Description of Strata	Weathering		Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	RQD	<u>"</u>	In Situ Test Details	Insta atio
egrees closely spa	ninly laminated grey CLAY. Fissures are 0 to 3 aced planar smooth.			-	-		Dottailo	Jan.						
LT) [GAULT FORM Complete at	30.35m. Termination Reason: Achiev	red	+-	30.35	8.12								-	-
	Scheduled Dep h				1									1
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NI-1-	· All donth in materia all discrete	llimetre -		1								1		
Notes	: All depth in metres, all diameters in mi See header sheet for details of boring, For details of abbreviations, see key.		d water.											
												- co	1 000000	DIC



Project	Name	Cam	nbridge	: Waste	Wa	ter Tre	atmer	nt Plant F	Relocati	ion										Н	lole ID	
Drainet	Ma	TE8:	264												Ехр	lorato	ry Hole	Log	_B	⊔ ς ⁻	TW_0	12R
Project Enginee				Donald	Ben	ıtley														l I5	1 V V	TED
Employ	er	Bark	nale Lir																		et 1 of 1	L
Ground L Date Star			5mOD 9/2021						Coordina Date Co			12.20E 9/2021	•	182.1	LON			Gric	nation	OSGB		
Top	Base			ime Star	rt Da	ate Tim	ne End			Barrel Type			ant U	sed	Shorin	g Used F	Pit Stability			Remark		
0.00	1.20	IP		2021 10:00		13/09/202		Danny Cundill	SAN				ted Har	nd too		one	Stable		Inspec	ction pit: H	and dug	
1.20	30.00	СР	13/09/	2021 11:00	1	15/09/202	1 15:00	Danny Cundill	SAN			D	ando 20	000								
			Depth			GRESS									Depth	Depth	WATER	STRIKE Water				
Date 1		Depth 12.00	Casing		r	nd of Shift		Rema	ırks			Date 13/09/20			Strike 5.20	Casing 5.20		Rose T		Medium	Remark	.s
14/09/202	21 07:30	12.00 30.00	11.60 11.60	3.00 Dry	St	tart of shift nd of Shift	t					13/03/20	JZ1 13.		3.20	3.20		4.00	20	Wicaidiii		
15/09/202 15/09/202	21 07:30	30.00 0.00	11.60 0.00	10.00) St	tart of shift	t	ehole Comple	ete													
			1	CABLE PI	ERCU	ISSION	DETAIL	S									SPT D	ETAILS				
Depth Top	Depth Base	Tim	e Start	Durati	on	Tool	1		Remai	rks		Depth Top	Tes	- 1		Reporte	ed Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
												1.20 2.20	S S	N	I=24 (3,4:5 I=26 (3,5:7	,6,6,7)			AR3501 AR3501	75 75	1.20 2.20	Dry Dry
												3.20 4.20 5.20	S S	N	I=26 (2,5:7 I=24 (3,5:6 I=30 (2,5:6	,6,7,5)			AR3501 AR3501 AR3501	75 75 75	3.20 4.20 5.20	Dry Dry Dry
												6.20 7.20	S	N	I=26 (2,4:6 I=24 (4,4:6	,7,6,7)			AR3501 AR3501	75 75	6.20 7.20	5.00 5.20
												8.20 9.20	S S	N	I=35 (3,5:7 I=42 (5,6:8	,9,9,10) ,9,10,15)			AR3501 AR3501	75 75	8.20 9.20	5.20 5.20
				ROTAR	Y FL	.USH DE	TAILS					10.70 12.20 13.70	S S	N	I=23 (3,5:6 I=26 (3,4:6 I=32 (3,5:7	,7,7,6)			AR3501 AR3501 AR3501	75 75 75	10.70 11.60 11.60	5.20 3.20 Dry
Depth Top	Depth Base	Flu	sh Type	Flus		Flush Colour		F	Remarks			15.20 16.70	S	N	I=32 (3,3:7 I=33 (3,4:7 I=36 (4,6:8	,8,9,9)			AR3501 AR3501	75 75	11.60 11.60	Dry Dry
Юр	base			Kett		Coloui						18.20 19.70	S S	N N	I=36 (4,6:7 I=40 (5,6:8	,9,10,10) ,9,11,12)			AR3501 AR3501	75 75	11.60 11.60	Dry Dry
												21.20 22.70 24.20	S S	N	I=48 (6,8:9 I=48 (6,7:9	,11,13,15)	4,16,8/55mm)		AR3501 AR3501 AR3501	75 75 75	11.60 11.60 11.60	Dry Dry Dry
												25.70 27.20	S	5	0/275mm	(8,9:12,15	,16,7/50mm) 7,21,0/0mm)		AR3501 AR3501 AR3501	75 75	11.60 11.60 11.60	Dry Dry
												28.70	S	5	0/200mm	(7,12:15,1	7,18/50mm)		AR3501	75	11.60	Dry
HOLE DI	AMETER	CASING	DIAME	ER			DYNAI	MIC SAM	PLING													
Depth Base	Diameter	r Depth Base	Diame	ter Depth	Тор	Depth Base	Diamet	ter Durat			Run ference											
30.00	200	11.60	200																			
	INSTA	ALLATIO			D.	D:	F	PIPE CONS	TRUCTI	ON		D	1.5			DE	PTH RELAT	TED REN	/IARKS			
Distance	ID 1	Type Re	Top	Response Base	Pipe Ref		Тор	Base	Diamete	er Pipe	Туре	Depth Top		pth ase				Re	marks			
	.																					
Depth	Depth				CKFIL	LL DETAI	ILS										LOCATIO	N DETAI	LS			
Top 0.00	Base 30.00	Grout	Desci	iption		\perp		Ren	narks								Rem	narks				
0.00	30.00	Giode																				
	Notes	All -l-		-+II	45		:111:	.														
AGS			eader sh	eet for de	tails	of boring		ess and wa	ater.													
FINIAL		For de	tails of a	bbreviati			no 12/	19/2022 1	2·EE		L	o choc	kod h	v Da	wid Hov	ward			SOI	L end	GINEE	RING

Log checked by David Howard

Part of the Bachy Soletanche Group

Issue Date 22/06/2016

FINAL

Form No. SIEXPHOLEHDR

Print date and time 12/09/2022 13:55

Hole ID Project Name Cambridge Waste Water Treatment Plant Relocation **Exploratory Hole Log** TE8364 BH_STW_012B Project No. Mott MacDonald Bentley Engineer Barhale Limited Employer Sheet 1 of 3 549712.20E, 261182.10N Ground Level +8.15mOD Coordinates Grid OSGB IP+CP Hole Type Inclination TCR/Sample Recovery % Depth Sampling In Situ Test Install-R Description of Strata (Thick Legend щ Level Details ation ness) Details Dia. TOPSOIL: Dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of flint. D1 010 B 2 0.10-0.40 (0.50)(TOP) [TOPSOIL]
Firm orangish brown slightly sandy gravelly CLAY. Gravel is angular to D 3 0.50 8.15 0.50 subrounded medium to coarse of flint and calcareous siltstone.
(SUPD) [SUPERFICIAL DEPOSITS] B 4 0 50-1 00 (0.60)1.10 8.15 D 5 1.10 CHALK recovered as firm light yellowish grey with localised yellow staining slightly gravelly calcareous CLAY. Gravel is medium to coarse angular to subangular of flint. SPT(S) N=24 (3,4:5,6,7,6) D 6 1.20-1.65 1.20 (WMCK) [WEST MELBURY CHALK FORMATION] B 7 1.20-1.70 D 8 2.00 SPT(S) N=26 (3,5:7,6,6,7) 2.20 D 9 2.20-2.65 B 10 2.20-2.70 D 11 3.00 SPT(S) N=26 (2,5:7,6,6,7) D 12 3.20-3.65 B 13 3.20-3.70 \vee D 14 4.00 SPT(S) N=24 (3,5:6,6,7,5) D 15 4.20-4.65 B 16 4.20-4.70 4.20 D 17 5.00 SPT(S) N=30 (2,5:6,7,8,9) D 18 5.20-5.65 5.20 (9.60) B 19 5.20-5.70 D 20 6.00 SPT(S) N=26 (2.4:6.7.6.7) D 21 6.20-6.65 6.20 B 22 6.20-6.70 D 23 7.00 SPT(S) N=24 (4,4:6,7,6,5)D 24 7.20-7.65 B 25 7.20-7.70 D 26 8.00 SPT(S) N=35 (3,5:7,9,9,10) D 27 8.20-8.65 B 28 8.20-8.70 8.20 D 29 9.00 SPT(S) N=42 (5,6:8,9,10,15) D 30 9.20-9.65 9.20 B 31 9.20-9.70 D 32 10.00 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. **AGS** For details of abbreviations, see key.

Log checked by David Howard

Issue Date 02/03/2018

Print date and time 12/09/2022 13:55

Issue.Revision No. 2.05

Form No. SIEXPHOLELOG



Project Name	Cambridge Waste Water Treatment	: Plant	Relocat	tion										Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	le Lo	og	R	H_STW_0	112R
Engineer	Mott MacDonald Bentley												ا	11_3100_0	JIZD
Employer	Barhale Limited													Sheet 2 of	3
Ground Level		ordinate		549712.2	20E, 2611	82.10	N		Gr	id	09	SGB			
Hole Type	IP+CP Incl	lination	1	Ι		l o				م ہو	S				
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test	Install-
		Wea		ness)	Level	Wate		Details	Dia.	TCR/ Reco	SCR	4		Details	ation
staining slightly gra	s firm light yellowish grey with localised yellow velly calcareous CLAY. Gravel is medium to coarse														
angular to subangul (WMCK) [WEST ME	ar of flint. LBURY CHALK FORMATION]														
CHALK recovered as	s stiff grey with localised yellow staining slightly			10.70	8.15									SPT(S) N=23	
sandy gravelly calca	reous CLAY. Sand is fine to coarse fragments of subangular to subrounded fine to coarse of							3 10.70-11.15						(3,5:6,5,6,6) 10.70	
coprolite.	LBURY CHALK FORMATION]						B 34	4 10.70-11.20							
(WIVICK) [WEST WIE	EBURT CHALK FORMIATION;			(1.30)											
]	-										
				12.00 -	8.15		D 3	5 12.00							
subrounded brown	ured thinly laminated dark grey CLAY with rare gravel of siltstone (10x10). Fissures are 0-5		<u> </u>		-									SPT(S) N=26	
(GLT) [GAULT FORM.								6 12.20-12.65 7 12.20-12.70						(3,4:6,7,7,6) 12.20	
from 12.00m to 15.	20m occasional fine to medium gravel of coprolite		E_=_				ВЗ	/ 12.20-12.70							
			<u></u>	_											
			<u></u>												
				:	-										-
from 13.70m to 15.	20m very stiff													SPT(S) N=32	
			<u> </u>	-				8 13.70-14.15 9 13.70-14.20						(3,5:7,8,8,9) 13.70	-
			<u></u>					2 10.70 1 1.20							
			E	-	-										-
				-											
														SPT(S) N=33 (3,4:7,8,9,9)	
								0 15.20-15.65 1 15.20-15.70						15.20	
			<u> </u>												
				-											
			<u> </u>												
			<u></u>												
					-									SPT(S) N=36 (4,6:8,9,9,10)	-
				-				2 16.70-17.15 3 16.70-17.20						16.70	
			<u></u>												
				-											
			E-E-												
			E==	-										077(0) 11 00	
							D.4	4 18.20-18.65						SPT(S) N=36 (4,6:7,9,10,10)	
				-	-			5 18.20-18.70						18.20	
			<u> </u>	-	-										
			E-E-											SPT(S) N=40	-
							D 4	6 19.70-20.15						(5,6:8,9,11,12) 19.70	
							B 47	7 19.70-20.20						13.70	
	All dense in cases 10 Process 200														
AGS Notes:	All depth in metres, all diameters in millimetre. See header sheet for details of boring, progress		water.												
FINAL	For details of abbreviations, see key. Print date and time 12/09	a/2022	13.55		Lo	o char	-kod L	oy David Howar	rd				soi	L engine	RING
FINAL Form No. SIEXPHOLEL			13.33	Issue Date	02/03/20	-	LNEU [oy ⊃aviu ⊓owaf	iu					of the Bachy Soletan	



Project Name	Cambridge Waste Water Treatr	ment Plan	t Relocat	ion										Hole ID	
Project No.	TE8364							Explor	ator	у Но	le Lo	9	В	H_STW_0	12B
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 3 of 3	}
Ground Level Hole Type	+8.15mOD IP+CP	Coordinat Inclination		549712.2	OE, 2611	32.10N	٨		Grid	b	OS	GB			
поте туре	11 101			Depth	Datum	rike	S	ampling		nple y %	SW0			In Situ Test	Install-
	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike		etails	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	Ψ.	Details	ation
subrounded brown	ured thinly laminated dark grey CLAY with ra gravel of siltstone (10x10). Fissures are 0-5 y spaced planar and smooth.				Level	Wate	D 48 21. B 49 21. D 50 22. B 51 22. D 52 24. B 53 24. D 54 25. D 56 27.	.20-21.65 20-21.70 .70-23.15 .70-23.20	Dia.	TCRA' Reco	SCR/			SPT(S) N=48 (6,8:9,9,14,16) 21.20 SPT(S) N=48 (6,7:9,11,13,15) 22.70 SPT(S) 50/280mm (8,10:12,14,16,8/5 5mm) 24.20 SPT(S) 50/275mm (8,9:12,15,16,7/50) mm) 25.70 SPT(S) 50/225mm (5,10:12,17,21,0/0) mm) 27.20	ation
				- - - - -				.70-29.05 .70-29.20						mm)	
Complete at 3	30.00m. Termination Reason: Achieve	ed	<u> </u>	30.00	8.15		D 60 30	.00						-	
	Scheduled Dep h												1		
AGS Notes:	All depth in metres, all diameters in mill See header sheet for details of boring, p		water.			_			_	_	_				



FINAL

For details of abbreviations, see key.

Issue.Revision No. 2.05

Print date and time 12/09/2022 13:55

Log checked by David Howard



Project	Name	Carr	nbridge	Waste	Wa	ter Tre	atment	Plant F	Reloc	ation											F	lole ID	
D	NI-	TE8	26/												E	plorat	ory	Hole	Log		ΣΠ C.	TW_C	1121
Project Engine			t MacD	onald	Ben	tley														-	ט_ו וי	1 4 4	JIJA
Employ			nale Lim			,															She	et 1 of :	1
Ground L			9mOD							linates			809.10E		88.10N				Grid		OSGB		
Date Star Top	ted Base		8/2021 Date Tir	no Star	+ D	ato Tim	e End R			Comple Jer Barr			08/2021	ant Us	and Sho	ring Used	d Di+	C+ability		ination	90° f o	m horizor	ntal
0.00	1.20	Туре)21 13:45		12/08/202		Colin	AM		NA NA	NA NA		ited han		None		Stabling			Remain	(5	
1.20	6.60	RC	12/08/20	021 14:45	1	16/08/202	1 16:30	Howard Colin Howard	AL		SWF	TCB	So	ilmec SI	M6								
6.60	15.50	RC	17/08/20	021 07:30	1	18/08/202	1 17:15	Colin Howard	AL		SWF	PCD	So	ilmec SI	M6								
15.50	48.45	RC	19/08/20	021 07:30	2	20/08/202	1 11:30	Colin Howard	AL		obore S (146)	PCD	So	ilmec SI	M6								
				F	PRO	GRESS											1	WATER	STRIKE	S			
Date ⁻	Time	Depth	Depth Casing	Depth Water				Rema	ırks				Date	Time	Deptl Strike			Depth Sealed	Water Rose T			Remark	ΚS
12/08/20: 13/08/20:		2.20 2.20	1.20 1.20	Dry Dry	Er	nd of Shift art of shift							13/08/20	021 09:1					2.75	20	Slow		
13/08/20 16/08/20	21 12:00	3.70 3.70	1.40 1.40	0.65 1.60	St	nd of Shift art of shift																	
16/08/20: 17/08/20:	21 07:30	6.60 6.60	1.40 1.40	1.60 1.60	St	nd of Shift art of shift																	
17/08/203 18/08/203	21 07:30	13.00 13.00 15.50	10.40 10.40 13.10	1.60 1.60	St	nd of Shift art of shift																	
18/08/20 19/08/20 19/08/20	21 07:30	15.50 15.50 38.05	13.10 13.10 13.10	14.70 14.70 37.80	St	nd of Shift art of shift nd of Shift																	
20/08/20:	21 07:30	38.05 48.45	13.10 13.10	36.50 17.60	St	art of shift rilling Com																	
20/08/20	21 15:30	13.00 13.00	13.00 13.00	3.50 4.00	Er	nd of Shift art of shift																	
23/08/20	21 16:30	13.00	0.00	4.00	Er	nd of Shift																	
Depth	Depth			T	Т		DETAILS						Depth	Tes	+ 1				ETAILS	Hammer Seria	Energy	Depth	Depth
Тор	Base	Tim	e Start	Duration	on	Tool			Ren	narks			Тор	Тур		Repoi	rted	Result		Number	Ratio	Casing	Water
				ROTAR	Y FL	USH DE	TAILS																
Depth Top	Depth Base	Flus	sh Type	Flus Retu		Flush Colour		ı	Remai	rks													
1.20	48.45	Al	R/MIST	100		Grey																	
HOLE DI	AMETER	CASING	DIAMETE	ER		1	DYNAM	IC SAM	PLIN	 G													
Depth Base	Diameter	Depth Base	Diamet	er Depth	Тор	Depth Base	Diameter	r Durat	tion	Samp	le Fery Refe	Run											
13.00	200 150	13.00 13.10	200 150			Dase				Recove	ery Reie	erence											
13.10 48.45	146	13.10	150																				
	INSTA	<u> </u> LLATIOI	N DETAIL	 .S			PIF	PE CONS	STRUC	TION							DEPT	H RELAT	ED REM	/ ∕IARKS			
Distance	ID 1	Гуре Re	esponse Re	esponse Base	Pipe Ref		Тор	Base	Diam	neter	Pipe Ty	уре	Depth Top	De _l Ba					Re	marks			
		-	юр	Dase	Rei	Rei	· ·						юр	Da	se								
				BAC	KFIL	L DETAI	LS										L	OCATIO	N DETA	ILS			
Depth	Depth		Descri					Ren	narks									Ren	narks				
Top 0.00	Base 48.45	Grout		•															•				
	Note	s: All de	pth in me	tres. all c	diam	eters in	millimetr	es.															
AGS	8	See he	ader she	et for det	tails	of boring			ater.														
FINAL		i oi ue	tails of ab				ne 12/09	a/2022 1:	3.55			1.	on char	ked h	/ David H	oward				so	ıL en	ginee	RING
	SIEXPHOLI	EHDR		11111		e.Revisior		,, CUCC I	دد.د	Issue	Date 22		-	.neu D)	, Daviu П	ovvaiu						hy Soletanch	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion										Hole ID	
Project No.	TE8364							Explo	rato	у Но	le Lo	og	l R	H_STW_0	113Δ
Engineer	Mott MacDonald Bentley													11_3177_()13A
Employer	Barhale Limited													Sheet 1 of	5
Ground Level Hole Type		rdinate ination			10E, 2612 horizonta		N		Gri	d	OS	SGB			
Thole Type	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	Ŀ	In Situ Test Details	Install- ation
TOPSOIL: Dark brow rootlets. Sand is fine (TOP) [TOPSOIL]	n slightly gravelly sandy CLAY with occasional to coarse.	>		(0.40)	-	>		0.20 0.20-0.40	Dia.	2 8	05				
is angular to subrou (SUPD) [SUPERFICIA Structureless CHALK slightly sandy CLAY. (WMCK) [WEST MEI	pravelly sandy CLAY. Sand is fine to coarse. Gravel nded fine to coarse of flint and quartz. L DEPOSITS] (composed of very stiff light grey mottled brown Sand is fine to coarse. (CIRIA Grade Dm) BURY CHALK FORMATION] (composed of yellowish grey slightly gravelly			0.40 (0.40) 0.80 (0.40) -	6.49 - 6.09 - 5.69		ES 4 B 6	0.30 0.40-0.60 0.50 0.60-1.00 1.00						K 1.20 - 3.50	
calcareous CLAY. Gra flint and very weak I (WMCK) [WEST MEL	avel is subangular to subrounded fine to coarse of ow density chalk. (CIRIA Grade Dm) BURY CHALK FORMATION] In recovered as non intact core (angular to subrounded			(1.40)	- - - - - - - - - - - - - - - - - - -		C 8	1.20-2.20	107	100					
CLAY. (CIRIA Grade D	(composed of very stiff yellowish grey calcareous lm) BURY CHALK FORMATION]			2.60	4.29	~	C 9	2.20-3.70	107	100					
Structureless CHALK calcareous CLAY. Fis- undulating rough. (C	n yellowish grey mottled brown C composed of very stiff fissured light grey sures are randomly orientated closely spaced IRIA Grade Dm) BURY CHALK FORMATION]	Grade Dm		3.95 _	2.94	•	C 10	3.70-5.10	107	100					
calcareous CLAY wit coarse gravel sized f randomly orientated Dm)	Composed of very stiff fissured light grey h clasts of subangular to subrounded fine to ragments of very weak chalk. Fissures are closely spaced undulating rough. (CIRIA Grade BURY CHALK FORMATION]			4.95 _ (1.35)	1.94		C 11	5.10-6.60	107	100			NA		
CLAY with closely sp chalk composed of o orientated closely sp	Composed of very stiff fissured grey calcareous aced thin beds of very weak low density grey calcareous siltstone. Fissures are randomly acade undulating smooth. (CIRIA Grade Dm) BURY CHALK FORMATION]			6.30	0.59			6.60-8.10 8.10-8.60	107	100					
Discontinuities 1) 10 undulating rough wi (WMCK) [WEST MEI from 8.60m to 8.70r	rey CHALK composed of calcareous SILTSTONE. to 25 degrees closely to medium spaced th silt infill. (CIRIA Grade B3) BURY CHALK FORMATION) In recovered as non intact core (subangular to coarse gravel sized fragments)	Grade B3		(1.80)	-1.71		C 14	8.60-10.20	107	100	100	31	NI 170 410		
AGS	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres For details of abbreviations, see key. Print date and time 12/05 OG Issue Revision No. 205	9/2022		Issue Date	Lo 2 02/03/20	-	cked by	y David Howa	rd					L enginee f the Bachy Soletan	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion										Hole ID	
Project No.	TE8364							Explo	rato	у Но	le Lo	g		H_STW_(712A
Engineer	Mott MacDonald Bentley													11_3177_()13A
Employer	Barhale Limited													Sheet 2 of	5
Ground Level		rdinate	es		10E, 2612		N		Gri	d	09	GB			
Hole Type	IP+RC Incli	nation	1	90° from	horizonta									1	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		ampling tails	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
	grey CHALK composed of calcareous SILTSTONE.					_		cuis	Dia.		•,				
	0 to 25 degrees closely to medium spaced vith silt infill. (CIRIA Grade B3)			10.40	2.51										-
	ELBURY CHALK FORMATION] Om recovered as non intact core (subangular to			10.40	-3.51										1
subrounded fine to	coarse gravel sized fragments) very gravelly glauconitic fine SAND. Gravel is		<u> </u>	10.75	-3.86										
subangular to subro	ounded fine to coarse of coprolites. OGE GREENSAND MEMBER]			11.00 -	-4.11		C 15 10.	20-11.70	107	100					
Firm thinly laminate	ed dark grey CLAY with occasional subangular to	1													1
	coarse gravel sized fragments of coprolites. OGE GREENSAND MEMBER]														
Stiff thinly laminate (GLT) [GAULT FORM				(1.38)											
(GEI) [GAGEI TORIVI	IATION			[()											
			<u> </u>	-											
				12.38	-5.49				107	98					
Stiff fissured thinly degrees closely spa	laminated dark grey CLAY. Fissures are 0 to 20] -	-5.49		C 16 11.	70-13.00							-
(GLT) [GAULT FORM	IATION]	1		12.65	-5.76										
closely spaced plan				-											
(GLT) [GAULT FORM	IATION]		F_=_												
				(1.60)	-										
				- (2.00) -			C 17 13.	00-14.00	107	100					
				-											-
Stiff fissured thinly	laminated dark grey CLAY. Fissures are 0 to 10	-		14.25	-7.36										
	nced undulating rough.		E==-	-	-										-
from 14.25m to 14.	75m with rare subrounded fragments of coprolite			-			C 18 14.	00-15.50	107	100					
(<15mm x 20mm)				(1.25)											
	laminated dark grey CLAY with occasional nodules	1		15.50 -	-8.61										
planar smooth polis				(0.72)											
(GLT) [GAULT FORM	IATION]		F_=_												
Stiff fissured thinly	laminated dark grey CLAY with rare nodules of	-		16.22	-9.33		C 19 15.	50-17.00	102	100					
	10mm). Fissures are 20 to 60 degrees closely														
(GLT) [GAULT FORM				(0.78)	-										
				17.00 -	-10.11										
	ninly laminated dark grey CLAY with rare nodules			17.00 -	-10.11										}
(<10mm x 5mm). Fi	issures are 25 to 40 degrees closely spaced planar														
smooth. (GLT) [GAULT FORM	IATION]			-	-										-
			F-I-	(1.55)	1		C 20 17.	00-18.55	102	97					1
				-											
			<u> </u>	1											
			<u></u>	18.55	-11.66					L					-
	ninly laminated dark grey CLAY with rare nodules imm). Fissures are 20 to 55 degrees closely spaced]		18.55	-11.66										
planar smooth with	clay infill.														
(GLT) [GAULT FORM	IATION		<u> </u>	-											
				1			C 21 18.	55-20.05	102	100					}
				-											
					-										
			<u> </u>	1					-						1
	All I al														
AGS	: All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water.												
7.00	For details of abbreviations, see key.												<u> </u>	L ADCIDCO	20100
FINAL	Print date and time 12/09		13:55	January D. 1			ked by Da	avid Howar	d					L engine	
Form No. SIEXPHOLEI	LOG Issue.Revision No. 2.05			issue Date	02/03/20	Τ0							Part o	f the Bachy Soletand	ле стоир

Project Name	Cambridge Waste Water Treatmen	t Plant	t Reloca	tion									Hole ID	
Droiget No	TE8364						Explo	orato	ry Ho	le Lo	og		LI CT\A/ (712A
Project No. Engineer	Mott MacDonald Bentley												H_STW_0	JIJA
Employer	Barhale Limited												Sheet 3 of	5
Ground Level		ordinate			10E, 2612		J	Gr	id	09	SGB	•		
Hole Type	IP+RC Inc	lination	<u> </u>		horizonta				e 9	I (0				1
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test Details	Install-
		Wea		ness)	Level	Wat	Details	Dia.	TCR.	SCR			Details	ation
of pyrite (<5mm x 5r	inly laminated dark grey CLAY with rare nodules mm). Fissures are 20 to 55 degrees closely spaced			:										-
planar smooth with (GLT) [GAULT FORM)														
				1										
			E- <u>-</u> -	(3.05)			C 22 20.05-21.60	102	100					
	inly laminated dark grey CLAY with rare nodules	-		21.60	-14.71									
spaced planar smoo			==											
(GLT) [GAULT FORM	ATIONJ			1	-									
				(1.60)			C 23 21.60-23.20	102	100					
			<u> </u>		-									
				_										
Very stiff fissured thi	inly laminated dark grey CLAY with occasional			23.20	-16.31									
	(<8mm x 5mm). Fissures are 20 to 40 degrees													
(GLT) [GAULT FORM			<u></u>		-									
							C 24 23.20-24.70	102	100					
					-									
		-		(2.85)	-									
		athere										NA		
from 25.10m to 26.0	05m nodules of siltstone become rare	Unweathered			-							TVA.		
from 25.45m to 25.6	60m fissures are 20 degrees closely spaced planar						C 25 24.70-26.05	102	100					
smooth	oon instance and 20 degrees closely spaced plantal													
			E- <u>-</u> -	_										
	inly laminated grey CLAY with occasional nodules x 5mm). Fissures are 20 to 60 degrees closely			26.05	-19.16									
spaced planar smoo (GLT) [GAULT FORM	th													
(02) [0/102] 10/11/1/							C 26 26.05-27.05	102	100					
]
			<u> </u>											1
	54m 1 No. thick lamination of silt													
	25m with occasional fossilised shell fragments (<5mm belemnite fragments (<5mm x 5mm)		F	(7.12)			C 27 27.05-28.65	102	99					
			E_=	(7.12)										
														1
					-									
							C 28 28.65-30.25	102	100					-
Notes:	All depth in metres, all diameters in millimet	res		<u> </u>									18	
AGS	See header sheet for details of boring, progre		water.											
FINAL	For details of abbreviations, see key. Print date and time 12/0	0/2022	12.55		1 -	a cha-	ked by David Howa	ord				SOI	L engine	ering
Form No. SIEXPHOLEL			10.00	Issue Date	02/03/20	-	ned by David HoWa	ii u					f the Bachy Soletan	

Project Name	Cambridge Waste Water Treatme	nt Plant	t Reloca	tion										Hole ID	
								Explo	rato	ry Ho	ole Lo	og		LL CTM/	0101
Project No. Engineer	TE8364 Mott MacDonald Bentley												B	H_STW_	013A
Employer	Barhale Limited													Sheet 4 of	5
Ground Level	+6.89mOD C	Coordinate	es	549809.	10E, 2612	88.10	N		Gr	id	09	SGB			
Hole Type	IP+RC I	nclination	1	90° from	horizonta	_				0 -	1	1		1	_
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	뜨	In Situ Test	Install-
			Logona	ness)	Level	Wate		Details	Dia.	TCR/S Reco	SCR	~	_	Details	ation
	ninly laminated grey CLAY with occasional nodule n x 5mm). Fissures are 20 to 60 degrees closely	s	<u> </u>												-
spaced planar smoo (GLT) [GAULT FORM	oth		<u></u>		-										
(GLI) [GAGLI FORIV	Anonj		<u></u>		1										
			<u></u>]										
				-	-		C 2	9 30.25-31.90	102	100					
			<u></u>		1										
			<u></u>		1										-
			<u></u>		-										
			<u></u>	-	1										-
			<u></u>]										
			<u></u>		-										-
			<u></u>]		C 3	0 31.90-33.40	102	99					1
			<u></u>	_	-										-
Very stiff fissured th	ninly laminated grey CLAY with occasional nodule	es .		33.17	-26.28										
of siltstone (<10mn	n x 5mm) and occasional fossilised shell fragmen sures are 20 to 60 degrees closely spaced		<u></u>]										1
undulating rough. (GLT) [GAULT FORM			F		-										
(GLI) [GAULI FORIV	IATION		F_=_		1										
			F	-]		C 2	1 33.40-35.05	102	100					7
			F_=_		-		CS	51 55.40-55.05	102	100					
			F_=_		1										
			F_=_]										
			F_=_	-	-										-
			F_=_	(4.43)]										
			F_=_		-										
			F_=_		1		C 3	2 35.05-36.65	102	100					
			F_=_	-	1										
			F_=_		1										
			F_=_		1										-
			F	1]										
			F	-	-										-
			F	1]										
			F		1		C 3	3 36.65-38.05	102	100					
	ninly laminated grey CLAY with occasional nodule x 5mm) and occasional belemnite fragments	:s		37.60	-30.71										
(<5mm x 5mm). Fis	sures are 20 to 55 degrees closely spaced planar		F	1]										
smooth. (GLT) [GAULT FORM	IATION]		F_=_	(1.30)	-										
			F_=_	1 (1.30)	1		C 3	4 38.05-38.55	102	100					1
			F_=_]											1
Very stiff ficeured +k	ninly laminated grey CLAY with occasional nodule	, , ,	F	38.90	-32.01										
of siltstone (<8mm	x 5mm). Fissures are 15 to 50 degrees closely	.	F	-]										
spaced planar smoo (GLT) [GAULT FORM			<u> </u>	(2.00)]		C 3	5 38.55-40.00	102	100]
			<u> </u>	(2.00)	1										
			<u> </u>]										
		+	Ε-	1					1						1
Notes	: All depth in metres, all diameters in millime	etres.	1						1						
AGS	See header sheet for details of boring, prog For details of abbreviations, see key.		water.												
FINAL	Print date and time 12.	/09/2022	13:55		In	a cher	ked	by David Howar	rd				SOI	L engine	ering
Form No. SIEXPHOLE				Issue Date	e 02/03/20	-		, = = = = = = = = = = = = = = = = = = =					Part o	f the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatm	ent Plai	nt Reloca	tion										Hole ID	
Drainet No	TE8364							Explo	rato	у Но	le Lo	og	D	LL CT\A/ /	712A
Project No. Engineer	Mott MacDonald Bentley													H_STW_0	JISA
Employer	Barhale Limited													Sheet 5 of	5
Ground Level	+6.89mOD	Coordina	tes	549809.	10E, 2612	88.10	N		Gri	d	09	GB			
Hole Type	IP+RC	Inclination		90° from	horizonta	ıl				ı				T	1
	Description of Strate	Weathering	lacand	Depth	Datum	strike		Sampling		TCR/Sample Recovery %	Slows	RQD	Ŀ	In Situ Test	Install-
	Description of Strata	Weath	Legend	(Thick- ness)	Level	Waterstrike		Details	Dia.	CR/S	SCR/Blows	8	=	Details	ation
	inly laminated grey CLAY with occasional nodu	-	+	-	-										-
spaced planar smoo			F	-]										
(GLT) [GAULT FORM.	ATION]		F				C 36	40.00-40.90	102	100					
			F	1											
	inly laminated grey CLAY with occasional nodu x 5mm). Fissures are 30 to 75 degrees closely			40.90	-34.01										
spaced planar smoo	th.		F	_]
(GLT) [GAULT FORM	ATIONJ		<u> </u>	<u>.</u>	1										
			F_=	1	1		C 37	40.90-42.45	102	100					
] .											
					-										
			<u> </u>	(3.10)	1										
			==] ` ´ ˙											
			<u> </u>]	-										
] -	1		6.20	. /2 /5 /2 05	100	93					
]]		C 38	3 42.45-43.95	102	95					}
			<u> </u>	} .	-										-
				-	1										
Very stiff fissured sli	ightly sandy CLAY with rare belemnite fragmer	nts		44.00 -	-37.11										
(<5mm x 5mm). San spaced planar rough	d is fine. Fissures are 0 to 20 degrees closely			1	-										
(GLT) [GAULT FORM.				(0.95)	1		C 39	43.95-44.95	102	100					-
				1]										
Greenish grey slight	tly gravelly fine SAND. Gravel is subrounded to			44.95	-38.06										-
rounded fine to med					1										
at 45.19m very clay]										
				(1.45)											
					1		C 40	44.95-46.95	102	70					
				-]										
Dayly are spick aroust	Fina CAND			46.40	-39.51										
Dark greenish grey to (LGF) [LOWER GREE	NSAND FORMATION]				1										
at 46.95m very clay	ey			-											
				(1.80)	1										
															-
from 47.70m to 47.9	95m dark greenish grey with occasional dark brown				-		C 41	46.95-48.45	102	90					
silt lenses (<5mm x	Toming			-	1										
	gravelly fine SAND. Gravel is rounded fine to			48.20	-41.31										
medium of flint. \((LGF)\) [LOWER GREE	NSAND FORMATION]			48.45	-41.56										-
	18.45m. Termination Reason: Achieved Scheduled Dep h	i]]
	Ocheduled Dep II]
					-										1
]]
				'	1										-
					†										1
	All depth in metres, all diameters in millir		1				'								•
AGS	See header sheet for details of boring, pro- For details of abbreviations, see key.	ogress an	d water.												
FINAL	Print date and time 1	2/09/207	2 13:55		In	g cher	cked h	y David Howar	rd				SOI	L engine	ering
Form No. SIEXPHOLEL				Issue Date	e 02/03/20	-		,aiowai	-				Part o	f the Bachy Soletan	che Group

Project	Name	Can	mbridge \	Waste V	Vater ⁻	Treatn	nent P	Plant R	≀elocati	on					-						Hole ID	
Project	No.	TE8	3364											Ex	plorat	ory H	ole L	_og	_E	3H S	TW_0)13B
Enginee	er	Mot	tt MacD		entley	/																
Employ Ground Le			hale Lim	ited					Coordina		5/108	10.101	E, 26128					Grid		She	eet 1 of 1	1
Date Start			09/2021						Date Cor			9/202		33.1014					i ination	OJGL		
Тор	Base	Туре	Date Tin					-		Barrel Type	Drill B	- 1	ant Us	1	ing Used		- 1		Inon	Remark		
0.00	1.20 30.00	IP CP	08/09/20			/2021 11: /2021 13:	C	Danny Cundill Danny	SAN				lated hand Dando 200		None	Stab	ole		ınsp	ection pit: H	and dug	
	I			ļ				Cundill	i I													١
	I			ļ					i I													١
	l			ļ					İ													
					ROGRE	SS												STRIKE				
Date 1		Depth	Depth Casing	Depth Water				Rema	rks				Time	Depth Strike	Casii	ing Se	epth ealed	Water Rose To	o Elapse	ed	Remark	(S
08/09/202 08/09/202 09/09/202	21 17:30	9.20 9.20	9.20 9.20	3.90 2.30	Start of S End of S Start of	Shift						08/09/2	2021 13:40	0 4.20	4.20	0		2.00	20	Medium	1	
09/09/202 10/09/202	21 17:30 21 07:30	25.00 25.00	11.60 11.60	8.00 2.30	End of S Start of	Shift shift																
10/09/202 10/09/202 13/09/202	21 17:30	0.00 0.00 0.00	0.00	Dry	Installat End of S Start of	Shift	plete, Bore	ehole Con	nplete													
13/09/202		0.00			End of S																	
		ĺ																				
		ĺ																				
				DEI	2: 1001						\perp				\perp	Щ,	D	=::::6				
Depth	Depth	Tin	ne Start	ABLE PER	T	ON DET	TAILS		Remar		_	Depth	Test	:	Deno			ETAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base		.e start	Duration	 		+			KS		Top 1.20	Type	N=21 (5,7	7:5,5,6,5)	rted Res	Suit		Number AR3501	Ratio 75	Casing 1.20	Water
	l											2.20 3.20 4.20	S S S	N=18 (3,4 N=17 (2,2 N=19 (2,2	2:4,4,4,5)				AR3501 AR3501 AR3501	75 75 75	2.20 3.20 4.20	Dry Dry 2.00
	I											5.20 6.20	S S	N=19 (2,3 N=24 (3,5	3:4,5,5,5) 5:5,6,7,6)				AR3501 AR3501	75 75	5.20 6.20	3.90 3.90
	I											7.20 8.20 9.20	S S S		4:6,7,6,6) 5:7,8,10,10 4:6,8,9,10)				AR3501 AR3501 AR3501	75 75 75	7.20 8.20 9.20	3.90 3.90 2.30
		<u></u>		ROTARY	/ FLUSH	ı DETA!	115					10.70 12.20	S S	N=38 (3,5 N=25 (4,5	5:8,10,10,1 5:5,6,7,7)				AR3501 AR3501	75 75	10.70 11.60	3.90 8.00
Depth	Depth	Flu	ısh Type	Flush	Flus	sh		F	Remarks			13.70 15.20 16.70	S S S	N=29 (4,6 N=35 (4,7 N=39 (6.7					AR3501 AR3501 AR3501	75 75 75	11.60 11.60 11.60	8.00 8.00 8.00
Тор	Base	+		Return	n Colo	our						18.20 19.70	S S	N=46 (6,8 N=48 (6,7	3:10,11,12, 7:10,11,13,	,13) ,14)	,		AR3501 AR3501	75 75	11.60 11.60	8.00 8.00
	l											21.20 22.70 24.20	S S S	50/270m	ım (7,9:12,: ım (7,9:12,: 10:10,12,14	,14,15,9/45			AR3501 AR3501 AR3501	75 75 75	11.60 11.60 11.60	8.00 8.00 8.00
	I											25.70 27.20	S S	50/225m 50/225m	ım (7,10:13 ım (8,11:12	3,15,22,0/0 2,19,19,0/0	0mm)		AR3501 AR3501	75 75	11.60 11.60	3.00 3.50
	l											28.70	s	50/220m	ım (7,9:13,:	18,19/70n	nm)		AR3501	75	11.60	3.80
	L	<u> </u>																				
Denth		Denth	G DIAMETE		. Dep	oth	NAMIC		c.	Sample F	Run											
Base 30.00	Diameter 200	Base	Diamete	er Depth To	op Bas		iameter	Durat		ecovery Refe												
33.33		1																				
	I																					
	I																					
	INST/	ALLATIO	N DETAILS	S	+		PIPE	E CONS	STRUCTION	ON					С	DEPTH F	RELAT	ED REN	/IARKS			
Distance	ID T	Type Re	esponse Re Top		Pipe Pip Ref Re		Гор	Base	Diamete	er Pipe T	уре	Depth Top	Dep Bas					Re	marks			
	.																					
													\perp									
Depth	Depth	T			KFILL DE	ETAILS					_					LOC		N DETAI	LS			
Top 0.00	Base 30.00	Grout	Descrip	otion	+			Ken	marks		_						Keni	narks				
	I																					
	l																					
	I																					
	I																					
			epth in met																			
AGS	1		eader shee etails of abl				rogress	and wa	iter.													
FINAL				Print (date and	d time	12/09/2	2022 1	3:55		Lc	og che	cked by	David Ho	oward				SO	ir eu	ginee	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Issue.Revision No. 2.02

Form No. SIEXPHOLEHDR

Hole ID Project Name Cambridge Waste Water Treatment Plant Relocation Exploratory Hole Log TE8364 BH_STW_013B Project No. Mott MacDonald Bentley Engineer Barhale Limited Employer Sheet 1 of 3 Ground Level +6.96mOD Coordinates 549810.10E, 261283.10N Grid OSGB Hole Type IP+CP Inclination Depth Sampling In Situ Test Install-R Description of Strata (Thick Legend ш Level Details ation ness) Details Dia. TOPSOIL: Dark brown slightly sandy gravelly CLAY. Sand is fine to D1 0.10 coarse. Gravel is subrounded to subangular of flint. D 2 0.20 (0.60)(TOP) [TOPSOIL] B 3 0.30-0.50 D 4 0.60 0.60 6.96 CHALK recovered as stiff light yellowish grey locally stained yellowish orange calcareous CLAY.
(WMCK) [WEST MELBURY CHALK FORMATION] B 5 0.70-1.00 SPT(S) N=21 (5,7:5,5,6,5) D 6 1.20 D 7 1.20-1.65 1.20 B 8 1.20-1.70 (2.60) \vee D 9 2.00 SPT(S) N=18 (3,4:4,4,5,5) 2.20 D 10 2.20-2.65 B 11 2.20-2.70 D 12 3.00 3.20 6.96 SPT(S) N=17 CHALK recovered as stiff brownish grey slightly gravelly calcareous (2,2:4,4,4,5) CLAY. Gravel is subangular to subrounded medium to coarse of D 13 3.20-3.65 extremely weak low density calcareous siltstone. (WMCK) [WEST MELBURY CHALK FORMATION] B 14 3.20-3.70 D 15 4.00 (2.00) W 16 4.20 SPT(S) N=19 (2,2:4,4,5,6) D 17 4.20-4.65 B 18 4.20-4.70 4.20 D 19 5.00 5.20 6.96 SPT(S) N=19 CHALK recovered as stiff grey slightly gravelly calcareous CLAY. Gravel (2,3:4,5,5,5) is subangular to subrounded medium to coarse of extremely weak D 20 5.20-5.65 5.20 B 21 5.20-5.70 (WMCK) [WEST MELBURY CHALK FORMATION] from 5.20m to 9.20m Clay is grey D 22 6.00 SPT(S) N=24 (3,5:5,6,7,6) D 23 6.20-6.65 6.20 B 24 6.20-6.70 D 25 7.00 SPT(S) N=25 (2,4:6,7,6,6)D 26 7.20-7.65 B 27 7.20-7.70 (5.60) D 28 8.00 SPT(S) N=35 (4,6:7,8,10,10) D 29 8.20-8.65 8.20 B 30 8.20-8.70 D 31 9.00 SPT(S) N=33 (3,4:6,8,9,10) D 32 9.20-9.65 9.20 B 33 9.20-9.70 D 34 10.00 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. **AGS** For details of abbreviations, see key. SOIL ENGINEERING Print date and time 12/09/2022 13:55 Log checked by David Howard Form No. SIEXPHOLELOG Issue Date 02/03/2018 Part of the Bachy Soletanche Group Issue.Revision No. 2.05

Project Name	Cambridge Waste Water Treatmer	nt Plant	Relocat	tion										Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	ole Lo	og	В	H_STW_0)13B
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 2 of	2
Ground Level		oordinate	es	549810.1	LOE, 2612	83.10	N I		Gr	id	0:	SGB		Sheet 2 of	<u> </u>
Hole Type		clination			,										
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
	s stiff grey slightly gravelly calcareous CLAY. Grave brounded medium to coarse of extremely weak	el													
low density siltston				[·											
	d dark grey slightly sandy CLAY with occasional Il size nodules of coprolite. Sand is fine black of			10.80	6.96			5 10.70-11.15 6 10.70-11.20						SPT(S) N=38 (3,5:8,10,10,10) 10.70	
(GLT) [GAULT FORM	iation]			(1.40) -											
gravel of brown silts	laminated dark grey CLAY with rare subrounded stone (10mmx10mm). Fissures are horizontal,			12.20	6.96			7 12.20-12.65						SPT(S) N=25 (4,5:5,6,7,7) 12.20	
planar, smooth and (GLT) [GAULT FORM							B 3	8 12.20-12.70						-	
				(4.50)				9 13.70-14.15 0 13.70-14.20						SPT(S) N=29 (4,6:7,7,8,7) 13.70	
								1 15.20-15.65 2 15.20-15.70						SPT(S) N=35 (4,7:8,8,9,10) 15.20	
subrounded gravel (1mmx10mm). Fissi	ninly laminated dark grey CLAY with rare of brown siltstone (10mmx10mm) and fossil ures are horizontal, planar and smooth, slightly rtical planar and smooth.			16.70	6.96			3 16.70-17.15 4 16.70-17.20						SPT(S) N=39 (6,7:8,9,11,11) 16.70	
				-				5 18.20-18.65 6 18.20-18.70						SPT(S) N=46 (6,8:10,11,12,13) 18:20	
				-				7 19.70-20.15 8 19.70-20.20						SPT(S) N=48 (6,7:10,11,13,14) 19.70	
AGS Notes:	All depth in metres, all diameters in millime See header sheet for details of boring, progr For details of abbreviations, see key.	ess and			la.	n char	-kod I	oy David Howar	d		<u> </u>		SOI	IL enginee	RING
FINAL Form No. SIEXPHOLEI			10.00	Issue Date	02/03/20		ven I	Daviu 170War	u					of the Bachy Soletano	

Project Name	Cambridge Waste Water Treatm	nent Plar	nt Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	le Lo	og		SH_STW_C	112B
Engineer	Mott MacDonald Bentley												ا ا	011_3177_0	1120
Employer	Barhale Limited													Sheet 3 of 3	3
Ground Level	+6.96mOD	Coordina		549810.3	10E, 2612	83.101	V		Gri	id	09	SGB	•		
Hole Type	IP+CP	Inclinatio				a)				9 v	· ·				
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	노	In Situ Test	Install-
		Wea		ness)	Level	Wate		Details	Dia.	TCR/ Reco	SCR	~		Details	ation
subrounded gravel	ninly laminated dark grey CLAY with rare of brown siltstone (10mmx10mm) and fossil														
(1mmx10mm). Fissu	ures are horizontal, planar and smooth, slightly rtical planar and smooth.	′	<u> </u>		-										
(GLT) [GAULT FORM			<u> </u>												
														:	
				_										SPT(S) 50/275mm	
							D 4	9 21.20-21.63						(7,9:12,13,15,10/5	
			<u> </u>	-				0 21.20-21.70						0mm) 21.20	
			<u> </u>	-										-	
			<u> </u>	-										-	
			<u> </u>	:	-									SPT(S) 50/270mm - (7,9:12,14,15,9/45	
			<u> </u>	_				1 22.70-23.12 2 22.70-23.20						mm) _ 22.70	
			<u> </u>											22.10	
			<u> </u>	-										-	
			<u> </u>												
			<u> </u>	_										_	
			<u> </u>		-									SPT(S) N=50	
			<u> </u>					3 24.20-24.65						(6,10:10,12,14,14) 24.20	
							B 54	4 24.20-24.70							
				(13.30) –											
				(13.30)-										-	
					-										
														SPT(S) 50/225mm	
							D 5	5 25.70-26.08						(7,10:13,15,22,0/0	
				-				6 25.70-26.20						mm) _ 25.70 -	
			<u> </u>	-										-	
			<u> </u>	:	-										
			<u> </u>	-										_	
			<u> </u>											SPT(S) 50/225mm (8,11:12,19,19,0/0	
			<u> </u>	-	-			7 27.20-27.58 8 27.20-27.70						mm) _	
			<u> </u>											21.20	
			<u> </u>	_										-	
					-									-	
														SPT(S) 50/220mm	
								9 28.70-29.07 0 28.70-29.20						(7,9:13,18,19/70m ⁻ m)	
								0 20.10 25.20						28.70	
			<u> </u>	30.00	6.96		DC	1 30.00							
Complete at 3	30.00m. Termination Reason: Achieved Scheduled Dep h	t		30.00	0.90		00	1 50.00							
	i- ·-														
Notes.	All depth in metres, all diameters in millin	metres													
AGS	See header sheet for details of boring, pro- For details of abbreviations, see key.		d water.												
FINAL	Print date and time 1	12/09/202	22 13:55		Lo	g chec	ked h	oy David Howar	d				so	ıL enginee	RING
Form No. SIEXPHOLEL				Issue Date	02/03/20:	-		,					Part o	of the Bachy Soletanc	he Group

Project	Name	Carr	nbridge	Waste V	Nater Tr	eatmen	t Plant	Relocat	ion										F	lole ID	
			_											Ехр	lorato	ry Hole	Log		אוו כי	T\\/ (1110
Project Enginee		TE83 Mot		Donald B	entlev													Þ	iH_3	TW_0	/13C
Employ			nale Lim										_						She	et 1 of 1	1
Ground L			1mOD					Coordina			9799.40		1288.8	30N			Gric		OSGB		
Date Star	rted Base		8/2021 Date Tir	me Start	Date Tir	me End I	Rio Crev	Date Cor Logger			/08/202 Bit P	21 Plant l	llsed	Shorin	na Used I	Pit Stability		lination	Remark		
0.00 1.20	1.20 13.10	IP RC	24/08/20	021 11:30 021 12:10	24/08/202 26/08/202	21 12:10	CH CH	SAN	NA		A Insu		nand tool		one	Stable	+				
		"	 I					-7				JU	,								
	1		I				İ														
	1		I																		
			<u>. </u>					<u> </u>									<u> </u>				
<u> </u>			Depth		ROGRESS	<u>;</u>					<u> </u>			Depth	Depth		STRIKE Water				
Date 7		Depth 11.60	Casing 11.60		End of Shift	*	Rema	arks				e Tim	ne	Strike 3.90	Casing 1.20			To Elapse		Remark	.s
25/08/202 25/08/202 25/08/202	21 07:30	11.60 11.60 13.10	11.60 11.60 13.10	1.70 1.70	Start of shift	ift					24/00,	2021 10	5.13	3.30	1.20		3.50		Media		
26/08/202 26/08/202	21 07:30	13.10 0.00	13.10 0.00	1.70 Dry	Start of shift		ehole Compl	lete													
			C	ABLE PER	CUSSION	DETAILS	;									SPT [DETAILS				
Depth Top	Depth Base	Time	e Start	Duration	n Too	ıl		Remai	rks		Depti Top		Fest Type		Report	ed Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
	1																1	'			
	1																1	'			
	1																1	'			
	1																1	'			
					' FLUSH D	ETAILS					1						1	'			
Depth Top	Depth Base		sh Type	Flush Return				Remarks	3								١	'			
1.20	13.10	AIF	R/MIST	100	Grey						1						١	'			
	1																1	'			
	1																١	'			
	1																	'			
																		'			
HOLE DIA	AMETER	CASING Depth	G DIAMETE	<u>ER</u>	Depth		∕IIC SAM		Sample	Run								'			
Base 13.10	Diameter 146	Base	Diameti	ter Depth To	op Base	Diamete	er Dura			Reference	è							'			
13.10	146	13.10	146															'			
	1																	'			
	1																	'			
	LNCT	L	N. DETAIL		Щ		IDE CON	ICTRUCT			<u> </u>	\perp				DTILDELA	TED DEI	LARKS.	<u> </u>		
Distance		Re	N DETAIL		Pipe Pipe	T		ISTRUCTI	1	- Tumo	Depti	h D	Depth	т—	DE	PTH RELA					
Distance 1.50	G1 G1	iype		Base F	Ref Ref	0.00	Base 0.50	19	PLAIN	ре Туре	Top 7.60	E	Base 7.60		est attemp			emarks			
					Pipe 1		1.50	19	SLOTTE	ED	9.45		9.45		est attemp						
				BACŁ	 KFILL DETA	LLS AILS					+					LOCATIO	N DETA	ILS			
Depth	Depth	$\overline{}$	Descri				Re	marks			+						marks				
-0.50 0.00	0.00 0.25	Upstandir Concrete	ng cover		+						+		-								
0.00 0.25 0.50	0.50 1.50	Bentonite Gravel ba	е																		
1.50 1.70	1.70 13.10	Bentonite Grout																			
	1																				
	1																				
	Note			etres, all dia																	
AGS	4			et for deta obreviation			ss and w	ater.											\		
FINAL				Print (date and ti	me 12/0	19/2022 1	13:55			Log che	ecked	by Da	avid Hov	ward			SO	ir eu	ginee	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Issue.Revision No. 2.02

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rato	y Ho	le Lo	9	R	H_STW_0)13C
Eng <mark>i</mark> neer	Mott MacDonald Bentley													11 <u>_</u> 31 44 _0	/ 1 3C
Employer	Barhale Limited													Sheet 1 of 2	2
Ground Level	+7.01mOD Cool	rdinate	:s	549799	40E, 2612	108.88	V		Gri	id	OS	GB			
Hole Type	IP+RC Incli	nation													
	Description of Strata	Wenhering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	RGD	<u>н</u>	In Situ Test Details	Install- ation
	m slightly gravelly sandy CLAY. Sand is fine to	-					H		 						
coarse. Gravel is and quartz. Occasional b	gular to subrounded fine to coarse of flint and ouried rootlets.			(0.40)		Ī		0.20 0.20-0.40							
(TOP) [TOPSOIL]	gravelly sandy CLAY. Sand is fine to coarse. Gravel	1		0.40	7.01			0.30 0.40-0.60						02	
is angular to subrou	nded fine to coarse of flint and quartz.		· · · · · ·	(0.40) 0.80	7.01			\$ 0.50							
(SUPD) SUPERFICIA CHALK recovered as	L DEPOSITS] :: Very stiff light grey mottled brown slightly sandy	1	To To	(0.40) -	7.01			0.80-1.00							
calcareous CLAY, Sai	nd is line to coarse. LBURY CHALK FORMATION]			1.20	7.01			7 1.00 1.20							H
Structureless CHALL	Composed of firm greyish brown slightly gravelly	Ē				İ									
	avel is angular to subangular fine and medium of is mudstone. (CIRIA Grade Dm)	Grade Dm	11 1	(0.71)										100	
	LBURY CHALK FORMATION]	5	91 9	:	1		١,,	1.20-2.30	102	100	35	35			
	ery weak medium density greyish brown CHALK	8 ~	7 12	1.91	7.01		"	1.20-2.30						152	
Grade)	eous MUDSTONE. (Unable to determine CIRIA	Grade A2	1 1	(0.39) 2.30	7.01										
	LBURY CHALK FORMATION] Composed of firm to staff greyish brown slightly	\Box		2.30	7.51								NA		
gravelly calcareous	CLAY. Gravel is angular to subangular fine to	F		:											
	calcareous mudstone. (CIRIA Grade Dm) LBURY CHALK FORMATION]	돌	12 D	(1.15)											
		Grade	ul gilig	-			C 10	0 2.30-3.90	102	100	17	В		S-	
			10 1	:	1										
	density greyish brown CHALK composed of	₩.		3.45	7.01	모							NI	-	
	ONE. Discontinuities: 1) 60 to 85 degrees very aced undulating planar smooth brown staining.	Grade	<u> </u>	(0.45)									110 130		********
(CIRIA Grade B3)		9	1	3.90	7.01								150		70,000,000
from 3.85m to 5.90	LBURY CHALK FORMATION] m non intact core (recovered as subangular medium	1	7.1	:	1										
\ and coarse gravel si Structureless CHALI	teed fragments) K composed of stiff to very stiff light grey slightly	_ ا		:											*****
	CLAY Gravel is angular to subangular fine and ak calcareous mudstone. (CIRIA Grade Dm)	Grade Dm	1 1	(1.46)			l						NA		2002(23)
(WMCK) [WEST MEI	LBURY CHALK FORMATION] In thin bed of very weak medium density light grey	Se Se	1 1	Service.	•		C1	1 3.90-5.50	102	100	16	9			
	m thin bed of very weak medium density light grey calcareous mudstone			2										-	
			PI	:											
	high density light grey CHALK composed of	*	Train at	5.36	7.01								20	<u> </u>	
closely to closely sp	ONE. Discontinuities: 1) 60 to 80 degrees very aced planar undulating smooth. (CIRIA Grade A4)	Grade	l' ,,, l' .,	(0.44)									50 80	:	
	LBURY CHALK FORMATION] K composed of soft to firm light grey gravelly	\	E E	5.80	7.01							8	_	:	
calcareous CLAY. Gra	avel is angular to subangular fine to coarse of very	Ę	<u> </u>	7					L					-	
	tstone. (CIRIA Grade Dm) LBURY CHALK FORMATION]	Grade Dm		(0.95)			CI	2 5.50-7.00	102	100	20	20	NA		
		্ৰ	<u> </u>	-										83	2000
Very weak medium	density light grey CHALK composed of calcareous	_	1	6.75	7.01									K 6.80 - 8.40	H
MUDSTONE. Discor	ntimulties. 1) 5 to 10 degrees medium spaced	Grade A3		(0.52) -									70 90	K 6.80 - 8.40	2172777
	with black staining, 2) 60 to 85 degrees closely lating smooth with black staining, (CIRIA Grade	8	1. 1.	7.27	7.01								130		******
B3) MMCKI WEST MEI	LBURY CHALK FORMATIONT			121	7.01										7/21/27
Structureless CHALL	Composed of stiff light grey slightly gravelly	٤	7	meny					L					127	
	avel is angular to subangular fine of very weak ie. (CIRIA Grade Dm)	Grade Dm	7 7	(1.01)]		C 1	3 7.00-B.50	102	100	41	33			
	LBURY CHALK FORMATION] I fossilised shell fragments (<6mm x 8mm)	্ত		+			1							5=	
from 7.72m to 7.78s	m non intact core (recovered as angular to subangular sized fragments of weak chalk composed of			8.2B	7.01		1						RIA		
calcareous mudstor		Grade A2		(0.53)	1		1						NA	532	7141170
mudstone	m very thin bed of very weak chalk composed of	Grac		9950			1							K 8.65 - 10.25 K 8.65 - 10.25	2012
calcareous mudstos		E		8.81	7.01		1							IU23	
MUDSTONE. (Unabl	e to determine CIRIA Grade)	8		(0.65)	1				Lau.						
	LBURY CHALK FORMATION] Composed of very stiff light grey gravelly	Grade					C14	8.50-10.10	102	100	53	38			30000
calcareous CLAY. Gra	avel is angular to subangular fine to coarse of very adstone. (CIRIA Grade Dm.)	2		9.46	7.01		1					- 3	40		83.00.00
(WMCK) [WEST MEI	LBURY CHALK FORMATION]	Grade		(0.53)									130 160		
at 8.85m occasional	l fossilised shell fragments (<11mm × 16mm)	9		9.99	7.01	\vdash	\vdash		+					-	
Motor-	All depth in metres, all diameters in millimetre												1	44	
AGS	See header sheet for details of boring, progress and water.														
	For details of abbreviations, see key.												SAI	L enginee	DIDE
FINAL Form No. SIEXPHOLEL	Print date and time 12/09.			Jerua Data	Lo 02/03/20		ked t	by David Howar	rd					f the Rachy Soletano	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Exploi	ator	у Но	le Lo	g	В	H_STW_C)13C
Engineer	Mott MacDonald Bentley														,100
Employer	Barhale Limited													Sheet 2 of 2	2
Ground Level Hole Type		ordinate lination		549799.4	i0Е, 2612	408.88	V		Gri	d	OS	GB			
Поте туре	Tivite inc.	_		Depth		ě		0 !:		eg %	٧s				
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test Details	Install- ation
Very weak medium	density light grey CHALK composed of calcareous	We		ness)		W		Details	Dia.	TCF Re	SC				
MUDSTONE with fr	equent coprolites at base (<35mm x 45mm). to 30 degrees very closely to closely spaced														
undulating planar si	mooth. (CIRIA Grade A3) LBURY CHALK FORMATION]			(1.11)										-	
from 9.90m to 9.99	m frequent coprolites (<35mm x 45mm) shark tooth (<10mm x 15mm)			(===)											
Stiff fissured dark gr	rey CLAY with rare fossilised coprolites (<13mm x tal to horizontal fissures are extremely closely to	'							102	100				-	
closely spaced plan	ar undulating smooth polished. Subvertical	-		11.10	7.01										
(GLT) [GAULT FORM		there		(0.50)									NA		
(8mmx 11mm). Fiss	ark grey CLAY with rare fossilised coprolites ures are subhorizontal to horizontal very closely to	Unweathered		11.60	7.01								147		
(GLT) [GAULT FORM			<u> </u>											=	
(<7mm x 12mm). Su	ark grey CLAY with rare fossilised coprolites ubhorizontal to horizontal fissures are extremely		F_=_												
	aced planar undulating smooth polished. al fissures are medium spaced planar smooth			(1.50)			C 1	5 11.60-13.10	102	90					
polished. (GLT) [GAULT FORM	ATION]		E_=_												
from 12.95m to 13.	10m assumed zone of core loss		E-E-	_										-	
Complete at 1	13.10m. Termination Reason: Achieved Scheduled Dep h			13.10	7.01										
	Scheduled Dep II													-	
				-										-	
															-
															-
				_										_	1
															-
				-											
															1
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															-
				-										-	
														-	
				-										-	
															-
														_	
<u> </u>															
	All depth in metres, all diameters in millimetre. See header sheet for details of boring, progre		water.												
AGS	For details of abbreviations, see key.	oo antu	·vacol.												
FINAL	Print date and time 12/0		13:55				ked l	by David Howard	t					L enginee	
Form No. SIEXPHOLEL	.OG Issue.Revision No. 2.0!	5		Issue Date	02/03/20	18							Part o	f the Bachy Soletanc	he Group

Project	Name	Car	nbridge	: Waste	: Wa	ater Tre	atment	Plant F	Reloca	ation					_					Н	ole ID	
Project	Nο	TE8	364												Exp	olorato	y Hole	Log		3H S	TW_	014
Engine			tt Macl	Donald	Ber	ntley																
Employ			hale Lir	nited																	et 1 of 1	1
Ground L Date Star			60mOD 09/2021						Coordi Date C		ted		37.50E, 9/2021	260872	.96N			Grid	nation	OSGB		
Top	Base		Date T	ime Stai	rt D	ate Tim	ne End F							nt Use	d Shorir	ng Used P	it Stability			Remark	S	
0.00 1.20	1.20 30.00	IP RC		2021 09:15 2021 11:00	-	23/09/202 27/09/202	1 11:00	TW TW	DT AY	Geo	bore S	PCD	Insulat	ted Hand To 46 Beretta	ools N	one	Stable					
										(1	146)											
					PRO	GRESS											WATER	STRIKE	S			
Date ¹	Time	Depth	Depth Casing	Dept	h			Rema	ırks				Date	Time	Depth Strike	Depth	Depth Sealed	Water Rose To	Time		Remark	(S
23/09/20 24/09/20		15.70 15.70	2.20 2.20	4.16 3.94	E	nd of Shift tart of Shift							23/09/20	21 14:00	6.40	Casing 2.20	Sealed	4.52	Elapsed 20			
24/09/20: 27/09/20:	21 17:30	27.20 22.70	2.20 2.20	5.15 3.95	Ei Si	nd of Shift tart of Shift	:															
27/09/20		0.00			В	ackfill Com	plete; Boreh	nole Comple	ete													
				240150	-	1001011	DETAILO										007.0			<u></u>		
Depth	Depth	T			\neg		DETAILS						Depth	Test		ъ .		ETAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base	lin	ne Start	Durati	on	Tool			Rem	arks			Тор	Туре		Reporte	d Result		Number	Ratio	Casing	Water
						LUSH DE	TAILS															
Depth Top	Depth Base	FIL	ısh Type	Flu: Retu	ırn	Flush Colour		ı	Remarl	ks												
0.00	30.00	А	IR/MIST	10	0	Grey																
HOLE DI	AMETE		_	ER			DYNAM	IC SAM	PLING													
Depth Base	Diamete	Pr Depti Base		ter Depth	Тор	Depth Base	Diamete	r Dura	tion	Sampl Recove	le Ru ery Refer											
2.20 30.00	150 146	2.20 30.00																				
	INST		N DETAI		Pipe	e Pipe	PII	PE CONS	STRUC				Depth	Depth		DEI	PTH RELAT	TED REN	1ARKS			
Distance	ID	Туре	Top	Base	Ref		Тор	Base	Diame	eter [Pipe Ty _l	ре	Тор	Base	<u> </u>			Re	marks			
Depth	Depth	1			CKFII	LL DETA	ILS										LOCATIO		LS			
Top 0.00	Base 30.00	Grout	Descr	iption				Ren	narks								Ren	narks				
0.00	00.00	a.out																				
	N1	OC: All -1	nth i= =	otros -!!	dia	notore :::	millior - 4	200														
AGS	Not	See h	eader she	eet for de	tails	of boring	millimetr g, progres		ater.													
EIA: A:		For de	etails of a			-	40 := :	V2625	2.55					. ,					SOI	L end	Sinee	שוחפ
FINAL Form No. 9	SIEXPHOL	.EHDR		Prin		e and tin le.Revisior	ne 12/09 n No. 2.02	1/2022 1	3.55	Issue [Date 22/		-	kea by L	David Ho	ward					ny Soletanch	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
								Explo	rator	у Но	le Lo	g			
Project No.	TE8364												E	BH_STW_	014
Engineer	Mott MacDonald Bentley Barhale Limited													Sheet 1 of	2
Employer Ground Level		rdinate	es.	549537.5	50E, 2608	72.961	N L		Gri	d	0.5	GB		SHEEL I OI	5
Hole Type		nation			,										
		ing		Depth	5.	iķe		Sampling		y %	ws			1 00 T .	
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
TORCOIL Dark have	us slighthy support to CLAV Count in first As	M	V///XV///	ness)		Š	D.1	Details	Dia.	TCF Re	SC				
coarse. Gravel is and	n slightly gravelly sandy CLAY. Sand is fine to gular to rounded fine to coarse of flint.			(0.30)				0.05-0.10 0.20-0.25							
(TOP) [TOPSOIL] Firm light brown slid	ghtly gravelly sandy CLAY. Sand is fine to coarse.	1	***	0.30	10.60			0.10-0.40 0.40-0.50							
Gravel is angular to	subrounded fine to coarse of flint.			(0.80)			ES 5	0.50-0.55							7
(SUPD) [SUPERFICIA	L DEPOSITS]			(0.80)			B 6	0.40-0.80							}
				1.10	10.60			0.80-1.20 1.00-1.10							
	s: Firm light grey slightly gravelly sandy calcareous lar to subrounded fine to medium of flint.	\vdash		1.20	10.60		1	1.10-1.10							
	LBURY CHALK FORMATION] K composed of soft yellowish brown gravelly	a Dm		(0.70)											-
calcareous CLAY wit	th orange staining. Gravel is subangular to	Grade		(0.70)			C 10	1.20-2.20		70			NA		
	n to coarse of extremely weak low density and flint. (CIRIA Grade Dm)			1.90	10.60										-
\setminus (WMCK) [WEST MEI	LBURY CHALK FORMATION] ore loss. CHALK. (Driller's Description)	Ί		(0.30)	10.60										
\setminus (WMCK) [WEST MEI	LBURY CHALK FORMATION]			2.20	10.60]::::::::::::::::::::::::::::::::::::::
	density yellowish brown CHALK composed of VEW with rare shell fragments (<10mm x 10mm).														
Discontinuities: 1) ra	andomly orientated extremely closely to very	B4											NI		
	ar smooth with silt infill (<3mm). (CIRIA Grade B4) LBURY CHALK FORMATION]	Grade B4		(1.40)			C 11	2.20-3.70		100	7	0	35 50		
	m structureless chalk composed of soft yellowish areous clay. Gravel is subangular to subangular fine to	G											30		
medium of calcared															
	fragments of extremely weak low density calcareous	<u> </u>		3.60	10.60										†
at 3.42m black spec	cks staining very weak low density yellowish brown CHALK														
composed of calcare	eous SILTSTONE. Discontinuities: 1) 0-10 degrees			-											
closely to widely spa (CIRIA Grade B1)	aced undulating rough with silt infill (<3mm).]::::::::::::::::::::::::::::::::::::::
	LBURY CHALK FORMATION]		 			\Box	C 12	3.70-5.20		100	100	100]
		l													
		de B1		(2.60)									120 800		
		Grade		` ′-									1000		
															1
				-											1
															-
							C 13	5.20-6.70		100	100	97			
				6.20	10.60										}
	medium density yellowish brown CHALK eous SILTSTONE. Discontinuities: 1) 0-10 degrees				10.00										
closely to medium s	spaced undulating rough with silt infill (<3mm).														-
	LBURY CHALK FORMATION]	B3											40		
	m discontinuities 2) randomly orientated very closely oth with orange staining.	Grade		(1.47)									150 370		-
		9											370		
										100	92	89]::::::::::
V	CHAIR CHAIR			7.67	10.60		C 14	6.70-8.20							}
composed of calcare	medium to high density light grey CHALK eous SILTSTONE. Discontinuities: 1) randomly	le B4		(0.53)									15 45		
	y closely to very closely locally closely spaced orange staining. (CIRIA Grade B4)	Grade] ` '-									130		-
(WMCK) [WEST MEI	LBURY CHALK FORMATION]	\vdash		8.20	10.60										-
SILTSTONE. Disconti	ight grey CHALK composed of calcareous inuities: 1) 0-20 degrees medium spaced														-
	mooth with orange staining. (CIRIA Grade B2) LBURY CHALK FORMATION]				1										1
from 8.40m to 8.47r	m extremely weak low density m extremely weak low density] :			C 15	8.20-9.70		100	83	75			}=====
0.50111 (0 6.55)				(3.60)										·	
from 9.35m to 9.42i	m extremely to very weak low density			1											
	·														-
				1											
■ ■ 	All donth in matree all dismeters in willing														
AGS	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water.												
78.000	For details of abbreviations, see key.													L ODGIGG	20100
FINAL	Print date and time 12/09.		13:55				cked by	/ David Howar	d					L engine	
Form No. SIEXPHOLEL	.OG Issue.Revision No. 2.05			issue Date	02/03/20	TΩ							Part o	f the Bachy Soletan	ne Group

Project Name	Cambridge Waste Water Treatmer	t Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Exploi	ratoi	у Но	le Lo	g		BH_STW_	01/
Engineer	Mott MacDonald Bentley													011_3177_	<u>.</u> 01 4
Employer	Barhale Limited													Sheet 2 of	3
Ground Level		ordinate		549537.5	50E, 2608	72.961	V		Gri	d	09	GB			
Hole Type	IP+RC In	lination	1	1	I	T 0)				0 .0	Ι.,			1	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	I	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
Weak high density I	ight grey CHALK composed of calcareous	>	 			>		Details	Dia.	2 &	Š				
	inuities: 1) 0-20 degrees medium spaced nooth with orange staining. (CIRIA Grade B2)														1
	LBURY CHALK FORMATION] m recovered as partially non intact core (angular						C 10	6 9.70-11.20		100	73	59			1
	54m extremely weak low density with randomly	5		:									NII.		
fractures	ly closely spaced planar smooth orange stained 10m 1 No. fractures 45 degrees planar rough	Grade B2		_									NI 240		
110111 10.55111 to 11	10111 1 No. Hactures 43 degrees planar rough	ট		:									460		
				-											-
Stiff arou CLAV with	frequent phosphatic nodules (<10mm x 40mm).			11.80	10.60										
(WMCK) [CAMBRID	GE GREENSAND MEMBER] 04m frequent phosphatic nodules (<10mm x 40mm)		<u> </u>	12.04	10.60		C 1	7 11.20-12.70		100	49	49			
Very stiff fissured da	ork grey CLAY. Fissures are 0-30 degrees closely of the polished and randomly orientated very closely	7													
spaced planar undu	lating smooth occasionally polished.			-											
(GLT) [GAULT FORM	AHONJ														
			<u></u>	_											
			<u></u>	-			C 1	8 12.70-14.20		100					-
			<u></u>												
				_											-
			<u> </u>	(4.88)											-
				-			C 19	9 14.20-15.70		100					-
			<u> </u>												
				-											_
				-											
							C 20	0 15.70-17.20		100					
]
	ark grey CLAY with occasional siltstone nodules	\dashv		16.92	10.60										
	nd phosphate nodules (<20mm x 30mm). Fissures edium spaced planar polished smooth with														
	of silt, 70-90 degrees medium spaced planar mly orientated very closely to closely spaced		F_=_	-											
planar smooth. (GLT) [GAULT FORM.			E-E-												
	•			_			C 2	1 17.20-18.70		100					
			<u></u>												
															-
				:											
							C 22	2 18.70-20.20		100]======
				:											
			<u> </u>												1
	All depth in metres, all diameters in millimet		<u> </u>	I .	1	<u> </u>	1		<u> </u>	<u>I</u>	<u> </u>	1 1			1
AGS	See header sheet for details of boring, progr For details of abbreviations, see key.	ess and	water.												
FINAL	Print date and time 12/0		13:55				ked b	y David Howard	t					L engine	
Form No. SIEXPHOLEL	.OG Issue.Revision No. 2.)5		Issue Date	02/03/20	18							Part o	f the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatmen	t Plant	Relocat	ion										Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley							Explor	ator	у Но	le Lo	g	E	BH_STW_	014
Employer	Barhale Limited			<u></u>										Sheet 3 of	3
Ground Level		ordinate		549537.5	50E, 2608	72.96N	J		Gri	d	09	GB			
Hole Type	IP+RC Inc	lination	Т	Donth		é				ə %	s/				T
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test Details	Install- ation
(<20mm x 20mm) at are 0-20 degrees m occasional dusting opolished and randor planar smooth. (GLT) [GAULT FORM.	ark grey CLAY with occasional siltstone nodules and phosphate nodules (<20mm x 30mm). Fissures redium spaced planar polished smooth with of silt, 70-90 degrees medium spaced planar mly orientated very closely to closely spaced (IATION) CLAY with occasional siltstone nodules (<20mm x retained to the codules (<20mm x retained to				10.60	Wate	C 23 2	0.20-21.70 0.20-21.70 0.3.20-24.20	Dia.	100	ADS SCR		NA	Details	ation
	.20m 1 No. fissure 30 degrees undulating polished ore loss. CLAY. (Driller's Description) IATION]			28.20 - (0.50) _	10.60		C 28 2	7.20-28.70							
spaced planar polish				(1.30)	10.60		C 29 2	8.70-30.00		100				-	
Complete at 3	30.00m. Termination Reason: Achieved Scheduled Dep h			30.00	10.60										
AGS	: All depth in metres, all diameters in millimet See header sheet for details of boring, progre For details of abbreviations, see key.	ess and v											501		
FINAL	Print date and time 12/0		13:55	1 0.	Lo:	_	ked by I	David Howard	t				501	L enginee	:KII IG

Project	Name	Carr	nbridge	Waste V	Nater Tre	eatmen [†]	t Plant	Reloca	ation									Н	lole ID	
			_										Exp	olorato	ry Hole	Log				215
Project Engine		TE83		onald Be	antlay												5	3H_S	STW_	015
Enginee Employ			nale Lim		cincy													She	et 1 of 1	1
Ground L	_evel		2mOD					Coordin			9671.50		75.20N			Grid	1	OSGB		
Date Star			7/2021		- T.	F.4			ompleted		/07/202:		- la -	II			ination		m horizor	ntal
Top 0.00	Base 1.20	Туре	Date Tin 22/07/20		Date Tir 22/07/202		Craig	Logge DT	er Barrel T			lant Us lated hand		ng Used F None	Pit Stability Stable	<u> </u>		Remark	is	
1.20	30.20	RC	22/07/20)21 14:00	28/07/202	21 14:00	Blackett Craig	MV	Geobor		o s	Soilmec SN	/18							
	1		I				Blackett		(146))										
	1		I																	
	1		I																	
				PF	ROGRESS	;					Τ				WATER	STRIKE	ES			
Date ⁻	Time	Depth	Depth Casing	Depth Water			Rema	arks				e Time	Depth Strike	Depth Casing		Water Rose To			Remark	<s< td=""></s<>
22/07/202 23/07/202	21 07:30	7.80 7.80	2.85 2.85	2.20 2.85	End of Shift Start of shift	ft						2021 00:00	0 4.50	2.85	<u>'</u>	4.50	0	Rise not flush.	recorded, m	
23/07/200 26/07/200	21 07:30	24.10 24.10	4.35 4.35	2.80 2.75	End of Shift Start of shift	ft					23/07/2	2021 12:00	0 12.30	2.85		12.30	0	Heavy in recorded	ıflux noted. R d.	ise not
26/07/202 27/07/202 27/07/202	21 07:30	30.20 30.20 12.00	4.35 4.35 4.35	3.35 2.80 2.80	End of Shift Drilling Cor End of Shift	mplete														
28/07/202 28/07/202	21 07:30	13.50 0.00	4.35 0.00	2.80 2.80 2.80	Start of shift		Borehole Cc	mplete												
						•														
			C	ARI F PEF	 RCUSSION	DETAILS					<u> </u>				SPT [DETAILS				
Depth	Depth	Tim	e Start	Duration	_			Rema	arks		Depth	- 1		Report	ed Result	7211.1.1	Hammer Serial Number	Energy	Depth	Depth
Тор	Base	\vdash		-	1						Тор	Туре	:	<u> </u>			Number	Ratio	Casing	Water
	1																			
	<u> </u>	<u></u>		- STADW																
Depth	Depth	T	1.7	Flush	FluSH D	TAILS					-									
Top 1.20	Base 3.60	AIF	sh Type R/MIST	Return 90		+		Remark	<s< td=""><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></s<>		-									
3.60	30.20		R/MIST	90	Grey															
	1																			
	1																			
noi e Di	ANAETER	CASING	G DIAMETE	-0		DYNAM	AIC SVIV	יטו ואוכ			-									
Depth	Diameter	Depth		er Depth To	Depth	_		ation	Sample	Run	-									
Base 30.20	Diameter 146	Base 4.35	150	P Depui io	op Base	Diamete	t Duis	TIOI	Recovery	Reference	*									
	1	15.30	146																	
	1																			
	1																			
	INST	LLATIO!	N DETAILS	S		PI	IPE CON:	STRUC ¹	TION		 			DE	PTH RELA	TED REN	MARKS			
Distance		Type Re	esponse Re	esponse Pi	Pipe Pipe	Тор	Base	Diame		е Туре	Depth						marks			
12.00 12.00		SP	1.25	12.00 Pip	Ref Ref	0.00	1.50 1.50	50 19	PLAIN		Тор	Bas	ie							
12.00	GI	SP	1.25	12.00	ipe 2 Pipe 2 Pipe 1 Pipe 2	1.50	1.50 12.00 3.00	50 19	SLOTTI	ED										
						1.01	0.00			LU										
				BACK	 KFILL DETA	 AILS					+				LOCATIO	N DETA	ILS			
Depth Top	Depth Base		Descrip				Rei	marks			†					marks				
-0.50 0.00	0.00 0.50	Upstandir Concrete	ng cover		+						+									
0.50 0.75	0.75 1.25	Gravel bar Bentonite	ckfill																	
1.25 12.00	12.00 13.50	Gravel bad Bentonite	ckfill																	
13.50	30.20	Grout			Ceme	nt / Bentoni	te Grout													
	1																			
	Note				ameters in												\Box			
AGS	3				ails of borir ns see key.		ss and w	ater.												
FINAL					date and ti		9/2022 1	13:55			Log che	cked by	David Ho	ward			SOI	L end	sinee	RING
Form No. S	SIEXPHOLE	HDR			ssue.Revisio	n No. 2.02			Issue Dat	e 22/06/2	016						Part	of the Bacl	hy Soletanch	e Group

Project Name	Cambridge Waste Water Treatme	ent Plan	t Relocat	tion									Hole ID	
Di+ M-	TE8364						Ex	plorato	ry Ho	le Lo	9	,	MTS HE	Λ1 Ε
Project No. Eng <mark>inee</mark> r	Mott MacDonald Bentley											[3H_STW_	_012
Employer	Barhale Limited												Sheet 1 of	4
Ground Level		Coordinat	es	549671.	50E, 2609	75.20	N I	Gr	id	OS	GB			-
Hole Type	IP+RC	Inclination	1	90° from	honzontz	al								
		gring g		Depth	Datum	trike	Samplir	ng	mple ₹y	DWG			In Situ Test	instali-
	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike	Details	Dia	TCR/Sample Recovery %	SCR/Blows	80	뜨	Details	ation
TOPSOIL: Dark brow	n slightly gravelly clayey fine to coarse SAND v		WAY.	(0.00)	_	>	D1 0.05	DIA	ř.	<i>v</i>				
occasional rootlets. (TOP) [TOPSOIL]			(Dale)	(0.30) 0.30	9.62		B3 0.05-0.30 ES2 0.20							
Orangish brown grav	velly slightly sifty fine to coarse SAND. Gravel is unded fine to coarse of flint.	<u>- </u>	x x x x	(0.50)	<u> </u>		D 4 0.45 ES 5 0.50							
(SUPD) SUPERFICIA	L DEPOSITS]		×	0.80	9.12		B 6 0.45-0.75 D 7 0.80							
	Composed of greyish white gravelly fine to Lis subangular to subrounded fine to coarse of			(0.40) -	•		ES 8 0.90						9	-
	A Grade – unable to determine) LBURY CHALK FORMATION]		T	1.20	8.72		B9 0.80-1.20	-				NR	-	
Assumed zone of co	re loss. CHALK with flint. (Driller's Description) LBURY CHALK FORMATION]	_	1 -	(0.40)]								33	
Structureless CHALK	Composed of greyish cream slightly sandy	Ε		1.60	8.32		C 10 1.20-2.20	102	60		-	NI		
With occasional sub	Gravel is very weak low density greyish white angular and rounded fine to coarse gravel and	Grade Dm		(0.60)	-						-	NA		
	thin white cortex. (CIRIA Grade Dm) LBURY CHALK FORMATION]	ક	1	2.20	7.72							NA		
from 1.60m to 1.80m coarse gravel sized t	m recovered as non intact core (subangular fine to fragments)	1	Train a	(0.30)			C 11 220-2.70	102	90	38	38	NI		
	density off white to light brown locally stained ALK composed of calcareous SILTSTONE. (CIRIA			2.50	7.42		111 220 270				00		E (2	1 111:
Grade - unable to de		1	1 1	1]									
	m recovered as non intact core (subangular fine to	1	1	(1.26)	1		040 070 000	102	93	10	o	NI	33	1.11.
Very weak medium	density light greyish brown locally stained ALK composed of calcareous SILTSTONE.		1 1]		C 12 2.70-3.60				-	90		
Recovered as non in	tact core (subangular to subrounded fine to		7 7		1			<u> </u>					- 1	H.:
(WMCK) [WEST MEL	fragments). (CIRIA Grade - unable to determine LBURY CHALK FORMATION]			3.76	6.16						39			1
	m assumed zone of core loss	1		-	}									<u>-</u> H.
occasional angular o	m recovered as non intact core (gravelly clay) with coarse black flints with thin grey cortex (<1-2mm)			1	}		C 13 3.60-4.80	102	100	87	87			
calcareous SILTSTON	density light greyish brown CHALK composed of NE. Discontinuities 1) 10 to 20 degrees medium		1		4	모							33	-H.
Grade A2)	y closely spaced, planar rough. (Possibly CIRIA		1]									· -
	LBURY CHALK FORMATION] m 1 No. discontinuity 45 degrees undulating rough		1	(2.54)	1							NI 310	=	- 1
clean			1		1							900		$\exists \exists$
] .	3									H
			1]	‡		C 14 4.80-6.30	102	92	83	83			H.
					1									Π
	m recovered as non intact core (subangular to m and coarse gravel sized fragments and subangular		Roll	1	}									7:∃:
cobble sized fragme			1 1	6.30	3.62								1	18
Very weak medium	density light grey CHALK composed of calcared inuities: 1) 10 to 20 degrees closely to medium	ous			-									
spaced planar rough	tocally infilled with silt (<3mm). 2) 60 to 85 nedium spaced planar and undulating smooth		1 1]]									: H
gravel infill (<1mm).	(CIRIA Grade B2/3)						C 15 6.30-7.80	102	100	85	73		9	FI.
from 6 70m to 6 84r	LBURY CHALK FORMATION] m recovered as non intact core (subangular to]									H:
	coarse gravel sized fragments) m very weak low density		1		1									17
			1 1	1	‡			-						H .
		82/3	1	-]							NI		- 1
		Grade 82/3	<u> </u>	(6.20)	‡							200 310		H :
		١	1 20		}		C 16 7.80-9.30	102	100	100	70		5)]
			1 1]]									
] .	‡									4 H
]]									: H
			1] .	1									17
				}	‡									
			1		1		CW1 1000							
						1								
						1								
-														
	All depth in metres, all diameters in millim See header sheet for details of boring, pro		water											
A	For details of abbreviations, see key.	gress diki	water.											
FINAL	Print date and time 13	13:55		Lo		ked by David H	oward				SOI	r eudine	PRING	

Project Name	Cambridge Waste Water Treatme	nt Plant	Relocat	ion										Hole ID	
,	ū							Explo	rato	у Но	le Lo	og -			
Project No.	TE8364							•				-	E	BH_STW_	015
Eng <mark>i</mark> neer	Mott MacDonald Bentley														
Employer	Barhale Limited													Sheet 2 of	4
Ground Level	+9.92mOD C	oordinate	s	5496715	OE, 2609	75.20	V		Gri	d	OS	GB.			
Hole Type	IP+RC II	clination	1	90° from	honzonta	1								r	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	SQD	<u>u</u>	In Situ Test Details	Install- ation
Very weak medium o	density light grey CHALK composed of calcareou		<u> </u>	· .		_	C 17	7 9.30-10.80	Dia	Ĕ Œ	, v,				<u>-</u>
SILTSTONE. Disconti	nuities: 1) 10 to 20 degrees closely to medium		7]
	locally infilled with silt (<3mm), 2) 60 to 85 ledium spaced planar and undulating smooth		300 300	-					102	93	83	76			· H.
gravel infill (<1mm)	(CIRIA Grade B2/3) BURY CHALK FORMATION]		E E	:					1						
from 10 90m to 10.4	Sm recovered as non intact core (angular to		, ,	:					\vdash						<u>;</u> ;∏.;;]
	oarse gravel sized fragments) Om assumed zone of core loss			-					1					-	1
			T T	:					1						
			i l	_			l		l] [
from 11 55m to 11.6 gravel sized fragmen	SSm recovered as non intact core (angular coarse		, l'l'	:			C 18	8 10.80-12.30	102	100	88	60			<u> </u>
			1,11	:					1						<u> </u>
from 11 90m to 11 6 gravel sized fragmen	PSm recovered as non intact core (angular coarse		, l, l,	2					1					-	
				:		모	1		L		L				
				12.50 -	-2.58		1								
	grey SILTSTONE with occasional subrounded to d coarse gravel of coprolite.		22222	12.65	-2.73		1					- 6		:	
(WMCK) [CAMBRIDG	GE GREENSAND MEMBER]	_/							1						/
	grey fissured CLAY Fissures are 0 to 30 degrees paced planar smooth locally polished and			7			C 19	9 12.30-13.80	102	100	0	0		-	
striated.	ationi			:					1						1
(GLT) [GAULT FORMA	ATON			<u> </u>					1						
			-=-=	:					1						
from 18 80m to 14.1	Iom 1 No. medium bed of weak light grey sittatione] :											
				-					1					-	
				:					1						
				-			C 20	0 13.80-15.30	102	100					
				:			"-"	20.00 20.00		200					
	16m from 14.80m to 15.18m 1 No. fissure 55 to 75 oth polished and striated								1						7.70.
degrees parar silo	oni buigise and straten		-=	-					1					-	-
									\vdash						*****
				-					1						
				:					1						
									l .						
				7			C 21	1 15.30-16.80	102	100					
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				-					1						10000000
				-					1						22000
			<u></u>	-											
									1						
			F						1						}
				-			C 22	2 16.80-18.30	102	100					
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				-					1					172	
				:					1						
			F				1		102	100				_	
				:			C 23	3 18.30-19.80							[
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							1								C3-57-2-1-0
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		+	 				\vdash		\vdash			\vdash			
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							1								
													_		
0.0000000000000000000000000000000000000	All depth in metres, all diameters in millime														
	See header sheet for details of boring, prog For details of abbreviations, see key.	ess and	water.												
FINAL	Print date and time 12	מכחכ/פח	1355		l o	n char	keri F	y David Howar	ri				SOI	L enginee	RING
FINAL Form No. SIEXPHOLEIC				Issue Date			wou D	oy David HOWal	'n					f the Rachy Soletano	

Project Name	Cambridge Waste Water Treatm	ent Plan	t Relocat	tion										Hole ID	
L								Explo	rato	у Но	ole Lo	og		NI CTM	015
Project No.	TE8364													BH_STW_	015
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 3 of	4
Ground Level	+9.92mOD	Coordinat	es	549671.5	50E, 2609	75.201	N		Gri	d	09	SGB		011000 0 01	
Hole Type	IP+RC	Inclination	1	90° from	horizonta	l									
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
	k grey fissured CLAY. Fissures are 0 to 30 degre									'					-
striated.	spaced planar smooth locally polished and		F_=_												
(GLT) [GAULT FORM from 20.30m to 20.	ATION] 50m recovered as firm (Drilling induced)		F_=_						102	100					-
			F_=_				C 22	4 19.80-21.30	102	100					
			F_=_	-											
			F_=_] :											
				-											-
			<u> </u>												
			<u> </u>	_			C 25	5 21.30-22.80	102	100					
from 22.05m to 22.	20m very closely fissured		<u> </u>				C 25	21.50-22.60	102	100					1
			<u> </u>]:::::::::
			<u> </u>												
			<u> </u>		-										
				-										,	
				1			C 26	5 22.80-24.10	102	100					
				-	-		C 20	22.80-24.10	102	100					-
			<u></u>												
				-											
					-		C 27	7 24.10-24.30	102	100					
				-											-
		pa.	F												
		Unweathered		(17.55)	-		C 28	3 24.30-25.80	102	100			NA		-
		Unwe					0 20	24.30 23.00	102	100					
			E												
from 25.55m to 25.	.70m 1 No. fissure 70 degrees undulating smooth clea	n	E-=-] :											
			<u> </u>												
				-										•	
			<u> </u>												
			<u> </u>				C 29	9 25.80-27.30	102	100					
			<u> </u>												
				-											
				-											
			<u> </u>	1											
			<u> </u>	-			C 30	27.30-28.80	102	100					[
			<u> </u>												
			<u> </u>		-										-
			<u></u>												1
				_											
at 29.04m with occ	asional light grey fragments of weak siltstone (<8mm)				-										
							C 31	1 28.80-30.20	102	100]
							C 3.	28.80-30.20							
			<u></u>		-										
<u> </u>															
	All depth in metres, all diameters in millir See header sheet for details of boring, pro		water.												
AGS	For details of abbreviations, see key.														
FINAL	Print date and time 1		13:55			-	ked b	y David Howar	d					L engine	
Form No. SIEXPHOLEI	LOG Issue.Revision No	. 2.05		Issue Date	02/03/20	18							Part o	f the Bachy Soletand	che Group

Project Name	Cambridge Waste Water Treatm	nent l	Plant	Relocat	ion									Hole ID	
Project No.	TE8364							Explor	ator	у Но	le Lo	g		BH_STW_	015
Engineer	Mott MacDonald Bentley												ן '		
Employer	Barhale Limited				E46==:							0.5		Sheet 4 of	4
Ground Level Hole Type	+9.92mOD IP+RC		dinate: nation			i0E, 26097 horizonta			Gri	d	OS	GB			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
	grey fissured CLAY. Fissures are 0 to 30 degrey	ees			30.20	-20.28									
striated. (GLT) [GAULT FORM.					30.20	-20.26									
Complete at 3	30.20m. Termination Reason: Achieved Scheduled Dep h														
	All depth in metres, all diameters in millio														
	See header sheet for details of boring, pro- For details of abbreviations, see key.	ogress	and v	vater.											
FINAL	Print date and time 1		2022	13:55	"			ked by David Howard	i					L enginee	
Form No. SIEXPHOLEL	OG Issue.Revision No	5. 2.05			issue Date	02/03/201	18						Part o	f the Bachy Soletanc	ne Group



Project	Name	Cam	nbridge '	Waste V	Water Tre	atment	Plant R	Relocat	ion				_			_		Н	łole ID	
Project	No	TE8:	364										Exp	lorator	y Hole	Log		RH S	STW_0	ი16
Enginee				onald B	entley															
Employ			nale Lim	ited				^din-		F.40	207405	30100				Cuia			et 1 of 1	1
Ground L Date Star			2mOD 8/2021					Coordina Date Co			807.10E 08/2021		34.7UN			Grid Incl	i ination	OSGB		
Тор	Base	Туре	Date Tin	ne Start			ig Crew	Logger	-		Bit Pla	ant Us		ng Used Pi				Remark		
0.00	1.20	IP DC	10/08/20		10/08/202		Colin Howard	DT DH	Cash	ore S PCD		ted Hand		one	Stable		Insp	ection pit: H	and dug	
1.20	30.20	RC	10/06/20	21 10:15	12/08/202		Colin Howard	Νh	Geobo (14) 30	ilmec SN	16							
			I																	
			I																	
				P!	ROGRESS						 				WATER	STRIKE	:S			
Date 1	Гіте	Depth	Depth	Depth			Rema	rks			Date	Time	Depth	Depth	Depth	Water	Time		Remark	(S
10/08/202 11/08/202	21 17:30	15.75 15.75	0.00 0.00	4.50 4.50	End of Shift Start of shift						10/08/20		Strike 5.65	0.00	Sealed	Rose T 4.50	o Elapse	Fast		
11/08/202 11/08/202 12/08/202	21 17:00	30.20 0.00	0.00	5.10	End of Shift		iole Comple	te												
				ARI E DEC	RCUSSION	DETAILS									SDT F	ETAILS				
Depth	Depth	Tim	e Start	Duration	1			Rema	rks		Depth	Test		Reported		LIAILS	Hammer Seria	Energy	Depth	Depth
Тор	Base	1		Burution	1001	`		Rema			Тор	Туре		перегее	- Result		Number	Ratio	Casing	Water
Depth	Depth	T =		ROTARY	FLUSH DE	TAILS														
Top 1.20	Base 5.65		sh Type R/MIST	Return 100		-		Remarks	-											
5.65	30.20		R/MIST	100	Grey															
HOLE DI	AMETER	CASING	DIAMETE	-R		DYNAM	IC SAMI	PLING												
Depth	Diamete	Depth		er Depth To	. Depth	Diameter		ion	ample											
Base 30.20	146	Base 30.20	146		Base	-		R	ecovery	Reference										
	INST	ALLATIOI	N DETAIL:	S		PIF	PE CONS	TRUCTI	ON					DEP	TH RELA	TED REM	//ARKS			
Distance	ID .	Type Re	sponse Re Top		Pipe Pipe Ref Ref	Тор	Base	Diamet	er Pi	ре Туре	Depth Top	Dep Bas				Re	marks			
		1		BACK	KFILL DETA	.ILS									LOCATIO	n deta	ILS			
Depth Top	Depth Base		Descrip	ption			Ren	narks							Ren	narks				
0.00	30.20	Grout																		
	N	<u> </u>																		
AGS		See he	ader shee	et for deta	iameters in ails of borin			iter.												
		For de	tails of ab		ns see key.	40.000	(0000 4	2.55					D : 111				50	II en	GINEE	שוחפי
FINAL Form No. S	IEXPHOL	EHDR			date and tir Issue.Revision		1/2022 1		ssue Da	l ate 22/06/20		kea by	David Hov	ward					hy Soletanche	

Project Name	Cambridge Waste Water Treatme	nt Plan	t Reloca	tion									Hole ID	
Project No.	TE8364						Explo	orato	ry Ho	le Lo	og		BH_STW_	016
Engineer	Mott MacDonald Bentley											'	511_5100_	_010
Employer	Barhale Limited												Sheet 1 of	4
Ground Level		oordinate clination		549807.	10E, 2610	84.701	V	Gr	id	09	SGB			
Hole Type	IF+RC II		1	Depth		e e			e %	S/				
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test Details	Install- ation
T000011 D 1 1			×///×//	ness)	LOVOI	War	Details	Dia.	TCR	SCF			Details	dtion
to coarse. Gravel is	vn slightly sandy slightly gravelly CLAY. Sand is fin angular to subrounded fine to medium of flint.	e		(0.50)	-		D1 0.20							
Occasional roots. (TOP) [TOPSOIL]				0.50	8.32		ES 2 0.20 B 3 0.20-0.50							1
	ntly gravelly sandy CLAY. Sand is fine to coarse. Ir to subrounded fine to medium of flint and						D 4 0.50 ES 5 0.60							
mudstone. (SUPD) [SUPERFICIA	AL DEPOSITS			(0.70)			B 6 0.60-1.00 D 7 1.00							
	-			1.20	8.32		ES 8 1.20						-	
occasionally stained	K composed of very stiff light greyish-brown d orangish-brown gravelly calcareous CLAY. Grave	1		1	-		C 9 1.20-1.60	102	88					
light grey calcareou	o coarse of very weak to weak medium density is siltstone. (CIRIA Grade Dm)			1]									
	ELBURY CHALK FORMATION] On: Assumed zone of core loss.			1	-									
		_		-			C 10 1.60-2.80	102	100					
		Grade Dm		(2.36)]		C 10 1.00-2.80	102	100			NA		
		Grac			-									
					-									1::::::::
				-]									-
					-									
	and the state of the same of the learning for the same of the same			3.56	8.32		C 11 2.80-4.30	102	100	49	0		=	
stained orangish-b	medium density light greyish brown frequently rown CHALK comprised of calcareous SILTSTONE.				-									
rough with rare bla	0-40degrees very closely to closely spaced plana ck smearing and frequently stained orangish-			_	1									-
brown and 70-90de staining. (CIRIA Gra	egrees planar, rough with frequent orangish-brow de B4)	n												
(WMCK) [WEST ME	LBURY CHALK FORMATION]	e B4		(2.02)	-							№		-
from 4.57m to 4.70 spaced.	m: 0-40degree discontinuities are extremely closely	Grade B4		(2.02)	1							50 90		
]		C 12 / 20 F CF	102	100	84	0			
from 5.09m to 5.17 spaced.	m: 0-40degree discontinuities are extremely closely				-		C 12 4.30-5.65							-
'														
	edium density light grey unstained CHALK			5.58	8.32									
orientated extreme	reous SILTSTONE. Discontinuities are randomly ly closely to very closely locally closely spaced	e B4/5		(0.77)	-									1222222
(CIRIA Grade B4/5)	ently stained orangish-brown and speckled black	Grade		` / -								10		7
from 5.84m to 5.95	ELBURY CHALK FORMATION] im: Weak medium density light grey calcareous	\vdash		6.35	8.32		C 13 5.65-6.90	102	100	6	0	20 90		
	edium density light grey unstained CHALK	A4/5		(0.75)									-	
	reous SILTSTONE. Discontinuities are randomly ly closely to very closely spaced planar, rough and	Grade		(0.75)	-									
unstained. (CIRIA G (WMCK) [WEST ME	rade A4/5) [LBURY CHALK FORMATION]			7.10	8.32								-	-
Weak medium to h	igh density light grey unstained CHALK composed TONE. Discontinuities are 0-30 degrees closely	ī												
locally medium spa	ced, planar, rough, unstained and 80-90 degrees				-									
	nstained. (CIRIA Grade A3) :LBURY CHALK FORMATION]]		C 14 6.90-8.55	102	100	100	35			
	im 2No. extremely closely spaced 30degree			-										
discontinuities, pla	nar rough unstained.	_			-									
		Grade A3		(3.32)]							20 90		
		g										220		
				-	1									-
				4			C 15 8.55-10.10	102	100	92	34			
					1		010 0.00 10.10							-
				1										
			1	1	1									-
Notes	: All depth in metres, all diameters in millime		1				1							
AGS	See header sheet for details of boring, prog For details of abbreviations, see key.	ess and	water.											
FINAL	Print date and time 12/		13:55		Lo	g chec	cked by David Howa	ard				SOI	L engine	ering
Form No. SIEXPHOLE	LOG Issue.Revision No. 2	05		Issue Date	e 02/03/20	18						Part o	of the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
								Exploi	rator	у Но	le Lo	og		NII CTW	04.0
Project No.	TE8364													BH_STW_	016
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 2 of	4
Ground Level		dinate	!S	549807.3	LOE, 2610	84.701	N I		Gri	d	09	SGB		311000 2 01	
Hole Type	IP+RC Incli	nation													
		ring		Depth	D-+	rike		Sampling		nple y %	sws.			In City Took	lII
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike				TCR/Sample Recovery %	SCR/Blows	RQD		In Situ Test Details	Install- ation
Weak medium to hi	igh density light grey unstained CHALK composed	š	ļ.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ness)		Š		Details	Dia.	₽ Z	SC				
of calcareous SILTST	FONE. Discontinuities are 0-30 degrees closely														-
planar, rough and ur	ced, planar, rough, unstained and 80-90 degrees nstained. (CIRIA Grade A3)	 		10.42	8.32]
	LBURY CHALK FORMATION] very weak low to medium density grey unstained	4/5					C 1	6 10.10-11.40	102	100	44	12	10		
CHALK composed o	of calcareous MUDSTONE. Discontinuities are dextremely closely to closely spaced planar and	Grade A4/5		(0.86)			CI	6 10.10-11.40	102	100	44	12	30 150		
rough, unstained. (C	CIRIA Grade A4/5)	ซื้		-									150		
Very stiff dark grey s	LBURY CHALK FORMATION] slightly sandy CLAY with occasional fine to coarse			11.28	8.32										}
	of black coprolite. Sand is fine to medium. GE GREENSAND MEMBER]	_		11.55	8.32										
Very stiff fissured th	inly and thickly laminated dark grey CLAY with		<u> </u>												
0-30degrees extren	:10mm) of brown siltstone. Fissures are nely closely to very closely spaced, planar, smooth		<u></u>	-			C 1	7 11.40-12.60	102	100					
and 80-90degrees p (GLT) [GAULT FORM	planar and smooth occasionally polished. ATION]		F_=_												
	•		F_=_												
			<u> </u>												
	12m: 1no. 40degree fissure planar and polished.			(3.00)											-
from 13.14m to 13.	35m: 1no. 75degree fissure planar and polished.						C 1	8 12.60-14.25	102	100					}
			<u></u>	-			CI	8 12.60-14.25	102	100					
from 14 01m to 14	27m: 1no. 65degree fissure planar and polished.		<u> </u>	_											-
11011114.0111110114.	27m. 2no. obdegree issure plantal and polished.		E]
			<u> </u>]
	ninly and thickly laminated dark grey CLAY with :10mm) of brown siltstone. Fissures are			14.55	8.32										
0-20degrees closely	y to medium spaced, planar, smooth occasionally		<u> </u>												
polished and 80-90 polished.	degrees, planar, smooth and occasionally		<u></u>	-			C 1	9 14.25-15.75	102	100					-
(GLT) [GAULT FORM	ATION]		<u> </u>]
				(1.90) -											
			F_=_												-
			F_=_	_											
			F_=_												
Very stiff fissured da	ark grey CLAY with rare nodules (<6 x <10mm).	-	<u> </u>	16.45	8.32		C 2	0 15.75-17.05	102	100					
Fissures are 0-20de	egrees very closely to closely spaced planar y slightly polished. 30-60degrees closely spaced		<u> </u>												
planar smooth occa	sionally slightly polished. 80-90degrees planar														}
smooth occasionally (GLT) [GAULT FORM															
from 17.53m to 17.	90m: 1no. 70degree fissure planar and polished.		<u></u>	-											-
			F- <u>-</u> -				C 2	1 17.05-18.65	102	99]
			E-I-	-]
			<u> </u>	(5.30)											
			<u> </u>	-											-
			<u> </u>												
			<u> </u>												-
			<u> </u>	:											
			<u></u>				C 2	2 18.65-20.25	102	100					
			<u> </u>]
			<u></u>												
Notes:	All depth in metres, all diameters in millimetre	S.	1	I	I		1		1	l	1				1
	See header sheet for details of boring, progres For details of abbreviations, see key.		water.												
FINAL	Print date and time 12/09.	/2022	13:55		In	a chec	ked I	by David Howard	d				SOI	L engine	RING
Form No. SIEXPHOLEL				Issue Date	02/03/20			,					Part o	f the Bachy Soletano	he Group

Project Name	Cambridge Waste Water Treatment	t Plant	Relocat	ion										Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley							Exploi	rator	у Но	le Lo	og .	E	BH_STW_	016
Employer	Barhale Limited													Sheet 3 of	4
Ground Level		ordinate		549807.1	LOE, 2610	84.70N	١		Gri	d	OS	GB			
Hole Type	IP+RC Inc	lination				a)				م بو					
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
Fissures are 0-20de smooth occasionally planar smooth occasionally gland from 20.25m to 20. from 20.85m to 21. Very stiff fissured th (<8 x <10mm) of brc closely to very close	ark grey CLAY with rare nodules (<6 x <10mm). Ingrees very closely to closely spaced planar y slightly polished. 30-60degrees closely spaced isionally slightly polished. 80-90degrees planar y slightly polished. IATION] 47m: 1no. 65degree fissure undulating and smooth. 10m: 1no. 65degree fissure undulating and smooth. ininly laminated dark grey CLAY with rare nodules own siltstone. Fissures are 0-40degrees extremely ely spaced planar smooth occasionally slightly rees planar smooth occasionally slightly polished. ATION]		Legend		8.32	Water	C 2-	Details 3 20.25-21.85 4 21.85-22.85 5 22.85-24.40	102 102		SCR/E	RO	NA NA	Details	ation
at 27.35m: 1no. bel	at 27.35m: 1no. belemnite (8x50mm).			-			C 2	7 25.90-27.50	102	96					
at 28.66m: 1no. bar	nd (10mm) of brown shell fragments (6x6mm).			-			C 2	8 27.50-29.00	102	100					
				-			C 2	9 29.00-30.20	102	100					
AGS	All depth in metres, all diameters in millimetr See header sheet for details of boring, progre For details of abbreviations, see key.	ess and						D ::::					SOL	L enginee	BIDG
FINAL	Print date and time 12/0		13:55	Janua Data	Lo:	-	ked l	by David Howard	1					f the Deeby Coletone	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion									Hole ID	
Project No.	TE8364						Exploi	ator	у Но	le Lo	g		BH_STW_0	016
Engineer	Mott MacDonald Bentley											'	JII_JIVV_\	
Employer	Barhale Limited												Sheet 4 of 4	′
Ground Level		dinate		549807.1	LOE, 2610	34.70N		Gri	d	OS	GB			
Hole Type	IP+RC Incli	nation		Donth		â			e %	S				
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum Level	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test Details	Install- ation
Very stiff fissured th	inly laminated dark grey CLAY with rare nodules	We		ness)		× ×	Details	Dia.	TCF	SC				
(<8 x <10mm) of bro	wn siltstone. Fissures are 0-40degrees extremely ly spaced planar smooth occasionally slightly			30.20	8.32									
polished. 80-90degi (GLT) [GAULT FORM	rees planar smooth occasionally slightly polished.			-									-	
Complete at 3	30.20m. Termination Reason: Achieved Scheduled Dep h													
	Concadica Dep II			-									-	
				-									-	
				-									_	
				-									-	
				-									-	
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				-									-	
] :]	
Notes:	All depth in metres, all diameters in millimetre	S.		•										
AGS	See header sheet for details of boring, progress For details of abbreviations, see key.	s and v	water.											
FINAL	Print date and time 12/09	/2022	13:55		Lo	g check	ed by David Howard	t				SOI	L enginee	RING

Issue Date 02/03/2018

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	Can	nbridge	Waste	: Wa	ter Tre	atment	t Plant	Reloca	ition							_		H	łole ID	
Project	No.	TE8	364											Ex	plorato	ry Hole	Log	E	BH S	STW_	017
Engine	er		tt MacD		Ben	itley															
Employ Ground L			nale Lim BmOD	nited					Coordi	nates	549	9940.00E	26110	08 70N			Grid		She OSGB	et 1 of 1	1
Date Star			8/2021							ompleted		/08/2021						nation		m horizor	ntal
Top 0.00	Base	Туре	Date Tir	ne Sta		ate Tin	ne End	Rig Crew	Logge	Barrel T			ant Us		ing Used F None	Pit Stability Stable	/		Remarl	ks	
1.20	15.00	RC		021 10:00		05/08/202		Howard Colin Howard	MM	Geobor			oilmec SM		vone	Stable					
					PRO	GRESS						<u> </u>				WATER	STRIKE	 S			
Date	Time	Depth	Depth Casing	Dept	h			Rema	arks			Date	Time	Depth Strike		Depth	Water Rose To	Time		Remark	KS
04/08/20 05/08/20		10.70 10.70	2.70 2.70	2.90 2.30	Er	nd of Shift tart of Shif						04/08/2	021 11:30		2.70	, coulou	2.70	20	Medium	ı	
05/08/20 05/08/20		15.00 0.00	2.70 0.00	2.30		nd of Hole ackfill Con	nplete; Bore	hole Compl	lete												
			С	ABLE P	ERCL	JSSION	DETAILS	;								SPT D	ETAILS				
Depth Top	Depth Base	Tim	e Start	Durat		Тоо			Rem	arks		Depth Top	Test Type		Reporte	ed Result	ŀ	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
Depth Top 1.20 5.20	Depth Base 5.20 15.00	Al	sh Type R/MIST R/MIST	ROTAF Flu: Retu 10 10	sh urn 0	USH DI Flush Colour Brown Grey	ETAILS		Remark	κs		-									
	AMETER	-	DIAMETE				DYNAN	IIC SAM			Dun										
Depth Base 15.00	Diameter 146	Depth Base 2.70	Diamet 150	er Depth	Тор	Depth Base	Diamete	er Dura		Sample Recovery	Run Reference	e									
13.00	140	15.00	146																		
Distance		IR ₄	N DETAIL		Pipe	Pipe	PI Top	PE CON	STRUC1 Diame	1	o Tuno	Depth	Dep	th	DE	PTH RELA		MARKS marks			
Distance	וטו	Гуре "``	Тор	Base	Ref	Ref	юр	Dase	Diame	riei Pip	е Туре	Тор	Bas	ie			Kei	IIIai KS			
Depth	Depth				CKFIL	LL DETA	ILS					-				LOCATIO		LS			
Top 0.00	Base 15.00	Grout	Descri	ption				Rei	marks			-				Ren	narks				
AGS		See he	pth in me eader shee tails of ab	et for de breviati	etails ons s	of borin see key.	g, progre	ss and w				lo- !	ales al. l	Deville				SOL	L en	GINE	Blue
FINAL Form No. 9	SIEXPHOLI	EHDR		Prin			me 12/0 n No. 2.02		13.33	Issue Dat	e 22/06/2		neu Dy	David Ho	ovvalu					hy Soletanch	

Project Name	Cambridge Waste Water Treatme	nt Plar	t Reloca	tion									Hole ID	
Project No.	TE8364						Explo	oratoi	ry Ho	le Lo	og		BH_STW_	017
Engineer	Mott MacDonald Bentley											"	JII_JIVV_	_017
Employer	Barhale Limited												Sheet 1 of	2
Ground Level		oordinat			00E, 2611		V	Gri	id	09	SGB			
Hole Type	IP+RC Ir	clinatio	n T		horizonta	_			a .o	T (0				1
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test	Install-
	'	Wear		ness)	Level	Wate	Details	Dia.	TCR/ Reco	SCR	~		Details	ation
	vn slightly sandy slight gravelly CLAY. Sand is fine angular to subangular fine to coarse of flint and			0.25	7.12		D 1 0.05-0.10 ES 2 0.20-0.25							
quartz. (TOP) [TOPSOIL]		Λ		0.25	7.13		B 3 0.10-0.40 D 4 0.40-0.50							
Soft to firm brown s	slightly gravelly sandy CLAY. Sand is fine to coarse or to subrounded fine and medium of mudstone	-		(0.75)]		ES 5 0.50-0.55							
and flint.					1		B 6 0.40-0.80							
	grey slightly gravelly silty CLAY. Gravel is	1	×	1.00 -	6.38		B 9 0.80-1.20 D 7 1.00-1.10							7
(SUPD) [SUPERFICIA		Λ		1.20	6.18		ES 8 1.10-1.20							
Stiff to very stiff ora (SUPD) [SUPERFICIA	nge brown slightly sandy CLAY. Sand is fine.	_		(0.85)	-									
	,			,	1		C 10 1.20-2.20	102	100					
Orange brown local	lly slightly gravelly calcareous fine SAND. Gravel i			2.05	5.33									-
subangular fine of s (SUPD) [SUPERFICIA	siltstone and flint.	`		(0.35)	-									
from 2.15m to 2.20	Om 1 No. very thin bed of soft light bluish grey silty clay	_/_		2.40	4.98		C 11 2.20-2.80	102	100					
brown calcareous s	K composed of stiff to very stiff light greyish ilty CLAY with occasional black and orange brown	.		(0.70)]									
	thin light grey cortex (<1mm). (CIRIA Grade Dm) [LBURY CHALK FORMATION]			ļ			C 12 2.80-3.10	102	100					-
	K composed of stiff to very stiff fissured light earny white and brown calcareous silty CLAY.		 	3.10	4.28							NA		-
Fissures are extrem	ely closely spaced 10 degrees planar striated and	E E		(0.00)]		612 210 / 00	100	0/					}
	LBURY CHALK FORMATION]	Grade Dm		(0.90)	-		C 13 3.10-4.00	102	94					
infilled (<1mm)	0m 1 No. fissure 65-70 degrees planar smooth and clay			4.00 -	2.20									
Structureless CHAL	om assumed zone of core loss K composed of firm to stiff light grey to grey silty	-1		4.00 -	3.38									7
CLAY. (CIRIA Grade I (WMCK) [WEST ME	Dm) :LBURY CHALK FORMATION]			(0.70)	-									
at 4.30m gravelly. 0 density chalk and o	Gravel is subangular fine and medium of very weak low occasional flint.			4.70	2.68		C 14 4.00-5.20	102	58					
dark grey clay with	Om recovered as non intact core (firm to stiff grey and high cobble content. Cobbles are subangular of			Ī	2.68									
	ore loss. Greyish brown CLAY. (Driller's description)		(0.50)	-									_======================================
	LBURY CHALK FORMATION] very weak low density light grey CHALK compose	d T		5.20	2.18								1	
	TONE. Discontinuities 1) 0 to 20 degrees medium anar smooth with clay infill (<2mm). (CIRIA Grade			1	1	•	C 15 5.20-5.70	102	60	60	24			1
B2)	ELBURY CHALK FORMATION]				1									
(VVIVICK) [VVEST IVIE	LEBURY CHALK FORIVIATION]			-	1		C 16 5.70-6.20	102	100	100	100			†:::::::::
	om recovered as non intact core (subangular fine to]									}
coarse gravel sized	fragments) (Drilling induced)	de B2		(2.65)	1		C 17 6.20-6.70	102	100	100	68	NI 210		-
		Grade] ` <i>′</i>	1							620		1
] .]			102	100	82	82			}
							C 18 6.70-7.35	102	100	02				
fine to coarse grave	m recovered as non intact core (angular to subangular el sized fragments) (Drilling induced)			1]									}
discontinuities, 0 to	im extremely closely to very closely spaced to 10 degrees and 80 to 90 degrees planar and]										
from 7.80m to 7.85	and infilled with soft clay (<1mm) im grey and recovered as non intact core (clayey alar fine to coarse gravel sized fragments)	\vdash		7.85	-0.47		C 19 7.35-8.20	102	59	41	24		-	
Assumed zone of co	ore loss. Strata presumed to be CHALK composed	_		(0.35) ⁻ 8.20	-0.82							NR		7
	LBURY CHALK FORMATION]	_/		(0.34)	-0.02		C 20 8.20-8.70	102	86	72	56	130		
	edium density grey CHALK composed of NE. Discontinuities 1) 10 to 40 degrees closely to	\vdash		8.54	-1.16		C 20 8.20-8.70	102	86	12	56		-	
	nar rough. (Probably CIRIA Grade B2/3) [LBURY CHALK FORMATION]	de B3		1]							NI 60		
Very weak low to m	redium density grey CHALK composed of NE. Discontinuities 1) 10 to 30 degrees closely to	Grade					C 21 8.70-9.20	102	64	30	0	90		-
medium spaced un	dulating rough. (CIRIA Grade B2/3)			(1.76)	-								1	
from 8.54m to 8.63	EBURY CHALK FORMATION] Impact and 8.70m to 9.20m fractures of discontinuity set 1)	B2/3		1	1		C 22 9.20-9.70	102	80	68	60	NI 140		-
	closely spaced Im assumed zone of core loss Im 1 No. discontinuity 85 degrees planar rough infilled	Grade B2/3		1]			100	400			230		
110111 6.70111 to 9.02	in 1 No. discontinuity 65 degrees planar rough millied	Ť			-		C 23 9.70-10.20	102	100	80	52			
■ NI	All donth in matree all diagrature is as ""	troc												
AGS	: All depth in metres, all diameters in millime See header sheet for details of boring, prog		l water.											
	For details of abbreviations, see key.											SOI	L engine	ספוטכ
FINAL Form No. SIEXPHOLEL	Print date and time 12/ LOG Issue.Revision No. 2		2 13:55	Issue Dat	Lo e 02/03/20		cked by David Howa	ard					of the Bachy Soletan	
	.3000.1107101011110. Z			Dat								1	, 50.0.0.011	Jup

Project Name	Cambridge Waste Water Treatm	ent Pla	nt R	elocat	ion										Hole ID)
Project No	TE8364								Explo	rator	у Но	le Lo	g		BH_STW_	∩17
Project No. Engineer	Mott MacDonald Bentley														רוום"וום	_011
Employer	Barhale Limited														Sheet 2 o	f 2
Ground Level		Coordin				OE, 2611		١		Gri	d	OS	GB			
Hole Type	IP+RC	Inclinati			90° from	horizonta					0 . 0					
	Description of Strata		L L	.egend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test Details	Install- ation
	edium density grey CHALK composed of IE. Discontinuities 1) 10 to 30 degrees closely	to		Щ												
medium spaced und	ulating rough. (CIRIA Grade B2/3) BURY CHALK FORMATION]	-			10.30	-2.92		C 24	10.20-10.70	102	76					
	n 1 No. discontinuity 85 degrees planar rough infilled		Ė		10.54	-3.16		C 24	10.20-10.70	102	70					
from 9.02m to 9.20r	n assumed zone of core loss n with very closely to closely spaced very thin to thin							C 25	10.70-11.20	102	100					
beds of grey calcare from 9.60m to 9.70r	ous mudstone n assumed zone of core loss				(1.16)			C 25	10.70-11.20	102	100					7
from 9.97m to 10.03	n 1 No. discontinuity 50 degrees undulating smooth Im recovered as non intact core (angular fine to coarse	.														
	nts) ning dark grey slightly sandy glauconitic CLAY.							C 26	11.20-11.70	102	100					
	GE GREENSAND MEMBER]		F		11.70	-4.32										
fragments of black		Ш			-											
fragments of black	uent angular to subangular coarse gravel sized coprolite Ired dark grey CLAY with occasional rounded fi		F					C 27	11.70-13.00	102	100					1
and medium gravel	sized nodules of siltstone. Fissures are 0 to 20				-									NA		
(GLT) [GAULT FORM/		are	L Age] :									IVA	`	
Stiff to very stiff fissu	Om assumed zone of core loss red thinly laminated dark grey CLAY. Fissures	are =			-											-
(GLT) [GAULT FORM			F		(3.30)											
at 12.58m 1 No. elo	brown gravel (<5mm) of siltstone ngate fragment of coprolite (<20mm x <5mm) ngate fragment of coprolite (<35mm x <5mm)															
	nded fragment of coprolite (15mm) with outer light		E		:			C 28	13.00-14.50	102	100					
from 13.23m to 13.2	19m 1 No. fissure 35 degrees planar smooth polished 17m 1 No. fissure 35 degrees planar smooth polished				-			C 20	15.00-14.50							-
																1
at 14.45m 1 No. noo	lule of siltstone (<10mm)				-											-
					:			C 29	14.50-15.00	102	100					
	lule of siltstone (<10mm)	_	+		15.00 -	-7.62										155555555
Complete at 1	5.00m. Termination Reason: Achieved Scheduled Dep h															1
					-											-
																1
					-											-
					-											-
																-
					_											_
]
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																1
					-											1
														1		
	All depth in metres, all diameters in millin See header sheet for details of boring, pro		nd wat	ter.												
	For details of abbreviations, see key.	J														00:5
FINAL	Print date and time 1:	2/09/20	22 13	:55		Loc	n chec	ked by	David Howar	d				5	oil engine	ERING

Issue Date 02/03/2018

Part of the Bachy Soletanche Group

FINAL

Form No. SIEXPHOLELOG

Print date and time 12/09/2022 13:55

Project	Name	Cam	nbridge '	Waste \	Vate	r Trea	tment	Plant F	Relocati	on										Н	lole ID	
Project	No	TE8	364												Exp	lorato	ry Hole	Log		RH S	TW_0	N12
Enginee			t MacD	onald B	entle	ey													'	JI I		010
Employe	er		nale Lim	ited																	et 1 of 1	1
Ground Le Date Start			37mOD 9/2021						Coordina Date Con			676.15 09/202	E, 2607 1	82.2	5N			Grid	nation	OSGB	m horizor	nt a l
Top	Base		Date Tin	ne Start	Date	e Time	e End R		Logger				iant Us	sed	Shorin	g Used F	Pit Stability		ilation	Remark		ıtaı
0.00 1.20	1.20 30.00	IP RC	15/09/20 15/09/20	21 12:00	15/	09/2021 09/2021	13:00	TW TW	DT AY	Geobore :		Insul	lated Han T46 Beret				Stable					
										(146)												
				Pl	ROGI	RESS											WATER	STRIKE	S			
Date T		Depth	Depth Casing	Depth Water				Rema	rks				e Time		Depth Strike	Depth Casing		Water Rose To	Time Elapse	d l	Remark	(S
15/09/202 16/09/202 16/09/202 17/09/202 17/09/202 20/09/202 20/09/202	21 07:30 21 17:30 21 07:30 21 17:30 21 07:30	12.70 12.70 30.00 30.00 12.50 12.50 0.00	3.70 3.70 2.50 2.50 2.50 2.50	5.94 3.34 14.23 3.25 3.25 3.25	Start End of Start End of Start	of Shift of Shift of Shift of Shift of Shift of Shift of Shift	omplete, Bo	orehole Cor	nplete			15/09/2	2021 14:4	0	7.40	2.20		3.27	20			
Depth	Depth	T		ABLE PEF	т —		DETAILS					Depth	n Tes	t I		_		ETAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base	Tim	e Start	Duratio	1	Tool			Remar	ks		Тор	Тур	- 1		Reporte	ed Result		Number	Ratio	Casing	Water
				POTADNA	51116		TAU C															
Depth	Depth	Eliz	sh Tuno	ROTARY		lush	IAILS		Remarks													
Top 0.00	Base 30.00		sh Type R/MIST	Return 100		olour Grey		r	Remarks													
HOLE DIA	AMETER	CASING	DIAMETE	:R		D	YNAMI	C SAM	PLING													
Depth Base	Diameter	Depth Base	Diamete	er Depth T		epth Base	Diameter	Durat		ample covery R	Run											
3.70 30.00	150 146	3.70 30.00	150 146			Jusc				covery in	cicionic											
	INSTA	L ALLATIOI	N DETAIL:	<u> </u>			PIF	E CONS	TRUCTIO	DN NC						DE	PTH RELAT	ED REN	1ARKS			
Distance	ID 1	Гуре Re	sponse Re Top			Pipe Ref	Тор	Base	Diamete	r Pipe	Туре	Depth Top	n De _l Ba					Re	marks			
12.20	S1	SP		12.20 P	pe 1	Pipe 1 Pipe 1	0.00 1.50	1.50 11.70	50 50	PLAIN SLOTTED)	2.50 7.50	12. 7.5		Geophys Falling H	ics testing ead Test	1					
		, '		BAC	FILL	DETAII	LS		1								LOCATIO	n detai	LS			
Depth Top -0.50	Depth Base 0.00	Upstandi	Descrip	otion				Ren	narks								Ren	narks				
-0.50 0.00 0.40 1.50 12.20 12.50	0.00 0.40 1.50 12.20 12.50 30.00	Concrete Bentonite Gravel ba Bentonite Grout	ckfill																			
AGS	Note	See he	oth in met ader shee tails of ab	et for deta breviation	ils of is see	boring key.		s and wa			ı	on che	cked h	/ Da	vid How	vard			so	ıL end	Ginee	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatmen	t Plan	t Reloca	tion									Hole ID	
Project No.	TE8364						Exploi	rator	у Но	le Lo	og	E	BH_STW_	_018
Engineer -	Mott MacDonald Bentley													_
Employer	Barhale Limited												Sheet 1 of	3
Ground Level		ordinat			15E, 2607		N .	Gri	d	O:	SGB			
Hole Type	IP+RC Inc	clination	1	90° from	honzonta	Ť .			m -	_			Т	_
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	RQD	쁘	In Situ Test Details	Inst atio
	m slightly sandy slightly gravelly CLAY. Sand is fine	• -	XXX	(0.32)	+									
(TOP) [TOPSOIL]	angular to subrounded fine to coarse of flint.			0.32	10.05									• • •
	slightly gravelly sandy CLAY Sand is fine to gular to subrounded fine to medium of fint.			(0.4B)	1									
(SUPD) SUPERFICIA				1	1									
	rown slightly gravelly sandy CLAY. Sand is fine to gular to subrounded fine to medium of flint.			0.80 (0.40) -	9.57									-
(SUPD) SUPERFICIA				1.20	9.17									
	(Driller's description) LBURY CHALK FORMATION]		T	1 -20]									
(ividisity [ives] time				4 .	-							NR		
			4	(1.00)	}				0					-
			1	2	1								. 8	
			<u> </u>	2.20	8.17								K 2.10 - 7.40	100
	K composed of firm yellowish brown slightly CLAY with orange staining. Gravel is angular to		T in	,	1									
subangular fine of e Dm)	extremely low density calcareous siltstone. (Grade		T	(0.90)	1								j.	1 -
	LBURY CHALK FORMATION]		1. 1.	(0.50)	1									
			1.	,	1				100				33	
	K composed of firm yellowish brown gravelly			3.10	7.27	모								-
	th orange staining. Gravel is angular to subangular remely weak low density calcareous siltstone.			d	1									1
(Grade Dm)	LBURY CHALK FORMATION)		7	Ι.	7	Ш								
	m recovered as non intact core (subangular coarse			(1.29)]	Ш								
gravel sized fragme	ents)			, ,	-	Ш								- 18
		Ę		}	}	Ш								
Structureless CHALL	K composed of firm yellowish brown gravelly	Grade Dm	45	4.39	5.98	Ш			100					
	th closely spaced thin beds of extremely weak to ity yellowish brown chalk composed of calcareous		1	4	3	Ш								
siltstone. Gravel is a	ingular to subangular fine to coarse of extremely	'	3.4Km2	1	}	Ш								-
	ow density calcareous siltstone. (Grade Dm) LBURY CHALK FORMATION]		1 1	-		Ш							=	- 4
(1	1	Ш		H						
				(2.23)	1	Ш								1
			1 1	<u> </u>	1	Ш								-
				4	1	Ш			100					
			1		1	Ш			100					
				<u>l</u>	1	Ш								-
			16 J	d .	1	Ш								4.6
	very weak low density yellowish brown CHALK			6.62	3.75	Ш		\vdash						
	eous SILTSTONE with closely spaced thin beds of composed of firm yellowish brown gravelly		15 E	,	1	Ш							9	-
calcareous clay. Gra	vel is angular fine to coarse of extremely weak			1	-	Ш							8	- , -
	stained calcareous siltstone. Discontinuities: 1) discontinuities: 1		T . T	}	7									-
with orange staining	g (CIRIA Grade B3) LBURY CHALK FORMATION]	89	1	(1.93)	}	I			100	64	40	NI 170		-
		Grade		4 (200,	}							200		
	m recovered as non intact core (angular medium to crange stained fragments)		T	4 .	-									
			11,000		1									16
				Н	‡			1						
Extremely weak to v	very weak low density light grey CHALK composes	+	7	8.55	1.82								1 2	
of calcareous SILTST	ONE. Discontinuities: 1) randomly orientated very			ן ו	1									
	ar smooth with orange staining. (CIRIA Grade B4) LBURY CHALK FORMATION]	25		Ι,	1	1			100	53	39	10	8	-
		Grade 84		(1.15)	1							30 290		
		°	4/4/	4	1								90	
	A.S			9.70	0.67			L	<u> </u>	L_				-
	high density light grey CHALK composed of NE. Discontinuities: 1) 0-20 degrees closely			3.70] ""									
		+	<u> r l' </u>					\vdash						(4)
Notes.	All depth in metres, all diameters in millimet See header sheet for details of boring, progre		water											
AGS	For details of abbreviations, see key.	Jos al Ri	rracti.											
NAL	Print date and time 12/0	19/2022	1355		le.	o char	ked by David Howard	d d				SOI	L engine	2RIC
orm No. SIEXPHOLEI			. 10.00	Ionua Dat	e 02/03/20		was program nowall	<u> </u>				Don't o	of the Rachy Soletan	-b- C

Project Name	Cambridge Waste Water Treatmer	t Plan	t Reloca	tion									Hole ID	
Project No.	TE8364						Explo	rato	ry Ho	ole Lo	og	I	3H_STW_	018
Eng <mark>ineer</mark> Employer	Mott MacDonald Bentley Barhale Limited												Sheet 2 of	2
Employer Ground Level		ordinati	es	549676.	15E, 2607	82.25N	<u> </u>	Gri	id	0:	SGB		Sheet 2 or	<u> </u>
Hole Type		clination			honzonta					_				
	Description of Strata	Wenthering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	RO D	Ŀ	In Situ Test Details	Install ation
	high density light grey CHALK composed of	+-	<u>' </u>			Ė	Dom.i.	-	<u> </u>	, ,				· (1)
spaced planar occa medium spaced pla orientated extreme clean. (CIRIA Grade \ (WMCK) [WEST ME	ELBURY CHALK FORMATION]	Grade A3	T T	(1.07)	-0.40				100	65	58	30 90 190	6.	
calcareous SILTSTO medium spaced pla 70-90 degrees med	high density light grey CHALK composed of NE. Discontinuities: 1) 0-20 degrees closely to nara occasionally undulating smooth clean. 2) dium spaced planar smooth clean. (CIRIA Grade A3 ELBURY CHALK FORMATION])												
		Grade A3		(2.43) -					100	69	60	50 190 470	13	
Stiff greenish grey	1.20m frequent phosphatic nodules (<30mm x 10mm) Slightly sandy glauconitic CLAY with occasional Imm x 10mm) and occasional light grey burrows			13.20 13.28	-2.83 -2.91								-	
(<1mm x 10mm). S. (WMCK) [CAMBRID Stiff fissured dark g (<10mm x 10mm).	and is fine to medium. DGE GREENSAND MEMBER] rey CLAY with rare dark brown phosphatic nodule: Fissures are 0-10 degrees and 20-25 degrees and very closely spaced planar smooth very tight	1		(1.07)					100	33	33			
polished and locally (GLT) [GAULT FORM	y striated.			14.35	-3.98			H						
tight and poliched	.02m 1 No. fissure inclined (65 degrees) planar amount	1			‡									2002(2)
tight and polished Very stiff fissured d phosphatic nodules vertical 0-10 degre	ank grey CLAY with rare dark brown and brown s (<10mm x 15mm). Fissures are horizontal and es and 90 degrees extremely closely to closely oth tight and polished. MATION]	J		=					100					
				(4.35)					100					
				-					100					
phosphatic nodule:				18.70	-8.33				100					
Notes	t. All depth in metres, all diameters in millimet See header sheet for details of boring, progr		water.										A	
AGS						دما	L enginee	אטוסג						
FINAL Form No. SIEXPHOLE	Print date and time 12/0 LOG Issue Revision No. 2	ked by David Howar	d					of the Bachy Soletan						

Project Name	Cambridge Waste Water Treatm	nent Pl	ant	Relocat	ion									Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	le Lo	og		BH_STW_	018
Engineer	Mott MacDonald Bentley													511 <u>_</u> 51 vv _	_010
Employer	Barhale Limited													Sheet 3 of	3
Ground Level Hole Type	+10.37mOD IP+RC	Coordina		S		15E, 2607 horizonta			Gr	id	09	SGB			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	¥	In Situ Test Details	Install- ation
Very stiff fissured da	ark grey CLAY with rare dark brown and brown s (<10mm x 15mm). Fissures are inclined 0-10														
planar smooth tight (GLT) [GAULT FORM										100					
										100					
from 23.53m to 23. and polished	.87m 1 No. fissure inclined (75 degrees) planar smooth	ו			(10.60)					100					
			Unweathered							100			NA		
					-					100					
brown phosphatic i decomposed plant	.95m slightly sandy with occasional dark brown and nodules (~10mm x 20mm) and occasional dark brown material (~5mm x 10mm) and with rare shell				-					100					
Very stiff thickly lan brown and brown p (GLT) [GAULT FORM Assumed zone of co	ore loss. CLAY (Driller's description) 30.00m. Termination Reason: Achieved				29.30 (0.35) - 29.65 (0.35)	-18.93 -19.28				81					
	Scheduled Dep h All depth in metres, all diameters in milling See header sheet for details of boring, prices.		and v	vater.											
FINAL Form No. SIEXPHOLEI	For details of abbreviations, see key. Print date and time 1	12/09/2			Issue Date	Lo: 02/03/20	-	ed by David Howa	rd					L enginee	

Project	Name	Can	nbridge	Waste V	Nater Tre	atment	Plant R	≀elocat	ion							_		Н	łole ID	
Project	No	TE8	364										Exp	lorator	y Hole	Log	_B	H S⁻	TW_C	119A
Enginee				onald B	entley												-			
Employ	er		nale Lim	ited				2 4:-		F/C	700 (05	2007							et 1 of 1	1
Ground Lo			2mOD 8/2021					Coordin Date Co			790.40E, 08/2021		2.90N			Grid Inclii	nation	OSGB		
Тор	Base	Туре	Date Tir	me Start			Rig Crew	Logge	r Barrel	Type Drill I	Bit Pla	ant Use		ng Used Pi				Remark	(S	
0.00	1.20 30.00	IP DC		021 16:00 021 07:30	17/08/202		Craig Blackett	DT	N/ Goobs			ited Hand		one	Stable					
1.20	30.00	RC	18/00/20)21 07:30	20/08/202		Craig Blackett	AL	Geobo (14		30	oilmec SM	8							
							1													
					ROGRESS										WATER	STRIKE				
Date 1	ime	Depth	Depth	Depth	T		Rema	ırks	-		Date	Time	Depth	Depth	Depth	Water	Time	Т	Remark	(S
17/08/202 18/08/202	1 17:30	1.20 1.20	0.00 0.00	Water Dry Dry	End of Shift Start of shift								Strike	Casing	Sealed	Rose To	Elapsed	+		
18/08/202 18/08/202 19/08/202	1 17:30	10.50 10.50	10.50 10.50	3.40 2.50	End of Shift Start of shift						İ									
19/08/202 20/08/202	1 07:30	30.00 30.00	30.00 30.00	4.20 2.80	End of Shift Start of shift	t					İ									
20/08/202	11:00	0.00	0.00		Backfill Com	nplete; Boreh	ole Comple	te			İ									
											İ									
<u> </u>				ADI E DEE	RCUSSION	DETAILS					<u> </u>				C T TO	DETAILS				
Depth	Depth	Tim	e Start	Duration	1			Rema			Depth	Test	Т	Reported		LIAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base	- ''''	- Start	Duration	1 1001			- Kerria			Тор	Туре	+	Керопес	a Result	\longrightarrow	Number	Ratio	Casing	Water
										ĺ										
]									
Depth	Depth	1		ROTARY	Flush DE	TAILS														
Top 1.20	Base		sh Type R/MIST	Return 90		<u> </u>	F	Remarks	5											
1.20 8.20	8.20 30.00		R/MIST	90	White															
											İ									
Depth		Denth	DIAMETE		Donth	DYNAMI	1	1	Sample	Run	!									
Base 2.50	Diamete 150	Base		er Depth To	op Base	Diameter	r Durat			Reference										
30.00	146	30.00	146								İ									
											İ									
											İ									
	INST	ALLATIO	N DETAIL	<u> </u>	4	PIE	PE CONS	TRUCT	ION					DEP	TH RELAT	TED REM	1ARKS		<u> </u>	
Distance	ID	Туре	esponse Re		Pipe Pipe	Тор	Base	Diamet	1	іре Туре	Depth	Dept					marks			
			Тор	Base F	Ref Ref	_		+	+	1 71	2.90	2.90) High pre	essure dilator	meter test					
											6.50 9.40	6.50 9.40		essure dilator essure dilator						
											i									
				BACk	KFILL DETA	JLS									LOCATIO	N DETAI	LS			
Depth Top	Depth Base		Descri	ption			Ren	narks							Ren	narks				
0.00	30.00	Grout			+															
											İ									
											i									
											i									
											i									
	Note				ameters in															
AGS	1				ails of boring as see key.	g, progres	ss and wa	iter.												
FINAL	- 1			Print (date and tir	ne 12/09	9/2022 13	3:55		I	Log chec	ked by	David Hov	ward			SOI	L end	ginee	RING
Form No. S	IEXPHOL	EHDR		ŀ	ssue.Revisior	n No. 2.02			ssue Da	ate 22/06/20	016						Part	of the Back	hy Soletanche	e Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo	9	l _R	H_STW_0	1191
Engineer	Mott MacDonald Bentley													11_3100_0	113/1
Employer	Barhale Limited													Sheet 1 of 3	3
Ground Level		dinate	S	549790.4	40E, 2608	72.901	N		Gri	d	OS	GB			
Hole Type	IP+RC Incli	nation			ı		1			0) -				1	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	±	In Situ Test Details	Install- ation
	n slightly sandy slightly gravelly CLAY. Sand is fine ngular to subrounded fine to medium of flint.			(0.30)				0.05-0.10							
Occasional roots.	ngular to subrounded line to medium or lime.	1	. — .	0.30	9.42		В3	0.20-0.25 0.10-0.40							
	htly gravelly sandy CLAY. Sand is fine to coarse.			(0.50)				0.40-0.50 0.50-0.55						-	
Gravel is angular to s (SUPD) [SUPERFICIAL	subrounded fine to coarse of flint. _ DEPOSITSI			0.80	9.42	1	B 6	0.40-0.80							-
Firm light brown to g	reyish slightly gravelly sandy CLAY. Sand is fine			(0.40) -		1		0.80-1.20						-	1
(SUPD) [SUPERFICIAL		1		1.20	9.42	1		1.00-1.10 1.10-1.20]
Brown clayey subang flint.	gular to subrounded fine to coarse GRAVEL of		-	(0.45)		1									
(SUPD) [SUPERFICIAL	_ DEPOSITS] n assumed zone of core loss.	 		1.65	9.42	1	C 10	1.20-2.20	102	65					
Structureless CHALK	composed of firm yellowish grey slightly					1									
	CLAY. Gravel is subangular to subrounded fine to low density calcareous siltstone with orange			-		1								-	
staining. (CIRIA Grad	e Dm) BURY CHALK FORMATION]					1									
(**************************************	54 6	E G	 	_		1								-	
		Grade Dm		(2.05)		1							NA		
		Ū		-		1	C 11	2.20-3.70	102	100				HPD 2.90	
						1									
from 3.30m to 3.50m	n slightly sandy. Sand is fine to coarse					1									
				270	0.10	1								-	1
	composed of yellowish grey slightly gravelly vel is subrounded to rounded fine to medium of	g L		3.70	9.42	1	C 12	3.70-4.10	102	100					
white and brown flin	t and very weak low density calcareous siltstone.	Grade		(0.40) - 4.10 -	9.42	1	C 12	3.70-4.10	102	100				-	
(CIRIA Grade Dm) (WMCK) [WEST MEL	BURY CHALK FORMATION] /	厂		4.10	J.₩∠]
Very weak low densit	ty CHALK composed of grey calcareous			-											
planar unstained. (CI		A3	 										NI		
(WMCK) [WEST MEL	BURY CHALK FORMATION]	Grade A3		(1.50)			C 13	4.10-5.60	102	100	100	50	100		
		σ̈		-									200	-	
				-											1::::::::
				5.60 ·	9.42										
	ty CHALK composed to grey calcareous nuities are 0 to 20 degrees medium spaced			5.00	5.7≥										
rough planar infilled	with clay films (CIRIA Grade B2)			-										_	ļ <u>.</u>
(WIMCK) [WEST WILL	BURY CHALK FORMATION]	B2											NI		
		Grade B		(1.50)									230		
		ซั		-			C 14	5.60-7.60	102	93	83	68	400	HPD 6.50 -	
				-											
				7.10 ·	9.42									-	
	HALK composed of grey calcareous SILTSTONE. to 20 degrees closely spaced rough planar.			7.10	J.42	1									}
(CIRIA Grade B3)		B3				1							130		
(WMCK) [WEST MEL	BURY CHALK FORMATION]	Grade E		(1.10)		1							190		
		ট				1	C 15	7.60-8.20	102	100	100	88	240		
					0.10	1								-	
	composed of grey gravelly calcareous CLAY. to subrounded fine to coarse of weak low	Dm		8.20	9.42	1									
density calcareous si	Itstone. (CIRIA Grade Dm)	Grade		(0.55)		1							NA	-	}======
from 8.60m to 8.75m	BURY CHALK FORMATION] n chalk recovered as subangular to subrounded fine	σ		8.75	9.42	1						-		-	
to coarse fragments Weak medium densi	ty CHALK composed of grey calcareous			9.00 -	9.42	1								_	
	nuities are 0 to 30 degrees closely spaced rough d. (probably CIRIA Grade B3)		 			1	C 16	8.20-10.20	102	90	77	73	NI		
(WMCK) [WEST MEL	BURY CHALK FORMATION]	e B3		(1 20)		1							120	HPD 9.40	
to subrounded fine to	n recovered as weak medium density grey subangular o coarse fragments of chalk	Grade		(1.20) -		1							320	1	
	lensity grey CHALK composed of calcareous tinuities: 1) 5 to 40 degrees closely to medium					1									ļ:::::::
												Ш			
AGS	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water.												
AGS	For details of abbreviations, see key.												501		0000
FINAL Form No. SIEXPHOLFIC	FINAL Print date and time 12/09/2022 13:55 Log checked b													t enginee	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	ole Lo	og	В	BH_STW_0)19A
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 2 of	3
Ground Level		rdinate	!S	549790.4	40E, 2608	72.901	N I		Gri	d	09	GB		Sileet Z Oi	
Hole Type	IP+RC Incl	ination													
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
	density grey CHALK composed of calcareous			10.20	0.72					'					
spaced planar smoo	ntinuities: 1) 5 to 40 degrees closely to medium oth stained light brown. 2) 60 to 85 degrees	42		10.20	9.42		C 1	7 10.20-10.50	102	100	100	100			}
(WMCK) [WEST ME	dulating planar smooth clean. (CIRIA Grade B3) LBURY CHALK FORMATION]	Grade A2		(0.66)				1 10.20 10.30							
from 9.62m to 9.70	Im extremely weak low density Im non intact core (recovered as subangular medium			10.86	9.42										
	or structureless chalk composed of soft clay (Dm) Om structureless chalk composed of soft clay (Dm)			-										-	
Weak high density	grey CHALK composed of calcareous MUDSTONE. 10 to 60 degrees medium spaced undulating						C 18	8 10.50-12.00	102	93	85	85			-
planar smooth stair	ned light brown. (CIRIA Grade B3)			(1.45)									1320 1320		
from 10.50m to 10.	LBURY CHALK FORMATION] 57m disturbed by drilling, recovered as clayey			(=:,									1320		
Extremely weak low	ounded fine to coarse gravel sized fragments v density grey CHALK composed of calcareous			-										-	-
	le to determine CIRIA Grade) LBURY CHALK FORMATION]			12.31	9.42										
from 10.86m to 10. gravelly clay (Dm)	99m structureless chalk composed of soft slightly		F_=_	12.51	3.42										
from 11.90m to 12.	34m very weak medium density 00m assumed zone of core loss	1	F_=_				C 19	9 12.00-13.50	102	100	21	21			
from 12.18m to 12.	18m very weak medium density 19m frequent coprolites (<15mm x 15mm)		F_=_	_]										
	rey CLAY with rare siltstone nodules (6mm x 8mm) shosphatic nodules (<6mm x 10mm). Fissures are		F_=_												
	rizontal very closely to closely spaced planar Id vertical to subvertical medium spaced planar		F_=_												
smooth polished. (GLT) [GAULT FORM			F_=_:	-										,	1
(GEI) [GAGEI TORRI	Allon		<u> </u>												
			F_=_:	-										-	
			<u> </u>				C 20	0 13.50-15.00	102	100					1
			<u> </u>	-											-
			<u> </u>												1
			<u> </u>	-										-	
			<u> </u>												
			<u> </u>	(6.48)											1
			<u> </u>				C 2	1 15.00-16.50	102	100					
			<u> </u>	-										-	
			<u> </u>		1										
			<u> </u>												
			<u> </u>												
			<u> </u>	_	}]
			<u> </u>				C 2	2 16.50-18.00	102	100					
							C 2.	2 10.30-10.00	102	100					
			<u> </u>	•	-										-
			<u> </u>		1										-
			<u> </u>	-]]:::::::::
			<u> </u>		1										-
			<u> </u>	-	1										+======
	ark grey CLAY with rare phosphatic nodules		E	18.79	9.42		C 2	3 18.00-19.50	102	100					
	nd rare siltstone nodules (<8mm x 15mm). izontal very closely spaced undulating smooth			(0.42) -										-	
polished. (GLT) [GAULT FORM	, , ,	/		19.21	9.42										
Very stiff fissured da	ark grey CLAY with rare siltstone nodules (<6mm x osphatic nodules (8mm x 28mm). Subhorizontal to		<u> </u>	-					-			\vdash			
horizontal fissures a	are very closely to closely spaced undulating		<u> </u>		1										
pianar smooth polis	shed, subvertical to vertical fissures are closely to		 												1
N N	All double in material diseases and all the second	<u> </u>			<u> </u>								T		
AGS	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres For details of abbreviations, see key.		water.												
FINAL	Print date and time 12/09	3/2022	13.55		10	n char	ked k	oy David Howar	d				so	ıL enginee	RING
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Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion								\top	Hole ID	
	-						Exp	lorato	ry Ho	ole Lo	og		LL CTIAL (2404
Project No. Engineer	TE8364 Mott MacDonald Bentley												H_STW_(J19A
Employer	Barhale Limited												Sheet 3 of	3
Ground Level		rdinate	s	549790.4	40E, 2608	72.901	N I	Gı	rid	0	SGB			
Hole Type	IP+RC Incli	nation		1	1		ı		,					1
	D	ering	l and	Depth	Datum	strike	Sampling	l	TCR/Sample Recovery %	slows	<u>م</u>		In Situ Test	Install-
	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike	Details	Dia	CR/Sa Recov	SCR/Blows	RQD	Ψ.	Details	ation
	dark grey CLAY with rare siltstone nodules (<6mm x	>	 			>	Details	Dia		٥,	+ +			1
horizontal fissures	nosphatic nodules (8mm x 28mm). Subhorizontal to are very closely to closely spaced undulating		F_=_				C 24 19.50-21.00)						
	ished, subvertical to vertical fissures are closely to anar smooth polished.		F_=_	-				102	100					1
(GLT) [GAULT FORN			F_=_											
			F_=_	-										
]
					-									
			<u> </u>				C 25 21.00-22.50	102	100					
				_										
					-									
				-										
				(6.52)	-									
				-										-
							C 26 22.50-24.00	102	100					
				-										
			===											
				-										-
			<u> </u>		-									
			E	-										-
			<u> </u>				C 27 24.00-25.50	102	100					
			L	_	-							NA		_
			L											
			<u> </u>											-
V	dada aya CI AV with yang da ay batin ya dala			25.73	9.42									
(12mm x 24mm). F	dark grey CLAY with rare phosphatic nodules Fissures are subvertical to vertical medium spaced		E	_										}
closely spaced und	smooth, fissures are subhorizontal to horizontal dulating planar smooth polished.			(0.70)				, 102	100					
(GLT) [GAULT FORM				26.43	9.42		C 28 25.50-27.00) 102	100					
(<15mm x 20mm).	dark grey CLAY with rare phosphatic nodules Fissures are subhorizontal to subvertical very		F											
are subvertical to v	paced planar undulating smooth polished. Fissures vertical are closely spaced planar polished.													
(GLT) [GAULT FORM	//ATION]		<u> </u>	(1.16) -	-								-	-
			<u> </u>											
Vanuatiff frances de	dayle exerce CLAV with years who exhating needules			27.59	9.42									
(<12mm x 18mm).	dark grey CLAY with rare phosphatic nodules Fissures are subhorizontal to horizontal very		<u> </u>		-		C 29 27.00-28.50	102	100					
closely spaced plar (GLT) [GAULT FORN	nar undulating smooth polished. MATION]		<u> </u>	-									,	-
			<u> </u>	(1.44)										
			<u> </u>	` ′ -	-									
			<u> </u>											
				29.03	9.42									
	dark grey CLAY with rare phosphatic nodules and rare siltstone nodules (<7mm x 11mm).		<u></u>	25.05	3.42		C 30 28.50-30.00	102	100					
	rizontal to horizontal very closely to closely spaced smooth polished, and subvertical to vertical		<u></u>	(0.97)										}=======
	anar polished smooth.		<u></u>	(0.91)										
	nination (5mm) of very weak siltstone		<u></u>	20.00	0.70									
Complete at	30.00m. Termination Reason: Achieved Scheduled Dep h			30.00	9.42									
	Scheduled Dep II													
Notes	s: All depth in metres, all diameters in millimetre													
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.	s and	water.											
FINAL	Print date and time 12/09	/2022	13:55		Lo	a chec	ked by David Hov	vard				SOI	ıL enginee	ering
Form No. SIEXPHOLE				Issue Date	02/03/20							Part c	of the Bachy Soletano	che Group

Project	Name	Can	nbridge	Waste \	Nater T	reatme	nt Plant F	Relocati	ion											Н	Hole ID	
Distort	* I =	TE8:) C/											Ехр	lorate	ory Hole	: Log		R	цς.	TW_0	119R
Project Enginee			tt MacD	onald E	Sentley														0,	10	1 V V O	120
Employ			hale Lim									\perp								She	eet 1 of 1	1
Ground L			2mOD	_				Coordina			788.16E,		72.7	77N	_			rid		OSGB		
Date Star	ted Base	_	0/2021 Date Tin	me Start	Date T	ime Fnr	d Rig Crew	Date Con			.0/2021 Rit Pla	ant Us	-ed	Shorin	a Used	Pit Stabili		nclina		90° f o Remark	om horizon ks	ıtal
0.00	1.20	IP	14/10/20	021 15:00	14/10/2	2021 16:00	DC	DT	NA	NA	Insulat	ted Hand ando 200	d Too		g useu one	Stable	-y			(Cinum		
1.20	11.20	CP	14/10/20	21 16:00	18/10/2	2021 12:30	DC	GL	NA	NA	Da	ando 200	00									
							1															
																						ا
																						١
				P	ROGRES	S							_			WATE	R STRIK	KES				
Date 1	Гіте	Depth	Depth Casing	Depth Water			Rema	arks			Date	Time	T	Depth Strike	Dept Casir				Time Elapsed		Remark	(S
14/10/202 15/10/202		4.00 4.00	4.00 4.00	Dry Dry	End of Sh Start of S	hift					15/10/20)21 12:0	0	8.70	8.70		4.50		20	Medium	ı	
15/10/202 18/10/202	21 17:30 21 07:30	11.20 11.20	11.20 11.20	5.20 4.00	End of Sh Start of S	nift Shift													l			1
18/10/202	21 12:30	0.00			Backfill C	omplete; Bo	orehole Comple	ete						ا					l			
														ا					l			
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														ا					l			
																			l			
		<u></u>	<u> </u>		-::::	ION DETAILS SPT DETAILS														<u></u>		
Depth	Depth	T		1	Т	Tool Remarks Depth Test Reported Result													mmer Serial	Energy	Depth	Depth
Тор	Base	lim	ne Start	Duratio	1 10	ol		Remar	ks ———	\rightarrow	Top 1.20		1	Number AR3501	Ratio 75	Casing 1.20	Water					
											2.20 3.20	S S S	N	N=8 (2,2:1,2 N=11 (2,2:3, N=9 (1,2:2,2	,2,3,3) 2,3,2)			A	AR3501 AR3501	75 75	2.20 3.20	Dry Dry
											4.20 5.20	S	N	N=15 (2,3:3, N=19 (3,4:5,	,4,5,5)			A	AR3501 AR3501	75 75	4.20 5.20	Dry Dry
											6.20 7.20 8.20	S S S	N	N=23 (3,4:6, N=23 (3,5:6, N=23 (4,4:5,	,5,6,6)			A	AR3501 AR3501 AR3501	75 75 75	6.20 7.20 8.20	Dry Dry
											9.20 10.70	S	N	N=23 (4,4:5, N=30 (4,5:6, N=31 (4,6:7,	,7,8,9)			A	AR3501 AR3501 AR3501	75 75 75	9.20 10.70	Dry 4.50 5.20
					/ FLUSH										-,							
Depth Top	Depth Base	Flu	ısh Type	Flush Returr				Remarks														
	AMETER		G DIAMETE	≟R			MIC SAM															
Depth Base	Diameter	Depth Base		er Depth To	Top Dept Base		eter Dura		Sample ecovery Ref	Run ference												
11.20	200	11.20	200																			
	l																					
	l																					
	INST/		N DETAIL:				PIPE CONS	STRUCTIO	NC						D	EPTH REL	ATED RE	ĒΜΑ	RKS			
Distance	ID 1	Туре	esponse Re Top		Pipe Pipe Ref Ref		Base	Diamete	er Pipe 1	Туре	Depth Top	Dep Bas					F	Rem;	narks			
												\top										
				BACk	KFILL DE	ΓAILS										LOCATI	ON DET	AILS	3			
Depth Top	Depth Base		Descrip	ption			Rer	marks								Re	marks					
0.00	11.20	Grout																				
	<u></u>																					
			pth in met																	4		
AGS			eader shee etails of ab				ress and wa	ater.												-		
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Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Issue.Revision No. 2.02

Form No. SIEXPHOLEHDR

Hole ID Project Name Cambridge Waste Water Treatment Plant Relocation **Exploratory Hole Log** BH_STW_019B Project No. TE8364 Mott MacDonald Bentley Engineer Employer Barhale Limited Sheet 1 of 2 Ground Level +9.32mOD 549788.16E, 260872.77N Grid OSGB Coordinates Hole Type IP+CP Inclination 90° from horizontal Depth TCR/Sampl Recovery 9 Sampling In Situ Test Install-R Description of Strata (Thick Legend ш Level Details ation ness) Details Dia. TOPSOIL: Dark brown slightly sandy slightly gravelly CLAY. Sand is fine D1 010 (0.30)to coarse. Gravel is subangular to subrounded fine to coarse flint. B 2 0.10-0.30 Frequent rootlets. 0.30 9.02 D 3 0.35 (TOP) [TOPSOIL]
Firm light brown slightly gravelly sandy CLAY. Sand is fine to coarse. 0.45 8.87 B 4 0.40-0.60 (0.45) Gravel is angular to subrounded fine to coarse of flint.
(SUPD) [SUPERFICIAL DEPOSITS]
Firm grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. 0.90 8.42 B 5 0 90-1 10 (0.30)Gravel is subangular to subrounded fine to coarse of flint and chert. (SUPD) [SUPERFICIAL DEPOSITS] SPT(S) N=8 (2,2:1,2,2,3) 1 20 8 1 2 D 6 1.20 CHALK. Recovered as firm grey slightly sandy slightly gravelly D 7 1.20-1.65 1.20 calcareous CLAY. Sand is fine to coarse. Gravel is angular to B 8 1.20-1.70 subrounded fine to coarse of flint, chert and extremely weak low density calcareous siltstone. (WMCK) [WEST MELBURY CHALK FORMATION] CHALK. Recovered as firm grey slightly gravelly calcareous CLAY.

Gravel is subangular to subrounded fine to coarse of extremely low D 9 2.00 SPT(S) N=11 density calcareous siltstone. (2,2:3,2,3,3) (WMCK) [WEST MELBURY CHALK FORMATION] D 10 2.20-2.65 B 11 2.20-2.70 D 12 3.00 (4.00) SPT(S) N=9 (1,2:2,2,3,2) D 13 3.20-3.65 3.20 B 14 3.20-3.70 D 15 4.00 SPT(S) N=15 (2,3:3,4,4,4) D 16 4.20-4.65 4.20 B 17 4.20-4.70 D 18 5.00 5.20 4.12 SPT(S) N=19 CHALK. Recovered as stiff grey slightly gravelly calcareous CLAY. (3,4:5,4,5,5) Gravel is subangular to subrounded fine to coarse of very weak D 19 5.20-5.65 5 20 medium density calcareous siltstone. B 20 5.20-5.70 (WMCK) [WEST MELBURY CHALK FORMATION] D 21 600 SPT(S) N=23 (3.4:6.5.6.6) D 22 6.20-6.65 6.20 B 23 6.20-6.70 D 24 7.00 SPT(S) N=23 (3,5:6,5,6,6) D 25 7.20-7.65 B 26 7.20-7.70 (6.00)D 27 8.00 SPT(S) N=23 (4,4:5,5,6,7) D 28 8.20-8.65 8.20 B 29 8.20-8.70 D 30 9.00 SPT(S) N=30 from 9.20m to 11.20m very stiff (4,5:6,7,8,9) D 31 9.20-9.65 9.20 B 32 9.20-9.70 D 33 10.00 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. AGS For details of abbreviations, see key. SOIL ENGINEERING FINAL Print date and time 12/09/2022 13:55 Log checked by David Howard Form No. SIEXPHOLELOG Issue Date 02/03/2018 Part of the Bachy Soletanche Group Issue.Revision No. 2.05

Project Name	Cambridge Waste Water Treatm	nent Plan	t Reloca	tion									Hole ID	
Project No.	TE8364						Explo	rator	у Но	le Lo	g	В	H_STW_0	19B
Engineer Employer	Mott MacDonald Bentley Barhale Limited												Sheet 2 of 2)
Ground Level	+9.32mOD	Coordinat	es	549788.2	16E, 2608	72.771	J	Gri	d	OS	GB		311000 2 01 2	-
Hole Type	IP+CP	Inclination	1	90° from	horizonta								1	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	۳	In Situ Test Details	Install- ation
	s stiff grey slightly gravelly calcareous CLAY. to subrounded fine to coarse of very weak												-	
medium density cald													-	
. , ,	·												SPT(S) N=31 -	
				1 :			D 34 10.70-11.15						(4,6:7,8,7,9) 10.70	
Complete at 1	1.20m. Termination Reason: Borehole	2		11.20	-1.88		B 35 10.70-11.20						-	
				-									- - - - -	
Notes:	All depth in metres, all diameters in milli	metres.	1	1	1	1	I	1	<u>I</u>					'
AGS	See header sheet for details of boring, pr For details of abbreviations, see key. Print date and time	ked by David Howar	d				SQI	L enginee	RING					
11 4/ NE	i iiii uate anu tille .				LO	4 01156	a py pavia i iuwdi	-						

Issue Date 02/03/2018

Part of the Bachy Soletanche Group

FINAL

Form No. SIEXPHOLELOG

Print date and time 12/09/2022 13:55

Project	Name	Can	nbridge	Waste '	Water	r Trea	tmen	t Plant	Relocat	ion				_					Н	łole ID	
Project		TE8												Exp	oloratoi	ry Hole	Log	E	3H_S	STW_	020
Enginee Employ			tt MacD nale Lim		Bentle	ey													She	et 1 of	1
Ground L			3mOD						Coordin	ates	549	898.80	E, 260975.	80N			Grid		OSGB		
Date Star		_	9/2021	<u> </u>	ь.	T:		D: 0		mpleted		09/202		- Inc				nation		m horizoi	ntal
7op 0.00	Base 1.20	Туре	Date Tir 03/09/20			9/2021		Craig	Logge	Rarrel Type	NA NA		lant Used lated hand too		ng Used P Ione	it Stability Stable	<u>'</u>		Remark	KS	
1.20	15.20	RC	06/09/20	021 07:30	06/0	9/2021	17:30	Blackett Craig Blackett	CJ	Geobore S (146)	PCD	s	Soilmec SM8								
15.20	16.20	RO	07/09/20	021 08:00	07/0	9/2021	09:15	Craig Blackett	СВ	NA NA	Drag B	Bit S	Soilmec SM8								
16.20	30.20	RC	07/09/20	021 09:15	08/0	09/2021	14:30	Craig Blackett	CJ	Geobore S (146)	PCD	S	Soilmec SM8								
		ı	Depth	P Depth	ROGR	RESS						·		Depth	Depth	WATER Depth	STRIKE Water				
Date 03/09/202		Depth 1.20	Casing 0.00	Water		f Shift		Rem	arks				e Time	Strike 5.40	Casing		Rose To			Remarl	
06/09/202	21 07:30	1.20 15.20	0.00 1.45	Dry 1.70	Start of	of shift of Shift						00/03/2	102111.50	3.40			0.00		Jeepage	. Nise not re	coraca.
07/09/202	21 17:30	15.20 24.20	1.45 7.35	2.20 4.90	End of																
08/09/202 08/09/202 08/09/202	21 11:00	24.20 30.20 0.00	7.35 7.35 0.00	2.10 4.45	Drillin	of shift ng Comp ill Comp		hole Comp	ete												
00,00,20,		0.00	0.50		Buokii	сор	.0.0, 2010														
Depth	Depth			ABLE PE			DETAILS	;				Depth	ı Test				ETAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base	Tim	e Start	Duratio	n	Tool			Rema	rks		Тор	Туре		Reporte	d Result		Number	Ratio	Casing	Water
Depth	Depth			ROTAR\		H DET	TAILS														
Top 1.20	Base 9.50	Fiu	sh Type R/MIST	Retur 90	n Co	olour /hite			Remarks	S											
9.50 19.70	19.70 27.20	Al	R/MIST R/MIST	90 50	G	arey arey															
27.20 28.70	28.70 30.20	Al	R/MIST R/MIST	90 50	G	arey arey															
HOLE DI	AMETE	R CASING	G DIAMETE	ER		D	YNAN	1IC SAIV	IPLING												
Depth	Diamete	Depth Base	Diamete	er Depth 1		anth	Diamete		tion (Sample ecovery Re	Run										
7.35 30.20	150 146	7.35	150	+	. в	ase			K	ecovery Re	rerence										
30.20	140																				
	INST		N DETAIL				Р	PE CON	STRUCT	ION					DEI	PTH RELAT	TED REN	MARKS			
Distance	ID	Type Re	esponse Re Top			Pipe Ref	Тор	Base	Diamet	er Pipe	Туре	Depth Top	Depth Base				Re	marks			
Depth	Depth		Б.		KFILL [DETAIL	_S									LOCATIO		LS			
Top 0.00	Base 30.20	Grout	Descrip	ption				Re	marks							Ken	narks				
	Not		pth in me																		
AGS	3		eader shee tails of ab				, progre	ss and w	ater.												
FINAL		For details of abbreviations see key. Print date and time 12/09/2022 13:55 Lo											cked by D	avid Ho	ward			SOI	L en	ginee	RING
Form No. C	IEADHUI	EUDD			Iccus D.		Na 202			leeue Dete 1	2 /00 /20	11.0							- C-I D		

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Drainet No	TEO2C/							Explo	ratoı	у Но	le Lo	og		N/T2 LIC	020
Project No. Engineer	TE8364 Mott MacDonald Bentley												[BH_STW_	_020
Employer	Barhale Limited													Sheet 1 of	4
Ground Level		rdinate	es .	549898.8	30E, 2609	75.801	N		Gri	d	09	GB			
Hole Type	IP+RC+RO Incli	nation		90° from	horizonta	ı									
		ering		Depth	Datum	trike		Sampling		TCR/Sample Recovery %	ows			In Situ Test	Install-
	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike			In:	R/Sal	SCR/Blows	RQD	<u>ц</u>	Details	ation
TOPSOIL: Dark brow	n slightly sandy slightly gravelly CLAY. Sand is fine	>	X//XX//			>	D1	Details 0.05-0.10	Dia.	으 관	Š				
	angular to subrounded fine to medium of flint.			(0.30) 0.30	7.83		ES 2	2 0.20-0.25							
(TOP) [TOPSOIL]		1		(0.30)			D 4	0.10-0.40 0.40-0.50							1
Gravel is angular to	ghtly gravelly sandy CLAY. Sand is fine to medium. subrounded medium and coarse of flint.	1		0.60	7.53			0.50-0.55 0.40-0.80							
\(SUPD) [SUPERFICIA Firm light greyish br	L DEPOSITS] rown slightly gravelly sandy CLAY. Sand is fine to			(0.60)			B 9	0.80-1.20							-
	ngular to subrounded medium and coarse of flint.			1.20	6.93		D 7	1.00-1.10							
Very stiff greyish bro	own slightly sandy slightly gravelly CLAY. Sand is						E2 8	3 1.10-1.20							-
(SUPD) [SUPERFICIA	ar to subrounded fine and medium of flint. L DEPOSITS]			(0.67)					400	100					
				1.87	6.26		C 10	0 1.20-2.20	102	100			NR		
calcareous CLAY. Gra	Composed of stiff greyish brown slightly gravelly avel is angular to subangular fine to coarse of very			-											-
	ıdstone. (CIRIA Grade Dm) _BURY CHALK FORMATION]				-									1	
(**************************************	,			(1.33)	-										-
				` -′	1		C 13	1 2.20-3.20	102	100					
Church	/ compaced of firm to stiff and it !			3.20	4.93										
calcareous CLAY wit	Composed of firm to stiff greyish brown gravelly h closely to medium spaced thin and medium				1										
	weak medium and high density chalk composed tone. Gravel is angular to subangular fine to			-											
coarse of very weak	calcareous mudstone. (CIRIA Grade Dm) BURY CHALK FORMATION]												NIA		
(VVIVICK) [VVEST IVIEL	BURY CHALK FORMATION	E		-									NA		-
		Grade Dm		:			C 12	2 3.20-5.40	102	89					
		ığ		-										HPD 4.50	-
				(3.05)											
				-]=======
from 5.15m to 5.40r	m assumed zone of core loss														
						abla									
															7
							C 1	2 5 40 6 20	102	100					
				-			C 1:	3 5.40-6.20							7
Structureless CHALK	Composed of stiff light grey gravelly calcareous			6.25	1.88										
CLAY. Gravel is angu calcareous mudston	lar to subangular fine to coarse of very weak			(0.39)											-
(WMCK) [WEST MEL	BURY CHALK FORMATION] n very thin bed of very weak medium density chalk			6.64	1.49								560	1	
composed of calcar				(0.56)			C 14	4 6.20-7.70	102	100	66	66	560 560		
MUDSTONE. No dis	continuities identified. CIRIA Grade - unable to			7.20	0.93								300		
	BURY CHALK FORMATION]	e B3		(0.00)]								NI 100]
Weak high density li	ight grey CHALK composed of calcareous itinuities 1) 50 to 85 degrees very closely to	Grade		(0.63)									100 140		
closely spaced undu	llating planar smooth with black staining. (CIRIA			7.83	0.30									1	
	BURY CHALK FORMATION]	Grade		(0.40)	1								NA		7
coarse gravel sized				8.23 (0.32)	-0.10								320	1	}
	Composed of soft to firm light grey gravelly avel is angular to subangular fine to coarse of very	0)		8.55	-0.42		C 11	5 7.70-9.50	102	94	34	18	320	HPD 8.50	
	idstone. (CIRIA Grade Dm) LBURY CHALK FORMATION]	Grade B4		(0.31)			01.	3 1.10 3.30	102		"	10	40		
	m very thin bed of very weak medium density chalk			8.86	-0.73									1	-
Weak high density li	ight grey CHALK composed of calcareous				1										
determine.	continuities identified. CIRIA Grade - unable to														
	_BURY CHALK FORMATION] ght grey CHALK composed of calcareous														
	tinuities 1) 5 to 15 degrees very closely spaced]											
	All depth in metres, all diameters in millimetre			<u> </u>	<u> </u>	<u> </u>			1		<u> </u>				
	See header sheet for details of boring, progres For details of abbreviations, see key.	s and	water.												
FINAL	Print date and time 12/09	/2022	13:55		In	a chec	cked h	oy David Howar	d				SOI	L engine	ering
Form No. SIEXPHOLEL				Issue Date	02/03/20	_		,	•				Part o	of the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatm	nent F	lant	. Relocat	ion										Hole ID	
Project No.	TE8364								Exploi	rator	у Но	le Lo)g	[BH_STW_	020
Engineer	Mott MacDonald Bentley)∏_31VV	.020
Employer	Barhale Limited														Sheet 2 of	4
Ground Level	+8.13mOD	Coord				80E, 2609		N		Gri	d	OS	SGB			
Hole Type	IP+RC+RO	Inclin				horizonta		1			n vo	Г.,			T	
	Description of Strata		Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test	Install-
	Description of Strate		Weat	Logo	ness)	Level	Wate	\vdash	Details	Dia.	TCR/5 Reco	SCR/	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	_	Details	ation
	ight grey CHALK composed of calcareous ntinuities 1) 5 to 15 degrees very closely space	he	1	HH				C 16	6 9.50-10.70							
planar and undulatin	ng smooth with black staining. 2) 80 to 85 ced planar smooth. (CIRIA Grade B4)		i		↓					102	100	93	93			
(WMCK) [WEST MEL	LBURY CHALK FORMATION]		e A2		(2.54)					l _	_	l _		NI 530		
MUDSTONE. Discont	density light grey CHALK composed of calcare ntinuities 1) 40 to 70 degrees medium to wide		Grade A2		(2.54)									700		
(WMCK) [WEST MEL	mooth clean. (CIRIA Grade A2) LBURY CHALK FORMATION]		i		1 -										-	
from 8.96m to 9.06n stiff calcareous clay	m thin bed of structureless chalk composed of very		i _		11.40	227										
coarse gravel sized f				E-=-	11.40	-3.27		C 17	7 10.70-12.20	102	53	47	47		1	
from 9.50m to 9.58n	m assumed zone of core loss m thin bed of soft gravelly clay (possibly drilling		i	E	(0.70)									NR		
	40m with occasional coprolites (<6mm x 7mm) and		i	E'	1210	3 07										-
Assumed zone of cor	te (CAMBRIDGE GREENSAND FORMATION) re loss. Grey CLAY (Driller's description)	-/	ı	F	12.10	-3.97				\vdash		-	+		-	
	ured dark grey CLAY with rare coprolites (<7m		i	F!						100	100					
	randomly orientated extremely closely to closed and all the closed and all the closed are randomly orientated.	sely	i	F_=_!				C 18	8 12.20-12.95	102	100					
(GLT) [GAULT FORMA			ı	F_=_!]						<u> </u>	\sqcup			
			i	F_=_!	(2.14)											
			ı	F_=_!				C 19	9 12.95-13.70	102	100					
			i	F_=_!]]						L		NA	-	
			i	F_=_!	_									14.		
			ı	F_=_!	<u> </u>	<u> </u>									-	
	rk grey CLAY with rare coprolites (<8mm x		i		14.24	-6.11			- 10 70 45 20	122						
spaced planar and ur	randomly orientated very closely to closely indulating smooth polished.		ı	<u> !</u>				CZU	0 13.70-15.20	102	93					
(GLT) [GAULT FORMA	TION		ı	<u> !</u>	(0.96)											
			ı	<u> </u>]									-	
	rilling. Grey CLAY. (Driller's description)		i	<u> </u>	15.20	-7.07									†	
(GLT) [GAULT FORMA	TION		i	<u> </u>										NR		
			ı	<u> </u>	(1.00)]								•	WRSBP 15.70	
			i	<u> </u>	-											
	fissured dark grey CLAY with rare coprolites		ı	<u> </u>	16.20	-8.07				\vdash		 	+		-	
(<10mm x 14mm). Fi	issures are 0 to 20 degrees very closely to closely to closely to closely to closely to closely to be supported and 80 to 90 degrees with the support of the		i	<u> </u>	-			C 21	1 16.20-16.70	102	100					
medium spaced plan (GLT) [GAULT FORMA	nar polished.		ı	<u> </u>						-		<u> </u>	\vdash			
	10m 1 No. fissure 85 degrees planar smooth polished	t	i	<u> </u>]]						İ				
from 17 20m to 17.7	71m 1 No. fissure 90 degrees planar smooth polished	4	i	<u> </u>												-
110111 11.26 60 1	Till I No. iissuie 30 acgrees piana, sinoota penene	.	ı	<u> </u>	1 !			C 22	2 16.70-18.20	102	100					
from 17.60m to 17.7	70m very stiff		i	<u> </u>]										
			ı	<u> </u>												
from 17.95m to 18.1	.6m very stiff		i	<u> </u>	(4.49)										-	
			i	<u> </u>]										
			i		1 -	<u> </u>										
-+ 10 05 m 1 No. cor	·· (F		i		1 1											
at 18.86m 1 №0. сор	orolite (5mm x 10mm)		i]		C 23	3 18.20-19.70	102	100				-	-
at 19.25m 1 No. cop	prolite (8mm x 14mm)		i	<u></u>	1 .											
			i													-
			i]				\vdash		<u> </u>	\vdash			
		_		 -	 	<u> </u>	-	-		-		<u> </u>	\vdash		<u> </u>	=======================================
			ı	'	'											
			ĺ	'	'											
			ĺ	'	'											
Notes:	All depth in metres, all diameters in millir					<u> </u>		Τ	123							
AGS																
	For details of appreviations, see key.															
FINAL	Print date and time 1	12/09/	2022	13:55		Log	g chec	cked b	by David Howard	d				301	L CHOILIC	KIIIO

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rato	у Но	le Lo	g	١.	BH_STW_	020
Engineer	Mott MacDonald Bentley												'	011_3177_	.020
Employer	Barhale Limited													Sheet 3 of	4
Ground Level		rdinate			30E, 2609		N		Gri	d	OS	GB			
Hole Type	IP+RC+RO Incli	nation			horizonta	_	1			0 .0				<u> </u>	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	۳	In Situ Test Details	Install- ation
	fissured dark grey CLAY with rare coprolites issures are 0 to 20 degrees very closely to closely														
	indulating smooth polished and 80 to 90 degrees		<u> </u>		-										
(GLT) [GAULT FORM	ATION]			20.69	-12.56		C 24	19.70-21.20	102	100					
	rk grey CLAY with rare coprolite (<8mm x 11mm). degrees closely to medium to spaced planar and			20.00	12.55										
undulating smooth (GLT) [GAULT FORM)				-											
	rrow infilled with silt (3mm x 12mm)		<u></u>												
from 21.44m to 21.5	50m recovered as soft (possibly drilling induced)			-											
at 21.73m 1 No. cop	prolite (5mm x 8mm)		<u></u>												-
			<u></u>	-			C 25	5 21.20-22.70	102	100					
			<u></u>	(3.22)											
			<u></u>	-											-
at 22.62m 1 No. cop	prolite (6mm x 11mm)		<u></u>												
			<u></u>	_											
			<u></u>												
			<u></u>	-			C 26	22.70-24.20	102	100					-
			<u></u>												
Stiff fissured dark gr	rey CLAY. Fissures are randomly orientated very		<u> </u>	23.91	-15.78										
closely spaced plana (GLT) [GAULT FORM	ar and undulating smooth polished. ATION]		<u></u>	(0.41)											
from 23.91m to 23.9	93m with frequent coprolites (<8mm x 14mm) irk grey CLAY with rare coprolites (<5mm x 8mm).	1		24.32	-16.19]
(GLT) [GAULT FORM/			<u></u>	(0.47)											
at 24.67m 1 No. cop	orolite (6mm x 11mm) ey CLAY with rare coprolites (6mm x 10mm).	1		24.79	-16.66				102	100			NA		
	lly orientated extremely closely to closely spaced						C 27	7 24.20-25.70					INA		
(GLT) [GAULT FORM															
	60m 1 No. fissure 80 degrees planar smooth polished]
	19m 1 No. fissure 75 degrees undulating smooth			(2.61)	-										
	asional coprolites (<18mm x 25mm) 61m 1 No. fissure 85 degrees planar smooth polished														
110111 20.23111 to 20.0	of the state of degrees planar smooth poished			-			C 28	3 25.70-27.20	102	100					
				-											
	rk grey CLAY with rare coprolites (<9mm x randomly orientated extremely closely to closely			27.40	-19.27										
spaced planar and u (GLT) [GAULT FORM	indulating smooth.		<u> </u>		-										
(GLI) [GAGLI FORIVI	ATION		<u> </u>	_			C 29	27.20-28.70	102	100					
at 28.24m 1 No. cop	prolite (<9mm x 14mm)		<u> </u>												
	,		<u> </u>	-	-										-
			<u> </u>	(2.80)					-						
			<u> </u>	_											-
			<u> </u>												
			<u> </u>	-			C 30	28.70-30.20	102	100					
			<u> </u>												
			<u> </u>												
Notes:	All depth in metres, all diameters in millimetre	S.													1
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.		water.												

Print date and time 12/09/2022 13:55

Log checked by David Howard



Project Name	Cambridge Waste Water Treatr	ment F	Plant	Relocat	ion									Hole ID	
D:+ N	TF02C/					Explor	ator	у Но	le Lo	g		OLL CT\A/ /	020		
Project No. Engineer	TE8364 Mott MacDonald Bentley													BH_STW_	020
Employer	Barhale Limited													Sheet 4 of 4	4
Ground Level	+8.13mOD		dinates		549898.8			I	Gri	d	OS	GB			
Hole Type	IP+RC+RO	Inclin			90° from	horizonta				% ë	υ				
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
14mm). Fissures are spaced planar and u (GIT) [GAULT FORM from 29.92m to 30) (subangular medium fossilised shell frag Complete at 3		ed		vater.	30.20	-22.07									
													1		- 1



Project	Name	Can	nbridge	Waste	Water [†]	Treatme	nt Plant	Reloc	ation					_					Н	lole ID	
Project	No.	TE8	364											Exp	olorato	ry Hole	Log	l E	3H S	STW_	021
Engine		Mo	tt MacD	onald E	Bentley																
Employ Ground L			nale Lim 98mOD	nited				Coord	linates		O.C. / .	2.705	200664	100			Grid		She OSGB	et 1 of 1	1
Date Star			8/2021						imates Complet		17/08/		260664.	OUN				nation	USGB		
Тор	Base	1	Date Tir				Rig Crew	Logg	er Barre		ill Bit		nt Used	- 1		Pit Stability	/		Remark	κs	
0.00 1.20	1.20 15.00	IP RC		021 12:00 021 13:00		2021 13:00	Craig Blackett Craig Blackett	DT AY	Geol	bore S 46)	PCD		ed Hand too	ols N	one	Stable					
				р	ROGRE	SS										WATER	STRIKE	ς			
Date ¹	Time	Depth	Depth	Depth			Rema	arks			1	Date 1	Гіте	Depth	Depth	Depth	Water	Time		Remark	KS
13/08/20 16/08/20		5.00 5.00	5.00 5.00	1.80 1.85	End of S Start of									Strike	Casin	g Sealed	Rose To	Elapsed	1		
16/08/20: 16/08/20: 17/08/20: 17/08/20:	21 17:30 21 07:30	13.00 13.00 0.00	13.00 13.00	2.40	End of S Start of	hift shift	rehole Compl	ete													
				ABI F PF	RCUSSIC	ON DETAII	s									SPT F	DETAILS				
Depth Top	Depth Base	Tim	ne Start	Duratio		ool		Ren	narks			epth Top	Test Type		Report	ed Result	72 17 11 20	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
Depth Top 1.20 8.00 11.00 13.00		AI AI AI AI AI AI AI AI AI AI AI AI AI A	sh Type R/MIST WATER R/MIST WATER R/MIST R/MIST	Flusi Retur 90 90 90 90 90	n Flux rn Colco Whit Gree Gree	DYNA	MIC SAM			e Run											
Base 15.00	Diamete 146	Base 15.00	Diamet	er Depth	Top Bas		ter Dura	ition		ry Referen											
	INST		n detail				PIPE CON	STRUC	TION						DE	PTH RELA	TED REN	MARKS			
Distance	ID	Type K	esponse Ro Top		Pipe Pij Ref Ro		Base	Diam	neter F	Pipe Type	e .	Depth Top 5.45 9.20 12.00	Depth Base 5.45 9.20 12.00	High Pre	essure Dila	remeter Test tometer Test tometer Test	Re	marks			
Dest	D1			BAC	KFILL DI	TAILS	•	•						•		LOCATIO	n detai	LS			
Depth Top	Depth Base	C :	Descri	ption			Rei	marks								Ren	narks				
0.00	15.00	Grout																			
AGS	Note	See he		et for det	ails of bo		etres. ress and w	ater.													
FINAL	SIEVDI : 0 :	CUID?					09/2022 1	3:55	1)-+- 00 m	_	check	ed by D	avid Hov	ward					ginee	
Form No. 9	DIEXPHUL	EHDK			issue.Kev	sion No. 2.0	IZ.		issue E	Date 22/06	0/2016							Part	or the Back	hy Soletanch	e Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	og		BH_STW_	021
Engineer	Mott MacDonald Bentley												'	۷۱ וטווע	_021
Employer	Barhale Limited													Sheet 1 of	2
Ground Level		ordinate		549642.7	70E, 2606	64.301	N		Gri	d	OS	SGB			
Hole Type	IP+RC Inc	lination		I		l o				م ہ	s				
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test	Install-
	•	Wea		ness)	Level	Wate		Details	Dia.	TCR/ Reco	SCR	4		Details	ation
to coarse. Gravel is	vn slightly sandy slightly gravelly CLAY. Sand is fine angular to subrounded fine to coarse of flint.			(0.30)				0.05-0.10 2 0.20-0.25							
Occasional rootlets (TOP) [TOPSOIL]		/	****	0.30 (0.40) -	10.98			0.10-0.40 0.40-0.50							
	gravelly sandy CLAY. Gravel is angular to coarse of flint. Sand is fine to coarse.			0.70	10.98		ES!	5 0.50-0.55 0.40-0.80							
(SUPD) [SUPERFICIA	AL DEPOSITS]							0.80-1.20							
Characteristics CIIAI	//						D 7	1.00-1.10 8 1.10-1.20						_	
CLAY. Gravel is angu	K composed of firm yellowish brown calcareous ular to subangular medium to coarse of flint and	Grade		(0.36)			ES	8 1.10-1.20					NA		
\ (WMCK) [WEST ME	v density calcareous siltstone. (CIRIA Grade Dm)			1.56	10.98		C 1	0 1.20-2.20	102	38				1	
	K. (Driller's description) ELBURY CHALK FORMATION]			(0.64)											
				2.20	10.98										7
composed of calcar	very weak low density yellowish brown CHALK reous SILTSTONE. Fractures are 0-10 degrees						C 1	1 2.20-2.70	102	100	40	22			
Grade B2)	spaced planar rough with silt infill (<3mm). (CIRIA														
(WMCK) [WEST ME	ELBURY CHALK FORMATION]	Grade B2		(1.51)									120 210		
		Grac					C 1	2 2.70-3.50	102	100	98	84	350		7
				3.71	10.98										
	K composed of firm yellowish brown gravelly ravel is angular medium to coarse of extremely	Dm .		1 :	10.56										
	alcareous siltstone. (CIRIA Grade Dm) ELBURY CHALK FORMATION]	Grade Dm		(0.53) _									NA		
Very weak low to m	nedium density yellowish brown CHALK composed TONE with orange stained incipient fractures.			4.24	10.98		C 1	3 3.50-5.00	102	100	58	58			
	egrees closely to medium spaced planar rough	A2											110		
(WMCK) [WEST ME	ELBURY CHALK FORMATION]	Grade A2		(1.07)									380 410		
110111 4.24111 to 4.30	Om extremely weak low density			-											-
Very weak medium	density light grey CHALK composed of calcareous	e ,+		5.31	10.98									14/DODD 5 /5	1
	es are randomly orientated extremely closely to planar undulating smooth rough with orange	Grade B4		5.60	10.98									WRSBP 5.45	-
staining. (CIRIA Gra		/					C 1	4 5.00-6.60	102	38	13	13			
Assumed zone of co	ore loss. CHALK. (Driller's description) ELBURY CHALK FORMATION	<u> </u>		(1.00)									10		-
(WWW.CITY [WEST WIL	EBURT CHARKTONNAHON)				1								30 40		
Vancuusele madium	density light grey CHALK composed of calcareous			6.60	10.98										-
SILTSTONE. Fracture	es are randomly orientated extremely to very lar undulating smooth rough with orange staining.	de B4		(0.51)											
(CIRIA Grade B4)		Grade		7.11	10.98									=	
Very weak low to m	ELBURY CHALK FORMATION] nedium density light grey CHALK composed of	Undetermine		(0.61)			C 1	5 6.60-8.00	102	100	44	44	610 610		
planar rough clean.	NE. Fractures are 0-10 degrees widely spaced (Unable to determine CIRIA Grade)	Indete		(0.61)									610		-
from 7.11m to 7.34	ELBURY CHALK FORMATION] im extremely weak low density	/-		7.72	10.98									1	1
composed of calcar	medium to high density light grey CHALK reous SILTSTONE. Fractures are 0-30 degrees			-	1							\vdash			-
(WMCK) [WEST ME	ar undulating rough clean. (CIRIA Grade A3) ELBURY CHALK FORMATION]			:	1										
fine to coarse grave	Om recovered as non intact core (angular to subangular el sized fragments of very weak medium density			-											-
calcareous siltston from 8.53m to 8.65	e) 5m 1 No. fracture 65 degrees planar smooth	Grade A3		(3.87)									NI 95		
		Grac		(0.0.)			C 1	6 8.00-10.00	102	94	44	36	190		-
														HPD 9.20	
				-											-
from 9.87m to 10.0	00m assumed zone of core loss				1		+					\vdash		1	1=======
Notes:	: All depth in metres, all diameters in millimetr		1	I	1		1		1	1					1
AGS	See header sheet for details of boring, progre For details of abbreviations, see key.	ss and	water.												
FINAL	Print date and time 12/0	9/2022	13:55		Lo	g chec	cked I	by David Howar	ď				SOI	L engine	ering
Form No. SIEXPHOLEI	LOG Issue.Revision No. 2.0	5		Issue Date	02/03/20								Part o	of the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatme	nt Plant	Reloca	tion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	og	F	BH_STW_	021
Engineer	Mott MacDonald Bentley													,,, <u>_</u>	.021
Employer	Barhale Limited													Sheet 2 of	2
Ground Level		oordinate		549642.	70E, 2606	64.30N	Ŋ		Gri	d	09	SGB			
Hole Type	IP+RC II	nclination		Б		99				<u>a</u> %	s				
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	ш	In Situ Test Details	Install- ation
	medium to high density light grey CHALK eous SILTSTONE. Fractures are 0-30 degrees														
closely spaced plana	ar undulating rough clean. (CIRIA Grade A3)														}
from 10.00m to 10.3	LBURY CHALK FORMATION] 14m extremely weak low density (possibly drilling			1 -	-		C 1	7 10.00-11.00	102	100	71	62			
induced)															-
				-										-	
	20m recovered as non intact core (angular to coarse gravel sized fragments of very weak medium														
density calcareous															-
	59m 1 No. fracture 80 degrees undulating smooth very weak low density light grey CHALK compose	ed 8	HH	11.59	10.98								80		
of calcareous SILTST	FONE. Fractures are 0-5 degrees closely spaced ough clean. (CIRIA Grade A3)	Ğ Grade A3		(0.46)			C 1	8 11.00-13.00	102	100	94	94	95 155	HPD 12.00 -	}
(WMCK) [WEST ME	LBURY CHALK FORMATION]	_/_		12.05	10.98		01	3 11:00 13:00	102	100	34	34		111 12:00	
calcareous SILTSTO	medium to high density CHALK composed of NE. Fractures are 0-5 degrees closely spaced														
	lanar clean. (CIRIA Grade A3) LBURY CHALK FORMATION]			1											7
													80		
		Grade A3		(2.06)									110		
		9											190		-
				-			C 1	9 13.00-14.00	102	100	90	75			
					-										
from 14.02m to 14:	11m frequent phosphate nodules (<15mm x 30mm)			-	40.00										-
Very stiff fissured da	ark grey CLAY with occasional phosphate nodule:			14.11	10.98]
undulating smooth.		Unweathered		(0.89)			C 2	0 14.00-15.00	102	100	11	11	NA		
(GLT) [GAULT FORM.	ATIONJ	nwea		(0.03)									IVA		
				15.00 -	10.98										
Complete at 1	15.00m. Termination Reason: Achieved Scheduled Dep h			20.00	10.00										-
	·														-
]
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						-			-		_				1
■ NI-+	All donth in matros all diagrature in a 90	troc													
AGS	All depth in metres, all diameters in millime See header sheet for details of boring, prog		water.												
	For details of abbreviations, see key.												501	L engine	שמים
FINAL Form No. SIEXPHOLEL	Print date and time 12. OG Issue.Revision No. 2		13:55	Issue Date	Lo 02/03/20	-	ked l	y David Howar	d					f the Bachy Soletano	
	issue.ite visioit IVO. 2			Dutt									1		- 2.0ap

Project	Name	Cam	ıbridge '	Waste \	Nater	Treatm	nent Plan	t Reloc	atic	on										Н	lole ID	
Project	Ma	TE83	264												Exp	lorato	ry Hole	Log	$ _{R}$	Η ς-	TW_0	122A
Enginee			tt MacD	onald E	Sentle	;y														11_0	· v v o	221
Employ	er	Barh	nale Lim																		et 1 of 1	Ĺ
Ground L Date Star			6mOD 9/2021					Coord		es ipleted		10.00E, 9/2021	2607	70.60	NC			Grid	nation	OSGB	m horizon	s+al
Top	Base			ne Start	Date	Time E	nd Rig Cre						nt Us	sed	Shorin	ıq Used	Pit Stability	_		Remark		lai
0.00	1.20 50.00	IP RC	03/09/20	21 11:15	03/09	9/2021 11:4	45 TW	DT	r	Geobore S		Insulat	ed Han	d Tools	1	one	Stable					
	I		I							(146)			-	-								
	I		I							İ												
	I		I							l												
	L		L																			
			Depth	PI Depth	ROGRI	ESS					\rightarrow				Depth	Depth		STRIKES Water	S Time			
Date 3		Depth 1.20	Casing 0.00	Water		f Shift	Rer	marks				Date '	Time		Strike	Casing		Rose To		1	Remark	.S
06/09/202	21 07:30	1.20 14.10	0.00	Dry 2.98	Start of End of	of Shift																
07/09/202 07/09/202	21 07:30 21 17:30	14.10 14.10	3.00 1.00	1.94 1.94	Start of End of	of Shift																
08/09/202 08/09/202	21 17:30	14.10 17.10	0.00 14.10	1.94 Dry	Start of End of	f Shift																
09/09/202 09/09/202 10/09/202	21 17:30	17.10 30.60	14.10 21.00	Dry Dry	Start of End of	f Shift																
10/09/202 10/09/202 13/09/202	21 17:30	30.60 39.60 39.60	21.00 21.00 21.00	Dry Dry Dry	Start of End of Start of	f Shift																
13/09/202 14/09/202	21 17:30	50.00 50.00	21.00 21.00	2.58 1.95	End of Start of	f Shift of Shift																
14/09/202		0.00	0.00				lete, Borehole	Complete														
			Ci	ABLE PER	⊥ ≀CUSSI	ION DET	AILS				+						SPT [DETAILS				
Depth Top	Depth Base	Tim	e Start	Duratio	n	Tool	$\overline{}$	Rer	mark	cs		Depth Top	Tes			Report	ed Result	F	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
					_							101	-71	+						Nuc	0	
	I																				!	
	I																				!	
	I																					
		Щ.		POTAR\	/ ELLISI	H DETAIL	¢															
Depth	Depth	Flur	sh Type	Flush	ı Flu	ush	.5	Rema	rks													
Top 1.20	14.10	AIF	R/MIST	Return 100	Cre	lour eam																
14.10	50.00	Air	R/MIST	100	Gr	irey															!	
	I																					
	I																					
	I																					
HOLE DI	AMETER	CASING	a DIAMETE	R		DYN	IAMIC SA	MPLIN	G													
Depth Base	Diameter	Depth Base	Diamete	er Depth To		epth ase Dia	meter Du	uration			Run											
12.00 21.00	200 150	12.00 21.00	200 150	+	Ба	ise	+		Nec	.overy Rei	erence											
50.00	146	50.00																				
	I																					
	I																					
	INSTA	LLATIO	N DETAILS	S	十		PIPE CO	NSTRU	CTIO	N						DE	EPTH RELA	TED REM	1ARKS			
Distance	ID T		esponse Re Top			Pipe Ref To	op Bas	e Dian	neter	Pipe T	Гуре	Depth Top	Dep Ba					Rei	marks			
2.00	G1			2.00 Pi			00 1.00 00 2.00		50 50	PLAIN SLOTTED		7.00 8.00	7.0		Falling H Packer Te						-	
	,											10.50	12.	.00	Aquifer S	ieal						
	,																					
				BAC	(FILL D	DETAILS											LOCATIO	N DETAIL	LS			
Depth Top	Depth Base		Descrip	otion			F	Remarks	;								Rer	marks				
-0.50 0.00	0.00 0.40	Upstandir Concrete	-										-		-							
0.40 1.00 2.00	1.00 2.00 50.00	Bentonite Gravel bac Bentonite	ckfill																			
2.00	50.00	bentonite																				
	I																					
		\perp									$\perp \perp$											
AGS			pth in met eader shee				imetres. ogress and	water.												4		
		For det	tails of abl																501	ı en	GINEE	DIDE
FINIAL				Drint	data ar	ad tima 1	12/09/2022	113.55			Loc	a chacl	rad by	/ Day	vid Hov	ward			301	CEIN	311166	KILIG

Part of the Bachy Soletanche Group

Issue Date 22/06/2016

FINAL

Form No. SIEXPHOLEHDR

Print date and time 12/09/2022 13:55

Project Name	Cambridge Waste Water Treatment	Plant	t Relocat	tion										Hole ID	
	Trans							Exp <mark>l</mark> o	rator	y Ho	le Lo	og -		LL CTAL (0004
Project No. Engineer	TE8364												R	H_STW_(JZZA
Eng <mark>i</mark> neer Employe <mark>r</mark>	Mott MacDonald Bentley Barhale Limited													Sheet 1 of	5
Ground Level		rdinate	es	549910	00E, 2607	70.60	N I		Gri	d	OS	GB		SHEET 1 OF	
Hole Type	IP+RC Incl	ination	1		honzonta										
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	ROD	Ľ.	In Situ Test	Install-
		Weat		ness)	Level	Vate te		Details	Dia	TCR/ Reco	꿇	~		Details	ation
	m slightly sandy slightly gravelly CLAY. Sand is fine	1		(0.20)	-			0.05-0.10	H						
Cocasional roots.	angular to subrounded fine to medium of flint.]		(0.35) 0.35	8.11			0.20-0.25 0.10-0.40							• 2
(TOP) [TOPSOIL]	ghtly gravelly sandy CLAY. Gravel is angular to	1	-		1		D4	0.40-0.50							
subrounded fine to	medium of flint. Nodules of chalk.			(0.75)	1			0.50-0.55 0.40-0.80							100
(SUPD) SUPERFICIA	IL DEPOSITS]				}		 	0.80-1.20							
Firm light brown go	eyish slightly gravelly sandy CLAY. Gravel is	<u> </u>	114	1.10 1.20	7.36		D7	1.00-1.10						2	
	led fine to medium of mixed lithologies including	8 8	(' '	(0.37)	7.26		ES 8	1.10-1.20					NA] . []
(SUPD) (SUPERFICIA	L DEPOSITS]	/ 5 -	<u> </u>	157	6.89		l								100
	Composed of firm yellowish brown calcareous aining, (CIRIA Grade Dm)	1	T	(0.52)	Ⅎ		C 10	1.20 -2.10		41			NR		
(WMCK) (WEST MEI	LBURY CHALK FORMATION]	1	10 10	(0.53)	1										
subrounded medius	m multicoloured slightly sandy subangular to m to course gravel of filmt	툺	100	2.10	6.36				\vdash						
	re loss. CHALK. (Driller's description) LBURY CHALK FORMATION]	Grade	Tr. Tr.	(0.45)	1					93					
Structureless CHALL	Composed of firm yellowish brown calcareous	5		2.55	5.91		[611	2.10-2.80		33					
	raining (CIRIA Grade Dm) LBURY CHALK FORMATION]	Ι.	<u> </u>	1	1				┝					K 2.80 - 6.80	
	m multicoloured slightly sandy slightly clayey ounded medium to coarse gravel of flint (possible	E	1 - 1	(1.05)	1										
cavings from hole)	Composed of firm yellowish brown gravelty	Grade	7	(LUS)	1		.,,	2 2.80-3.60		100					
calcareous CLAY wit	h orange staining. Gravel is angular to subangular	•			1		١, ,	2 2.80-3.60							
	remely weak low density calcareous siltstone. LBURY CHALK FORMATION]	\vdash	F T	3.60	4.86				⊢						1
from 2.75m to 2.80	m assumed zone of core loss Composed of firm yellowish brown gravelly	/ _	L. L.]										-
calcareous CLAY wit	th medium spaced thin beds of extremely weak to	<u>۾</u>	L P	(1.00)	}										}
	rty yellowish brown chalk composed of calcareous ingular to subangular medium of extremely weak	Grade ((1.00)	-										ł
low density calcared	ous siltstone. (CiRIA Grade Dm)		1 15	1 .	1		C 13	3.60-5.10		100					
	LBURY CHALK FORMATION] Composed of light grey gravelly calcareous CLAY	+-	1 1	4.60	3.86										
	lum spaced thin beds of very weak medium nalk composed of calcareous siltstone. Gravel is		1.1		‡								NA		
angular to subangul	ar medium to coarse of extremely weak to very		1 1	-					┡						1
weak low density ca (WMCK) (WEST MEI	iicareous siitstone. LBURY CHALK FORMATION]		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1										1
	m assumed zone of core loss] .	‡										1
			1 1	1	1										
		톮	T T		1		C 14	5.10-6.60		93					1
		Grade D	1	(3.00)	7										3
		Š	35.5		}										}
				1	-										1
					1										
			15 15	1	1										1
			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1									K 7.20 - 8.80	
			T	1	1		C 1	5 6.60-B.10		100	39	33			
Very week to week	medium to high density light grey CHALK	+	 	7.60	0.86	Ī	1								
composed of calcare	eous SILTSTONE. Discontinuities: 1) 0-20 degrees		FE	1	1		1								
	ly spaced undulating smooth with dustings of s very closely to closely spaced undulating		1 10	-	}		1		L						-
smooth with dusting	gs of siit. (CIRIA Grade B3) LBURY CHALK FORMATION]	83		61 /44]		1						NI 140		}
from 8.28m to 8.34d	m structureless chalk composed of stiff light grey	Grade		(1.43)	1	Ī	1						140 200		
gravelly calcareous very weak chalk	clay Gravel is angular to subangular fine to medium of	-	1 1		1		1								
			1 1		‡		C 16	6 B.10-9.60		100	48	43			
Structureless CHALL	Composed of stiff light grey gravelly calcareous	+	7 7	9.03	-0.57		1								
CLAY. Gravel is angu	alar to subangular fine to coarse of very weak to estone. (CIRIA Grade Dm)	_		1	‡	Ī	1								
(WMCK) [WEST MEI	LBURY CHALK FORMATION)	<u>چ</u>	1 1	(1.22)	1								NA		
from 9.45m to 9.89 calcareous siltstone	m weak high density light grey chalk composed of	Grade	.1 (5)		1										
			<u> </u>	1	7	Ī	1								
															T
							1								
-	ut a san a san a san a san a san a san a san a san a san a san a san a san a san a san a san a san a san a san					<u> </u>	1		<u> </u>						
Notes.	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water												
AGS	For details of abbreviations, see key.														
FINAL	Print date and time 12/09	9/2022	13:55		Lo	g chec	ked b	y David Howar	d				SOI	L enginee	PRING
Form No. SIEXPHOLEI				Issue Date	e 02/03/20								Part o	f the Rachy Soletane	che Grove

Project Name	Cambridge Waste Water Treatm	ent Plai	nt Reloca	tion										Hole ID	
Project No.	TE8364							Exploi	rator	у Но	le Lo	og	В	H_STW_0)22A
Engineer	Mott MacDonald Bentley														_
Employer Ground Level	Barhale Limited +8.46mOD	Coordina	tos	5/00107	00E, 2607	70.601	N.		Gri	d	09	GB		Sheet 2 of	5
Hole Type	IP+RC	Inclination			horizonta		V		GII	u	O.	очь			
	Description of Strata	Weathering		Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	뜨	In Situ Test Details	Install- ation
	K composed of stiff light grey gravelly calcareo	us	1 1			>		Details	Dia.	F 4	0,				
weak calcareous silt	llar to subangular fine to coarse of very weak to tstone. (CIRIA Grade Dm)	` -	1 1	10.25	-1.79		C 1	7 9.60-11.10							
Very weak to weak r	LBURY CHALK FORMATION] medium density light CHALK composed of	-/		1 .						100	53	43			
	NE. Discontinuities: 1) 0-20 degrees closely lating smooth. (CIRIA Grade A3)	Grade A3		(1.19)									90 160		
(WMCK) [WEST ME	LBURY CHALK FORMATION]	Grad		Į · · -									200	-	
				I											
	slightly sandy slightly gravelly CLAY. Sand is fin	e	##	11.44 11.53	-2.98 -3.07										
	r to subrounded fine to coarse of coprolite. GE GREENSAND MEMBER]	/	F_=_	-]					400	۵,	2,			
	rey CLAY with rare fossilised shell fragments nd rare fossilised coprolites (<30mm x 10mm).		F				C 1	8 11.10-12.60		100	24	24		-	
Fissures are 0-10 de	egrees closely spaced smooth occasionally ional dustings of silt and randomly orientated		F_=	-											
extremely closely to	very closely spaced planar smooth occasional	ly	F_=] .											
polished. (GLT) [GAULT FORM.	ATION]			_											
			<u> </u>	_											
			<u> </u>	_										_	
				-			C 19	9 12.60-14.10		100					
				(4.32)											-
			<u> </u>	(4.52)]										
			F	-										-	
			<u> </u>] .]										1
			F]			C 21	0 14.10-15.60		100					
			<u> </u>	-			C 21	J 14.10-15.60		100				-	
			<u> </u>												
			F												
			L	-											
	ark grey CLAY with occasional phosphatic nodu			15.85	-7.39									_	-
	issures are 0-20 degrees closely spaced plana d randomly orientated extremely closely to	r	F	-											
closely spaced plana (GLT) [GAULT FORM	ar undulating smooth polished. ATION]		F	-			C 2	1 15.60-17.10		100					
	•		<u> </u>	-											1
			<u> </u>	-[
				-										-	
			<u> </u>	-											
			<u> </u>												
			<u> </u>	((00)			C 2:	2 17.10-18.60		100					
			<u> </u>	(4.08)			02.	17:10 10:00		100				-	
			<u> </u>	-											
				-											
			<u> </u>	-]										
			<u> </u>	-											
from 19.42m to 19.	60m vertical undulating polished fissure			-			C 2	3 18.60-20.10		100					
10111 1011 1011	oon votacar anadatang pononca noodic														
				19.93	-11.47										
				1											
Notes:	All depth in metres, all diameters in millin	netres.							<u> </u>		<u> </u>				
AGS	See header sheet for details of boring, pro- For details of abbreviations, see key.		d water.												
FINAL	Print date and time 1	2/09/202	2 12.55		Lo	a chac	-kod k	by David Howard	d				SOI	L enginee	RING
FINAL Form No. SIEXPHOLEL			L 1J.JJ	Issue Date	LO 202/03/20	-	ven [aviu חטwdro עי	u					f the Bachy Soletano	

Project Name	Cambridge Waste Water Treatm	nent Plan	t Relocat	tion										Hole ID	
Project No.	TE8364							Exploi	rator	у Но	le Lo	g	l R	H_STW_0	122A
Engineer	Mott MacDonald Bentley														
Employer Ground Level	Barhale Limited +8.46mOD	Caradiaa		F/0010/	00E, 2607	70.00			C	_		GB		Sheet 3 of	5
Ground Level Hole Type	IP+RC	Coordinat Inclination			horizonta		N		Gri	a	US	GB			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
Very stiff fissured da (<30mm x 10mm). F	rk grey CLAY with occasional phosphatic node issures are 0-15 degrees closely to medium	ules	<u> </u>												
spaced planar smoo (GLT) [GAULT FORM	th polished.		<u> </u>												
			E-E-												
							C 24	20.10-21.60		100				_	
															-
				-											
			E_=_												
			E-E-	-										-	-
				:			C 25	21.60-23.10		100					
from 22.34m to 22.6	0m subvertical planar polished fissure		<u> </u>	-			0.20	21.00 20.10		100					
			<u> </u>	:											-
			<u> </u>	-										-	
			<u> </u>												
				-											-
							C 26	23.10-24.60		100					
			<u> </u>	-										-	
			E_=												-
			<u> </u>	(18.87)											
				(10.07)											
			<u> </u>				C 27	24.60-26.10		100					
] :											-
				-										-	-
			<u> </u>	-											-
			E==				C 20	26.10-27.60		100					-
			<u></u>	_			C 20	20.10-27.00		100				-	
from 27.26m to 27.5	i3m 1 No. 45 degrees planar polished fissure		<u> </u>	:											-
110111 27.54111 to 27.5	om 1 No. 45 degrees planar polistied lissure		<u> </u>	-											-
			E												
				-										-	
							C 29	27.60-29.10		100					-
			<u> </u>	-											
			E==	:											
			<u></u>												-
			<u> </u>							100					
			<u> </u>] :						100					
			F	-			C 30	29.10-30.60							
	All depth in metres, all diameters in millin		1	1			1		1	<u> </u>		<u> </u>			
	See header sheet for details of boring, pro For details of abbreviations, see key.	ogress and	water.												
FINAL	Print date and time 1		2 13:55				cked by	David Howard	d					L enginee	
Form No. SIEXPHOLEL	OG Issue.Revision No	o. 2.05		Issue Date	02/03/203	18						_	Part o	of the Bachy Soletano	he Group

Project Name	Cambridge Waste Water Treatm	ent Plan	Reloca	tion									Hole ID	
D : . N	TF026/						Explo	orator	у Но	le Lo	og		II CTM/ (777 A
Project No. Engineer	TE8364 Mott MacDonald Bentley											B	H_STW_0	JZZA
Employer	Barhale Limited												Sheet 4 of	5
Ground Level	+8.46mOD	Coordinate	es	549910.0	OOE, 2607	70.601	l '	Grio	t	09	GB			
Hole Type	IP+RC	Inclination	1	90° from	horizonta	_			0				I	
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test	Install-
	'	Weat		ness)	Level	Wate	Details	Dia.	TCR/	SCR	~		Details	ation
	ark grey CLAY with occasional phosphatic nodu Fissures are 0-15 degrees closely to medium	ıles												
spaced planar smoo (GLT) [GAULT FORM	oth polished.		<u></u>											
	.76m 1 No. 45 degrees undulating polished fissure										\vdash			
			<u></u>											
				-										-
			<u></u>				C 31 30.60-32.10		100					
			<u></u>											
			F											
			F_=_	-										
			<u> </u>											
			<u> </u>	1 .										
from 22 90m to 22	.97m 1 No. 45 degrees planar polished fissure		==		1		C 32 32.10-33.60		100					
110111 52.50111 to 52	.57111 1 No. 45 degrees planar polistied lissure			-										-
			<u> </u>	-										
			F											
				-										
							C 33 33.60-35.10		100					
												NIA		
				-								NA		
			<u>L</u>	-										
			<u></u>				C 34 35.10-36.60		100					
			F_=_	-										
			F_=_	1										
			<u> </u>											-
			<u> </u>	1	1									
			<u> </u>	_										
							C 35 36.60-38.10		100					
				-										
				-										
			F	1	1									
			F											
Vonestiff E.	high lowingtod de le CLAY 19		<u> </u>	38.80	-30.34		C 36 38.10-39.60		100					
phosphatic nodules	ninly laminated dark grey CLAY with occasional s (<30mm x 10mm) fossilised shell fragments			-			C 36 38.10-39.60		100					
are 0 degrees very	and fossilised belemnite (<30mm x 5mm). Fissu closely to closely spaced planar polished and		<u> </u>	1]									
	dium spaced planar undulating polished smoot	h	F-T-		1									
(GLT) [GAULT FORM	MATION]		<u> </u>											
			<u>E-</u>		L	L								
							·							
,														
	: All depth in metres, all diameters in millir See header sheet for details of boring, pro		water.											
AGS	For details of abbreviations, see key.													
FINAL	Print date and time 1		13:55			-	ked by David Howa	ırd					L engine	
Form No. SIEXPHOLE	LOG Issue.Revision No	. 2.05		Issue Date	e 02/03/20	18						Part o	f the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatme	ent Plant	Relocat	tion									Hole ID	
<u>.</u>							Explo	rator	у Но	le Lo	og		LL CTM	2224
Project No. Engineer	TE8364 Mott MacDonald Bentley											B	H_STW_(JZZA
Employer	Barhale Limited												Sheet 5 of	5
Ground Level		Coordinate	es .	549910.0	OOE, 2607	70.60N	1	Grio	d	09	GB .			
Hole Type	IP+RC I	nclination		90° from	horizonta	ıl							T	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	¥	In Situ Test Details	Install- ation
	ninly laminated dark grey CLAY with occasional (<30mm x 10mm) fossilised shell fragments		<u></u>											-
(<10mm x 10mm) a	nd fossilised belemnite (<30mm x 5mm). Fissur closely to closely spaced planar polished and	es					C 37 39.60-41.10							
	lium spaced planar undulating polished smooth			-					100					
(GLT) [GAULT FORM	ATION]		<u></u>											
			<u></u>	-	1									-
			<u></u>											
														-
			<u></u>				C 38 41.10-42.60		100					
				(5.43)										-
			<u> </u>		1									
			<u> </u>	-										-
				-										
			E-=-		1		C 39 42.60-44.10		100					-
			E	-										-
			<u></u>		1									
			==	-										1
	inated dark grey CLAY with frequent fossilised			44.23	-35.77									
and shell fragments	x 5mm), phosphatic nodules (<30mm x 10mm) s (<10mm x 10mm). Fissures are 0-10 degrees			-										-
	ely spaced planar rough occasionally undulating 70-80 degrees medium to widely spaced planar						C 40 44.10-45.60		84					
polished. (GLT) [GAULT FORM	ATION]			-			0 10 1 1.20 10.00		٠.					1
														-
from 45.36m to 45	60m assumed zone of core loss			-	1									-
			<u> </u>	1										-
			<u> </u>	(3.37)										
							C 41 45.60-47.10		100					
							C 41 45.60-47.10		100					-
			F_=_	1										
			<u> </u>	-										
			E_=_											
				-										-
	slightly sandy gravelly CLAY. Sand is fine to subrounded to rounded fine of flint.			47.60	-39.14		0.00 (7.10 :							
	NSAND FORMATION]			-	1		C 42 47.10-48.60		87					
				(1.40)										
from 48.40m to 48	60m assumed zone of core loss													-
Dark groonish see	cliabtly arayally cliabtly clayor fine CAND. Co			49.00 -	-40.54									
is subrounded fine				(0.50)			C 43 48.60-50.00		64					
from 49.00m to 49	NSAND FORMATION] 08m medium strong light grey gravelly medium Gravel is cultiqued to rounded fine of flint			49.50 -	-41.04		C 73 70.00-30.00		04					-
	Gravel is subrounded to rounded fine of flint ore loss. Very sandy CLAY. (Driller's Description)	_/		(0.50)	1									-
	50.00 T			50.00	41.54									-
Complete at	50.00m. Termination Reason: Achieved Scheduled Dep h													
												1		
4 6 6	All depth in metres, all diameters in millim See header sheet for details of boring, prog		water.											
AGS	For details of abbreviations, see key.											<u>.</u>	L ADCIDGO	aniac
FINAL Form No. SIEXPHOLE	Print date and time 12 OG Issue,Revision No.		13:55	Icelia Date	Lo e 02/03/20	-	ked by David Howar	rd					f the Bachy Soletano	
I JIIII INU. JILAPHULE	issue.revision IVO.	د.0.5		roout Dale	. 02/03/20	τ0						L Lair 0	i the pacity soletand	rie aloup

Project	Name	Cam	ıbridge	Waste \	Nater	Treatm	ent Plant f	Relocati	on										Н	lole ID	
Dsinot	NI.	TE83	2 6 7											Exp	lorato	ry Hole	Log	_{Ri}	⊔ ς ⁻	TW_0	122B
Project Engine			t MacD	onald E	Sentle	٧													. I3	100_0	220
Employ			nale Lim																She	et 1 of 1	L
Ground L			LmOD					Coordina			07.72E,		768.09	ÐΝ			Grid		OSGB		
Date Star Top	Base		0/2021 Date Tin	ne Start	Date	Time Fr	nd Rig Crew	Date Cor			0/2021 it Pla	ant U	sed	Shorin	a Used	Pit Stability		nation	Remark	om horizon ks	tal
0.00	1.20	IP CP	07/10/20 07/10/20	21 13:00	07/10	0/2021 14:00	DC DC	DT GL	Ванен турс	Dini bi	Insula	ted Har	nd Tools		one	Stable			Ciliair		
1.20	30.00	CP	07/10/20	21 14:00	12/10	0/2021 11:30) DC	GL			Di	ando 20	J00								
			1																		
			1																		
			1																		
				P	ROGRE	ESS										WATER	STRIKE	S			
Date	Time	Depth	Depth Casing	Depth Water			Rema	arks			Date	Time		Depth Strike	Depth Casing		Water Rose To	Time Elapsed		Remark	เร
07/10/202 08/10/202		5.20 5.20	5.20 5.20	Dry 2.90	End of											,					
08/10/202 11/10/202	21 17:30	15.20 15.20	12.20 12.20	5.20 2.90	End of Start of																
11/10/202 12/10/202	21 07:30	11.70 11.70	11.70 11.70	2.90 2.50	End of Start of	f shift															
12/10/202	21 11:00	0.00	0.00		Installa	ition Comple	ete, Borehole Co	mplete													
Donth	Donth		C/	ABLE PER	CUSSI	ON DETA	ILS				Donth	Tes	ct T			SPT D	ETAILS		Engrav	Donth	Donth
Depth Top	Depth Base	Time	e Start	Duratio	n .	Tool		Remar	ks		Depth Top	Typ	эе		•	ed Result	ŀ	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
											1.20 2.20	S	N=	=7 (1,1:2,1 =8 (1,2:2,2	2,2,2)			AR3501 AR3501	75 75	1.20 2.20	Dry Dry
											3.20 4.20 5.20	S S	N=	=9 (1,2:2,2 =14 (2,3:3 =20 (3,4:4	3,3,4,4)			AR3501 AR3501 AR3501	75 75 75	3.20 4.20 5.20	Dry Dry 2.90
											6.20 7.20	S	N=	=25 (3,5:6 =27 (4,5:6	5,6,7,6)			AR3501 AR3501	75 75	6.20 7.20	4.00 4.20
											8.20 9.20	S S	N= N=	=28 (5,5:7 =28 (4,5:5	7,6,7,8) 5,7,8,8)			AR3501 AR3501	75 75	8.20 9.20	4.20 4.20
				ROTARY	_ ′ FLUSF	H DETAILS	 S				10.70 12.20	S	N=	=31 (4,5:6 =32 (5,6:7	7,8,8,9)			AR3501 AR3501	75 75	10.70 12.20	4.20 5.20
Depth	Depth	Flu	sh Type	Flush				Remarks			13.70 15.20 16.70	S S	N=	=33 (6,7:7 =31 (5,6:7 =34 (5,7:7	7,7,8,9)			AR3501 AR3501 AR3501	75 75 75	12.20 15.20 15.20	5.20 2.90 Dry
Тор	Base	 		Retur	1 Cole	lour					18.20 19.70	S	N=	39 (6,7:8		6)		AR3501 AR3501	75 75	15.20 15.20	Dry Dry
											21.20 22.70	S S	50/	/290mm	(6,7:10,11	2,14,14/70mm) L,14,15/65mm)		AR3501 AR3501	75 75	15.20 15.20	Dry Dry
											24.20 25.70	S	50/	/280mm	(8,10:12,1	i,16,9/55mm) l5,16,7/55mm)		AR3501 AR3501	75 75	15.20 15.20	Dry Dry
											28.70	S	50/	/2/5mm /265mm	(10,12:13,	,15,18,6/50mn ,18,16,0/40mn	1)	AR3501 AR3501	75 75	15.20	Dry
HOLE DI	AMETER	CASING	DIAMETE	R		DYN	AMIC SAM	PLING													
Depth	Diameter	Depth		er Depth T	. Dep	pth Dian	neter Dura	stian Si		Run											
30.00	150	Base 15.20	150	" Боран	Ba	se		Re	ecovery Ref	ference											
	INISTA	LL ATIO!	N DETAILS		\dashv		PIPE CONS	STRICTI	ON							PTH RELAT	TED DEM	IVDKS			
Distance			esponse Re			ipe To		Diamete	1	Type	Depth		epth			FIII KELA		marks			
11.70						Ref 0.0	.	50	PLAIN	туре	Тор	Ва	ase				Rei	IIdiks			
					Pip	pe 1 11.3	30 11.70	50	SLOTTED												
									<u> </u>												
Depth	Depth				KFILL D	ETAILS										LOCATIO		LS			
Top -0.50	Base 0.00	Upstandin	Descrip	otion			Rer	marks								Ren	narks				
0.00 0.50	0.50 11.30	Concrete Bentonite	-																		
11.30 11.70	11.70 30.00	Gravel bad Grout	ckfill																		
					\perp																
AGS			pth in met eader shee				netres. gress and wa	ater.													
		For det	tails of ab															501	LAN	GINEE	PING
FINIAL				Drint	data an	d time 11	2/09/2022 1	2·EC		1.0	o chac	kad h	w Day	vid Hov	ward			301	L CIII	311 ICC	KIIIG

Part of the Bachy Soletanche Group

Issue Date 22/06/2016

FINAL

Form No. SIEXPHOLEHDR

Print date and time 12/09/2022 13:56

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion									Hole ID	
Project No.	TE8364						Expl	orato	ry Ho	le Lo	og	В	H_STW_	022B
Eng <mark>ineer</mark>	Mott MacDonald Bentley												CL1	3
Employer Ground Level	Barhale Limited +8.51mOD Coor	dinate	ĸ	549907	72E, 2607	68 0QI		Gr	id	O!	SGB		Sheet 1 of	3
Hole Type		nation	_		honzonta		•	J.		٠.	,,,,			
, and the same of	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling	la:	TCR/Sample Recovery %	SCR/Blows	RQD	Ē.	In Situ Test Details	Install- ation
TOPSOIL: Dark brow	m slightly sandy slightly gravelly CLAY. Sand is fine	5	3(/)3((/)	,		5	Details D1 0.10	Dia	<u>⊬</u> æ	o				0.1
to coarse. Gravel is	subangular to subrounded fine to medium of flint.			(0.30) 0.30	8.21		B2 0.10-0.30							
Occasional roots (2) (TOP) [TOPSOIL]	mm diameter).	1	4	0.30	821		D3 0.40							
Soft light brown mo	ottled dark brown slightly sandy slightly gravelly			(0.70)	1		B 4 0.50-0.70							
to coarse of flint and	coarse. Gravel is subangular to subrounded fine dichert.		1		1									7 0 0
(SUPD) SUPERFICIA		-		1.00	7.51		D5 1.00							-101 10
	ntly sandy slightly gravelly CLAY with orangish id is fine to coarse. Gravel is subangular to				1		B6 1.00-1.20						SPT(S) N=7	
subrounded fine to (SUPD) SUPERFICIA	coarse of flint and chert.		-	(0.70)	1		D7 1.20-1.65						(1,1:2,1,2,2) 1.20	
from 1.20m to 1 85	m gravel of flint and calcareous sitstone			1.70	6.81		B8 1.20-1.70 D9 1.70							
	htty clayey slightly gravelly fine to coarse SAND. It to subrounded fine to coarse of fint. Occasional]	-	(0.30)	0.81		D9 1/0							\mathbb{R}
pockets (>30mm x -	<20mm) of soft grey clay.		1	2.00 -	6.51		D 10 2.00							1
(SUPD) [SUPERFICIAL CHALK recovered as	AL DEPOSITS] s: Firm light grey slightly sandy slightly gravelly				}								SPT(S) N=8	
calcareous CLAY, Sa	nd is fine. Gravel is subangular to subrounded fine		- 4		1		D 11 2.20-2.65						(1,22,2,2,2) 22 0	<u> </u>
	ely weak low density light grey with orangish areous siltstone and flint.		1		1		B 12 2.20-2.70							
(WMCK) [WEST ME	LBURY CHALK FORMATION]		T T	:	1									
			1 1	-										
			1 1		1								SPT(S) N=9 (1,2:2,2,3,2)	
			1 2		1		D 13 3.20-3.65 B 14 3.20-3.70						3.20	
			T	(3.20)	1		B 14 3.20-3.70							
				-	1									
					1								SPT(S) N=14 (2,3:3,3,4,4)	
			7	-	1		D 15 4.20-4.65 B 16 4.20-4.70						4.20	-
			- I I		1									-10
			-1-1	=										3
			1	5.20	3.31								SPT(S) N=20	
	s: Very stiff grey slightly gravelly CLAY with low evel is subangular to subrounded fine to coarse of		Tag I	5.20	3.51								(3,4:4,5,5,6)	$\mathbb{R}^{\mathbb{N}}$
very weak medium	density grey calcareous siltstone. Cobbles are		T L		}		D 17 5.20-5.65 B 18 5.20-5.70						5.20	
	weak medium density calcareous siltstone. LBURY CHALK FORMATION]		1		}									
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			T T				D 19 6.00							
			P. F		1								SPT(S) N=25	
			1 1		1		D 20 6.20-6.65						(3,5-6,6,7,6) 6.20	
			1 2 2	,	1		B 21 6.20-6.70						0.20	
				,	1									10 10
				- 3			D 22 7.00							- 1
					}								SPT(S) N=27	
			4 4 1		1		D 23 7.20-7.65						(4,5:6,7,7,7) 7.20	
			l colo	(6.10)	}		B 24 7.20-7.70							3
			<u> </u>		1									
				+			D 25 8.00							-
			1 1] :	1								SPT(S) N=28 (5,5:7,6,7,8)	
							D 26 8.20-8.65 B 27 8.20-8.70						8.20	
				;	1		B 27 820-8.70							
				:	1		D 20 0 00							
				- 5	1		D 28 9.00						egrict st oc	7 8 8
				:	}								SPT(S) N=28 (4,5:5,7,8,8)	
			1 1	-	1		D 29 9.20-9.65 B 30 9.20-9.70						9.20	
			7	:	1									
			7 7	'			D 31 10.00	\bot						
AGS Notes.	All depth in metres, all diameters in millimetre See header sheet for details of boring, progress		water.									<u> </u>		
	For details of abbreviations, see key.											SO.	I ADGIDE	DIVE
FINAL Form No. SIEXPHOLEI	Print date and time 12/09/			law n ·	LO		ked by David Howa	ard					L engined	
II-ORD NO SILYDUMI CI	LA Recub Douleian No. 205			regula Data	202703/77	1 H						I Part ≏	of the Rachy Soletan	cno Cimum

Project Name	Cambridge Waste Water Treatm	nent Plant	Relocat	tion									Т	Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley							Explo	rator	y Ho	le Lo	og	В	H_STW_0)22B
Employer	Barhale Limited													Sheet 2 of 3	3
Ground Level	+8.51mOD	Coordinate	ıs	549907.	72E, 2607	68.091	v		Gri	d	O:	SGB			
Hole Type	IP+CP	Inclination		90° from	honzonta	ı									
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	ROD	Ħ	In Situ Test Details	Install- ation
	s: Very stiff grey slightly gravelly CLAY with lov avel is subangular to subrounded fine to coars		1												
very weak medium subangular of very	density grey calcareous siltstone. Cobbles are weak medium density calcareous siltstone. ELBURY CHALK FORMATION]			-				2 10.70-11.15 3 10.70-11.20						SPT(S) N=31 (4,5-6,8,9,8) 10.70	
Gravel is subangula (WMCK) [CAMBRID	slightly sandy slightly gravelly CLAY Sand is fi ar to subrounded fine to coarse of coprolite. OGE GREENSAND MEMBER!			11.30 (0.30) 11.60	-2.79 -3.09			5 11.30 5 11.60						K 11.30 - 11.70 K 11.30 - 11.70	
	hinly laminated dark grey CLAY with rare nodu siftstone. Fissures are planar smooth and MATION]	les						i 12.20-12.65						SPT(S) N=32 (5,6:7,8,8,9) 12.20	
				(3.60)			1 B 37	12.20-12.70						-	
				-				13.70-14.15 13.70-14.20						SPT(S) N=33 (6,7:7,8,9,9) 13.70	
	hinly laminated dark grey CLAY. Fissures are paced planar and smooth Rare siltstone nodu MATION]	eles		15.20	-6.69) 15.20-15.65 . 15.20-15.70						SPT(S) N=31 (5,6:7,7,8,9) 15.20	
								! 16.70-17.15 ! 16.70-17.20						SPT(S) N=34 (5,7:7,8,9,10) 16:70	
				-				i 18.20-18.65 i 18.20-18.70						SPT(S) N=39 (6,7:8,9,10,12) 18:20	
								5 19.70-20.15 1970-20.20						SPT(S) N=50 (6,8:10,11,13,16) 19.70	
AGS Notes FINAL Form No SEXPHOLE	; All depth in metres, all diameters in milli See header sheet for details of boring, p For details of abbreviations, see key. Print date and time too ssue Revision N	rogress and 12/09/2022			Lo 2 02/03/20		ked b	y David Howar	d					L enginee	

	ter Treatment Plar											Hole ID	
Project No. TE8364 Engineer Mott MacDonald Beni	tlev					Explo	ratory	у Но	le Lc	g	В	H_STW_0	22B
Employer Barhale Limited												Sheet 3 of 3	3
Ground Level +8.51mOD	Coordinat			72E, 26076		I	Gric	t	OS	GB			
Hole Type IP+CP Description of Strata	Inclinatio Weathering		Depth (Thick-	Datum Level	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>"</u>	In Situ Test Details	Install- ation
Very stiff fissured thinly laminated dark grey CLAY. Fis extremely closely spaced planar and smooth. Rare sit (<6mm x <10mm). (GLT) [GAULT FORMATION]	ssures are		ness)	Level	Wat	Details D 48 21.20-21.65 B 49 21.20-21.70 D 50 22.70-23.14 B 51 22.70-23.20	Dia	TCR. FCR. Rec	SCE			SPT(S) 50/295mm- (7,8:10,12,14,14/7 0mm) 21.20 SPT(S) 50/290mm- (6,7:10,11,14,15/6 5mm) 22.70 SPT(S) 50/280mm- (8,9:11,14,16,9/55	
			(14.80) -			D 52 24.20-24.63 B 53 24.20-24.70 D 54 25.70-26.13 B 55 25.70-26.20						mm) 24.20	
						D 56 27.20-27.63 B 57 27.20-27.70						SPT(S) 52/275mm- (10,12:13,15,18,6/ 50mm) 27.20	
from 28.70m to 30.00m fissures are very closely spaced						D 58 28.70-29.12 B 59 28.70-29.20						SPT(S) 50/265 mm (10,13:16,18,16,0/- 40mm) 28.70	
Complete at 30.00m. Termination Reason Scheduled Dep h	n: Achieved		30.00	21.49		-D-60-30.00							
	ı	1	1	1			1 1		1			1	1

Form No. SIEXPHOLELOG

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Project	Name	Cam	nbridge	Waste	Wa	iter Tre	atment	Plant F	Reloca	tion				_					Н	ole ID	
Project	No	TE8	364											Exp	olorato	ry Hole	Log		RH S	TW_	023
Engine			t MacD	onald	Ben	ntley													<i>.</i>		020
Employ			nale Lim	nited																et 1 of :	1
Ground L Date Star			66mOD 7/2021						Coordin Date Co			.9686.60E ./07/2021		70N			Grid	nation	OSGB	m horizor	otal
Top	Base		Date Tir	ne Star	t D	ate Tim	ne End F						ant Use	d Shori	ng Used F	it Stability			Remark		ıtaı
0.00 1.20	1.20 15.30	IP RC		021 12:30	2	20/07/202 21/07/202	1 14:30	CB CB	DT MM	N/ Geobo	A N	A Insul	ated hand to	ools N	lone	Stable					
	1		Depth	Depth		GRESS						_		Depth	Depth	WATER Depth	STRIKE Water	S Time			
Date 20/07/20		Depth 2.20	Casing 0.00	Water 2.00	r	nd of Shift		Rema	arks			Date	Time	Strike	Casing		Rose To		4	Remark	KS
21/07/20:	21 07:30	2.20 15.30	0.00	1.80 2.60	St	tart of Shift rilling Com	t														
21/07/20 22/07/20	21 17:30 21 07:30	15.30 15.30	3.00 3.00	2.60 2.35	Er St	nd of Shift tart of Shift	t														
22/07/20	21 10:30	0.00	0.00	2.35	In	nstallation	Complete, B	lorehole Co	mplete												
			С	ABLE PE	RCL	ISSION	DETAILS								-1	SPT D	ETAILS				
Depth Top	Depth Base	Tim	e Start	Duratio	on	Tool	I		Rema	arks		Depth Top	Test Type		Reporte	d Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
													//								
				DOTAD	V FI	.USH DE	TAILC														
Depth	Depth	Eliz	sh Tuno	Flus		Flush	IAILS		Remark			_									
Top 1.20	Base 4.80		sh Type R/MIST	Retu 90		Colour White		'	Kemark	.5											
4.80	15.30	Al	R/MIST	90		Grey															
HOLE DI	ΔΜΕΤΕΡ	CASING	DIAMETE	-D			DYNAM	IC SAM	DLING												
Depth	Diameter	Depth		er Depth	Ton	Depth	Diamete	1	tion	Sample											
Base 15.30	146	3.00	150	СПВСРИП	юр	Base	Diamete	Duit	CIOII F	Recovery	Reference	e									
		15.30	146																		
	INSTA	I ALLATIOI	N DETAIL	S			PII	PE CONS	STRUCT	ION					DF	PTH RELA	TED REN	1ARKS			
Distance			sponseRe	esponse	Pipe		Тор	Base	Diame		ре Туре	Depth		1				marks			
14.50	S1	SP	Top 2.00	Base 14.50	Ref Pipe 1	1 Pipe 1	0.00	2.00	50	PLAIN	V	Тор	Base								
						Pipe 1 Pipe 1	2.00 14.00	14.00 14.50	50 50	SLOT PLAII											
				BAC	KFII	LL DETA	ILS									LOCATIO	N DETAI	LS			
Depth	Depth		Descri		16			Rer	marks								narks	-			
-0.50	0.00	Upstandi	ng cover																		
0.00 0.50 0.80	0.50 0.80 2.00	Concrete Gravel ba Bentonite	ckfill																		
2.00 14.50	14.50 15.30	Gravel ba Bentonite	ckfill																		
	Note	es: All de	pth in me	tres, all c	diam	eters in	millimetr	es.				_									
AGS	3		ader sheetalls adder				g, progres	ss and wa	ater.												
FINAL	-		a.				ne 12/09	9/2022 1	3:56			Log ched	cked by [David Ho	ward			SOI	L end	sinee	RING
Form No. 9	SIEXPHOL	EHDR					n No. 2.02			Issue Da	te 22/06/		,, .					Part	of the Back	ny Soletanch	e Group

Project Name	Cambridge Waste Water Treatment	Plant	t Relocat	tion										Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	le Lo	og		3H_STW_	023
Eng <mark>i</mark> neer	Mott MacDonald Bentley														_
Employer	Barhale Limited													Sheet 1 of	2
Ground Level		rdinate			60E, 2605		N		Gri	id	O:	SGB			
Hole Type	IP+RC Incli	nation	1	90° from	honzonta	т.				۱ ۵		1		1	1
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Aaterstrike		Sampling	I.a.	TCR/Sample Recovery %	SCR/Blows	õ	<u>.</u>	In Situ Test Details	Instali ation
TOPSOIL: Brown ora	rvelly slightly clayey fine to coarse SAND.	3	X//XX//			≤	D1	Details 0.05	Dia.	일존	Ø1				
(TOP) [TOPSOIL]				(0.50)	}		В3	0.05-0.30 2 0.20							
Madani'ah hanna	CANID AND AND AND AND AND AND AND AND AND AN			0.50	10.16			0.50							
	evelly slightly silty fine to coarse SAND with low vel is subangular to subrounded fine to coarse of		xx x		1			0.60 0.50-0.80							
flint. Cobbles are su (SUPD) [SUPERFICIAL	bangular to subrounded of flint. L DEPOSITSI		, Y x	(0.70)				1.00							
(-1, (-1			× ×	1.20	9.46			1.00						2	3
	K composed of light greyish brown stained orange Y. Gravel is angular to subangular coarse of flint.		'	1	3.40		"	1.20							3
(CIRIA Grade Dm)	LBURY CHALK FORMATION]			(0.50)	1									13	1
	K composed of fissured light greyish white			1.70	8.96		C 9	1.20-2.20	102	100					
	h brown staining calcareous CLAY. Fissures are 50 oth closely spaced infilled (<1mm) with fine weak			(0.50)										15	
gravel of calcareous	sitstone. (CIRIA Grade Dm) LBURY CHALK FORMATION]	Æ		2.20	8.46				\vdash						1. 1
Structureless CHALL	K composed of light greyish white mottled light	Grade D	1 4										NA		
	CLAY. (CIRIA Grade Dm) LBURY CHALK FORMATION]	6	1 1		}									15	
((1.45)	1		61	2.20-3.65	102	100					
				(L43)			"	2.20-3.03	102	100				33	7 : H
			1 1	}	1										# F
					1									38	1
	medium to high density yellowish white locally			3.65	7.01				\vdash					1	1 4
	LK composed of calcareous MUDSTONE. to 30 degrees medium to widely spaced planar				1										3
smooth. (CIRIA Grad	le - Unable to determine) LBURY CHALK FORMATION]			(1.15)				L 3.65-4.80	102	100	91	83			
from 8.95m to 4.15	m 3 No. randomly oriented closely spaced incipient		9	(113)			"	3.03-1.80	""	100	31	"			
	m non intact core (recovered as subangular fine to													35	T.F.
Coarse gravel sized	fragments) density light greyish white CHALK composed of	-	See Luci	4.80	5.86				\vdash				NI		
calcareous MUDSTO	ONE. (CIRIA Grade - Unable to determine)		1	-									670	5	
(WMCK) (WEST ME	LBURY CHALK FORMATION]		E E										1200		
				(7>											
			1 1	(1.50)	1		[61	2 4.80-6.30	102	100	97	97			1 F
			<u> </u>	-	1										
at 8.00m 1 No. disc	ontinuity 5 degrees planar rough clean			1											1.11
from 6.24m to 6.29 to coarse gravel size	m recovered as non intact core (clayey subangular fine	\vdash	7.1	6.30	4.36				\vdash					1	
Very weak medium	density yellowish brown mottled orange brown	82		1	}								NI	8	1
	f calcareous MUDSTONE. Discontinuities 1) 5 to to medium spaced undulating rough stained	Grade		(0.75)	1								110 340		-
orangish brown. (CII	RIA Grade 83) LBURY CHALK FORMATION]	Ľ		7.05	3.61		 -1	3 6.30-7.80	102	100	87	74		- 3	1 F
from 8 95m to 7 00	m recovered as non intact core (angular to subangular	I		7.35	3.31	1	["	. UC.1-Law	""	TAN	"	'-		1	10
	ity light greyish white CHALK composed of		T	1	1	1									
	NE with very closely spaced thin dark grey lenses intinuities 1) 20 to 40 degrees medium spaced		1 1	(1.25)] 出
undulating rough. (0		۱			1				\vdash						
framony tages into		Grade B2	1 1	-									NI 310		† A
Mogh high done?	inht amaich white CHALK coranges of as	Š	2 1	8.30	2.36	1							480		; H
calcareous SILTSTO	ight greyish white CHALK composed of NE with very closely spaced thin dark grey lenses				1		C 14	4 7.80-9.30	102	100	88	81		5)	1 H
of mudstone. Discor undulating rough. (0	ntinuities 1) 20 to 40 degrees medium spaced CIRIA Grade 82)			(0.85)	1						""	"			} 出
(WMCK) [WEST ME	LBURY CHALK FORMATION] rn 2 No. discontinuities 30 to 40 degrees closely			1 _	}										<u> </u>
spaced planar roug	h with clay and gravel infill (<2mm) and 1 No.	Щ		9.15	1.51										
Very weak to weak i	90 degrees undulating smooth medium to high density grey CHALK composed of		e 45	1	1				\vdash						H
	NE. Discontinuities 1) 40 to 60 degrees closely to nar and undulating smooth. (CIRIA Grade B3)			1	‡)8	† ‡
	LBURY CHALK FORMATION]				1										
				1	1	_	EW	1 10.00	+						
Notes	All depth in metres, all diameters in millimetre	s											_		
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.	s and						P					SOI	L engine	SBIDA
FINAL Form No. SIEXPHOLEI	Print date and time 12/09 OG Issue Revision No. 205		13:56	Issue Date			ked t	y David Howa	rd					f the Rachy Soletan	

Project Name	Cambridge Waste Water Treatme	nt Pla <mark>n</mark> t	: Relocat	tion										Hole ID	
,	·							Explo	rato	y Ho	le Lo	ıg .			
Project No.	TE8364												E	BH_STW_	023
Eng <mark>in</mark> eer	Mott MacDonald Bentley														_
Employer Ground Level	Barhale Limited +10.66mOD	Coordinate		5408084	50E, 2605	01 701			Gri	н	00	GB		Sheet 2 of 2	2
Hole Type		nclination			horizonta		V		GII	u	Os	436			
того туро	11 110		<u> </u>		TIOT ILLUM		Г			€ %	100				\Box
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum Level	Waterstrie		Sampling		TCR/Sample Recovery %	R/Blows	RdD	<u></u>	In Situ Test Details	Install- ation
		Wea	n are ra	ness)	Level	AA tea		Details	Dia.	75 g	ន			Details	alkin
	nedium to high density grey CHALK composed IE. Discontinuities 1)40 to 60 degrees closely to		L. L.	4			C 1	5 9.30-10.80							
medium spaced plan	nar and undulating smooth. (CIRIA Grade B3) BURY CHALK FORMATION]			4 :					102	100	72	72			
from 9 90m to 9,95m	n 1 No discontinuity 50 degrees infilled with grey	8	1	(2.14)									NI 180		
	iðm 1 No. inciplent discontinuity 65 degrees planar	Grade											360		-
	iOm 1 No. incipient discontinuity 70 degrees		1	-										1.5	\mathbb{H}
undulating smooth from 10 80m to 11.0			F.	11.29	-0.63							-			₩.
composed of calcare	reak low to medium density grey CHALK sous SILTSTONE. Discontinuities 1) 10 to 30		1 2				.,	6 10. 8 0-12.30	102	100	52	47	NI	139	
degrees closely space B3)	ed planar and undulating smooth. (CIRIA Grade	•		(0.71)	1			0 10:00-12:50	102	100	J.	"	90 150		
(WMCK) [WEST MEL	BURY CHALK FORMATION] '5m 1 No discontinuity 70 to 90 degrees undulating	œ	4	12.00	-134								130	15	
rough and smooth g		Grade 83	24	12.00											
subangular fine to o	oarse gravel sized fragments) nedium to high density grey CHALK composed		10 1	(0.90)									NI 80		
calcareous SILTSTON	IE locally with dark grey thin laminations of	o.	1.10	gerany	1								300	-	\Box
	uities 1) 10 to 40 degrees closely to medium th clean: 2) 50 to 70 degrees closely to medium		1. 1	12.90	12767										-
spaced undulating a Grade B3)	nd stepped rough with gravel infill (<2mm). (Cli	RIA	1	12.50	-224		C 1	7 12.30-13.80	102	100	75	65] -	
(WMCK) WEST MEL	BURY CHALK FORMATION] 18mm recovered as non intact core (subangular fine to		1	4 :											
coerse gravel sized f				(1.35)	1								NI 190	14	
SILTSTONE (CIRIA G	rade B3)	Grade .	1	(12.33)									300		
from 12.95m to 12.9	.BURY CHALK FORMATION] 17m 1 No. discontinuity 10 degrees planar smooth		, 1	4											
locally with gravelly			. "	14.3	250									200	
spaced planar rough				14.25	-3.59										
clean	1m 1 No discontinuity 20 degrees stepped rough	pege	F===	Date: 1.000	1		C 1	B 13.80-1530	102	98	89	89			
grave sized fragmer		_ _ Unweathered		(1.05)									NA		
	ly laminated dark greenish grey CLAY. GE GREENSAND MEMBER]	1		=										=	
	medium and coarse gravel sized fragments of		=	15.30	-4.64				╙						
Complete at 1	5.30m. Termination Reason: Achieved Scheduled Dep h	_		-										:	1
	Scheduled Dep II]
					1										1
]
															:
				1											
]
				:	1										1
				-										5=	
]
				-											
				:											1
															1
				1 5										2.5	
				:											
				-											1
				:					1]
			+	'					\vdash						
Notes	All depth in metres, all diameters in millim	etres.	1	<u> </u>	<u> </u>		<u> </u>		_		<u> </u>		1	44	
AGS	See header sheet for details of boring, pro-		water.												
	For details of abbreviations, see key.	ma			141								SOL	L enginee	Blue
FINAL Form No. SIEXPHOLEI	Print date and time 12 DG Issue Revision No.		13:56	Intrin Date	Lo 02/03/20		Ked I	by David Howar	d					f the Rachy Soletano	

Project	Name	Can	nbridge '	Waste '	Wate	er Trea	atment	Plant l	Reloca	ation										H	lole ID	
D	NI-	TE8	264												Exp	lorato	ory Hole	Log		ΩL C	STW_	Λ2 / ₄
Project Engine			504 tt MacD	onald E	3ent	lev													-)I I_3) I V V	024
Employ			nale Lim			,														She	et 1 of	1
Ground L			9mOD						Coordi			9995.10		733.6	0N			Grid		OSGB		
Date Star Top	ted Base	30/0 Type	7/2021 Date Tin	no Start	Da	to Tim	e End R	lia Cross		omplete		/08/202 Bi+ DI	1 lant L	Icod	Chorin	a Head	Pit Stability		nation	90° f o Remarl	m horizoi	ntal
0.00	1.20	IP	30/07/20			/07/2021		Colin	мм	NA NA				and tool	- 1	g useu one	Stable			Kelliali	(5	
1.20	15.00	RC	30/07/20	21 11:00	03	/08/2021	l 17:00	Howard Colin Howard	ММ	Geobo	re S PC	D S	oilmec	SM6								
								rioward														
				P	ROG	iRESS											WATER	 STRIKE	S			
Date -	Time	Depth	Depth	Depth				Rema	arks			Date	e Tim		Depth	Deptl	h Depth	Water	Time		Remarl	KS
30/07/202	21 12:00	2.80	0.00	Water	End	of Shift						03/08/2			Strike 6.50	Casin 2.70		Rose To 2.70	Elapsed 20	Fast		
02/08/202	21 17:00	2.80 4.95	0.00	2.60 4.30	End	t of Shift of Shift																
03/08/202	21 15:30	4.95 15.00 0.00	0.00 2.70 0.00	4.00 2.70	Dril	t of Shift ling Com		arabala Ca	mulata													
03/08/202	21 17:00	0.00	0.00	2.70	inst	allation	ompiete, Bi	orenoie Co	mpiete													
			CA	ABLE PE	RCUS	SION	DETAILS										SPT D	ETAILS				
Depth	Depth	Tim	e Start	Duratio	n	Tool			Rem	arks		Depth		est		Report	ed Result		Hammer Serial Number	Energy	Depth	Depth
Тор	Base				+							Тор	Ту	/pe					Number	Ratio	Casing	Water
		1		ROTAR	/ FLU	ISH DE	TAILS															
Depth Top	Depth Base	Flu	sh Type	Flush Retur		Flush Colour			Remarl	ks												
1.20	2.80 4.80		IR/MIST IR/MIST	100 100		Brown Grey																
4.80 4.95	4.95 15.00	A	IR/MIST IR/MIST	0 100	N	o return Grey																
HOLF DI	AMFTFR	CASINO	3 DIAMETE	R			DYNAM	IC SAM	PLING	<u> </u>												
Depth	Diameter	Depth	,	er Depth 1		Depth	Diameter		tion	Sample	Run											
Base 15.00	146	2.70	150	Бери	юр	Base	Diameter	Duit	idon	Recovery	Referenc	e										
		l _R	N DETAILS		Pipe	Pipe		PE CON:	1	1		Depth	ים די	epth	1	DI	EPTH RELAT					
Distance	ID T	ype ''	Тор	Base	Ref	Ref	Top 0.00	Base 1.50	Diame		ре Туре	Тор		Base				Re	marks			
11.50	51	SP	1.50	11.50 F	Pipe 1	Pipe 1 Pipe 1	1.50	11.00	50 50													
				_						_	_	1		_								
				BAC	KFILL	DETAI	LS										LOCATIO	N DETAI	LS			
Depth Top	Depth Base		Descrip	otion				Rei	marks								Ren	narks				
-0.50 0.00	0.00 0.50	Upstandi Concrete																				
0.50 0.70	0.70 1.50	Gravel ba Bentonit	e																			
1.50 11.50	11.50 15.00	Gravel ba Bentonit																				
	Note	s: All de	pth in met	tres, all d	iame	ters in	millimetr	es.				_1										
AGS		See he	eader shee tails of ab	t for det	ails o	f boring			ater.													
FINAL		i oi ue	rans of dD				ne 12/09	1/2022 1	3.56			Log che	cked l	hy Da	avid Hov	vard			soı	L en	ginee	RING
Form No. S	SIEXPHOLE	HDR					No. 2.02	1	0	Issue Da	te 22/06/2		2.10U I	ص رد		.aru			Part	of the Bac	hy Soletanch	e Group

Project Name	Cambridge Waste Water Treatme	nt Plar	nt Reloca	tion									Hole ID	
Project No.	TE8364							Explorato	ry Ho	ole Lo	og	[3H_STW_	024
Eng <mark>inee</mark> r	Mott MacDonald Bentley											"	оп <u>_</u> ЭТVV_	<u>UZ4</u>
Employer	Barhale Limited												Sheet 1 of	2
Ground Level	+7.99mOD C	oordina	tes	549995	10E, 2607	33.60	V .	G	rid	OS	SGB			
Hole Type	IP+RC Ir	clinatio	'n	90° from	honzonta	al								
	Deposintian of Starts	Weathering	lanond	Depth (Thick-	Datum	strie	s	ampling	TCR/Sample Recovery %	EW0	RGD	ш	In Situ Test	instali-
	Description of Strata	Weat	Legend	ness)	Level	Abterstrie	De De	stails Dia	CP/S	SCR/Blow	2	=	Details	ation
	m slightly sandy slightly gravelly CLAY. Sand is fir			(0.05)	-	Ė	D1 0.05		_					
quartz. Occasional r	angular to subrounded fine to coarse of flint and coulets.			(0.35) 0.35	7.64		ES 2 0.2 B 3 0.10							
\(TOP)[TOPSOIL] Stiff brown slightly (gravelly sandy CLAY. Sand is fine to coarse. Grave	-/	-		}		D 4 0.40 ES 5 0.5							9 9
is subangular to sub (SUPD) [SUPERFICIA	xounded fine to coarse of mudstone and flint.			(0.85)	‡		B 6 0.40							
	-		77-	-]		B9 0.80							-
	K composed of firm yellowish brown slightly		7.5	1.20	6.79		D7 1.00 ES8 1.1						1	:
	lly calcareous CLAY Sand is fine. Gravel is angula o coarse of white flint. (CIRIA Grade Dm)	r	1 1		1								13	44-
(WMCK) [WEST ME	LBURY CHALK FORMATION]		1 10	(1.00)]		C 10 1.2	0-2.20 102	100					- F
		E											15	
Structureless CHALL	K composed of firm to stiff greenish greyish brow	u Grade Dm		2.20	5.79							NA		
sandy locally gravel	ly calcareous CLAY. Sand is fine. Gravel is angular o coarse of white fint. (CIRIA Grade Dm)		7. 35. 3		}		C 11 22	0-2.80 102	100				12	
	LBURY CHALK FORMATION]			(80,0)	1	모							12	
			1		1								-	
			1/1/	3.1B	4.81						a-			
(WMCK) [WEST ME	re loss. White silty CLAY (Driller's description) LBURY CHALK FORMATION]		1. 1	(0.37)	‡		C 12 2.8	0-3.80 102	63			NR		
Structureless CHALI	m grey strongly stained orange K composed of firm to stiff fissured light greenish	· 8	E	3.55	4.44						-		-	
	occasional orangish brown staining calcareous redominantly 0 to 20 degrees extremely closely	<u> </u>	- 1	3.BO 3.92	4.19 4.07							NA		
	SMOOTH. (CIRIA Grade Dm) LBURY CHALK FORMATION]	Į,	No. 1	(0.38)	4.01		C 13 3.8	0-4.30 102	24			NR	- 50	
Recovered as: Struct	tureless CHALK composed of soft light greyish LAY. (CIRIA Grade - unable to determine)	7	1 1	4.30	3.69								-	
(WMCK) [WEST ME	LBURY CHALK FORMATION]		1 18	(0.50)	}		C 14 4.3	0-4.80 102	100				18	
(WMCK) (WEST ME	re loss. White silty CLAY. (Driller's description) LBURY CHALK FORMATION]	_ —	T. F.	4.80	3.19			102	100					
greyish brown calca	tureless CHALK composed of very soft light reous silty CLAY. (Drilling disturbed) (CIRIA Grade			8 0]		C 15 4.8	0-4.95	100			NA	5	
- unable to determine (WMCK) [WEST ME	ne) LBURY CHALK FORMATION]	Grade	l l	(0.70)]		C 16 4.9	5-5.45 102	88					
	K composed of firm to stiff fissured light greyish nal orangish brown staining calcareous CLAY.		1 1	5.50	2.49	ll					1	NI	9	
Fissures are random	ily orientated extremely closely to very closely indulating smooth. (CIRIA Grade Dm)	1	1	(0.45)]		C 17 5.4	5-5.95 102	100	60	44	90		
(WMCK) [WEST ME	LBURY CHALK FORMATION]	- []		5.95	2.04				+			250	>	
Very weak medium	m assumed zone of core loss density light grey locally stained orangish brown	-1		(0.55)	1							NI		
degrees medium sp	f calcareous SILTSTONE, Discontinuities: 1) 85 aced stepped and undulating rough with gravel	1		6.50	1.49	_					84	90	8 8	
	d orangish brown. (Probably CIRIA Grade 82/3) LBURY CHALK FORMATION]	ı	Pil				C 18 5.9	5-7.30 102	100	52	49	NI		
from 5.60m to 5.88	m 1 No. discontinuity 50 degrees stepped rough m 1 No. discontinuity 35 to 40 degrees planar tight	A		(O.BG)	3							300	3	
	m with occasional subhorizontal lenses («Smm) of	1	P		1							400		
dark greyish brown from 5 80m to 5 95 fine to coarse grave	m recovered as non intact core (angular to subangular		2.1	7.30	0.69								1	1.1
Very weak low to m	edium density light grey and grey CHALK	1	I vilia	,]								17	
intact core (very gra	eous SILTSTONE. Generally recovered as non welly silty clay). (CIRIA Grade - unable to		P. P.	i .	1									
	LBURY CHALK FORMATION]	3rade 82/3	J. To	(1.70)	-		C 19 7.3	0-8.80 102	85	75	67	40 200	5	
	m 1 No discontinuity 10 degrees undulating rough	E S	Jh 15.]							450		
	m 1 No discontinuity 80 to 90 degrees undulating	1	1 1		1								39	
	medium to high density light grey and grey	-1	P.T.	i										
determine).	f calcareous SILTSTONE. (CIRIA Grade - unable to	` ├─	P	9.00	1.01						8		2	1:1:
from 6.90m to 7.00	LBURY CHALK FORMATION] m recovered as non intact core (angular to subangular	83/4	Part I	(0.76)	†					_	_	NI 60		
	m recovered as non intact core (subangular fine to	Grade B3/4	1 1	(0.76)]	1	C 20 8.8	0-10.20	100	71	44	90 90	78	
Very weak to weak i	fragments) (Orilling Induced) medium to high density light grey mottled grey	┙┝	1	9.76	-1.77	1							-	1 1
CHALK composed o	f calcareous SILTSTONE Discontinuities 1) 0 to 1	U	0.1	1	1	-	CW 1 10	.00			+		-	<u>, </u>
						İ								
						1								
Notes	All depth in metres, all diameters in millime	tres.					<u> </u>	1						1
AGS	See header sheet for details of boring, prog		water.											
EINAL	For details of abbreviations, see key.	/no /no-	7 1255		1	n a	bod	ndd I Income				SOI	L engine	RING
FINAL	Print date and time 12/	U9/202	∠ 13:36	dialia p	LO		кешту О	avid Howard						

Project Name	Cambridge Waste Water Treatme	nt Plant	Relocat	ion										Hole ID	
	TT000/							Exploi	ratoi	у Но	le Lo	g	_	NI CTIAL	00.7
Project No. Eng <mark>i</mark> neer	TE8364 Mott MacDonald Bentley												5	BH_STW_	024
Employer	Barhale Limited													Sheet 2 of	2
Ground Level		oordinate	!S	549995.1	LOE, 2607	33.60	1		Gri	d	OS	GB			
Hole Type	IP+RC II	clination	1:	90° from	honzonta	1	_			-				T	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	_	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	ROD	<u>in</u>	In Situ Test Details	Install- ation
	nedium to high density light grey mottled grey f calcareous SILTSTONE. Discontinuities 1) 0 to 1	0 0	77												
degrees closely to m clay (<1mm), (CIRIA ((WMCK) [WEST MEL	edium spaced planar rough locally infilled with	Grade B2/3		(1.04)									90 300	6	
spaced from 8.48m to 8.55m («3mm) from 8.58m to 8.80m	n 1 No. discontinuity 45 degrees infilled with sity clay in assumed zone of core loss	F	0.50	10.80	-2.81 -2.96		C 21	1 10.20-11.50	102	100	75	65		6.	
	edium density light grey and grey CHALK yous SILTSTONE. Discontinuities 1) randomly														
smooth and infilled v soft clay (<3mm). (Cl (WMCK) [WEST MEL	ely to closely spaced planar and undulating with fine to coarse gravel sized fragments and RIA Grade B3/4). BURY CHALK FORMATION] In recovered as non intact core (subangular fine to			(2.20)										19	
coerse gravel sized f Very weak medium o calcareous SILTSTON medium spaced plan		1					C 22	2 11.50-13.15	102	100					
from 10.60m to 10.8 subrounded fine to o from 10.77m to 10.8	BURY CHALK FORMATION] Orn glauconitic with frequent subangular to coarse gravel sized fragments of black coprolite our with occasional subangular coarse gravel sized	Unweathered		13.15	-5.16								NA		
subangular to subrou bearing nodule (<10)	ery gravelly glauconitic fine SAND. Gravel is unded fine to coarse of coprolite and 1 No. pyrit	11			o-recitife:			3 13.15-14.45	910	per					
Firm to stiff laminate pyrite and occasiona (GLT) [GAULT FORM/at 11.76m 1 No. fissi	ed dark greenish grey CLAY with rare specks of Il lenticular pockets of fine glauconitic sand.			(1.RS)			L 2:	3 13.13-14.43	102	98				-	
planar smooth polisi from 12.11m to 12.1 from 12.25m to 12.2 (<1mm)				15.00	-7.01		C 24	4 14.45-15.00	102	91					
(GLT) [GAULT FORMA at 14 00m 1 No. fissi from 14.45m to 14.5	brownish grey CLAY.														
			1	Ľ.											
AGS	All depth in metres, all diameters in millime See header sheet for details of boring, prog For details of abbreviations, see key. Print date and time 12.	ress and			Lo	g chec	ked b	y David Howard	đ				SOI	L enginee	RING
Form No. SIEXPHOLEIC	DG Issue Revision No. 2	ΔE		hitue Date									P-4-	f the Rachy Soletans	L - C

Project	Name	Can	nbridge '	Waste V	Vater Tre	eatmen	t Plant	Reloca	tion									F	łole ID	
D : .	N.I.	TE8	267										Exp	lorato	ry Hole	Log		ры с	STW_	025
Project Engine			304 tt MacD	onald B	entlev													DI I_3) I V V	023
Employ			nale Lim		,													She	et 1 of	1
Ground L			3mOD					Coordin				, 261395	5.30N			Grio		OSGB		
Date Star Top	ted Base	26/0 Type	7/2021 Date Tin	no Start	Data Tir	no End	Dia Cross		mpleted F Barrel Type		07/2021	ant Use	d Shorin	o Head I	Pit Stability		ination	90° f c	m horizoi	ntal
0.00	1.20	IP	26/07/20		26/07/20		Colin	Logge	NA NA	NA		ited hand to	- 1	one	Stable			Keman	15	
1.20	15.05	RC	27/07/20	21 07:30	27/07/20	21 17:30	Howard Colin Howard	MV	Geobore S	PCD	Sc	ilmec SM8								
					ROGRESS										WATER					
Date ⁻		Depth	Casing	Depth Water			Rema	arks				Time	Depth Strike	Depth Casing		Water Rose T	o Elapse	d	Remark	ΚS
26/07/202 27/07/202	21 07:30	1.20 1.20	0.00	Dry 1.20	End of Shif Start of Shi	ft					27/07/2	021 10:45	5.00	2.70		2.40	20	Fast		
27/07/202	21 17:30	15.05	2.70	2.40	Installation	Complete,	Borehole Co	mplete												
				ARI E DED	CUSSION	DETAILS	:								SDT D	ETAILS				
Depth	Depth	Tim	ne Start	Duration	1		<u> </u>	Rema	arks		Depth	Test		Renort	ed Result	LIAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base		- Court	Burution	1 100			- North			Тор	Туре		переге	- Tesure		Number	Ratio	Casing	Water
Donth	Donth			ROTARY	FLUSH D	ETAILS														
Depth Top	Depth Base		sh Type	Returr	Colour			Remark	S											
1.20 2.70 8.65	2.70 8.65 15.05	A	IR/MIST IR/MIST IR/MIST	100 100 100	Brown White Grey															
0.05	15.05	A	IK/ IVII 3 I	100	diey															
	AMETER		DIAMETE	R		DYNAM	IIC SAIV		CI-	Desir										
Depth Base	Diameter	Depth Base	Diamete	er Depth T	Depth Base	Diamete	er Dura		Sample Recovery Re	Run ference										
15.05	146	2.70	150																	
	INSTA		N DETAILS		ipe Pipe	P	PE CON	STRUCT	ION		Depth	Depth	,	DE	PTH RELAT	ED REN	JARKS			
Distance		ype	Тор	Base I	Ref Ref	Тор	Base	Diame		Туре	Тор	Base				Re	marks			
9.00	S1	SP	2.00	9.00 Pi	pe 1 Pipe 1 Pipe 1	0.00 2.00	2.00 8.50	50 50	PLAIN SLOTTED											
Donth	Donth			BACK	FILL DETA	AILS									LOCATIO	N DETA	ILS			
Depth Top	Depth Base	II.	Descrip	otion			Re	marks							Ren	narks				
-0.50 0.00 0.50	0.00 0.50 0.60	Concrete Gravel ba																		
0.50 0.60 2.00	2.00 9.00	Bentonit	e																	
9.00	15.05	Bentonit																		
<u> </u>																				
AGS			pth in met eader shee					ater.												
AUN	4		tails of ab	breviatior	ıs see key.															NOIS C
FINAL Form No. 9	SIEXPH∩I F	HDR			date and ti				Issue Date 2			ked by I	David Hov	ward					hy Soletanch	
									Dute 2								ı ra	unc Dat	,	up



Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rato	у Но	le Lo	9		BH_STW_	025
Eng <mark>inee</mark> r	Mott MacDonald Bentley												-	эп <u>_</u> эт vv_	_023
Employer	Barhale Limited													Sheet 1 of	2
Ground Level		dinate	:	549843	80E, 2613	95.30	N		Gri	d	OS	GB			
Hole Type	IP+RC Inclin	nation		90° from	honzonta	al									
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	SQ:	ш.	In Situ Test	Install-
	Description of Strata	Weat	Logeria	ness)	Level	\$ \$	Н	Details	Dia	CPS Second	2	2	=	Details	ation
TOPSOIL: Dark brow	m sightly sandy slightly gravelly CLAY. Sand is fine	_	WARKEN AND THE PARTY OF THE PAR			 -	D1	0.10-0.15		_ =	-				200
to coarse Gravel is a (TOP) [TOPSOIL]	angular to subangular fine to coarse of flint.			(0.35) 0.35	6.03			0.20 -0.25 0.20 -0.25							
Stiff brown slightly s	sandy slightly gravelly CLAY. Gravel is subangular			(0.30)	0.00		B 4	0.25-0.35							- C
(SUPD) SUPERFICIA		l		0.65	5.78			0.50- 0.55 6 0.50- 0.55							
Stiff light grey mottl medium.	ed brown slightly sandy CLAY Sand is fine to			(0.55)			В7	0.55-0.65							
(SUPD) SUPERFICIA	L DEPOSITS]			1.20	5.23			1.00-1.10 1.00-1.10							3
Orangish brown clay (SUPD) ISUPERFICIA					3.24	İ		0 1.10-1.20							
	m recovered as soft sandy clay (Drilling induced)			(0.55)											
Structureless CHALL	Composed of light greyish brown gravelly	_		1.75	4.68		 C1	1 1.20 -2.20	102	95			NA		
calcareous CLAY. Gra	avel is angular to subangular fine to coarse of very	Grade Dm		(0.58)			"	1 110-1.20							
	rty chalk. (CIRIA Grade Dm) LBURY CHALK FORMATION]	Grad	I I	(0.30)	1										
	density light greyish brown CHALK composed of	<u> </u>	0.00	2.33	410	22	61	2 2.20-2.70	102	100	74	74		1	1.14.
	NE. Discontinuities 1) 5 to 15 degrees closely to nar and undulating smooth locally stained				1		"				''	'			1:1:
orangish brown. (CII	RIA Grade B3)		T T		1	ll									1.4
from 2.39m to 2.83s	LBURY CHALK FORMATION] m locally mottled and stained orangish brown		1 1	+											- }.;;∏`.;
	m recovered as non intact core (subangular medium to fragments) (Drilling induced)	Grade B3		(1.87)	-								NI 120		
		8			1		C 1	3 2.70-4.20	102	100	76	69	300	36	
	m recovered as non intact core (clayey subangular fine				1										
	m recovered as non intact core (subangular fine to				1										₽.F :
coarse gravel sized from 4 08m to 4 20m	fragments) m recovered as non intact core (subangular medium to			100		ll									12 H.
	obble sized fragments) Composed of light greyish brown mottled and	g G		4.20 (0.30)	2.23								NA	1	
stained orangish bro	own gravelly calcareous CLAY. Gravel is very weak	90	1 1	4.50	193	ll									<u>}</u> ** ±*:
Dm)	white to light greyish brown chalk. (CIRIA Grade		T];
	LBURY CHALK FORMATION] density light brownish grey CHALK composed of	23	100	á		-	C 1	4 4.20-5.70	102	100	70	70	NI	5	
calcareous SILTSTON	VE. Discontinuities 1) 10 to 20 degrees medium	98.5	<u> </u>	(1.20)	1								340 560		
spaced planar smoo B2)	th locally infilled with clay (<3mm). (CIRIA Grade	9	T I'm		1								300		
	LBURY CHALK FORMATION] m recovered as non intact core (very clayey subangular		111	:	1										13日。
fine to coarse grave	sized fragments)			5.70	0.73									1	1: H:
SILTSTONE Disconti	ight grey CHALK composed of calcareous inuities 1) 0 to 10 degrees closely to medium		TI	-											-1.°F::
spaced planar and u Grade B2/3)	indulating locally infilled with clay (<1mm). (CIRIA														
	LBURY CHALK FORMATION] In recovered as non intact core (subangular fine to			(1.65)	1		L . 1	5 5.70-7.35	102	98	90	76			
coarse gravel sized			Light	(1.00)	1		"	0 0.10-1.00	102	~		"			1.
			15 15		1										7 (1)
		ω		1		1];
	m recovered as non intact core (clayey subangular	Grade 82/3		7.35	-0.92								NI 210		
	ravel and couble sized fragments) (Orilling induced) density grey CHALK composed of calcareous	P. S				1							360	8	· :
	nuities 1) 0 to 20 degrees closely to medium the locally infilled with fine gravelly clay (<3mm).				1										
(CIRIA Grade B2/3)	, == , ,, ,						C 1	6 7.35-B.65	102	95	79	51			⋣
from 7.80m to 7.86e	LBURY CHALK FORMATION] m recovered as non intact core (subangular fine to		7	(1.65)	1	1	EW	1 8.00							
	m with very closely spaced thin beds of weak high				1	1									1. F:
from 8 50m to 8 85s	osed of calcareous siltstone m recovered as non intact core (weak medium density		1 1 1		-	1						Ш			
	rse angular fragments) (Orilling induced) m assumed zone of core loss		E T		}	1									
	m recovered as non intact core (angular fine to coarse	┼	2 1 4	9.00 -	-2.57	1								1	
Firm dark greenish (grey slightly sandy slightly gravelly CLAY Sand is gular to subrounded fine to coarse of black	\vdash		9.25	-2.82	1	C1	7 8.65-9.90	102	88	0	0			
coprolites	-		77		1	1								38	-
	GE GREENSAND MEMBER] ish grey sandy glauconitic CLAY.		1 T		1										
(GLÍ) [GAULT FORMA		L	177		<u> </u>	L	L		\vdash			Ш		<u> </u>	}
						1									
			L		L	L			1	L					
Notes.	All depth in metres, all diameters in millimetres														_
AGS	See header sheet for details of boring, progress For details of abbreviations, see key.	sand	water.												
FINAL	Print date and time 12/09	/2022	1356		lo.	o char	kerl l	y David Howar	rd				SOI	L engine	RING
FINAL Form No. SIEXPHOLEIS		LUZZ		Issue Date	LO 202/03/20		- NCU	or navia Howai	J					f the Rachy Soletan	

Interception of the part of th	Project Name	Cambridge Waste Water Treatm	ent Plar	t Reloca	tion									Hole ID	
Single-program Motor MacComand Berniery Invanier All - 4-40 (1922) Conditions - 4-40 (1922) C	Project No	TF8364						Explo	rator	у Но	le Lo	g		RH STW	025
The control of the co	Engineer												'		
Description of States Percentage of States By Repair (Price) Description of States Desc	Employer													Sheet 2 of	2
Description of Suitab Page								V	Grid	1	OS	GB			
No. 2016 To overy still instructed data (gray CLAT Finance or 8 to 20 degrees (classes) and to degree (form) and t					Depth (Thick-	Datum	_		Dia	CR/Sample Recovery %	SCR/Blows	RQD	Ŀ		
The control of the co								Details	Dia.	Т	0,				-
AGS See header sheet for details of boring, progress and water. For details of abbreviations, see key.	(GLT) [GAULT FORM. from 10.57m to 10.4 at 10.75m with occ. from 10.89m to 10.5 from 10.95m to 10.5 at 11.06m 1 No. fiss Stiff to very stiff fissa and 70 to 80 degree (GLT) [GAULT FORM. at 13.23m 1 No. frag at 13.56m 1 No. frag	ish grey sandy glauconitic CLAY. ATION] 55m 1 No. fissure 40 degrees planar smooth polished asional shell fragments 93m 1 No. fissure 15 degrees planar smooth polished 18m 1 No. fissure 15 degrees smooth 18m 1 No. fissure 15 degrees smooth 19m 1 No. fissure 15 degrees smooth 19m 1 No. fissure 15 degrees smooth 19m 1 No. fissure 15 degrees smooth 19m 1 No. fissure 15 degrees smooth 19m 1 No. fissure 15 degrees smooth 19m 1 No. fissure 15 degrees planar smooth 19m 1 No. fissure 15 degrees planar smooth 19m 1 No. fissure 15 degrees moo	es h.		(3.20) 12.45	-6.02	Mate	C 18 9.90-11.45 C 19 11.45-12.95 C 20 12.95-14.45	102	999	SCEVI			Details	ation
AGS See header sheet for details of boring, progress and water. For details of abbreviations, see key.															
	ACS	See header sheet for details of boring, pro For details of abbreviations, see key.	ogress and				ه داد	lod by Drift!	rd.				SOI	L enginee	RING

Log checked by David Howard

Issue Date 02/03/2018

Part of the Bachy Soletanche Group

FINAL

Form No. SIEXPHOLELOG

Print date and time 12/09/2022 13:56

Project	Name	Can	nbridge \	Waste \	Vater Tr	eatment	t Plant	Reloca	ntion									H	lole ID	
		TEO	201										E	plorat	ory Hole	Log		מון כ	·T\ \ /	വാട
Project Enginee		TE8	364 t MacDo	onald R	entlev												-	рп_3	TW_	026
Employ			nale Limi		criticy													She	et 1 of :	1
Ground L			3mOD					Coordi	nates	550	007.10E,	, 2611	65.50N			Grid		OSGB		
Date Star	ted		7/2021					Date C	ompleted	29/	07/2021	:				Incli	nation	90° f o	m horizor	ntal
Top 0.00	Base	Туре	Date Tim 28/07/202		Date Tir 28/07/20		Rig Crev	Logge AL	Barrel Typ	e Drill NA		ant Us		ring Used	Pit Stabilit Stable	у		Remark	(S	
1.20	15.00	RC	28/07/202		29/07/20		Howard Colin	MM	Geobore S			ilmec SI		None	Stable					
							Howard													
					ROGRESS	5										STRIKE				
Date 1		Depth	Depth Casing	Depth Water			Rem	arks			Date	Time	Depti Strike			Water Rose To	Time Elapsed	ı	Remark	KS
28/07/202 29/07/202	21 07:30	7.00 7.00	0.00 2.70	5.80 4.80	End of Shif Start of shi	ft														
29/07/202 29/07/202		15.00 0.00	2.70 0.00	2.50 2.50	Drilling Co Installation	mplete ı Complete, E	Borehole Co	mplete												
			CA	ABLE PER	CUSSION	I DETAILS	;								SPT I	DETAILS				
Depth	Depth	Tim	e Start	Duratio	n Too	ol		Rem	arks		Depth	Tes		Repor	ted Result	ŀ	Hammer Serial Number	Energy	Depth	Depth
Тор	Base										Тор	Тур	e				rumber	Ratio	Casing	Water
				ROTARY	FLUSH D	ETAILS														
Depth	Depth	Flu	sh Type	Flush	Flush			Remark	ks											
Top 1.20	Base 15.00		R/MIST	Returr 100	Colour Grey	•		reman												
HOLE DI	AMETER	CASING	DIAMETE	R		DYNAN	IIC SAIV	1PLING	ì											
Depth Base	Diameter	Depth Base	Diamete	er Depth To	Depth Base	Diamete	er Dura	ation	Sample Recovery Re	Run										
15.00	146	2.70	150		Dase		+		Recovery Re	rielelice										
		15.00	146																	
	INSTA		N DETAILS		in a Dina	PI	PE CON	STRUC1	TION		Darab	I p	-41-	D	EPTH RELA	TED REM	1ARKS			
Distance		ype	esponse Re Top		ipe Pipe Ref Ref	Тор	Base	Diame		Туре	Depth Top	De _l Ba				Rei	marks			
10.00	S1	SP	1.50	10.00 Pi	pe 1 Pipe 1 Pipe 1	0.00 1.50	1.50 9.50	50 50												
				BACK	FILL DET	AILS									LOCATIO	N DETAI	LS			
Depth	Depth		Descrip		5_1/		Do	marks								marks				
Top -0.50	Base 0.00	Upstandi		,cioll			ке	iiiai NS							ке	iiai N5				
0.00 0.50	0.50 0.70	Concrete Gravel ba	-																	
0.70 1.50	1.50 10.00	Bentonite Gravel ba	•																	
10.00 15.00	15.00 15.00	Bentonite Grout			Ceme	nt / Bentoni	te Grout													
		L																		
			pth in met																	
AGS	3		eader shee tails of abl			ng, progre	ss and w	ater.												
FINAL		. 5. 46	0. 401			me 12/0	9/2022 1	13:56		ı	og chec	ked h	/ David H	oward			SOI	L en	sinee	RING
Form No. S	IEXPHOLE	HDR				on No. 2.02			Issue Date 2				. David II				Part	of the Bac	ny Soletanch	e Group

Project Name	Cambridge Waste Water Treatme	ent Plai	nt Reloca	tion										Hole ID	
0	TE000/							Explo	rato	ry Ho	le Lo	g	Ι.	OLL CTIAL	026
Project No.	TE8364													3H_STW_	_026
Eng <mark>i</mark> neer Employe <mark>r</mark>	Mott MacDonald Bentley Barhale Limited													Sheet 1 of	2
Ground Level		Coordina	ntes	550007	10E, 2611	65 501	N		Gri	id	O5	GB		JIEEL I OI	
Hole Type		Inclinatio			honzonta				-		0.				
- 31		2	p	Depth		٥	П			훒寒	9				T
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrie		Sampling		TCR/Sample Recovery %	SCR/Blow	PGD.	<u></u>	In Situ Test Details	Install- ation
		Š		ness)	Level	耋		Details	Dia.	5 %	ង			Details	ation
TOPSOIL: Brown slig (TOP) [TOPSOIL]	ghtly gravelly sandy CLAY.			(0.35)	-			0.05-0.10 2							
	K composed of soft to firm light grey slightly	_		0.35	6.73			0.20-0.25							
gravelly sitty calcare	eous CLAY. Gravel is subangular to subrounded		T.	d .	1			0.35-0.40 5 0.50-0.55							
	careous mudstone and flint. (CIRIA Grade Dm) LBURY CHALK FORMATION]		Tordon.	(0.85)	1			0.40-1.00							
			1,000		-		 n 7	100-110							
Structumines CUAU	K composed of firm light greyish brown locally	_	1 1	1.20	5.88			3 1.10-1.20	\vdash					1	
	relly calcareous CLAY. Gravel is angular to		7 7	}	1										
subangular medium (CIRIA Grade Dm)	to coarse of very weak medium density chalk.		<u>i. i. </u>	4 .	1										
	LBURY CHALK FORMATION]		<u> </u>	4	1		C 9	1.20-2.20	102	100					
		Grade Dm		Q =										8	1 1
		5		d	7				-						
			7. 31. 3	(2.48)	3			0 2.20-2.80	102	100			NA] T
			W. A.	<u> </u>	}		"	0 2.20-2.00	102	100				15	
			<u> </u>	1	}				\vdash						1
				} .	1									33	
			F T	4	1										
			T	Ι.	1		C 1:	1 2.80-4.00	102	97	11	0		38	
Very week medium	density yellowish brown CHALK composed of	_	1 1	3.68	3.40									1	
calcareous SILTSTO	NE. Discontinuities 1) 0 to 20 degrees closely			(0.32)	1										
	smooth (Possibly CRIIA Grade A3) LBURY CHALK FORMATION]	1		4.00 -	3.08									- 51	
	rn recovered as non intact core (angular fine to coarse	- /	<u> </u>	7	1								NI 80		
Weak high density	ight grey CHALK composed of calcareous		al alla	(1.06)	1								220	35	1:1
	inurties 1) 0 to 20 degrees closely to medium smooth. (Possibly CIRIA Grade A3)		T T	1]		C 1	2 4.00-5.50	102	77	61	30			1
	LBURY CHALK FORMATION] in structureless chalk composed of firm light grey		Tr. Tr.	9]							Sore		=	H
	is angular medium to coarse very weak medium		<u> </u>	5.06	2.02								MIT		
from 4.70m to 4.92	m structureless chalk composed of firm light grey	1		(0.34) 5.40	1.68							1	NR		1
density (CIRIA Grad		-		d					\vdash					8	1 1
coarse gravel sized		_	Total Control		1		C 1	3 5.50-6.00	102	80	20	20	NI		: 1
	ore loss. Strata presumed to be CHALK. LBURY CHALK FORMATION]		10	(1.10)	1									>	1
Very weak medium	density light grey CHALK composed of calcared	us	T in		1		_1	4 6.00-6.50	102	60	34	34	170		1:11:
	lly recovered as non intact core (angular to coarse gravel and cobble sized fragments). (CIRU	4	1 1		1		"	7 0.00-0.00		"	"	"			1
Grade - unable to d WMCK) WEST ME	etermine) LBURY CHALK FORMATION]		<u> </u>	6.50 · (0.30)	0.58	ł							NA	- 0	T. []
from 5.50m to 5.80	m assumed zone of core loss			6.B0	0.28		C 1	5 6.50-7.00	102	100	24	0	NI	(} I
from 5.87m to 5.80 from 6.00m to 6.17	m partially intact			(0.45)]				\vdash				60	- 6	
	m assumed zone of core loss tureless CHALK composed of light grey very	_		7.25	-0.17			6 7.00-7.60	102	92	0	,	80	1	
	el is angular medium to coarse very weak mediu illing induced) (CIRIA Grade - unable to	ım		d .	}		["	0 7.00-7.00	102	32	"			0	I H
determine).			1 1	(0.85)	1				\vdash			\vdash	NI	14	1.1
Weak high density	LBURY CHALK FORMATION] grey CHALK composed of calcareous SILTSTONE		1 10	1	1										1.1
	to 15 degrees closely spaced undulating rough 80 degrees closely spaced planar and undulatin		1	8.10	-1.02			1 8.00 7 7.60-8.55	102	95	0	0		s 5	1 H
rough with localised	d yellowish brown staining and fine gravel infill		11	(0.45)	1	1									
(<3mm). (Possibly C (WMCK) (WEST ME	IRIA Grade 83) LBURY CHALK FORMATION]		1	8.55	-147								NI	5)	4 1
	m recovered as non intact core (subangular medium to		l. l.	4	ļ		C1.	B 8.55-9.00	102	67	33	33	150		3
Very weak medium	density grey CHALK composed of calcareous	-2	1	(0.65)]		`"	u.ad-BAN		u'	33	33	130		3
subangular fine to o	red as non intact core (clayey angular to coarse gravel sized fragments with low cobble		7.	9.20	-212										- H
content. Cobble size to determine)	ed fragments are angular). (CIRIA Grade - unable	2		(0.30)			C 15	9 9.00-9.50	102	100	68	54	300		
(WMCK) [WEST ME	LBURY CHALK FORMATION]			9.50	2.42				\vdash			\vdash	P-2421		: : ::
Very weak low dens	m assumed zone of core loss sity light grey CHALK composed of calcareous		P. F.		1		C 26	9.50-10.00	102	100	76	64			
MUDSTONE, Recov	ered as non intact core (angular coarse gravel a	nd	1 1	1	1	_	_								
B N	All donth in materia all diameters in material	otron											1		1
AGS Notes.	All depth in metres, all diameters in millim See header sheet for details of boring, pro-		d water.												
For details of abbreviations, see key.											SOI	L engine	ppine		
FINAL	Print date and time 12	/09/202	22 13:56		Lo		cked t	by David Howar	rd				301	C CITOTIC	SKII IU

Project Name	Cambridge Waste Water Treatment	Plant	: Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo)g		BH_STW_	026
Engineer	Mott MacDonald Bentley) J v v	.020
Employer	Barhale Limited													Sheet 2 of	2
Ground Level Hole Type		rdinate nation			LOE, 2611 horizonta		N		Gri	d	09	SGB			
Поте туре	IF+RC			Depth		_		0 5		eg %	N.S			_	
	Description of Strata	Weathering	Legend	(Thick- ness)	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
Very weak low densi	ity light grey CHALK composed of calcareous	Š	 	Hess)		8		Details	Dia.	75 S	SC	\vdash			_
MUDSTONE. Recove angular cobble sized	ered as non intact core (angular coarse gravel and I fragments locally with clay coating (<2mm)).	M		(1.28)									NIA		
(CIRIA Grade - unabl (WMCK) [WEST MEL	le to determine) _BURY CHALK FORMATION]			(1.20)									NA		-
Very weak medium of	m assumed zone of core loss density light grey CHALK composed of calcareous			10.78	-3.70		C 2	1 10.00-11.50	102	97	59	54	500		
angular cobble sized	ed as non intact core (angular coarse gravel and fragments). (CIRIA Grade - unable to determine)			(0.50)									500 500	-	-
from 8.85m to 9.00r				11.28	-4.20										
calcareous SILTSTON	ight yellowish grey CHALK composed of NE. (CIRIA Grade - unable to determine) LBURY CHALK FORMATION]			-								\Box		,	-
Structureless CHALK	Composed of very stiff slightly sandy calcareous (robable CIRIA Grade Dm)														-
(WMCK) [WEST MÈL	BURY CHALK FORMATION] 28m very weak medium density chalk composed of			-										-	-
siltstone, recovered gravel sized fragmer	as non intact core (clayey subangular fine to coarse nts)			:			C 2	2 11.50-13.15	102	100					-
	ark greenish grey sandy glauconitic calcareous equent angular to subrounded fragments of														-
coarse flint. Sand is f															-
Very stiff fissured da	GE GREENSAND MEMBER] rk grey CLAY with rare angular to subrounded			(3.72)									NA		-
0 to 20 degrees clos	coprolites (<10mm). Fissures are predominantly ely to medium spaced undulating smooth.														-
	00m dark greenish grey						C 2	3 13.15-14.35	102	100					
	itised belemnite shell (<25mm) 52m 2 No. fissures 55 degrees closely spaced planar			_											-
				_											-
							C 2	4 14.35-15.00	102	100					
Complete at 1	5.00m. Termination Reason: Achieved	-		15.00 -	-7.92							\vdash			-
	Scheduled Dep h			-											-
				-											
															1
				-										-	-
]
				-											
															-
				-										-]
]
															-
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															-
				-]
]
				-										-	-
]
				-											-
															-
		\vdash	-												1
	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water												
	For details of abbreviations, see key.	S allu I	water.												
FINAL	Print date and time 12/09	/2022	13:56		Lo	g chec	cked I	by David Howar	d				SOI	r euginee	RING

Issue Date 02/03/2018

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	Can	nbridge '	Waste V	Nater Tre	atment	Plant R	Relocat	ion							_		Н	łole ID	
Project	No.	TE8	364										Exp	lorator	y Hole	Log	l _B	H S	TW_C)31A
Engine				onald B	entley															
Employ Ground L			nale Lim 77mOD	ited				Coordina	ntas	540	9378.90E	26081	5 60N			Grid		She OSGB	et 1 of 1	L
Date Star			8/2021					Date Co			/08/2021		J.001 4				nation		m horizor	ntal
Тор	Base		Date Tin					Logger				ant Use	- 1	-	t Stability	/		Remark	(S	
0.00 1.20	1.20 15.00	IP RC	02/08/20 03/08/20		02/08/202 04/08/202		PM PM	MV	Geobo			ated hand oilmec SM		one	Stable					
							1													
							1													
					ROGRESS										WATER	STRIKE	S			
Date ⁻	Time	Depth	Depth Casing	Depth Water	Ī		Rema	rks			Date	Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time	1	Remark	(S
02/08/202		1.20 1.20	0.00 0.00	Dry Dry	End of IP Start of Shift	it .							June	Casing	Jeanea	NOSC 13	Liapses	1		
03/08/202 04/08/202	21 17:30 21 07:30	8.40 8.40	3.00 3.00	Dry Dry	End of Shift Start of Shift	: ft														
04/08/202	21 13:00	15.00	3.00	4.20	End of Hole															
		<u></u>		ARI F PFF	RCUSSION	DETAILS					 				SPT D	ETAILS				
Depth	Depth	Tim	ne Start	Duration	1			Remai	rks		Depth			Reported		EIRILO	Hammer Serial	Energy	Depth	Depth
Тор	Base	+			-	_					Тор	Туре	+	,,o _F -		-	Number	Ratio	Casing	Water
					<u></u>															
Depth	Depth			ROTARY	FluSH DE	TAILS					-									
Top 1.20	Base 15.00	Fiu	sh Type	Return 100			———	Remarks	•											
1.20	10.00		K/ IVII J	100	Grey,															
HOLE DI	ANAETE	CVCIVIC	G DIAMETE			DYNAMI	IC CANA	שוווכ			-									
Depth		Depth	Diamete	er Depth To	Depth			tion	Sample		-									
Base 15.00	Diamete 146	Base 3.00		Pr Deptii it	op Base	Diameter	r Durat			Reference	<u> </u>									
-																				
	INST	OITA LIA	N DETAILS	ς		PII	PE CONS	TRUCTI	ΟN		 			DEP	TH RELAT	FFD REM	ΔRKS		<u> </u>	
 Distance			esponse Re	esponse P	Pipe Pipe	Тор	Base	Diamete	Т-	ре Туре	Depth						marks			
		-	Тор	Base F	Ref Ref	\dashv					Тор	Base	8							
				BACK	FILL DETA	.ILS									LOCATIO	N DETAI	LS			
Depth Top	Depth Base		Descrip	ption		-	Ren	narks		-		-			Ren	narks	-	-		
0.00	15.00	Grout																		
					ameters in ails of boring			ntor										4		
AGS					ns see key.	g, progres	is and wa	itoi.												
FINAL	CIEVELIO	FUDD			date and tin)/2022 13					ked by	David Hov	ward					GINEE	
Form No. S	SIEXPHOL	LEHDR		ļ:	ssue.Revisior	ภ No. 2.02		l:	ssue Da	ate 22/06/2	.016						Part	i of the Bach	hy Soletanche	a Group

Project Name	Cambridge Waste Water Treatmen	t Plan	t Relocat	ion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	og .	R	H_STW_(121 <i>\</i>
Engineer	Mott MacDonald Bentley													11_5100_(JJIA
Employer	Barhale Limited													Sheet 1 of	2
Ground Level Hole Type		ordinat :linatior			90E, 2608 horizonta		N		Gri	d	OS	GB			
Tible Type	II THE IIIC			Depth	Tiorizonia	_				e %	۸s				
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
TOPSOIL: Dark brow	n slightly sandy slightly gravelly CLAY. Sand is fine	_	X//XX///	ness)		×	D1	Details 0.05-0.10	Dia.	TCI Re	SC				
	subangular to subrounded fine to coarse of flint.			(0.35) 0.35	11.42		ES 2	2 0.20-0.25 0.10-0.40							
(TOP) [TOPSOIL]	Composed of very stiff light yellowish brown	1		0.55	11.42		D 4	0.40-0.50 0.50-0.55							1
	Y. Gravel is subangular to subrounded fine to			(0.85)				0.40-0.80							
	LBURY CHALK FORMATION]			_				0.80-1.20 1.00-1.10							
	Composed of yellowish brown locally stained	- Dm		1.20	10.57			3 1.10-1.20							-
Gravel is subangular	htly gravelly sandy calcareous CLAY. Sand is fine. r fine to coarse of siltstone. Recovered as soft.	Grade		(0.50)			C 10	1.20-1.70	102	80					
	LBURY CHALK FORMATION]			1.70	10.07								NA		
calcareous CLAY. Sar	Composed of firm to stiff yellowish brown sandy and is fine. (CIRIA Grade Dm)			(0.70)			C 11	1 1.70-2.40	102	100					
(WMCK) [WEST MEI	LBURY CHALK FORMATION]														
	ery weak low density light yellowish brown gish brown CHALK composed of calcareous		HH	2.40	9.37										
SILTSTONE with rand	domly orientated very closely to closely spaced vith frequent black surface speckling. (CIRIA			(0.80)											
Grade - unable to de				-									NI		
	m recovered as non intact core (subangular fine to			3.20	8.57		C 12	2 2.40-3.90	102	100	87	87	600 700		
Very weak low dens	ity light yellowish brown and greyish brown gish brown CHALK composed of calcareous	1		(0.70)											
SILTSTONE with rand	domly orientated closely to medium spaced														
(WMCK) [WEST MEI	CIRIA Grade - unable to determine) LBURY CHALK FORMATION] m recovered as non intact core (subangular to			3.90	7.87										
subrounded fine to	coarse gravel sized fragments) (Drilling induced) density light yellowish greyish brown locally]													
stained orangish bro	own CHALK composed of calcareous SILTSTONE. to 20 degrees medium spaced undulating rough				1										-
locally with orangish	n brown staining (CIRIA Grade B2)						C 13	3 3.90-5.40	102	100	94	92			
	LBURY CHALK FORMATION] m 1 No. discontinuity 70 degrees undulating rough			-											
from 4.66m to 4.72r	m recovered as non intact core (subangular to coarse gravel sized fragments)	B2											NI		
	m extremely weak low density m recovered as non intact core (subangular to	Grade		(3.00)									250 400		
from 5.35m to 5.40i	coarse gravel sized fragments) m recovered as non intact core (subangular to														
from 5.90m to 6.10r	coarse gravel sized fragments) m 1 No. discontinuity 75 to 90 degrees stepped			-											
from 6.20m to 6.35i	ith abundant orangish brown staining m 1 No. discontinuity 65 to 70 degrees undulating						C 14	4 5.40-6.90	102	97	75	75			
rough with abundar	nt orangish brown staining														
from 6.60m to 7.50r	m greyish brown														
	m recovered as non intact core (subangular to coarse gravel sized fragments) (Drilling induced)	\vdash		6.90	4.87								NI		-
	density greyish brown with abundant orangish LK composed of calcareous SILTSTONE.			(0.60)			C 15	6.90-7.50	102	67	3	0	INI		
	tact core (clayey angular to subangular fine to fragments). (CIRIA Grade - unable to determine)			7.50 -	4.27									_	
(WMCK) [WEST MEI from 7.28m to 7.30r	LBURY CHALK FORMATION] m intact core	1													
	m assumed zone of core loss density light grey locally grey CHALK composed	J		_			C 16	7.50-8.40	102	100	87	78	NI 170		-
	ONE. Discontinuities 1) 10 to 40 degrees very aced, rarely medium spaced, planar locally												280		
	rally unstained. (Probably CIRIA Grade B3/4) LBURY CHALK FORMATION]														-
degrees planar roug	m with closely to medium spaced discontinuities 65 yh with slight yellowish brown staining and with gravel			(3.00)									NI		
	ture of discontinuity set 1) infilled with fine gravel and			_									20 60		-
silt (<3mm) from 7.75m to 7.90 thin beds of grey m	m weak high density with very closely spaced very						C 17	7 8.40-10.00	102	100	75	19	60		
from 7.90m to 8.05i	m recovered as non intact core (subangular to coarse gravel sized fragments)												NI		-
coarse gravel sized													80 100		
from 8.50m to 9.40	m fractures of discontinuity set 1) locally stained				-								100		
Notes:	All depth in metres, all diameters in millimet			1	1		1		1	<u> </u>		<u> </u>			1
AGS	See header sheet for details of boring, progre For details of abbreviations, see key.	ess and	water.												
FINAL	Print date and time 12/0	9/2023	2 13:56		Lo	n cher	rked h	ny David Howar	rd				SOI	L engine	RING

Issue Date 02/03/2018

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project Name	Cambridge Waste Water Treatme	nt Plan	t Reloca	tion										Hole ID	
Donain at Na	TE026/							Explo	rato	ry Ho	le Lo	g	D	H_STW_0	Λ21 Λ
Project No. Engineer	TE8364 Mott MacDonald Bentley													п <u>_</u> 3177_	021A
Employer	Barhale Limited													Sheet 2 of	2
Ground Level	+11.77mOD C	Coordinate	es	549378.	90E, 2608	15.60N	V		Gri	id	09	GB	-		
Hole Type	IP+RC I	nclination	ı	90° from	horizonta	ıl	ı								_
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
	density light grey locally grey CHALK composed ONE. Discontinuities 1) 10 to 40 degrees very		 												-
closely to closely spa	aced, rarely medium spaced, planar locally rally unstained. (Probably CIRIA Grade B3/4)		 	1											
(WMCK) [WEST MEL	BURY CHALK FORMATION]			10.50 -	1.27										-
yellowish orange. D	m fractures of discontinuity set 1) locally stained iscontinuity set 2) 75 to 85 degrees extremely closely	1		1			C 1	8 10.00-11.50	102	87	58	53			
from 10.00m to 10.2	ed planar rough with orangish brown surface staining 20m assumed zone of core loss 50m recovered as non intact core (subangular to	33		- 1									NI		
subrounded fine to	coarse gravel sized fragments) nedium to high density light grey CHALK	Grade B3		(1.50)									90 280		
composed of calcare	eous SILTSTONE. Discontinuities 1) 5 to 10				-								280		-
unstained locally inf	to medium spaced planar and undulating rougl filled with fine gravel and silt (<1-2mm). (CIRIA	י					C 1	9 11.50-12.00	102	92	68	50			
Grade B3) (WMCK) [WEST MEL	BURY CHALK FORMATION]	_		12.00 -	-0.23										-
subrounded fine to	40m recovered as non intact core (subangular to coarse gravel sized fragments)	1		1											
yellowish orange	00m fractures of discontinuity set 1) are locally stained														
stained orangish bro	62m 1 No. discontinuity 65 degrees undulating rough own and infilled with fine gravel (<1-2mm)	Grade B2/3		(1.50)			C 2	0 12.00-13.50	102	96	96	83	20 110		
Weak high density li	Oom assumed zone of core loss ight grey locally grey CHALK composed of	Grade		_ (====,									300		
	VE. Discontinuities 1) 5 to 20 degrees closely to nar smooth locally stained orangish brown and														
	nfill (<2mm). (CIRIA Grade B2/3) LBURY CHALK FORMATION]														
	21m fractures of discontinuity set 1) are very closely			13.50 -	-1.73										1
Dark greenish grey v	very clayey glauconitic fine SAND. GE GREENSAND MEMBER]	_		13.87	-2.10										
from 13.50m to 13.5	57m with occasional subrounded to rounded fine to d fragments of black coprolite		<u> </u>	-											-
from 13.50m to 13.6	60m assumed zone of core loss 75m with occasional subrounded to rounded fine to		<u> </u>	(1.12)			C 2	1 13.50-15.00	102	93			NA		
	d fragments of black coprolite 34m with occasional subrounded to rounded fine to		<u> </u>	(1.13)											-
Stiff to very stiff fissu	d fragments of black coprolite ured dark grey CLAY. Fissures are closely spaced	5	<u> </u>	1											
to 15 degrees and 70 (GLT) [GAULT FORM)	0 to 85 degrees planar smooth. ATION]			15.00 -	-3.23										1:::::::::
	5.00m. Termination Reason: Achieved Scheduled Dep h	_													-
	Concadica Dep II														-
															-
				-											-
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					1										-
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															-
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]
				-	1										-
															1
		+													1
Notes:	All depth in metres, all diameters in millime	etres							1						1
AGS	See header sheet for details of boring, prog		water.												
	For details of abbreviations, see key.	/00/2022	12.50			a e l-	die C	nu Dovid II	· al				SOI	L engine	eRing
FINAL Form No. SIEXPHOLEL	Print date and time 12. OG Issue.Revision No. 2		15:50	Issue Date	Lo 02/03/20	-	жеа І	oy David Howar	u					f the Bachy Soletan	

Project	Name	Cam	ıbridge '	Waste \	Water	Treatme	ent Plant F	Relocati	ion										Н	lole ID	
Dsinot	NI.	TE83	2 6 4											Exp	lorato	ry Hole	Log	 _{BI}	⊔ ς ⁻	TW_0	121R
Project Engine			t MacD	onald E	3entle	V													1_3	100_0	210
Employ			nale Lim																She	et 1 of 1	1
Ground L			60mOD					Coordina			75.81E		819.5	51N			Grid		OSGB		
Date Star Top	Base		0/2021 Date Tin	ne Start	Date	Time Fn	d Rig Crew	Date Cor	·		0/2021 it Pla	ant U	 Ised	Shorin	n Used I	Pit Stability		nation •	90°1 o Remark	m horizon	tal
0.00	1.20	IP CP	12/10/20	21 12:00	12/10	0/2021 13:00	DC	DT	Бинет турс	Dini B	Insula	ited Har	nd Too		one	Stable			CITICIT		
1.20	30.00	CP	12/10/20	21 13:00	13/10)/2021 17:30	DC	GL			"	ando 20	000								
			1																		
			1																		
			1																		
				P	ROGRI	ESS										WATER	STRIKE	S			
Date ⁻	Time	Depth	Depth Casing	Depth Water			Rema	ırks			Date	Time	е	Depth Strike	Depth Casing		Water Rose To	Time Elapsed		Remark	(S
12/10/202 13/10/202		8.00 8.00	8.00 8.00	6.40 5.90	End of Start of						12/10/20	021 17:	10	8.00	8.00		6.40	20	Medium	ī	
13/10/202 14/10/202	21 17:30	23.20 23.20	14.70 14.70	Dry 22.00	End of Start of	f shift															
14/10/202	21 14:00	0.00	0.00		Installa	ition Comple	te, Borehole Cor	mplete													
			<u></u>																		
Depth	Depth		C/	ABLE PER	CUSSI	ON DETA	ILS				Depth	Tes	ct T			SPT D	ETAILS		Enorov	Depth	Depth
Тор	Base	Time	e Start	Duratio	n '	Tool		Remar	'ks		Тор	Тур	ре			ed Result	ŀ	Number	Energy Ratio	Casing	Water
											1.20 2.20	S S	5 N	N=46 (6,8:1 N=28 (2,4:6	5,7,7,8)	.)		AR3501 AR3501	75 75	1.20 2.20	Dry Dry
											3.20 4.20 5.20	S	5 N	N=32 (4,5:7, N=36 (4,6:7, N=25 (4,5:6,	7,8,10,11)			AR3501 AR3501 AR3501	75 75 75	3.20 4.20 5.20	Dry Dry Dry
											6.20 7.20	S	5 N	N=22 (3,4:5 N=21 (3,4:4	,5,6,6)			AR3501 AR3501	75 75	6.20 7.20	Dry Dry
											8.20 9.20	S S	1 6	N=28 (3,4:5, N=36 (4,6:7,	5,6,8,9) 7,9,10,10)			AR3501 AR3501	75 75	8.20 9.20	6.00 6.20
		<u></u>		ROTARY	_ / FLUSH	H DETAILS	 S				10.70 12.20	S	5 N	N=39 (5,7:8, N=44 (6,8:9,	9,10,12,13)			AR3501 AR3501	75 75	10.70 12.20	7.50 7.50
Depth	Depth	Flus	sh Type	Flush	ı Flu	ısh		Remarks			13.70 15.20 16.70	S S	S N	N=27 (4,6:6, N=27 (4,5:6, N=33 (4,5:7,	5,6,7,8)			AR3501 AR3501 AR3501	75 75 75	13.70 14.70 14.70	13.00 Dry Dry
Тор	Base	_		Returi	n Col	our					18.20 19.70	S	5 N	N=39 (6,7:8, N=43 (7,8:9,	3,9,10,12)			AR3501 AR3501	75 75	14.70 14.70	Dry Dry
											21.20 22.70	S S	S N	N=49 (6,8:1 50/290mm	0,12,12,15 (8,9:11,12	,14,13/65mm)		AR3501 AR3501	75 75	14.70 14.70	Dry Dry
											24.20 25.70	S	5 5	50/280mm	(8,9:12,16	,16,6/55mm) ,16,6/55mm)		AR3501 AR3501	75 75	14.70 14.70	Dry Dry
											28.70	S	, 5	50/2/5mm 50/275mm	(8,10:13,1 (7,9:13,16	5,17,5/50mm) ,18,3/50mm)		AR3501 AR3501	75 75	14.70 14.70	Dry
HOLE DI	ΔΜΕΤΕΡ	CASING	DIAMETE	:D		DVN/	AMIC SAM	DIING													
Depth	Diameter	Depth		er Depth T	De _l	pth Diam		tion S		Run											
30.00	150	Base 14.70		л Бериг г	Ва	se	Dula	Re	ecovery Ref	erence											
	INICTA	LLATIO	N DETAILS				PIPE CONS	CTRUCTI								PTH RELAT	TED DEM	IADI/C			
Distance		Re	esponse Re		Pipe Pi	ipe _{Ton}		1		ī.ma	Depth	De	epth	Т	DE	PIH KELAI					
Distance 13.60						Ref Top		Diamete 50	PLAIN	уре	Тор	Ba	ase	₩			ке	marks			
						pe 1 13.10		50	SLOTTED												
												\bot									
Depth	Depth				KFILL D	ETAILS										LOCATIO		<u>.</u> S			
Top -0.50	Base 0.00	Upstandin	Descrip	otion			Ren	marks								Rem	narks				
0.00 0.50	0.50 0.50 0.70	Concrete Gravel bac	-																		
0.70 13.10	13.10 13.60	Bentonite Gravel bac	•																		
13.60	30.00	Bentonite																			
	<u> </u>																				
\ C(pth in met				netres. gress and wa	ater											4		
AGS	2		tails of abl				,, 000 and 110														
FINIAL	•			Drint	doto on	d +inon 1°	///9/2022 1	3.56		Lo	o choc	·kod h	w D	avid Hov	ward			SOI	L end	ginee	RING

Log checked by David Howard

Part of the Bachy Soletanche Group

Issue Date 22/06/2016

FINAL

Form No. SIEXPHOLEHDR

Print date and time 12/09/2022 13:56

Hole ID Project Name Cambridge Waste Water Treatment Plant Relocation Exploratory Hole Log Project No. TE8364 BH_STW_031B Mott MacDonald Bentley Engineer Employer Barhale Limited Sheet 1 of 3 +11.60mOD Coordinates 549375.81E, 260819.51N Grid OSGB Ground Level IP+CP Hole Type Inclination 90° from horizontal Depth Sampling Datum In Situ Test Install õ Description of Strata (Thick 쁘 Legend Level Details ation ness) Dia Details TOPSOIL: Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse Gravel is subangular to subrounded fine to coarse of flint. D1 010 (0.30)B 2 0.20-0.30 0.30 11.30 Occasional roots (2mm x 40mm). D3 0.35 (TOP) [TOPSOIL] B 4 0.40-0.70 CHALK recovered as: Very stiff light grey slightly sandy slightly gravelly calcareous CLAY with occasional orange staining. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint. B 5 0.90-1.10 (WMCK) [WEST MELBURY CHALK FORMATION] SPT(S) N=46 D6 120 (6,812,12,11,11) D7 120-165 120 B8 120-170 D9 2.00 2.00m to 7.80m gravel is subangular to subrounded fine to coarse of nely weak low density light grey calcareous sjitstone SPT(S) N=28 (2,4·6,7,7,8) 2.20 D 10 2.20-2.65 B 11 2.20-2.70 D 12 3.00 SPT(S) N=32 (4,5:7,8,8,9)D 13 3.20-3.65 3.20 B 14 3.20-3.70 D 15 4.00 (7.50) SPT(S) N=36 (4,6:7,8,10,11) D 16 4.20-4.65 420 B 17 4.20-4.70 D 18 5.00 SPT(S) N=25 (4,5 6,6,7,6) D 19 5.20-5.65 B 20 5.20-5.70 D 21 6.00 SPT(S) N=22 (3,4:5,5,6,6) D 22 6.20-6.65 B 23 6.20-6.70 D 24 7.00 SPT(S) N=21 (3,4:4,5,5,7)D 25 7.20-7.65 7.20 B 26 7.20-7.70 7.80 3.80 CHALK recovered as: Very stiff light grey slightly gravelly CLAY with occasional orange staining. Gravel is subangular to subrounded fine \mathbf{T} D 27 8.00 to coarse of very weak medium density calcareous siltstone. [WMCK] [WEST MELBURY CHALK FORMATION] SPT(S) N=28 (3,4:5,6,8,9) 8.20 D 28 8.20-8.65 B 29 B.20-B.70 D 30 9.00 SPT(S) N=36 (4,6:7,9,10,10) 9.20 D 31 9.20-9.65 B 32 9.20-9.70 D 33 10 00 Notes. All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. AGS For details of abbreviations, see key. SOIL ENGINEERING Print date and time 12/09/2022 13:56 Log checked by David Howard Form No SIEXPHOLELOG ssue Date 02/03/2018 Part of the Bachy Soletanche Group Issue Revision No. 2.05

Project Name	Cambridge Waste Water Treatn	nent Plant	Relocat	tion									Hole ID	
	-		- · - -				Explo	ratory	Ho	le Lo	og	_		204-
Project No.	TE8364											B	H_STW_0)31B
Eng <mark>i</mark> neer	Mott MacDonald Bentley												Sheet 2 of	•
Employer Ground Level	Barhale Limited +11.60mOD	Coordinate	ıs	549375	81E, 2608	1951	<u> </u>	Grid		O!	SGB		Sheet 2 of	3
Hole Type	IP+CP	Inclination			honzonta		•	Gila		0.	~55			
		8		Depth		ike	Compling	1	<u>e</u> *	¥				Ī
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	SQ.	<u> </u>	In Situ Test Details	Install- ation
CIDIV	on Many at 5 the had a survey of the later a survey like CLAV and			ness)		₹	Details	Dia	<u>⊉</u> Æ	Я				NAME IN C
occasional orange	as: Very stiff light grey slightly gravelly CLAY wi staining. Gravel is subangular to subrounded fi			1	†									
	eak medium density calcareous siltstone. ELBURY CHALK FORMATION]		- 1 xoz l' xo		}									
			P. I.										SPT(S) N=39	
			<u> </u>	1	1		D 34 10.70-11.15						(5,7:8,9,10,12) 10.70	
				-			B 35 10.70-11.20						10.70	
			1/2		•									<u> </u>
				(5.30)			D 36 11.50							
					1									
				2										- 1
					1								SPT(S) N=44	
]		D 37 12.20-12.65						(6,8·9,10,12,13) 12.20	
							B 38 12.20-12.70							
			<u> </u>		1									
Very stiff azeenish a	grey slightly sandy slightly gravelly CLAY. Sand	ie	eds t sett o	13.10	-1.50		D 39 13.00 D 40 13.10						K 13.10 - 13.60	
fine to coarse. Grav	vel is subangular to subrounded fine to coarse		and and	(0.40)	3]]
	DGE GREENSAND MEMBER]	/	1 - 1 -	13.50 -	1.90		D 41 13.50						100	
	lark grey CLAY with rare phosphatic nodules ssures are extremely closely spaced planar and		F		1								SPT(S) N=27 (4,6:6,7,7,7)	
rough. (GLT) [GAULT FORM				-			D 42 13.70-14.15 B 43 13.70-14.20						13.70	
(GL)[GAULI FORW	MATION		<u> </u>		1		B-45 13:70-1420							
]]
					1									
				-										
from 15.20m to 15	5.85m 1 No. pocket (2mm x 10mm) of pyritic fine sand		===										SPT(S) N=27 (4,5:6,6,7,8)	
			===				D 44 15.20-15.65 B 45 15.20-15.70						15.20	1
				(4.70)	1									
				(4.70)										
					1									
														}
					1								SPT(S) N=33	
					1		D 46 16.70-17.15						(4,5:7,8,8,10) 16.70	
				1			B 47 16.70-17.20						10.70	
			F											}
			<u> </u>		1									
				-										
Very stiff fissured ti	hinly laminated dark grey CLAY with rare	\longrightarrow		18.20	-6.60								SPT(S) N=39]
phosphatic nodules	s (5mm x 10mm). Fissures are very closely spa- ting, rough and occasionally polished.	ced	<u> </u>		-		D 48 18.20-18.65						(6,7:8,9,10,12) 18.20	
(GLT) [GAULT FORM			<u> </u>		1		B 49 18.20-18.70							
			F===		1									
			F===	1	3	1							'	
			F===		-									
			<u> </u>	1 -	1									
			<u> </u>		1								SPT(S) N=43 (7,8:9,10,11,13)	
			-			_	D 50 19.70-20.15 B 51 19.70-20.20	+					19.70	
							20							
						1								
Notes	s. All depth in metres, all diameters in milli See header sheet for details of boring, pr		water	<u> </u>				1 1		·	1			
AGS	For details of abbreviations, see key.	_g. 300 and												
FINAL	Print date and time	12/09/2022	13:56				ked by David Howa	rd					r euginee	
Form No SIEXPHOLE	LOG Issue Revision N	o. 2.05		Issue Date	e 02/03/20	18						Part o	of the Bachy Soletane	che Group

Project Name	Cambridge Waste Water Treatr	ment Plar	nt Relocat	ion									Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley						Explo	rator	у Но	le Lo	9	В	H_STW_C	31B
Employer	Barhale Limited												Sheet 3 of 3	3
Ground Level	+11.60mOD IP+CP	Coordina			31E, 2608		J	Grid	d	OS	GB			
Hole Type	Description of Strata	Inclinatio Weathering		Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	±	In Situ Test Details	Install- ation
phosphatic nodules	inly laminated dark grey CLAY with rare (5mm x 10mm). Fissures are very closely sprag, rough and occasionally polished. ATION]			(11.80)		eM em	D52 21.20-21.65 B53 21.20-21.70 D54 22.70-23.14 B55 22.70-23.20 D56 24.20-24.70 D58 25.70-26.13 B59 25.70-26.20 D60 27.20-27.63 B61 27.20-27.70	Dia.	TCF Rec				SPT(S) N=49 (6.8:10,12,12,15) 21.20 SPT(S) 50/290mm (8,9:11,12,14,13/6 5mm) 22.70 SPT(S) 50/280mm (7,8:13,15,16,6/55 mm) 24.20 SPT(S) 50/280mm (8,9:12,16,16,6/55 mm) 25.70 SPT(S) 50/275mm (8,0:13,15,17,5/5 0mm) 27.20 SPT(S) 50/275mm (7,9:13,16,18,3/50 mm) 28.70	
Complete at 3	30.00m. Termination Reason: Achieve Scheduled Dep h	ed		30.00	18.40		D 64 30.00						-	
AGS	All depth in metres, all diameters in mill See header sheet for details of boring, p For details of abbreviations, see key. Print date and time OG Issue Revision N	12/09/202		Isqua Note	Log		ked by David Howar	rd					L enginee of the Bachy Soletance	



Project	Name	Can	nbridge	Waste	Wate	er Tre	atment	Plant F	Reloca	ition										Н	ole ID	
Project	No	TE8	364												Exp	olorator	y Hole	Log		3H 1	PS_(001
Engine			t MacD	onald E	Bentl	ley														<u> </u>		
Employ			nale Lim	ited					0 1:			F./0	.74 .05	20072	2011			0:1			et 1 of :	1
Ground L Date Star			14mOD 8/2021						Coordin Date Co		eted		471.40E, 08/2021	260970	.90N			Grid Inclin	ation	OSGB		
Тор	Base		Date Tir	ne Start	Dat	te Tim	e End R							nt Used	Shorin	ng Used P	it Stability			Remark	S	
0.00 1.20	1.20 15.10	IP RC	23/08/20 23/08/20		23	/08/202: /08/202:	1 13:00	CB CB	DT AY	Geo	NA obore S	NA PCD	Insulat	ted hand to Imec SM8	ols N	one	Stable					
										(1	146)											
		I	Depth	Depth		RESS								1	Depth	Depth	WATER Depth	STRIKES Water	Time	1		
Date 23/08/20		Depth 15.10	Casing 2.75	Water 3.50		of Shift		Rema	irks				Date	Time	Strike	Casing		Rose To			Remark	KS
24/08/20 24/08/20	21 07:30	15.10 0.00	2.75	3.20 Dry	Star	t of shift	Complete, Bo	orehole Cor	mplete													
			C.	ABLE PE	RCUS	SION	DETAILS							I			SPT D	ETAILS				
Depth Top	Depth Base	Tim	e Start	Duratio	n	Tool			Rema	arks			Depth Top	Test Type		Reporte	d Result	н	ammer Serial Number	Energy Ratio	Depth Casing	Depth Water
ТОР	Buse												юр	Турс						itutio	cusing	VVacci
					<u> </u>																	
Depth	Depth			ROTAR\		SH DE Flush	IAILS															
Top 1.20	Base 12.30		sh Type R/MIST	Retur 90		Colour White			Remark	KS												
12.30	15.10		R/MIST	90		Grey																
Depth	1	Donth	DIAMETE		Г	L Depth	DYNAM			Sampl	le R	un										
Base 15.10	Diamete 146	Base	Diamete 150	er Depth		Base	Diameter	Durat			ery Refe											
13.10	140	15.10	146																			
D: .		lp,	N DETAIL		Pipe	Pipe		PE CONS	T		D: T		Depth	Depth		DEI	PTH RELA					
Distance 13.00	ID S1	Type "	Тор	Base	Ref	Ref Pipe 1	Top 0.00	Base 3.10	Diame 100		Pipe Ty	/pe	Тор	Base				Ren	narks			
		-				Pipe 1	3.10	13.00	100	SLC	OTTED											
Depth	Depth				KFILL	. DETAI	LS										LOCATIO		S			
Top 0.00	Base 13.00	Gravel ba	Descri	otion				Ren	narks								Ken	narks				
13.00	15.10	Bentonite																				
.	<u> </u>	^** :				<u> </u>	:00															
AGS		See he	pth in me eader shee	et for det	ails of	f boring			ater.													
		For de	tails of ab																SOU	l en	SINE	שוחפ
FINAL Form No. S	SIEXPHOL	EHDR					ne 12/09 n No. 2.02	/2022 1	3:56	Issue [Date 22		og check	ked by [avid Ho	ward					ny Soletanch	

Project Name	Cambridge Waste Water Treatme	nt Plan	t Reloca	tion										Hole ID	
Project No.	TF8364							Explora	itory	Ho	le Lo	og		BH_TPS_	001
Eng <mark>inee</mark> r	Mott MacDonald Bentley													BH_1F3_	001
Employer	Barhale Limited													Sheet 1 of	2
Ground Level		Coordinat		549471	.40E, 2609	70.90	N		Grid		OS	GB			
Hole Type	IP+RC	nclination o	<u> </u>		Т	T ø	Г		9	2 ×2	po eq		I	Τ	Т
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike	Sé	ampling	į	Recovery %	SC R/Blows	ĝ	쁘	In Situ Test	Instal
		₩.		ness)	Level	şş	De	tails !	Dia.	Beck	ន	~		Details	atio
	wn slightly gravelly sandy CLAY, Sand is fine to igular to subrounded fine to coarse of flint and			(0.30)	-		D1 0.05 ES2 0.20								-22
quartz. Occasional (TOP) [TOPSOIL]		/		0.30	10.14		B3 0.10-	- 0 .40							1
Firm brown slightly	gravelly sandy CLAY Sand is fine to coarse. Grav	ਦ [/]	1-1	(2.00)	1		D 4 0.40 ES 5 0.50								
is angular to subrou Occasional flints.	unded fine to medium of mixed lithologies.			(0.80)]		B 6 0.40-	-0.80							
(SUPD) [SUPERFICE				1.10	10.14		B9 0.80- D7 1.00								
	K composed of firm greyish brown slightly sand; careous CLAY Sand is fine to coarse. Gravel is	′ 	To All A	(0.40)	-		ES 8 1.10		+					1	
	ılar fine to medium of very weak calcareous		1	1.50	10.14										
(WMCK) [WEST ME	ELBURY CHALK FORMATION]	_/		n	1		C 10 1.20	0-2.20	102	48					
calcareous CLAY wi	K composed of firm greyish brown gravelly ith medium spaced thin beds of extremely weak		1											8	
	i brown CHALK composed of calcareous is angular to subangular medium to coarse of ve	n,		7	1			L							
weak chalk. (CIRIA		´	P P	,	1		C 11 2.20	0 2 70	102	90					
(AAIAICK) [AAE21 IAIE	ELBURY CHALK FORMATION]	_		<u> </u>	7		" 22		102	30					
		Grade Dm	1 1	1]			Γ					NA		
		Ē	7.4	(3.00)	-		C 12 2.70	0-3.50	102	100				33	- 1
			1 1		1										₺ , []
			la la la la la la la la la la la la la l	4 .	1										4. II
				4	1										1. 1
			1 1	4.	3										J H
				d	-		C 13 3.50	0-4.80	102	100	19	0			3 H
			To The	d	‡										1.1
	very weak medium density greyish brown CHALI	<		4.50	10.14							3			13.
degrees closely to	reous SILTSTONE. Discontinuities: 1) 0 to 20 medium spaced undulating smooth and iron]				+						3 H
staining. (CIRIA Gra (WMCK) (WEST ME	ide B3) Elbury Chalk Formation]	S	1]								70	5	
from 4.94m to 5.20	om structureless chalk composed of firm greyish brown s clay. Gravel is angular to subangular medium to	Grade B2/3	P T	(1.40)	1								150 370		
coarse of very wea		<u>چ</u>		, i	‡		C 14 4.84	0-630	102	100	57	40	0,0		1 1
			<u> </u>	,	1					200	ļ	"			1 1
Structureless CHAL	K composed of firm greyish brown gravelly		7 7	5.90	10.14							- 3			3 H
calcareous CLAY, Ga very weak chalk, (C	ravel is angular to subangular medium to coarse	of	1.	֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	1										\mathbb{R}
(WMCK) (WEST ME	ELBURY CHALK FORMATION]	E	1	}	1				+						# H
calcareous siltston	5m very weak medium density chalk composed of ie	Grade Dm	l'ast's	(1.37)	‡								NA		1
		ğ	7	4]										3 H
			<u> </u>	4	-		C 15 6.30	0-7.80	102	100	51	44		- 9], <u> </u>
Extremely weak to	very weak medium density light grey CHALK		1	7.27	10.14									-	# H
composed of calcar	reous SILTSTONE with medium spaced thin beds	of		ф.	1										‡ H
calcareous CLAY Gr	K composed of firm greyish brown gravelly ravel is angular to subangular medium to coarse			þ]			L							H
	ies: 1) 0 to 20 degrees closely to medium spaced with iron staining. (CIRIA Grade B2/3)			d .	-										<u> </u>
(WMCK) [WEST ME	ELBURY CHALK FORMATION]		1	d	1										i F
		٠		d	1										1
		Grade B2/3		(3.03)]		C 16 7.80	0-9.30	102	100	53	48	NI 200		$\mathbb{F}^{\mathbb{F}}$
		Š	P T	d]								280		3 4
			7 l.	1	-										† H
			1	1]			-	-						<u> </u>
			l.		-										1 H
			<u> </u>	, I	1										‡ H
		+	' ' '		1	1		\rightarrow	-					-	100
				<u>L</u>										<u></u> _	\perp
Notes	: All depth in metres, all diameters in millim See header sheet for details of boring, pro		water.												
AGS	For details of abbreviations, see key.														
FINAL	Print date and time 12		13:56				ked by Da	vid Howard						r eugine	
Form No SIEXPHOLE	LOG Issue Revision No.	2.05		ssue Dat	e 02/03/20	18							Parto	of the Bachy Soletan	che Grou

Project Name	Cambridge Waste Water Treatme	nt Pla <mark>n</mark> t	Relocat	ion										Hole ID	
Project No.	TE8364							Exp <mark>l</mark> o	ratoi	y Ho	le Lo	9		BH_TPS_0	ากา
Eng <mark>inee</mark> r	Mott MacDonald Bentley												'	311 <u></u> 1F3 <u></u>	501
Employer	Barhale Limited													Sheet 2 of	2
Ground Level		coordinate		549471.4	ЮE, 2609	70.901	N		Gri	d	OS	GB			
Hole Type	IP+RC II	nclination go		D		ė	Г			⊕ ×8	100				Т
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	_	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	ğ	뜨	In Situ Test Details	Install- ation
	very weak medium density light grey CHALK eous SILTSTONE with medium spaced thin beds	of	<u> </u>				C 1	7 9.30-10.80							
structureless CHALI calcareous CLAY. Gr chalk. Discontinuite undulating smooth	K composed of firm greyish brown gravelly avel is angular to subangular medium to coarse es: 1) to 20 degrees closely to medium spaced with iron staining. (CIRIA Grade B2/3) LBURY CHALK FORMATION]		l l	10.30	10.14				102	97	43	25		8	
Weak high density I	ight grey CHALK composed of calcareous quent coprolites at base (<40mm x 30mm).	-6	1 1	(1.56)									NI		± 1
Discontinuities: 1) 0	to 30 degrees medium spaced planar smooth n). (CIRIA Grade 82/3)			:									200 290		! ∃ !
	LBURY CHALK FORMATION)			-			C 1	8 10.80-12.30	102	100	76	72			: E
Ct.ff arou (1 AV with	frequent coprolites (<45mm x 30mm).			11.86	10.14										J I I
(WMCK) [CAMBRID	GE GREENSAND MEMBER] ink grey CLAY. Fissures are horizontal to	\dashv		12.05	10.14									is a	H.,
	spaced undulating smooth.								_]∃.
	ontal undulating smooth with dustings of silt		<u>-x</u>	-										133	լ և .
			<u>x_</u>	:											LH:
			<u> </u>	-			C 1	9 12.30-13.80	102	100				-	
		18	<u> </u>	:											
at 13,68m 45 degre	es planar polished	Unweathered	x_	(3.05)									NA		
] 3	x	-										_	
at 14.10m siltstone	nodules (<10mm x 10mm)		X												
			<u>x_</u> _	-			C 2	0 1380-1510	102	100					
			x_	-											
			X_	15.10	10.14									_	
Complete at	15.10m. Termination Reason: Achieved Scheduled Dep h			-181											1
				-]
]
				7										2*	1
				:]
]										·]
				2											1
														55	1
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				-											-
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				-											-
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				7										-	1
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]
				:			L		L						1
Notes	All depth in metres, all diameters in millime	etres.				<u> </u>							T		<u> </u>
AGS	See header sheet for details of boring, prog	ress and	water.												
FINAL	For details of abbreviations, see key. Print date and time 12.	09/2077	13:56		lo	g chec	ked	by David Howar	d				SOI	L enginee	RING
Form No SIEXPHOLEL				Issue Date	02/03/20			,	_				Part o	f the Bachy Soletano	he Group

Project	Name	Can	nbridge \	Waste \	Nater Tre	atment	Plant I	Relocat	ion										Н	ole ID	
Project	No	TE8	364										Ex	plorat	ory Hole	e Log		 Bl	н т	PS_0	Ո1ի
Engine			tt MacD	onald B	Bentley													"	''	0_0	OID
Employ			hale Lim	ited																et 1 of 1	1
Ground L Date Star			09mOD .0/2021					Coordinate Co			9425.67E 10/2021		29.07N			Gri	d Iinatioi	ın	OSGB	n horizon	ntal
Top	Base		Date Tin	ne Start	Date Tin	ne End R	ig Crew					ant Us	sed Shor	ing Used	Pit Stabili		IIIIatioi		Remark		ıtaı
0.00 1.20	1.20 13.70	IP RC	07/10/20: 07/10/20:	21 08:00	07/10/202 08/10/202	1 09:00	CB CB	DT AL	NA Geobore	NA e S PCE	Insula	ited Hand oilmec SN		None	Stable						
									(146)												
D-4- '	T:	D 41-	Depth	Depth	ROGRESS		D				D-4-	T:	Depth	Dept		R STRIK		Γime		D	
Date 07/10/202	21 17:30	Depth 13.70	Casing 1.60	Water 6.25	End of Shift		Rema	arks			Date	Time	Strike	Casir			To Ela	apsed		Remark	(S
08/10/202 08/10/202		8.70 0.00	1.60	4.20	Start of Shif Installation	t Complete, B	orehole Co	mplete													
Depth	Depth	1		1	RCUSSION						Depth	Test	+			DETAILS	Hammer	- Carial F	Energy	Depth	Depth
Тор	Base	Tim	ne Start	Duratio	n Too			Rema	rks		Тор	Туре	1	Repor	ted Resul	t	Numb		Ratio	Casing	Water
					FLUSH DE	TAILS															
Depth Top	Depth Base		sh Type	Flush Returi	n Colour			Remarks	5												
1.20 7.70	7.70 13.70		IR/MIST IR/MIST	90 90	White Grey																
HOLE DI	AMETER	CASING Depth	G DIAMETE		Donth	DYNAM	IC SAM		Sample	Run	=										
Base 1.60	Diamete 150	r Base		er Depth T	op Base	Diameter	r Dura			Reference											
13.70	146	13.70																			
	INIOT	1111710	AL DETAIL	<u> </u>		- Dur	25.0014									nc					
Distance		R	N DETAILS esponse Re		Pipe Pipe		Base	STRUCTI	1	a Tuma	Depth	Dep	oth	U	EPTH REL						
Distance 13.70	S1	Type "			Ref Ref ipe 1 Pipe 1	Top 0.00	4.00	Diamet 100	PLAIN	е Туре	Top 8.70	Ba:		ole collapse	ed to 8.70m a		emark wal of wi		asing.		
					Pipe 1	4.00	12.20	100	SLOTTE	D											
				BACK	FILL DETA	ILS									LOCATI	ON DETA	ILS				
Depth	Depth		Descrip				Rer	narks								emarks					
Top 0.00	Base 13.70	Gravel b	•					-													
					ameters in																
AGS	3		eader shee etails of abl		ails of borin ns see key.	g, progres	s and w	ater.													
FINAL	_				date and tir	ne 12/09)/2022 1	3:56			Log ched	ked by	David H	oward			_	SOIL	. end	sinee	RING
Form No. S	SIEXPHOL	.EHDR		ı	ssue.Revisio	n No. 2.02		I	ssue Date	e 22/06/2	-							Part o	of the Bach	y Soletanche	e Group

Project Name	Cambridge Waste Water Treatm	ent Plant	: Relocat	tion										Hole ID	
	TF000/							Explo	rato	y Ho	le Lo	og -		III TOC O	.01.
Project No. Eng <mark>i</mark> neer	TE8364 Mott MacDonald Bentley												8	H_TPS_0	OID
Employer	Barhale Limited													Sheet 1 of 3	2
Ground Level	+10.09mOD	Coordinate	#S	549425.0	57E, 2610	29.07	N		Gri	d	OS	GB			
Ноје Туре	IP+RC	Inclination	1	90° from	honzonta	1									
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	ROD	ĸ	In Situ Test Details	Install- ation
	n stightly gravelly sandy CLAY. Sand is fine to			(0.30)		<u> </u>	D1	0.05-0.10	J.L		-				
(TOP) [TOPSOIL]	ngular to subrounded fine to medium of flint.	_		0.30	9.79	Ī		0.10-0.40							
	htty gravelly sandy CLAY Sand is angular to is angular to subrounded fine to medium.		·	0.55	9.54			0.40-0.50 0.40-0.80						-	
(SUPD) (SUPERFICIAL		_/					``	0.10 0.00							
CHALK. Sand is angu	ılar to subangular of flint. Gravel is angular to			(0.65)				0.80-1.20						_	
	BURY CHALK FORMATION]	_}	L T	1.20	8.89		D5	1.00-1.10	⊢						
	Composed of firm yellowish brown slightly ly calcareous CLAY Sand is fine. Gravel is														
subangular to subrou (CIRIA Grade Dm)	unded fine to coarse of extremely weak chalk.] :			C 7	1.20-2.20	102	100					
	BURY CHALK FORMATION]		100											150	
				:											
		Grade Dm		(2.50)	•										
		198			1		١.,	2.20-3.20	100	100					
			1 1				"	2.20-3.20	102	100			NA		
			1/2/1	+										\$ -	
			1 1	;											
]									-	
	composed of stiff yellowish brown mottled	-	T T	3.70	6.39										
	ghtly gravelly calcareous CLAY, Gravel is unded fine to coarse of extremely weak chalk.	Grade Dm		(0.65)			C 9	3.20-4.70	102	99	23	23		87	
(CIRIA Grade Dm)	BURY CHALK FORMATION]	5.0													
Very weak low densi	ty CHALK composed of yellowish brown		TT	4.35	5.74										
spaced undulating re	IE. Discontinuities: 1) 10-35 degrees medium ough with clay infill (CIRIA Grade 82)			:											
(WMCK) [WEST MEL	BURY CHALK FORMATION]													==	
					1										
		88					١.,	0 /70 000	100				60		
		grade ((2.40)			[0 4.70-6.20	102	83	79	63	210		LΗ
		8		:	1								610		
				+										2=	- H
				:					H						[: □::
				_	1										1 □
Many week madition of	density CHALK composed of grey calcareous		l l	6.75	3.34		C1	1 6.20-7.20	102	71	71	71			. ⊟
SILTSTONE Discontin	nuities. 1) 10-40 degrees medium spaced plan	nar		-										-	[F :
rough with clay infill (WMCK) [WEST MEL	. (CIRIA Grade B2) BURY CHALK FORMATION]				1				⊢						
			4]		C1	2 7.20-7.70	102	100	100	100			
] :											
		82											120		
		Grade B2		(2.65)	1								383 400		
		6		;					102	100	93	93	***		
			T of				C1	3 7.70-9.20	102	100	95	95		-	
			1 1												
														-	
			, T									\vdash			1 1 1
	HALK composed of grey calcareous SILISTON stiff grey calcareous clay. Discontinuities: 1)	E		9.40	0.69				102	100	92	47		-	1 1
10-45 degrees/near	vertical degrees medium spaced planar rough	,		1	}				102	100	32	"'			
with silt infill. (CIRIA	Grade B2)						C 1	4 9.20-10.70							
12000															
E0.00000000000000000000000000000000000	All depth in metres, all diameters in millin		1467277												
	See header sheet for details of boring, pro For details of abbreviations, see key.	yress and	watef.												
FINAL	Print date and time 1	2/09/2027	13:56		Lo	g chec	ked	by David Howar	d				SOI	L enginee	RING
Form No. SIEXPHOLEIC				Jerus Detr	02/03/20									f the Rachy Soletano	h- C

Project Name	Cambridge Waste Water Treati	ment Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Exp <mark>l</mark> oi	ator	y Ho	le Lo	g		BH_TPS_0	01b
Eng <mark>inee</mark> r	Mott MacDonald Bentley												-		
Employer Ground Level	Barhale Limited	5		E/0/2E/	75 2510	20.071			<u> </u>			~~		Sheet 2 of 2	2
Ground Level Hole Type	+10.09mOD IP+RC	Coordinate Inclination			57E, 2610: honzo <mark>n</mark> ta		V		Gri	a	OS	GB			
		ering		Depth	Datum			Sampling		mple % Xx	S-WG	۵		In Situ Test	Install-
_	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike		Details	Dia	TCR/Sample Recovery %	SCR/Blows	₩ Q	<u></u>	Details	ation
	CHALK composed of grey calcareous SILTSTO f stiff grey calcareous clay. Discontinuities: 1)	٠ I	<u>' ' </u>											;	
10-45 degrees/near with silt infill. (CIRIA	vertical degrees medium spaced planar rou	grade B2	' '	(1.50)									200 216		
(WMCK) [WEST MEL	LBURY CHALK FORMATION]	85		:									490		
	rey slightly gravelly slightly sandy CLAY. Sand	d is		10.90 (0.30)	-0.81							35			
coprolite.	guiar to subrounded fine to coarse of black	├	- 17 - T	11.20	-111										
Stiff fissured dark gr	GE GREENSAND MEMBER] ey CLAY with occasional nodules of siltstone			_			C 1	5 10.70-12.20	102	100	13	13			
polished.	issures are 10-15 degrees closely spaced pla	anar													
(GLT) [GAULT FORM/	RHONJ		===	2										100	
		pere											NA		
		Unweathered		(2.50)										-	
] 5							400	***					
			===	*			C 16	5 12.20-13.70	102	100				-	
		.	<u> </u>	13.70	-3.61]	
Complete at 1	3.70m Termination Reason: Achieve Scheduled Dep h	ed			5.22										
				:]	
															1
				:											
				2										=	:
				:											1
]											
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				<u> </u>			\vdash		\vdash					-	\vdash
0.0000000000000000000000000000000000000	All depth in metres, all diameters in mill See header sheet for details of boring, p		water.												
	For details of abbreviations, see key.	-9. 555 diliu												1 0001000	0100
FINAL Form No. SIEXPHOLED	ked i	by David Howard	j					L ENGINEE of the Bachy Soletano							

Project	Name	Cam	nbridge \	Waste \	Water [*]	reatmer [it Plant I	Reloca	ition					_					Н	ole ID	
Project	No.	TE8	364											Exp	loratoi	y Hole I	Log		BH 7	ΓPS_C	002
Engine		Mot	t MacDo	onald E	Bentley																
Employ Ground L			nale Limi L4mOD	ited				Coordii			F/0/1	01 / 05	260071	1400			Grid		She OSGB	et 1 of 1	1
Date Star			8/2021					Date C				81.40E, 3/2021	260971	.UUN				nation		m horizor	ntal
Тор	Base		Date Tin			ime End		Logge	er Barre	el Type D	rill Bi		nt Used		-	it Stability			Remark	(S	
0.00	1.20 15.20	IP RC	24/08/202			2021 13:00	Craig Blackett Craig	DT AL		NA bore S	NA PCD		ted hand to	ols N	one	Stable					
1.20	13.20	, Ke	24/00/202	21 15.00	24,00	2021 17.50	Blackett	AL		146)	100	301	innec sivio								
				P	ROGRE	SS										WATER	STRIKES	<u> </u>			
Date ⁻	Гіте	Depth	Depth	Depth	T		Rema	arks				Date '	Time	Depth Strike	Depth	Depth	Water Rose To	Time		Remark	(S
24/08/202 25/08/202		15.20 15.20	1.40 1.40	3.40 3.20	Drilling Start of	Complete					- 1	24/08/20	21 15:00	5.50	Casing 1.40	Sealeu	0.00	Elapsed 0	Rise not	recorded. Flo	
25/08/202		0.00	0.00	3.20		on Complete,	Borehole Co	mplete											Increasi	ig with dept	
			CA	BLE PE	RCUSSIO	N DETAIL	S									SPT D	ETAILS				
Depth	Depth	Tim		Duratio		ool		Rem	arks			Depth	Test		Reporte	d Result		lammer Serial Number	Energy	Depth	Depth
Тор	Base											Тор	Туре		•			Number	Ratio	Casing	Water
				DOTA DV	/ FLLICH	DETAILS															
Depth	Depth	Elus	sh Type	Flush				Remark	/c												
Top 1.20	7.70	All	R/MIST	Retur 90	Whi	e		Remair													
7.70	15.20	All	R/MIST	90	Gre	y .															
HOLE DI	AMETER	CASING	DIAMETE	R		DYNAN	ЛІС SAM	PLING	i												
Depth Base	Diameter	Depth Base	Diamete	r Depth T	op Dep		ter Dura		Sample	e Ru ry Refere											
1.40 15.20	150 146	1.40	150		Das	e			Recove	Ty Keleit	ence										
15.20	146																				
	INSTA		N DETAILS			F	PIPE CONS	STRUCT	ΓΙΟΝ						DEI	PTH RELAT	ED REM	ARKS			
Distance	ID 1	ype	sponse Res		Pipe Pip Ref Re	f lop	Base	Diame	eter F	Pipe Typ	ре	Depth Top	Depth Base				Ren	narks			
13.00	S1	SP	3.30	13.00 P	ipe 1 Pip Pip		3.30 13.00	100 100	PLA SLO	AIN OTTED											
Donath	Donth			BACI	KFILL DI	TAILS					\Box					LOCATIO	N DETAIL	.S			
Depth Top	Depth Base	Cwc	Descrip	tion			Rer	marks								Rem	narks				
0.00 13.00	13.00 15.20	Gravel ba Bentonite																			
	NI-+	C. VII -1.	ath i= :	roc all d	iamata	in mill:	troc											1			
AGS	INOTE	See he	ader shee	t for deta	ails of bo	in millime ring, progr		ater.													
		For de	tails of abb				10/2022 4	3.E.c.			1 -	o chr -	and his 5	avid II-	ward			SOI	L en	sinee	RING
FINAL Form No. S	IEXPHOLE	HDR				time 12/0 sion No. 2.0		.ა.၁೮	Issue D	Date 22/0		-	ked by E	aviū Ho\	ward					ny Soletanche	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
								Explo	rato	ry Ho	ole Lo	og -	Ι.	OLL TOC	000
Project No. Engineer	TE8364 Mott MacDonald Bentley												'	BH_TPS_	UUZ
Employer	Barhale Limited													Sheet 1 of	2
Ground Level		dinate	:s	549481.	40E, 2609	71.00	N		Gri	id	OS	SGB			
Hole Type	IP+RC Incli	nation		90° from	honzontz	al									
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
		Š	877789777	ness)		3		Details	Dia	고 문 종	R				-37
angular to subround	m slightly sandy slightly gravelly clay. Gravel is ded fine to medium of flint. Sand is fine to coarse.			(0.30)	.	l		0.05-0.10 0.20-0.25							
Occasional roots. (TOP) [TOPSOIL]	/	1		0.30	9.84			0.10-0.40 0.40-0.50							-
Firm brown slightly	gravelly sandy CLAY Sand is fine to coarse. Gravel inded fine and medium of flint.	_	1 1	0.55	9.59		ES 5	0.50 -0.55						· ·	
(SUPD) SUPERFICIA	AL DEPOSITS] /	Grade Dm	<u> </u>	(0.65)	1		Be	0.40-0.80							
	K composed of firm light greyish brown slightly Sand is fine to medium. Gravel is angular to	\$		- 5	1			0.80-1.20 1.00-1.10							
subangular medium	of flint. (CIRIA Grade Dm) LBURY CHALK FORMATION]	\vdash	Tolky.	1.20	8.94	i		1.10-1.20							
Structureless CHALL	K composed of firm yellowish grey calcareous	٤		(0.50)	1										
fine sand (CIRIA Gra	al pockets (<10mm x 10mm) of orangish brown ade Dm)	Grade D	T I	1.70	8.44		.,,	1.20 -2.20	102	100			NA		-
	LBURY CHALK FORMATION] K composed of firm yellowish grey calcareous	5	' ' '	(0.50)	}		"	J 12U-2.20						is	
CLAY with clasts of	very weak to weak subangular to subrounded fine		1 31 3	2.20	7.94										
(WMCK) WEST MEI	ed fragments of chalk. (CIRIA Grade Dm) LBURY CHALK FORMATION]	1	1 1		‡										
Extremely weak low calcareous SILTSTOR	density light grey CHALK composed of NE. With 0 to 20 degree closely spaced undulating		7 7	(9.00)	1		.,	L 2.20-3.20	100	400	400	95			
incipient fractures. ((CIRIA Grade - unable to determine)		<u> </u>	(1.00)	1		[1 220-320	102	100	100	95			
(ANIMICIA) [AAE21 MIEI	LBURY CHALK FORMATION]		1 1	+											
	density light grey CHALK composed of		 	3.20	6.94									-	
	NE Discontinuities 1) 20 to 40 degrees very spaced undulating rough with orangish brown				1										1 II.
staining, (CIRIA Grad			7 7		1										1. II
(AAMICK) (AREST ME	LBURT CHALK FORMATION]	22	1		3		C 12	2 3.20-4.70	102	100	97	80	40		
		Grade 82		(1L78)									255 470	0.0	
		<u>ح</u>			_								470		1.₽
					‡										1 F
			- '' I		•										1
Very weak high dens	sity light grey CHALK composed of calcareous		1 1	4.98	5.16							l 1		9	
	inunies 1) 20 to 38 degrees extremely closely to dulating rough with orangish brown staining.		7]] '⊟
(CIRIA Grade B3)			 		1	巫	C 13	3 4.70-6.20	102	99	87	77			1
(ANMICK) (ANEZI MEI	LBURY CHALK FORMATION]		 		‡										1 1
		82	1 1		1								10		1 H
		Grade (1 1	(2.22)	}								170 320		3 F.
		ত	 		1								320		1 II.
			7 1	:	‡										: 1
					1										1 II.
				1			C 14	6.20-7.70	102	100	83	53]. H
Very weak medium	density light grey CHALK composed of calcareous			7.20	2.94							lŀ			
	inuities 1) 15 to 40 degrees closely to medium rough with orangish brown staining(CIRIA Grade				1										
B2)	LBURY CHALK FORMATION]				1				_						L. Fi
(VOINICITY (VOES) MIE	LBURT CHALK FORMATION]				1								115		
			' ' ' '	(1.B5)]								370		
			7]	:		.,	5 7.70-9.20	100	400		_,	404		1
		Grade B2	1 1	-	1		"	5 1.1U-9.ZU	102	100	87	77			1 1
		5	PT		1										
Non-mark madism	density and CHRIS and a feel and			9.05	1.09										1
SILTSTONE with me	density grey CHALK composed of calcareous dium spaced thin beds of extremely weak low		7 7		1				\vdash						1 H
	composed of calcareous sittstone. Discontinuities closely to medium spaced undulating rough with		1 1] .	1										1 F
	ning. (CIRIA Grade B2) LBURY CHALK FORMATION]				‡				102	100	93	67			1 1
(ary (esec) MEI					1	L	C 16	9.20-10.70	L	L	L				
							1		_		_	ΙŢ			
															1
															1
		L			L	L				L	L				<u>L</u>
	All depth in metres, all diameters in millimetre														
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.	s and	water.												
FINAL	Print date and time 12/09	/2022	1356		10	o cha	ked t	y David Howar	rd				SOI	L enginee	RING
Form No. SIEXPHOLEI		LUZZ		Issue Date	P U5/U3/20		JACU L	,, outin i⊐owidi	J				Part o	f the Rachy Soletane	he Grown

Project Name	Cambridge Waste Water Treatm	nent Plant	Relocat	tion										Hole ID	
Project No. Eng <mark>inee</mark> r	TE8364 Mott MacDonald Bentley							Explo	rato	ry Ho	ole Lo	og		BH_TPS_0	002
Employer	Barhale Limited													Sheet 2 of	2
Ground Level	+10.14mOD	Coordinate	s	549481.	40E, 2609	71.00	N		Gri	id	O.	SGB			
Hole Type	IP+RC	Inclination	1	90° from	honzonta	_	_			1-					
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	ᄟ	In Situ Test Details	Install- ation
SILTSTONE with me density grey chalk i 1) 15 to 40 degrees orangish brown sta (WMCK) [WEST ME WMCK] [CAMBRIC Stiff fissured dark g x 8mm]. Fissures as planar smooth. (GLT) [GAULT FORW at 11.99m Contact		with payteevin		(2.75)	-166 -185	ev.	C1	Details 7 10.70-12.20 8 12.20-13.70	102	100	289	53	70 343 440		
Notes	. All depth in metres, all diameters in milli	metres.													
AGS	See header sheet for details of boring, pr For details of abbreviations, see key.		water.												
FINAL		12/00/2022	1356		la.	n char	·karl !	hy David House	d				SOI	L enginee	RING
FINAL Form No SIEXPHOLE			13.30	Issue Dat	Print date and time 12/09/2022 13:56 Log checked by DG Issue Revision No. 2.05 Issue Date 02/03/2018										he Group

Project	Name	Cam	bridge \	Waste V	Vater Tre	atment	Plant l	Relocat	ion										H	lole ID	
_			Ü									İ		Ехр	lorato	ry Hole	Log				
Project		TE83																E	3H_T	PS_0	02b
Enginee			t MacDo		entley														0.1		
Employe Ground Le			nale Limi 1mOD	ited				Coordina	-4	F/0/	35.44E	201	020.22	ON.			Grid		OSGB	et 1 of 1	L
Date Start			0/2021					Date Co			0/2021		029.23	SIN				nation	USGB		
Тор	Base		Date Tin	ne Start	Date Tim	ne End R	lia Crew		Barrel Type			ant U	Ised	Shorin	g Used	Pit Stability			Remark	ζS.	
0.00	1.20	IP	11/10/202		11/10/202		Craig Blackett	CB	7.				nd tools		one	Stable		Inspe	ection pit: H		
1.20	13.30	RO	11/10/202	21 09:30	11/10/202		Craig Blackett	СВ		Tricone Steel	So	ilmec S	SM8								
							Didonott			0.000											
				DI	ROGRESS											WATER	STDIKE	c			
Date 1	imo	Depth	Depth	Depth			Rema	rke			Date	Time		Depth	Depth		Water			Remark	
11/10/202		0.00	Casing	Water	Start of shift	:	Nema	11 NS			Date	11111		Strike	Casing	g Sealed	Rose To	Elapse	t	Keillair	.5
11/10/202		0.00			Installation (orehole Co	mplete													
Depth	Depth		CA	ABLE PER	CUSSION	DETAILS					Depth	Te	ct I			SPT D	ETAILS		Energy	Depth	Depth
Тор	Base	Time	e Start	Duration	Tool			Rema	rks		Тор	Ty			Report	ed Result		Hammer Serial Number	Ratio	Casing	Water
				DOTA BY	FILIALI DE	TAU 0															
Depth	Depth	T		Flush	FLUSH DE	IAILS															
Top 1.20	Base 5.80		sh Type R/MIST	Return 90				Remarks	S												
5.80	13.30		R/MIST	90	Grey																
HOLE DIA	AMETER	CASING	DIAMETE	R		DYNAM	IC SAM	PLING													
Depth	Diameter	Depth	Diamete	r Depth To	Depth	Diameter		tion	Sample	Run											
Base 13.30	150	Base 1.60	150	+ -	Base			R	ecovery Re	terence											
					1,																
	INSTA		V DETAILS		ino Di	PIF	PE CONS	STRUCTI	ON		Donth	1 5	n+h l		DE	PTH RELAT	TED REN	MARKS			
Distance		ype		Base F	ipe Pipe Ref Ref	Тор	Base	Diamet		Туре	Depth Top		epth ase				Re	marks			
13.30	S1	SP	0.00	13.30 Pi	pe 1 Pipe 1 Pipe 1	0.00 4.00	4.00 12.00	100 100	PLAIN SLOTTED												
				BACK	FILL DETA	ILS		1	1					I		LOCATIO	N DETAI	LS			
Depth Top	Depth Base		Descrip	tion			Rer	narks								Rem	narks				
0.00	13.30	Gravel ba	ckfill							E	Borehole f	ormed	for inst	allation o	of pump w	ell installation					
┢		<u></u>				:0:															
100	Note				ameters in ils of boring			ater.													
AGS			tails of abl															<u> </u>			
FINAL					ate and tin)/2022 1				og chec	ked b	by Dav	vid Hov	vard					GINEE	
Form No. S	IEXPHOLI	HDR		ls	sue.Revisior	No. 2.02		l:	ssue Date 2	22/06/20	16							Par	t of the Bac	hy Soletanche	Group

Project Name	Cambridge Waste Water Treat	ment Plant	Relocat	tion									Hole ID	
Project No.	TE8364						Explo	orato	ry Ho	le Lo	og	E	BH_TPS_0	02b
Eng <mark>inee</mark> r Employe <mark>r</mark>	Mott MacDonald Bentley Barhale Limited												Sheet 1 of 3	2
Ground Level	+1021mOD	Coordinate	s	549435	4E, 2610	29.231	<u> </u> 	Gri	id	OS	SGB .		0,,,,,,,,	
Hole Type	IP+RO	Inclination												
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling	Dia	TCR/Sample Recovery %	SCR/Blows	ROD	Ħ	In Situ Test Details	instalj- ation
Sandy gravelty TOPS (TOP) [TOPSOIL]	SOIL (Driller's description)			(0.35)			D1 0.05-0.10 B2 0.10-0.40							
(SUPD) (SUPERFICIA	gravelly (Dritler's description) AL DEPOSITS)			0.35 0.55	10.21 10.21		D3 0.40-0.50 B4 0.40-0.80							
CHALK (Driller's des (WMCK) (WEST ME	scription) LBURY CHALK FORMATION]		<u> </u>				D-1 0.10-0.00							
				Ē			B6 0.80-1.20 D5 1.00-1.10							
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			7 7											
			1	- 5									-	
			4	1										
			7 ' ' '											
								T						
AGS	All depth in metres, all diameters in mill See header sheet for details of boring, p		vater.					-						
7	For details of abbreviations, see key.	4D ### #===	1050				Late. B. Com					SOI	L enginee	RING
Final Form No Siexpholei	Print date and time LOG Issue Revision I		13:26	Issue Date	Lo 02/03/20		ked by David Howa	ia					of the Bachy Soletano	

Project Name	Cambridge Waste Water Treatm	nent Plant	Relocat	ion									Hole ID	
D:+ N-	TE026/						Exploi	rator	у Но	le Lo	9		II TDC A	กวน
Project No. Engineer	TE8364 Mott MacDonald Bentley											6	H_TPS_0	UZB
Employer	Barhale Limited												Sheet 2 of 2	2
Ground Level	+10.21mOD	Coordinate		5494354	4E, 2610	29.23N		Grie	d	OS	GB			
Hole Type	IP+RO	Inclination			Ι	۵			0 40					
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	SQD	±	In Situ Test Details	Install- ation
CHALK (Driller's des (WMCK) (WEST ME	cription) LBURY CHALK FORMATION]		<u>'</u> ''											
(<u> </u>	:									:	
			<u>'</u> ' ' '											7 ()
			<u> </u>	1100	10.22									
Grey CLAY (Driller's (GLT) [GAULT FORM	description) ATION]			11.00 -	10.21									, , ,
	•		F==											
] :										7 .
				(2.30)										
				:										
														1.64
				-									-	
Complete at 1	13.30m. Termination Reason: Achieve	ьd		13.30	10.21									
	Scheduled Dep h			:									-	1
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	All depth in metres, all diameters in mill	imetres.		•										•
AGS	See header sheet for details of boring, p For details of abbreviations, see key.	rogress and	water.											
FINAL	Print date and time	12/09/2022	13:56		Log	g checi	ked by David Howard	d				SOII	L enginee	RING
Form No. SIEXPHOLEL	OG Issue Revision N	lo 205		Issue Date	02/03/20							Part of	f the Rachy Soletano	he Groun

Project	Name	Can	nbridge	Waste	Wat	ter Tre	atment	Plant F	Reloca	tion										Н	ole ID	
Project	No	TE8	364												Exp	lorator	y Hole	Log		3H 7	ΓPS_(203
Engine			t MacD	onald	Bent	tley														· · ·		
Employ			nale Lim	iited																	et 1 of :	1
Ground L Date Star			28mOD 8/2021						Coordin Date Co				471.40E, 08/2021	260961	10N			Grid Inclin	ation	OSGB		
Top	Base		Date Tir	ne Star	t Da	ate Tim	ne End R							nt Used	Shorir	ng Used Pi	t Stability			Remark	(S	
0.00 1.20	1.20 15.20	IP RC	25/08/20 25/08/20	21 12:00	2	5/08/202	1 13:00	CB CB	DT AY	N	NA bore S	NA PCD	Insulat	ted hand to	- 1	one	Stable					
											46)											
						GRESS		·		'			•					STRIKES		,		
Date '		Depth	Depth Casing	Deptl Wate	r			Rema	rks				Date '	Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed		Remark	ΚS
25/08/20 26/08/20	21 07:30	15.20 15.20	1.70 1.70	3.60 3.30	Sta	d of Shift art of shift																
26/08/20	21 11:45	0.00	0.00	Dry	Ins	stallation (Complete, Bo	orehole Cor	mplete													
			<u> </u>																			
Depth	Depth	T		1	\neg		DETAILS						Depth	Test				ETAILS	ammer Serial	Energy	Depth	Depth
Тор	Base	Tim	e Start	Durati	on	Tool			Rema	arks			Тор	Туре		Reporte	d Result	- "	Number	Ratio	Casing	Water
				ROTAR	Y FLI	USH DE	TAILS															
Depth	Depth	Flu	sh Type	Flus		Flush		ı	Remark	s												
Top 1.20	Base 9.20	Al	R/MIST	Retu 90		Colour White																
9.20	15.20	Al	R/MIST	90		Grey																
HOLEDI	A N 4 F T F F	CACINIC	DIAMETE				DYNAMI	IC CANA	DLING													
Depth		Denth				Depth				Sample	e Ru	ın										
Base 15.20	Diamete 146	Base	Diameti 150	er Depth	Іор	Base	Diameter	Durat			ry Refer	ence										
10.20	1.0	15.20	146																			
						1																
		lpa	N DETAIL		Pipe	Pipe		PE CONS	1				Depth	Depth		DEF	TH RELA					
Distance 13.20	ID S1	Type "SP	Тор	Base 13.20	Ref Pipe 1	Ref	Top 0.00	Base 3.20	Diame 100	ter P	Pipe Typ	pe	Тор	Base				Ren	narks			
13.20	31	Jr	3.20	13.20	ripe I	Pipe 1	3.20	13.20	100	SLO	TTED											
Donah	Donath	1		BAC	KFIL	L DETA	ILS										LOCATIO	N DETAIL	S			
Depth Top	Depth Base		Descri	ption				Ren	narks								Ren	narks				
0.00 3.20 13.20	3.20 13.20 15.20	Bentonite Gravel ba Bentonite	ckfill																			
15.20	15.20	bentonite	=																			
			pth in me						ato:													
AGS	5		eader shee tails of ab				y, progres	o anu Wa	atel.													
FINAL				Print			ne 12/09	/2022 1	3:56					ked by [avid Ho	ward			SOII	L end	sinee	RING
Form No. 9	SIEXPHOL	EHDR			Issue	e.Revisior	No. 2.02			Issue D	ate 22/0	06/20	16						Part	of the Back	ny Soletanch	e Group

Project Name	Cambridge Waste Water Treatment	Plant	t Relocat	tion										Hole ID	
Doctor Man	- -							Explo	rato	ry Ho	le Lo	og	Ι.	DII TOC	002
Project No. Engineer	TE8364												'	BH_TPS_	003
Employer	Mott MacDonald Bentley Barhale Limited													Sheet 1 of	2
Ground Level		rdinate	es	549471	40E, 2609	61.10	N.		Gri	id	OS	SGB		SHEEL I OI	
Hole Type		nation		0.031.2	744 2440	01.10									
			<u> </u>	D		۵	Т			⊕ ≽€	100				T
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrie	l	Sampling		TCR/Sample Recovery %	SCR/Blows	PGO	<u></u>	In Situ Test	Install-
		Wea		ness)	Level	囊	Г	Details	Dia	5 %	32	~		Details	ation
	wn slightly gravelly sandy CLAY. Sand is fine to			(0.30)	-			0.05-0.10							- 8
quartz. Occasional	igular to subrounded fine to coarse of flint and rootlets.		<u> ((1))((())</u>	0.30	10.28			2 0.20 -0.25 0.10 -0.40							
(TOP) [TOPSOIL]	gravelly sandy CLAY. Sand is fine to coarse. Gravel	/		(0.50)	1		D4	0.40-0.50							- N
is angular to subrou	unded fine to medium of mixed lithologies.			0.80	10.2B			5 0.50-0.55 0.40-0.80							- 1
Occasional flints. (SUPD) [SUPERFICIAL	AL DEPOSITS]	age d	J.C.T.	(0.40) -] 1028		١,,	0.80-1.20							<u> </u>
	K composed of firm greyish brown to light brown ndy calcareous CLAY Sand is fine to coarse. Gravel		and the same	1.20	10.28		D7	1.00-1.10							
is angular to subrou	unded fine to medium of extremely weak to very	ig 5		(0.30)	1		ES	8 1.10-1.20							
weak and flint. (CIR (WMCK) IWEST ME	tiA Grade Dm) ELBURY CHALK FORMATION]		10 10	1.50	10.28		ı						NA		
Structureless CHAL	K composed of firm greyish brown calcareous	Grade	1	(0.4B)	1		C1	0 1.20- 2.20	102	100	0	0			
(CIRIA Grade Dm)	pockets (<10mm x 10mm) of orange fine sand.		111	1.98	10.28		ı							-	
	ELBURY CHALK FORMATION] K composed of firm greyish brown gravelly	Grade B4/5	P P	(0.38)	1		l						NI		
calcareous CLAY. Gr	ravel is angular to subangular medium to coarse of	!——		2.36	10.28		l					-		e e	
	very weak chalk. (CIRIA Grade Dm) ELBURY CHALK FORMATION]	E D	V. I	(0.54)	7		١.,	4 000 000		400	_		NA		
Very weak low dens	sity greyish brown CHALK composed of calcareous	Grade	F T	3.00	1		["	1 2.20-3.20	102	100	0	0			
	red as non intact, highly fractured with frequent ir to subangular medium to coarse fragments with		W. W.	2.90	- 10.2B		ı							1	-100
orangish brown sta 84/5)	ining on fracture surfaces. (Possible CIRIA Grade		, ,	1	}		ı		-						
(WMCK) [WEST ME	ELBURY CHALK FORMATION]	1		1	}		ı							12	
	K composed of firm greyish brown gravelly ravel is angular to subangular medium to coarse of i	1		1	}		l] [
extremely weak cal	careous siltstone. (CIRIA Grade Dm)		15 E		1		١.,					۱.,			
	ELBURY CHALK FORMATION] medium density light grey CHALK composed of		1	7			[61	2 3.20-4.70	102	95	47	40			
	NE. Discontinuities: 1) 0 to 30 degrees medium smooth. 2) 45 degrees medium spaced planar		Page 1		‡		ı								
smooth. (CIRIA Grad	de A3)	2	The Part		1		l						NI		
	ELBURY CHALK FORMATION] 5m structureless chalk composed of firm greyish brown	Grade /	15 17	(3.50)	1		ı						150		
gravelly calcareous coarse extremely w	s clay Gravel is angular to subangular medium to weak chalk	Ğ		1	1		ı						220		
from 4.44m to 4.52	2m structureless chalk composed of firm greyish brown s clay Gravel is angular to subangular medium			-	1		ı								
extremely weak ch			10	1	1		l								
from 5.52m to 5.74	Am structureless chalk composed of firm greyish brown		1 1		1		C1	3 470-6.20	102	98	53	50		8	1 1
	clay Gravel is angular to subangular medium		1]		ı]
exactness weak on			T in the		}		l								
			T T		Ⅎ		l								
			T T	6.40	10.28		ı					- 13			
	medium density light grey CHALK composed of NE. Discontinuities: 1) 70 degrees closely spaced	క్ట్రీ ర	7 45 3	(0.30)	‡		ı						NI		1.1:
	n silt infill (>3mm). (CIRIA Grade C4) ELBURY CHALK FORMATION]	1		6.70	10.28		ı							1	
Very weak to weak	medium density light grey CHALK composed of	5		1	1		C1	6.20-7.70	102	100	40	34			1
	NE. Discontinuities: 1) 0 to 30 degrees closely to dulating smooth. 2) randomly orientated		ulife of list	1	1		ı								1. 1.
extremely closely s	paced planar smooth with iron staining. (CIRIA		The Part of	1	1		ı								138
Grade B3) (WMCK) WEST ME	ELBURY CHALK FORMATION]		f f	1 .	7	1									1. 出.
	5m structureless chalk composed of firm greyish brown s clay. Gravel is angular to subangular medium		T. E.	1	}	1									7 3
extremely weak ch			7 7	-	}		ı						NI]: ;
with iron staining	om structureless chalk composed of firm greyish brown	Grade 83	1,	(3.03)]		ı						180], [4]
gravelly calcareous	clay Gravel is angular to subangular medium	9		1 .	}		C1	5 770-9.20	102	93	53	46	270]. -
extremely weak ch	RIGIR		7	1	1	1									
			1 1	9	‡	1									
from 9.05m to 9.13	om structureless chalk composed of firm greyish brown		1		1	1									1.14.
	clay Gravel is angular to subangular medium			1	1	1			\vdash						2, 1
					1	1					_ ا				
Denotes de 1917	V	(Q)	T. I	9.73	10.2B	1			102	100	48	43		1	7
	K composed of firm light grey gravelly calcareous ular medium extremely weak calcareous siltstone.	Grade		(0.31)	7	1	CI	6 9.20-10.70							1 1:
							Γ								T "
						1									
						1									
B Blot	: All depth in metres, all diameters in millimetre	<u> </u>	1	<u> </u>			_		1	1	<u> </u>	<u> </u>	Т	44-	
AGS	See header sheet for detai <mark>l</mark> s of boring, progres		water.												
	For details of abbreviations, see key.														
FINAL	Print date and time 12/09						cked	by David Howa	rd					r engine	
Form No. SIEXPHOLE	IOG Issue Revision No. 2 05	:		hittie Date	e 02/03/20	18							Part o	f the Rachy Soletan	che Grove

Project Name	Cambridge Waste Water Treatm	ent Plant	Relocat	tion										Hole ID	
Project No.	TE8364							Explo	ratoi	ry Ho	ole Lo	og		BH_TPS_	003
Eng <mark>inee</mark> r Employer	Mott MacDonald Bentley Barhale Limited													Sheet 2 of	2
Ground Level		Coordinate	es	549471.	40E, 2609	61.10N			Gri	id	OS	SGB		SHEEL Z OF	
Hole Type	IP+RC	Inclination	ı												
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	ī	In Situ Test Details	Install- ation
	K composed of firm light grey gravelly calcared ular medium extremely weak calcareous sitistor	us		10.04	10.2B		H								т.
(CIRIA Grade Dm) (WMCK) [WEST ME Extremely weak to to calcareous SILTSTO) to medium spaced	ELBURY CHALK FORMATION] very weak medium density CHALK composed o WIE. Discontinuities 1) 0 - 30 degrees very close undulating and smooth. [CIRIA Grade A2) ELBURY CHALK FORMATION]	_		(1.97) -									35 240		
Stiff grey CLAY with	n frequent coprolites (<45mm x 30mm).	- B		12.01 -	10.28		C1	7 10.70-12.20	102	100	84	80	380		
Very stiff fissured da	OGE GREENSAND MEMBER] lark grey CLAY. Fissures are horizontal to ely to medium spaced undulating and smooth. AATION]			12.22	10.28		C1	8 12.20-1370	102	100	0	0			
		Unweathered		(2.98)									NA		
							C 1	9 13.70-15.20	102	100					
Complete at	15.20m. Termination Reason: Achieved Scheduled Dep h			15.20	10.28										
				-										:•	
				_											
														,-	
													_		
AGS Notes.	All depth in metres, all diameters in millin See header sheet for details of boring, pro For details of abbreviations, see key. Print date and time 1	ogress and			Lo	g chec	ked I	by David Howan	d				SOI	L enginee	RING
Form No SIEXPHOLE			20.00	Issue Date	02/03/20	_	. rse-td	-, outle i lottel						f the Bachy Soletand	

Project	Name	Cam	bridge \	Naste V	Vater ⁻	Treatme	nt Plant I	Relocat	ion									Н	ole ID	
			_										Exp	lorato	ry Hole	Log		· · T	20 0	221-
Project Enginee		TE83	364 t MacDo	nald B	entlev												B	н_11	PS_0	asu
Employ			ale Limi		еппеу													Shee	et 1 of 1	
Ground L		+10.2	2mOD					Coordina	ates	54943	35.45E, 2	61019	.05N			Grid		OSGB		
Date Star)/2021					Date Co)/2021						nation			
Top 0.00	Base 1.20	Туре	Date Tim 12/10/202			Time End 2021 10:30	d Rig Crew	Logger	Barrel Type	Drill Bi		t Used	- 1	ng Used I one	Pit Stability Stable	/		Remark		
1.20	13.30	RO	12/10/202			2021 13:00	Blackett Craig	СВ		Tricone		nec SM8						·	J	
							Blackett			Steel										
				PF	ROGRE	SS									WATER	STRIKE	<u> </u>			
Date 1	ime	Depth	Depth	Depth			Rema	arks			Date T	ime	Depth	Depth	Depth	Water	Time		Remark	s
12/10/202 12/10/202		0.00	Casing	Water	Start of		e, Borehole Co						Strike	Casing	Sealed	Rose To	Elapsed			
12/10/202	114:00	0.00			installat	ion Complet	е, вогепоје Со	mpiete												
Depth	Depth				1	ON DETAI	LS				Depth	Test			SPT D	DETAILS		Enoroy	Donth	Depth
Тор	Base	Time	Start	Duration	T	ool		Rema	rks		Тор	Туре		Report	ed Result		Hammer Serial Number	Energy Ratio	Depth Casing	Water
				ROTARY	 FLUSH	DETAILS														
Depth	Depth	Flus	h Type	Flush	Flus	sh		Remarks	<u> </u>											
Top 1.20 8.80	8.80 13.30		/MIST	Return 90 90	Whi	te														
8.80	15.50	AIR	/ IVIIS I	30	Gre	y														
HOLE DIA	AMETER	CASING	DIAMETER	₹		DYNA	MIC SAM	PLING												
Depth	Diameter	Depth	Diamete	r Depth To	Dep	th Diam		tion S		!un										
Base 13.30	150	1.20	150	<u>'</u>	P Bas	e		Re	ecovery Refe	rence										
	INSTA	LLATION	I DETAILS	;			PIPE CON:	STRUCTI	ON					DE	PTH RELA	TED REM	IARKS			
Distance		Re	sponse Res	sponse P	ipe Pip	e _{Top}		Diamete	1	/pe	Depth	Depth					marks			
13.30	S1	· .			Ref Re	1 0.00	4.00	100	PLAIN	-	Тор	Base								
					Pip	≥ 1 4.00	12.00	100	SLOTTED											
				BACK	FILL DE	TAILS									LOCATIO	N DFTAII	S			
Depth	Depth		Descrip			IAILO	Rei	marks								narks				
Top 0.00	Base 13.30	Gravel bac	•				T(C)	nurks		Во	orehole for	med for i	nstallation o	of pump w	ell installation					
	Note	s: All den	th in met	res, all dis	meters	in millim	etres													
AGS		See hea	ader sheet	t for deta	ils of bo	ring, prog	ress and w	ater.												
FINIAL		ror det	ails of abb				/09/2022 1	3.56		Lo	o chock	ad by F)avid Hov	word			SOIL	. end	inee	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Form No. SIEXPHOLEHDR

Employer Barhale Limited Sheet 1 of 2 Ground Level +10.22mOD Coordinates 549435 45E, 261019.05N Grid OSGB	Project Name	Cambridge Waste Water Treat	ment Plar	nt Relocat	ion									Hole ID	
Sample More March Lemined March Lemine	Project No.	TE8364						Expl	orato	ry Ho	le Lo	9	\mid B	H TPS C)03b
County 10,22 m 10,22	Eng <mark>inee</mark> r	Mott MacDonald Bentley													
Part Part			Coordina	tae	5404254	SE 2610	10.058	<u> </u>	Gri	id	0	C0		Sheet 1 of	2
Each Control Prince C	Hole Type				3-0-100-	JJC, 2010.	10.001	•	G.		0.	~JD			
Each Control Prince C		Description of Strata	Weathering	Legend	(Thick-		Waterstrike		Dia	TCR/Sample Recovery %	SCR/Blows	ROD	<u>u</u>		
Vote: All disprts in motions all clarences in millimeters. Control of the state		SOIL (Driller's description)			(0.35)										
CONAC (Durist not about 7 crosswinding) Construction Construc					1			D 3 0.40-0.50							
Return All dogsts in motives, all distrinctors the millimenture. See header since for details of boring progress and watest For details of double distrinctors, see they. Final All September 1, 1985 (2004) (2004	CHALK (Driller's des	senption)	_1		0.55	10.22		B 4 0.40-0.80							
See header sheet for details of boring, progress and water. For details of abbreviations, see key. FINAL Print date and time 12/09/2022 13:56 Log checked by David Howard SOIL ENGINEERING	Notes	All depth in metres, all diameters in mil	ilimetres.		(10.45)										
	FINAL	For details of abbreviations, see key. Print date and time	12/09/202	2 13:56				ked by David How	ard						

Project Name	Cambridge Waste Water Treatm	nent Plant	Relocat	ion							Hole ID			
D:+ NI-	TEO2C						Explo	rator	у Но	le Lo	9		II TDC A	กวน
Project No. Engineer	TE8364 Mott MacDonald Bentley											6	H_TPS_0	บวม
Employer	Barhale Limited												Sheet 2 of 2	2
Ground Level	+10.22mOD	Coordinate		5494354	5E, 2610	19.05N	l	Gri	d	OS	GB	•		
Hole Type	IP+RO	Inclination			Ι				(D)					
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	g G	<u>.</u>	In Situ Test Details	Install- ation
CHALK (Driller's des (WMCK) [WEST MEI	cription) LBURY CHALK FORMATION]		<u>'</u> ''											
,,,				:									,	
													-	7 (1)
Grey CLAY (Driller's (GLT) [GAULT FORM.	description) ATION			11.00 -	10.22									, , ,
	•		F==										,	
] :										, ,
				(2.30)										
														1.0
			===											
				-										1.7
Complete at 1	3.30m. Termination Reason: Achieve	d									,			
	Scheduled Dep h											1		
						-								
				:										
				-										1
				-									-	
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]
				7									-	
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				:										
				-										1
				-										1
				7									100	
				:										
				:										1
								<u> </u>						
MINISTER STATE OF THE PARTY OF	All depth in metres, all diameters in milli See header sheet for details of boring, p	imetres. rogress and r	water.											
AGS	For details of abbreviations, see key.													
FINAL Form No. SIEXPHOLEI	Print date and time			Issue Date			ked by David Howar	d					L ENGINEE	

Project	Name	Cam	bridge '	Waste V	Vater Tre	atment	Plant l	Reloca	tion									Н	lole ID	
D	NI-	TE8	26/										Exp	lorato	ory Hole	Log		2Ы 7	ΓPS_()) ()
Project Engine			t MacD	onald B	entley												'	ו וכ	11-3_(JU 4
Employ			nale Lim		,													She	et 1 of 1	1
Ground L			25mOD					Coordin			481.30E		0.90N			Grid		OSGB		
Date Star Top	Base		8/2021 Date Tin	ne Start	Date Tim	e End F	Rin Crew		ompleted		08/2021 Bit Pla	ant Use	d Shorir	nn Used	Pit Stability		nation	90°† o Remark	m horizor	ntal
0.00	1.20	IP	26/08/20		26/08/202		Craig Blackett	DT	NA NA	NA		ited hand t		one	Stable			rterriari		
1.20	15.20	RC	26/08/20	21 14:00	26/08/202	1 17:30	Craig Blackett	AL	Geobore S (146)	PCD	So	ilmec SM	3							
			D		ROGRESS								Double	I D		STRIKE				
Date		Depth	Depth Casing	Depth Water	Deilling Com	-1-4-	Rema	arks				Time	Depth Strike	Depti Casin	g Sealed	Water Rose To			Remark	
26/08/202 27/08/202 27/08/202	21 07:30	15.20 15.20 0.00	1.65 1.65 0.00	3.40 3.20	Drilling Com Start of shift Installation		orehole Co	mnlete			26/08/20	021 15:00	4.00	1.65		0.00	0		noted, incre ise not recor	
217087202	113.30	0.00	0.00		Ilistaliation	complete, b	orenoie co	inpiete										masked	by ilusii.	
			CA	ABLE PER	CUSSION	DETAILS								-	SPT D	ETAILS	-			
Depth Top	Depth Base	Tim	e Start	Duration	Tool			Rema	arks		Depth Top	Test Type		Report	ed Result	ı	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
												1								
				ROTARY	FLUSH DE	TAILS														
Depth	Depth	Flus	sh Type	Flush				Remark	:S											
Top 1.20 10.70	10.70 15.20	All	R/MIST R/MIST	Return 90 90	White															
10.70	15.20	All	K/ IVIIS I	90	Grey															
HOLE DI	AMETER	CASING	DIAMETE	R		DYNAM	IC SAM	PLING												
Depth Base	Diameter	Depth Base	Diamete	er Depth To	Depth Base	Diamete	r Dura		Sample Recovery Re	Run										
1.65 15.20	150 146	1.65	150		Busc				tecovery ite	.iciciicc										
13.20	140																			
	INSTA		N DETAILS			PII	PE CON:	STRUCT	ION					DI	EPTH RELA	TED REM	1ARKS			
Distance	ID T	ype Re	sponse Re Top		ipe Pipe Ref Ref	Тор	Base	Diame	ter Pipe	Туре	Depth Top	Dept Base				Re	marks			
13.00	S1	SP		13.00 Pi	pe 1 Pipe 1 Pipe 1	0.00 3.10	3.10 13.00	100 100												
				BACK	FILL DETA	ILS						_			LOCATIO	n detai	LS			
Depth Top	Depth Base		Descrip	otion			Rei	marks							Ren	narks				
0.00 13.00	13.00 15.20	Gravel ba Bentonite																		
AGS					ameters in ils of borin			ater.												
AGN			tails of ab	breviation	is see key.												-	000		DICC
FINAL Form No. 9	IEXPH∩I F	HDR			late and tir		9/2022 1		Issue Date 2		•	ked by	David Ho	ward					ny Soletanch	
140. 3	I O L L			18					Date 2	/_(rait	Daci	,	vup

Project Name	Cambridge Waste Water Treatment	Plant	t Relocat	tion										Hole ID	
Project No.	TE8364							Explo	rato	y Ho	le Lo	9		3H_TPS_0	004
Eng <mark>inee</mark> r	Mott MacDonald Bentley														
Employe <mark>r</mark>	Barhale Limited													Sheet 1 of	2
Ground Level		rdinate			30E, 2609		N		Gri	id	OS	SGB			
Hole Type	IP+RC Incli	nation	<u> </u>	90° from	honzonta		_			Ø .a				I	Т
]	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	T	TCR/Sample Recovery %	SCR/Blows	Q.	<u>u</u>	In Situ Test Details	Install- ation
TOPSOIL: Dark brow	m slightly sandy slightly gravelly CLAY. Sand is fine	3	30//230//			\$	D1	0.05-0.10	Dia	₽ Æ	Ø				1000 1000 15
to coarse. Gravel is	angular to subrounded fine to medium of flint.			(0.30) 0.30	9.95		ES ?	0.20 -0.25							7
Occasional roots. \((TOP)(TOPSOIL)		1		0.45	9.80			0.10-0.40 0.40-0.50							-
	gravelly sandy CLAY Sand is fine to coarse. Gravel inded fine to coarse of flint.							5 0.50 -0.55 0.40 -0.80							
(SUPD) [SUPERFICIA				(0.75)			1								
subrounded fine to	coarse of flint.		1	1.20	9.05			0.80-1.2 0 1.00-1. 10						-	
(SUPD) SUPERFICIA Structureless CHALL	AL DEPOSITS K composed of firm yellowish grey slightly	\Box		120	9.03		ES	3 1.10-1.20							
gravelly calcareous	CLAY. Gravel is subangular to subrounded fine to weak low density chalk. (CIRIA Grade Dm)				1										
(WMCK) (WEST ME	LBURY CHALK FORMATION]			(1.00)	1		C 10	0 1.20-2.20	102	90					
from 1.20m to 1.40	m slightly sandy. Sand is fine to medium.			2										Fig.	
	m assumed zone of core loss K composed of stiff yellowish grey calcareous	2		2.20	8.05				-						1 5
CLAY with closely sp	paced thin beds of extremely weak low density		1 16		}										
Dm)	composed of calcareous siltstone. (CIRIA Grade	ے	1, 1		1		c1	1 2.20-3.20	102	90					
(WMCK) (WEST ME	LBURY CHALK FORMATION]	Grade Dm	<u> </u>	,	1								NA		
form 3 10m to 3 70	m assumed zone of core loss	9		*										3.9	
1411 0.2411 10 0.20	in addition 2010 0. Oak Roo		1	(2.33)	1										₽
			of self	(2.55)	}										+H
					}										}. I
				-		巫	C1	2 3.20-4.70	102	97					
from 4.20m to 4.70	m with some fossilised broken shell fragments				1										11
(<15mm x 10mm)	THE PERSON POSSIBOUR BROWN GROWN TO SERVICE		7] :	1										1.1
	ight grey CHALK composed of calcareous			4.53	5.72									'	3 .H
composed of stiff br	dium spaced medium beds of structureless chalk rownish grey calcareous clay. Discontinuities 1) 5				1										
to 20 degrees media (CIRIA Grade B2)	um spaced undulating rough with infill of silt.													=	I F
	LBURY CHALK FORMATION]] ;	1										1 1
				-	1		C1	3 4.70-6.20	102	100	80	73			
					}								90]
				(2.67)									296 570	29	: 1
			1		1				_						1 1
			17.1		}										1 1
					}										1
			10 1		1		 -1	4 6.20-7.70	102	95	79	75		56	
		22		7.00	205		"	4 020-7.70	""	33	'*	"			₽ E
	ight grey CHALK composed of calcareous inuities 1) 15 to 40 degrees medium spaced	Grade B2		7.20	3.05										1 II.
undulating rough w	ith orangish brown staining. (CIRIA Grade B2)	9	1 1		}										}
from 7.70m to 7.80	LBURY CHALK FORMATION] m recovered as non intact core (subangular to] ;	1				\vdash						1
subrounded fine to	coarse gravel sized fragments)		1	-										-	1.
			1		1								200		1 H.
				(2.45)	}		C1	5 7.70-9.20	102	99	70	60	408		3 H
					1								502		: H
				:	1										1 H
				1 5	}				L					•	H.
				1	1										: F
				9.65	0.60				102	100	90	67			
	grey CHALK composed of calcareous SILTSTONE. O to 45 degrees medium spaced planar rough]	0.00										<u> </u>
-			<u> </u>	 	-	\vdash	C 1	6 9.20-10.70	\vdash			\vdash			
i															
Notes.	All depth in metres, all diameters in millimetre														
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.	a diki	water.												
FINAL	Print date and time 12/09	/2022	13:56		Lo	ng chek	cked i	by David Howar	d				SOI	L enginee	RING
Form No. SIEXPHOLEI				Issue Date	02/03/20								Part o	f the Rachy Soletano	he Grown

Project Name	Cambridge Waste Water Treatme								Hole ID						
								Exp <mark>l</mark> o	ratoi	y Ho	le Lo	g	Ι.	DLI TOC A	
Project No. Engineer	TE8364 Mott MacDonald Bentley												1	BH_TPS_0	JU4
Employer	Barhale Limited													Sheet 2 of	2
Ground Level		Coordinate	s	549481.3	30E, 2609	50.901	N		Gri	d	OS	GB			
Hole Type	IP+RC	Inclination		90° from	honzonta	1									
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia	TCR/Sample Recovery %	SCR/Blows	ROD	<u></u>	In Situ Test Details	Install- ation
	rey CHALK composed of calcareous SILTSTONE) to 45 degrees medium spaced planar rough	1 -	 - - -				Т								
clean unstained (Cil	RIA Grade B2)														\mathbb{H} :
(ANVICK) [ANE21 INIE!	LBURY CHALK FORMATION]													01	\mathbb{H}
				(2.20)									204 250] []
													340	-	I
			L T				١,,	7 10.70-12.20	100	400	70	F2			1. II. I
			<u>' </u>	:			[61	/ 10.70-12.20	102	100	70	53			
Stiff dads amenich o	rey slightly sandy slightly gravelly CLAY. Sand is			11.85	-1.60] I .
	gular to subrounded fine to coarse of black	·		12.00	-1.75									15	II.
(WMCK) [CAMBRID	GE GREENSAND MEMBER]	_													Į Į
(5mm x <10mm). Fis	rk grey CLAY with occasional nodules of siltstor ssures are 10 to 30 degrees extremely closely	ne		-										125] I i
spaced planar smoo (GLT) [GAULT FORM/			<u> </u>	:											1 1
				H			C1	8 12.20-13.70	102	100				-	
from 13.20m to 13.4	form with rare nodules of pyrite (8mm x 10mm)			:											
		there	===	(3.20)									NA		
		Unweathered		: ```											
		_		7										-	
				:											
				-			C 1	9 13.70-15.20	102	100					
				2										-	
Complete at 1	5.20m Termination Reason: Achieved			15.20	-4.95									1	
	Scheduled Dep h			-]
]
				-										29	}
				:											1
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]]
				- 5											1
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				7										5.5	1
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				-											1
]
				•			\vdash								1
Notes. All depth in metres, all diameters in millimetres.														44	<u> </u>
AGS	See header sheet for details of boring, prog		water.												
	For details of abbreviations, see key.	/no man	1250				de d	bu Dovid Harr					SOI	L engines	RING
FINAL Form No. SIEXPHOLEI	Print date and time 12 OG Issue Revision No.		13:26	Jerua Data	LO:		:ked	by David Howar	J					f the Rachy Soletano	

Project	Name	Cam	bridge \	Waste V	Vater Tre	atment	Plant l	Relocat	ion										H	lole ID	
			Ü											Ехр	lorato	ry Hole	Log				
Project		TE83																E	3H_T	PS_0	04b
Enginee			t MacDo		entley														0.1		
Employe Ground Le			nale Limi .4mOD	ited				Coordina	-4	F/0/	25.40E	201/	0100	ON.			Grid		OSGB	et 1 of 1	L
Date Start			0/2021					Date Co			0/2021	•	015.0.	211				nation	OSGB		
Top	Base		Date Tin	ne Start	Date Tim	ne End R	lia Crew		Barrel Type			ant U	Ised	Shorin	g Used	Pit Stability			Remark	(S	
0.00	1.20	IP	11/10/202		11/10/202		Craig Blackett	CB	7.				nd tool		one	Stable		Inspe	ection pit: H		
1.20	13.30	RO	11/10/202	21 15:15	11/10/202		Craig Blackett	СВ		Tricone Steel	So	ilmec S	SM8								
							Didonott			0.000											
				DI	ROGRESS											WATER	STDIKE	c			
Date T	imo	Depth	Depth	Depth			Rema	rke			Date	Time	,	Depth	Depth		Water			Remark	
11/10/202		0.00	Casing	Water	Start of shift	:	Nema	11 NS			Date	111116	-	Strike	Casing	g Sealed	Rose To	Elapse	t	Remain	.5
11/10/202		0.00			Installation (orehole Co	mplete													
Depth	Depth		CA	ABLE PER	CUSSION	DETAILS					Depth	Te	ct			SPT D	ETAILS		Energy	Depth	Depth
Тор	Base	Tim	e Start	Duration	Tool			Rema	rks		Тор	Тур			Report	ed Result		Hammer Serial Number	Ratio	Casing	Water
				DOTA BY	FILIALI DE	TAU 0															
Depth	Depth	T		Flush	FLUSH DE	IAILS															
Top 1.20	Base 8.80		sh Type R/MIST	Return 90				Remarks	S												
8.80	13.30		R/MIST	90	Grey																
HOLE DIA	AMETER	CASING	DIAMETE	R		DYNAM	IC SAM	PLING													
Depth	Diameter	Depth	Diamete	r Depth To	Depth	Diameter		tion	Sample	Run											
Base 13.30	150	Base 1.20	150	+ -	Base			R	ecovery Re	terence											
					1,																
ļ.,	INSTA		N DETAILS		ipe Pipe	PIF	PE CONS	STRUCTI	ON		Depth	n	epth		DE	PTH RELAT	TED REM	MARKS			
Distance		ype	Top	Base F	Ref Ref	Тор	Base	Diamet		Туре	Тор		ase				Re	marks			
13.30	S1	SP	0.00	13.30 Pi	pe 1 Pipe 1 Pipe 1	0.00 3.85	3.85 11.85	100 100	PLAIN SLOTTED												
				BACK	FILL DETA	ILS		1	1			1		I		LOCATIO	N DETAI	LS			
Depth Top	Depth Base		Descrip	tion			Rer	narks								Rem	narks				
0.00	13.30	Gravel ba	ckfill							E	Borehole f	ormed	for inst	allation o	of pump w	ell installation					
┢						:0:															
ACC	Note				ameters in ils of boring			ater.													
AGS			tails of abl															<u> </u>			
FINAL					ate and tin		9/2022 1				og chec	ked b	y Da	vid Hov	vard					ginee	
Form No. S	IEXPHOLI	HDR		ls	sue.Revisior	No. 2.02		l:	ssue Date 2	22/06/20	16							Par	t of the Bac	hy Soletanche	Group

Project Name	Cambridge Waste Water Treat	ment Plan	t Relocat	ion									Hole ID	
Project No.	TE8364						Explo	orator	у Но	le Lo	9	\mid B	H_TPS_C	04b
Engineer	Mott MacDonald Bentley													
Employer Ground Level	Barhale Limited +10.14mOD	Coordinat	ac .	5/0/25/	OE, 2610	10.028		Gri	d	0	GB		Sheet 1 of	2
Hole Type	IP+RO	Inclination		343423.	ЮЦ 2010.	15.051	•	Gil	•	0.	~JD			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	ROD	<u>u</u>	In Situ Test Details	instali- ation
Sandy gravelly TOPS (TOP) [TOPSOIL]	OIL (Dniler's description)			(0.35)			D1 0.05-0.10 B2 0.10-0.40	1						
Light brown sandy g	pravelly (Drijler's description)			0.35	10.14		D3 0.40-0.50							
(SUPD) [SUPERFICIA CHALK (Driller's des		_1	T	0.55	10.14		B 4 0.40-0.80							
				(10.45)			B6 0.80-1.20 D5 100-1.10							
ACS	All depth in metres, all diameters in mil See header sheet for details of boring, p For details of abbreviations, see key. Print date and time OG Issue Revision I	12/09/202	2 13:56	loure P-/	Lo <u>q</u> 02/03/20:		ked by David Howa	ırd					L enginee	

Project Name	Cambridge Waste Water Treatr	nent Plant	Relocat	ion									Hole ID	
Project No.	TE8364						Explo	rator	y Ho	le Lo	g	В	H_TPS_0	04b
Eng <mark>inee</mark> r Employe <mark>r</mark>	Mott MacDonald Bentley Barhale Limited												Sheet 2 of 2	,
Ground Level	+10.14mOD	Coordinate	s	549425.4	OE, 2610	19.03N	<u> </u>	Gri	d	OS	GB		0110012 011	
Hole Type	IP+RO	Inclination	1						<i>a</i> s -					
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQ D	쁘	In Situ Test Details	Install- ation
CHALK (Driller's des (WMCK) (WEST MEI	cription) LBURY CHALK FORMATION]		<u> </u>											
			, I,	<u> </u>]	
				:									:	‡ ∏∵i
a alexandra	. 1313		<u> </u>	11.00 -	10.14								S=	
Grey CLAY (Driller's (GLT) [GAULT FORM.	description) Ation]													
				_										
				2									N.	1
				(2.30)										
			===	<u> </u>										
			===											
											13.5			
0 114 44	12.00 T : C . D . A													
Complete at 1	13.30m. Termination Reason: Achieve Scheduled Dep h	ed									-	1		
												1		
				-									-	1
				:										
				2									=	Ē
													-	1
				:										
				Ħ									2=	e e
				:										
				-									-	1
				:										
													-	
				-									-	
				:										1
				-									-	
														1
				-									-	
				7									2.5	6
]
				:										
M D STATE OF THE S	All depth in metres, all diameters in mill See header sheet for details of boring, p													
See header sheet for details of boring, progress and water. For details of abbreviations, see key.													0100	
FINAL Form No. SIEXPHOLEIS	Print date and time OG Issue Revision N		13:56	Issue Pet-	Log 02/03/201		ked by David Howar	d					L ENGINEE f the Bachy Soletano	

Project	Name	Cam	bridge	Waste	Wate	er Trea	atment	: Plant F	Relocati	on										Н	ole ID	
		TEO	201												Expl	lorato	ry Hole	Log		TI	INI C	1Ω1 A
Project		TE83	364 t Mac[hleno	Rent	lov.														п_ п	JN_C	JUTA
Enginee Employe			iale Lim		Denic	iey														She	et 1 of 1	1
Ground Le			.mOD						Coordina	tes	5472	11.50E,	26150	04.201	N			Grid		OSGB		- '
Date Start	ted	06/09	9/2021						Date Cor	mpleted	10/0	9/2021						Incli	nation	90° f o	m horizor	ntal
Тор	Base	1 ''	Date Ti					Rig Crew		1	1		nt Us				Pit Stability	,		Remark	(S	
0.00	1.20	IP DC		021 08:30		/09/2021 /09/2021		Mitch Maxey	DT AY	NA	NA S PCD	Insulate			No	ne	Stable					
1.20	35.00	RC	06/09/20	JZI 11:45	09	/09/2021	14:30	Mitch Maxey	AY	Geobore (146)	PCD	2011	mec SN	VI8								
						RESS											WATER					
Date 1	Time	Depth	Depth Casing	Depth Wate				Rema	ırks			Date 1	Γime		epth trike	Depth Casing		Water Rose To	Time Elapse	i	Remark	(S
06/09/202 07/09/202		6.00 6.00	6.00 6.00	5.80 5.90	Star	of Shift t of shift						09/09/202	21 14:00	0 3	35.00	6.00		0.82	20			
07/09/202 08/09/202	1 07:30	24.00 24.00	6.00 6.00	23.95 17.00	Star	of Shift t of shift																
08/09/202 09/09/202	1 07:30	24.00 24.00	6.00 6.00	23.90 17.00	Star	of Shift t of shift																
09/09/202 09/09/202	1 17:30	35.00 7.00	6.00	0.82 1.10	End	of Shift	olete															
10/09/202 10/09/202		8.00 0.00	6.00 0.00	1.00		t of shift allation C	omplete, E	Borehole Cor	mplete													
	<u>'</u>		C	ABLE PE	RCUS	SION [DETAILS	i									SPT D	ETAILS	'			
Depth Top	Depth Base	Time	e Start	Duration	on	Tool			Remar	ks		Depth Top	Test Type			Reporte	ed Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
													.,,,,									
	5			ROTAR			TAILS															
Depth Top	Depth Base		sh Type	Flus Retu		Flush Colour		F	Remarks													
1.20 2.20	2.20 3.20	AIF	R/MIST R/MIST	60 70	(Orange Orange																
3.20 4.20	4.20 6.00	AIF	R/MIST R/MIST	80 90		Orange Brown																
6.00 33.00	33.00 35.00		R/MIST R/MIST	90 100		Grey Green																
HOLE DIA	AMETER	CASING	DIAMETI	ER			YNAM	IIC SAM	PLING													
Depth	Diameter	Depth	Diamet	er Depth		Depth	Diamete	er Durat		ample	Run											
Base 6.00	150	Base 6.00	150	+ '-	+	Base			Re	covery R	eterence											
35.00	146																					
		Re	N DETAIL		Pipe	Pipe		PE CONS	T	T		Depth	Dep	oth		DE	PTH RELA					
Distance 4.75		ype "	Top 1.25	Base	Ref Pipe 1	Ref Pipe 1	Top 0.00	Base 1.25	Diamete 50	PLAIN	Туре	Тор	Bas					Re	marks			
4.75	31	SF	1.25	4.75	ripe 1	Pipe 1 Pipe 1	1.25 4.25	4.25 4.75	50 50	SLOTTED)											
						Tipe I	4.23	4.75	50	l Daily												
	•	•		BAC	KFILL	DETAI	LS										LOCATIO	n detai	LS			
Depth Top	Depth Base		Descri	ption				Ren	narks								Ren	narks	<u> </u>			
-0.50 0.00	0.00 0.50	Upstandir Concrete																				
0.50 0.70	0.70 1.25	Gravel ba	ckfill																			
1.25 4.25	4.25 7.00	Gravel ba Bentonite	ckfill																			
7.00	35.00	Grout																				
	Note	s: All der	oth in me	tres. all o	diame	ters in r	nillimet	res.														
AGS		See he	ader she	et for de	tails o	f boring		ss and wa	ater.													
		Lot de	tails of al	nneviatio	JIIS SE	е кеу.																0.00



Form No. SIEXPHOLEHDR Issue Date 22/06/2016 Issue.Revision No. 2.02



Project Name	Cambridge Waste Water Treatment	Plan	t Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	le Lo	og	В	H_TUN_(001A
Eng <mark>i</mark> neer	Mott MacDonald Bentley														
Employe <mark>r</mark>	Barhale Limited													Sheet 1 of	4
Ground Level		dinate			50E, 2615		N		Gri	id	O:	SGB			
Hole Type	IP+RC Incli	nation	10	90° from	horizonta	1	_			1					
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	1	TCR/Sample Recovery %	SCR/Blows	PICID	뜨	In Situ Test Details	Install- ation
TORCOIL: Dorde brown	m slightly rough, elightly amusiky CLSV Sand in San	*	V/2582/25		6.81	3	N1	Details 0.05-0.10	Dia.	<u>გ</u>	Ж				I
	m stightly sandy slightly gravelly CLAY. Sand is fine angular to subrounded fine to medium of flint.			0.10	D.81			0.03=0.10 2 0.20=0.25							
Cocasional roots.	1			(0.50)	1			0.10-0.40							
	ght brown slightly gravelly sandy clay. Sand is fine			0.60	6.31			0.40-0.50 0.50-0.55							
	red fragments are angular to subrounded medium			0.80	6.11	Z		0.40-0.80							
mudstone.	one, brick, flint, concrete and occasional			(0.40) -			B9	0.80-1.20							:
(MGR) [MADE GROU	UND] ree courses of brickwork			1.20	5.71	ll	D7	1.00-1.10							
(MGR) [MADE GROU				(0.35)		ll	ES 8	1.10-1.20					NA		
Reddish brown fine medium to coarse G	to coarse SAND and angular to subrounded		-	1.55	5.36	ll								139	
(RTD) (SUPERFICIAL	DEPOSITS]				}	ll	C 10	120-220	102	35			NR		+ + +
Brown sandy slightly of flint. Sand is fine to	y clayey angular to rounded fine to coarse GRAVEL		2	(0.65)	}	ll								16	
(RTD) [SUPERFICIAL	DEPOSITS]			2.20	4.71	ll									+ + :
Assumed zone of co (RTD) [SUPERFICIAL	re loss, SAND and GRAVEL (Driller's description)	1	-		375	ll]	
	layey angular to rounded fine to coarse GRAVEL of			(0.50)	7	ll							NA	12	
flint. Sand is fine to ((RTD) [SUPERFICIAL				2.70	4.21	ll			102	50		5	_		
	re loss. SAND and GRAVEL (Driller's description)		1	(0.50)	1	ll	C 11	2.20-3.20					NR	K 2.92 - 3.42	1. F
(RTD) [SUPERFICIAL	DEPOSITS]					ll .								3.	
	y clayey angular to rounded fine to coarse GRAVEL	1	-	3.20	3.71									1	
of flint. Sand is fine ((RTD) (SUPERFICIAL			100	(0.40)	1								NA	. 14	1 1.
	re loss. SAND and GRAVEL (Driller's description)	1	512	3.60	3.31		C 12	3.20-4.20	102	40		- 3		1	1
				(0.60)	1								NR		17 - 27
					1		EW	1 4.00							
Soft dark grey CLAY.		1	 -	4.20 (0.30)	2.71							\vdash	NA	1	
(GLT) [GAULT FORM	11.5			4.50	2.41							-	NA .	· E	
(GLT) [GAULT FORM	re loss, Grey CLAY. (Driller's description) ATIONI		<u> </u>		1	Н	C 13	3 4.20-5.20	102	30			NR		
. ,,	•			(0 70)	1	ll									
			<u> </u>	-		!!	ł							-	1
Soft dark grey CLAY		1		5.20	1.71				\vdash				NA	1	ł
(GLT) [GAULT FORM		1		5.40	1.51								INK	1 .	}
(GLT) [GAULT FORM	re loss. Grey CLAY (Driller's description) ATION			(0.00)	-		C 14	4 5.20 -6.00	102	25			NR		}
	•			(0.60)	1										1
Stiff fissured dark or	rey CLAY with rare coprolites (<20mm x 10mm)	-		6.00 -	0.91				_			\vdash			1
and siltstone nodule	es (<10mm x 10mm). Fissures are randomly		<u> </u>		1	11	İ								1
onentated extremely smooth and general	y closely to very closely spaced undulating lly notished			-	1	ll									1
(GLT) [GAULT FORM.	ATION				1	ll	C 18	5 6.00-7.00	102	100					1
at 8 44m with occas	sional sittstone nodules (<10mm x 10mm)				1	ll									
				- 1		ll			_						
					1	ll	L 14	5 7.00-7.50	102	80					
					1	ll	"	1.00-1.00	""	30					********
non 7 son to 7 so	m assumed zone of core loss			:	1	ll									300000000
			<u> </u>		1	ll								K 7.70 - 9.30 K 7.70 - 9.30	
				(6.48) -	1	ll								K 7.70 - 9.30	
at 8.04m with occar	sional silitatione nodules (<10mm x 10mm)		F===		1	ll		7 7.50-9.00	102	93				K 7.70 - 9.30 K 7.70 - 9.30	*******
			<u> </u>		1	ll	["	7 7.50-9.00	102	93				107.70 - 0.30	
					1	ll									
			F		1	ll									
	ment of coprolite (<20mm x 10mm) m assumed zone of core loss					ll								١.	
non s.son to s.con	in assumed 2016 of core less				1	ll									
			F		1	ll									
0.27.00			<u> </u>		1	ll								78	
at 9.57m 1 No thesis	re 45 degrees undulating polished				}	ll									1
					}	ll									-141895
							<u> </u>						1	<u> </u>	1
Notes. All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.															
AGS	For details of abbreviations, see key.	_ u.n.	. na wat.												
FINAL	Print date and time 12/09	/2027	13:56		In	a cher	cked h	y David Howai	rd				SOI	L enginee	PRING
Form No. SIEXPHOLEI				Intue Date	02/03/20		L	.,	-				Part o	f the Rachy Soletary	he Groun

Project Name	Cambridge Waste Water Treatm	ent F	Plant	Relocat	ion										Hole ID	
Project No.	TE8364								Explo	rato	у Но	le Lo	og	l _R	H_TUN_0	201Δ
Engineer	Mott MacDonald Bentley														II_IGIN_\	301A
Employer	Barhale Limited														Sheet 2 of	4
Ground Level		Coord		S		50E, 2615		N		Gri	d	09	SGB			
Hole Type	IP+RC	IIICIIII			Depth	horizonta	1				e %	s,				
	Description of Strata		Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u></u>	In Situ Test Details	Install- ation
Ctiff facured days o	way CLAV with your convalitor (20mm v 10mm)		We		ness)		Wa		Details	Dia.	TCR Rec	SCI				
and siltstone nodule	rey CLAY with rare coprolites (<20mm x 10mm) es (<10mm x 10mm). Fissures are randomly	'		<u> </u>												
smooth and genera								C 1	8 9.00-12.00							
(GLT) [GAULT FORM	AHONJ															
at 10.87m 1 No. fis	sure 45 degrees planar polished				_					102	100					
																-
					-											
at 12.46m 1 No. thi	ick lamination of dark grey fossilised shell fragments			<u> </u>	12.48 -	-5.57										
<10mm x 10mm)	ark grey CLAY. Fissures are 1) 0 degrees closely	to		<u> </u>												
medium spaced pla	nar smooth with occasional dusting of silt. 2) d extremely closely to closely spaced undulatin			<u> </u>	_											
and planar smooth (GLT) [GAULT FORM	polished.															
	•				-			C 1	9 12.00-15.00	102	100					
					_											
	43m with frequent fragments of coprolite (<20mm x ed shell fragments (<10mm x 10mm)				(3.96)											
Torritry and rossins	ed shell hagments (C10mm x 10mm)															
					_									NA		
from 15.42m to 15.	53m firm															1
				<u> </u>												
from 15.83m to 15.	92m 1 No. fissure 90 degrees planar smooth				_											-
Very stiff fissured da	ark grey CLAY with rare coprolites (<20mm x				16.44	-9.53		C 2	0 15.00-18.00	102	100					
10mm) and fossilise	ed shell fragments (<10mm x 10mm). Fissures at the medium spaced planar smooth occasionally							"	10.00 10.00	102	100					
	O degrees medium to widely spaced planar	,			_											
(GLT) [GAULT FORM	ATION]															
					_											
				<u> </u>	(3.26)											
				<u> </u>	_											
				<u> </u>												
					_					102	95					
from 19.12m to 20.	10m 1 No. fissure 45 degrees undulating polished									102	33					
								C 2	1 18.00-21.00							
Vanuatiff facured de	and arou CLAV with frequent helemaites (.20m				19.70	-12.79		C 2	1 10.00-21.00							
	ark grey CLAY with frequent belemnites (<30mi 40mm x 30mm) and shell fragments (<10mm x															
														1		
AGS Notes:	All depth in metres, all diameters in millin See header sheet for details of boring, pro			vater.												
AUS	For details of abbreviations, see key.														L ODGUGG	
FINAL Form No. SIEXPHOLEL	Print date and time 1 OG Issue.Revision No		2022	13:56	Issue Date	Lo e 02/03/20	-	cked	by David Howar	d					f the Bachy Soletan	
	10000.11011011110					0								1 . 21.00	, 50,000	>up

Project Name	Cambridge Waste Water Treatm	ent Plant	Relocat	ion										Hole ID	
								Explo	ratoı	у Но	ole Lo	og			2044
Project No.	TE8364												B	H_TUN_(JUTA
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 3 of	4
Ground Level		Coordinate	es	547211.5	50E, 2615	04.201	N		Gri	d	09	SGB		311000 3 01	
Hole Type	IP+RC	Inclination			horizonta										
		Weathering		Depth	Datum	trike		Sampling		TCR/Sample Recovery %	ows			In Situ Test	Install-
	Description of Strata	/eath	Legend	(Thick- ness)	Level	Waterstrike			Dia.	CR/Sa ecove	SCR/Blows	RQD	<u>"</u>	Details	ation
Very stiff fissured da	ark grey CLAY with frequent belemnites (<30mi					>		Details	Dia.	2 ~	S				
5mm), coprolites (<4 10mm). Fissures are	40mm x 30mm) and shell fragments (<10mm x e 1) 0 to 15 degrees closely spaced planar														
occasionally undula	ting smooth polished. 2) 40 to 50 degrees			-											-
polished.	paced planar and undulating smooth generally														
(GLT) [GAULT FORM. from 20.85m to 21.0	ATION] 00m assumed zone of core loss		E-=-												
			<u></u>												
															}======================================
			<u></u>	-											-
			<u></u>												
			F_=_	_											
			E	-			C 2	2 21.00-24.00	102	100					
			<u> </u>												-
				-]
from 23.42m to 23.	55m 1 No. fissure 70 degrees planar smooth polished		<u></u>												
			<u></u>												
			<u></u>												
			F_=_												-
]
				-			C 2	3 24.00-25.00	102	90					-
			==	:											
from 24.90m to 25.0	00m assumed zone of core loss			(13.20) –											_
			<u> </u>												
			<u></u>	-											
			F_=_												
							C 2	4 25.00-28.00	102	97					
															1
			==												
			E-=-]
			<u></u>	-											
			<u></u>												
from 27.90m to 28.0	00m assumed zone of core loss		<u> </u>						<u> </u>						1
			<u></u>												1
			<u></u>												-
			F_=_												
			F_=_	:											
				-			C 2	5 28.00-30.00	102	100					
			E	-											-
			<u> </u>												
Notes:	All depth in metres, all diameters in millin	netres.				<u> </u>			1			1			
ACS	See header sheet for details of boring, pro For details of abbreviations, see key.		water.												
FINAL	Print date and time 1	2/00/2022	13.55		1 -	o cho	المماء	by David Howar	d				SOI	L engine	RING
FINAL Form No. SIEXPHOLEL			10.00	Issue Date	02/03/20	_	neu I	oy ⊃aviu ⊓0Wafi	u					f the Bachy Soletand	

				ion			- 1							Hole ID	
Project No. TE8364 Engineer Mott MacDonald Bentley								Explo	rator	у Но	le Lo	9	В	H_TUN_0	001A
Employer Barhale Limited														Sheet 4 of	4
Ground Level +6.91mOD Hole Type IP+RC	Coord	dinates nation			50E, 2615 horizonta		V		Gri	d	OS	GB			
Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u></u>	In Situ Test Details	Install- ation
Very stiff fissured dark grey CLAY with frequent belemnites (<5mm), coprolites (<40mm x 30mm) and shell fragments (<10 10mm). Fissures are 1) 0 to 15 degrees closely spaced planar occasionally undulating smooth polished. 2) 40 to 50 degrees medium to widely spaced planar and undulating smooth gen polished. (GLT) [GAULT FORMATION] from 32.62m to 32.90m becomes gravelly. Gravel is subrounded to	mm x r s nerally						C 26	30.00-33.00	102	100					
rounded fine of flint Very stiff dark greenish grey slightly sandy gravelly CLAY. Sand to medium. Gravel is subrounded to rounded fine to medium (LGF) [LOWER GREENSAND FORMATION] Assumed zone of core loss. Green SAND (Driller's description (LGF) [LOWER GREENSAND FORMATION] from 33.00m to 33.21m 1 No. medium bed of medium strong lightgravelly medium grained sandstone. Gravels are subrounded to round fine of flint. Very stiff dark greenish grey slightly sandy gravelly CLAY. Sand	nd is fine n of flint. n) grey unded			32.90 - 33.00 - - - - (1.50) - - - - - - - - - - - - - - - - - - -	-25.99 -26.09		C 27	33.00-35.00	102	25			NR		
Very stiff dark greenish grey slightly sandy gravelly CLAY. Sant to medium. Grave It is subrounded to rounded fine to medium (LGF) [LOWER GREENSAND FORMATION] Complete at 35.00m. Termination Reason: Achie Scheduled Dep h	-28.09								NA						
Notes: All depth in metres, all diameters in r See header sheet for details of boring For details of abbreviations, see key. FINAL Print date and tin	g, progress	and w			Lou	n chec	ked h	y David Howar	rd				SOI	L engine	ering

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	Can	nbridge '	Waste \	Nate	er Trea	atment	Plant F	Relocat	.ion										ŀ	Hole ID	
Project Engine		TE83	364 tt MacD	Smold F	ont										Ехр	lorato	ory Hole	Log	E	3H_T	UN_0)01B
Enginee Employe			tt MacD hale Lim		enue	Эy														Sh	eet 1 of 1	1
Ground Le			9mOD		-				Coordina	ates	547	222.19E	, 261	524.1	17N			Grid	1	OSGB	3	
Date Start)9/2021	Ctout	T	Time	a r		Date Co		,	09/2021		ام - ا	- L	d	Dir Or Lilia		ination		om horizon	ıtal
7op 0.00	Base 1.20	IP	28/09/20	021 12:00	28/0	/09/2021	1 13:00	DS	DT	R Barrel Type	NA	Insula	ant U	and Too		ng Used one	Pit Stability Stable	1-		Remar	ks	
1.20	35.00	СР	28/09/20			/09/2021	14:00	DS	AM	NA	NA	[Oando 2	000								
		_	Toonth		ROGF	RESS								- 	Panth	T Dont		STRIKE				
Date T		Depth	Casing			1 71 :64		Rema	ırks				Time		Depth Strike	Dept Casin	ng Sealed	Rose To	o Elapse	ed	Remark	(S
28/09/202 29/09/202 29/09/202	21 07:30	12.00 12.00 30.00	9.00 9.00	Dry Dry	Start	of Shift t of Shift						28/09/2 30/09/2			1.70 33.30	1.70 9.00		1.60 16.60	20 20	Very Slo Fast	w	
29/09/202 30/09/202 30/09/202	21 07:30	30.00 30.00 0.00	9.00	Dry Dry	Start Backt		plete; Boreh	hole Comple	ate								2011	DETAILS				
Depth	Depth	Tim	ne Start	Duratio	1	Tool			Remai	-100	-	Depth	Te	est		Danor		EIAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base		e Start	Duracio	1	1001	+		- Kelliai	/KS		Top 1.50	Тур	C N	N=25 (4,5:6	6,6,6,7)	ted Result		Number AR3501	Ratio 75	Casing 1.50	Water Dry
				ROTARY			TAILS				2.50 C N=28 (4,66,77,8) AR3501 75 2.50 3.50 S N=18 (2,34,4,5,5) AR3501 75 3.50 4.50 S N=13 (2,23,33,4) AR3501 75 4.50 5.50 S N=15 (3,33,4,44) AR3501 75 5.50 6.50 S N=17 (2,23,3,44) AR3501 75 6.50 7.50 S N=17 (2,33,4,45) AR3501 75 6.50 8.50 S N=17 (2,33,4,45) AR3501 75 8.50 9.50 S N=17 (3,44,4,45) AR3501 75 8.50 11.00 S N=20 (3,45,5,5,5) AR3501 75 9.00 12.00 S N=23 (4,45,6,6,6) AR3501 75 9.00 13.50 S N=26 (4,55,6,7,8) AR3501 75 9.00 15.00 S N=33 (5,66,8,9,10) AR3501 75 9.00										3.50 4.50 5.50 6.50 7.50 8.50 9.00 9.00 9.00	2.20 Dry Dry Dry Dry Dry Dry Dry Dry Dry Dry
Depth Top	Depth Base	Flu	ısh Type	Flush Returi		Flush Colour		ŗ	Remarks	;		17.00	S	s N	N=32 (5,6:7	7,7,8,10)		ļ	AR3501	75	9.00	Dry Dry
												18.50 20.00 21.50 23.00 24.50 26.00 27.50 29.00 30.50 32.00 33.50 34.50	S S S S S S S S S S S S S S S S S S S	S N S N S N S N S N S N S N S N S N S N	N=34 (6,7:8, N=35 (5,6:7, N=33 (5,5:6, N=26 (4,4:5, N=30 (4,5:6, N=37 (5,6:8, N=31 (4,5:7, N=35 (5,6:7, N=35 (4,6:8, N=21 (3,4:4, N=22 (2,3:5,6:7,	7,8,9,11) 6,8,9,10) 5,6,7,8) 6,7,8,9) 7,9,9,9) 3,9,10,10) 7,7,8,9) 7,8,10,10) 3,8,9,10) 4,5,6,6)			AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501 AR3501	75 75 75 75 75 75 75 75 75 75 75 75	9.00 9.00 9.00 9.00 9.00 9.00 9.00 9.00	Dry Dry Dry Dry Dry Dry Dry Dry Dry Dry
L	AMETER	-	G DIAMETE	.R		-	MANYC	IIC SAM		- T								ļ				
Base	Diameter	Base	Diamete	er Depth T		Depth Base	Diameter	er Durat		Sample ecovery Ref	Run ference							ļ				
9.00 35.00	200 150	3.00 9.00	200 150																			
<u> </u>		Re	N DETAILS		Pipe I	Pipe		PE CONS		1		Depth	П.	epth		D	EPTH RELA					
Distance	ID T	Туре				Ref	Тор	Base	Diamete	er Pipe T	Гуре	Тор	В	Base	Ptanii	21		Re	emarks			
												6.00	9	9.00	Bentonite	e Seal						
Depth	Depth				(FILL	DETAII	LS										LOCATIO		LS			
Тор 0.00	Base 35.00	Grout	Descrip	otion		_		Ren	marks								Ren	marks				
AGS		See he	epth in met eader shee etails of ab	et for deta	ails of	boring			ater.											(
FINAL	=1		-	Print	date a	and tim	ne 12/09	9/2022 1	.3:56		l	og cher	cked t	by Da	avid Hov	ward			SO	ır eu	iginee	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

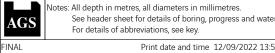
Issue.Revision No. 2.02

Form No. SIEXPHOLEHDR

Project Name Cambrid	ge Waste Water Treatment F	Plant	Relocat	ion									Hole ID		
Project No. TE8364								Exploi	ratoı	ry Ho	le Lo	g	В	H_TUN_(001B
Engineer Mott Ma	acDonald Bentley														
Employer Barhale Ground Level +6.99mOD		dinata		E / 7222	L9E, 2615	2/170			C =	id		C D		Sheet 1 of	4
Ground Level +6.99mOD Hole Type IP+CP		dinate ation			19E, 2615 horizonta		N		Gri	ıa	US	GB			
		ing		Depth	Datases	rike		Sampling		y %	SMO			In City Took	l
Descripti	on of Strata	Weathering	Legend	(Thick- ness)	Datum Level	Waterstrike			1	TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test Details	Install- ation
MADE GROUND: Light brown slig	htly gravelly sandy clay. Sand is fine	>	******	0.10	6.89	3		Details 0.05-0.10	Dia.	5 %	Š				
to coarse. Gravel is angular to sub (MGR) [MADE GROUND]							B 2 0	.10-0.40							-
MADE GROUND: Brown gravel size brick and concrete.	red fragments of flint, sandstone,			(0.60)				.50-0.55							
(MGR) [MADE GROUND] Light brown reddish sandy GRAVE	I Sand is fine to coarse Gravel is		*****	0.70	6.29		B4 0	.40-0.80							
angular to subrounded fine to coa (RTD) [SUPERFICIAL DEPOSITS]				(0.50)				.80-1.20							
Medium dense brown fine to coar				1.20	5.79		D5 1	00-1.10							1
angular to subrounded fine to coa (RTD) [SUPERFICIAL DEPOSITS]	rse of flint and quartzite.			-										SPT(C) N=25	-
						₹	B7 1	.50-2.00						(4,5:6,6,6,7) 1.50	
				(1.70)											
												1			
		-										SPT(C) N=28			
				B 8 2	.50-3.00						(4,6:6,7,7,8) 2.50				
	k grey CLAY. Fissures are randomly														
orientated undulating planar smo (GLT) [GAULT FORMATION]										-					
										SPT(S) N=18	}				
		E_=_				D9 3	.50-3.95						(2,3:4,4,5,5)		
					3.50-4.00						3.50	-			
			E_=_	(2.60)											
				-			D 44	/ FO / OF						SPT(S) N=13 (2,2:3,3,3,4)	
								4.50-4.95 4.50-5.00						4.50	
			E_=_	-										-	-
			<u></u>												1
	grey CLAY. Fissures are randomly			5.50 -	1.49									SPT(S) N=15 (3,3:3,4,4,4)	
orientated undulating planar smo (GLT) [GAULT FORMATION]	oth.		<u></u>					5.50-5.95 5.50-6.00						5.50	
			<u></u>	-										-	
															-
			<u></u>	-										SPT(S) N=14 (2,2:3,3,4,4)	1
			<u></u>					6.50-6.95 6.50-7.00						6.50	
				-			5 20	0.00 7.00							
			<u></u>												
			<u></u>	-										SPT(S) N=17	
			<u> </u>	(6.50)				7.50-7.95						(3,3:4,4,4,5) 7.50	
			<u></u>				B 18	7.50-8.00							
			<u></u>												
			<u></u>	-										SPT(S) N=17	
			<u></u>				D 19	8.50-8.95						(2,3:3,4,5,5) 8.50	
			<u> </u>				B 20	8.50-9.00							
			<u> </u>												1
			<u> </u>											SPT(S) N=17	}
		<u> </u>		D 21	9.50-9.95						(3,4:4,4,4,5)				
						9.50-10.00						5.55			
AGS See header	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.														
INAL Print date and time 12/09/2022 13:56 Log checked by David Howard SOIL 6												L engine	RING		
orm No. SIEXPHOLELOG	Issue.Revision No. 2.05			Issue Date	02/03/20								Part o	f the Bachy Soletand	he Group

Project Name	Cambridge Waste Water Treatm	nent Plant	Reloca	tion										Hole ID	
Project No.	TE8364							Explora	ator	у Но	le Lo	g	В	H_TUN_(001B
Engineer	Mott MacDonald Bentley														
Employer Ground Level	Barhale Limited +6.99mOD	Coordinate	200	E47222	19E, 2615	27.171			Grio	4	09	GB		Sheet 2 of	4
Hole Type	IP+CP	Inclination			horizonta		u .		GIIC	u	O.	GB			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sam Detai	mpling	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	Æ	In Situ Test Details	Install- ation
	laminated dark grey CLAY. Fissures are random		ŧ												-
orientated undulation (GLT) [GAULT FORM			<u> </u>												
				-											
				-										SPT(S) N=20 (3,4:5,5,5,5)	-
							D 23 11.00 B 24 11.00							11.00	
				-											
			<u></u>												
Stiff fissured thinly I	laminated dark grey CLAY. Fissures are extrem	ely	==	12.00 -	-5.01									SPT(S) N=23 (4,4:5,6,6,6)	-
smooth and polishe					-		D 25 12.00 B 26 12.00							12.00	
(GLT) [GAULT FORM	IATION]			-											
				-											-
				:											
			<u> </u>	(3.00)										SPT(S) N=26	-
			<u> </u>				D 27 13.50 B 28 13.50							(4,5:5,6,7,8) 13.50	
			F- <u>-</u> -	-			D 20 13.30	J-14.00							-
			F- <u>-</u> -												
			<u> </u>	-	-										-
			E												
Very stiff fissured th	ninly laminated dark grey CLAY. Fissures are			15.00 -	-8.01									SPT(S) N=33	_
	closely spaced randomly orientated planar						D 29 15.00							(5,6:6,8,9,10) 15.00	
(GLT) [GAULT FORM				1	-		B 30 15.00)-15.50							
				-											
					-										
														SPT(S) N=32	
							D 31 17.00	0-17.45						(5,6:7,7,8,10) 17.00	
							B 32 17.00)-17.50						27.00	1
					-										
			F_=_] :											
			<u> </u>]										SPT(S) N=34	
			<u> </u>				D 33 18.50	18 95						(6,7:8,8,9,9)	1
			F_=_		-		B 34 18.50							18.50	
			E-E-												
														207(2) 11 25	
														SPT(S) N=35 (5,6:7,8,9,11)	
														20.00	
	All depth in metres, all diameters in milli		tor												
AGS	See header sheet for details of boring, pr For details of abbreviations, see key.	ogress and	watei.												
FINAL	Print date and time 1		13:56			_	ked by Davi	id Howard						L engine	
Form No. SIEXPHOLEL	LOG Issue.Revision No	o. 2.05		Issue Date	02/03/20	18							Part o	f the Bachy Soletand	che Group

Company Comp	roject Name	Cambridge Waste Water Treatr	ment Plai	nt Relocat	tion			F 1						Hole ID	
Internal Bottom to MacCompanies Month MacCompanies Month Early Mon								Exploi	rator	y Ho	ole Lo	og	В	H_TUN_()01B
Description of Street Desc	mployer	Barhale Limited													
Description of Strate Property Propert							N		Gri	d	OS	SGB			
SPTID (-2.50) Comp. 2.50m to 25.00m digitally wordy. Examina from Comp. 2.50m to 25.00m digitally wordy. Examina Comp. 2.50m to 25.00m digitally wordy. Examina Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy. Comp. 2.50m to 25.00m digitally wordy	юте туре			_	Depth (Thick-	Datum			Dia.	CR/Sample Recovery %	SCR/Blows	RQD	ч		Install- ation
Box 2000-2050 Box 2100-10 12 50n Person of Market Med Registers (-Some) From 2100-10 12 50n Person white Med Registers (-Some) Box 2100-10 12 50n Person white Med Registers	Very stiff fissured the	inly laminated dark grey CLAY. Fissures are		±- <u>-</u> -						— —	1				
D 27 7 155-31.95 B 38 2150-2250 C 23.00	undulating smooth a	and polished.													
D 32 23.00 23.45 8 40 23.00 23.50 23.00														(5,5:6,8,9,10)	
D 41 24.50-24.95 B 42 24.50-24.95 B 42 24.50-25.00 D 43 25.00-26.45 B 44 26.00-26.50 D 45 27.50-27.95 B 46 27.50-28.00 SPT(S) N-37 (5.68.3.10.10) 27.50 D 47 29.00-29.45 B 48 29.00-29.50	from 23.00m to 32.5	30m frequent white shell fragments (<20mm)												(4,4:5,6,7,8)	
D 43 26.00-26.45 B 44 26.00-26.50 SPT(S) N=37 (5.88.9.10.10) 27.50 D 47 29.00-29.45 B 48 29.00-29.50 D 47 29.00-29.50 D 47 29.00-29.50	from 2.50m to 25.00	Jm slightly sandy. Sand is fine			(17.90)									SPT(S) N=30 (4,5:6,7,8,9) 24.50	
D 45 27.50-27.95 B 46 27.50-28.00 SPT(S) N=31														SPT(S) N=34 - (5,7:7,9,9,9) 26.00	
D 47 29.00-29.45 B 48 29.00-29.50 (4,5:7,7,8,9) 29.00 1														(5,6:8,9,10,10)	
Note: All death in matrice all diameters is stillington.														(4,5:7,7,8,9)	
AGS See header sheet for details of boring, progress and water. For details of abhreviations, see key	Notes:	All depth in metres, all diameters in mill See header sheet for details of boring o		d water										(





Project Name	Cambridge Waste Water Treatm	ent Plant	Relocat	ion										Hole ID	
Project No.	TE8364						Exploi	rator	у Но	le Lo	g	R	H_TUN_0	01R	
Engineer	Mott MacDonald Bentley														,010
Employer	Barhale Limited													Sheet 4 of	'
Ground Level Hole Type	+6.99mOD IP+CP	Coordinate Inclination	S		19E, 26152 horizonta		V		Gri	d	OS	GB			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	Ŀ	In Situ Test Details	Install- ation
	nly laminated dark grey CLAY. Fissures are closely spaced randomly orientated planar														
undulating smooth a	ind polished.			-										SPT(S) N=35 -	
71	•		<u> </u>	-			D 49	30.50-30.95						(5,6:7,8,10,10) 30.50	
				_				30.50-31.00						30.30	
		-										-			
		-													
			_										SPT(S) N=35 - (4,6:8,8,9,10)		
		<u> </u>					32.00-32.45 32.00-32.50						32.00		
			-										-		
Very stiff dark greeni	sh grey mottled brown slightly gravelly very			32.90 -	-25.91										
sandy CLAY. Sand is f subrounded fine of fl	îne to medium. Gravel is subangular to			-										-	
(LGF) [LOWER GREEN				-										SPT(S) N=21 -	
								33.50-33.95						(3,4:4,5,6,6) 33.50	
				(2.10)			B 54	33.50-34.00						_	
				-											
				-										SPT(S) N=22 - (2,3:5,5,6,6)	
								34.50-34.95 34.50-35.00						34.50	
Complete at 3	5.00m. Termination Reason: Achieved Scheduled Dep h		i k ok i j ej	35.00 -	-28.01									-	
	ocheduled Dep II			-											
				-											
				-										-	
				-										-	
				-											
				-											
				-											
				-										-	
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				-											
				-										-	
				-											
M.L.	All donth in matros all diamaters in a ""	notroc													
AGS	All depth in metres, all diameters in millir See header sheet for details of boring, pro		water.												
FINAL	For details of abbreviations, see key. Print date and time 1	2/09/2022	13:56		Lo	a chec	ked by	David Howard	d				SOI	ıL enginee	RING
FINAL Form No. SIEXPHOLELO			10.00	Issue Date	02/03/20	_	cu by	Savia i iOwdii	-				1	of the Bachy Soletanc	

Project	Name	Cam	nbridge \	Waste V	Vater 7	reatme	nt Plant I	Relocati	on										ole ID	
Drainat	Na	TE8	364										Exp	olorato	ry Hole	Log	В	H_TI	JN_C)01P
Project Enginee			t MacD	onald B	entley														M	
Employ			nale Limi		,													She	et 1 of 1	1
Ground L			BmOD					Coordina			14.10E,	261518	3.80N			Grid		OSGB		
Date Start Top	Base		9/2021 Date Tin	na Start	Data T	ime End	Rig Crew	Date Cor	npleted Barrel Type		9/2021 it D lau	nt Use	d Shorir	no Used	Pit Stability		nation	Remark	rc .	
0.00	1.20	IP	10/09/20:			2021 14:40	Mitch	мм	barrer Type	e Dilli b		ed Hand t		one	Stable	1		ction pit: H		
1.20	18.00	RO	10/09/20	21 14:40	15/09/	2021 10:30	Maxey Mitch Maxey	ММ		Drag Bi	t Soil	mec SM8	:							
			Donth		ROGRE	SS							Donth	Depth	WATER n Depth	STRIKE Water				
Date 1		Depth 1.20	Depth Casing 0.00	Depth Water	End of S	.:f+	Rema	arks			Date 1	Гime	Depth Strike	Casin		Rose To		i	Remark	(S
13/09/202	1 07:30	1.20 1.20 15.00	0.00	Dry Dry 14.80	Start of s	hift														
14/09/202 14/09/202	1 07:30	15.00 6.00	6.00 6.00	14.20 0.40	Start of s	hift														
15/09/202 15/09/202		6.00 0.00	6.00	0.45	Start of s		, Borehole Co	mplete												
			CA	ABLE PER	cussic	N DETAIL	.S								SPT D	DETAILS				
Depth Top	Depth Base	Tim	e Start	Duration	T	ool		Remar	ks		Depth Top	Test Type		Report	ed Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
				ROTARY	FLUSH	DETAILS														
Depth Top	Depth Base	Flus	sh Type	Flush Return	Flus Colo			Remarks												
1.20 6.00	6.00 18.00		R/MIST R/MIST	70 90	Oran	ge														
	AMETER		DIAMETE	R			MIC SAM													
Depth Base	Diameter	Base	Diamete	er Depth To	Dep Bas		ter Dura		covery Re	Run eference										
18.00	145	6.00	150																	
	INICT	LI ATIO	N DETAIL	<u> </u>			NDE CON	CTDUICT!						DI	EPTH RELA	TED DEA	4A DI/C			
Distance		Re	N DETAILS		ipe Pip	ا م	PIPE CONS		T	Tuna	Depth	Depth	n	DE	PIH KELA					
1.50	G1	SP SP			Ref Re	1 0.00	Base 0.50	Diamete 19	PLAIN		Top 12.50	Base 12.50	Self Bori	ing Pressu	remeter Test	ке	marks			
					Pipe	1 0.50	1.50	19	SLOTTED		18.50	18.50	Self Bori	ing Pressu	remeter Test					
				BACK	FILL DE	TAILS									LOCATIO	N DETAI	15			
Depth	Depth		Descrip			IAILS	Rer	marks								narks				
-0.50	0.00	Upstandi	ng cover				- Itel	Harks		E	Borehole fo	rmed to fa	acilitate in s	itu testing		Haiks				
0.00 0.30 0.50	0.30 0.50 6.00	Concrete Bentonite Gravel ba	•																	
6.00	18.00	Gravel ba	CAIII																	
	Note		pth in met																	
AGS			ader shee tails of abl				ess and w	ater.												
FINIAL							09/2022 1	3.56		1,	n check	ed by 1	David Ho	ward			SOI	L end	sinee	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Form No. SIEXPHOLEHDR

Engineer Employer Ground Level Hole Type TOPSOIL (Driller's des	TE8364 Mott MacDonald Bentley Barhale Limited +7.13mOD IP+RO Description of Strata	Coord	ation	s	547214									H_TUN_(M	
Hole Type TOPSOIL (Driller's des	IP+RO Description of Strata		ation	s	547214									Sheet 1 of	2
TOPSOIL (Driller's des	Description of Strata	Inclina				LOE, 2615	18.80N		Gri	d	O.	SGB	•		
TOPSOIL (Driller's des	scription)		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RĢD	<u> </u>	In Situ Test Details	Install- ation
MADE GROUND: Brice (MGR) [MADE GROUN Orange SAND (Driller) (SUPD) [SUPERFICIAL SAND GRAVEL (Driller (SUPD) [SUPERFICIAL GREY CLAY (Driller's di (GLT) [GAULT FORMAT	's description) DEPOSITS] 's description) DEPOSITS] DEPOSITS]				(1.00) - 1.00 - 1.20	7.13 7.13 7.13				4 4					
AGS	All depth in metres, all diameters in mi see header sheet for details of boring, for details of abbreviations, see key. Print date and time Issue Revision	progress:	and v			Lo: 02/03/20		ed by David Howar	d					L enginee	

Project Name	Cambridge Waste Water Treatr	ment Pla	ant	Relocat	ion										Hole ID	
Duning the No	TEOOCI							E	Explor	ator	у Но	le Lo)g	В	H_TUN_(001P
Project No. Engineer	TE8364 Mott MacDonald Bentley														M	
Employer	Barhale Limited														Sheet 2 of	2
Ground Level	+7.13mOD	Coordin	nates	3	547214.1	LOE, 2615	18.80N			Gri	d	09	GB			
Hole Type	IP+RO	Inclinat														
			Weathering		Depth	Datum	trike	Samp	oling		TCR/Sample Recovery %	lows			In Situ Test	Install-
	Description of Strata		/eath	Legend	(Thick- ness)	Level	Waterstrike			Die	CR/Sa ecove	SCR/Blows	RQD	Ψ.	Details	ation
Grey CLAY (Driller's	description)		5		<u> </u>		>	Details	5	Dia.	7 2	S				
(GLT) [GAULT FORM	IATION]			===												
				===	-											
					-											}
]											
					-										SBP 12.00	-
					(9.90) -										WRSBP 12.50	-
			}		-											
] :											
																7
					:											
				:	-											
					-											-
					:											
Gray CLAV (Drillar's	description				15.00 -	7.13										-
Grey CLAY (Driller's (GLT) [GAULT FORM	IATION]				-											
					:											
					-											
																}=======
					(3.00) -											-
					-											
																}
					-											
					18.00 -	7.13									SBP 18.00	
Complete at 18.0	0m. Termination Reason: Achieved Sเ th to Undertake In Situ Testing	uitable			10.50	/3									521 10.00	
]					:											1
					-										WRSBP 18.50	-
																-
					-											-
																1
					-											-
					:											-
																1
	: All depth in metres, all diameters in mill See header sheet for details of boring, p		nd :-	ıator												
AGS	For details of abbreviations, see key.	Jogress a	iiiu W	ratel.												
FINAL	Print date and time	12/09/20	022 1	13:56		Lo	g check	ked by David	Howard	l				SOI	L engine	PRING
Form No. SIEXPHOLEI	LOG Issue.Revision N	18							Part o	of the Bachy Soletan	che Group					

Project	Name	. Ca	mbrio	dge V	Vaste \	Nater Tre	atment	Plant F	Reloca	ation										Н	ole ID	
															Exp	lorato	ory Hole	Log	-	.	1181 4	202
Project			8364		anald E	Sentley														SH_I	UN_(JU2
Engine Employ			rhale			criticy														She	et 1 of 1	Ĺ
Ground L		+6.	92mOl	D					Coordi	nates	54	7352.80	E, 261	L488.7	'0N			Grid		OSGB		
Date Star			08/20			I				ompleted		/08/202			_				nation		m horizon	tal
7op 0.00	Base 1.20	Type		e Tim /08/202	e Start 1 08:30	Date Tir 23/08/202	ne End R	Rig Crew	Logge	Barrel T NA			ant l	Jsed and tool		g Used	Pit Stability Stable	<u>'</u>		Remark	S	
1.20	30.00	RC		/08/202		25/08/202		MM	AY	Geobor (146)	e S PC		oilmec									
					P	ROGRESS											WATER	STRIKE	S			
Date	Time	Dept		epth	Depth			Rema	ırks			Date	e Tim	ne	Depth	Depti	h Depth	Water	Time		Remark	s
23/08/20		16.00	1	6.00 6.00	15.70 15.60	End of Shift Start of shift									Strike	Casin	g Sealed	Rose To	Elapsed			
24/08/20 24/08/20 25/08/20	21 17:30	30.00	3	0.00	29.80 28.10	End of Shift Start of shift																
25/08/20		0.00		0.00	Dry		nplete; Boreh	nole Comple	ete													
Depth	Depth	. 1				1	N DETAILS SPT DET Dool Remarks Depth Test Top Type Reported Result													Energy	Depth	Depth
Тор	Base	' Ti	me Sta	art	Duratio	n Too	ı		Rem	arks		Тор		/pe		Report	ed Result		lammer Serial Number	Ratio	Casing	Water
					ROTARY	' FLUSH D	ETAILS															
Depth Top	Depth Base	FI	ush Ty	/ре	Flush Retur			ı	Remarl	ks												
1.20 5.20	5.20 30.00		AIR/MIS		90 90	Orange Grey																
HOLE DI	AMETE	R CASIN	IG DIAI	METER	1		DYNAM	IC SAM	PLING	i		1										
Depth Base	Diamete	Dep Bas		ameter	Depth T	Depth Base	Diamete	r Dura	tion	Sample Recovery	Run	9										
16.00 30.00	146 146	5.0		150		Buss																
30.00	140																					
	INS	TALLATI	ON DE	TAILS	1		PII	PE CONS	STRUC	TION						DI	EPTH RELA	TED REM	IARKS			
Distance	ID	Туре	Respon Top			Pipe Pipe Ref Ref	Тор	Base	Diame	eter Pip	е Туре	Depth Top		epth Base				Re	marks			
					BACI	KFILL DETA	ILS										LOCATIO	N DETAI	LS			
Depth Top	Depth Base	1	De	escript	tion			Ren	narks		_						Ren	narks	_	_	_	_
0.00	30.00	Grout										1. Inspec available			rmed on 0	9/08/202	1 to 0.50m. Pro	gress susp	ended until r	esults of G	PR survey ma	ide
L_																						
	Not					ameters in						•										
AGS						ails of borir ns see key.	g, progres	ss and wa	ater.													
FINAL						date and ti		9/2022 1	3:56			Log che	cked	by Da	avid Hov	vard			SOI	L end	sinee	RING
Form No. 9	SIEXPHO	LEHDR				ssue.Revisio	n No. 2.02			Issue Dat	e 22/06/2	2016							Part	of the Bach	ny Soletanche	Group

Project Name	Cambridge Waste Water Treatment	: Plant	t Relocat	ion										Hole ID	
D:+ NI-	TE02C/							Explo	rato	у Но	le Lo	og		BH_TUN_	002
Project No. Engineer	TE8364 Mott MacDonald Bentley												-	on_Tuiv_	_002
Employer	Barhale Limited													Sheet 1 of	3
Ground Level	+6.92mOD Cod	ordinate	es	547352.	80E, 2614	88.70	N		Gri	d	09	GB .			
Hole Type	IP+RC Inc	lination	1	90° from	horizonta	l									
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	Dia	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
MADE GROUND: G	rey rounded coarse gravel of flint. (Drainage	>	*******	0.10	6.82	>	D1	Details 0.05-0.10	Dia.	2 ~	S				
stones) (MGR) [MADE GRO	UNDI	Λ		0.25	6.67			2 0.20-0.25 0.10-0.40							-
MADE GROUND: G	rey slightly sandy gravelly clay. Sand is fine to unded fine to coarse of flint.	1		(0.35)			D 4	0.40-0.50							-
(MGR) [MADE GRO	UND]	Л		0.60	6.32			5 0.50-0.55 0.40-0.80							
	ark brown slightly sandy gravel. Gravel is angular to coarse of sandstone, mudstone, brick and	1		(0.60)			В9	0.80-1.20							
concrete. Occasiona (MGR) [MADE GRO	al nodules of light brown sandy clay. UND]	П		1.20	5.72			1.00-1.10 8 1.10-1.20						-	
MADE GROUND: Fi	ne to coarse sand and angular to subrounded fine ized fragments of flint.	1		(0.45)			25 (0 1.10 1.20					NA		-
(MGR) [MADE GRO	UND]	Л		1.65	5.27		C 1	0 1.20-2.20	102	45		<u> </u>		1	
subangular to subro	ey gravelly fine to coarse SAND. Gravel is ounded fine to coarse of flint and chalk.	/		(0.35)			"	2.20 2.20	102				NR		
(RTD) [SUPERFICIAL Assumed zone of co	DEPOSITS] ore loss. Orange SAND and GRAVEL (Driller's	1		2.00 -	4.92										
description) (RTD) [SUPERFICIAL	DEPOSITS	//		2.20	4.72								NA		
Orangish brown ver	y gravelly fine to coarse SAND. Gravel is ded fine to coarse of flint and chalk.	1		(0.45) 2.65	4.27										
(RTD) [SUPERFICIAL	DEPOSITS]	Л			4.21		C 1	1 2.20-3.20	102	45			NR		
	y gravelly fine to coarse SAND. Gravel is ded fine to coarse of flint and chalk.	/		(0.55)											
(RTD) [SUPERFICIAL Assumed zone of co	DEPOSITS] ore loss. Orange SAND and GRAVEL (Driller's	J		3.20	3.72									-	
description) (RTD) [SUPERFICIAL		/		(0.40)									NA		-
Orangish brown ver	y gravelly fine to coarse SAND. Gravel is	1		3.60	3.32		C 1	2 3.20-4.20	102	45		<u> </u>	ND		
subangular to round (RTD) [SUPERFICIAL	ded fine to coarse of flint and chalk. DEPOSITS]	/		(0.60)									NR		
Assumed zone of co description)	ore loss. Orange SAND and GRAVEL (Driller's			4.20	2.72										
(RTD) (SUPÉRFICIAL	DEPOSITS] y gravelly fine to coarse SAND. Gravel is	/		(0.30)									NA		
subangular to round	ded fine to coarse of flint and chalk.	1		4.50 - 4.60	2.42		C 1	3 4.20-5.20	102	40		<u> </u>		-	-
	tly sandy gravelly CLAY. Sand is fine to coarse.	1		(0.60)				3 4.20-3.20	102				NR		
Gravel is subangula (RTD) [SUPERFICIAL	r to rounded fine to medium of flint and chalk. DEPOSITS]	/		' '-											-
Assumed zone of co	ore loss. SAND and GRAVEL (Driller's description). CE DEPOSITS!	/		5.20	1.72									-	-
Stiff fissured thickly	laminated dark grey CLAY. Fissures are randomly	Partially Weathered	<u> </u>	(0.73)											1
(GLT) [GAULT FORM	y closely spaced planar smooth. ATION]	Pal					C 1	4 5.20-6.20	102	92					
	laminated dark grey CLAY. Fissures are randomly	+		5.93	0.99										†::::::::::
	y closely to very closely spaced, generally planar onally undulating polished, with occasional		<u> </u>												
dusting of silt. (GLT) [GAULT FORM	ATION]		<u> </u>												
. , ,	·						C 1	5 6.20-7.20	102	89					
				_											_
			<u> </u>												
			<u> </u>	(3.27)]]
			===				C 1	6 7.20-8.70	102	100					
at 8.00m nodules o 15mm)	f siltstone (<10mm x 10mm) and coprolite (10mm x		===	-				0 1.20-8.10	102	100					-
1311111)			<u> </u>												
			L	-											-
				-	1										-
Stiff fissured thickly	laminated dark grey CLAY with rare nodules of	-	===	9.20	-2.28										}
	10mm). Fissures are horizontal to subhorizontal ertical extremely closely spaced planar smooth,		<u> </u>				C 1	7 8.70-10.20	102	95					-
with rare dusting of (GLT) [GAULT FORM	silt.		<u> </u>												
(GLI) [GAGLI FORIVI	ATION														
Notes:	All depth in metres, all diameters in millimetr See header sheet for details of boring, progre		water												
AGS	For details of abbreviations, see key.	_ 4.14													
FINIAI	Print date and time 12/0	9/2022	13.56		Lo	n cher	-kod l	hy David Howa	rd				SOI	L engine	PRING

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project Name	Cambridge Waste Water Treatm	nent Pla	ant Re	elocat	ion										Hole ID	
D:+ N -	TE020/								Explo	rato	у Но	le Lo	og		DII TIINI	002
Project No. Engineer	TE8364 Mott MacDonald Bentley														BH_TUN_	.002
Employer	Barhale Limited														Sheet 2 of	3
Ground Level	+6.92mOD	Coordin	ates		547352.8	30E, 2614	88.701	N		Gri	d	09	SGB			
Hole Type	IP+RC	Inclinat			90° from	horizonta		1			a .		1 1		I	
	Description of Strata		Weathering	egend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	ш	In Situ Test Details	Install- ation
	laminated dark grey CLAY with rare nodules o	f														-
and vertical to subve	10mm). Fissures are horizontal to subhorizont ertical extremely closely spaced planar smoot	h,														
with rare dusting of (GLT) [GAULT FORM.	ATION]			-=-	-											
from 10 90m to 11	10m fissures are undulating smooth							C 18	10.20-11.70	102	100					
110111 10.30111 to 11	10m nasures are undulating smooth				-			010	10.20 11.70	102	100					
			-	-=-												
				-=-	-											
			-	-=-												
			-	-=-	-											
								C 19	11.70-13.00	102	100					
			Ė		(6.06)											-
			Ė		-											
			Ė		-											
								C 20	13.00-14.50	102	80					
					-											
from 14.20m to 14.	50m assumed zone of core loss.			_=_:												1
					-											
			ered													
			Unweathered	_=_:	-									NA		-
	ark grey CLAY. Fissures are randomly orientated	i i	5 📙		15.26	-8.34		C 21	14.50-16.00	102	97					
smooth. Frequent fo	undulating polished, occasionally planar and ossilised shell fragments (<8mm x 10mm) and			-=-	-											
occasional coprolite (GLT) [GAULT FORM.	ATION]															
from 15.26m to 15.3	36m very thin bed of weak siltstone			-=-	-											-
				-=-												
					-											-
			-	-=-				C 22	16.00-17.50	102	100					
				-=-	-											
					-											-
			Ė													
			Ė		-											
								C 23	17.50-19.00	102	92					
					-											
				=:												
				=:	-											
			-													
										102	100					
				-=-				C 24	19.00-20.50							
	All depth in metres, all diameters in millin					I .	<u> </u>	1		1	<u> </u>	<u> </u>				1
AGS	See header sheet for details of boring, pro- For details of abbreviations, see key.	ogress ar	nd wat	er.												
FINAL	Print date and time 1	2/09/20	22 13	56		Lo	g chec	cked b	y David Howar	d				SOI	L engine	PRING
Form No. SIEXPHOLEL	OG Issue.Revision No	2.05			Issue Date	02/03/20	18							Part o	f the Bachy Soletand	che Group

Project Name	Cambridge Waste Water Treatm	ent Plar	nt Relocat	tion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	og	l F	BH_TUN_	002
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 3 of	
Ground Level	+6.92mOD	Coordina			30E, 2614		N		Gri	d	09	SGB			
Hole Type	IP+RC	Inclination			horizonta					0 .0					1
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	۳	In Situ Test Details	Install- ation
	rk grey CLAY. Fissures are randomly orientated	1													
smooth. Frequent fo	undulating polished, occasionally planar and ossilised shell fragments (<8mm x 10mm) and		<u></u>												}
occasional coprolite (GLT) [GAULT FORM	ATION]		<u> </u>	-											
at 19.95m one bele	mnite fossil (2mm x 5mm)														
				-										-	
							C 25	20.50-22.00	102	72					
			<u> </u>												
			F_=_												
				-										-	
			<u> </u>				C 26	22.00-23.00	102	97					
			<u> </u>	1			020	22.00 20.00	102	•					
				_											
			<u> </u>	-			C 27	23.00-24.00	102	95					
			F	-										-	
			F												
			F	-											
			F				C 28	24.00-25.50	102	89					
			<u> </u>	(14.74)-										-	
			<u> </u>												}=====
			L												-
from 25.72m to 25.9	94m 70 degrees planar polished fissure														
110111 2011 2011	o ini vo dogreco pianar pononea nocare		L	_											
							C 29	25.50-27.00	102	96					
			L				C 23	23.30-27.00	102	30					
			<u> </u>												
			L												
			<u> </u>	-											-
			L												
			<u> </u>	-											-
			L				C 30	27.00-28.50	102	100					
			E==-	-										-	
			F-I-												
			F-I-	-											
			E-=-												
			F-I-	-										-	
							C 31	28.50-30.00	102	100					}
			<u> </u>												
			<u> </u>	30.00	23.08										
Complete at 3	30.00m. Termination Reason: Achieved Scheduled Dep h			35.55											
	,														
	All depth in metres, all diameters in millin		1 14/2+25												
	See header sheet for details of boring, pro For details of abbreviations, see key.	ogress and	ı walei.												
FINAL	Print date and time 1	2/09/202	2 13:56		Lo	g chec	ked b	y David Howar	rd				SOI	r engine	RING

Issue.Revision No. 2.05 Issue Date 02/03/2018

Form No. SIEXPHOLELOG



Project	Name	Can	nbridge	Waste	Wa	iter Tre	atment	Plant F	Reloc	ation					_						Н	lole ID	
Project	No	TF8	364												Exp	olorato	ory Hole	e Log	9	l B	кн т	UN_	003
Engine			tt Mac[onald	Ben	itley															• • • •	O.,	
Employ	er		hale Lin	nited																		et 1 of 1	1
Ground L Date Star			3mOD)8/2021							linates Comple			483.50E, 18/2021	261491.	40N				Grid Inclin	ation	OSGB	m horizor	atal
Top	Base		Date Ti	me Star	t D	ate Tim	ne End F			<u>-</u> -				nt Usec	Shorir	ng Used	Pit Stabili		memi		Remark		TCG1
0.00	1.20	IP		021 12:00	1	16/08/202	1 14:00	Mitch Maxey	DT		NA	NA		ted hand to	ols N	one	Stable						
1.20	30.00	RC	16/08/2	021 14:00	1	18/08/202	1 17:30	Mitch Maxey	SAN		obore S (146)	PCD	Soi	ilmec SM8									
		ı —	Depth	Depti		GRESS									Depth	Dept	WATE h Depth		RIKES Vater	Time			
Date 16/08/20		Depth 1.20	Casing		r	nd of Shift		Rema	ırks				Date	Time	Strike	Casin			se To		<u> </u>	Remark	(S
17/08/20 17/08/20	21 07:30	1.20 1.20 6.00	0.00	Dry 3.20	St	tart of shift nd of Shift																	
18/08/20 18/08/20	21 07:30	6.00 16.50	6.00	Dry 16.45	St	tart of shift nd of Shift																	
19/08/20 19/08/20	21 17:30	16.50 30.00	6.00 6.00	16.00 29.40	Di	tart of shift rilling Com	plete																
20/08/20 20/08/20		30.00 0.00	6.00 0.00	28.00		tart of shift ackfill Com	plete; Boreh	nole Comple	ete														
		<u> </u>		ABLE PE	RCL	JSSION	DETAILS SPT DETAIL Remarks Depth Test Reported Result																
Depth Top	Depth Base	Tim	ne Start	Durati	on	Tool														mmer Serial Number	Energy Ratio	Depth Casing	Depth Water
					T																		
				DOTAB	V EI	.USH DE	TAILC																
Depth	Depth	Eli	ısh Type	Flus		Flush	IAILS		Remar	rke													
Top 1.20	Base 9.00	A	IR/MIST	Retu 90		Colour Brown			Ciliai	- NS													
9.00	30.00	A	IR/MIST	90		Grey																	
HOLF DI	ΔMFTFF	CASING	G DIAMET	FR			DYNAM	IC SAM	PLING	G													
Depth	Diamete	Depth	Diamo	ter Depth	Ton	Depth	Diamete			Samp		lun											
Base 6.00	150	Base 6.00	150	Борил	ТОР	Base	- Diamoto	Jana		Recov	ery Refe	erence											
30.00	146																						
	INST	L ALLATIO	N DETAII	_S			PII	PE CONS	TRUC	TION						D	EPTH REL	ATED	REM	ARKS			
Distance			esponse R	esponse	Pipe		Тор	Base	Diam		Pipe Ty	/pe	Depth	Depth					Rem	narks			
		<i></i>	Тор	Base	Ref	Ref	•				' '	′1	Тор	Base									
				BAC	KFIL	LL DETA	ILS	<u> </u>						1			LOCATI	ON D	ETAIL	S			
Depth	Depth		Descri					Ren	narks									mark					
Top 0.00	30.00	Grout																					
	Note		pth in me									I											
AGS	3		eader she etails of al				g, progres	ss and wa	ater.														
FINAL	-						ne 12/09	9/2022 1	3:56			Le	og checl	ked by D	avid Ho	ward				SOII	L end	sinee	RING
Form No. 9	SIEXPHOL	EHDR					No. 2.02			Issue	Date 22									Part	of the Back	ny Soletanch	e Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion										Hole ID	
Project No.	TE8364							Explo	orato	ry Ho	le Lo	og		BH_TUN_	UU3
Engineer	Mott MacDonald Bentley												-	DII_IUIN_	_003
Employer	Barhale Limited													Sheet 1 of	3
Ground Level	+7.03mOD Coo	rdinate	es	547483.	50E, 2614	91.40	N		Gri	id	0:	SGB			
Hole Type	IP+RC Incli	ination		90° from	horizonta	al	,							ı	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
	wn slightly sandy slightly gravelly CLAY. Sand is fine	_		0.10	6.93		D1	0.05-0.10	Dia.		-				
to coarse. Gravel is Occasional roots.	angular to subrounded fine to medium of flint.	Λ		0.30	6.73			0.20-0.25 0.10-0.40							-
(TOP) [TOPSOIL]	Multicoloured sandy angular to subangular fine to			(0.60)	1		D 4	0.40-0.50							1
coarse gravel sized	fragments of brick, flint, sandstone and shale with t. Sand is fine to coarse. Cobble sized fragments are			0.90	6.13		B 6	0.40-0.80							
(MGR) [MADE GRO				(0.30)	5.83			0.80-1.20 1.00-1.10							7
	Frown slightly gravelly sandy clay. Sand is fine to angular to rounded fine to coarse of flint,			1.20	3.03		ES 8	3 1.10-1.20							}
sandstone and sha (MGR) [MADE GRO				(0.60)]								NA		-
Firm brown slightly	y gravelly sandy CLAY. Sand is fine to medium.			1.80	5.23		C 10	0 1.20-2.20	102	60					
Gravel is subangul (RTD) [RIVER TERR	ar to subrounded fine to coarse of flint. ACE DEPOSITS]	1		(0.40) -									NR		-
	se SAND and angular to subrounded fine to coarse	/		2.20	4.83										1
(RTD) [RIVER TERR		1		(0.38)	1								NA		
Assumed zone of c (RTD) [RIVER TERR	ore loss. SAND and GRAVEL (Driller's description). AVE DEPOSITS]	1		2.58	4.45		C 1	1 2.20-3.00	102	48			NR		
Brown very gravell	y fine to coarse SAND. Gravel is angular to	/		(0.42)]										
(RTD) [RIVER TERR	ACE DEPOSITS]	/		3.00 -	4.03										-
Assumed zone of co (RTD) [RIVER TERR	ore loss. SAND and GRAVEL (Driller's description). ACE DEPOSITS]	/		(0.40)	-								NA		
	se SAND and subangular to subrounded fine to	1		3.40	3.63		C 1	2 3.00-4.00	102	40			NID		
(RTD) [RIVER TERR	ACE DEPOSITS]	4		(0.60)	-								NR		
Assumed zone of c (RTD) [RIVER TERR	ore loss. SAND and GRAVEL (Driller's description). ACE DEPOSITS]														
	to coarse SAND and angular to subrounded fine to	1		4.00 -	3.03								NA		
(RTD) [RIVER TERRA	ACE DEPOSITS]			4.40	2.63								IVA		}
at 4.10m sandy gr Assumed zone of c	avel ore loss. SAND and GRAVEL (Driller's description).	1					C 13	3 4.00-5.00	102	40					-
(RTD) [RIVER TERR	ACE DEPOSITS]			(0.60)	1										
No recovery SAND	and GRAVEL (Driller's description).	-		5.00 -	2.03								NR		_
(RTD) [SUPERFICIA					1								INK		
				(1.00)					102	0]
				(1.00)]				102	ľ					
					-										
	hinly laminated dark grey CLAY with occasional	1		6.00 -	1.03										-
	gravel sized nodules of brown siltstone and agments. Fissures are 0 to 30 degrees very closely		<u></u>		1										
spaced undulating (GLT) [GAULT FORM			F_=_		1										
(GEI) [GAGEI TOKK	nanonj		F_=_	-]		C 14	4 6.00-7.50	102	100]
				1 .											}
				(2.16)											
					1										
					-										-
			F-I-	-	1										
			<u></u>	-	}								NA		-
	hinly laminated dark grey CLAY with occasional			8.16	-1.13		C 1	5 7.50-9.00	102	100					
	ım to coarse gravel sized nodules of brown sional shell fragments. Fissures are 1) 0 to 30		<u></u>		1										
degrees undulating	g smooth slightly polished. 2) 80 to 85 degrees spaced planar smooth polished.		<u>L</u>	1	1										
(GLT) [GAULT FORM			F_=_	-	1										
			F_=	(2.27)	1										1
				1]]
			E		1				102	100					-
					_		C 10	6 9.00-10.50							
			<u> </u>		1				-						
													T		
AGS	s: All depth in metres, all diameters in millimetre See header sheet for details of boring, progres For details of abbreviations, see key.		water.												
FINAL	Print date and time 12/09	/2022	13:56		Lo	g ched	cked b	oy David Howa	ırd				SOI	L engine	ering
Form No. SIEXPHOLE	LOG Issue.Revision No. 2.05	,		Issue Date	e 02/03/20	18							Part o	f the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatment	Plant	t Reloca	tion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	og	[3H_TUN_	UU3
Engineer	Mott MacDonald Bentley												'		
Employer	Barhale Limited			E/=:::	F0F -::	04.00						205		Sheet 2 of	3
Ground Level Hole Type		ordinate lination			50E, 2614 i horizonta		N		Gri	d	OS	SGB			
поте туре	II + NC INC	_	<u>'</u>	1	nonzonta	1				e %	y,				1
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
	hinly laminated dark grey CLAY with occasional	+	 		-										
	m to coarse gravel sized nodules of brown ional shell fragments. Fissures are 1) 0 to 30		F_=_	-	1										
	smooth slightly polished. 2) 80 to 85 degrees spaced planar smooth polished.	1		10.43	-3.40										1
(GLT) GAULT FORM	MATION]	/]										
	hinly laminated dark grey CLAY. Fissures are 1) 0 to osely spaced undulating smooth and polished. 2)		<u> </u>] _	1										_
80 to 90 degrees ve polished.	ery closely to closely spaced planar smooth and			(1.05)	-		6.1	7 10 50 12 00	100	100					
(GLT) [GAULT FORM	1ATION]			(1.65)			CI	7 10.50-12.00	102	100					
	.50m 1 No. fissure 30 degrees with soft gravelly clay ular fine of stiff clay.														
Illilli. Graver is any	ulai line di Stili Ciay.		<u> </u>		1										
				12.08	-5.05										-
	laminated dark grey CLAY. Fissures are 0 to 30 y spaced undulating rough. 2) 80 degrees very			(0.44)	-3.03										1
closely to closely s	paced planar rough.		<u> </u>	1]										}
(GLT) [GAULT FORM Very stiff fissured to	hinly laminated dark grey CLAY. Fissures are 1) 30	1		12.52	-5.49										
	aced undulating rough. 2) 80 degrees closely		<u> </u>	(0.68)	_		C 1	8 12.00-13.50	102	80					
(GLT) [GAULT FORM				-	-										-
	ore loss. Grey CLAY. (Driller's description)		==	13.20	-6.17								NR	-	
(GLT) [GAULT FORM	MATION] hinly laminated dark grey CLAY. Fissures are 1) 0 to			13.50	-6.47								INK		
40 degrees very clo	osely spaced undulating rough. 2) 80 degrees				1										
closely spaced plar (GLT) [GAULT FORM			<u>L</u>		1		C 1	9 13.50-14.50	102	100					
				(1.24)]		C 1	9 15.50-14.50	102	100					}:::::::::
			F_=_		_										
					-										-
Very stiff fissured the	hinly laminated grey CLAY. Fissures are 1) 0 to 40	-		14.74	-7.71										
degrees very closel spaced planar roug	y spaced undulating rough. 2) 80 degrees closely		<u> </u>	(0.67)	1		C 2	0 14.50-15.50	102	100					4
(GLT) [GAULT FORM	MATION]		<u> </u>	(0.07)	1								NA		-
grey clayey silt	.60m with closely spaced thick laminations of light			15.41	-8.38								NA]=======
	hinly laminated grey silty CLAY. Fissures are 1) 0 to osely spaced undulating rough. 2) 80 degrees		<u>×</u> <u>×</u>		-										
	spaced planar rough.		×		1										
	.21m with closely spaced thick laminations of light		×	(1.19) -	-		C 2	1 15.50-16.50	102	100					-
grey clayey silt			<u>×_×</u> _	1	1										
			<u>×_×</u> _		1										
	inated grey silty CLAY with some subangular fine		X	16.60	9.57										1
coprolites.	e and occasional subrounded coarse gravel sized		<u>×</u> <u>×</u>	(0.50)	1										
(GLT) [GAULT FORM	MATION] ore loss. Grey CLAY (Driller's description)	-	<u></u>	17.10	-10.07							-		-	}
(GLT) [GAULT FORM]		C 2	2 16.50-18.00	102	40			NR]=======
				(0.90)	-								INK		
			<u> </u>	1	1										
Vary stiff fissured t	hinly laminated grey silty CLAY with occasional	4		18.00 -	-10.97										-
subangular to subr	ounded fine to medium gravel sized nodules of		<u>×_×</u> _	1	1										
	ubrounded coarse gravel sized coprolites. Fissures closely spaced undulating smooth.		<u>×_×</u> _		1			2 10 00 10 00	100	100					1
(GLT) [GAULT FORM			× ×		1		C 2	3 18.00-19.00	102	100					7
			$\overline{}$ $\overline{}$	(1.61)]										}
				-											-
			×	1	-		C 2	4 19.00-19.50	102	100					
			×		1										
	hinly laminated grey silty CLAY with rare to		× ×	19.61	-12.58										
	ites (15mm x 12mm) and belemnites (15mm x 0 to 40 degrees closely spaced undulating		×		1										
	<u> </u>														1
NI-4	· All donth in motroe all diameters is seilli	000	1			1	1				<u> </u>		1		1
ACS	: All depth in metres, all diameters in millimetr See header sheet for details of boring, progre		water.												
AUS	For details of abbreviations, see key.														
FINAL	Print date and time 12/0	9/2022	13:56		Lo	g chec	cked l	by David Howar	d			-	501	r eugine	ering



Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	g		BH_TUN_	UU3
Engineer	Mott MacDonald Bentley												'	ni_ran_	.003
Employer	Barhale Limited													Sheet 3 of	3
Ground Level Hole Type		rdinate ination			50E, 2614 horizonta		N		Gri	d	OS	GB			
поте туре	IF+RC IIICI	1		Depth	TIOTIZOTILA	_				e %	S/				
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
Vary stiff fissured th	inly laminated grey silty CLAY with rare to	We		ness)		Ma		Details	Dia.	TCF Rec	SC				
occasional ammonit	tes (15mm x 12mm) and belemnites (15mm x 0 to 40 degrees closely spaced undulating		× ×												
smooth. (GLT) [GAULT FORM.	. , , , , , , , , , , , , , , , , , , ,		× :	-	-										
(GLI) [GAGLI FORIVI	Anonj		× :	(1.73)											
			× ×	_			C 25	19.50-22.50							
			× ×		-				102	100					
	inly laminated grey CLAY with occasional		Ê	21.34	-14.31										}=====
1) 0 to 40 degrees c	igments and a tooth (15mm x 20mm). Fissures are losely spaced undulating smooth. 2) 85 degrees		<u> </u>												
closely to medium s (GLT) [GAULT FORM.	paced planar smooth. ATION]		<u></u>		-										
			<u></u>	_										-	
			<u></u>												
				-	-										-
			F												
			E-E-	(3.24)											
			<u> </u>												
			<u> </u>	-											
			<u> </u>												
			<u> </u>				C 26	22.50-25.50	102	97					
			<u> </u>												
			<u> </u>												
	inly laminated grey silty CLAY with occasional to uding belemnites, shell fragments, ammonites		×	24.58	-17.55										
and echinoids. Fissu	ires are 1) 0 to 40 degrees closely spaced		×										NA		
smooth.	2) 85 degrees closely to medium spaced planar		×	(1.01)									1471		
	nination of subangular to subrounded fine to coarse		×												
	inly laminated grey CLAY with rare subrounded		× = :	25.59	-18.56										
	nodules of siltstone and coprolites. Fissures are 0 spaced planar smooth.		<u> </u>												
(GLT) [GAULT FORM	ATION]		<u> </u>	(1.21)										-	
			<u> </u>	(1.21)											
			<u> </u>	-											
Very stiff fissured th	inly laminated light grey silty CLAY with			26.80	-19.77										
occasional coprolite	s and belemnites (5mm x 20mm). Fissures are 1) sely spaced planar smooth 2) 80 degrees closely			-			C 27	25.50-28.50	102	97					
spaced planar smoo (GLT) [GAULT FORM.	th.		×_×	(1.17)											
(GLI) [GAGLI FORIVI	ATION		×	(1.17)											
			1×— —		-										
Very stiff fissured th	inly laminated grey silty CLAY with occasional		<u> </u>	27.97	-20.94										
	mm x 10mm) and with occasional fossils. Ily orientated closely spaced planar smooth.		<u>×</u> _												}
(GLT) [GAULT FORM			<u>×</u>	-	-										-
			<u>×</u> <u>×</u> .												1
			×_×	(2.03) _											-
			×		-		C 28	28.50-30.00	102	98					
			1×				- 23	3.00]======
			X												
			X_X	30.00	22.97										
Complete at 3	30.00m. Termination Reason: Achieved Scheduled Dep h			30.00	22.31										
	,														
	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water												
AGS	For details of abbreviations, see key.														
FINIAL	Duint data and time 12 /00	/2022	12.50		1	1		. David Harris	al.				SOL	L enginee	RING



Project	Name	Cam	nbridge	Waste	Wat	er Trea	atment	Plant F	Reloc	ation										Н	lole ID	
Project	No	TE8	364												Exp	olorato	ry Hole	Log	l _R	H T	UN_(004c
Engine			t MacD	onald l	3ent	ley															O .	, , ,
Employ			nale Lim	ited					6	P		F / 7.0	75.075	20151	7.261			6 :			et 1 of :	1
Ground L Date Star			2mOD 9/2021							linates Comple	eted		675.97E, 9/2021		7.36IN			Grid Incli	nation	OSGB 90° f o	m horizor	ntal
Тор	Base	Туре	Date Tir				e End R	ig Crew	Logg	jer Ban	rel Type	Drill B	it Pla	nt Use			it Stability	,		Remark	(S	
0.00 1.20	1.20 30.00	IP RC	16/09/20 17/09/20	021 12:15 021 07:30		5/09/2021 1/09/2021		MM MM	DT AY		NA obore S	NA PCD		ted Hand ilmec SM		lone	Stable					
					PROG	GRESS											WATER	STRIKE	S			
Date '	Time	Depth	Depth	Depth		arceoo		Rema	ırks				Date	Time	Depth	Depth	Depth	Water	Time		Remark	KS
16/09/20 17/09/20	21 17:30	1.20	0.00 0.00	Water Dry Dry	Enc	d of Shift rt of Shift									Strike	Casing	Sealed	Rose To	Elapsed	1		
17/09/20 17/09/20 20/09/20	21 17:30	10.00 10.00	6.00 6.00	9.70 9.90	Enc	rt of Shift I of Shift rt of Shift																
20/09/20 21/09/20	21 17:30 21 07:30	30.00 30.00	6.00 6.00	29.90 28.40	End Sta	d of Shift rt of Shift																
21/09/20	21 11:30	0.00			Bac	ckfill Com	plete; Boreh	ole Comple	ete													
																				\perp		
Depth	Depth	T		ABLE PE	\top							-	Depth	Test	1			ETAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base	lim	e Start	Duratio	on	Tool			Ren	narks			Тор	Туре		Reporte	d Result		Number	Ratio	Casing	Water
				ROTAR			TAILS															
Depth Top	Depth Base		sh Type	Flus Retu	n (Flush Colour		1	Rema	rks												
1.20 4.20	4.20 5.20	Al	R/MIST R/MIST	90 90		Orange Brown																
5.20	30.00	All	R/MIST	90		Grey																
	AMETER		DIAMETE	ER			DYNAM	IC SAM	PLIN													
Depth Base	Diameter	Dase	Diamet	er Depth		Depth Base	Diameter	Dura	tion	Samp Recove	ery Refe	Run erence										
6.00 30.00	150 146	6.00 30.00	150 146																			
		Re	N DETAIL		Pipe	Pipe		PE CONS	1				Depth	Dept	h l	DE	PTH RELA					
Distance	ID .	Гуре	Тор	Base	Ref	Ref	Тор	Base	Diam	neter	Pipe Ty	ype	Тор	Base				Re	marks			
Depth	Depth		ъ .		KFILI	L DETAI	ILS										LOCATIO		LS			
Top 0.00	Base 30.00	Grout	Descri	ption				Ker	narks								Ken	narks				
	Note	es. All des	pth in me	tres all d	iamo	ters in	millimetr	25														
AGS	3 1,400	See he	ader she	et for det	ails o	of boring			ater.													
FINAL		For de	tails of ab				ne 12/09	1/2022 1	3·E¢			1 -	on chast	kad bu	David Ho	word			SOI	L en	sinee	RING
FINAL Form No. 9	SIEXPHOL	EHDR					ne 12/09 n No. 2.02	,	J.JU	Issue	Date 22		-	neu by	David ∏0	vvalu					ny Soletanch	

Project Name	Cambridge Waste Water Treatm	ent Plan	t Relocat	tion										Hole ID	
Project No.	TE8364							Explo	orato	ry Ho	le Lo	og	В	H_TUN_	004c
Engineer	Mott MacDonald Bentley														
Employer	Barhale Limited													Sheet 1 of	3
Ground Level Hole Type	+6.92mOD IP+RC	Coordinate			97E, 2615 i horizonta		N		Gri	id	0	SGB			
Tible Type	II +NC		<u> </u>	1	THOTIZOTIC	1				e %	S.				
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test Details	Install- ation
		We	×///×///	ness)	2010.	Wa		Details	Dia.	TCR	SCI			Botano	dation
coarse. Gravel is a	wn slightly gravelly sandy CLAY. Sand is fine to ngular to subrounded fine to medium of mixed			(0.32)	-			0.05-0.10 2 0.20-0.25							
lithologies includin (TOP) [TOPSOIL]	ng flint and sandstone. Occasional rootlets.	1	×/	0.32	6.60		В3	0.10-0.40							
Firm light brown s	lightly gravelly sandy CLAY. Sand is fine to coars	e.		(0.58)				0.40-0.50 0.50-0.55							7
Gravel is angular to (RTD) [SUPERFICIA	o subrounded fine to medium of flint.				1		B 6	0.40-0.80							
Reddish brown sai	ndy GRAVEL. Sand is fine to coarse. Gravel is			0.90	6.02			0.80-1.20							-
(RTD) [SUPERFICIA	nded fine to coarse of mixed lithologies. LL DEPOSITS]			1.20	5.72			1.00-1.10 3 1.10-1.20							1
	AND and GRAVEL. Sand is fine to coarse. Graveld fine to coarse of flint and chalk.	is		(0.46)	1								NA		-
(RTD) [SUPERFICIA	L DEPOSITS]			1.66	5.26		C 10	1.20-2.20	102	46					7
(RTD) [SUPERFICIAL	core loss. SAND GRAVEL. (Driller's Description) LL DEPOSITS]			(0.54)			C 10	7 1.20-2.20	102	40			NR		
	•			(0.54)											-
Orangish brown S	AND and GRAVEL. Sand is fine to coarse. Gravel	is		2.20	4.72										
angular to rounded (RTD) [SUPERFICIA	d fine to coarse of flint and chalk.			(0.50)	1								NA		
				2.70	4.22		C 11	1 2.20-3.20	102	50					
(RTD) [SUPERFICIAL	core loss. SAND GRAVEL. (Driller's Description) LL DEPOSITS]			(0.50)	-								NR		
															7
	AND and GRAVEL. Sand is fine to coarse. Gravel	is		3.20	3.72										=======================================
(RTD) [SUPERFICIAL	d fine to coarse of flint and chalk. LL DEPOSITS]			(0.60)	1								NA		-
							C 12	2 3.20-4.20	102	60					
	core loss. SAND GRAVEL. (Driller's Description)			3.80	3.12										
(RTD) [SUPERFICIA	LE DEPOSITS]				1								ND		7
				(1.05)	1								NR		1
					1										-
					}		C 13	3 4.20-5.20	102	35					
	grey CLAY with occasional siltstone nodules			4.85	2.07]
	Fissures are randomly orientated extremely clo undulating smooth and polished.	sely	<u> </u>		-										
(GLT) [GAULT FORM	MATION]		L- <u>-</u> -	-	1										
			H												
				1	-		C 14	4 5.20-6.20	102	100					
				(2.05)	1								NA		_
			E]											
			<u> </u>	-			C 15	6.20-6.50	102	100					
			E	1	1										7
			<u> </u>	-	1										-
Assumed zone of o	core loss. Grey CLAY. (Driller's Description)			6.90	0.02										-
(GLI) [GAGLI FOR	VIATION		<u></u>]		C 16	6.50-8.00	102	27					}
			F_=_	(1.10)]
					1										
			<u> </u>		1								NR		-
	CLAY. (Driller's Description)		_	8.00 -	-1.08										-
(GLT) [GAULT FORM	MATION]		F	-	1										
				(1.00)	1				102	0					-
			<u> </u>												
			<u> </u>	-	1										
	grey CLAY with occasional siltstone nodules			9.00 -	-2.08										-
	Fissures are randomly orientated extremely clo ced planar undulating smooth occasionally	sely		(0.62)	1										
polished. (GLT) [GAULT FORM	•		E]			C 17	7 9.00-10.00	102	100					-
Very stiff dark grey	CLAY with occasional siltstone nodules (<30mi			9.62	-2.70										
20mm) and phosp	hatic nodules (<40mm x 20mm). Fissures are 0-	-10	<u> </u>		1										
<u> </u>															
AGS	s: All depth in metres, all diameters in millin See header sheet for details of boring, pr For details of abbreviations, see key.	ogress and											50:	L engine	apinc
FINAL	Print date and time 1 ELOG Issue Revision No		13:56	Januar D. :			cked b	y David Howa	rd						
Form No. SIEXPHOLE	ELOG Issue.Revision No	J. Z.U5		issue Dat	e 02/03/20	19							Part o	f the Bachy Soletan	cne Group

Project Name	Cambridge Waste Water Treatme	nt Plant	Relocat	ion										Hole ID	
	-							Explo	rato	у Но	le Lo	og			201
Project No. Engineer	TE8364 Mott MacDonald Bentley												B	H_TUN_(JU4C
Employer	Barhale Limited													Sheet 2 of	3
Ground Level	+6.92mOD (Coordinate	es	547675.	97E, 2615	17.36	N		Gri	d	09	GB			
Hole Type	IP+RC I	nclination	ı	90° from	horizonta									T.	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	۳	In Situ Test Details	Install- ation
	CLAY with occasional siltstone nodules (<30mm atic nodules (<40mm x 20mm). Fissures are 0-1														
	nedium spaced planar undulating smooth														
(GLT) [GAULT FORM	ATION] 28m band of soft clay with angular to subangular			(1.54)			C 18	10.00-11.00	102	100					7
medium gravel size	nodules of mudstone 71m 1 No. 60 degree fissure undulating and polished		<u></u>												-
Vany stiff fiscured da	rk grey CLAY. Fissures are 0-15 degrees closely			11.16	-4.24										
spaced planar undul	lating polished and 70-90 degrees closely to		<u> </u>		-										
(GLT) [GAULT FORM	nar undulating polished. ATION]		<u></u>	-											
			<u> </u>												
			E-E-	-			C 19	11.00-13.00	102	100					-
			E==												
from 12.52m to 12.6	68m 1 No. 45 degree fissure planar and polished		<u></u>	(2.91)											-
at 12.95m shell frag from 13.09m to 13.1	nments (<20mm x 2mm) 18m soft clay			-											
	,														
				-											
Very stiff fissured da	rk grey CLAY with occasional siltstone nodules			14.07	-7.15										
	issures are randomly orientated very closely						C 20	13.00-15.70	102	100					
(GLT) [GAULT FORM			<u> </u>	-											
			F_=_	(1.63)											
			<u> </u>	-									NA		-
			E-E-												
				45.70	0.70										
	rk grey CLAY with occasional siltstone nodules issures are 0-20 degrees closely spaced planar		===	15.70	-8.78										
	polished, 75-90 degrees closely spaced			-											-
(GLT) [GAULT FORM				(1 (0)											
			<u></u>	(1.48)											
				- 17.18	-10.26		6.21	15 70 10 70	100	100					
	rk grey CLAY with frequent siltstone nodules issures are 0-20 degrees closely spaced planar			17.10	-10.20		C 21	15.70-18.70	102	100					
undulating smooth of spaced planar polish	occasionally polished, 45-50 degrees medium ned.		E	-											-
(GLT) [GAULT FORM	ATION]														
				-											
				(4.64)											
				-											
			<u> </u>						102	100					
				-											
			E- <u>-</u> -				C 22	19 70 21 20							
		\top					C 22	18.70-21.20							
					<u>L</u>	L					L_				
	All depth in metres, all diameters in millim See header sheet for details of boring, prog		water												
	For details of abbreviations, see key.	jivsə allu	*vat61.												
FINIAI	Print date and time 12	/00/2022	13.56		Lo	n cher	cked h	v David Howar	Ч				SOI	L engine	PRING



Project Name	Cambridge Waste Water Treatment	: Plant	t Relocat	tion										Hole ID	
Drainat No	TE8364							Exploi	rator	у Но	ole Lo	og		H_TUN_(00/c
Project No. Engineer	Mott MacDonald Bentley													Л_TUN_(JU46
Employer	Barhale Limited													Sheet 3 of	3
Ground Level		ordinate			97E, 2615		N		Gri	d	05	SGB			
Hole Type	IP+RC Incl	lination	'	1	n horizonta	1				Tn ,0	Г.,			1	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
	ark grey CLAY with frequent siltstone nodules Fissures are 0-20 degrees closely spaced planar		<u> </u>				<u> </u>		\dagger						
undulating smooth of spaced planar polish	occasionally polished, 45-50 degrees medium		<u></u>	-	1										
(GLT) [GAULT FORM			<u> </u>	-	-									1	
			<u> </u>		1										
			<u> </u>	-	-									-	7
				-	-							\dagger			
			<u></u>] :	}										
			E	21.82	-14.90									1	
(<10mm x 40mm). F	ark grey CLAY with rare phosphate nodules Fissures are randomly orientated extremely closely		F		-										-
to closely spaced pla (GLT) [GAULT FORMA	lanar undulating smooth polished. IATION]		F	-]										
` '.	•		F] :	-										-
			F	-	-		C 23	3 21.20-24.20	102	100					
			F_=_	-]									1	
at 23.11m shell fraç	gments (<10mm x 10mm)		F_=_	(2.64)	-									1	
			F_=_		-										
			<u> </u>	_]									1	1
			F_=_	<u> </u>	-										
			F_=_		-									-	1
at 24.35m 1 No. be	elemnite (<5mm x 30mm)		<u> </u>		<u> </u>										
Very stiff fissured da	ark grey CLAY with frequent phosphate nodules occasional siltstone nodules (<20mm x 20mm) and	7	<u> </u>	24.46	-17.54									1	-
rare belemnite (<5m	mm x 30mm). Fissures are randomly orientated		<u> </u>		-									1	
very closely spaced (GLT) [GAULT FORM	planar undulating smooth occasionally polished. IATION]		<u> </u>] -	-										
			<u> </u>		1										
			<u> </u>] :	-									1	
			<u> </u>	ļ ·	-		C 24	4 24.20-27.20	102	100					
			<u> </u>	-	-										
			<u> </u>	:	_									1	
			<u> </u>	1 :	1									1	
			<u> </u>	-	-									1	
			<u> </u>	1 3]									1	
			<u> </u>	(5.54)	-							1		1	
			F	, , ,	-										
			F	1 -]									1	
			F	1 .	1										
			F	-	-									-	1
				1 .	-										
				-	-		C 25	5 27.20-30.00	102	95				1	-
				1	-										
				-	1										-
				-	1									1	
				1 -	-										-
	.85m thinly laminated		F	-	-									1	
	.00m assumed zone of core loss 30.00m. Termination Reason: Achieved	_	<u> </u>	30.00	23.08		-		-		-	1		 	
Complete at c	Scheduled Dep h														
Notes:	: All depth in metres, all diameters in millimetr		<u></u>	<u></u>									$\overline{}$		<u> </u>
AGS	See header sheet for details of boring, progre- For details of abbreviations, see key.		water.												
FINAL	Print date and time 12/09	9/2022	13:56		Lo	g chec	cked b	y David Howard	d				SOI	L enginee	PRING

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	Carr	nbridge '	Waste \	Nater T	reatme	nt Plant f	Relocati	ion			\Box								ŀ	Hole ID	
		TE83	20%											Exp	olorato	ory H	ole l	Log	l _B	·U TI	JN_0	051h
Project Enginee			зь4 tt MacD	onald F	entley!															П_т	יט_עוג	JOHU
Employe			nale Lim										_			_				She	eet 1 of 1	1
Ground Le	evel		3mOD					Coordina			787.50E,	26149	90.60	NC				Grid		OSGB		
Date Start			8/2021 Date Tin	Ctart	Date T	·mo Enc	d Rig Crew	Date Cor	<u> </u>)9/2021 Rit Dl au	nt Us	d	Charin	ng Used	D:+ C+-	- Lility		ination	Remarl	I.o.	
7op 0.00	Base 1.20	Туре	26/08/20			1me End 2021 12:00	Mitch	v Logger DT	Rarrel Type	NA NA		ted hand			ng Used lone	Pit Sta Stal		+		Keman	<u> </u>	
1.20	30.00	RC	26/08/20	121 12:00	01/09/2	2021 17:30	Maxey Mitch Maxey	CJ	Geobore S	PCD	Soil	ilmec SN	M8									
	I						IVILINE															I
	I		l																			
	I																					
'					ROGRES	iS												STRIKE				
Date T		Depth	Depth Casing				Rema	arks			Date 1	Time		Depth Strike	Deptl Casin		epth ealed	Water Rose To			Remark	is
26/08/202 27/08/202	21 07:30	4.20 4.20	4.20 4.00	4.00 3.90	End of Sh Start of sh	hift							\top									
27/08/202 31/08/202	21 07:30	14.50 14.50	5.00 5.00	14.20 14.45	End of Sh Start of sh	hift																١
31/08/202 01/09/202 01/09/202	21 07:30	26.50 26.50 0.00	5.00 5.00	26.40 26.00	End of Sh Start of sh Backfill Co	hift	orehole Comple	ilate														
01.02.2.	.117.50				Dacimin	Jiipiete, -	TETIOIS S	eic .														
		ĺ																				ا
		ĺ																				
		ĺ																				١
				ABLE PER	PCLISSIO	NI DETAI	15									Щ,	SPT D	DETAILS				
Depth	Depth	Tim	ne Start	Duration	Т	ool		Remar	rks		Depth	Test	- 1		Report				Hammer Seria		Depth	Depth
Тор	Base			-	+						Тор	Туре	e		1,00				Number	Ratio	Casing	Water
	I																	ļ				
	I																	ļ	l			
	I																	ļ				
	L																	ļ				
Depth	Depth	T		ROTARY	/ FLUSH [ļ				
Top 1.20	Base 5.20		sh Type IR/MIST	Returr 90		ur		Remarks	·									ļ				
5.20 9.20	9.20 14.50	AIF	IR/MIST IR/MIST	90 90	Brown	n												ļ				
14.50 28.10	28.10 30.00	AIF	IR/MIST IR/MIST	20 30	Grey Grey	<i>'</i>												ļ				
	I																	ļ				
	I																	ļ				
						2)(010	- 410 000											ļ				
Denth		Denth	DIAMETE		Depti	h	MIC SAM	9	Sample	Run								ļ				
Base 30.00	Diameter 146	Base 5.00		er Depth To	op Base		eter Dura		ecovery Ref									ļ				
30.00	1-10	30.00																ļ				
	I																	ļ				
	I																	ļ	1			
		1114710					DIDE CON	OTDI IOTI								- FRTU						
Distance		Do	N DETAILS		Pipe Pipe	۵	PIPE CONS			Tuno	Depth	Dep	pth			EPIHI	KELAI	TED REN	emarks			-
Distance	ָן עו	Type '``	Тор	Base I	Ref Ref	f Top	Dasc	Diamen	er Pipe 1	Туре	Тор	Bas	se						Hidi No			
	,																					
	,																					
				BACI	KFILL DET	TAII S							\Box			100	OITA'	N DETAI	<u></u>			
Depth	Depth	T	Descrip		1111 51.	AILO	Re	marks						-				narks				
Top 0.00	30.00	Bentonite			+																	
	I																					
	I																					
	I																					
	I																					
	Note	es: All de	pth in met	tres, all d	ameters	in millim	etres.												\top			
AGS		See he		et for deta	ails of bor	ring, prog	ress and wa	rater.												(
FINAL							/09/2022 1	13:56			og check	ked by		vid Hov	ward				SO	ıL en	Ginee	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Issue.Revision No. 2.02

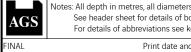
Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion										Hole ID	
Project No.	TE8364							Explo	rato	у Но	le Lo	og	RL	H_TUN_0	n54h
Engineer	Mott MacDonald Bentley														OJAD
Employer	Barhale Limited													Sheet 1 of	3
Ground Level		rdinate		547787.	50E, 2614	90.601	N		Gri	d	09	SGB			
Hole Type	IP+RC Incli	nation	1			I w				9 v					
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
angular to subangul (MGR) [MADE GROU MADE GROUND: Br	own slightly sandy slightly gravelly clay. Gravel is lar fine to coarse of flint. Sand is fine to coarse. UND] own slightly gravelly sandy clay. Sand is fine to gular to subrounded fine to coarse of flint, brick			0.20 0.32 - (0.68)	6.63 6.63		ES 2 B 3 D 4 ES 5	0.05-0.10 0.20-0.25 0.10-0.40 0.40-0.50 0.50-0.55 0.40-0.80							_
(MGR) [MADE GROUMD: Br coarse. Gravel sized	UND] own slightly gravelly sandy clay. Sand is fine to fragments are angular to subrounded fine to ologies, flint, brick (cobbles) and concrete.			1.00 - 1.20	6.63		B 9 D 7	0.80-1.20 1.00-1.10 1.10-1.20						-	
coarse. Gravel is and lithologies.	ish slightly gravelly sandy CLAY. Sand is fine to gular to subrounded fine to medium of mixed			(0.35) 1.55	6.63			1.20-2.20	102	35		-	NA NR		
to rounded fine and (RTD) [SUPERFICIAL	y gravelly fine to coarse SAND. Gravel is angular medium of flint and chalk.			2.20	6.63									-	
description) (RTD) [SUPERFICIAL Orangish brown ver	DEPOSITS] y gravelly fine to coarse SAND. Gravel is angular medium of flint and chalk.			(0.40)	6.63		C 11	2.20-3.20	102	40		-	NA NR		
Assumed zone of co description) (RTD) [SUPERFICIAL Orangish brown ver	ore loss. Orange SAND and GRAVEL (Driller's			3.20 (0.35) 3.55	6.63		C10	220.420	102	25			NA		
(RTD) [SUPERFICIAL Assumed zone of co description) (RTD) [SUPERFICIAL	DEPOSITS] pre loss. Orange SAND and GRAVEL (Driller's DEPOSITS]			(0.65) - 4.20	6.63		C 12	3.20-4.20	102	35			NR		
to rounded fine and (RTD) [SUPERFICIAL Assumed zone of co description)	ore loss. Orange SAND and GRAVEL (Driller's			(0.35) 4.55 (0.65)	6.63		C 13	4.20-5.20	102	35		-	NA		
(RTD) [SUPERFICIAL Assumed zone of co (GLT) [GAULT FORM.	ore loss. Brown CLAY (Driller's description)			5.20	6.63								NR		
undulating planar si				5.95	6.63		C 14	5.20-6.20	102	25		-		-	
(GLT) [GAULT FORM.	•			(0.90)	6.63		C 15	6.20-7.20	102	65		-	NA		
(GLT) [GAULT FORM.	dark grey CLAY. Fissures are randomly orientated			(0.35) ⁻ 7.20 7.40	6.63								NR NA		
(GLT) [GAULT FORM.	ATION] ore loss. Grey CLAY (Driller's description)			(0.80)	-		C 16	7.20-8.20	102	20			NR		
undulating smooth planar smooth polis (GLT) [GAULT FORM	ATION]			8.20 (0.55) ₋ 8.75	6.63		C 17	8.20-9.20	102	55			NA		
(GLT) [GAULT FORM. Stiff fissured dark gr	ore loss. Grey CLAY (Driller's description) ATION] rey CLAY with rare fossilised coprolites (<11mm x tal to horizontal fissures are planar undulating			9.20	6.63								NR		
	ubvertical to vertical fissures are medium spaced			-			C 18	9.20-10.70	102	87					
Notes:	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water.												
FINAL Form No. SIEXPHOLEL	For details of abbreviations, see key. Print date and time 12/09 OG Issue Revision No. 2.05		13:56	Issue Date	Lo: 02/03/20		cked b	y David Howa	rd					L enginee	

Project Name	Cambridge Waste Water Treatme	ent Plant	t Relocat	tion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	og	RL	H_TUN_0	n54h
Engineer	Mott MacDonald Bentley														UJAD
Employer	Barhale Limited													Sheet 2 of	3
Ground Level		Coordinate		547787.	50E, 2614	90.601	N		Gri	d	09	SGB			
Hole Type	IP+RC	Inclination	1	I		o o				م ہ	l "				
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	±	In Situ Test Details	Install- ation
18mm). Subhorizont	rey CLAY with rare fossilised coprolites (<11mm tal to horizontal fissures are planar undulating ubvertical to vertical fissures are medium space														-
(GLT) [GAULT FORM.															-
from 10.50m to 10.	70m assumed zone of core loss														
				-	1		C 19	9 10.70-11.50	102	69				-	-
from 11.25m to 11.	50m assumed zone of core loss														
				-											-
				(4.95)									NA	-	-
							C 20	0 11.50-13.00	102	93					
				-											-
from 12 00m to 12	00m assumed zone of save less														
from 12.90m to 13.	00m assumed zone of core loss			-										-	-
				-											-
							C 2	1 13.00-14.50	102	77					
A	Land Company of the state of th	_		14.15	6.63										-
description)	ore loss. Grey CLAY with very soft bands (Driller	s		(0.35)									NR		
	ured dark grey CLAY with rare fossilised coproli			14.50 -	6.63										
very closely spaced	ures are randomly orientated extremely closely planar undulating smooth polished.	to	<u></u>												-
(GLT) [GAULT FORM	ATIONJ			-			C 2	2 14.50-15.50	102	50				-	-
from 15.36m to 15.	50m stiff														
				(2.30)											1
from 15.80m to 16.	00m assumed zone of core loss						C 2	3 15.50-16.00	102	60					-
				-									NA	-	-
from 16.35m to 16.							C 24	4 16.00-16.50	102	90					
from 16.45m to 16.	50m assumed zone of core loss		E-E-					- 4050 4700	400						
	ured dark grey CLAY with rare fossilised coproli	tes		16.80	6.63		C 2	5 16.50-17.00	102	80					-
undulating smooth	ubhorizontal to horizontal fissures are planar polished. Subvertical to vertical fissures are			-			6.24	0 1700 1750	102	-00					
(GLT) [GAULT FORM.	nar smooth polished. ATION] 00m assumed zone of core loss			(1.05)			C 21	6 17.00-17.50	102	80					-
	50m assumed zone of core loss			-											
Assumed zone of co	ore loss. Grey CLAY with very soft bands (Driller	s		17.85	6.63		C 21	7 17.50-18.50	102	35					
description) (GLT) [GAULT FORM	ATION]			(0.65)			C 2	7 17.50-16.50	102	33					-
				18.50 -	6.63								NR		
No recovery. Grey C (GLT) [GAULT FORM.	LAY with very soft bands (Driller's description) ATION]			(0.50)	0.03				102	0					
				19.00 -	6.63				102						-
12mm). Fissures are	rey CLAY with rare fossilised coprolites (<8mm : e randomly orientated extremely closely to very		<u> </u>	(0.50)	3.53			8 19.00-19.50	102	60			NA		-
(GLT) [GAULT FORM.				19.50	6.63		L 2	0 13.00-13.50				Ш			-
No recovery. Grey C	50m assumed zone of core loss LAY with very soft bands (Driller's description)	_/	<u> </u>	(0.50)	1				102	0			NR		-
(GLT) [GAULT FORM	ATIONJ		<u> </u>	20.00	6.63					_		Ш			
	All I also a superior and a superior		1										1		
AGS Notes:	All depth in metres, all diameters in milling. See header sheet for details of boring, pro		water.												
	For details of abbreviations, see key.												SOI	L engine	שטוטפ
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Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
,	3							Explo	ratoı	у Но	le Lo	og			
Project No.	TE8364												BH	H_TUN_0	05Ab
Engineer	Mott MacDonald Bentley													Sheet 3 of	า
Employer Ground Level	Barhale Limited +6.63mOD Coor	dinate		547787	50E, 2614	90.601	N.		Gri	Н	09	GB		Sheet 3 of	3
Hole Type		nation		511101.	JOE, 2011	50.001	•		dii	u	0.	оав			
21				Depth		ā				e %	۸s				
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
		Wea	l	ness)	Levei	Wat		Details	Dia.	TCR,	SCF			Details	auon
	rey CLAY with rare fossilised coprolites (<8mm x lised shell fragments (<5mm x 6mm). Fissures are		<u> </u>	(0.30)				2000 20 50	1,,,	100					
	d extremely closely to very closely spaced planar		<u></u>	20.30	6.63		C Z	9 20.00-20.50	102	100					
(GLT) [GAULT FORM			<u></u>												
15mm) and rare foss	rey CLAY with rare fossilised coprolites (<11mm x silised shell fragments (<5mm x 8mm).		<u> </u>	(1.20)									NA		
Subhorizontal to hor	rizontal fissures are extremely closely to very ulating planar smooth polished. Vertical fissures		F	(1.20)]									-	1
are medium spaced	planar smooth polished.		F_=_				C 3	0 20.50-22.00	102	67					
(GLT) [GAULT FORM	ATION] ore loss. Grey CLAY with very soft bands (Driller's			21.50 -	6.63										
description)			<u> </u>	(0.50)											
	00m assumed zone of core loss		<u> </u>	22.00 -	6.63										
No recovery. Grey C (GLT) [GAULT FORM	LAY with very soft bands (Driller's description) ATION]			22.00	0.00								NR		
(/ [F												
			F	(1.00) -					102	0					
			<u> </u>												
Stiff locally soft fissu	ured dark grey CLAY with rare fossilised coprolites			23.00 -	6.63										
(<14mm x 18mm). S	Subhorizontal to horizontal fissures are extremely		<u> </u>				C 3	1 23.00-23.50	102	90					
Subvertical to vertic	ely spaced planar undulating smooth polished. I fissures are medium spaced planar smooth		<u>L</u>				-	1 23.00 25.55							1
polished. (GLT) [GAULT FORM.	ATION]		F										***		
(32) [Allon,		F_=_	(1.55)									NA		
			<u> </u>	-										-	
			<u> </u>				C 3	2 23.50-25.00	102	70					
Accumed zone of co	ore loss. Grey CLAY (Driller's description)			24.55	6.63										1
(GLT) [GAULT FORM			E	(0.45)									NR		
O. W. L III. ooft food	Clay with more formalized convolition			25.00 -	6.63										
(<14mm x 18mm). S	ured dark grey CLAY with rare fossilised coprolites Subhorizontal to horizontal fissures are extremely		F-I-				C 3	3 25.00-25.50	102	80					
	ely spaced planar undulating smooth polished. Lal fissures are medium spaced planar smooth		<u></u>					3 23.00 25.55	1	00					
polished. (GLT) [GAULT FORM	·		<u> </u>												
from 25.00m to 25.1	15m soft		<u> </u>												
from 25.40m to ∠5.	50m assumed zone of core loss		<u> </u>	-			C 3	4 25.50-26.50	102	100				-	
			F												
from 26.50m to 26.7	72m soft to firm		F:												
1101.1.20.00	73111 301. 60 11111		<u> </u>				C 3	5 26.50-27.00	102	70					
	00m assumed zone of core loss		==:	_											
from 27.00m to 27.1	10m soft		F]	}										
			F												
			E	(5.00)			C 3	6 27.00-28.10	102	100			NA		
			<u> </u>	_											-
			<u></u>				C 3	7 28.10-28.50	102	100					
			<u></u>				0.5	7 20.10-20.30	102	100					
			<u></u>												
			F												
				-	•									-	1
							C 3	8 28.50-30.00	102	100					
				-											
			F												
Complete et '	20 00m Termination Reason: Ashioved		<u> </u>	30.00	6.63										
Complete at 3	30.00m. Termination Reason: Achieved Scheduled Dep h														
	All depth in metres, all diameters in millimetres														
	See header sheet for details of boring, progress For details of abbreviations, see key.	s and v	water.												
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Project No. TE8364	Droject	Namo	Cam	hridaa \	Macta M	Jotor Tro	atmor	t Dlant E	Poloc	ation												lole ID	
Project	Project	ivairie	Call	ibriage v	rvaste v	vater ne	aunen	IL PIAIIL F	reioc	ation						Evn	loroto	n, Hala l	امما		'	IOIC ID	
Sheet 1 1 1 1 1 1 1 1 1	Drainat	NIa	TEQ:	26/												Ехр	iorato	ту ноте	Log	R	⊔ ТІ	INI O	N5R
Separate Separate					anald Re	antlov															''	arv_c	030
SCHOOL 1						entiey															Cho	-+ 1 of 1	
March Marc	_				teu				Caard	·		F/17	701 C)E	2614	00	4011			Grid			erroir	_
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April			/ .								rei iype	ו וווזע					-						
The continue								Cundill															
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200900201239 1300	24/09/202	21 17:30	30.00	10.70	Dry	End of Shift	t																
Company Comp	27/09/202	21 17:30	10.00	10.00		End of Shift	t																
CABLE PERCUSSION DETAILS SPT DETAILS S				10.20	Dry			Borehole Cor	nplete														
Depth Depth Flush Flush Flush Flush Flush Colour Remarks Flush F																							
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Top Base	Depth	Depth	T										Depth	Tes	t T				LIAILS	Jammar Sarial	Energy	Depth	Depth
According to the part Acco			Tim	e Start	Duration	Too			Ren	narks			Тор	Тур	e					Number	Ratio	Casing	Water
Applied Appl														C		N=37 (4,6:8,	,9,10,10)	17,11/60mm)					Dry Dry
Note: All depth De																							2.90 Dry
													5.20	S		N=23 (2,3:5	,5,6,7)			AR3501	75	4.20	Dry
Note													7.20	S		N=17 (1,3:3	,4,4,6)			AR3501	75	4.20	Dry Dry
Post Post																							Dry Dry
Depth Depth Open Flush Type Return Flush													10.70	S		N=17 (2,3:3	,4,4,6)			AR3501	75	10.70	Dry Dry
Top	Danah	Darab					TAILS						13.70	S		N=27 (1,3:5)	,6,8,8)			AR3501	75	10.70	Dry
Note: All depth in metres, all diameter Depth Top Base Dameter Depth D			Flus	sh Type				F	Remai	rks			16.70	S		N=28 (2,3:5,	,7,7,9)			AR3501	75	10.70	Dry Dry
HOLE DIAMETER CASING DIAMETER DYNAMIC SAMPLING Popth Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter Base Diameter																N=31 (2,4:6, N=29 (3,4:5,	,7,8,10) ,6,8,10)						Dry Dry
HOLE DIAMETER CASING DIAMETER DYNAMIC SAMPLING Pipe Diameter Base Diameter Base Diameter Depth Top Base Diameter Depth Top Depth Base Diameter Diameter Diameter Diameter Diameter Diameter Diameter Diameter Diameter Diameter Diameter Diameter Diameter Depth Top Diameter Diameter Depth Top Depth Diameter Dia																							20.00 Dry
HOLE DIAMETER CASING DIAMETER DYNAMIC SAMPLING Top Depth Base Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Diameter Depth Depth Diameter Depth Diameter Depth Diameter Depth Dept													24.20	S		N=33 (3,4:6	,8,9,10)			AR3501	75	10.70	Dry Dry
HOLE DIAMETER CASING DIAMETER Depth Base Diameter Depth Top Depth Base Diameter Depth Top Depth Base Diameter Depth Top Depth Depth Base Diameter Depth Top Depth Base Diameter Depth Top Depth Base Diameter Depth Top Depth Base Diameter Depth Top Depth Base Diameter Depth Top Depth Depth Top Depth Top Depth Top Depth Top Depth Top Depth Top Depth Top Depth Top Depth Top Depth Top Base Diameter Depth Top Depth Top Depth Top Depth Top Depth Top Depth Top Depth Top Depth Depth Top Depth Base Diameter Depth Top Depth Depth Top Depth Depth Top Depth Base Description Depth Depth Depth Depth Depth Top Base Description Remarks Description Depth Depth Top Depth Depth Top Depth Depth Top Depth Dept													27.20	S		N=41 (5,7:8,	,10,11,12)			AR3501	75	10.70	Dry
Depth Diameter Depth Diameter Depth Diameter Depth Dep													28.70	5	ľ	N=43 (6,7:9	,10,11,13)			AR3501	/5	10.70	Dry
Depth Diameter Depth Diameter Depth Diameter Depth Dep																							
Depth Diameter Depth Diameter Depth Diameter Depth Dep	HOLE DI	V V V E L E E	CVSIVIC	DIAMETER	9		DANIVI	AIC SANA	DI INI	2													
Distance ID Type Response			Denth			Denth					le	Run											
	Base		Base		r Depth To		Diamet	er Durat	tion														
Note: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.																							
Distance ID Type Response Response Ref Top Base Ref Top Base Diameter Pipe Type Top Depth Top Depth Base Ref Top Response Response Response Ref Top Ref Top Response																							
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BACKFILL DETAILS BACKFILL DETAILS LOCATION DETAILS LOCATION DETAILS LOCATION DETAILS Remarks Remarks Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.	Distance	ID .	Type Re				Тор	Base	Diam	eter	Pipe :	Туре							Re	marks			
BACKFILL DETAILS Depth Top Base Description Remarks -0.50 0.00 Upstanding over Concrete 0.50 0.80 Gravel backfill 0.80 7.00 Bentonite 7.00 10.00 Gravel backfill 10.00 Grout Motes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.	10.00	S1	SP			e 1 Pipe 1							юр	Du	100								
Depth Top Base Description Remarks Remarks -0.50 0.00 Upstanding cover 0.50 0.80 Gravel backfill 0.80 7.00 Bentonite 10.00 Gravel backfill 10.00 Grout						Pipe 1	7.00	10.00	50) SL	OTTED												
Depth Top Base Description Remarks Remarks -0.50 0.00 Upstanding cover 0.50 0.80 Gravel backfill 0.80 7.00 Bentonite 10.00 Gravel backfill 10.00 Grout																							
Depth Top Base Description Remarks Remarks -0.50 0.00 Upstanding cover 0.50 0.80 Gravel backfill 0.80 7.00 Bentonite 10.00 Gravel backfill 10.00 Grout																							
Depth Top Base Description Remarks Remarks -0.50 0.00 Upstanding cover 0.50 0.80 Gravel backfill 0.80 7.00 Bentonite 10.00 Gravel backfill 10.00 Grout					BACK	FILL DETA	AILS											LOCATIO	N DETAI	LS			
O.00	Depth	Depth		Dogovin				Don	ممعاده														
0.00 0.50 0.80 Gravel backfill Gravel backfill Gravel backfill Gravel backfill Gravel backfill Gravel backfill Gravel backfill Grout Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.			Unatandi		tion			Ken	ilai KS									Ken	iaiks				
7.00 10.00 10.00 Gravel backfill Grout Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.	0.00	0.50	Concrete	-																			
Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.																							
Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.				ckfill																			
ACS See header sheet for details of boring, progress and water.	10.00	30.00	Grout																				
ACS See header sheet for details of boring, progress and water.																							
ACS See header sheet for details of boring, progress and water.																							
		Note																					
	AGS	3					ıg, progre	ess and wa	ater.														



Form No. SIEXPHOLEHDR

Log checked by David Howard

Print date and time 12/09/2022 13:56 Issue.Revision No. 2.02 Issue Date 22/06/2016



Hole ID Cambridge Waste Water Treatment Plant Relocation Project Name Exploratory Hole Log Project No. TE8364 BH_TUN_005B Mott MacDonald Bentley Engineer Employer Barhale Limited Sheet 1 of 3 +6,69mOD Coordinates 547781.62E, 261488.18N Grid OSGB Ground Level IP+CP Inclination Hole Type Depth Sampling Datum In Situ Test Installõ Description of Strata (Thick 쁘 Legend Level Details ation ness) Details Dia. MADE GROUND: Dark brown very clayey fine to coarse sand with frequent rootlets. Gravel sized fragments are angular to subrounded D1 010 0.20 6.69 D2 020 ine to medium of flint and quartzite B 3 0.30-0.50 (MGR) [MADE GROUND] (0.50)MADE GROUND: Greyish brown very sandy gravelly clay. Gravel sized fragments are angular to subrounded fine to coarse of flint, quartzite, concrete and brick. 0.70 D 4 0.70 6.69 B 5 0.80-1.00 (MGR) [MADE GROUND] (0.50)Brown slightly clayey gravelly fine to coarse SAND, Gravel is angular to subrounded fine to coarse of flint and quartzite. 1.20 6.69 D6 120 SPT(C) 50/285mm (3,4:10,12,17,11/6 (RTD) [SUPERFICIAL DEPOSITS] Medium dense to very dense brown fine to coarse SAND and GRAVEL Gravel is angular to subrounded fine to coarse of flint and quartzite. B7 120-170 1.20 (RTD) [SUPERFICIAL DEPOSITS] D8 2.00 SPT(C) N=37 (4,6:8,9,10,10) B9 220-270 220 (2.80) D 10 3.00 SPT(C) N=26 (2,4:6,6,7,7) B 11 3.20-3.70 3.20 D 12 4.00 4.00 6.69 Firm fissured thinly laminated bluish grey CLAY. Fissures are 10-20 degrees randomly orientated extremely to closely spaced planar SPT(S) N=14 undulating smooth and 80-90 degrees planar smooth. (2,2:3,3,3,5) D 13 4.20-4.65 B 14 4.20-4.70 (GLT) [GAULT FORMATION] 420 SPT(S) N=23 (2,3:5,5,6,7) D 15 5.20-5.65 B 16 5.20-5.70 SPT(S) N=19 (2,2:4,4,6,5) D 17 6.20-6.65 6.20 B 18 6.20-6.70 K 7.00 - 10.00 K 7.00 - 10.00 (6.70)SPT(S) N=17 from 7,20m to 7,50m slightly sandy. Sand is fine (1,33,4,4,6) 7.20 D 19 7.20-7.65 B 20 7.20-7.70 SPT(S) N=20 (2,3:4,5,5,6) 8.20 D 21 8.20-8.65 B 22 8.20-8.70 SPT(S) N=21 (2,4:4,5,6,6) 9.20 D 23 9.20-9.65 B 24 9.20-9.70 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. AGS For details of abbreviations, see key. SOIL ENGINEERING Print date and time 12/09/2022 13:56 Log checked by David Howard Form No SIEXPHOLELOG Issue Date 02/03/2018 Part of the Bachy Soletanche Group Issue Revision No. 2.05

Project Name	Cambridge Waste Water Treatme	nt Plan	t Relocat	tion										Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	ole Lo	og		H_TUN_0)\[D
Engineer	Mott MacDonald Bentley													II_IUN_	0000
Employer	Barhale Limited													Sheet 2 of	3
Ground Level		oordinat		547781.6	S2E, 2614	88.181	V		Gr	id	09	SGB			
Hole Type	IP+CP II	nclination 5	1			ey.				<u>a</u> %	s				
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	Ŧ	In Situ Test Details	Install- ation
		We		ness)	LCVCI	Wat		Details	Dia.	TCR.	SCF			Details	ation
degrees randomly of	laminated bluish grey CLAY. Fissures are 10-20 prientated extremely to closely spaced planar		E-E-	:											
(GLT) [GAULT FORM	and 80-90 degrees planar smooth. IATION]														
Stiff fissured thinly	laminated bluish grey CLAY. Fissures are 10-20	_		10.70	6.69									SPT(S) N=17	
	degrees extremely closely to very closely spaced			-				5 10.70-11.15 6 10.70-11.20						(2,3:3,4,4,6) 10.70	
(GLT) [GAULT FORM							D Z	6 10.70-11.20							
			<u> </u>												1
			F_=_	-											
			F_=_	(3.00)										SPT(S) N=22	
			E-E-					7 12.20-12.65 8 12.20-12.70						(1,3:4,5,6,7) 12.20	-
			<u></u>				52	0 12.20 12.70							
			<u></u>	-											
			<u> </u>	-											-
Very stiff fissured th	ninly laminated bluish grey CLAY. Fissures are	_	==	13.70	6.69									SPT(S) N=27 (1,3:5,6,8,8)	
10-20 degrees and spaced undulating	40-50 degrees extremely closely to very closely planar smooth.		<u> </u>	-				9 13.70-14.15 0 13.70-14.20						13.70	
(GLT) [GAULT FORM	IATION]							3 10.73 1 1.23							
			E-E-	-											-
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														SPT(S) N=33 (2,4:6,7,9,11)	
				-				1 15.20-15.65 2 15.20-15.70						15.20	
								2 10.20 10.70							
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			<u> </u>												
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from 16.70m to 17.	.20m slightly sandy. Sandy is fine and medium		F_=_											SPT(S) N=28 (2,3:5,7,7,9)	
			E-E-	_				3 16.70-17.15 4 16.70-17.20						16.70	
				-											-
			<u> </u>												
				-											
			<u> </u>	:										SPT(S) N=31 (2,4:6,7,8,10)	
			<u> </u>	-				5 18.20-18.65 6 18.20-18.70						18.20	
			<u> </u>	-											
				-											
				:										SPT(S) N=29 (3,4:5,6,8,10)	
		+	+	<u> </u>	1			7 19.70-20.15 8 19.70-20.20						19.70	1
															1
	: All depth in metres, all diameters in millime				-				•			•			•
See header sheet for details of boring, progress and water. For details of abbreviations, see key.															
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Form No. SIEXPHOLEL	LOG Issue.Revision No. 2	.05		Issue Date	02/03/20	18							Part c	of the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatm	nent Plant	Relocat	tion									Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley						Explo	rator	у Но	le Lo	g	В	H_TUN_C	05B
Employer	Barhale Limited												Sheet 3 of 3	3
Ground Level Hole Type	+6.69mOD IP+CP	Coordinate		547781.6	62E, 2614	88.18	ı	Gri	d	OS	GB			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	¥	In Situ Test Details	Install- ation
	inly laminated bluish grey CLAY. Fissures are 40-50 degrees extremely closely to very close Jlanar smooth. ATION]			liess)		M	Details D 39 21.20-21.65 B 40 21.20-21.70 D 41 22.70-23.15 B 42 22.70-23.20	Dia.	TC Re	38			SPT(S) N=30 (3,5:6,7,9,8) 21.20 SPT(S) N=31 (4,5:6,8,8,9) 22.70	
				(16.30)			D 43 24.20-24.65 B 44 24.20-24.70 D 45 25.70-26.15 B 46 25.70-26.20						SPT(S) N=37 (5,67,9,10,11) 25.70	
							D 47 27.20-27.65 B 48 27.20-27.70						SPT(S) N=41 (5,7:8,10,11,12) 27.20	
							D 49 28.70-29.15 B 50 28.70-29.20						SPT(S) N=43 (6,7:9,10,11,13) 28.70	
Complete at 3	30.00m. Termination Reason: Achieved Scheduled Dep h	Ė		30.00	6.69		D 51 30.00							
ACS	All depth in metres, all diameters in milli See header sheet for details of boring, pr For details of abbreviations, see key.		Nater.	<u> </u>	<u> </u>									<u> </u>

Log checked by David Howard

Issue Date 02/03/2018

Print date and time 12/09/2022 13:56

Issue.Revision No. 2.05

FINAL

Form No. SIEXPHOLELOG

SOIL ENGINEERING

Project	Name	Cam	nbridge \	Waste 1	Water	r Trea	tment	. Plant f	Reloca	tion				П								Н	lole ID	
			_													Exp	lorato	ory Hole	Log		_	ד ויכ	-1111	200
Project Enginee		TE83	364 :t MacD	onald F	≀entle	//د																3H_1	UN_(JUb
Employe			nale Limi			, _			_			_			_	_						She	et 1 of 1	1 _
Ground Le	evel	+9.15				-			Coordin				879.70E,	2615	513.9	90N				Grid		OSGB		
Date Start			9/2021	- Ctort	Data	Time			Date Co				09/2021	+11	'd	L. ovir	U-od (Cir Ctabili	_	Inclina			m horizon	ıtal
0.00	Base 1.20	IP	Date Tin	021 11:30	21/09	09/2021	12:30	Rig Crew	DT	N	AV	NA	Insulat		nd Too		ng Used F Ione	Pit Stabilit Stable	У			Remark	.s	
1.20 7.50	7.50 40.00	CP RC	21/09/20: 22/09/20:			09/2021 (09/2021 (DC MM	AM AA	Geob	VA bore S	NA PCD		ando 20 ilmec S										
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	i		i					ļ																١
				Р	ROGRI	ESS												WATER	₹ STRI	IKES	;			
Date T	īime	Depth	Depth Casing	Depth Water				Rema	arks				Date ⁻	Time		Depth Strike	Depth Casing			ater se To	Time Elapsed	b	Remark	(S
21/09/202 22/09/202	21 07:30	7.50 7.50	6.90 7.50	7.00 7.20	End of Start of	of Shift							21/09/20	21 13:4		5.20	5.20	1		3.60	20	Medium		
22/09/202 22/09/202	21 17:30	7.50 18.00	6.90 7.50	5.00 2.80	End of End of	of Shift																		
23/09/202 23/09/202 24/09/202	21 17:30	18.00 21.00 21.00	7.50 21.00 21.00	7.40 20.80 19.00	Start of End of Start of	of Shift																		
24/09/202 24/09/202 27/09/202	21 17:30	31.50 31.50	21.00 21.00 21.00	31.00 30.50	End of Start of	of Shift																		١
27/09/202 28/09/202	21 17:30 21 07:30	8.00 8.00	7.00 7.00	8.00 8.00	End of Start of	of Shift of Shift																		١
28/09/202	:1 09:30	0.00			Installa	ation Co	omplete, Bo	Borehole Cor	mplete			Ì												I
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				ABLE PER	PCLISS	ION F)FTAILS								\perp			SPT	DETAIL	15				
Depth	Depth	Tim	e Start	10.000	Rema	arks	_		Depth	Tes			Report	ed Result		На	ammer Serial	Energy	Depth	Depth				
Тор	Base	+		Duratio	+	Tool	+				_		Тор	Тур	pe				—	+	Number	Ratio	Casing	Water
	i																							
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	i																							
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Depth	Depth	T		ROTARY		H DET	AILS																	
Top 1.20	Base 2.20		sh Type R/MIST	Return	n Col	olour			Remark	.s 														
7.50 9.00	9.00 18.00	W.	VATER VATER	90 70	Gr Gr	Grey Grey																		
18.00 21.00	21.00 40.00	AIR	R/MIST R/MIST	40 90	Gr	Grey Grey																		
	i																							
	i																							
HOLE DI	^N/FTFR	CASING	DIAMETE	-D	Ш		MAINV	IIC SAM	IDI ING															
Depth	Diameter	Depth		er Depth T		epth	Diameter		ntion	Sample		Run												
7.50	200	6.90	200	проран.	Ba	Base	Diamete	-	F	Recover	y Ref	erence												
40.00	146	21.00	150																					
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	ı																							
	INST/	L ALLATIOI	N DETAILS	.s	+		PII	PE CONS	STRUCT	ION							DF	EPTH RELA	ATED F	 REM	ARKS			
Distance	ID T		esponse Re Top			Pipe Ref	Тор	Base	Diame	ter F	Pipe T	Гуре	Depth Top		epth lase					Rem	narks			
6.00 6.00	S1 G1	SP	1.50	6.00 P	ipe 1 Pip	Pipe 1	0.00	1.50 1.50	50 19	PLAI PLAI	IN		106	-	ase									
		.			Pip Pip	Pipe 2 Pipe 1	1.50 1.50	6.00 5.50	19 50	SLO ⁻	TTED													
						Pipe 1	5.50	6.00	50	PLAI	IN													
				BACI	KFILL D	DETAIL	LS											LOCATIO	ON DE	TAIL	.S			
Depth Top	Depth Base		Descrip	ption				Rer	marks									Re	marks	ŝ				
-0.50 0.00	0.00 0.50	Upstandin Concrete																						
0.50 1.50	1.50 6.00	Bentonite Gravel bac	e ickfill																					
6.00 8.00	8.00 40.00	Bentonite Grout																						
	i																							
					\perp																			
	Note		pth in met eader shee						ntar]	4		
AGS	4		tails of abl				progres	.5 and +	ate.													•		
FINAL				Print	date ar	nd tim	e 12/09	9/2022 1	.3:56			L	og check	ked b	by Da	avid Hov	ward				SOI	L end	ginee	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Issue.Revision No. 2.02

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatmer	nt Plant	Relocat	tion									Hole ID	
Project No.	TE8364			•			Expl	orato	ry Ho	ole Lo	og		3H_TUN_	
Eng <mark>i</mark> neer	Mott MacDonald Bentley													
Employe <mark>r</mark>	Barhale Limited												Sheet 1 of	5
Ground Level		oordinate			70E, 2615		N	Gr	id	O:	SGB			
Hole Type		Meathering Weathering		Depth	horizontz Datum	Waterstrike	Sampling		TCR/Sample Recovery %	Swa	Q.		In Situ Test	Install
	Description of Strata	Veat	Legend	(Thick- ness)	Level	Abten	Details	Dia	CP/S	SCR/Blows	2	<u> </u>	Details	ation
	ark brown slightly gravelly sandy clay. Gravel size		2000		_	ŕ	D1 0.05-0.10	-	F	•				
	ular to subrounded fine to coarse of mixed g flint, sandstone and rootlets. Occasional nodule UND]	s		(1.20)			ES 2 0.20-0.25 B 3 0.10-0.40 D 4 0.40-0.50 ES 5 0.50-0.55 B 6 0.40-0.80							o o o o o
	ark grey mottled brown sandy gravelly clay. Sand			1.20	7.95		B9 0.80-1.20 D7 1.00-1.10 ESB 110-1.20							
	e fine to coarse. Gravel sized fragments are angula to coarse of flint, quartzite, coal ash, sandstone	r			‡		ES 10 1.50							
and concrete. (MGR) [MADE GRO]		B 11 1.50-2.00							}
gerally period and	(3.00)]		EW1 2.00							3.44
				(2.80)			ES 12 2.50 B 13 2.50-3.00						5	
					-									
					1	\Box	ES 14 3.50							#1
]		B 15 3.50-4.00							
				4.00 -	5.15									411
subrounded fine to	se SAND and GRAVEL. Gravel is angular to coarse of flint and quantzite.				1									
(RTD) (SUPERFICIAI	L DEPOSITS]]		ES 16 4.50							
]									
					1		B 17 4.50-5.00							111
				-	-									1:11:
				(2.50)]								K 5.20	<u>-</u>
					}									∃ .∏.
			$W_{ij}^{(i)}(x)$		‡		B 18 5.50-6.00							∮
					}									} \
Cian Annua debiat	CLAY C		<i>1</i>	6.50	2.65								8	:
onentated extreme	laminated bluish grey CLAY. Fissures are randomlely closely spaced planar undulating smooth.	y			‡		B 19 6.50-7.00							1
(GLT) [GAULT FORM	MATION]			(4 00)	1								9	:
				(1.00)	}								8	}
				-	1									
	red bluish grey CLAY with rare brown phosphatic 10mm). Fissures are 0-10 degrees and 15-55			7.50	1.65								8	7
degrees extremely	closely and very closely spaced planar and		<u> </u>	-]									}
undulating smooth (GLT) [GAULT FORM					1		C 20 7.50-B.50	102	100					
			E	-	1									3,77,00
			F==]	1		\vdash				-	5)	-
			F===	(3.95)	‡		C 21 8.50-9.00	102	100					
			F==		1			\vdash		_		4		-
			F==]									100000
			F==		1									
from 9.62m to 9.85	5m recovered as very soft		<u> </u>		†									* (1-5/c=1
			<u> </u>		<u>l</u>	L		\perp		L			<u> </u>	111111
								_		_				
AGS	 All depth in metres, all diameters in millime See header sheet for details of boring, progress details of abbreviations, see key. 		water.			•				•	-			•
FINAL	Print date and time 12/	09/2022	13:56		Lo	g chec	ked by David Howa	ard				SOI	r engine	ering
Form No. SIEYPHOLE	TOG Issue Revision No. 2	05		Ionus Dat	e 02/03/20							Don't e	of the Rachy Soletan	obo Crour

Project Name	Cambridge Waste Water Treatme	ent Pla	nt Reloca	ition									Hole ID	
Project No.	TE8364						Explo	rato	у Но	le Lo	og		BH_TUN_	006
Engineer	Mott MacDonald Bentley											-	ni_iuii_	_000
Employer	Barhale Limited												Sheet 2 of	5
Ground Level		Coordina			70E, 2615		V	Gri	d	09	SGB			
Hole Type	IP+CP+RC	Inclination		1	horizonta	1			e .o	T (0	1 1			1
	Description of Strata	Meathering	Legend	Depth Thick-	Datum	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test	Install-
		W/69	^^	ness)	Level	Wate	Details	Dia.	TCR/ Reco	SCR	~		Details	ation
	ed bluish grey CLAY with rare brown phosphation 10mm). Fissures are 0-10 degrees and 15-55	С		-										
degrees extremely of undulating smooth	closely and very closely spaced planar and and polished.		<u> </u>	-	-		6.22 0.00 12.00							
(GLT) [GAULT FORM.			<u> </u>	-]		C 22 9.00-12.00							
			<u> </u>	-										
			<u> </u>	-	1			102	90					
			<u> </u>	-]									
	grey CLAY with occasional brown phosphatic 20mm). Fissures are 0-10 degrees, 20-60 degre	200	===	11.45	-2.30									
and 85-90 degrees	very closely and closely spaced planar smooth	res	<u> </u>	-	1									
and polished. (GLT) [GAULT FORM.	ATION]		<u> </u>]									-
from 11.70m to 12.0	00m assumed zone of core loss		<u> </u>	-										
			<u> </u>		1		C 23 12.00-13.00	102	100					-
				_]									
			<u> </u>											
			F_=	(3.55)	1									
			F_=		1									
			F	_										
			F_=	-	1									
			F		1		C 24 13.00-15.00	102	100					
			F_=	_]:::::::::
					-									
from 14.80m to 15.	00m very stiff		<u> </u>		1							NA		
	ed bluish grey CLAY with occasional brown			15.00 -	-5.85							NA		-
	(<10mm x 20mm). Fissures are randomly y closely and very closely spaced planar and		<u> </u>	_	-									
undulating smooth (GLT) [GAULT FORM.	and polished.		<u> </u>		1									
(GEI) [GAGEI TORRI	Allon			(4.70)										
				- (1.70) 	1									
]									
]]		C 25 15.00-18.00	102	100					
Vary stiff fissured bl	uish grey CLAY with occasional brown phospha	ntic		16.70	-7.55									
nodules (<10mm x 2	20mm). Fissures are 0-10 degrees, 20-75 degre		F	1										
and polished.	very closely and closely spaced planar smooth		F											
(GLT) [GAULT FORM.	ATION]				1									
				-										
			F	-	†									
			F	-	1									-
			<u> </u>	(3.10)]									1
			<u> </u>	-	1									-
			<u> </u>	-	1									
from 19.00m to 19.	80m with rare shell fragments (<5mm x 10mm)			-]			102	62					-
				-	-									
4055	000 f		E	-	1		C 26 18.00-21.00							-
very closely spaced				19.80	-10.65									
Assumed zone of co	ore loss. Grey CLAY. (Driller's description)		_==	-]	10.03									-
Notes:	All depth in metres, all diameters in millin	netres				L								
AGS	See header sheet for details of boring, pro		ıd water.											
	For details of abbreviations, see key.	2 /00 /20	22 12-50			0.01-	lead by Devid II	d				SOI	L engine	ering
FINAL Form No. SIEXPHOLEL	Print date and time 12 OG Issue.Revision No.		££ 13.J0	Issue Dat	e 02/03/20	-	ked by David Howar	u					f the Bachy Soletan	

Project Name	Cambridge Waste Water Treatm	nent Plar	nt Reloca	tion									Hole ID	
Project No.	TE8364						Expl	orato	ry Ho	le Lo	og		BH_TUN_	006
Engineer	Mott MacDonald Bentley											'	DII_IGIN_	_000
Employer	Barhale Limited												Sheet 3 of	5
Ground Level	+9.15mOD	Coordina			70E, 2615		N	Gr	id	09	SGB			
Hole Type	IP+CP+RC	Inclination		1	horizonta				a .o	T (0	— Т			1
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	느	In Situ Test Details	Install- ation
Assumed zone of co	ore loss. Grey CLAY. (Driller's description)		<u> </u>											
(aci) [anaci i onivi	Allong											NR		
			<u></u>	(1.20)	1									
				-										
	sured bluish grey CLAY with occasional dark hosphatic nodules (<10mm x 20mm) and rare			21.00 -	-11.85								-	-
shell fragments (<3r	mm x 15mm). Fissures are 0-10 degrees, 20-6	35												
smooth and polishe		ır					C 27 21.00-22.00	102	100					
(GLT) [GAULT FORM.	AHONJ			-										
			<u> </u>	(2.00) -										-
			<u> </u>	-										
			<u> </u>											-
			<u> </u>	-			C 28 22.00-23.50	102	97					
	soft bluish grey CLAY with occasional to freque	ent		23.00 -	-13.85									
fragments (<20mm (GLT) [GAULT FORM	x 30mm) of stiff bluish grey clay. ATION]		E-E-	-]										-
from 23.45m to 23.	50m assumed zone of core loss		E	-										-
			E	(1.70)			C 29 23.50-24.00	102	100					
			F] ` ′-										-
														-
	uish grey CLAY with occasional dark brown an	nd		24.70	-15.55		C 30 24.00-25.50	102	100					
fragments (<3mm x	odules (<10mm x 20mm) and rare shell 10m). Fissures are 0-10 degrees, 20-75 degre			-										-
and polished.	very closely and closely spaced planar smooth	1												-
(GLT) [GAULT FORM.	ATION]													
			<u> </u>	-										
			F	-										
			F	-										
			F_=											
			F_=	1										
			E==	.] -			C 31 25.50-28.50	102	92					_
			E-E-	(7.40)										
from 27 50m to 31	80m with occasional coprolite (<26mm x 25mm) and			(7.10)										-
occasional belemni	te shells (<5mm x 20mm)			-										
														-
from 28.25m to 28	50m assumed zone of core loss			_										
110111 20.23111 to 20.	Soft assumed Zone of Core loss													
			<u></u>	-										
			<u> </u>	-										
							C 32 28.50 31.50							
							002 20:00 02:00							
AGS Notes:	All depth in metres, all diameters in milling See header sheet for details of boring, pr		d water.											
	For details of abbreviations, see key.											SOI	L engine	PDIDG
FINAL Form No. SIEXPHOLEL	Print date and time 1 OG Issue.Revision No		Z 13:56	Issue Date	Lo 02/03/20	-	ked by David How	ard					f the Bachy Soletan	

Project Name	Cambridge Waste Water Treatme	ent Pla	nt Reloca	tion										Hole ID	
Droiget No	TE8364							Explo	rato	у Но	le Lo	og		3H_TUN_	006
Project No. Engineer	Mott MacDonald Bentley													on_TuiN_	_000
Employer	Barhale Limited													Sheet 4 of	5
Ground Level		Coordina			70E, 2615		N		Gri	d	09	SGB	•		
Hole Type	IP+CP+RC	Inclination			horizonta	1				e .o	T (0				
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	ш	In Situ Test Details	Install- ation
	uish grey CLAY with occasional dark brown and odules (<10mm x 20mm) and rare shell	ı		-											
fragments (<3mm x	10m). Fissures are 0-10 degrees, 20-75 degree very closely and closely spaced planar smooth	es	<u> </u>	-	-										
and polished. (GLT) [GAULT FORM			<u> </u>												
	80m 1 No. fissure 60 degrees planar smooth tight and		<u> </u>	-					102	100					
polisticu			<u> </u>	-	1										
				-]										
from 31.50m to 31.	60m assumed zone of core loss		<u> </u>												
Vany stiff fissured da	ark grey silty CLAY with occasional phosphatic			31.80	-22.65										
nodules (<20mm x 3	30mm) and rare shell fragments (<5mm x 25mr		<u>×_×</u> _	-	1										
closely and closely s	egrees, 20-55 degrees and 85-90 degrees very spaced planar smooth and polished.		<u>×_×</u> _	-]]
(GLT) [GAULT FORM	ATION]		<u>×_×</u> _		1										
			<u>×_×</u> _	-	1										
			×_×_] -]		C 33 3	1.50-34.50	102	97					
			×_×_]	-		0000	2.00 0 1.00	102						
			<u>×_×</u>		-										-
			×_×_	1]										1
			×_×_	1	-										
			<u>×</u> ×] -	-										
			<u>×</u> ×	1]]
			××												
			××	1	1										
			×_×_	(6.20)	1								NA		
			E ×	1											
			×_×_	1 .	1										
			×	1	1		C 34 3	4.50-37.00	102	100					
			××	1 .											}======
			×	1	-										
			×	-	1										
			×												
			×		-										
from 37.00m to 37.	30m assumed zone of core loss		×	-	1										
	47m recovered as very soft grey clay with dark brown		×	1]										
fine sand at 37.55m with part	ting (<2mm) and lenses (<2mm x 40mm) of dark brown	.	×	-	1		C 35 3	7.00-38.00	102	70					-
fine sand from 37.55m to 37.	60m with frequent shell fragments (<5mm x 15mm)		×	1	1										
and 1 No. belemnit at 37.70m with part	e (5mm x 20mm) ting (<2mm) of dark brown fine sand	/	X	38.00 -	-28.85										
occasional pockets	ark grey slightly sandy to sandy CLAY with (<20mm x 30mm) of green glauconitic sandy cl	ay		1.	‡										{:::::::::::::::::::::::::::::::::::::
and occasional phos	sphatic nodules (<25mm x 40mm) and with ent belemnite shells (<5mm x 25mm) and shell			(0.80)	-		C 36 3	8.00-39.00	102	100					-
fragments (<5mm x	20mm). Sand is fine and medium. Fissures are			38.80	-29.65										1
medium spaced pla	5 degrees and 90 degrees possibly closely to nar and undulating smooth and rough and loca	lly		30.00	- 23.03										-
polished. (GLT) [GAULT FORM		_/			-										
	locally mottled yellowish brown glauconitic elly to gravelly SAND. Sand is fine to coarse. Gra	vel		(1.20)]		C 37 2	9.00-40.00	102	100]
is subangular to rou	inded fine and medium predominantly fine of fli NSAND FORMATION]						C 37 3	3.00-40.00	102	100					
	00m dark greyish brown mottled yellowish brown fine				1										
			2.3.3.	40.00	30.85										
	All depth in metres, all diameters in millim				1	-	1		1	1					1
AGS	See header sheet for details of boring, pro For details of abbreviations, see key.	gress an	d water.												
FINAL	Print date and time 12	2/09/202	22 13:56		Lo	g chec	cked by [David Howar	rd				SOI	L engine	RING
Form No. SIEXPHOLEL				Issue Date	e 02/03/20	-							Part o	of the Bachy Soletan	che Group



Project Name	Cambridge Waste Water Treatme	ent Pl	lant	Relocat	ion									Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo	g		BH_TUN_	006
Engineer	Mott MacDonald Bentley												'		
Employer Ground Level	Barhale Limited	Coordi	inata		E/(7070 =	'NE 2615	12 004		C	4	00	·CP		Sheet 5 of 5	5
Ground Level Hole Type		Inclina				'0E, 2615: horizonta		ų.	Gri	u	OS	чв			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
clayey slightly grave is subangular to rou (LGF) [LOWER GREEf from 39.80m to 40.0 sand Complete at 4	All depth in metres, all diameters in milling See header sheet for details of boring, proceedings of the second seed of the second seed of the second seed of the	netres.		vater.				Details	J. C. C. C. C. C. C. C. C. C. C. C. C. C.	L X					
	See header sheet for details of boring, pro	gress a	and W	ratef.											

Log checked by David Howard

Issue Date 02/03/2018

FINAL

Form No. SIEXPHOLELOG

Print date and time 12/09/2022 13:56

Issue.Revision No. 2.05

SOIL ENGINEERING

Project	Name	Can	nbridge	Waste \	Water Tre	atment	Plant I	Reloca	ation											ole ID	
Project	No	TE8	364											Exp	lorator	y Hole	Log	В	H_TI	JN_C)06P
Engine			tt MacD	onald E	Bentley															M	
Employ		Barl	hale Lim	nited															She	et 1 of 1	1
Ground L			9mOD					Coordi			7838.54E		494.7	75N			Grid		OSGB		
Date Star Top	Base	Type	9/2021 Date Tir	ne Start	Date Tin	ne End R	Ria Crew		omplete er Barrel	Type Drill	/09/2021 Bit Pl		Jsed	Shorir	a Used P	it Stability		nation	Remark	(S	
0.00	1.20	IP		021 14:30	28/09/202		Mitch Maxey	MM		71			and too		one	Stable		Inspe	ction pit: H		
1.20	18.00	RO	28/09/20	021 15:00	30/09/202	21 17:30	Mitch Maxey	MM		PCI	D Si	oilmec	SM8								
			Depth	P Depth	ROGRESS									Depth	Depth	WATER Depth	STRIKE Water		_		
Date 28/09/20		Depth 12.00	Casing 6.00	Water 11.70	End of Shift		Rema	arks			Date	Tim	ie	Strike	Casing		Rose To		i	Remark	(S
29/09/20 29/09/20	21 07:30	12.00 12.00 19.00	6.00 6.00	11.50 12.00	Start of shift End of Shift	t															
30/09/20 30/09/20		19.00 0.00	6.00	8.50	Start of shif		nole Compl	ete													
			С	ABLE PEI	RCUSSION	DETAILS										SPT D	ETAILS				
Depth Top	Depth Base	Tim	ne Start	Duratio	n Too	ı		Rem	arks		Depth Top		est /pe		Reporte	d Result	ı	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
												Ť									
				ROTARY	 Flush de	FTAILS					1										
Depth	Depth	Flu	sh Type	Flush	Flush			Remarl	ks												
Top 1.20	Base 6.00	A	IR/MIST	Retur	Orange																
6.00	18.00	A	IR/MIST	90	Grey																
HOLE DI	AMETER	CASINO	G DIAMETE	ER .		DYNAM	IC SAM	PLING	ì												
Depth Base	Diameter	Depth Base		er Depth T	op Depth Base	Diamete	r Dura	tion	Sample	Run Reference											
6.00 18.00	150 146	6.00	150		Dase				Recovery	/ Reference											
18.00	140																				
	INSTA	ALLATIO	N DETAIL	.S		PII	PE CON:	STRUC	TION						DEF	PTH RELAT	TED REM	1ARKS			
Distance	ID .	Гуре R	esponse Re Top		Pipe Pipe Ref Ref	Тор	Base	Diame	eter Pi	ре Туре	Depth Top		epth Base				Re	marks			
											12.20 12.90	1	L2.20 L2.90	Self Bori Self Bori	ng Pressure	emeter Test at	tempted				
											14.00 18.50		L4.00 L8.50	Packer T Self Bori	est ng Pressure	emeter Test					
		-		BACI	KFILL DETA	ILS										LOCATIO	n detai	LS			
Depth Top	Depth Base		Descri	ption			Rei	marks								Ren	narks				
0.00	18.00	Grout									Borehole	formed	d to fac	ilitate in si	tu testing						
	Note				iameters in ails of borin			ater													
AGS					ns see key.	J, F. 59100															-
FINAL Form No. 9	CIEVDUIO	THOD			date and tir		9/2022 1	.3:56	locu. C		Log ched	cked I	by Da	avid Hov	ward					sinee	
FUITI NO. S	DIEAPHUL	-חטג			Issue.Revisio	11 INO. Z.UZ			issue Da	ate 22/06/2	OTD.							Par	ι or the Bacl	ny Soletanch	e Group

Project Name	Cambridge Waste Water Treatr	nent Plar	t Relocat	ion									Hole ID	
							Explo	rator	у Но	le Lo	g	В	H_TUN_0	006P
Project No. Engineer	TE8364 Mott MacDonald Bentley												М	
Employer	Barhale Limited												Sheet 1 of	2
Ground Level	+5.59mOD	Coordinat	es	547838.5	54E, 2614	94.75N		Gri	d	OS	GB	1		
Hole Type	IP+RO	Inclinatio	n										I	
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	Ŀ	In Situ Test Details	Install- ation
MADE GROUND: So (MGR) [MADE GRO	oil (Driller's description)													
(Man) [MADE and	unb]			(0.70)										
				0.70	5.59									
MADE GROUND: Sa (MGR) [MADE GRO	and and Gravel (Driller's description) UND]			0.70	3.33									
				-									-	
				-									-	
				(3.50)										
				` /-										
														1
													_	
Grey CLAY (Driller's	description			4.20	5.59									
(GLT) [GAULT FORM	ATION]													
			<u> </u>											
			<u> </u>										-	
			E											<u></u>
			<u> </u>											
			<u> </u>	-									-	
														1
			E_=_											
			E-E-											
				(7.80)									-	
				-										
			E											<u> </u>
			E	-									-	
			<u> </u>											1
			<u> </u>	-										<u> </u>
			F=]========
			F_=_	-									-	
			E-E-											
			<u> </u>											
			<u> </u>											
	All dende in the control of the cont	:												
ACS	All depth in metres, all diameters in mill See header sheet for details of boring, p	irnetres. rogress and	water.											
	For details of abbreviations, see key.											SOL	ı enginee	DIDG



Project Name	Cambridge Waste Water Treatr	ment Plant	Relocat	ion									Hole ID	
D N	T5000/						Explor	rator	у Но	le Lo	g	В	H_TUN_C	06P
Project No. Engineer	TE8364 Mott MacDonald Bentley												М	
Employer	Barhale Limited												Sheet 2 of 2	<u>)</u>
Ground Level	+5.59mOD	Coordinate	es	547838.5	54E, 2614	94.75N		Grid	d	OS	GB	-		
Hole Type	IP+RO	Inclination	1	I					0 -					
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum Level	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
Grey CLAY (Driller's	description	×		ness)		W	Details	Dia.	Re TCF	SC				
(GLT) [GAULT FORM	ATION]		<u> </u>										-	
				-									-	
													-	
				-									- -	
													- -	
			<u> </u>	-									-	
			<u></u>										-	
Grev CLAY (Driller's	description)		<u></u>	12.00 -	5.59								SBP 12.00 -	
Grey CLAY (Driller's (GLT) [GAULT FORM	ATION]		<u> </u>										-	
			<u></u>	-									-	
													- -	
				-									WRSBP 12.90 -	
													-	
			<u> </u>	-									=	
			<u></u>										-	
													-	
			<u> </u>										-	
				-									K 14.40 - 16.00 - K 14.40 - 16.00 -	
			E										K 14.40 - 16.00 K 14.40 - 16.00 -	
			<u></u>	(6.00) –									K 14.40 - 16.00 -	
			<u> </u>										-	
				-									-	
													-	
				_									- -	
													-	
			<u> </u>	_									-	
													- -	
			E_=_	-	-								-	
			<u> </u>										-	
				-	-								- -	
			<u></u>										-	
Complete at 18.00	Dm. Termination Reason: Achieved Su	uitable		18.00 -	5.59								SBP 18.00 -	
Dept	th to Undertake In Situ Testing												-	
				-									WRSBP 18.50 -	
													-	
				-									- -	
					-								-	
				-									-	
				:	-								-	
				-							+		-	
Notes:	All depth in metres, all diameters in mill	imetres.		<u> </u>										
AGS	See header sheet for details of boring, p For details of abbreviations, see key.		water.											
FINAL	Print date and time	12/09/2022	13:56		Lo	a checl	ked by David Howard	d				SOI	L enginee	RING
Form No. SIEXPHOLEL			10.00	Issue Date	02/03/20	_		-					f the Bachy Soletanch	

Project	Name	Car	nbridge	: Waste	: Wa	ater Tre	atment	Plant F	Reloca	ation					_					Н	ole ID	
Project	No	TE8	364												Exp	olorato	y Hole	Log	_F	зн т	UN_	007
Engine			tt Macl	Donald	Ber	ntley														<i></i>	on . _	,001
Employ			hale Lir	nited																	et 1 of :	1
Ground L Date Star			6mOD 10/2021						Coordi Data C	nates Complet)13.92E, 0/2021	261466	.60N			Grid	nation	OSGB	m horizor	ntal
Top	Base		Date T	me Sta	rt D	ate Tim	ne End F							ınt Used	d Shorii	ng Used P	it Stability			Remark		iitai
0.00 1.20	1.20 30.20	IP RC		2021 14:00 2021 15:00	1	13/10/202 15/10/202	1 15:00	CB CB	DT AY	N	NA pore S	NA PCD	Insulat	ted Hand To	ools N	lone	Stable					
											46)											
			Depth			GRESS									Depth	Depth	WATER Depth	STRIKE Water	S Time			
Date 13/10/20		Depth 7.70	Casing		r	nd of Shift		Rema	arks				Date	Time	Strike	Casing		Rose To		1	Remark	ks
14/10/20	21 07:30	7.70 25.70	2.90 2.90	6.90	St	tart of Shift and of Shift	t															
15/10/20 15/10/20	21 07:30	25.70 30.20	2.90	25.10) S1	tart of Shift	t iplete; Boreh	nole Comple	ete													
				CABLE P	ERCL	USSION	DETAILS										SPT D	ETAILS				
Depth Top	Depth Base	Tim	ne Start	Durat	on	Tool			Rem	arks			Depth Top	Test Type		Reporte	d Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
Юр	Dase												юр	Туре						Katio	Casing	vvatei
Depth	Depth	T -		ROTAL Flu		LUSH DE	IAILS															
Top 1.20	Base 30.20	FIU	ISh Type	Retu 90	ırn	Colour		-	Remarl	ks												
						,																
							D) (0.14.1.4	10.041.4	DI INIO													
HOLE DI		Dont	h		_	Depth	DYNAM			Sample	e Ru	ın										
Base 2.90	Diamete 150	Base	Diame	ter Depth	lop	Base	Diamete	r Dura	tion		ry Refere	ence										
30.20	146	30.20																				
	INICT	ALLATIO	AL DETAI	1.6		1	DII	DE CONG	CTDU C	TION						DE	PTH RELAT		AA DI/C			
Distance	П	D	N DETAI		Pipe			PE CONS Base	Diame		Ріре Тур	20	Depth	Depth		טבו	PIN KELA		marks			
Distance	וטו	Type "	Тор	Base	Ref	Ref	Тор	Dase	Diairie	stei P	ripe iyp	Эе	Тор	Base				ке	IIIaiks			
				DA	CIZEII	LL DETA	II C										LOCATIO	NI DETAI	1.0			
Depth	Depth		Docer	iption	ZNFII	LL DETA	ILS	Don	marks									narks	LS			
Top 0.00	Base 30.20	Grout	Desci	ірцоп				Rei	iiai K5								Keii	Idiks				
	Not	es: All de	epth in m	etres all	diam	neters in	millimetr	es.														
AGS	3	See h	eader she	eet for de	tails	of boring	g, progres		ater.													
FINAL		ror de	etails of a			-	ne 12/09	9/2022 1	3.26			10	on chac	ked by [)avid Un	ward			soı	L end	sinee	RING
Form No. 9	SIEXPHOL	EHDR				e and tin e.Revision		., LULL I	5.50	Issue D	ate 22/0		-	uby L	, a v (u T 10	.varu			Part	of the Back	ny Soletanch	e Group

Project Name	Cambridge Waste Water Treatm	ent Pla	nt Reloca	ation										Hole ID	
Project No.	TE8364							Explo	rato	ry Ho	le Lo	og		BH_TUN_	007
Engineer	Mott MacDonald Bentley												-	DII_IGIN_	_007
Employer	Barhale Limited													Sheet 1 of	4
Ground Level	+4.66mOD	Coordin			92E, 2614		N		Gri	id	09	SGB			
Hole Type	IP+RC	Inclinati			horizonta					ā %	y,				T
	Description of Strata	Most bound	Legeno	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u> </u>	In Situ Test	Install-
		20/07		ness)	Level	Wate		Details	Dia.	TCR/ Reco	SCR	-		Details	ation
	on slightly gravelly sandy CLAY. Sand is fine to gular to subrounded fine to medium of flint.			(0.30)				0.05-0.10 0.20-0.25							
(TOP) [TOPSOIL]	htly gravelly sandy CLAY. Gravel is angular to	_/		0.30	4.36		B3 (0.10-0.40							
subrounded fine to	coarse of flint. Sand is fine to coarse.			-	1		ES 5	0.40-0.50 0.50-0.55							
(SUPD) [SUPERFICIA from 0.70m to 1.20	AL DEPOSITS] Im light brown and greyish white CLAY.			(0.90)]		B6 0	0.40-0.80							
				: -	-			0.80-1.20 1.00-1.10							-
	and thickly laminated dark grey mottled green	1		1.20	3.46			1.10-1.20						-	
orientated extremel	al rootlets (<1mm). Fissures are randomly ly closely spaced undulating smooth.			_	-										-
(GLT) [GAULT FORM from 1.20m to 1.37	ATION] 'm soft dark grey and orange sandy gravelly clay. Sand		F_E	_]		C 10	1.20-2.20	102	90					
is fine to coarse. Gr	ravel is subangular to subrounded fine to coarse of flint	:	F_=		-										
from 2.10m to 2.20	m assumed zone of core loss		F_=	(2.05)	1										
				1	-										
			F		-		C 11	2.20-3.20	102	82					
			F		1				-/-						
from 3.02m to 3.20	m assumed zone of core loss		F] .	1										-
	laminated dark grey CLAY with occasional		<u> </u>	3.25	1.41										
	(<10mm x 30mm). Fissures are randomly sely spaced planar undulating smooth polished		<u> </u>	-	-										-
(GLT) [GAULT FORM			F	-	-										
			E-=-		1		C 12	3.20-4.70	102	93					-
			<u> </u>	(1.74)	1										
			<u> </u>	-]										}
from 4.59m to 4.70	m assumed zone of core loss		<u> </u>	-	-										
			<u> </u>	-											
	brown shell fragments (<3mm x 3mm) ninly laminated dark grey CLAY. Fissures are	-1	<u> </u>	4.99 ·	-0.33										
	d extremely closely to very closely spaced plan polished and 45 degrees closely to medium	ar	F_=	-]										
spaced planar polisl	hed.		F_=	_	-		C 13	4.70-6.20	102	97					
(GLT) [GAULT FORM	AHONJ		F_=	_	1										
			<u> </u>		-										
				-]]
				-]										
			<u> </u>]	1										
			<u> </u>	-	1		C 14	6.20-7.70	102	100					
from 7.05m to 7.16	im 1 No. fissure 45 degrees planar polished		<u> </u>	_] (4.32)]										-
			F	-	1										
			F	-]	-										
from 7 0/ to 0 00	Im 2 No. fissures very closely spaced 45 decrees along		F	-]]										1
polished	lm 2 No. fissures very closely spaced 45 degrees plana	•	F	- 1	-										-
				-[1										
			<u> </u>	-[-		C 15	7.70-9.20	102	97					-
			<u> </u>	-	1										
from 8.81m to 8.98	m 2 No. fissures very closely spaced planar polished		<u> </u>]										-
			<u> </u>	_	-										
	ark grey CLAY with occasional phosphate nodu		==	9.31	-4.65										
	Fissures are 0-30 degrees closely spaced plana occasionally polished, 45 degrees closely spac		F_=	-	1				102	100					-
planar polished and polished.	70-90 degrees planar undulating smooth		F_F_	_]										
			+	1			C 16	9.20-10.70				\vdash			
Notes:	All depth in metres, all diameters in millir	netres.	1	1	1	<u> </u>	<u> </u>			1					1
AGS	See header sheet for details of boring, pro- For details of abbreviations, see key.		d water.												
FINAL	Print date and time 1	2/09/20	22 13:56		I o	a chec	ked hv	David Howa	rd				SOI	L engine	ering
Form No. SIEXPHOLEL				Issue Dat	e 02/03/20	-							Part o	f the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatment	t Plan	t Relocat	tion										Hole ID	
Project No.	TE8364							Exploi	rator	γ Но	ole Lo	og		BH_TUN_	007
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 2 of	
Ground Level		ordinate			.92E, 2614		N		Gri	d	09	SGB			
Hole Type	IP+RC Inc	clination		1	n horizonta	Т				T 40	Τ.,				_
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	ICR/Sample Recovery %	SCR/Blows	RQD	<u></u>	In Situ Test Details	Install- ation
(<20mm x 30mm), undulating smooth planar polished an polished. (GLT) [GAULT FORM from 11.50m to 1: planar polished from 12.50m to 2: planar polished from 15.50m to 1: planar po	Description of Strata dark grey CLAY with occasional phosphate nodules. It issures are 0-30 degrees closely spaced planar th occasionally polished, 45 degrees closely spaced nd 70-90 degrees planar undulating smooth MATION] 11.70m 2 No. fissures 45 degrees very closely spaced thinly laminated dark grey CLAY with rare siltstone x 15mm). Fissures are randomly orientated very anar occasionally undulating smooth and 70-90 olished. MATION] dark grey CLAY with rare phosphate nodules It issures are 0-30 degrees extremely closely to anar occasionally undulating smooth occasionally undulating smooth occasionally 90 degrees planar occasionally undulating smooth occasionally 90 degrees planar occasionally undulating smooth	Clination Weathering W		Depth (Thick-	Datum	ě	C 17 10 C 18 12 C 19 13 C 20 15		102 102 102	100	SCR/Blows	RQD	NA .		1
		 		-			C 22 18	8.20-19.70	102	100					
Note:	es: All depth in metres, all diameters in millimetr	res.							<u>L</u>				_		
AGS	See header sheet for details of boring, progre For details of abbreviations, see key.	ess and					·						 - 50'	IL engine	PRING
FINAL	Print date and time 12/0	,9/2022	₹ 13:56		Lo	g ched	cked by [David Howard	d				301	L CHOILIC	CKIIIO

Part of the Bachy Soletanche Group

Issue.Revision No. 2.05

Project Name	Cambridge Waste Water Treatme	nt Plar	it Reloca	tion									Hole ID	
Project No.	TE8364						Explo	rato	у Но	ole Lo	og		BH_TUN_	007
Engineer	Mott MacDonald Bentley											-	DII_IUIN_	_007
Employer	Barhale Limited												Sheet 3 of	4
Ground Level		Coordina			92E, 2614		N	Gri	d	09	SGB			
Hole Type	IP+RC I	nclinatio			horizonta	1			e					_
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
	ark grey CLAY with rare phosphate nodules Fissures are 0-30 degrees extremely closely to		<u> </u>											-
closely spaced plans	ar occasionally undulating smooth occasionally degrees planar occasionally undulating smooth													
polished.							C 23 19.70-21.20	102	100					
(GLT) [GAULT FORM from 20.81m to 21.	08m thinly laminated													
			<u> </u>	-										-
			<u> </u>											
			<u> </u>											
			<u> </u>											
			<u> </u>	-			C 24 21.20-22.70	102	100					
			<u> </u>											
			F											-
			F											
			E-E-	-										
			E- <u>-</u> -											-
			E	-			C 25 22.70-24.20	102	100					-
			E==											
from 23.87m to 24.	07m 2 No. fissures 50 degrees undulating polished		<u></u>	-										-
			==											
	elemnite (5mm x 25mm)			-										-
at 24.57m light bro	wn shell fragments (<5mm x 5mm)													
				-			C 26 24.20-25.70	102	100					_
	ark grey CLAY with rare phosphate nodules Fissures are randomly orientated closely spaced			25.41	-20.75									
planar undulating s	mooth.		<u> </u>	1										
(GLT) [GAULT FORM	Allonj		F	(1.27)										
			F											
			F				C 27 25.70-27.20	102	100					
Very stiff dark grey (26.68	-22.02									
(GLT) [GAULT FORM	AHONJ			(0.52)										-
	ark grey CLAY with rare phosphate nodules			27.20	-22.54									
fragments (<3mm x		ell		-										
(GLT) [GAULT FORM	ATION]													
			<u> </u>	-			C 28 27.20-28.70	102	100					-
			<u> </u>											
			<u> </u>	(2.00)	1									-
			<u> </u>	(3.00)										
			<u> </u>	-										-
			F											
			F				C 29 28.70-30.20	102	97					-
			E- <u>-</u> -											
														-
	All depth in metres, all diameters in millim See header sheet for details of boring, prog		l water	•	•			•						ı
AGS	For details of abbreviations, see key.	,, 555 and												00:00
FINAL Form No. SIEXPHOLEL	Print date and time 12 OG Issue,Revision No.		2 13:56	Issue Date	Lo e 02/03/20	_	ked by David Howa	rd					f the Bachy Soletan	
140. OIL/(I I I OLLL	resultation in the same i			.oout Dalt	///							1 mill	Ducity Juictell	Group



Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion									Hole ID	
Project No.	TE8364						Exploi	rator	у Но	le Lo	g		BH_TUN_	007
Engineer	Mott MacDonald Bentley												DII_IUN_	
Employer	Barhale Limited												Sheet 4 of 4	4
Ground Level		rdinate			92E, 2614			Gri	d	OS	GB			
Hole Type	IP+RC Inc	ination			horizonta				e %	s				
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling	1_	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
Very stiff fissured da	rk grey CLAY with rare phosphate nodules	*		11633)		>	Details	Dia.	75 ag	S				
(<10mm x 20mm), b fragments (<3mm x	nelemnites (<2mm x 15mm) and light brown shell 3mm).			30.20	-25.54									
(GLT) [GAULT FORM) from 30.15m to 30.2	20m assumed zone of core loss			-									-	
Complete at 3	30.20m. Termination Reason: Achieved Scheduled Dep h													
				-										
				-									-	
				-									-	
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		-												
Notes:	All depth in metres, all diameters in millimetr	es.	<u> </u>	<u> </u>	<u> </u>			1	<u> </u>					
ACS	See header sheet for details of boring, progre For details of abbreviations, see key.	ss and v	water.											
FINAL	Print date and time 12/0	9/2022	13:56		Lo	g check	ed by David Howard	d				soı	L enginee	RING

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Project	Name	Cam	bridge	Waste \	Nate	er Trea	tment	Plant F	Relocati	on										Н	ole ID	
		TF0													Exp	lorator	y Hole I	Log	١,) I T	1111	011
Project		TE83		onald E	on+l	lov													'	3H_1	UN_	011
Enginee Employe			t MacD ale Lim		enu	ley														She	et 1 of 1	1
Ground L		+6.57		itou					Coordina	tes	548	3423.41E,	2613	02.281	N			Grid		OSGB	00 1 01 1	
Date Start	ted	05/10	0/2021						Date Con	npleted	12/	10/2021						Incli	nation	90° f o	m horizor	ntal
Тор	Base	1 ''	Date Tir						Logger				nt Us			-	it Stability			Remark	(S	
0.00 1.20	1.20 42.50	IP RC	05/10/20 05/10/20			/10/2021 /10/2021		TW TW	DT AL	NA Geobore	NA S PCE		ed Hand 6 Beret		No	ne	Stable					
										(146)												
			Depth	P Depth	ROG	RESS								I De	epth	Depth	WATER Depth	STRIKE Water	S Time			
Date 1		Depth 5.20	Casing 2.20	Water	End	of Shift		Rema	rks			Date 05/10/202		St	trike 4.10	Casing	Sealed	Rose To	Elapse	d	Remark	(S
06/10/202 06/10/202	21 07:30	5.20 5.20 9.20	2.20 2.20 6.00	3.20 2.70	Star	t of Shift of Shift						12/10/202			4.10 i2.50	2.20 12.70		3.20 0.55	20 60			
07/10/202 07/10/202	21 07:30	9.20 9.20 22.70	6.00 6.00 12.70	Dry Dry Dry	Star	t of Shift of Shift																
08/10/202 08/10/202	21 07:30	22.70 24.70	12.70 12.70	Dry Dry	Star	t of Shift of Shift																
11/10/202 11/10/202	21 07:30	24.70 36.70	12.70 12.70	Dry Dry	Star	t of Shift of Shift																
12/10/202 12/10/202	21 07:30	36.70 0.00	12.70	Dry	Star	t of Shift	olete; Borel	nole Comple	ete													
Depth	Depth	1		ABLE PEI	Т		DETAILS					Depth	Test	F T				ETAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base	Time	e Start	Duratio	n	Tool			Remar	ks		Тор	Туре	- 1		Reporte	d Result		Number	Ratio	Casing	Water
				DOTA D	, 5111	CLI DE	FALLC					-										
Depth	Depth		h T	ROTARY		SH DE Flush	IAILS		Dl													
Top 1.20	Base 39.50		sh Type	Retur		Colour			Remarks													
39.50	42.50		R/MIST	100		Green																
HOLE DIA	AMETER		DIAMETE	R			NAMY	IC SAM														
Depth Base	Diameter	Depth Base	Diamete	er Depth T		Depth Base	Diamete	r Durat		ample covery F	Run Reference											
5.00 12.70	200 150	5.00 12.70	200 150																			
42.50	146	42.50	146																			
	INSTA	LLATION	N DETAIL:	S	\dashv		PI	PE CONS	TRUCTIO	DN NC						DEF	TH RELAT	ED REM	1ARKS		<u> </u>	<u> </u>
Distance	ID 1	ype Re	sponse Re Top		Pipe Ref	Pipe Ref	Тор	Base	Diamete	r Pipe	е Туре	Depth Top	Dep Bas					Re	marks			
5.00 5.00	G1 S1		1.50 1.50	5.00 P	ipe 2	Pipe 1 Pipe 2	0.00	1.50 1.50	50 19	PLAIN PLAIN		ТОР	Da	36								
3.00	31	Jr	1.50	3.00 F		Pipe 2 Pipe 1	1.50 1.50	2.50 4.50	19 50	SLOTTE												
							1.00	1.50		020112												
				BACI	(FILL	. DETAI	15										LOCATIOI	VI DETAI	15			
Depth	Depth		Doccrie		VI ILL	DEIAI		Don	narks									narks				
Top -0.50	Base 0.00	Upstandir	Descrip	Juon				Ken	IIdiks								Ken	Idiks				
0.00 0.50	0.50 1.50	Concrete Bentonite	-																			
1.50 5.00	5.00 42.50	Gravel bad Grout	ckfill																			
A C C			oth in me ader shee						ater.													
AGS	4		ails of ab				. 5															0100



Form No. SIEXPHOLEHDR Issue Date 22/06/2016 Issue.Revision No. 2.02



Project Name	Cambridge Waste Water Treatme	ent Pla	nt Reloca	ition									Hole ID	
Project No.	TE8364						Ехр	olorato	ry Ho	ole Lo	og		BH_TUN_	011
Eng <mark>inee</mark> r	Mott MacDonald Bentley													
Employer	Barhale Limited												Sheet 1 of	5
Ground Level		Coordina Inclination			.41E, 2613 honzo <u>n</u> ta		N	Gr	id	O	SGB			
Hole Type	ir+kc				1 NONZONG	Т.	ı		وب ⊈	L 100	Г		Τ	Т
	Description of Strata	Meathoring	Legeno	Depth (Thick- ness)	Datum Level	Waterstrike	Sampline Details	9 Dia	TCR/Sample Recovery %	SCR/Blows	ROD	뜨	In Situ Test Details	Install- ation
	vn slightly silty CLAY with abundant rootlets		W/8W	0.10	6.47	Ė	D1 0.10		<u> </u>					
\ (<3mm x 10mm). \ (TOP) [TOPSOIL]		/	<u> </u>	-]	1		D2 0.10-0.25							
Firm brown slightly subrounded fine to	gravelly slightly silty CLAY. Gravel is subangula medium of flint	r to	<u> </u>	(0.65)	-	ᄝ	B 3 0.25-0.75							
(SUPD) [SUPERFICIA		_	X-	0.75	5.82		D4 0.75-0.90							
slightly silty slightly	gravelly calcareous CLAY Gravel is subangular	to	1	(0.45)	-		B5 0.90-1.20							
subrounded fine to (WMCK) [WEST ME	coarse of chalk. [LBURY CHALK FORMATION]	_ <u></u>	T it.	1.20	5.37		D6 120	<u> </u>					_	
	K composed of soft yellowish brown gravelly ravel is subangular to subrounded fine to coarse	of &	1 1	(0.44)	1							NA		
extremely weak low	v density calcareous siltstone. (CIRIA Grade Dm)	گ_ ر "ر	2. 0	1.64	4.93		C7 1.20-2.20	102	100	80	70		_	THH
	LBURY CHALK FORMATION] density CHALK composed of yellowish brown	-/		1	:		120-220	102	100		"			HH
	NE with closely spaced thinly bedded K composed of firm calcareous CLAY.		<u> </u>	4		İİ	EW1 200						K 2.00 - 5.00	111
Discontinuities are	10 to 25 degrees medium spaced undulating			1	1									
(WMCK) [WEST ME	day and sift. (CIRIA Grade B2) (LBURY CHALK FORMATION)		1	4	-								13	- + 1
gravelly calcareous	im non intact core (recovered as yellowish brown sclay, Gravel is subangular to subrounded fine to coarse	2		I (200]							NI		
of calcareous siltst	one)	Grade B.		(2 36) I	3		C 8 2.20-3.70	102	100	73	57	200 300	8	1
			1 1	<u> </u>	1	□								\Box
			, <u>l</u> '	<u>d</u>	:									
			1 1	7	7								12.0	
			1	<u> </u>]									
Stiff dark greenish (grey slightly gravelly slightly sandy CLAY. Gravel	is	about make	4.00	2.57		EW 2 4.00						- 8	\pm
subangular to subro fine.	ounded fine to coarse of black coprolite. Sand is	\ <u></u>		4.20	2.37									
(WMCK) [CAMBRID	GE GREENSAND MEMBER]	_/	F	-	4		C 9 3.70-5.20	102	100				33	J. 1
closely spaced plan		′	F==		1									
(GLT) [GAULT FORM	IATION]		F==											4.5
					}									27172
				-	;									
				(2.60)	‡		 							277127
				3	1		C 10 5.20-6.20	102	100					
				-	-									
			FE	3	:			\vdash						200.000
from 8.38m to 8.42	em with rare nodule of pyrite (40mm x 30mm)		F==	_			C 11 6.20-6.70	102	100					10.0(20)
				<u> </u>	1			<u> </u>						282000110
	ark grey CLAY with occasional nodules of siltsto Fissures are 10 to 25 degrees very closely space		57,57133	6.BO	-0.23									
planar polished	- , , , ,	"		-	-		C 12 6.70-7.70	102	100				1 3	
(GLT) [GAULT FORM	IATIONJ			-	1									
			F	-	‡								8	- 000.00
from 7.80m to 7.85	im with rare shell fragment (20mm x 25mm)		F	<u>-</u>]	1									
	, , , , , , , , , , , , , , , , , , ,		F <u>-</u> -	-]	-									
					1									
				(5 90)	1		C 13 7.70-9.20	102	100					7777
				-	1									9835
			世		3									-
				-]									*******
			F==	-	1									
			F==	-]	1			102	100					K5-57-0-7
			F==	-]									
		+	+-	1	1	╙	C 14 9.20-10.70	+						
Notes.	. All depth in metres, all diameters in millin		1	1	1		<u> </u>		1		1	Т		1
AGS	See header sheet for details of boring, pro For details of abbreviations, see key.	gress an	d water.											
FINAL	Print date and time 1:	ארי פווי צ	7 1256		l -	n cha	ked by David Ho	Marana Marana				so	ıL engine	RING
FINAL Form No SIEXPHOLEI			£ 13.30	Issue Dat	LC 22/03/20		wenna na na na na na	eralU					of the Bachy Soletan	

Project Name	Cambridge Waste Water Treatm	nent Pla	ant F	Relocat	ion										Hole ID	
Project No.	TE8364								Explo	rator	у Но	le Lo	g	F	BH_TUN_	011
Engineer	Mott MacDonald Bentley													ן '		
Employer	Barhale Limited	6 1:			F/0/22/	45 26426	22.201			<u> </u>			<u> </u>		Sheet 2 of	5
Ground Level Hole Type	+6.57mOD IP+RC	Coordin				1E, 26130 horizontal		IN		Gri	a	OS	GB			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling	I	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
Very stiff fissured da	rk grey CLAY with occasional nodules of siltsto		Š		11622)		*		Details	Dia.	TC	SC]
	issures are 10 to 25 degrees very closely space		F		-]
(GLT) [GAULT FORM	ATION]		F	:	-											1
			F		-											
			E		-			C 15	10.70-11.20	102	100				-	
					-											
from 11.50m to 12.7	70m fissures are 0 to 12 degrees very closely spaced		E		-											1
planar polished					-											
			E		-			C 16	11.20-12.70	102	100				-	
			F													
			F		-											
Very stiff fissured da	rk grey CLAY with rare nodules of siltstone		E		12.70	-6.13										
spaced planar smoo			F		(0.50)										-	
	rk grey CLAY with rare nodules of siltstone	_	F	==	13.20	-6.63										
planar smooth.	issures are 0 to 20 degrees very closely space	d	F		-			C 17	12.70-14.20	102	100					
(GLT) [GAULT FORM	ATION]				-											
			E		-										-	
					-											
			E		-											
			F													
					-			C 18	14.20-15.70	102	100				-	
			F		-											-
			F		-											1
			F		-											
			E		_										-	
from 16.30m to 16.3	35m with rare nodules of pyrite (<10mm x 10mm)				-											
	, , , ,		E		(8.80)			C 19	15.70-17.20	102	100					
					•											
			F		-										-	
			F		-											
			F		-											
			F		-			C 20	17.20-18.20	102	100					<u> </u>
					-										-	
			E		-											
			F		-											
			F		-			6.21	10 20 10 70	100	100					
			F		-			C 21	18.20-19.70	102	100				-	
			F		-											1
			F		-											
			E		-											
ı																
	All depth in metres, all diameters in millir See header sheet for details of boring, pro		nd wa	ater.												
	For details of abbreviations, see key.															
FINAL	Print date and time 1	2/09/20	22 1	3:56		Log	g chec	cked b	y David Howar	d				SOI	r euginee	KING

Issue.Revision No. 2.05

Part of the Bachy Soletanche Group

Project Name	Cambridge Waste Water Treatr	nent Plant	Relocat	tion									Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley						Explo	ratoı	у Но	le Lo	og	E	BH_TUN_	011
Employer	Barhale Limited												Sheet 3 of	5
Ground Level Hole Type	+6.57mOD IP+RC	Coordinate Inclination			41E, 26130 horizonta		I	Gri	d	09	SGB			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
(>20mm x 30mm). F planar smooth. (GLT) [GAULT FORM.	ark grey CLAY with rare nodules of siltstone rissures are 0 to 20 degrees very closely space ATION] 00m with occasional nodules of siltstone (>20mm x	ed		-			C 22 19.70-21.20	102						
	ark grey silty CLAY with occasional nodules of 40mm). Fissures are 0 to 25 degrees very clo ned. ATION]		X X X	22.00 -	-15.43		C 23 21.20-22.70	102	100					
			× × × × × × × × × × × × × × × × × × ×	_			C 24 22.70-23.20	102	100					
			X				C 25 23.20-24.70	102	100					
		Unweathered	X				C 26 24.70-26.20	102	100			NA		
from 26.30m to 30.0 20mm)	00m with occasional fragment of belemnite (10mm :	x	X X X X X X X X X X X X X X X X X X X				C 27 26.20-27.70	102	100					
			X				C 28 27.70-29.20	102	100					
			X_X_X_X_X_X_X_X_X_X_X_X_X_X_X_X_X_X_X_	-			C 29 29.20-30.70	102	100					
AGS	All depth in metres, all diameters in mill See header sheet for details of boring, p For details of abbreviations, see key. Print date and time OG Issue Revision N	rogress and 12/09/2022		Issue Date	Log		ked by David Howa	rd					L enginee	

Project Name	Cambridge Waste Water Treatm	ent Plant	Relocat	tion									Hole ID	
Project No.	TE8364						Explo	rator	у Но	le Lo	og	E	BH_TUN_	011
Engineer Employer	Mott MacDonald Bentley Barhale Limited												Sheet 4 of	5
Ground Level Hole Type		Coordinate Inclination			11E, 2613 horizonta		N	Gri	d	OS	GB			
поле туре	Description of Strata	Weathering	Legend	Depth	Datum Level	Waterstrike	Sampling	Dia	TCR/Sample Recovery %	SCR/Blows	RQD	Ŀ	In Situ Test Details	Install- ation
siltstone (>20mm x spaced planar polisi (GLT) [GAULT FORM	ark grey silty CLAY with occasional nodules of 40mm). Fissures are 0 to 25 degrees very close hed.		Legend	(Thick-ness)	Level	TS-I MAGE IS	C 30 30.70-32.20 C 31 32.20-33.70 C 32 33.70-35.20 C 33 35.20-36.70	102	100	SCR/Blc	RQD			
				40.00	33.43							_		
	All depth in metres, all diameters in millin See header sheet for details of boring, pro		water											
AGS	For details of abbreviations, see key.				Loc	n chec	ked by David Howar	rd.				SOI	L enginee	RING

Form No. SIEXPHOLELOG

Issue.Revision No. 2.05

Project Name	Cambridge Waste Water Treatm	nent Plar	nt Reloca	tion										Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo	g	E	BH_TUN_	011
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 5 of 5	
Ground Level	+6.57mOD	Coordina	tes	548423.4	41E, 2613	02.28	N		Gri	d	OS	GB			
Hole Type	IP+RC	Inclination	n	90° from	horizonta	al									,
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	ш	In Situ Test Details	Install- ation
	ghtly sandy CLAY with rare belemnite fragments fine. Fissures are 0 to 20 degrees closely	nts		-											
spaced planar rough				(0.00)]		C 36 3	39.50-41.00							
(GLT) [GAULT FORMA	ALION			(0.89)					102	100				-	
				40.89	-34.32										
	sh grey slightly gravelly slightly sandy nd is fine to medium. Gravel is subrounded to			(0.46)	34.52									=	
rounded fine of flint. (LGF) [LOWER GREEN				41.35	-34.78										
Very stiff dark greeni	sh grey sandy CLAY. Sand is fine.	$\overline{}$		-	3470									-	
(LGF) [LOVVER GREEN	ISAND FORMATION			-			6.27	(4.00. (2.50	102	67					
				(1.15)	-		C37 4	41.00-42.50						-	
				1	1										
				42.50 -	-35.93	_									
Complete at 4	2.50m. Termination Reason: Achieved Scheduled Dep h	1			-										-
					1										
]										
					-										
				-	-									-	-
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Notes:	All depth in metres, all diameters in millir	metres.		1	1		1		1						
AGS	See header sheet for details of boring, pro		d water.												
INAI	For details of abbreviations, see key. Print date and time 1	12/00/202	2 12-54		1.0	a char	rkad hu	David Howar	d				SOI	L enginee	RING

Log checked by David Howard

Issue Date 02/03/2018

Part of the Bachy Soletanche Group

FINAL

Form No. SIEXPHOLELOG

Print date and time 12/09/2022 13:56

Project	Name	e Ca	mbric	lge V	Vaste ¹	Wat	ter Tre	atment	Plant	Reloca	ation											łole ID	
Project	No	TE	8364													Exp	lorato	ry Hole	Log	E	βH_T	UN_()11P
Engine				acDo	onald E	3ent	tley															M	
Employ			rhale		ted																	et 1 of	1
Ground I Date Star			57mO[′10/20;							Coord	inates Comple			28.85E, 0/2021	261303	3.96N			Grid	l ination	OSGB		
Тор	Base				ne Start	Da	ate Tim	ne End F	Rig Crew					_	nt Use	d Shorir	ng Used F	Pit Stabilit			Remark	KS .	
0.00 1.20	1.20 25.50	IP RO			1 11:00 1 12:00	13	3/10/202 5/10/202	1 12:00	TW	TW			PCD	Insulat	ed Hand T 46 Beretta	ools N	one	Stable					
							00500											14/4755	OTDUC				
Date	Time	Dept		pth	Depth		GRESS		Rema	arks				Date	Time	Depth	Depth	Depth	STRIKE Water	Time		Remarl	ks
13/10/20	21 17:30	20.00	5	sing .50	Water	En	d of Shift		Kem	ai NS			+	Date	111116	Strike	Casing	Sealed	Rose T	o Elapse	d	Keman	
14/10/20 14/10/20 15/10/20 15/10/20	21 17:30 21 07:30	20.00 25.50 25.50 0.00	5	.50 .50 .50		En Sta	art of shift d of Shift art of shift ckfill Com		nole Comp	lete													
Depth	Depth	1				$\overline{}$		DETAILS						Depth	Test				DETAILS	Hammer Seria	Energy	Depth	Depth
Тор	Base	Ti	me Sta	rt	Duratio	n	Tool	I		Rem	narks		-	Тор	Туре		Reporte	ed Result		Number	Ratio	Casing	Water
					ROTAR			TAILS															
Depth Top	Depth Base	1	ush Ty		Flusi Retur	'n	Flush Colour			Remar	rks												
1.20	25.50		AIR/MIS	•	100		Grey																
HOLE D	AMETE	R CASIN	IG DIAN	ЛЕТЕР	₹			 DYNAM	IC SAIV	IPLING	G												
Depth Base	Diamet	er Dep Bas		mete	r Depth	Гор	Depth Base	Diamete	r Dura	ation	Sample	e Run											
5.50 25.50	150 146	5.50		150			Busc				Recove	ny ikererer											
Distance		Type	Respon	se Res	sponse	Pipe		Тор	PE CON Base	Diam		Pipe Type	2	Depth	Depth		DE	PTH RELA		marks			
Distance	IID	туре	Тор	E	Base	Ref	Ref	юр	Dase	Diami	ietei j	ripe type		Top 6.00 24.95	6.00 24.95	Self Bori	ing Pressur	emeter Test	i Ne	illaiks			
														24.95	24.95	Self Bori	ing Pressur	emeter lest					
					BAC	KFIL	L DETA	ILS										LOCATIO	N DETA	LS			
Depth Top	Depth Base		De	scrip	tion				Re	marks									marks				
0.00	25.50												В	orehole fo	ormed to fa	acilitate in s	itu testing						
	~							millimetr g, progres		rater													
AGS	•				reviatio	ns se	ee key.														II. 60		מחומים
FINAL Form No.:	SIEXPHO	LEHDR						me 12/09	9/2022 1	L3:56	ا مرزووا	Date 22/06		-	ked by I	David Hov	ward					by Soletanch	

Project Name	Cambridge Waste Water Treat	ment Plant	t Reloca	tion									Hole ID	
	T-000/						Explo	rato	у Но	le Lo	og	В	H_TUN_0	011P
Project No. Engineer	TE8364 Mott MacDonald Bentley												М	
Employer	Barhale Limited												Sheet 1 of	3
Ground Level	+6.57mOD	Coordinate	es	548428.8	35E, 2613	03.96N		Gri	d	09	SGB			
Hole Type	IP+RO	Inclination	1		1				a .		1 1			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
TOPSOIL (Driller's d (TOP) [TOPSOIL]	escription)			(0.50)										
				(0.50) 0.50 -	6.57									
CHALK (Driller's des (WMCK) [WEST ME	scription) LBURY CHALK FORMATION]			0.50	0.57									
														-
				_										
					-									
				(3.80)										
				_										
				-										-
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0.07/2011				4.30	6.57									
CLAY (Driller's descr (GLT) [GAULT FORM	ription) ATION]			-										-
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			F] :	-									
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	All depth in metres, all diameters in mil	limetres.	<u>.</u>	<u> </u>	<u> </u>									
	See header sheet for details of boring, properties of abbreviations, see key.	orogress and	water.											
FINAL Form No. SIEXPHOLEL	Print date and time OG Issue.Revision I		13:56	Issue Date	Lo 02/03/20		ed by David Howa	rd					the Bachy Soletand	

Project Name	Cambridge Waste Water Tr	eatment l	Plant	Relocat	ion			Flas			1-1-	_		Hole ID	2445
Project No.	TE8364							Explor	ator	у но	ie Lo	og	B	H_TUN_()11P
Engineer	Mott MacDonald Bentley													M	
Employer Ground Level	Barhale Limited +6.57mOD	Coor	dinate	e	548428	35E, 2613	U3 96N		Grie	4	09	GB		Sheet 2 of	3
Hole Type	IP+RO		nation	5	J40420.0	33E, 2013	03.3011		GIII	J	O3	GB			
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	¥	In Situ Test Details	Install- ation
CLAY (Driller's desc (GLT) [GAULT FORM	cription)							Dottalio	Dia.						-
(GLI) [GAGLI FORIV	IATION														}
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					(21.20) –									-	
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Notes	:: All depth in metres, all diameters in	n millimetres	S		I	ı	1		ı			<u>ı </u>			1
AGS	See header sheet for details of bori For details of abbreviations, see key	ng, progress y.	and v	vater.											
FINAL	Print date and t	ime 12/09/	2022	13:56		Log	g check	ed by David Howard	d				SOI	L engine	RING

Issue.Revision No. 2.05



Project Name	Cambridge Waste Water Trea	itment Pla	nt Relocat	ion			Fla.			1-1-	_		Hole ID	.445
Project No. Engineer	TE8364 Mott MacDonald Bentley						Explor	ator	у но	ie Lo	og	B	H_TUN_(M)11P
Employer	Barhale Limited												Sheet 3 of 3	3
Ground Level Hole Type	+6.57mOD IP+RO	Coordin Inclinati		548428.8	35E, 26130	03.96N		Grid	d	OS	GB			
поте туре	Description of Strata	IIICIIIIau		Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>"</u>	In Situ Test Details	Install- ation
	Om. Termination Reason: Achieved that to Undertake In Situ Testing All depth in metres, all diameters in management of the state of th	Suitable	S	25.50	6.57		Details	Dia.	TT R				WRSBP 24.95 _	
AGS	See header sheet for details of boring For details of abbreviations, see key.		d water.											
FINAL	Print date and tim	e 12/09/20	22 13:56		Log	g check	ked by David Howard	d				SOI	L enginee	RING
orm No. SIEXPHOLEL				Issue Date	02/03/202		,						f the Bachy Soletanc	

Project	Name	Cam	nbridge '	Waste V	Nater Tre	atment	Plant R	Relocat	ion									Н	łole ID	
Project	No	TE8:	364										Exp	olorator	y Hole	Log	[RH T	UN_	015
Enginee	er	Mot	tt MacD	onald B	entley															
Employ Ground L			nale Lim 61mOD	ited				Coordina	ntas	548	3994.00E,	26105	5 59N			Grid	1	She OSGB	et 1 of 1	L
Date Star			9/2021					Date Co			09/2021						ination		m horizor	ntal
Top 0.00	Base	Туре	Date Tin		Date Tim 28/09/202		Rig Crew	Logger	Barrel	Type Drill		ant Use		ng Used Pi	t Stability Stable			Remark	(S	
1.20	30.20	RC	28/09/20		30/09/202		TW	AY	Geobo (146			46 Beretta		One	Junic					
<u> </u>		- T	Depth	PF Depth	ROGRESS						<u> </u>		Depth	Depth	WATER Depth	STRIKE Water				
Date 3	21 17:30	Depth 1.20	Casing 0.00	Water	End of Shift		Rema	rks			Date 29/09/20	Time 021 12:20	Strike	Casing 2.20	Sealed	Rose To		1	Remark	is ———
29/09/202 29/09/202	21 07:30 21 17:30	1.20 23.20	0.00 2.20	Dry 7.34	Start of Shift End of Shift	ft :														
30/09/202 30/09/202		23.20 0.00	2.20	7.92	Start of Shift Backfill Com	ft nplete; Boreh	iole Comple	ete												
			C,	ABLE PEF	RCUSSION	DETAILS									SPT D	ETAILS				
Depth Top	Depth Base	Tim	ie Start	Duration	n Tool	ı		Rema	rks		Depth Top	Test Type		Reported	d Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
1-1		+										17	+						522. 3	****
	<u> </u>				FLUSH DE	TAILS														
Depth Top	Depth Base	Fius	sh Type	Flush Return	n Colour		F	Remarks	;											
1.20	30.20	All	IR/MIST	100	Grey															
HOLE DI	AMETE	R CASING	G DIAMETE	ER .		DYNAMI	IC SAMI	PLING			}									
Depth Base	Diamete	Depth Base		er Depth To	Depth Base	Diameter	r Durat		ample	Run Reference]									
2.20 30.20	150 146	2.20 30.20	150	+	-	+		- 1	500	noron										
		\perp	\bot	\bot	Ц		\perp						\perp							
Dietanes		lp.	N DETAILS		Pipe Pipe	I I	PE CONS	Diamete		no Tuno	Depth	Dept	th	DEP	TH RELAT		MARKS emarks			
Distance		Туре	Тор	Base F	Ref Ref	Тор	Base	Diamete	er Pi	ре Туре	Тор	Base	e			ке	marks			
				BACK	KFILL DETA	,ILS									LOCATIO	N DETAI	ILS			
Depth Top	Depth Base		Descrip	ption			Rem	narks							Ren	narks				
0.00	30.20	Grout																		
	Not	es: All de	oth in me	tres, all di	ameters in	millimetr	es.													
AGS		See he	eader shee		ails of boring			ater.												
FINAL					date and tin	me 12/09		3:56			Log chec	ked by	David Hov	ward			sor	L end	ginee	RING
Form No. S	SIEXPHOL	EHDR			ssue.Revisior				ssue Da	te 22/06/2	-						Par	t of the Bac	hy Soletanche	e Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo	og		BH_TUN_	Λ15
Engineer	Mott MacDonald Bentley												-	// I I GI \	,010
Employer Ground Level	Barhale Limited +11.61mOD Cool	rdinate		E 1800 (00E, 2610	55 59t			Grie	۸.		SGB		Sheet 1 of	4
Hole Type		nation			horizonta		V		Gi.	u .	Ů.)UD			
		ering		Depth	Datum	strike		Sampling		mple ery %	lows			In Situ Test	Install-
	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike	-	Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	Ψ.	Details	ation
	rn slightly gravelly sandy CLAY. Sand is fine to gular to subrounded fine to medium of flints.	\vdash		(0.30)				0.05-0.10	+			\vdash			
(TOP) [TOPSOIL]	ddish blue slightly gravelly sandy CLAY. Sand is	1	\(\frac{\frac}\f{\frac{\frac{\frac{\frac{\frac{\frac{\fir\fir}\f{\frac{\fra	0.30	11.31			0.10-0.40 0.40-0.50							1
	el is angular to subrounded fine to coarse of flints.			(0.75)				0.40-0.80							
(00. 5) [- DEI 055 _j						R 6	0.80-1.20							
CHALK recovered as	firm light greyish brown slightly gravelly sandy nd is fine to coarse. Gravel is angular to			1.05	10.56 10.41			1.00-1.10				\sqcup			
subrounded fine to c		1													<u></u>
Structureless CHALK	Composed of soft yellowish brown gravelly avel is angular to subangular fine to coarse	Dm					C 7	1.20-2.20		100					
extremely weak low	density calcareous siltstone. (CIRIA Grade Dm) LBURY CHALK FORMATION]	Grade Dm		(1.26)			L 1	1.20-2.20					NA		
(VVIVICR) [VVLS1 IVILL	BURY CHALK FORIVIALION			:											
Voncuent medium (density yellowish brown CHALK composed of	<u> </u>		2.46	9.15										
calcareous SILTSTON	NE. Discontinuities: 1) 0 to 20 degrees closely to														
80 to 90 degrees clos	dulating rough with silt infill and black specks. 2) osely to medium spaced undulating rough with							- 74		100	87	81		,	<u></u>
	LBURY CHALK FORMATION]] :			C 8	2.20-3.70							
from 2.46m to 2.72n	m extremely weak low density			-											1
				-						<u> </u>					
				-											}======
				-			C 9	3.70-5.20		100	89	79			
		_m											20		
		Grade B3		(4.88)									80 170		
		ট		-									400		
				_											
							C 10	5.20-6.70		100	93	88			-
	m 45 degrees undulating rough with black specks													-	
fracture															
				-											
from 7.06m to 7.09n fracture	m 45 degrees undulating rough with orange staining													-	
Extremely weak and	very weak low density yellowish brown CHALK	\vdash		7.34	4.27		C 11	1 6.70-8.20		100	76	54			
degrees closely spac	eous SILTSTONE. Discontinuities: 1) 0 to 25 ced undulating rough with orange staining. 2) 85			-				0.10 0.22							1
	y to medium spaced planar undulating rough estaining. (CIRIA Grade B3)			-											-
(WMCK) [WEST MEL from 7.94m to 8.13n	LBURY CHALK FORMATION] m extremely weak low density with randomly			-										-	}
orange staining	ly closely spaced planar undulating smooth with	B3											10		-
from 8.46m to 8.63n	m extremely weak low density	Grade		(2.36)									160 230		
		-] :			C 12	2 8.20-9.70		100	52	49			
from 9.07m to 9.26n	m extremely weak low density			-			-	0.20 0						-	
from 9.64m to 9.70r	m extremely weak low density (possibly drilling			9.70	1.91									•	
induced)	Hextremely weak low density (possion, similary	1		5.70	1.52								_		}
									\vdash						
Notes:	All depth in metres, all diameters in millimetre	95				<u> </u>									
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.		water.												
FINAL	Print date and time 12/09	/2022	13:56		Lo	q chec	ked b	y David Howar	d				SOI	L enginee	RING
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Project Name	Cambridge Waste Water Treatment	Plant	Reloca	tion										Hole ID	
Project No.	TE8364							Exploi	ato	ry Ho	ole Lo	og	E	BH_TUN_	015
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 2 of	4
Ground Level		rdinate	s	548994.0	00E, 2610	55.591	I N		Gri	id	09	GB		SHEEL Z OI	-
Hole Type	IP+RC Incli	nation		90° from	horizonta	ıl									
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	۳	In Situ Test Details	Install- ation
composed of calcar degrees closely spa 2) conjugate fractur planar undulating n (WMCK) [WEST ME from 9.82m to 9.95 conjugate fractures staining from 10.06m to 10.	medium to high density light grey CHALK reous SILTSTONE. Discontinuities: 1) 0 to 15 aced planar undulating rough with orange staining. res 40 to 50 degrees very closely to closely spaced ough with orange staining. (CIRIA Grade B3) ELBURY CHALK FORMATION] 5m extremely weak to very weak low density with so f 45 & 60 degrees undulating rough with orange	Grade B3		(1.36)	0.55		C 1:	3 9.70-11.20		100	45	31	10 90 250		
staining (possibly of from 10.59m to 10 fracture sets of 45 with orange staining Weak high density Discontinuities are with orange staining (WMCK) [WEST ME from 11.20m to 11 (possibly drilling in from 11.89m to 12 from 12.06m to 12.06m	96m extremely weak to very weak with conjugate & 65 degrees very closely spaced planar smooth rough ng CHALK composed of calcareous SILTSTONE. 0 to 10 degrees medium spaced planar smoothing. (CIRIA Grade B2) ELBURY CHALK FORMATION] 29m extremely weak to very weak low density duced) 105m 86 degrees undulating smooth fracture 16m extremely weak low density	Grade B2		(1.64)	-1.09		C 14	4 11.20-12.70		100	87	73	50 240 400		
at 12.63m very wea (<20mm x 30mm) Stiff dark greenish g subangular to subro fine. (WMCK) [CAMBRID Stiff fissured dark g	20m 80 degrees undulating smooth fracture ak medium density with frequent phosphate nodules grey gravelly slightly sandy CLAY. Gravel is ounded fine to coarse of black coprolite. Sand is DGE GREENSAND MEMBER] grey CLAY with rare nodules of siltstone (<10mm x e 5 to 30 degrees extremely closely spaced planar MATION]		X	12.90	-1.29		C 1!	5 12.70-14.20		100					
from 14.50m to 14.	.60m with rare nodule of pyrite (20mm x 45mm)		X	-			C 10	6 14.20-15.70		100					
			X	(7.30)			C 1	7 15.70-17.20		100					
from 17,20m to 20. 40mm)	.20m with occasional nodules of siltstone (>20mm x		X	-			C 18	8 17.20-18.70		100					
			X	-			C 19	9 18.70-20.20		100					
AGS Notes:	: All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water.												
FINAL Form No. SIEXPHOLE	For details of abbreviations, see key. Print date and time 12/09. LOG Issue Revision No. 2.05		13:56	Issue Date	Log	-	cked b	by David Howard	t					L enginee	

Project Name	Cambridge Waste Water Treatm	ent Pla	nt R	elocat	ion										Hole ID	
									Explo	rato	ry Ho	ole Lo	og		N. T. IN.	045
Project No. Engineer	TE8364 Mott MacDonald Bentley														BH_TUN_	_015
Employer	Barhale Limited														Sheet 3 of	4
Ground Level	+11.61mOD	Coordina	ates		548994.0	OOE, 2610	55.591	N		Gri	id	09	SGB	I		
Hole Type	IP+RC	Inclinati			90° from	horizonta	ıl									
		Weathering	n		Depth	Datum	trike		Sampling		TCR/Sample Recovery %	lows			In Situ Test	Install-
	Description of Strata	d+co/		egend	(Thick- ness)	Level	Waterstrike		Details	Dia.	CR/Sa ecove	SCR/Blows	RQD	느	Details	ation
	rey CLAY with rare nodules of siltstone (<10mn	n x	, X				>		Details	Dia.	7 02	0,				
20mm). Fissures are polished.	e 5 to 30 degrees extremely closely spaced plan	nar	E		20.20	-8.59										
(GLT) [GAULT FORM	IATION] CLAY with rare nodules of siltstone (<20mm x	_/	F	:	-											
35mm).																
(GLT) [GAULT FORM	IAHONJ				_			C 20	20.20-21.70		100					
					(1.80)											
			\vdash													
			F													
			F													
Very stiff fissured da	ark grey CLAY with rare nodules of siltstone		E		22.00 -	-10.39										-
planar polished.	Fissures are 10 to 30 degrees closely spaced		F													
(GLT) [GAULT FORM	IATION]		F		-			C 21	21.70-23.20		100					-
					_											-
			F]											
			F					C 22	23.20-24.70		100					
			F		-			C 22	25.20-24.70		100					-
			E		-											-
		5														
		Lawasth ara	L		-									NA		
		1	 													
					(7.00) -			C 23	24.70-26.20		100]
					(7.00)											
			F													-
					-											7
			E													}
					-											
			E		_			C 24	26.20-27.70		100					-
			\vdash													}
			F			-										
			F													
			F													
			F	:				C 2F	27.70-29.20		100					
								C 25	21.10-29.20		100					-
Very stiff brownish	dark grey slightly sandy CLAY with rare nodule:	s of	1		29.00 -	-17.39										-
siltstone (<20mm x (GLT) [GAULT FORM	40mm). Sand is fine.															
(42.) [4.142. 101.11			- P		(1.20) -											-
			11					C 26	29.20-30.20		100					
																1
Note:	: All depth in metres, all diameters in millir	metros													40.	
AGS	See header sheet for details of boring, pro		d wa	ter.												
FINAL	For details of abbreviations, see key. Print date and time 1	2/09/20)) 13	R·56		10	n char	·ked h	y David Howar	rd.				SOI	L engine	ering
Form No. SIEXPHOLEI			13	,	Issue Date	02/03/20	-	eu D	y David HOWall	u					f the Bachy Soletan	

Project Name	Cambridge Waste Water Treatm	ent Plar	t Relocat	tion									Hole ID	
Project No.	TE8364						Explor	ator	у Но	le Lo	9	F	BH_TUN_0	015
Engineer	Mott MacDonald Bentley													
Employer Ground Level	Barhale Limited +11.61mOD	Coordinat	es	5489947	00E, 2610	55 59NI		Grio	1	OS	GR		Sheet 4 of 4	
Hole Type	IP+RC	Inclinatio			horizonta			GII	ı	US	ub			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
Very stiff brownish of siltstone (<20mm x	lark grey slightly sandy CLAY with rare nodule 40mm). Sand is fine.	s of		30.20	-18.59								-	
(GLT) [GAULT FORM	ATION] 80.20m. Termination Reason: Achieved	/											-	
	Scheduled Dep h													
				-										
	All depth in metres, all diameters in millin	metres.		1	I									
	See header sheet for details of boring, pr For details of abbreviations, see key. Print date and time 1				Lo	g check	ed by David Howard	i				SOI	L enginee	RING

Issue.Revision No. 2.05 Issue Date 02/03/2018

Part of the Bachy Soletanche Group

Project	Name	Carr	nbridge '	Waste V	Vate	r Treat	tment	Plant R	Relocati	on										Н	lole ID	
Project	No	TE8	364											E	Explor	ator	y Hole I	Log		зн т	UN_	016
Enginee			t MacD	onald B	entle	еу													'		art_	010
Employ	er		nale Lim	ited																	et 1 of 1	1
Ground L Date Star			19mOD 9/2021						Coordina Date Con			.45.90E, 9/2021	26104	3.10N				Grid	nation	OSGB	m horizor	nt a l
Top	Base		Date Tin	ne Start	Date	e Time	End R		Logger				nt Us	ed Sh	horing U	sed P	it Stability		IIation	Remark		ıtaı
0.00	1.20	IP	15/09/20	21 15:15	15/0	09/2021 1	16:00	Craig Blackett	DT			Insulat	ted Hand	tools	None		Stable					
1.20	30.20	RC	15/09/20	21 16:00	20/0	09/2021 1		Craig Blackett	AY	Geobore (146)	S PCD	Soi	ilmec SM	18								
				DI	2000)FCC											\A/ATED	CTDUKE	<u> </u>			
Date 1	Timo	Depth	Depth	Depth	ROGR	(E22		Rema	rko			Date '	Timo	Dep	pth D	epth	WATER Depth	STRIKE Water			Remark	· · · · · · · · · · · · · · · · · · ·
15/09/202	21 17:30	6.20	Casing 2.80	Water 2.20		of Shift		Кепта	185			Date	Tille	Stri	ike Ca	asing	Sealed	Rose To	Elapse	d	Kelliair	
16/09/202 16/09/202 17/09/202	21 17:30	6.20 27.20 27.20	2.80 4.00 4.00	1.45 5.10 4.85	End o	of shift of Shift of shift																
17/09/202 17/09/202 20/09/202	21 15:30	30.20 12.00	4.00 4.00 4.00	4.10 3.80	End o	of Shift of shift																
20/09/202		0.00					mplete, Bo	orehole Con	nplete													
																	ODT D					
Depth	Depth	T:		ABLE PER	т —		EIAILS		D	1		Depth	Test	T	D			ETAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base	III	e Start	Duration	1	Tool			Remark	KS		Тор	Туре		кер	oorte	d Result		Number	Ratio	Casing	Water
Depth	Depth	Ι		ROTARY		H DET	AILS															
Top 1.20	Base 10.70		sh Type R/MIST	Return 90	Co	olour Vhite		F	Remarks													
10.70	30.20		R/MIST	90		Grey																
HOLE DI	AMETER	CASING	DIAMETE	R		D,	YNAMI	C SAMI	PLING													
Depth Base	Diameter	Depth Base	Diamete	er Depth To		epth Base	Diameter	Durat		mple	Run teference											
4.00 30.20	150 146	4.00 30.20	150 146			ase			Re	covery	elelelice											
30.20	140	30.20	140																			
	INSTA		N DETAILS				PIP	E CONS	TRUCTIO	DN						DEF	TH RELAT	ED REN	1ARKS			
Distance		iype		Base F	Ref	Pipe Ref	Тор	Base	Diamete		е Туре	Depth Top	Dep Bas					Re	marks			
10.80	S1	SP	1.50	10.80 Pi		Pipe 1 Pipe 1	0.00 1.50	1.50 10.30	50 50	PLAIN SLOTTEE	D											
Donth	Donth	1		BACK	FILL [DETAIL	.S										LOCATIO	N DETAI	LS			
Depth Top	Depth Base		Descrip	otion				Ren	narks								Rem	narks				
-0.50 0.00 0.50	0.00 0.50 1.50	Upstandii Concrete Bentonite	-																			
1.50 10.80	10.80 12.00	Gravel ba Bentonite	ckfill																			
12.00	30.20	Grout																				
	Note	es. All do	oth in met	res all di-	ameto	ers in m	nillimetro	25											T			
AGS		See he	ader shee	t for deta	ils of l	boring,			iter.													
FINAL		roi ae	tails of ab				12/00	/2022 13	R·56		1.	na checi	kad hv	David	Howard	1			so	ıL end	sinee	RING

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatme	nt Plar	<mark>rt</mark> Reloca	tion										Hole ID	
	-							Explo	rato	ry Ho	ole Lo	og -	,	OLI TUMI	010
Project No. Eng <mark>i</mark> neer	TE8364 Mott MacDonald Bentley												1	BH_TUN_	_UT0
Employer	Barhale Limited													Sheet 1 of	4
Ground Level	+10.19mOD C	oordina	tes	549145	90E, 2610	43.10	N		Gr	id	O:	GB			
Hole Type	IP+RC II	clinatio	n	90° from	honzont	al									
	D 1.11 D 1.	S S	١.	Depth	Datum	trike		Sampling		TCR/Sample Recovery %	DWS	۵		In Situ Test	Install
	Description of Strata	Weathering	Legeno	(Thick- ness)	Level	Waterstrike	\vdash	Details	Dia	CR/Sa	SCR/Blows	8	뜨	Detaits	ation
TOPSOIL: Dark brow	vn slightly gravelly sandy CLAY Sand is fine to		\$(/A)\$(/	, , , , , , , , , , , , , , , , , , ,	<u> </u>	>	D1	0.05-0.10	Dia	ř.	V)				
coarse. Gravel is and lithologies.	gular to subrounded fine to coarse of mixed			(0.30)	9.89		B 2	0.10-0.40							
(TOP) [TOPSOIL]	rown slightly gravelly sandy CLAY. Sand is fine to	_/			1			0.40-0.50						6	
coarse. Gravel is an	gular to subrounded fine to coarse of mixed		<u> </u>	(0.90)]		84	0.40-0.80							
lithologies. (SUPD) SUPERFICIA	AL DEPOSITS]		• •	-	}		B6	0.80-1.20							1
Future above a la cons	d vers versele beer desseibt verleuwieb bewere C1181 K	_		1.20	8.99			1.00-1.10							
composed of calcar	d very weak low density yellowish brown CHALK reous SILTSTONE with rare shell fragments (<5mr	n		1	1										
	tities. 1) randomly orientated extremely closely to planar and undulating smooth with silt infill	'		1	1		,,	1.20-2.20	102	100	60	0		K 1.50 - 10.80 K 1.50 - 10.80	
	ining and occasional black specks. (CIRIA Grade		111	II.]		۲	1.20-2.20	102	100	OU	"]
	LBURY CHALK FORMATION]		1 1	1										15	
			7 10	Ц	1	1									
			1	Д.]	1	1							13	1
			1 1	1]	1	C8	2.20-3.20	102	100	70	0			H.
			1	ф.	-									19	_
				I	1										1 7
		1,4		ц	1								10		₽
		Grade 84		(4.65)	}								30 40		$\mathbb{F}^{\mathbb{F}}$
				T]		١					_			
			1	7	2		69	3.20-4.70	102	93	50	0			はは
			T.E	'n	1										1 1
_			T T	, T	}									33	1 1
from 4.80m to 4.70	m assumed zone of core loss.		T I	1	1										1 H
				1										5	13 1
			1	1	1										\$ H
			T	1 .]		C 16	0 4.70-6.20	102	93	49	7			玉玉
<u>,</u>			1 1	1	1										: 1
Very weak low dens	sity yellowish brown CHALK composed of	+	<u> </u>	5.85	4.34									-	1
calcareous SILTSTO	NE. Discontinuities: 1) randomly orientated o closely spaced planar and undulating smooth		, ,	1	1										7. II.
with silt infill (<3mm	m) and orange staining. (CIRIA Grade B4)		1	1]] I
	LBURY CHALK FORMATION] Im assumed zone of core loss.		Transit	Ι .	1									8	1 1
		4		1	1								10		1 1
		Grade	1 1	(2.25)			C 1:	1 6.20-7.70	102	100	67	0	50	- 6	1. 1
		ੱ		I]								100		
				ф.	1	1	1								1.1
			1	Ц	1	1	1								F
			<u> </u>	1 1]	1	1								<u> </u>
	density light grey CHALK composed of calcareou	ıs		8.10	2.09	1								1	
SILTSTONE Discont	tinuities. 1) 0-20 degrees closely spaced planar fill (>3mm) 2) 60-90 degrees closely to medium		<u> </u>	Д	‡	1	C1	2 7.70-9.20	102	100	44	37		21	1
spaced planar and u	undulating smooth clean. (CIRIA Grade C3) ELBURY CHALK FORMATION]		T	n .	1	1	٦٠	. 1.10-9.20	""	100	""	"		1)	1
from 8.20m to 8.39	om extremely weak low density CHALK with very		77	7]	1	1						92		1 1
orange staining	continuities randomly orientated planar smooth with	8	1, 1,	(2.10)		1	1						30 110	22	1 H
		8	Til	'n	‡	1							. 260		\Box
			7	T]	1			102	100	67	63)9	1 H
			1	#]	1			""	100	"	"			
		\perp		4	1	_	C 1	3 9.20-10.70	_						11
						1									
						1									
Notes.	. All depth in metres, all diameters in millime See header sheet for details of boring, prog		i water.												
AGS	For details of abbreviations, see key.														
FINAL	Print date and time 12	09/202	2 13:56		Lo	g chec	ked i	by David Howa	rd				501	r eudine	≥RING

Project Name	Cambridge Waste Water Treatm	nent P	lant	Relocat	ion									Т	Hole ID	
	-	- 1			-				Exp <mark>l</mark> o	rato	ry Ho	le Lo	og			
Project No.	TE8364													E	BH_TUN_	_016
Eng <mark>i</mark> neer	Mott MacDonald Bentley														0 .0 .	,
Employer	Barhale Limited +10.19mOD	Coord	linata		540145	DOE 2610	42 10I	NI NI		Gri	id		SGB		Sheet 2 of	4
Ground Level Hole Type	IP+RC	Coord				90E, 2610 honzonta		N		Gn	ка	O:	N3B			
пов туре	II TRC	IIICIIII		Ι		TRAIZUITE	_	т			⊕ ×€	po eq				Т
	Description of Strata		Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	ĝ	<u>u</u>	In Situ Test	Install-
			Weat		ness)	Level	V at the		Details	Dia	2 S	8	~		Details	ation
	density light grey CHALK composed of calcan							t		T	ĺ					·24 HE
	tinuities: 1) 0-20 degrees closely spaced plana fill (>3mm) 2) 60-90 degrees closely to mediun				10.20	-0.01									1	. II.
	undulating smooth clean. (CIRIA Grade C3) ELBURY CHALK FORMATION]	- //		J 7 3	-	1									Œ	
Very weak to weak	medium density light grey CHALK composed	sf		E 15						\vdash						
	ONE. Discontinuities: 1) 0-10 degrees closely oth clean. (CIRIA Grade A3)		Grade A3	1 1	(1.55) _									NI 130		
(WMCK) (WEST ME	ELBURY CHALK FORMATION]		Ě	T. I	(2.55)	-								220] 💥
angular medium to	L.15m recovered as non intact core (subangular to o coarse gravel sized fragments of very weak to weak			1 1		}										}
	ght grey calcareous siltstone) L.75m frequent phosphatic nodules (30mm x 10mm)							C1	4 10.70-12.20	102	100	44	42		13	-
	Assured light bluish grey CLAY with rare to				11.75	-1.56									1]
occasional dark bro	own and brown phosphatic nodules (<15mm x				2											
	re 0-10 degrees, 20-40 degrees and 90 degrees osely spaced planar smooth tight and polished.			<u> </u>		1										
(GLT) [GAULT FORM	AATION]					1					_		_			
from 11.75m to 11 from 11.85m to 13	L.85m occasional light grey burrows (<1mm x 3mm) 3 70m very stiff			F	-	1									12	*******
					(1.95)	1										
								C 1	5 12.20-1370	102	100					
				<u> </u>		1										******
	lark grey CLAY with rare dark brown and brown				13.70	-3.51										1
	s (<10mm x 25mm). Fissures are 0-10 degrees, I 90 degrees very closely and closely spaced pla			===	_	1										
smooth tight and p	polished.					1										-
(GLT) [GAULT FORM	MATION					1		٦	6 13.70-15.20	102	100					*****
								<u>ا</u> "	.U 15.1U-152U		100					40904.079
				===												
					5											
										\vdash				•		
				F												
						1										
										30.						
					7			C1	7 15.20-16.70	102	100				,	
				<u> </u>		1										
						•										ACRES 1
				F===		1										
					- 1											
						1										
						1		C 1	8 16.70-18.20	102	100					· Correction
						1										
				<u> </u>		1										
					-	1										
at 18.12m 1 No. py	yrite nodule (<5mm x 10mm)			H===		1								1		
				F_==		1									53	-
						1										2000
				<u> </u>		1		c1	9 18.20-19.70	102	100					-
					1											
				F		-										1
						}				\vdash				-		
				<u> </u>				L								******
Notes	s. Al <mark>l depth in metres, all diameters in milli</mark>	metres.						<u> </u>								
AGS	See header sheet for details of boring, pr For details of abbreviations, see key.	ogress	and (water.												
FINAL	Print date and time 3	12/No/	ינחכ	1356		lo.	n char	·karl	by David Howai	rd				SOI	L engine	RING
Form No SIEXPHOLE			LUZZ	13.30	Issue Date	LC 2 02/03/20		.NEU	na na na mana na na na na na na na na na na na na	J					of the Bachy Soletan	

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	ion										Hole ID	
								Exploi	ratoı	у Но	le Lo	og		N. I. T. I. I.	04.0
Project No.	TE8364													BH_TUN_	016
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 3 of	4
Ground Level		rdinate	!S	549145.9	90E, 2610	43.10	N L		Gri	d	09	SGB		311000 3 01	
Hole Type	IP+RC Incli	nation			horizonta										
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>"</u>	In Situ Test Details	Install- ation
	ark grey CLAY with rare dark brown and brown : (<10mm x 25mm). Fissures are 0-10 degrees,		<u> </u>	-											
20-35 degrees and	90 degrees very closely and closely spaced planar		<u></u>) 19.70-21.20							
smooth tight and po (GLT) [GAULT FORM				-			C 20	19.70-21.20	102	100					-
			<u> </u>												
				-]
			F_=_	-											
from 21.41m to 21. polished	59m 1 No. 65 degree fissure planar smooth and		F_=_	_											-
pononea			F												
			F_=_	-			6.24	24 22 22 72	102	100					-
			F_=_				C 21	21.20-22.70							
			<u> </u>	-]
			<u> </u>	-											
			<u> </u>	-											
				-					102	100					
				-			C 22	2 22.70-24.20	102	100					-
			<u> </u>												
from 24.05m to 24.	08m very thin bed of soft grey clay			-											
	3,7,7		<u></u>	(15.00)											
			<u></u>	(15.06)											-
		p _e ,	<u> </u>												
		Unweathered		-			C 23	24.20-25.70	102	100			NA		-
		Unwe	F	-											-
			E	-											}
			<u> </u>] :											
			<u> </u>] -											
			<u> </u>											•	
			<u> </u>	:			C 24	25.70-27.20	102	100					
			<u> </u>	-			C 24	23.10-21.20	102	100					
				-											-
			<u> </u>												
			<u> </u>	-											
			<u> </u>	-											-
			<u> </u>	_			C 25	27.20-28.70	102	100					
															}
				-											
				28.76	-18.57										
x 40mm).	CLAY with occasional phosphatic nodules (<15mm														}
(GLT) [GAULT FORM	ATION]			-											
			<u> </u>	(1.44)			C 26	5 28.70-30.20	102	100					1
			<u> </u>	-											
			<u> </u>	-											
	All depth in metres, all diameters in millimetre See header sheet for details of boring, progres		water.												
AGS	For details of abbreviations, see key.														
FINAL	Print date and time 12/09		13:56			-	ked b	y David Howard	d					r engine	
Form No. SIEXPHOLEL	LOG Issue.Revision No. 2.05			Issue Date	02/03/20	18							Part o	f the Bachy Soletand	he Group

Project Name	Cambridge Waste Water Treatm	ent Plant	Relocat	tion									Hole ID	
Project No.	TE8364						Explor	rator	у Но	le Lo	9	F	BH_TUN_0	016
Engineer	Mott MacDonald Bentley													
Employer	Barhale Limited	C 1: 1		F/01/F/	205 2640	/2.401		6 :			C.D.		Sheet 4 of 4	i
Ground Level Hole Type	+10.19mOD IP+RC	Coordinate			90E, 2610 horizonta			Grid	ı	OS	αв			
	Description of Strata	Weathering	Legend	Depth	Datum Level	Waterstrike	Sampling	l s:	TCR/Sample Recovery %	SCR/Blows	RQD	<u></u>	In Situ Test Details	Install- ation
	CLAY with occasional phosphatic nodules (<15					>	Details	Dia.	2 &	Š			-	
x 40mm). \(GLT) [GAULT FORM	ATION] 30.20m. Termination Reason: Achieved	_/_		30.20	-20.01								-	
Complete at t	Scheduled Dep h												-	
													- - -	
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				-									- - -	
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— — . .	All double to make a self-discuss of the control of	natr												
AGS Notes:	All depth in metres, all diameters in millir See header sheet for details of boring, pr For details of abbreviations, see key.	neues. ogress and	water.											
FINAL	Print date and time 1	2/09/2022	13:56		Lo	g check	ked by David Howard	d				SOI	r euginee	RING

Issue.Revision No. 2.05 Issue Date 02/03/2018

Part of the Bachy Soletanche Group

Project	Name	Can	nbridge	Waste	Wat	ter Tre	atment	Plant F	Reloc	ation					_					Н	lole ID	
Project	Nο	TE8	364												Exp	olorato	ry Hole	Log		зн т	UN_	017
Engine			tt MacD	onald	Ben ⁻	tley															S	
Employ			nale Lim	ited																	et 1 of 1	1
Ground L Date Star			34mOD 9/2021							inates Comple			288.00E, 19/2021	261031.	50N			Grid Incli	nation	OSGB 90° f o	m horizor	ntal
Тор	Base		Date Tir				ne End F	Rig Crew						nt Used			Pit Stability			Remark		
0.00 1.20	1.20 30.20	IP RC		021 09:00 021 10:00		3/09/2021 4/09/2021		CB CB	AL	Ge	NA obore S	NA PCD		ted hand to ilmec SM8	ols N	one	Stable					
										((146)											
					200	CDECC											VAVATED	CTDUKE	•			
Date ¹	Time	Depth	Depth	Depth		GRESS		Rema	rke				Date '	Time	Depth	Depth		Water	Time	T	Remark	/c
13/09/20	21 17:30	24.20	2.75	Water 7.40	En	d of Shift		Kema	11 N3				Date	Time	Strike	Casin	g Sealed	Rose To	Elapsed	+	Kemair	\ <u>\</u>
14/09/20: 14/09/20:		24.20 30.20	2.75 2.75	5.65 6.00		art of Shift ckfill Com	: plete; Boreh	nole Comple	ete													
Depth	Depth	T		1	\top		DETAILS						Depth	Test		_		ETAILS	Hammer Serial	Energy	Depth	Depth
Тор	Base	Tim	e Start	Duration	on	Tool			Ren	narks			Тор	Туре		Report	ed Result		Number	Ratio	Casing	Water
						USH DE	TAILS															
Depth Top	Depth Base	Fiu	sh Type	Flus Retu		Flush Colour		F	Remar	ks												
1.20 9.20	9.20 30.20		IR/MIST IR/MIST	90 90		White Grey																
	AMETE		DIAMETI	ER			DYNAM	IC SAM	PLIN													
Depth Base	Diamete	Base	Diamet	er Depth	Тор	Depth Base	Diameter	r Durat	tion	Samp Recov	ole F ery Refe	Run erence										
30.20	146	2.75	150																			
		D	N DETAIL		Pipe	Pipe		PE CONS	1				Depth	Depth	1	DE	PTH RELAT					
Distance	ID	Type "	Тор	Base	Ref	Ref	Тор	Base	Diam	eter	Pipe T	уре	Тор	Base	1			Re	marks			
				- DAG	·IZEII	L DETAI	11.0										LOCATIO	AL DETAI	1.0			
Depth	Depth	<u> </u>	Dac:		KHIL	L DETAI	IL2	D-	narks								LOCATIO	N DETAI narks	Lò			
Top 0.00	Base 30.20	Grout	Descri	ption				Ken	IIaiks								Ken	IIdIKS				
	Not	es: All de	pth in me	tres. all o	diame	eters in	millimetr	es.														
AGS	4	See he	eader she tails of ab	et for det	tails o	of boring			ater.													
FINAL		i or ue	.cuii3 UI dL				ne 12/09	9/2022 1	3:56			10	og checl	ked by D	avid Ho	ward			SOI	L en	ginee	RING
Form No. 9	SIEXPHOL	EHDR					No. 2.02			Issue	Date 22		-	~ , D					Part	of the Bacl	hy Soletanch	e Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion									Hole ID	
Project No.	TE8364						Explo	orato	у Но	le Lo	g		BH_TUN_	017
Engineer	Mott MacDonald Bentley											-)	_0 1 /
Employer	Barhale Limited			E/0200	201.0	21 501		C	_	00	·CD		Sheet 1 of	4
Ground Level Hole Type		dinate nation	S		00E, 2610 horizonta			Gri	d	OS	GB			
31	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling	D:-	TCR/Sample Recovery %	SCR/Blows	RQD	Ŀ	In Situ Test Details	Install- ation
	n slightly gravelly sandy CLAY. Sand is fine to	5		(0.30)		>	Details D1 0.05-0.10	Dia.	2 &	S				
quartzite. \(TOP) [TOPSOIL] CHALK recovered as slightly gravelly calc angular to subround calcareous siltstone (WMCK) [WEST MEI Structureless CHALK	gular to subrounded fine to coarse of flint and s very stiff light grey mottled brown slightly sandy careous CLAY. Sand is fine to coarse. Gravel is ded fine to coarse of very weak medium density	,		(0.90) - 1.20	10.14		B 2 0.10-0.40 D 3 0.40-0.50 B 4 0.40-0.80 B 6 0.80-1.20 D 5 1.00-1.10							
coarse of extremely Grade Dm) (WMCK) [WEST MEI from 1.85m to 2.20	weak low density calcareous siltstone. (CIRIA LBURY CHALK FORMATION) m recovered as subangular to subrounded fine to fragments of extremely weak low density calcareous			[- [-			C 7 1.20-2.20	102	100					
		Grade Dm		(3.40)			C 8 2.20-3.20	102	100			NA		
				- [C 9 3.20-3.90	102	100					
	ity CHALK composed of yellowish grey calcareous			4.60	6.74		C 10 3.90-4.70	102	100					-
calcareous clay. Disc undulating rough wi	dium spaced thin beds of stiff yellowish grey continuities: 1) 5-40 degrees medium spaced ith slight orangish iron staining. LBURY CHALK FORMATION]	Grade B2		(2.10)			C11 4.70-6.20	102	100	100	97	300 435 570		
SILTSTONE. Disconti spaced undulating v	density CHALK composed of grey calcareous inuities: 1) 10-45 degrees closely to medium with clay infill (-3mm). LBURY CHALK FOMRATION]			6.70	4.64		C 12 6.20-7.70	102	100	90	79			
		Grade B3		(2.90)			C13 7.70-9.20	102	100	93	93	110 170 300		
Discontinuities: 1) 1	CHALK composed of grey calcareous SILTSTONE. .0-50 degrees closely to medium locally widely rough with slight orangish iron staining.			9.60	1.74		C14 9.20-10.70	102	100	93	83 -			4
AGS	All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress. For details of abbreviations, see key. Print date and time 12/09. OG Issue.Revision No. 2.05	s and v		Issue Date	Lo: 02/03/20	-	ked by David Howa	ard					L enginee f the Bachy Soletan	

Project Name	Cambridge Waste Water Treatm	ent Plan	t Reloca	tion										Hole ID	
Drainet No	TE8364							Explo	rato	ry Ho	le Lo	og		DLI TIINI	017
Project No. Engineer	Mott MacDonald Bentley													BH_TUN_	_017
Employer	Barhale Limited													Sheet 2 of	4
Ground Level	+11.34mOD	Coordinat			00E, 2610		N		Gri	id	09	SGB			
Hole Type	IP+RC	Inclination	1	1	horizonta	_				<u>a</u> %	s				1
	Description of Strata	Weathering	Legend		Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
- W - 1 1 2 1 1 2 2	CHALL			ness)	LCVCI	Wat		Details	Dia.	TCR	SCF			Details	ation
Discontinuities: 1) 1	CHALK composed of grey calcareous SILTSTON 10-50 degrees closely to medium locally widely rough with slight orangish iron staining.			Ц П	_										
	ELBURY CHALK FORMATION]			# T	1										-
				1	1										
				1 1 -	1										
				Ī	1										
		e B2] (2.55)	_		C 1	5 10.70-12.20	102	100	100	79	70		
		Grade B2		(3.55)]								310 700		1
					-										-
				I]										
				Į .	-										
				I]										
				Ī .	1		C 1	6 12.20-13.70	102	100	100	60			-
	grey slightly sandy slightly gravelly CLAY. Sand ingular to subrounded fine to coarse of black	is		13.15	-1.81									-	
coprolites.	OGE GREENSAND MEMBER			13.43	-2.09										
Stiff fissured dark g	rey CLAY with occasional nodules of siltstone	/	<u> </u>	-]										
polished.	Fissures are 5-15 degrees closely spaced plana	r	F		-										-
(GLT) [GAULT FORM from 13.70m to 14	MATION] i.00m with rare nodule of pyrite (10mm x 40mm)		E	-]]										
			E		-		C 1	7 13.70-15.20	102	100					-
			<u> </u>												
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]	-										
					1										
			<u> </u>	(4.57)	-										
			F	-	1		C 1	8 15.20-16.70	102	100					
			F_=	-	-										
from 16.50m to 16	6.60m with rare nodule of pyrite (8mm x 20mm)		E-E-	-	-										
			<u></u>	-	-										
			<u> </u>	-	-										-
			<u> </u>	-											
			<u> </u>	-	1		C 1	9 16.70-18.20	102	100					
			<u> </u>	-	-										
	ark grey CLAY with rare nodules of siltstone		<u> </u>	18.00 -	-6.66										
polished.	Fissures are 0-25 degrees closely spaced plana	r	E	-]	-										
(GLT) [GAULT FORM	MATION]		E-E-	-	1										-
			<u> </u>		-										
				-	1		C 2	0 18.20-19.70	102	100					-
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			F	-	1										
															12222222
Notes	: All depth in metres, all diameters in millir	netres.											1		
AGS	See header sheet for details of boring, pro For details of abbreviations, see key.		water.												
FINAL	Print date and time 1	2/09/2022	13:56		Lo	g chec	cked I	by David Howar	d				SOI	L engine	ering
Form No. SIEXPHOLE				Issue Dat	e 02/03/20	-							Part o	of the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatn	nent Pla	nt Reloca	tion										Hole ID	
Project No. Engineer	TE8364 Mott MacDonald Bentley							Exploi	rator	у Но	le Lo	g	E	BH_TUN_	017
Employer	Barhale Limited													Sheet 3 of	4
Ground Level	+11.34mOD	Coordin			OOE, 2610		N		Gri	d	OS	GB			
Hole Type	IP+RC	Inclinati		1	horizonta I					0 . 0					
	Description of Strata	Worthoring	Legeno	Depth (Thick- ness)	Datum Level	Waterstrike		Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	4	In Situ Test Details	Install- ation
(<15mm x 20mm). F polished. (GLT) [GAULT FORM.	rk grey CLAY with rare nodules of siltstone issures are 0-25 degrees closely spaced plan ATION] ATION Inly laminated dark grey CLAY with rare nodu x 15mm). Fissures are 0-25 degrees closely led.	boods decorred [(Thick-		Wateistrii	C 21 1 1 C 21 1 C 22 2 C 22 2 C 23 2 C 24 2 C 26 2		102 102 102	100	SCR/Blow	RQD	NA NA		
Notes:	All depth in metres, all diameters in milli See header sheet for details of boring, p		nd water												
	For details of abbreviations, see key.	-													

Log checked by David Howard

Form No. SIEXPHOLELOG

FINAL

Issue.Revision No. 2.05

Print date and time 12/09/2022 13:56

lssue Date 02/03/2018



Project Nam	ne Cambridge Waste Water Tr	eatment F	Plant	Relocat	ion									Hole ID	
Project No.	TE8364							Explo	rator	у Но	le Lo	g		BH_TUN_	017
Engineer	Mott MacDonald Bentley													UIN	υ ± 1
Employer	Barhale Limited													Sheet 4 of 4	4
Ground Level Hole Type	+11.34mOD IP+RC	Coord				00E, 2610 horizonta		N	Gri	d	OS	GB			
Поле Туре	II THE	IIICIIII			Depth			Consulino		ple %	WS				
	Description of Strata		Weathering	Legend	(Thick- ness)	Datum Level	Waterstrike	Sampling	1_	TCR/Sample Recovery %	SCR/Blows	RQD		In Situ Test Details	Install- ation
Very stiff fissure	ed thinly laminated dark grey CLAY with rare	nodules	Š		Hess)		Š	Details	Dia.	TC	SC				
of siltstone (<1	5mm x 15mm). Fissures are 0-25 degrees clo	osely			30.20	-18.86									
(GLT) [GAULT FO	ORMATION]	/												-	
Complete	e at 30.20m. Termination Reason: Ach Scheduled Dep h	ieved													
														_	
					-									-	
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													1		
ACS No	otes: All depth in metres, all diameters in See header sheet for details of bori	millimetres ng, progress	and v	vater.											
AGS	For details of abbreviations, see key														
FINAL								ked by David Howar	d				SOI	L enginee	RING

Issue.Revision No. 2.05 Issue Date 02/03/2018

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project	Name	Cam	bridge	Waste V	/ater Tre	eatmen	t Plant F	Relocati	on										H	lole ID	
		TE8	304											Expl	orato	ry Hole	Log		ד רוט	TUNI (10
Project Enginee				onald Be	entlev														оп_ і	UN_(710
Employ			ale Lim																She	et 1 of 1	L
Ground L	evel		!8mOD					Coordina	tes		445.42E,	2609	99.33	BN			Gric	ı	OSGB		
Date Star			9/2021	na Ctaut	Data Tir	no Fod		Date Cor	<u> </u>		09/2021	n+ I I a		Chi		D:4 C4 - L:1:4-		ination		m horizon	ital
7op 0.00	Base 1.20	IP	20/09/20	21 14:00	20/09/20	21 15:00	Rig Crew CB	DT	NA	NA	Insulat	nt Us	d Tools	1		Pit Stability Stable	1		Remark	us	
1.20	49.50	RC	20/09/20	21 15:00	29/09/20	21 12:00	CB	AY	Geobore S (146)	PCD	Soi	Imec SN	M8								
				PR	OGRESS	3										WATER	STRIKE	:S			
Date 1	Гіте	Depth	Depth Casing	Depth Water			Rema	ırks			Date :	Time		Depth Strike	Depth Casing		Water Rose T			Remark	:S
20/09/202		6.20 6.20	2.80 2.80	4.90 3.73	End of Shif Start of Shi						20/09/20	21 16:4		6.20	2.80	6.20	4.91	20	Slow		
21/09/202	21 17:30	12.20 12.20	2.00	4.50 3.75	End of Shif Start of Shi	t															
22/09/202 23/09/202	21 07:30	12.20 12.20	9.00 9.00	4.10 4.10	End of Shif Start of Shi	ft															
23/09/202	21 07:30	21.00 21.00	12.30 12.30	20.50	End of Shif Start of Shi	ft															
24/09/202 27/09/202 27/09/202	21 07:30	30.00 30.00 46.50	12.30 12.30 12.30	29.20 27.15 46.00	End of Shif Start of Shi End of Shif	ft															
28/09/202 28/09/202	21 07:30	46.50 49.50	12.30 12.30	45.75 0.00	Start of Shi End of Shif	ft															
29/09/202 29/09/202		49.50 0.00	12.30	0.80	Start of Shi Installation		Borehole Cor	mplete													
Depth	Depth	1		ABLE PER	I		S				Depth	Test	+				ETAILS	Hammer Seria	Energy	Depth	Depth
Тор	Base	Tim	e Start	Duration	Too	ol		Remar	ks		Тор	Туре			Report	ed Result		Number	Ratio	Casing	Water
				ROTARY	i Flush d	ETAILS															
Depth Top	Depth Base	Flus	sh Type	Flush Return	Flush Colour			Remarks													
1.20 10.70	10.70 46.50		R/MIST R/MIST	90	White Grey																
46.50	49.50	All	R/MIST	90	Green																
HOLE DI	AMETER	CASING	DIAMETE	:R		DYNAN	/IC SAM	PLING													
Depth Base	Diameter	Depth Base	Diamete	er Depth To	p Depth Base	Diamet	er Dura		ample covery Ref	Run ference											
12.20 12.30	248 200	12.30 49.50	200 146																		
49.50	146	10.00	1.0																		
	INSTA	ALLATIOI	N DETAIL	S		P	IPE CONS	TRUCTION	ON						DE	PTH RELA	TED REN	/IARKS			
Distance	ID 1	Гуре Re	sponse Re Top		pe Pipe ef Ref	Тор	Base	Diamete	er Pipe	Гуре	Depth Top	Dep Bas					Re	marks			
10.20	S1	SP			e 1 Pipe 1 Pipe 1	0.00 1.50	1.50 9.70	50 50	PLAIN SLOTTED		2.00	1.9	90 (Geophysi Bentonite)					
					'																
				BACK	FILL DETA	AILS										LOCATIO	N DETAI	LS			
Depth Top	Depth Base		Descri	otion			Ren	narks								Ren	narks			-	
-0.50 0.00	0.00 0.50	Upstandii	ng cover																		
0.50 1.50	1.50 10.20	Bentonite Gravel ba																			
10.20 12.30	12.30 49.50	Bentonite Grout	•																		
	Note			tres, all dia																	
AGS	3			et for detai breviation		ng, progre	ess and wa	ater.													
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Issue.Revision No. 2.02 Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Form No. SIEXPHOLEHDR

Project Name	Cambridge Waste Water Treatme	ent Pla	nt Reloca	ation									Hole ID	
Project No.	TE8364						Expl	orato	ry Ho	ole Lo	og	[BH_TUN_	Λ1 Ω
Eng <mark>inee</mark> r	Mott MacDonald Bentley											'	on_ruiv_	_010
Employer	Barhale Limited												Sheet 1 of	5
Ground Level	+1028mOD	Coordina	ites	549445	.42E, 2609	99.331	N .	Gr	id	O:	SGB			
Hole Type	IP+RC	Inclination	n	90° from	horizonta	al			,				1	
	Description of Strata	Weathering	Legeno	Depth (Thick-	Datum Level	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	õ	Ē.	In Situ Test Details	Install-
		\$		ness)	Level	≱ ₹	Details	Dia	5 %	ä	-		Details	auon
	brown slightly gravelly sandy CLAY. Sand is fine gular to subrounded fine to medium.	to		(0.30)	:		D1 0.05-0.10 ES 2 0.20-0.25							
(TOP) [TOPSOIL]	gravelly sandy CLAY Gravel is angular to	_/	(//)	0.30	9.98 9.88		B 2 0.10-0.40							
subrounded fine to	coarse of mixed lithologies and flint.	Λ	T. T.	1	-		D 3 0.40-0.50 ES 5 0.50-0.55							
\(SUPD) SUPERFICIA Firm light brown on	AL DEPOSITS] eyish slightly gravetly sandy calcareous clay		100	(O.BO)	1		B 4 0.40-0.80							
CHALK, Gravel is an	gular to subrounded fine to coarse of mixed		T I	1 .	-		B 6 0.80-1.20							-
	LBURY CHALK FORMATION]	_	L L	1.20	9.08		D5 1.00-1.10 ES8 1.10-1.20	\vdash			-		-	
	K composed of firm yellowish brown gravelly rivel is angular to subangular fine to coarse of		A STATE	7	3								K 1.50 - 10.20	
extremely weak low	density calcareous siltstone with occasional		<u> </u>	1]		C 7 1.20-2.20	102	100				K 1.50 - 10.20	3.H
black specks. (WMCK) [WEST ME	LBURY CHALK FORMATION]		11	1	1		17 120 220	1202	100				K 1.50 - 10.20	. ∏
		۔ ا		4 :									5	
		<u>ة</u>		(2.24)	1							NA.		
		8	1 1	耳 ` 「	1								1	40 H
				I I	1		C8 2.20-3.20	102	100				K 2.60 - 6.00	
			- V	T .	1									1 7
			10,000	1 '	7								5	7 H
			Tr.	1 12000]									
	very weak low density yelkwish brown CHALK		Lat and	3.44	6.84									+
	reous SILTSTONE. Discontinuities: 1) 0-10 degre aced undulating rough with silt infill and	es	7 1	4]									
occasional black sp	ecks. [LBURY CHALK FORMATION]			Ι.	-		C 9 3.20-4.70	102	100	83	83			1
(votalicity (votal) tale	EBURT CHARLET ON MATION		<u> </u>	I '	1									
				工	1									
		1 2		[2.37]	‡							90 415);	7 F
		8	3	1	1	모						740		
from 4.87m to 5.17 rough with black sp	m 2 No discontinuities 80-90 degrees undulating pecks		No.										ŧ	171
			<u>li il</u>	1	7	Ш								\mathbb{H}
			T	<u>"</u>	3	Ш		102	100	49	49			13H8
			1 1	<u> </u>	:	Ш	C 10 4.70-6.20							\exists
	very weak low to medium density yellowish bro		1	5.81	4.47	Ш							1	
	of calcareous SILTSTONE with medium spaced the ss chalk composed of firm yellowish brown	hin	1	<u> </u>	1									1.11
gravelly catcareous	clay. Gravel is subangular medium to coarse of		T.	1	1	'-								\mathbb{H}
	v density calcareous chalk. Discontinuities: 1) d extremely closely to very closely spaced plana	r .		ユ	-								8	+
	orth orange staining. (LBURY CHALK FORMATION)	1 2		(1.89)	7							10 25		\mathbb{F}
	im 1 No discontinuity 80 degrees planar smooth clean	8	(% T)		4		C 11 6.20-7.70	102	100	69	69	40	9	
			<u> </u>		3								3	: 1
			T L	<u> </u>	1									
			1 1	4	‡									
	medium to high density light grey CHALK		<u> </u>	7.70	2.58			\vdash					1	
	eous SILTSTONE. Discontinuities: 1) 0-20 degre spaced planar undulating rough with orange	es	-	4 .	-									1 1
staining.	LBURY CHALK FORMATION]		1	I	7									\mathbb{H}
(versicity (vees) inte	EBURT CHALK FORWATION	8		I	3		C12 770-9.20	102	100	73	67	200	5	3 +
		Grade R2	T	(1.65)]							310 620		
		"	1 1	┪]									
			1, 1,	, 1	1								á	
	im 1 No. discontinuity 90 degrees planar smooth		1	9.35	0.93			\vdash						
	light grey CHALK composed of calcareous tinuities: 1) 60-90 degrees undulating rough cle	an.	1	1 3.33)	4 H
2) 0-25 degrees clo	sely to medium spaced undulating rough clean.		1 1	∄	1			102	100	100	100			Į.
(ANMICH) (ANEZI WE	LBURY CHALK FORMATION]		1 1	Щ	1	L	C 13 9.20-10.70	\bot			L		<u>L</u>	
							[
Notes.	All depth in metres, all diameters in millim													
AGS	See header sheet for details of boring, pro For details of abbreviations, see key.	gress an	d water.											
FINAL	Print date and time 12	יחכייםחיי	77 1256		le.	yn char	ked by David How	ard				SOI	L engine	ering
FINAL Form No. SIEXPHOLEI			.c 13.JU	Issue Dat	E 02/03/20		AND DE DEVILLE TOWN	aid					of the Rachy Soletan	

Project Name	Cambridge Waste Water Treatn	nent f	Plant	Relocat	ion										Hole ID	
Project No.	TE8364								Explo	rator	у Но	le Lo	g	[BH_TUN_	01 2
Engineer	Mott MacDonald Bentley													'	_ ו עווע ו	010
Employer	Barhale Limited														Sheet 2 of	5
Ground Level Hole Type	+10.28mOD IP+RC	Coord				42E, 2609 horizonta		N		Gri	d	OS	GB			
Tiole Type	THE STATE OF THE S	mem			Depth				Compline		ble %	ws				
	Description of Strata		Weathering	Legend	(Thick- ness)	Datum Level	Waterstrike		Sampling	I _D .	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
	ight grey CHALK composed of calcareous		>		11033)		>		Details	Dia.	5 %	Š				
2) 0-25 degrees clos	nuities: 1) 60-90 degrees undulating rough coely to medium spaced undulating rough clea				r :											
(WMCK) [WEST MEI	BURY CHALK FORMATION]		Grade A2		(1.53)									90 240		
Chiff over CLAY 11	frequent phosph-ki		Gra		10.88	-0.60								400		
(WMCK) [CAMBRID	frequent phosphatic nodules (<40mm x 40m GE GREENSAND MEMBER] 20m frequent phosphatic nodules (<40mm x 40mm)			<u> </u>	(0.32)										-	
Very stiff fissured da	rk grey CLAY with rare dustings of silt. Fissur	es			11.20	-0.92		61/	10.70 12.20	100	100	17	12			
	ry closely to closely spaced planar polished c ated extremely closely spaced planar undula			<u> </u>	-			C 14	10.70-12.20	102	100	17	13			
(GLT) [GAULT FORM	ATION]			<u> </u>	(1.40)											
				E-E-]										-	
				E==												
Very stiff fissured da	rk grey CLAY with occasional phosphate node	ules			12.60	-2.32										
(<20mm x 30mm). F	issures are 0-15 degrees closely spaced plan an and randomly orientated very closely space	ar		<u> </u>				C 15	12.20-13.50	102	100					
planar undulating po (GLT) [GAULT FORM				===											-	
from 13.20m to 13.4 closely spaced plan	48m thinly laminated randomly orientated extremely ar smooth fissures	′		<u> </u>						L						
from 13.50m to 13.6	67m 1 No. fissure 85 degrees planar polished			E_=_												
				E-E-												
from 14.00m to 14.3	15m 1 No. fissure 75 degrees undulating smooth			<u></u>				C 16	13.50-15.00	102	100					
				<u> </u>				2 10	_0.00 10.00	132						
				<u></u>												
				<u> </u>											_	
				E												
				<u> </u>												-
								C 17	15.00-16.50	102	100					
						-									-	-
				===	(7.95)											
				<u></u>	(****)											
				E_=_												
from 16.94m to 17.0	08m 1 No. fissure 50 degrees planar polished			<u></u>	-										-	
				<u> </u>				C 18	16.50-18.00	102	100					
				<u> </u>	-											
from 17.75m to 17.8	33m 1 No. fissure 60 degrees planar polished			<u></u>		-										
				<u> </u>	-										-	
				E-E-		-										-
				E-=-	-											1
				<u></u>				C 19	18.00-19.50	102	100					
				===	-										-	
				<u> </u>	-											-
				E_=_												1
					_											
ı																
	All depth in metres, all diameters in milli See header sheet for details of boring, p			water												
AGS	For details of abbreviations, see key.	. 0 9 . 0 0 0	una													
FINAL Form No. SIEXPHOLEL	Print date and time OG Issue.Revision N		2022	13:56	Jeeus D-	Lo:	-	ked by	David Howar	d					t the Pachy Soletane	
roim ino. SIEXPHOLEL	oa Issue.Kevision N	o. 2.05			issue Date	: 02/03/20:	TΩ							rart o	of the Bachy Soletano	не стоир

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion										Hole ID	
								Explo	rato	ry Ho	le Lo	og		SII TIINI	040
Project No.	TE8364													BH_TUN_	_018
Engineer Employer	Mott MacDonald Bentley Barhale Limited													Sheet 3 of	5
Ground Level		rdinate	s	549445.4	42E, 2609	99.331	N		Gri	id	09	SGB		0.1000 0 01	
Hole Type	IP+RC Incl	ination		90° from	horizonta	ıl									
		ering		Depth	Datum	trike		Sampling		TCR/Sample Recovery %	ows			In Situ Test	Install-
	Description of Strata	Weathering	Legend	(Thick- ness)	Level	Waterstrike		Details	Dia.	CR/Sa ecove	SCR/Blows	RQD	<u>"</u>	Details	ation
Very stiff fissured da	ark grey CLAY with occasional phosphate nodules	>		, ·		>		Details	Dia.	2 ~	S				
	Fissures are 0-15 degrees closely spaced planar ean and randomly orientated very closely spaced		<u> </u>				C 20	19.50-21.00							
planar undulating p (GLT) [GAULT FORM				20.55	-10.27				102	100					1
Very stiff fissured da	ark grey CLAY with occasional phosphate nodules Fissures are 0-30 degrees very closely to closely		<u> :</u>												
	oth polished clean, 75-90 degrees planar polished		<u> :</u>	-											
(GLT) [GAULT FORM	IATION]		<u> </u>]
			<u> :</u>												
			<u> :</u>				C 21	21.00-22.50	102	100					1
			<u> </u>												
			<u> :</u>												
			<u> </u>]										
				:											
				(4.71)											
				:			C 22	2 22.50-24.00	102	100					
				1 -											
				-											-
					1										
				-											-
							C 22	3 24.00-25.50	102	100					
				-			C 23	24.00-25.50							-
Very stiff fissured da	ark grey CLAY with occasional phosphate nodules	-		25.26	-14.98										
(<20mm x 30mm) a	and shell fragments (<10mm x 10mm). Fissures are ly to medium spaced planar undulating polished			-											
smooth clean and r undulating polished	andomly orientated very closely to closely spaced														
(GLT) [GAULT FORM	IATION]		<u> </u>	-											
			<u> </u>				C 24	25.50-27.00	102	100					
			<u> </u>												
			<u> :</u>												1
			<u> :</u>												-
			<u> :</u>												
			<u> :</u>	(4.52)	1										1
			<u> :</u>	(4.32)			C 25	5 27.00-28.50	102	100					
				_	1		020	21.00 20.00	102	100					
			F_=_] :	1										
			F_=_] -	1										
			F_=_		1		C 26	5 28.50-30.00	102	100					
			F_=_] :	1										
Very stiff fissured da	ark grey CLAY with occasional phosphate nodules		===	29.78	-19.50										
Notes: All depth in metres, all diameters in millimetres.														1	
AGS	See header sheet for details of boring, progres For details of abbreviations, see key.		water.												
FINAL	Print date and time 12/09	9/2022	13:56		In	g chec	cked h	y David Howar	d				SOI	L engine	ering
Form No. SIEXPHOLE				Issue Date	202/03/20	_		,					Part o	of the Bachy Soletan	che Group

Project Name	Cambridge Waste Water Treatment	Plant	Relocat	tion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	og	F	BH_TUN_	018
Engineer	Mott MacDonald Bentley													OIN_	_0 10
Employer	Barhale Limited													Sheet 4 of	5
Ground Level Hole Type		rdinate ination			42E, 2609 horizonta		N		Gri	d	OS	SGB			
Поте туре	Tivite inc.	_		Depth		_		0 !:		eg %	NS.				
	Description of Strata	Weathering	Legend	(Thick-	Datum Level	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u></u>	In Situ Test Details	Install- ation
Very stiff fissured da	ark grey CLAY with occasional phosphate nodules	We		ness)		W		Details	Dia.	TCF Re	SC				
(<20mm x 40mm) a	nd shell fragments (<10mm x 10mm). Fissures are ly spaced planar smooth occasionally polished and														
	d extremely closely to very closely spaced planar				1										-
(GLT) [GAULT FORM]		C 27	30.00-31.50	102	100					
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			==	(2.86)											
			<u> </u>	(2.00)	1										
			F_=_]										
			<u> </u>	-	-										-
			E_=_				C 28	31.50-33.00	102	100					
from 32.31m to 32.	64m fissures are 85 degrees planar polished clean.		<u> </u>		-										-
	ark grey CLAY with frequent phosphate nodules		===	32.64	-22.36										
spaced planar occas	Fissures are 0-15 degrees very closely to closely sionally undulating smooth polished and randomly		<u> </u>	_	1										
occasionally polishe			<u> </u>]										
(GLT) [GAULT FORM	ATIONJ		<u> </u>		1										-
			<u></u>]		C 29	33.00-34.50	102	100					
			<u> </u>]										-
			<u> </u>	(2.89)	1										
			<u> </u>												-
			<u> </u>												
from 25 00m to 25	12m 1 No forms FF downson whileting walished		<u> </u>	_]								NA		
from 35.00m to 35.	12m 1 No. fissure 55 degrees undulating polished				-		C 30	34.50-36.00	102	100					
			E	35.53	-25.25										1
polished smooth cle			<u> </u>	33.33	-23.23										
(GLT) [GAULT FORM	ATION]		<u></u>	_											
				(1.39)	-										
				1 .											
					-		C 21	36.00-37.50	102	100					
Very stiff fissured da	ark grey CLAY with occasional phosphate nodules	-		36.92	-26.64		C 51	36.00-37.30							
	rissures are randomly orientated very closely to ar occasionally undulating polished smooth.		==		1										
(GLT) [GAULT FORM			<u> </u>												1
			F_=_		-										
			E_=_	_]										
			<u></u>		1		C 32	37.50-39.00	102	100					
			<u></u>	(4.66)]										-
			<u> </u>		1										
	89m 1 No. fissure 85 degrees planar polished lemnite (5mm x 40mm)		<u> </u>	_											
from 20 22m to 20	45m 1 No. fissure 90 degrees undulating polished		<u> </u>		-										
110111 33.23111 to 33.	45III 1 No. lissure 50 degrees diridulating polished		<u> </u>]				102	100					-
			<u> </u>		-		C 22	39.00-40.50							
			<u> </u>				C 33	33.00-40.30							
	All death in mass. 0. Proc. 200												1		
AGS Notes:	All depth in metres, all diameters in millimetre. See header sheet for details of boring, progre		water.												
	For details of abbreviations, see key.		40 ===										SOI	L engine	ppine
FINAL Form No. SIEXPHOLEL	Print date and time 12/09 OG Issue.Revision No. 2.09		13:56	Issue Date	Lo e 02/03/20		скед by	David Howar	d					f the Bachy Soletan	

Project Name	Cambridge Waste Water Treatmen	t Plan	t Relocat	tion										Hole ID	
Project No.	TE8364							Explo	ratoı	у Но	le Lo	og		BH_TUN_	Λ1 Ω
Engineer	Mott MacDonald Bentley												-	DII_IGIN_	_010
Employer	Barhale Limited													Sheet 5 of	5
Ground Level		ordinate			42E, 2609		N		Gri	d	09	SGB			
Hole Type	IP+RC Inc	lination	1		horizonta	_				_a ≫	s				1
	Description of Strata	Weathering	Legend	Depth (Thick-	Datum	Waterstrike		Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test	Install-
		Wea		ness)	Level	Wat		Details	Dia.	TCR/ Reco	SCR			Details	ation
	ark grey CLAY with occasional phosphate nodules sissures are randomly orientated very closely to														
closely spaced plana (GLT) [GAULT FORM.	ar occasionally undulating polished smooth. ATION1		<u> </u>		-										
(, [<u> </u>												
			<u> </u>	:											
				-											-
							C 34	40.50-42.00	102	100					
Vany stiff dark gray (CLAY with occasional fossilised belemnite (<5mm			41.58	-31.30										
x 40mm) and rare pl	hosphate nodules (<20mm x 30mm) occasional														
shell fragments (<10 (GLT) [GAULT FORM				-											
			<u></u>												
			<u></u>	-	-										-
			<u> </u>				C 35	42.00-43.50	102	100					
			F_=_	_				12.00							
			F_=_	(3.23)											
			F_=_												
			F_=_	1											
	82m fissures are randomly orientated extremely ar undulating smooth occasionally polished		F_=_												
	3		<u> </u>	-											
			<u> </u>				C 36	43.50-45.00	102	100					1
			<u> </u>		-										-
Very stiff fissured da	ark grey CLAY with occasional belemnite (<5mm x	_		44.81	-34.53										
30mm) phosphate n	nodules (<20mm x 20mm) and shell fragments Fissures are 80-90 degrees planar undulating		<u> </u>	-											-
polished.			<u> </u>												
(GLT) [GAULT FORM	ATIONJ			-											
				(1.83)			C 37	45.00-46.50	102	100					
					-										
Very stiff dark grey s	slightly sandy slightly gravelly CLAY with frequent	-		46.64	-36.36										
shell fragments (<10 rounded fine of flint	0mm x 10mm. Sand is fine to coarse. Gravel is			(0.57)											
(LGF) [LOWER GREE	NSAND FORMATION] monite (45mm x 45mm) and 1 No. phosphate nodule			47.21	-36.93			(0.50 (0.00	400	400					}
(20mm x 45mm)	slightly gravelly clayey fine to medium SAND.	4					C 38	46.50-48.00	102	100					=======================================
Gravel is subrounde	ed to rounded fine to medium of flint. NSAND FORMATION]			(0.77)											-
(EGI) [EOWER GREE	NOAND FORMATION;														
	rey slightly sandy gravelly CLAY. Sand is fine to abrounded to rounded fine to medium of flint.			47.98 _ (0.39)	-37.70										7
(LGF) [LOWER GREE	NSAND FORMATION]			48.37	-38.09										
SAND. Gravel is sub	slightly gravelly slightly clayey fine to medium rounded to rounded fine to medium of flint.			-											-
(LGF) [LOWER GREE	NSAND FORMATION]						C 39	48.00-49.50	102	100					
				(1.13)											-
Complete at /	10 50m Termination Peacen: Achieved	_		49.50 -	-39.22										
Complete at 2	49.50m. Termination Reason: Achieved Scheduled Dep h														1
			1	-											1
<u> </u>													1		
	All depth in metres, all diameters in millimet See header sheet for details of boring, progre		water.												
AGS	For details of abbreviations, see key.														
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Form No. SIEXPHOLEL	.OG Issue.Revision No. 2.0	5		Issue Date	02/03/20	18							Part o	f the Bachy Soletan	che Group

Project	Name	Cam	nbridge	: Waste	Water Ti	eatment	Plant F	Reloca	ation					_						lole ID	
Project	No	TE8	364											Exp	lorator	y Hole	Log	В	H_TI	UN_C)18P
Engine				Donald E	Bentley															M	
Employ			nale Lin	nited				0 1		F.	0						0.1			et 1 of 1	l
Ground L Date Star			24mOD 9/2021					Coord Date C	inates Complet		9441.46I /10/202:			15IN			Grid Incli	nation	OSGB		
Тор	Base		Date Ti	me Start			Rig Crew	Logg	er Barre	I Type Drill	Bit Pl	ant L			g Used Pi	t Stability			Remark		
0.00	1.20	IP DO		021 16:00		021 17:00	Craig Blackett	CB		T.:		ated Ha		ols No	one	Stable		Inspe	ection pit: H	and dug	
1.20	31.00	RO	30/09/2	021 07:30	05/10/2	021 16:30	Craig Blackett	СВ		Trico Ste		oilmec	SM8								
					DOCDEC											\A/ATED	CTDUC				
Date ⁻	Time	Depth	Depth		ROGRES	3	Rema	rke			Date	e Tim	ما	Depth	Depth	WATER Depth	Water		1	Remark	rc .
29/09/20	21 17:30	1.20	Casing 0.00	Dry	End of Shi		Keine	ai No			Date			Strike	Casing	Sealed	Rose To	Elapsed	1	Kemar	
30/09/20: 30/09/20: 01/10/20:	21 17:30	1.20 26.50 26.50	0.00 2.80 2.80	Dry 4.00 4.00	Start of sh End of Shi Start of sh	ft															
01/10/20	21 15:30	27.50 27.50	2.80	4.00 4.00 4.00	End of Shi	ft															
04/10/20:	21 17:30	31.00 31.00	2.80 2.80	3.80 4.00	End of Shi Start of sh	ft															
05/10/20	21 16:30	0.00			Backfill Co	mplete; Borel	hole Comple	ete													
Depth	Depth		(_	1	DETAILS					Depth	То	est			SPT D	ETAILS		Energy	Depth	Depth
Тор	Base	Tim	e Start	Duratio	n To	ol		Rem	narks		Тор		/pe		Reported	d Result		Hammer Serial Number	Ratio	Casing	Water
				ROTARY	/ FLUSH [ETAILS															
Depth Top	Depth Base	Flus	sh Type	Flush Retur			ı	Remar	ks												
1.20 8.50	8.50 31.00		R/MIST R/MIST	90	White Grey																
HOLE DI	AMETER	CASING	DIAMET	ER		DYNAM	IIC SAM	PLINC	G												
Depth Base	Diamete	Depth Base	Diame	ter Depth 1	Top Depth Base	Diamete	er Dura	tion	Sample Recover	e Run ry Reference	e										
2.80 31.00	200 146	2.80	200																		
	INST	ALLATIO					PE CONS	STRUC	TION						DEP	TH RELA	TED REN	/IARKS			
Distance	ID	Type Re	sponse R Top		Pipe Pipe Ref Ref	Тор	Base	Diam	eter F	Pipe Type	Depth Top	В	epth Base					marks			
											27.00 28.00	2	27.00 28.00	Self Bori	ng Pressure	meter Test a meter Test a	ttempted				
											28.70 30.40 32.20	3	28.70 30.40 32.20	High Pre	ng Pressurei ssure Dilato ssure Dilato		ttempted				
											32.20	,	32.20	Inghirie	ssure Dilato	illeter rest					
				BACI	KFILL DET	AILS										LOCATIO	n detai	LS			
Depth Top	Depth Base		Descr	iption			Rer	marks				,		44.2.2		Ren	narks				
0.00	31.00	Grout									Borehole	formed	d to fac	ilitate in si	tu testing						
_																					
ACG	Note					n millimeti ng, progre		ater.											4		
AUN	2			bbreviatio	ns see key																DICC
FINAL Form No. 9	SIEXPHO	EHDR .				ime 12/09 on No. 2.02	9/2022 1	3:56	leena P)ate 22/06/2	Log che	cked b	by Da	avid Hov	vard					GINEE	
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Project Name	Cambridge Waste Water Treat	ment Pla	ant Relo	cation									Hole ID	
Project No.	TE8364						Explo	orato	ry Ho	le Lo	og	В	H_TUN_	018P
Engineer	Mott MacDonald Bentley												M	
Employer	Barhale Limited												Sheet 1 of	4
Ground Level	+10.24mOD	Coordin		549441.	46E, 2610	03.15N	l	Gr	id	09	SGB			
Hole Type	IP+RO	Inclinat			1	(n)			0 v	, , ,				1
	Description of Strata		Meathering Lege	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	≝	In Situ Test Details	Install- ation
Sandy gravelly TOPS (TOP) [TOPSOIL]	SOIL (Driller's description)			(0.30)	-		Botano	D.a.						-
Light brown sandy	gravelly CLAY (Driller's description)		(//)	0.30 0.40	10.24 10.24									
\ (SUPD) [SUPERFICIA CHALK (Driller's des	AL DEPOSITS] scription)	/			10.27									
(WMCK) [WEST ME	LBURY CHALK FORMATION]			(0.80)]									
				1 20	102/									-
CHALK (Driller's des (WMCK) [WEST ME	scription) LBURY CHALK FORMATION]			1.20	10.24									
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Notes:	All depth in metres, all diameters in mil	llimetres.												
	See header sheet for details of boring, provide a see header sheet for details of abbreviations, see key.		nd water.											
FINAL	Print date and time		122 13:56				ked by David Howa	ard					L engine	
Form No. SIEXPHOLEL	.OG Issue.Revision I	No. 2.05		Issue Dat	e 02/03/20	18						Part o	f the Bachy Soletan	che Group



Project Name	Cambridge Waste Water Treat	ment Pla	nt Reloca	tion									Hole ID	
Project No.	TE8364						Exploi	rator	у Но	le Lo	g	В	H_TUN_0)18P
Project No. Engineer	Mott MacDonald Bentley												М	
Employer	Barhale Limited												Sheet 2 of	4
Ground Level Hole Type	+10.24mOD IP+RO	Coordin Inclinati		549441.4	46E, 2610	03.15N	J	Grid	d	OS	GB			
поте туре	IP+RO			Depth		ě			응 %	S/				
	Description of Strata	3	Legend	(Thick-	Datum Level	Waterstrike	Sampling		TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
CHALK (Driller's des	scription)	,	Š	ness)		×	Details	Dia.	Re TC	SC				
(WMCK) [WEST ME	LBURY CHALK FORMATION]			1										
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Grev CLAY (Driller's	description)		1' 1'	11.00 -	10.24								_	1
Grey CLAY (Driller's (GLT) [GAULT FORM	ATION]		F_=	-										
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	All depth in metres, all diameters in mi See header sheet for details of boring,		nd water											
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Project Name	Cambridge Waste Water Trea	tment Pl	lant l	Relocat	ion									Hole ID	
Project No.	TE8364							Explor	ator	у Но	le Lo	9	B	H_TUN_()18P
Engineer	Mott MacDonald Bentley													M	
Employer	Barhale Limited													Sheet 3 of	4
Ground Level	+10.24mOD	Coordi			549441.4	6E, 26100	03.15N	I	Gri	d	OS	GB			
Hole Type	IP+RO	Inclina								a. I					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	۳	In Situ Test Details	Install- ation
Grey CLAY (Driller's (GLT) [GAULT FORM	description)				-										
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FINAL	For details of abbreviations, see key. Print date and time					Los	n chool	ked by David Howard	4				SOI	L enginee	RING
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Issue.Revision No. 2.05 Issue Date 02/03/2018

Part of the Bachy Soletanche Group

Form No. SIEXPHOLELOG

Project Name	Cambridge Waste Water Treatme	ent Plar	it Reloca	tion									Hole ID	
Project No.	TE8364						Exploi	ratory	/ Ho	le Lo	g	В	H_TUN_	018P 🛮
Engineer	Mott MacDonald Bentley												М	
Employer	Barhale Limited												Sheet 4 of	4
Ground Level		Coordinat		549441.4	46E, 2610	03.15N		Grid		OS	GB			
Hole Type	IP+RO	Inclinatio		1		0			o .o	"				
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampling Details	Dia.	TCR/Sample Recovery %	SCR/Blows	RQD	<u>u</u>	In Situ Test Details	Install- ation
Grey CLAY (Driller's (GLT) [GAULT FORM	description)		<u> </u>											
(GEI) [GAGEI TONNI	Alonj			- - - -	-								HPD 30.40	
				31.00 -	10.24									
Complete at 31.0 Dep	0m. Termination Reason: Achieved Suita th to Undertake In Situ Testing	able			-									-
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	: All depth in metres, all diameters in millim See header sheet for details of boring, pro		l water							_]
AGS	For details of abbreviations, see key.	gress and	vvalei.											
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Log checked by David Howard

Issue Date 02/03/2018

Part of the Bachy Soletanche Group

FINAL

Form No. SIEXPHOLELOG

Print date and time 12/09/2022 13:56

Issue.Revision No. 2.05



SUPPORTING FACTUAL DATA

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SECTION A

Exploratory Hole Records and Field Data

EXCAVATION RECORDS

F CANADRON SICODOS

Project Name	Cambridge Waste Water Trea	tment Plant Relocation									Н	lole ID	
Project No.	TE8364					Exc	avati	on Log			IP TI	UN_(001
Engineer	Mott MacDonald Bentley												
Employer Ground Level	Barhale Limited +7.03mOD	Coordinates 547220.708	2615	514 80N			Grid	OSGB			She	et 1 of :	1
Hole Type	IP IP	Method/Equipment Insulated H					Gila	OSGE					
Date Started	30/07/2021	Date Completed 30/07/2022	т —			Lo	gged	By DT					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det				tu Test tails	Install- ation
to round fine to coa (TOP) [TOPSOIL] MADE GROUND: G (MGR) [MADE GRO MADE GROUND: B angular to subroun (MGR) [MADE GRO MADE GROUND: R angular to subroun (MGR) [MADE GRO MADE GROUND: R angular to subroun (MGR) [MADE GRO	irey chalk clay. Occasional rootlets. DUND] Trownish red sandy gravel. Sand is fine to coaded fine to coarse of sandstone, flint, brick a UND] Eddish brown sandy gravel. Sand is fine to coaded fine to coarse of sandstone, flint, brick a ded fine to coarse of sandstone, flint, brick a	arse. Gravel sized fragments are ind concrete. oarse. Gravel sized fragments are ind concrete.			0.15 0.30 (0.50) 0.80 (0.70) 1.50	7.03		D1 0.05-CES 2 0.20-B3 0.30-0 B6 0.40-0 D4 0.40-CES 5 0.50-B9 0.80-1 D7 1.00-1 ES 8 1.10-	0.25 0.40 0.80 0.50 0.55 20			-	
Stability Shoring Depth Top Depth Ba 1.50 1.50		TED REMARKS Remarks d at base of inspection pit.		•			gth (Si gth (Si	des A and C)	ensions	s and	(0.40m 0.90m 1.50m	1
								WATER STRIK				WATER STR	
	DAC	KFILL				[Date Tii	ne	Depth S	trike D	epth Sealed	Depth Water	Time Elapse
Depth Top Depth Ba	se Description	Remarks											
0.00 1.50	Arisings												
	DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL N	IOTES	<u> </u>		
Depth Top Depth Ba		Remarks							Remark	S			
					1.	No ground	water o	bserved during	excava	tion.			
AGS Notes	: All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.		ults, se	e accomp	anying re	ecords.							
FINAL		2 12/09/2022 13:59		-	d by Davi	id Howard				SOI	ir eu	GINEE	RING

Project Name	Cambridge Waste Water Trea	tment Plant Relocation									Н	ole ID	
Project No.	TE8364					Exc	avati	on Log			P TI	JN_C	004
Engineer	Mott MacDonald Bentley									'			
Employer Ground Level	Barhale Limited +6.89mOD	Coordinates 547670.90E	261/	OE 20N			Grid	OSGE)		She	et 1 of 1	1
Hole Type	IP	Method/Equipment Insulated ha					and	OSGL	,				
Date Started	28/07/2021	Date Completed 28/07/2021		1	1	L	ogged	By DT			Т		1
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samı Det				u Test tails	Install- ation
to subrounded fine \(TOP) [MADE GROUND: Li	JND] ight brown slightly sandy angular to subrou stone, flint, mudstone, brick and concrete. Sa	nded fine to coarse gravel sized	/		0.10	6.79		D 1 0.05-0 B 3 0.10-0 ES 2 0.20- B 6 0.50-0 D 4 0.50-0	0.50 0.25 0.90			- - - -	
	ration at 1.20m. Termination Reason: Strong C				1.20	5.69		ES 5 0.50- B 9 0.90-1 D 7 1.10-1 ES 8 1.10-	l.20 l.20			- - -	
Stability Shoring Depth Top Depth Ba 1.20 1.20		TED REMARKS Remarks d at base of inspection pit.					igth (Si igth (Si	ccavation Dim des A and C) des B and D)	ensions	and (().50m).50m I.20m	
								WATER STRIK		L		WATER STR	
	BAC	KFILL					Date Tir	пе	Depth S	trike De	pth Sealed	Depth Water	Time Elapse
Depth Top Depth Ba	Description Arisings	Remarks											
0.00	Atomys												
		RATORY HOLE REMARKS						GEN	ERAL N	IOTES			
Depth Top Depth Ba	ise	Remarks			1.	No ground	water o	bserved during	Remark excava				
						g. 34.14							
AGS Notes	s: All depth in metres, all soil strengths a All bearings given relate to magnetic t For details of abbreviations, see key.	North.											nicc
FINAL		2 12/09/2022 13:59		-	d by Dav	id Howard				3UI	L EH 10	sinee	KIIIG

Project Name	Cambridge Waste Water Treat	ment Plant Relocation									Н	ole ID	
Project No.	TE8364					Exc	avati	on Log		ΙP	TU	N_0	04a
Engineer	Mott MacDonald Bentley									''-			o ia
Employer	Barhale Limited	6 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		00.001			0 : 1	0000			Shee	et 1 of 1	L
Ground Level Hole Type	+6.95mOD IP	Coordinates 547671.30E Method/Equipment Insulated Ha					Grid	OSGB					
Date Started	28/07/2021	Date Completed 28/07/2021				L	ogged	By DT					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta			In Siti Det	u Test ails	Install- ation
flint. (TOP) [TOPSOIL]	wn slightly gravelly sandy CLAY. Gravel is and				0.10	6.95						-	
					0.70)	6.95						-	
	rown slightly gravelly medium sand.	/			(0.40) -	-						-	
	ation at 1.20m. Termination Reason: Strong C	AT signal at base of inspection pit		******	1.20	6.95						-	8-2-12-3
												-	
						- - -						-	
						1							
						-							
						-						-	
					-	- - - -						-	
												-	
					-							- -	
						-							
						- - - -						- - -	
						-						-	
						-						- -	
						1						-	
Stability	Stable			L		1	E	cavation Dime	ensions	and Ori	entatio	n	
Shoring	None					Ler	ngth (Si	des A and C)			0	.40m	
Depth Top Depth Ba		ED REMARKS Remarks					• •	des B and D)				.40m	
1.20 1.20	Strong signal on CAT. Borehole abandone					De	oth				1	20m	
							Date Tir	WATER STRIK		: D		WATER STR	
	BAC	KFILL					Jake III	116	Depin Sti	ike Depth	i sealed	Depth Water	inne ciapse
Depth Top Depth Base 0.00 1.20	se Description Arisings	Remarks											
3.55	gc												
	DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL N	OTES			
Depth Top Depth Ba	se	Remarks			1.	No ground	water o	bserved during	Remarks excavati				
						.							
AGS Notes.	: All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.		ılts, se	e accomp	anying re	cords.							
FINAL		2 12/09/2022 13:59		-	by Davi	id Howard			5	SOIL	end	inee	RING

Project Name	Cambridge Waste Water Treat	ment Plant Relocation										H	ole ID	
Droject No	TE8364	64							on Log		IC) TII	NI O	0/h
Project No. Engineer	Mott MacDonald Bentley										-	_10	N_0	U 4 D
Employer	Barhale Limited											Shee	et 1 of 1	1
Ground Level	+6.96mOD	Coordinates 547664						Grid	OSGB					
Hole Type	IP 01/09/2021	Method/Equipment Insulate Date Completed 01/09/2			ols		1.		D					
Date Started	01/09/2021	Date Completed 01/09/2	2021	т —		Donath	T	ogged 	Ву		\neg			
	Description of Strata			Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta				u Test tails	Install- ation
TOPSOIL: Dark brov flint.	vn slightly gravelly sandy CLAY. Gravel is and	gular to subrounded fine to medium	of /			0.10	6.96		ES 2 0.20-	0.25			-	
\(TOP) [TOPSOIL] MADE GROUND: B	rickwork over concrete.					(0.45)]							
(MGR) [MADE GRO End of excavation	at 0.55m. Termination Reason: Buried obstr	uction at base of excavation. Location	/	1	XXXXXX	0.55	6.96							
	abandoned.						1						-	
]						-	
							1							
							1						-	
]							
							1						-	
							1							
							-						=	
							1							
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]							
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							1						-	
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							1							
							-						-	
							1							
							1						_	
							1							
]							
							1							
							1							
Stability	Stable				•			E	cavation Dime	ensions	and C	rientatio	on	
Shoring	None								des A and C)).90m	
Depth Top Depth Bas		ED REMARKS Remarks							des B and D)).80m	
0.10 0.55	Buried structure encountered.	Remarks					De _l	ptn				٠).55m	
								Date Ti	WATER STRIK				WATER STR	
	BAC	KFILL						Date III	ne	Depth St	тке рер	otn Sealed	Depth Water	пте ciapse
Depth Top Depth Bas	-	Remark	(S											
0.00 0.55	Arisings													
Double Tool Double Do		RATORY HOLE REMARKS								ERAL N				
Depth Top Depth Bas	se	Remarks				1.	No ground	water o	bserved during	Remarks excavati				
	All depth in metres, all soil strengths a		resu	ılts, se	e accomp	anying re	cords.							
AGS	All bearings given relate to magnetic N For details of abbreviations, see key.	voru).												
FINAL		12/09/2022 13:59		I٥	a checker	by Davi	id Howard			<u> </u>	SOIL	. end	inee	RING
Farmer NI - CIEVELLOLE			. 0/		-	-, Duv					D . C		0.1.	

Project Name	Cambridge Waste Water Trea	tment Plant Relocation									Н	ole ID	
Project No.	TE8364					Exc	avati	on Log		IC) TII	N_00	1/ ₂ D1
Engineer	Mott MacDonald Bentley									''	_14	IN00) 4 171
Employer	Barhale Limited										She	et 1 of 1	1
Ground Level	+6.95mOD	Coordinates 547664.56E					Grid	OSGE	3				
Hole Type Date Started	IP 02/07/2021	Method/Equipment Insulated has Date Completed 28/07/2021		OIS		L	ogged	By DT					
		· · · · · · · · · · · · · · · · · · ·			Depth		Ι		1.			<u> </u>	
	Description of Strata		Weathering	Legend		Level	Waterstrike	Samı Det	ails		1	u Test tails	Install- ation
to subrounded fine		is fine to coarse. Gravel is subangular	1		0.10	6.85		D 1 0.05-0 B 3 0.10-0					
fragments of sands	IND] ght brown slightly sandy angular to subrou tone, flint, mudstone, brick and concrete wi d fragments are subangular of brick and co	th low cobble content. Sand is fine to			(0.70)	-		ES 2 0.20- B 6 0.40-0 D 4 0.50-0).80).55			-	
	UND] ght brown slightly gravelly fine to coarse sa sandstone and mudstone.	nd. Gravel sized fragments are			0.80 (0.40)	6.15		ES 5 0.50- B 9 0.80-1 D 7 1.10-1	20			- -	
(MGR) [MADE GRO		AT signal at base of inspection pit			1.20	5.75		ES 8 1.10-					
												-	
						1						-	
						}							
						-						-	-
]							
						-						-	
						1							
						-						_	
						1							
						-						-	
						-							
						1							
						1							
						-							-
						1						-	
						-							
						_						-	-
						1							
						-						-	
						-							
						1							
Stability	Stable						E:	cavation Dim	ensions	s and	 Orientation	on	<u> </u>
Shoring	None					Ler	gth (S	des A and C)			().50m	
Depth Top Depth Ba		ED REMARKS Remarks						des B and D)).50m	
1.20 1.20	Strong signal on CAT. Borehole abandone					De _l	otn					L.20m	
					-			WATER STRIK	FS			WATER STR	IKES DETAI
							Date Ti			trike De		Depth Water	
Depth Top Depth Ba	*	KFILL Remarks											
0.00 1.20	Arisings	Kemana											
Depth Top Depth Ba		RATORY HOLE REMARKS Remarks							ERAL N Remark		5		
top popul ba					1	No ground	water o	bserved during					
■ Notes	: All depth in metres, all soil strengths a	re average in kPa. For in situ test resi	ılts, se	e accomn	anyino re	ecords.							
AGS	All bearings given relate to magnetic N For details of abbreviations, see key.			·	. 0								
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FINAL				-	aby Dav	via i iowala				<u> </u>			1 6

Project Name	Cambridge Waste Water Treat	ment Plant Relocation									Н	ole ID	
Project No.	TE8364					Exc	avati	on Log		ID	TLIN	1_00	/ ₁ TT1
Engineer	Mott MacDonald Bentley									''' -	_101	u _00	T111
Employer	Barhale Limited										Shee	et 1 of 1	L
Ground Level Hole Type	+6.96mOD IP	Coordinates 547664.00E Method/Equipment Insulated Ha					Grid	OSGB					
Date Started	01/09/2021	Date Completed 01/09/2021		,013		Lo	ogged	By DT					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta				u Test tails	Install- ation
	wn slightly sandy slightly gravelly clay. Sand	is fine to coarse. Gravel is subangular	>	X	0.10	6.96	>					-	
fragments of sands coarse. Cobble size (MGR) [MADE GRO	JND] ight brown slightly sandy angular to subrou stone, flint, mudstone, brick and concrete wi d fragments are subangular of brick and con	th low cobble content. Sand is fine to ncrete.			0.30	6.96							
Stability	Stable			1			L E	L cavation Dime	ensions	and O	rientatio	on	
Shoring	None					Len	gth (Si	des A and C)			C).90m	
Depth Top Depth Ba		ED REMARKS Remarks					• •	des B and D)).80m	
0.30 0.30	Concrete obstruction	Remarks				Dep	oth				٠).30m	
					-		Date Tir	WATER STRIK		rike Der		WATER STR Depth Water	
	BAC	KFILL											
Depth Top Depth Ba 0.00 0.30	se Description Arisings	Remarks											
0.00 0.50	Alianiga												
	DEDTH BEI VIEU EADIO	RATORY HOLE REMARKS			+			GENI	ERAL N	OTFS			
Depth Top Depth Ba		Remarks							Remarks				
					1.	No ground	water o	bserved during	excavati	on.			
AGS	: All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.	Jorth.								ייספ	enc	inee	DIDG
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Project Name	Cambridge Waste Water Trea	tment Plant Relocation									H	ole ID	
Project No.	TE8364					Exc	avati	on Log		ID	TLIN	1_00	/ ₁ TT2
Engineer	Mott MacDonald Bentley									''' _	_TGI	u _00	T112
Employer	Barhale Limited										Shee	et 1 of 1	L
Ground Level Hole Type	+6.93mOD IP	Coordinates 547665.20E Method/Equipment Insulated Ha					Grid	OSGB	1				
Date Started	01/09/2021	Date Completed 01/09/2021		013		Lo	ogged	By DT					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta				u Test tails	Install- ation
	wn slightly sandy slightly gravelly clay. Sand	is fine to coarse. Gravel is subangular	>	*****	0.10	6.93	>					-	
fragments of sands coarse. Cobble size (MGR) [MADE GRO	JND] ight brown slightly sandy angular to subrou stone, flint, mudstone, brick and concrete wi d fragments are subangular of brick and co	th low cobble content. Sand is fine to ncrete.				6.93							
Stability	Stable			1		1	E>	L cavation Dime	ensions	and C	Orientatio	on	1
Shoring	None						• •	des A and C)).90m	
Depth Top Depth Ba		TED REMARKS Remarks				Len Der	• •	des B and D)).80m).30m	
0.30 0.30	Concrete obstruction					DC	, ci i					.50111	
								WATER STRIK	FS			WATER STR	IKES DETAI
							Date Tir			rike De		Depth Water	
		KFILL											
Depth Top Depth Ba 0.00 0.30	Description Arisings	Remarks											
	DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL N	OTES			
Depth Top Depth Ba	se	Remarks			1	No ground	water o	bserved during	Remarks excavati				
						g							
AGS	EAll depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.	North.									000		DICC
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Project Name	Cambridge Waste Water Trea	ment Plant Relocation									Н	ole ID	
Project No.	TE8364					Exc	avati	on Log		ΙP	TH	N_0	05Δ
Engineer	Mott MacDonald Bentley									''	_' ~		00/1
Employer	Barhale Limited	6 15 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5		00.001			0 : 1	0000			Shee	et 1 of 1	L
Ground Level Hole Type	+6.64mOD IP	Coordinates 547782.20E Method/Equipment Insulated ha					Grid	OSGB					
Date Started	29/07/2021	Date Completed 29/07/2021				Lo	gged	By DT					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)		Waterstrike	Samp Det				u Test tails	Install- ation
fragments of sands (MGR) [MADE GRO MADE GROUND: B fragments of sands (MGR) [MADE GRO	rown slightly sandy angular to subrounded stone, flint, shale, mudstone, brick, porcelain	medium and coarse gravel sized and concrete. Sand is fine to coarse.	M /		0.28 (0.37) 0.65	6.36	M	D1 0.05-C B3 0.10-0 ES 2 0.20- B6 0.40-0 D4 0.40-C ES 5 0.50-	0.40 0.25 0.60 0.50				
Stability	Stable						F	ccavation Dim	ensions	and O	rientatic		
Shoring	None					Len		des A and C)	ensions	and O		on).50m	
<u> </u>	DEPTH RELAT	ED REMARKS						des B and D)			0).50m	
Depth Top Depth Bar 0.00 0.65	Concrete at base of excavation.	Remarks				Dep	oth				0).65m	
							Date Tir	WATER STRIK		rika Dan		WATER STR Depth Water	
	BAC	KFILL					Jace III	ne .	Бериі за	пке рер	tii Sealeu	Deput water	типе спарае
Depth Top Depth Bar 0.00 0.65	se Description Arisings	Remarks											
	,ogo												
	DEPTH RELATED EXPLO	RATORY HOLE REMARKS			\dashv			GEN	ERAL N	OTES			
Depth Top Depth Ba		Remarks			1	No around	water o	bserved during	Remarks				
						. No ground	water c	bserved during	excavati	OII.			
AGS	: All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.	Jorth.											DICC
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Project Nam	ne C	ambridge Waste Water Treat	ment Plant Relocatio	n									Н	ole ID	
Project No.	Т	E8364						Exc	avati	on Log		11	P TI	JN_C	006
Engineer	Ν	Nott MacDonald Bentley													
Employer		arhale Limited	Coordinates 5	/7070.055	2015	10.7CN			C1	000	,		Shee	et 1 of 1	L
Ground Level Hole Type	+: IP	9.04mOD	Method/Equipment Ir	47879.65E, nsulated Ha					Grid	OSGB	•				
Date Started	20	0/10/2021	Date Completed 2	0/10/2021				L	ogged	By PS					
		Description of Strata			Weathering	Legend	Depth (Thick- ness)		Waterstrike	Samp Det				u Test ails	Install- ation
rounded fine to (MGR) [MADE	o coarse d GROUND	orown slightly gravelly sandy clay. Sand of flint and sandstone. gravation at 1.20m. Termination Reason: A		gular to	w		(1.20)	9.04		LB 1 0.50-					
														-	
Stability	St	able							E	Cavation Dime	ensions	and O	rientatio	on .	
Shoring	N	one								des A and C)			C	.30m	
Depth Top Dept	h Paca	DEPTH RELAT	ED REMARKS Remarks							des B and D)				.30m	
Берит тор Бери	III Dase		Kemarks					De _l	otn					.20m	
							-			WATER STRIK				WATER STR	IKEC DETAI
									Date Tir			rike Dep		Depth Water	
			KFILL												
Depth Top Dept 0.00 1		Description risings	l	Remarks											
		DEPTH DELATED EVEN							CEN	EDAL N	OTEC				
Depth Top Dept	h Base	DEPTH RELATED EXPLO								Remarks					
0.000 1.	200 1.	Groundwater not encountered to base	of excavation.				1.	. No ground	water o	bserved during	excavati	on.			
AGS	All	depth in metres, all soil strengths a bearings given relate to magnetic N details of abbreviations, see key.	lorth.	tu test resu								ייס	end	inee	DIDE
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Project I	Name	Cambridge Waste Water Trea	tment Plant Relocation									Н	ole ID	
Project N	Nο	TE8364					Exc	avati	on Log			IP_Tl	IN (10
Enginee		Mott MacDonald Bentley												
Employe Ground Le		Barhale Limited +4.27mOD	Coordinates 548364.22E	. 2012	24 07N			Grid	OSGE)		She	et 1 of 1	1
Hole Type	vei	IP	Method/Equipment Insulated Ha					GHU	OSGE)				
Date Starte	ed	15/10/2021	Date Completed 15/10/2021	L .			L	ogged	By DT					
		Description of Strata		Weathering	Legend	Depth (Thick- ness)		Waterstrike	Samı Det			1	u Test tails	Install- ation
flint. (TOP) [TOI Firm grey medium c (SUPD) [SI Firm brow to mediur (SUPD) [SI	PSOIL] slightly gra of flint. UPERFICIAL on mottled on of flint. UPERFICIAL	n slightly gravelly sandy CLAY. Gravel is any avelly sandy CLAY. Sand is fine to medium. DEPOSITS] grey and red slightly gravelly sandy CLAY. DEPOSITS] 20m. Termination Reason: Exploratory hole intrusive works	Gravel is angular to subrounded fine to Gand is fine to medium. Gravel is fine			0.20 (0.30) 0.50 (0.70) 1.20	4.27		D1 0.05-C B3 0.10-C ES 2 0.20- B6 0.40-C D4 0.40-C ES 5 0.50- B9 0.80-1 D7 1.00-1 ES 8 1.10-	0.40 0.25 0.80 0.50 0.55 20				
							-							
Stability		Stable					1.		cavation Dim	ensions	s and		on).40m	
Shoring		None DEPTH RELAT	TED REMARKS						des A and C) des B and D)				0.40m 0.40m	
Depth Top	Depth Base		Remarks				De	• •	,				L.20m	
												۰		
									WATER STRIK	ES			WATER STR	IKES DETAI
		DAC	KFILL					Date Tii	ne	Depth S	trike De	epth Sealed	Depth Water	Time Elapse
Depth Top	Depth Base		REMARKS Remarks											
0.00	1.20	Arisings												
		DEDTH DELATED EVELO	RATORY HOLE REMARKS			\perp			CEN	ERAL N	IOTEC	:		
Depth Top			Remarks							Remark	s			
0.000	1.200	No groundwater encountered to base	of excavation.			1.	. No ground	water o	bserved during	excavat	tion.			
AGS		All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.	North.								SOI	L end		Blue
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Project Nan	ne	Cambridge Waste Water Treat	ment Plant Relocation									Н	ole ID	
Project No.		TE8364					Exc	avati	on Log			TP_F	E_0	01
Engineer		Mott MacDonald Bentley												
Employer Ground Level		Barhale Limited +3.84mOD	Coordinates 548433.30E	2616	52/L10N			Grid	OSGE	2		Shee	et 1 of 1	L
Hole Type		TP	Method/Equipment JCB 3CX	, 2010	024.1UN			GHU	OSGE)				
Date Started		20/09/2021	Date Completed 23/09/2021	L			L	ogged	By AM/E	TO				
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sam _l Det				u Test tails	Install- ation
	e of flin	slightly sandy slightly gravelly CLAY. Sand t and quartzite. Occasional rootlets.	is fine to coarse. Gravel is angular to			(0.30) 0.30	3.54		B 1 0.30-0	0.35			IV .	
	ottled c	rey CLAY with frequent white shell fragm DEPOSITS]	ents (<5mm).			(0.90)						Н	0.50 - IV :	
Firm light grey		y gravelly sandy CLAY. Sand is fine to coar	se. Gravel is angular to subrounded	_		1.20	2.64		B 2 1.00-1 B 3 1.20-1				IV –	
(SUPD) [SUPER	RFICIAL	DEPOSITS]				(1.00)							- - - -	
coarse of flint, (SUPD) [SUPER	sandst RFICIAL		/			2.20 2.40 2.50	1.64 1.44 1.34	abla	B 4 2.20-2 LB 5 2.40-				- - -	
medium of silt (SUPD) [SUPER	tstone. RFICIAL	y gravelly sandy CLAY. Sand is fine. Gravel DEPOSITS] n at 2.50m. Termination Reason: Terminate				-							- -	
													-	
						-	-						- - - -	
						-								
						-							- - -	
						-							- - - -	
						_	1							
Stability		Stable		<u> </u>	1		<u> </u>	L Ex	cavation Dim	ensions	and C)rientatio	on	<u> </u>
Shoring		None					Ler		des A and C)				70m	
D .: I-		DEPTH RELAT	ED REMARKS					• •	des B and D)).60m	
Depth Top Dept 0.50	tn Base 0.50	CBR test undertaken	Remarks				De		ona Sido A to	un d Cia	do D		.50m .3°	
							Dec		ong Side A to		4C D			
						L		Date Tir	WATER STRIK		trike No-		WATER STR Depth Water	
		BAC	KFILL					9/2021		2.20		Jealed	-p • vacel	Lapset
Depth Top Dept	th Base 2.50	Description Arisings	Remarks											
0.00	50	Arianiya												
		DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL N	OTES			<u> </u>
Depth Top Dept	th Base .500	Soakaway test carried out.							Remark	s				
AGS	P	Il depth in metres, all soil strengths a Il bearings given relate to magnetic N or details of abbreviations, see key.	Jorth.									000		DICC
FINAL	101570		2 12/09/2022 13:59		og checked	by Davi	d Howard				SUIL	- en 10	sinee	KIIIG

Project Na	ame	Cambridge Waste Water Treat	ment Plant Relocation									Hol	le ID	
Project No	0	TE8364					Exc	avati	on Log			TP_FI	F O	72
Engineer		Mott MacDonald Bentley												
Employer		Barhale Limited	0 1		2424011			0 : 1	0000			Sheet	1 of 1	L
Ground Leve Hole Type	el	+4.14mOD TP	Coordinates 548562.50E Method/Equipment JCB 3CX	, 2616	o17.10N			Grid	OSGB	3				
Date Started	ł	21/09/2021	Date Completed 21/09/2021	L			Lo	ogged	By AM					
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det			In Situ Detai		Install- ation
		htly sandy slightly gravelly CLAY. Sand is fi int and quartzite.	ne to coarse. Gravel is angular to			(0.30)						HV 0.00		
(SUPD) [SUP	PERFICIAL		ents (<5mm).			0.30 (0.40)	3.84		B 1 0.30-0).55		CBR 0.	-	
(SUPD) [SUP		. DEPOSITS] grey sandy gravelly CLAY. Sand is fine to co	arse Gravel is annular to subrounded			0.70	3.44		B 2 0.70-0).75		HV 0.50	-	
fine to coars (SUPD) [SUP	se of flint PERFICIAL to coarse	and quartzite. DEPOSITS] SAND and GRAVEL. Gravel is angular to su				(0.30) 1.00 -	3.14	▽	B 3 1.00-1	1.05		HV 1.00	-	
													-	
Firm grey Cl (GLT) [GAUL	T FORMA	TION] d of excavation at 2.20m. Termination Reaso	on: Pits walls unstable			2.20	1.94		LB 4 2.00-	2.05			- - - -	
						-								
Stability		Unstable		-			1	E	cavation Dime	ensions	and (Orientation		
Shoring		None						-	des A and C)				!0m	
Depth Top De	epth Base		ED REMARKS Remarks				Len Der	-	des B and D)				0m 10m	
0.50	0.50	CBR test undertaken							ong Side A tov	wa d Sid	de B	67		
						-			WATER STRIK	ŒS		w	ATER STR	IKES DETAI
								Date Tir	me	Depth St		pth Sealed De	epth Water	Time Elapse
Depth Top De	enth Paca		KFILL Remarks				21/0	09/2021	1 10:00	1.30			1.25	5 10
0.00	2.20	Arisings	Remarks			$\overline{}$							1.15 1.10	15 20
			RATORY HOLE REMARKS							ERAL N				
Depth Top De 0.000	epth Base 2.200	1. Trial pit terminated at 2.20m due to gro	Remarks oundwater and instability. 2. Bucket widtl	h reduc	ced to 300n	nm				Remarks	5			
		from 1.00m to base of excavation. 3. Soal												
AGS	,	All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.		ılts, se	ee accomp	anying re	cords.					#		
FINAL	(0) 0 575		2 12/09/2022 13:59		og checked	d by Davi	d Howard				SOI	L engi	nee	RING

Project Name	ect Name Cambridge Waste Water Treatment Plant Relocation										Н	ole ID	
Project No.	TE8364					Exc	avati	on Log		Т	P F	E_0	าร
Engineer	Mott MacDonald Bentley									·			
Employer	Barhale Limited	C	2015	-0040N			6 : 1	0000			Shee	et 1 of 1	L
Ground Level Hole Type	+6.23mOD TP	Coordinates 548800.40E Method/Equipment JCB 3CX	, 2615	588.10N			Grid	OSGB	5				
Date Started	24/08/2021	Date Completed 24/08/2021				Lo	ogged	By AM					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det			In Situ Det		Install- ation
TOPSOIL: Dark brow Sand is fine to coarse (TOP) [TOPSOIL] Structureless CHALK gravelly calcareous (WMCK) [WEST MEL Structureless CHALK GRAVEL with high cosiltstone and silt. Co (WMCK) [WEST MEL Structureless CHALK CLAY, Gravel is angu (WMCK) [WEST MEL from 2.50m to 2.80r	Grade Dm Grade Dc Grade Dm Grade Dm		(0.30) (0.30) (0.50) (0.80) (0.80) 1.60 (1.20)	5.93	<u>₩</u>	B 2 0.25 ES 1 0.25 B 4 0.50 ES 3 0.50 B 5 1.00 B 7 2.00 ES 6 2.00 B 9 2.80 ES 8 2.80			CBR H 0.9.	V -			
					-	-						-	
						1				\perp		-	
Stability Shoring Depth Top Depth Bas 0.50 0.50			Len De _l	gth (Si gth (Si oth iring al	ccavation Dime des A and C) des B and D) ong Side A tow WATER STRIK	wa d Sid		2 0 2 1	.50m .60m .80m 06°	IKES DETAII			
BACKFILL							Date Tii 8/2021		Depth Str 2.00	ike Depth	Sealed	Depth Water	Time Elapsed
Depth Top Depth Base	e Description	Remarks											
0.00 2.80	Arisings												
	DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL NO	OTES			
Depth Top Depth Base 0.000 2.800	e 1. Excavation terminated at 2.80m due to	Remarks unstable ground							Remarks				
	3333334 23011 446 10												
AGS									9	SOIL	end	inee	RING

Project Name	Cambridge Waste Water Treat								Н	ole ID			
Project No.	TE8364					Exc	avati	on Log		Т	P_F	E_0	04
Engineer	Mott MacDonald Bentley										CI	. 1 . 6	
Employer Ground Level	Barhale Limited +6.76mOD	Coordinates 548964.60E	2615	556.20N			Grid	OSGB			Snee	et 1 of 1	L
Hole Type	TP	Method/Equipment JCB 3CX	,										
Date Started	25/08/2021	Date Completed 25/08/2021				Lo	ogged	By AM					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta				u Test ails	Install- ation
coarse. Gravel is and (TOP) [TOPSOIL] MADE GROUND: Bro	own slightly gravelly sandy CLAY with frequaler to subangular fine to medium of flint above slightly gravelly clay. Samedium of brick flint and quartz	and quartz.			(0.30) 0.30	6.46		B1 0.40				0.50 - V -	
					(1.50) -	4.96		B 2 1.00			H 1.	00 - - - - -	
gravelly calcareous (calcareous siltstone (WMCK) [WEST MEI	Composed of firm light grey mottled brow CLAY. Gravel is angular to sub rounded, fine flint and quartz. Sand is fine to coarse. occ. BURY CHALK FORMATION]	to medium of extremely weak asional brown staining.	Grade Dm		(0.70)	4.26		B 3 2.00				- - - - -	
CLAY. Gravel is angu fine to coarse. (WMCK) [WEST MEL	lar to subangular fine to coarse of extremel BURY CHALK FORMATION] excavation at 3.00m. Termination Reason: A	y weak calcareous siltstone. Sand is	G		(0.50)	3.76	\square	B 4 3.00				-	
				- - -									
0. 1.00	0.11												
Stability Shoring Depth Top Depth Bas 0.50 0.50		ED REMARKS Remarks				Len De _l	gth (Si gth (Si oth iring al	cavation Dimedes A and C) des B and D) ong Side A tov	wa d Sid		2 0 3 1	50m .60m .00m .13°	IVEC DET
				Date Tir		Depth Str	ike Depth		WATER STR Depth Water				
Depth Top Depth Bas		KFILL Remarks				25/0	8/2021	. 12:30	2.70				
0.00 3.00	Arisings	Relians											
	DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL NO	DTES			
Depth Top Depth Bas	е	Remarks							Remarks				
Notes: All depth in metres, all soil strengths are average in kPa. For in situ test results, see accompany All bearings given relate to magnetic North. For details of abbreviations, see key. FINAL Print date and time 12/09/2022 13:59 Log checked b										SOIL	end	Sinee	RING

Project Name	Cambridge Waste Water Treat								Но	le ID			
Project No.	TE8364					Exc	avati	on Log		TI	P_F	E_0	05
Engineer Employer	Mott MacDonald Bentley Barhale Limited										Shee	t 1 of 1	ı
Ground Level	+7.00mOD	Coordinates 549133.30E	, 2615	20.70N			Grid	OSGB			01100	. 1 01 1	-
Hole Type	TP	Method/Equipment JCB 3CX											
Date Started	26/08/2021	Date Completed 26/08/2021				Lo	ogged	By AM					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det			In Situ Deta		Install- ation
angular to subroun	ark brown slightly sandy slightly gravelly cla ded fine to medium of flint quartz and brick.	y. Sand is fine to coarse. Gravel Occasional rootlets.			(0.30) 0.30	6.70		ES 1 0.20				-	
(MGR) [MADE GRO Stiff brown slightly flint and quartz. San (SUPD) [SUPERFICIA	sandy slightly gravelly CLAY. Gravel is anguland is fine to coarse.	ar to subrounded fine to medium of			(0.40) · 0.70	6.30		B 3 0.50 ES 2 0.50			CBR (H\ 0.5	, -	
CLAY. Gravel is ang	.K composed of very stiff light greyish browr ular to subangular fine to medium of extrem ELBURY CHALK FORMATION]				- -	- - - -		B 5 1.00 ES 4 1.00			H\ 1.0	, <u> </u>	
			m C		(1.40)	- - - -		ES 6 1.50				-	
Structureless CHAL	K composed of very stiff light grey mottled	prown slightly sandy slightly gravelly	Grade Dm		2.10	4.90		B 7 2.00				- -	
Sand is fine to coar	ravel is angular to subangular fine to coarse se. ELBURY CHALK FORMATION]	extremely weak calcareous siltstone.			(0.90)	- - - -						- - - -	
End c	of excavation at 3.00m. Termination Reason: A	chieved Scheduled Depth			3.00 -	4.00	\Box	B 8 3.00				-	
										- - -			
			_							-			
												-	
						-						-	
					-							-	
												-	
					-							-	
												- - -	
												-	
Stability	Stable						F-	cavation Dim	ensions :	and Oric	ntatio	<u> </u>	
Shoring	None					Len		des A and C)		5110		60m	
		ED REMARKS				Len	gth (S	des B and D)			0.	60m	
Depth Top Depth Ba 0.50 0.50	Se CBR test undertaken	Remarks				Dep						00m	
1.50 3.00	Reduced bucket width to 300mm to com	plete excavation to scheduled depth				Bea	ring a	ong Side A tov	wa d Side	e B	10)6°	
							Date Ti	WATER STRIK	ES Depth Stri	:			IKES DETAI
	BAC	KFILL					08/2021		3.00	іке Беріп	Sealed	epin water	тте Etapse
Depth Top Depth Ba 0.00 3.00	-	Remarks											
0.00 5.00	Arisings												
	DEDTH RELATED EYDLO	RATORY HOLE REMARKS						GENI	ERAL NO)TFS			
Depth Top Depth Ba		Remarks							Remarks	7120			
AGS Notes	: All depth in metres, all soil strengths a All bearings given relate to magnetic N		ılts, se	e accomp	anying re	cords.					<i>d</i>		
FINAL	' '								s	OIL (eng	inee	RING

Project Nar	me	Cambridge Waste Water Treat								Н	ole ID			
Project No.		TE8364					Exc	avati	on Log			TP_	FE_0	06
Engineer Employer		Mott MacDonald Bentley Barhale Limited										Sho	et 1 of	1
Ground Level		+9.59mOD	Coordinates 549318.30E	, 2614	496.00N			Grid	OSGE] B		3116	et 1 0i	1
Hole Type		TP	Method/Equipment JCB 3CX											
Date Started		26/08/2021	Date Completed 26/08/2021		1	I	T L	ogged	By AM					
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samı Det				u Test tails	Install- ation
angular to sub	brounde	k brown slightly sandy slightly gravelly cla ed fine to coarse of flint quartz and brick.	y. Sand is fine to coarse. Gravel is			(0.30) 0.30	9.29							
(MGR) [MADE Stiff brown sli and quartz. Sa \(SUPD) [SUPE	ightly sa and is fir	undy slightly gravelly CLAY. Gravel is angula ne to coarse.	ar to subrounded fine to coarse of flint	_		(0.30)	8.99		B 1 0.50			H	0.50 · IV .50	
CLAY. Gravel is	is angula	composed of very stiff light greyish browr ar to subangular fine to medium of extrem BURY CHALK FORMATION]				(1.20)	- - - - -		B 2 1.20			 	HV -	
		composed of very stiff light grey mottled I ubangular extremely weak to very weak ca		Grade Dm		1.80	7.79		B 3 2.00					
(WMCK) [WES	ST MELE	BURY CHALK FORMATION]				(1.20)	-						-	
	End of e	excavation at 3.00m. Termination Reason: A	chieved Scheduled Depth			3.00 -	6.59		B 4 3.00				-	
													-	
Stability		Stable						Ev	cavation Dim	oncione	and (Oriontati	on	
Shoring Depth Top Dep 0.50	oth Base 0.50 3.00		ED REMARKS Remarks	h			Ler De _l	igth (Si igth (Si oth	des A and C) des B and D) long Side A to			((2.60m 0.60m 3.00m 130°	
			,			-			WATER STRIK	ES			WATER STE	RIKES DETAI
	BACKFILL								me	Depth St	rike De	epth Sealed	Depth Water	Time Elapse
Depth Top Dep			Remarks											
0.00	3.00	Arisings												
		DEPTH RELATED EXPLOI	RATORY HOLE REMARKS						GEN	ERAL N	OTES	<u> </u>		
Depth Top Dep	oth Base		Remarks							Remarks				
		colors and any colors deput.												
Notes: All depth in metres, all soil strengths are average in kPa. For in situ test results, see accompany All bearings given relate to magnetic North. For details of abbreviations, see key.						anying re	cords.							
FINAL	NAL Print date and time 12/09/2022 13:59 Log checked by						id Howard			- 5	SOI	L end	sinee	KING

Project Na	me	Cambridge Waste Water Treat								Н	ole ID			
Project No	ı.	TE8364					Exc	avati	on Log		Т	-P S	TW_(003
Engineer		Mott MacDonald Bentley												
Employer Ground Level		Barhale Limited +10.10mOD	Coordinates 549443.30E	2613	252 20N			Grid	OSGB			Sne	et 1 of :	1
Hole Type		+10.10110 <i>B</i>	Method/Equipment JCB 3CX	, 2013	333.2011			GIIU	OSGB	1				
Date Started		02/09/2021	Date Completed 02/09/2021				Lo	ogged	By AM					
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta				u Test tails	Install- ation
	fine to co	slightly gravelly sandy CLAY. Sand is fine parse of flint quartz and brick.	to coarse. Gravel angular to			(0.50)			B 1 0.40				1V 00	
calcareous Cl siltstone flint	LAY. Grav	composed of very stiff light greyish brown vel is angular to subrounded fine to coarse artz. Sand is fine to coarse.				0.50	9.60		31 6.16			ŀ	: 0.50 - IV 50	
(WMCK) [WE	ST MELI	BURY CHALK FORMATION]				(1.30)			B 2 1.00				IV - .00	
Structureless	CHALK	composed of very stiff light grey mottled	brown slightly gravelly slightly sandy	Grade Dm		1.80	8.30						-	
siltstone flint	and qua	vel is angular to subrounded fine to coarse artz. Sand is fine to coarse. 3URY CHALK FORMATION]	of extremely weak calcareous			(1.20)			B 3 2.00				-	
	End of	excavation at 3.00m. Termination Reason: A	schieved Scheduled Deoth			3.00 -	7.10		LB 4 3.00				_	
	LING OF	sociation at 0.00m. Termination reason. A									-			
					_							-	-	
														-
						_							_	-
													-	-
						-							_	-
													-	
														-
		0.11				<u> </u>								
Stability Shoring		Stable None					Lon		cavation Dime des A and C)	ensions	and C		on 2.50m	
-noning			ED REMARKS			$\overline{}$		-	des B and D)).60m	
Depth Top Dep			Remarks				Dep	-				3	3.00m	
	0.50 3.00	CBR test undertaken Soakaway test undertaken					Bea	ring a	ong Side A tov	wa d Sid	е В	:	L45°	
									WATER STRIK	ES			WATER STR	RIKES DETA
	DAC			l	Date Ti	me	Depth Sti	rike De _l	pth Sealed	Depth Water	Time Elapse			
Depth Top Dep	pth Base		KFILL Remarks											
	3.00	Arisings												
		DEDTIL DELATED EVELO	RATORY HOLE REMARKS						CEAU	ERAL N	OTES			
Depth Top Dep	pth Base		RATORY HOLE REMARKS Remarks			+				Remarks				
0.000	3.000	No groundwater encountered to base depth in order to achieve scheduled depth		300m	m from 1.0	0m								
AGS	A	 All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.		ılts, se	e accomp	anying re	cords.							
FINAL			: 12/09/2022 13:59	Lo	og checked	by Davi	d Howard				50II	L end	sinee	RING
	NAL Print date and time 12/09/2022 13:59 Log checked										Dort of	the Dook	C-1-+	ha Craun

Project Name	Project Name Cambridge Waste Water Treatment Plant Relocation									H	ole ID	
Project No.	TE8364					Exc	avati	on Log		TP_S	ΓW	004
Engineer	Mott MacDonald Bentley											
Employer	Barhale Limited									Shee	et 1 of	1
Ground Level Hole Type	+10.51mOD TP	Coordinates 549402.80E Method/Equipment JCB 3CX	, 2611	143.90N			Grid	OSGB				
Date Started	27/08/2021	Date Completed 27/08/2021	L			L	ogged	By AM				
	Description of Strata		Weathering	Legend	Depth (Thick-	Datum Level	Waterstrike	Samp			u Test tails	Install- ation
MADE GROUND: D	Dark brown slightly sandy slightly gravelly cl	av with occasional rootlets. Sand sized	×	******	ness)		×			H	IV	9
fragments are fine flint, brick and qua (MGR) [MADE GRO	to coarse. Gravel sized fragments are angul ortz. DUND] gravelly sandy CLAY. Sand is fine to coarse.	ar to subrounded fine to medium of	_		(0.30) 0.30 (0.30) 0.60	9.91		B 1 0.40		O. CBR	0.50 IV	
(SUPD) [SUPERFICI Structureless CHAI CLAY. Sand is fine t			Grade Dm		(1.10)	- - - -		B 2 1.00		н	50 IV - 00	
Structureless CHAI	LK composed of stiff light grey mottled brov	vn slightly gravelly sandy calcareous	5		1.70	8.81						
	to coarse. Gravel is angular to subrounded fi ELBURY CHALK FORMATION]	ne to course of siltstone.	e Dm		(1.30)	- - - -		B 3 2.00			-	
			Grade		(1.30)	- - - -						
End o	of excavation at 3.00m. Termination Reason:	Achieved Scheduled Depth			3.00 -	7.51		LB 4 3.00			-	
			-	-					-			
						-						-
					-						-	
						-						-
					-	- - -					-	
						-						-
Stability	Stable						F	cavation Dime	ensione an	nd Orientatio	on.	
Shoring	None					Ler		des A and C)			.50m	
		TED REMARKS				Ler	igth (Si	des B and D)		C).60m	
Depth Top Depth Ba 0.50 0.50	CBR test undertaken	Remarks				De		C:- - A +	1 6:1- 1		3.00m	
1.00 1.00	HV unsuitable too stiff					Вег		ong Side A tov			.70°	
				Date Tir	WATER STRIK ne		,		Time Elapse			
Depth Top Depth Ba	*	CKFILL Remarks										
0.00 3.00	Arisings	Remains										
	DEPTH RELATED EXPLO	PRATORY HOLE REMARKS						GENI	ERAL NOT	ES		
	Depth Top Depth Base Remarks 0.000 3.000 1. No groundwater encountered to base of excavation. 2. Bucket width reduced to 300mm fron								Remarks			
0.000 3.000	depth in order to achieve scheduled dep	III IIOIII 1.3	om									
AGS Notes	Notes: All depth in metres, all soil strengths are average in kPa. For in situ test results, see accomp All bearings given relate to magnetic North. For details of abbreviations, see key.											
FINAL					d by Davi	d Howard				oir euc		
Form No. SIFXPHOLE	Print date and time 12/09/2022 13:59 Log checked SIEXPHOLETPLOG Issue Revision No. 2.05 Issue Date 04/01/2019								Par	rt of the Bach	v Soletano	he Group

Project Name	lame Cambridge Waste Water Treatment Plant Relocation										Hole ID	
Project No.	TE8364					Exc	avati	on Log		TP	STW_	005
Engineer	Mott MacDonald Bentley											
Employer	Barhale Limited	C	2011	22.201			6 : 1	0000		Sh	eet 1 of	1
Ground Level Hole Type	+9.35mOD TP	Coordinates 549540.90E, Method/Equipment JCB 3CX	, 2611	.23.20N			Grid	OSGB				
Date Started	03/09/2021	Date Completed 03/09/2021				Lo	ogged	By AM				
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det			Situ Test Details	Install- ation
	able dark brown slightly gravelly sandy cla coarse. Gravel sized fragments are angula				(0.30)	-					HV 0.00	
flint, quartz and brick (MGR) [MADE GROUI Structureless CHALK is fine to coarse. Gravalltstone. (WMCK) [WEST MELI	C .	n sandy gravelly calcareous CLAY. Sand of flint, quartz and calcareous	Grade Dm		(1.20)	9.05		B 1 0.50			BR 0.50 BR 0.50 HV 0.50 HV	
calcareous CLAY with to course of calcareo	composed of very stiff light grey mottled I low cobble content. Sand is fine to coarse us siltstone. Cobbles are subrounded of ca BURY CHALK FORMATION]	e. Gravel is angular to subrounded fine	Grade Dm		1.50	7.85		B 3 2.00			-	
End of o	excavation at 3.00m. Termination Reason: A		3.00 -	6.35		LB 4 3.00			-			
				-						-		
Stability	Stable		•	•		•		cavation Dim	ensions a	and Orienta		•
Depth Top Depth Base 0.50 0.50		ED REMARKS Remarks				Len Dep	gth (Si oth ring al	des A and C) des B and D) ong Side A tov		e B	2.50m 0.60m 3.00m 10°	
					F	[Date Tir	WATER STRIK ne		ke Depth Sea	WATER STE ed Depth Wate	RIKES DETAI
							1		<u> </u>			
Depth Top Depth Base 0.00 3.00												
		RATORY HOLE REMARKS						GEN	ERAL NO	TES		
Depth Top Depth Base Remarks Remarks 1. No groundwater encountered to base of excavation. 2. Bucket width reduced to 300mm from 1.40 depth in order to achieve scheduled depth.									Remarks			
AGS FINAL	, ,								s	oir et	Ginee	RING

Project Name	roject Name Cambridge Waste Water Treatment Plant Relocation									Н	lole ID	
Project No.	TE8364					Exc	avati	on Log		TP_S	TW_0	006
Engineer	Mott MacDonald Bentley									CI	. 4 . 6.	1
Employer Ground Level	Barhale Limited +9.38mOD	Coordinates 549502.80E	2612	57.30N			Grid	OSGB		She	et 1 of	1
Hole Type	TP	Method/Equipment JCB 3CX	,									
Date Started	31/08/2021	Date Completed 31/08/2021				Lo	ogged	By AM				
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det			tu Test etails	Install- ation
	vn slightly gravelly sandy CLAY. Sand is fine to coarse of flint and quartz.	coarse. Gravel is angular to			(0.30) 0.30	9.08					HV 0.00	
Stiff brown slightly medium of flint and (SUPD) [SUPERFICIA					(0.40) - 0.70	8.68		B 1 0.50		1	R 0.50 · HV 0.50	
CLAY. Sand is fine to siltstone and quarta	coarse. Gravel is angular to subrounded fine t		Grade Dm		(1.00)	-		B 2 1.00			HV - 00	
	K composed of very stiff light grey mottled bro th low cobble content. Sand is fine to coarse. C				1.70	- - - 7.68						
to course of calcare	crition countries. Saile is line to coarse. Crous siltstone. Cobbles are subrounded of calca		Grade Dm		(1.30)	- - - -		B 3 2.00			-	
			Grad		-	- - - -					-	
End o	f excavation at 3.00m. Termination Reason: Ach		<u>' , </u>	3.00 -	6.38		LB 4 3.00			-		
				-						-		
				-	-					-	-	
					-						-	
												-
					-	- - - -					•	-
					-	-					-	
					-	- - -					-	-
Stability Shoring	Stable None					Len		cavation Dimo des A and C)	ensions ar		on 2.50m	
	DEPTH RELATE	D REMARKS					• •	des B and D)		(0.60m	
Depth Top Depth Bar 0.50 0.50	CBR test undertaken	Remarks				De _l Bea		ong Side A tov	va d Side		3.00m 105°	
							Date Tir	WATER STRIK		e Depth Sealed		Time Elapse
	BACKF											
Depth Top Depth Bar 0.00 3.00	se Description Arisings	Remarks										
	DEPTH RELATED EXPLORA	TORY HOLE REMARKS			+			GEN	ERAL NOT	ES		
	Depth Top Depth Base Remarks 0.000 3.000 1. No groundwater encountered to base of excavation. 2. Bucket width reduced to 450mm fro								Remarks			
0.000 3.000	depth in order to achieve scheduled depth.	m from 1.5	JM									
AGS Notes	: All depth in metres, all soil strengths are All bearings given relate to magnetic Nor For details of abbreviations, see key.		ılts, se	e accomp	anying red	cords.						
FINAL	Print date and time 12/09/2022 13:59 Log check					d Howard				oir eu		
Form No SIEXPHOLE	· · · · · · · · · · · · · · · · · · ·								Pai	rt of the Bach	ny Soletano	he Group

Project Name	roject Name Cambridge Waste Water Treatment Plant Relocation									Н	ole ID	
Project No.							avati	on Log		TP_S1	ΓW_(007
Engineer	Mott MacDonald Bentley											
Employer Ground Level	Barhale Limited +9.14mOD	Coordinates 549646.00E	2612	216 OON			Grid	OSGB		Shee	t 1 of	L
Hole Type	+9:14(110D)	Method/Equipment JCB 3CX	, 2013	10.5011			GHU	OSGB				
Date Started	31/08/2021	Date Completed 31/08/2021	L			Lo	ogged	By AM				
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta		In Situ Det		Install- ation
	wn slightly gravelly sandy CLAY. Sand is fine medium of flint and quartzite.	to coarse. Gravel is angular to			(0.30)	- 8.84	_	ES 1 0.20		H 0.0		
	gravelly CLAY. Sand is fine to coarse. Gravel is	angular to subrounded fine to coarse				1		B 2 0.50		CBR		
(SUPD) [SUPERFICI					(0.80)	-		ES 3 0.50 B 4 1.00		0.5 H	50	
	ly fine to coarse calcareous SAND with low of				1.10	8.04		ES 5 1.00		1.0		
low density calcare		ar to subrounded of extremely weak			(0.80)	-		B 6 1.50				
(SUPD) [SUPERFICI	AL DEPOSITS]				(0.80)			ES 7 1.50			-	
Structureless CHAL	LK composed of light grey mottled brown sli	ahtly sandy slightly gravelly calcareous			1.90	7.24		B 8 2.00				
CLAY. Sand is fine to	o coarse. Gravel is angular to subrounded fir ELBURY CHALK FORMATION]		_					B 8 2.00				
, ,,	,		Grade Dm		(1.10)							
			Grac									
					3.00 -	6.14		LB 9 3.00				
End o	of excavation at 3.00m. Termination Reason: A	chieved Scheduled Depth			3.00 -	0.14		LB 9 3.00			_	
					-						-	
Stability	Stable							cavation Dime	nsions and			
Shoring	None	ED REMARKS					• •	des A and C) des B and D)			.50m .60m	
Depth Top Depth Ba		Remarks				Der	-	des Balld D)			.00m	
0.00 0.00 0.50 0.50	HV unsuitable too friable CBR test undertaken							ong Side A tow	a d Side E	3 1	10°	
1.00 1.00	HV unsuitable too gravelly							WATER STRIKE	S	ľ	NATER STR	IKES DETAI
BACKFILL						ļ	Date Ti	ne	Depth Strike	Depth Sealed	Depth Water	Time Elapse
Depth Top Depth Ba		Remarks										
0.00 3.00	Arisings											
Donth Ton Donth Bo		RATORY HOLE REMARKS Remarks							RAL NOTI	ES		
Depth Top Depth Ba 0.000 3.000		of excavation. 2. Bucket width reduced to	300m	m from 1.2	0m			r	emarks			
	s: All depth in metres, all soil strengths a All bearings given relate to magnetic N		ılts, se	e accomp	anying re	cords.						
AGS	For details of abbreviations, see key.											0:00
FINAL	Print date and time 12/09/2022 13:59 Log checke									of the Bachy		

Project Na	ect Name Cambridge Waste Water Treatment Plant Relocation									Н	ole ID	
Project No).	TE8364				Exc	avati	on Log		TP_S	TW_(010
Engineer Employer		Mott MacDonald Bentley Barhale Limited								Sho	et 1 of :	1
Ground Level	I	+10.06mOD Coordinates 549495.10l	2610	033.30N			Grid	OSGB		3116	50 1 01	1
Hole Type		TP Method/Equipment JCB 3CX										
Date Started		01/09/2021 Date Completed 01/09/202	1		1	L	ogged	By AM		_		
		Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sampli Detail			u Test tails	Install- ation
Gravel is ang	gular to s DIL]	n slightly gravelly sandy CLAY with occasional rootlets. Sand is fine to coarse. Subrounded fine to coarse of flint and quartzite.			(0.30)	9.76					HV .00	
medium of fli (SUPD) [SUPE	lint and o		_		(0.40) 0.70	9.36		B 1 0.50		H	1 0.50 - HV .50	
CLAY. Gravel i calcareous si	is angul iltstone.	ar to subrounded fine to coarse of flint, quartzite and extremely weak low density			-			B 2 1.00			HV -	
			Grade Dm		(1.70)			B 3 2.00			-	
CLAY with lov	w cobble	composed of very stiff light grey mottled brown slightly sandy slightly gravelly e content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse w density calcareous siltstone. (Grade Dm)			2.40	7.66						
	ST MEL	excavation at 3.00m. Termination Reason: Achieved Scheduled Depth			3.00 -	7.06		LB 4 3.00			-	
						1						1
									_			
												-
											-	
					-						-	
						-						
											-	
						1						
Stability		Stable					F,	cavation Dimer	sions and	Orientatio		
Shoring		None				Ler		des A and C)	and		2.50m	
		DEPTH RELATED REMARKS				Ler	igth (S	des B and D)		(0.60m	
Depth Top Dep	pth Base 0.00	Remarks HV unsuitable too friable				De					3.00m	
	0.50 1.00	CBR test undertaken HV unsuitable too gravelly				Bea	ring a	ong Side A towa	d Side B	-	12°	
		alcalazo do grator,					Date Ti	WATER STRIKES		Depth Sealed	WATER STR	
		BACKFILL					Julio III		spen demo E	opan ocurou	 	
Depth Top Dep 0.00	pth Base 3.00	Description Remarks Arisings										
		DEPTH RELATED EXPLORATORY HOLE REMARKS						GENEF	RAL NOTE	S		
Depth Top Dep								Re	emarks			
0.000	3.000	No groundwater encountered to base of excavation. 2. Bucket width reduced to depth in order to achieve scheduled depth.	300m	im from 1.5	0m							
AGS		 All depth in metres, all soil strengths are average in kPa. For in situ test resi All bearings given relate to magnetic North. For details of abbreviations, see key	ults, se	e accomp	anying re	cords.						
FINAL	Tor details or abbreviations, see key.					id Howard			so	ıL end	sinee	RING
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Project Nar	me	Cambridge Waste Water Trea								Hole I)		
Project No.		TE8364					Exc	avati	on Log		TP	_STW_	011
Engineer		Mott MacDonald Bentley											
Employer		Barhale Limited										Sheet 1 c	f 1
Ground Level Hole Type		+8.93mOD TP	Coordinates 549642.50E Method/Equipment JCB 3CX	., 2611	120.50N			Grid	OSGB	5			
Date Started		01/09/2021	Date Completed 01/09/2021	L			L	.ogged	By AM				
		Description of Strata		Weathering	Legend	Depth (Thick- ness)		Waterstrike	Samp Deta			In Situ Test Details	Install- ation
		k brown slightly gravelly sandy clay. Sand ts are angular to subrounded fine to coars				(0.30)						HV 0.00	
(MGR) [MADE	GROUI			1	*****	0.30	8.63		D1 050				
(SUPD) [SUPE	RFICIAL			-		0.60	8.33		B 1 0.50			CBR 0.50	
CLAY. Sand is	fine to c	coarse. Gravel is angular to subrounded fir density calcareous siltstone. (Grade Dm)				1			B 2 1.00			0.50 HV	
		BURY CHALK FORMATION]				1]		В 2 1.00			1.00	
						# #	1						
				m D		(1.90)	1						
				Grade [1]		B 3 2.00				
							1		2 0 2.00				
						2.50	6.43						
calcareous CL	AY. Sand	composed of very stiff light grey mottled d is fine to coarse. Gravel is angular to sub	rounded fine to coarse of extremely			(0.50)	1						
(WMCK) [WES	ST MELE	w density calcareous siltstone. (Grade Dm BURY CHALK FORMATION]				3.00	5.93		LB 4 3.00				
	End of e	excavation at 3.00m. Termination Reason: A			1						-		
					1						-		
							1						1
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							1						1
]]
							1						
							1						1
							1						
]						1
							1						
							3						1
							1						
]]
							1						-
							1						-
						<u> </u>							
Stability		Stable							xcavation Dime	ensions a	and Orie		
Shoring		None DEPTH RELAT	TED REMARKS						ides A and C) ides B and D)			2.60m 0.60m	
Depth Top Dep			Remarks					pth				3.00m	
	0.50 1.00	CBR test undertaken. HV unsuitable too s HV unsuitable too stiff	stiff and gravelly				Ве	aring a	long Side A tov	wa d Side	е В	75°	
									WATER STRIK	ES		WATER	STRIKES DETAI
	BACKFILL								me	Depth Str	ike Depth S	Sealed Depth W	ater Time Elapse
Depth Top Dep	oth Base		KFILL Remarks										
	3.00	Arisings											
Depth Top Dep	oth Base		RATORY HOLE REMARKS Remarks							ERAL NO Remarks			
0.000 3	0.000 3.000 1. No groundwater encountered to base of excavation. 2. Bucket width reduced to 300mm from 1.50r depth in order to achieve scheduled depth.												
		All depth in metres, all soil strengths a		ılts, se	e accom	panying re	ecords.						
AGS		All bearings given relate to magnetic N For details of abbreviations, see key.	NOTUT.										
FINAL	, ,					d by Dav	vid Howard	<u>t</u>		s	OIL 6	engine	ering
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Project N	lame	Cambridge Waste Water Treat	ment Plant Relocation								H	lole ID	
Project N		TE8364					Exc	avati	on Log		TP_S	TW_	012
Engineer Employe		Mott MacDonald Bentley Barhale Limited									Sho	et 1 of	1
Ground Lev		+8.12mOD	Coordinates 549707.60E	, 2611	.85.50N			Grid	OSGB		3116	etioi	1
Hole Type		TP	Method/Equipment JCB 3CX										
Date Starte	ed	03/09/2021	Date Completed 03/09/2021		1		L	ogged	By AM				
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta		1	tu Test etails	Install- ation
coarse. Gra (TOP) [TOP	avel is ang 'SOIL]	n slightly sandy slightly gravelly CLAY with I ular to subrounded fine to coarse of flint an	d quartzite.			(0.30)	7.82					HV 0.00	
		andy slightly gravelly CLAY. Sand is fine to c oarse of flint and quartzite.	oarse. Gravel is angular to			(0.30) 0.60	7.52		B 1 0.50		1	R 0.50 HV	
		DEPOSITS] SAND and angular to subrounded fine to co	parse GRAVEL of flint and quartzite.	1		(0.40)	1		B 2 0.80		1	.50	
(SUPD) [SU Structurele calcareous	IPERFICIA ess CHALK CLAY. Sar	L DEPOSITS] Composed of very stiff light grey mottled be distincted by distinct to coarse. Gravel is angular to subrow density calcareous siltstone. (Grade Dm)	rown slightly sandy slightly gravelly ounded fine to coarse of extremely			1.00 -	7.12		B 3 1.20		1	HV - 00	
(WMCK) [\	WEST MEL	BURY CHALK FORMATION]					-						
				Grade Dm		(2.00) -	- - - - - -		B 4 2.00			-	
	us siltstone	n low cobble content. Cobbles are subrounded of e	, , ,			3.00 -	5.12		LB 5 3.00				
	End of	excavation at 3.00m. Termination Reason: Ad	chieved Scheduled Depth						22 0 0.00				-
]						
							-						-
						_						-	
							-						-
							1]
													-
						_	_					_	_
							-						-
							1						-
						-]]
							-						-
						-						•	
													-
Stability		Stable		•	•		•		cavation Dime	nsions and			•
Shoring		None						• .	des A and C)			2.50m	
Depth Top I	Depth Bas	DEPTH RELAT	ED REMARKS Remarks				Ler De _l		des B and D)			0.60m 3.00m	
0.50 1.00	0.50 1.00	CBR test undertaken HV unsuitable too stiff							ong Side A tow	a d Side E		165°	
		Try unsultable too still							WATER STRIKE			MATER ST	RIKES DETAI
								Date Ti			Depth Sealed		
		BACK											
Depth Top I 0.00	3.00	e Description Arisings	Remarks										
		DEPTH RELATED EXPLOR	ATORY HOLE REMARKS						GENE	RAL NOTE	ES .		
Depth Top I			Remarks						F	Remarks			
0.000	3.000	No groundwater encountered to base o depth in order to achieve scheduled depth		300m	m from 1.3	om							
AGS		 All depth in metres, all soil strengths ar All bearings given relate to magnetic N For details of abbreviations, see key.		ılts, se	e accomp	anying re	cords.						
			12/00/2022 12:50		o charle	4 by D-: .	d Uass			Sc	oir en	GINE	RING
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Project N	lame	Cambridge Waste Water Treat	tment Plant Relocation									Hole ID	
Project N	Jo	TE8364					Exc	avati	on Log		TP	STW_	013
Engineer		Mott MacDonald Bentley											
Employe Ground Le		Barhale Limited +7.09mOD	C	2012	70.001			C4	000		Sł	neet 1 of	1
Hole Type	vei	TP	Coordinates 549814.50E Method/Equipment JCB 3CX	, 2612	278.00IN			Grid	OSGB				
Date Starte	ed	06/09/2021	Date Completed 06/09/2021				Lo	ogged	By AL				
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det			Situ Test Details	Install- ation
TOPSOIL: I subrounde (TOP) [TOP	ed of flint.	htly clayey slightly gravelly fine to medium	SAND. Gravel is subangular to			(0.40)	-		B 1 0.10-0	.40		HV 0.00	
orangish fi	ine sand. (0	composed of firm light grey calcareous Cl Grade Dm) BURY CHALK FORMATION]	AY with pockets (10mm x 20mm) of			0.40	6.69		B 2 0.50-1	.00	C	BR 0.50 HV 0.50	
						(1.10)	<u>-</u>					HV -	
		composed of firm light grey calcareous Cl BURY CHALK FORMATION]	LAY. (Grade Dm)	Grade Dm		1.50	5.59		B 3 1.50-2	.00			
(winciy [i	WEST WILE	Dant Charlet Grant Interpretation		Grad			-		B 4 2.00-2	.50		-	
						(1.50)							
	End of	excavation at 3.00m. Termination Reason: A	schieved Scheduled Depth			3.00 -	4.09		LB 5 2.80-	3.00		-	
			, i										
													-
						-						-	
													- - -
						-	1					=	
							-						-
							1					-	
							-						-
													-
Stability		Stable				<u> </u>		Fy	cavation Dim	ensions :	and Orienta	ation	
Shoring		None					Len		des A and C)	:= *		2.50m	
			TED REMARKS				Len	gth (Si	des B and D)			0.60m	
Depth Top	0.50	CBR test undertaken	Remarks				De _l Rea		ong Side A tov	wa d Side	∍ R	3.00m 0°	
2.50	2.50	Very slow seepage encountered from side	es A and C						WATER STRIK				RIKES DETAI
		DAC	KFILL				I	Date Tir	ne	Depth Stri	ike Depth Sea	led Depth Wate	Time Elapse
Depth Top	Depth Base		RFILL Remarks										
0.00	3.00	Arisings											
		DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL NO	OTES		
Depth Top 0.000	pth Top Depth Base Remarks 0.000 3.000 1. Bucket width reduced to 300mm from 1.20m to achieve scheduled depti									Remarks			
	-												
AGS		All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.		ılts, se	e accomp	anying re	cords.						
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Project Name	Cambridge Waste Water Treatme	ent Plant Relocation								Н	ole ID	
Project No.	TE8364					Exc	avati	on Log		TP_S	TW_0	014
Engineer	Mott MacDonald Bentley									CI.	. 4 . 6.	
Employer Ground Level	Barhale Limited +10.62mOD	Coordinates 549541.96E	2608	R66 17N			Grid	OSGB		She	et 1 of	1
Hole Type		Method/Equipment JCB 3CX	, 2000	300.1714			ana	0300				
Date Started	07/09/2021	Date Completed 07/09/2021				Lo	ogged	By AM				
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta			tu Test tails	Install- ation
Stiff dark brown sl fine to coarse of fli (SUPD) [SUPERFIC		Gravel is angular to subrounded			(0.30)	10.32		ES 1 0.30			HV .00	
Stiff brown slightly quartzite.	gravelly sandy CLAY. Gravel is angular to subrou	nded fine to coarse of flint and			(0.70)	-		B 2 0.50			R 0.50	
(SUPD) [SUPERFIC	IAL DEPOSITS]				(0.70)	-		ES 3 0.80			.50	
Structureless CHA	LK composed of very stiff light greyish brown sli	ghtly gravelly sandy calcareous			1.00 -	9.62					-1V -	
	to coarse. Gravel is angular to subrounded fine to siltstone. (Grade Dm)	medium of extremely weak low						B 5 1.20 ES 4 1.20			.00	
	ELBURY CHALK FORMATION] 5m lens of brown fine to coarse sand				(1.10)	1						
from 1.70m to 2.0	Om lens of brown fine to coarse sand		Ε		1	-						
			Grade Dm		2.10	8.52		B 6 2.00			-	
	LK composed of very stiff light grey mottled brow and is fine to coarse. Gravel is angular to subrou		Gre		2.10	0.52						
	calcareous siltstone. (Grade Dm) ELBURY CHALK FORMATION]				(0.90)						-	
	•]						
End	of excavation at 3.00m. Termination Reason: Achie	eved Scheduled Denth			3.00 -	7.62		LB 7 3.00			-	
	5, 5,654 au 6,764 au 6,764 au 6,764 au 6,764 au 6,764 au 6,764 au 6,764 au 6,764 au 6,764 au 6,764 au 6,764 au	Tod Concadioa Bopan				1						1
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						-						-
						1]
						1						-
Carletta.	Carlota							Discontinua Discontinua		d O.::		
Stability Shoring	Stable None					Len		cavation Dime des A and C)	ะแรเบเเร สก		on 2.50m	
	DEPTH RELATED	REMARKS					• •	des B and D)			0.60m	
Depth Top Depth B	CBR test undertaken	Remarks				Dep	oth				3.00m	
1.00 1.00	HV unsuitable too stiff					Bea	ring al	ong Side A tov	va d Side E	3 1	163°	
								WATER STRIK	ES		WATER STE	RIKES DETAI
	BACKFI					l	Date Tii	me	Depth Strike	Depth Sealed	Depth Water	Time Elapse
Depth Top Depth B		Remarks										
0.00 3.00	Arisings											
	DEPTH RELATED EXPLORAT								ERAL NOT	ES		•
0.000 Depth B		Remarks ccavation. 2. Bucket width reduced to	300m	ım from 1.2	0m				Remarks			
	depth then extended using 600mm bucket.											
Note:	 s: All depth in metres, all soil strengths are a	verage in kPa. For in situ test resu	ılts, se	e accomp	anying re	cords.						
AGS	All bearings given relate to magnetic Nort For details of abbreviations, see key.											
		2/00/2022 12:50	-	o cha-l··	d by D-: '	d Uarres '			sc	oil end	SINE	RING
FINAL Form No. SIEXPHOLI	Print date and time 12			og checked	a by Davi	u Howard				t of the Bach		

Project Nam	e Cambridge Was	te Water Treat	tment Plant Relocation								H	Hole ID	
Project No.	TE8364						Exc	avati	on Log		TP_S	STW_0	015
Engineer Employer	Mott MacDona Barhale Limited	d Bentley									She	eet 1 of	1
Ground Level	+10.08mOD		Coordinates 549663.10E	, 2609	980.10N			Grid	OSGB		3116	201 101	1
Hole Type	TP		Method/Equipment JCB 3CX										
Date Started	07/09/2021		Date Completed 07/09/2022	1	1	1	Lo	ogged	By AM				1
	Des	cription of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Deta		I	itu Test etails	Install- ation
	to coarse of flint and quart		l is fine to coarse. Gravel is angular to			(0.30)	9.78					HV 0.00	
subrounded fine (SUPD) [SUPERF	tly sandy slightly gravelly C to coarse of flint and quart ICIAL DEPOSITS]	zite.				(0.40) 0.70	9.38		B 1 0.50			R 0.50 - HV 0.50	
CLAY. Sand is fir (Grade Dm)		r to subrounded fir	n slightly gravelly sandy calcareous ne to coarse of flint and quartzite.			(1.10)	<u>-</u> - -		B 2 1.00		I	HV - 1.00	
from 1.40m to	1.60m 1 No. thin bed of brown g	ravelly fine to coarse s	and	E									
calcareous CLA\ weak to very we		el is angular to sub iltstone. (Grade Dm	brown slightly sandy slightly gravelly rounded fine to coarse of extremely)	Grade Dm		1.80	8.28		B 3 2.00			-	
low density ca	careous siltstone	-	ounded of extremely weak to very weak			3.00 -	- - - - - 7.08		LB 4 3.00				
Eı	nd of excavation at 3.00m. Te	rmination Reason: A	chieved Scheduled Depth			3.00	1		25 1 3.00				-
							-						-
						-	-					-	-
							-						
						-						-	
							-						
							- - - -						1
						-	-					-	-
							1					-	
							-						
Stability	Stable								cavation Dime	ensions ar			
Shoring	None	DEDTH DELAT	ED REMARKS					• •	des A and C) des B and D)			2.60m 0.60m	
Depth Top Depth		DEFTITICEA	Remarks				Dep	-	des b'and bj			3.00m	
0.50 0.5 1.00 1.0		f							ong Side A tov	va d Side	В	85°	
									WATER STRIK				RIKES DETAI
		BAC	KFILL					Date Tir	ne	Depth Strik	e Depth Seale	d Depth Water	Time Elapse
Depth Top Depth			Remarks										
0.00 3.0	00 Arisings												
	DEDTH	DEI ATEN EVDIN	RATORY HOLE REMARKS						GENI	ERAL NO	LEC		
Depth Top Depth		KEEKIEB EKI EG	Remarks							Remarks			
0.000 3.0	1. No groundwater en depth then extended		of excavation. 2. Bucket width reduced to et.	300m	m from 1.2	0m							
AGS No	tes: All depth in metres, a All bearings given rel For details of abbrevi	ate to magnetic N	re average in kPa. For in situ test resu Jorth.	ults, se	e accomp	anying re	cords.						
FINAL			2 12/09/2022 13:59	In	g checked	d by Davi	d Howard			S	oır en	Ginee	RING
Form No. SIFXPHO		Issue Revision				-, 500				Pa	rt of the Bac	hy Soletano	he Group

Project Na	ame	Cambridge Waste Water Treat	ment Plant Relocation									Hole ID)
Project No	0	TE8364					Exc	avati	on Log		TP	_STW_	016
Engineer		Mott MacDonald Bentley											
Employer		Barhale Limited	C	2010	200.001			6 : 1	0000		5	Sheet 1 o	f 1
Ground Leve Hole Type	el	+8.50mOD TP	Coordinates 549801.90E Method/Equipment JCB 3CX	, 2610	086.00N			Grid	OSGB				
Date Started	ł	08/09/2021	Date Completed 08/09/2021	L			L	ogged	By AM				
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det		li	n Situ Test Details	Install- ation
		n slightly sandy slightly gravelly CLAY. Sand nedium of flint and quartzite.	l is fine to coarse. Gravel is angular to			(0.30)						HV 0.00	
(TOP) [TOPS	OIL] slightly g flint and o	ravelly sandy CLAY. Sand is fine to coarse. Q quartzite.	Gravel is angular to subrounded fine to			(0.70)	8.20		B1 0.50			CBR 0.50 HV 0.50	
Brown sligh quartzite. (SUPD) [SUP		lly fine to coarse SAND. Gravel is angular to	o subrounded fine to coarse of flint and	-		1.00 - (0.40)	7.50		B 2 1.10			HV 1.00	
Structureles CLAY. Sand i	ss CHALK is fine to o	composed of very stiff light grey mottled l coarse. Gravel is angular to subrounded fin BURY CHALK FORMATION]				1.40	7.10						
from 2.00i	m to 3.10m	n low cobble content. Cobbles are subangular to s	subrounded of siltstone			(1.70)			B 3 2.00				
	End of	excavation at 3.10m. Termination Reason: A	chieved Scheduled Depth			3.10	- 5.40		LB 4 3.00				
						-							
0. 1.00		0.11							5:				
Stability Shoring Depth Top De 0.50 2.90	epth Base 0.50 2.90		TED REMARKS Remarks				Ler De _l	igth (Si igth (Si oth	ccavation Dimo des A and C) des B and D) ong Side A tov			2.50m 0.60m 3.10m 8°	
									WATER STRIK		. le :		STRIKES DETAIL
		BAC	KFILL			-+		Date Tir	ne	Depth Stri	ike Depth Se	aled Depth Wa	iter Time Elapse
Depth Top De	epth Base		Remarks										
0.00	3.10	Arisings											
		DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL NO	OTES		
Depth Top De 0.000	th Top Depth Base Remarks .000 3.100 1. Bucket width reduced to 300mm from 1.00m depth in order to achieve s					+				Remarks			
			·										
AGS	,	All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.	Jorth.								:O!! C		POLICE
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Project Name	Cambridge Waste Water Trea	ment Plant Relocation								H	łole ID	
Project No.	TE8364					Exc	avati	on Log		TP_S	TW_(017
Engineer	Mott MacDonald Bentley									CI	. 1 (1
Employer Ground Level	Barhale Limited +7.38mOD	Coordinates 549943.81	7611	114 30N			Grid	OSGE	1	Sne	et 1 of	1
Hole Type	TP	Method/Equipment JCB 3CX	_,				unu	5542				
Date Started	10/09/2021	Date Completed 10/09/2022	1	_		L	ogged	By AM				
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sam Det			tu Test etails	Install- ation
	phtly sandy slightly gravelly CLAY. Sand is fir medium of flint and quartzite. ALDEPOSITSI	e to coarse. Gravel is angular to			(0.30)	7.08					HV 0.00	
Stiff brown slightly coarse of flint and coarse (SUPD) [SUPERFICE	gravelly sandy CLAY. Sand is fine to coarse. (quartzite.	,	_		(0.30) 0.60	6.78		B 1 0.50			R 0.50 HV).50	
calcareous CLAY. Sa (Grade Dm)	ind is fine to coarse. Gravel is angular to sub		Grade Dm		(1.30)	-		B 2 1.00			HV =	
Gravel is angular to	K composed of light greyish brown gravelly subrounded fine to medium of flint and qu LBURY CHALK FORMATION]		Grade Dc		1.90	5.48		B 3 2.00			-	
fine to coarse. Grav	K composed of firm grey slightly sandy slig el is angular to subrounded fine to coarse o		Grade Gra		2.60 (0.40)	4.78					-	
	EBURY CHALK FORMATION] If excavation at 3.00m. Termination Reason: A	chieved Scheduled Depth	0		3.00 -	4.38		LB 4 3.00			-	
					-						- -	
Stability	Stable			•		•		cavation Dim	ensions ar			•
Shoring	None	ED REMARKS					• •	des A and C) des B and D)			2.60m 0.60m	
Depth Top Depth Ba		Remarks				Dei	-	des b'and b)			3.00m	
0.50 0.50 1.00 1.00	CBR test undertaken HV unsuitable too stiff					Bea	aring al	ong Side A to	wa d Side	В	64°	
					H			WATER STRIK	ŒS		WATER STE	RIKES DETAI
							Date Tii 09/2021		Depth Strike	Depth Sealed	Depth Water	Time Elapse
Depth Top Depth Ba		KFILL Remarks				10/0	19/2021	1 15.00	2.50			
0.00 3.00	Arisings	Kemuna										
	DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL NOT	ES		
Depth Top Depth Ba	se	Remarks							Remarks			
0.000 3.000	600mm bucket used from ground level to	b base of excavation.										
AGS	All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.	Jorth.								oir eu		anno c
FINAL Form No. SIEXPHOLE		No. 2.05 Issue Date 04		og checked	by Davi	d Howard				rt of the Back		

Project Name	Cambridge Waste Water Treatment Plant Relocation								Hole II)
Project No.	TE8364				Exc	avati	on Log		TP_STW	_018
Engineer	Mott MacDonald Bentley								Cl 11	(1
Employer Ground Level	### Barhale Limited ### 10.47mOD Coordinates 549669.10	 F 2607	779 50N			Grid	OSGB		Sheet 1	DT 1
Hole Type	TP Method/Equipment JCB 3CX	_, 2001	73.5014			ana	ОЗОВ			
Date Started	09/09/2021 Date Completed 09/09/202	1			Lo	ogged	By AM			
	Description of Strata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samplin Details		In Situ Test Details	Install- ation
	wn slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to igular to subrounded fine to coarse of flint and quartzite.			(0.30)	10.17		ES 1 0.20		HV 0.00	
Stiff brown slightly coarse of flint and o (SUPD) [SUPERFICE				(0.60)			B 2 0.50 ES 3 0.50		CBR 0.50 HV 0.50	
is fine to coarse. Gr	.K composed of very stiff light greyish brown sandy gravelly calcareous CLAY. Sand avel is angular to subrounded fine to coarse of flint, quartzite and siltstone. **ELBURY CHALK FORMATION** **ELBURY CHALK FORMATION** **Total Country Chalk FORMATION** **Total Country Chalk FORMATION** **Total Chalk FORMATION** *			0.90	9.57		B 4 1.00 ES 5 1.00 ES 6 1.50		HV 1.00	
from 2.00m to 2.50	Om lens of brown fine to coarse sand	Grade Dm		(1.60)			B 7 2.00			
calcareous CLAY. Sa (WMCK) [WEST ME	K composed of very stiff light grey mottled brown slightly sandy slightly gravelly and is fine to coarse. Gravel is angular to subrounded fine to coarse of siltstone. ELBURY CHALK FORMATION] of excavation at 3.00m. Termination Reason: Achieved Scheduled Depth			(0.50)	7.97 - - - - 7.47		LB 8 3.00			
				-	-					
Stability	Stable				1	E>	cavation Dimens	ions and	l Orientation	
Shoring	None					• .	des A and C)		2.50m	
Depth Top Depth Ba	DEPTH RELATED REMARKS se Remarks				Len Der		des B and D)		0.60m 3.00m	
0.50 0.50 1.00 1.00	CBR test undertaken HV unsuitable too stiff						ong Side A towa	d Side B	100°	
	distribute as sain			\vdash			WATER STRIKES		WATER	STRIKES DETAI
					ļ	Date Tir		oth Strike D		later Time Elapse
Depth Top Depth Ba	BACKFILL se Description Remarks									
0.00 3.00	Arisings Remarks									
	DEPTH RELATED EXPLORATORY HOLE REMARKS	—		-			GENERA	AL NOTE	s	
Depth Top Depth Ba	se Remarks							narks		
0.000 3.000	 No groundwater encountered to base of excavation. Bucket width reduced t depth in order to achieve scheduled depth. 	o 300m	m from 0.90	0m						
AGS	: All depth in metres, all soil strengths are average in kPa. For in situ test res All bearings given relate to magnetic North. For details of abbreviations, see key.							60	IL engine	APPINC.
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Project Na	ame	Cambridge Waste Water Treat	tment Plant Relocation									Н	ole ID	
Project No	1	TE8364					Exc	avati	on Log		TF	ρς	ΓW_(719
Engineer		Mott MacDonald Bentley									• • •			
Employer		Barhale Limited	6 1 5 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6		75.501			0:1	0000			Shee	et 1 of 1	1
Ground Leve Hole Type	el	+9.47mOD TP	Coordinates 549787.50E Method/Equipment JCB 3CX	:, 2608	375.50N			Grid	OSGB					
Date Started		10/09/2021	Date Completed 10/09/2021	L			L	ogged	By AM					
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det			In Situ Det	u Test tails	Install- ation
		ntly gravelly sandy CLAY. Sand is fine to coa	arse. Gravel is angular to subrounded	>			-	>				H 0.0	IV	
(TOP) [TOPSO		and quartzite. Occasional rootiets.				(0.60)]		B 1 0.40					
		composed of light greyish brown slightly				0.60	8.87						0.50 - IV	
		llar to subrounded fine to medium of flint a BURY CHALK FORMATION]	and quartzite. (Grade Dm)			1	_		B 2 1.00				50 IV -	
						(0.90)			B 2 1.00			1.0		
						1.50	7.97							
calcareous C		composed of very stiff light grey mottled d is fine to coarse. Gravel is angular to sub		Б		1.30	1.51							
(Grade Dm) (WMCK) [WE	EST MELI	BURY CHALK FORMATION]		Grade Dm		1 1 .	_		B 3 2.00				_	
						(1.50)	-		2 0 2.00					
						[(===)]						-	
						I	-							
	Ford of	everyation at 2 00m. Termination December	phiasad Cahadulad Danth			3.00	6.47		LB 4 3.00				_	
	End of 6	excavation at 3.00m. Termination Reason: A	chieved Scheduled Depth				1							
							1							
							1							
							_						_	
							-							
							_							
							1						_	
							1							
]							
							-							-
]						_	
							1							
]						-	
							-							
							1							
Stability		Stable					Les		cavation Dimodes A and C)	ensions	and Or		on !.60m	
Shoring		None DEPTH RELAT	TED REMARKS					• .	des A and C) des B and D)				.60m).60m	
Depth Top De			Remarks					pth	,				3.00m	
1.00	0.50 1.00	CBR test undertaken HV unsuitable too stiff					Bea	aring a	ong Side A tov	wa d Sid	е В	1	.70°	
									WATER STRIK	ES			WATER STR	IKES DETAI
		PAC	KFILL					Date Ti	ne	Depth Sti	rike Dept	:h Sealed	Depth Water	Time Elapse
Depth Top De	epth Base		Remarks											
0.00	3.00	Arisings												
Depth Top De	epth Base		RATORY HOLE REMARKS Remarks							ERAL NO Remarks				
	3.000 1. No groundwater encountered to base of excavation.													
		I All depth in metres, all soil strengths a		ılts, se	e accomp	anying re	cords.							
AGS		All bearings given relate to magnetic N For details of abbreviations, see key.	NOLUT.											
FINAL			2 12/09/2022 13:59		-	d by Dav	id Howard				SOIL	ene	sinee	RING
Farma NIA CIEVI	DUOLETE	NOC Janua Baujajan	No. 2 OF Joseph Date O/	/01/20	110						Dort of th	ho Dock	. Calabana	ha Crau-

Project Nam	e Cambridge Waste Water Trea	tment Plant Relocation									Н	ole ID	
Project No.	TE8364					Exc	avati	on Log		TE	ο ς-	ΓW_(120
Engineer	Mott MacDonald Bentley												
Employer	Barhale Limited	C	. 2000	272 2011			6:1	0000			Shee	et 1 of 1	1
Ground Level Hole Type	+8.27mOD TP	Coordinates 549892.30E Method/Equipment JCB 3CX	., 2609	972.30N			Grid	OSGE	3				
Date Started	13/09/2021	Date Completed 13/09/2021	L			L	ogged	By AM					
	Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samı Det				u Test tails	Install- ation
	brown slightly sandy slightly gravelly CLAY. Gra . Sand is fine to coarse. Occasional roots.	vel is angular to subrounded fine to	>		(0.30)		>					IV .	
(TOP) [TOPSOIL] Stiff brown sligh is fine to coarse] htly gravelly sandy CLAY. Gravel is angular to su	brounded fine to medium of flint. Sand	_		0.30 0.50	7.97 7.77		B 1 0.40-0 B 2 0.50-0			CBR H	0.50 -	
Structureless Ch is angular to sub Sand is fine to c	HALK composed of light greyish brown slightly brounded fine to medium of extremely weak lo coarse. (CIRIA Grade Dm) MELBURY CHALK FORMATION]				(1.00) -	-		B 3 1.20-1	.25		Н	50] IV –	
Structureless Ch	HALK composed of light greyish brown slightly brounded fine to coarse of very weak medium		le Dm		1.50	6.77		B 4 1.50-1	55			- - -	
	oarse. (CIRIA Grade Dm) MELBURY CHALK FORMATION]		Grade		(1.50)							-	
						-	∇	B 5 2.50-2	2.55			- - - -	
Er	nd of excavation at 3.00m. Termination Reason:	Achieved Scheduled Depth			3.00 -	5.27		LB 6 2.95-	3.00			-	
						-						- -	
					-	-						- - -	
												-	
						-						_	
						1						- - -	
						-						-	
						-						-	
						1				4			
Stability	Stable						E.	cavation Dim	ensions	and Or	ientatio	on.	
Shoring	None					Ler		ides A and C)	CHISTOTIS	una on		.60m	
	DEPTH RELA	TED REMARKS				Ler	igth (S	ides B and D)			C).60m	
Depth Top Depth		Remarks				De	oth				3	3.00m	
1.00 1.0						Bea	ring a	long Side A to	wa d Sid	е В	6	°°	
								WATER STRIK				WATER STR	
	RAC	KFILL					Date Ti 19/2021	me L 10:15	Depth Str 2.80	ike Deptl	h Sealed	Depth Water 2.80	Time Elapse
Depth Top Depth		Remarks											
0.00 3.0	00 Arisings												
	DEPTH RELATED EXPLO	RATORY HOLE REMARKS						GEN	ERAL NO	OTES			
Depth Top Depth	n Base	Remarks							Remarks				
0.000 3.0	JUU Bucket width reduced to 300mm from 1	.50m then extended using 600mm bucke	T.										
AGS No	tes: All depth in metres, all soil strengths a All bearings given relate to magnetic For details of abbreviations, see key.		ılts, se	e accomp	anying re	cords.							
FINAL		e 12/09/2022 13:59	Lo	og checked	d by Davi	id Howard				SOIL	end	inee	RING
Form No CIEVELLO		No 20E Janua Data 04		-						Dout of +1	ho Dock	(Calata	no Crou

Project Nai	me	Cambridge Waste Water Treat	ment Plant Relocation									Hole ID	
Project No.	ı.	TE8364					Exc	avati	on Log		TP_	_STW_	021
Engineer Employer		Mott MacDonald Bentley Barhale Limited										Sheet 1 of	: 1
Ground Level	l	+11.01mOD	Coordinates 549640.40E	, 2606	69.50N			Grid	OSGB		•	<u></u>	Τ.
Hole Type		TP	Method/Equipment JCB 3CX										
Date Started		13/09/2021	Date Completed 13/09/2021	L	1	1	Lo	ogged	By AM				
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det			In Situ Test Details	Install- ation
coarse. Grave (MGR) [MADI	el sized f E GROU		o medium of flint, quartzite and brick.			(0.30)	10.71		B 1 0.30-0	.35		HV 0.00	
medium of fli	int and o		Gravel is angular to subrounded fine to			(0.50)	-					CBR 0.50 HV	
(SUPD) [SUPE Structureless		DEPOSITS] composed of very stiff light grey mottled l	prown slightly gravelly very sandy			0.80	10.21		B 2 0.80-0	.85		0.50	
calcareous Cl	LAY. San	d is fine to coarse. Gravel is angular to sub ely weak low density calcareous siltstone.	rounded fine to medium of flint,			-	1					HV 1.00	
		BÚRY CHALK FORMÁTION]	,			(1.20)	1						
						(1.20)	-		B 3 1.50-1	55			
				Grade Dm		1	1						
Structureless	CHALK	composed of very stiff light grey mottled I	prown slightly gravelly sandy	Grade		2.00 -	9.01		B 4 2.00-2	.05			
calcareous Cl	LAY. San	d is fine to coarse. Gravel is angular to sub areous siltstone. (Grade Dm)					1						
		BURY CHALK FORMATION]				(1.00)	1						
]						
	End of	excavation at 3.00m. Termination Reason: A	chicked Schoduled Donth			3.00 -	8.01		LB 5 2.95-	3.00			
	Elia oi i	excavation at 5.00m. Termination Reason. A	chieved Scheduled Depth				1						1
							_						_
							1						1
							1						-
						-]]
							1						1
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]]
						-	-						-
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							-						-
							-						-
							-						-
]]
							1						-
							1						1
							1						-
Stability		Stable							cavation Dime	ensions a	and Orie		
Shoring		None	ED DEMADIZO					• •	des A and C)			2.50m	
Depth Top Dep	pth Base		ED REMARKS Remarks				Dep	-	des B and D)			0.60m 3.00m	
	0.50 1.00	CBR test undertaken HV unsuitable too stiff							ong Side A tov	wa d Side	е В	115°	
						-			WATER STRIK	EC		WATER C	TRIKES DETAI
								Date Tir			ke Depth S	Sealed Depth Wat	
		BACI	KFILL										
Depth Top Dep 0.00	pth Base 3.00	Description Arisings	Remarks										
		9-											
		DEPTH RELATED EXPLOI	DATORY HOLE BENANDIZE						CEN	EDAL NO	TEC .		
Depth Top Dep	oth Base		Remarks							ERAL NC Remarks)1E2		
	3.000	No groundwater encountered to base of and widened with 600mm bucket.		300m	m from 1.5	0m							
	Notes: A	All depth in metres, all soil strengths a	re average in kPa. For in situ test resu	ılts, se	e accomp	anying re	cords.						
AGS		All bearings given relate to magnetic N For details of abbreviations, see key.	lorth.										
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FINAL Form No. SIEXP	PHOLETE				-	u ny Davi	iu noward					Bachy Soletan	

Project Name	Cambridge Waste Water Trea	tment Plant Relocation									Hole ID	
Project No.	TE8364					Exc	avati	on Log		TP_9	STW_	022
Engineer	Mott MacDonald Bentley									CI	. 1 .	1
Employer Ground Level	Barhale Limited +8.61mOD	Coordinates 549903.10E	260	771 40N			Grid	OSGB	<u> </u>	Sn	eet 1 of	1
Hole Type	TP	Method/Equipment JCB 3CX	., 200	771.4011			anu	OSGE	,			
Date Started	14/09/2021	Date Completed 14/09/2021	L			L	ogged	By AM				
	Description of Strata		Weathering	Legend		Datum Level	Waterstrike	Samp Det		I	iitu Test etails	Install- ation
	own slightly sandy slightly gravelly CLAY. Sa medium of flint and quartzite.	nd is fine to coarse. Gravel is angular to	×		ness)		W				HV 0.00	
(SUPD) [SUPERFICIA	AL DEPOSITS]	Swared in an autor to authrounded fine to	1		0.30	8.31		B 1 0.40-0	.45			
coarse of flint and o		aravel is angular to subrounded fine to		+	(0.30) 0.60	8.01		B 2 0.60-0		CE	BR 0.50 HV	
	K composed of very stiff light greyish brown				4	1					0.50	
	o coarse. Gravel is angular to subrounded fir w density calcareous siltstone. (Grade Dm)	e to coarse of flint, quartzite and			ļ ·	-					HV - 1.00	
	ELBURY CHALK FORMATION]				(1.40)						1.00	
			_ ا			-		B 3 1.50-1	55			
			Grade Dm]						
Characteristics CIIAI	.K composed of stiff light grey mottled brow	Parker de - Parker Be	Grad		2.00 -	6.61		B 4 2.00-2	2.05			
calcareous CLAY. Sa	and is fine to coarse. Gravel is angular to sub											
	llcareous siltstone. (Grade Dm) ELBURY CHALK FORMATION]				(1.00)]						
					(1.00)	-						
					2.00			LB 5 2.95-	3 00			
End o	of excavation at 3.00m. Termination Reason: A	chieved Scheduled Depth			3.00 -	5.61		25 0 2.00	0.00			
]]
												-
					-	1					-	1
						1						1
						-						}
]]
												-
						1						1
]						
						-						-
												1
						1						1
						-]
												-
						-						
Stability Shoring	Stable					Len		cavation Dim	ensions a	nd Orienta	tion 2.50m	
Shoring	None DEPTH RELAT	ED REMARKS					• •	des A and C) des B and D)			2.50m 0.60m	
Depth Top Depth Ba		Remarks				Dei	-	200 D and D)			3.00m	
0.50 0.50 1.00 1.00	CBR test undertaken HV unsuitable too stiff							ong Side A tov	wa d Side	В	135°	
3.00 3.00	Soakaway test undertaken							WATER STRIK	EC		MATER STI	RIKES DETAI
					-		Date Tir			ce Depth Seale		Time Elapse
		KFILL										
Depth Top Depth Ba 0.00 3.00	Se Description Arisings	Remarks										
	DEDTH DELATED EVELO	RATORY HOLE REMARKS						CEN	ERAL NO	TEC		
Depth Top Depth Ba		Remarks							Remarks	163		
0.000 3.000	No groundwater observed, wet weather widened with 600mm bucket.	er conditions 2. Bucket width reduced to	300mi	m from 1.20	m and							
	WAll donth in motion all as ill stress all	re average in I/De Fevir - its took	ulto -	20.2025	anvin -	cords						
AGS	E All depth in metres, all soil strengths a All bearings given relate to magnetic N		iits, Se	e accomp	anying re	cords.						
7100	For details of abbreviations, see key.									OII	CIDO	nnice.
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Project Name	Cambridge Waste Water Tr	eatment Plant Relocation									Hole ID	
Project No.	TE8364					Exc	avati	on Log		TP_	STW_	031
Engineer	Mott MacDonald Bentley									CI	. 1 .	4
Employer Ground Level	Barhale Limited +11.77mOD	Coordinates 549375.408	F. 2608	811.90N			Grid	OSGE	<u>_</u>	Sr	neet 1 of	1
Hole Type	TP	Method/Equipment JCB 3CX	_,	711.0011			Gild	000.0				
Date Started	15/09/2021	Date Completed 15/09/2022	1			L	ogged	By AM				
	Description of Stra	ata	Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Sam Det	pling ails		Situ Test Details	Install- ation
	wn slightly sandy slightly gravelly CLAY. Ond is fine to coarse. Occasional roots.	iravel is angular to subrounded fine to			(0.50)	-		B 1 0.30-0).35		HV 0.00	
CLAY. Gravel is ang calcareous siltstone	K composed of very stiff light greyish brular to subrounded fine to coarse of flint e. Sand is fine to coarse. ELBURY CHALK FORMATION]				0.50	11.27		B 2 0.50-0).55	С	BR 0.50 HV 0.50	
(WINICK) [WEST IVIE	LEBUKT CHALK FORWATION]		Grade Dm		(1.50)			B 3 1.40-1	1.45		HV =	
calcareous SILTSTO	very weak medium density light grey mo NE. Discontinuities are generally very clo	sely spaced, randomly orientated,			2.00 -	9.77		B 4 2.00-2	2.05			
	d brown with black speckling. (Probably ELBURY CHALK FORMATION]	CIRIA Grade B3/4)			(1.00)	- - - - - -						
End o	of excavation at 3.00m. Termination Reaso	n: Achieved Scheduled Depth			3.00 -	8.77		LB 5 2.95-	-3.00		-	
						-						
					-	-					-	-
					-	- - - -					-	
						1						
											-	
						-						
						-						
Stability Shoring	Stable None					Lor		cavation Dim des A and C)	ensions a	ind Orienta	ation 2.50m	
Siloring		LATED REMARKS					• •	des B and D)			0.60m	
Depth Top Depth Ba		Remarks				De	-				3.00m	
3.00 3.00	CBR test undertaken Soakaway test undertaken					Bea	ring al	ong Side A to	wa d Side	: B	120°	
								WATER STRIK	ŒS		WATER STI	RIKES DETAI
	R	ACKFILL					Date Ti	me	Depth Stri	ke Depth Sea	led Depth Wate	r Time Elapse
Depth Top Depth Ba	se Description	Remarks										
0.00 3.00	Arisings											
	DEDTH DELATED EVO	LORATORY HOLE REMARKS						CEN	ERAL NO	TEC		
Depth Top Depth Ba	se	Remarks						GEN	Remarks	'I ES		
0.000 3.000	Groundwater not encountered to be base of excavation and then widened	ase of excavation 2. Bucket width reduced to with a 600mm bucket	o 300m	m from 1.0	0m to							
AGS Notes	: All depth in metres, all soil strength All bearings given relate to magnet For details of abbreviations, see key		ults, se	e accomp	anying re	cords.						
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Project Na	ame	Cambridge Waste Water Treat	tment Plant Relocation									Н	lole ID	
Project No. TE8364				Excavation Log				TP_STW_032						
Engineer Employer	Mott MacDonald Bentley Barhale Limited				Sheet 1 of 1									
Ground Leve	el	farhale Limited 11.43mOD Coordinates 549285.50E, 261019.20N Grid OSGB					3110	Ct 1 01	1					
Hole Type		TP	Method/Equipment JCB 3CX											
Date Started	l	13/09/2021	Date Completed 13/09/2021	1	1	ı	Lo	ogged	By AM					
		Description of Strata		Weathering	Legend	Depth (Thick- ness)	Datum Level	Waterstrike	Samp Det				tu Test tails	Install- ation
subrounded (TOP) [TOPS Structureles	fine to co OIL] ss CHALK	slightly gravelly sandy CLAY. Sand is fine to parse of flint and quartzite. composed of very stiff light grey mottled if requent lenses of brown fine to coarse s	brown slightly sandy slightly gravelly		1' 1'	(0.30) 0.30	11.13		B 1 0.30-0).35		O CBF	HV .00 R 0.50	
Gravel is and (Grade Dm) (WMCK) [WI	gular to s EST MELI	ubrounded fine to coarse of very weak me BURY CHALK FORMATION]				(1.70)	-		B 2 1.00-1	1.05		0 1	HV .50 HV -	
110111 1.201		no sand trises		Grade Dm			-							
calcareous C fine to coars medium der	CLAY with se of very nsity calc	composed of very stiff light grey mottled in medium cobble content. Sand is fine to coweak medium density calcareous siltston areous siltstone. (Grade Dm) BURY CHALK FORMATION]	oarse. Gravel is angular to subrounded			(1.00)	9.43 - - -		B 3 2.00-2	2.05			-	
	End of	excavation at 3.00m. Termination Reason: A	chieved Scheduled Depth			3.00 -	8.43		LB 4 2.95-	3.00			-	
						-							- - -	
Stability Stable Shoring None DEPTH RELATED REMARKS Depth Top Depth Base Remarks 0.50 0.50 CBR test undertaken. HV unsuitable too stiff					Excavation Dimensions and Orientation Length (Sides A and C)									
1.00	1.00	HV unsuitable too stiff							WATER STRIK					RIKES DETAI
								Date Tir			rike De	epth Sealed	Depth Water	
			KFILL											
Depth Top De	epth Base 3.00	Description Arisings	Remarks											
DEPTH RELATED EXPLORATORY HOLE REMARKS Depth Top Depth Base Remarks					GENERAL NOTES									
0.000	3.000	Remarks 1. No groundwater encountered to base of excavation. 2. Bucket width reduced to 300mm from 1.00m and widened with 600mm bucket to 2.00m. Too stiff to widen to base.												
AGS	,	 All depth in metres, all soil strengths a All bearings given relate to magnetic N For details of abbreviations, see key.		ults, se	e accomp	anying re	cords.							
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SUPPORTING FACTUAL DATA

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SECTION A

Exploratory Hole Records and Field Data

IN SITU TEST DATA

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REPORT ON THE

GEOPHYSICAL LOGGING

OF

THREE BOREHOLES

ΑT

CAMBRIDGE WATER TREATMENT WORKS

Prepared For:



Henderson House Langley Place Higgins Lane, Burscough Lancashire L40 8JS

SEPTEMBER2021/SENG2111_CAMBRIDGE_WTW_Rpt/TL46

	Name	Date			
Logged by:	K. Clark	22.09.2021			
Report by:	K. Clark	14.10.2021			
Checked by:	M. Kynaston	18.10.2021			

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2.	THE GEOP	HYSICAL LOGGING METHODS	2			
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5.	BOREHOLE	E LOGGING CONSTRAINTS	6			
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Figure 3.2		Aerial Image showing approximate borehole locations.				
Appendix 1		Defect Classification				
Appendix 2		Geophysical Logs				

1.0 INTRODUCTION

At the request of Soil Engineering Geoservices limited, optical and acoustic imaging, and geophysical logging was carried out in three boreholes for the Cambridge Water Treatment Works ground investigation

The work was carried out by European Geophysical Services on the 23rd of August, and 17th & 22nd September 2021.

The following logs were run:-

ВН	BH Logs		To (m)
BH_STW_013A	Acoustic Borehole Imager (OBI) Acoustic Borehole Imager (ABI)		
BH_STW_018	Optical Borehole Imager (OBI) Acoustic Borehole Imager (ABI) 3-arm Caliper (CAL3) Natural Gamma (GAM)	3	28.9
BH_TUN_018	Optical Borehole Imager (OBI) Acoustic Borehole Imager (ABI) 3-arm Caliper (CAL3) Natural Gamma (GAM)	2	11.9

2.0 THE GEOPHYSICAL LOGGING METHODS

The Equipment and Field Procedure

A fully digital logging system with a 600m capacity motorised winch mounted in a 4x4 van was used.

All logging data was recorded digitally for reprocessing and archiving purposes.

The optical imager survey was carried out first to avoid the disturbance of the fluid by the geophysical logs which may affect water clarity.

Acoustic Borehole Imager (Amplitude and Travel Time)

This tool scans the borehole wall through 360 degrees and records the acoustic reflection of the resulting signal in terms of amplitude and transit time (the travel time from the tool to the borehole wall). This technique requires a fluid filled borehole with a minimum of suspended solids, polymers or muds within the fluid column.

This sensitive technique responds to small diameter changes, rugosity and the acoustic nature of the borehole wall. It is primarily used for detecting fractures and other discontinuities. The resultant images are orientated (to magnetic North) 0° through 90°, 180° and 270° back to 0°.

The logging tool is centralised during data acquisition by two sets of bow springs. The bow springs are adjusted to a variety of borehole diameters prior to acquisition. The image is viewed on the way down the borehole to allow fine tuning of the acquisition parameters. The settings are then adjusted and the image recorded on the way up the borehole which ensures a constant line speed during acquisition.

Images and associated data are viewed in real time during the data acquisition.

The orientation system employs a flux gate magnetometer and therefore the recorded data within approximately one metre of magnetic steel casing is un-orientated. This is corrected manually during the post-processing stage

2.0 THE GEOPHYSICAL LOGGING METHODS

Optical Borehole Imager (Optical)

A precision-machined prism and CCD camera assembly permits a high-definition video image of the borehole wall to be captured in a variety of horizontal and vertical resolutions. The resulting image is digitised in the sonde for transmission to the surface acquisition system.

The image is then orientated to Magnetic North and displayed as an unwrapped image log. This enables a detailed structural interpretation to be made if required.

For the best results the optical imager should be run above the water level or in clean, clear fluid. The logging tool is centralised during data acquisition by two sets of bow springs. The bow springs are adjusted to a variety of borehole diameters prior to acquisition. The image is recorded on the way down the borehole to limit disturbance to the clarity of the water in the borehole by the logging tool.

Images and associated data are viewed in real time during the data acquisition.

The orientation system employs a flux gate magnetometer and therefore the recorded data within approximately one metre of magnetic steel casing is un-orientated. This is corrected manually during the post-processing stage

Natural Gamma (Gam)

The tool measures the naturally occurring gamma radiation found in rocks and sediments. It is mainly used to detect the clays that contain potassium K⁴⁰, though the U²³⁸ and the Th²³² series of elements present in certain rocks also emit gamma radiation. The higher the concentration of these clay minerals the greater the responses on the natural gamma log. Natural Gamma radiation is expressed in counts per second (CPS).

Caliper (Cal3)

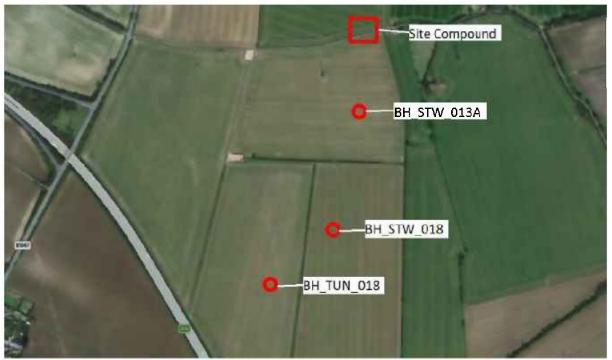
This tool measures 3 diameters of the borehole. It is used to check the integrity of the borehole lining, and where the borehole is unlined to identify zones of washout, breakout or fissures.

3.0 SITE DETAILS

Cambridge water treatment works, Horningsea, Cambridgeshire OS Grid Reference: TL 4976 6159



OS Map showing approximate area of investigation highlighted by red Figure 3.1 oval. © Crown copyright 2021 OS100057099.



Aerial Image showing site compound and approximate borehole Figure 3.2 locations. © Google 2021

PROCESSING AND PRESENTATION OF IMAGER RESULTS 4.0

Detailed logs of the imager data have been produced at a vertical scale of 1:20.

Constructional details and information on each borehole are given in the headers of each log.

All images have been referenced to Magnetic North.

The borehole's azimuth and tilt are plotted alongside the images.

The image of the borehole wall is presented in an unwrapped form with a horizontal scale marked 0° - North, through 90° - East, 180° - South, 270° - West, back to North.

Structural features and discontinuities have been picked from the images in the form of colour coded sinusoidal projections - see Appendix 1 for details. 'Discontinuities' log is also presented with a horizontal scale marked 0° - North, through 90° - East, 180° - South, 270° - West, back to North.

Structure picking is not a definitive analysis of all the features within a borehole. Only the discontinuities that have a linear dip and direction are 'picked' and used in the analysis of the discontinuities. Features that do not have a regular sinusoidal shape do not have a linear dip and direction, 'best fit' picking of these features is done if approximately 80% coverage of the sinusoid can be achieved. Below this percentage the inaccuracy of the picking is too great and if included in any structural analysis may adversely skew the results. Vughs, solution holes, and angular break outs are examples of features not picked.

The apparent azimuth and apparent dip (i.e. relative to the borehole's azimuth and tilt) of the discontinuities are calculated using the diameter of the borehole and the geometric parameters of the sinusoids overlaid on the discontinuities. The final processing stage is to correct these apparent values to true azimuth (in relation to Magnetic North) and true dip (from horizontal) by correcting for the borehole's azimuth and tilt.

The final results are presented as a 'tadpole' plot (Discontinuities - True'). The horizontal position of the tadpole's head gives the defect's true dip angle and its tail points in the direction of the defect's azimuth. These logs are presented with a horizontal scale in degrees. By convention the top of the page is North (Magnetic) and the right hand edge of the paper is East.

The true structural data has been presented in digital format as an excel file (xls).

5.0 **BOREHOLE LOGGING CONSTRAINTS**

Vehicle access restrictions

Farmland, 4x4 required.

Tool access restrictions

None

Borehole conditions / risk to equipment

Larger diameter on BHSTW13A prevented good centralisation of the acoustic imager.

Lack of fluid filled column / cloudy fluid

Boreholes required acoustic imager logs due to cloudy fluid.

Time constraint

None

Borehole construction / casing

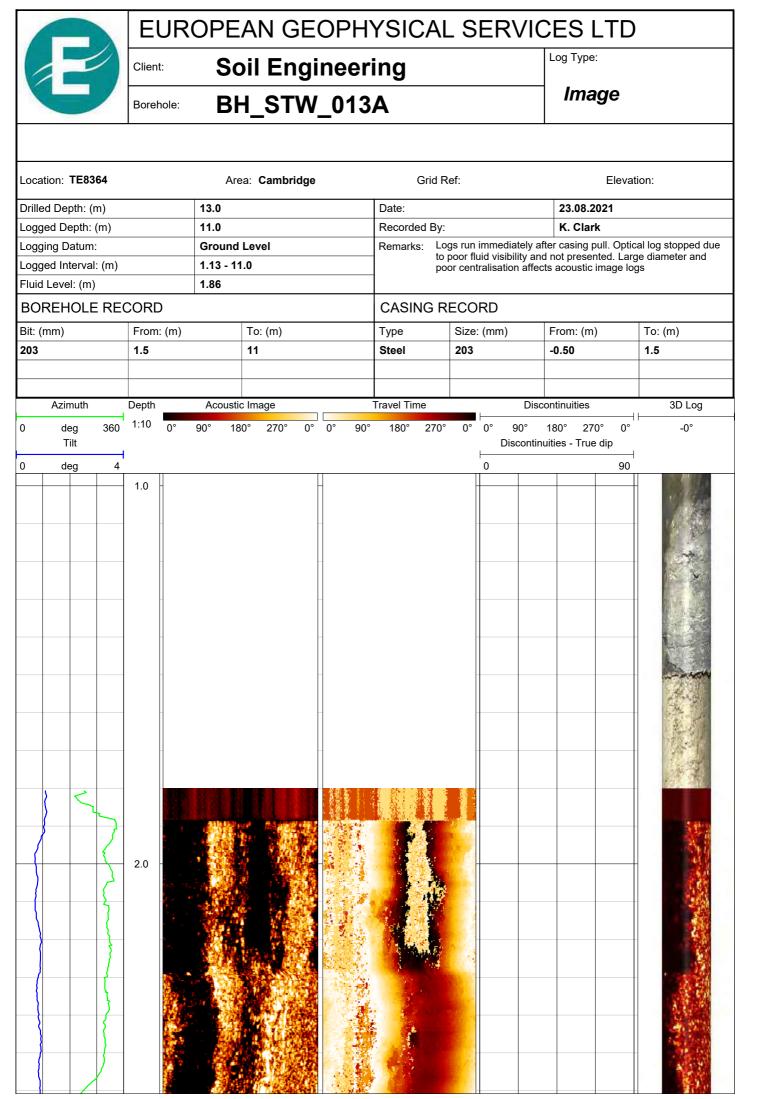
Overburden cased off with steel casing, rotary cored to total depth.

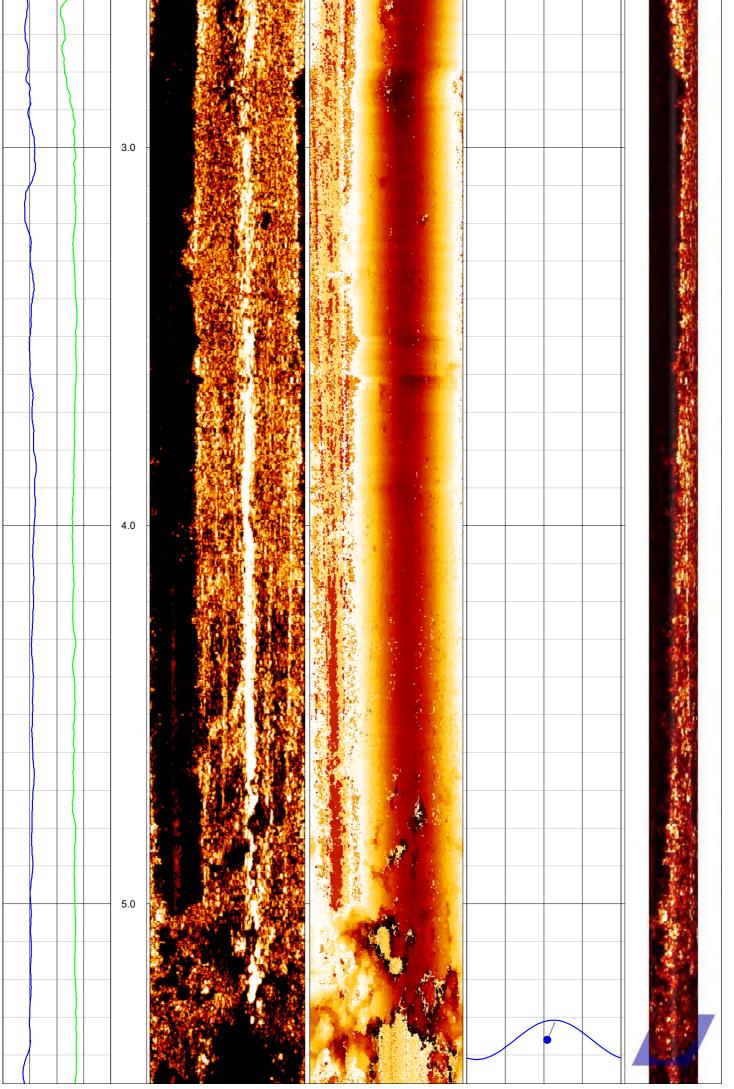
Appendix 1

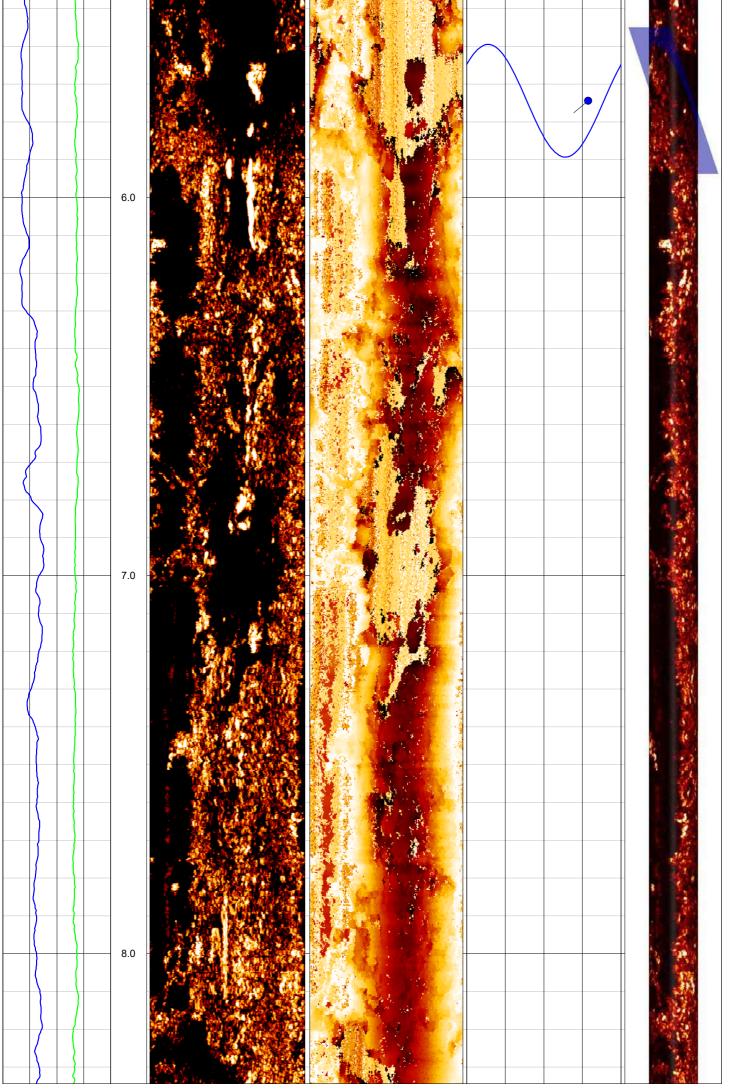
Discontinuity Classification.

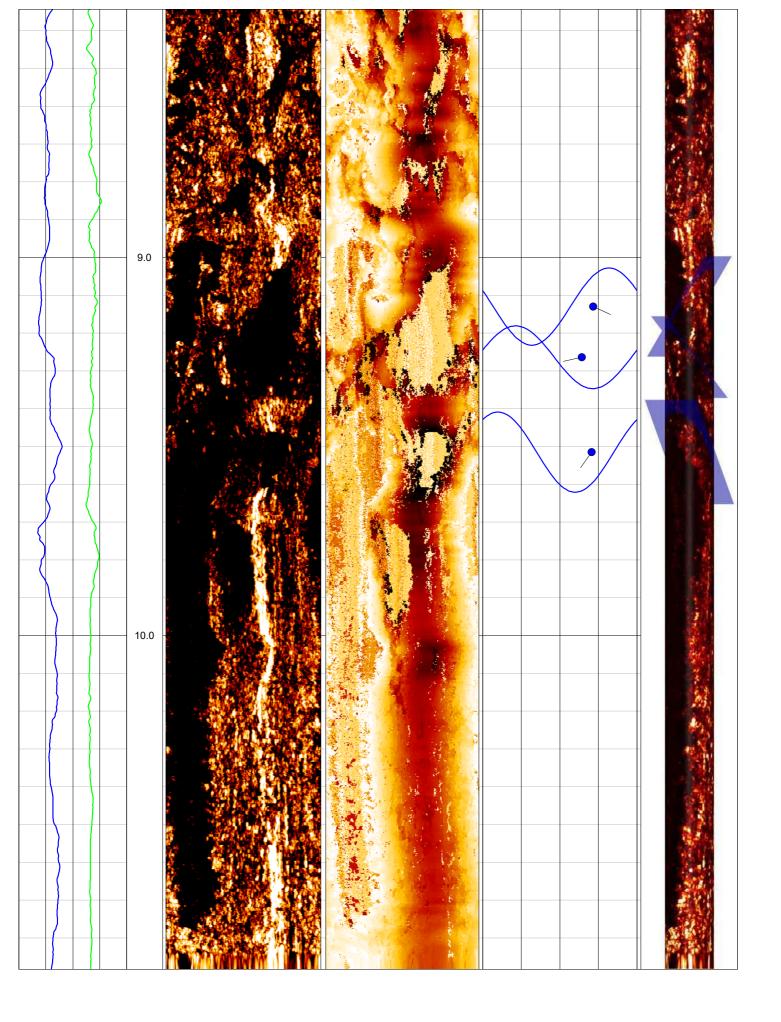
Discontinuity	Colour	Classification Parameters
Major Fracture or Fissure	Blue	An open break in the formation, that is continuous across the entire image.
Minor Fracture or Fissure	Turquoise	A thin or closed break in the formation, that is continuous or discontinuous across the image.
Vein	Green	That may be <u>continuous or discontinuous</u> across the entire image.
Fabric	Red	Defines a feature generally metamorphic, igneous or sedimentary in origin that may be continuous or discontinuous across the image, such as bedding and cross-bedding, schistosity or gneissosity.
Intrusions	Purple	Intrusive features such as dykes and sills, generally <u>continuous</u> across the image
Unknown	Black	Faint features which can not be classified.

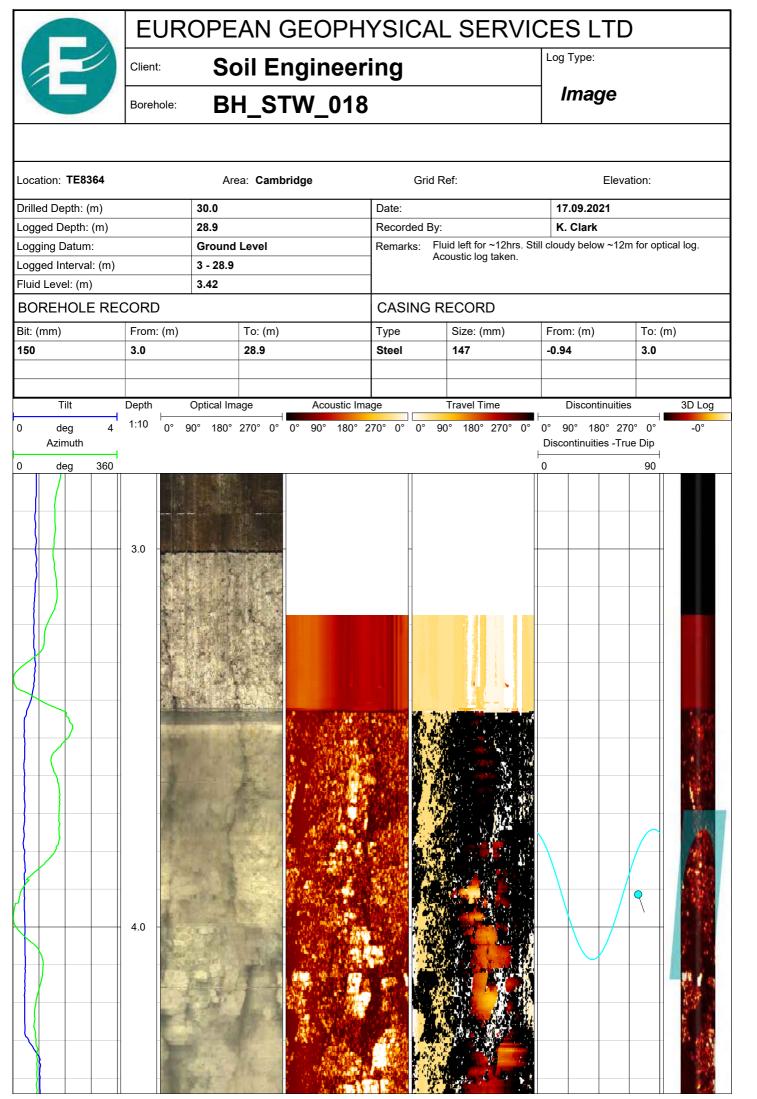
Appendix 2 **Geophysical Logs**

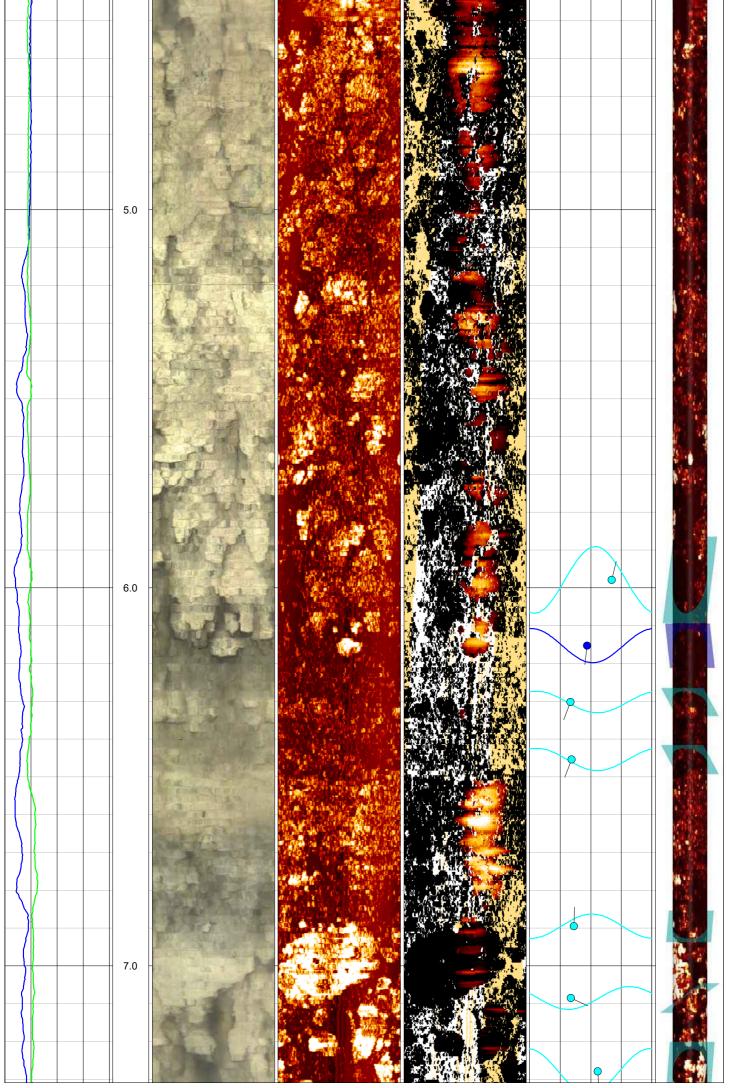




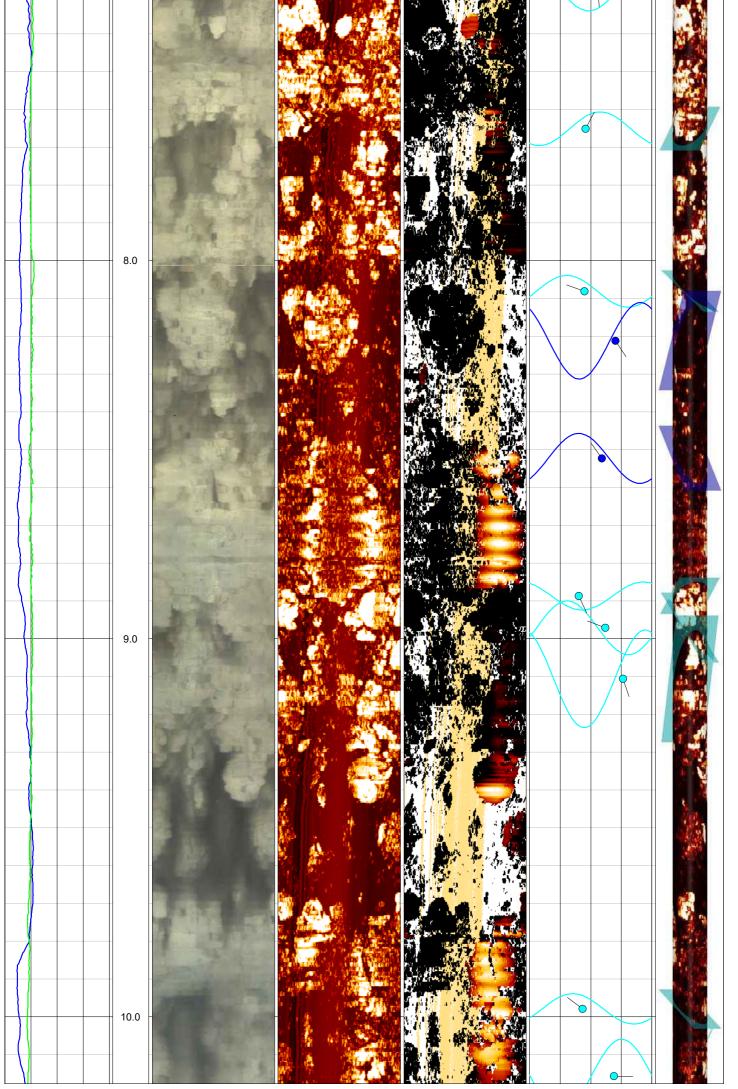


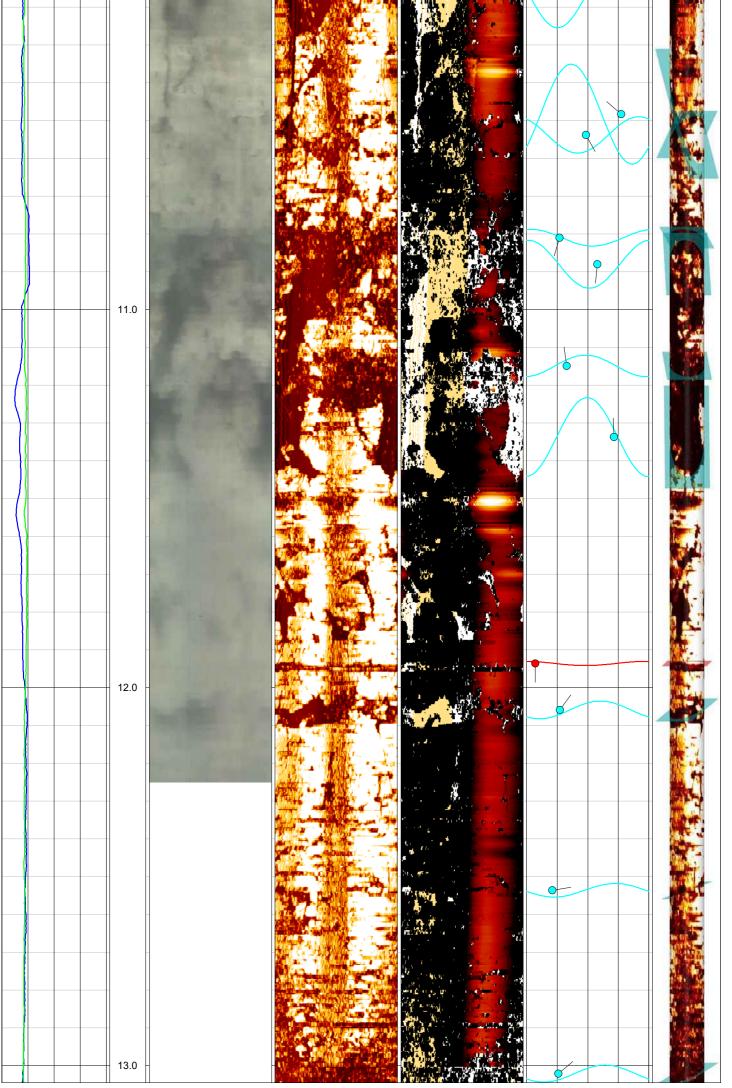




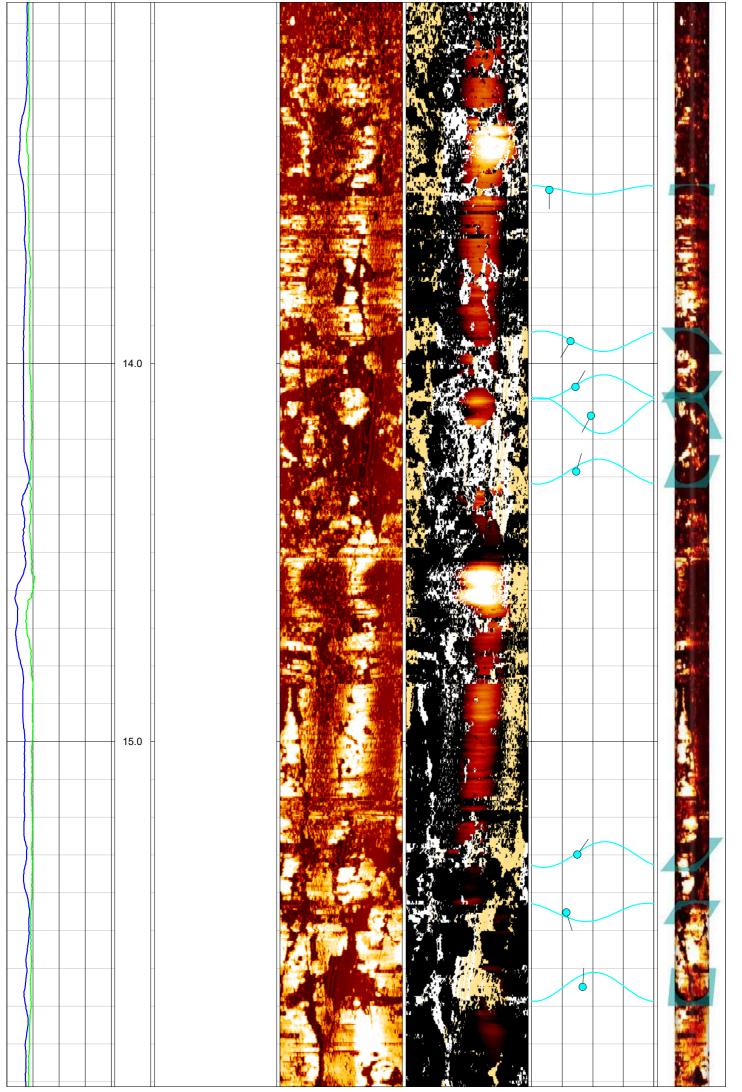


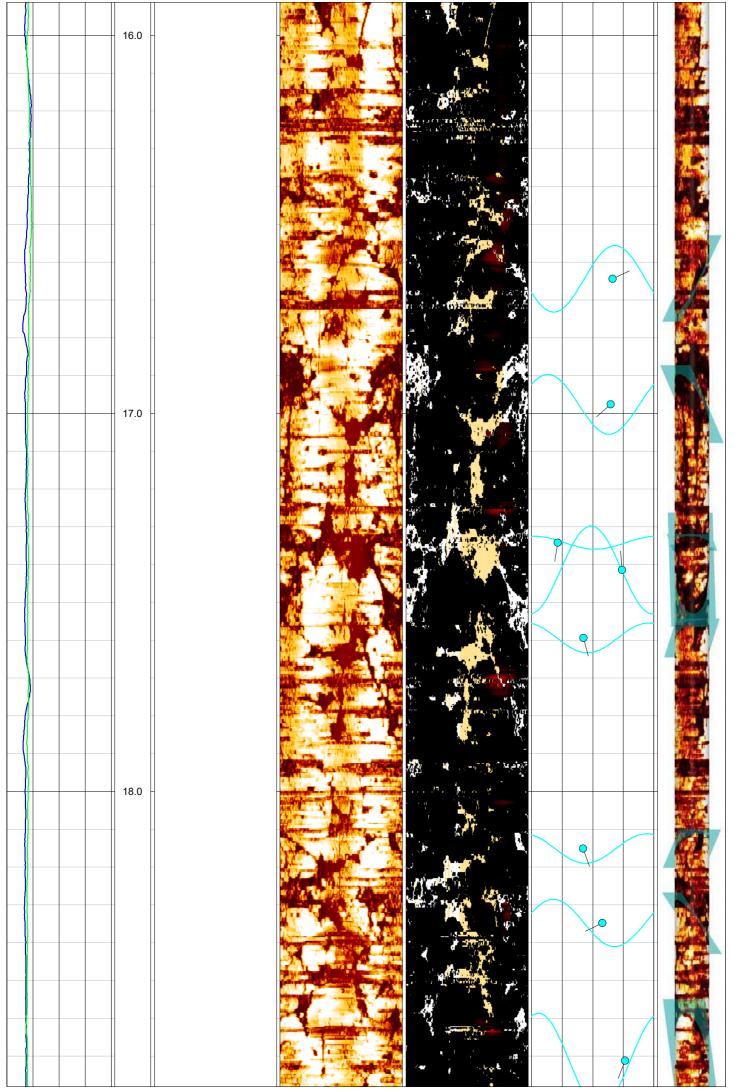
Page 2

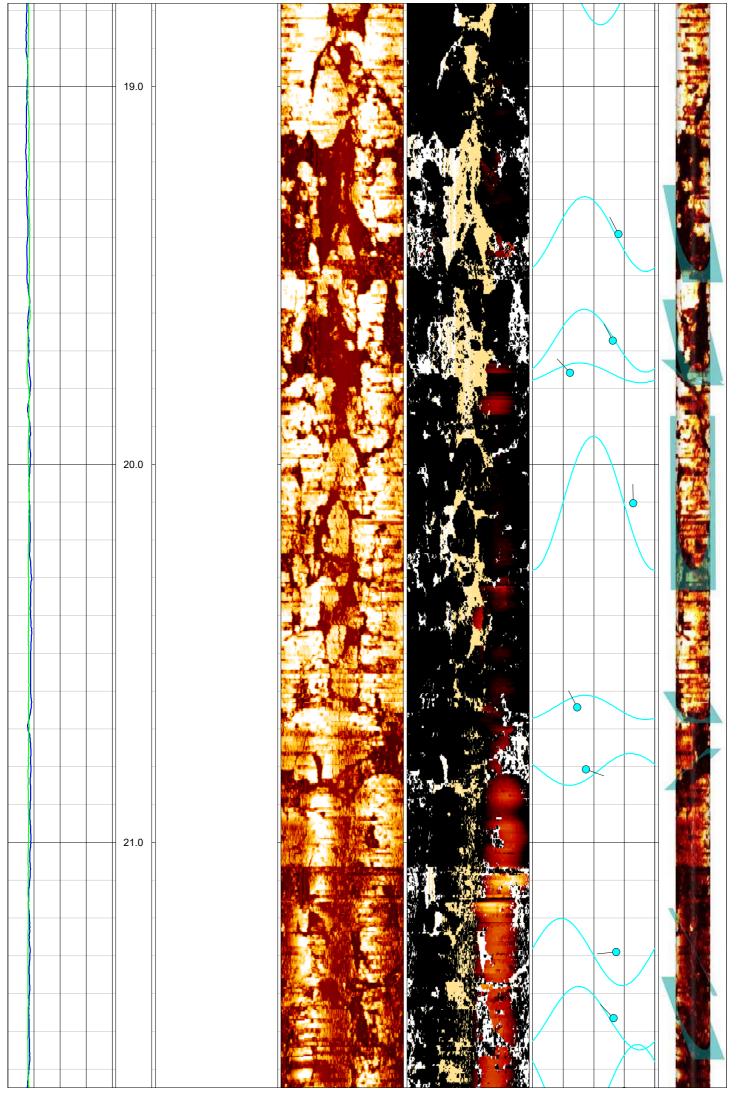


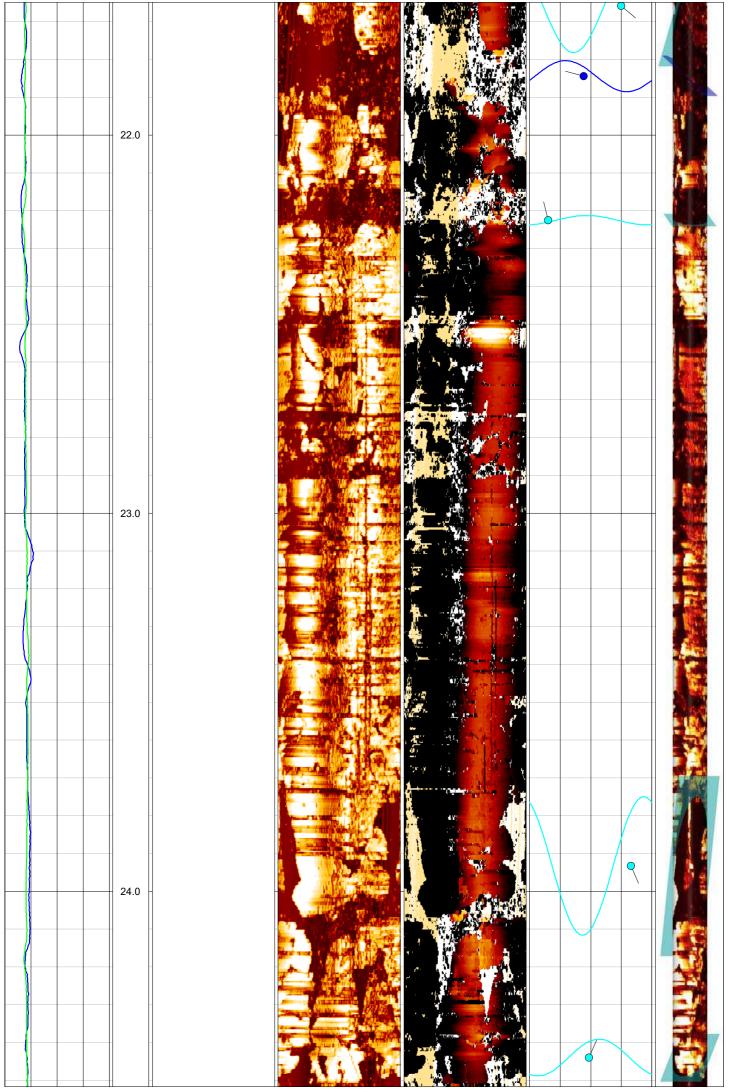


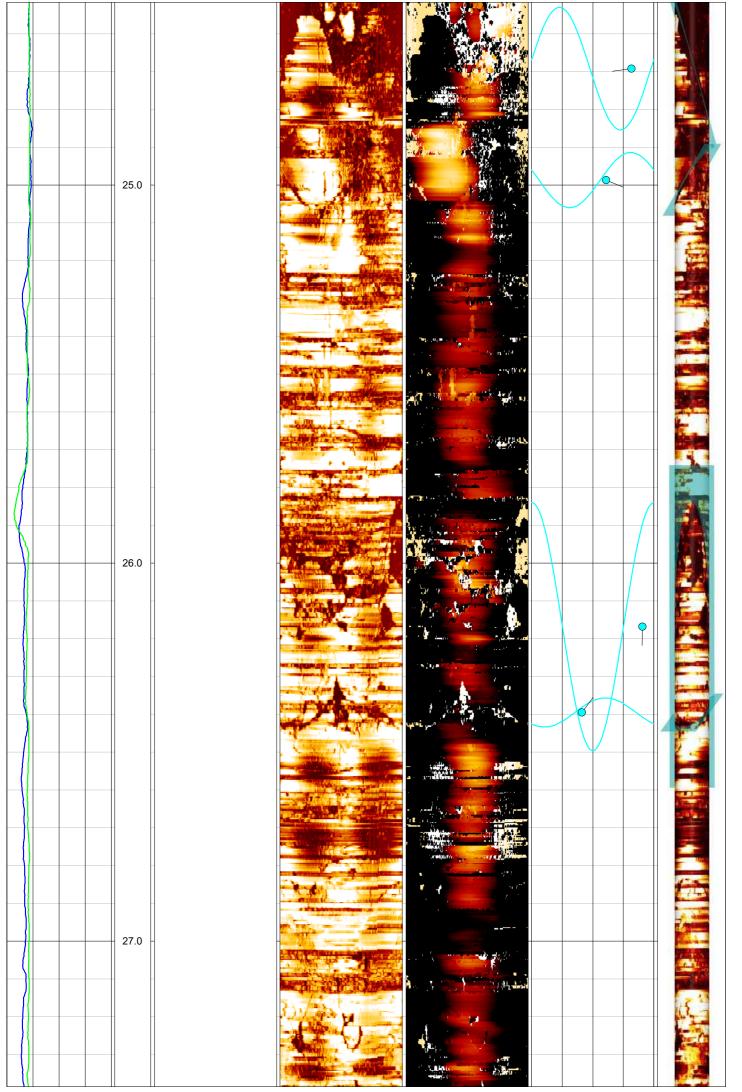
Page 4

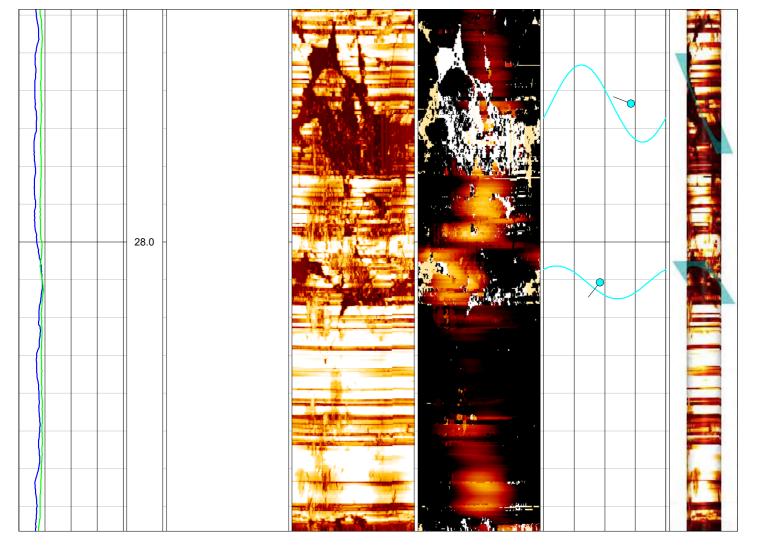


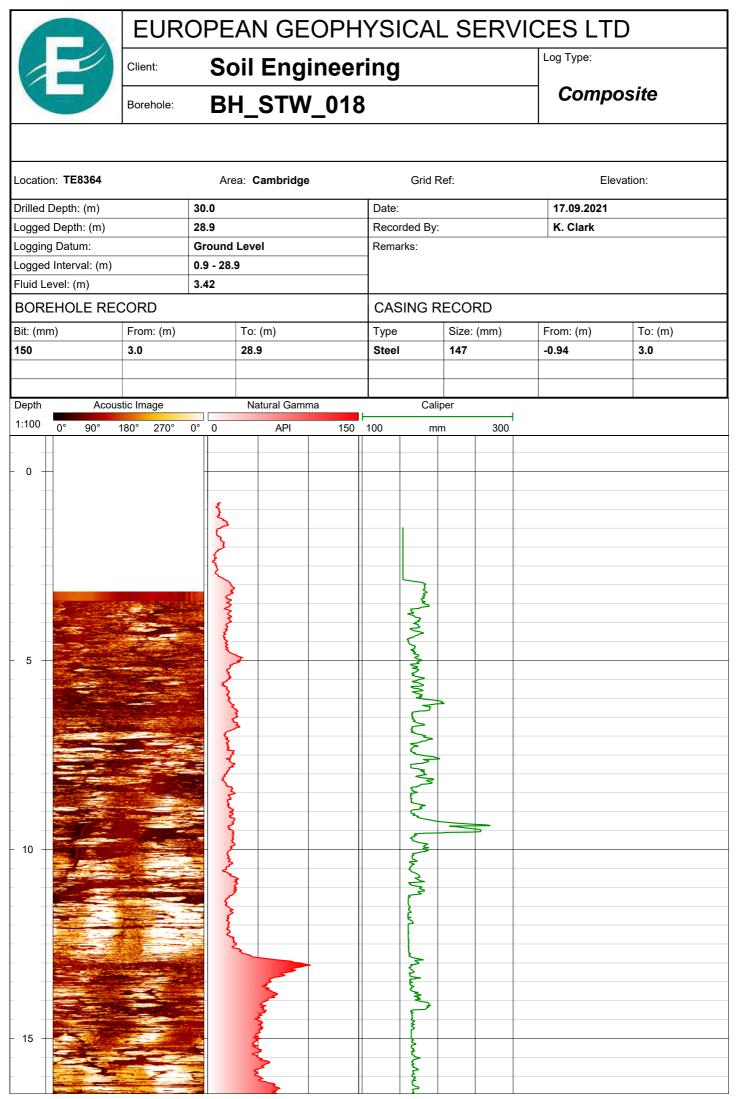


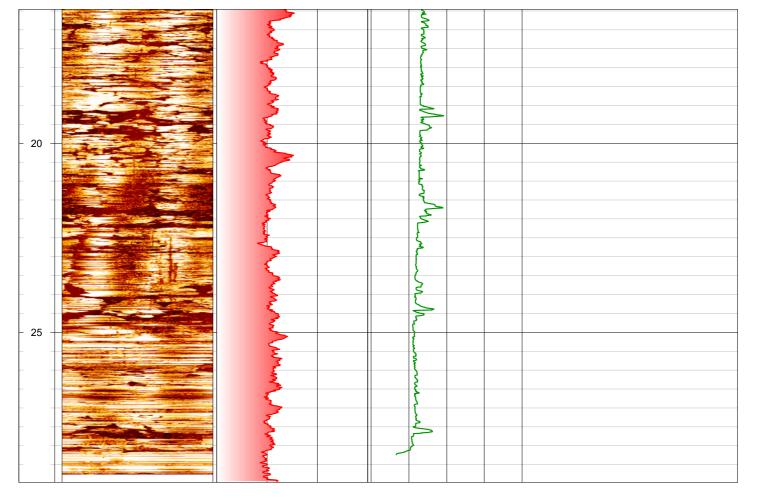




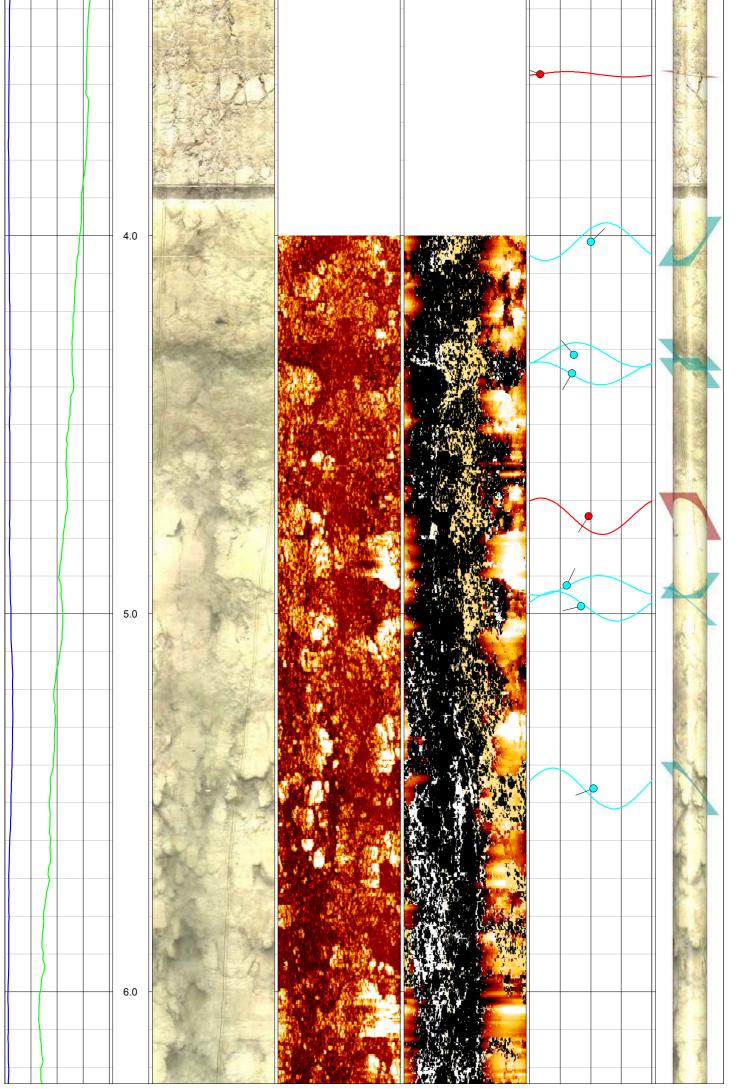


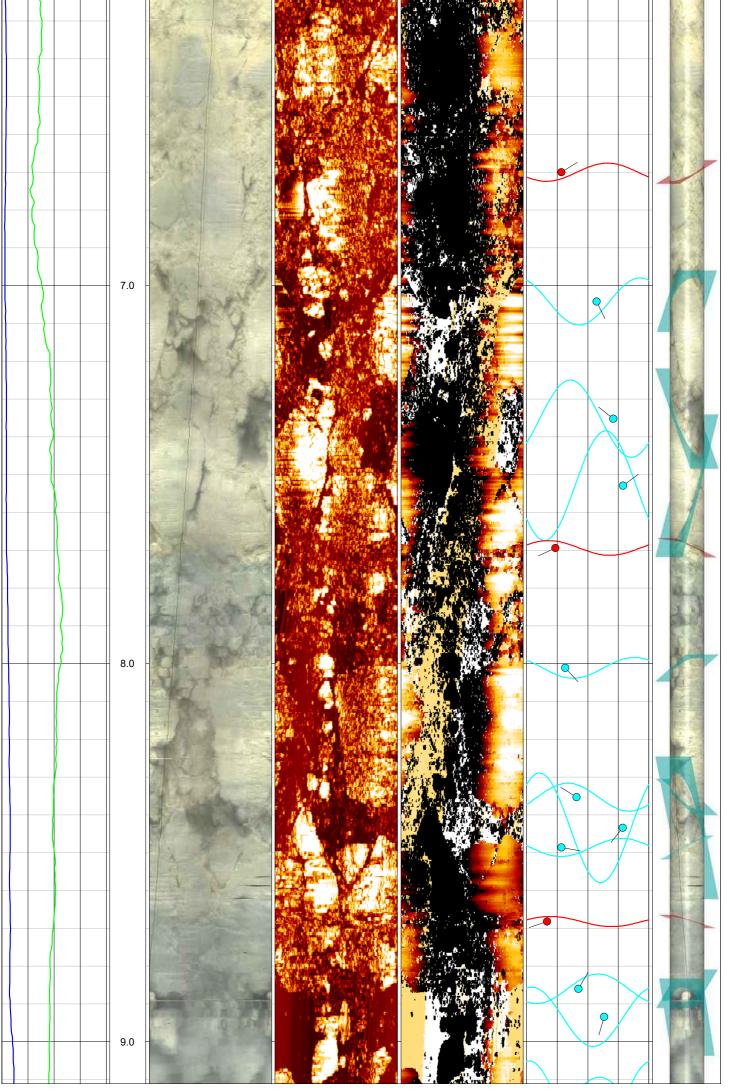


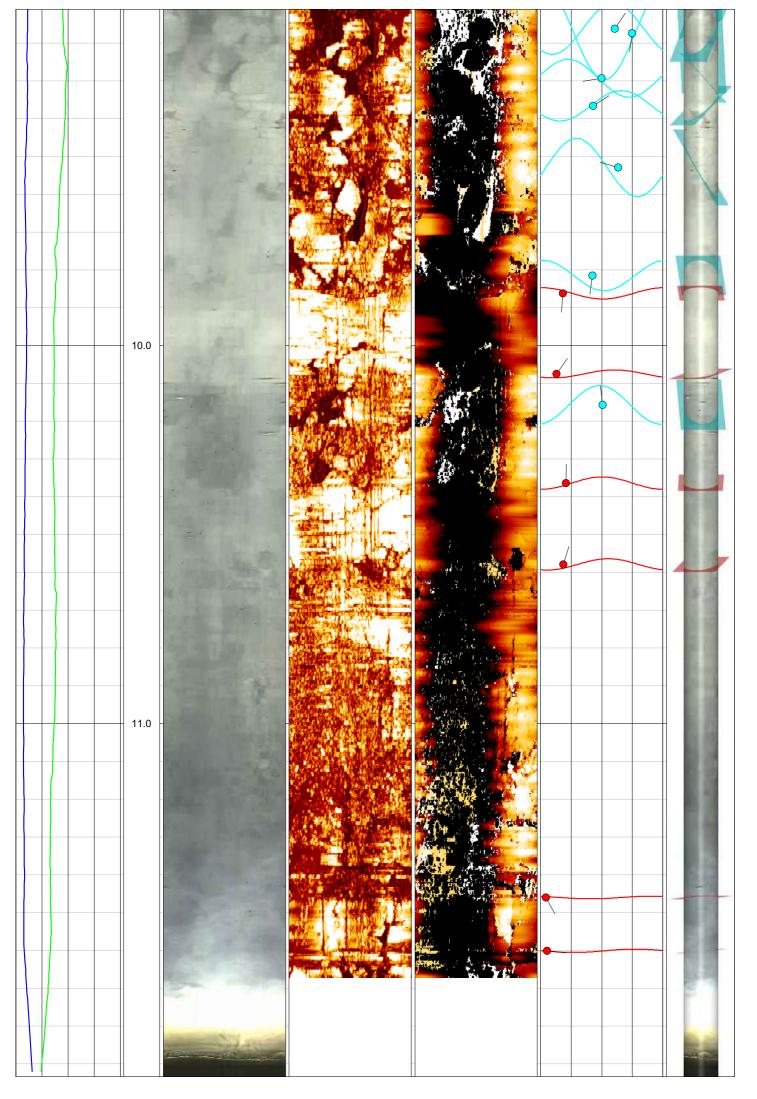


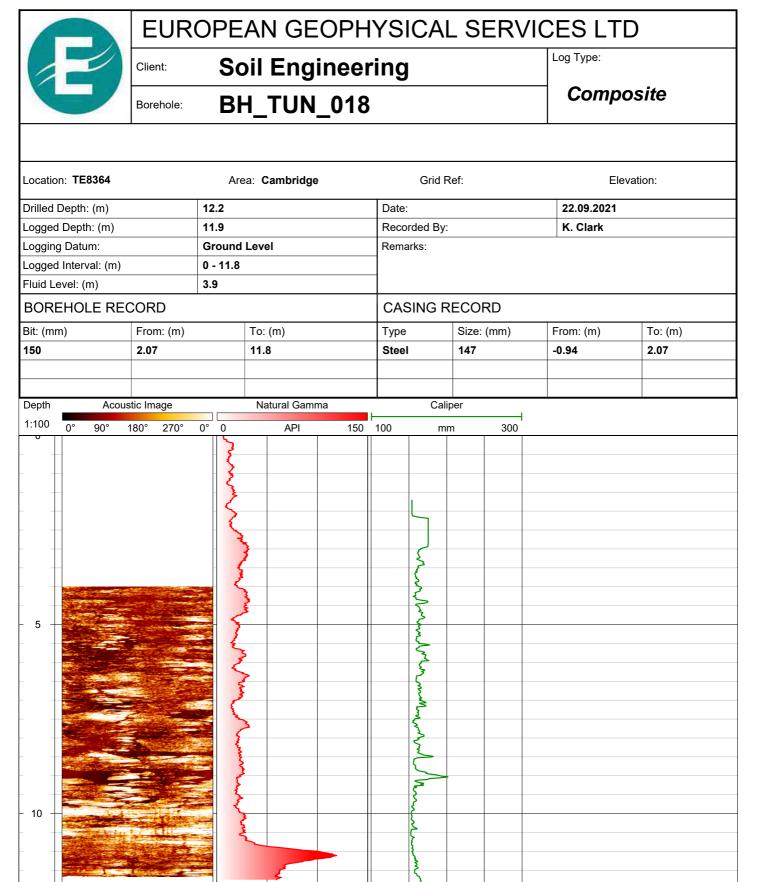


	EUR	OPE	AN GEO	PH	YSIC	CAL	SERVI	CE	SLTD		
P	Client:	Sc	oil Engin	eeri	ng			Log	ј Туре:		
	Borehole:	Bł	H_TUN_()18					lmage		
Location: TE8364		Are	ea: Cambridge			Grid R	ef:		Elevati	ion:	
		1			D 1				0.00.0004		
Drilled Depth: (m)		12.2 11.9			Date:	I D. //			2.09.2021 Clark		
Logged Depth: (m) Logging Datum:		Ground	Level		Recorde				Clark		
Logged Interval: (m)		2.0 - 11.			TCHIAIK	J.					
Fluid Level: (m)		3.9									
BOREHOLE RE	CORD				CASIN	JG R	ECORD			-	
			T ()			10 1	T	T	()	T /	
Bit: (mm) 150	From: (m) 2.07		To: (m)		Type Steel		Size: (mm)	-0.9	m: (m)	To: (m	1)
100	2.07		11.5		Sieel		147	-0.8	74	2.07	
Tilt	Depth	Optical Im	age Aco	ustic Ima	ge		│ Travel Time		Discontinuities		3D Log
0 deg 4	1:10 _{0°}	90° 180°	270° 0° 0° 90°	180° 2	70° 0°	0° 90	0° 180° 270° 0°	0°	90° 180° 270°	⊢	-0°
Azimuth	I							Disc	ontinuities - True	∍ Dip	
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Hole ID Cambridge Waste Water Treatment Plant Project Name **Packer or Lugeon Test** BH_STW_003A Relocation Record **Ground Level** Project No. TE8364 10.248 mAOD Date Mott MacDonald Bentley Engineer 31/08/2021 **Barhale Limited** BS 5930: 1999: Clause 25.5 Page Client 1 of 2 Test no. Depth below ground level to 6.20 Packer type Double - using initial groundwater level Top of test section m 10 7.80 Packer pressure **Bottom of test section** bar m 146 Diameter of hole in test area Centre of test section 7.00 m Weather Bottom of hole at time of test 10.00 m Type of rock Chalk Bottom of casing 1.60 m 5.70 Initial ground water level m 5.70 Assumed standing water level m Length of test section 1.60 m 0.00 Gauge height above ground level m 1st period 8.6 m head Gauge Pressure Friction head loss im bar Average Flow **V**min 0 2 4 6 8 10 12 14 16 Time mins 45646 45838 45894 45953 46006 46058 46128 45714 45779 Readings litres 30.13 Take Irtres 68 65 59 56 59 53 52 70 2nd period Gauge Pressure bar Friction head loss m Average Flow **V**min Time mins Readings litres Take Irtres 3rd period Gauge Pressure bar Friction head loss im Average Flow **Vmin** Time mins Readings Irtres Take Irtres 4th period Gauge Pressure Friction head loss im bar Average Flow **V**min Time mins Readings Irtres Take Irtres 5th period Gauge Pressure Friction head loss im Average Flow **V**min Time mins Readings Irtres Take litres Pipework and Drill String Details Type of drill rod 2 7/8 Total length of drill rod (including 'stick up') 7.50 m 5.00 24 Diameter of delivery hose mm Total length of delivery hose in metres m Remarks Bypass top packer. Test Cancelled. Crew/Operator **SOIL ENGINEERING** SE-PGR-F-009 24/01/2014 Form No. Revision No. 2.04 ssue Date Part of the Bachy Soletanche Group

Project Name	Cambridge Wa	ste Water Treatm	nent Plant	Packer or	Lugeon Te	st	Hole ID	
6	Relocation			during the control of	ecord	DI	H_STW_003A	
Project No.	TE8364			"	ecora		Ground Level LO.248 mAOD	
Engineer	Mott MacDona	ald Bentley					Date 31/08/2021	
Client	Barhale Limited	d		BS 5930: 1	999: Clause 25.5		Page 2 of 2	_
Test no.		55	1	Depth below	w ground level to		V	_
Packer type	Double	e - using initial gro	undwater level	Тор о	f test section	m	6.20	
Packer pressure		bar	10	Botto	m of test section	m	7.80	
Diameter of hole	in test area	mm	146	Centre	e of test section	m	7.00	
Weather	Cloudy			Botto	m of hole at time o	of test m	10.00	
Type of rock	Chalk				m of casing	m		
					ground water leve			
					ned standing wate			
				_	h of test section	. m		
	E	T			ht above ground le	lncremental Lugeon	0.00	_
Period	Flow I/min	Gauge Pressure bar	Head of water m	Friction head loss m	Total head m	Value	permeability m/s	
1st	30.13	8.6 m head	#VALUE!	0.00	#VALUE!	#VALUE!	#VALUE!	
2nd								
3rd								٦
4th								٦
5th								٦
								_
35.00]
30.00								
25.00								
도 20.00 —								-
(E 20.00 + 20.								
10.00								
5.00 —								-
0.00								
20.0	0 :	30.00	40.00	50.00	60.00	70.00	80	.0
	ed from graph:	1		Total head (m)				
	00/l)(q/h) (where	ALUE! e I is the length o			=	#VALUE!	_	
	ng 1 Lugeon unit	is equal to a per	meability of 10	m/s		#VALUE!	m/s	
Crew/Operator						SOIL O	(S)	
Form No. S	E-PGR-F-010	Revision No.	2.04	Issue Date 24.	/01/2014		achy Soletanche Group	_

Project No. Engineer Client Test no. Packer type Packer pressure Diameter of hole Weather	Barhale Li	:Donald Be	ntley			acker o		ļ		H_STW_00	
Client Test no. Packer type Packer pressure Diarneter of hole	Barhale Li		ntley			R	ecord			Ground Leve 10.248 mAO	
Client Test no. Packer type Packer pressure Diameter of hole		mited						-		Date	·U
Test no. Packer type Packer pressure Diarneter of hole		mitea				DC E030 4	000 Cl			31/08/2022	<u> </u>
Packer type Packer pressure Diarneter of hole	С					BS 5930: 1	999: Clause	25.5		Page 1 of 2	
Packer pressure Diameter of hole	0	ñ	10	2		Depth below	w ground le	el to			
Diameter of hole		ouble - usin	ıg initial grou	ındwater level		Торо	f test sectio	n	m	3	.70
			bar	7		Botto	m of test se	ction	m	5	.30
Weather	in test area		mm	146		Centr	e of test sec	tion	m	4	.50
	Cloud	•					-	time of test		_	0.00
Type of rock	Chall	(m of casing		m	_	.60
							ground wat		m	_	.70 .70
							ned standing th of test sec	g water level		_	.60
						•	in or lest sec ht above gro		m	_	.00
1st period		Gauge Press	sure bar	0.52	- 0	Friction head		0.0	***		
Time min	. 0	2	4	6	8	10	12	14	16		Averag I/n
-		46281	46319	46357	46395	46432	46469	46506	46543		
Readings litres											18.
Take Intre:	•	36	38	38	38 %	37	37	37	37		
2nd period	1	Gauge Press	eure bar	0.67		Friction head	lloss m	0.0			Averag
Time mins	0	2	4	6	8	10	12	14	16		Vn
Readings litres	46621	46659	46699	46738	46778	46813	46852	46891	46931		19
Take Intres	3	38	40	39	40 _	35	39	39	40] 13
3rd period	•	Gauge Press	sure bar	0.71		Friction head	lloss m	0.0			Averag
Time min	0	2	4	6	8	10	12	14	16		Vn
Readings Irtres	47023	47054	47085	47121	47155	47188	47221	47255	47292		
										1	40
Take litres	3	31	31	36	34	33	33	34	37		- 16
	3	31 Gauge Press		0.64	34	33 Friction head	- 6	34 0.0	37		
Take litres 4th period Time mins		V V			8	100	- 6		37 16		Averag
4th period	s 0	Gauge Press	sure bar	0.64	,	Friction head	lloss m	0.0			Averag 1/n
4th period Time min: Readings litre:	5 0 5 47342	Gauge Press	sure bar	0.64	8	Friction head	l loss m	0.0	16		Averag 1/n
4th period Time mins Readings litres Take litres	5 0 5 47342	Gauge Press 2 47373 31	4 47405 32	0.64 6 47438	8 47471	10 47503	1 loss m 12 47534 31	0.0 14 47566	16 47597		Averag Vn
4th period Time mins Readings litres Take litres Sth period	s 0 s 47342	Gauge Press 2 47373 31 Gauge Press	4 47405 32 sure bar	0.64 6 47438 33 0.55	8 47471 33	Friction head 10 47503 32 Friction head	11 loss m 12 47534 31 11 loss m	0.0 14 47566 32 0.0	16 47597 31		Averag 1/n 15 Averag
4th period Time mins Readings litres Take litres Sth period Time mins	5 0 5 47342 5 0	Gauge Press 2 47373 31 Gauge Press 2	4 47405 32 sure bar	0.64 6 47438 33 0.55 6	8 47471 33 8	Friction head 10 47503 32 Friction head	12 47534 31 1loss m	0.0 14 47566 32 0.0	16 47597 31		Averag
4th period Time mine Readings litre: Take litre: 5th period Time mine Readings litre:	0 47342 3 6 0 47619	Gauge Press 2 47373 31 Gauge Press 2 47644	4 47405 32 sure bar 4 47670	0.64 6 47438 33 0.55 6 47699	8 47471 33 8 47720	10 47503 32 Friction head 10 47755	1 loss m 12 47534 31 1 loss m 12 47783	0.0 14 47566 32 0.0 14 47812	16 47597 31 16 47840		Averag I/n 15.
4th period Time mins Readings litres Take litres Sth period Time mins Readings litres Take litres	0 47342 5 0 47619	Gauge Press 2 47373 31 Gauge Press 2	4 47405 32 sure bar	0.64 6 47438 33 0.55 6	8 47471 33 8	Friction head 10 47503 32 Friction head	12 47534 31 1loss m	0.0 14 47566 32 0.0	16 47597 31		Averag 15 Averag I/n
4th period Time mine Readings litre: Take litre: Sth period Time mine Readings litre: Take litre: Pipework and Drill:	0 47342 5 0 47619	Gauge Press 2 47373 31 Gauge Press 2 47644	4 47405 32 sure bar 4 47670	0.64 6 47438 33 0.55 6 47699 29	8 47471 33 8 47720	10 47503 32 Friction head 10 47755 35	1 loss m 12 47534 31 1 loss m 12 47783 28	0.0 14 47566 32 0.0 14 47812 29	16 47597 31 16 47840 28		Average I/n Average I/n 13
4th period Time mins Readings litres Take litres Sth period Time mins Readings litres Take litres	0 47342 5 6 7 9 9 9 9 9 9 9	Gauge Press 2 47373 31 Gauge Press 2 47644	4 47405 32 sure bar 4 47670	0.64 6 47438 33 0.55 6 47699	8 47471 33 8 47720	10 47503 32 Friction head 10 47755 35 Total length	1 loss m 12 47534 31 1 loss m 12 47783 28	0.0 14 47566 32 0.0 14 47812 29 Cluding 'stick	16 47597 31 16 47840 28	_	Averag I/n 15 Averag I/n

Project Name	Cambridge Was	te Water Treatm	ent Plant	Packer or	Lugeon To	est		Hole ID
Decipat No	Relocation TE8364			\$0.4	ecord			_STW_003A round Level
Project No.	1E0304							0.248 mAOD
Engineer	Mott MacDonal	ld Bentley					_	Date
Client	Barhale Limited	1		RS 5930- 19	999: Clause 25.5	, ├		1/08/2021 Page
CHETIC	barriale Elimited			D 3 3330. 1.	555. Cidusc 25			2 of 2
Test no.	k.	15 8	2	Depth below	v ground level to			
Packer type	Double	- using i n itial grou	ındwater level	Top of	f test section		m	3.70
Packer pressure		bar	7	Botto	m of test section		m	5.30
Diameter of hole	in test area	mm	146		e of test section		m	4.50
Weather	Cloudy			Botto	m of hole at time	of test	m	10.00
Type of rock	Chalk				m of casing		m	1.60
					ground water lev		m	5.70
					ned standing wat	er level	m	5.70
				_	h of test section		m	1.60
				Gauge heigl	ht above ground I		m	0.00
Period	Flow I/min	Gauge Pressure bar	Head of water m	Friction head loss m	Total head m	Incremental Value	_	permeability m/s
1st	18.63	0.52	5.20	0.00	10.90	106.8	3	1.1E-05
2nd	19.38	0.67	6.70	0.00	12.40	97.7		9.8E-06
3rd	16.81	0.71	7.10	0.00	12.80	82.1		8.2E-06
4th	15.94	0.64	6.40	0.00	12.10	82.3		8.2E-06
5th	13.81	0.55	5.50	0.00	11.20	77.1		7.7E-06
25.00 — 20.00 — ([w]w/]) 5 % 6 ([/w]u) 15.00 — 5.00 —		1						
0.00	0 11.00	12.00 13	3.00 14.00	15.00	16.00 17.0	00 18	00	19.00 20.

Determined from graph:

1.579 Slope of graph

L, from (100/I)(q/h) (where I is the length of the test section in metres)

Lugeons

98.7

k, assuming 1 Lugeon unit is equal to a permeability of $10^{-7} \mathrm{m/s}$

9.9E-06_m/s

•	Crew/Operato	or					
ı F	Tom Walton /	Ace Drilling					SOIL ENGINEERING
Ī	Form No.	SE-PGR-F-010	Revision No.	2.04	Issue Date	24/01/2014	Part of the Bachy Soletanche Group

Project No.		later Treatment Plar		Packer of	r Lugeon	iest		אופ וט W_013C
	Relocation TE8364			R	ecord		Grour	nd Level
Engineer	Mott MacDonald Be	entlev				<u> </u>		2 mAOD Date
		mady						8/2021
Client	Barhale Limited			BS 5930: 1	1999: Clause 2	:5.5		age of 2
Test no.	1 1841.211	A C S Date of		Depth belo	w ground level	to		
Packer type	Double - using	g assumed groundwate	er level	Тор с	of test section		m	8.65
Packer pressure		bar 8.5		Botto	om of test section	on	m	10.25
Diameter of hole		mm 146		Cent	re of test sectio	n	m	9.45
Weather	Cloudy				om o <mark>f h</mark> ole at tir	ne of test	m	13.10
Type of rock	Chalk				om of casing		m	1.60
					l ground water		m	
					med standing w		m	1.60
				_	th of test section		m m	0.00
lst period	Gauge Press	sure bar		Friction head	ght above groun	id level	m	
Time min		T			T T			Average Flo
		 						
Readings litres					-			
Take Intre				9 morane	- 16			
2nd period	Gauge Press	sure bar		Friction head	d loss m			Average Flo
Time min	5							1/min
Readings litre	5							
Take Intres	s			22				
3rd period	Gauge Press	sure bar		Friction head	diloss m			Average Flo
Time min	5							l/min
Readings Intres	s							
Take Intre:	s							
		sure bar		Friction head	d loss m			Average Flo
ith period	Gauge Press	sure bar	1					
fth period	-	Sure Dai						l/min
Time min	5	- Dai						Vmin
Time mins	5 S	Dail Dail						Vmin
Firme mining litre:	s s			Friction beau	dloss m			
Firme mine Readings litre: Fake litre: Sth period	s Gauge Press			Friction head	d loss m			V/min Average Flo
Firme mins Readings litres Fake litres Sth period	s Gauge Press			Friction head	d loss m			Average Flo
Firme mins Readings litre: Fake litre: Sth period Firme mins Readings litre:	Gauge Press			Friction head	d loss m			Average Flo
Firme mins Readings litre: Fake litre: Sth period Firme mins Readings litre: Fake litre:	Gauge Press			Friction head	d loss m			Average Flo
Firme mine Readings Intre: Fake Intre: Sth period Firme mine Readings Intre: Fake Intre: Pipework and Drill	Gauge Press	sure bar		Ta An	p.h			Average Flo
Firme mins Readings litre: Fake litre: Sth period Firme mins Readings litre: Fake litre:	Gauge Press			Total length	d loss m of drill rod (incluse) of delivery hose in		m	Average Flo

Project Name	Cambridge Waste Wat	er Treatment Plant	P	acker or	Lugeo	n Test		טו פ ו ט TW_013C
Project No.	Relocation TE8364			Re	ecord		Grou	nd Level
Engineer	Mott MacDonald Bent	lev				\vdash		2 mAOD Date
- A		,						8/2021
Client	Barhale Limited			BS 5930: 19	999: Clause	e 25.5		Page of 2
Test no.		2		Depth below				
Packer type	Double - using as	ssumed groundwater l	level		test section		m	6.80
Packer pressure	1.10	bar 10			m of test se		m	8.40
Diameter of hole i		mm 146			e of test sec		m	7.60
Weather	Cloudy Chalk					time of test	m	13.10 1.60
Type of rock	Cliain				m of casing ground wat	or loval	m m	1.00
						g water level	m	
					n of test sec		m	1.60
				Gauge heigh			m	0.00
1st period	Gauge Pressure	re bar		Friction head		0.0		Average Flow
Time mins	:							1/min
Readings litres				1				
Take Intres	;			8	- 14			
2nd period	Gauge Pressur	e bar		Friction head	loss m			Average Flow
Time mins	;							l/min
Readings litres				1				
Take Intres				· .	6			
3rd period	Gauge Pressur	e bar	<u> </u>	Friction head	loss m		<u> </u>	Average Flow
Time mins								l/min
Readings Intres	;							
Take Intres				3	GP.			
4th period	Gauge Pressur	e bar		Friction head	loss m			Average Flow
Time mins								l/min
Readings Irtres								
Take Intres				52	-			
5th period	Gauge Pressur	e bar		Friction head	loss m		•	Average Flow
Time mins	;							I/min
Readings Intres	;			1				
Take litres				1				
Pipework and Drill S	tring Details		-	н э	la contract	4	-	<u> </u>
Type of drill rod			1	Total length o	of drill rod (in	cluding 'stick up') m	
Diameter of delivery	/ hose	тт		Total length o	of delivery ho	se in metres	m	
Remarks Bled system Attem B B B	pt to build pressure – injectin	g 170 I/min. Bypass of to	op packer - c	ancelled.			26	
Crew/Operator	±1 ==						•	
Form No S	F-PGR-F-009 Revision	1 No. 2 04	cen	e Date 24/	01/2014		Part of the Bachy Sc	

Double - using as	ssumed groundv	3 water le ve l		930: 1	ecord 999: Clause wground lev		•	H_STW_01 Ground Lew 7.012 mAO Date 25/08/202: Page 1 of 2	el D
t MacDonald Bent ale Limited Double - using as	ssumed groundv	15						Date 25/08/202: Page	
Double - using as	ssumed groundv	15						25/08/202: Page	1
Double - using as	ssumed groundv	15						Page	
Double - using as	ssumed groundv	15	Depti	h belov	w ground le	vel to		1012	
Double - using as	ssumed groundv	15			•				
1.1			l	Торо	f test sectio		m	8	1.65
area		10			m of test se		m	10	0.25
	mm 1	46		Centr	e of test sec	ction	m	9	.45
Cloudy				Botto	m of hole at	t time of test	: m	13	3.10
Chalk				Botto	m of casing		m	1	60
				Initial	ground wat	ter level	m		
				Assur	ned standin	g water leve	l m		
			2	Lengt	h of test sec	ction	m	1	60
4 1 100			Gaug	je heig	ht above gro	ound level	m	0	.00
Gauge Pressur	re bar		Friction	on head	loss m	0.0			Average Flow
									l/min
		$\overline{}$	$\overline{}$						
			8		- 14				1
Gauge Pressur	re bar		Fnctio	on head	loss m			<u>'</u>	Average Flow
									1/min
			$\neg \uparrow \neg$						
			82						1
Gauge Pressur	re bar		Fnctio	on head	lloss m				Average Flow
									l/min
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Gauge Pressur	re bar	_	Fnctic	on head	lloss m				Average Flow
		_	$\overline{}$						I/min
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Gauge Process	n har		Enetic	an baad	lloce m				
Gauge Flessui	e bai		FIECK	JII NEau	11055 111	<u> </u>	<u> </u>		Average Flow
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		-							-
etails			14 JI		2.120 .46-	2 2 4 4 4 4	45	Ι	
			- 11		<u> </u>				
	mm		I Otai	lengtn (of delivery no	se in metres	m		
	Gauge Pressur Gauge Pressur Gauge Pressur	Gauge Pressure bar Gauge Pressure bar Gauge Pressure bar Gauge Pressure bar	Gauge Pressure bar Gauge Pressure bar Gauge Pressure bar Gauge Pressure bar Octavity of the control of the	Gauge Pressure bar Friction Gauge Pressure bar Friction Gauge Pressure bar Friction Gauge Pressure bar Friction Gauge Pressure bar Friction Gauge Pressure bar Friction Total	Gauge Pressure bar Friction head Gauge Pressure bar Friction head Gauge Pressure bar Friction head Gauge Pressure bar Friction head Gauge Pressure bar Friction head Gauge Pressure bar Friction head Total length	Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Total length of drill rod (in	Length of test section Gauge Pressure bar Friction head loss in 0.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Friction head loss in 5.0 Gauge Pressure bar Friction head loss in 5.0 Friction head loss in	Length of test section m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m	Length of test section m 1 Gauge Pressure bar Friction head loss m 0.0 Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m Gauge Pressure bar Friction head loss m

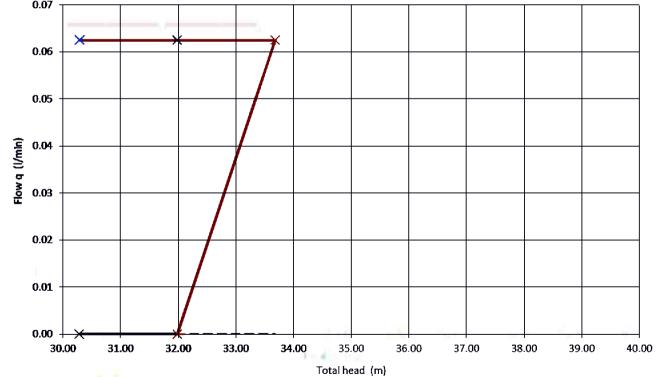
Double - using as	4	ater le vel 0	BS 5930: 1 Depth belo Top o Botto Centr	ecord 1999: Claus w ground le of test section om of test se	evel to	7		el D 1
MacDonald Bentl ale Limited Double - using as area r	4:sumed groundwarbar 10	ater le vel 0	Depth belo Top o Botto Centr	w ground le of test section om of test se	evel to	m	Date 25/08/2021 Page 1 of 2	.80
Double - using as area r	4:sumed groundwarbar 10	ater le vel 0	Depth belo Top o Botto Centr	w ground le of test section om of test se	evel to	m	25/08/2021 Page 1 of 2	.80
Double - using as area r Cloudy	sumed groundwa	ater le vel 0	Depth belo Top o Botto Centr	w ground le of test section om of test se	evel to	m	Page 1 of 2	.80
Double - using as area r Cloudy	sumed groundwa	ater le vel 0	Top o Botto Centr	of test section	on		6.	
Double - using as area r Cloudy	sumed groundwa	ater le vel 0	Top o Botto Centr	of test section	on			
area r Cloudy	bar 10	0	Botto Centr	om of test se		m	8	
Cloudy				re of test se			-	.40
•			Rotto	I OI LEST SE	ction	m	7.	.60
CHALK		- 1	-	om of hole a	t time of test	m	13	3.10
			Botto	om of casing)	m	1	.60
V 1982			Initia	l ground wa	iter level	m		
V 196			Assur	med standir	ng water level	m		
4 20			Leng	th of test se	ction	m	1	60
	11		Gauge heig	ght above gr	ound level	m	0.	.00
Gauge Pressure	e bar		Friction head	m szolt	0.0			Average Flow
				Ī	T		_ 	l/min
					T			
			9	100				Ī
Gauge Pressure	e bar		Friction head	d loss m				Average Flow
					\Box			l/min
							<u> </u>	
			% <u> </u>		†			-
Gauge Pressure	e bar		Friction head	d loss m				Average Flow
								1/min
								-
Gauge Pressure	e bar		Friction head	dloss m				Average Flow
				T				l/min
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Gauge Pressure	e har	+	Enction bear	lloss m				. 5
daugo	, pa		111000011112	11000 11.				Average Flow I/min
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rtans	<u> </u>		Total langth	-4 d-ill and fix	ludina letick	/\ m		
7.4		\longrightarrow		-				
	min		10tal longer	OI USIIVOIY III	Se III IIIcaes	""		
	Gauge Pressure Gauge Pressure Gauge Pressure	Gauge Pressure bar Gauge Pressure bar Gauge Pressure bar etails	Gauge Pressure bar Gauge Pressure bar Gauge Pressure bar etails	Gauge Pressure bar Friction head Gauge Pressure bar Friction head Gauge Pressure bar Friction head Gauge Pressure bar Friction head Total length	Gauge Pressure bar Friction head loss im Gauge Pressure bar Friction head loss im Gauge Pressure bar Friction head loss im Gauge Pressure bar Friction head loss im Total length of drill rod (in Total length of delivery head length of delivery	Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Total length of delivery hose in metres	Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Total length of drill rod (including 'stick up') in in in in interest in inter	Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Gauge Pressure bar Friction head loss in Total length of drill rod (including 'stick up') in in in in in in in in in in in in in

Hole ID Cambridge Waste Water Treatment Plant Project Name **Packer or Lugeon Test** BH_STW_022A Relocation Record **Ground Level** Project No. TE8364 8.462 mAOD Date Mott MacDonald Bentley Engineer 07/09/2021 **Barhale Limited** BS 5930: 1999: Clause 25.5 Page Client 1 of 2 Test no. Depth below ground level to 7.20 Packer type Double - using initial groundwater level Top of test section m 9 2 20 Packer pressure **Bottom of test section** bar m 146 Diameter of hole in test area Centre of test section 8.00 m Weather Bottom of hole at time of test 14.10 m Type of rock Chalk Bottom of casing 3.00 m 1.94 Initial ground water level m 1.94 Assumed standing water level m Length of test section 1.60 m 0.00 Gauge height above ground level m 1st period Gauge Pressure bar Friction head loss im Average Flow **V**min Time mins Readings litres Take Irtres 2nd period Gauge Pressure Friction head loss im Average Flow **V**min Time mins Readings litres Take Irtres 3rd period Gauge Pressure bar Friction head loss im Average Flow **V**min Time mins Readings Irtres Take Irtres Gauge Pressure 4th period Friction head loss im bar Average Flow **V**min Time mins Readings Irtres Take Irtres 5th period Gauge Pressure Friction head loss im Average Flow **V**min Time mins Readings Irtres Take litres Pipework and Drill String Details Type of drill rod Total length of drill rod (including 'stick up') m Diameter of delivery hose mm Total length of delivery hose in metres m Remarks Failed test bypassing top packer 130 l/min. Crew/Operator TW **SOIL ENGINEERING** SE-PGR-F-009 24/01/2014 Form No. Revision No. 2.04 ssue Date Part of the Bachy Soletanche Group

Project No.	Dalasatis:		atment Plant	Packer of	. Lagor		DLI 6	ማግለ/ ሰንጋል
10,000	Relocation TE8364			971	Record			STW_022A und Level
								52 mAOD
Engineer	Mott MacDona	ld Bentley					07/	Date '09/2021
Client	Barhale Limited	l		BS 5930:	1999: Clause	e 25.5		Page
Test no.			1	Depth bel	low ground le	wel to		1 of 2
Packer type	Double	- using initial (groundwater level		of test sectio		m	7.20
Packer pressure	•	bar	9		tom of test se		m	8.80
Diameter of hole i	in test area	mm	146		ntre of test sec		m	8.00
Weather	Sunny			1.70	tom of hole at		m	14.10
Type of rock	Chalk			Bot	tom of casing		m	3.00
				Initi	ial ground wat	ter level	m	1.94
				Ass	umed standin	g water level	m	1.94
				Len	gth of test sec	ction	m	1.60
1211		and the		, Gauge he	ight above gro	ound level	m	0.00
1st period	Gauge	e Pressure t	bar	Friction he	adloss m	0.0		Average
Time mins	3							Vm
Readings litres	3							
Take Intres	s			99				
2nd period	Gauge	e Pressure d	bar	Fnction he	ad loss m	Ī		Average
Time mins	 				<u></u>			Average I/m
Readings litres								
Keadings nues	·					l I		
			1 1	I				
				9 .	- 0			
		e Pressure 1	bar	Friction he	ad loss m			Average
3rd period	Gauge	Pressure I	bar	Friction he	ead loss m			Averago I/m
3rd period	Gauge	Pressure I	bar	Friction he	ead loss m			
3rd period Time mins Readings Intres	Gauge	Pressure I	bar	Friction he	ad loss m			
3rd period Time mins Readings litres Take litres	Gauge		bar	9	ead loss m			I/m
3rd period Tirne mins Readings Intres	Gauge			9				
3rd period Time mins Readings litres Take litres 4th period Time mins	Gauge S S Gauge			9				I/m
3rd period Time mins Readings litres Take litres 4th period Time mins Readings litres	Gauge			9				I/m
3rd period Time mins Readings litres Take litres 4th period Time mins Readings litres Take litres	Gauge	e Pressure 1	bar	Friction he	ead loss m			Average I/m
3rd period Time mins Readings litres Take litres 4th period Time mins Readings litres Take litres Sth period	Gauge Gauge Gauge Gauge	e Pressure l		9	ead loss m			I/m
3rd period Tirne mins Readings litres Take litres 4th period Time mins Readings litres Take litres Sth period Time mins	Gauge Gauge Gauge Gauge	e Pressure 1	bar	Friction he	ead loss m			Average I/m
3rd period Time mins Readings litres Take litres 4th period Time mins Readings litres Take litres Sth period	Gauge Gauge Gauge Gauge	e Pressure 1	bar	Friction he	ead loss m			Average I/m
3rd period Tirne mins Readings litres Take litres 4th period Time mins Readings litres Take litres 5th period Time mins Readings litres Take litres Take litres	Gauge Gauge Gauge Gauge Gauge Gauge	e Pressure 1	bar	Friction he	ead loss m			Averag
3rd period Time mins Readings litres Take litres 4th period Time mins Readings litres Take litres 5th period Time mins Readings litres Take litres Take litres	Gauge Gauge Gauge Gauge Gauge Gauge	e Pressure 1	bar	Friction he	ead loss m			Average I/m
3rd period Tirne mins Readings litres Take litres 4th period Time mins Readings litres Take litres 5th period Time mins Readings litres Take litres Take litres	Gauge Gauge Gauge Gauge Gauge Gauge Gauge Gauge Gauge Gauge	e Pressure 1	bar	Friction he Friction he Total lengt	ead loss m	cluding 'stick up')	m	Averag

+	Relocation		ater Treat	ment Plant	Pa	acker o		n Test		Hole ID H_TUN_00	
Project No.	TE8364					R	ecord			Ground Leve 6.908 mAOI	
Engineer	Mott Mad	:Donald Be	ntley							Date	
7			·			DC E030 4	000 6	25.5		08/09/2021	<u> </u>
Client	Barhale Li	imited				BS 5930: 1	.999: C <mark>l</mark> aus	e 25.5		Page 1 of 2	
Test no.	_	n.	, j.	1		•	w ground le			_	
Packer type	L)ouble - usin	-	oundwater level			of test section		m	_	.70
Packer pressure			bar	10 146			om of test se		m		.30 .50
Diameter of hole i Weather		y and Hot	mm	140			re of test sec	uon t time of test	m : m		.30 7.30
Type of rock		t Clay					om of casing		. m	_	.00
		,					l ground wa		m		5.98
								g water leve	l m	16	5.98
						Leng	th of test se	ction	m	1	.60
57 1		L COM			14	Gauge heig	ht above gr	ound level	m	0.	.00
1st period		Gauge Press	ure bar	r 1.33		Friction head	lloss m	0.0			Avera
Time mins	. 0	2	4	6	8	10	12	14	16		I/ı
Readings litres	50277	50277	50277	50277	50277	50277	50277	50277	50278		0
Take Intres		0	0	0	0 %	0	0	0	1] "
2nd period	•	Gauge Press	ure bar	r 1.50		Friction head	dloss m	0.0			Avera
Time mins	. 0	2	4	6	8	10	12	14	16		I/i
Readings litres	50282	50282	50282	50282	50282	50282	50283	50283	50283		
Take Irtres	:	0	0	0	0	0	1	0	0		0
3rd period	ı	Gauge Press	ure ba	r 1.67		Friction head	dloss m	0.0			Averag
Time mins	0	2	4	6	8	10	12	14	16		I/ı
Readings Irtres	50284	50284	50284	50284	50284	50284	50285	50285	50285		0
Take Irtres	;	0	0	0	0	0	1	0	0		
4th period		Gauge Press	ure ba	r 1.50		Friction head	dloss m	0.0			Avera
Time mins	. 0	2	4	6	8	10	12	14	16		Vi
Readings Titres	50285	50285	50285	50285	50285	50285	50285	50285	50285		0
Take Intres		0	0	0	0 8	0	0	0	0		_
5th period		Gauge Press	ure ba	r 1.33		Friction head	illoss m	0.0			Avera
Time mins	0	2	4	6	8	10	12	14	16		Vi
Readings Irtres	50285	50285	50285	50285	50285	50285	50285	50285	50285		0
Take litres	:	0	0	0	0	0	0	0	0		
Pipework and Drift S	tring Details					ii)		- 0			
Type of drill rod				2 3/8		Total length	of drill rod (in	cluding 'stick	up') m	7	.50
Diarneter of delivery	hose		mm	50.8		Total length	of delivery ho	se in metres	m	5	.00
Remarks Water supply tanks	observed for	loss of water o	dun <mark>n</mark> g test. I	No loss observed.							
Crew/Operator									-		
•											

Project Name Project No.	Cambridge Wa Relocation TE8364	ste Water Treatm	ent Plant	But 14 '00' A	Lugeon Te ecord	est	Hole ID BH_TUN_00: Ground Leve 6.908 mAOD	l
Engineer	Mott MacDona	ld Bentley					Date	'
						_	08/09/2021	
Client	Barhale Limited	1		BS 5930: 1	999: Clause 25.5	•	Page 2 of 2	
Test no.			1	Depth below	w ground level to			
Packer type	Double	: - using initial grou	ındwater level	Торо	f test section	1	m 7.	70
Packer pressure		bar	10	Botto	m of test section	- 1	m 9.3	30
Diameter of hole	in test area	mm	146	Centre	e of test section		m 8.9	50
Weather	Sunny and	Hot		Botto	m of hole at time	of test	m 27.	30
Type of rock	Caush Class			l =				
.75	Gault Clay			Rotto	m of casing	п.	m 6.0	00
.762 21.22	Gaun Clay				m of casing ground water lev		m 6.0 m 16.	_
.>=====================================	Gaun Clay			Initial		rel i		.98
.763 000	Gaun Clay			Initial Assun	ground water lev	vel i erlevel i	m 16	.98 .98
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Gaun Clay			Initial Assur Lengt	ground water lev	rel : er level : evel :	m 16.m 16.m 2.0m 0.0m	98 98 90 50
Period	Flow I/min	Gauge Pressure bar	Head of water m	Initial Assur Lengt	ground water level ned standing water here. The standing water here to be section.	rel : er level :	m 16.m 16.m 2.0m 0.0m	98 98 50 00
	Flow	Gauge Pressure	-	Initial Assur Lengt Gauge heig	ground water level ned standing water he of test section ht above ground lead	er level : evel : Incremental Lugeo	m 16 m 16 m 1.0 m 0.0 m Increment permeabil	98 98 60 00 tal
Period	Flow I/min	Gauge Pressure bar	m	Initial Assur Lengt Gauge heig Friction head loss m	ground water lev ned standing wat h of test section ht above ground I Total head m	er level in evel incremental Lugeo Value	m 16. m 16. m 0.0 m 0.0 n Increment permeabil m/s	98 98 50 00 tal
Period 1st	Flow I/min 0.06	Gauge Pressure bar 1.33	m 13.30	Initial Assur Lengt Gauge heigi Friction head loss m 0.00	ground water level need standing water he of test section that above ground I Total head m 30.28	er level inevel incremental Lugeo Value 0.1	m 16 m 16 m 1.0 m 0.0 m Increment permeabil m/s 1.3E-08	98 98 50 00 tal ity
Period 1st 2nd	Flow I/min 0.06 0.06	Gauge Pressure bar 1.33 1.50	m 13.30 15.00	Initial Assur Lengt Gauge heigi Friction head loss m 0.00	ground water level need standing water he of test section has above ground lead on 30.28	er level 1 evel 1 Incremental Lugeo Value 0.1	m 16. m 16. m 16. m 10. m 0. increment permeabil m/s 1.3E-08	98 98 50 00 tal ity



Determined from graph:

Slope of graph 0.000

L, from (100/l)(q/h) (where l is the length of the test section in metres)

k, assuming 1 Lugeon unit is equal to a permeability of 10^{-7}m/s

0.0 Lugeons 0.0E+00 m/s

Crew/Operator								
MM / DT						soit engineering		
Form No.	SE-PGR-F-010	Revision No.	2.04	Issue Date	24/01/2014	Part of the Bachy Soletanche Group		

Project No. Engineer Client Test no. Packer type Packer pressure Diameter of hole Weather	Barhale Li	:Donald Be	ntley				ecord	1	DL		
Client Test no. Packer type Packer pressure Diarneter of hole	Barhale Li		ntley						BH_TUN_006PM Ground Level		
Client Test no. Packer type Packer pressure Diarneter of hole	Barhale Li		naey						6.585 mAOD Date		D
Test no. Packer type Packer pressure Diarneter of hole		mited	n A							30/09/2021	ī.
Packer type Packer pressure Diarneter of hole	Γ	lient bamaie Limited					999: Clause	e 25.5		Page 1 of 2	
Packer pressure Diameter of hole	[0.00		1		Depth below	w ground le	el to			
Diameter of hole		ouble - usin	ıg initial gro	undwater level		Торо	f test section	n	m	14	4.40
			bar	16		Botto	m of test se	ction	m	16	6.00
Weather	in test area		mm	146		Centr	e of test sec	tion	m		5.20
		cast, rain					-	time of test			3.00
Type of rock	Clay						m of casing	as laval	m		l.50 .5 4
							l ground wat med standin	er ievei g water level	m I m	_	.54 .54
							th of test sec	7	m	_	.60
						•	ht above gro		m		.00
1st period		Gauge Press	ure bar	2.52		Friction head		0.0			Averag
Time min	s 0	2	4	6	8	10	12	14	16		I/r
Readings litre	s 50569	50569	50569	50569	50569	50569	50569	50569	50569		_
Take Intre:	s	0	0	0	0 %	0	0	0	0		0.
2nd period		Gauge Press	ure bar	2.72		Friction head	lloss m	0.0			Averaç
Time min	s 0	2	4	6	8	10	12	14	16		l/r
Readings litres	s 50569	50569	50569	50569	50569	50569	50569	50569	50569		
Take Intres	3	0	0	0	0	0	0	0	0		0.
3rd period	•	Gauge Press	ure bar	2.92		Friction head	lloss m	0.0		1	Averag
								0.0			WAGIGE
Time min	0	2	4	6	8	10	12	14	16		_
		2 50567	4 50567	6 50567	8 50567	1	I		16 50567		Vr
Readings Intre	s 50567					10	12	14			Vr
Readings Intre	s 50567	50567	50567	50567	50567	10 50567	12 50567 0	14 50567	50567		U/r - 0.
Readings Intre: Take Intre: 4th period	50567	50567	50567	50567	50567	10 50567 0	12 50567 0	14 50567 0	50567		U/r 0.
Readings Intre: Take Intre: 4th period Time min:	50567 5 5	50567 0 Gauge Press	50567 0 ure bar	50567 0 2.72	50567 0	10 50567 0 Friction head	12 50567 0	14 50567 0 0.0	50567		O. Averag
Readings Intres Take Intres 4th period Time mins Readings Intres	s 50567 s 50567	50567 0 Gauge Press	50567 0 ure bar	50567 0 2.72 6	50567 0 8	10 50567 0 Friction head	12 50567 0 1 loss m	14 50567 0 0.0	50567 0 16		O. Averag
Readings Intre: Take Intre: 4th period Time mine Readings Intre: Take Intre:	s 50567 s 50567	50567 0 Gauge Press 2 50557	50567 0 ure bar 4 50557	50567 0 2.72 6 50557	50567 0 8 50557	10 50567 0 Friction head 10 50557	12 50567 0 1 loss m 12 50557	14 50567 0 0.0 14 50557	50567 0 16 50557		Averag
Readings Intres Take Intres 4th period Time mins Readings Intres Take Intres Sth period	5 50567 5 0 5 50557	50567 0 Gauge Press 2 50557	50567 0 ure bar 4 50557	50567 0 2.72 6 50557 0	50567 0 8 50557	10 50567 0 Friction head 10 50557	12 50567 0 1 loss m 12 50557	14 50567 0 0.0 14 50557	50567 0 16 50557		Averag
Readings Intres Take Intres 4th period Time mins Readings Intres Take Intres Sth period	s 50567 s 0 s 50557 s 0	50567 0 Gauge Press 2 50557 0 Gauge Press	50567 0 ure bar 4 50557 0	50567 0 2.72 6 50557 0 2.52	50567 0 8 50557	10 50567 0 Friction head 10 50557 0	12 50567 0 11 loss m 12 50557 0	14 50567 0 0.0 14 50557 0	50567 0 16 50557 0		Average I/m
Readings Intre: Take Intre: 4th period Time min: Readings Intre: Take Intre: 5th period Time min:	\$ 50567 \$ 0 \$ 50557 \$ 0 \$ 50557	50567 0 Gauge Press 2 50557 0 Gauge Press 2	50567 0 ure bar 4 50557 0 ure bar	50567 0 2.72 6 50557 0 2.52 6	50567 0 8 50557 0	10 50567 0 Friction head 10 50557 0 Friction head	12 50567 0 1 loss m 12 50557 0	14 50567 0 0.0 14 50557 0 0.0 14	50567 0 16 50557 0		Average I/m
Readings litres Take litres 4th period Time mins Readings litres Take litres 5th period Time mins Readings litres	5 50567 5 0 5 50557 6 50557	50567 0 Gauge Press 2 50557 0 Gauge Press 2 50557	50567 0 ure bar 4 50557 0 ure bar 4 50557	50567 0 2.72 6 50557 0 2.52 6 50557	50567 0 8 50557 0 8 50557	10 50567 0 Friction head 10 50557 0 Friction head 10 50557	12 50567 0 1 loss m 12 50557 0 1 loss m 12 50557	14 50567 0 0.0 14 50557 0 0.0 14 50557	50567 0 16 50557 0 16 50557		Averag
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Project Name	e Cambridge Wa	ste Water Treatm	nent Plant	Packer or	Lugeon Te	est BH	Hole ID _TUN_006PM		
Project No.	TE8364			R	ecord	•	Ground Level		
Engineer	Mott MacDona	ald Bentlev					6.585 mAOD Date		
Client	Barhale Limite	_		RS 5930-1	999: Clause 25.5		30/09/2021 Page 2 of 2		
Clienc	Damaic Limito								
est no.	H 15 K		1		w ground level to				
		e - using initial grou			f test section	m			
Packer pressure		bar	16		m of test section	m			
Diameter of hole in test area mm			146		re of test section	m			
Neather	Overcast, i	rain			om of hole at time o				
Type of rock	Clay				m of casing I ground water leve	m al m			
					ned standing water				
					th of test section	m m			
				1	ht above ground le				
	Flow	Gauge Pressure	Head of water	Friction head loss	Total head	Incremental Lugeon	Incremental	Т	
Period	l/min	bar	m	m	m	Value	permeability m/s		
1st	0.00	2.52	25.20	0.00	33.74	0.0	0.0E+00	1	
2nd	0.00	2.72	27.20	0.00	35.74	0.0	0.0E+00	1	
3rd	0.00	2.92	29.20	0.00	37.74	0.0	0.0E+00		
4th	0.00	2.72	27.20	0.00	35.74	0.0	0.0E+00		
5th	0.00	2.52	25.20	0.00	33.74	0.0	0.0E+00		
0.80 - 0.70 - 0.60 - 0.50 - 0.30 - 0.20 - 0.10 -		XXX							
0. 00 - 20	0.00	30.00	40.00	50.00	60.00	70.00	80.	.00	
20			1	Total head (m)	20100	70.00	50.	•	
Determine Slope of	ned from graph: graph 0.00	00		.otarnead (m)	3850				
L, from	(100/l <mark>)</mark> (q/h) (where	e I is the length o			=	0.0	Lugeons		
	ning 1 Lugeon unit	t is equal to a per	meability of 10	m/s		0.0E+00	m/s		
Crew/Operato	r					2 .			
MM	CE DCD C 640	Davision No.	20/	Janua Didi	404 F104 4		ngineering		
orm No.	SE-PGR-F-010	Revision No.	2.04	Issue Date 24	/01/2014	Part of the Ba	achy Soletanche Group		



Cambridge Waste Water Treatment Plant Relocation Project GROUND INVESTIGATION

Results of pressuremeter tests carried out by Cambridge Insitu Ltd

Client reference TE8364

Contractor Soil Engineering

Cambridge Insitu reference: CIR1506/21

Report date: November 2021

Version: 1.0

VOLUME 1 of 2

Text report with a summary of the results

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Initial calibration (Wally HPD)	Ewan Stockwell	Cambridge Insitu Ltd
Initial calibration (Dougal)	Ewan Stockwell	Cambridge Insitu Ltd
Field work	Ewan Stockwell/ Simon Baxter	Cambridge Insitu Ltd
Preliminary analysis	Yasmin Byrne / Ewan Stockwell	Cambridge Insitu Ltd
Final analysis	Yasmin Byrne / Robert Whittle	Cambridge Insitu Ltd
Reporter	Yasmin Byrne	Cambridge Insitu Ltd
Reviewer	Robert Whi ttle	Cambridge Insitu Ltd

Preface - Equations for Modulus

Shear modulus G, where τ is shear stress and γ is shear strain:	$G = \tau/\gamma$	[P.1]
G in terms of cavity strain ϵ_c and cavity pressure p_c : This is valid for a linear elastic response and a small	$2G = \delta P_c / \delta \epsilon_c$ strain alteration	[P.2]
Linear elastic Young's modulus E in terms of G, where v is Poisson's ratio:	E = 2(1+v)G	[P.3]
Non-linear secant shear modulus G _s : where α is the shear stress constant and β is the expreloading response in shear stress/shear strain space	•	-
Non-linear secant Young's modulus E'_s using invariant shear strain γ_α : Multiplying by $\sqrt{3}$ converts γ_α to γ assuming no volunt	$E'_{s} = 2\alpha[1+v][\sqrt{3}\gamma_{\alpha}]^{\beta-1}$ metric strains are involved.	[P.5]
Non-linear tangential shear modulus Gt:	$G_t = \alpha\beta\gamma^{\beta-1}$	[P.6]
Plane shear strain at failure, undrained case, c_{u} is undrained shear strength:	$\gamma_f = [c_u/\alpha]^{1/\beta}$	[P.7]
Secant shear modulus at failure, in terms of stress:	$G_s = \alpha [c_u/\alpha]^{(\beta-1)/\beta}$	[P.8]
For secant shear modulus at mobilised stress levels less than failure, introduce n where $0 < n \le 1$	$G_n = \alpha [nc_u/\alpha]^{(\beta-1)/\beta}$	[P.9]
For the special case of G_{50} at half of the ultimate shear strength:	$G_{50} = \alpha [c_{u}/2\alpha]^{(\beta-1)/\beta}$	[P.10]

Note: substitute τ_f for c_u in the case of drained tests in P.7 to P.10

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Volume 2 - Data for tests in all boreholes and all Calibrations

Cambridge Waste Water Treatment Plant Relocation Project

1 Introduction

Cambridge Insitu Ltd (CI) was contracted by Soil Engineering to supply pressuremeter testing services for the Cambridge Waste Water Treatment Plant Relocation Project between Fen Ditton and Horningsea in Cambridgeshire. The testing formed part of the ground investigation for the proposed relocation of infrastructure to a greenfield site. The ultimate Client is Barhale Limited. Testing was specified and instructed by Mott MacDonald.

Pressuremeters are used to obtain representative engineering parameters for stiffness, strength and the initial state of stress. Given these parameters it is then possible to calculate the yield stress and strain, and limit pressure.

The material was predominantly structureless Chalk overlying Gault Clay. Tests were carried out at ten borehole locations, with between two and five tests in each. 17 tests were attempted in Gault Clay, and 14 tests in Chalk. Of these, 25 gave sufficient data for analysis. The levels were between 6.69mAOD and -21.82mAOD (between 2.20mBGL and 32.10mBGL). The fieldwork took place between the 5th August and 14th October 2021 on an intermittent basis as locations and test levels became available.

Two different types of pressuremeter were deployed. A self-boring pressuremeter (SBP) was used for softer ground, and a High Pressure Dilatometer (HPD) in pre-bored pockets where stiffer or heterogenous ground conditions applied. The pressuremeter work was conducted with the assistance of a rotary drilling facility provided by Soil Engineering.

Six unsuccessful test attempts occurred. These were predominantly in the Gault Clay and involved self boring. BH_STW_006 Test 2 was an unsuccessful attempt to self bore the chalk. BH_TUN_018PM Test 3 was an unsuccessful attempt at a pocket for a pre-bored test in Gault Clay.

This report is concerned solely with the presentation of the pressuremeter results. Any previous revisions and preliminary results are now superseded by the data in this report.

1.1 Instrumentation

The two types of pressuremeter deployed on this contract have certain features in common. The central part of each probe is covered by an elastic membrane. Once at the required depth, pressure is applied down an umbilical hose/cable to the inner surface of the membrane. This pressure causes the membrane to load the borehole wall and carry out a cavity expansion test. Measurements of displacement and pressure on the inner surface of the membrane are made directly in the probes. The resolution is high enough to provide data for shear modulus and its variation with shear strain in the range 10^{-4} to 10^{-2} . The instruments contain all the necessary signal conditioning electronics, so the final output of the probes is digital data in RS232 format for direct connection to the USB port of a personal computer.

The major difference between the devices is the method of introducing them into the ground and the alteration this causes to the insitu stress state.

1.1.1 Self Boring Pressuremeter (SBP)

The self-boring pressuremeter is first bored into the ground in a controlled manner that results in only minor alteration of the insitu stress condition of the soil mass. Clays and sands are most suited to this method of pressuremeter testing, as they can be difficult to sample without major disruption to their natural stress state.

Six equally spaced displacement transducers track the radial movement of the inside of the membrane while an internal pressure transducer measures the applied pressure. The SBP is also equipped with two opposite facing pore water pressure measuring transducers positioned at the midpoint of the membrane. These allow the pore water pressure regime to be monitored throughout the drilling and testing phases.

Standard self-boring means that along its entire length the probe is a consistent diameter to within a few microns. The stress in the ground is carried by the body of the probe at all times, an arrangement that is only practicable in weak soils. The SBP used on this contract was setup for 'weak rock' work. This means that the cutting arrangement made a hole about 1mm greater in diameter than the expanding section. Only the first 0.25m of the probe carries the full stress in the ground. This change means that the probe can self-bore into stiff clays and weak rocks but at the cost of a small amount of stress relief, small enough to remain within the recoverable range of the material.

The radial expansion capability of the probe is about 15%. This is more than sufficient to carry out a test provided that the boring has been carried out correctly. The pressure capability is 100 bars, enough for all soils and some soft rocks. The system outputs a line of data every 5 or 6 seconds, depending on the number of displacement followers, and the SBP probes deployed are known as' Dougal' and 'Shula'.

1.1.2 High Pressure Dilatometer (HPD)

The 95mm diameter Cambridge High Pressure Dilatometer was developed to carry out a pressuremeter test in soft to weak rock. In use the instrument is lowered into a nominal 101mm pocket, usually made by a rotary coring rig using a T6H/T101 barrel. Once in position, oil or gas pressure is applied down an umbilical and inflates a membrane covering the central third of the probe, so loading the borehole wall. Movements of the cavity wall and the necessary pressure are measured in a similar way to the SBP.

Although intended for soft to weak rocks, the displacement range and resolution of the equipment is such that it can make suitable tests in much weaker material, such as stiff clay.

The pressure capability is 200 bars in normal use, 300 bars under special circumstances. The displacement capability is the equivalent of 50% shear strain. Maximum pressure and maximum displacement do not occur in the same test.

A single HPD was used on this contract, known as 'Wally'. This version of the HPD outputs a line of data every 10 seconds.

1.2 Analysis

The pressuremeter loading curve can be solved directly using mathematical expressions for the expansion of a cylindrical cavity. The solution conventionally is quoted in terms of strength and stiffness parameters for the material, typically shear modulus, shear strength or friction angle as appropriate, and the insitu lateral stress. The success of this method is dependent on the validity of the assumptions that have to be made about the nature of the ground and the geometry of the cavity expansion configuration.

Appendix D is a detailed guide to the analyses that have been applied and uses some examples to show how choices are made and the implications.

1.2.1 Assumptions

 Assumptions about the material response assume that at the test level the material is homogeneous with isotropic properties behaving as a continuum. If the material is a soil it is assumed that it is fully saturated.

- An assumption about the instrument is that the length to diameter ratio of the expanding section
 is large enough for end effects to be negligible allowing the test to be modelled as a plane strain
 expansion.
- The pressuremeter test gives data for the total radial stress and radial displacements of the cavity wall. The displacements are a direct function of the hoop strain. In order to solve the boundary problem represented by a cavity expansion it is necessary also to know the radial strain and circumferential stress. If it assumed the test is undrained (as it might be for low permeability materials) then the loading takes place at constant volume. This means that radial and shear strains are derived easily from circumferential strain. If the expansion is drained then a more complex solution is required; shear and volumetric strains are derived using assumptions about the dilatant behaviour of the material.
- In addition it is assumed that the cavity expands as a circle and hence the results have been
 obtained by analysing the curve derived from the average of all displacement followers as this
 gives the best representation of a circular expansion. Unless the probe is an exact fit to the cavity
 the output from individual arms is almost meaningless, because the centre of the probe is the
 reference for all measured displacements and is free to translate in relation to the cavity.

1.2.2 Shear stiffness

Plausible and consistent data for shear modulus have been obtained from the unload/reload cycles and several cycles were incorporated into each test. The simplest approach is to assume linear elasticity so that the slope of a chord through the cycle gives the shear modulus.

In principle the slope of the initial loading is also a source of modulus data but in a pre-bored test this is not sensible choice. Values for modulus from this part of the test are designated G_i . The ratio G_{ur}/G_i is an approximate indication of the degree of disturbance caused by the pocket formation and subsequent unloading of the cavity wall. For a pushed test the significance of the initial slope is uncertain and G_i should not be used.

At the time of measurement all modulus parameters are shear modulus G. They can be converted to Young's modulus E - if the material is isotropic then the relationship $E=2G(1+\nu)$ can be used where ν is Poisson's ratio. We have applied 0.3 as this is a common choice. However the appropriate choice will depend on the particular application and the values for E may need re-calculation – the shear modulus parameters are independent and will not change.

In all soils the unload/reload response is hysteretic due to the strain dependency of stiffness. We have applied the procedure suggested by Bolton & Whittle (1999) to derive the stiffness/strain degradation properties in the shear strain range 10^{-4} to 10^{-2} . If the material is cohesive and with low permeability then the test is conducted at a rate that does not permit excess pore water pressure to drain. Consequently, after failure, the mean effective stress is constant and all unload/reload cycles give a similar response. This is the case for the tests in Gault Clay.

The tests in chalk are drained, so there is also a stress dependency to consider. We have looked at applying an adaptation of the Bellotti et al (1989) procedure to adjust the drained stiffness/strain trends to a reference stress. It happens that for the tests in the structureless chalk most of the cycles are carried out when the material is deforming at close to constant volume conditions. This means that the cycles within a single chalk test are not greatly different, one from the other. The major difference is between the first cycle and subsequent cycles, where the first is more affected by the consequences of pocket formation. Stress adjustment, therefore, has not been carried out.

Parameters from all the unload/reload cycles are given in Table 3.3. Those adjudged to be representative for the individual tests are given in Table 3.4. They are not the conservative choice.

1.2.3 Pore water pressure and vertical stress

The ambient pore water pressure has been determined based on ground water monitoring information provided by Soil Engineering for each borehole. Refer to Table 3.1 for test specific values.

The total vertical stress is calculated from an assumed bulk unit weight, 20kN/m³.

1.2.4 Strength

UNDRAINED:

All of the tests in Gault Clay has been assumed to follow an undrained loading path.

Provided that the material has not been pushed, the strength and limit pressure can be obtained from the expansion phase of the test using the simple elastic/perfectly plastic solution of Gibson & Anderson (1961). Jefferies (1988) applies this model to the case of cavity contraction, giving an alternative method of discovering the shear strength. The result of the analysis process is a set of parameters that ought to be capable of producing the measured field data. The final act of the analysis procedure is to demonstrate this is the case. Whittle, 1999, is a curve fitting method for undrained pressuremeter tests in a non-linear elastic/perfectly plastic soil. The length of the strain scale is adjusted until the two estimates of strength obtained from the loading and contraction agree, and the measured results for stiffness are used without alteration. This leaves only one free variable, the cavity reference pressure, and that is set for best fit. This value is also assumed to be the best estimate of the insitu lateral stress σ_{ho} .

Values for shear strength are further supported by applying the 1972 Palmer numerical analysis to the contraction data.

DRAINED:

All the tests in chalk have been judged to be following a drained loading path. The primary indication is the increase in stiffness with stress level for successive unload/reload cycles. This indicates increasing mean effective stress and therefore analysis by methods that identify the angles of internal friction ϕ and dilation ψ .

Two procedures can be applied. Hughes et al (1977) is applicable to expansion data and can identify the peak angle of friction and dilation. Withers et al (1989) is applied to contraction data. Both analyses assume cohesion-less material, an assumption that is examined in the curve fitting part of the analysis.

To fully apply these solutions it is necessary to know the residual friction angle when the material is deforming under constant volume conditions. We have assumed that as the material is unloaded the mobilised friction angle will tend to this state, giving a residual angle of between 27° and 32°.

As with the undrained analysis the derived parameters can be modelled using a modified $c'-\phi$ solution (Carter et al, 1986). There are two unknowns, drained cohesion c' and p_o , that must be adjusted for best fit. The drained model is less constrained than the undrained version and consequently estimates of the insitu lateral stress are more uncertain. Based on information provided by Soil Engineering a Poisson's ratio of 0.25 has been applied to the model.

1.2.5 Cavity reference pressure

We have given estimates for the cavity reference pressure p_o . We have assumed that the values for p_o are representative of the total insitu lateral stress σ_{ho} .

For an initial estimate we have attempted iteration from the yield stress using the procedure of Marsland & Randolph (1977). These estimates are likely to over-estimate σ_{ho} and modelling the tests has been utilised to optimise the results.

If the test has been self-bored it is sometimes possible to recognise the initial stress from inspection of the early loading response ('lift-off') or by inspection of pore pressure data.

1.3 Report Layout

Although it is necessary to make judgments when analysing data, this remains a factual report. The parameters derived represent what seems a reasonable choice having applied a particular analysis. Other choices are possible, and the intention is that this report provides a full description of the tests and analytical methods employed so that the choices made here can be checked or modified.

This report is in two volumes. Volume 2 contains the test data, both raw and analysed, predominantly in graphical form. Volume 1 summarises the results (see Section 3 for detail) and provides explanatory text. Some plots of parameters against elevation have also been included but the data are not separated by borehole or material. Conveniently, most of the chalk tests are at elevations above 0 and are easily recognised.

The appendices of this volume detail instrumentation, calibration, test procedure and analysis.

1.4 Notation

The data collection system employed on site utilises a limited keyboard that restricts the options for describing a test. In particular it stores tests in the form B**T* where ** must be a number. The 'B', which may be modified, is intended to refer to the borehole and the 'T' refers to the individual test, so a typical test reference is B001T02 – the second test in borehole BH-TUN-001PM.

This limitation does not apply to the analysed data which uses different software. Calibration tests to evaluate membrane stiffness and system compliance are reported in a similar manner but using a test number that cannot be confused with an actual test.

1.5 Units

Pressure is quoted throughout in kPa. Displacements are quoted in millimetres which in turn are eventually converted to percent cavity strain. Depths are given in metres below ground level (mBGL) and elevation is given in metres above ordnance datum (mAOD). The data for ground levels was supplied by Soil Engineering.

2 Details of work carried out

Table 2.1 below details the pressuremeter testing carried in the boreholes. Table 2.2 provides background information about the tests and probe used. Table 2.3 provides borehole information. Notes on the work carried out and tables of information are provided below.

Table 2.1 Sequence of work

Table 2.1 Sequ	ence or wo	ı K				
Test	Internal ref.	Depth (mBGL)	Date	Max Pressure (kPa)	Material	Remarks
			l		Structureless	
BH_STW_006 Test 1	B006T01	2.70	05/08/2021	1 143	Chalk	
DIL CTM OOC Took 2	DOGETOS	B1 / B	OE /09 /2024	N1/6	Structureless Chalk	SBPM hit obstruction.
BH STW 006 Test 2	B006T02	N/A	05/08/2021	N/A	Chair	Drilling aborted
PLI STAV 006 Tont 2	B006T03	8.00	05/08/2021	1041	Structureless Chalk	
BH_STW_006 Test 3	6000103	8.00	03/08/2021	1041	Structureless	
BH STW 011A Test 1	B011T01	3.80	31/08/2021	1365	Chalk	
			,			SBPM would not advance.
BH_STW_011A Test 2	B011T02	N/A	01/09/2021	N/A	Gault Clay	Drilling aborted.
BH_STW_011A Test 3	B011T03	13.50	01/09/2021	1660	Gault Clay	
BH_STW_011A Test 4	B011T04	21.70	02/09/2021	1768	Gault Clay	
					Structureless	
BH_STW_012a Test 1	B012T01	4.20	10/08/2021	2290	Chalk	50
			l		Structureless	
BH_STW_012a Test 2	B012T02	7.70	10/08/2021	1088	Chalk	
						Highly anisotropic expansion, only single loop
BH_STW_012a Test 3	B012T03	13.20	11/08/2021	940	Gault Clay	possible on loading curve
<u> </u>	B012103	15.20	11,00,2021	3.0	Structureless	possible of founding curve
BH_STW_019A Test 1	B019T01	2.90	18/08/2021	1663	Chalk	
						Electrical short at 170kPa.
			l		Structureless	This was repaired and the
BH_STW_019A Test 2	B019T02	6.50	18/08/2021	1124	Chalk	test resumed.
DUL CTIME OAGA Took 2	DO4OTO3	0.40	40/00/2024	1562	Structureless	
BH_STW_019A Test 3	B019T03	9.40	18/08/2021	1562	Chalk Structureless	
BH_STW_020 Test 1	B020T01	4.50	06/09/2021	702	Chalk	
BH_STW_020 Test 2	B020T02	8.50	06/09/2021	2506	Chalk	
BH_STW_020 Test 3	B020T03	2.20	07/09/2021	1637	Gault Clay	
					Structureless	
BH_STW_021 Test 1	B021T01	5.45	16/08/2021	1110	Chalk	
					Structureless	
BH STW 021 Test 2	B021T02	9.20	16/08/2021	1452	Chalk	
BH_STW_021 Test 3	B021T03	12.00	16/08/2021	1511	Chalk	
BH_TUN_001PM Test 1	B001T01	12.50	13/09/2021	1142	Gault Clay	
BH_TUN_001PM Test 2	B001T02	18.50	14/09/2021	1613	Gault Clay	
BH TUN 006PM Test 1	B6PMT01	12.20	29/09/2021	154	Gault Clay	Pocket oversized
BH_TUN_006PM Test 2	B6PMT02	12.90	29/09/2021	1132	Gault Clay	
BH_TUN_006PM Test 3	B6PMT03	18.50	29/09/2021	1382	Gault Clay	
BH_TUN_011PM Test 1	B11PMT01	6.00	13/10/2021	701	Gault Clay	
BH_TUN_011PM Test 2	B11PMT02	24.95	14/10/2021	1761	Gault Clay	
BH_TUN_018PM Test 1	B018T01	27.00	01/10/2021	1948	Gault Clay	Burst at 2MPa
BH_TUN_018PM Test 2	B018T02	n/a	04/10/2021	n/a	Gault Clay	SBPM refused, test aborted
BH_TUN_018PM Test 3	B018T03	28.70	04/10/2021	481	Gault Clay	Pocket oversized
BH_TUN_018PM Test 4	B018T04	30.40	04/10/2021	2634	Gault Clay	
BH_TUN_018PM Test 5	B018T05	32.10	05/10/2021	2916	Gault Clay	
			,		•	i

Notes:

- 1. Depth is given as metres below ground level to the centre of the measuring section. The SBP membrane is 0.46 long, hence the affected zone is \pm 0.23m of the quoted test centre. The HPD membrane is 0.60 long, hence the affected zone is \pm 0.30m of the quoted test centre.
- 2. Max Pressure is the maximum pressure reached by the end of loading and may be used as a rough indication of how the material strength is changing with depth.

Table 2.2 Probe details and calibrations

Calibration Stiffness Compliance	Test	Operator	Probe			System
BH STW 006 Test 2				calibration	stiffness	compliance
BH_STW_006 Test 3	BH_STW_006 Test 1	EJS/SB	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_STW_011A Test 1	BH STW 006 Test 2	EJS/SB	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH STW 011ATest 2	BH_STW_006 Test 3	EJS/SB	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH STW 011A Test 3 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_011A Test 4 EIS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_STW_012a Test 1 EIS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_STW_012a Test 2 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_012a Test 3 EIS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_STW_019A Test 1 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_019A Test 2 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_019A Test 3 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_019A Test 3 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_019A Test 3 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_020 Test 3 EIS Shula (SBP) 19/07/2021 E0907T21 E0907T21	BH_STW_011A Test 1	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_011A Test 4	BH_STW_011A Test 2	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_STW_012a Test 1	BH STW 011A Test 3	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_012a Test 2	BH_STW_011A Test 4	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_STW_012a Test 3	BH_STW_012a Test 1	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_STW_019A Test 1	BH_STW_012a Test 2	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_019A Test 2	BH_STW_012a Test 3	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_STW_019A Test 3	BH_STW_019A Test 1	EJS	Wally (HPD)	13/07/2021	£0907T21	E0907T21
BH STW 020 Test 1 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_020 Test 2 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_020 Test 3 EIS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_STW_021 Test 1 EIS Shula (SBP) 19/07/2021 E0907T21 E0907T21 BH_STW_021 Test 2 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_021 Test 3 EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_TUN_001PM Test 1 EIS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_TUN_001PM Test 2 EIS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_TUN_006PM Test 1 EIS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_TUN_006PM Test 3 EIS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_TUN_011PM Test 1 EIS Shula (SBP) 19/07/2021 E0610T22 E0610T21	BH_STW_019A Test 2	EJS	Wally (HPD)	13/07/2021	£0907T21	E0907T21
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BH_STW_020 Test 3 EJS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_STW_021 Test 1 EJS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_STW_021 Test 2 EJS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_STW_021 Test 3 EJS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_TUN_001PM Test 1 EJS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_TUN_001PM Test 2 EJS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_TUN_006PM Test 1 EJS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_TUN_006PM Test 2 EJS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_TUN_006PM Test 3 EJS Shula (SBP) 19/07/2021 E1907T22 E1907T21 BH_TUN_01PM Test 1 EJS Shula (SBP) 19/07/2021 E0610T22 E0610T21 BH_TUN_018PM Test 1 EJS Shula (SBP) 19/07/2021 E1907T22 E1907T21 <tr< td=""><td>BH STW 020 Test 1</td><td>EJS</td><td>Wally (HPD)</td><td>13/07/2021</td><td>E0907T21</td><td>E0907T21</td></tr<>	BH STW 020 Test 1	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
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BH_TUN_018PM Test 2 EJS Dougal (SBP) 13/07/2021 E0309T22 E0309T21 BH_TUN_018PM Test 3 EJS Wally (HPD) 13/07/2021 E0907T21 E0907T21 BH_TUN_018PM Test 4 EJS Wally (HPD) 13/07/2021 E0907T21 E0907T21	BH TUN 011PM Test 2	EJS	Shula (SBP)	19/07/2021	E0610T22	E0610T21
BH_TUN_018PM Test 3	BH_TUN_018PM Test 1	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_TUN_018PM Test 4	BH_TUN_018PM Test 2	EJS	Dougal (SBP)	13/07/2021	E0309T22	E0309T21
The state of the s	BH_TUN_018PM Test 3	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
DU TUN CAODAT	BH_TUN_018PM Test 4	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_IUN_UI8PM IEST EIS Wally (HPD) 13/07/2021 E0907T21 E0907T21	BH_TUN_018PM Test 5	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21

Notes:

- 1. Probe Three probes were on this project, a six arm self bored pressuremeter known as 'Shula', a three arm self bored pressuremeter known as 'Dougal', a High Pressure Dilatometer known as 'Wally'.
- 2. Operator EJS is Ewan Stockwell and SB is Simon Baxter, both employees of Cambridge Insitu.
- 3. For the probes there is a transducer calibration referenced by date. There are also separate calibrations for the membrane and system compliance.

Table 2.3 Borehole location information

Borehole	Easting	Northing	Elevation mAOD	Groundwater level: mBGL
BH_STW_006	549502.5	261260.1	9.39	3.75
BH_STW_011A	549493.8	261023.6	10.17	3.75
BH_STW_012A	549712.9	261183.3	8.12	3.75
BH_STW_019A	549790.4	260872.9	9.42	3.75
BH_STW_020	549898.8	260975.8	8.13	3.75
BH_STW_021	549642.7	260664.3	10.98	3.75
BH_TUN_001PM	547214.1	261518.8	7.13	1.25
BH_TUN_006PM	547838.5	261494.8	6.59	4.50
BH_TUN_011PM	548428.8	261304.0	6.57	1.75
BH_TUN_018PM	549441.5	261003.2	10.24	4.00

Notes:

- 1. The ground level and coordinates of the borehole have been provided by Soil Engineering.
- 2. The ground water level is based on ground water monitoring information and provided by Soil Engineering.

3 Summary of results

Table 3.1 details the initial stress state for each of the tests. Table 3.2 summaries the key strength parameters for each test. Table 3.3 summaries the linear and non-linear parameters for deriving shear modulus and stiffness for each loop. Table 3.4 contains the selected modulus parameters for each test.

Table 3.1 Initial stress state

Test	Depth (mBGL)	Elevation (mAOD)	u_o (kPa)	р _о (kРа)	σ_{vo} (kPa)	k_0	OCR
BH_STW_006 Test 1	2.70	6.69	0	76	54	1.41	4.9
BH_STW_006 Test 3	8.00	1.39	24	109	160	0.63	1.4
BH_STW_011A Test 1	3.80	6.37	0	94	76	1.24	3.3
BH_STW_011A Test 3	13.50	-3.33	92	325	270	1.31	6.9
BH_STW_011A Test 4	21.70	-11.53	176	462	434	1.11	5.6
BH_STW_012A Test 1	4.20	3.92	4	97	84	1.16	4.0
BH_STW 012A Test 2	7.70	0.42	39	147	154	0.94	2.1
BH_STW_012A Test 3	13.20	-5.08	93	318	264	1.32	4.8
BH_STW_019A Test 1	2.90	6.52	0	91	58	1.57	4.5
BH_STW_019A Test 2	6.50	2.92	27	113	130	0.83	2.5
BH_STW_019A Test 3	9.40	0.02	55	166	188	0.83	2.3
BH_STW_020 Test 1	4.50	3.63	0	98	90	1.09	3.2
BH_STW_020 Test 2	8.50	-0.37	0	194	170	1.14	3.5
BH_STW 020 Test 3	15.70	-7.57	117	355	314	1.21	7.7
BH_STW_021 Test 1	5.45	5.53	17	150	109	1.45	3.3
BH_STW_021 Test 2	9.20	1.78	53	162	184	0.83	2.8
BH_STW_021 Test 3	12.00	-1.02	81	199	240	0.74	2.4
BH_TUN_001PM Test 1	12.50	-5.37	110	368	250	1.84	5.3
BH_TUN_001PM Test 2	18.50	-11.37	169	520	370	1.75	6.1
BH_TUN_006PM Test 2	12.90	-6.32	82	410	258	1.86	3.7
BH_TUN_006PM Test 3	18.50	-11.92	137	453	370	1.36	3.7
BH_TUN_011PM Test 1	6.00	0.57	42	131	120	1.14	7.5
BH_TUN_011PM Test 2	24.95	-18.38	228	629	499	1.48	4.7
BH_TUN_018PM Test 4	30.40	-20.16	259	958	608	2.00	4.7
BH_TUN_018PM Test 5	32.10	-21.86	276	932	642	1.79	5.2

- 1. Depth is the distance below ground level to the centre of the pressuremeter membrane.
- 2. Elevation uses the level provided by Soil Engineering.
- 3. u_o is the estimated ambient pore water pressure, this has been estimated based on groundwater monitoring information provided by Soil Engineering.
- 4. p_o is cavity reference pressure and is also the best estimate of σ_{ho} , the lateral insitu stress. For the most part it has been obtained from curve fitting.
- 5. σ_{vo} is our approximate judgment of the overburden stress assuming a constant increase with depth of 20kPa/metre. This is based on an approximation from the unit weight information provided by Soil Engineering.
- 6. k_0 is the coefficient of earth pressure at rest, being the ratio of the effective lateral stress to the effective vertical stress.
- OCR is the over consolidation ratio. This has been derived using a relationship suggested by Wroth (1984) for undrained tests and by using the calculated failure pressure for drained tests.

 $P_f(obs)$ $P_f(calc)$ Depth ϕ_{pk} c' P_{lim} c_u τ_f ϕ_{cv} Test (mBGL) (kPa) (kPa) (kPa) (kPa) (°) (kPa) (kPa) (°) BH STW 006 Test 1 2.70 **152** 266 2963 118 30 35.6 6.7 40 BH STW 006 Test 3 8.00 459 218 1717 69 30 31.4 5 1.7 114 40 BH STW 011A Test 1 3.80 421 253 2528 32 35.6 4.3 BH_STW_011A Test 3 1970 239 13.50 765 784 235 294 BH_STW_011A Test 4 749 959 2306 293 21.70 BH_STW_012A Test 1 4.20 688 324 5251 151 32 38.3 7.7 60 7.70 8.0 BH STW 012A Test 2 610 280 2128 90 27 27.7 23 BH_STW_012A Test 3 13.20 493 596 1468 173 172 598 259 2.7 20 BH STW 019A Test 1 2.90 3213 104 32 34.3 BH_STW_019A Test 2 6.50 411 281 2085 111 28 29.6 1.8 46 BH STW 019A Test 3 9.40 597 359 2785 118 32 34.8 3.4 14 BH_STW_020 Test 1 4.50 292 287 1031 106 32.4 0.5 10 32 BH STW 020 Test 2 8.50 797 597 5092 280 32 35.5 4.2 117 15.70 287 290 BH STW 020 Test 3 621 860 2211 BH STW 021 Test 1 5.45 448 322 2236 107 30 30.3 0.4 8 BH STW 021 Test 2 9.20 571 414 3501 164 28 37.2 10.8 57 BH_STW_021 Test 3 12.00 582 470 2487 142 28.2 0.3 28 12.50 637 1496 154 BH TUN 001PM Test 1 471 152 BH TUN 001PM Test 2 789 2139 247 245 18.50 891 BH TUN 006PM Test 2 12.90 614 657 1392 141 143 BH_TUN_006PM Test 3 18.50 627 747 1788 191 191 BH TUN 011PM Test 1 6.00 209 320 898 114 112 BH TUN 011PM Test 2 24.95 751 1057 2395 266 267 BH_TUN_018PM Test 4 30.40 1291 1527 3194 343 346 BH TUN 018PM Test 5 32.10 1423 1602 3475 396 395

Table 3.2 Parameters associated with strength

- 1. $P_f(obs)$ is observed total yield stress, derived from inspection of the loading curve.
- 2. $P_f(calc)$ is calculated yield stress, using values for the cavity reference pressure, non-linearity and strength $(C_u \text{ or } \tau_f)$.
- 3. P_{lim} is the total limit pressure. If the test is undrained it is the intercept of the plot used to derive the undrained shear strength.
- 4. c_u is undrained shear strength from the slope of a plot of the natural log of the current shear strain versus total pressure (Gibson & Anderson, 1961).
- 5. au_f is the shear stress at first yield. For the drained tests, it can be derived by applying a Mohr-Coulomb failure criteria using the given data for p'_o , c' and ϕ_{pk} . However, for these data the calculation used is $(P_f P_o) \times \beta$ where P_f is the calculated failure stress, P_o is the best estimate of the insitu stress (Table 3.1) and β is the material non-linearity that was applied when P_f was derived. The same calculation should give the undrained strength for the undrained case so it has been applied to all the tests for comparison. For tests in Gault Clay it does, within a very small margin.
- 6. ϕ_{cv} is the residual friction angle when the material is deforming at constant volume.
- 7. ϕ_{pk} and ψ are internal angle of friction and dilation. They are derived in the first instance by applying Hughes et al, 1977 and optimised by curve fitting with an adapted version of Cater et al, 1986.
- 8. c' is drained cohesion. It is not measured but is a 'found' value required for the best fit curve comparison result. It should be used with appropriate caution.

Table 3.3 Linear and non-linear parameters for deriving shear modulus

Table 5.5 Linear and non-linear parameters for deriving snea												
Test:	Depth	Loop No.	G_{ur}	E	Constant α	Exponent $oldsymbol{eta}$	G _{50.01%}	G _{s0.1%}	G _{s1%}	$E_{s_{0.01\%}}$	E _{s0.1%}	$E_{s_{1\%}}$
	mBGL		MPa	MPa	MPa		MPa	MPa	MPa	MPa	MPa	MPa
BH STW			0.4	240	F 0.4C	0.620	400	77	22	204	4.50	
0057 .4	2.70	1	84	219	5.946	0.630	180	77	33	381	163	69
006 Test 1	2.70	2	90	234	6.402	0.623	206	87	36	436	183	77
		3	80	208	5.011	0.590	219	85	33	454	177	69
		1	67	173	11.993	0.780	91	55	33	210	126	76
006 Test 3	8.00	2	84	219	6.584	0.659	152	69	32	328	150	68
		3	89	232	6.608	0.635	191	82	35	405	175	76
		4	68	178	4.512	0.593	192	75	29	398	156	61
		1	53	139	8.983	0.758	83	48	27	190	109	62
011A Test 1	3.80	2	72	188	6.965	0.679	134	64	31	292	139	67
		3	83	216	11.224	0.714	156	81	42	347	180	93
		4	81	210	5.588	0.602	218	87	35	456	183	73
		1	58	152	9.726	0.761	88	51	29	200	116	67
		2	70	181	3.630	0.582	171	65	25	353	135	51
011A Test 3	13.50	3	63	165	3.438	0.558	202	73	26	411	149	54
		4	56	146	2.774	0.520	231	76	25	461	153	51
		5	47	122	3.185	0.556	190	68	25	387	139	50
		1	58	152	6.754	0.643	181	80	3 5	387	170	75
011A Test 4	21.70	2	51	131	6. 101	0.624	195	82	34	412	173	73
		3	54	140	4.484	0.588	199	77	30	413	160	62
		1	142	369	14.026	0.676	277	132	62	603	286	136
012A Test 1	4.20	2	132	343	14.587	0.667	313	1 46	68	678	31 5	146
	4.20	3	139	360	8.303	0.583	387	148	57	799	306	117
		4	138	359	10.061	0.612	359	147	60	753	308	126
		1	59	154	22.372	0.870	74	55	41	179	133	99
8424 T- + 3	7.70	2	127	329	12.341	0.696	203	101	50	446	222	110
012A Test 2		3	130	337	12.192	0.679	234	112	53	511	244	117
		4	53	139	4.327	0.612	154	63	26	324	133	54
012A Test 3		1	38	98	3.770	0.629	115	49	21	244	104	44
	13.20	2	34	87	3.446	0.618	1 16	48	20	245	102	42
		1	82	214	10.666	0.733	125	67	36	280	151	82
		2	146	379	10.706	0.662	241	111	51	520	239	110
019A Test 1	2.90	3	172	447	9.431	0.619	315	131	55	665	276	115
		4	145	376	6.017	0.556	359	129	46	732	263	95
		1	63	163	8.079	0.725	102	54	29	227	121	64
		2	81	210	6.691	0.660	153	70	32	331	151	69
019A Test 2	6.50	3	106	276	14.739	0.721	193	101	53	429	226	119
		4	111	288	9:148	0.660	210	96	44	452	207	94
		5	59	153	3.003	0.522	245	82	27	490	163	54
		1	82	214	11.724	0.737	132	72	39	297	162	89
		2	91	237	10.836	0.699	173	87	43	382	191	96
019A Test 3	9.40	3	113	295	6.942	0.610	252	103	42	529	215	88
		4	100	261	8.694	0.636	248	107	46	529	229	99
		1	19	50	1.790	0.649	45	20	9	97	43	19
		2	25	65	1.610	0.594	68	27	10	141	55	22
020 Test 1	4.50	3	26	68	1.508	0.559	88	32	11	179	65	23
		4	25	64	2.090	0.591	90	35	14	188	73	29
		1	50	129	10.301	0.780	78	47	28	180	108	65
		2	82	214	11.272	0.732	133	72	39	299	161	87
020 Test 2	8.50	3	149	386	13.628	0.681	257	123	59	561	269	129
OLU IUSU Z	8.50	4	188	488	21.494	0.694	360	178	88	791	391	193
		5	188	490	15.956	0.643	427	188	83	914	402	176
		1	60	156	7.889	0.664	174	80	37	377	174	80
070 Toot 3	15 70	2	52			0.625						
020 Test 3	1 5. 70			134	5.888		186	79	33	394	166	70 57
		3	57	147	3.878	0.574	196	74	28	404	151	57
021 Test 1	5.45	1	47	123	4.605	0.639	128	56	24	273	119	52
		2	48	126	4.516	0.621	148	62	26	313	131	55

T <mark>est:</mark>	Depth	Loop No.	G_{nr}	E	Constant α	Exponent β	G _{s 0.01%}	G _{s0.1%}	<i>G</i> _{s1%}	$E_{s_{0.01\%}}$	E _{s0.1%}	E _{s1%}
		3	41	106	2.749	0.567	148	55	20	304	112	41
		1	59	154	10.577	0.757	99	57	32	226	129	74
034 T+ 3	0.30	2	97	252	13.214	0.724	168	89	47	375	199	10 5
021 Test 2	9.20	3	123	320	11.253	0.652	278	125	56	596	267	120
		4	116	301	7.231	0.581	343	131	50	708	270	103
		1	95	248	4.830	0.605	184	74	30	384	155	62
021 Test 3	12.00	2	114	296	3.454	0.530	262	89	30	526	178	60
		3	121	316	3.743	0.523	303	101	34	606	202	67
BH_TUN_												
001514		4	96	250	3.555	0.525	282	95	32	566	189	63
001PM	12.50	1	43	111	3.848	0.608	142	58	23	298	121	49
Test 1		2	43	112	3.112	0.568	166	62	23	341	126	47
004014		3	46	118	3.029	0.571	1 58	59	22	324	120	45
001PM	18.50	1	58	150	7.073	0.660	162	74	34	350	160	73
Test 2		2	47	122	4.180	0.579	202	77	29	417	158	60
006PM 12.90		3	50	129	4.790	0.612	171	70	29	359	147	60
	12.90	1	28	72	2.845	0.590	124	48	19	258	100	39
Test 2		2	26	67	2.745	0.580	131	50	19	271	103	39
		3	29	76	3.334	0.617	113	47	19	239	99	41
006PM	40.50	1	55	143	6.611	0.656	1 57	71	32	338	153	69
Test 3	18.50	2	48	125	6.425	0.648	164	73	32	352	157	70
		3	52	134	4.690	0.610	170	69	28	357	146	59
044014		1	27	70	2.351	0.614	82	34	14	173	71	29
011PM	6.00	2	25	65	2,170	0.599	87	35	14	182	72	29
Test 1		3	26	67	2.000	0.592	86	33	13	178	70	27
044044		1	82	212	7.228	0.637	205	89	38	436	189	82
011PM	24.95	2	63	163	9.071	0.671	188	88	41	408	191	90
Test 2		3	65	170	5.970	0.625	189	80	34	399	168	71
		1	67	174	5.345	0.611	192	79	32	404	165	67
018PM	00.40	2	56	145	5.786	0.616	199	82	34	419	173	71
Test 4	30.40	3	51	131	5.614	0.608	208	84	34	435	176	72
		4	57	148	6.548	0.615	227	94	39	478	197	81
		1	105	272	7.989	0.647	206	92	41	442	196	87
040044		2	66	171	8.147	0.651	203	91	41	435	195	87
018PM	32.10	3	57	148	7.523	0.635	217	94	40	462	199	86
Test 5		4	61	158	7.039	0.608	260	1 06	43	546	221	90
		5	66	170	6.154	0.589	271	105	41	562	218	85

- 1. G_{ur} is modulus obtained by taking the slope of the chord bisecting a cycle of unloading and reloading. This can only be shear modulus if the material response is linear elastic.
- 2. E is the Youngs modulus calculated from the linear shear modulus (G_{ur}) assuming a Poisson's ratio v of 0.3:- E=2G(1+v)
- 3. Due to the non-linear characteristics of the soil, secant shear modulus is given by a power law of the form $G_s=\alpha\gamma^{\beta-1}$ where α and β are discovered from a plot of reloading data on log scales. If the response is linear elastic then $\beta=1$ and α would be identical to G_{ur} , quoted in the first column.
- 4. Secant shear modulus parameters are given at three plane shear strain levels, γ of $10^{-4}/10^{-3}/10^{-2}$, but any value of shear strain can be used in the range 10^{-4} to 10^{-2} . All these modulus values are G_{hh} . 10^{-2} is approximately the shear strain at which the overconsolidated clay will yield, but it is too low for sand, where the yield strain is more likely to be 3×10^{-4} .
- 5. For comparison purposes, values for secant Young's modulus E_s at three axial strain values are given. These are derived from the following relationship: $E_s = 2\alpha(1+v)\big(\gamma_a\sqrt{3}\big)^{\beta-1}$

where v is Poisson's ratio and here is an arbitrary 0.3. The $\sqrt{3}$ term converts axial or invariant shear strain to plane shear strain, so that α and β can be used.

Table 3.4 Selected modulus parameters

Test	β	α MPa	<i>G</i> _{50.01%} MPa	<i>G</i> _{s0.1%} MPa	$G_{s_{1\%}}$ MPa	E _{s0.01%} MPa	Е _{s0.1%} МРа	E _{s1%} MPa	G_{γ} MPa	G ₅₀ MPa
BH STW 006 Test 1	0.623	6.402	206	87	36	436	183	77	44	109
BH_STW_006 Test 3	0.635	6.608	191	82	35	405	1 75	76	44	135
BH_STW_011A Test 1	0.714	11.224	156	81	42	347	180	93	38	93
BH_STW_011A Test 3	0.520	3.150	262	87	29	523	173	57	34	65
BH_STW_011A Test 4	0.588	4.496	200	77	30	414	161	62	31	50
BH STW 012A Test 1	0.667	14.587	313	146	68	678	315	146	97	202
BH_STW_012A Test 2	0.679	12.192	234	112	53	511	244	117	71	172
BH_STW_012A Test 3	0.618	3.979	134	56	23	283	117	49	28	43
BH_STW_019A Test 1	0.619	9.431	315	131	55	665	276	115	97	232
BH STW 019A Test 2	0.660	6.691	153	70	32	331	151	69	38	79
BH_STW_019A Test 3	0.610	6.942	252	103	42	529	215	88	47	147
BH_STW_020 Test 1	0.559	1.508	88	32	11	179	65	23	5	21
BH_STW_020 Test 2	0.694	21.494	360	178	88	791	391	193	58	198
BH STW 020 Test 3	0.574	4.220	213	80	30	439	16 5	62	31	52
BH_STW_021 Test 1	0.621	4.516	148	62	26	313	131	55	51	68
BH_STW_021 Test 2	0.652	11.253	278	125	56	596	267	120	29	155
BH_STW_021 Test 3	0.523	3.743	303	101	34	606	202	67	44	139
BH_TUN_001PM Test 1	0.571	3.726	194	72	27	398	148	55	41	69
BH_TUN_001PM Test 2	0.660	7.055	162	74	34	349	1 59	73	40	57
BH_TUN_006PM Test 2	0.580	2.813	135	51	19	278	106	40	24	40
BH_TUN_006PM Test 3	0.648	6.588	169	75	33	361	161	71	45	66
BH_TUN_011PM Test 1	0.592	2.378	102	40	16	212	83	32	20	31
BH_TUN_011PM Test 2	0.625	6.119	193	82	34	409	173	73	40	61
BH_TUN_018PM Test 4	0.608	6.476	240	97	39	502	204	83	43	67
BH_TUN_018PM Test 5	0.589	6.443	284	110	43	589	229	89	45	73

- 1. This table selects representative unload/reload cycle data from each test.
- 2. β and α have the meanings defined in Table 3.3.
- 3. G_s is the secant shear modulus against plane strain and E_s is the secant Young's modulus against invariant strain. These are calculated as defined in Table 3.3. The results are presented at three strain intervals.
- 4. G_{v} is the shear modulus when the material is on the point of yielding.
- 5. G_{50} is secant shear modulus when 50% of the available shear stress has been mobilised.

Figure 3.1 Cavity Reference Pressure against Elevation

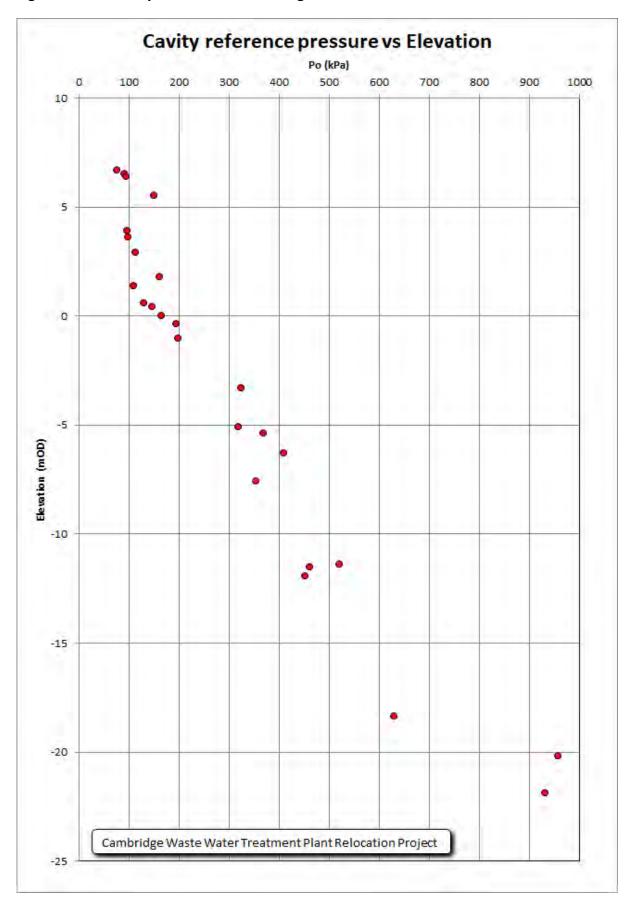


Figure 3.2 Coefficient of earth pressure at rest against Elevation

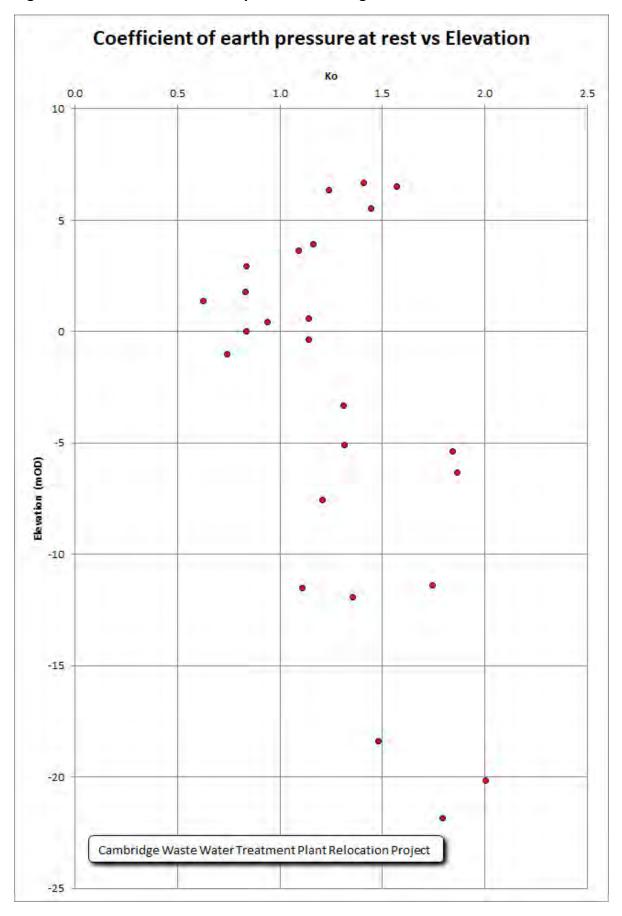


Figure 3.3 Shear stress at first yield against Elevation

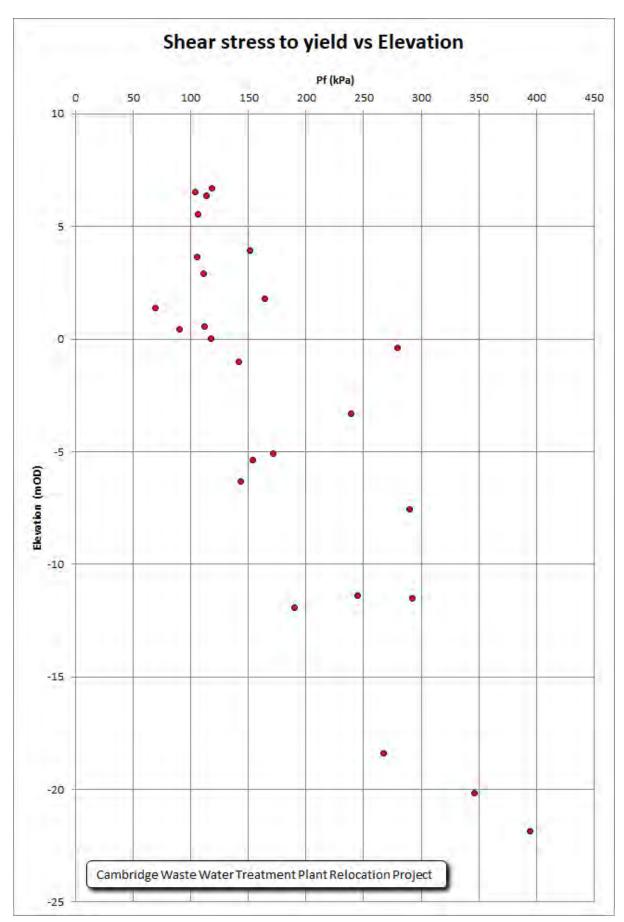
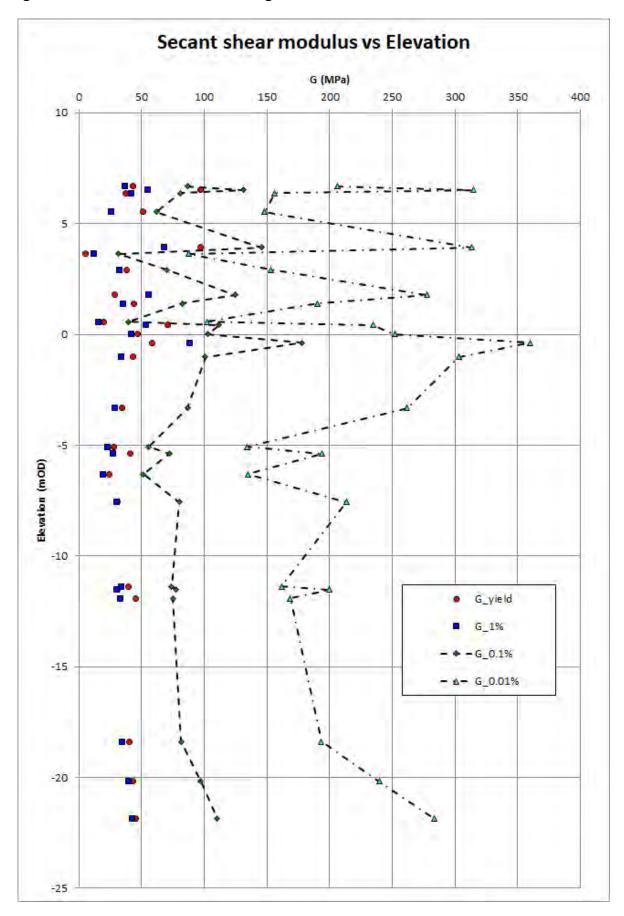


Figure 3.4 Secant shear modulus against Elevation



4 Field Curves

Figure 4.1 All tests on common axes – BH_STW_006

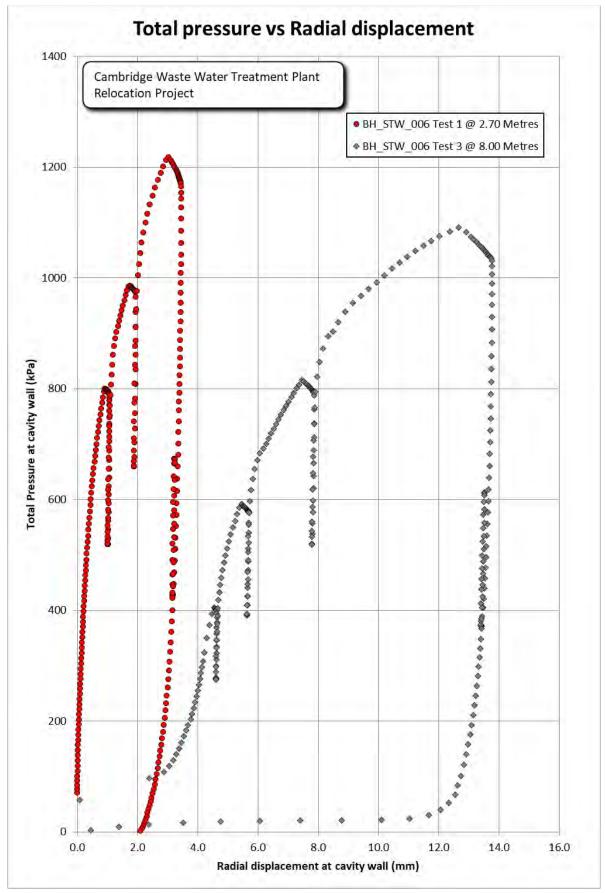


Figure 4.2 All tests on common axes – BH_STW_0011A

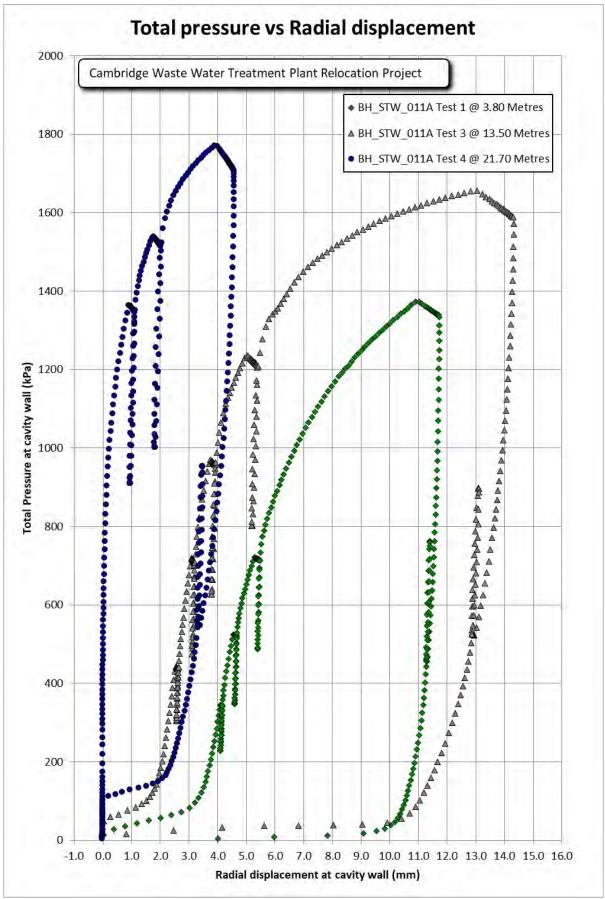
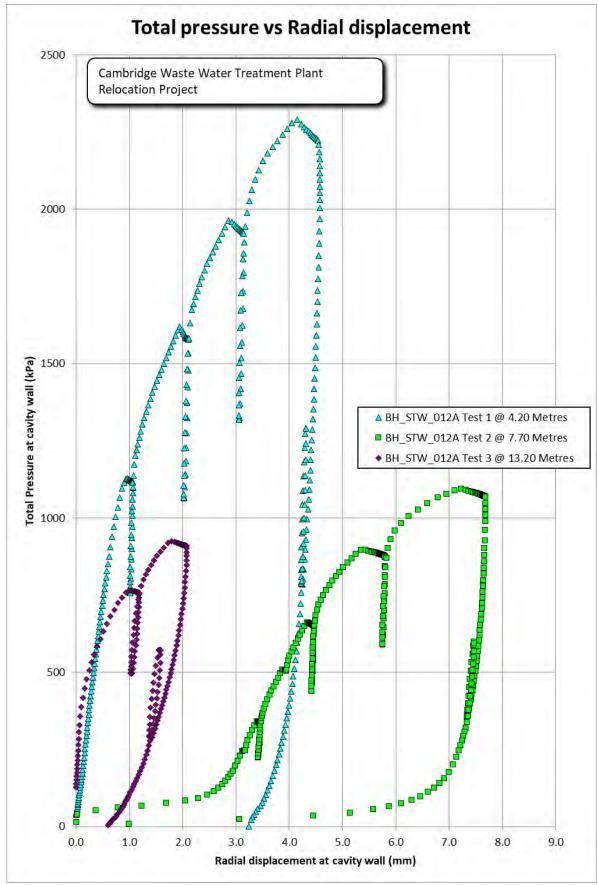


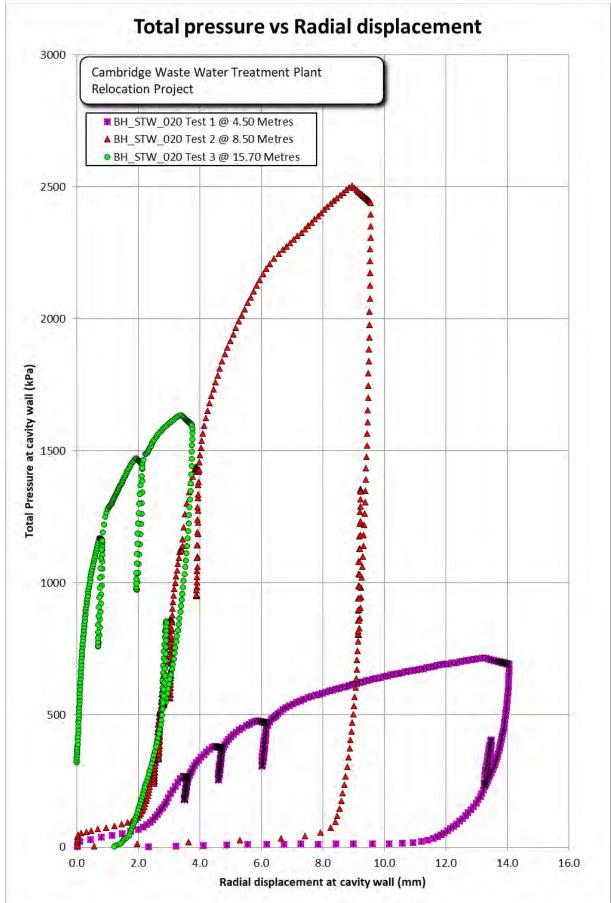
Figure 4.3 All tests on common axes – BH_STW_0012A



Total pressure vs Radial displacement 1800 Cambridge Waste Water Treatment Plant Relocation Project ■ BH_STW_019A Test 1 @ 2.90 Metres 1600 BH_STW_019A Test 2 @ 6.50 Metres ■ BH_STW_019A Test 3 @ 9.40 Metres 1400 1200 Total Pressure at cavity wall (kPa) 1000 800 600 400 200 2.0 4.0 10.0 0.0 12.0 Radial displacement at cavity wall (mm)

Figure 4.4 All tests on common axes – BH_STW_0019A

Figure 4.5 All tests on common axes – BH_STW_0020



Total pressure vs Radial displacement 1600 Cambridge Waste Water Treatment Plant Relocation Project BH_STW_021 Test 1 @ 5.45 Metres △ BH_STW_021 Test 2 @ 9.20 Metres 1400 ♦ BH_STW_021 Test 3 @ 12.00 Metres 1200 Δ 0 Δ 0 0 Δ A 444 \triangle Δ 1000 A Total Pressure at cavity wall (kPa) 0 0 A 0 0 0 A 800 A 600 **\$ \$ \$ \$ \$ \$ \$** 400 Δ A 200 0.0 2.0 4.0 5.0 8.0 9.0 1.0 10.0 Radial displacement at cavity wall (mm)

Figure 4.6 All tests on common axes – BH_STW_0020

Total pressure vs Radial displacement 1800 Cambridge Waste Water Treatment Plant Relocation Project 1600 1400 1200 Total Pressure at cavity wall (kPa) 1000 800 600 400 200 △ BH_TUN_001PM Test 1 @ 12.50 Metres ■ BH TUN 001PM Test 2 @ 18.50 Metres 0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 Radial displacement at cavity wall (mm)

Figure 4.7 All tests on common axes – BH_TUN_001PM

Figure 4.8 All tests on common axes – BH_TUN_006PM **Total pressure vs Radial displacement** 1600 Cambridge Waste Water Treatment Plant Relocation Project 1400 1200 1000 Total Pressure at cavity wall (kPa) 800 600 400 200

-0.5

0.0

0.5

1.0

Radial displacement at cavity wall (mm)

2.0

1.5

5.5

□ BH_TUN_006PM Test 2 @ 12.90 Metres

◆ BH_TUN_006PM Test 3 @ 18.50 Metres

4.0

4.5

5.0

Total pressure vs Radial displacement 2000 Cambridge Waste Water Treatment Plant Relocation Project ▲ BH_TUN_011PM Test 1 @ 6.00 Metres 1800 ▲ BH_TUN_011PM Test 2 @ 24.95 Metres 1600 1400 1200 Fotal Pressure at cavity wall (kPa) 1000 800 600 400 200 0.5 1.5 -0.5 0.0 1.0 3.5 4.0 4.5 5.0 Radial displacement at cavity wall (mm)

Figure 4.9 All tests on common axes – BH_TUN_011PM

Figure 4.10 All tests on common axes – BH_TUN_011PM **Total pressure vs Radial displacement** 3500 Cambridge Waste Water Treatment Plant Relocation Project BH_TUN_018PM Test 4 @ 30.40 Metres BH_TUN_018PM Test 5 @ 32.10 Metres 3000 2500 Total Pressure at cavity wall (kPa) 2000 1500 1000 500 0.0 2.0 4.0 6.0 8.0 10.0 12.0

Radial displacement at cavity wall (mm)

APPENDIX A A DESCRIPTION OF THE EQUIPMENT

1 The High Pressure Dilatometer (HPD)

The 95mm High Pressure Dilatometer (95HPD) is a pre-bored hole pressuremeter for testing a 101mm diameter pocket. When a test is required it is lowered into a pocket in the ground conventionally formed by an H size barrel. On completion of a test it is removed from the borehole which is then extended by conventional drilling techniques.

The instrument is 2 metres long. The central third of the instrument is covered by a 6mm thick reinforced rubber membrane. Pressure is applied to the inside of the instrument and the membrane expands, pressing against the borehole wall. The radial displacement of the inside boundary of the membrane is measured at six points equally distributed around the centre of the expanding section. It is up to 95mm in diameter at the ends of the membrane and 94mm diameter at the centre of the membrane where displacements are sensed.



Figure 1.1 The 95mm High Pressure Dilatometer

This displacement, and the pressure necessary to cause the movement, are continuously monitored by strain gauged transducers contained within the instrument. Also within the instrument is the analogue and digital electronic circuitry necessary to condition the signals from the transducers. Every ten seconds a set of readings from all the measuring circuits are transmitted to the surface as an RS232 data stream which may be connected directly to the serial port of a microcomputer. Plotting these readings of displacement against pressure produces a loading curve for the material being tested. A number of mathematical analyses are available for translating this loading curve to fundamental strength and stiffness parameters for the ground.

Because the instrument has six strain arms there is some redundancy in the measurement of strain, and this enables the user to carry out a successful test even if one of the arms are defective. In order

to give a similar level of reliability to the pressure measuring system a second pressure cell is included in the HPD-MPX, and its readings provide a check of the performance of the first transducer.

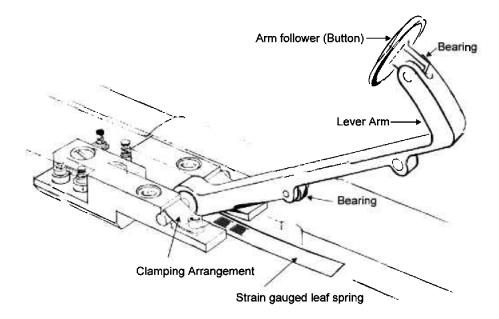


Figure 1.2 Displacement sensor of the 95mm HPD

The HPD can apply up to 30MPa of pressure to the ground, and can expand from an initial diameter of 95mm to nearly 150mm. It will resolve movements of less than 1 micron and pressure changes of less than 1kPa. Hence although it was developed to test weak rock it can make a test at two extremes of ground conditions - stiff clays, which yield at pressures below 1MPa, and weak rock with a shear modulus greater than 4GPa.

Although internally complex by the standards normally applied to instrumentation of this kind, it is reliable and robust, and the routine maintenance is straightforward. Because all the signal conditioning electronics is contained in the probe itself, the instrument is unaffected by external changes such as replacing the cable.

An additional feature of this pressuremeter is an electronic compass module fitted to the foot of the instrument. This gives a continuous reading of the orientation of a fixed reference on the instrument with respect to magnetic North. The compass consists of two magneto-resistive sensors at right angles to each other. The output of the compass therefore is two signals which are the sine and cosine of the angle made with the Earth's magnetic field. The quotient of these gives an unambiguous direction.

Like all expansion pressuremeters in commercial use the HPD has one significant uncertainty- the loading curve which it produces is derived from following the movement of the *inside* boundary of an elastic membrane. This is different from the movements of the *outside* boundary of the membrane, and hence the movements in the material itself. For the majority of the tests for which the HPD is used, this uncertainty is not significant. However, for a small number of tests it is critical; for this reason, the calibration procedure described in Appendix B necessarily is complex in order to reduce the margin of uncertainty and set limits to it.



Figure 1.3 Under the membrane of an HPD 95

2 The Self Boring Pressuremeter (SBP)

It is a probe about 88 millimetres in diameter and 1.2 metres long. Approximately 0.5m can be expanded by dry nitrogen gas and a typical test will expand the instrument by 10%.

The expansion is monitored by three or six followers, depending on the version of the probe used. These are conventionally referred to as 'strain arms' or more usually 'arms'. They are spaced evenly around the middle of the expanding test section. The arms are forced to follow the movements of the membrane by strain gauged leaf springs, and hence radial expansion is converted to an electrical output.

The internal pressure is measured by a strain gauged cell within the instrument. A further two cells are attached to the membrane, 180° apart, and these measure the changes in pore water pressure during the test.

The membrane covering the expanding portion of the instrument is in two parts. The inner layer, which is sealed, is made of nitrile rubber and is about 4mm thick. This inner skin is then covered by an outer layer, which because of its appearance when the instrument is inflated is known as a 'Chinese Lantern' (CHL). The CHL is made up of stainless steel strips. It has two main tasks - to take the frictional forces that occur when the instrument is being bored into the ground, and to provide some protection from inclusions that might otherwise puncture the inner membrane.

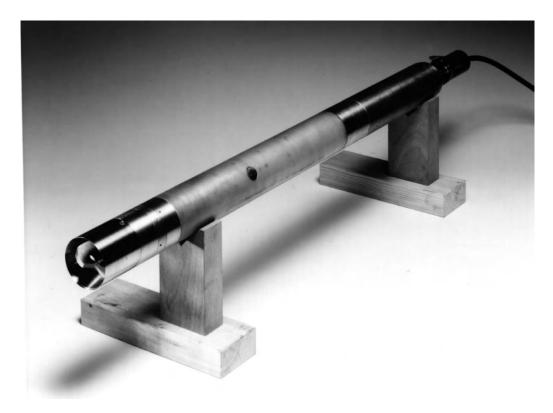


Figure 2.1 The Self Boring Pressuremeter without a Chinese lantern

The foot of the instrument is fitted with a sharp edged internally tapered cutting shoe. When boring, the instrument is jacked into the ground, and the material being cut by the shoe is sliced into small pieces by a rotating cutting device. It is a shearing process. The distance between the leading edge of the shoe and the start of the cutter is important and can be optimised for a particular material. If too close to the cutting edge the soil experiences some stress relief before being sheared. If the cutter is too far behind the shoe edge then the instrument begins to resemble a close ended pile. In stiff materials the usual setting is flush with the cutting shoe edge. The cutting device takes many forms. In soft clays it is generally a small drag bit, in more brittle material a rock roller is often used.

The instrument is connected to the jacking system by a drill string. This is in two parts, an outer casing to transmit the jacking force and an inner rod to rotate the cutter device. The casing is smaller than the maximum instrument diameter and the drill string is extended in one metre lengths as necessary to allow continuous boring to take place.

The cut material is flushed back to the surface through the instrument annulus. Normally water is used but air and drilling mud can also be used if appropriate.

The self boring method has been well documented and a complete description of the instrument and its test can be found in the references.

There is an isolated pressure-tight compartment at the lower end of the probe containing analogue and digital circuitry. All transducers in the probe are

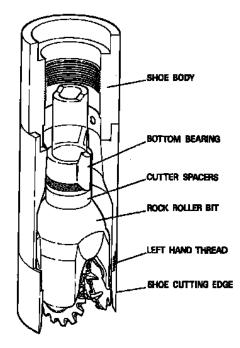


Figure 2.2 The rock roller configuration

read once every five or six seconds, depending on the version, and the result is output as digital numbers in ASCII format via an RS232 compatible serial link. All the signal conditioning is carried out in the probe itself, so the pressuremeter is unaffected by changes to external equipment including the cable.

The SBP can be arranged to cut the same diameter over its entire length – this is only appropriate for the softest ground conditions. In stiffer ground, the cutting head is larger by 1mm than any other part of the probe. This allows the instrument to penetrate ground of the strength of very weak rock.



Figure 2.3 The SBP ready to use

2.1 Boring Equipment

The SBP can be bored into its test positions by a conventional rotary drilling rig. The head rotates and pushes at the same time. To separate these two forces Cambridge Insitu supply an adapter incorporating a thrust bearing that allows a rotary head to drive the two rod SBP system. Water flush (supplemented with drilling muds, if available) is used, applied by whatever water pump is fitted to the drill rig. The reaction for the self boring is the self —weight of the drill rig.

A typical arrangement is shown in Figure 2.4 left. Figure 2.4 right shows a schematic of the adapter.



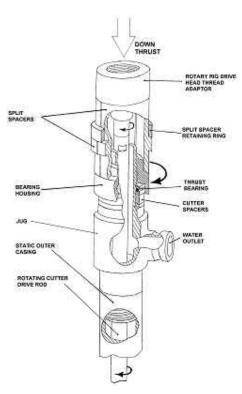


Figure 2.4 left: SBP system with drill rig right: Rotary Rig Adapter

3 The Membrane

The membrane itself is a nitrile rubber sleeve. Because the behaviour of the membrane has an influence on the derived displacements it is kept relatively thin (8mm for the standard probe) so that its contribution is small. By its very nature there is a gap between the instrument and the borehole and steps have to be taken to prevent the membrane extruding axially. This is achieved by stiffening the ends of the membrane with rings of stainless steel fingers known because of their appearance as 'Christmas Trees'.

There is a version of the membrane which carries local reinforcement at the ends consisting of kevlar strands. When the applied pressures are fairly modest (no more than about 50% of the available range) then this membrane can be used without Christmas trees.

The entire length of the of rubber membrane is covered with a sheath of eighteen stainless steel strips which are axially stiff but free to expand radially. This sheath protects the membrane from sharp edges, and is known as a 'Chinese Lantern'. The individual strips do not overlap in the closed position.

4 The Pressurising System

The instrument is inflated by oil or gas. A strong hose connects the instrument to the pressure source, either a manually operated hydraulic pump or a pneumatic control system. The passage down the centre of the hose is large enough to incorporate a steel logging cable with four electrical conductors. Three of these conductors are used; one carries the digital signals output by the instrument, and two carry power to the instrument from a conventional 12 volt vehicle battery. The power consumption of the pressuremeter is small; up to 500 metres of hose and cable could be connected to the instrument with only minor modification.



Figure 4.1 The control system

The advantages of the oil inflation are that it is inherently safe, requires very little equipment and because it is re-cycled the consumable costs are low. However if the instrument is on a long cable it takes time for the oil to return to the surface and in a dry hole it will never return unaided.

When working over water, it is normal to fill the probe itself with oil but surcharge it with air. Should the membrane become punctured the oil will keep the water out of the probe.

5 Electronic Interface Unit (EIU)

All pressuremeter hardware is powered by a single 12 volt vehicle battery. The battery is connected to the EIU, which introduces some protection and distributes the power to a number of outlets, including one for the pressuremeter. The returning signals from the pressuremeter connect to the same socket. The digital signals pass through an opto-isolation circuit and are then made available on two identical sockets for connection to the serial port of a computer. There is also an analogue signal which represents the output of TPC A.

The unit has a panel meter which can be switched either to read the battery volts or to read the analogue signal representing pressure in the probe.

6 Data Logging / Analysis Software

Software developed by Cambridge Insitu is used to log the data during the test, and for analysing the results subsequently.

The logging software stores the incoming data, displays the pressure/expansion curve in real time, and provides a text file output of the test data in engineering units. This file is read directly by the analysis program but can also be read by any of the common spreadsheet programs.

The analysis software provides routines which implement a number of standard analyses. The analyses tend to be graphically driven, meaning that the analyst identifies and marks significant parts of the curve, either for breakpoints or slope. The final screen for the analysis is then output as hardcopy backup for the decisions made.

APPENDIX B CALIBRATING CAMBRIDGE PRESSUREMETERS

1 Introduction

The calibrations are of two kinds. The most straightforward are those related to the performance of the transducers that determine changes in stress and displacement. However, no matter how exact the measurement, what is being determined are the changes caused to the *inner* surface of a sealed membrane. The purpose of the test is to determine the alterations to the cavity wall on the *outer* surface of the membrane. The second aspect to the pressuremeter calibration therefore is calculating the difference between these two surfaces. The difference is due to the strength of the membrane and the finite stiffness of the instrument.

All Cambridge pressuremeters use similar procedures so examples are given from a variety of probes. This description is laid out in the following order:

- Scale factors
- 2. The displacement measuring system
- 3. Pressure measuring transducers
- 4. Reference ('zero') outputs
- 5. Membrane stiffness
- 6. Instrument compliance
- 7. Instrument straightness
- 8. Membrane thinning
- 9. Repeatability (or how much effort should be devoted to calibrations)

2 Scale Factors

The transducers in the probes are based on full bridge strain gauge circuits, where one half of the bridge is in compression and the other is seeing tension. The gauges are matched and distributed so that the effects of temperature alteration cancel out. Any such transducer produces an output dependent on the voltage being applied to it, the stress deflecting it and the amplification or buffering between it and the recording system.

The instruments contain electronic devices that provide a regulated voltage to the transducers and amplification of the resulting output signals. Because this electronic conditioning is a fixed part of the system it is not mentioned when presenting calibrations. The electrical output of the transducer, in volts, is quoted only as a function of the deflecting stress. This function is termed 'sensitivity' and gives the scale factor for deriving pressure or displacement from the transducer electrical output.

Although the output of the transducers is described as voltages, the true output of the system is a digital data stream of ASCII encoded numbers representing volts. All variables associated with producing the digital output from the strain gauge signals are a function of the pressuremeter itself, and are independent of external changes (such as alterations to the connecting cable).

When using the sensitivity calibrations to convert readings from volts into engineering units we make two important assumptions about this output; that it is linear, and that the hysteresis is negligible. The calibration procedure is the evidence that these assumptions are reasonable.

3 The Displacement Measuring System

The displacement measuring devices are often referred to as 'the arms'. The arms are calibrated by mounting a micrometer above each in turn and recording the output for a given deflection. When calibrating an instrument, it is necessary to plot these readings for both an increasing and reducing

deflection. The difference at a given point between the increasing and reducing path is a measure of the hysteresis. The worst-case figure is noted, and corrective action is taken if the hysteresis is outside an acceptable limit - normally 0.5% of the sensitivity. We use micrometer heads with a non-rotating stem to ensure we are not spoiling the hysteresis measurement.

The slope of the best fit straight line through all the points is used to quote the arm sensitivity - as an output for a given deflection in units of millivolts per millimetre (mV/mm). See Figure 3.1.

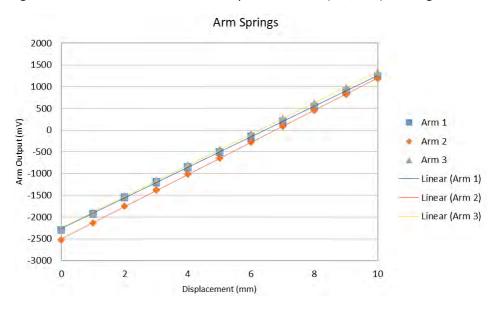


Figure 3.1 Arm Calibration example

4 Pressure Measuring Transducers

For pressure measuring circuits the maximum possible sensitivity is desirable, the only requirement is that the sensitivity be known and be linear and stable.

The sensitivity of *internal* pressure transducers is determined by placing a large metal cylinder over the probe and applying a known pressure to the inside of the instrument. The pressure being applied is measured by a standard test gauge. As with the arms, readings are plotted, the hysteresis noted, and the best fit straight line drawn through the plotted points.

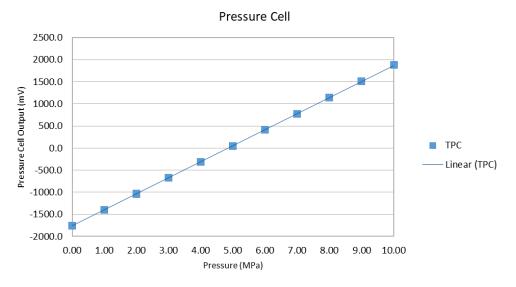


Figure 4.1 Pressure cell calibration example.

Pressure sensitivities are quoted in units of millivolts per MPa. See Figure 4.1.

5 Reference ('zero') outputs

The other parameter that the transducers have is a known output for an 'at rest' position. This is the value of the outputs produced by the circuits with atmospheric pressure both inside and outside the instrument, and any displacement measuring system at the initial radius position. This is called a little misleadingly 'zero'.

The absolute value of this figure is normally unimportant - it is not necessary that the figure be zero volts for zero displacement or stress, just that it be known. For practical purposes, as the analogue to digital converter outputs a number between –3.2767 and +3.2767 volts, the 'at rest' readings for the arms are set to be about -2 volts to allow a large output range with a margin for gradual drift over time.

A similar situation applies to the pressure cell – the absolute value of the 'zero' output is unimportant provided it allows the full pressure of the system to be resolved. Adjustment positions using 1% metal film resistors are provided in the instruments for setting all 'zero' outputs.

It is recommended to take (and make a record of) zero readings both at ground level and also at test depth immediately prior to carrying out a test. A significant change between zero readings must be investigated. 'Significant' would mean a change of 30 millivolts from the last set of zero readings. It is not unusual for shifts of a few millivolts to occur from day to day. It is important that the zero readings be stable when viewed over a period of a few minutes.

Note that when using oil to inflate a probe, ground level readings are the preferred reference because once in the borehole the pressure transducers will read the head of oil. For gas inflation it is probably better to use the zero readings when the probe is in place in the borehole, because it will then be at the temperature most applicable to the test. However, the self boring probe is fitted with pore pressure transducers. These two transducers must use zeroes recorded at ground level if they are to read the full water pressure in the ground.

6 Membrane stiffness

The membrane that is expanded by a pressuremeter has its own initial tension requiring a finite pressure to move it. The readings measured by the stress cells need to be reduced by this pressure in order to determine the net stress being applied to the ground.

The membrane correction is idealised as two components – a fixed pressure (in kPa) to move the membrane from its position at rest on the instrument, and a variable pressure dependent on the radial expansion, in units of kPa/mm.

The technique for obtaining the correction data is to pressurise the instrument in free air, ideally using similar rates of expansion as would be applied during a test.

The slope and the intercept on the pressure axis of the graph produced by this test give the membrane correction information for each arm. See Figure 6.1.

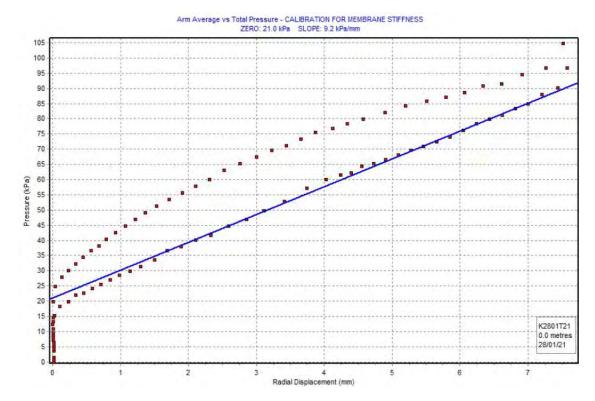


Figure 6.1 An example of an HPD membrane stiffness calibration

Knowing that the membrane does not necessarily possess isotropic properties, it has been customary to derive a different set of figures for each arm position. However an unconfined inflation in air exaggerates any variation in membrane properties; an average correction factor is more appropriate. The argument is that the ground has significant strength and stiffness, so that the membrane is always the weaker component. Hence although in air the weakest part of the membrane will move first when expanding, in the ground this cannot happen. Conversely, when the unconfined membrane is unloaded, the strongest part of the membrane will dominate. The consequence is that in air the membrane response looks like a hysteresis loop. The nearest approximation to the behaviour of the membrane in the ground will be the unloading phase of the test in air.

Typical correction figures are 60kPa and 10kPa/mm. Occasionally we calibrate membranes in a batch to save time when replacing them. The calibration values are written on the membrane.

7 Instrument compliance

The instruments will deform as a consequence of the pressure being internally applied. Put simply, the probes stretch. Because the displacement measuring system uses the body of the instrument as a reference, movements of the body are seen as apparent displacements of the membrane; some ingenuity is needed to isolate the displacement measuring system from this problem. This system compliance has implications for the measurement of shear modulus, and it can become a significant source of error when measuring very high modulus values.

There are a number of effects to consider but they are collectively determined using a single procedure. The correction figure which results is known for historical reasons as 'membrane compression', unfortunately not a good description.

For the Cambridge family of pressuremeters real membrane compression, that is the membrane changing in thickness as a direct result of the pressure differential across it, is almost too small to be

measurable. There are a number of other factors to consider of greater magnitude than membrane compression.

Inflating the instrument inside a metal cylinder will provide data on the magnitude of these effects. However a separate source of error, which is a function of the calibration procedure itself, then becomes apparent. The membrane is able to expand axially by a small amount, and as a result experiences a change in thickness which may not occur in the ground. Although steps can be taken to keep this axial movement to a minimum, it cannot be eliminated.

As a consequence of the relatively poor fit of a calibration cylinder, and also the low coefficient of friction between the membrane and the steel by comparison with the membrane and the ground, the instrument will move about in the cylinder - its centre will not be the same as the centre of the cylinder. Only average radial movement can be derived from this calibration process, and it is not sensible to try for separate factors for individual arm.

If metal protective strips are fitted then part of the correction response is due to these strips taking up the form of the cylinder, a process that would only occur in the ground if the material was good rock. This is the explanation for much of the initial curvature that occurs when an assembled probe is inflated inside a metal sleeve - it is a serious error to attempt to derive a correction factor from this part of the loading.

Taking account of all the above, the following method is used. The outer sheath is removed and a thick wall metal tube of known properties is placed over the membrane of the instrument. The instrument is inflated slowly until the membrane contacts the wall of the tube. The test continues, either as a gentle continuous inflation or in discrete steps, holding each step briefly to ensure maximum accuracy. The probe is pressurised up to maximum working pressure. The pressure is then reduced, also in steps of 5 bars. Some users prefer the unloading should be down to 20 bars, then the probe should be reloaded again to maximum pressure and unloaded to zero, in effect doing a large unload/reload cycle. In a good calibration, all loading and unloading slopes will be similar, but it sometimes happens that the probe moves with respect to the cylinder and this will affect the data. In this event doing the second reloading would give the best correction information.

The calibration is obtained by plotting the pressure/displacement data on a large scale, and finding the best fit slope through the points. The slope ought to be the known expansion of the cylinder for the pressure applied. In practice it is always a little more, the difference being the 'membrane compression' figure. We quote the figure in terms of 'mm/GPa' a typical compression being between 2 & 5mm/GPa, depending on the type of probe. See Figure 7.1.

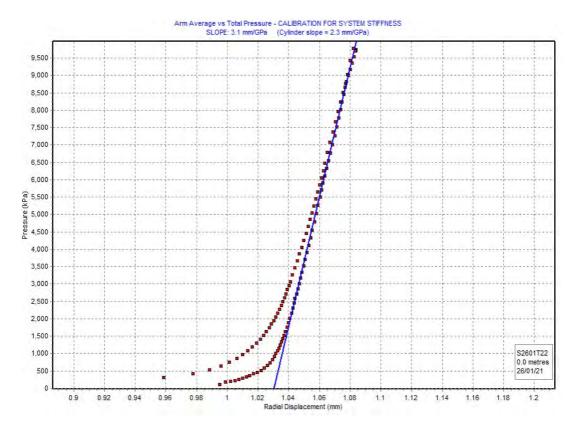


Figure 7.1 An SBP system compliance calibration

Quoting the compression in this manner allows the software to calculate the appropriate error for every step of pressure and to make the necessary adjustment to the measured displacements.

To put the correction in context, a slope of 3mm/GPa is equivalent to a modulus greater than 4GPa. Because the calibration is highly repeatable, within about 5%, the actual uncertainty is considerably higher than 4GPa, so shear modulus of 20GPa or more can be determined within acceptable limits.

8 Instrument straightness

All instruments can become bent during operations due to the large forces that occasionally are applied when the probe is not well supported. Before bringing the instrument on site it is good practice to check that the instrument is straight (within a small tolerance). The method for doing this is to support the instrument at the points where the membrane is clamped, and then to rotate the instrument whilst the run out is observed at a number of points. A record is kept indicating the total runout at these points, and the probe can be straightened if the deformation is significant.

The instrument is never perfect, and it happens that frequently a consistent bias in the displacement system (especially in the vicinity of initial movement of the membrane) can be linked to a lack of straightness.

This is an especially important check for the self boring probe.

9 Membrane thinning

During a test, the pressuremeter membrane changes in thickness as a consequence of being stretched. This change in thickness can be calculated by assuming to a first approximation that the cross-section area of the membrane remains constant. The calculation is incorporated into the program that converts raw data into engineering units.

Note that the term 'membrane' includes the stainless steel protective sheath, and that the measurement made by the arms is the radial distance to the inside of the membrane.

Definition of Terms

а	is the internal radius of the membrane at rest
b	is the external radius of the membrane at rest
С	is the internal radius of the membrane expanded
r	is the external radius of the membrane expanded
t	is the thickness of the stainless steel sheath strips
d	is the measured movement of the strain arm
Ε	is the actual expansion of the membrane

Calculation

At rest the cross-section area of rubber $= \pi (b-t)^2 - \pi a^2$ The expanded cross-section area of rubber $= \pi (r-t)^2 - \pi c^2$

Because the rubber is incompressible, these must be equal:-

Therefore
$$(b-t)^2 - a^2 = (r-t)^2 - c^2$$
 Now:-
$$c = a+d$$
 and:-
$$r = b+E$$
 hence
$$(b-t)^2 - a^2 = [(b+E)-t]^2 - (a+d)^2$$

$$\therefore [(b-t)+E]^2 = (b-t)^2 - a^2 + (a+d)^2$$

$$(b-t)^2 + d(2a+d)$$

$$(b-t) + E = \sqrt{[(b-t)^2 + d(2a+d)]}$$

$$E = \sqrt{[(b-t)^2 + d(2a+d)]} - (b-t)$$

This is the form in which the calculation is commonly applied to the data, with 2a, 2b and t being known from the manufacturer's data, and d being the measurement made by the displacement sensors during the test.

Typical dimensions for three types of probe are:-

	47mm RPM	88mm SBP	95mm HPD
	(mm)	(mm)	(mm)
2 <i>a</i>	38.00	79.15	81.00
2 <i>b</i>	47.00	88.10	95.00
t	0.5	0.5	0.5

To apply the correction at a given expansion the *average* radius of the expanding membrane is calculated. This average is then entered into the equation and the ratio between the corrected average and the raw average is expressed as a scale factor (for example it is about 0.86 for an RPM at all expansions). The scale factor is then applied to the individual arm displacement outputs.

10 Repeatability (or how much effort should be devoted to calibrations)

Although it is important regularly to check the sensitivities of the strain gauge circuits, it is unusual for them to change markedly. Indeed it is common for the hysteresis to improve with use or exercise. 90% of the performance of a strain gauge bridge application can be predicted from its design; the calibration removes the uncertainty due to manufacturing tolerances, and can give early warning of impending problems in a particular circuit.

The expansion test is concerned with making relative measurements, not absolute measurements. The displacement measuring system will resolve movements of less than 0.5 microns over a range of 13 millimetres; the pressure measuring system will resolve changes of 0.1 kPa over a range of 20MPa. This resolution is considerably higher than can be seen with a standard micrometer or test gauge. To put it into context, 0.5 microns is approximately the wavelength of ultraviolet light. Obviously, there is no practical possibility of checking by measurement a movement so small.

Hence the term 'calibrating' is inappropriate. What is done in practice is to check that the various sensors are linear over a number of relatively coarse steps or intervals. We assume that this linear behaviour will be true for very much smaller changes.

We expect successive calibrations on the same sensor to be within 2% and investigate a difference greater than 3%.

We also ignore smaller sources of error in this assumption of linearity, such as temperature change. The full bridge configuration is inherently insensitive to temperature variation, and in addition the strain gauges used are matched to the characteristics of the surface to which they are bonded. When critical measurements are being made during a test, for example when taking a reload loop, it is reasonable to assume the temperature remains constant. The ground is usually at a constant temperature whenever a test is carried out, but sometimes there are problems - the temperature of the gas being supplied to the downhole tool can have an influence especially if the gas bottle reservoir is lying outside in direct sunlight.

Spreadsheet software is used to present the results of the calibrations for sensitivity. One benefit of this is that gradients are calculated by linear regression routines; this ensures different operators given the same set of data will derive identical calibration factors. The calibrations are presented as a tabulation of transducer output against a known reference, with the linearity and hysteresis quoted for each calibration step.

The membrane corrections seldom change greatly and the strength of material tested means that for the most part any errors in the magnitude of the correction are of minor importance. In general, if the material is weak (shear strength less than 100kPa) then membrane strength and stiffness are important. If the material is extremely stiff (shear modulus greater than 1GPa) then correcting for instrument compliance is important. In between these two extremes the influence of the imperfections of the machine on the derived parameters is minor.

APPENDIX C TEST PROCEDURES

1 Description of the Test

The tests the pressuremeters make are loading tests. Pressure is applied to the instrument and readings are taken of this pressure and the resulting displacements of the cavity. Plotting pressure against displacement gives a test curve with a characteristic 'S' shape. The two kinds of test can be made dependent on probe used.

- A) The material yields well before the maximum pressure capability of the equipment is reached.
- B) Tests where the maximum pressure capability of the probe is the limiting factor and the material does not yield.

This project only saw type A tests.

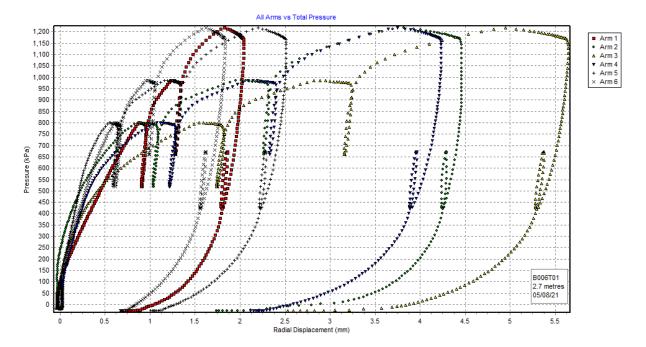


Figure 1.1 Example of test in a material showing significant deformation

There are several ways of using the data contained in the pressure/strain curve but the most common is to use it to derive fundamental parameters about the strength of the material being tested. Therefore, the precise manner in which the test is carried out should be chosen to make it easier to assess these parameters.

The slope of the initial linear part can give a value for the initial shear modulus G_i but because this part of the curve is sensitive to the disturbance produced by the coring the derived value may well not be representative of the true shear modulus of the material.

A better estimate of shear modulus (G)can be made by taking unload/reload loops at intervals along the loading path. To do this a little of the pressure that has been applied is released and then reapplied in a controlled manner, taking readings of the changing strain. This produces a characteristic loop. The slope of the best fit straight line through the long axis of the loop can be used to derive G_{ur} .

The value of *G* produced in this way is relatively insensitive to the initial drilling disturbance. The shear modulus is probably the single most useful parameter that the test can produce. Because of this significance it is usual to take at least two loops at suitable points on the test curve. Suitable points would be on the linear part of the curve and as soon as there are indications of failure. Loops can also

be taken on the unloading curve. Before starting the loop the pressure is held for at least 1 minute to allow residual creep effects to minimise – 3 minutes is about the time taken to carry out a cycle.

Deductions about the material strength or internal friction angle are made from the part of the curve following yield until the end of loading for pre-bored and self bored tests. Note that it is also possible to analysis the final cavity contraction curve for strength and stiffness. In many ways this is preferable, because there is only minor uncertainty concerning the origin of the contraction event.

2 Logging Rate

A line of data representing the output of all transducers was logged every 6 seconds for the SBP and 5 seconds for the RPM.

3 Placing the HPD

The HPD test is carried out in a 101mm pocket that has been formed by coring. Coring is the conventional method because the recovered core can give some information about the pocket before the instrument is placed. Samples of the core are normally of sufficient quality to permit standard laboratory testing, which can be compared with the pressuremeter results.

The pocket itself should be at least 2 metres long. This allows the user some choice about the exact point in the pocket in which to place the HPD. Note the following crucial measurements

- From the foot of the instrument to the centre of the measuring section is 0.9 metres.
- The expanding part of the instrument is about 0.6 metres.
- The instrument is 2 metres long if the BW extension rod is added to this then the effective length from the foot of the pressuremeter to the start of the rotary drill string is 3 metres. If the pocket is longer than 3 metres then the diameter of the drill rod used to place the pressuremeter must not exceed 75mm; this together with two thicknesses of hose, is the maximum that will fit into a 101mm pocket.

From these dimensions it is apparent that the instrument must be at least 1.3 metres into the pocket, and for safety we use 1.7 metres as a minimum. The very lowest part of the pocket should be avoided as this is often the area most spoiled by the coring, but as the test centre is some distance from the foot of the instrument this is not normally a problem.

Soft patches in the core suggest a point that ought to be in the test section. However soft patches at the ends of the expanding section may result in the membrane bursting before the pocket has been properly loaded.

It is a truism that the quality of the test is dependent on the quality of the initial coring. However many good tests have been made in pockets where no core at all was recovered. Standard coring practice is designed to preserve the core without regard for the borehole wall. This is the opposite of what the priorities need to be for the pressuremeter test.

4 Placing the RPM

The sequence was as follows:

Starting with a working RPM system, calibrated and in all respects ready to go:

The support drill crew formed a pocket at least 0.7metres long by using either a custom made SPT split spoon or button bit provided by Cambridge Insitu Ltd. The drill string is then removed. Using conventional drill rods the RPM was placed at the desired location. The RPM has its own umbilical.

This is a high pressure pneumatic hose threaded with an electrical cable. It was taped at regular intervals to the drill rod.

If the RPM has difficulty finding its way into the pocket the drill head can be used to give a gentle push. Normally the weight of the drill string is sufficient. Once the depth was confirmed a cavity expansion test was carried out. Once the test is completed, the electronics are switched off, electrical cables and pneumatic hoses at the surface were disconnected and the drill string lifted back until the probe was recovered. Finally, following testing the probe is checked, cleaned, and made ready for the next test.

5 Drilling and placing the SBP

The SBP operation takes place under a rotary rig. Before using the SBP the borehole must be cleaned out beyond the end of the rotary casing. The probe is lowered to the bottom of the borehole, in a similar way RPM. However, unlike the RPM the drill string used is special to the SBP and has an inner and an outer rod. The sequence of events was as follows:

- 1. The rig prepared a hole to a nominated depth approximately 0.5 metres above the intended test point.
- 2. The instrument was laid horizontally on a holding frame and a single length of casing and inner rod was added to the probe. The pore pressure cells on the probe were de-aired and covered to prevent evaporation. A line of zero readings were then taken from the data logging system. The pore water pressure response during the drilling operation was logged (Figure 5.1).
- 3. The instrument was lowered down the borehole using the rig winch, with lengths of casing added at intervals of about 3 metres.
- 4. Approximately 1 metre was self bored, using the column of previously installed water well casing as kentledge. This force is kept to the minimum necessary consistent with good return flow so that the probe enters the ground at a constant force. Typically a metre of self-boring took about 30 minutes. The return from the SBP was observed but discarded.
- 5. Once at depth a test was carried out, with two or more unload/reload cycles.
- 6. After the test the probe was extracted, the borehole was cleaned out and advanced by the rig to the next test depth.

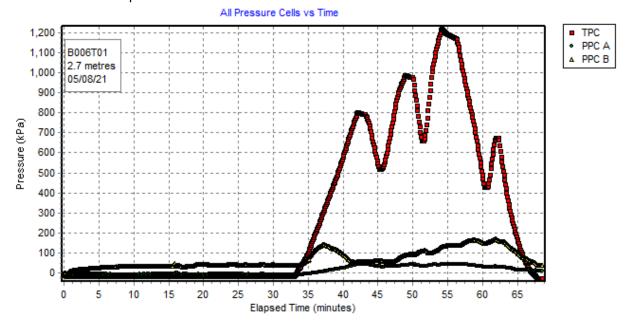


Figure 5.1 Drilling and testing example, SBP pore pressure response

6 Terminating a test

The decision about when to stop a test depends on a number of factors, as follows:

- For any test the operator is trying to record at least two unload/reload cycles and to record a full
 cavity contraction. This is because in recent times the advantages of analysing the unloading of a
 cavity have become apparent.
- If possible, the operator wants to see the material yield, and record at least some of the plastic response of the material.
- If the maximum pressure capability of the instrument is reached then this is an obvious termination imperative. However no test on this contract reached the pressure limit of the equipment.
- This decision making process can be informed by indications that the material is showing unusual behaviour such as a structural breakdown.
- If the maximum displacement capability of the instrument is reached then this is an obvious reason to terminate the test. The criteria for termination based on displacement depends on the material and the size of the initial pocket. A tight pocket in any material can be taken further than one in an oversize pocket that yields at stress levels greater than 100 bars.

APPENDIX D INTERPRETING PRESSUREMETER TESTS

This appendix gives details of the methods used to derive the results of pressuremeter tests on this contract. The text is illustrated with examples from the fieldwork.

1 MATERIAL PROPERTIES FROM PRESSUREMETER TESTS IN SOIL.

1.1 Notation

P_o Initial cavity reference stress (total)

P Pressure

 P_f Pressure when yield first occurs at the cavity wall (total)

 P_{max} Maximum pressure reached

r Radius

 r_o Initial radius of cavity

 ε_c Cavity strain

G Shear Modulus

1.2 Overview

There are two well established approaches to the interpretation of expansion pressuremeter test data. The first, developed by Menard, uses empirical correlations to allow measured co-ordinates of pressure and displacement to be inserted directly into design equations. This approach depends on a standardised test procedure and a large data bank of pressuremeter tests correlated with observations of the response of finished structures.

The second approach, which will be described briefly here and is the usual way of interpreting the pressuremeter test in the UK, relies on solving the boundary problem posed by the pressuremeter test.

The aim of the pressuremeter test is to expand a long cylindrical cavity within an undisturbed mass of soil. Fundamental strength properties of the material can be deduced from measurements made of cavity pressure and displacement.

In practice no instrument can be placed into the ground without affecting the surrounding soil. In the case of a self-bored pressuremeter test the disturbance is generally within the elastic range of the soil and can be allowed for in the analysis procedure. For all other kinds of pressuremeter the disturbance is irrecoverable, and analysis takes place on those parts of the curve following strain reversal.

1.3 The pressuremeter test in soil - initially elastic response/failure in shear.

Consider that the soil is homogeneous and shows simple elastic behaviour before failing in shear. The stress path followed by an element of soil adjacent to the cavity is given in Figure 1.1 and the corresponding pressure /strain curve is shown alongside.

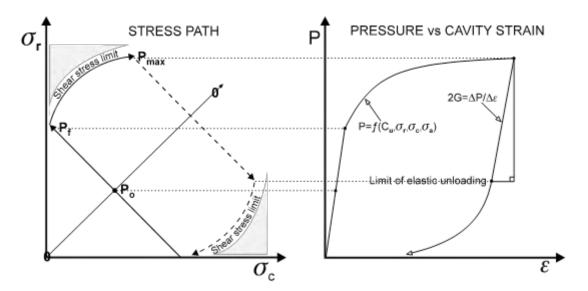


Figure 1.1: Elastic Response followed by failure in shear

The radial stress, ideally at the insitu horizontal stress for a perfect installation, increases at the same rate as the circumferential stress decreases, regardless of whether the material is deforming under plane strain or plane stress conditions. The line 0 - 0 represents stress equality, so that in the ideal case considered here the point P_0 is the insitu lateral stress.

Once the radial stress increases above the insitu stress then the shear stress in the soil at the cavity wall will increase. If the insitu lateral stress is low, then it is possible that the circumferential stress would go into tension. However, in this example the insitu stress is high enough to ensure that the shear stress limit is reached before tensile stresses can be generated.

The pressure necessary to initiate shear failure is denoted P_f in Figure 1.1. After this pressure the strain rate shows a substantial increase, and the form of this part of the pressure/strain curve is a function of the shear strength of the material.

Radial stress and circumferential stress now increase together. If the shear stress limit is constant, and is not influenced by pressure, and if the material deforms at constant volume, then the failure shear strength can be determined by the analytical solution developed by Gibson & Anderson.

Before the shear stress limit is reached the pressuremeter response is elastic, both in loading and unloading. Assuming the soil deforms at a constant modulus and the installation is perfect then the slope of the initial loading path gives the shear modulus of the material, using the classic procedure of Bishop, Hill & Mott (1945). The diagram also indicates that reversing the direction of loading causes an initial elastic response giving an alternative means of deriving the shear modulus. This implies that small cycles of unloading and reloading taken anywhere in a test after reaching the shear stress limit can be used as a source of stiffness information (Hughes 1982).

As Figure 1.1 suggests, the complete unloading of the pressuremeter can also be used to give strength and stiffness parameters comparable with those obtained from the loading path.

From the right-hand side of the stress diagram it is apparent that the pressuremeter provides a limited set of the necessary information for resolving the stresses and strains around the probe. Specifically, it gives the changes in radius of the borehole wall (a particular case of hoop strain) and the corresponding changes in radial stress at the borehole wall. There are no data for hoop stress or radial strain or movements in the vertical direction. Test procedures are chosen to allow the missing data to be inferred – for example an undrained expansion means shearing occurs at constant volume and

hence changes of radial strain must be equal and opposite to changes in hoop strain. The unseen vertical axis data are rendered redundant by making pressuremeters long with respect to their diameter, allowing plane strain expansion to be assumed.

1.4 Defining strain

For a pressuremeter measuring the radius of an expanding cavity the conversion from displacement to strain is:

$$\varepsilon_c = \frac{r - r_o}{r_o}$$
 [Equ 1.1]

where r is the current radius of the cavity and r_o is the original radius of the cavity in the insitu state. This is simple strain and when displacements are measured at the borehole wall is termed cavity strain, ε_c .

 r_o can be approximated by the at rest radius of the instrument. The preferred approach is to identify when the applied pressure has reached the insitu lateral stress, and interpolate from this the corresponding radius, which then becomes r_o .

Note that although the pressuremeter measures the radius of the cavity wall, ε_c is a specific instance of circumferential or hoop strain. It is usually expressed as a percentage.

Figure 1.1 shows how pressures and strains in the expanding borehole are defined.

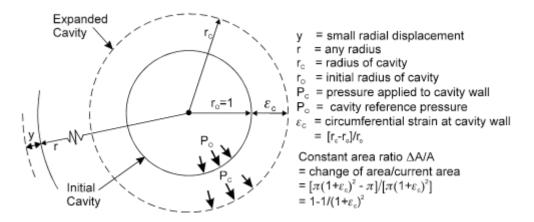


Figure 1.1: Pressures and strains around the expanding cavity

The other strain commonly used is the constant area ratio, which is shear strain. As Figure 1.1 indicates it can be defined in terms of simple strain.

The large expansion pressuremeter test results in the soil experiencing very large strains and the approximations of simple strain conventionally used in pressuremeter testing when converting displacements are inappropriate. True strain or natural strain is the sum of the incremental increase in radius divided by the current radius, which is conveniently defined as:

$$Ln\left(\frac{r}{r_o}\right)$$
 or $Ln(1+\varepsilon_c)$ [Equ 1.2]

This makes it possible to use the 'at rest' radius of the probe as an origin for strain, even though the soil particle adjacent to the probe before starting to inflate the membrane has been displaced by at least the instrument radius.

Some calculations are easier with true strain. Consider the equation for determining shear modulus from the slope of rebound cycles - Mair and Wood (1987) write this as:

$$2G = \left[\frac{r}{r_o}\right] \left[\frac{\Delta P}{\Delta \varepsilon}\right]$$
 [Equ 1.3]

It is apparent from [Equ 1.2] that the term $(\frac{r}{r_o})$ is a correction factor made necessary as a consequence of using simple strain - the equation reduces to:

$$2G = \left[\frac{\Delta P}{\Delta \varepsilon}\right]$$
 [Equ 1.4]

if ε is defined in terms of true strain. As $\Delta \varepsilon$ is merely a change in strain, no knowledge of the actual strain origin is required in order to calculate a modulus parameter.

1.5 Average displacements versus the output of the separate axes

There are a number of displacement sensors in the expansion probe but recommended practice is to quote parameters from the average displacement curve. This is for two reasons:

- The reference for the measured displacements is the body of the instrument itself trying to separate the individual axes means assuming that the body of the instrument remains fixed at all times, which is not realistic.
- All available analyses assume isotropic properties in the surrounding soil, and only the average pressure/strain curve represents this condition.

These remarks assume that the instrument is in full working order throughout the test - failure of a displacement follower means that alternative strategies must be adopted.

The significance of the first point above has been demonstrated by an examination of cycles of unloading taken from separate arms (Whittle 1993) and by work with a six arm version of the Self Boring Pressuremeter (Whittle et al 1995). In the case of the three arm Self Boring Pressuremeter an exception is sometimes made for the initial part of the loading prior to yield. In such circumstances the response of the separate arms may yield clues to the initial stress state in the surrounding soil, allowing an assessment of the degree of insertion disturbance.

1.6 The Analysis program

We use (and supply to others) software for analysing a pressuremeter test. The program is called **WINSITU**, which has been in use for a number of years.

To use the program the user must first read in a text file of test data in engineering units. The program needs to know the type of instrument being used, and the user may choose to enter additional background information about the test.

The next task is to identify for the program the nature of the individual data points. Broadly, the options are these:

- a point can be part of the expansion curve
- or part of a reload loop
- or part of the contraction curve
- or none of the above. This might mean a 'rogue' data point, but it is more likely to be true of parts
 of the loading where the expansion was slowed prior to taking an unload/reload cycle. Data points
 recorded at this time are neither part of the expansion nor part of a cycle and should be identified
 as such.

There is a quick on-screen routine for marking the points. Once marked, they appear in different colours. Most of the analyses use a limited set of the available data - for example the Gibson & Anderson analysis for undrained shear strength uses only points on the expansion curve.

The program implements all the standard analyses mainly in a graphical form. As Figure 1.1 implies, there are significant changes of gradient in the pressure/strain curve denoting critical soil parameters. The user of the program is provided with on-screen tools to mark these breakpoints or to obtain the slope of the loading curve. The tools can be visualised as rulers, whose position is stored by the program in the file of test data. The evidence for any derived parameter is a screen dump of the appropriate analysis that shows the position of any rulers set by the user and quotes the parameter obtained. Even when the user declines to make a choice it is good practice to provide the screen dump as evidence of why a choice is difficult.

The results for a test appear as a summary sheet of derived parameters followed by a number of plots showing the application of the various procedures.

Sometimes analyses are required which are not included in the WINSITU program. In such instances commonly available spreadsheet software is used to implement the new analysis. Inevitably in such circumstances there is some risk of human error affecting the conversion of data in engineering units to the form required for analysis. WINSITU has export facilities and wherever possible is used as the data source for the spreadsheet.

2 ANALYSES FOR INSITU LATERAL STRESS

2.1 Notation

P_o	Initial cavity reference stress (total)
P_f	Pressure when yield first occurs at the cavity wall (total)
σ_{ho}	Total insitu lateral stress
σ_{vo}	Total insitu vertical stress
k_o	Ratio of horizontal to vertical effective insitu stress
C_u	Undrained shear strength
$ au_f$	Shear stress when yield first occurs
G_i	Shear modulus from the initial slope of the loading curve
β	Exponent of non-linearity

2.2 Overview

The expansion pressuremeter test is a sequence of measured co-ordinates of pressure and displacement of the cavity wall (once suitable corrections have been made to compensate for the response of the elastic membrane).

For an SBP it is possible to recognise the insitu lateral stress by inspection, the so-called lift-off method. It is also possible to recognise by inspection the shear stress limit (the point marked P_f in Figure 1.1) as this is indicated by the onset of a markedly non-linear response. An iterative procedure first suggested by Marsland & Randolph (1977) allows the insitu lateral stress to be inferred. The method is not valid for tests in sands and tests in material with non-linear elastic properties. This effectively rules out all soils. Nevertheless, it is usual to run the analysis because it tends to set an upper limit to any estimate of insitu lateral stress. Both these methods are outlined by Mair & Wood (1987).

A more complex approach uses the full set of parameters derived from a pressuremeter test within a model and discovers whether the measured field curve can be recovered. The input data set is then adjusted in a controlled manner until the best match for all parameters is obtained.

The self-boring pressuremeter is fitted with pore pressure transducers, and the trend of excess pore water pressure against total stress can be used to identify yield stress and insitu lateral stress.

All these methods amount to obtaining a value for the cavity reference pressure, P_o . It is not possible to measure the insitu lateral stress σ_{ho} because the act of placing instrumentation always results in some disturbance, even if small. The methods above are indirect indicators for determining σ_{ho} .

It is open to question whether the reference stress is equivalent to the insitu lateral stress, and it is usual to bring a range of evidence to bear in order to decide if a particular value for P_0 is also a plausible value for σ_{ho} . External evidence might take the form of using the derived reference stress within a k_o calculation, or checking that the derived vertical/horizontal anisotropy can be supported by the material shear strength:

$$\sigma_{ho} - \sigma_{vo} < 2C_u$$
 [Equ 2.1]

In practice there is a wide range of values that would satisfy this condition so only the most extreme estimates for σ_{ho} would be identified by this test.

2.3 Lift-off

This method was developed for the SBP. In principle it is a straightforward procedure. The instrument is assumed to be bored into the ground with insignificant disturbance caused to the surrounding material. If the insitu conditions around the instrument remain unchanged by the insertion process, then the pressure at which the membrane first moves and the cavity begins to expand is P_o . The corresponding cavity diameter will be the same as the at rest diameter of the instrument. Because the initial part of a SBP test is very stiff the choice is made from an enlarged view of the first 0.2mm (0.5% strain) of the expansion. In the example there is slight disturbance, in this case stress relief, and the selected stress is a little higher than the stress at which the membrane first moves.

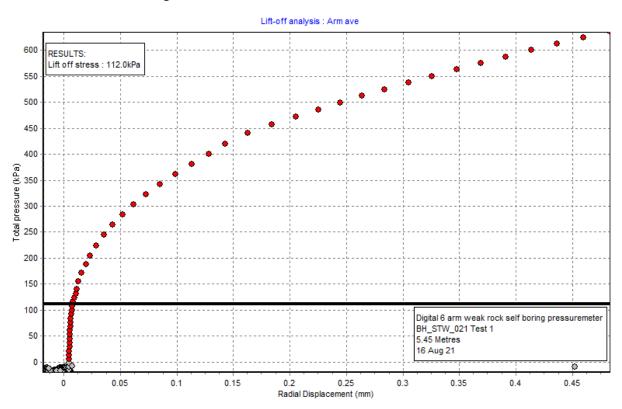


Figure 2.1 An example of lift-off

Difficulties can arise because the instrument has finite stiffness and hence there is instrument compliance to be separated from the expansion of the cavity. In addition, the instrument is being externally loaded by the lateral stress when the test is started. This external stress tends to deflect the arms of the instrument and reveals any imperfections in the seating of the arms. The imperfections, in effect small movements, are revealed when the pressure differential across the membrane is removed, i.e. exactly at the point where the cavity reference pressure is reached. In a simplistic approach these arm 'signatures' could be considered as positive indications of the reference pressure. However, in the ground it is not possible to have displacements without an associated change in stress, which add to or subtract from the reference pressure.

As a result of finite instrument stiffness and small movements from the displacement sensors applying the lift-off analysis means that there can be considerable uncertainty attached to identifying a plausible reference pressure. Conventional practice for coping with this uncertainty is to relax the definition of 'lift-off' to mean something more like 'significant movement'.

Figure 2.2 is a typical illustration of the problems involved with identifying lift-off. Here the individual arms from a SBP test are plotted together, with Figure 2.1 being the average output of these arms. There are a choice of lift-off points corresponding to a rigorous interpretation of what is implied by the

term. In general, the strict lift-off stress is that obtained from the first arm to move and sometimes small movements seen in separate arms cancel out in the average view. The difference one side of the probe to the other suggests that the probe may not be installed perfectly vertically, and cancelled movement show the influence of instrument compliance.

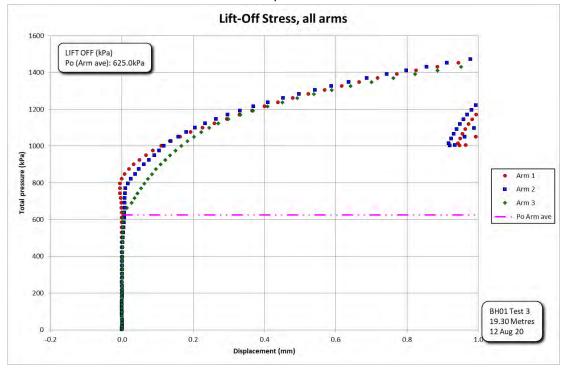


Figure 2.2: Lift-off, all arms shown (not from this contract)

It is important to bear in mind the scale. All the lift-off information is concentrated into the first 100 microns of the expansion or about 0.25% cavity strain. In this test the elastic strain range is at least 1.0% cavity strain. Because the movements are well within the elastic range of the material the analyst is justified in attributing significance to the output of the separate arms. In this event the arithmetic mean of the separate lift-off points is often a more useful parameter than lift-off derived from averaged arm displacement data.

Accepting that some movement takes place prior to 'lift-off' implies that assumptions be made about the mode of deformation. In the less rigorous application of 'lift-off' it is important that the analyst identifies the onset of plastic behaviour as a guide to deciding that some conspicuous change of form in the loading curve at a lesser stress is likely to be p_o . Our plots would still refer to such a break point as 'lift-off' but clearly it is something else, p_o by inspection perhaps.

2.4 Marsland & Randolph (1977) Analysis

Marsland & Randolph analysis relies on being able to identify the onset of plastic behaviour, the yield stress P_f . The argument is as follows:

- In the vicinity of the insitu lateral stress the soil response is simple elastic manner and therefore the total pressure/ cavity strain plot will be linear
- Elastic behaviour will cease when the undrained shear strength of the soil is reached in the wall of the cavity, and hence the pressure /strain plot will begin to curve (see Figure 1.1).
- This can be expressed as:

$$P_f = P_o + C_u ag{Equ 2.2}$$

From this it follows that P_o can be deduced by iteration. Initially an estimation is made of a value for P_o and used to define a temporary strain origin a total pressure/ log volumetric strain plot is then generated in order to derive a value for C_u . The sum of these two parameters is compared with the selected value of P_f . The choice of P_o is then suitably adjusted and the process repeated until a match is found. It is a straightforward matter to carry out this procedure on the computer.

The modified method in current use is a response to the difficulty that perfectly plastic deformation is not a realistic enough model for many materials and yield may occur at a different shear stress than the large strain shear strength. Hawkins et al (1990) suggested that the most appropriate choice was that value of shear stress pertaining at the apparent onset of plasticity, so [Equ 2.2] now becomes:

$$P_f = P_o + \tau_f$$
 [Equ 2.3]

 τ_f can be obtained from a total pressure/ log volumetric strain plot by selecting the slope at the pressure and strain corresponding to the choice of P_f (in practice, using the Palmer (1972) argument to identify the mobilised shear stress at failure). See inset plot in Figure 2.3.

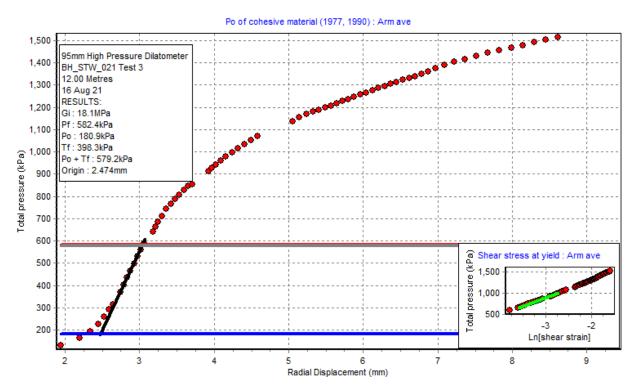


Figure 2.3 An example of the Marsland & Randolph analysis

The analysis is implemented graphically, using a number of rulers to identify significant points on the curve (Figure 2.3).

There are a number of problems:

- There can a choice of slopes for G_i , giving multiple possibilities for P_f . In practice the first slope encountered is usually too stiff to make a credible choice for G_i and is probably an indication of insertion disturbance.
- The assumption of simple elastic response in practice most soils exhibit marked non-linear
 elastic characteristics, so that the pressure at which the material appears to go fully plastic is
 more than one increment of shear strength above P_o this point is developed later.
- The original analysis was developed as an aid to the interpretation of pre-bored pressuremeter tests in clays where the process of forming the pocket results in the complete

unloading of the cavity prior to the test commencing. It is certain therefore that the soil has seen stress relief. It is arguable whether in these circumstances that the yield point remains unchanged, as more than elastic unloading has taken place. However, the form of such tests does tend to give an unambiguous choice for the onset of plasticity.

- In a self-bored pressuremeter test the situation is not so clear cut. The very factors that make the test desirable also results in more realistic behaviour being seen in the form of the early part of the test, with non-linear elasticity being a feature. Hence a choice of P_f is by no means easy. In general, the better the test the harder such a choice becomes. However, it is probable that in a good test the lift off pressure would be a credible choice so that in the wider context it is not a serious problem.
- A disturbed SBP test does not necessarily imply stress relief. Typically, disturbance arises out
 of damage to the shoe cutting edge; if the shoe is enlarged then stress relief will result.
 However, if the shoe is damaged in such a way that it cuts undersize or becomes blocked
 (even momentarily) then stress increase will take place and plasticity will be masked by a rise
 in the pore water pressures around the instrument. In this event the analysis can contribute
 nothing forcing such data to fit the assumptions of the analysis will over-estimate the insitu
 lateral stress.

The failure mode represented by [Equ 2.3] is only appropriate for tests in undrained material. However, there is good empirical evidence that no matter the mode of failure, identifying the yield stress and working back to the insitu stress works for all soils, provided one takes the apparent mobilized shear stress at failure, not large strain. For this reason the procedure is often applied with apparent success to tests in frictional material.

2.5 Deriving insitu lateral stress by synthesis

The doubt concerning the appropriateness of using the measured values for cavity reference pressure P_o as best estimates for the insitu lateral stress σ_{ho} mean that other methods for inferring plausible values are required. Jefferies (1988) is a procedure for deriving insitu lateral stress, stiffness and strength from undrained pressuremeter curves by matching the measured data points with an iteratively selected set of numbers. Some rigour is introduced into the procedure by making the single set of parameters match the contraction as well as the expansion phases of the SBPM test.

For the procedure to work the model used to represent the deformation characteristics of the soil has to be realistic. Jefferies (1988) assumes a simple elastic/perfectly plastic shear stress/ shear strain response. Outside of a computer there is no such soil and despite the claims made for it, the procedure fails – in particular it cannot predict the measured field values for stiffness, the one property of the soil pressuremeters can provide without major difficulty.

However the procedure can be used with more realistic soil models, and it is customary now to backanalyse undrained tests using a non-linear elastic/perfectly plastic shear stress/ shear strain solution. This uses measured values of stiffness and shear strength so the only variable to be decided is the insitu lateral stress. Both expansion and contraction phases of the test are fitted as shown in Figure 2.4.

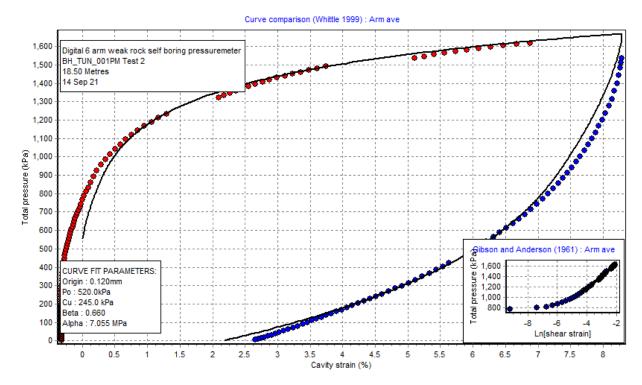


Figure 2.4: Using an undrained non-linear elastic/perfectly plastic solution

For a SBP arranged to drill to size the values for lateral stress derived using this procedures are often lower than those obtained by inspection, and are consistent with a view of the test as slightly under drilled, raising the state of stress around the probe. As in the case of these tests, if the probe is configured to drill fractionally oversize the reverse situation can occur. The procedure can also be applied to pre-bored pressuremeter test data but the fit to the loading will always be questionable.

Note that it is only possible to derive one value for insitu lateral stress using these procedures, as isotropy of soil properties is a fundamental assumption. Because the procedure makes uses of all the evidence it is the preferred method for deriving the insitu lateral stress.

2.6 Deriving parameters from the excess pore pressure trend

Bolton & Whittle (1999) predict the trend of excess pore water build –up from an undrained cavity expansion in a non-linear elastic/perfectly plastic material (Figure 2.5). The significant difference between this trend and that in a simple elastic/perfectly plastic medium is the generation of some excess pore pressure during the elastic phase of the test prior to the material fully yielding. The rate at which the pore pressure rises during the elastic phase is related to the exponent of non-linearity, β , a number less than 1 unless the response is truly linear elastic (the Bolton & Whittle analysis is described more fully later in this Appendix). In both cases, once the material becomes plastic, there is a 1 for 1 correspondence between changes in total stress and changes in pore water pressure.

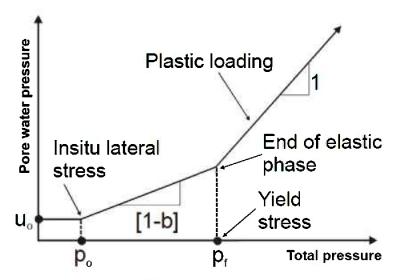


Figure 2.5: The non-linear elastic pore pressure response

In practice very few self boring tests have the necessary minimal disturbance to show the full theoretical curve, and even if they do so then interruptions to the loading to take unload/reload cycles tend to disrupt the plastic response. It is sometimes possible to recognise a partial set of the parameters predicted in Figure 2.5.

Figure 2.6 is a reasonable example. The gradient of the plastic phase is close to the predicted 1 for an undrained expansion and yield and the pseudo-elastic response are clearly delineated. Later in the test when unload/reload cycles are taken the pore water pressure response falls off. This indicates partial drainage, possibly not in the soil mass but locally at the borehole wall where gaps in the protective sheath introduce axial drainage paths.

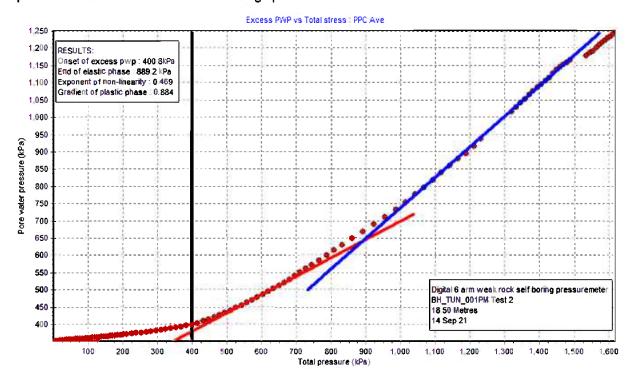


Figure 2.6 An example of pore pressure response

3 SHEAR MODULUS

3.1 Notation

3.2 Notation

J.Z Notation	
α	Shear stress constant when the strain scale is shear strain
β	Exponent of non-linearity
C_u	Undrained shear strength
$arepsilon_{c}$	Cavity strain
E_H , E_V	Young's modulus in the horizontal and vertical direction
f	Proportion of strength used
G	Shear modulus
G_{S}	Secant shear modulus
G_t	Tangential shear modulus
G_{100}	Secant modulus at the maximum elastic shear strain, sometimes termed
G_p	G_{min} or G_{yield} Pressuremeter modulus
G_{HH} , G_{VH}	Shear moduli for transversely isotropic material where the first suffix is direction of loading and the second is the direction of particle movement
k_o	Ratio of horizontal to vertical effective insitu stress
n	Ratio of horizontal to vertical Young's modulus E_H/E_V
η	Radial stress constant when the strain scale is shear strain
P_{C}	Total pressure measured at the cavity wall
$ au$, $ au_c$	Shear stress, suffix c means at the cavity wall
v_{HH} , v_{HV}	Poisson's ratios for transversely isotropic material
γ	Shear strain
γ_c	Shear strain at the borehole wall
γ_f	Shear strain for given strength proportion

3.3 Background

For users of high resolution pressuremeter data the primary purpose of the test is obtaining realistic parameters for the elastic properties of the ground. Up to yield, where yield is defined as the first instance of mobilising the maximum shear stress, the slope of the loading curve can be used as a source of stiffness data. In practice this part of the cavity loading will be affected by disturbance, difficult to quantify, caused by the method used to place the probe in the ground (Figure 3.1, the pseudo-elastic slope).

Once the material is loaded past its yield condition a zone of plastically deformed material starting from the cavity wall begins to extend into the soil mass. One consequence is that the stress history of the insertion process is erased as all elements within the plastic zone are put into a uniform condition. At a radius remote from the cavity wall and the pressuremeter there will be a single boundary where the material is on the point of yielding. If the direction of loading is reversed, the response seen at the pressuremeter will be that of the material beyond the boundary being unloaded elastically and then plastically. If the unloading continues then reverse plastic yield will result.

In Figure 3.1, small cycles of unloading and reloading exploit the response prior to the reverse yield condition to derive the elastic properties of the ground. It is evident that although each cycle is taken at a different cavity radius and stress, the procedure is highly repeatable. This test was pre-bored, so the cavity was completely unloaded prior to the pressuremeter test commencing. The consequences of this are clear when the slope of the initial loading is compared to the unload/reload cycles.

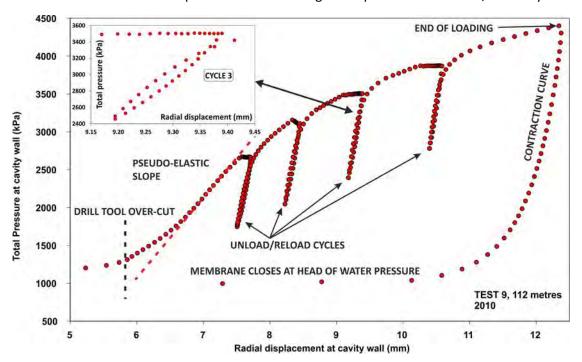


Figure 3.1: Field curve -pre-bored test in silty sand

It would be straightforward to place a line through each of the cycles in Figure 3.1 and use the slope to calculate the shear modulus, G. This is common practice but, unless the material is intact rock, is misleading. The third cycle in Figure 3.1, is shown as an inset, and has a clear hysteretic characteristic. This is due primarily to the influence of strain level on the current modulus. The elastic response of the ground where all deformation is fully recoverable applies to a strain level beyond the reliable resolution of the pressuremeter at shear strains of about 0.002%. The unload/reload cycles are showing the largely recoverable response when the stress alteration is less than that required to make the material yield, shear strains in the range 0.01% to 1%. This is the strain range that is significant for design purposes.

If there are sufficient data in the cycle then it is possible take tangents to the unload or reload path of radial stress against cavity strain and find the current shear stress (Palmer 1972), as in Figure 3.5. It is straightforward to turn these shear stress values into a shear modulus degradation trend. In practice the quantity of data are limited and the alternative is finding a function that describes the unload or reload path. Bolton & Whittle (1999) shows that this non-linear response is adequately represented by a power law. Using the power law parameters to solve the Palmer semi-differential solution gives a continuous stiffness degradation curve (Figure 3.2 and Figure 3.2). The individual points in these figures are the product of taking tangents to the measured data, the lines are the power law trend. Alternatives to the power law method include Jardine (1992) where a 'transformed strain' approach is applied to unload/reload data. The semi-empirical formulations were developed for specific soil types and are not transferable.

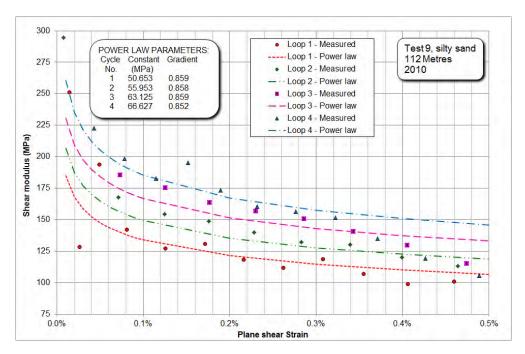


Figure 3.2 Shear modulus degradation curves (drained loading)

If the material has low permeability, giving an undrained loading, then the mean effective stress σ_{av} following yield is constant, and all cycles will follow a similar path (Figure 3.3).

The material tested in Figure 3.1 is a silty sand and the loading is a drained event. The trend of each cycle (the strain dependency) is almost identical, but successive cycles (Figure 3.2) plot a higher stiffness, because of increasing mean effective stress, σ'_{av} .

A full data reduction will adjust these trends to a reference stress level such as the effective insitu lateral stress, σ'_{ho} . This requires σ'_{av} for each cycle to be calculated. Hence although stiffness is obtainable from all insertion methods, no matter how disturbed, it may still be necessary to determine additional strength related parameters in order fully to reconcile the stiffness data.

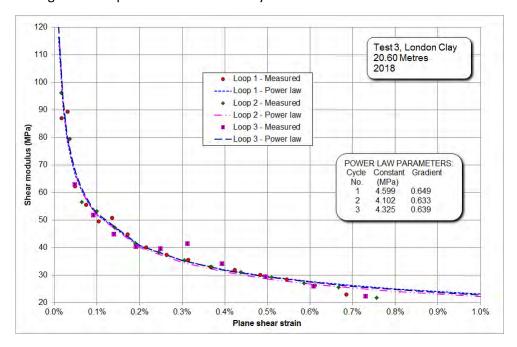


Figure 3.3 Shear modulus degradation curves (undrained loading)

Used vertically, the pressuremeter gives shear modulus parameters of type G_{hh} , where the first suffix shows the direction of loading and the second the direction of particle movement. Many design calculations requiring a value for shear modulus mean in practice the independent shear modulus G_{vh} . It is not possible to discover the ratio connecting G_{hh} and G_{vh} from a conventional pressuremeter test unless it is assumed that the ratio is related to k_o . This is only partly true. Nevertheless, because of the quality and relative speed with which G_{hh} can be determined it may be convenient to measure G_{hh} and assume an appropriate reduction factor. For engineering problems where the direction of loading is lateral, G_{hh} is the most relevant stiffness parameter.

Unloading and reloading are a feature of many laboratory material test procedures and pile loading tests. In the context of a cavity expansion in an infinite medium the first account of the theory behind the procedure is given by Hughes (1982). Cycles are a prominent feature of the Wroth Rankine lecture (Wroth, 1984). Bellotti et al (1989) give an explanation and methodology for manipulating the stress dependency of tests in sand. Muir Wood (1990) and Jardine (1992) explore the potential of the cycles for describing the non-linear strain dependency of the ground. Bolton & Whittle (1999) propose the simple procedure (described below) based on a power function.

Examining the detail within an unload/reload event requires high resolution local displacement measurement. Even in devices that do use local measurement it is necessary to be certain that what is measured is an accurate representation of the movements of the cavity wall, and not the finite stiffness of the probe itself.

The pressuremeter test shears the material. The modulus measured is shear modulus G and is independent of Poisson's ratio v. G can be used to derive Young's modulus E but v must be given or estimated. It is also straightforward to derive the bulk modulus M from the shear modulus.

3.4 Describing the unload/reload cycle

Figure 3.4 shows an unload/reload cycle extracted from a field curve such as the example in Figure 3.1. In this case the data are part of a test in stiff clay. In the interval between pausing the loading to take the cycle and the actual reversal of stress there are several data points showing the expansion continuing for no pressure increase. This phase of time dependent deformation is referred to as 'creep'.

Separating the contribution of the multiple processes that contribute to this behaviour is complex. It is unlikely that it will be possible to wait long enough for all creep behaviour to cease. This test in clay is an undrained event. There is a large excess pore pressure in the soil mass at the commencement of the cycle and waiting more than a short time would allow consolidation to take place. However the reducing displacement between readings shows that creep has fallen to a level low enough to permit a cycle to be taken.

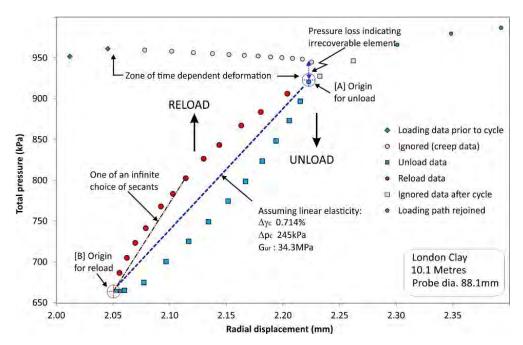


Figure 3.4 Annotated unload/reload cycle

The decrease of pressure continues until sufficient data has been recorded to give a clear indication of the path of the unloading response. The pressure decrease needs to be less than that required to cause reverse plastic failure, which for an undrained test is equivalent to twice the shear strength.

The reloading phase mirrors the unloading with a similar rate of pressure change and eventually crosses the cycle unload path. There are a few points before the main loading path is re-joined because the cycle is not a completely recoverable event.

A chord has been drawn through the start and lowest point of the cycle. The slope of this can be used as a means of calculating shear modulus. If the material response was linear elastic then the result would be the shear modulus. It is apparent that the unloading and reloading data show a non-linear response, and the chord that has been drawn is only the minimum secant. There are an infinite number of steeper secants that could be drawn. The unloading and reloading responses mirror each other, and a rotation of the unloading data would describe the same path as the reloading data. This is made explicit in Figure 3.5.

3.5 Linear elastic interpretation

If the material response is linear elastic then the local gradient prior to yield can be used as a source of modulus data. In Figure 3.1 the part of the curve labelled 'pseudo-elastic' is an example. Because it occurs at the start of the test it is referred to as the initial shear modulus¹, G_i .

Shear modulus is the quotient of the change of shear stress τ and change of shear strain γ :

$$G = \left[\frac{\Delta P}{\Delta \nu}\right]$$
 [Equ 3.1]

Shear stress and shear strain are not directly measured by the pressuremeter. In Figure 3.4 the axes are radial displacement and radial stress at the cavity wall. If the material is linear elastic then a change of radial stress is equivalent to the change of shear stress (in this example, 244kPa). Displacement needs to be expressed non-dimensionally as strain. The change of current cavity strain

-

¹Unfortunately, 'initial' is used in two conflicting senses. In the context of non-linear stiffness "initial modulus" generally refers to the maximum or elastic modulus, which in the case of fig 2.1 is certainly not true.

 ε_c is the change of displacement divided by the radius of the probe at the mid-point of the cycle, in this example 3.566 x 10⁻³

Current shear strain at the cavity wall γ_c is twice ε_c , an approximation that is convenient and valid if ε_c is small as detailed in [Equ 1.4].

The calculation for shear modulus G in can be carried out using [Equ 1.4] and gives 34.3MPa. As G has been derived from an unload/reload cycle it normally has the subscript G_{ur} . [Equ 1.4] can be applied anywhere on the loading curve where elastic data can be found. If shear strain is calculated as in the example then it is always current shear strain and [Equ 1.4] remains valid for all expansions. The advantage is that shear modulus can be derived from displacements without the need for prior processing to identify a strain origin for the entire field curve.

In practice the only material routinely showing a linear elastic response up to the point of yield is intact because the material is strong enough to support an open hole without failing in the reverse sense, the slope from the latter part of the field curve gives a result similar to the modulus determined from unload/reload data.

3.6 Non-linear stiffness/strain response

If the material fails in shear then it is likely that for shear strains smaller than the yield value, the stiffness/strain relationship is not linear. The unload/reload cycle can be made to give a comprehensive description of this relationship by looking at smaller steps of pressure/strain other than the points at the extreme ends of the cycle.

Figure 3.5 plots the unloading and reloading data from Figure 3.4 in this way. Each path has its own origin, as indicated Figure 3.4, and the unloading data have been rotated to emphasise that both sets of data are showing the same thing. It follows that it is only necessary to examine one half of the rebound cycle, and the origin for data obtained after the reversal of stress in a loop has the smallest uncertainty because creep is at a minimum (Whittle *et al*, 1992). Figure 3.5 also shows the underlying shear stress response. The test is an undrained event so taking tangents to the radial stress data gives the current shear stress (Palmer 1972, Hughes 1973).

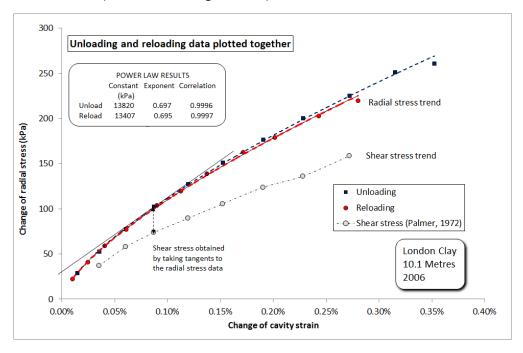


Figure 3.5 The non linear elastic response

The simplest description of the reloading response is a power law. The exponent of the power law defines the non-linearity of the response and is denoted β . It is generally a number between 0.5 and 1 where 1 indicates linear elasticity. In the example β is almost 0.7, appropriate for a silty clay.

The results in Figure 3.5 show the power law trend in radial stress/cavity strain space. Using parameters that the pressuremeter test can determine, this result can be written as:

$$P_c = \eta_h \varepsilon_c^{\beta}$$
 [Equ 3.2]

 $P_c=\eta_h \varepsilon_c^{eta}$ [Equ 3.2] η_h is the radial stress constant when the strain scale is current cavity strain (circumferential strain at the cavity wall). Because the test is undrained there are no volumetric strains so shear strain is twice the circumferential strain. This approximation is valid for small strains below the yielding value. The result in radial stress/shear strain space is given by:

$$P_{c} = \eta \gamma^{\beta}$$
 [Equ 3.3]

Where $\eta = \eta_h/2^{\beta}$.

For an undrained expansion, Palmer (1972) shows that the current shear stress τ_c is given by

$$\tau_c = \frac{dP_c}{d[\ln \gamma_c]}$$
 [Equ 3.4]

Substituting for dP_c using the right hand side of [Equ 3.3] allows the differential equation to be solved giving

$$\tau_c = \eta \beta \gamma^{\beta}$$
 [Equ 3.5]

 $\tau_c = \eta \beta \gamma^\beta \qquad \qquad \text{[Equ 3.1]}$ Bolton & Whittle refer to $\eta \beta$ as the shear stress constant and call it α . Shear modulus G_s is given by;

$$G_{\rm S} = \tau/\gamma$$
 [Equ 3.6]

 $G_{\rm S} = \tau/\gamma \label{eq:GS}$ so the expression for secant shear modulus is given by

$$G_{\rm s} = \alpha \gamma_{\rm c}^{\beta - 1}$$
 [Equ 3.7]

This gives a means of determining the secant shear modulus at any elastic shear strain, although an arbitrary cut-off strain must be assumed below which the modulus will be constant and a maximum this strain is below the resolution of the SBPM.

Note:

When comparing triaxial results with pressuremeter results, invariant shear strain ε_T is given by:

$$\gamma_T = \gamma_c/\sqrt{3}$$
 [Equ 3.8]

 $\gamma_T \ = \ \gamma_c/\sqrt{3}$ Tangential shear modulus G_t is given by

$$G_t = G_S + \varepsilon_c (\frac{dG_S}{d\varepsilon_c})$$
 [Equ 3.9]

Hence from the power law:

$$G_t = \alpha \beta \gamma_c^{\beta - 1}$$
 [Equ 3.10]

[Equ 3.7] gives a means of determining the secant shear modulus for shear strains below the yielding value down to 10⁻⁴. This is the safe resolution limit of the current generation of pressuremeters and is more than the elastic strain at which the stiffness degradation commences. It is usual to plot the trend between 10⁻⁴ and 10⁻² plane shear strain (0.01% to 1%, see Figure 3.2 and Figure 3.3). Ideally the large strain limit should be the yield shear strain of the material. 1% is appropriate for many stiff clays but will be too large for sands and too small for soft clay. Secant shear modulus at yield strain is G_{ν} and is the secant shear stiffness governing the pressuremeter loading curve.

It is not necessary to take cycles of small strain amplitude to obtain small strain stiffness parameters. It is better to make the cycles as large as practicable (subject to the condition that the material is not allowed to fail in extension) to obtain parameters from as wide a strain range as possible.

The Bolton & Whittle analysis was developed for undrained tests. For a test in drained material the solution can be used assuming that whilst the material is deforming elastically there are no volumetric strains. Alternatively, the power approach is merely a curve fitting exercise and the solution in radial stress/cavity strain space [Equ 3.2] can be used to generate a smooth data set. This allows a numerical solution for drained tests to be applied (Manassero, 1989). The results are similar to the undrained parameters with a tendency for β to be slightly higher (more linear). The difficulty is that to apply the drained analysis the ambient water pressure and the constant volume friction angle ϕ'_{cv} must be known or estimated. Figure 3.6 is an example of a test in highly weathered mudstone, with the shear stress/shear strain response obtained by treating a reloading phase as a drained and undrained event. The difference between the two trends will depend on the potential for dilation.

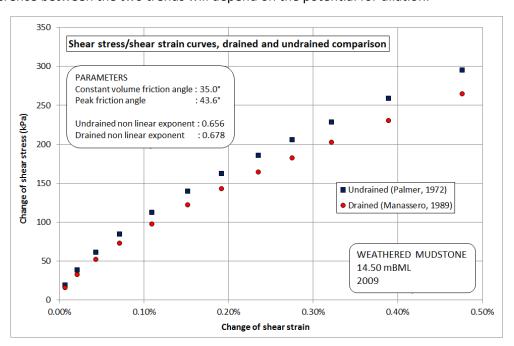


Figure 3.6 Drained & undrained interpretation of the same data

3.7 Stress Level

For modulus parameters derived from undrained expansion tests the mean effective stress remains unchanged throughout the expansion and all stiffness/strain data will plot the same trend. Conversely, failure to plot the same trend implies changes in the mean effective stress. This is true of tests affected by consolidation, but is also true of a heavily disturbed loading where the effects of the pressuremeter installation method have yet to be overcome. For such data it is reasonable to take modulus parameters from as late in the loading as possible. Division of the modulus values by a normalising stress such as the effective insitu lateral stress or yield stress gives a dimensionless parameter for modelling purposes.

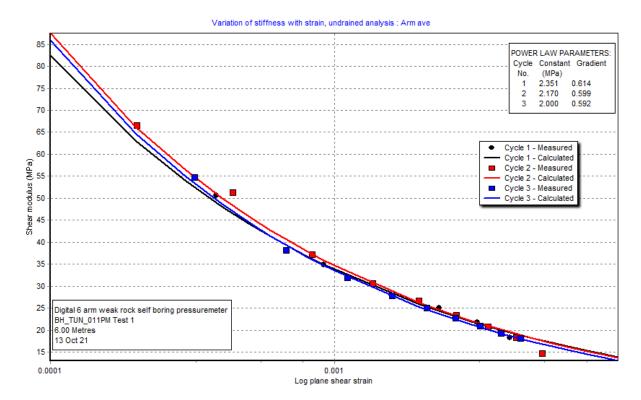


Figure 3.7 Stiffness strain curves (undrained example)

Reducing the unload/reload cycles from *drained* tests is a more complex process and is not described here.

In Figure 3.7 the lines are the result of fitting the reloading response with the power law. The points are obtained by applying the Palmer 1972 solution directly to the measured data and clearly support the idealised trend.

3.8 Shear modulus from other parts of the pressuremeter curve.

The first part of the unloading is an elastic process and can be used as a source of stiffness information. By the time the pressuremeter unloads, creep strains due to consolidation and rate effects will be large, so there will be a tendency for the initial unloading to be too stiff. If some allowance is made for this, then reasonable estimates of the shear modulus will be obtained.

Curve fitting analyses imply a value for the secant shear modulus at yield. Although this is not likely to be the best way of deriving shear modulus data it is important justification for using such analyses that they can predict this independently measurable stiffness.

3.9 Cross hole anisotropy

The pressuremeter test gives values for G_{HH} , the shearing stiffness in the horizontal plane. This is directly applicable to the analysis of radial consolidation or cylindrical cavity expansion due to pile insertion. G_{VH} is applicable all shearing which has an element of deformation in the vertical plane, such as under a footing or round an axially loaded pile.

To convert from G_{HH} to G_{VH} some relationship between the two must be assumed. Wroth et al (1979) suggest that anisotropy arises from two causes:

- Structural anisotropy due to the deposition of soil on well-defined planes
- Stress induced anisotropy, due to the differences in normal stress acting in different directions.

The second cause implies the stiffness in any direction will be a function of the effective insitu stress in that direction, ie a function of k_o .

It can be shown that:
$$G_{HH}=\frac{E_H}{2(1+v_{HH})}$$
 [Equ 3.11] For undrained expansion:
$$v_{HH}=1-\frac{n}{2}$$
 [Equ 3.12]

For undrained expansion:
$$v_{HH} = 1 - \frac{n}{2}$$
 [Equ 3.12]

Where:
$$n = \frac{E_H}{E_V} = k_o \eqno(Equ 3.13)$$

From this
$$E_H = (4-n)G_{HH} \qquad \qquad \text{[Equ 3.14]}$$

and
$$E_v = \frac{(4-n)G_{HH}}{n} \label{eq:energy}$$
 [Equ 3.15]

This is as far as argument from first principles can go, because of the additional contribution of the manner in which the material is deposited. k_o is likely to lie between 0.5 and 2, so [Equ 3.15] $\frac{E_H}{G_{HH}}$ lies between 2 and 3.5. From [3.16] $\frac{E_v}{G_{HH}}$ lies between 1 and 1.75.

It is likely that G_{VH} will be linked to E_V by Poisson's ratio in a relationship of the form of [Equ 3.15]. Plausible values of $\frac{E_v}{G_{VH}}$ would seem to be 2.4 to 3. Hence in a material with k_o of 2, G_{VH} could be as low as $\frac{G_{HH}}{3}$. Simpson et al (1996) come to the same conclusion but find in practice heavily overconsolidated London clay gives relationships of the order of: $G_{VH} \cong 0.65G_{HH}$. The influence of the strain range is not separately considered in these studies, and it is possible that the G_{100} values would be similar in all planes.

Lee & Rowe (1989) give details of the anisotropy characteristics of many clays varying from lightly over consolidated to heavily over consolidated. The general conclusion is $\frac{E_v}{G_{VH}}$ lies between 4 and 5, rather more than the isotropic relationship of 3. However, their paper was concerned with the impact of anisotropic stiffness properties on surface settlement. Deriving G_{VH} from E_v is therefore unsatisfactory, because although G_{VH} is insensitive to the direction of loading, E_v is not.

4 ANALYSES FOR UNDRAINED SHEAR STRENGTH (C_U)

4.1 Notation

δ	Small change
A	Current area of cavity
δA	Change in current area of cavity
α	Shear stress constant when the strain scale is shear strain
β	Exponent of non-linearity
$\mathrm{d}x$	Differential of x (where x is changeable)
ε_a	Axial strain
$arepsilon_c$	Cavity strain
$arepsilon_{ heta}$	Circumferential strain
$arepsilon_r$	Radial strain
$arepsilon_{max}$	Maximum cavity strain (also termed maximum hoop strain)
G	Shear modulus
I_r	Rigidity index
P	Total pressure
P_{c}	Total pressure measured at the cavity wall
P_{o}	Initial cavity reference stress (total)
P_l	Total limit pressure when $\frac{\delta A}{A}=1$
P_{max}	Maximum pressure reached
σ_r	Radial stress
$\sigma_{ heta}$	Circumferential stress (also termed hoop stress)
σ_{ho}	Insitu lateral stress
r	Radius
$r_{\!f}$	Radius of cavity at first yield
r_c	Current radius of cavity
au	Shear strength
u	Increment of radial displacement at a point in the continuum
γ	Shear strain
$\gamma_c, \gamma_{ce}, \gamma_{cc}$	Shear strain at the borehole wall, 2nd suffix denotes test stage - e for
	expansion and c for contraction
$\gamma_{\gamma}, \gamma_{\gamma e}, \gamma_{\gamma c}$	Shear strain at which the material reaches first failure, 2nd suffix denotes test
	stage - e for expansion and c for contraction

4.2 Overview

Once the strain origin is known, the expansion and contraction phases of the test can be used to determine the material shear strength. Two methods have been applied:

Case A

Assume the shape of the shear strength/ shear strain curve and hence derive a closed form solution for the pressuremeter curve. For the SBPM tests on this contract a non-linear elastic/perfectly plastic soil response has been assumed. This has been solved (Bolton & Whittle 1999) for the case where the non-linear elastic characteristics are given by a power law. Strictly, the form of the elastic phase is of no consequence for the derivation of shear strength once perfect plasticity is assumed, and the classic procedure developed by Gibson & Anderson (1961) could be used. For both solutions the slope of the pressure /strain curve plotted on semilog axes gives the shear strength directly and an estimate of the ultimate limit pressure. However, the terminology of the non-linear elastic solution is different from the linear elastic model and this avoids some conceptual problems.

Case B

Make no assumptions about the shape of the shear stress/ shear strain curve but differentiate the measured pressuremeter curve directly to give the shear stress response. Palmer (1972) gives the differential equation used to describe the complete shear stress/ shear strain response of a material deforming under undrained conditions. The equation can be solved graphically or numerically by taking the current tangent of the total pressure/cavity strain plot, but the success of the method depends on the smoothness of the measured data.

4.3 Bolton & Whittle (1999)

Figure 4.1 gives the shear stress/ shear strain response of a non-linear elastic/perfectly plastic soil. Both expansion and contraction are included. Because this solution is not widely known it is given in greater depth here than is strictly necessary.

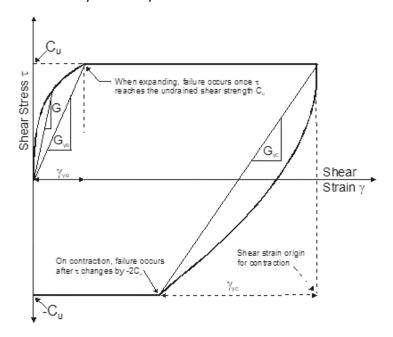


Figure 4.1: Non-linear elastic/ perfectly plastic shear stress/ strain curve

It is assumed that the non-linear elastic response of soils can be fitted with a power law of the form:

$$au = lpha \gamma^{eta}$$
 [Equ 4.1]

This assumption is justified by inspecting unload/reload cycles.

Around the pressuremeter, assume that the soil is deformed under conditions of axial symmetry and the expansion is undrained. The following relationships apply:

Axial strain
$$= \varepsilon_a = 0$$
 [Equ 4.2]

Circumferential strain=
$$\varepsilon_{\theta} = -\frac{u}{r}$$
 [Equ 4.3]

Assuming that expansion is undrained the radial strain is:

$$arepsilon_r = -arepsilon_{ heta} = rac{u}{r}$$
 [Equ 4.5]

Shear strain=
$$\gamma = \varepsilon_{\theta} + \varepsilon_{r} = \frac{2u}{r} = \delta A/A$$
 [Equ 4.6]

The equation of radial equilibrium applies throughout the expansion:

$$r = \frac{\mathrm{d}\sigma_r}{\mathrm{d}r} + (\sigma_r - \sigma_{ heta})$$
 [Equ 4.7]

Using τ to represent the maximum shear stress, this becomes

$$r\frac{\mathrm{d}\sigma_r}{\mathrm{d}r} + 2\tau = 0$$
 [Equ 4.8]

Using the constitutive relationship [Equ 4.1] and writing the current area in terms of radius:

$$\frac{\mathrm{d}\sigma_r}{\mathrm{d}r} + \frac{2\alpha}{r} \left(\frac{\delta A}{\pi r^2}\right)^{\beta} = 0$$
 [Equ 4.9]

[Equ 4.9] can be re arranged to:

$$\frac{\mathrm{d}\sigma_r}{\mathrm{d}r} + 2\alpha \left(\frac{\delta A}{\pi}\right)^{\beta} r^{-(2\beta+1)} = 0$$
 [Equ 4.10]

From by integrating between the reference state, and the pressure and radius at the cavity wall:

$$\int_{P_0}^{P} \sigma_r = -2\alpha \left(\frac{\delta A}{\pi}\right)^{\beta} \int_{\infty}^{r_c} r^{-(2\beta+1)} dr$$
 [Equ 4.11]

Resulting in:

$$P - P_o = 2\alpha \left(\frac{\delta A}{\pi}\right)^{\beta} \left(\frac{1}{r^2}\right)^{\beta} \left(\frac{1}{2\beta}\right) = \frac{\alpha}{\beta} \left(\frac{\delta A}{A}\right)^{\beta}$$
 [Equ 4.12]

The right-hand side of this result is the shear stress mobilised at the cavity wall and can be written as $\frac{\tau_c}{\beta}$. Note that if $\beta=1$, the condition for linear elastic response, the right-hand side of [Equ 4.12] reverts to the following familiar expression where α is shear moulus G:

$$\alpha \left[\frac{\delta A}{A} \right]$$
 [Equ 4.13]

The end of the elastic phase is reached when $au_c = \mathcal{C}_u$ for the expansion, hence

$$P - P_o = \frac{c_u}{\beta}$$
 [Equ 4.14]

Thereafter, there is a plastic zone confined by the limiting elastic radial stress of $\frac{c_u}{\beta}$. Equation [4.8] still applies, so

$$r\frac{\mathrm{d}\sigma_r}{\mathrm{d}r} + 2C_u = 0$$
 [Equ 4.15]

This gives

$$d\sigma_r = -2C_u \frac{dr}{r}$$

Integrating between the radii of the cavity wall and of the elastic-plastic transition:

$$\int\limits_{P_{C}}^{Po+\frac{C_{u}}{\beta}}\mathrm{d}\sigma_{r}=-2C_{u}\int_{r_{c}}^{r_{f}}\frac{\mathrm{d}r}{r}$$
 [Equ 4.17]

Hence:

$$P_c = P_o + C_u \left[\frac{1}{\beta} + ln \left(\frac{r_f^2}{r_c^2} \right) \right]$$
 [Equ 4.18]

If a soil being sheared at constant specific volume (Gibson & Anderson 1961), ie:

$$\frac{r_f^2}{r_c^2} = \frac{\gamma_{\gamma e}}{\gamma_{ce}}$$
 [Equ 4.19]

Then ratio of the shear strain required to initiate plasticity during expansion $\gamma_{\gamma e}$ to the shear strain at the cavity wall during expansion γ_{ce} . This leads to:

[Equ 4.16]

$$P_c = P_o + C_u \left[\frac{1}{\beta} - \ln(\gamma_{e}) + \ln(\gamma_{ce}) \right]$$
 [Equ 4.20]

This result resembles the simple elastic/perfectly plastic solution proposed by Gibson & Anderson. For the special case of a simple elastic response when $\beta=1$ the two solutions are identical. Indefinite expansion of the borehole and limit pressure is predicted by:

$$P_l = P_o + C_u \left[\frac{1}{\beta} - \ln(\gamma_{\gamma e}) \right]$$
 [Equ 4.21]

and substituting this into [Equ 4.20] gives:

$$P_c = P_l + C_u \ln(\gamma_{ce})$$
 [Equ 4.22]

showing the undrained shear strength and limit pressure can be obtained from the gradient and intercept of a plot of total pressure at the cavity wall versus the natural log of the current cavity shear strain (Figure 4.2). Note that equation [Equ 4.20] makes no explicit reference to shear modulus.

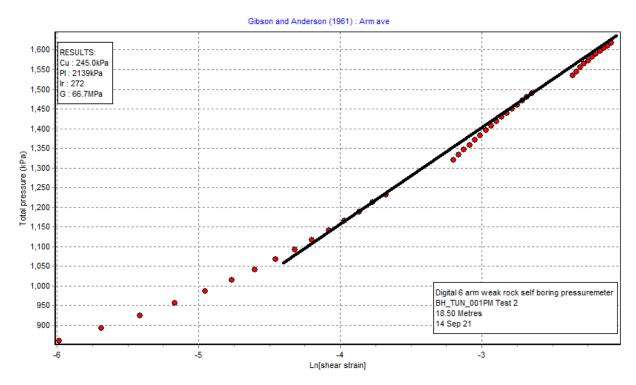


Figure 4.2 Deriving undrained shear strength from expansion data

4.4 Analysing pressuremeter undrained contraction data

The expansion phase ends at some value of pressure and cavity strain at the borehole wall P_{max} and $\varepsilon_{c_{max}}$. This is the origin for the contraction event. During contraction, the end of the elastic phase is reached when $\tau_c=-2C_u$, hence:

$$P_{max} - P = \frac{2C_u}{\beta}$$
 [Equ 4.23]

Jefferies (1988) gives the simple elastic solution for the relationship between pressures and strains at the cavity wall once reverse plastic failure is initiated:

$$P = P_{max} - \frac{2C_u}{1 + \ln(\gamma_{cc}) - \ln(2\gamma_{e})}$$
 [Equ 4.24]

This is not quite as his solution is written - γ_{cc} is the shear strain at the cavity wall during contraction [Equ 4.25] and $\gamma_{\gamma e}$ is the shear strain required to initiate yielding when expanding the cavity. From [Equ 4.20] it follows the non-linear elastic version of [Equ 4.24] is given by:

$$P = P_{max} - 2C_U \left[\frac{1}{\beta} + \ln(\gamma_{cc}) - \ln\left(\frac{2\gamma_{\gamma e}}{\beta}\right) \right]$$
 [Equ 4.25]

Shear strain γ_{cc} is obtained from conventional cavity strain ε_c by:

$$\gamma_{cc} = \frac{1 + \varepsilon_{max}}{1 + \varepsilon_c} - \frac{1 + \varepsilon_c}{1 + \varepsilon_{max}}$$
 [Equ 4.26]

An inspection of [Equ 4.26] indicates that a plot of the natural log of the contraction shear strain against total pressure at the cavity wall gives a curve whose ultimate gradient is $-2C_u$.

Figure 4.3 gives an example for the contraction phase. As before, if $\beta = 1$, the condition for simple elastic response, all non-linear elastic equations given above revert to published solutions for simple elastic/perfectly plastic material.

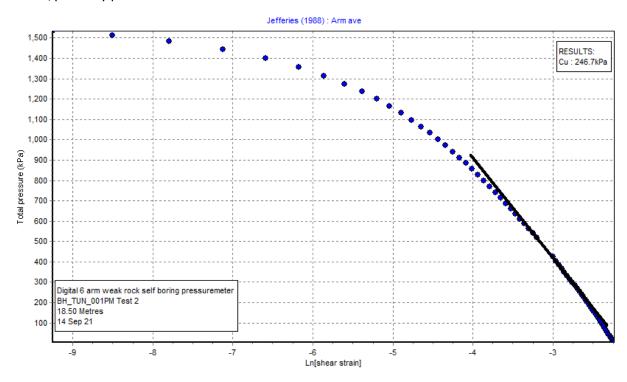


Figure 4.3: Using the contraction curve to derive undrained shear strength

Sometimes there is uncertainty in deciding the ultimate slope in both the expansion and contraction examples. For the expansion there can be indications of shear strength changing after the point in loading where unload/reload loops have been taken. It is assumed here that the taking of the cycles has allowed partial drainage, invalidating the primary assumption underpinning the analysis. For the contraction there is a difficulty in that the slope sometimes increases sharply towards the end -the start of this seems to coincide with the point where the major and minor stresses reverse.

One good reason for using contraction data to discover the shear strength is the certainty of knowing the origin for the contraction event. Altering the length of the strain scale for the expansion event has a noticeable impact on the derived shear strength. All things being equal, a comparison between loading and unloading values may indicate insertion disturbance but also a means for correcting for it.

4.5 Subtangent Analysis (1972)

Palmer (1972) is an analysis which derives the shear stress/shear strain curve directly from the local slope of the measured pressure/cavity strain expansion data. The attraction of the analysis is no assumptions are required concerning the shape of the shear stress/shear strain response. The derivation of shear strain from cavity strain requires no volumetric strains are developed, which means the analysis is usually applicable to undrained expansion tests only.

Provided the material response is elastic, no volumetric strains are generated and thus the result is useful for describing the stiffness/strain response seen in unload/reload cycles, regardless of the permeability of the material.

In terms of cavity strain the shear stress τ is approximately:

$$\tau = \varepsilon_c \frac{dP_c}{\mathrm{d}\varepsilon_c}$$
 [Equ 4.27]

Indicating the mobilised shear stress is the product of the current slope and cavity strain and explains why the analysis is sometimes called the Subtangent method. [Equ 4.27] is an approximation. The exact expression is:

$$\tau = \frac{dP}{d\ln(\gamma)}$$
 [Equ 4.28]

When examining pushed RPM tests the analysis can be used on the final contraction.

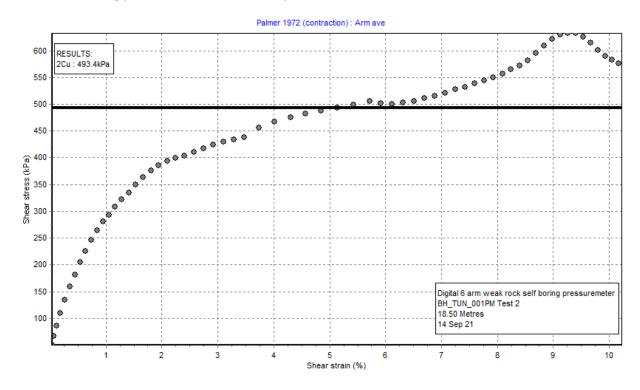


Figure 4.4: Palmer (1972) analysis applied to contraction data

5 ANALYSES FOR STRENGTH, DRAINED LOADINGS

5.1 Notation

$$\alpha$$
 1/M
 $A^{\#}$ Constant
 $A = \frac{T}{(1+\alpha)}$

β	1/N
B	•
D	$B = \frac{-Z}{(1-\beta)}$
С	Cohesion
С	C = 1 - A - B
d	The stress exponent, describing the variation of stiffness with stress level
ε_c	Cavity strain also termed circumferential strain
ε_{max}	Maximum cavity strain at the end of loading
$arepsilon_{yc}$	Cavity strain at the onset of reverse plasticity
\mathcal{E}_R	Radial strain
$arepsilon_v$	Volumetric strain
$arepsilon_{ heta}$	Circumferential strain at the elastic/plastic boundary
h	The exponent of a non-linear elastic power law
G	Shear modulus
G_s	Secant shear modulus
J	A scale factor to adjust for stiffness at differing stress levels
k_a^{cv}	$k_a^{cv} = \frac{1}{k_p^{cv}}$
k_p^{cv}	Constant volume stress ratio coefficient
M or n	
M OI II	$n=M=rac{1-sin\psi}{1+sin\psi}$ M and n are used interchangeably. Withers, Howie, Hughes and
	Robertson typically uses n and Carter et al typically use M
N	$N = \frac{1 - \sin\phi'}{1 + \sin\phi'}$
P_o	Effective cavity reference pressure
P_l	Effective limit pressure for an infinite cavity expansion
P'_{max}	Maximum effective pressure reached during expansion
P,P'	Pressure at cavity wall, suffix 'denotes effective
q_{xx}	The co-efficient of a non-linear elastic power law. The first suffix is r or s denoting radial stress or shear stress intercept. The second suffix is c or s and defines the strain scale, circumferential or shear.
q_{ref}	Radial stress elastic constant at insitu or reference stress
r	Radius
r_o	Initial radius of cavity
r_a	Current radius of cavity
R R	Radius of the elastic/plastic boundary
S	• • • • • • • • • • • • • • • • • • • •
	$S = \frac{(1 + \sin\psi)\sin'\phi}{1 + \sin\phi'}$
$\sigma_{\!\scriptscriptstyle AV}$	Mean effective stress
σ_c	Circumferential stress
σ_r	Radial stress
$\sigma_{\!\scriptscriptstyle R}$	Radial stress at the cavity wall at first yield
σ_{RU}	Radial stress at the cavity wall at yield in cavity contraction
σ'_{ho}	Effective insitu horizontal stress
T	T = 2 + Z
и	Increment of radial displacement at a point in the continuum
u_o	Initial pore water pressure in the ground
$\phi^{'}$	Peak angle of internal friction
ϕ_{cv}	Critical state angle of internal friction
ψ	Dilation angle
τ	Shear stress

v Poisson's ratios $W = \frac{1 - v - v(M + N) + (1 - v)MN}{MN}$ The intercept of a plot of stiffness against stress level $\chi = \frac{(1 - v) - v(M + N) + (1 - v)MN}{MN}$ Shear strain $Y = \frac{1 + \alpha}{1 - \beta} = \frac{NM + N}{NM - M}$ $Z = \frac{2\chi}{(\alpha + \beta)}$

5.2 Overview

For drained expansion tests in purely frictional material the strength is described in terms of the peak angle of internal friction and dilation. The method used is that due to Hughes et al (1977). The form of the shear stress/ shear strain curve is simple elastic/perfectly plastic and dilation and friction are related by Rowe's dilatancy law. Although the soil response during elastic deformation is more realistically described as non-linear elastic, this has no effect on the plastic part of the curve from where strength is derived.

The technique is to plot effective pressure against cavity strain on log scales and to discover by inspection the maximum slope of the resulting curve. It is usual to only quote a single value for friction and dilation. The same assumptions have been applied by Withers et al (1989) to produce a solution for cavity contraction.

Manassero (1989) is a numerical solution that applies Rowe's dilatancy law as a flow rule. Elastic strains in the plastic area are ignored for simplicity.

For tests in c' – phi material a method based on the solution of Carter et al (1986) is used. In such material the value for friction angle can often be identified from the Hughes analysis.

5.3 Hughes et al (1977)

In addition to the usual conditions governing the expansion of a cylindrical cavity in plane strain this analysis assumes the following:

- A simple elastic/perfectly plastic model
- The expansion is fully drained, i.e. no excess pore water pressures are allowed to develop
- Following yield the sand deforms at a constant angle of internal friction
- Volumetric and shear strains are connected by Rowe's dilatancy law (1962) Rowe's dilatancy law can be written:

$$\frac{1+sin\phi'}{1-sin\phi'} = \left(\frac{1+sin\phi_{cv}}{1-sin\phi_{cv}}\right) \left(\frac{1+sin\psi}{1-sin\psi}\right)$$
 [Equ 1.1]

At failure the effective pressure at the cavity wall p' is given by:

$$P' = \sigma'_{ho}(1 + \sin\phi')$$
 [Equ 5.1]

Following failure:

$$\ln(P') = S \ln\left[\frac{\varepsilon_c}{1 + \varepsilon_c} + \frac{c}{2}\right] + A^{\#}$$
 [Equ 5.2]

where S is

$$S = \frac{(1 + \sin\psi)\sin'\phi}{1 + \sin\phi'}$$
 [Equ 5.3]

[Equ 5.2] indicates that s is approximately the gradient of effective pressure plotted against cavity strain on log scales. Once obtained, both $sin\phi'$ d $sin\psi$ can be derived.

By incorporating Rowe's stress dilatancy theorem (1962) and by knowing or estimating constant volume friction angle, the gradient can be turned into values for the peak angles of internal friction and dilation:

$$sin\phi' = \frac{S}{1 + (S - 1)sin\phi_{cv}}$$
 [Equ 5.4]

$$sin\psi = S + (S - 1)sin\phi_{cv}$$
 [Equ 5.5]

The factor $\frac{c}{2}$, representing elastic strain in the plastic region, is usually ignored - it has been shown to introduce an error of about 0.03% in the strain scale for a typical dense sand.

An example of the Hughes analysis is shown in Figure 5.1. Both the ambient pore water pressure U_o and ϕ_{cv} are required to implement the analysis. Because the expansion is drained the membrane normally collapses at the head of water pressure, and an estimate of U_o can often be made from this behaviour. ϕ_{cv} must either be given or estimated. The analysis is sensitive to the choice of strain origin.

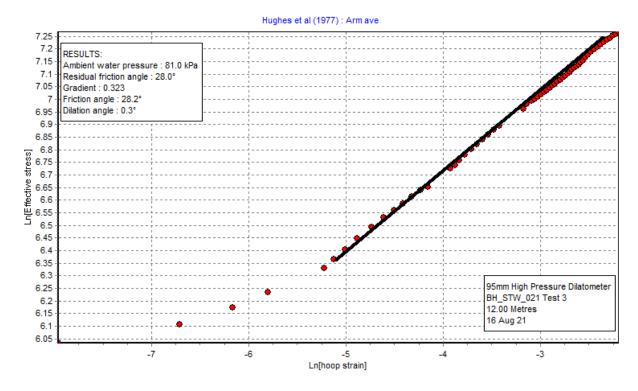


Figure 5.1 Example of Hughes et al (1977) solution

If the test shown in Figure 5.1 was taken to a high enough cavity strain then the final part of the loading would show strain softening indicating that the peak friction angle is passed and the current internal angle is reducing towards a residual value. Curvature at relatively low strain (as in the example) indicates the presence of some cohesion, in which case the ultimate slope of the trend gives the best estimate of the friction angle.

5.4 Withers, Howie, Hughes and Robertson (1989)

Withers, Howie, Hughes and Robertson (1989) is an analysis for the unloading of a cone pressuremeter in sand.

The solution is a development of the Hughes et al (1977) analysis for a cavity expansion in sand. During expansion, given a low disturbance insertion, effective radial stress is related to circumferential strain by the following:

$$P' = \sigma'_{ho} \left[\frac{2}{1+N} \right] \left[\left(\frac{G}{\sigma'_{ho}} \right) (1+N) \left(\frac{1+N}{1-N} \right) \varepsilon_c + \left(\frac{1-n}{2} \right) \right]^{\left[\frac{1-N}{1+n} \right]}$$
 [Equ 5.6]

This solution cannot be sensibly applied to CPM expansion data. The final unloading, however, is in principle valid. It starts with an elastic phase which ends when the effective radial stress is

$$P'_{max} = NP'$$
 [Equ 5.7]

The cavity strain at the onset of reverse plasticity will be

$$\varepsilon_{yc} = \varepsilon_{max} - \left[\frac{(1 - N)P'_{max}}{2G} \right]$$
 [Equ 5.8]

The solution for the plastic contraction is

$$P' = NP'_{max} \left[\frac{2G(\varepsilon_{max} - \varepsilon_{yc})(1 + nN)}{nP'_{max}(1 - N)(1 + N)} - \left(\frac{1 - n}{n(1 + N)}\right) \right]^{\frac{nN^2 - n}{nN^2 + N}}$$
[Equ 5.9]

If $\log \frac{P'}{P'_{max}}$ is plotted against $\log [(\varepsilon_{max} - \varepsilon_{yc})/(1 + \varepsilon_{max})]$

$$s = \frac{nN^2 - n}{nN^2 + N}$$
 [Equ 5.10]

In principle these equations can be used to draw the entire test curve. In practice this is generally unsuccessful, because the simple assumptions cannot capture the complex response of most sands.

Quite frequently, there is no long straight portion in this plot. It can be imagined that after reaching failure in contraction at the peak angle of internal friction the sand quickly falls into an ultra loose condition. The analysis can depend, therefore, on identifying the point of maximum curvature in log log space and is not very convincing.

However when the analysis does work it can be useful in assessing the origin for strain on the *loading*. Because the contraction starts from a defined origin there is no uncertainty in the strain scale. Adjusting the loading scale to give similar answers using the Hughes et al analysis indirectly corrects for insertion disturbance.

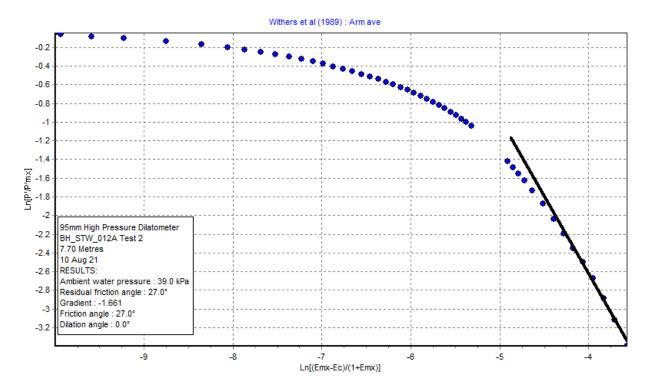


Figure 4.2 Example of Withers et al (1989) solution

5.5 Carter et al (1986, adapted 2010)

Carter et al (1986) is a closed form analytical solution for cavity expansion tests in ideal cohesive frictional material. There is an explicit small strain expression of the solution which makes a convenient basis for a curve comparison routine. What is presented here is a modified version of the solution incorporating non-linearity in the elastic phase of the test. A power law is used to describe the non-linear response and the parameters for the power law are obtained from rebound cycles carried out during the test. Unload/reload cycles offer the means of obtaining the elastic properties of the ground independently of disturbance caused by the process of placing the instrumentation - it is a necessary aspect of the methodology presented here that the analysis be constrained by the measured values of soil stiffness.

The process starts with the parameter set already obtained from the conventional analyses for cavity reference pressure, stiffness and internal angle of friction. Using the measured pressures but calculating the cavity strains according to the input parameter set, a theoretical curve is generated. This is overlaid on the measured field data. If the mis-match is significant, then certain parameters can be adjusted to improve the match. The fixed parameters are the stiffness data. The curve comparison procedure covers elastic loading, plastic loading and elastic contraction – the plastic contraction part of the test is ignored for the present. For simplicity, all stresses in the following description are effective. As does Carter *et al* the method is developed first in terms of a purely frictional material and is then modified for cohesion. The solution is presented in terms appropriate for cylindrical cavity expansion, the spherical case has been ignored.

There are two main reasons for using this procedure. With the analyses available at the present time it is difficult to separate out the contribution of cohesion and friction in a dilating material. This can be done reasonably easily with the curve comparison approach. The other reason is that the influence of cavity reference pressure on the overall curve is very obvious. Tests in material of this type are often pre-bored and there is very little that can be done to assess the cavity reference pressure when the

initial part of the loading curve is dominated by disturbance effects. With this procedure implausible values are identified very easily.

5.5.1 Carter, Booker and Yeung (1986)

Assuming small deformations (where 10% cavity strain is considered small), Carter *et al* offer the following general solution for a cylindrical cavity expansion:

$$\frac{u}{r} = \varepsilon_{\theta} \left[A \left(\frac{R}{r} \right)^{1+\alpha} + B \left(\frac{R}{r} \right)^{1-\beta} + C \right]$$
 [Equ 5.11]

In terms of parameters that the pressuremeter can measure directly, circumferential strain ε_c and radial stress P at the cavity wall, this solution can be written as:

$$\varepsilon_{c} = \varepsilon_{\theta} \left[A \left(\frac{P'}{\sigma_{R}} \right)^{Y} + B \left(\frac{P'}{\sigma_{R}} \right) + C \right]$$
 [Equ 5.12]

Carter et al point out the similarity between this solution and that offered by Hughes et al (1977). Using the current notation the solution of Hughes et al can be written:

$$\varepsilon_c = \varepsilon_\theta \left(\frac{P'}{\sigma_R}\right)^Y$$
 [Equ 5.13]

The omission of the linear and constant terms in [Equ 5.13] comes about because the earlier solution ignores elastic strain in the plastic region. The attraction of the earlier solution is that plotting cavity strain against radial stress on log scales gives the gradient γ which can used to discover the approximate values of friction angle ϕ and dilation angle ψ , so it is helpful to carry out the Hughes et al analysis as a means of providing input parameters for the Carter et al solution. The Hughes log-log plot also indicates the influence of cohesion, because the data will plot a strain-softening curve rather than a straight line.

5.5.2 Elastic Strain and non-linear stiffness

In the simple elastic model the cavity strains before yield are given by:

Where
$$P_o < P' < \sigma_R$$
 then $\varepsilon_c = \frac{P - P_o}{2G}$ [Equ 5.14]

Then at first yield when $P' = \sigma_R = P_o(1 + \sin \phi)$:

$$\varepsilon_c = \frac{P_0 \sin \phi}{2G}$$
 [Equ 5.15]

The non-linear elastic versions of [Equ 5.14] and [Equ 5.15] are:

Where
$$P_o < P' < \sigma_R$$
 then $\varepsilon_C = \left[\frac{P' - P_o}{q_{ref}}\right]^{\frac{1}{h}}$ [Equ 5.16]

Then at first yield when $P' = \sigma_R$

$$\varepsilon_c = \left[\left(\frac{P_o}{q_{ref}} \right) \left(\frac{N-1}{N(2h-1)+1} \right) \right]^{\frac{1}{h}}$$
 [Equ 5.17]

The derivation of the non-linear elastic equations is given later. At the end of loading the cavity has a maximum pressure P'_{max} and expansion ε_{max} and the first part of the final unloading is elastic with a non-linear characteristic prior to yield in extension. The elastic circumferential strain is given by:

Where
$$P'_{max} > P' > \sigma_{RU}$$
 then $\varepsilon_c = \varepsilon_{max} - \left[\frac{P'_{max} - P'}{Jq_{ref}}\right]^{1/h}$ [Equ 5.18]

Then at first yield when $P'_{max} > P'$ and $P' = \sigma_{RU}$

$$\varepsilon_c = \varepsilon_{max} - \left[\left(\frac{P'_{max}}{Jq_{ref}} \right) \left(\frac{N^2 - 1}{N(2h - 1) + N^2} \right) \right]^{1/h}$$
 [Equ 5.19]

The explanation of the terms Q_{ref} and h and f is now presented, based on the methodology of Bolton and Whittle (1999). This solution uses a power law to describe the development of shear stress with strain for strains below the elastic/plastic threshold:

$$au = q_{ss} \gamma^h$$
 [Equ 5.20]

The co-efficient and exponent of the power law in [Equ 5.20] can be derived from plotting reloading data from unload/reload cycles. The origins for the data are the loop turnaround points. However, for the purposes of curve fitting, the trend of radial stress versus cavity strain is required. This is not shear modulus, where the data would be shear stress plotted against shear strain. Figure 5.2 is an example (not from a test on this contract).

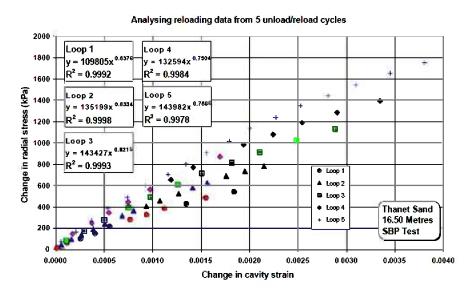


Figure 5.2 Plotting stiffness curves (not from this contract)

It is easy to manipulate the trends in Figure 5.2 to give shear modulus. Assuming no volumetric strains are being developed whilst the material is deforming elastically, shear strain can be derived by multiplying the cavity strain values by two. Furthermore Bolton & Whittle show that the shear stress coefficient is related to the radial stress coefficient as follows:

$$q_{ss} = hq_{rs} ag{Equ 5.21}$$

and secant shear modulus G_s is

$$G = q_{ss}\gamma^{h-1}$$
 [Equ 5.22]

5.5.3 Manipulating stiffness data for changes in mean effective stress

The stiffness data represented by q_{ref} and h give the stress/strain response of the elastic part of the curve. It is necessary to know the cavity strain at yield when this relationship will cease, given by [Equ 5.17]. Thereafter a single value of shear modulus, at yielding strain, is used implicitly by [Equ 5.12].

When the final unloading commences the shear modulus applicable to this part of the test will also depend on q_{ref} and h with q_{ref} multiplied by a scale factor decided by the increase in the mean effective stress. All that is then required is to know when the elastic unloading stops, and this is given by [Equ 5.19].

The yielding value of shear modulus for [Equ 5.12] is likely to be lower than that from simply taking the slope of the first loop in the test but probably higher than the initial slope of the virgin loading curve, which will be influenced by disturbance.

Bellotti et al (1989) give a procedure for converting modulus at intermediate stress levels to a reference level, the insitu mean effective stress p_o . It is based on the relationship proposed by Janbu (1963) and in terms of the nomenclature used here can be written:

$$q_{ref} = q_{rc} \left(\frac{P_o}{\sigma_{AV}}\right)^d$$
 [Equ 5.23]

Given a value of radial stress at the cavity wall P, the mean effective stress can be calculated as follows:

For unload/reload where
$$P' > \sigma_R$$
 then $\sigma_{AV} = (\frac{P - c\cos\phi}{1 + \sin\phi})$ [Equ 5.24]

For unload/reload where
$$P' > \sigma_R$$
 then $\sigma_{AV} = (\frac{P - c\cos\phi}{1 + \sin\phi})$ [Equ 5.24]
For unload/reload where $P' < \sigma_{RU}$ then $\sigma_{AV} = (\frac{P + c\cos\phi}{1 - \sin\phi})$ [Equ 5.25]

These two equations also incorporate the contribution of cohesion, c.

The modulus exponent d is obtained by plotting the mean effective stress against modulus and finding the best fit power law. The best correlation is obtained using q and h together as both are needed to fully describe the shape of the elastic response. Once a value for q_{ref} is obtained it is possible to predict the appropriate 'q' value for any other part of the curve, such as the final unloading, by calculating the mean effective stress for that point and multiplying by the ratio of that stress to the initial stress state. This is the scale factor *J* in [Equ 5.18] and [Equ 5.19].

5.5.4 Influence of Cohesion

It is straightforward to introduce the influence of cohesion using Caquot's principle. All stresses are raised by $c \cot \phi$, so that [Equ 5.12] now becomes:

$$\varepsilon_c = \varepsilon_\theta \left[A \left(\frac{P' + c \cot \phi}{\sigma_r + c \cot \phi} \right)^Y + B \frac{P' + c \cot \phi}{\sigma_r + c \cot \phi} + C \right]$$
 [Equ 5.26]

If there is no cohesion then the additional terms are zero and the equations revert to the frictional only form.

5.5.5 Deriving the limit pressure

Despite being a small strain solution it is possible to use the Carter et al solution in its adapted form to discover the limit pressure of an infinitely large expansion. At the limit state the ratio R/r_a of the elastic-plastic boundary to the current cavity size reaches a constant condition, which can be written:

$$\frac{1}{\varepsilon_{\theta}} = \left[T \left(\frac{R}{r_a} \right)^{1+\alpha} - Z \left(\frac{R}{r_a} \right)^{1-\beta} \right]$$
 [Equ 5.27]

or re-arranged to give:

$$\frac{1}{\varepsilon_{\theta}} = \left[T \left(\frac{P_l}{\sigma_R} \right)^{\mathbf{Y}} - Z \left(\frac{P_l}{\sigma_r} \right) \right]$$
 [Equ 5.28]

where P_l is limit pressure. To apply these results, [Equ 5.18] is used to discover the elastic yield strain ε_R . Now estimate the ratio P_1/σ_R and use [Equ 5.28] within an iterative procedure to modify the guess until the known value of ε_R is obtained. Once the ratio has been identified, multiply it by the yield stress σ_R to obtain the limit pressure. This is effective limit pressure and we add to it the ambient pore water pressure to give the total limit pressure.

5.5.6 Deriving the elastic equations

Assuming the non-linear elastic response of the soil prior to yield can be described by a power law of the form $\tau = q_{ss} \gamma^h$ (after Bolton & Whittle 1999) and assuming that whilst the soil is deforming elastically there are no volumetric strains then it follows that the principal stresses at first yield can be written as:

$$\sigma_r = P_o + \frac{\tau}{h}$$
 [Equ 5.29]

$$\sigma_c = \sigma_r - 2\tau$$
 [Equ 5.30]

Where τ represents the mobilised shear stress at failure. For a perfectly plastic frictional material development of the plastic zone occurs at a constant stress ratio, with the radial stress the major principal stress so at yield

$$\frac{\sigma_r}{\sigma_c} = N = \frac{(1 + \sin\phi)}{(1 - \sin\phi)}$$
 [Equ 5.31]

Substituting [Equ 5.29] into [Equ 5.30] and the result into [Equ 5.31] leads to:

$$Np_o + \frac{N}{h}\tau - 2N\tau = P_o + \frac{\tau}{h}$$
 [Equ 5.32]

And this can be re-arranged to find τ/h :

$$\frac{\tau}{h} = P_o \left(\frac{(N-1)}{N(2h-1)+1} \right)$$
 [Equ 5.33]

So substituting into [Equ 5.29] gives:

$$\sigma_R = P_o \left(1 + \frac{(N-1)}{N(2h-1)+1} \right)$$
 [Equ 5.34]

Alternatively, using the friction angle ϕ :

$$\sigma_R = P_o \left(1 + \frac{\sin\phi}{h(1 + \sin\phi) - \sin\phi} \right)$$
 [Equ 5.35]

The final unloading starts with the radial stress at a maximum P'_{max} . 'Non-linear' yield in extension first occurs at the borehole wall when the radial stress is:

$$\sigma_r = {P'}_{max} - \frac{2\tau}{h}$$
 [Equ 5.36]

The circumferential stress at yield will be $\sigma_r + 2\tau$ hence:

$$\sigma_c = P'_{max} - \frac{2\tau}{h} + 2\tau$$
 [Equ 5.37]

The mobilised shear stress τ is discovered in a similar way to the elastic loading equations noting that yield in contraction occurs with the circumferential stress being the major principal stress. Radial stress $(2\tau/h)$ for the elastic part of the final unloading is:

$$\frac{2\tau}{h} = \left(\frac{P'_{max}(N-1)}{N-1+h}\right)$$
 [Equ 5.38]

The equivalent to [Equ 5.34] for the final unloading is:

$$\sigma_{RU} = P'_{max} \left[1 - \frac{(N-1)}{(N-1+h)} \right]$$
 [Equ 5.39]

Alternatively, using the friction angle ϕ :

$$\sigma_{R} = P'_{max} \left(1 - \frac{2 sin \phi}{h(1 - sin \phi) + 2 sin \phi} \right)$$
 [Equ 5.40]

If h=1, the value for linear elasticity, [Equ 5.34] and [Equ 5.39] revert to the standard equations for yield in a frictional material. Typical values for h in sand like material would be 0.6-0.8.

For a c' – phi material the failure does not occur at a constant stress ratio but can be made to seem so if all stresses are raised by $c \cot \phi$. Thus, [Equ 5.31] becomes:

$$\frac{\sigma_r + ccot\phi}{\sigma_c + ccot\phi} = N$$
 [Equ 5.41]

So failure on first loading occurs when:

$$\sigma_R = \sigma_{ho} + \left[\frac{(\sigma_{ho} + ccot\phi)(N-1)}{N(2h-1)+1} \right]$$
 [Equ 5.42]

Or:

$$\sigma_{R} = \sigma_{ho} + \left[\frac{(\sigma_{ho} + ccot\phi)sin\phi}{h(1 + sin\phi) - sin\phi} \right]$$
 [Equ 5.43]

If there is no cohesion then [Equ 5.35] and [Equ 5.43] are the same. If the material is linear elastic, h=1 and [Equ 5.42] reverts to the familiar Mohr-Coulomb expression for first yield. Similarly, the expression for first yield in unloading in a c'-phi material is obtained by taking equation [Equ 5.36] and [Equ 5.37] and using the argument that the failure stress ratio is given by:

$$\frac{\sigma_c + ccot\phi}{\sigma_r + ccot\phi} = N$$
 [Equ 5.44]

This leads to the following expression for the yielding stress in unloading:

$$\sigma_{RU} = P'_{max} - \left(\frac{(P'_{max} + ccot\phi)(N-1)}{(N-1+h)}\right)$$
 [Equ 5.45]

Or:

$$\sigma_{RU} = P'_{max} - \left(\frac{(P'_{max} + ccot\phi)2sin\phi}{h(1 - sin\phi) + 2sin\phi}\right)$$
 [Equ 5.46]

5.5.7 Example

A typical result of the curve fitting method applied to a test is given in Figure 5.3. This particular test shows some cohesion. The elastic range on the final unloading is predicted reasonably well, although this is not always the case. The list of parameters in the top left hand corner includes the Janbu exponent of how stiffness varies with stress level at yield strain.

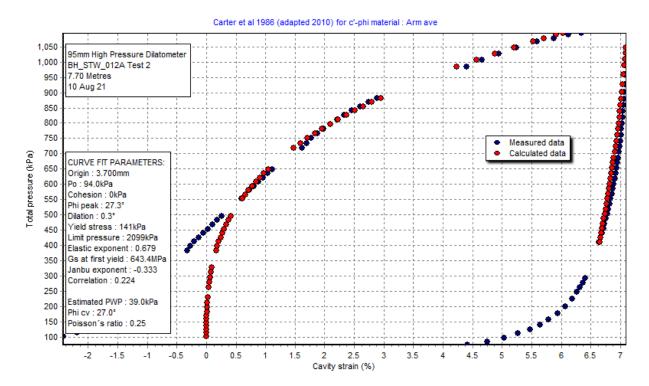


Figure 5.3 Drained test, curve fitting example, some cohesion

6 DERIVING OVER CONSOLIDATION RATIO FROM PRESSUREMETER DATA

Plastic volumetric strain ratio and for most clavs is ≈ 0.8

6.1 Notation

٨

11	riastic volumetric strain ratio and for most days is 40.0
β	Exponent of non-linearity
C_u	Undrained shear strength
I_p	Plasticity index
m	Exponent
M	The frictional coefficient equal to $6 \sin \phi (3 - \sin \phi)$ and is ≈ 1 for typical
	values of ϕ .
nc	Normally consolidated
P'_{y}	Maximum past effective stress
P'_f	Effective yield stress
P'_{a}	Effective overburden stress

 R_p Over consolidation ratio

r Spacing ratio between equivalent points on the isotropic consolidation line and critical state line and is ≈ 2

 σ'_{vo} Effective insitu vertical stress (overburden stress)

6.2 Overview

Soil is over consolidated when its current state of stress is less than the maximum stress it experienced in the past. There are a number of ratios that could be called the over consolidation ratio (OCR) but the particular one described here is R_p where:

$$R_p = \frac{P_\gamma'}{P_\Delta'}$$
 [Equ 6.1]

 R_p is the ratio of maximum past effective stress to the current effective stress. For our purposes P_A' is the effective overburden stress and is usually easy to estimate to a suitable accuracy.

6.3 Wroth 1984

Wroth (1984) gives a correlation, using critical state soil mechanics nomenclature, between the undrained shear strength ratio and OCR:

$$\frac{C_u}{\sigma_{vo}} = \frac{M}{2} \left(\frac{R_p}{r}\right)^{\Lambda}$$
 [Equ 6.2]

The labelling here is slightly different from the published form, and in particular Wroth takes care to specify that the undrained shear strength and friction angle are triaxial test parameters, not those from plane strain shearing. Nevertheless, in view of the other uncertainties these are minor objections and combining these assumptions leads to the following:

$$R_p = 2\left(\frac{2C_u}{\sigma_{vo}}\right)^{\frac{1}{\Lambda}}$$
 [Equ 6.3]

Ladd et al (1977) quote a similar expression using classical soil mechanics terminology, and this can be re-arranged to give the following:

$$R_p = \left[\frac{C_u}{\sigma_{vo} (0.11 + 0.0037 I_p)} \right]^{\frac{1}{m}}$$
 [Equ 6.4]

where I_p is plasticity index. Ladd et al (1977) note that the exponent m reduces slightly with increasing OCR and has the range 0.85 to 0.75. Wroth ('84) states that $m = \Lambda$.

Equation 7.4 is related to an earlier empirical formulation offered by Skempton (1957) for natural deposits of clay normally consolidated:

$$\frac{C_u}{\sigma_{vo}} = 0.11 + 0.0037 I_p$$
 [Equ 6.5]

Wroth ('84) also offers the following:

$$R_p^{\Lambda} = \frac{\frac{C_u}{\sigma_{vo}}}{(C_u/\sigma_{vo})_{nc}}$$
 [Equ 6.6]

This normalises the undrained strength ratio and is independent of the frictional coefficient M and the spacing ratio r.

Based on [Equ 6.3] when values for OCR are required it would be reasonable to use the following:

$$R_p = 2(2C_u/\sigma'_{vo})^{5/4}$$
 [Equ 6.7]

APPENDIX E SAMPLE CALCULATION OF A LINE OF DATA

What is described in some detail in this appendix is the steps necessary to convert the raw data output from a High Pressure Dilatometer into engineering units.

In order to convert pressuremeter signals into calibrated data the following steps are taken:

- Zeroing and scaling
- Compression correction
- Membrane correction
- Displacement and average total pressure
- Calculation of pressure outside membrane

Calibrations and raw data

The calibrations for this particular test are presented as follows: -

INSTRUMENT CALIBRATIONS:

	TRA	TRANSDUCER CORRECTION					CORRE	CTION	CON	MPRESSION
	ZERC)	SLOPE		ZERO		S	SLOPE		
ARM 1	-1590.6	mV	113.7	mV/mm	60	k <mark>P</mark> a	14.4	kPa/mm	7	mm/GPa
ARM 2	-1385.5	mV	112.5	mV/mm	60	k <mark>P</mark> a	14.4	kPa/mm	-24.2	mm/GPa
ARM 3	-1861.3	mV	120.1	mV/mm	60	kPa	14.4	kPa/mm	11.6	mm/GPa
ARM 4	-1326.7	m۷	112.5	mV/mm	60	k <mark>P</mark> a	14.4	kPa/mm	5.1	mm/GPa
ARM 5	-1880.6	mV	105.8	mV/mm	60	k <mark>P</mark> a	14.4	kPa/mm	7.4	mm/GPa
ARM 6	-2343.8	mV	109.5	mV/mm	60	kPa	14.4	kPa/mm	5.6	mm/GPa
TPC A	-61.9	mV	68.5	mV/MPa						
TPC B	49.2	mV	77.9	mV/MPa						

The line of raw data reads from left to right as follows. The units are volts: -

LINE	TPC A	ARM 1	ARM 2	ARM 3	ARM 4	ARM 5	ARM 6	TPC B	SIN	cos
204	0.5531	-1.3697	-1.1102	-1.3910	-0.8961	-1.4996	-2.0560	0.7717	-1.0710	-0.5917

Zeroing and scaling

The raw data is in units of volts and needs to be corrected for zero offsets and scaled using the sensitivities quoted in the calibration data.

The first operation is to deduct the zero offsets. These are the figures found in the first column of the calibration information but quoted here in volts. The columns for Sin and Cos disappear at this stage, as they are not transferred to the calibrated data file:

	TPC A	ARM 1	ARM 2	ARM 3	ARM 4	ARM 5	ARM 6	ТРС В
Output	0.5531	-1.3697	-1.1102	-1.3910	-0.8961	-1.4996	-2.0560	0.7717
Zero	-0.0619	-1.5906	-1.3855	-1.8613	-1. <mark>3</mark> 267	-1.8806	-2.3438	0.0492
Result	0.6150	0.2209	0.2753	0.4703	0.4306	0.3810	0.2878	0.7225

[1]

This result [1] can now be scaled. The information for this is found in the second column of calibration data and is expressed as millivolts per millimetre to calculate displacement, and as millivolts per megaPascal to calculate pressure. As before, the results of the calculations are quoted in volts:

	TPC A	ARM 1	ARM 2	ARM 3	ARM 4	ARM 5	ARM 6	TPC B	
From [1]	0.6150	0.2209	0.2753	0.4703	0.4306	0.3810	0.2878	0.7225	
Slope	0.0685	0.1137	0.1125	0.1201	0.1125	0.1058	0.1095	0.0779	
Result	8.9781	1.9428	2.4471	3.9159	3.8276	3.6011	2.6283	9.2747	[2]
Resulting units	(MPa)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(MPa)	

At this point in the procedure, a choice has to be made about which total pressure cell or combination of cells to use in producing the calibrated data. The difference between the cells is because cell A is read at the beginning of a data scan and cell B at the end. The time taken to make the scan allows some pressure change to occur in the probe. In this example the average of cells A and B are used: (8.9782 + 9.2747)/2 = 9.1264MPa.

Compression Correction

The data is now in engineering units which reflect what is taking place inside the membrane. The remaining corrections are introduced to give a better representation of what is taking place at the point where the membrane bears on the borehole wall.

The displacement data is adjusted for the instrument displacements due to the pressure being applied to it. This is expressed as a linear movement in millimetres per GigaPascal of pressure being applied, and is found in the 5th column of the calibration details:

	ARM 1	ARM 2	ARM 3	ARM 4	ARM 5	ARM 6	
Correction Factor (mm/GPa)	7.0	-24.2	11.6	5.1	7.4	5.6	column 5
Internal Pressure (MPa)	9.1264	9.1264	9.1264	9.1264	9. <mark>1</mark> 264	9.1264	
Adjustment:							[3]
(correction factor *[2])/1000	0.0639	-0.2209	0.1059	0.0465	0.0675	0.0511	
Internal Displacement (mm)	1.9428	2.4471	3.9159	3.8276	3.6011	2.6283	[2]
Corrected Displacement (mm)	1.8789	2.6680	3.8100	3.7810	3.5336	2.5772	[4]

Membrane Correction

The displacement data calculated so far is the movement measured by the arms to the inside of the membrane. The figures quoted in the calibrated data listings are the movement of the outside of the protective sheath. This is derived from the internal movement by assuming that the cross-section area of the membrane is a constant. A full explanation of this and the derivation of the equation used is discussed in the appendix on calibration technique.

The equation is
$$E = t - b + \sqrt{[(b-t)^2 + d(2a+d)]}$$
 [a]

Where:

a	is the internal radius of the membrane at rest
b	is the external radius of the membrane at rest
r	is the external radius of the membrane expanded
t	is the thickness of the stainless steel sheath strips
d	is the measured movement of the strain arm
E	is the actual expansion of the membrane

For the pressuremeter used to produce this example:-

2b = 94.0 mm 2a = 81.0 mm t = 0.5334 mm

Because the membrane can be assumed to have the same thickness at all points on the cross-section the technique employed is to calculate a scale factor from the average displacement.

	ARM 1	ARM 2	ARM 3	ARM 4	ARM 5	ARM 6
	mm	mm	mm	mm	mm	mm
Corrected Displacements	1.8789	2.6680	3.8100	3.7810	3.5336	2.5772
Average Displacement	3.0415	3.0415	3.0415	3.0415	3.0415	3.0415
Result of equation [a] using D = [5]	2.6735	2.6735	2.6735	2.6735	2.6735	2.6735
Scale Factor [6]/[5]	0.8790	0.8790	0.8790	0.8790	0.8790	0.8790
Apply [7] to [4]	1.6517	2.3452	3.3491	3.3236	3.1061	2.2654

Displacement and average total pressure

The result, using displacements from [8] and the average total pressure quoted in kPa:

LINE	ARM 1	ARM 2	ARM 3	ARM 4	ARM 5	ARM 6	TPC
	mm	mm	mm	mm	mm	mm	kPa
204	1.6517	2.3452	3.3492	3.3236	3.1062	2.2655	9126.4

In practice the errors introduced by rounding-off calculations may result in small differences in the final figure. This is the line of data seen in the calibrated data file that is passed from the logging program to the analysis program.

Calculation of pressure outside membrane

However, the conversion to data ready for analysis is not yet complete. The column for pressure is the pressure *inside* the membrane. What is required is the pressure on the *outside* of the membrane where it bears against the borehole wall. Before using the calibrated data file, therefore, the analysis program corrects the pressure data for the influence of the membrane, using the data in the calibrations for membrane correction. It is separately calculated for each arm position, although in practice an average correction value tends to be used. The correction figure is the sum of the zero figure (column 3 in the calibrations) plus the increased stiffness with strain (column 4 in calibrations):-

	ARM 1	ARM 2	ARM 3	ARM 4	ARM 5	ARM 6]
From Result [8] (mm)	1.6517	2.3452	3.3491	3.3236	3.1061	2.2654	
Average Displacement (mm)	2.6735	2.6735	2.6735	2.6735	2.6735	2.6735	[10]
Membrane correction slope (kPa/mm)	14.4	14.4	14.4	14.4	14.4	14.4	[11]
Result [10]*[11] (kPa)	38.5	38.5	38.5	38.5	38.5	38.5	[12]
Membrane correction zero (kPa)	60.0	60.0	60.0	60.0	60.0	60.0	
Add zeroes to result [12]	98.5	9 8.5	98.5	98.5	98.5	98.5	[13]

This is the total membrane correction at each arm position and is now deducted from the total pressure cell readings. In this example because an average membrane correction has been used, the calculation is 9126.4kPa – 98.5kPa giving 9027.9kPa.

When the calibrated data is taken from the Analysis program the format differs from the PRN file produced by the logging program (see D, above). The analysis output gives the average radial displacement of opposing pairs of arms, together with a column of corrected pressure readings for each arm pair, and the uncorrected pressure:

[9]

LINE	Arms(1+4)/2	Arms (2+5)/2	Arms (3+6)/2	TPC 1	TPC 2	TPC 3	TPC
	mm	mm	mm	KPa	KPa	KPa	KPa
204	2.4876	2.7257	2.8073	9027.9	9027.9	9027.9	9126.4

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Cambridge Waste Water Treatment Plant Relocation Project GROUND INVESTIGATION

Results of pressuremeter tests carried out by Cambridge Insitu Ltd

Client reference TE8364

Contractor Soil Engineering

Cambridge Insitu reference: CIR1506/21

Report date: November 2021

Version: 1.0

VOLUME 2 of 2

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Data for tests in all boreholes and all calibrations

Table 1.1 below details the pressuremeter testing carried out in the boreholes. Table 1.2 provides background information about the tests and probe used. Table 1.3 provides borehole information Notes on the work carried out and tables of information are provided below:

Table 1.1 Tests included

	included			P 42. 6	D	
Test	Internal ref.	Depth (mBGL)	Date	Max Pressure	Material	Remar ks
	(el.	(IIIDGE)		(kPa)		
				` '	Structureless	
BH_STW_006 Test 1	B006T01	2.70	05/08/2021	1143	Chalk	
					Structureless	SBPM hit obstruction.
BH_STW_006 Test 2	B006T02	N/A	05/08/2021	N/A	Chalk	Drilling aborted
0						
					Structureless	
BH_STW_006 Test 3	B006T03	8.00	05/08/2021	1041	Chalk	
BH_STW_011A Test 1	B011T01	3.80	31/08/2021	1365	Structureless Chalk	
BII_3144_OTTA (GSC I	DOTTIOL	3.00	31/00/2021	1303	Citalk	SBPM would not advance.
BH STW 011A Test 2	B011T02	N/A	01/09/2021	N/A	Gault Clay	Drilling aborted.
BH_STW_011A Test 3	B011T03	13.50	01/09/2021	1660	Gault Clay	
BH_STW_011A Test 4	B011T04	21.70	02/09/2021	1768	Gault Clay	
		2		(1)	Structureless	
BH_STW_012a Test 1	B012T01	4.20	10/08/2021	2290	Chalk	40
7					Structureless	
BH_STW_012a Test 2	B012T02	7.70	10/08/2021	1088	Chalk	
						Highly anisotropic
BH_STW_012a Test 3	B012T03	13.20	11/08/2021	940	Gault Clay	expansion, only single loop possible on loading curve
BH_31W_U12a lest 3	8012103	13.20	11/08/2021	540	Structureless	possible on loading curve
BH STW 019A Test 1	B019T01	2.90	18/08/2021	1663	Chalk	
		H				Electrical short at 170kPa.
					Structureless	This was repaired and the
BH_STW_019A Test 2	B019T02	6.50	18/08/2021	1124	Chalk	test resumed.
DII 0711/ 0404 7 0	DO4 OTOG	0.45	40/00/0004	4550	Structureless	
BH_STW_019A Test 3	B019T03	9.40	18/08/2021	1562	Chalk Structureless	
BH STW 020 Test 1	B020T01	4.50	06/09/2021	702	Chalk	
BH_STW_020 Test 2	B020T02	8.50	06/09/2021	2506	Chalk	
BH_STW_020 Test 3	B020T02	2.20	07/09/2021	1637	Gault Clay	
BH_5147_020 10305	D020103	2.20	0770372021	1037	Structureless	
BH STW 021 Test 1	B021T01	5.45	16/08/2021	1110	Chalk	
					Structureless	
BH_STW_021 Test 2	B021T02	9.20	16/08/2021	1452	Chalk	
BH_STW_021 Test 3	B021T03	12.00	16/08/2021	1511	Chalk	
BH_TUN_001PM Test 1	B001T01	12.50	13/09/2021	1142	Gault Clay	
BH_TUN_001PM Test 2	B001T02	18.50	14/09/2021	1613	Gault Clay	
BH_TUN_006PM Test 1	B6PMT01	12.20	29/09/2021	154	Gault Clay	Pocket oversized
BH_TUN_006PM Test 2	B6PMT02	12.90	29/09/2021	1132	Gault Clay	
BH_TUN_006PM Test 3	B6PMT03	18.50	29/09/2021	1382	Gault Clay	
BH_TUN_011PM Test 1	B11PMT01	6.00	13/10/2021	701	Gault Clay	
BH_TUN_011PM Test 2	B11PMT02	24.95	14/10/2021	1761	Gault Clay	
BH_TUN_018PM Test 1	B018T01	27.00	01/10/2021	1948	Gault Clay	Burst at 2MPa
BH_TUN_018PM Test 2	B018T02	n/a	04/10/2021	n/a	Gault Clay	SBPM refused, test aborted
BH_TUN_018PM Test 3	B018T03	28.70	04/10/2021	481	Gault Clay	Pocket oversized
BH_TUN_018PM Test 4	B018T04	30.40	04/10/2021	2634	Gault Clay	32
BH_TUN_018PM Test 5	B018T05	32.10	05/10/2021	2916	Gault Clay	
		22,10	00/10/2021	2310		

Notes:

- 1. Depth is given as metres below ground level to the centre of the measuring section. The SBP membrane is 0.46 long, hence the affected zone is \pm 0.23m of the quoted test centre. The HPD membrane is 0.60 long, hence the affected zone is \pm 0.30m of the quoted test centre.
- 2. Max Pressure is the maximum pressure reached by the end of loading and may be used as a rough indication of how the material strength is changing with depth.

Table 1.2 Probe details and calibrations

Test	Operator	Probe	Transdu <mark>c</mark> er	Membrane	System
			calibration	stiffness	compliance
BH_STW_006 Test 1	EJS/SB	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH STW 006 Test 2	EJS/SB	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_STW_006 Test 3	EJS/SB	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_011A Test 1	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_011A Test 2	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH STW 011A Test 3	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_011A Test 4	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_STW_012a Test 1	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_STW_012a Test 2	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_012a Test 3	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_STW_019A Test 1	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_019A Test 2	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_019A Test 3	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH STW 020 Test 1	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_020 Test 2	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_020 Test 3	EJS	Shula (SBP)	19/07/2021	£1907T22	E1907T21
BH_STW_021 Test 1	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH STW 021 Test 2	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_STW_021 Test 3	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_TUN_001PM Test 1	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_TUN_001PM Test 2	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_TUN_006PM Test 1	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_TUN_006PM Test 2	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_TUN_006PM Test 3	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_TUN_011PM Test 1	EJS	Shula (SBP)	19/07/2021	E0610T22	E0610T21
BH TUN 011PM Test 2	EJS	Shula (SBP)	19/07/2021	E0610T22	E0610T21
BH_TUN_018PM Test 1	EJS	Shula (SBP)	19/07/2021	E1907T22	E1907T21
BH_TUN_018PM Test 2	EJS	Dougal (SBP)	13/07/2021	E0309T22	E0309T21
BH_TUN_018PM Test 3	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_TUN_018PM Test 4	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21
BH_TUN_018PM Test 5	EJS	Wally (HPD)	13/07/2021	E0907T21	E0907T21

Notes:

- 1. Probe Three probes were on this project, a six arm self bored pressuremeter known as 'Shula', a three arm self bored pressuremeter known as 'Dougal', a High Pressure Dilatometer known as 'Wally'.
- 2. Operator EJS is Ewan Stockwell and SB is Simon Baxter, both employees of Cambridge Insitu.
- 3. For the probes there is a transducer calibration referenced by date. There are also separate calibrations for the membrane and system compliance.

Table 1.3 Borehole location information

Borehole	Easting	Northing	Elevation mAOD	Groundwater level: mBGL
BH_STW_006	549502.5	261260.1	9.39	3.75
BH_STW_011A	549493.8	261023.6	10.17	3.75
BH_STW_012A	549712.9	261183.3	8.12	3.75
BH_STW_019A	549790.4	260872.9	9.42	3.75
BH_STW_020	549898.8	260975.8	8.13	3.75
BH_STW_021	549642.7	260664.3	10.98	3.75
BH_TUN_001PM	547214.1	261518.8	7.13	1.25
BH_TUN_006PM	547838.5	261494.8	6.59	4.50
BH_TUN_011PM	548428.8	261304.0	6.57	1.75
BH_TUN_018PM	549441.5	261003.2	10.24	4.00

Notes:

- 1. The ground level and coordinates of the borehole have been provided by Soil Engineering.
- 2. The ground water level is based on ground water monitoring information and provided by Soil Engineering.

The remainder of this volume is laid out as follows:

- There is a plot of all the field curves on the same axes.
- Thereafter the individual results and plots showing the derivation of the results are given. For each test the pages are in approximately the following order:

Plots from the analysis program WINSITU:

- 1. A Results Summary Sheet
- 2. A plot of total pressure against cavity strain, using the output from the average of all displacement followers.
- 3. A plot of total pressure against the initial part of the expansion, showing the pressure at which, the cavity begins to expand and identifying any 'witness' to the cavity reference pressure Po. Self bored tests only.
- 4. A plot of excess pore water pressure against total pressure. If the data allow, the total pressure at which excess pore water pressure changes its gradient is identified, hence giving an estimate of the cavity reference pressure Po. Self bored tests only.
- 5. A plot of Total pressure/Radial displacement showing the slope identified as the initial shear modulus, the apparent yield stress and the cavity reference pressure inferred from this yield stress (Marsland & Randolph 1977, Hawkins 1990).
- 6. For tests in granular soil, a log-log plot of current cavity strain against effective radial stress, using loading data, quoting the gradient (Hughes et al, 1977). This can be used to derive a peak friction angle and dilation angle if the constant volume friction angle is known (or estimated).
- 7. For tests in granular soil, a log-log plot of current cavity strain against effective radial stress, using contraction data if available, quoting the gradient (Withers et al, 1989). This can be used to derive a peak friction.
- 8. For tests in cohesive soil, a semi-log plot of total pressure against current shear strain at the cavity wall, quoting the slope and intercept. These give the undrained shear strength (Cu) and limit pressure (Plim), respectively (Gibson & Anderson 1961, Bolton & Whittle 1999).
- 9. For tests in cohesive soil, a semi-log plot of total pressure against current shear strain at the cavity wall using contraction data, quoting the slope and the derived undrained shear strength (Cu) (Jefferies, 1988).
- 10. For tests in cohesive soil, a plot of shear stress against current shear strain at the cavity wall using contraction data (Palmer, 1972).
- 11. Plots on axes of Radial displacement/Total Pressure showing enlarged views of unload/reload cycles and quoting shear modulus G.
- 12. Plots on axes of Ln[shear strain]/Ln[radial stress] showing loop reloading paths and quoting the gradient and intercept for each loop.
- 13. A plot on axes of secant shear modulus/Log[Shear strain] showing the decay of stiffness against strain curves derived from fitting a power law function to reloading data, all cycles. Individual data points obtained from applying Palmer (1972) directly to reloading data are also shown.
- 14. For undrained tests showing plastic development, a plot on axes of Average Cavity Strain/Total pressure giving the results of curve fitting the field curve with the best set of parameters using a non-linear elastic/perfectly plastic solution (Whittle, 1999).
- 15. For tests in granular soil, a plot on axes of Average Cavity Strain/Total pressure giving the results of curve fitting the field curve with the best set of parameters using a non-linear elastic/perfectly plastic solution (Carter et al 1986, modified).

Plots taken from the data collection software package WINLOG:

- 1. On axes of Radial Displacement/Total Pressure showing average displacement.
- 2. On axes of Radial Displacement/Total Pressure showing all displacement sensors.
- 3. On axes of Radial Displacement/Total Pressure showing opposing arm pairs.
- 4. On axes of Radial Displacement/Total Pressure showing the mean trend of even numbered and odd numbered arms.
- 5. A plot of all the pressure cells against time. Self bored tests only.

Because the information presented here comes from a variety of sources it is not possible to number the pages in a coherent manner, although within a test some pages may be numbered.

Winsitu colour coding

Plots from the analysis program WINSITU use a colour coding scheme to distinguish between different kinds of data. The options are these:

Data description	Colour
On the loading path	red
On the unloading path	blue
To be ignored	grey
Loop unloading	yellow
Loop reloading	magenta

When a particular plot displays one colour only then this is arbitrary and the colour has no significance. When more than one colour is shown then the meaning is indicated above.

Figure 1 All tests on common axes – BH_STW_006

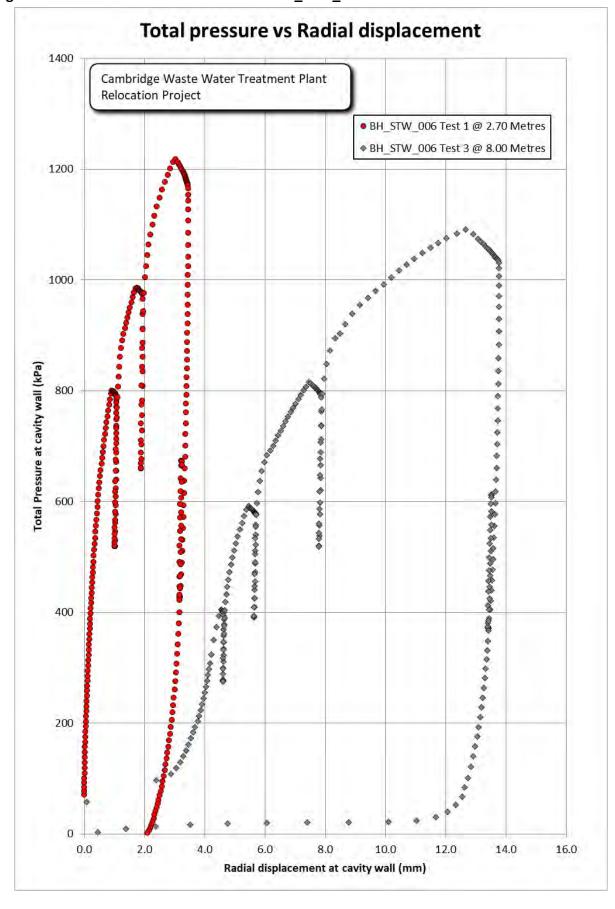


Figure 2 All tests on common axes – BH_STW_0011A

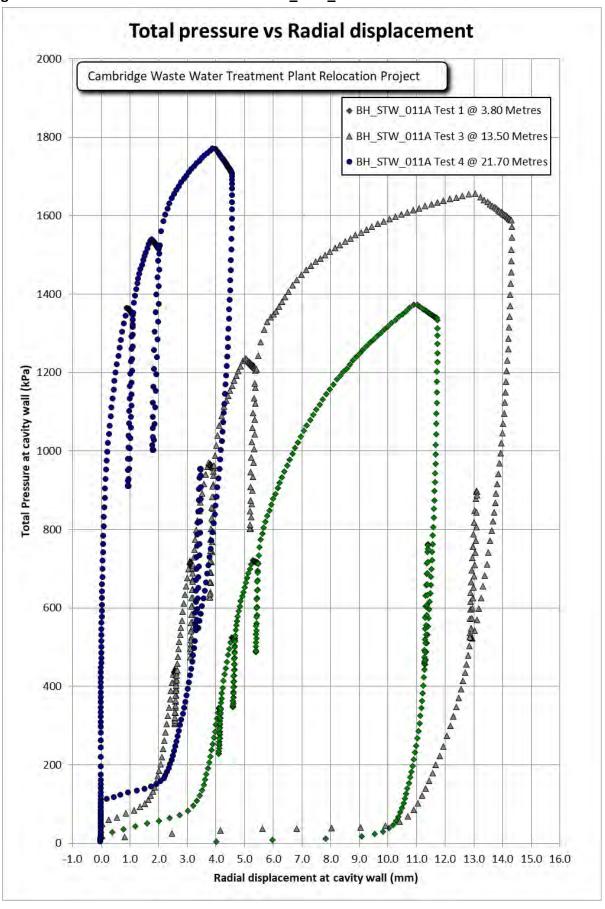


Figure 3 All tests on common axes – BH_STW_0012A

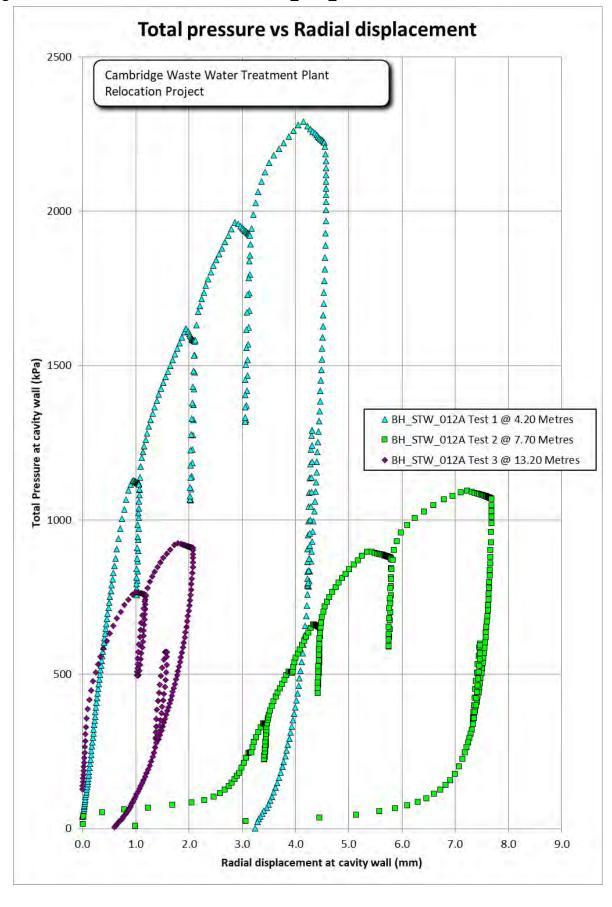


Figure 4 All tests on common axes – BH_STW_0019A

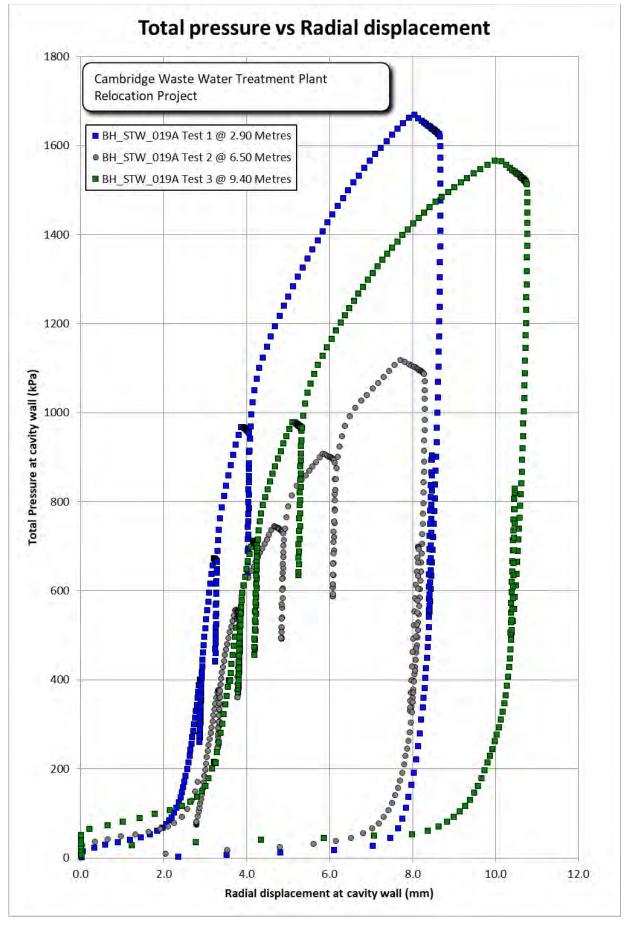


Figure 5 All tests on common axes – BH_STW_0020

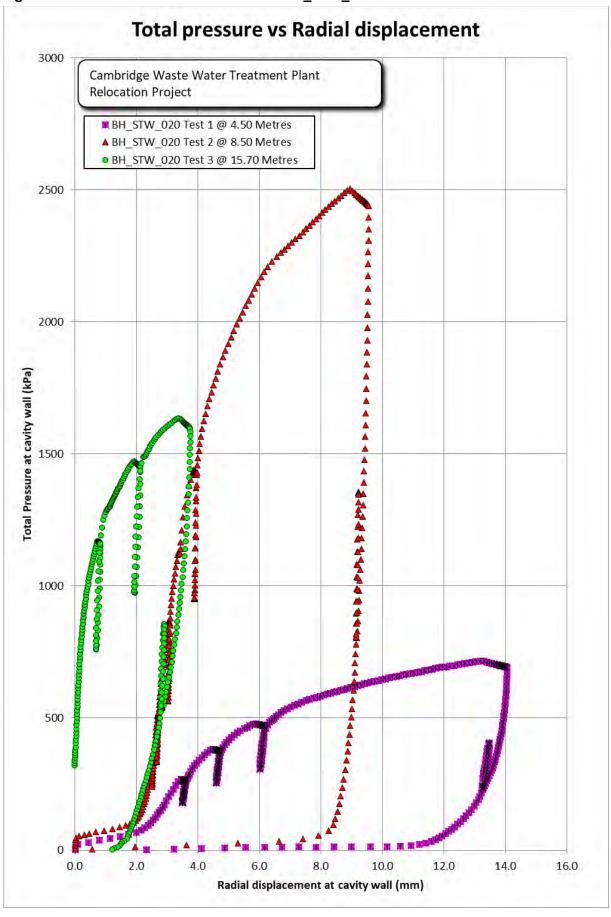


Figure 6 All tests on common axes – BH_STW_0020

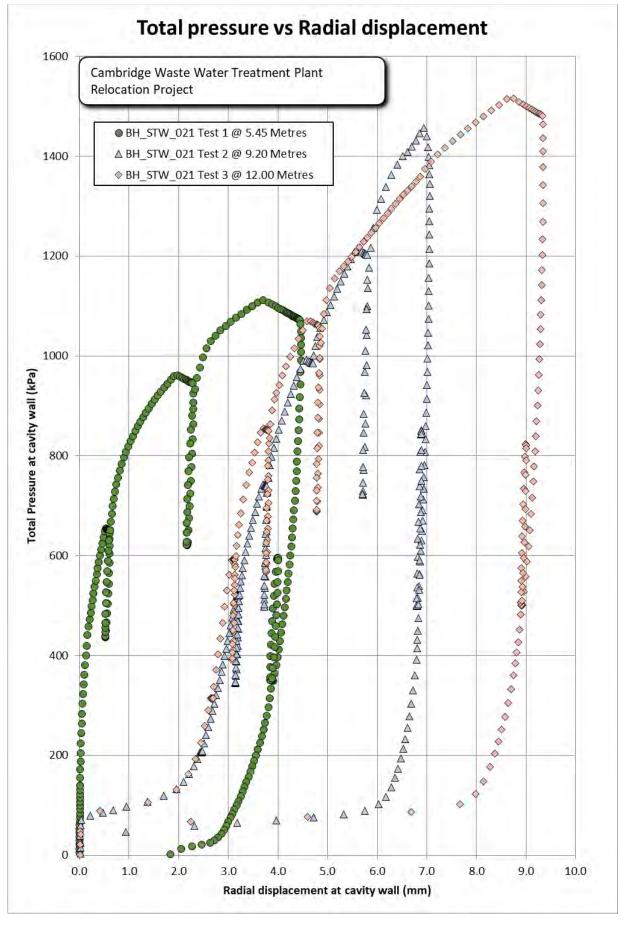


Figure 7 All tests on common axes – BH_TUN_001PM

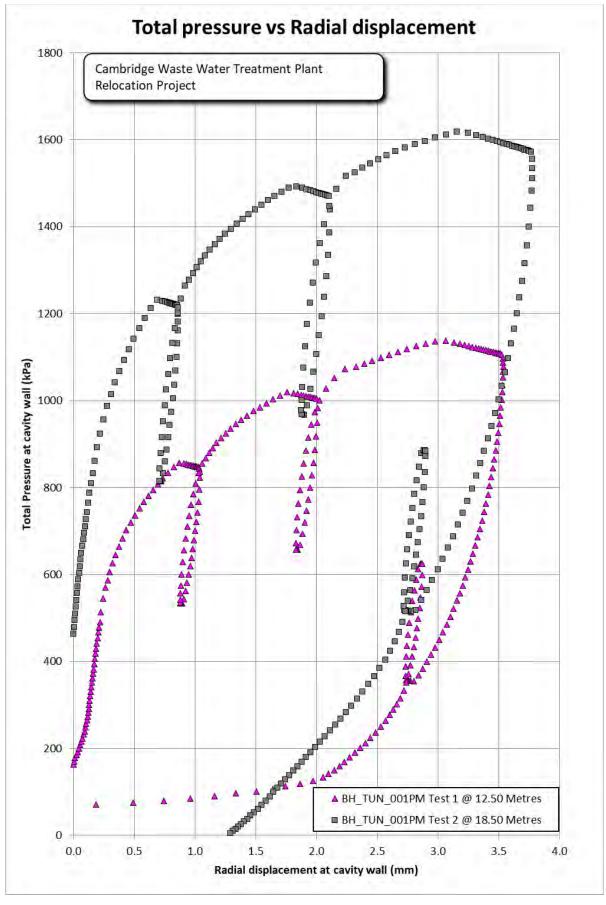


Figure 8 All tests on common axes – BH_TUN_006PM

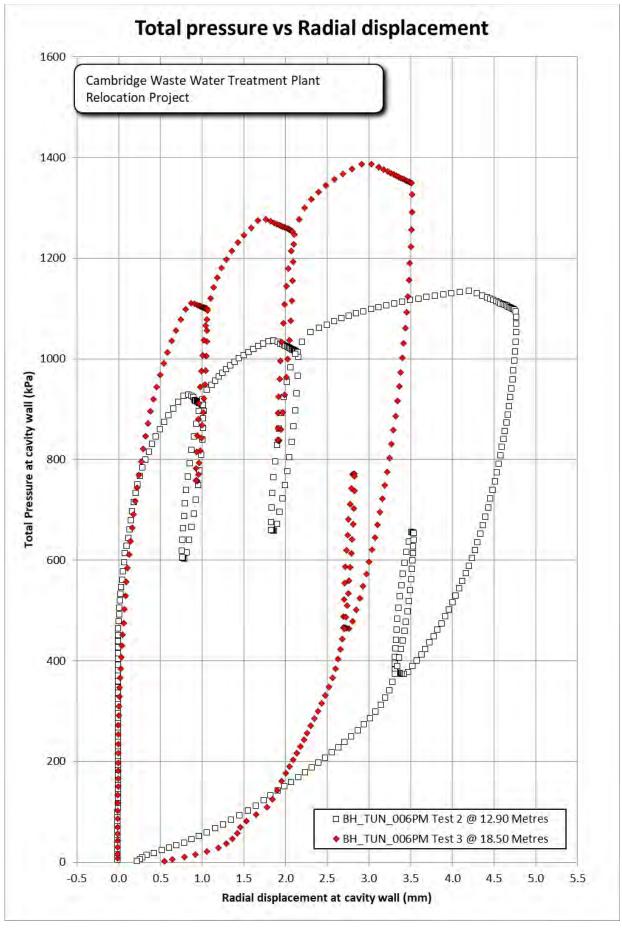


Figure 9 All tests on common axes – BH_TUN_011PM

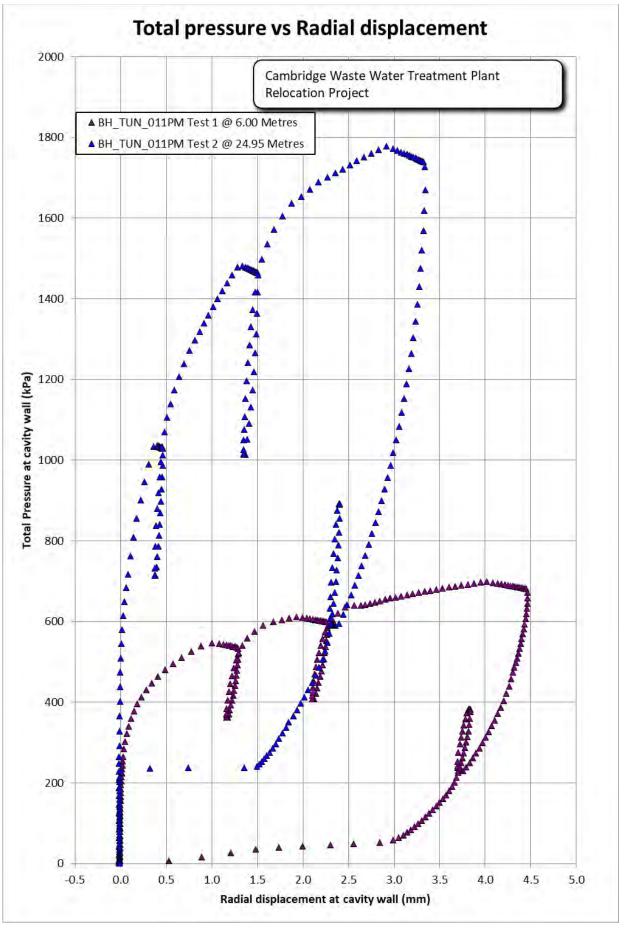
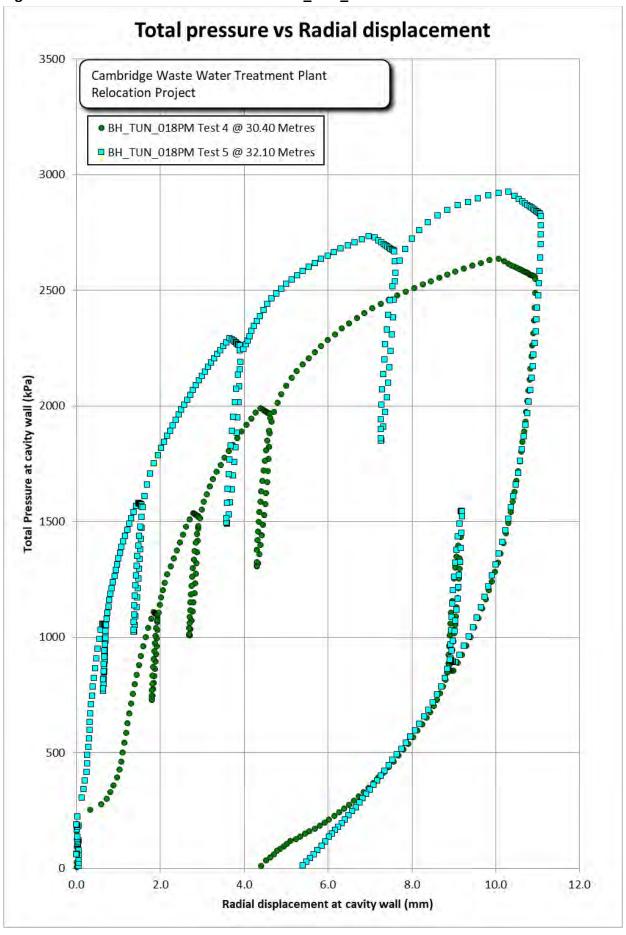


Figure 10 All tests on common axes – BH_TUN_011PM



TEST DATA FOR INDIVIDUAL TESTS (TAKEN FROM WINSITU and WINLOG FILES)

Test	Internal Ref.	Depth (mBGL)	Date
BH_STW_006 Test 1	B006T01	2.70	05/08/2021
BH_STW_006 Test 2	B006T02	N/A	05/08/2021
BH_STW_006 Test 3	B006T03	8.00	05/08/2021
BH_STW_011A Test 1	B011T01	3.80	31/08/2021
BH_STW_011A Test 2	B011T02	N/A	01/09/2021
BH_STW_011A Test 3	B011T03	13.50	01/09/2021
BH_STW_011A Test 4	B011T04	21.70	02/09/2021
BH_STW_012A Test 1	B012T01	4.20	10/08/2021
BH_STW_012A Test 2	B012T02	7.70	10/08/2021
BH_STW_012A Test 3	B012T03	13.20	11/08/2021
BH_STW_019A Test 1	B019T01	2.90	18/08/2021
BH_STW_019A Test 2	B019T02	6.50	18/08/2021
BH_STW_019A Test 3	B019T03	9.40	18/08/2021
BH_STW_020 Test 1	B020T01	4.50	06/09/2021
BH_STW_020 Test 2	B020T02	8.50	06/09/2021
BH_STW_020 Test 3	B020T03	15.70	07/09/2021
BH_STW_021 Test 1	B021T01	5.45	16/08/2021
BH_STW_021 Test 2	B021T02	9.20	16/08/2021
BH_STW_021 Test 3	B021T03	12.00	16/08/2021
BH_TUN_001PM Test 1	B001T01	12.50	13/09/2021
BH_TUN_001PM Test 2	B001T02	18.50	14/09/2021
BH_TUN_006PM Test 1	B6PMT01	12.20	29/09/2021
BH_TUN_006PM Test 2	B6PMT02	12.90	29/09/2021
BH_TUN_006PM Test 3	B6PMT03	18.50	29/09/2021
BH_TUN_011PM Test 1	B11PMT01	6.00	13/10/2021
BH_TUN_011PM Test 2	B11PMT02	24.95	14/10/2021
BH_TUN_018PM Test 1	B018T01	27.00	01/10/2021
BH_TUN_018PM Test 2	B018T02	n/a	04/10/2021
BH_TUN_018PM Test 3	B018T03	28.70	04/10/2021
BH_TUN_018PM Test 4	B018T04	30.40	04/10/2021
BH_TUN_018PM Test 5	B018T05	32.10	05/10/2021

Cambridge WWTPR BH_STW_006 Test 1 - SUMMARY OF RESULTS [File made with WinSitu]

[DETAILS OF TEST]

Project : TE8364

Site Cambridge Waste Water Treatment Plant Relocation Project

Borehole BH STW 006 Test name BH_STW_006 Test 1

5 Aug 21 Test date Test depth 2.70 Metres Test depth : 2.70 Metres
Water table : Nothing entered
Ambient PWP : 0.0 kPa

: Structureless chalk Material

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB/RW on 5 Aug 21

Remarks: Drained response- based on PPC response

[RESULTS FOR CAVITY REFERENCE PRESSURE]

"Arm ave=0.04" Strain Origin (mm) "Arm ave=51.6" Po from Marsland & Randolph (kPa) : Po from Lift off (kPa) : "Arm ave=46.8" "Arm ave=76.0" Best estimate of Po (kPa)

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) "Arm ave=152.2"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 30.0

"Arm ave=35.6" Angle of internal friction (°) "Arm ave=6.7" Dilation angle (°) "Arm ave=0.411" Gradient of log-log plot

[Withers et al 1989]

Angle of internal friction (°) "Arm ave=35.7" Dilation angle (°) "Arm ave=6.7" "Arm ave=-2.310" Gradient of log-log plot

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=78.7"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	84.4	2.280	628	0.260	220
Arm ave	2	89.9	4.250	788	0.285	257
Arm ave	3	80.1	7.159	552	0.304	244

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Loop	Intercept	Alpha	Gradient
No	(MPa)	(MPa)	
1	9.441	5.946	0.630
2	10.283	6.402	0.623
3	8.497	5.011	0.590
	No ' 1 2	No (MPa) 1 9.441 2 10.283	No (MPa) (MPa) 1 9.441 5.946 2 10.283 6.402

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

0.04 Strain Origin (mm) Po (kPa) 76 Cohesion (kPa) 40 Angle of peak friction (deg) 35.6 Angle of peak dilation (deg) 6.7 Total yield stress (kPa) 266 2963 Total limit stress (kPa) CIR1506/21

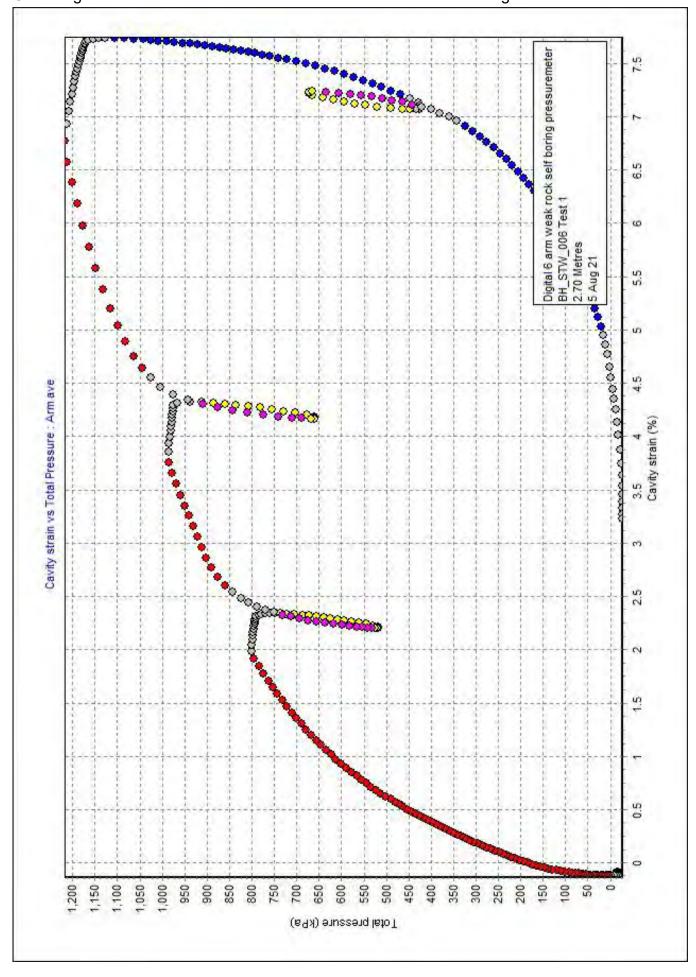
Cambridge WWTPR

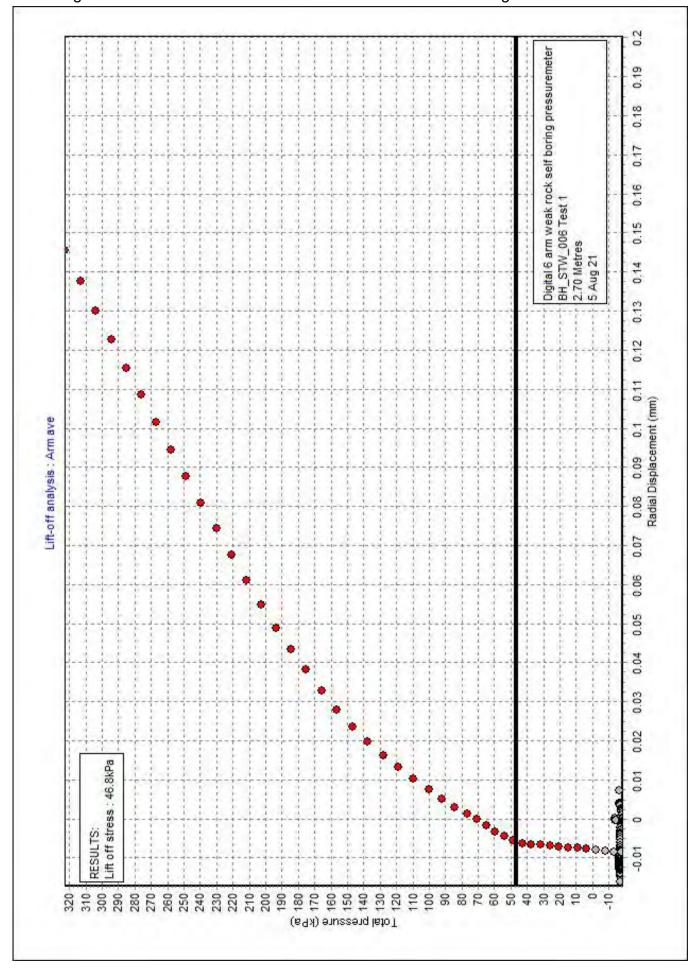
Pressuremeter Testing

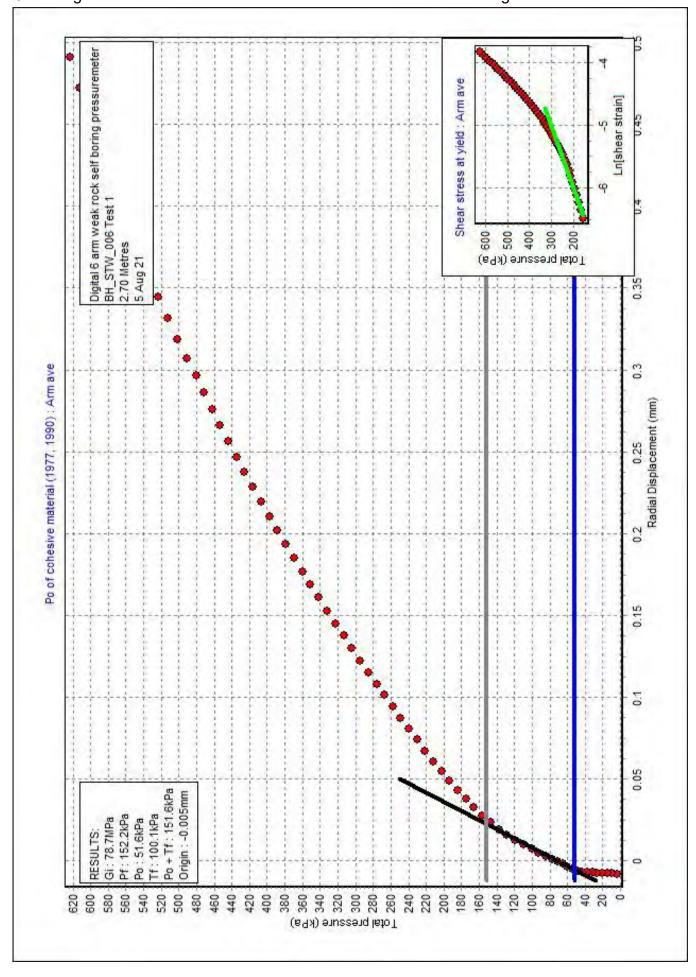
BH_STW_006 Test 1 - SUMMARY OF RESULTS

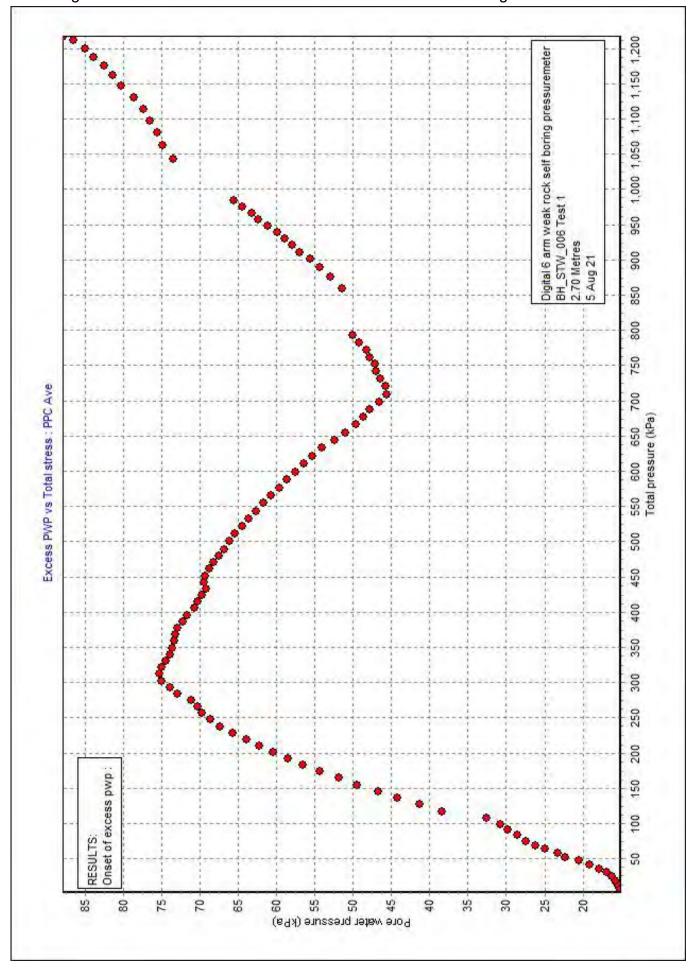
G at first yield (MPa) : 43.5 Non-linear exponent : 0.623 Janbu exponent : 0.150 Correlation : 0.317

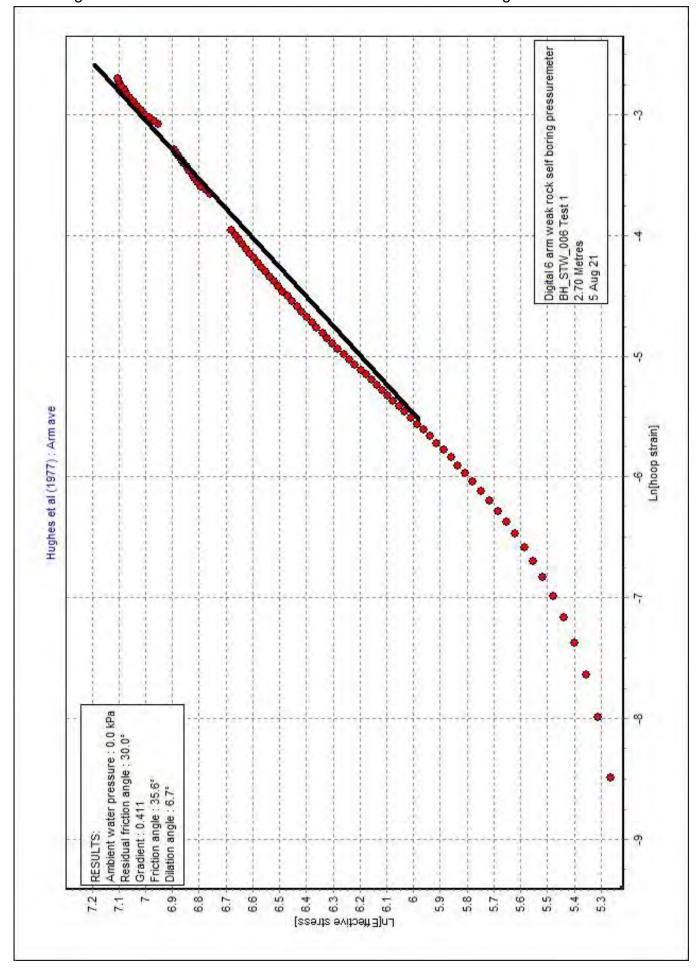
Ambient pore water pressure (kPa) : 0
Residual friction angle (deg) : 30.0
Poisson's ratio : 0.25

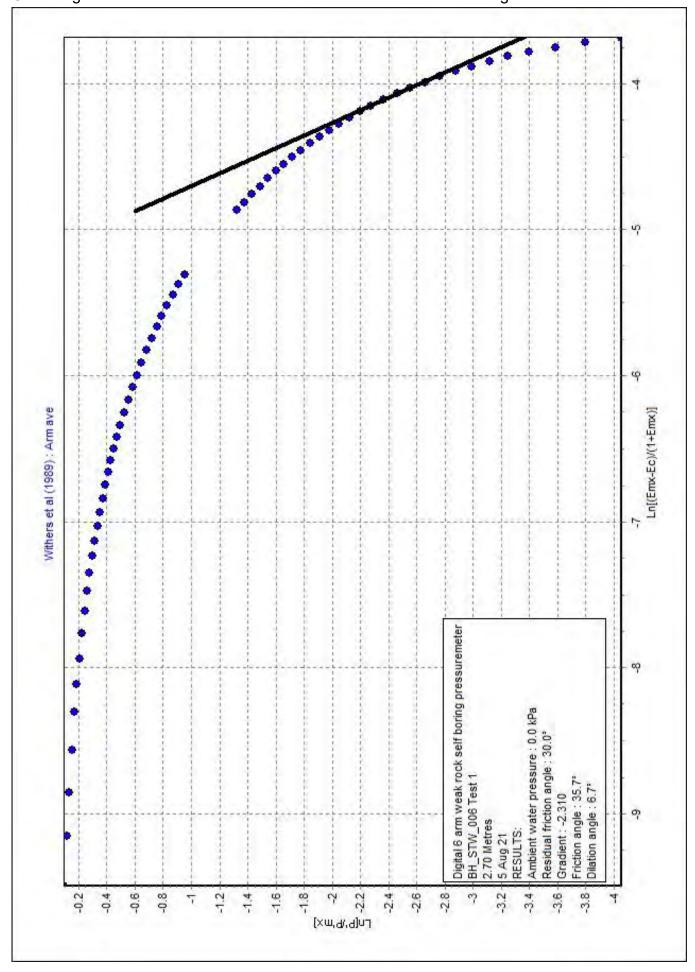


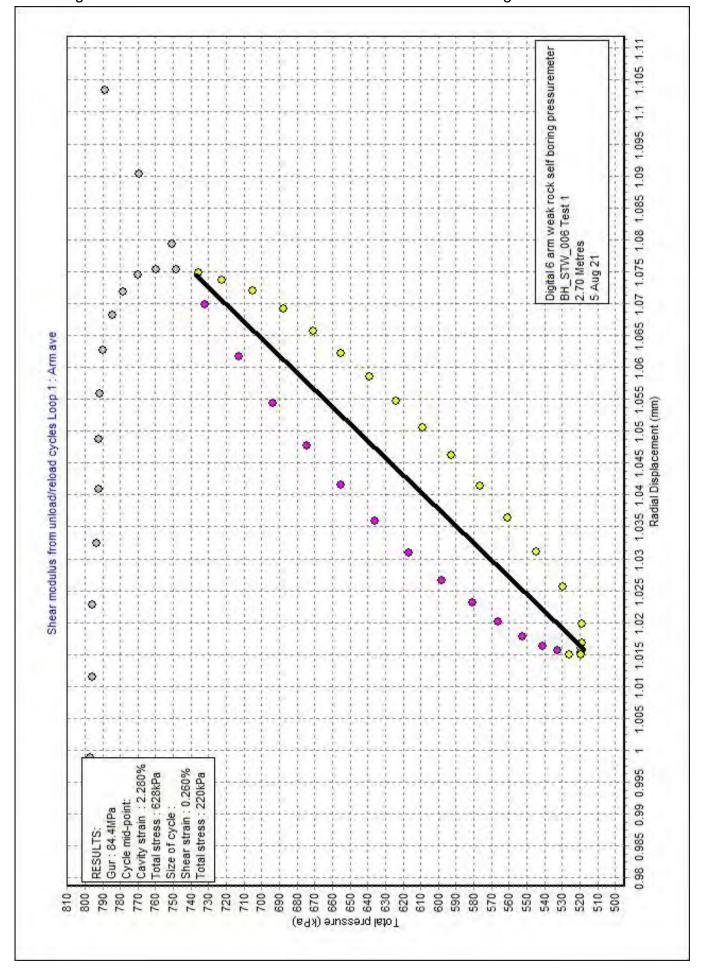


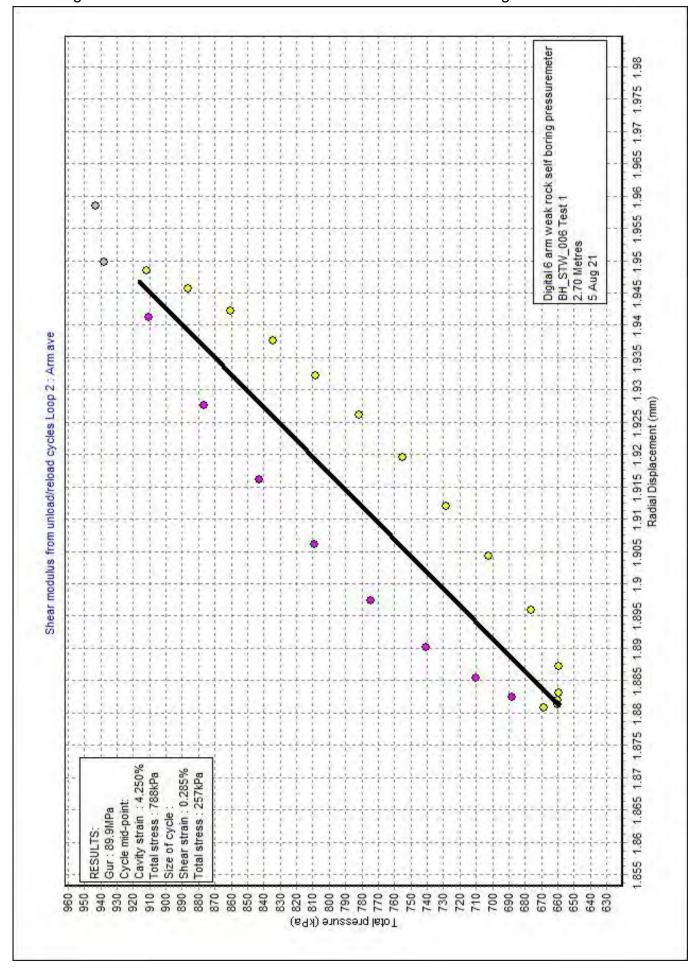


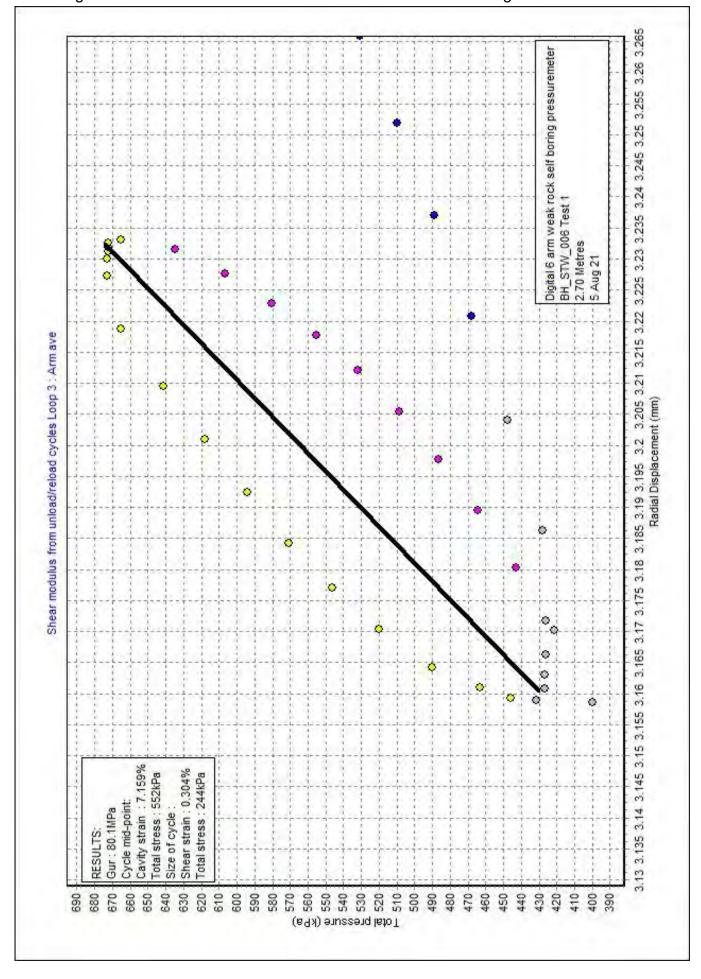


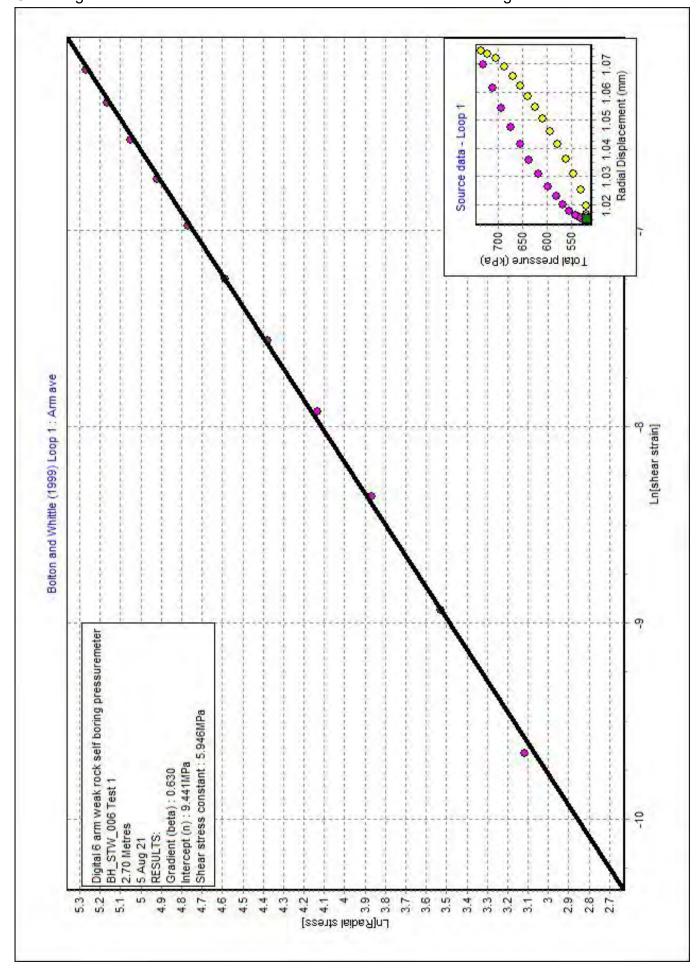


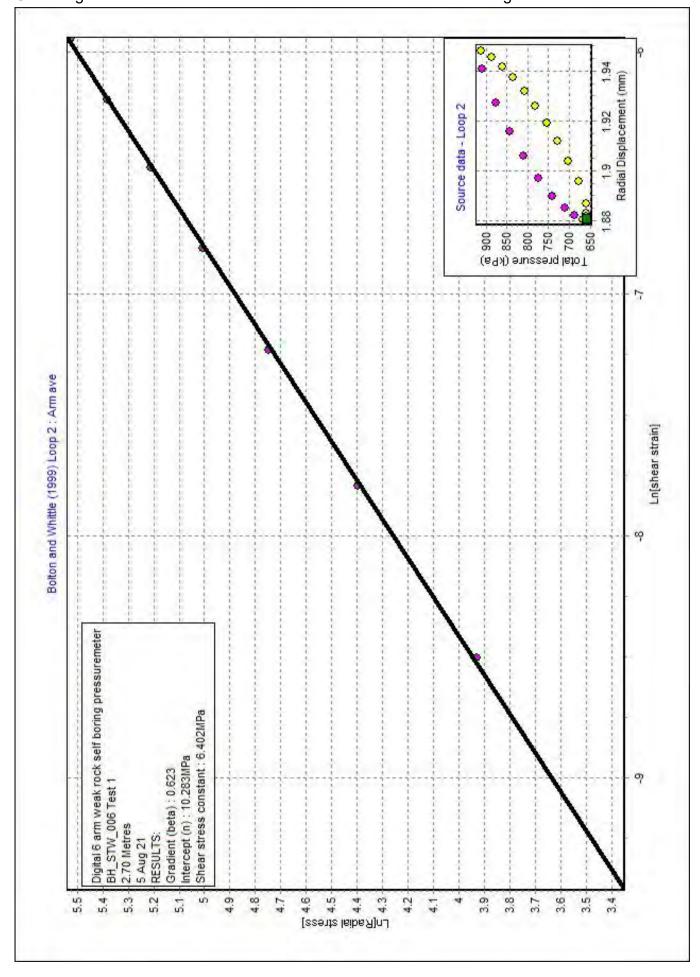


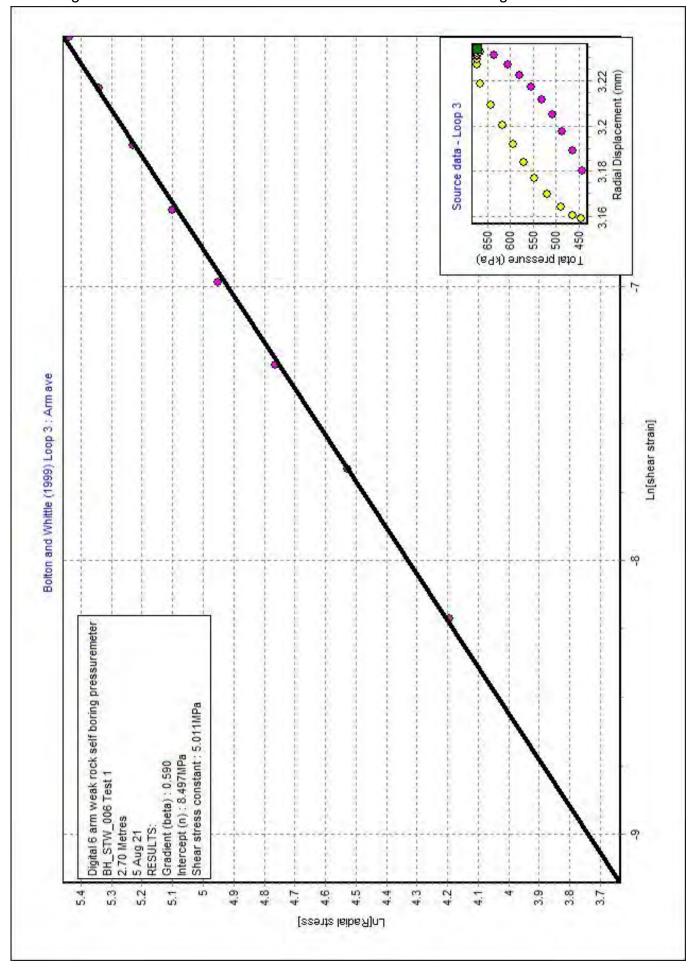


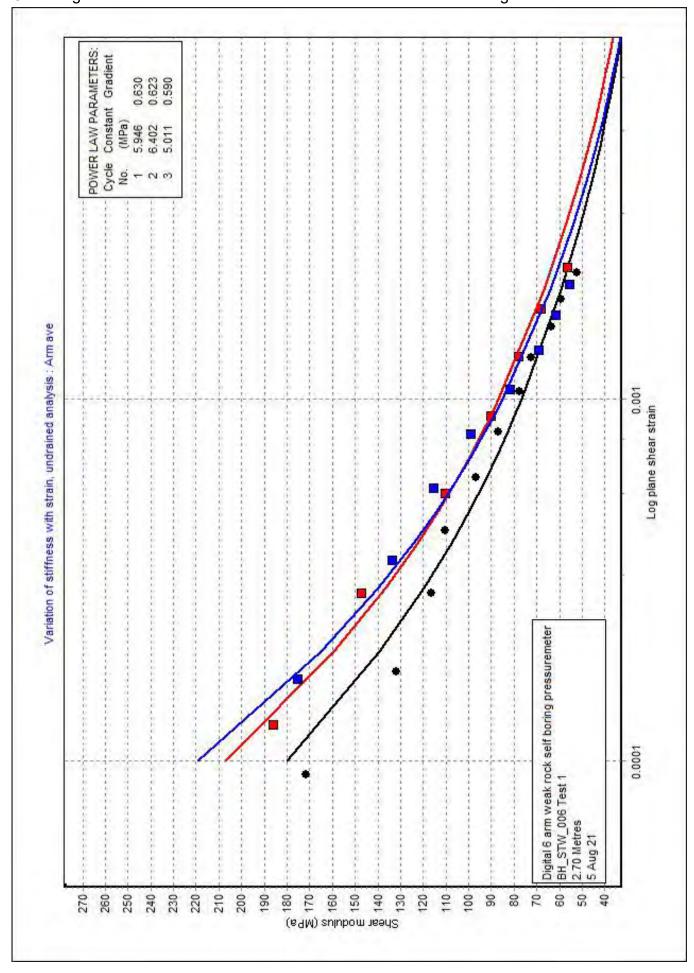


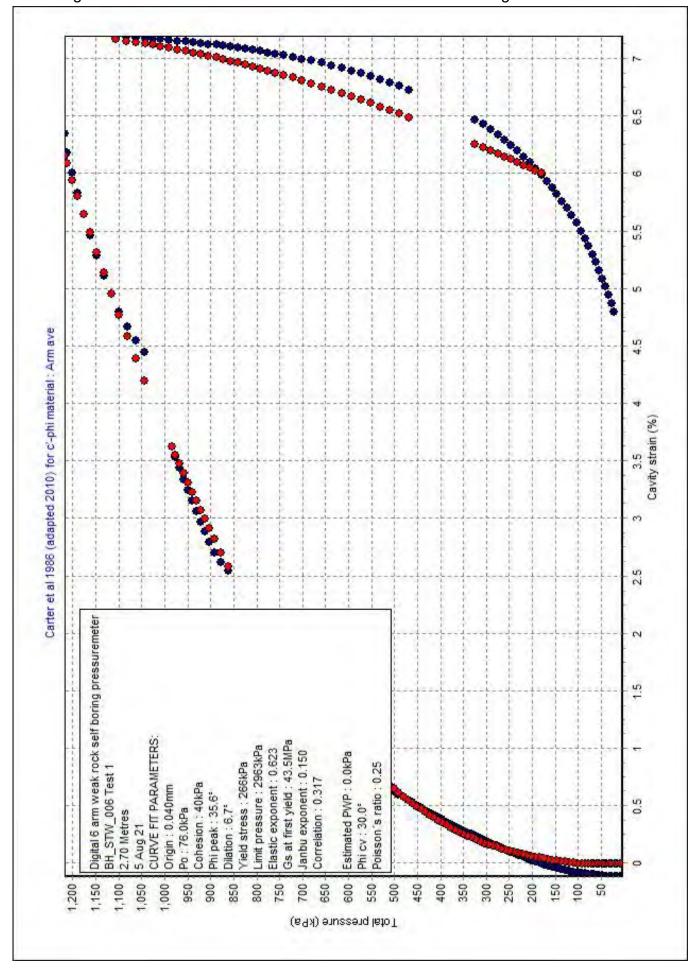












B006T01 - TEST & CALIBRATION DETAILS

[PROJECT DETAILS]

Contract name : CWW TPR

[BOREHOLE DETAILS] Borehole : BH_STW_006

[TEST DETAILS]
Test name: B006T01
Test date: 05/08/21
Depth (M): 2.70

Material: : Structureless chalk

Heading (deg): n/a Data Rate (secs): 6 Start Line: 1 Stop Line: 686

[COMMENTS]

Slow drilling. Highly anisotropic expansion. Early unload as a result

[PROBE DETAILS]

Type: Digital 6 Arm Self Boring Pressuremeter

Diameter over probe: 88.10mm
Diameter under membrane: 79.15mm
CHL strip thickness: 0.5000mm

[CALIBRATION FACTORS]

TRANSDUCERS MEMBRANE COMPLIANCE

ARM 1 -81.0 mV and 306.3 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 2 -929.5 mV and 326.5 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 3 -330.5 mV and 326.9 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

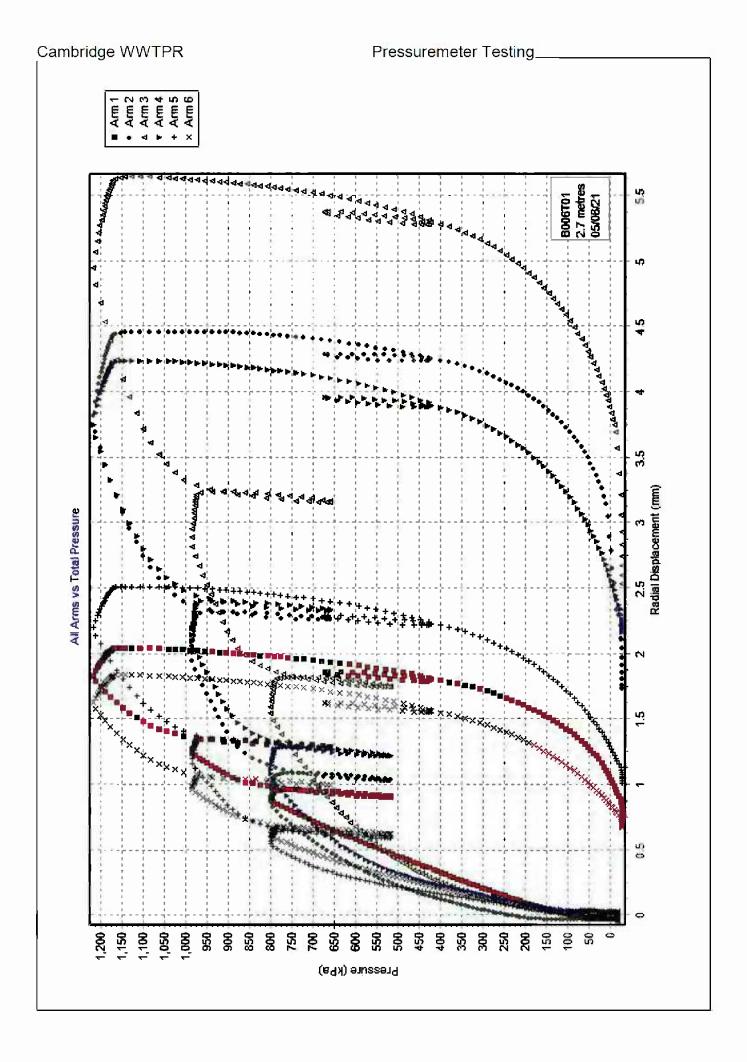
ARM 4 75.0 mV and 330.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

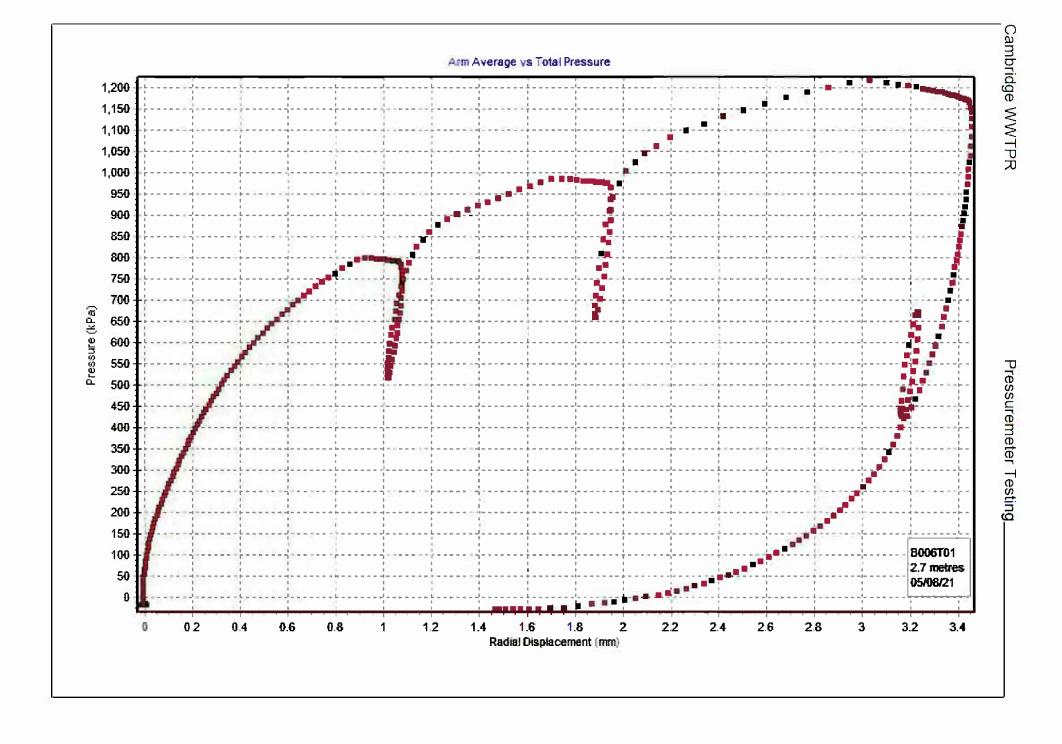
ARM 5 74.0 mV and 330.4 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

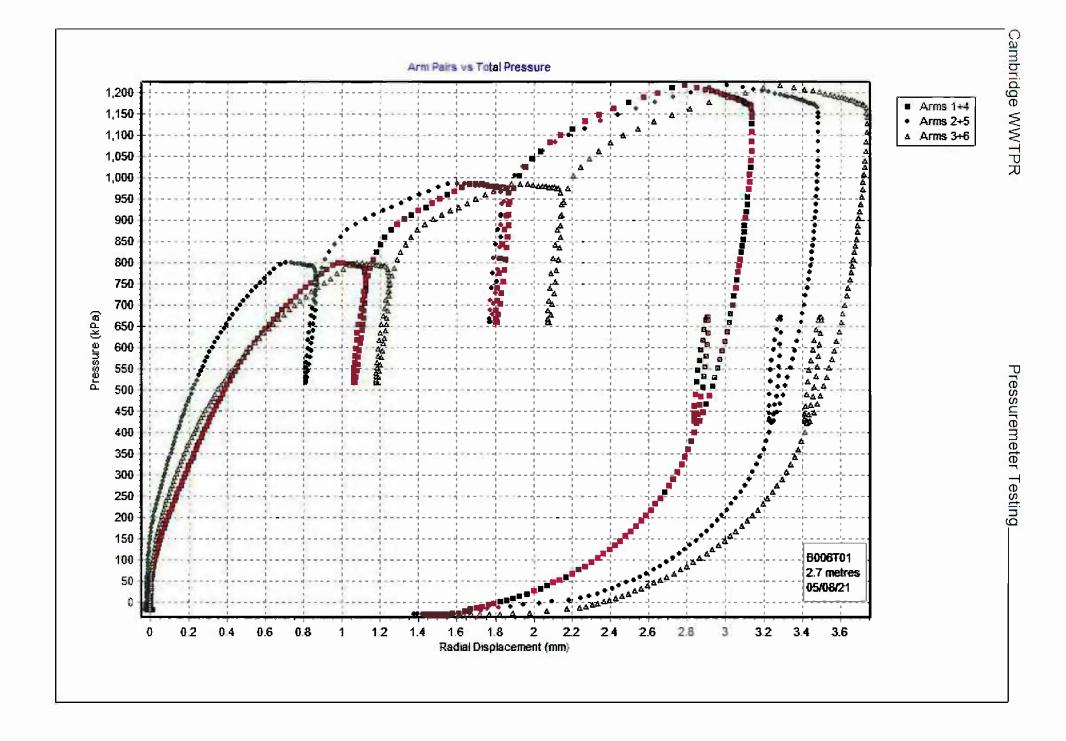
ARM 6 -133.2 mV and 329.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

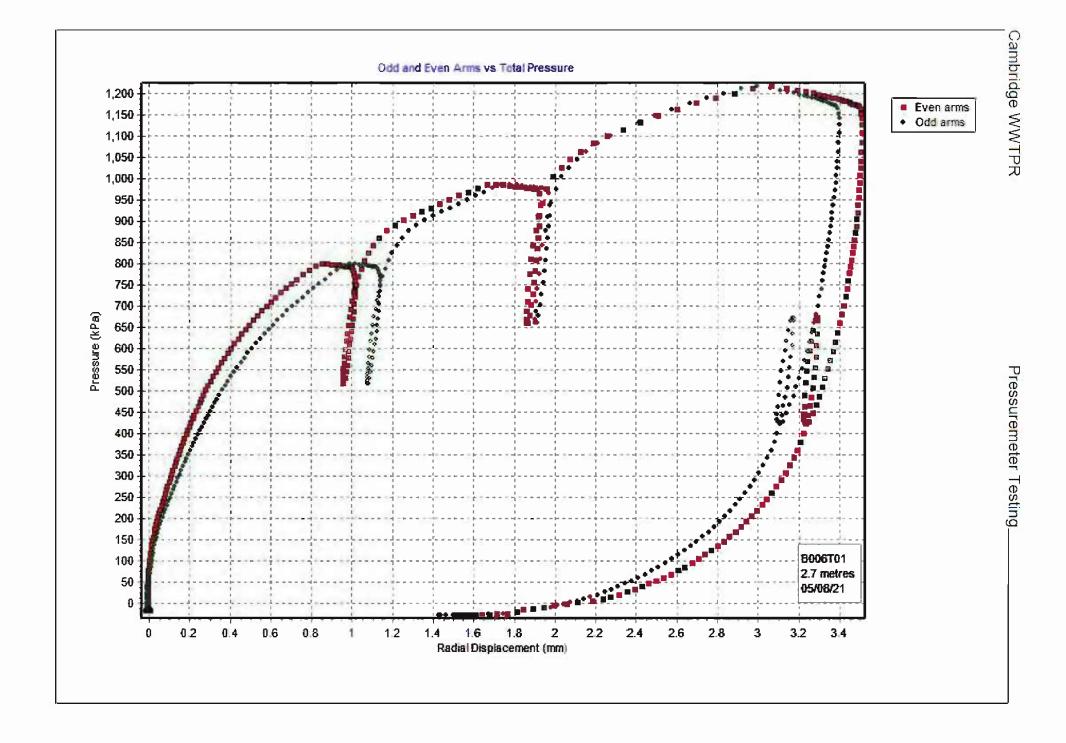
ARM 6 -133.2 mV and 329.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

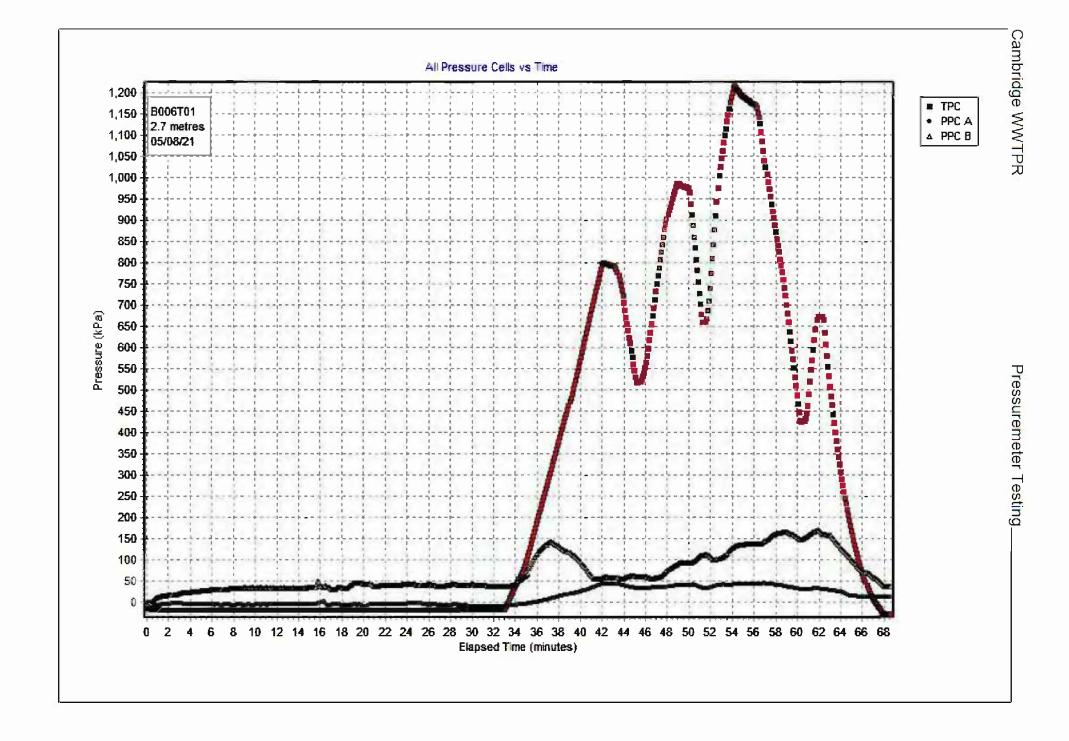
PPC A -2520.1 mV and 402.4 mV/MPa PPC B -2345.1 mV and 388.5 mV/MPa TPC -2381.6 mV and 457.3 mV/MPa











B006T02 - TEST & CALIBRATION DETAILS

[PROJECT DETAILS]

Contract name : CWW TPR

[BOREHOLE DETAILS] Borehole : BH_STW_006

[TEST DETAILS]
Test name: B006T02
Test date: 05/08/21
Depth (M): 7.60

Material: : Structureless chalk

Heading (deg): n/a
Data Rate (secs): 6
Start Line: 1
Stop Line: 252

[COMMENTS]

SBPM hit obstruction (likely a clast) during drilling. Test terminated.

[PROBE DETAILS]

Type: Digital 6 Arm Self Boring Pressuremeter

Diameter over probe: 88.10mm
Diameter under membrane: 79.15mm
CHL strip thickness: 0.5000mm

[CALIBRATION FACTORS]

TRANSDUCERS MEMBRANE COMPLIANCE

ARM 1 -82.7 mV and 306.3 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 2 -932.3 mV and 326.5 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 3 -332.1 mV and 326.9 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

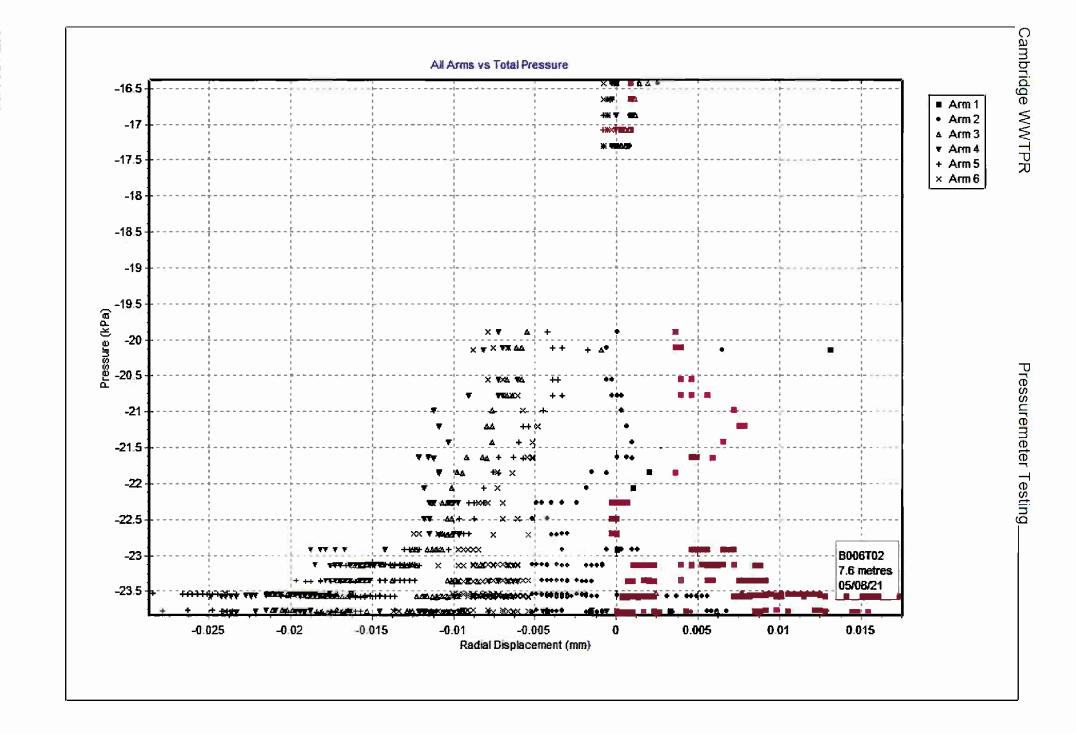
ARM 4 76.1 mV and 330.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

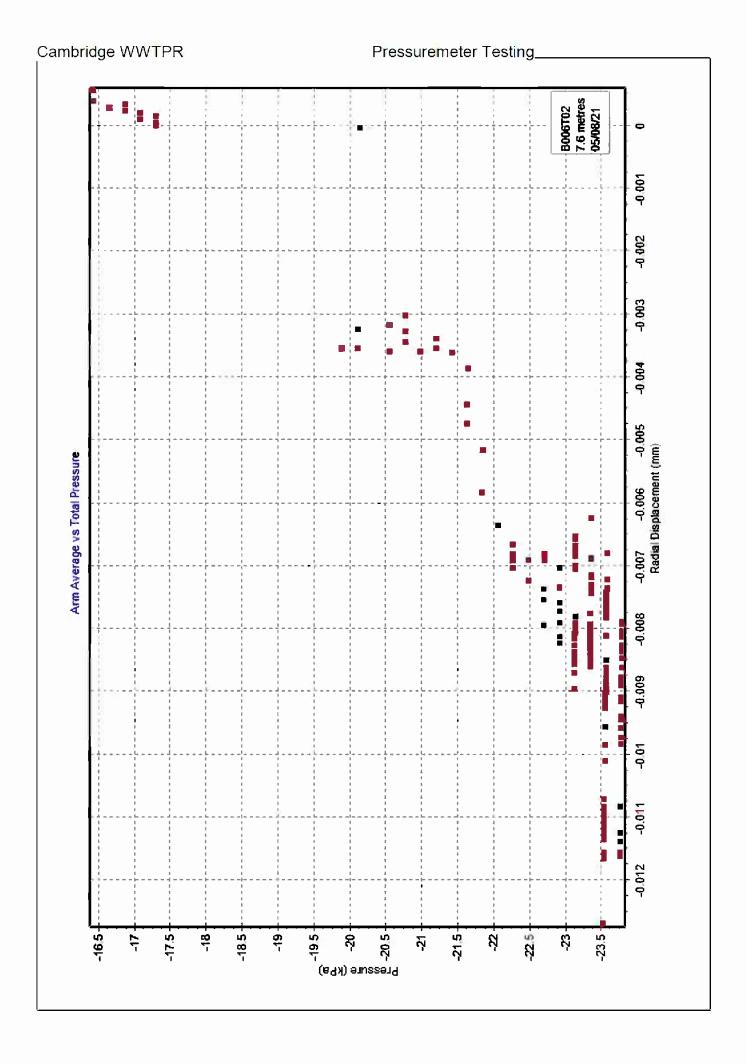
ARM 5 73.8 mV and 330.4 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

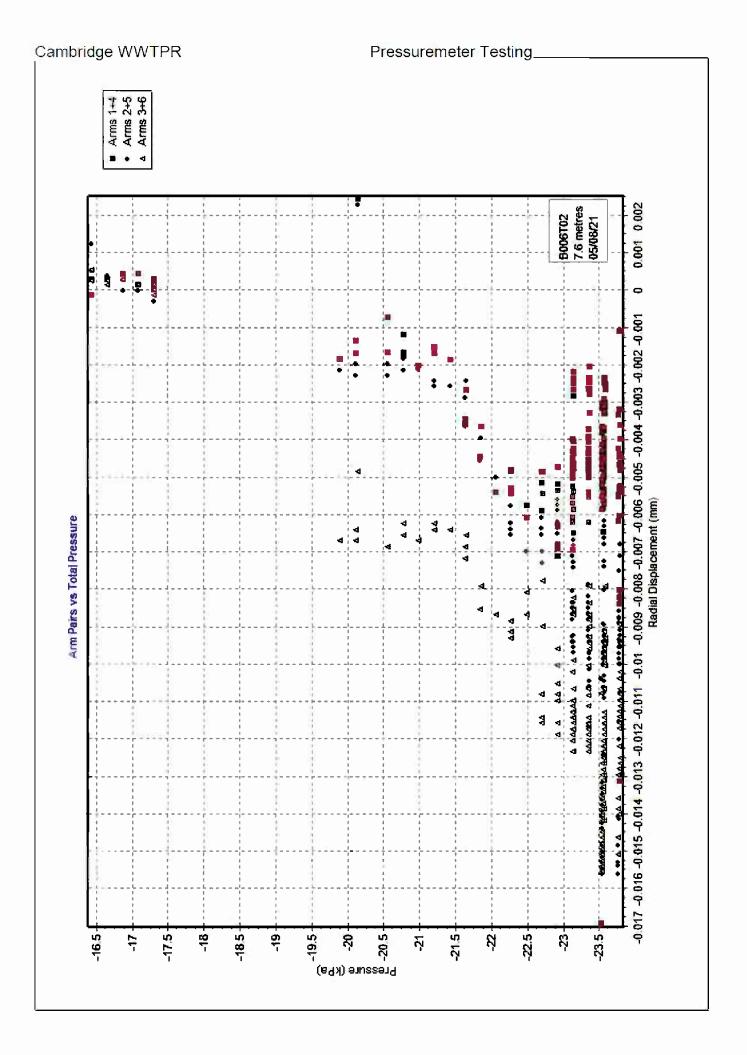
ARM 6 -133.3 mV and 329.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

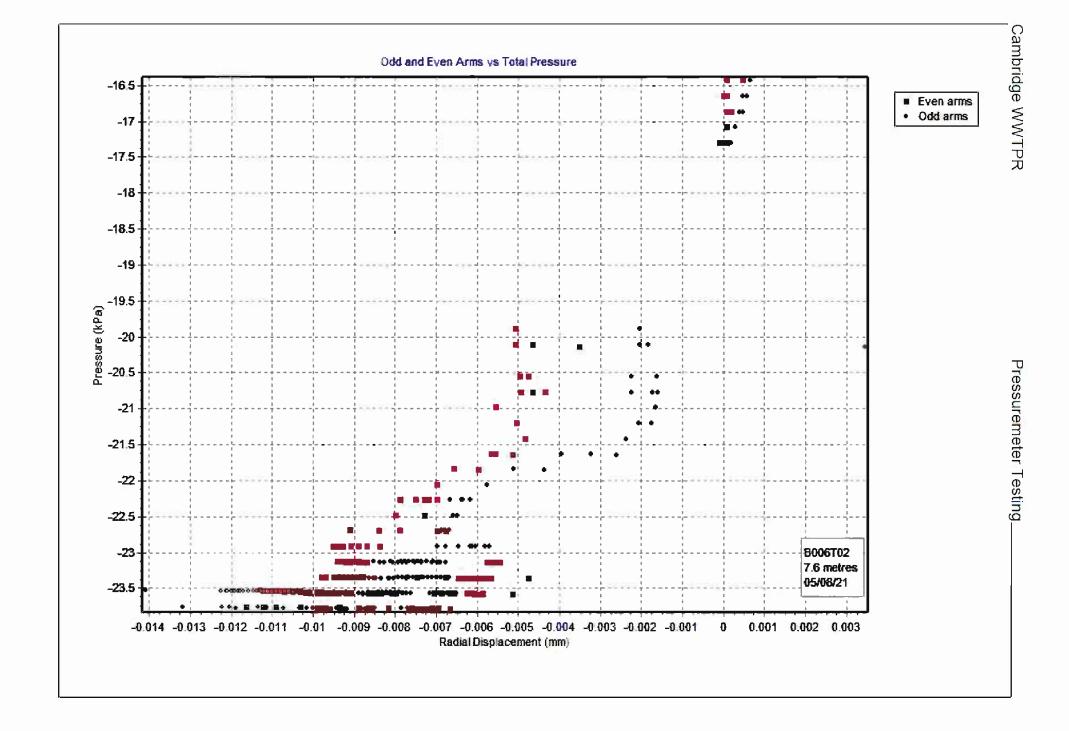
PPC A -2527.1 mV and 402.4 mV/MPa

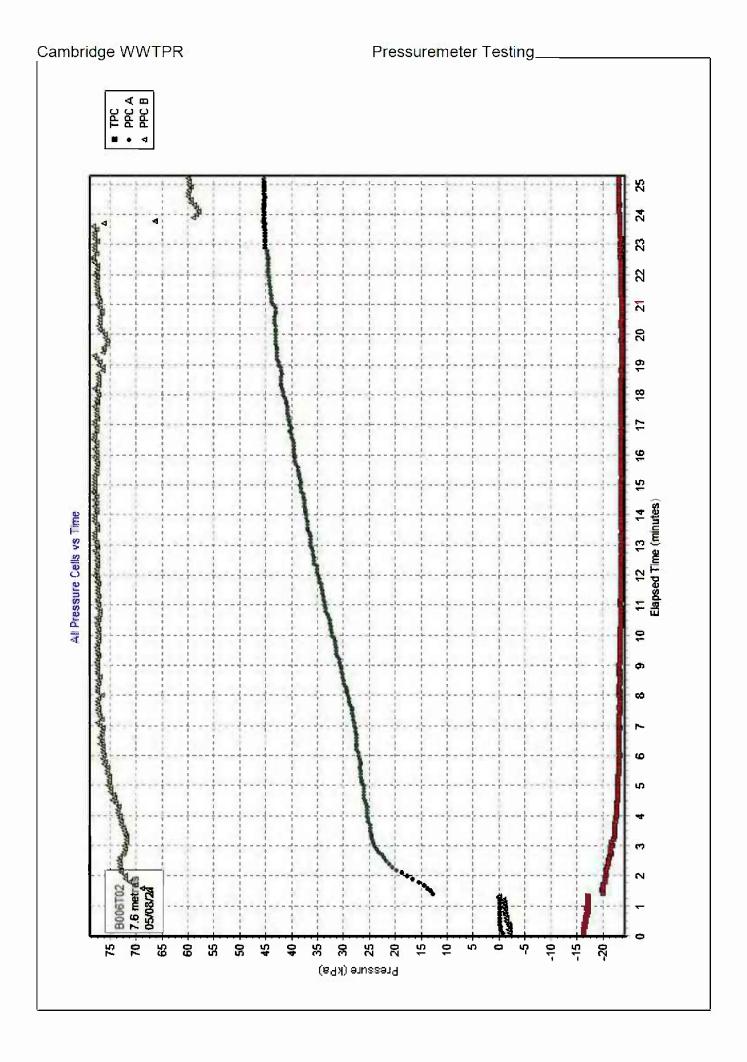
PPC A -2527.1 mV and 402.4 mV/MPa PPC B -2330.2 mV and 388.5 mV/MPa TPC -2380.5 mV and 457.3 mV/MPa











Cambridge WWTPR BH_STW_006 Test 3 - SUMMARY OF RESULTS [File made with WinSitu]

[DETAILS OF TEST]

Project TE8364

Site Cambridge Waste Water Treatment Plant Relocation Project

Borehole BH STW 006

BH_STW_006 Test 3 Test name 5 Aug 21 Test date

Test depth 8.00 Metres Water table 3.75 Metres Ambient PWP 42.0 kPa

Material Structureless chalk

Probe 95mm High Pressure Dilatometer

Diameter 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB/RW on 6 Aug 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

"Arm ave=4.21" Strain Origin (mm) : "Arm ave=169.2" Po from Marsland & Randolph (kPa) : Best estimate of Po (kPa) "Arm ave=109.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) "Arm ave=459.2"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) 30.0

Angle of internal friction (°) "Arm ave=31.4" "Arm ave=1.7" Dilation angle (°) "Arm ave=0.353" Gradient of log-log plot

[Withers et al 1989]

Angle of internal friction (°) "Arm ave=31.2" "Arm ave=1.4" Dilation angle (°) "Arm ave=-2.070" Gradient of log-log plot

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=8.2" Axis Loop Value Mean Strain Mean Pc

dPc (MPa) (kPa) (kPa) No (%) (%) 0.760 Arm ave 1 66.7 316 0.122 81 0.176 2 84.2 2.746 464 148 Arm ave 3 89.3 6.853 628 0.247 221 Arm ave Arm ave 4 68.3 17.540 494 0.341 233

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	15.373	11.993	0.780
Arm ave	2	9.989	6.584	0.659
Arm ave	3	10.399	6.608	0.635
Arm ave	4	7.610	4.512	0.593

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

Strain Origin (mm) 4.21 Po (kPa) 109 Cohesion (kPa) Angle of peak friction (deg) 31.4 Angle of peak dilation (deg) 1.7 Total yield stress (kPa) 218 CIR1506/21

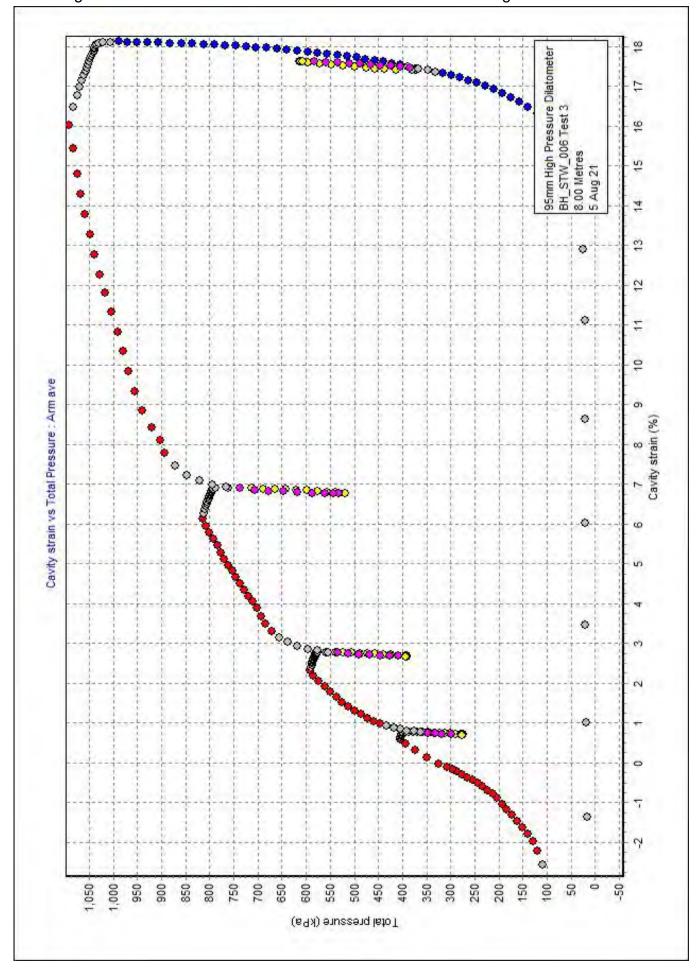
Cambridge WWTPR

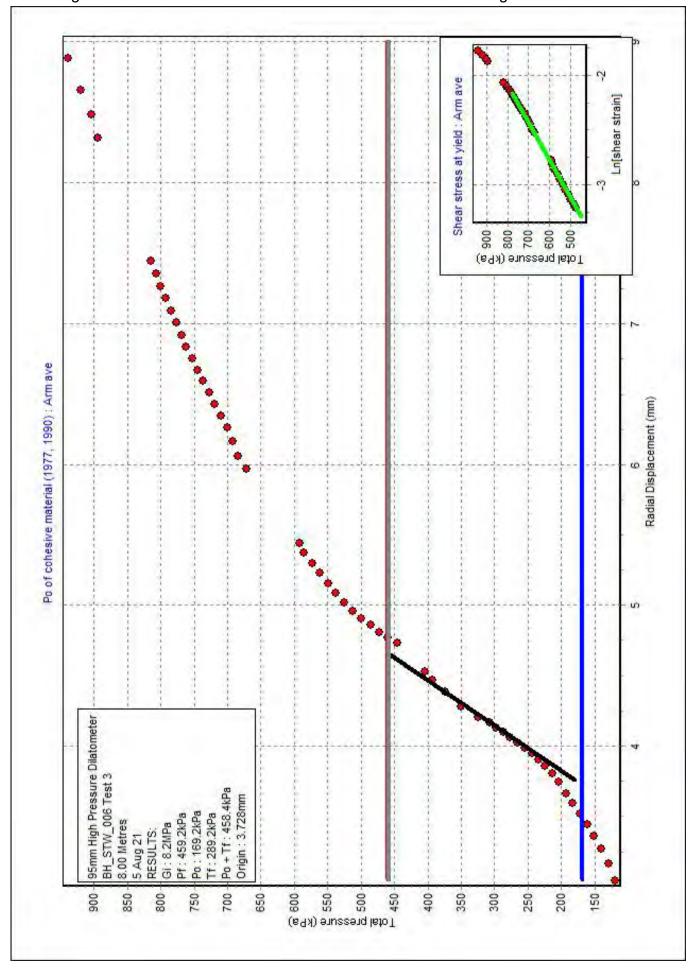
Pressuremeter Testing

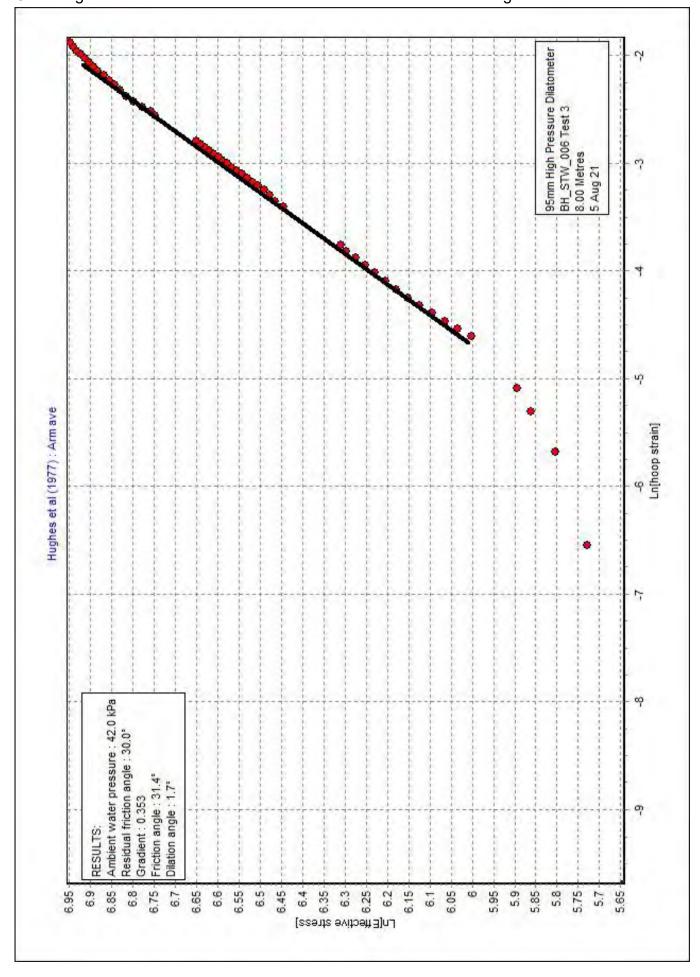
BH_STW_006 Test 3 - SUMMARY OF RESULTS

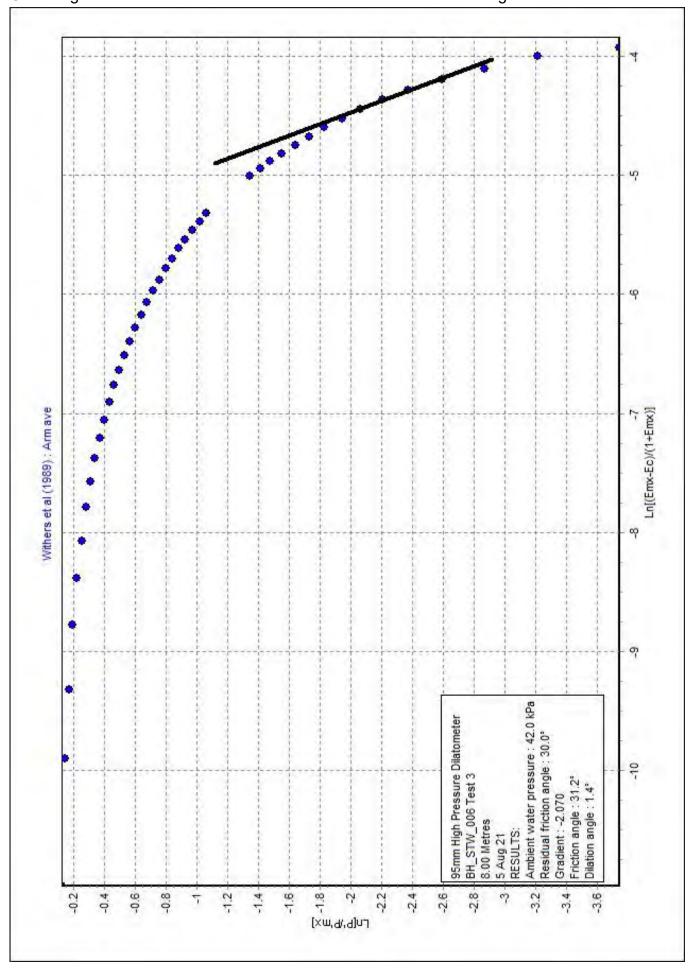
Total limit stress (kPa) : 1717
G at first yield (MPa) : 43.9
Non-linear exponent : 0.635
Janbu exponent : 0.255
Correlation : 0.651

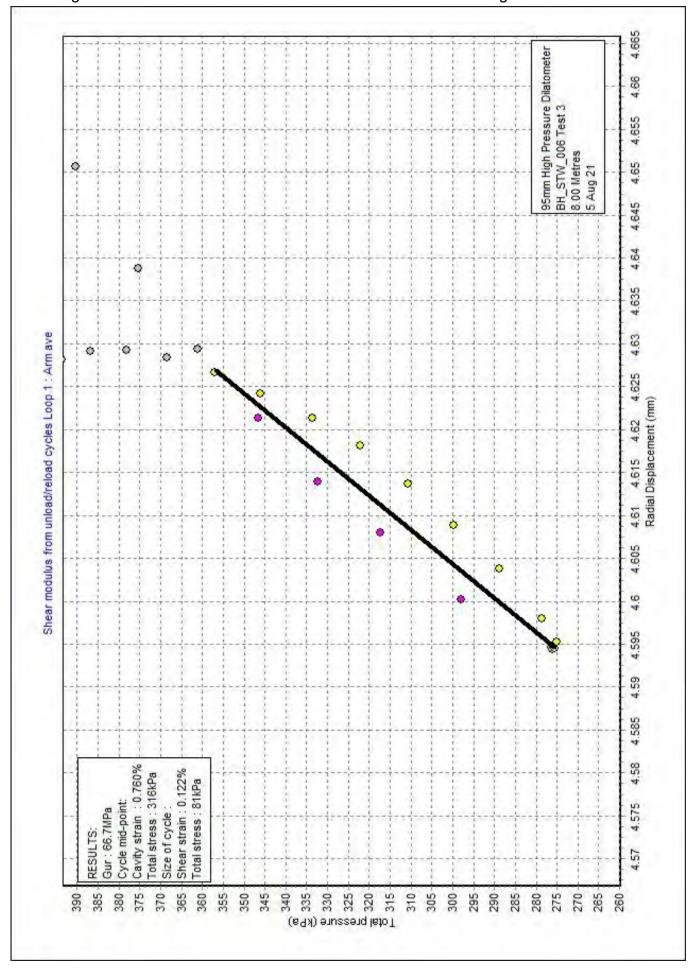
Ambient pore water pressure (kPa) : 24
Residual friction angle (deg) : 30.0
Poisson's ratio : 0.25

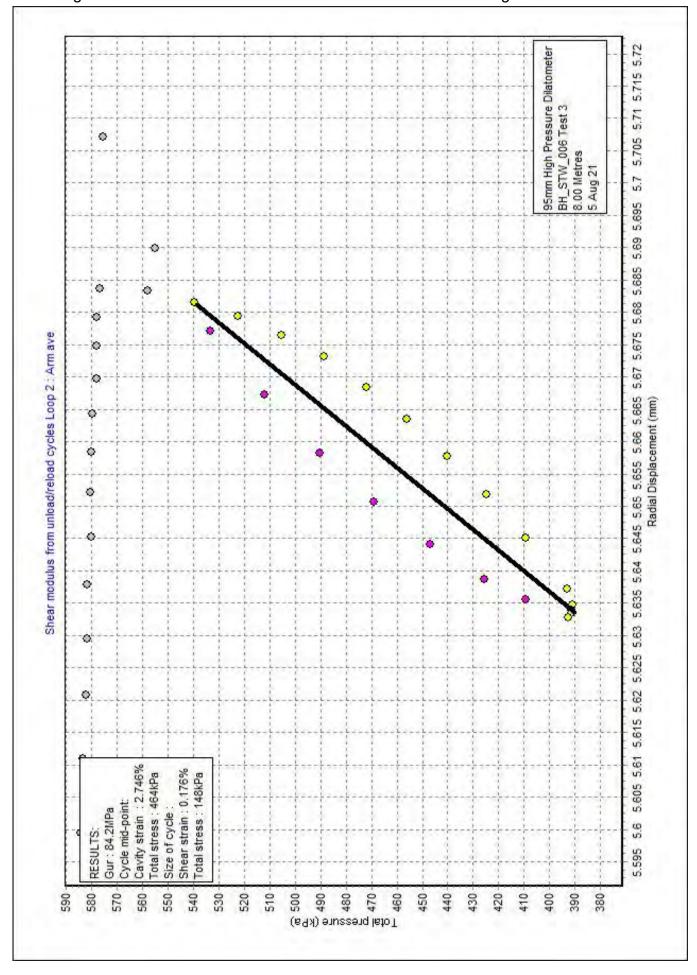


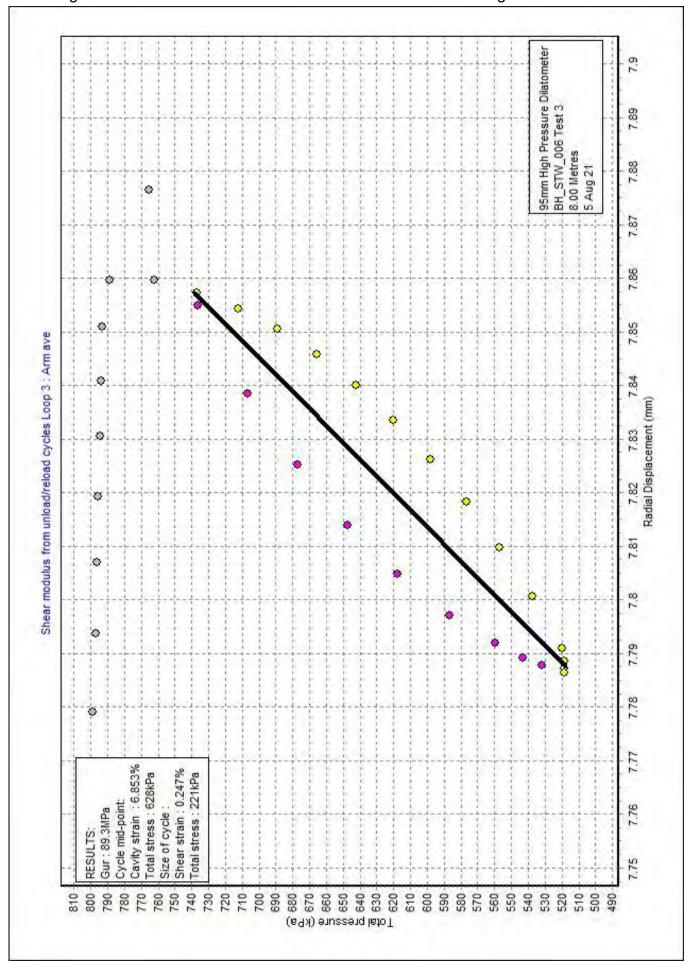


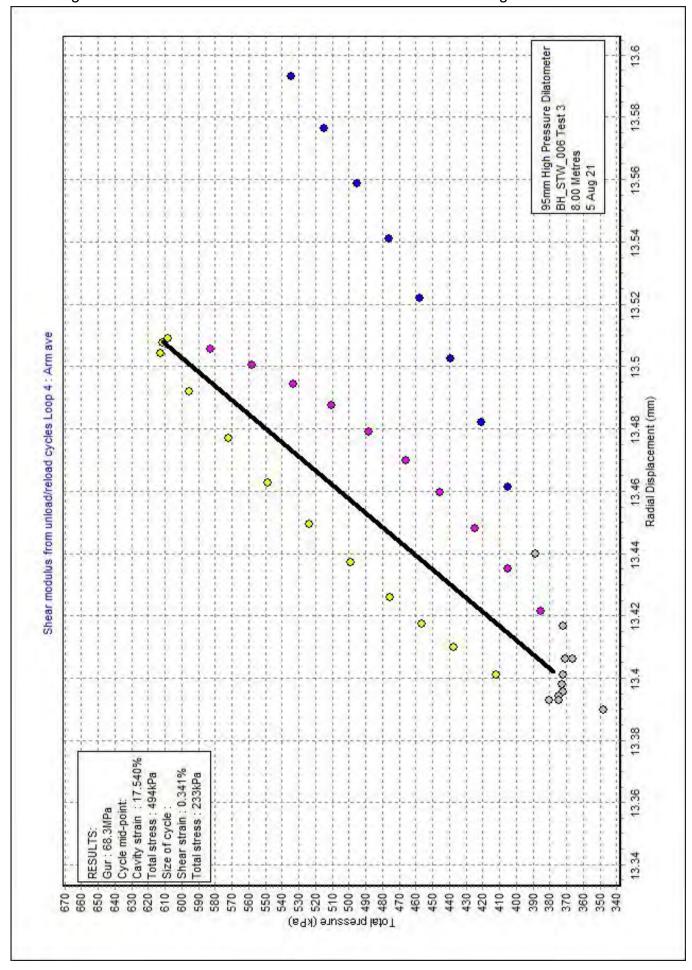


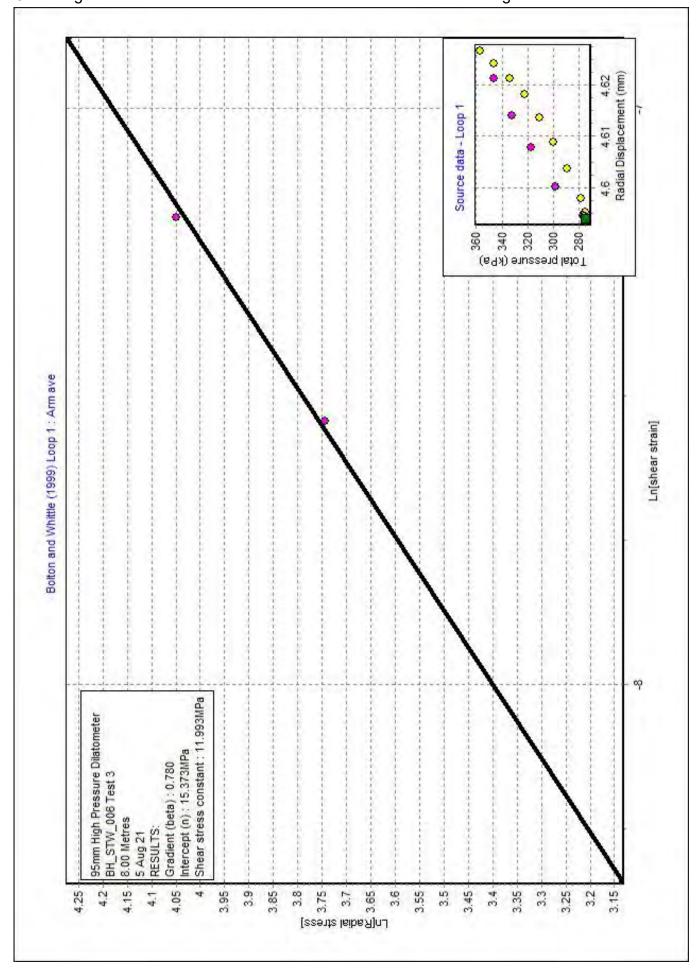


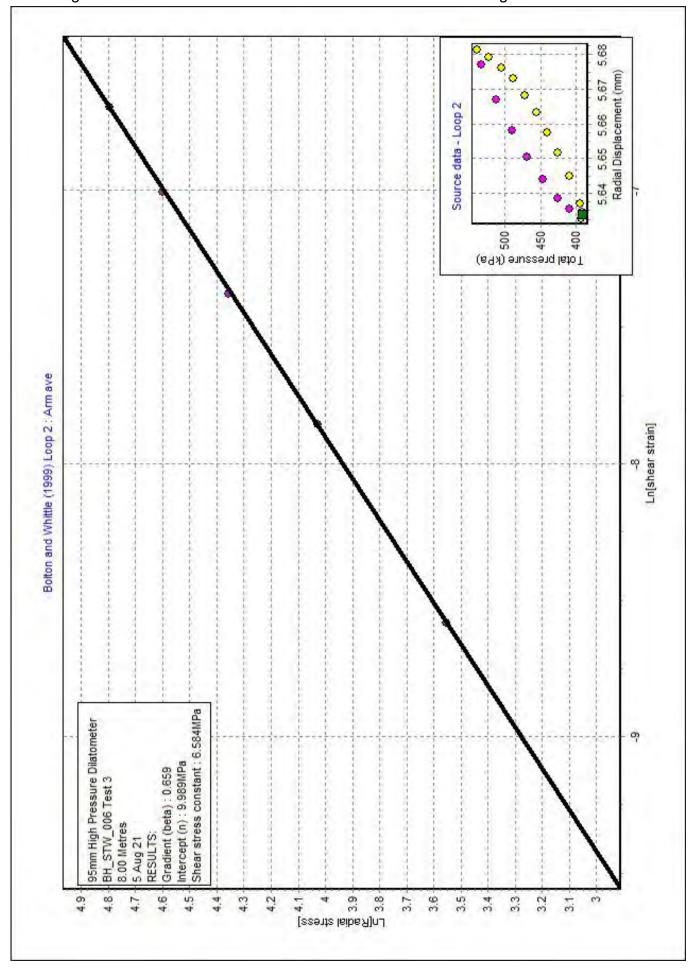


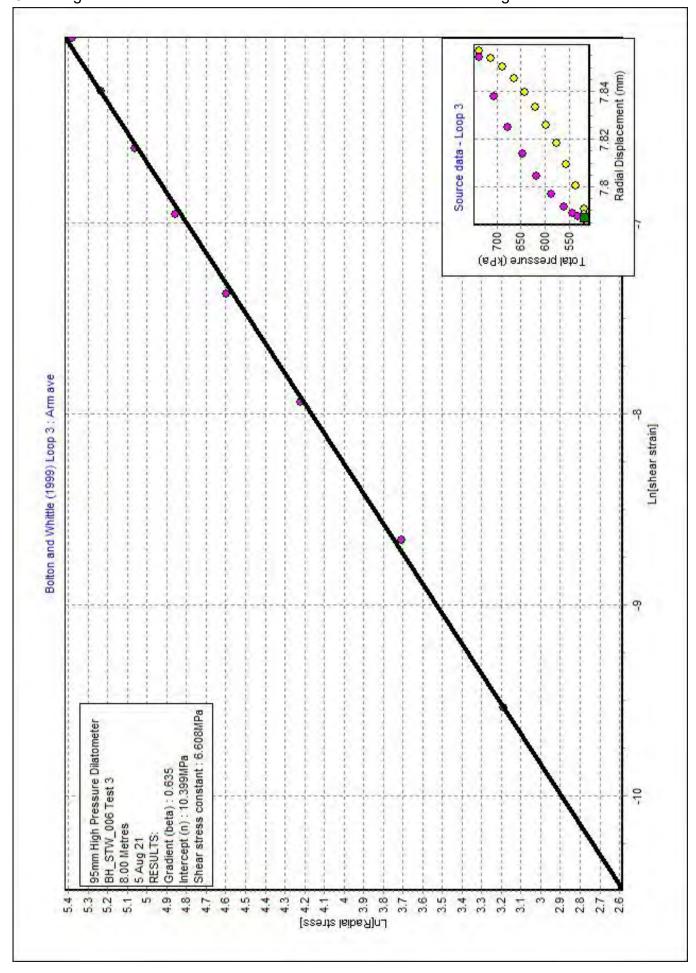


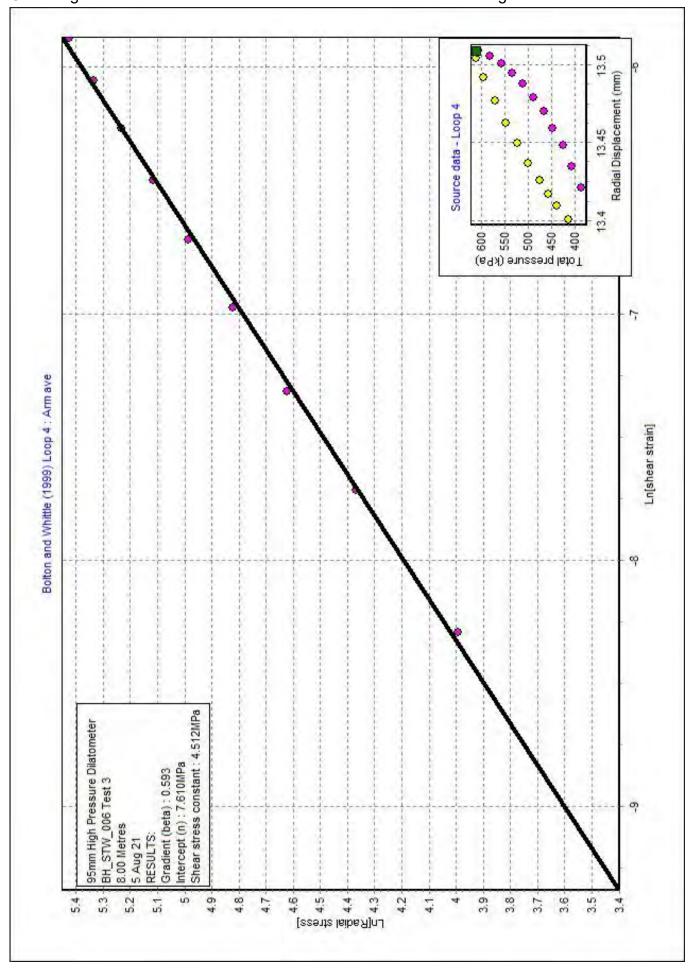


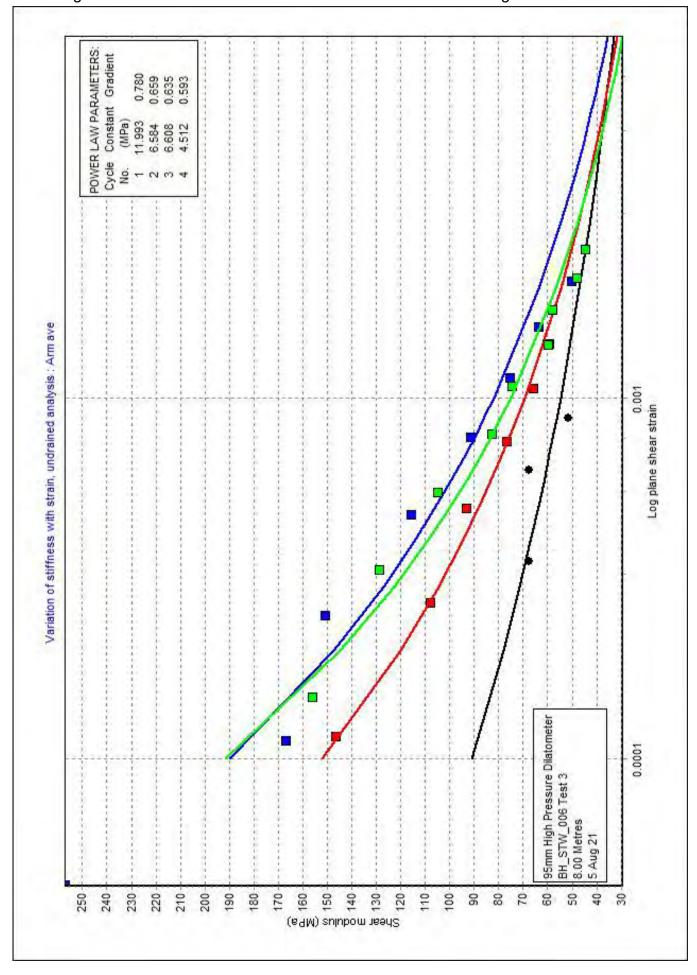


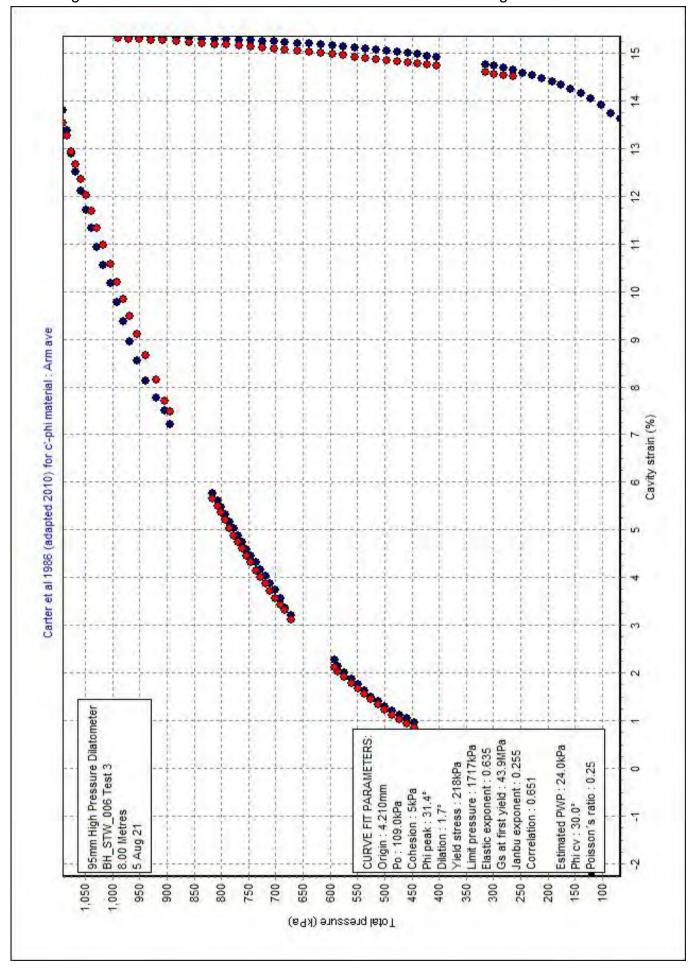


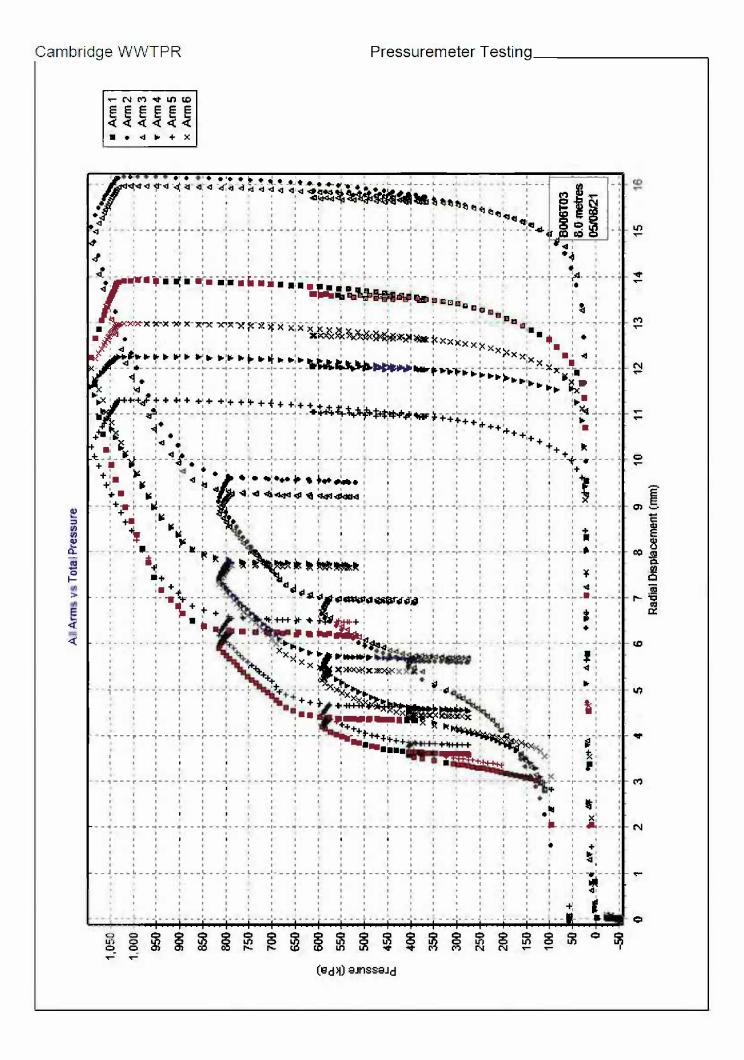


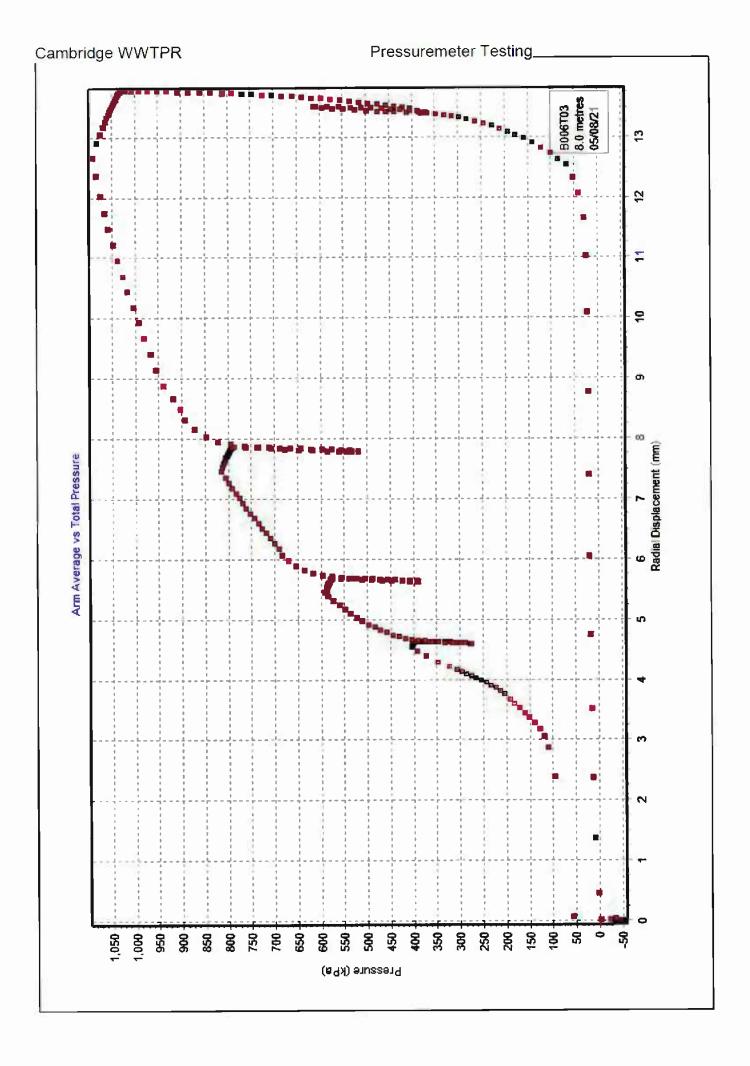


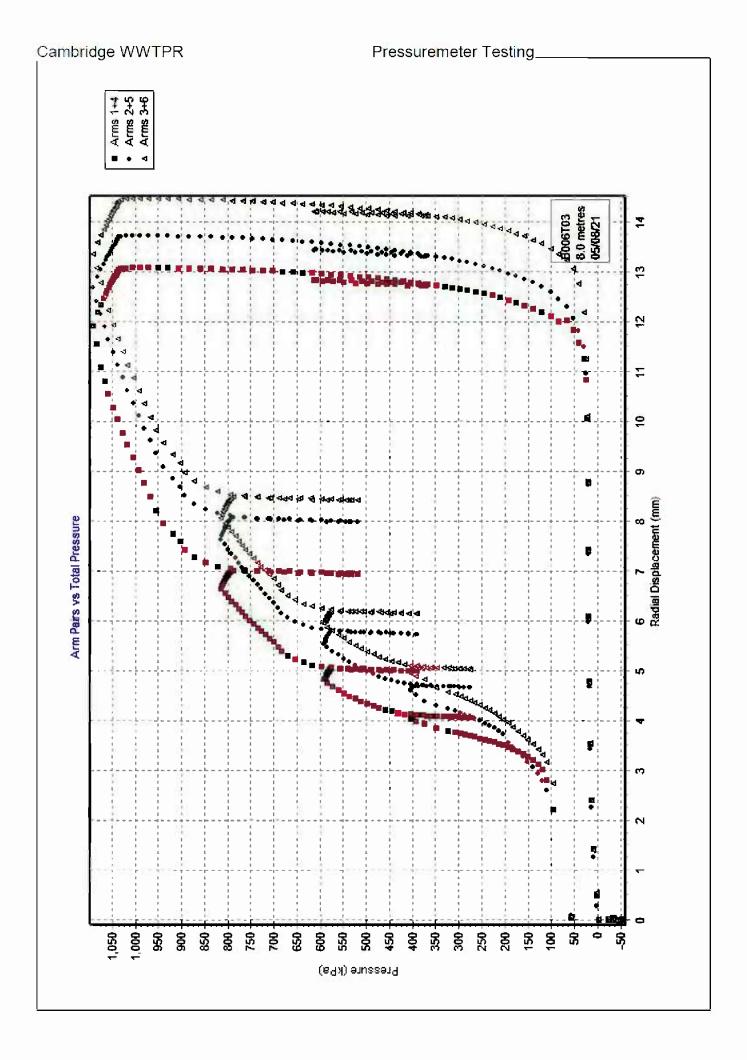


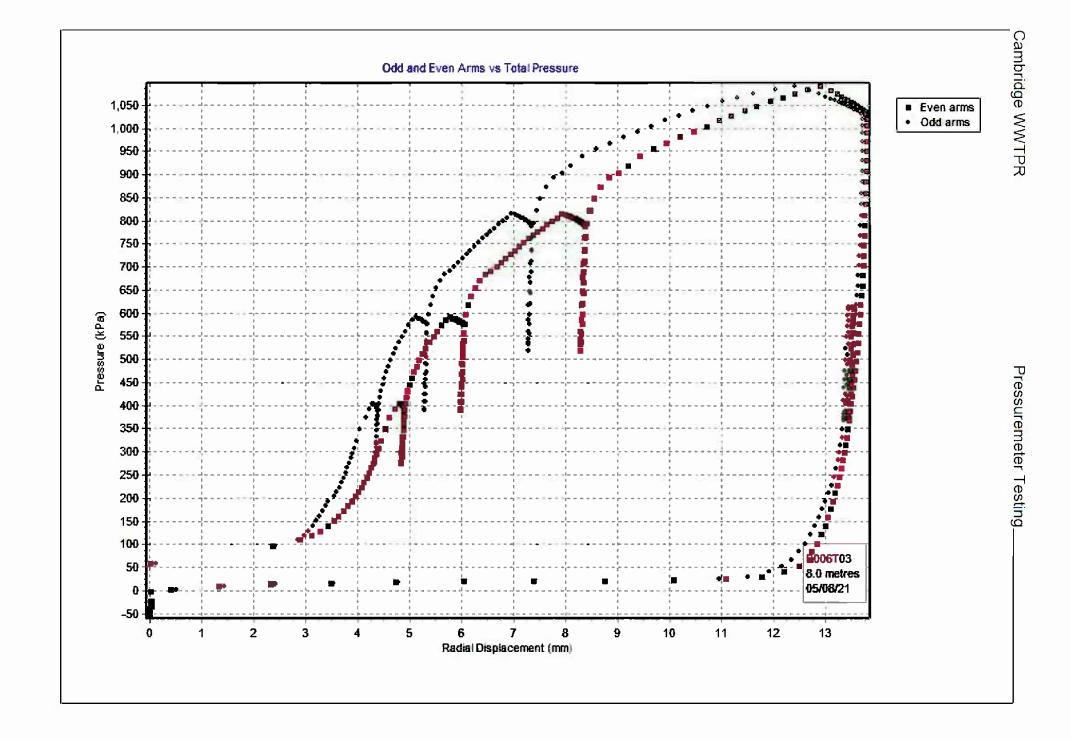












Cambridge WWTPR
BH_STW_011A Test 1 - SUMMARY OF RESULTS
[File made with WinSitu]

[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_STW_011A
Test name : BH_STW_011A Test 1

Test date : 31 Aug 21
Test depth : 3.80 Metres
Water table : 3.75 Metres
Ambient PWP : 0.0 kPa
Material : Chalk

Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/YB/RW on 31 Aug 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=4.07"

Po from Marsland & Randolph (kPa) : "Arm ave=98.3"

Best estimate of Po (kPa) : "Arm ave=94.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) : "Arm ave=420.9"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 32.0

Angle of internal friction (°) : "Arm ave=35.6"
Dilation angle (°) : "Arm ave=4.3"
Gradient of log-log plot : "Arm ave=0.396"

[Withers et al 1989]

Angle of internal friction (°) : "Arm ave=35.8"

Dilation angle (°) : "Arm ave=4.5"

Gradient of log-log plot : "Arm ave=-2.476"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=11.9"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	53.4	0.103	280	0.193	103
Arm ave	2	72.3	1.054	424	0.212	153
Arm ave	3	83.1	2.564	579	0.219	182
Arm ave	4	80.6	13.820	611	0.370	298

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis Loop		Intercept	Alpha	Gradient	
	No	(MPa)	(MPa)		
Arm ave	1	11.849	8.983	0.758	
Arm ave	2	10.261	6.965	0.679	
Arm ave	3	15.729	11.224	0.714	
Arm ave	4	9.286	5.588	0.602	

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

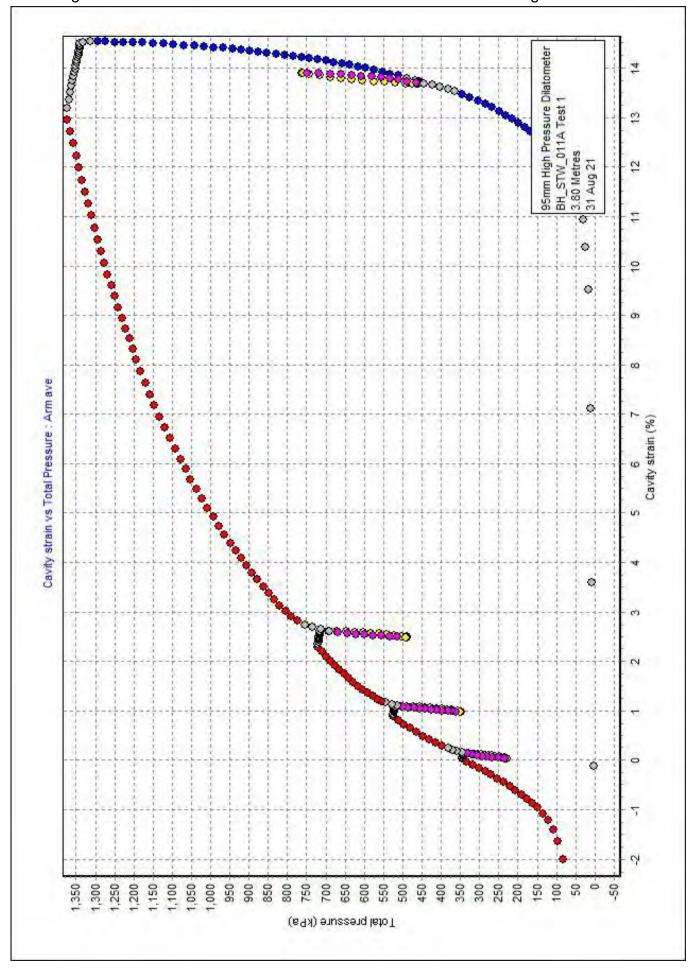
{Axis is Arm ave}

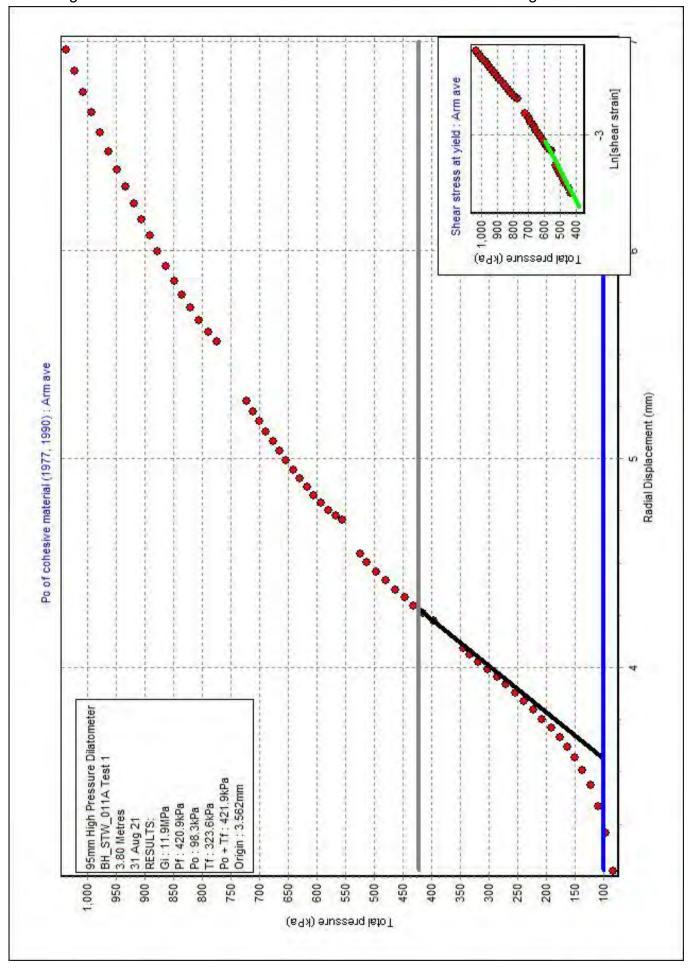
Strain Origin (mm) : 4.07
Po (kPa) : 94
Cohesion (kPa) : 40
Angle of peak friction (deg) : 35.6
Angle of peak dilation (deg) : 4.3
Total yield stress (kPa) : 253
CIR1506/21

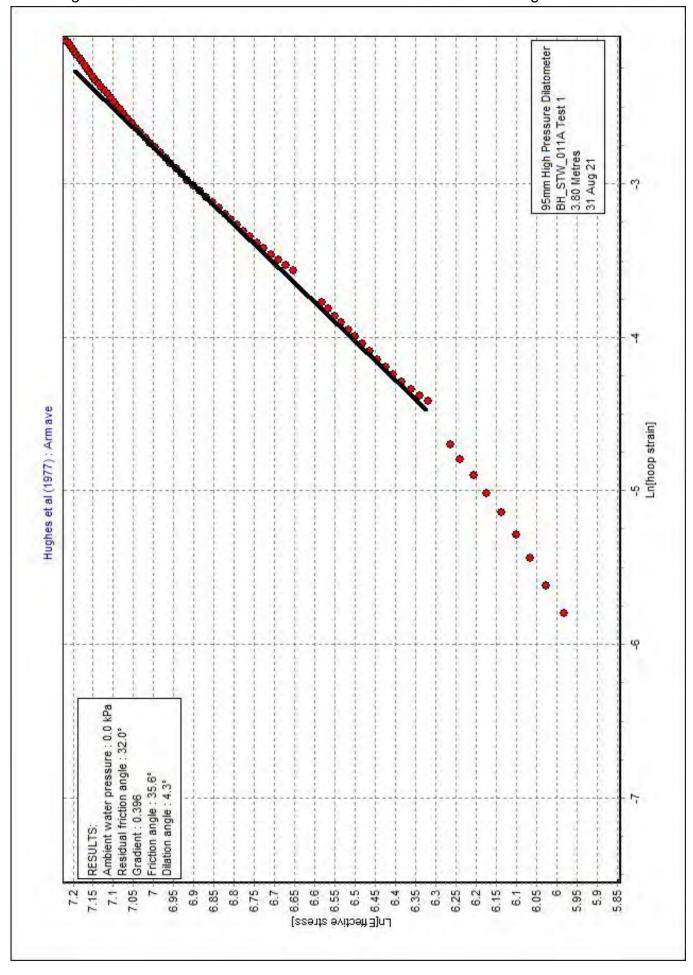
BH_STW_011A Test 1 - SUMMARY OF RESULTS

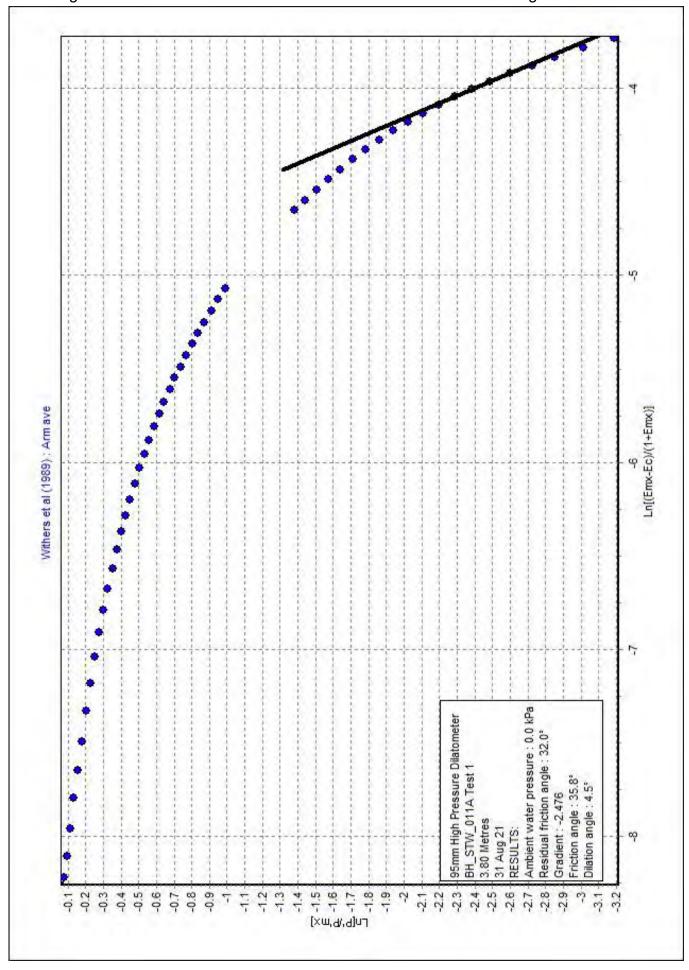
Total limit stress (kPa) : 2526
G at first yield (MPa) : 37.5
Non-linear exponent : 0.714
Janbu exponent : 0.295
Correlation : 0.713

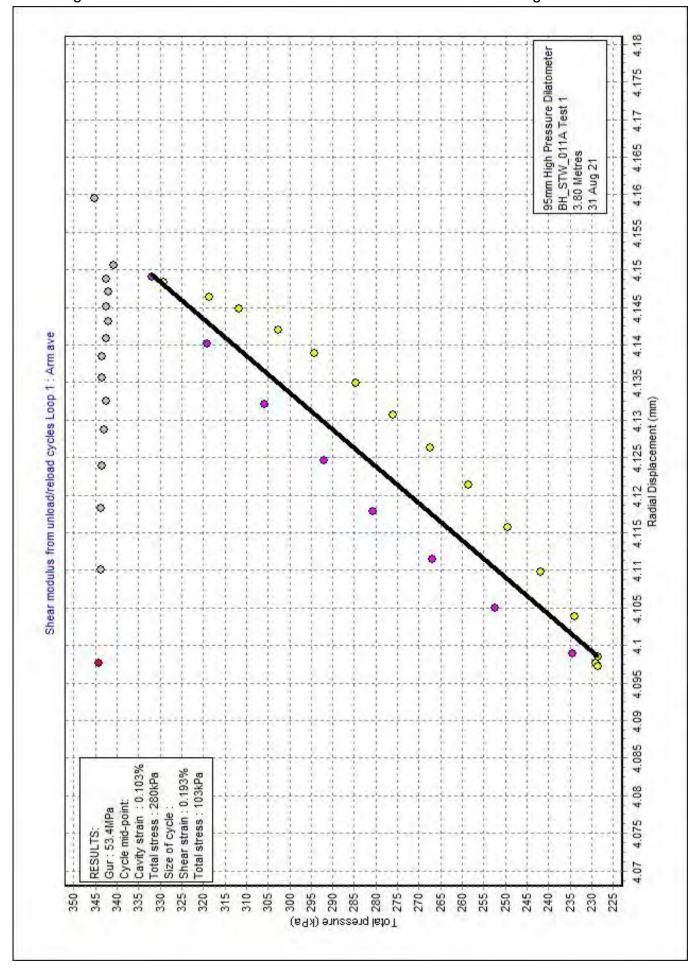
Ambient pore water pressure (kPa) : 0
Residual friction angle (deg) : 32.0
Poisson's ratio : 0.25

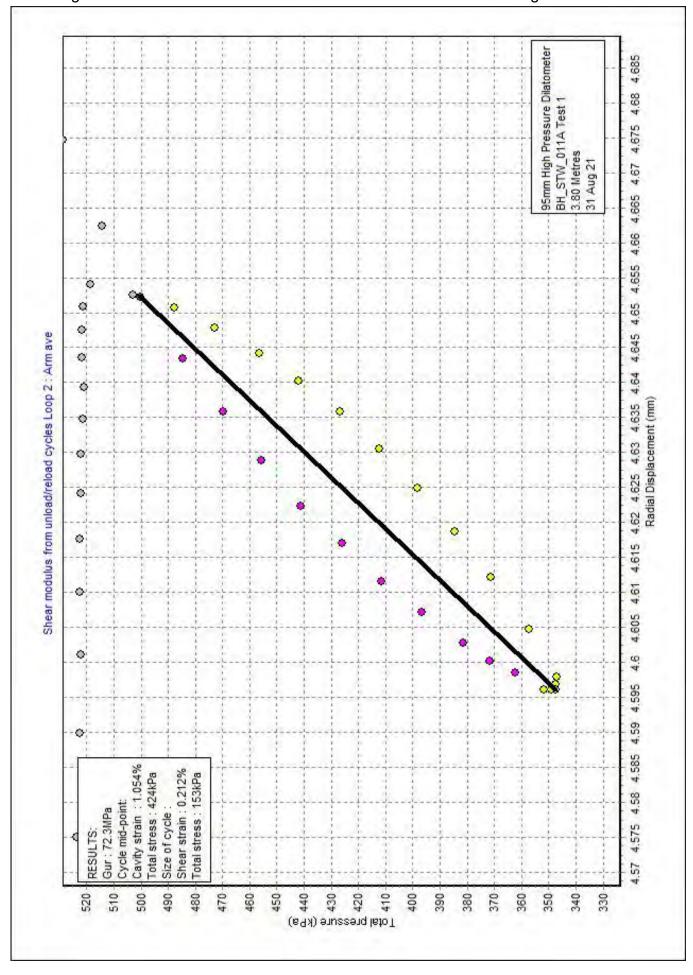


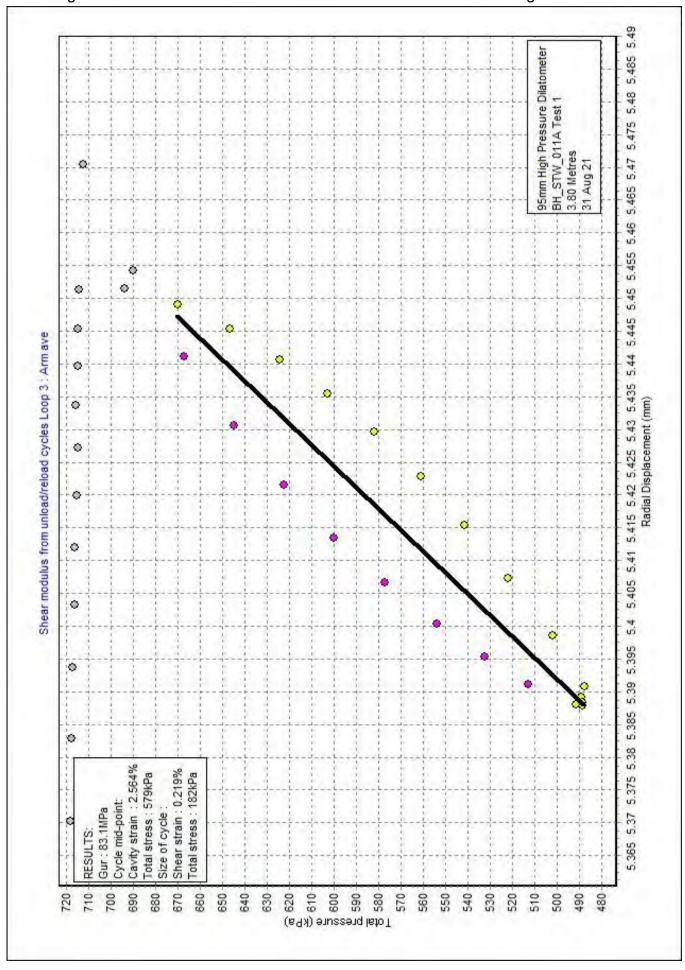


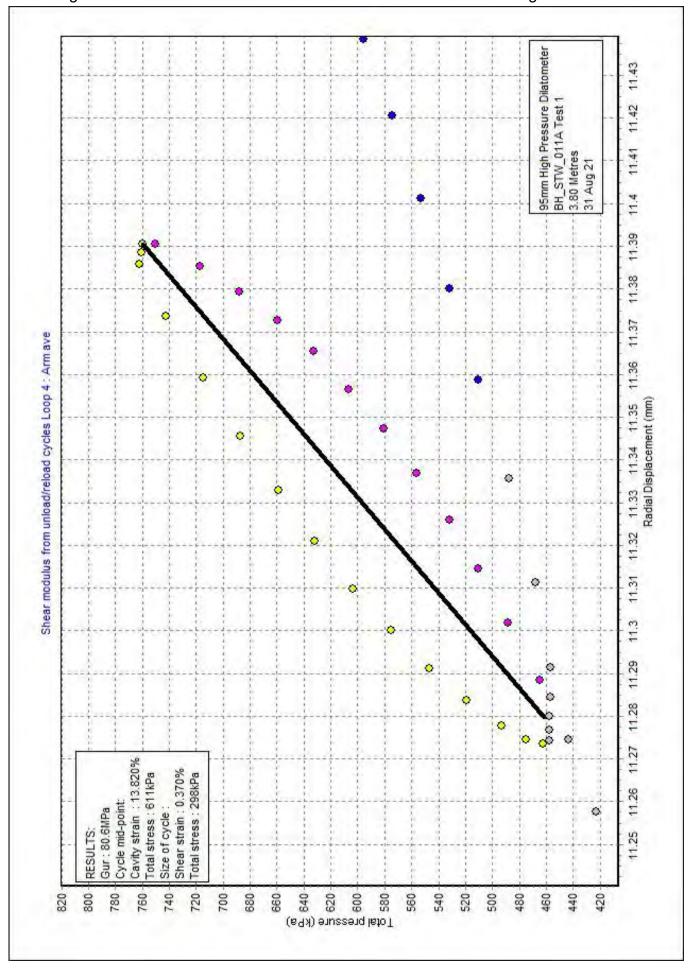


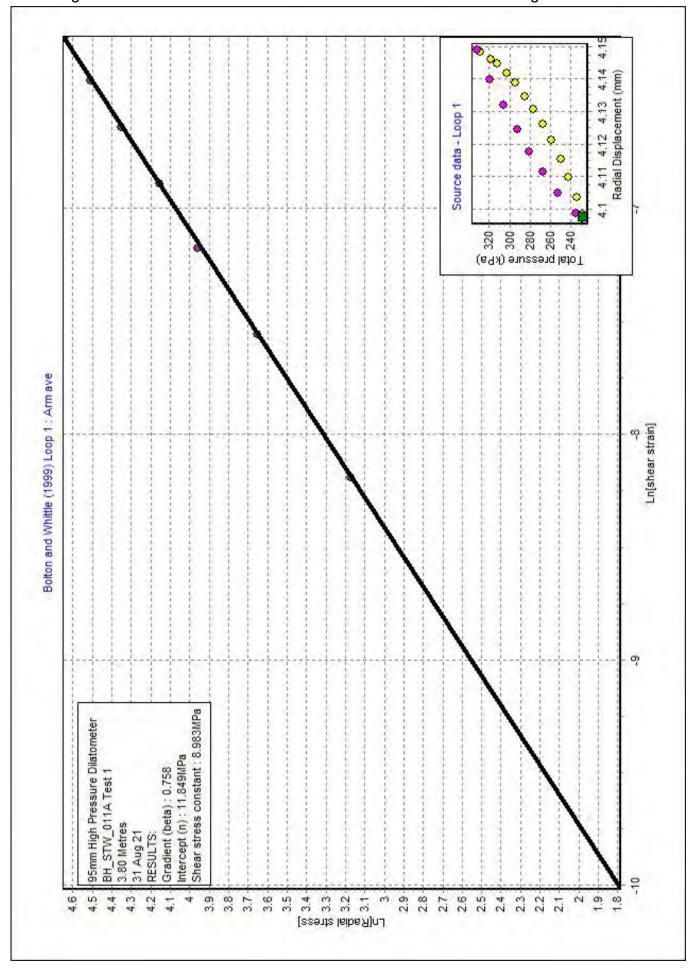


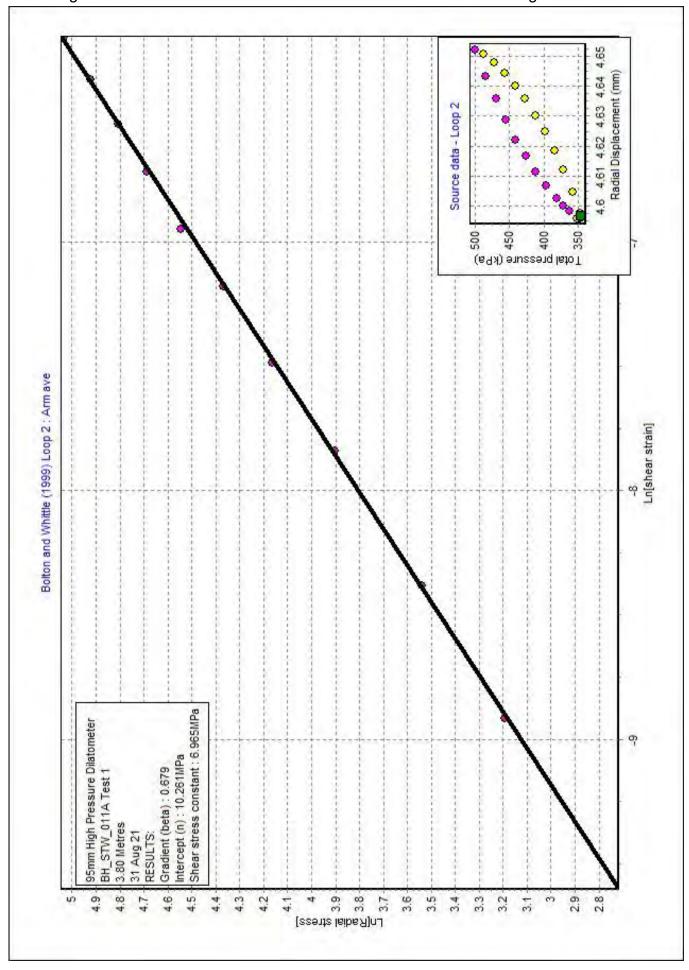


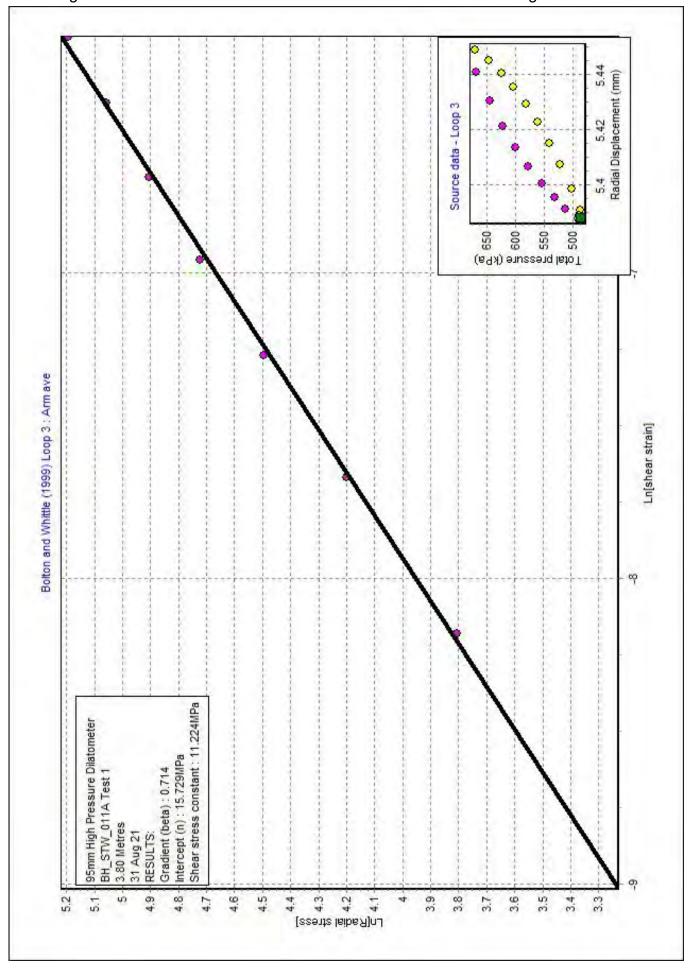


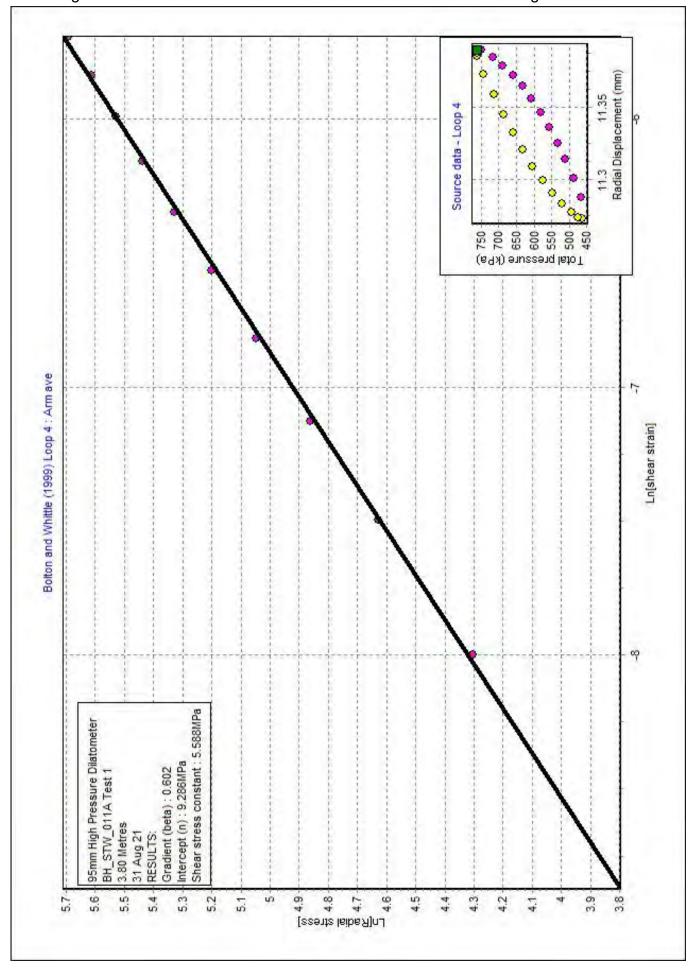


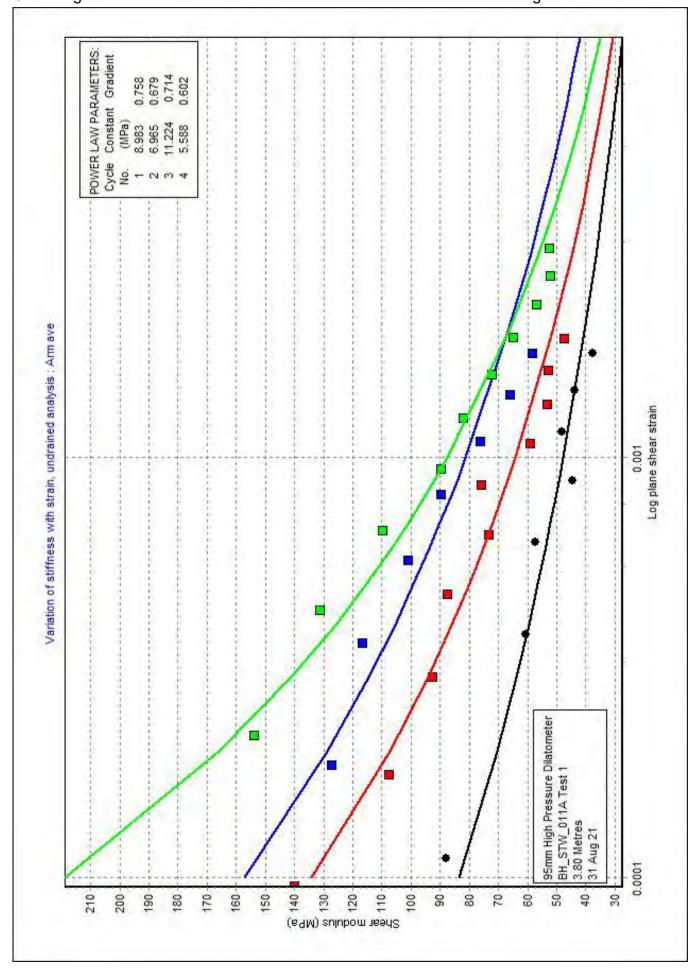


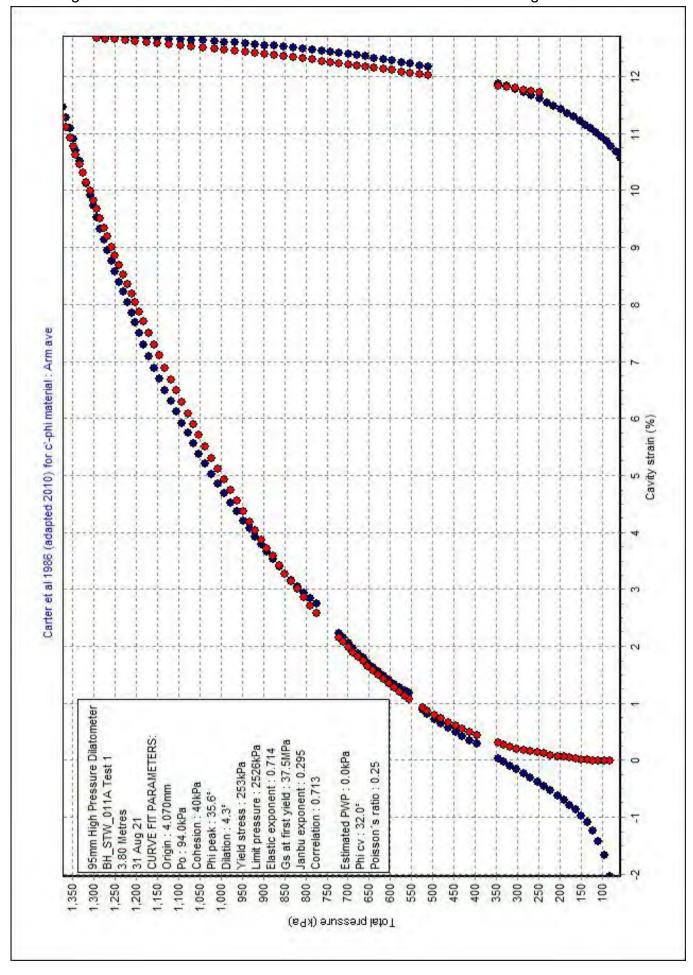


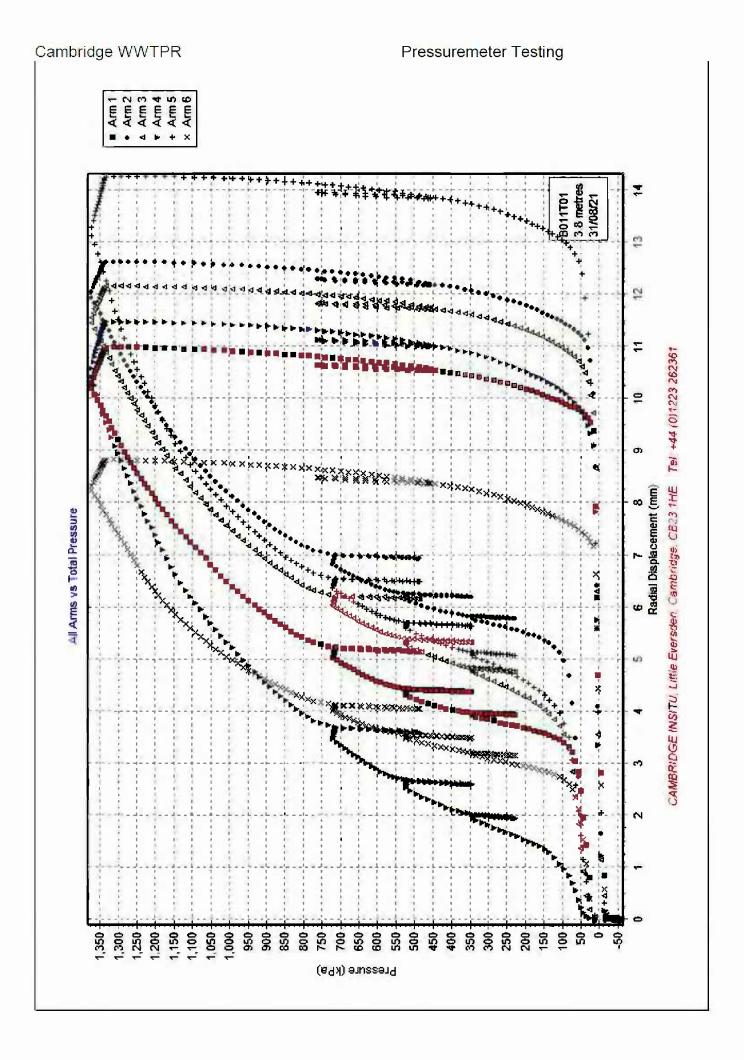


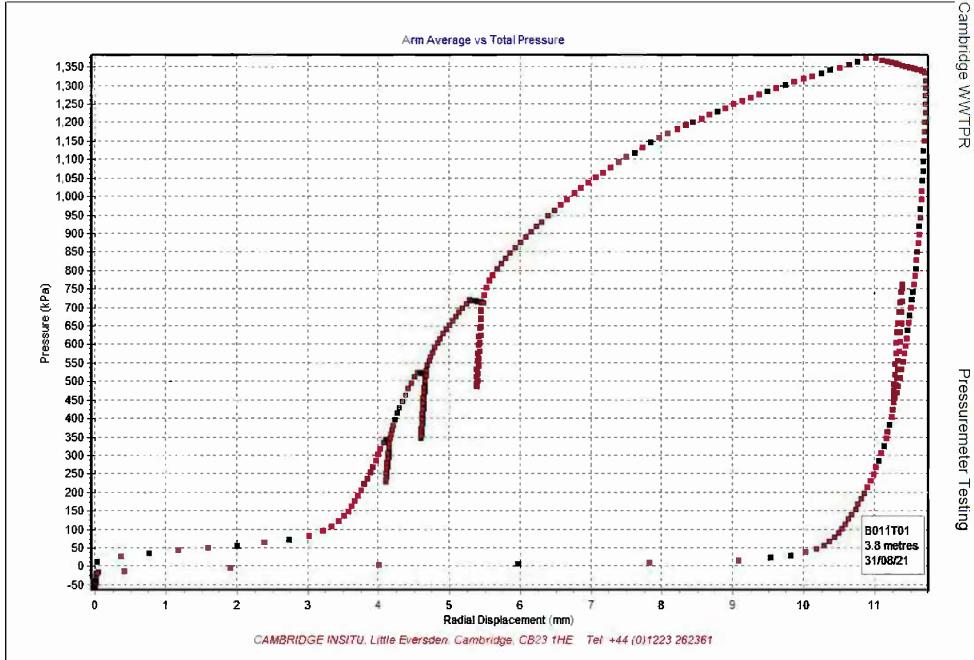


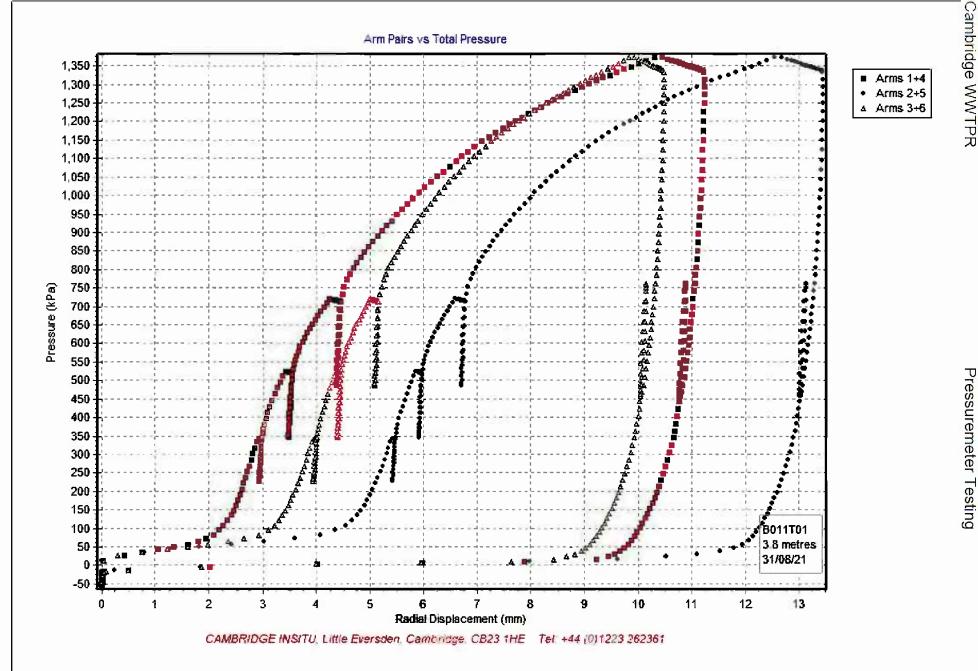


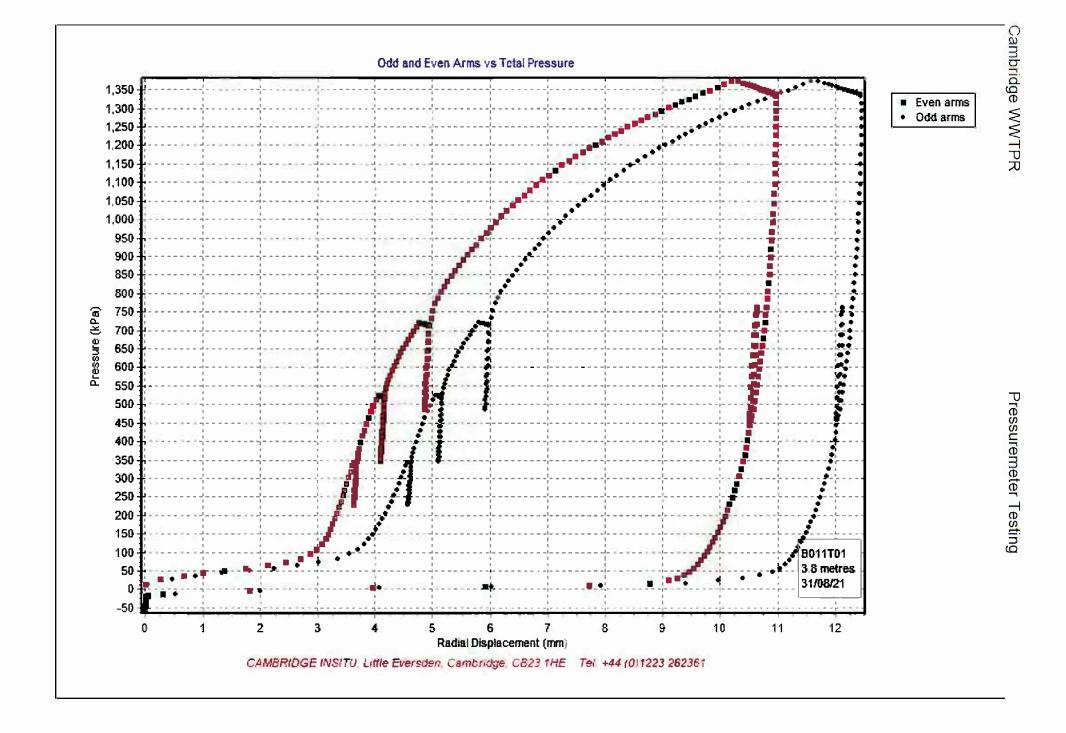












Cambridge WWTPR B011T02 - TEST & CALIBRATION DETAILS

[PROJECT DETAILS]
Contract name : CWWTPR

[BOREHOLE DETAILS] Borehole : BH_STW_011a

[TEST DETAILS]
Test name: B011T02
Test date: 01/09/21
Depth (M): 12.70
Material:: Gault Clay
Heading (deg): n/a
Data Rate (secs): 6
Start Line: 1

[COMMENTS]

Stop Line: 468

Drilled 60cm, SBPM stopped advancing. Drilling aborted

[PROBE DETAILS]

Type: Digital 6 Arm Self Boring Pressuremeter

Diameter over probe: 88.10mm
Diameter under membrane: 79.15mm
CHL strip thickness: 0.5000mm

[CALIBRATION FACTORS]

TRANSDUCERS MEMBRANE COMPLIANCE

ARM 1 -81.5 mV and 306.3 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 2 -931.7 mV and 326.5 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 3 -328.2 mV and 326.9 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

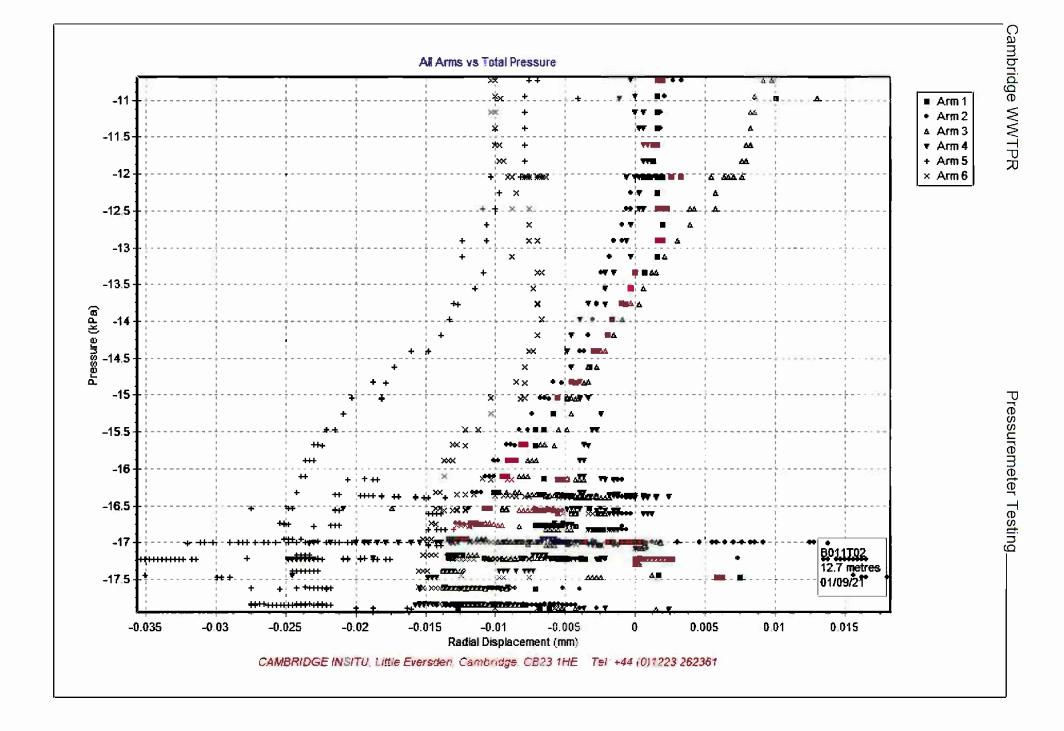
ARM 4 74.5 mV and 330.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

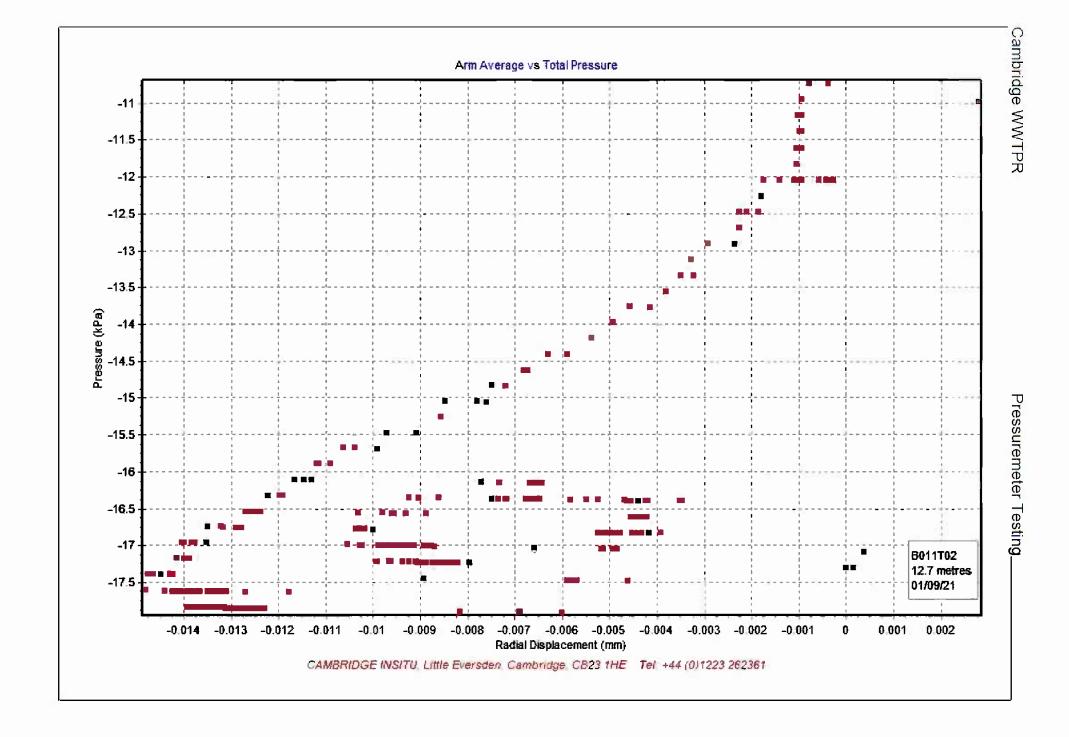
ARM 5 78.7 mV and 330.4 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

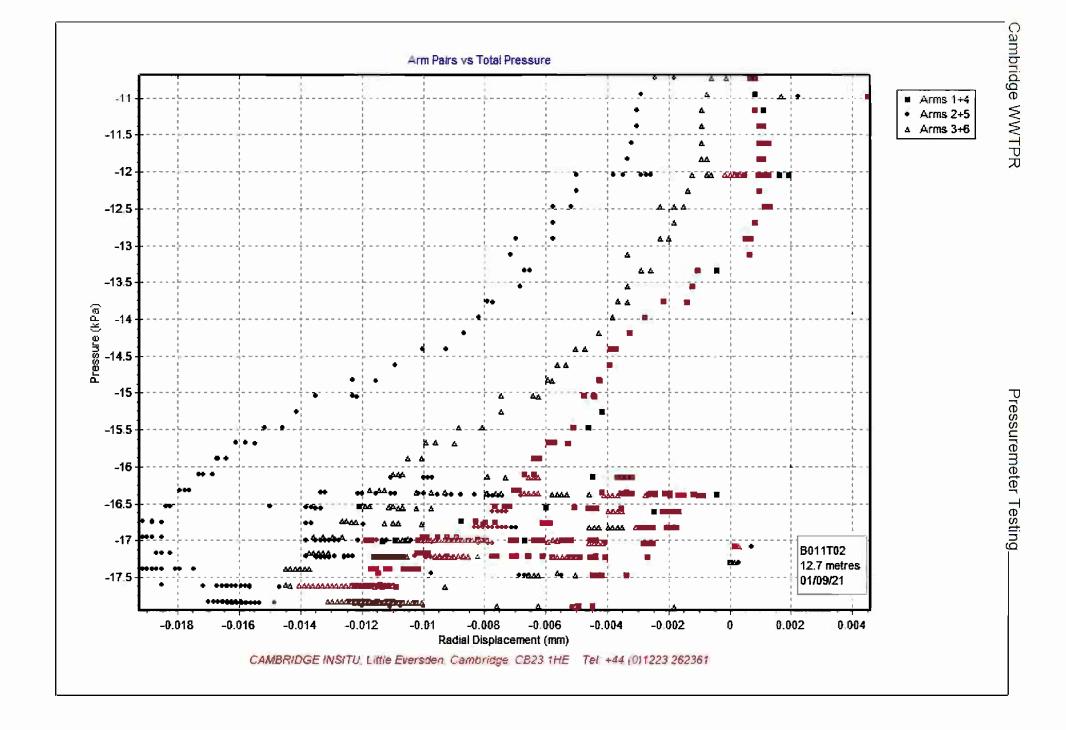
ARM 6 -134.9 mV and 329.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

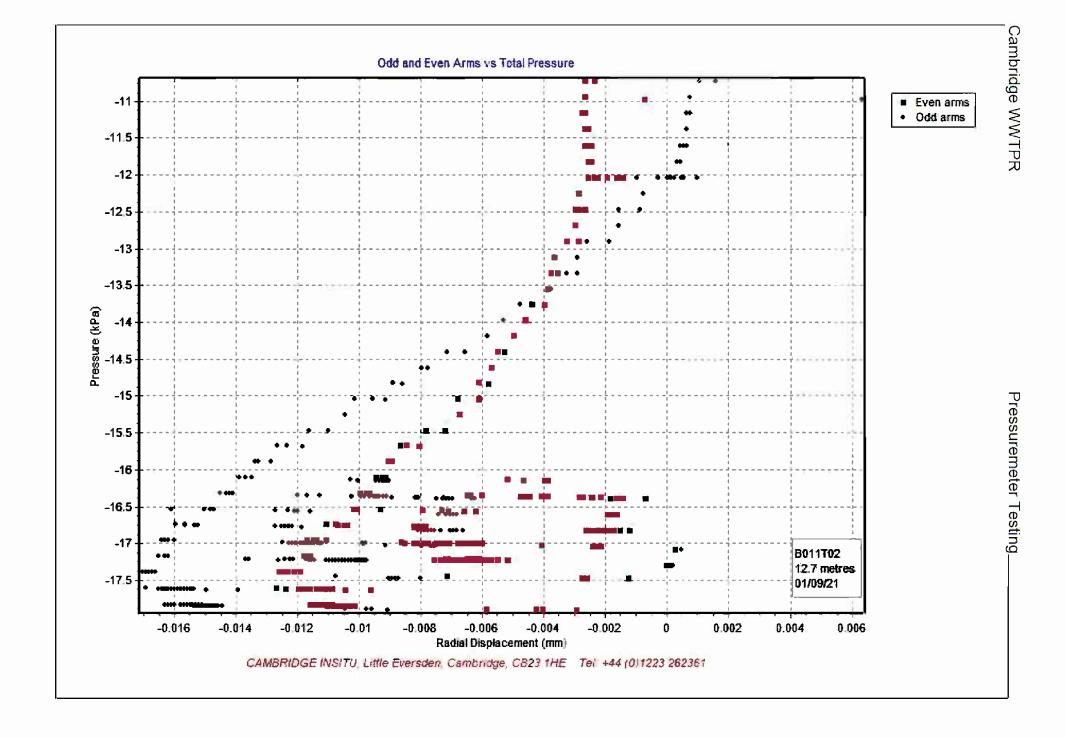
PPC A -2561.5 mV and 402.4 mV/MPa

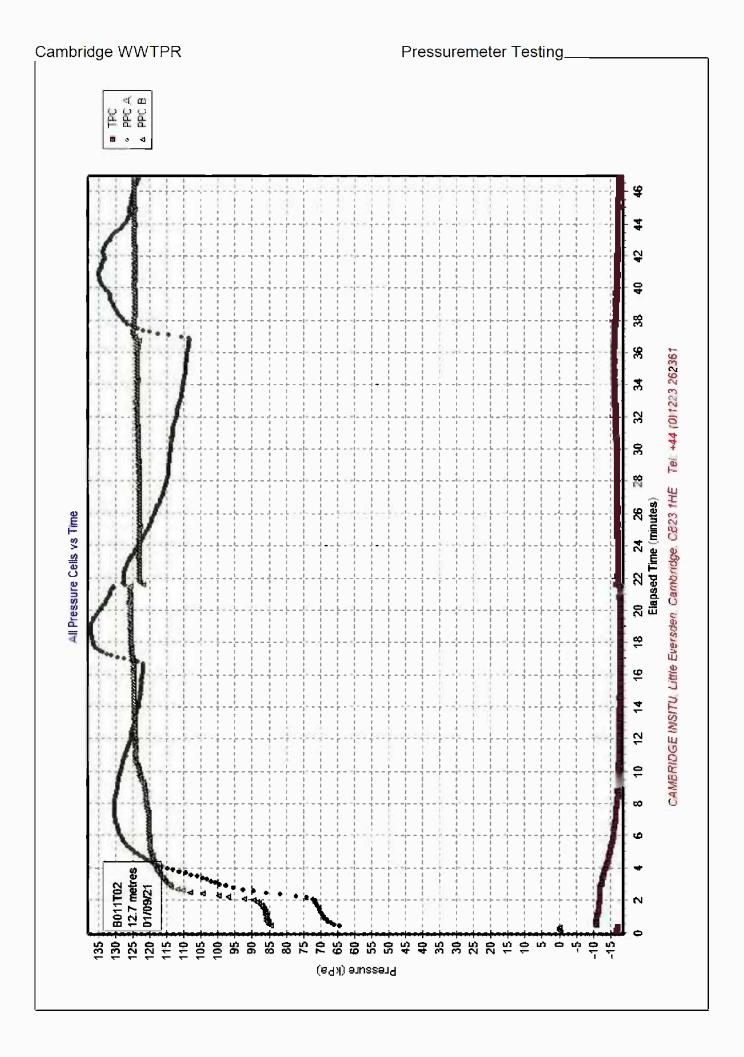
PPC A -2561.5 mV and 402.4 mV/MPa PPC B -2360.5 mV and 388.5 mV/MPa TPC -2379.4 mV and 457.3 mV/MPa











[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_STW_011A
Test name : BH_STW_011A Test 3

Test date : 1 Sep 21
Test depth : 13.50 Metres
Water table : 3.75 Metres
Ambient PWP : 92.0 kPa
Material : Gault Clay

Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/RW on 7 Sep 21

Remarks: Loop 1 taken too early

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=3.65"
Po from Marsland & Randolph (kPa) : "Arm ave=292.7"
Best estimate of Po (kPa) : "Arm ave=325.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=238.9"
Limit pressure (kPa) : "Arm ave=1970"

Jefferies 1988 - Cu (kPa) : "Arm ave=234.9"
Undrained yield stress (kPa) : "Arm ave=764.8"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=15.2"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	58.4	-2.043	346	0.143	84
Arm ave	2	69.5	-0.963	573	0.288	200
Arm ave	3	63.4	0.366	773	0.458	291
Arm ave	4	56.3	3.123	985	0.650	367
Arm ave	5	46.9	17.890	711	0.772	364

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	12.774	9.726	0.761
Arm ave	2	6.242	3.630	0.582
Arm ave	3	6.164	3.438	0.558
Arm ave	4	5.331	2.774	0.520
Arm ave	5	5.727	3.185	0.556

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 3.65

 Po (kPa)
 : 325

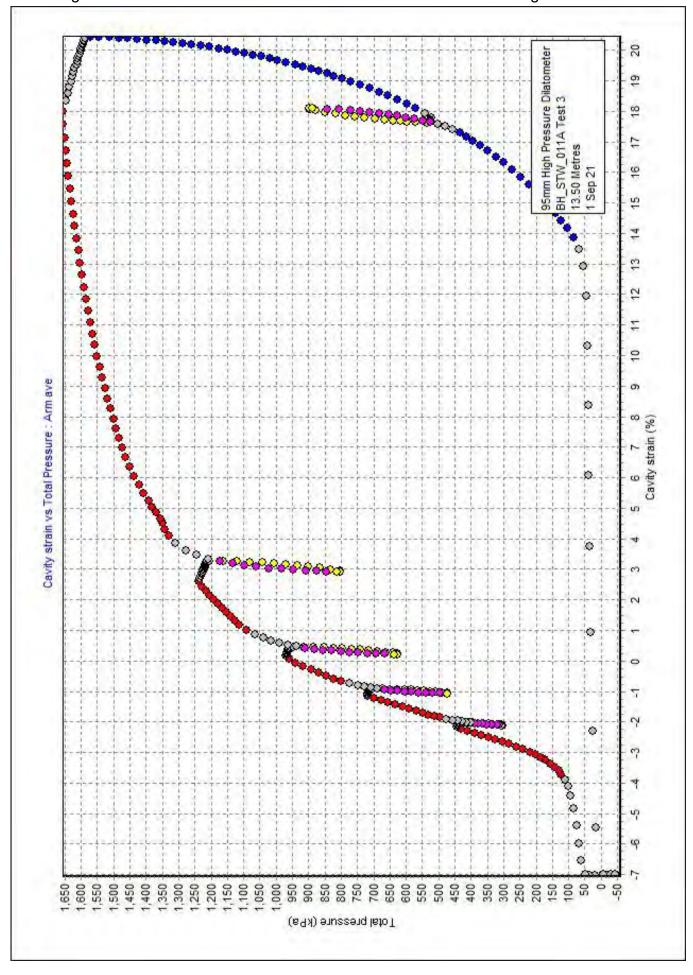
 Cu (kPa)
 : 238.9

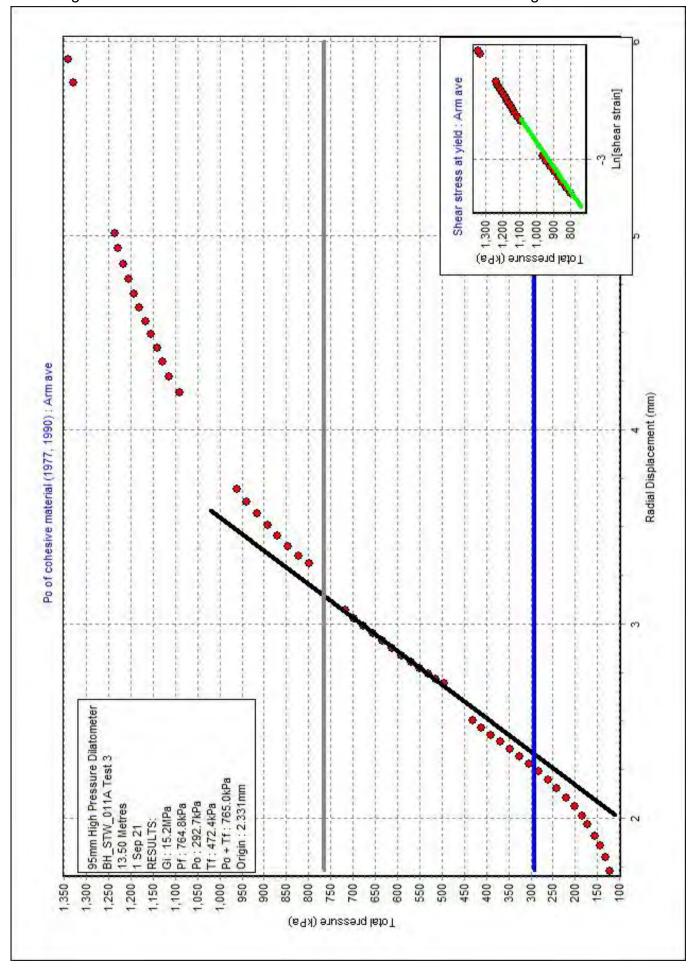
 Limit pressure (kPa)
 : 1970

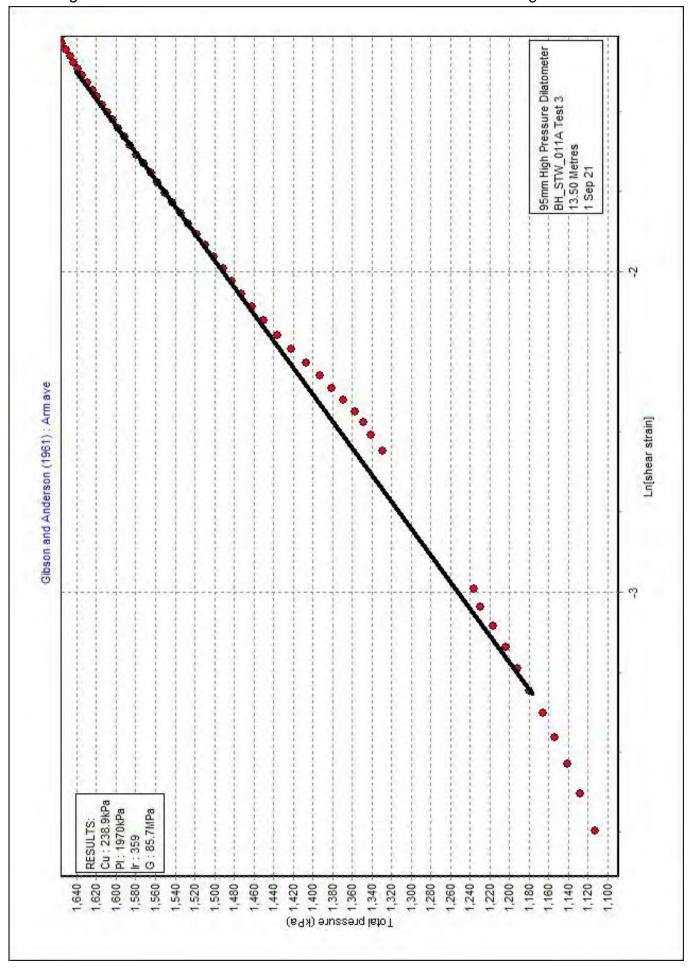
 Non-linear exponent
 : 0.520

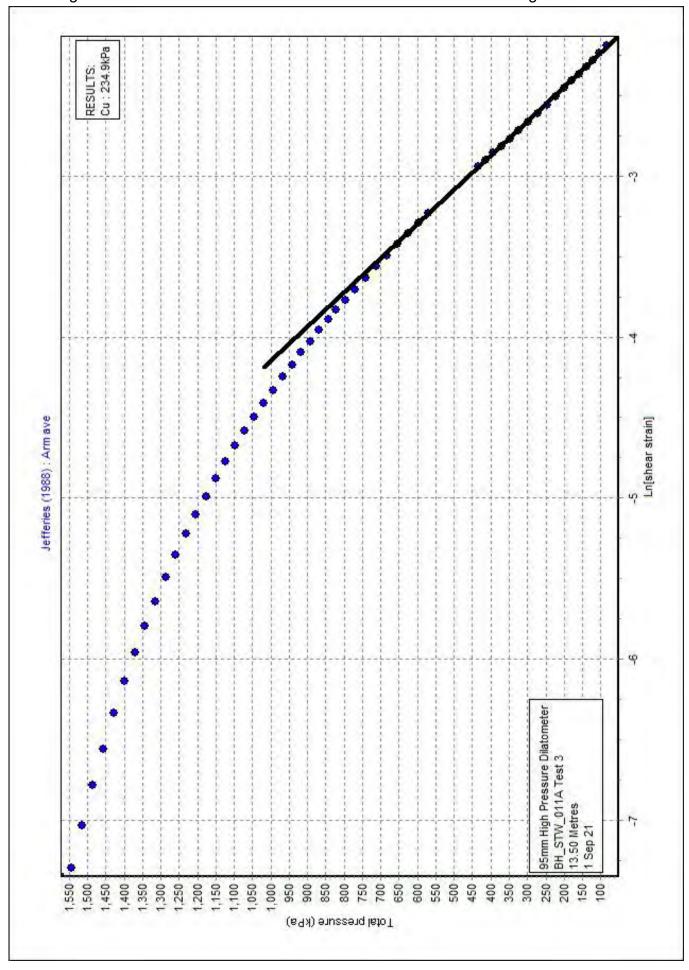
 Calculated alpha (MPa)
 : 3.150

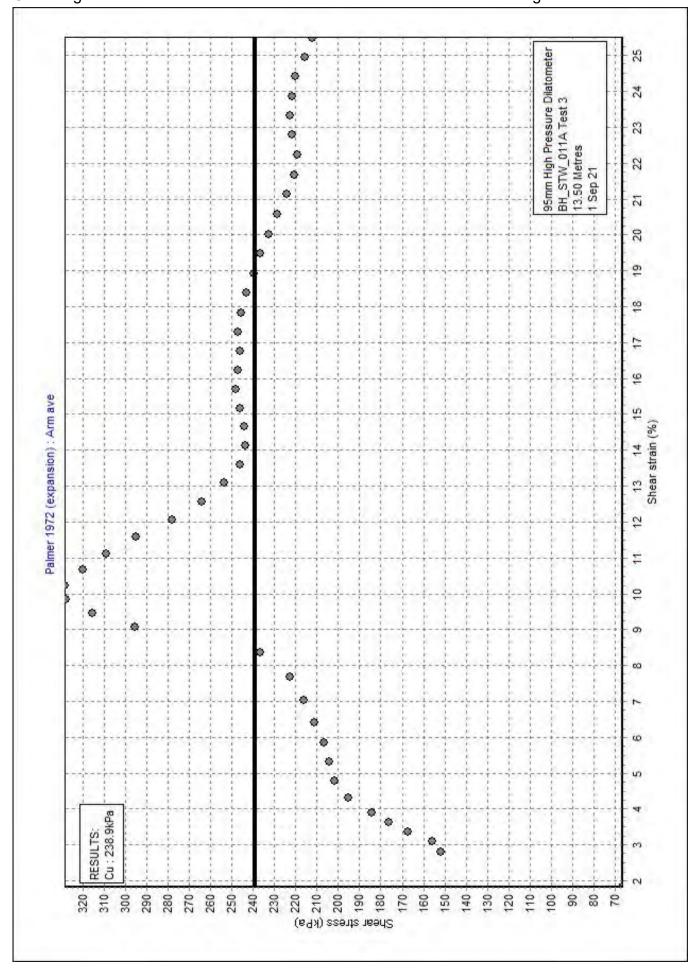
 G at yield (MPa)
 : 34.1

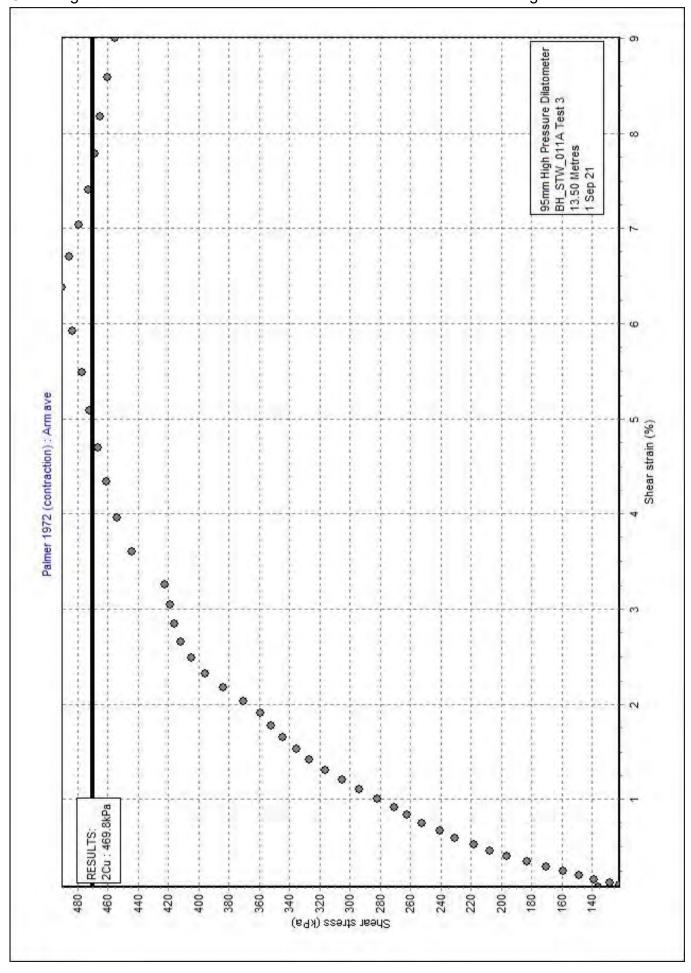


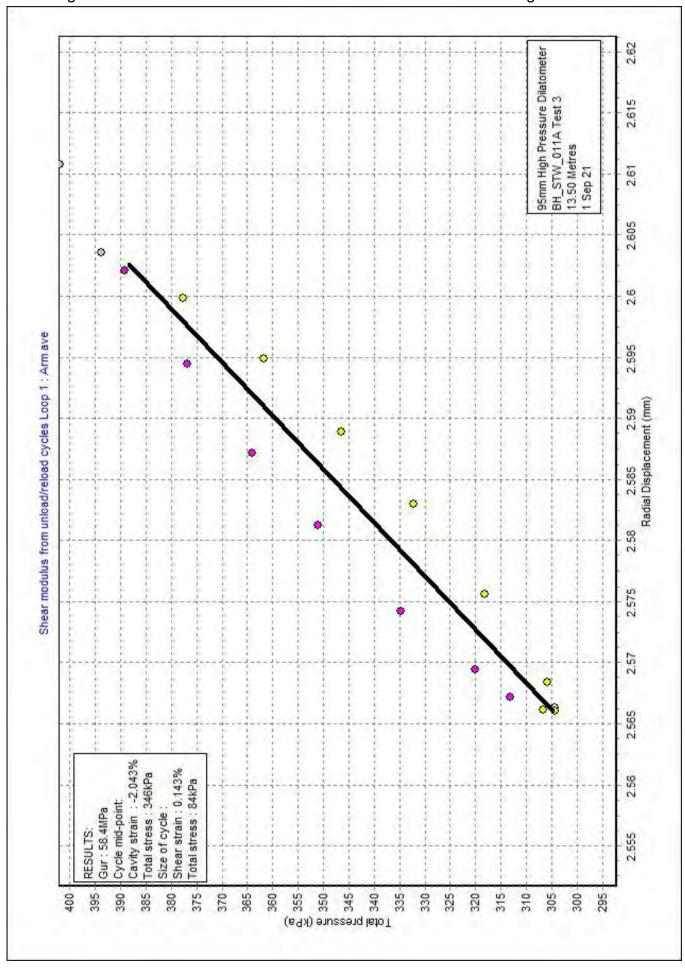


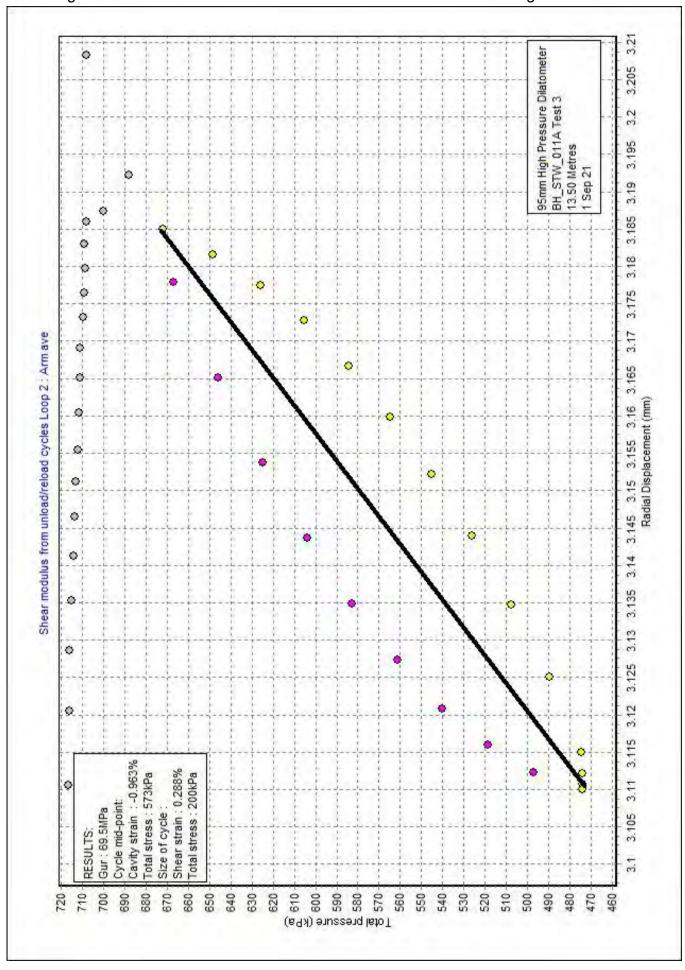


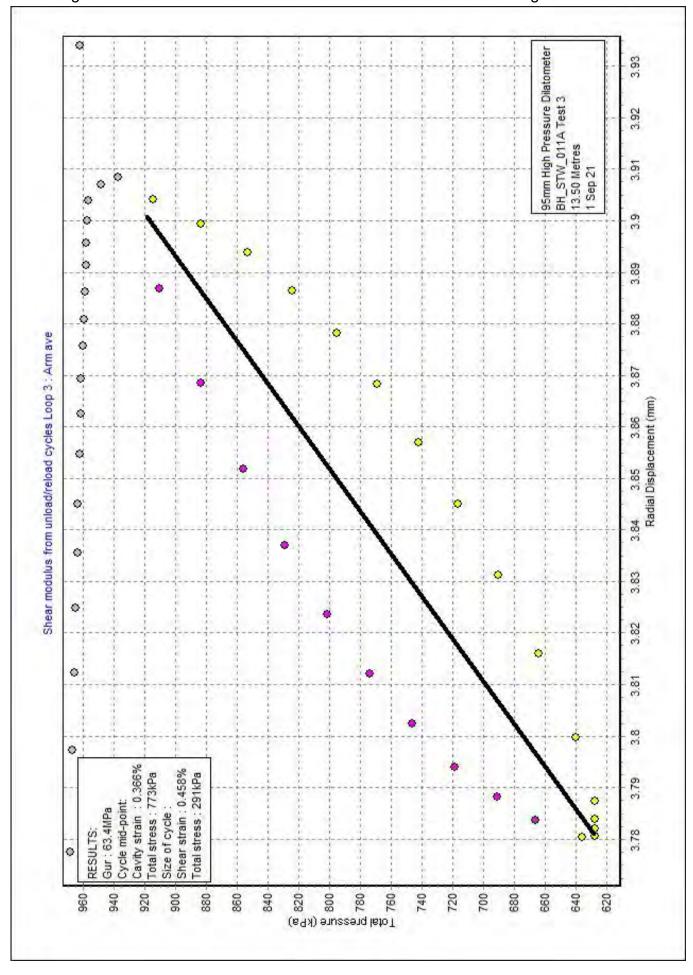


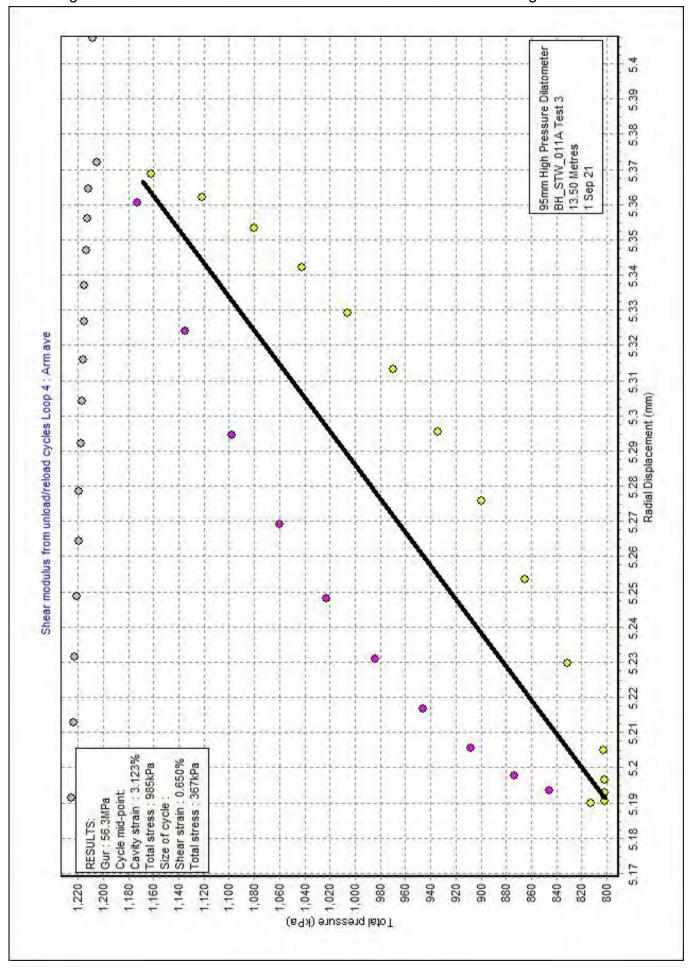


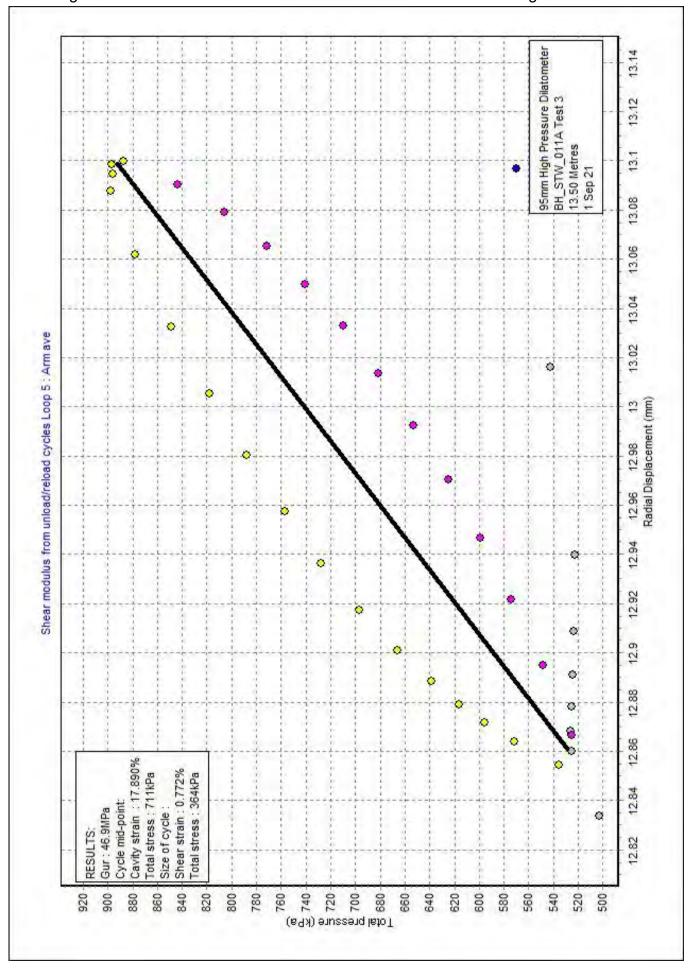


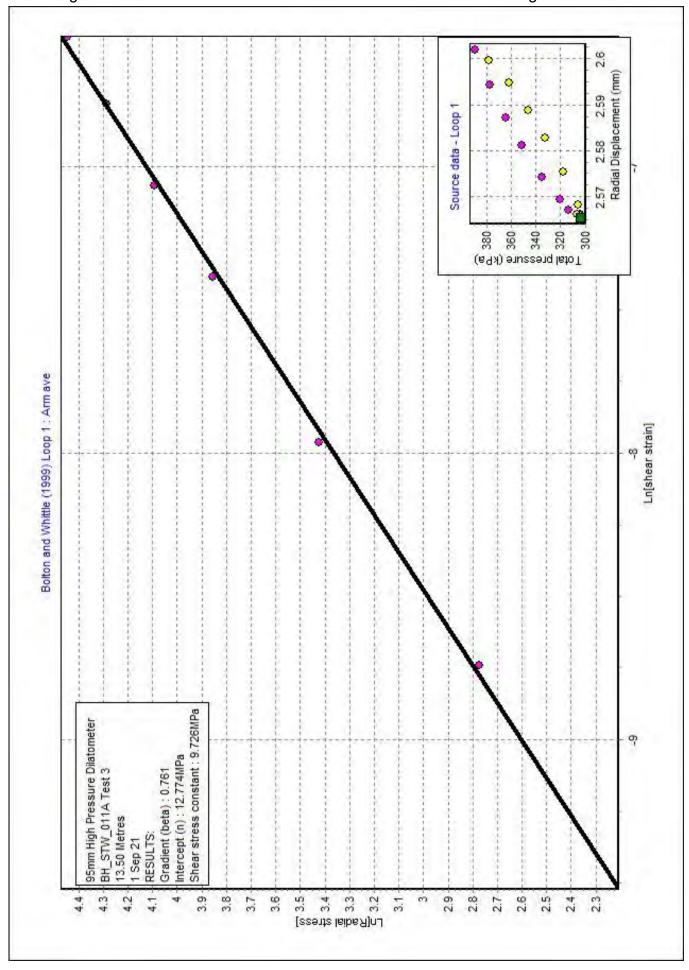


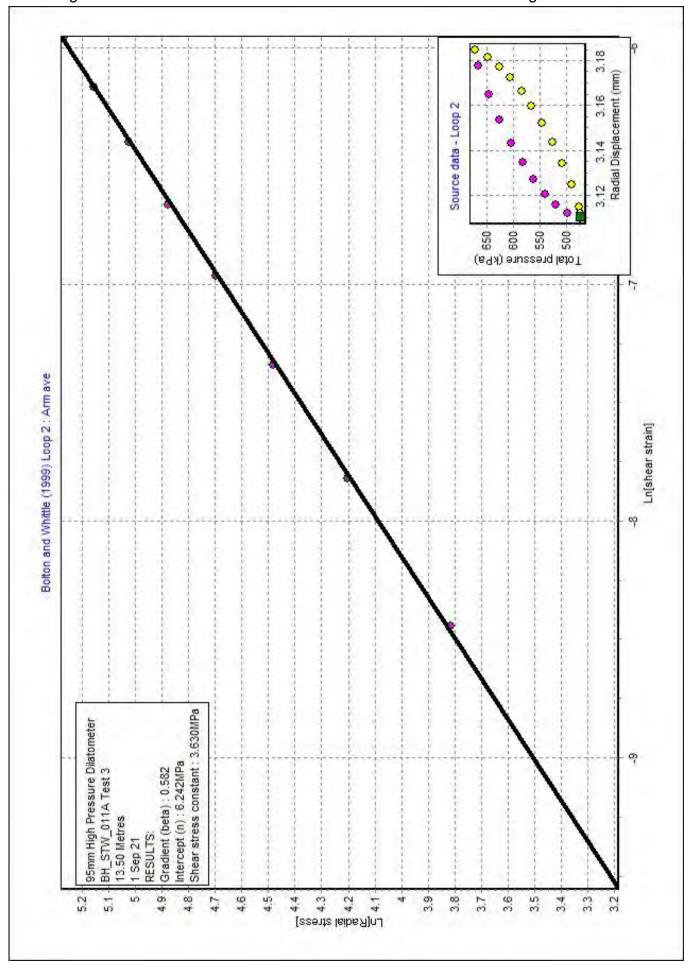


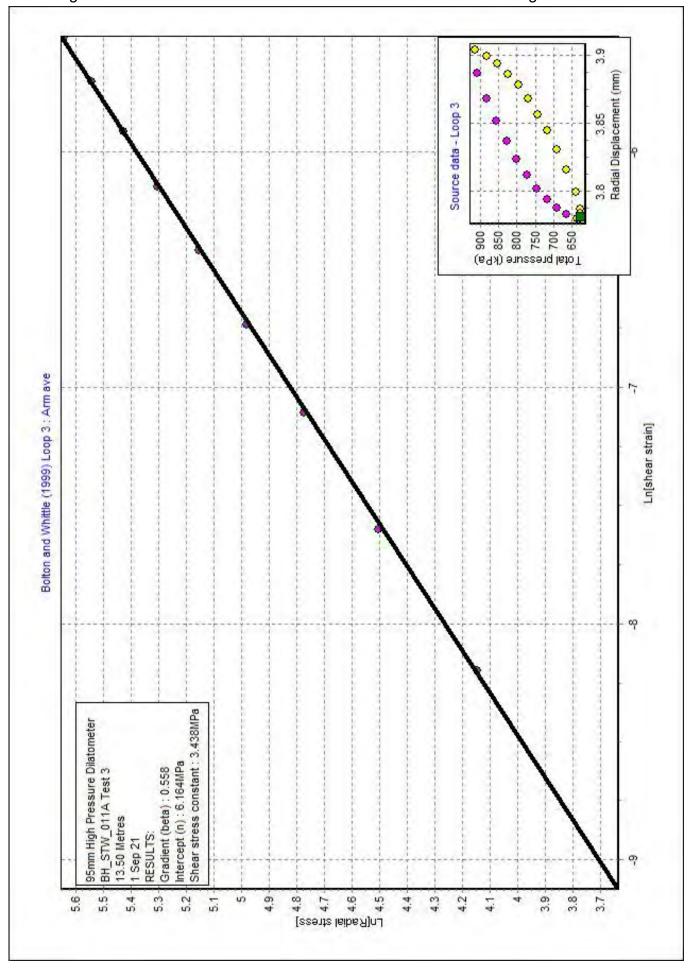


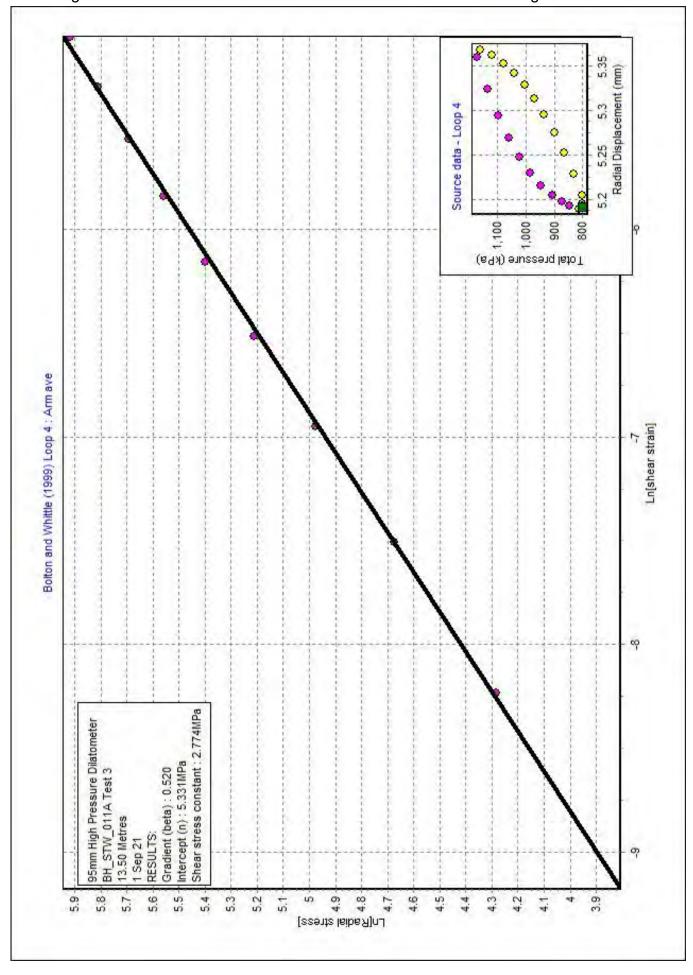


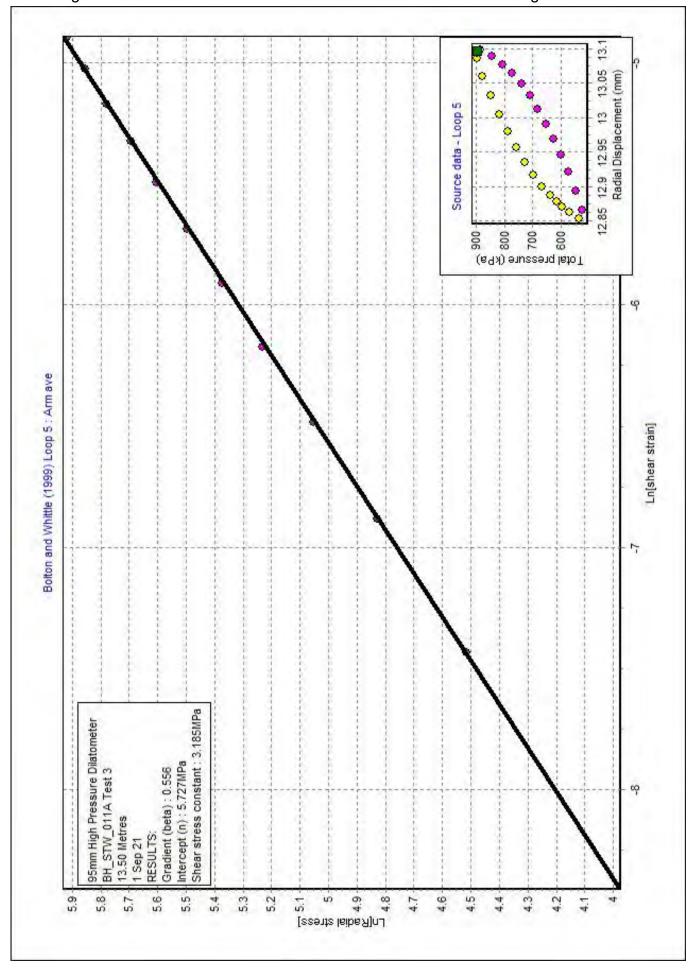


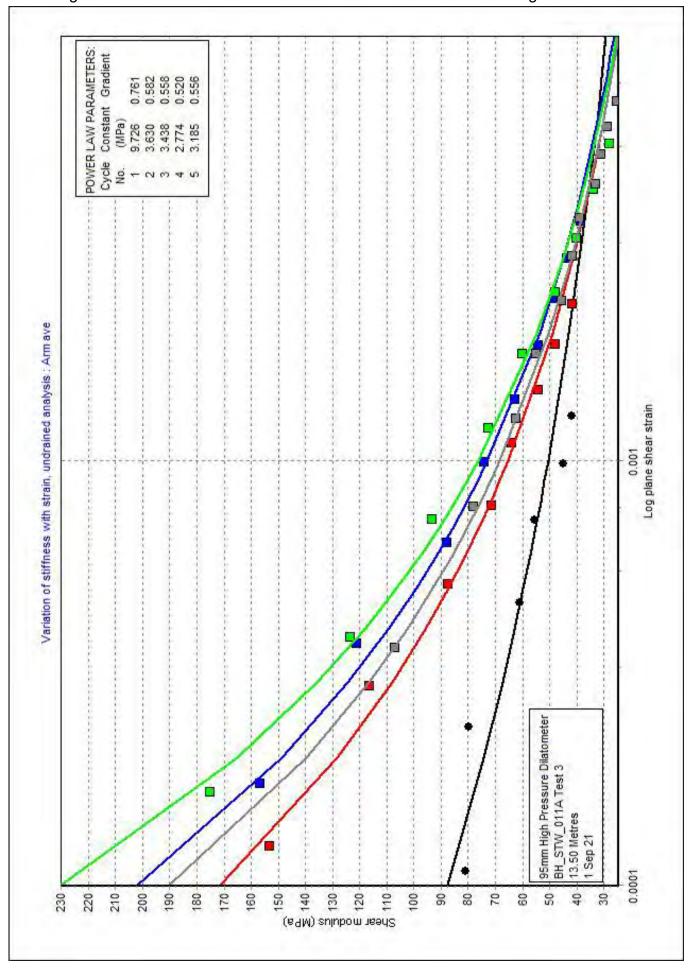


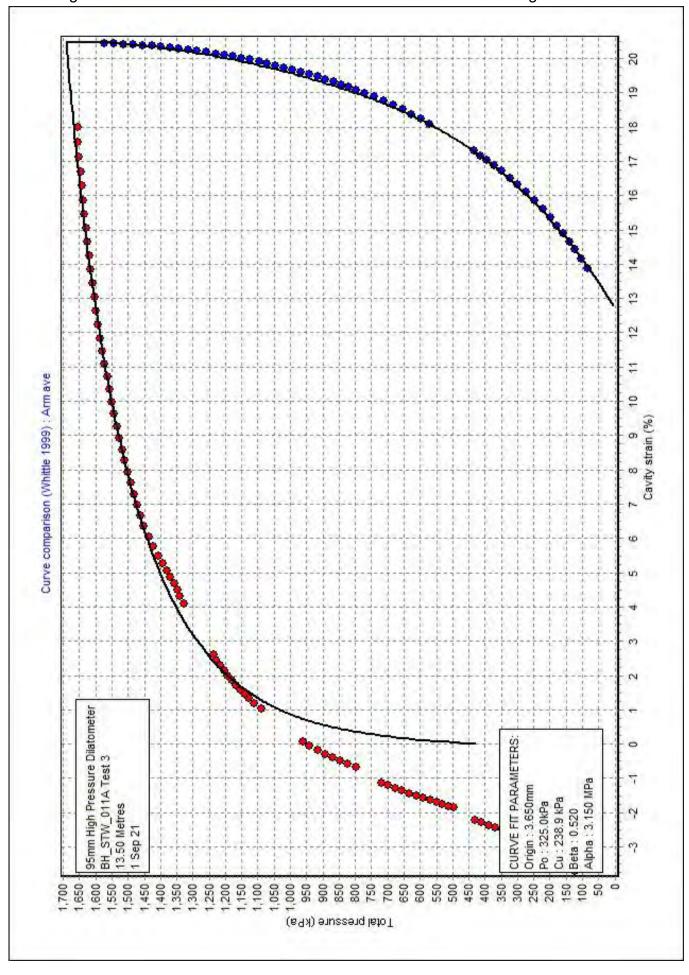


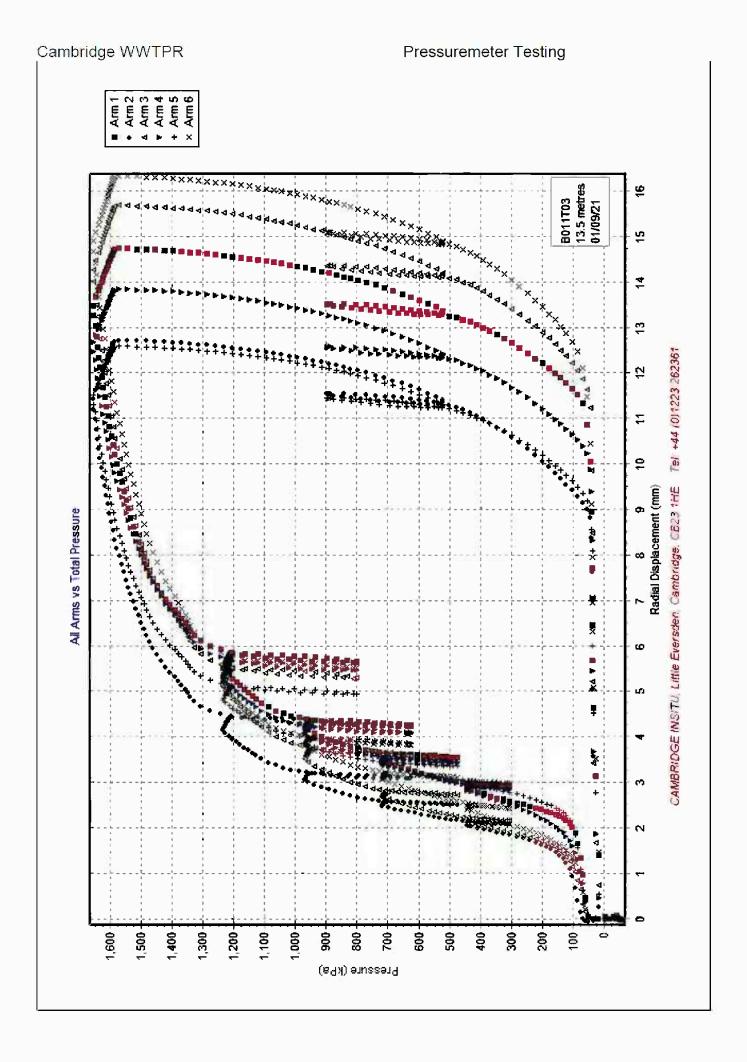


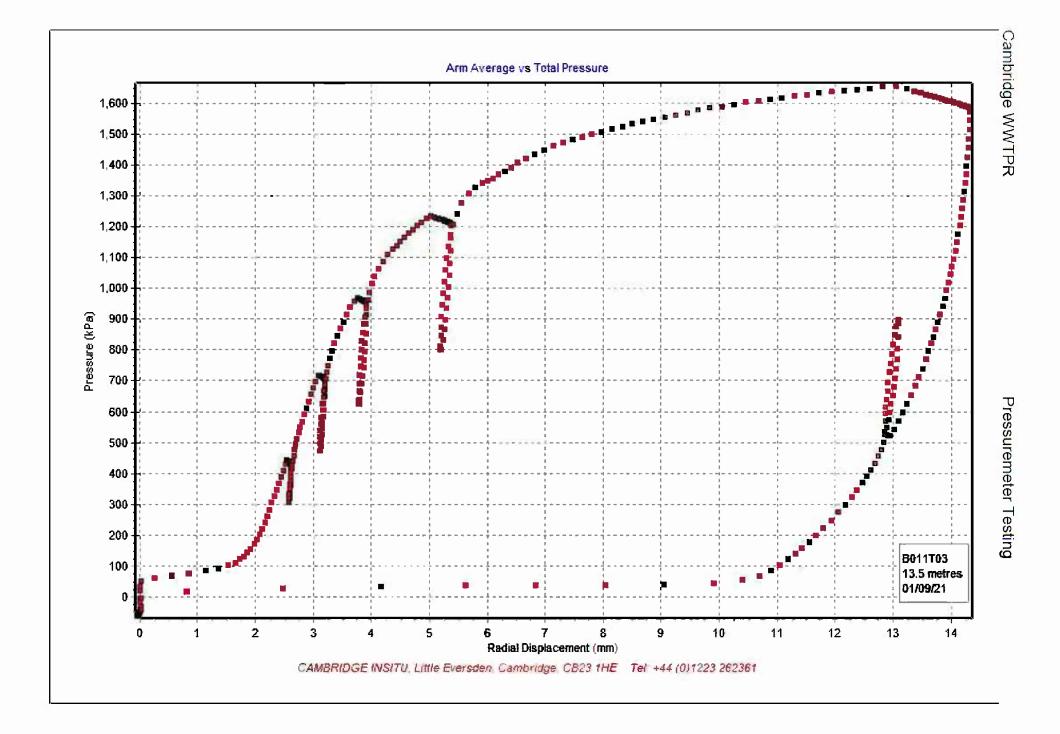


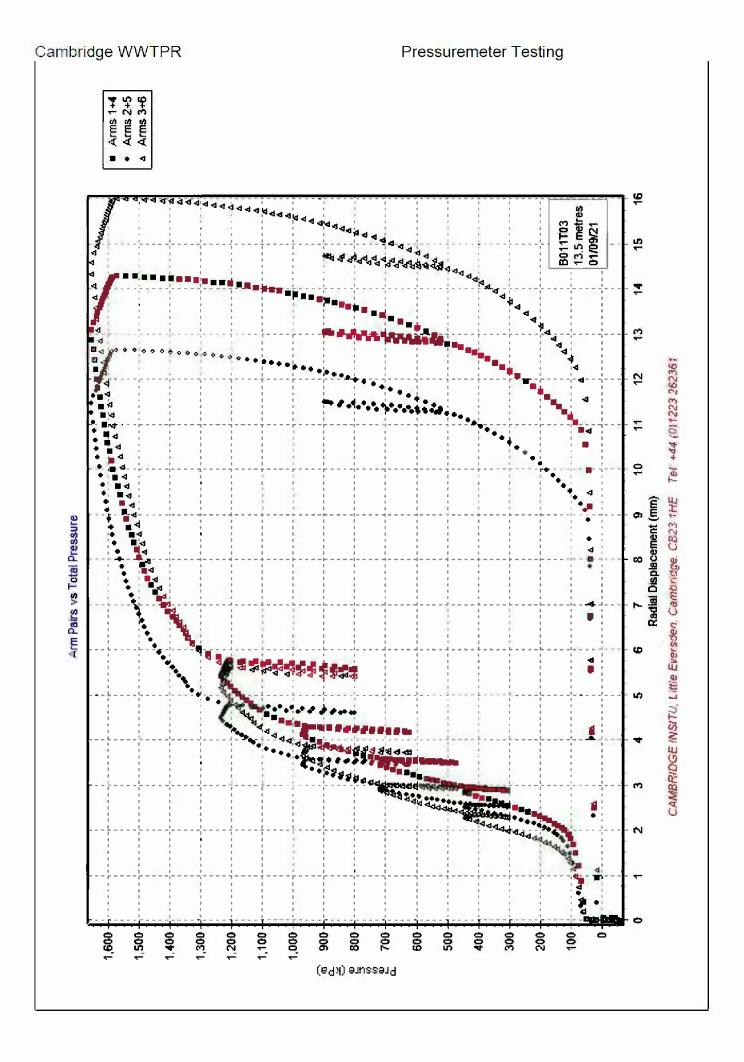


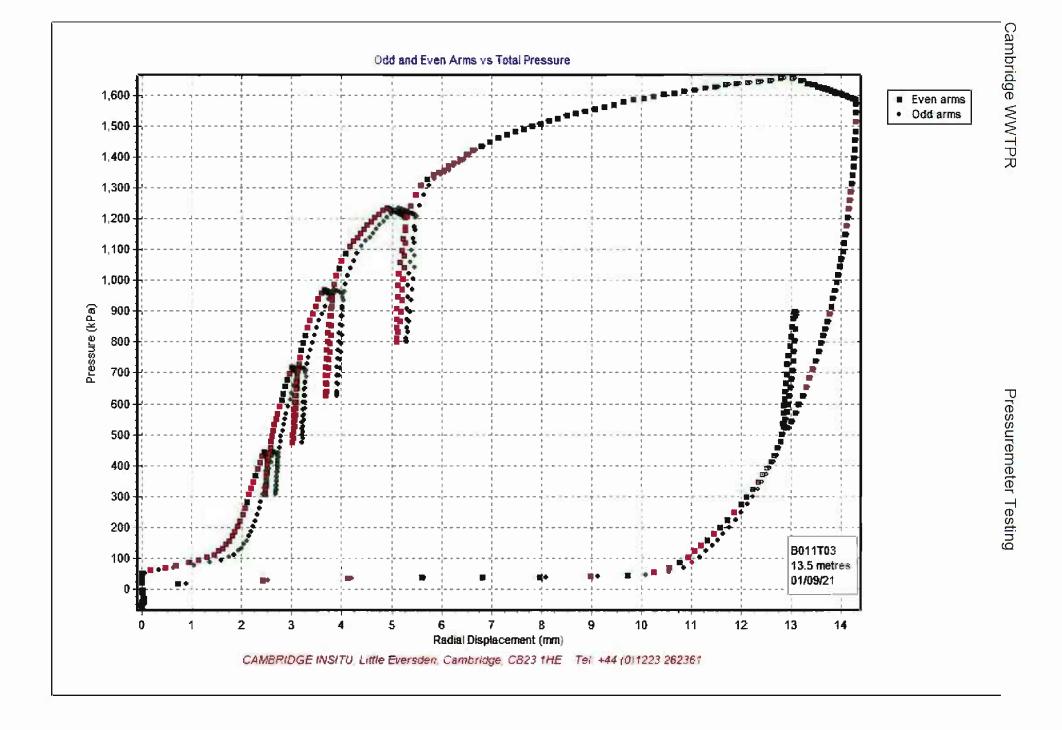












[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_STW_011A
Test name : BH_STW_011A Test 4

Test date : 2 Sep 21
Test depth : 21.70 Metres
Water table : 3.75 Metres
Ambient PWP : 176.0 kPa
Material : Gault Clay

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/YB/RW on 7 Sep 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=0.00"

Po from Marsland & Randolph (kPa) : "Arm ave=532.4"

Po from Lift off (kPa) : "Arm ave=378.0"

Best estimate of Po (kPa) : "Arm ave=462.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=292.5" Limit pressure (kPa) : "Arm ave=2316" Jefferies 1988 - Cu (kPa) : "Arm ave=293.7" Undrained yield stress (kPa) : "Arm ave=749.2"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=89.5"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	58.4	2.313	1115	0.697	408
Arm ave	2	50.5	4.332	1252	0.983	499
Arm ave	3	53.7	7.699	755	0.732	394

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	10.508	6.754	0.643
Arm ave	2	9.784	6.101	0.624
Arm ave	3	7.628	4.484	0.588

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 0.00

 Po (kPa)
 : 462

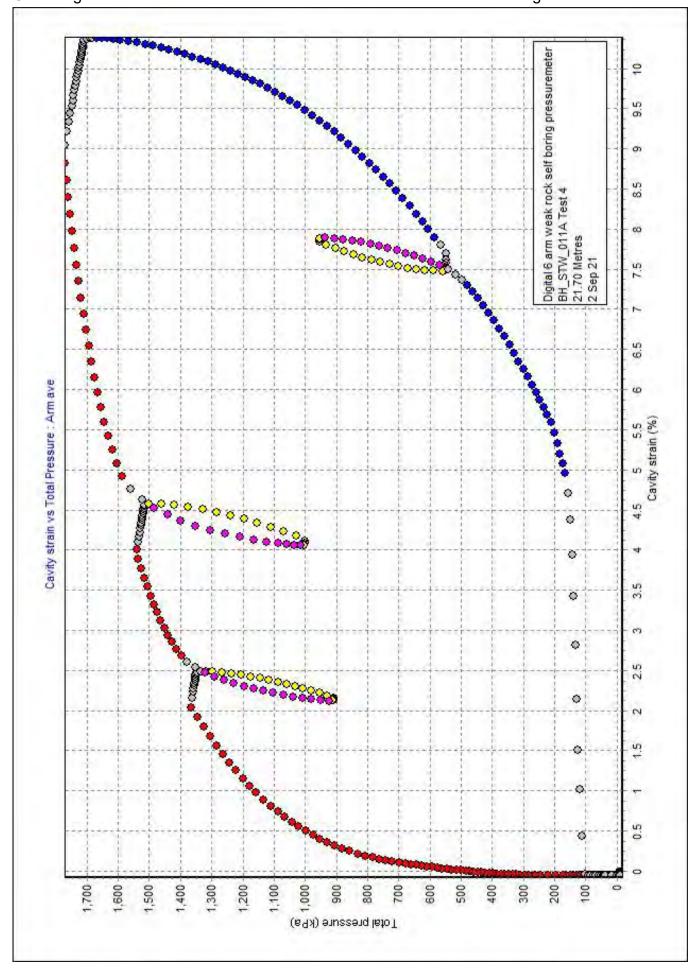
 Cu (kPa)
 : 292.5

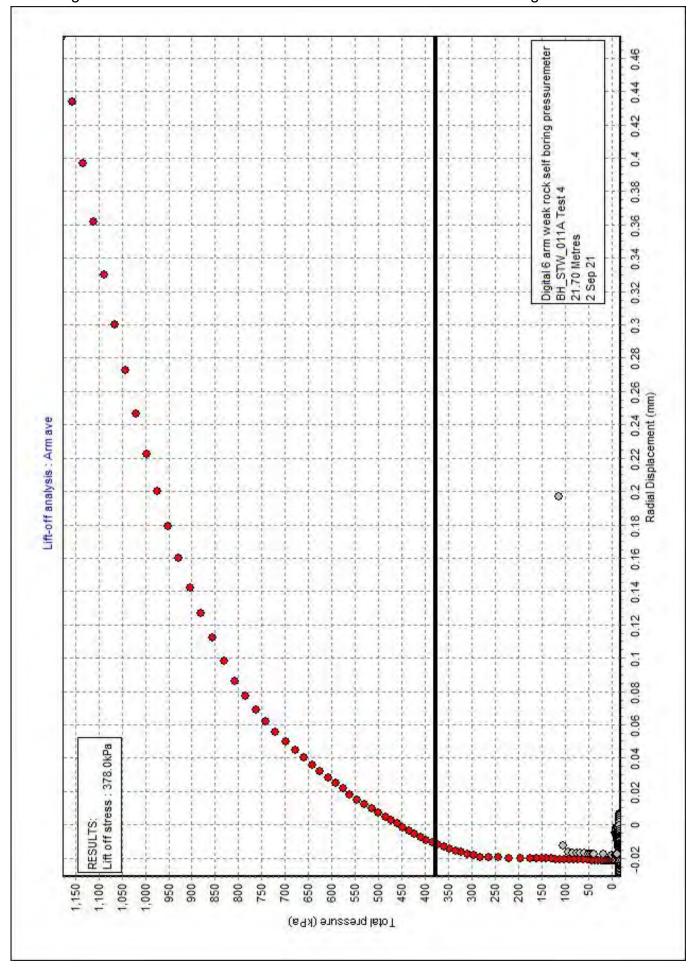
 Limit pressure (kPa)
 : 2316

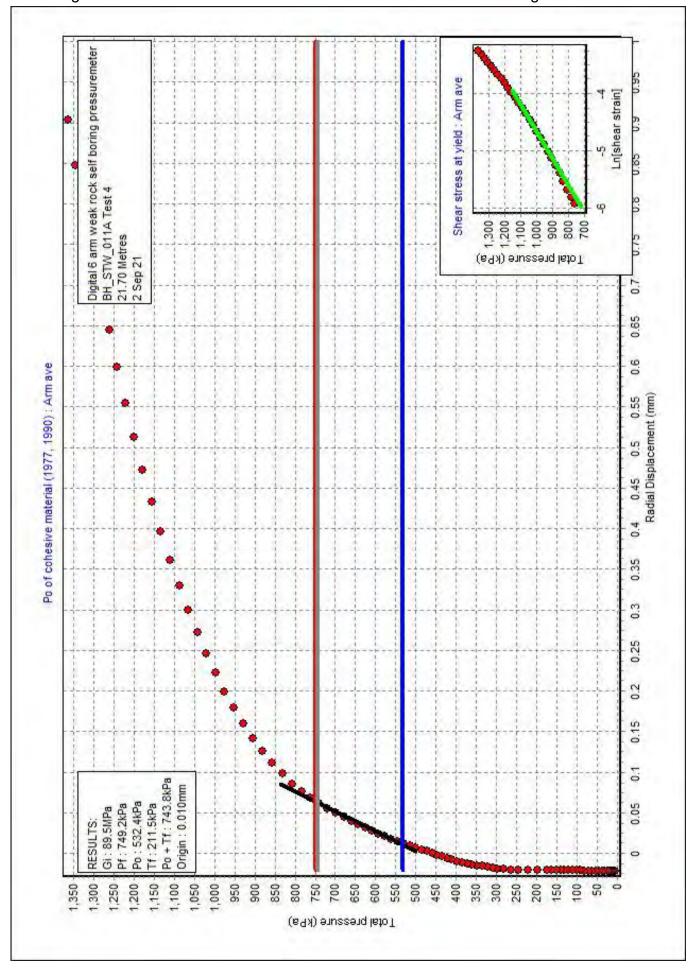
 Non-linear exponent
 : 0.588

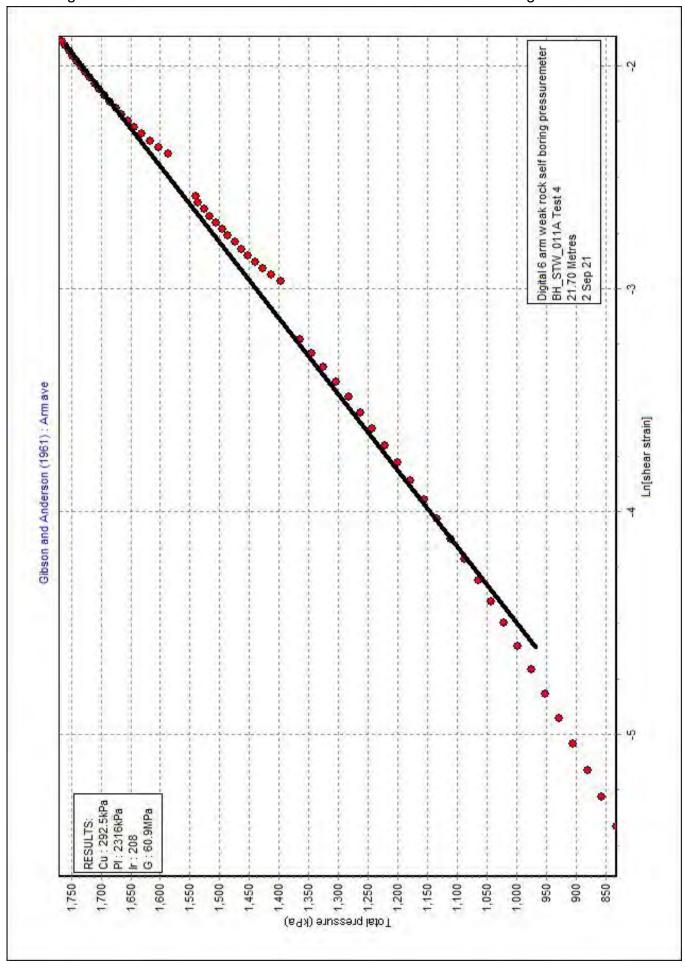
 Calculated alpha (MPa)
 : 4.472

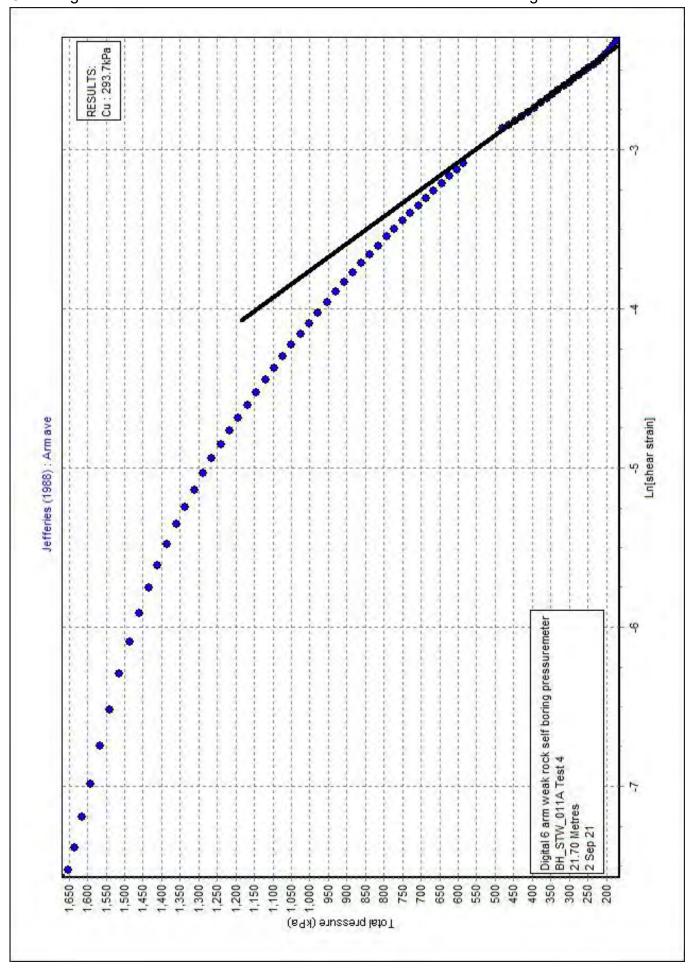
 G at yield (MPa)
 : 30.2

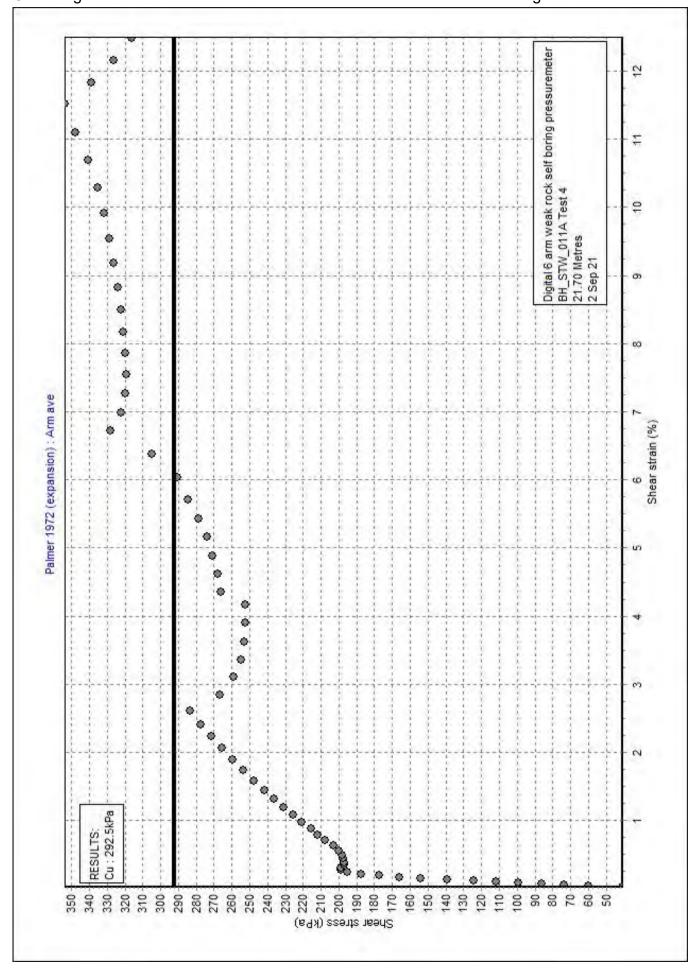


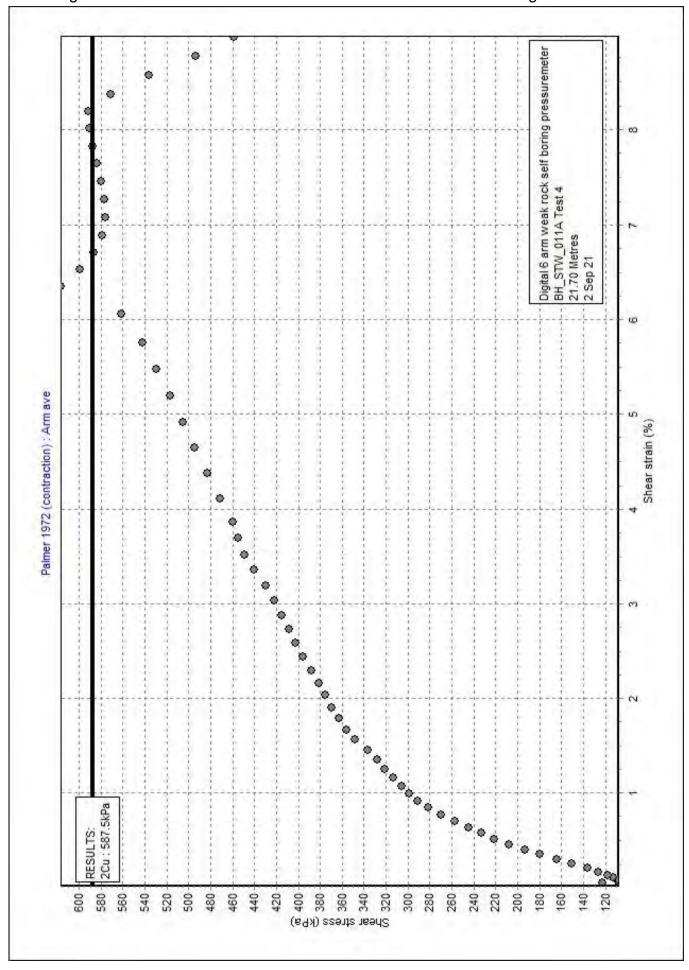


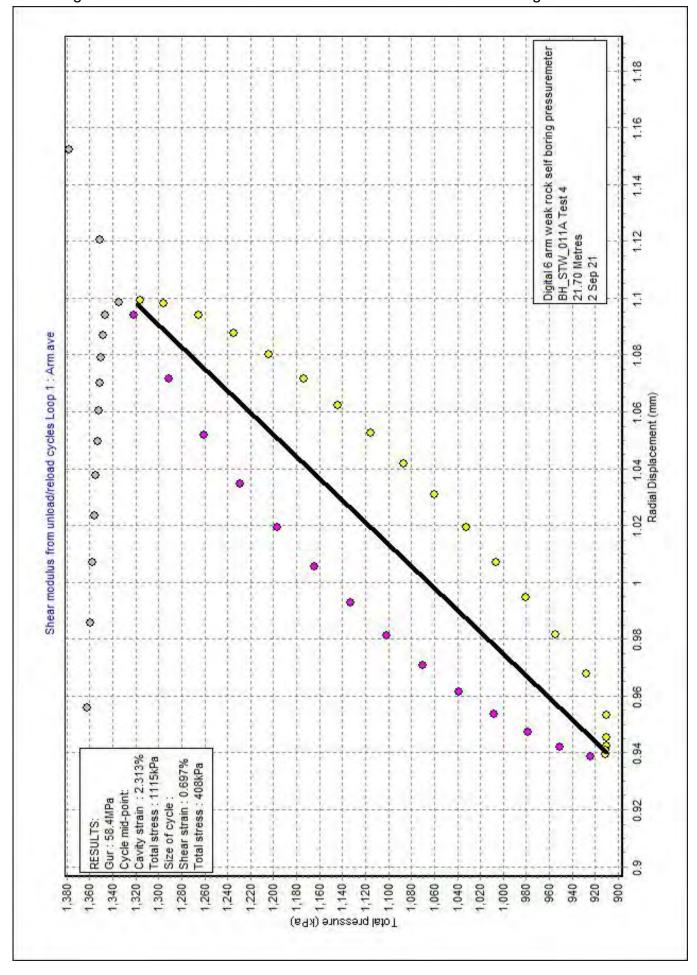


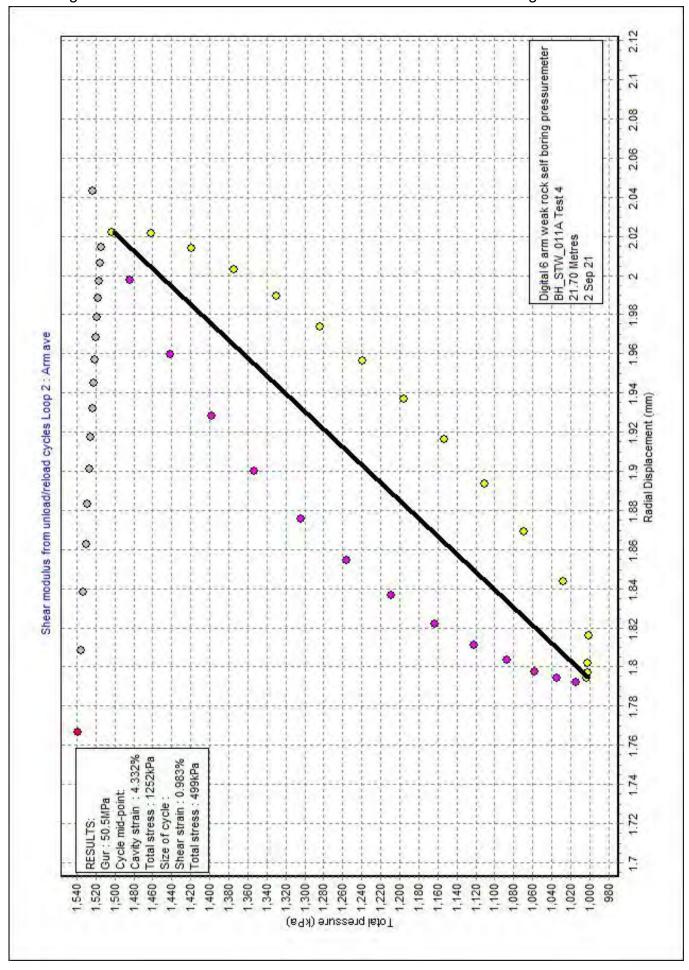


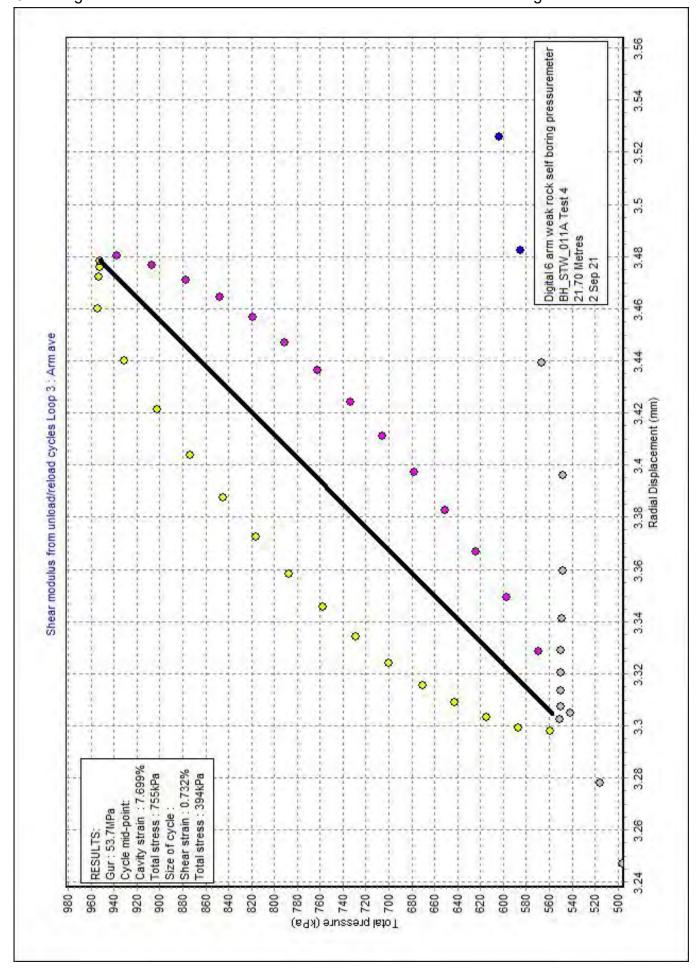


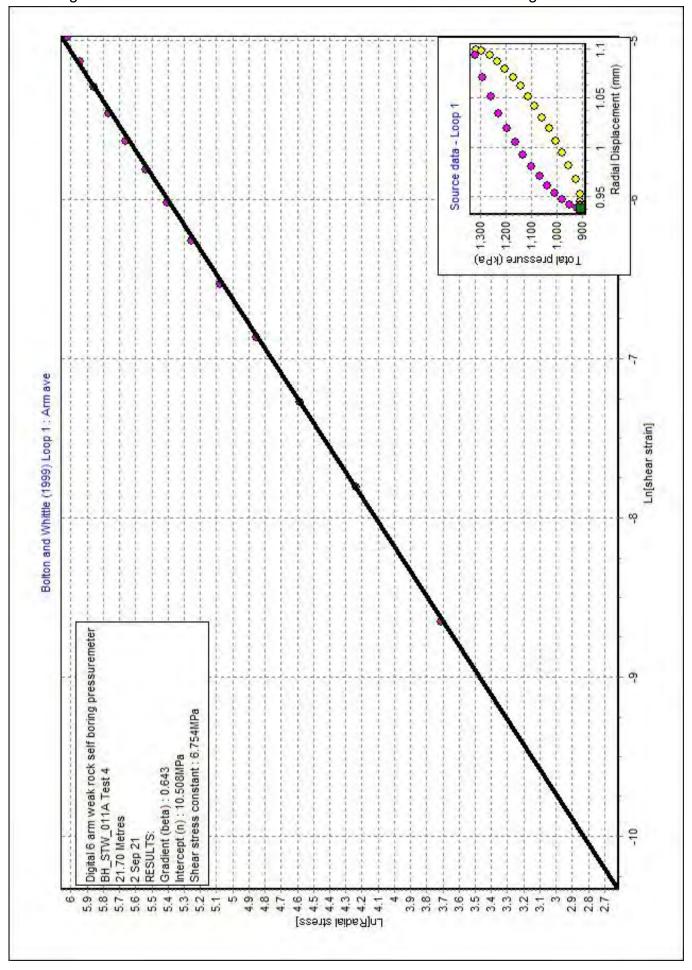


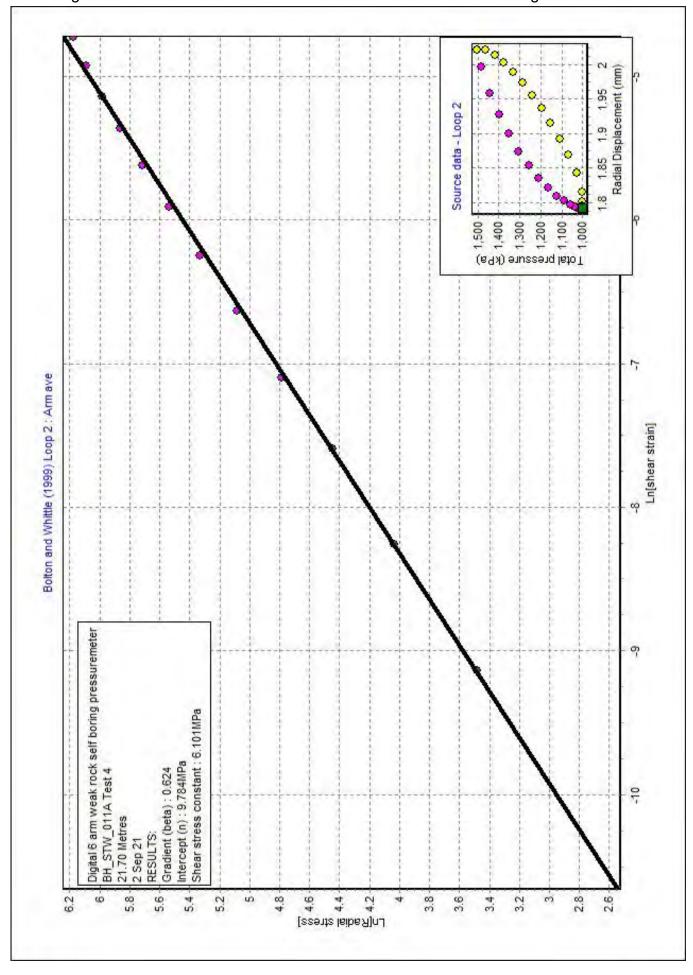


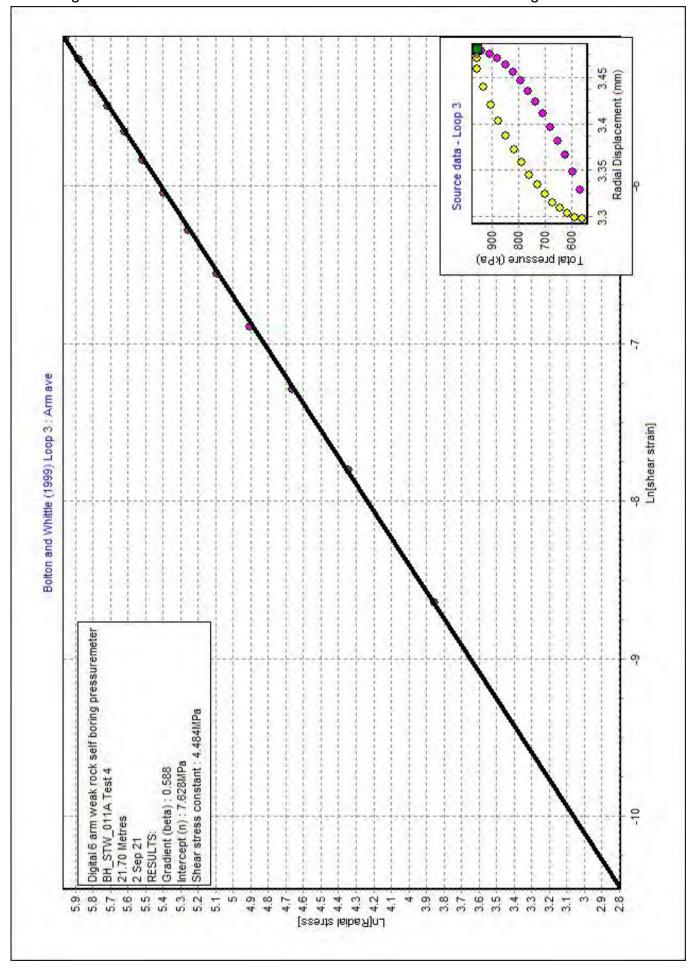


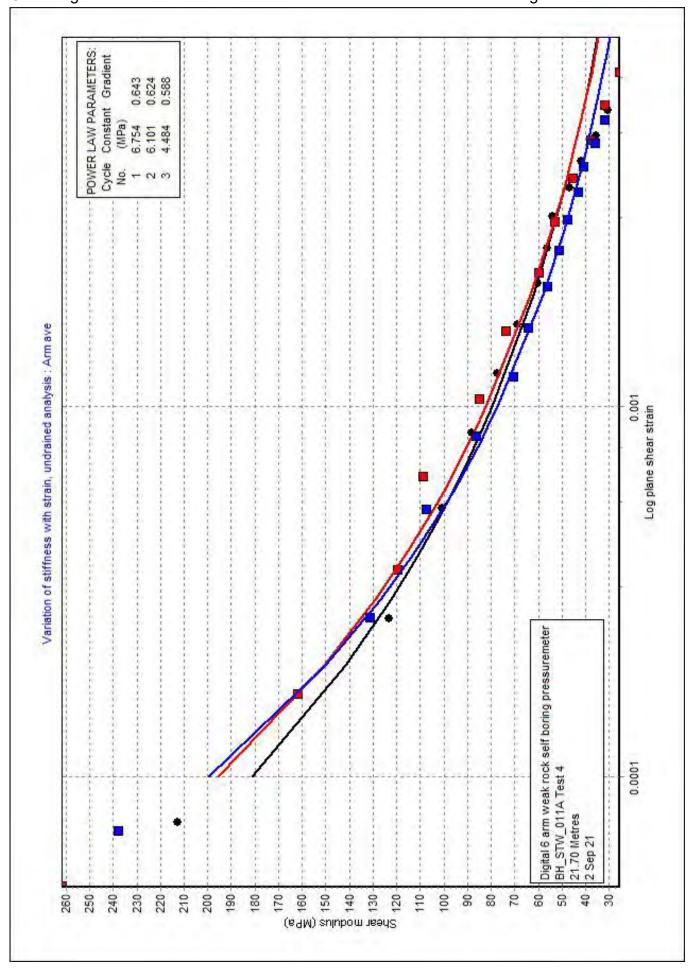


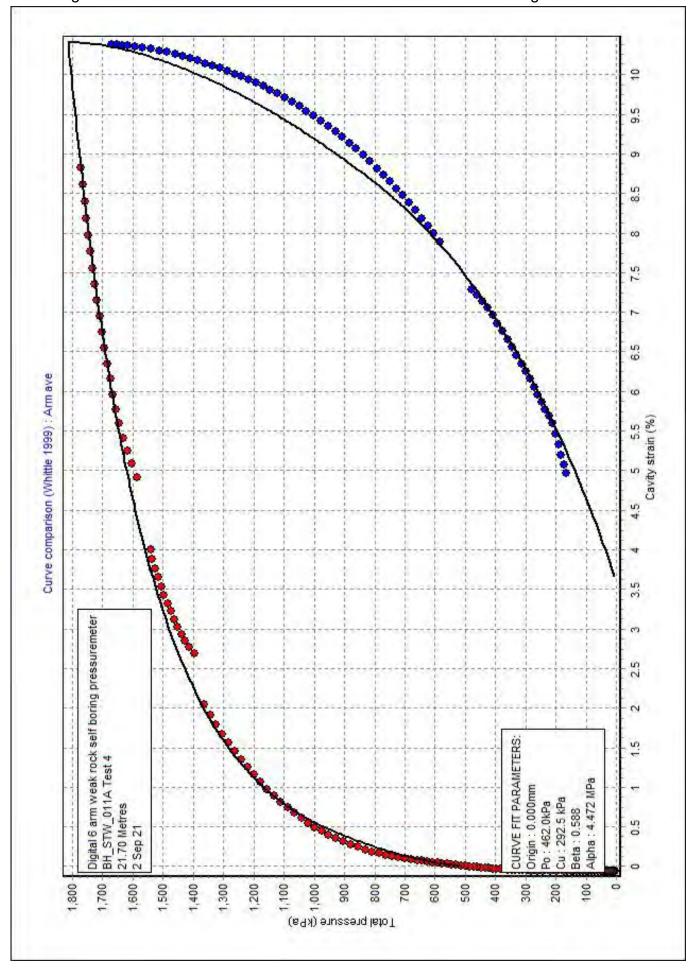


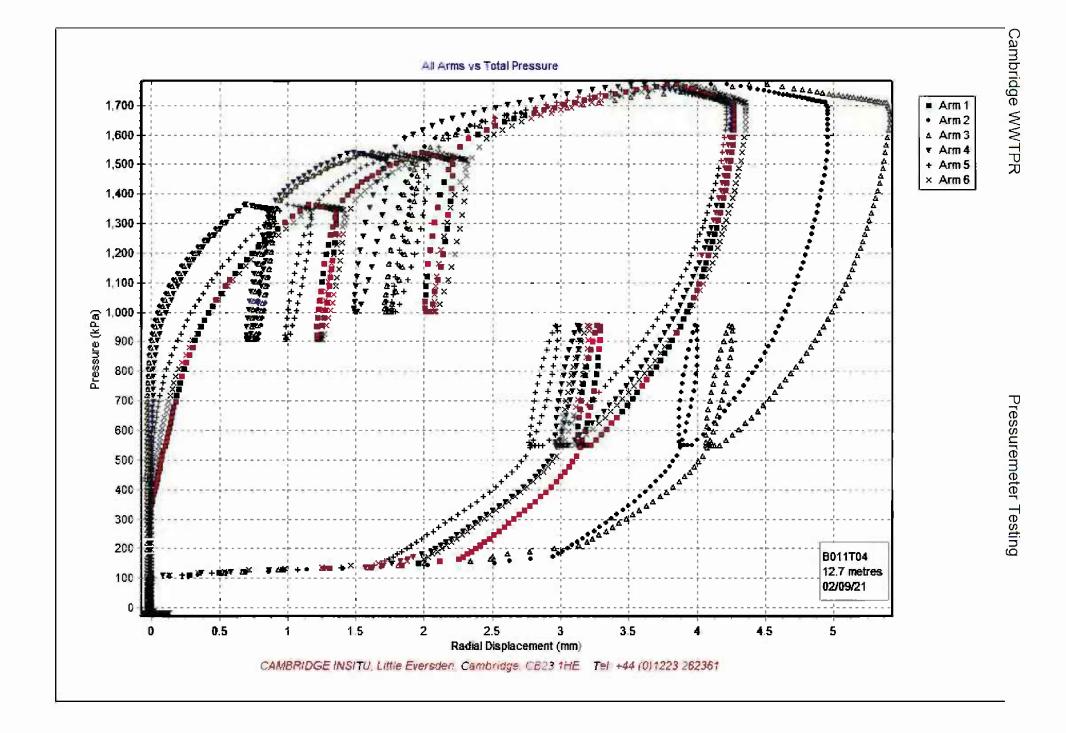




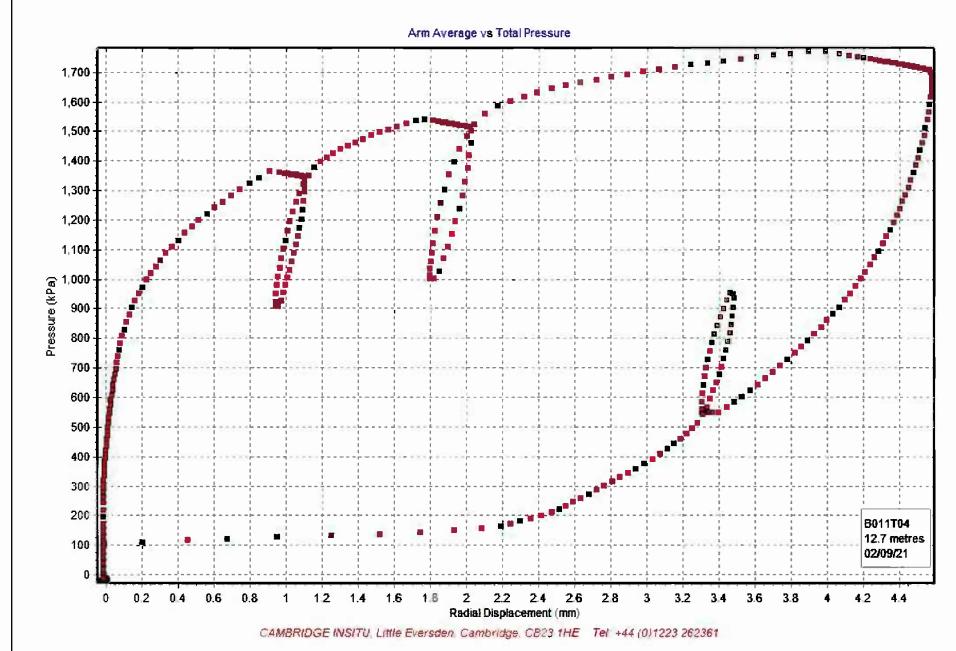


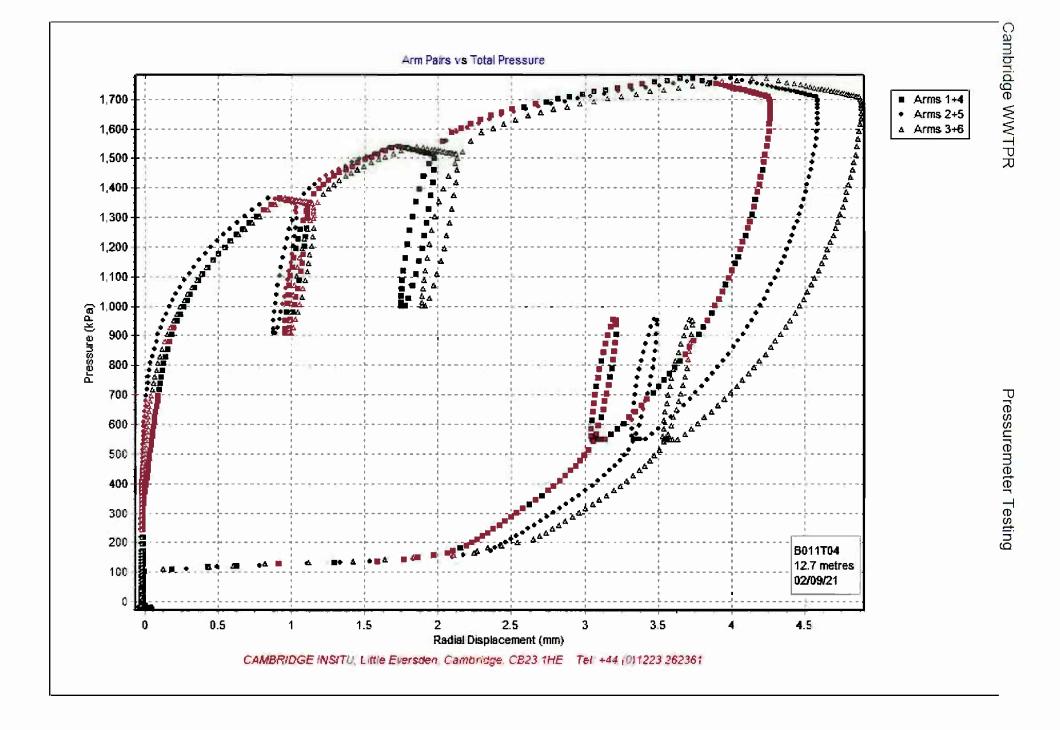


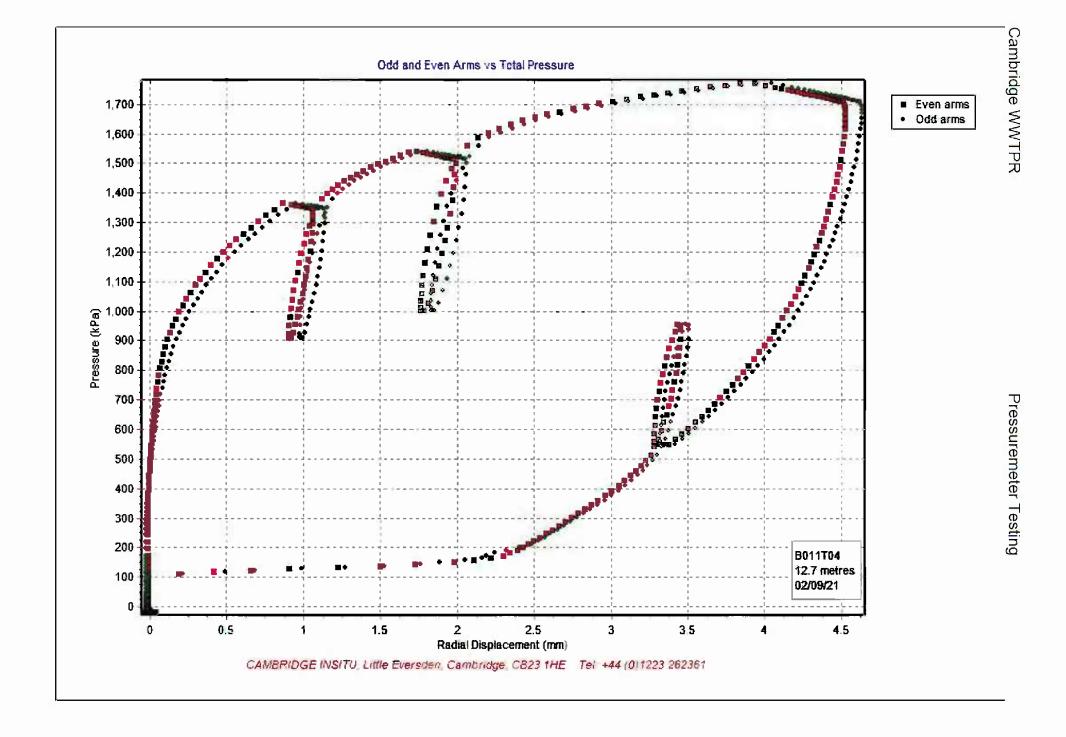


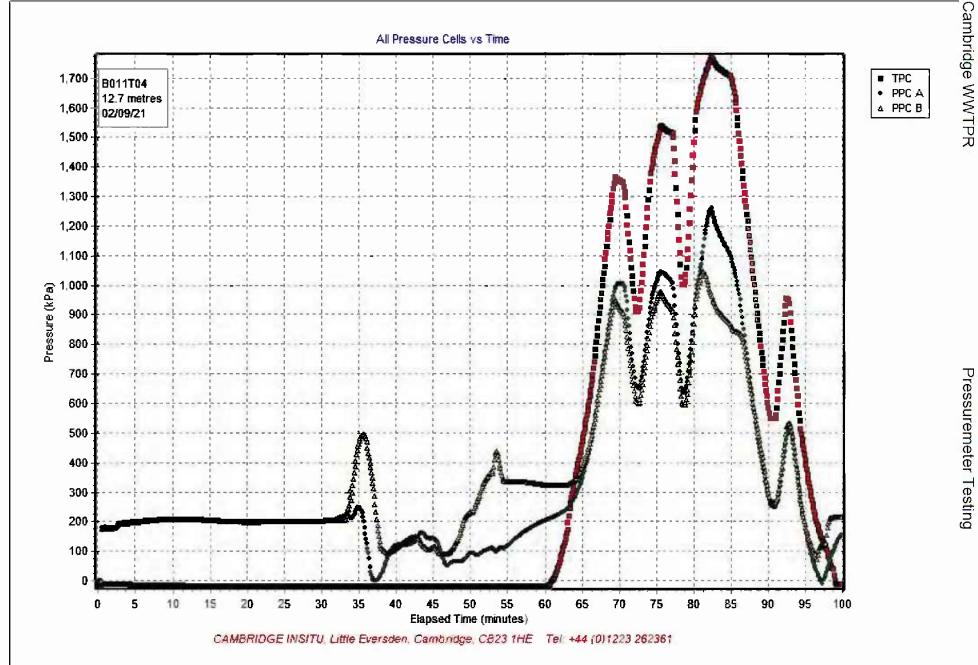


Cambridge WWTPR









Cambridge WWTPR BH_STW_012A Test 1 - SUMMARY OF RESULTS [File made with WinSitu]

[DETAILS OF TEST]

Project TE8364

Site Cambridge Waste Water Treatment Plant Relocation Project

Borehole BH STW 012A BH_STW_012A Test 1 Test name

Test date 10 Aug 21 Test depth 4.20 Metres table :
Ambient PWP :
Material 3.75 Metres 4.0 kPa

: Structureless chalk

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by SP/RW on 10 Aug 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

"Arm ave=0.25" Strain Origin (mm) : "Arm ave=137.8" Po from Marsland & Randolph (kPa) : Best estimate of Po (kPa) "Arm ave=97.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) "Arm ave=687.6"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 32.0

Angle of internal friction (°) "Arm ave=38.3" "Arm ave=7.7" Dilation angle (°) "Arm ave=0.434" Gradient of log-log plot

[Withers et al 1989]

Angle of internal friction (°) "Arm ave=38.0" "Arm ave=7.3" Dilation angle (°) Gradient of log-log plot "Arm ave=-2.593"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=33.2"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	142.0	1.780	926	0.238	339
Arm ave	2	131.9	4.094	1299	0.357	471
Arm ave	3	138.5	6.431	1587	0.386	536
Arm ave	4	138.1	9.076	1043	0.357	493

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	20.758	14.026	0.676
Arm ave	2	21.876	14.587	0.667
Arm ave	3	14.239	8.303	0.583
Arm ave	4	16.429	10.061	0.612

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

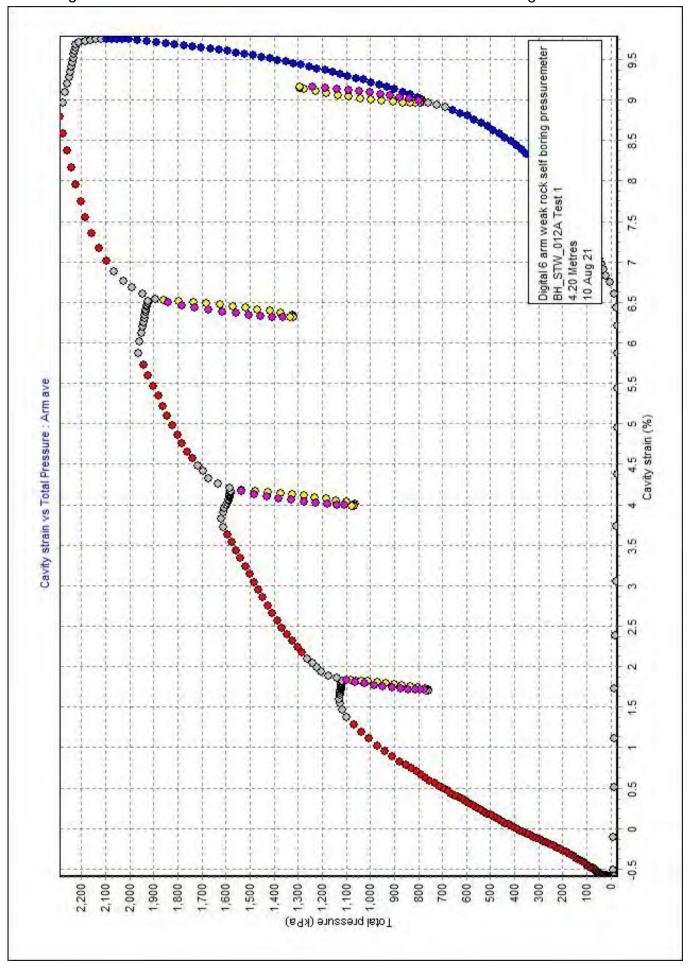
{Axis is Arm ave}

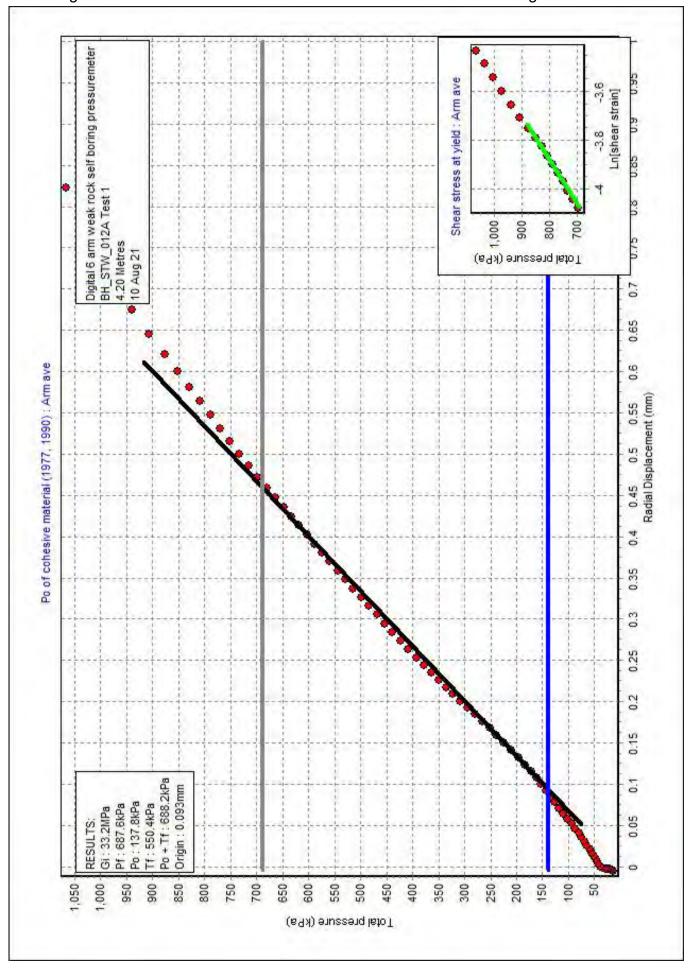
Strain Origin (mm) 0.25 Po (kPa) 97 Cohesion (kPa) 60 Angle of peak friction (deg) 38.3 Angle of peak dilation (deg) 7.7 Total yield stress (kPa) 324 CIR1506/21

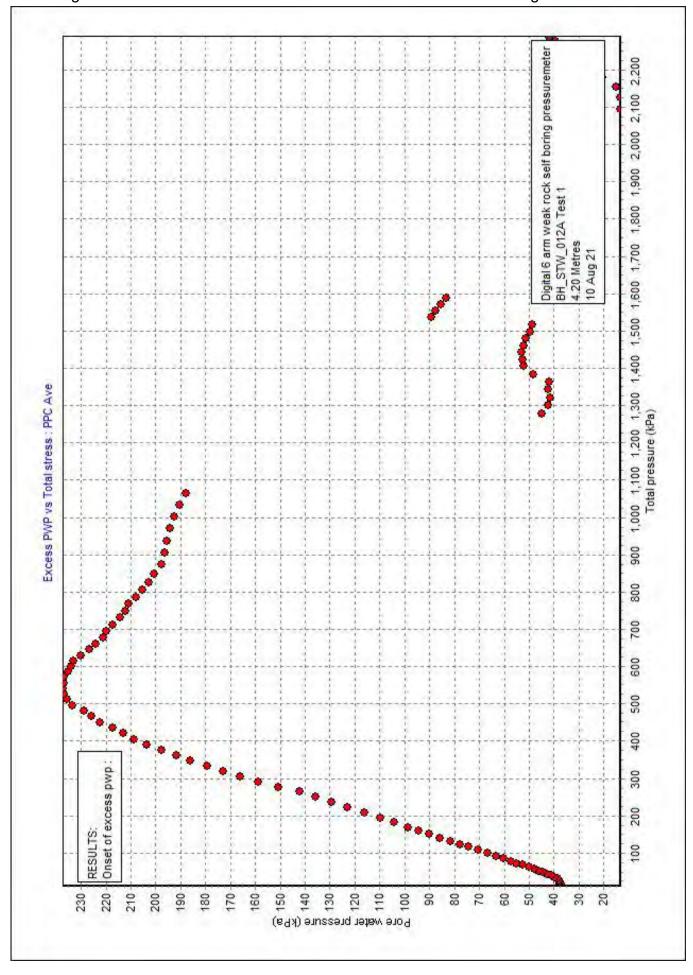
BH_STW_012A Test 1 - SUMMARY OF RESULTS

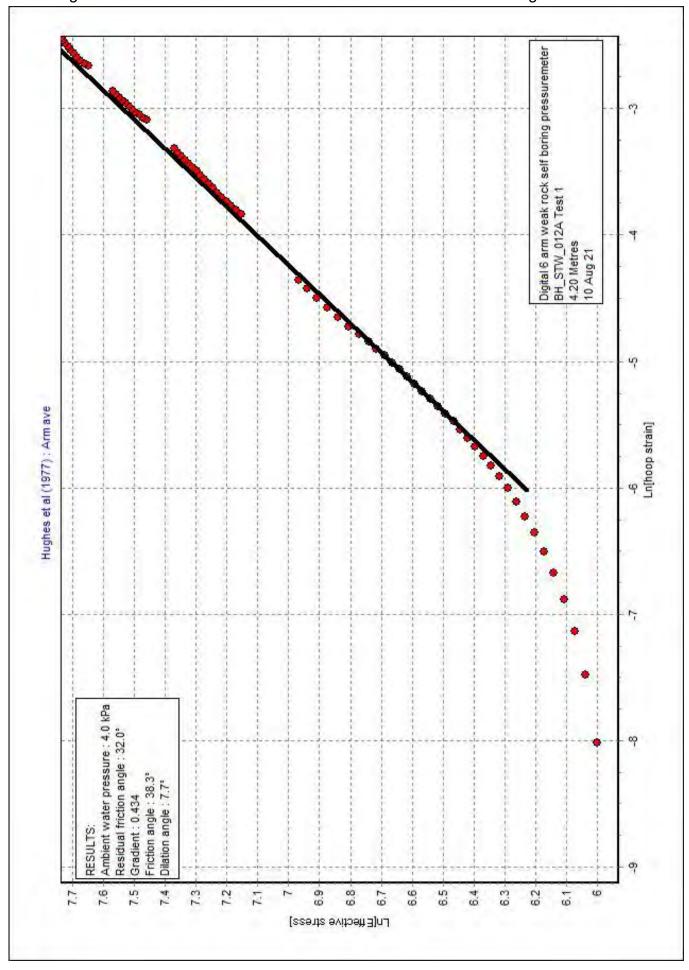
Total limit stress (kPa) : 5251
G at first yield (MPa) : 97.2
Non-linear exponent : 0.667
Janbu exponent : 0.109
Correlation : 0.631

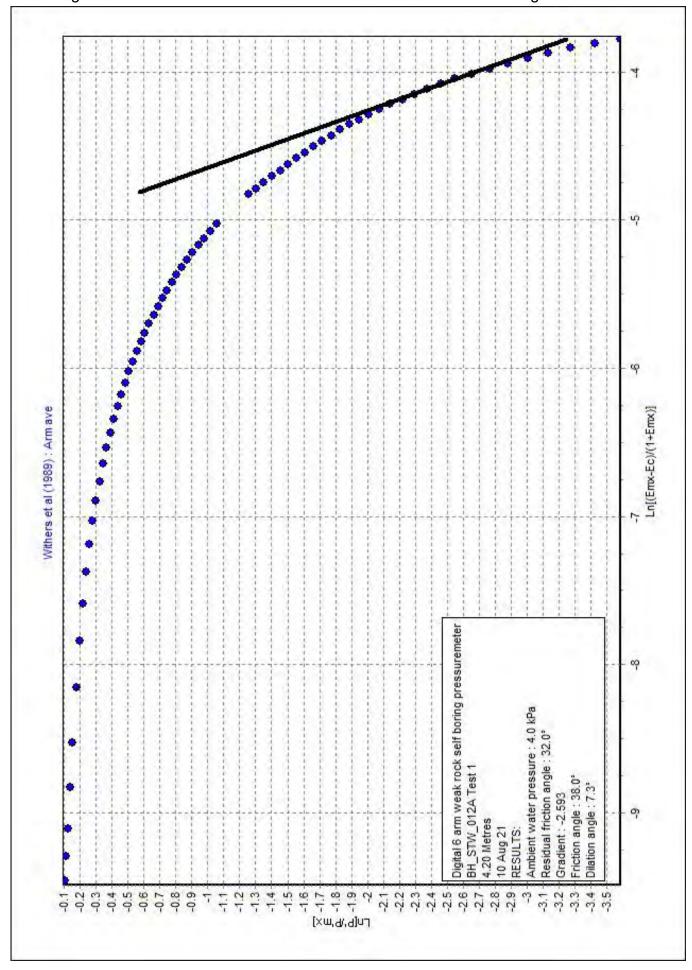
Ambient pore water pressure (kPa) : 4
Residual friction angle (deg) : 32.0
Poisson's ratio : 0.25

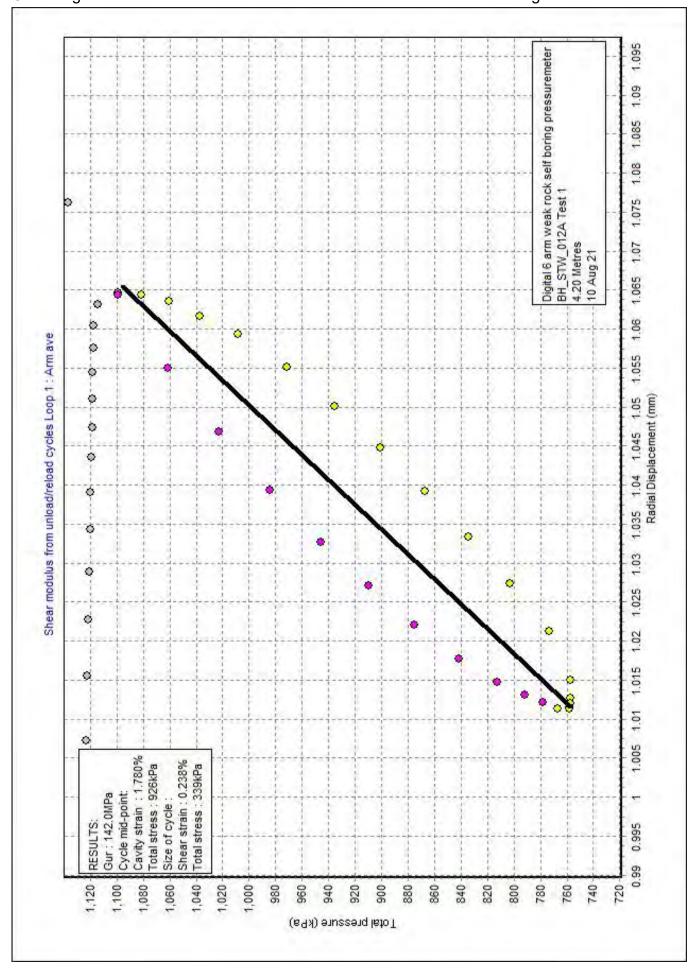


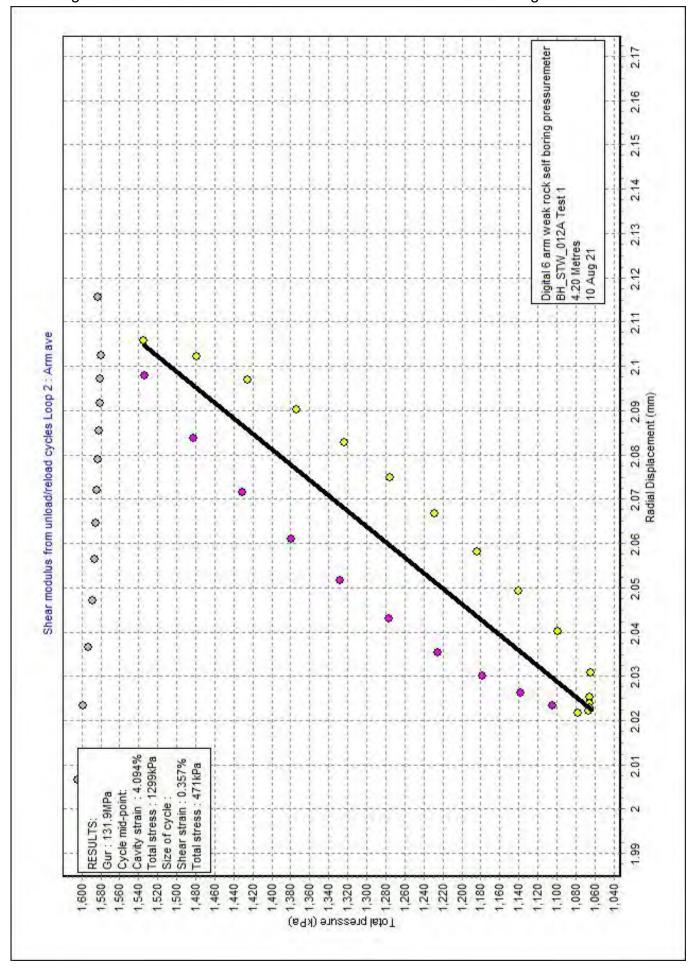


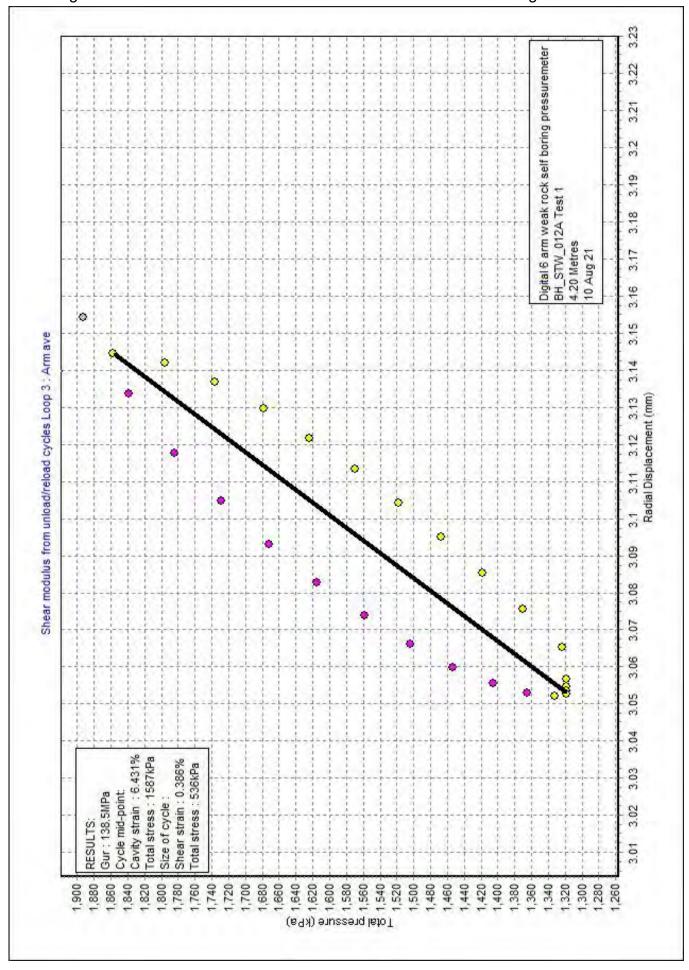


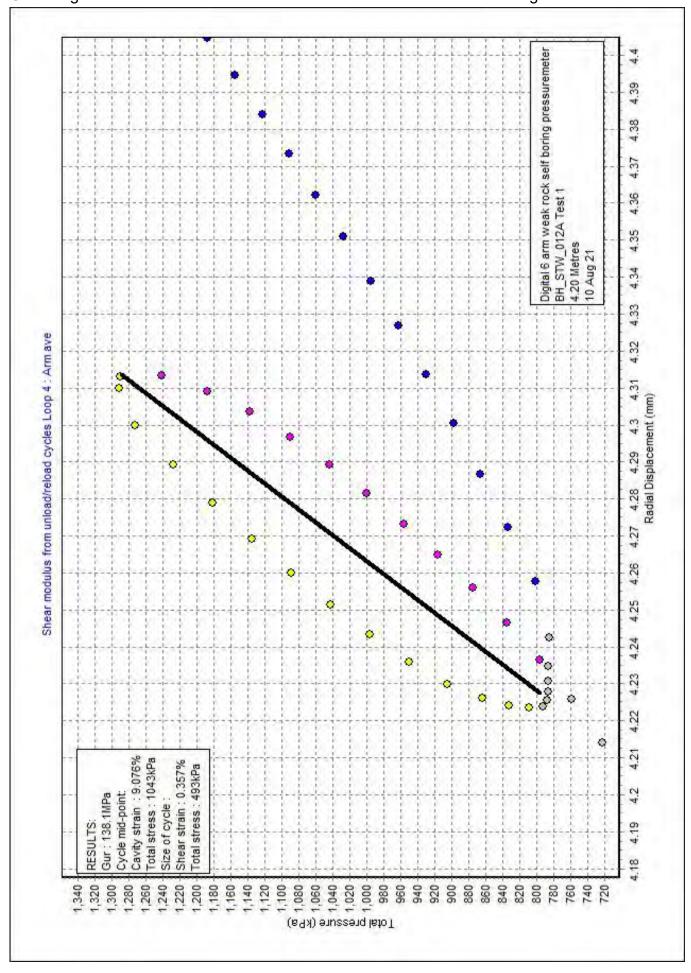


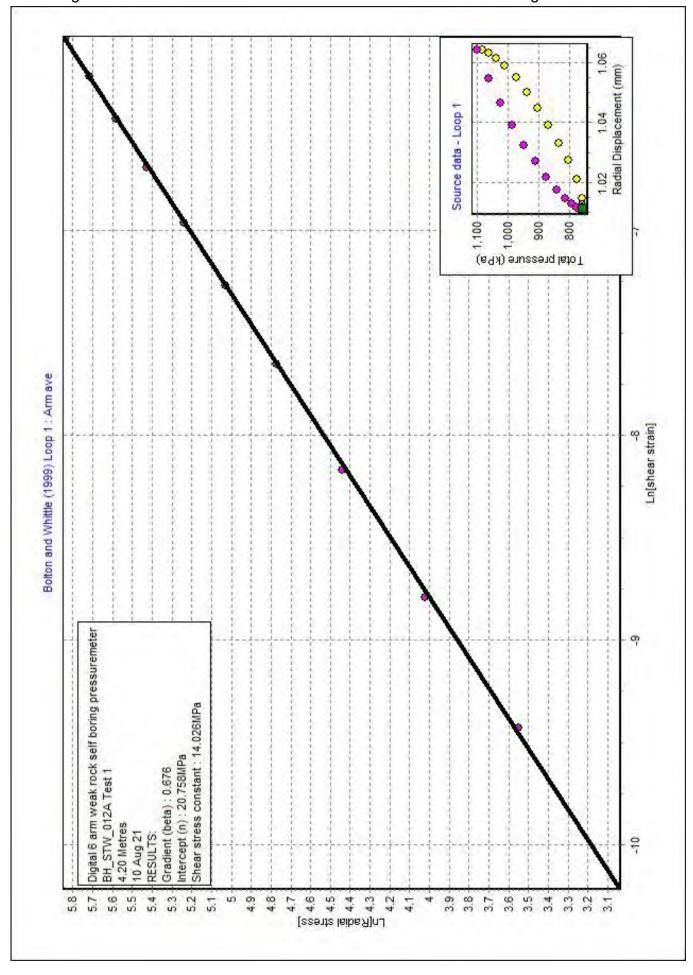


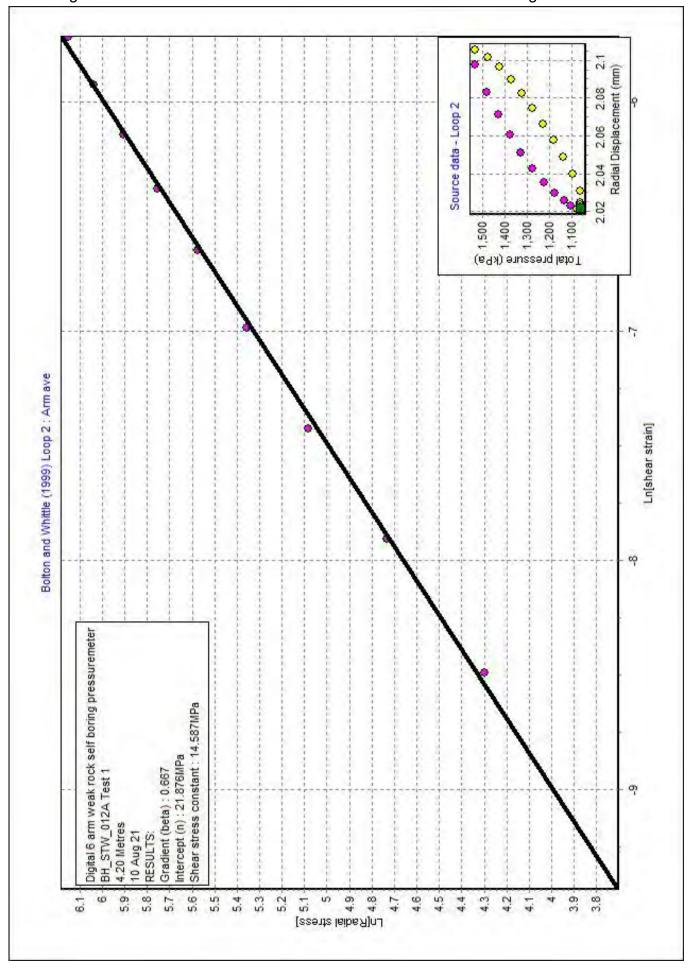


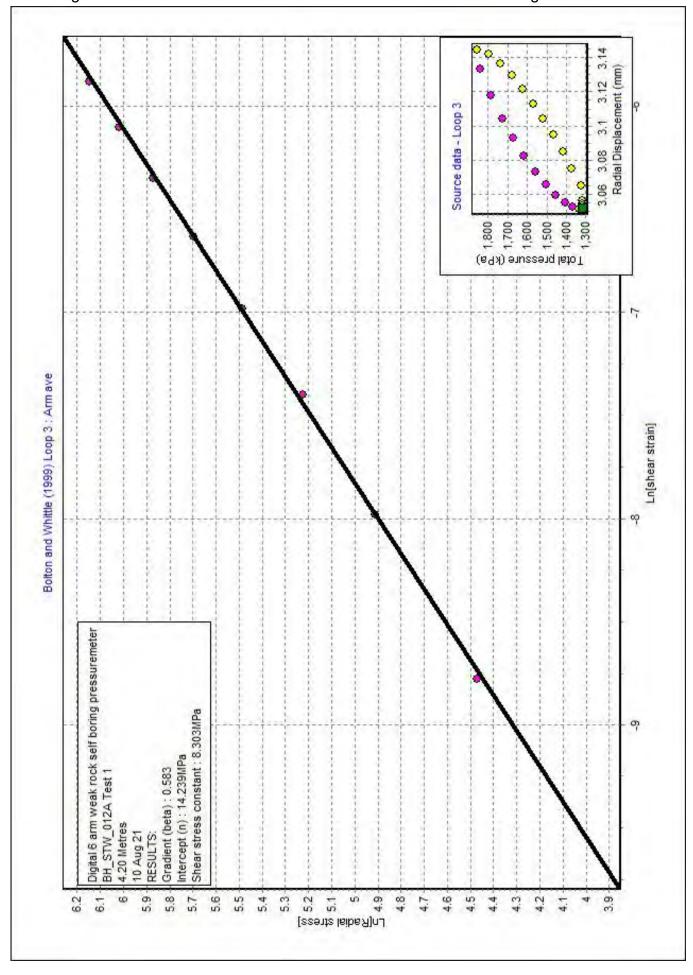


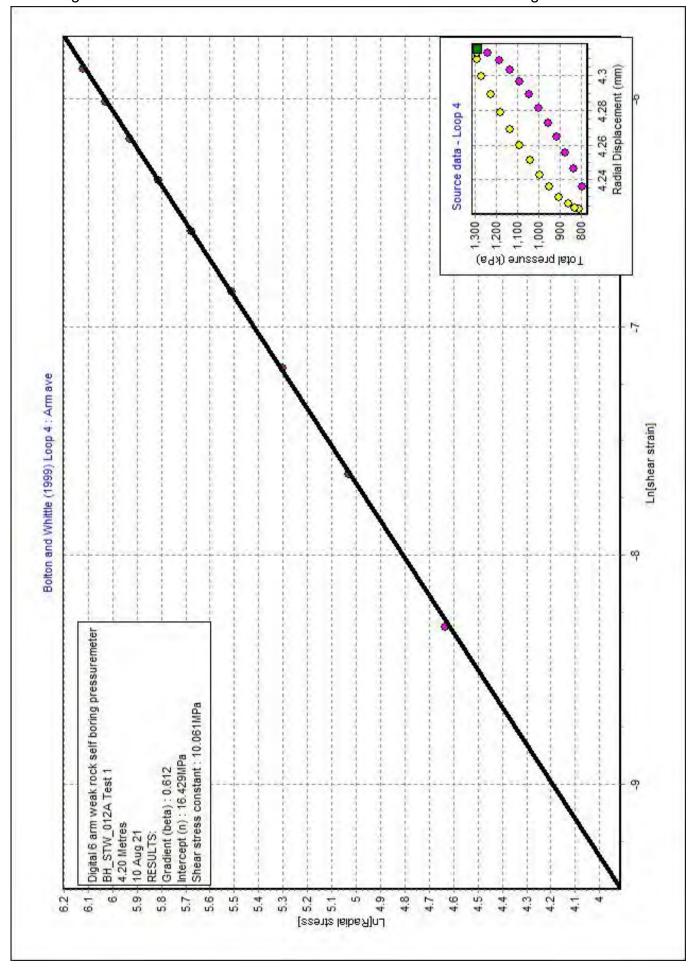


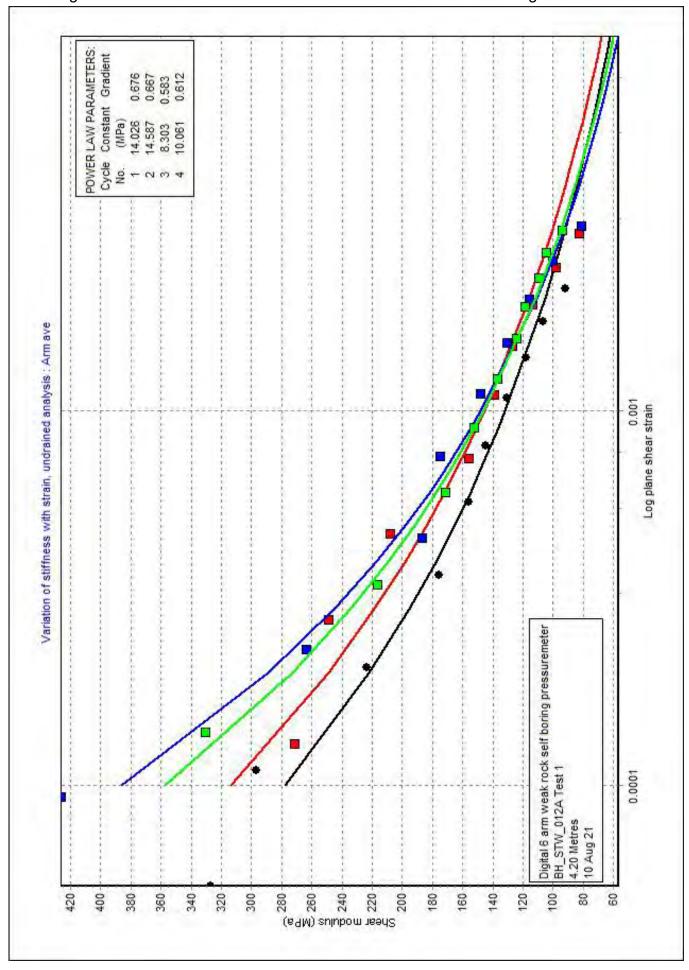


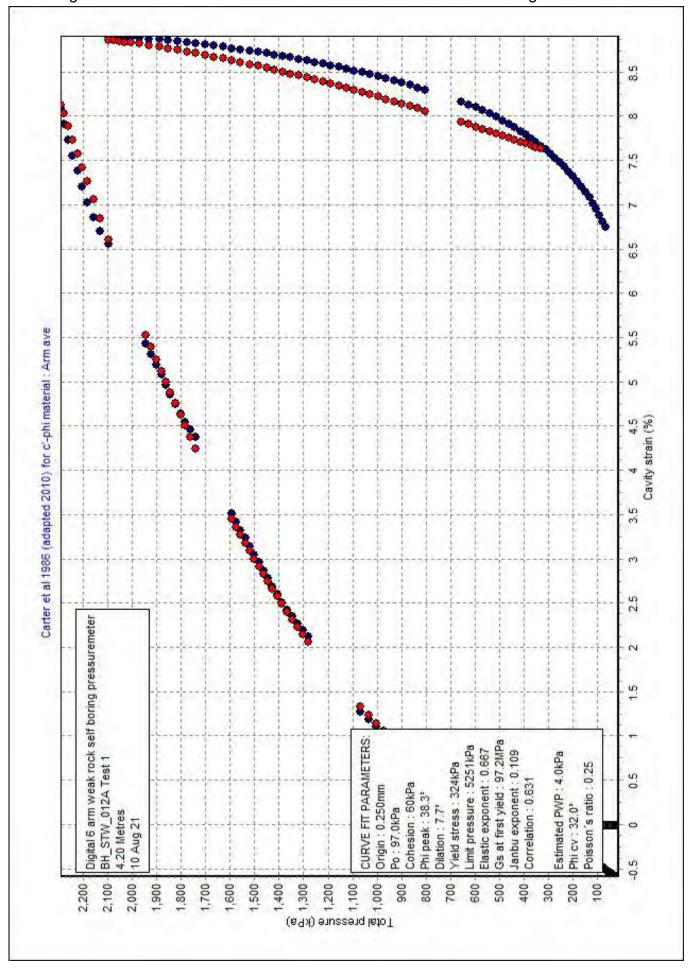


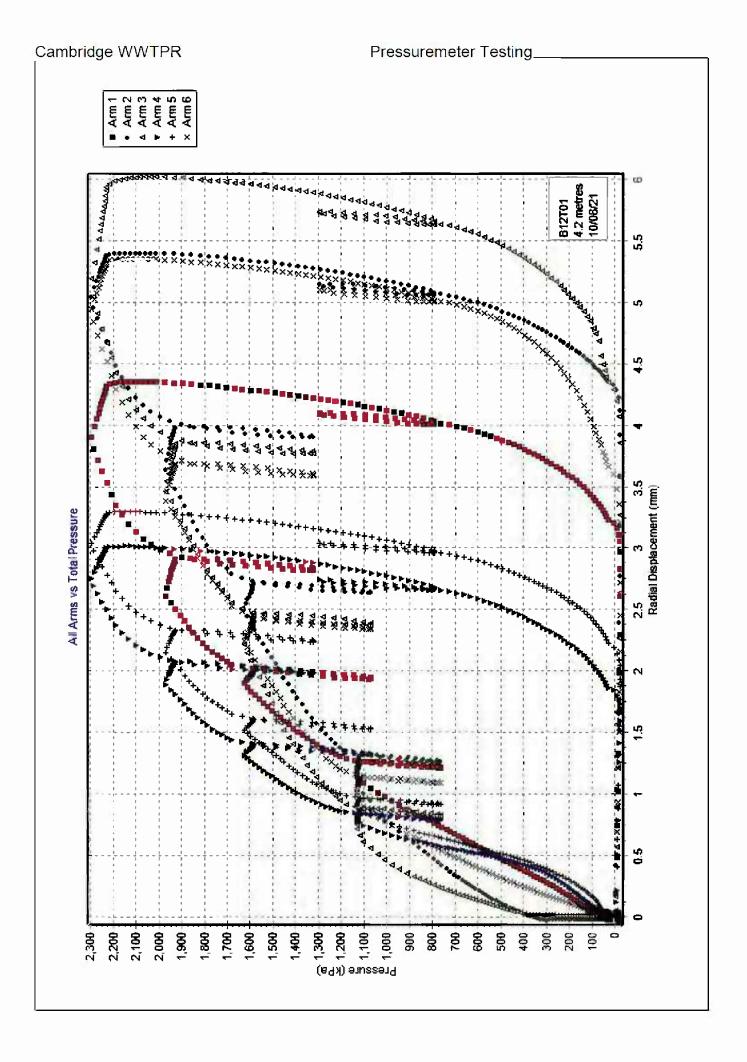


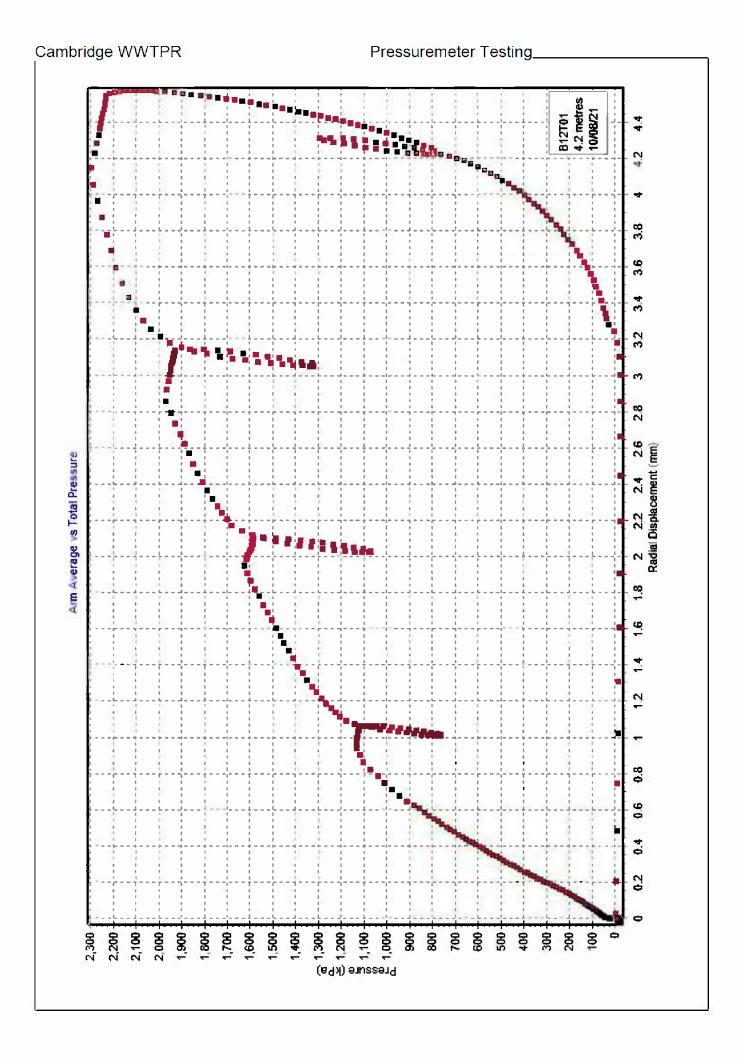


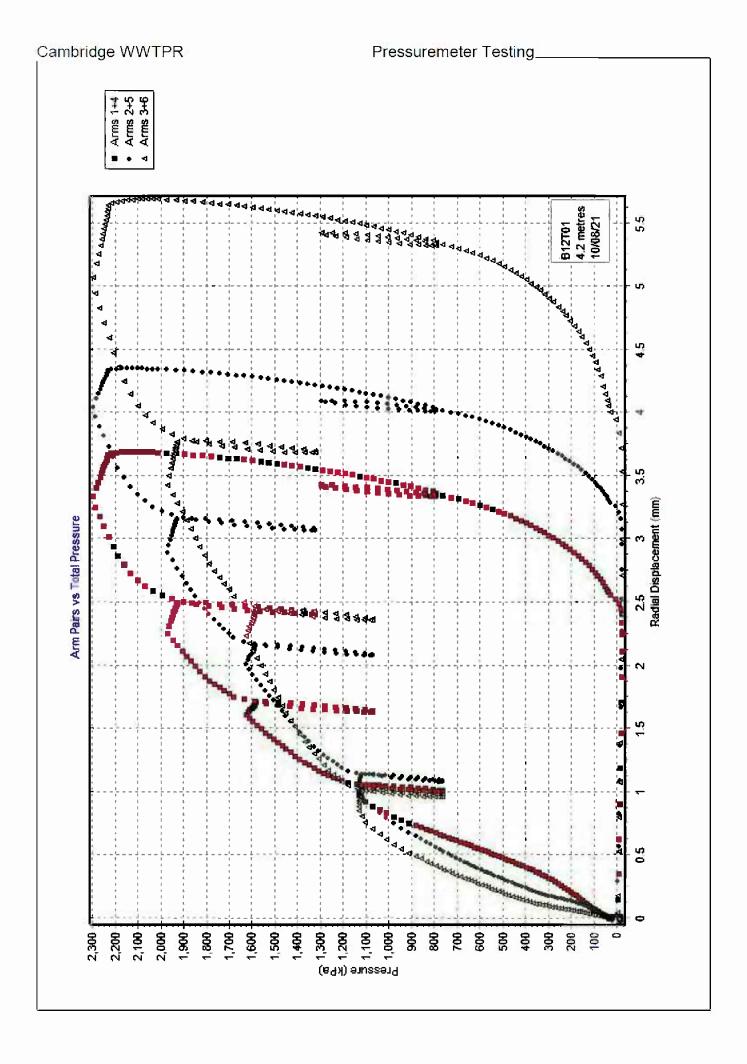


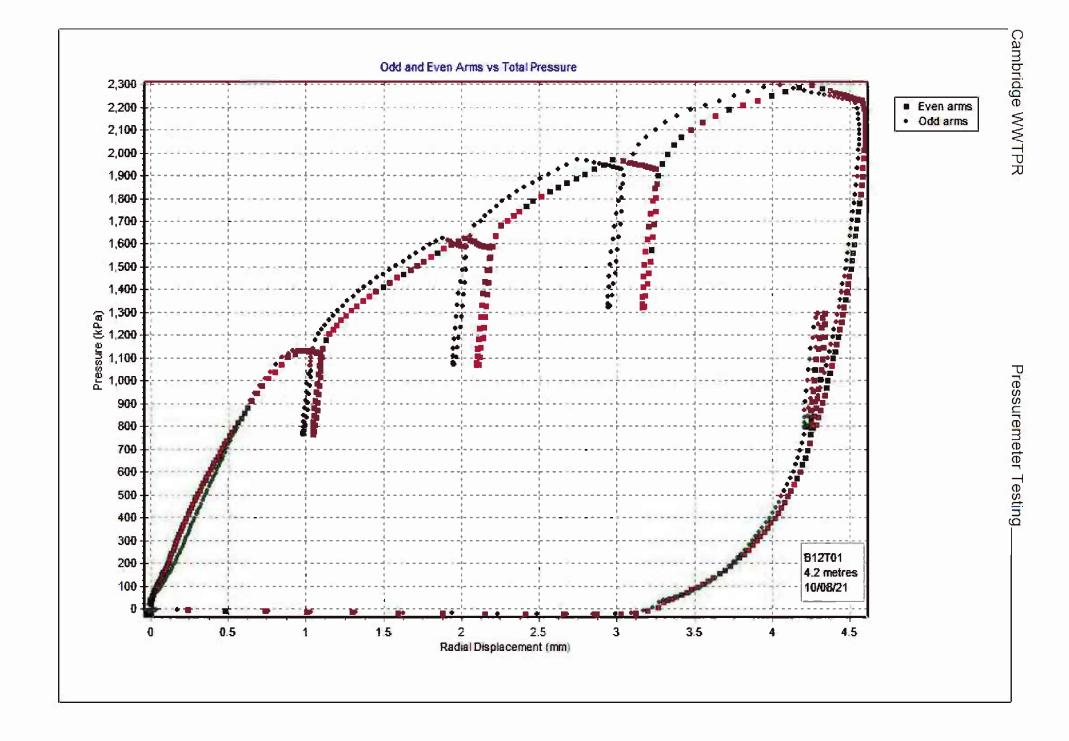


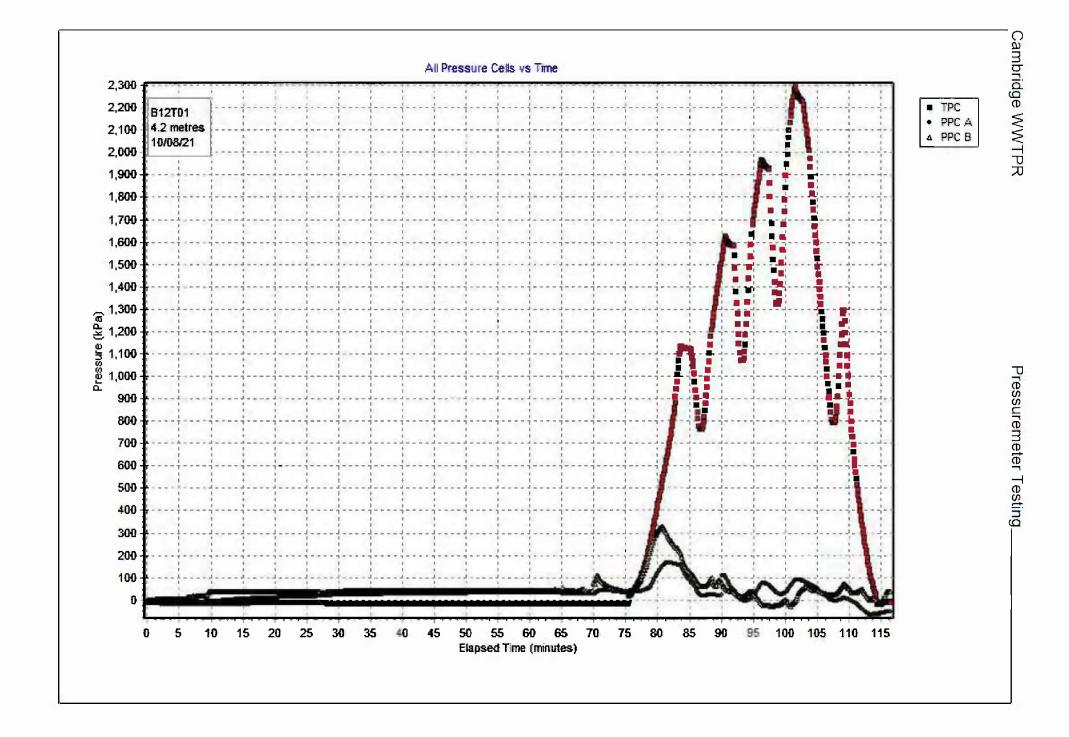












[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project,

Borehole : BH_STW_012A
Test name : BH_STW_012A Test 2

Test date : 10 Aug 21
Test depth : 7.70 Metres
Water table : 3.75 Metres
Ambient PWP : 39.0 kPa

Material : Structureless chalk

Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by SP/RW on 11 Aug 21

Remarks: Cycle 1 too early to be representative

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=3.71"
Po from Marsland & Randolph (kPa) : "Arm ave=152.5"
Best estimate of Po (kPa) : "Arm ave=91.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) : "Arm ave=609.6"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 27.0

Angle of internal friction (°) : "Arm ave=27.7"

Dilation angle (°) : "Arm ave=0.8"

Gradient of log-log plot : "Arm ave=0.322"

[Withers et al 1989]

Angle of internal friction (°) : "Arm ave=26.8"

Dilation angle (°) : "Arm ave=-0.2"

Gradient of log-log plot : "Arm ave=-1.652"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=9.3" dPc Axis Loop Value Mean Strain Mean Pc (MPa) (kPa) No (%) (kPa) (%) -0.519 271 97 Arm ave 1 59.2 0.163 Arm ave 2 126.5 1.401 531 0.147 186 3 129.5 3.955 701 0.173 224 Arm ave Arm ave 4 53.3 7.095 488 0.412 220

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	25.714	22.372	0.870
Arm ave	2	17.728	12.341	0.696
Arm ave	3	17.952	12.192	0.679
Arm ave	4	7.073	4.327	0.612

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

Strain Origin (mm) : 3.71

Po (kPa) : 147

Cohesion (kPa) : 23

Angle of peak friction (deg) : 27.7

Angle of peak dilation (deg) : 0.8

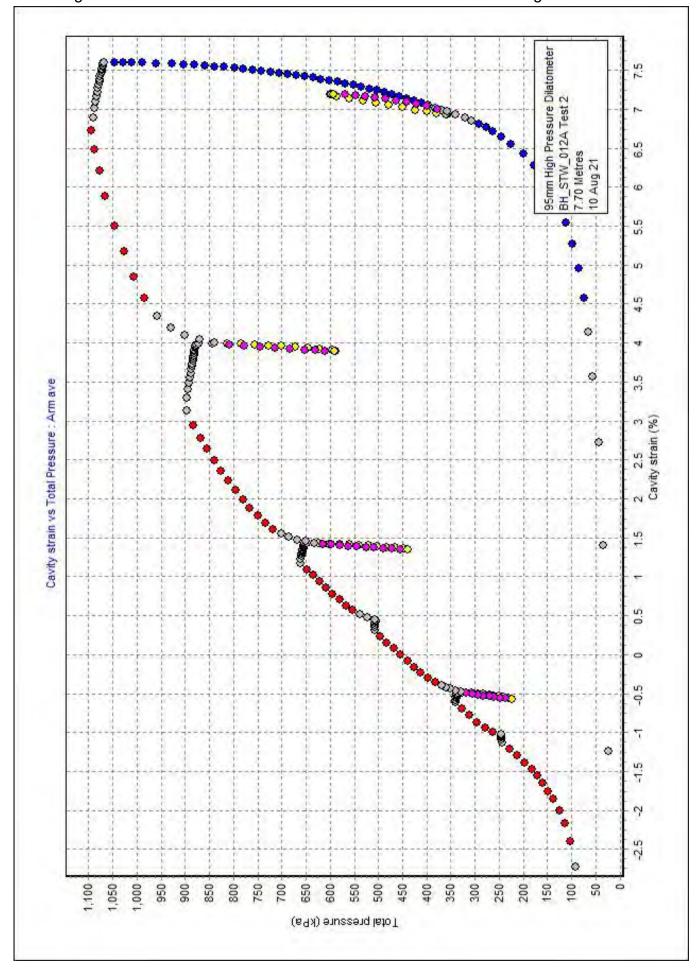
Total yield stress (kPa) : 280

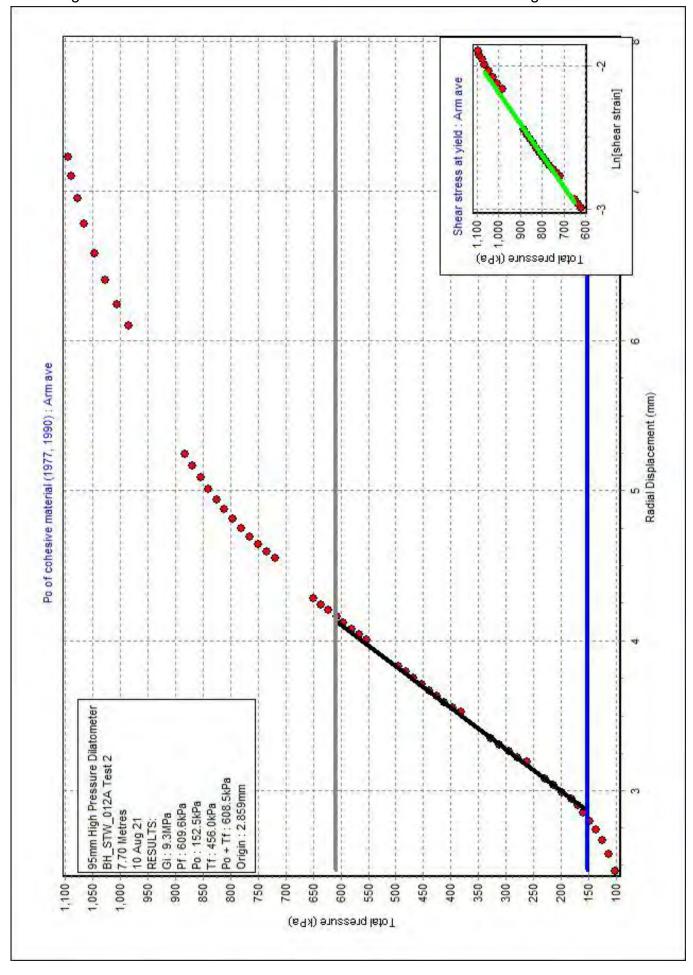
CIR1506/21

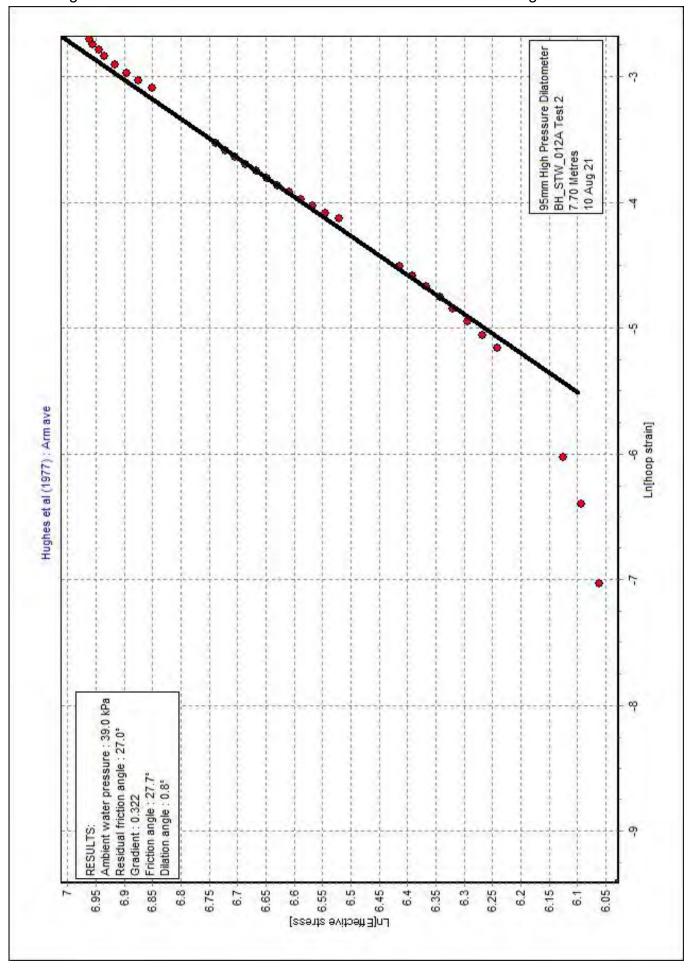
BH_STW_012A Test 2 - SUMMARY OF RESULTS

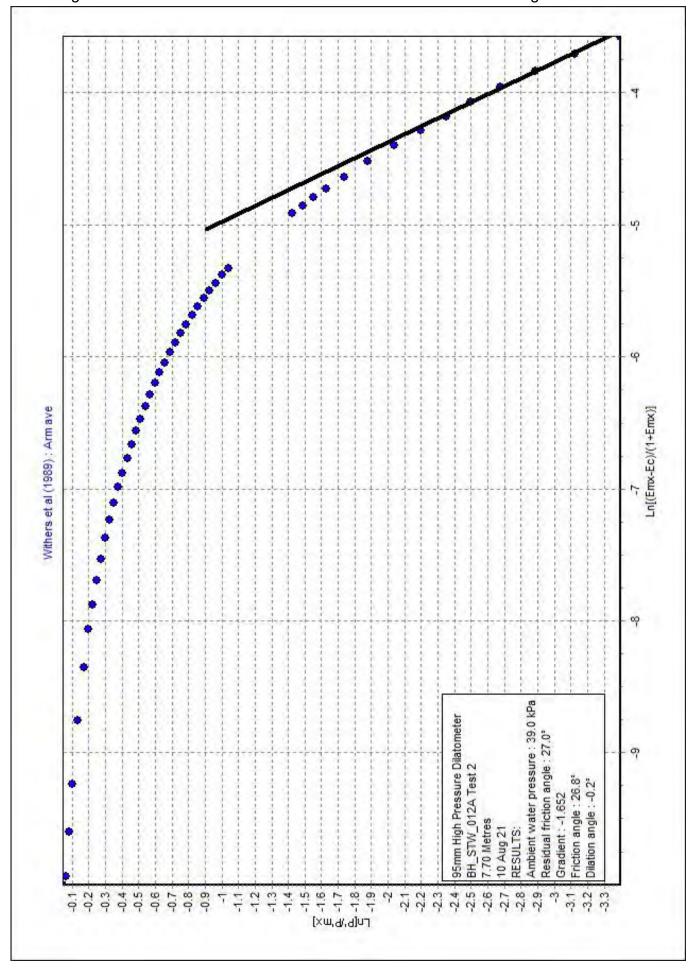
Total limit stress (kPa) : 2128
G at first yield (MPa) : 70.6
Non-linear exponent : 0.679
Janbu exponent : 0.229
Correlation : 0.151

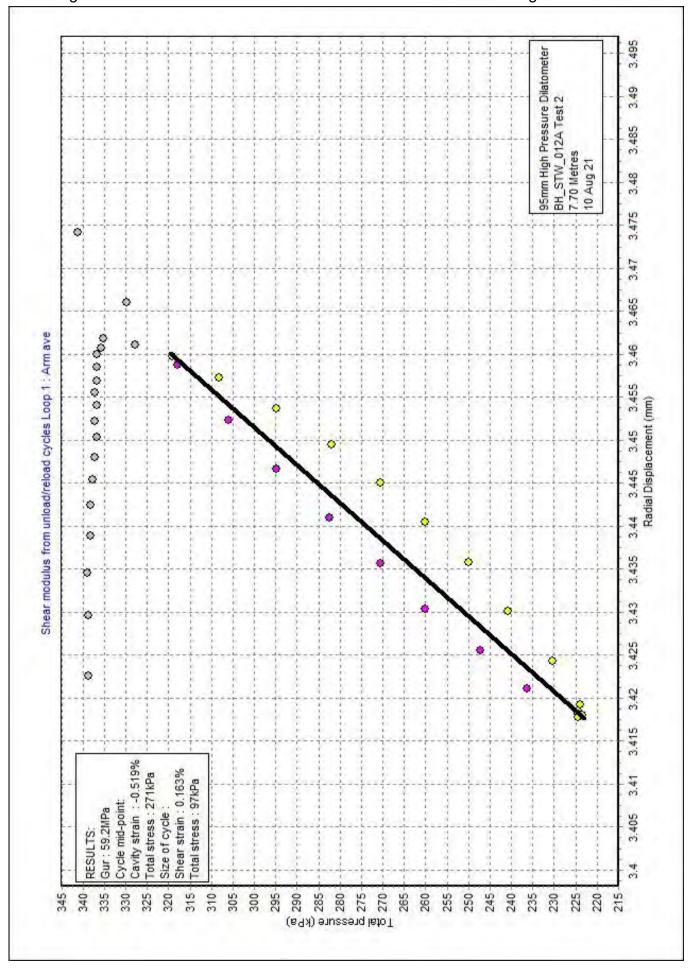
Ambient pore water pressure (kPa) : 39
Residual friction angle (deg) : 27.0
Poisson's ratio : 0.25

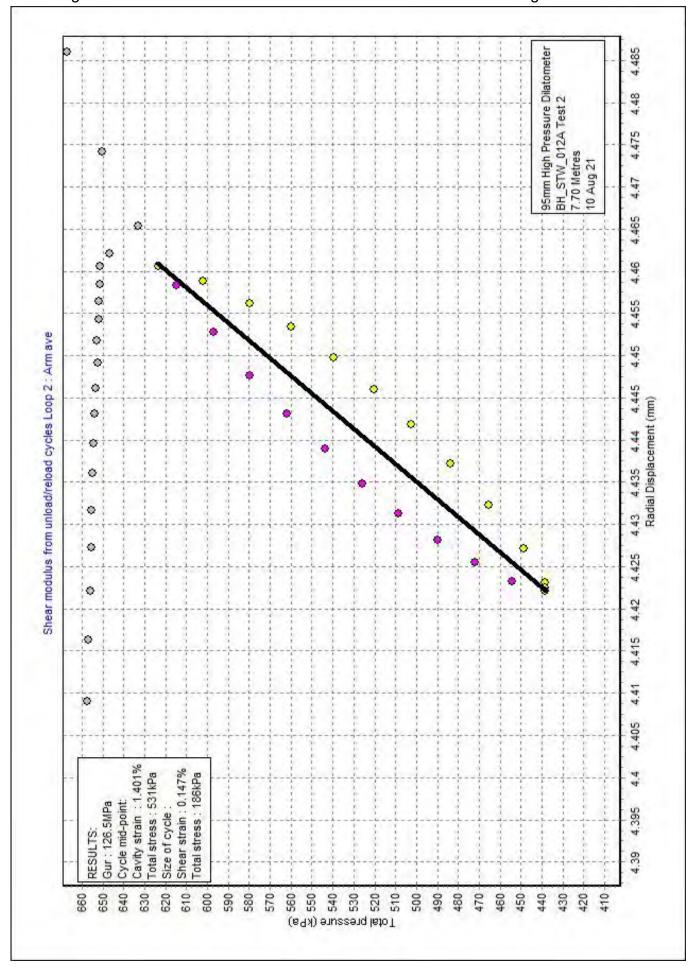


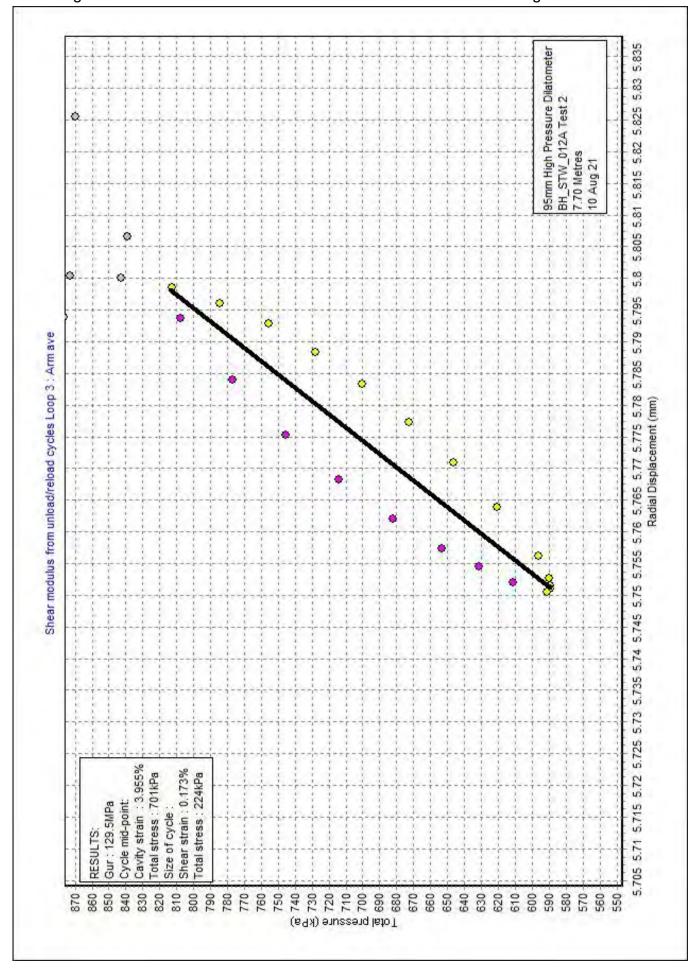


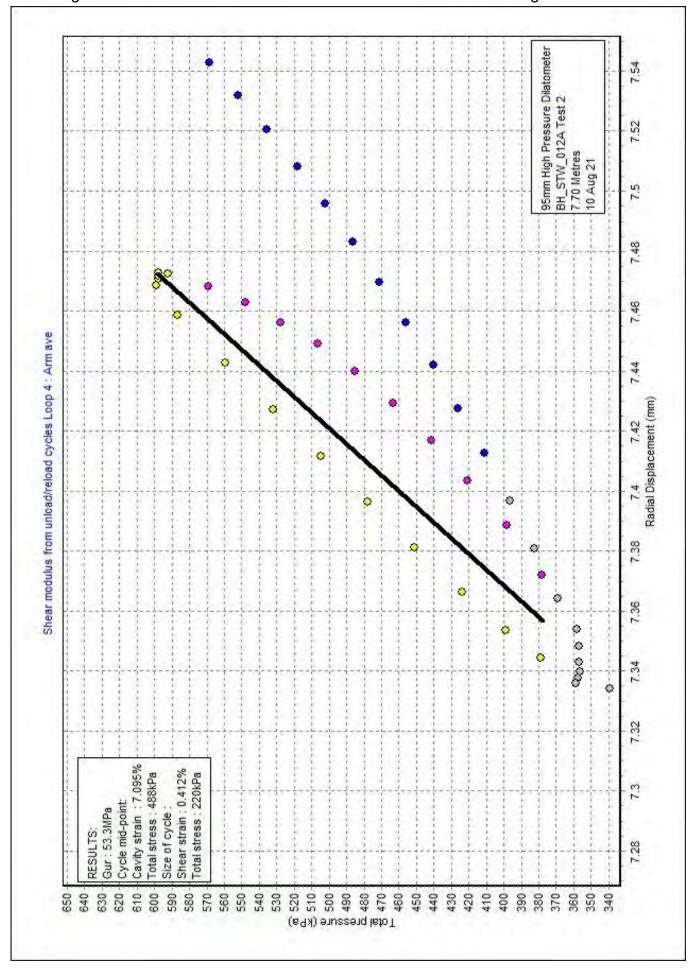


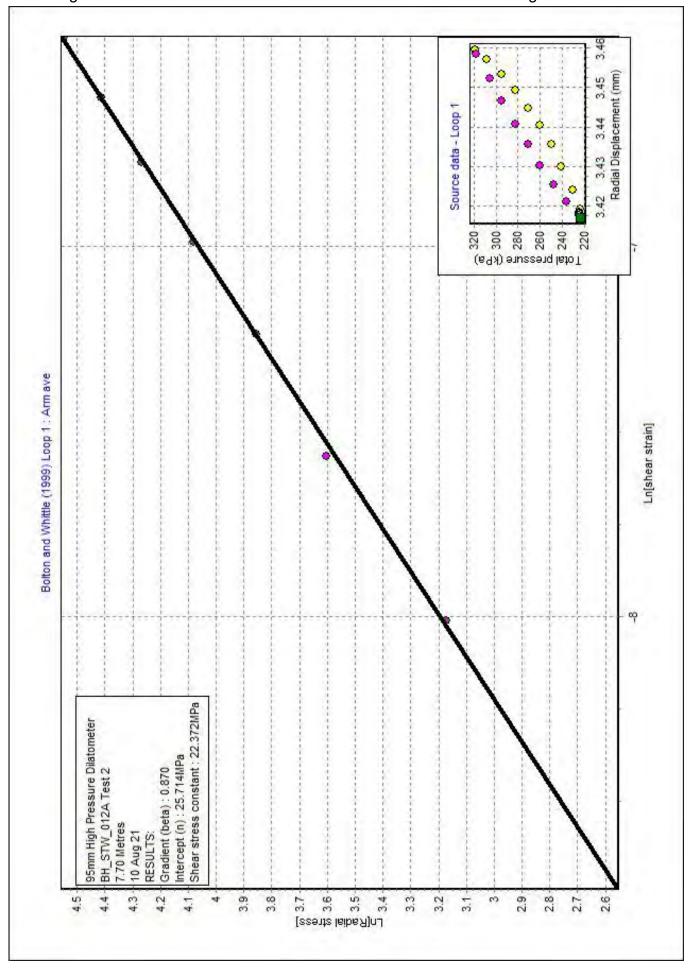


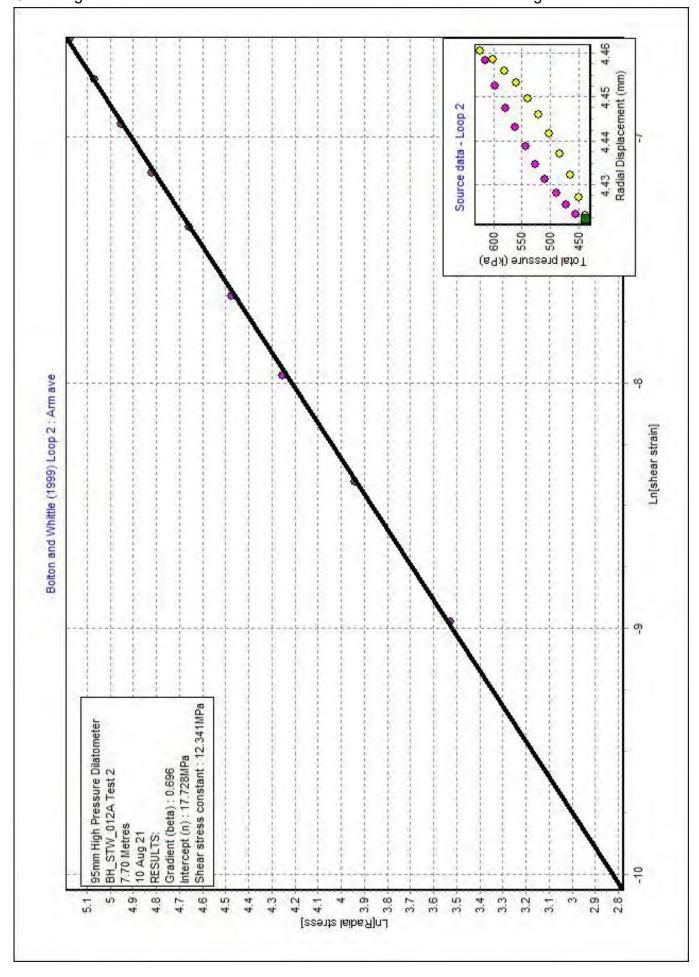


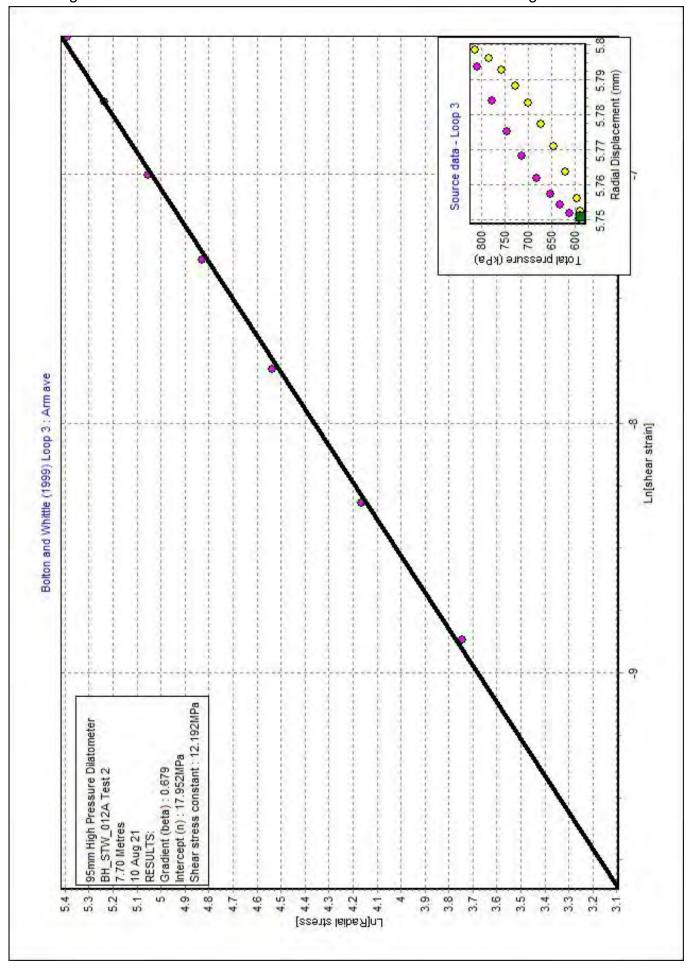


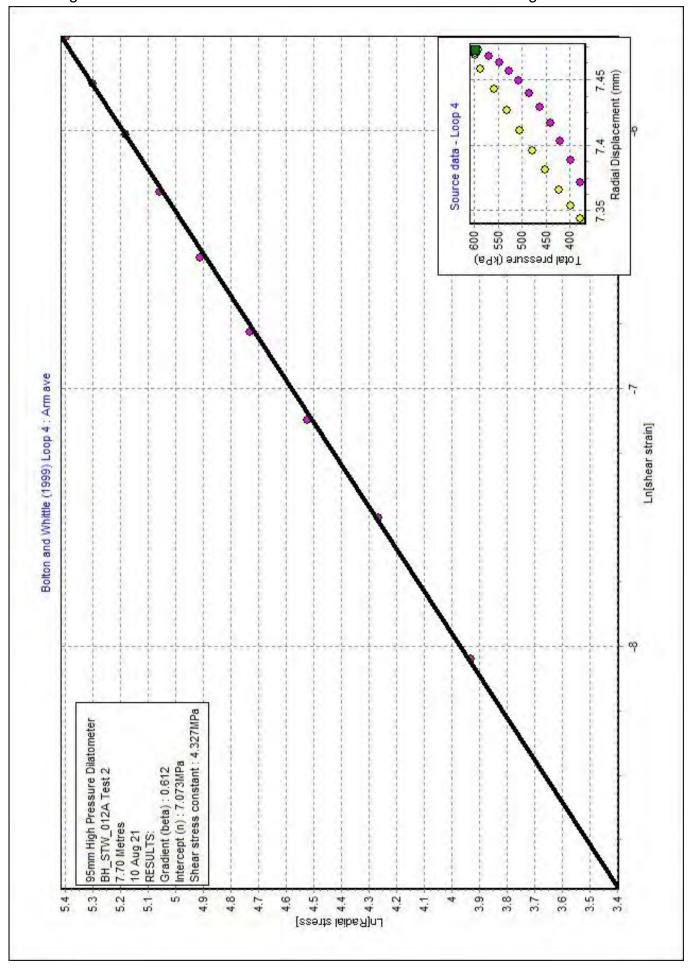


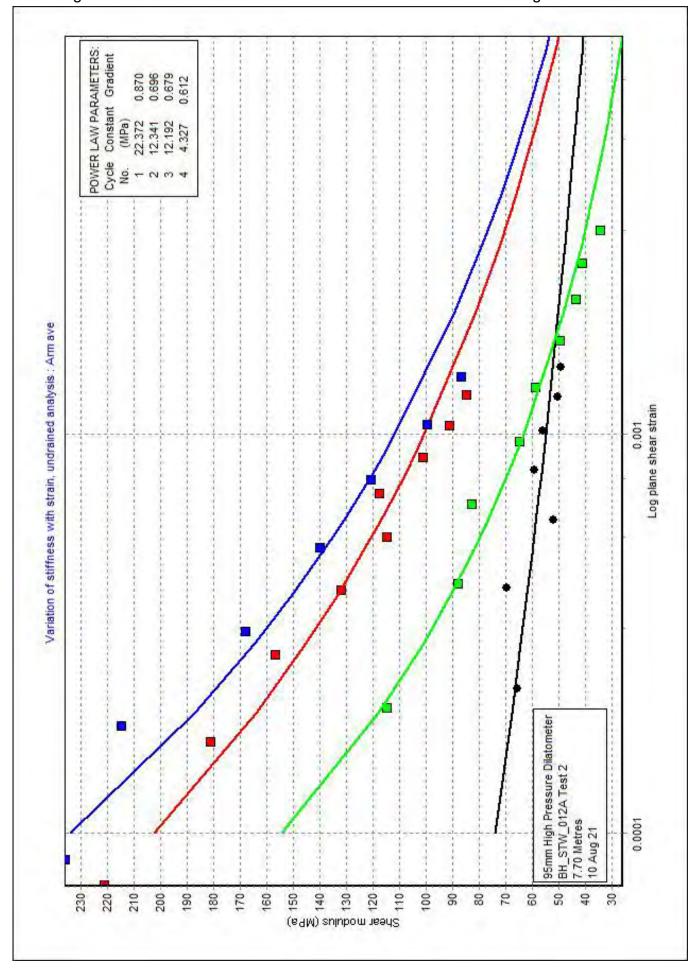


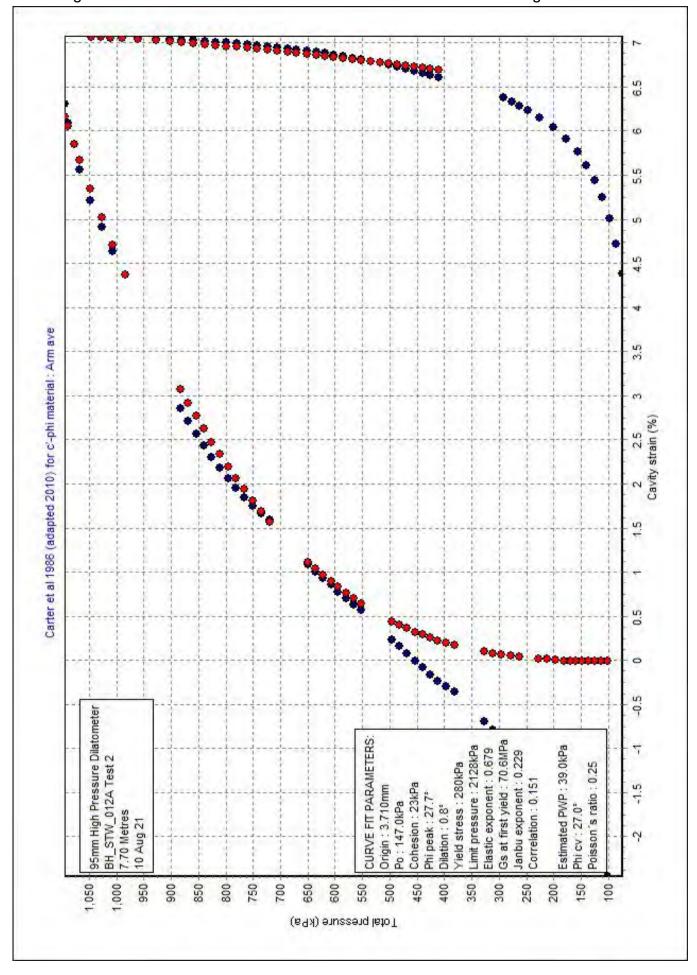


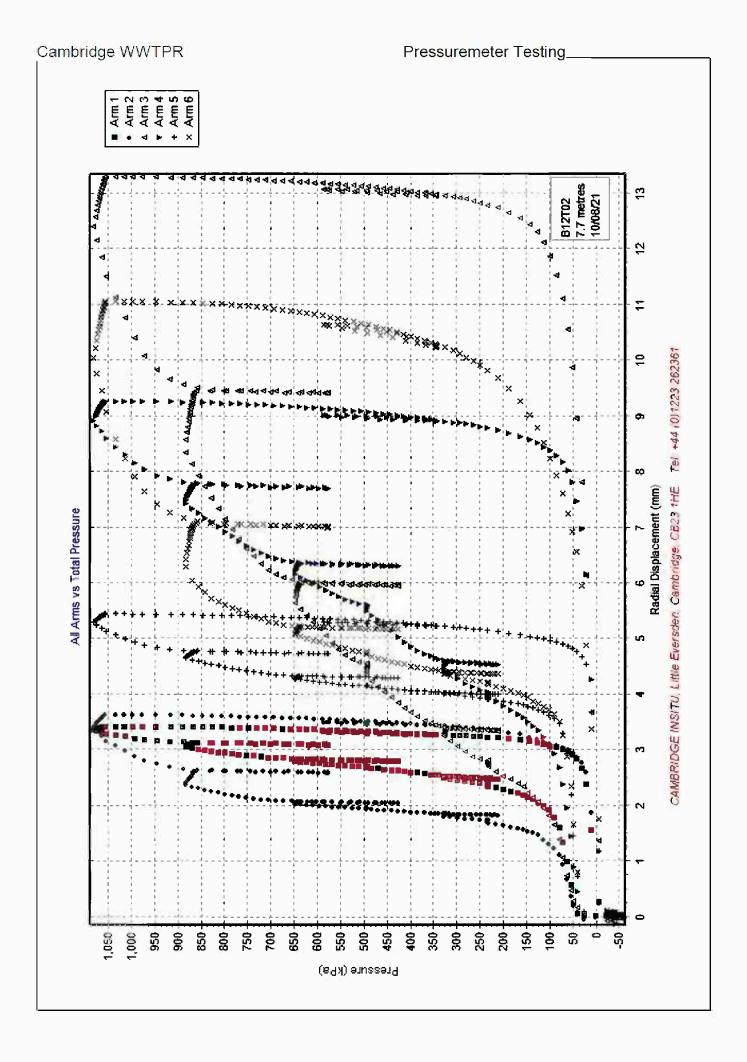






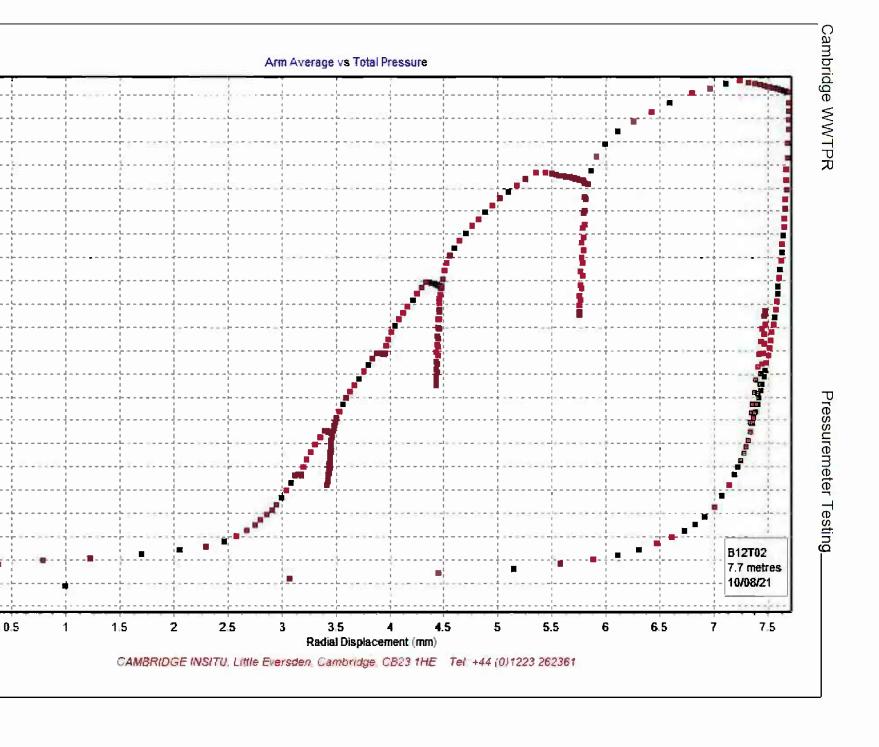


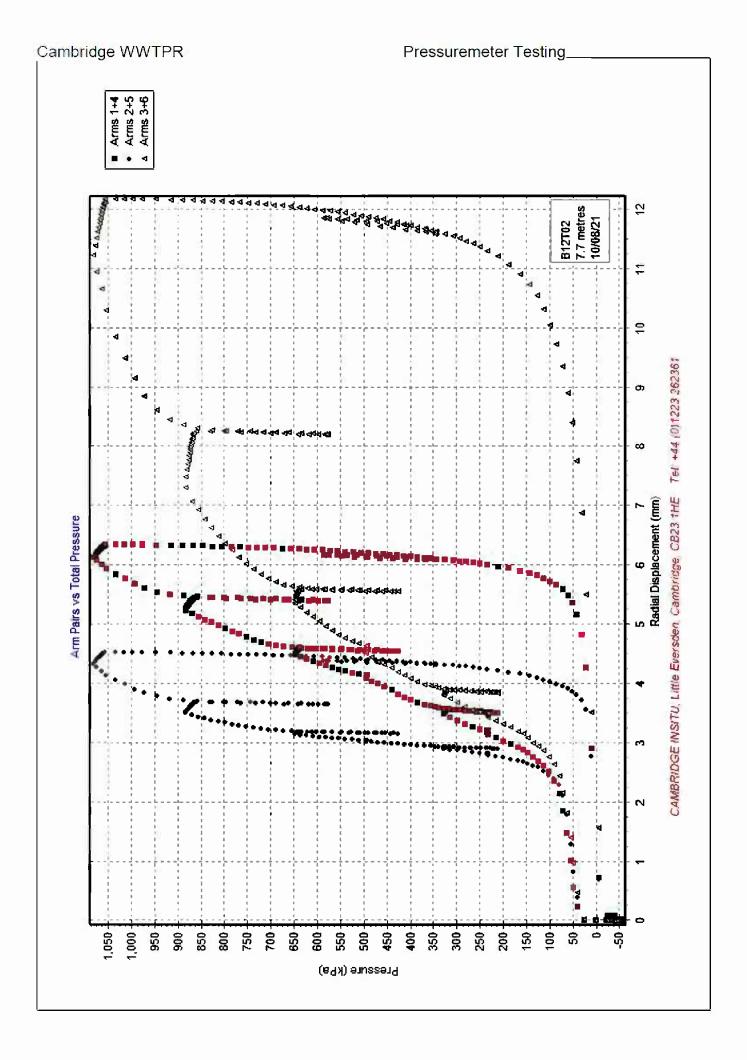


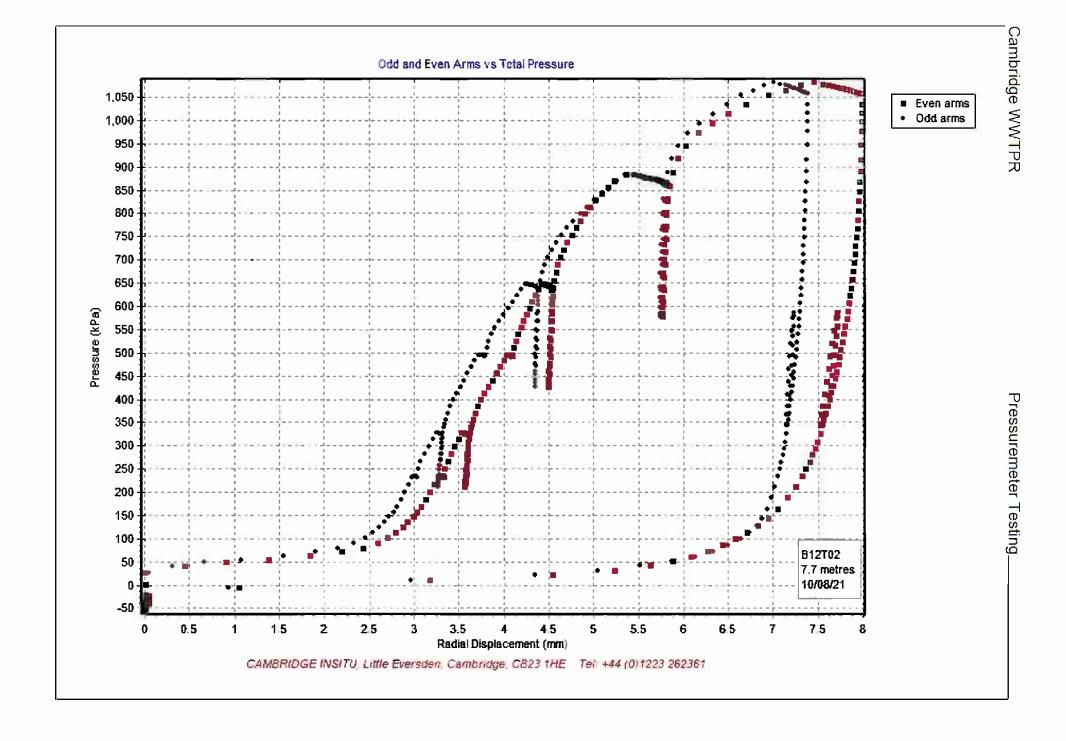


Pressure (kPa)

-50







[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_STW_012A
Test name : BH_STW_012A Test 3

Test date : 11 Aug 21
Test depth : 13.20 Metres
Water table : 3.75 Metres
Ambient PWP : 93.0 kPa
Material : Gault Clay

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by SP/RW on 11 Aug 21

Remarks: Arm 2 moves more than twice as much as any other arm and forces an early end to the test. Appears to be significantly disturbed.

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=0.79"
Po from Marsland & Randolph (kPa) : "Arm ave=347.6"
Po from Lift off (kPa) : "Arm ave=333.1"
PWP versus Total Stress (kPa) : "PPC Ave=238.3"
Best estimate of Po (kPa) : "Arm ave=318.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=171.6"
Limit pressure (kPa) : "Arm ave=1468"
Jefferies 1988 - Cu (kPa) : "Arm ave=173.0"
Undrained yield stress (kPa) : "Arm ave=492.7"
PWP derived yield stress (kPa) : "PPC Ave=468.7"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=23.4"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	37.5	0.708	621	0.666	251
Arm ave	2	33.6	1.542	439	0.793	267

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis Intercept Alpha Gradient Loop Nο (MPa) (MPa) Arm ave 1 5.995 3.770 0.629 2 5.574 3.446 0.618 Arm ave

Non-linear exponent from PWP response : "PPC Ave=0.447"

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 0.79

 Po (kPa)
 : 318

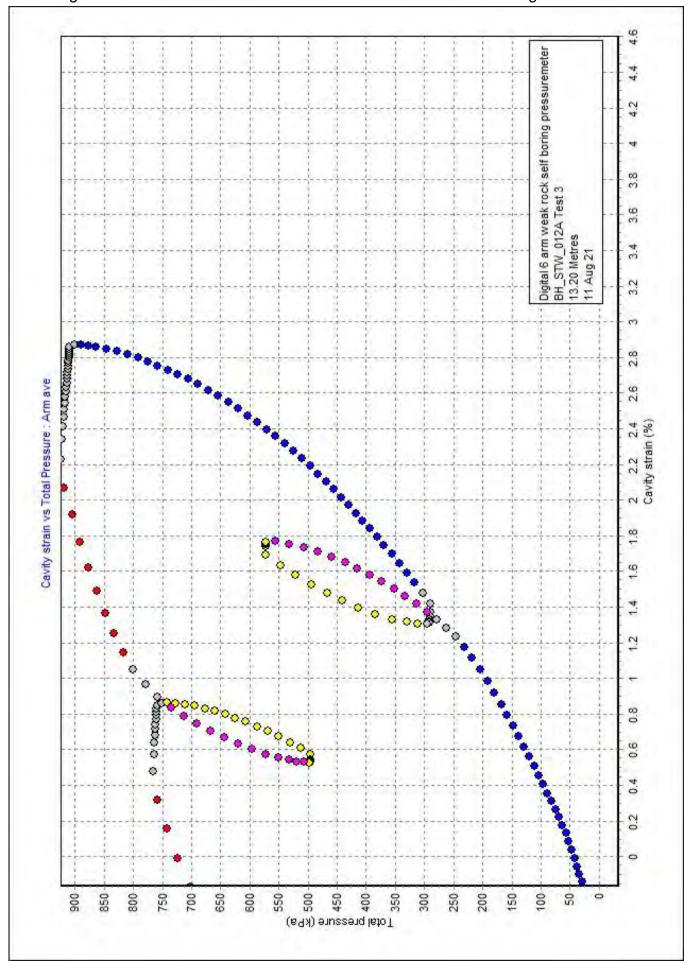
 Cu (kPa)
 : 171.6

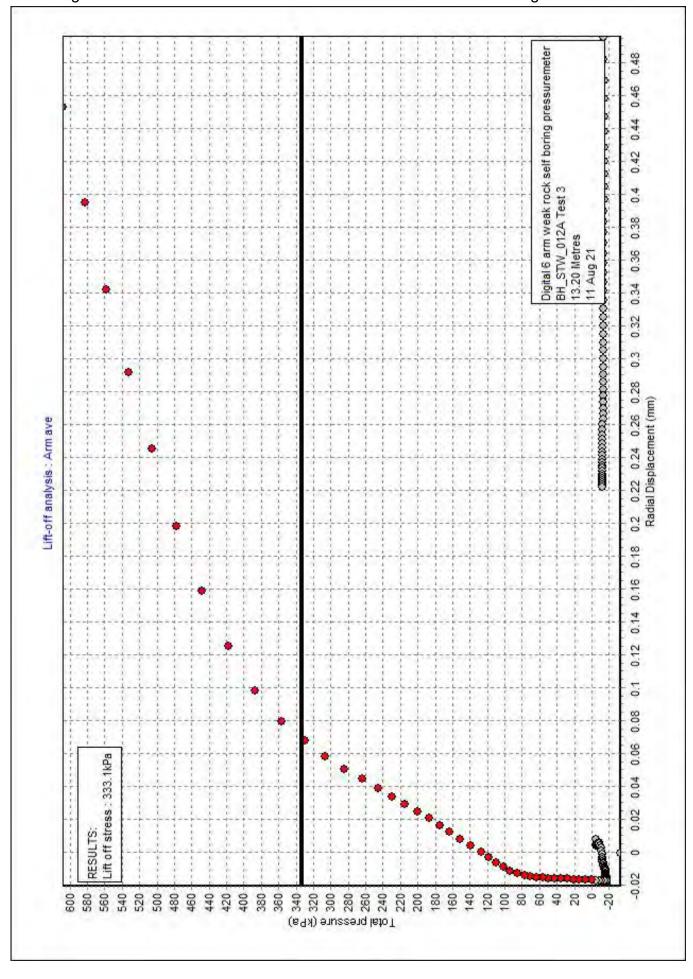
 Limit pressure (kPa)
 : 1468

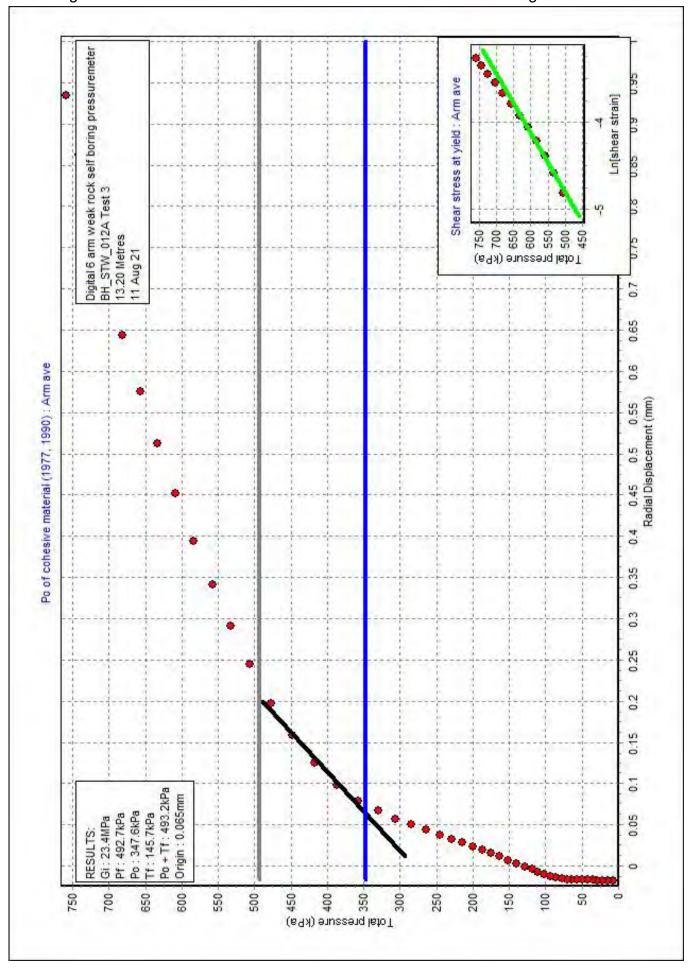
 Non-linear exponent
 : 0.618

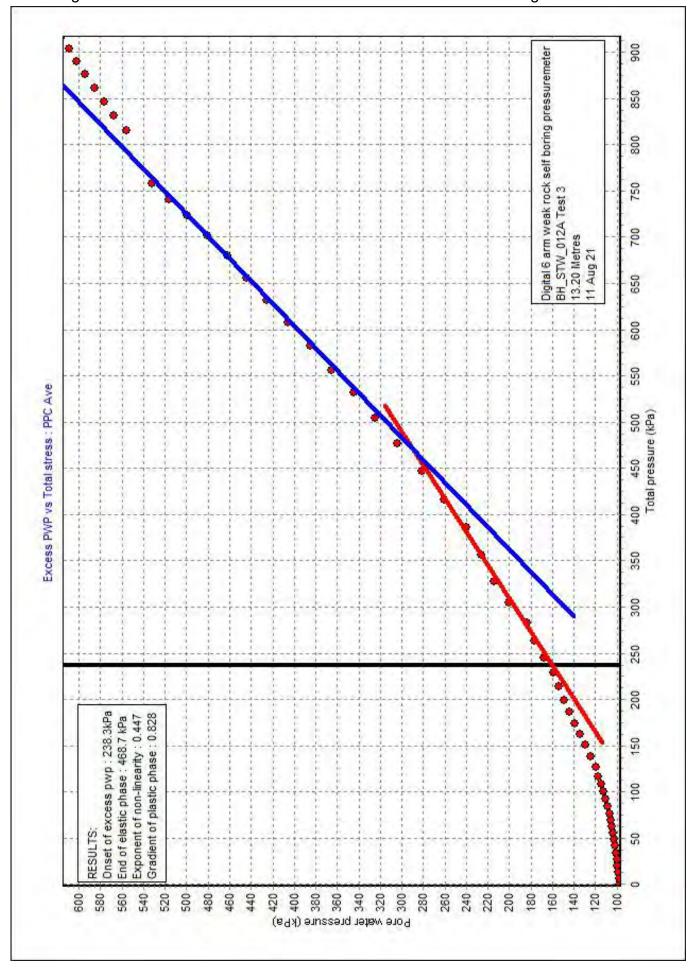
 Calculated alpha (MPa)
 : 3.979

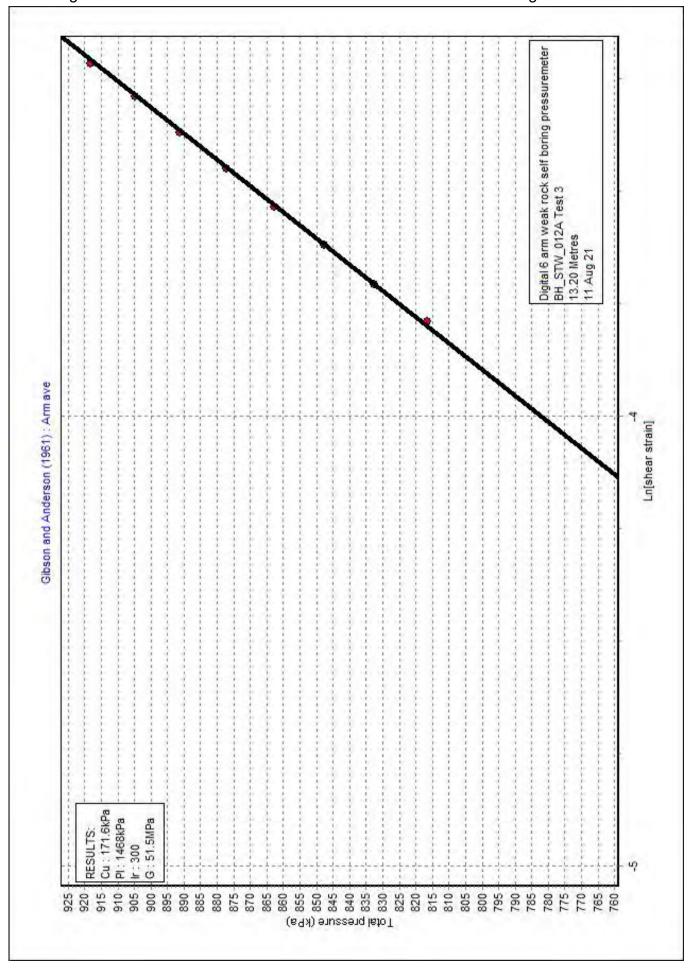
 G at yield (MPa)
 : 27.8

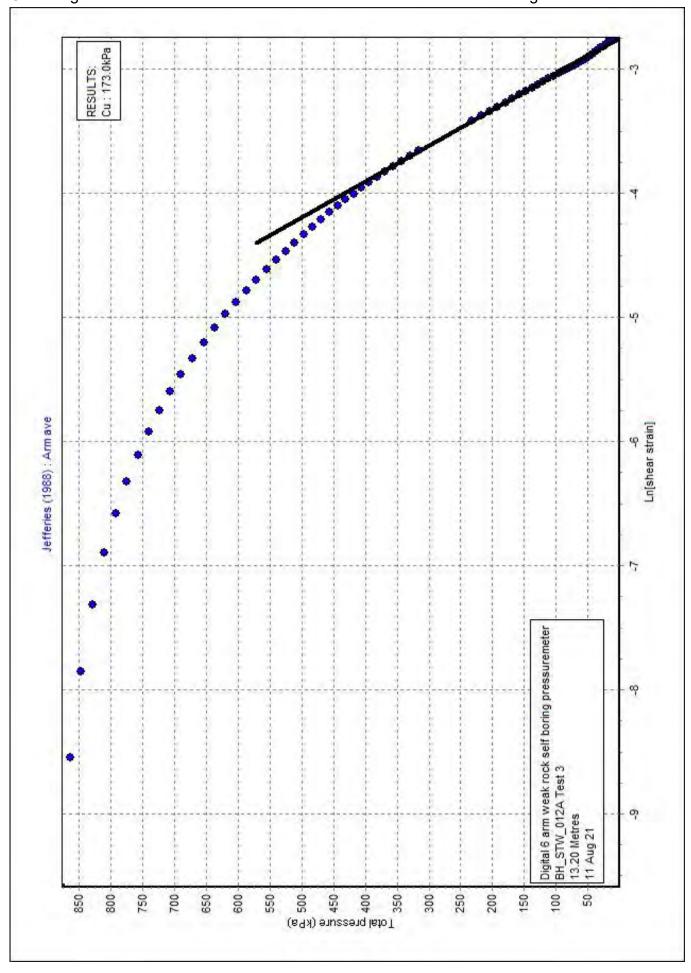


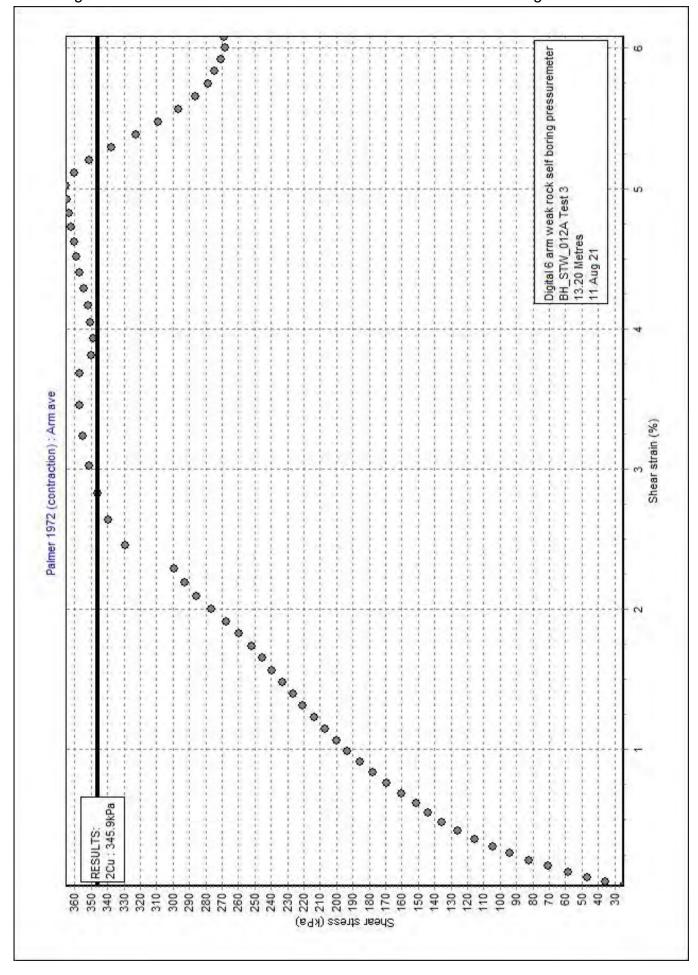


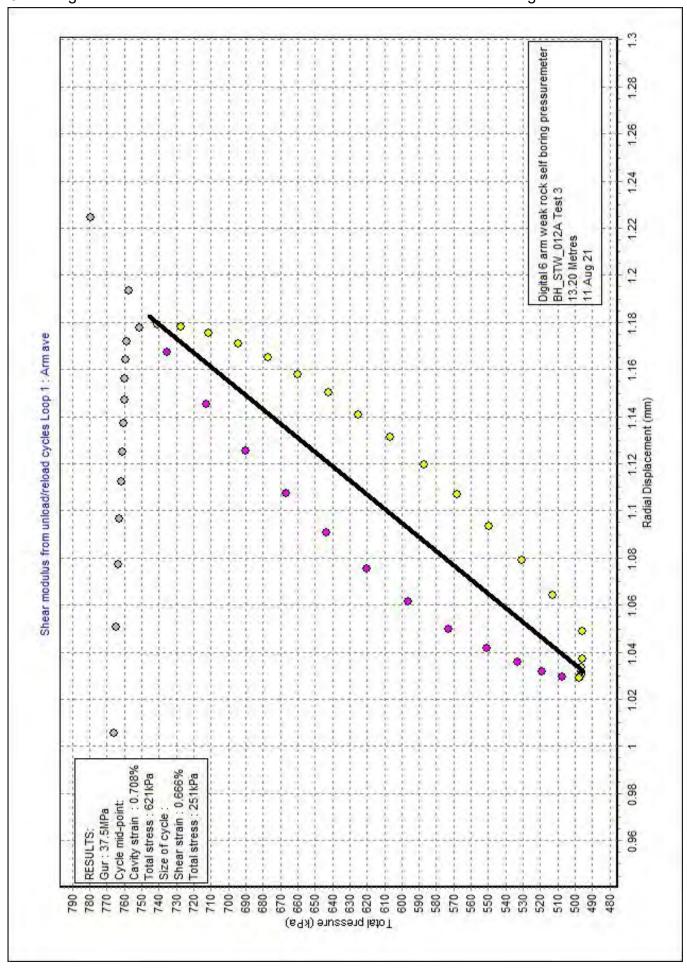


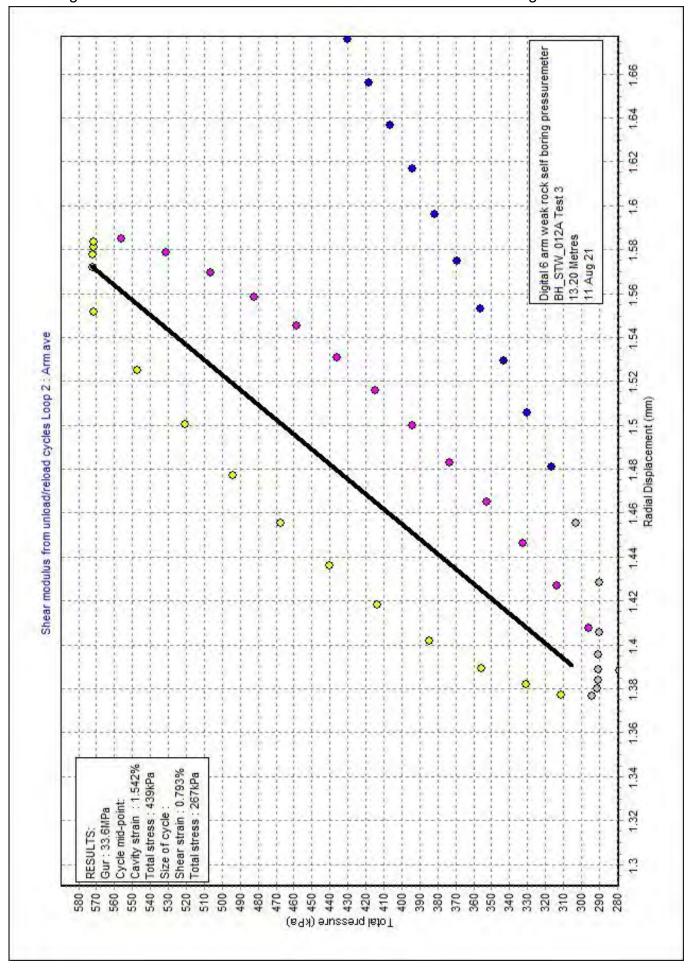


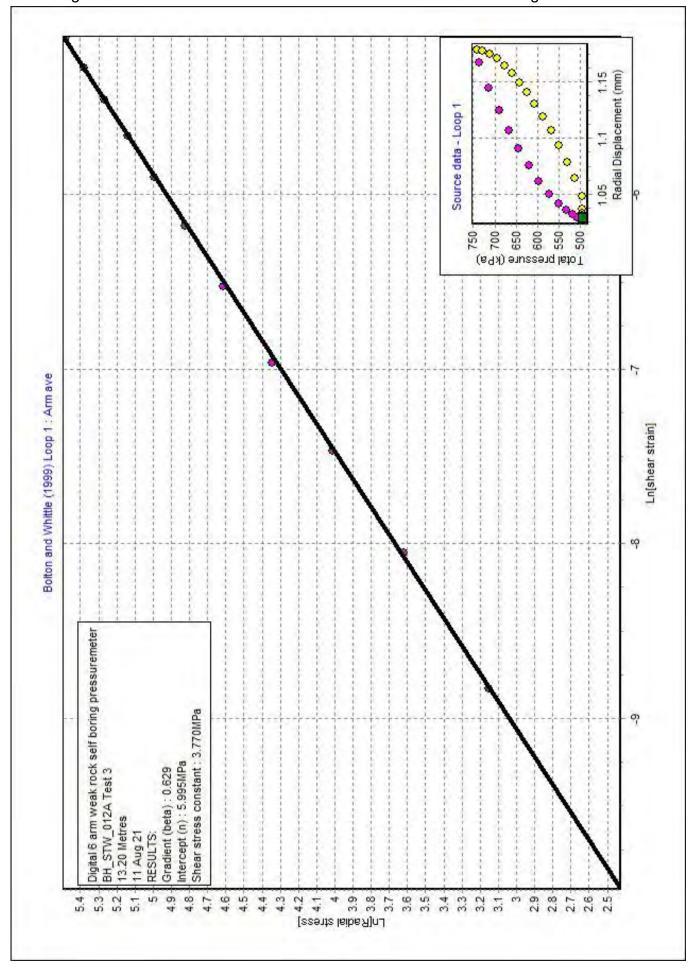


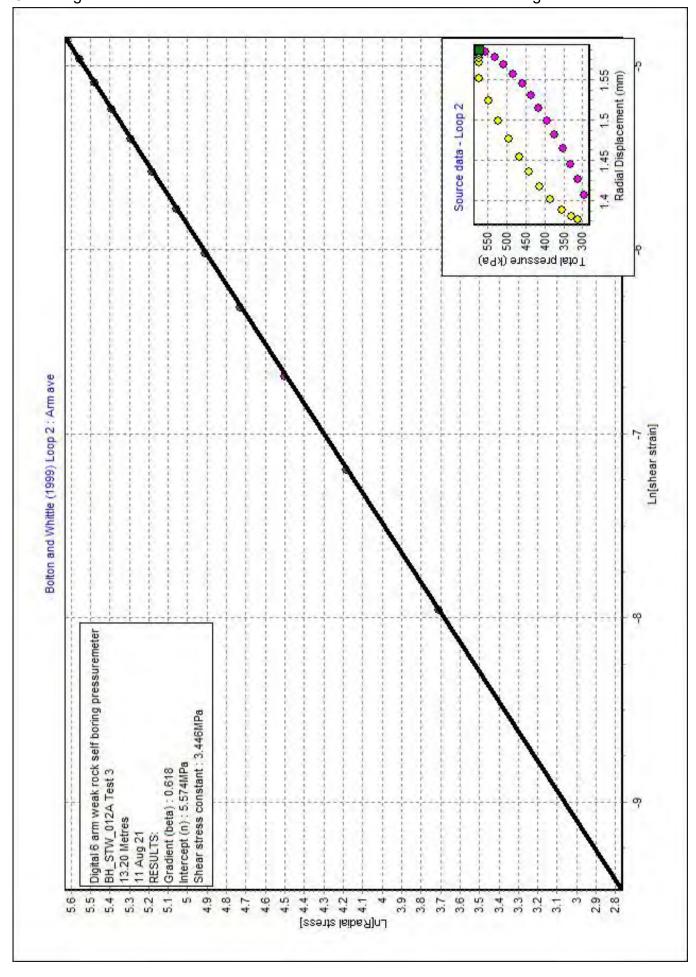


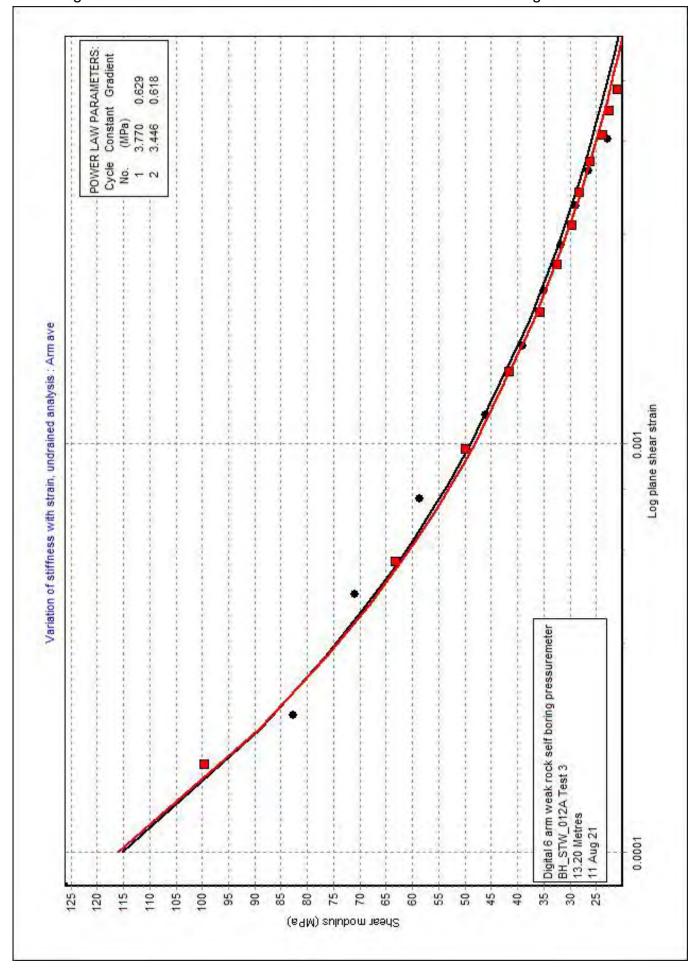


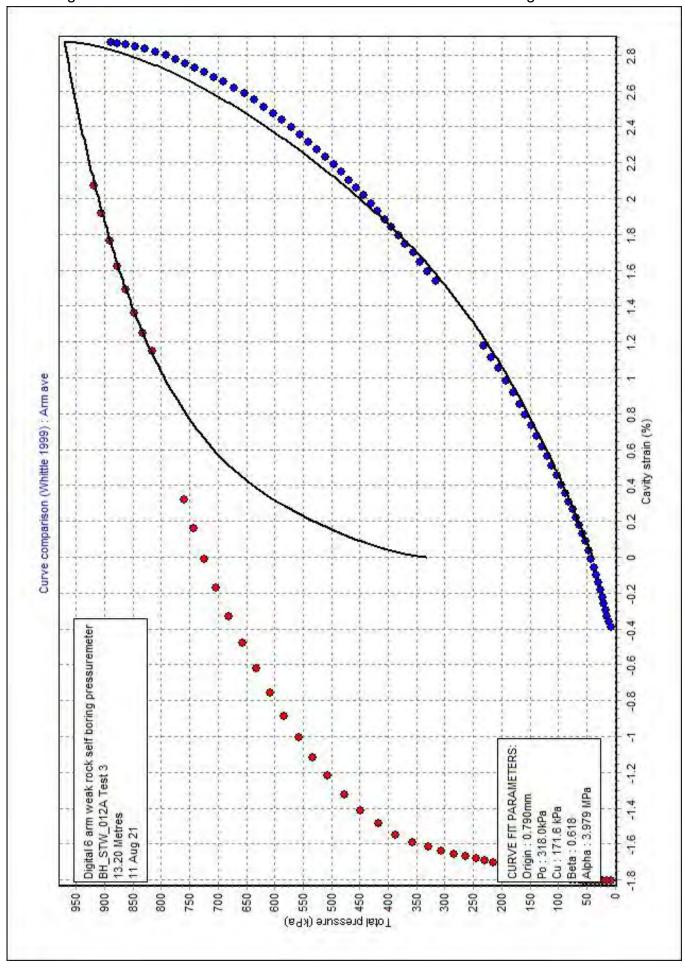


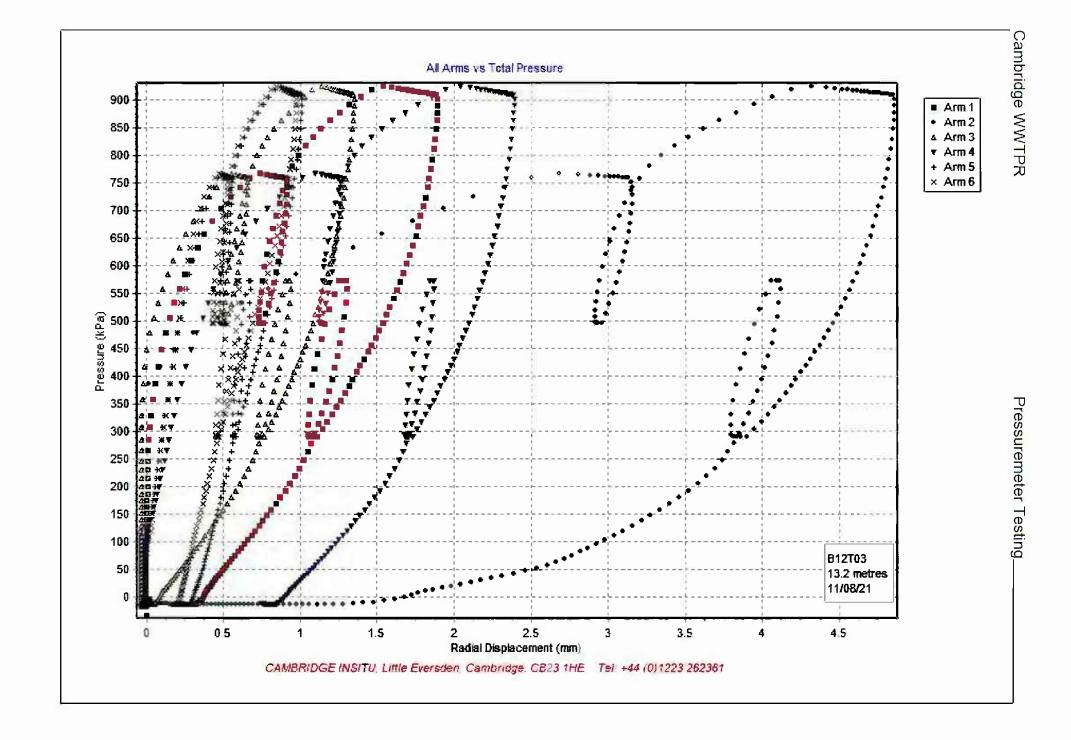


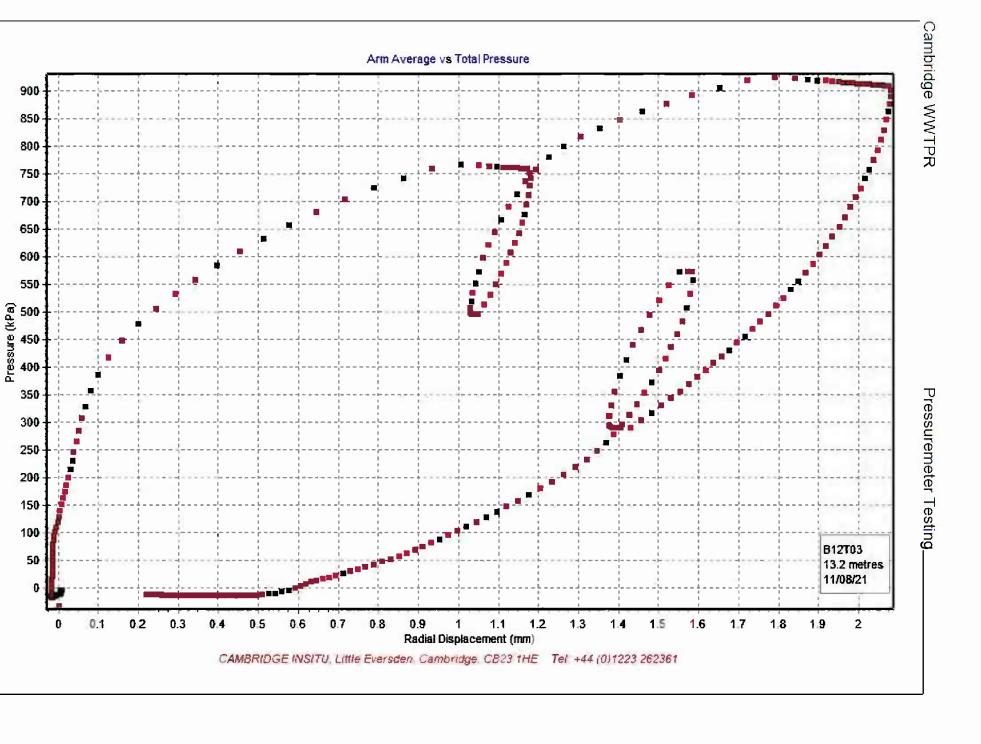


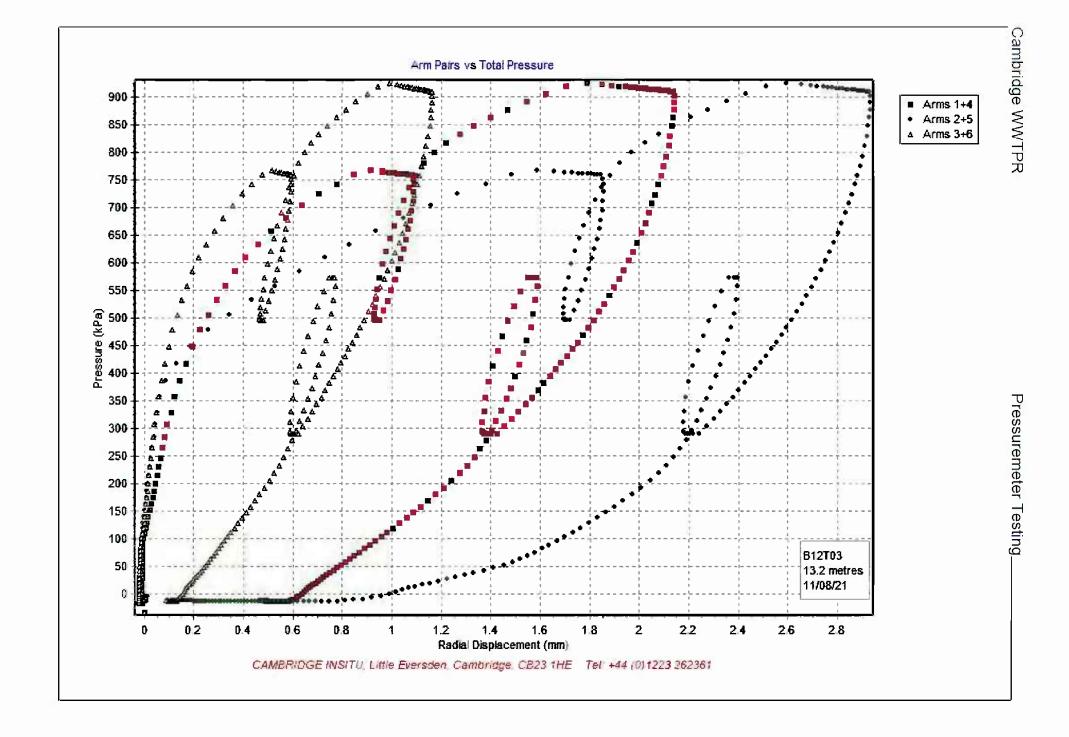


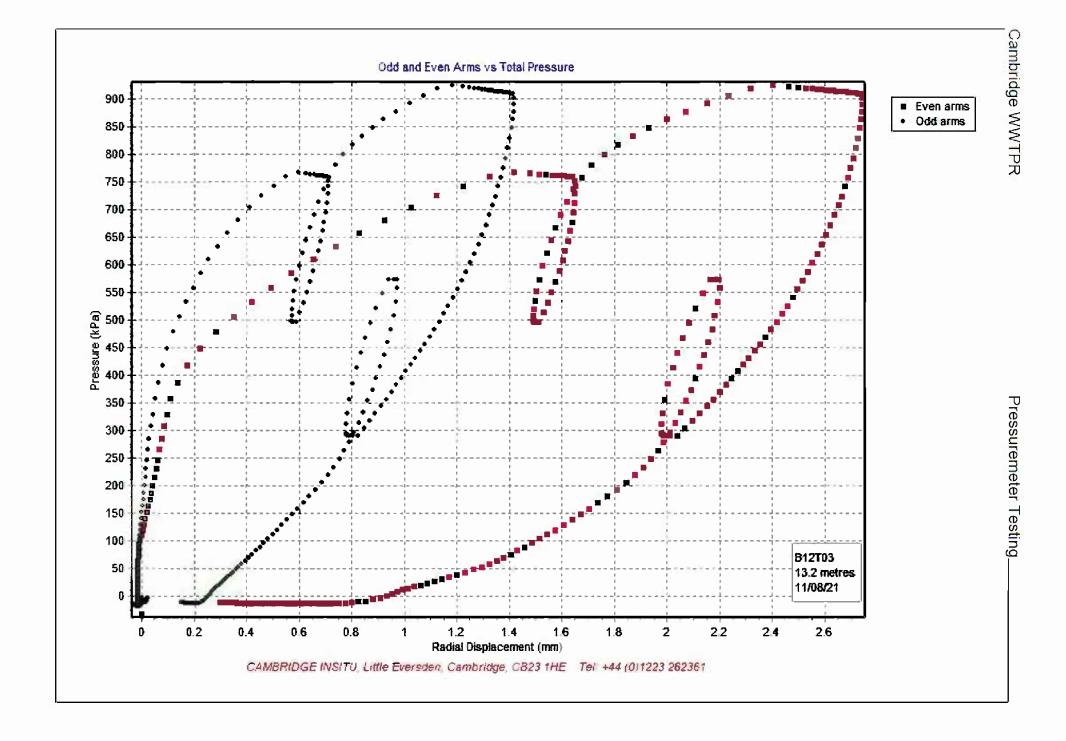


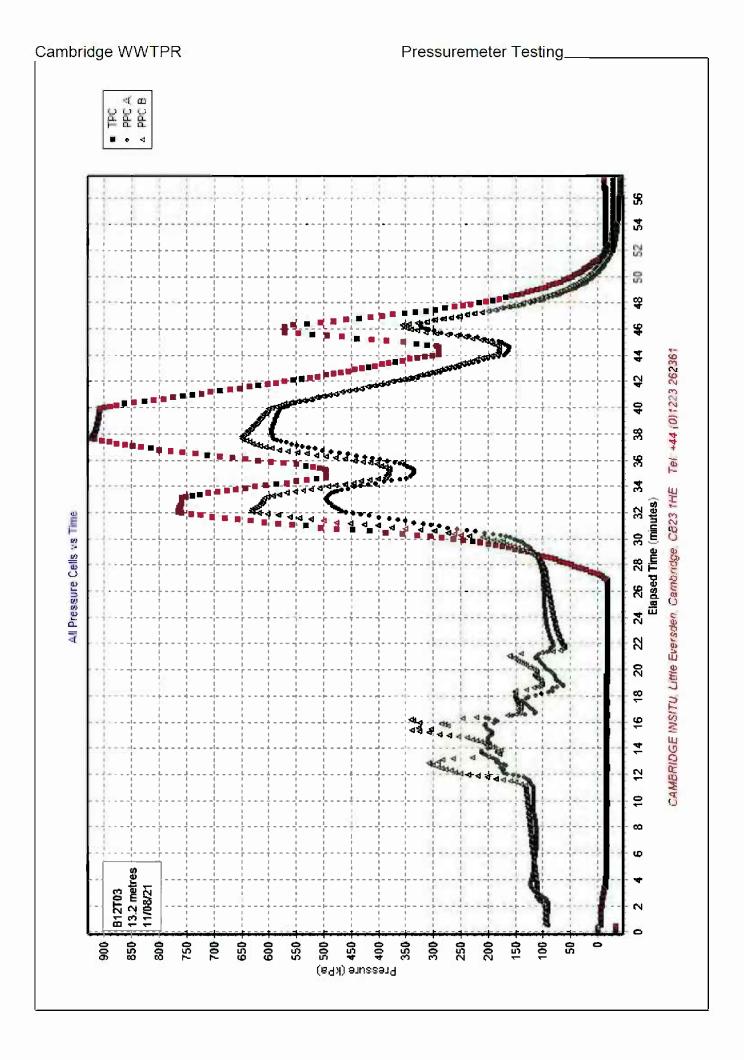












Cambridge WWTPR BH_STW_019A Test 1 - SUMMARY OF RESULTS [File made with WinSitu]

[DETAILS OF TEST]

Project TE8364

Site Cambridge Waste Water Treatment Plant Relocation Project

Borehole BH STW 019A BH_STW_019A Test 1 Test name

Test date 18 Aug 21 Test depth 2.90 Metres table :
Ambient PWP :
Material 3.75 Metres 0.0 kPa

: Structureless Chalk

Probe : 95mm High Pressure Dilatometer

Diameter 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/RW on 19 Aug 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

"Arm ave=2.81" Strain Origin (mm) : Po from Marsland & Randolph (kPa) "Arm ave=141.8" : Best estimate of Po (kPa) "Arm ave=91.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) "Arm ave=598.4"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 32.0

Angle of internal friction (°) "Arm ave=34.3" "Arm ave=2.7" Dilation angle (°) "Arm ave=0.378" Gradient of log-log plot

[Withers et al 1989]

Angle of internal friction (°) "Arm ave=32.8" "Arm ave=0.9" Dilation angle (°) Gradient of log-log plot "Arm ave=-2.302"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) : "Arm ave=22.2"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	82.2	0.155	316	0.132	109
Arm ave	2	145.9	0.888	531	0.124	181
Arm ave	3	172.1	2.408	757	0.136	233
Arm ave	4	144.7	10.970	730	0.238	345

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	14.554	10.666	0.733
Arm ave	2	16.174	10.706	0.662
Arm ave	3	15.237	9.431	0.619
Arm ave	4	10.814	6.017	0.556

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

Strain Origin (mm) 2.81 Po (kPa) 91 Cohesion (kPa) 20 Angle of peak friction (deg) 34.3 Angle of peak dilation (deg) 2.7 Total yield stress (kPa) 259

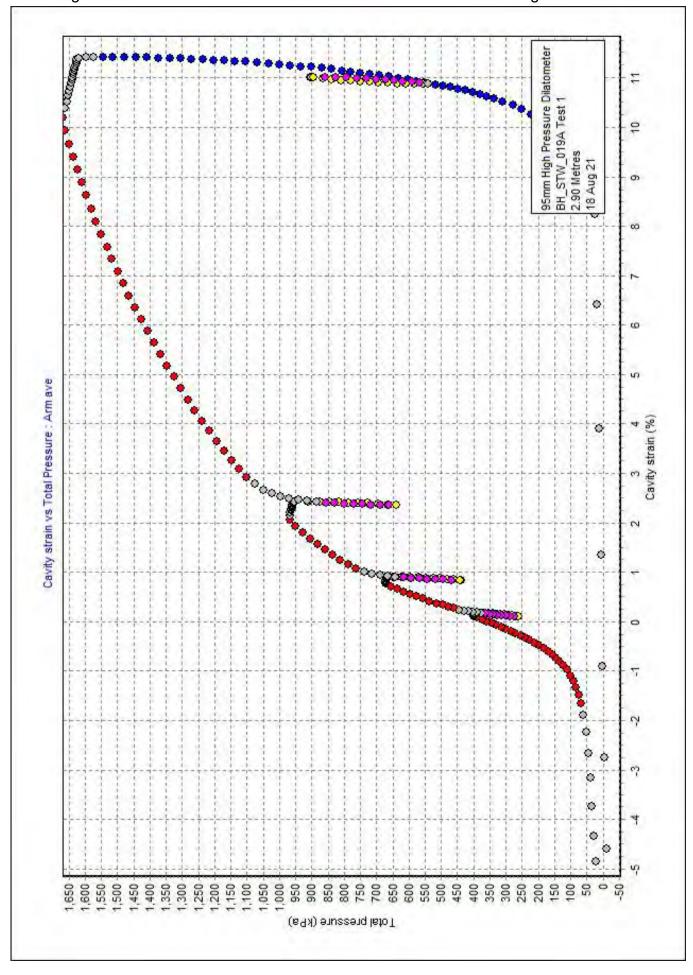
CIR1506/21

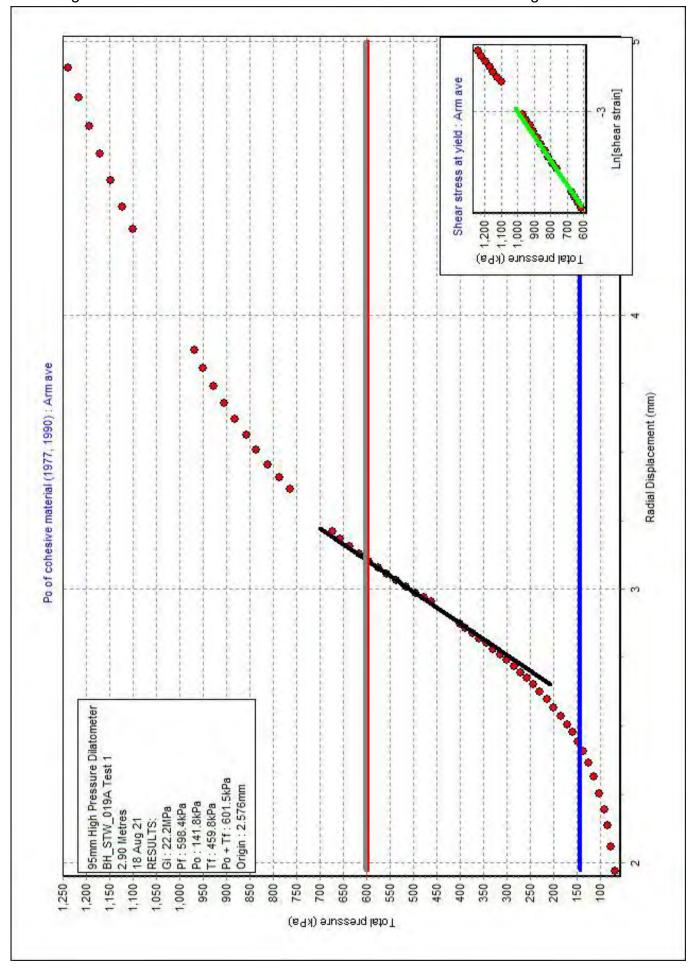
Pressuremeter Testing

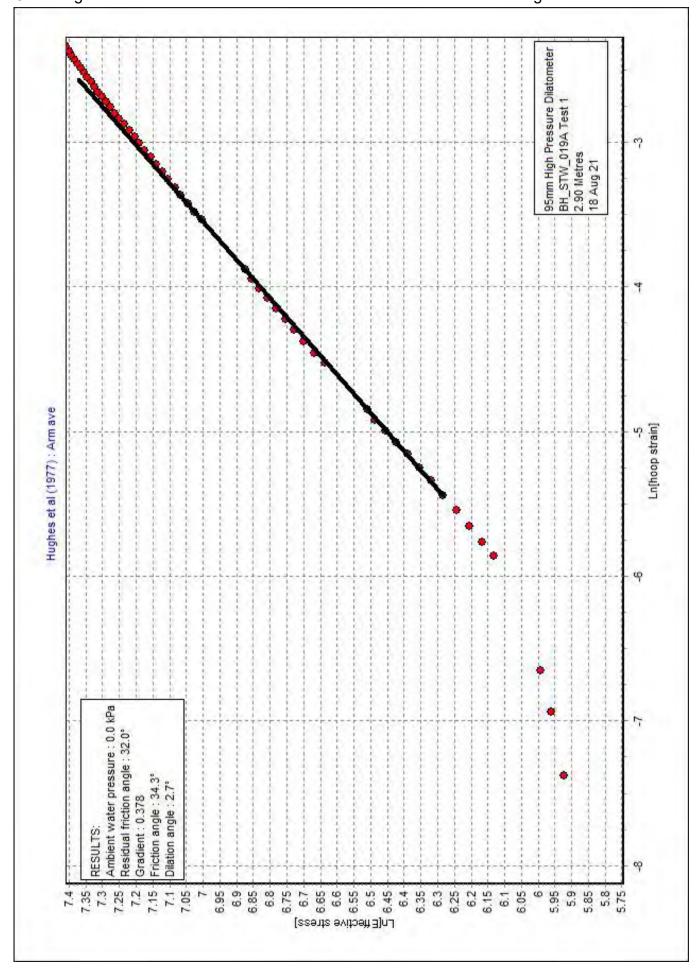
BH_STW_019A Test 1 - SUMMARY OF RESULTS

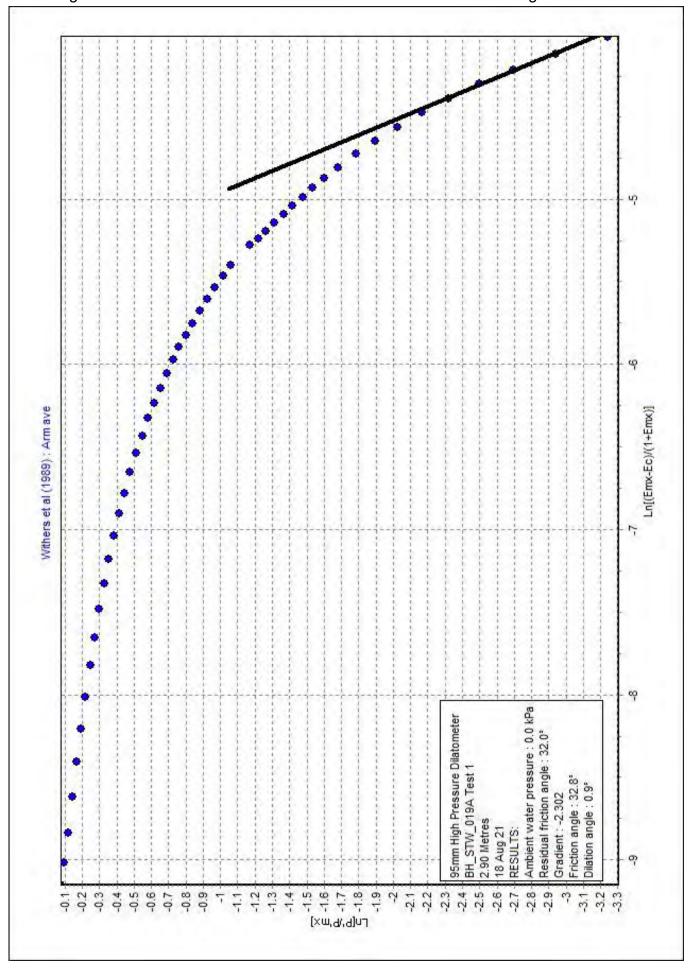
Total limit stress (kPa) : 3213
G at first yield (MPa) : 96.7
Non-linear exponent : 0.619
Janbu exponent : 0.146
Correlation : 0.549

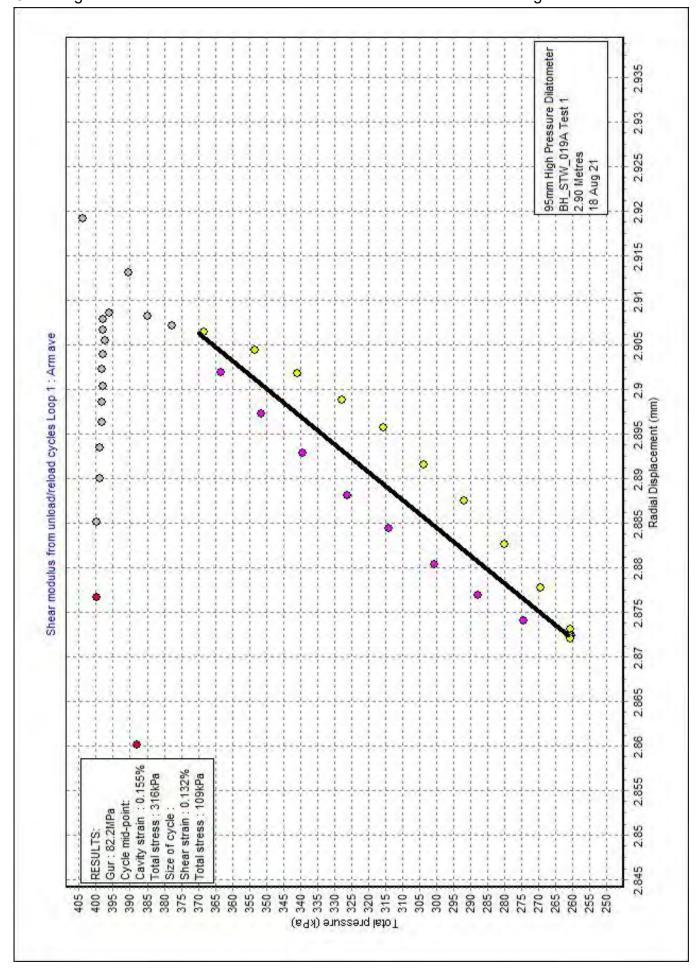
Ambient pore water pressure (kPa) : 0
Residual friction angle (deg) : 32.0
Poisson's ratio : 0.25

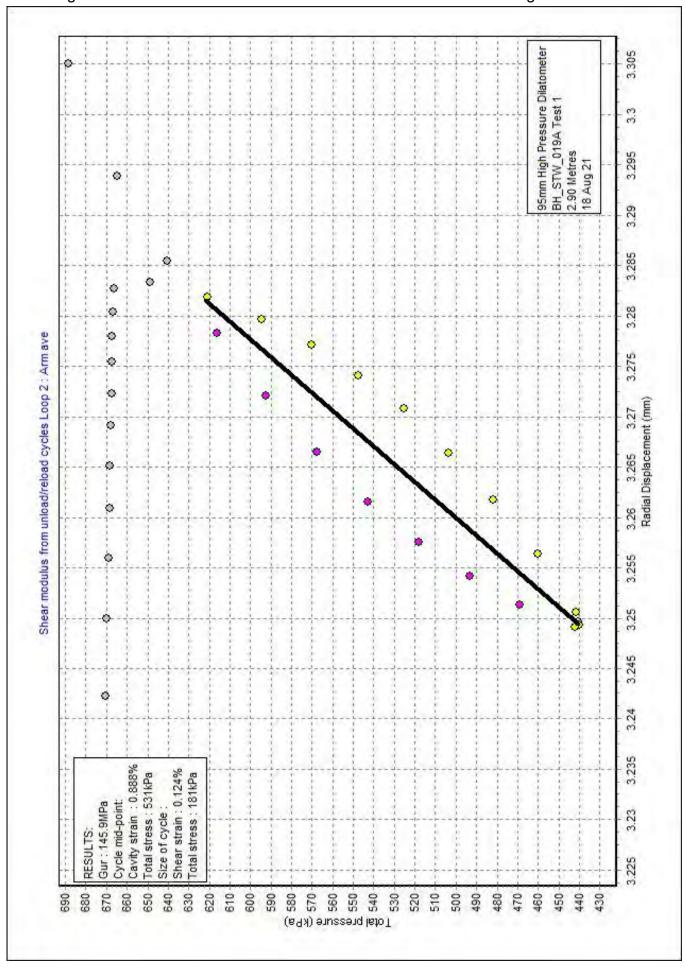


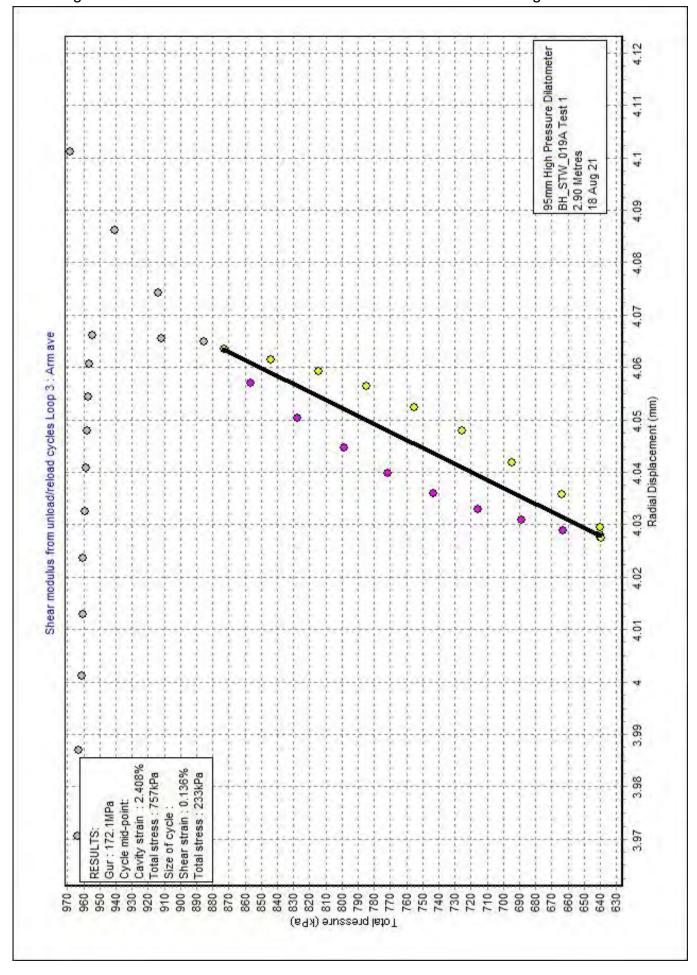


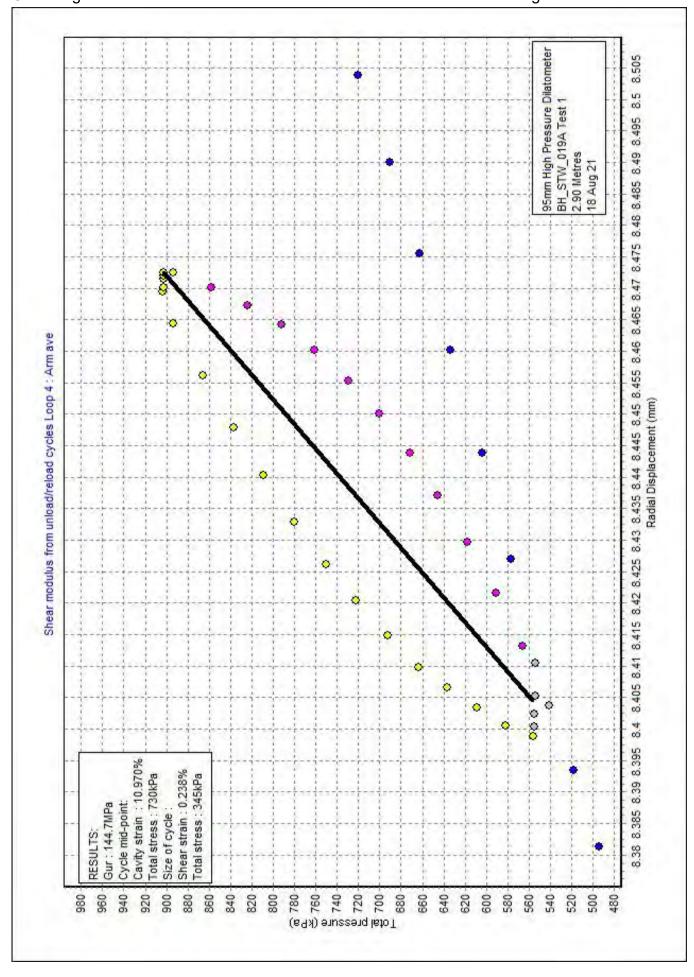


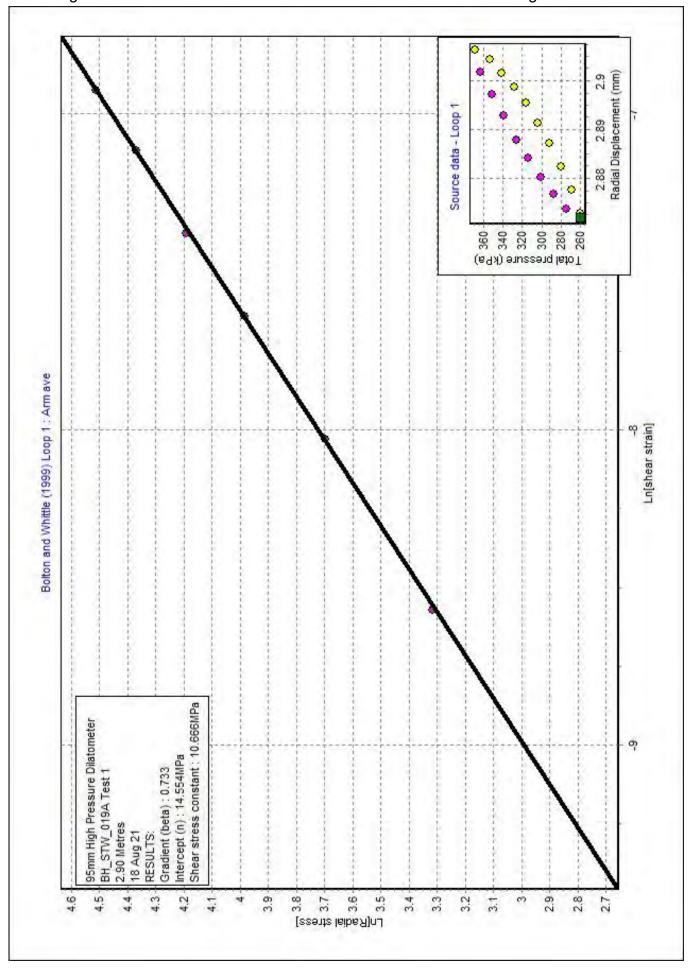


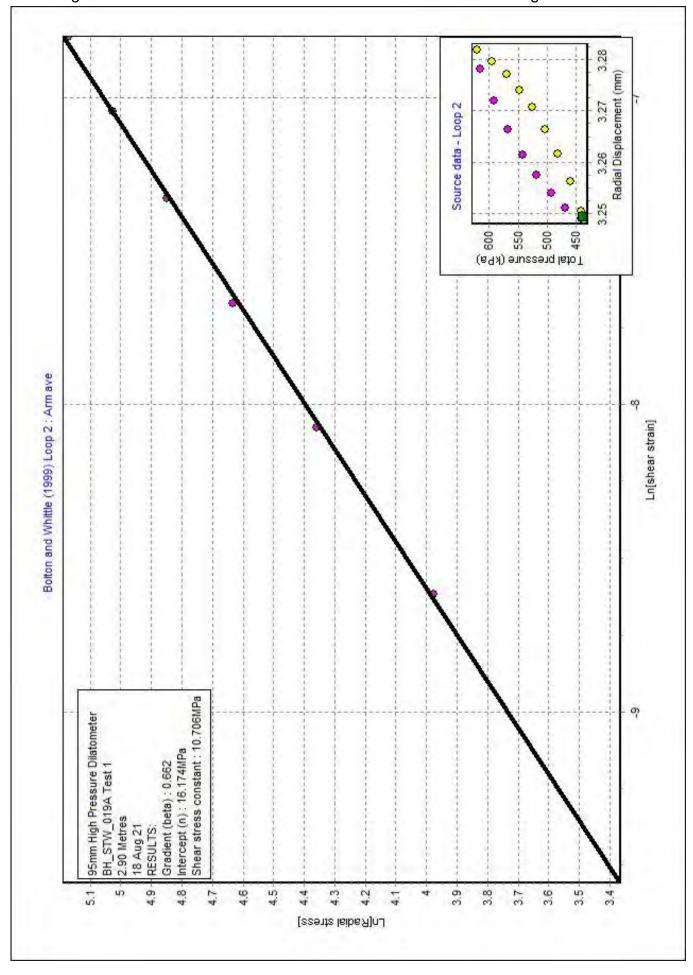


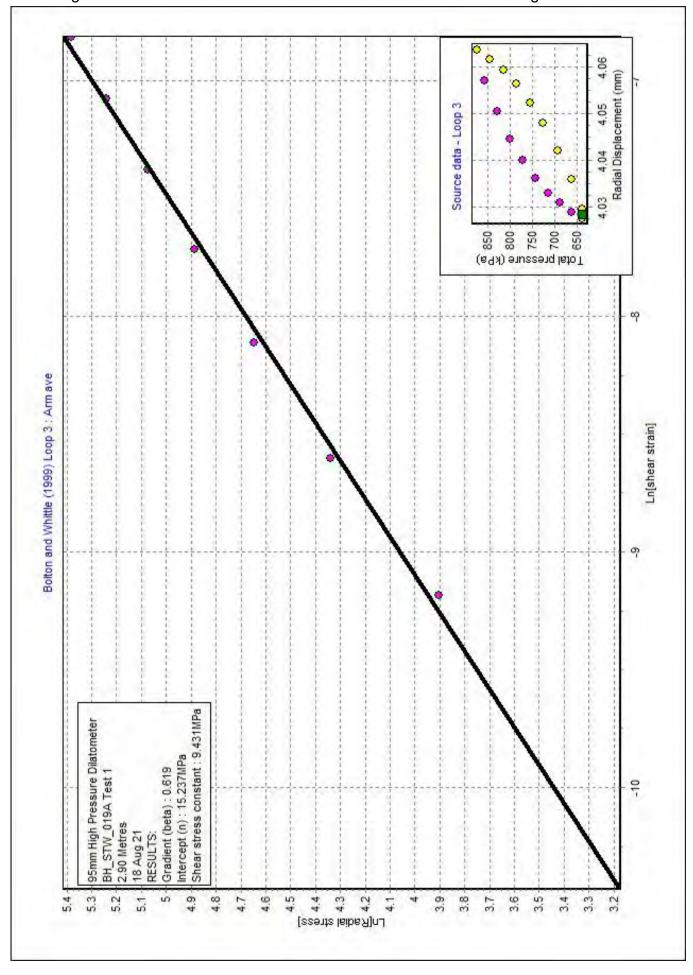


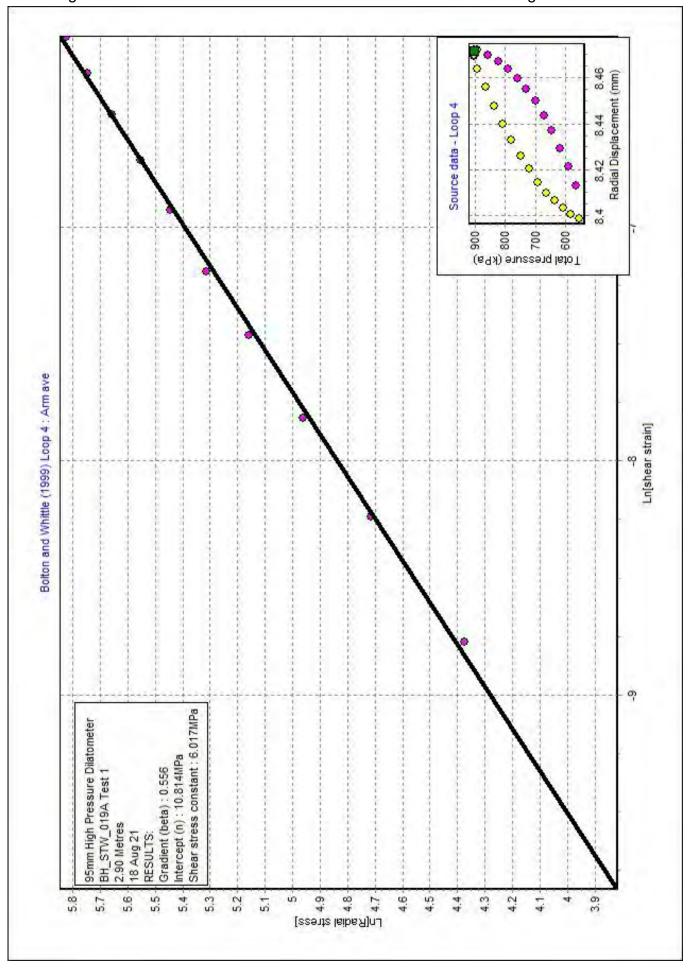


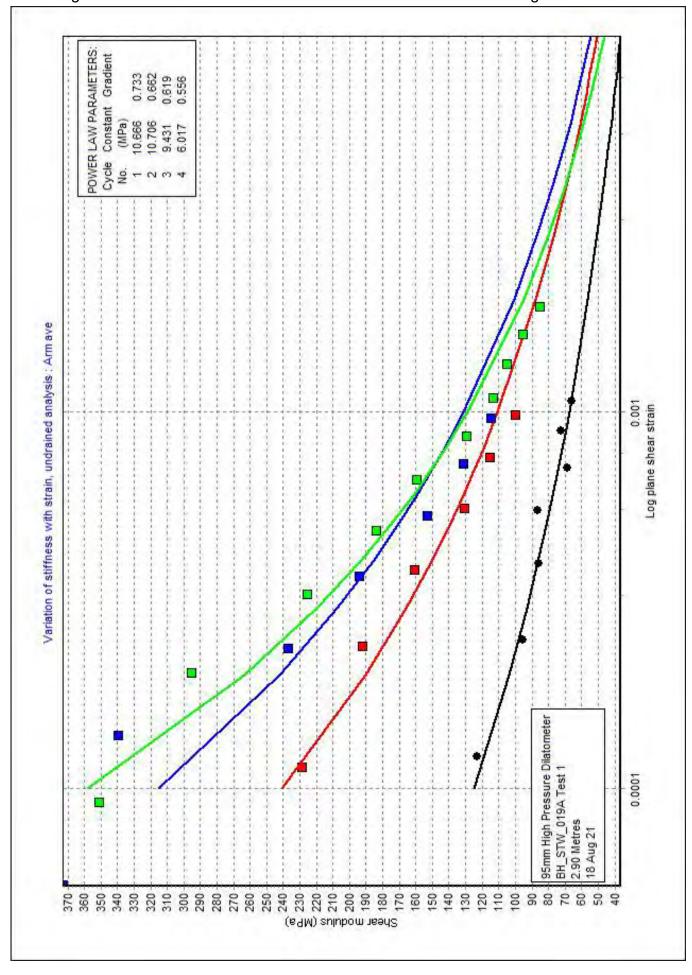


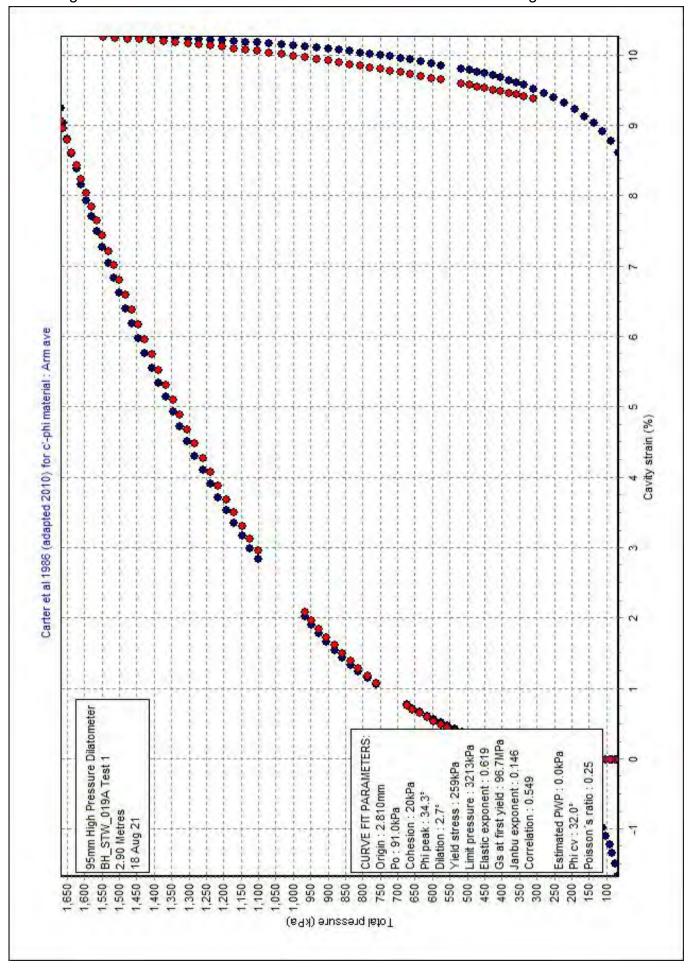


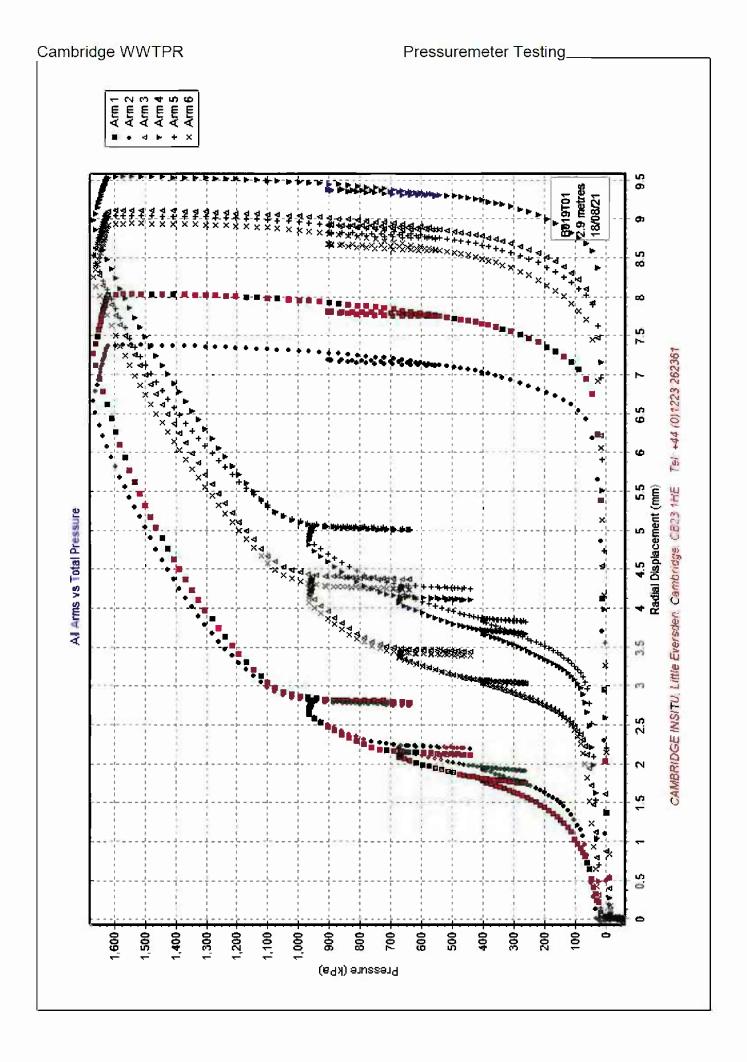


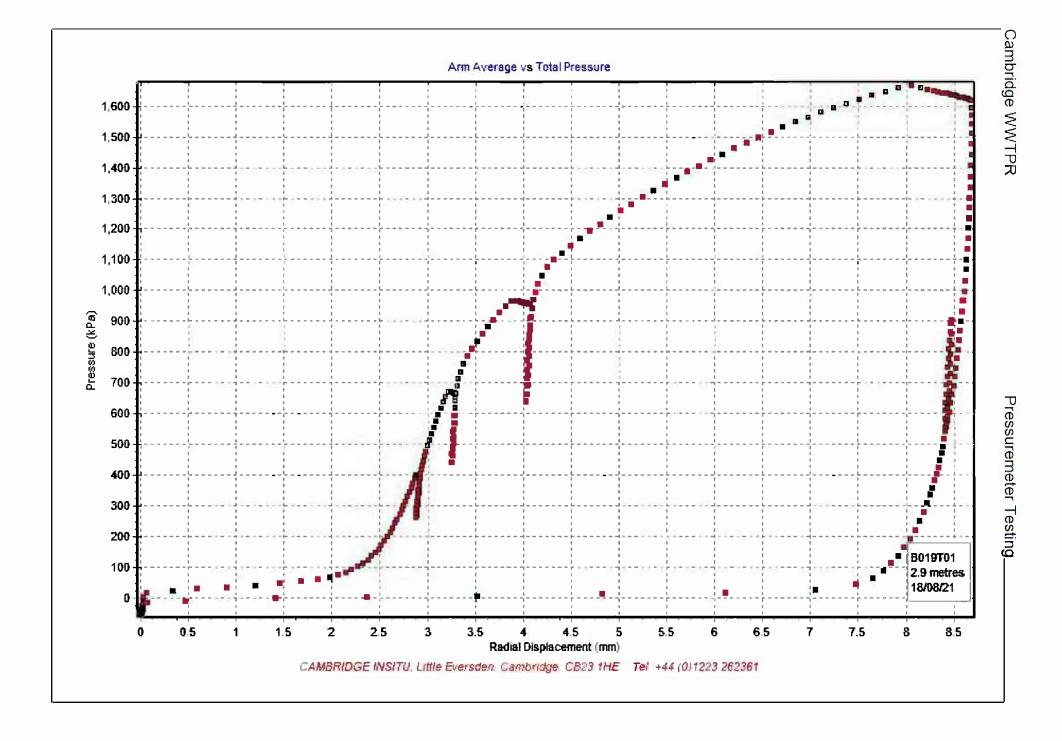


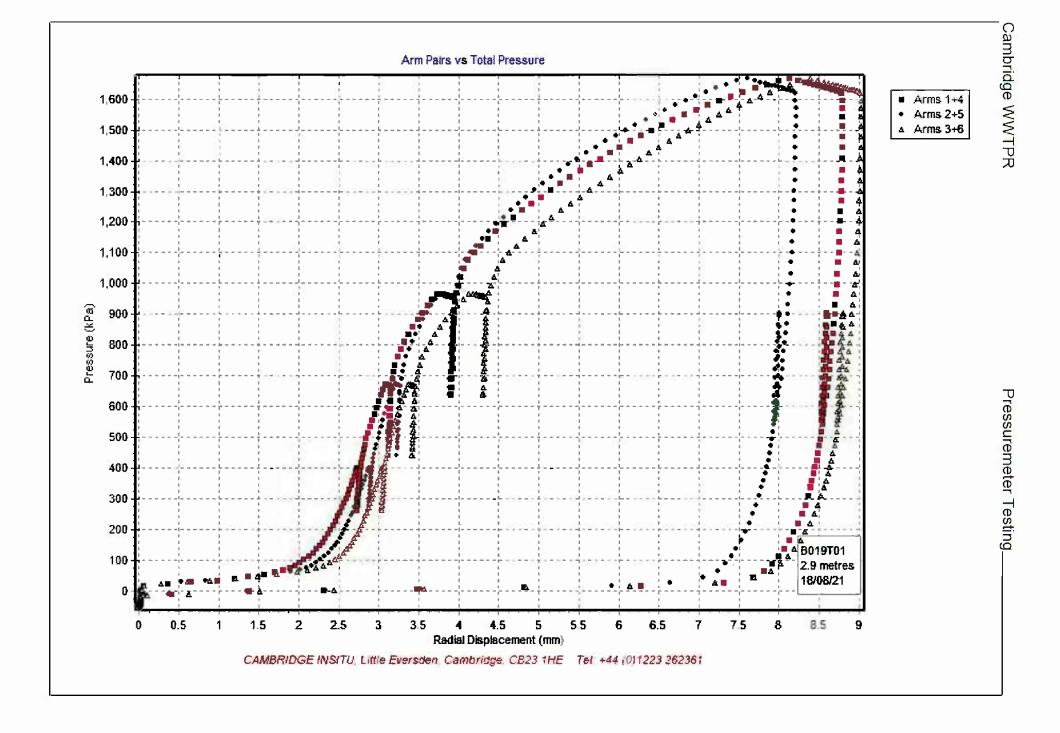


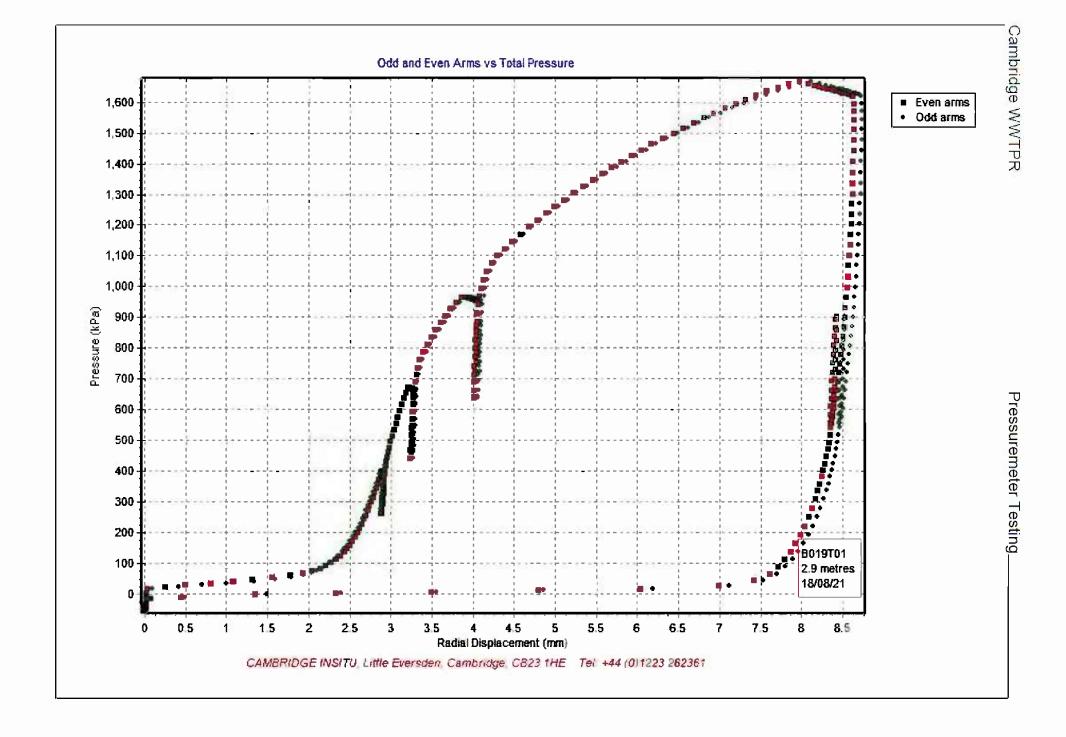












[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_STW_019A Test name : BH_STW_019A Test 2

Test date : 18 Aug 21
Test depth : 6.50 Metres
Water table : 2.4 Metres
Ambient PWP : 27.0 kPa

Material : Structureless Chalk

Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/RW on 19 Aug 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=3.20"
Po from Marsland & Randolph (kPa) : "Arm ave=140.7"
Best estimate of Po (kPa) : "Arm ave=113.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) : "Arm ave=410.7"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 28.0

Angle of internal friction (°) : "Arm ave=29.6"
Dilation angle (°) : "Arm ave=1.8"
Gradient of log-log plot : "Arm ave=0.341"

[Withers et al 1989]

Angle of internal friction (°) : "Arm ave=27.7"

Dilation angle (°) : "Arm ave=-0.4"

Gradient of log-log plot : "Arm ave=-1.751"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=16.0"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	62.7	0.252	297	0.160	101
Arm ave	2	80.6	1.176	442	0.196	158
Arm ave	3	106.1	3.218	584	0.172	183
Arm ave	4	110.9	5.615	686	0.179	198
Arm ave	5	58.9	9.400	514	0.612	361

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Āxis	Loop No	Intercept (MPa)	Alpha (MPa)	Gradient
Arm ave	1	11.144	8.079	0.725
Arm ave	2	10.138	6.691	0.660
Arm ave	3	20.454	14.739	0.721
Arm ave	4	13.856	9.148	0.660
Arm ave	5	5.751	3.003	0.522

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

Strain Origin (mm) : 3.20
Po (kPa) : 113
Cohesion (kPa) : 46
Angle of peak friction (deg) : 29.6

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BH_STW_019A Test 2 - SUMMARY OF RESULTS

Angle of peak dilation (deg) : 1.8

Total yield stress (kPa) : 281

Total limit stress (kPa) : 2085

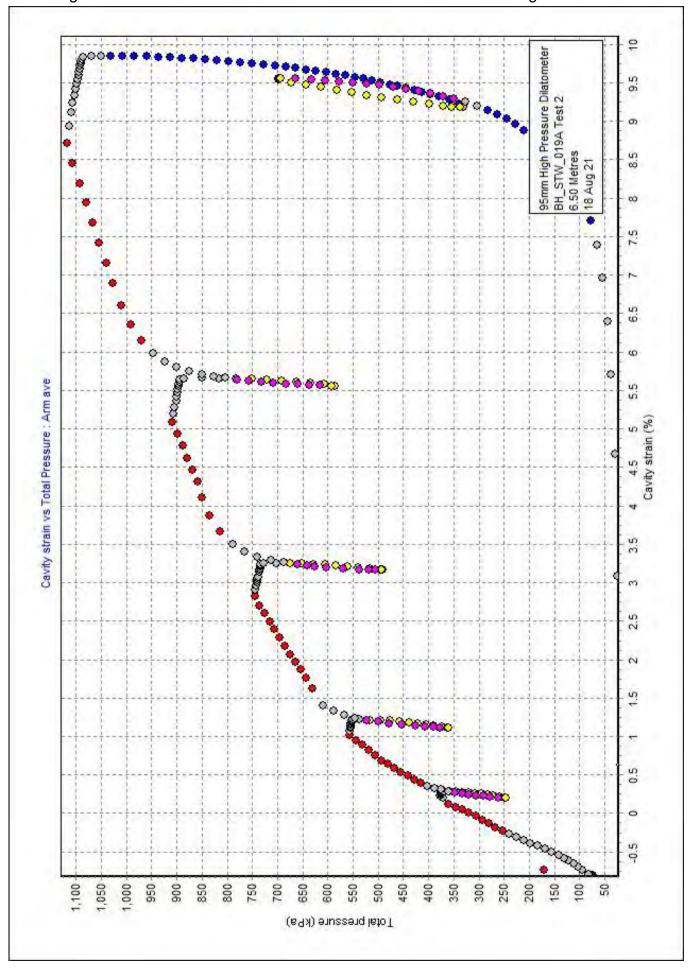
G at first yield (MPa) : 38.3

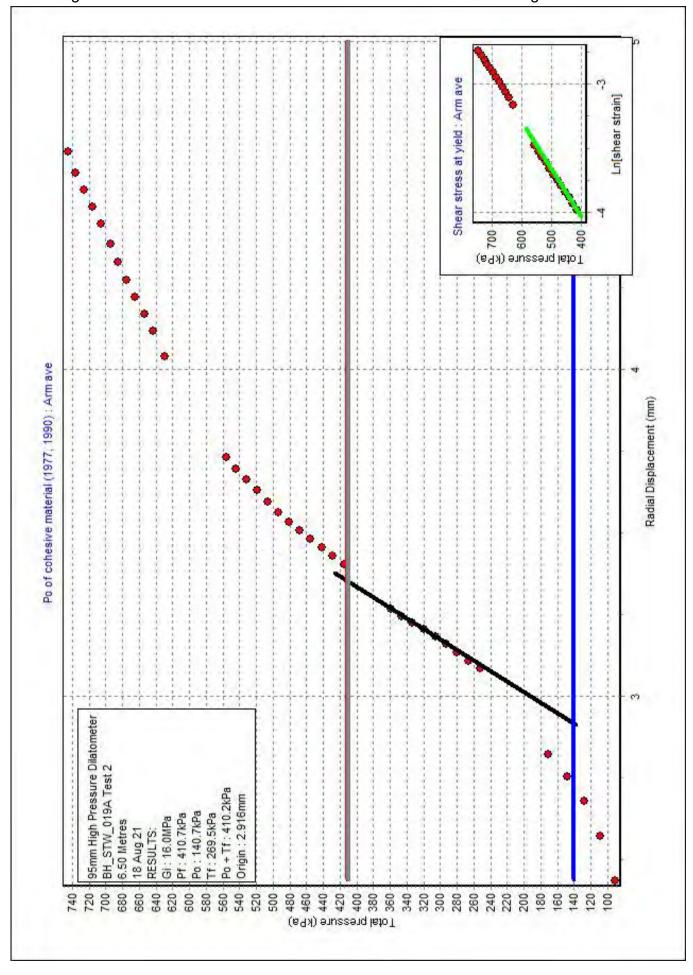
Non-linear exponent : 0.660

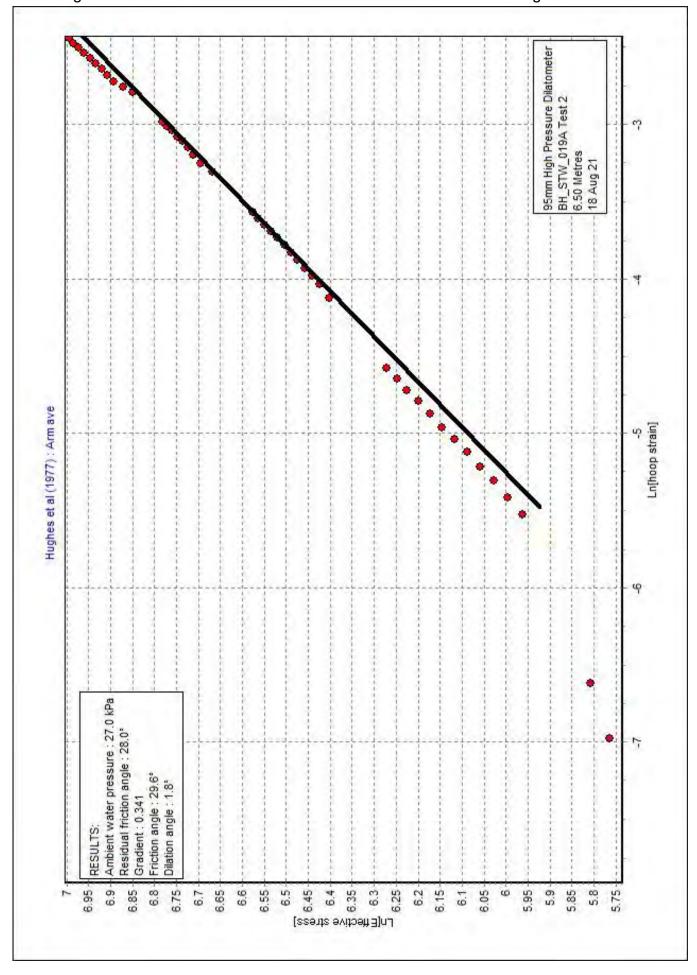
Janbu exponent : 0.295

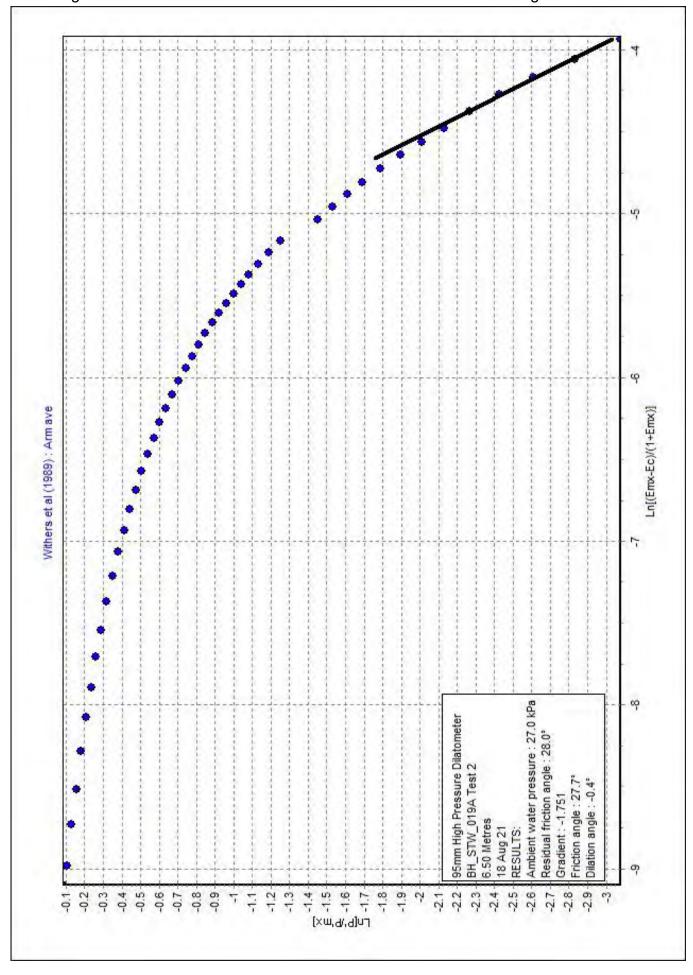
Correlation : 0.309

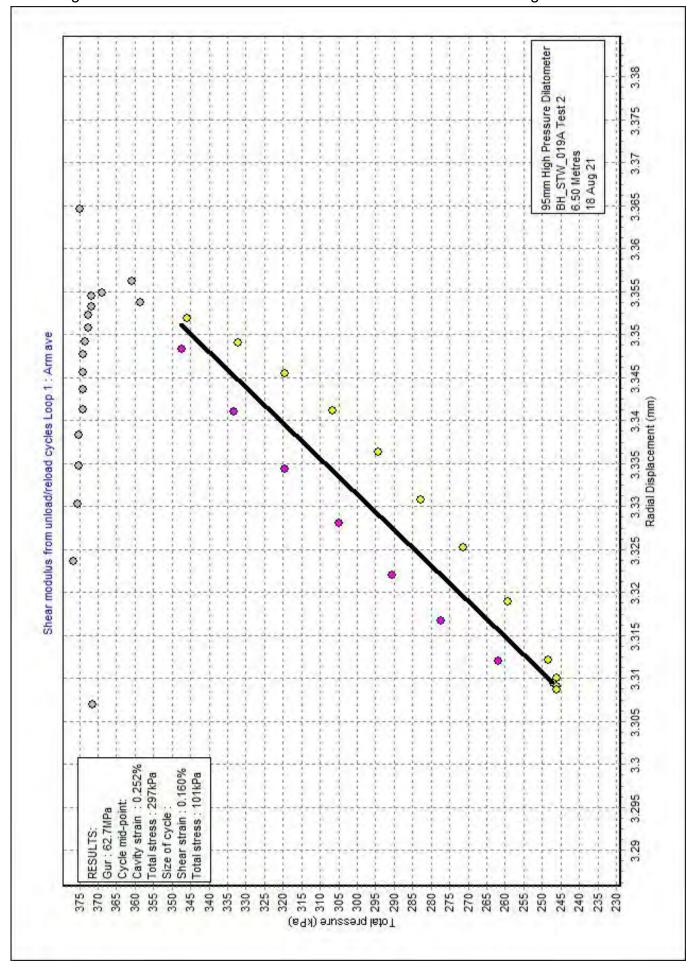
Ambient pore water pressure (kPa) : 27 Residual friction angle (deg) : 28.0 Poisson's ratio : 0.25

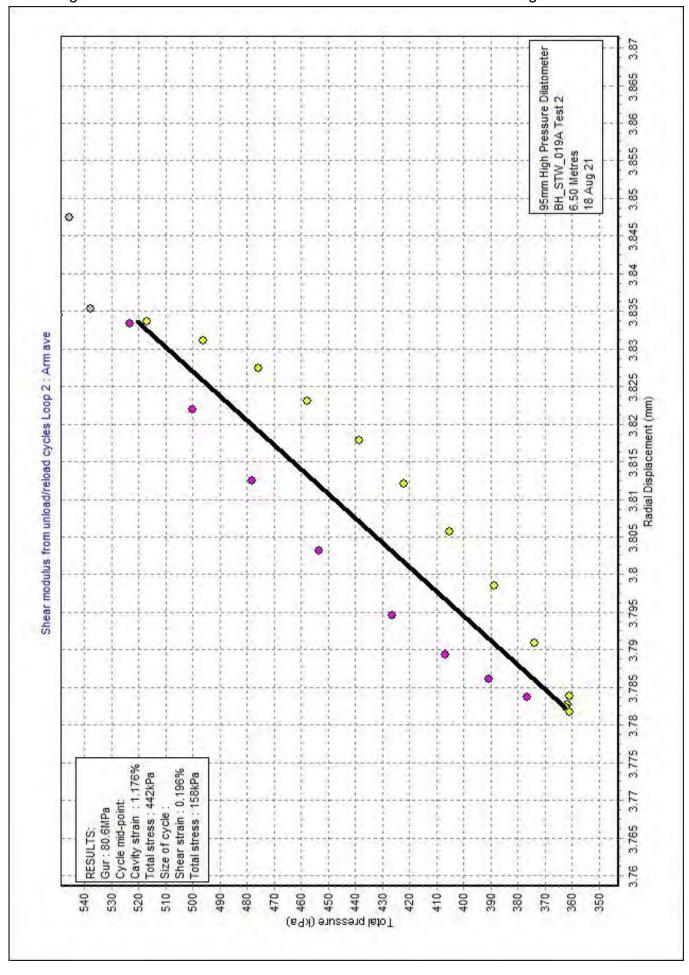


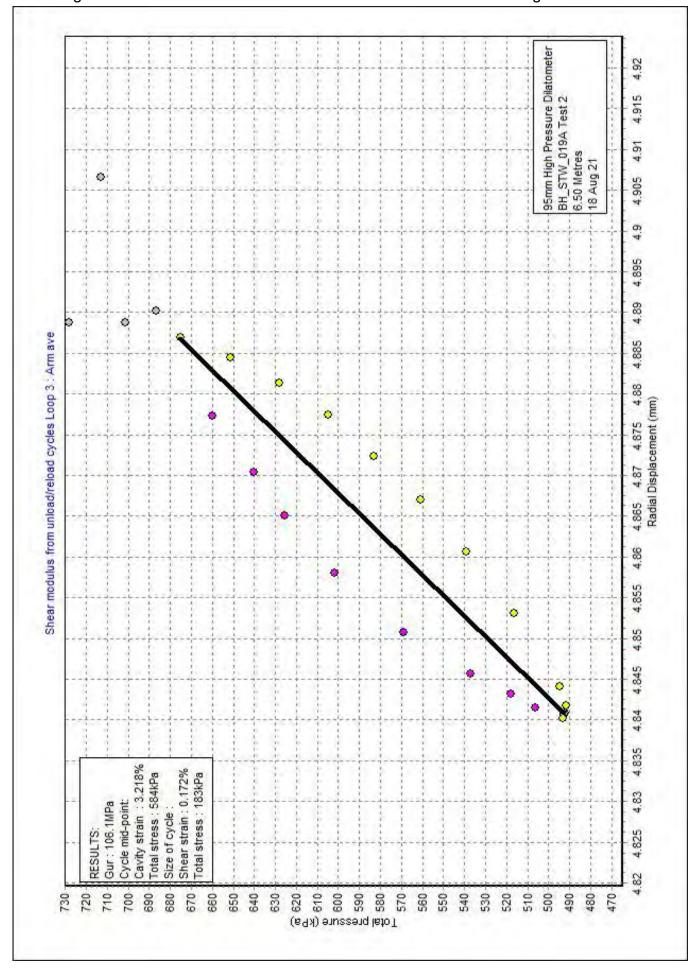


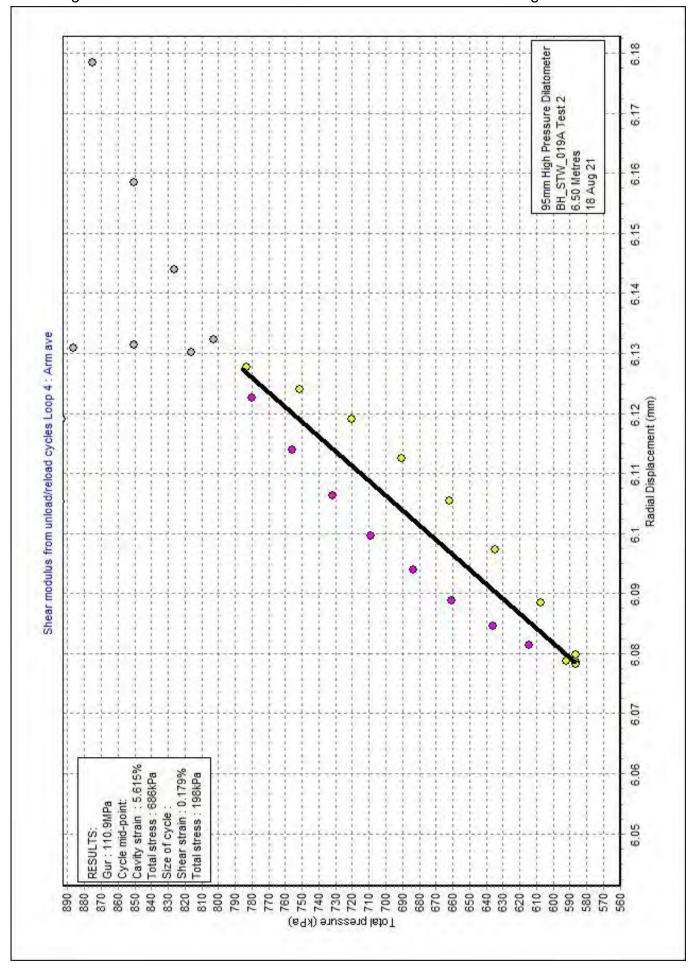


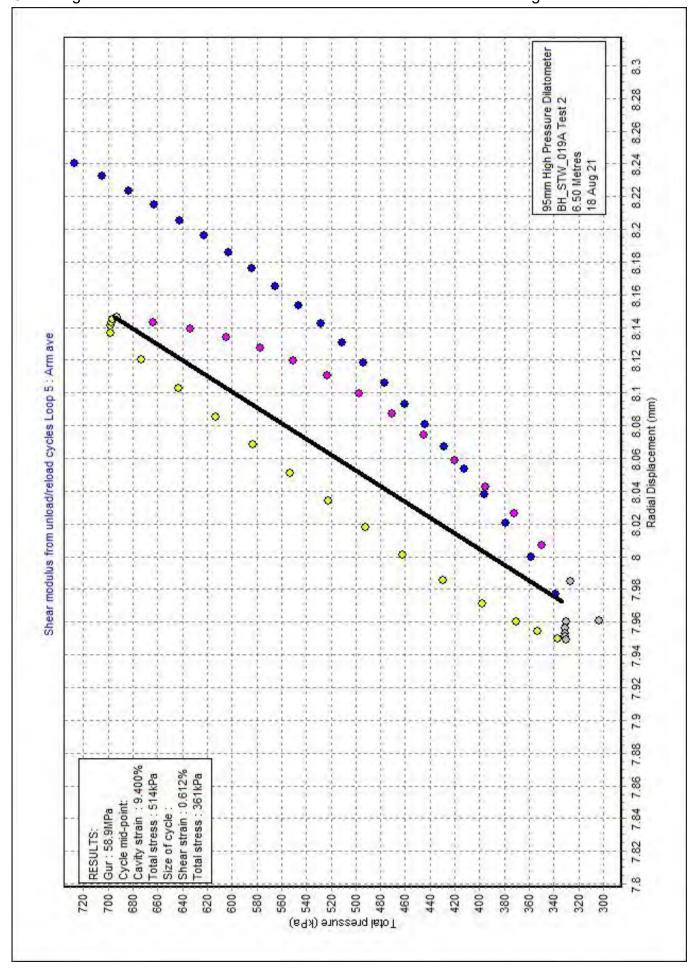


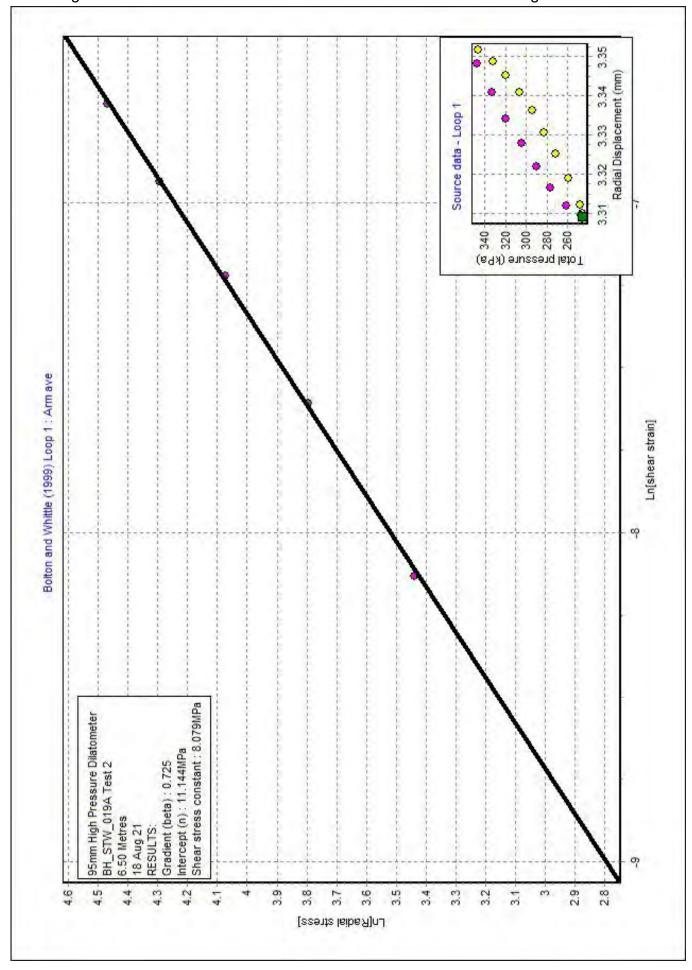


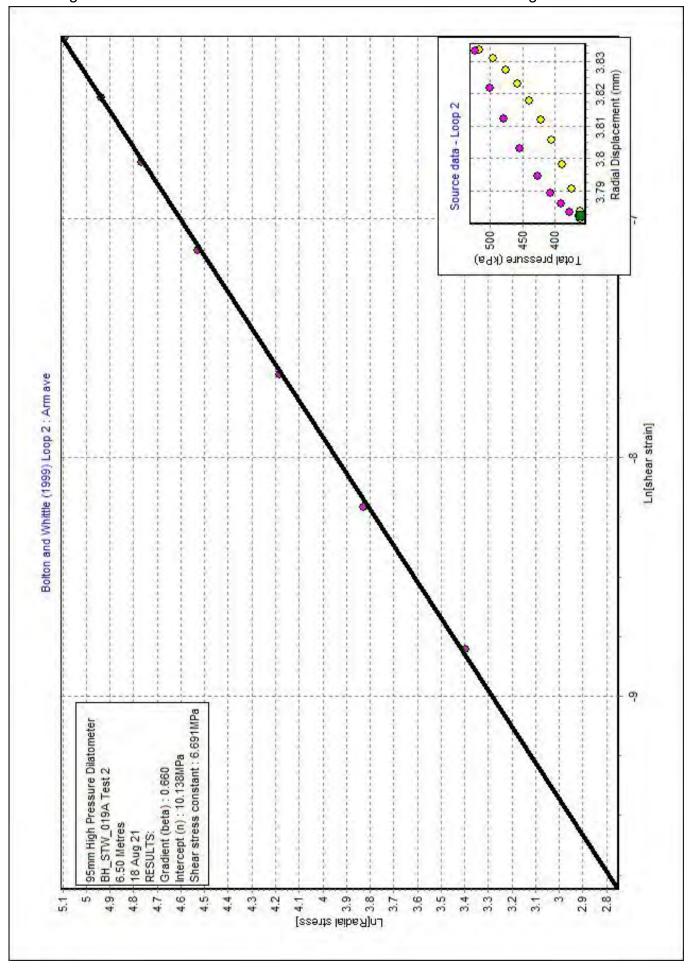


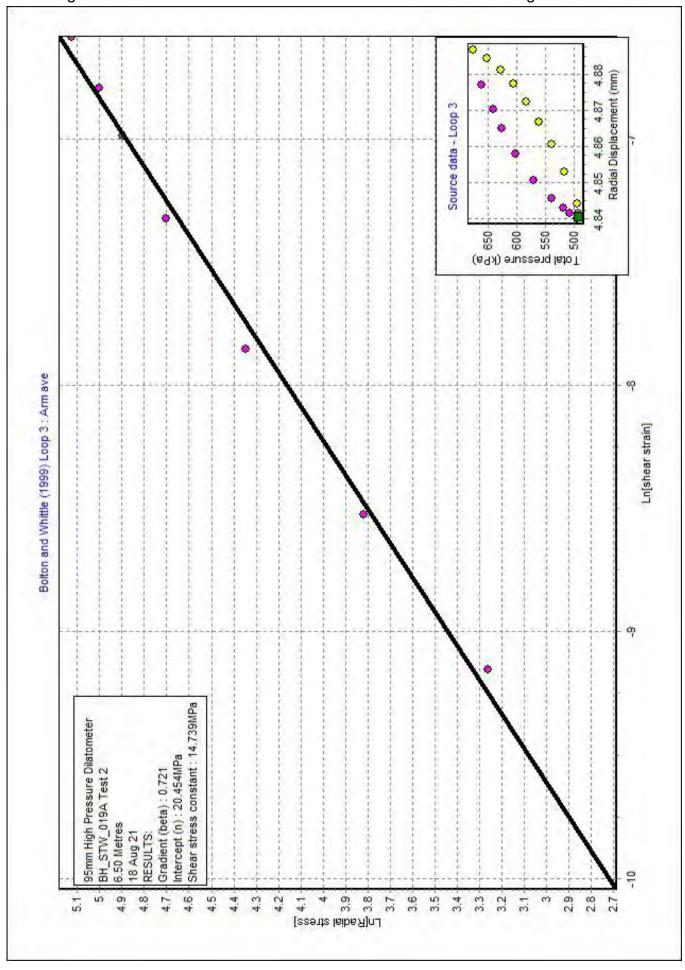


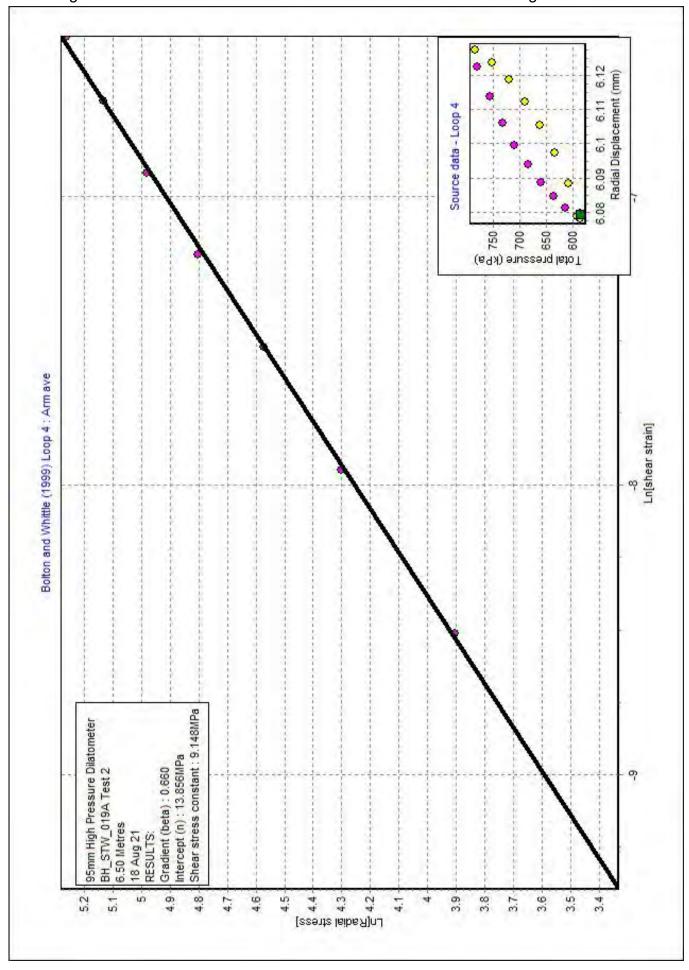


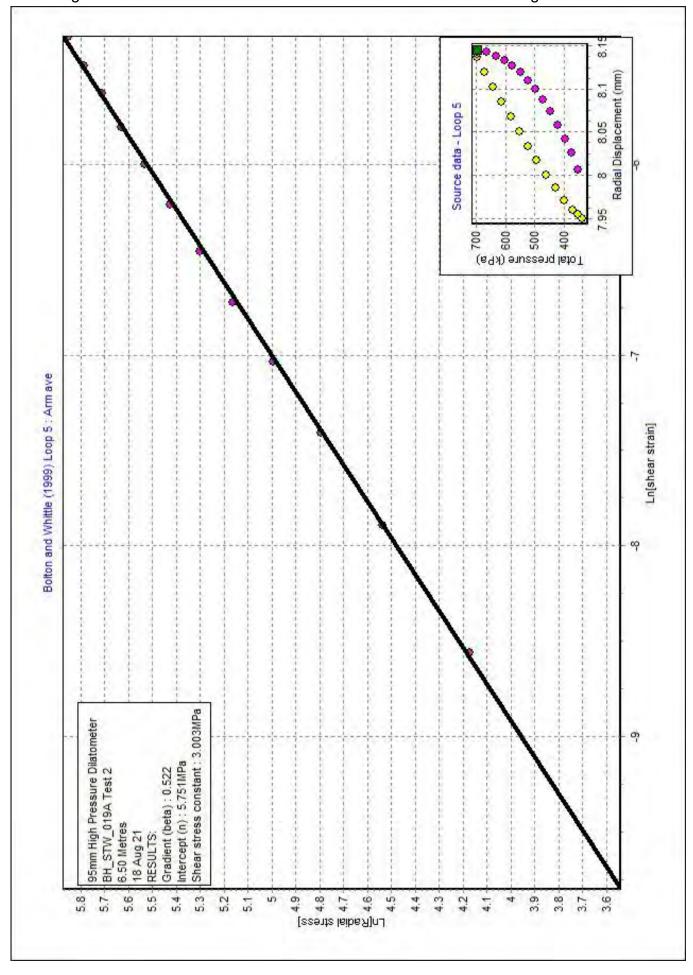


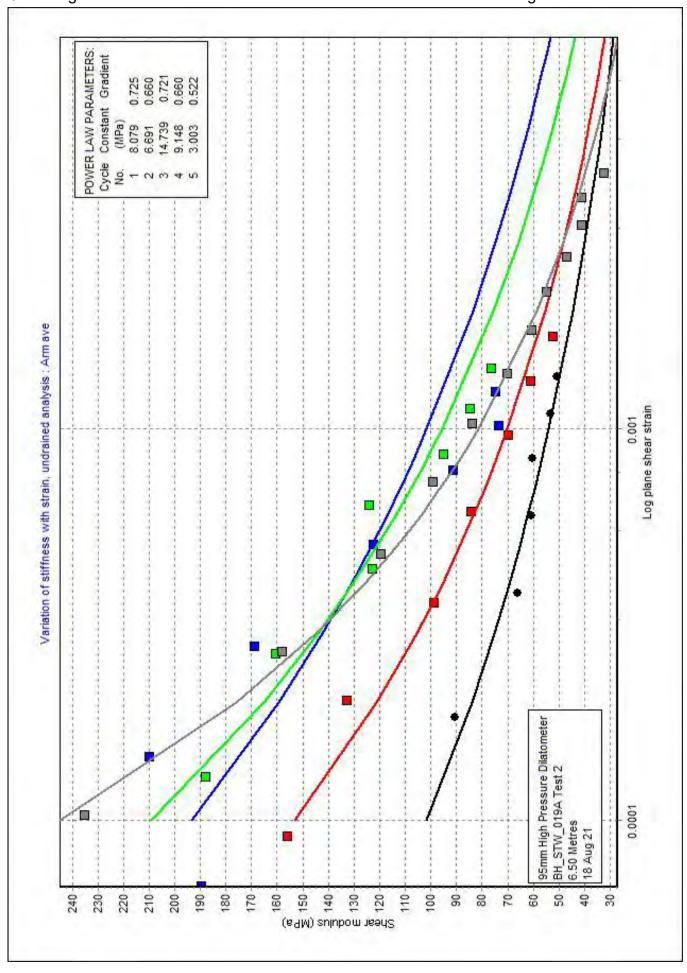


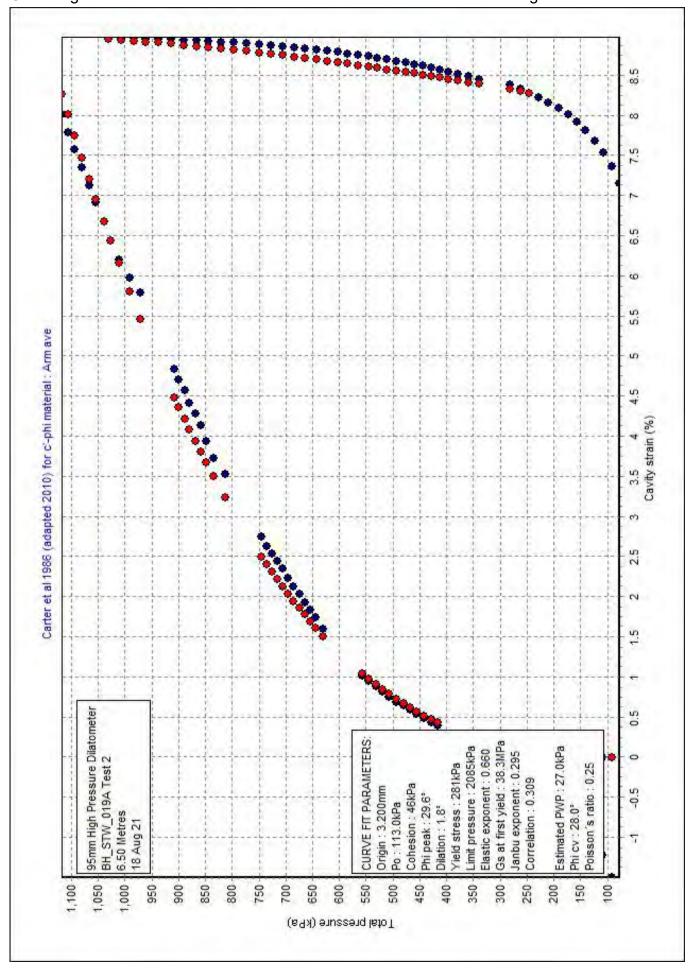


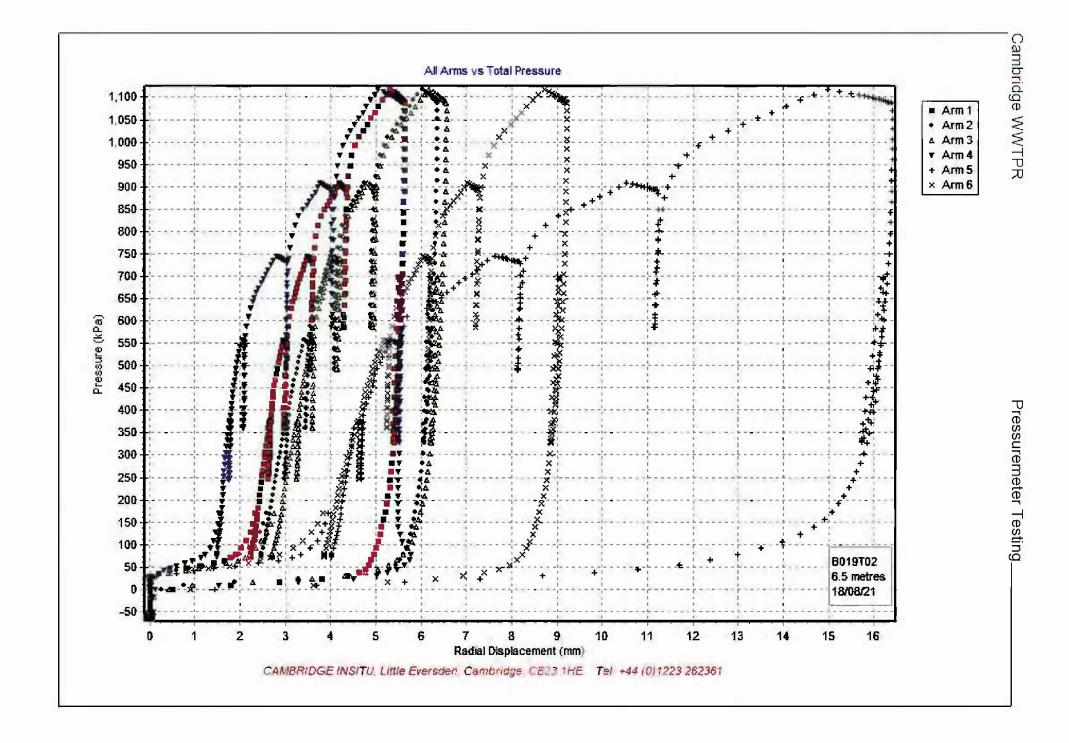


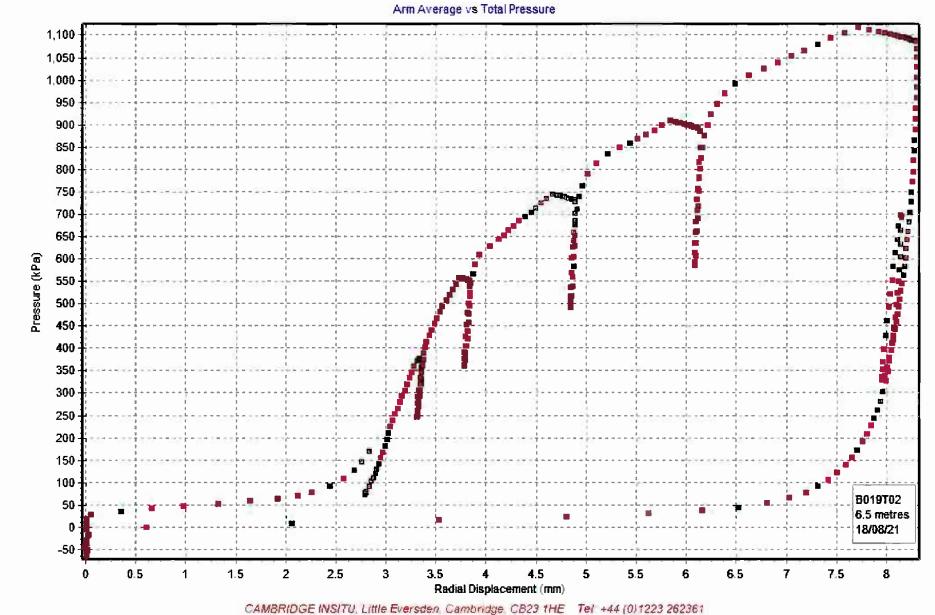


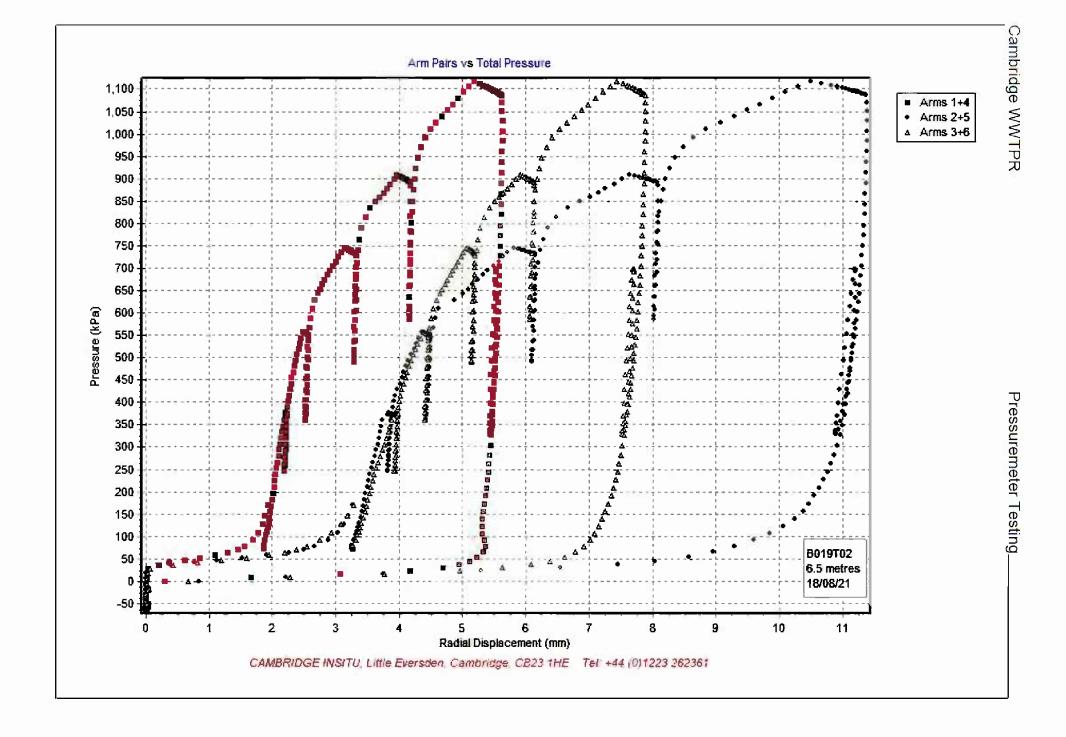


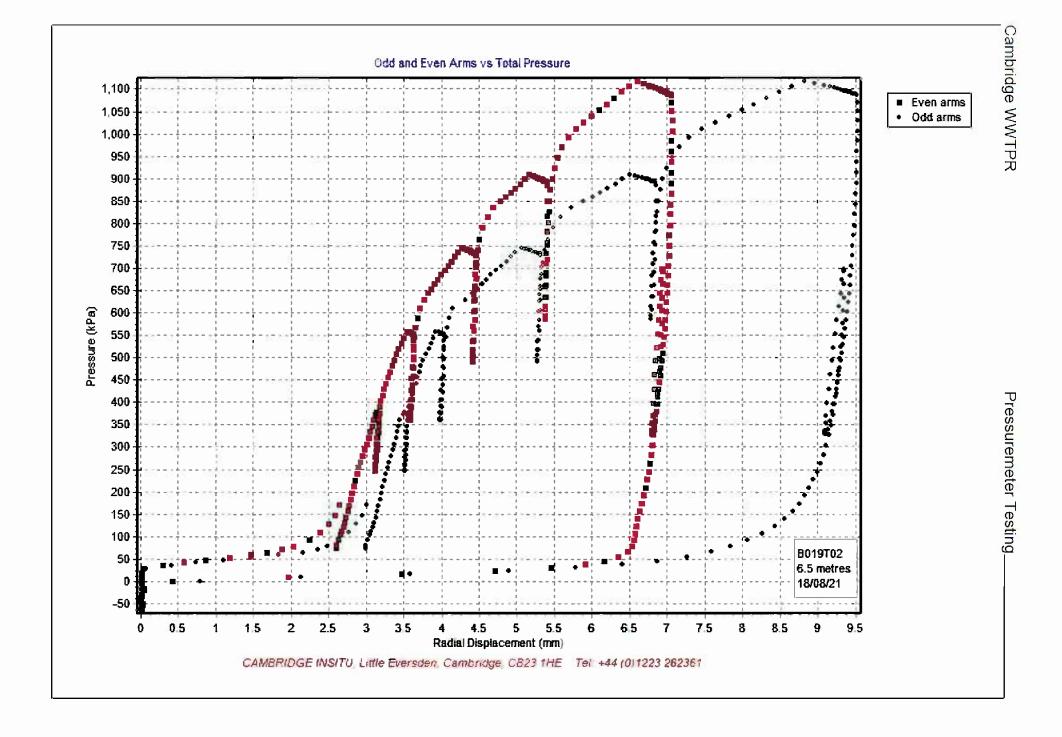












Cambridge WWTPR
BH_STW_019A Test 3 - SUMMARY OF RESULTS
[File made with WinSitu]

[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_STW_019A Test name : BH_STW_019A Test 3

Test date : 18 Aug 21
Test depth : 9.40 Metres
Water table : 2.6 Metres
Ambient PWP : 55.0 kPa

Material : Structureless Chalk

Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/RW on 19 Aug 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=3.53"
Po from Marsland & Randolph (kPa) : "Arm ave=281.2"
Best estimate of Po (kPa) : "Arm ave=166.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) : "Arm ave=596.5"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 32.0

Angle of internal friction (°) : "Arm ave=34.8"

Dilation angle (°) : "Arm ave=3.4"

Gradient of log-log plot : "Arm ave=0.385"

[Withers et al 1989]

Angle of internal friction (°) : "Arm ave=34.7"

Dilation angle (°) : "Arm ave=3.3"

Gradient of log-log plot : "Arm ave=-2.418"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=17.9"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	82.4	0.566	440	0.165	136
Arm ave	2	91.2	1.332	563	0.232	212
Arm ave	3	113.3	3.372	769	0.237	269
Arm ave	4	100.4	13.252	664	0.327	329

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	15.908	11.724	0.737
Arm ave	2	15.511	10.836	0.699
Arm ave	3	11.376	6.942	0.610
Arm ave	4	13.677	8.694	0.636

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

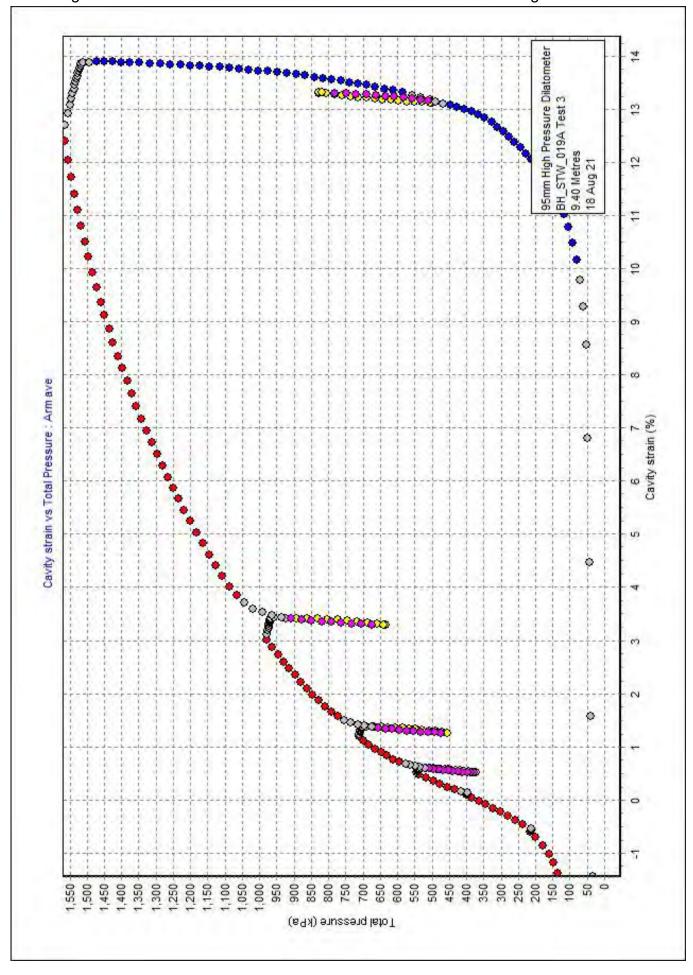
{Axis is Arm ave}

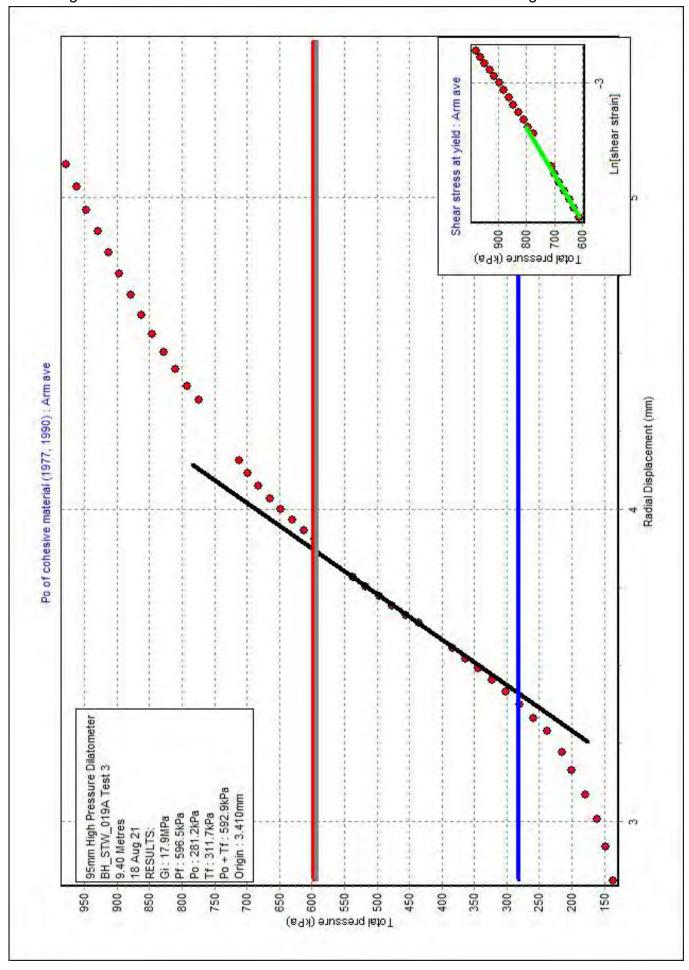
Strain Origin (mm) : 3.53
Po (kPa) : 166
Cohesion (kPa) : 14
Angle of peak friction (deg) : 34.8
Angle of peak dilation (deg) : 3.4
Total yield stress (kPa) : 359
CIR1506/21

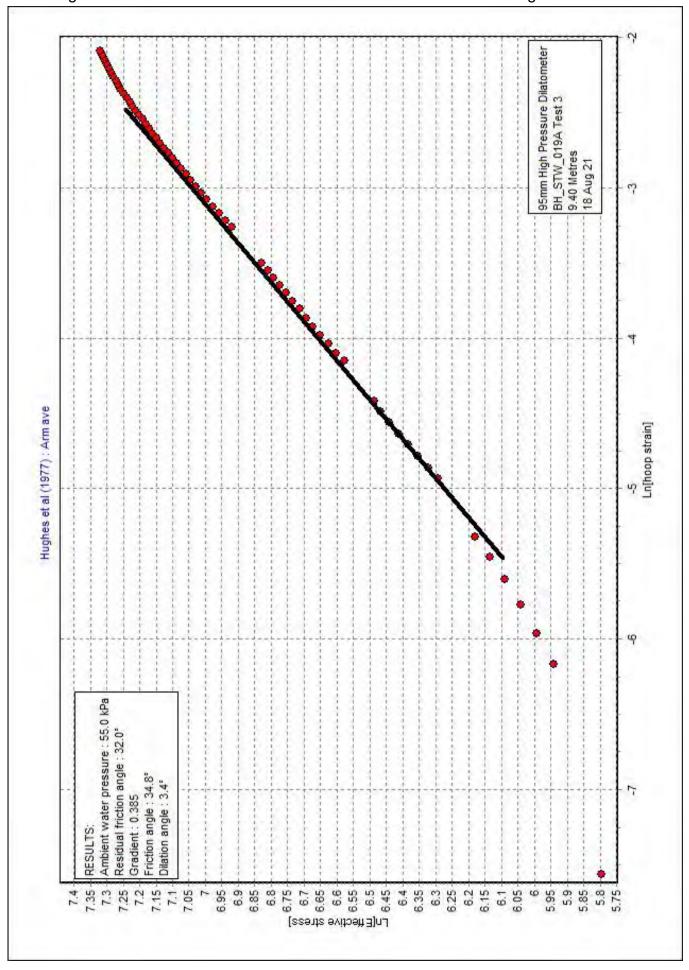
BH_STW_019A Test 3 - SUMMARY OF RESULTS

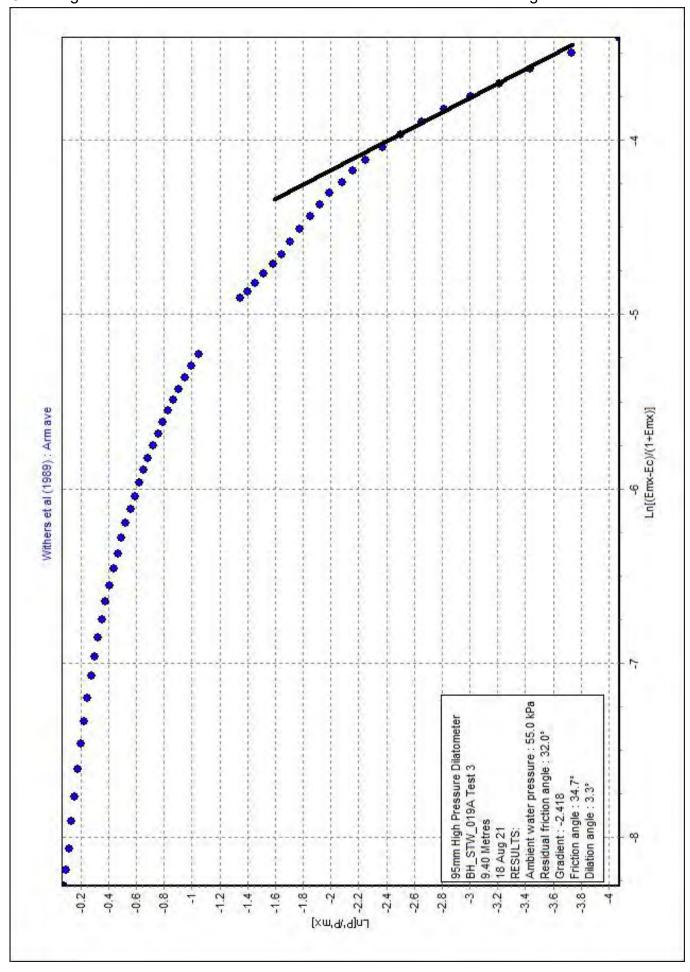
Total limit stress (kPa) : 2785
G at first yield (MPa) : 46.8
Non-linear exponent : 0.610
Janbu exponent : 0.257
Correlation : 0.918

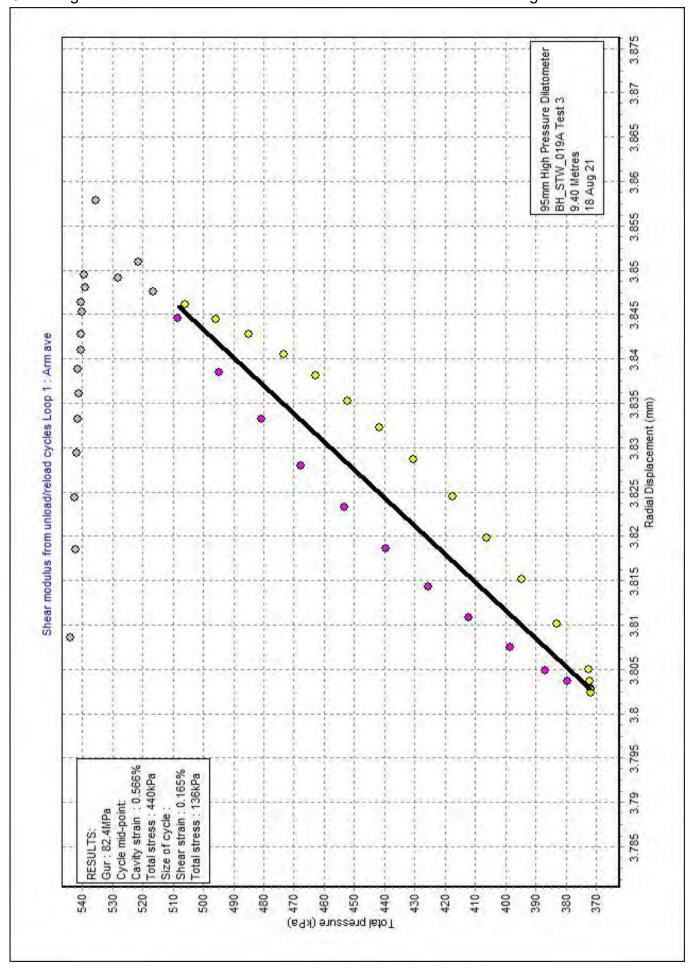
Ambient pore water pressure (kPa) : 55 Residual friction angle (deg) : 32.0 Poisson's ratio : 0.25

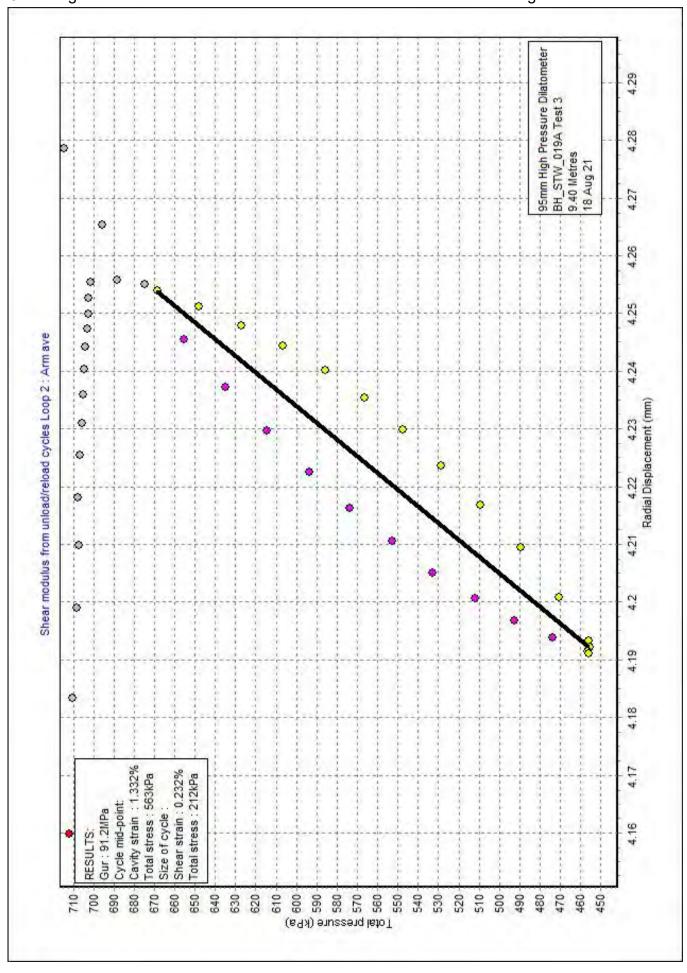


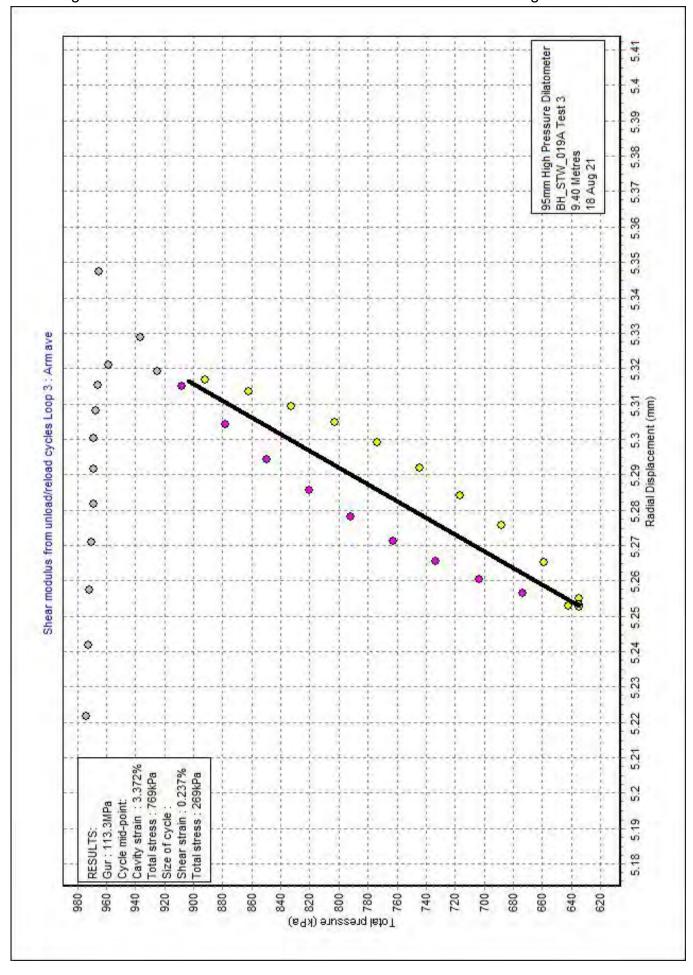


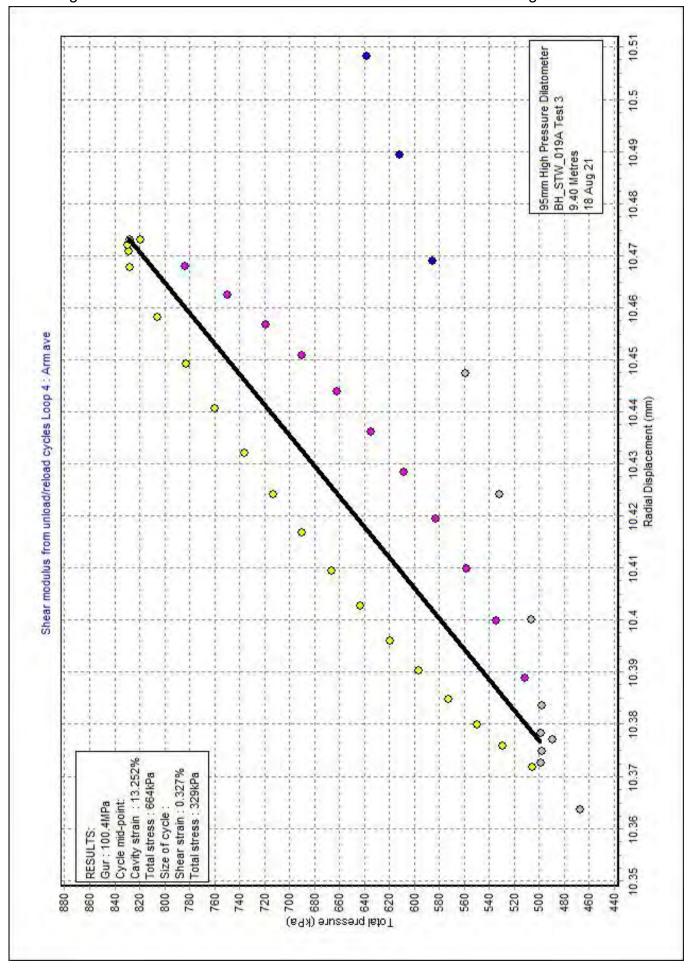


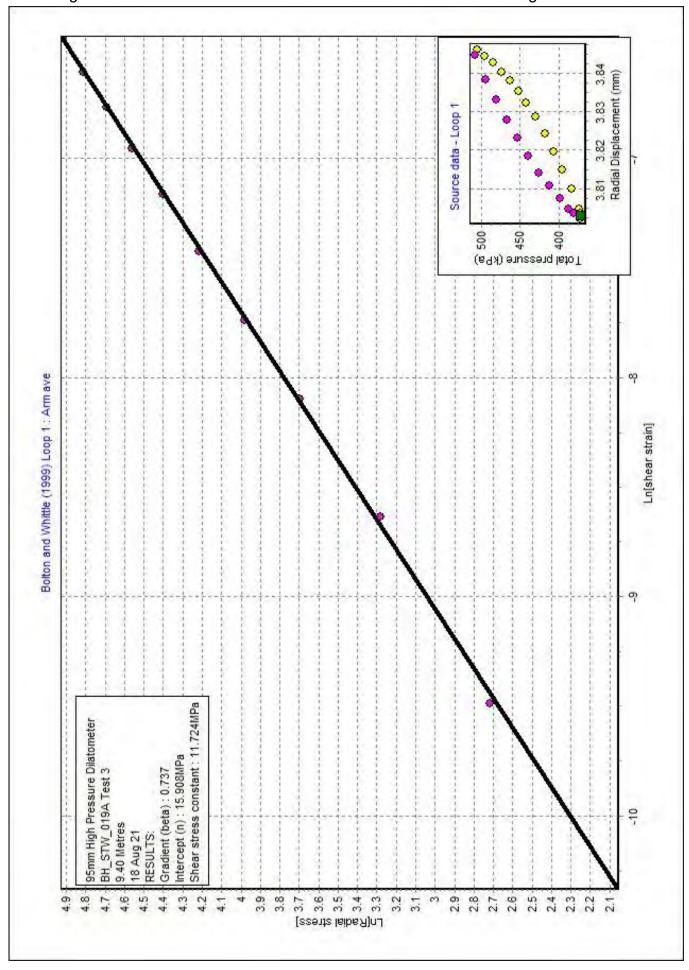


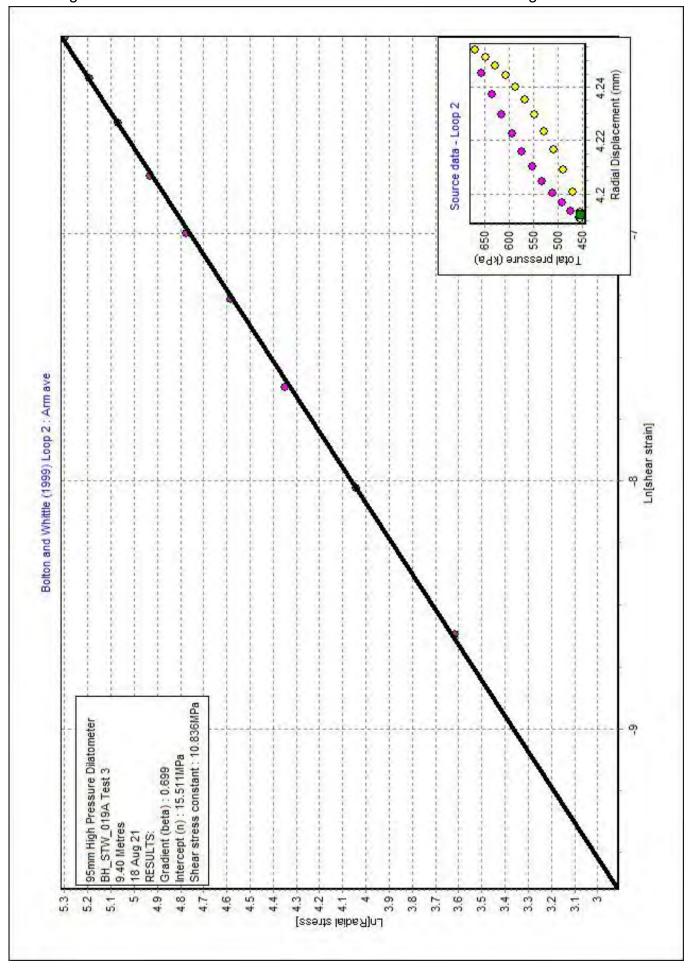


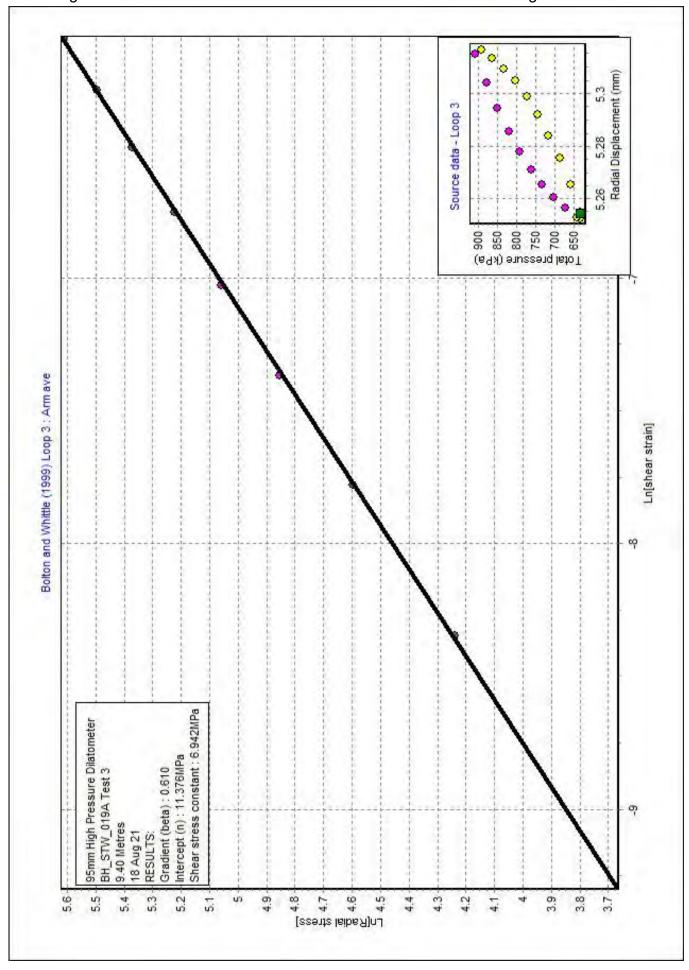


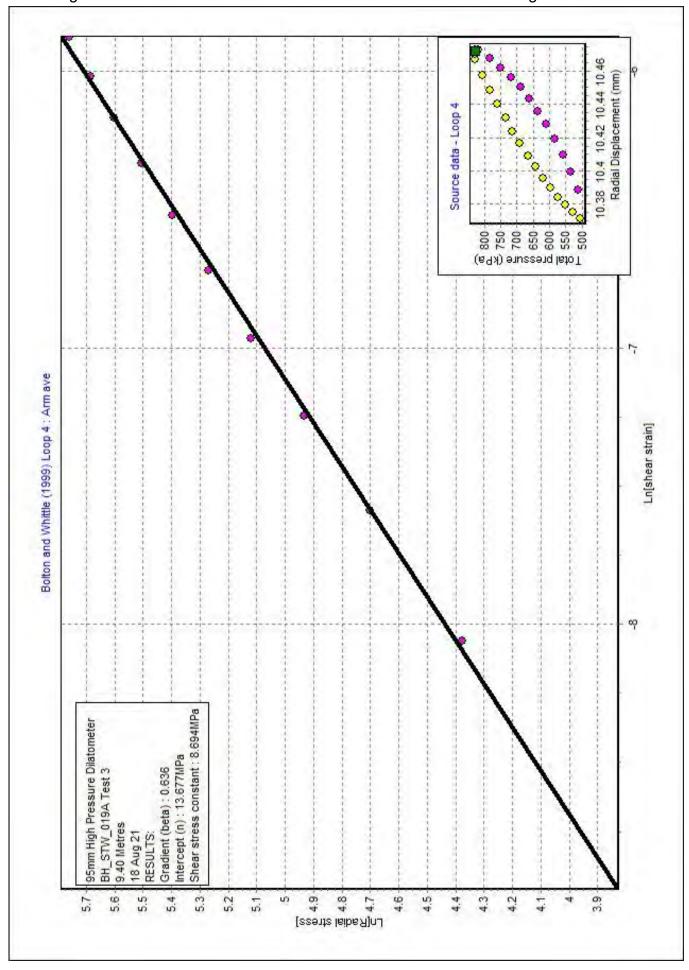


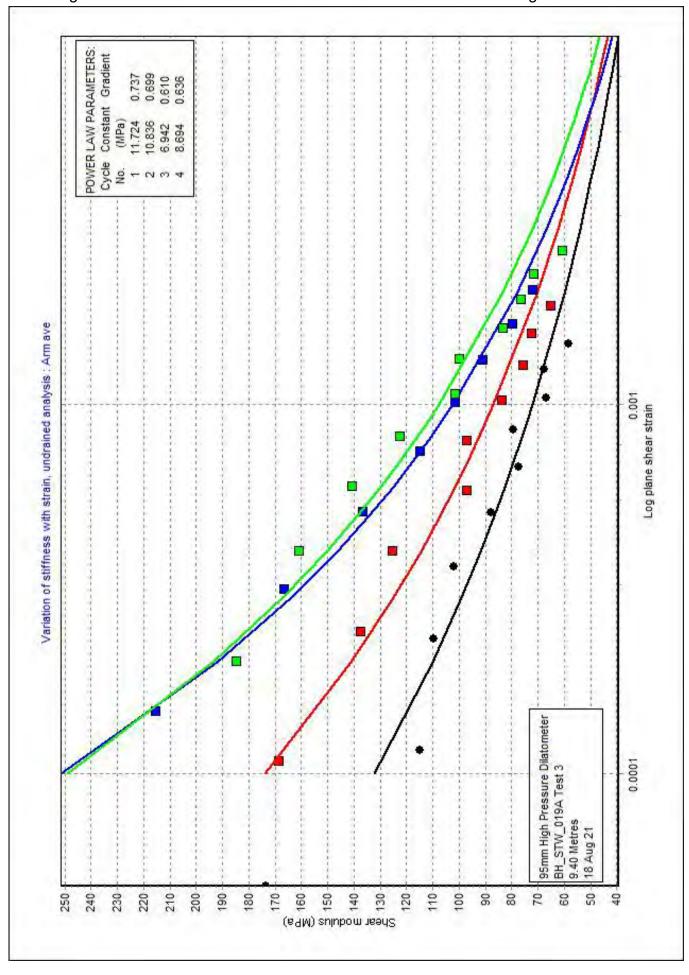


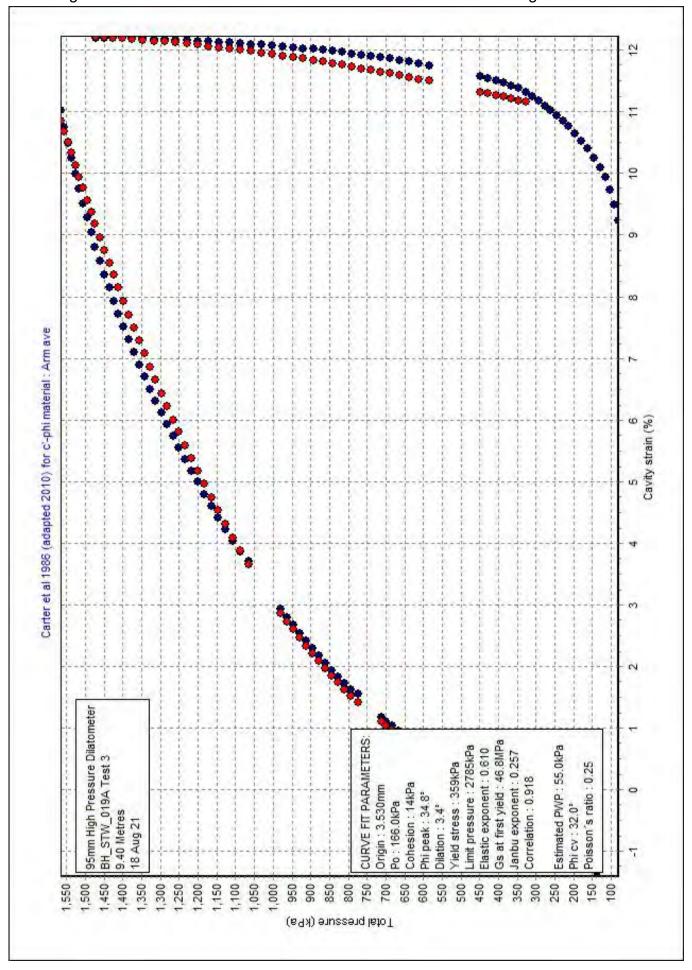


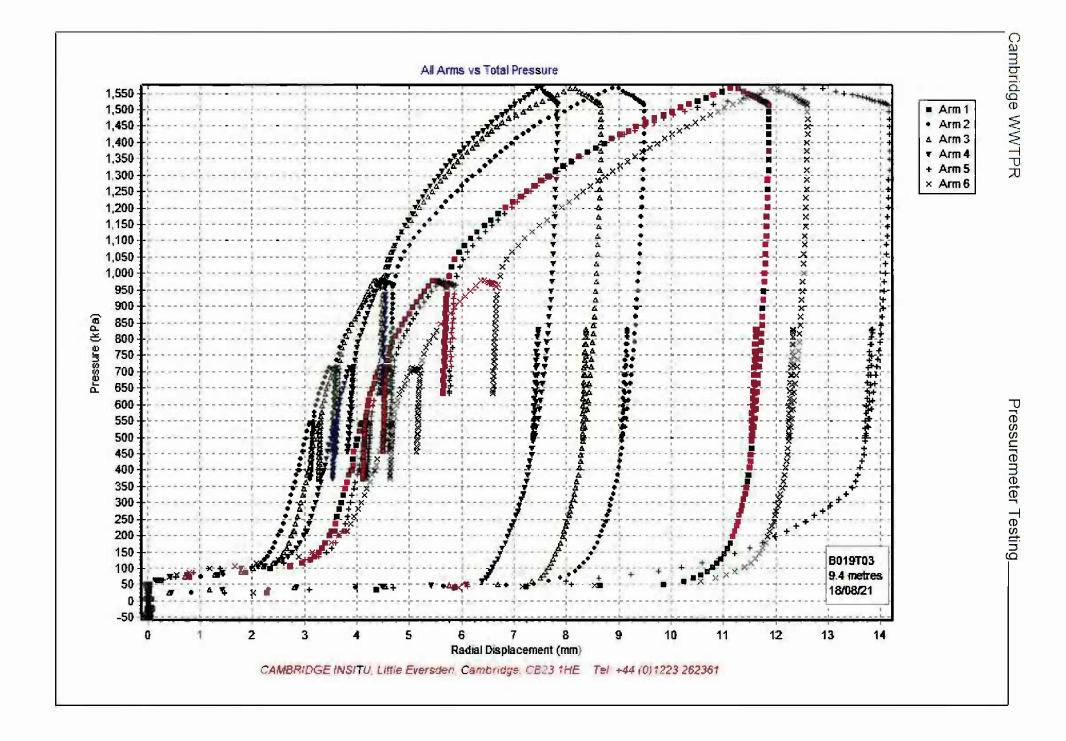




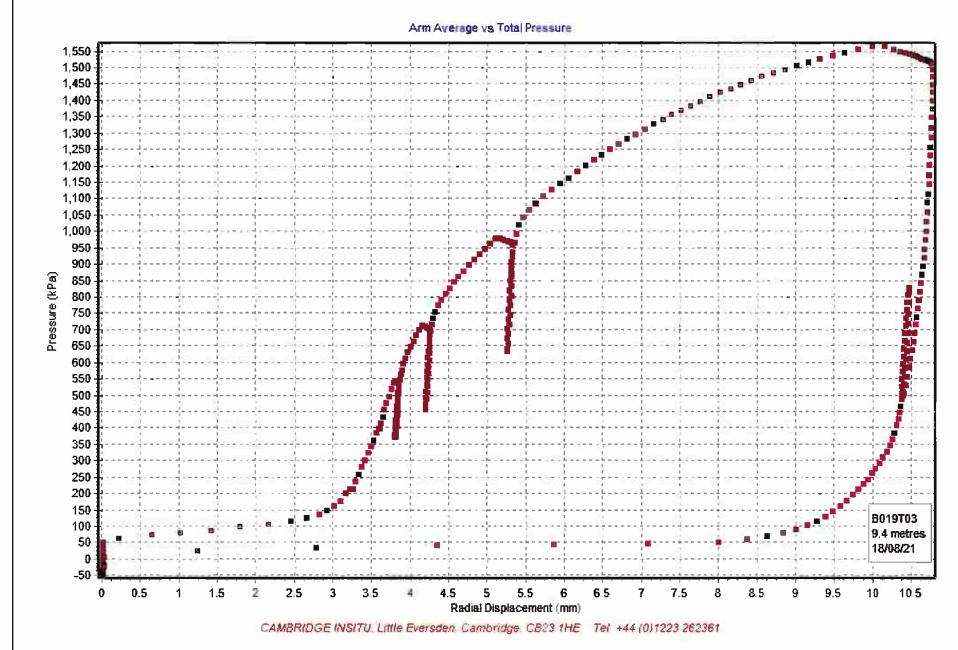


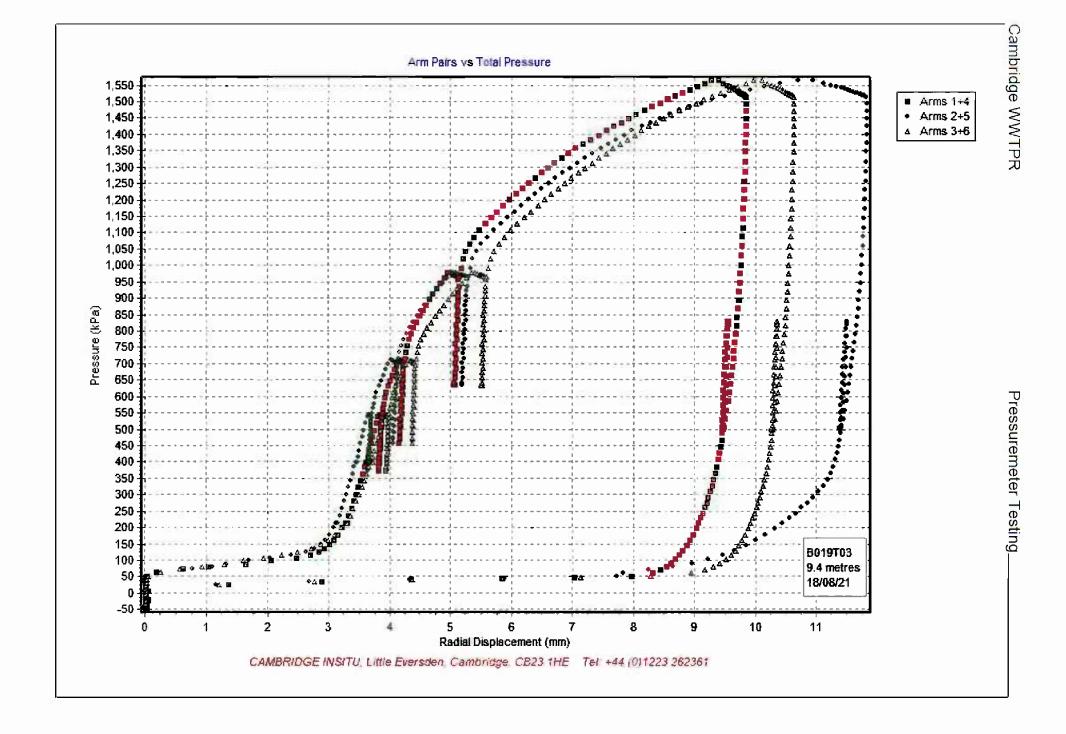


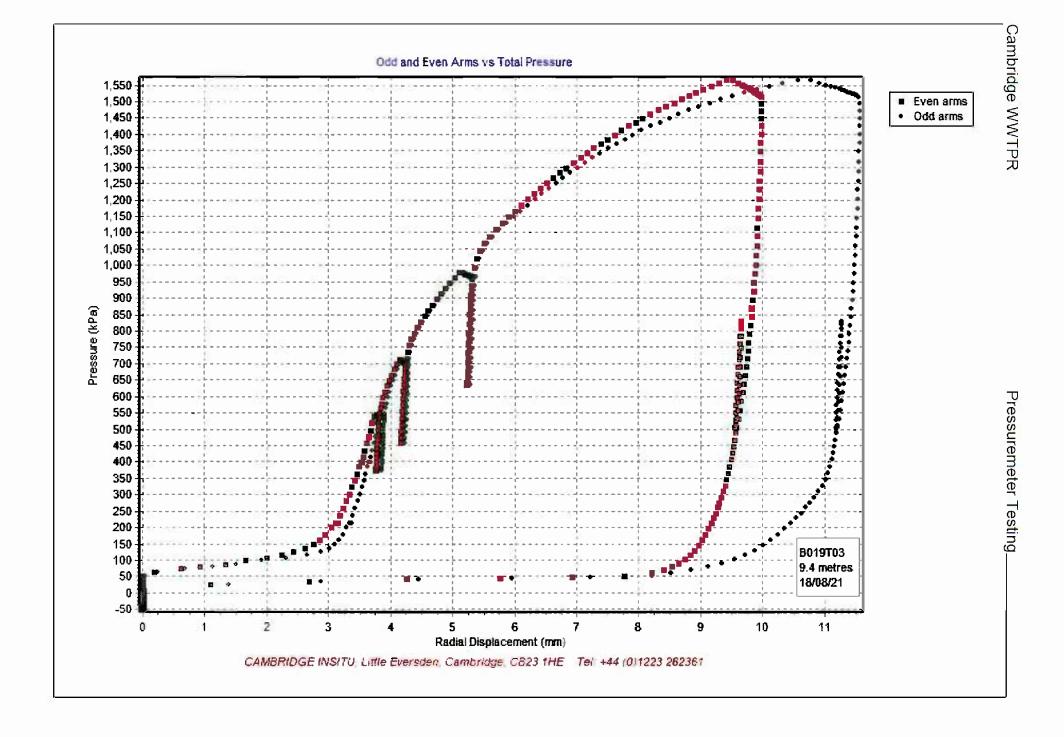




Cambridge WWTPR







Cambridge WWTPR

BH_STW_020 Test 1 - SUMMARY OF RESULTS

[File made with WinSitu]

[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_STW_020
Test name : BH_STW_020 Test 1

Test date : 6 Sep 21
Test depth : 4.50 Metres
Water table : 3.75 Metres
Ambient PWP : 0.0 kPa

Material : Structureless Chalk

Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/YB/RW on 6 Sep 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=3.09"

Po from Marsland & Randolph (kPa) : "Arm ave=98.4"

Best estimate of Po (kPa) : "Arm ave=98.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) : "Arm ave=291.5"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 32.0

Angle of internal friction (°) : "Arm ave=32.4"

Dilation angle (°) : "Arm ave=0.5"

Gradient of log-log plot : "Arm ave=0.352"

[Withers et al 1989]

Angle of internal friction (°) : "Arm ave=33.2"

Dilation angle (°) : "Arm ave=1.4"

Gradient of log-log plot : "Arm ave=-2.327"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=5.1" Axis Loop Value Mean Strain Mean Pc (MPa) No (%) (kPa) (%) 0.864 19.4 Arm ave 1 212 0.334 2 25.0 3.007 301 0.375 Arm ave

Arm ave 3 26.1 5.798 374 0.511 134 Arm ave 4 24.6 19.922 322 0.671 165

dPc

65

94

(kPa)

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	2.758	1.790	0.649
Arm ave	2	2.712	1.610	0.594
Arm ave	3	2.696	1.508	0.559
Arm ave	4	3.535	2.090	0.591

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

Strain Origin (mm) : 3.09
Po (kPa) : 98
Cohesion (kPa) : 10
Angle of peak friction (deg) : 32.4
Angle of peak dilation (deg) : 0.5
Total yield stress (kPa) : 287
CIR1506/21

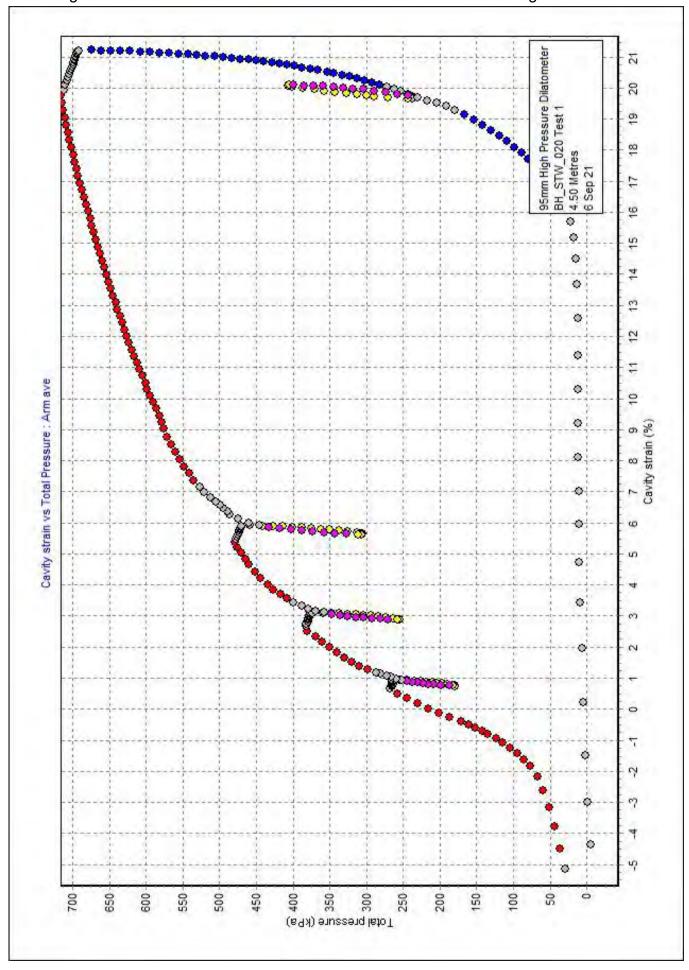
Cambridge WWTPR

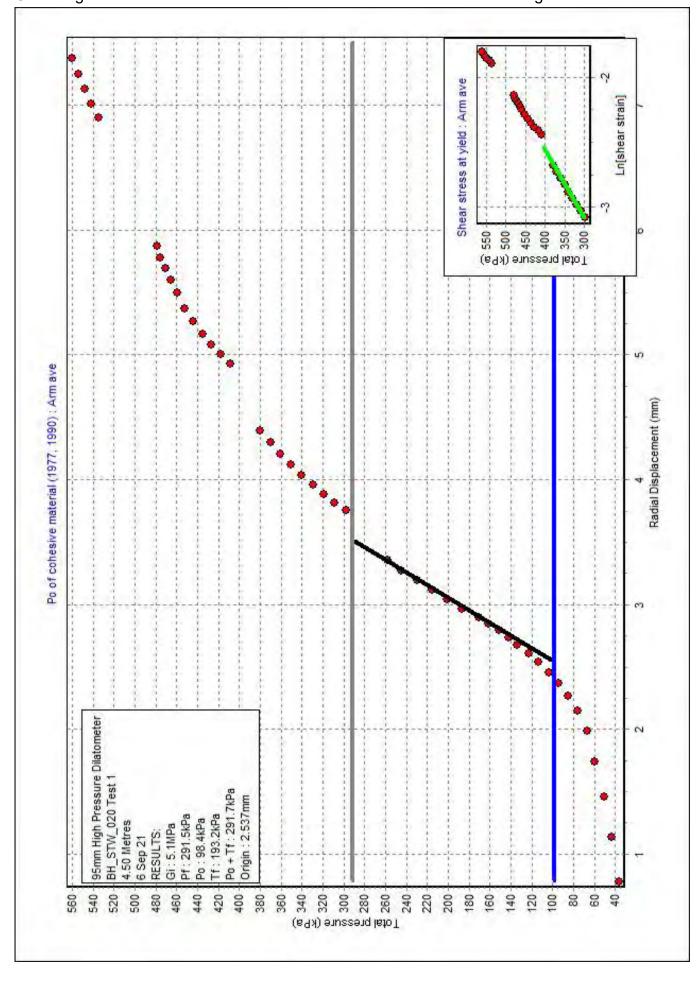
Pressuremeter Testing

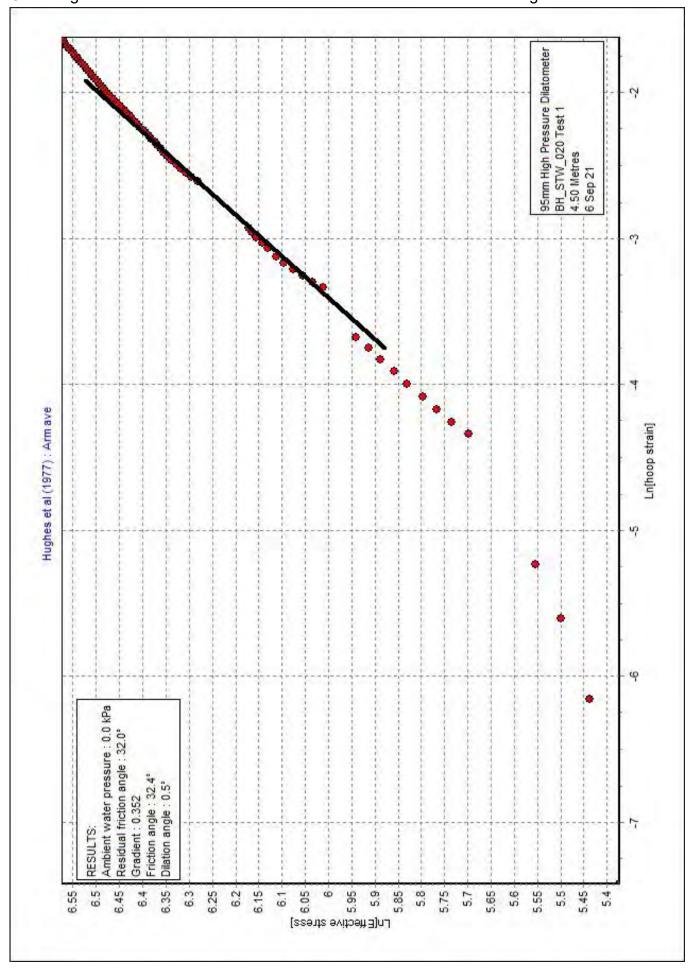
BH_STW_020 Test 1 - SUMMARY OF RESULTS

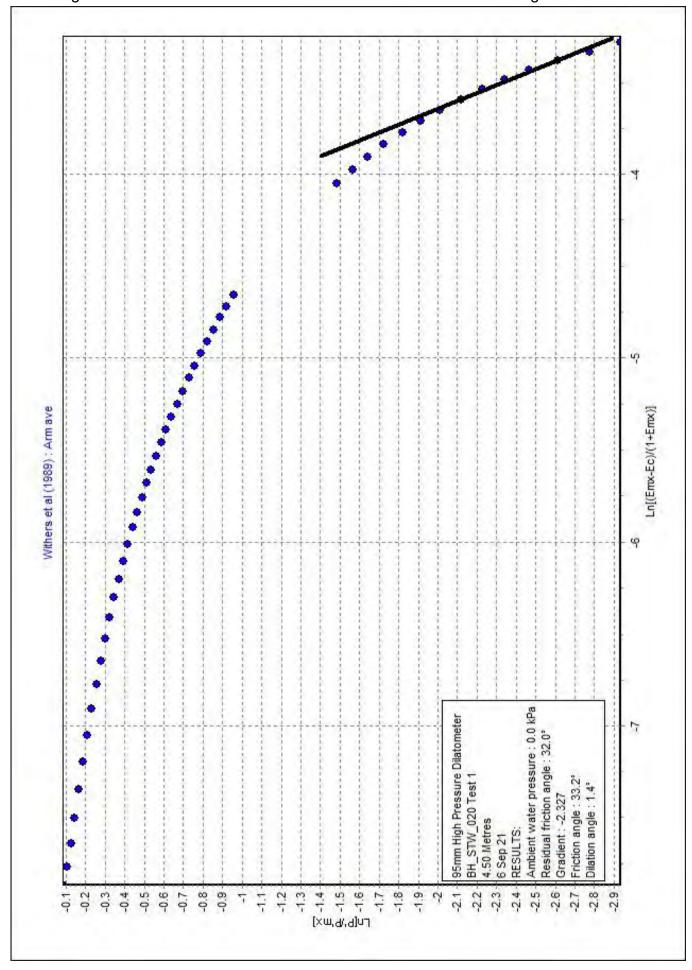
Total limit stress (kPa) : 1031
G at first yield (MPa) : 5.2
Non-linear exponent : 0.559
Janbu exponent : 0.418
Correlation : 0.991

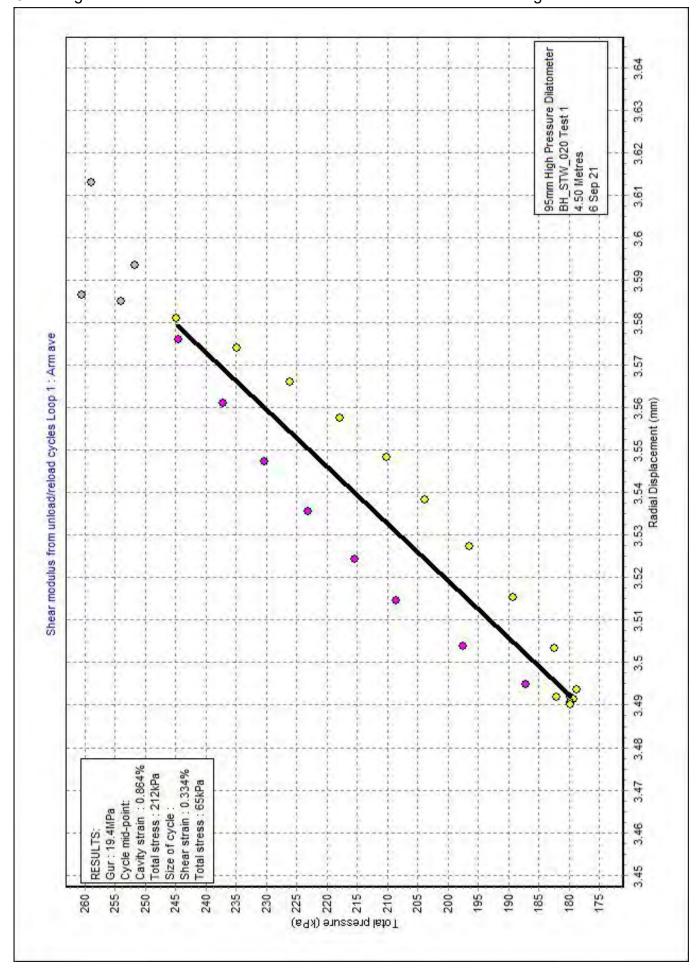
Ambient pore water pressure (kPa) : 0
Residual friction angle (deg) : 32.0
Poisson's ratio : 0.25

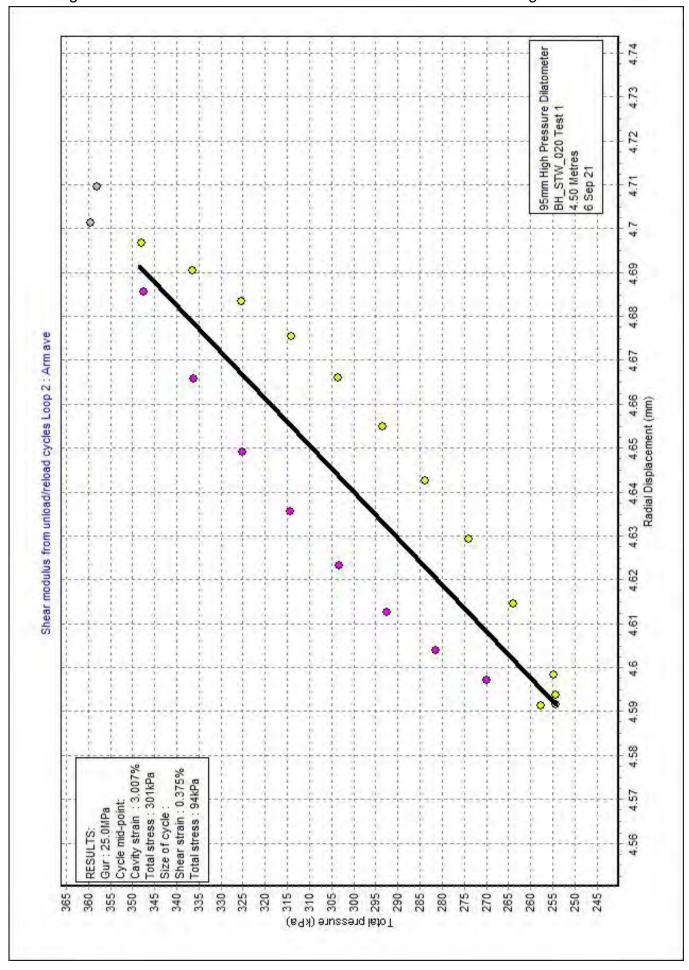


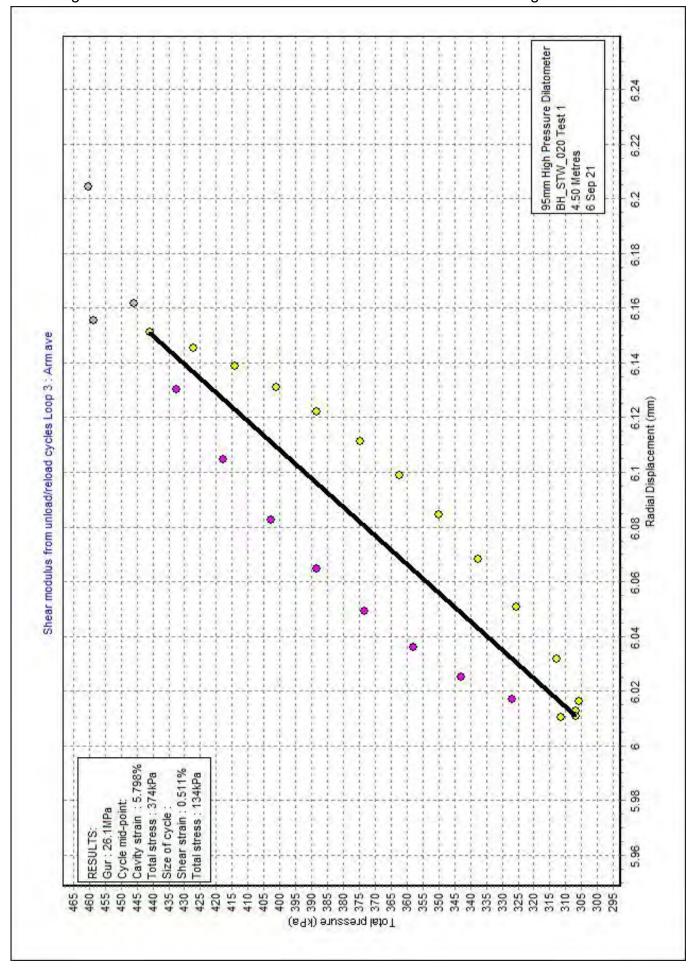


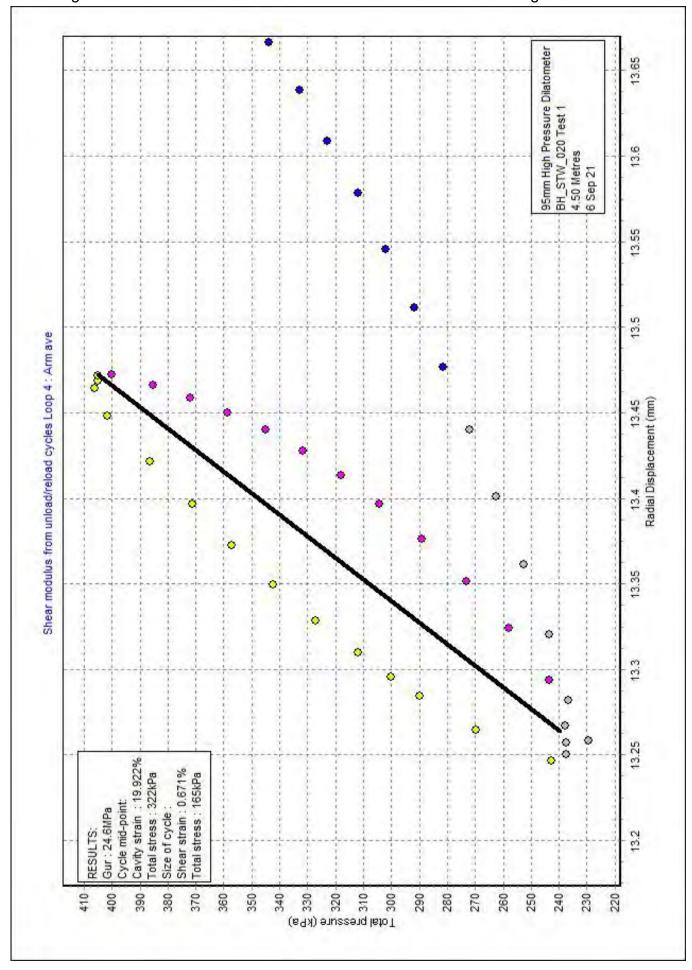


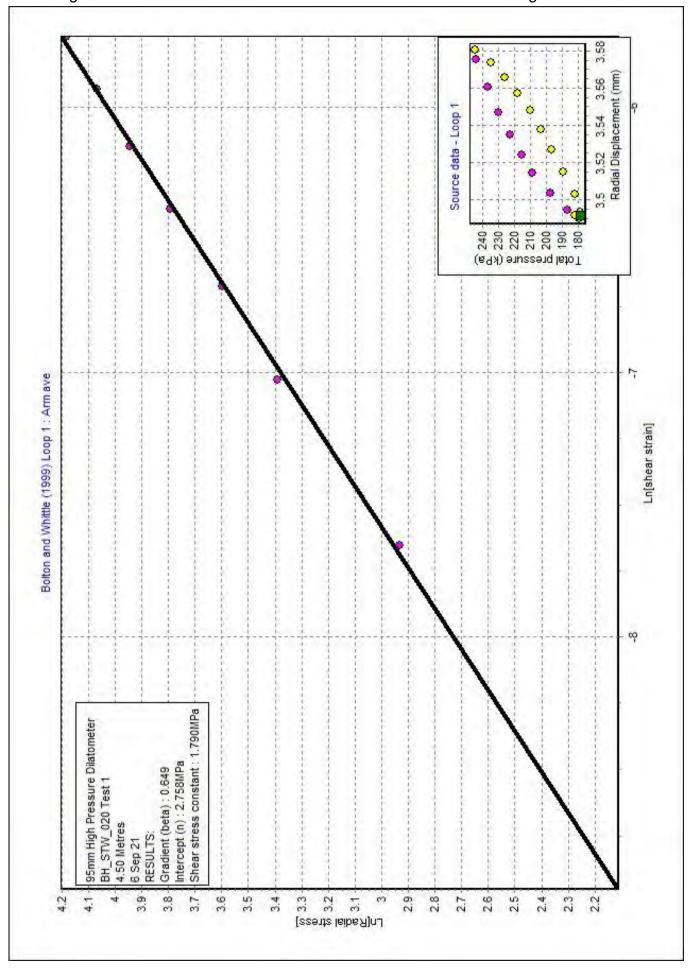


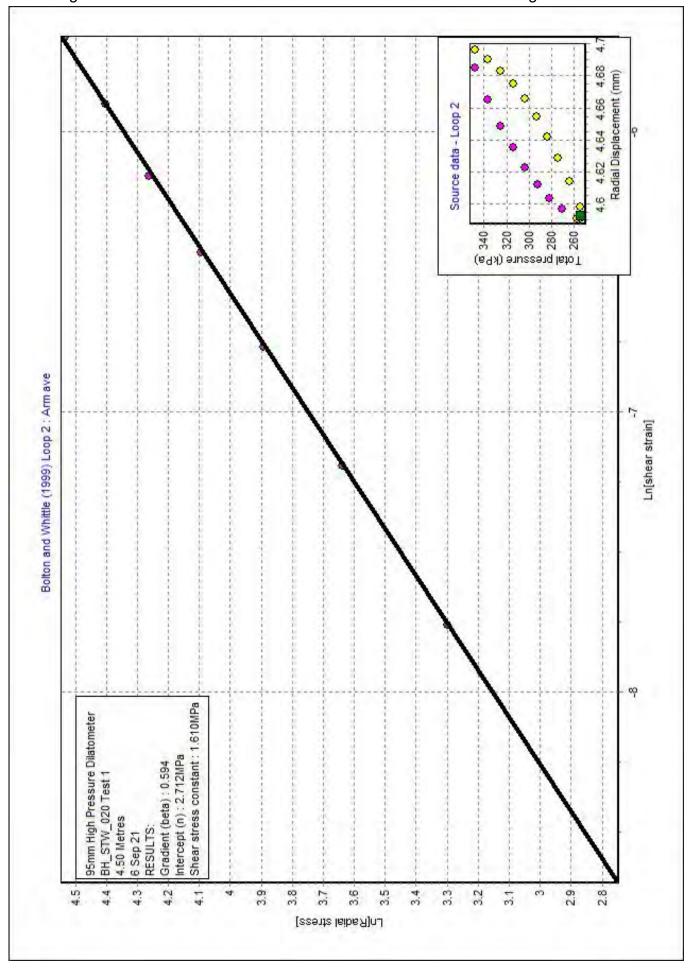


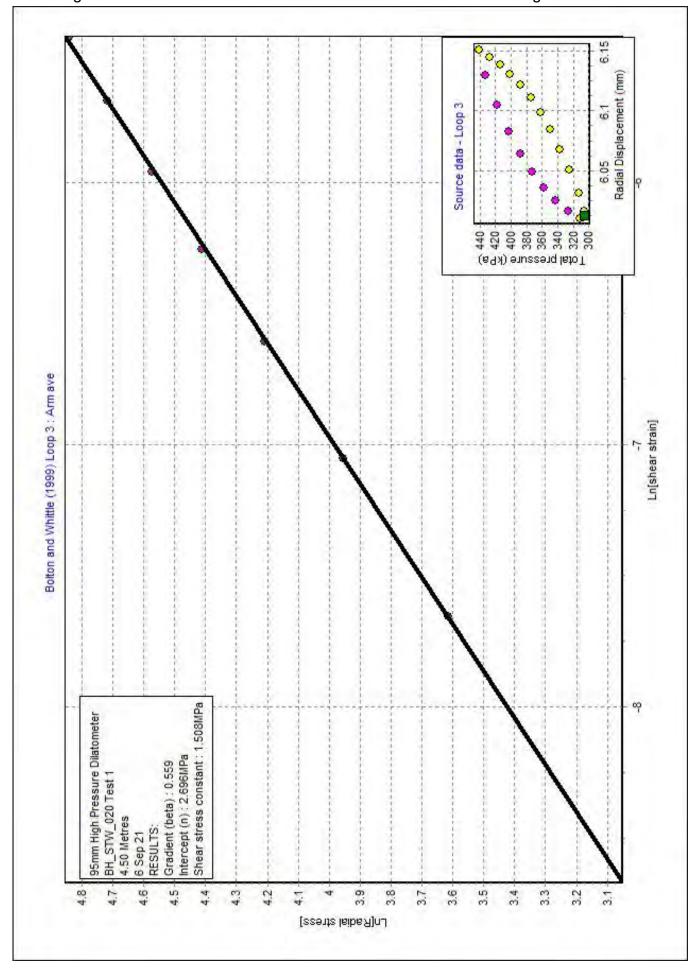


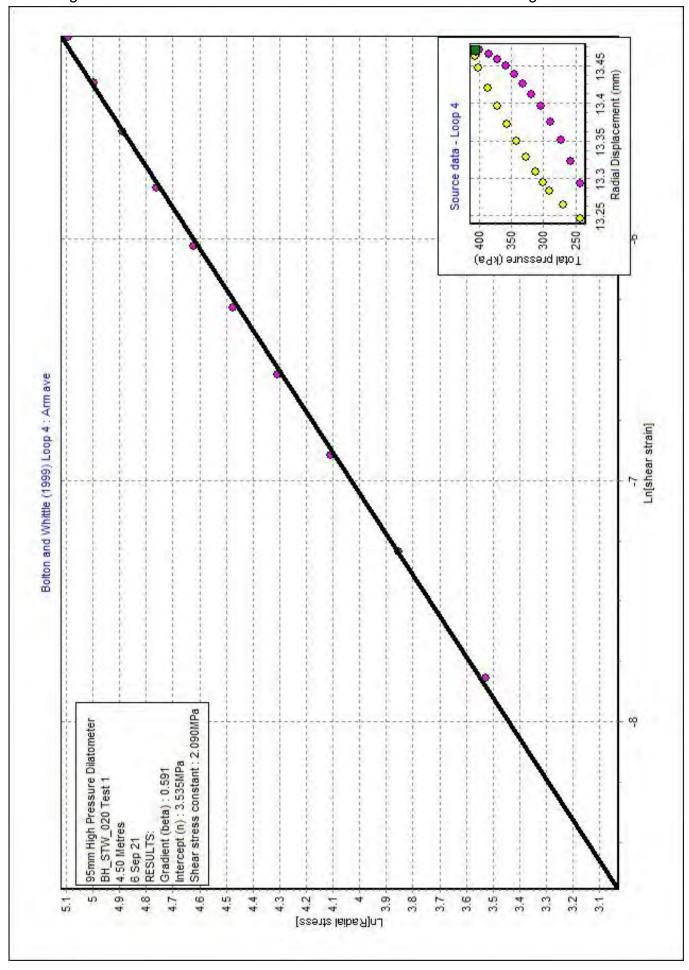


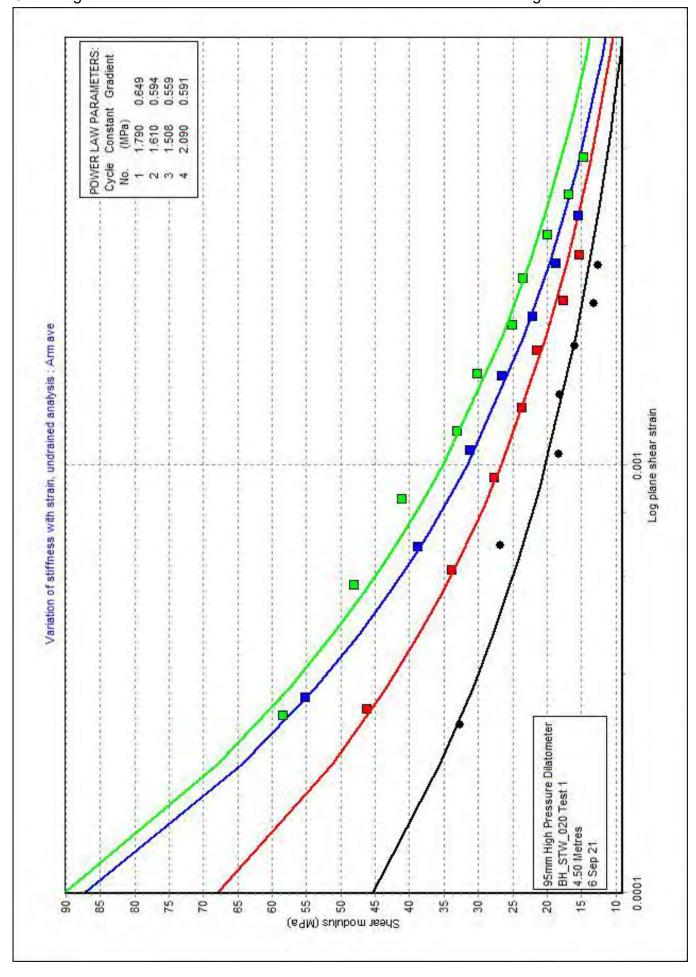


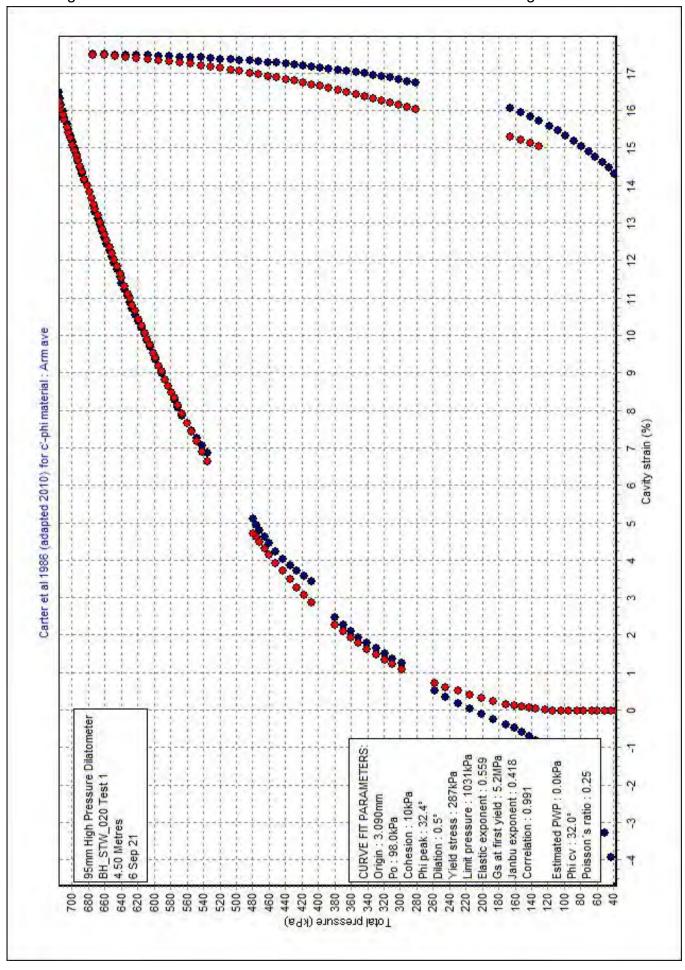


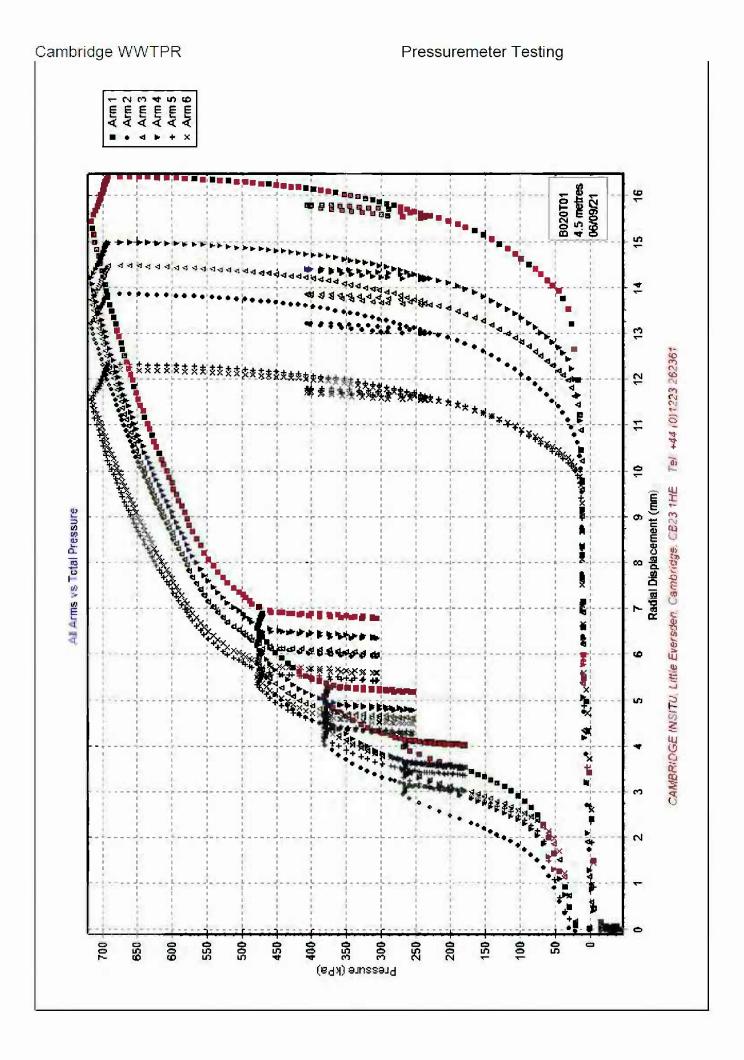


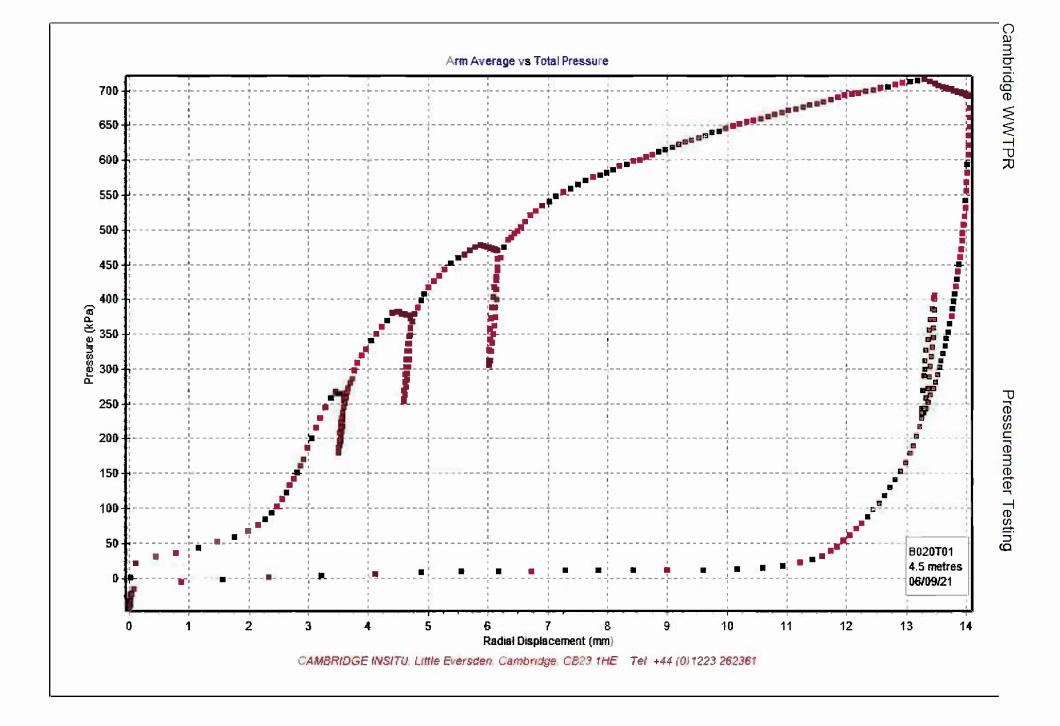


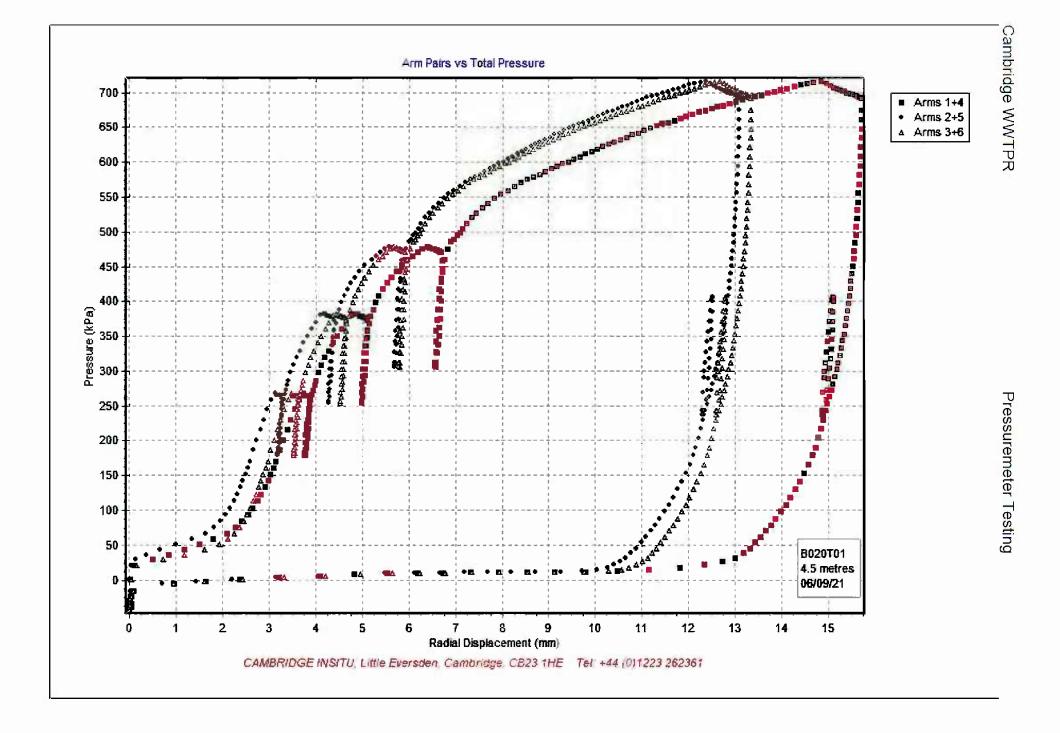


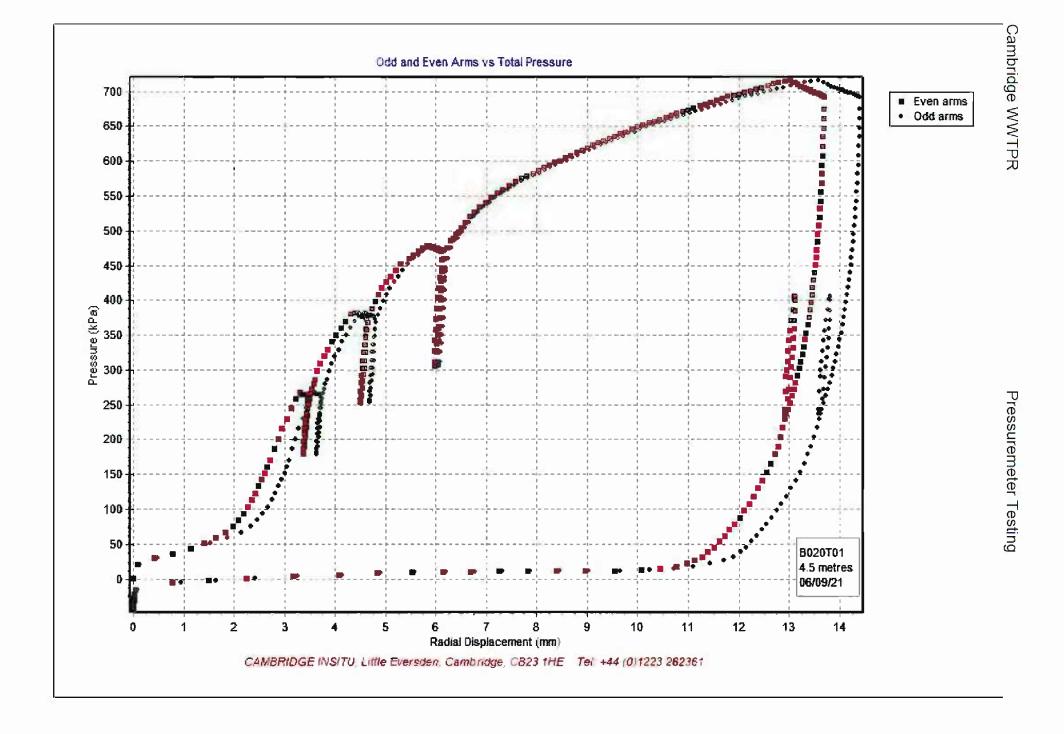












Cambridge WWTPR
BH_STW_020 Test 2 - SUMMARY OF RESULTS
[File made with WinSitu]

[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_STW_020
Test name : BH_STW_020 Test 2

Test date : 6 Sep 21
Test depth : 8.50 Metres
Water table : 2.1 Metres
Ambient PWP : 0.0 kPa
Material

Material : Chalk
Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/YB/RW on 6 Sep 21

Remarks: Curve modelling doesn't work very well because after 6.5% cavity strain the material structure begins to break down.

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=2.74"
Po from Marsland & Randolph (kPa) : "Arm ave=181.4"
Best estimate of Po (kPa) : "Arm ave=194.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) : "Arm ave=797.0"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 32.0

Angle of internal friction (°) : "Arm ave=35.5"

Dilation angle (°) : "Arm ave=4.2"

Gradient of log-log plot : "Arm ave=0.394"

[Withers et al 1989]

Angle of internal friction (°) : "Arm ave=34.2"
Dilation angle (°) : "Arm ave=2.7"
Gradient of log-log plot : "Arm ave=-2.390"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=29.1"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	49.8	-0.402	293	0.209	104
Arm ave	2	82.3	-0.107	413	0.190	156
Arm ave	3	148.5	0.618	695	0.177	262
Arm ave	4	187.5	2.297	1144	0.203	381
Arm ave	5	188.3	12.582	1088	0.279	525

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	13.203	10.301	0.780
Arm ave	2	15.401	11.272	0.732
Arm ave	3	19.997	13.628	0.681
Arm ave	4	30.957	21.494	0.694
Arm ave	5	24.818	15.956	0.643

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 2.74

 Po (kPa)
 : 194

 Cohesion (kPa)
 : 117

 CIR1506/21

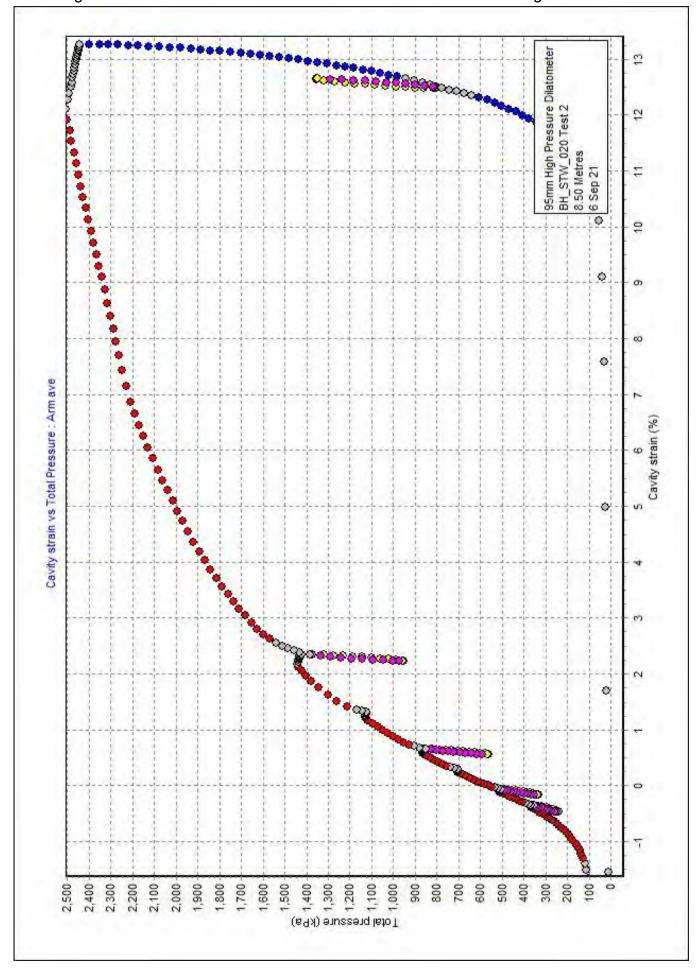
Correlation

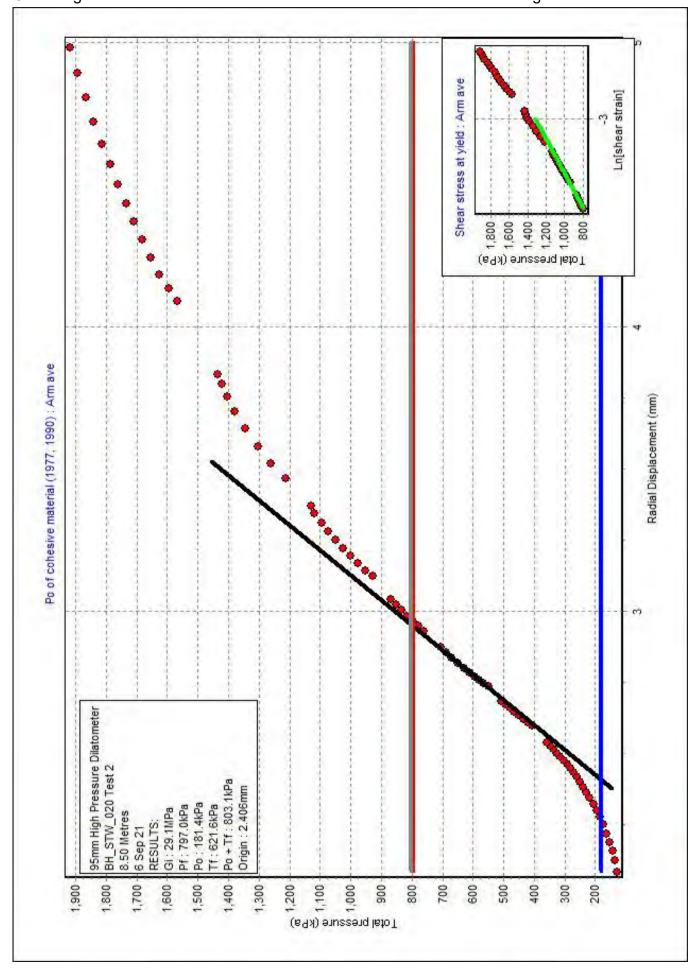
Pressuremeter Testing

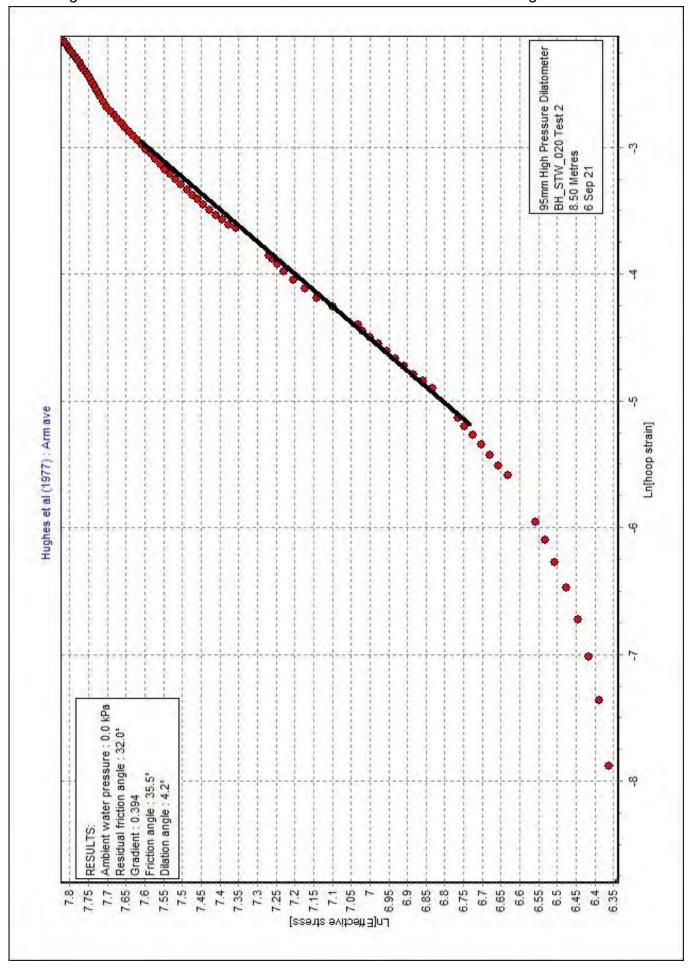
BH_STW_020 Test 2 - SUMMARY OF RESULTS
Angle of peak friction (deg) : 35.5
Angle of peak dilation (deg) : 4.2
Total yield stress (kPa) : 597
Total limit stress (kPa) : 5092
G at first yield (MPa) : 58.1
Non-linear exponent : 0.694
Janbu exponent : 0.432

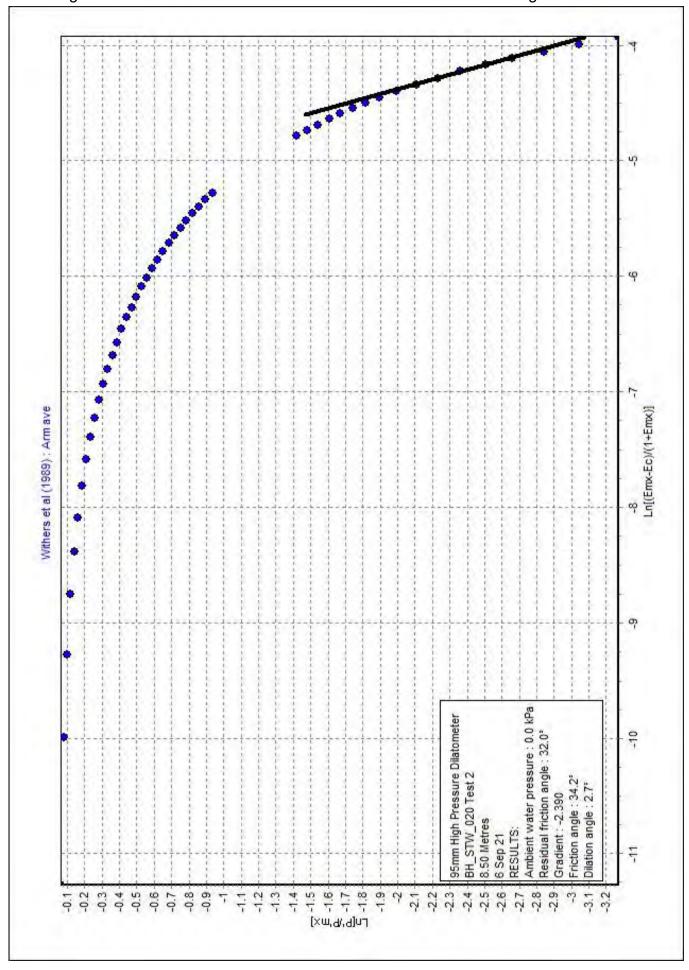
Ambient pore water pressure (kPa) : 0
Residual friction angle (deg) : 32.0
Poisson's ratio : 0.25

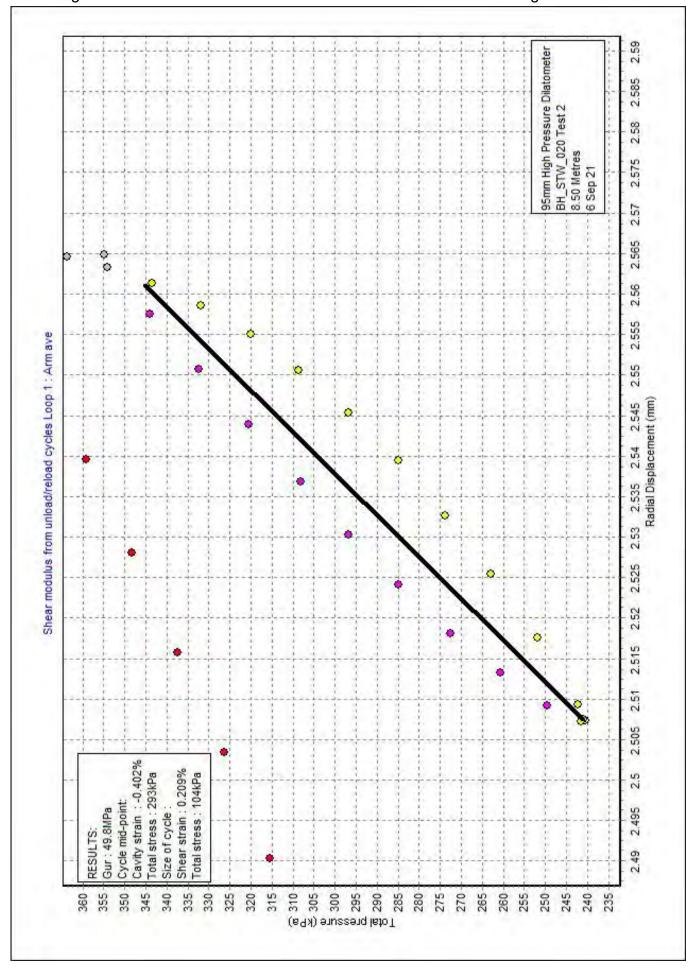
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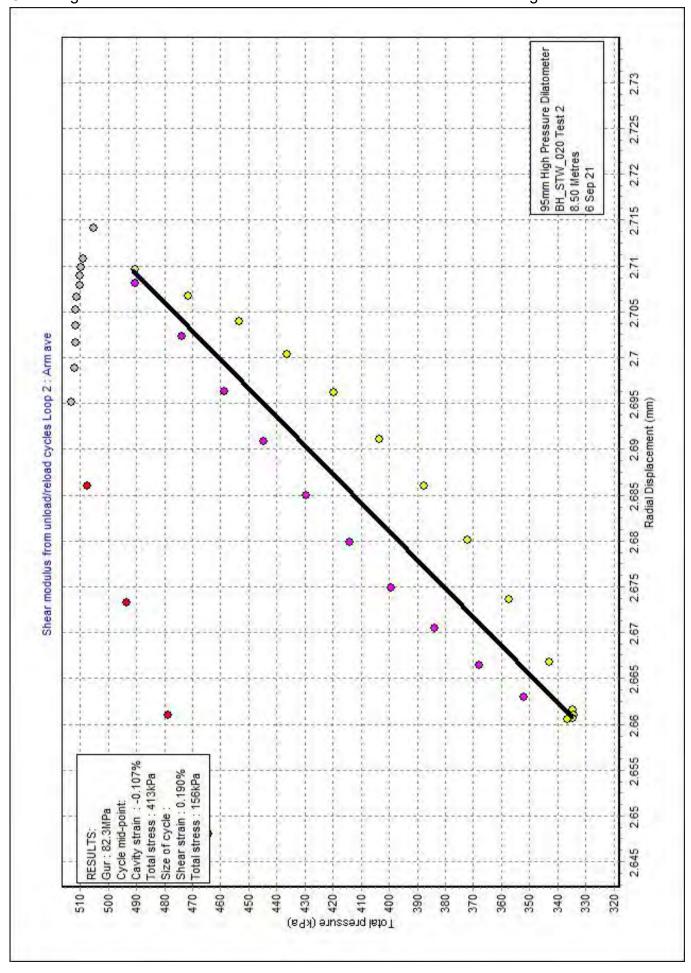


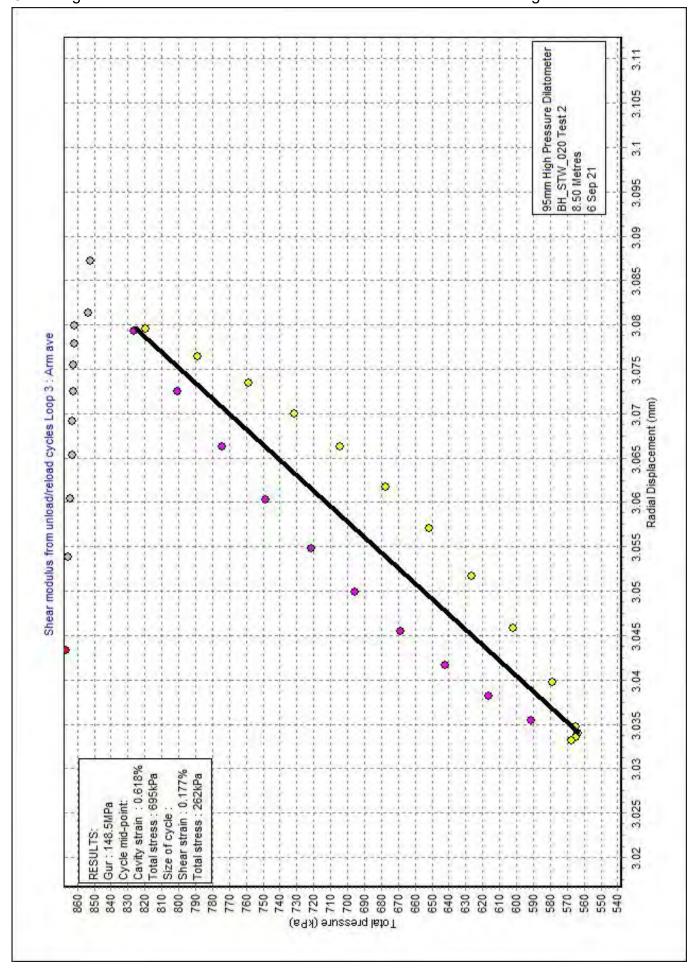


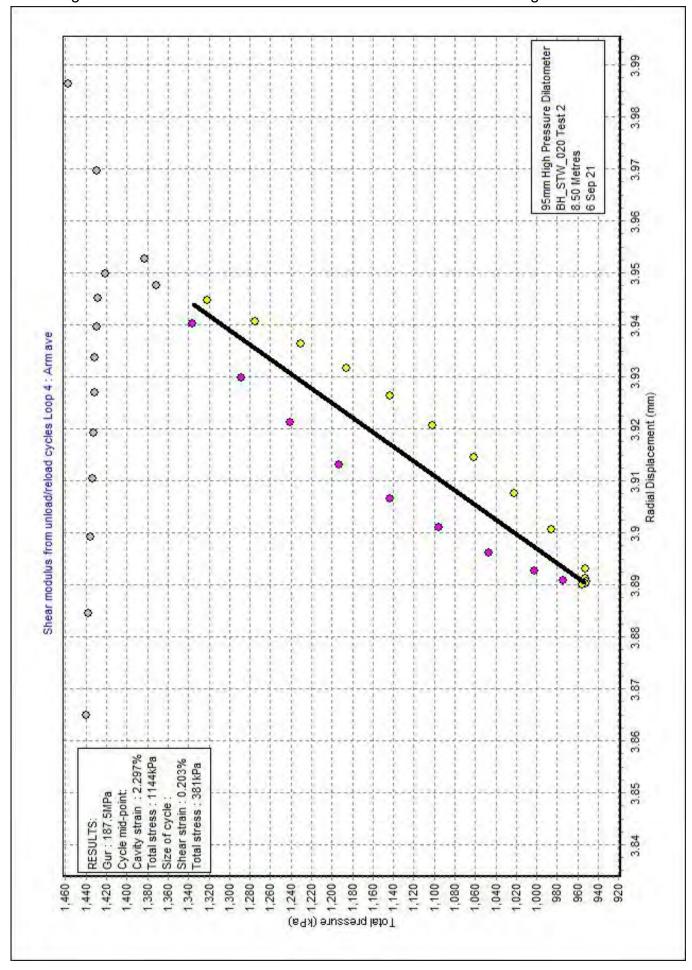


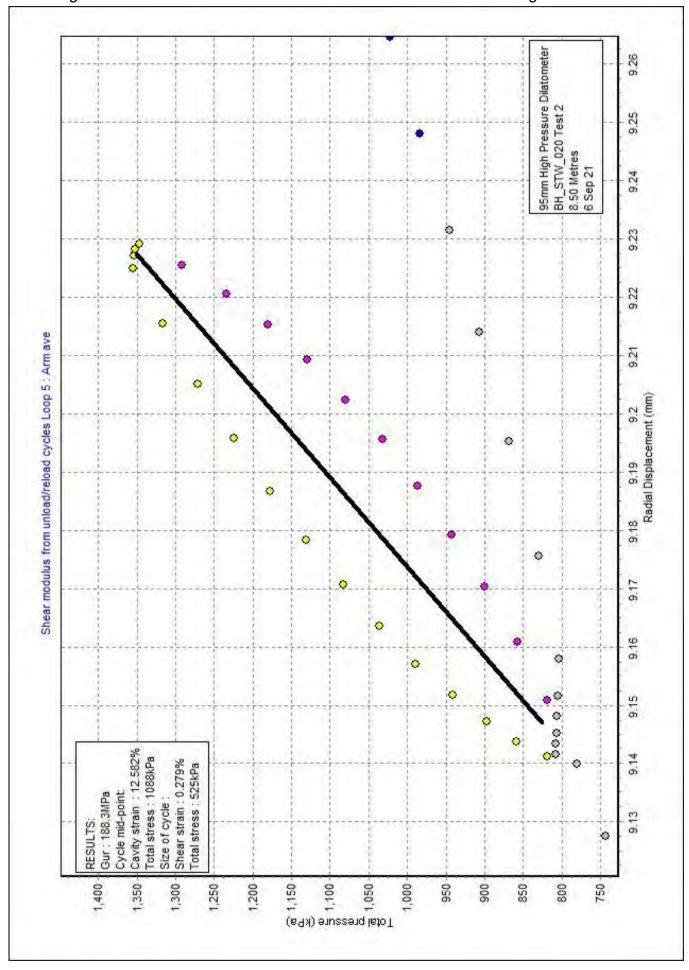


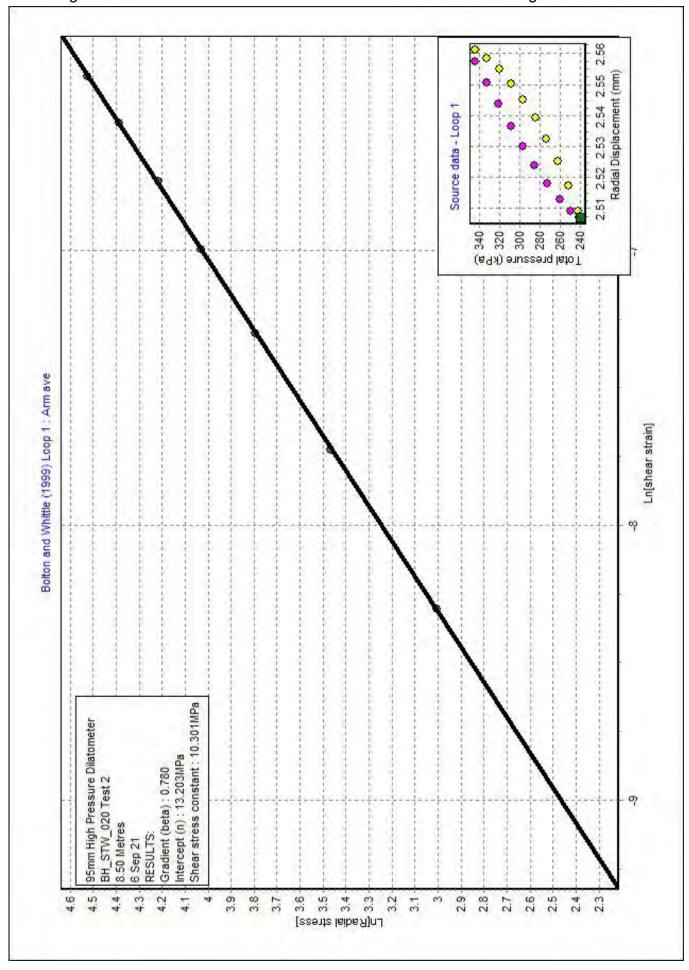


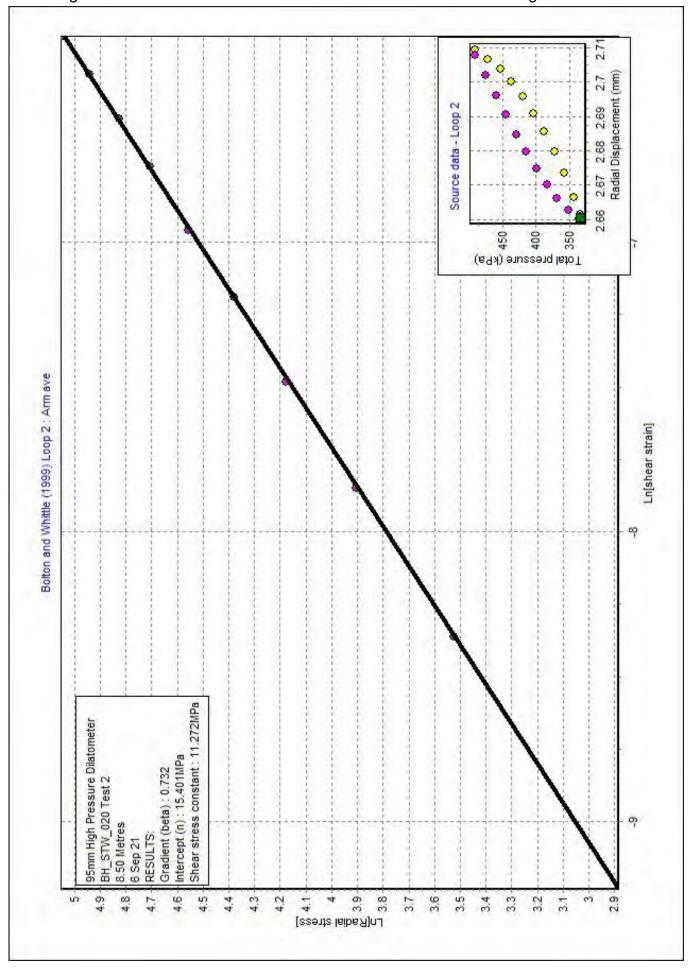


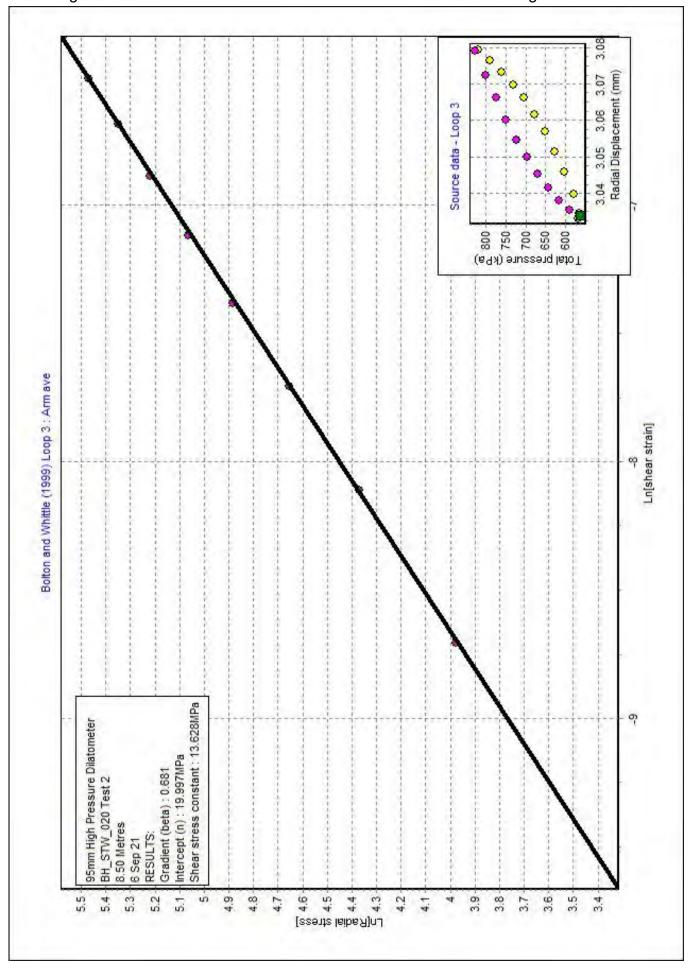


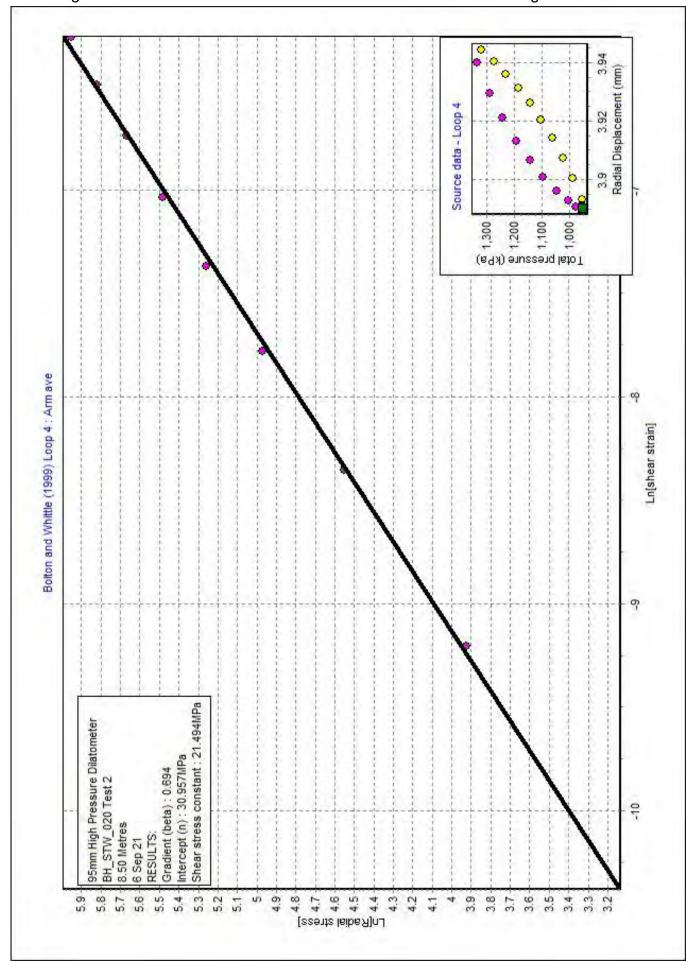


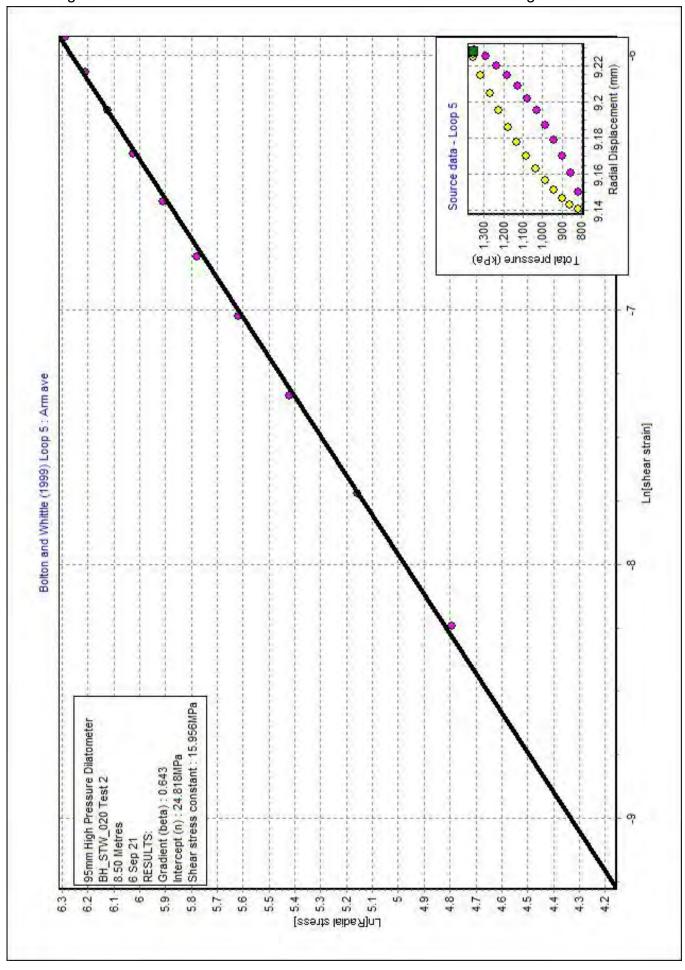


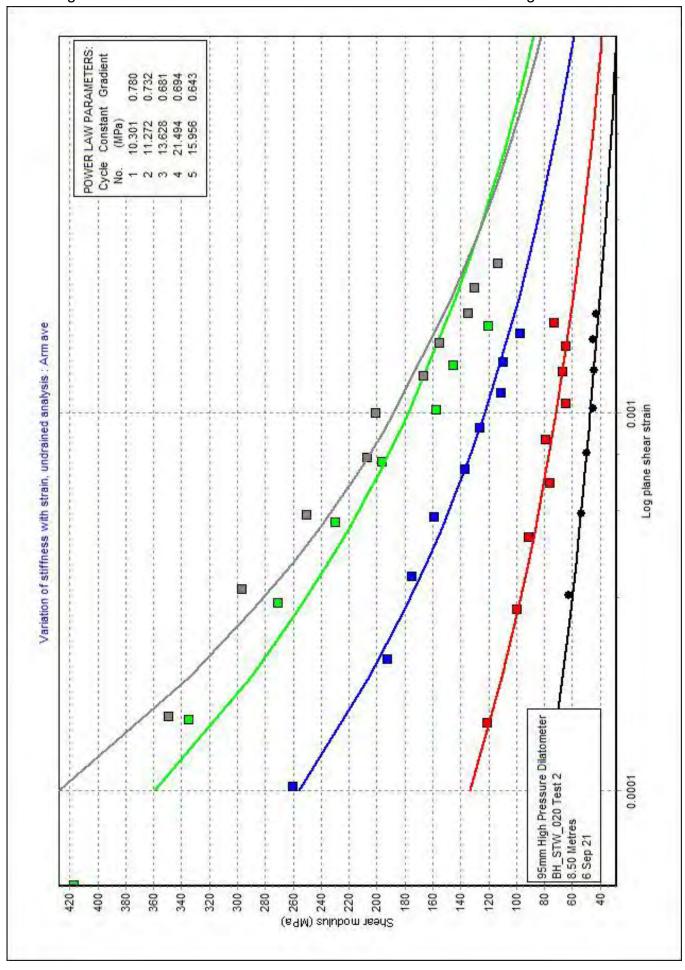


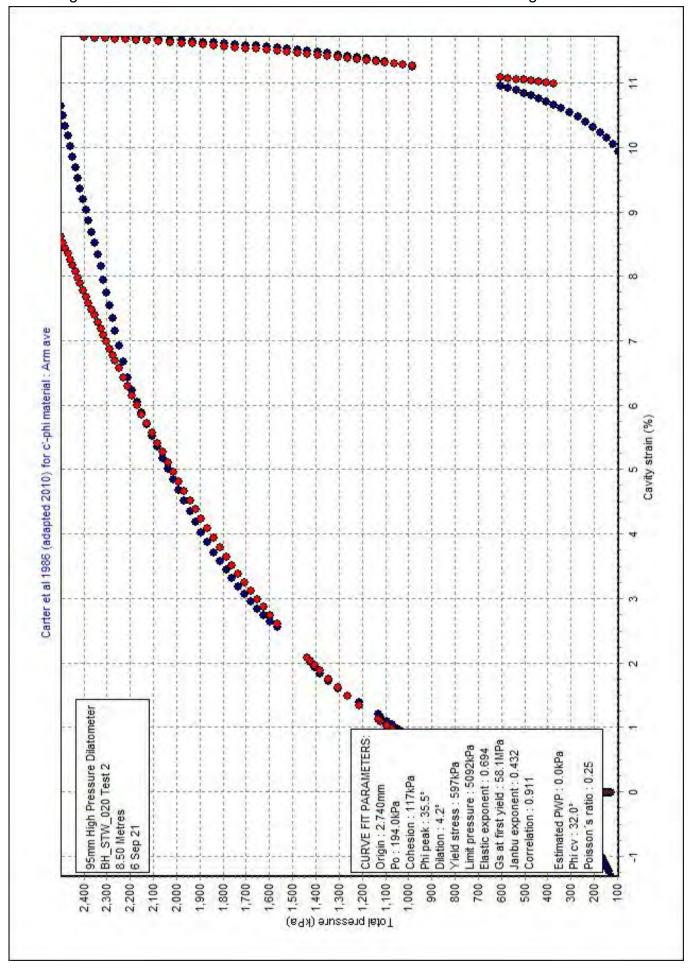


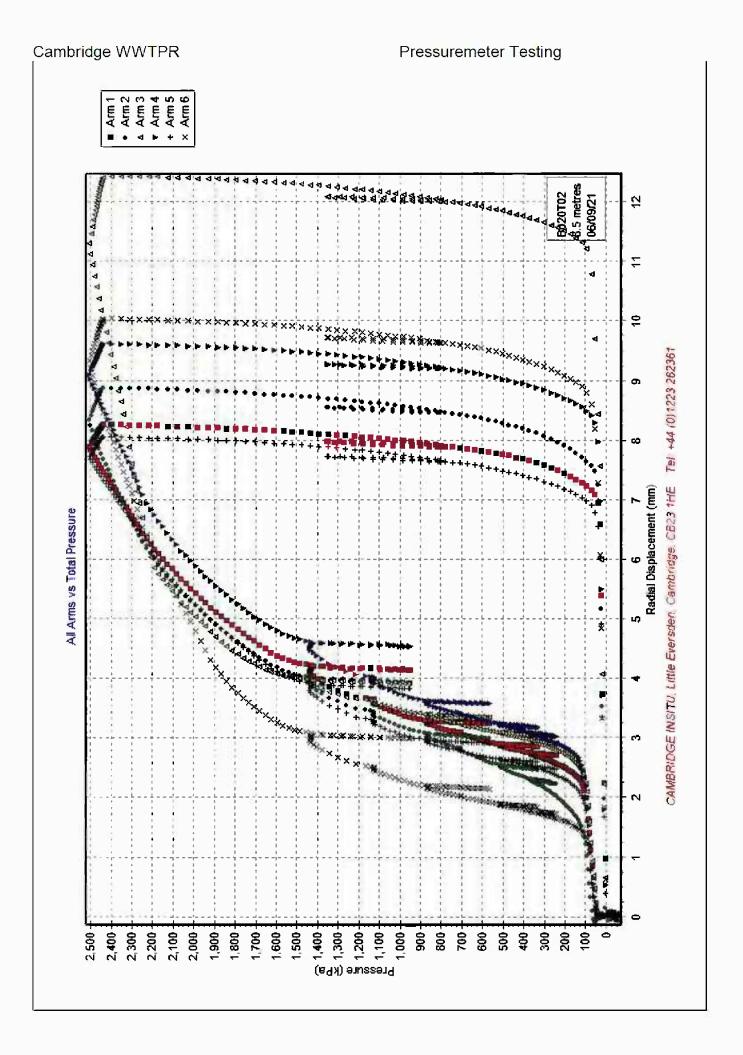


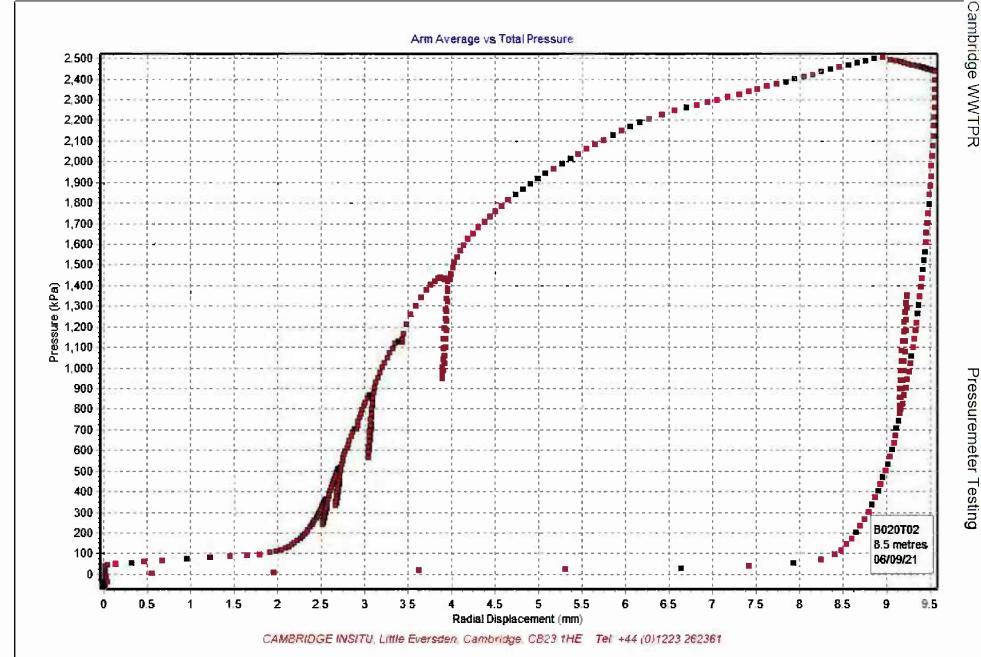


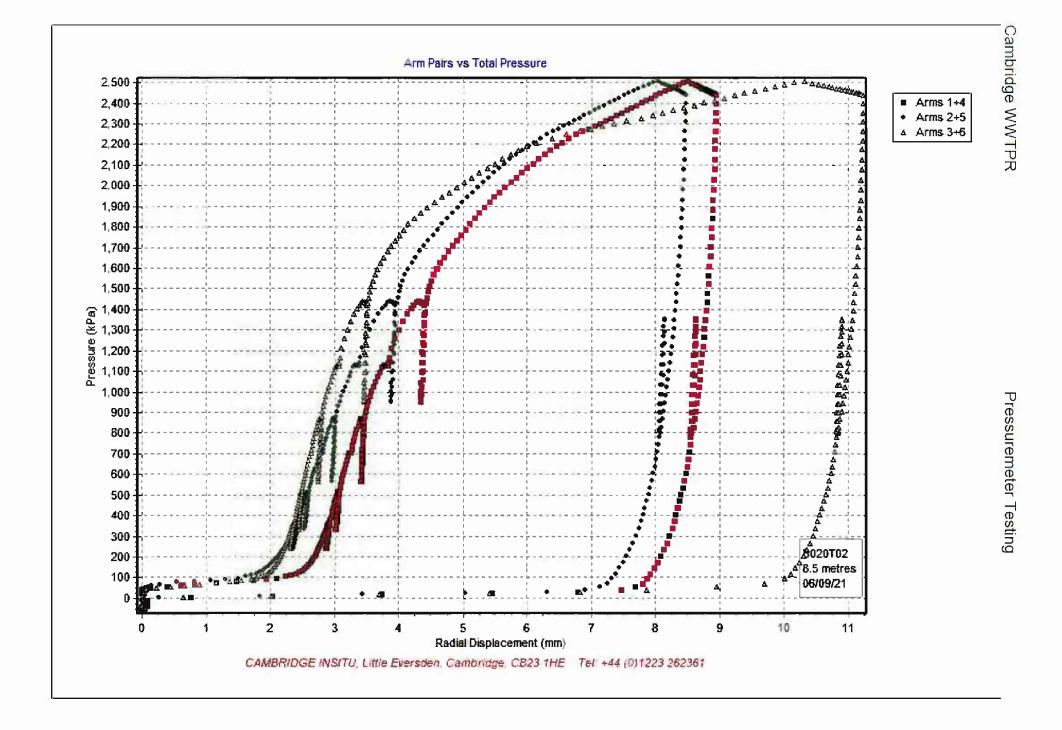


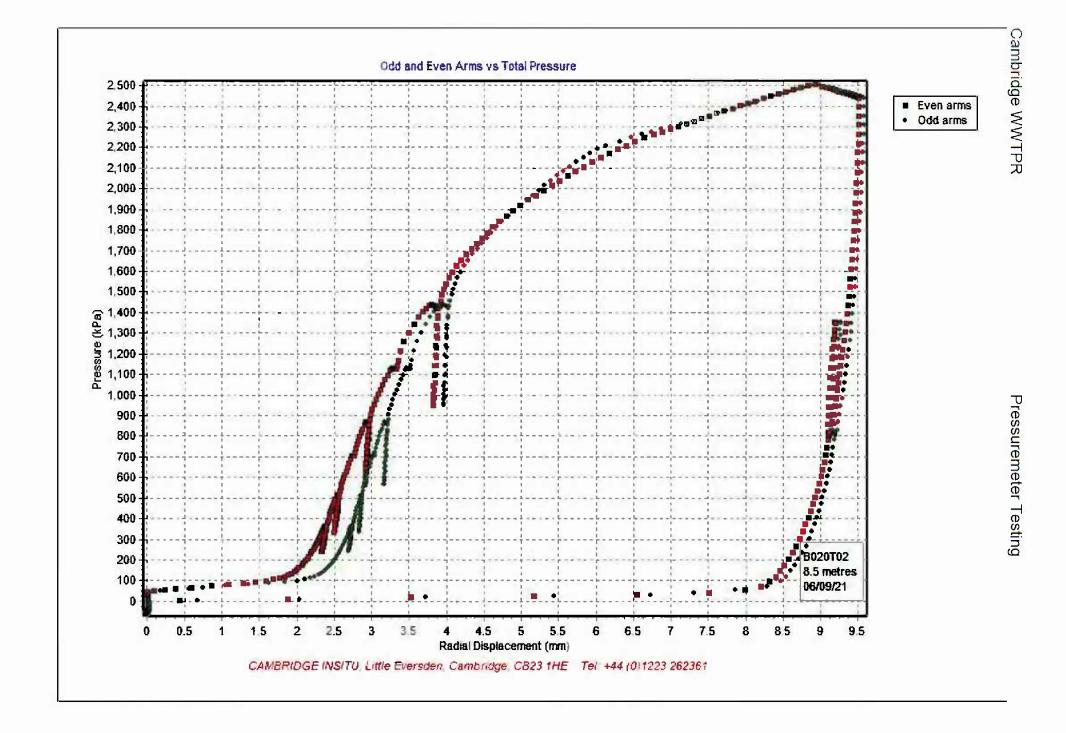












[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_STW_020
Test name : BH_STW_020 Test 3

Test date : 7 Sep 21
Test depth : 15.70 Metres
Water table : 3.75 Metres
Ambient PWP : 117.0 kPa
Material : Gault Clay

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/RW on 7 Sep 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=0.12"

Po from Marsland & Randolph (kPa) : "Arm ave=320.1"

Po from Lift off (kPa) : "Arm ave=305.6"

PWP versus Total Stress (kPa) : "PPC Ave=400.6"

Best estimate of Po (kPa) : "Arm ave=355.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=289.6"
Limit pressure (kPa) : "Arm ave=2211"
Jefferies 1988 - Cu (kPa) : "Arm ave=287.0"
Undrained yield stress (kPa) : "Arm ave=620.5"
PWP derived yield stress (kPa) : "PPC Ave=642.7"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=61.8"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	60.1	1.468	956	0.644	388
Arm ave	2	51.6	4.348	1203	0.877	455
Arm ave	3	56.6	6.193	699	0.545	309

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis		Loop	Intercept	Alpha	Gradient
		No	(MPa)	(MPa)	
Arm	ave	1	11.876	7.889	0.664
Arm	ave	2	9.418	5.888	0.625
Arm	ave	3	6.762	3.878	0.574

Non-linear exponent from PWP response : "PPC Ave=0.440"

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 0.12

 Po (kPa)
 : 355

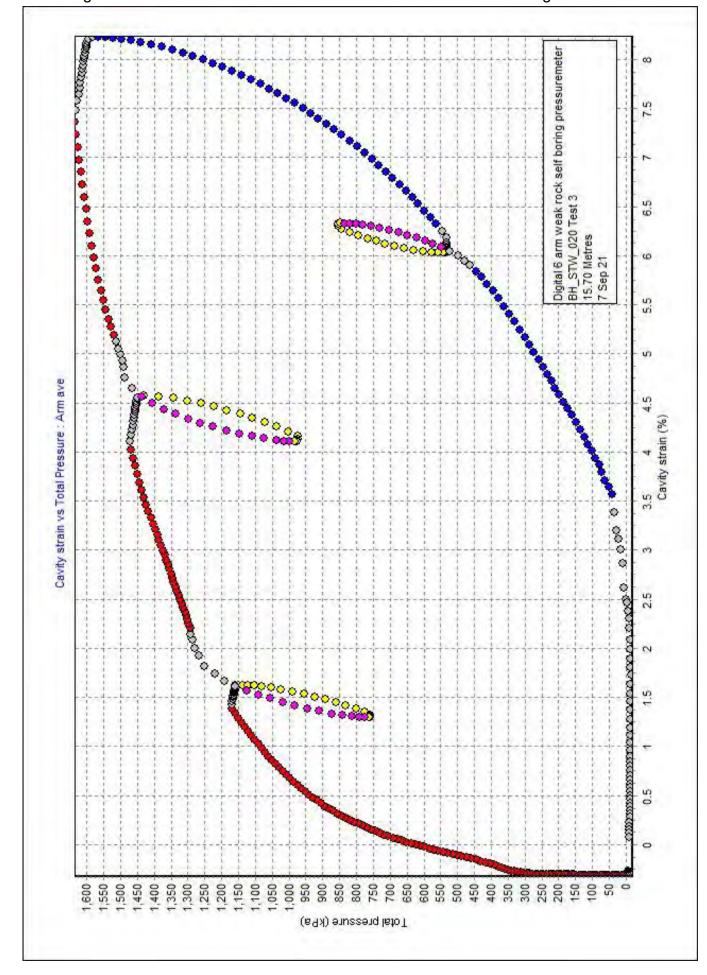
 Cu (kPa)
 : 289.6

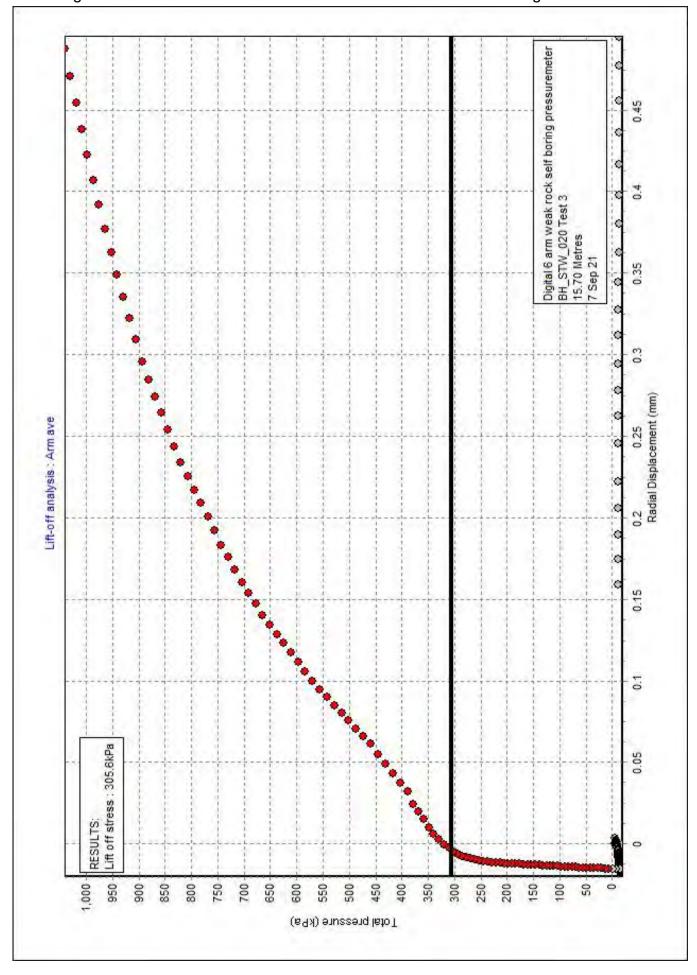
 Limit pressure (kPa)
 : 2211

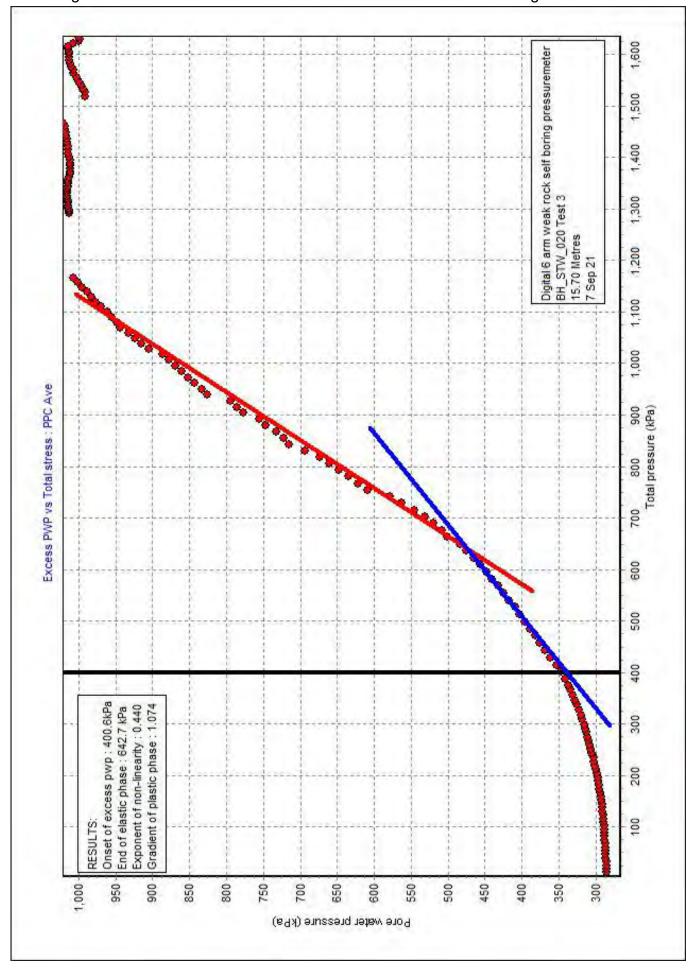
 Non-linear exponent
 : 0.574

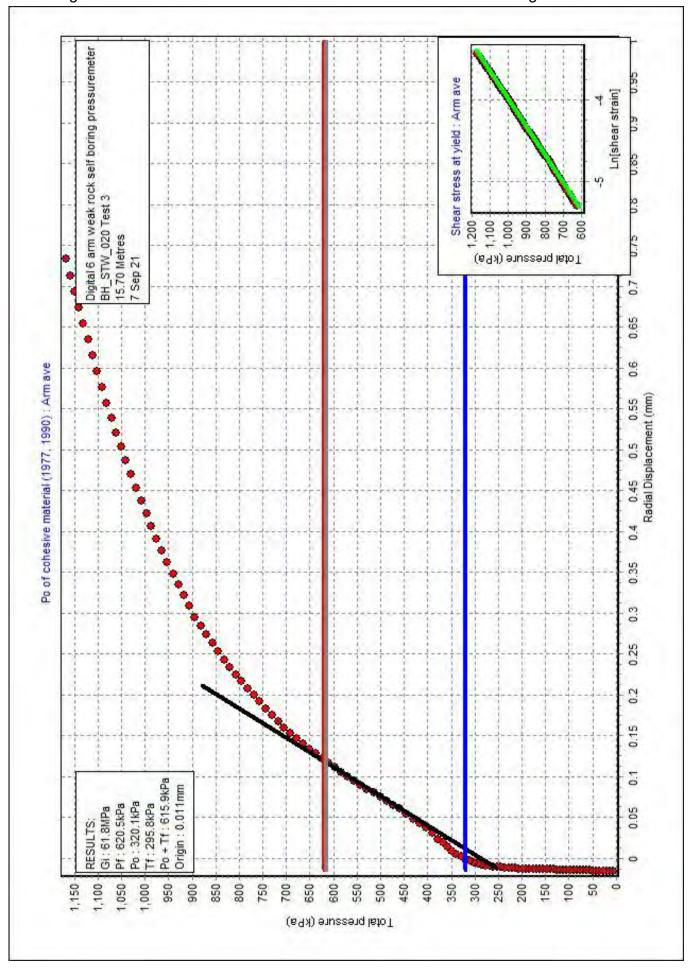
 Calculated alpha (MPa)
 : 4.220

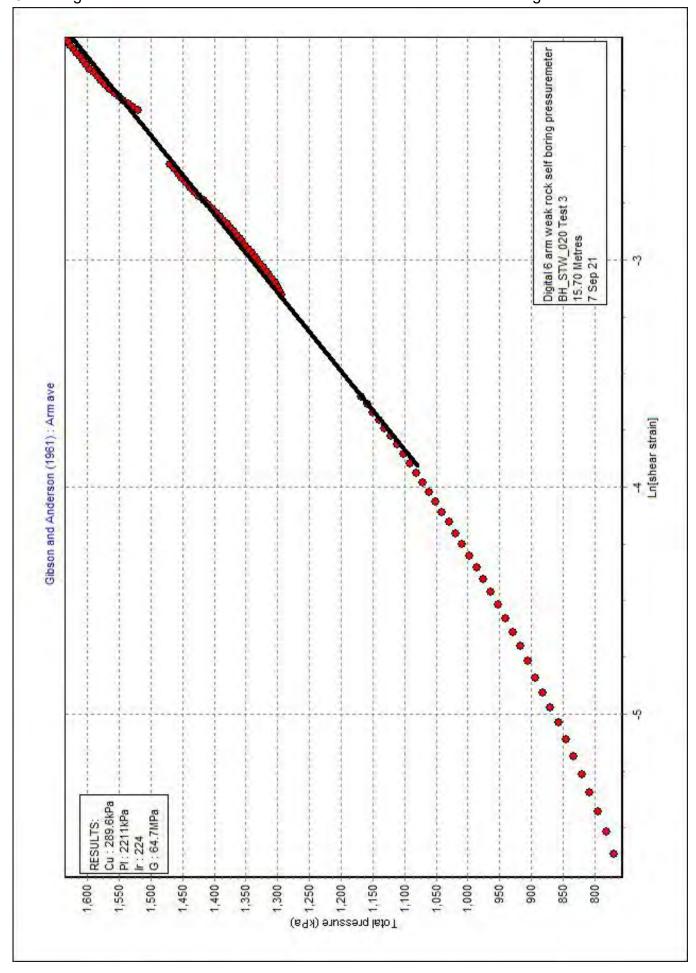
 G at yield (MPa)
 : 30.8

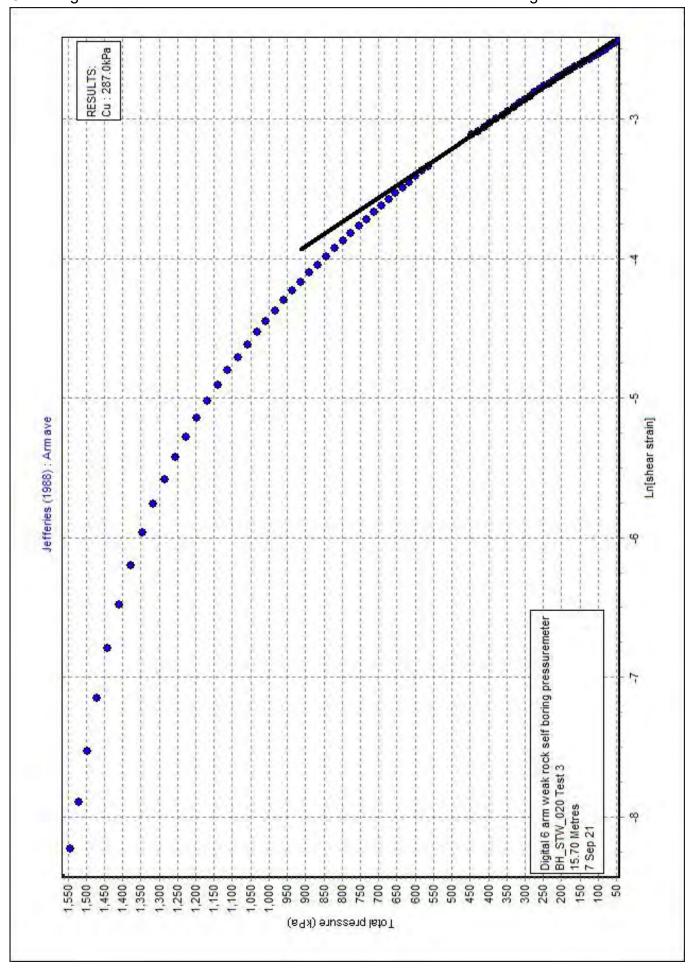


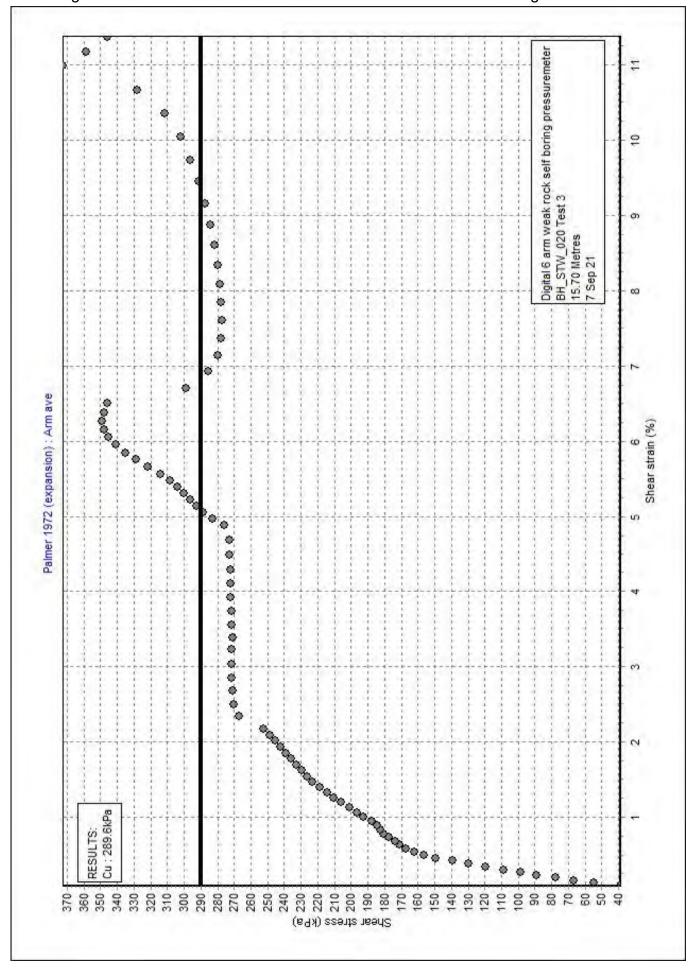


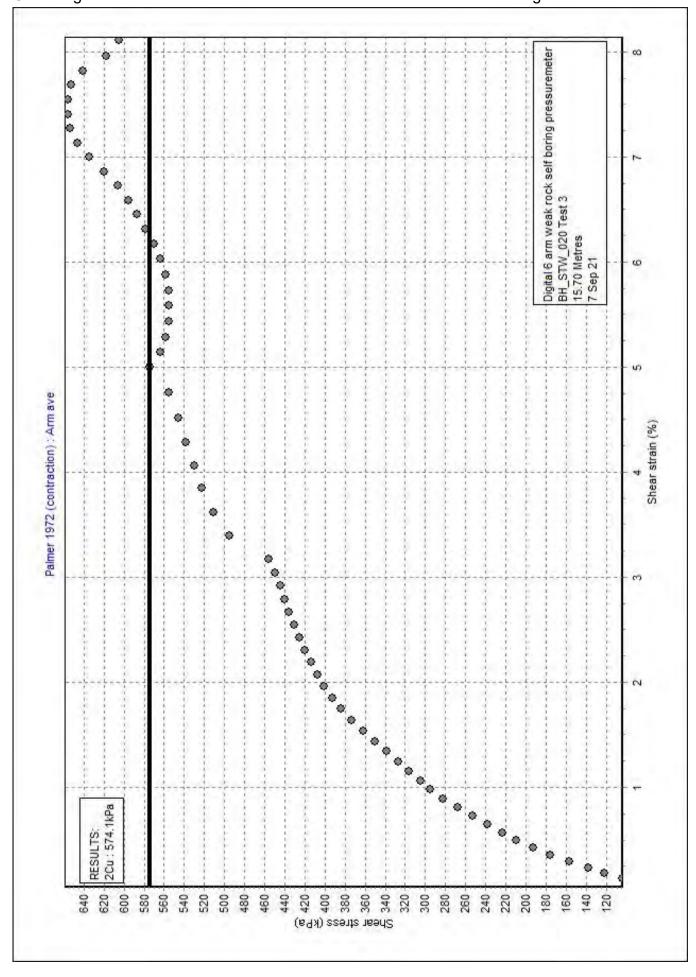


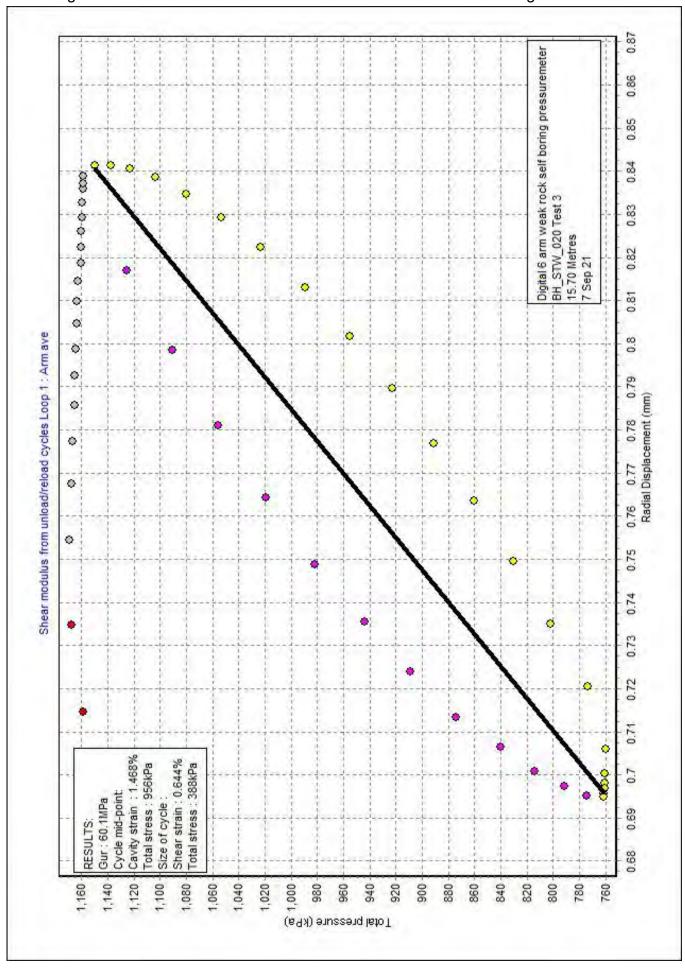


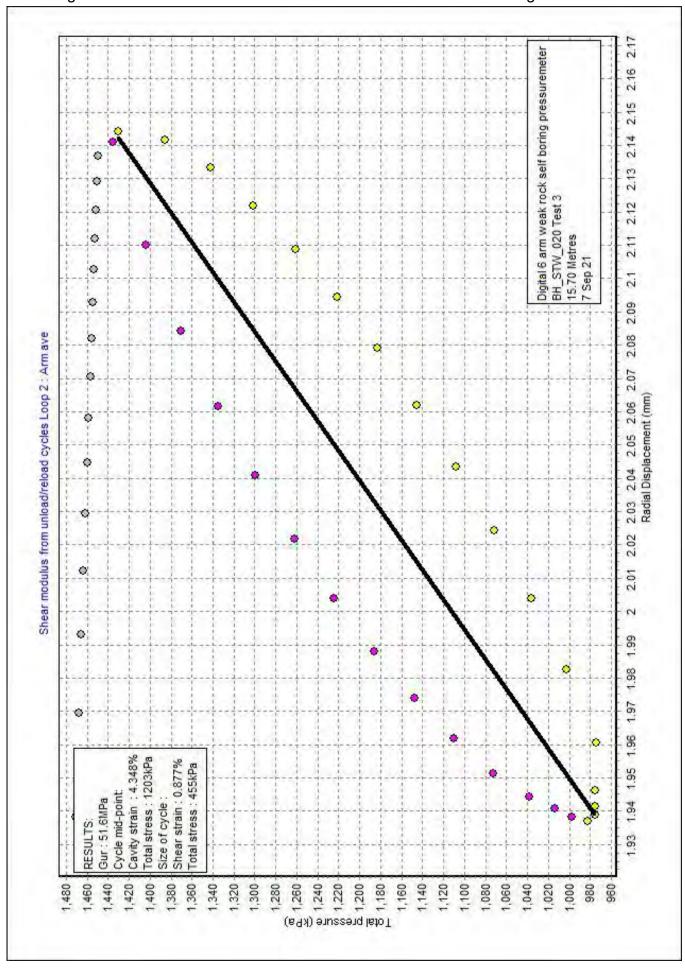


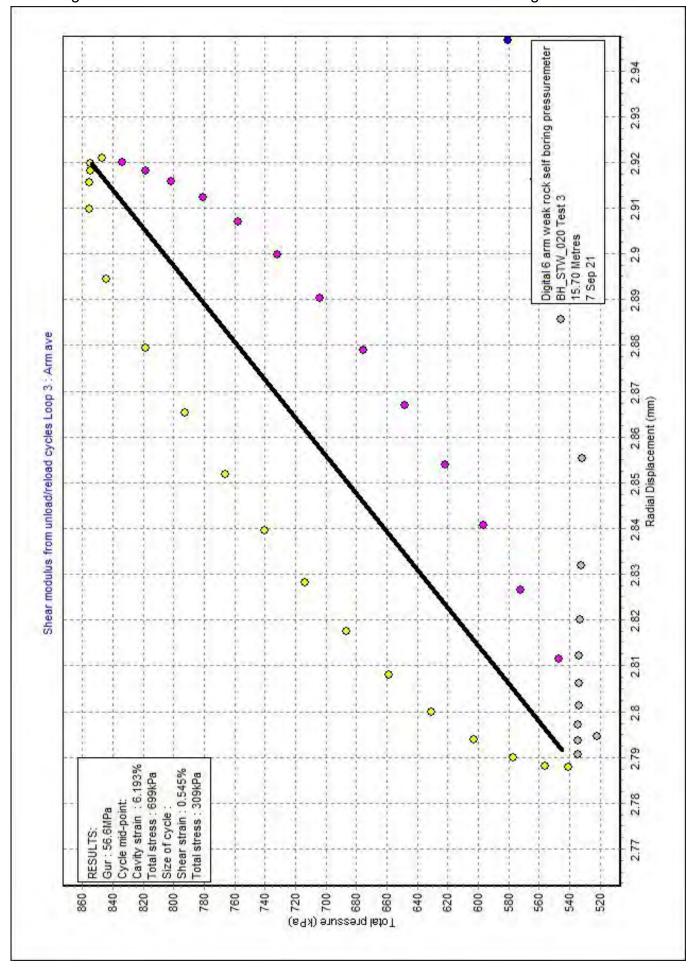


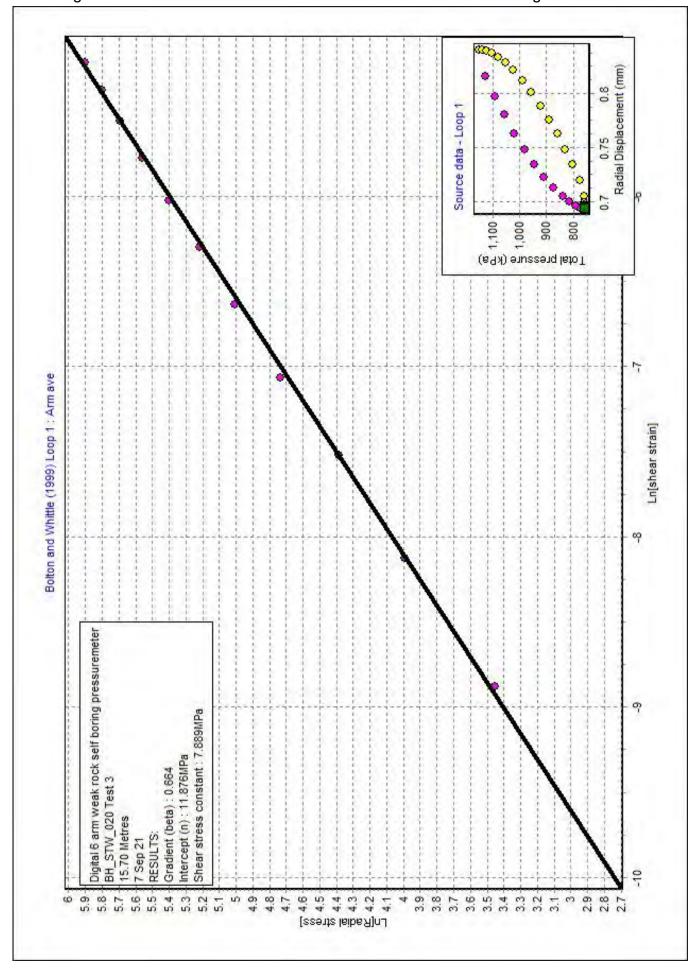


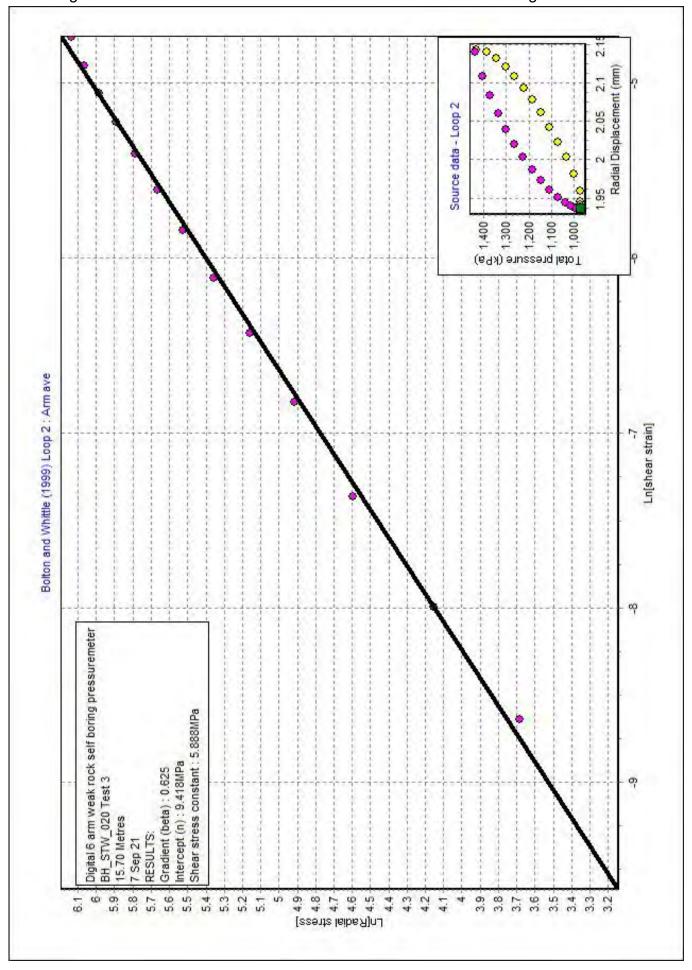


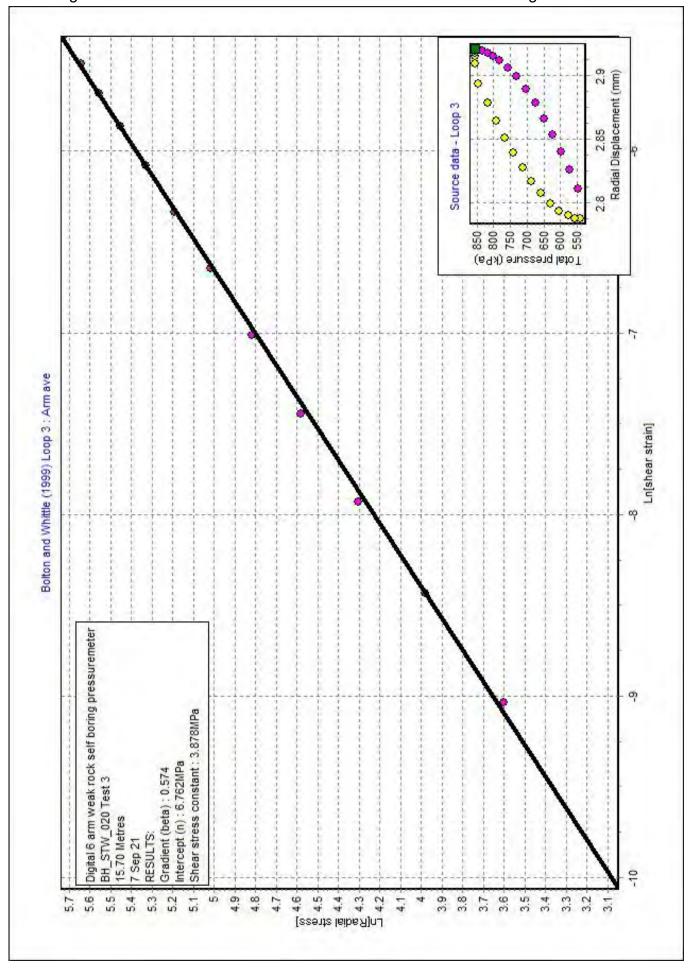


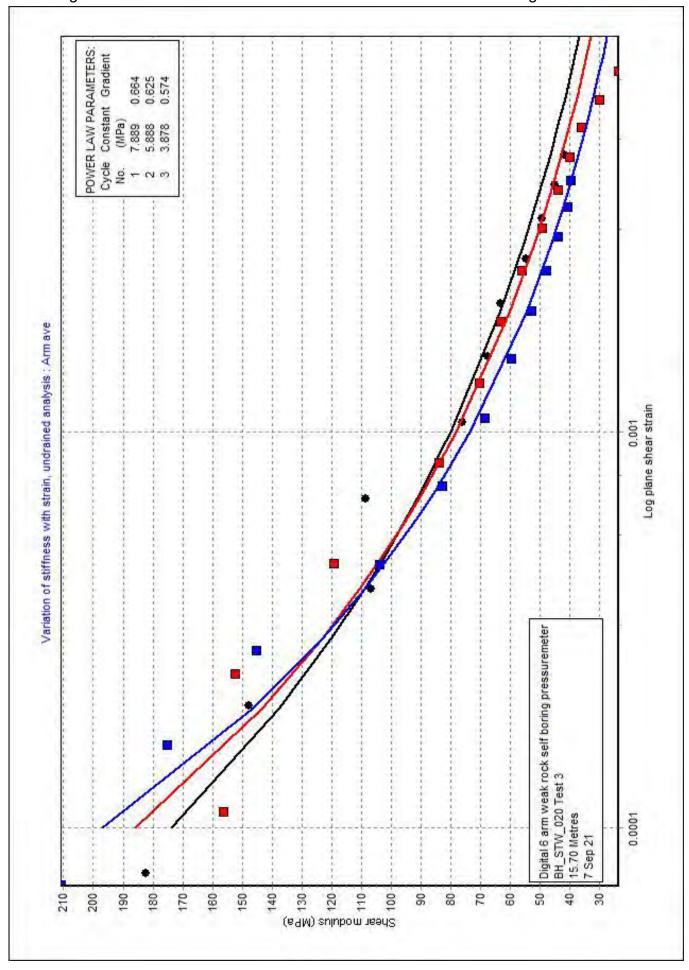


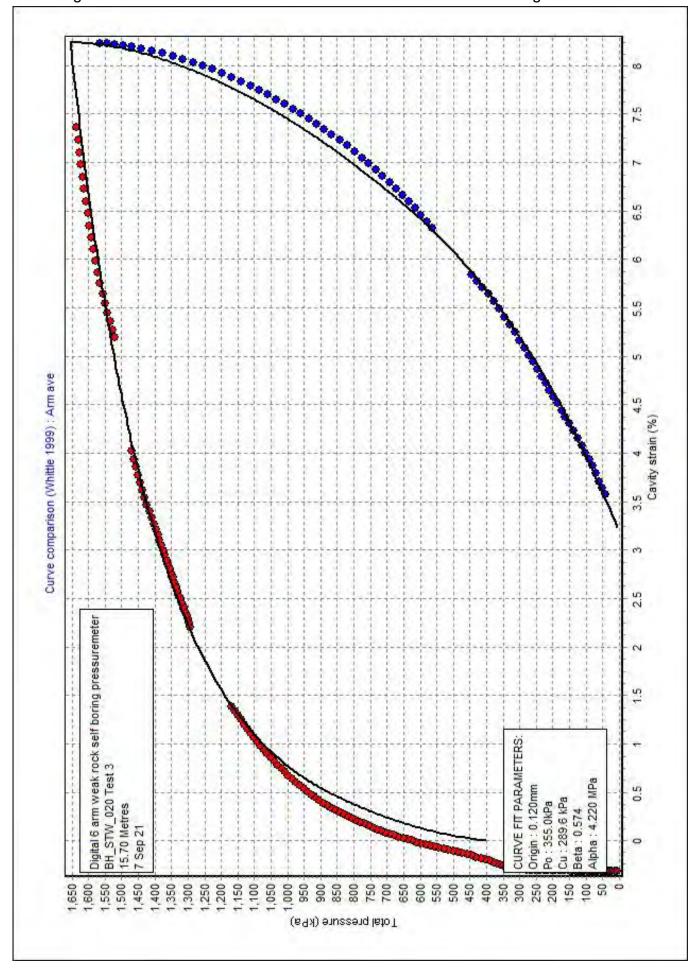


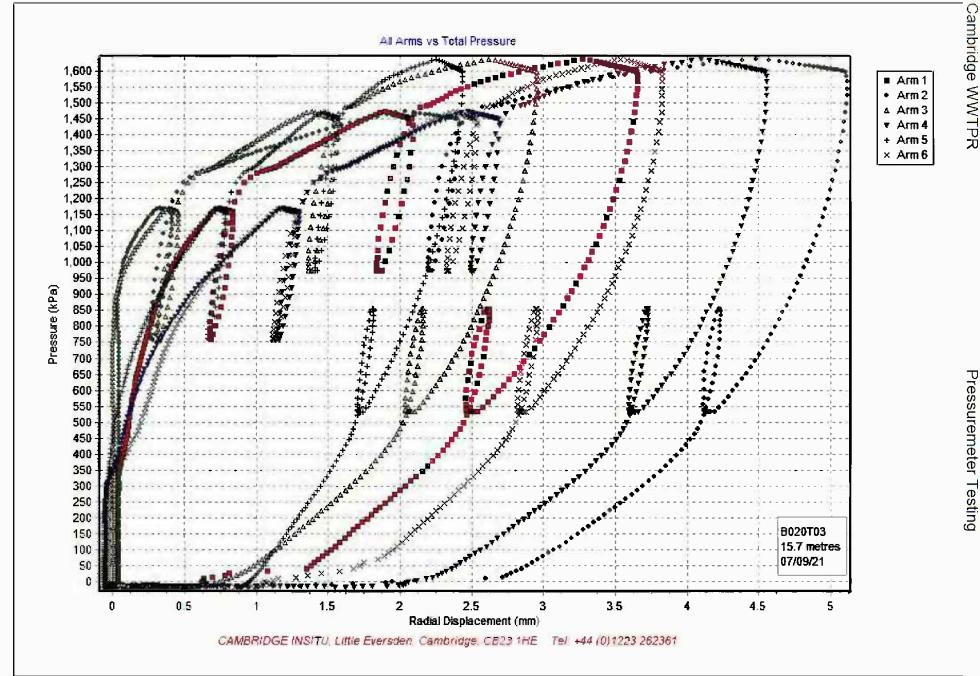


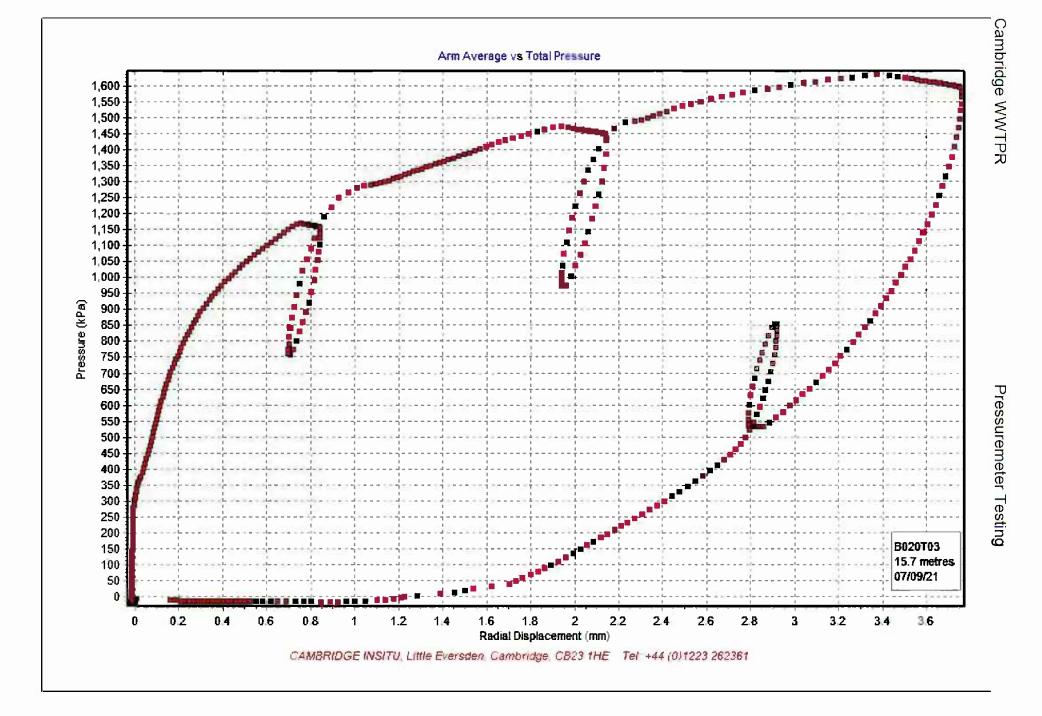


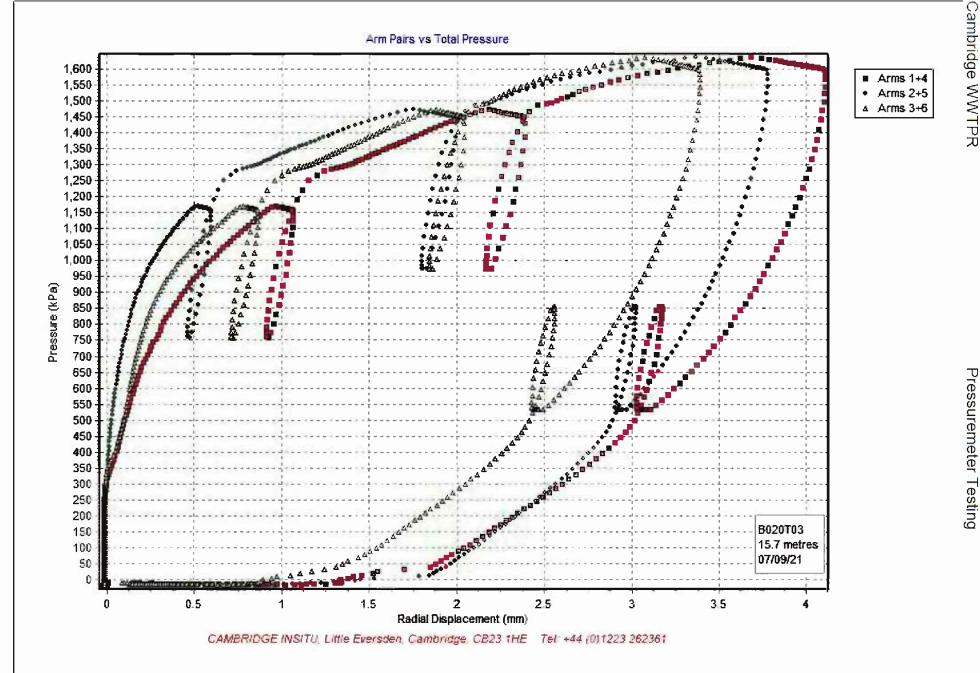


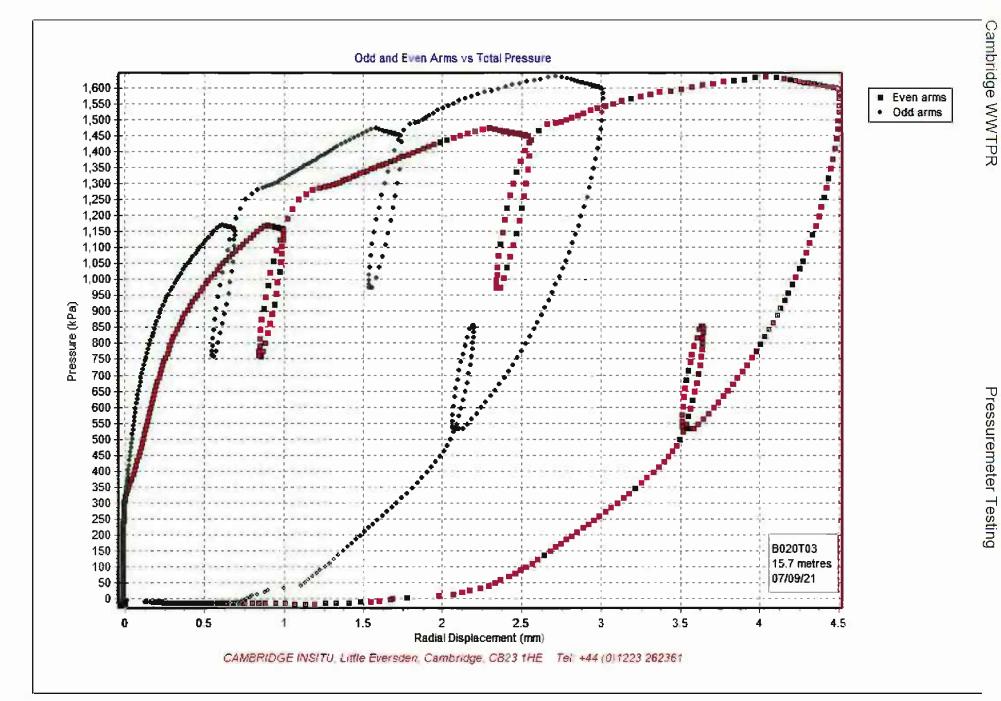


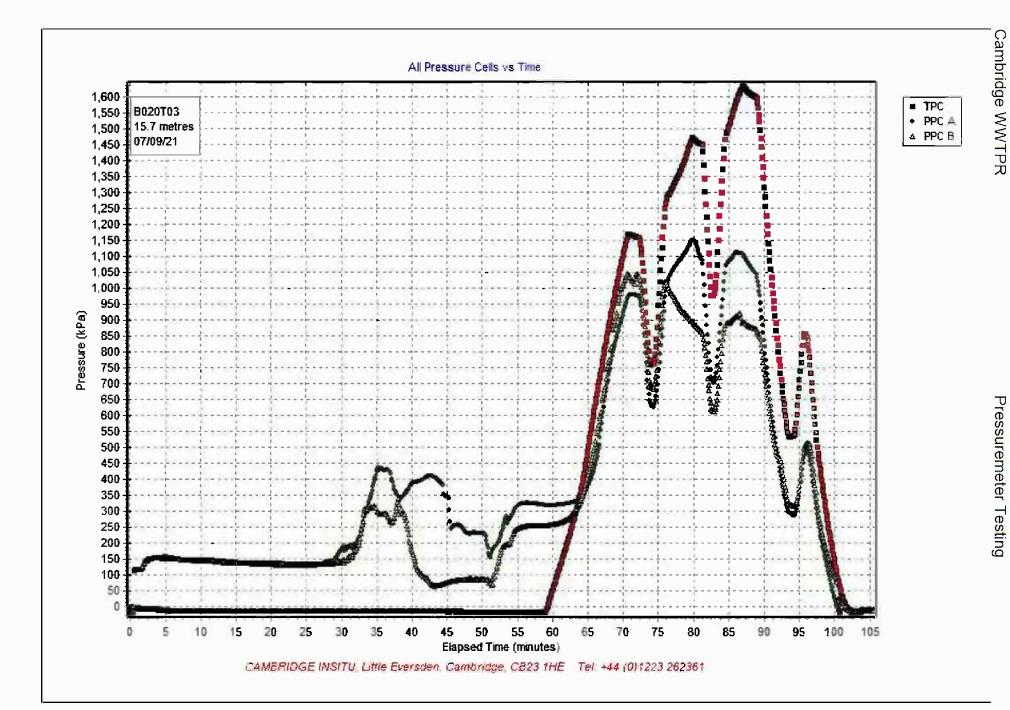












Cambridge WWTPR

BH_STW_021 Test 1 - SUMMARY OF RESULTS

[File made with WinSitu]

[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Wastewater Treatment Plant Relocation Project

Borehole : BH_STW_021

Test name : BH_STW_021 Test 1

Test date : 16 Aug 21
Test depth : 5.45 Metres
Water table : 3.75 Metres
Ambient PWP : 17.0 kPa

Material : Structureless Chalk

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by SP/RW on 16 Aug 21

Remarks: Material clearly has some structure but this breaks down at about 3% cavity strain and this prevents curve modelling from fitting the latter part of the loading.

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=0.02"

Po from Marsland & Randolph (kPa) : "Arm ave=183.9"

Po from Lift off (kPa) : "Arm ave=112.0"

PWP versus Total Stress (kPa) : "PPC Ave=91.2"

Best estimate of Po (kPa) : "Arm ave=150.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) : "Arm ave=448.3"
PWP derived yield stress (kPa) : "PPC Ave=355.5"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 30.0

Angle of internal friction (°) : "Arm ave=30.3"

Dilation angle (°) : "Arm ave=0.4"

Gradient of log-log plot : "Arm ave=0.337"

[Withers et al 1989]

Angle of internal friction (°) : "Arm ave=36.1"
Dilation angle (°) : "Arm ave=7.3"
Gradient of log-log plot : "Arm ave=-2.332"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=27.1"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	47.3	1.227	531	0.400	190
Arm ave	2	48.4	5.003	762	0.584	283
Arm ave	3	40.9	8.865	477	0.577	237

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop No	Intercept (MPa)	Alpha (MPa)	Gradient
Arm ave	1	7.211	4.605	0.639
Arm ave	2	7.269	4.516	0.621
Arm ave	3	4.850	2.749	0.567

Non-linear exponent from PWP response : "PPC Ave=0.656"

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 0.02

 Po (kPa)
 : 150

CIR1506/21

Cambridge WWTPR BH_STW_021 Test 1 - SUMMARY OF RESULTS

Cohesion (kPa) : 8

Angle of peak friction (deg) : 30.3

Angle of peak dilation (deg) : 0.4

Total yield stress (kPa) : 322

Total limit stress (kPa) : 2236

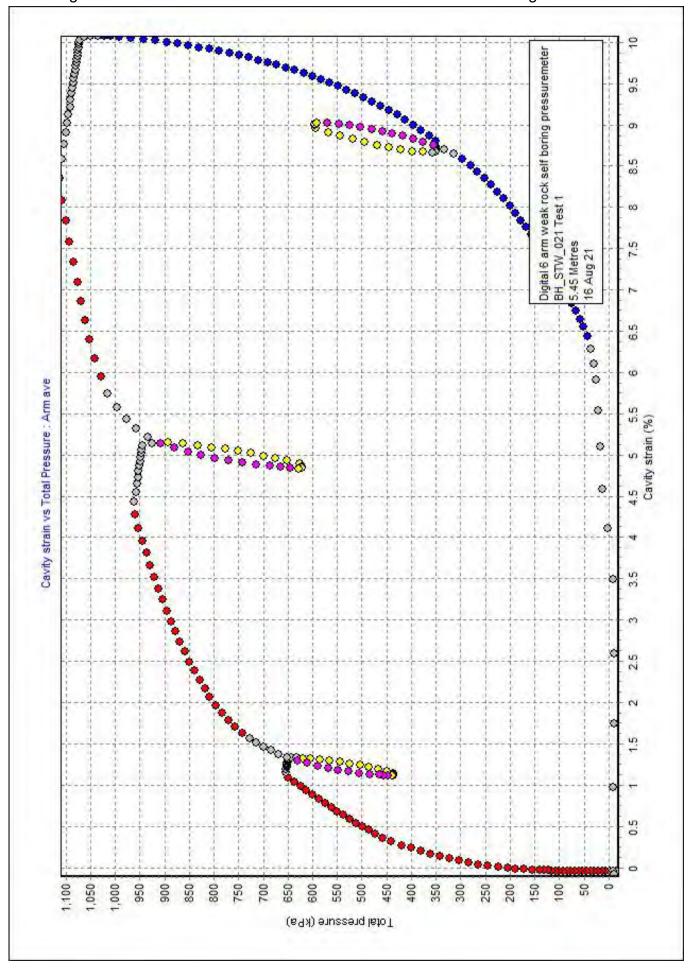
G at first yield (MPa) : 51.1

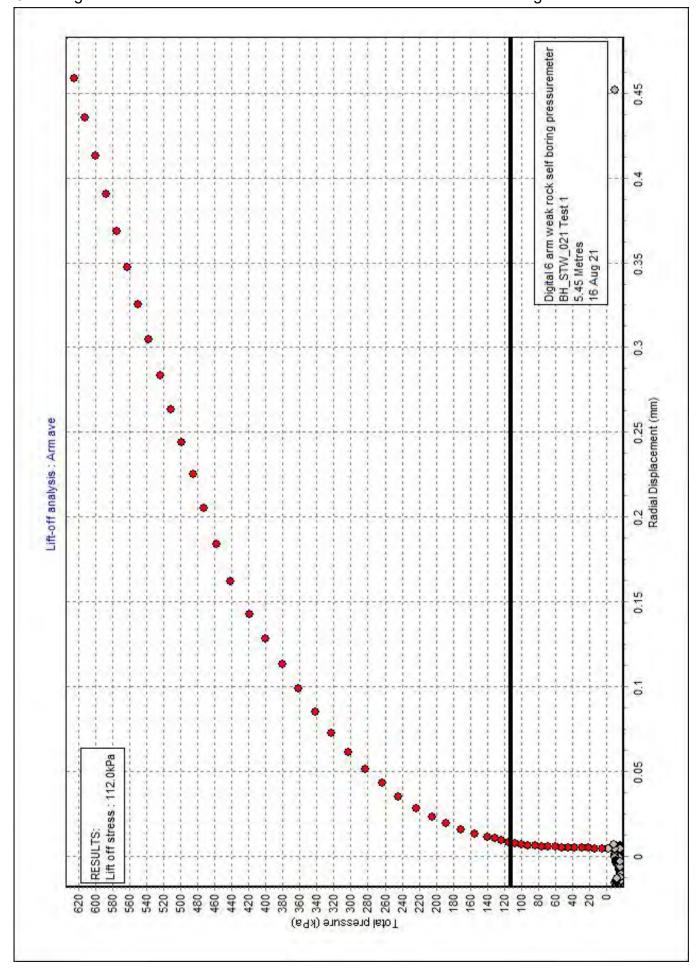
Non-linear exponent : 0.621

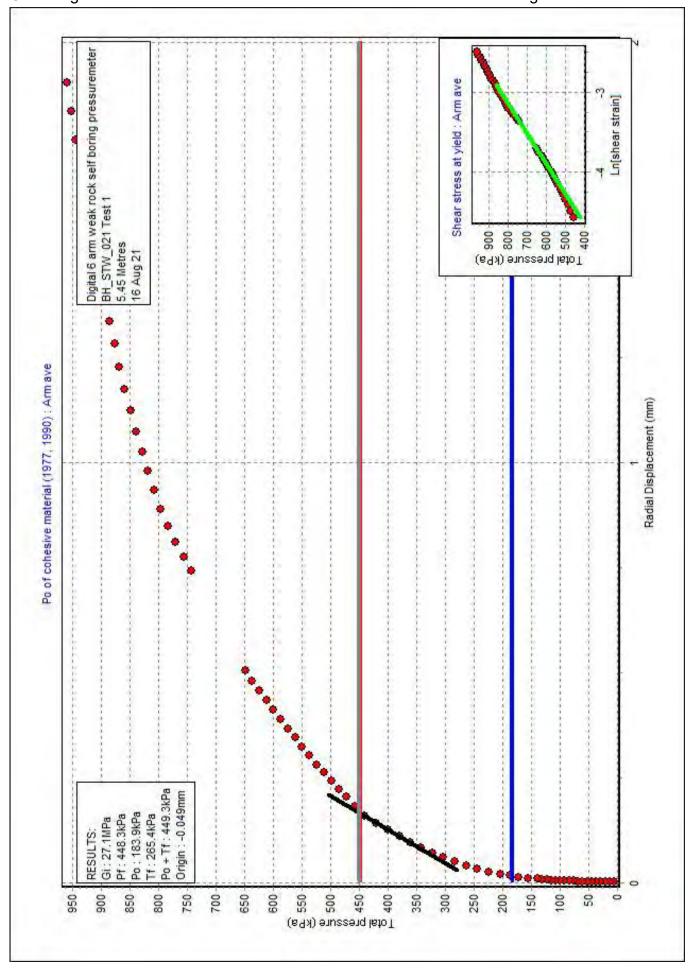
Janbu exponent : -0.057

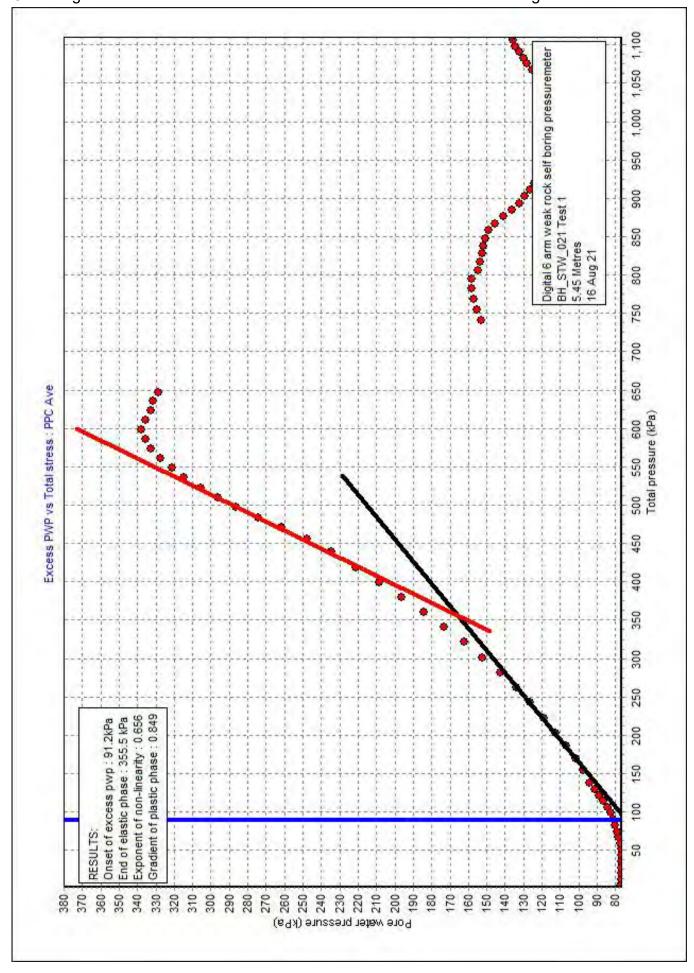
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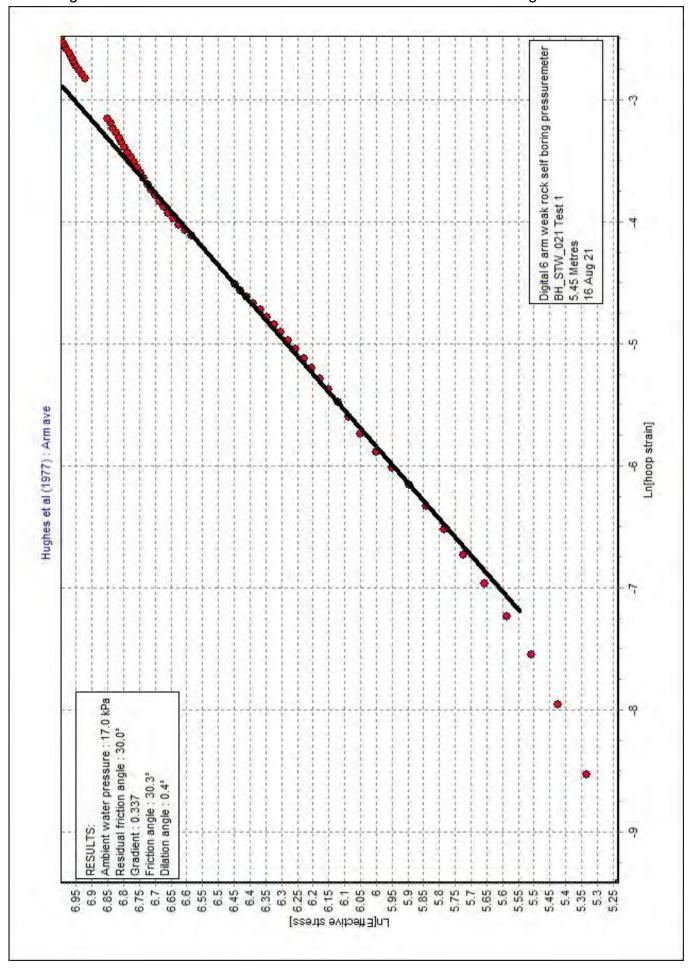
Ambient pore water pressure (kPa) : 17
Residual friction angle (deg) : 30.0
Poisson's ratio : 0.25

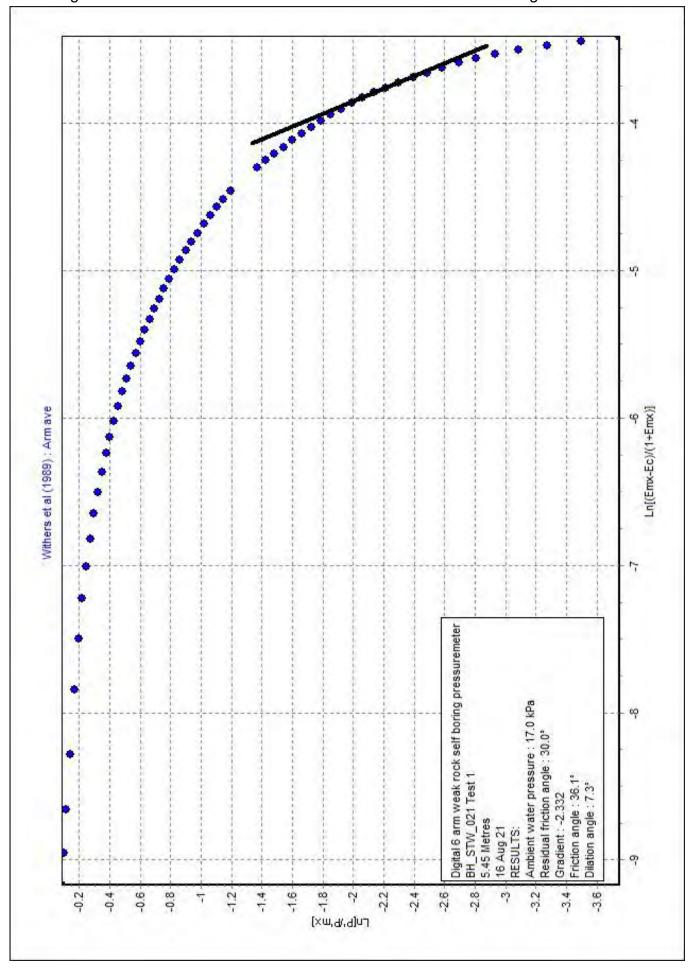


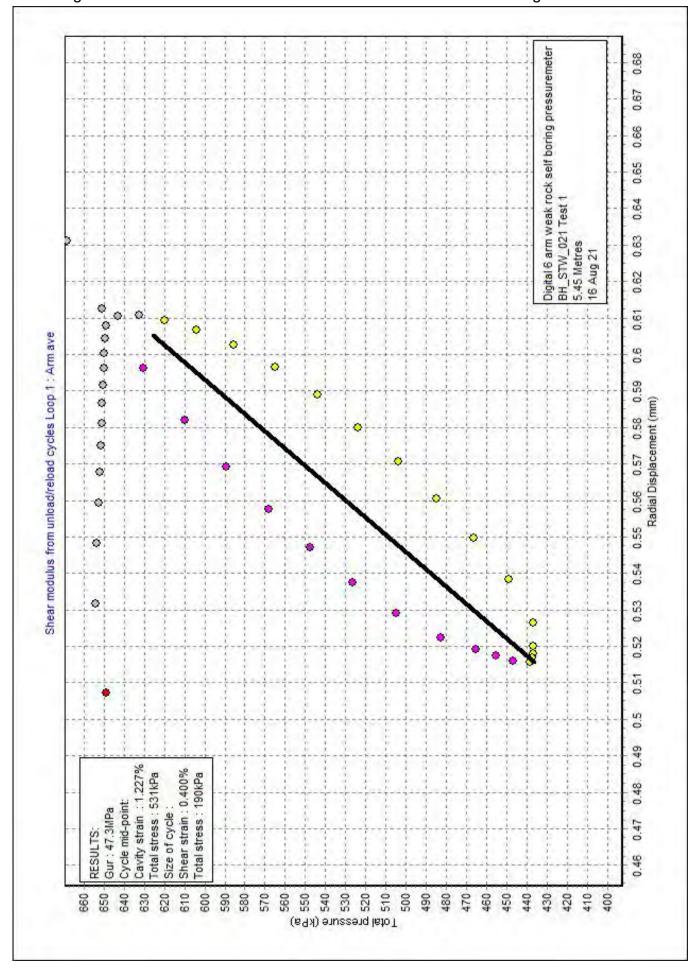


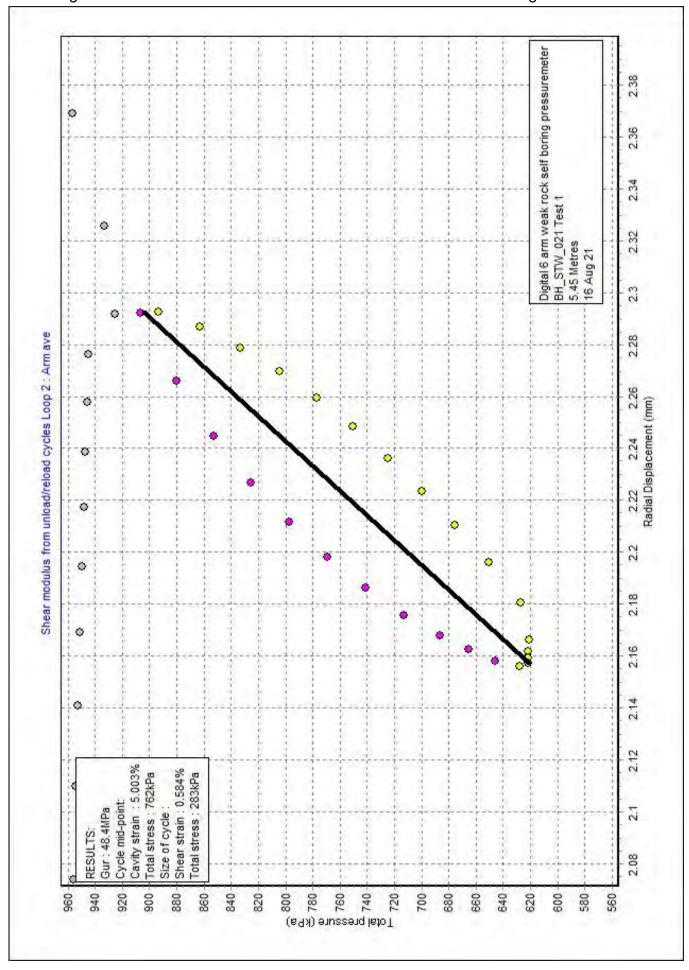


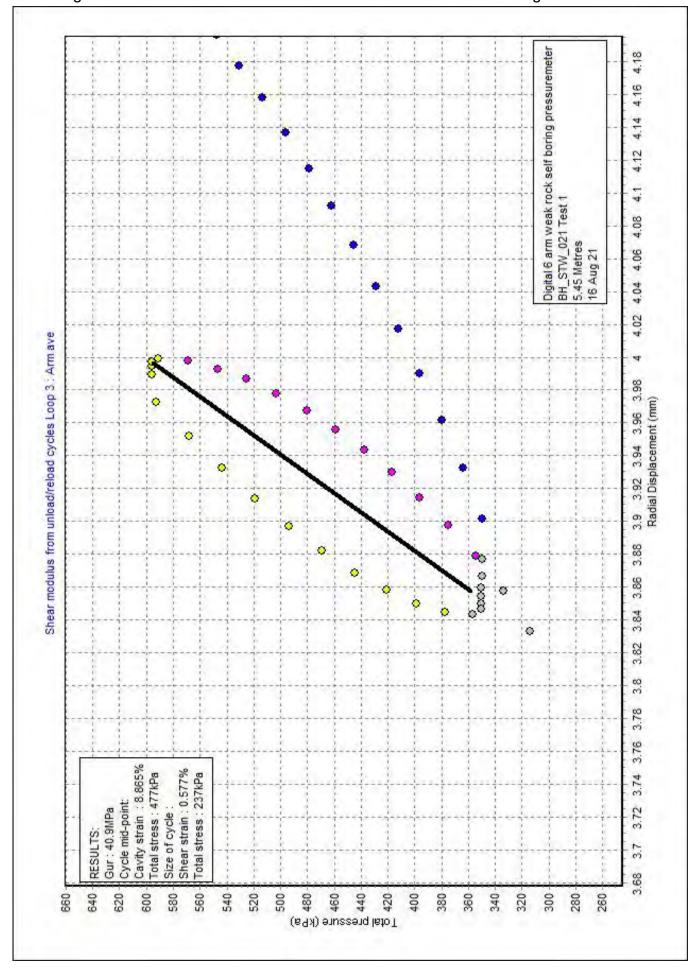


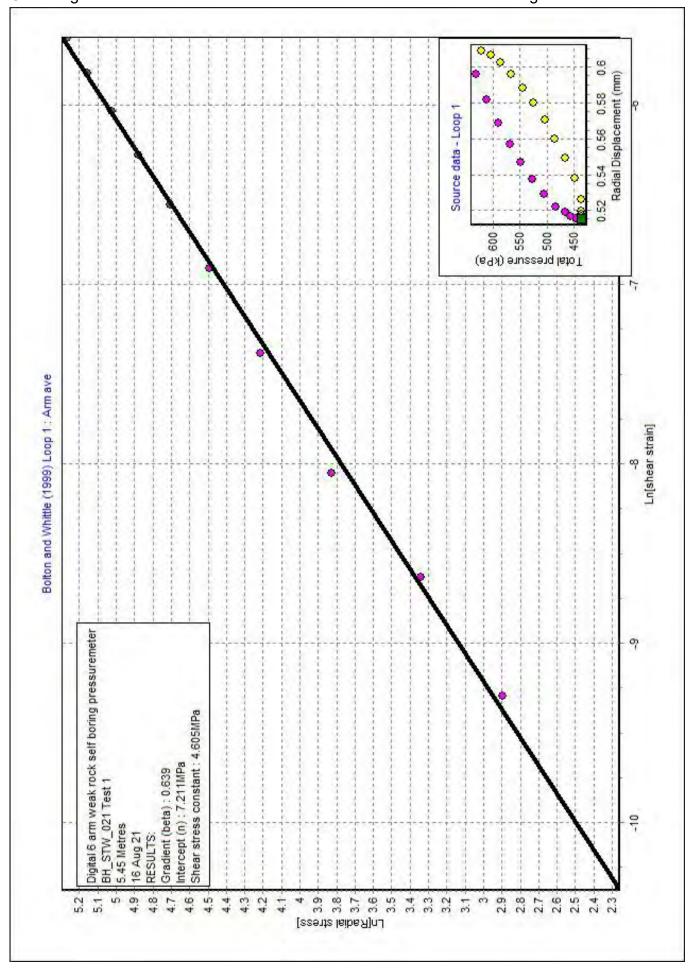


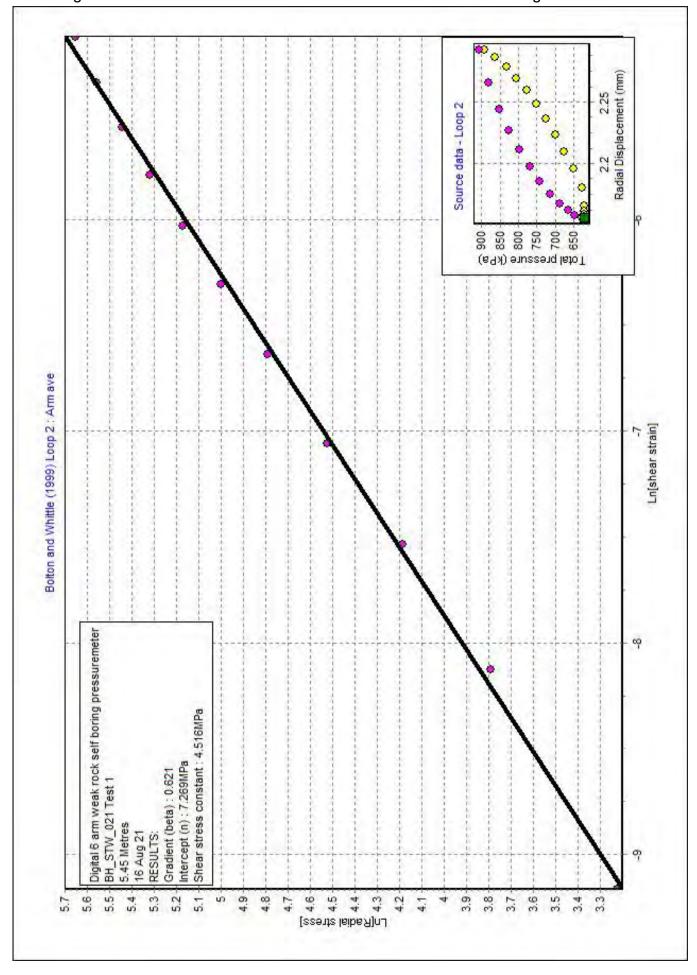


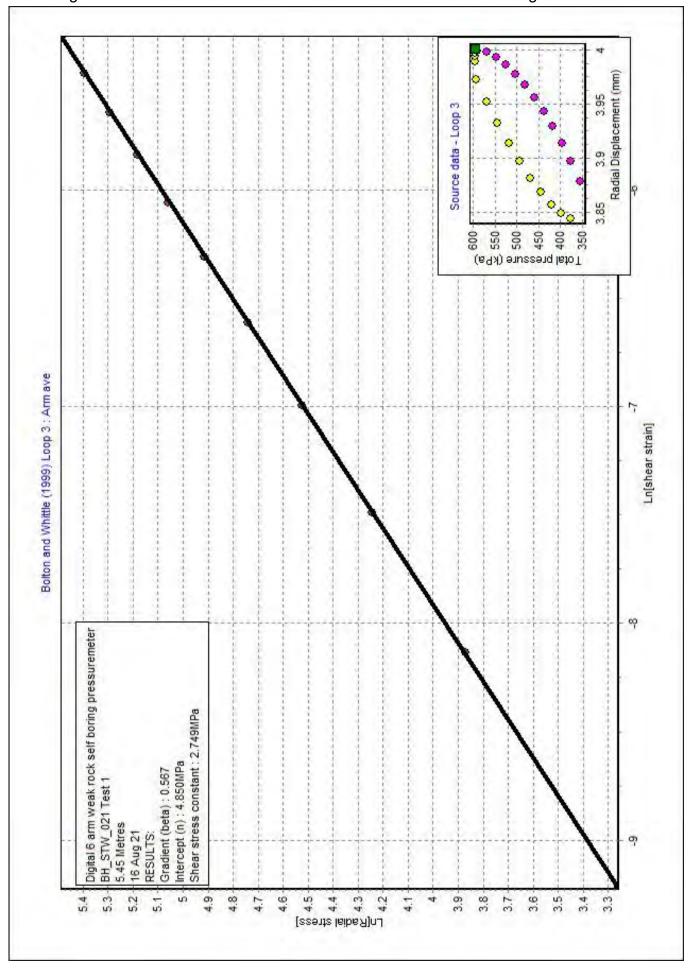


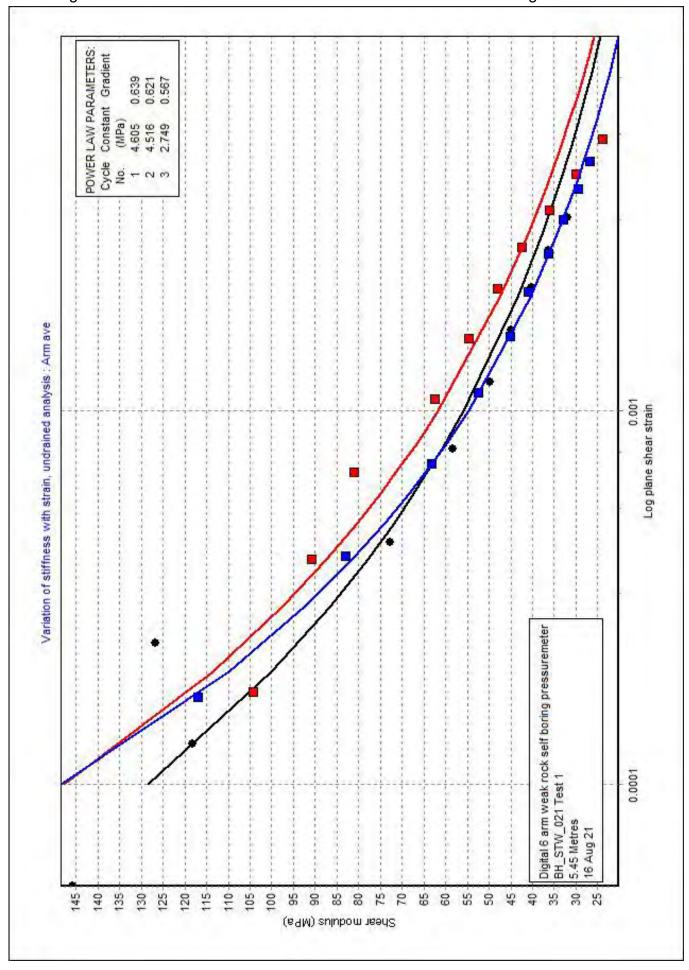


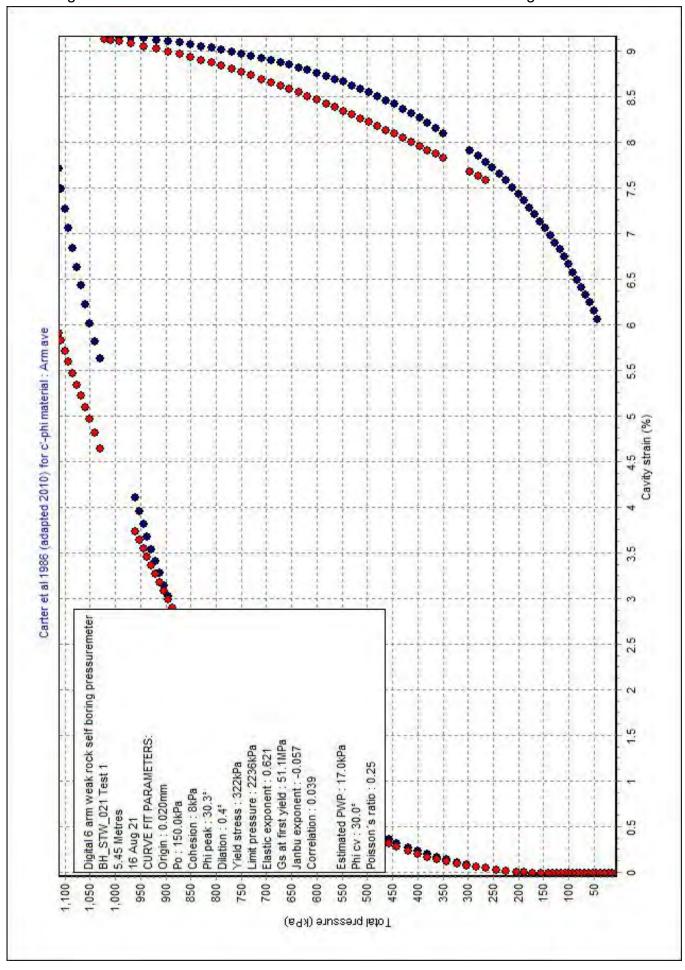


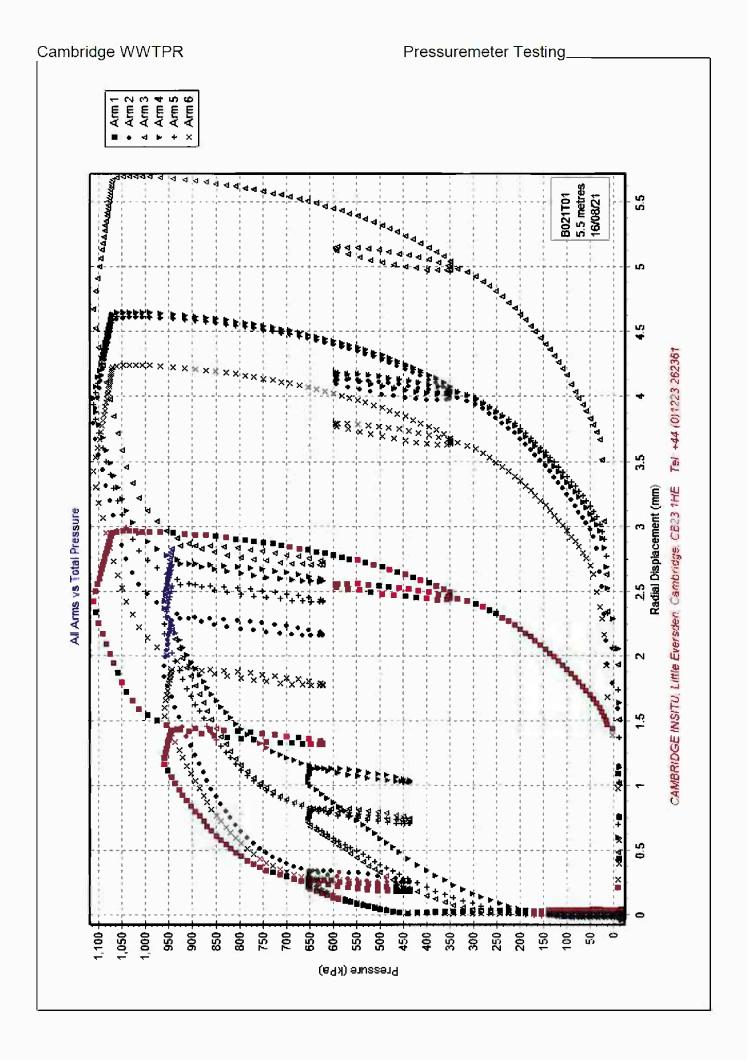


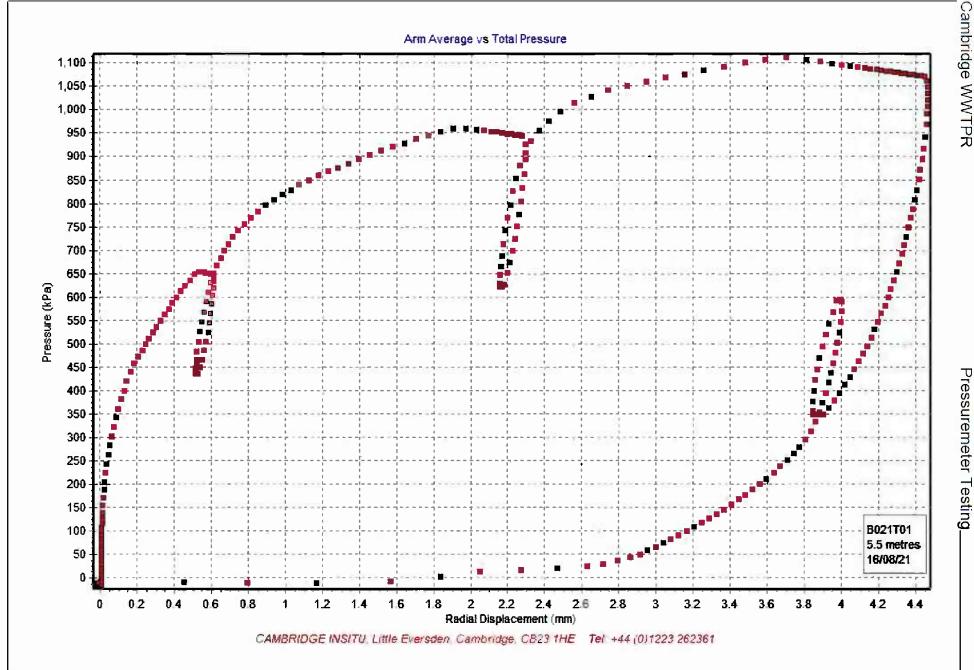


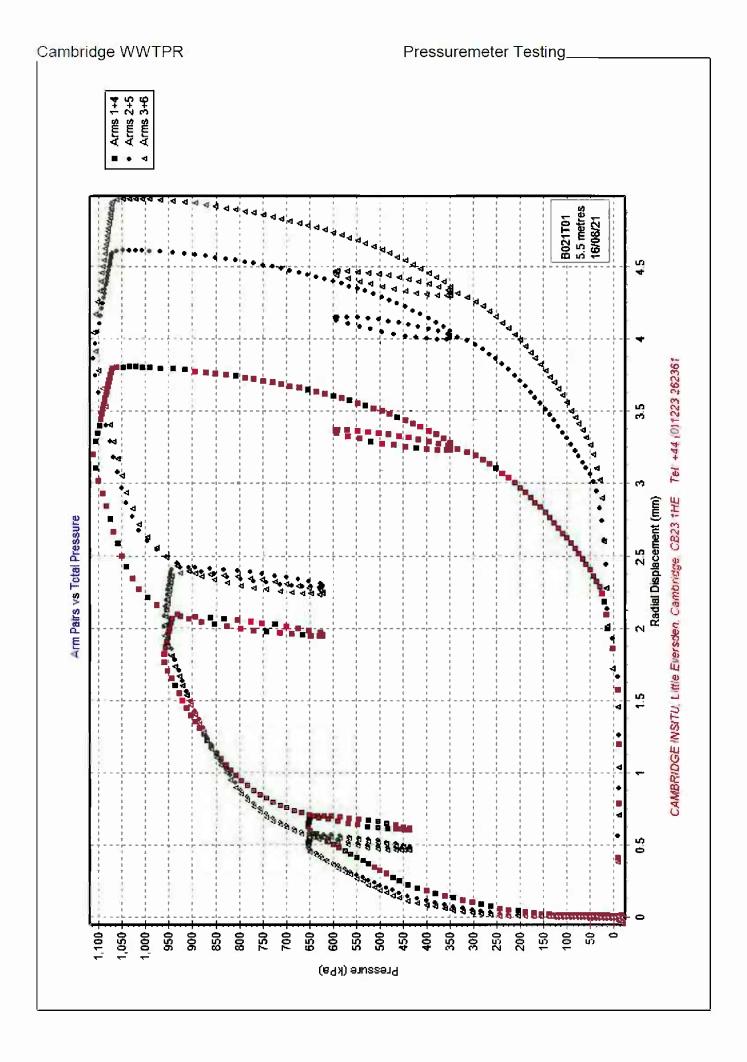


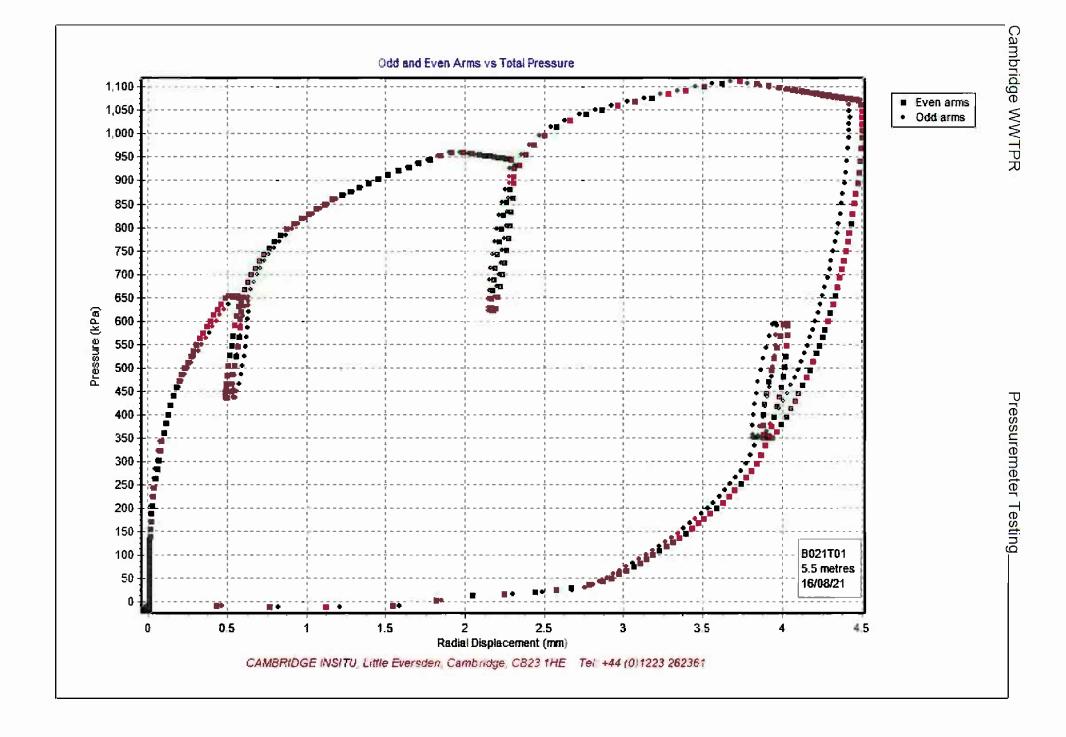


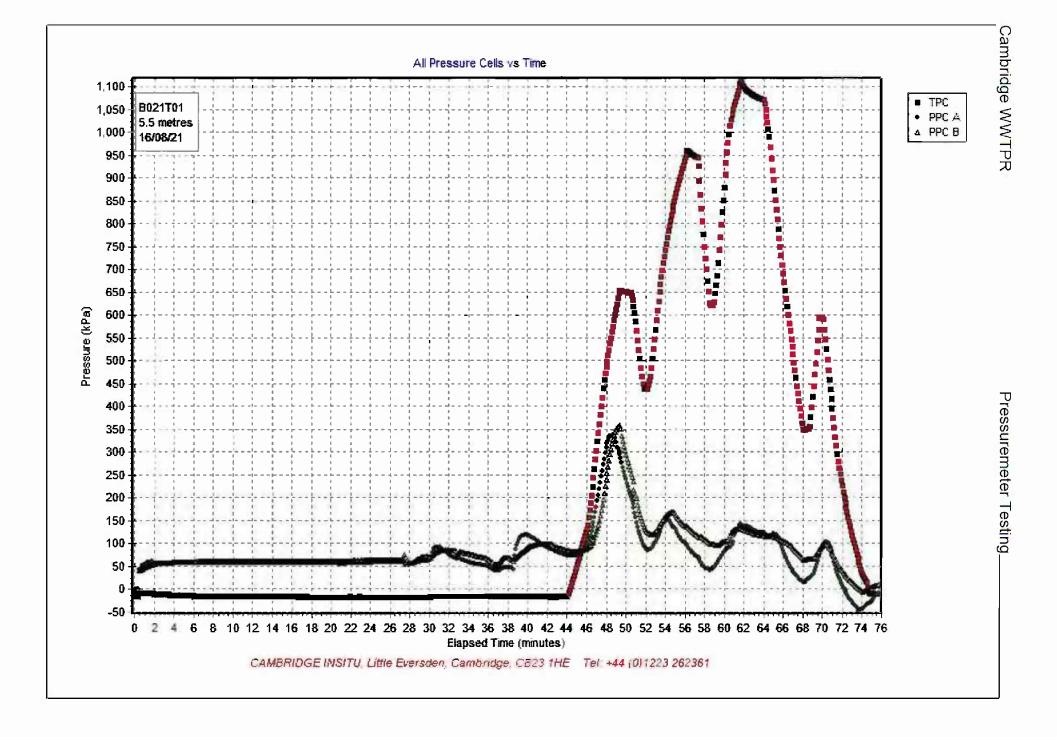












Cambridge WWTPR BH_STW_021 Test 2 - SUMMARY OF RESULTS [File made with WinSitu]

[DETAILS OF TEST]

Project TE8364

Site Cambridge Waste Water Treatment Plant Relocation Project

Borehole BH STW 021

BH_STW_021 Test 2 Test name

Test date 16 Aug 21 Test depth 9.20 Metres Ambient PWP : 3.75 Metres 53.0 kPa

Structureless Chalk

Probe : 95mm High Pressure Dilatometer

97.0 mm Diameter

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by SP/RW on 17 Aug 21

Remarks: Poor core recovery. Early unload, arm behaviour indicating burst

likely.

[RESULTS FOR CAVITY REFERENCE PRESSURE]

"Arm ave=2.94" Strain Origin (mm) : Po from Marsland & Randolph (kPa) "Arm ave=223.9" Best estimate of Po (kPa) "Arm ave=162.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) "Arm ave=571.2"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

28.0 Constant volume friction angle (°) :

"Arm ave=37.2" Angle of internal friction (°) "Arm ave=10.8" Dilation angle (°) "Arm ave=0.447" Gradient of log-log plot

[Withers et al 1989]

Angle of internal friction (°) "Arm ave=28.4" Dilation angle (°) "Arm ave=0.5" "Arm ave=-1.793" Gradient of log-log plot

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=13.9"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	59.1	0.458	421	0.255	151
Arm ave	2	97.0	1.568	599	0.209	203
Arm ave	3	123.0	5.464	914	0.314	387
Arm ave	4	115.6	7.606	686	0.281	326

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop No	Intercept (MPa)	Alpha (MPa)	Gradient	
Arm ave	1	13.975	10.577	0.757	
Arm ave	2	18.255	13.214	0.724	
Arm ave	3	17.263	11.253	0.652	
Arm ave	4	12 440	7 231	0 581	

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

Strain Origin (mm) 2.94 Po (kPa) 162 Cohesion (kPa) 57 Angle of peak friction (deg) 37.2 Angle of peak dilation (deg) 10.8 CIR1506/21

BH_STW_021 Test 2 - SUMMARY OF RESULTS

Total yield stress (kPa) : 414

Total limit stress (kPa) : 3501

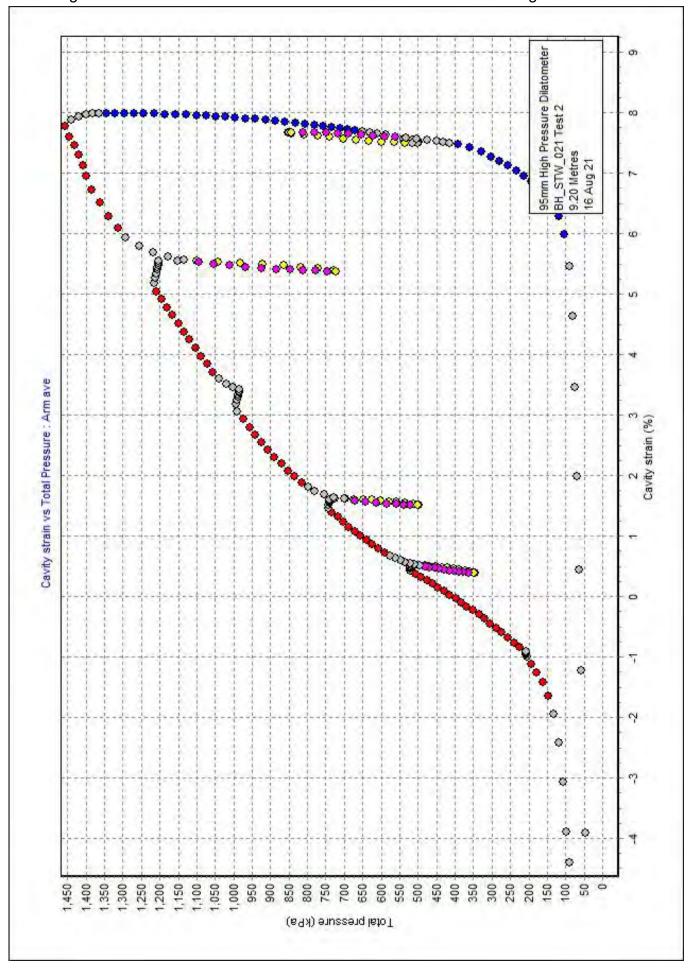
G at first yield (MPa) : 28.7

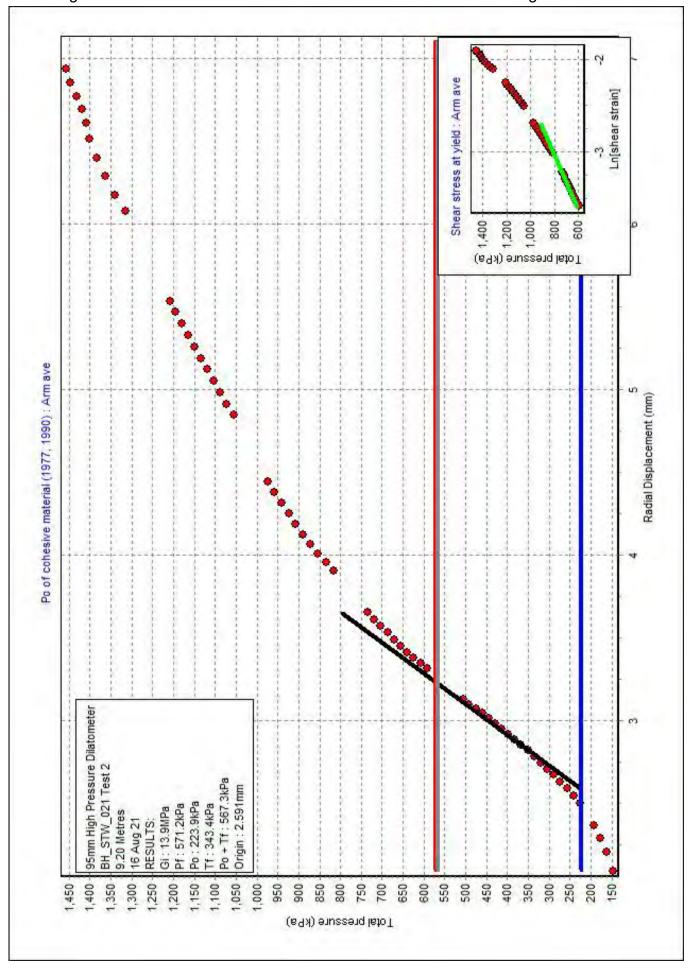
Non-linear exponent : 0.652

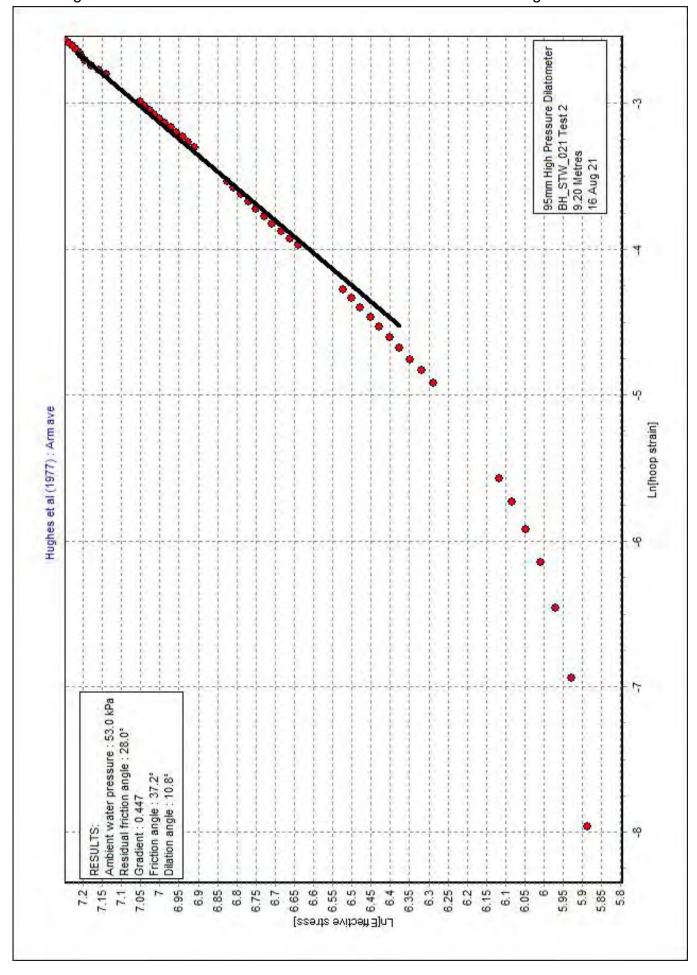
Janbu exponent : 0.464

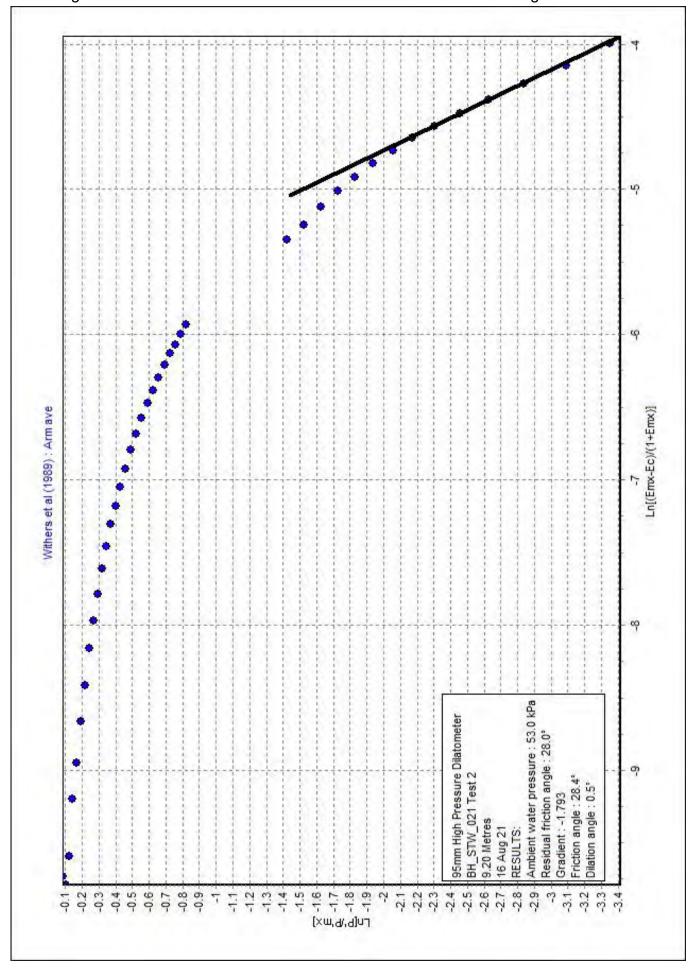
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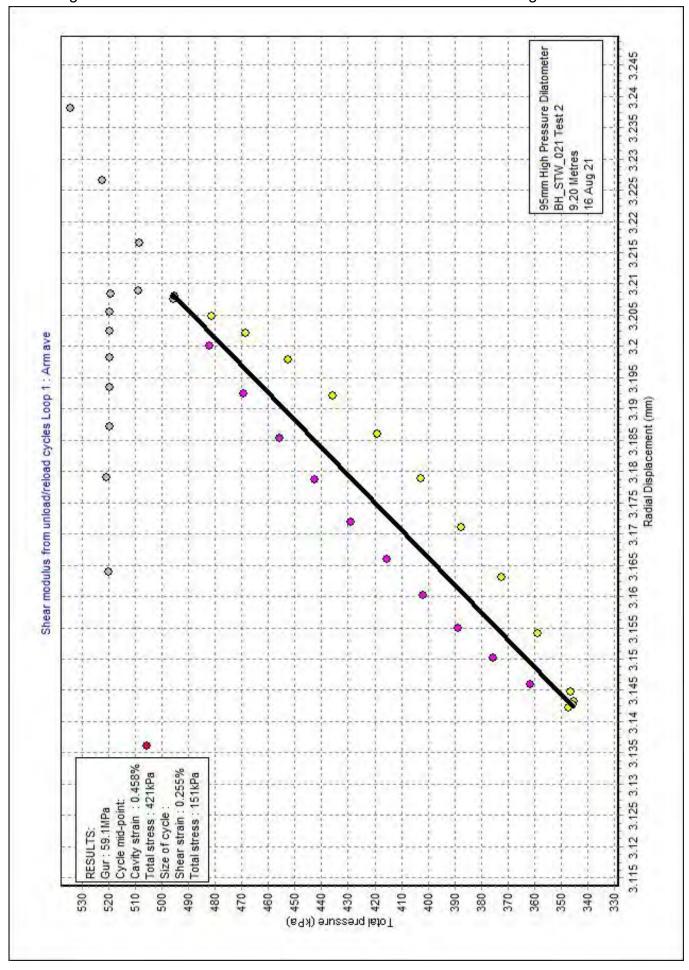
Ambient pore water pressure (kPa) : 53
Residual friction angle (deg) : 28.0
Poisson's ratio : 0.25

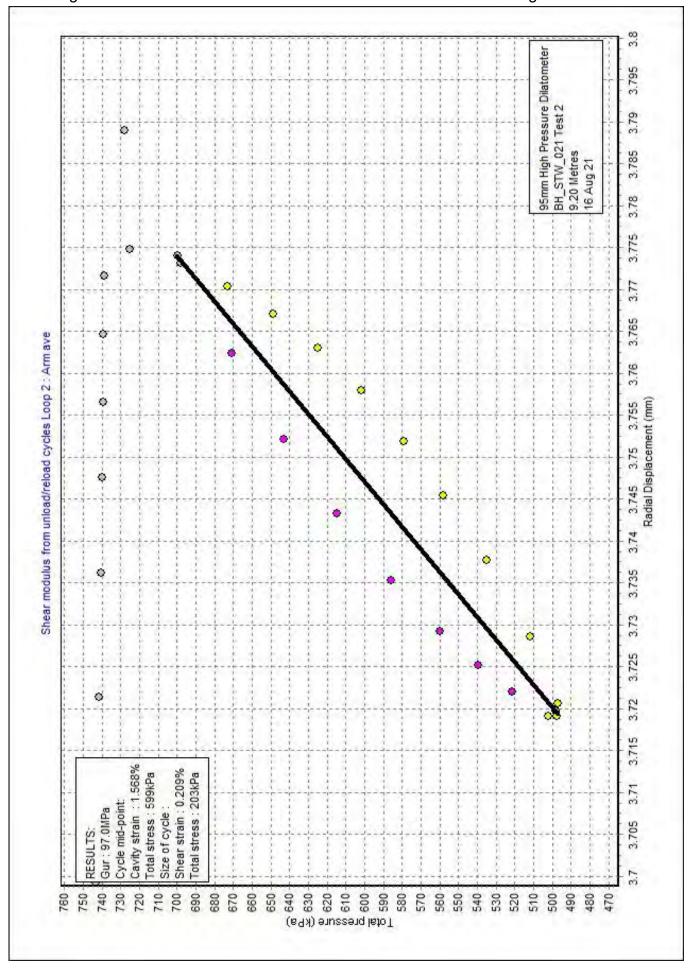


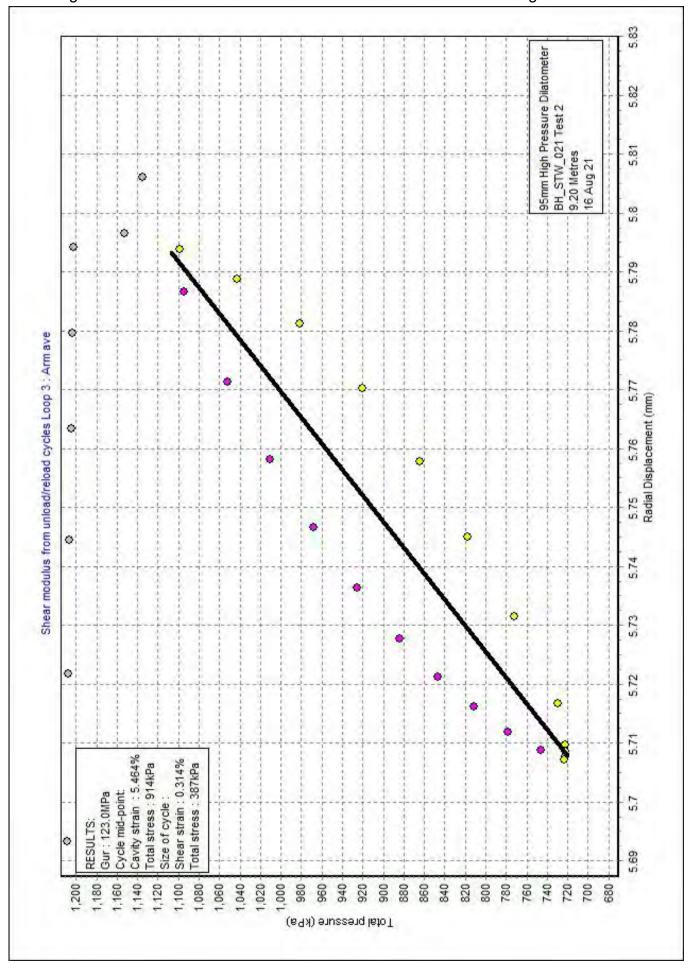


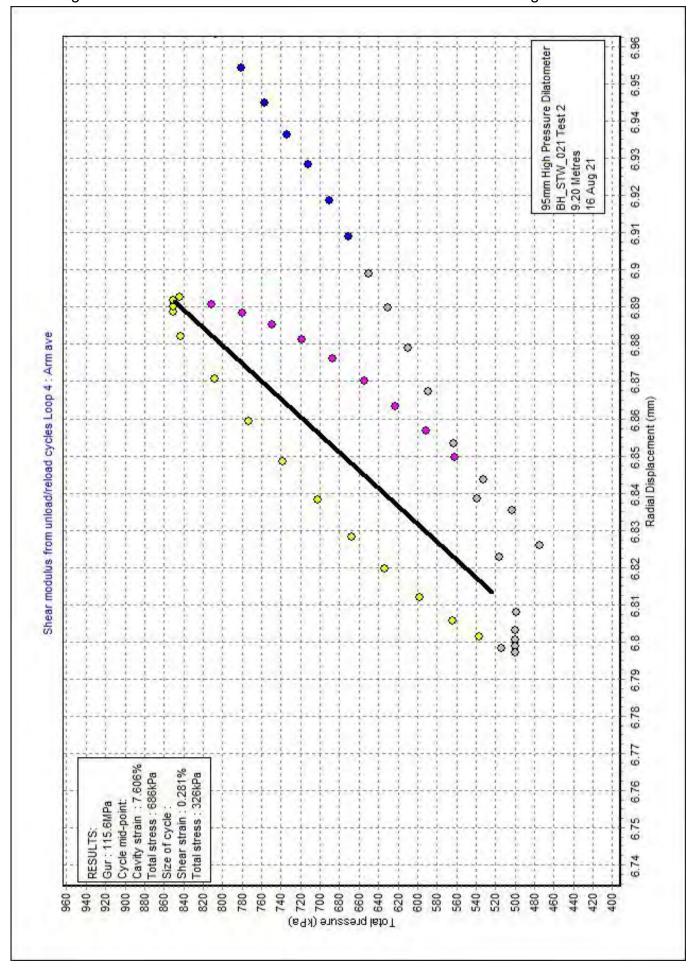


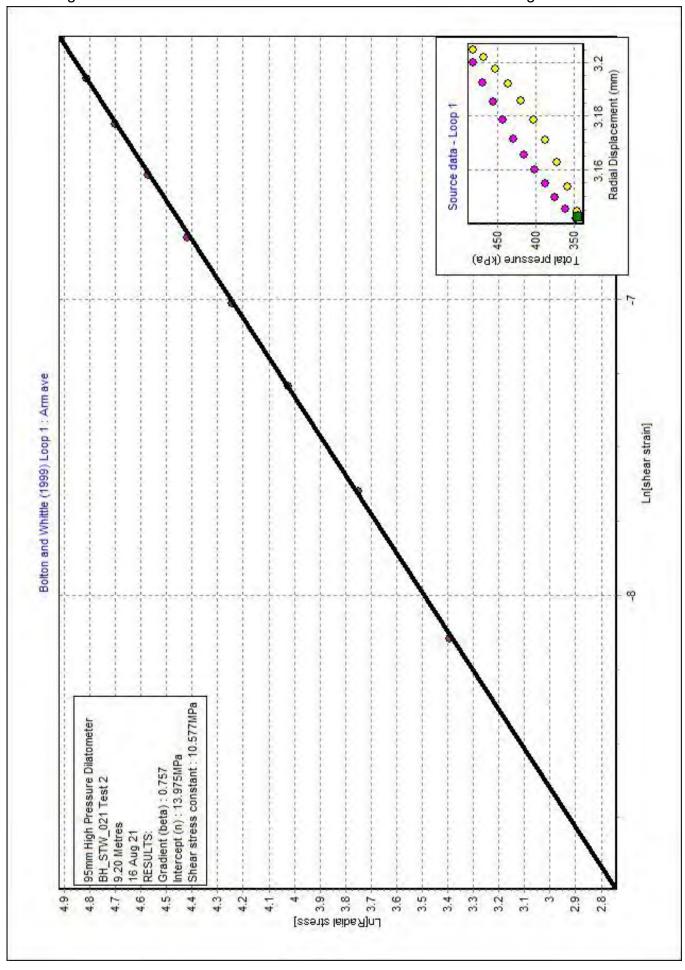


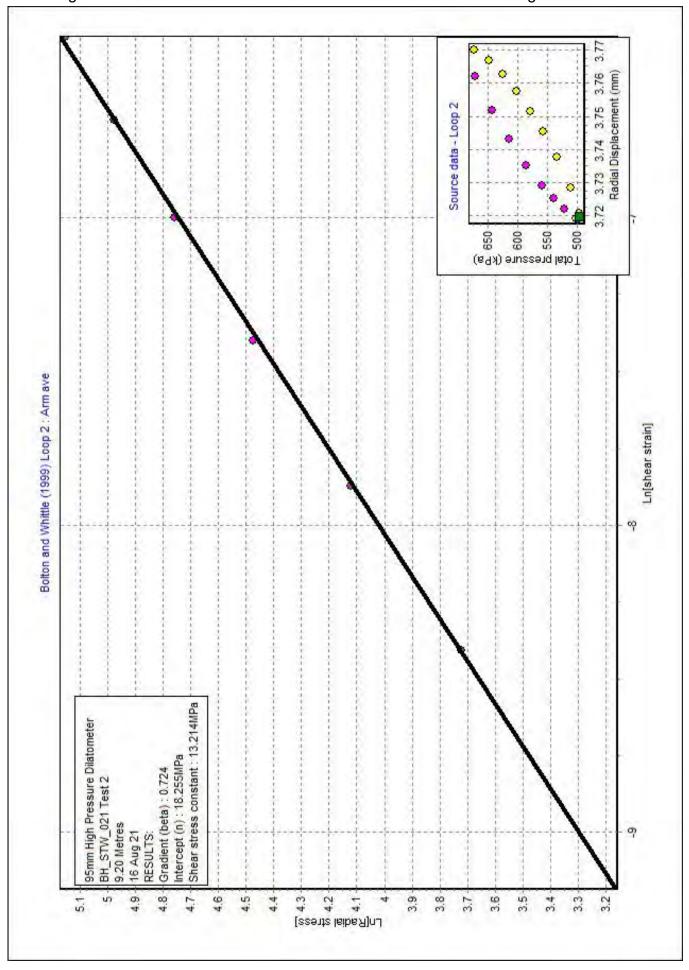


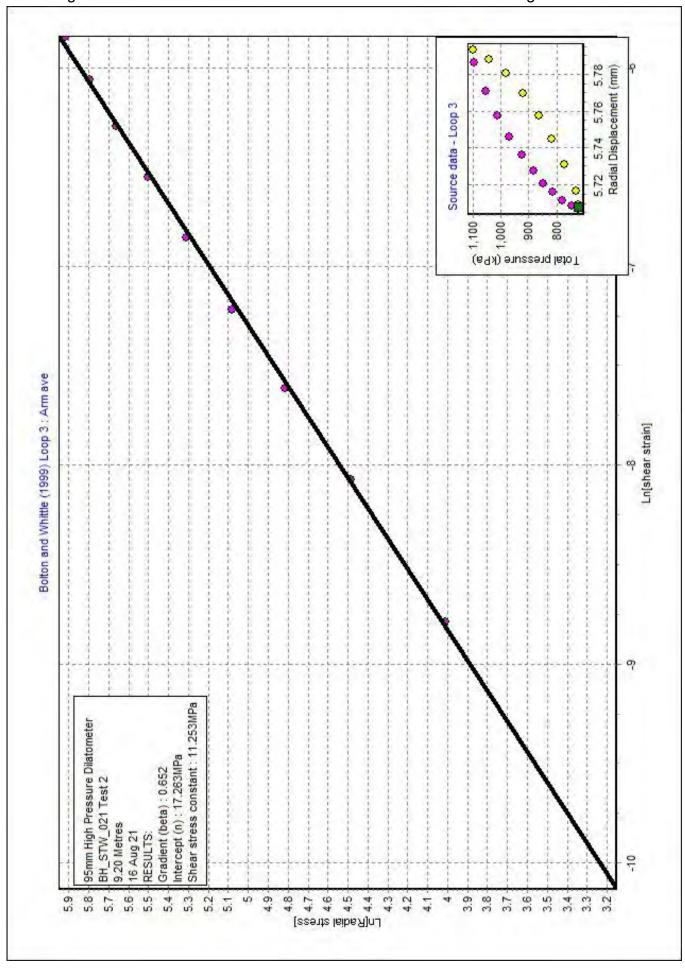


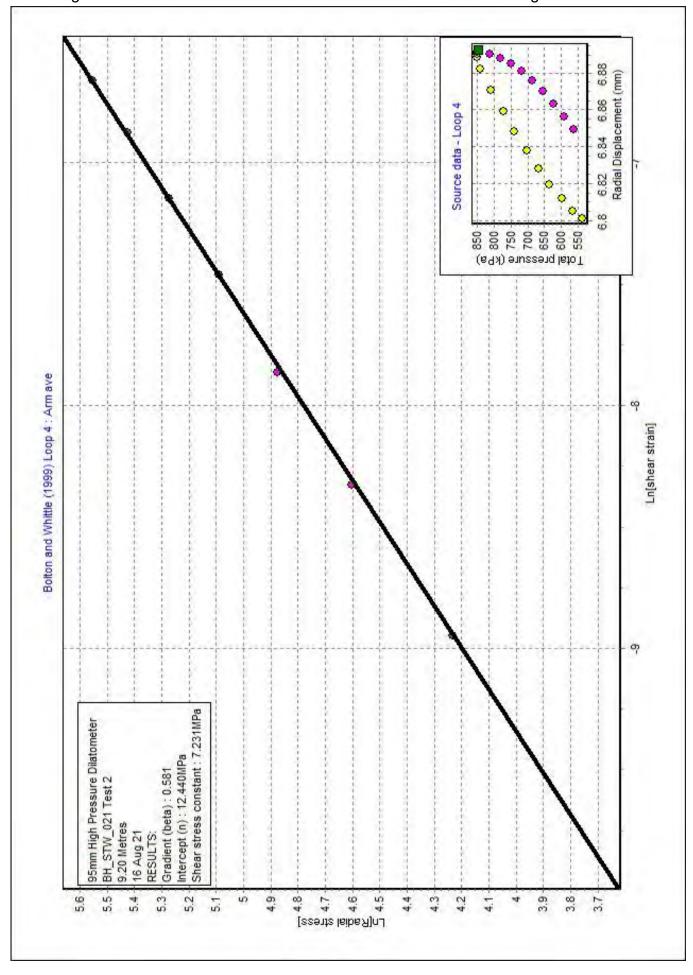


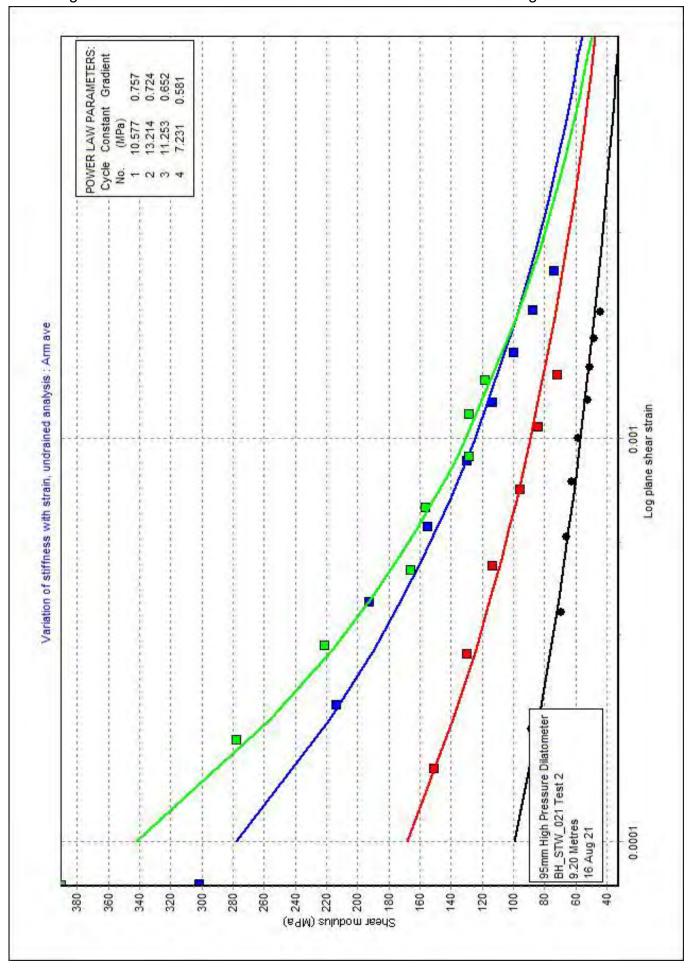


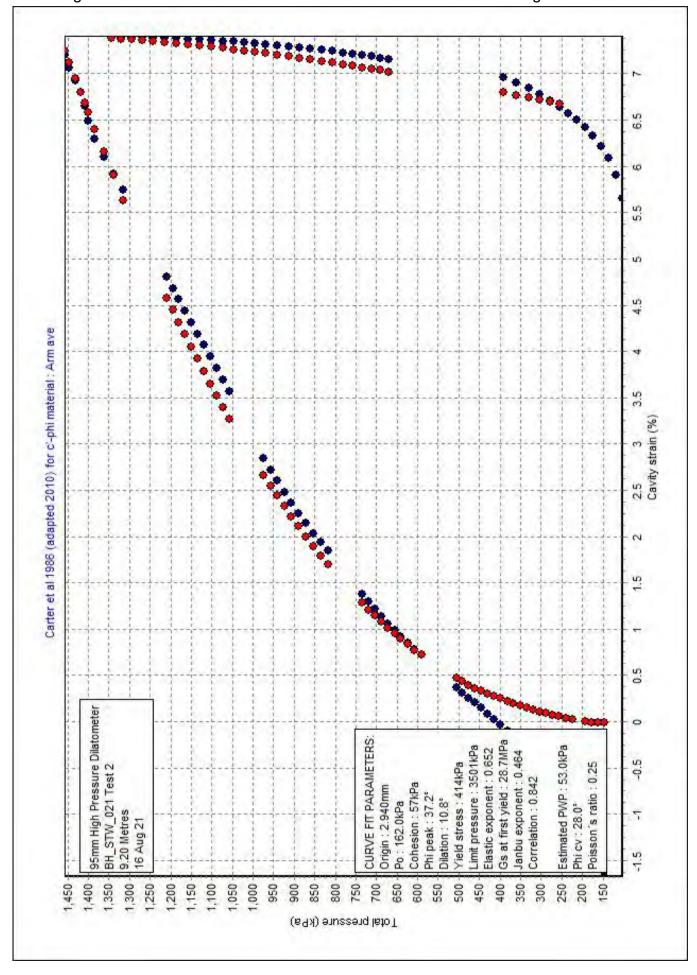


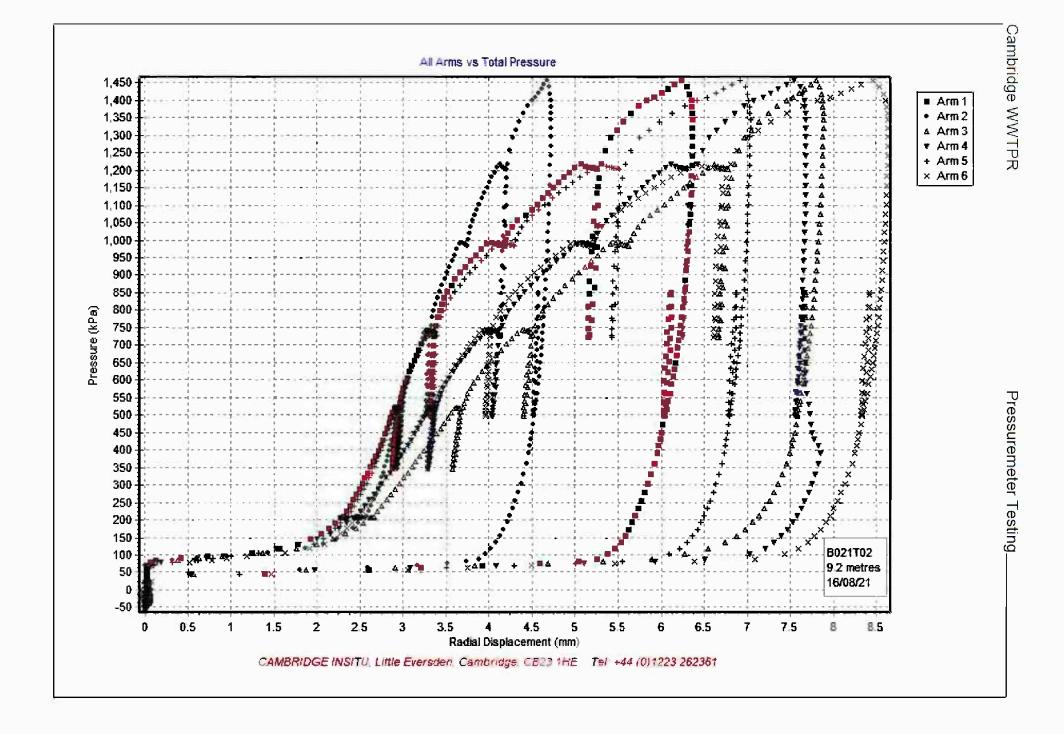


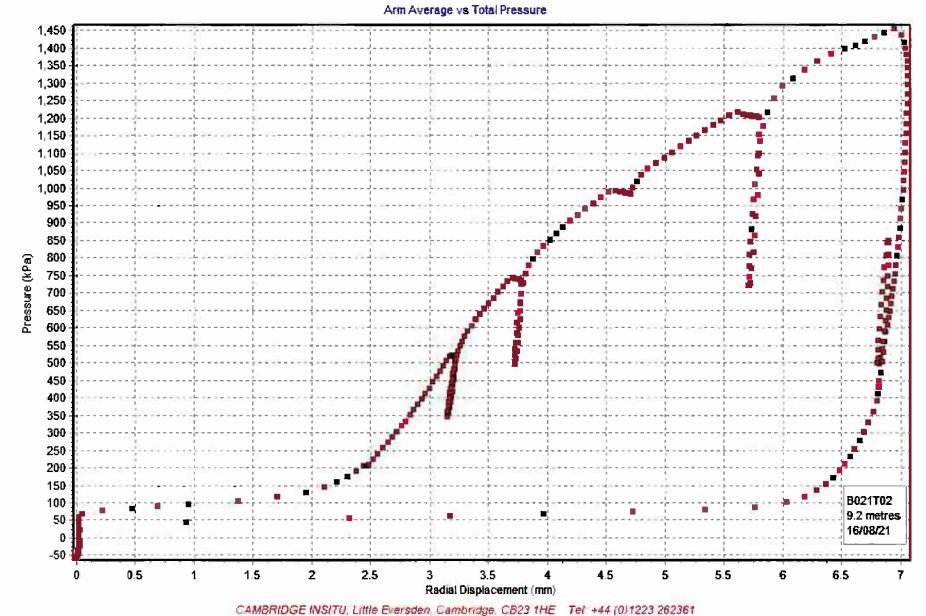


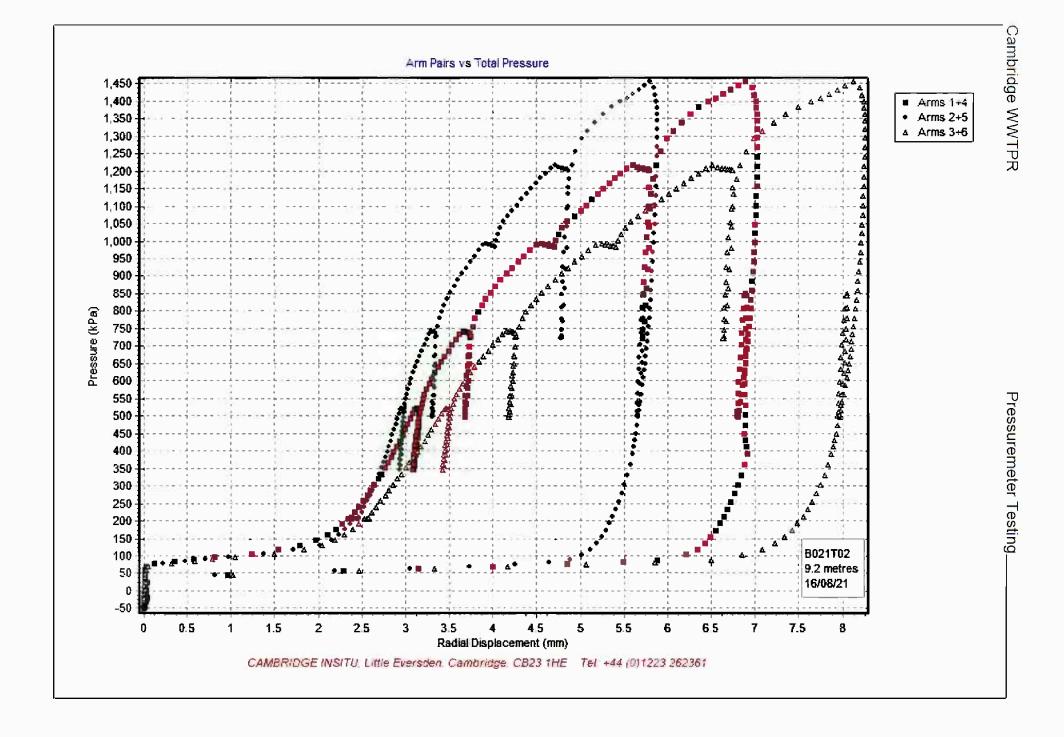


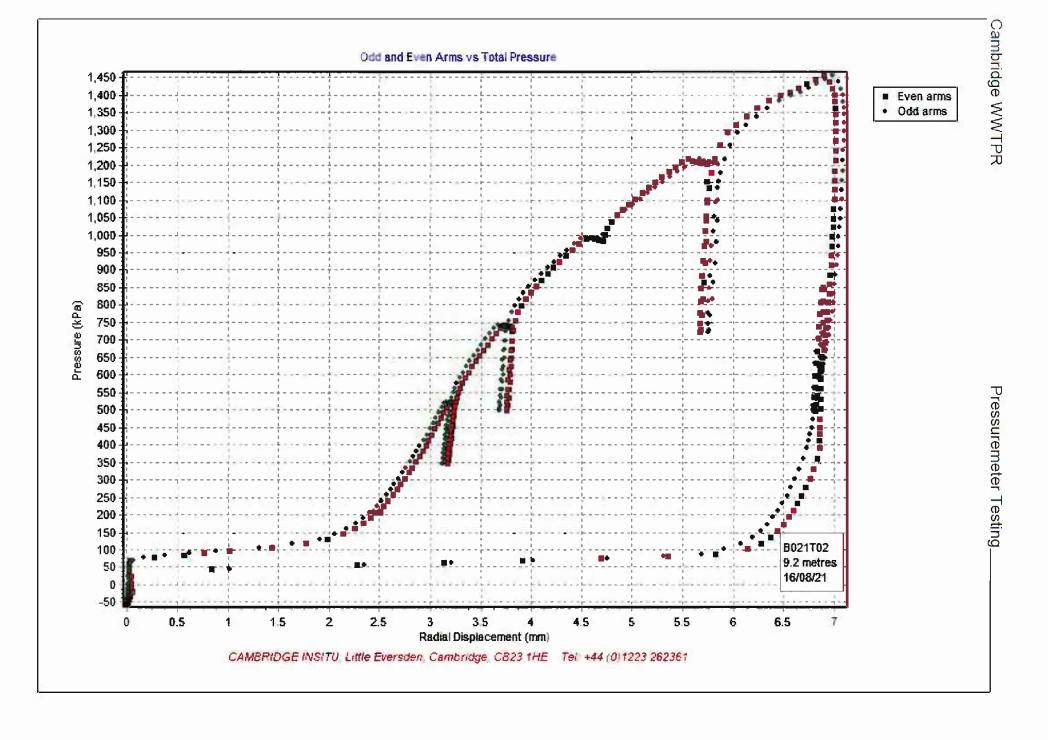












Cambridge WWTPR
BH_STW_021 Test 3 - SUMMARY OF RESULTS
[File made with WinSitu]

[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Wastewater Treatment Plant Relocation Project

Borehole : BH_STW_021

Test name : BH_STW_021 Test 3

Test date : 16 Aug 21
Test depth : 12.00 Metres
Water table : 2.2 Metres
Ambient PWP : 81.0 kPa
Material : Chalk

Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by ES/RW on 17 Aug 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=2.91"
Po from Marsland & Randolph (kPa) : "Arm ave=180.9"
Best estimate of Po (kPa) : "Arm ave=199.0"

[UNDRAINED STRENGTH PARAMETERS]

Undrained yield stress (kPa) : "Arm ave=582.4"

[DRAINED ANALYSIS OF SANDS]

[Hughes et al 1977]

Constant volume friction angle (°) : 28.0

Angle of internal friction (°) : "Arm ave=28.2"

Dilation angle (°) : "Arm ave=0.3"

Gradient of log-log plot : "Arm ave=0.323"

[Withers et al 1989]

Angle of internal friction (°) : "Arm ave=28.7"

Dilation angle (°) : "Arm ave=0.8"

Gradient of log-log plot : "Arm ave=-1.809"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=18.1"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	95.3	0.381	478	0.181	173
Arm ave	2	114.0	1.706	684	0.207	236
Arm ave	3	121.4	3.692	841	0.249	303
Arm ave	4	96.2	11.750	662	0.331	319

)

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	7.983	4.830	0.605
Arm ave	2	6.519	3.454	0.530
Arm ave	3	7.152	3.743	0.523
Arm ave	4	6.771	3.555	0.525

[PARAMETERS USED FOR DRAINED CURVE MODELLING]

{Axis is Arm ave}

Strain Origin (mm) : 2.91
Po (kPa) : 199
Cohesion (kPa) : 28
Angle of peak friction (deg) : 28.2
Angle of peak dilation (deg) : 0.0
Total yield stress (kPa) : 467
CIR1506/21

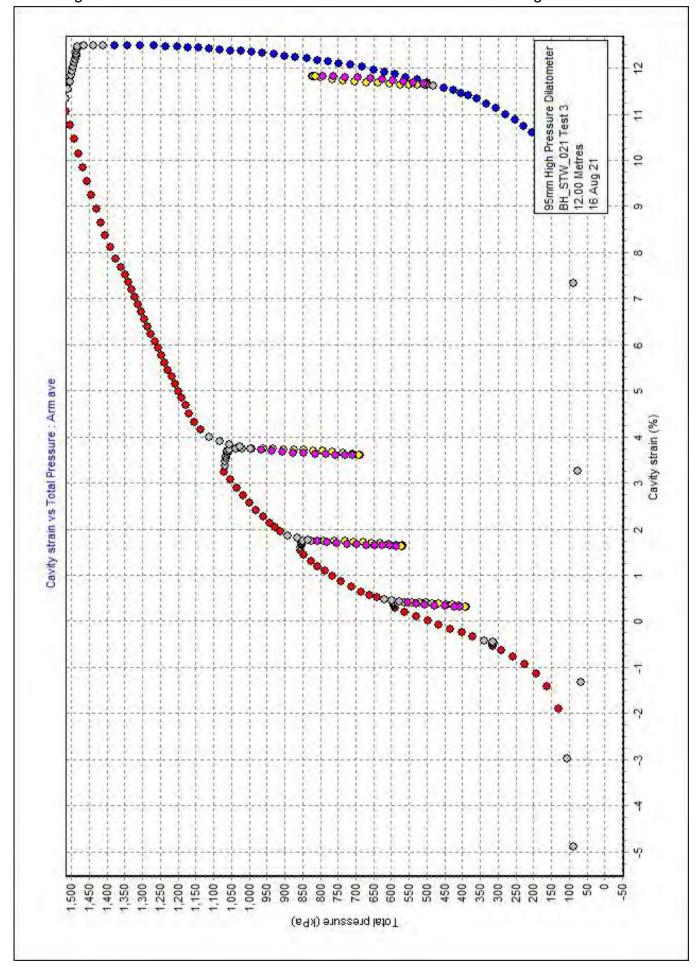
Cambridge WWTPR

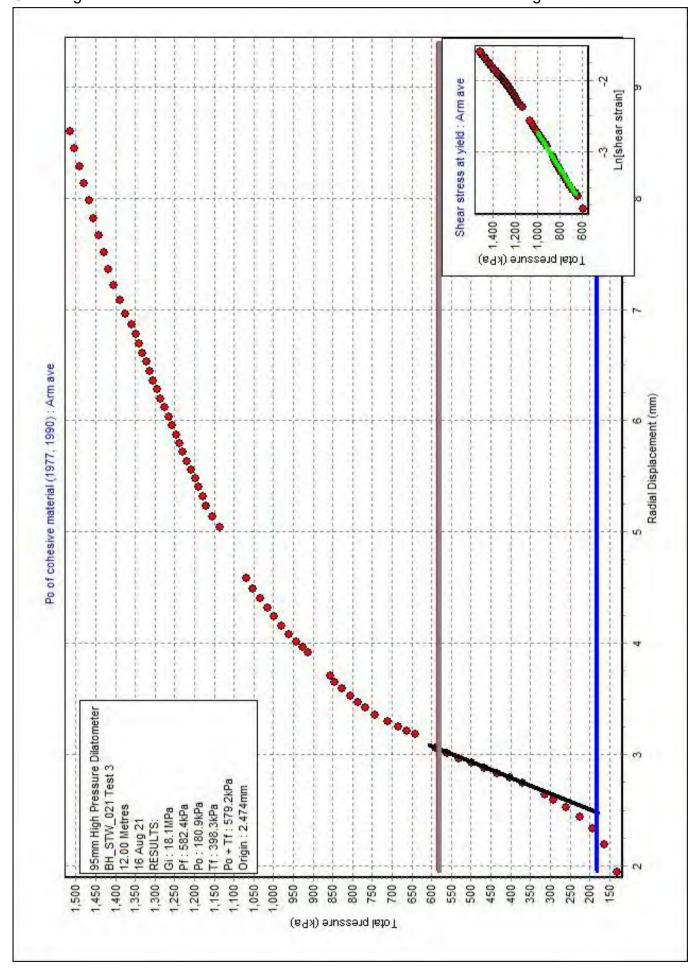
Pressuremeter Testing

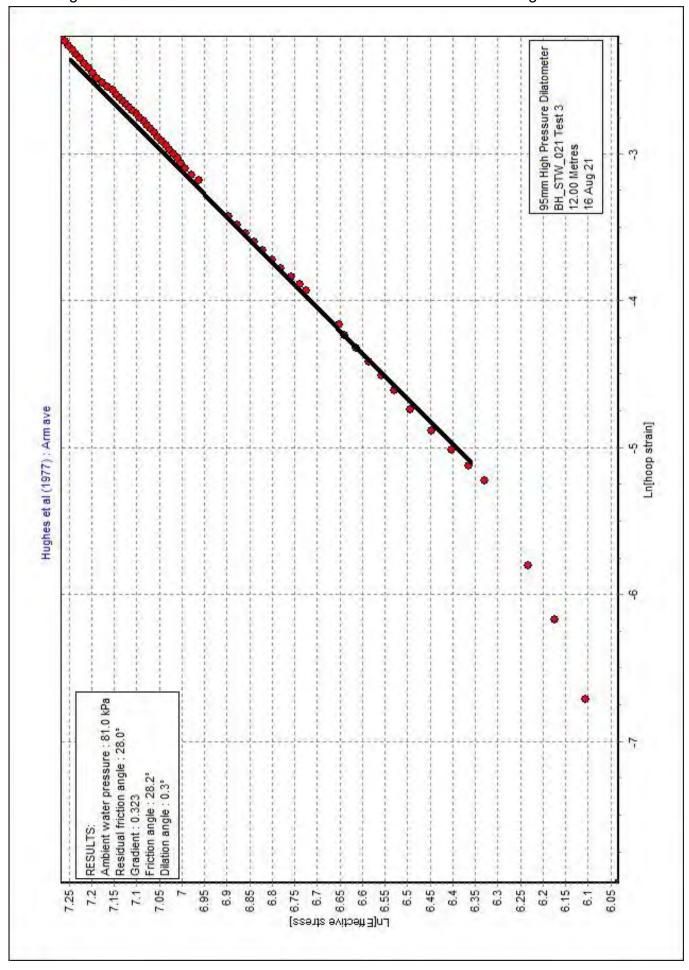
BH_STW_021 Test 3 - SUMMARY OF RESULTS

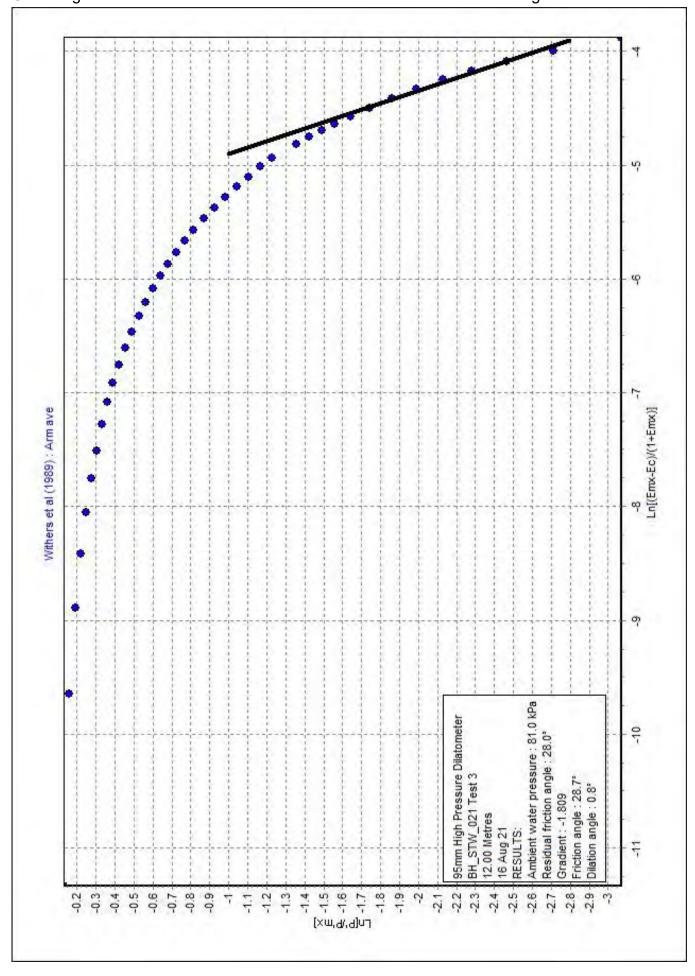
Total limit stress (kPa) : 2449
G at first yield (MPa) : 43.7
Non-linear exponent : 0.523
Janbu exponent : 0.163
Correlation : 0.641

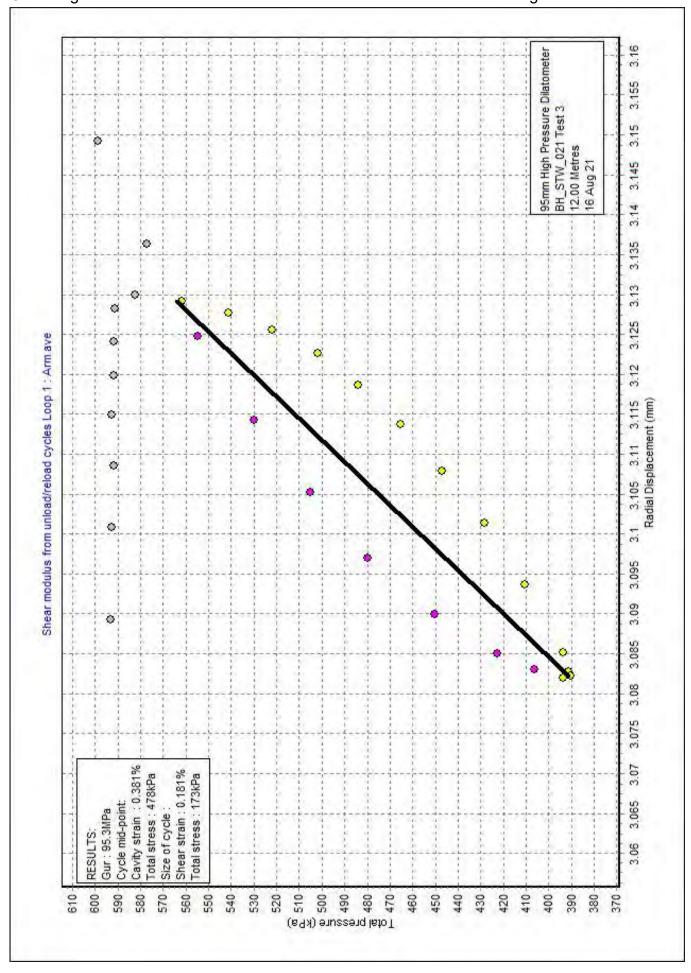
Ambient pore water pressure (kPa) : 81
Residual friction angle (deg) : 28.0
Poisson's ratio : 0.25

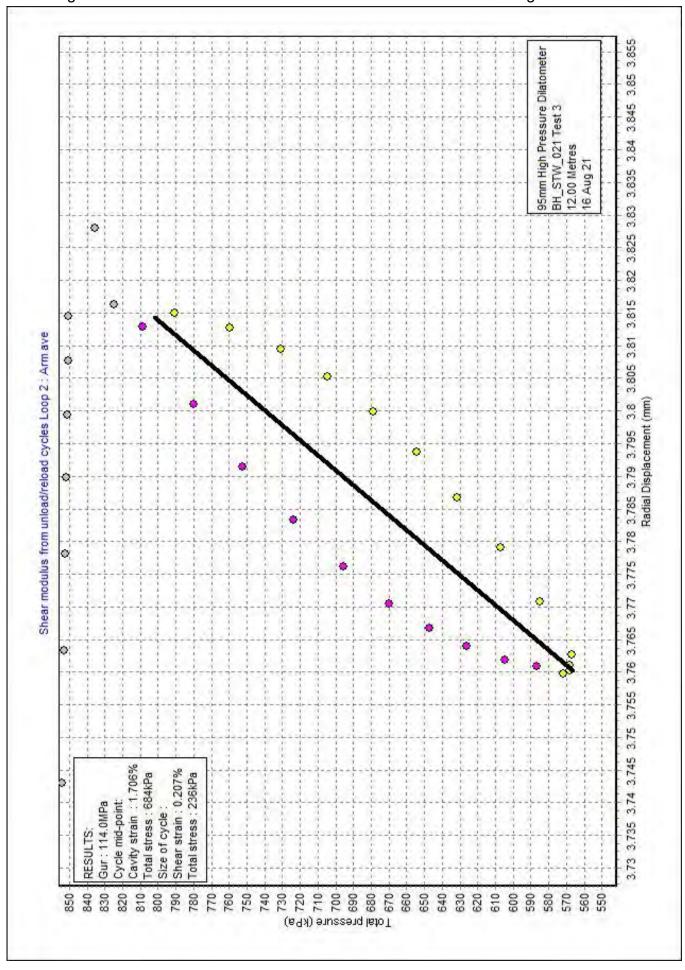


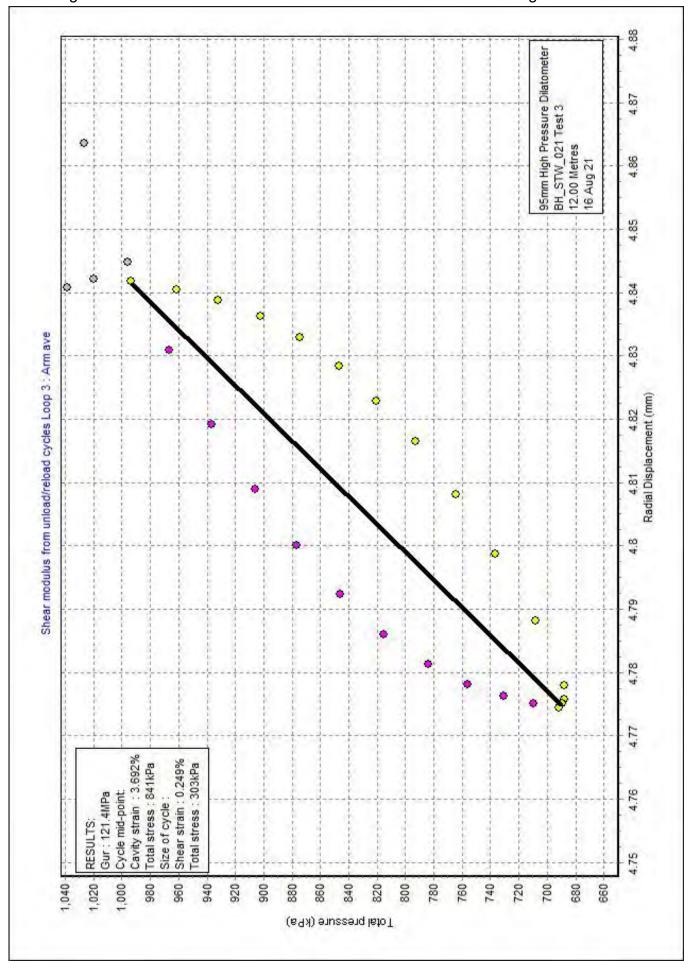


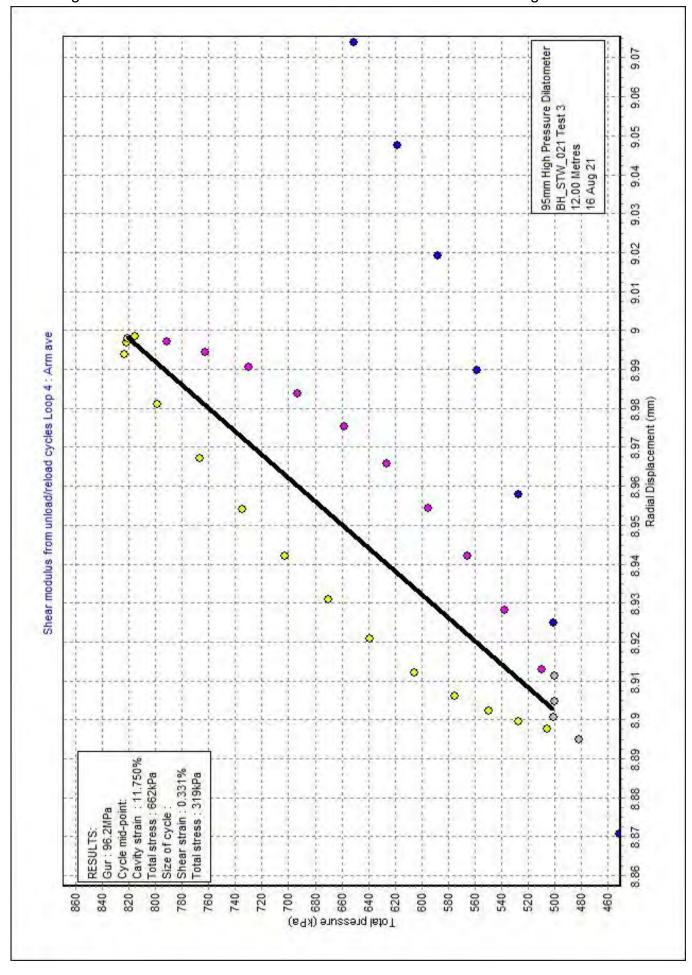


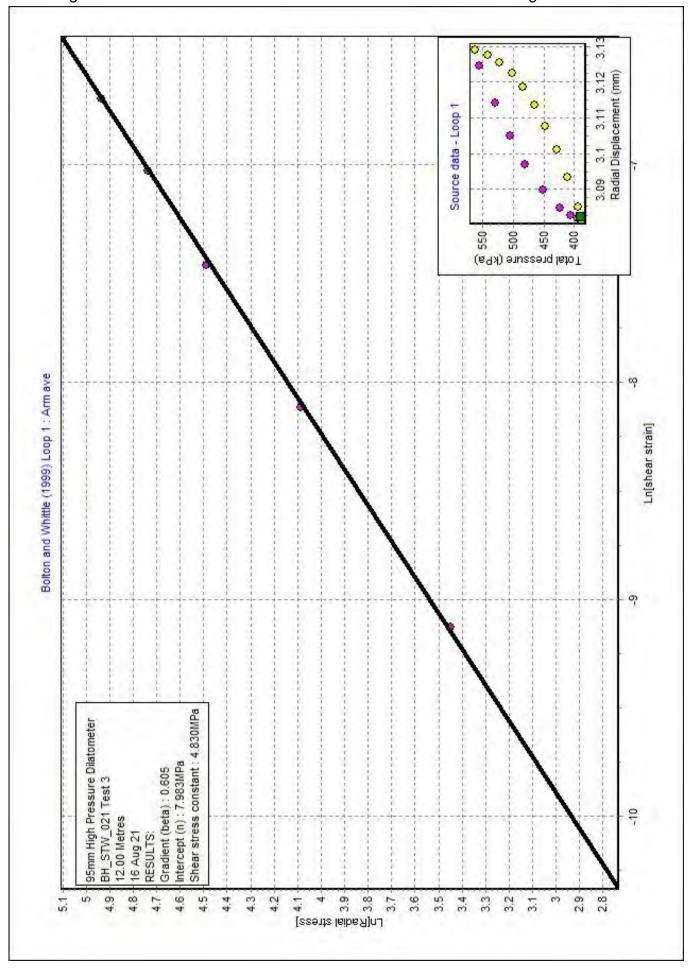


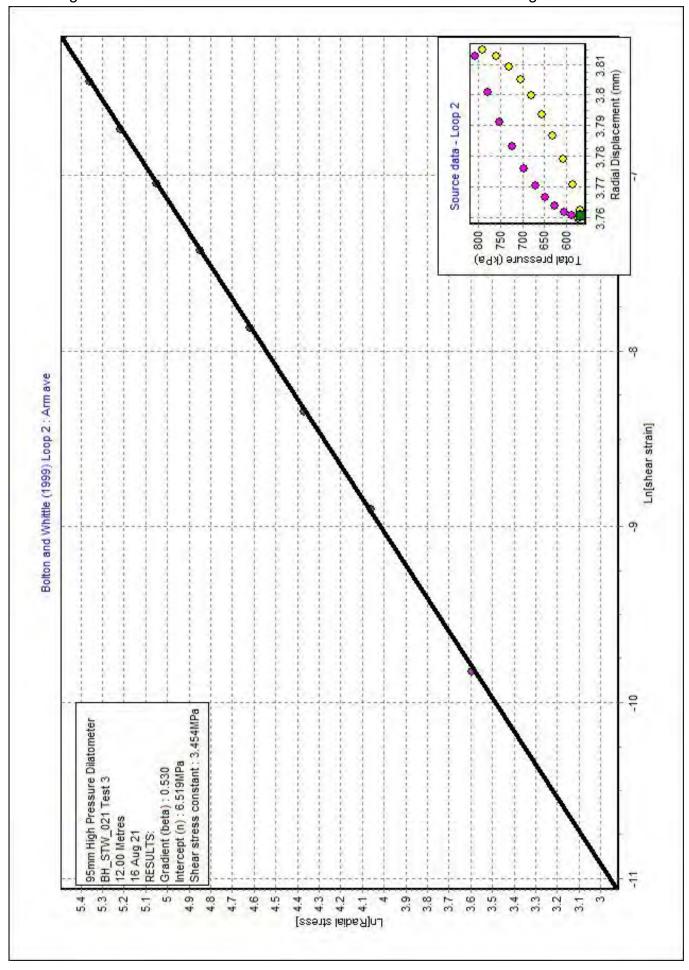


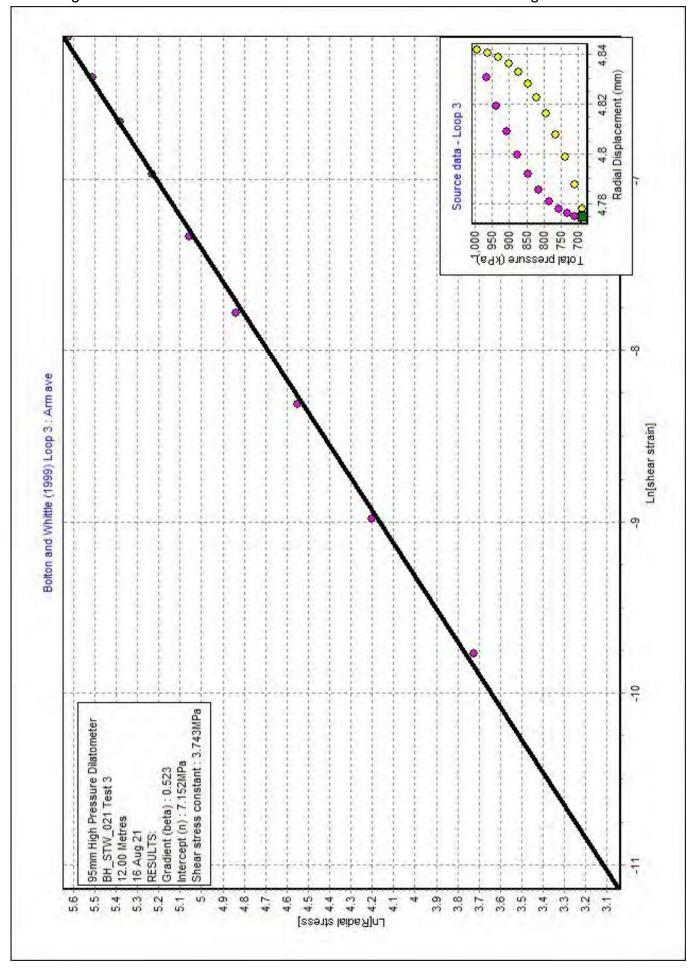


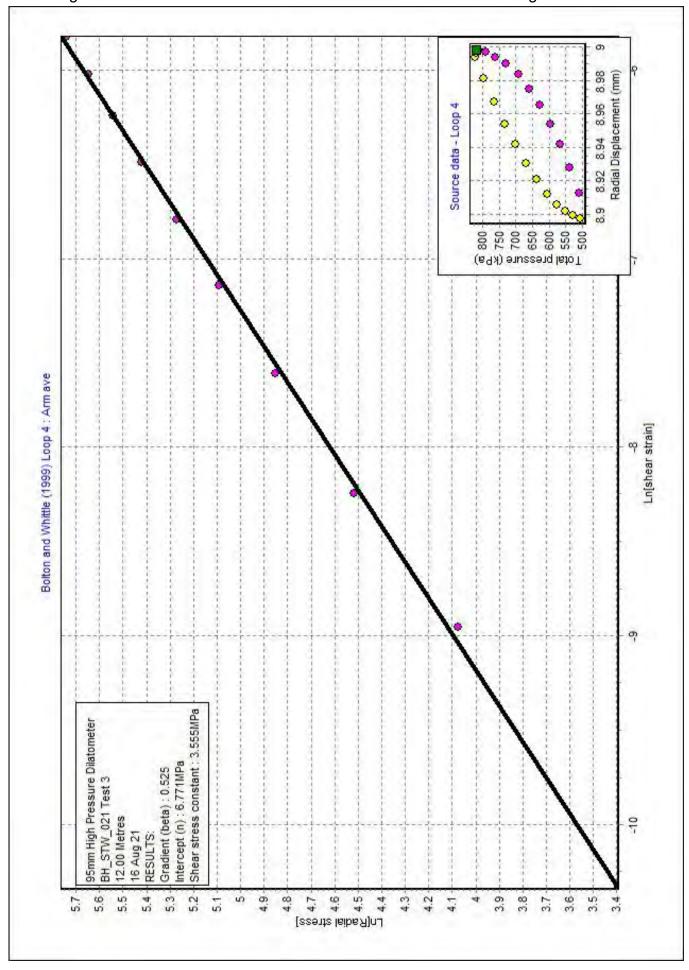


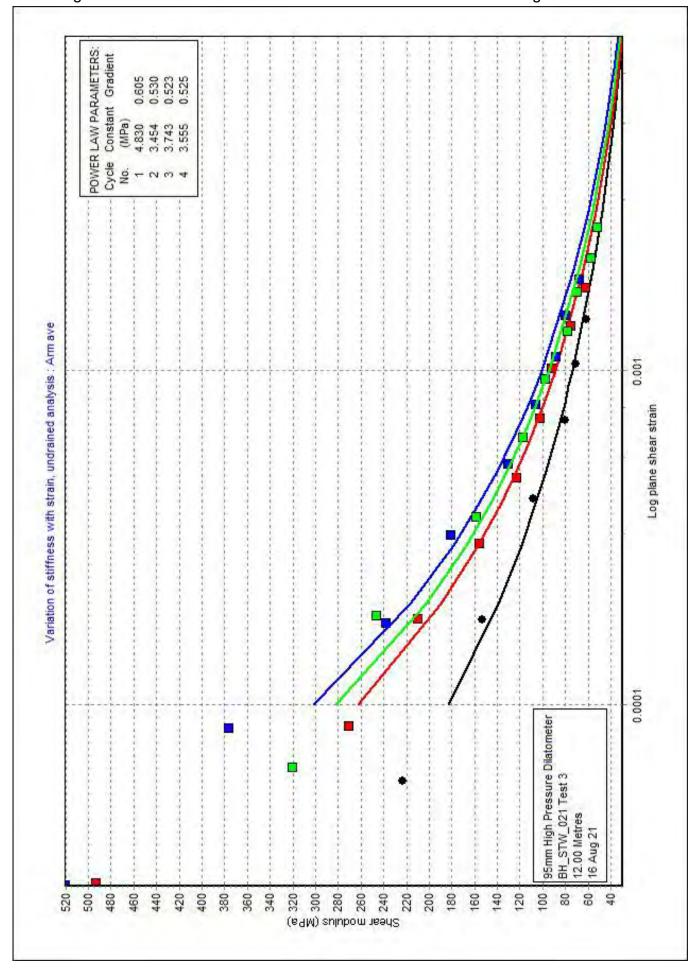


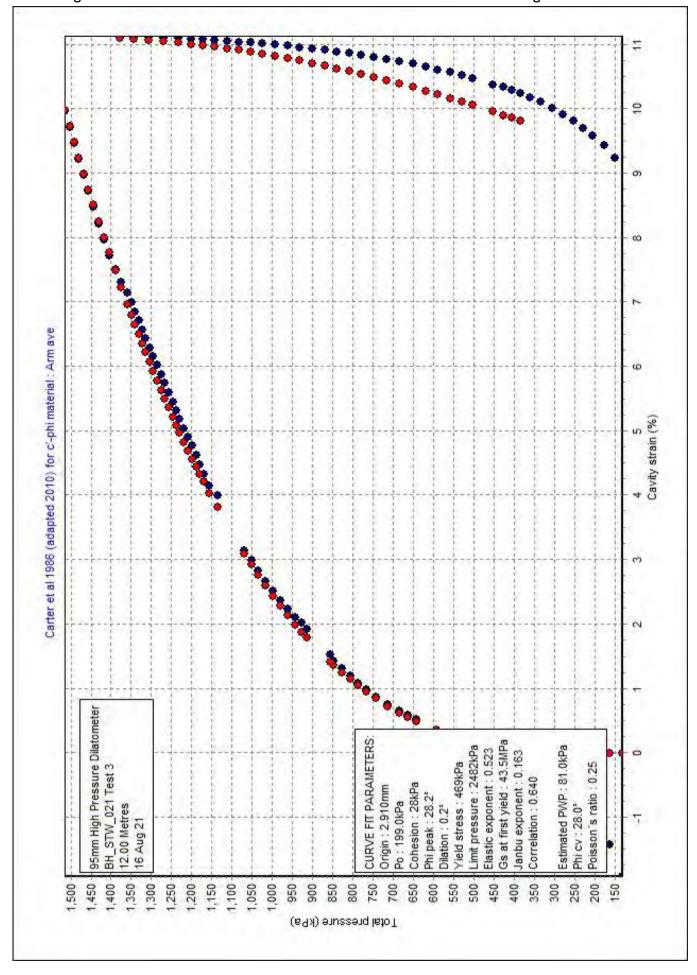


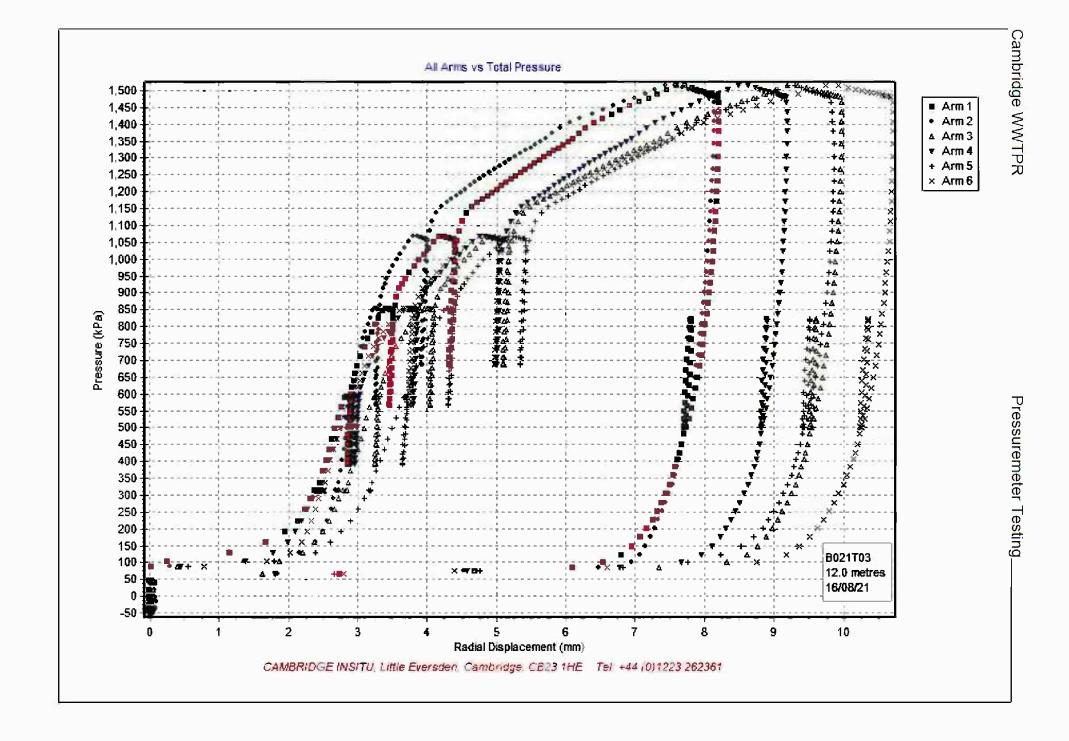


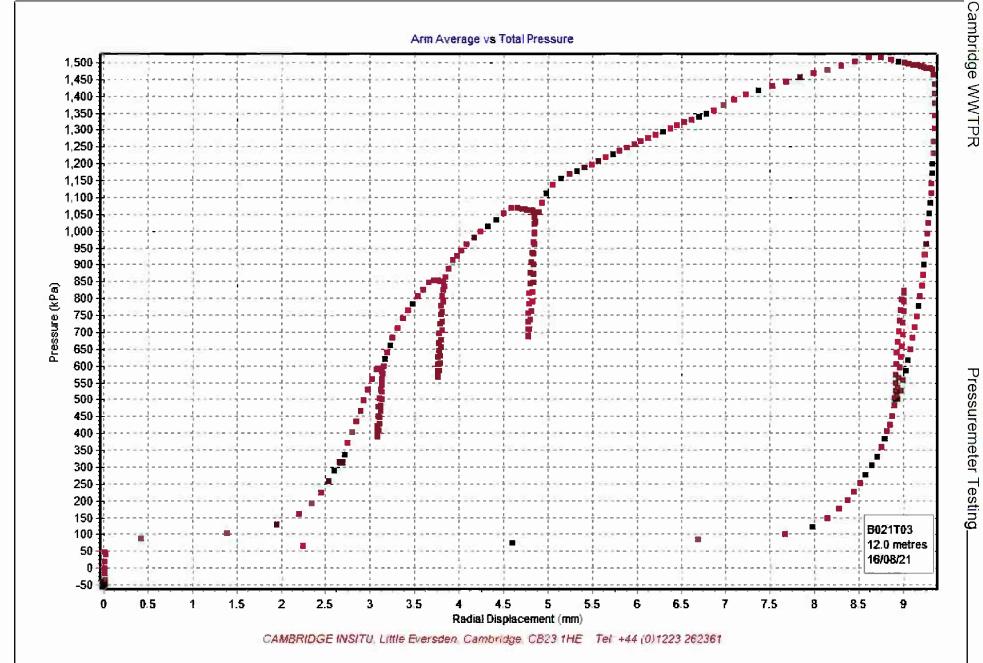


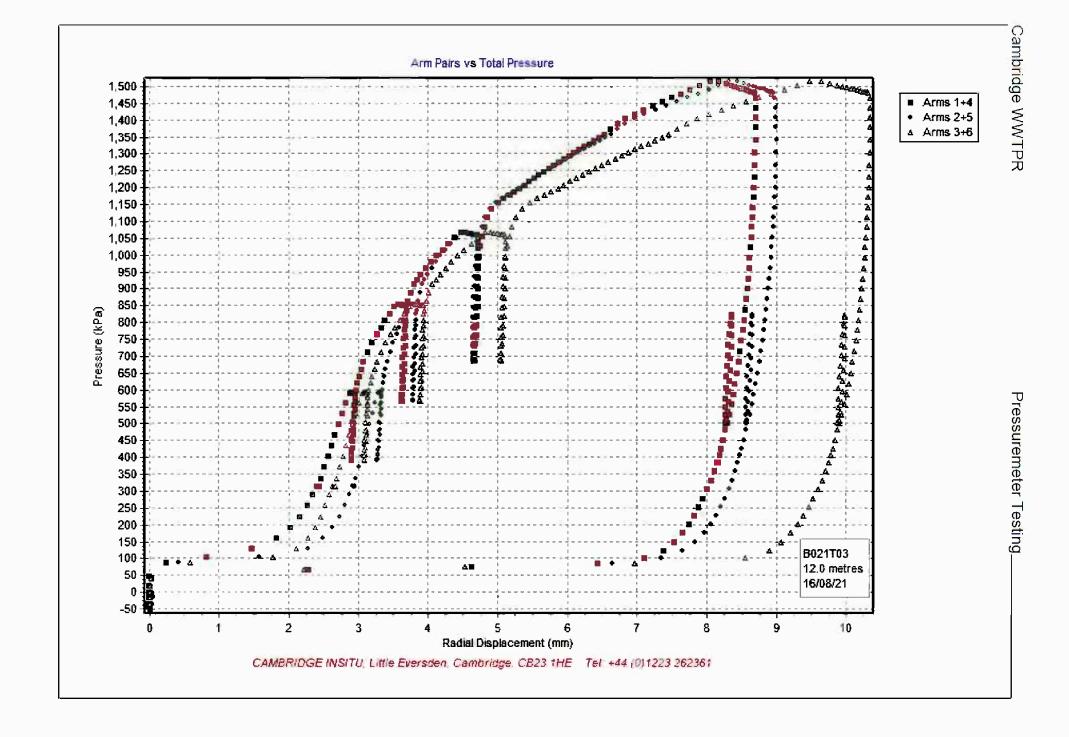


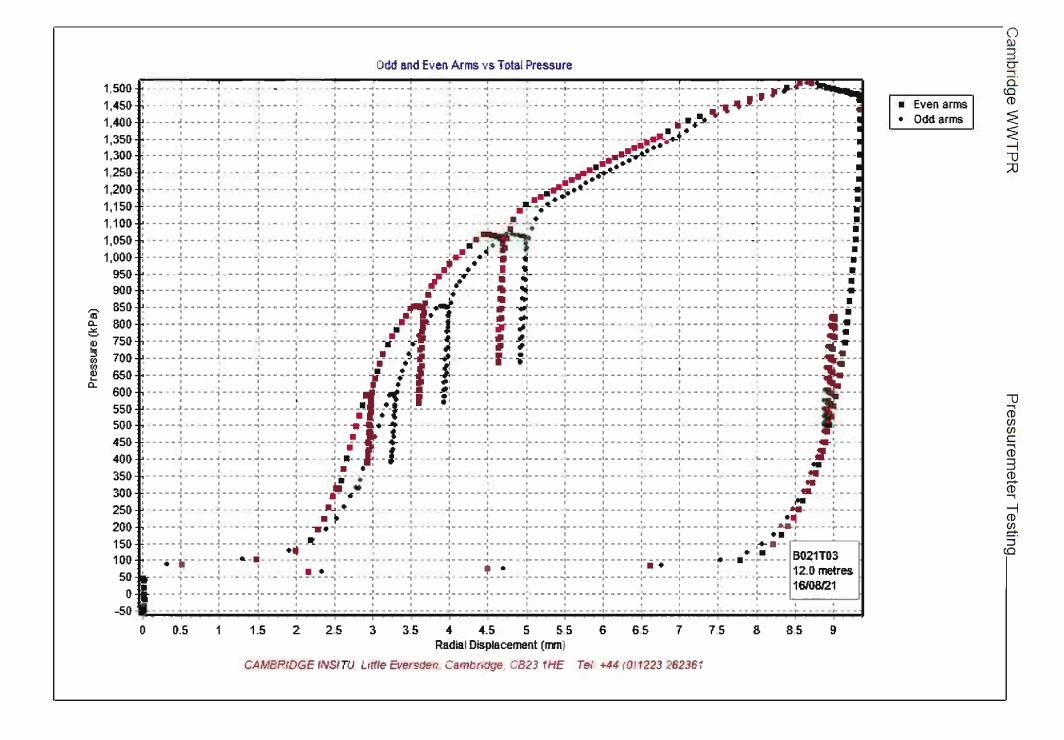












[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_TUN_001PM
Test name : BH_TUN_001PM Test 1

Test date : 13 Sep 21
Test depth : 12.50 Metres
Water table : 1.25 Metres
Ambient PWP : 110.0 kPa
Material : Gault Clay

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB / ES / RW on 14 Sep 21

Remarks: Cutting shoe caught on casing, caused damange to cutting shoe and resulted in a disturbed pocket.

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=0.69"
Po from Marsland & Randolph (kPa) : "Arm ave=270.4"
PWP versus Total Stress (kPa) : "PPC Ave=294.5"
Best estimate of Po (kPa) : "Arm ave=368.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=153.8"

Limit pressure (kPa) : "Arm ave=1496"

Jefferies 1988 - Cu (kPa) : "Arm ave=151.6"

Undrained yield stress (kPa) : "Arm ave=470.5"

PWP derived yield stress (kPa) : "PPC Ave=564.6"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=52.6"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	42.6	0.599	686	0.696	297
Arm ave	2	43.2	2.742	819	0.749	325
Arm ave	3	45.5	4.716	495	0.567	259

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	6.333	3.848	0.608
Arm ave	2	5.474	3.112	0.568
Arm ave	3	5.308	3.029	0.571

Non-linear exponent from PWP response : "PPC Ave=0.508"

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 0.69

 Po (kPa)
 : 368

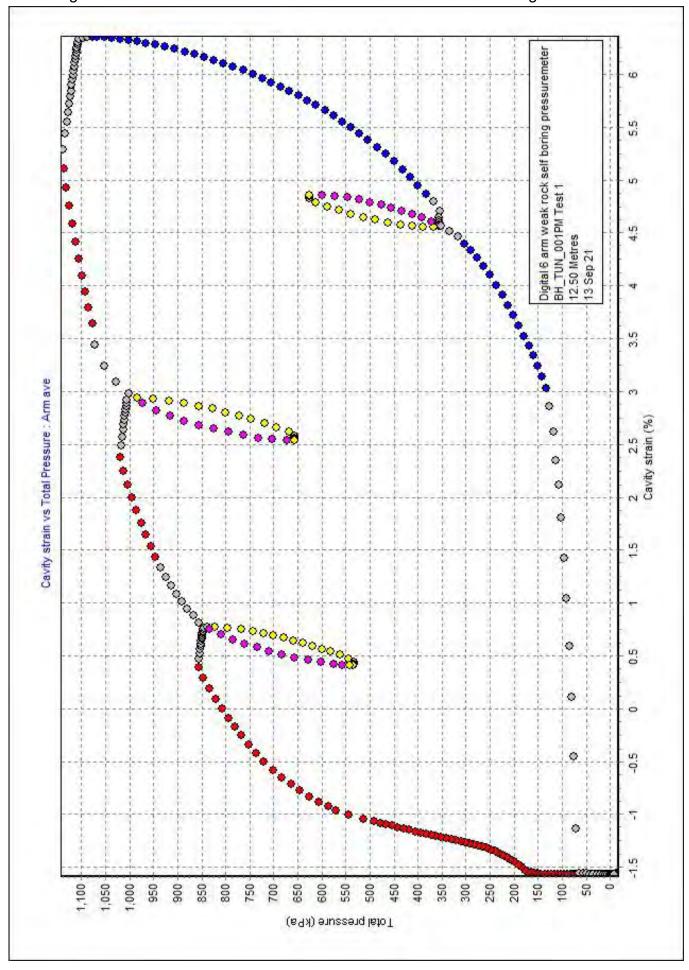
 Cu (kPa)
 : 153.8

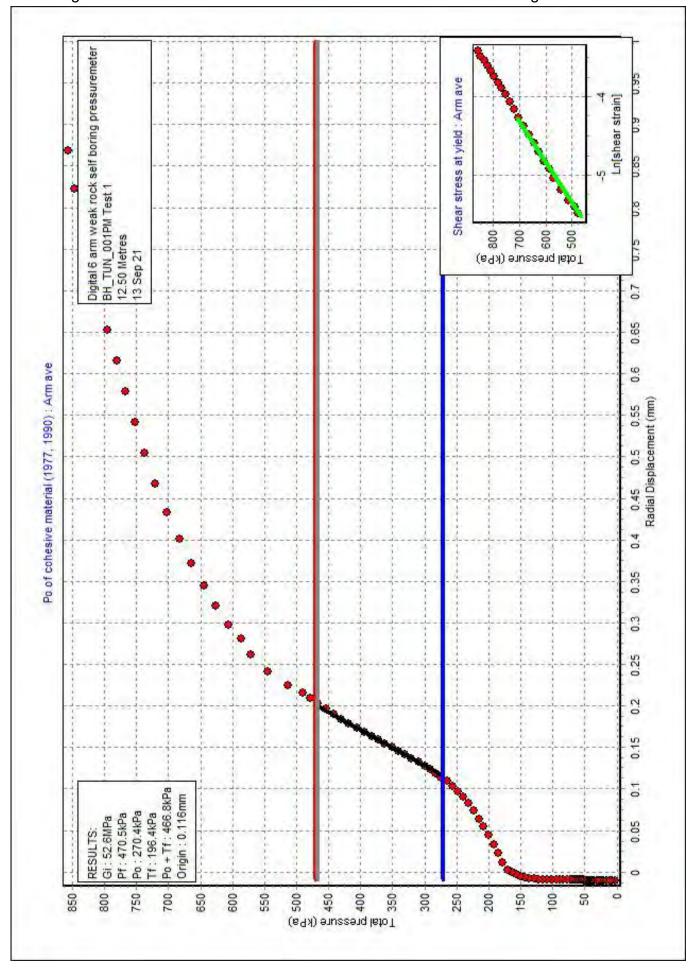
 Limit pressure (kPa)
 : 1496

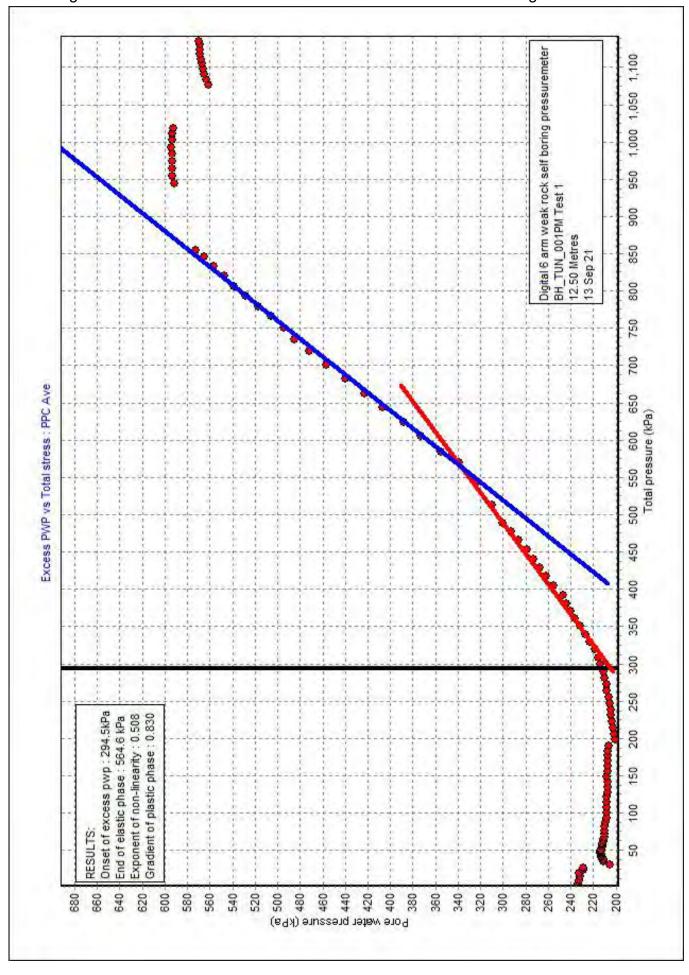
 Non-linear exponent
 : 0.571

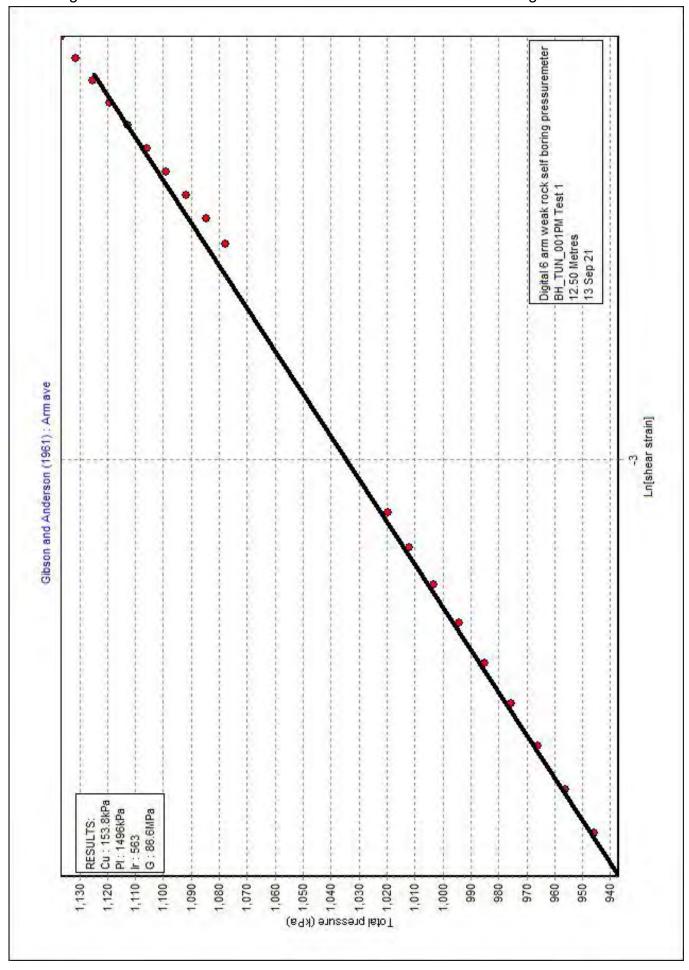
 Calculated alpha (MPa)
 : 3.726

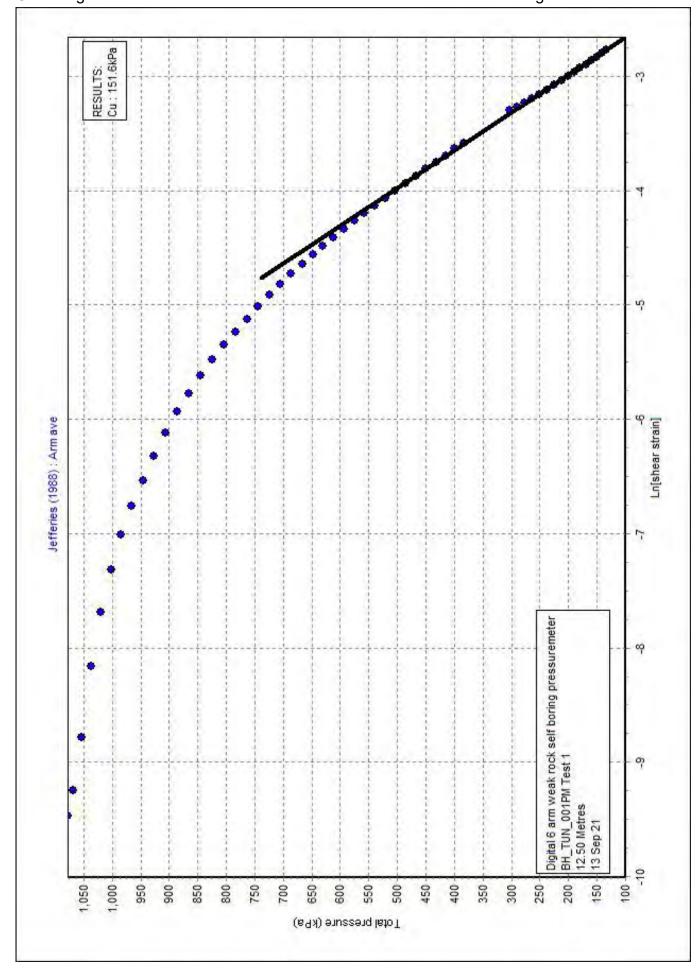
 G at yield (MPa)
 : 40.9

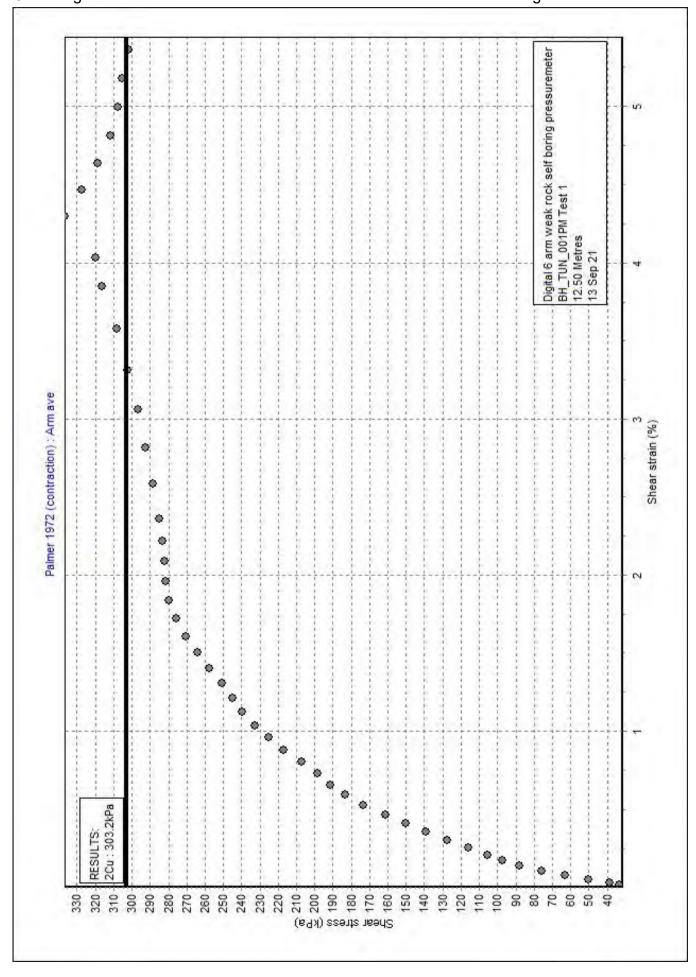


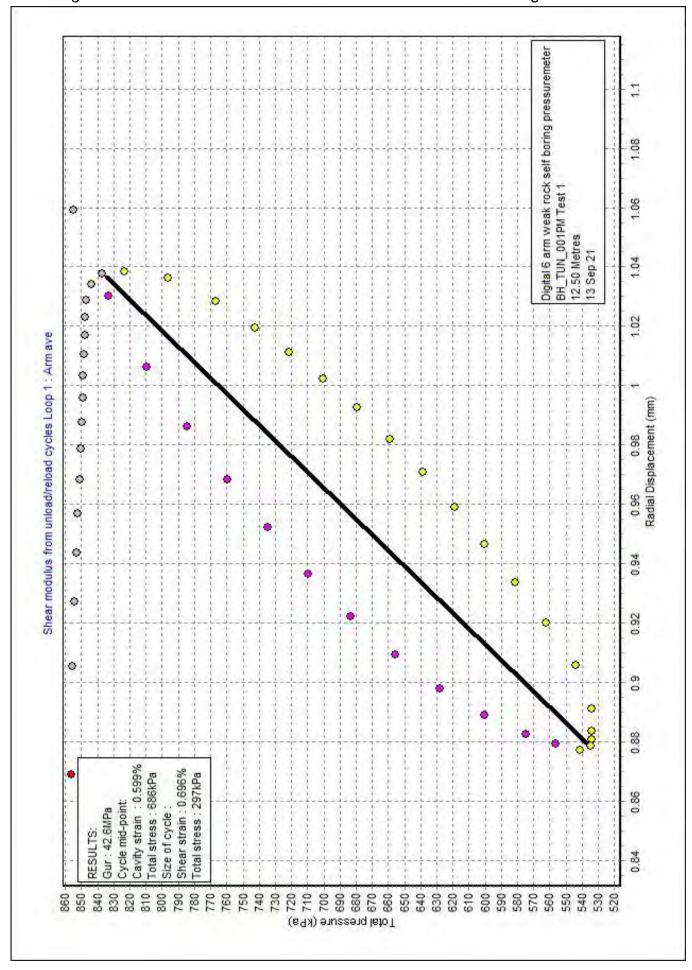


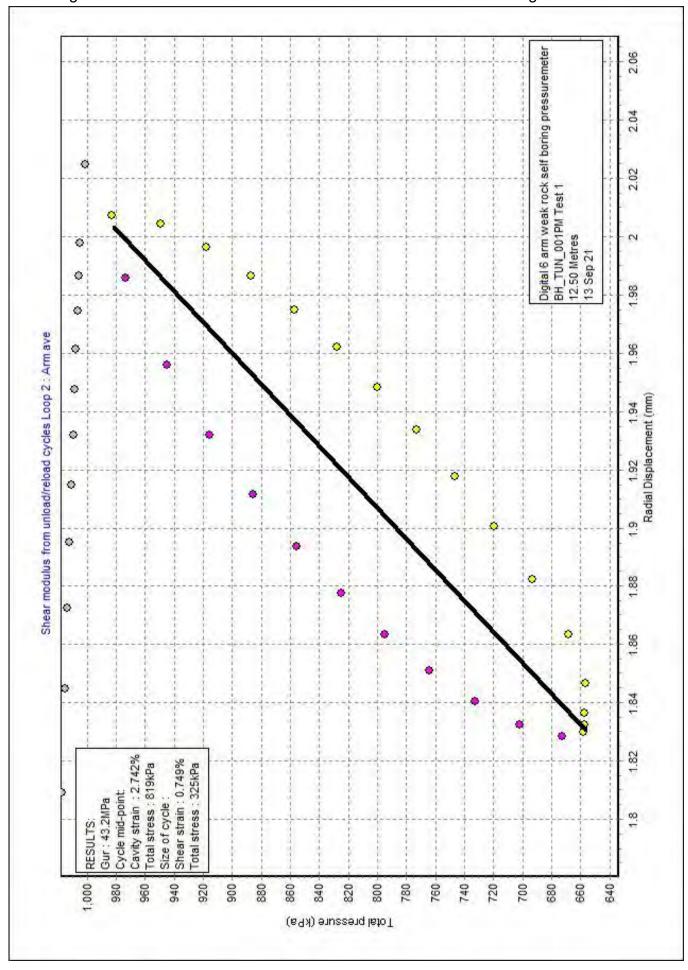


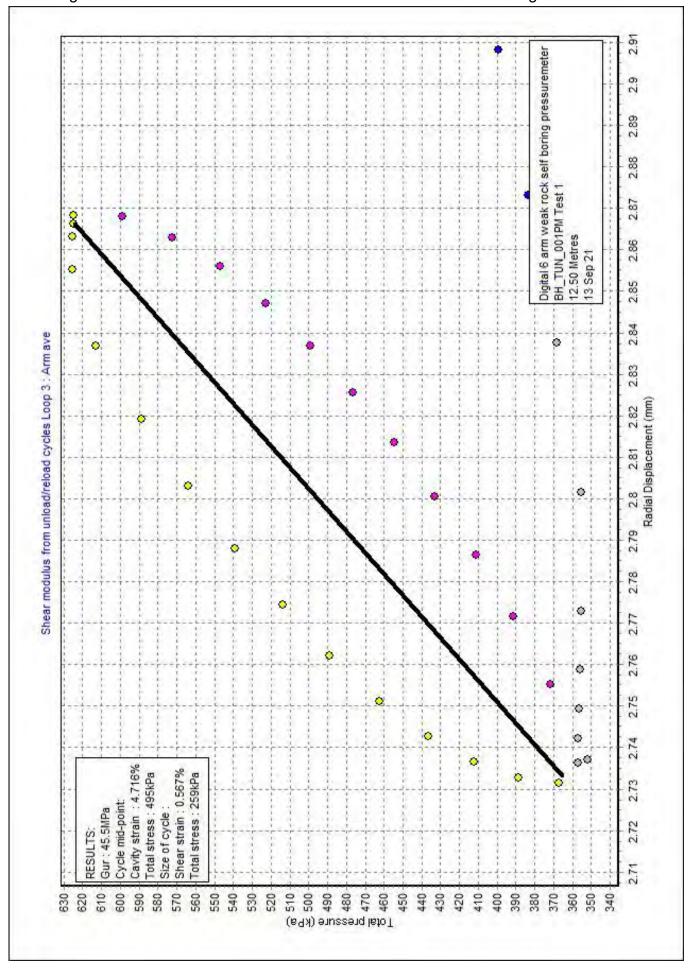


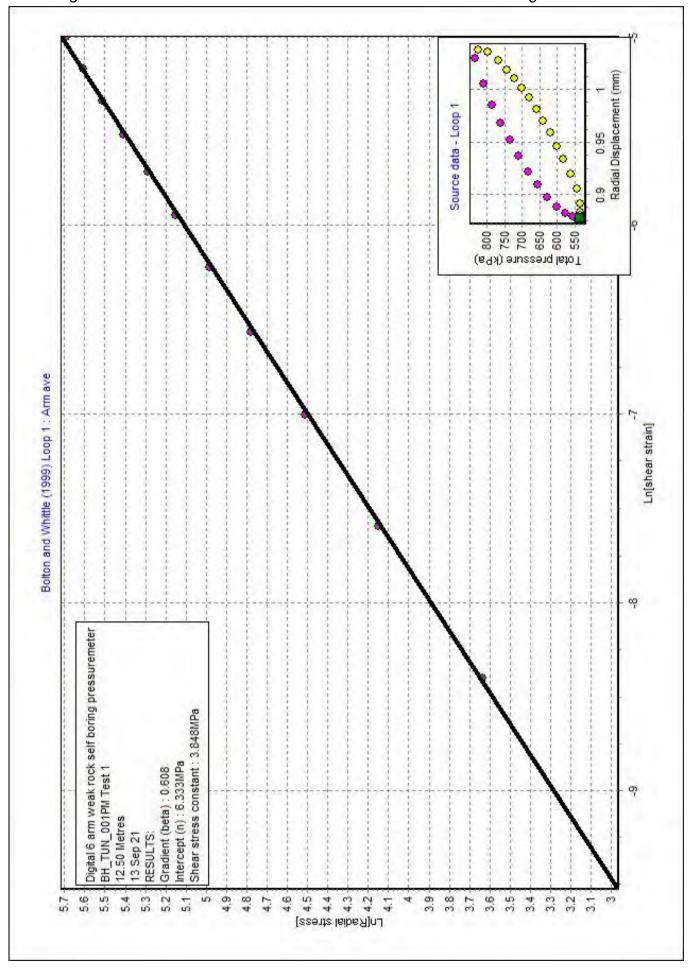


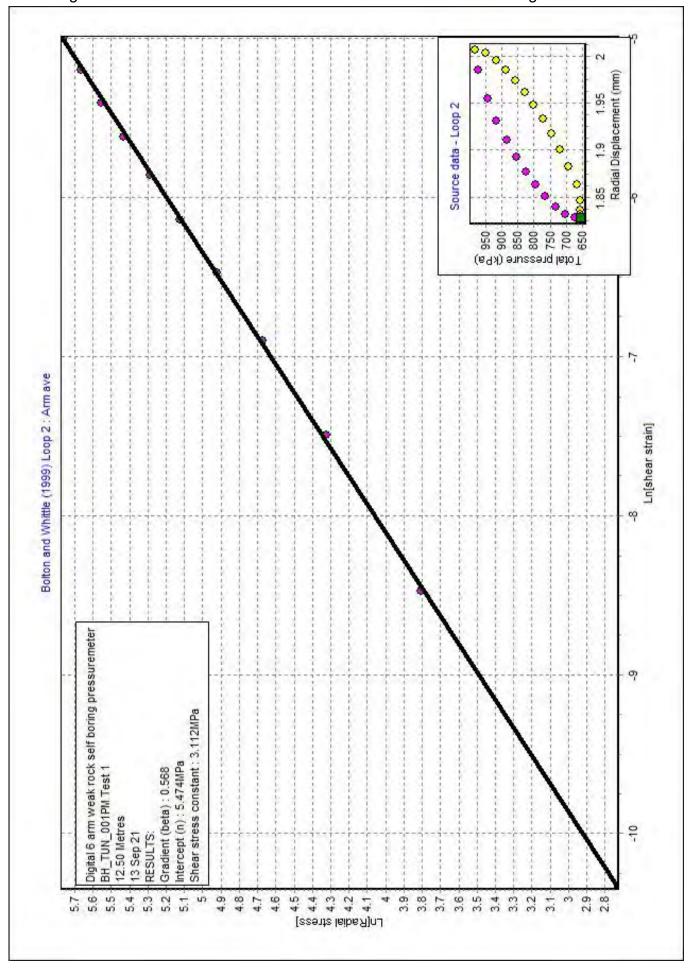


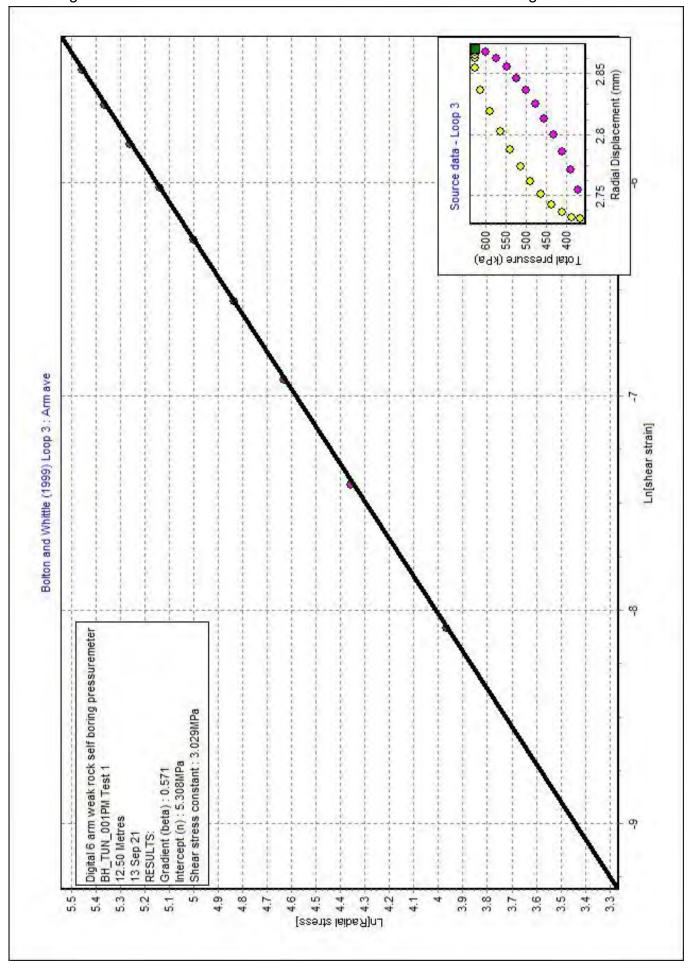


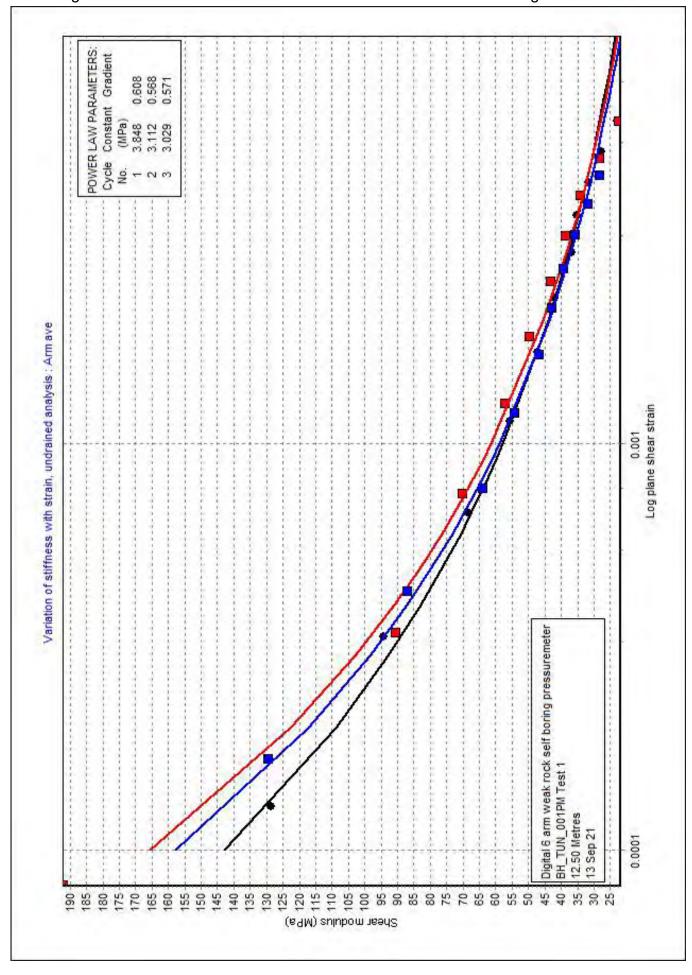


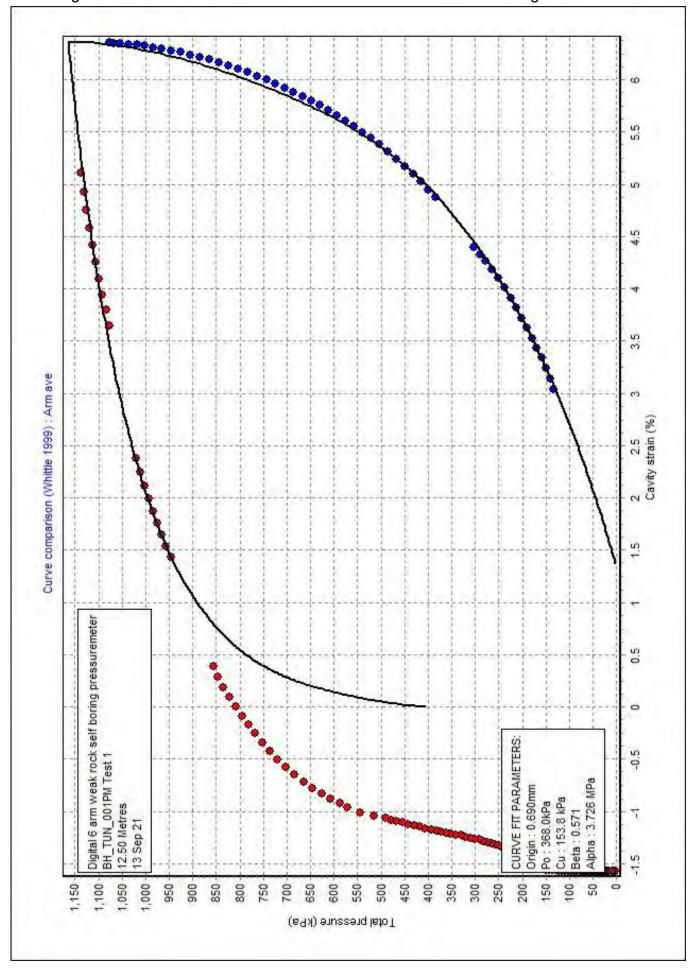


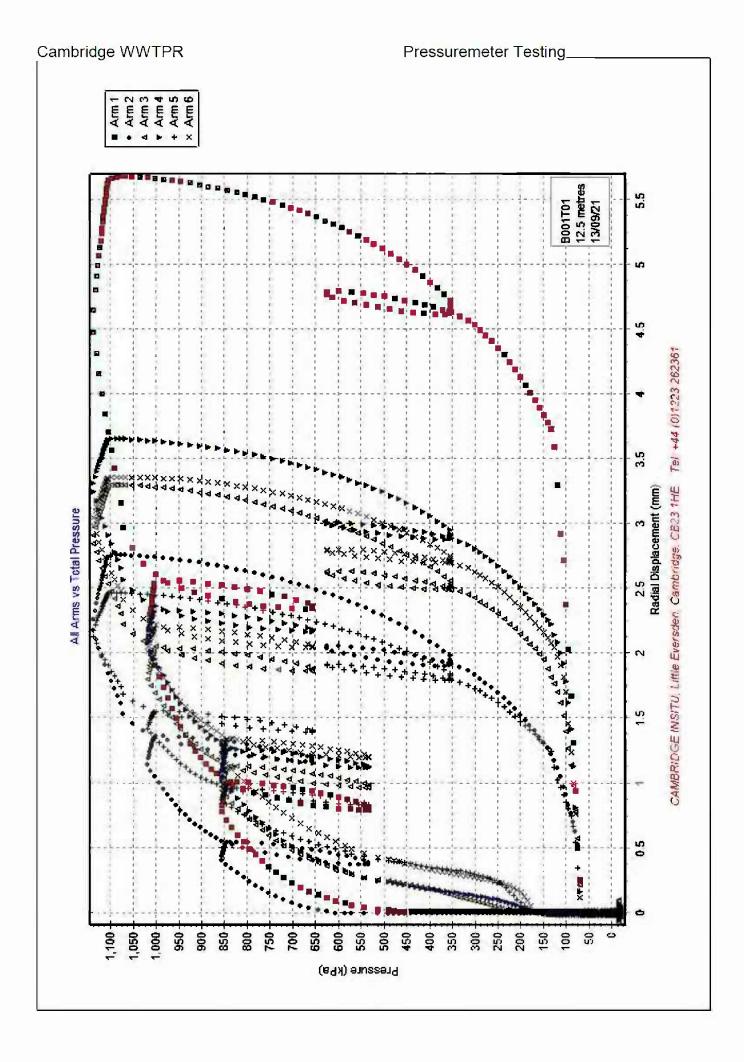


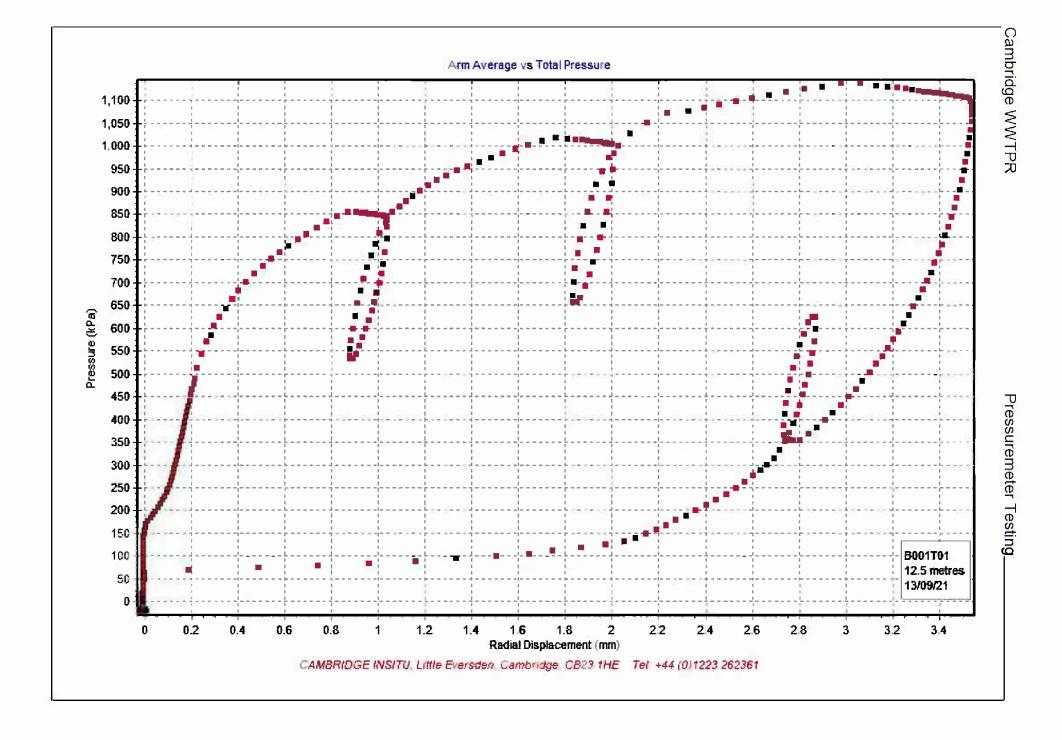


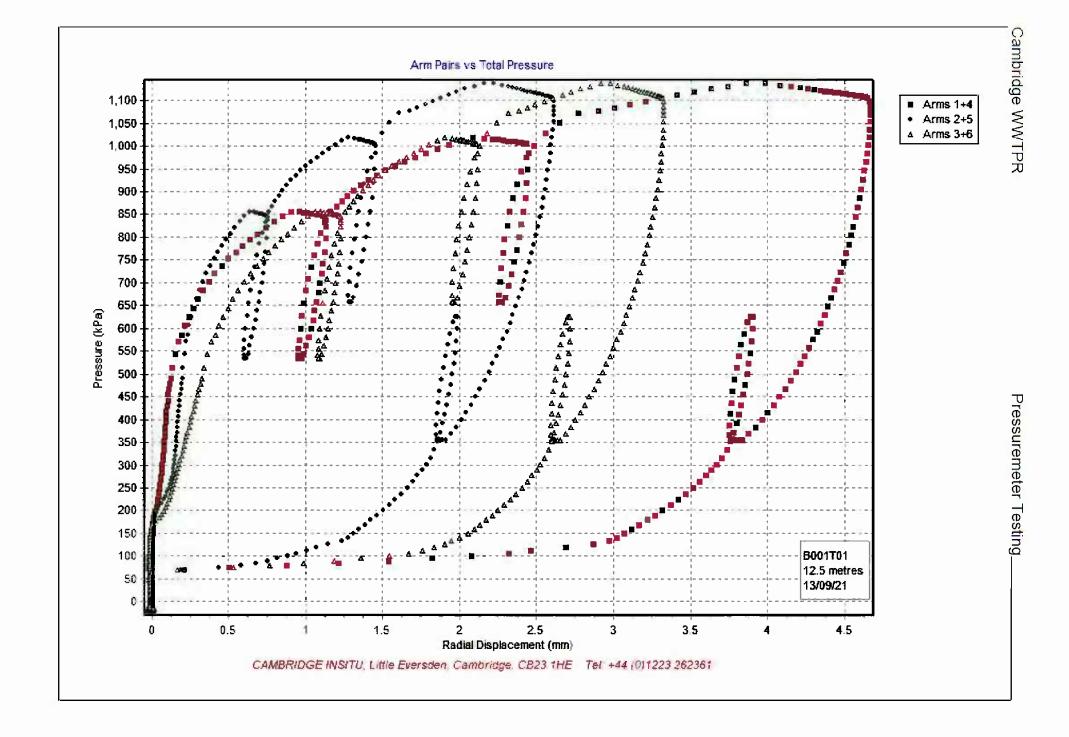


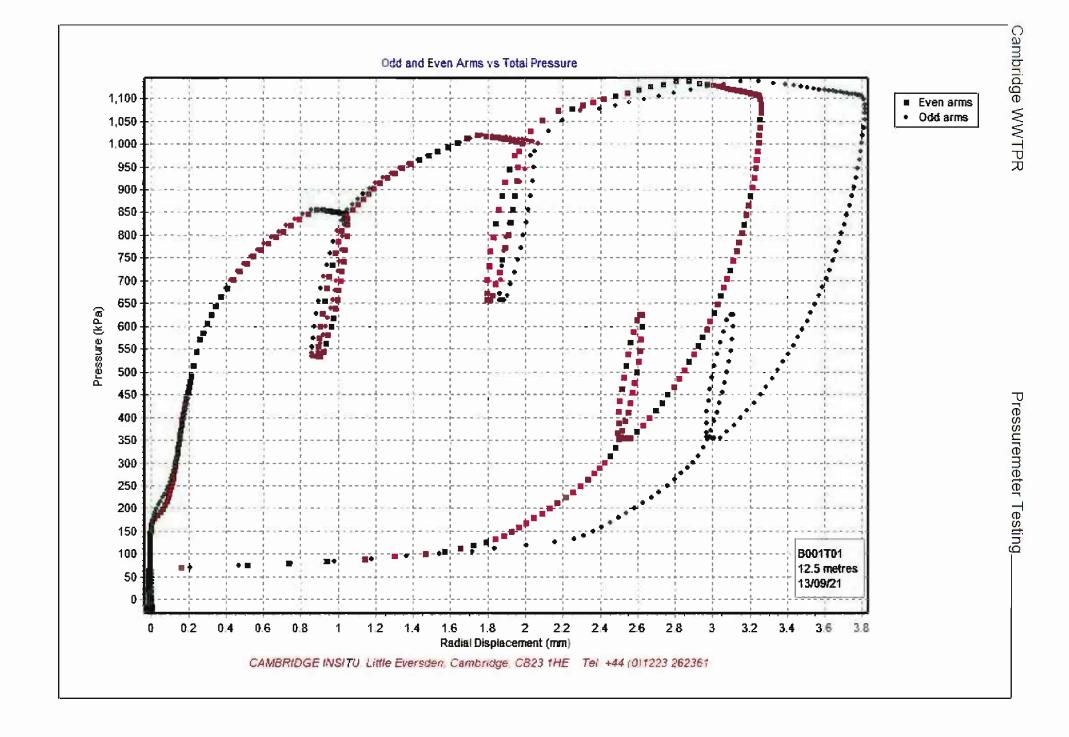


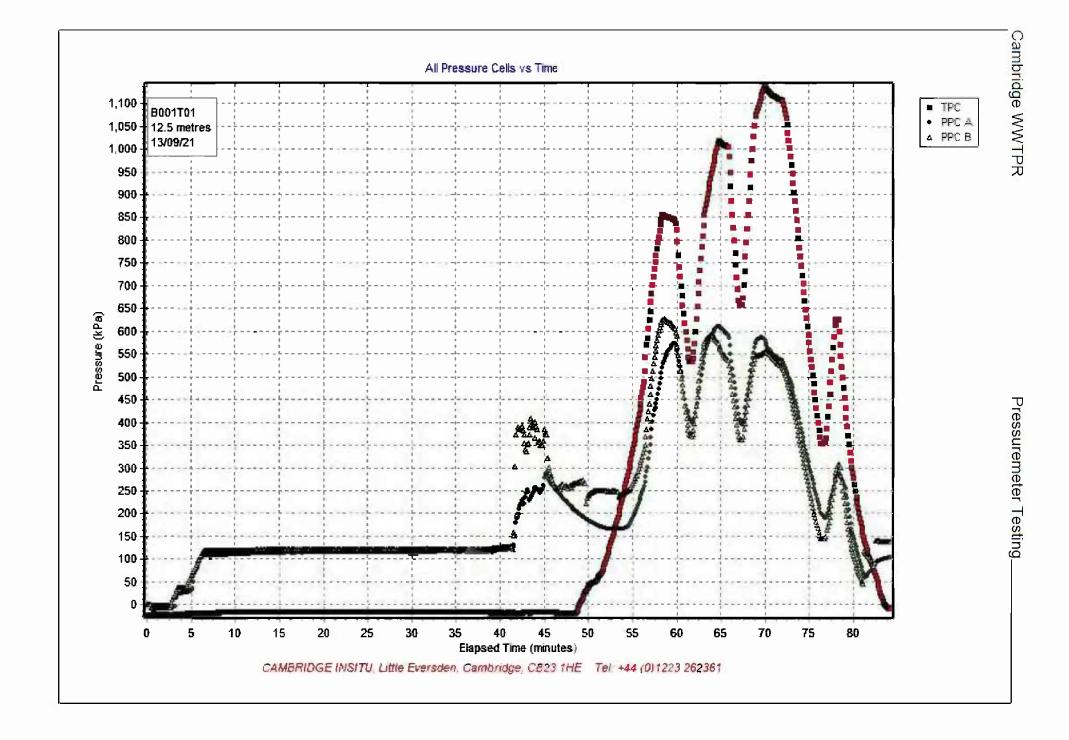












[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_TUN_001PM
Test name : BH_TUN_001PM Test 2

Test date : 14 Sep 21
Test depth : 18.50 Metres
Water table : 1.25 Metres
Ambient PWP : 169.0 kPa
Material : Gault Clay

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB / ES / RW on 14 Sep 21

Remarks: SBPM caught on casing shoe resulting in some drilling issues.

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=0.12"
Po from Marsland & Randolph (kPa) : "Arm ave=483.2"
Po from Lift off (kPa) : "Arm ave=351.6"
PWP versus Total Stress (kPa) : "PPC Ave=400.8"
Best estimate of Po (kPa) : "Arm ave=520.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=245.0"
Limit pressure (kPa) : "Arm ave=2139"
Jefferies 1988 - Cu (kPa) : "Arm ave=246.7"
Undrained yield stress (kPa) : "Arm ave=789.0"
PWP derived yield stress (kPa) : "PPC Ave=889.2"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) : "Arm ave=48.7"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	57.6	1.505	1008	0.670	387
Arm ave	2	47.1	4.243	1207	1.005	476
Arm ave	3	49.6	6.090	706	0.719	358

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	10.722	7.073	0.660
Arm ave	2	7.216	4.180	0.579
Arm ave	3	7.821	4.790	0.612

Non-linear exponent from PWP response : "PPC Ave=0.469"

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 0.12

 Po (kPa)
 : 520

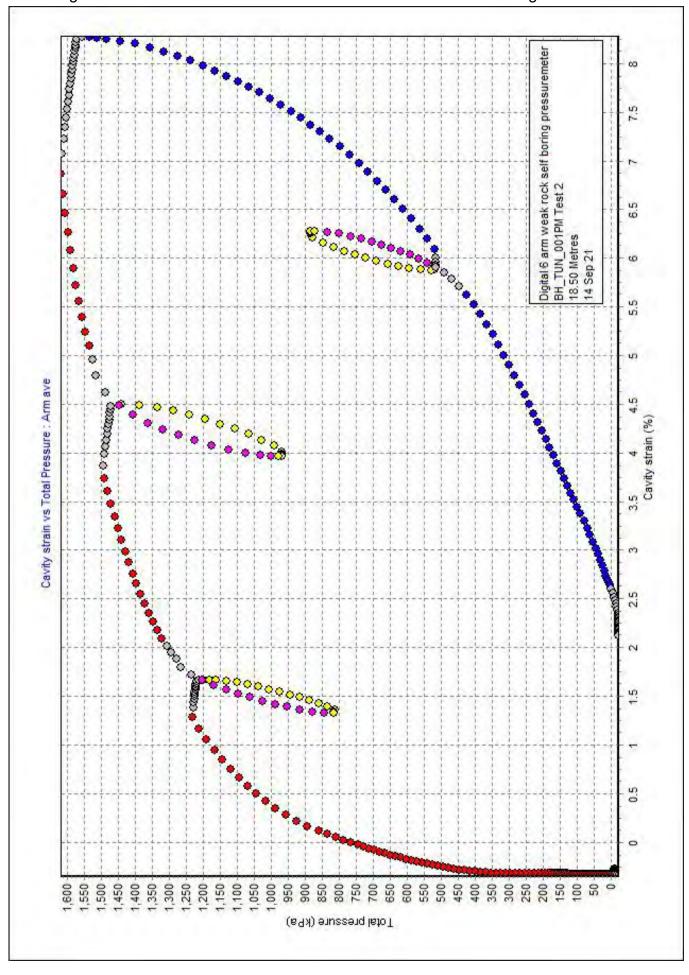
 Cu (kPa)
 : 245.0

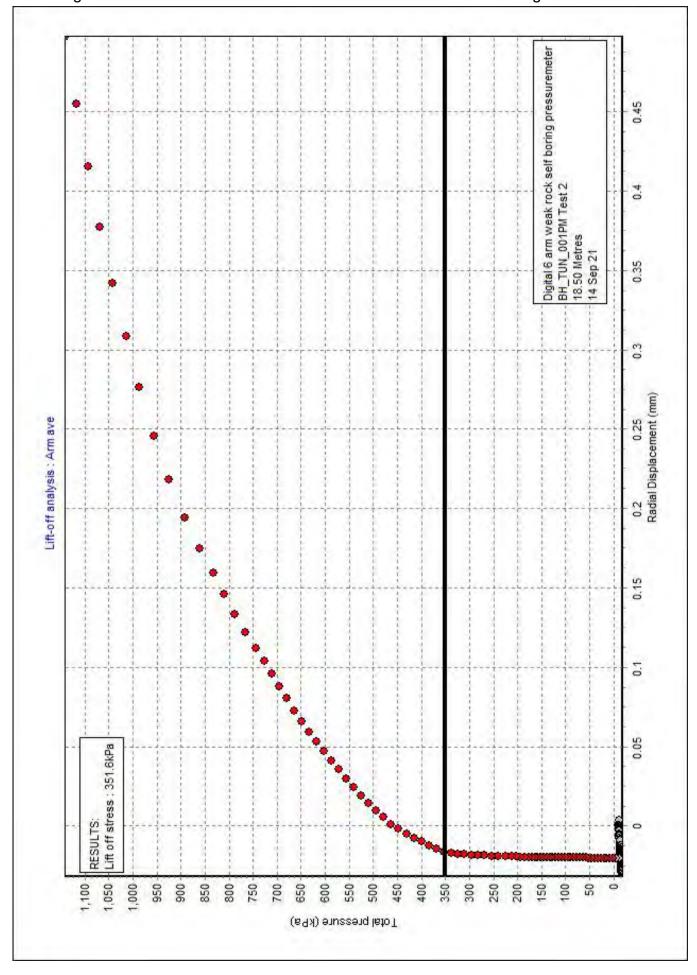
 Limit pressure (kPa)
 : 2139

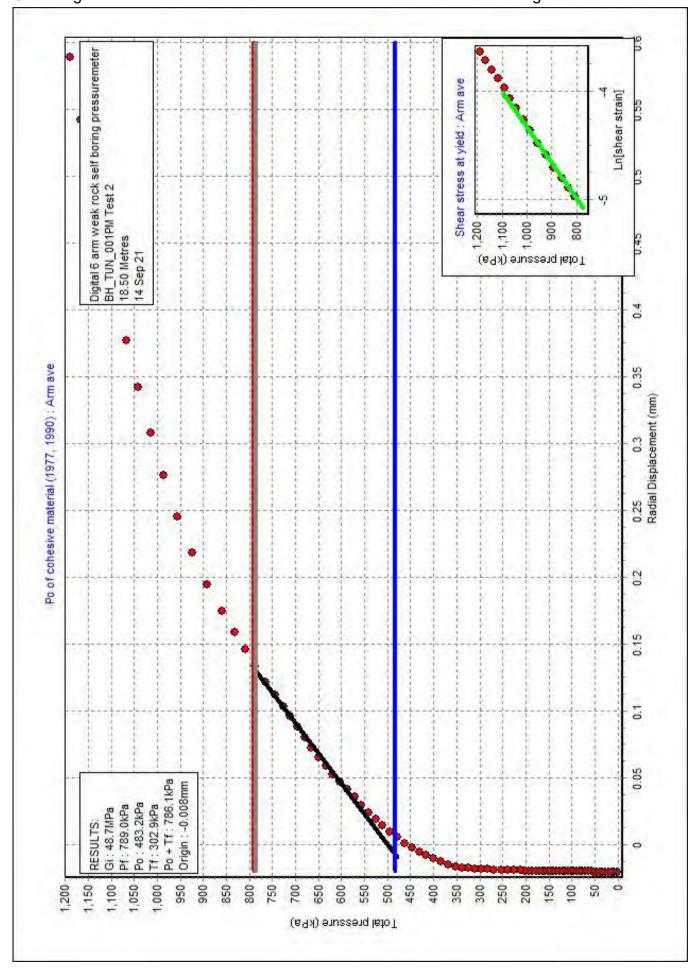
 Non-linear exponent
 : 0.660

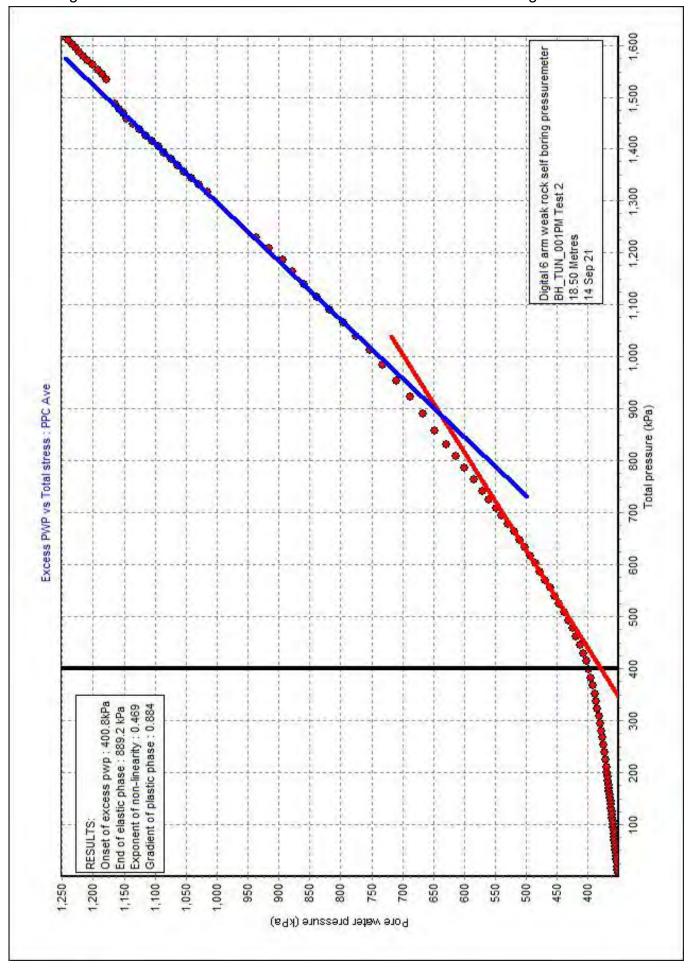
 Calculated alpha (MPa)
 : 7.055

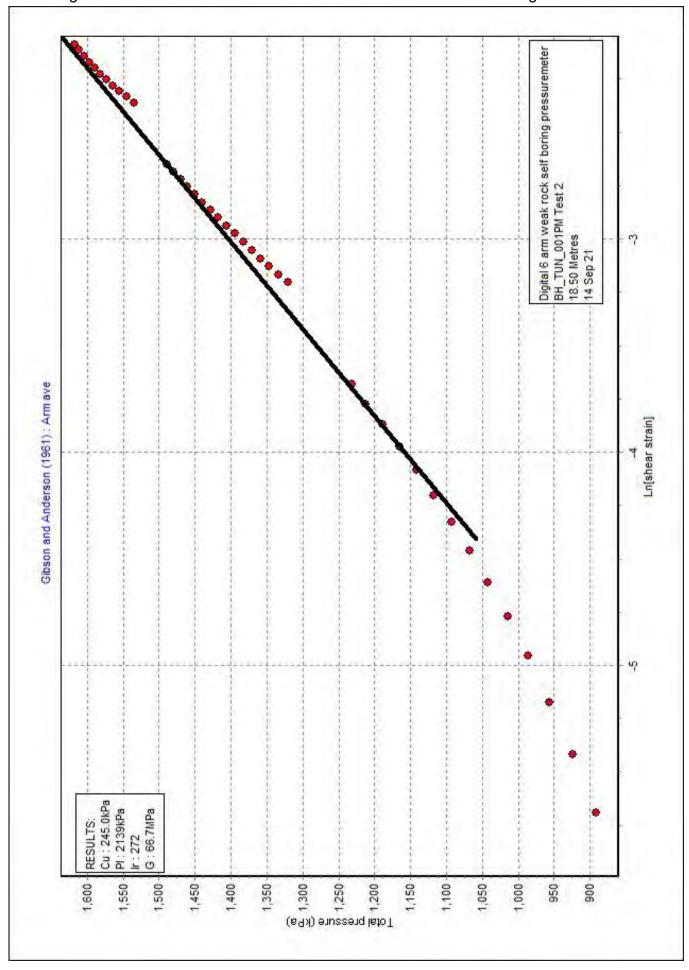
 G at yield (MPa)
 : 39.8

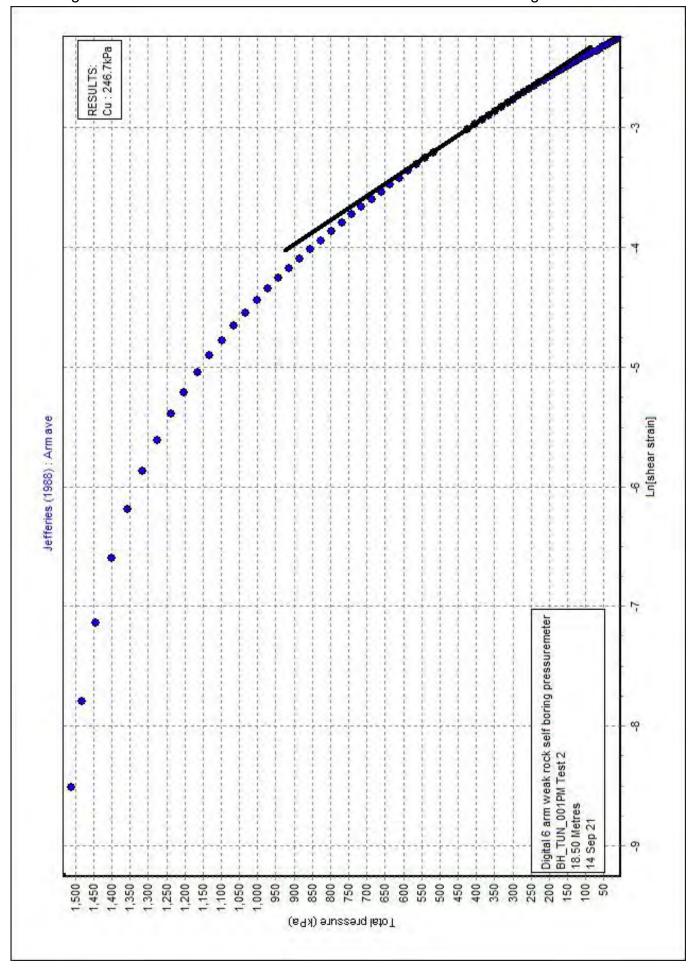


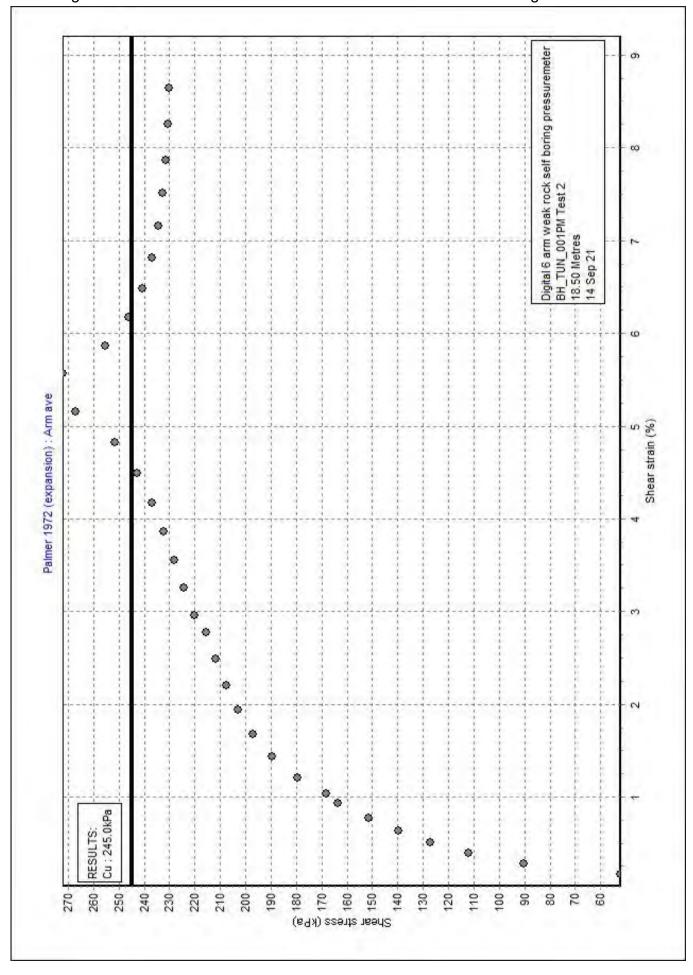


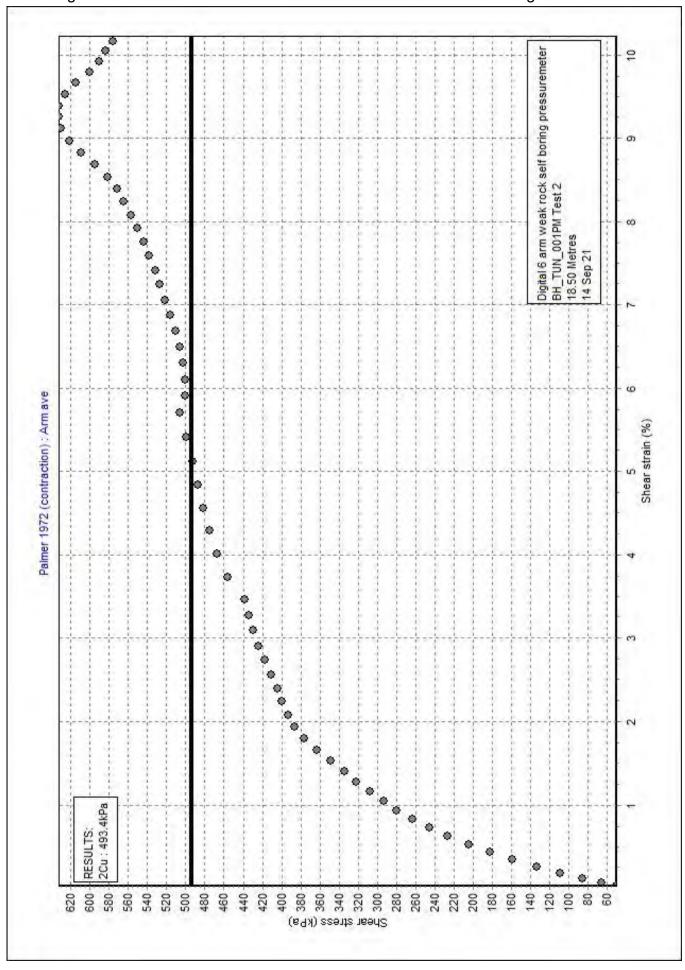


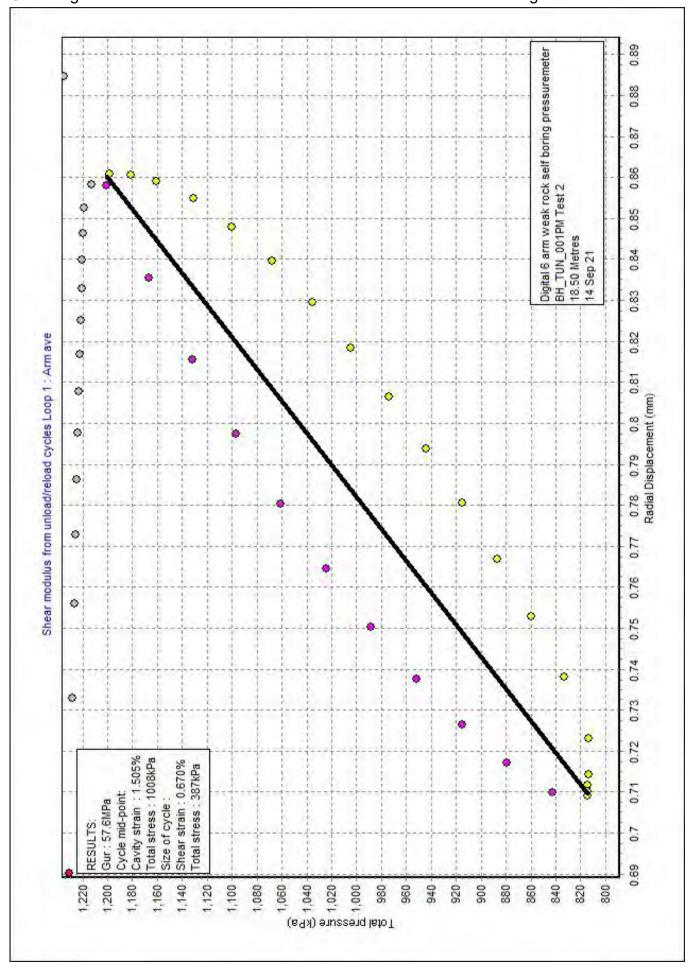


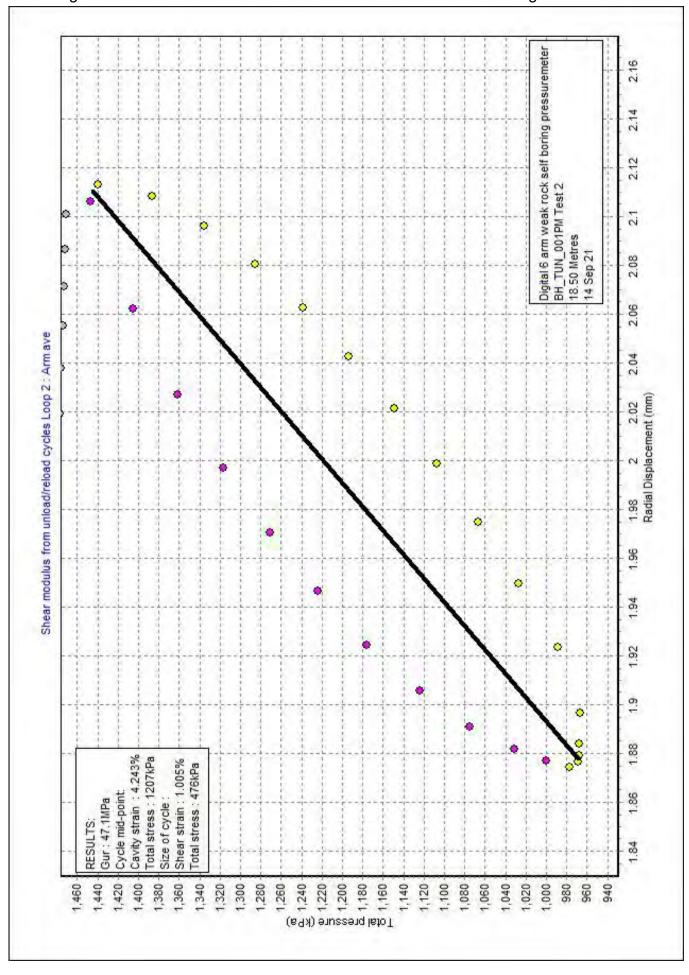


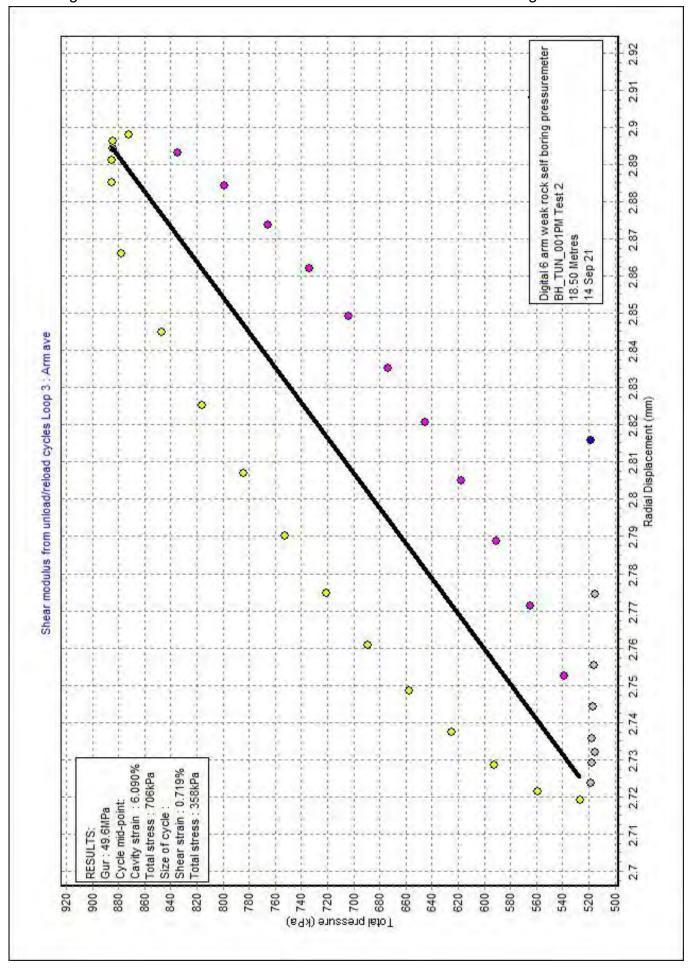


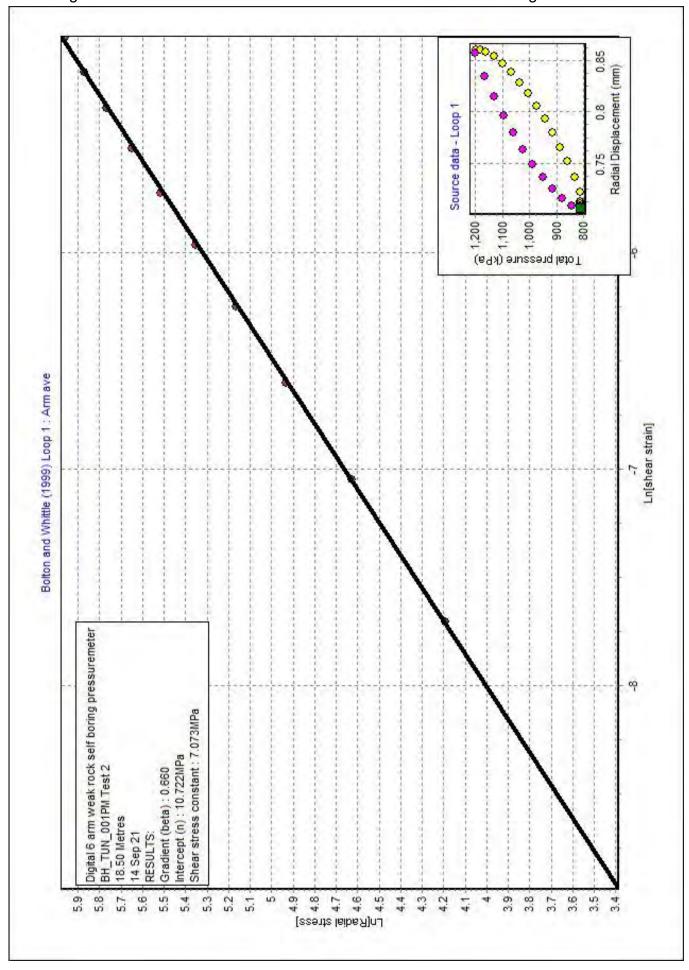


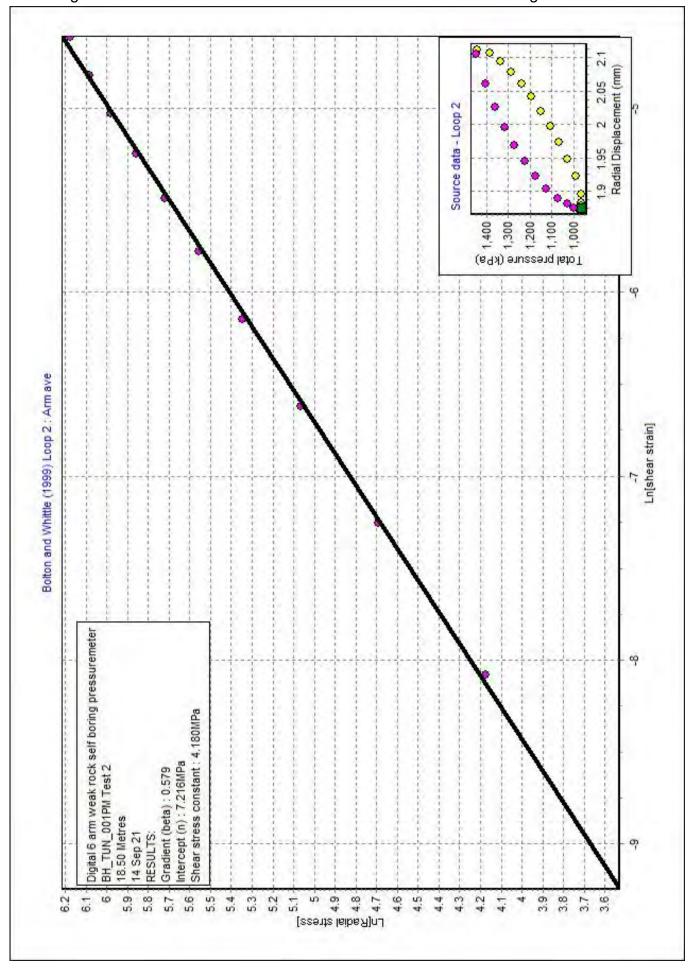


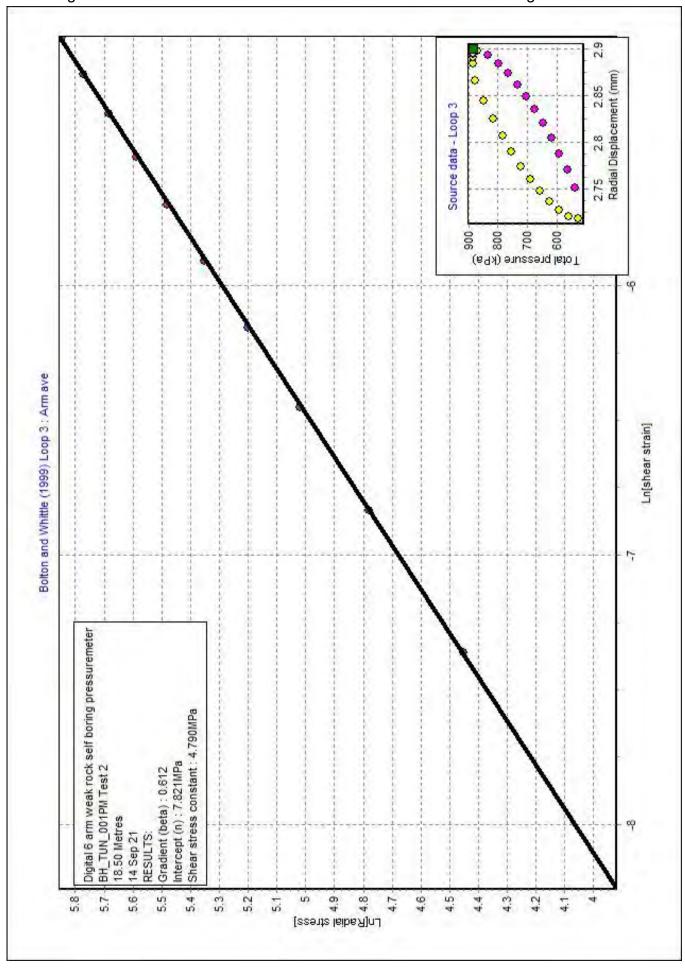


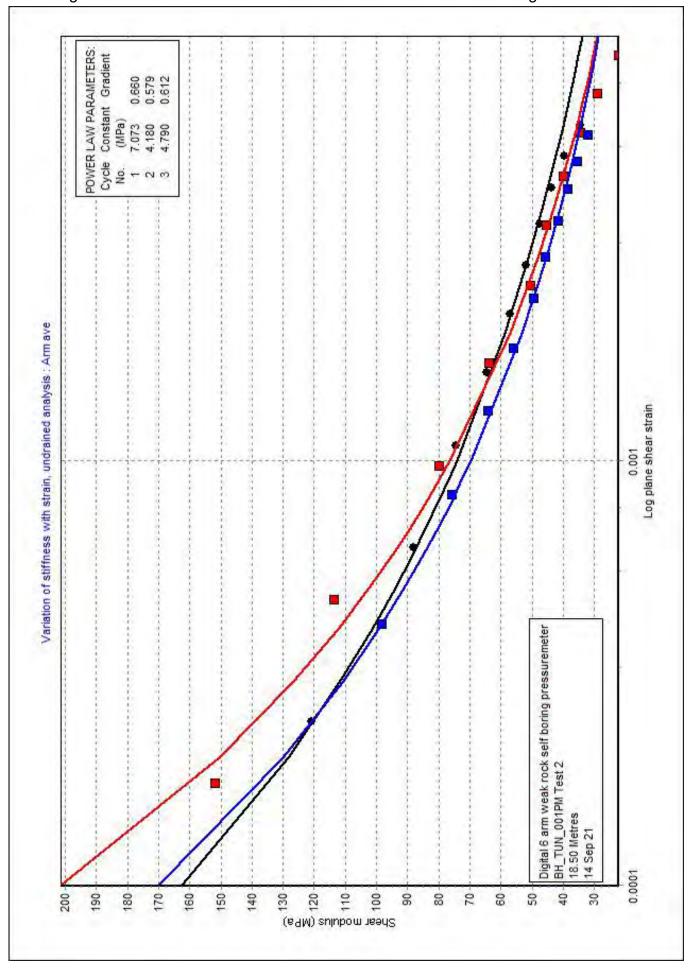


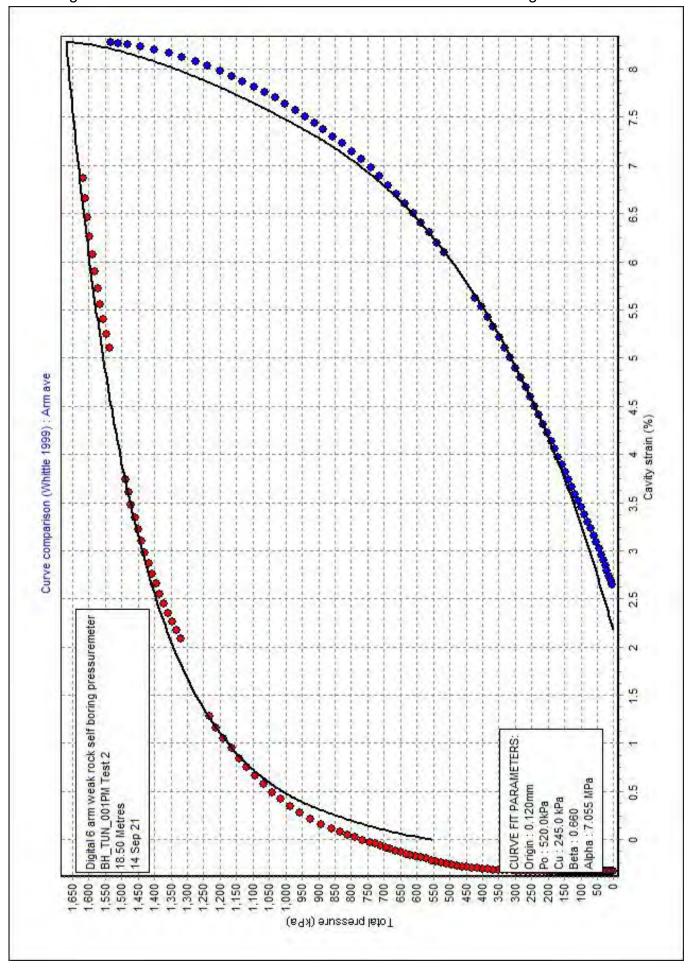


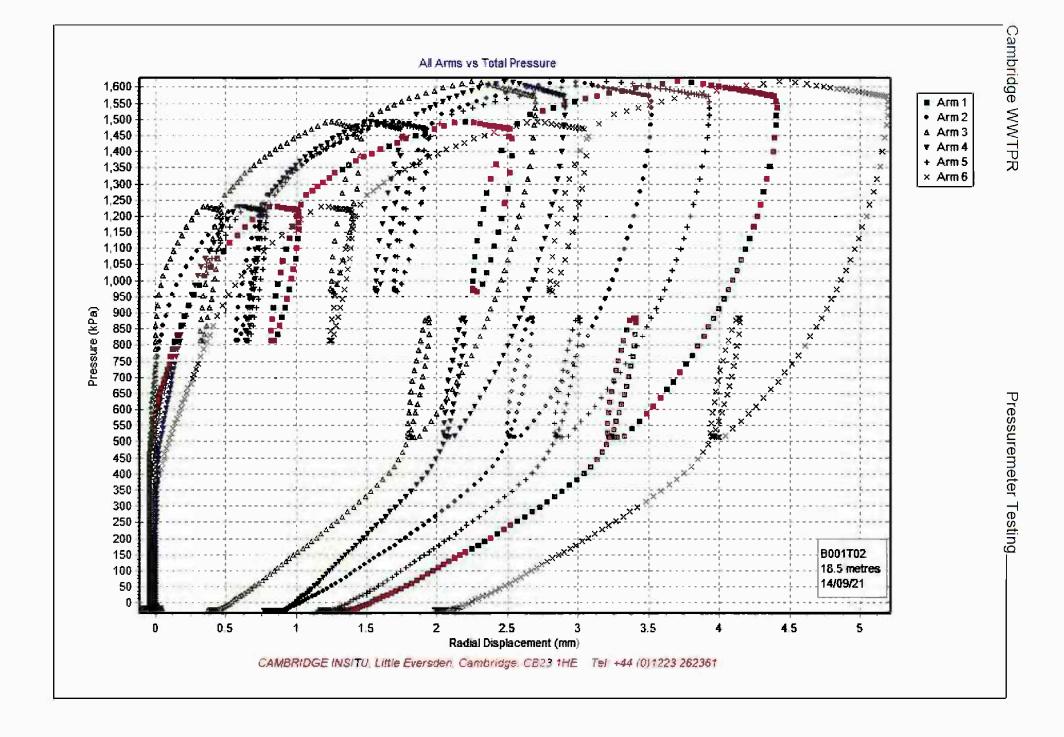


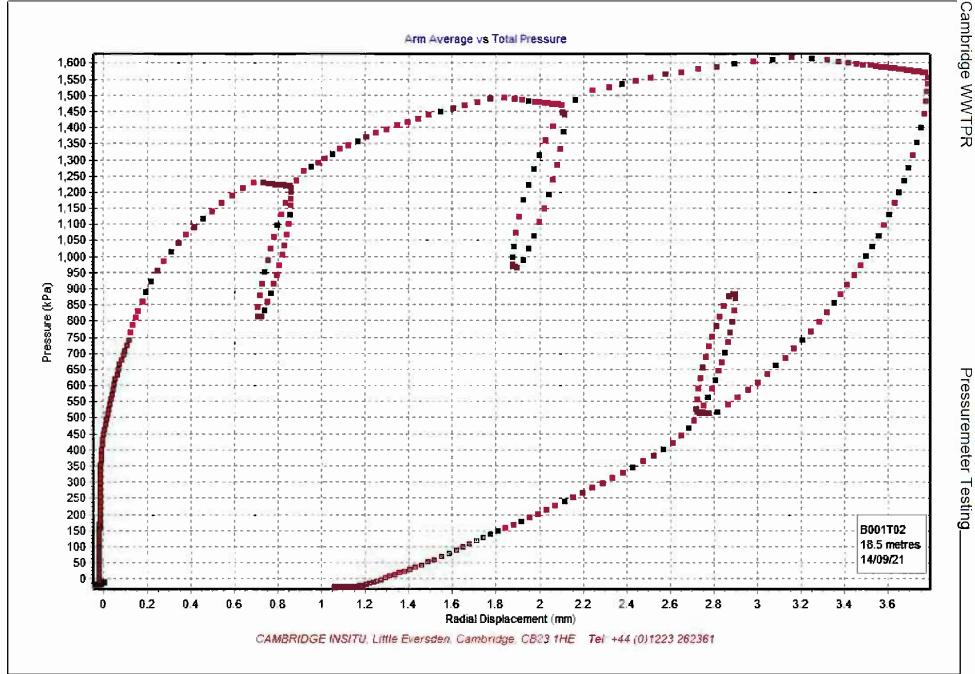


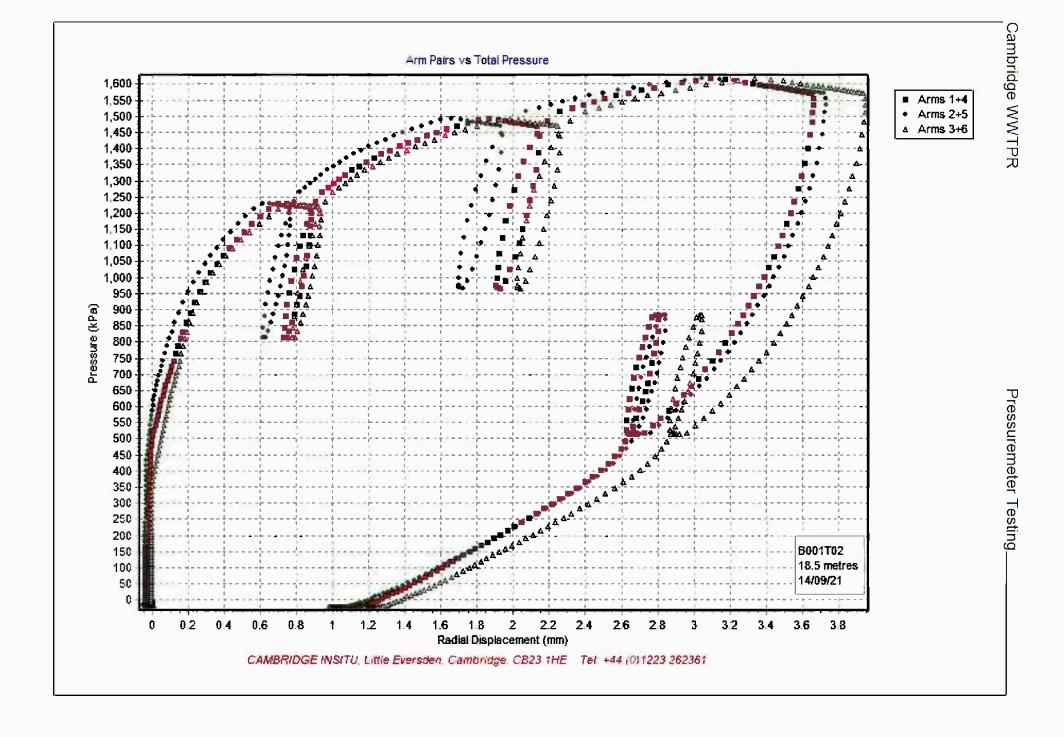


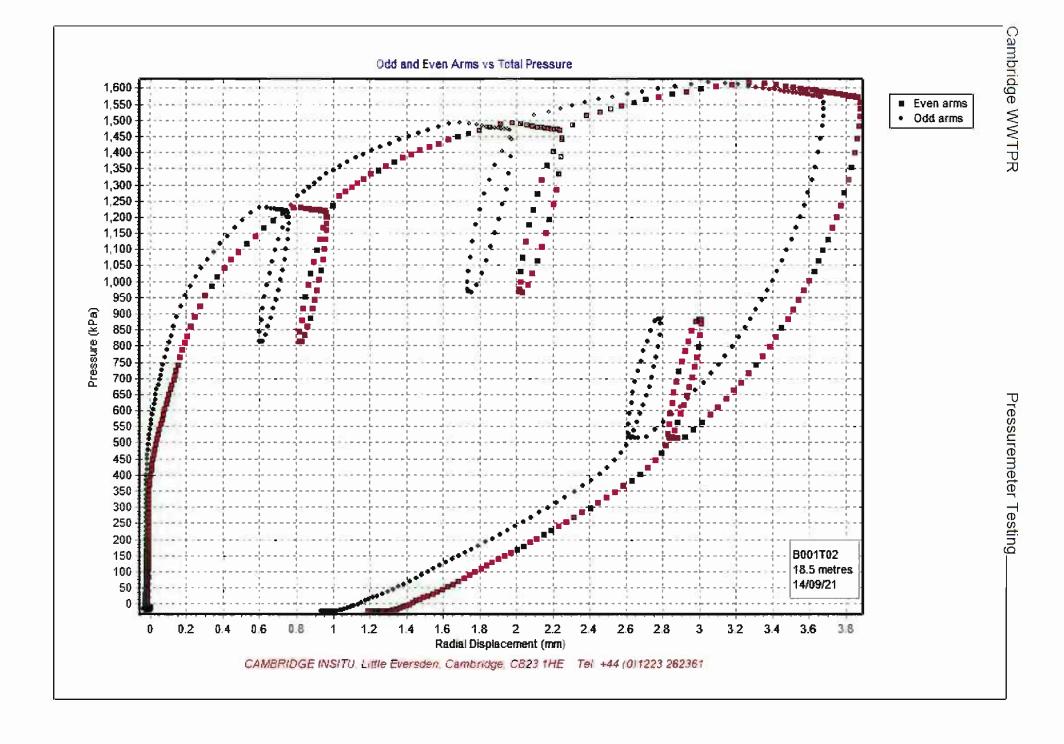




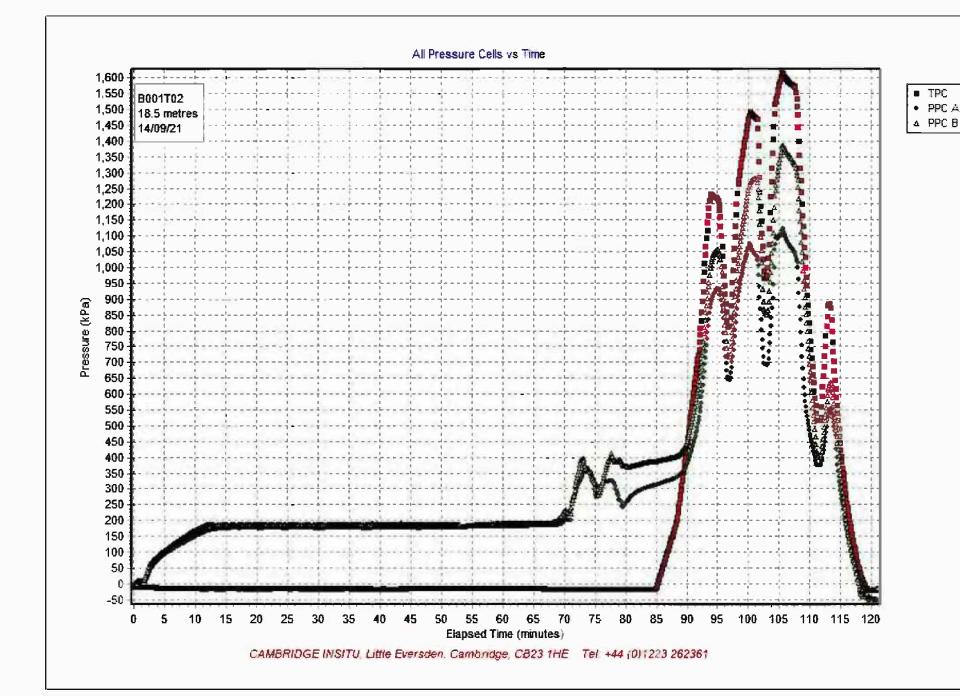








Cambridge WWTPR



Cambridge WWTPR B6PMT01 - TEST & CALIBRATION DETAILS

[PROJECT DETAILS]
Contract name : CWWTPR

[BOREHOLE DETAILS] Borehole : BH_TUN_006PM

[TEST DETAILS]

Test name: B6PMT01
Test date: 29/09/21
Depth (M): 12.20
Material: Gault Clay
Heading (deg): n/a
Data Rate (secs): 6
Start Line: 1
Stop Line: 425

[COMMENTS]

Very quick drilling. Likely washed out pocket. No data suitable for analysis.

[PROBE DETAILS]

Type: Digital 6 Arm Self Boring Pressuremeter

Diameter over probe: 88.10mm
Diameter under membrane: 79.15mm
CHL strip thickness: 0.5000mm

[CALIBRATION FACTORS]

TRANSDUCERS MEMBRANE COMPLIANCE

ARM 1 -85.0 mV and 306.3 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 2 -933.4 mV and 326.5 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 3 -326.0 mV and 326.9 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

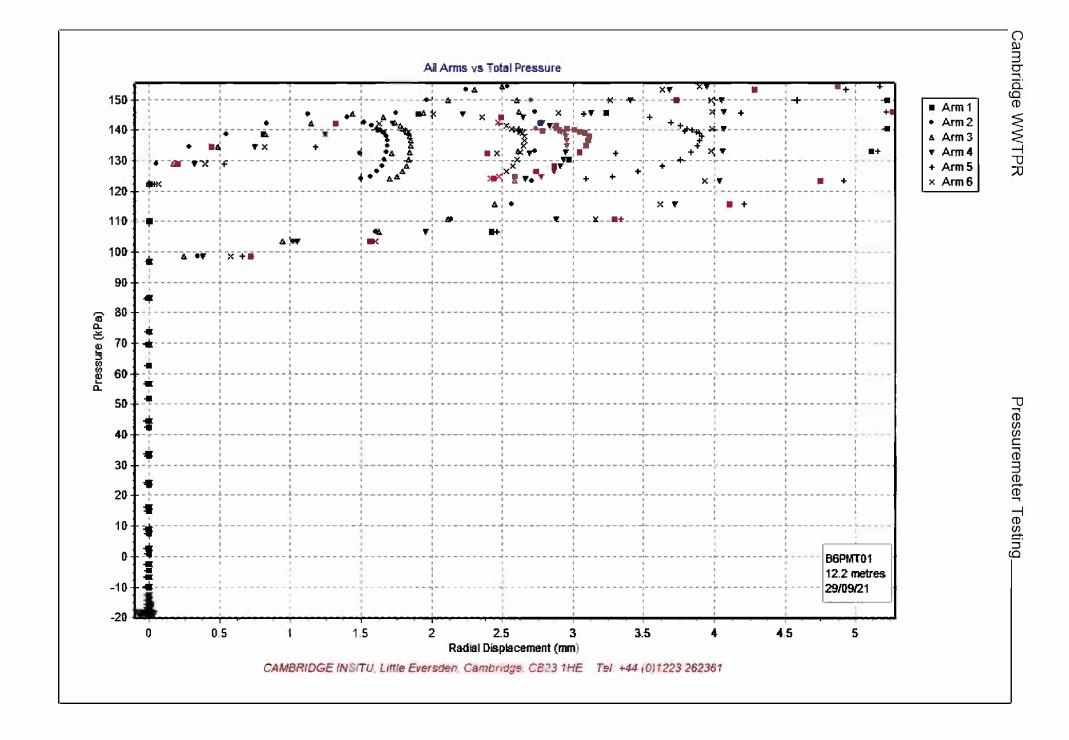
ARM 4 75.7 mV and 330.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

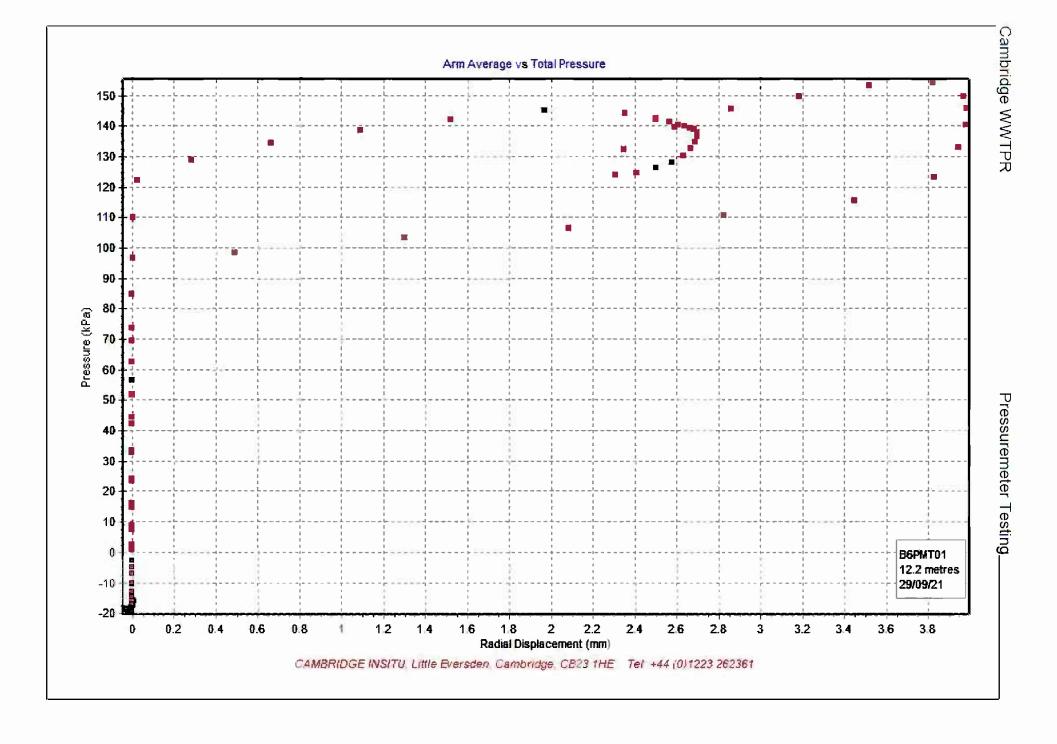
ARM 5 78.5 mV and 330.4 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

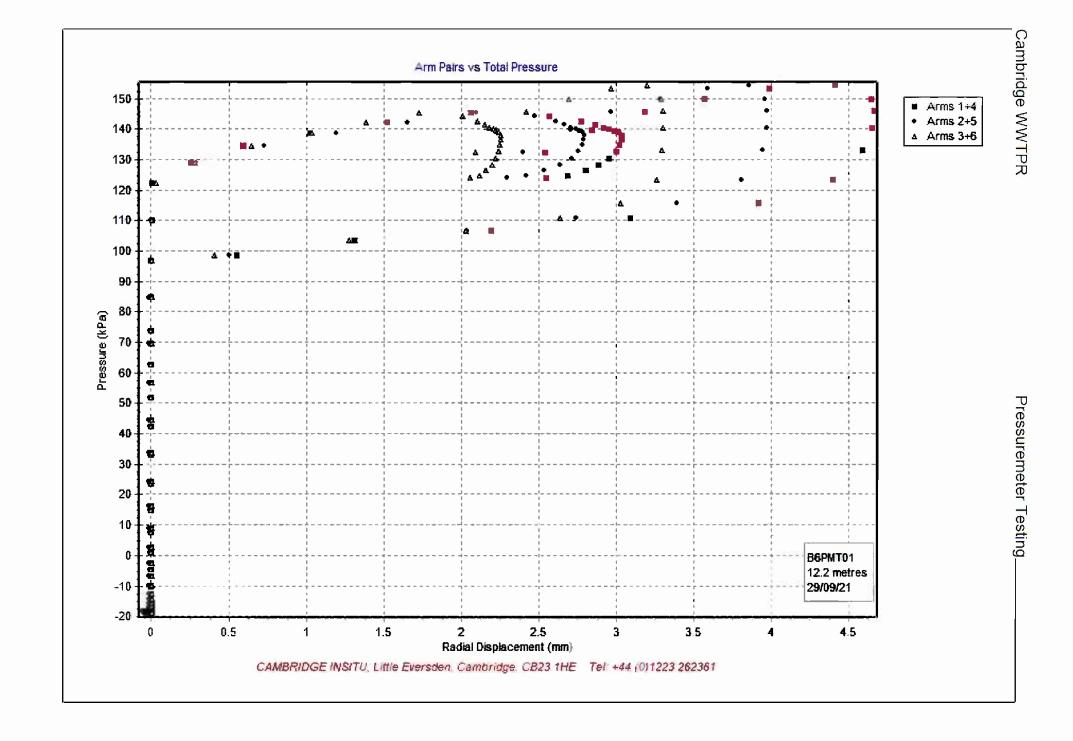
ARM 6 -140.9 mV and 329.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

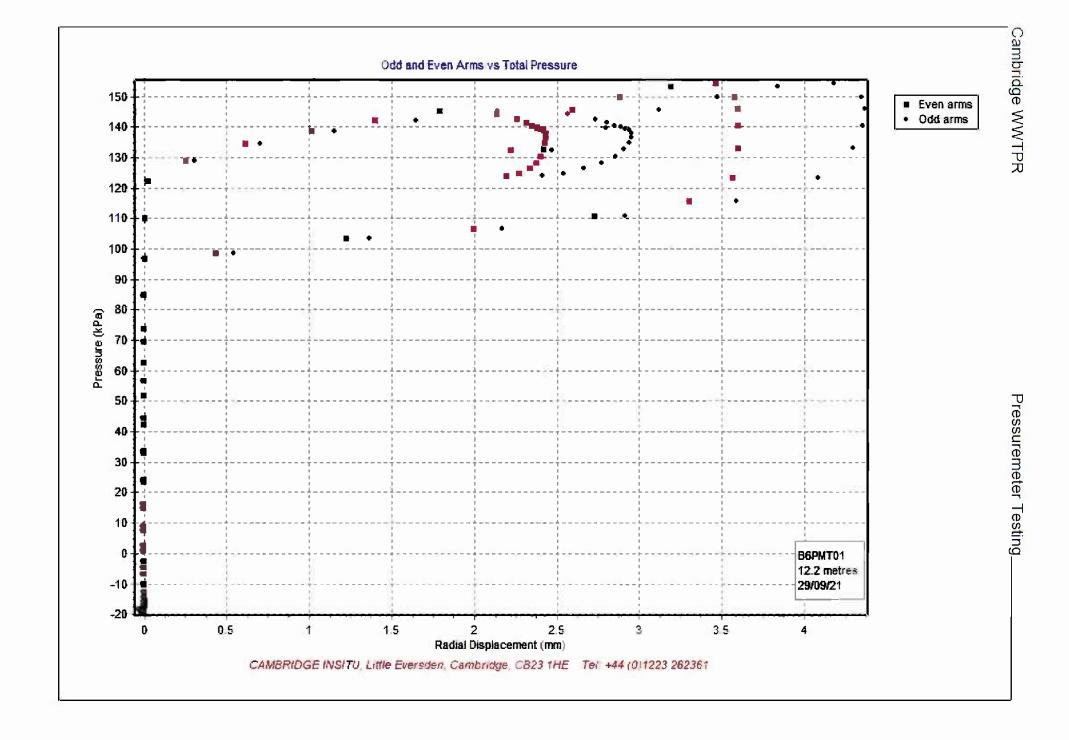
ARM 6 -2564.0 mV and 402.4 mV/MPa

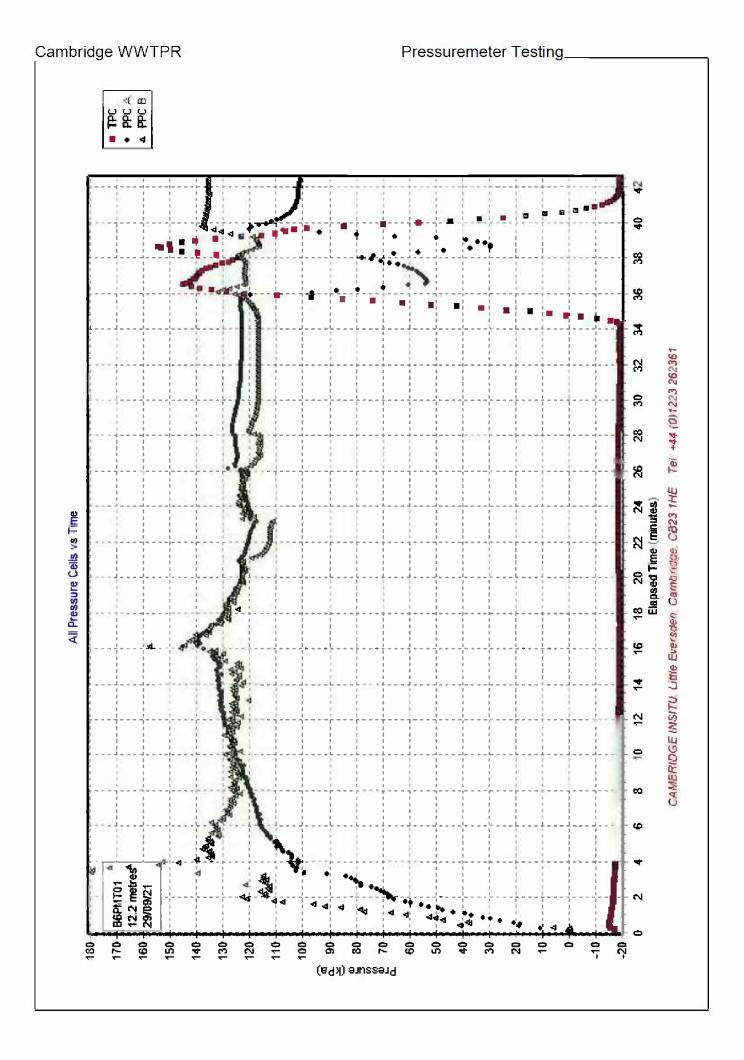
PPC B -2379.3 mV and 457.3 mV/MPa











[DETAILS OF TEST]

Project : TE8364

Site Cambridge Waste Water Treatment Plant Relocation Project

BH TUN 006PM Borehole Test name : BH_TUN_006PM Test 2

29 Sep 21 Test date 12.90 Metres Test depth 4.5 Metres

Water table : 4.5 Metro
Ambient PWP : 82.0 kPa Material : Gault Clay

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB / ES / RW on 30 Sep 21

Remarks: Test has been slightly pushed. Test has been slightly pushed. Initial stiffness is over estimated due to this disturbance and

should be treated with caution

[RESULTS FOR CAVITY REFERENCE PRESSURE]

"Arm ave=-0.05" Strain Origin (mm) Po from Marsland & Randolph (kPa) "Arm ave=415.7" Po from Lift off (kPa) "Arm ave=453.0" : "PPC Ave=423.3" PWP versus Total Stress (kPa) Best estimate of Po (kPa) "Arm ave=410.0"

[UNDRAINED STRENGTH PARAMETERS]

"Arm ave=143.1" Gibson & Anderson 1961 - Cu (kPa) "Arm ave=1392" Limit pressure (kPa) "Arm ave=140.8" Jefferies 1988 - Cu (kPa) Undrained yield stress (kPa) "Arm ave=613.6" "PPC Ave=876.9" PWP derived yield stress (kPa)

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=41.2"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	27.5	2.133	757	1.099	303
Arm ave	2	25.9	4.631	835	1.343	350
Arm ave	3	29.1	7.897	518	0.943	275

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

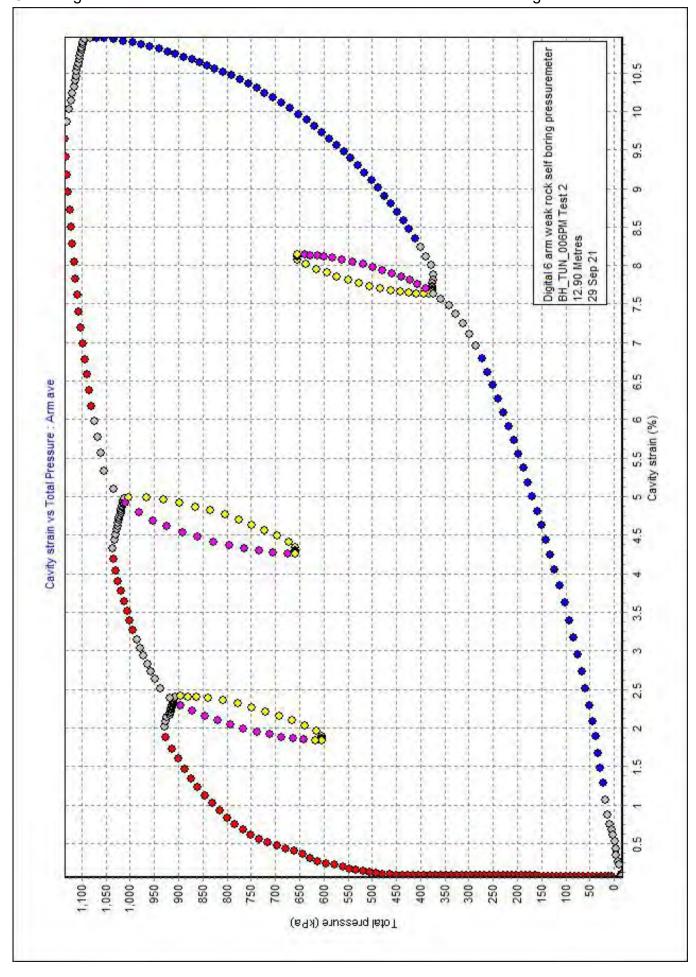
Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	4.824	2.845	0.590
Arm ave	2	4.732	2.745	0.580
Arm ave	3	5.407	3.334	0.617

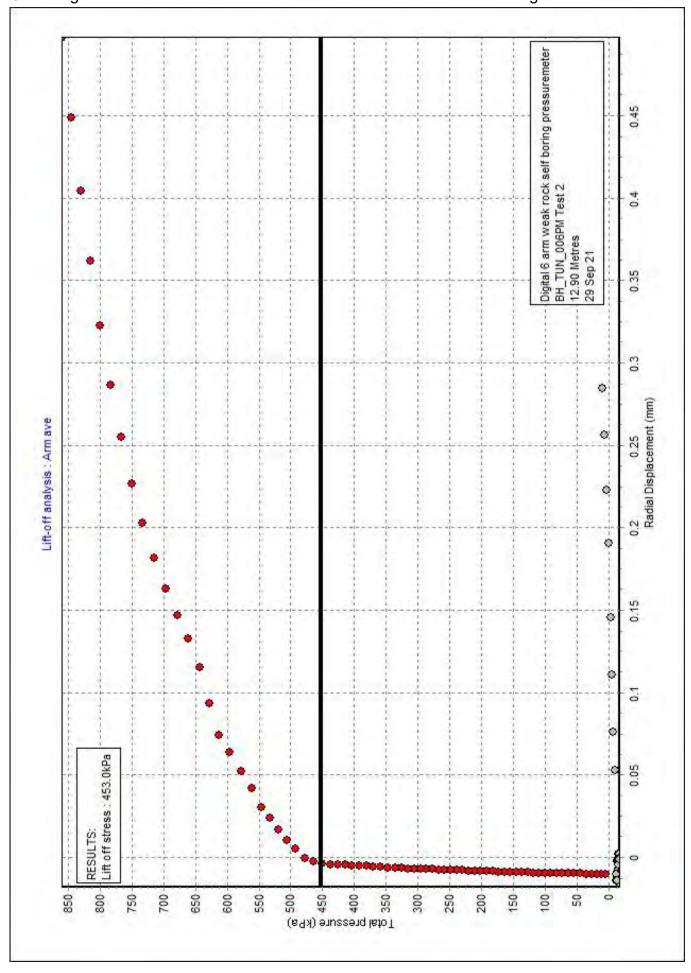
Non-linear exponent from PWP response : "PPC Ave=0.676"

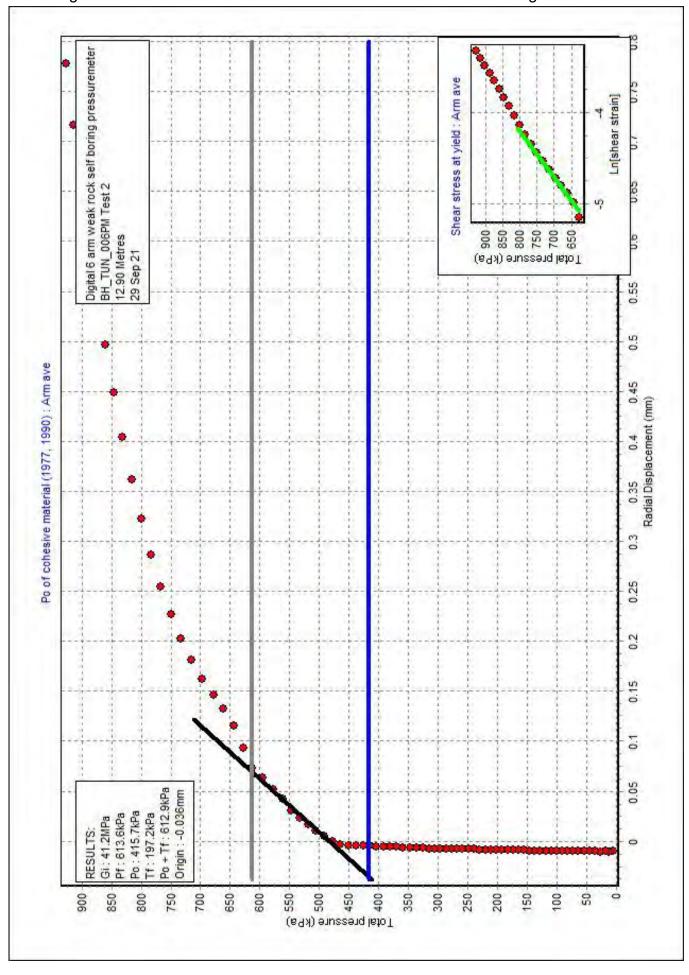
[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

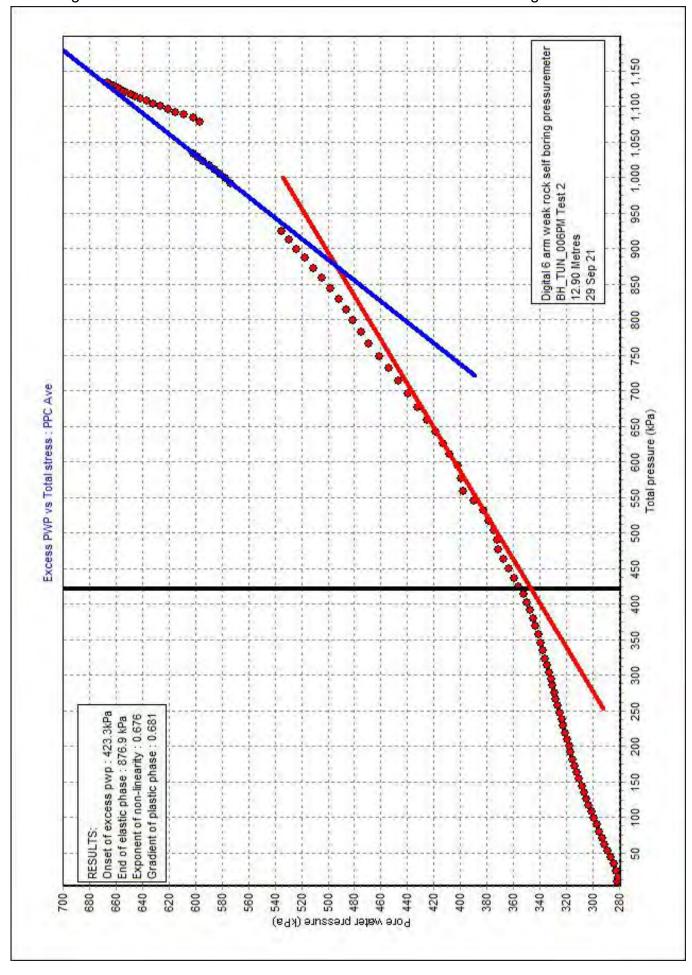
{Axis is Arm ave}

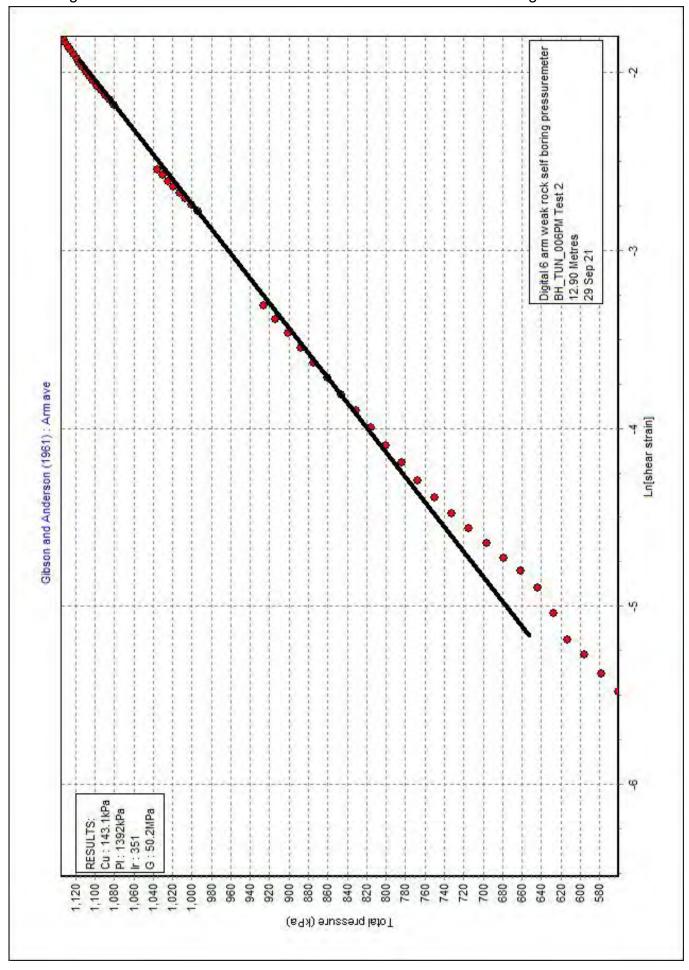
Strain Origin (mm) -0.05 Po (kPa) 410 Cu (kPa) 143.1 1392 Limit pressure (kPa) 0.580 Non-linear exponent Calculated alpha (MPa) 2.813 G at yield (MPa) 24.3

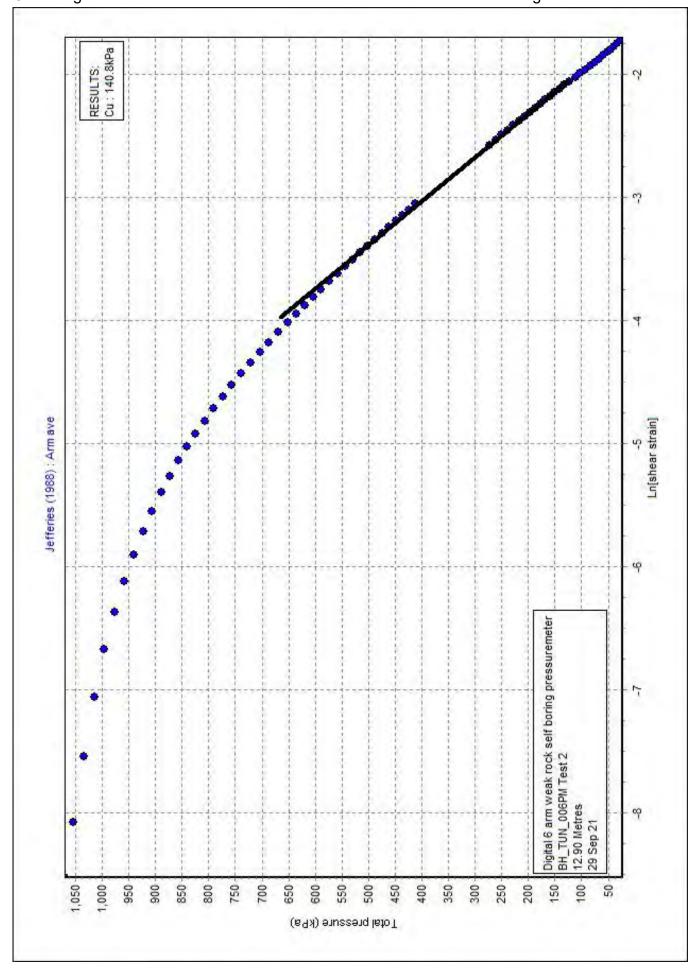


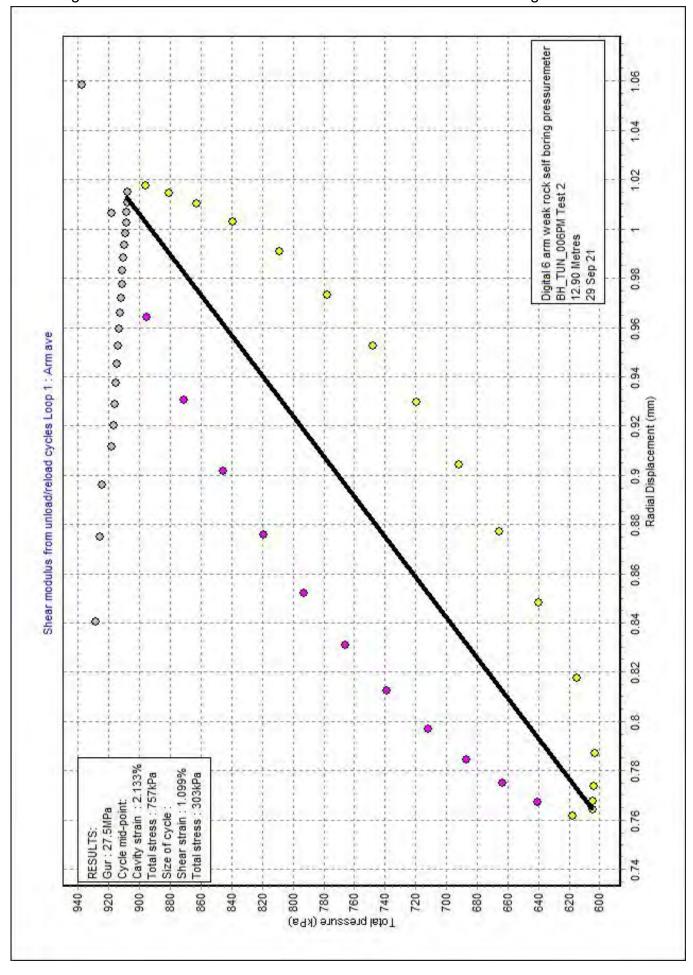


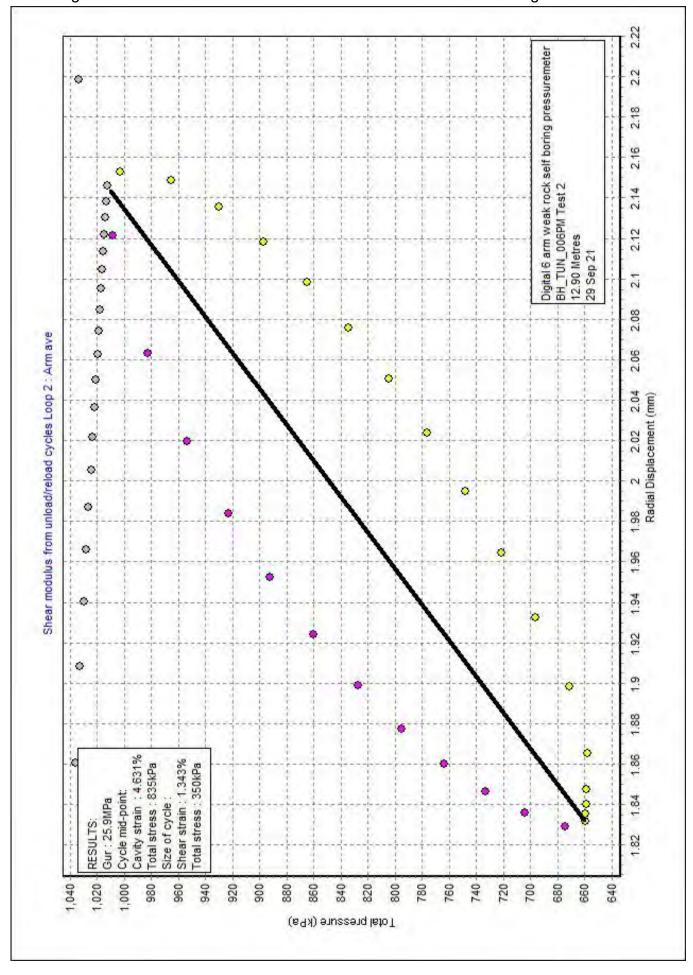


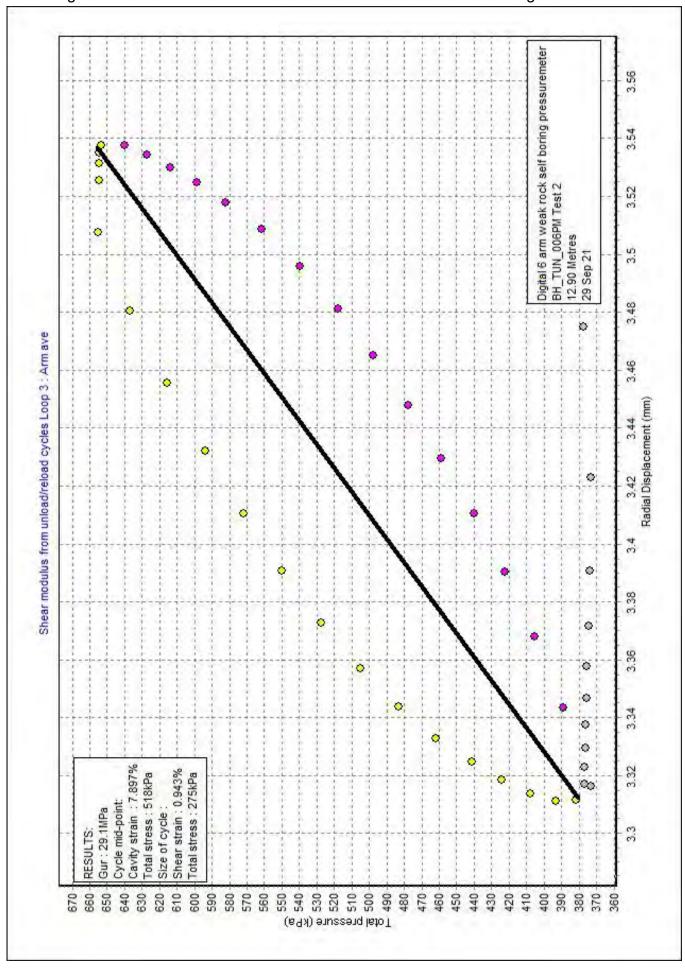


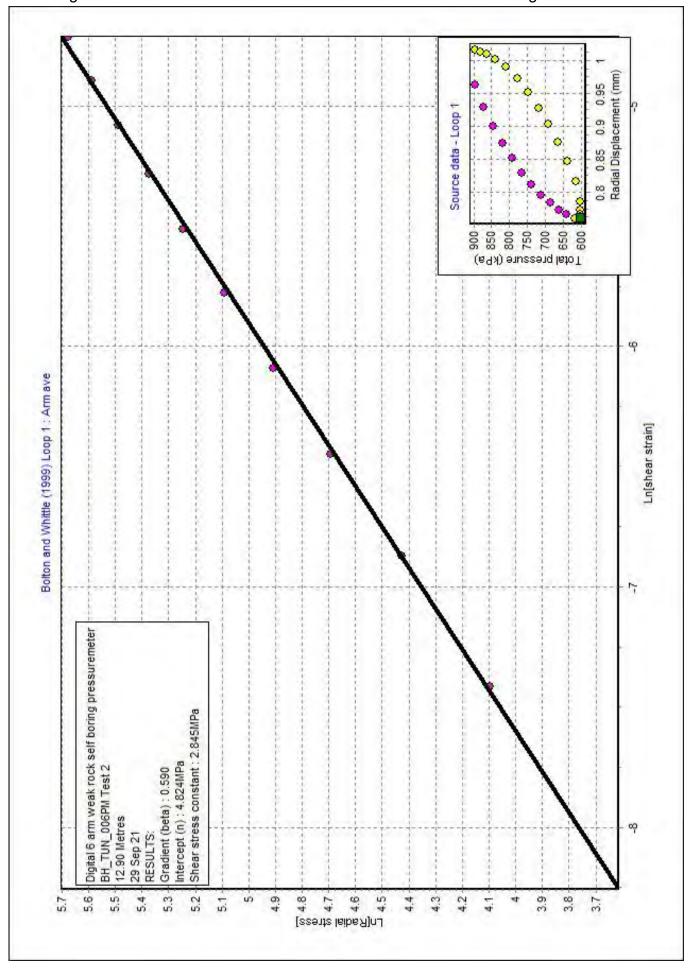


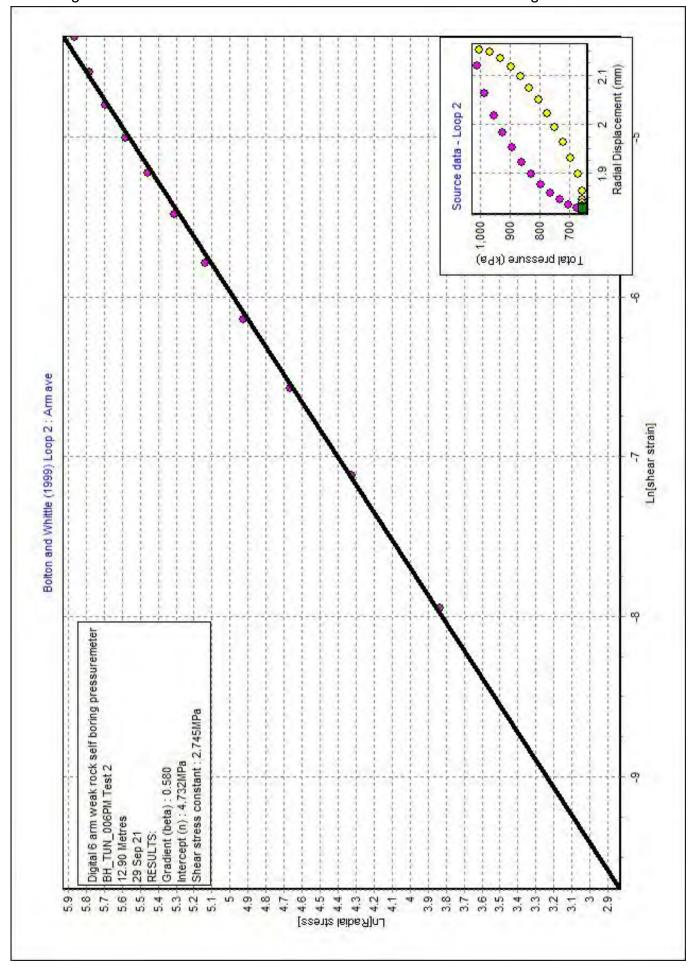


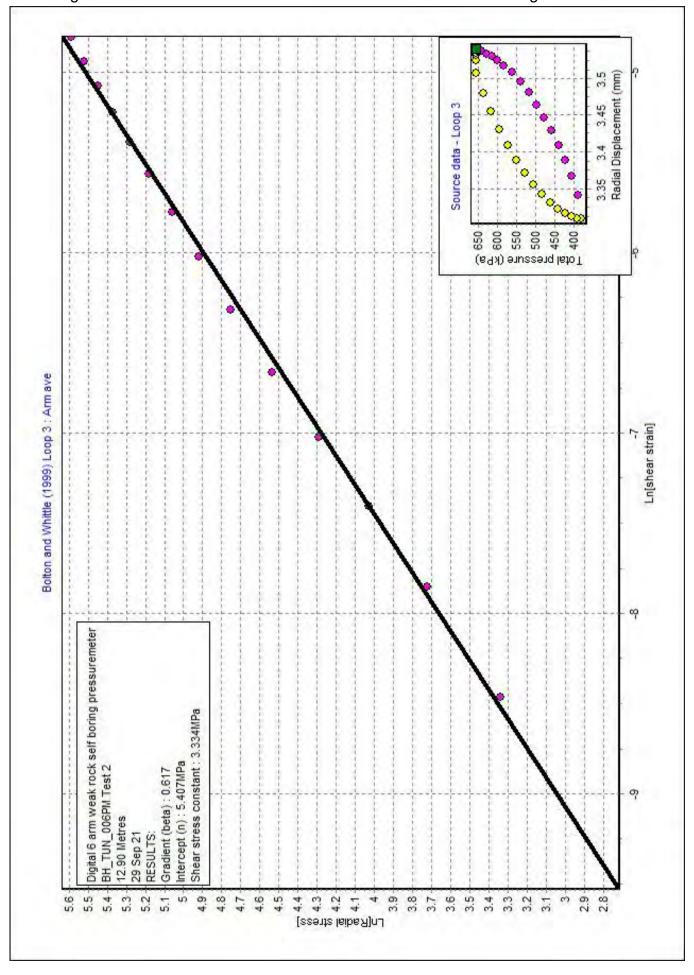


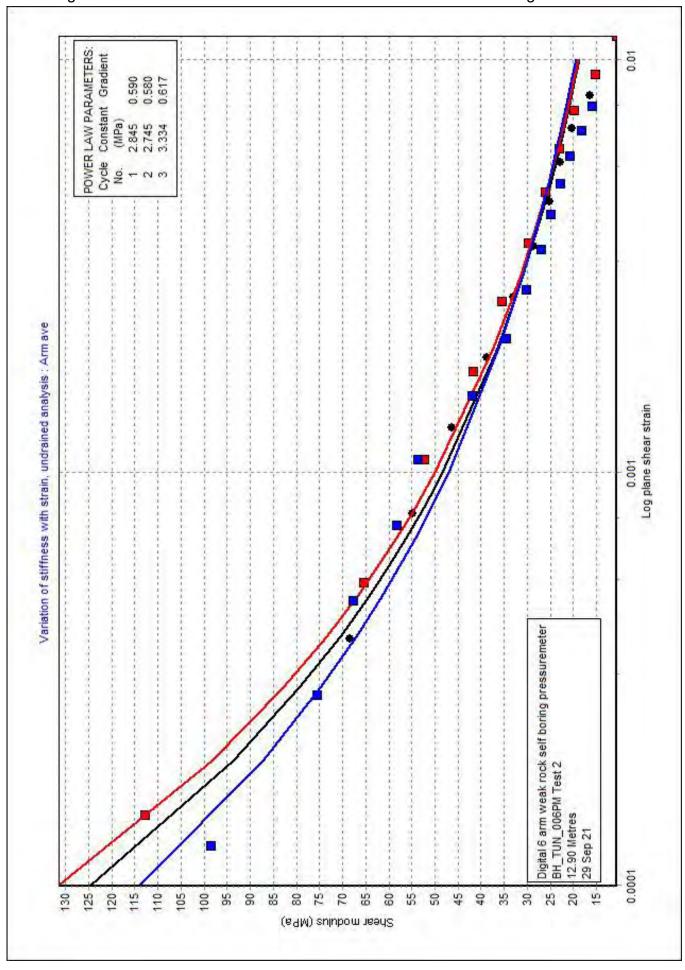


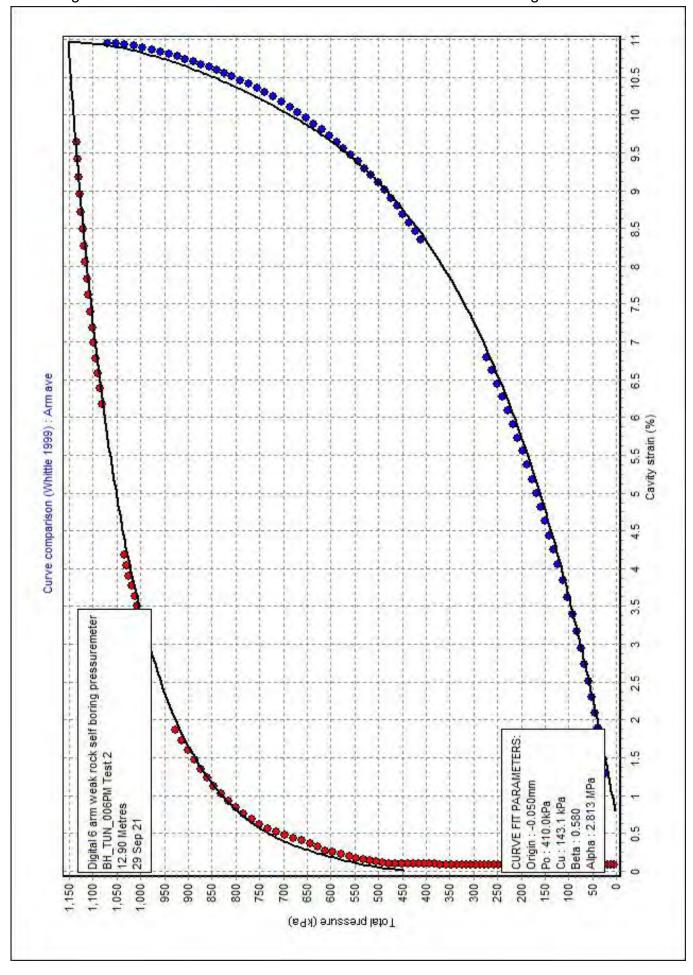


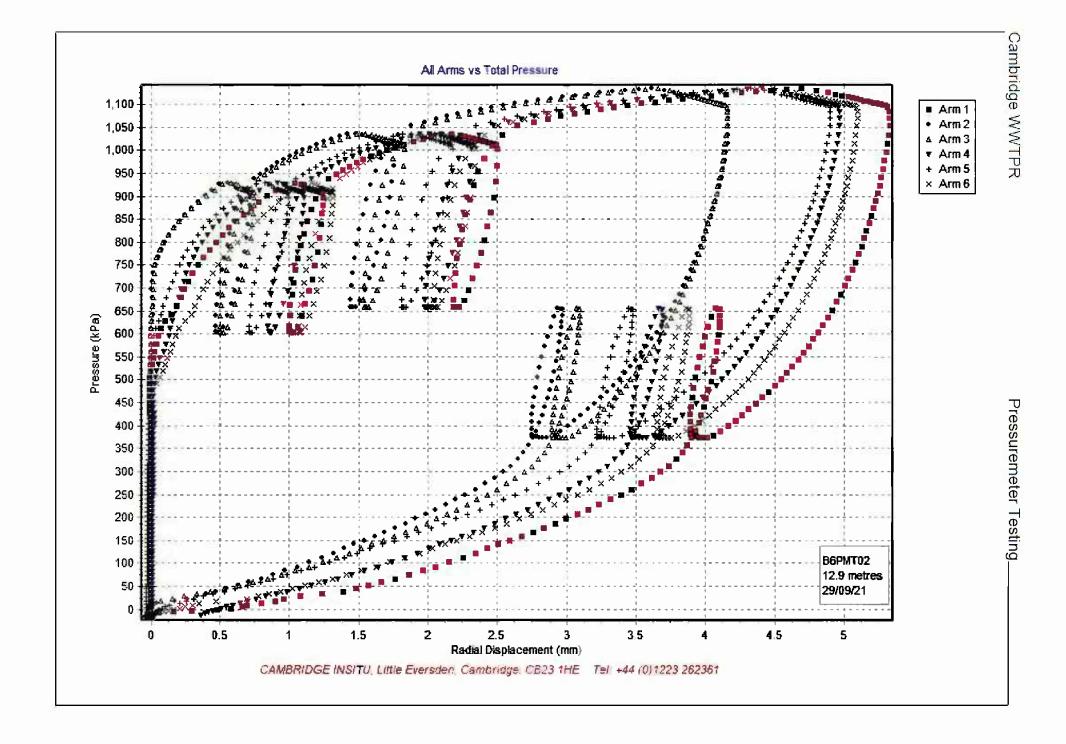


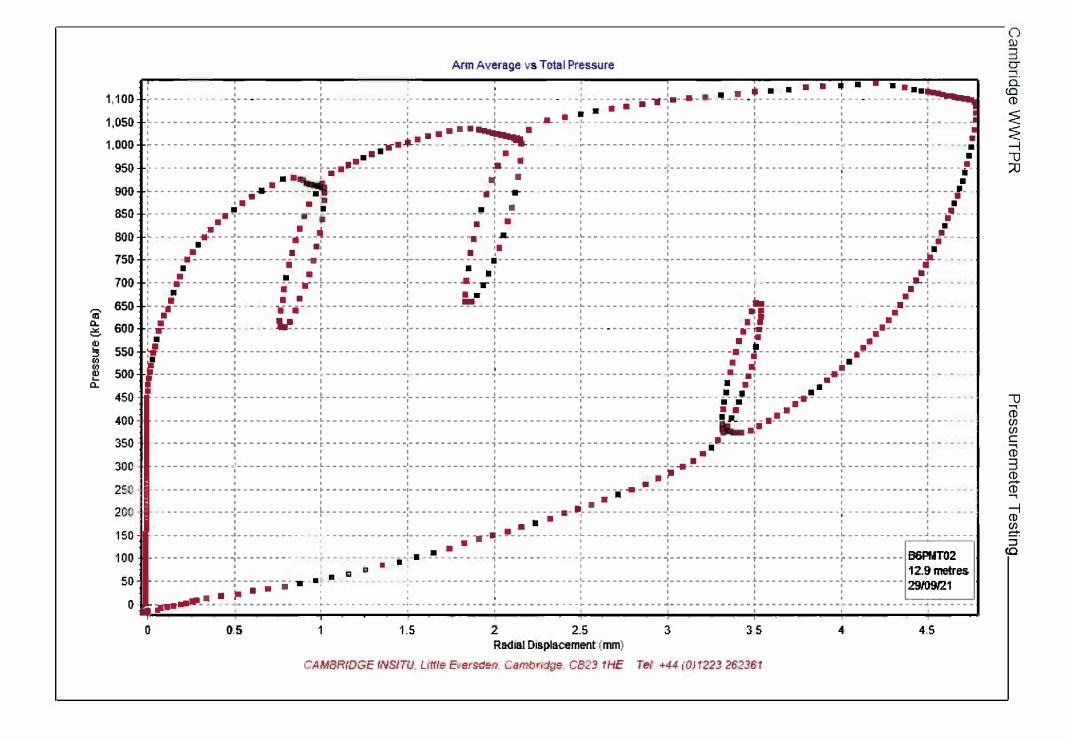


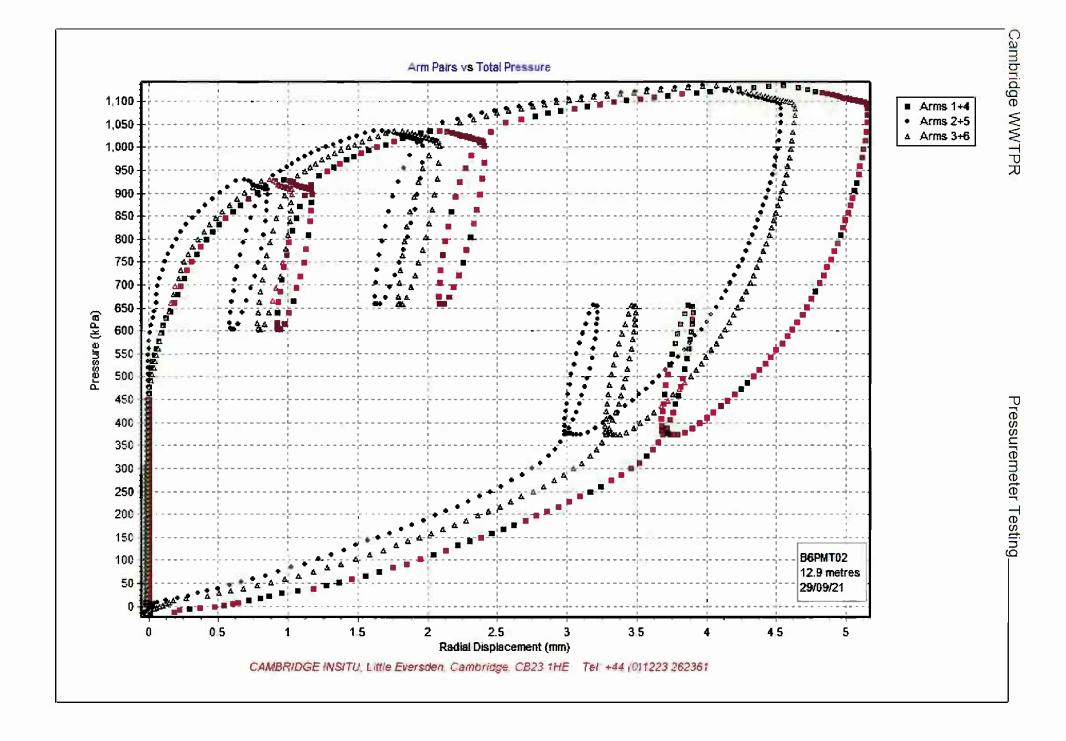


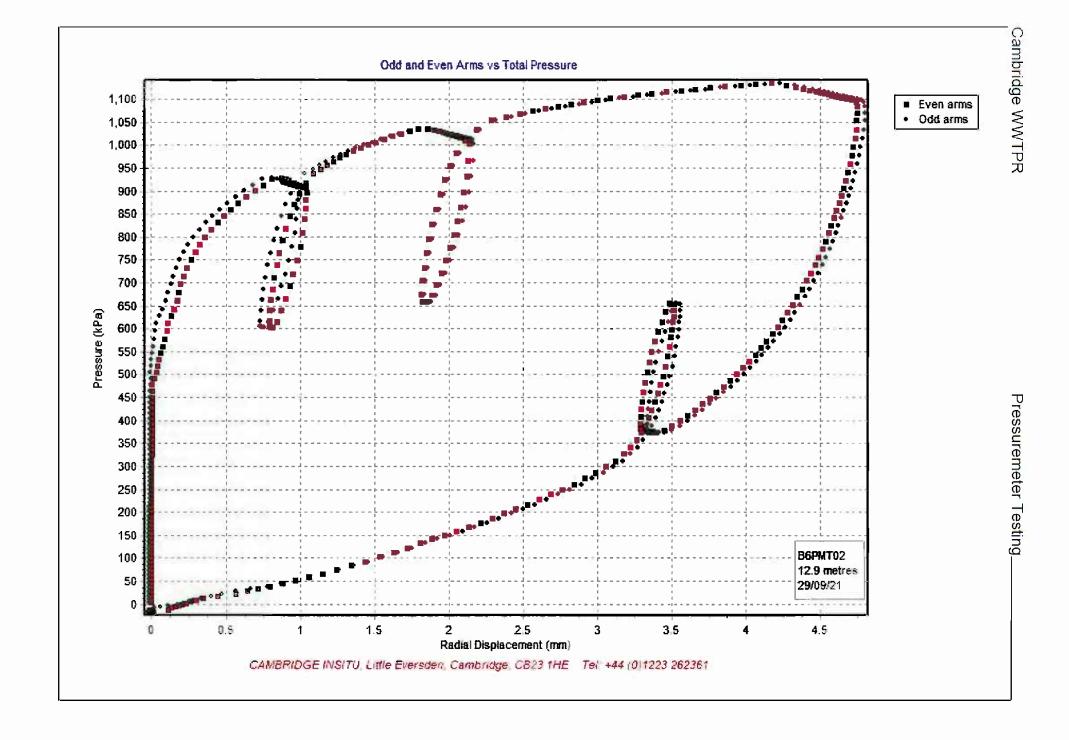


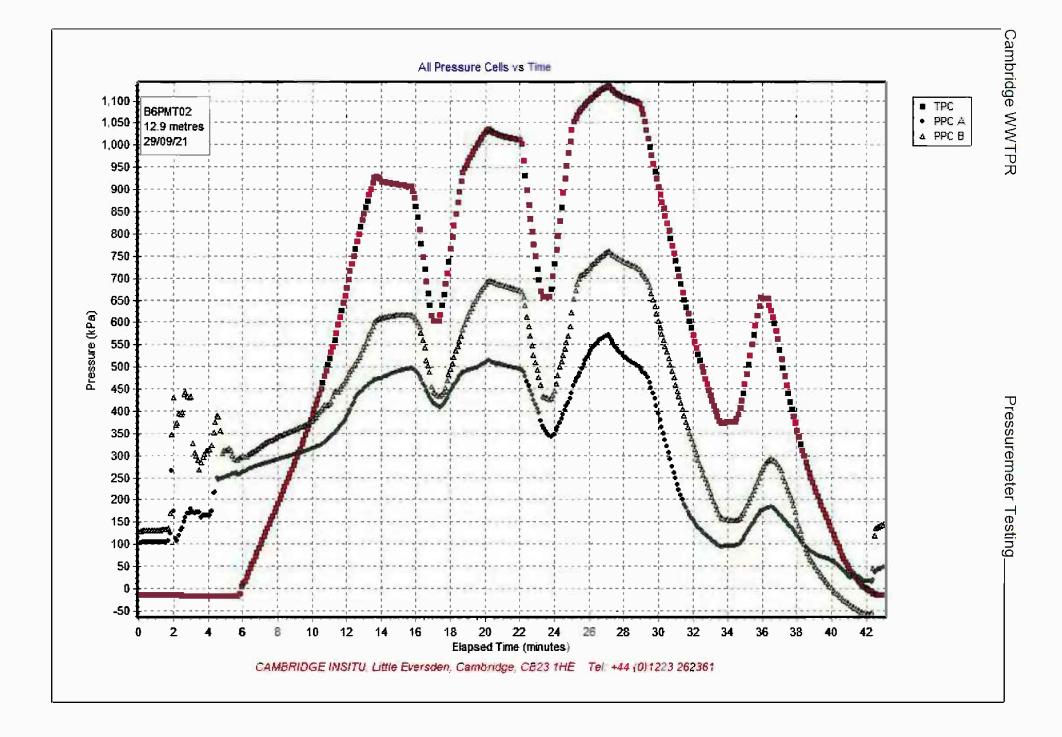












[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_TUN_006PM
Test name : BH_TUN_006PM Test 3

Test date : 29 Sep 21
Test depth : 18.50 Metres
Water table : 4.5 Metres
Ambient PWP : 137.0 kPa
Material : Gault Clay

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB / ES / RW on 30 Sep 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=0.20"
Po from Marsland & Randolph (kPa) : "Arm ave=436.1"
Best estimate of Po (kPa) : "Arm ave=453.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=190.5"
Limit pressure (kPa) : "Arm ave=1788"
Jefferies 1988 - Cu (kPa) : "Arm ave=190.5"
Undrained yield stress (kPa) : "Arm ave=627.3"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=46.3"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No .	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	54.9	1.797	919	0.581	320
Arm ave	2	47.9	4.066	1034	0.808	389
Arm ave	3	51.7	5.792	626	0.542	281

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	10.084	6.611	0.656
Arm ave	2	9.918	6.425	0.648
Arm ave	3	7.691	4.690	0.610

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 0.20

 Po (kPa)
 : 453

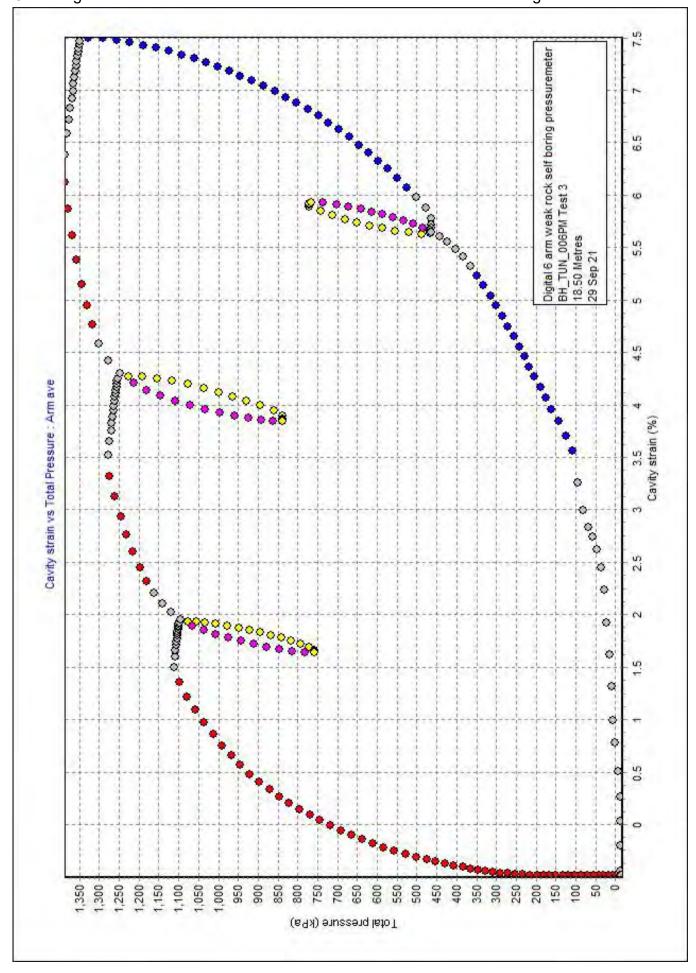
 Cu (kPa)
 : 190.5

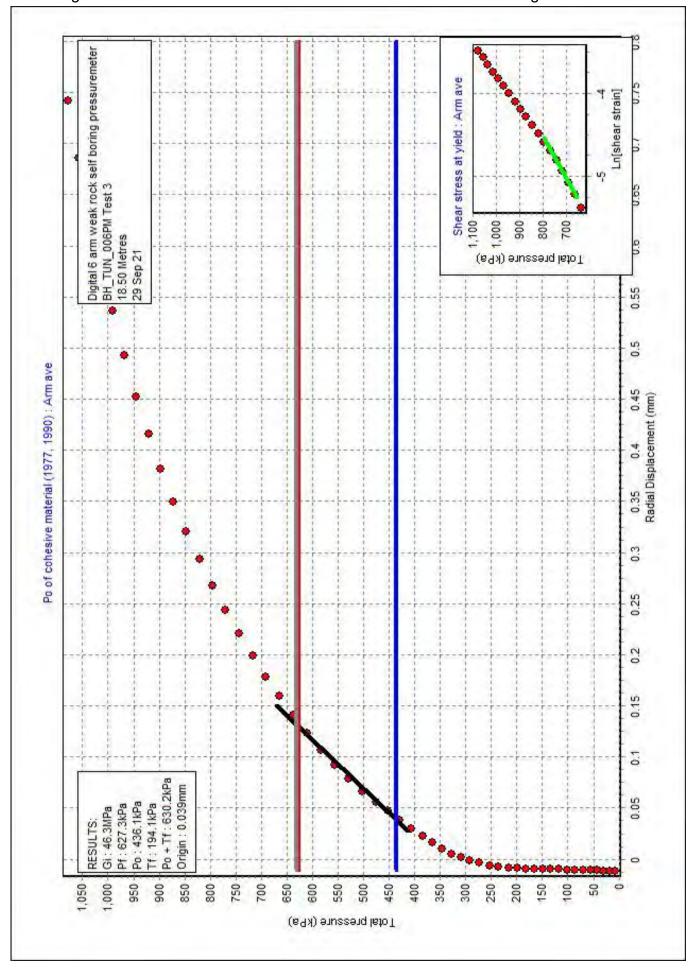
 Limit pressure (kPa)
 : 1788

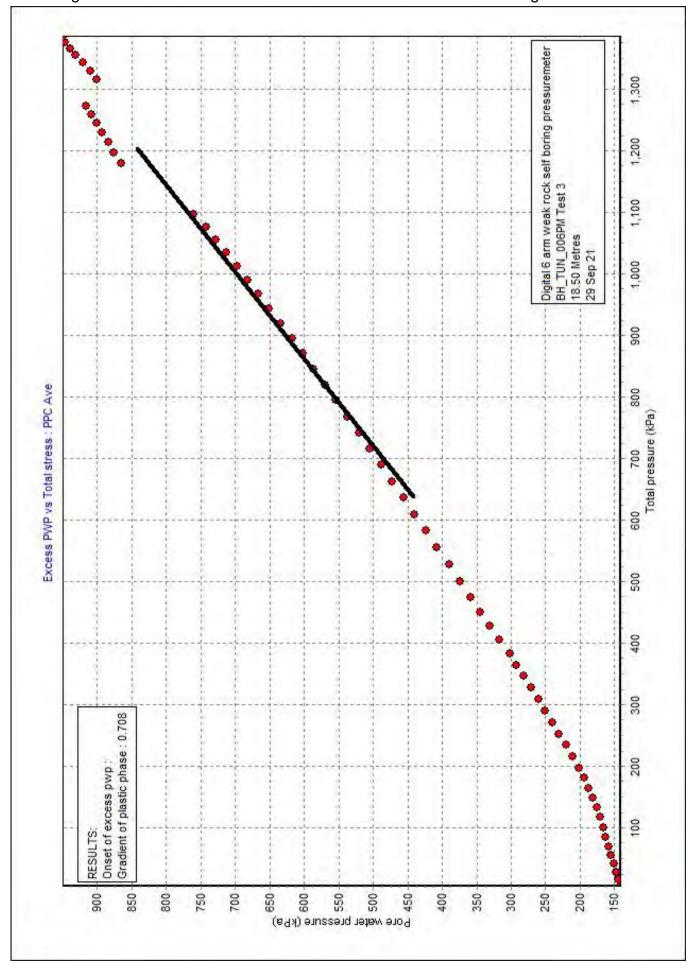
 Non-linear exponent
 : 0.648

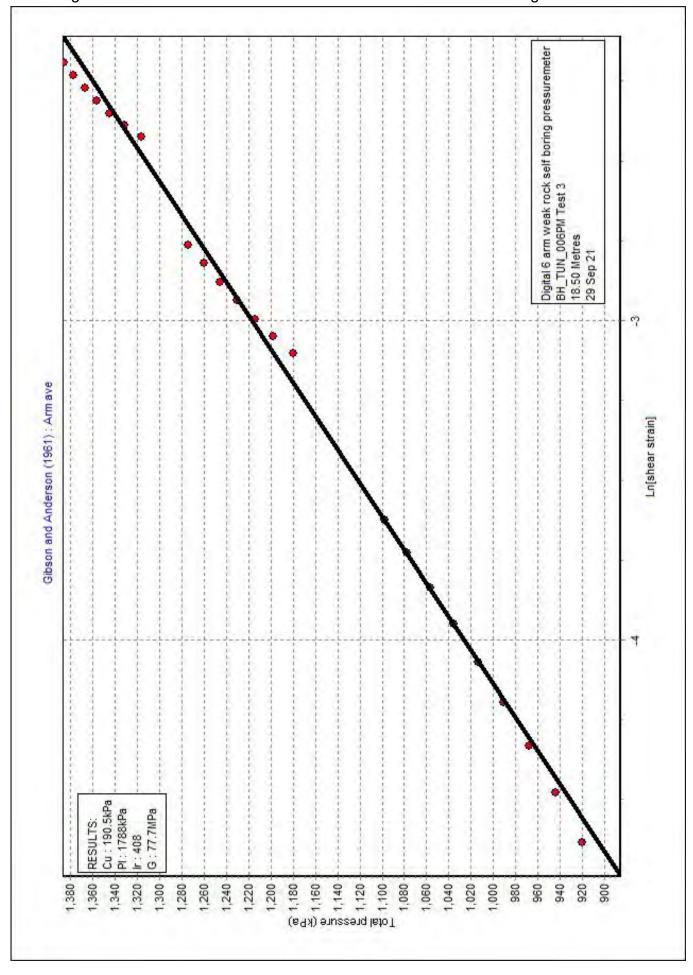
 Calculated alpha (MPa)
 : 6.588

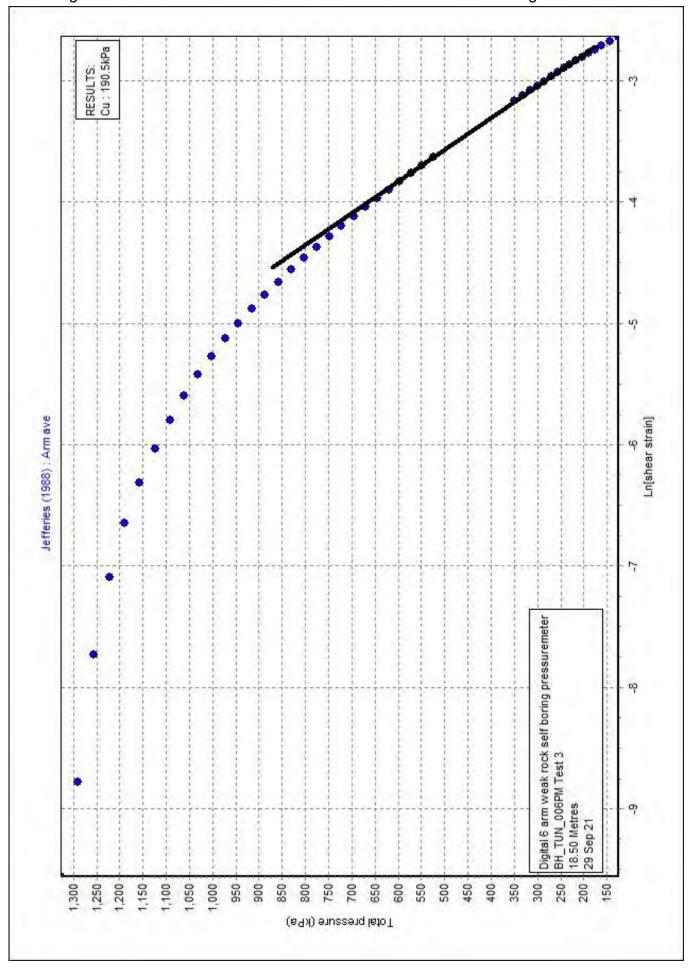
 G at yield (MPa)
 : 45.2

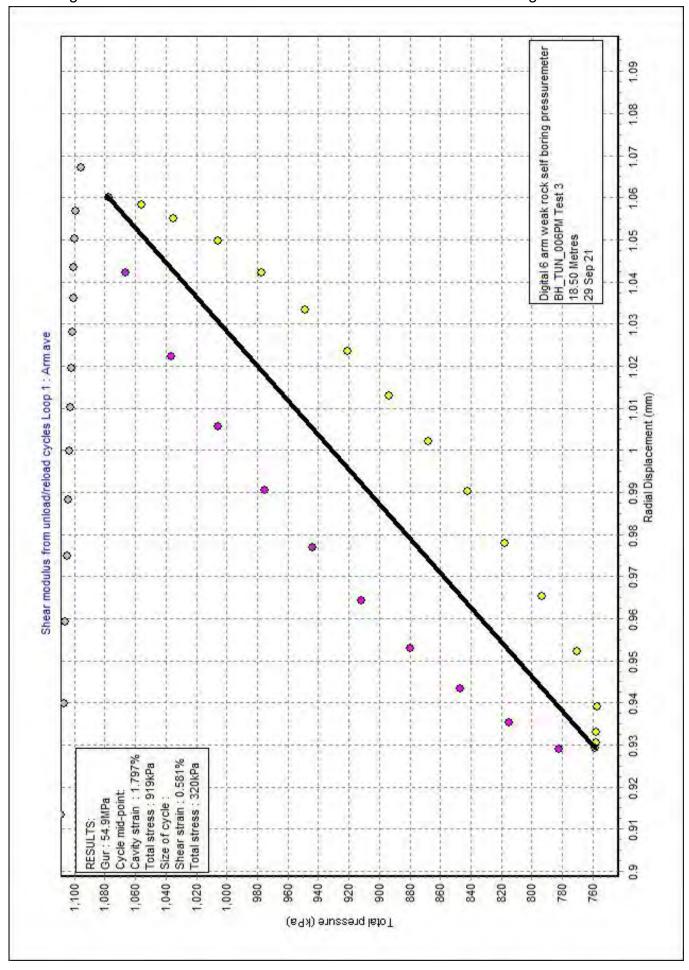


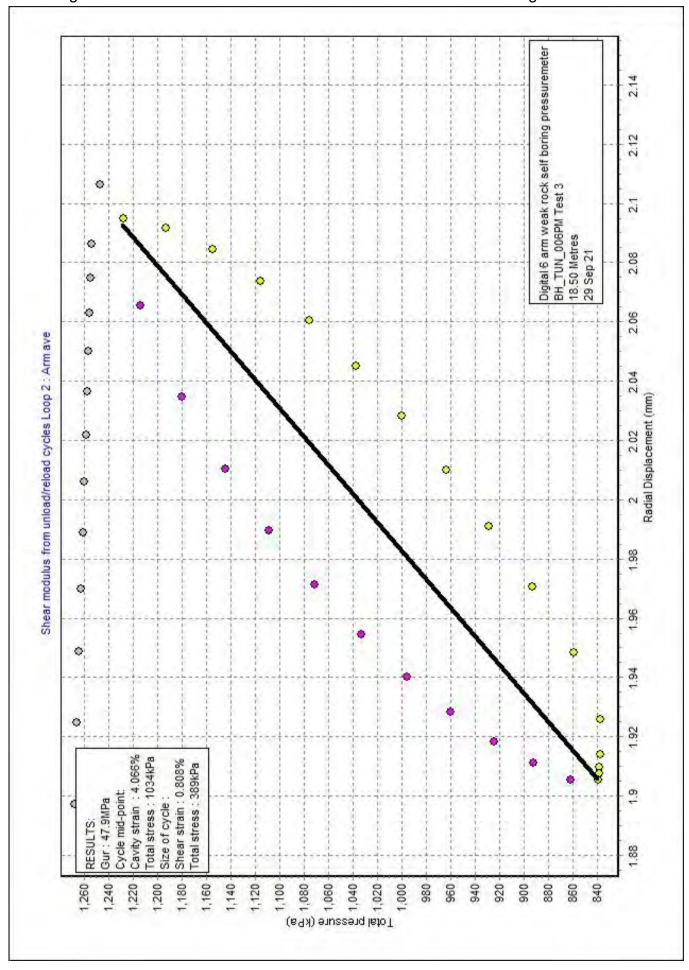


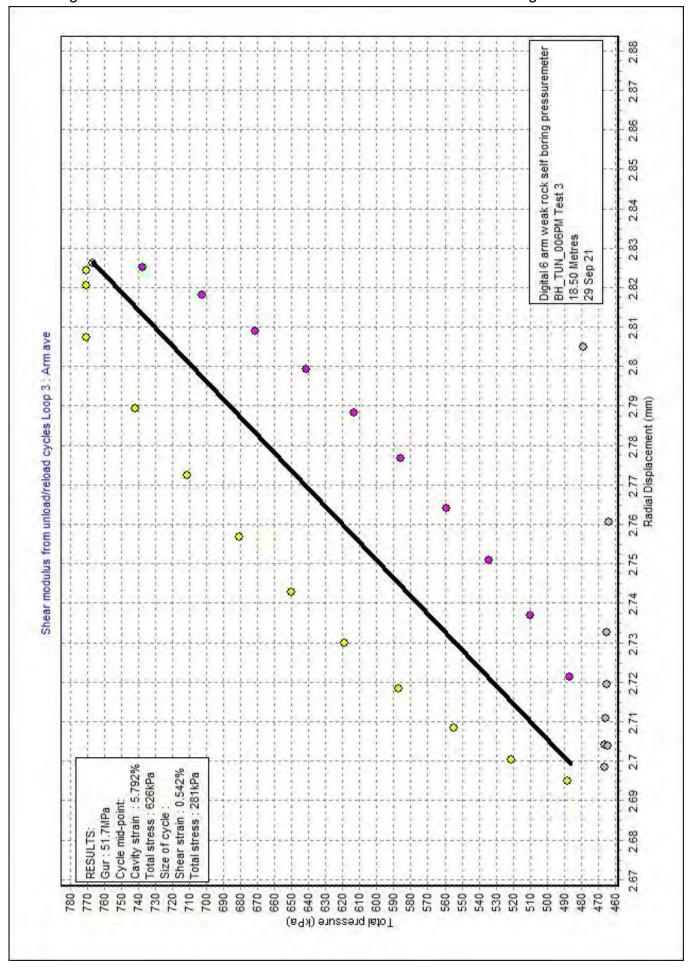


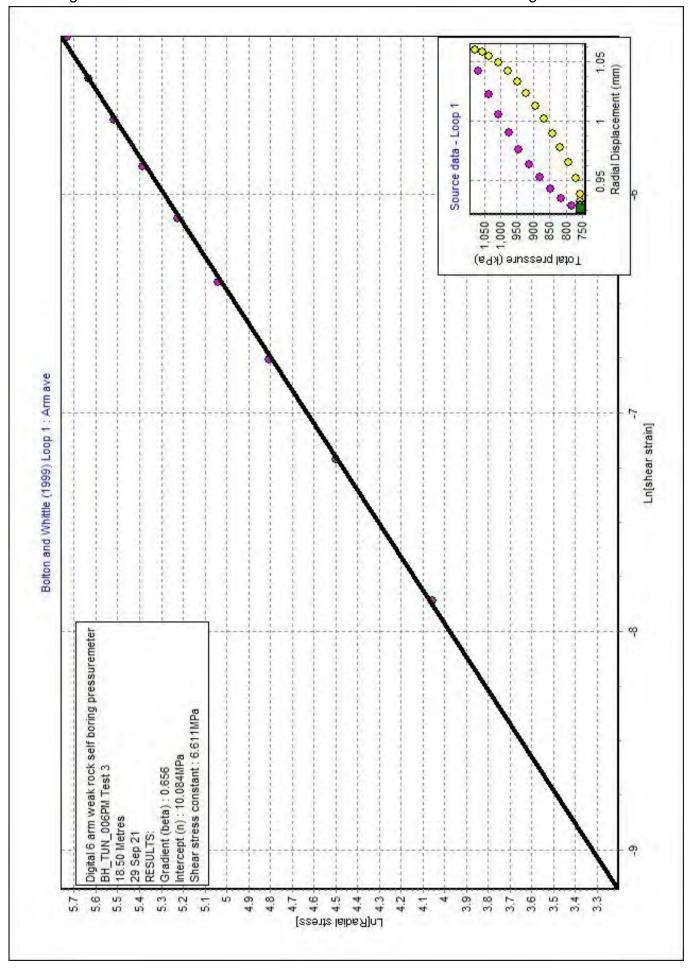


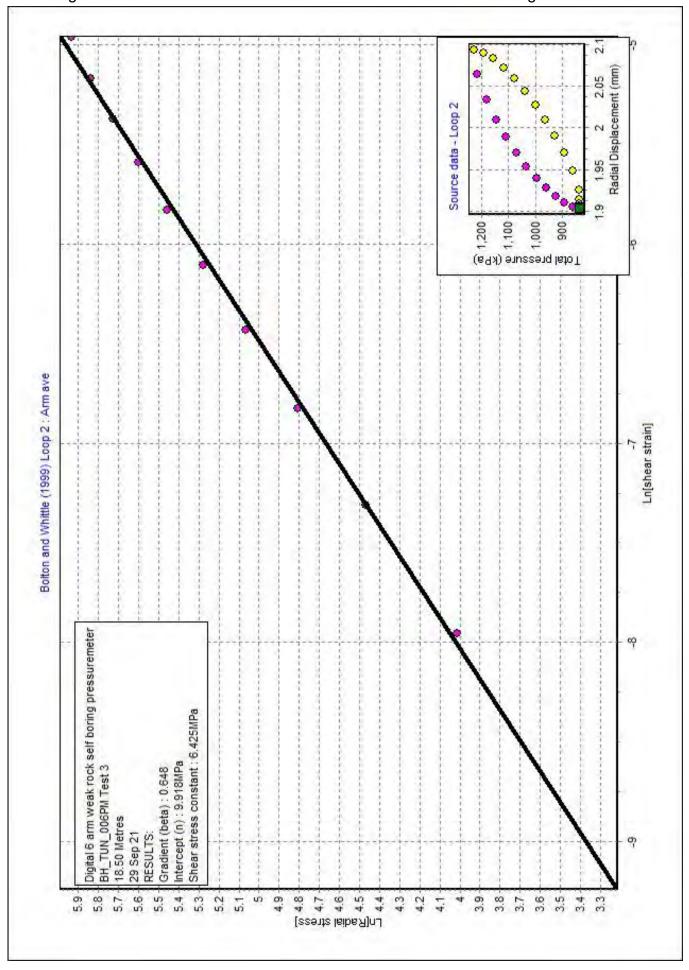


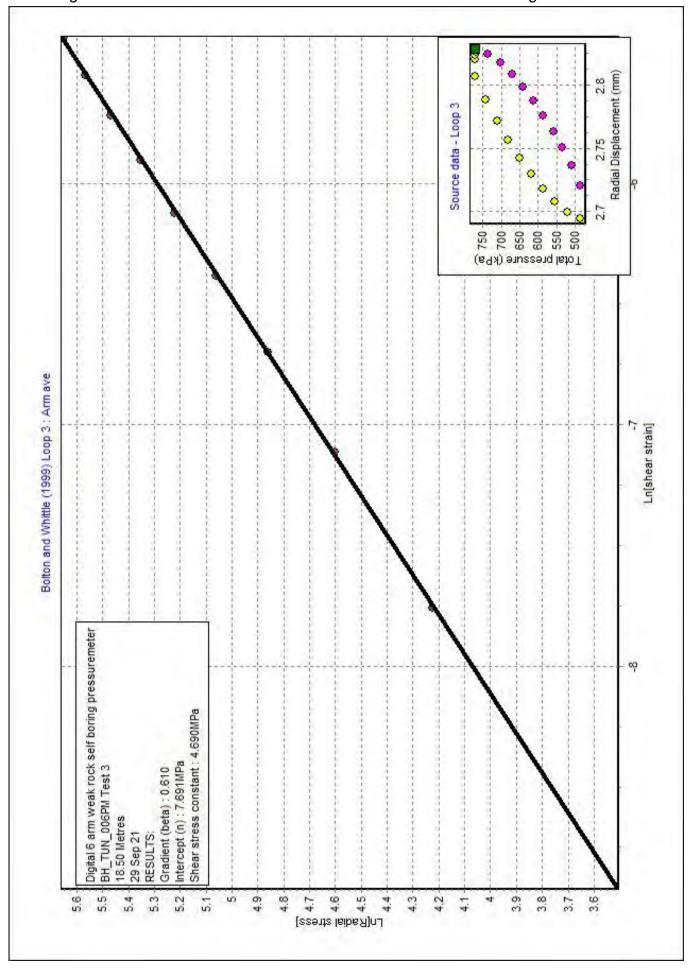


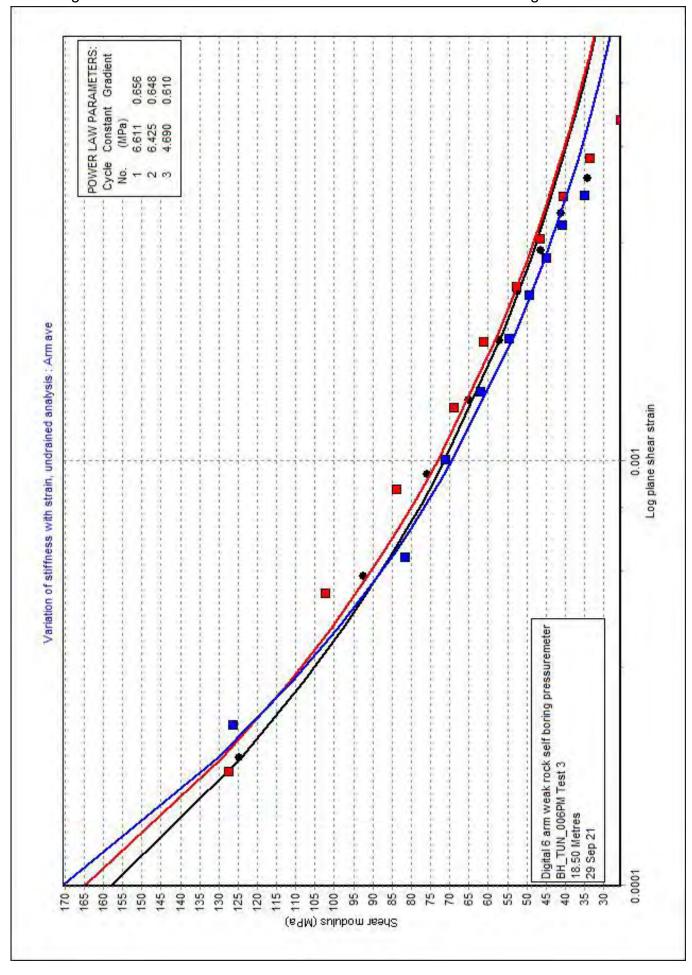


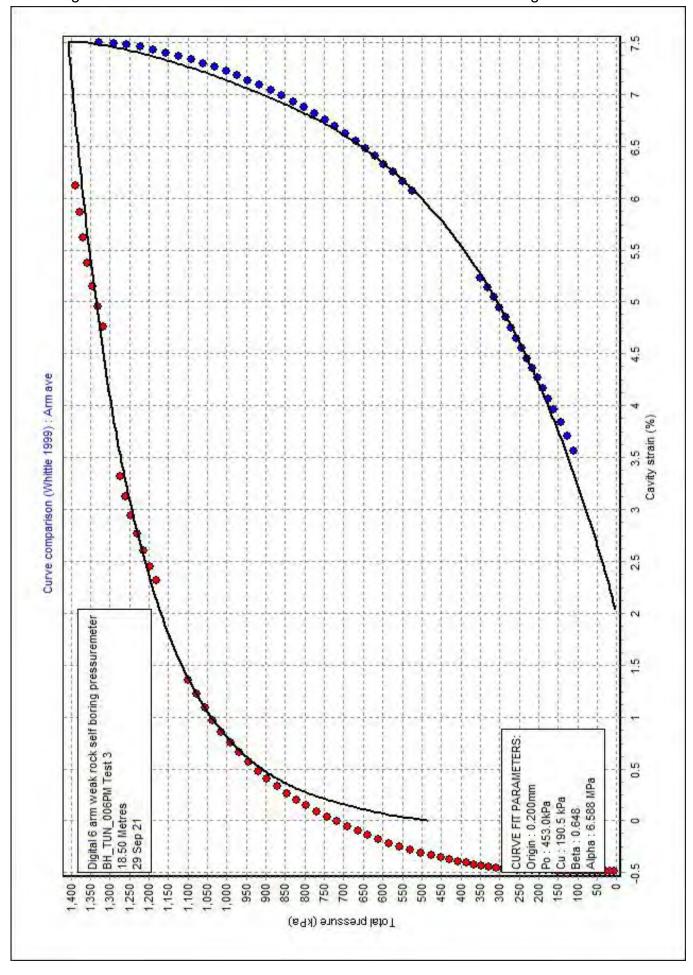


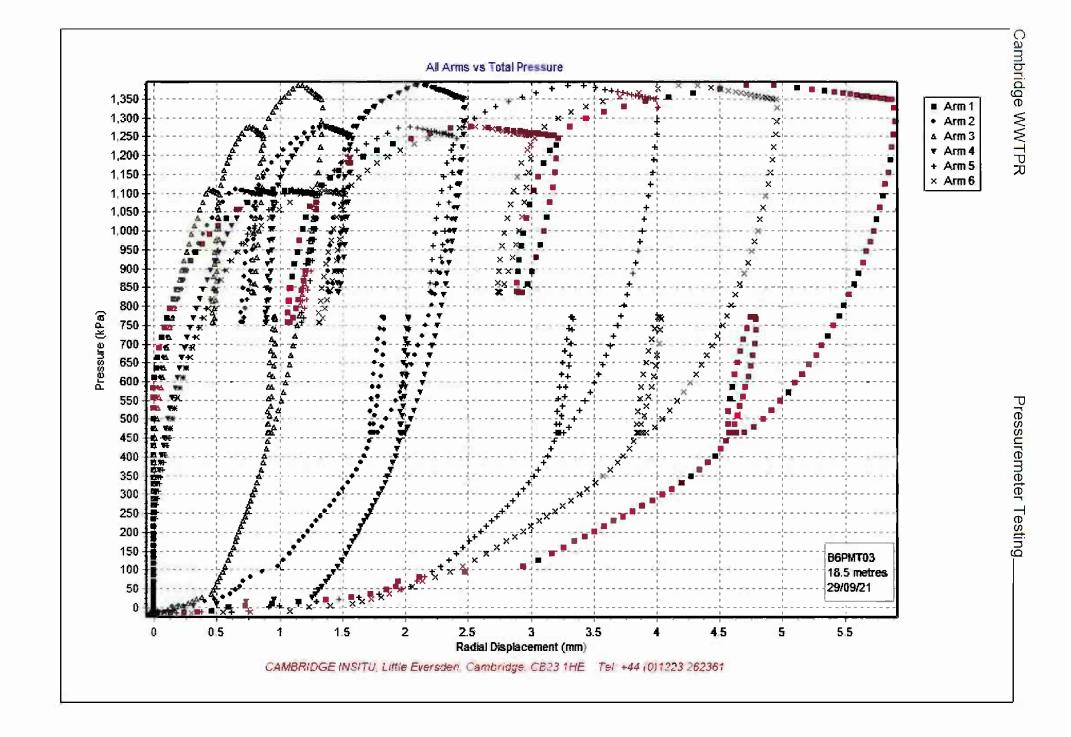


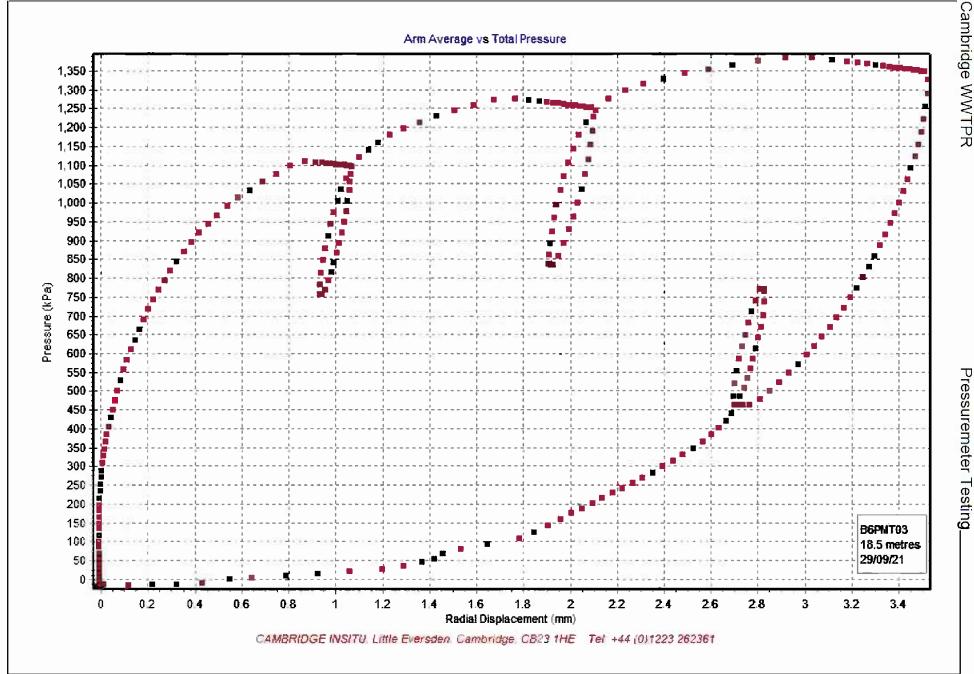


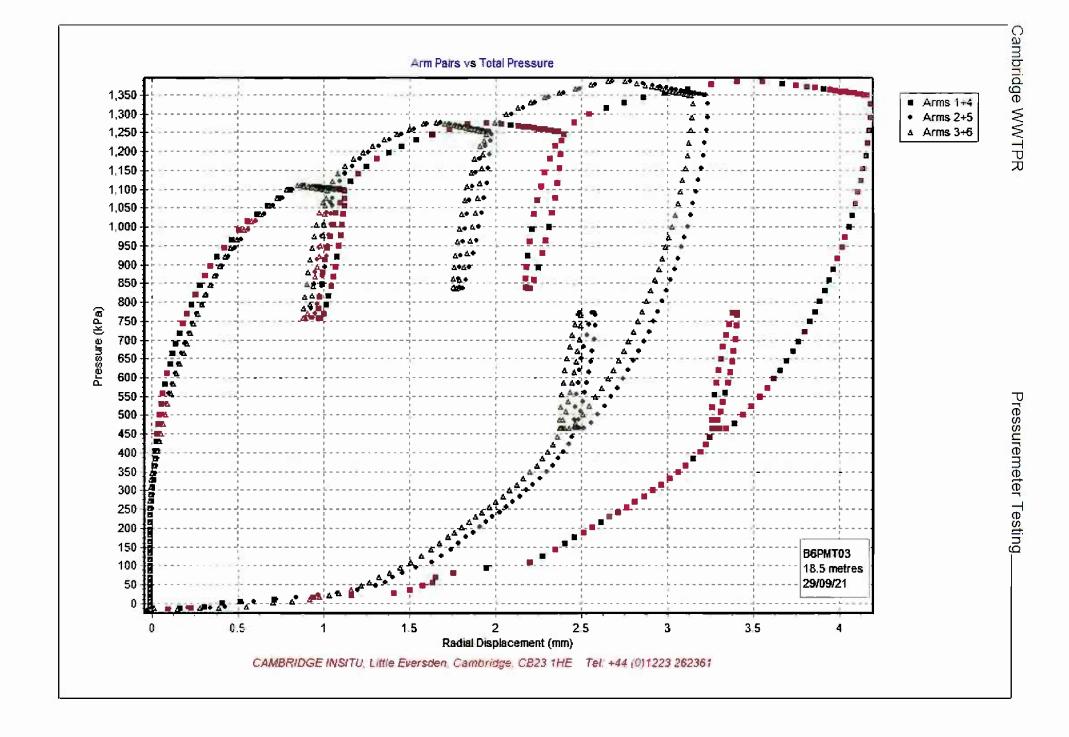


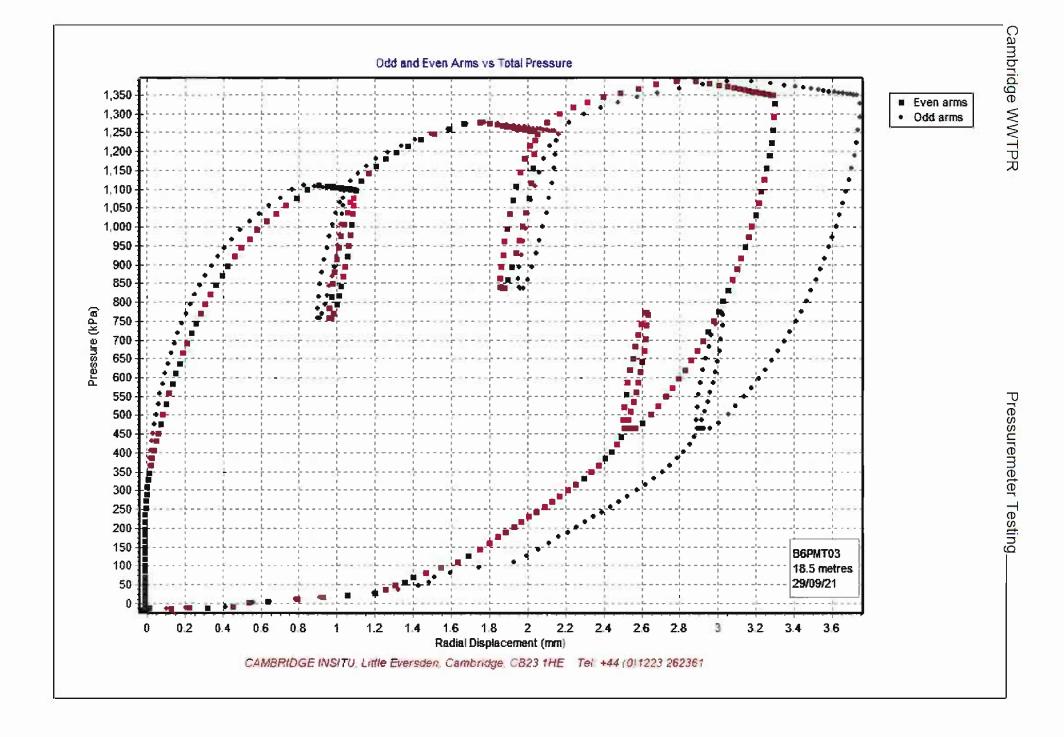


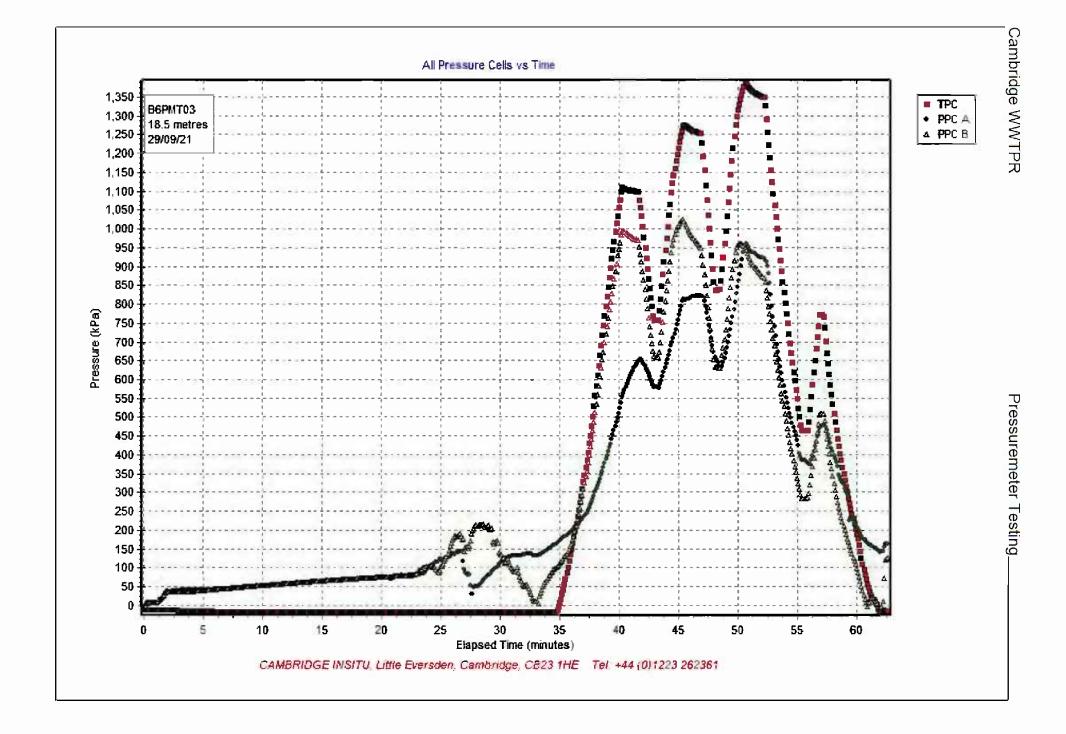












[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_TUN_011PM
Test name : BH_TUN_011PM Test 1

Test date : 13 Oct 21
Test depth : 6.00 Metres
Water table : 1.75 Metres
Ambient PWP : 42.0 kPa
Material : Gault Clay

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB / ES / RW on 13 Oct 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=-0.06"

Po from Marsland & Randolph (kPa) : "Arm ave=145.8"

Po from Lift off (kPa) : "Arm ave=155.4"

PWP versus Total Stress (kPa) : "PPC Ave=116.8"

Best estimate of Po (kPa) : "Arm ave=131.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=112.0"

Limit pressure (kPa) : "Arm ave=898"

Jefferies 1988 - Cu (kPa) : "Arm ave=113.5"

Undrained yield stress (kPa) : "Arm ave=209.4"

PWP derived yield stress (kPa) : "PPC Ave=470.9"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=156.8"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	27.1	2.924	441	0.575	156
Arm ave	2	25.0	5.100	496	0.699	175
Arm ave	3	25.8	8.701	309	0.558	145

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	L	.oop In	tercept	Alpha	Gradient
	N	lo (M	lPa)	(MPa)	
Arm a	ve 1	. 3.	831	2.351	0.614
Arm a	ve 2	3.	626	2.170	0.599
Arm a	ve 3	3.	380	2.000	0.592

Non-linear exponent from PWP response : "PPC Ave=0.791"

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : -0.06

 Po (kPa)
 : 131

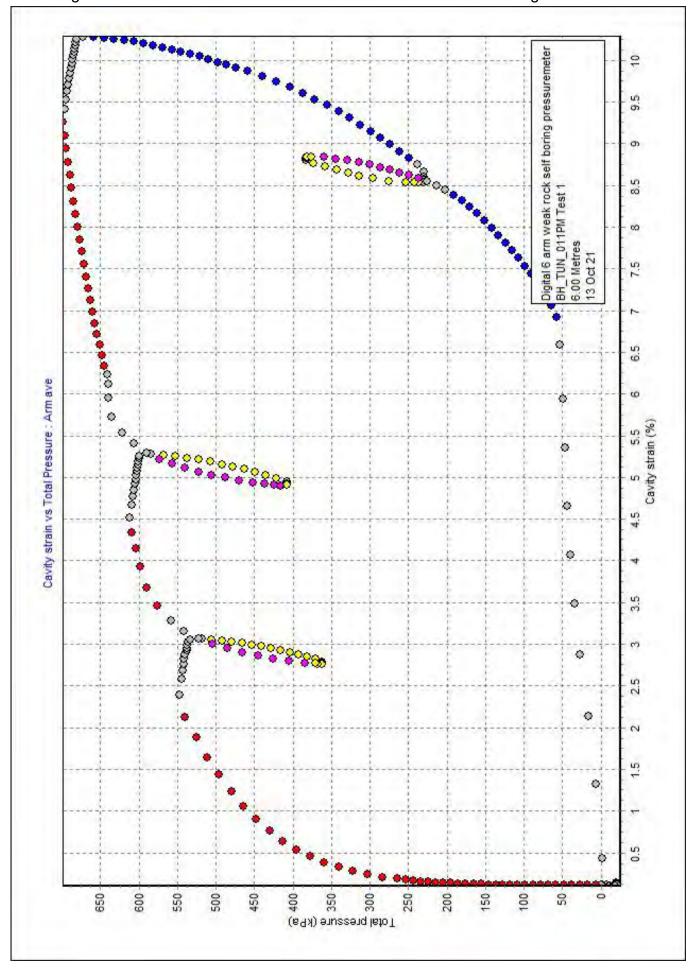
 Cu (kPa)
 : 112.0

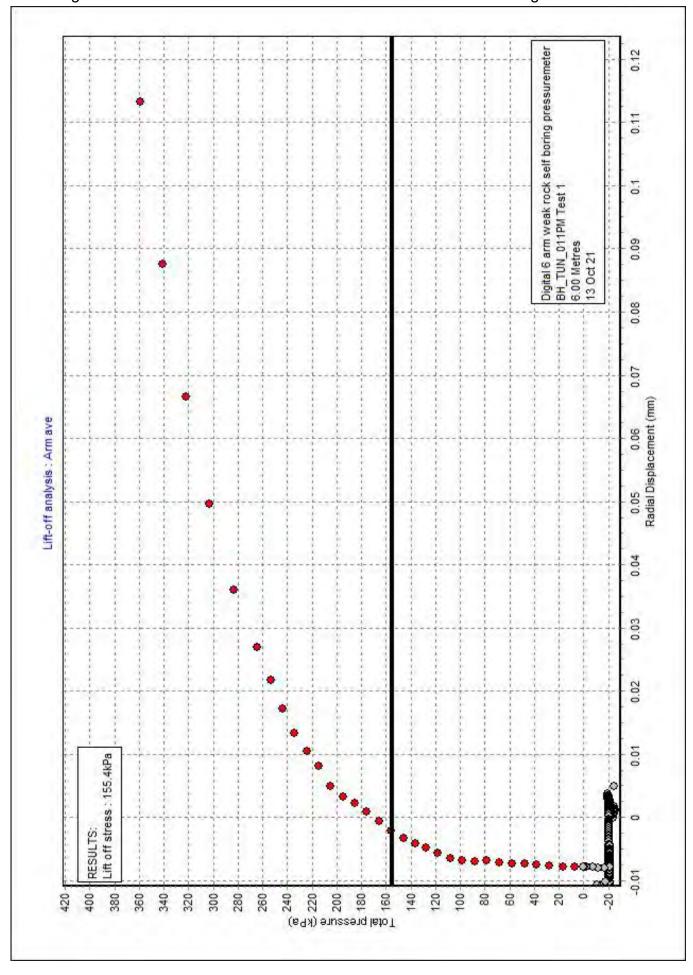
 Limit pressure (kPa)
 : 898

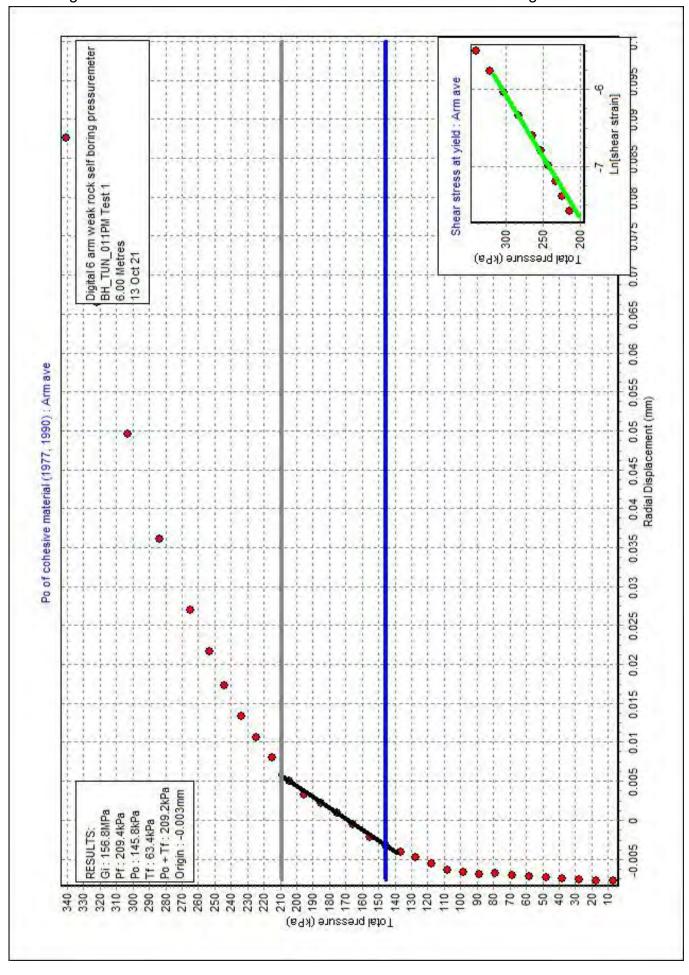
 Non-linear exponent
 : 0.592

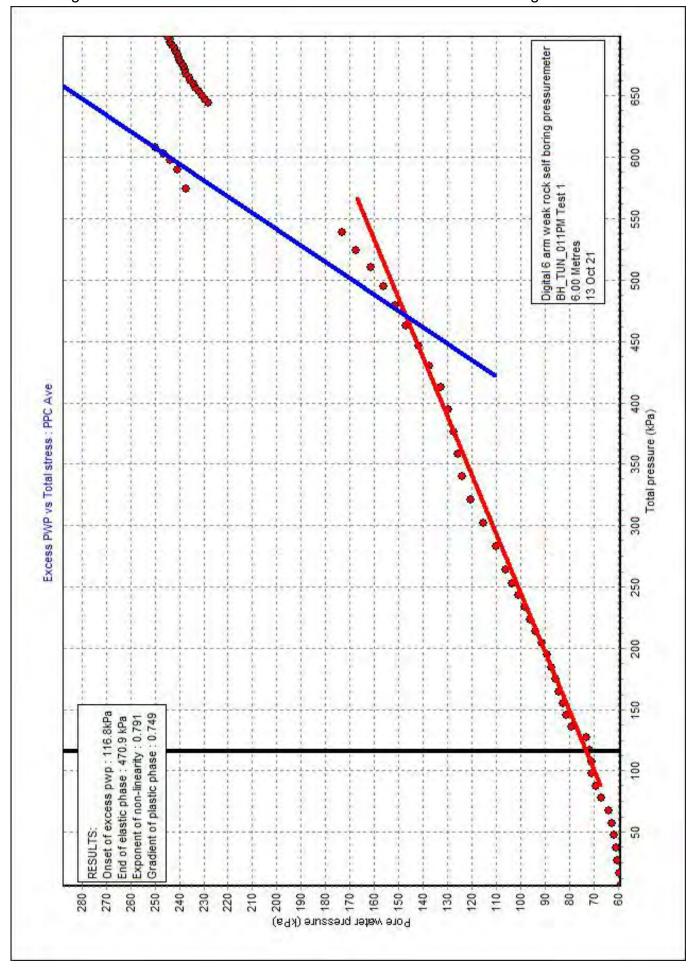
 Calculated alpha (MPa)
 : 2.378

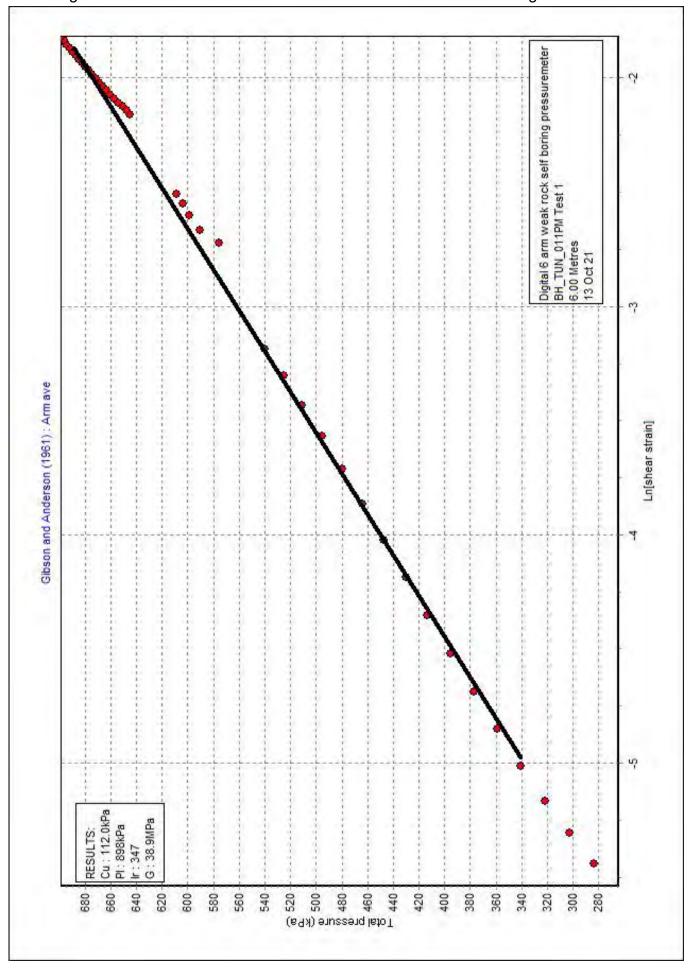
 G at yield (MPa)
 : 19.5

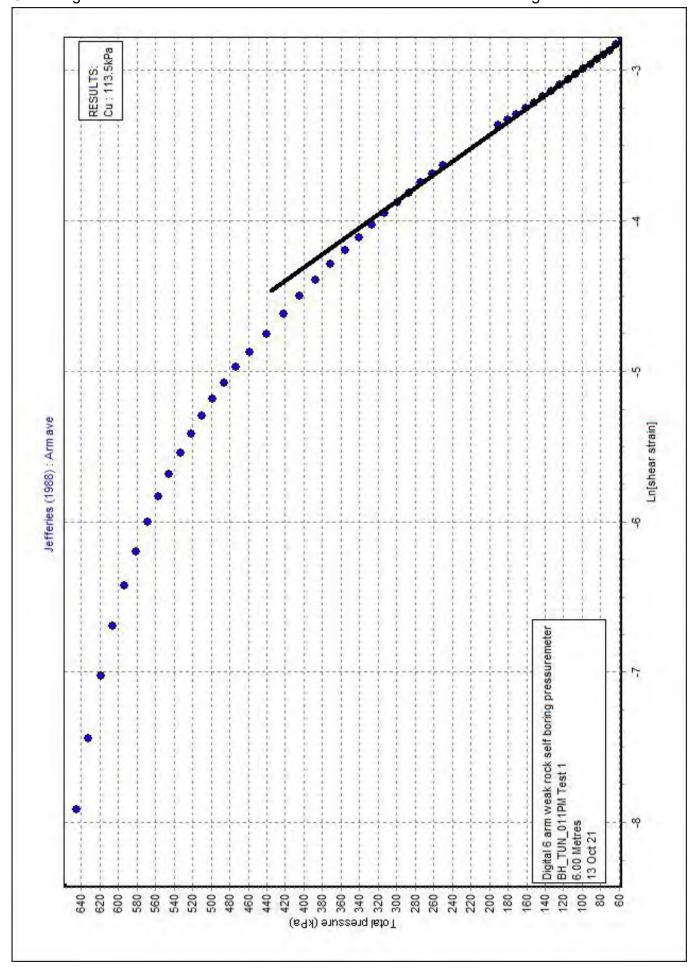


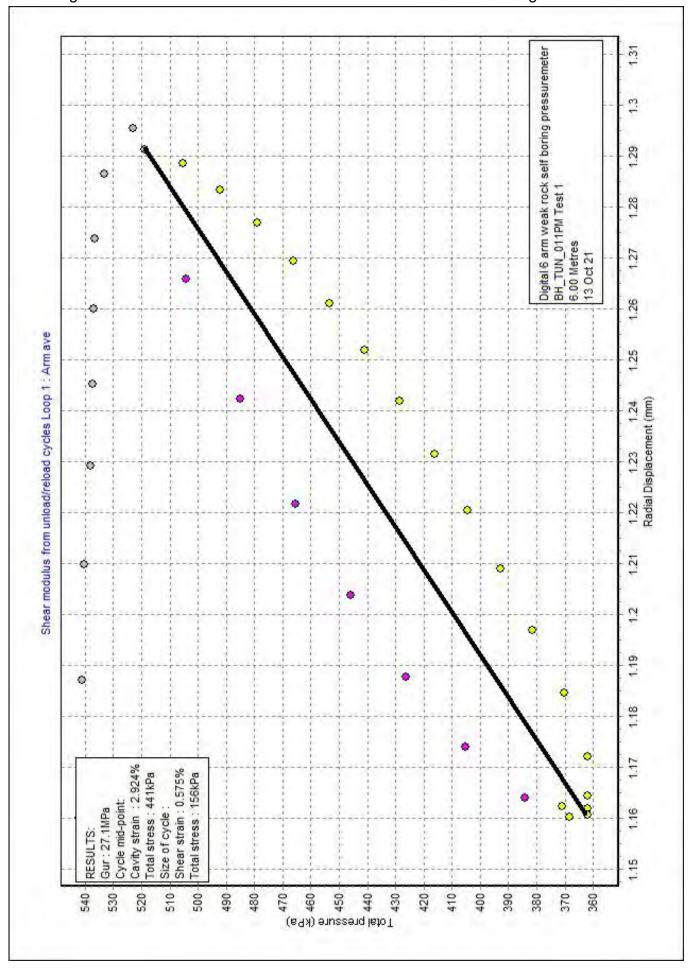


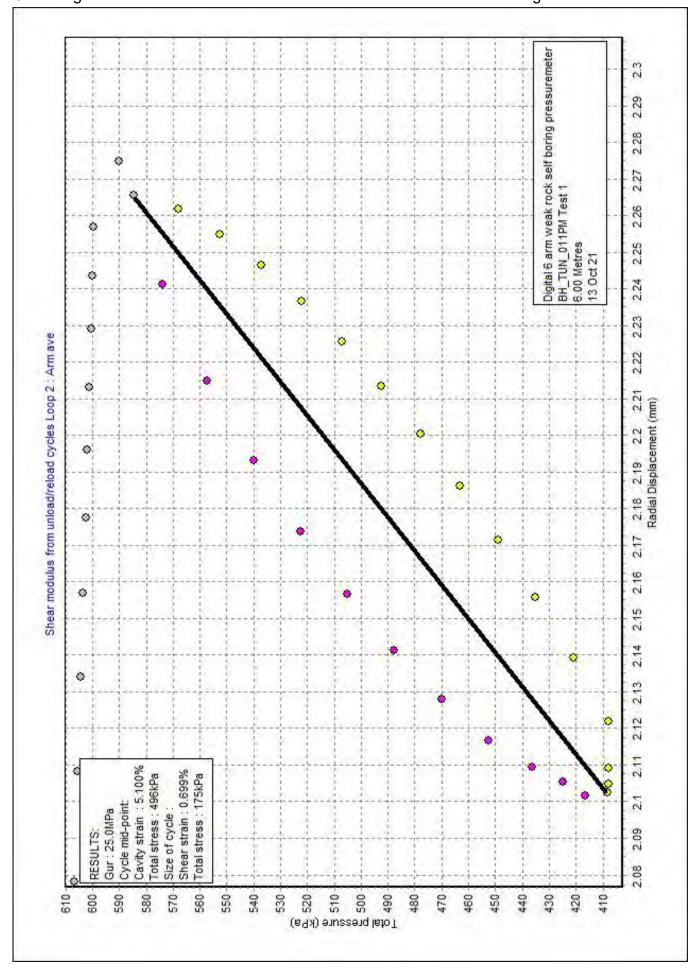


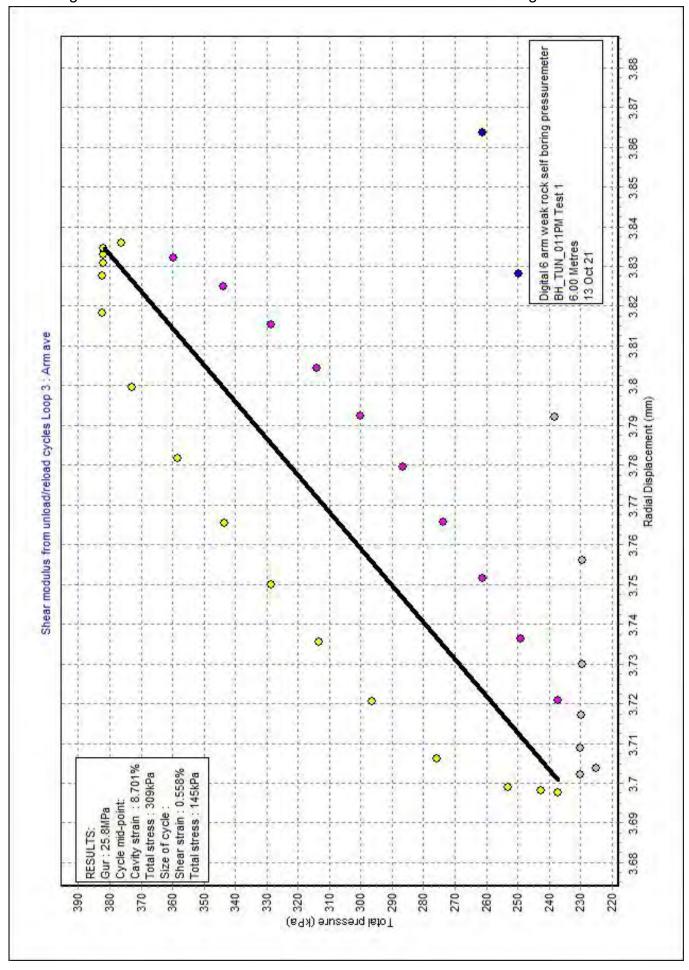


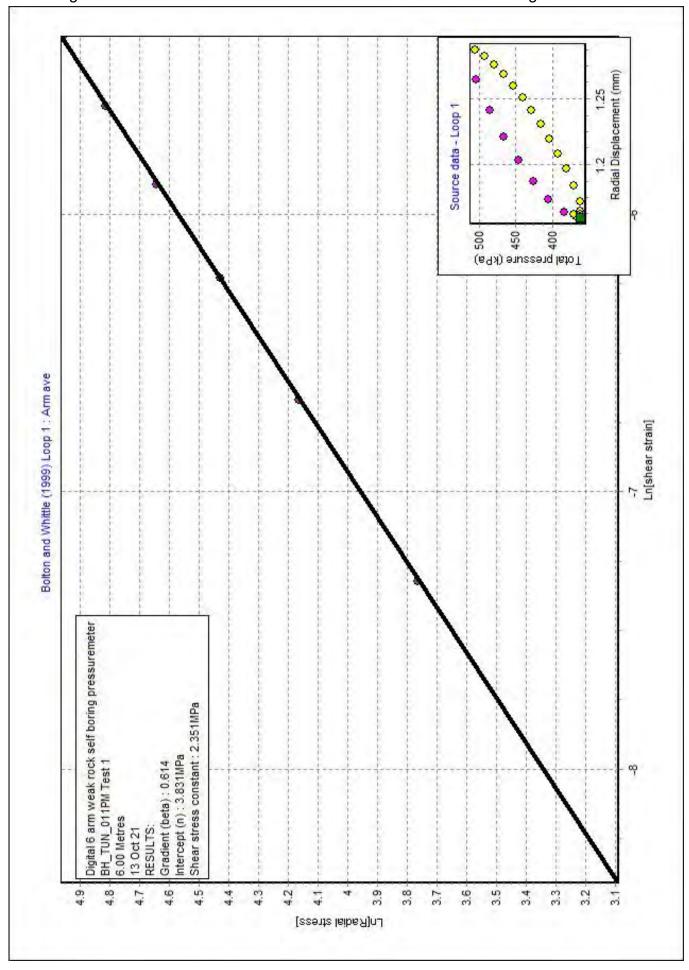


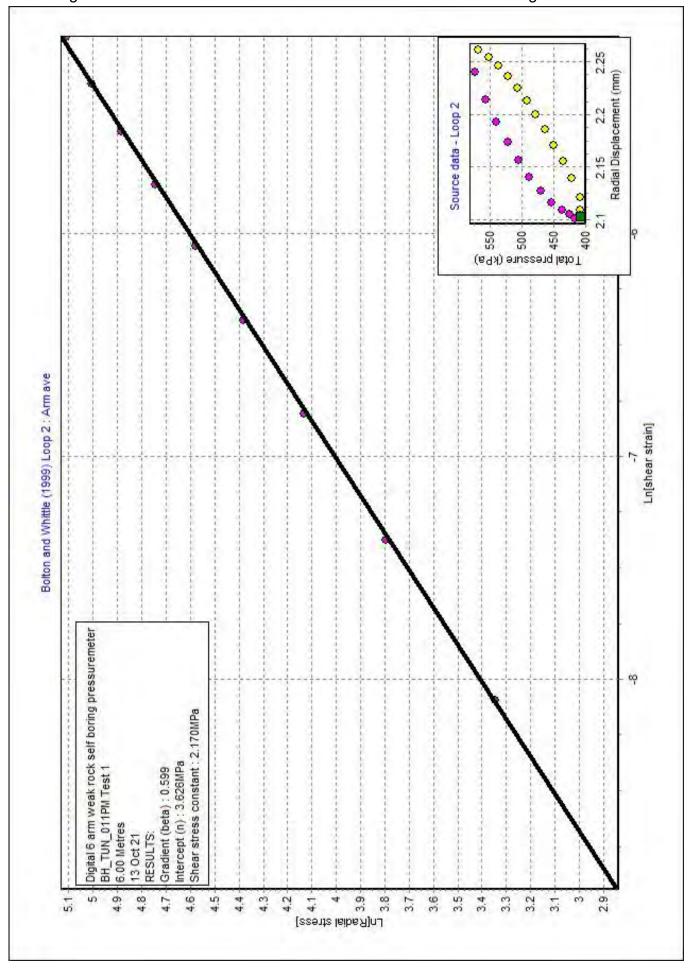


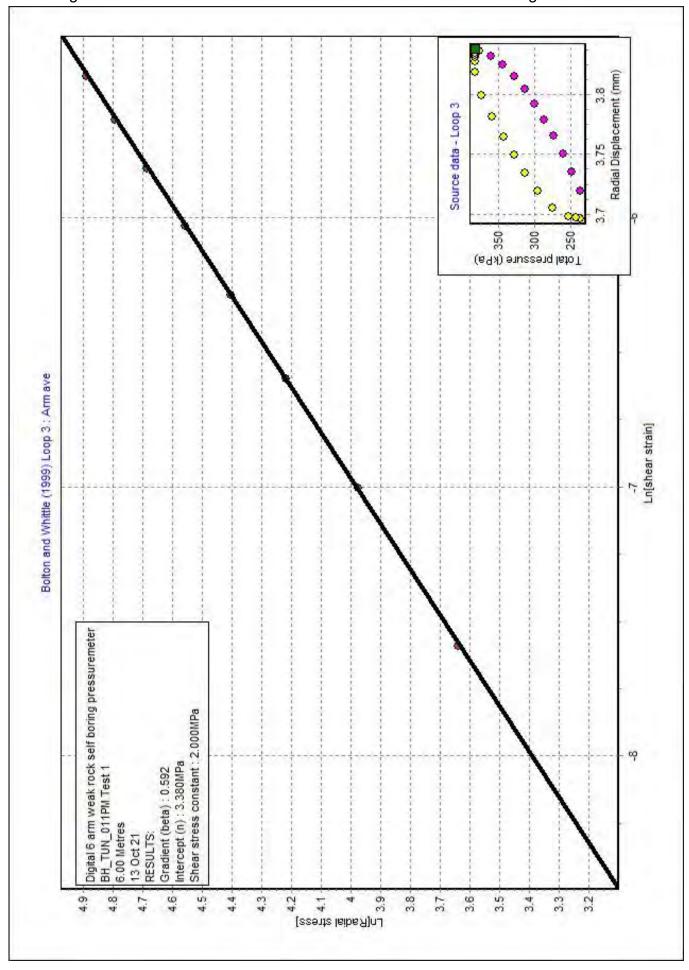


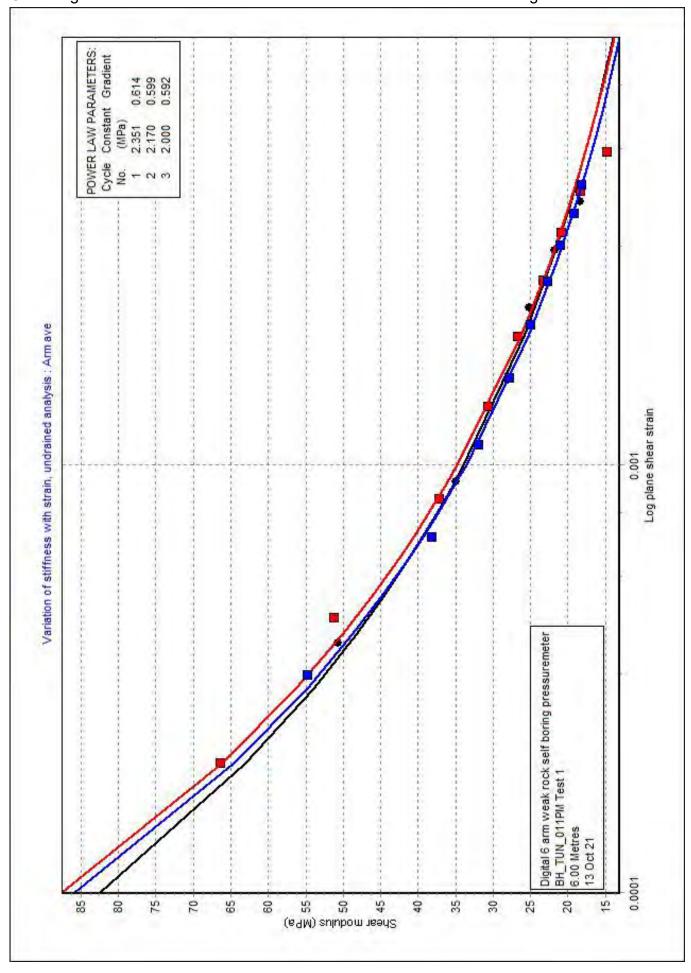


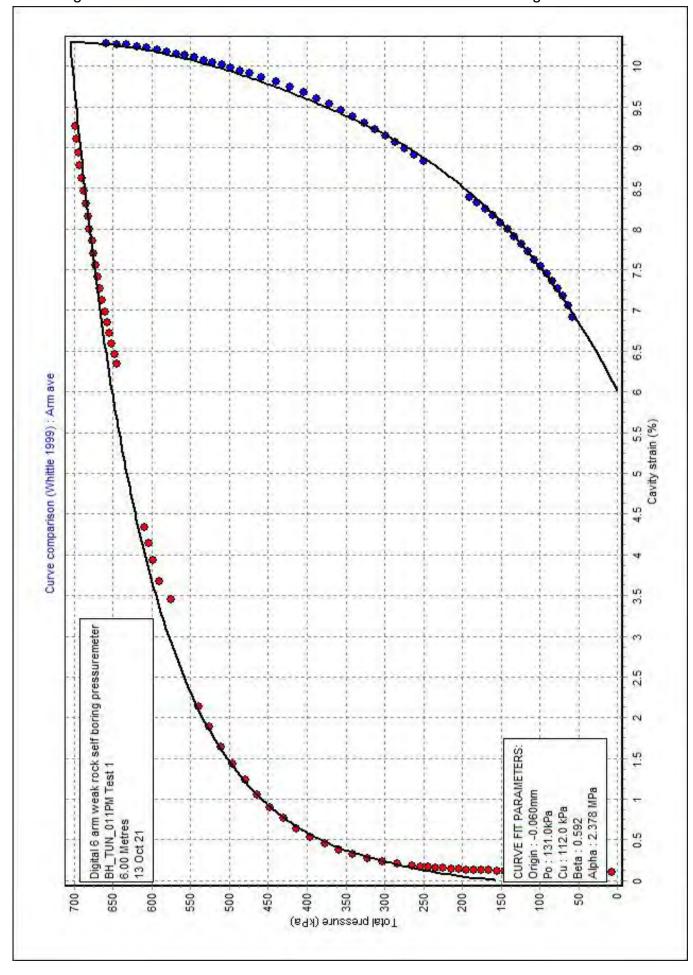


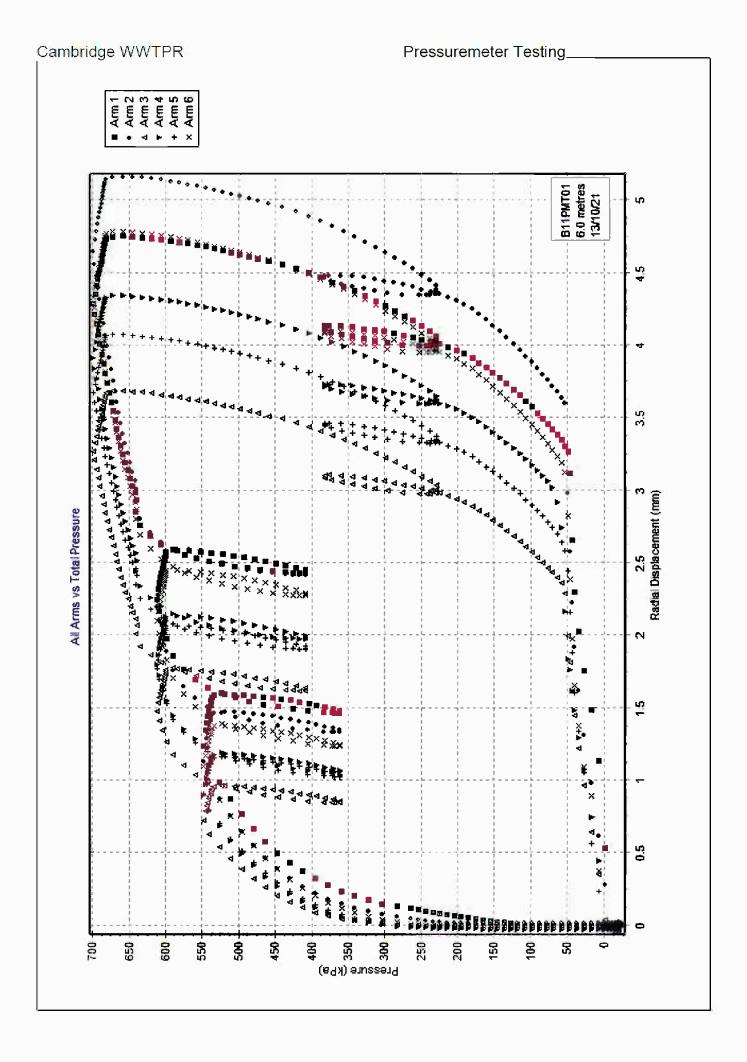


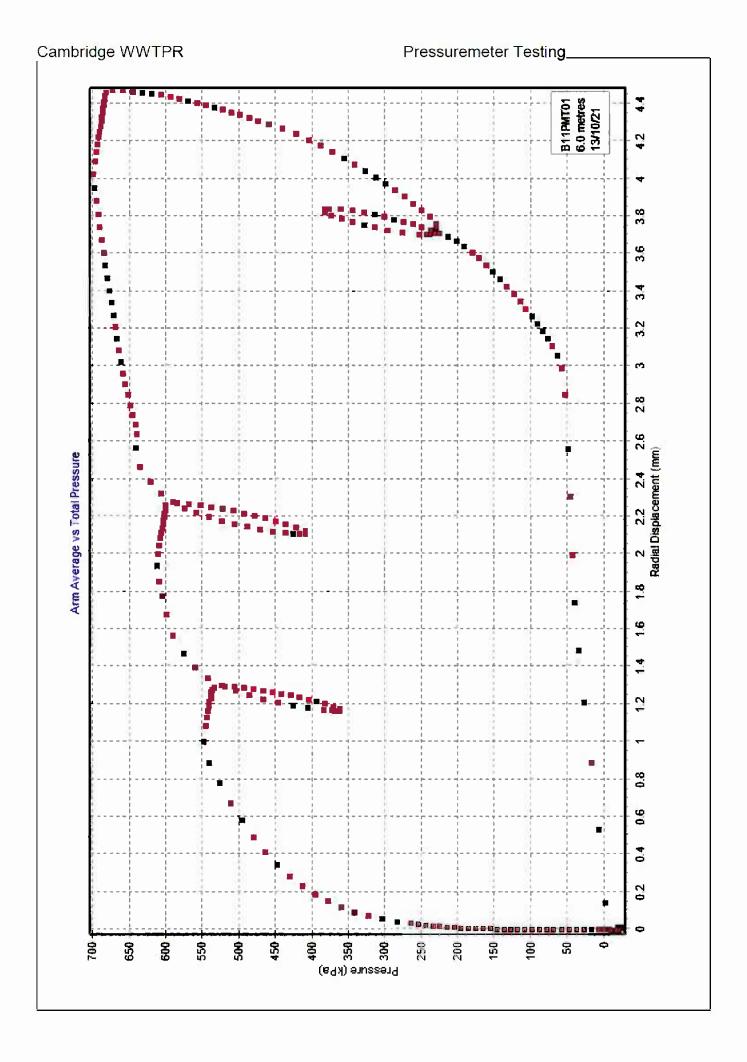


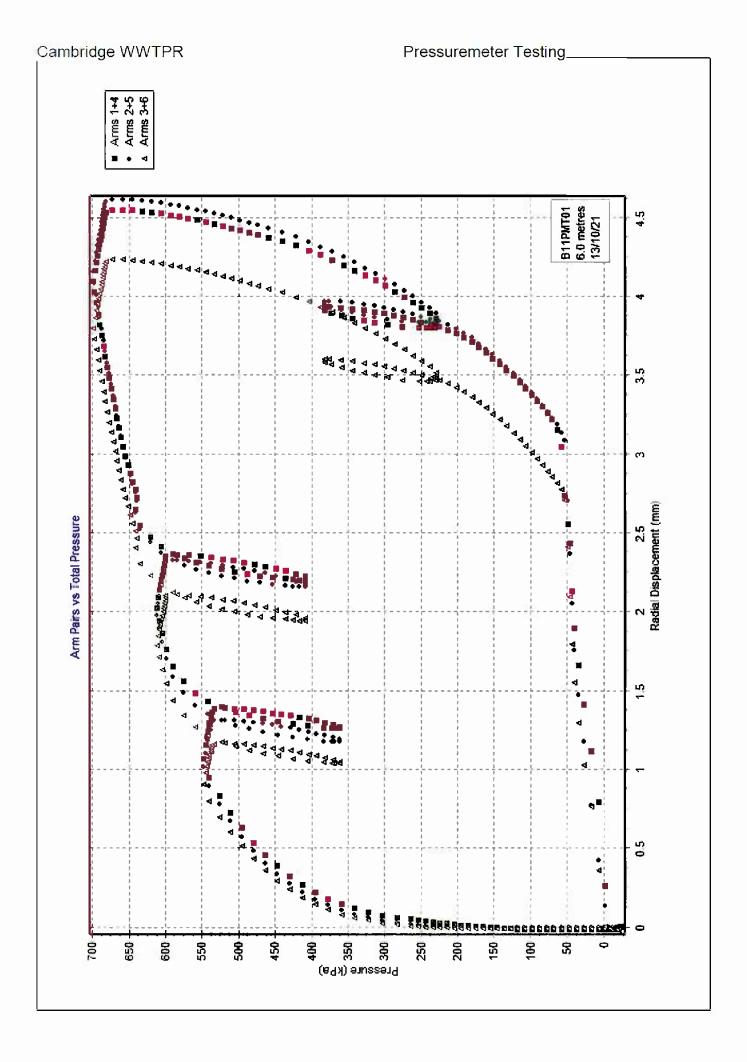


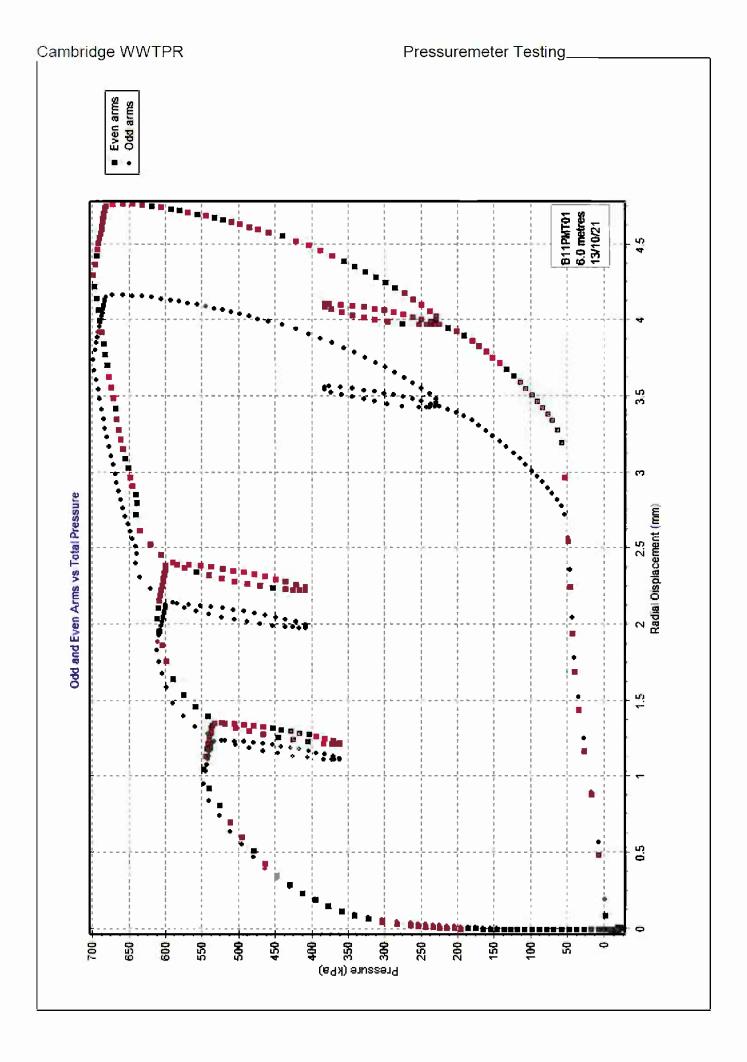


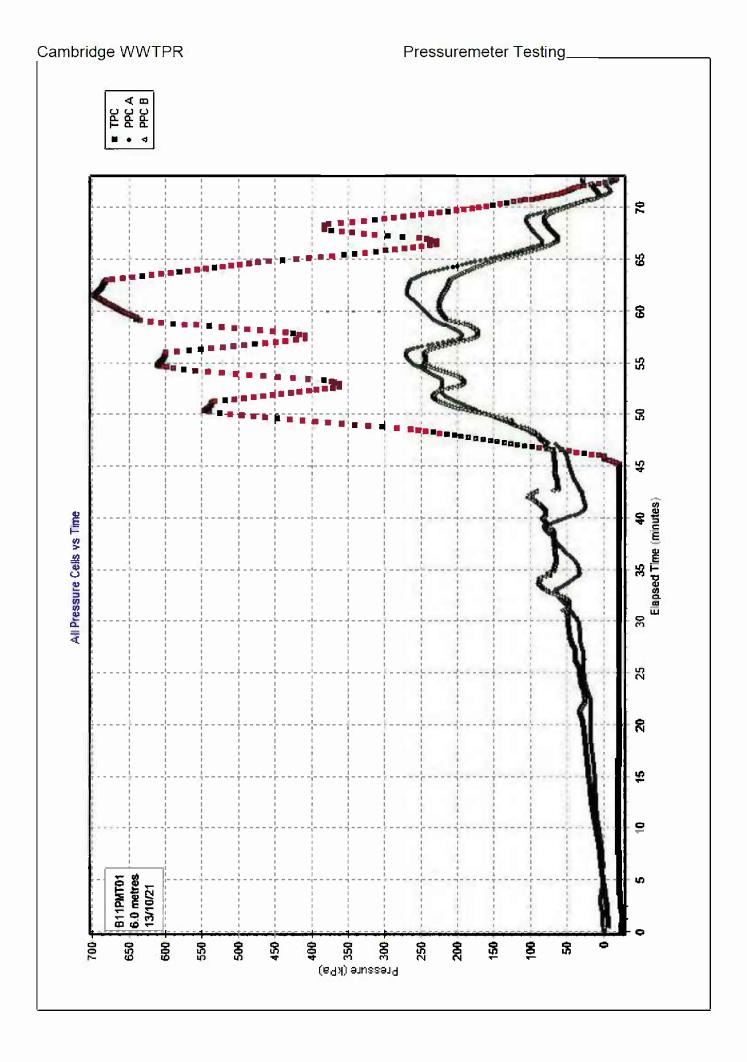












[DETAILS OF TEST]

Project : TE8364

Site : ambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_TUN_011PM
Test name : BH_TUN_011PM Test 2

Test date : 14 Oct 21
Test depth : 24.95 Metres
Water table : 1.75 Metres
Ambient PWP : 228.0 kPa
Material : Gault Clay

Probe : Digital 6 arm weak rock self boring pressuremeter

Diameter : 88.1 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB / ES / RW on 15 Oct 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=0.52"

Po from Marsland & Randolph (kPa) : "Arm ave=651.1"

Po from Lift off (kPa) : "Arm ave=541.9"

PWP versus Total Stress (kPa) : "PPC Ave=507.8"

Best estimate of Po (kPa) : "Arm ave=629.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=267.2"
Limit pressure (kPa) : "Arm ave=2395"
Jefferies 1988 - Cu (kPa) : "Arm ave=265.7"
Undrained yield stress (kPa) : "Arm ave=750.6"
PWP derived yield stress (kPa) : "PPC Ave=871.4"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=42.9"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	81.5	-0.240	861	0.358	292
Arm ave	2	62.6	2.021	1219	0.644	404
Arm ave	3	65.4	4.113	749	0.432	283

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm av	/e 1	11.342	7.228	0.637
Arm av	/e 2	13.521	9.071	0.671
Arm av	/e 3	9.551	5.970	0.625

Non-linear exponent from PWP response : "PPC Ave=0.527"

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 0.52

 Po (kPa)
 : 629

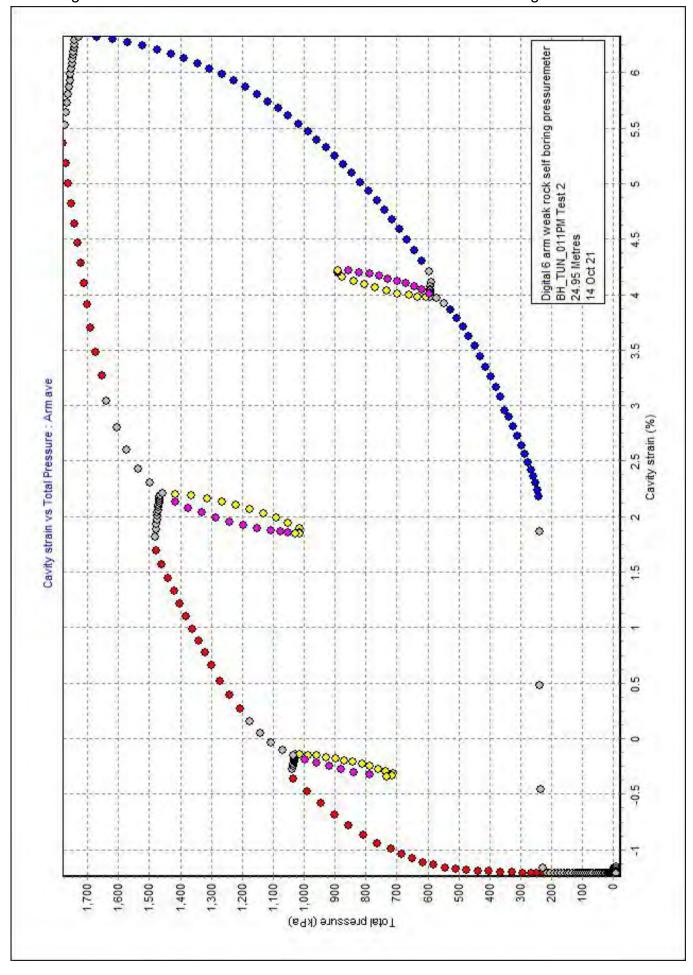
 Cu (kPa)
 : 267.2

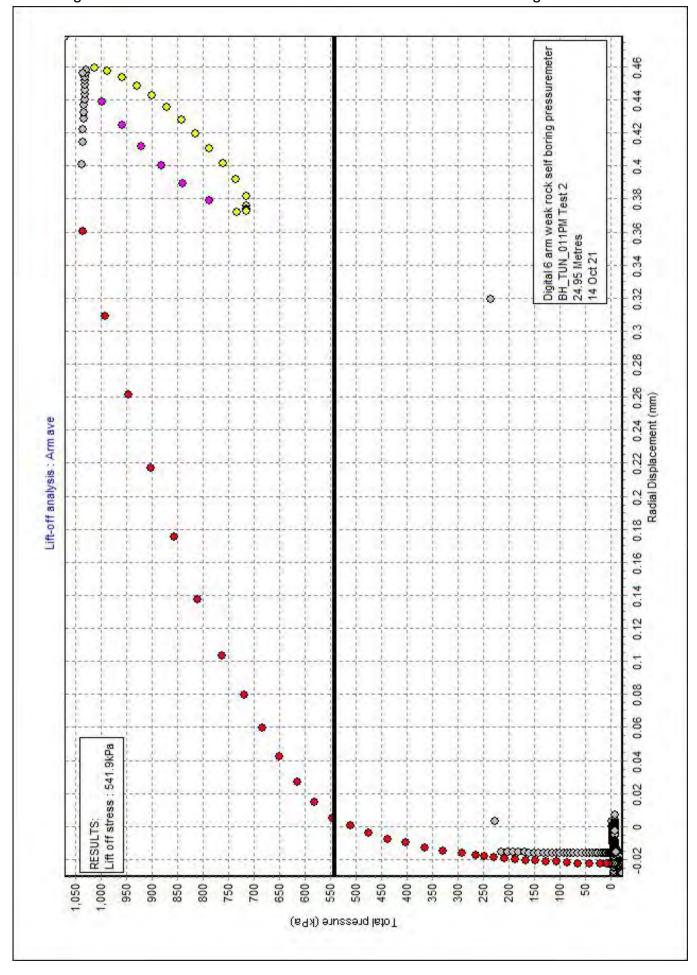
 Limit pressure (kPa)
 : 2395

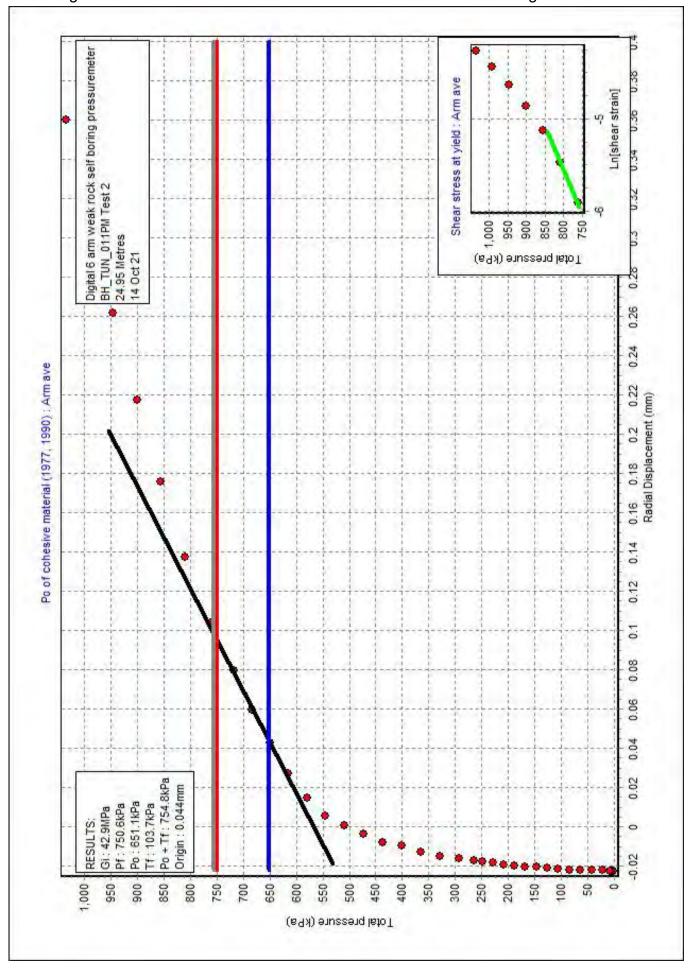
 Non-linear exponent
 : 0.625

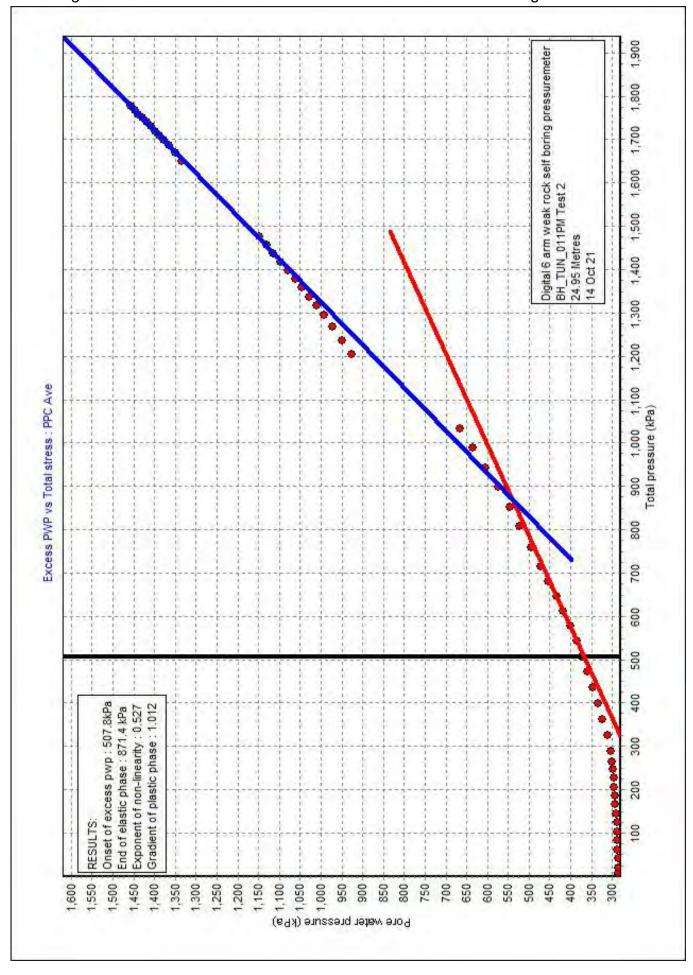
 Calculated alpha (MPa)
 : 6.119

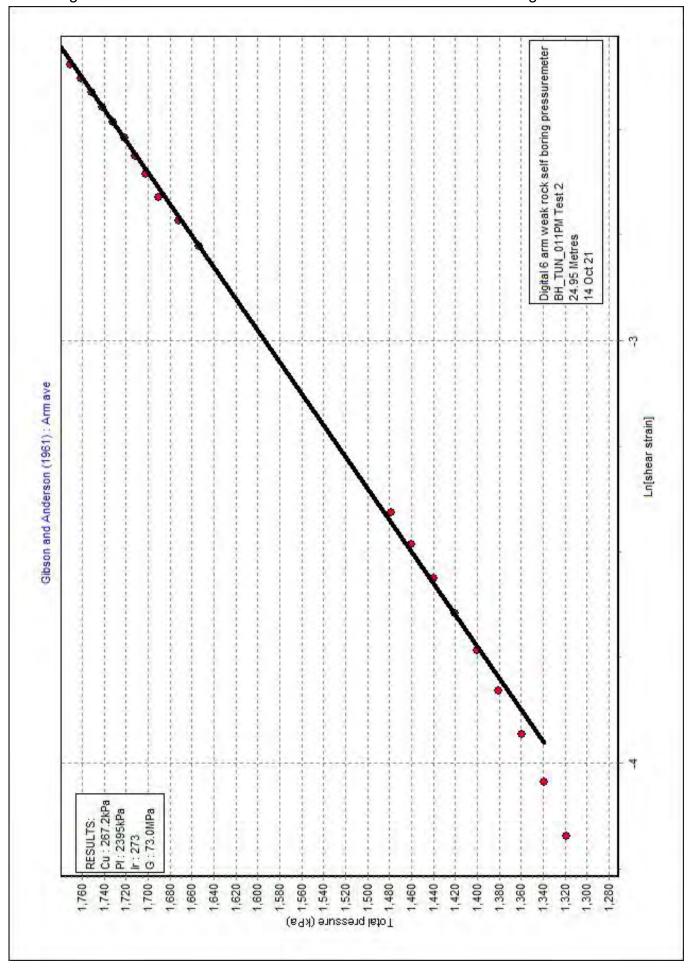
 G at yield (MPa)
 : 40.0

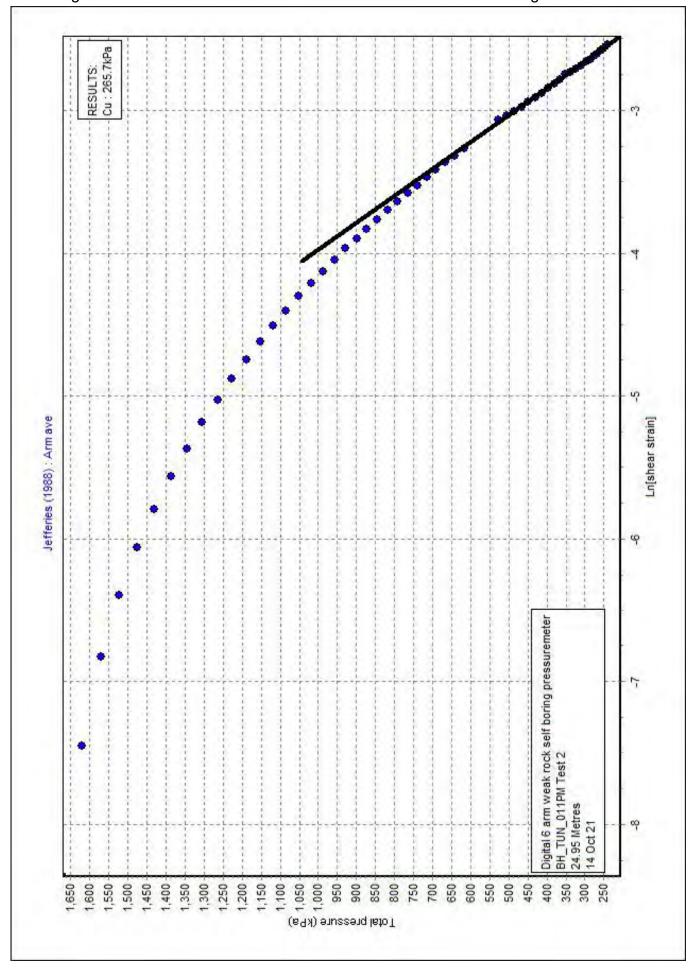


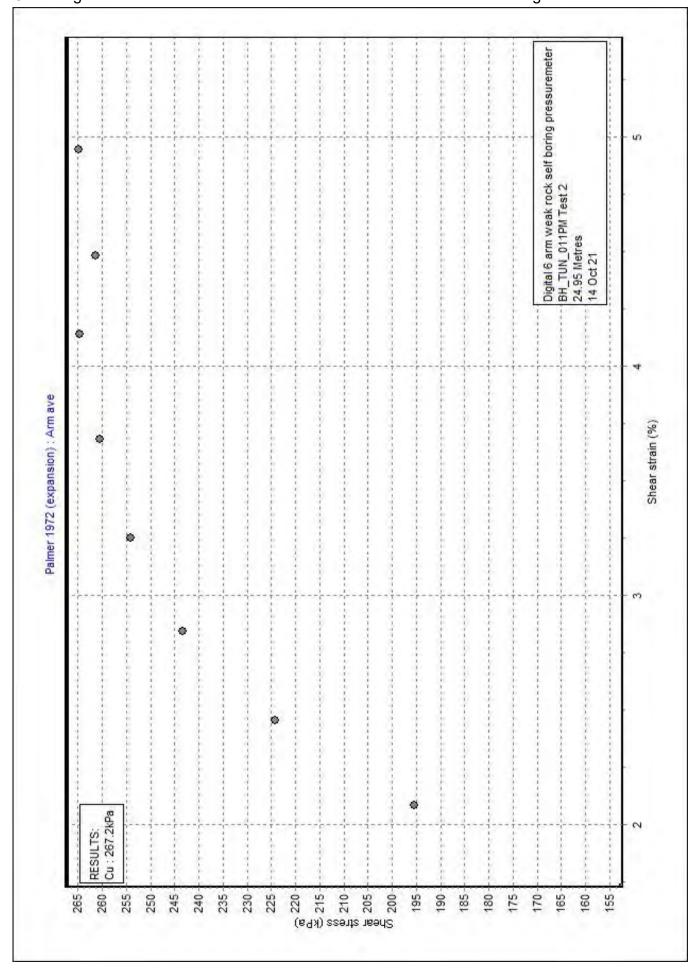


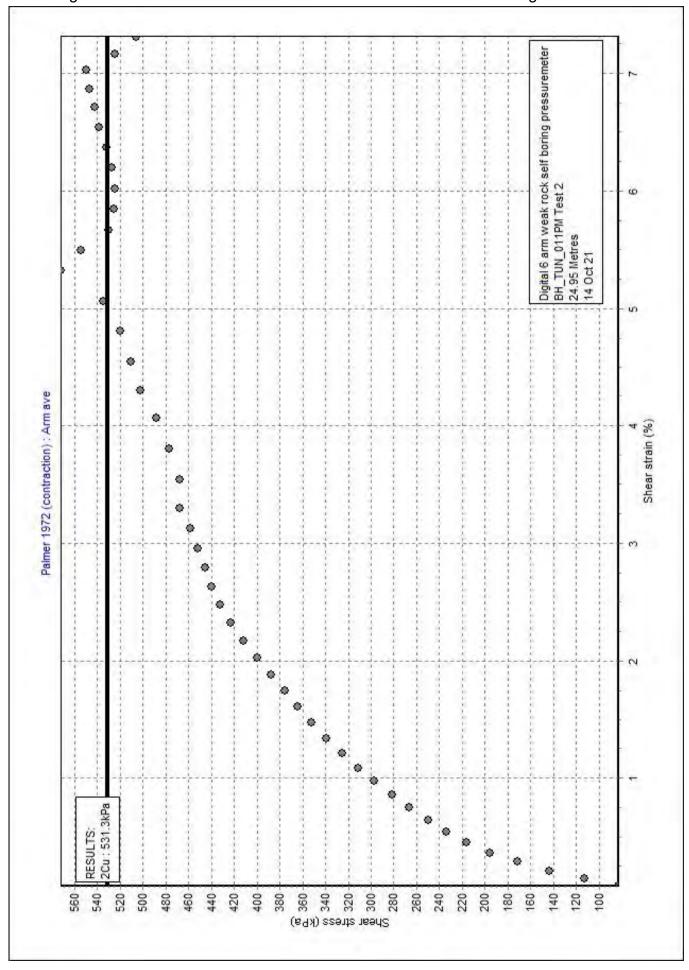


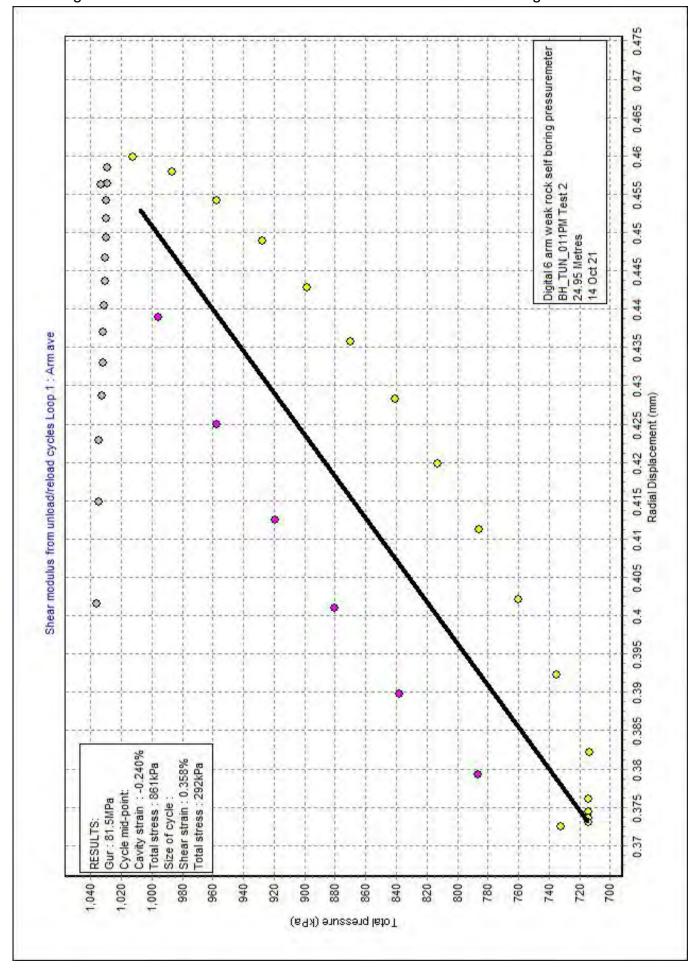


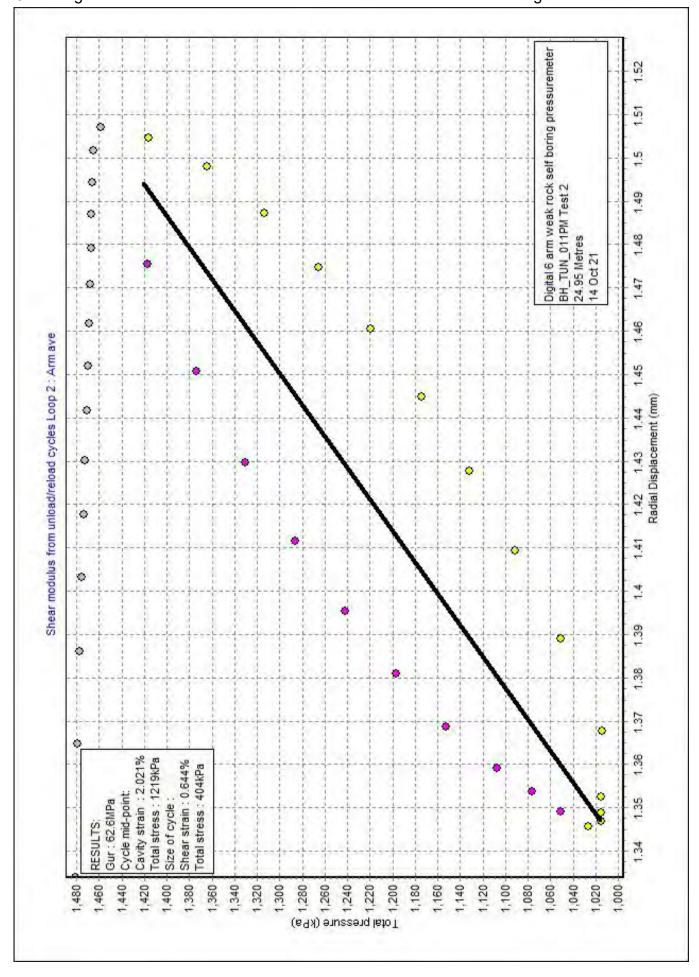


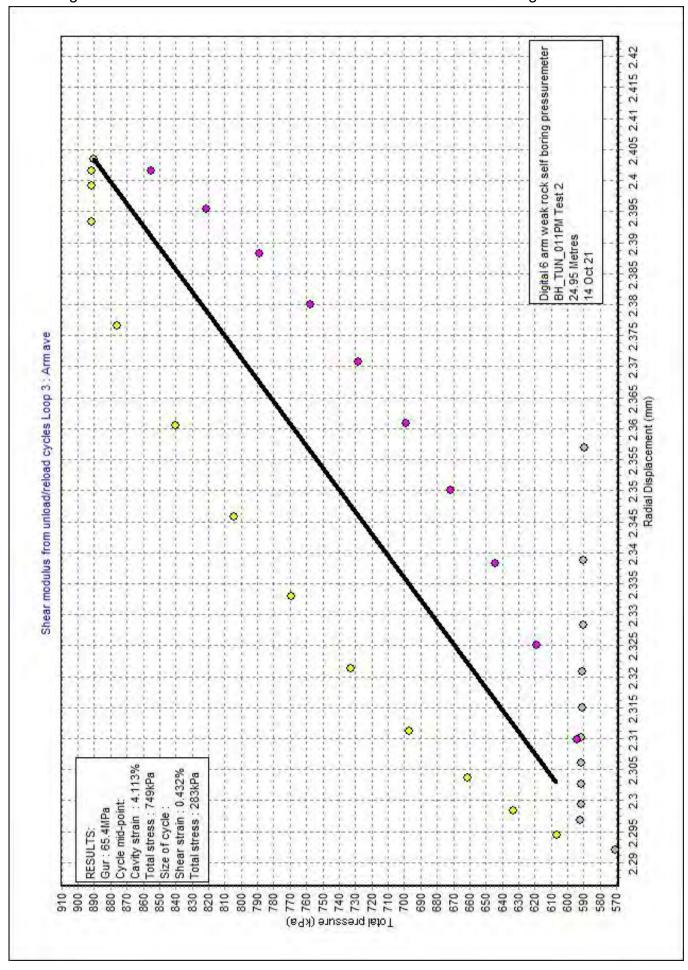


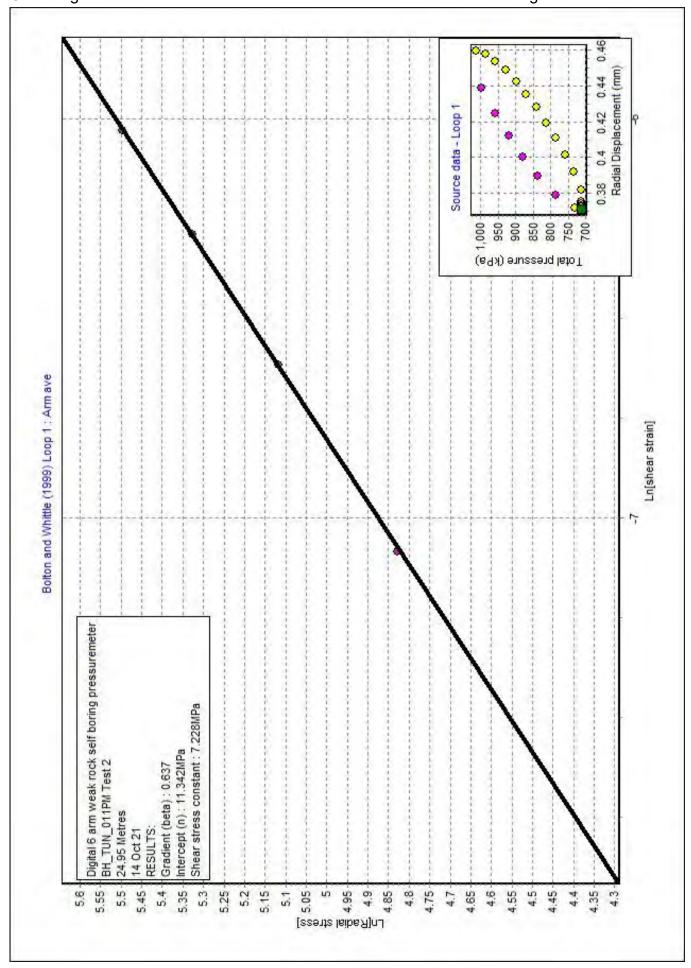


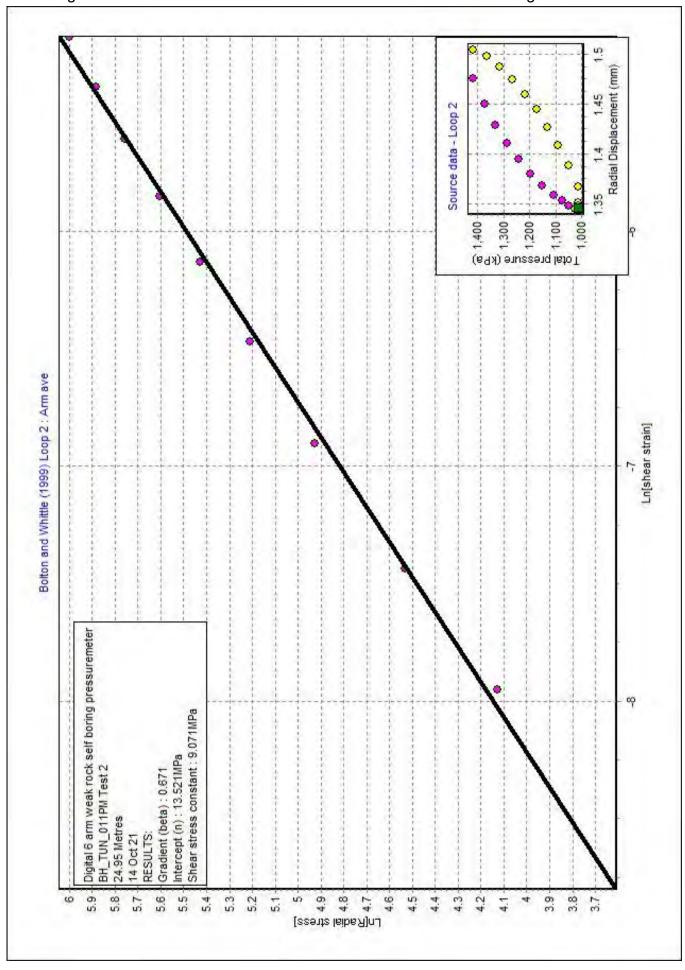


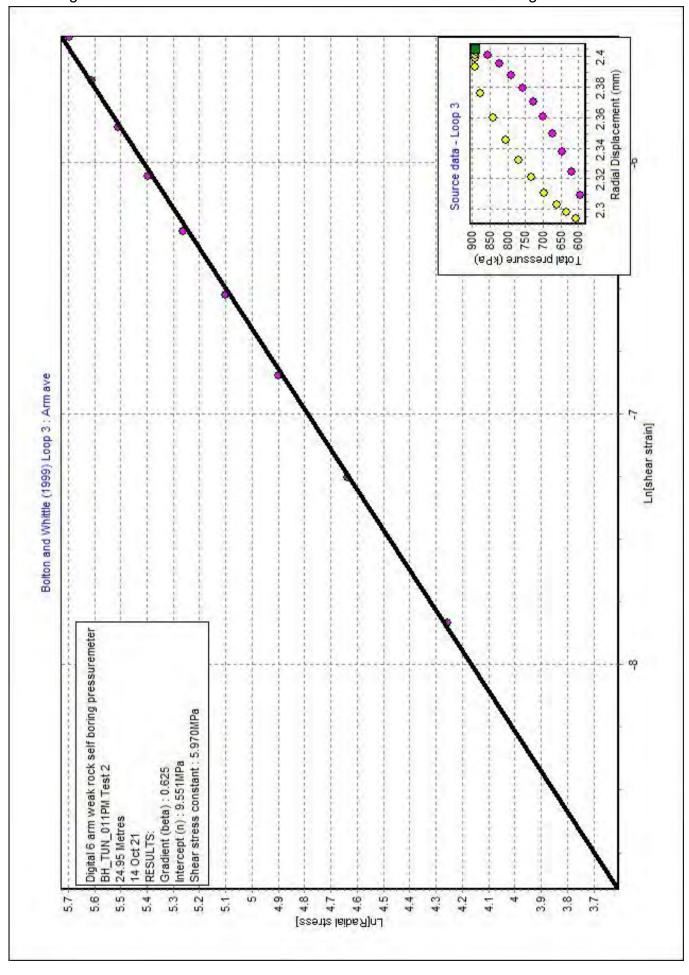


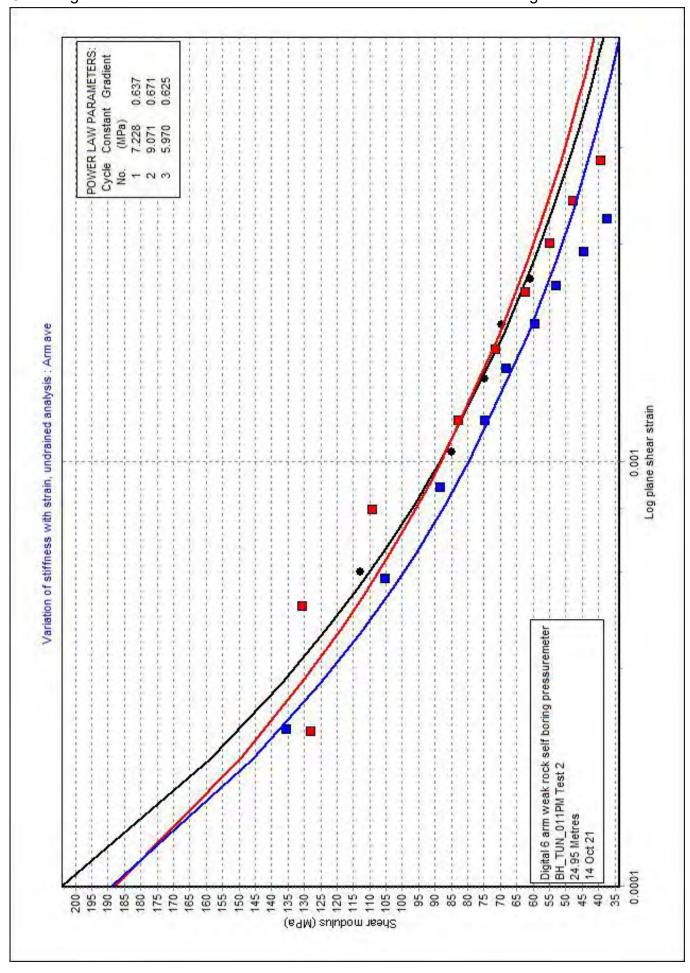


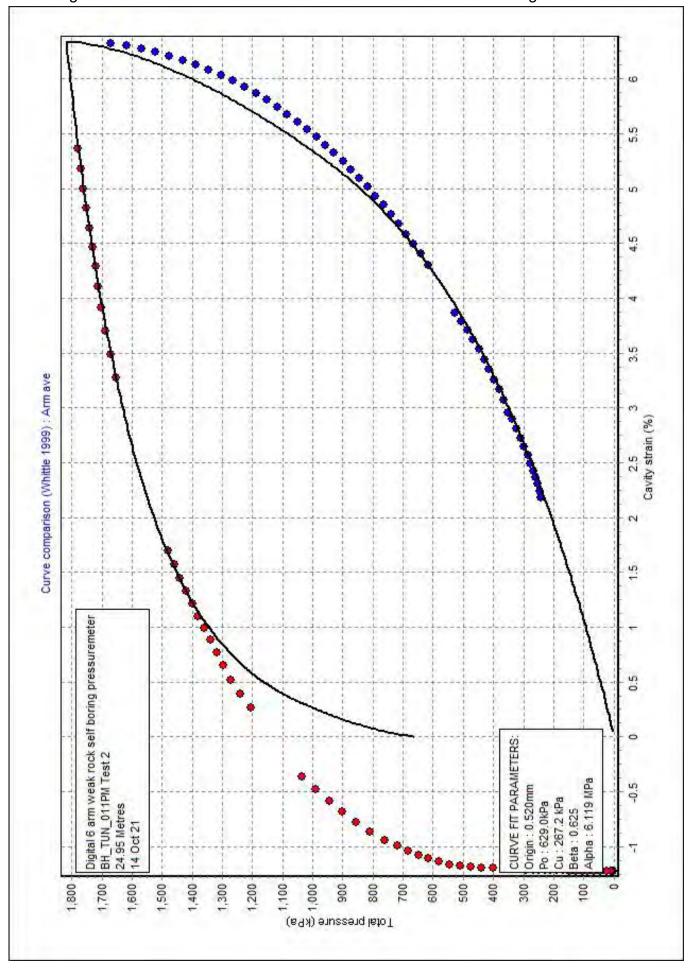


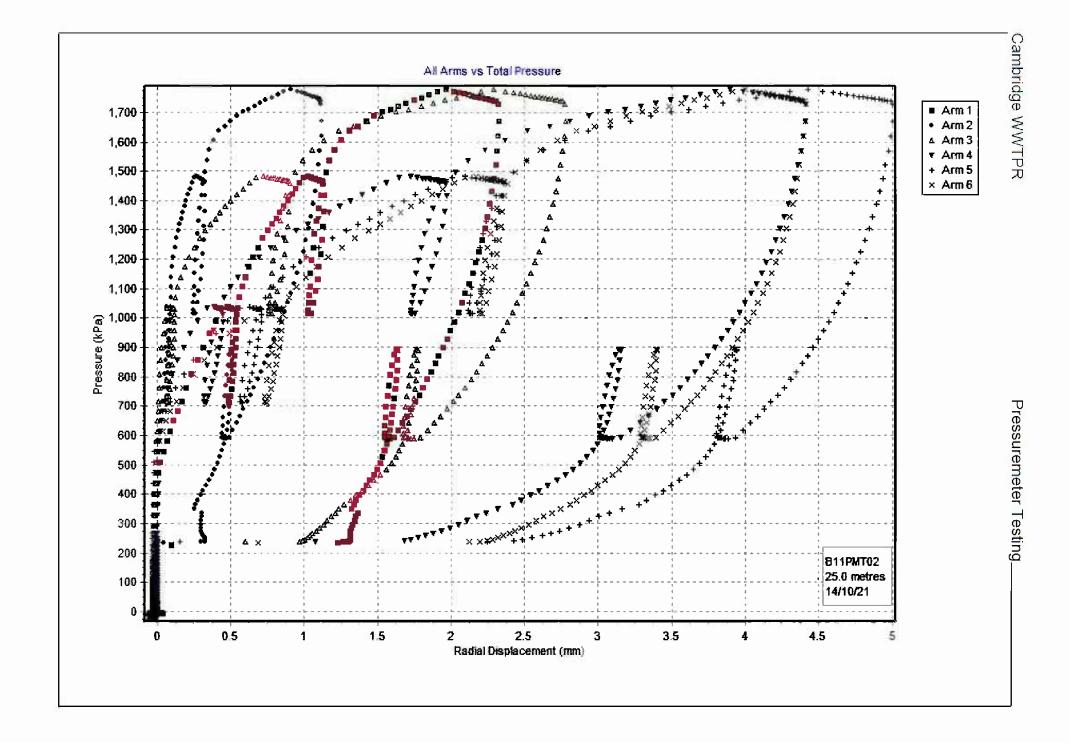


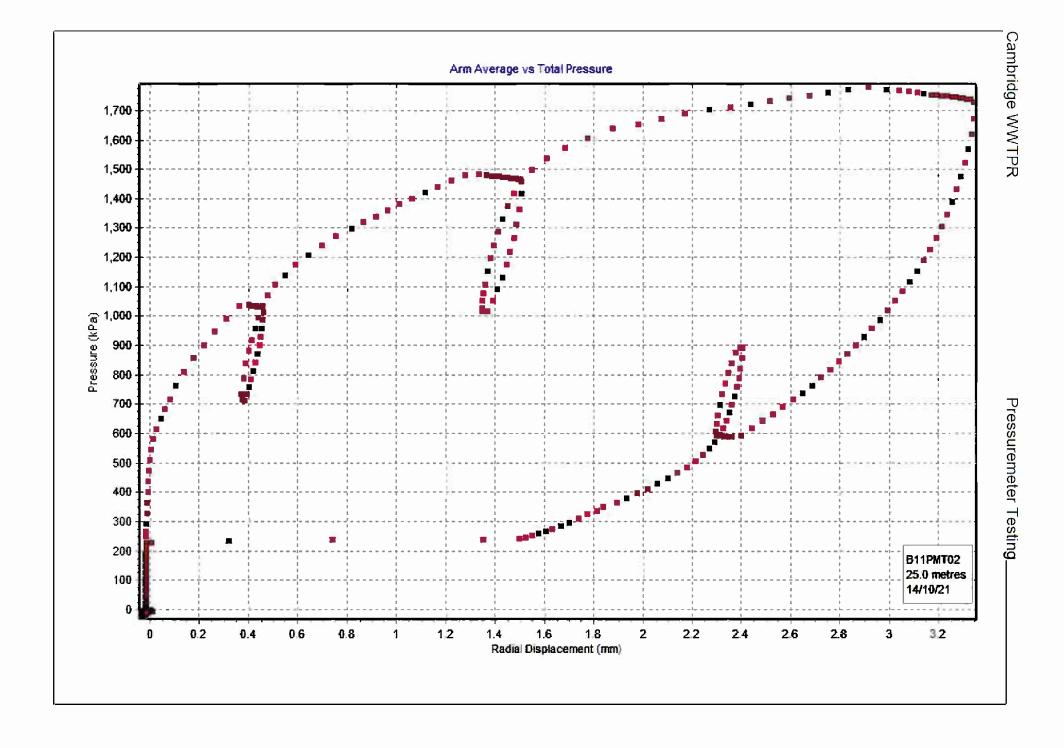


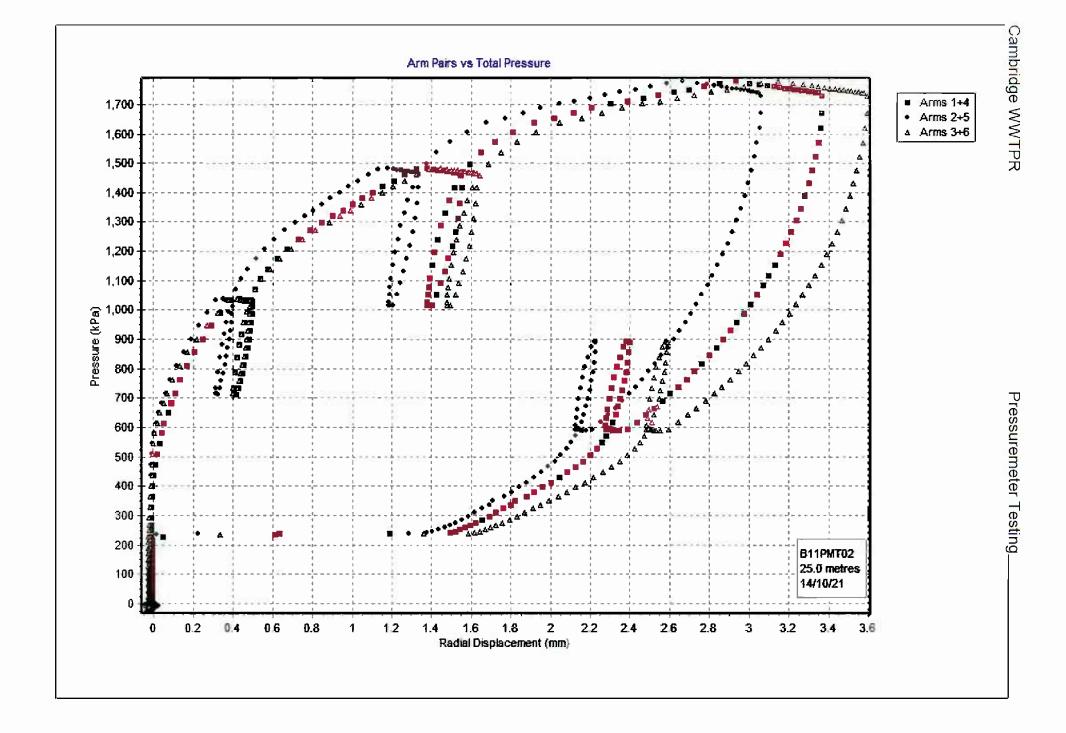


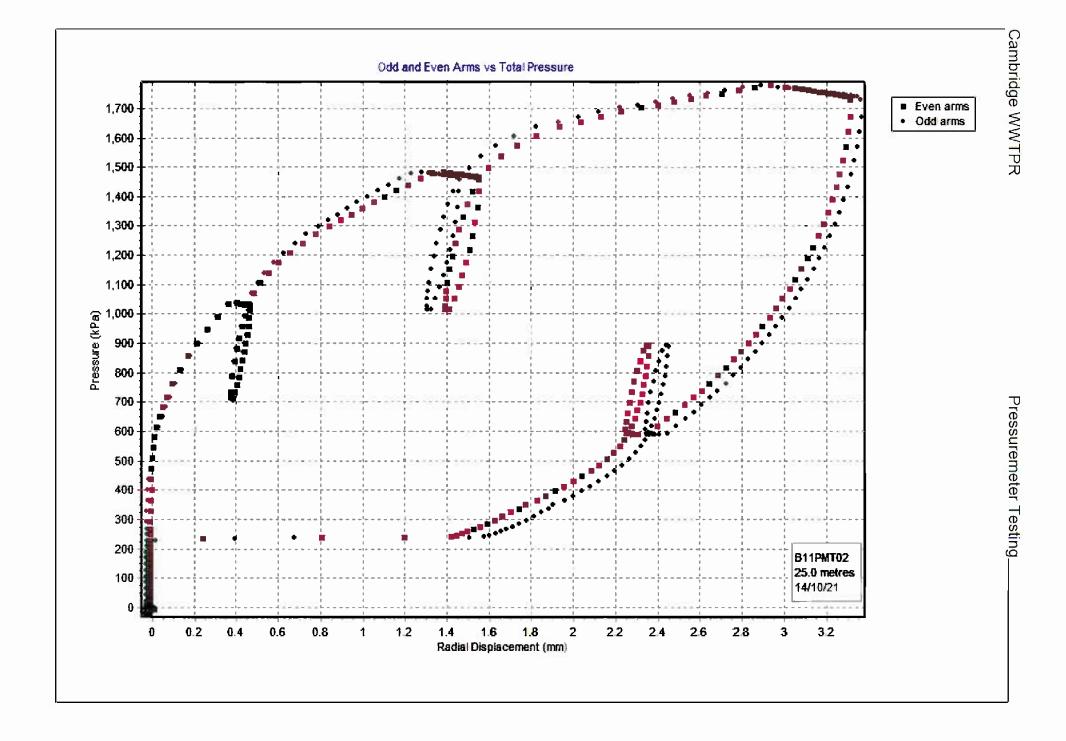


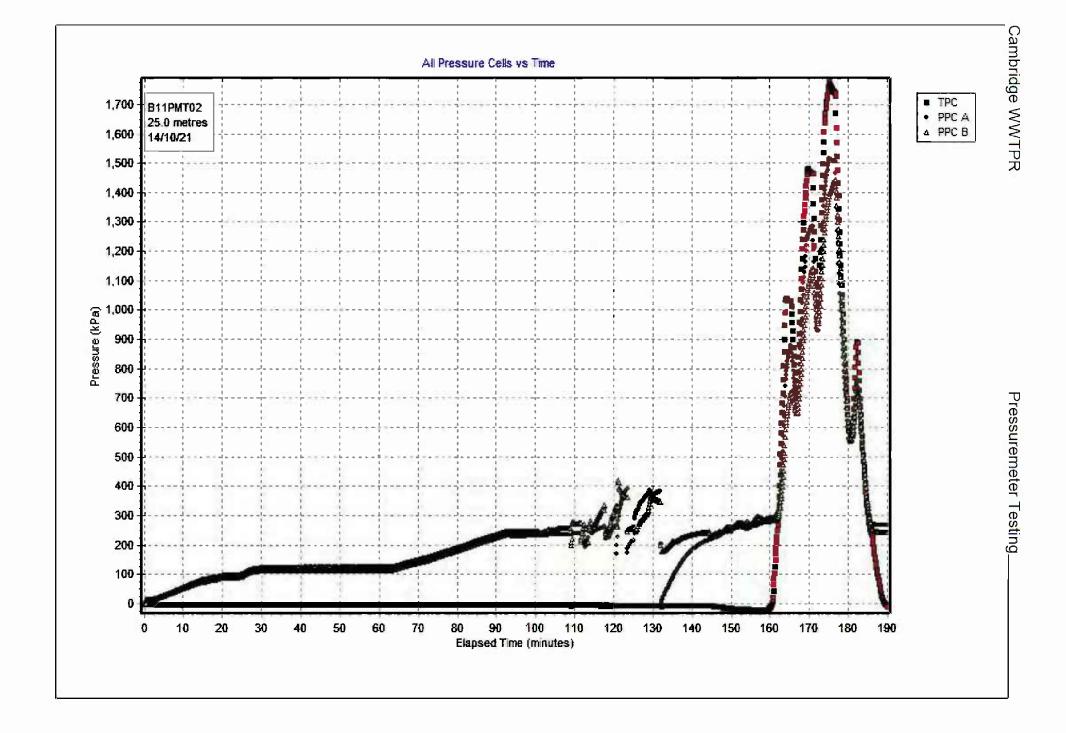












Cambridge WWTPR B018T01 - TEST & CALIBRATION DETAILS

[PROJECT DETAILS]

Contract name: CWW TPR

[BOREHOLE DETAILS] Borehole : BH TUN 006PM

[TEST DETAILS]
Test name: B018T01

Test date: 01/10/21
Depth (M): 27.00
Material:: Gault Clay
Heading (deg): n/a
Data Rate (secs): 6
Start Line: 1
Stop Line: 630

[COMMENTS]

Challenging drilling. Likely washed out top of pocket resulting in burst.

[PROBE DETAILS]

Type: Digital 6 Arm Self Boring Pressuremeter

Diameter over probe: 88.10mm
Diameter under membrane: 79.15mm
CHL strip thickness: 0.5000mm

[CALIBRATION FACTORS]

TRANSDUCERS MEMBRANE COMPLIANCE

ARM 1 -83.9 mV and 306.3 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 2 -930.9 mV and 326.5 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

ARM 3 -323.9 mV and 326.9 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

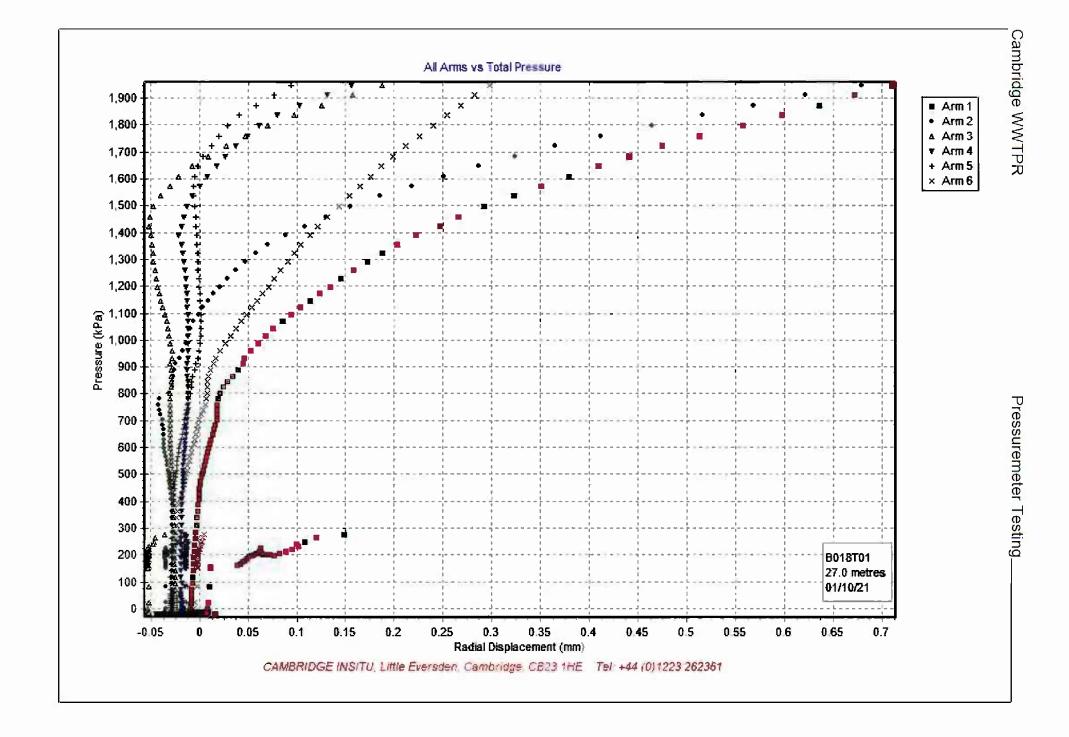
ARM 4 75.5 mV and 330.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

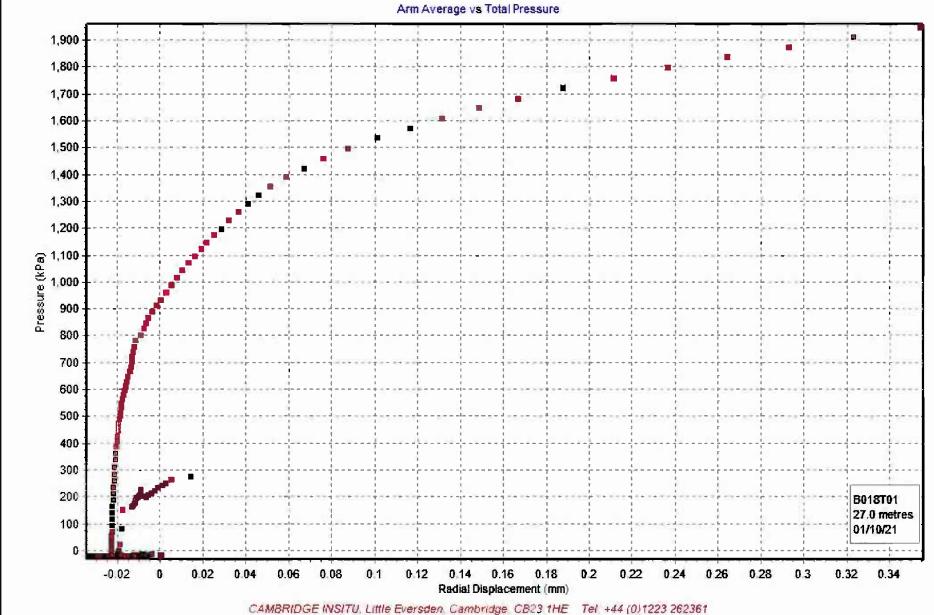
ARM 5 75.7 mV and 330.4 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

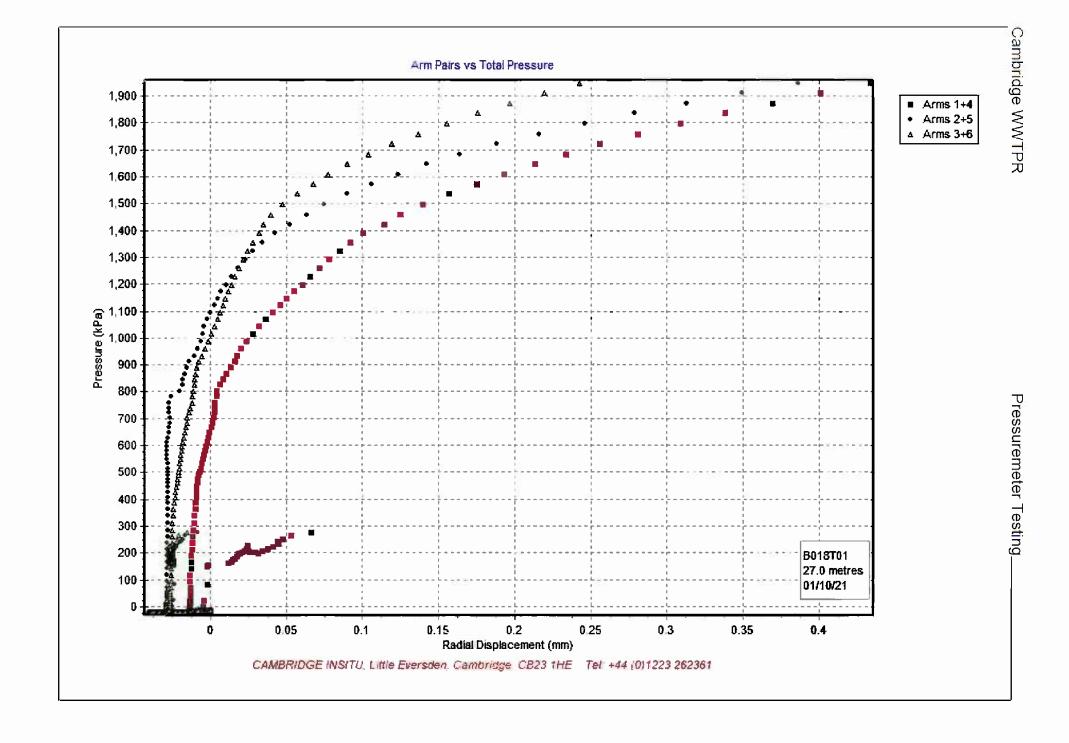
ARM 6 -137.3 mV and 329.0 mV/mm 17.3 kPa and 9.1 kPa/mm 3.4 mm/GPa

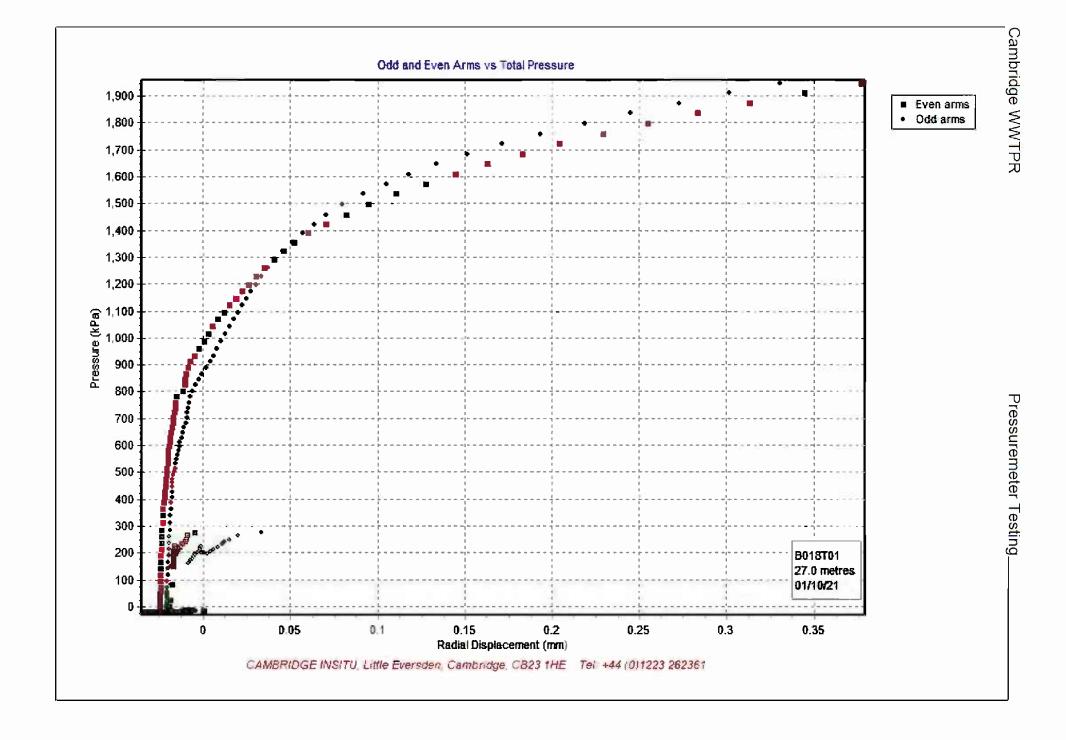
PPC A -2572.5 mV and 402.4 mV/MPa

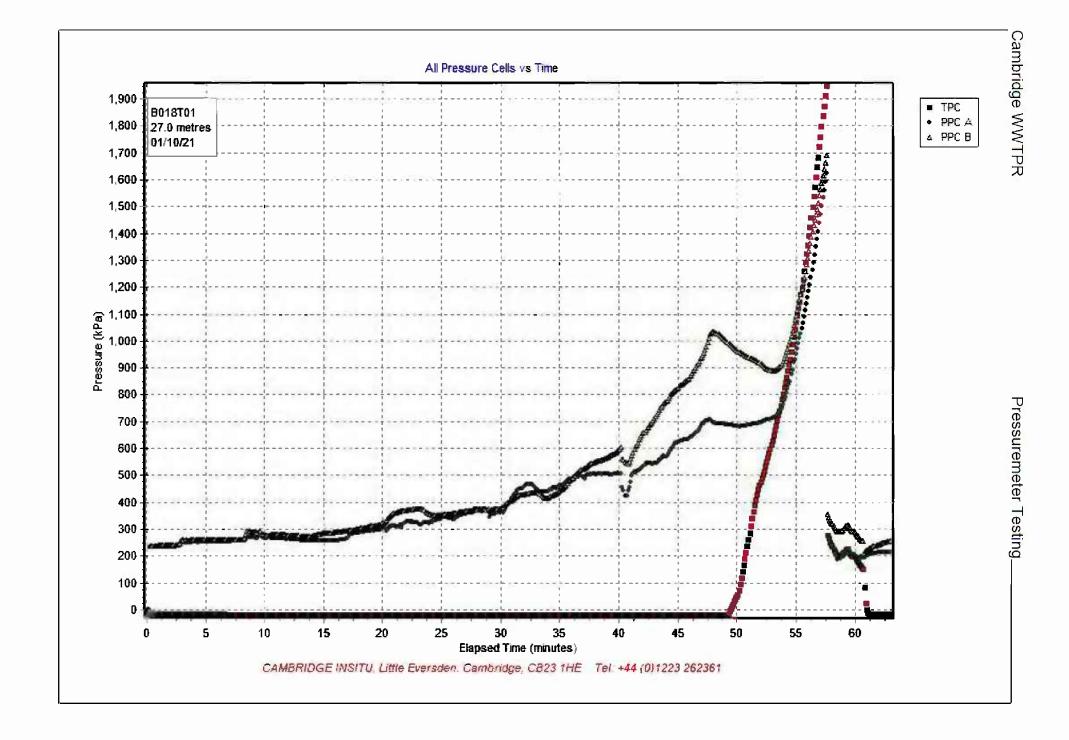
PPC B -2403.0 mV and 388.5 mV/MPa TPC -2379.2 mV and 457.3 mV/MPa











Cambridge WWTPR B018T02 - TEST & CALIBRATION DETAILS

[PROJECT DETAILS]

Contract name : CWW TPR

[BOREHOLE DETAILS] Borehole : BH TUN 018PM

[TEST DETAILS]

Test name: B018T02 Test date: 04/10/21 Depth (M): 28.00 Material: Gault Clay Heading (deg): n/a Data Rate (secs): 5 Start Line: 1 Stop Line: 933

[COMMENTS]

SBP test terminated. Refusal at 0.5m.

[PROBE DETAILS]

Type: Digital 3 Arm Self Boring Pressuremeter

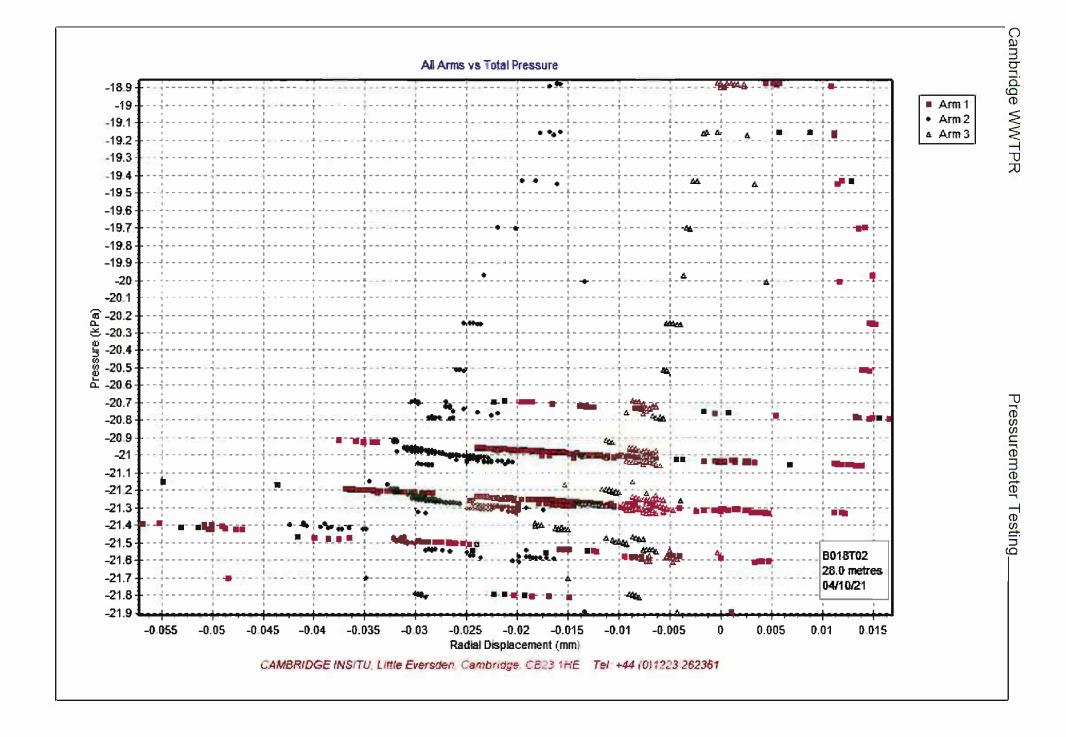
Diameter over probe: 88.10mm
Diameter under membrane: 79.15mm
CHL strip thickness: 0.5000mm

[CALIBRATION FACTORS]

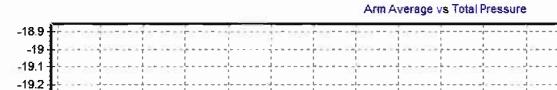
TRANSDUCERS MEMBRANE COMPLIANCE

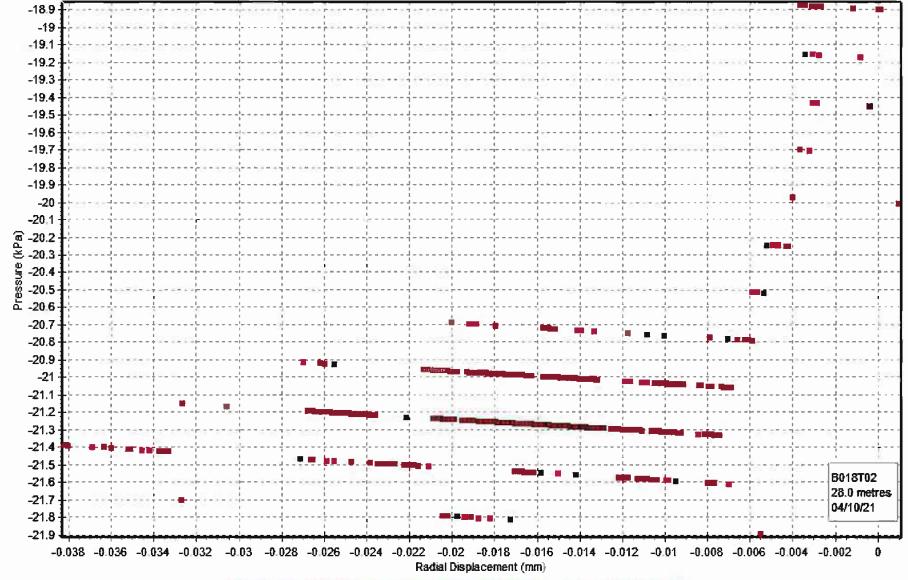
ARM 1 31.9 mV and 295.5 mV/mm 18.9 kPa and 7.1 kPa/mm 3.2 mm/GPa ARM 2 71.3 mV and 292.7 mV/mm 18.9 kPa and 7.1 kPa/mm 3.2 mm/GPa ARM 3 -25.6 mV and 300.5 mV/mm 18.9 kPa and 7.1 kPa/mm 3.2 mm/GPa

TPC -2072.8 mV and 362.4 mV/MPa PPC A -2133.9 mV and 430.6 mV/MPa PPC B -1767.9 mV and 424.2 mV/MPa

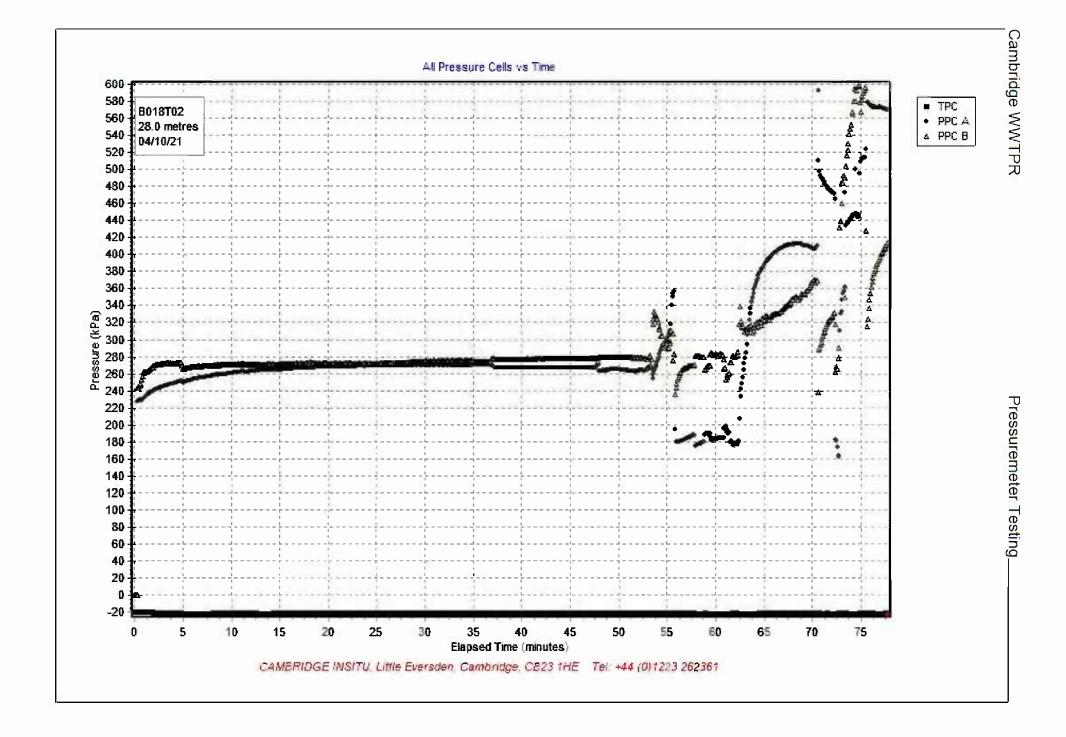


Cambridge WWTPR





CAMBRIDGE INSITU, Little Eversden, Cambridge, CB23 1HE Tel: +44 (0)1223 262361



Cambridge WWTPR B018T03 - TEST & CALIBRATION DETAILS

[PROJECT DETAILS]

Contract name : CWW TPR

[BOREHOLE DETAILS] Borehole : BH_TUN_018PM

[TEST DETAILS]

Test name: B018T03 Test date: 04/10/21 Depth (M): 28.70 Material: Gault Clay Heading (deg): n/a Data Rate (secs): 10

Start Line: 1 Stop Line: 59

[COMMENTS]

Very stiff clay. Pocket likely had significant flush channel. No data obtained suitable for analysis

[PROBE DETAILS]

Type: Digital High Pressure Dilatometer Diameter over probe: 97.00mm Diameter under membrane: 81.00mm CHL strip thickness: 1.0000mm

[CALIBRATION FACTORS]

TRANSDUCERS MEMBRANE COMPLIANCE

ARM 1 -2027.6 mV and 146.0 mV/mm 43.3 kPa and 6.1 kPa/mm 3.1 mm/GPa

ARM 2 -2660.2 mV and 138.9 mV/mm 43.3 kPa and 6.1 kPa/mm 3.1 mm/GPa

ARM 3 -2305.5 mV and 146.2 mV/mm 43.3 kPa and 6.1 kPa/mm 3.1 mm/GPa

ARM 4 -2073.2 mV and 140.7 mV/mm 43.3 kPa and 6.1 kPa/mm 3.1 mm/GPa

ARM 5 -2326.9 mV and 139.3 mV/mm 43.3 kPa and 6.1 kPa/mm 3.1 mm/GPa

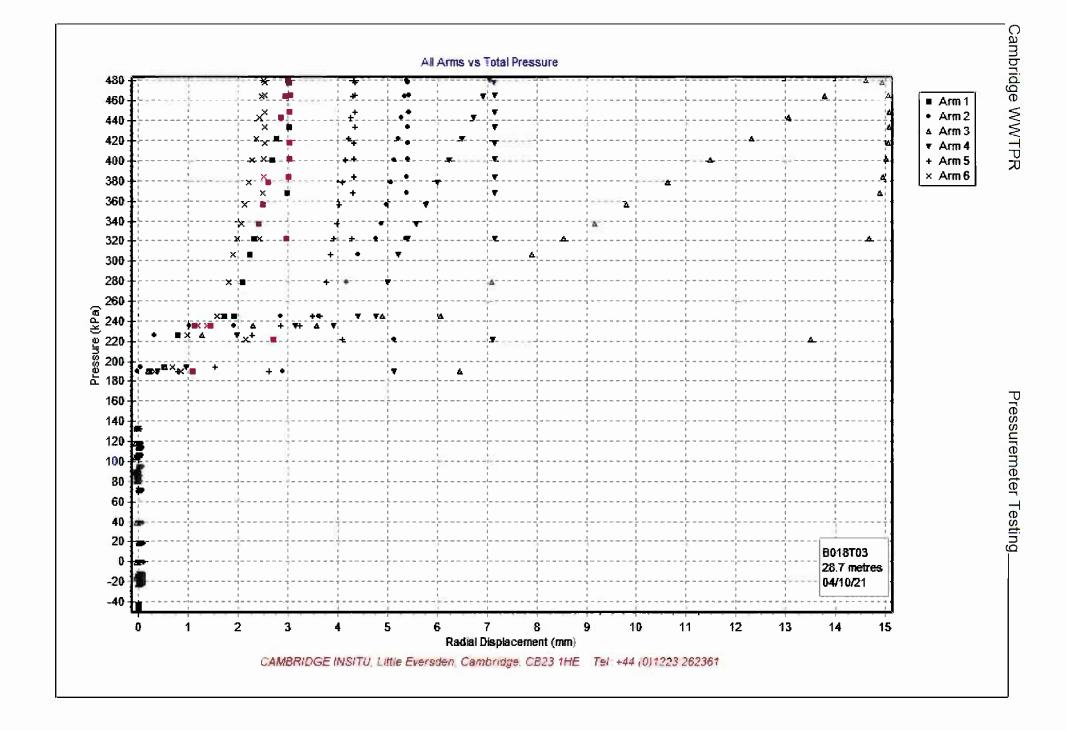
ARM 6 -2068.4 mV and 125.3 mV/mm 43.3 kPa and 6.1 kPa/mm 3.1 mm/GPa

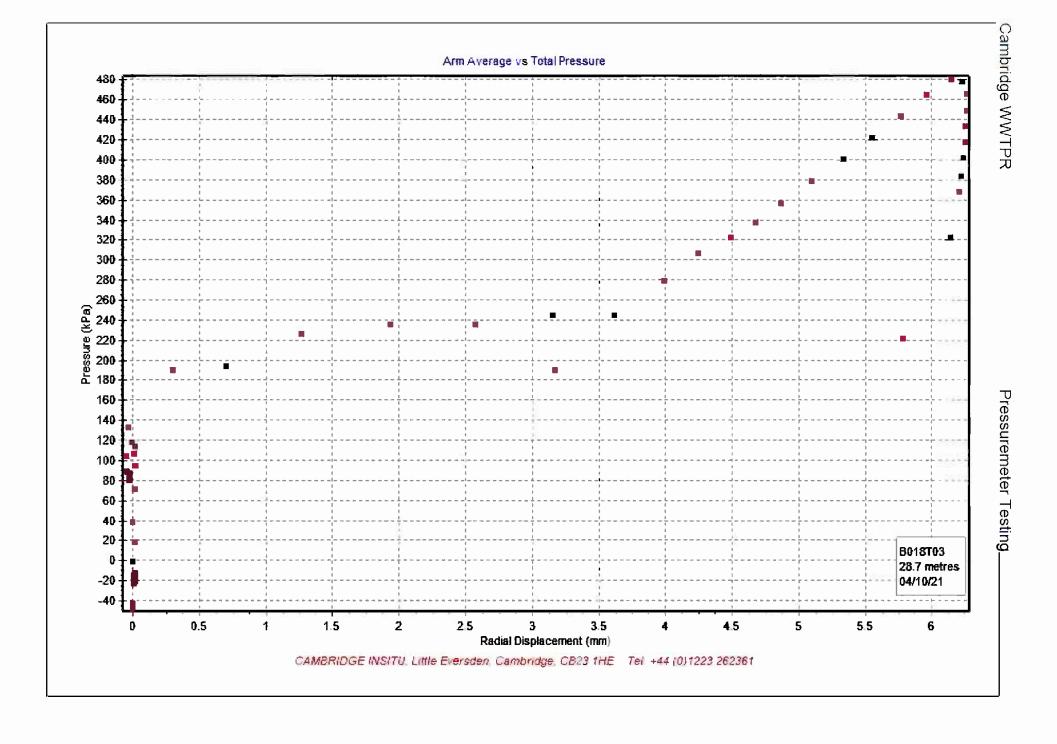
TPC A -1601.8 mV and 108.8 mV/MPa *

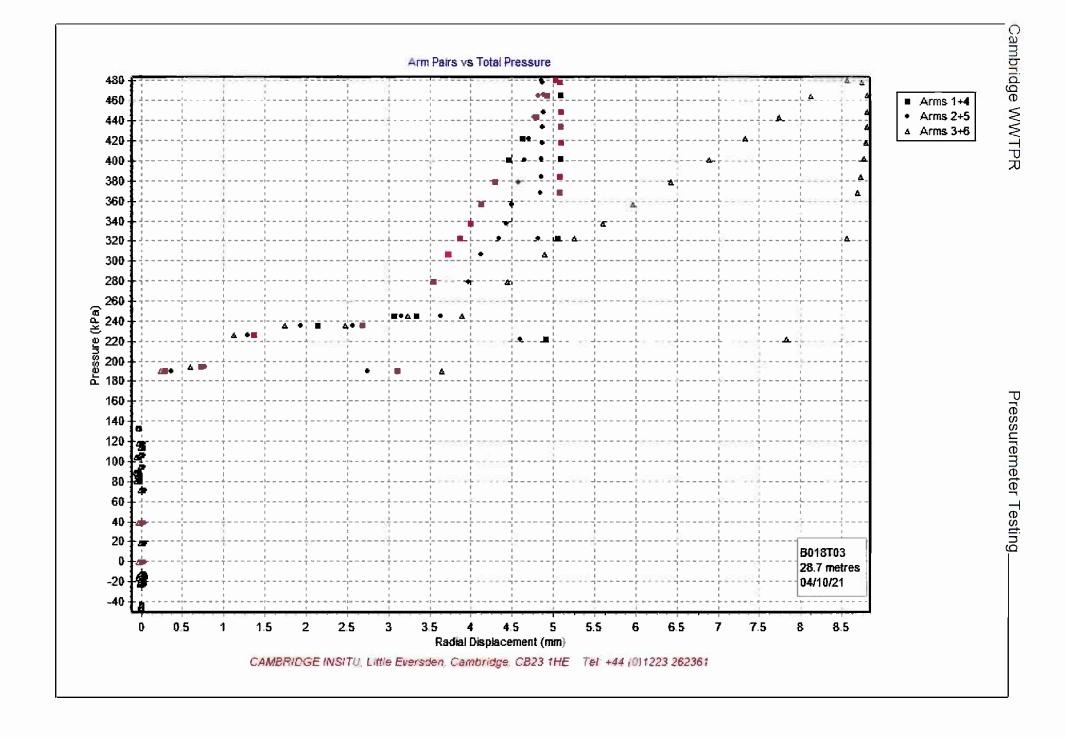
TPC A -1601.8 mV and 108.8 mV/MPa * TPC B -2052.5 mV and 108.9 mV/MPa *

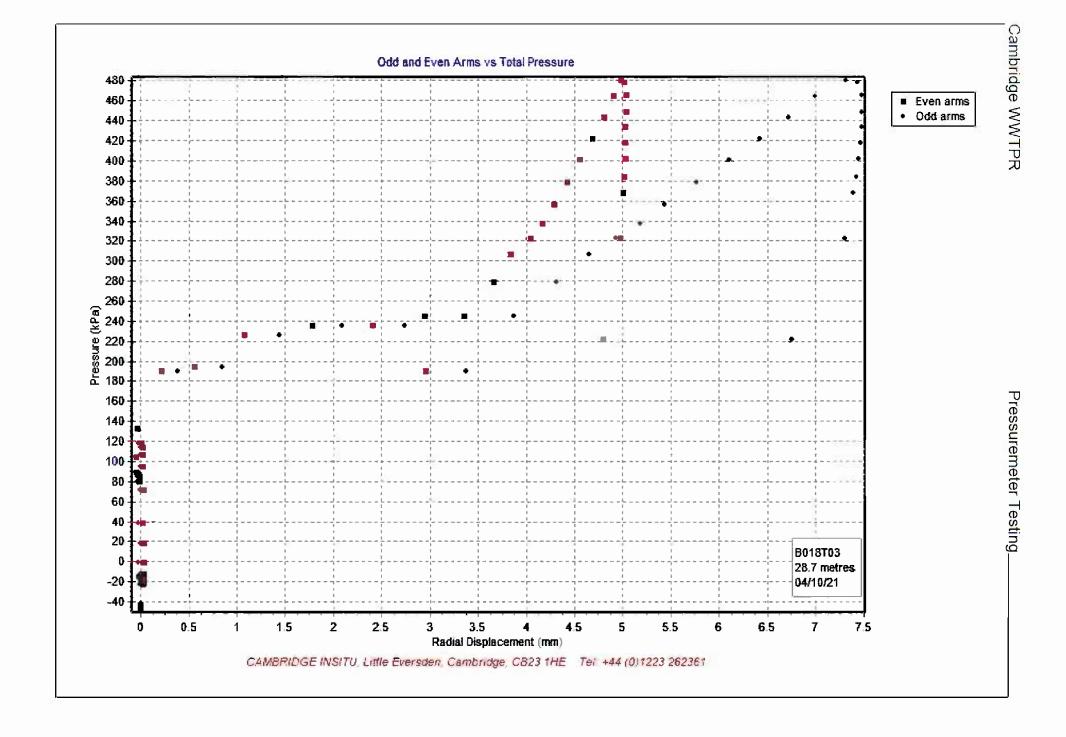
[COMPASS FACTORS (units in millivolts)]

Sin Sensor: Min: -1000.0000 Max: 1000.0000 Cos Sensor: Min: -1000.0000 Max: 1000.0000









[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_TUN_018PM
Test name : BH_TUN_018PM Test 4

Test date : 4 Oct 21
Test depth : 30.40 Metres
Water table : 4 Metres
Ambient PWP : 259.0 kPa
Material : Gault Clay

Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB / ES / RW on 5 Oct 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=3.95"
Po from Marsland & Randolph (kPa) : "Arm ave=898.7"
Best estimate of Po (kPa) : "Arm ave=958.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=345.9"
Limit pressure (kPa) : "Arm ave=3194"
Jefferies 1988 - Cu (kPa) : "Arm ave=342.7"
Undrained yield stress (kPa) : "Arm ave=1291.1"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=15.8"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	67.0	-3.961	900	0.512	344
Arm ave	2	55.9	-2.201	1222	0.761	427
Arm ave	3	50.5	0.969	1596	1.140	579
Arm ave	4	57.0	9.675	1163	0.968	554

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Āxis	Loop No	Intercept (MPa)	Alpha (MPa)	Gradient
Arm ave	1	8.751	5.345	0.611
Arm ave	2	9.397	5.786	0.616
Arm ave	3	9.238	5.614	0.608
Arm ave	4	10.640	6.548	0.615

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 3.95

 Po (kPa)
 : 958

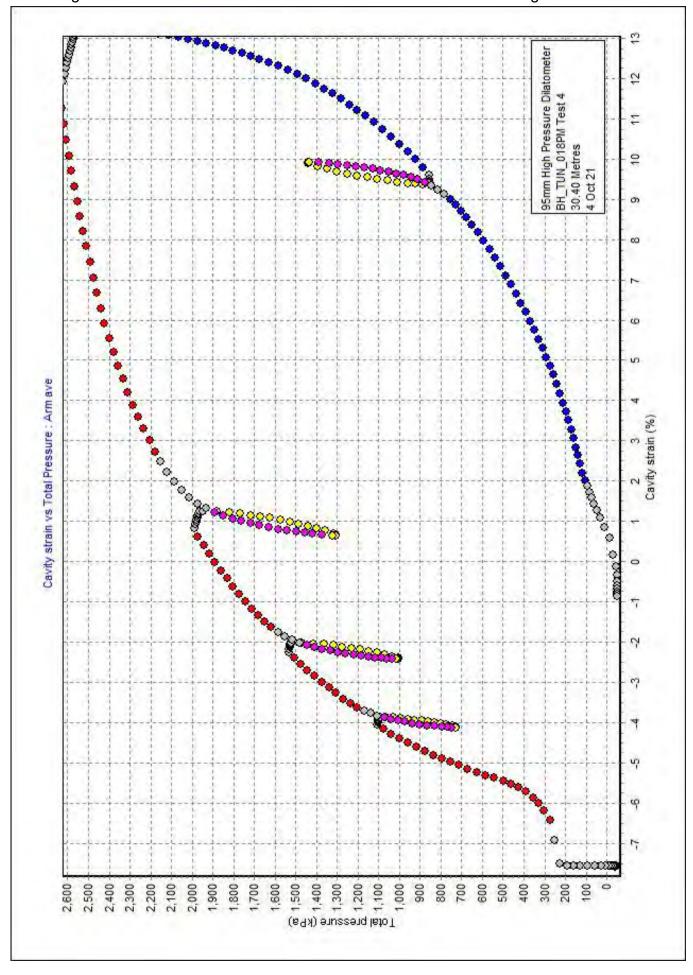
 Cu (kPa)
 : 345.9

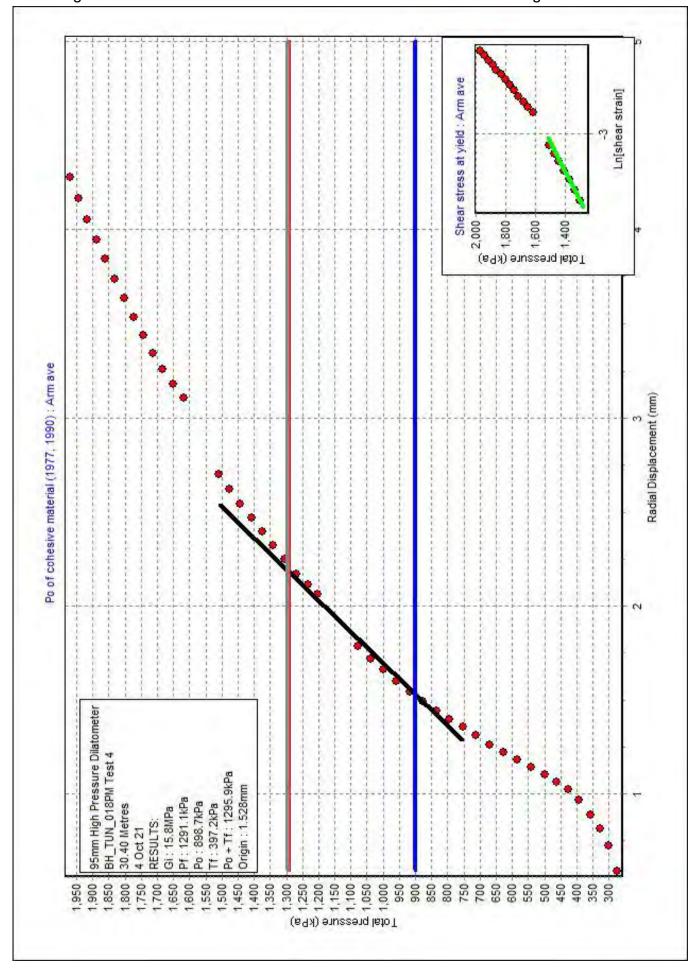
 Limit pressure (kPa)
 : 3194

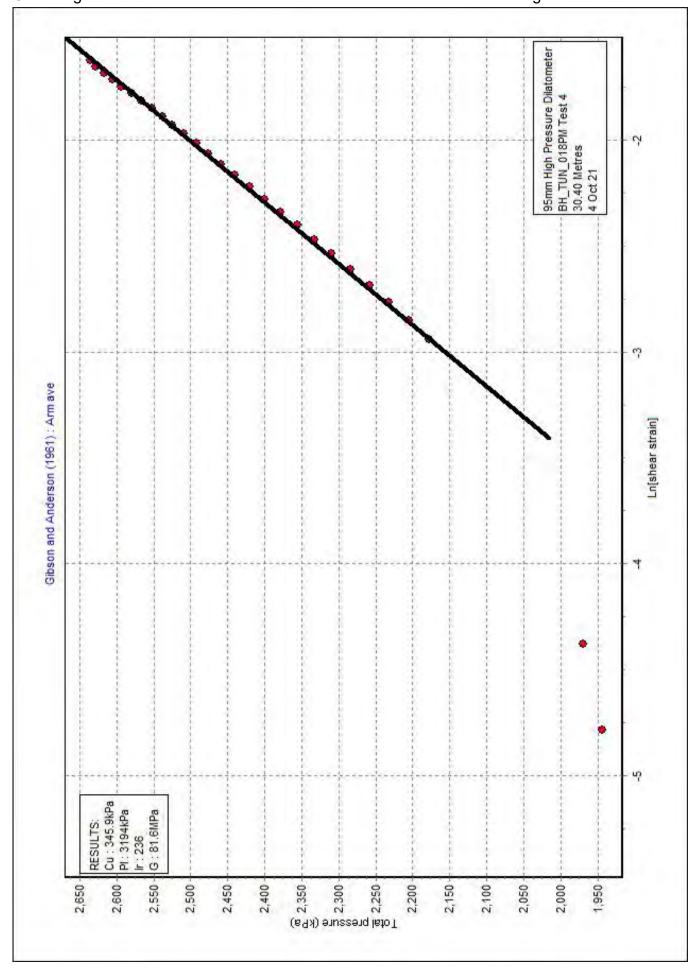
 Non-linear exponent
 : 0.608

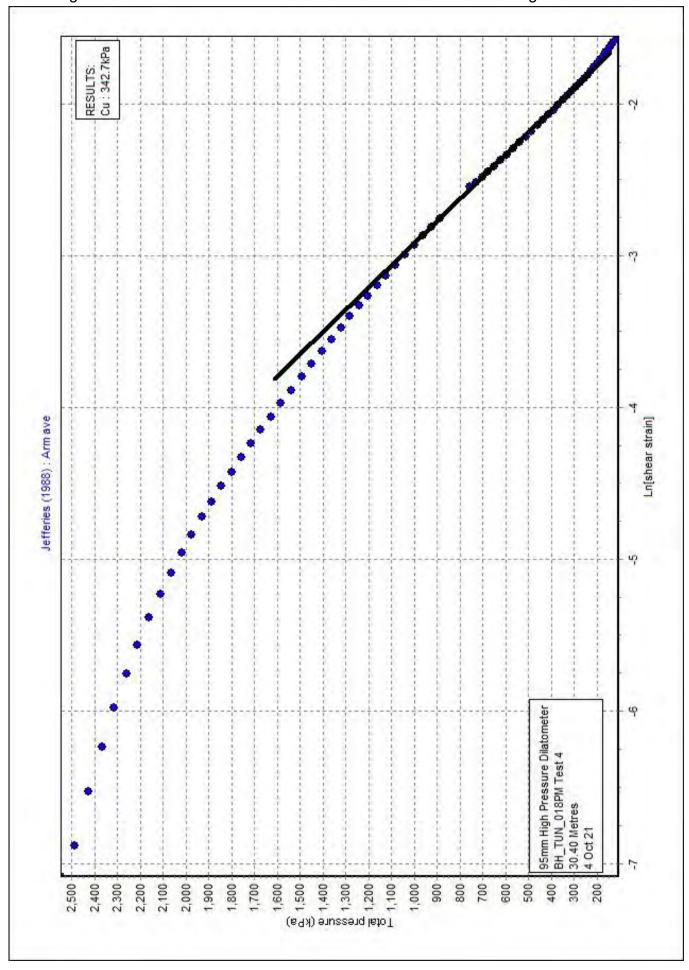
 Calculated alpha (MPa)
 : 6.476

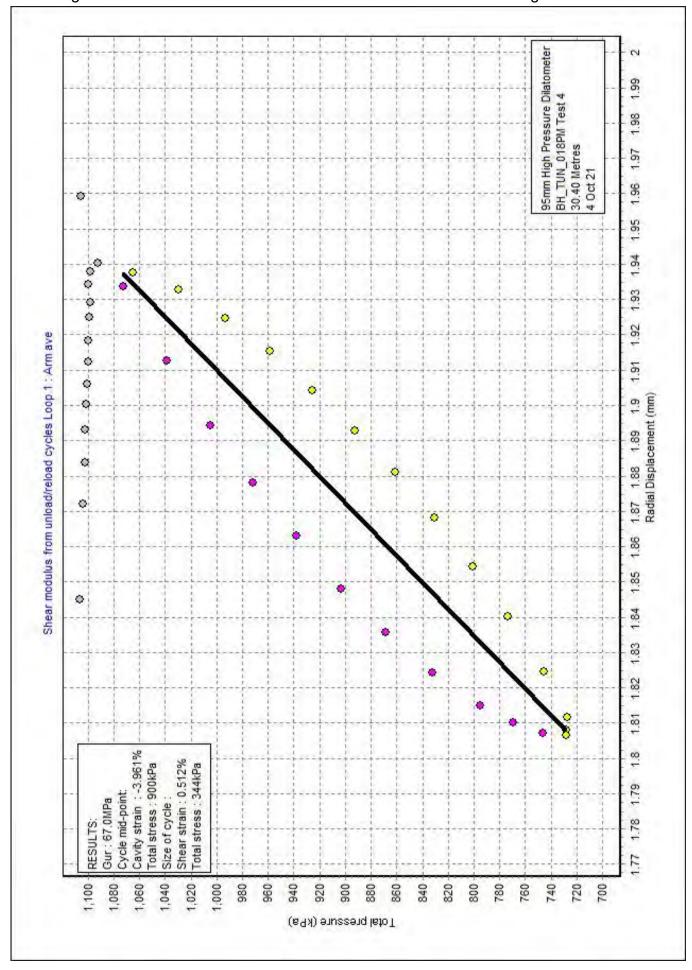
 G at yield (MPa)
 : 42.8

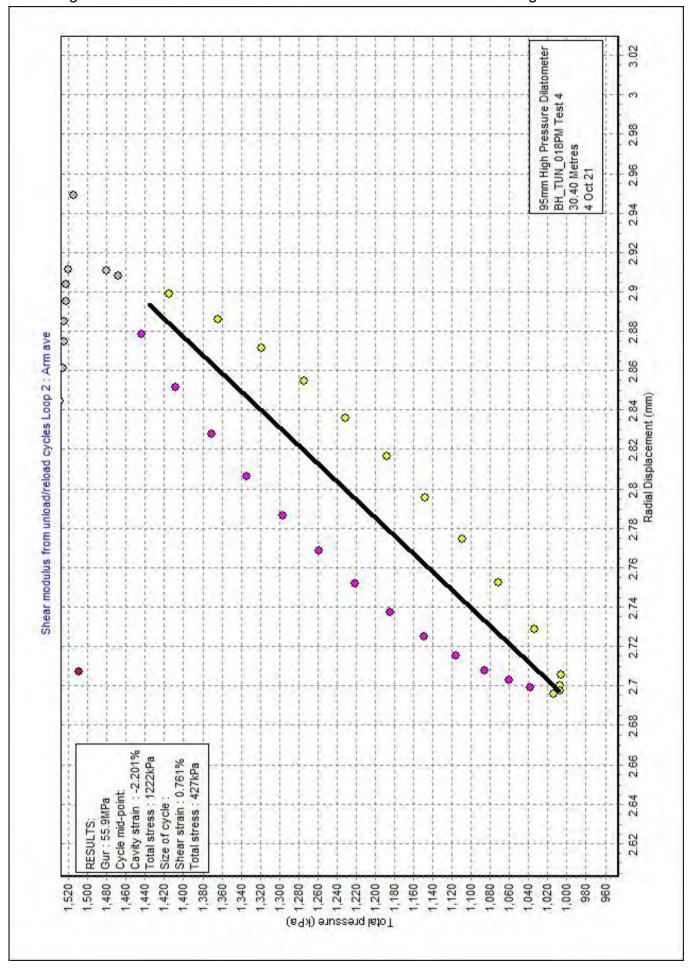


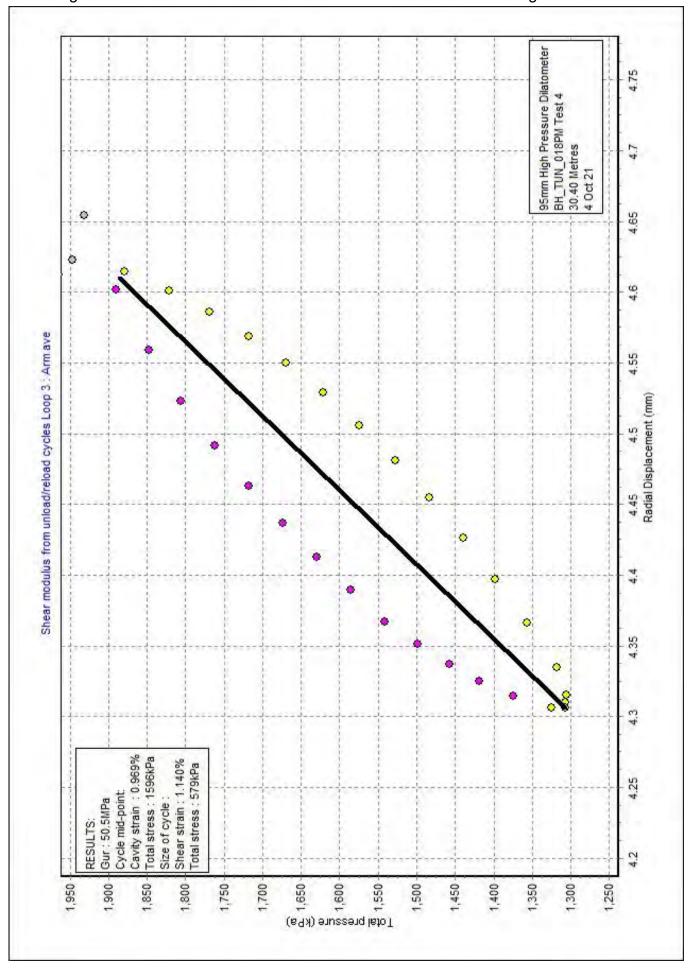


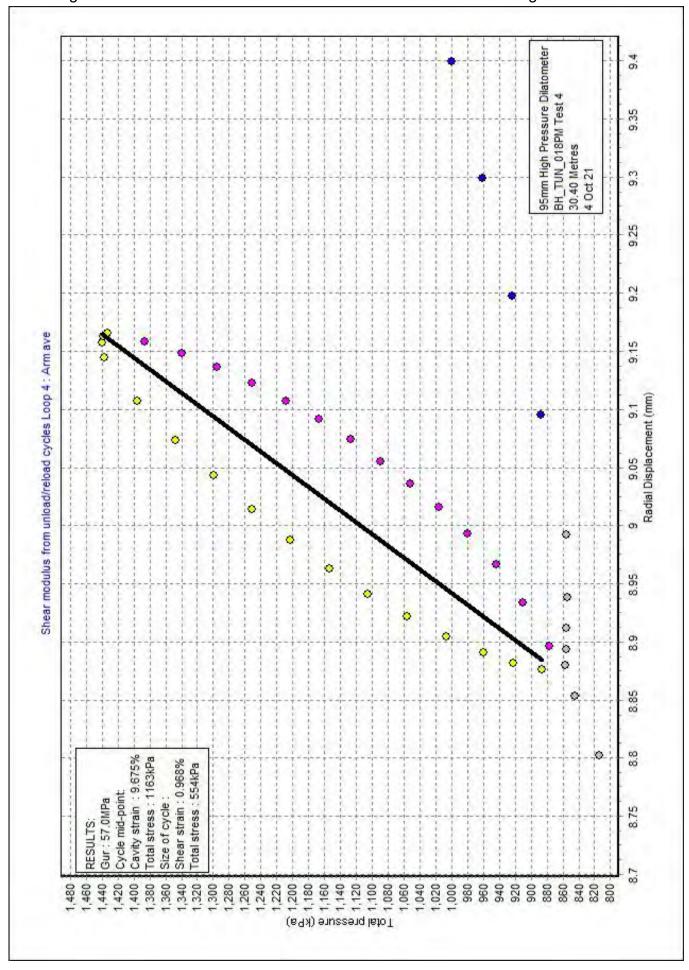


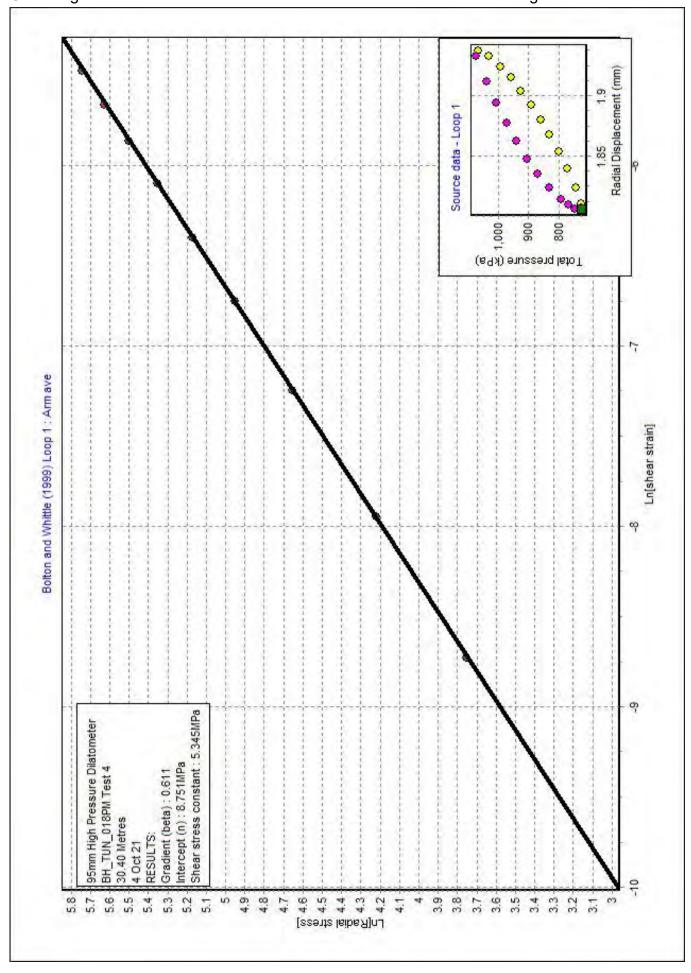


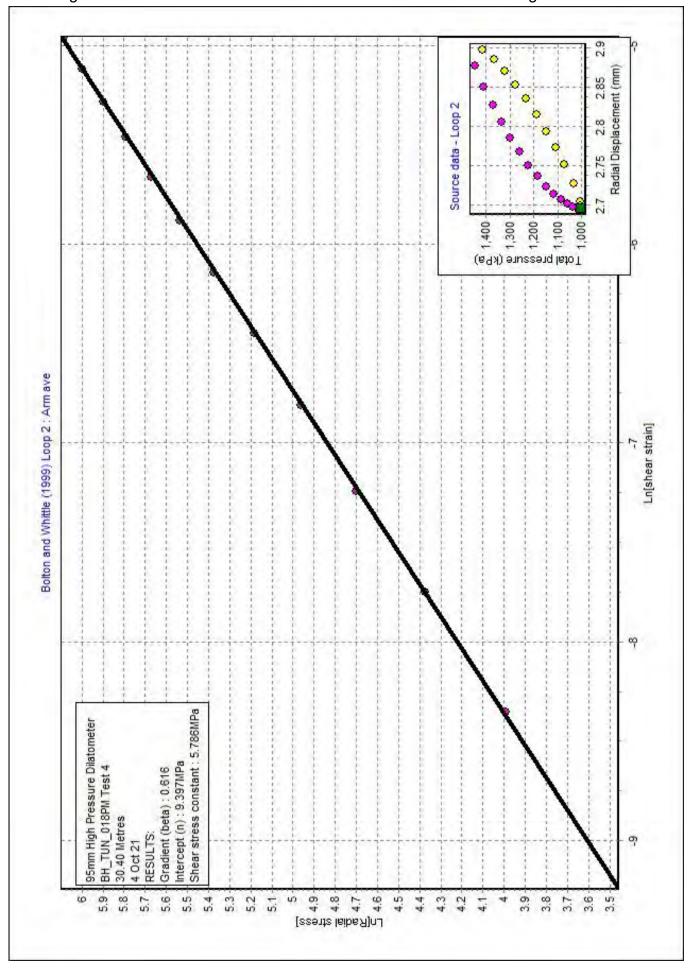


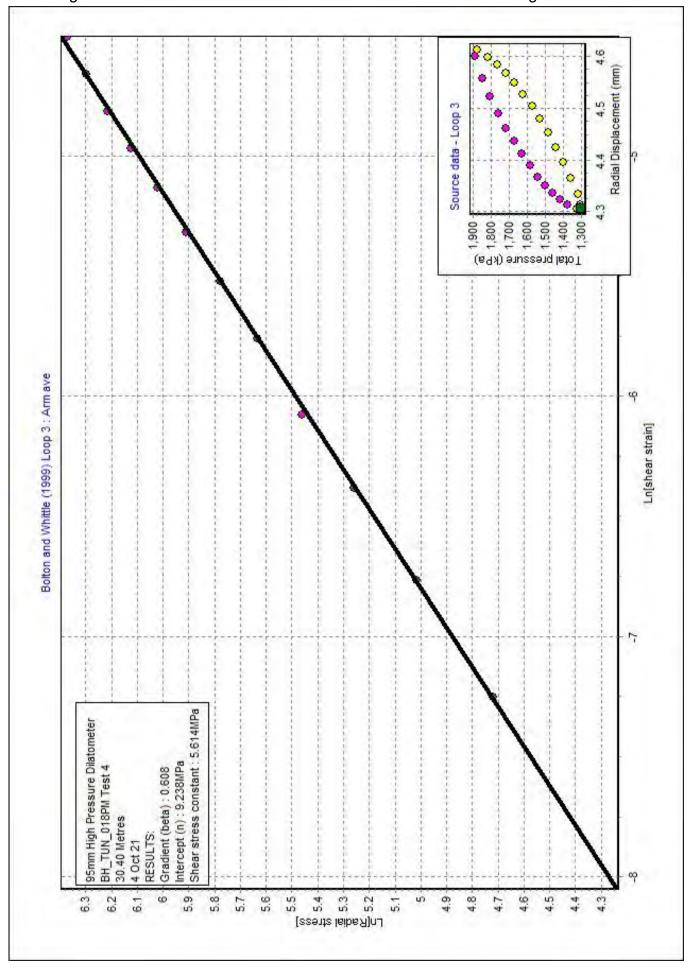


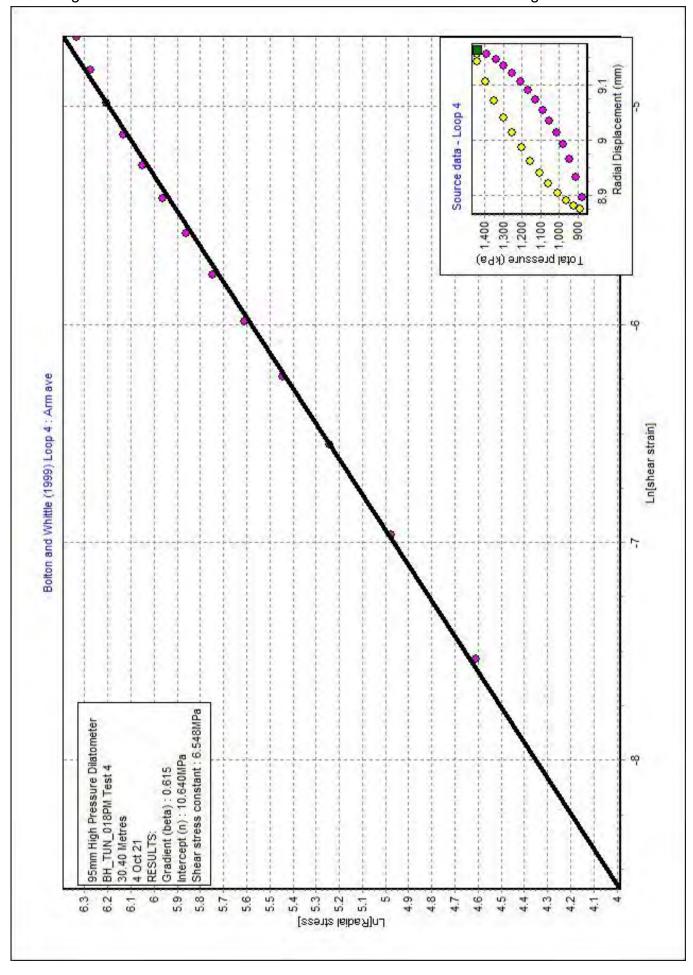


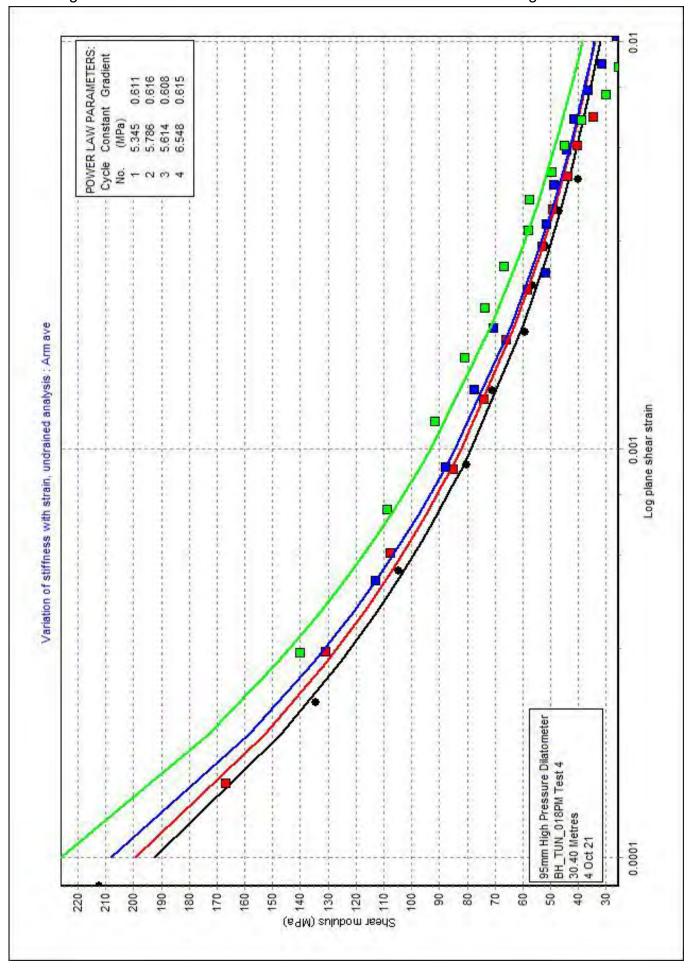


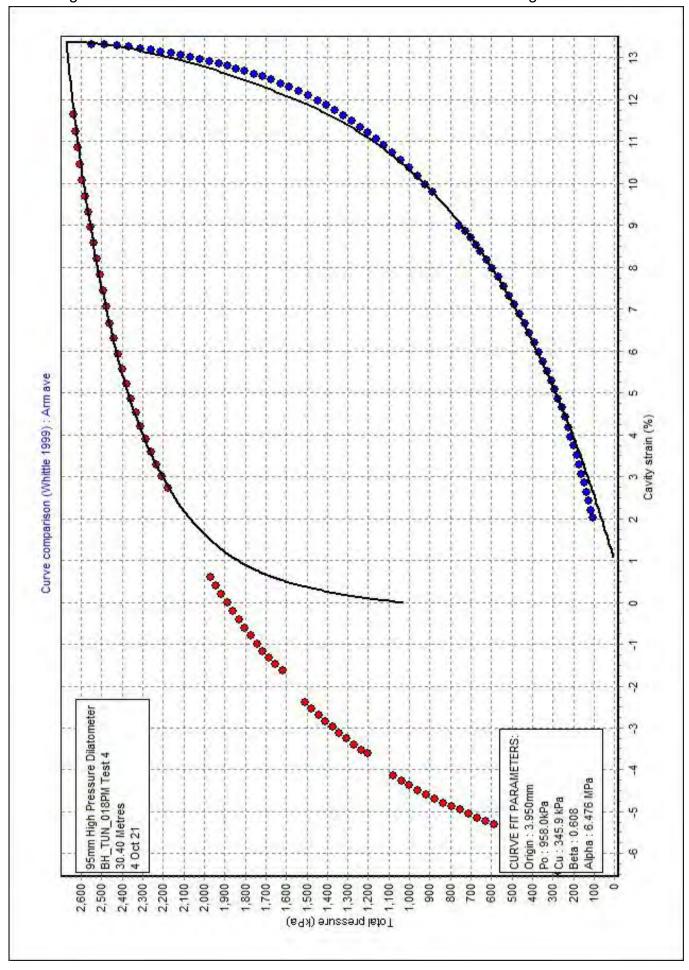


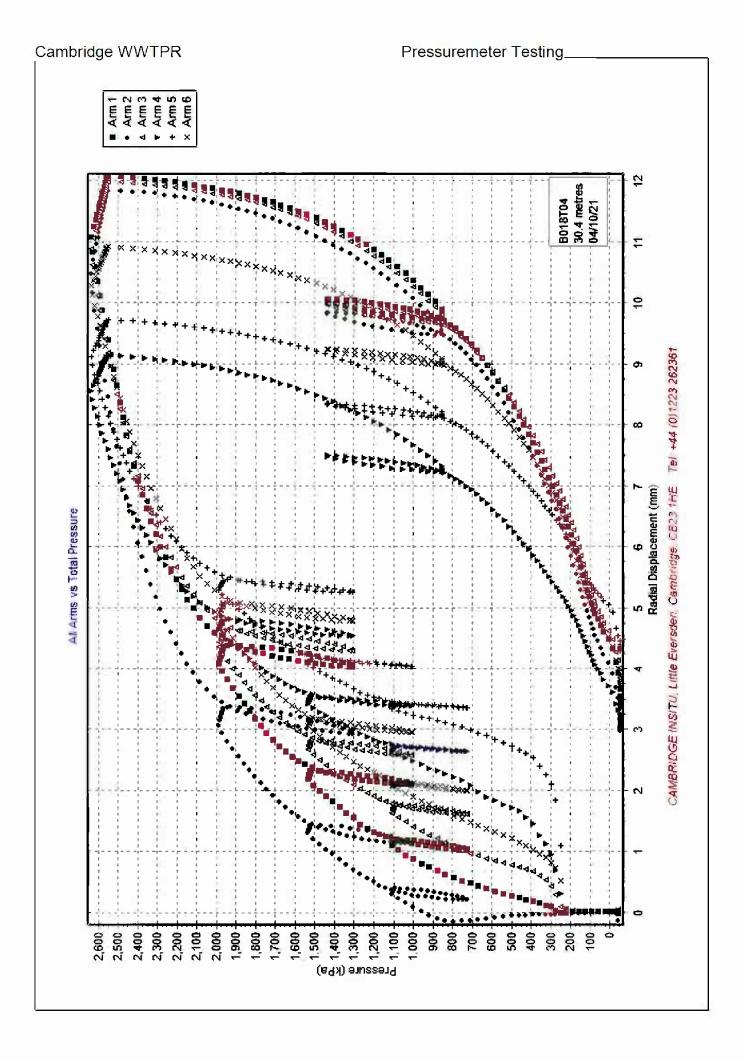


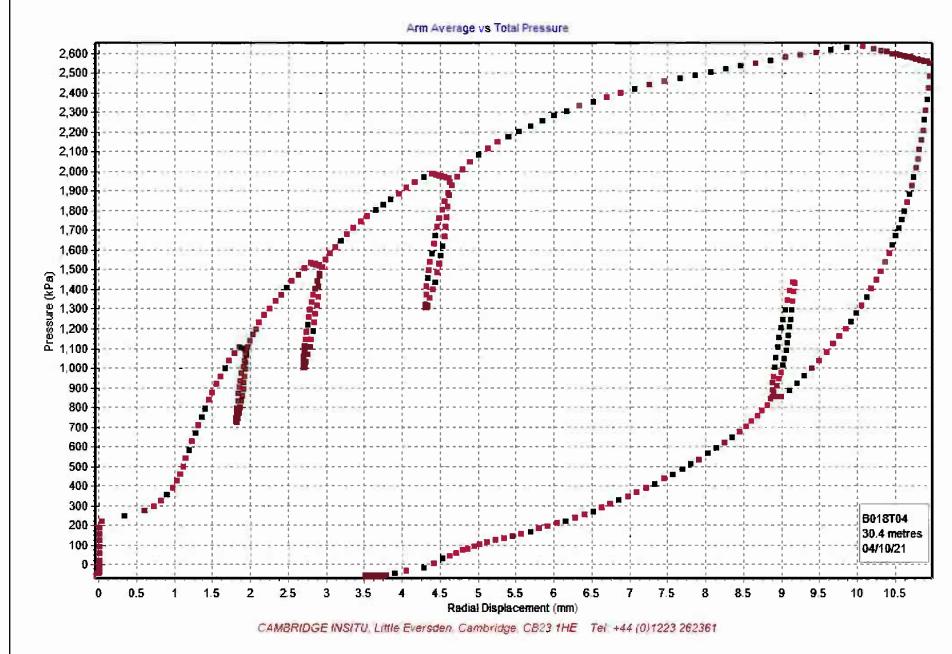


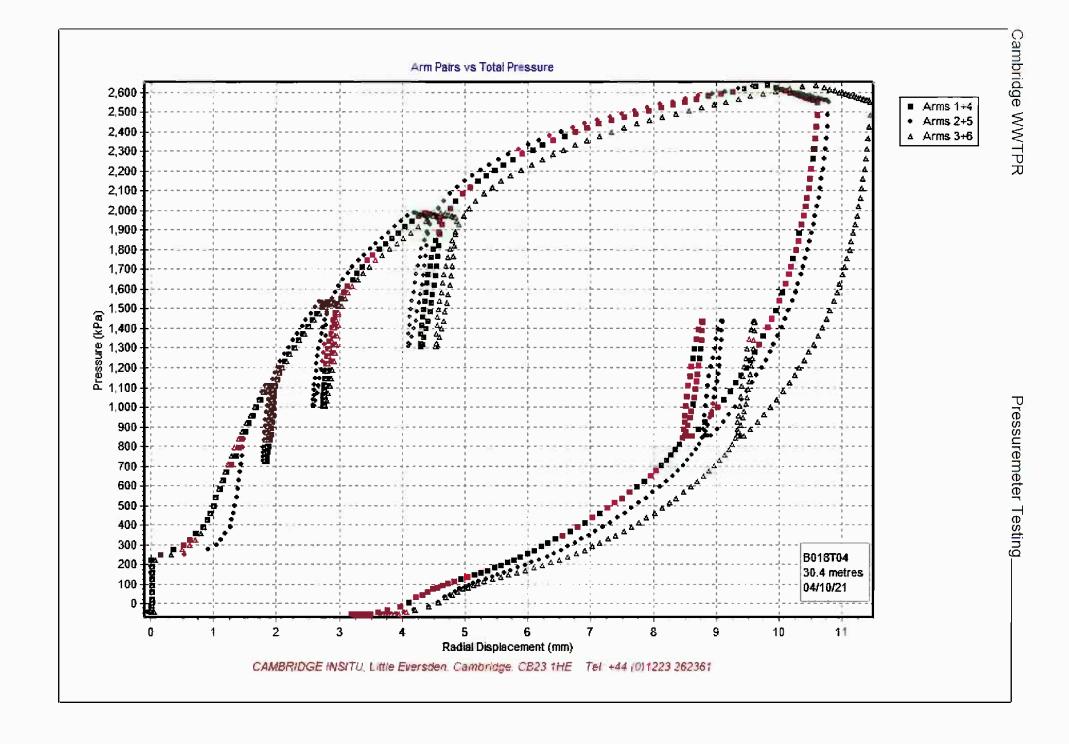


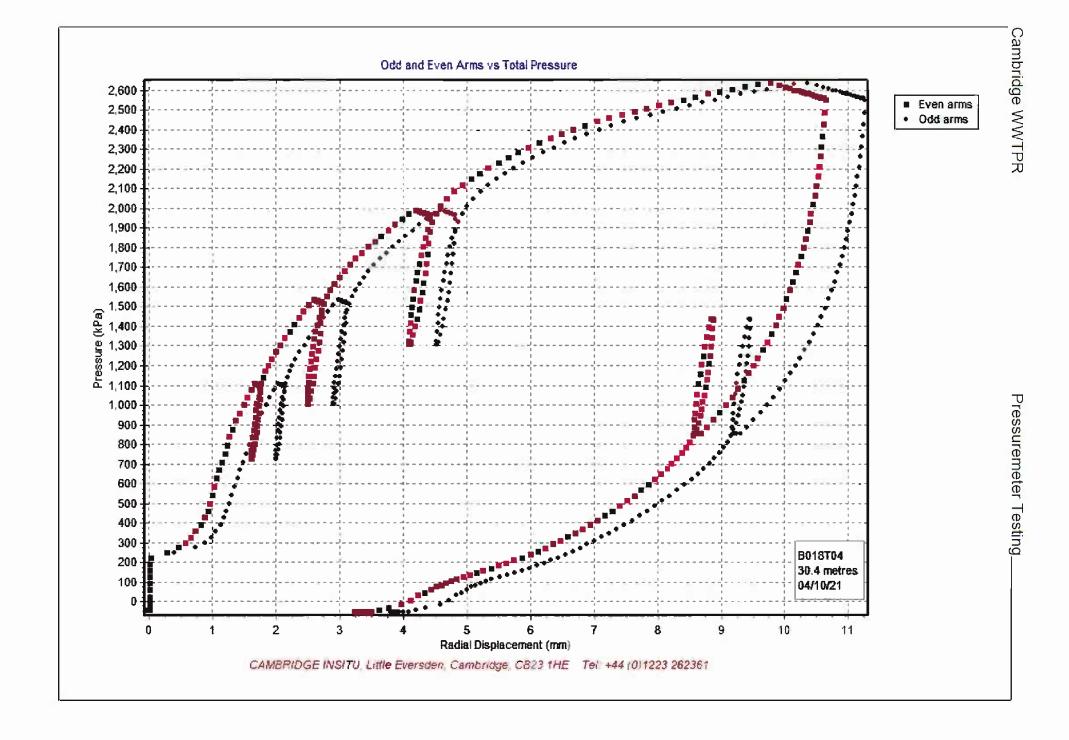












[DETAILS OF TEST]

Project : TE8364

Site : Cambridge Waste Water Treatment Plant Relocation Project

Borehole : BH_TUN_018PM
Test name : BH_TUN_018PM Test 5

Test date : 5 Oct 21
Test depth : 32.10 Metres
Water table : 4 Metres
Ambient PWP : 276.0 kPa
Material : Gault Clay

Probe : 95mm High Pressure Dilatometer

Diameter : 97.0 mm

Data analysed using average arm displacement curve

A non-linear analysis of the rebound cycles has been carried out

The file includes results from a curve fitting analysis

Analysed by YB / ES / RW on 6 Oct 21

Remarks:

[RESULTS FOR CAVITY REFERENCE PRESSURE]

Strain Origin (mm) : "Arm ave=2.54"
Po from Marsland & Randolph (kPa) : "Arm ave=1051.0"
Best estimate of Po (kPa) : "Arm ave=932.0"

[UNDRAINED STRENGTH PARAMETERS]

Gibson & Anderson 1961 - Cu (kPa) : "Arm ave=394.9"
Limit pressure (kPa) : "Arm ave=3475"
Jefferies 1988 - Cu (kPa) : "Arm ave=395.8"
Undrained yield stress (kPa) : "Arm ave=1423.1"

[LINEAR INTERPRETATION OF SHEAR MODULUS G]

Initial slope shear modulus (MPa) :"Arm ave=18.9"

Axis	Loop	Value	Mean Strain	Mean Pc	dE	dPc
	No	(MPa)	(%)	(kPa)	(%)	(kPa)
Arm ave	1	104.5	-3.669	880	0.212	222
Arm ave	2	65.8	-2.107	1272	0.749	495
Arm ave	3	57.0	2.354	1832	1.170	670
Arm ave	4	60.7	9.545	2181	1.075	656
Arm ave	5	65.5	12.788	1254	0.896	590

[UNDRAINED NON LINEAR INTERPRETATION OF SECANT SHEAR MODULUS]

Axis	Loop	Intercept	Alpha	Gradient
	No	(MPa)	(MPa)	
Arm ave	1	12.352	7.989	0.647
Arm ave	2	12.515	8.147	0.651
Arm ave	3	11.848	7.523	0.635
Arm ave	4	11.578	7.039	0.608
Arm ave	5	10.445	6.154	0.589

[PARAMETERS USED FOR UNDRAINED CURVE MODELLING]

{Axis is Arm ave}

 Strain Origin (mm)
 : 2.54

 Po (kPa)
 : 932

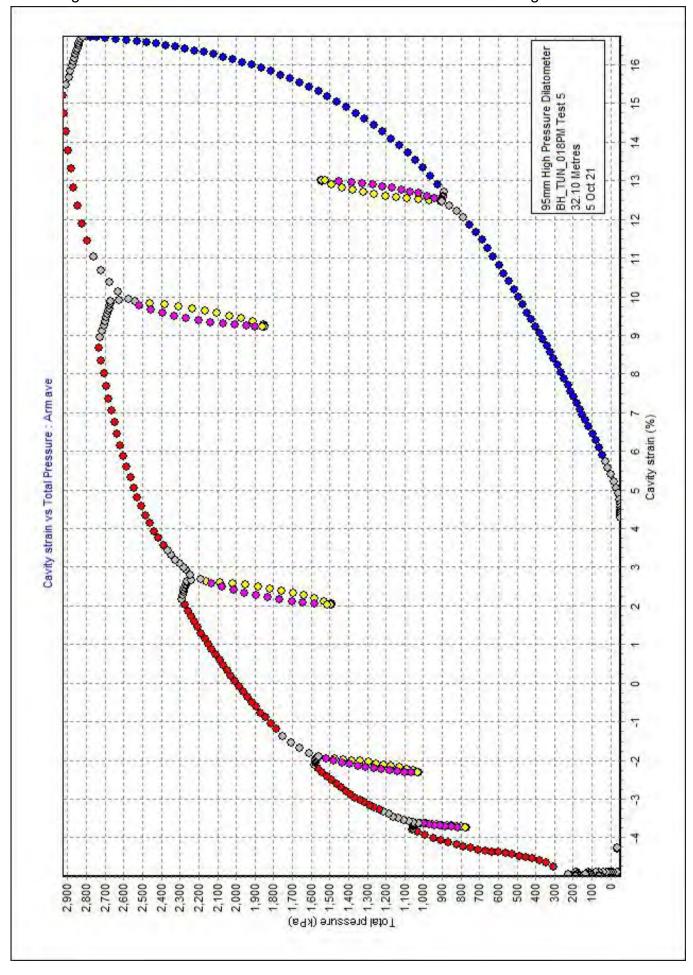
 Cu (kPa)
 : 394.9

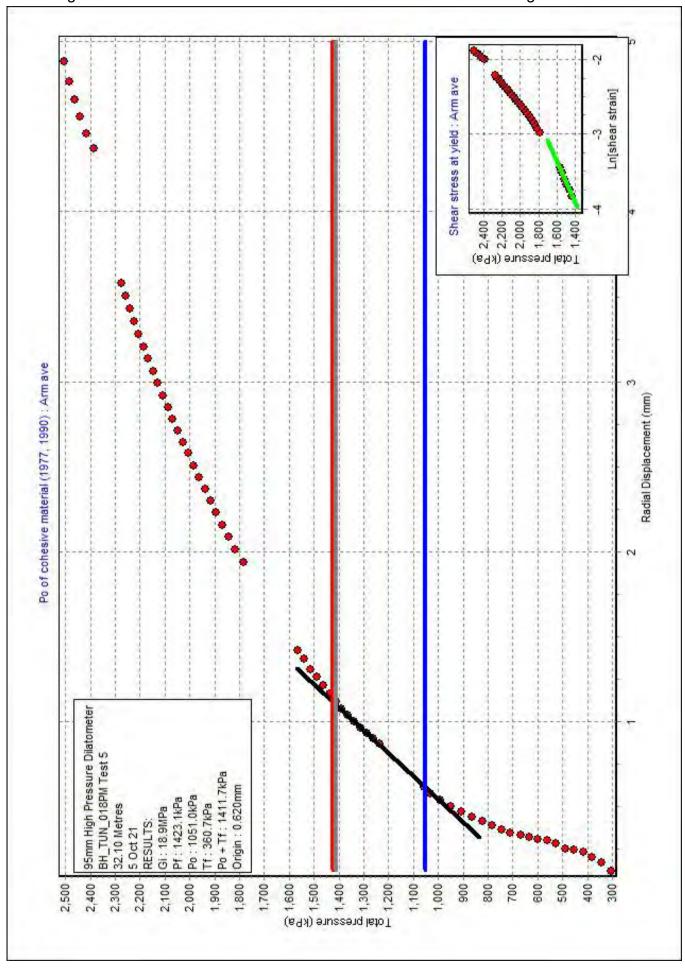
 Limit pressure (kPa)
 : 3475

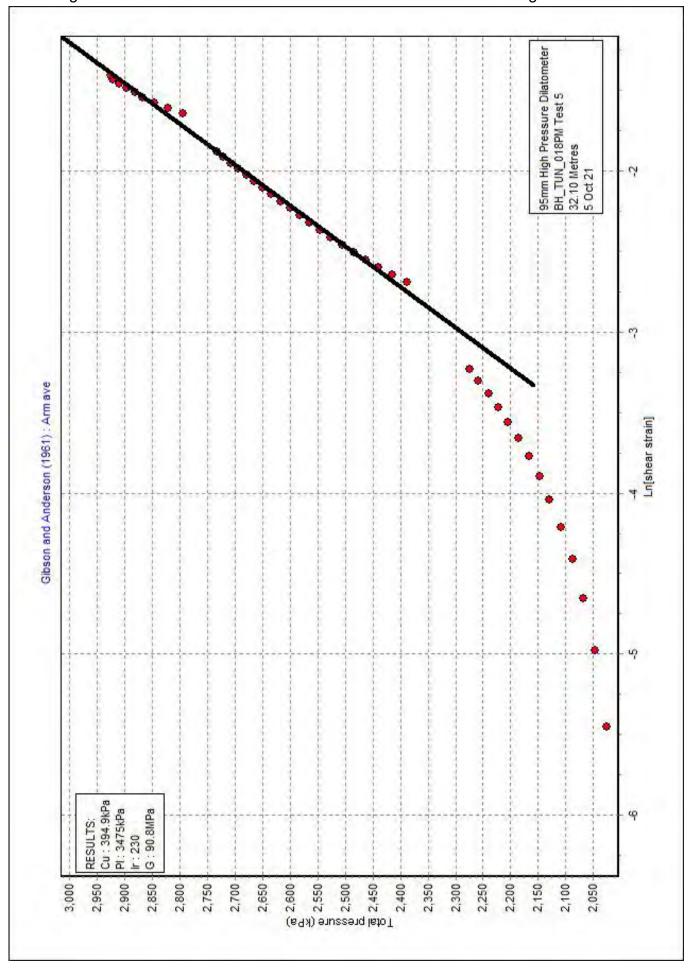
 Non-linear exponent
 : 0.589

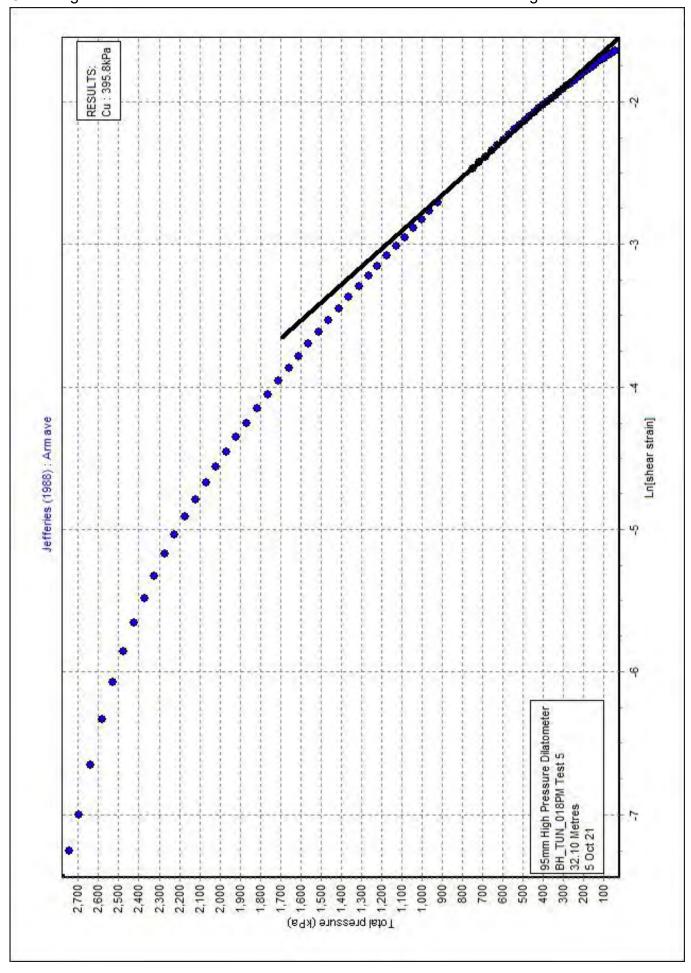
 Calculated alpha (MPa)
 : 6.443

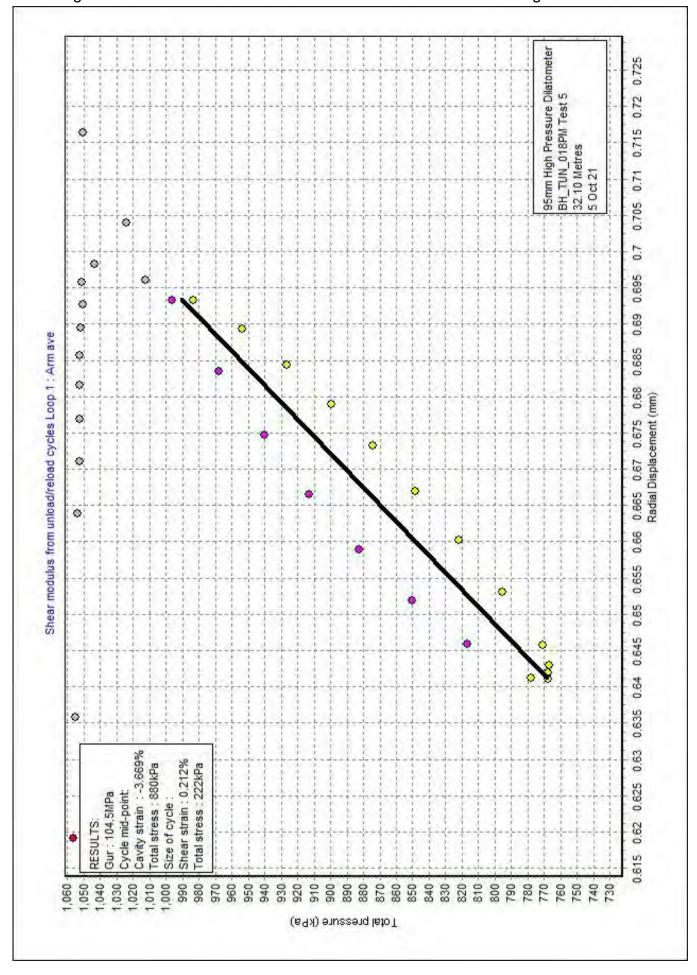
 G at yield (MPa)
 : 45.2

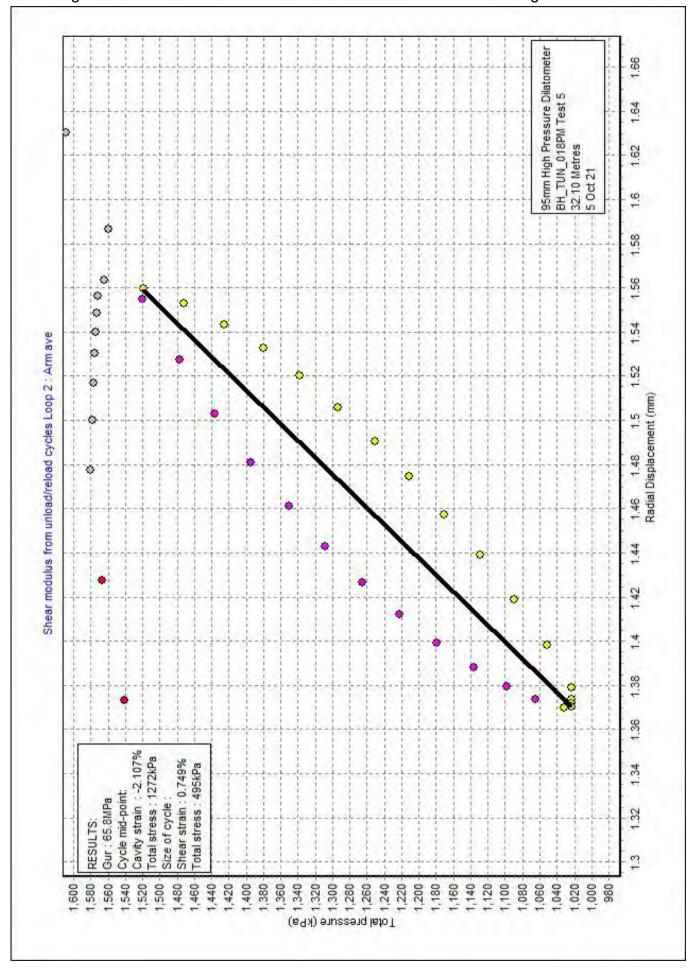


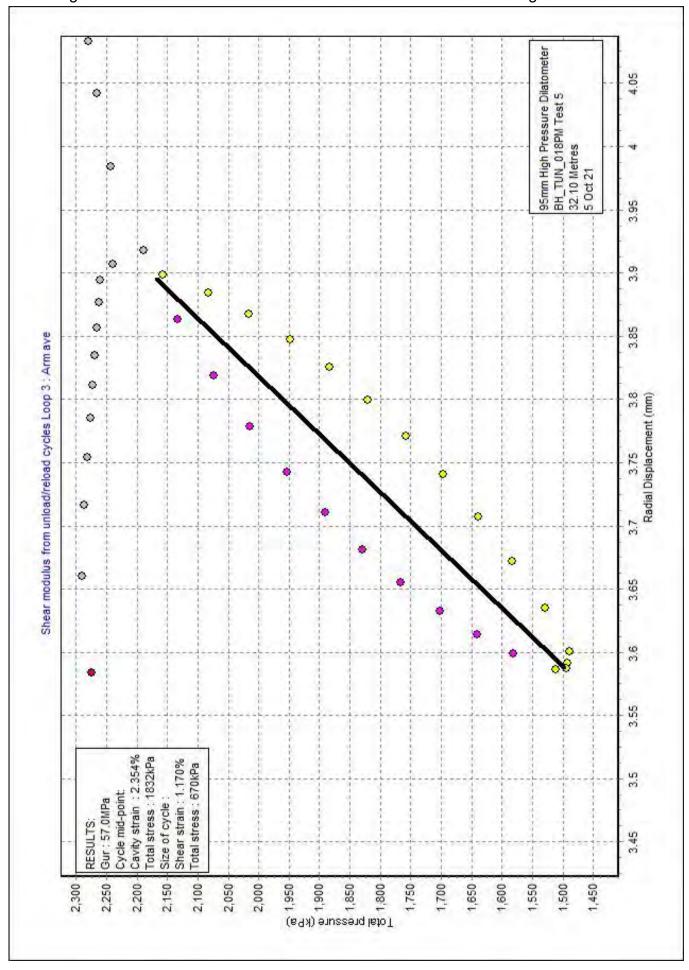


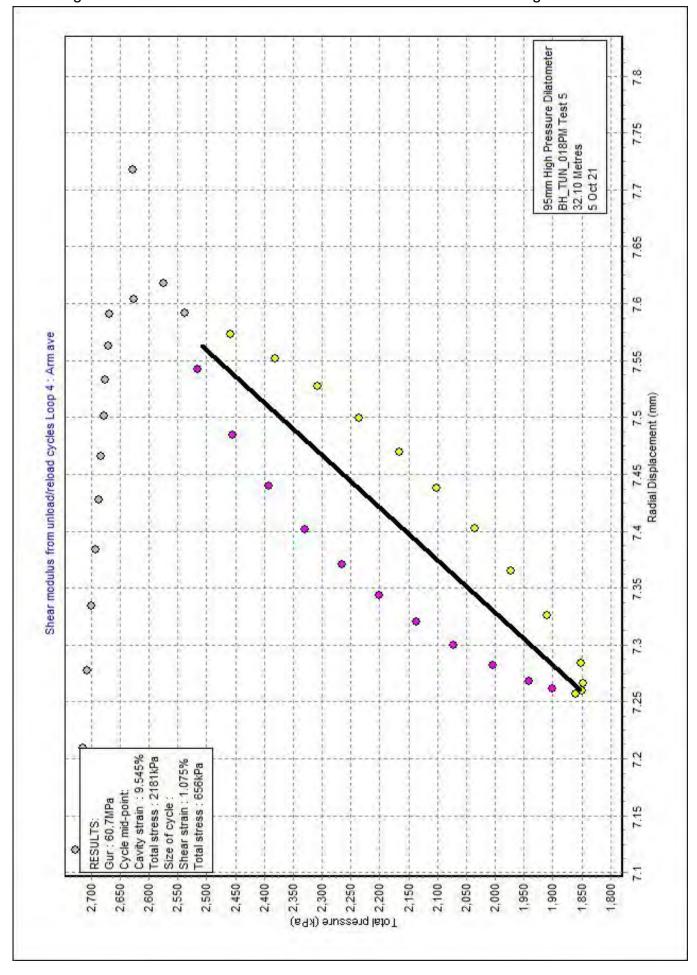


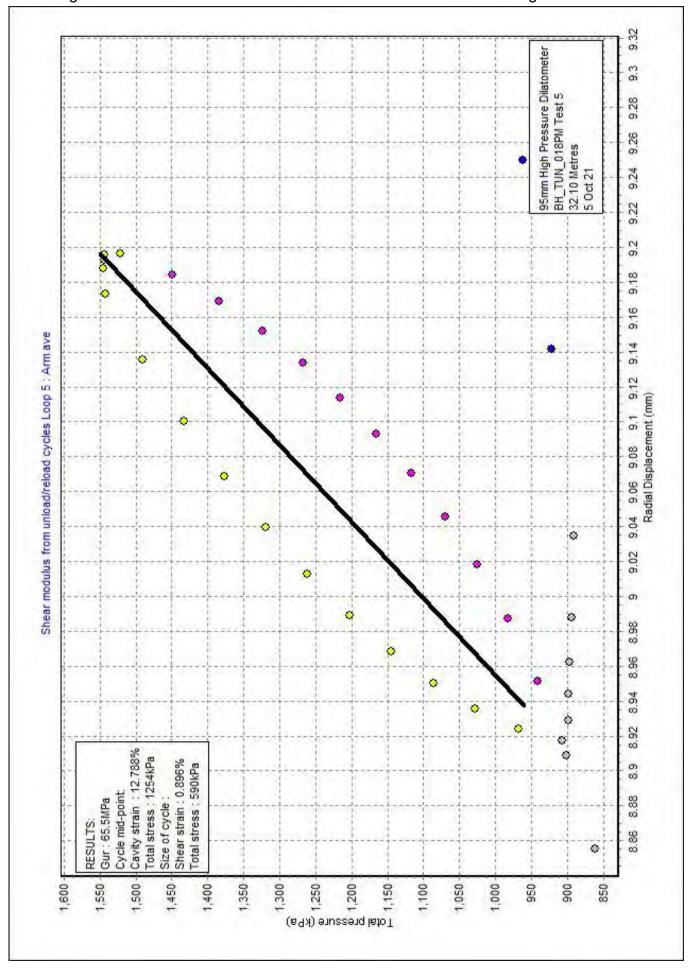


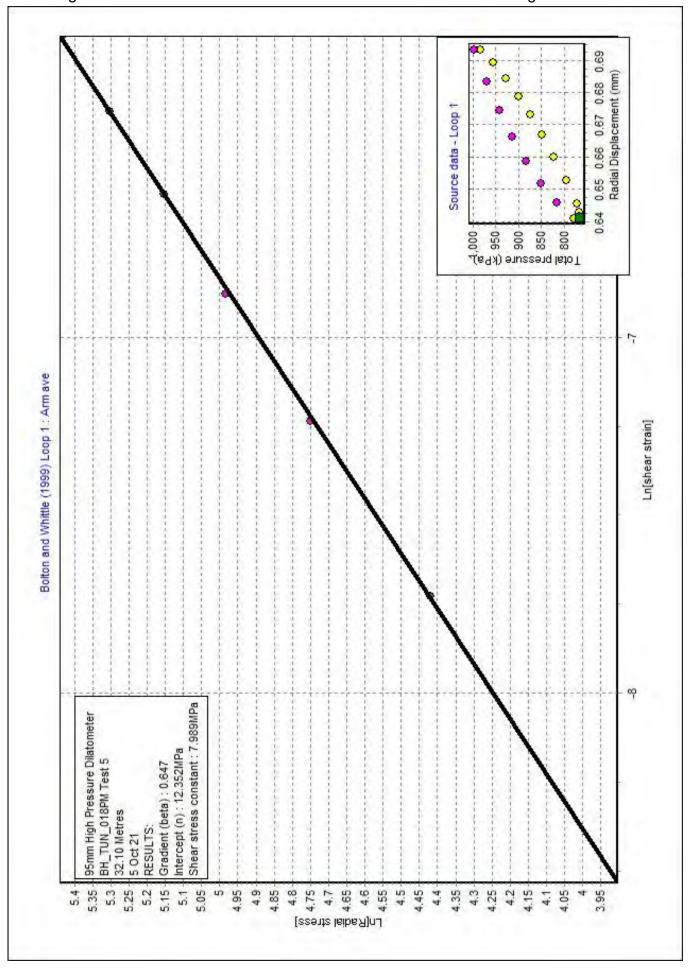


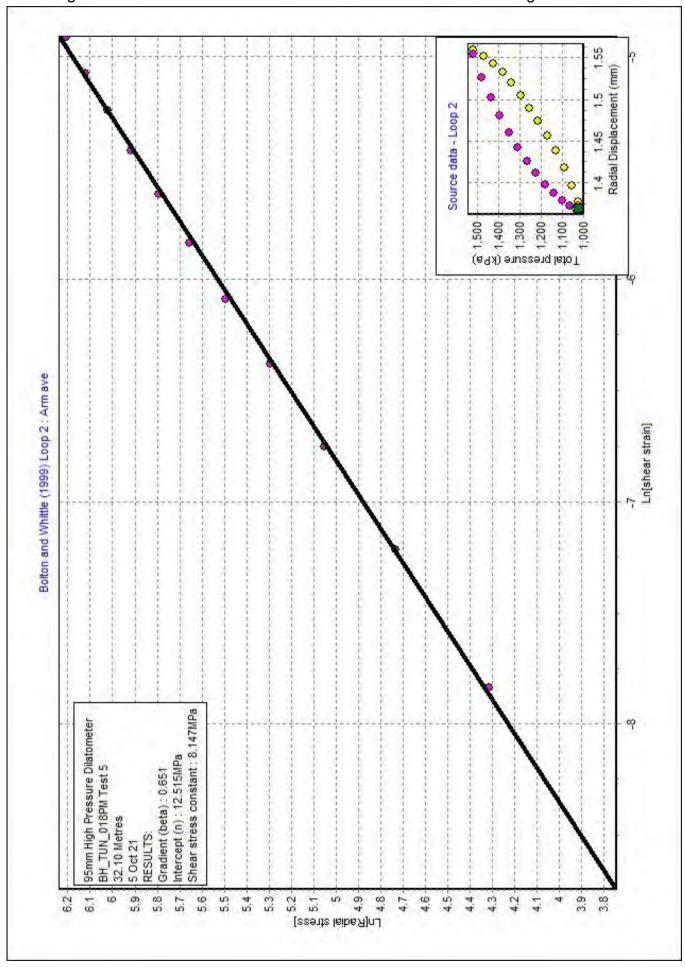


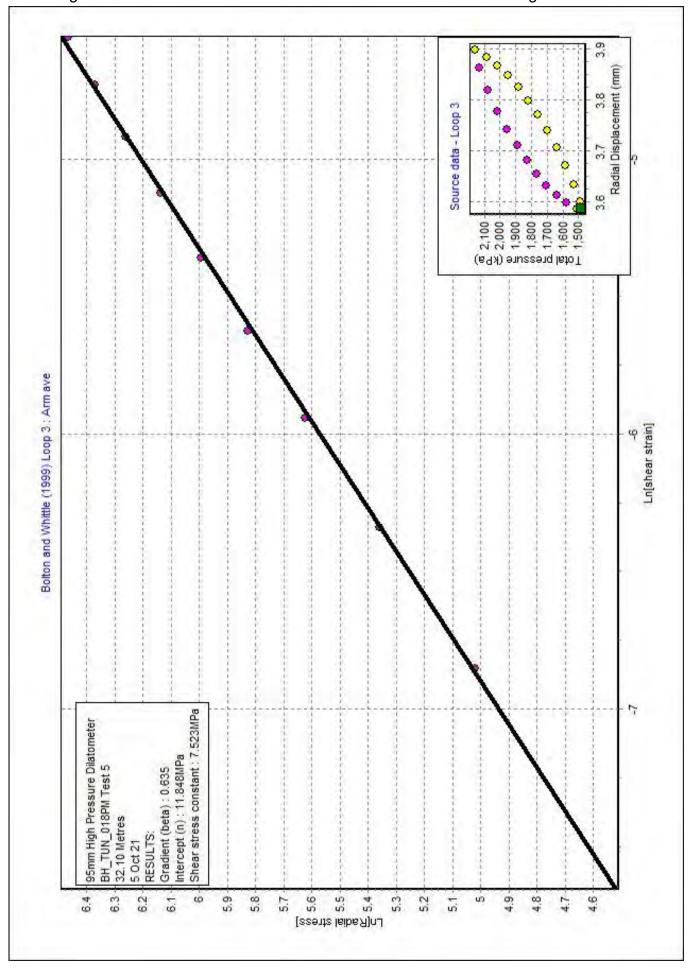


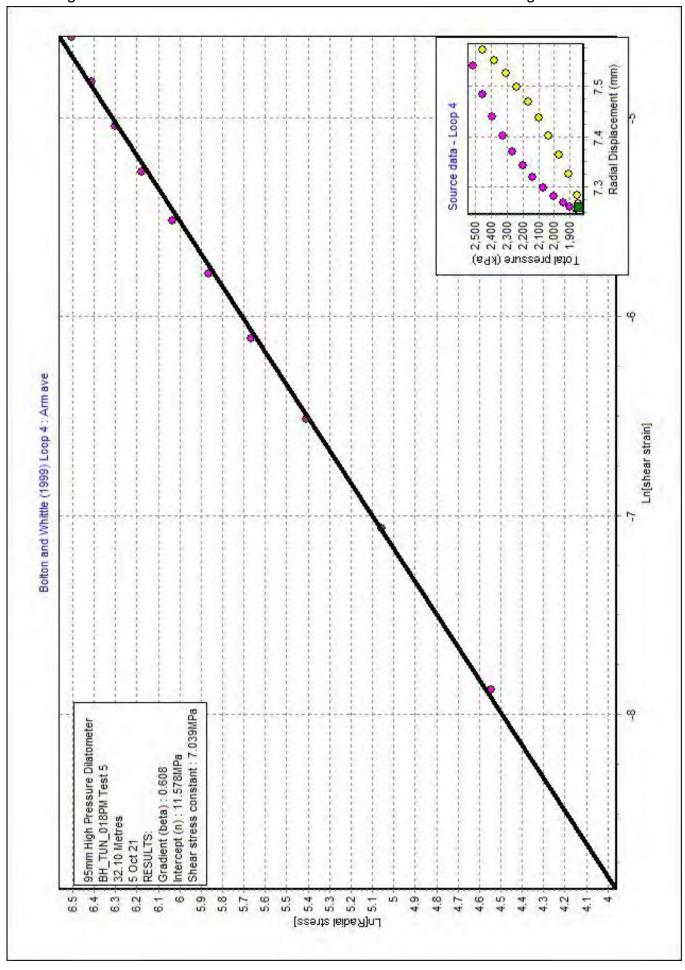


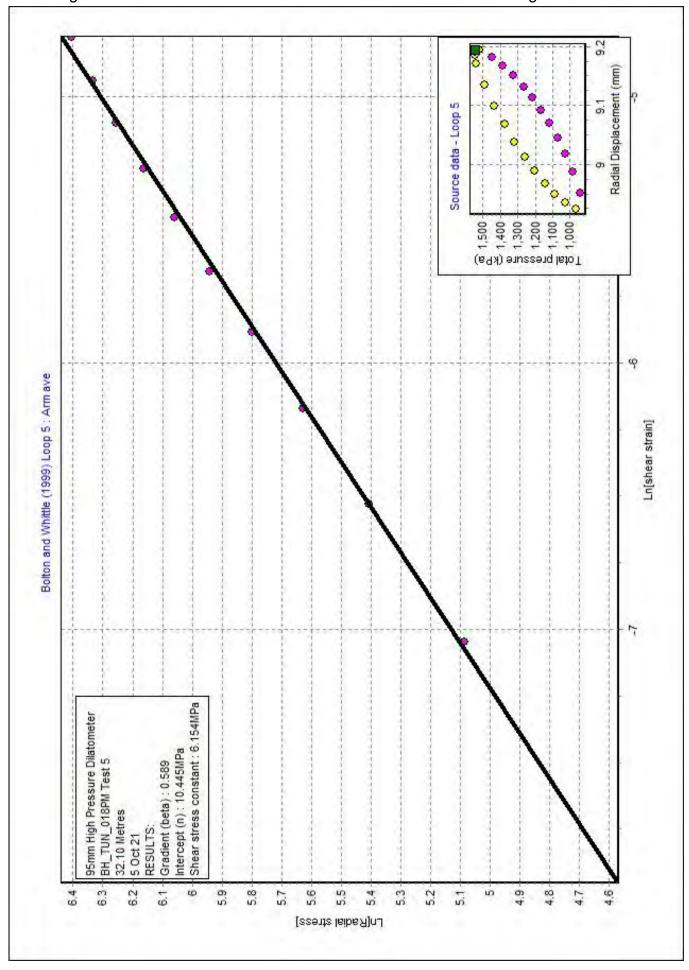


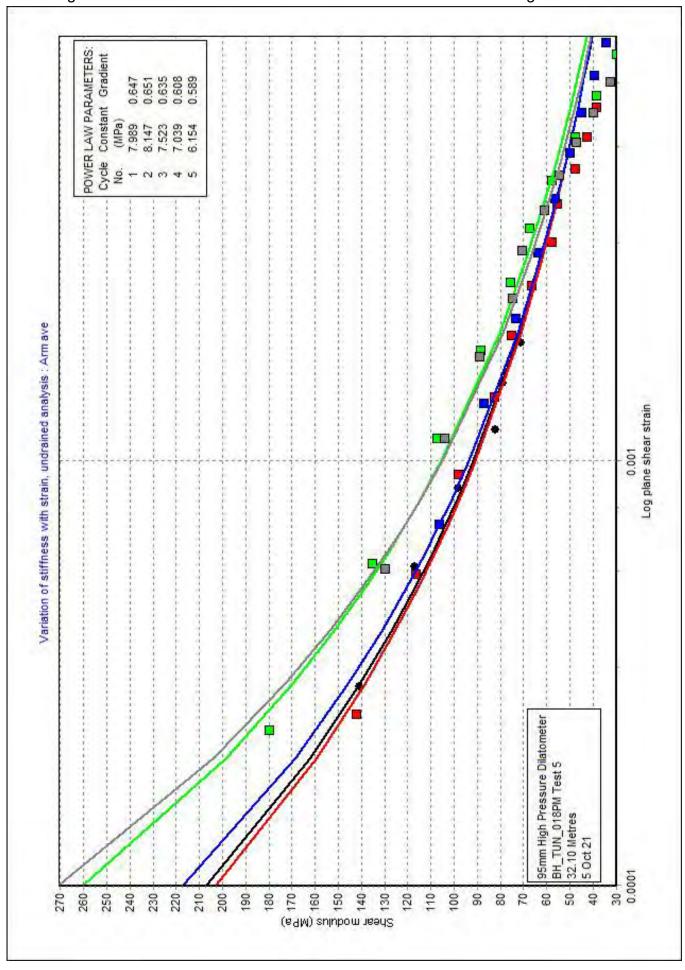


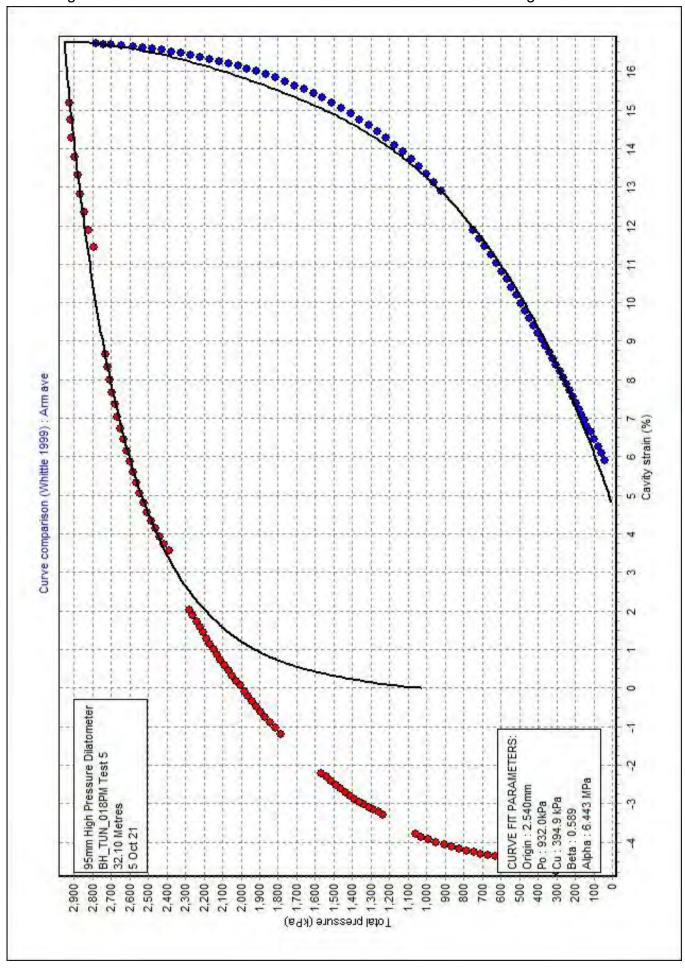


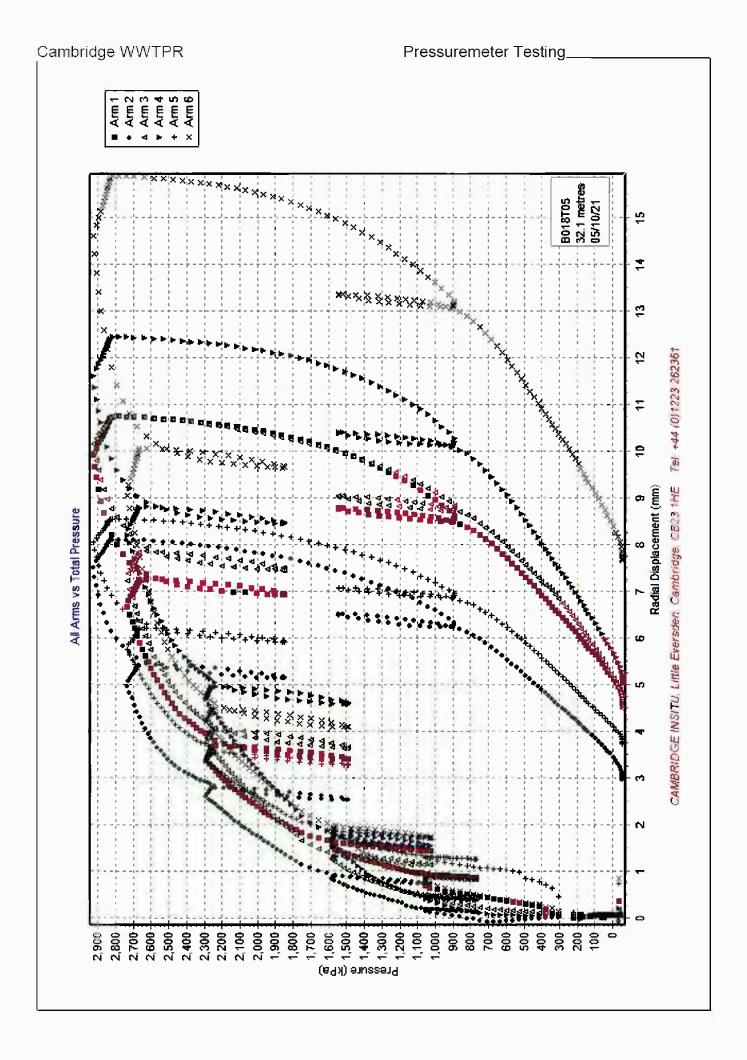


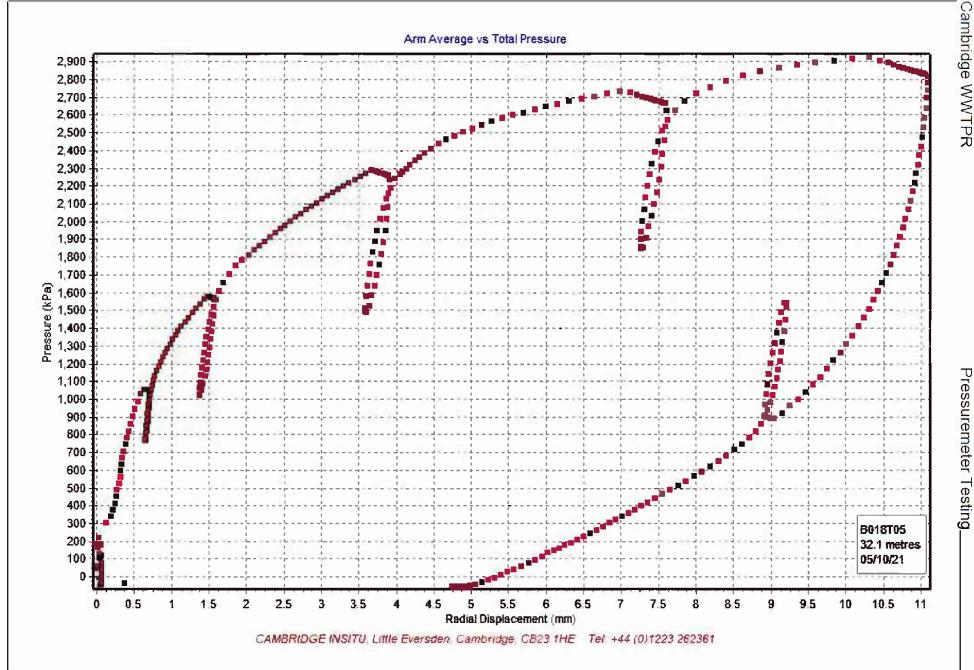


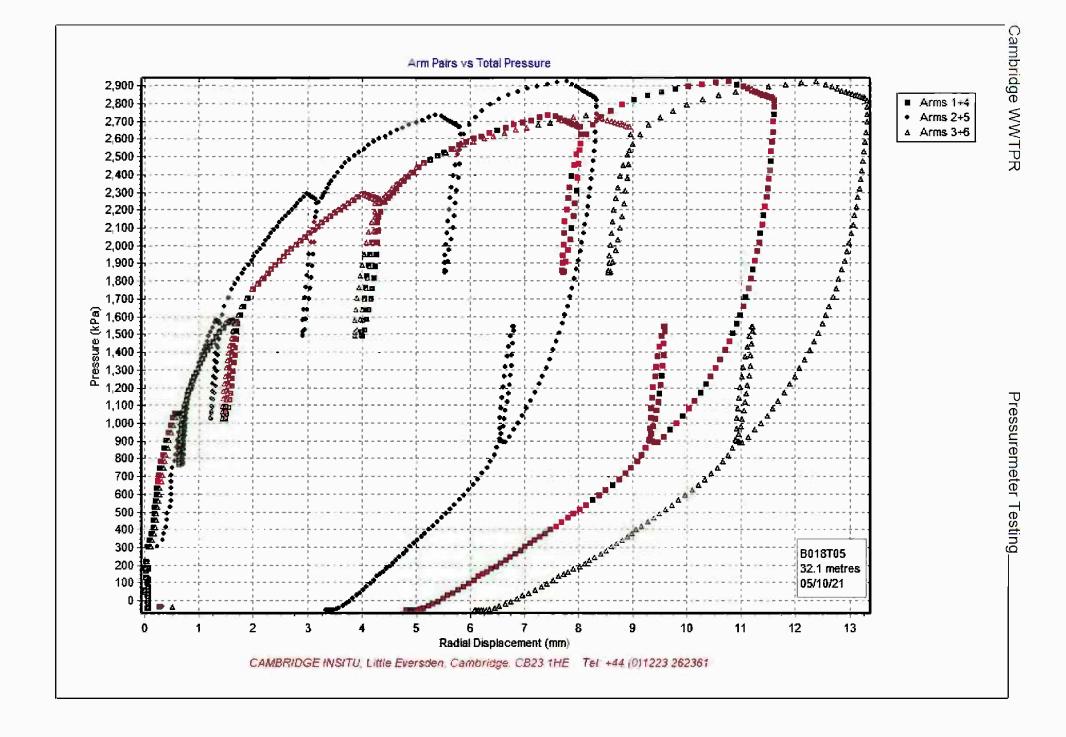


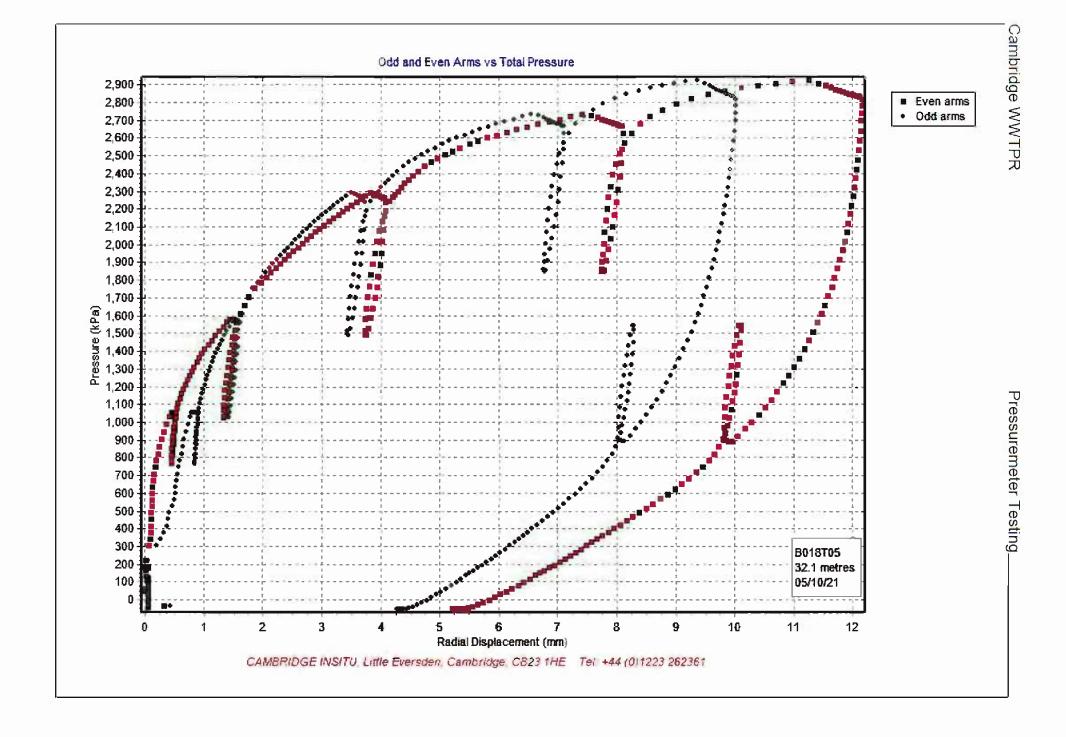










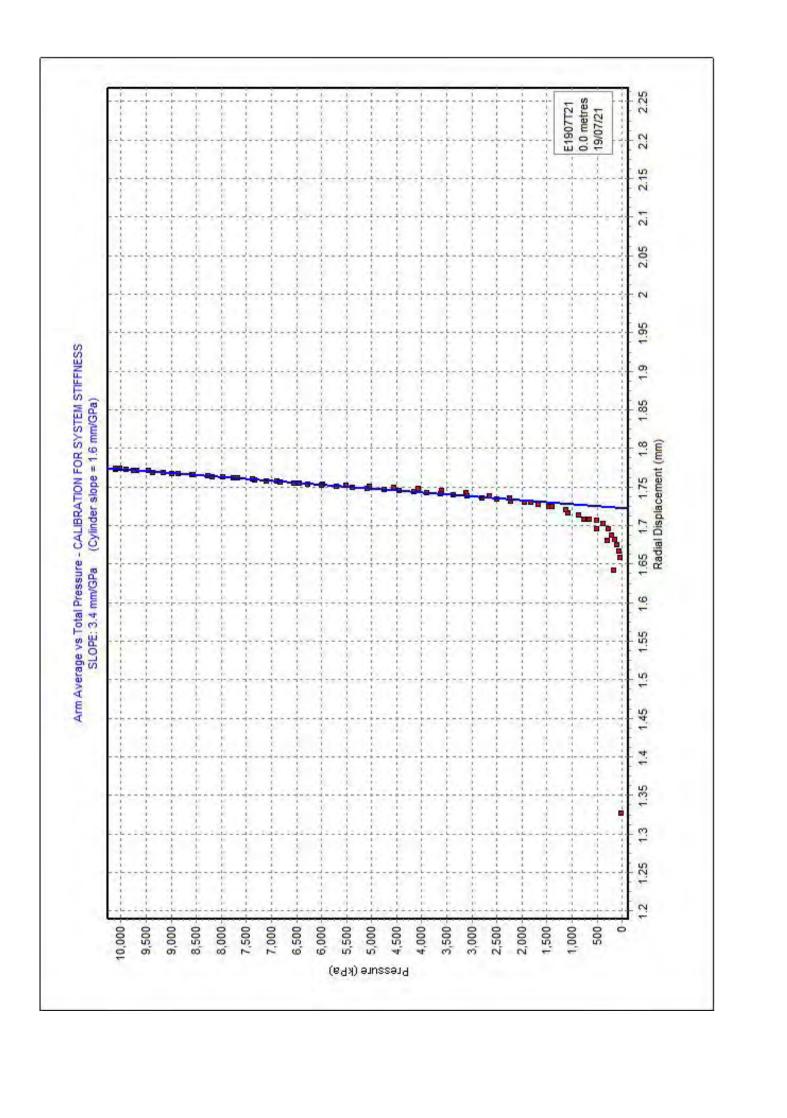


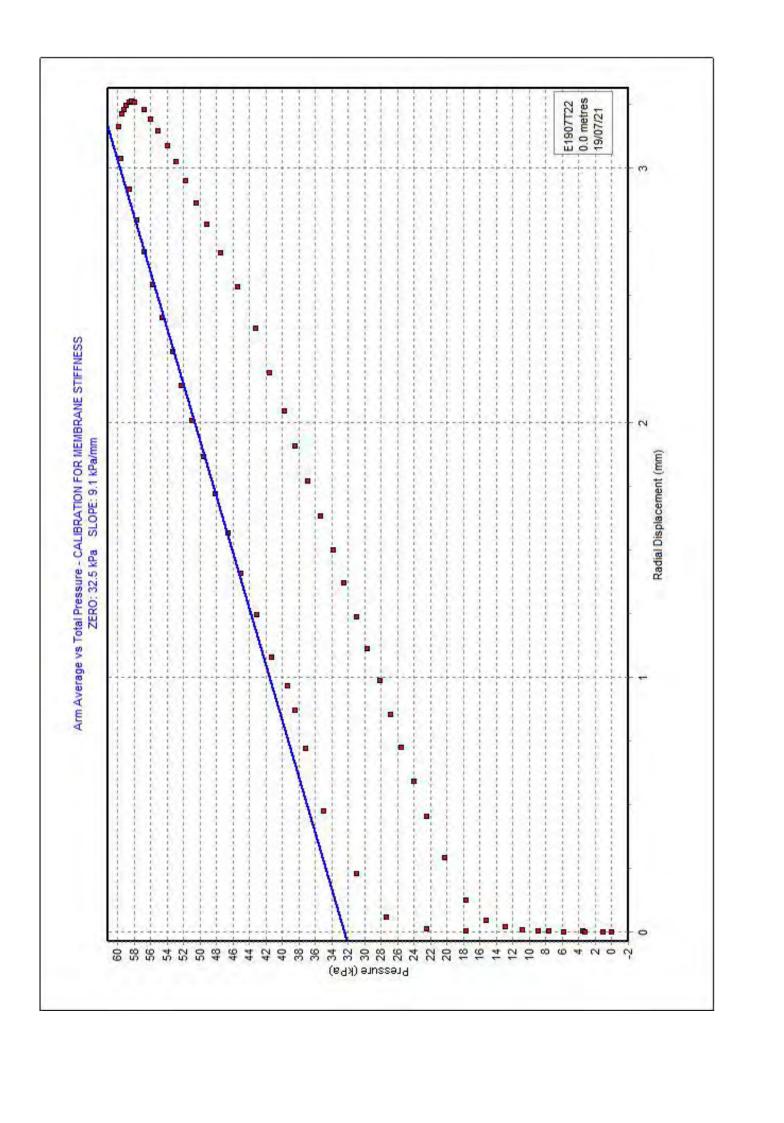
CALIBRATION DATA

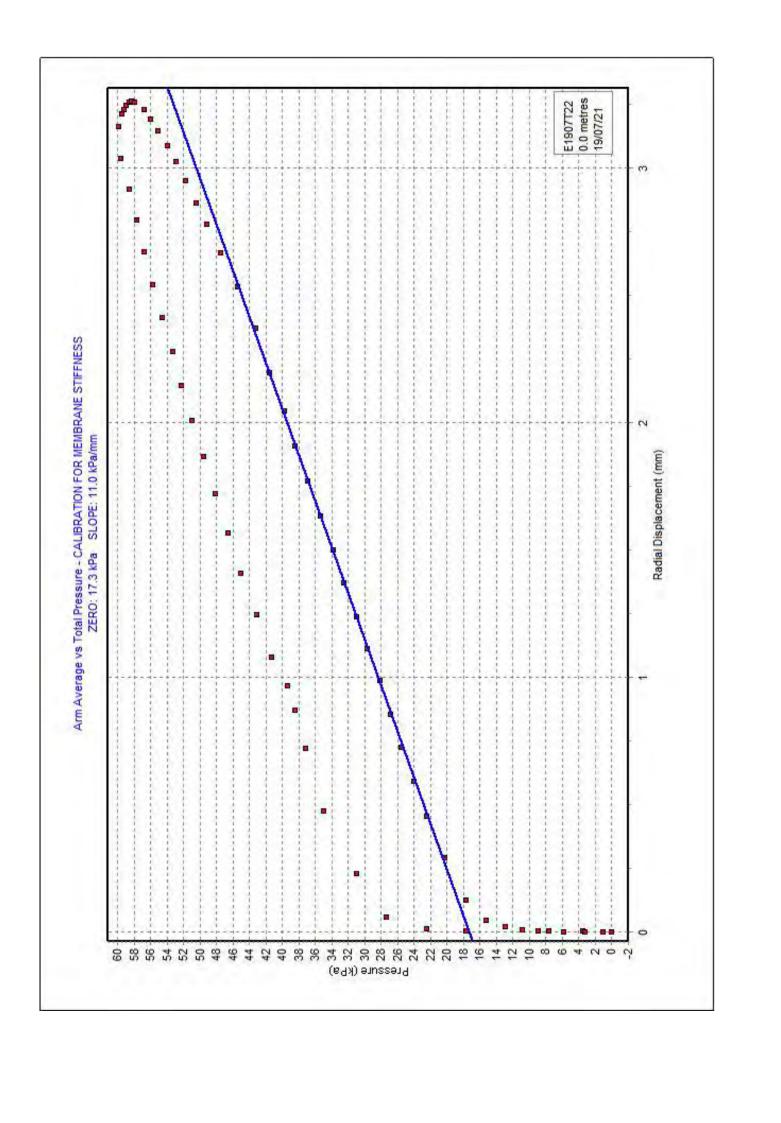
DESCRIPTION	DATE	PROBE	NOTES
Transducers	19/07/2021	Shula SBP	Full calibration of all sensors
E1907T21	19/07/2021	Shula SBP	System compliance
E1907T22	19/07/2021	Shula SBP	Membrane stiffness
E0610T21	06/10/2021	Shula SBP	System compliance
E0610T22	06/10/2021	Shula SBP	Membrane stiffness
Straightness	14/10/2020	Shula SBP	Straightness check
Transducers	13/07/2021	Wally HPD	Full calibration of all sensors
E0907T21	09/07/2021	Wally HPD	System compliance
E0907T21	09/07/2021	Wally HPD	Membrane stiffness
Transducers	13/07/2021	Dougal SBP	Full calibration of all sensors
E0309T21	03/09/2021	Dougal SBP	System compliance
E0309T22	03/09/2021	Dougal SBP	Membrane stiffness
Straightness	14/10/2020	Dougal SBP	Straightness check

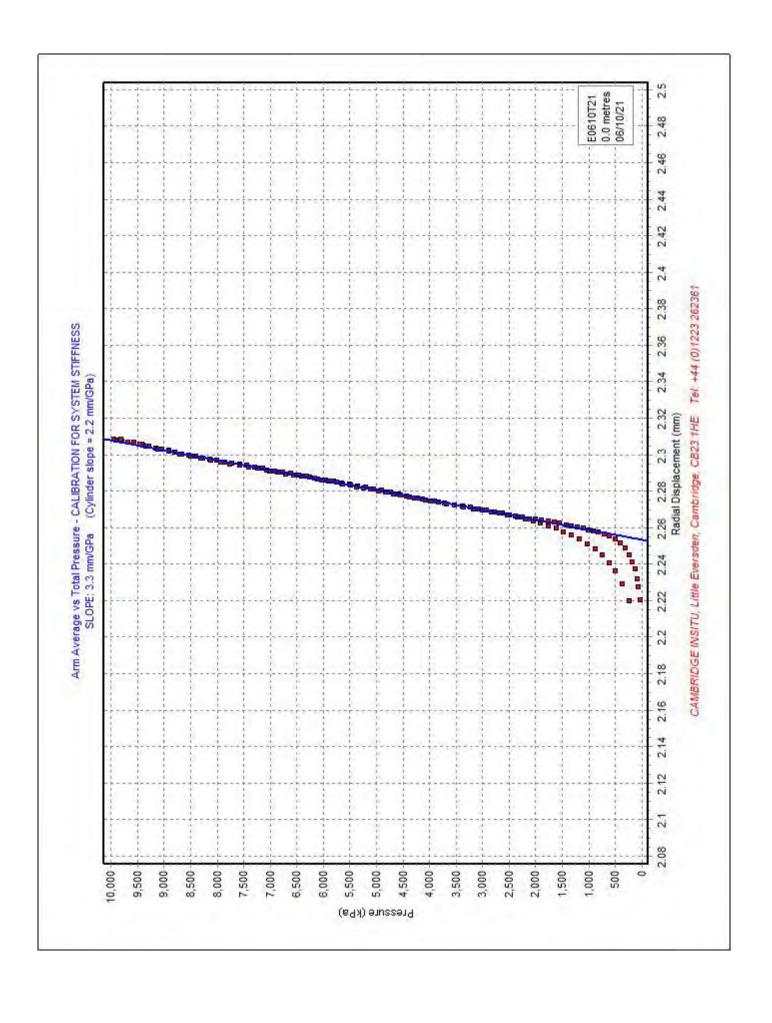
Calibration	on Date	Ope	rator	Instrume	ent Type	Serial N	lumber	Instrume	ent Name
1	9/07/2021	E	JS	SE	3P	170	530	Sh	ula
Notes:	Faulty PPC	B replaced	1						
				Pressu	re cells	T	est Gauge:		
Gauge Zero	Offset (Bar)	0	.0						
Mpa	TPC	Linearity	Hysteresis	PPC A	Linearity	Hysteresis	PPC B	Linearity	Hysteresis
	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)
0.00	-2381.8	98.6	0.01	-2562.4	100.6	-0.01	-2294.1	100 9	-0.1
1.00	-1930.8	98.9	-0.06	-2157.5	99.4	-0.09	-1902.1	100.1	-0.17
2.00	-1478.4	99.0	-0.05	-1757.4	99.2	-0.13	-1513.1	99.8	-0.17
3.00	-1025.6	98.7	-0.14	-1358.4	106.7	-0.25	-1125.4	98.8	-0.30
4.00	-574.1	100.4	-0.18	-929.2	92.3	0.49	-741.4	101 0	-0.39
5.00	-114.9	100.6	-0.16	-557.9	100.4	-0.29	-349.0	100.6	-0.33
6.00	345.0	101.2	-0.14	-153.8	100.9	-0.26	41.7	100.6	-0_3
7.00	808.0	100.1	-0.08	252.3	100.1	-0.18	432.7	99.1	-0.2
8.00	1265.7	100.9	-0.13	655.1	100.7	-0.19	817.7	99.7	0.3
9.00	1727.3	101.8	-0.07	1060.5	101.2	-0.10	1205.2	100.6	-0.2
10.00	2192.9	-101.1		1467.9	-100.2		1595.9	-98.2	
9.00	1730.5	-100.4		1064.5	-99.8		1214.4	-105.9	
8.00	1271.6	-100.6		662.8	-100.2		803.0	-92.8	
7.00	811.5	-100.6		259.7	-100.2		442.6	-100.1	
6.00	351.6	-100.4		-143.4	-100.1		53.7	-100.3	
5.00	-107.4	-100.2	l	-546.3	-100.0		-336.1	-100.5	
4.00	-565.7	-99.2	l	-948.8	-99.3		-726.4	-99.7	
3.00	-1019.3	-99.9	l	-1348.4	-100.3		-1113.6	-101.1	
2.00	-1476.0	-98.9		-1752.2	-99.8		-1506.3	-100.2	
1.00	-1928.2	-99.3		-2153.9	-101.4		-1895.6	-101.5	
0.00	-2382.4			-2562.0			-2289.8		
Zero	-2390.9			-2559.5			-2287.4		
Slope	457.3	mV/MPa		402.4	mV/MPa		388.5	mV/MPa	

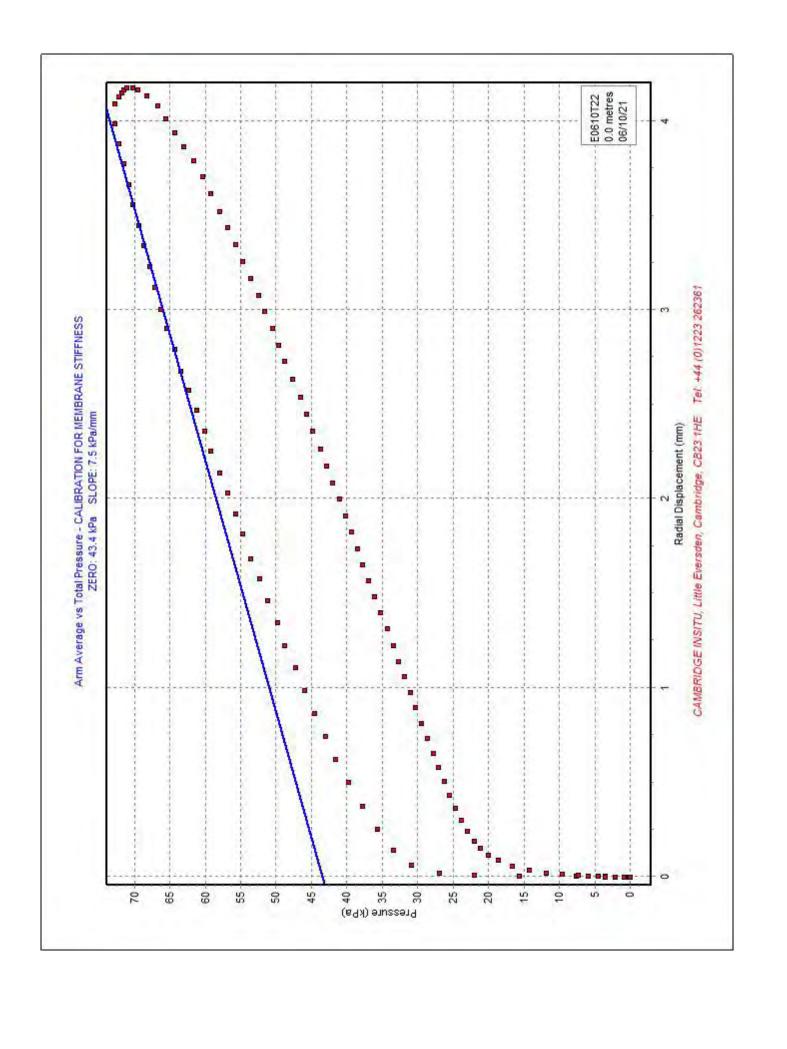
								Α	rm Spring	js								
			.w															
mm	Arm 1	Linearity	Hysteresis	Arm 2	Linearity	Hysteresis	Arm 3	Linearity	Hysteresis	Arm 4	Linearity	Hysteresis	Arm 5	Linearity	Hysteresis	Arm 6	Linearity	Hysteresis
	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)
0	9.3	100.6	0.04	-811.2	101.0	0.01	-250.6	100 8	0.00	160.9	100.7	0.01	159.6	102.0	0.03	-56.0	101.4	-0.01
1	317.5	100.6	0.11	-481.3	100.6	0.19	79.0	100 8	0.24	493.3	100.6	0.17	496.6	100.4	0.26	277.6	100.4	0.12
2	625.6	99.9	0.21	-152.9	100.0	0.24	408.4	100 0	0.35	825.2	100.0	0.24	828.3	100.0	0.30	608.0	99.9	0.14
3	931.5	99.6	0.17	173.5	99.5	0.21	735.3	100 2	0.35	1155.2	99.6	0.24	1158.7	99.4	0.30	936.6	99.5	0.16
4	1236.5	99.6	0.14	498.5	100.0	0.12	1062.7	99.2	0.31	1483.9	99.9	0.20	1487.2	99.3	0.25	1264.0	99.6	0.13
5	1541.6	99.8	0.08	824.9	97.7	0.07	1387.0	97.7	0.09	1813.5	98.8	0.12	1815.4	98.9	0.18	1591.6	99.6	0.09
6	1847.3	-100.3		1144.0	-98.1		1706.4	-98.3		2139.5	-99.5		2142.1	-100.0	1	1919.4	-100.2	
5	1540.1	-99.9		823.6	-100.3		1385.2	-100.5		1811.1	-100.4		1811.8	-99.7	1	1589.8	-99.8	
4	1234.0	-99.8		496.1	-100.1		1056.6	-100.4		1479.9	-99.9		1482.3	-99.7	ı	1261.4	-99.7	
3	928.3	-100.1		169.3	-100.1		728.4	-100.0		1150.4	-100.0		1152.8	-100.0	ı	933.5	-99.8	
2	621.7	-100.0		-157.6	-100.3		401.6	-100.1		820.4	-100.1		822.4	-100.2	ı	605.3	-100.3	
1	315.5	-100.2		-485.1	-99.9		74.4	-99.4		490.0	-99.8		491.4	-100.6	ı	275.3	-100.6	
0	8.6			-811.3			-250.6			160.8		ļ	159.0			-55.8		
Zero	10.1	mV		-809.4	mV		-249.5	mV		161.9	mV		162.5	m٧		-53.4	m∨	
Slope	306.3	mV/mm		326.5	mV/mm		326.9	mV/mm		330.0	mV/mm		330.4	mV/mm		329.0	mV/mm	

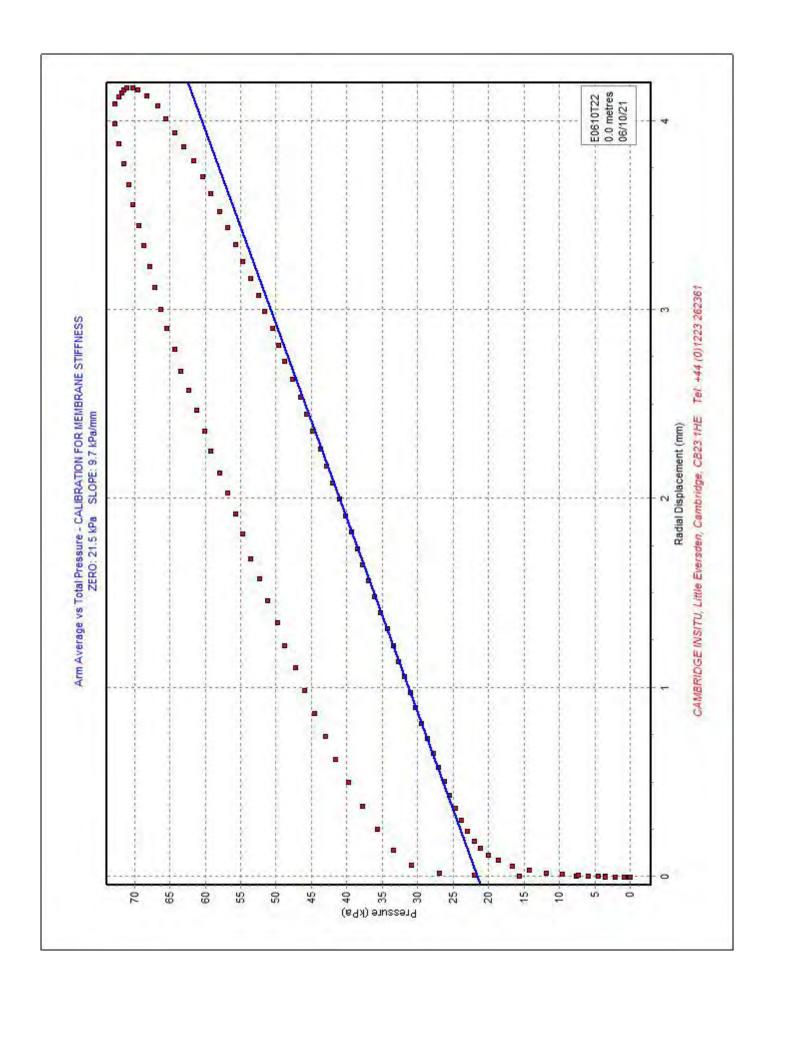










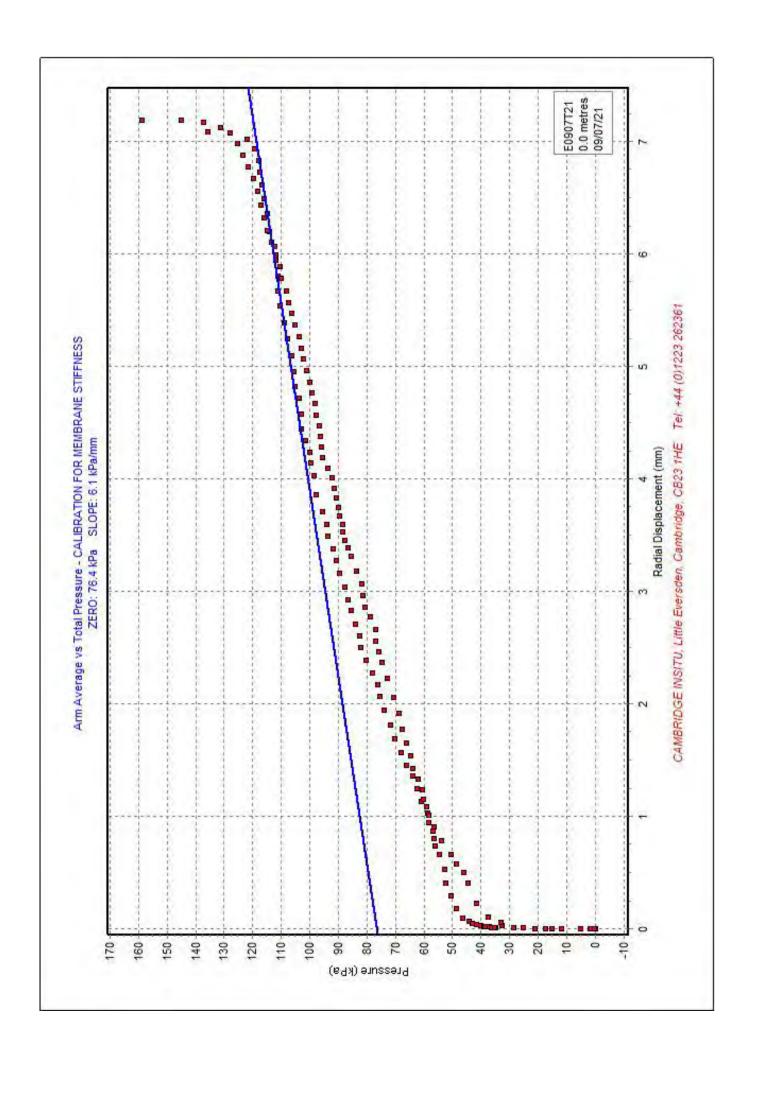


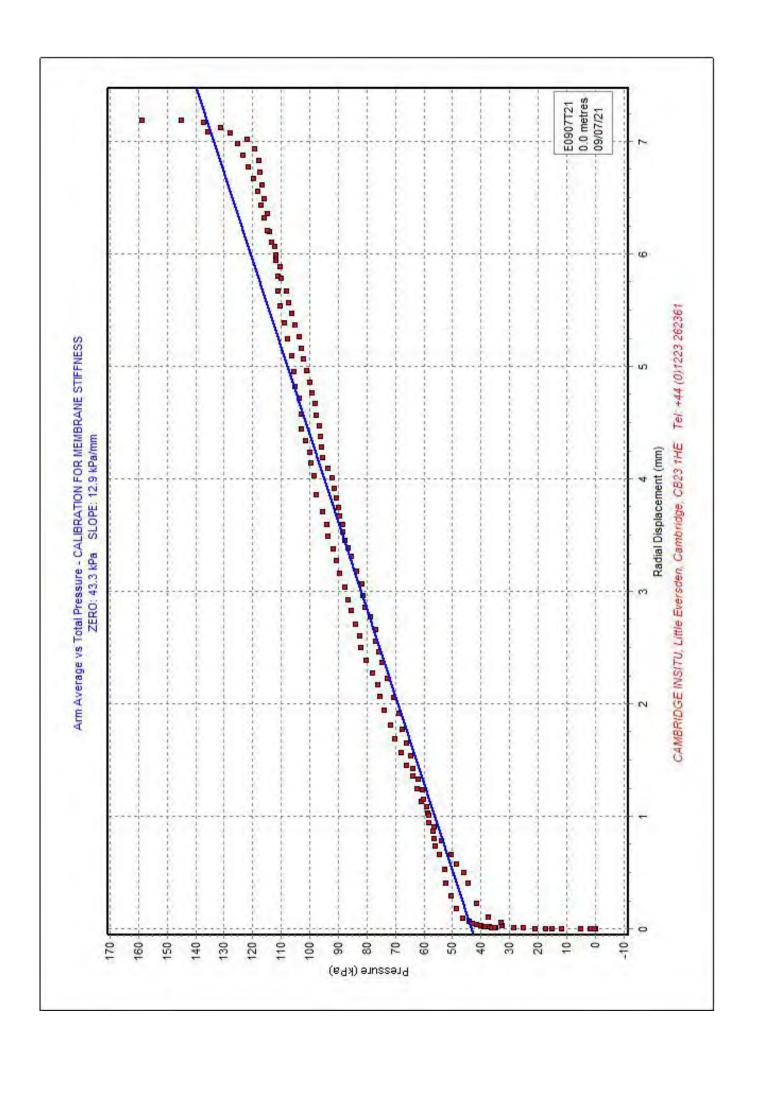
Self Boring Pressuremeter straightness calibration sheet on renspiece 0.66.m. Total Runout at - A: 0.25 B: N/A C: 0.1 mm D: 0.2 mm E:0.3 6 mm F: 0.5 7 mm After Straightening - A: 0.25 B: N/A C: 0.1 mm C: 0.1 mm D: 0.2 mm E:0.19 mm F: 0.15 mm on clare ling in clampting on My Place C Α 80mm 280mm (just below arms) 510mm 635mm 870mm 1070mm (on length adjuster)

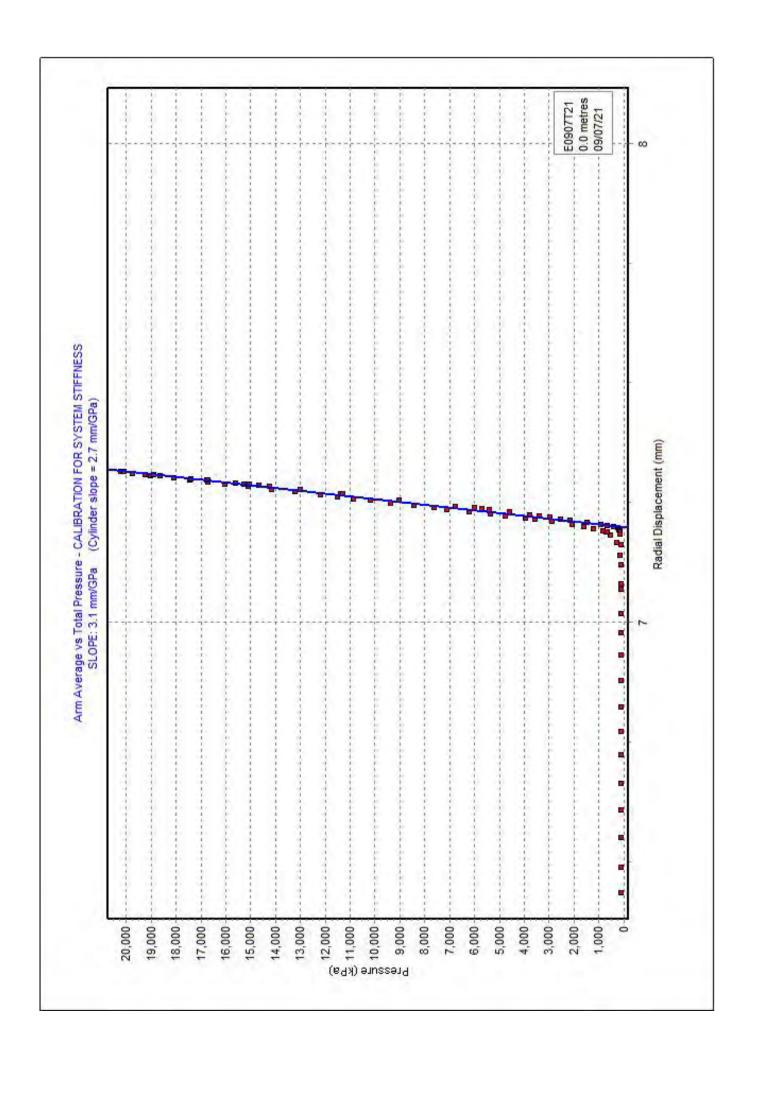
Date of check	Serial Number	Instrument Name	A PERSONAL PROPERTY.	CAMBRIDGE INSITU LTD	Drawn By	Date	Scale
14/10/10		SHULA		LITTLE EVERSDEN	JJB	20140303	NTS
Operator Cincolus		Initials	Cambridge	CAMBRIDGE	Description		
		SPB	Carrioriase	CB23 1HE	Checking Straig	ghtness of Self Boring Pressure	emeter
		212	- incitii	ODZO IIIE	Item Number		iss
SALES V	nech after re	w fube end	Ltd	T: +44-1223 252962 E: cam@cambridge-insitu.com W: www.cambridge-insitu.com	File Location \camb-sts2011\Publisheet Rev1.odg	c\Working Instructions\Calibration Sheets\2	0140303 SBP Straightness Calibration
		check to restreet					

Calibrat	ion Date	Ope	rator	instrum	ent Type	Serial N	lumber	Instrume	nt Name									
		BIKGCS/EJ		H		1602		Wa										
1372	UFZ 1	PHOORE	O finesand	111		IOUZ	200	110	" у									
Notes:	Arms calib	rated 06/05/	21; Arms 4 a	and 6 redo	ne 13/05/21	KC; Pressu	re Cells 13	37721										
	l							Ап	n Sprin	gs								
mm	Arm 1	Linearity	Hysteresis	Arm 2	Linearity	Hysteresis	Arm 3	Linearity	lvsteres is	Arm 4	Linearity	Hysteresis	Arm 5	Linearity	Hysteresis	Arm 6	Linearity	Hysteresi
	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)
0	-2006.0	103.3	0.05	-2624.1	1033	0 04	-2252.7	102.3	Ó.05	-2062 5	98.1	000	-2278.1	102.5	0.02	-2041.8	1092	0 08
2	-1704.4	102.2	0.11	-2337 0	1020	0 03	-1953.7	101.7	0.07	-1786 5	1026	-0 07	-1992.4		-0.03	-1768.1	103.1	0 03
4	-1406.1	101.6	0.14	-2053 6	101 3	-0 03	-1656.2	101.7	D.1D	-1497 8	101 9	-0 05	-1708.8	101.2	-0.05	-1509.6	1018	0.16
6	-1109.4	100.5	0.16	-17722	100 5		-1358.7	101.4	0.12	-1211 2	1009	-0 01	-1426.7	100.6	-0.06	-1254.5	100 5	0 07
8	-815.9	100.D	0.16	-1493 0	995	-0.12	-1062.2	99.9	0.16	-927.3	100 5		-1146.4	100.2	-0.06	-1002.5	992	0.00
10	-523.9	99.7	0.18	-1216.7	995		-770.0		0.19	-644.6	998		-867.2		-0.05	-753.9	98.7	-0 06
12	-232.9		0.20	-940.4	986		-479.9		0.16	-363.7	98 9		-590.0		-0.06	-506.6	97 9	-0 09
14	55.2		0.17	-666.4	988		-191.4		0.12	-853	98.1		-315.9		-0.07	-261. 1	97 3	-0 12
16		98.4	0.15	-392 0	980		96.1		0.10	190.8	98.1		-40.7		-0.04	-17.3	97.7	-0.10
18	628.9		0.13	-119.7	989		383.1		0.06	466.9	98 9		234.4		-0.02	227.6	96.7	0.00
20	913.9	-98.9		155.1	-9 82		668.3			745.1	-98 9		509.4			469.9	-96.7	
18	625.1	-98.6		-1 <mark>1</mark> 7.7	- 9 76		381.4			466.9	-9 7 5		235.0			227.6	-968	
16	337.2			-388 8	-983		93.3			192.6	-992		-39.5			-14.9	-97 0	
14	50.2			-662 0	-98.7		-194.8			-86 5	-9 8 8		-313.9			-258. 1	-98 3	
12	-238.6			-9362	-99 5		-484.5			-364.5	-999		-588.3	-9 9.6		-504.4	-989	
10	-529.3			-12126	-99.7		-775.5			-645.5	-100 0		-865.8	-100.1		-752.4	-998	
8	-820.6			-1489 6	-1008		-1067.0			-927.0	-1009		-1144.8	-100.5		-1002.6	-1012	
6	-1114.2	-101.4		-1769 6	-1020		-1362.3			-1211 0	-101.4		-1424.9			-1256.3	-102.7	
4	-1410.3	-101.8		-2052 9	-1026		-1659.1			-1496.4	-102.4		-1707.5	-102.0		-1513.6	-101 9	
2	-1707.5			-2337 9	-103.4		-1955.6			-1784.4	-9 88		- 199 1.7	-103.0		-1768.9	-109.7	
0	-2007.5			-2625.1			-2254.1			-2062.4			-2278.7			-2043.8		
Intercept				-2611.1			-2242.6			-2058.7			-2267.1			-2017.6		
Slope	146.0	mV/mm		1.58.9	mV/mm		146.2	mV/mm		140.7	mV/mm		139.3	mV/mm		125.3	mV/mm	
ax Output		mV			mV			mV			mV			mV			mV	
iin Output	1	mV			mV			mV			mV			mV			mV	
lax Range		mm			mm			mm			mm			mm			mm	

		Pre	ssure C	elis		
Gauge Ze	ro Offset	0	.0			
Bars	TPC A	Linearity	Hysteresia	TPCB	Linearity	Hysteresia
	(mV)	(%)	(%)	(mV)	(%)	(%)
0.0	-1595.0	100.4	-0.13	-2045.7	100.1	-0.10
20.0	-1376.5	99.7		-1827.7	99.4	-0 21
40.0	-1159.5	99.7		-16112	100 2	-0 22
60.0	-942.6	100.1	-0.19	-1393 0	998	-0.18
80.0	-724.8	100.2	-0.19	-11756	1003	-0 22
100.0	-506.7	99.7	-0.19	-957 0	99.7	-021
120.0	-289.7	100.2	-0.21	-739.7	100 5	-0 20
140.0	-71.7	100.4	-0.19	-520 8	100 0	-0.16
160.0	146.8	100.6	-0.13	-303 0	100.4	-0.13
180.0	365.8	99.9	-0.06	-84 2	100.4	-0 06
200.0	583.3	99.3		134 5	99.7	
180.0	367.2	100.0		-82 8	998	
160.0	149.6	99.8		-300 2	99.7	
140.0	-67.6	99.9		-517.4	100.1	
120.0	-285.1	99.9		-735.4	99.7	
100.0	-502.6	100.2		-952 5	100 2	
80.0	-720.7	100.1		-11708	100 2	
60.0	-938 .5	99.7		-1389 0	99.7	
40.0	-1155.4	99.2		-1606 3	996	
20.0	-1371.3	101.5		-1823 2	101 2	
0.0	-1592.1			-2043 6		
Intercept	-1592.9	mV		-2044 3	mV	
Stope	10 882	mV/Bars		10.893	mV/Bars	
Stope	108.8	mV/MPa		1089	mV/MPa	







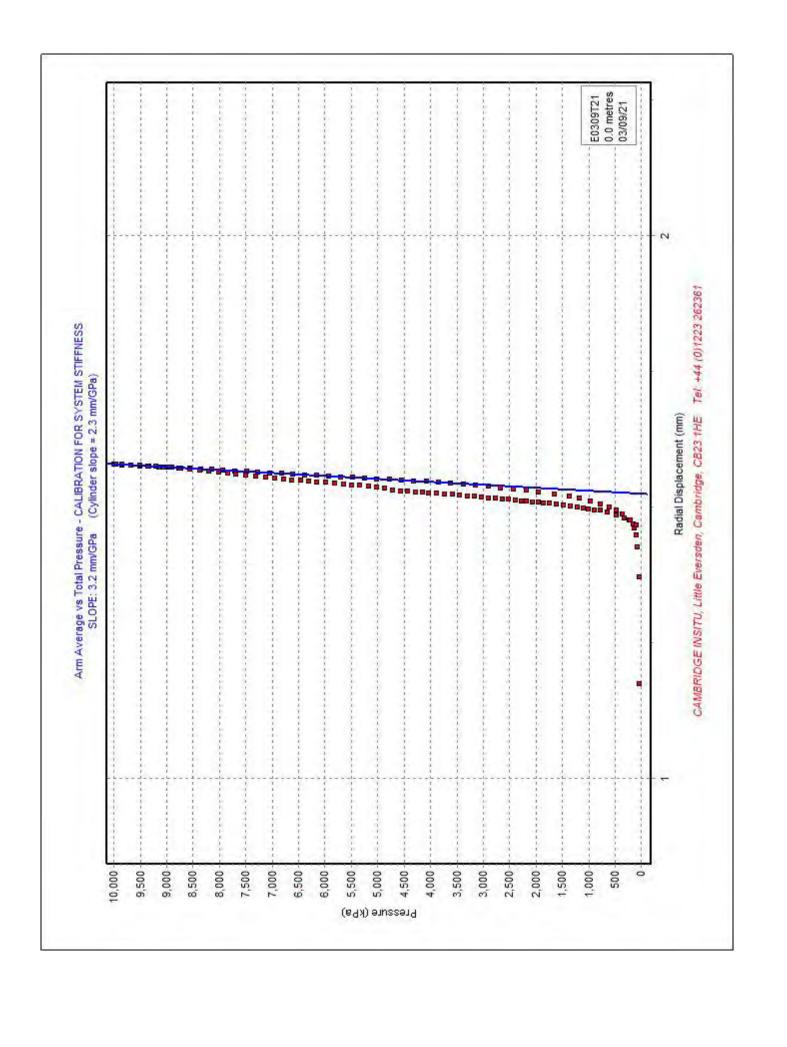
Calibration Date	Operator	Instrument Type	Serial Number	Instrument Name
13/07/2021	ES	SBP	920123	Dougal

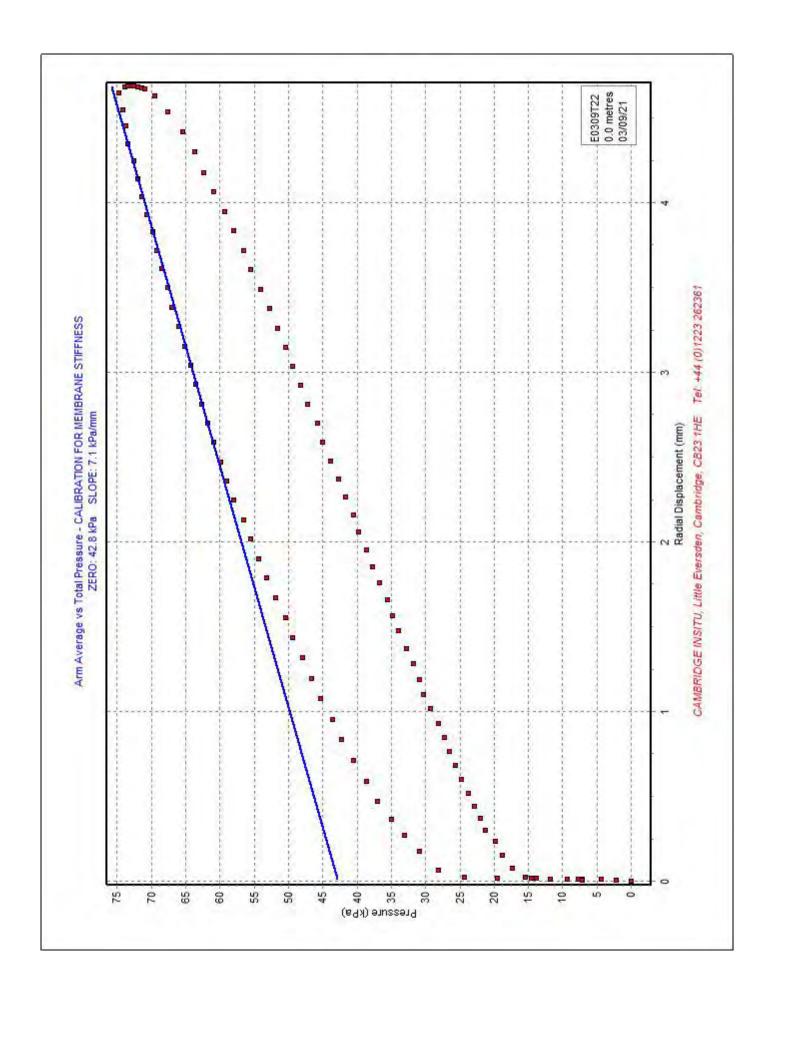
Notes:

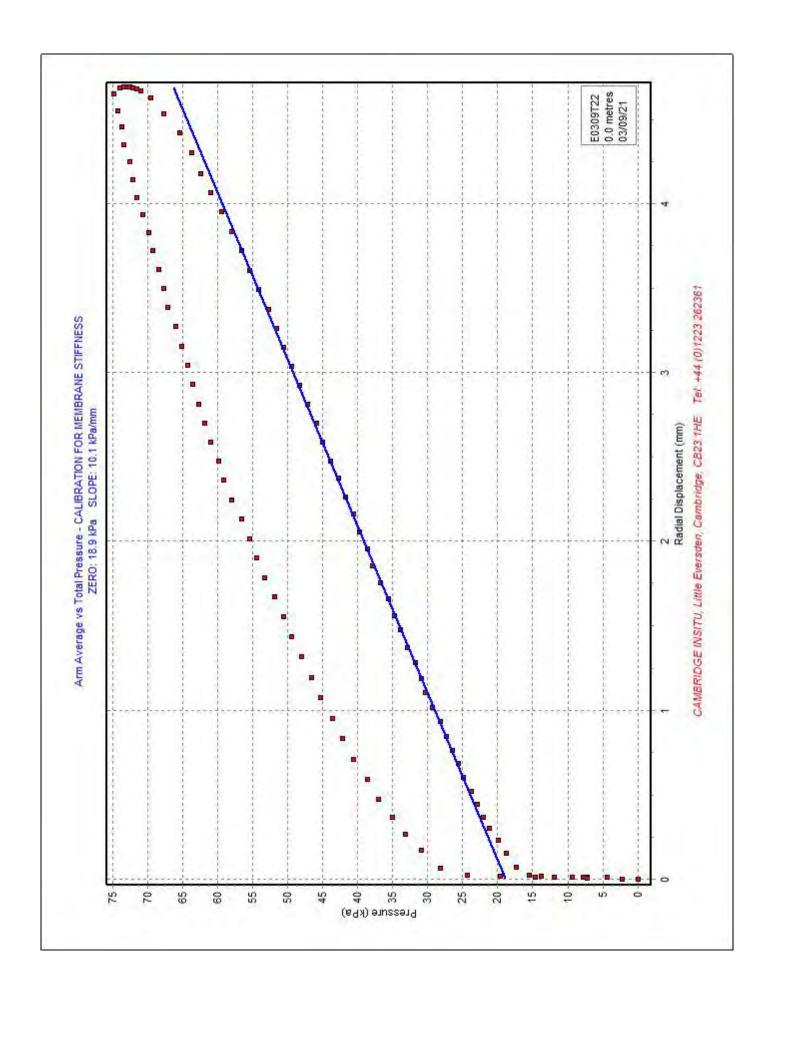
				Pressu	re cells		Test Gauge:		
Gauge Zero	Offset (Bar):	0.	.0						
Мра	TPC	Linearity	Hysteresis	PPC A	Linearity	Hysteresis	PPC B	Linearity	Hysteresis
	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)
0.00	-2074.3	99.4	0.01	-2136.0	100.1	-0.05	-1813.0	99.8	0.00
1.00	-1714.2	99.1	-0.08	-1705.1	100.1	-0.15	-1389.9	99.6	-0.08
2.00	-1355.0	98.9	-0.10	-1274.2	99.5	-0.14	-967.4	99.2	-0.09
3.00	-996.4	99.4	-0.16	-845.9	99.6	-0.17	-546.8	99.5	-0.14
4.00	-636.0	100.0	-0.17	-416.9	100.0	-0.18	-124.6	100.0	-0.1€
5.00	-273.7	100.7	-0.16	13.8	100.4	-0.17	299.6	100.3	-0.1€
6.00	91.3	100.2	-0.12	445.9	100.1	-0.13	725.0	100.4	-0 14
7.00	454.4	100.8	-0.13	876.9	100.4	-0.14	1150.7	100.5	-0.14
8.00	819.8	100.9	-0.08	1309.0	100.2	-0.12	1577.1	100.4	-0.12
9.00	1185.6	101.3	-0.06	1740.3	100.4	-0.06	2003.0	100.8	-0.07
10.00	1552.8	-100.7		2172.8	-99.8		2430.6	-100.1	
9.00	1187.7	-100.7		1743.1	-99.6		2006.0	-99.9	
8.00	822.8	-100.3		1314.3	-100.2		1582.2	-100.3	
7.00	459.2	-100.3		883.0	-100.2		1156.6	-100.4	
6.00	95.6	-100.3		451.7	-100.0		730.8	-100.1	
5.00	-267.8	-99.9		21.2	-99.9		306.2	-100.0	
4.00	-629.8	-99.6		-409.1	-99.7		-117.8	-99.7	
3.00	-990.6	-99.5		-838.4	-99.8		-540.7	-99.7	
2.00	-1351.3	-99.4		-1268.0	-100.0		-963.4	-99.7	
1.00	-1711 <u>-</u> 4	-100.2		-1698.6	-101.1		-1386.4	-100.5	
0.00	-2074.6			-2133.9			-1812.8		
Zero	-2078.5	mV	·	-2134.0	mV		-1814.8	mV	•
Slope	362.4	mV/MPa		430.6	mV/MPa		424.2	mV/MPa	

Arm Springs

mm	Arm 1	Linearity	Hysteresis	Arm 2	Linearity	Hysteresis	Arm 3	Linearity	Hysteresis
	(mV)	(%)	(%)	(mV)	(%)	(%)	(mV)	(%)	(%)
0	103.2	101.8	0.00	192.3	101.7	-0.01	57.3	102.5	0.00
1	404.0	100.9	0.25	490.1	100.6	0.16	365.4	101.7	0.23
2	702.0	100.1	0.36	784.5	100.1	0.23	671.0	101.2	0.31
3	997.8	99.7	0.36	1077.4	99.8	0.22	975.1	100.7	0.35
4	1292.3	98.5	0.27	1369.4	99.4	0.17	1277.7	98.3	0.29
5	1583.3	98.2	0.01	1660.2	97.3	0.03	1573.1	88.0	-0.14
6	1873.4	-98.2		1945.0	-97.5		1837.7	-87.2	
5	1583.2	-100.1		1659.6	-100.2		1575.6	-100.8	
4	1287.5	-100.2		1366.4	-100.1		1272.6	-101.1	
3	991.5	-100.1		1073.5	-100.1		968.8	-100.9	
2	695.6	-100.2		780.5	-100.2		665.5	-101.2	
1	399.6	-100.3		487.3	-100.7		361.3	-101.1	
o	103.2			192.5			57.3		
Zero	106.2	mV		195.5	mV		64.5	mV	
Slope	295.5 mV/mm			292.7 mV/mm			300.5		







Self Boring Pressuremeter straightness calibration sheet Total Runout at - A: 7 B: 6 C: 0.08m D: 5.7m E: 2.03mm F: 40.06 After Straightening - A: 0.1 B: 0.05 C: 0.08m D: 0.4mm E: 1.7mm F: 0.2 mm C A 80mm 280mm (just below arms) 510mm 635mm 870mm 1070mm (on length adjuster)

Date of check Serial Number	Instrument Name DOUGA-L		CAMBRIDGE INSITU LTD	Drawn By JJB	Date 20140303	Scale NTS
Operator Signature		Cambridge	CAMBRIDGE CB23 1HE	Description Checking Strai	ghtness of Self Boring Pressur	emeter
emments		4 insitu	T: +44 1223 262962	Item Number		Iss
The deformed at poin	T E?	Ltd	E: cam@cambndge-insitu.com W: www.cambridge-insitu.com	File Location \camb-sbs2011\Publi Sheet Rev1.odg	cWorlding Instructions/Calibration Sheets/2	0140303 SBP Straightness Calls

Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_FE_001 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Depth Test no. Peak Vane Residual Vane Penetrometer Date Remarks kPa m 0.00 58 30 1 20/09/2021 0.00 2 65 40 20/09/2021 0.00 3 62 35 20/09/2021 0.50 1 62 40 20/09/2021 20/09/2021 0.50 2 50 30 0.50 3 69 40 20/09/2021 38 20/09/2021 1.00 1 61 36 20/09/2021 1.00 2 59 1.00 3 62 20/09/2021 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_FE_002 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 25 0.00 62 1 21/09/2021 0.00 2 54 15 21/09/2021 0.00 3 45 10 21/09/2021 0.50 30 21/09/2021 1 78 0.50 2 20 21/09/2021 60 0.50 3 68 22 21/09/2021 4 - 4 - 4 - 4 - 1 - 1 21/09/2021 Material not suitable for Hand Vane Test 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_FE_003 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer ac Exercise Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 94 50 0.50 24/08/2021 1 16 24/08/2021 0.50 2 58 0.50 3 128 98 24/08/2021 1 24/08/2021 1.00 Material not suitable for Hand Vane Test SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_FE_004 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 90 0.50 43 1 25/08/2021 25/08/2021 0.50 2 72 34 0.50 3 110 38 25/08/2021 65 25/08/2021 1.00 1 84 2 35 25/08/2021 1.00 90 1.00 3 85 35 25/08/2021 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Vane and Hole ID Relocation **Penetrometer Results** TP_FE_005 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Peak Vane Residual Vane Depth Test no. Penetrometer Date Remarks kPa m 55 10 0.50 26/08/2021 1 40 26/08/2021 0.50 2 95 0.50 3 57 20 26/08/2021 Material too stiff for Hand Vane Test 1 26/08/2021 1.00 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_FE_006 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Peak Vane Residual Vane Depth Test no. Penetrometer Date Remarks kPa m 68 30 0.50 26/08/2021 1 33 26/08/2021 0.50 2 62 0.50 3 67 15 26/08/2021 Material too stiff for Hand Vane Test 26/08/2021 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_003 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Depth Test no. Peak Vane Residual Vane Penetrometer Date Remarks kPa m 10 0.00 60 1 02/09/2021 5 0.00 2 30 02/09/2021 0.00 3 35 6 02/09/2021 0.50 5 02/09/2021 1 45 2 10 02/09/2021 0.50 57 0.50 3 60 10 02/09/2021 AND RESIDENCE OF 02/09/2021 Material too stiff for Hand Vane Test 1.00 1 SOIL ENGINEERING

Form No.

SE-IST-F-017

lssueNo.RevisionNo

1.04

Issue Date

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Part of the Bachy Soletanche Group

Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_004 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 14 0.00 58 1 27/08/2021 22 0.00 2 95 27/08/2021 0.00 3 125 48 27/08/2021 0.50 25 27/08/2021 1 115 2 5 27/08/2021 0.50 85 0.50 3 135 20 27/08/2021 RIVER CARRIED X 27/08/2021 Material too stiff for Hand Vane Test 1.00 1 SOIL ENGINEERING

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Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_005 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Peak Vane Residual Vane Depth Test no. Penetrometer Date Remarks kPa m 15 0.00 25 03/09/2021 1 10 03/09/2021 0.00 2 42 0.00 3 35 18 03/09/2021 0.50 1 Material not suitable for Hand Vane Test 1.00 Material too stiff for Hand Vane Test 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Relocation Project No. TE8364

16 1 16

Vane and
Penetrometer Results
for Excavations

Hole ID

TP_STW_006

Engineer Mott MacDonald Bentley

Employer Barhale Limited

Depth	Test no.	Peak Vane	Residual Vane	Penetrometer	Date	Remarks
∭ m		kPa	kPa	kPa	ded s	040 ==
0.00	1	5	15 8 3		31/08/2021	Test failed: Too friable
0.00	2	8	0.00 E		31/08/2021	Test failed: Too friable
0.00	3		191		31/08/2021	Test failed: Too friable
0.50	1	82	40		31/08/2021	3.4.81
0.50	2	80	2000		31/08/2021	Residual test failed
0.50	3	80	15		31/08/2021	
1.00	1	115	40		31/08/2021	
1.00	2	105	38		31/08/2021	
1.00	3	75	20		31/08/2021	
						•

Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation TE8364 **Penetrometer Results** TP_STW_007 Project No. for Excavations Mott MacDonald Bentley Engineer Employer **Barhale Limited**

прюует	Darriale L	inited							
Depth m	Test no.	Peak Vane kPa	Residual Vane kPa	Penet <mark>r</mark> ometer kPa	Date	WE 74 P	Remarks		
0.00 0.50 0.50 0.50 1.00	1 1 2 3 1	- 95 80 55	- 5 10 5		31/08/2021 31/08/2021 31/08/2021 31/08/2021 31/08/2021	Material not suitable fo	4		
							6011 00010000100		
CE I			Nie Derdeie-Nie			[s]	SOIL ENGINEERING		

Project Name Cambridge Waste Water Treatment Plant

Relocation

Project No. TE8364

Engineer Mott MacDonald Bentley

Vane and
Penetrometer Results
for Excavations

Hole ID

TP_STW_010

4.5	114.4			F.		(K. e. K
Depth	Test no.	Peak Vane	Residual Vane	Penetrometer	Date	Remarks
0.00		kPa	kPa	kPa	01 (00 (2021	Make sign and a sign black for the sign of Make a Track
	1	125	- 30		01/09/2021	Material not suitable for Hand Vane Test
0.50	1	125	20		01/09/2021	
0.50 0.50	3	≓ 70 70	10 5		01/09/2021 01/09/2021	
1.00	1 1	70	,		01/09/2021	Material not suitable for Hand Vane Test
						1 m 74400 h. I
		1				

Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_011 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 48 0.00 90 21/09/2021 1 10 21/09/2021 0.00 2 45 0.00 3 40 5 21/09/2021 0.50 21/09/2021 1 Material not suitable for Hand Vane Test 1.00 1 21/09/2021 Material too St ff for Hand Vane Test SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_012 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 20 0.00 40 1 03/09/2021 10 0.00 2 40 03/09/2021 0.00 3 50 12 03/09/2021 0.50 15 03/09/2021 1 125 2 10 03/09/2021 0.50 120 0.50 3 115 15 03/09/2021 071 H 340 H 1 Material too stiff for Hand Vane Test 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_013 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Depth Test no. Peak Vane Residual Vane Penetrometer Date Remarks kPa - kPa m 0.00 90 06/09/2021 Residual Test not undertaken 1 0.00 2 85 06/09/2021 Residual Test not undertaken 0.00 3 06/09/2021 88 Residual Test not undertaken Residual Test not undertaken 0.50 1 55 06/09/2021 0.50 2 53 06/09/2021 Residual Test not undertaken 0.50 3 60 06/09/2021 Residual Test not undertaken 06/09/2021 Residual Test not undertaken 1.00 1 90 1.00 2 95 06/09/2021 Residual Test not undertaken 1.00 3 89 06/09/2021 Residual Test not undertaken

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Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_014 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 0.00 15 5 1 03/09/2021 7 0.00 2 20 03/09/2021 0.00 3 15 10 03/09/2021 0.50 65 25 03/09/2021 1 0.50 2 20 03/09/2021 60 0.50 3 72 18 03/09/2021 REPORT OF THE RESIDENCE 03/09/2021 Material too stiff for Hand Vane Test 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_015 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m _ 19 0.00 48 1 07/09/2021 0.00 2 40 07/09/2021 0.00 3 74 28 07/09/2021 105 0.50 25 07/09/2021 1 0.50 2 25 07/09/2021 55 0.50 3 58 07/09/2021 07/09/2021 Material too stiff for Hand Vane Test 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_016 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 10 0.00 50 1 08/09/2021 12 0.00 2 60 08/09/2021 0.00 3 42 - 5 08/09/2021 0.50 1 60 08/09/2021 2 20 08/09/2021 0.50 84 0.50 3 55 10 08/09/2021 08/09/2021 Material not suitable for Hand Vane Test 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_017 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 0.00 45 1 10/09/2021 10 0.00 2 37 10/09/2021 0.00 3 64 15 10/09/2021 0.50 30 10/09/2021 1 75 10 10/09/2021 0.50 2 80 0.50 3 60 10/09/2021 0.1 to 1.000 1 0 X 10/09/2021 Material too stiff for Hand Vane Test 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_018 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 0.00 30 1 09/09/2021 10 0.00 2 46 09/09/2021 0.00 3 35 10 09/09/2021 0.50 10 1 68 09/09/2021 0.50 20 09/09/2021 2 84 0.50 3 92 25 09/09/2021 THE PERSON 09/09/2021 Material too stiff for Hand Vane Test 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_019 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Residual Vane Depth Test no. Peak Vane Penetrometer Date Remarks kPa m 0.00 50 5 1 10/09/2021 10 0.00 2 48 10/09/2021 0.00 3 12 10/09/2021 64 0.50 20 10/09/2021 1 84 2 10 10/09/2021 0.50 60 0.50 3 90 25 10/09/2021 the second terms 10/09/2021 Material not suitable for Hand Vane Test 1.00 1 SOIL ENGINEERING

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Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_020 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Depth Test no. Peak Vane Residual Vane Penetrometer Date Remarks kPa m 10 0.00 68 1 13/09/2021 0.00 2 54 5 13/09/2021 0.00 3 48 10 13/09/2021 0.50 20 13/09/2021 1 72 2 15 13/09/2021 0.50 65 0.50 3 70 20 13/09/2021 14 14 14 13/09/2021 Material not suitable for Hand Vane Test 1.00 1 SOIL ENGINEERING

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Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_021 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Depth Test no. Peak Vane Residual Vane Penetrometer Date Remarks kPa m 10 0.00 45 1 13/09/2021 5 0.00 2 50 13/09/2021 0.00 3 60 10 13/09/2021 0.50 75 15 13/09/2021 1 10 13/09/2021 0.50 2 68 0.50 3 60 13/09/2021 DESCRIPTION 13/09/2021 Material too St ff for Hand Vane Test 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 lssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_022 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Depth Test no. Peak Vane Residual Vane Penetrometer Date Remarks kPa m 10 0.00 35 1 14/09/2021 5 0.00 2 40 14/09/2021 0.00 3 28 3 14/09/2021 0.50 15 14/09/2021 1 85 2 10 14/09/2021 0.50 90 0.50 3 70 20 14/09/2021 CLUB SERVER R 14/09/2021 Material too stiff for Hand Vane Test 1.00 1

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Issue Date

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Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_031 Project No. TE8364 for Excavations Mott MacDonald Bentley Engineer Employer Barhale Limited Peak Vane Residual Vane Depth Test no. Penetrometer Date Remarks kPa m 0.00 15 35 03/09/2021 1 10 0.00 2 40 03/09/2021 0.00 3 25 5 03/09/2021 0.50 30 03/09/2021 1 85 75 **15** 03/09/2021 0.50 2 0.50 3 90 20 03/09/2021 03/09/2021 Material too stiff for Hand Vane Test 1.00 1 SOIL ENGINEERING Form No. SE-IST-F-017 IssueNo.RevisionNo 1.04 Issue Date 08/11/2012 Part of the Bachy Soletanche Group Project Name Cambridge Waste Water Treatment Plant Hole ID Vane and Relocation **Penetrometer Results** TP_STW_032 Project No. TE8364 for Excavations Engineer Mott MacDonald Bentley Employer Barhale Limited Peak Vane Residual Vane Depth Test no. Penetrometer Date Remarks kPa m 12 0.00 28 13/09/2021 1 12 13/09/2021 0.00 2 35 0.00 3 52 22 13/09/2021 0.50 Material too stiff for Hand Vane Test 1 1.00 1 Material too stiff for Hand Vane Test SOIL ENGINEERING

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Project Na <mark>m</mark> e		oridge Was	ste Wate	er Treatme	nt Pl <mark>an</mark> t			•	Test			Hole I	
Project No.	TE83	64					R	esult	S		T	P_FE_C	001
Engineer	Mott	MacDonal	ld Bentle	ey								Table No	0.
Employer	Barha	ale Limited					1						
Pit Dimension	s Lengt	th m	1	.70	Width	m	0	.60	Dep	th at start	m	- 2	2.50
Details of cons	structio	on JCB 30	CX Mac	hine Excav	ated				Dep	th at end	m		1.7
Invert of disch					•	m		.25	Test				1
Description							_			40m: Light grey sand			-
Environment	Field												
Remarks	Remarks Start Time: 15:07 Finish Time: 16:32. Test terminated at end of working day.												
Elapsed Tin	ne	Water D	Depth						Elansed 1	Time (min)			
mins		m	-			40.0	20.5	22 -				70.0	000 577
0.0		0.2	5	1 6	0.0	10.0	20.0	30.0	40.0	50.0 6	0.0	70.0	80.0 90.0
1.0		0.20	6	1									
2.0		0.20	6	1								Max	imum effective
3.0		0.20	6	1	*****	20000	×××	X	(V V			875	depth
4.0		0.20	6	1						XX	××	××	××
5.0		0.2	7	0.9	50 -								
6.0		0.2		1									
7.0		0.27											
8.0		0.28		1									 75%
9.0		0.28		1 .	00 -								
10.0		0.28		1									
12.0		0.29		<u>~</u>									
14.0		0.29		Depth (m)									
16.0		0.30		å									— - 50%
18.0		0.30		1.9	50 -								
20.0		0.3:											
25.0		0.3:		-									
30.0		0.3		-									
35.0		0.3		┨	00								——- 25%
40.0		0.34		- 23									
45.0		0.3		1									
50.0		0.3		1									
55.0		0.3		1									
60.0		0.30		2.9	50 🗕 🗕 –								— — - Empty
65.0		0.3			31								
70.0		0.3		1									
75.0		0.3		Volume (outflow be	tween '	75% an	d 25% e	effective	depth		m³	
80.0		0.3		1			. en uil	/8		aspin.		111	
85.0		0.39		Mean su	rface area	through	h which	outflo	w occilr	s		m²	
		5.5	-		4100	509		44110	50001	-		-11	
				Time for	outflow b	etween	75% aı	nd 25%	effective	e depth		mins	
				Soil infilt	ration rate	on rate f m/s Not determin						Not determined	
Recorded By:	Δifra	d Lee	Cha	cked Dr	david.hov	ward	Ann	roved E	3 v.				
-		9/2021			17/09/20				Jy.				
Date:	06/0: GR-F-0:		Dat			721	Dat		23/03/2	015	 		GINEERING hy Soletanche Grou
Form No. SE-P	un-r-U.	r4	ISSU	No Revision	INO 2.05		issu	e Date	Z3/U3/Z	013	Pa	art of the BaC	y soretanone drou

Project Name Project No.	Reloc TE83	atio	_	Nater	Tre <mark>a</mark> tı	ment f	Soakaway Test Results					٦	Hole		2			
Engineer	Mott	Ma	cDonald B	entle	v										Table I	No.		
					,													
Employer	Barha	ale L	imited.											1				
Pit Dimension			m	1.8		<u> </u>	idth	ı	m	0.60		Depth a		m		1.0		
Details of con	structi	on	JCB 3CX I	Mach	ine Exc	cavate	d					Depth a	t end	m		1		
Invert of disch									m	0.15		Test no.				1		
Description	and (GRA')m: Gr	avei	ly CLA	Y. 0.70) - 1.00n	n: Sand	ly gravell	y CLAY	. 1.00	- 2.00m	: Br	own S	SAND
Environment								- 52										
Remarks	Start	Tim	e: 11:25 F	inish	Time:	11:55												
Elapsed Tir	ne	V	Vater Dept	th							Ela	psed Time	(min)					
mins			m			0.0	n	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	വ	0.0 :	100.0
0.0			0.15			0.00	_	10.0	20.0	30.0	-10.0	30.0	00.0	, 0.0	90.0	51		100.0
0.5			0.20															
1.0			0.25															
2.0			0.30				_								<u>M</u>		um eff	ective
3.0			0.35			1											depth	
4.0			0.39															
5.0			0.44			- 1	*											
10.0			0.50				*											
15.0			0.60				*									_	75%)
20.0			0.69				*											
30.0			0.79				X											
45.0			0.85		~	0.50		X										
60.0			0.90		Depth (m)			1									ne:	
90.0			0.90		8	1	10		<u> </u>							_	50%)
									X									
							10.0			-×						_	25%	
													*			→	<	
						1.00	=	. – –	. _							- 1,35	Emp	oty
						8												
					Volum	ne outf	low	betwe	een 75	% and 25	5% effe	ective de	pth		m³	3	0.49	59
					Mean	surfac	e ar	ea thr	ough v	<mark>v</mark> hich o <mark>u</mark>	tflow	occurs			m²	?	3.1	2
					Time f	for o <mark>u</mark> t	flow	/ betw	een 75	5% and 2	5% eff	ective de	pth		mins	.	26.0	00
					Soil in	filtrati	on r	ate				f			m/s		9.4E-	-05
Recorded By:	Adam	ı M	eacher	Chec	ked R	v: da	vid.l	howar	d	Approv	ed Bv.						<u> </u>	
Recorded By: Adam Meacher Checked By: david.how Date: 21/09/2021 Date: 11/10/202						Date:				_			,					
	GR-F-0:				No.Revis			05		Issue Dat	e 23	/03/2015	SOIL ENGINEERING Part of the Bachy Soletanche Group					
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Project Name Project No.	Camb Reloc TE83	atio		Vatei	r Tre <mark>a</mark> tme	Soakaway Test Results						Hole ID TP_FE_002				
Engineer	Mott	Ma	cDonald B	entle	v									Table I	No.	
-				OTTE	,									1		
Employer 	Вагла	aie L	imited.													
Pit Dimension			m		80	Width	1	m	0.60		Depth a		m		1.00)
Details of cons			-								Depth a		m		1	
Invert of disch						<u> </u>		m	0.22		Test no.				2	
Description	and G	GRA'				: Grave	ily CLA	Y. 0.70) - 1.00m	n: Sand	ly gravell	ly CLAY	'. 1.00 ·	- 2.00m	: Bro	wn SAND
Environment							- 52									
Remar <mark>k</mark> s	Start	Tim	e: 13:02 F	inish	Time: 15	5:02										
El <mark>a</mark> psed Tin	ne	٧	Vater Dept	th					Elapsed Time (min)							
mins			m			0.0	20.0	40.0	60.0	80.0	100.0	120.0	140.0	160.0	180.	.0 200.0
0.0			0.22		0.0		-1	-	-	- 1	-0	-	1		- 1	
0.5			0.23													
1.0			0.29													
2.0			0.30													
3.0			0.32											M	aximu	m e <mark>ff</mark> ective
4.0			0.33			*										epth
5.0			0.34			k										
10.0			0.46			*										
15.0			0.52			1										
20.0			0.57			-/									- ·	75%
30.0			0.70			3	K									
45.0			0.78		€ 0.5	60	X									
60.0			0.84		Depth (m)		1									
90.0			0.88		\$										=".	50%
180.0			0.90				1									
						-	-								-(*)	25%
									X		×			-	→ ×	
					1.0	ю —-									- ,•	Empty
						ik										
					Volume o	outflow	betwe	een 759	% a <mark>nd</mark> 25	5% effe	ctive de	pth		m³		0.421
					Me an su	rface a	rea thr	ough v	<mark>v</mark> hich ou	tflow	occurs			m²		2.952
					Time for	o <mark>u</mark> tflo	w betw	een 75	% a <mark>n</mark> d 2	5% eff	ective de	epth		mins		43.00
					Soil infiltration rate f m/s							5.5E-05				
Recorded By:	Adam	ı M	eacher	Chec	ked By:	david	.howar	d	Approve	ed Bv:			Т			
-					Date:	- , .				PAU C		DANICE.				
	1					2.05		Issue Date	e 23	/03/2015		P			BERING letanche Group	

Project Name Cambridge Waste Water Treatment Plant Hole ID **Soakaway Test** Relocation Results TP_STW_003 Project No. TE8364 Mott MacDonald Bentley Table No. Engineer 1 Employer **Barhale Limited** Pit Dimensions Length 2.50 Width 0.30 3.00 Depth at start m Details of construction JCB 3CX Machine Excavated Depth at end 3 Invert of discharge drain / maximum effective depth m 1.00 Test no. 1 Structureless CHALK composed of calcareous CLAY from 0.50m to 3.00m Environment Field Start Time: 11:18 Finish Time: 16:18. Test terminated at end of working day, 75% not achieved. Pit unsafe to Remarks be left overnight as not gravel filled. Elapsed Time Water Depth Elapsed Time (min) mins m 50.0 100.0 150.0 200.0 250.0 300.0 350.0 0.0 1.00 0.0 0.90 0.5 1.01 Maximum effective depth 1.0 1.05 1.10 2.0 1.05 3.0 1.05 1.30 4.0 1.05 5.0 1.05 1.50 10.0 1.07 15.0 1.10 1.70 30.0 1.13 45.0 1.14 1.90 60.0 1.16 Depth (m) 120.0 1.24 2.10 180.0 1.29 240.0 1.34 300.0 1.40 2.30 2.50 2.70 2.90 3.10 Volume outflow between 75% and 25% effective depth m^3 Mean surface area through which outflow occurs m² Time for outflow between 75% and 25% effective depth mins Not Soil infiltration rate f determined Recorded By: Adam Meacher Checked By: david.howard Approved By: 17/09/2021 03/09/2021 Date: Date: Date: SOIL engineering SE-PGR-F-014 23/03/2015 Form No. IssueNo.RevisionNo 2.05 Issue Date Part of the Bachy Soletanche Group

Project Name Cambridge Waste Water Treatment Plant Hole ID **Soakaway Test** Relocation Results TP_STW_013 Project No. TE8364 Table No. Engineer Mott MacDonald Bentley 1 Employer **Barhale Limited** Pit Dimensions Length 2.50 Width 0.30 3.00 Depth at start m Details of construction JCB 3CX Machine Excavated Depth at end 3 Invert of discharge drain / maximum effective depth m 0.40 Test no. 1 Structureless CHALK composed of calcareous CLAY from 0.40m to 3.00m Environment Field Start Time: 13:10 Finish Time: 16:10. Test terminated at end of working day, 75% not achieved. Pit unsafe to Remarks be left overnight as not gravel filled. Elapsed Time Water Depth Elapsed Time (min) mins m 20.0 40.0 60.0 80.0 100.0 120.0 140.0 160.0 180.0 200.0 0.0 0.40 0.0 0.00 0.40 0.5 1.0 0.42 Maximum effective 1.5 0.43 depth 0.50 2.0 0.44 3.0 0.45 4.0 0.46 5.0 0.46 1.00 10.0 0.50 15.0 0.55 20.0 0.58 25.0 0.60 1.50 30.0 0.62 40.0 0.65 50% 50.0 0.68 60.0 0.71 2.00 120.0 0.85 180.0 1.00 25% 2.50 3.00 **Empty** Volume outflow between 75% and 25% effective depth m^3 Mean surface area through which outflow occurs m² Time for outflow between 75% and 25% effective depth mins Not Soil infiltration rate f determined Recorded By: Alfred Lee Checked By: david.howard Approved By: 06/09/2021 17/09/2021 Date: Date: Date: SOIL engineering SE-PGR-F-014 23/03/2015 Form No. IssueNo.RevisionNo 2.05 Issue Date Part of the Bachy Soletanche Group

Project Name		_	Wate	r Treatme	nt Pl <mark>an</mark> t		Soaka	way T	est		Н	ole ID	
Project No.	Reloc TE836						Re	sults			TP_S	TW_0	16
Engineer	Mott	MacDonald	Bentle	ey							Tal	ole No.	
Employer	Barha	le Limited											
Pit Dimension	s Lengt	h m	2.	.50	Width	m	0.3	30	Depth at	start	m	3.1	LO
Details of cons	structio	n JCB 3CX	Mach	nine Excav	ated				Depth at	end	m	3.	1
Invert of disch	arge d	rain / maxim	um et	fective de	pth	m	1.4	0	Test no.			1	
Description	Struct	tureless CHA	LK co	mposed o	f calcare	ous CLA	Y from 1.	40m to 3	3.10m.				
Environment	Field												
Remarks		T <mark>ime: 10:46</mark> t overnight a				est termi	nated at	end of w	orking day	, 25% i	not achiev	red. Pi	t unsafe to
Elapsed Tin	ne	Water De	oth					Eli	apsed Time (i	min)			
mins		m			0.0	FO 0	400.0				200.0	250	
0.0		1.40		1.3	0.0 0 +	50.0	100.0	150.0	200.0	250.0	300.0	350.0	0 400.0
0.5		1.41										Maxim	num effective
1.0		1.41		1	*								depth
2.0		1.42		1.5	0								
3.0		1.42			X								
4.0		1.43		1.7	0 - 3	<							
5.0		1.44				X							
10.0		1.52		1		- \							· 75%
15.0		1.58		1.9	0								
20.0		1.63		1									
30.0		1.69		2.1	0		×						
45.0		1.74		<u> </u>					~				
60.0		1.85		(iii) that 2.3	-								- 50%
120.0		2.10		8 2.3 A	0 +					*			
180.0		2.20									*		
240.0		2.31		2.5	0							7	*
300.0		2.40											
360.0		2.45											- 25%
				2.7	U -								
				2.9	0 -								
				3.1	0							- -	Empty
				Volume c	്വ outflow I	oetween	75% and	25% eff	ective dep	th		m³	
				Mean su	rrace are	a (nroug	JII WNICN	outfloW (occurs			m²	
				Time for	outflow	betweer	175% and	d 25% eft	ective dep	oth	n	nins	
				Soil infi <mark>l</mark> ti	ration ra	n rate t m/s						<mark>N</mark> ot etermined	
Recorded By:	Adam	Meacher	Che	cked By:	david.h	oward	Appr	oved By:					
Date:		9/2021	Date		17/09/2021 Date: SOIL engineer				naepina naepina				
	GR-F-01		u.	No Revision			Issue		3/03/2015				Soletanche Group

Hole ID Project Name Cambridge Waste Water Treatment Plant **Soakaway Test** Relocation Results **TP_STW_018** Project No. TE8364 Mott MacDonald Bentley Table No. Engineer 1 Employer **Barhale Limited** Pit Dimensions Length 2.50 Width 0.30 3.00 Depth at start m Details of construction JCB 3CX Machine Excavated Depth at end 3 Invert of discharge drain / maximum effective depth m 1.00 Test no. Structureless CHALK composed of calcareous CLAY from 0.90m to 3.00m. Sand lense in sidewall of pit from 2.00m to 2.50m. Field Environment Start Time: 10:58 Finish Time: 16:58. Test terminated at end of working day, 75% not achieved. Pit unsafe to Remarks be left overnight as not gravel filled. Elapsed Time Water Depth Elapsed Time (min) mins m 50.0 100.0 150.0 200.0 250.0 300.0 350.0 400.0 0.0 0.0 1.00 0.90 5.0 1.00 Maximum effective depth 10.0 1.00 1.10 15.0 1.00 20.0 1.00 1.30 30.0 1.00 1.00 45.0 1.50 60.0 1.00 120.0 1.21 1.70 180.0 1.29 240.0 1.35 1.90 300.0 1.42 Depth (m) 360.0 1.48 2.10 2.30 2.50 2.70 2.90 3.10 Volume outflow between 75% and 25% effective depth m^3 Mean surface area through which outflow occurs m^2 Time for outflow between 75% and 25% effective depth mins Not Soil infiltration rate f determined Recorded By: Adam Meacher Checked By: david.howard Approved By: 17/09/2021 09/09/2021 Date: Date: Date: SOIL engineering SE-PGR-F-014 23/03/2015 Form No. IssueNo.RevisionNo 2.05 Issue Date Part of the Bachy Soletanche Group

Hole ID Project Name Cambridge Waste Water Treatment Plant Soakaway Test Relocation Results TP_STW_022 Project No. TE8364 Mott MacDonald Bentley Table No. Engineer 1 Employer Barhale Limited Pit Dimensions Length 2.50 Width 0.30 3.00 Depth at start Details of construction JCB 3CX Machine Excavated Depth at end 3 Invert of discharge drain / maximum effective depth 0.60 Test no. 1 Structureless CHALK composed of calcareous CLAY from 0.60m to 3.00m Environment Field Remarks Start Time: 11:10 Finish Time: 14:10. Test terminated due to adverse weather conditions Elapsed Time Water Depth Elapsed Time (min) mins m 0.0 20.0 40.0 60.0 0.08 100.0 120.0 140.0 160.0 180.0 200.0 0.0 0.60 0.50 Maximum effective 5.0 0.60 depth 10.0 0.60 0.70 15.0 0.60 0.90 20.0 0.60 30.0 0.60 1.10 45.0 0.60 0.60 60.0 1.30 120.0 0.77 180.0 0.85 1.50 1.70 Depth (m) 1.90 2.10 2.30 2.50 2.70 2.90 **Empty** 3.10 Volume outflow between 75% and 25% effective depth m^3 Mean surface area through which outflow occurs m² Time for outflow between 75% and 25% effective depth mins Not Soil infiltration rate determined Recorded By: Adam Meacher Checked By: david.howard Approved By: 14/09/2021 17/09/2021 Date: Date: Date: **SOIL ENGINEERING** Form No. SE-PGR-F-014 23/03/2015 IssueNo, RevisionNo 2.05 Issue Date Part of the Bachy Soletanche Group

Project Name Cambridge Waste Water Treatment Plant Hole ID **Soakaway Test** Relocation Results TP_STW_031 Project No. TE8364 Table No. Engineer Mott MacDonald Bentley 1 Employer **Barhale Limited** Pit Dimensions Length 2.50 Width 0.30 3.00 Depth at start m Details of construction JCB 3CX Machine Excavated Depth at end 3 Invert of discharge drain / maximum effective depth m 1.00 Test no. Structureless CHALK composed of calcareous CLAY from 0.50m to 2.50m and Extremely weak to very weak medium density CHALK (probable CIRIA Grade B3/4) Environment Start Time: 11:19 Finish Time: 16:19. Test terminated at end of working day, 75% not achieved. Pit unsafe to Remarks be left overnight as not gravel filled. Elapsed Time Water Depth Elapsed Time (min) mins m 50.0 100.0 150.0 200.0 250.0 300.0 350.0 0.0 1.00 0.0 0.90 0.5 1.00 Maximum effective depth 1.0 1.01 1.10 2.0 1.01 3.0 1.01 1.30 4.0 1.01 5.0 1.01 1.50 10.0 1.02 15.0 1.02 1.70 20.0 1.03 30.0 1.03 1.90 45.0 1.04 Depth (m) 60.0 1.05 2.10 120.0 1.13 180.0 1.20 240.0 1.28 2.30 300.0 1.35 2.50 2.70 2.90 **Empty** 3.10 Volume outflow between 75% and 25% effective depth m^3 Mean surface area through which outflow occurs m² Time for outflow between 75% and 25% effective depth mins Not Soil infiltration rate f determined Recorded By: Adam Meacher Checked By: david.howard Approved By: 17/09/2021 15/09/2021 Date: Date: Date: SOIL engineering SE-PGR-F-014 23/03/2015 Form No. IssueNo.RevisionNo 2.05 Issue Date Part of the Bachy Soletanche Group

Project Name	e Cambridge Waste Water Treatment	In Situ California	Hole ID			
Project No.	Plant Relocation TE8364	Bearing Ratio Test	TP_FE_001 Test Depth			
			0.50m			
Engineer	Mott MacDonald Bentley		Test Number 1			
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 20/09/2021			
Description	Brown CLAY.		20,00,2021			
0.80 0.70 0.60 0.50 0.30 0.20		3.5 4.0 4.5 5.0 5.5	6.0 6.5 7.0 7.5			
	Per	netration (mm)				
Penetra 2.50 m 5.00 m Curve con	nm 3.3 3.3 3.3	Natural moisture content Seating load Surcharge Kentledge used	71 % 1 N 10.5 kPa			
	Plunger	General remarks Site conditions: Cloudy				
Prel <mark>imi</mark> nary	SE Engineer					
	Not UKAS	Print date 04/11/2021	SOIL ADGIDABILIC			
9 ()	Revision No. 3.00	Issue Date 22/10/2020	soil engineering			

Proj	ect Name	Cambridge Waste Wate	er Treatment	In Situ C	Hole ID				
Proi	ect No.	Plant Relocation TE8364		Bearing R	atio Test	TP_FE_002 Test Depth			
						0.50m			
Eng	ineer	Mott MacDonald Bentle	у			Test Number			
Emp	oloyer	Barhale Limited		BS1377: Part	Q: 1000: // 3	Test Date			
Des	cription	Brown CLAY.		DO1371.1 alt	9. 1990. 4.5	21/09/2021			
Desi	cription	BIOWITCEAT.							
	0.80								
	070 -				· · · · · · · · · · · · · · · · · · ·	No. of the last of			
	0.60			/					
	0.50 -								
LoadkN	0.40								
	0.30								
	0.20								
	0.10								
	0.00	0.5 1.0 1.5 2.0		3.5 4.0 4.5 netration (mm)	5.0 5.5	6.0 6.5 7.0 7.5			
	Penetra	CBR values %	Accepted CBR	Natural moist Seating load Surcharge	ture content	49 % 1 N 10.5 kPa			
	2.50 m 5.00 m Curve corr	im 2.8 im 3.2	3.2	Kentledge us	eed				
			Plunger	General rema Site condition					
Preli	iminary	SE E <mark>ng</mark> in	eer						
		Not UKAS		Print date	04/11/2021	soil engineering			
		Revision No	. 3.00	Issue Date 22/10/	Joil Chamberling				

Project Nam	e Cambridge Waste Water Treatment Plant Relocation	t	In Situ California	Hole ID TP_FE_003	
Project No.	TE8364		Bearing Ratio Tes	Test Depth	
	Mott MacDonald Bentley			-	0.50m Test Number
Engineer				L	1
Employer	Barhale Limited		BS1377: Part 9: 1990: 4.3		Test Date 24/08/2021
Description	Brown calcareous CLAY.				
3.50					
3.00 •					
2.50					
2.00 •					
1.50 ·					
1.00 -					
0.50					
0.00	0.5 1.0 1.5 2.0 2.5 3.0		3.5 4.0 4.5 5.0 5.5	6	.0 6.5 7.0 7.5
		Pen	etration (mm)		
Penetra	•	BR	Natural moisture content Seating load Surcharge		11 % 6 N 10.5 kPa
2.50 n 5.00 n Curve cor	mm 12		Kentledge used		
	Plunger		General remarks Site conditions: Warm a	nd sı	unny
		<i>)</i>			
Preliminary	SE Engineer				
	Not UKAS		Print date 04/11/2021		SOIL ENGINEERING
	Revision No. 3.00		Issue Date 22/10/2020		SUIL ELIGITEERING

Project N	lame Cambri	idge Waste Wate	r Treatment	In Situ C	alifornia	Hole ID TP_FE_004
Project N		telocation 4		Bearing F	Ratio Test	Test Depth
		a a Daniel al Daniela.				0.50m Test Number
Enginee	r iviott ivi	acD <mark>o</mark> nald Bent <mark>l</mark> ey	•			rest Number 2
Employe	r Ba <mark>r</mark> hale	e Limited		BS1377: Part	t 9: 1990: 4.3	Test Date
Description	on Brown o	calcareous CLAY.				08/08/2021
0.90 0.80 0.70 0.60 0.50 0.40 0.30 0.20 0.10		1.0 1.5 2.0		3.5 4.0 4.5 netration (mm)	5.0 5.5	6.0 6.5 7.0 7.5
		CBR values %		Natural mois		14 %
Pe	netration	CBR	Accepted CBR	Seating load Surcharge		1 N 10.5 kPa
	.50 mm	3.2		Kentledge us	sed	10.5 KFG
5	.00 mm	3.2	3.2			
Curv	e correction	No				
			Plunger	General rem Site conditio	arks ons: Cloudy	
Prel <mark>i</mark> mina	ıry	SE Engine	er			
		Not UKAS		Print date	04/11/2021	
5		Revision No.	3.00	Issue Date 22/10		soil engineering

Project Nam	ne Cambridge Waste Water Treatment	In Situ California	Hole ID
Project No.	Plant Relocation TE8364	Bearing Ratio Test	TP_FE_005 Test Depth
Engineer	Mott MacDonald Bentley		0.50m Test Number
			1
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 26/08/2021
Description	Brown calcareous CLAY.	·	
3.00 · 2.50 · 2.00 · 4.			
0.0	0.5 1.0 1.5 2.0 2.5 3.0	3.5 4.0 4.5 5.0 5.5	6.0 6.5 7.0 7.5
	r	enetration (mm)	
Penetr 2.50 5.00 Curve co	mm 12 ₁₂ mm 11	Natural moisture content Seating load Surcharge Kentledge used	13 % 1 N 10.5 kPa
	Plunger	General remarks Site conditions: Cloudy	
Prel <mark>i</mark> minary	SE Engineer		
	Not UKAS	Print date 04/11/2021	soil engineering
4	Revision No. 3.00	Issue Date 22/10/2020	

Project Nan	ne Cambridge Waste Water Treatment	In Situ California Hole ID						
Project No.	Plant Relocation TE8364	Bearing Ratio Test	TP_FE_006 Test Depth					
r roject ito.			0.50m					
Engineer	Mott MacDonald Bentley		Test Number					
Employer	Barhale Limited	DO1077 B 10, 1000, 10	1 Test Date					
		BS1377: Part 9: 1990: 4.3	24/08/2021					
Description	Brown calcareous CLAY.							
2.50								
2.00 •		<i></i>						
1.50								
Ny peol								
0.50								
0.00 \$\frac{\frac{1}{2}}{0.0}\$	0.5 1.0 1.5 2.0 2.5 3.0	3.5 4.0 4.5 5.0 5.5 Penetration (mm)	6.0 6.5 7.0 7.5					
Penet 2.50 5.00 Curve co	mm 7.7 8.1	Natural moisture content Seating load R Surcharge Kentledge used	12 % 1 N 10.5 kPa					
	Plunger	General remarks Site conditions: Cloudy						
Prel <mark>imi</mark> nary	SE Engineer							
	Not UKAS	Print date 04/11/2021	SOIL ADGINGGRIDG					
-	Revision No. 3.00	Issue Date 22/10/2020 SOIL enginee						

Project Name Cambridge Waste Water Treatment					In Situ California Hole ID TP_STW_003							
Project	l No	Plant Relocation TE8364	on			g Ratio			_STW_ est Dep			
					1955	3			0.50m			
Engine	er	Mott MacDona	ald Bent <mark>l</mark> ey	•				Te	st Num	ber		
Employ	/er	Barhale Limite	ad		201077	7		Т	1 est Dat	te		
= -					BS1377:	Part 9: 19	90: 4.3		2/09/20:			
Descrip	otion	CHALK/CLAY.										
2.	.00 1											
1.	80 •									<i>></i>		
1	20								***************************************			
1.	.60											
1.	.40											
1.	.20					_/						
2												
Load kN	.00											
0.	.80											
0	.60											
0.	.50											
0.	40											
0.	.20											
0.	.00 / 0.0	0.5 1.0	1.5 2.0	2.5 3.0	3.5 4.0	4.5 5.0	5.5	6.0 6.5	7.0	7.5		
	0.0	2.0	2.0		netration (mm)		0.0	0.0				
		CBR va	lues %		Natural	moisture co	ntent		7	%		
					Seating				1	N		
F	Penetrat			Accepted CBR	Surchar			1	10.5	kPa		
	2.50 m			6.0	Kentled	ge used						
Ci	5.00 m urve corre											
			_		Genera	l remarks						
					Site co	nditions: cl	oudy					
			/)								
				Plunger								
Prel <mark>i</mark> mir	nary		SE Engine	er								
		F	Not UKAS	1	Prin	t date 04/11/	2021					
r)	Revision No. 3.00					22/10/2020		SOIL	engir	neering		

Project Nam	ne Cambridge Waste Water Treatment	In Situ California	Hole ID TP_STW_004
Project No.	Plant Relocation TE8364	Bearing Ratio Test	Test Depth
Engineer	Mott MacDonald Bentley		0.50m Test Number
			1
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 27/08/2021
Description	Brown calcareous CLAY.		
3.00 ·			
0.0	0.5 1.0 1.5 2.0 2.5 3.0 Pe	3.5 4.0 4.5 5.0 5.5 netration (mm)	6.0 6.5 7.0 7.5
Penetro 2.50 r 5.00 r Curve co	mm 10 10 mm 10	Natural moisture content Seatin <mark>g</mark> load Surcharge Kentledge used	9.3 % 1 N 10.5 kPa
	Plunger	General remarks Site conditions: Cloudy	
Prel <mark>i</mark> minary	SE Engineer Not UKAS Revision No. 3 00	Print date 04/11/2021 Issue Date 22/10/2020	SOIL ENGINEERING

Project Name	e Cambridge Waste Water	Treatment	In Situ California	Hole ID
Project No.	Plant Relocation TE8364		Bearing Ratio Test	TP_STW_005 Test Depth
Froject No.			3	0.50m
Engineer	Mott MacDonald Bentley			Test Number 2
Employer	Barhale Limited		BS1377: Part 9: 1990: 4.3	Test Date
Description	Gravelly CHALK/ CLAY.		201077714170710007110	03/09/2021
7.00 - 6.00 - 5.00 - 3.00 - 2.00 -				
0.00	0.5 1.0 1.5 2.0		3.5 4.0 4.5 5.0 5.5 netration (mm)	6.0 6.5 7.0 7.5
	CBR values %		Natural moisture content	6.4 %
Penetra 2.50 m 5.00 m Curve con	nm nm		Seating load Surcharge Kentledge used	1 N 10.5 kPa
	P	lunger	General remarks Site conditions: Cloudy Test stopp	ed at ring limit.
Prel <mark>i</mark> minary	SE Enginee	er		A
	Not UKAS		Print date 04/11/2021	soil engineering
	Revision No.	3.00	Issue Date 22/10/2020	Joic Gronigganio

Project Na	ame Cambridge Waste Water Treatment	In Situ California	Hole ID
Project No	Plant Relocation 5. TE8364	Bearing Ratio Test	TP_STW_006 Test Depth
Engineer	Mott MacDonald Bentley		0.50m Test Number
_			1
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 31/08/2021
Descriptio	n Brown calcareous CLAY.		
2.00 1.80 1.60 1.40 1.20 1.00 1.00 1.00 1.00 1.00 1.00 1.0	0.0 0.5 1.0 1.5 2.0 2.5 3.0	3.5 4.0 4.5 5.0 5.5 enetration (mm)	6.0 6.5 7.0 7.5
2.5 5.0	cetration CBR Accepted CBR 7.0 7.1 7.1 Correction No	Natural moisture content Seating load Surcharge Kentledge used	8.5 % 1 N 10.5 kPa
	Plunger	General remarks Site conditions: Cloudy	
Preliminar	y SE E <mark>ng</mark> ineer		
	Not UKAS	Print date 04/11/2021	soil engineering
	Revision No. 3.00	Issue Date 22/10/2020	Jaoir engineering

Project Nai	me Cambridge Waste Water Treatment Plant Relocation	In Situ California	Hole ID TP_STW_007
Project No.		Bearing Ratio Test	Test Depth
Engineer	Mott MacDonald Bentley		0.50m Test Number
			1
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 31/08/2021
Description	Brown calcareous CLAY.		
2.50 • 2.00 • 1.50 • 0.50 • 0.50 • 0.00	0 0.5 1.0 1.5 2.0 2.5 3.0	3.5 4.0 4.5 5.0 5.5 netration (mm)	6.0 6.5 7.0 7.5
2.50 5.00	CBR values % tration CBR Accepted CBR 0 mm 8.6 8.6 0 mm 8.1 correction No	Natural moisture content Seati <mark>n</mark> g load Surcharge Kentledge used	7.5 % 1 N 10.5 kPa
	Plunger	General remarks Site conditions: Cloudy	
Prel <mark>i</mark> minary	SE Engineer		
	Not UKAS	Print date 04/11/2021	soil engineering
	Revision No. 3 00	Issue Date 22/10/2020	Soit endineering

Project Na	me Cambridge Waste Water 1	reatment	In Situ California	Hole ID TP_STW_010
Project No	Plant Relocation TE8364		Bearing Ratio Test	Test Depth
	Mott MacDonald Bentley			0.50m Test Number
Engineer				1
Employer	Barhale Limited		BS1377: Part 9: 1990: 4.3	Test Date 01/09/2021
Description	Brown calcareous CLAY.			0 17 007 202 1
2.50 • 2.00 • 1.50 • 0.		2.5 3.0 Pe	3.5 4.0 4.5 5.0 5.5 netration (mm)	6.0 6.5 7.0 7.5
2.5 5.0	CBR values % etration CBR A 0 mm 10 0 mm 9.9 correction No	accepted CBR 10	Natural moisture content Seating load Surcharge Kentledge used	11 % 1 N 10.5 kPa
	Pit	inger	General remarks Site conditions: Cloudy	
Prel <mark>i</mark> minary	SE Engineer			
	Not UKAS		Print date 04/11/2021	soil engineering
	Revision No.	3.00	Issue Date 22/10/2020	SOIL ENGINEERING

Project Name	e Cambridge Waste Water Treatment	In Situ California	Hole ID
Project No.	Plant Relocation TE8364	Bearing Ratio Test	TP_STW_011 Test Depth
-			0.50m
Engineer	Mott MacDonald Bentley		Test Number 1
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 01/09/2021
Description	Brown calcareous CLAY.		01/09/2021
2.50 · 2.00 · 1.50 · 0.50 ·			and the second s
0.00	0.5 1.0 1.5 2.0 2.5 3.0 Pe	3.5 4.0 4.5 5.0 5.5 netration (mm)	6.0 6.5 7.0 7.5
Penetra 2.50 n 5.00 n Curve cor	nm 10 10 nm 9.9	Natural moisture content Seating load Surcharge Kentledge used	6.2 % 1 N 10.5 kPa
	Plunger	General remarks Site conditions: Cloudy	
Preliminary	SE Engineer		
	Not UKAS	Print date 04/11/2021	soil engineering
	Revision No. 3.00	Issue Date 22/10/2020	Joil Grionisanii (

Project Name	e Cambridge Waste Water Treatment	In Situ California	Hole ID TP_STW_012
Project No.	Plant Relocation TE8364	Bearing Ratio Test	Test Depth
Engineer	Mott MacDonald Bentley		0.50m Test Number
			1
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 03/09/2021
Description	Brown CLAY.		
3.50 • 3.00 • 2.50 • 1.50 • 1.00 • 0.50 •			
0.00		3.5 4.0 4.5 5.0 5.5 netration (mm)	6.0 6.5 7.0 7.5
Penetra 2.50 m 5.00 m Curve con	nm 12 13 nm 13	Natural moisture content Seating load Surcharge Kentledge used	5.5 % 1 N 10.5 kPa
	Plunger	Genera <mark>l remarks</mark> Site conditions: Cloudy	
Preliminary	SE Engineer		
	Not UKAS	Print date 04/11/2021	SOU ODGIDAAAIDG
	Revision No. 3.00	Issue Date 22/10/2020	soil engineering

Proj	ect Name	Cambridge Waste Water Treatment	In Situ California	Hole ID
Proj	ect No.	Plant Relocation TE8364	Bearing Ratio Test	TP_STW_013 Test Depth
ı ıoj	ectivo.			0.50m
Engi	ineer	Mott MacDonald Bentley		Test Number
Emp	loyer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 06/09/2021
Desc	cription	Off white CHALK and calcareous CLAY.		00/00/2021
	5.00			
	4.50			
	4.00			
	3.50 •			
	3.00			
LoadkN	2.50			
	2.00 -			
	1.50 -			
	1.00 -			
	0.50 -			
	0.00		3.5 4.0 4.5 5.0 5.5 netration (mm)	6.0 6.5 7.0 7.5
		CBR values %	Natural moisture content	11 %
			Seating load	1 N
	Penetra 2.50 m	.m 10	Surcharge Kentledge used	10.5 kPa
	5.00 m	13	Nermedge daed	
	Curve corr			
		Plunger	General remarks Site conditions: Dry/ sunny	
Preli	minary	SE Engineer		
		Not UKAS	Print date 04/11/2021	
-		Revision No. 3.00	Issue Date 22/10/2020	soil engineering

Proje	ect Name	Cambridge Waste Water Treatmen Plant Relocation	t	In Situ California		Hole TP_STV	
Proje	ect No.	TE8364		Bearing Ratio Test	1	Test D	epth
		Mott MacDonald Bontloy				0.50 Test Nu	
Engi	neer	Mott MacDonald Bentley				1	imber
Emp	loyer	Barhale Limited		BS1377: Part 9: 1990: 4.3		Test 07/09/2	
Desc	ription	Brown CLAY.		I		017.007.	
	1.40						
	1.20					/	
	1.00 -				/		
Z	0.80 -						
LoadkN	0.60						
	0.40						
	0.20						
	0.00	0.5 1.0 1.5 2.0 2.5 3		3.5 4.0 4.5 5.0 5.5	6.0	6.5 7.	0 7.5
			Per	netration (mm)			
		CBR values %		Natural moisture content		11	%
		CDIT values //		Seating load		1	N
	Penetrat	•	BR	Surcharge		10.5	kPa
	2.50 m	3. 4		Kentledge used			
	5.00 m Curve com						
		Plunger		General remarks Site conditions: Cloudy			
Preli	minary	SE Engineer					
		Not UKAS		Print date 04/11/2021		SOIL EDG	sineering
I.,		Revision No. 3.00		Issue Date 22/10/2020		JOIL CIT	ALL DESCRIPTION OF THE PARTY OF

Project Nam	ne Cambridge Waste Water Treatment		In Situ California Hole ID
Project No.	Plant Relocation TE8364		Bearing Ratio Test TP_STW_015 Test Depth
			0.50m
Engineer	Mott MacDonald Bentley		Test Number 1
Employer	Barhale Limited		RS1377: Part 0: 1000: 4.3 Test Date
Description	Brown CLAY.		07/09/2021
Description	BIOWIT CLAT.		
2.50			A Company of the Comp
1.00 · 0.50 · 0.00 · 0.00	0.5 1.0 1.5 2.0 2.5 3.0	0	3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5
		Per	netration (mm)
Penetr 2.50 I 5.00 I Curve co	mm 13 13 mm 10	BR	Natural moisture content 11 % Seating load 1 N Surcharge 10.5 kPa Kentledge used
	Plunger)	General remarks Site conditions: cloudy
Preliminary	SE Engineer		
	Not UKAS		Print date 04/11/2021 SOUL ADSIDERATION
	Revision No. 3.00		Issue Date 22/10/2020 SOIL ENGINEERING

Project		Cambridge Was		Treatment	In Sit	tu Ca	lifor	nia			Hole II	
Project		Plant Relocation TE8364			Bearii	ng Ra	tio '	Test			STW_ st De _l	
1 1											0.50m	1
Engine	er	Mott MacDonald	Bentley							Tes	t Num	nber
Employ	/er	Barhale Limited			BS1377	7: Dort 0	. 1000	N 4 2			est Da	
=		Due to OLAY			5513//	. Fait 9	. 1990	7. 4.3		08	/09/20	121
Descrip	tion	Brown CLAY.										
1.6 1.6 1.2	60 • 40 • 20 • 80 •											
	00 0.0	0.5 1.0 1.9	5 2.0		3.5 4.0 netration (mm)	4.5	5.0	5.5	6.0	6.5	7.0	7.5
	Penetrati 2.50 mr 5.00 mr urve corre	m 5.1 m 6.4		Accepted CBR 6.4	Seatin Surcha	_		tent			10 1 0.5	% N kPa
			F	Plunger		al remarl ondition		nny				
Prel <mark>i</mark> min	nary	SE	Engine	er								
		No	t UKAS		Pr	int date	04/11/20	21		ee	7	7
5		Re	vision No.	3.00	Issue Date	22/10/20				SOIL	engli	neering

Project Name	e Cambridge Waste Water Treatment Plant Relocation	In Situ California	Hole ID TP_STW_017
Project No.	TE8364	Bearing Ratio Test	Test Depth
	Mott MacDonald Bentley		0.50m Test Number
Engineer			1
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 10/09/2021
Description	Brown CLAY,		
0.90 • 0.80 • 0.60 • 0.50 • 0.40 •			
0.30		3.5 4.0 4.5 5.0 5.5 netration (mm)	6.0 6.5 7.0 7.5
Penetra 2.50 m 5.00 m Curve con	nm 3.0 3.1	Natural moisture content Seating load Surcharge Kentledge used	12 % 1 N 10.5 kPa
	Plunger	General remarks Site conditions: Cloudy	
Preliminary	SE Engineer Not UKAS Revision No. 3.00	Print date 04/11/2021 Issue Date 22/10/2020	SOIL ENGINEERING

Project Nam	ne Cambridge Waste Water	Treatment	In Situ Cal	ifornia	Hole ID
Project No.	Plant Relocation TE8364		Bearing Ra		TP_STW_018 Test Depth
					0.50m
Engineer	Mott MacDonald Bentley				Test Number 1
Employer	Barhale Limited		BS1377: Part 9:	4000- 4 3	Test Date
Description	Brown CLAY.		DOTOLL FAILS.	1880. 4.5	09/09/2021
Description	Blown CLAT.				
3.50					
3.00 •					
2.50					
2.00					
Load kN					
1.50					
1.00 -					
0.50					
0.00	0.5 1.0 1.5 2.0	2.5 3.0	3.5 4.0 4.5	5.0 5.5	6.0 6.5 7.0 7.5
V.V	V.3 1.V 1.J 2.V		netration (mm)	3.0 3.3	0.0 0.0 1.0 1.0
			.		
	CBR values %		Natural moisture	e content	7 %
			Seatin <mark>g</mark> load		1 N
Penetr 2.50		Accepted CBR	Surcharge		10.5 kPa
5.00		14	Kentledge used		
Curve co					
			General remark	s	
	P	lunger	Site conditions	s: Cloudy	
Prel <mark>i</mark> minary	SE E <mark>ng</mark> inee	r			
	Not UKAS		Print date (04/11/2021	
-,	Revision No.	3.00	Issue Date 22/10/202		soil engineering

Project Nam	e Cambridge Waste Water Treatment	In Situ California	Hole ID
	Plant Relocation		TP_STW_019
Project No.	TE8364	Bearing Ratio Test	Test Depth
- :	A4: WA4: - Dawald Dawlley		0.50m
Engineer	Mott MacDonald Bent <mark>l</mark> ey		Test Number 1
Employer	Barhale Limited	DC4277: Da≠ 0: 4000: 4.2	Test Date
		BS1377: Part 9: 1990: 4.3	10/09/2021
Description	Brown CLAY.		
4.50			
4.00 •			at the state of th
3.50			
3.00			
2.50			
Load kN			
1.50 •			
1.00 -			
0.50 -			
0.00	0.5 1.0 1.5 2.0 2.5 3.0	3.5 4.0 4.5 5.0 5.5	6.0 6.5 7.0 7.5
0.0		netration (mm)	
	CPR values 9/	Notural mainture contant	7.5 0/
	CBR values %	Natural moisture content Seatin <mark>g</mark> load	7.5 % 1 N
Penetra	ation CBR Accepted CBR	Surcharge	10.5 kPa
2.50 r	nm 20	Kentledge used	
5.00 r	20		
Curve cor	rrection No		
		General remarks Site conditions: Cloudy	
	Plunger		
Prel <mark>i</mark> minary	SE Engineer		
	Not UKAS	Print date 04/11/2021	
	Revision No. 3.00	Issue Date 22/10/2020	soil engineering

Project Nam	ne Cambridge Waste Water	Treatment	In Situ Ca	alifornia	Hole ID
Project No.	Plant Relocation TE8364		Bearing R	atio Test	TP_STW_020 Test Depth
Engineer	Mott MacDonald Bentley				0.50m Test Number
					1
Employer	Barhale Limited		BS1377: Part	9: 1 990: 4.3	Test Date 13/09/2021
Description	Clayey CHALK.				
1.60 1.40 · 1.20 · 1.00 · 0.80 · 0.60 · 0.40 ·	0.5 1.0 1.5 2.0		3.5 4.0 4.5 netration (mm)	5.0 5.5	6.0 6.5 7.0 7.5
	CBR values %		Natural moist Seating load	ure content	13 % 1 N
Peneti 2.50 5.00 Curve co	mm 6.4 mm 6.1	Accepted CBR 6.4	Surcharge Kentledge us	ed	10.5 kPa
	P	lunger	General rema Site conditio		
Preliminary	SE Enginee	er			
	Not UKAS		Print date	04/11/2021	
	Revision No.	3.00	Issue Date 22/10/2		SOIL ENGINEERING

Project Nam	ne Cambridge Waste Water Trea	atment	In Situ Californi	a		Hole ID	
Project No.	Plant Relocation TE8364		Bearing Ratio Te			STW_0	
			- 100 -		(0.50m	
Engineer	Mott MacDonald Bentley				Tes	st Numb	per
Employer	Barhale Limited		D04277- Da≠ 0-4000- 4	<u>,</u>	Te	1 est Date	e
_			BS1377: Part 9: 1990: 4	.5		/09/202	
Description	Brown CLAY,						
0.80				_			<i>></i>
0.70							
0.60 -							
0.50							
N 4 0.40 •							
0.30							
0.20 -							
0.10 -							
0.00	0.5 1.0 1.5 2.0 2.1			.5 6	6.0 6.5	7.0	7.5
		rei	etration (mm)				
	CBR values %		Natural moisture content			11	%
	CBR values %		Seating load			1	% N
Penetr	ration CBR Acce	epted CBR	Surcharge			0.5	kPa
2.50	mm 2.5	2.7	Kentledge used				
5.0 <mark>0</mark> Curve co							
Curve co	inection No						
	Plung	er	General remarks Site conditions: Sunny				
Prel <mark>i</mark> minary	SE Engineer				\Box		
	Not UKAS		Print date 04/11/2021				
	Revision No. 3.	00	Issue Date 22/10/2020		SOIL	engin	eering

Project Name	e Cambridge Waste Water Treatment Plant Relocation	In Situ California	Hole ID TP_STW_022
Project No.	TE8364	Bearing Ratio Test	Test Depth
Engineer	Mott MacDonald Bentley		0.50m Test Number
			1 Test Date
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	14/09/2021
Description	Brown CLAY.		
1.20 1 1.00 • 0.80 •		A CONTRACTOR OF THE PARTY OF TH	
0.20	0.5 1.0 1.5 2.0 2.5 3.0 P	3.5 4.0 4.5 5.0 5.5 Penetration (mm)	6.0 6.5 7.0 7.5
Penetra 2.50 m 5.00 m Curve com	nm 4.1 4.1 nm 3.9	Natural moisture content Seating load Surcharge Kentledge used	16 % 1 N 10.5 kPa
	Plunger	General remarks Site conditions: Very heavy	rain
Preliminary	SE Engineer		
	Not UKAS	Print date 04/11/2021	soil engineering
	Revision No. 3.00	Issue Date 22/10/2020	Soil Chairmannia

Project Nam	ne Cambridge Waste Water Treatment Plant Relocation	In Situ California	Hole ID TP_STW_031
Project No.	TE8364	Bearing Ratio Test	Test Depth
	Mott MacDonald Bentley		0.50m Test Number
Engineer			1
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 15/09/2021
Description	Chalky CLAY.		
250			
3.50			٠.
			A STATE OF THE STA
3.00 -		·	
2.50			
2.00			
LoadkN			
道 1.50 •			
1.00			
l			
0.50			
	/		
/			
0.00	0.5 1.0 1.5 2.0 2.5 3.0	3.5 4.0 4.5 5.0 5.5	6.0 6.5 7.0 7.5
	Pe	enetration (mm)	
<u> </u>			
	CBR values %	Natural moisture content	9.7 %
		Seating load	1 N
Penetra 2.50 r	mm 13	Surcharge Kentledge used	10.5 kPa
2.30 r 5.00 r	13	iveimende naen	
Curve co	orrection No		
		General remarks Site conditions: Clear	
		One obligations. S.S.S.	
	Plunger		
	\		
Prel <mark>i</mark> minary	SE Engineer		
,	Not UKAS	Print date 04/11/2021	
	Revision No. 3.00	Print date 04/11/2021 Issue Date 22/10/2020	soil engineering

Project Nam	ne Cambridge Waste Water Treatment Plant Relocation	In Situ California	Hole ID TP_STW_032
Project No.	TE8364	Bearing Ratio Test	Test Depth
	Mott MacDonald Bentley		0.50m Test Number
Engineer			2
Employer	Barhale Limited	BS1377: Part 9: 1990: 4.3	Test Date 13/09/2021
Description	Chalky CLAY.		
7.00 • 6.00 • 5.00 • 3.00 •			
0.00	0.5 1.0 1.5 2.0 2.5 3.0 Pe	3.5 4.0 4.5 5.0 5.5 netration (mm)	6.0 6.5 7.0 7.5
Penetr 2.50 (5.00 (Curve co	mm 27 27 mm 26	Natural moisture content Seating load Surcharge Kentledge used	13 % 6 <mark>N</mark> 10.5 kPa
	Plunger	General remarks Site conditions: Cloudy	
Prel <mark>i</mark> minary	SE Engineer		
	Not UKAS	Print date 04/11/2021	
	Revision No. 3.00	Issue Date 22/10/2020	soil engineering



In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153995.1.1.1

CLIENT REF: MD3225 CLIENT: Soil Engineering Geoservices Ltd

DATE COMPLETED: 20/10/2021 ADDRESS: Henderson House, Higgs Lane, Burscough, Lancashire, L40 8JS

TESTED BY: Callum Clarkson SITE: Cambridge

LOCATION: TP_STW_012 Depth 1.5m MATERIAL: Brown Chalky Clay

DISTANCE FROM EDGE OF 1000 mm SUPPLIER: Site Won

PLATE TO WALL:

TEST METHOD: Incremental Plate Loading SOURCE: Site Won SAMPLING PLAN: Standard Requirements SAMPLE TAKEN: No

Equipment Details

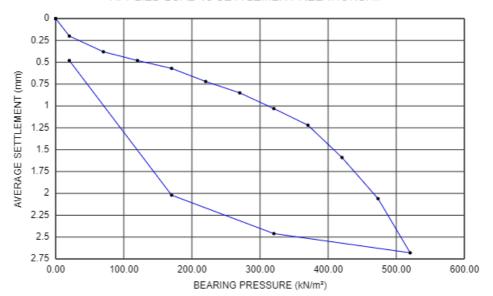
Type of Kentledge: 25T Excavator Plate Diameter: 600 mm Plate Area: 0.282743 m² Plate Correction: 0.80

Results

Max applied pressure: Max settlement: Modulus of subgrade K762: Cycle 1 Cycle 2

520 kN/m² 0.0 kN/m² 2.68 mm 0.00 mm 241 kN/m²/mm > 13 kN/m²/mm

APPLIED LOAD vs SETTLEMENT RELATIONSHIP



Remarks:



In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153995.1.1.1

TEST RESULTS

LOAD APPLIED	AVERAGE BEARING	G	AUGE READIN	NG	GAUGE SETTLEMENT			AVERAGE
TO PLATE	PRESSURE	1	2	3	1	2	3	SETTLEMENT
kN	kN/m ²		mm			mm		mm
0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.0	21.2	-0.26	-0.13	-0.20	0.26	0.13	0.20	0.20
20.0	70.7	-0.59	-0.17	-0.38	0.59	0.17	0.38	0.38
34.0	120.3	-0.65	-0.23	-0.55	0.65	0.23	0.55	0.48
48.0	169.8	-0.79	-0.27	-0.65	0.79	0.27	0.65	0.57
62.0	219.3	-0.98	-0.39	-0.79	0.98	0.39	0.79	0.72
76.0	268.8	-1.16	-0.50	-0.90	1.16	0.50	0.90	0.85
91.0	321.8	-1.39	-0.63	-1.06	1.39	0.63	1.06	1.03
105.0	371.4	-1.74	-0.73	-1.18	1.74	0.73	1.18	1.22
119.0	420.9	-2.07	-1.13	-1.58	2.07	1.13	1.58	1.59
134.0	473.9	-2.44	-1.71	-2.04	2.44	1.71	2.04	2.06
147.0	519.9	-3.00	-2.33	-2.72	3.00	2.33	2.72	2.68
91.0	321.8	-2.82	-2.09	-2.47	2.82	2.09	2.47	2.46
48.0	169.8	-2.57	-1.59	-1.91	2.57	1.59	1.91	2.02
6.0	21.2	-1.44	0.00	0.00	1.44	0.00	0.00	0.48

Remarks:

Test results reported relate only to the items tested.
This report shall not be reproduced except in full without approval of the Laboratory.
Amended report. This test report supersedes test report version 2 - location Adjustment

For and on behalf of CTS

James Browne - Testing Services Manager



Approved Signatory 03-Nov-21





In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153996.1.1.1

CLIENT REF: MD3225 CLIENT: Soil Engineering Geoservices Ltd

DATE COMPLETED: 21/10/2021 ADDRESS: Henderson House, Higgs Lane, Burscough, Lancashire, L40 8JS

TESTED BY: Callum Clarkson SITE: Cambridge

LOCATION: TP_STW_005 Depth 1m MATERIAL: Brown, chalky Clay

DISTANCE FROM EDGE OF 1000 mm SUPPLIER: Site won

PLATE TO WALL:

TEST METHOD: Incremental Plate Loading SOURCE: Site won SAMPLING PLAN: Client Specification SAMPLE TAKEN: No

Equipment Details

Plate Area: 0.282743 m²
Plate Correction: 0.80

Results
Max applied pressure:

Max settlement: Avg Bearing Pressure (P) at 1.25mm penetration:

Modulus of subgrade K762:
Equivalent C.B.R Value at 1.25mm pen

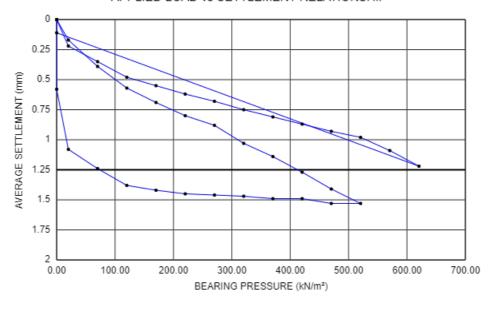
Equivalent C.B.R Value at 1.25mm penetration: Plate recovery:

Cycle 1 Cycle 2

520 kN/m² 621 kN/m² 1.53 mm 1.22 mm 413 kN/m² > 621 kN/m² 266 kN/m²/mm > 399 kN/m²/mm

153.3% > 310.8% 62% 91%

APPLIED LOAD vs SETTLEMENT RELATIONSHIP



Equivalent C.B.R Value: Cycle 1: 153.3 % , Cycle 2: > 310.8 %

Remarks:



In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153996.1.1.1

TEST RESULTS

LOAD APPLIED	AVERAGE BEARING	G	AUGE READI	NG	GAU	GE SETTLEN	/IENT	AVERAGE
TO PLATE	PRESSURE	1	2	3	1	2	3	SETTLEMENT
kN	kN/m ²		mm	•		mm		mm
0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.0	21.2	-0.24	-0.15	-0.13	0.24	0.15	0.13	0.17
20.0	70.7	-0.62	-0.29	-0.27	0.62	0.29	0.27	0.39
34.0	120.3	-0.98	-0.39	-0.34	0.98	0.39	0.34	0.57
48.0	169.8	-1.17	-0.51	-0.39	1.17	0.51	0.39	0.69
62.0	219.3	-1.35	-0.59	-0.46	1.35	0.59	0.46	0.80
76.0	268.8	-1.50	-0.65	-0.50	1.50	0.65	0.50	0.88
91.0	321.8	-1.65	-0.80	-0.65	1.65	0.80	0.65	1.03
105.0	371.4	-1.85	-0.85	-0.72	1.85	0.85	0.72	1.14
119.0	420.9	-1.99	-0.98	-0.84	1.99	0.98	0.84	1.27
133.0	470.4	-2.16	-1.10	-0.97	2.16	1.10	0.97	1.41
147.0	519.9	-2.30	-1.20	-1.10	2.30	1.20	1.10	1.53
133.0	470.4	-2.30	-1.20	-1.10	2.30	1.20	1.10	1.53
119.0	420.9	-2.28	-1.10	-1.08	2.28	1.10	1.08	1.49
105.0	371.4	-2.28	-1.11	-1.09	2.28	1.11	1.09	1.49
91.0	321.8	-2.24	-1.10	-1.07	2.24	1.10	1.07	1.47
76.0	268.8	-2.23	-1.10	-1.06	2.23	1.10	1.06	1.46
62.0	219.3	-2.20	-1.10	-1.05	2.20	1.10	1.05	1.45
48.0	169.8	-2.16	-1.06	-1.03	2.16	1.06	1.03	1.42
34.0	120.3	-2.10	-1.00	-1.03	2.10	1.00	1.03	1.38
20.0	70.7	-1.93	-0.82	-0.98	1.93	0.82	0.98	1.24
6.0	21.2	-1.66	-0.76	-0.83	1.66	0.76	0.83	1.08
0.0	0.0	-1.03	-0.34	-0.38	1.03	0.34	0.38	0.58
0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.0	21.2	-0.33	-0.09	-0.24	0.33	0.09	0.24	0.22
20.0	70.7	-0.56	-0.12	-0.37	0.56	0.12	0.37	0.35
34.0	120.3	-0.75	-0.26	-0.44	0.75	0.26	0.44	0.48
48.0	169.8	-0.87	-0.27	-0.50	0.87	0.27	0.50	0.55
62.0	219.3	-0.98	-0.31	-0.57	0.98	0.31	0.57	0.62
76.0	268.8	-1.08	-0.34	-0.63	1.08	0.34	0.63	0.68
91.0	321.8	-1.18	-0.38	-0.70	1.18	0.38	0.70	0.75
105.0	371.4	-1.25	-0.42	-0.75	1.25	0.42	0.75	0.81
119.0	420.9	-1.33	-0.46	-0.81	1.33	0.46	0.81	0.87
133.0	470.4	-1.42	-0.50	-0.87	1.42	0.50	0.87	0.93
147.0	519.9	-1.48	-0.54	-0.92	1.48	0.54	0.92	0.98
161.0	569.4	-1.61	-0.64	-1.01	1.61	0.64	1.01	1.09

Remarks:

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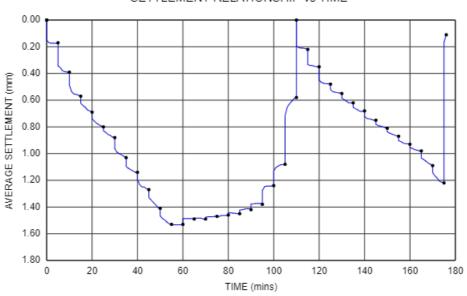


In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153996.1.1.1

175.0	618.9	-1.81	-0.73	-1.12	1.81	0.73	1.12	1.22
0.0	0.0	-0.22	-0.10	0.00	0.22	0.10	0.00	0.11

SETTLEMENT RELATIONSHIP vs TIME



Remarks:

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For and on behalf of CTS

James Browne - Testing Services Manager



Approved Signatory 03-Nov-21





In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153996.1.1.2

CLIENT REF: MD3225 CLIENT: Soil Engineering Geoservices Ltd

DATE COMPLETED: 21/10/2021 ADDRESS: Henderson House, Higgs Lane, Burscough, Lancashire, L40 8JS

TESTED BY: Callum Clarkson SITE: Cambridge

LOCATION: TP_STW_014 Depth 1m MATERIAL: Brown, sandy, chalky Clay

DISTANCE FROM EDGE OF 1000 mm SUPPLIER: Site won

PLATE TO WALL:

TEST METHOD: Incremental Plate Loading SOURCE: Site won SAMPLING PLAN: Client Specification SAMPLE TAKEN: No

Equipment Details

Type of Kentledge: 25T excavator
Plate Diameter: 600 mm
Plate Area: 0.282743 m²
Plate Correction: 0.80

Results

Max applied pressure: Max settlement: Avg Bearing Pressure (P) at 1.25mm penetration:

Modulus of subgrade K762: Equivalent C.B.R Value at 1.25mm penetration:

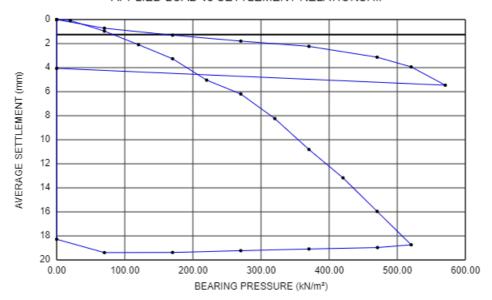
Equivalent C.B.R Value at 1.25mm Plate recovery:

Cycle 1 Cycle 2

520 kN/m² 571 kN/m² 19.39 mm 5.46 mm 83 kN/m² 162 kN/m² 53 kN/m²/mm 104 kN/m²/mm

9.5% 30.3% 5.7% 26%

APPLIED LOAD vs SETTLEMENT RELATIONSHIP



Equivalent C.B.R Value: Cycle 1: 9.5 % , Cycle 2: 30.3 %

Remarks:



In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153996.1.1.2

TEST RESULTS

LOAD APPLIED	AVERAGE BEARING	G	AUGE READIN	IG	GAL	JGE SETTLEN	IENT	AVERAGE
TO PLATE	PRESSURE	1	2	3	1	2	3	SETTLEMENT
kN	kN/m ²		mm			mm		mm
0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.0	21.2	-0.11	-0.09	-0.05	0.11	0.09	0.05	0.08
20.0	70.7	-0.98	-1.12	-0.79	0.98	1.12	0.79	0.96
34.0	120.3	-2.00	-2.41	-1.87	2.00	2.41	1.87	2.09
48.0	169.8	-3.12	-3.74	-2.92	3.12	3.74	2.92	3.26
62.0	219.3	-4.93	-5.67	-4.53	4.93	5.67	4.53	5.04
76.0	268.8	-6.12	-6.90	-5.55	6.12	6.90	5.55	6.19
91.0	321.8	-8.34	-9.00	-7.38	8.34	9.00	7.38	8.24
105.0	371.4	-11.16	-11.63	-9.64	11.16	11.63	9.64	10.81
119.0	420.9	-13.81	-13.98	-11.71	13.81	13.98	11.71	13.17
133.0	470.4	-17.17	-16.71	-14.01	17.17	16.71	14.01	15.96
147.0	519.9	-21.18	-19.11	-15.92	21.18	19.11	15.92	18.74
133.0	470.4	-21.39	-19.30	-16.22	21.39	19.30	16.22	18.97
105.0	371.4	-21.45	-19.36	-16.47	21.45	19.36	16.47	19.09
76.0	268.8	-21.55	-19.45	-16.70	21.55	19.45	16.70	19.23
48.0	169.8	-21.64	-19.54	-16.97	21.64	19.54	16.97	19.38
20.0	70.7	-21.47	-19.52	-17.18	21.47	19.52	17.18	19.39
0.0	0.0	-20.21	-18.70	-15.93	20.21	18.70	15.93	18.28
0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.0	70.7	-0.84	-0.69	-0.62	0.84	0.69	0.62	0.72
48.0	169.8	-1.56	-1.24	-1.09	1.56	1.24	1.09	1.30
76.0	268.8	-2.26	-1.63	-1.48	2.26	1.63	1.48	1.79
105.0	371.4	-2.95	-2.03	-1.71	2.95	2.03	1.71	2.23
133.0	470.4	-4.55	-2.84	-2.01	4.55	2.84	2.01	3.13
147.0	519.9	-5.96	-3.61	-2.26	5.96	3.61	2.26	3.94
161.0	569.4	-8.25	-4.96	-3.18	8.25	4.96	3.18	5.46
0.0	0.0	-6.39	-3.63	-2.16	6.39	3.63	2.16	4.06

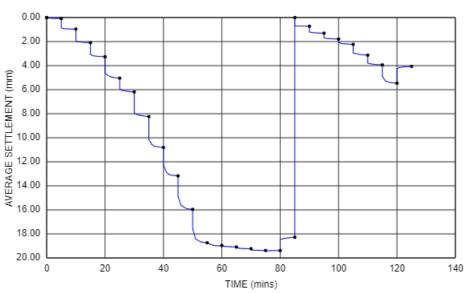
Remarks:



In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153996.1.1.2

SETTLEMENT RELATIONSHIP vs TIME



Remarks:

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For and on behalf of CTS

James Browne - Testing Services Manager



Approved Signatory 03-Nov-21





In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153997.1.1.1

CLIENT REF: MD3225 CLIENT: Soil Engineering Geoservices Ltd

DATE COMPLETED: 22/10/2021 ADDRESS: Henderson House, Higgs Lane, Burscough, Lancashire, L40 8JS

TESTED BY: Callum Clarkson SITE: Cambridge

LOCATION: TP_STW_015 Depth 1m MATERIAL: Brown, chalky Clay

DISTANCE FROM EDGE OF 1000 mm SUPPLIER: Site won

PLATE TO WALL:

TEST METHOD: Incremental Plate Loading SOURCE: Site won SAMPLING PLAN: Client Specification SAMPLE TAKEN: No

Equipment Details

Plate Area: 0.282743 m²
Plate Correction: 0.80

ResultsMax applied pressure:

Max settlement: Avg Bearing Pressure (P) at 1.25mm penetration: Modulus of subgrade K762:

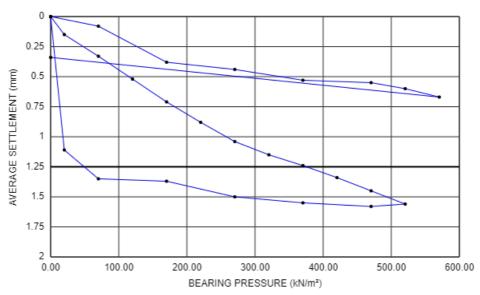
Equivalent C.B.R Value at 1.25mm penetration: Plate recovery:

Cycle 1 Cycle 2

520 kN/m² 571 kN/m² 1.58 mm 0.67 mm 374 kN/m² > 571 kN/m² 241 kN/m²/mm > 367 kN/m²/mm

129.1% > 268.6% 100% 50%

APPLIED LOAD vs SETTLEMENT RELATIONSHIP



Equivalent C.B.R Value: Cycle 1: 129.1 % , Cycle 2: > 268.6 %

Remarks:



In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153997.1.1.1

TEST RESULTS

LOAD APPLIED	AVERAGE BEARING	G	AUGE READI	NG	GAU	GE SETTLEN	/IENT	AVERAGE
TO PLATE	PRESSURE	1	2	3	1	2	3	SETTLEMENT
kN	kN/m ²		mm	•		mm		mm
0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.0	21.2	-0.23	-0.14	-0.07	0.23	0.14	0.07	0.15
20.0	70.7	-0.41	-0.38	-0.21	0.41	0.38	0.21	0.33
34.0	120.3	-0.56	-0.62	-0.37	0.56	0.62	0.37	0.52
48.0	169.8	-0.80	-0.79	-0.54	0.80	0.79	0.54	0.71
62.0	219.3	-1.02	-0.95	-0.66	1.02	0.95	0.66	0.88
76.0	268.8	-1.22	-1.12	-0.79	1.22	1.12	0.79	1.04
91.0	321.8	-1.32	-1.22	-0.91	1.32	1.22	0.91	1.15
105.0	371.4	-1.42	-1.31	-1.00	1.42	1.31	1.00	1.24
119.0	420.9	-1.53	-1.40	-1.09	1.53	1.40	1.09	1.34
133.0	470.4	-1.64	-1.52	-1.20	1.64	1.52	1.20	1.45
147.0	519.9	-1.77	-1.64	-1.26	1.77	1.64	1.26	1.56
133.0	470.4	-1.80	-1.67	-1.27	1.80	1.67	1.27	1.58
105.0	371.4	-1.81	-1.58	-1.26	1.81	1.58	1.26	1.55
76.0	268.8	-1.80	-1.43	-1.27	1.80	1.43	1.27	1.50
48.0	169.8	-1.63	-1.36	-1.13	1.63	1.36	1.13	1.37
20.0	70.7	-1.55	-1.41	-1.09	1.55	1.41	1.09	1.35
6.0	21.2	-1.23	-1.18	-0.92	1.23	1.18	0.92	1.11
0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.0	70.7	-0.10	-0.08	-0.06	0.10	0.08	0.06	0.08
48.0	169.8	-0.59	-0.28	-0.26	0.59	0.28	0.26	0.38
76.0	268.8	-0.66	-0.35	-0.31	0.66	0.35	0.31	0.44
105.0	371.4	-0.75	-0.46	-0.37	0.75	0.46	0.37	0.53
133.0	470.4	-0.77	-0.48	-0.40	0.77	0.48	0.40	0.55
147.0	519.9	-0.83	-0.52	-0.44	0.83	0.52	0.44	0.60
161.0	569.4	-0.93	-0.56	-0.51	0.93	0.56	0.51	0.67
0.0	0.0	-0.48	-0.25	-0.28	0.48	0.25	0.28	0.34

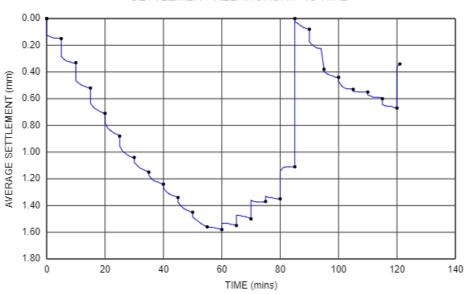
Remarks:



In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153997.1.1.1

SETTLEMENT RELATIONSHIP vs TIME



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For and on behalf of CTS

James Browne - Testing Services Manager



Approved Signatory 03-Nov-21





In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

Site won

REPORT NUMBER: C1054343 / 153997.1.1.2

CLIENT REF: MD3225 CLIENT: Soil Engineering Geoservices Ltd

DATE COMPLETED: 22/10/2021 ADDRESS: Henderson House, Higgs Lane, Burscough, Lancashire, L40 8JS

TESTED BY: Callum Clarkson SITE: Cambridge

LOCATION: TP_STW_016 Depth 1.5m MATERIAL: Brown, chalky Clay

DISTANCE FROM EDGE OF 1000 mm SUPPLIER: PLATE TO WALL:

TEST METHOD: Incremental Plate Loading SOURCE: Site won

SAMPLING PLAN: Client Specification SAMPLE TAKEN: No

Equipment Details

Plate Area: 0.282743 m²
Plate Correction: 0.80

Results
Max applied pressure:

Max settlement: Avg Bearing Pressure (P) at 1.25mm penetration: Modulus of subgrade K762:

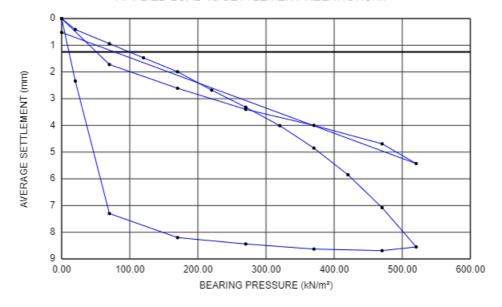
Equivalent C.B.R Value at 1.25mm penetration: Plate recovery:

Cycle 1 Cycle 2

520 kN/m² 520 kN/m² 8.69 mm 5.43 mm 99 kN/m² 51 kN/m² 64 kN/m²/mm 33 kN/m²/mm

12.9% 4.1% 100% 90%

APPLIED LOAD vs SETTLEMENT RELATIONSHIP



Equivalent C.B.R Value: Cycle 1: 12.9 % , Cycle 2: 4.1 %

Remarks:



In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153997.1.1.2

TEST RESULTS

LOAD APPLIED	AVERAGE BEARING	GA	UGE READIN	G	GAU	GE SETTLEN	1ENT	AVERAGE
TO PLATE	PRESSURE	1	2	3	1	2	3	SETTLEMENT
kN	kN/m ²		mm	'		mm		mm
0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.0	21.2	-0.34	-0.36	-0.54	0.34	0.36	0.54	0.41
20.0	70.7	-0.90	-0.79	-1.13	0.90	0.79	1.13	0.94
34.0	120.3	-1.61	-1.19	-1.62	1.61	1.19	1.62	1.47
48.0	169.8	-2.36	-1.56	-2.06	2.36	1.56	2.06	1.99
62.0	219.3	-3.43	-1.99	-2.63	3.43	1.99	2.63	2.68
76.0	268.8	-4.30	-2.47	-3.20	4.30	2.47	3.20	3.32
91.0	321.8	-5.21	-2.96	-3.86	5.21	2.96	3.86	4.01
105.0	371.4	-6.15	-3.65	-4.74	6.15	3.65	4.74	4.85
119.0	420.9	-7.28	-4.48	-5.79	7.28	4.48	5.79	5.85
133.0	470.4	-8.67	-5.50	-7.07	8.67	5.50	7.07	7.08
147.0	519.9	-10.48	-6.61	-8.55	10.48	6.61	8.55	8.55
133.0	470.4	-10.63	-6.77	-8.67	10.63	6.77	8.67	8.69
105.0	371.4	-10.58	-6.70	-8.60	10.58	6.70	8.60	8.63
76.0	268.8	-10.35	-6.56	-8.41	10.35	6.56	8.41	8.44
48.0	169.8	-10.07	-6.42	-8.12	10.07	6.42	8.12	8.20
20.0	70.7	-9.07	-5.75	-7.09	9.07	5.75	7.09	7.30
6.0	21.2	-8.07	-5.01	6.05	8.07	5.01	-6.05	2.34
0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.0	70.7	-1.61	-1.51	-2.03	1.61	1.51	2.03	1.72
48.0	169.8	-2.57	-2.32	-2.93	2.57	2.32	2.93	2.61
76.0	268.8	-3.42	-2.99	-3.80	3.42	2.99	3.80	3.40
105.0	371.4	-4.10	-3.49	-4.40	4.10	3.49	4.40	4.00
133.0	470.4	-4.99	-4.04	-5.04	4.99	4.04	5.04	4.69
147.0	519.9	-6.23	-4.55	-5.50	6.23	4.55	5.50	5.43
0.0	0.0	-1.15	-0.30	-0.10	1.15	0.30	0.10	0.52

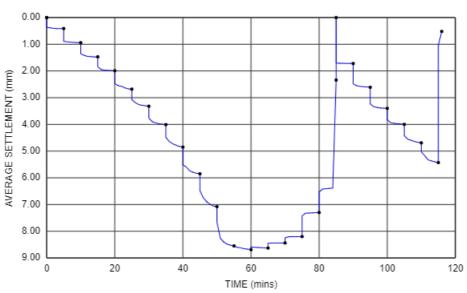
Remarks:



In-house Test Procedures STP S8 and Design Guidance for Road Pavement Foundations (DRAFT HD25) IAN 73/06 Revision 1 (2009)

REPORT NUMBER: C1054343 / 153997.1.1.2

SETTLEMENT RELATIONSHIP vs TIME



Remarks:

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For and on behalf of CTS

James Browne - Testing Services Manager



Approved Signatory 03-Nov-21



Soil Engineering Geoservices Ltd **Henderson House** Langley Place **Higgins Lane** Burscough Lancaster L40 8JS

Construction Testing Solutions



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WVY-51547A - R1

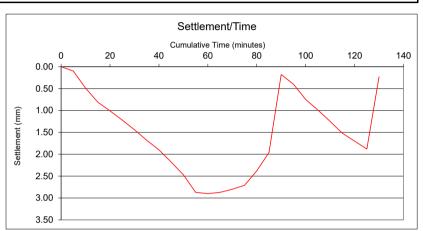
Low Fen Drove - Right turn off Horningsea Road, Cambridge, CB5 8TB

Contract Test Reference: MD3225/3 REPORT NO: Determination of Vertical Deformation - Plate Loading Test BS1377: Part 9: 1990 Clients Reference: MD3225/3 Report Date: 26/10/2021

TEST REPORT

Material Description:	Yellowish White firm to stiff chalk	Date Tested:	25/10/2021
Test Location:	TP_STW_019 Depth 1.5m	Supplier/Source:	Insitu/Site Won
Weather:	Clear, mild, light wind		

Cumulative Time (minutes)	Mean Bearing Pressure kPa	Average Settlement (mm)
0.0	0.0	0
5.0	20.2	0.10
10.0	70.4	0.49
15.0	121.0	0.81
20.0	171.5	1.01
25.0	221.8	1.22
30.0	272.2	1.44
35.0	322.6	1.68
40.0	373.1	1.90
45.0	423.4	2.18
50.0	473.8	2.47
55.0	524.2	2.87
60.0	470.0	2.90
65.0	369.9	2.87
70.0	269.9	2.80
75.0	170.1	2.71
80.0	70.4	2.38
90.0	20.2	0.18
95.0	70.4	0.40
100.0	171.5	0.75
105.0	272.0	0.99
110.0	372.8	1.25
115.0	473.6	1.52
120.0	524.2	1.70
125.0	562.3	1.88
130.0	0.0	0.23



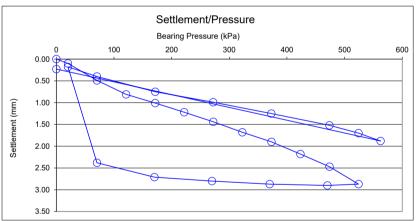


Plate Diameter 600 mm Maximum Applied Pressure 562.3 kPa Reaction Load 25T Excavator Maximum Settlement 2.9 mm Depth of Test 1500 mm Moisture Content (BS1377: Part 2: 1990) **Not Taken** Distance from edge of plate to wall of excavation (mm) 2000

Results relate only to the sample(s) as tested.

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The laboratory does not apply a conformity statement to test reports as standard, unless specifically requested by he customer.

Testing carried out at client's site location. **Authorised Signatory** Notes: 1 - One kPa is equivalent to One kN/m2 Initial load applied by test equipment calculated to be less than 0.8 kN Soil Engineering Geoservices Ltd **Henderson House** Langley Place **Higgins Lane** Burscough Lancaster L40 8JS

Construction Testing Solutions



Quarry Farm View Bowbridge Lane Newark Notts NG24 3BZ Tel: (01636) 705100

Email: enquiries@constructiontesting.co.uk Web: www.constructiontesting.co.uk

Low Fen Drove - Right turn off Horningsea Road, Cambridge, CB5 8TB

Determination of Vertical Deformation - Plate Loading Test

BS1377: Part 9: 1990

Contract Test Reference: MD3225/3 REPORT NO: MD3225/3 Report Date: Clients Reference:

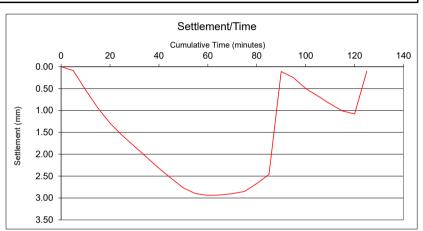
WVY-51547B - R1

26/10/2021

TFST	D	FD	n	D.	Г

Material Description:	Yellowish White firm to stiff chalk	Date Tested:	25/10/2021
Test Location:	TP_STW_018 Depth 1.5m	Supplier/Source:	Insitu/Site Won
Weather:	Clear, mild, light wind		

weather.	olcar, mila, light w	
Cumulative Time (minutes)	Mean Bearing Pressure kPa	Average Settlement (mm)
0.0	0.0	0
5.0	20.2	0.09
10.0	70.4	0.53
15.0	121.0	0.94
20.0	171.2	1.29
25.0	221.8	1.57
30.0	272.0	1.82
35.0	322.6	2.07
40.0	372.8	2.32
45.0	423.4	2.55
50.0	473.6	2.77
55.0	495.9	2.90
60.0	470.0	2.94
65.0	369.9	2.93
70.0	269.9	2.90
75.0	170.1	2.85
80.0	70.4	2.67
90.0	20.2	0.11
95.0	70.4	0.25
100.0	171.5	0.50
105.0	272.0	0.67
110.0	372.8	0.85
115.0	473.6	1.01
120.0	495.1	1.08
125.0	0.0	0.10



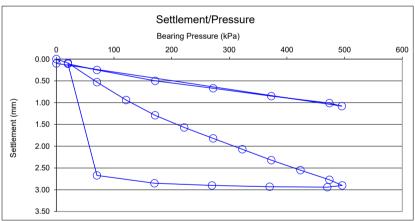


Plate Diameter 600 mm Maximum Applied Pressure 495.9 kPa Reaction Load 25T Excavator Maximum Settlement 2.94 mm Depth of Test 1500 mm Moisture Content (BS1377: Part 2: 1990) **Not Taken** Distance from edge of plate to wall of excavation (mm) 2000

Results relate only to the sample(s) as tested.

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The laboratory does not apply a conformity statement to test reports as standard, unless specifically requested by he customer.

Testing carried out at client's site location. **Authorised Signatory** Notes: 1 - One kPa is equivalent to One kN/m2 Initial load applied by test equipment calculated to be less than 0.8 kN Project Name Cambridge Waste Water Treatment Plant

Relocation

Project No. TE8364

Engineer

Mott MacDonald Bentley

Date:

Revision No.

SE-EMS-F-001

Form No.

Client Barhale Limited

Photo lonisation Results

Client	Barhale L	imited	d								
Hole ID	Sample Depth m	Sample Type	Sample Ref.	Test Number	Test Date yyyy-mm-dd		ID im	Temp. °C	Weather	Remarks	PID Device Type
BH_STW_001	0.30	ES	1	1	2021-07-16	0	.3	25.0	Sunny		Mini RAE Lite
BH_STW_001	0.70	ES	4	1	2021-07-16	0	4	25.0	Sunny		Mini RAE Lite
BH_STW_001	1.00	ES	5	1	2021-07-16	0	.4	25.0	Sunny		Mini RAE Lite
BH_STW_023	0.20	ES	2	1	2021-07-20	0	.2	27.0	Sunny		Mini RAE Lite
BH_STW_023	0.60	ES	8	1	2021-07-20	0	.3	27.0	Sunny		Mini RAE Lite
BH_STW_023	0.20	ES	2	1	2021-07-20	0	.2	27.0	Sunny		Mini RAE Lite
BH_STW_015	0.20	ES	2	1	2021-07-22	0	.3	27.0	Sunny		Mini RAE Lite
BH_STW_015	0.50	ES	5	1	2021-07-22	0	.2	27.0	Sunny		Mini RAE Lite
BH_STW_015	0.90	ES	8	1	2021-07-22	0	.3	27.0	Sunny		Mini RAE Lite
BH_STW_009	0.20	ES	2	1	2021-07-28	0	1	20.0	Sunny		Mini RAE Lite
BH_STW_009	0.60	ES	5	1	2021-07-28	0	.1	20.0	Sunny		Mini RAE Lite
BH_STW_009	1.10	ES	8	1	2021-07-28	0	.1	20.0	Sunny		Mini RAE Lite
BH_STW_026	0.20	ES	2	1	2021-07-28	0	.2	20.0	Sunny		Mini RAE Lite
BH_STW_026	0.50	ES	5	1	2021-07-28	0	.2	20.0	Sunny		Mini RAE Lite
BH_STW_026	1.10	ES	8	1	2021-07-28	0	.1	20.0	Sunny		Mini RAE Lite
BH_TUN_004	0.20	ES	2	1	2021-07-28	0	.9	20.0	Sunny		Mini RAE Lite
BH_TUN_004	0.50	ES	5	1	2021-07-28	0	.6	20.0	Sunny		Mini RAE Lite
BH_TUN_004	1.10	ES	8	1	2021-07-28	0	.4	20.0	Sunny		Mini RAE Lite
BH_TUN_004A	0.20	ES	2	1	2021-07-28	0	.5	20.0	Sunny		Mini RAE Lite
BH_TUN_004A	0.50	ES	5	1	2021-07-28	0	.5	20.0	Sunny		Mini RAE Lite
BH_TUN_004A	0.80	ES	8	1	2021-07-28	0	4	20.0	Sunny		Mini RAE Lite
BH_TUN_005	0.20	ES	2	1	2021-07-29	0	.5	20.0	Sunny		Mini RAE Lite
BH_TUN_005	0.50	ES	5	1	2021-07-29	0	.6	20.0	Sunny		Mini RAE Lite
BH_STW_024	0.20	ES	2	1	2021-07-30	0	.5	20.0	Sunny		Mini RAE Lite
BH_STW_024	0.40	ES	5	1	2021-07-30	1	.1	20.0	Sunny		Mini RAE Lite
BH_STW_024	1.10	ES	8	1	2021-07-30	1	.1	20.0	Sunny		Mini RAE Lite
BH_STW_031A	0.20	ES	2	1	2021-08-02	0	.4	19.0	Sunny		Mini RAE Lite
BH_STW_031A	0.50	ES	5	1	2021-08-02	0	.5	19.0	Sunny		Mini RAE Lite
BH_STW_031A	1.10	ES	8	1	2021-08-02	0	.4	19.0	Sunny		Mini RAE Lite
BH_STW_006	0.20	ES	2	1	2021-08-04	1	.5	20.0	Sunny		Mini RAE Lite
BH_STW_006	0.50	ES	5	1	2021-08-04	0	.7	20.0	Sunny		Mini RAE Lite
BH_STW_006	1.10	ES	8	1	2021-08-04	0	.8	20.0	Sunny		Mini RAE Lite
BH_STW_017	0.40	ES	2	1	2021-08-04	0	.4	20.0	Sunny		Mini RAE Lite
	1	Chec	ked I	Ву:		· · · · · ·	Аррі	roved By:			TAIL.

Date:

Issue Date

19/02/2015

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SOIL engineering

Project Name Cambridge Waste Water Treatment Plant

> Relocation TE8364

> > 0.50

0.20

1.20

ES

ES

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1

Project No.

BH_FE_006

BH_FE_005

BH_STW_016

Photo Ionisation Results

Mott MacDonald Bentley Engineer Client **Barhale Limited** Sample Sample Sample Number Test Date PID Device PID Temp. Type Test Hole ID Depth æ Weather Remarks yyyy-mm-dd °C ppm Туре m BH_STW_017 2021-08-04 0.50 ES 5 1 0.4 20.0 Mini RAF Lite Sunny BH_STW_017 2021-08-04 Mini RAE Lite 1.10 ES 8 1 1.7 20.0 Sunny BH_STW_004 0.20 2021-08-05 20.0 Mini RAF Lite 15 FS 2 1 Sunny BH_STW_004 0.50 ES 5 1 2021-08-05 0.9 20.0 Sunny Mini RAE Lite BH STW 004 1.10 2021-08-05 8.0 20.0 Mini RAE Lite FS R 1 Sunny BH_FE_006 0.20 ES 2 1 2021-08-09 0.7 17.0 Raining Mini RAE Lite

Mini RAE Lite BH_FE_006 1.10 ES 8 1 2021-08-09 0.6 17.0 Raining BH_STW_012A 0.20 ES 2 1 2021-08-09 0.3 17.0 Mini RAE Lite Raining BH_STW_012A 0.60 ES 5 1 2021-08-09 0.4 17.0 Raining Mini RAE Lite BH_STW_012A 1.00 ES 8 1 2021-08-09 0.4 17.0 Raining Mini RAE Lite Mini RAE Lite 2021-08-10

0.6

17.0

21 0

21.0

Raining

Sunny

Sunny

2021-08-09

2021-08-10

2021-08-10 Mini RAE Lite BH_FE_005 0.50 ES 5 1 0.9 21.0 Sunny BH_FE_005 110 2021-08-10 0.8 21.0 Sunny ES 8 1 Mini RAF Lite BH_STW_016 0.20 2021-08-10 21.0 Mini RAE Lite ES 2 1 0.3 Sunny 2021-08-10 Mini RAE Lite BH_STW_016 0.60 FS 5 0.4 21.0 1 Sunny

11

BH FE 002 0.20 ES 2 2021-08-12 1.7 20.0 Mini RAE Lite 1 Sunny BH_FE_002 0.50 ES 2021-08-12 1.3 20.0 Mini RAE Lite 5 1 Sunny BH_FE_002 1.10 2021-08-12 0.9 20.0 Mini RAE Lite FS R 1 Sunny BH_STW_013A 0.20 ES 1 1 2021-08-12 0.5 20.0 Sunny Mini RAE Lite

0.4

BH_STW_013A 0.50 ES 4 1 2021-08-12 8.0 20.0 Sunny Mini RAE Lite BH_STW_013A 1.00 ES 7 1 2021-08-12 0.3 20.0 Sunny Mini RAE Lite Mini RAE Lite BH_FE_003 0.20 ES 2 1 2021-08-13 1.2 16.0 Overcast BH_FE_003 0.50 2021-08-13 0.9 ES 5 1 16.0 Overcast Mini RAE Lite

BH_FE_003 2021-08-13 Overcast 1.10 ES 8 1 0.7 16.0 Mini RAE Lite Mini RAE Lite BH_STW_021 1 2021-08-13 0.20 ES 2 0.7 16.0 Overcast BH_STW_021 0.50 ES 5 1 2021-08-13 0.6 16.0 Overcast Mini RAE Lite 2021-08-13 BH_STW_021 1.10 ES R 1 0.6 16.0 Overcast Mini RAE Lite

BH_FE_004A 0.20 ES 2 1 2021-08-16 1.1 16.0 Cloudy Mini RAE Lite BH_FE_004A 0.50 2021-08-16 0.9 16.0 Mini RAE Lite FS 5 1 Cloudy BH_FE_004A 1.10 ES 8 1 2021-08-16 0.9 16.0 Cloudy Mini RAE Lite BH_TUN_003 0.20 ES 2 2021-08-16 1.7 16.0 Cloudy Mini RAE Lite 1

Checked By: Approved By: Date: 19/02/2015 Form No. SE-EMS-F-001 Revision No. 200 Issue Date

SOIL ENGINEERING

Mini RAE Lite

Mini RAE Lite

Project Name Cambridge Waste Water Treatment Plant

Date:

Revision No.

SE-EMS-F-001

Form No.

Relocation

Project No. TE8364

Engineer Mott MacDonald Bentley

Client Barhale Limited

Photo Ionisation Results

Client	Darnale L	mnec	J								
Hole ID	Sample Depth m	Sample Type	Sample Ref.	Test Number	Test Date yyyy-mm-dd		ID om	Temp. ℃	Weather	 Remarks	PID Device Type
BH_TUN_003	0.50	ES	5	1	2021-08-16	1	.4	16.0	Cloudy		Mini RAE Lite
BH_TUN_003	1.10	ES	8	1	2021-08-16	1	.1	16.0	Cloudy		Mini RAE Lite
BH_STW_019A	0.20	ES	2	1	2021-08-17	0	.9	18.0	Overcast		Mini RAE Lite
BH_STW_019A	0.50	ES	5	1	2021-08-17	0	.7	18.0	Overcast		Mini RAE Lite
BH_STW_019A	1.10	ES	8	1	2021-08-17	0	.6	18.0	Overcast		Mini RAE Lite
BH_FE_001	0.20	ES	2	1	2021-08-18	1	.3	20.0	Sunny		Mini RAE Lite
BH_FE_001	0.50	ES	5	1	2021-08-18	1	.1	20.0	Sunny		Mini RAE Lite
BH_FE_001	1.10	ES	8	1	2021-08-18	0	.7	20.0	Sunny		Mini RAE Lite
BH_OUT_001	0.20	ES	2	1	2021-08-19	1	.7	22.0	Overcast		Mini RAE Lite
BH_OUT_001	0.50	ES	5	1	2021-08-19	1	.6	22.0	Overcast		Mini RAE Lite
BH_OUT_001	1.10	ES	8	1	2021-08-19	1	.6	22.0	Overcast		Mini RAE Lite
BH_TPS_001	0.20	ES	2	1	2021-08-23	0	.9	18.0	Overcast		Mini RAE Lite
BH_TPS_001	0.50	ES	5	1	2021-08-23	0	.7	18.0	Overcast		Mini RAE Lite
BH_TPS_001	1.10	ES	8	1	2021-08-23	0	.7	18.0	Overcast		Mini RAE Lite
BH_TUN_002	0.20	ES	2	1	2021-08-23	8		18.0	Overcast		Mini RAE Lite
BH_TUN_002	0.50	ES	5	1	2021-08-23			18.0	Overcast		Mini RAE Lite
BH_TUN_002	1.10	ES	8	1	2021-08-23	1	.4	18.0	Overcast		Mini RAE Lite
BH_TPS_002	0.20	ES	2	1	2021-08-24	1	.1	18.0	Sunny		Mini RAE Lite
BH_TPS_002	0.50	ES	5	1	2021-08-24	o	.9	18.0	Sunny		Mini RAE Lite
BH_TPS_002	1.10	ES	8	1	2021-08-24	0	.9	18.0	Sunny		Mini RAE Lite
TP_FE_003	0.25	ES	1	1	2021-08-24	_ 0	.4	18.0	Sunny		Mini RAE Lite
TP_FE_003	0.50	ES	3	1	2021-08-24	O	.5	18.0	Sunny		Mini RAE Lite
TP_FE_003	2.00	ES	6	1	2021-08-24	0	.5	18.0	Sunny		Mini RAE Lite
TP_FE_003	2.80	ES	8	1	2021-08-24	0	.5	18.0	Sunny		Mini RAE Lite
BH_TPS_003	0.20	ES	2	1	2021-08-25	1	.0	17.0	Cloudy		Mini RAE Lite
BH_TPS_003	0.50	ES	5	1	2021-08-25	0	.9	17.0	Cloudy		Mini RAE Lite
BH_TPS_003	1.10	ES	8	1	2021-08-25	0	.8	17.0	Cloudy		Mini RAE Lite
BH_STW_003A	0.20	ES	2	1	2021-08-26	o	.9	17.0	Overcast		Mini RAE Lite
BH_STW_003A	0.50	ES	5	1	2021-08-26	o	.7	17.0	Overcast		Mini RAE Lite
BH_STW_003A	1.10	ES	8	1	2021-08-26	o	.7	17.0	Overcast		Mini RAE Lite
BH_TPS_004	0.20	ES	2	1	2021-08-26	0	.9	16.0	Overcast		Mini RAE Lite
BH_TPS_004	0.50	ES	5	1	2021-08-26	0	.7	16.0	Overcast		Mini RAE Lite
BH_TPS_004	1.10	ES	8	1	2021-08-26	0	.7	16.0	Overcast	400	Mini RAE Lite
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Date:

Issue Date

19/02/2015

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SOIL ENGINEERING

Project Name Cambridge Waste Water Treatment Plant

Relocation

Project No. TE8364

Engineer

Mott MacDonald Bentley

Date:

Revision No.

2.00

SE-EMS-F-001

Form No.

Photo lonisation Results

Client	Barhale L	imited	d									
Hole ID	Sample Depth m	Sample	Sample Ref.	Test Number	Test Date yyyy-mm-dd	1.75	D nm	Temp. ℃	Weather	Į.	Remarks	PID Device Type
BH_TUN_005Ab	0.20	ES	2	1	2021-08-26	1	.6	16.0	Overcast			Mini RAE Lite
BH_TUN_005Ab	0.50	ES	5	1	2021-08-26	1	.4	16.0	Overcast			Mini RAE Lite
BH_TUN_005Ab	1.10	ES	8	1	2021-08-26	1	.4	16.0	Overcast			Mini RAE Lite
BH_STW_011A	0.20	ES	2	1	2021-08-31	1	.2	13.0	Overcast			Mini RAE Lite
BH_STW_011A	0.50	ES	5	1	2021-08-31	0	.9	13.0	Overcast			Mini RAE Lite
BH_STW_011A	1.10	ES	8	1	2021-08-31	0	.8	13.0	Overcast			Mini RAE Lite
TP_STW_007	0.20	ES	1	1	2021-08-31	<().1	13.0	Overcast			Mini RAE Lite
TP_STW_007	0.50	ES	3	1	2021-08-31	<().1	13.0	Overcast			Mini RAE Lite
TP_STW_007	1.00	ES	5	1	2021-08-31	<().1	13.0	Overcast			Mini RAE Lite
TP_STW_007	1.50	ES	7	1	2021-08-31	<().1	13.0	Overcast			Mini RAE Lite
BH_STW_020	0.20	ES	2	1	2021-09-03	1	.2	20.0	Sunny			Mini RAE Lite
BH_STW_020	0.50	ES	5	1	2021-09-03	1	.0	20.0	Sunny			Mini RAE Lite
BH_STW_020	1.10	ES	8	1	2021-09-03	0	.9	20.0	Sunny			Mini RAE Lite
BH_STW_022A	0.20	ES	2	1	2021-09-03	1	.1	19.0	Sunny			Mini RAE Lite
BH_STW_022A	0.50	ES	5	1	2021-09-03	1	.0	19.0	Sunny			Mini RAE Lite
BH_STW_022A	1.10	ES	8	1	2021-09-03	0	.9	19.0	Sunny			Mini RAE Lite
BH_TUN_001A	0.20	ES	2	1	2021-09-06	2	.3	18.0	Sunny			Mini RAE Lite
BH_TUN_001A	0.50	ES	5	1	2021-09-06	2	.0	18.0	Sunny			Mini RAE Lite
BH_TUN_001A	1.10	ES	8	1	2021-09-06	1	.3	18.0	Sunny			Mini RAE Lite
TP_STW_014	0.30	ES	1	1	2021-09-07	0	.6	18.0	Sunny			Mini RAE Lite
TP_STW_014	0.80	ES	3	1	2021-09-07	0	.5	18.0	Sunny			Mini RAE Lite
TP_STW_014	1.20	ES	4	1	2021-09-07	1	.2	18.0	Sunny			Mini RAE Lite
BH_TUN_004C	0.20	ES	2	1	2021-09-16	1	.7	21.0	Sunny			Mini RAE Lite
BH_TUN_004C	0.50	ES	5	1	2021-09-16	1	.7	21.0	Sunny			Mini RAE Lite
BH_TUN_004C	1.10	ES	8	1	2021-09-16	1	.4	21.0	Sunny			Mini RAE Lite
BH_TUN_006	0.20	ES	2	1	2021-09-16	0	.6	14.0	Sunny			Mini RAE Lite
BH_TUN_006	0.50	ES	5	1	2021-09-16	1	.4	14.0	Sunny			Mini RAE Lite
BH_TUN_006	1.10	ES	8	1	2021-09-16	1	.3	14.0	Sunny			Mini RAE Lite
BH_TUN_018	0.20	ES	2	1	2021-09-20	0	.9	16.0	Cloudy			Mini RAE Lite
BH_TUN_018	0.50	ES	5	1	2021-09-20	0	.9	16.0	Cloudy			Mini RAE Lite
BH_TUN_018	1.10	ES	8	1	2021-09-20	0	.7	16.0	Cloudy			Mini RAE Lite
BH_TUN_010	0.20	ES	2	1	2021-10-15	0	.9	16.0	Overcast			Mini RAE Lite
BH_TUN_010	0.50	ES	5	1	2021-10-15	0	.8	16.0	Overcast		- Season	Mini RAE Lite
		Chec	ked l	By:			Appr	oved By:				l
		Date		- L1			Date				3 46	

Date:

Issue Date

19/02/2015

SOIL ENGINEERING

Project Name	Project Name Cambridge Waste Water Treatment F							Photo	lonisation		,
Project No.	Relocation TE8364	on						F 1.85	sults		
Engineer		acDona	ald Be	entley							
Client	Barhale I		d								
Hole ID	Sample Depth m	Sample	Sample Ref.	Test Number	Test Date yyyy-mm-dd	P	ID om	Temp. ℃	Weather	Remarks	PID Device
BH_TUN_010	1.10	ES	8	1	2021-10-15	0	.8	16.0	Overcast		Mini RAE Lit
	1										
	<u> </u>										
	-										
	1										
	•	Che	cked	Ву:				roved By:	l I		
Form No. S	E-EMS-F-00	Date		ion No.	2.00		Date		/02/2015	SOIL ENGI	neering Soletanche Group



Cambridge WWTPR Pumping Test Report

Contract Name:	Cambridge WWTPR
Client Name:	Soil Engineering Ltd
Groundwater & Dewatering Specialist:	Stuart Wells Limited (SWL)
Report No:	SWL21-122-01-PT-02
Location ID	Step Test Abstraction Wells:
	BH_TPS_001b, BH_TPS_002b, BH_TPS_003b,
	BH_TPS_004b
	Constant Rate Test Abstraction Well:
	BH_TPS_004b
	Additional Observation Wells:
	BH_STW_009, BH_STW_010b, BH_STW_015,
	BH_TUN_018.

Revision	Date	Description	Prepared By (SWL)	Checked By (SWL)
01	26/11/2020	Submission	James Pettengell	Mark Pickett
02	20/12/2021	Updated as per clients' comments	James Pettengell	Mark Pickett

For:	Contact:
Soil Engineering	Name: Matthew Bellhouse
Parkside Lane	Regional Manager (South)
Dewsbury Road Leeds	Telephone:
LS11 5SX	Email: @soil-engineering.co.uk
By:	Contact:
Stuart Wells Ltd	Dr Mark Pickett
Hargham Road	Technical Director
Shropham	Telephone:
Norfolk NR17 1DT	Email: <u>@stuartwells.co.uk</u>



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TABLES

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1. Introduction

Stuart Wells Ltd. (hereafter referred to as SWL) were appointed by Soil Engineering Ltd. (the client) to undertake a pumping test in accordance with BS EN ISO 22282-4:2012 and BS ISO 14686:2003.

The pumping test scope was outlined in Mott MacDonald specification referenced: 421008-01 Rev C dated April 2021 (herein referred to as the specification) and 'EA CONSENT TO INVESTIGATE A GROUNDWATER SOURCE: Consent no: 660/12/952 dated 08 July 2021. It was defined that the purpose of this test was to determine the hydraulic properties the West Melbury Chalk Formation. The testing was undertaken to determine what groundwater control techniques will be required during shaft construction.

Initially, the pumping test was to comprise of a step test in each of the 4 no. abstraction wells. This would be undertaken to identify the highest yielding abstraction well, which would subsequently be used to abstract groundwater from during the constant rate test. Abstracted groundwater was discharged to ground approximately 70 m from the pumping well.

The pumping test sequence involved; pre-test monitoring of groundwater levels, an equipment test, followed by 6 no. step-tests and a 7-day constant rate test. Groundwater levels were monitored in accordance with BS EN ISO 22282-4:2012, both manually and electronically using dataloggers in the pumping well and groundwater monitoring points. The configuration of the pumping test is shown in Figure 1. Atmospheric pressure was measured using a barometric logger.

This report details the activities and the results of the testing carried out.

2. Ground Conditions

TABLE 1: Summary of ground conditions encountered

Geotechnical Unit	Description of Strata	Eleva	ation (mOD)
		from	to
Topsoil	Sandy slightly gravelly CLAY	10.09	9.79
Superficial Deposits	variable SAND/Variable CLAY	9.79	9.54
West Melbury Chalk Formation	Structureless Chalk becoming weak high-density Chalk	9.54	-0.81
Cambridge Greensand Formation	Siltstone/variable CLAY	-0.81	-1.11
Gault Clay Formation	CLAY	-1.11	-36.36
Lower Greensand Formation	variable CLAY/Variable SAND	-36.36	Proven to -39.22

For site specific ground conditions encountered during this investigation phase, please refer to the full borehole logs prepared by Soil Engineering.



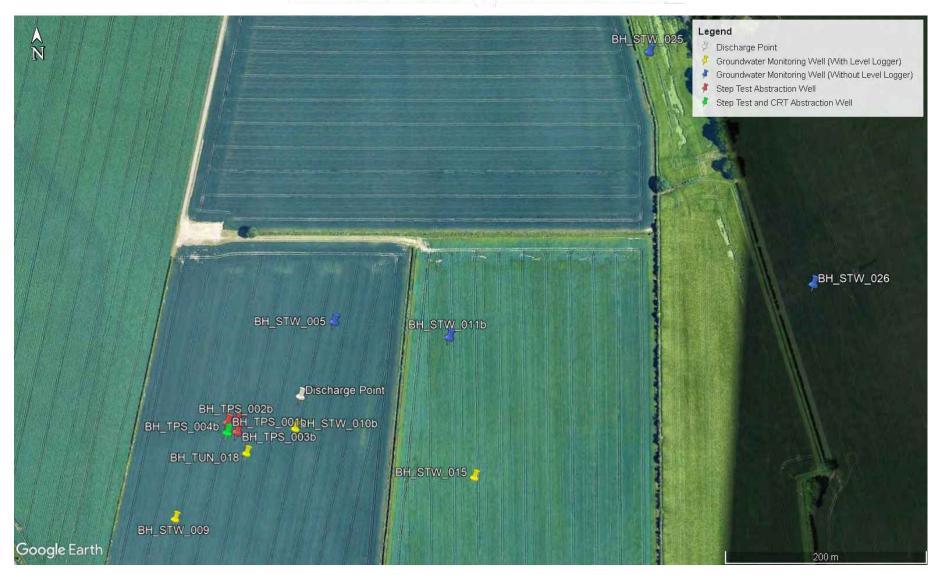


Figure 1: Pumping Test Location Map

Stuart Wells Ltd Cambridge WWTPR – Pumping Test Report Document Reference: SWL21-122-01-PT-02



3. Scope of Works

The programme of works undertaken at site is summarised in Table 1. Detailed information on specific project tasks is included in subsequent sections.

TABLE 2: Programme of Works

TABLE 2: Programme of Wor	
Date	Activity
13 th October 2021	Installation of Groundwater Loggers.
13th to 21st October 2021	Mobilisation: Setting up of Testing Equipment
10 (02) 00(000) 2021	Setting up of generators and pumping equipment
	Equipment Testing BH_TPS_004b
21st October 2021	An equipment test, which comprised of determining the well
	yield and pump suitability, as well as general equipment checks.
	Step-Test BH_TPS_004b
	Step 1 at 0.125 l/s
22 nd October 2021	Step 2 at 0.25 l/s
	Step 3 at 0.375 l/s
	Step 4 at 0.5 l/s
	Equipment Testing BH_TPS_002b
25 th October 2021	An equipment test, which comprised of determining the well
	yield and pump suitability, as well as general equipment checks.
	Step-Test BH_TPS_002b
26th October 2021	Step 1 at 0.05 l/s
26 th October 2021	Step 2 at 0.10 l/s Step 3 at 0.15 l/s
	Step 3 at 0.13 l/s
	Step-Test BH_TPS_002b
27 th October 2021	Step 1 at 0.20 l/s
	Equipment Testing BH_TPS_003b
27 th October 2021	An equipment test, which comprised of determining the well
27 ··· October 2021	yield and pump suitability, as well as general equipment
	checks.
	Step-Test BH_TPS_003b
20th October 2021	Step 1 at 0.125 l/s
28 th October 2021	Step 2 at 0.25 l/s Step 3 at 0.375 l/s
	Step 4 at 0.5 l/s
	Step-Test BH_TPS_003b
29th October 2021	Step 1 at 0.5 l/s
	Equipment Testing BH_TPS_001b
29th October 2021	An equipment test, which comprised of determining the well
27 October 2021	yield and pump suitability, as well as general equipment
	checks.
1st November 2021	Step-Test BH_TPS_001b
	Step 1 at 0.066 l/s Constant Rate Test BH_TPS_004b
2 nd November 2021	Constant Rate Pumping Test undertaken at 0.36 l/s.
	Constant Rate Test BH_TPS_004b
4 th November 2021	Constant Rate Pumping Test flow rate reduced to 0.25 I/s
9 th November 2021	End of Constant Rate Test
9th to 11th November 2021	Recovery Monitoring
11 th November 2021	Datalogger Download and reset
TT NOVETHBEI ZUZT	Datalogger Download and reset



3.1. Groundwater Level Monitoring

Groundwater monitoring was completed at a number of monitoring points during the pumping test. They are summarised in Table 2 below.

TABLE 3: Groundwater Monitoring

Location Identification	Detail	Designation			
BH_TPS_001b	SWL Level logger	Step test and monitoring well			
BH_TPS_002b	SWL Level logger	Step test and monitoring well			
BH_TPS_003b	SWL Level logger	Step test and monitoring well			
BH_TPS_004b	SWL Level logger	Step test and pumping well during constant rate test			
BH_STW_009	SWL Level logger	monitoring well			
BH_STW_010b	SWL Level logger	monitoring well			
BH_STW_015	SWL Level logger	monitoring well			
BH_TUN_018	SWL Level logger	monitoring well			
BH_STW_005	Manual data	monitoring well			
BH_STW_011b	Manual data	monitoring well			
BH_STW_025	Manual data	monitoring well			
BH_STW_026	Manual data	monitoring well			
Barologger	Barometric pressure datalogger	barometric calibration			

3.2. Pumping Test Equipment

Equipment used during testing is summarised as follows:

- 1 no. 415v submersible borehole pump 11.6mBTOC on WellMaster riser.
- A duty 20kVA Silenced generator was used to power the borehole pump, with bunded fuel tank, auto-mains failure (AMF) panel and standby generator.
- Electronic level-loggers were used at the abstraction well and monitoring wells to record continuous water level readings for the duration of the testing period.
- Manual water level readings were recorded using a Manual Dip Tape.
- Flow rate was monitored using 1 no. electronic flowmeter (Mag 2000) and 1 no. mechanical flowmeter.
- Approximately 70 metres of Bauer discharge pipeline, with scour protection at discharge point.



4. Results

The following section presents a summary of the results obtained during the pumping test. The full testing results are included in the associated excel file 'SWL21-122 -01 Cambridge WWTPR Pumping Test Data'.

4.1. Pre-test Monitoring

Pre-test groundwater monitoring data was collected from SWL level loggers installed in all wells. The results are summarised in Table 3 and shown in the hydrograph, Figure 2. Please note, as explained in Section 4.6, pre-test monitoring was not completed at monitoring well BH_STW_015.

TABLE 4: Summary of Pre-Test Groundwater Level Monitoring

Location Identification	Groundwater Depth (mBGL)
BH_TPS_001b	4.30 to 4.35
BH_TPS_002b	4.14 to 4.19
BH_TPS_003b	4.82 to 4.86
BH_TPS_004b	4.09 to 4.13
BH_STW_009	4.80 to 4.85
BH_STW_010b	4.36 to 4.42
BH_TUN_018	4.48 to 4.53
BH_STW_015	n/a

4.2. Equipment Test

After the installation of the submersible borehole pump in each abstraction well, an equipment test was undertaken to determine that all site equipment was working correctly, this comprised of 1 no. pumping phase. The equipment tests in the 4 no. abstraction wells were undertaken between the 21st and 29th October 2021.

4.3. Step Test

A series of 6 no. step tests were undertaken in each of the 4 no. abstraction wells (BH_TPS_001b, BH_TPS_002b, BH_TPS_003b and BH_TPS_004b). The purpose of the step tests was to determine, which of the wells had the highest yield, and it would be this well that would be utilised as the abstraction well for the purpose of the constant rate test.

The details of each completed step test including test dates and flow rates are summarised in the Table 4 below. After each step test, groundwater levels were left to recover overnight prior to next step test and the constant rate test.

The Step Test results are presented in the hydrograph, Figure 2 (time-water level).



TABLE 5: Summary of Step Tests

Location Identification	Step test Date	No. steps	Flow rate(s) (I/s)
BH_TPS_001b	01/11/2021	1	0.066
BH_TPS_002b	26/10/2021	4	0.05, 0.10, 0.15, 0.20
BH_TPS_002b (Additional Step test upon client's request)	27/10/2021	1	0.20
BH_TPS_003b	28/10/2021	4	0.125, 0.25, 0.375, 0.50
BH_TPS_003b (Additional Step test upon client's request)	29/10/2021	1	0.50
BH_TPS_004b	22/10/2021	4	0.125, 0.25, 0.375, 0.5

4.4. Constant Rate Test (CRT)

The CRT was started on 2nd November 2021 at 11:00 and completed at 11:00 on 9th November 2021. Initially, the first two days of the test were undertaken at a flow rate of 0.36 l/s. However, on the third day it was noted that this flow rate was too great for the well to maintain for the full duration of the test. As a result, on the 4th November 2021, it was agreed between Mott MacDonald, Soil Engineering and SWL to reduce the abstraction flow rate to 0.25 l/s for the remainder of the pumping test.

Please find a summary of water depths and drawdown achieved during the CRT in Table 5. The results of the pumping test are also presented in the hydrographs, Figure 3 (time-water level). While Figure 4 presents a semi-log plot of the distance drawdown.



TABLE 6: Summary of Constant Rate Test Drawdown

Well No.	Easting	Northing	Distance from pumped well (m)	Maximum Change (m)
Pumping Well (BH_TPS_004b)	549425.40	261019.03	0.10	6.79
BH_TPS_001b	549425.67	261029.07	10.04	0.75
BH_TPS_003b	549435.45	261019.05	10.05	0.54
BH_TPS_002b	549435.44	261029.23	14.31	0.70
BH_STW_010b	549493.73	261023.34	68.47	0.35
BH_STW_015	549671.50	260975.20	249.97	0.13
BH_STW_009	549374.10	260933.60	99.65	0.15
BH_TUN_018	549445.42	260999.33	28.09	0.02
BH_STW_005	549531.13	261127.75	151.65	0.08
BH_STW_011b	549645.96	261113.4	239.90	0.05
BH_STW_025	549843.67	261395.68	562.86	0.10
BH_STW_026	550007.1	261165.69	599.90	0.05

4.5. Recovery Monitoring

Recovery monitoring was completed upon completion of the CRT on the 9th November 2021 through to the 11th November 2021. The results of the recovery monitoring are presented in the hydrographs, Figure 3 (time-water level).

4.6. Additional Commentary

- Upon request of the client, additional single step tests were undertaken in BH_TPS_002b and BH_TPS_003b. These additional step tests were completed at a flow rate of 0.20 l/s and 0.50 l/s respectively.
- Prior to beginning the Constant Rate Test, SWL was requested by the client to include an additional monitoring well, BH_STW_015. As a result, data was not collected during Pre-Test Monitoring or Step Tests.
- As is shown in Figure 3, over the course of the night on the 03rd November 2021, the groundwater level fell below the installation depth of the monitoring probe. As a result, between 23:21 03rd to 09:00 04th November 2021, the data 'flat lines'. Therefore, it was decided to reduce the flow rate from 0.36 l/s to 0.25 l/s on the 4th November 2021 at 09:00. The reduction in flow rate was necessary to bring the groundwater level back above the monitoring probe and the test could continue.



Yours faithfully,

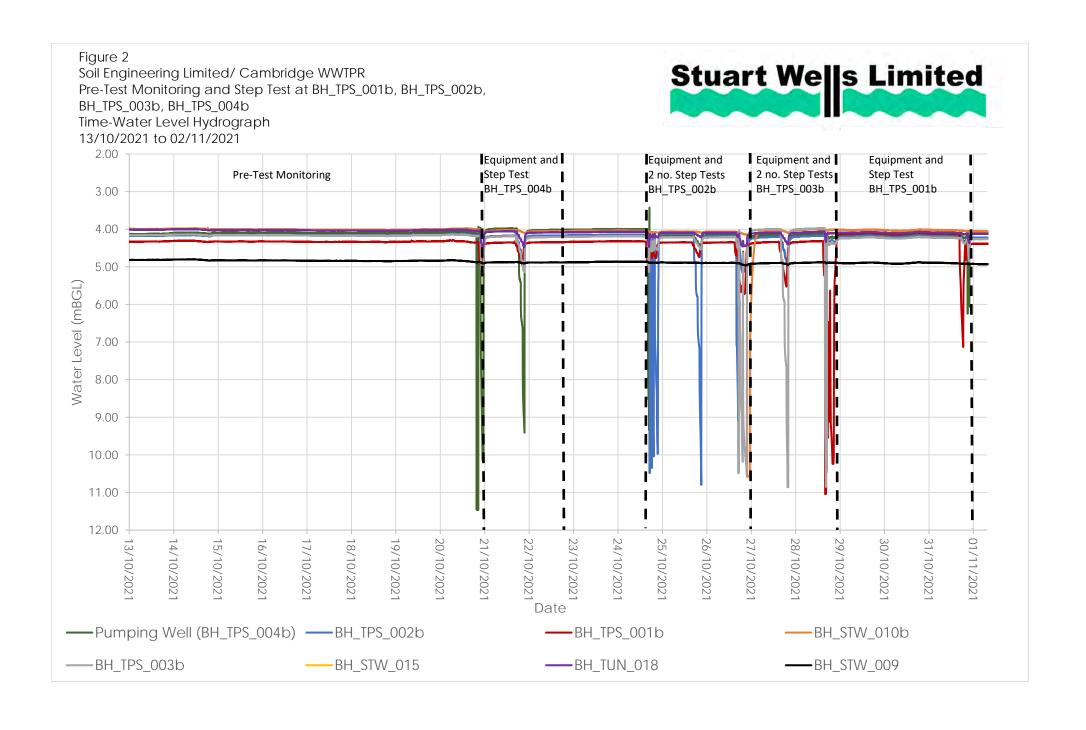
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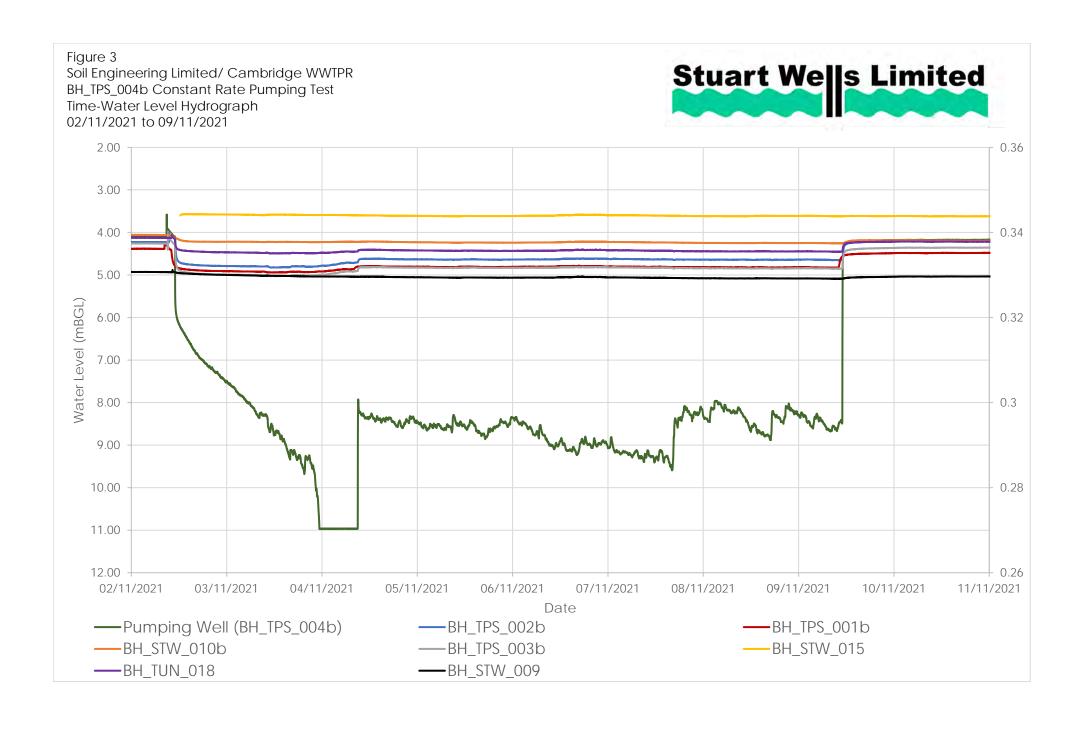


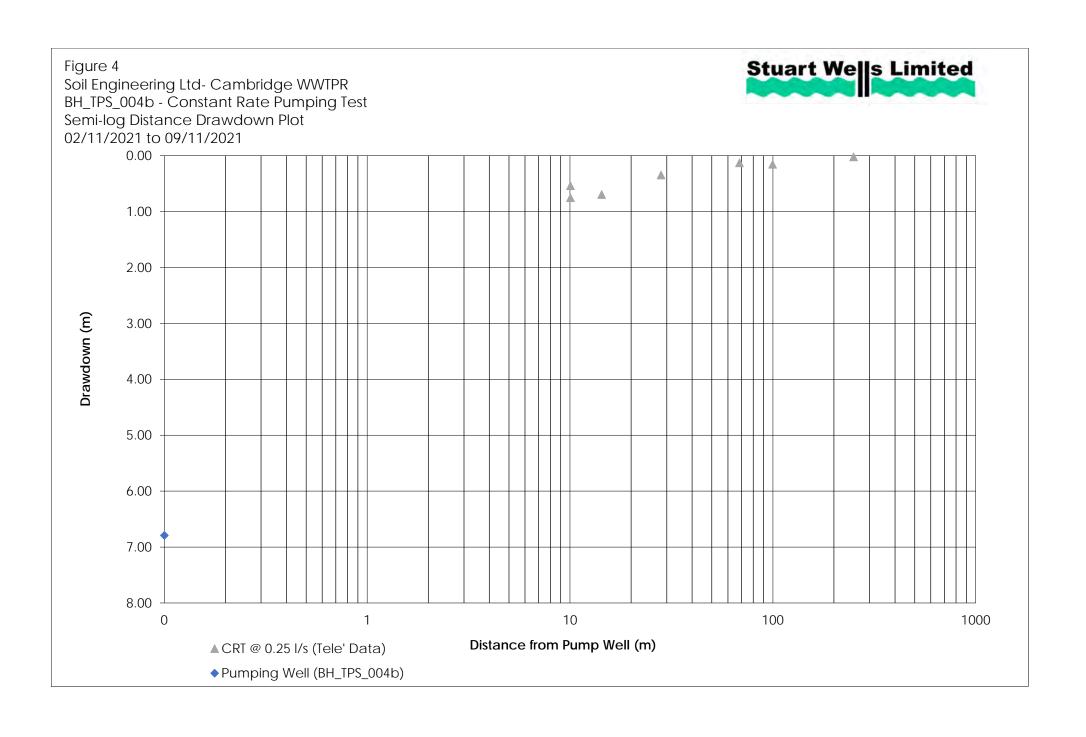
James Pettengell BSc, MSc (Hons) Geotechnical Engineer For & behalf of Stuart Wells Ltd Reviewed and Approved by:



Dr. Mark Pickett PhD, MCSM, BEng (Hons) FGS Technical Director For & behalf of Stuart Wells Ltd







	A . P. M.		Sec.			363				
Project Name	Cambridge Was	te Water T re a	atment Plant		Inspecti	on Pit		ole ID		
11	Relocation			11	Infiltratio	1 To 1		FE_001		
Project No.	TE8364				intiitratio	on rest	I .	nd Level m AOD		
Engin ee r	Mott MacDonal	d Bentley)ate 8/2021		
Client	Barhale Limited				BS EN ISO 222	82-2: 2012	Page			
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Description	coarse GRAVEL	_	slightly gravelly C	LAY.	1.00m to 1.20m	1: Slightly sandy	angular to sub	rounaea tine ti		
Type of test	Borehole	ormine. Ins	tallation type							
	elative to ground									
Initial ground w			1.09 m		Top of test sec	tion	0.0) m		
Height of casing	g above surface		0.00 m		Bottom of test	section	1.20) m		
Length of test s	ection				Water level at	end of test	0.90) m		
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1.5	0.48			l	64	0.87				
2	0.50			ı	67	0.87		 		
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3	0.54			l	73	0.88		1		
3.5	0.55			l	76	0.89				
3.3 4	0.56			l	79	0.90				
				1	19	0.90		1		
4.5	0.58			1						
5	0.59							1		
6	0.60									
7	0.62			1						
8	0.63			l						
9	0.64			1						
10	0.64			l						
12	0.65			l						
14	0.66									
16	0.67									
18	0.68			1		1		1		
20	0.70			1		1	1	1		
25	0.72			1	-	1	1	1		
28	0.74			1		1		1		
31	0.76			1		1	1	1		
34	0.77			1		 		†		
37	0.78							1		
40	0.79			1		1	1	1		
43	0.80					1	1	1		
46	0.80				-	 	 	+		
49	0.81		+			 		+		
52	0.83		1			 	 	 		
	0.85			1						
Remarks Test perfo	rmed in inspection	on pit as instr	ucted by Client. In	nspe	ction pit dimens	sions: 240mm x	260mm x 1.20	m.		
Recorded by: D.	Tiernan						soil engin	eering		

01/09/2010

Part of the Bachy Soletanche Group

Issue Date

SE-PGR-F-002

Revision No.

3.03

roject Name	Cambridge Wast Relocation	t e W ater Trea	itment Pla	int	Inspect	tion Pit		Hole I BH_FE_	
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lient	Barhale Limited							Page	
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ength of test s			1.20	m		at end of test		0.90	m
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Project Name	Cambridge Was	ste Water Trea	t men t Plant	\$50 GA 600	D. I. R. E.S.	ling Hea	BH_	Hole II _STW_	_003A
Project No.	TE8364			Pern	neabil	ity Test	1	ound L .25m <i>F</i>	AOD
Engineer	Mott MacDona	ld Bentley					27	Date 27/08/2021	
Client	Barhale Limited	ı		BS EN	BS EN ISO 22282-2: 2012 Page 1 of 2				
Description	1.40m to 7.00m	n: Alternating S	Structureless CH	ALK and Gra	de B3/B4	4 CHALK			
Type of test	Borehole		allation type						
Initial ground w	elative to ground	level.	5.46 m	Top of	test sec	tion		l. 45	m
Height of casing			0.22 m		n of test			2.00	m
Length of test s			5.55 m			end of test		5.03	m
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Time	Penth to		41		ime	Depth to	<u>. T</u>	Т	
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0	0.00	5.46	0.00	1	55	4.91	0.55		2.30
0.5	0.18	5.28	0.03	1	58	4.94	0.52		2.35
1	0.25	5.21	0.05		61	4.97	0.49		2.41
1 .5	0.35	5.11	0.07		64	5.00	0.46		2.47
2	0.46	5.00	0.09	1	67	5.02	0.44		2.52
2.5	0.65	4.81	0.13	1	70	5.03	0.43		2.54
3	0.78	4.68	0.15						
3.5	0.88	4.58	0.18						
4	0.97	4.49	0.20						
4.5	1.06	4.40	0.22						
5	1.18	4.28	0.24	<u> </u>					
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20	3.11	2.35	0.84					+	
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40	4.46	1.00	1.70]					
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4 6	4.69	0.77	1.96						
49	4.77	0.69	2.07						
52	4.85	0.61	2.19						
Remarks									
Recorded by: D.	. Tiernan						EAU AD		une.
Form No. SE-PC	GR-F-002	Revision No.	3.03	Issue Date	01/09/20	010	SOIL end		
J. SILLING. SL-PC		Mariagui ITO.	3.03	issue Dale	021 C31 Z1	V-V	rait of the Dath	र ज्यादावा।	are atout

,		Cambridge Wa Relocation	ste W ater Treat	ment Pla	ant		le <mark>F</mark> alling Hea eability Test	I	Hole BH_STW	_003A
Project	No.	TE8364				rerm	icability lest		Ground	
Eng ine e	er	Mott MacDona	ald Bentley						10.25m Date	e
Clicat		Dorbela 139-						<u> </u>	27/08/2021 Page	
Client		Barhale Limited	2	4		BS EN ISO 22282-2: 2012			2 of 2	
Descrip	tion	1.40m to 7.00n	n: Alternating St	tructurele	ess CHAL	K and Grad	de B3/B4 CHALK			
Type of		Borehole	Insta	allation ty		<u> </u>	:		4./5	
		ater level above surface		5.46 0.22	m m		test section n of test section		1.45 7.00	m BG m BG
	of test se			5.55	m		level at end of test		5.03	
		section		146	mm		ter of casing/stand	pipe	146	m
			C!					<u> </u>		n.n.
Quality Weathe	of water	usea	Clean and Cloudy	1 цегр			art time nish time			9:03 0:13
vveatrie	<u> </u>		Сюшау			rest iii	nan unte			<i>)</i> .13
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0.	.500	10	20	30		40	50	60	70	80
0.	.500	10	20	30)			50	70	80
0.	.500	10	20	30)	40		50	70	80
0.	.500) Tim	40		D 114		
0.	.500	10		30 $k = \alpha . S_{k}$) Tim	40		6 0 1.26 × 10 ⁻⁶		80 n/s
0. 0.	.500	city graph meth	ood) Tim	40		D 114		
0. 0.	.500	city graph meth α= 0.0006) Tim	40		D 114		
0. 0.	.500	city graph meth α= 0.0006 S= 0.0167m	ood) Tim	40		D 114		
0. 0.	.500	city graph meth α= 0.0006	ood) Tim	40		D 114		
0. 0.	.500	city graph meth α= <i>0.0006</i> S= <i>0.0167m</i> F= 8.047m	ood) Tim	40		1.26 × 10 ⁻⁶	i n	
0. 0.	.500	city graph meth α= <i>0.0006</i> S= <i>0.0167m</i> F= 8.047m	ood) Tim	40		1.26 × 10 ⁻⁶		n/s

Project Name	Cambridge Wa	ste Water T re	atment Plant	Rorohe	Borehole Falling Head			Hole	·ID
	Relocation			\$21 S.A. B. B.	P. S. W. C.	1.4		BH_STW	
Project No.	TE8364			Pern	neabil	ity Test		Ground 9.31m	
Engineer	Mott MacDona	ald Bentley						Dai 06/09/	te
Client	Barhale Limited	d		BS EN	I ISO 222	82-2 : 2012		Paç	је
Description	CHALK recover	red as very sti	ff gravelly calcar	eous CLAY.				1 of	Z
		-							
Type of test	Borehole elative to ground		stallation type						
Initial ground w		ı ievei.	4.80 m	Top o	f test sec	tion		6.20	m
	g above surface		0.00 m		m of test			6.20	m
Length of test s			0.00 m	Water	r level at	end of test		2.50	m
Diameter of tes	t section		200 mn	n Diame	eter of ca	sing/stand	pipe	200	mm
Quality of water	rusad	Cloop o	nd fresh	Tests	tart time			-	2:00
Quality of water Weather	usea	Cloudy	nu iresn		inish time				.3:00
Time	Depth to	l	1 11		ime	Depth t	<u>. T</u>	i	.0.00
Minutes	water m	Н	In H₀/H		inutes	water		Н	Log H/I
0	0.00	4.80	0.00		indeed		-		_
0.25	0.10	4.70	0.02	+					
0.5	0.15	4.65	0.03	1					
0.75	0.17	4.63	0.04	1					
1	0.20	4.60	0.04	1					
1.5	0.26	4.54	0.06	1					
2	0.31	4.49	0.07						
2.5	0.37	4.43	0.08	1					
3	0.42	4.38	0.09						
3.5	0.46	4.34	0.10	1					
4	0.51	4.29	0.11						
4.5	0.57	4.23	0.13						
5	0.60	4.20	0.13	<u> </u>					
6	0.70	4.10	0.16	』					
7	0.77	4.03	0.17						
8	0.84	3.96	0.19	┨					
10	0.99	3.81	0.23	┨					
12	1.12	3.68	0.27	┨					
14	1.19	3.61	0.28	┥					
16 18	1.25 1.42	3.55 3.38	0.30 0.35	$+ \vdash -$		-	-+		
20	1.42	3.38	0.35	$+$ \vdash		-	-+		
25	1.78	3.02	0.40	$+$ \vdash		 	+		
30	1.98	2.82	0.53	┨ ├──			+		
40	2.16	2.64	0.60	┪ ├─			-+		
50	2.36	2.44	0.68	┨ ├──		1	-+		
60	2.50	2.30	0.74	1		1	-		
	<u> </u>	-		1		1	-		
		1		1		<u> </u>	\neg		
				7			$\neg \vdash$		
Remarks	ĺ			1 1		İ		ľ	
Recorded by: D	Cundill								
-								soil engine	spine
		1						SOIF EI IGII IE	CAIIN

Project Name	Cambridge Wa Relocation	i ste W ater Treatmo	ent Plant	6.1.36	hole Falling H		Hole BH_STW_	_005B
Project No.	TE8364			Pe	ermeability Tes	st 🗀	Ground	
							9.31m /	
Eng ineer	Mott MacDon	ald Bentley					Date 06/09/2	
Client	Barhale Limite	d		BS	BS EN ISO 22282-2: 2012		Page	
Description	CHALK recover	red as very stiff gra	avelly calc	areous CLA	Υ.		2 of :	<u> </u>
Type of test	Borehole	Installa	ition type					
Initial ground w					p of test section		6.20	m BG
	above surface	0.	.00 r		ttom of test section		6.20	m BG
Length of test s	ection	0.	.00 г	n W	ater level at end of te	st	2.50	m
Diameter of tes	t section	2	00 r	nm Di	ameter of casing/star	ndpipe	200	mm
Quality of water	rusad	Clean and fr	och	Tz	st start time		13	2:00
Weather	useu	Cloudy	6311		st finish time			3:00
vveaulei		Cloudy		16	st iiiisii tiilie		1.	5.00
0.800 —								55.
-								
0.700						/		
0.700					/*			
-					/			
0.600				,				
-			94.44					
2500								
0.500		3	/					
			1/4					
-								
를 0.400 를								
불								—
=		1						
0.300	25	1						——
0.300	X	100						
F	/							
-								
0.200	1							
-								
	1							
0.100	<i>*</i>							——
0.100	9							
1								
6	W	74	i i		7 1	20		
0.000	175	Æ	- 2		52 89	3.0	\	
0	10	20		30	40 50)	60	70
				Time t (n	nins)			
ueina Vala	city graph meth	and 6	=α .S/F					
using velt	wicy graph meu	nou K	– u . <i>3/Γ</i>		=	5.11 x 10 ⁻⁶	'n	ı/s
where	n- 0.000	204 m/s						
wiere		:UT IIV 5						
	S= 0.0314m							
	F= 1.256m							
D1 11 2	C1711	I				1	441	
Recorded by: D	Cundill	Ī		1		26.4	- 🛞	8
							ar enginee	RING

Project Name	Cambridge Wa	ste Water Tre	atment Plant	Boreh	ole Fal	ling Hea	be	Hole	
	Relocation			1979	10 H 4 A			BH_STV	
Project No.	TE8364			Perr	neapıı	ity Test		Ground 6.89m	
Engineer	Mott MacDona	ald Bentley						Da 13/08	ite /2021
Client	Barhale Limite	d		BS EN	I ISO 222	82-2: 20 1 2		Pa 1 o	ge
Description	1.40m to 3.70n	n: Structureles	s CHALK compos	ed of very :	stiff fissu	red calcared	us CLAY		
T£44	Borehole	Inc	tallation type						
Type of test All depths are r	elative to ground		tanation type						
Initial ground v	vater level	. 10101.	1.95 m	Торо	of test sec	tion		1.20	m
	g above surface		0.20 m	Botto	m of test	section		3.50	m
Length of test :			2.30 m			end of test		0.67	m
Diameter of te	st section		200 mm	Diam	eter of ca	sing/standp	oipe	200	mn
Quality of wate	rupod	Clean ar	nd from	Toot	start time				10:10
Quality of water Weather	er usea	Clean ar	ia iresri		start time finish tim				10.10 11:40
Time	Depth to	Cloudy	1 11		Time		<u>. </u>		11.40
Minutes	water m	Н	In H₀/H		inutes	Depth t water r		Н	Log H
0	-0.20	2.15	0.00	1					
0.5	-0.19	2.14	0.00] [
1	-0.19	2.14	0.01						
1 .5	-0.18	2.13	0.01						
2	-0.18	2.13	0.01						
2.5	-0.17	2.12	0.01						
3	-0.17	2.12	0.02						
3.5	-0.16	2.11	0.02						
4	-0.16	2.11	0.02	<u> </u>					
4.5	-0.15	2.10	0.02	<u> </u>					
5	-0.14	2.09	0.03	ļ					
6	-0.13	2.08	0.03	!					
7	-0.12	2.07	0.04	!					
8	-0.11	2.06	0.05	!					
9	-0.09	2.04	0.05	!			_		
10	-0.08	2.03	0.06	!					
12	-0.06	2.01	0.07	!			_		
14	-0.03	1.98	0.08	!			_		
16	-0.01	1.96	0.10	!					
18	0.02	1.94	0.11	ļ			_		
20 25	0.04	1.91 1.86	0.12 0.15	!			+		
30	0.10	1.80	0.13						
40	0.15	1.71	0.18	┨ ├──			+		
50	0.24	1.61	0.23	∤			_		
60	0.43	1.52	0.29	∤			+		
70	0.43	1.44	0.55	∤			+		
80	0.51	1.36	0.46	∤			+		
90	0.53	1.28	0.40	┨ ├─					
30	0.07	1.20	0.52	!			-		
	1		1	1 —					
Remarks	1		1						
Nomarko									
Recorded by: C	. Howard							(
	100							soil engine	egina
Form No. SE-P	GR-F-002	Revision No.	3.03	Issue Date	01/09/2	010		of the Bachy Sole	

Proj ect Name	Cambridge Waste Water Relocation	Treatment Plan	t E	orehole Falling		Hole I BH_STW_	
roj ect No .	TE8364			Permeability 1	'est 💳	Ground L	
ing ineer	Mott MacDonald Bentley	,				6.89m A	
ingineei	Wolf WacDonald Bentley					13/08/2	
Client	Barhale Limited			BS EN ISO 22282-2:	2012	Page 2 of 2	
Description	1.40m to 3.70m: Structui	eless CHALK co	mposed	of very stiff fissured ca	careous CLAY.	Grade Dm.	
ype of test	Borehole	Installation typ	e				
nitial ground		1.95	m	Top of test section		1.20	m BG
	ng above surface	0.20 2.30	m	Bottom of test section Water level at end of		3.50 0.67	m BG
ength of test Diameter of te		2.30	m	Diameter of casing/s		200	m
nameter of te	St Section	200	mm	Diameter of casing/s	stanopipe	200	mm
uality of wate	orused Clea	n and fresh		Test start time		10	:10
Veather	Clou			Test finish time			:40
0.600							55.
						/	
0.500					/	-	
					_		
-					/		
-				-/	/		
0.400							
0.100							
-				/			
_				_/			
_			30	/			——
된 0.300 +			_/	15			
<u>-</u>		82	/				
_		/					
0.200							
5.200							
-							
_							
-	*						
0.100							\longrightarrow
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	1						
Carrie	*	10	200	20. 257	.70.	0.70	
0.000		<u> </u>	ū.	9	19	Ž.	144.700
0.000 P	10 20	30 4	0	50 60 7	70 80	90	100
v	20 20						
			IIme	e t (mins)			
using Vel	ocity graph method	$k = \alpha . S/F$	-	=	6.55 x 10	⁻⁷ m	/s
. •	0.000000 (
where	α= 0.000096 m/s S= 0.0314m						
	F= 4.607m					100	
ecorded by: 0	. Howard					<u> </u>	
					26. 4.	(\$)	2
						oir eugine <mark>e</mark> i	
orm No. SE-F	GR-F-003 Revision No	. 3.04	leer	ue Date 24/01/2014	Part o	of the Bachy Soletan	icha Croup

Project ivame	Cambridge Wa	ste Water T re a	atment Plant	Roreho	nle Fal	lling He	ad	Hole	
Project No.	Relocation TE8364				E	ity Test		BH_STV Ground	d Level
Engineer	Mott MacDona	ald Bentley						6.96m Da	te
Client	Barhale Limited	d		BS EN	I ISO 222	82-2: 2012		08/09 Pa 1 o	ge
Description	CHALK recover	ed as stiff ora	velly calcareous (L AY				10	1 Z
-			- n - 11						
Type of test All depths are re	Borehole		tallation type						
Initial ground w		1 ICACI.	4.80 m	Торо	f test sec	tion		4.20	m
Height of casing			0.00 m		m of test			4.20	m
Length of test se			0.00 m	Wate	r level at	end of test		2.00	m
Diameter of test	t section		200 mm	Diam	eter of ca	sing/stand	pipe	200	mn
Quality of water	used	Clean ar	nd fresh	Tests	tart time	<u>, </u>		-	14:00
Weather	uoca	Cloudy	id fiedii		inish tim				15:00
Time	Depth to		-11		ime	Depth	to T		V 7 -
Minutes	water m	Н	In H₀/H	м	inutes	water		Н	Log H
0	0.00	4.80	0.00	1					
0.25	0.09	4.71	0.02						
0.5	0.15	4.65	0.03						
0.75	0.26	4.54	0.06						
1	0.30	4.50	0.06						
1 .5	0.49	4.31	0.11						
2	0.60	4.20	0.13						
2.5	0.68	4.12	0.15						
3	0.76	4.04	0.17	ļ L					
3.5	0.84	3.96	0.19	<u> </u>					
4	0.92	3.88	0.21	ļ					
4.5	1.00	3.80	0.23	l	_				
5	1.08	3.72	0.25	l		<u> </u>	_		
6 7	1.15 1.23	3.65 3.57	0.27 0.30	!			-+		
8	1.30	3.50	0.30	l —					
10	1.37	3.43	0.32	!					
12	1.43	3.37	0.35	 			-		
14	1.55	3.25	0.39	1					
16	1.64	3.16	0.42	l		<u> </u>			
18	1.71	3.09	0.44	1		1			
20	1.78	3.02	0.46	ſ ├─ ⁻		<u> </u>	$\neg \vdash$		
25	1.84	2.96	0.48	i		1			
30	1.89	2.91	0.50	1					
40	1.93	2.87	0.51	i 🗀					
50	1.96	2.84	0.52	i					
60	2.00	2.80	0.54						
]					
			1	ļ		ļ			
						<u>L</u>			
Remarks									
Recorded by: D	Cundill							SOUL OPICIOS	onise
		ı		le all a				soil engine	ekillG

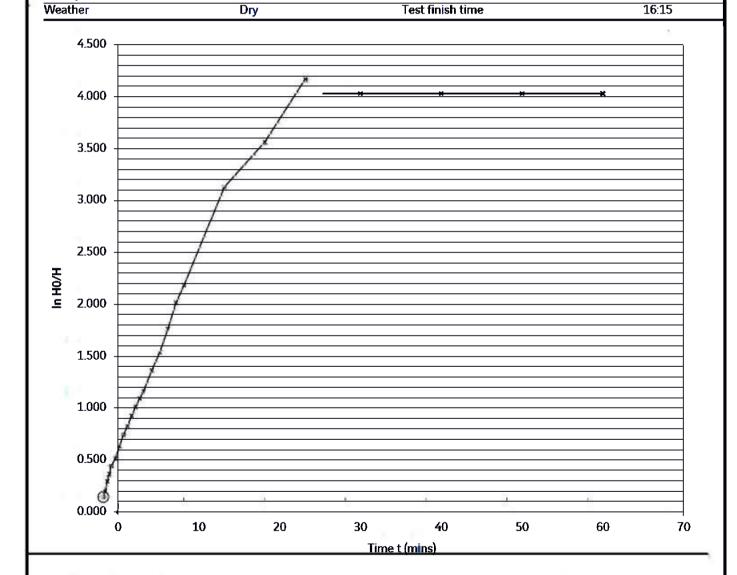
Project Name	Cambridge Wa Relocation	ste W ater Tr <mark>eat</mark> ment P	lant	Borehole Falling He	I	Hole I BH_STW_	
Pro ject No .	TE8364			Permeability Test	t	Ground I 6.96m A	.evel
Eng ineer	Mott MacDona	ald Bentley				Date 08/09/2	
Client	Barhale Limited	l		BS EN ISO 22282-2: 2012	2	Page 2 of 2	
Description	CHALK recover	ed as stiff gravelly calc	areous CL	AY.	'		
Type of test	Borehole	Installation		T		(20	D.C
Initial ground w	rater ievei g above surface	4.80 0.00	m m	Top of test section Bottom of test section		4.20 4.20	m BG m BG
Length of test s		0.00	m	Water level at end of test	<u> </u>	2.00	m
Diameter of tes		200	mm	Diameter of casing/stand		200	mm
Quality of water	rused	Clean and fresh		Test start time		14	:00
Weather	useu	Cloudy		Test finish time			:00
**Cadici		Cloudy		rest iiijsii tiitie			.00
0.600 —							555.
						¢:	
-		83					-
0.500 +			2				
0.400		/					
0.400	,						
0.400	/						
0.400							
0.400							
0.300							
0.300							
H/0/H 0.3000 —							
0.300							
H/0H 0.3000 —							
H/0H 0.3000 —							
H/0H 0.3000 —							
0.300 0.200							
H/0H 0.3000 —							
0.300 0.200							
0.300 0.200							
0.300 0.200							
0.300 0.200							
0.300 0.200 0.100	10	20	30	40 50		60	70
0.300 0.200	10	20	30	40 50	A)	60	70
0.300 0.200 0.100	10	20		40 50 me t (mîns)		60	70
0.300 0.200 0.000 0	10 ocity graph meth		Tir	me t (mins)	9.65 × 10.16		
0.300 0.200 0.000 0			Tir	ne t (mins)	9.65 x 10 ⁻⁶		70
0.300 0.200 0.000 0	ocity graph meth		Tir	me t (mins)			
0.300 - 0.200 - 0.000	ocity graph meth α= 0.0003	od <i>k</i> = α	Tir	me t (mins)			
0.300 - 0.300 - 0.000	ocity graph meth α= 0.0003 S= 0.0314m	od <i>k</i> = α	Tir	me t (mins)			
0.300 - 0.300 - 0.000 - 0.000 - 0.000 where	ocity graph meth α= 0.0003 S= 0.0314m F= 1.256m	od <i>k</i> = α	Tir	me t (mins)			
0.300 - 0.200 - 0.000	ocity graph meth α= 0.0003 S= 0.0314m F= 1.256m	od <i>k</i> = α	Tir	me t (mins)			
0.300 - 0.300 - 0.000 - 0.000 - 0.000 where	ocity graph meth α= 0.0003 S= 0.0314m F= 1.256m	od <i>k</i> = α	Tir	me t (mins)	9.65 x 10 ⁻⁶		/s

Project Name		ste Water Treat	t men t Plant	Во	rehole Fal	ling He	ad	Hole	
	Relocation			100	Permeabil	14	- 1	BH_ST\	
Project No.	TE8364				reilleabii	ity iest	'	Ground 10.37n	
Engin ee r	Mott MacDona	ald Bentley						Da 15/09	te
Client	Barhale Limited	d			BS EN ISO 2228	R7_7- 2012		Pag	ge
Б : 1:		111.0	1.7		na v			10	
Description			CHALK compos						: CIRIA Grade
Type of test	B3 CHALK com Borehole	<u>iposed of extre</u> Inst	mely to very wea allation type	k lov	<u>r density calcar</u>	eous SITLS	IONE	•	
	elative to ground		шиноп суро						
Initial ground w			3.28 m		Top of test sec	tion		2.10	m
Height of casing			0.10 m		Bottom of test	section		7.40	m
Length of test s			5.30 m	1	Water level at o			3.22	m
Diameter of tes	t section		146 mm		Diameter of ca	sing/stand	pipe	146	mm
			16.1		T				15.45
Quality of water Weather	r usea	Clean and	1 Tresn		Test start time				15:15 16:15
	5	Dry			Test finish time		. 1	-	10:12
Time	Depth to	н	In H₀/H		Time	Depth t		Н	Log H/H0
Minutes	water m			'	Minutes	water	m		
0	-0.10	3.38	0.00						
0.25	0.09	3.19	0.06						
0.5	0.37	2.91	0.15						
0.75	0.57	2.71	0.22						
1	0.77	2.51	0 .30						
1 .5	0.94	2.34	0.37						
2	1.20	2.08	0.49						
2.5	1.42	1.86	0.60						
3	1.57	1.71	0.68						
3.5	1.73	1.55	0.78						
4	1.86	1.42	0.87						
4.5	1.97	1.31	0.95						
5	2.06	1.22	1.02						
6	2.28	1.00	1.22						
7	2.44	0.84	1.39						
8	2.61	0.67	1.62						
9	2.76	0.52	1.87						
10	2.84	0.44	2.04						
15	3.11	0.17	2.99						
20	3.17	0.11	3.43						
25	3.22	0.06	4.03						
30	3.22	0.06	4.03						
40	3.22	0.06	4.03						
50	3.22	0.06	4.03						
60	3.22	0.06	4.03						
Remarks									
Recorded by: T.	Wigstow								
<u> </u>								soil engine	epin <i>c</i>
Form No. SE-PC	GR-F-002	Revision No.	3.03	Issue	Date 01/09/20	010		Part of the Bachy Sole	
OTTINO. SE-PC	JICT 7002	VEAISION IAO	3.03	rasue	PP16 0T/03/5(,10		raitor die bachy 50le	minne ainnh

Proj ect Name	Cambridge Waste V Relocation	Vater Treatment Pla	ant	Borehole Falling Head	Hole I BH_STW	_
Proj ect No .	TE8364			Permeability Test	Ground L 10.37m /	
Eng ineer	Mott MacDonald Be	entley			Date 15/09/2	
Client	Barhale Limited			BS EN ISO 22282-2: 2012	Page 2 of 2	
Description				d of firm gravelly calcareous CLAY. (low density calcareous SITLSTONE		IRIA Grade
Type of test	Borehole	Installation t				
nitial ground v	vater level	3.28	m	Top of test section	2.10	m BGL
Height of casin	g above surface	0.10	m	Bottom of test section	7.40	m BGL
ength of test:	section	5.30	m	Water level at end of test	3.22	m
Diameter of te	st section	146	mm	Diameter of casing/standpipe	146	mm

Test start time

Clean and fresh



using Velocity graph method

 $k = \alpha .S/F$

 5.79×10^{-6}

m/s

15:15

where

Quality of water used

0.00269 m/s

S= *0.0167m* F= 7.768m

Recorded	by: T. Wigstow					
				e = 1		soil engineering
Form No.	SE-PGR-F-003	Revision No.	3.04	Issue Date	24/01/2014	Part of the Bachy Soletanche Group

Hole ID Cambridge Waste Water Treatment Plant Project Name **Borehole Falling Head** BH_STW_022A Relocation **Permeability Test** Ground Level TE8364 Project No. 8.46m AOD Date Engineer Mott MacDonald Bentley 06/09/2021 Page Client **Barhale Limited** BS EN ISO 22282-2: 2012 1 of 2 Description 3.00m to 7.00m: Structureless CHALK composed of firm gravelly calcareous CLAY. Grade Dm. Type of test Borehole Installation type All depths are relative to ground level. 2.04 2.80 Initial ground water level Top of test section m m Height of casing above surface 0.20 m Bottom of test section 6.80 m Length of test section Water level at end of test 4 00 m 1.97 Diameter of test section 200 Diameter of casing/standpipe 200 mm mm Quality of water used Clean and fresh Test start time 12:15 Weather Test finish time Cloudy 13:15 Time Time Depth to Depth to Log H/H0 Н In H₀/H Н water m water m Minutes Minutes 0 1.25 0.79 0.00 0.5 1.25 0.79 0.00 0.46 0.54 1 1.58 1.5 1.74 0.30 0.97 2 1.84 0.20 1.37 0.17 2.5 1.87 1.54 3 1.90 1.73 0.14 35 0.13 1.80 1.91 4 1.92 0.12 1.88 4.5 1.93 0.11 1.97 5 1.93 0.11 1.97 1.94 2 07 6 0.10 0.10 2.07 7 1.94 8 1.95 0.10 2.12 9 1.95 0.10 2.12 10 0.09 2.17 1.95 15 1.96 0.08 2.29 20 1.97 0.08 2.35 25 1.97 0.08 2.35 30 2.35 1.97 0.08 0.08 40 1.97 2.35 50 1.97 0.08 2.35 60 1.97 0.08 2.35 Remarks Recorded by: T. Wigstow SOIL engineering orm No. SE-PGR-F-002 Revision No. 3.03 Issue Date 01/09/2010 Part of the Bachy Soletanche Group

Project Name	Cambridge Waste Water Relocation	ter Treatment Pl	lant	Borehole Fallin	13.0	Hole BH_STW	
Project No.	TE8364			Permeability	/Test 📙	Ground	
				•		8.46m /	
Eng ineer	Mott MacDonald Bent	tley				Date	
		•				06/09/2	
Client	Barhale Limited			BS EN ISO 22282-	2: 2012	Page	e
Description	3.00m to 7.00m: Struc	turaless CUALV	compos			2 of	2
				.a or mini graveny calci	arcous CLAT. UI	auc DIII.	
Type of test	Borehole	Installation t		T		2.00	
Initial ground w		2.04	m	Top of test section		2.80	m B
	g above surface	0.20	m	Bottom of test se		6.80	m B
Length of test s		4.00	m	Water level at end		1.97	m
Diameter of tes	t section	200	mm	Diameter of casin	g/standpipe	200	mm
Quality of water	rused	lean and fresh		Test start time		1:	2:15
Weather		loudy		Test finish time			3:15
		uu,		TOOL IMIDIT CHIIG		1.	
2.500 —							55.
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2.000							
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1.500 +	1						
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1.000 +	<u> </u>						
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0.000	30	A			Mi	25	
Ō	10	20	30	40	50	60	70
			Ti	me t (mins)			
					W _31 W3		
	city graph method	$k=\alpha.5$	S/F	=	9.05 x 1	10 _{-e} u	ı/s
using Velo							
_							
using Velo	α= 0.00196 m/s						
_	α= 0.00196 m/s S= 0.0314m						
_							
where	S= <i>0.0314m</i> F= 6.810m		Т			A .	
_	S= <i>0.0314m</i> F= 6.810m						2
where	S= <i>0.0314m</i> F= 6.810m				- A	SOIL ENGINEE	RING

_		available		Sec. 11	9	Married MC				
F	roject Name	Cambridge Wa	ste Water T rea t	ment Plant	Вс	rehole Fal	ling Hea	d		le ID N. 001A
	roject No.	Relocation TE8364			187	Permeabil		-		N_001A d Level
ľ	roject No.	120301					,			n AOD
E	ingineer	Mott MacDona	ıld Bentley							ate 9/2021
_	lient	Barhale Limited						-		age
				1 6		BS EN ISO 222	82-2: 2012			of 2
	escription	3.70m to 4.20m	n: SAND & GRAV	/EL (Driller's De	scrip	tion)				
F	ype of test	Borehole	Inst	allation type						
		elative to ground		71						
	nitial ground w			0.95 m		Top of test sec			2.92	
	leight of casing ength of test s	above surface		0.78 m 0.50 m		Bottom of test Water level at			3.42 0.30	
	Diameter of test			0.50 m 150 mm		Diameter of ca		ipe	150	
F				111		40	э			
	uality of water	used	Clean and	l fresh		Test start time				14:34
٧	Veather		Fine 1	1 21	1	Test finish time		1		15:41
	Time	Depth to	н	In H₀/H		Time	Depth to		Н	Log H/H0
L	Minutes	water m	4.22	200	-	Minutes	water m	<u> </u>	0.70	0.53
\perp	0.5	-0.27	1.22 1.21	0.00	-	55	0.23	+	0.72 0.70	0.53 0.56
L		-0.26		0.01	-	58	0.25	\perp		
L	1 1.5	-0.24 -0.23	1.19 1.18	0.02 0.03	-	61 64	0.26 0.28	$ \vdash$	0.69	0.57 0.60
H	2	-0.23	1.18	0.03	-	67	0.28	+	0.67	0.60
H	2.5	-0.22	1.16	0.04	-	01	0.50		0.03	0.05
H	3	-0.21	1.15	0.05	-			+		
H	3.5	-0.19	1.14	0.07	-			-		
H	4	-0.18	1.13	0.08	-			-		
H	4.5	-0.18	1.13	0.08	-					
H	5	-0.17	1.12	0.09	-			+		
t	6	-0.15	1.10	0.10	-					
r	7	-0.14	1.09	0.11	-	<u></u>				
I	8	-0.13	1.08	0.12	-					
	9	-0.12	1.07	0.13	_					
	10	-0.11	1.06	0.14	_					
	12	-0.10	1.05	0.15	_					
L	14	-0.08	1.03	0.17	_					
L	16	-0.07	1.02	0.18	_			\perp		
\downarrow	18	-0.06	1.01	0.19	-			+		
┢	20 25	-0.04 -0.02	0.99 0.97	0.21 0.23	-			+		
\vdash	25	0.02	0.97	0.23	-			+		
\vdash	31	0.01	0.91	0.20	-		-	+		
┢	34	0.07	0.31	0.23	-			+		
\vdash	37	0.09	0.86	0.35	-			+		
\vdash	40	0.12	0.83	0.39	-		 	+		
	43	0.14	0.81	0.41	-			\top		
上	4 6	0.16	0.79	0.43	-			十		
	49	0.18	0.77	0.46	-					
丰	52	0.21	0.74	0.50				\top		
R	lemarks									
L										
R	ecorded by: D.	Tiernan								
		166			15				soil engine	eering
F	orm No. SE-PG	iR-F-002	Revision No.	3.03	Issue	Date 01/09/20	010	Pa	rt of the Bachy Sol	etanche Group

Engineer Client Description Type of test Initial ground wa	TE8364 Mott MacDonald Ber Barhale Limited 3.70m to 4.20m: SAN	ntley			meability Test	6	ound Let .91m AO Date 6/09/202	D
Client Description Type of test Initial ground wa	Barhale Limited	ntley					Date	
Client Description Type of test Initial ground wa	Barhale Limited	ntley				0		21
Description Type of test Initial ground wa						-		
Type of test Initial ground wa	3.70m to 4.20m; SAN			BS EN	N ISO 22282-2: 2012		Page 2 of 2	
nitial ground wa		ID & GRAVEL (Driller's D	escription)				
_	Borehole	Installation						
		0.95			of test section		2.92	m BC
Height of casing		0.78			om of test section		3.42	m BO
Length of test se		0.50			er level at end of test		0.30	m
Diameter of test	section	150) mr	n Diam	neter of casing/standpip	oe ·	150	mm
Quality of water	used (Clean and fres	sh	 Test	start time		14:3	4
Weather		Fine			finish time		15:4	
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0	10	20	30	40	50 60	70		80
				Time t (min	s)			
	city graph method	L =	α . <i>S/F</i>			_		
using Vols	sky grapii illetiku	K =	u .3/F		= 1.	69 x 10 ⁻⁶	m/s	;
using Velo								
_	0.000453	/ -						
using Velo	α= 0.000157 m/	's						
where	S= 0.0177m	's						
where		's						
where	S= <i>0.0177m</i> F= 1.636m	's						
where	S= <i>0.0177m</i> F= 1.636m	's						
where	S= <i>0.0177m</i> F= 1.636m	's					(ineerii	n.c

Project Name	Cambridge Wa	ste Water Tre	atment Plant	Borehole Fa	llin <mark>o He</mark> a		ole ID
Don't at Ma	Relocation			Permeabi		вн_	run_006 Ind Level
Project No.	TE8364			Permeann	iity iest		ına Levei 5m AOD
Engineer	Mott MacDona	ald Bentley					Date
Cli	Daukala Liasika						09/2021 Page
Client	Barhale Limited		H 10	BS EN ISO 222		1	l of 2
Description	Brown fine to o	corase SAND a	and angular to sub	rounded fine coarse	GRAVEL of f	lint.	
Type of test	Borehole		tallation type	1			
All depths are r Initial ground v	elative to ground	1 level.	3.80 m	Top of test sec	tion	5.2	20 m
	g above surface		0.00 m	Bottom of test		5.2	
Length of test			0.00 m	Water level at		2.1	
Diameter of tes			200 mm	Diameter of ca			
Old f		Classia	(II)	To at at at the set the set			17.00
Quality of wate Weather	er usea	Clean ai Fine	na rresn	Test start time Test finish tim			14:00 15:00
Time	Depth to	11116	11	Time	Depth to		15.00
Minutes	water m	Н	In H₀/H	Minutes	water m	I H	Log H/H
0	0.00	3.80	0.00				
0.5	0.05	3.75	0.01				
1	0.10	3.70	0.03				
1 .5	0.15	3.65	0.04				
2	0.20	3.60	0.05				
2.5	0.30	3.50	0.08				
3	0.40	3.40	0.11				
3.5	0.45	3.35	0.13				
4	0.50	3.30	0.14				
4.5	0.55	3.25	0.16				
5	0.60	3.20	0.17				
6	0.70	3.10	0.20				
7	0.80	3.00	0.24				
8	0.89	2.91	0.27				
10	0.99	2.81	0.30				
12	1.10	2.70	0.34				
14	1.20	2.60	0.38				
16	1.50	2.30	0.50				
18	1.55	2.25	0.52				
20	1.60	2.20	0.55				1
25	1.75	2.05	0.62		 		
30	1.90	1.90	0.69				
40	2.00	1.80	0.75		1		
50	2.10	1.70	0.80				
60	2.15	1.65	0.83	<u> </u>			
	1		_				-
	 		1				
	+		+		1	+	
	+		+	<u> </u>		-	+
	+		+			-	+
Remarks	I	<u> </u>		<u> </u>	<u>L</u>		
omaino							
Recorded by: D	Cundill					48	<u> </u>
necoraea by. D	Cunun					(•
	166					soit engli	
Form No. SE-P	GR-F-002	Revision No.	3.03	Issue Date 01/09/2	010	Part of the Bachy S	oletanche Group

	Cambridge Waste Water Treatment Plant Relocation	Borehole Falling Head	Hole ID BH_TUN_006
Project No.	TE8364	Permeability Test	Ground Level
			9.15m AOD
Eng inee r	Mott MacDonald Bentley		Date 21/09/2021
Cli •	Deskele Lienite I		
Client	Barhale Limited	BS EN SO 22282-2: 2012	Page 2 of 2
Description	Brown fine to corase SAND and angular to s	ubrounded fine coarse GRAVEL of flint.	
Type of test	Borehole Installation type	Tam after 1 12:-	F 20 5
Initial ground w		Top of test section	5.20 m B0
Height of casing	g above surface 0.00 m	Bottom of test section	5.20 m B0
Length of test s		Water level at end of test	2.15 m
Diameter of tes	et section 200 mi	m Diameter of casing/standpipe	200 mm
Quality of water	r used Clean and fresh	Test start time	14:00
Quality of water Weather	Fine	Test finish time	15:00
***************************************	LIIIC	resembly time	13.00
0.900 —			55.
0.500	-		222
0.800			
0.000			
-			
A 300		<u> </u>	
0.700			
0.600			
_			
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0.300			
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		V 3	A)
₫ _	<u>X</u>		
0.000	<u> </u>		
0.000	10 20 3	0 40 50	60 70
	10 20 3	0 40 50 Time t (mins)	60 70
	10 20 3		60 70
0		Time t (mins)	
0	10 20 3 pocity graph method $k = \alpha . S/F$		
0 using Velo	ocity graph method $k = \alpha$.S/F	Time t (mins)	
0	pocity graph method $k = \alpha$. S/F $\alpha = 0.000385$ m/s	Time t (mins)	
0 using Velo	ocity graph method $k = \alpha$. S/F $\alpha = 0.000385 m/s$ $S = 0.0314m$	Time t (mins)	
0 using Velo	pocity graph method $k = \alpha$. S/F $\alpha = 0.000385$ m/s	Time t (mins)	
using Velo where	city graph method $k = \alpha . S/F$ $\alpha = 0.000385 \text{ m/s}$ $S = 0.0314m$ $F = 1.256m$	Time t (mins)	
0 using Velo	city graph method $k = \alpha . S/F$ $\alpha = 0.000385 \text{ m/s}$ $S = 0.0314m$ $F = 1.256m$	Time t (mins) = 9.63 x	10 ⁻⁶ m/s
using Velo where	city graph method $k = \alpha . S/F$ $\alpha = 0.000385 \text{ m/s}$ $S = 0.0314m$ $F = 1.256m$	Time t (mins) = 9.63 x	10 ⁻⁶ m/s

Project Name	Cambridge Wa	ste Water Tres	atment Plant	Davahala Fal	line Head	Hol	e ID	
riojectivanie	Relocation	iste vvater met	aument rant	Borehole Fal	BH_TUN_011			
Project No.	TE8364			Permeabil	Ground Level			
Engineer	Mott MacDon	ald Rentley				6.57m AOD Date		
		-			06/10/2021			
Client Barhale Limited				BS EN ISO 222	82-2: 2012		ge of 2	
Description		_	-	CHALK. 4.00m to 4 20	m: slightly sandy	slightly gravel	ly CLAY. 4.	
Type of test	to 5.20m: Stiff Borehole	fissured CLAY	tallation type					
	relative to ground		tanation type					
Initial ground v	vater level	4 10401.	2.50 m	Top of test sec	tion	2.00	m	
	g above surface		0.20 m	Bottom of test		5.00	m	
Length of test :			3.00 m	Water level at	end of test	2.45	m	
Diameter of tes	st section		200 mm	Diameter of ca	sing/standpipe	200	mm	
21			110	2.1				
Quality of wate	er used	Clean ar	nd fresh	Test start time			09:15	
Weather 📑		Fine		Tes <mark>t</mark> finish tim	e i		10:15	
Time	Depth to	н	In H₀/H	Time	Depth to	н	Log H/I	
Minutes	water m		1 """	Minutes	water m		Logital	
0	-0.20	2.70	0.00					
0.33	-0.02	2.52	0.07					
0.5	0.07	2.43	0.11					
0.75	0.15	2.35	0.14	-				
1	0.22	2.28	0.17	-				
1.5	0.48	2.02	0.29	-				
2	0.57	1.93	0.34	-	 			
2.5	0.68	1.82	0.39	-				
3	0.76	1.74	0.44	-				
3.5	0.84	1.66	0.49	-				
4	0.91	1.59	0.53	-				
4.5	1.10	1.40	0.66	-				
5	1.22	1.28	0.75	· -				
6	1.44	1.06	0.93	-				
7	1.61	0.89	1.11	-	1			
8	1.77	0.73	1.31	-	 			
9	1.96	0.54	1.61	-				
10	2.14	0.36	2.01	-				
12	2.26	0.24	2.42	-	1			
14	2.41	0.09	3.40	-	1			
16	2.42	0.08	3.52					
18	2.43	0.07	3.65		 			
20	2.44	0.06	3.81	-				
25	2.45	0.05	3.99					
30	2.45	0.05	3.99	-				
40	2.45	0.05	3.99					
50	2.45	0.05	3.99	-				
60	2.45	0.05	3.99	-				
			- 24	-				
			- 0					
Remarks	1		1		 			
Recorded by: D	Cundill							
_						soil engine		
	GR-F-002	Revision No.	3.03	Issue Date 01/09/2		art of the Bachy Sok		

Proj e	ct Name	Cambridge Waste Wa Relocation	ter Tr <mark>eat</mark> ment Plai	nt	Borehole Falling	The second secon	Hole I BH_TUN	
oroje	ct No.	TE8364			Permeability	Test 💳	Ground L	
,-							6.57m AOI	
nair	neer	Mott MacDonald Ben	tley				Date	1
g			•				06/10/2	021
lien	t	Barhale Limited			BS EN ISO 22282-2:	2012	Page	
)occ	ription	200-1-100-1	1 1 1	- i. CII	•		2 of 2	
)esci	прион	to 5.20m; Stiff fissure		nsity CH	ALK. 4.00m to 4 20m: sl	ightly sandy sligi	ntly gravelly	CLAY. 4.2
vpe	of test	Borehole	Installation ty	pe				
	ground w		2.50	m	Top of test section		2.00	m BGI
	_	g above surface	0.20	m	Bottom of test sect	on	5.00	m BGI
	th of test s		3.00	m	Water level at end of		2.45	m
	eter of tes		200	mm	Diameter of casing/		200	mm
					_			
)uali	ty of water	rused (lean and fresh		Test start time		09	:15
Veat			ine		Test finish time			:15
		·						
	4.500 —							12)
	1.300 T							
	\vdash							
	,,,, F			1340	2			
	4.000		76					
	F	16	/					
		,/	7.					
	3.500	1						
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	0.000		<u> </u>	C	W.			
	0.000 —	40	20	20	40	F0		——
	0	10	20	30	40	50	60	70
				Tir	ne t (mins)			
					. ,			
	ie = 17 1		,	·r				
	using Velo	city graph method	$k = \alpha . S/c$	<i>-</i>	=	1.51 x 10 ⁻⁵	⁵ m	/s
	where	$\alpha = 0.002659 \text{m/s}$	5					
		S= 0.0314m						
		F= 5.539m						
							100	
ecol	rded by D	Cundill		l			/ A	
ecol	rded by: D	Cundill				in to	(\$)	
ecol	rded by: D	Cundill					SIL engineer	RING

	81 lb.		No.	Married Married	- 10				- 1
Project Name	-	aste Water T re a	atment Plant	Borehole Falling Head			Hole ID BH_TUN_018		
Project No.	Relocation TE8364	Perm	Permeability Test			Ground Level 10.28m AOD			
Engineer	Mott MacDon					Date 06/10/2021			
Client	Barhale Limite	BS EN	ISO 222	82-2 : 2012	-	Pa	nge of 2		
Description	2.80m to 3.44r CHALK.	m: Structureles	s CHALK. 3.44m	to 6.20m: Ext	tremely	weak to ve	y wea	ak low to medi	um density
Type of test	Borehole	Ins	tallation type						
All depths are	relative to groun	d level.							
Initial ground v			3.53 m 0.20 m		test sec			2.60	
Height of casir			section		6.00				
Length of test			3.40 m	ı		end of test	-	3.45	
Diameter of te	st section		200 mm	Diame	ter of ca	sing/stand	pipe	200	mm
Quality of wate	er used	Clean ar	nd fresh	Test st	art tıme	1			08:00
Weather	ii docu	Fine	iu iresii		nish tim				09:00
Time	Depth to	1	0.1		me	Depth t	<u>. T</u>		
Minutes	water m	Н	In H₀/H	Mir	nutes	water		Н	Log H/H0
0	-0.22	3.75	0.00		55	3.37		0.16	3.15
0.5	-0.35	3.88	-0.03		58	3.41		0.12	3.44
1	-0.25	3.78	-0.01		51	3.45		0.08	3.85
1.5	-0.15	3.68	0.02						
2	-0.05	3.58	0.05						
2.5	0.03	3.50	0.07						
3	0.14	3.39	0.10						
3.5	0.24	3.29	0.13						
4	0.33	3.20	0.16						
4.5	0.41	3.12	0.18						
5	0.49	3.04	0.21						
6	0.62	2.91	0.25	l			_		
7	0.80	2.73	0.32				_		
8	0.94	2.59	0.37				_		
9	1.09	2.44	0.43						
10	1.19	2.34	0.47	ļ <u> </u>			\dashv		
12	1.42	2.11	0.58				\dashv		
14	1.62	1.91	0.67				_		
16 18	1.82	1.71 1.53	0.79				-		
	2.00		0.90				\dashv		
20 25	2.14	1.39 1.04	0.99 1.28				\dashv		
28	2.49	0.90	1.43				\dashv		
31	2.03	0.30	1.43				\dashv		
34	2.70	0.62	1.80				-+		
37	3.02	0.52	2.00				\dashv		
40	3.10	0.43	2.17				\dashv		
43	3.16	0.37	2.32				\dashv		
46	3.23	0.30	2.53				_		
49	3.27	0.26	2.67				\dashv		
52	3.32	0.21	2.88				\dashv		
Remarks									
Recorded by: D	Cundill							(
								soil engine	
Form No. SE-P	GR-F-002	Revision No.	3.03	Issue Date	01/09/2	010		Part of the Bachy Sok	etanche Group

Pro ject	Name	Cambridge Waste \ Relocation	N ater Tr <mark>eat</mark> ment Pla	ant	Borehole Falling Hea	KH IIII				
roject	No.	TE8364		Permeability Test		Ground Level 10.28m AOD				
Tojouc	110.	123001								
noines	ər	Mott MacDonald B	lentlev			Dat				
Eng ineer		THOSE INGCOORDED D	- inity			06/10/				
Client		Barhale Limited	Pag							
		I	4.4	ń	BS EN ISO 22282-2: 2012	2 of	f 2			
escrip		CHALK			o 6.20m: Extremely weak to ver	y weak low to mediu	m density			
pe of		Borehole	Installation ty	ype						
itial gr	round w	ater level	3.53	m	Top of test section	2.60	m BG			
eight c	of casing	above surface	0.20	m	Bottom of test section	6.00	m BG			
ength o	of test s	ection	3.40	m	Water level at end of test	3.45	m			
iamete	er of test	t section	200	mm	Diameter of casing/standp	pipe 200	mm			
					3 3	•				
uality	of water	used	Clean and fresh		Test start time	(08:00			
leathe			Fine		Test finish time		9:00			
20010	•				. seejoir tillio					
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				Ti	ime t (mins)					
HE	ina Vela	city graph method	$k = \alpha . S_{c}$	/F	4	7 12				
us	any velo	ony graph method	n – u .3/		=	4.79 x 10 ⁻⁶	m/s			
	adban-		n (a							
١	where	$\alpha = 0.000924 m$	n/s							
		S= 0.0314m								
·		F= 6.055m								
						1.00				
	ja.									
	ed by: D	Cundill				<u> </u>				
	ed by: D	Cundill				(18			
	ed by: D	Cundill			Ssue Date 24/01/2014	SOIL ENGINE	ering			

Project Name	Cambridge Waste Water Treatment Plant Relocation				orehole Fal	_	Hole ID BH_STW_005A	
Project No.	TE8364				Permeabil	lity lest	Ground Level 9.30m AOD	
Engineer	Mott MacDona	ld Bentley					D	ate L/2021
Client	Barhale Limited				BS EN ISO 222	82-2: 2012	Pa	age of 1
Description	Extremely weak to weak low to medium densit				ht grey CHALK c	omposed of calca		
Type of test	Standpipe	Insta	allation type	We	II point or hole ex	xtended in unifor	rm soil	
	elative to ground	level.	2.22		T		4.00	
Initial ground w Height of casing			3.32 m 0.57 m		Top of test sec Bottom of test		1.00	
Length of test so			9.00 m		Water level at		3.32	
Diameter of test			146 mr	n		sing/standpipe	50	mm
Quality of water	used	Clean and	l fresh		Test start time			12:00
Weather	T	Fine	1		Test finish tim	T	ı	13:00
Time	Depth to water	Н	In H₀/H		Time	Depth to water	Н	Log H/H0
Minutes	m				Minutes	m		ű
				1				
			1	-				
			1	-				
			1	1				
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Remarks Test failed	l - put 100 litres	of water into sta	ındpipe, water	level o	did not change.			
Recorded by: An	ndrew Yuen						SOIL ENGINE	eering
Form No. SE PO	GR F 002	Revision No.	3.03	Issue	e Date 01/09/2	2010	Part of the Bachy Sol	etanche Group

Hole ID Project Name Cambridge Waste Water Treatment Plant **Borehole Rising Head** Relocation BH_STW_005A **Permeability Test** Ground Level Project No. TE8364 9.30m AOD Date Mott MacDonald Bentley Engineer 27/10/2021 Page **Barhale Limited** Client BS EN ISO 22282-2: 2012 1 of 2 Description Extremely weak to weak low to medium density light grey CHALK composed of calcareous SILTSTONE. Type of test Installation type Well point or hole extended in uniform soil Standpipe All depths are relative to ground level. Initial ground water level 3.46 Top of test section 1.00 m Height of casing above surface 0.57 Bottom of test section 10.00 Length of test section 9.00 Water level at end of test 3.46 m Diameter of test section 146 mm Diameter of casing/standpipe 50 mm 12:50 Quality of water used Water from borehole Test start time Weather Test finish time 13:02 Fine Time Depth to water Time Depth to water Н In H₀/H Н Log H/H0 Minutes m Minutes m 0 4.65 1.19 0.00 0.5 4.02 0.56 0.75 1 3.78 0.32 1.31 3.74 0.28 1.5 1.45 2 3.64 0.18 1.89 2.5 3.63 0.17 1.95 3 3.58 0.12 2.29 3.5 3.56 0.10 2.48 4 3.54 0.08 2.70 4.5 0.07 2.83 3.53 5 3.51 0.05 3.17 6 3.51 0.05 3.17 7 3.49 0.03 3.68 3.48 0.02 4.09 8 9 3.48 0.02 4.09 10 3.47 0.01 4.78 0.00 12 3.46 Remarks Purged 100 litres over 20 minutes Recorded by: Andrew Yuen SOIL ENGINEERING 01/09/2010 Form No. SE PGR F 002 Revision No. 3.03 Issue Date Part of the Bachy Soletanche Group

Engineer Mott MacDonald Bentley	Rising Head	Hole II		
Engineer Mott MacDonald Bentley	ability Test	BH_STW_005A Ground Level 9.30m AOD		
	-			
Cliant Bodolo Limited		Date		
If the man the desired the state of the stat	<u> </u>	27/10/20)21	
Client Barhale Limited BS EN ISO	22282-2: 2012	Page 2 of 2		
Description Extremely weak to weak low to medium density light grey CHA	LK composed of calcai	eous SILTSTONE.		
	ole extended in uniforn			
Initial ground water level 3.46 m Top of test		1.00	m BGL	
	test section	10.00	m BGL	
•	el at end of test	3.46	m	
Diameter of test section 146 mm Diameter	of casing/standpipe	50	mm	
Quality of water used Water from borehole Test start t	tima	12:	<u> </u>	
Quality of water used Water from borehole Test start to Weather Fine Test finish		13:		
weather the rest illist	i cilile	13.	UZ	
6.000				
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0 2 4 6 8				
0 2 4 6 8 Time t (mins)		_		
0 2 4 6 8	= 1.33 >	c 10 ⁻⁶ m/	's	
0 2 4 6 8 Time t (mins) using Velocity graph method $k = \alpha . S/F$	= 1.33 >	√ 10⁻⁶ m /	's	
0 2 4 6 8 Time t (mins)	= 1.33 >	∢10 ⁻⁶ m/	's	
0 2 4 6 8 Time t (mins) using Velocity graph method $k = \alpha . S/F$ where $\alpha = 0.007967 sec^{-1}$ $S = 0.001963m^2$	= 1.33 >	(10^{−6} m /	r's	
0 2 4 6 8 Time t (mins) using Velocity graph method $k = \alpha . S/F$ where $\alpha = 0.007967 sec^{-1}$ $S = 0.001963m^{2}$ $F = 11.739m$	= 1.33 >	(10^{−6} m /	's	
0 2 4 6 8 Time t (mins) using Velocity graph method $k = \alpha.S/F$ where $\alpha = 0.007967 sec^{-1}$ $S = 0.001963m^2$	= 1.33 >	(10⁻⁶ 	····	
0 2 4 6 8 Time t (mins) using Velocity graph method $k = \alpha . S/F$ where $\alpha = 0.007967 sec^{-1}$ $S = 0.001963m^{2}$ $F = 11.739m$	= 1.33 >	•		
0 2 4 6 8 Time t (mins) using Velocity graph method $k = \alpha$.S/F where $\alpha = 0.007967 \text{sec}^{-1}$ $S = 0.001963 m^2$ $F = 11.739 m$ Recorded by: Andrew Yuen		SOIL ENGINEER		

Project Name Cambridge Waste Water Treatment Plant Hole ID **Borehole Rising Head** Relocation BH_STW_005A **Permeability Test** Ground Level Project No. TE8364 9.30m AOD Date Mott MacDonald Bentley Engineer 27/10/2021 Page **Barhale Limited** Client BS EN ISO 22282-2: 2012 1 of 2 Description Extremely weak to weak low to medium density light grey CHALK composed of calcareous SILTSTONE. Type of test Installation type Well point or hole extended in uniform soil Standpipe All depths are relative to ground level. Initial ground water level 3.46 Top of test section 1.00 m Height of casing above surface 0.57 Bottom of test section 10.00 Length of test section 9.00 Water level at end of test 3.48 m Diameter of test section 146 mm Diameter of casing/standpipe 50 mm 16:00 Quality of water used Water from borehole Test start time Weather Test finish time Fine 16:12 Time Depth to water Time Depth to water Η In H₀/H Н Log H/H0 Minutes m Minutes m 0 4.67 1.21 0.00 0.5 0.65 4.11 0.62 1 3.81 0.35 1.24 3.77 1.5 0.31 1.36 2 3.68 0.22 1.70 2.5 3.66 0.20 1.80 3 3.62 0.16 2.02 3.5 3.58 0.12 2.31 4 3.56 0.10 2.49 4.5 3.55 0.09 2.60 5 3.54 0.08 2.72 6 3.52 0.06 3.00 7 3.51 0.05 3.19 3.49 0.03 3.70 8 9 3.49 0.03 3.70 10 3.48 0.02 4.10 Remarks Purged 100 litres over 20 minutes Recorded by: Andrew Yuen SOIL engineering 01/09/2010 Form No. SE PGR F 002 Revision No. 3.03 Issue Date Part of the Bachy Soletanche Group

Project Name		Water Treatment Plar	nt	Borehole Ri	ising Head		le ID
Project No.	Relocation TE8364			Permeab			W_005A nd Level
Toject NO.	160304						n AOD
ngineer	Mott MacDonald E	3entley			ŀ		ate
_		-					0/2021
Client	Barhale Limited			BS EN ISO 22	282-2: 2012		age of 2
Description	Extremely weak to	weak low to medium	dencity li	oht arev CHAIK	composed of calca		
ocsoription	Extremely weak to	weak low to medium	ruensity ii	gitt grey CriALK	composed of carca	Teous SIL 13 TON	VL.
ype of test	Standpipe	Installation ty	pe W		extended in unifor	m soil	
nitial ground w		3.46	m	Top of test se		1.00	
	g above surface	0.57	m	Bottom of tes		10.00	
ength of test s		9.00	m	Water level a		3.48	
iameter of test	(section	146	mm	Diameter of c	casing/standpipe	50	mm
uality of wate	rused	Water from boreho	ole	Test start tim	e		16:00
Veather		Fine		Test finish tin			16:12
4.500 —							
F							
4.000						<i></i>	
F					,		
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0	2	4		6	8	10	12
			Tim	e t (mins)			
usina Vela	ocity graph method	$k = \alpha . S$	/F			40-6	
	, o 4				= 1.14	x 10 ⁻⁶	m/s
where	α= <i>0.006838 s</i>	sec-1					

	S= <i>0.001963m2</i> F= 11.739m	ı					
	r= 11./39M						
ecorded by: An	idrew Yuen		- 1		ı		
Recorded by: An	ndrew Yuen						
corded by: An	ndrew Yuen					SOIL ENGINE	eering

Project Name	-	ste Water Treat	ment Plant	Borehole Falling Head				Hole BH_STV		
Project No.	Relocation TE8364			Per	meabi	lity Test		Ground	d Level	
Engineer	Mott MacDonal	ld Bentley							ite	
Client	Barhale Limited	I		DC E	N ISO 222	82-2: 2012		Pa	ge	
Description	Firm to stiff dar	k arev sandy Cl	AV (CAMBRIDG				n verv stiff			
	dark grey CLAY	at 11.90m.	•	L GREENSA	IND IVILIV	iblik), överlyli	ig very still	IISSUIEU	iaiiiiiateu	
Type of test	Standpipe		allation type							
	elative to ground l	level.		-			44.50			
Initial ground w			4.37 m		of test sec					
	g above surface		0.33 m		m of test					
Length of test s			0.50 m			end of test				
Diameter of tes	st section		200 mm	Diam	eter of ca	sing/standpip)e	50	mm	
Quality of wate	r used	Clean and	d fresh	Test	start time			(08:00	
Weather		Fine		Test	finish tim	е		(09:00	
Time	Depth to water				Time	Depth to wa	ter			
Minutes	m	Н	In H₀/H		linutes	m	1	H	Log H/H0	
0	0.00	4.37	0.00	"			-			
0.5	0.00	4.32	0.00			-				
1	0.03	4.32	0.01							
1.5	0.10	4.27	0.02							
2	0.18	4.19	0.04							
2.5	0.20	4.17	0.05							
3	0.24	4.13	0.06							
3.5	0.30	4.07	0.07							
4	0.32	4.05	0.08							
4.5	0.34	4.03	0.08							
5	0.36	4.01	0.09							
6	0.40	3.97	0.10							
7	0.46	3.91	0.11							
8	0.52	3.85	0.13							
9	0.57	3.80	0.14							
10	0.61	3.76	0.15							
12	0.71	3.66	0.18							
14	0.80	3.57	0.20							
16	0.89	3.48	0.23							
18	0.98	3.39	0.25							
20	1.06	3.31	0.28							
25	1.26	3.11	0.34							
30	1.44	2.93	0.40							
40	1.78	2.59	0.52							
50	2.08	2.29	0.65							
60	2.31	2.06	0.75							
						1				
Remarks										
Kemano										
Recorded by: Ar	ndrew Yuen									
							SOIL	engine	ering	
Form No. SE P	GR F 002	Revision No.	3.03	Issue Date	01/09/2	2010	Part of th	Date 15/11/2021 Page 1 of 2 very stiff fissured laminated 11.50 m 12.00 m 2.31 m 50 mm 08:00 09:00		

						111		
Proje	ect Name		te Water Treatment Pla	nt	Borehole Fa	lling Hea	u	lole ID
		Relocation			Permeab	_	BH_3	TW_010B
Proje	ect No.	TE8364			reilleau	inty rest		und Level
							10.2	26m AOD
Engi	ineer	Mott MacDona	ld Bentley				15/	Date 11/2021
Clier	nt	Barhale Limited	I					Page
			-		BS EN ISO 22	282-2: 2012		2 of 2
Desc	ription	Firm to stiff dar	k grey sandy CLAY (CAN	/IBRIDGE	GREENSAND MEN	/IBER), overlyi	ng very stiff fissu	red laminated
		dark grey CLAY				,	•	
	of test	Standpipe	Installation t	уре				198
	al ground w		4,37	m	Top of test se	ction	11	.50 m BGL
		g above surface	0.33	m	Bottom of tes	t section	12	.00 m BGL
	th of test s		0.50	m	Water level a			31 m
Dian	neter of tes	t section	200	mm	Diameter of o	asing/standpi	pe 5	0 mm
Qual	ity of wate	rused	Clean and fresh		Test start tim			08:00
Wea	ther		F <mark>ine</mark>		Test finish tin	ne		09:00
	0.800 \top							
	F						×	
	0.700						_/	
	0.700						/	
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	0.600							
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	7,200		/					
	-	1	5					
		*						
	0.100 +							
	-	7						
	F	1						
	0.000	*						
	0.000 🗳	40	20	20	10	FA		70
	0	10	20	30	40	50	60	70
				Т	ime t (mins)			
	usina Vala	ocity graph metho	$ k = \alpha . S. $	·/E				
	using ver	ocity graph metric	M K=U.S.	/ [= 2	2.15 x 10 ⁻⁷	m/s
			aa -1					
	where	α= 0.00020						
		S= 0.001963	m^z					
		F= 1.906m						
					_			
Reco	orded by: Ar	ndrew Yuen					4	
							SOIL ENG	// Deering
Eor.	No ce n	GR F 003	Revision No. 3.04		Issue Date 24/01/	/2014		
Form	INO. SE PO	GR F 005	Revision No. 3.04		1550E Date 24/01/	2014	rart of the Bachy	Soletanche Group

Project Name	Cambridge Was	te Water Treat	ment Plant			sing Hea	d	RH_21AA_010R	
Project No.	TE8364			Per	meabi	lity Test			d Level m AOD
Engineer	Mott MacDonal	d Bentley							ate 0/2021
Client	Barhale Limited			BS E	N ISO 222	282-2: 2012		Pa	age of 2
Description	Firm to stiff dark	k grey sandy C	LAY (CAMBRIDGI	E GREENSA	ND MEN	/IBER), overlyi	ng very		
Type of test	dark grey CLAY a Standpipe	at 11.90m.	tallation type						
* *	elative to ground l		tanation type						
Initial ground w		C V C I .	4.23 m	Тор	of test sec	ction		11.50) m
Height of casing			0.33 m	Bottom of test section				12.00) m
Length of test s			0.50 m			end of test		7.21	m
Diameter of tes	t section		200 mm	Dian	neter of c	asing/standpi	pe	50	mm
Quality of water	r used	Water fro	om borehole	Test	start time	<u> </u>			11:00
Weather		Fine			finish tim				12:00
Time	Depth to water	11			Time	Depth to w	ater	11	10511/110
Minutes	m m	Н	In H₀/H	N	linutes	, m		Н	Log H/H0
0	12.00	7.77	0.00			1			
0.5	10.82	6.59	0.16			1			
1	10.65	6.42	0.19						
1.5	10.62	6.39	0.20						
2	10.55	6.32	0.21						
2.5	10.51	6.28	0.21						
3	10.48	6.25	0.22						
3.5	10.45	6.22	0.22						
4	10.42	6.19	0.23						
4.5	10.39	6.16	0.23						
5	10.36	6.13	0.24						
6	10.29	6.06	0.25						
7	10.23	6.00	0.26						
8	10.16	5.93	0.27						
9	10.10	5.87	0.28						
10	10.05	5.82	0.29						
12	9.93	5.70	0.31						
14	9.83	5.60	0.33	-					
16 18	9.72 9.67	5.49 5.44	0.35 0.36	-					
20	9.29	5.06	0.38						
25	8.87	4.64	0.43			+			
30	8.62	4.39	0.52			+			
40	8.13	3.90	0.69			+			
50	7.67	3.44	0.81				-		
60	7.21	2.98	0.96			1			
			1			1			
						1			
						1			
Remarks									
	after <1 minute of	purging							
Recorded by: Ar	ndrew Yuen							•	
								soil engine	eering
Form No. SE P	GR F 002	Revision No.	3.03	Issue Date	01/09/	2010	Par	t of the Bachy Sol	etanche Group

Proje	ect Name	Cambridge Wa	ste Water Treatme	ent Plant		Borehole Rising He	BH	Hole ID STW_010B
Proje	ect No.	TE8364				Permeability Test	Gro	ound Level .26m AOD
Engi	ineer	Mott MacDona	ıld Bentley					Date /10/2021
Clier	nt	Barhale Limite	d			BS EN ISO 22282-2: 2012		Page 2 of 2
Desc	ription			Y (CAMB	RIDGE	GREENSAND MEMBER), overly	ying very stiff fissu	
Type	of test	dark grey CLAY Standpipe		ation typ)6			
	al ground w			4.23	m	Top of test section	1:	L.50 m BGL
		g above surface		0.33	m	Bottom of test section		2.00 m BGL
	th of test s		(0.50	m	Water level at end of test	7	.21 m
Diam	neter of test	t section	7	200	mm	Diameter of casing/stand	pipe !	50 mm
Quali	ity of water	rused	Water from	borehole	е	Test start time		11:00
Weat	ther		Fine			Test finish time		12:00
	1.200							
	1,000							
	0.800							
H0/H	0.600				/			
ul				/				
	0.400							-
	0 200 -	A STATE OF THE PARTY OF THE PAR						
	0.000	10	20		30	40 50	60	70
_						ime t (mins)		
	using Velo	α= <i>0.00026</i> S= <i>0.001963</i> F= 1.906m	61 sec ⁻¹	k = α .S/F	7	=	2.74 x 10 ⁻⁷	m/s
Reco	orded by: An	drew Yuen					SOU ADO	ineering
Form	No con	GR F 003	Dougaism 61:	0.04		Issue Date 24/01/2014		
UIIII	140. SE PC	an F 005	Revision No. 3	04		Issue Date 24/01/2014	Part of the Bach	y Soletanche Group

Project Name	Cambridge Was	te Water Treat	ment Plant	Borehole Rising Head Hole					
	Relocation					_	_		W_010B
Project No.	TE8364			Per	meapii	lity Test			d Level
Engineer	Mott MacDonal	ld Pontloy							m AOD ate
Engineer	Mott MacDonal	іа веппеу							1/2021
Client	Barhale Limited								age
Cilcile	244.0			BS E	N ISO 222	82-2: 2012			of 2
Description	Firm to stiff dar	k grey sandy Cl	LAY (CAMBRIDGI	GREENSA	ND MEM	IBER), overlyi	ng very	stiff fissured	d laminated
	dark grey CLAY	at 11.90m.							
Type of test	Standpipe		allation type						
	elative to ground I	evel.	(2)	-				44.5	•
Initial ground w			4.34 m		of test sec			11.50	
Height of casing			0.33 m 0.50 m		om of test	end of test		12.00	
Length of test s Diameter of tes						end of test ising/standpi	no	6.81 50	
Diameter of tes	i section		200 mm	Dian	ietei oi ca	isirig/stariupi	pe	30	mm
Quality of water	rused	Water fro	om borehole	Test	start time				14:00
Weather	1 4364	Fine	nn borenoie		finish tim				15:00
Time	Depth to water		I	1.000	Time	Depth to wa	ater		
Minutes	m m	Н	H/H0		linutes	m m	atei	Н	H/H0
0	12.00	7.66	1.00		mutes	"	-		1
_									
0.5	11.01	6.67	0.87						
1	10.81	6.47	0.84						
1.5	10.72	6.38	0.83						
2	10.65	6.31	0.82						
2.5	10.60	6.26	0.82						
3	10.56	6.22	0.81						
3.5	10.53	6.19	0.81						
4	10.50	6.16	0.80						
4.5	10.48	6.14	0.80						
5	10.46	6.12	0.80						
6	10.38	6.04	0.79						
7	10.30	5.96	0.78						
8	10.22	5.88	0.77						
9	10.13	5.79	0.76						
10	10.02	5.68	0.74						
12	9.71	5.37	0.70						
14	9.50	5.16	0.67						
16	9.21	4.87	0.64						
18									
	9.01	4.67	0.61	l					
20	8.79	4.45	0.58						-
25	8.32	3.98	0.52						
30	7.98	3.64	0.48						
40	7.32	2.98	0.39						
50	7.03	2.69	0.35						
60	6.81	2.47	0.32						
Remarks							•		•
Recorded by: Andrew Yuen								SOIL ENGINE	eering
Form No. SE P	GR F 002	Revision No.	3.03x	Issue Date	19/09/2	2017	Pai	rt of the Bachy So	CONTRACTOR OF THE SERVICE OF THE SER
. J JE 1			3.00%	.oogo Dato	_5,05,2		1 41		anono aroup

-	ect Name	e Cambridge Waste \ Relocation TE8364	Nater Treatment Pla	int	Borehole Rising Hea Permeability Test	BH SIW UTUB		
_	neer	Mott MacDonald B	entley		•	10.26n Da	n AOD te	
Clier	nt	Barhale Limited			BS EN ISO 22282-2: 2012	11/11/ Pag 2 of	ge	
)esc	ription	Firm to stiff dark gr dark grey CLAY at 1		/IBRIDGE	GREENSAND MEMBER), overlyi			
ype	of test	Standpipe	Installation t	уре				
	_	water level	4.34	m	Top of test section	11.50		
		ing above surface	0.33	m	Bottom of test section	12.00	m BGL	
		section	0.50	m	Water level at end of test	6.81	m	
iam	eter of t	est section	200	mm	Diameter of casing/standpi	pe 50	mm	
ual	ty of wat	to- unod	Water from boreh	olo	Test start time	1	L4:00	
	ty or war	ter usea	Fine Fine	ole	Test finish time		L5:00 L5:00	
rea	. Her		Fille		rest illigir time		13.00	
	1.000	N.					11977	
	2.000	70000000 H-H-H-H-H-H-H-H-H-H-H-H-H-H-H-H-				-		
		The state of the s	X-X-X				8	

					*			
							==	
	0.100							
	0.100							
	0.100							
	0.100							
•	0.100							
/Ho	0.100							
Н/Но	0.100							
H/Ho	0.100							
H/Ho	0.100							
H/Ho								
Н/Но	0.100							
H/Ho								
H/Ho								
H/Ho								
Н/Но								
H/H0								
н/но								
H/Ho								
H/Ho								
H/Ho			13	ï				
H/H0	0.010	0 10	20	30	40 50	60	70	
04/H	0.010	0 10	20			60	70	
H/H0	0.010	0 10	20		40 50 me t (mins)	60	70	
oH/H	0.010	0 10	$k = \frac{r^2}{20}$	Tiı	me t (mins)		70 m/s	
0Н/Н	0.010			Tiı	me t (mins)		_	
0H/H	0.010	vorslev method r= 0.025m		Tiı	me t (mins)		_	
0Н/Н	0.010 0.001 using H	vorslev method r= 0.025m L= 0.5m		Tiı	me t (mins)		_	
oH/H	0.010 0.001 using H	vorslev method r= 0.025m L= 0.5m R= 0.10m		Tiı	me t (mins)		_	
он/н	0.010 0.001 using H	vorslev method r= 0.025m L= 0.5m		Tiı	me t (mins)			
0H/H	0.010 0.001 using H	vorslev method r= 0.025m L= 0.5m R= 0.10m		Tiı	me t (mins)			
0H/H	0.010 0.001 using H	vorslev method r= 0.025m L= 0.5m R= 0.10m		Tiı	me t (mins)		m/s	

Project Name	Cambridge Wast Relocation	e Water Treat	ment Plant	Borehole Fa	_	Hole ID BH_STW_011B		
Project No.	TE8364			Permeabi	lity Test		Grou	nd Level m AOD
Engineer	Mott MacDonald	d Bentley						Date
		•						1/2021
Client	Barhale Limited			BS EN ISO 222	282-2: 2012			age of 2
Description	CHALK.							01.2
Type of test	Standpipe	Inst	allation type					
	lative to ground le	evel.						
Initial ground wa			3.35 m	Top of test sec			1.50	
Height of casing Length of test se			0.19 m 8.20 m	Bottom of test Water level at			9.7	•
Diameter of test			8.20 m 200 mm	Diameter of ca		ipe	50	
						.,,,		
Quality of water	used	Clean and	d fresh	Test start time				09:00
Weather		Fine	_	Test finish tim				10:00
Time	Depth to water	Н	In H₀/H	Time	Depth to w	/ater	Н	Log H/H0
Minutes	m			Minutes	m			1 ,
0	-0.19	3.54	0.00					
0.5	0.21	3.14	0.12					
1	0.66	2.69	0.27					
1.5	0.93	2.42	0.38					
2	1.17	2.18	0.48					1
2.5	1.38	1.97	0.59					
3	1.57	1.78	0.69					
3.5	1.72	1.63	0.78					
4	1.88	1.47	0.88					
4.5	1.88	1.47	0.88					
5	1.89	1.46	0.89					
6	1.91	1.44	0.90					
7	1.95	1.40	0.93					
8	1.98	1.37	0.95					
9	2.01	1.34	0.97					
10	2.04	1.31	0.99					
12	2.12	1.23	1.06					
14	2.18	1.17	1.11					
16	2.25	1.10	1.17					
18	2.32	1.03	1.23					
20	2.38	0.97	1.29					
25	2.51	0.84	1.44					
30	2.67	0.68	1.65					
40	2.94	0.41	2.16					
50	3.11	0.24	2.69					1
60	3.16	0.19	2.92					
					1			
Remarks Put 25 litre	es of water to top	of standnine						
					т		22%	
Recorded by: An	drew Yuen					-	OIL ENGIN	PERIO
				i .		3	AIL 61 1011	CCKIIIG

-	e Cambridge Waste Relocation	e Water Treatment Plan	t	Borehole Falling Head	RH_SIM	_011B		
Project No.	TE8364			Permeability Test	Ground 8.93m			
Engineer	Mott MacDonald	Bentley			Date 15/11/2	_		
Client	Barhale Limited			BS EN ISO 22282-2: 2012	_	Page 2 of 2		
Description	CHALK.				1			
ype of test	Standpipe	Installation ty		I=		5.01		
nitial ground	mater level ng above surface	3.35 0.19	m m	Top of test section Bottom of test section	1.50 9.70	m BGL m BGL		
ength of test		8.20	m	Water level at end of test	3.16	m		
Diameter of te		200	mm	Diameter of casing/standpipe		mm		
<u> </u>				Diameter of according starraphys				
Quality of water	er used	Clean and fresh		Test start time	0:	9:00		
Weather		Fine		Test finish time		0:00		
3.500 - 3.000 -								
2.500 -								
								
2.000 -						=======================================		
H0/H				/				
1.500 -		1	/		_			
1.000 -	The same of the sa							
0.500 -	<i>f</i>							
0.000	1							
	0 10	20	30	40 50	60	70		
			1 16	me t (mins)				
	elocity graph method		F	= 1.0	2 x 10 ⁻⁷ In	n/s		
		9 sec ⁻¹	F	= 1.0	2 x 10 ⁻⁷ n	n/s		
using Ve	α= <i>0.000608</i> 3 S= <i>0.001963m</i> F= 11.686m	9 sec ⁻¹	F	= 1.0	2 x 10 ⁻⁷ n			

Project Name	Cambridge Wast	e Water Treati	ment Plant	Borehole Ris	•			ole ID W_011B
Project No.	TE8364			Permeabi	lity Test	:		nd Level m AOD
Engineer	Mott MacDonald	d Bentley					С	ate
								0/2021
Client	Barhale Limited			BS EN ISO 222	82-2: 2012			age of 2
Description	CHALK.					·		
Type of test	Standpipe elative to ground le		allation type					
Initial ground w		evei.	3.28 m	Top of test sec	tion		1.50	O m
Height of casing			0.19 m	Bottom of test			9.70	
Length of test se			8.20 m	Water level at	end of test		3.33	3 m
Diameter of test	t section		200 mm	Diameter of ca	sing/standp	oipe	50	mm
Quality of water	used	Water fro	m borehole	Test start time				12:00
Weather		Cloudy		Test finish tim				12:40
Time	Depth to water	Н	In H ₀ /H	Time	Depth to v	vater	Н	Log H/H0
Minutes	m			Minutes	m			20917710
0	7.28	4.00	0.00					
0.5	7.00	3.72	0.07					
1	6.59	3.31	0.19					
1.5	5.78	2.50	0.47					
2	5.49	2.21	0.59					
2.5	5.20	1.92	0.73					
3	5.00	1.72	0.84					
3.5	4.79	1.51	0.97					
4	4.57	1.29	1.13					
4.5	4.41	1.13	1.26					
5	4.22	0.94	1.45					
6	4.01	0.73	1.70					
7	3.88	0.60	1.90					
8	3.78	0.50	2.08					
9	3.73	0.45	2.18					
10	3.68	0.40	2.30					
12	3.62	0.34	2.47					
14	3.56	0.28	2.66					
16	3.52	0.24	2.81					
18	3.45	0.17	3.16					
20	3.40	0.12	3.51					
25	3.39	0.11	3.59					
30	3.33	0.05	4.38					
					1			
					1			
Remarks			<u> </u>		1			1
Purged 25	litres in 5 minute	s						
Recorded by: An	drew Yuen					_	4	
-						:	soil engin	eering
Form No. SE PO	GR F 002 F	Revision No.	3.03	Issue Date 01/09/2	2010	Part	of the Bachy So	oletanche Group

Proje	ect Name		e Water Treatment I	Plant	Borehole Rising H	ieau i	Hole ID _STW011B
Proje	ect No.	Relocation TE8364			Permeability Te	est Gr	ound Level
Engi	ineer	Mott MacDonald	Bentley				93m AOD Date
Clier	nt	Barhale Limited					7/10/2021 Page
					BS EN ISO 22282-2: 20	12	2 of 2
Desc	ription	CHALK.					
	of test al ground w	Standpipe	Installatio 3.28		Tour of tout another		50 m BGL
		g above surface	0.19		Top of test section Bottom of test section		9.70 m BGL
	th of test s		8.20		Water level at end of te		3.33 m
	neter of tes		200	mm	Diameter of casing/sta		50 mm
						, ,	
	ity of wate	rused	Water from bor	ehole	Test start time		12:00
Weat	ther		Cloudy		Test finish time		12:40
	5.000						
	4.500					*	
	(000						
	4.000						
	3.500						
	3.000				/		
H0/H	2.500			/			
H u							
	2.000						
	1.500						
	1.000						
	0.500	1					
	0.000		lli	7	я	#1 OF	
	0	5	10	15	20	25 30	35
				Ti	me t (mins)		
	using Velo	ocity graph method	k = 0	S/F	=	4.09 x 10 ⁻⁷	m/s
	where	α= 0.002434 S= 0.001963m F= 11.686m					
Reco	orded by: Ar	ndrew Yuen		Т			<u> </u>
	n dod by. Al	IMIGAA I MGII				SOIL end	SINEERING
Form	No. SE P	GR F 003 R	evision No. 3.04		ssue Date 24/01/2014	Part of the Bach	y Soletanche Group

Project Name	Cambridge Wast	te Water Treat	ment Plant	Borehole Ris	_		Hole ID BH_STW_011B	
Project No.	TE8364			Permeabi	lity Test		Groui	nd Level m AOD
Engineer	Mott MacDonald	d Bentley					Ε	ate
_								0/2021
Client	Barhale Limited			BS EN ISO 222	282-2: 2012			age of 2
Description	CHALK.							
Type of test	Standpipe		allation type					
All depths are re Initial ground wa	elative to ground le	evel.	3.28 m	Top of test sec	tion		1.50) m
Height of casing			0.19 m	Bottom of test			9.70	
Length of test se			8.20 m	Water level at			3.33	
Diameter of test			200 mm	Diameter of ca		ipe	50	
Quality of water	used	Water fro	m borehole	Test start time	<u> </u>			15:00
Weather		Fine		Test finish tim	e			15:50
Time	Depth to water	1.1	با/ الما	Time	Depth to v	vater	11	1 - 11 / 10
Minutes	, m	Н	In H ₀ /H	Minutes	m		Н	Log H/H0
0	7.31	4.03	0.00					1
0.5	7.05	3.77	0.07					
1	6.63	3.35	0.18					
1.5	5.81	2.53	0.47					
2	5.53	2.25	0.58					1
2.5	5.24	1.96	0.72					
3	5.03	1.75	0.83					
3.5	4.82	1.54	0.96					
4	4.64	1.36	1.09					
4.5	4.50	1.22	1.19					
5	4.27	0.99	1.40					
6	4.10	0.82	1.59					
7	3.92	0.64	1.84					
8	3.80	0.52	2.05					
9	3.76	0.48	2.13					
10	3.71	0.43	2.24					
12	3.68	0.40	2.31					
14	3.62	0.34	2.47					
16	3.55	0.27	2.70					
18	3.48	0.20	3.00					
20	3.42	0.14	3.36					
25	3.40	0.12	3.51					
30	3.36	0.08	3.92					_
40	3.31	0.03	4.90					
	+ +				1			
Remarks	liana in E							
Purged 25	litres in 5 minute	s 						
Recorded by: An	drew Yuen					-		
							soir eugin	
Form No. SE PO	GR F 002 F	Revision No.	3.03	Issue Date 01/09/2	2010	Part	of the Bachy So	oletanche Group

Proje	ect Name		aste Water Trea	tment Plar	nt	Borehole	Rising He	ead		le ID	
Proje	ect No.	Relocation TE8364				Permea	bility Tes	t		N_011B d Level	
. 10,0		ILOJOT					•			n AOD	
Engi	neer	Mott MacDona	ald Bentley							ate	
Clien	\+	Barhale Limite	sd.)/2021 age	
Cileii	IL	Damale Limite	zu.			BS EN ISO	22282-2: 2012	2		of 2	
Desc	ription	CHALK.									
	of test	Standpipe	Ins	tallation ty							
	l ground wa	ater level above surface		3.28 0.19	m	Top of test: Bottom of t			1.50 9.70		
	th of test se			8.20	m m		est section at end of test		3.31	10000	
	eter of test			200	mm		f casing/stance		50	mm	
D (G())						Diamoto, o	· cooning ocume	- Pipo			
Quali	ity of water	used	Water fr	om boreho	le	Test start ti	me			15:00	
Weat	her		Fine			Test finish t	time			15:50	
	5.000								×		
	F										
	4.000						/				
	_					real control	/				
					1						
H0/H	3.000				/						
in H(-			-/							
_	<u> </u>			/							
				2							
	2.000										
		-f									
	1.000										
		1									
	0.000	į.	- 112	372	18.5	21	-511	ų,			
	0.000	5	10	15	20	25	30	35	40	45	
						me t (mins)					
	using Velo	city graph meth	nod	$k = \alpha . S $	F		=	3.43 x 10 ⁻¹	7	m/s	
	where	α= 0.0020	042 sec ⁻¹								
		S= <i>0.001963</i> F= 11.686 m									
Reco	rded by: An	drew Yuen							(1)	_	
								so	AL ENGIN	eering	
		R F 003	Revision No.	3.04		ssue Date 24/0	01/2014	Part of			

Project Name		ste Water Treat	ment Plant	Borehole Fa	lling Head	Hole ID BH_STW_022B	
Project No.	Relocation TE8364			Permeabi	lity Test	Groun	d Level
Engineer	Mott MacDonal	ld Bentley				Da	n AOD ate ./2021
Client	Barhale Limited	I		BS EN ISO 222	282-2: 2012	Pa	nge of 2
Description	Firm greenish g	rey slightly san	ıdy slightly grave	lly CLAY. (CAMBRID	GE GREENSAND		
Type of test	Standpipe	Inst	allation type				
All depths are re	elative to ground l	level.					
Initial ground w			2.30 m	Top of test sec		11.30	
Height of casing			0.16 m	Bottom of test		11.70	
Length of test se			0.40 m	Water level at		1.98	m
Diameter of test	t section		150 mm	Diameter of ca	asing/standpipe	50	mm
Quality of water	r used	Clean and	d fresh	Test start time			08:15
Weather		Fine		Test finish tim	е		08:17
Time Minutes	Depth to water m	Н	H/H0	Time Minutes	Depth to water	Н	H/H0
0	0.00	2.30	1.00				
0.5	1.34	0.96	0.42		+		
1	1.98	0.32	0.14				
				<u> </u>			
Remarks							
Recorded by: An	ndrew Yuen						
Form No. SE PO	GR F 002	Revision No.	3.03x	Issue Date 19/09/2	2017	Part of the Bachy Sol	Control of the second of the s
I OTTITIVO. SE PO	GR 1 002	REVISION INU.	J.UJA	133uc Date 13/03/2	-011	rait of the bacily 501	ctaniche Group

Project Name		Water Treatment Plant	Во	rehole Falling H	lead	Hole IC	
Project NI-	Relocation			Permeability Te	В	H_STW_ Ground Le	
Project No.	TE8364			- J		8.51m A	
ingineer	Mott MacDonald	Bentley				Date	224
llient	Barhale Limited					15/11/20 Page	121
ment	Damale Limited			BS EN ISO 22282-2: 203	12	2 of 2	
escription	Firm greenish gre	y slightly sandy slightly	gravelly CL	AY. (CAMBRIDGE GREEF	NSAND MEMBER)	
ype of test	Standpipe	Installation typ					
nitial ground w		2.30	m	Top of test section Bottom of test section		11.30	m BGL
ength of test so	above surface	0.16 0.40	m	Water level at end of te	et	11.70 1.98	m BGL m
iameter of test		150	mm	Diameter of casing/star		50	mm
					11		
uality of water	used	Clean and fresh		Test start time		08:	
/eather		Fine		Test finish time		08:	17
1.000 *							
1.000 *-							
F							
-			*				
-							
					×		
0.100							
-							
/H9							
±							
-							
0.010							
0.010				· · · · · · · · · · · · · · · · · · ·			
-							
-							
-							
Ogenia.							
0.001 +	1		1		3		
0	0.2	0.4		.6 0.8	1		1.2
			Time t	(mins)			
uning 11		<i>,</i>	-/(/el				
using Hvo	rslev method	$k = \frac{r^2 \cdot h}{2 \cdot h}$	Lt _o	=	3.74 x 10 ⁻⁵	m/	's
_							
where	r= <i>0.025m</i> L= <i>0.4m</i>						
	L= <i>0.4m</i> R= 0.075m						
	t _o = 35 secs						
						NO SIDO CO	
					2000 *	engineer	1116

Project Name	Cambridge Was	te Water Treat	ment Plant	Borehole Rising Head			Hole ID BH_STW_022B	
Project No.	TE8364			F	Permeabil	lity Test	Groun	d Level n AOD
Engineer	Mott MacDonal	d Bentley					D	ate L/2021
Client	Barhale Limited			E	BS EN ISO 222	82-2: 2012	Pa	age of 2
Description	Firm greenish g	rey slightly san	dy slightly grave	elly CLA	Y. (CAMBRIDO	GE GREENSAND		-
Type of test	Standpipe	Inst	allation type					
	elative to ground le	evel.						
Initial ground w			2.28 m		op of test sect		11.30	
Height of casing			0.16 m		Bottom of test		11.70	
Length of test so			0.40 m		Water level at		2.30	
Diameter of test	t section		150 mm	[Diameter of ca	sing/standpipe	50	mm
O alita . af at a		\\/_+	m borehole		est start time			11:30
Quality of water Weather	usea	Raining	m porenoie		est start time Test finish time			11:34
Time	Donth to water	Kaiiiiig	T	 	Time	1		11.54
	Depth to water	Н	H/H0			Depth to wate	er H	H/H0
Minutes	m	221	1.00	↓ ⊦	Minutes	m		
0	6.22	3.94	1.00					
0.5	5.60	3.32	0.84	↓				
1	4.42	2.14	0.54					
1.5	2.91	0.63	0.16					
2	2.52	0.24	0.06					
2.5	2.33	0.05	0.01					
3	2.30	0.02	0.01					
				1				
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Remarks	-		-	-		-	-	•
Purged 25	litres in 5 minute	es.						
Recorded by: An	drew Yuen							
							SOIL ENGINE	eering
Form No. SE PO	lo. SE PGR F 002 Revision No. 3.03x			Issue D	ate 19/09/2	017	Part of the Bachy Sol	etanche Group

Proje	ct Name	Cambridge Wa Relocation	ste Water Treatmen	t Plant	Borehole Rising Hea	d Hole ID BH_STW_0	
Proje	ct No.	TE8364			Permeability Test	Ground Le	
, , ,						8.51m AO	D
Engin	neer	Mott MacDona	ald Bentley			Date 12/11/202	21
Clien	t	Barhale Limite	d		BS EN ISO 22282-2: 2012	Page 2 of 2	
Descr	iption	Firm greenish	grey slightly sandy s	lightly gravel	ly CLAY. (CAMBRIDGE GREENSAI	ND MEMBER)	
	of test	Standpipe	Installat				3
	ground w		2.2		Top of test section	11.30	m BGL
		g above surface	0.1		Bottom of test section	11.70	m BGL
_	h of test s		0.4		Water level at end of test	2.30	m
Diame	eter of test	t section	15	0 mm	Diameter of casing/standpi	pe 50	mm
Oualid	ty of wate	- Head	Water from be	orahala	Test start time	11:3	0
Weat	•	useu	Raining	<u> </u>	Test finish time	11:3	
VVCac	ilei		Raming		rescription cline	II.J	7
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	0	0.5	1	1.5	2 2.5	3	3.5
				Ti	ime t (mins)		
				2			
	using Hvo	rslev method	k =	r2.In(L/R) 2.Lt o	= 1	.79 x 10 ⁻⁵ m/s	S
				Z.Lt _o	-		
	urboro	r= <i>0.025m</i>					
	where	r= <i>0.025m</i> L= <i>0.4m</i>					
		R= 0.075m					
		A- 0.075III					
		t _o = 73 secs					
		t _o = 73 secs			Т		
		t _o = 73 secs			I	•	
		t _o = 73 secs				SOIL ENGINEERI	ng

Project Name	Cambridge Was	te Water Treat	ment Plant	В	orehole Ris	_	Hole ID BH_STW_022B	
Project No.	TE8364				Permeabil	lity Test		d Level n AOD
Engineer	Mott MacDonal	d Bentley					D	ate L/2021
Client	Barhale Limited				BS EN ISO 222	82-2: 2012	Pa	age of 2
Description	Firm greenish g	rey slightly san	dy slightly grave	elly CI	LAY. (CAMBRIDO	GE GREENSAND		
Type of test	Standpipe	Inst	allation type					
	elative to ground l	evel.						
Initial ground w			2.28 m		Top of test sect		11.30	
Height of casing			0.16 m		Bottom of test		11.70	
Length of test so			0.40 m	Water level at end of test Diameter of casing/standpipe			2.31	
Diameter of test	t section		150 mm		Diameter of ca	sing/standpipe	50	mm
Quality of water	rused	Water fro	m borehole		Test start time			11:30
Weather	useu	Raining	III borenole		Test finish time			11:34
Time	Depth to water	Ranning		I	Time	Depth to wate	ar l	11.5 1
Minutes	m	Н	H/H0		Minutes	m	" H	H/H0
0	6.25	3.97	1.00	-	Williates	""		
0.5	5.68	3.40	0.86	-				
				4				
1	4.54	2.26	0.57	4				
1.5	3.05	0.77	0.19	4				
2	2.66	0.38	0.10	1				
2.5	2.39	0.11	0.03	4				
3	2.31	0.03	0.01					
				1				
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				1				
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Remarks	•			•	•	•	•	•
Purged 25	litres in 5 minute	es.						
Recorded by: An	drew Yuen							
						[soil engine	eering
Form No. SE PGR F 002 Revision No. 3		3.03x	Issue	Date 19/09/2	017	Part of the Bachy Sol	etanche Group	

Proje	ct Name	Cambridge Waste Relocation	Water Treatment Plant		e Rising Head	Hole II BH_STW_	
Proje	ct No.	TE8364		Perme	ability Test	Ground L	
-						8.51m A	
Engin	neer	Mott MacDonald	Bentley			Date 12/11/2	
Client	t	Barhale Limited		BS EN IS	O 22282-2: 2012	Page 2 of 2	
Descr	iption	Firm greenish gre	y slightly sandy slightly g	gravelly CLAY. (CAM	BRIDGE GREENSAND N	ЛЕМВЕR)	
	of test	Standpipe	Installation type				-
	ground w				st section	11.30	m BGL
		g above surface			of test section	11.70	m BGL
	h of test sa				vel at end of test	2.31	m
Diame	eter of test	t section	150	mm Diameter	r of casing/standpipe	50	mm
.			186.2		1. 1		-20
	ty of water	rused	Water from borehole				:30
Veat	her		Raining	Test finis	sh time	11	:34
	4.055						
	1.000						=
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	0.400						F-1
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	0.001	0.5	1	1.5 2	2.5	3	3.5
	U	0.5	1		۷.5	J	3.3
				Time t (mins)			
	using Hvo	rslev method	$k = \frac{r^2.ln}{2.L}$	(L/R)	a ==	. 40-5	(-
	•		$\kappa = \frac{1}{2.L}$	ī.t _o	= 1.72	x 10⁻⁵ m .	/ S
		r= <i>0.025m</i>					
	where						
	where	L= <i>0.4m</i>					
	where	R= 0.075m					
	where					_	
	where	R= 0.075m			1		
	where	R= 0.075m				(i)	
		R= 0.075m t _o = 76 secs				SOIL ENGINEER	
rm N		R= 0.075m t _o = 76 secs	evision No. 3.04x	Issue Date 1	9/09/2017	SOIL ENGINEER	

Hole ID Project Name Cambridge Waste Water Treatment Plant **Borehole Falling Head** BH_STW_031B Relocation **Permeability Test** Project No. TE8364 Ground Level 11.60m AOD Date Mott MacDonald Bentley Engineer 15/11/2021 Page **Barhale Limited** Client BS EN ISO 22282-2: 2012 1 of 2 Description Very stiff greenish grey slightly sandy slightly gravelly CLAY (CAMBRIDGE GREENSAND MEMBER) Type of test Installation type Standpipe All depths are relative to ground level. 5.46 Initial ground water level Top of test section 13.10 m Height of casing above surface N/A Bottom of test section 13.60 0.50 5.30 Length of test section Water level at end of test m Diameter of test section 150 mm Diameter of casing/standpipe 50 mm 08:00 Quality of water used Clean and fresh Test start time Weather Test finish time 09:00 Fine Time Time Depth to water Depth to water Η Log H/H0 Н Log H/H0 Minutes m Minutes m 0 4.05 1.41 0.00 0.5 4.47 0.99 0.35 1 5.12 0.34 1.42 1.5 5.14 0.32 1.48 2 5.16 0.30 1.55 2.5 5.17 0.29 1.58 3 5.17 0.29 1.58 3.5 5.17 0.29 1.58 4 5.17 0.29 1.58 4.5 5.18 0.28 1.62 5 5.18 0.28 1.62 6 5.18 0.28 1.62 7 5.18 0.28 1.62 5.18 0.28 1.62 8 9 5.18 0.28 1.62 10 5.18 0.28 1.62 12 5.19 0.27 1.65 14 5.19 0.27 1.65 16 5.19 0.27 1.65 18 5.19 0.27 1.65 20 5.20 0.26 1.69 25 5.20 0.26 1.69 30 5.20 0.26 1.69 40 5.24 0.22 1.86 50 5.26 0.20 1.95 5.30 0.16 60 2.18 Remarks Unable to fill water to top of standpipe - put 100 litres of water into standpipe, start of test at 4.05m. Recorded by: Andrew Yuen SOIL engineering Form No. SE PGR F 002 Revision No. 3.03 Issue Date 01/09/2010 Part of the Bachy Soletanche Group

Permeability Test Ground lavel 11.80m ADD Date 11.80m ADD Date 11.80m ADD Date 15.711.70021 Page 2 of 2 Description Very stiff greenish grey dightly sandy slightly gravelly CLAY (CAMBRIDGE GREENSAND MEMBER) Type of test Standpipe Installation type Initial ground water level 5.46 m Top of test section 13.10 m Height of casing above surface N/A m Bottom of test section 13.80 m Water level of test section 13.80 m Water level at end of test 13.80 m Danater of casing/standpipe So m Danater of	Proje	ect Name	Cambridge Wa	ste Water Treatment Pla	nt	Borehole Falling He		Hole II BH_STW_	
Engineer Mott MacDonald Bentley Client Barhale Limited Date 15-11/2021 Page 2 of 2 Description Very stiff greenish grey slightly sandy slightly gravelly CLAY (CAMBRIDGE GREENSAND MEMBER) Type of test Standpipe Installation type Installation	Proje	ect No.				Permeability Tes	t		
15.11.72021 Page 2 of 2									
Page	Engi	neer	Mott MacDona	ıld Bentley					
Description Very stiff greenish grey slightly sandy slightly gravelly CLAY (CAMBRIDGE GREENSAND MEMBER) Type of test Standpipe Initial ground water level 5.46 m Top of test section 13.10 m Height of casing above surface N/A m Bottom of test section 13.50 m Diameter of test section 13.00 m Diameter of test section 13.00 m Diameter of test section 150 mm Diameter of test section 150 mm Diameter of test section 150 mm Diameter of test section 150 mm Diameter of test section 150 mm Diameter of test section 2500 2.000 0.000	Clion	nt.	Rarhala Limito	d			<u> </u>		
Type of test Standpipe Installation type	CHEN	IL.	Damaie Limile	u		BS EN ISO 22282-2: 2012	·		
Initial ground water level 5.46 m Top of test section 13.10 m 13.60 m Meight of casing above surface N/A m Sortom of test section 13.60 m Water level at end of test 5.30 m Diameter of test section 150 mm Diameter of test section 150 mm Diameter of casing/standpipe 50 mm Diameter of test section 150 mm Diameter of casing/standpipe 50 mm Diameter of casing/stand	Desci	ription	Very stiff greer	nish grey slightly sandy sl	lightly g	ravelly CLAY (CAMBRIDGE GRE	ENSAND M	EMBER)	
Height of casing above surface					ype				-
Length of test section 0.50 m Water level at end of test 5.30 m Diameter of test section 150 mm Diameter of casing/standpipe 50 mm Diameter of test section 0.8:00 mm Diameter of casing/standpipe 50 mm Diameter of test start time 0.8:00 mm Diameter of test start time		_				■ =			m BGL
Diameter of test section 150 mm Diameter of casing/standpipe 50 mm						I			m BGL
Quality of water used Clean and fresh Test start time 08:00 Weather Fine Test finish time 09:00 2.500 2.000 2.000 1.500 0.	_								m mm
Veather Fine Test finish time 09:00	Diaili	ietei oi te	sc section		111111	Diameter of casing/stand	рре	- 30	11111
Velocity graph method Vel	Quali	ty of wate	er used	Clean and fresh		Test start time		08	:00
2.000 1.500 0.000 0 10 20 30 40 50 60 70 Time t (mins) using Velocity graph method $k = \alpha$. S/F = 2.53 x 10 ⁻⁷ m/s where $\alpha = 0.00223$ sec ⁻³ S = 0.001963m ² F = 1.655m Recorded by: Andrew Yuen		-		Fine	_				
2.000 1.500 0.500 0.000 0 10 20 30 40 50 60 70 Time t (mins) using Velocity graph method $k = \alpha$. S/F = 2.53 x 10 ⁻⁷ m/s where $\alpha = 0.00213 \text{ sec}^{-3}$ $S = 0.001963\text{ m}^2$ $F = 1.65\text{Sm}$ Recorded by: Andrew Yuen					_				
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0 10 20 30 40 50 60 70 Time t (mins) using Velocity graph method $k = \alpha . S/F$ = 2.53 x 10 ⁻⁷ m/s where $\alpha = 0.000213 \ sec^{-1}$ $S = 0.001963 \ m^2$ $F = 1.655 \ m$ Recorded by: Andrew Yuen		0.500							
0 10 20 30 40 50 60 70 Time t (mins) using Velocity graph method $k = \alpha . S/F$ = 2.53 x 10 ⁻⁷ m/s where $\alpha = 0.000213 \ sec^{-1}$ $S = 0.001963 \ m^2$ $F = 1.655 \ m$ Recorded by: Andrew Yuen									
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Time t (mins) using Velocity graph method $k = \alpha . S/F$ = 2.53×10^{-7} m/s where $\alpha = 0.000213 \text{ sec}^{-1}$ $S = 0.001963 \text{m}^2$ $F = 1.655 \text{m}$ Recorded by: Andrew Yuen		- 2		20	30	40 50		60	70
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where α= 0.000213 sec ⁻¹ S= 0.001963m ² F= 1.655m Recorded by: Andrew Yuen					'	une t (unus)			
where α= 0.000213 sec ⁻¹ S= 0.001963m ² F= 1.655m Recorded by: Andrew Yuen		_							
where α= 0.000213 sec ⁻¹ S= 0.001963m ² F= 1.655m Recorded by: Andrew Yuen Soil engineering		using Vel	locity graph meth	od $k = \alpha . S_k$	/F	=	2.53 x 10 ⁻⁷	m	/s
S= 0.001963m ² F= 1.655m Recorded by: Andrew Yuen Soil engineering				4					
Recorded by: Andrew Yuen Soil engineering		where	α= 0.0002	13 sec ⁻¹					
Recorded by: Andrew Yuen Soil engineering				m^2					
SOIL ENGINEERING			F= 1.655m						
SOIL ENGINEERING				ı	1	-		ساهام	
	Reco	rded by: A	ndrew Yuen]		
							so	NL engineer	ang
Form No. SE PGR F 003 Revision No. 3.04 Issue Date 24/01/2014 Part of the Bachy Soletanche Gro	Form f	No. SE F	PGR F 003	Revision No. 3.04		Issue Date 24/01/2014	Part of	the Bachy Soletan	che Group

Hole ID Project Name Cambridge Waste Water Treatment Plant **Borehole Rising Head** BH_STW_031B Relocation **Permeability Test** Ground Level Project No. TE8364 11.60m AOD Date Mott MacDonald Bentley Engineer 11/11/2021 Page **Barhale Limited** Client BS EN ISO 22282-2: 2012 1 of 2 Description Very stiff greenish grey slightly sandy slightly gravelly CLAY (CAMBRIDGE GREENSAND MEMBER) Type of test Installation type Standpipe All depths are relative to ground level. Initial ground water level 5.05 13.10 Top of test section Height of casing above surface N/A Bottom of test section 13.60 Length of test section 0.50 Water level at end of test 8.85 m Diameter of test section 150 mm Diameter of casing/standpipe 50 mm 10:00 Quality of water used Water from borehole Test start time Weather Test finish time 11:00 Raining Time Depth to water Time Depth to water Log H/H0 Η Log H/H0 Н Minutes m Minutes m 0 9.12 4.07 0.00 0.5 9.09 4.04 0.01 1 9.07 4.02 0.01 4.01 1.5 9.06 0.01 2 9.05 4.00 0.02 2.5 9.04 3.99 0.02 3 9.03 3.98 0.02 3.5 9.02 3.97 0.02 4 9.02 3.97 0.02 4.5 9.02 3.97 0.02 5 9.01 3.96 0.03 6 9.00 3.95 0.03 9.00 7 3.95 0.03 9.00 3.95 0.03 8 9 9.00 3.95 0.03 10 9.00 3.95 0.03 12 9.00 3.95 0.03 14 9.00 3.95 0.03 16 8.99 3.94 0.03 18 8.99 3.94 0.03 20 8.97 3.92 0.04 25 8.96 3.91 0.04 3.89 30 8.94 0.05 40 8.91 3.86 0.05 50 8.87 3.82 0.06 8.85 3.80 0.07 60 Remarks Purged 20 litres in 5 minutes. Recorded by: Andrew Yuen SOIL engineering Form No. SE PGR F 002 Revision No. 3.03 Issue Date 01/09/2010 Part of the Bachy Soletanche Group

	ect Name	Cambridge Wa	ste Water Treatment Plant	F	Borehole Rising H	ead	Hole II	D
		Relocation					BH_STW_	
Engi	ect No.	TE8364			Permeability Te	St	Ground L	
Engi			118 4				11.60m /	
4	ineer	Mott MacDona	ild Bentley				Date 11/11/2	
Clie	n#	Barhale Limite	A				Page	
Cilei	iit.	Damale Limite	u		BS EN ISO 22282-2; 201	L2	2 of 2	
Desc	ription	Very stiff green	ish grey slightly sandy sligh	htly grave	elly CLAY (CAMBRIDGE GR	REENSAND M		'
	·	, ,	0,0,,,	, 0	, ,		,	
	of test	Standpipe	Installation type	e				
	al ground w		5.05	m	Top of test section		13,10	m BGL
		above surface	N/A	m	Bottom of test section		13.60	m BGL
	th of test seneter of test		0.50 150	m	Water level at end of test Diameter of casing/star		8.85 50	m
Dian	ieter or test	. section	150	mm	Diameter of casing/star	аргре		mm
Qual	ity of water	used	Water from borehole		Test start time		10	:00
Wea			Raining		Test finish time			:00
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	0.080 _							
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	0.000	W.	- 0	- 9			3	
	ď	10	20	30	40 5	0	60	70
				Time	t (mins)			
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	uniona Mali	المدادة بالمسام وطأم	ad 4 a.					
	using velo	city graph meth	od $k = \alpha . S/F$		=	1.44 x 10	8 m.	/s
_			a-5 ·1					
	مددم عادي	α= <i>1.204 x1</i>						
_	where		. 7					
	where	S= 0.001963	'm ⁻					
_	where	S= <i>0.001963</i> F= 1.636m	'm'					
Door		F= 1.636m	<i>'m</i> -					
Reco	where	F= 1.636m	m ⁻				***	
Reco		F= 1.636m	<i>m</i> -			So	DIL engineer	ang

Hole ID Project Name Cambridge Waste Water Treatment Plant **Borehole Rising Head** BH_STW_031B Relocation **Permeability Test** Ground Level Project No. TE8364 11.60m AOD Date Mott MacDonald Bentley Engineer 12/11/2021 Page **Barhale Limited** Client BS EN ISO 22282-2: 2012 1 of 2 Description Very stiff greenish grey slightly sandy slightly gravelly CLAY (CAMBRIDGE GREENSAND MEMBER) Type of test Installation type Standpipe All depths are relative to ground level. Initial ground water level 5.41 13.10 Top of test section Height of casing above surface N/A Bottom of test section 13.60 Length of test section 0.50 Water level at end of test 8.81 m m Diameter of test section 150 mm Diameter of casing/standpipe 50 mm 08:00 Quality of water used Water from borehole Test start time Weather Test finish time 09:00 Raining Time Depth to water Time Depth to water Η Log H/H0 Н Log H/H0 Minutes m Minutes m 0 9.00 3.59 0.00 0.5 8.96 3.55 0.01 1 8.94 3.53 0.02 1.5 8.94 3.53 0.02 2 8.93 3.52 0.02 2.5 8.93 3.52 0.02 3 8.93 3.52 0.02 3.5 8.92 3.51 0.02 4 8.92 3.51 0.02 4.5 8.91 3.50 0.03 5 8.91 3.50 0.03 6 8.90 3.49 0.03 8.90 7 3.49 0.03 8.90 3.49 0.03 8 9 8.90 3.49 0.03 10 8.89 3.48 0.03 12 8.89 3.48 0.03 14 8.89 3.48 0.03 16 8.88 3.47 0.03 18 8.88 3.47 0.03 20 8.87 3.46 0.04 25 8.87 3.46 0.04 30 8.86 3.45 0.04 40 8.85 3.44 0.04 50 8.83 3.42 0.05 8.81 3.40 0.05 60 Remarks Purged 20 litres in 5 minutes. Recorded by: Andrew Yuen SOIL engineering Form No. SE PGR F 002 Revision No. 3.03 Issue Date 01/09/2010 Part of the Bachy Soletanche Group

Proje	ect Name	Cambridge Waste	e Water Treatment Plan	t	Borehole Rising He		Hole II	
_	ect No.	TE8364			Permeability Tes	t	Ground L 11.60m	evel AOD
Engi	neer	Mott MacDonald	Bentley				Date 12/11/2	
Clier	nt	Barhale Limited			BS EN ISO 22282-2: 2012	2	Page 2 of 2	
Desc	ription	Very stiff greenis	h grey slightly sandy sli	ghtly g	avelly CLAY (CAMBRIDGE GRI	ENSAND IV	1EMBER)	
	of test	Standpipe	Installation ty					-
	al ground w		5.41 N/A	m	Top of test section Bottom of test section		13,10 13.60	m BGL m BGL
	th of test se	above surface	0.50	m m	Water level at end of test		8.81	m
_	neter of test		150	mm	Diameter of casing/stand		50	mm
	ity of water	used	Water from boreho	le	Test start time			:00
Weat	ther		Raining		Test finish time		09	:00
	0.060						*	
	0.050							
	-							
	0.040							
Log H/Ho	0.030	***						
	0.020	Ĭ						
	0.010							
	0.000 💠	10	20	30	40 50		60	70
				T	ime t (mins)			
	using Velo	city graph method	$k = \alpha . S/a$	F	=	9.62 x 10	9 m	/s
	where	α= 8.025 x10 ⁻¹ S= 0.001963m F= 1.636m						
Reco	rded by: An	drew Yuen				S	OIL ENGINEER	RING
_	No. SE PO	GR F 003 R	evision No. 3.04		Issue Date 24/01/2014	Part of	f the Bachy Soletan	che Group

Project Name	Cambridge Was	te Water Treat	ment Plant	Borel	ole Fal	lling Hea	d		le ID
	Relocation					•			N_005B
Project No.	TE8364			Pei	meapii	lity Test			d Level
Ги a:и a a и	Mott MacDana	d Dantlay							n AOD ate
Engineer	Mott MacDonal	а веппеу							1/2021
Client	Barhale Limited			DC I	NI 100 222	00.0.0010			age
				R2 F	N 150 222	82-2: 2012		1	of 2
Description	Firm thinly lam	inated fissured	bluish grey CLAY	. (GAULT	CLAY FORM	ЛАТION)			
Type of test	Standpipe	Inst	allation type						
	elative to ground l								
Initial ground w			1.94 m	Тор	of test sec	tion		7.00	m
	g above surface		0.54 m	Bott	om of test	section		10.00) m
Length of test s			3.00 m			end of test		1.89	m
Diameter of tes	st section		200 mm	Diar	neter of ca	sing/standpi	ре	50	mm
O alit af at a		Clean and	d funcile	Tast	start time				09:00
Quality of wate Weather	r useu	Fine	a fresh		finish tim				10:00
Time	Danth to water	rille	T	l lest	Time	1	-4		10.00
	Depth to water	Н	H/H0	.		Depth to w	ater	Н	H/H0
Minutes	m	2.70	4.00	<u> </u>	/linutes	m	-		
0	-0.54	2.48	1.00						
0.5	-0.44	2.38	0.96						
1	-0.34	2.28	0.92						
1.5	-0.26	2.20	0.89			1			
2	-0.14	2.08	0.84						
2.5	-0.08	2.02	0.81						
3	0.01	1.93	0.78						
3.5	0.07	1.87	0.75						
4	0.13	1.81	0.73						
4.5	0.21	1.73	0.70						
5	0.29	1.65	0.67						
6	0.75	1.19	0.48						
7	0.80	1.14	0.46						
8	0.86	1.08	0.44						
9	0.97	0.97	0.39						
10	1.04	0.90	0.36						
12	1.16	0.78	0.31						
14	1.29	0.65	0.26						
16	1.38	0.56	0.23						
18	1.45	0.49	0.20						
20	1.52	0.42	0.17						
25	1.61	0.33	0.13						
30	1.69	0.25	0.10						
40	1.80	0.14	0.06						
50	1.85	0.09	0.04						
60	1.89	0.05	0.02						
						1			
						1			
						1			
						1			
						1			
Remarks						•			•
Recorded by: Aı	ndraw Vuon					ı			
necorded by. Al	nulew fuell							SOIL ENGINE	eering
Form No. SE P	PGR F 002	Revision No.	3.03x	Issue Date	19/09/2	017	Par	rt of the Bachy Sol	etanche Group

	Cambridge Waste Relocation	Water Treatment Plant	В	orehole Falling F	lead	Hole II BH_TUN_	
roject No.	TE8364			Permeability Te	st 🗀	Ground Le	
						6.69m A	
ngineer	Mott MacDonald	Bentley				Date 01/11/20	021
Client	Barhale Limited			BS EN ISO 22282-2: 20	12	Page 2 of 2	
escription	Firm thinly lamina	ated fissured bluish grey C	LAY. (G/	AULT CLAY FORMATION)	<u> </u>		
ype of test	Standpipe	Installation type					
nitial ground wa	ater level	1.94 n	n	Top of test section		7.00	m BGl
	j above surface	The second secon	n	Bottom of test section		10.00	m BGL
ength of test se			n	Water level at end of te		1.89	m
iameter of test	section	200 n	nm	Diameter of casing/star	ndpipe	50	mm
uality of water	used	Clean and fresh		Test start time		09:	
Veather		F <mark>ine</mark>		Test finish time		10:	00
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1.000	٧.						
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0.001	10	20	30	40 5	0	60	70
	10	20			0	60	70
	10	20		40 5 t (mins)	0	60	70
0	10		Time	t (mins)			
0		$k = \frac{r^2 . ln(1)}{2.Lt}$	Time		0 6.12 x 10		
0 using Hvo	rslev method		Time	t (mins)			
0	rslev method r= <i>0.025m</i>		Time	t (mins)			
using Hvo	rslev method r= <i>0.025m</i> L= <i>3m</i>		Time	t (mins)			
using Hvo	rslev method r= 0.025m L= 3m R= 0.1m		Time	t (mins)			
using Hvo	rslev method r= <i>0.025m</i> L= <i>3m</i>		Time	t (mins)			
using Hvo	rslev method r= 0.025m L= 3m R= 0.1m		Time	t (mins)	6.12 x 10 ⁻⁷		/s

Hole ID Project Name Cambridge Waste Water Treatment Plant **Borehole Rising Head** BH_TUN_005B Relocation **Permeability Test** Ground Level Project No. TE8364 6.69m AOD Date Mott MacDonald Bentley Engineer 26/10.2021 Page **Barhale Limited** Client BS EN ISO 22282-2: 2012 1 of 2 Description Firm thinly laminated fissured bluish grey CLAY. (GAULT CLAY FORMATION) Type of test Installation type Standpipe All depths are relative to ground level. Initial ground water level 1.90 7.00 Top of test section Height of casing above surface 0.80 Bottom of test section 10.00 Length of test section 3.00 Water level at end of test 9.50 m m Diameter of test section 200 mm Diameter of casing/standpipe 50 mm 09:00 Quality of water used Water from borehole Test start time Weather Test finish time 10:00 Fine Time Depth to water Time Depth to water Log H/H0 Η Log H/H0 Н Minutes m Minutes m 0 10.00 8.10 0.00 0.5 9.98 8.08 0.00 1 9.91 8.01 0.01 1.5 9.88 7.98 0.01 2 9.84 7.94 0.02 9.77 2.5 7.87 0.03 9.71 3 7.81 0.04 3.5 9.67 7.77 0.04 4 9.65 7.75 0.04 4.5 9.64 7.74 0.05 5 9.58 7.68 0.05 6 9.56 7.66 0.06 7.64 7 9.54 0.06 9.54 7.64 0.06 8 9 9.54 7.64 0.06 10 9.54 7.64 0.06 12 9.53 7.63 0.06 14 9.53 7.63 0.06 16 9.53 7.63 0.06 18 9.53 7.63 0.06 20 9.53 7.63 0.06 25 9.53 7.63 0.06 30 9.52 7.62 0.06 40 9.52 7.62 0.06 50 9.51 7.61 0.06 9.50 7.60 0.06 60 Remarks Well dry after purging for <2 minutes. Recorded by: Andrew Yuen SOIL engineering Form No. SE PGR F 002 Revision No. 3.03 Issue Date 01/09/2010 Part of the Bachy Soletanche Group

Proje	ect Name	Cambridge Waste	e Water Treatment Plan	nt	Borehole Rising	Head	Hole BH_TUN	
Proje	ect No.	TE8364			Permeability	Test	Ground 6.69m	Level
Engii	neer	Mott MacDonald	Bentley				Date 26/10.2	e
Clien	nt	Barhale Limited			BS EN ISO 22282-2:	2012	Pag 2 of	е
Desc	ription	Firm thinly lamin	ated fissured bluish gr	ey CLAY.	(GAULT CLAY FORMATIO	DN)	2 01	
	of test	Standpipe	Installation ty	ype				-
	ıl ground wa		1.90	m	Top of test section		7.00	m BGL
		above surface	0.80	m	Bottom of test secti		10.00	m BGL
	th of test se		3.00	m	Water level at end of		9.50	m
Diam	eter of test	section	200	mm	Diameter of casing/	standpipe	50	mm
Ouali	ity of water	unad	Water from boreho	olo.	Test start time		0	9:00
Weat		useu	Fine	<u></u>	Test finish time			0:00
VVCac			Time		rescriman time			<u></u>
	0.070							
						V		
	0.060				×			
	0.060 —	*****	* * * * * * * * * * * * * * * * * * * 					
год Н/Но								
	0.050							
	-							
		- 						
	0.040	1						
		+						
	0.030							
_	0.030							
	0.020	<u> </u>						
		†						
	0.010							
	0.000	10	20	30	40	50	60	70
	U	10	20		me t (mins)	50	60	70
								_
	using Velo	city graph method	k = a .S/	/F	=	8.75 x 1	0 ⁻¹⁰ n	n/s
	where	α= 2.469 x 10	6 sec -1					
		S= <i>0.001963m</i> F= 5.539m	Z					
Reco	rded by: An	drew Yuen					(3)	- -
							SOIL ENGINEE	RING

Project Name	Cambridge Was	ste Water Treat	ment Plant	Bore	nole Ris	sing Hea	d		e ID
	Relocation							BH_TUI	
Project No.	TE8364			rei	meabii	lity Test		Ground 6.69m	
Engineer	Mott MacDona	ld Rentley						0.0311 Da	
Liigiileei	WOLL WISCOUNS	id Beritiey						29/10	
Client	Barhale Limited	I		BS E	N ISO 222	82-2: 2012			ge of 2
Description	Firm thinly lam	inated fissured	bluish grey CLAY	. (GAULT (CLAY FORN	MATION)			-
Type of test	Standpipe	Inst	allation type	Well noin	t or hole e	xtended in ur	niform	soil	
	elative to ground		and ton type	vven pon	1 01 11010 0	Ateriaca iii ai		3011	
Initial ground wa			2.04 m	Тор	of test sec	tion		7.00	m
Height of casing			0.80 m		om of test			10.00	m
Length of test se			3.00 m	Wat	er level at	end of test		9.75	m
Diameter of test	t section		50 mm	Diar	neter of ca	sing/standpi	ре	50	mm
Quality of water	used		m borehole		start time				09:00
Weather	T	Fine	T	lest	finish tim				10:00
Time	Depth to water	Н	Log H/H0		Time	Depth to wa	ater	Н	Log H/H0
Minutes	m			ľ	∕linutes	m			9
0	10.00	7.96	0.00						
0.5	9.82	7.78	0.02						
1	9.80	7.76	0.03						
1.5	9.79	7.75	0.03						
2	9.79	7.75	0.03						
2.5	9.79	7.75	0.03						
3	9.78	7.74	0.03						
3.5	9.78	7.74	0.03						
4	9.78	7.74	0.03						
4.5	9.78	7.74	0.03						
5	9.78	7.74	0.03						
6	9.78	7.74	0.03						
7	9.78	7.74	0.03						
8	9.78	7.74	0.03						
9	9.78	7.74	0.03						
10	9.78	7.74	0.03						
12	9.78	7.74	0.03						
14	9.78	7.74	0.03						
16	9.78	7.74	0.03						
18	9.78	7.74	0.03						
20	9.78	7.74	0.03						
25	9.78	7.74	0.03				+		
30	9.77	7.73	0.03				+		
40	9.75	7.71	0.03				+		
50	9.75	7.71	0.03						
60	9.75	7.71	0.03						
	00		1 0.00						
							+		
Remarks	1		1			1			
	fter purging for <	2 minutes.							
Recorded by: An	drew Yuen							SOIL ENGINE	epine
Form No. SE PO	GR F 002	Revision No.	3.03	Issue Date	01/09/2	010	Pa	rt of the Bachy Sole	
I OTTITIVO. SE PO	an 1 002	REVISION NO.	5.05	issue Dale	01/03/2	.010	ra	it of the bactly 5016	carione Group

Project No. TE8364 Engineer Mott MacDonald Bentley Client Barhale Limited BS EN ISO 22282-2: 2012 Description Firm thinly laminated fissured bluish grey CLAY. (GAULT CLAY FORMATION) Type of test Standpipe Installation type Well point or hole extended in uniform soil Initial ground water level 2.04 m Top of test section Height of casing above surface 0.80 m Bottom of test section Length of test section 3.00 m Water level at end of test Diameter of test section 50 mm Diameter of casing/standpipe Quality of water used Water from borehole Test start time Weather Fine Test finish time 0.035	10.00 9.75	m BGL m BGL m BGL
Engineer Mott MacDonald Bentley Client Barhale Limited BS EN ISO 22282-2: 2012 Description Firm thinly laminated fissured bluish grey CLAY. (GAULT CLAY FORMATION) Type of test Standpipe Installation type Well point or hole extended in uniform soil Initial ground water level 2.04 m Top of test section Height of casing above surface 0.80 m Bottom of test section Length of test section 3.00 m Water level at end of test Diameter of test section 50 mm Diameter of casing/standpipe Quality of water used Water from borehole Test start time Weather Fine Test finish time	Date 29/10/2021 Page 2 of 2 7.00 10.00 9.75 50	m BGL m BGL m mm
Client Barhale Limited Description Firm thinly laminated fissured bluish grey CLAY. (GAULT CLAY FORMATION) Type of test Standpipe Installation type Well point or hole extended in uniform soil Initial ground water level 2.04 m Top of test section Height of casing above surface 0.80 m Bottom of test section Length of test section 3.00 m Water level at end of test Diameter of test section 50 mm Diameter of casing/standpipe Quality of water used Water from borehole Test start time Weather Fine Test finish time 0.035	Page 2 of 2 7.00 10.00 9.75 50	m BGL m BGL m mm
Description Firm thinly laminated fissured bluish grey CLAY. (GAULT CLAY FORMATION) Type of test Standpipe Installation type Well point or hole extended in uniform soil Initial ground water level 2.04 m Top of test section Height of casing above surface 0.80 m Bottom of test section Length of test section 3.00 m Water level at end of test Diameter of test section 50 mm Diameter of casing/standpipe Quality of water used Water from borehole Test start time Weather Fine Test finish time	7.00 10.00 9.75 50	m BGL m mm
Type of test Standpipe Installation type Well point or hole extended in uniform soil Initial ground water level 2.04 m Top of test section Height of casing above surface 0.80 m Bottom of test section Length of test section 3.00 m Water level at end of test Diameter of test section 50 mm Diameter of casing/standpipe Quality of water used Water from borehole Test start time Weather Fine Test finish time	10.00 9.75 50 09:00	m BGL m mm
Initial ground water level 2.04 m	10.00 9.75 50 09:00	m BGL m mm
Height of casing above surface Length of test section So m Water level at end of test Diameter of test section Diameter of test section Diameter of casing/standpipe Quality of water used Weather Fine Test finish time 0.035 0.025	10.00 9.75 50 09:00	m BGL m mm
Length of test section Diameter of test section Diameter of casing/standpipe Quality of water used Weather Fine U.035 0.035 0.020	9.75 50 09:00	m mm
Diameter of test section 50 mm Diameter of casing/standpipe Quality of water used Water from borehole Test start time Weather Fine Test finish time 0.035 0.030	09:00	mm)
Quality of water used Water from borehole Test start time Weather Fine Test finish time 0.035 0.030 0.025	09:00)
0.035 0.030 0.025 0.020		
0.035 0.030 0.025 0.020		
0.030 0.025 0.020		
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0.005		_
		_
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N 10 90 M 10 10		
0.000 10 20 30 40 50 60		7 0
		. •
Time t (mins)		
Time Comms)		
using Velocity graph method $k = \alpha . S/F$ = 5.05×10^{-10}		
	m/s	
- 5.03 X IV	m/s	
	m/s	
where $\alpha = 1.425 \times 10^{-6} \text{ sec}^{-1}$	m/s	
where $\alpha = 1.425 \times 10^{-6} \text{ sec}^{-1}$ $S = 0.001963 \text{ m}^2$	m/s	
where $\alpha = 1.425 \times 10^{-6} \text{ sec}^{-1}$	m/s	
where α= 1.425 x10 ⁻⁶ sec ⁻¹ S= 0.001963m ² F= 5.539m	m/s	
where α= 1.425 x10 ⁻⁶ sec ⁻¹ S= 0.001963m ² F= 5.539m	m/s	
where $\alpha = 1.425 \times 10^{-6} \text{ sec}^{-1}$ $S = 0.001963 m^{2}$ $F = 5.539 m$ Recorded by: Andrew Yuen	m/s	—
where $\alpha = 1.425 \times 10^{-6} \text{ sec}^{-1}$ $S = 0.001963 m^{2}$ $F = 5.539 m$ Recorded by: Andrew Yuen Soil er	()	

Project Name	Cambridge Was Relocation	te Water Treatr	nent Plant		rehole Fal	_		e ID IN_016
Project No.	TE8364				Permeabil	ity Test		d Level m AOD
Engineer	Mott MacDonal	d Bentley					Da	ate ./2021
Client	Barhale Limited				BS EN ISO 2228	32-2: 2012		nge of 2
Description	Extremely weak	to very weak lo	ow to medium de	ensity	yellowish brow	n CHALK comp	oosed of calcareou	
Type of test	Standpipe		Illation type					
	lative to ground I	evel.			T 6.		4.50	
Initial ground wa Height of casing			4.89 m 0.49 m		Top of test sect		1.50 10.80	
Length of test se			0.49 m 9.30 m		Water level at 6		4.84	
Diameter of test			150 mm		Diameter of cas		50	m mm
						3 11		
Quality of water	used	Clean and	fresh		Test start time			10:30
Weather		Fine			Test finish time	9	_	10:35
Time	Depth to water	Н	Log H/H0		Time	Depth to wate	r H	Log H/H0
Minutes	m	• • • • • • • • • • • • • • • • • • • •	209 11/110		Minutes	m	''	209 11/110
0	4.30	0.59	0.00					
0.5	4.45	0.44	0.29					
1	4.53	0.36	0.49					
1.5	4.61	0.28	0.75					
2	4.66	0.23	0.94					
2.5	4.70	0.19	1.13					
3	4.76	0.13	1.51					
3.5	4.79	0.10	1.77					
4	4.82	0.07	2.13					
4.5	4.84	0.05	2.47					
							-	
							1	
							1	
				L				
Remarks	•							
							*	
			2.00		B		SOIL ENGINE	Control of the Contro
Form No. SE PC	GR F 002	Revision No.	3.03	Issue	Date 01/09/20	010	Part of the Bachy Sol	etanche Group

Project Name	Carrie City 147 -	. M.A T	. 1			lolo ID				
		e Water Treatment Plant	t B	orehole Fa <mark>ll</mark> ing He	au	lole ID TUN_016				
Project No.	Relocation TE8364			Permeability Test		und Level				
rioject No.	1E0304					l9m AOD				
Engineer	Mott MacDonald	Bentlev				Date				
ruânice.	THOSE INGOLOGICAL	. Donnie,				11/2021				
Client	Barhale Limited			DC FALIO 00000 0 0000		Page				
				BS EN ISO 22282-2: 2012		2 of 2				
Description	Extremely weak	to very weak low to med	lium densi	ty yellowish brown CHALK o	omposed of calcare	ous SILTSTONE.				
	•	•			•					
Type of test	Standpipe	Installation typ								
Initial ground v		4.89	m	Top of test section		50 m BGL				
	g above surface	0.49	m	Bottom of test section		.80 m BGL				
Length of test s		9.30	m	Water level at end of test	4.8					
Diameter of te	я ѕестюп	150	mm	Diameter of casing/standp	5 sqic	0 mm				
Quality of wate	erused	Clean and fresh		Test start time		10:30				
Weather	i useu	Fine		Test finish time		10:35				
44000[[C]		i nic		reserring time		10.33				
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0.500 -	0.5	1 1.5		2.5 3 3.5 et (mins)	4 4.	5 5				
0.500 -	0.5	1 1.5			4 4.	5 5				
0.500	0.5		Time	t (mins)		50%				
0.500			Time	t (mins)	4 4.1 1.48 x 10 ⁻⁶	5 5 m/s				
0.500	ocity graph method	k = α .S/P	Time	t (mins)		50%				
0.500 - 0.000 • 0.000	ocity graph method α= 0.009141	k = \alpha .S/F	Time	t (mins)		50%				
0.500 - 0.000 • 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ocity graph method α= 0.009141 S= 0.001963m	k = \alpha .S/F	Time	t (mins)		50%				
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0.500 - 0.000	ocity graph method α= 0.009141 S= 0.001963m	k = \alpha .S/F	Time	t (mins)		m/s				

Hole ID Project Name Cambridge Waste Water Treatment Plant **Borehole Rising Head** Relocation BH_TUN_016 **Permeability Test** Ground Level Project No. TE8364 10.19m AOD Date Mott MacDonald Bentley Engineer 11/11/2021 Page **Barhale Limited** Client BS EN ISO 22282-2: 2012 1 of 2 Description Extremely weak to very weak low to medium density yellowish brown CHALK composed of calcareous SILTSTONE. Type of test Installation type Well point or hole extended in uniform soil Standpipe All depths are relative to ground level. Initial ground water level 5.00 Top of test section 1.50 m Height of casing above surface 0.49 Bottom of test section 10.80 Length of test section 9.30 Water level at end of test 5.01 m m Diameter of test section 50 mm Diameter of casing/standpipe 50 mm 10:00 Quality of water used Water from borehole Test start time Weather Test finish time 10:08 Raining Time Depth to water Time Depth to water Η Log H/H0 Н Log H/H0 Minutes m Minutes m 0 6.92 1.92 0.00 0.5 6.51 1.51 0.24 1 5.95 0.95 0.70 5.74 0.74 1.5 0.95 2 5.46 0.46 1.43 2.5 5.24 0.24 2.08 3 5.20 0.20 2.26 3.5 5.17 0.17 2.42 4 5.12 0.12 2.77 4.5 5.09 0.09 3.06 5 5.05 0.05 3.65 6 5.03 0.03 4.16 7 5.02 0.02 4.56 5.01 0.01 5.26 8 Remarks Purged 87 litres in 18 minutes Recorded by: Andrew Yuen SOIL engineering 01/09/2010 Form No. SE PGR F 002 Revision No. 3.03 Issue Date Part of the Bachy Soletanche Group

Proje	ct Name	Cambridge Wast Relocation	e Water Treatment Pl	lant	Borehole Rising He	ad	Hole BH_TUN			
Proie	ct No.				Permeability Tes	t	Ground Level			
,-						10.19m AOD				
ngir	neer	Mott MacDonald	l Bentley				Date 11/11/2021			
lien	t	Barhale Limited			BS EN ISO 22282-2: 2012	2	Page 2 of 2			
)esci	ription	Extremely weak	to very weak low to n	nedium de	ensity yellowish brown CHALK	composed of	calcareous	SILTSTONE		
	of test	Standpipe	Installation	type	Well point or hole extended in	uniform soil				
	l ground w		5.00	m	Top of test section		1.50	m BGL		
		above surface	0.49	m	Bottom of test section		10.80	m BGL		
_	th of test se		9.30	m	Water level at end of test		5.01	m		
iam	eter of test	section	50	mm	Diameter of casing/stand	lpipe	50	mm		
Auga lie	ty of water	unad	Water from bore	holo	Test start time			0:00		
van Veat		usea	Raining	noie	Test finish time			0:08		
Teac	IICI		Raining		rescription three			0.00		
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	using Velo	city graph method	$k = \alpha$.	.S/F	=	1.77 x 10 ⁻⁶	r	n/s		
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	where	α= 0.01095	sec -1							
		S= 0.001963m	n ²							
		F= 12.116m	,							
ecoi	rded bv: An	drew Yuen				Τ				
						-	(1)			
							it enginee			
rm f	vo. SE PC	GRF 003 R	Revision No. 3.04		Issue Date 24/01/2014	Part of t	he Bachy Soleta	anche Group		

Project Name Project No.	Cambridge Was Relocation TE8364	te Water Treatr	nent Plant		orehole Ris Permeabil	_	Hole BH_TU Ground	N_016 Level
Engineer	Mott MacDonal	d Bentley					10.19n Da 11/11	te
Client	Barhale Limited				BS EN ISO 222	82-2: 2012	Pa ₂	ge
Description	Extremely weak	to very weak lo	ow to medium de	ensity	yellowish brov	vn CHALK comp	osed of calcareou	
Type of test	Standpipe	Insta	Illation type					
All depths are re	lative to ground l	evel.						
Initial ground w			5.00 m		Top of test sect		1.50	m
Height of casing			0.49 m		Bottom of test		10.80	m
Length of test se			9.30 m		Water level at		5.02	m
Diameter of test	section		50 mm		Diameter of ca	sing/standpipe	50	mm
Quality of water	used	Water fro	n borehole		Test start time			L5:30
Weather		Raining			Test finish time	е	-	15:38
Time	Depth to water				Time	Depth to water		
Minutes	m m	Н	Log H/H0		Minutes	m m	Н	Log H/H0
0	6.68	1.68	0.00					
0.5	6.30	1.30	0.00					
1	6.12	1.12	0.41					
1.5	5.94	0.94	0.58					
2	5.84	0.84	0.69					
2.5	5.72	0.72	0.85					
3	5.60	0.60	1.03					
3.5	5.44	0.44	1.34					
4	5.26	0.26	1.87					
4.5	5.18	0.18	2.23					
5	5.11	0.11	2.73					
6	5.06	0.06	3.33					
7	5.02	0.02	4.43					
8	5.01	0.01	5.12					
Damarilia								
Remarks Purged 87	litres in 18 minu	tes						
Recorded by: An	drew Yuen						soil engine	ering
Form No. SE PC	GR F 002	Revision No.	3.03	Issue	Date 01/09/2	010	Part of the Bachy Sole	tanche Group

Proje	ct Name	Cambridge Waste Water Treatmen	it Plant	Borehole Rising Head	Hole IC)
ĺ ´		Relocation			BH_TUN_	016
Proje	ct No.	TE8364		Permeability Test	Ground Le	
					10.19m A	OD
Engir	neer	Mott MacDonald Bentley			Date	24
ļ					11/11/20	21
Clien	it	Barhale Limited		BS EN ISO 22282-2: 2012	Page 2 of 2	
Descr	ription	Extremely weak to very weak low t	o medium de	ensity yellowish brown CHALK com	posed of calcareous S	ILTSTONE.
	of test	Standpipe Installat	ion type			-
	l ground w			Top of test section	1.50	m BGL
		above surface 0.4		Bottom of test section	10.80	m BGL
	th of test se			Water level at end of test	5.02	m
Diam	eter of test	section 50	0 mm	Diameter of casing/standpipe	50	mm
O 111		and little from h	a ab ala	Total short time	45.5	30
	ty of water		orenoie	Test start time	15:	
Weat	ner	Raining		Test finish time	15:	38
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	usina Vala	city graph method k =	=α <i>.S/F</i>		2 40-6	-
	using vero			= 1.7	3 x 10 ⁻⁶ m/	S
	using velo					
	_	$0 = 0.01069 \text{ cm}^{-1}$				
	where	α= 0.01068 sec ⁻¹				
	_	S= 0.001963m ²				
	_					
	where	S= 0.001963m ² F= 12.116m		<u> </u>		
	_	S= 0.001963m ² F= 12.116m			•	
	where	S= 0.001963m ² F= 12.116m		Issue Date 24/01/2014	SOIL ENGINEER	

Project Name	•	ste Water Treatn	nent Plant	Во	rehole Fal	ling Head		e ID IN_018	
Project No.	Relocation TE8364				Permeabil	ity Test		d Level	
								m AOD	
Engineer	Mott MacDona	ld Bentley						ate ./2021	
Client	Barhale Limited	d			BS EN ISO 222	82-2: 2012	Pa	nge of 1	
Description	Structureless C	HALK overlying	extremely weak	to ve	ry weak low to	medium density			
T of to at	very weak to w	eak medium to h	nigh density CHA	ALK a	t 7.70m.				
Type of test	Standpipe elative to ground		llation type						
Initial ground wa	ater level	ievei.	4.19 m		Top of test sect	tion	1.50 m		
Height of casing	above surface		0.30 m		Bottom of test	section	10.20) m	
Length of test se			8.70 m		Water level at		4.19 m		
Diameter of test	section		200 mm		Diameter of ca	sing/standpipe	50	mm	
Quality of water	used	Clean and	fresh		Test start time			07:50	
Weather	uscu	Raining	110311		Test finish time			07:50	
Time	Depth to water				Time	Depth to water			
Minutes	m	Н	In H₀/H		Minutes	m	Н	Log H/H0	
						 			
Remarks	•	•				•	•		
Test failed	. Water level did	not change afte	r putting 60 litre	s of v	water into stand	pipe.			
Recorded by: An	drew Yuen						SOIL engine	eering	
Form No. SE PO	GR F 002	Revision No.	3.03	Issue	Date 01/09/2	010	Part of the Bachy Sol	etanche Group	

Project Name	Cambridge Was	te Water Treati	ment Plant		Rising He	Br	Hole ID H_TUN_018		
Project No.	TE8364			Permea	ability Test	G	round Level 0.28m AOD		
Engineer	Mott MacDonal	d Bentley					Date 1/11/2021		
Client	Barhale Limited			BS EN ISO	22282-2: 2012		Page 1 of 2		
Description			extremely weak		w to medium de	nsity CHALK at 3	3.44m, overlying		
Type of test	very weak to we Standpipe	eak medium to	high density CH <i>I</i> allation type	ALK at 7.70m.					
	elative to ground l		anation type						
Initial ground w			4.25 m	Top of test	section	1.50 m			
Height of casing			0.30 m		test section	10.20 m			
Length of test se			8.70 m		el at end of test	4.26 m			
Diameter of test	t section		200 mm	Diameter	of casing/standp	oipe	50 mm		
Quality of water	rused	Water fro	m borehole	Test start	time		09:00		
Weather	uscu	Raining	in borenoie	Test finish			09:10		
Time	Depth to water			Time		water			
Minutes	m	Н	In H₀/H	Minute	1 '	H	Log H/H0		
0	4.50	0.25	0.00						
0.5	4.45	0.20	0.22						
1	4.41	0.16	0.45				1		
1.5	4.34	0.09	1.02						
2	4.33	0.08	1.14						
2.5	4.32	0.07	1.27						
3	4.30	0.05	1.61						
3.5	4.29	0.04	1.83						
4	4.29	0.04	1.83						
4.5	4.28	0.03	2.12						
5	4.28	0.03	2.12						
6	4.27	0.02	2.53						
7	4.27	0.02	2.53						
8	4.26	0.01	3.22						
9	4.26	0.01	3.22						
	+			<u> </u>					
	+ -								
	+ -								
	+								
	†								
	†								
Remarks Purged 90) litres in 20 minu	tes.							
Recorded by: An	ndrew Yuen								
						SOIL en	GINEERING		
orm No. SE PO	GR F 002	Revision No.	3.03	Issue Date 01	/09/2010	Part of the Bad	chy Soletanche Group		

Proje	ect Name	Cambridge Waste \	Nater Treatment Pla	ant	Borehole R	ising Head		Hole II 3H_TUN_			
Proie	ect No.	TE8364			Permeab	ility Test		Ground L			
								10.28m	AOD		
Engi	neer	Mott MacDonald B	entley					Date 11/11/2			
Clier	nt	Barhale Limited			BS EN ISO 22	2282-2: 2012		Page 2 of 2			
Desc	ription	Structureless CHAL	K overlying extreme	ely weak	to very weak low t	o medium densi	ty CHALK at				
			medium to high dei		LK at 7.70m.						
	of test	Standpipe	Installation		IT C			4.50	DCI.		
	al ground w	ater level g above surface	4.25 0.30	m m	Top of test se Bottom of te			1.50 10.20	m BGL m BGL		
	th of test s		8.70	m	Water level a			4.26	m		
	neter of test		200	mm		casing/standpip	•••				
	ity of water	rused	Water from boreh	nole	Test start tim				:00		
Veat	ther		Raining		Test finish ti	me		09	:10		
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				Ti	ime t (mins)						
	using Valo	ocity graph method	$k = \alpha . 3$	S/E			_				
	using vere	city graph method	N - U.S.	<i>37 1</i>		= 9.	57 x 10 ⁻⁷	m	/s		
	where	α= <i>0.005963 s</i>	ec ⁻¹								
		S= 0.001963m ² F= 12.234m									
0000	rdad by: An	drew Yuen		Т	=						
1500	n ded by: An	IGIEW TUEII									
								engineer			
ormi	No. SE PO	GR F 003 Rev	ision No. 3.04		Issue Date 24/01	/2014	Part of the I	Bachy Soletar	iche Group		

Project Name	Cambridge Was	te Water Treati	nent Plant			sing Hea			e ID IN_018
Project No.	TE8364			Per	meabi	lity Test			d Level m AOD
Engineer	Mott MacDonal	d Bentley							ate ./2021
Client	Barhale Limited	l		BS E	N ISO 222	282-2: 2012		Pa	ge of 2
Description	Structureless Ch	HALK overlying	extremely weak	to verv we	ak low to	medium der	nsity CI		
·	very weak to we	eak medium to	high density CH	-					.,,g
Type of test	Standpipe		allation type						
	elative to ground I	evel.	/ 25	Τ	£ 4 4	***		1 50	
Initial ground w Height of casing			4.25 m 0.30 m		of test sec om of test		1.50 m 10.20 m		
Length of test so			8.70 m			end of test		4.26	
Diameter of test			200 mm			asing/standp	ipe	50	mm
Quality of water	rused	Water fro	m borehole	Test	start time	2			12:50
Weather		Raining	55.511010		finish tim				13:00
Time	Depth to water				Time	Depth to w	/ater		
Minutes	m	Н	In H₀/H		linutes	m		Н	Log H/H0
0	4.52	0.27	0.00			+			
0.5	4.47	0.22	0.20			+			
1	4.42	0.17	0.46			1			
1.5	4.35	0.10	0.99						
2	4.34	0.09	1.10						
2.5	4.32	0.07	1.35						
3	4.31	0.06	1.50						
3.5	4.31	0.06	1.50						
4	4.30	0.05	1.69						
4.5	4.29	0.04	1.91						
5	4.29	0.04	1.91						
6	4.28	0.03	2.20						
7	4.28	0.03	2.20						
8	4.27	0.02	2.60						
9	4.27	0.02	2.60						
10	4.26	0.01	3.30						
							-		
Remarks				<u> </u>		1			
Purged 90	litres in 20 minu	tes.							
Recorded by: An	ndrew Yuen								
Form No. CF 50	CD E 002	Dovicion No	2.02	Jeona D-+-	01 /00 "	2010		SOIL ENGINE	
Form No. SE PO	GR F 002	Revision No.	3.03	Issue Date	01/09/2	2010	Pa	art of the Bachy Sol	etanche Group

Proje	ect Name	_	Water Treatment Plan	nt	Borehole Rising Hea	IU I	Hole ID	_
Droid	ect No.	Relocation TE8364			Permeability Test		_TUN_018 ound Level	
Proje	ect No.	168304			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,).28m AOD	
Engi	ineer	Mott MacDonald	Bentley				Date	
- 3			,			11	1/11/2021	
Clier	nt	Barhale Limited			BS EN ISO 22282-2: 2012		Page	
			-				2 of 2	
Desc	cription			-	to very weak low to medium den	sity CHALK at 3.	44m, overlyir	ng
Tuna	of test	Very weak to weal Standpipe	k medium to high den Installation t		LK at 7.70m.			_
		vater level	4.25	m m	Top of test section		L.50 m E	BGL
		g above surface	0.30	m	Bottom of test section			BGL
	th of test s		8.70	m	Water level at end of test	4	4.26 m	
Diam	neter of te	st section	200	mm	Diameter of casing/standpi	ipe	50 mn	n
								_
	ity of wate	rused	Water from boreho	ole	Test start time		12:50	0
Weat	ther		Raining		Test finish time		13:00	
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				Т	ime t (mins)			
	using Vel	ocity graph method	$k = \alpha . S_{c}$	/F		7		
	•	, , ,			=	8.82 x 10 ⁻⁷	m/s	
	where	α= <i>0.0055 s</i>	ec -1					
		S= 0.001963m						
		F= 12.234m						
Reco	orded by: A	ndrew Yuen				4		
						SOIL AD	GIN ee RING	
Form	No. SE E	PGR F 003 Re	evision No. 3.04		Issue Date 24/01/2014		ny Soletanche Grou	ın
W III	.vo. JE F	an i ood - ne	. TIGIOTI ITO. 3.04		24/01/2014	rail of the pact	y succentile CEO	-1-



SUPPORTING FACTUAL DATA

or appointed values as name

SECTION A

Exploratory Hole Records and Field Data

CELL MANAGEMENTS ADMITTED BY

GROUNDWATER / GAS MONITORING RESULTS

Project Name	Camb Reloca		aste W	ater Tr	eatment Plar	nt		Ground	dwate	er			
Project No.	TE836							Readir Install					
Engineer	Mott	MacDoi	nald Be	ntley				instail	ation	5	Sh	eet No.	-
Client	Barha	le Limit	ed										
NOTES:	For m		nstallat	ions at	the same de			t Installation standpipes =			the field is op	tional.	
COMMENTS													
		Installatio	on Details					Recorde	d Water Le	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_TUN_011	SP	m 5.00	5.00	S1	dd/mm/yyyy 15/10/2021	hh:mm 09:47	m 1.76	dd/mm/yyyy	hh:mm	m	dd/mm/yy yy	hh:mm	m
511_1414_011	- 01	3.00	3.00	J1	13/10/2021	03.41	1.70						
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Recorded by:			Ch	ecked	by:	App	roved by	r :					
Date:			Da			Dat				S	DIL ENGINE	ering	
Form No. SE	-PGR-F-	-008	İssi	ıe.Revis	ion No. 2.05	Issu	e Date	24/01/201	4	Part o	of the Bachy Soleta	nche Group	ı

-														
Project Name	Camb Reloc	_	aste Wa	iter Ti	eatment Plar	nt		Ground	dwate	er				
Project No.	TE836							Readir Install	-			Sheet No.		
Engineer	Mott	MacDo	nald Ber	ntley				instail	ation	S	Sh	eet No.	-	
Client	Barha	le Limit	ed											
NOTES:			eter, SP=				1.66				2 % 2			
					t the same de p <mark>iezometers</mark>							itional.		
COMMENTS							,							
		Installatio	on Details				.,	Recorde	d Water L	evel				
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading	
BH_STW_013C	SP	m 1.50	m 1.50	C1	dd/mm/yyyy 24/09/2021	hh:mm	DRY	dd/mm/yyyy 01/10/2021	hh:mm	m DRY	dd/mm/yyyy	hh:mm 09:55	m DRY	
BU_21AA_012C	3P	1.50	1.50	G1	15/10/2021	10:35 10:23	DRY	01/10/2021	12:10	DKT	08/10/2021	09:55	UKT	
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Project Name	Camb Reloca		laste Wa	ater Tr	eatment Plan	ıt		Ground	dwate) T			
Project No.	TE836							Readin Install	-				
Engineer	Mott	MacDor	nald Ben	ıtley				llistan	ation	S	Sh	eet No.	
Client	Barha	ile Limite	ed										
NOTES:	For m	ıultiple i		ions at	t the same de							tional.	
COL 41 AFRITO	Monit	toring p	o <mark>i</mark> nt dep	th for	p <mark>iezometers</mark>	= tip de	pth, for s	tandpipes =	base of r	esponse	zone		
COMMENTS													
			on Details					Recorde	d Water Le	avel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
	SP	9.70	m 10.20	S1	dd/mm/yyyy 01/10/2021	hh:mm 09:35	3.95	dd/mm/yyyy 08/10/2021	hh:mm 09:44	m 3.98	dd/mm/yyyy 15/10/2021	hh:mm 13:18	m 4.04
011_1014_010	Ji	3.10	10.20	35	OB 10 ZOZI	03.03	4.55	V0) 10/ 2021	VJ.7 1	3.50	13/10/2021	13.10	4.01
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Date:			Dat	te:		Dat	:e:			Si	oit engine	ering	
Form No. SE-	-PGR-F-	-008	İssu	e.Revis	ion No. 2.05	Issu	e Date	24/01/2014	4		of the Bachy Soleta		

Project Name		_	laste Wa	ater Tr	eatment Plar	nt		Ground	dwate	}r			
Project No.	Reloca TE836							Readin Install	_				
Engineer	Mott	MacDor	nald Ber	ntley				instail	ation	S	Sh	eet No.	-
Client	Barha	le Limite	ed										
NOTES:	For m		nstal <mark>l</mark> ati	ions at	dpipe t the same de piezometers							tional.	
COMMENTS													
		Installatio	on Details	,				Recorde	d Water Le	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_TUN_016	SP	9.70	m 10.20	S1	dd/mm/yyyy 24/09/2021	hh:mm 09:39	m 4.73	dd/mm/yyyy 01/10/2021	hh:mm 10:10	m 4.80	dd/mm/yyyy 08/10/2021	hh:mm 11:07	m 4.83
					15/10/2021	11:16	4.86						
Recorded by:			Che	ecked	by:	App	proved by	r: 					
Date:			Dat								oir eugine		
Form No. SE-	-PGR-F-	-008	issu	ue.Revisi	ion No. 2.05	Issu	e Date	24/01/2014	4	Part c	of the Bachy Soleta	inche Group	١

Project Name	Camb Reloc	_	/aste Wa	ater Ti	reatment Plar	nt		Ground	dwat	er			
Project No.	TE836							Readir Install	-				
Engineer	Mott	MacDo	nald Ber	ntley				instail	ation	IS	Sh	eet No.	=======================================
Client	Barha	le Limit	ed										
NOTES:			eter, SP:			_					0 1.17.		
					t the same de p <mark>iezometers</mark>							itional.	
COMMENTS	101011	torning p	on a cop		piozomotoro	<u> - пр а</u> с	JP111, 101	zanapipos –	<u> </u>	Тороно	20110		
	ı	lacta llatic	on Details		ı			Doggedo	d Water I	aval.			
								Recorde	d water t	.evei	<u> </u>		
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
DIL TIM OOC	CD	m 250	m -	Ca	dd/mm/yyyy	hh:mm	m 3.71	dd/mm/yyyy	hh:mm	m 3.71	dd/mm/yyyy	hh:mm	m
BH_TUN_006	SP	3.50	3.50	G1	08/10/2021	12:17	3.71	08/10/2021	12:17	3.71	15/10/2021	08:39	3.68
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Date:			Dat			Dat				S	DIL ENGINE	ering	
Form No. SE	-PGR-F	-008	İssu	e.Revis	ion No. 2.05	Issu	e Date	24/01/201	4	Part o	of the Bachy Soleta	nche Group	

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Project Name	Camb: Reloca	_	/aste W	ater Tr	reatment Plan	ıt		Ground		275			
Project No.	TE836							Readin Install					
Engineer	Mott	MacDor	nald Be	ntley				Illətan	ation	3	Sh	eet No.	
Client	Barha	ıle Limite	ed										
NOTES:		Piezome						<u> </u>			o 1. W.		
					t the same de piezometers							tional.	
COMMENTS	1010	ioning r	011.12	P (1.12.	prozenica	- v.F	-paris	.co.rep.h	<u></u>		Lone		
		Installatio	on Detail:	s				Recorde	d Water Le	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_TUN_006	SP	m 6.00	m 6.00	S1	dd/mm/yyyy	hh:mm	M 4.67	dd/mm/yyyy 08/10/2021	hh:mm	m 4.47	dd/mm/yyyy 15/10/2021	hh:mm	m 4.41
RH_IMIN_000	25	6.00	6.00	21	08/10/2021	12:16	4.47	08/10/2021	12:16	4.41	15/10/2021	08:38	4.41
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Recorded by:			Ch	necked	by:	Apr	proved by	<i>r</i>					
Date:			Da	ate:		Dat	te:			S	oır engine	ering	
Form No. SE-	-PGR-F-	-008	155	ue Revisi	ion No. 2.05	Issu	e Date	24/01/2014	4	Part (of the Bachy Soleta	anche Grour	0

Project Name		_	'aste Wa	iter Tr	eatment Plar	nt		Ground	dwate)r			
Project No.	Reloca TE836							Readin Install	-				
Engineer	Mott	MacDor	nald Ben	ıtley				instaii	ation	5	Sh	eet No.	
Client	Barha	le Limite	ed										
NOTES:							1:66		15 01				
												tional.	
COMMENTS					<u> </u>								
								Recorde	d Water Le	evel .			
Exploratory Hole ID	Туре	Depth to base of pipe	.	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_TUN_005B	SP	m 10.00	m 10.00	S1	dd/mm/yyyy 28/09/2021	hh:mm 11:56	m 4.39	dd/mm/yyyy 01/10/2021	hh:mm 10:30	m 4.45	dd/mm/yyyy 08/10/2021	hh:mm 12:08	m 1.97
DII_1011_0002		10.00	10.00	01	15/10/2021	08:24	1.91	01/10/2021	10.00	7.10	00/10/10/1	12.00	1.0.
			rometer, SP=Standpip ple installations at the ng point depth for pie allation Details Output Outp							-			
				i i									0.0
				10						-			
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Recorded by:			Che	ecked	by:	Apr	proved by	r:)s
Date:			Dat			Dat					oir eugine		
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Engineer Mott MacDonald Bentley Sheet No. Sheet No. Sheet No.												1		
Readings	Project Name			laste Wa	ater Ti	reatment Plar	nt							
Client Barhale Limited Sheet No. S	Project No.									-				
NOTES: SPIE-Piezometer, SP-Standpipe For multiple installations at the same depth, use different installation IDs. Otherwise, the field is optional. Monitoring point depth for piezometers = tip depth, for standpipes = base of response zone COMMENTS	Engineer	Mott	MacDoi	nald Ber	ntley				IIIStan	ation	S	Sh	eet No.	
For multiple installations at the same depth, use different installation IDs. Otherwise, the field is optional. Monitoring point depth for piezometers = tip depth, for standpipes = base of response zone	Client	Barha	ıle Limit	ed										
	NOTES:	For m	nultiple i	insta <mark>ll</mark> ati	ions at	t the same de							otional.	
Stylestory Hole 10 10 10 10 10 10 10 1	COMMENTS	Monit	toring p	oint dep	th for	piezometers	s = tip de	epth, for s	standpipes =	base of	response	zone		
Exploratory Hole ID Page Fig. Page	CONTINUE													
Mathematical Mat				_	i				Recorde	d Water L	evel			
BH_TUN_001PM 8P 1.50 1.50 61 24/09/2021 10/21 12/3 01/10/2021 10/25 12/8 08/10/2021 12/0 12/0 12/0 13/09/2021 12/0 12/0 12/0 12/0 12/0 12/0 12/0	Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID			Reading		Time	Reading			Reading
	DU TIM ONIDM	- cp		_	G1				V					
Recorded by: Checked by: Date:	BH_10N_0015M	21	1.50	1.50	GI				01/10/2021	10:25	1.25	08/10/2021	12:01	1.29
Date: Date: Soil engineering							-							-
Date: Date: Soil engineering														
Date: Date: Soil engineering		-	-	-	-									
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Date: Date: Soil engineering		+	-		-	 					-			
Date: Date: Soil engineering														
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Project Name	Camb Reloca	_	/aste Wa	ater Tr	eatment Plar	nt		Ground		250			
Project No.	TE836							Readir Install	-				
Engineer	Mott	MacDoi	nald Ber	ntley				instaii	ation	5	Sh	eet No.	-
Client	Barha	le Limit	ed										
NOTES:			eter, SP:								0 5 55		
					t the same de piezometers							tional.	
COMMENTS	IVIOIIII	toring p	o <mark>nit de</mark> p	itii ioi	piezometers	= up ue	pin, ioi s	statiupipes =	Dase Oil	esponse	ZONE		
			on Details			_	,	Recorde	d Water L	evel			,
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_TUN_001A	SP	m 4.25	m 4.75	S1	dd/mm/yyyy 24/09/2021	hh:mm 10:16	m 1.28	dd/mm/yyyy 01/10/2021	hh:mm 10:20	m 1.35	dd/mm/yyyy 08/10/2021	hh:mm 11:59	m 1.30
BII_IGIN_001A	JF	7.23	7.73	31	15/10/2021	08:19	1.28	01/10/2021	10.20	1.00	00/10/2021	11.33	1.50
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Recorded by:	_		Che	cked	by:	Apr	proved by	r:					
Date:			Dat			Dat				e 4	DIL ENGINE	ביחום <i>ב</i>	
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Project Name			aste Wa	ater Tr	eatment Plar	nt		Ground	dwate	er			
	Reloca TE836							Readir					
Engineer	Mott	MacDoi	nald Ber	ntley				Install	ation	S	Sh	eet No.	
Client	Barha	le Limit	ed										
	For m	ultiple i		ons at	the same de			t Installation standpipes =				tional.	
COMMENTS													
			on Details					Recorde	d Water Lo	evel		_	
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_STW_031B	SP	m 13.60	m 13.60	S1	dd/mm/yyyy 15/10/2021	hh:mm 11:01	7.39	dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m
BI1_3144_031B	JF	13.00	13.00	31	13/10/2021	11.01	1.05	-					- 15
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Recorded by:			Che	ecked	bv:	Apr	roved by	r:					
Date:			Dat		_ _	Dat		· -		_			
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Project Name			aste W	ater Tr	eatment Plar	nt		Ground	dwate	er			
Project No.	Reloca TE836							Readir Install	-				
Engineer	Mott	MacDor	nald Be	ntley				IIIStaii	ation	>	Sh	eet No.	
Client	Barha	le Limite	ed										
NOTES:	For m		nstal <mark>l</mark> at	ions at	the same de			t Installation standpipes =				tional.	
COMMENTS		3 F					P/						
		Installatio	on Details	. /				Recorde	d Water L	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_STW_010B	SP	m 12.00	m 12.00	S1	dd/mm/yyyy 15/10/2021	hh:mm 10:53	m 3.98	dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m
PH_2166_010B	3P	12.00	12.00	21	15/10/2021	10.55	3.90						
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Reco <mark>rd</mark> ed by:			Ch	ecked	by:	App	proved by	<i></i>]				
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Project Name Project No.	Camb Reloc TE836	ation	/aste Wa	ater Ti	reatment Pla	nt		Groun Readii					
Engineer			nald Ber	ntley				Install	_		Sh	eet No.	-
Client	Barha	ıle Limit	ed										
NOTES:	For m	ultiple i		ons a	t the same de							tional.	
COMMENTS	Молі	toring p	oint dep	oth for	⁻ pi <mark>ezometers</mark>	s = tip de	epth, for s	standpipes =	base of	response	zone		
		Installatio	on Details		<u> </u>			Recorde	d Water L	evel			-
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_FE_001	SP	m 2 EO	m 3.90	C1	dd/mm/yyyy 20/08/2021	hh:mm	m 1.01	dd/mm/yyyy	hh:mm	m 111	dd/mm/yyyy 10/09/2021	hh:mm	m 1.12
BH_FE_001	2P	3.50	3.90	S1	17/09/2021	12:41 08:59	1.01 0.93	03/09/2021	10:06 11:47	0.88	15/10/2021	08:31 09:26	0.91
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Recorded by:			Che	ecked	<u>l</u> ∐by:	Ap	proved by	<u> </u> 					
Date:			Dat			Dat				S	DIL ENGINE	ering	
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Project Name	Cambi Reloca	_	laste W	ater Tr	reatment Plan	ıt		Ground					
Project No.	TE836							Readin Install	-				
Engineer	Mott !	MacDor	nald Ber	ntley				Шэш	ativii	3	Sh	eet No.	
Client	Barha	le Limite	ed										
NOTES:		Piezome						·			o 1. 15.		
					t the same de piezometers							tional.	
COMMENTS	INIO	Willia F.	<u> </u>	<u> </u>	Piozomess	_ rib =-	prily ioi -	remapipes .		СОРОПО	Lonc		
		Installatio	on Details	5	ſ <u></u>			Recorde	d Water Le	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
D11 FF 003	CD.	m	m F 00		dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m
BH_FE_002	SP	4.00	5.00	S1	03/09/2021	09:49 11:30	2.33	10/09/2021 15/10/2021	08:58 09:15	2.36 2.32	17/09/2021	09:12	2.38
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Project Name	Reloca	_	/aste vv	/ater ir	reatment Plar	ıt		Ground					
,	TE836							Readin Install	-				
Engineer	Mott !	MacDor	nald Be	ntley				Histori	ativi		Sh	eet No.	
Client	Barha	ıle Limite	ed										
NOTES:		Piezome					**		:- 0.1		9 % 30.		
					t the same de piezometers							itional.	
COMMENTS	10.20	ioning r	U	P*****	P1		Pary	seriel-l-	5-1 -2-2-2				
		Installatio	on Detail:	s				Recorde	d Water Le	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_STW_001	SP	9.00	9.50	S1	dd/mm/yyyy 06/08/2021	hh:mm 12:59	m 4.54	dd/mm/yyyy 13/08/2021	hh:mm 10:02	m 4.42	dd/mm/yyyy 20/08/2021	hh:mm 12:27	m 4.53
011_0144_001		2.00	3.30	- 51	08/10/2021	11:13	4.81	15/10/2021	11:21	4.83	207 007 2021	15.6.	4.50
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Project Name	Camb Reloca		/aste Wa	ater Tr	eatment Plar	nt		Ground	dwate)r			
Project No.	TE836							Readin Install	-				
Engineer	Mott	MacDor	nald Ber	ntley				IIIStali	ation	3	Sh	eet No.	
Client	Barha	le Limite	ed										
NOTES:			eter, SP=								0.5.5		
					t the same de piezometers							tional.	
COMMENTS	10101111	ornig p	onit dop		piczomictero	, <u> </u>	ptil, 101 c	remapipes =	<u> </u>	соропос	Zone		
			on Details					Recorde	d Water Le	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date dd/rom/sees	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_STW_005A	SP	9.50	10.00	S1	dd/mm/yyyy 24/09/2021	hh:mm 09:32	m 3.23	dd/mm/yyyy 01/10/2021	hh:mm 09:40	m 3.55	dd/mm/yyyy 08/10/2021	hh:mm 09:37	m 3.41
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Date:			Dat			Dat				C (OIL ENGINE	ADIOG	
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Project Name	Camh	ridae V	/aste W	ater Tr	eatment Plai	nt		Groun	duncata				
roject Hame	Reloc	_	14010 11	110. 11	outmont in			5/47					
Project No.	TE836	54						Readir					
Engineer	Mott	MacDo	nald Be	ntley				Install	lation	S	Sh	eet No.	
Client	Barha	le Limit	ed										
NOTES:		Piezom			dpipe t the same de		- differen	*	IDa Oth		he field in on	+:!	
		•			r the same de piezometers					•		icional.	
COMMENTS		<u>5 F</u>											
		Installatio	n Details		1				d Water L	evel			
Exploratory Hole ID		Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
		m	m		dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m
BH_STW_009	SP	3.00	12.00	G1	06/08/2021	13:40	DRY	13/08/2021	09:50	DRY	20/08/2021	08:04	DRY
					03/09/2021	09:27	DRY	06/09/2021	08:26	DRY	07/09/2021	08:04	DRY
					08/09/2021	08:20	DRY	09/09/2021	08:14	DRY	10/09/2021	09:34	DRY
					13/09/2021	10:15	DRY	14/09/2021	15:29	DRY	15/09/2021	14:15	DRY
					16/09/2021 21/09/2021	08:23 09:13	DRY	17/09/2021 22/09/2021	13:05 08:03	DRY	20/09/2021	10:32 09:17	DRY
					24/09/2021	08:27	DRY	27/09/2021	08:25	DRY	01/10/2021	09:30	DRY
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Project Name			/aste W	ater Ti	eatment Plai	nt		Groun	dwate	er -			
Project No.	Reloc TE836							Readin	_				
Engine <mark>er</mark>	Mott	MacDo	nald Be	entley				Install	ation	S	Sh	eet No.	-
Client	Barha	le Limit	ed										
NOTES:	For m		nstalla	tions a	t the same de							tional.	
	Мопі	toring p	oint de	pth for	p <mark>iezometers</mark>	= tip de	epth, for s	standpipes =	base of	response	zone		
COMMENTS													
		Installatio	on Detail	s				Recorde	d Water L	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
		m	m		dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m
BH_STW_009	SP	12.00	12.00	S1	06/08/2021	12:34	3.80	13/08/2021	09:50	3.91	20/08/2021	12:57	4.02
					03/09/2021	09:25 08:22	4.23	06/09/2021	08:23 08:13	4.84	07/09/2021 10/09/2021	08:03	4.94
					08/09/2021 13/09/2021	10:14	4.96 5.07	14/09/2021	15:28	4.96 5.07	15/09/2021	09:33 14:16	4.36 5.09
					16/09/2021	08:24	5.11	17/09/2021	13:04	4.48	20/09/2021	10:31	5.18
					21/09/2021	09:12	5.20	22/09/2021	08:02	5.21	23/09/2021	09:16	5.21
					24/09/2021	08:26	5.19	27/09/2021	08:24	5.23	01/10/2021	09:30	5.15
					08/10/2021	09:44	4.76	15/10/2021	11:10	4.82			
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Project Name	Camb Reloca		/aste Wa	ater Tr	reatment Plar	nt		Ground	dwate)r			
Project No.	TE836							Readin Install	-				
Engineer	Mott	MacDor	nald Ben	ıtley				llistan	ation	S	Sh	eet No.	3
Client	Barha	le Limite	ed										
NOTES:	For m	ultiple i		ions at	t the same de							itional.	
COMMENTS	Monit	toring p	o <mark>i</mark> nt dep	th for	p <mark>iezometers</mark>	; = tip de	pth, for s	tandpipes =	base of I	esponse	zone		
COMMENTS													
			on Details				-	Recorde	d Water Le	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	D	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_STW_011B	SP	m 9.20	9.70	S1	dd/mm/yyyy 24/09/2021	hh:mm 09:13	3.12	dd/mm/yyyy 01/10/2021	hh:mm 09:45	m 3.20	dd/mm/yyyy 08/10/2021	hh:mm 09:13	3.27
UII_0144_0110		J.E.	J., C	01	15/10/2021	10:28	3.25	VI) 10/ 2021	00.10	Jie	00 10, 2021	00.10	J.L.
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Project Name	Camb	ridge W	/aste W	ater Tı	eatment Plai	nt		Groun	dwate				
	Reloc	ation						5/47/00					
Project No.	TE836	54						Readir	-				
Engineer	Mott	MacDo	nald Be	ntley				Install	lation	S	Sh	eet No.	
Client	Barha	le Limit	ed										
NOTES:		Piezom					li ec					1	
					t the same de piezometers							itional.	
COMMENTS	1010111	toning p	J 40 ₁	J 101	piezoniecon	o – tip ut	Span, 101	- variapipos	5400 01	соронос	20110		
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		Installatio		<u> </u>			1	Recorde	d Water L	evei	T	1	
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
		m	m		dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m
BH_STW_015	SP	3.00	12.00	G1	06/08/2021	13:28	2.97	13/08/2021	09:40	2.98	23/08/2021	08:08	DRY
					03/09/2021	09:01	DRY	06/09/2021	08:36	DRY	07/09/2021	07:47	DRY
					08/09/2021 13/09/2021	08:07 09:56	DRY	09/09/2021 14/09/2021	07:56 15:13	DRY	10/09/2021 15/09/2021	09:52 13:16	DRY
					16/09/2021	08:15	DRY	17/09/2021	12:53	DRY	20/09/2021	09:38	DRY
					21/09/2021	08:34	DRY	22/09/2021	08:08	DRY	23/09/2021	09:34	DRY
					24/09/2021	08:38	DRY	27/09/2021	08:34	DRY	01/10/2021	09:45	DRY
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Project Name	Camb	ridae M	/asto \A/-	ater T	reatment Plai	nt		<u></u>	ا الم				
rroject warne	Reloc		idate AA	ici II	caunent rid			Groun					
Project No.	TE836							Read <mark>i</mark> r Install	-				
Engineer	Mott	MacDoi	nald Ber	ntley				ilistali	ation	3	Sh	eet No.	
Client	Barha	le Limit	ed										
NOTES:		Piezom					li cc		ID 01		1 6 41:		
					t the same de piezometers							itional.	
COMMENTS		3 F					- p - 1. y - 1. s						
		Installatio	on Details					Recorde	d Water L	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
		m	m		dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m
BH_STW_015	SP	12.00	12.00	S1	06/08/2021	12:52	2.93	13/08/2021	09:37	3.02	20/08/2021	11:59	3.15
					03/09/2021	09:12	3.37	06/09/2021	08:34	3.81	07/09/2021	07:46	3.82
					08/09/2021	08:06	3.82	09/09/2021	07:57 15:12	3.83	10/09/2021 15/09/2021	09:51 13:15	3.52
					16/09/2021	08:16	3.95	17/09/2021	12:52	3.62	20/09/2021	09:37	3.96
					21/09/2021	08:33	4.01	22/09/2021	08:07	4.02	23/09/2021	09:33	4.01
					24/09/2021	08:37	4.03	27/09/2021	08:33	4.02	01/10/2021	09:45	4.03
					08/10/2021	09:18	3.83	15/10/2021	10:32	3.83			
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Engineer Client	Reloca TE836 Mott I Barha SPIE=I For m	ation 64 MacDor le Limite Piezome ultiple in	nald Ben ed eter, SP=		reatment Plai	nt		Ground Readir Install	ngs Fo	r						
Engineer Client	Mott Barhal	MacDor le Limite Piezome ultiple ii	ed eter, SP=	ntley					-							
Client	Barha SPIE=I For m	le Limite Piezome ultiple ir	ed eter, SP=	ntley						•			_,			
	SPIE=I	Piezome ultiple ir	eter, SP=	arhale Limited PIE=Piezometer, SP=Standpipe												
	For m	ultiple ir														
NOTES:	1910			ions at	dpipe t the same de piezometers							itional.				
COMMENTS			7n1		Pioze		han	year releve -		орган	and the					
		Installatio	on Details	,				Recorde	d Water Le	evel						
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date dd/mm/yyyy	Time	Reading	Date dd/mm/yyyy	Time	Reading	Date dd/mm/yyyy	Time	Reading			
BH_STW_018	SP	11.70	12.20	S1	24/09/2021	09:25	3.37	01/10/2021	09:50	m 3.65	08/10/2021	09:22	3.61			
-	1				15/10/2021	10:36	3.62		-							
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Project Name	Camb Reloca	_	aste Wa	ater Tr	eatment Plar	nt		Ground		270			
Project No.	TE836							Readir Install	-				
Engine <mark>e</mark> r	Mott	MacDoi	nald Ber	ntley				IIIStaii	ation	3	Sh	eet No.	=
Client	Barha	le Limit	ed										
NOTES:			eter, SP				1:66		1D- 0+b		L - 21-14 1	.: 1	
					t the same de piezometers							tional.	
COMMENTS													
			n Details					Recorde	d Water Le	evel	-		
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_STW_022A	SP	m 2.00	m 2.00	S1	dd/mm/yyyy 24/09/2021	hh:mm 09:02	m 1.71	dd/mm/yyyy 01/10/2021	hh:mm 10:00	m 1.87	dd/mm/yyyy 08/10/2021	hh:mm 08:53	m 1.84
	-				15/10/2021	10:13	1.94						
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Project Name	Camb Reloc	_	/aste Wa	ater Ti	reatment Plan	nt		Groun					
Project No.	TE836							Readii	_				
Engineer	Mott	MacDo	nald Ber	ntley				Install	ation	S	Sh	eet No.	-
Client	Barha	le Limit	ed										
NOTES:	For m	ultiple i		ons a	t the same de							tional.	
CON 41 45 1170	Moni	toring p	oint dep	th for	p <mark>iezometers</mark>	s = tip de	epth, for s	standpipes =	base of	response	zone		
COMMENTS													
		Installatio	on Details					Recorde	d Water L	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
DIL CDIL 022	SP	m	m 14.50	Ca	dd/mm/yyyy 06/08/2021	hh:mm	m 2.54	dd/mm/yyyy 13/08/2021	hh:mm	m	dd/mm/yyyy 20/08/2021	hh:mm	m
BH_STW_023	2h	14.00	14.50	S1	03/09/2021	12:44 09:16	2.51 2.85	10/09/2021	09:25 09:59	2.49 3.00	17/09/2021	12:08 13:13	2.67 3.09
					08/10/2021	09:27	3.41	15/10/2021	10:41	3.44	117 037 2021	13.13	3.03
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Project Name	Reloc	ation	/aste Wa	ater Ti	reatment Plai	nt		Groun					
Project No.	TE836	54						Readi	_				
Engine <mark>er</mark>	Mott	MacDo	nald Ber	ntley				Instal	ation	S	Sh	eet No.	-
Client	Barha	le Limit	ed										
NOTES:	For m	ultiple i		ons a	t the same de							itional.	
COMMENTS	Мопі	toring p	oint dep	th for	p <mark>iezometers</mark>	s = tip de	epth, for s	standpipes =	base of	response	zone		- 5
COMMINICATS													
			on Details										
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
DIL CDIL 02/	SP	m	m 11.50	Ca	dd/mm/yyyy 06/08/2021	hh:mm	m 1.00	dd/mm/yyyy 13/08/2021	hh:mm	m	dd/mm/yyyy 20/08/2021	hh:mm	m
BH_STW_024	3P	11.00	11.50	S1	03/09/2021	11:59 08:41	1.90 2.07	10/09/2021	10:16 11:21	1.92 2.10	17/09/2021	11:35 12:23	1.94 2.12
					08/10/2021	08:58	2.17	15/10/2021	10:09	2.14	1110372021	12.2.0	2.12
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Project Name	Reloc	ation	/aste Wa	ater Ti	reatment Plai	nt		Groun					
Project No.	TE836	54						Readi	_				
Engineer	Mott	MacDo	nald Ber	ntley				Instal	ation	S	Sh	eet No.	-
Client	Barha	le Limit	ed										
NOTES:	For m	ultiple i		ons a	t the same de							itional.	
COMMENTS	Monit	toring p	oint dep	th for	piezometers	s = tip de	epth, for s	standpipes =	base of	response	zone		
COMMENTS													
		Installatio	on Details					Recorde	d Water L	evel			-
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
DIL COLL COL	GD.	m	m	Ca	dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m	dd/mm/yyyy	hh:mm	m
BH_STW_025	SP	8.50	9.00	S1	06/08/2021 03/09/2021	12:17 08:59	2.02	13/08/2021 10/09/2021	10:25 11:47	2.05	20/08/2021 17/09/2021	11:53 12:41	2.04
					08/10/2021	08:43	2.24	15/10/2021	09:59	2.20	1170372021	12.41	2.11
							-						
x								İ			Ì		
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-		-											
Reco <mark>rd</mark> ed by:		Į.	Che	ecked	by:	Apr	proved by	<i>r</i> :	' 	I			1
Date:						Nation 1							
	-PGR-F	-008			ion No. 2.05				4	SOIL ENGINEERING Part of the Bachy Soletanche Group			

Project Name Project No.	Camb Reloc TE836	ation	/aste Wa	ater Ti	eatment Pla	nt		Groun Readii					
Engineer			nald Ber	ntley				Install	_		Sh	eet No.	-
Client	Barha	le Limit	ed										
NOTES:	For m	ultiple i		ons a	dpipe t the same de piezometers							tional.	
COMMENTS	IVIOIII	toring p	onit det	icii ioi	piezometers	s = tip de	spin, for s	standhibes =	Dase Oi	response	ZONE		
		Installatio	on Details					Recorde	d Water L	evel			
Exploratory Hole ID	Туре	Depth to base of pipe	Monitoring point depth	ID	Date	Time	Reading	Date	Time	Reading	Date	Time	Reading
BH_STW_026	SP	m 9.50	m 10.00	S1	dd/mm/yyyy 06/08/2021	hh:mm 12:09	m 2.40	dd/mm/yyyy 13/08/2021	hh:mm 10:30	m 2.37	dd/mm/yyyy 20/08/2021	hh:mm 11:48	m 2.38
BH_51W_026	317	9.50	10.00	91	03/09/2021	08:52	2.40	10/09/2021	11:35	2.37	17/09/2021	12:32	2.38
					08/10/2021	09:04	2.54	15/10/2021	10:05	1.50	1 0.57 2021		2.73
											l		
											<u> </u>		
				<u> </u>									
					-			-					
2-													
						_					-		
Recorded by:]	C.L.	acked	bu:	A	nround L	<u>, </u>	<u> </u>				
Recorded by: Checked by: Date: Date:					ъy.	Approved by: Date:							
	SE-PGR-F-008 Issue.Revis					2.05 Issue Date 24/01/2014				SOIL ENGINEERING Part of the Bachy Soletanche Group			

Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga Monitoring			ocation ID I_STW_009	
Project No.	TE8364			otorinig			toring point ID	
Engineer	Mott MacDonald B	entley				Monitori	ng round number 01	
Client	Barhale Limited					_	Date	
						1	9/10/2021	
Monitoring point i	information		'					
Distance to moni	toring point m		12.00	Initial base depth	m		3.00	
Top of response	zone m		1.50	Base of response zo	ne m		12.00	
Installation type			SP					
Condition of mon	itoring point	Good						
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)	,				
			Day 1	Day 2			Day 3	
Date/time of read	ling		-					
Atmospheric pres	ssure mbar							
Description of pre	evious days weather							
Equipment detail	s							
Equipment type			GA5000	Equipment serial nun	nber	(GA501940	
Date equipment I		2	0/07/2021					
Has equipment b			Yes	Time equipment zero	ed			
Incidental informa								
Description of we during monitoring		Overcast						
Ground condition monitoring	s at the time of	Dry						
Barometric / air re	eadings							
Barometric press	ure trend		Stable					
		E	Barometric Sarometric	Relative				
Time of reading	hh:mm:ss		15:25:00	15:25:00				
Pressure	mbar		1009	1009				
		Ambien	t air temperature					
Time of reading	hh:mm:ss		15:25:00	1				
Temperature	°C		17.0					
Gas readings				1				
			Pe	eak		Ste	ady	
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time	
Methane	0.1	%v/v	0.1	15:27:00	0	.1	15:30:00	
Methane (LEL)	1	%	2	15:27:00	- :	2	15:30:00	
Carbon Dioxide	0.1	%v/v	1.9	15:27:00	1.	.8	15:30:00	
Oxygen	0.1	%v/v	20.5	15:27:00	20).4	15:30:00	
Carbon Monoxide	9 1	ppm	1	15:27:00	<	:1	15:30:00	
Hydrogen Sulfide	1	ppm	1	15:27:00	<	:1	15:30:00	
Gas Flow	0.1	i/hr	0.1	15:25:00	0	.1	15:26:00	
Further information	on			1				
			Groundwater level	Installation base				
Time of reading		nh:mm:ss	15:35:00	15:35:00				
Reading		m	DRY	3.06				
Remarks								
Monitored by:	Checked	by:	Approved	i by:				
						SOIL DO	GIDEEDING	
Form No. SE-EMS	S-F-002 Revision N	o. 3.00	Issue Date	e 01/02/2021		soil engineering		

Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga Monitoring	as		ocation ID _STW_009	
Project No.	TE8364			oo.			toring point ID	
Engineer	Mott MacDonald B	entley				Monitori	ng round number 02	
Client	Barhale Limited						Date	
						0	2/11/2021	
Monitoring point i	information						_	
Distance to monit	toring point m		12.00	Initial base depth	m		3.00	
Top of response	zone m		1.50	Base of response zon	ne m		12.00	
Installation type			SP					
Condition of mon	itoring point	Good						
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)	·				
			Day 1	Day 2			Day 3	
Date/time of read	ling		-	_				
Atmospheric pres	ssure mbar							
Description of pre	evious days weather							
Equipment details	s							
Equipment type			GA5000	Equipment serial nun	nber	(GA501940	
Date equipment I		2	0/07/2021					
Has equipment b			Yes	Time equipment zero	ed			
Incidental informa								
Description of we during monitoring		Clear						
Ground condition monitoring	s at the time of	Dry						
Barometric / air re	eadings							
Barometric press	ure trend		Stable					
		E	Barometric Sarometric	Relative				
Time of reading	hh:mm:ss		11:49:00	11:49:00				
Pressure	mbar		997	997				
		Ambier	t air temperature					
Time of reading	hh:mm:ss		11:49:00	_				
Temperature	°C		9.0					
Gas readings				•				
			Pe	eak		Ste	ady	
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time	
Methane	0.1	%v/v	<0.1	11:52:00	<().1	11:55: 00	
Methane (LEL)	1	%	<1	11:52:00	<	:1	11:55:00	
Carbon Dioxide	0.1	%v/v	1.9	11:52:00	1.	.9	11:55:00	
Oxygen	0.1	%v/v	21.1	11:52:00	18	3.6	11:55:00	
Carbon Monoxide	e 1	ppm	<1	11:52:00	<	:1	11:55: 00	
Hydrogen Sulfide	1	ppm	<1	11:52:00	<	:1	11:55: 00	
Gas Flow	0. 1	l/hr	<0.1	11:50:00	<(0.1	11:51: 00	
Further information	on							
			Groundwater level	Installation base				
Time of reading		nh:mm:ss	11:56:00	11:56:00				
Reading		m	DRY	3.06				
Remarks								
Monitored by:	Checked	by:	Approved	i by:				
						enii oo	CIDEEDING	
Form No. SE-EMS	S-F-002 Revision N	o. 3.00	Issue Date	01/02/2021		soil engineering		

Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga	Location ID BH_STW_009		
Project No.	TE8364			otorinig			toring point ID
Engineer	Mott MacDonald B	entley				Monitori	ng round number 02
Client	Barhale Limited						Date
						0	8/11/2021
Monitoring point i	information						_
Distance to monit	toring point m		12.00	Initial base depth	m		3.00
Top of response	zone m		1.50	Base of response zo	ne m		12.00
Installation type			SP				
Condition of mon	itoring point	Good					
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)	·			
			Day 1	Day 2			Day 3
Date/time of read	ling		-				
Atmospheric pres	ssure mbar						
Description of pre	evious days weather						
Equipment details	s						
Equipment type			GA5000	Equipment serial nun	nber		GA501940
Date equipment I		2	0/07/2021				
Has equipment b			Yes	Time equipment zero	ed		
Incidental informa							
Description of we during monitoring		Clear					
Ground condition monitoring	s at the time of	Dry					
Barometric / air re	eadings						
Barometric press	ure trend		Stable				
		E	Barometric Sarometric	Relative			
Time of reading	hh:mm:ss		11:33:00	11:33:00			
Pressure	mbar		1022	1022			
		Ambier	t air temperature				
Time of reading	hh:mm:ss		11:33:00	_			
Temperature	°C		7.0				
Gas readings				•			
			Pe	eak		Ste	ady
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time
Methane	0.1	%v/v	<0.1	11:36:00	<(0.1	11:39:00
Methane (LEL)	1	%	<1	11:36:00	<	:1	11:39:00
Carbon Dioxide	0.1	%v/v	1.9	11:36:00	1.	.9	11:39:00
Oxygen	0.1	%v/v	20.9	11:36:00	18	3.6	11:39:00
Carbon Monoxide	e 1	ppm	<1	11:36:00	<	:1	11:39:00
Hydrogen Sulfide	1	ppm	<1	11:36:00	<	:1	11:39:00
Gas Flow	0.1	l/hr	<0.1	11:34:00	<().1	11:35:00
Further information	on						
			Groundwater level	Installation base			
Time of reading		nh:mm:ss	11:40:00	11:40:00			
Reading		m	DRY	3.07			
Remarks							
Monitored by:	Checked	by:	Approved	i by:			
						CO!! 00	CIDOCOICO
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Project Name	Cambridge Waste V Relocation	Vater Trea	tment Plant	Record Of G Monitoring	Location ID BH_STW_013C		
Project No.	TE8364			monnomy			toring point ID G1
Engineer	Mott MacDonald B	entley				Monitori	ng round number 01
Client	Barhale Limited						Date
						1	9/10/2021
Monitoring point in	nformation		ı				
Distance to monit			1.50	Initial base depth	m		1.50
Top of response			0.50	Base of response zo			1.50
Installation type			SP				
Condition of mon	itoring point	Good					
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)				
			Day 1	Day 2			Day 3
Date/time of read	lina						
Atmospheric pres							
	evious days weather						
,	-						
Equipment details	S	I		I=			
Equipment type			GA5000	Equipment serial nui	mber		GA501940
Date equipment l			20/07/2021				
Has equipment be			Yes	Time equipment zero	ped		
Incidental informa							
Description of we during monitoring		Overcast					
Ground conditions monitoring	s at the time of	Dry					
Barometric / air re	eadings						
Barometric press			Stable				
-			Barometric	Relative			
Time of reading	hh:mm:ss		15:10:00	15:10:00			
Pressure	mbar		1008	1008			
i ioobaio	11770-21		nt air temperature	1555			
Time of reading	hh:mm:ss	-	15:10:00	-			
	°C		20.0	00			
Temperature			20.0				
Gas readings						~-	
D - t!	l-D	11-14		eak ————	D	Ste	
Determinand	LoD	Unit	Reading	Time	Rea		Time
Methane	0.1	%v/v	0.1	15:10:00	0		15:13:00
Methane (LEL)	1	%	2	15:10:00		2	15:13:00
Carbon Dioxide	0.1	%v/v	0.2	15:10:00		.2	15:13:00
Oxygen	0.1	%v/v	21.0	15:10:00	20).7	15:13:00
Carbon Monoxide		ppm	1	15:10:00	<	1	15:13:00
Hydrogen Sulfide	1	ppm	1	15:10:00	<	1	15:13:00
Gas Flow	0.1	l/hr	0.1	15:08:00	0	.1	15:09:00
Further information	on						
			Groundwater level	Installation base			
Time of reading		hh:mm:ss	15:15:00	15:15:00			
Reading		m	DRY	1.45			
Remarks							
Monitored by:	Checked	by:	Approved	i by:			
Form No. SE-EMS	G-F-002 Revision N	lo. 3.00	Issue Date	e 01/02/2021		soir en	GINEERING

Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga Monitoring	Location ID BH_STW_013C		
Project No.	TE8364			Monitoring			toring point ID
Engineer	Mott MacDonald B	entley			Monitoring round number		
Client	Barhale Limited						Date
Cheffit	Damale Limiteu					0	2/11/2021
Monitoring point i	nformation						2/11/2021
Distance to monit			1.50	Initial base depth	m		1.50
Top of response			0.50	Base of response zor			1.50
Installation type	LONG (II		SP	Base of responde Est	10 111		1.00
Condition of mon	itoring point	Good	OI*				
Preceding atmos	pheric conditions for t	hree days	· · · · · · · · · · · · · · · · · · ·				
			Day 1	Day 2			Day 3
Date/time of read							
Atmospheric pres							
Description of pre	evious days weather						
Equipment details	s						
Equipment type			GA5000	Equipment serial nun	nber		GA501940
Date equipment I		2	20/07/2021				
Has equipment b			Yes	Time equipment zero	ed		
Incidental informa		I = -					
Description of we during monitoring		Clear					
Ground condition monitoring	s at the time of	Dry					
Barometric / air re	eadings	l.					
Barometric press	ure trend		Stable				
-		E	Barometric	Relative			
Time of reading	hh:mm:ss		11:08:00	11:08:00			
Pressure	mbar		997	997			
		Ambier	t air temperature			ı	
Time of reading	hh:mm:ss		11:08:00	1			
Temperature	°C		9.0				
Gas readings		·		1			
			Pe	eak		Stea	ady
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time
Methane	0.1	%v/v	<0.1	11:11:00	<().1	11:14:00
Methane (LEL)	1	%	<1	11:11:00	<	:1	11:14:00
Carbon Dioxide	0.1	%v/v	0.2	11:11:00	D.	.2	11:14:00
Oxygen	0.1	%v/v	20.6	11:11:00	20).5	11:14:00
Carbon Monoxide	1	ppm	<1	11:11:00	<	:1	11:14:00
Hydrogen Sulfide	1	ppm	<1	11:11:00	<	:1	11:14:00
Gas Flow	0.1	l/hr	<0.1	11:10:00	<().1	11:11:00
Further information	on						
			Groundwater level	Installation base			
Time of reading		hh:mm:ss	11:15:00	11:15:00			
Reading		m	DRY	3.00			
Remarks							
Monitored by:	Checked	by:	Approved	i by:			
Form No. SE-EMS	G-F-002 Revision N	lo. 3.00	Issue Date	e 01/02/2021		soir en	GINEERING

Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga	Location ID BH_STW_013C		
Project No.	TE8364			Monitoring			toring point ID
Engineer	Mott MacDonald B	entley			Monitoring round number		
Client	Barhale Limited						Date
Ollent	Damale Limiteu					0	8/11/2021
Monitoring point i	information		· ·				
Distance to monit	toring point m		1.50	Initial base depth	m		1.50
Top of response	zone m		0.50	Base of response zo	ne m		1.50
Installation type			SP				
Condition of mon	itoring point	Good					
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)				
•	•		Day 1	Day 2			Day 3
Date/time of read	ling						
Atmospheric pres	ssure mbar						
Description of pre	evious days weather						
Equipment details	s						
Equipment type			GA5000	Equipment serial nur	nber	(SA501940
Date equipment I		2	0/07/2021				
Has equipment b			Yes	Time equipment zero	æd		
Incidental informa							
Description of we during monitoring		Clear					
Ground condition monitoring	s at the time of	Dry					
Barometric / air re	eadings						
Barometric press	ure trend		Stable				
-		E	Barometric	Relative			
Time of reading	hh:mm:ss		11:00:00	11:00:00			
Pressure	mbar		1022	1022			
		Ambier	t air temperature				
Time of reading	hh:mm:ss		11:00:00				
Temperature	°C		7.0				
Gas readings				1			
_			Pe	eak		Stea	ady
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time
Methane	0.1	%v/v	<0.1	11:03:00	<().1	11:06:00
Methane (LEL)	1	%	<1	11:03:00	<	:1	11:06:00
Carbon Dioxide	0.1	%v/v	0.1	11:03:00	0	.1	11:06:00
Oxygen	0.1	%v/v	20.9	11:03:00	20).8	11:06:00
Carbon Monoxide	e 1	ppm	<1	11:03:00	<	:1	11:06:00
Hydrogen Sulfide	1	ppm	<1	11:03:00	<	:1	11:06:00
Gas Flow	0.1	l/hr	<0.1	11:01:00	<().1	11:02:00
Further information	on					·	
			Groundwater level	Installation base			
Time of reading		nh:mm:ss	11:07:00	11:07:00			
Reading		m	DRY	3.00			
Remarks							
Monitored by:	Checked	by:	Approved	i by:			
						ED!! 00	CIDACOICC
Form No. SE-EMS	S-F-002 Revision N	o. 3.00	Issue Date	01/02/2021		SUIL BIT	GINEERING

Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga	Location ID BH_STW_015		
Project No.	TE8364			otorinig		Moni	toring point ID
Engineer	Mott MacDonald B	entley				Monitori	ng round number 01
Client	Barhale Limited						Date
						1	9/10/2021
Monitoring point i	information						
Distance to monit	toring point m		12.00	Initial base depth	m		3.00
Top of response	zone m		1.50	Base of response zo	ne m		12.00
Installation type			SP				
Condition of mon	itoring point	Good					
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)	•			
			Day 1	Day 2			Day 3
Date/time of read	ling		-				-
Atmospheric pres	ssure mbar						
Description of pre	evious days weather						
Equipment details	s						
Equipment type			GA5000	Equipment serial nur	nber	(GA501940
Date equipment I		2	0/07/2021				
Has equipment b			Yes	Time equipment zero	ed		
Incidental informa							
Description of we during monitoring		Overcast					
Ground condition monitoring	s at the time of	Dry					
Barometric / air re	eadings						
Barometric press	ure trend		Stable				
		E	Barometric Sarometric	Relative			
Time of reading	hh:mm:ss		15:45:00	15:45:00			
Pressure	mbar		1009	1009			
		Ambien	t air temperature				
Time of reading	hh:mm:ss		15:45:00	1			
Temperature	°C		17.0	100			
Gas readings				•			
			Pe	eak		Ste	ady
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time
Methane	0.1	%v/v	0.1	15:47:00	0.	.1	15:50: 00
Methane (LEL)	1	%	2	15:47:00	- 2	2	15:50:00
Carbon Dioxide	0.1	%v/v	1.6	15:47:00	1.	.6	15:50:00
Oxygen	0.1	%v/v	21.6	15:47:00	19	0.0	15:50:00
Carbon Monoxide	e 1	ppm	<1	15:47:00	<	:1	15:50:00
Hydrogen Sulfide	1	ppm	<1	15:47:00	<	:1	15:50:00
Gas Flow	0.1	l/hr	0.1	15:45:00	0.	.1	15:46:00
Further information	on			·			
			Groundwater level	Installation base			
Time of reading		nh:mm:ss	15:52:00	15:52:00			
Reading		m	DRY	3.00			
Remarks							
Monitored by:	Checked	by:	Approved	i by:			
						SOIL DO	GINEERING
Form No. SE-EMS	S-F-002 Revision N	o. 3.00	Issue Date	e 01/02/2021		JUIL EII	GHIECKHIN

Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant		Record Of G Monitoring	Location ID BH_STW_015		
Project No.	TE8364				monnomy			itoring point ID
Engineer	Mott MacDonald B	entley					Monitori	ing round number 02
Client	Barhale Limited							Date
							C	2/11/2021
Monitoring point in	nformation							
Distance to monit			12.00		Initial base depth	m		3.00
Top of response z			1.50		Base of response zo			12.00
Installation type	,,,		SP					
Condition of moni	toring point	Good			<u> </u>			
Preceding atmost	oheric conditions for t	hree days	(nominally	at noon)				
<u> </u>			Day 1		Day 2			Day 3
Date/time of read	ina							
Atmospheric pres								
	vious days weather				l			
Equipment details	3							
Equipment type			GA5000		Equipment serial nui	mber	(GA501940
Date equipment la	ast calibrated	2	20/07/2021					
Has equipment be	een zeroed		Yes		Time equipment zero	ped		
Incidental informa	ition							
Description of wea		Clear						
Ground conditions	s at the time of	Dry						
Barometric / air re	adinas	I						
Barometric pressu			Stable					
		F	Barometric		Relative			
Time of reading	hh:mm:ss	_	11:30:00		11:30:00			
Pressure	mbar		997		997			
ricobarc	11111111		it air tempe	rature				
Time of reading	hh:mm:ss		11:29:00	, atai o				
Temperature	°C		9.0					
•			3. U					
Gas readings							~-	
Determinend	I aD	11=11	Danel		eak	Daa		ady
Determinand	LoD	Unit	Read		Time	Rea		Time
Methane	0.1	%v/v	<0.		11:32:00	<0		11:35:00
Methane (LEL)	1	%	<1		11:32:00	<	-	11:35:00
Carbon Dioxide	0.1	%v/v	1.6		11:32:00	1.		11:35:00
Oxygen	0.1	%v/v	20.0		11:32:00	18		11:35:00
Carbon Monoxide		ppm	<1		11:32:00	<	-	11:35:00
Hydrogen Sulfide		ppm	<1		11:32:00	<		11:35:00
Gas Flow	0.1	l/hr	<0.	1	11:30:00	<0	1.1	11:31:00
Further information	n							
			Groundwa		Installation base			
Time of reading		hh:mm:ss	11:37		11:37:00			
Reading		m	DR	Y	3.00			
Remarks								
Monitored by:	Checked	by:	A	\pproved	by:			
							22 2 27	
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Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga Monitoring	as	Location ID BH_STW_015		
Project No.	TE8364					Moni	toring point ID G1	
Engineer	Mott MacDonald B	entley				Monitori	ng round number 03	
Client	Barhale Limited						Date	
						0	8/11/2021	
Monitoring point i	information		'				_	
Distance to monit	toring point m		12.00	Initial base depth	m		3.00	
Top of response :	zone m		1.50	Base of response zo	ne m		12.00	
Installation type			SP					
Condition of mon	itoring point	Good						
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)					
	-		Day 1	Day 2			Day 3	
Date/time of read	ling		-				-	
Atmospheric pres	ssure mbar							
Description of pre	evious days weather			,				
Equipment details	s							
Equipment type			GA5000	Equipment serial num	nber	(GA501940	
Date equipment I		2	0/07/2021					
Has equipment b			Yes	Time equipment zero	ed			
Incidental informa								
Description of we during monitoring		Clear						
Ground condition monitoring	s at the time of	Dry						
Barometric / air re	eadings							
Barometric press	ure trend		Stable					
		E	Barometric	Relative				
Time of reading	hh:mm:ss		11:14:00	11:14:00				
Pressure	mbar		1022	1022				
		Ambier	t air temperature					
Time of reading	hh:mm:ss		11:14:00	-				
Temperature	°C		7.0					
Gas readings				I.				
			Pr	eak		Ste	adv	
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time	
Methane	0.1	%v/v	<0.1	11:18:00).1	11:21:00	
Methane (LEL)	1	%	<1	11:18:00		:1	11:21:00	
Carbon Dioxide	0.1	%v/v	0.1	11:18:00	0	.1	11:21:00	
Oxygen	0.1	%v/v	21.1	11:18:00		1.1	11:21:00	
Carbon Monoxide		ppm	<1	11:18:00		:1	11:21:00	
Hydrogen Sulfide		ppm	<1	11:18:00		:1	11:21:00	
Gas Flow	0.1	l/hr	<0.1	11:16:00).1	11:17:00	
Further information				11112122	-			
			Groundwater level	Installation base				
Time of reading		nh:mm:ss	11:22:00	11:22:00				
Reading		m	DRY	2.70				
Remarks								
Monitored by:	Checked	by:	Approved	i by:			A	
						11 m		
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Project Name	Cambridge Waste V Relocation	Vater Trea	tment Plant	Record Of Ga	Location ID BH_STW_022A		
Project No.	TE8364			monitoring			toring point ID
Engineer	Mott MacDonald B	entley				Monitori	ing round number 01
Client	Barhale Limited						Date
						1	9/10/2021
Monitoring point in	nformation						0,10,2021
Distance to monit			2.00	Initial base depth	m		2.00
Top of response			1.00	Base of response zo			2.00
Installation type	LONG (II		SP	Base of responde 20			2.00
Condition of moni	itarina naint	Good	JF				
Preceding atmos	pheric conditions for t	nree days	· · · · ·				
			Day 1	Day 2			Day 3
Date/time of read							
Atmospheric pres							
, ,	evious days weather						
Equipment details	S						
Equipment type			GA5000	Equipment serial nur	nber	1	GA501940
Date equipment la	ast calibrated		20/07/2021				
Has equipment be			Yes	Time equipment zero	ed		
Incidental informa	ation						
Description of we during monitoring		Overcast					
Ground conditions monitoring	s at the time of	Dry					
Barometric / air re	eadings	l.					
Barometric press			Stable				
			Barometric	Relative			
Time of reading	hh:mm:ss		16:14:00	16:14:00			
Pressure	mbar		1010	1010			
riessuie	IIII		nt air temperature	1010			
Time of reading	hh:mm:ss	-	16:14:00	-			
	°C		16.0	00			
Temperature	C		ט.סו				
Gas readings			_			0 1-	
				eak			ady —
Determinand	LoD	Unit	Reading	Time		ding	Time
Methane	0.1	%v/v	0.1	16:14:00		.1	16:17:00
Methane (LEL)	1	%	2	16:14:00		2	16:17:00
Carbon Dioxide	0.1	%v/v	0.6	16:14:00		.6	16:17:00
Oxygen	0.1	%v/v	21.1	16:14:00	15	5.0	16:17:00
Carbon Monoxide	1	ppm	1	16:14:00	<	:1	16:17:00
Hydrogen Sulfide	1	ppm	<1	16:14:00	<	:1	16:17:00
Gas Flow	0.1	l/hr	0.1	16:12:00	0	.1	16:13:00
Further information	on						
			Groundwater level	Installation base			
Time of reading		hh:mm:ss	16:23:00	16:23:00			
Reading		m	1.96	2.10			
Remarks							
Monitored by:	Checked	by:	Approved	i by:			4
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Project Name	Cambridge Waste V Relocation	Vater Trea	tment Plant	Record Of G Monitoring	Location ID BH_STW_022A		
Project No.	TE8364			oo.	•		toring point ID G1
Engineer	Mott MacDonald B	entley				Monitori	ng round number 02
Client	Barhale Limited						Date
						0	2/11/2021
Monitoring point i	nformation						
Distance to monit			2.00	Initial base depth	m		2.00
Top of response a			1.00	Base of response zo			2.00
Installation type			SP				
Condition of mon	itoring point	Good					
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)				
			Day 1	Day 2			Day 3
Date/time of read	ling						
Atmospheric pres							
	evious days weather						
Becompaign of pro	Thous days weather						
Equipment details	s						
Equipment type			GA5000	Equipment serial nu	mber	•	GA501940
Date equipment l		2	20/07/2021				
Has equipment be			Yes	Time equipment zero	oed		
Incidental informa	ation						
Description of we during monitoring		Clear					
Ground conditions monitoring	s at the time of	Dry					
Barometric / air re	eadings	I					
Barometric press			Stable				
Baromonio proso			Barometric	Relative			
Time of reading	hh:mm:ss		10:29:00	10:29:00			
Pressure	mbar		997	997			
Pressure	Inpar			337			
		-	nt air temperature	_			
Time of reading	hh:mm:ss		10:29:00	10			
Temperature	°C		9.0				
Gas readings							
			Pe	eak		Ste	ady
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time
Methane	0.1	%v/v	<0.1	10:32:00	<(0.1	10:35:00
Methane (LEL)	1	%	<1	10:32:00	<	:1	10:35:00
Carbon Dioxide	0.1	%v/v	0.2	10:32:00	0.	.1	10:35:00
Oxygen	0.1	%v/v	20.9	10:32:00	18	3.9	10:35:00
Carbon Monoxide	• 1	ppm	1	10:32:00	<	:1	10:35:00
Hydrogen Sulfide		ppm	<1	10:32:00	<	:1	10:35:00
Gas Flow	0.1	l/hr	<0.1	10:30:00).1	10:31:00
Further information		171 11	70.1	10.00.00		<i>,</i> ,,	10.01.00
	7 (1		Groundwater level	Installation base			
Time of modine							
Time of reading		hh:mm:ss	10:36:00	10:36:00			
Reading		m	DRY	2.00			
Remarks							
Monitored by:	Checked	by:	Approved	i by:			(A)
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Project Name	Cambridge Waste V Relocation	Vater Trea	tment Plant	Record Of G Monitoring	Location ID BH_STW_022A		
Project No.	TE8364			omiomig			toring point ID G1
Engineer	Mott MacDonald B	entley				Monitori	ng round number 03
Client	Barhale Limited						Date
						0	8/11/2021
Monitoring point i	nformation		ı				
Distance to monit			2.00	Initial base depth	m		2.00
Top of response			1.00	Base of response zo			2.00
Installation type			SP				
Condition of mon	itoring point	Good					
Preceding atmos	pheric conditions for t	hree davs	(nominally at noon)	•			
<u> </u>			Day 1	Day 2			Day 3
Date/time of read	ina						, _
Atmospheric pres							
	evious days weather						
, ,	•						
Equipment details	\$	1		T= -			
Equipment type			GA5000	Equipment serial nu	nber	•	GA501940
Date equipment l		2	20/07/2021				
Has equipment be			Yes	Time equipment zero	ed		
Incidental informa	ation						
Description of we during monitoring		Clear					
Ground conditions monitoring	s at the time of	Dry					
Barometric / air re	eadings	1					
Barometric press			Stable				
Baromonio proso			Barometric	Relative			
Time of reading	hh:mm:ss		10:52:00	10:52:00			
Pressure	mbar		1022	1022			
Pressure	Inpar			1022			
			nt air temperature	-			
Time of reading	hh:mm:ss		10:52:00				
Temperature	°C		7.0				
Gas readings							
			Pe	eak		Ste	ady
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time
Methane	0.1	%v/v	<0.1	10:55:00	<().1	10:58:00
Methane (LEL)	1	%	<1	10:55:00	<	:1	10:58:00
Carbon Dioxide	0.1	%v/v	0.2	10:55:00	0	.1	10:58:00
Oxygen	0.1	%v/v	20.9	10:55:00	18	3.9	10:58:00
Carbon Monoxide	• 1	ppm	1	10:55:00	<	:1	10:58:00
Hydrogen Sulfide		ppm	<1	10:55:00	<	:1	10:58:00
Gas Flow	0.1	I/hr	<0.1	10:53:00).1	10:54:00
Further information		171 11	70.1	10.00.00		,. ı	10.04.00
	A1		Groundwater level	Installation base			
Time of modine		h h	10:59:00	10:59:00			
Time of reading		hh:mm:ss					
Reading		m	DRY	2.00			
Remarks							
Monitored by:	Checked	by:	Approved	i by:			(A)
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Project Name	Cambridge Waste V Relocation	Vater Trea	tment Plant	Record Of G Monitoring		Location ID BH_TUN_001PM		
Project No.	TE8364			Monitoring	,		oring point ID	
Engineer	Mott MacDonald B	entley				Monitorir	ng round number 01	
Client	Barhale Limited					10	Date 9/10/2021	
Monitoring point in	formation					13	9/10/2021	
Distance to monito			1.50	Initial base depth	m		1.50	
Top of response zo			0.50	Base of response zo			1.50	
Installation type	•••		SP		•••			
Condition of monito	oring point	Good						
Preceding atmospl	heric conditions for t	hree days	(nominally at noon)	•				
			Day 1	Day 2			Day 3	
Date/time of reading	ng						-	
Atmospheric press								
Description of prev	rious days weather							
Equipment details		I	015000				A F 0 4 0 4 0	
Equipment type	4 12 1 1		GA5000	Equipment serial nu	mber	G	A501940	
Date equipment la		1	20/07/2021	- :				
Has equipment bea			Yes	Time equipment zer	oea			
Description of wea		Overcast						
during monitoring								
Ground conditions monitoring		Dry						
Barometric / air rea		ı		ı				
Barometric pressu	re trend		Stable			ı		
			Barometric	Relative				
Time of reading	hh:mm:ss		13:15:00	13:15:00				
Pressure	mbar	Ambier	1009 nt air temperature	1009				
Time of reading	hh:mm:ss		13:15:00					
Temperature	ဇ		18.0					
Gas readings			P	eak		Stea	dy	
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time	
Methane	0.1	%v/v	0.1	13:15:00		.1	13:18: 00	
Methane (LEL)	1	%	2	13:15:00		2	13:18:00	
Carbon Dioxide	0.1	%v/v	0.1	13:15:00		.1	13:18:00	
Oxygen	0.1	%v/v	21.8	13:15:00	21	1.8	13:18:00	
Carbon Monoxide	1	ppm	<1	13:15:00	<	:1	13:18:00	
Hydrogen Sulfide	1	ppm	<1	13:15:00	<	:1	13:18:00	
Gas Flow	0.1	I/hr	0.2	13:13:00	0	.1	13:14:00	
Further information	1							
			Groundwater level					
Time of reading		hh:mm:ss	13:23:00	13:23:00				
Reading		m	1.27	1.50				
Remarks								
Monitored by:	Checked	by:	Approve	d by:				
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Revision No.

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Project Name	Cambridge Waste V Relocation	Vater Trea	tment Plant	Record Of G Monitoring	Location ID BH_TUN_001PM			
Project No.	TE8364			Monitoring point IE				
Engineer	Mott MacDonald B	entley				Mon itori	ng round number 02	
Client	Barhale Limited						Date	
						0	2/11/2021	
Monitoring point i	nformation							
Distance to monit			1.50	Initial base depth	m		1.50	
Top of response a			0.50	Base of response zo			1.50	
Installation type			SP					
Condition of mon	itoring point	Good						
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)					
			Day 1	Day 2			Day 3	
Date/time of read	ing		<u> </u>	-				
Atmospheric pres	sure mbar							
	evious days weather							
, ,	•							
Equipment details	3							
Equipment type			GA5000	Equipment serial nu	mber	•	GA501940	
Date equipment la		2	20/07/2021					
Has equipment be			Yes	Time equipment zero	ped			
Incidental informa	ation							
Description of we during monitoring		Clear						
Ground conditions monitoring	s at the time of	Dry						
Barometric / air re	eadings							
Barometric press			Stable					
•			Barometric	Relative				
Time of reading	hh:mm:ss		14:33:00	14:33:00				
Pressure	mbar		997	997				
riessuie	IIII		nt air temperature	331				
Time of reading	hh:mm:ss	-	14:33:00	_				
	°C			10				
Temperature	<u> </u>		9.0					
Gas readings			_			5 4-		
				eak		Ste		
Determinand	LoD	Unit	Reading	Time		ding	Time	
Methane	0.1	%v/v	<0.1	14:36:00).1	14:39:00	
Methane (LEL)	1	%	<1	14:36:00		:1	14:39:00	
Carbon Dioxide	0.1	%v/v	3.1	14:36:00		.0	14:39:00	
Oxygen	0.1	%v/v	20.5	14:36:00	13	3.4	14:39:00	
Carbon Monoxide	1	ppm	<1	14:36:00	<	:1	14:39:00	
Hydrogen Sulfide	1	ppm	<1	14:36:00	<	1	14:39: 00	
Gas Flow	0.1	l/hr	<0.1	14:34:00	<().1	14:35:00	
Further information	on .							
			Groundwater level	Installation base				
Time of reading		hh:mm:ss	14:40:00	14:40:00				
Reading	·	m	1.24	1.50				
Remarks						,		
Monitored by:	Checked	by:	Approved	i by:			A	
						y-g -=		
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Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga Monitoring	as	Location ID BH_TUN_001PM Monitoring point ID G1		
Project No.	TE8364							
Engineer	Mott MacDonald B	entley				Monitori	ng round number 03	
Client	Barhale Limited						Date	
						0	8/11/2021	
Monitoring point i	information		I .				_	
Distance to monit	toring point m		1.50	Initial base depth	m		1.50	
Top of response	zone m	0.50 E		Base of response zo	ne m		1.50	
Installation type			SP					
Condition of mon	itoring point	Good						
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)					
			Day 1	Day 2			Day 3	
Date/time of read	ling							
Atmospheric pres	ssure mbar							
Description of pre	evious days weather							
Equipment details	S							
Equipment type			GA5000	Equipment serial num	nber	(SA501940	
Date equipment I		2	0/07/2021					
Has equipment b			Yes	Time equipment zero	ed			
Incidental informa								
Description of we during monitoring		Clear						
Ground condition monitoring	s at the time of	Dry						
Barometric / air re	eadings							
Barometric press	ure trend		Stable					
		E	Barometric Sarometric	Relative				
Time of reading	hh:mm:ss		12:25:00	12:25:00				
Pressure	mbar		1022	1022				
		Ambier	t air temperature					
Time of reading	hh:mm:ss		12:26:00	_				
Temperature	°C		7.0					
Gas readings				•				
			Pe	eak		Stea	ady	
Determinand	LoD	Unit	Reading	Time	Rea	ding	Time	
Methane	0.1	%v/v	<0.1	12:28:00	<(0.1	12:31:00	
Methane (LEL)	1	%	<1	12:28:00	<	:1	12:31:00	
Carbon Dioxide	0.1	%v/v	2.7	12:28:00	2	.6	12:31:00	
Oxygen	0 .1	%v/v	19.0	12:28:00	15	5.4	12:31:00	
Carbon Monoxide	e 1	ppm	<1	12:28:00	<	:1	12:31:00	
Hydrogen Sulfide	1	ppm	<1	12:28:00	<	:1	12:31:00	
Gas Flow	0. 1	l/hr	<0.1	12:26:00	<(0.1	12:27:00	
Further information	on							
			Groundwater level	Installation base				
Time of reading hh:mm:s		nh:mm:ss	12:32:00	12:32:00				
Reading		m	1.25	1.50				
Remarks								
Monitored by:	Checked	by:	Approved	i by:				
						6011 66	CIDOCOICO	
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Project Name	Cambridge Waste V Relocation	Vater Trea	Record Of Gas Monitoring			Location ID BH_TUN_006		
Project No.	TE8364			Monitoring		Monitoring point ID		
Engineer	Mott MacDonald B	entley				Monitori	ng round number 01	
Client	Barhale Limited						Date	
						1	9/10/2021	
Monitoring point i	nformation							
Distance to monit			6.00	Initial base depth	m		3.50	
Top of response	<u> </u>		1.50	Base of response zo		1	6.00	
Installation type			SP					
Condition of mon	itoring point	Good						
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)					
			Day 1	Day 2			Day 3	
Date/time of read	ina							
Atmospheric pres								
	evious days weather							
, ,	•							
Equipment details	\$	1		I				
Equipment type			GA5000	Equipment serial nui	nber	GA501940		
Date equipment l		2	20/07/2021					
Has equipment be			Yes	Time equipment zeroed				
Incidental informa								
Description of we during monitoring		Overcast						
Ground conditions monitoring	s at the time of	Dry						
Barometric / air re	eadings							
Barometric press			Stable					
_			Barometric	Relative				
Time of reading	hh:mm:ss		13:42:00	13:42:00				
Pressure	mbar		1009	1009				
riessuie	IIII		nt air temperature	1003				
Time of reading	hh:mm:ss	-	13:42:00	-				
	°C			16				
Temperature	C		20.0					
Gas readings			_			5 1-		
			-	eak		Ste		
Determinand	LoD	Unit	Reading	Time		ding	Time	
Methane	0.1	%v/v	0.2	13:42:00		.2	13:45:00	
Methane (LEL)	1	%	4	13:42:00		4	13:45:00	
Carbon Dioxide	0.1	%v/v	8.0	13:42:00		.8	13:45:00	
Oxygen	0.1	%v/v	21.5	13:42:00	20).5	13:45:00	
Carbon Monoxide	1	ppm	<1	13:42:00	<	:1	13:45:00	
Hydrogen Sulfide	1	ppm	<1	13:42:00	<1		13:45:00	
Gas Flow	0.1	l/hr	0.1	13:40:00	0	.1	13:41:00	
Further information	on .			'				
			Groundwater level	Installation base				
Time of reading		hh:mm:ss	13:47:00	13:47:00				
Reading	<u>'</u>	m	DRY	3.50				
Remarks		141	Ditti	0.00				
Monitored by:	Checked	by:	Approved	i by:				
						<u> </u>		
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Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga		Location ID BH TUN 006			
Project No.	TE8364			Monitoring			Monitoring point ID		
							G1		
Engineer	Mott MacDonald B	entley			49	Monitorii	ng round number 02		
Client	Barhale Limited						Date		
						0:	2/11/2021		
Monitoring point i	information								
Distance to monit			6.00	Initial base depth	m		3.50		
Top of response :	zone m	1.50 E		Base of response zo	ne m		6.00		
Installation type			SP						
Condition of mon	itoring point	Good							
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)	·					
	•		Day 1	Day 2			Day 3		
Date/time of read	ling						•		
Atmospheric pres									
	evious days weather								
Equipment details	s								
Equipment type			GA5000	Equipment serial nur	nber	(SA501940		
Date equipment I	ast calibrated	2	0/07/2021						
Has equipment b	een zeroed		Yes	Time equipment zero	ed				
Incidental informa	ation			•					
Description of we during monitoring		Clear							
Ground condition monitoring	s at the time of	Dry							
Barometric / air re	eadings								
Barometric press			Stable						
_			Barometric	Relative					
Time of reading	hh:mm:ss		14:00:00	14:00:00					
Pressure	mbar		997	997					
ricasare	IIII	Amhier	t air temperature	331					
Time of reading	hh:mm:ss	ATTIBIET	14:00:00	-					
Temperature	°C		9.0						
Gas readings			9.0						
Gas readings						Cha	n.els.r		
Determinend	I aD	11=14		eak Time		Stea	•		
Determinand	LoD	Unit	Reading		Rea		Time		
Methane	0.1	%v/v	<0.1	14:04:00	<0		14:07:00		
Methane (LEL)	1	%	<1	14:04:00		:1	14:07:00		
Carbon Dioxide	0.1	%v/v	0.1	14:04:00	0.		14:07:00		
Oxygen	0.1	%v/v	21.2	14:04:00		.2	14:07:00		
Carbon Monoxide		ppm	<1	14:04:00		:1	14:07:00		
Hydrogen Sulfide		ppm	<1	14:04:00		:1	14:07:00		
Gas Flow	0.1	l/hr	<0.1	14:02:00	<0).1	14:03:00		
Further information	on								
			Groundwater level	Installation base					
<u> </u>		hh:mm:ss	14:04:00	14:04:00					
Reading		m	DRY	3.45					
Remarks									
Monitored by:	Checked	by:	Approved	i by:					
						12 E E			
Form No. SE-EMS	S-F-002 Revision N	lo. 3.00	Issue Date	e 01/02/2021		soit en	GINEERING		

Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Gas Monitoring			Location ID BH_TUN_006		
Project No.	TE8364	TE8364			Monitoring		Monitoring point ID G1		
Engineer	Mott MacDonald B	entley				Monitoring round number 03			
Client	Barhale Limited							Date	
							C	8/11/2021	
Monitoring point in	nformation								
Distance to monit			6.00		Initial base depth	m		3.50	
Top of response a	~ .				Base of response zo			6.00	
Installation type			SP						
Condition of moni	itoring point	Good							
Preceding atmos	pheric conditions for t	hree days	(nominally at	noon)					
			Day 1		Day 2			Day 3	
Date/time of read	ing		<u> </u>		-				
Atmospheric pres	sure mbar								
	evious days weather								
Equipment details	\$								
Equipment type			GA5000		Equipment serial nur	nber	GA501940		
	Date equipment last calibrated								
Has equipment be			Yes		Time equipment zero	æd			
Incidental informa									
Description of wea		Clear							
Ground conditions monitoring	s at the time of	Dry							
Barometric / air re	eadings								
Barometric pressi	ure trend		Stable						
		E	Barometric		Relative				
Time of reading	hh:mm:ss		12:11:00		12:11:00				
Pressure	mbar		1022		1022				
		Ambien	t air temperat	ture					
Time of reading	hh:mm:ss		12:11:00						
Temperature	°C	7.0							
Gas readings									
				Pe	ak		Ste	ady	
Determinand	LoD	Unit	Reading		Time	Rea		Time	
Methane	0.1	%v/v	0.3		12:14:00	0.		12:17:00	
Methane (LEL)	1	%	6		12:14:00		5	12:17:00	
Carbon Dioxide	0.1	%v/v	19.1		12:17:00	19		12:17:00	
Oxygen	0.1	%v/v	19.1		12:14:00	2.		14:07:00	
Carbon Monoxide		ppm	1		12:14:00		<u>-</u> I	14:07:00	
Hydrogen Sulfide		ppm			12:14:00	<	-	14:07:00	
Gas Flow	0.1	l/hr	<0.1		12:12:00	<0		12:13:00	
Further information		17111	-0.1		12.12.00		···	12.10.00	
	лі		Groundwater	r level	Installation base				
Time of reading		hh:mm:ss	12:18:00		12:18:00				
Reading		m	DRY	<u> </u>	3.45				
Remarks			<u> </u>		3.13				
Monitored by:	Checked	by: Approve			d by:				
Form No. SE-EMS	E (M) Davisian N	lo. 3.00	la a ·	io Dota	01/02/2021	-	soil er	GINEERING	
FUIII NO. SE-EMS	F-F-002 Revision N	IV. J. UU	ISSU	ue Date	01/02/2021				

Project Name	Cambridge Waste V Relocation	Vater Treat	tment Plant	Record Of Ga Monitoring	as	Location ID BH_TUN_011		
Project No.	TE8364			Worldoning			toring point ID	
							G1	
Engineer	Mott MacDonald B	entley				Monitori	ng round number 01	
Client	Barhale Limited						Date	
						1	9/10/2021	
Monitoring point i	information		'					
Distance to monit	toring point m		5.00	Initial base depth	m		2.50	
Top of response	zone m	1.50 E		Base of response zo	ne m		5.00	
Installation type			SP					
Condition of mon	itoring point	Good						
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)	·				
			Day 1	Day 2			Day 3	
Date/time of read	ling						-	
Atmospheric pres	ssure mbar							
Description of pre	evious days weather				·			
Equipment details	s							
Equipment type			GA5000	Equipment serial nun	nber	GA501940		
Date equipment I		2	20/07/2021					
Has equipment b			Yes	Time equipment zero	ed			
Incidental informa								
Description of we during monitoring		Clear						
Ground condition monitoring	s at the time of	Dry						
Barometric / air re	eadings							
Barometric press	ure trend		Stable					
_		Barometric		Relative				
Time of reading	hh:mm:ss		14:33:00	14:33:00				
Pressure	mbar		1008	1008				
		Ambier	nt air temperature					
Time of reading	hh:mm:ss		14:33:00	-				
Temperature	°C		20.0					
Gas readings				ı				
			Pe	eak		Ste	ady	
Determinand	LoD	Unit	Reading	Time	Rea		Time	
Methane	0.1	%v/v	0.1	14:35:00	0.		14:38:00	
Methane (LEL)	1	%	2	14:35:00	- 2	2	14:38:00	
Carbon Dioxide	0.1	%v/v	0.1	14:35:00	0.	.1	14:38:00	
Oxygen	0.1	%v/v	22.0	14:35:00	11	1.6	14:38:00	
Carbon Monoxide	9 1	ppm	5	14:35:00		5	14:38:00	
Hydrogen Sulfide	1	ppm	1	14:35:00	1		14:38:00	
Gas Flow	0.1	l/hr	0.1	14:33:00	0.	.1	14:34:00	
Further information	on			1				
			Groundwater level	Installation base				
Time of reading hh:mr		nh:mm:ss	14:40:00	14:40:00				
Reading		m	1.77	2.50				
Remarks								
Monitored by:	Checked	by:	Approved	i by:			(A)	
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Project Name	Cambridge Waste V Relocation	Vater Treat	tment Plant	Record Of Gas Monitoring			Location ID BH_TUN_011		
Project No.	TE8364				monitoring		Monitoring point ID		
Engineer	Mott MacDonald B	entley					Monitoring round number		
Client	Barhale Limited							Date	
							C	2/11/2021	
Monitoring point in	nformation								
Distance to monit		5.00			Initial base depth	m		2.50	
Top of response a	zone m				Base of response zo	ne m		5.00	
Installation type			SP		-				
Condition of moni	toring point	Good							
Preceding atmosp	oheric conditions for t	hree days	(nominally a	at noon)					
			Day 1		Day 2			Day 3	
Date/time of read	ing								
Atmospheric pres	sure mbar								
Description of pre	vious days weather								
Equipment details	3								
Equipment type			GA5000		Equipment serial nur	nber	GA501940		
Date equipment la		2	20/07/2021						
Has equipment be			Yes		Time equipment zero	xed			
Incidental informa									
Description of wea		Clear							
Ground conditions at the time of monitoring		Dry							
Barometric / air re	eadings								
Barometric pressu	ure trend		Stable						
		E	3arometric		Relative				
Time of reading	hh:mm:ss		12:12:00		12:12:00				
Pressure	mbar		997		997				
		Ambier	nt air temper	rature					
Time of reading	hh:mm:ss	12:12:00							
Temperature	°C	9.0							
Gas readings		l.			ı				
				P€	ak		Ste	ady	
Determinand	LoD	Unit	Readi	ing	Time	Rea	ding	Time	
Methane	0.1	%v/v	<0.1	 I	12:16:00	<0	0.1	12:19:00	
Methane (LEL)	1	%	<1		12:16:00	<	1	12:19:00	
Carbon Dioxide	0.1	%v/v	0.1		12:16:00	0.	1	12:19:00	
Oxygen	0.1	%v/v	20.9	•	12:16:00	17	'.4	12:19:00	
Carbon Monoxide		ppm	1		12:16:00	•		12:19:00	
Hydrogen Sulfide		ppm	<1		12:16:00	<	1	12:19:00	
Gas Flow	0.1	l/hr	<0.1	1	12:14:00	<0	.1	12:15:00	
Further information									
			Groundwat	ter level	Installation base				
Time of reading		hh:mm:ss	12:20:		12:20:00				
Reading		m DRY			2.50				
Remarks		•							
Monitored by:	Checked	by:	Α	pproved	d by:				
							ED!! 00	CIDEODICC	
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Project Name	Cambridge Waste V Relocation	Vater Treat	ment Plant	Record Of Ga		Location ID BH_TUN_011		
Project No.	TE8364			Worldoning	Monitoring point ID			
							G1	
Engineer	Mott MacDonald B	entley				Monitori	ng round number 03	
Client	Barhale Limited						Date	
						0	8/11/2021	
Monitoring point i	inf ormation		<u>'</u>					
Distance to monit	toring point m		5.00	Initial base depth	m		2.50	
Top of response :	zone m	1.50 E		Base of response zo	ne m		5.00	
Installation type			SP					
Condition of mon	itoring point	Good						
Preceding atmos	pheric conditions for t	hree days	(nominally at noon)	·				
			Day 1	Day 2			Day 3	
Date/time of read	ling							
Atmospheric pres	ssure mbar							
	evious days weather							
Equipment details	s							
Equipment type			GA5000	Equipment serial nur	nber	(GA501940	
Date equipment I	ast calibrated	2	0/07/2021					
Has equipment b	een zeroed		Yes	Time equipment zero	ed			
Incidental informa	ation							
Description of we during monitoring		Clear						
Ground condition monitoring	s at the time of	Dry						
Barometric / air re	eadings							
Barometric press			Stable					
•		E	Barometric	Relative				
Time of reading	hh:mm:ss	10:31:00		10:31:00				
Pressure	mbar		1022	1022				
		Ambien	t air temperature					
Time of reading	hh:mm:ss		10:31:00	-				
Temperature	°C		7.0					
Gas readings			7.0					
ous readings			Dı	eak		Stea	adv	
Determinand	LoD	Unit	Reading	Time	Rea		Time	
Methane	0.1	%v/v	<0.1	10:34:00	<0		10:37:00	
Methane (LEL)	1	%	<1	10:34:00		:1	10:37:00	
Carbon Dioxide		%v/v	0.1	10:34:00	0.		10:37:00	
Oxygen	0.1	%v/v	21.0	10:34:00).8	10:37:00	
Carbon Monoxide		ppm	1	10:34:00		1	10:37:00	
Hydrogen Sulfide		ppm	<u>'</u> <1	10:34:00	<	-	10:37:00	
Gas Flow	0.1	l/hr	<0.1	10:32:00).1	10:37:00	
Further information		1/101	~0.1	10.32.00	~(). I	10.33.00	
runner monnauc)(I		Groundwater level	Installation base				
Time of median			10:38:00	10:38:00				
		nh:mm:ss		2.50				
Reading Remarks		m	DRY	2.50				
i vernains								
Monitored by:	Checked	by:	Approved	d by:		A		
							CIDOCOIO -	
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Get in touch

You can contact us by:



Emailing at info@cwwtpr.com



Calling our Freephone information line on **0808 196 1661**



Writing to us at Freepost: CWWTPR

You can view all our DCO application documents and updates on the application on The Planning Inspectorate website:

https://infrastructure.planninginspectorate.gov.uk/projects/eastern/cambridge-waste-water-treatment-plant-relocation/

