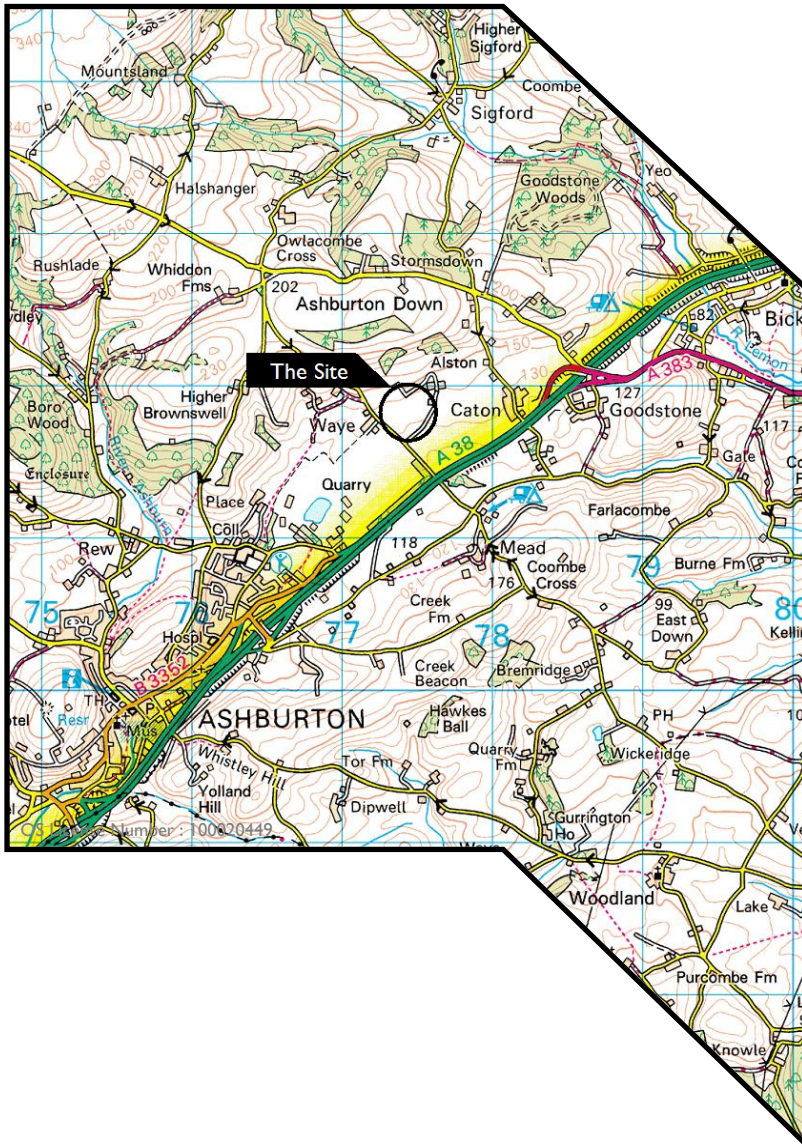


Ground Investigation



www.geotechnics.co.uk



September 2021 GI,
New Access to Alston
Farm, Ashburton

Factual Report

for
E & JW Glendinning Ltd

Engineer : Atkins

Project Number PE211721

February 2022

Issuing Office South West Office
The Geotechnical Centre
Unit 5, Orchard Court
Heron Road, Sowton
Exeter
EX2 7NR
Tel: 01392 463110
mail@exeter.geotechnics.co.uk

Head Office
The Geotechnical Centre
203 Torrington Avenue
Tile Hill
Coventry
CV4 9UT
Tel: 02476 694664
mail@geotechnics.co.uk

North West Office
The Geotechnical Centre
Unit 1, Borders Industrial Park
River Lane, Saltney
Chester
CH4 8RJ
Tel: 01244 671117
mail@chester.geotechnics.co.uk

North East Office
The Geotechnical Centre
Unit 1, Bypass Park Estate
Sherburn-in-Elmet
Leeds
LS25 6EP
Tel: 01977 525030
mail@yorkshire.geotechnics.co.uk

Ground Investigation
at

Factual Report

**September 2021 GI,
New Access to Alston Farm, Ashburton**
for
E & JW Glendinning Ltd

Engineer :
Atkins

Project No:
PE211721
February 2022

LIST OF CONTENTS

	Page No
1.0 INTRODUCTION	I
2.0 OBJECT AND SCOPE OF THE INVESTIGATION	I
3.0 PRESENTATION	I
4.0 THE SITE	I
4.1 Location	I
4.2 Description	I
4.3 Site Geology	2
5.0 PROCEDURE	I
5.1 Commissioning	2
5.2 General	2
5.3 Trial Pits	2
5.4 Dynamic Cone Penetration Tests	2
6.0 LABORATORY TESTING	3
6.1 Geotechnical	3
6.2 Contamination	3

APPENDICES

APPENDIX 1	The Brief
APPENDIX 2	Site Location Plan
APPENDIX 3	Exploratory Hole Location Plan
APPENDIX 4	Trial Pit Records
APPENDIX 5	Trial Pit Photographs
APPENDIX 6	Dynamic Cone Penetration Tests
APPENDIX 7	Laboratory Testing Results - Geotechnical
APPENDIX 8	Laboratory Testing - Contamination
APPENDIX 9	Investigation Techniques and General Notes

1.0 INTRODUCTION

A geotechnical and geoenvironmental investigation was undertaken by Geotechnics Limited at the site of a proposed new access road to Alston Farm. The investigation was carried out to the instructions of the Engineer, Atkins on behalf of the Client, E and JW Glendinning Ltd. This report describes the work undertaken and presents the data obtained.

2.0 OBJECT AND SCOPE OF THE INVESTIGATION

The object of the investigation was to obtain information on the ground and groundwater conditions relating to the design of the proposed works within the limitations posed by exploratory hole numbers, locations, depths, methods adopted and the scope of approved in situ and laboratory testing. The Brief for the project is included in Appendix I. The investigation comprised trial pits, in situ and laboratory testing and reporting. A Factual Report was also commissioned.

3.0 PRESENTATION

A description of the site and a summary of the procedures followed during the investigation process are presented in Sections 4 to 6. The factual data so obtained are presented in Appendices 4 to 8 of this report. Attention is drawn to the General Notes and Investigation Procedures presented in Appendix 9 to aid an understanding of the procedures followed and the context in which the report should be read.

In addition, data in electronic format in accordance with “The Electronic Transfer of Geotechnical Data from Ground Investigations” published by the AGS (the AGS Format) are presented together with a copy of the report in electronic PDF format.

4.0 THE SITE

4.1 Location

The site is located approximately 625m northwest of the A38, 2.5km northeast of the town of Ashburton, and 300m northeast of Linhay Quarry. The approximate Ordnance Survey National Grid Reference for the centre of the site is SX 774 719 and an extract from the relevant 1:50,000 Scale O.S. Map (Sheet No. 202) is included as Appendix 2.

4.2 Description

The investigation locations form an L shape approximately 540m long. The proposed road links an existing ‘B’ road with a property whose current access will be lost if a proposed quarry extension takes place. The site is currently occupied by fields used for grazing livestock. The site is within Dartmoor National Park.

The site topography is undulating, with overall levels falling to the southeast. Field boundaries are defined by hedgerows. A historic track defined by parallel hedgerows runs through the most northerly part of the site. There are no watercourses on the site, and the ground was firm and dry at the time of the investigation. An unusual circular depression was noted in the most easterly field of the site. Investigation of this feature was not included in the scope of works. Vegetation on the site is generally grass. The hedgerows are formed of small to medium size trees. Overhead 11kv power lines cross the proposed route of the new road towards its eastern end.

4.3 Site Geology

The British Geological Survey website, <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>, accessed on the 21st October 2021, shows the site to be underlain by the Chercombe Bridge Limestone Formation in the south and the Tavy Formation, which is a slate, in the north. No superficial deposits are recorded on the site.

The Chercombe Bridge Limestone is a sedimentary rock formed in shallow seas in the Devonian. The Tavy Formation is a metamorphic rock from the Devonian period.

5.0 PROCEDURE

5.1 Commissioning

The work was awarded following submission of a tender for work designed by the Engineer for a ground investigation of the site in accordance with their requirements (see Appendix 1).

5.2 General

The procedures followed in this site investigation are based on *BS 5930: 2015+A1:2020 – Code of Practice for Site Investigations*. The soils and rocks encountered have been described in accordance with BS5930:2015+A1:2020 and BS EN ISO 14688-1:2018 and BS EN ISO 14689:2018. The Trial Pit and Dynamic Cone Penetrometer records are included in Appendices 4 to 6 and their approximate positions are shown on the Exploratory Hole Location Plan in Appendix 3.

The Exploratory Hole locations were specified by the Engineer. The co-ordinates and levels shown on the Exploratory Hole Records were measured using a Leica GPS survey device. The depths quoted on the exploratory hole records are in metres below ground level.

At each exploratory hole the location was scanned using a cable avoidance tool (CAT) prior to breaking ground.

5.3 Trial Pits

Nine (9 No.) Trial Pits (numbered AFTP01 to AFTP09) were excavated to depths varying between 2.10 and 3.60m below ground level using a Backhoe excavator between the 13th and 14th September 2021. This work was supervised on site by a geotechnical / geo-environmental engineer.

The profiles of strata or other features were recorded as excavation proceeded and measurements taken from ground level. Representative samples were taken, where appropriate, for laboratory examination and analysis and in addition, Environmental samples (ES) were recovered at the depths indicated on the Trial Pit Records. Samples were taken directly from excavated materials deposited at the surface. Groundwater observations and trench stability notes are included on the Trial Pit Records. Photographs of the pits are presented in Appendix 5.

5.4 Dynamic Cone Penetration Tests

Eight (8 No.) Dynamic Cone Penetration (DCP) Tests (numbered AFDCP01 to AFDCP08) were carried out at the locations marked on the Exploratory Hole Location Plan in Appendix 3.

The tests were commenced from Ground Level and were performed to give an indication of CBR values at shallow depths to aid pavement design. The test comprises the measurement of increments of penetration of a 60° cone driven into the ground using an 8kg hammer falling a distance of 575mm. The CBR is obtained from the relationship between the CBR and the DCP readings; $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10}(\text{mm/blow})$ as defined in Interim Advice Note 73/06 Revision 1 (2009) "Design Guidance for Road Pavement Foundations (Draft HD25)" published by the Highways Agency. The test results are presented in Appendix 6.

6.0 LABORATORY TESTING

6.1 Geotechnical

The laboratory testing schedule was specified by the Engineer in order to relate to the proposed development. Unless otherwise stated, the tests were carried out in South West Geotechnical's UKAS accredited Laboratory (Testing No. 8260) and were undertaken in accordance with the appropriate Standards as indicated below and on the Laboratory Test Certificate in Appendix 7. Any descriptions, opinions and interpretations are outside the scope of UKAS accreditation.

The tests undertaken can be summarised as follows:-

Standard	Test Description	Quantity
BS EN ISO 17892-1:2014	Water Content Determination	8
BS EN ISO 17892-4:2016	Particle Size Distribution Determination – Sieving Method	8
BS EN ISO 17892-12:2018	Determination of Liquid and Plastic Limits	8
BS 1377:1990 Part 2: 8.3	Particle Density Determination	1
BS 1377:1990 Part 7: 4	Shear Strength Measurement – Direct Shear test 60mm	2
BS 1377:1990 Part 7: 9	Shear Strength Measurement - (Multi-Stage) Quick Undrained Triaxial Compression Test	2

The results of these tests are presented in Appendix 7.

6.2 Contamination

Selected samples of soil were tested at the laboratories of Eurofins Chemtest (Testing No. 2183) for a number of determinands in order to check on potential site contamination. The determinands were specified by the Engineer and are detailed on the results sheets in Appendix 8 together with the test result as well as the test method, accreditation and detection limit.

Written by:

Michael Kerr
BSc (Hons), FGS
Senior Engineer

Reviewed by:

Anne Simpson
BSc (Hons) MSc(Eng), CEng, IOM3, FGS
Principal Engineer

APPENDIX I

The Brief

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Conditions of Contract

The Employer shall be the E&JW Glendinning Ltd., and the conditions of contract shall be the Infrastructure Conditions of Contract, the Ground Investigation Version, 1 August 2011 (and subsequent amendments, if any), subject to the following amendments.

Cl. 21.1	In lines 2 and 3, delete “in the joint names of the Contractor and the Employer” and insert “in the name of the Contractor”.
Cl. 23(1)	In lines 2 and 3, delete “in the joint names of the Contractor and the Employer” and insert “in the name of the Contractor”.
Cl. 23(2)	Delete clause.
Cl. 25(1)	Delete final sentence.
Cl. 31(1)	Delete clause.
Cl. 71	Heading and side heading – delete “2007” insert “2015”. Replace Clause 71(1) and (2) with the following: 71(1) In this Clause (a) “the Regulations” means the Construction (Design and Management) Regulations 2015 or any statutory re-enactment or amendment thereof for the time being in force (b) “Construction Phase Plan” means the document recording the health and safety arrangements site rules and any specific measures for construction work as described in regulation 2(1) of the Regulations and prepared in accordance with regulation 12 of the Regulations (c) “Principal Designer” and “Principal Contractor” mean the persons so described in regulation 2(1) of the Regulations (2) Where and to the extent that the Regulations apply to the Works and (a) the Engineer is appointed as Principal Designer and/or (b) the Contractor is appointed Principal Contractor Then in taking any action as such they shall state in writing what action is being taken under the Regulations 71(3)(a) and (b) replace the words “CDM Co-ordinator” with the words “Principal Designer”.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Specification

The specification shall be the UK Specification for Ground Investigation, 2nd Edition, published by ICE Publishing, 2012, with information, amendments and additions as described in the Schedules.

Schedules

Schedule 1: Information		
S1.1	Name of Contract	Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane, and a new private access to Alston Farm, near Ashburton, Devon, for E&JW Glendinning Ltd.
S1.2	Investigation Supervisor	Atkins Ltd.
S1.3	Description of site	The investigation is for a new culvert for the Balland Stream at Balland Lane, a new 1.35km public road called Waye Lane which is planned north of Linhay Hill Quarry between Balland Lane in the east of Ashburton and Waye at Alston Lane north east of Linhay Hill Quarry, and for a new 550m private access to Alston Farm. Much of the new Waye Lane route follows an existing public footpath through land owned by E&JW Glendinning Ltd., and with the eastern section crossing an area of restored quarry spoil tip. The route crosses several ordinary watercourses which flow to and including the Balland Stream. The new Alston Farm access is off Alston Lane and traverses farm fields used for livestock pasture. Vegetation clearance is anticipated to be carried out during September and October including along Balland Lane.
S1.4	Main works proposed and purpose of this contract	Exploratory investigations to confirm the ground conditions and determine geotechnical parameters for a new culvert in Balland Lane, and the new roads which are subject to ongoing design.
S1.5	Scope of investigation	Inspection pits, borehole drilling with standard penetration tests, rotary follow on and standpipe installation, window sampling and super heavy dynamic probing, trial pits, TRL dynamic cone penetration tests, geotechnical and environmental laboratory tests.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.6	Geology and ground conditions	Geological maps do not identify the presence of superficial deposits though they may be locally present as alluvial deposits along the watercourses, and Made Ground is present associated with the restored quarry spoil tip. The geological maps show Balland Lane and the southern ≈185m of the new Waye Lane, and the eastern 185m of the new access to Alston Farm to be underlain by the Chercombe Bridge Limestone which is karstic, and the remainder of the new roads to be underlain by the Tavy Formation, which the BGS Lexicon describes as “a pale green and grey-green slaty silty mudstone with minor thin fine-grained sandstone beds and lenses”. Groundwater is likely to be locally shallow in areas along the planned new Waye Lane route.
S1.7	Schedule of drawing(s) and documents	Drawings LINHAY-ATK-G-DR-001 Sh 1 of 10 to 010 Sh 10 of 10. LHQ Waye Lane Atkins Specification for Ground Investigation 2021. LHQ Waye Lane Atkins Bill of Quantities for Ground Investigation 2021. LHQ Waye Lane Atkins Designers Risk Assessment for Ground Investigation 2021. Proposed Extension of Linhay Hill Quarry Land Contamination Assessment, June 2016. Utility statutory search records, which have been transposed to the drawings.
S1.8	General requirements (Specification Section 3) Particular restrictions / relaxations	Only agreed access routes and agreed working and storage areas to be utilised. Access to the west end of the new Waye Lane can be via a track from within Linhay Hill Quarry. Access to the east end of the new Waye Lane can be via a field entrance off Alston Lane. Access to the new farm access to Alston Farm will be via fields off the existing farm access. Access to locations will be dependent on the surface ground and vegetation conditions for trafficking of plant and avoidance of unnecessary damage.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.8.1	Quality management system (Clause 3.3)	The Contactor shall work in line with or follow: The ground investigation shall be carried out in accordance with quality management systems established in accordance with BS EN ISO 9001, BS EN ISO 14001 and BS OHSAS 18001. Environmental laboratory testing shall be carried out by a certified MCERTS and UKAS accredited laboratory. Compliance records shall be made available to the Investigation Supervisor upon request.
S1.8.2	Professional Attendance (Clause 3.5.2)	The Contractor shall provide an experienced geotechnical engineer or geologist full time on site for the supervision of the site activities, logging of exploratory holes, taking samples from the exploratory holes, taking videos and photographs and providing daily records and preliminary logs (except where daily records are for activities carried out by boring operatives). The Geotechnical Engineer / Engineering Geologist shall be contactable for the entire working day and shall be responsible for taking photographs, providing daily records and the production of preliminary logs in accordance with BS EN 1997-2 and BS EN ISO 14688-2.
S1.8.3	Provision of ground practitioners and other personnel (Clauses 3.6.1 and 3.6.2)	Site personnel provided by the contractor shall, as a minimum, have CSCS or similar accreditation. The personnel involved with the Contract shall have demonstrable competence and suitability for the tasks and duties they will be expected to carry out. The Employer reserves the right to exclude any worker from a role if it cannot be demonstrated that the worker has sufficient training, skills and experience in the role. Drillers employed on the Contract shall hold a certificate of competence for percussion/dynamic boring and rotary drilling applicable to the work on which they are engaged, as issued by the British Drilling Association Limited under the Ground Investigation Drillers Accreditation Scheme or an equivalent body.
S1.8.4	Hazardous ground, land affected by contamination and invasive weeds (Clauses 3.7.1 and 3.22)	A Land Contamination Assessment desk study has been carried out and hazardous substances are not expected within the ground, therefore the site is designated "GREEN" in accordance with the Guidelines for Guidance for safe intrusive activities on contaminated or potentially contaminated land, BDA, 2008.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.8.5	Additional information on services not shown on Contract Drawings (Clause 3.7.2)	Exploratory hole locations should be moved to avoid known or suspected services or evidence of possible services, or those services located accurately.
S1.8.6	Known/suspected mine workings mineral extractions, etc. (Clause 3.7.3)	None known. However the Chercombe Bridge Limestone is karstic and it is possible that cavities or with clayey infill could be encountered.
S1.8.7	Protected species (Clause 3.7.4)	Specific areas of vegetation are within dormice habitat, and so require clearance under licence from Natural England. That vegetation clearance is expected to commence in September 2021.
S1.8.8	Archaeological remains (Clause 3.7.5)	An archaeological watching brief applies to the construction of the new access to Alston Farm. Therefore an archaeologist may visit or require inspection of trial pits within Alston Farm and should be contacted to be informed when those trial pits are to be excavated. Also trial pits within Alston Farm are to be excavated with a toothless bucket where possible. The archaeologist who should also be contact if suspected archaeological features or deposits are encountered is: Simon Hughes, Project Manager for AC Archaeology Ltd. Unit 4, Halthaies Workshops, Bradninch, Nr Exeter, Devon, EX5 4LQ, tel. 01392-882410.
S1.8.9	Security of the site (Clause 3.11)	The Contractor is responsible for site materials, plant and equipment and security of them. Working areas must be demarcated and must be made and kept safe at all times by means of barriers, warning notices, lights, etc. as determined by the health and safety risk assessment(s). If excavations have to be left open overnight then they must be securely fenced.
S1.8.10	Traffic management measures (Clause 3.12)	None envisaged.
S1.8.11	Restricted working hours (Clause 3.13)	None envisaged, though access to the new Waye Lane route via Linhay Hill Quarry will only be possible during the quarry working hours (Monday – Friday and Saturday mornings).
S1.8.12	Trainee site operatives (Clause 3.14.1)	Permitted subject to prior approval by the Investigation Supervisor.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.8.13	Contamination avoidance and/or aquifer protection measures required (Clauses 3.15.2 and 3.15.3)	Not envisaged. The Chercombe Bridge Limestone is classified as a Principal Aquifer whereas the surrounding strata are classified as Secondary A aquifers. Investigation Supervisor to be notified if suspected contamination is encountered.
S1.8.14	Maximum period for boring, pitting or trenching through hard material, hard stratum or obstruction (Clauses 2.8, 4.3 and 6.4)	One hour, as per Clauses 4.3 and 6.4. Where obstructions are encountered at a depth less than 1.2m, an alternative location should be sought close to the original location. Alternative locations should be agreed with the Investigation Supervisor.
S1.8.15	Reinstatement requirements (Clause 3.16)	Reinstatement of surfaces to be as per existing ground surfaces.
S1.8.16	Hygiene facilities required (Clauses 2.20 and 3.16.1)	No additional requirements.
S1.8.17	Unavoidable damage to be reinstated by Contractor (Clause 3.16.1)	Unavoidable damage caused by the Contractor shall be reported to the Investigation Supervisor to agree with the Investigation Supervisor the reparation, if any, which shall be carried out prior to demobilising from site.
S1.8.18	Accuracy of exploratory hole locations (Clauses 3.19 and 3.20)	The final position of all exploratory holes shall be surveyed relative to Ordnance Survey National Grid and Ordnance Datum. Coordinates shall be to the nearest 0.5 metre. Levels shall be to the nearest 0.05m OD.
S1.8.19	Photography requirements (Clause 3.25)	Required for inspection pits, trial pits, dynamic samples and rotary core. Inspection pits shall be photographed to show a general view of the pit and excavation arisings plus separate view of each excavated face and notable features such as structures or potential contamination.
S1.9	Percussion boring (Specification Section 4) Particular restrictions / relaxation	

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.9.1	Permitted methods and restrictions (Clauses 4.1 to 4.4)	Cable percussion. Minimum diameter 150mm. SPT testing in ground other than bedrock, first test at base of the inspection pit. SPT hammer calibration certificates to be included in the reporting. Where appropriate ground conditions are encountered open tube samples (OS-T/W) shall be undertaken on an alternating basis with SPT tests between each windowless sampling run. If the ground conditions are not suitable for the use of thin wall open tube samplers then thick wall open tube sampling (OS-TK/W) shall be used. If the ground conditions are not suitable for the use of thin or thick wall open tube sampling then SPT tests shall be undertaken instead.
S1.9.2	Backfilling (Clause 4.5)	Backfill with clean gravel below the water table, then cement bentonite grout above the water table as per Clause 5.7 or as otherwise agreed with the Investigation Supervisor.
S1.9.3	Dynamic sampling (Clause 4.6)	No additional requirements.
S1.10	Particular Rotary drilling (Specification Section 5) Particular restrictions / relaxations	
S1.10.2	Particular rotary drilling techniques (Clause 5.2)	Percussion boreholes may need to be extended by rotary drilling to investigate the bedrock. Minimum hole and core diameter to be as necessary to achieve the borehole target depth. Operations entailed in recovering the cores from the ground after completion of drilling shall be carried out in a manner such as to minimise disturbance to the cores. The Contractor shall achieve no less than 90% core recovery. If recovery falls below 90% the Contractor shall take immediate steps to rectify the problem.
S1.10.3	Drilling fluid type and collection (Clause 5.3)	The Contractor shall utilise appropriate flush suitable for the ground conditions and to ensure that the required total core recovery is achievable in the anticipated strata. No drilling flush or returns are to escape to surface drainage or pavement surfaces outside the limits of the designated working areas. Drilling flush is to be contained close to the hole utilising, for example, sandbags and polythene sheeting to form an impermeable bund as necessary. Drilling flush that is expended shall be pumped into a container to avoid ground contamination. Excess drilling flush is then to be removed following completion of each hole. This shall be collected and stored prior to disposal at an appropriately licensed facility.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S.10.4	Rotary core drilling equipment and core diameter (Clauses 5.4.1 and 5.4.2)	Rotary core diameter and equipment to be as necessary to ensure core recovery with subsampling for testing and to achieve the borehole target depth and monitoring installation if required.
S1.10.5	Core logging (Clause 5.4.6)	No additional requirements.
S.10.6	Core sub-samples for laboratory testing (Clause 5.4.7)	Geotechnical samples are to be taken every 1.5-2m or change of strata, whichever is the greater frequency. Samples to be collected and preserved so as not to hinder any test detailed within Clause S1.19.5.
S1.10.7	Address for delivery of selected cores (Clauses 5.4.8 and 5.4.9)	Core may be required for long term storage by E&JW Glendinning Ltd. at Linhay Hill Quarry, Ashburton.
S1.10.12	Backfilling (Clause 5.7)	Backfill with clean gravel below the water table, then cement bentonite grout above the water table as per Clause 5.7.
S1.10.13	Core photographic requirements (Clause 5.8)	Photographs of cores in a fresh condition will be required.
S1.11	Pitting and trenching (Specification Section 6) Particular restrictions / relaxations	
S1.11.1	Indirect detection of buried services and inspection pits (Clauses 3.8.3 and 6.1)	Each exploratory hole location is to be CAT scanned by a suitably trained operator. An inspection pit is to be dug to ensure the avoidance of underground services.
S1.11.6	Backfilling (Clause 6.10)	No additional requirements.
S1.11.7	Photographic requirements (Clause 6.12)	No additional requirements (to Clause 3.25).
S1.12	Sampling and monitoring during intrusive investigation (Specification Section 7) Particular restrictions / relaxations	

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.12.3	Frequency of sampling for geotechnical purposes	Geotechnical samples are to be taken in accordance with Clauses 7.6.3 to 7.6.11. Samples to be collected and preserved so as not to hinder the tests detailed within Clause S1.19.5. Inspection Pits and Trial Pits Small disturbed samples shall be taken at every strata change or 0.5m interval in each excavation. Large bulk disturbed samples shall be taken at a rate of one per stratum or 1m interval in each excavation unless directed otherwise by the Investigation Supervisor. Cable percussion holes <i>Granular soils</i> - Bulk disturbed samples shall be taken of each soil type and at a minimum of 1.0m intervals in the top 8m or 1.5m beyond that depth. <i>Cohesive soils</i> - Small disturbed samples shall be taken at each change in soil type or consistency and at 1m intervals to a depth up to 8m bgl. Open tube sampling shall be taken alternately with SPTs at 1m centres up to 8m bgl or 1.5m beyond this depth. Rotary drillholes Subject to the condition of the core, sub-samples are to be taken at nominally 1.5m depth intervals.
S1.12.7	Groundwater level measurements during exploratory hole construction (Clause 7.7)	As per Clause 7.7.
S1.12.8	Special geotechnical sampling (Clause 7.8)	Bulk sampling of selected fill at Linhay Hill Quarry will be required for geotechnical laboratory testing.
S1.12.10	Retention and disposal of contamination / WAC samples (Clause 7.9.3)	No additional requirements.
S1.12.11	Frequency of sampling (Clause 7.9.4)	If an environmental land quality concern is suspected, e.g. stained soils, odours or Made Ground i.e. non engineered fill, environmental samples of that ground are to be collected for testing for potential contaminants, and with a sample below the zone of suspected contamination. In the absence of indicators of potential contamination at least one environmental sample is to be taken per exploratory hole e.g. within the unsaturated zone between 0.2-0.8mbgl.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.12.12	Sampling method (Clause 7.9.5)	Soil sample container requirements should be as required by the laboratory based on the potential soil, soil leachate and WAC testing detailed in this specification or suspected contamination encountered. Samples with suspected contamination (e.g. asbestos, hydrocarbons) shall be marked accordingly to make laboratory staff aware of potential risks, so that appropriate precautions can be taken. This shall also be noted on the sample schedule sheet so that these samples can be scheduled for the appropriate analysis. Samples shall be stored so that they are protected from damage and deterioration, from direct heat and sunlight and from frost and precipitation. They shall also be protected to ensure that their temperature remains within the range appropriate to the type and nature of the sample. Samples should be kept at a low temperature (ideally at approximately 4°C) and in darkness via the use of cool boxes packed with ice blocks during storage and transit to the laboratory. Adequate chain of custody information shall be maintained at all times.
S1.13	Probing and cone penetration testing (Specification Section 8) Particular restrictions / relaxations	
S1.13.1	Type(s) and reporting of dynamic probing (Clauses 8.1.1 and 8.1.2)	Windowless sampling and super heavy dynamic probing (DPSH-B).
S1.14	Geophysical testing (Specification Section 9) Particular restrictions / relaxations	
		Not required.
S1.15	In situ testing (Specification Section 10) Particular restrictions / relaxations	
S1.15.1	Tests in accordance with British Standards (Clause 10.3)	Standard Penetration Test (SPT).
S1.15.7	Special in situ testing and reporting requirements (Clause 10.7)	TRL Dynamic Cone Penetrometer (DCP) testing to 0.85mbgl with results for each location including number of blow, depth reading, penetration per blow, estimated CBR.
S1.16	Instrumentation (Specification Section 11) Particular restrictions / relaxations	

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.16.1	Protective covers for installations (Clause 11.2)	Appropriately sized (minimum 100mm dia) monitoring well covers to be installed to manufacturer's recommendations to be clearly marked with 'Monitoring well' or similar and ID of monitoring well location. Raised covers will be required except if a monitoring location is within a publicly accessible area.
S1.16.2	Protective fencing (Clause 11.3)	Required.
S1.16.3	Standpipe and standpipe piezometer installations (Clauses 11.4.1 and 11.4.2)	Standpipes (≥ 19 mm diameter) to be installed in boreholes to enable monitoring of groundwater elevation.
S1.17	Installation monitoring and sampling (Specification Section 12) Particular restrictions / relaxations	
S1.17.1	Groundwater level readings in installations (Clause 12.2)	Groundwater level to be taken on completion of standpipe installation and thereafter at least twice before the end of the site work.
S1.17.2	Groundwater sampling from installations (Clause 12.3.1)	Not required.
S1.17.6	Other monitoring	Not required.
S1.18	Daily records (Specification Section 13) Particular restrictions / relaxations	
		No additional requirements.
S1.19	Geotechnical laboratory testing (Specification Section 14) Particular restrictions / relaxations	
S1.19.1	Preparation of test schedule (Clause 14.1.1)	The Contractor shall provide details of the samples taken during the ground investigation for each exploratory hole, where required, to the Investigation Supervisor along with the hand written exploratory hole logs within 24 hours of completion of the exploration and sampling to allow immediate contamination test scheduling. Preliminary logs shall be provided within 7 working days of completion of the exploration and sampling. The Investigation Supervisor geotechnical specialist shall be responsible for scheduling geotechnical laboratory testing requirements, which will be provided to the Contractor within 5 working days of receipt of the preliminary logs and details of samples.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.19.2	Tests Required (Clause 14.1.2)	May include but not restricted to: moisture content, specific gravity, particle size distribution, Atterberg limits (liquid limit, plastic limit and plasticity index), organic matter content, compaction tests, MCV, oedometer consolidation, quick undrained triaxial test, consolidated undrained triaxial test, small / large shear box, sulphate and pH. Additional testing may be required and will be requested by the Investigation Supervisor if necessary.
S1.19.3	Specification for tests not covered by BS 1377 and options under BS 1377 (Clause 14.2.1 and 14.4)	Not envisaged.
S1.19.4	UKAS accreditation to be adopted (Clause 14.3)	The laboratory testing shall be carried out under UKAS Accreditation.
S1.19.5	Rock testing requirements (Clause 14.5)	May include but not restricted to: natural moisture content, point load index, unconfined compressive strength.
S1.19.6	Chemical testing for aggressive ground / groundwater for concrete (Clause 14.6)	Chemical testing for aggressive ground/groundwater for concrete shall be in accordance with BRE Special Digest 1 – Soil and groundwater aggressivity tests, Suite A Natural Ground (pyrite absent) and Suite C Brownfield Site (pyrite absent).
S1.20	Geo-environmental laboratory testing (Specification Section 15) Particular restrictions / relaxations	
S1.20.1	Preparation of test schedule (Clause 15.1)	The Investigation Supervisor will schedule all testing. The Contractor will supply testing schedules and draft logs within 24 hours of the completion of each exploratory location. The Investigation Supervisor will decide the contamination laboratory tests required and will provide the Contractor with one or more schedules of laboratory tests. It may be necessary to specify additional testing after results of the original testing are available. Ideally testing schedules will not be prepared until the Investigation Supervisor has received the relevant preliminary logs. The Contractor shall inform the Investigation Supervisor within 24 hours from receipt of the testing schedule if the sample is not available for all the tests specified.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.20.2	Accreditation required (Clause 15.2)	Chemical laboratory testing shall be carried out to BS EN ISO / IEC 17025. The laboratory appointed to carry out environmental testing must hold current UKAS and MCERTS (where available) accreditation for soil analysis and CONTEST/AQUACHECK registration for water analysis, for analytes listed in this specification.
S1.20.3	Chemical testing for contamination (Clause 15.3)	Suite E – Soil samples, to comprise the following determinands: As, B, Cd, Cr (total), Cu, Pb, Hg, Ni, Se, Zn, pH, sulphate, total organic carbon, total petroleum hydrocarbons, speciated polyaromatic hydrocarbons, asbestos (screen), phenol. Suite F – Water samples, to comprise the following determinands: As, B, Cd, Cr (total), Cu, Pb, Hg, Ni, Se, Zn, pH, sulphide, sulphate, phenols (total), ammoniacal nitrogen, chloride, total organic carbon, dissolved organic carbon, total petroleum hydrocarbons, speciated polyaromatic hydrocarbons.
S1.20.4	Waste characterisation (Clause 15.4)	Required if evidence of contaminated ground, to inform whether if arising as waste it would be inert or not i.e. likely to be hazardous or non hazardous.
S1.20.5	Waste Acceptance Criteria testing (Clause 15.5)	Anticipated Suite H – Inert waste landfill, may be required if evidence of contaminated ground.
S1.21	Reporting (Specification Section 16) Particular restrictions / relaxations	
S1.21.1	Form of exploratory hole logs (Clauses 16.1 and 16.2.1)	Test results for environmental samples shall be accompanied by an unambiguous description of sample preparation, extraction and analysis method used. Draft results of the chemical analysis shall be reported to the Investigation Supervisor as they become available.
S1.21.2	Information on exploratory hole logs (Clause 16.2.2)	Report Fracture Index.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 1: Information		
S1.21.3	Variations to final digital data supply requirements (Clause 16.5.1)	No additional groups, fields or codes shall be accepted without the prior agreement of the Investigation Supervisor, and then only in exceptional circumstances. The Contractor shall be responsible for assigning GEOL_GEOL and GEOL_GEO2 codes. AGS Format data shall be issued as a single file. The following associated files are to be included in the AGS data submission. The formats for specific associated files are given below: - Photographs of cores and trial pits (Cl. 5.8 & 6.12) in JPEG format. - Drawings (Cl 16.4) in AutoCAD dwg or dxf format.
S1.21.4	Digital Data – Preliminary data (Clause 16.5.3)	Preliminary digital data shall be supplied with the first digital copy of the Ground Investigation Report.
S1.21.5	Type(s) of report required (Clause 16.6)	The Contractor is to prepare a Ground Investigation Report as per BS EN 1997-1:2004 Eurocode 7: Geotechnical design – Part 1 General rules Section 3.4. Contractor is not required to prepare a Geotechnical Design Report.
S1.21.8	Contents of Ground Investigation Report (Clause 16.8)	As per Clause 16.8.1 and BS EN 1997-1:2004 Eurocode 7: Geotechnical design – Part 1 General rules Sections 3.4.2 and 3.4.3.
S1.21.10	Submission of electronic information – Timing (Clause 16.10.1)	Complete set of electronic information to be supplied with draft and approved final copies of the report.
S1.21.11	Submission of electronic information – Media (Clause 16.10.2)	Via email, CD or DVD ROM.
S1.21.12	Approval of report (Clause 16.11)	One digital copy of a draft Ground Investigation Report required within three weeks of completion of the main site work (which excludes subsequent visits). One digital copy of the final Ground Investigation Report required within two weeks of receipt of the Investigation Supervisor's comments on a second draft report which shall include laboratory test results.
S1.21.13	Laboratory testing duration	The laboratory testing shall be completed and reported within four weeks of the completion of the fieldwork period.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 2: Exploratory Holes					
Hole ID.	Type	Sched- uled Depth	NGR	Anticipated Ground Surface	Remarks
As per each exploratory hole location.	Hand dug inspection pit.	0-1.2 m	At each exploratory borehole location, see drawing.	As indicated below.	To check for underground services.
For new culvert at Balland Lane					
BLWS01 to BLWS04 (& BLDP01 to 04)	Window sampler and DPSH-B	WS to 5m or refusal, DPSH to refusal	TBA	Grass / soil, vegetation clearance on north side expected to start Sept. 2021.	To determine ground conditions for founding a new culvert. One WS hole to have a standpipe.
Along the planned new public road Waye Lane					
WLBH01 – WLBH08	Cable percussion with rotary follow on.	6m	TBA	Grass/soil or hardcore where within existing footpath/track.	To determine ground conditions for the new road earthworks and culverts. Standpipes in WLBH01, WLBH04, WLBH05, WLBH06, WLBH08.
WLWS01 – WLWS18 (& WLDP01 to 18)	Window sampler and DPSH-B	WS to 5m or refusal, DPSH to refusal.	TBA	Grass/soil or hardcore where within existing footpath/track.	To determine ground conditions for the new road earthworks and culverts. Standpipes in WLWS05, WLWS07, WLWS10.
WLTP01 to WLTP06	Trial pit mechanically excavated.	3m	TBA.	Grass/soil over Chercombe Bridge Limestone	To determine ground conditions for the new road earthworks and culverts.

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Schedule 2: Exploratory Holes					
Hole ID.	Type	Sched-uled Depth	NGR	Anticipated Ground Surface	Remarks
WLTP07 to WLTP20, WLTP21 to WL26	Trial pit mechanically excavated.	1.5m	TBA.	Grass/soil or hardcore where within existing footpath/track, over Tavy Formation weathered slate.	To determine ground conditions for the new road earthworks and culverts.
WLTP21 to WLTP24, WLTP27 to WLTP36	Trial pit mechanically excavated.	3m	TBA.	Grass/soil or hardcore where within existing footpath/track, over Tavy Formation weathered slate.	To determine ground conditions for the new road earthworks and culverts.
WLDCP01 to WLDCP23	TRL DCP.	0.85m	TBA.	Grass / soil.	To determine CBR of the formation.
Within Alston Farm along route of proposed new farm access					
AFTP01 AFTP02 AFTP03 AFTP04 AFTP05 AFTP06 AFTP07	Trial pit mechanically excavated.	4.5m 4.5m 3m 3m 3m 3m 3m	TBA.	Grass.	To determine ground conditions for the new access earthworks.
AFDCP01 to AFDCP10	TRL DCP.	0.85m	TBA.	Grass.	To determine CBR of the formation.

Schedule 3: Engineer's Facilities		
S3.1, S3.2, S3.3, S3.4, S3.5, S3.6	Accommodation, Furnishings, Services, Equipment, Transport, Personal Protective Equipment for Investigation Supervisor	Not required.
Schedule 4: Specification Amendments		
None.		
Schedule 5: Specification Additions		
None.		

Ground Investigation for a new culvert at Balland Lane, a new public road Waye Lane and new private access to Alston Farm near Ashburton, Devon, 2021, Rev 1, for E&JW Glendinning Ltd., document reference 5196443.S0.G.001.SP

Bill of Quantities

See document reference 5196443.S0.G.002.BoQ

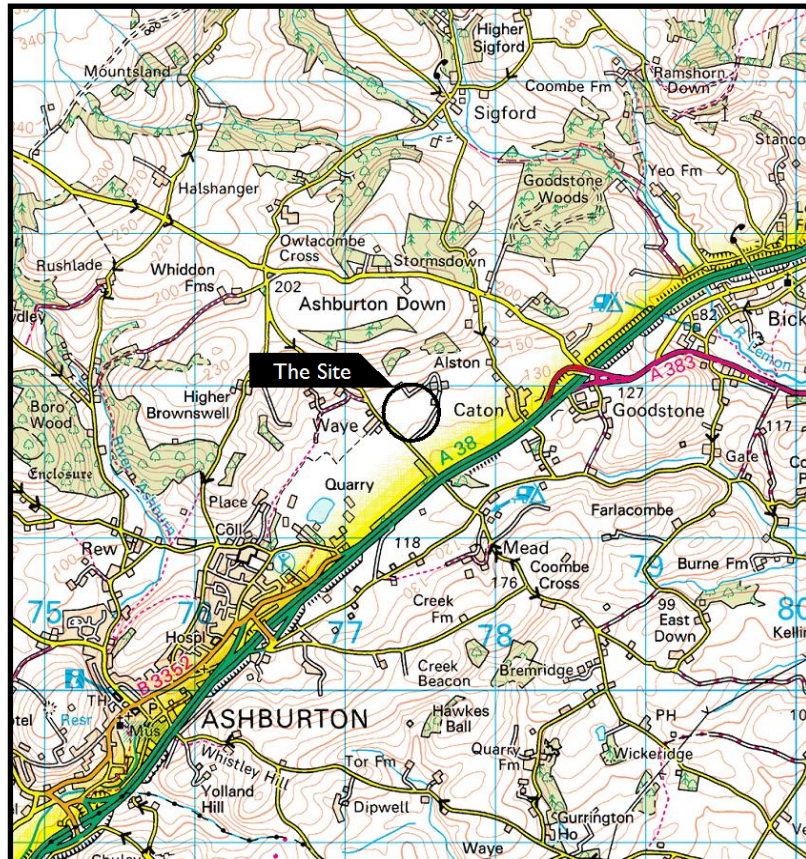
Designer's Risk Assessment

See document reference 5196443.S0.G.003.DRA

APPENDIX 2

Site Location Plan

SITE LOCATION PLAN



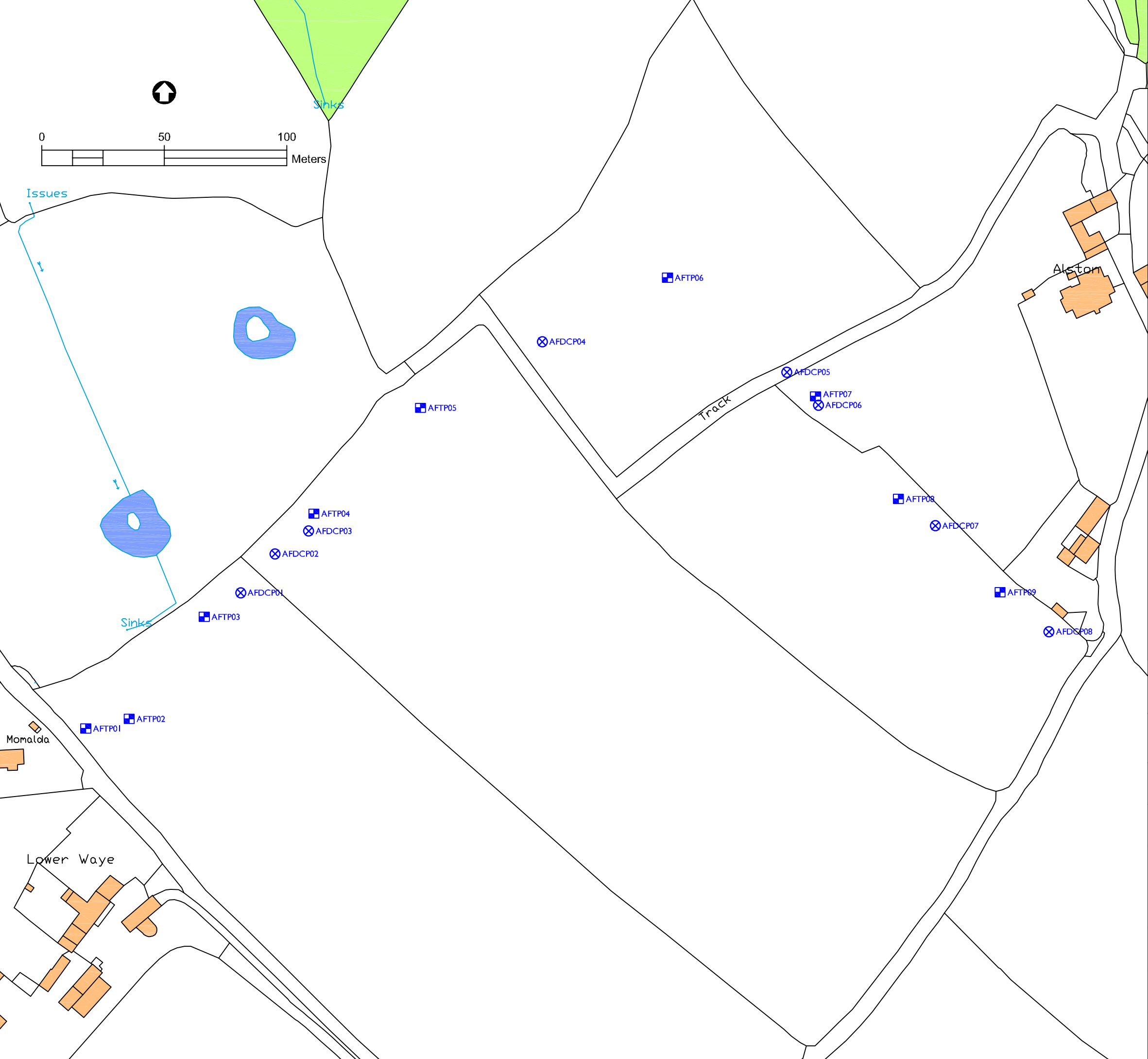
© Crown Copyright Reserved, OS License Number: 100020449

Ground Investigation
at
September 2021 GI,
New Access to Alston Farm, Ashburton
for
E & JW Glendinning Ltd

GEOTECHNICS
geotechnical and geoenvironmental specialists

APPENDIX 3

Exploratory Hole Location Plan



Key

Trial Pit

Dynamic Cone Penetration Test

Hole ID	Easting (mE)	Northing (mN)	Level (mOD)
AFDCP01	277264.82	71882.46	144.35
AFDCP02	277278.89	71898.39	144.97
AFDCP03	277292.58	71907.69	145.20
AFDCP04	277388.03	71984.96	148.32
AFDCP05	277487.88	71972.52	143.65
AFDCP06	277500.80	71959.10	141.60
AFDCP07	277548.57	71909.84	138.67
AFDCP08	277594.95	71866.56	137.72
AFTP01	277201.54	71827.06	140.13
AFTP02	277219.25	71831.02	140.40
AFTP03	277249.93	71872.71	144.45
AFTP04	277294.68	71914.77	145.70
AFTP05	277338.24	71957.97	148.64
AFTP06	277439.16	72011.14	151.45
AFTP07	277499.61	71962.69	142.37
AFTP08	277533.46	71920.85	139.45
AFTP09	277575.02	71882.71	138.46

GEOTECHNICS

geotechnical and geoenvironmental specialists

The Geotechnical Centre,
Unit 5 Orchard Court,
Sowton Industrial Estate,
EXETER
EX2 7LL

Phone: (01392) 463110
Fax: (01392) 463111
Email: mail@exeter-geotechnics.co.uk
www.geotechnics.co.uk

Engineer:
Atkins

Client:
E & JW Glendinning Ltd

Project:
GROUND INVESTIGATION SEPTEMBER
2021 – NEW ACCESS TO ALSTON FARM

Drawing Title:
Exploratory Hole Location Plan

Scale: 1:1500@A3

Date:
February 2022

Project No:
PE211721

File Name:
Geo-PE211721-001(I)

APPENDIX 4

Trial Pit Records

DATA SHEET - Symbols and Abbreviations used on Records



Sample Types

B	Bulk disturbed sample
BLK	Block sample
C	Core sample
D	Small disturbed sample (tub/jar)
E	Environmental test sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
LB	Large bulk disturbed sample
P	Piston sample (PF - failed P sample)
TW	Thin walled push in sample
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)
UT	Thin wall open drive tube sampler - 102mm diameter with blows to take sample. (UTF - failed UT sample)
V	Vial sample
W	Water sample
#	Sample Not Recovered

Insitu Testing / Properties

CBRP	CBR using TRL probe
CHP	Constant Head Permeability Test
COND	Electrical conductivity
TC	Thermal Conductivity
TR	Thermal Resistivity
HV	Strength from Hand Vane
ICBR	CBR Test
IDEN	Density Test
IRES	Resistivity Test
MEX	CBR using Mexecon Probe Test
PID	Photo Ionisation Detection (ppm)
PKR	Packer Permeability Test
PLT	Plate Load Test
PP	Strength from Pocket Penetrometer
Temp	Temperature
VHP	Variable Head Permeability Test
VN	Strength from Insitu Vane
w%	Water content
(All other strengths from undrained triaxial testing)	
S	Standard Penetration Test (SPT)
C	SPT with cone
N	SPT Result
-/-	Blows/penetration (mm) after seating drive
-*/-(mm)	Total blows/penetration
()	Extrapolated value

Groundwater

Water Strike	
Depth Water Rose To	

Instrumentation

Seal

Filter

Seal

Strata

Made Ground Granular
Made Ground Cohesive
Topsoil
Cobbles and Boulders
Gravel
Sand
Silt
Clay
Peat

Note: Composite soil types shown by combined symbols

Chalk

Limestone

Sandstone

Coal

Strata, Continued

Mudstone

Siltstone

Metamorphic Rock

Fine Grained

Medium Grained

Coarse Grained

Igneous Rock

Fine Grained

Medium Grained

Coarse Grained

Backfill Materials

Arisings

Bentonite Seal

Concrete

Fine Gravel Filter

General Fill

Gravel Filter

Grout

Sand Filter

Tarmacadam

Rotary Core

RQD Rock Quality Designation (% of intact core >100mm)

FRACTURE INDEX Fractures/metre

FRACTURE SPACING (m) Maximum Minimum

NI Non-intact core

NR No core recovery

AZCL Assumed zone of core loss

(where core recovery is unknown it is assumed to be at the base of the run)

TRIAL PIT RECORD

Trial Pit

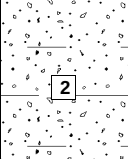
Project **GROUND INVESTIGATION SEPTEMBER 2021 - Engineer** **ATKINS GLOBAL**
NEW ACCESS TO ALSTON FARM

Trial Pit **AFTP01**
 Project No **PE211721**

Client **E & JW GLENDINNING LTD**

National Grid **277201.544E**
 Coordinates **71827.063 N**

Ground Level **140.23 m OD**

Samples and Tests				Strata	Scale 1:50		
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
				TOPSOIL: Grass over brown friable gravelly silt. Gravel is subangular to subrounded fine to coarse mudstone and limestone.	G.L.		140.23
0.30 0.30	B D				0.30		139.93
0.70 0.70 0.70	B D ES			Brown and grey very clayey sandy GRAVEL with a low cobble content. Gravel is subangular to subrounded fine to coarse limestone. Cobbles are subrounded limestone.			
1.70 1.70	B D			Stiff light grey very gravelly CLAY. Gravel is angular to subangular fine to medium mudstone.	1.50		138.73
2.30 2.30	B D			Extremely weak to weak light grey highly weathered SLATE. Recovered as light grey very sandy clayey gravel with a low cobble content of angular slate. Sand is fine to coarse. Gravel is angular fine to coarse slate. Remnant bedding observed.	2.00		138.23
3.40 3.40	B D				3.60		136.63
				End of Excavation			

Excavation				Groundwater		
Plant JCB 3CX	Width (B) 0.60	Length (C) 3.20	Orientation 090 deg	Depth Observed	Depth of Pit	Details
Date 14/09/2021	Date Backfilled 14/09/2021					Damp from 2.50m depth
Shoring None.						
Stability Miner spalling from 2.30m.						

Remarks  The Trial was terminated at a depth of 3.60m due to refusal.
 On completion the trial pit was backfilled with arisings and compacted in layers.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by **DJ**
 Checked by **EAS**
 Figure **1 of 1**
 15/07/2022



TRIAL PIT RECORD

Trial Pit

Project **GROUND INVESTIGATION SEPTEMBER 2021 - Engineer** **ATKINS GLOBAL**
NEW ACCESS TO ALSTON FARM

Trial Pit **AFTP02**
 Project No **PE211721**

Client **E & JW GLENDINNING LTD**

National Grid **277219.251E**
 Coordinates **71831.020 N**

Ground Level **140.52 m OD**

Samples and Tests				Strata	Scale 1:50		
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.20 0.20	B D			TOPSOIL: Grass over brown gravelly silt. Gravel is angular to subrounded fine to medium mudstone and limestone.	G.L. 0.35		140.52 140.17
0.70 0.70 0.70	B D ES			Soft to firm light orangish grey slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse limestone and occasional mudstone.			
1.30 1.30	B D			Firm dark brown slightly sandy very gravelly CLAY. Gravel is subangular to subrounded fine to medium mudstone and limestone.	1.20		139.32
2.40 2.40	B D			Stiff light grey very gravelly CLAY. Gravel is flat, angular mudstone. Gravel content increasing with depth.	2.30		138.22
				End of Excavation	3.00		137.52

Excavation				Groundwater		
Plant	JCB 3CX	Width (B)	0.60	Depth Observed	Depth of Pit	Details
Date	14/09/2021	Length (C)	3.20			
Shoring	None.	Orientation	090 deg			Groundwater not encountered during excavation.
Stability	Stable during excavation.	Date Backfilled	14/09/2021			

Remarks  The Trial Pit was terminated at a depth of 3.00m due to refusal.
 On completion the trial pit was backfilled with arisings and compacted in layers.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by **DJ**
 Checked by **EAS**
 Figure **1 of 1**
 15/07/2022



TRIAL PIT RECORD

Trial Pit

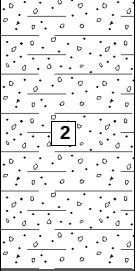
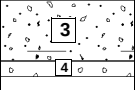
Project **GROUND INVESTIGATION SEPTEMBER 2021 - Engineer** **ATKINS GLOBAL**
NEW ACCESS TO ALSTON FARM

Trial Pit **AFTP03**
 Project No **PE211721**

Client **E & JW GLENDINNING LTD**

National Grid **277249.931E**
 Coordinates **71872.709 N**

Ground Level **144.45 m OD**

Samples and Tests				Strata	Scale 1:50		
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
				TOPSOIL: Grass over brown friable gravelly silt. Gravel is angular to subangular fine to coarse limestone and mudstone.	G.L.		144.45
0.20	B				0.30		144.15
0.20	D						
0.50	B						
0.50	D			Stiff orangish brown mottled light grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse limestone and mudstone.			
0.50	ES						
1.70	B				2.10		142.35
1.70	D						
				Pale orangish brown slightly sandy very clayey GRAVEL with a low cobble content. Gravel is angular to subangular fine to coarse mudstone. Cobbles are subangular mudstone. Occasional moist pockets.	2.50		141.95
2.40	B				2.60		141.85
2.40	D			Stiff light grey gravelly CLAY. Gravel is angular to subangular fine mudstone. Occasional partially decomposed organic matter.			
				End of Excavation			

Excavation				Groundwater		
Plant	JCB 3CX	Width (B)	0.60	Depth Observed	Depth of Pit	Details
Date	13/09/2021	Length (C)	2.80			
Shoring	None.	Orientation	120 deg			Groundwater not encountered during excavation.
Stability	Stable during excavation.	Date Backfilled	13/09/2021			

Remarks  The Trial Pit was terminated at a depth of 2.60m due to refusal. On completion the trial pit was backfilled with arisings and compacted in layers.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres. Logged in accordance with BS5930:2015 + A1:2020

Logged by **DJ**
 Checked by **EAS**
 Figure **1 of 1**
 15/07/2022



TRIAL PIT RECORD

Trial Pit

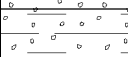
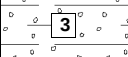
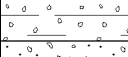
Project **GROUND INVESTIGATION SEPTEMBER 2021 - Engineer** **ATKINS GLOBAL**
NEW ACCESS TO ALSTON FARM

Trial Pit **AFTP04**
 Project No **PE211721**

Client **E & JW GLENDINNING LTD**

National Grid **277294.683E**
 Coordinates **71914.768 N**

Ground Level **145.70 m OD**

Samples and Tests				Strata	Scale 1:50		
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.15	B			TOPSOIL: Grass over brown friable gravelly silt. Gravel is subangular fine to medium mudstone and limestone.	G.L.		145.70
0.15	D				0.30		145.40
0.60	B			Soft to firm orangish brown mottled light grey gravelly CLAY. Gravel is angular to subangular fine to medium slate and mudstone.	0.90		144.80
0.60	D						
0.60	ES			From 0.75m, Very gravelly.			
				Firm to stiff orangish brown mottled light grey very gravelly CLAY. Gravel is angular to subangular mudstone. Occasional partially decomposed organic matter and occasional damp pockets.			
1.70	B				2.00		143.70
1.70	D						
				Greyish brown clayey sandy GRAVEL with a low to medium cobble content. Gravel is angular to subangular fine to coarse limestone and mudstone. Cobbles are subangular limestone.	2.60		143.10
2.40	B						
2.40	D						
				End of Excavation			

Excavation				Groundwater		
Plant	JCB 3CX	Width (B)	0.60	Depth Observed	Depth of Pit	Details
Date	13/09/2021	Length (C)	2.80			
Shoring	None.	Orientation	090 deg			
		Date Backfilled	13/09/2021			
Stability	Stable during excavation.					Groundwater not encountered during excavation.

Remarks  The Trial Pit was terminated at a depth of 2.60m due to refusal.
 On completion the trial pit was backfilled with arisings and compacted in layers.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by **DJ**
 Checked by **EAS**
 Figure **1 of 1**
 15/07/2022



TRIAL PIT RECORD

Trial Pit

Project **GROUND INVESTIGATION SEPTEMBER 2021 - Engineer** **ATKINS GLOBAL**
NEW ACCESS TO ALSTON FARM

Trial Pit **AFTP05**
 Project No **PE211721**

Client **E & JW GLENDINNING LTD**

National Grid **277338.236E**
 Coordinates **71957.971 N**

Ground Level **148.64 m OD**

Samples and Tests				Strata	Scale 1:50		
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.15	B			TOPSOIL: Grass over brown gravelly silt. Gravel is subangular to subrounded fine to coarse limestone.	G.L.		148.64
0.15	D				0.25		148.39
0.50	B						
0.50	D			Brown slightly sandy very gravelly CLAY. Gravel is subangular to subrounded fine to coarse limestone and mudstone.			
0.50	ES						
1.50	B				1.30		147.34
1.50	D			Light greyish brown sandy very clayey GRAVEL with a medium cobble content. Gravel is angular fine to coarse slate. Cobbles are angular slate.			
					1.80		146.84
				Extremely weak to weak light greyish brown highly weathered SLATE. Recovered as sandy slightly clayey gravel with a medium cobble content. Remnant bedding visible.	2.10		146.54
				End of Excavation			

Excavation				Groundwater		
Plant	JCB 3CX	Width (B)	0.60	Depth Observed	Depth of Pit	Details
Date	13/09/2021	Length (C)	2.70			
Shoring	None.	Orientation	180 deg			Groundwater not encountered during excavation.
Stability	Stable during excavation.	Date Backfilled	13/09/2021			

Remarks  The Trial Pit was terminated at a depth of 2.10m due to refusal.
 On completion the trial pit was backfilled with arisings and compacted in layers.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres. Logged in accordance with BS5930:2015 + A1:2020

Logged by **DJ**
 Checked by **EAS**
 Figure **1 of 1**
 15/07/2022



TRIAL PIT RECORD

Trial Pit

Project **GROUND INVESTIGATION SEPTEMBER 2021 - Engineer** **ATKINS GLOBAL**
NEW ACCESS TO ALSTON FARM

Trial Pit **AFTP06**
 Project No **PE211721**

Client **E & JW GLENDINNING LTD**

National Grid **277439.156E**
 Coordinates **72011.138 N**

Ground Level **151.45 m OD**

Samples and Tests				Strata	Scale 1:50		
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.20	B			TOPSOIL: Grass over brown gravelly silt. Gravel is subangular to subrounded fine to coarse mudstone and siltstone.	G.L.		151.45
0.20	D				0.30		151.15
0.50	B						
0.50	D			Stiff orangish brown slightly sandy gravelly CLAY with a medium cobble content of subrounded mudstone and siltstone. Gravel is subangular to subrounded medium to coarse mudstone and siltstone.			
0.50	ES			From approximately 1.00m, Light grey.	1.20		150.25
1.50	B						
1.50	D			Greyish brown slightly sandy slightly clayey GRAVEL with a low cobble content. Gravel is angular to subangular fine to coarse slate. Cobbles are subangular slate.			
				End of Excavation	2.50		148.95

Excavation				Groundwater		
Plant	JCB 3CX	Width (B)	0.60	Depth Observed	Depth of Pit	Details
Date	14/09/2021	Length (C)	3.00			
Shoring	None.	Orientation	090 deg			Groundwater not encountered during excavation.
Stability	Moderate spalling from 1.50m.	Date Backfilled	14/09/2021			

Remarks  The Trial Pit was terminated at a depth of 2.50m on the instruction of the Engineer. On completion the trial pit was backfilled with arisings and compacted in layers.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by **DJ**
 Checked by **EAS**
 Figure **1 of 1**
 15/07/2022



TRIAL PIT RECORD

Trial Pit

Project **GROUND INVESTIGATION SEPTEMBER 2021 - Engineer** **ATKINS GLOBAL**
NEW ACCESS TO ALSTON FARM

Trial Pit **AFTP07**
 Project No **PE211721**

Client **E & JW GLENDINNING LTD**

National Grid **277499.609E**
 Coordinates **71962.686 N**

Ground Level **142.37 m OD**

Samples and Tests				Strata	Scale 1:50		
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
				TOPSOIL: Long grass over brown slightly gravelly silt. Gravel is subangular to subrounded fine to coarse mudstone.	G.L.		142.37
0.30	B			Stiff greyish brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse siltstone and limestone. Occasional subangular limestone cobbles.	0.45		141.92
0.30	D						
0.60	B						
0.60	D						
0.60	ES			Orangish brown slightly sandy clayey GRAVEL with a low to medium cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse limestone and slate. Cobbles are subangular to subrounded limestone. Occasional boulder of subangular limestone.	1.30		141.07
1.50	B						
1.50	D						
					2.50		139.87
				End of Excavation			

Excavation				Groundwater		
Plant JCB 3CX	Width (B) 0.60	Length (C) 3.50	Orientation 090 deg	Depth Observed	Depth of Pit	Details
Date 14/09/2021	Date Backfilled 14/09/2021					Groundwater not encountered during excavation.
Shoring None.						
Stability Stable during excavation.						

Remarks  The Trial Pit was terminated at a depth of 2.50m on the instruction of the Engineer. On completion the trial pit was backfilled with arisings and compacted in layers.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by **DJ**
 Checked by **EAS**
 Figure **1 of 1**
 15/07/2022



TRIAL PIT RECORD

Trial Pit

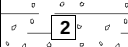
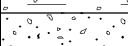
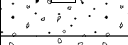
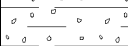
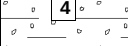
Project **GROUND INVESTIGATION SEPTEMBER 2021 - Engineer** **ATKINS GLOBAL**
NEW ACCESS TO ALSTON FARM

Trial Pit **AFTP08**
 Project No **PE211721**

Client **E & JW GLENDINNING LTD**

National Grid **277533.461E**
 Coordinates **71920.847 N**

Ground Level **139.45 m OD**

Samples and Tests				Strata	Scale 1:50		
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
0.20	B			TOPSOIL: Grass over brown slightly gravelly silt. Gravel is angular to subangular fine to medium limestone and mudstone.	G.L.		139.45
0.20	D			Firm to stiff orangish brown mottled light grey gravelly CLAY. Gravel is angular to subangular fine to coarse limestone and occasional mudstone.	0.30		139.15
0.90	B			Grey slightly sandy clayey GRAVEL with a low cobble content. Gravel is angular to subrounded fine to coarse limestone and mudstone. Cobbles are subrounded limestone.	1.00		138.45
0.90	D						
0.90	ES						
1.30	B				1.60		137.85
1.30	D						
2.10	B			Soft to firm orangish brown mottled light grey very gravelly CLAY with a low cobble content. Gravel is subangular to subrounded fine to coarse limestone and mudstone. Cobbles are subrounded limestone.			
2.10	D						
				From 2.70m, Stiff and mottled dark grey.			
				End of Excavation	3.00		136.45

Excavation				Groundwater		
Plant	JCB 3CX	Width (B)	0.60	Depth Observed	Depth of Pit	Details
Date	13/09/2021	Length (C)	2.70			
Shoring	None.	Orientation	180 deg			
Stability	Stable during excavation.	Date Backfilled	13/09/2021			Groundwater not encountered during excavation.

Remarks  Historic borehole uncovered in northern pit wall. Dipped to 4.80m depth below ground level. The Trial Pit was terminated at the scheduled depth of 3.00m. On completion the trial pit was backfilled with arisings and compacted in layers. Logged by **DJ** Checked by **EAS** Figure **1 of 1** 15/07/2022

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres. Logged in accordance with BS5930:2015 + A1:2020



TRIAL PIT RECORD

Trial Pit

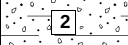
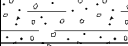
Project **GROUND INVESTIGATION SEPTEMBER 2021 - Engineer** **ATKINS GLOBAL**
NEW ACCESS TO ALSTON FARM

Trial Pit **AFTP09**
 Project No **PE211721**

Client **E & JW GLENDINNING LTD**

National Grid **277575.015E**
 Coordinates **71882.705 N**

Ground Level **138.46 m OD**

Samples and Tests				Strata	Scale 1:50		
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
				TOPSOIL: Grass over brown friable slightly sandy slightly gravelly silt. Gravel is subangular fine to coarse limestone and occasional slate.	G.L.		138.46
0.30 0.30	B D			Soft to firm orangish brown slightly sandy slightly gravelly CLAY with a low cobble content. Gravel is angular to subangular fine to coarse limestone and occasional slate.	0.35		138.11
0.95 0.95 0.95	B D ES			Greyish brown slightly sandy GRAVEL with a low to medium cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse limestone with occasional mudstone. From 1.80m, Some remnant bedding structure visible.	1.20		137.26
2.10 2.10	B D						
3.00 3.00	B D			Firm to stiff dark grey gravelly CLAY with a low cobble content. Gravel is subangular to subrounded fine to medium limestone and mudstone.	2.80 3.00		135.66 135.46
				End of Excavation			

Excavation				Groundwater		
Plant	JCB 3CX	Width (B)	0.60	Depth Observed	Depth of Pit	Details
Date	13/09/2021	Length (C)	2.80			
Shoring	None.	Orientation	180 deg			Groundwater not encountered during excavation.
Stability	Stable during excavation.	Date Backfilled	13/09/2021			

Remarks  The Trial Pit was terminated at the scheduled depth of 3.00m.
 On completion the trial pit was backfilled with arisings and compacted in layers.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres. Logged in accordance with BS5930:2015 + A1:2020

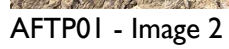
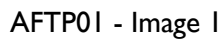
Logged by **DJ**
 Checked by **EAS**
 Figure **1 of 1**
 15/07/2022



APPENDIX 5

Trial Pit Photographs

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP01 - Image 3



AFTP02 - Image 1

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP02 - Image 2



AFTP02 - Image 3

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP03 - Image 1



AFTP03 - Image 2

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP03 - Image 3



AFTP04 - Image 1

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP04 - Image 2



AFTP04 - Image 3

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP05 - Image 1



AFTP05 - Image 2

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP05 - Image 3



AFTP06 - Image 1

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP06 - Image 2

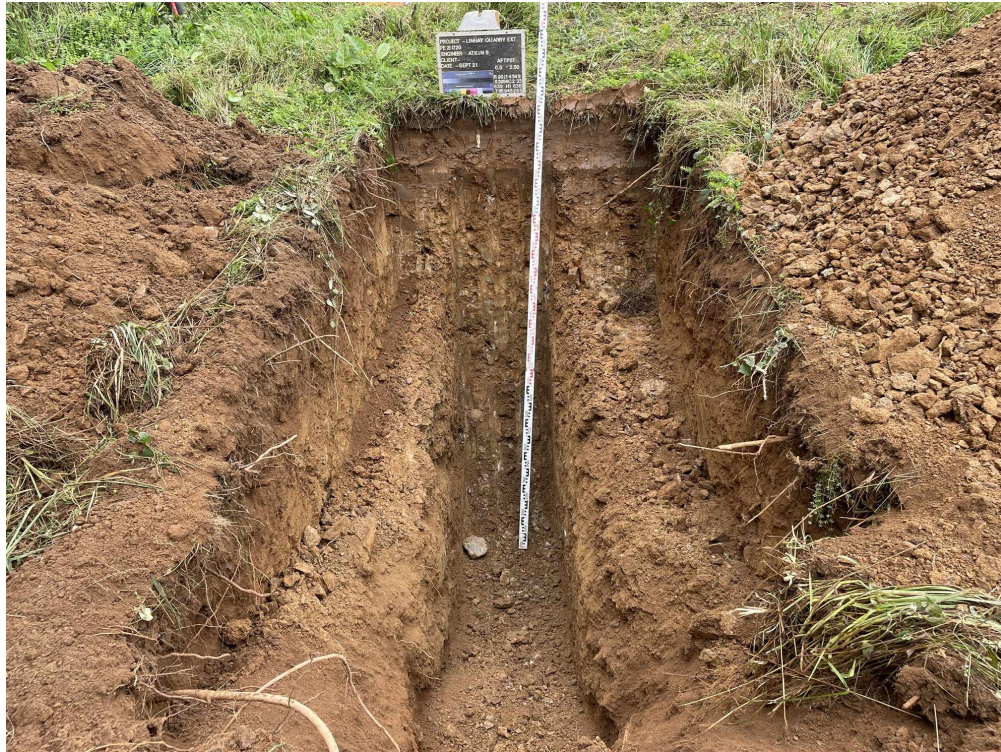


AFTP06 - Image 3

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP07 - Image 1



AFTP07 - Image 2

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP07 - Image 3



AFTP08 - Image 1

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP08 - Image 2



AFTP08 - Image 3

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP09 - Image 1



AFTP09 - Image 2

PHOTOGRAPHS

Project Number : PE211721

Project : NEW ACCESS TO ALSTON FARM, ASHBURTON



AFTP09 - Image 3

APPENDIX 6

Dynamic Cone Penetration Tests

In Situ Testing - Dynamic Cone Penetration Test

Project GROUND INVESTIGATION SEPTEMBER 2021 - NEW ACCESS TO ALSTON FARM

Location No. AFDGP01

Client E & JW Glendinning Ltd

Project No. PE211721

Coordinates 277264.815 E, 71882.462 N

Ground Level 144.35 m OD

Test No. 1

Test Date 14/09/2021

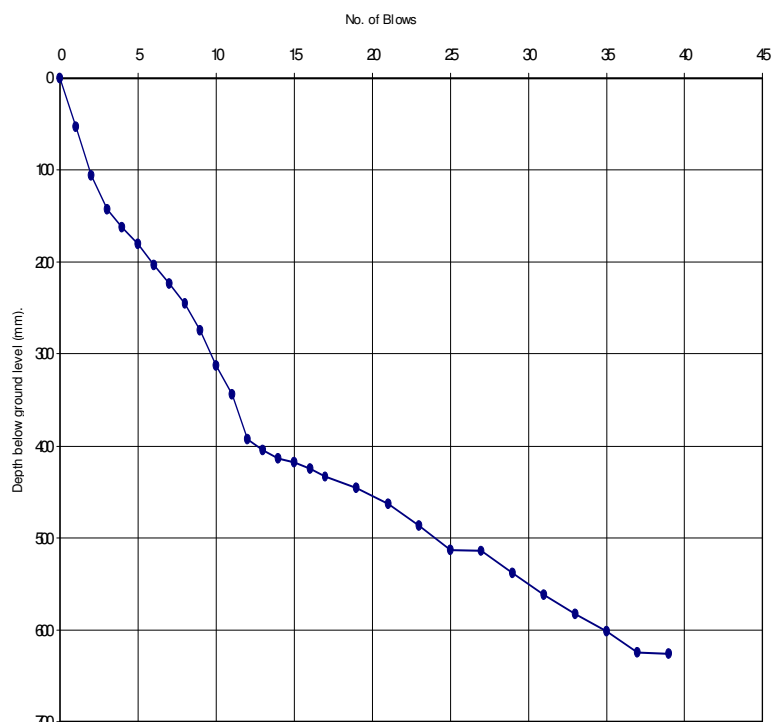
Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
0	0	1	487	0
1	1	1	540	53
1	2	1	593	106
1	3	1	630	143
1	4	1	650	163
1	5	1	667	180
1	6	1	690	203
1	7	1	710	223
1	8	1	732	245
1	9	1	761	274
1	10	1	800	313
1	11	1	831	344
1	12	1	880	393
1	13	1	892	405
1	14	1	901	414
1	15	1	905	418
1	16	1	912	425
1	17	1	920	433
2	19	1	933	446
2	21	1	950	463
2	23	1	974	487

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
2	25	1	1000	513
2	27	1	1001	514
2	29	1	1026	539
2	31	1	1049	562
2	33	1	1070	583
2	35	1	1089	602
2	37	1	1112	625
2	39	1	1113	626

Test Started at	0.00 m
Operator	MK
Checked by	

Rod No.	Zero Reading (mm)
1	487

Depth bgl (mm)		Blows No.		DCP mm/blow	CBR %
Top	Base	Top	Base		
0	143	0	3	48	5.1
143	274	3	9	22	11.6
274	393	9	12	40	6.2
393	513	12	25	9	28.8
513	514	25	27	1	628.3
514	625	27	37	11	23.7
625	626	37	39	1	628.3



Remarks

Printed: 17/02/2022

CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020

GEOTECHNICS



In Situ Testing - Dynamic Cone Penetration Test

Project GROUND INVESTIGATION SEPTEMBER 2021 - NEW ACCESS TO ALSTON FARM

Location No. AFDCP03

Client E & JW Glendinning Ltd

Project No. PE211721

Coordinates 277292.583 E, 71907.694 N

Ground Level 145.20 m OD

Test No. 1

Test Date 13/09/2021

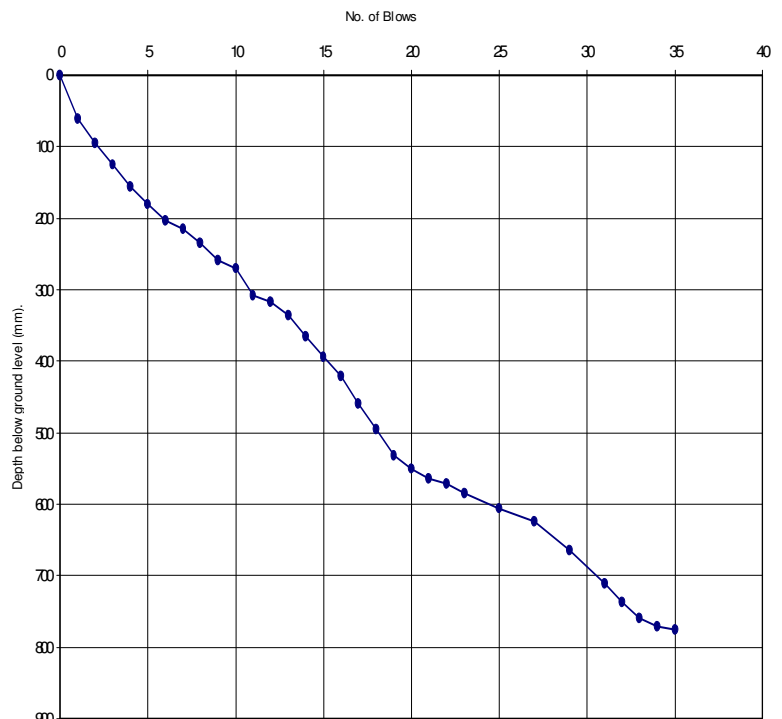
Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
0	0	1	385	0
1	1	1	446	61
1	2	1	480	95
1	3	1	510	125
1	4	1	541	156
1	5	1	565	180
1	6	1	589	204
1	7	1	600	215
1	8	1	619	234
1	9	1	644	259
1	10	1	655	270
1	11	1	694	309
1	12	1	702	317
1	13	1	720	335
1	14	1	751	366
1	15	1	779	394
1	16	1	806	421
1	17	1	844	459
1	18	1	880	495
1	19	1	917	532
1	20	1	935	550

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
1	21	1	949	564
1	22	1	956	571
1	23	1	969	584
2	25	1	991	606
2	27	1	1009	624
2	29	1	1049	664
2	31	1	1096	711
1	32	1	1121	736
1	33	1	1144	759
1	34	1	1156	771
1	35	1	1160	775

Test Started at	0.00 m
Operator	DJ
Checked by	

Rod No.	Zero Reading (mm)
1	385

Depth bgl (mm)		Blows No.		DCP mm/blow	CBR %
Top	Base	Top	Base		
0	204	0	6	70	3.4
204	270	6	10	17	15.6
270	309	10	11	39	6.3
309	335	11	13	13	20.1
335	532	13	19	33	7.5
532	606	19	25	12	21.2
606	711	25	31	18	14.7
711	759	31	33	24	10.5
759	775	33	35	8	33.5



Remarks

CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020

Printed: 17/02/2022

GEOTECHNICS



APPENDIX 7

Laboratory Testing Results - Geotechnical



Test Report

South West Geotechnical Ltd
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Job No:	13567	Date Received:	27/09/21
Job Name:	New Access for Alston Farm	Date Sent:	16/02/22
Client Name:	Geotechnics	Transmittal Number:	T6928
Client Job No:	PE211720	Senders Initials:	DT
Client Address	5 Orchard Close, Heron Road, Sowton Industrial Estate, Exeter, EX2 7NR	Report Revision No.	2
		Sampled by SWG lab staff?	NO

Ref.	Test Detail	No. of Tests / Report No.
A1	BS EN ISO 17892-1: 2014 - Water Content - UKAS Accredited	8
A5	BS EN ISO 17892-12: 2018 - Atterberg Limits - UKAS Accredited	8
A8	BS1377: Part 2: 1990: Clause 8.2 - Particle Density (Gas jar)	1
A9	BS EN ISO 17892-4:2016: Clause 5.2 Sieving method - Determination of Particle Size Distribution - UKAS Accredited	8
C2.2	BS1377: Part 7: 1990: Clause 9 - Quick Undrained Triaxial Test (Multi Stage) - UKAS Accredited	2
C1	BS1377: Part 7: 1990: Clause 4 - Direct shear test on 60mm square specimen by direct shearing on a set of 3 specimens including 1st day for each specimen - UKAS Accredited	2
	Revised due to project name change	

Sampling not performed by South West Geotechnical laboratory staff. Results apply to the samples as received.

Approved Signatories:

David Trowbridge (Laboratory Manager)

Matt Stokes (Senior Technician)

The results contained within this report only relate to the samples tested, as received from the client. This certificate shall not be reproduced except in full, without prior written approval of the laboratory.



8260

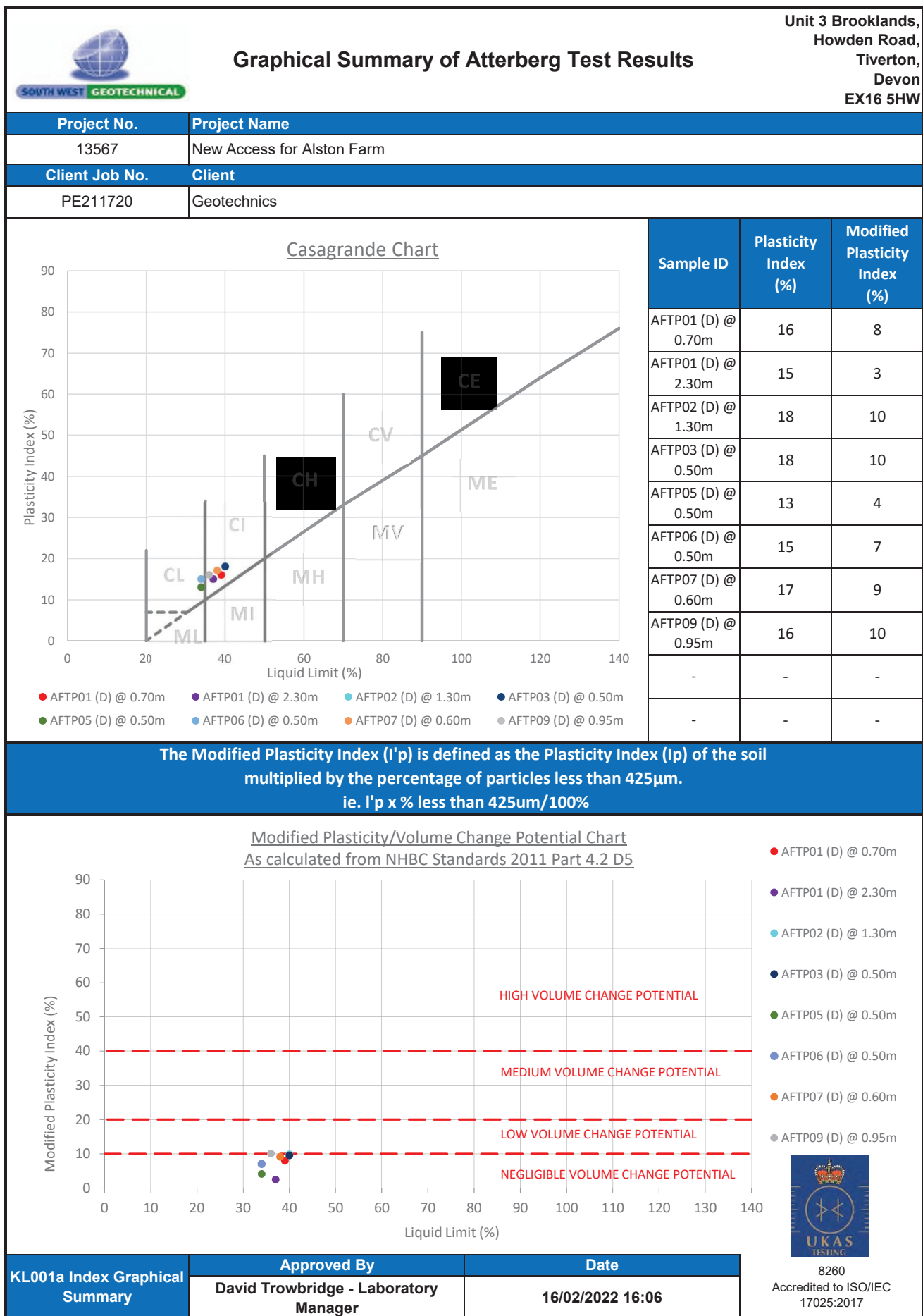
Accredited to
ISO/IEC
17025:2017

Summary of Classification Test Results												
Project No.		Project Name										
13567		New Access for Alston Farm										
Client Job No.		Client										
PE211720		Geotechnics										
Hole No.	Sample				Soil Description	wc	Passing 425µm	LL	PL	PI	Particle density	Remarks
	Type	Top	Base	Ref		%	%	%	%	%	Mg/m3	
AFTP01	D	0.70			Orangish brown slightly gravelly slightly sandy CLAY	10.3	50 - Sieved	39	23	16	-	
AFTP01	D	2.30			Greyish brown clayey very sandy GRAVEL	7.4	17 - Sieved	37	22	15	-	
AFTP02	D	1.30			Dark brown slightly gravelly slightly sandy CLAY	13.9	55 - Sieved	40	22	18	2.75-gj	
AFTP03	D	0.50			Orangish brown slightly gravelly slightly sandy CLAY	14.8	53 - Sieved	40	22	18	-	
AFTP05	D	0.50			Brown very clayey very sandy GRAVEL	13.6	32 - Sieved	34	21	13	-	
AFTP06	D	0.50			Brown slightly sandy gravelly CLAY	10.8	47 - Sieved	34	19	15	-	
AFTP07	D	0.60			Brown slightly gravelly slightly sandy CLAY	14.5	54 - Sieved	38	21	17	-	
AFTP09	D	0.95			Brown slightly gravelly slightly sandy CLAY	17.6	63 - Sieved	36	20	16	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
Preparation in accordance with BS1377-1:2016 where applicable. Atterberg 4 point preparation in accordance with BS EN ISO 17892-12:2018												
Key Atterberg Limits 4pt - BS EN ISO 17892-12:2018 (30° cone and increasing water contents) unless : 1pt - BS1377-2:1990 (CL.4.4)						Water Content (wc) % BS EN ISO 17892-1:2014 Particle density BS1377-2:1990 sp - small pyknometer CL.8.3 gj - gas jar CL.8.2		Date		Approved By		Page No.
						16/02/2022		Matt Stokes - Senior Technician		KL001R Index Summary		

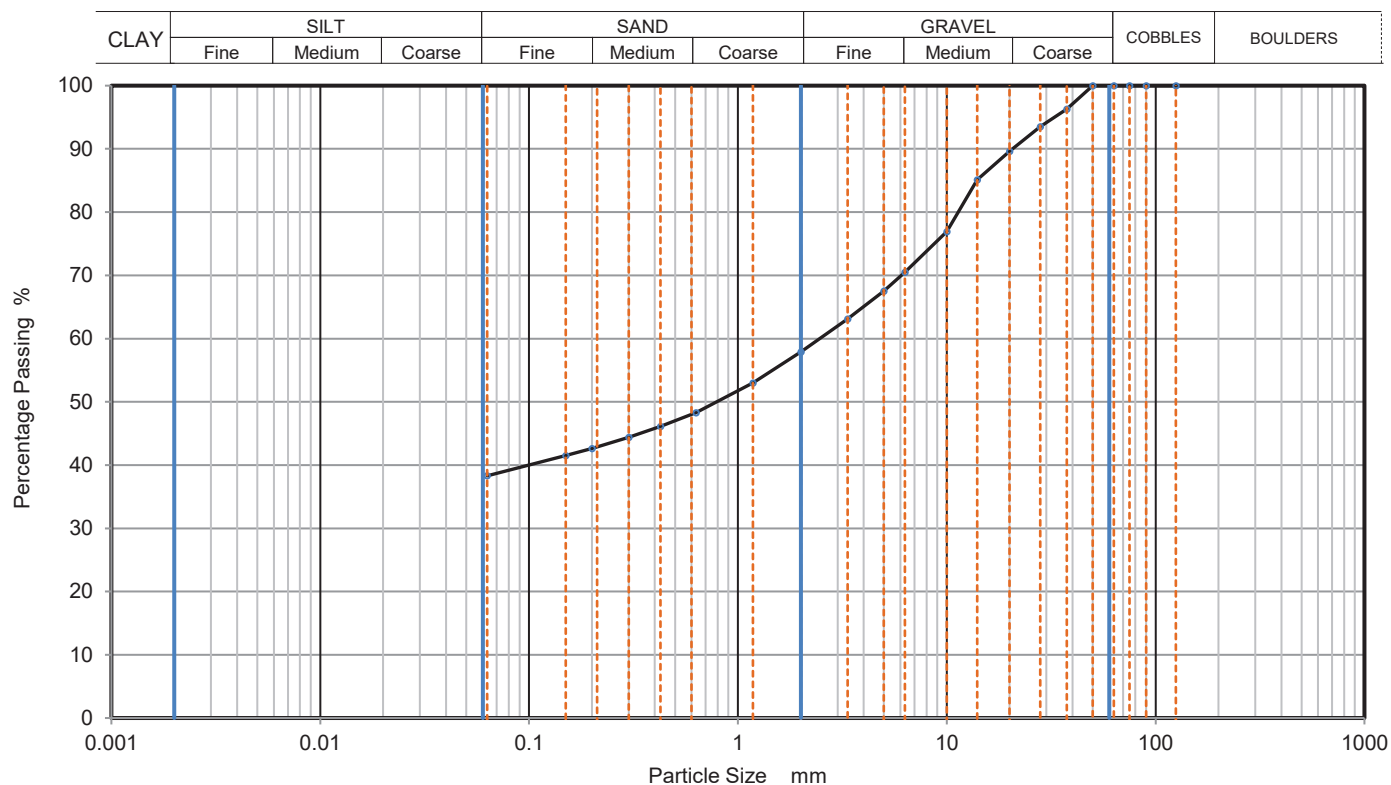
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW



6260
Accredited to
ISO/IEC
17025:2017



	PARTICLE SIZE DISTRIBUTION		Project No.	13567	
			Borehole/Pit No.	AFTP01	
Project Name	New Access for Alston Farm		Sample No.		
Soil Description	Brown slightly sandy gravelly SILT		Depth, m	0.70	
Specimen Reference	5	Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4: 2016, clause 5.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	96		
28	94		
20	90		
14	85		
10	77		
6.3	71		
5	68		
3.35	63		
2	58		
1.18	53		
0.63	48		
0.425	46		
0.3	44		
0.2	43		
0.15	42		
0.063	38		

Dry Mass of sample, g	9933
------------------------------	-------------

Sample Proportions	% dry mass
Very coarse	0
Gravel	42
Sand	20
Fines <0.063mm	38

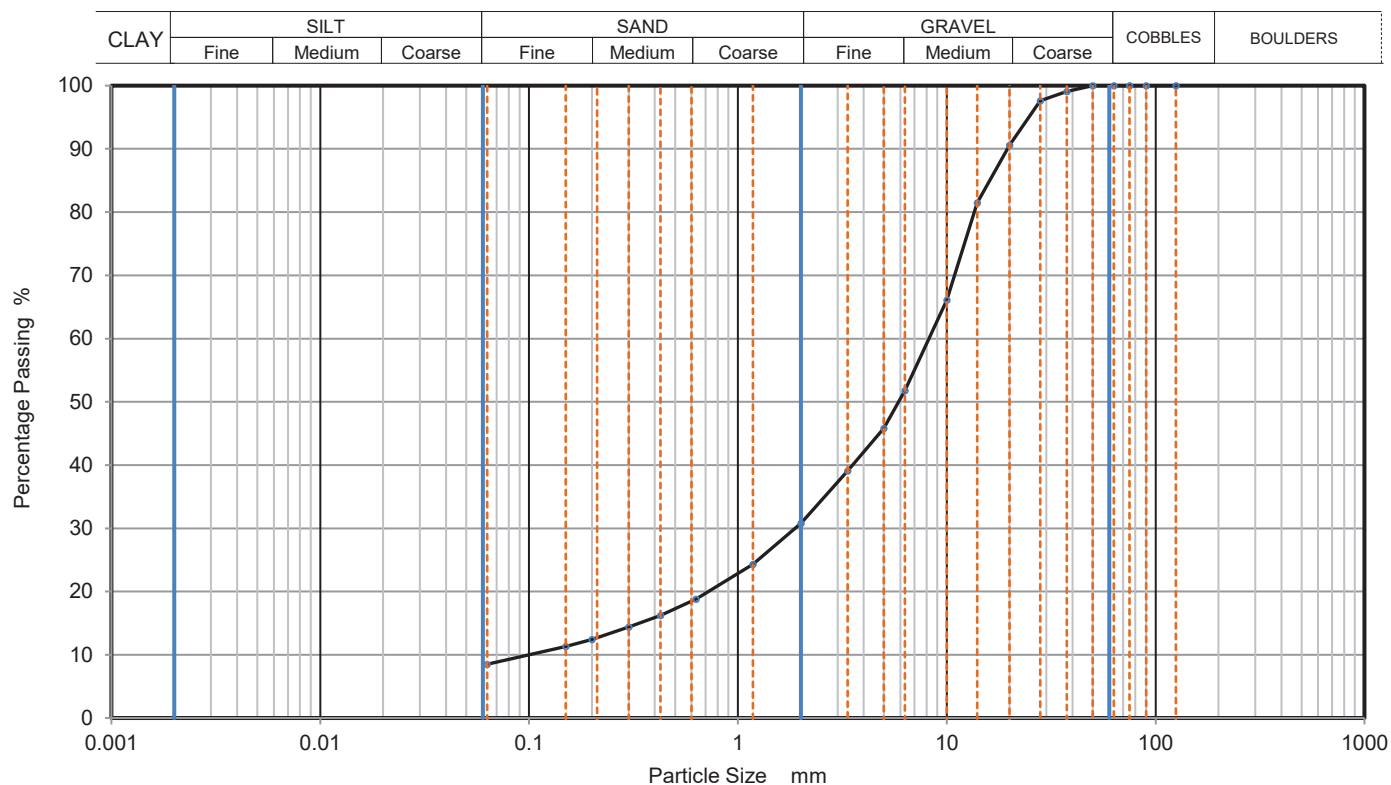
Grading Analysis	
D10	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS EN ISO 17892-4: 2016



Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	22/10/2021	KL002R PSD

	PARTICLE SIZE DISTRIBUTION		Project No.	13567	
			Borehole/Pit No.	AFTP01	
Project Name	New Access for Alston Farm		Sample No.		
Soil Description	Greyish brown silty/clayey very sandy GRAVEL		Depth, m	2.30	
Specimen Reference	5	Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4: 2016, clause 5.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	99		
28	98		
20	91		
14	82		
10	66		
6.3	52		
5	46		
3.35	39		
2	31		
1.18	24		
0.63	19		
0.425	16		
0.3	14		
0.2	12		
0.15	11		
0.063	9		

Dry Mass of sample, g	12627
------------------------------	-------

Sample Proportions	% dry mass
Very coarse	0
Gravel	69
Sand	22
Fines <0.063mm	8

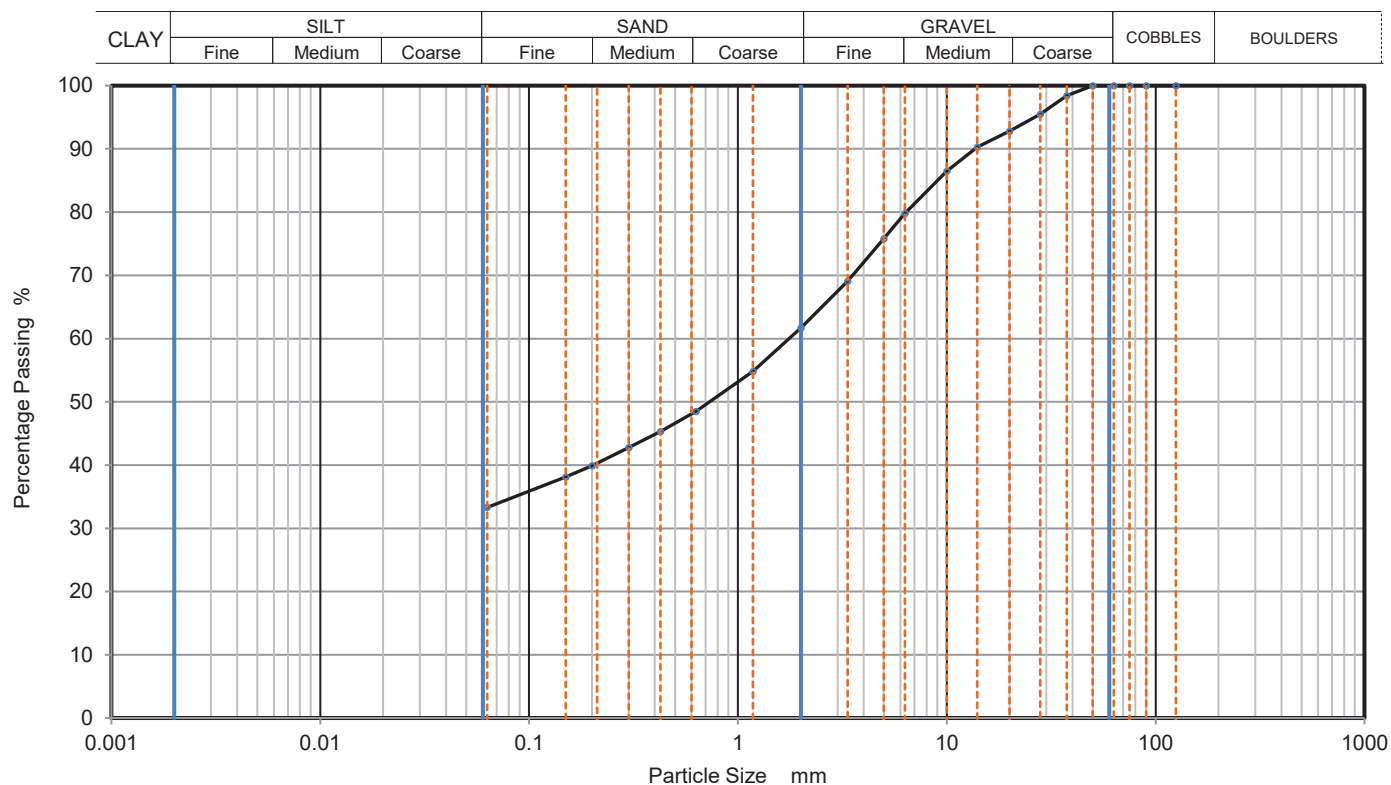
Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	81
Curvature Coefficient	4.2

Remarks
Preparation and testing in accordance with BS EN ISO 17892-4: 2016



Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	22/10/2021	KL002R PSD

	PARTICLE SIZE DISTRIBUTION		Project No.	13567	
			Borehole/Pit No.	AFTP02	
Project Name	New Access for Alston Farm		Sample No.		
Soil Description	Greyish brown very sandy very silty/clayey GRAVEL		Depth, m	1.30	
Specimen Reference	8	Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4: 2016, clause 5.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	98		
28	96		
20	93		
14	90		
10	87		
6.3	80		
5	76		
3.35	69		
2	62		
1.18	55		
0.63	49		
0.425	45		
0.3	43		
0.2	40		
0.15	38		
0.063	33		

Dry Mass of sample, g	9730
------------------------------	------

Sample Proportions	% dry mass
Very coarse	0
Gravel	38
Sand	28
Fines <0.063mm	33

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

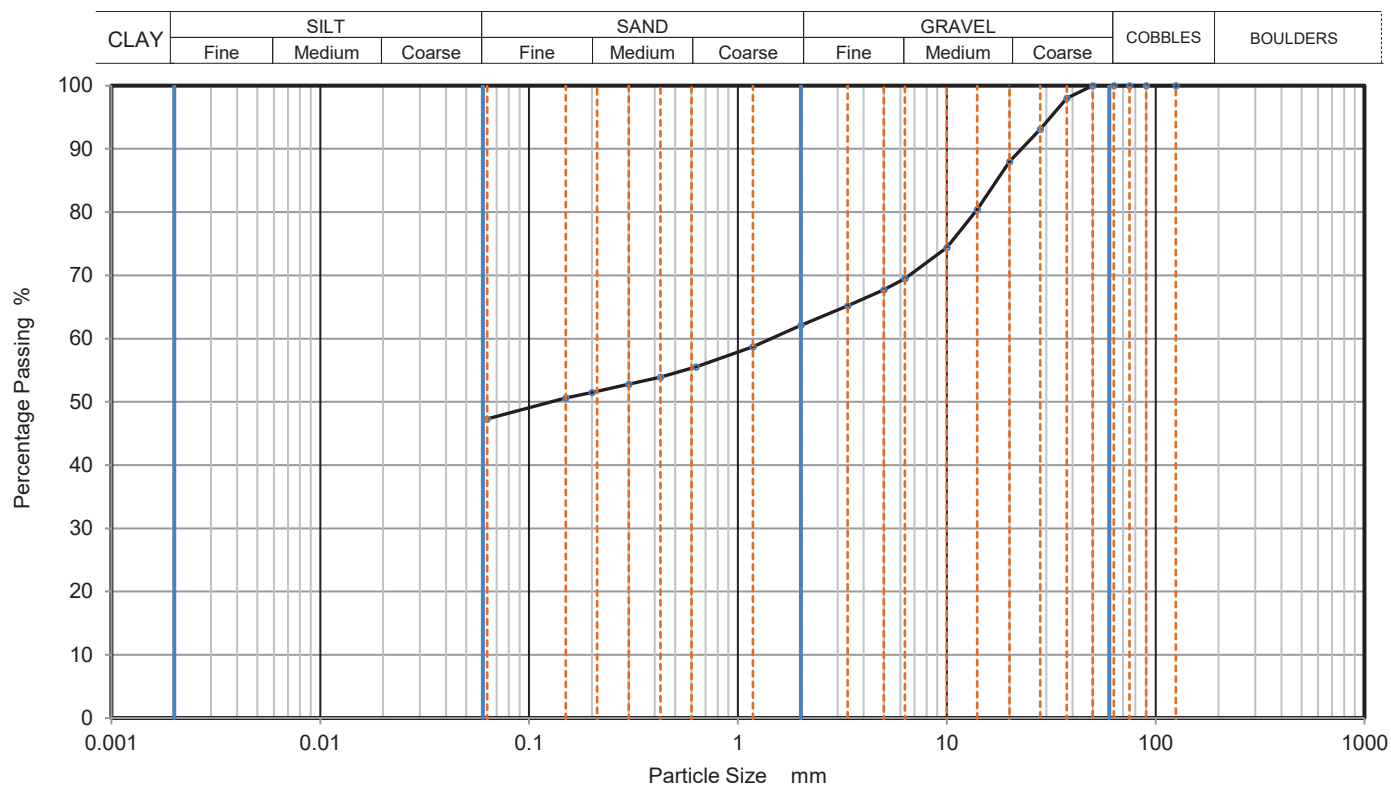
Remarks
Preparation and testing in accordance with BS EN ISO 17892-4: 2016



8260
Accredited to
ISO/IEC
17025:2017

Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	22/10/2021	KL002R PSD

	PARTICLE SIZE DISTRIBUTION		Project No.	13567	
			Borehole/Pit No.	AFTP03	
Project Name	New Access for Alston Farm		Sample No.		
Soil Description	Brown slightly sandy gravelly SILT		Depth, m	0.50	
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4: 2016, clause 5.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	98		
28	93		
20	88		
14	80		
10	74		
6.3	70		
5	68		
3.35	65		
2	62		
1.18	59		
0.63	56		
0.425	54		
0.3	53		
0.2	52		
0.15	51		
0.063	47		

Dry Mass of sample, g	9737
------------------------------	------

Sample Proportions	% dry mass
Very coarse	0
Gravel	38
Sand	15
Fines <0.063mm	47

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

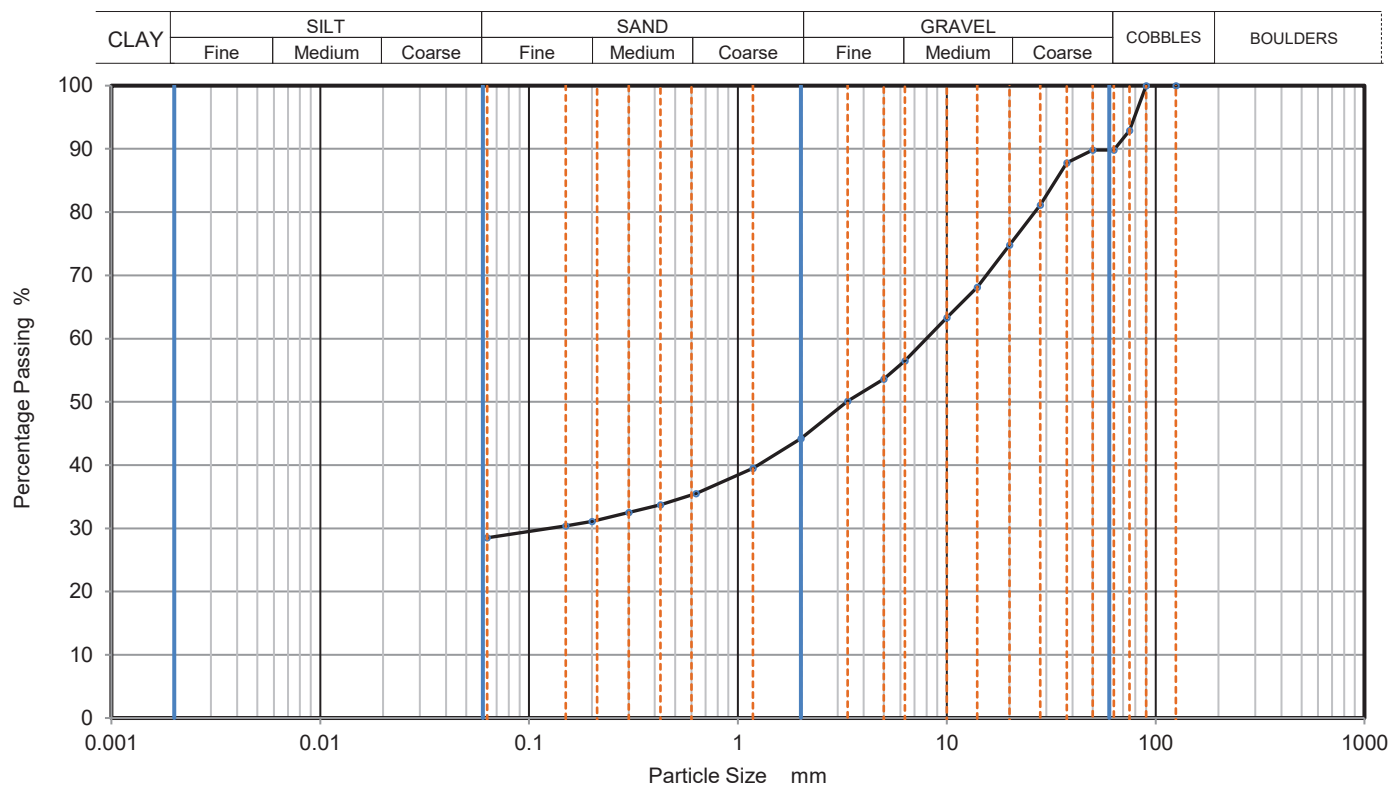
Remarks
Preparation and testing in accordance with BS EN ISO 17892-4: 2016



8260
Accredited to
ISO/IEC
17025:2017

Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	22/10/2021	KL002R PSD

	PARTICLE SIZE DISTRIBUTION		Project No.	13567	
			Borehole/Pit No.	AFTP05	
Project Name	New Access for Alston Farm		Sample No.		
Soil Description	Brown sandy very silty/clayey GRAVEL with medium cobble content		Depth, m	0.50	
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4: 2016, clause 5.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	93		
63	90		
50	90		
37.5	88		
28	81		
20	75		
14	68		
10	63		
6.3	57		
5	54		
3.35	50		
2	44		
1.18	40		
0.63	36		
0.425	34		
0.3	33		
0.2	31		
0.15	30		
0.063	29		

Dry Mass of sample, g	11065
-----------------------	-------

Sample Proportions	% dry mass
Very coarse	10
Gravel	46
Sand	16
Fines <0.063mm	29

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

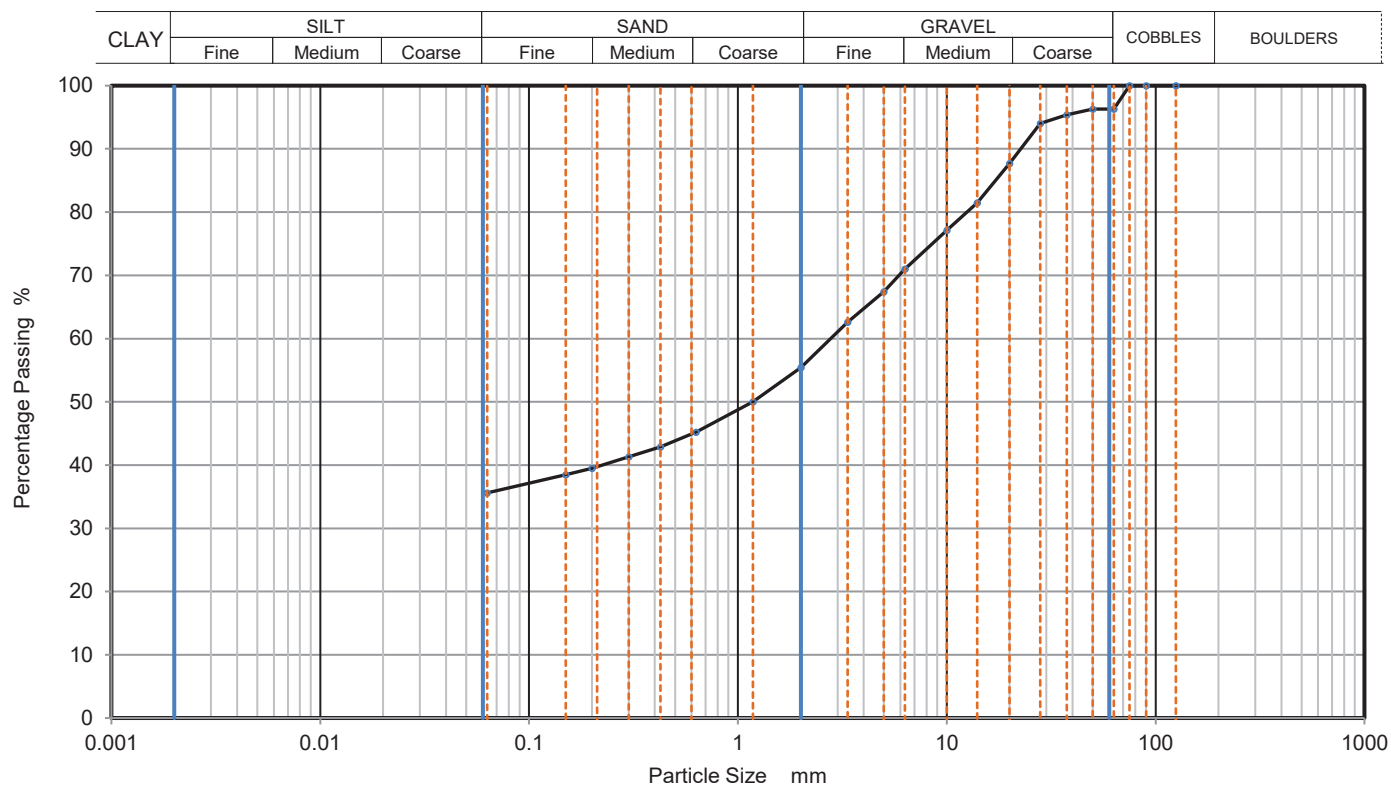
Remarks
Preparation and testing in accordance with BS EN ISO 17892-4: 2016 - Deviation to standard as insufficient material provided in order to meet the minimum mass requirement



8260
Accredited to
ISO/IEC
17025:2017

Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	22/10/2021	KL002R PSD

	PARTICLE SIZE DISTRIBUTION		Project No.	13567	
			Borehole/Pit No.	AFTP06	
Project Name	New Access for Alston Farm		Sample No.		
Soil Description	Brown slightly sandy gravelly SILT with low cobble content		Depth, m	0.50	
Specimen Reference	9	Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4: 2016, clause 5.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	96		
50	96		
37.5	95		
28	94		
20	88		
14	82		
10	77		
6.3	71		
5	67		
3.35	63		
2	55		
1.18	50		
0.63	45		
0.425	43		
0.3	41		
0.2	40		
0.15	39		
0.063	36		

Dry Mass of sample, g	10111
------------------------------	-------

Sample Proportions	% dry mass
Very coarse	4
Gravel	41
Sand	20
Fines <0.063mm	36

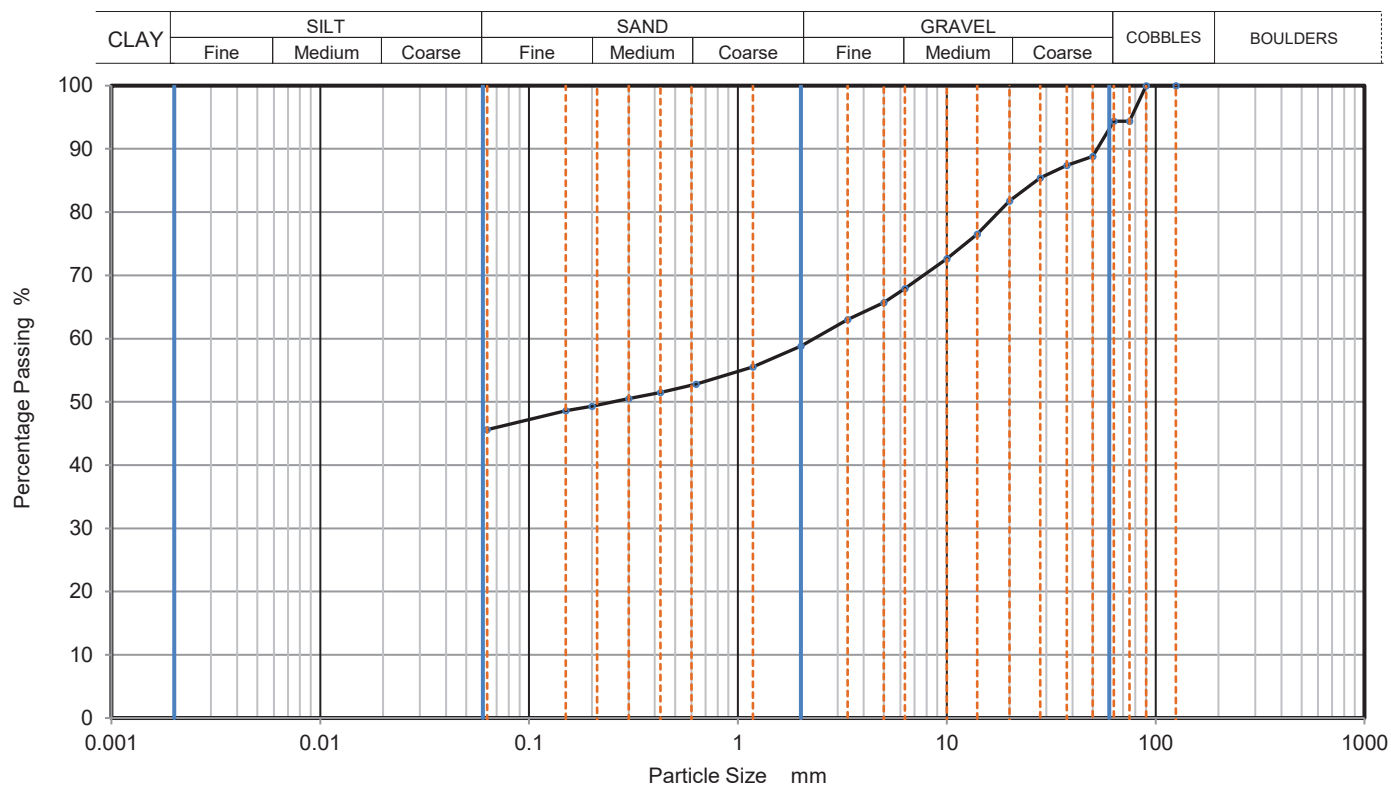
Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS EN ISO 17892-4: 2016



Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	22/10/2021	KL002R PSD

	PARTICLE SIZE DISTRIBUTION		Project No.	13567	
			Borehole/Pit No.	AFTP07	
Project Name	New Access for Alston Farm		Sample No.		
Soil Description	Brown slightly sandy gravelly SILT		Depth, m	0.60	
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4: 2016, clause 5.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	94		
63	94		
50	89		
37.5	87		
28	85		
20	82		
14	77		
10	73		
6.3	68		
5	66		
3.35	63		
2	59		
1.18	56		
0.63	53		
0.425	52		
0.3	51		
0.2	49		
0.15	49		
0.063	46		

Dry Mass of sample, g	10965
------------------------------	-------

Sample Proportions	% dry mass
Very coarse	6
Gravel	36
Sand	13
Fines <0.063mm	46

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

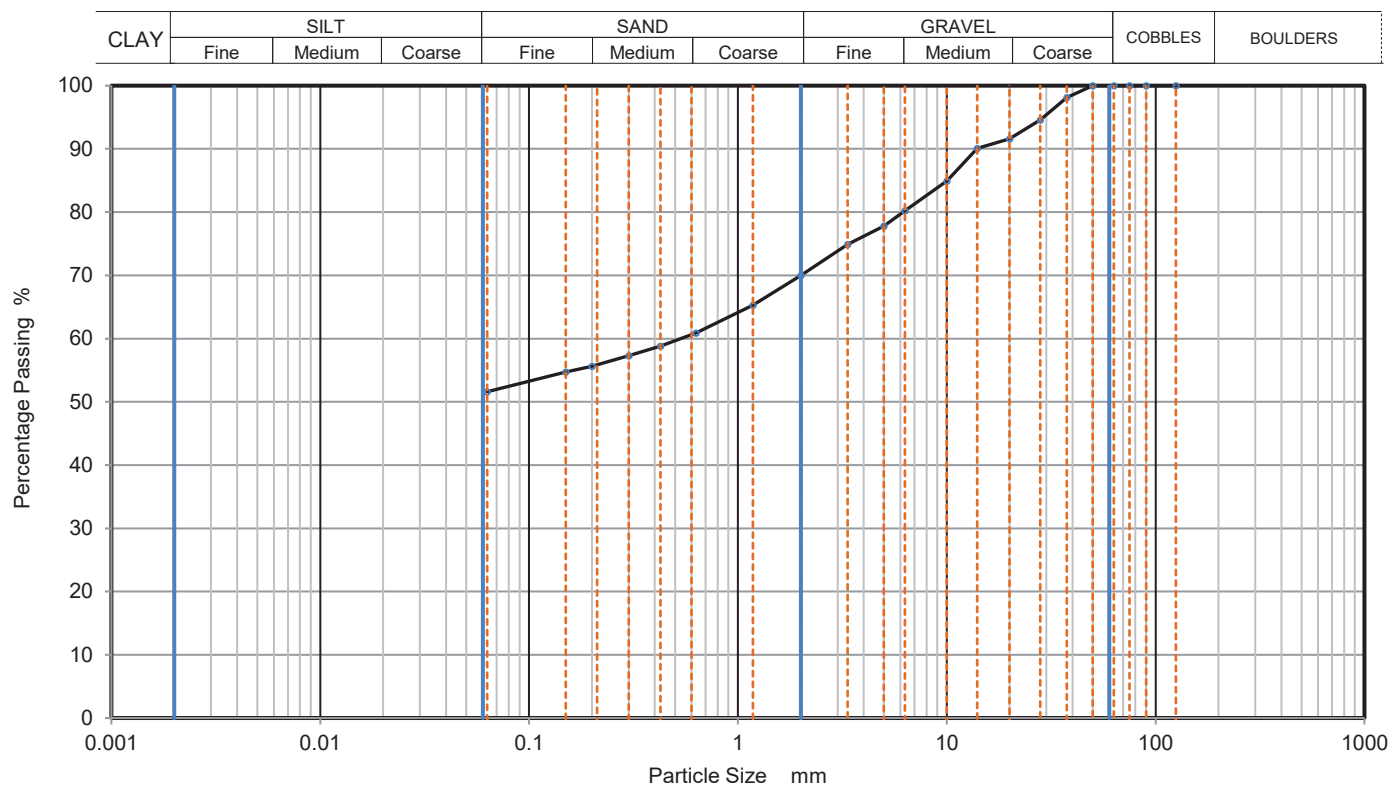
Remarks
Preparation and testing in accordance with BS EN ISO 17892-4: 2016 - Deviation to standard as insufficient material provided in order to meet the minimum mass requirement



8260
Accredited to
ISO/IEC
17025:2017

Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	22/10/2021	KL002R PSD

	PARTICLE SIZE DISTRIBUTION		Project No.	13567	
			Borehole/Pit No.	AFTP09	
Project Name	New Access for Alston Farm		Sample No.		
Soil Description	Brown slightly sandy slightly gravelly SILT		Depth, m	0.95	
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4: 2016, clause 5.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	98		
28	95		
20	92		
14	90		
10	85		
6.3	80		
5	78		
3.35	75		
2	70		
1.18	65		
0.63	61		
0.425	59		
0.3	57		
0.2	56		
0.15	55		
0.063	52		

Dry Mass of sample, g	10342
------------------------------	-------

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	18
Fines <0.063mm	52

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS EN ISO 17892-4: 2016



8260
Accredited to
ISO/IEC
17025:2017

Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	22/10/2021	KL002R PSD

	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - Multistage test			Project ID	13567
				Borehole/Pit No.	AFTP02
Project Name	New Access for Alston Farm			Sample No.	-
Soil Description	Brown slightly sandy silty CLAY			Depth	1.30
Client Job No.	PE211720	Specimen Depth	1.30 m	Sample Type	B
Client Name	Geotechnics			KeyLAB ID	-
Test Method	BS1377:Part 7:1990, clause 9, multistage test on a single specimen			Date of test	11/10/2021

Prep Method for undisturbed samples: BS1377:Part 1: 1990: Clause 8.3. Prep Method for remoulded samples: BS1377:Part 1: 1990: Clause 7.7.3 & 7.7.5 with reference to 8.4.1

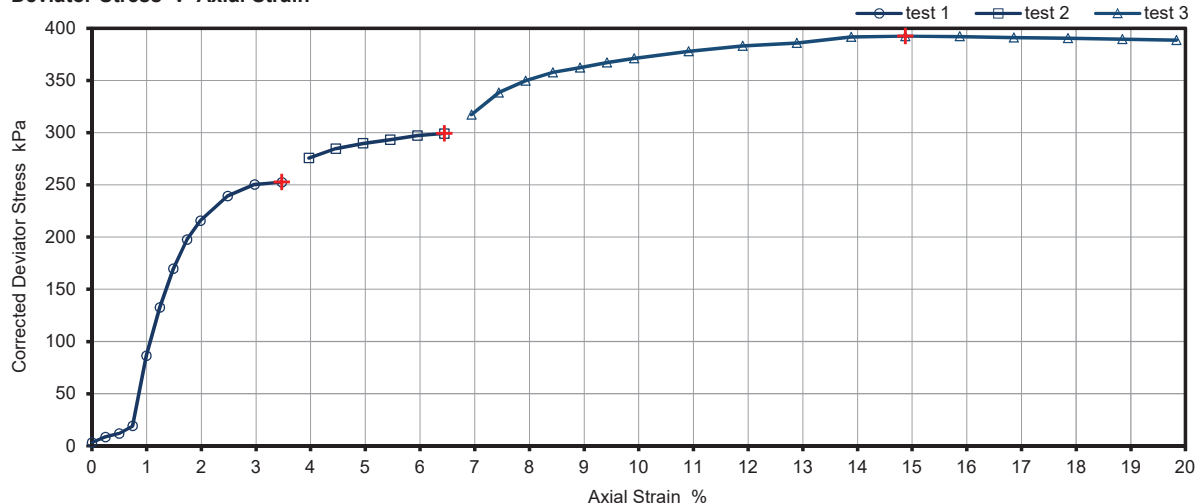
REMOULDED BS1377:Part 1: 1990: Clause 7.7.3(a) & 7.7.5 - Compactive Effort

Length	mm	201.7
Diameter	mm	99.8
Bulk Density	Mg/m ³	2.09
Moisture Content	%	13
Dry Density	Mg/m ³	1.84

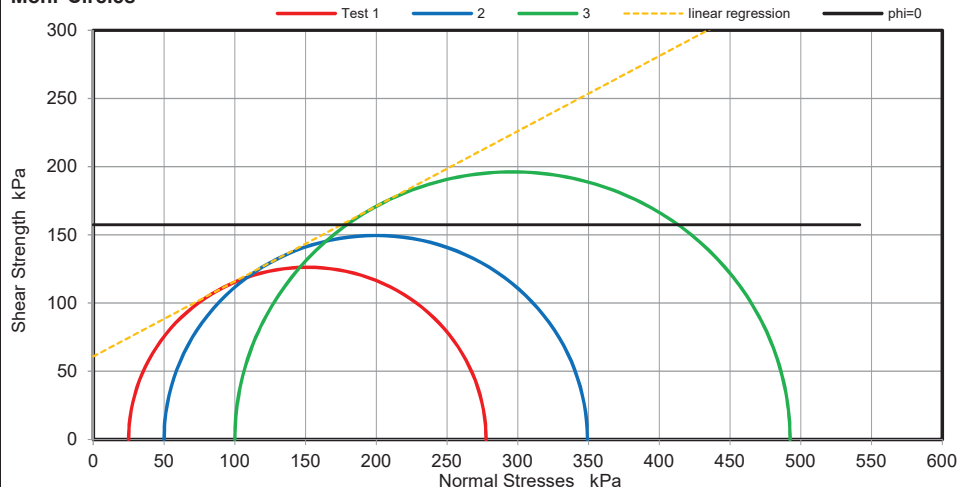
Rate of Strain	%/min	2.00		
Stage Number		1	2	3
Cell Pressure	kPa	25	50	100
End of stage	Axial Strain %	3.5	6.4	14.9
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	kPa	252.6	299.2	392.5
Shear strength, c_u	kPa	126.3	149.6	196.2
Mode of failure		Plastic		

corrected for area and membrane

Deviator Stress v Axial Strain



Mohr Circles



$$\phi_u = 0$$

Average c_u 157 kPa

Linear Regression

$$\phi_u = 28.8^\circ$$

c_u 61 kPa

Mohr circles and their interpretation is not covered by BS1377. These are provided for information only



8260
Accredited to
ISO/IEC
17025:2017

Remarks

Lab Sheet Reference : KL024 Quick Undrained Triaxial (Multistage)

Approved

David Trowbridge - Laboratory Manager

Printed

16/02/2022 16:09

	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - Multistage test		Project ID	13567
			Borehole/Pit No.	AFTP06
Project Name	New Access for Alston Farm		Sample No.	-
Soil Description	Brown slightly gravelly slightly sandy silty CLAY		Depth	0.50
Client Job No.	PE211720	Specimen Depth	-	m
Client Name	Geotechnics		Sample Type	B
Test Method	BS1377:Part 7:1990, clause 9, multistage test on a single specimen		KeyLAB ID	-
			Date of test	11/10/2021

Prep Method for undisturbed samples: BS1377:Part 1: 1990: Clause 8.3. Prep Method for remoulded samples: BS1377:Part 1: 1990: Clause 7.7.3 & 7.7.5 with reference to 8.4.1

REMOULDED

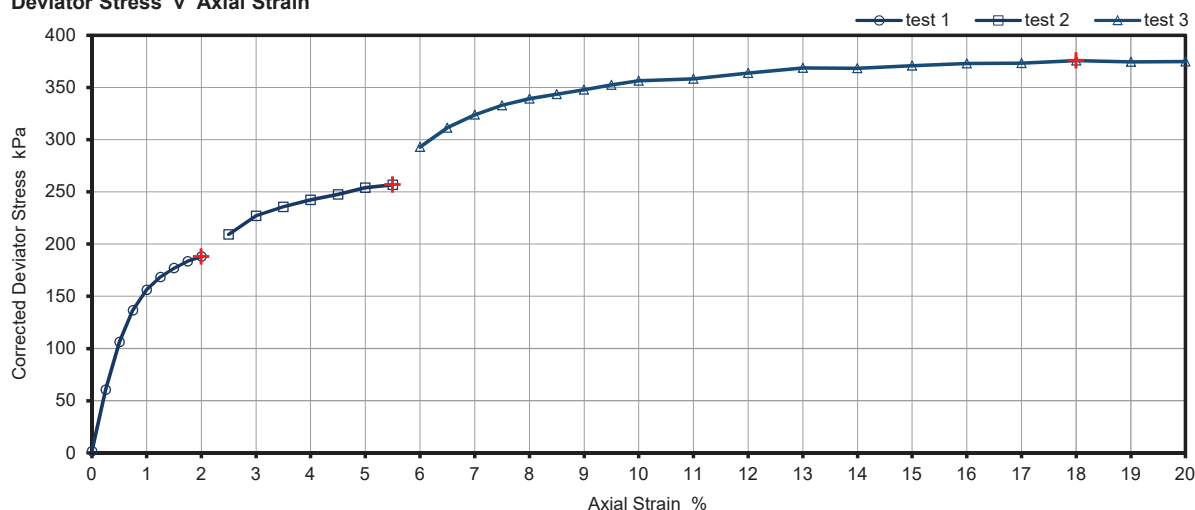
BS1377:Part 1: 1990: Clause 7.7.3(a) & 7.7.5 - Compactive Effort

Length	mm	200.0
Diameter	mm	99.4
Bulk Density	Mg/m ³	2.12
Moisture Content	%	12
Dry Density	Mg/m ³	1.89

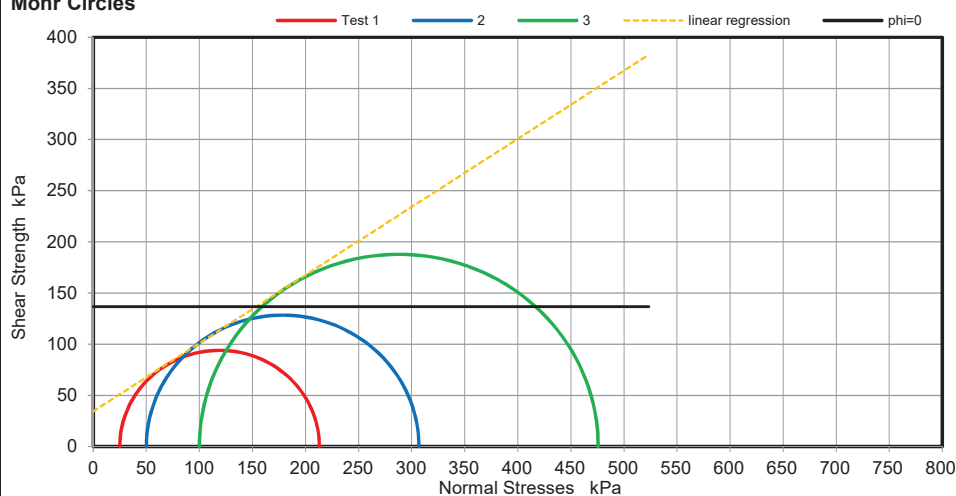
Rate of Strain	%/min	2.00		
Stage Number		1	2	3
Cell Pressure	kPa	25	50	100
End of stage	Axial Strain %	2.0	5.5	18.0
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	kPa	188.0	256.9	375.8
Shear strength, c_u	kPa	94.0	128.4	187.9
Mode of failure		Plastic		

corrected for area and membrane

Deviator Stress v Axial Strain



Mohr Circles



$\phi_u = 0$

Average c_u 137 kPa

Linear Regression

ϕ_u 33.7 °

c_u 34 kPa

Mohr circles and their interpretation is not covered by BS1377. These are provided for information only



8260
Accredited to
ISO/IEC
17025:2017

Remarks

Lab Sheet Reference : KL024 Quick Undrained Triaxial (Multistage)

Approved

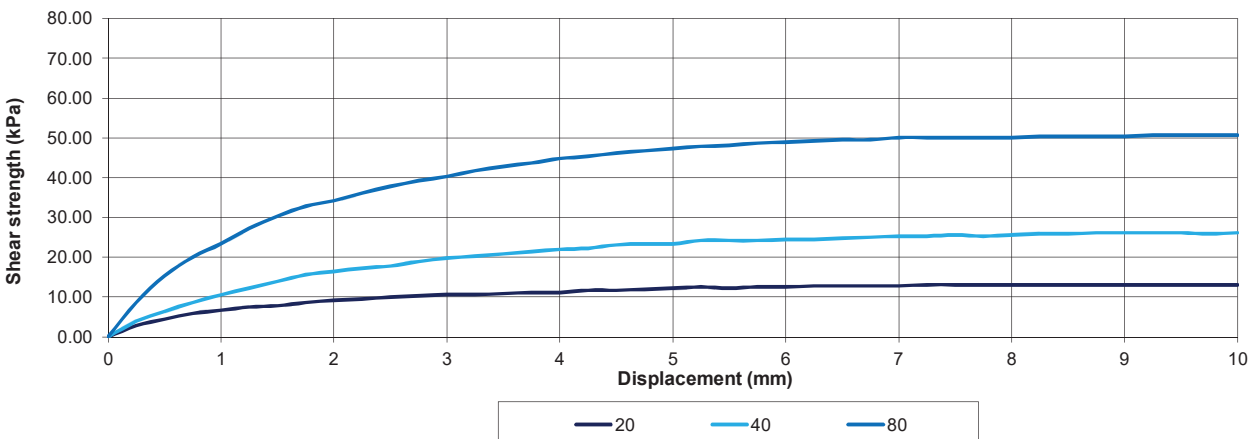
David Trowbridge - Laboratory Manager

Printed

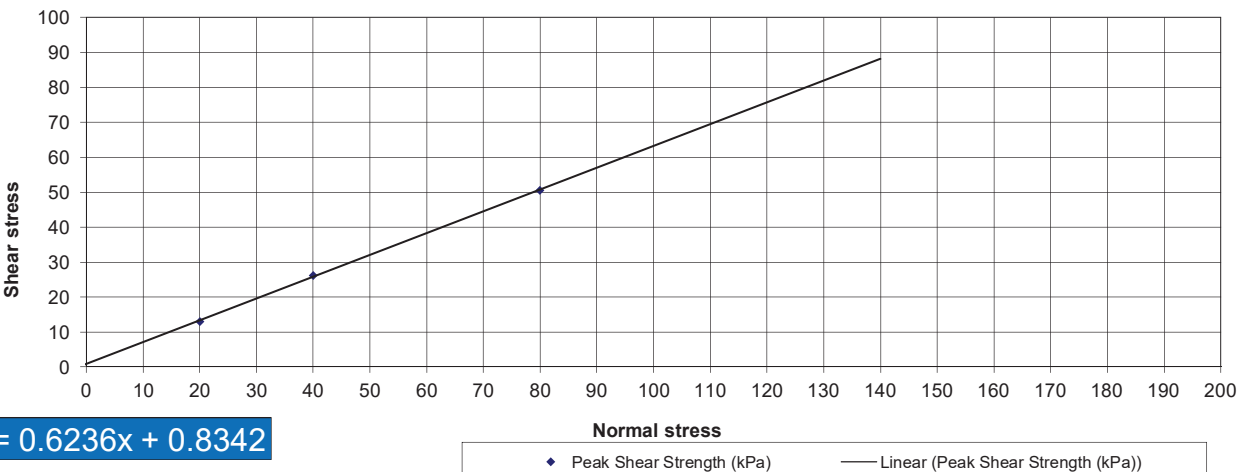
25/02/2022 16:11

 Determination of Shear Strength using the Small Direct Shearbox Apparatus										Unit 3 Brooklands, Howden Road, Tiverton, Devon EX16 5HW				
Project Name					New Access for Alston Farm					Project No.		13567		
Client:					Geotechnics					Borehole / Pit No.		AFTP01		
Soil Description					Orangish brown slightly sandy silty CLAY					Client Job No:		PE211720		
Specimen Description					Orangish brown slightly sandy silty CLAY					Depth (m)		0.70		
Test Method					Tests carried out in accordance with Clause 4 of BS1377: 1990: Part 7: CL 4.5.4 (Single Stage) using the fraction passing a 2.0mm sieve					Sample No.		-		
Sample Type					Bulk sample					Date of test		12/10/2021		
Preparation Details										Test prepared in accordance with BS1377:1990:Part 7: CL4.4.3.5		Assumed Particle Density (Mg/m ³)		2.65
Rate of displacement (mm/min)	Test Dry or Submerged	Load Stage (kPa)	Initial Moisture Content %	Initial Height (mm)	Initial Bulk Density (Mg/m ³)	Initial Dry Density (Mg/m ³)	Specimen Width (mm)	Specimen Length (mm)	Consolidated Height (mm)	Peak Shear Strength (kPa)	Horizontal Displacement At Peak (mm)			
0.031	Submerged	20	16	20.21	1.60	1.38	59.93	60.01	19.34	13	7.3			
0.031		40		20.02	1.62	1.39			19.05	26	8.8			
0.031		80		20.33	1.59	1.37			17.82	51	9.3			
Angle of friction (Peak) °		32	Peak Cohesion (kPa)		0.8	Angle of friction (Residual) °		-	Residual Cohesion (kPa)		-			

Shear stress versus Horizontal Displacement



Maximum shear stress versus Normal Applied Stress



$y = 0.6236x + 0.8342$

◆ Peak Shear Strength (kPa) — Linear (Peak Shear Strength (kPa))



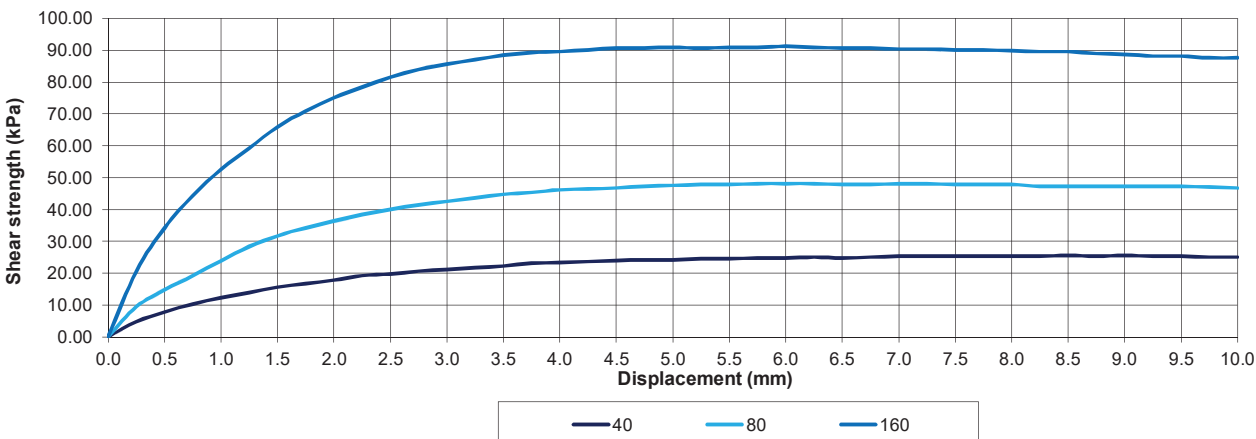
8260
Accredited to
ISO/IEC
17025:2017

Remarks:	

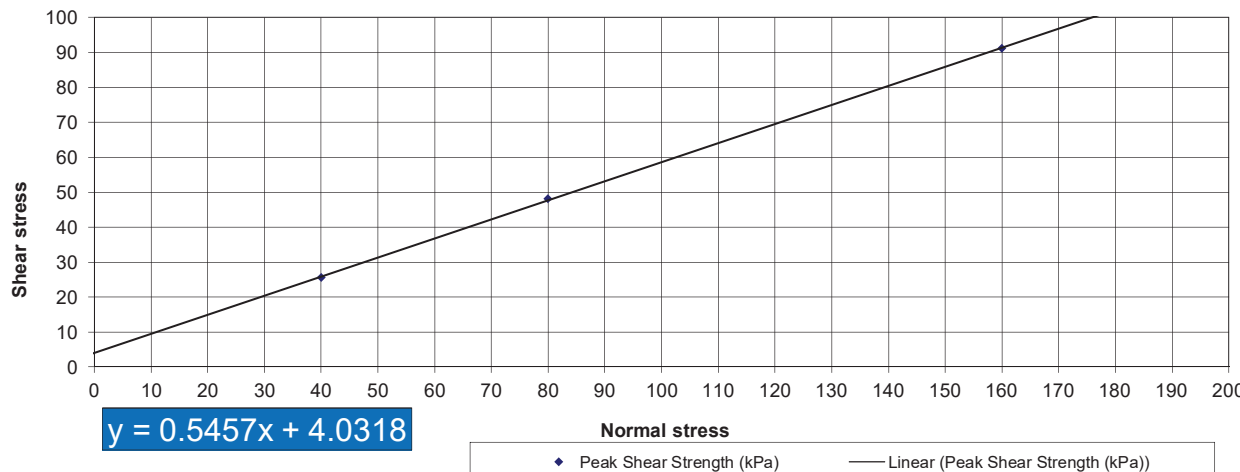
Approved by	Date Approved
David Trowbridge - Laboratory Manager	16/02/2022 16:09

 Determination of Shear Strength using the Small Direct Shearbox Apparatus										Unit 3 Brooklands, Howden Road, Tiverton, Devon EX16 5HW		
Project Name		New Access for Alston Farm						Project No.		13567		
Client:		Geotechnics						Borehole / Pit No.		AFTP02		
Soil Description		Brown slightly sandy silty CLAY						Client Job No:		PE211720		
Specimen Description		Brown slightly sandy silty CLAY						Depth (m)		2.40		
Test Method		Tests carried out in accordance with Clause 4 of BS1377: 1990: Part 7: CL 4.5.4 (Single Stage) using the fraction passing a 2.0mm sieve						Sample No.		-		
Sample Type		Bulk sample						Date of test		14/10/2021		
Preparation Details								Test prepared in accordance with BS1377:1990:Part 7: CL4.4.3.5		Assumed Particle Density (Mg/m³)		2.65
Rate of displacement (mm/min)	Test Dry or Submerged	Load Stage (kPa)	Initial Moisture Content %	Initial Height (mm)	Initial Bulk Density (Mg/m ³)	Initial Dry Density (Mg/m ³)	Specimen Width (mm)	Specimen Length (mm)	Consolidated Height (mm)	Peak Shear Strength (kPa)	Horizontal Displacement At Peak (mm)	
0.05	Submerged	40	13	20.12	1.87	1.65	59.93	60.01	18.73	26	8.5	
0.05		80		20.14	1.87	1.65			18.19	48	5.8	
0.05		160		20.17	1.87	1.65			17.19	91	6.0	
Angle of friction (Peak) °		29	Peak Cohesion (kPa)		4.0	Angle of friction (Residual) °		-	Residual Cohesion (kPa)		-	

Shear stress versus Horizontal Displacement



Maximum shear stress versus Normal Applied Stress



$y = 0.5457x + 4.0318$

◆ Peak Shear Strength (kPa) — Linear (Peak Shear Strength (kPa))



8260
Accredited to
ISO/IEC
17025:2017

Remarks:

Approved by	Date Approved
David Trowbridge - Laboratory Manager	16/02/2022 16:08

APPENDIX 8

Laboratory Testing - Contamination



2183

Amended Report

Report No.:	21-32512-6		
Initial Date of Issue:	01-Oct-2021	Date of Re-Issue:	07-Feb-2022
Client	Geotechnics Ltd		
Client Address:	Unit 5 Orchard Court Heron Road Sowton Industrial Estate Exeter Devon EX2 7LL		
Contact(s):	Anne Simpson Hannah Dwane Matthew Yates		
Project	New Access to Alston Farm		
Quotation No.:		Date Received:	20-Sep-2021
Order No.:	AUTH-OE30890	Date Instructed:	27-Sep-2021
No. of Samples:	4		
Turnaround (Wkdays):	5	Results Due:	01-Oct-2021
Date Approved:	01-Oct-2021		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Soil

Project: New Access to Alston Farm

Client: Geotechnics Ltd	Chemtest Job No.:				21-32512	21-32512	21-32512	21-32512
Quotation No.:	Chemtest Sample ID.:				1281893	1281896	1281897	1281917
	Client Sample ID.:				WLTP35	AFTP06	AFTP01	WLTP21
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.5	0.5	0.7	0.5
	Date Sampled:				14-Sep-2021	14-Sep-2021	14-Sep-2021	16-Sep-2021
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD				
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	17	9.1	8.8	20
pH	U	2010		4.0	9.3	8.9	8.8	8.6
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	< 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Arsenic	U	2450	mg/kg	1.0	120	43	48	89
Cadmium	U	2450	mg/kg	0.10	4.7	< 0.10	< 0.10	6.6
Chromium	U	2450	mg/kg	1.0	18	14	25	15
Copper	U	2450	mg/kg	0.50	96	29	40	98
Mercury	U	2450	mg/kg	0.10	0.27	< 0.10	< 0.10	0.25
Nickel	U	2450	mg/kg	0.50	220	16	22	470
Lead	U	2450	mg/kg	0.50	130	13	32	170
Selenium	U	2450	mg/kg	0.20	0.38	0.48	0.70	0.24
Zinc	U	2450	mg/kg	0.50	660	38	50	940
Total Organic Carbon	U	2625	%	0.20	< 0.20	0.50	0.30	< 0.20
Total TPH >C6-C40	U	2670	mg/kg	10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

APPENDIX 9

Investigation Techniques and General Notes

INTRODUCTION

The following brief review of Ground Investigation techniques, generally used as part of most Site Investigations in the UK, summarises their methodology, advantages and limitations. Detailed descriptions of the techniques are available and can be provided on request. This review should be read in conjunction with the accompanying General Notes.

TRIAL PITS

The trial pit is amongst the simplest yet most effective means of identifying shallow ground conditions on a site. Its advantages include simplicity, speed, potential accuracy and cost-effectiveness. The trial pit is most commonly formed using a back-acting excavator which can typically determine ground conditions to some 4 metres below ground level. Hand excavation is often used to locate, expose and detail existing foundations, features or services. In general, it is difficult to extend pits significantly below the water table in predominantly granular soils, where flows can cause instability. Unless otherwise stated, the trial pits will not have been provided with temporary side support during their construction. Under such circumstances, entrance into the pit is not permitted and hence observations will have been made from the ground surface and samples taken from the excavator bucket.

Where access for personnel is required to allow close observation of the exposed strata, the taking of samples and the carrying out of in situ tests, the sides of the trial pits (Observation Pits in BS 5930:2015) will be made safe using temporary supports or the sides battered back to a stable angle. Some limited access to such Trial Pits (Observation Pits) at depths less than 1m may be allowed in stable conditions or where the sides are benched or battered back to a safe angle.

Trends in strata type, level and thickness can be determined, shear surfaces identified and the behaviour of plant, excavation sides and excavated materials can be related to the construction process. They are particularly valuable in land slip investigations. Some types of in situ test can be undertaken in such pits and large disturbed or block samples obtained.

CABLE PERCUSSION BORING

The light Cable Percussion technique of soft ground boring, typically at a diameter of 150mm, is a well-established simple and flexible method of boring vertical holes and generally allows data to be obtained in respect of strata conditions other than rock. A tubular cutter (for cohesive soils) or shell with a flap valve (for granular soils) is repeatedly lifted and dropped using a winch and rope operating from an "A" frame. Soil which enters these tools is regularly removed and either sampled for subsequent examination or test, or laid to one side for later removal off site and licensed disposal or, if permitted by the Client, use as backfill. Steel casing will have been used to prevent collapse of the borehole sides where necessary. A degree of disturbance of soil and mixing of layers is inevitable and the presence of very thin layers of different soils within a particular stratum may not be identified. Changes in strata type can only be detected on recognition of a change in soil samples at the surface, after the interface has been passed. For the foregoing reasons, depth measurements should not be considered to be more accurate than 0.10 metre. The technique can determine ground conditions to depths in excess of 30 metres under suitable circumstances and usually causes less surface disturbance than trial pitting.

In cohesive soils cylindrical samples are retrieved by driving or pushing in 100mm nominal diameter tubes. In soft soils, piston sampling or vane testing may be undertaken. In granular soils and often in cohesive materials, in situ Standard Penetration Tests (SPT's) are performed. The SPT records the number of standard blows required to drive a 50mm diameter open or cone ended probe for 300mm after an initial 150mm penetration. A modified method of recording is used in denser strata. Small disturbed samples are obtained throughout.

ROTARY DRILLING

Rotary Drilling to produce cores by rotating an annular diamond-impregnated tube or barrel into the ground is the technique most appropriate to the forming of site investigation boreholes through rock or other hard strata. It has the advantage of being able to be used vertically or at an angle. Core diameters of less than 100mm are most common for site investigation purposes. Core is normally retrieved in plastic lining tubes. A flushing fluid such as air, water or foam is used to cool the bit and carry cuttings to the surface. Depths in excess of 60 metres can be achieved under suitable circumstances using rotary techniques, with minimal surface disturbance.

Examination of cores allows detailed rock description and generally enables angled discontinuity surfaces to be observed. However, vertical holes do not necessarily reveal the presence of vertical or near-vertical fissures or joint discontinuities. The core type and/or techniques used will depend on the ground conditions. Where open hole rotary drilling is employed, descriptions of strata result from examination at the surface of small particles ejected from the borehole in the flushing medium. In consequence, no indication of fissuring, bedding, consistency or degree of weathering can be obtained.

DYNAMIC SAMPLING

This technique involves the driving of an open-ended tube into the ground and retrieval of the soil which enters the tube. It was previously called window or windowless sampling. The term "window sample" arose from the original device which had a "window" or slot cut into the side of the tube through which samples were taken. This was superseded by the use of a thin-walled plastic liner to retrieve the soil sample from within a sampler (windowless sampling) which has a solid wall. Line diameters range from 36 to 86mm. Such samples can be used for qualitative logging, selection of samples for classification and chemical analysis and for obtaining a rudimentary assessment of strength.

Driving devices can be hand-held or machine mounted and the drive tubes are typically in 1m lengths. Depending on the type of rig used, the hole formed can be cased to prevent collapse of the borehole sides. Where the type of rig does not allow the insertion of casing, the success of this technique can be limited when soils and groundwater conditions are such that the sides of the hole collapse on withdrawal of the sampler. Obstructions within the ground, the density of the material or its strength can also limit the depth and rate of penetration of this light-weight investigation technique. Nevertheless, it is a valuable tool where access is constrained such as within buildings or on embankments. Depths of up to 10m can be achieved in suitable circumstances depending on the rig type but depths of 5m to 6m are more common.

EXPLORATORY HOLE RECORDS

The data obtained by these techniques are generally presented on Trial Pit, Borehole, Drillhole or Dynamic Sample Records. The descriptions of strata result from information gathered from a number of sources which may include published geological data, preliminary field observations and descriptions, in situ test results, laboratory test results and specimen descriptions. A key to the symbols and abbreviations used accompanies the records. The descriptions on the exploratory hole records accommodate but may not necessarily be identical to those on any preliminary records or the laboratory summaries.

The records show ground conditions at the exploratory hole locations. The degree to which they can be used to represent conditions between or beyond such holes, however, is a matter for geological interpretation rather than factual reporting and the associated uncertainties must be recognised.

DYNAMIC PROBING

This technique typically measures the number of blows of a standard weight falling over a standard height to advance a cone-ended rod over sequential standard distances (typically 100mm). Some devices measure the penetration of the probe per standard blow. It is essentially a profiling tool and is best used in conjunction with other investigation techniques where site-specific correlation can be used to delineate the distribution of soft or loose soils or the upper horizon of a dense or strong layer such as rock.

Both machine-driven and hand-driven equipment is available, the selection depending upon access restrictions and the depth of penetration required. It is particularly useful where access for larger equipment is not available, disturbance is to be minimised or where there are cost constraints. No samples are recovered and some techniques leave a sacrificial cone head in the ground. As with other lightweight techniques, progress is limited in strong or dense soils. The results are presented both numerically and graphically. Depths of up to 10m are commonly achieved in suitable circumstances.

The hand-driven DCP probing device has been calibrated by the Highways Agency to provide a profile of CBR values over a range of depths.

INSTRUMENTATION

The most common form of instrument used in site investigation is either the standpipe or else the standpipe piezometer which can be installed in investigation holes. They are used to facilitate monitoring of groundwater levels and water sampling over a period of time following site work. Normally a standpipe would be formed using rigid plastic tubing which has been perforated or slotted over much of its length whilst a standpipe piezometer would have a filter tip which would be placed at a selected level and the hole sealed above and sometimes below to isolate the zone of interest. Groundwater levels are determined using an electronic "dip meter" to measure the depth to the water surface from ground level. Piezometers can also be used to measure permeability. They are simple and inexpensive instruments for long term monitoring but response times can limit their use in tidal areas and access to the ground surface at each instrument is necessary. Remote reading requires more sophisticated hydraulic, electronic or pneumatic equipment.

Settlement can be monitored using surface or buried target plates whilst lateral movement over a range of depths is monitored using slip indicator or inclinometer equipment.

1. The report is prepared for the exclusive use of the Client named in the document and copyright subsists with Geotechnics Limited. Prior written permission must be obtained to reproduce all or part of the report. It is prepared on the understanding that its contents are only disclosed to parties directly involved in the current investigation, preparation and development of the site.
2. Further copies may be obtained with the Client's written permission, from Geotechnics Limited with whom the master copy of the document will be retained.
3. The report and/or opinion is prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to Geotechnics Limited at that time. Re-consideration will be necessary should those details change. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Geotechnics Limited.
4. The assessment of the significance of the factual data, where called for, is provided to assist the Client and their Engineer and/or Advisers in the preparation of their designs.
5. The report is based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. The data from any commissioned desk study and site reconnaissance are also drawn upon. There may be special conditions appertaining to the site, however, which are not revealed by the investigation and which may not be taken into account in the report.
6. Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical and any geoenvironmental data would be required to provide discussion and evaluations appropriate to these methods.
7. The accuracy of results reported depends upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristics of the strata as a whole (see accompanying notes on Investigation Techniques). Where such measurements are critical, the technique of investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the Company where necessary.
8. The samples selected for laboratory test are prepared and tested in accordance with the relevant Clauses and Parts of BS EN ISO 17892 and BS 1377 Parts 1 to 8, where appropriate, in Geotechnics Limited's UKAS accredited Laboratory, where possible. A list of tests is given.
9. Tests requiring the use of another laboratory having UKAS accreditation where possible are identified.
10. Any unavoidable variations from specified procedures are identified in the report.
11. Specimens are cut vertically, where this is relevant and can be identified, unless otherwise stated
12. All the data required by the test procedures are recorded on individual test sheets but the results in the report are presented in summary form to aid understanding and assimilation for design purposes. Where all details are required, these can be made available.
13. Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on the possible presence of features based on either visual, verbal, written, cartographical, photographic or published evidence, this is for guidance only and no liability can be accepted for its accuracy.
14. The Code of Practice for Ground Investigations – BS 5930:2015 calls for man-made soils to be described as Anthropogenic Ground with soils placed in an un-controlled manner classified as Made Ground and soils placed in a controlled manner as Fill. In view of the difficulty in always accurately determining the origin of man-made soils in exploratory holes, Geotechnics Limited classify such materials as Made Ground. Where soils can be clearly identified as being placed in a controlled manner then further classification of the soils as Fill has been added to the Exploratory Hole Records.
15. Classification of man-made soils is based on the inspection of retrieved samples or exposed excavations. Where it is obvious that foreign matter such as paper, plastic or metal is present, classification is clear. Frequently, however, for man-made soils that arise from the adjacent ground or from the backfilling of excavations, their visual characteristics can closely resemble those of undisturbed ground. Other evidence such as site history, exploratory hole location or other tests may need to be drawn upon to provide clarification. For these reasons, classification of soils on the exploratory hole records as either Made Ground or naturally occurring strata, the boundary between them and any interpretation that this gives rise to should be regarded as provisional and subject to re-evaluation in the light of further data.
16. The classification of materials as Topsoil is generally based on visual description and should not be interpreted to mean that the material so described complies with the criteria for Topsoil used in BS 3882:2015. Specific testing would be necessary where such a definition is a requirement.
17. Ground conditions should be monitored during the construction of the works and the report should be re-evaluated in the light of these data by the supervising geotechnical engineers.
18. Any comments on groundwater conditions are based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.
19. Any bearing capacities for conventional spread foundations which are given in the report and interpreted from the investigation are for bases at a minimum depth of 1m below finished ground level in naturally occurring strata and at broadly similar levels throughout individual structures, unless otherwise stated. Typically they are based on serviceability criteria taking account of an assessment of the shear strength and/or density data obtained by the investigation. The foundations should be designed in accordance with the good practice embodied in BS 8004:2015 - Foundations, supplemented for housing by NHBC Standards. Foundation design is an iterative process and bearing pressures may need adjustment or other measures may need to be taken in the context of final layouts and levels prior to finalisation of proposals.
20. Unless specifically stated, the investigation does not take account of the possible effects of mineral extraction or of gases from fill or natural sources within, below or outside the site.
21. The costs or economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical or geoenvironmental considerations and hence their evaluation is outside the scope of the report.