Appendix 10-11: daa Airfield Underpass – Ground Investigation

DAA Airfield Underpass – Ground Investigation

Client:	DAA
Client's Representative:	Ramboll Consulting Engineers
Report No.:	21-1219
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Document Control Sheet

Report No.:		21-1219			
Project Title:		DAA Airfield Underpass			
Client:		DAA			
Client's Representative:		Ramboll Consulting Engineers			
Revision:	A00	**Status:**	Draft Report	**Issue Date:**	10th June 2022
Prepared by:		**Reviewed by:**		**Approved by:**	
 Gabriella Horan BSc		 Sean Ross BSc MSc MIEI PGeo		 Darren O'Mahony BSc MSc MIEI EurGeol PGeo	

The works were conducted in accordance with:

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for site investigations.

EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9

METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015+A1:2020, The Code of Practice for Site Investigation.

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
P	Nominal 100mm diameter undisturbed piston sample.
B	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
C	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length.
(Y for Z/ Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa.
V VR	Shear vane test (borehole). Shear strength stated in kPa. V: undisturbed vane shear strength VR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of Nx5=Cu is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
▽	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relating to rock core – reference Clause 36.4.4 of BS 5930: 2015	
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.

DAA Airfield Underpass

1 AUTHORITY

On the instructions of Ramboll Consulting Engineers, ("the Client's Representative"), acting on the behalf of DAA ("the Client"), a ground investigation was undertaken at the above location to provide geotechnical and environmental information for input to the design and construction of proposed underpass tunnel to connect the existing facilities in the eastern part of Dublin Airport (in the vicinity of the current Pier 3) to proposed areas of development to the west. To facilitate this, a cut-and-cover tunnel is proposed, passing beneath the existing crosswind runway. The tunnel will be approximately 1km in plan length, with the construction depth below ground level extending to a maximum of approximately 15-20m.

This report details the work carried out both on site and in the geotechnical and chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results. A discussion on the recommendations for construction is also provided.

All information given in this report is based upon the ground conditions encountered during the site investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client's Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

2 SCOPE

The extent of the investigation, as instructed by the Client's Representative, included boreholes, soil and rock core sampling, environmental sampling, in-situ and laboratory testing, and the preparation of a factual report on the findings.

3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were conducted on the site of Dublin Airport, in an east-west direction in the vicinity of the crosswind runway. The operational crosswind runway is bounded on both sides by several adjoining taxiways and areas of soft landscaping. The majority of the investigation lies within the grass areas however there was also some works on the existing apron areas, adjacent to Pier 3.

4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted between 09th March and 3rd May 2022, comprised:

- thirteen rotary drilled boreholes
- a standpipe installation in eleven boreholes; and
- two pump tests

The exploratory holes and in-situ tests were located as instructed by the Client's Representative, as shown on the exploratory hole location plan in Appendix A.

4.2 Boreholes

Eleven boreholes (BH101-BH111) were put to their completion by rotary drilling techniques only. The boreholes were completed using a Comacchio 601 tracked drilling rig, a Comacchio 405 tracked drilling rig and a truck mounted Beretta T44 rotary drilling rig.

Inspection pits at all boreholes locations were undertaken by Kilwex. They were not logged or photographed by Causeway Geotech.

Symmetrix-cased full hole rotary percussive drilling techniques were employed to advance the boreholes to a certain depth, after which rotary coring was employed to recover core samples of the overburden and bedrock. SPTs were carried out at standard intervals throughout the overburden, in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals using the split spoon sampler (SPT(s)) or solid cone attachment (SPT(c)). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix G.

Where coring was carried out within overburden and bedrock strata, Geobor S Coring was used. The core was extracted in up to 1.5m lengths using an SK6L core barrel, which produced core of nominal 102mm diameter, and was placed in single channel wooden core boxes.

Following completion of BH105 and BH107, both boreholes were re-drilled to a larger diameter to allow installation of a pumping well.

The core was subsequently photographed and examined by a qualified and experienced Engineering Geologist, thus enabling the production of an engineering log in accordance with *BS 5930: 2015: Code of practice for ground investigations*.

Appendix B presents the borehole logs, with core photographs presented in Appendix C.

4.3 Standpipe installations

Groundwater monitoring standpipes were installed in boreholes as shown below in Table 1.

Table 1 Summary of standpipe installations

GI Ref	Standpipe Type	Response Zone (mbgl)
BH101	50mm standpipe	15.0-20.0
BH102	50mm standpipe	3.0-14.0
BH103	50mm standpipe	5.0-12.0
BH104	50mm standpipe	15.0-19.0
BH105	150mm pumping well	2.50-20.5
BH106	50mm standpipe	13.0-18.5
BH107	150mm pumping well	2.50-28.0
BH108	50mm standpipe	14.0-18.0
BH109	50mm standpipe	2.5-25.0
BH110	50mm standpipe	3.8-16.0
BH111	50mm standpipe	4.0-31.5

Details of the installations, including the depth range of the response zone, are provided in Appendix B on the individual borehole logs.

4.4 Pump tests

Pump and step tests were carried in borehole BH105 and BH107 after the installation of a 150mm groundwater well.

Monitoring of nearby standpipes was carried out using manual dip-meters and digital data loggers to measure “drawdown” of the groundwater during tests.

Results have been provided to the client's representative in electronic format and are not presented as part of this report.

4.5 Surveying

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R10 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish Transverse Mercator) and ground elevation (mOD Malin) at each location are recorded on the individual exploratory hole logs. The exploratory hole plan presented in Appendix A shows these as-built positions.

Note, at the time of issuing this report, BH110 and BH111 have not been surveyed due to access restrictions. Co-ordinates and elevations provided on the logs are based on the co-ordinates provided in the tender documents and drawings.

5 LABORATORY WORK

Upon their receipt in the laboratory, all disturbed samples were carefully examined and accurately described, and their descriptions incorporated into the borehole logs.

5.1 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement, Atterberg Limit tests, particle size distribution analysis and bulk density tests
- **shear strength** (total stress): unconsolidated undrained triaxial tests (UU)
- **shear stress** (effective stress): consolidated undrained triaxial tests (CU)
- **consolidation**: oedometer testing
- **compaction related:** California bearing ratio tests and dry density/moisture content relationship tests
- **soil chemistry:** pH, organic matter content, BRE Test Suite C and D.

Laboratory testing of soils samples was carried out in accordance with British Standards Institute: *BS 1377, Methods of test for soils for civil engineering purposes; Part 1 (2016), and Parts 2-9 (1990).*

The test results are presented in Appendix E.

5.2 Geotechnical laboratory testing of rock

Laboratory testing of rock sub-samples comprised:

- point load index
- unconfined compressive strength (UCS) tests

Test	Test carried out in accordance with
Point load index	ISRM Suggested Methods (1985) Suggested method for determining point-load strength. Int. J. Rock Mech. Min. Sci. Geomech. Abstr. 22, pp. 53–60
Uniaxial compression strength tests	ISRM Suggested Methods (1981) Suggested method for determining deformability of rock materials in uniaxial compression, Part 2 and ISRM (2007) Ulusay R, Hudson JA (eds) The complete ISRM suggested methods for rock characterization, testing and monitoring, 2007

The test results are presented in Appendix E.

5.3 Environmental laboratory testing of soils

Environmental testing was conducted on selected environmental soil and water samples by Chemtest at its laboratory in Newmarket, Suffolk.

Testing was carried out in accordance with Engineer's Ireland Specification for Ground Investigation (2016) Suite I. This included testing for a range of determinants, including:

- Metals
- Speciated total petroleum hydrocarbons (TPH)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- BTEX compounds
- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds (SVOCs)
- Polychlorinated biphenyls (PCBs)
- Phenols
- Organic matter
- Total Organic Carbon (TOC)
- Cyanides
- Asbestos screen
- Sulphate and sulphide

- Sulphur
- Phosphate
- Calcium
- pH
- Waste acceptance criteria (WAC)

Results of environmental laboratory testing are presented in Appendix F.

5.4 Environmental laboratory testing of water samples

Environmental testing was conducted on groundwater samples from before and after pump tests by Chemtest at its laboratory in Newmarket, Suffolk.

Testing was carried out in accordance with Engineer's Ireland Specification for Ground Investigation (2016) Suite F and also for PFAS and ammonia.

Results of laboratory testing are presented in Appendix F.

NOTE GW TESTING FROM AFTER PUMP TESTS IS OUTSTANDING AT THE TIME OF ISSUING THIS REPORT.

6 GROUND CONDITIONS

6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise Glacial Till. These deposits are underlain by calcareous shale and limestone conglomerate of the Tober Colleen Formation.

6.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Glacial Till:** sandy gravelly clay, frequently with low cobble content, typically firm or stiff in upper horizons, becoming very stiff with increasing depth. Frequently with lenses of granular material, same large in extent as seen in BH103 and BH104. It should be noted that the method of drilling may have washed out the fines content of the granular deposits and it is possible they may just be a more granular glacial till.

- **Bedrock (Limestone):** Rockhead comprising mudstone and limestone was encountered at depths ranging from 21.40m in BH102 to 32.55m in BH111

6.3 Groundwater

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location.

Groundwater was encountered during rotary drilling through soil as water strikes as shown in Table 2 below.

Table 2 Groundwater strikes encountered during ground investigations.

Location	Depth (mbgl)
BH101	4.00
BH102	4.00
BH103	3.70
BH105-Well	16.50

Groundwater was not noted during drilling at any of the other borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any groundwater strikes and the possibility of encountering groundwater during excavation works should not be ruled out.

Due to the nature of the drilling system (Geobor-S), whereby water is added, groundwater strikes within overburden or bedrock may have been masked by the fluid used as the drilling flush medium.

Seasonal variations should be factored into design considerations.

7 REFERENCES

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

BS EN ISO 14689-1:2018: Geotechnical investigation and testing. Identification and classification of rock. Identification and description.

BS EN ISO 22476-3:2005+A1:2011: Geotechnical investigation and testing. Field testing. Standard penetration test.

CAUSEWAY GEOTECH

APPENDIX A

SITE AND EXPLORATORY HOLE LOCATION PLANS



Project No.:	21-1219	**Client:**	DAA
Project Name:	DAA Airfield Underpass	**Client's Representative:**	Ramboll Consulting Engineers

Legend Key



Title:

Site Location Plan

Last Revised:	**Scale:**
10/06/2022	1:50000

CAUSEWAY GEOTECH

Project No.:	21-1219	**Client:**	DAA
Project Name:	DAA Airfield Underpass	**Client's Representative:**	Ramboll Consulting Engineers

Legend Key

- Locations By Type - RC
- Locations By Type - RO



Title:
Exploratory Hole Location Plan

Last Revised:	**Scale:**
10/06/2022	1:5000

CAUSEWAY GEOTECH

APPENDIX B

BOREHOLE LOGS



CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH101
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 405	0.00	4.20
Rotary Coring	Comacchio 405	4.20	27.70

Coordinates: 715774.50 E, 743117.50 N

Final Depth: 27.70 m | Start Date: 21/03/2022 | Driller: MW | Elevation: 62.84 mOD | End Date: 23/03/2022 | Logger: MRG

Sheet 1 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
											Inspection pit excavated by Kilwex to 1.20m
1.20	D1					1.20	Dry	61.64	1.20		
1.20 - 1.65	SPT(S) N=15 (1,1/2,3,4,6) Hammer SN = 0643										Stiff becoming very stiff dark brown sandy gravelly CLAY. (Driller's description)
2.70	D2					2.70	Dry				
2.70 - 3.15	SPT(S) N=40 (4,7/10,9,7,14) Hammer SN = 0643										
	Slow seepage at 4.00m										
4.20	D3					4.20	4.00	58.64	4.20		
4.20 - 4.65	SPT(S) N=44 (3,4/6,12,12,14) Hammer SN = 0643										Very stiff greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of predominantly limestone. Cobbles are subangular to subrounded of limestone.
4.30	ES1	60									
4.60 - 4.85	B1										
5.20											
5.55	ES2										
		100									
6.10	D4										
6.25 - 6.60	C1										
6.70											
		TCR	SCR	RQD	FI						

Water: ▼ 4.00

Backfill: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.00	4.00	20	4.00

Casing Details

To (m)	Diam (mm)
4.20	200
27.70	150

Core Barrel: SK6L

Flush Type: Water

Remarks: Inspection pit excavated by Kilwex to 1.20m.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH101
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 405	0.00	4.20
Rotary Coring	Comacchio 405	4.20	27.70

Coordinates: 715774.50 E, 743117.50 N

Final Depth: 27.70 m | Start Date: 21/03/2022 | Driller: MW

Elevation: 62.84 mOD | End Date: 23/03/2022 | Logger: MRG

Sheet 2 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		100									Very stiff greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of predominantly limestone. Cobbles are subangular to subrounded of limestone.		
8.10	ES3												
8.20													
8.40	D5												
8.50 - 8.80	B2												
		100											
9.70													
		100											
10.90 - 11.20	C2												
11.20													
		100											
11.90 - 12.30	B3												
12.50	D6												
12.70													
		100											
14.20													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.00	4.00	20	4.00

Casing Details

To (m)	Diam (mm)
4.20	200
27.70	150

Core Barrel: SK6L

Flush Type: Water

Remarks: Inspection pit excavated by Kilwex to 1.20m.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH101
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 405	0.00	4.20
Rotary Coring	Comacchio 405	4.20	27.70

Coordinates: 715774.50 E, 743117.50 N

Final Depth: 27.70 m | Start Date: 21/03/2022 | Driller: MW

Elevation: 62.84 mOD | End Date: 23/03/2022 | Logger: MRG

Scale: 1:40

FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
15.00 - 15.30	B4	100									Very stiff greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of predominantly limestone. Cobbles are subangular to subrounded of limestone.
15.45	D7										
15.70								47.04	15.80		Stiff thinly laminated dark greyish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular fine to coarse.
		90									
17.20											
17.55 - 17.90	C3	80									
18.70											
19.10 - 19.50	B5							43.64	19.20		Grey and greyish brown gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine to coarse.
19.60	D8	100						43.19	19.65		Very stiff dark grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are subangular to subrounded.
20.20								42.54	20.30		Very stiff dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.
20.90 - 21.30	C4	100						41.79	21.05		Very stiff dark grey slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subangular of limestone.
21.70								41.14	21.70		Medium strong thinly laminated grey argillaceous LIMESTONE. Partially weathered. Discontinuities: 1. 0 to 15 degree bedding fractures, closely spaced (10/76/170). 2. 80 to 90 degree joint at 21.70m to 27.70m, planar, rough, with patchy brown staining on joint surface.
		TCR	SCR	RQD	FI						

Water: Backfill

15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.00	4.00	20	4.00

Casing Details

To (m)	Diam (mm)
4.20	200
27.70	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH101
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 405	0.00	4.20
Rotary Coring	Comacchio 405	4.20	27.70

Coordinates: 715774.50 E, 743117.50 N

Final Depth: 27.70 m | Start Date: 21/03/2022 | Driller: MW

Elevation: 62.84 mOD | End Date: 23/03/2022 | Logger: MRG

Sheet 4 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
22.35 - 22.53	C5	100						40.44	22.40		Medium strong thinly laminated grey argillaceous LIMESTONE. Partially weathered. Discontinuities: 1. 0 to 15 degree bedding fractures, closely spaced (10/76/170). 2. 80 to 90 degree joint at 21.70m to 27.70m, planar, rough, with patchy brown staining on joint surface.		
23.20		100									Weak thinly laminated dark grey MUDSTONE. Distinctly weathered. Discontinuities: 1. 0 to 20 degree bedding fractures, very closely spaced (11/38/90) with orange brown staining. 2. 80 to 90 degree joint at 23.65m to 23.90m, at 23.65m to 23.96m, planar, rough with patchy brown and orange staining on joint surface at 24.15m to 24.35m undulating, rough with brown patches on surface.		
24.70								38.34	24.50		Medium strong thickly laminated dark grey LIMESTONE. Largely unweathered with some light brown staining on fracture surface. Discontinuities: 1. 0 to 15 degree bedding fractures medium spaced (60/232/600) with some brown staining on surfaces. 2. 80 to 90 degree joint at 25.50m to 25.65m at 27.55m planar, rough with some light brown staining.		
24.97	C6												
25.65 - 26.08	C7	100											
26.20 - 26.45	C8												
26.20		100											
27.70								35.14	27.70		End of Borehole at 27.70m		

TCR	SCR	RQD	FI

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.00	4.00	20	4.00

Casing Details

To (m)	Diam (mm)
4.20	200
27.70	150

Core Barrel: SK6L

Flush Type: Water

Remarks: Inspection pit excavated by Kilwex to 1.20m.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH102
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Beretta T44	0.00	4.00
Rotary Coring	Beretta T44	4.00	23.50

Coordinates: 715939.80 E, 743123.10 N

Final Depth: 23.50 m | Start Date: 12/05/2022 | Driller: GT | Elevation: 62.65 mOD | End Date: 12/05/2022 | Logger: DMC

Sheet 1 of 4
Scale: 1:40
FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
											Inspection pit excavated by Kilwex to 1.20m.
								61.45	1.20		Soft brown sandy gravelly CLAY (Driller description)
2.50 - 2.95	SPT(S) N=7 (1,1/1,2,2,2)							60.15	2.50		Gravels/Grey silty CLAY(Drillers description)
								59.15	3.50		Grey slightly sandy gravel (Drillers description)
4.00 - 5.00	B1							58.65	4.00		
4.00 - 4.45	SPT(S) N=11 (2,2/3,3,3,2)										Firm dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.
4.50	D11	87									
5.00 - 13.00	B2							57.65	5.00		Stiff becoming very stiff dark brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone
5.50 - 5.95	SPT(S) N=22 (4,4/4,6,6,6)										*Fines possibly washed out by drilling.*
5.50		87									
7.00 - 7.45	SPT(S) N=42 (6,8/10,10,10,12)										*firm dark brown slightly clayey sand.*
7.00											
		TCR	SCR	RQD	FI						

Water: ▼ at 4.00

Backfill: 0.00 – 3.00

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.00			

Casing Details

To (m)	Diam (mm)
4.00	200
23.50	150

Core Barrel: SK6L

Flush Type: Water

Termination Reason: Terminated at scheduled depth

Remarks
Inspection pit excavated by Kilwex to 1.20m.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH102
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 23.50 m	Start Date: 12/05/2022	Driller: GT	Sheet 2 of 4
Rotary Drilling	Beretta T44	0.00	4.00					Scale: 1:40
Rotary Coring	Beretta T44	4.00	23.50	715939.80 E	Elevation: 62.65 mOD	End Date: 12/05/2022	Logger: DMC	FINAL
				743123.10 N				

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
7.70 - 8.00	ES18	100									Stiff becoming very stiff dark brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone
8.00	D12										
8.50 - 8.65	SPT(S) N=0 (0,0/0 for 0mm)	100									
8.50											
10.00 - 10.45	SPT(S) N=47 (7,8/11,12,12,12)	100									
10.00											
10.70 - 11.00	ES19	100									
11.50 - 11.91	SPT(S) 0 (75 for 111mm/,,,)	100									firm dark brown slightly sandy clay
11.50											
13.00 - 13.95	B3							49.65	13.00		Firm brown slightly clayey SAND. Sand is fine to coarse.
13.00 - 13.45	SPT(S) N=40 (6,8/8,10,10,12)	100									
13.00											
13.50	D13										
13.95 - 14.50	B4							48.70	13.95		Very stiff greyish brown slightly sandy GRAVEL. Sand is fine to coarse gravel is subangular fine to coarse of various lithologies.
14.50	D14							48.15	14.50		Firm brown slightly clayey SAND. Sand is fine to coarse.
14.50 - 15.15	B5										
		TCR	SCR	RQD	FI						

Water | Backfill

7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.00			

Casing Details

To (m)	Diam (mm)
4.00	200
23.50	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.

Termination Reason

Terminated at scheduled depth

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH102
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 23.50 m	Start Date: 12/05/2022	Driller: GT	Sheet 3 of 4
Rotary Drilling	Beretta T44	0.00	4.00					Scale: 1:40
Rotary Coring	Beretta T44	4.00	23.50	715939.80 E	Elevation: 62.65 mOD	End Date: 12/05/2022	Logger: DMC	FINAL
				743123.10 N				

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
14.50 - 14.88	SPT(S) 75 (12,13/75 for 229mm)										Firm brown slightly clayey SAND. Sand is fine to coarse.		
14.50													
15.00	D15												
15.15 - 16.40	B6	100						47.50	15.15		Stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse gravel is subangular fine to coarse of various lithologies.		
15.50	D16												
16.00 - 16.00	SPT(S) 0 (0 for 0mm/0 for 0mm)										*firm slightly clayey slightly gravelly SAND*		
16.00													
16.40 - 20.25	B7	100						46.25	16.40		Firm becoming stiff dark brown slightly sandy CLAY. Sand is fine to coarse.		
17.50 - 17.95	SPT(S) N=34 (8,8/7,8,9,10)												
17.50													
18.00	D17	100											
19.00 - 19.42	SPT(S) 0 (75 for 119mm/,,,)										*Very stiff slight sandy clay. Sand is fine.*		
19.00													
20.25 - 21.40	B8	100						42.40	20.25		Very stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse gravel is subangular fine to coarse of various lithologies.		
20.50 - 20.50	SPT(S) 0 (0 for 0mm/0 for 0mm)												
20.50													
		100						41.25	21.40		Medium strong grey LIMESTONE. Partially weathered; slightly reduced strength, slightly reduced fracture spacing. Discontinuities: 1. 5-10 degree joints, medium spaced (70/260/500), clean, smooth with some brown discolouration on joint surfaces. 2. One 80-90 degree joint from 22.35-23.00m, rough and undulating.		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.00			

Casing Details

To (m)	Diam (mm)
4.00	200
23.50	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.

Termination Reason

Terminated at scheduled depth

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH102
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Rotary Drilling	Beretta T44	0.00	4.00	
Rotary Coring	Beretta T44	4.00	23.50	715939.80 E
				743123.10 N

Final Depth:	23.50 m	Start Date:	12/05/2022	Driller:	GT	Sheet 4 of 4
Elevation:	62.65 mOD	End Date:	12/05/2022	Logger:	DMC	Scale: 1:40
						FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
22.00 - 22.39	SPT(S) 0 (75 for 94mm/,,,)												
22.00		100	90	55	5						Medium strong grey LIMESTONE. Partially weathered; slightly reduced strength, slightly reduced fracture spacing. Discontinuities: 1. 5-10 degree joints, medium spaced (70/260/500), clean, smooth with some brown discolouration on joint surfaces. 2. One 80-90 degree joint from 22.35-23.00m, rough and undulating.		
23.05 - 23.40	U10												
23.40 - 23.50	U9												
23.50								39.15	23.50		End of Borehole at 23.50m		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.00			

Casing Details

To (m)	Diam (mm)
4.00	200
23.50	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.

Termination Reason

Terminated at scheduled depth

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH103
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	4.00
Rotary Coring	Comacchio 601	4.00	25.50

Coordinates
715891.00 E
743087.30 N

Final Depth: 25.50 m | **Start Date:** 11/05/2022 | **Driller:** JG
Elevation: 63.05 mOD | **End Date:** 11/05/2022 | **Logger:** TH

Sheet 1 of 4
Scale: 1:40
FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
											Inspection pit excavated by Kilwex to 1.20m.
								61.85	1.20		Firm brown gravelly CLAY (Driller description)
2.50 - 2.95	SPT(C) N=19 (3,3/4,5,5,5)										
								60.05	3.00		Firm sandy gravelly CLAY with cobbles and boulders. (Drillers description)
4.00	D11							59.05	4.00		
4.00 - 4.75	B1										Medium dense dark greyish brown clayey fine to coarse SAND.
4.00 - 4.45	SPT(C) N=29 (3,5/7,6,7,9)	75									
4.75	D12							58.30	4.75		
4.90 - 6.50	B2							58.15	4.90		Dark brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine.
5.00					AZCL						Dark greyish brown clayey fine to coarse SAND with very widely spaced medium beds of subrounded fine to coarse GRAVEL with low cobble content. Gravel and cobbles are of limestone.
		50									*5.00-5.75m: AZCL fines possibly washed out with drilling fluid.*
6.50 - 6.82	SPT(C) N=47 (4,8/47 for 174mm)										
6.50		80									
7.00 - 7.30	ES19										
		TCR	SCR	RQD	FI						

Water: ▼ 3.70

Backfill: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.70	4.00		

Casing Details

To (m)	Diam (mm)
4.00	200
25.50	150

Core Barrel
SK6L

Flush Type
Water

Remarks
Inspection pit excavated by Kilwex to 1.20m.

Termination Reason
Terminated at scheduled depth

Last Updated
10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH103
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 25.50 m	Start Date: 11/05/2022	Driller: JG	Sheet 2 of 4
Rotary Drilling	Comacchio 601	0.00	4.00					Scale: 1:40
Rotary Coring	Comacchio 601	4.00	25.50	715891.00 E				
				743087.30 N	Elevation: 63.05 mOD	End Date: 11/05/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
											Dark greyish brown clayey fine to coarse SAND with very widely spaced medium beds of subrounded fine to coarse GRAVEL with low cobble content. Gravel and cobbles are of limestone.
8.00 - 8.15	SPT(C) N=0 (25,25/0 for 0mm)										
8.00											
8.50 - 8.80	ES20	90									
9.00 - 9.30	ES21										
9.50 - 11.25	B3										
9.50 - 9.95	SPT(C) N=38 (3,8/6,8,11,13)										
9.50		100									
11.00											
11.25	D13							51.80	11.25		
11.25 - 13.15	B4										Very stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.
11.50 - 11.95	SPT(C) N=46 (4,7/10,10,12,14)	100									
12.50											
13.15	D14							49.90	13.15		
13.15 - 14.15	B5	97									Very stiff dark grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.
14.00 - 14.45	SPT(C) N=46 (5,7/9,10,12,15)										
14.00											
		TCR	SCR	RQD	FI						

Water

Backfill

7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.70	4.00		

Casing Details

To (m)	Diam (mm)
4.00	200
25.50	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.

Termination Reason

Terminated at scheduled depth

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH103
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 25.50 m	Start Date: 11/05/2022	Driller: JG	Sheet 3 of 4
Rotary Drilling	Comacchio 601	0.00	4.00					Scale: 1:40
Rotary Coring	Comacchio 601	4.00	25.50	715891.00 E				
				743087.30 N	Elevation: 63.05 mOD	End Date: 11/05/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		100									Very stiff dark grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.		
15.50													
16.10 - 16.40	U22	97											
16.90	D15							46.15	16.90				
16.90 - 18.50	B6										Dense dark greyish brown very clayey fine to coarse SAND.		
17.00 - 17.45	SPT(C) N=34										*17.00-17.50m: AZCL disturbance due to SPT.*		
17.00	(5,6/7,9,9,9)				AZCL								
		67											
18.50													
		83											
19.60	D16							43.45	19.60				
19.60 - 20.60	B7										Very dense dark grey fine to medium SAND.		
20.00 - 20.40	SPT(C) N=50 (4,8/50												
20.00	for 250mm)												
		83											
21.50													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.70	4.00		

Casing Details

To (m)	Diam (mm)
4.00	200
25.50	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.

Termination Reason

Terminated at scheduled depth

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH103
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	4.00
Rotary Coring	Comacchio 601	4.00	25.50

Coordinates: 715891.00 E, 743087.30 N

Final Depth: 25.50 m | Start Date: 11/05/2022 | Driller: JG

Elevation: 63.05 mOD | End Date: 11/05/2022 | Logger: TH

Sheet 4 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Very dense dark grey fine to medium SAND.		
22.35	D17							40.70	22.35				
22.35 - 22.90	B8	100									Very stiff dark greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium.		
22.90	D18							40.15	22.90				
22.90 - 23.90	B9										Very dense greyish black silty fine SAND.		
23.00 - 23.45	SPT(C) N=50												
23.00	(6,8/9,12,13,16)	100											
24.30 - 24.65	B10							38.75	24.30				
24.50											Very stiff dark greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse of limestone.		
								38.40	24.65		Medium strong massive dark grey LIMESTONE. Partially weathered: slightly reduced strength, dark orangish brown discolouration on some fracture surfaces. Discontinuities: 1. 70-90 degree joint, at 24.75-25.50m (incipient from 24.90-25.50m), undulating, smooth, dark orangish brown staining on joint surface.		
		80	80	80	1								
25.50								37.55	25.50		End of Borehole at 25.50m		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.70	4.00		

Remarks

Inspection pit excavated by Kilwex to 1.20m.

Casing Details

To (m)	Diam (mm)
4.00	200
25.50	150

Core Barrel: SK6L

Flush Type: Water

Termination Reason: Terminated at scheduled depth

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH104
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	4.00
Rotary Coring	Comacchio 601	4.00	29.00

Coordinates: 716195.12 E, 743047.22 N

Final Depth: 29.00 m | Start Date: 21/04/2022 | Driller: JG

Elevation: 62.44 mOD | End Date: 22/04/2022 | Logger: TH

Sheet 1 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Inspection pit excavated by Kilwex to 1.20m.		
1.20 - 1.65	SPT(C) N=15 (1,2/3,3,4,5) Hammer SN = 1387							61.24	1.20		Soft to firm brown sandy gravelly CLAY (Driller's description)		
2.50 - 2.95	SPT(C) N=16 (3,3/3,3,4,6) Hammer SN = 1387												
4.00	D27							58.44	4.00		Stiff dark greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse of limestone. Cobbles are subangular of limestone.		
4.00 - 5.00	B1												
4.00 - 4.45	SPT(C) N=28 (3,5/6,6,8,8) Hammer SN = 1387	100											
5.00 - 5.45	SPT(C) N=22 (4,4/5,6,5,6) Hammer SN = 1387	73			AZCL						5.00-5.40m: AZCL disturbance due to SPT.		
6.40	D28							56.04	6.40		Stiff, becoming very stiff, dark brownish grey slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of predominantly limestone and rare quartz. Cobbles are subangular of limestone.		
6.40 - 7.40	B2												
6.50 - 6.95	SPT(C) N=27 (3,5/5,7,7,8) Hammer SN = 1387	90											
		TCR	SCR	RQD	FI								

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
4.00	200
29.00	150

Core Barrel: SK6L

Flush Type: Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH	**Project No.** 21-1219	**Project Name:** DAA Airfield Underpass **Client:** DAA **Client's Rep** Ramboll Consulting Engineers	**Borehole ID** BH104

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 29.00 m	Start Date: 21/04/2022	Driller: JG	Sheet 2 of 4 Scale: 1:40
Rotary Drilling	Comacchio 601	0.00	4.00					
Rotary Coring	Comacchio 601	4.00	29.00	716195.12 E 743047.22 N	Elevation: 62.44 mOD	End Date: 22/04/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Stiff, becoming very stiff, dark brownish grey slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of predominantly limestone and rare quartz. Cobbles are subangular of limestone.		
8.00 - 8.28 8.00	SPT(C) N=38 (3,8/38 for 130mm) Hammer SN = 1387	40			AZCL						*8.00-8.90m: AZCL disturbance due to SPT.*		
9.50 - 9.95 9.50	SPT(C) N=41 (4,6/8,10,11,12) Hammer SN = 1387	90									*9.95-10.10m: Lens of subangular fine to coarse gravel of limestone.*		
11.00													
11.45 - 11.75	U21	87											
11.95 11.95 - 12.50	D29 B3							50.49	11.95		Very stiff dark brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles are angular of limestone.		
12.50 12.50 - 12.80 12.50	D30 B4							49.94	12.50		Dark brown very sandy CLAY. Sand is fine to coarse.		
12.80 12.80 - 13.45	D31 B5	100						49.64	12.80		Stiff dark brown slightly sandy slightly gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is angular fine to coarse of limestone. Cobbles are subangular of limestone.		
13.45 13.45 - 13.80	D32 B6							48.99	13.45		Dark brown gravelly very clayey fine to coarse SAND with low cobble content. Gravel is subangular fine to coarse of limestone. Cobbles are subangular of limestone.		
13.80 13.80 - 14.70 14.00	D33 B7							48.64	13.80		*13.70-13.80m: Lens of subangular fine to coarse gravel of limestone.* Very stiff dark brownish grey sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles are subangular of limestone.		
											14.45-15.55m: Lens of gravelly very clayey fine to coarse sand.		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
4.00	200
29.00	150

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH104
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	4.00
Rotary Coring	Comacchio 601	4.00	29.00

Coordinates: 716195.12 E, 743047.22 N

Final Depth: 29.00 m | Start Date: 21/04/2022 | Driller: JG

Elevation: 62.44 mOD | End Date: 22/04/2022 | Logger: TH

Sheet 3 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
14.70	D34							47.74	14.70		
14.70 - 15.50	B8	100									Very stiff dark brownish grey sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles are subangular of limestone.
											Very stiff dark brownish grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles are subangular of limestone.
15.50	D35							46.94	15.50		
15.50 - 16.25	B9										Dark greyish brown very clayey fine to coarse SAND.
15.50											
16.25	D36	100						46.19	16.25		
16.25 - 17.00	B10										Dark grey subangular fine to coarse GRAVEL of limestone with high cobble content. Cobbles are subangular of limestone.
17.00	D37							45.44	17.00		
17.00 - 18.10	B11										Dark grey very clayey fine to coarse SAND.
17.00		93									
18.10	D38							44.34	18.10		
18.10 - 19.10	B12										Very stiff dark greyish brown slightly gravelly sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles are of limestone.
18.50											18.50-18.60m: Lens of subangular fine to coarse gravel of limestone.
19.20 - 19.50	U22	100									
20.00											19.75-19.80m: Lens of subangular fine to medium gravel of limestone.
20.25	D39							42.19	20.25		
20.25 - 20.55	B13										Very stiff dark greyish brown sandy SILT. Sand is fine to coarse.
20.55	D40							41.89	20.55		
20.55 - 21.55	B14	100									Greyish black fine to medium SAND.
21.50											
		TCR	SCR	RQD	FI						

Water | Backfill

15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
4.00	200
29.00	150

Core Barrel: SK6L

Flush Type: Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH104
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	4.00
Rotary Coring	Comacchio 601	4.00	29.00

Coordinates: 716195.12 E, 743047.22 N

Final Depth: 29.00 m | Start Date: 21/04/2022 | Driller: JG

Elevation: 62.44 mOD | End Date: 22/04/2022 | Logger: TH

Sheet 4 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Greyish black fine to medium SAND.		
22.55	D41	100											
22.55 - 23.55	B15												
23.00													
		100											
24.50	D42							37.94	24.50		Greyish black silty fine to coarse SAND.		
24.50 - 24.90	B16												
24.50													
24.90	D43							37.54	24.90		Very stiff dark grey CLAY.		
24.90 - 25.05	B17							37.39	25.05		Greyish black fine SAND.		
25.05	D44												
25.05 - 26.00	B18	97											
26.00													
26.45	D46							35.99	26.45		Very stiff dark greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse Gravel is subangular of limestone.		
26.45 - 27.30	B20	100	4	4									
								35.14	27.30		Medium strong indistinctly thinly laminated black LIMESTONE. Partially weathered: slightly reduced strength, slightly closer fracture spacing. Discontinuities: 1. 5-15 degree bedding fractures, closely spaced (25/105/390), planar, rough. 2. 30-50 degree joints, at 27.50-27.60m and 27.95-27.03m, slightly undulating, smooth. 3. 60-70 degree joint, at 28.10-28.30m, planar, rough.		
27.45 - 27.50	C24				11								
27.50													
27.83 - 27.95	C25												
28.20 - 28.50	C23	100	93	57									
					7								
28.70 - 28.80	C26												
29.00								33.44	29.00		End of Borehole at 29.00m		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
4.00	200
29.00	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH105
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	4.00
Rotary Coring	Comacchio 601	4.00	27.00

Coordinates: 716016.20 E, 743061.80 N

Final Depth: 27.00 m | Start Date: 25/04/2022 | Driller: JG

Elevation: 62.81 mOD | End Date: 25/04/2022 | Logger: TH

Sheet 1 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Inspection pit excavated by Kilwex to 1.20m.		
1.20 - 1.65	SPT(C) N=19 (3,3/4,5,5,5) Hammer SN = 1387							61.61	1.20		Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse. (Driller's description)		
4.00 - 5.00 4.00 - 4.45	B1 SPT(C) N=32 (4,5/6,8,8,10) Hammer SN = 1387	50						58.81	4.00		Very stiff greyish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse. *4.00-4.65m: AZCL disturbance due to SPT.*		
5.00 - 8.00 5.00	B2	50						57.81	5.00		Dark grey GRAVEL and COBBLES of limestone with some slightly sandy slightly gravelly clay. *5.00-5.90m: AZCL fines washed out with drilling fluid.*		
6.50 - 6.79 6.50	SPT(C) N=40 (3,6/40 for 140mm) Hammer SN = 1387	50									*6.50-7.30m: AZCL disturbance due to SPT.*		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
4.00	200
27.00	150

Core Barrel: SK6L

Flush Type: Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH105
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 27.00 m	Start Date: 25/04/2022	Driller: JG	Sheet 2 of 4
Rotary Drilling	Comacchio 601	0.00	4.00					Scale: 1:40
Rotary Coring	Comacchio 601	4.00	27.00	716016.20 E				
				743061.80 N	Elevation: 62.81 mOD	End Date: 25/04/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Dark grey GRAVEL and COBBLES of limestone with some slightly sandy slightly gravelly clay.		
8.00 - 12.95 8.00	B3	50						54.81	8.00		Greyish brown gravelly very clayey fine to coarse SAND with low cobble content. Gravel is subrounded fine to coarse of limestone. Cobbles are subangular. *8.00-8.90m: AZCL fines washed out with drilling fluid.*		
9.50 - 9.57 9.50	SPT(C) N=0 (14 for 75mm/0 for 0mm) Hammer SN = 1387	65									*9.50-10.00m: AZCL disturbance due to SPT.*		
11.00 - 11.45 11.00	SPT(C) N=44 (4,7/7,10,13,14) Hammer SN = 1387	65											
12.50													
12.95 - 13.95	B4	95						49.86	12.95		Very stiff dark brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone.		
13.50 - 13.95	SPT(C) N=44 (5,8/10,11,11,12) Hammer SN = 1387												
14.00											*14.00-14.70m: Dark greyish brown very clayey fine to coarse sand, possibly disturbed by drilling.*		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
4.00	200
27.00	150

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH105
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 27.00 m	Start Date: 25/04/2022	Driller: JG	Sheet 3 of 4
Rotary Drilling	Comacchio 601	0.00	4.00					Scale: 1:40
Rotary Coring	Comacchio 601	4.00	27.00	716016.20 E				
				743061.80 N	Elevation: 62.81 mOD	End Date: 25/04/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
14.70	D9	80									Very stiff dark brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone.		
15.50		80									*15.50-16.10m: Dark greyish brown very clayey fine to coarse sand, possibly disturbed by drilling.*		
16.50 - 16.95	SPT(C) N=44 (3,6/8,11,11,14) Hammer SN = 1387												
17.00	D10							45.81	17.00				
17.00 - 18.10	B5	95									Very stiff greyish black slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
17.00													
18.00 - 18.29	SPT(C) N=47 (6,17/47 for 140mm) Hammer SN = 1387							44.71	18.10		Dense greyish black very silty fine to medium SAND.		
18.10	D11												
18.10 - 19.10	B6	75											
18.50													
20.00		100											
21.00 - 21.45	SPT(C) N=34 (3,3/5,8,10,11) Hammer SN = 1387												
21.50													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
4.00	200
27.00	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH105
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 27.00 m	Start Date: 25/04/2022	Driller: JG	Sheet 4 of 4
Rotary Drilling	Comacchio 601	0.00	4.00	716016.20 E				Scale: 1:40
Rotary Coring	Comacchio 601	4.00	27.00	743061.80 N	Elevation: 62.81 mOD	End Date: 25/04/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Dense greyish black very silty fine to medium SAND.		
22.50 - 22.95	SPT(S) N=34 (4,4/6,8,10,10)	100											
22.75	D12							40.06	22.75				
22.75 - 23.75	B7										Greyish black fine to coarse SAND.		
23.00											23.35-23.40m: Greyish black clay.		
		100									23.50-23.60m: Greyish black slightly sandy slightly gravelly clay.		
24.00 - 24.45	SPT(S) N=44 (8,8/10,10,12,12)												
24.30	D13							38.51	24.30				
24.30 - 25.30	B8										Very stiff dark greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.		
24.50		100	26	0									
25.50 - 25.62	SPT(S) N=50 (25 for 50mm/50 for 70mm)							37.41	25.40		Medium strong indistinctly thinly laminated LIMESTONE. Partially weathered: slightly reduced strength, closer fracture spacing, some gravelly clay infill. Discontinuities: 1. 10-15 degree bedding fractures, closely spaced (15/94/110), planar, rough, dark grey gravelly clay infill on some fracture surfaces, up to 15mm thick. 2. 80-90 degree joints, at 25.40-25.80m, 26.00-26.10m and 26.30-26.45m, undulating, rough.		
26.00		100	53	11	13								
27.00								35.81	27.00		End of Borehole at 27.00m		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
4.00	200
27.00	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH105-Well
	Client: DAA	
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Rotary Drilling	Comacchio 601	0.00	22.00	716016.20 E 743061.80 N

Final Depth:	22.00 m	Start Date:	27/04/2022	Driller:	JG
Elevation:	62.81 mOD	End Date:	27/04/2022	Logger:	CH

Sheet 1 of 4
Scale: 1:40
FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
								Inspection pit excavated by Kilwex to 1.20m.
					61.61	1.20		Firm brown sandy gravelly CLAY. (Driller's description)
					57.81	5.00		Dark grey GRAVEL with cobbles. (Driller's description)

Water

Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
16.50			

Casing Details

To (m)	Diam (mm)
22.00	254

Water Added

From (m)	To (m)

Remarks

BH105 expanded to allow installation of 150mm ID pumping well.

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH105-Well
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 22.00 m	Start Date: 27/04/2022	Driller: JG	Sheet 2 of 4
Rotary Drilling	Comacchio 601	0.00	22.00	716016.20 E				Scale: 1:40
				743061.80 N	Elevation: 62.81 mOD	End Date: 27/04/2022	Logger: CH	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
					54.81	8.00		Dark grey GRAVEL with cobbles. (Driller's description)
					49.86	12.95		Grey to brown SAND. (Driller's description)
								Sandy slightly gravelly CLAY. (Driller's description)

Water

Backfill

7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
16.50			

Casing Details

To (m)	Diam (mm)
22.00	254

Water Added

From (m)	To (m)

Remarks

BH105 expanded to allow installation of 150mm ID pumping well.

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH105-Well
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 22.00 m	Start Date: 27/04/2022	Driller: JG	Sheet 3 of 4
Rotary Drilling	Comacchio 601	0.00	22.00	716016.20 E 743061.80 N	Elevation: 62.81 mOD	End Date: 27/04/2022	Logger: CH	Scale: 1:40 FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		Strike at 16.50m						Sandy slightly gravelly CLAY. (Driller's description)		
					44.71	18.10		Grey SAND. (Driller's description)		

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
16.50			

Casing Details

To (m)	Diam (mm)
22.00	254

Water Added

From (m)	To (m)

Remarks

BH105 expanded to allow installation of 150mm ID pumping well.

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH105-Well
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 22.00 m	Start Date: 27/04/2022	Driller: JG	Sheet 4 of 4
Rotary Drilling	Comacchio 601	0.00	22.00	716016.20 E				Scale: 1:40
				743061.80 N	Elevation: 62.81 mOD	End Date: 27/04/2022	Logger: CH	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					40.81	22.00		Grey SAND. (Driller's description) End of Borehole at 22.00m		

22.0 22.5 23.0 23.5 24.0 24.5 25.0 25.5 26.0 26.5 27.0 27.5 28.0 28.5 29.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
16.50			

Casing Details

To (m)	Diam (mm)
22.00	254

Water Added

From (m)	To (m)

Remarks

BH105 expanded to allow installation of 150mm ID pumping well.

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH106
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	4.00
Rotary Coring	Comacchio 601	4.00	29.00

Coordinates: 716152.58 E, 743117.56 N

Final Depth: 29.00 m | Start Date: 20/04/2022 | Driller: JG+GT

Elevation: 63.04 mOD | End Date: 21/04/2022 | Logger: TH

Sheet 1 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
											Inspection pit excavated by Kilwex to 1.20m.
								61.24	1.80		Soft grey silty CLAY (Driller's description)
								60.54	2.50		Grey slightly sandy GRAVEL. Sand is fine to coarse. (Driller's description)
4.00	D23							59.04	4.00		Very stiff dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium.
4.00 - 4.30	B5										
4.30	D24							58.74	4.30		Very stiff dark greyish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles are of limestone.
4.30 - 5.30	B6	85									
5.00 - 5.45	SPT(S) N=38 (7,8/8,10,10,10) Hammer SN = 0208										
5.00		100									
6.50 - 6.95	SPT(S) N=44 (8,8/10,10,12,12) Hammer SN = 0208										
6.50		97									
		TCR	SCR	RQD	FI						

Water | Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200
29.00	150

Core Barrel: SK6L

Flush Type: Water

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH106
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 29.00 m	Start Date: 20/04/2022	Driller: JG+GT	Sheet 2 of 4
Rotary Drilling	Comacchio 601	0.00	4.00					Scale: 1:40
Rotary Coring	Comacchio 601	4.00	29.00	716152.58 E	Elevation: 63.04 mOD	End Date: 21/04/2022	Logger: TH	FINAL
				743117.56 N				

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Very stiff dark greyish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles are of limestone.		
8.00 - 8.14 8.00	SPT(S) N=50 (25 for 68mm/50 for 75mm) Hammer SN = 0208	100											
9.50 9.50 - 10.50 9.50	D25 B7							53.54	9.50		Very stiff dark brown slightly sandy gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles and boulders are of limestone.		
11.00 - 11.45 11.00	SPT(S) N=39 (7,8/8,10,10,11) Hammer SN = 0208	100											
12.50 12.50 - 13.65 12.50 - 12.95 12.50	D26 B8 SPT(S) N=47 (10,10/12,12,11,12) Hammer SN = 0208	90						50.54	12.50		Dense greyish brown very clayey fine to coarse SAND		
13.65 13.65 - 14.00	D27 B9							49.39	13.65		Very stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.		
14.00 14.00 - 14.90 14.00 - 14.45 14.00	D28 B10 SPT(S) N=31 (6,6/8,8,8,7) Hammer SN = 0208							49.04	14.00		Dense dark greyish brown slightly clayey fine to coarse SAND.		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
2.50	200
29.00	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH106
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	4.00
Rotary Coring	Comacchio 601	4.00	29.00

Coordinates: 716152.58 E, 743117.56 N

Final Depth: 29.00 m | Start Date: 20/04/2022 | Driller: JG+GT

Elevation: 63.04 mOD | End Date: 21/04/2022 | Logger: TH

Sheet 3 of 4 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Dense dark greyish brown slightly clayey fine to coarse SAND.		
											14.80m to 14.90m: Lens of subangular fine to medium gravel.		
14.90	D29							48.14	14.90		Dark grey subangular fine to coarse GRAVEL of limestone with medium cobble content. Cobbles are of limestone.		
14.90 - 15.50	B11	95											
15.50	D30							47.54	15.50		Dark greyish brown slightly clayey fine to coarse SAND.		
15.50 - 16.00	B12												
15.50													
16.00	D31							47.04	16.00		Dark greyish brown fine to medium SAND with pockets of dark brown sandy clay.		
16.00 - 16.65	B13	95											
16.60 - 17.00	B14												
16.65	D32							46.39	16.65		Dark greyish brown gravelly very clayey fine to coarse SAND. Gravel is subrounded fine to coarse of limestone.		
17.00	D33							46.04	17.00		Dark greyish brown fine to coarse SAND		
17.00 - 17.30	B15												
17.00								45.74	17.30		Greyish black silty fine to coarse SAND.		
17.30	D34												
17.30 - 17.85	B16	100											
17.85	D35							45.19	17.85		Very stiff dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.		
17.85 - 18.50	B17												
17.95 - 18.25	U40												
18.50	D36							44.54	18.50		Dark brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to medium of limestone. (Possibly disturbed by drilling)		
18.50 - 19.10	B18												
18.50													
19.10 - 19.40	B19	87						43.94	19.10		Dark grey subangular fine to coarse GRAVEL		
19.40	D37							43.64	19.40		Very stiff dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.		
19.40 - 20.40	B20												
20.00 - 20.45	SPT(C) N=50												
20.00	(4,7/10,13,14,13) Hammer SN = 0208	100											
21.50 - 21.95	SPT(C) N=41												
21.50	(4,6/9,9,10,13) Hammer SN = 0208				AZCL						*21.50m to 22.10m: AZCL disturbance due to SPT*		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
2.50	200
29.00	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH106
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 29.00 m	Start Date: 20/04/2022	Driller: JG+GT	Sheet 4 of 4
Rotary Drilling	Comacchio 601	0.00	4.00					Scale: 1:40
Rotary Coring	Comacchio 601	4.00	29.00	716152.58 E				
				743117.56 N	Elevation: 63.04 mOD	End Date: 21/04/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		60									Very stiff dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.		
23.00	D38							40.04	23.00				
23.00 - 23.70	B21										Dense dark grey clayey fine to coarse SAND		
23.00 - 23.45	SPT(C) N=44												
23.00	(5,8/8,10,12,14) Hammer SN = 0208												
23.70	D39	95						39.34	23.70				
23.70 - 24.70	B22										Very stiff dark grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles are of limestone.		
											24.20m to 24.30m: Lens od subangular fine to medium gravel		
24.50 - 24.95	SPT(C) N=44												
24.50	(5,6/7,11,13,13) Hammer SN = 0208	95											
26.00 - 26.29	SPT(C) N=43 (5,8/43 for 140mm)										*26.00m to 26.10m: Lens of subangular fine to medium gravel (possible weathered rock)*		
26.00	Hammer SN = 0208							36.94	26.10		Medium strong indistinctly thinly laminated black LIMESTONE. Partially weathered: slightly reduced strength, closer fracture spacing, some dark brown discolouration on some fracture surfaces. Discontinuities: 1. 0 to 10 degree bedding fractures, closely spaced (10/80/150) planar, rough. 2. 70 to 80 degree joints, at 26.10m to 26.40m, 26.60m to 26.80m, slightly undulating, rough, dark brown staining on some joint surfaces.		
26.40 - 26.57	C2	87	60	47	15								
								36.14	26.90		Strong indistinctly thinly laminated black LIMESTONE. Partially weathered; closer fracture spacing. Discontinuities: 1. 0 to 10 degree bedding fractures, closely spaced (25/200/370) planar, smooth. 2. 80 to 90 degree joints at 27.05m to 27.25m and 28.03m to 28.15m, undulating, smooth.		
27.50 - 27.60	C3												
27.50													
27.95 - 28.03	C4				11								
28.15 - 28.45	C1	93	93	72									
29.00								34.04	29.00		End of Borehole at 29.00m		
		TCR	SCR	RQD	FI								

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details	
To (m)	Diam (mm)
2.50	200
29.00	150

Core Barrel: SK6L

Flush Type: Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH107
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	2.00
Rotary Coring	Comacchio 601	2.00	30.00

Coordinates: 716243.80 E, 743104.60 N

Final Depth: 30.00 m | Start Date: 11/04/2022 | Driller: JG

Elevation: 63.31 mOD | End Date: 12/04/2022 | Logger: DMC

Sheet 1 of 5 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Inspection pit excavated by Kilwex to 1.20m		
								62.11	1.20		Soft brown gravelly CLAY (Driller's description)		
2.00	D13							61.31	2.00		Stiff brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of various lithologies. Cobbles are subangular.		
2.00 - 3.00	B1												
2.00 - 2.45	SPT(C) N=18 (2,2/3,5,5,5) Hammer SN = 1387	78											
3.00	D14							60.31	3.00		Firm dark brown slightly organic slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse.		
3.00 - 3.45	SPT(C) N=41 (3,5/8,10,11,12) Hammer SN = 1387												
3.50	D15							59.81	3.50		Very stiff dark brown sightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of various lithologies. Cobbles are subangular.		
3.50 - 4.50	B2												
3.50		68											
5.00 - 5.45	SPT(C) N=41 (4,6/9,9,10,13) Hammer SN = 1387				AZCL						5.00m to 5.30m: AZCL		
5.00		72											
6.50 - 6.86	SPT(C) N=50 (3,7/50 for 210mm) Hammer SN = 1387							56.71	6.60		Very stiff dark brown slightly sandy sightly gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone.		
6.50													
6.60	D16												
6.60 - 7.60	B3	100											
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
3.50	200
28.50	150

Core Barrel: SK6L

Flush Type: Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH107
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	2.00
Rotary Coring	Comacchio 601	2.00	30.00

Coordinates
716243.80 E
743104.60 N

Final Depth: 30.00 m **Start Date:** 11/04/2022 **Driller:** JG
Elevation: 63.31 mOD **End Date:** 12/04/2022 **Logger:** DMC

Sheet 2 of 5
Scale: 1:40
FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Very stiff dark brown slightly sandy sightly gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone.		
8.00		100											
9.50 - 9.95 9.50 9.70 - 9.95	SPT(C) N=50 (4,7/10,13,14,13) Hammer SN = 1387 U27	100											
11.00 - 11.45 11.00	SPT(C) N=50 (4,6/11,11,15,13) Hammer SN = 1387	93											
12.00 12.00 - 13.00	D17 B4												
12.50 - 12.95 12.50	SPT(C) N=49 (4,6/9,13,13,14) Hammer SN = 1387												
13.00 13.00 - 14.00 13.20 - 13.45	D18 B5 U26	95						50.31	13.00		Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
14.00		100											
		TCR	SCR	RQD	FI			48.71	14.60				

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks
Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
3.50	200
28.50	150

Core Barrel
SK6L

Flush Type
Water

Termination Reason
Terminated at scheduled depth.

Last Updated
10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH107
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 30.00 m	Start Date: 11/04/2022	Driller: JG	Sheet 3 of 5
Rotary Drilling	Comacchio 601	0.00	2.00					Scale: 1:40
Rotary Coring	Comacchio 601	2.00	30.00	716243.80 E	Elevation: 63.31 mOD	End Date: 12/04/2022	Logger: DMC	FINAL
				743104.60 N				

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
14.50 - 14.95	SPT(C) N=35 (3,5/5,8,10,12) Hammer SN = 1387										Brown sandy very clayey subangular fine to coarse GRAVEL with medium spaced thin beds of stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
14.60	D19												
14.60 - 15.60	B6												
15.00 - 15.27	SPT(C) N=47												
15.00	(7,13/47 for 120mm) Hammer SN = 1387	94											
16.50	D20							46.81	16.50		Very stiff greyish brown slightly sandy slightly gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone.		
16.50 - 17.50	B7												
16.50 - 16.95	SPT(C) N=50												
16.50	(7,7/9,14,12,15) Hammer SN = 1387	87											
18.00	D21												
18.00 - 19.00	B8												
18.00 - 18.45	SPT(C) N=47												
18.00	(8,10/10,11,13,13) Hammer SN = 1387	97									18.30m to 18.50m: Lens of fine to coarse gravel		
19.30	D22												
19.30 - 20.20	B9												
19.50 - 19.95	SPT(S) N=40							43.81	19.50		Greyish brown very clayey fine to coarse SAND		
19.50	(7,8/8,10,10,12) Hammer SN = 1387												
20.20	D23	100						43.11	20.20		Very stiff dark greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular fine to coarse of limestone.		
20.20 - 21.00	B10												
21.00 - 21.15	SPT(S) N=50 (25 for 66mm/50 for 85mm) Hammer SN = 1387							42.31	21.00		Very stiff greyish black slightly gravelly CLAY with closely spaced, partings of fine to medium sand. Gravel is sub angular fine to coarse.		
21.00		100						41.81	21.50		Very stiff dark greyish brown slightly sandy slightly gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular fine to coarse of limestone.		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
3.50	200
28.50	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH107
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	2.00
Rotary Coring	Comacchio 601	2.00	30.00

Coordinates: 716243.80 E, 743104.60 N

Final Depth: 30.00 m | Start Date: 11/04/2022 | Driller: JG

Elevation: 63.31 mOD | End Date: 12/04/2022 | Logger: DMC

Sheet 4 of 5 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
22.00	D24										Very stiff dark greyish brown slightly sandy slightly gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular fine to coarse of limestone.		
22.00 - 23.00	B11												
22.50 - 22.95	SPT(S) N=46 (10,10/10,12,12,12) Hammer SN = 1387												
22.50		100											
24.00 - 24.45	SPT(S) N=42 (7,8/8,10,12,12) Hammer SN = 1387												
24.00		100											
25.50 - 25.60	SPT(S) N=50 (25 for 39mm/50 for 57mm) Hammer SN = 1387												
25.50		100											
27.00		100											
28.00	D25												
28.00 - 29.00	B12												
28.50 - 28.63	SPT(S) N=50 (25 for 55mm/50 for 75mm) Hammer SN = 1387												
28.50								34.31	29.00		Medium strong probably thinly laminated black LIMESTONE. Partially weathered slightly reduced strength and slightly reduced fracture spacing. Discontinuities: 1. 10 to 15 degree bedding fractures medium spaced (60/200/360) planar, smooth) 2. 30 to 40 degree joints at 29.20m and 29.80m planar, smooth.		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
3.50	200
28.50	150

Core Barrel: SK6L

Flush Type: Water

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH107
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 601	0.00	2.00
Rotary Coring	Comacchio 601	2.00	30.00

Coordinates: 716243.80 E, 743104.60 N

Final Depth: 30.00 m | Start Date: 11/04/2022 | Driller: JG

Elevation: 63.31 mOD | End Date: 12/04/2022 | Logger: DMC

Scale: 1:40

FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		100	67	77	7						Medium strong probably thinly laminated black LIMESTONE. Partially weathered slightly reduced strength and slightly reduced fracture spacing. Discontinuities: 1. 10 to 15 degree bedding fractures medium spaced (60/200/360) planar, smooth) 2. 30 to 40 degree joints at 29.20m and 29.80m planar, smooth.		
30.00								33.31	30.00		End of Borehole at 30.00m		
		TCR	SCR	RQD	FI								

29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
3.50	200
28.50	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH107-Well
	Client: DAA	
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Rotary Drilling	Comacchio 601	0.00	28.00	716243.80 E 743104.60 N

Final Depth:	28.00 m	Start Date:	18/04/2022	Driller:	GT+JG
Elevation:	63.31 mOD	End Date:	19/04/2022	Logger:	

Sheet 1 of 4
Scale: 1:40
FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
								Inspection pit excavated by Kilwex to 1.20m.
					62.11	1.20		Stiff brown sandy slightly gravelly CLAY. (Driller's description)

Water

Backfill

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
22.50	254
28.00	190

Water Added

From (m)	To (m)

Remarks

BH105 expanded to allow installation of 150mm ID pumping well.

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH107-Well
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 28.00 m	Start Date: 18/04/2022	Driller: GT+JG	Sheet 2 of 4
Rotary Drilling	Comacchio 601	0.00	28.00	716243.80 E 743104.60 N	Elevation: 63.31 mOD	End Date: 19/04/2022	Logger:	Scale: 1:40 FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
								Stiff brown sandy slightly gravelly CLAY. (Driller's description)		
					50.31	13.00		Stiff blackish grey slightly sandy gravelly CLAY. (Driller's description)		
					48.71	14.60				

7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
22.50	254
28.00	190

Water Added

From (m)	To (m)

Remarks

BH105 expanded to allow installation of 150mm ID pumping well.

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH107-Well
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 28.00 m	Start Date: 18/04/2022	Driller: GT+JG	Sheet 3 of 4
Rotary Drilling	Comacchio 601	0.00	28.00	716243.80 E 743104.60 N	Elevation: 63.31 mOD	End Date: 19/04/2022	Logger:	Scale: 1:40 FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
								GRAVEL. (Driller's description)		
					46.81	16.50		Stiff grey slightly sandy slightly gravelly CLAY. (Driller's description)		
					43.81	19.50		Brown SAND. (Driller's description)		
					43.11	20.20		Stiff grey slightly sandy slightly gravelly CLAY. (Driller's description)		

15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
22.50	254
28.00	190

Water Added

From (m)	To (m)

Remarks

BH105 expanded to allow installation of 150mm ID pumping well.

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH107-Well
	Client: DAA	
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Rotary Drilling	Comacchio 601	0.00	28.00	716243.80 E 743104.60 N

Final Depth:	28.00 m	Start Date:	18/04/2022	Driller:	GT+JG	Sheet 4 of 4 Scale: 1:40
Elevation:	63.31 mOD	End Date:	19/04/2022	Logger:		FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
								Stiff grey slightly sandy slightly gravelly CLAY. (Driller's description)		
					34.81	28.50		End of Borehole at 28.00m		

22.0 22.5 23.0 23.5 24.0 24.5 25.0 25.5 26.0 26.5 27.0 27.5 28.0 28.5 29.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
22.50	254
28.00	190

Water Added

From (m)	To (m)

Remarks

BH105 expanded to allow installation of 150mm ID pumping well.

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH108
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Beretta T44	0.00	2.50
Rotary Coring	Beretta T44	2.50	30.50

Coordinates: 716384.10 E, 743090.70 N

Final Depth: 30.50 m | Start Date: 06/04/2022 | Driller: GT

Elevation: 64.88 mOD | End Date: 11/04/2022 | Logger: TH

Sheet 1 of 5
Scale: 1:40
FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Inspection pit excavated by Kilwex to 1.20m.		
								63.68	1.20		Soft brown slightly sandy slightly gravelly CLAY (Driller's description)		
2.50 - 2.95	SPT(S) N=20 (4,4/4,5,5,6)	40						62.38	2.50		Medium dense coarse GRAVEL.		
4.00	14							60.88	4.00		Very stiff dark greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
4.00 - 5.00	B1												
4.00 - 4.45	SPT(S) N=33 (8,7/8,8,8,9)	100											
4.00													
5.50 - 5.63	SPT(S) N=50 (25 for 56mm/50 for 75mm)	100											
5.50													
5.85 - 6.15	U28												
7.00 - 7.45	SPT(S) N=42 (7,8/10,10,10,12)												
7.00													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
2.50	200
30.50	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH108
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 30.50 m	Start Date: 06/04/2022	Driller: GT	Sheet 2 of 5
Rotary Drilling	Beretta T44	0.00	2.50					Scale: 1:40
Rotary Coring	Beretta T44	2.50	30.50	716384.10 E				
				743090.70 N	Elevation: 64.88 mOD	End Date: 11/04/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
		98									Very stiff dark greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.
8.50											*Lens of subrounded fine to coarse gravel.*
8.70	15							56.18	8.70		
8.70 - 9.70	B2	100									Very stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.
											Lens of subangular fine to coarse gravel of limestone.
10.00 - 10.13	SPT(S) N=50 (25 for 60mm/50 for 70mm)										
10.00											*Lens of subangular fine to coarse gravel of limestone.*
		100									
11.50 - 11.95	SPT(S) N=50 (10,10/12,12,12,14)										
11.50		87									
13.00	16							51.88	13.00		Dense dark greyish brown clayey fine to medium SAND.
13.00 - 13.35	B3										
13.00 - 13.11	SPT(S) N=50 (25 for 40mm/50 for 70mm)										
13.00								51.53	13.35		Very stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.
13.35	17										
13.35 - 14.35	B4	100									
14.50	18							50.38	14.50		Dense dark greyish brown clayey fine to medium SAND.
14.50 - 15.40	B5										
		TCR	SCR	RQD	FI						

Water

Backfill

7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200
30.50	150

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH108
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Beretta T44	0.00	2.50
Rotary Coring	Beretta T44	2.50	30.50

Coordinates 716384.10 E, 743090.70 N

Final Depth: 30.50 m **Start Date:** 06/04/2022 **Driller:** GT

Elevation: 64.88 mOD **End Date:** 11/04/2022 **Logger:** TH

Sheet 3 of 5 Scale: 1:40

FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
14.50 - 14.95	SPT(S) N=33 (7,7/7,8,8,10)	100									Dense dark greyish brown clayey fine to medium SAND.
15.40	19							49.48	15.40		
15.40 - 16.40	B6										Very stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of limestone.
16.00 - 16.45	SPT(S) N=33 (4,4/7,8,8,10)	100									*Bed of dark greyish brown clayey fine to medium sand.*
17.50 - 17.95	SPT(S) N=44 (8,8/10,10,12,12)	100									
18.30 - 18.60	U29										
19.00 - 19.21	SPT(S) N=50 (29 for 125mm/50 for 87mm)	100									
19.40	20										
19.40 - 20.35	B7										
20.35	21							44.53	20.35		
20.35 - 21.35	B8	100									Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.
20.50											
		TCR	SCR	RQD	FI						

Water | Backfill

15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200
30.50	150

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH108
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Beretta T44	0.00	2.50
Rotary Coring	Beretta T44	2.50	30.50

Coordinates 716384.10 E, 743090.70 N

Final Depth: 30.50 m **Start Date:** 06/04/2022 **Driller:** GT

Elevation: 64.88 mOD **End Date:** 11/04/2022 **Logger:** TH

Sheet 4 of 5 Scale: 1:40

FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
22.00 - 22.45	SPT(S) N=48												
22.00	(10,10/10,12,12,14)	100									Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
23.50	22							41.38	23.50				
23.50 - 24.20	B9										Very loose dark greyish brown clayey fine to medium SAND.		
23.50 - 23.62	SPT(S) N=0 (75 for												
23.50	120mm/0 for 0mm)												
24.20	23	100						40.68	24.20				
24.20 - 25.00	B10										Very stiff greyish black slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone. Cobbles are subangular of limestone.		
25.00	24							39.88	25.00				
25.00 - 25.85	B11										Medium dense dark greyish brown clayey fine SAND.		
25.00 - 25.45	SPT(S) N=28												
25.00	(4,4/5,7,8,8)												
25.85	25	100						39.03	25.85				
25.85 - 26.50	B12										Very stiff greyish black slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles are subangular of limestone.		
26.50	26							38.38	26.50				
26.50 - 26.95	SPT(S) N=27										Medium dense dark greyish brown clayey fine to coarse SAND.		
26.50	(4,5/6,7,7,7)												
27.00	27							37.88	27.00				
27.00 - 28.00	B13	100									Very stiff greyish black slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone.		
28.00 - 28.45	SPT(S) N=42										*Greyish black slightly clayey fine sand.*		
28.00	(8,8/10,10,10,12)	98											
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
2.50	200
30.50	150

Core Barrel: SK6L

Flush Type: Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH108
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Rotary Drilling	Beretta T44	0.00	2.50	
Rotary Coring	Beretta T44	2.50	30.50	716384.10 E
				743090.70 N

Final Depth:	30.50 m	Start Date:	06/04/2022	Driller:	GT	Sheet 5 of 5
Elevation:	64.88 mOD	End Date:	11/04/2022	Logger:	TH	Scale: 1:40
						FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Very stiff greyish black slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone.		
29.50								35.38	29.50				
		80	70	56	6						Medium strong massive black LIMESTONE. Partially weathered: slightly reduced strength, slightly closer fracture spacing. Discontinuities: 1. 5-15 degree joints, medium spaced (35/200/250), slightly undulating, smooth. 2. 40-50 degree joint, at 29.60-29.65m, planar, smooth.		
30.50								34.38	30.50		End of Borehole at 30.50m		
		TCR	SCR	RQD	FI								

29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200
30.50	150

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH109
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 32.50 m	Start Date: 28/03/2022	Driller: GT	Sheet 1 of 5
Rotary Drilling	Beretta T44	0.00	2.50					Scale: 1:40
Rotary Coring	Beretaa T44	2.50	32.50	716406.60 E				
				743039.50 N	Elevation: 63.75 mOD	End Date: 04/04/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Excavation pit excavated by Kilwex to 1.20m.		
								62.55	1.20		Greyish brown CLAY with roots (Driller's description)		
2.50	D11							61.25	2.50		Stiff greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of various lithologies.		
2.50 - 3.50	B1												
2.50 - 2.95	SPT(S) N=22 (4,4/5,5,6,6) Hammer SN = 0208	93											
3.50	D12							60.25	3.50		Very stiff dark greyish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone.		
3.50 - 4.50	B2												
4.00 - 4.45	SPT(S) N=40 (8,8/8,10,10,12) Hammer SN = 0208	100											
4.00													
4.25 - 4.50	U21												
5.50 - 5.95	SPT(S) N=48 (10,10/12,12,12,12) Hammer SN = 0208	100											
5.50													
7.00													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH109
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 32.50 m	Start Date: 28/03/2022	Driller: GT	Sheet 2 of 5
Rotary Drilling	Beretta T44	0.00	2.50					Scale: 1:40
Rotary Coring	Beretaa T44	2.50	32.50	716406.60 E	Elevation: 63.75 mOD	End Date: 04/04/2022	Logger: TH	FINAL
				743039.50 N				

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
7.70	D13							56.05	7.70		Very stiff dark greyish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of limestone.		
7.70 - 8.70	B3	100									Very stiff dark brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles are subrounded of limestone.		
8.50 - 8.95 8.50	SPT(S) N=44 (8,8/10,10,12,12) Hammer SN = 0208	100											
9.55 - 9.85	U22												
10.00 - 10.13 10.00	SPT(S) N=50 (25 for 60mm/50 for 72mm) Hammer SN = 0208	100											
11.50													
11.70	D14												
11.70 - 12.70	B4	100											
13.00 - 13.27 13.00	SPT(S) N=50 (10,15/50 for 117mm) Hammer SN = 0208	100											
14.50													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
2.50	200

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH109
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 32.50 m	Start Date: 28/03/2022	Driller: GT	Sheet 3 of 5
Rotary Drilling	Beretta T44	0.00	2.50					Scale: 1:40
Rotary Coring	Beretaa T44	2.50	32.50	716406.60 E	Elevation: 63.75 mOD	End Date: 04/04/2022	Logger: TH	FINAL
				743039.50 N				

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
14.90	D15							48.85	14.90		Very stiff dark brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles are subrounded of limestone.		
14.90 - 15.90	B5	83									Very stiff dark brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is subangular fine to medium.		
16.00 - 16.14	SPT(S) N=10 (25 for 68mm/10 for 71mm) Hammer SN = 0208												
16.00													
16.70 - 17.00	U23	100											
17.50	D16							46.25	17.50		Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse of limestone.		
17.50 - 18.50	B6	100											
17.50													
19.00 - 19.45	SPT(S) N=50 (8,8/10,12,14,14) Hammer SN = 0208										18.90-19.00m: Bed of brown very sandy clay.		
19.00		100									20.10-20.20m: Bed of brown very sandy clay.		
20.30	D17							43.45	20.30		Very stiff greyish black slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subrounded of limestone.		
20.30 - 21.30	B7	100											
20.50													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
2.50	200

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH109
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 32.50 m	Start Date: 28/03/2022	Driller: GT	Sheet 4 of 5
Rotary Drilling	Beretta T44	0.00	2.50					Scale: 1:40
Rotary Coring	Beretaa T44	2.50	32.50	716406.60 E				
				743039.50 N	Elevation: 63.75 mOD	End Date: 04/04/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
22.00 - 22.45	SPT(S) N=50 (8,10/12,12,12,14) Hammer SN = 0208	100									Very stiff greyish black slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subrounded of limestone.		
23.50													
24.30	D18	100											
24.30 - 25.30	B8												
25.00 - 25.45	SPT(S) N=48 (7,9/10,12,12,14) Hammer SN = 0208	97											
26.50 - 26.65	SPT(S) N=50 (25 for 75mm/50 for 75mm) Hammer SN = 0208							37.15	26.60		Very stiff greyish black slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.		
26.60	D19	100											
26.60 - 27.60	B9												
28.00 - 28.45	SPT(S) N=44 (8,8/10,10,12,12) Hammer SN = 0208	100											
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH109
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 32.50 m	Start Date: 28/03/2022	Driller: GT	Sheet 5 of 5
Rotary Drilling	Beretta T44	0.00	2.50					Scale: 1:40
Rotary Coring	Beretaa T44	2.50	32.50	716406.60 E				
				743039.50 N	Elevation: 63.75 mOD	End Date: 04/04/2022	Logger: TH	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
29.50											Very stiff greyish black slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.		
29.90	D20							33.85	29.90				
29.90 - 30.90	B10	100									Very stiff greyish black slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone.		
31.00													
								32.35	31.40		Medium strong indistinctly thinly laminated black LIMESTONE. Partially weathered: slightly reduced strength, closer fracture spacing. Discontinuities: 1. 0-10 degree bedding fractures, closely spaced (20/110/190), planar, smooth, clayey gravelly infill on some fracture surfaces up to 10mm thick. 2. 70-90 degree joints, at 31.40-31.65m and 32.10-32.50m, undulating, smooth.		
		97	45	15	11								
32.50								31.25	32.50		End of Borehole at 32.50m		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
2.50	200

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH110
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 405	0.00	2.50
Rotary Coring	Comacchio 405	2.50	32.00

Coordinates: 716511.40 E, 743139.06 N

Final Depth: 32.00 m | Start Date: 11/03/2022 | Driller: MW

Elevation: 65.09 mOD | End Date: 14/03/2022 | Logger: MRG

Sheet 1 of 5 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
											Inspection pit excavated by Kilwex to 1.20m.
1.20	D1					1.20	Dry	63.89	1.20		
1.20 - 1.36	SPT(S) N=50 (6,10/50 for 10mm) Hammer SN = 0643										MADE GROUND: Grey sandy silty GRAVEL. (Driller's description)
								63.09	2.00		
2.20	D2					2.20	Dry				Frim brown sandy gravelly CLAY. (Driller's description)
2.20 - 2.65	SPT(S) N=12 (2,3/3,3,3,3) Hammer SN = 0643							62.59	2.50		
2.50 - 3.50	B1	80									Stiff brownish grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded to subangular fine to medium of mixed lithologies. Cobbles are of limestone.
2.60	ES1										
2.85 - 3.15	C1										
3.50 - 3.95	SPT(C) N=20 (4,6/6,5,4,5) Hammer SN = 0643	26			AZCL			61.59	3.50		Low recovery: Medium dense becoming dense blackish grey slightly sandy clayey subangular to subrounded fine to coarse GRAVEL of limestone with low cobble content. Cobbles are of limestone.
3.50											
4.90	ES2										
5.00 - 5.45	SPT(C) N=18 (2,3/3,5,5,5) Hammer SN = 0643	15			AZCL						
5.00											
6.50 - 6.95	SPT(C) N=18 (3,4/4,5,4,5) Hammer SN = 0643										
6.50											
7.20	D3										
		TCR	SCR	RQD	FI						

Water: Dry

Backfill: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
16.00	200
32.00	150

Core Barrel: SK6L

Flush Type: Water

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH110
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 2 of 5
Rotary Drilling	Comacchio 405	0.00	2.50					Scale: 1:40
Rotary Coring	Comacchio 405	2.50	32.00	716511.40 E	32.00 m	11/03/2022	MW	
				743139.06 N	Elevation: 65.09 mOD	End Date: 14/03/2022	Logger: MRG	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
7.20 - 7.65	SPT(S) N=34 (3,10/8,8,10,8) Hammer SN = 0643										Low recovery: Medium dense becoming dense blackish grey slightly sandy clayey subangular to subrounded fine to coarse GRAVEL of limestone with low cobble content. Cobbles are of limestone.		
7.65	ES3	70											
7.80	D4				AZCL								
8.20 - 8.55	B2							56.89	8.20		Very stiff brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of mixed lithologies. Cobbles are of limestone.		
8.20													
8.40	ES4												
8.80 - 9.10	C2	75											
9.60	D5												
9.70		100											
11.20													
11.30	D6												
11.50 - 11.90	B3	100											
12.70		100											
13.75 - 14.05	C3												
14.20													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
16.00	200
32.00	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH110
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 32.00 m	Start Date: 11/03/2022	Driller: MW	Sheet 3 of 5
Rotary Drilling	Comacchio 405	0.00	2.50					Scale: 1:40
Rotary Coring	Comacchio 405	2.50	32.00	716511.40 E				
				743139.06 N	Elevation: 65.09 mOD	End Date: 14/03/2022	Logger: MRG	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
14.70 - 14.92	SPT(C) N=50 (11,14/50 for 75mm) Hammer SN = 0643	63			AZCL						Very stiff brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of mixed lithologies. Cobbles are of limestone.		
15.00		0									*14.70-16.00m: AZCL (driller noted band of sand and gravel likely washed out due to flush)*		
16.00													
16.25 - 16.55	B4	100											
16.60	D7												
17.00								47.79	17.30		Brownish grey slightly sandy very clayey subangular to subrounded fine to coarse GRAVEL of limestone.		
								47.59	17.50		Very stiff brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse. Cobbles are of limestone.		
17.85 - 18.20	C4	70											
								46.99	18.10		Low recovery: Brownish grey slightly sandy clayey subangular to subrounded fine to coarse GRAVEL of limestone.		
18.50					AZCL								
18.80	D8				AZCL								
18.80 - 19.40	B5	75											
								45.69	19.40		Very stiff brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse. Cobbles are of limestone.		
20.00								45.04	20.05		Very stiff dark grey slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are of limestone.		
20.30 - 20.60	B6												
20.70	D9	100											
21.50													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
16.00	200
32.00	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH110
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 32.00 m	Start Date: 11/03/2022	Driller: MW	Sheet 4 of 5
Rotary Drilling	Comacchio 405	0.00	2.50					Scale: 1:40
Rotary Coring	Comacchio 405	2.50	32.00	716511.40 E				
				743139.06 N	Elevation: 65.09 mOD	End Date: 14/03/2022	Logger: MRG	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		100									Very stiff dark grey slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are of limestone.		
23.00													
23.30 - 23.70	C5												
23.60	D10												
23.70 - 24.10	B7	80											
24.50													
		100											
26.00													
		100	100	35	16			38.44	26.65		Medium strong thickly laminated dark grey MUDSTONE. Distinctly weathered. Discontinuities: 1. 0 to 30 degree bedding fractures, closely paced (50/94/150) undulating, rough.		
27.50								37.59	27.50				
27.62	C6										Medium strong thickly laminated dark grey LIMESTONE. Distinctly weathered. Discontinuities: 1. 0 to 30 degree bedding fractures, closely spaced (10/84/180) (10/84/180) planar and undulating, smooth, brown staining on surfaces. 2. 80 to 90 degree joint a 30.08m to 30.21m, at 30.91m to 31.03m, at 31.70m to 32.00m, planar, rough, with patchy brown and dark brown staining on joint surface. *28.42m to 28.50m: Band of dark brownish grey slightly silty slightly sandy clayey subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.*		
		100	100	52	15								
					4								
29.00													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
16.00	200
32.00	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH110
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 5 of 5
Rotary Drilling	Comacchio 405	0.00	2.50					Scale: 1:40
Rotary Coring	Comacchio 405	2.50	32.00	716511.40 E	32.00 m	11/03/2022	MW	
				743139.06 N	Elevation: 65.09 mOD	End Date: 14/03/2022	Logger: MRG	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
29.50 - 29.75	C7	100	100	50							Medium strong thickly laminated dark grey LIMESTONE. Distinctly weathered. Discontinuities: 1. 0 to 30 degree bedding fractures, closely spaced (10/84/180) (10/84/180) planar and undulating, smooth, brown staining on surfaces. 2. 80 to 90 degree joint a 30.08m to 30.21m, at 30.91m to 31.03m, at 31.70m to 32.00m, planar, rough, with patchy brown and dark brown staining on joint surface.		
30.50					2								
31.30 - 31.45	C8	100	100	18									
32.00								33.09	32.00		End of Borehole at 32.00m		
		TCR	SCR	RQD	FI								

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details	
To (m)	Diam (mm)
16.00	200
32.00	150

Core Barrel: SK6L

Flush Type: Water

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: DAA Airfield Underpass	Borehole ID
21-1219	Client: DAA	BH111
	Client's Rep: Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 36.60 m	Start Date: 09/03/2022	Driller: MW	Sheet 1 of 6
Rotary Drilling	Comacchio 405	0.00	2.50					Scale: 1:40
Rotary Coring	Comacchio 405	2.50	36.60	716507.31 E				
				743276.32 N	Elevation: 66.61 mOD	End Date: 09/03/2022	Logger: RS	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Inspection pit excavated by Kilwex to 1.20m.		
								65.41	1.20		Firm brown sandy gravelly CLAY. (Driller's description)		
2.50 - 3.50	B1							64.11	2.50		Very stiff brownish grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of mixed lithologies.		
3.00	ES1	73											
3.60													
3.80 - 4.10	C1												
4.30	D1	100											
5.10													
		100											
6.25 - 6.60	B2							60.36	6.25		Very stiff brownish grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		
6.60													
		TCR	SCR	RQD	FI								

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200
36.60	150

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH111
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 405	0.00	2.50
Rotary Coring	Comacchio 405	2.50	36.60

Coordinates: 716507.31 E, 743276.32 N

Final Depth: 36.60 m | Start Date: 09/03/2022 | Driller: MW

Elevation: 66.61 mOD | End Date: 09/03/2022 | Logger: RS

Sheet 2 of 6 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		100									Very stiff brownish grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		
8.10													
8.55 - 8.85	C2	100											
8.60	D2												
9.50	ES2												
9.60													
9.70 - 10.00	B3	100											
11.10													
11.60	D3	100											
12.60													
12.80 - 13.10	B4	100											
14.10													
14.37 - 14.73	C3												
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
2.50	200
36.60	150

Core Barrel: SK6L

Flush Type: Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH111
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 405	0.00	2.50
Rotary Coring	Comacchio 405	2.50	36.60

Coordinates: 716507.31 E, 743276.32 N

Final Depth: 36.60 m | Start Date: 09/03/2022 | Driller: MW

Elevation: 66.61 mOD | End Date: 09/03/2022 | Logger: RS

Sheet 3 of 6
Scale: 1:40
FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
14.90	D4	100									Very stiff brownish grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies.
15.60											
16.25 - 16.65	B5	100						50.36	16.25		
17.10											Very stiff brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of mixed lithologies. Cobbles are of limestone.
17.70	D5	100									
18.00 - 18.35	C4										
18.60											
19.00 - 19.40	B6	100									
20.10								46.51	20.10		Very stiff brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of mixed lithologies. Cobbles are of mixed lithologies.
20.80 - 21.15	B7	100						45.91	20.70		Very stiff grey slightly sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.
21.40	D6										
21.60											
		TCR	SCR	RQD	FI						

Water | Backfill

15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200
36.60	150

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH111
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Rotary Drilling	Comacchio 405	0.00	2.50	
Rotary Coring	Comacchio 405	2.50	36.60	716507.31 E
				743276.32 N

Final Depth:	36.60 m	Start Date:	09/03/2022	Driller:	MW	Sheet 4 of 6
						Scale: 1:40
Elevation:	66.61 mOD	End Date:	09/03/2022	Logger:	RS	FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		100									Very stiff grey slightly sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		
23.10													
23.60 - 23.95	B8	100									*23.40m to 24.50m: Dark brown very silty gravelly fine to coarse SAND. Gravel is subangular fine to coarse of mixed lithologies predominantly limestone.*		
24.40	D7												
24.60													
24.95 - 25.40	C5	100											
26.00	D8												
26.10													
26.70 - 27.10	B9	90						39.91	26.70		Very stiff dark grey sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		
27.60		90											
29.10													
		TCR	SCR	RQD	FI								

Backfill scale: 22.0, 22.5, 23.0, 23.5, 24.0, 24.5, 25.0, 25.5, 26.0, 26.5, 27.0, 27.5, 28.0, 28.5, 29.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200
36.60	150

Core Barrel

SK6L

Flush Type

Water

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH111
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 405	0.00	2.50
Rotary Coring	Comacchio 405	2.50	36.60

Coordinates: 716507.31 E, 743276.32 N

Final Depth: 36.60 m | Start Date: 09/03/2022 | Driller: MW

Elevation: 66.61 mOD | End Date: 09/03/2022 | Logger: RS

Sheet 5 of 6 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
29.70 - 30.10	B10	90									Very stiff dark grey sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.
30.20	D9										
30.60		100						36.01	30.60		Dark grey sandy very clayey subangular GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles are subangular. (Weathered bedrock)
32.10		100	64	60				34.06	32.55		Medium strong thickly laminated dark grey LIMESTONE. Largely unweathered: possibly slightly closer fracture spacing. Discontinuities: 1. 0 to 30 degree bedding fractures, medium spaced (40/320/520) planar, smooth.
33.60											
33.90 - 34.10	C6										
34.09 - 34.36	30	100	100	96	3						
34.88 - 35.03	C7										
35.10											
35.80 - 36.00	C8	100	97	89							
		TCR	SCR	RQD	FI						

Water | Backfill

29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Casing Details

To (m)	Diam (mm)
2.50	200
36.60	150

Core Barrel: SK6L

Flush Type: Water

Termination Reason: Terminated at scheduled depth.

Last Updated: 10/06/2022

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
21-1219	DAA Airfield Underpass	BH111
	Client: DAA	
	Client's Rep Ramboll Consulting Engineers	

Method	Plant Used	Top (m)	Base (m)
Rotary Drilling	Comacchio 405	0.00	2.50
Rotary Coring	Comacchio 405	2.50	36.60

Coordinates: 716507.31 E, 743276.32 N

Final Depth: 36.60 m | Start Date: 09/03/2022 | Driller: MW

Elevation: 66.61 mOD | End Date: 09/03/2022 | Logger: RS

Sheet 6 of 6 | Scale: 1:40 | FINAL

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
36.60								30.01	36.60		Medium strong thickly laminated dark grey LIMESTONE. Largely unweathered: possibly slightly closer fracture spacing. Discontinuities: 1. 0 to 30 degree bedding fractures, medium spaced (40/320/520) planar, smooth. End of Borehole at 36.60m		

TCR	SCR	RQD	FI

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diam (mm)
2.50	200
36.60	150

Core Barrel

SK6L

Flush Type

Water

Remarks

Inspection pit excavated by Kilwex to 1.20m.
No noticeable groundwater strikes, water added during drilling.

Termination Reason

Terminated at scheduled depth.

Last Updated

10/06/2022

AGS

CAUSEWAY GEOTECH

APPENDIX C

CORE PHOTOGRAPHS





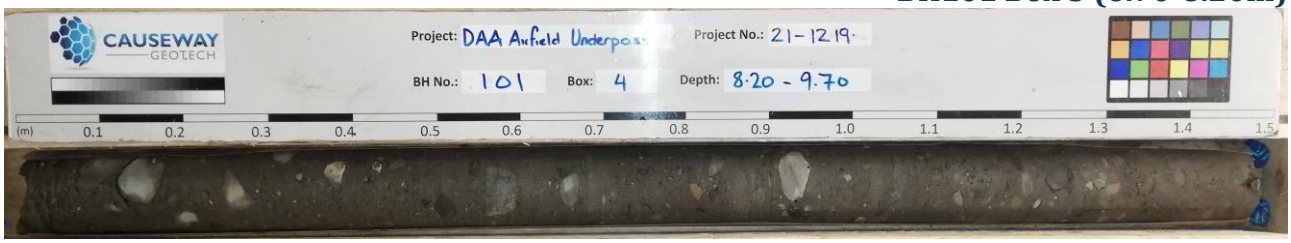
BH101 Box 1 (4.20-5.20m)



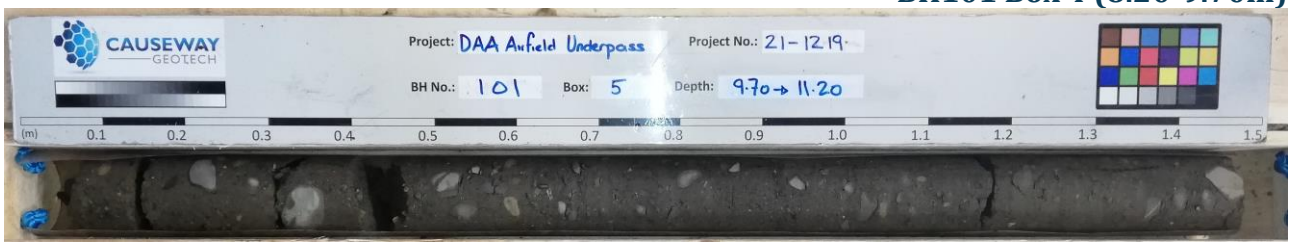
BH101 Box 2 (5.20-6.70m)



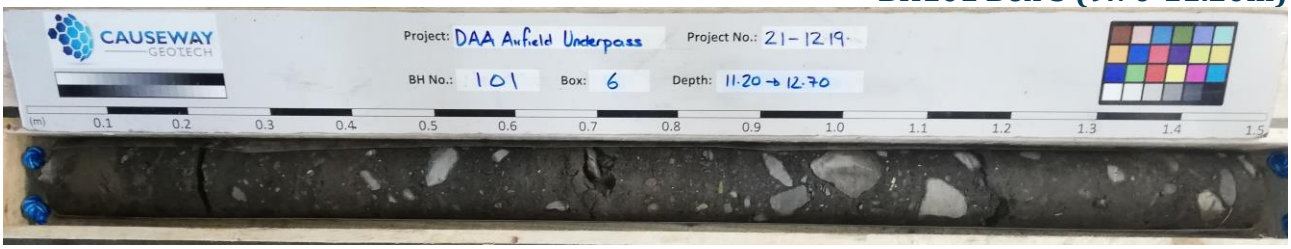
BH101 Box 3 (6.70-8.20m)



BH101 Box 4 (8.20-9.70m)



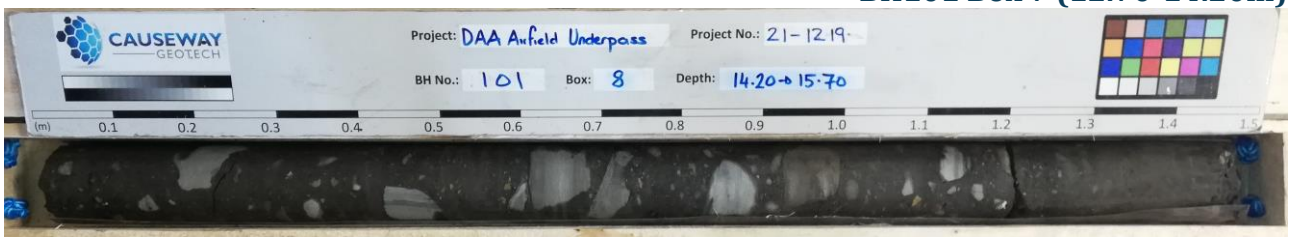
BH101 Box 5 (9.70-11.20m)



BH101 Box 6 (11.20-12.70m)



BH101 Box 7 (12.70-14.20m)



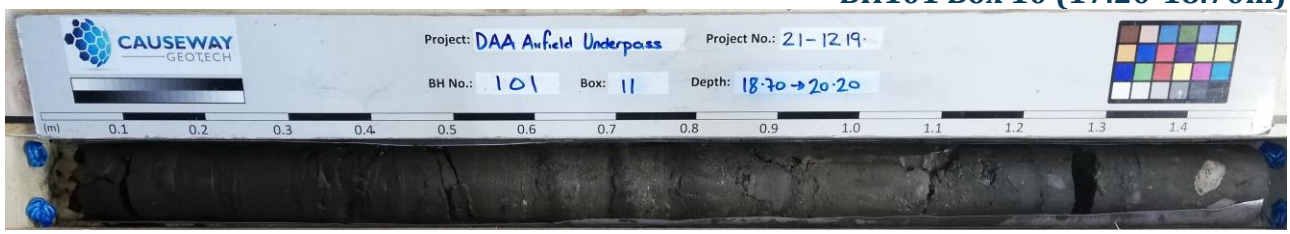
BH101 Box 8 (14.20-15.70m)



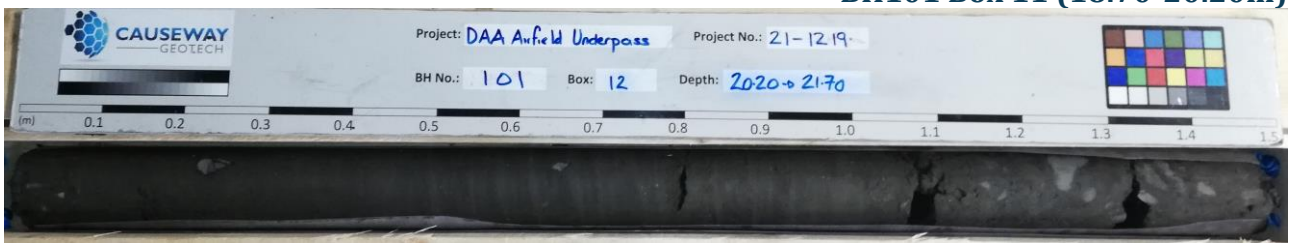
BH101 Box 9 (15.70-17.20m)



BH101 Box 10 (17.20-18.70m)



BH101 Box 11 (18.70-20.20m)



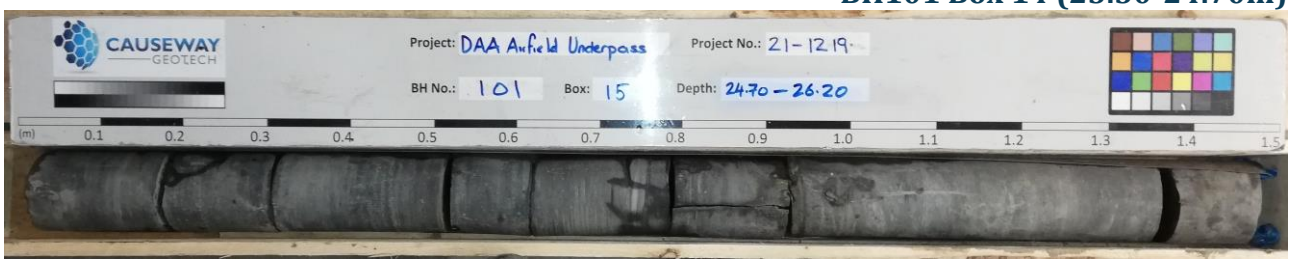
BH101 Box 12 (20.20-21.70m)



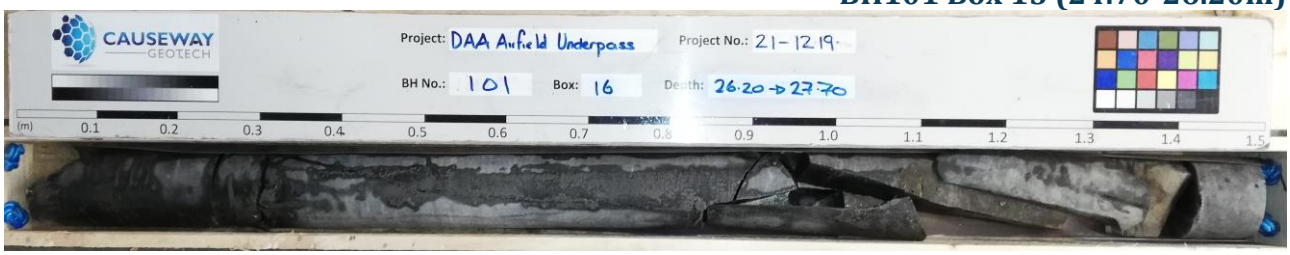
BH101 Box 13 (21.70-23.20m)



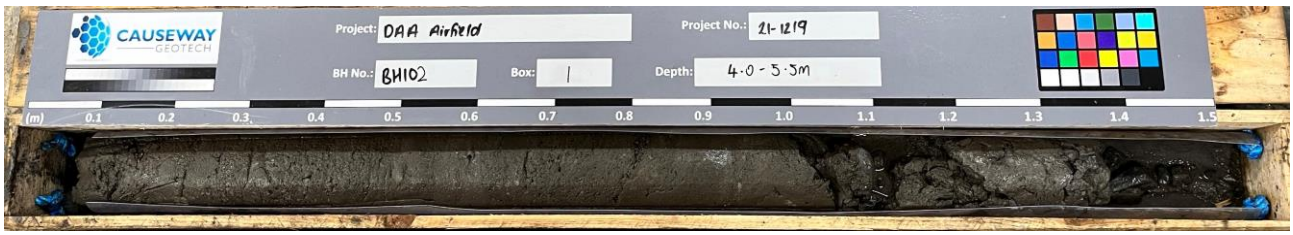
BH101 Box 14 (23.30-24.70m)



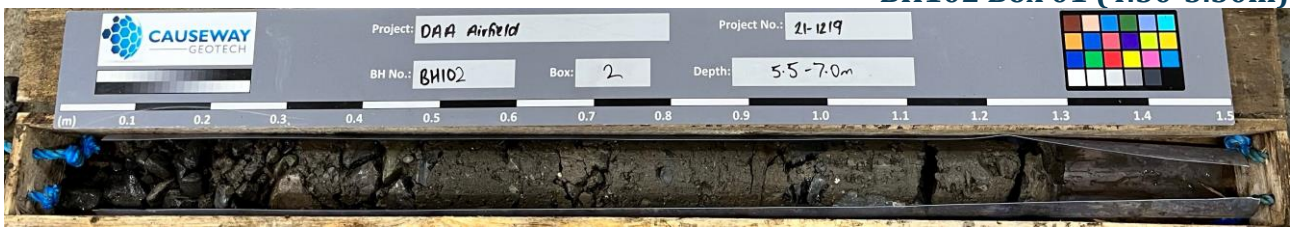
BH101 Box 15 (24.70-26.20m)



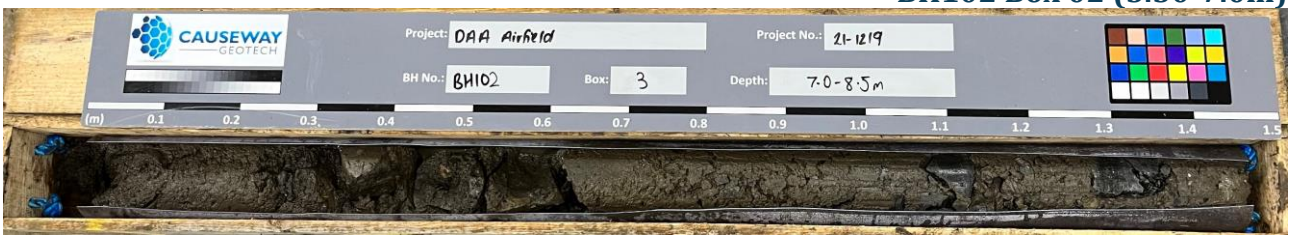
BH101 Box 16 (26.20-27.70m)



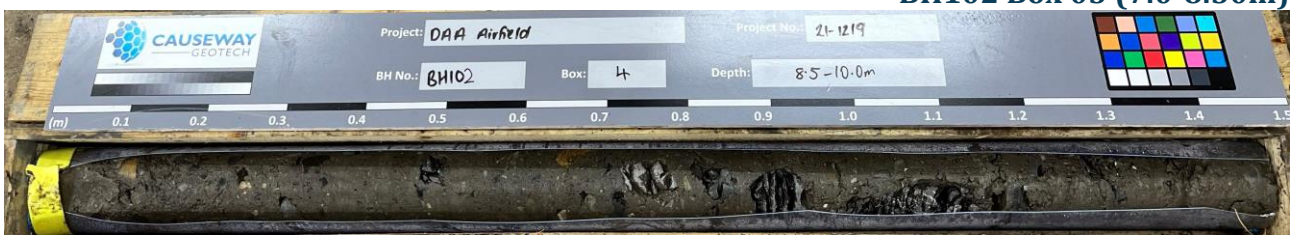
BH102 Box 01 (4.50-5.50m)



BH102 Box 02 (5.50-7.0m)



BH102 Box 03 (7.0-8.50m)



BH102 Box 04 (8.50-10.0m)



BH102 Box 05 (10.0-11.50m)



BH102 Box 06 (11.50-13.0m)



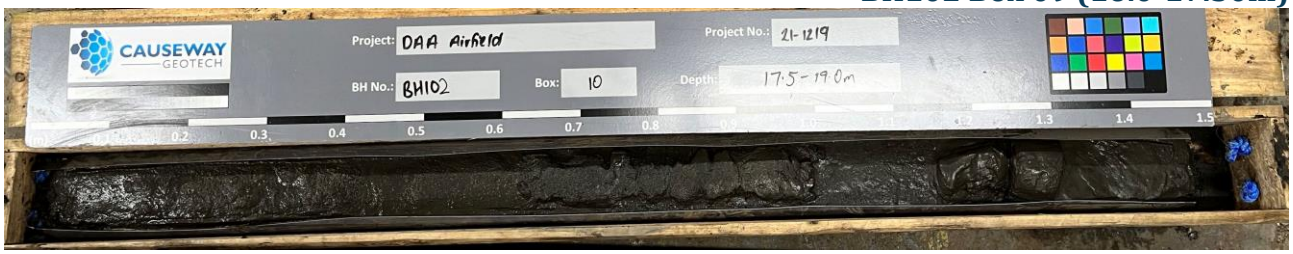
BH102 Box 07 (13.0-14.50m)



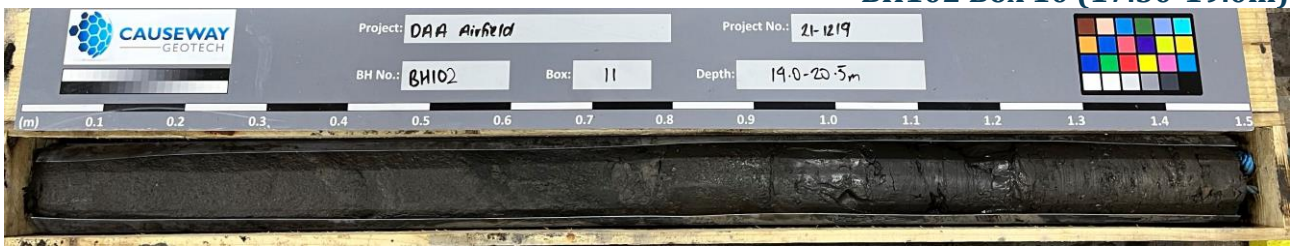
BH102 Box 08 (14.50-16.0m)



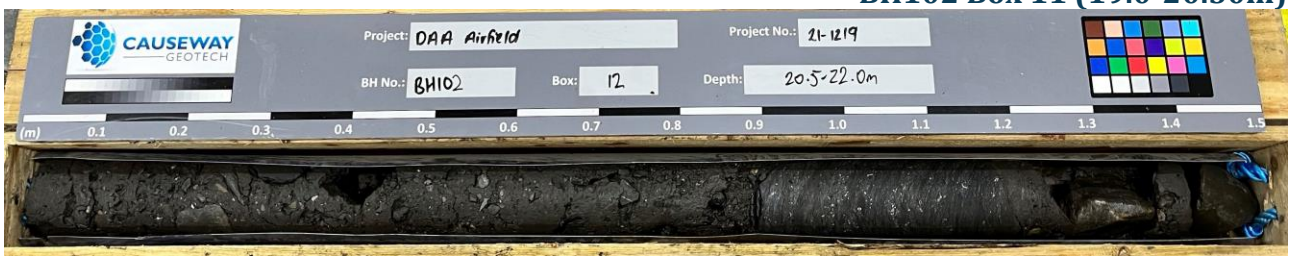
BH102 Box 09 (16.0-17.50m)



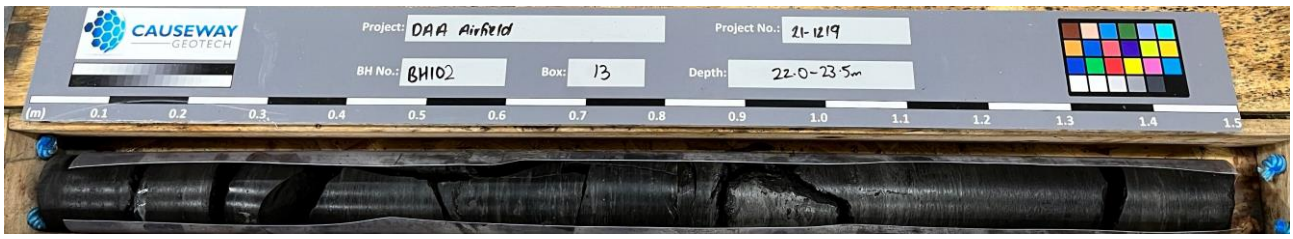
BH102 Box 10 (17.50-19.0m)



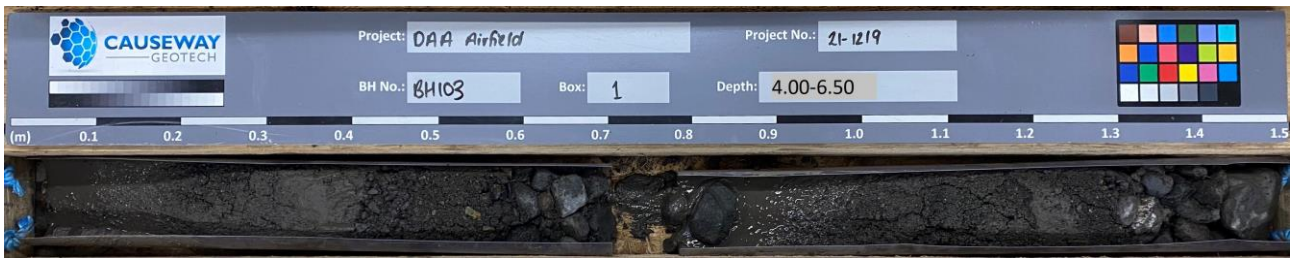
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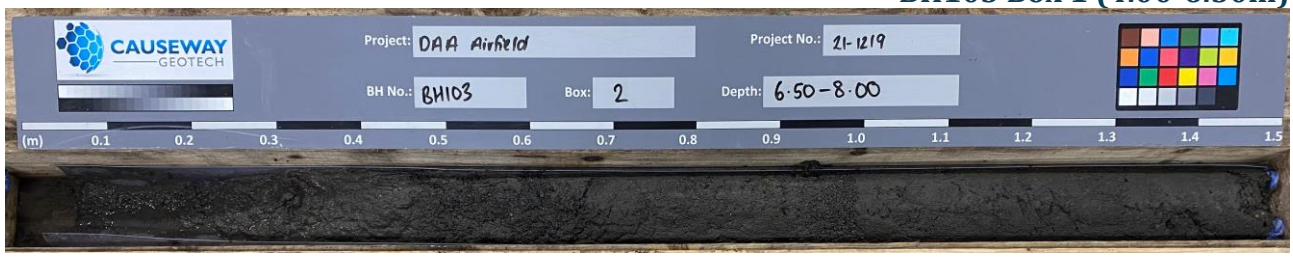
BH102 Box 12 (20.50-22.0m)



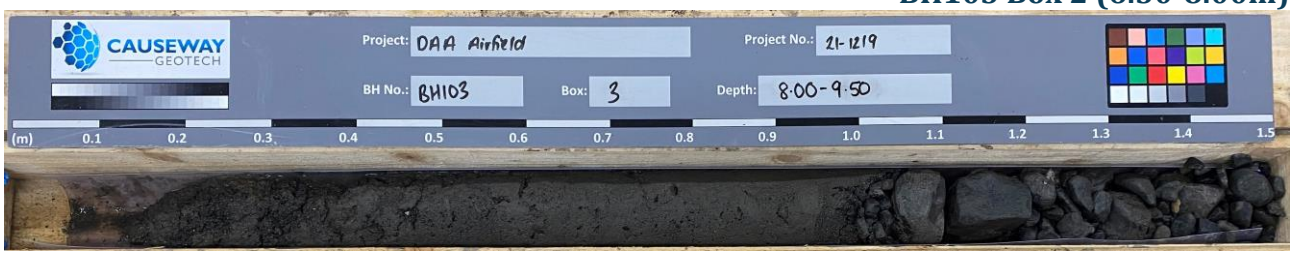
BH102 Box 13 (22.0-23.50m)



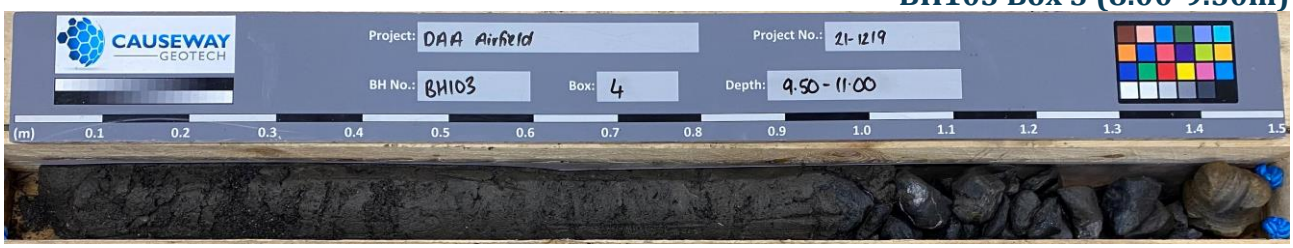
BH103 Box 1 (4.00-6.50m)



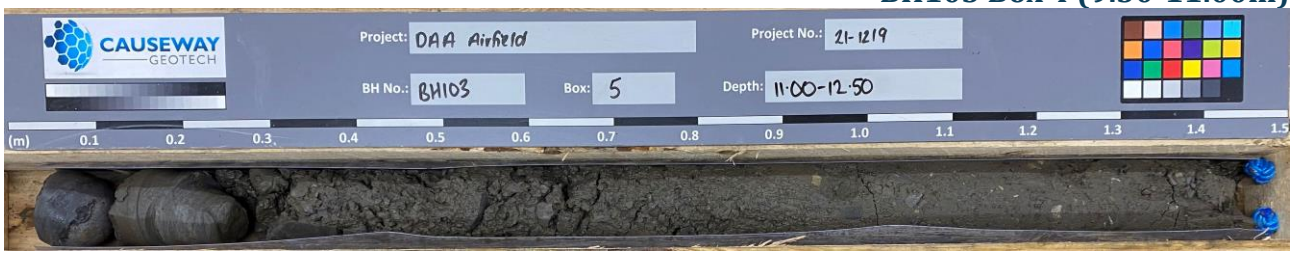
BH103 Box 2 (6.50-8.00m)



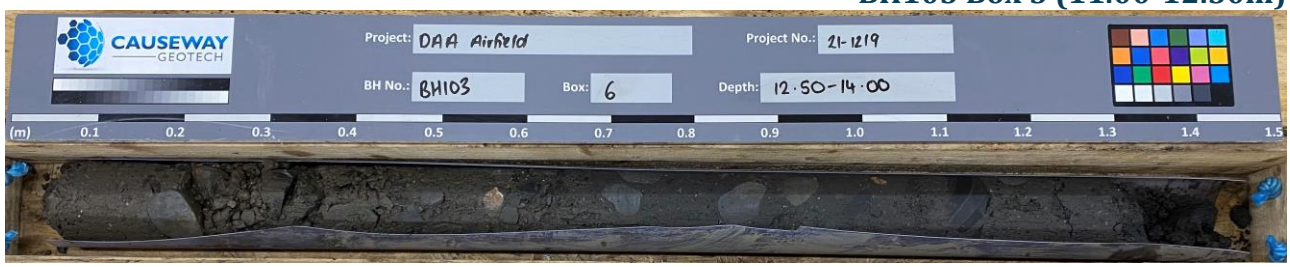
BH103 Box 3 (8.00-9.50m)



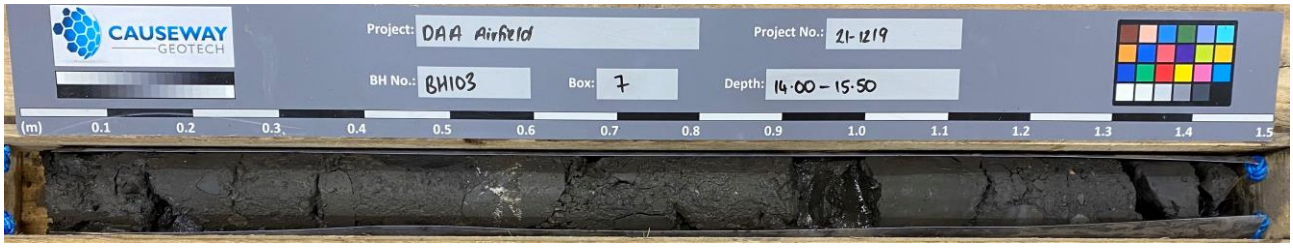
BH103 Box 4 (9.50-11.00m)



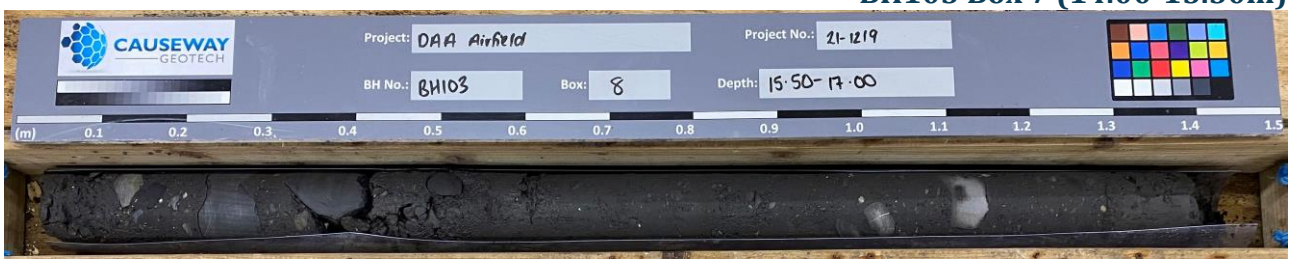
BH103 Box 5 (11.00-12.50m)



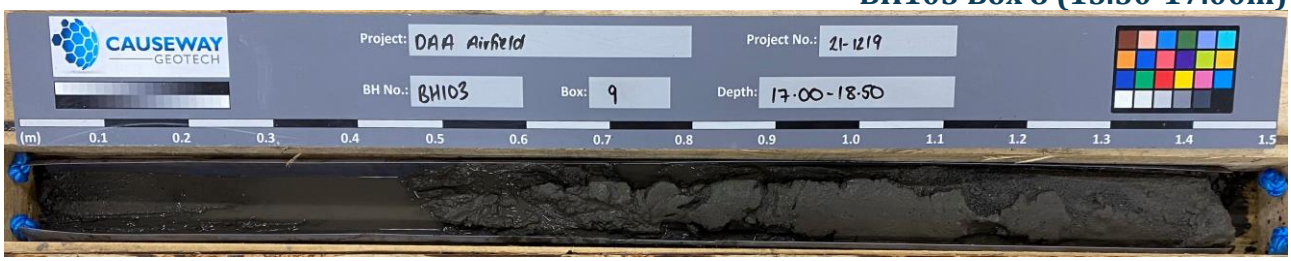
BH103 Box 6 (12.50-14.00m)



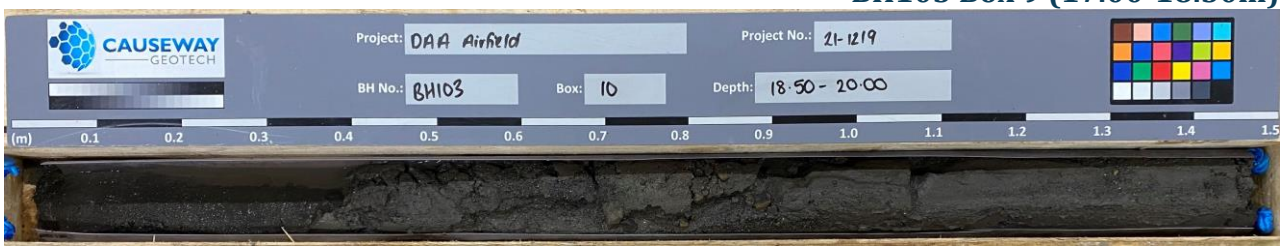
BH103 Box 7 (14.00-15.50m)



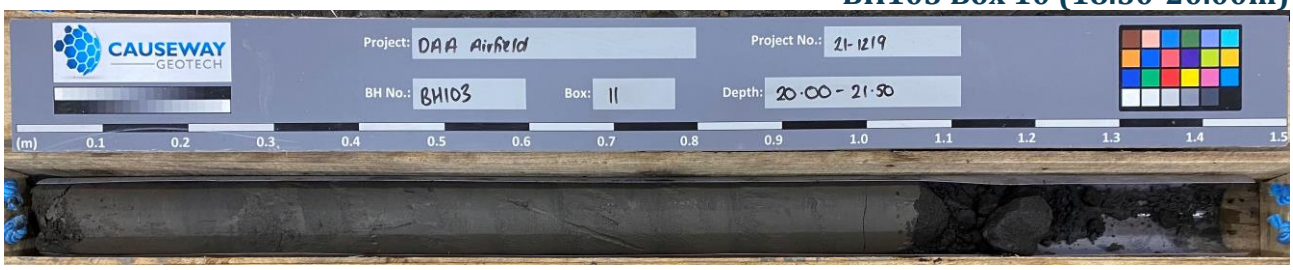
BH103 Box 8 (15.50-17.00m)



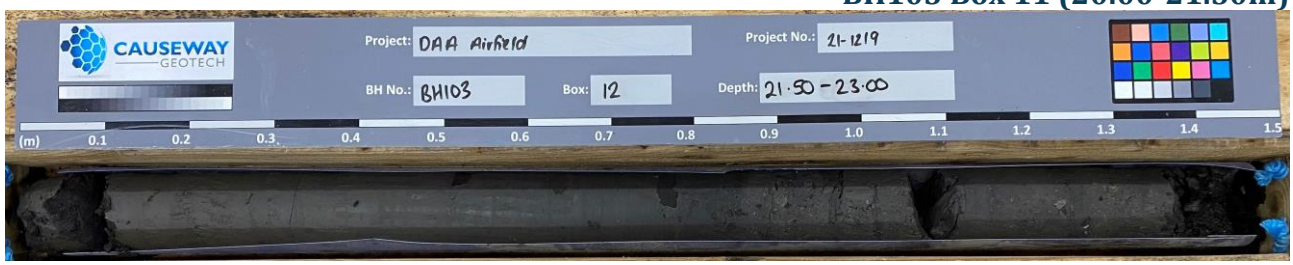
BH103 Box 9 (17.00-18.50m)



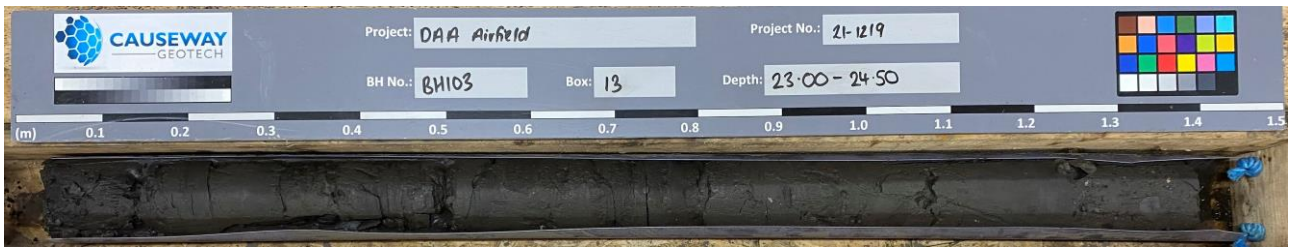
BH103 Box 10 (18.50-20.00m)



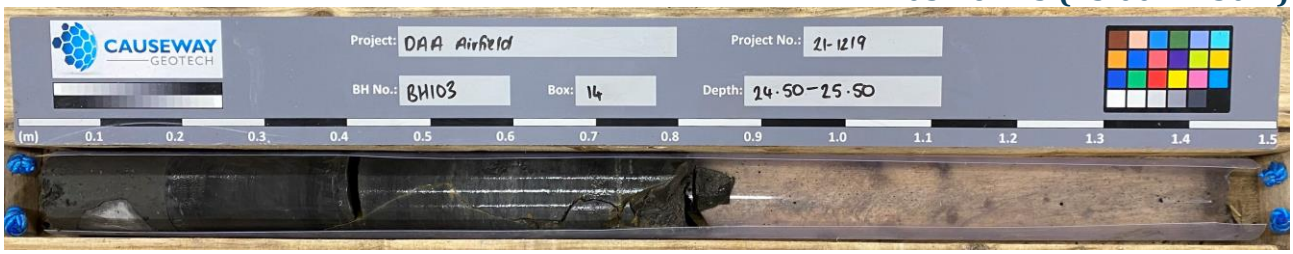
BH103 Box 11 (20.00-21.50m)



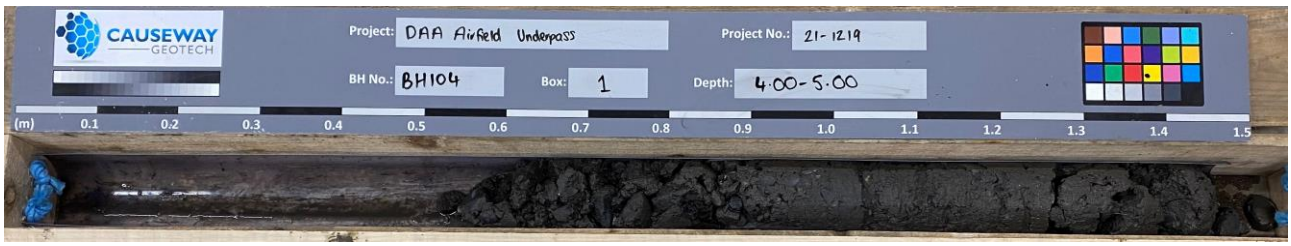
BH103 Box 12 (21.50-23.00m)



BH103 Box 13 (23.00-24.50m)



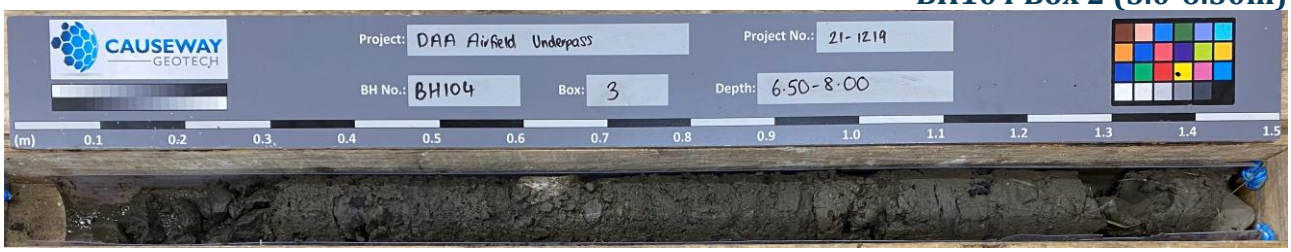
BH103 Box 14 (24.50-25.50m)



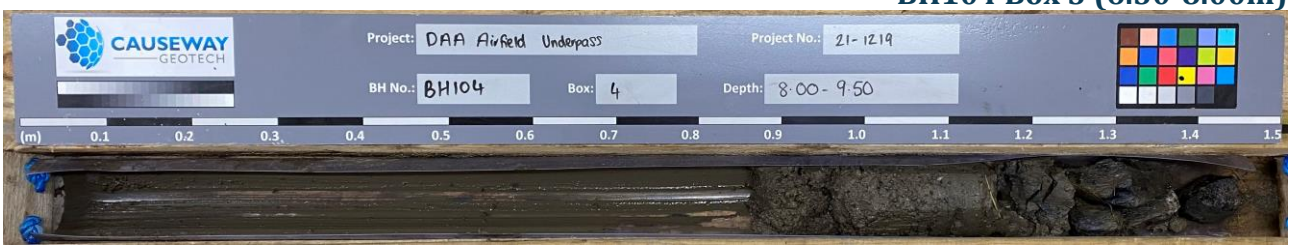
BH104 Box 1 (4.00-5.00m)



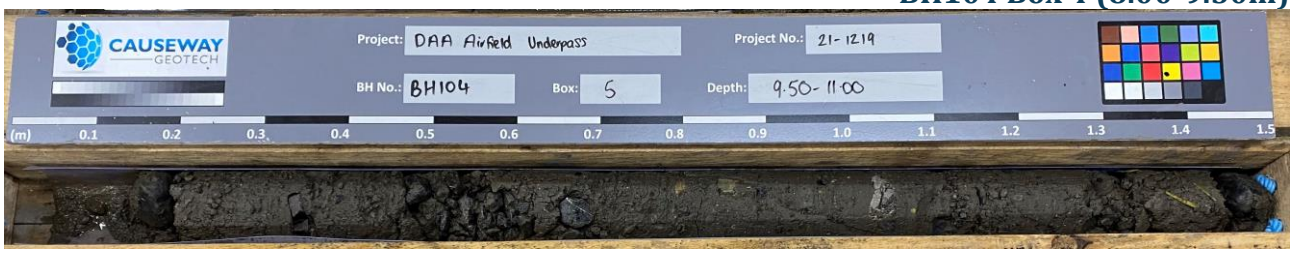
BH104 Box 2 (5.0-6.50m)



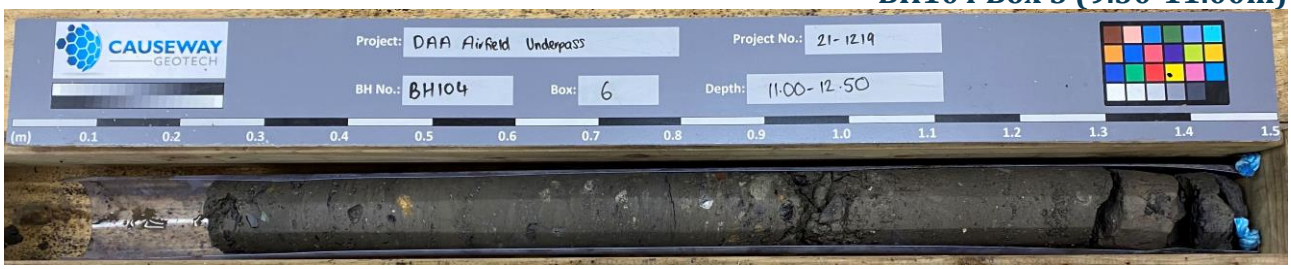
BH104 Box 3 (6.50-8.00m)



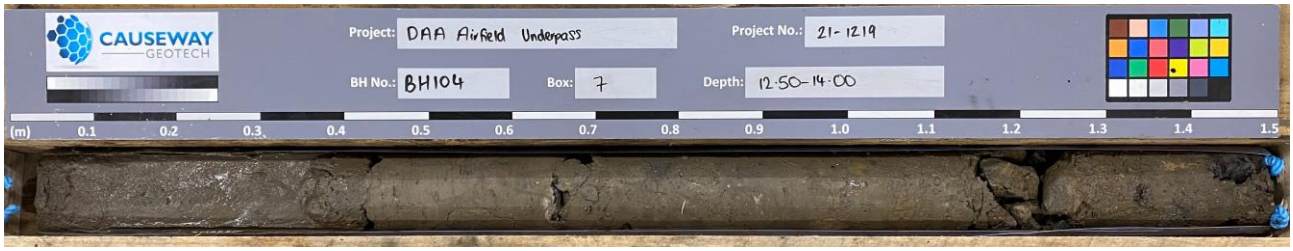
BH104 Box 4 (8.00-9.50m)



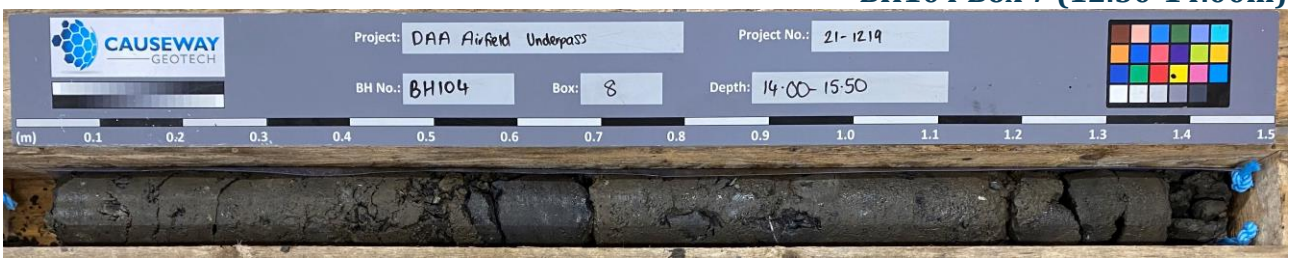
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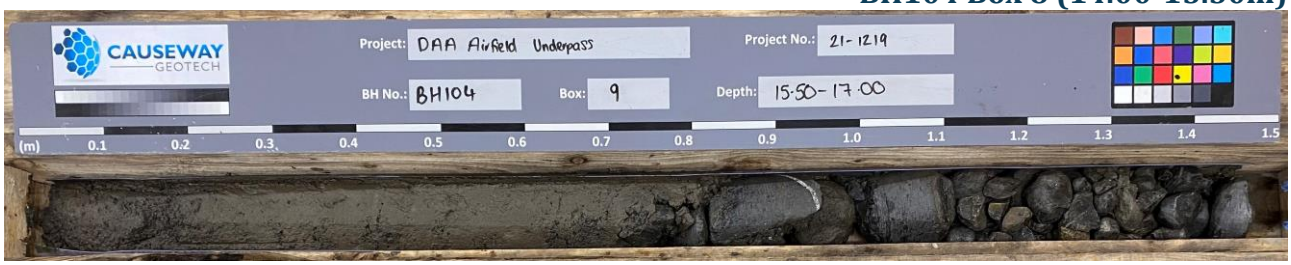
BH104 Box 6 (11.00-12.50m)



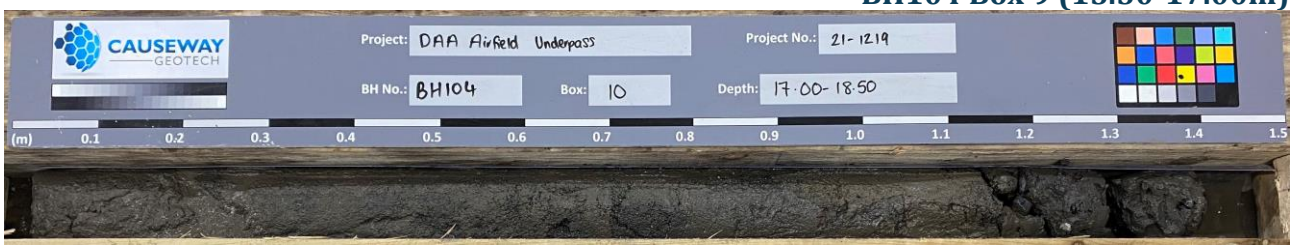
BH104 Box 7 (12.50-14.00m)



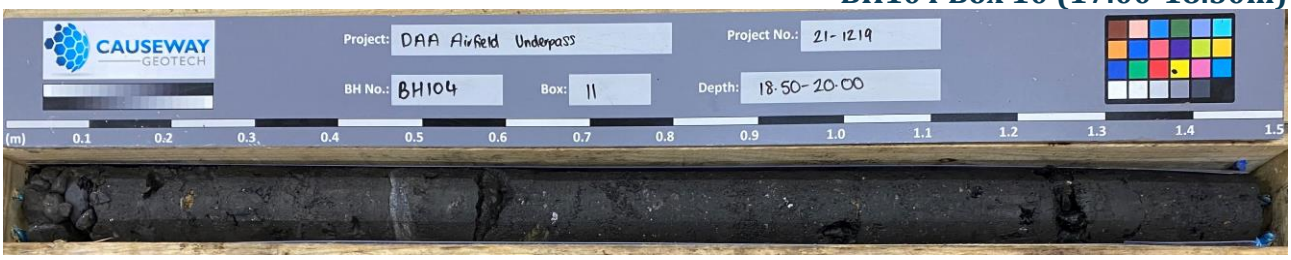
BH104 Box 8 (14.00-15.50m)



BH104 Box 9 (15.50-17.00m)



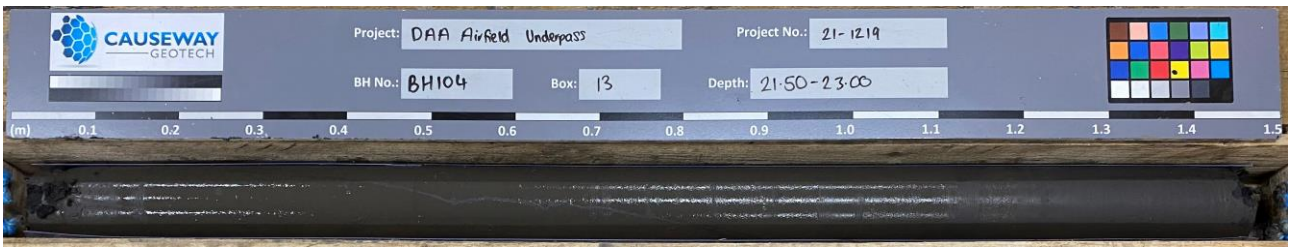
BH104 Box 10 (17.00-18.50m)



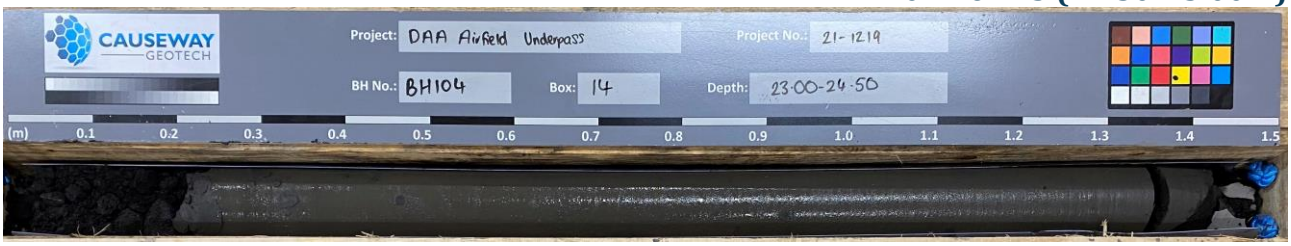
BH104 Box 11 (18.50-20.00m)



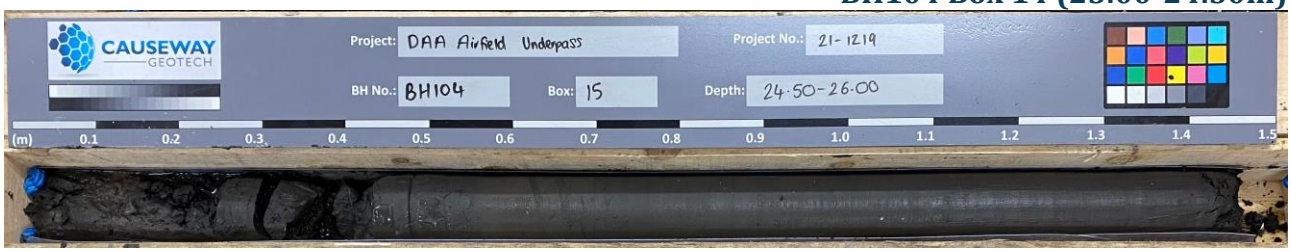
BH104 Box 12 (20.00-21.50m)



BH104 Box 13 (21.50-23.00m)



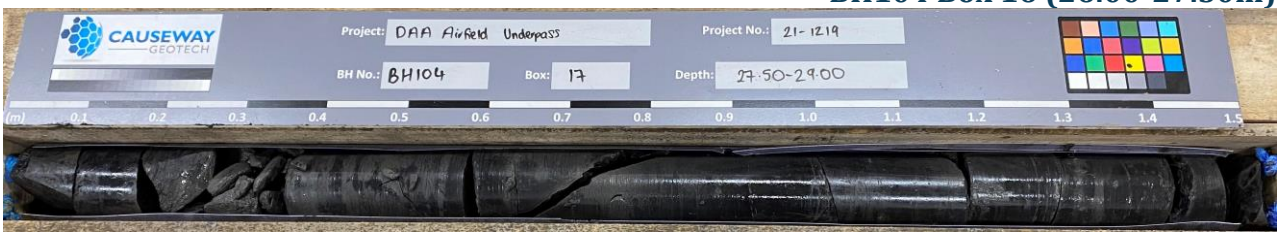
BH104 Box 14 (23.00-24.50m)



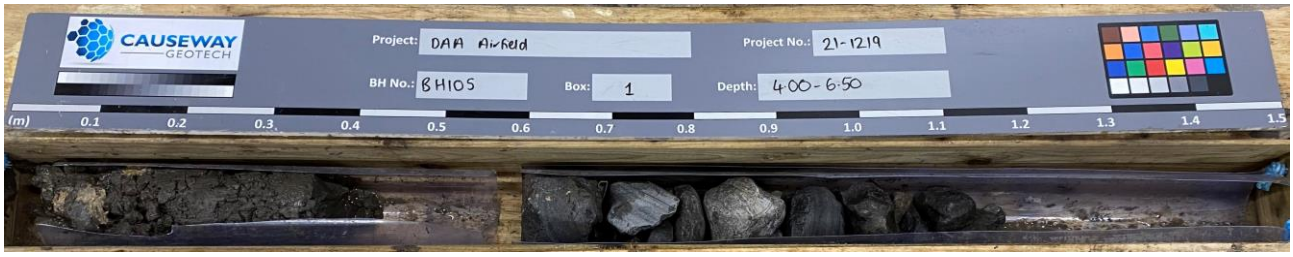
BH104 Box 15 (24.50-26.00m)



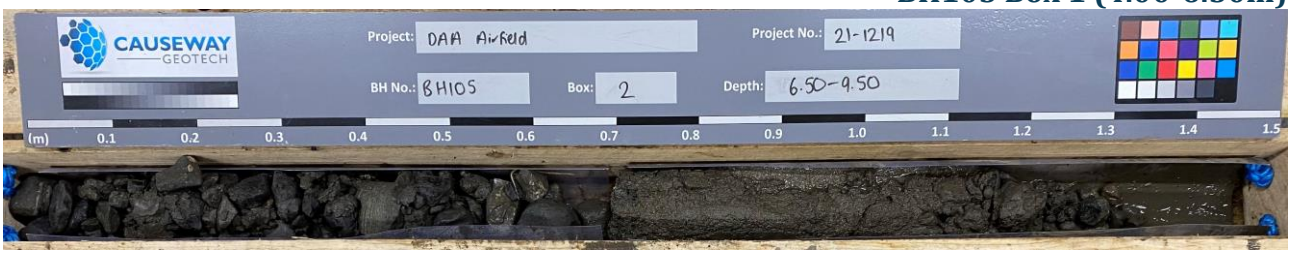
BH104 Box 16 (26.00-27.50m)



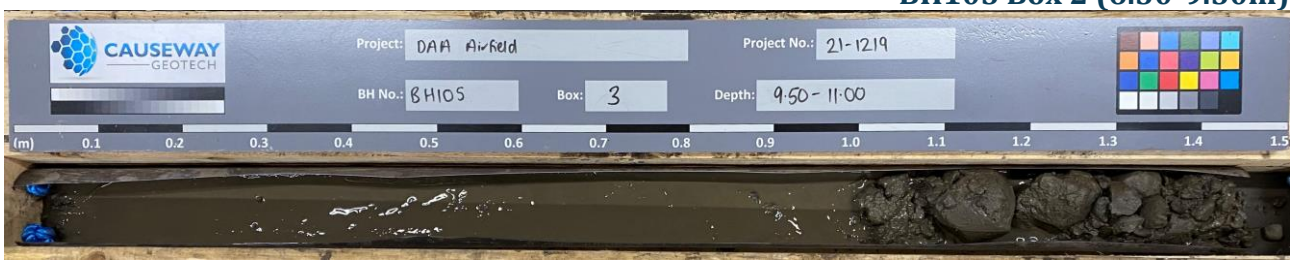
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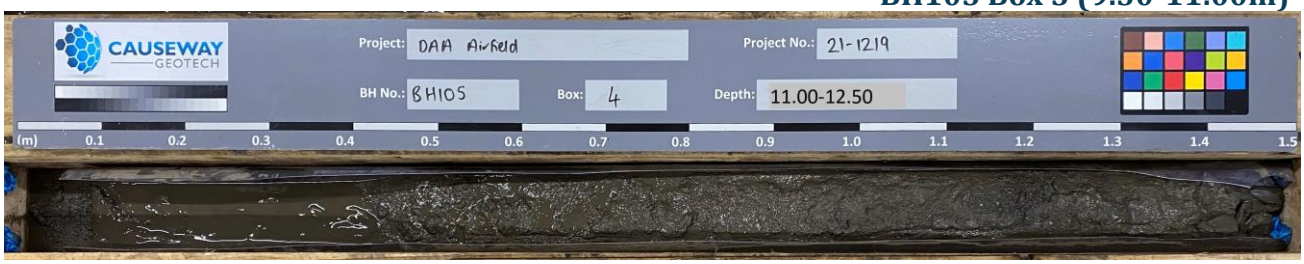
BH105 Box 1 (4.00-6.50m)



BH105 Box 2 (6.50-9.50m)



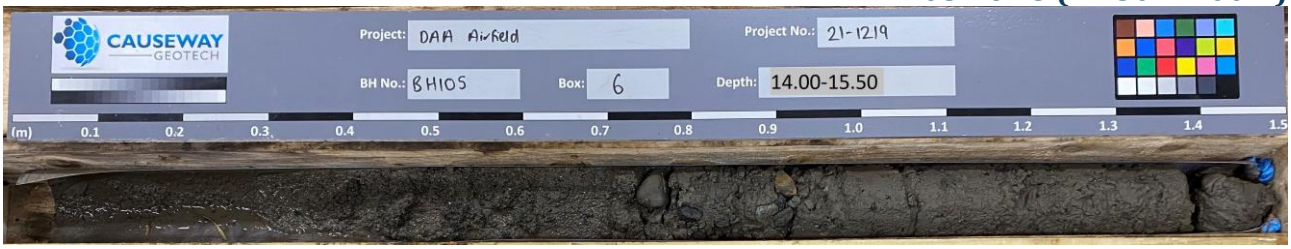
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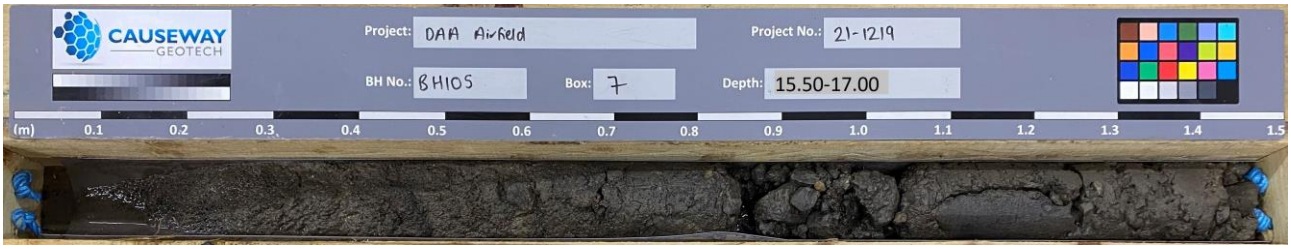
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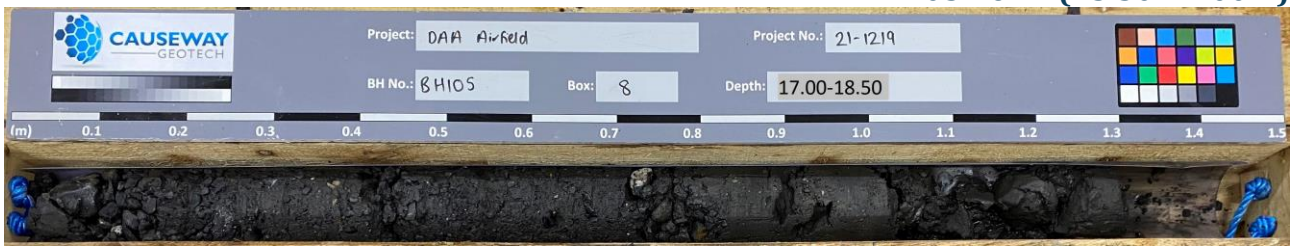
BH105 Box 5 (12.50-14.00m)



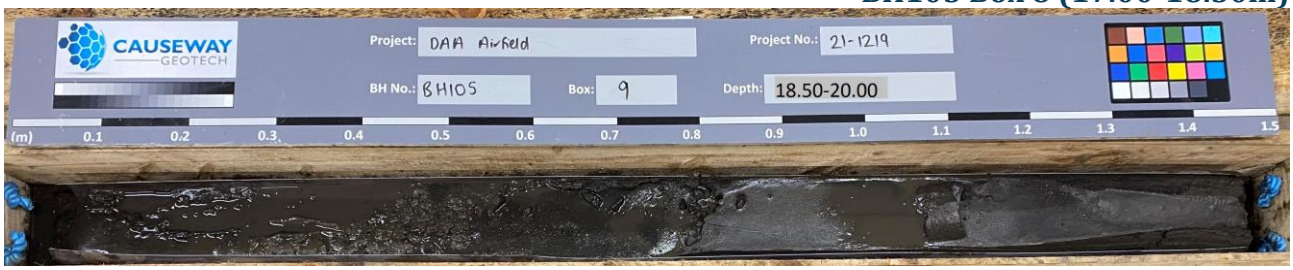
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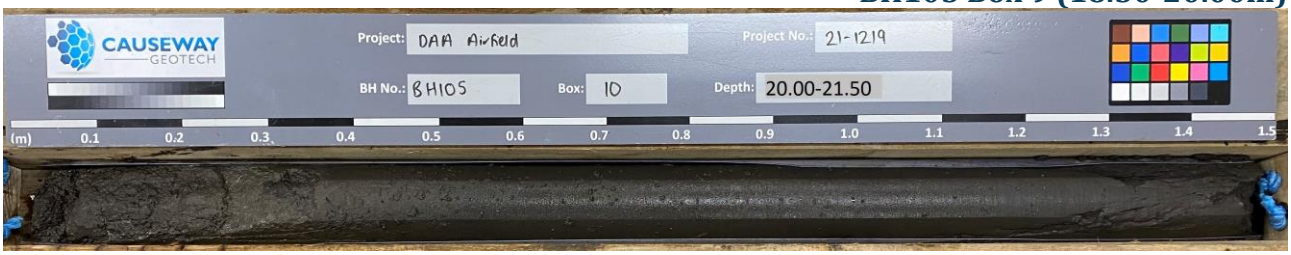
BH105 Box 7 (15.50-17.00m)



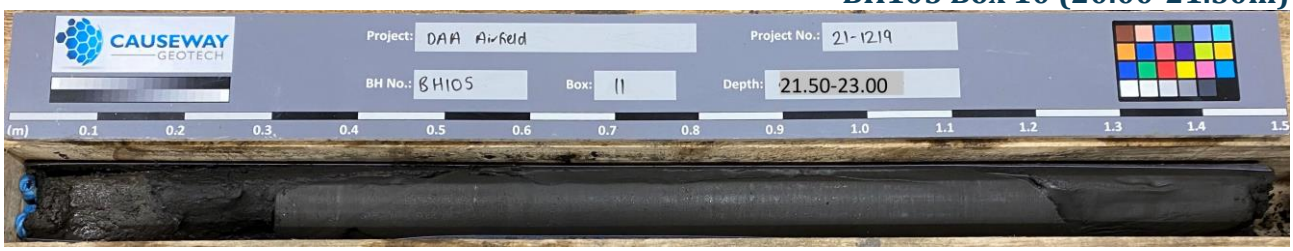
BH105 Box 8 (17.00-18.50m)



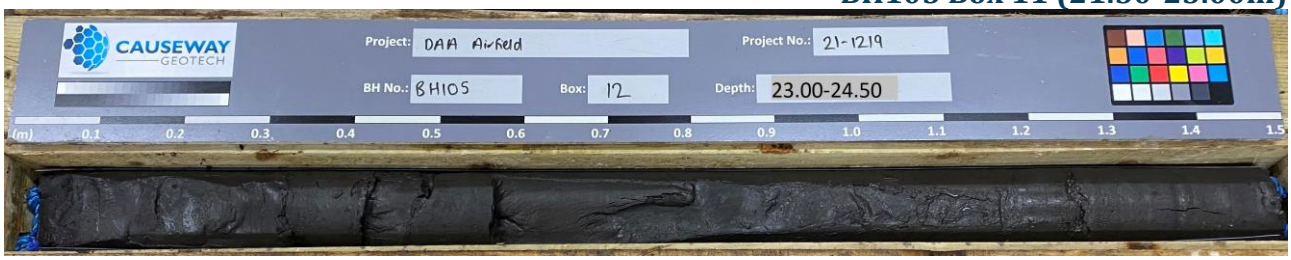
BH105 Box 9 (18.50-20.00m)



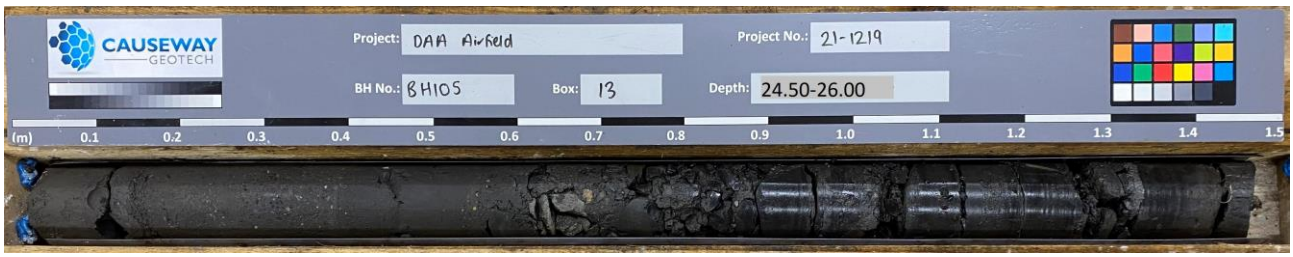
BH105 Box 10 (20.00-21.50m)



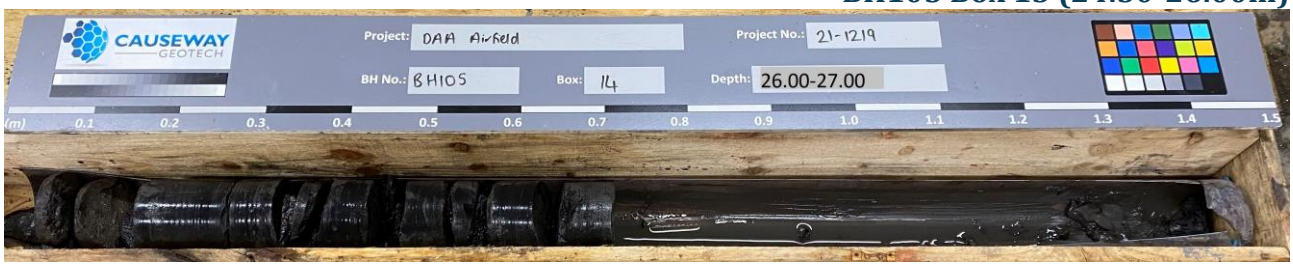
BH105 Box 11 (21.50-23.00m)



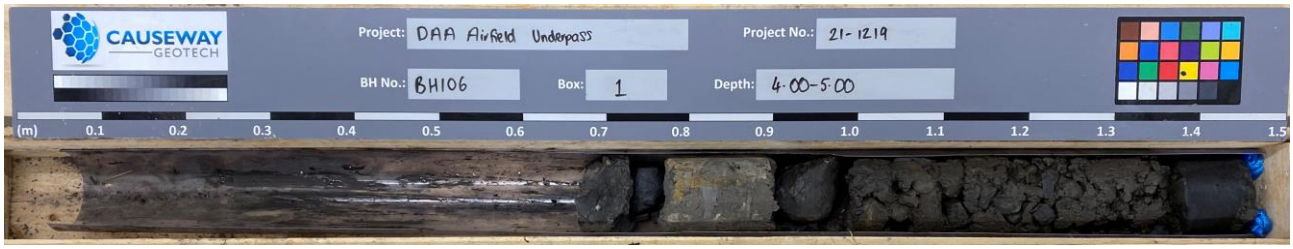
BH105 Box 12 (23.00-24.50m)



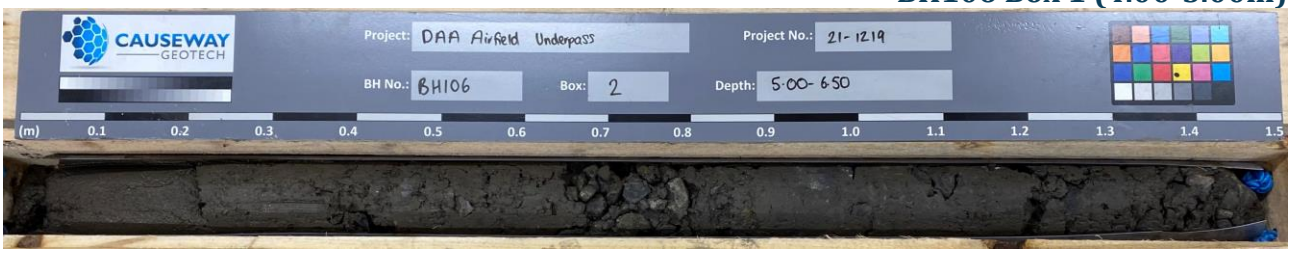
BH105 Box 13 (24.50-26.00m)



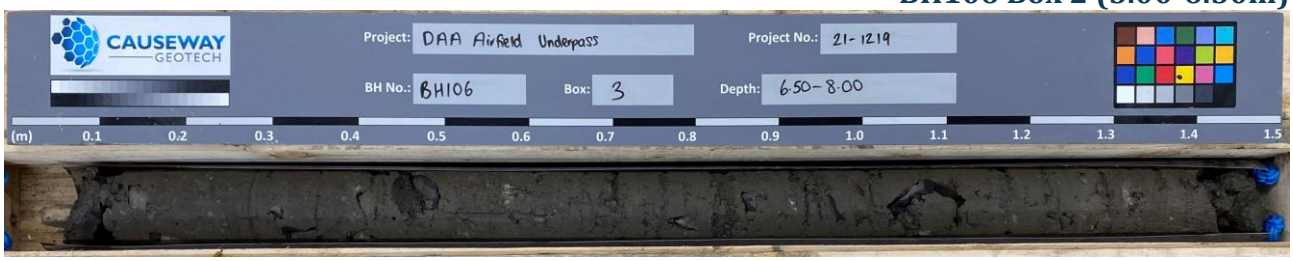
BH105 Box 14 (26.00-27.00m)



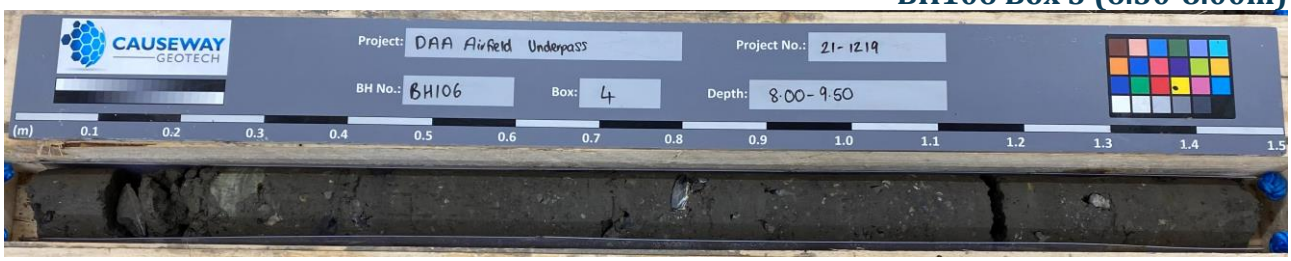
BH106 Box 1 (4.00-5.00m)



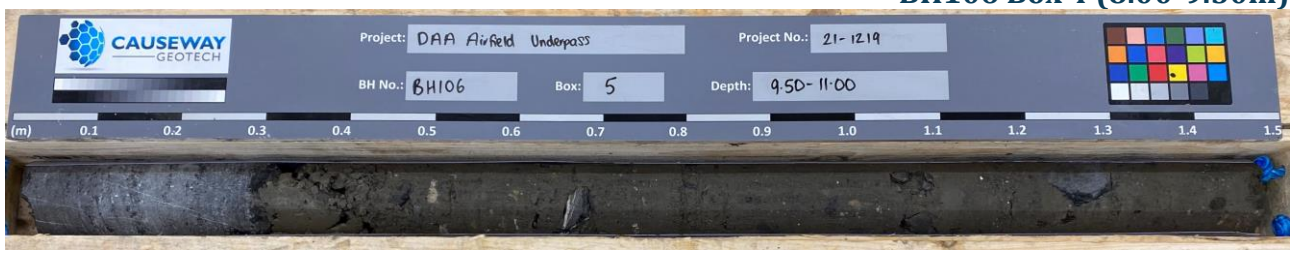
BH106 Box 2 (5.00-6.50m)



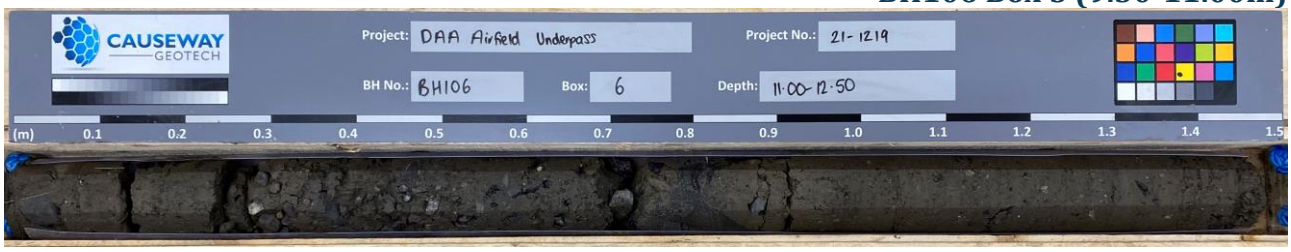
BH106 Box 3 (6.50-8.00m)



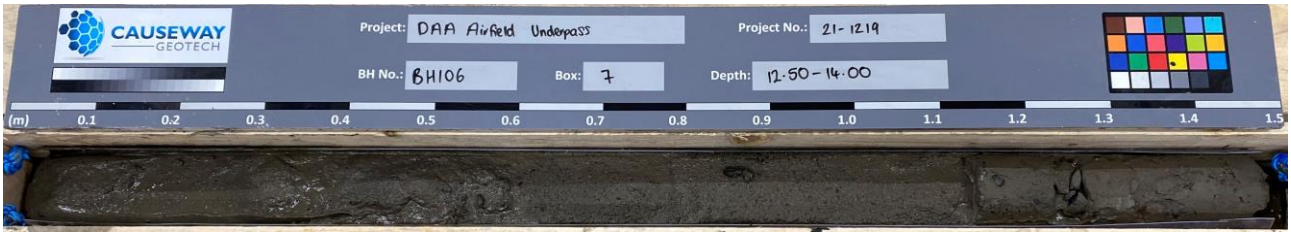
BH106 Box 4 (8.00-9.50m)



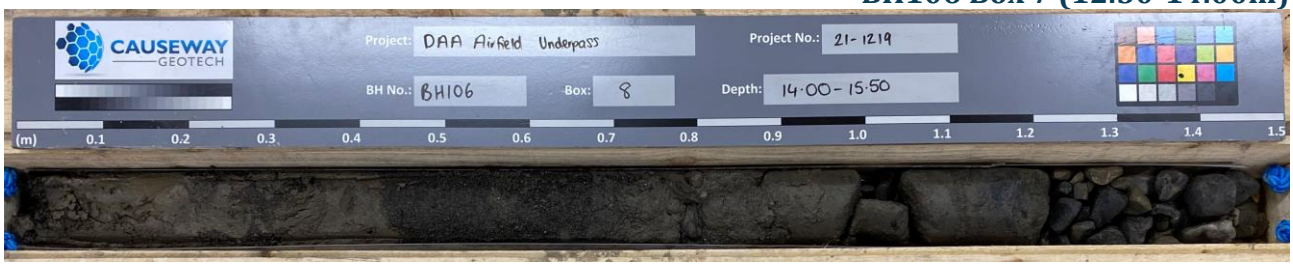
BH106 Box 5 (9.50-11.00m)



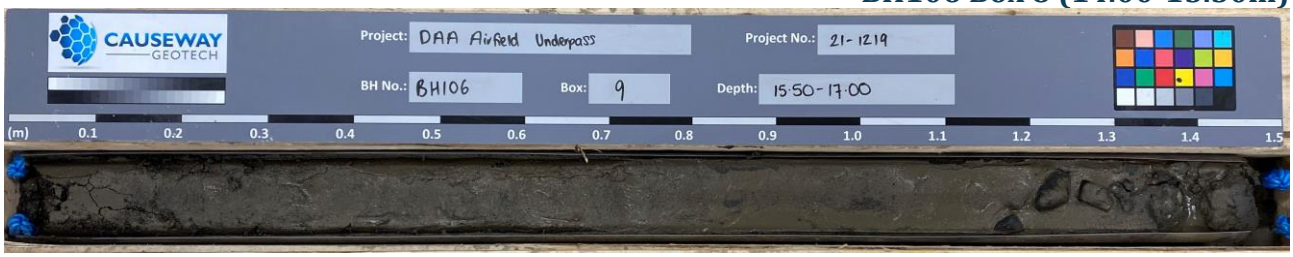
BH106 Box 6 (11.00-12.50m)



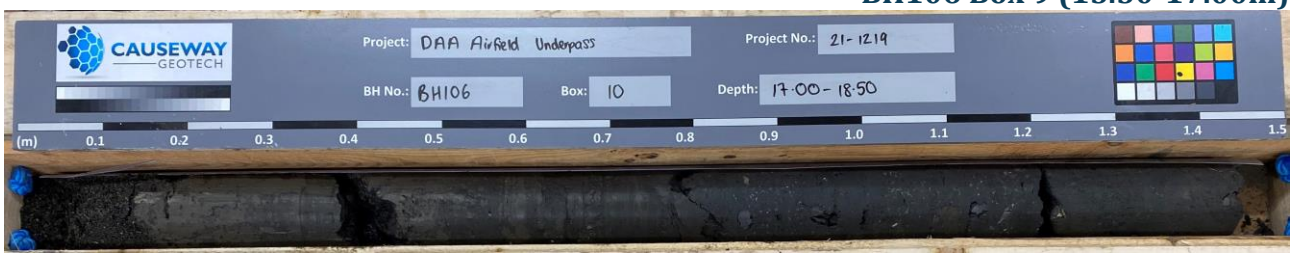
BH106 Box 7 (12.50-14.00m)



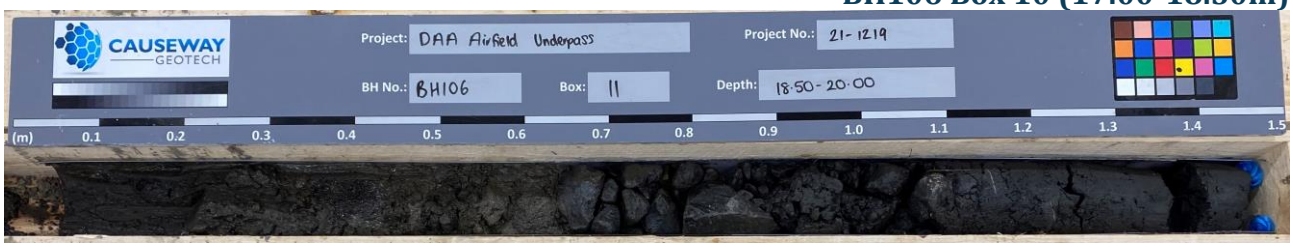
BH106 Box 8 (14.00-15.50m)



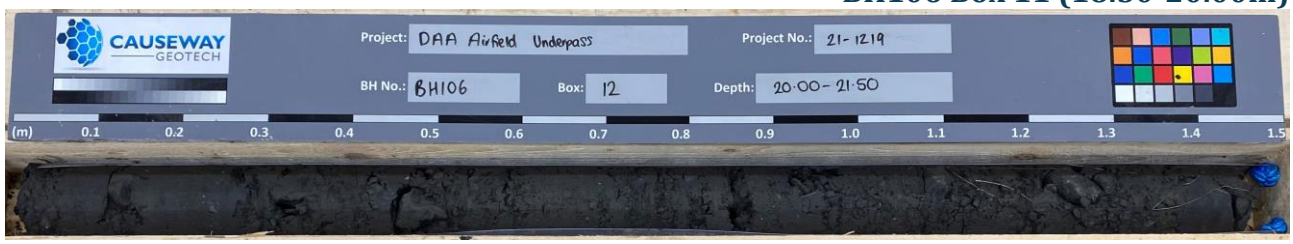
BH106 Box 9 (15.50-17.00m)



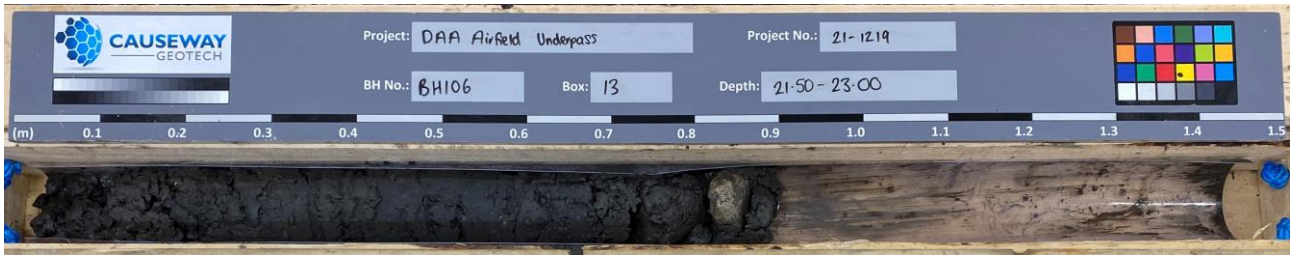
BH106 Box 10 (17.00-18.50m)



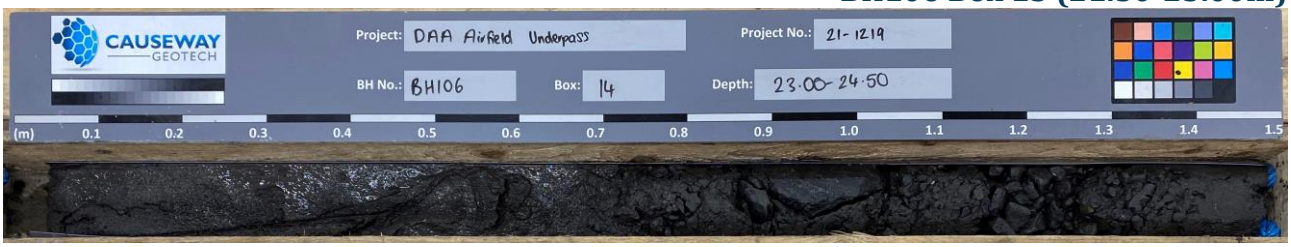
BH106 Box 11 (18.50-20.00m)



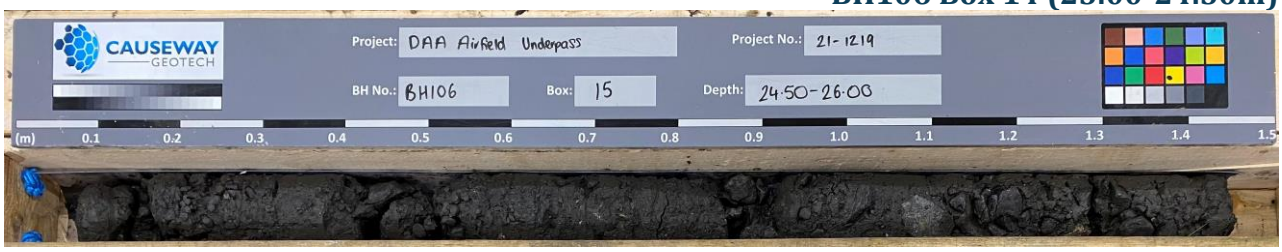
BH106 Box 12 (20.00-21.50m)



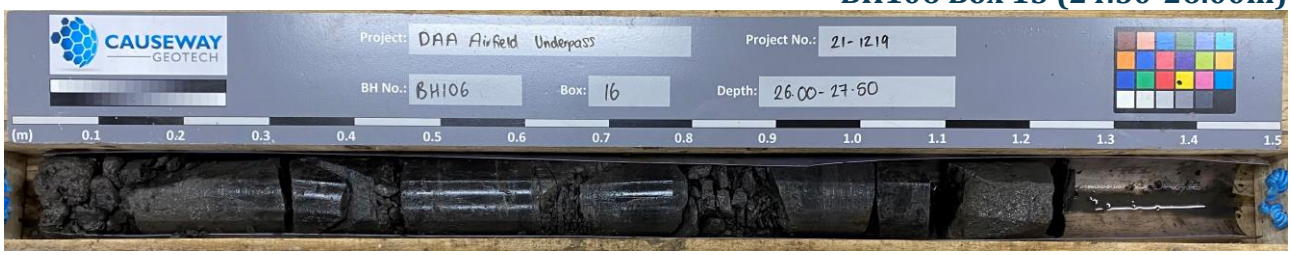
BH106 Box 13 (21.50-23.00m)



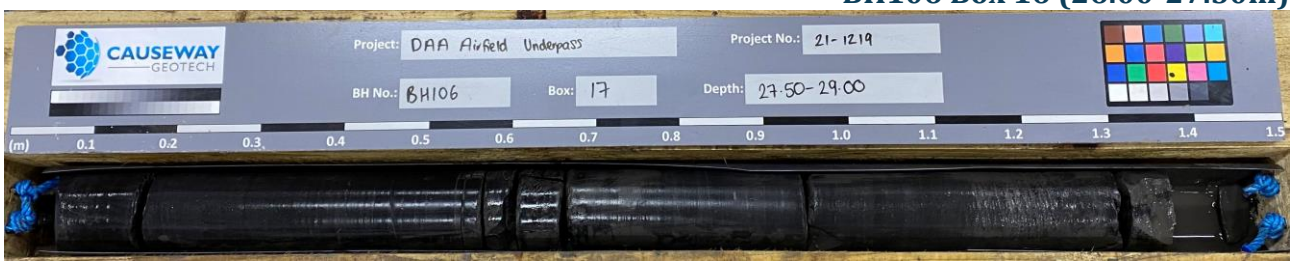
BH106 Box 14 (23.00-24.50m)



BH106 Box 15 (24.50-26.00m)



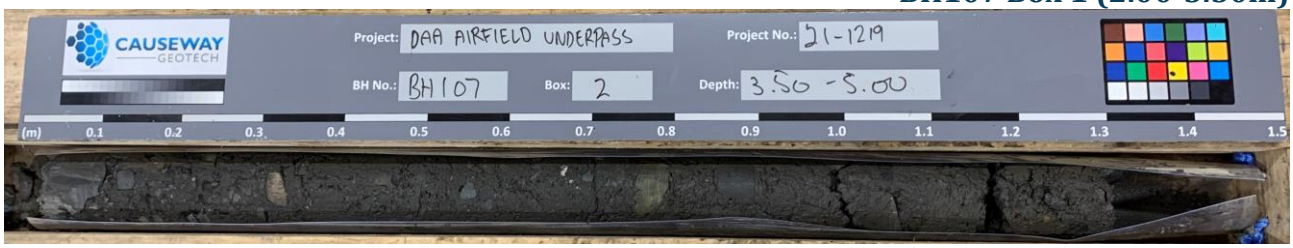
BH106 Box 16 (26.00-27.50m)



BH106 Box 17 (27.50-29.00m)



BH107 Box 1 (2.00-3.50m)



BH107 Box 2 (3.50-5.00m)



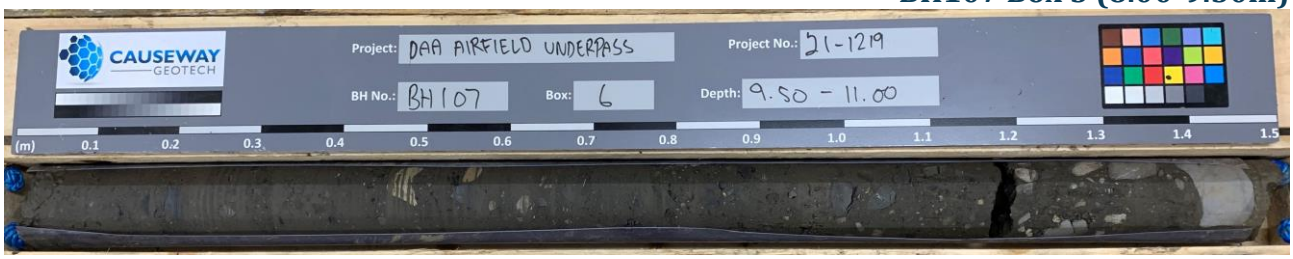
BH107 Box 3 (5.00-6.50m)



BH107 Box 4 (6.50-8.00m)



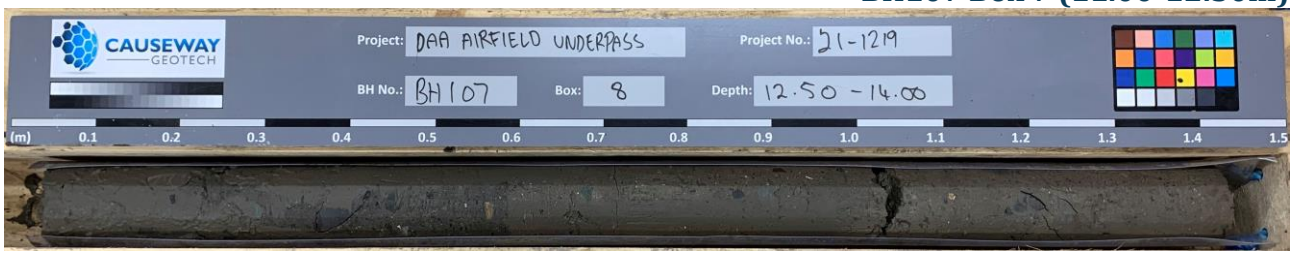
BH107 Box 5 (8.00-9.50m)



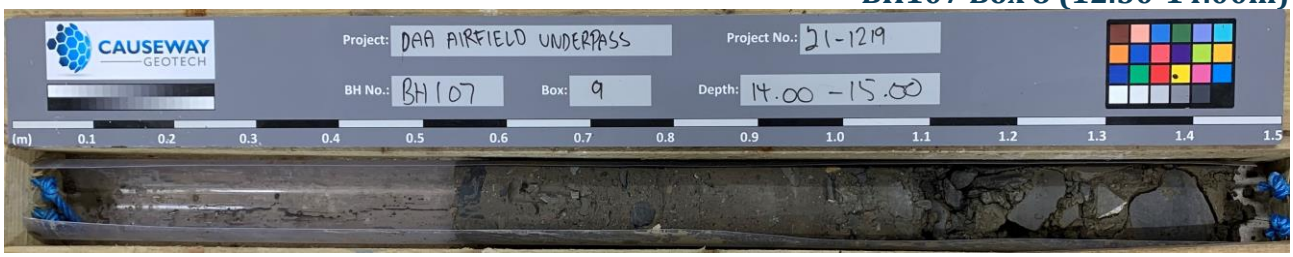
BH107 Box 6 (9.50-11.00m)



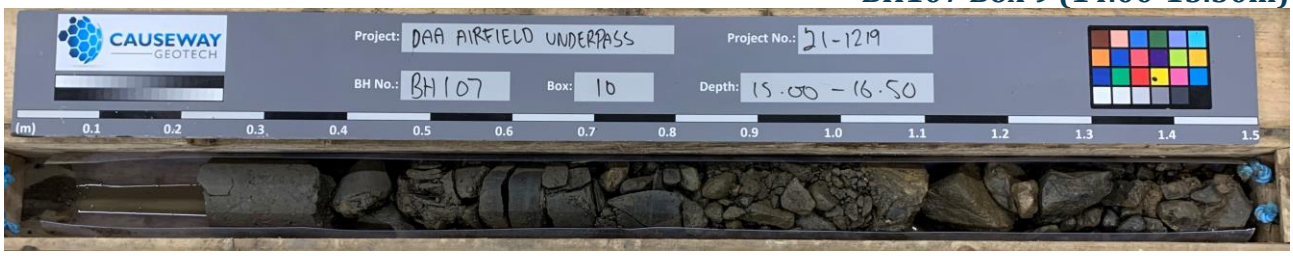
BH107 Box 7 (11.00-12.50m)



BH107 Box 8 (12.50-14.00m)



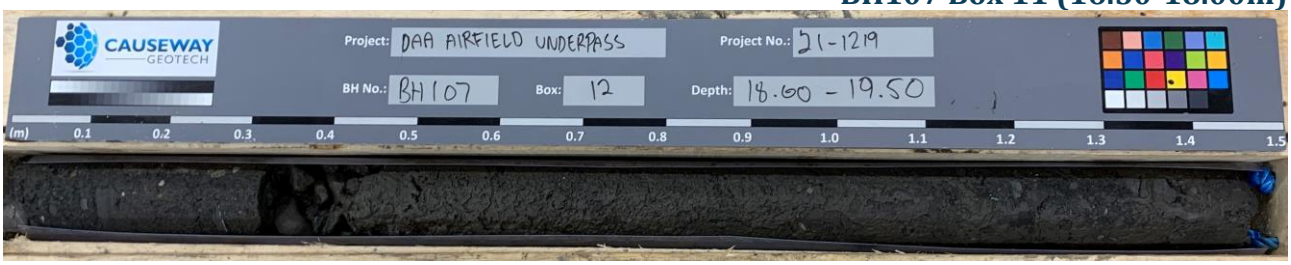
BH107 Box 9 (14.00-15.50m)



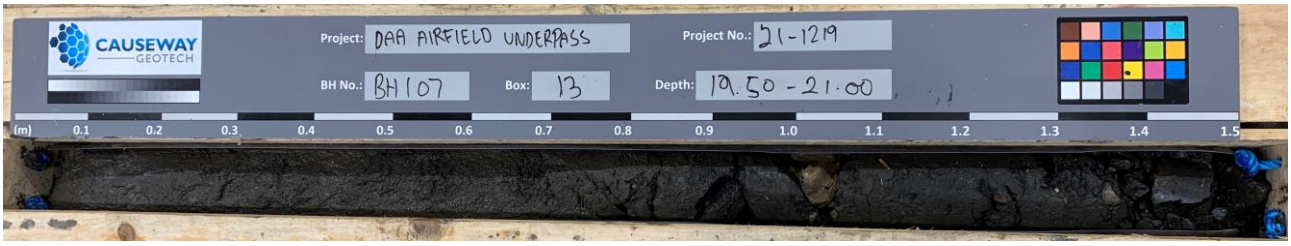
BH107 Box 10 (15.00-16.50m)



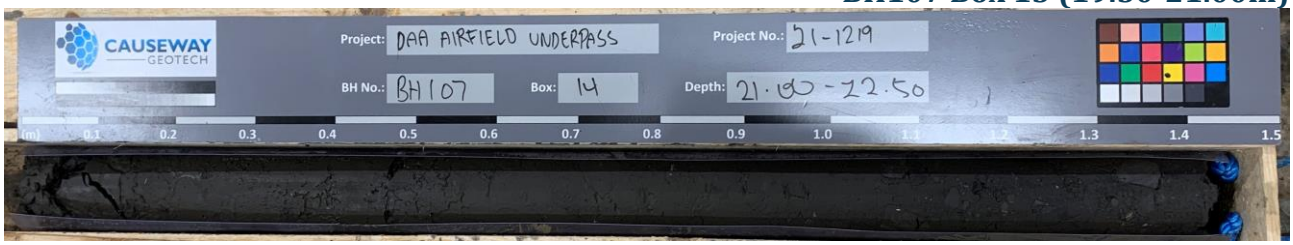
BH107 Box 11 (16.50-18.00m)



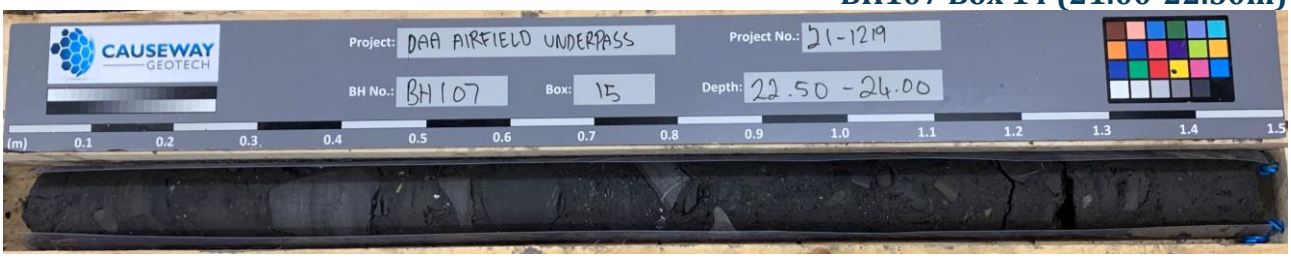
BH107 Box 12 (18.00-19.50m)



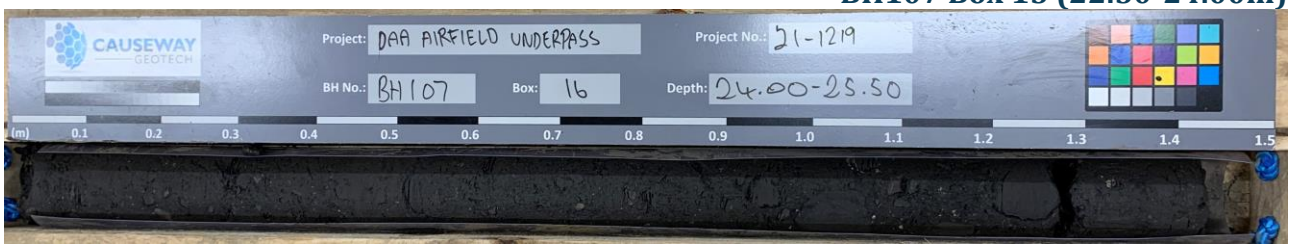
BH107 Box 13 (19.50-21.00m)



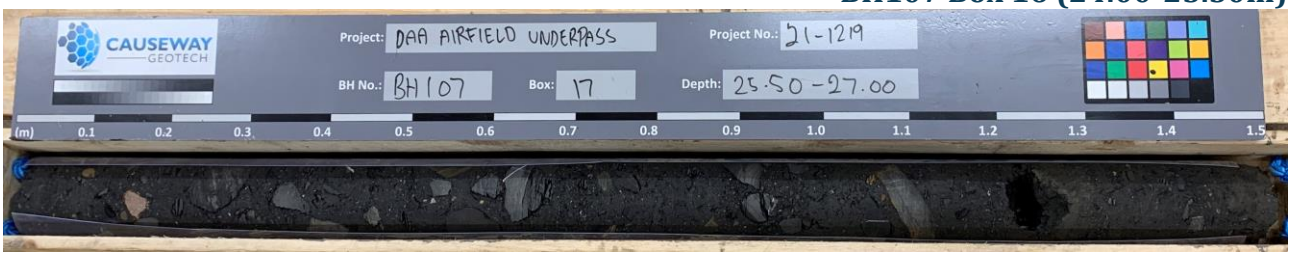
BH107 Box 14 (21.00-22.50m)



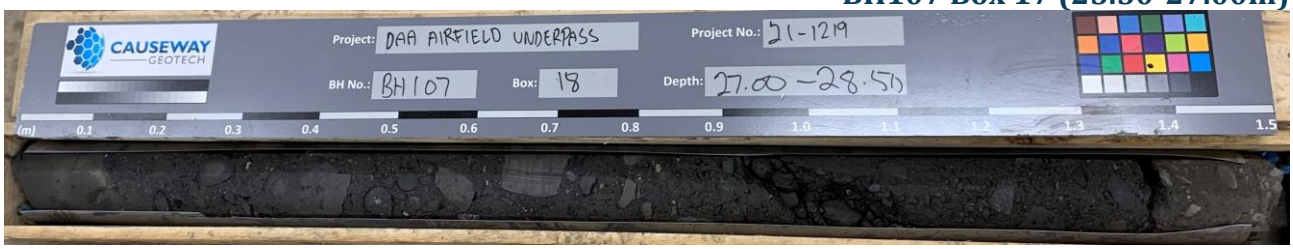
BH107 Box 15 (22.50-24.00m)



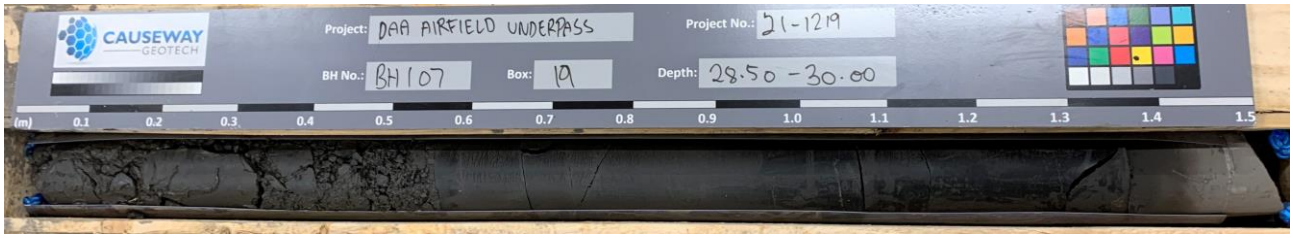
BH107 Box 16 (24.00-25.50m)



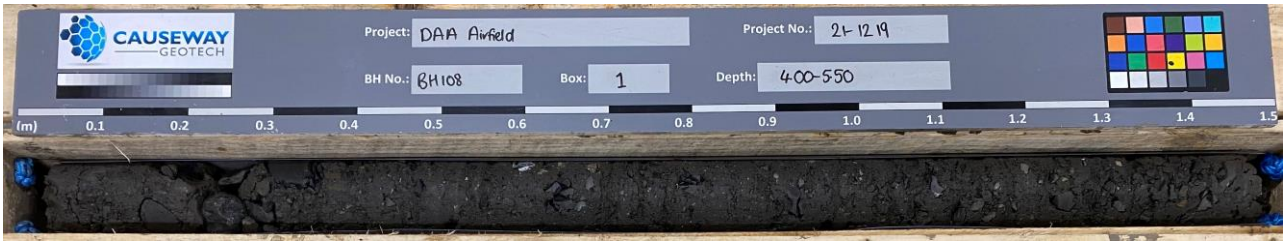
BH107 Box 17 (25.50-27.00m)



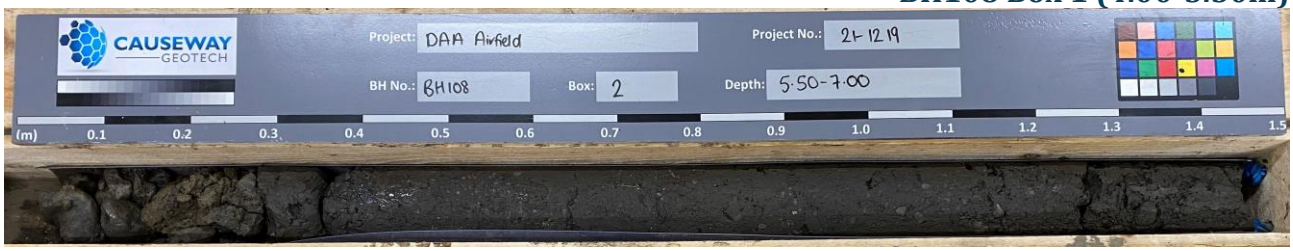
BH107 Box 18 (27.00-28.50m)



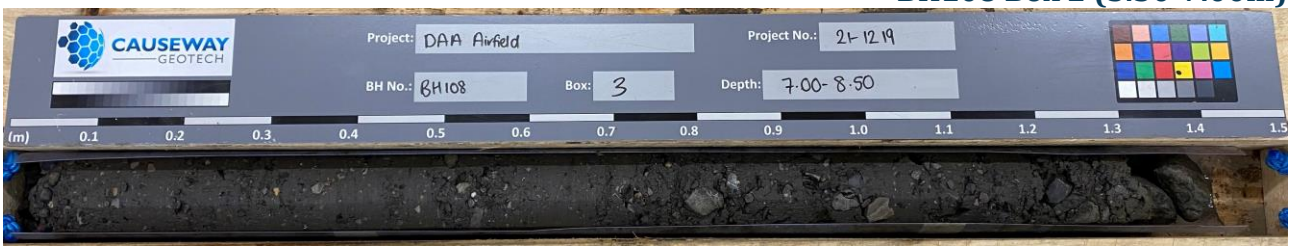
BH107 Box 19 (28.50-30.00m)



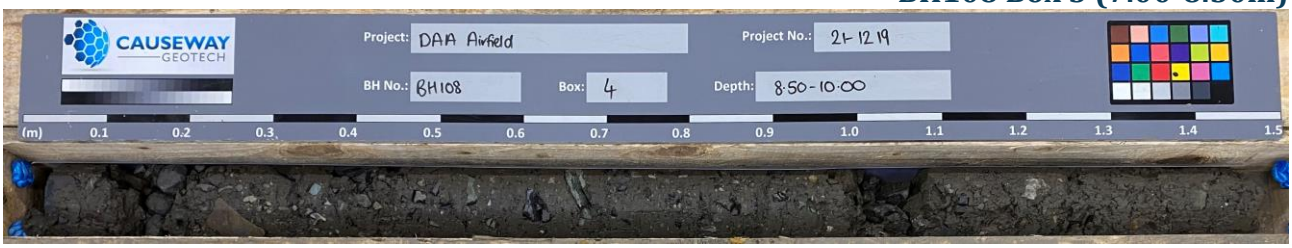
BH108 Box 1 (4.00-5.50m)



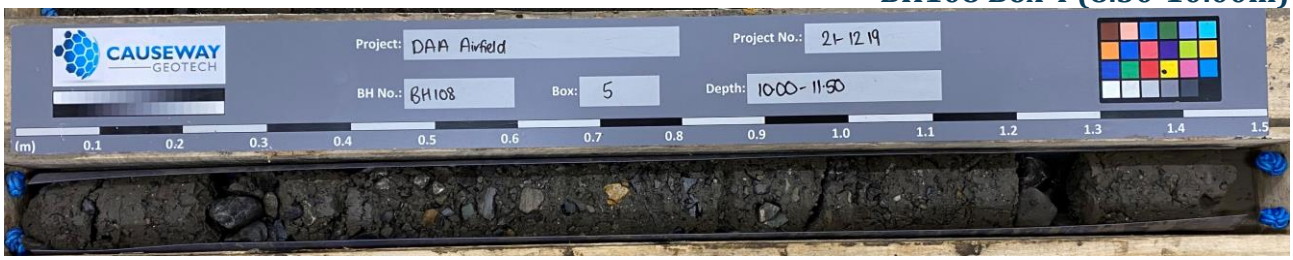
BH108 Box 2 (5.50-7.00m)



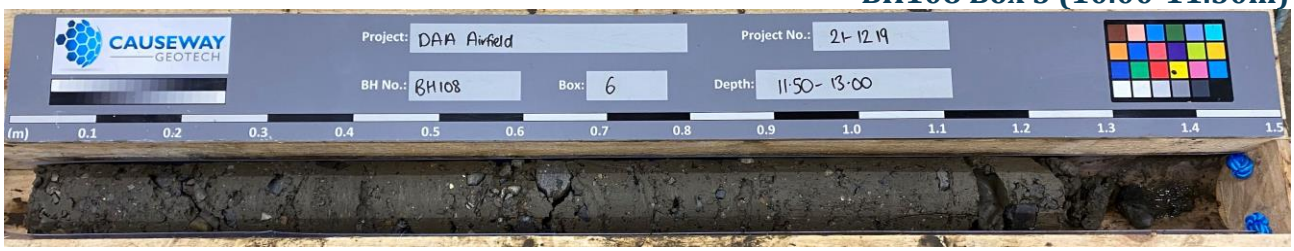
BH108 Box 3 (7.00-8.50m)



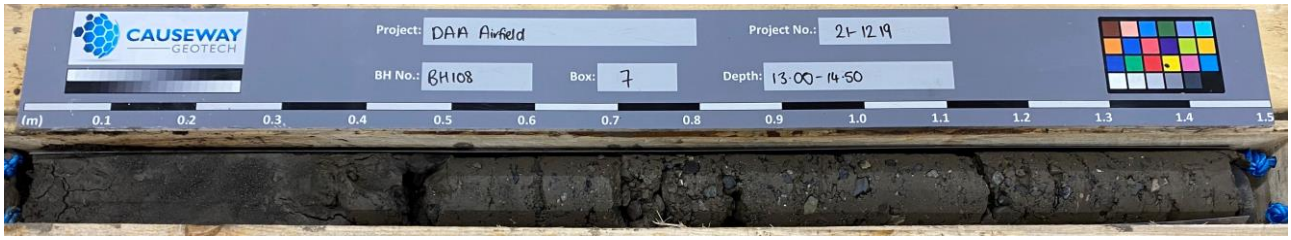
BH108 Box 4 (8.50-10.00m)



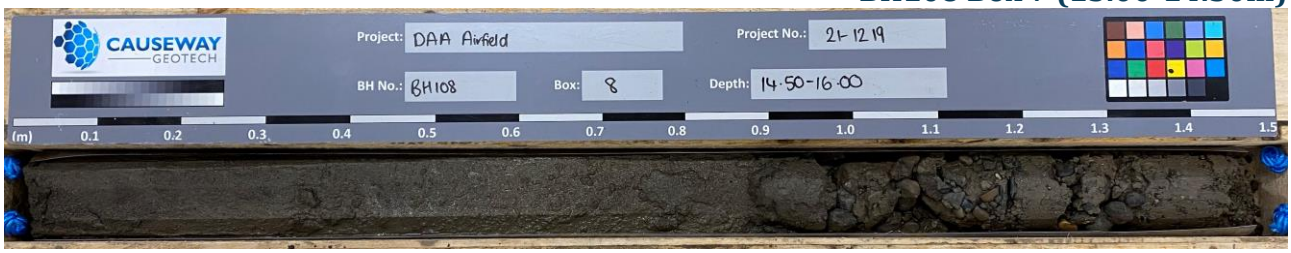
BH108 Box 5 (10.00-11.50m)



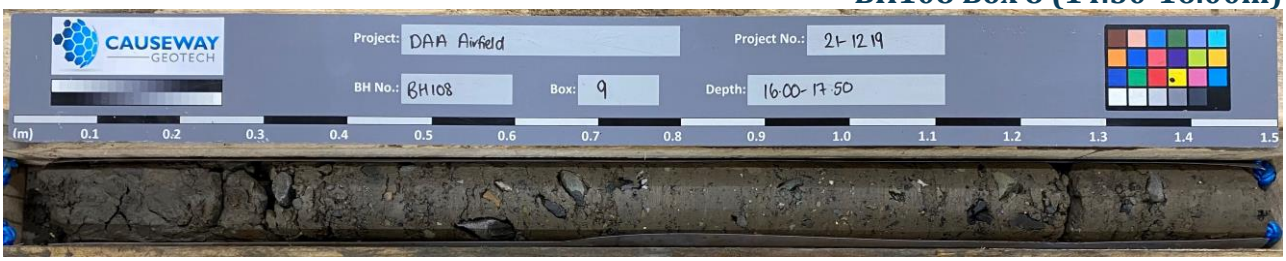
BH108 Box 6 (11.50-13.00m)



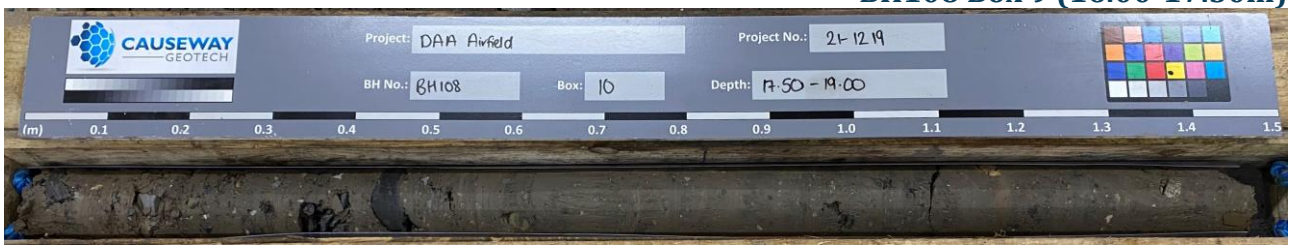
BH108 Box 7 (13.00-14.50m)



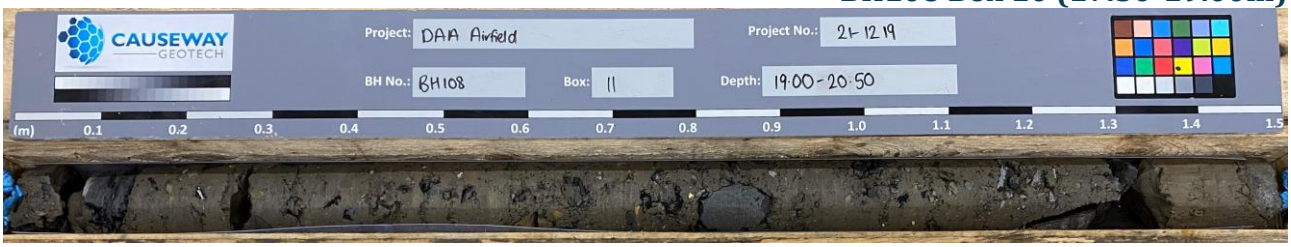
BH108 Box 8 (14.50-16.00m)



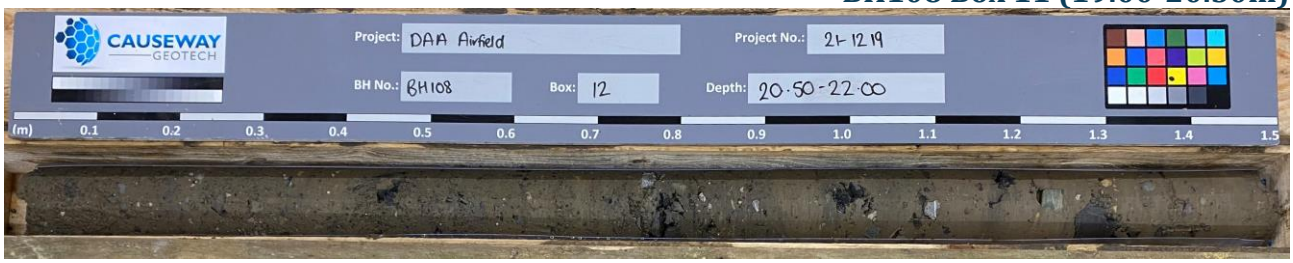
BH108 Box 9 (16.00-17.50m)



BH108 Box 10 (17.50-19.00m)



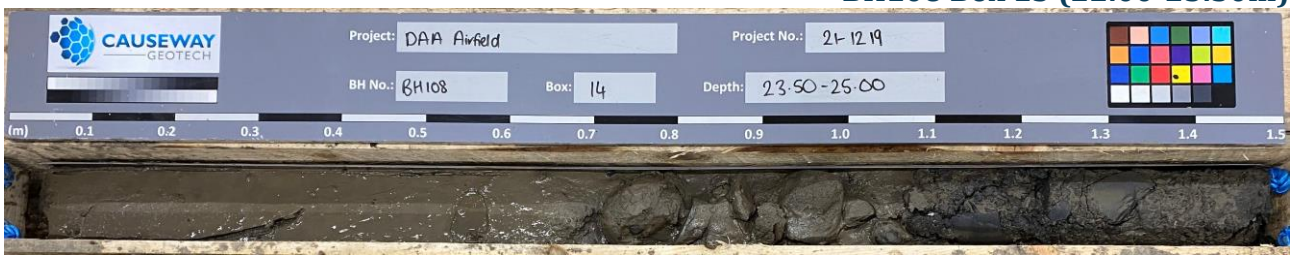
BH108 Box 11 (19.00-20.50m)



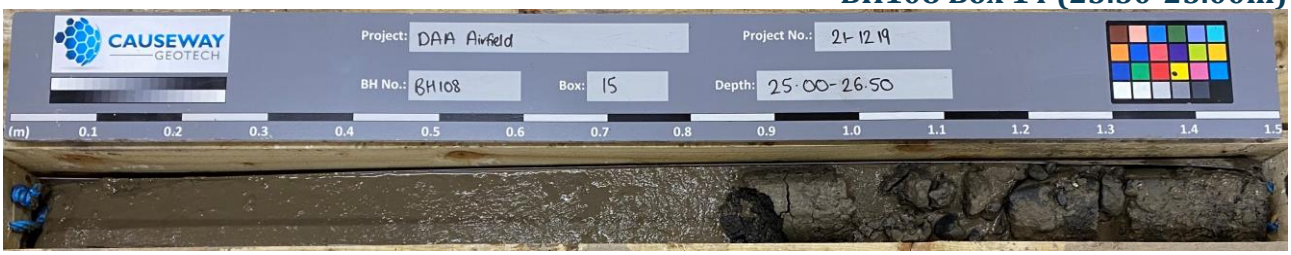
BH108 Box 12 (20.50-22.00m)



BH108 Box 13 (22.00-23.50m)



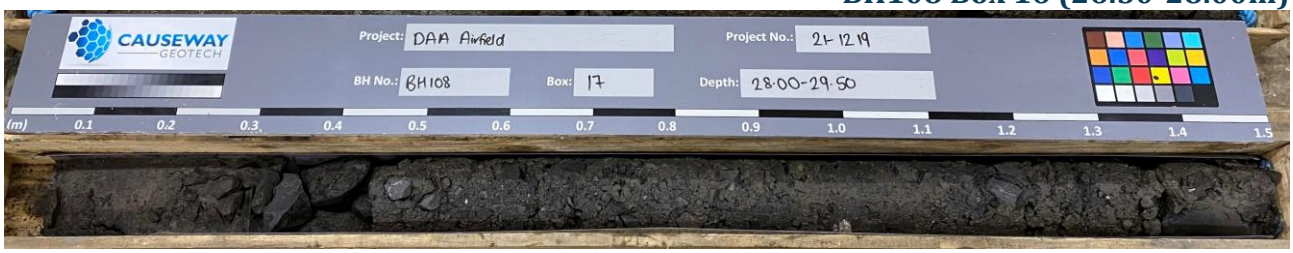
BH108 Box 14 (23.50-25.00m)



BH108 Box 15 (25.00-26.50m)



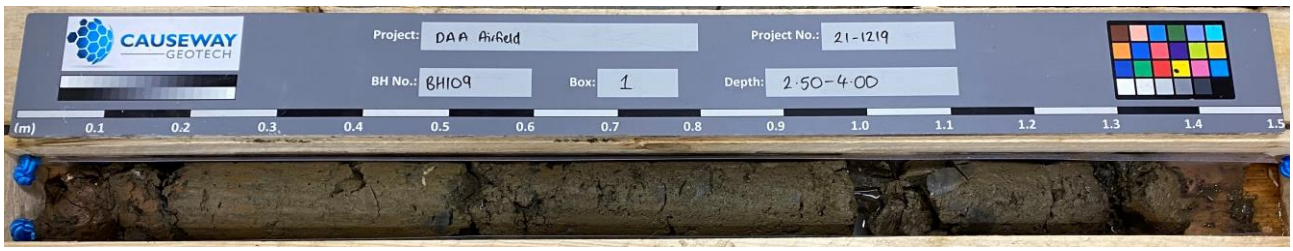
BH108 Box 16 (26.50-28.00m)



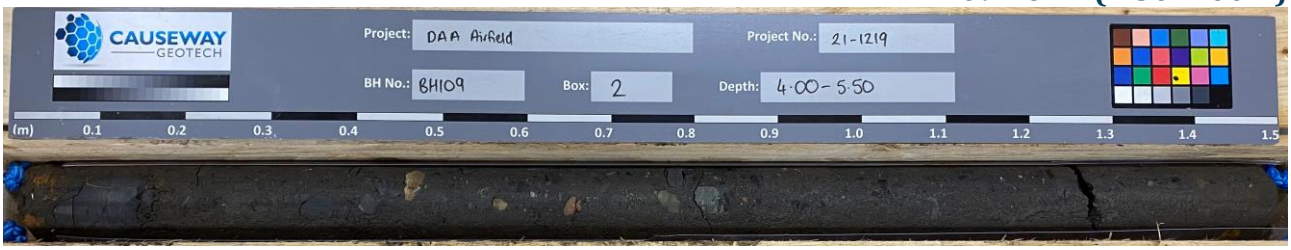
BH108 Box 17 (28.00-29.50m)



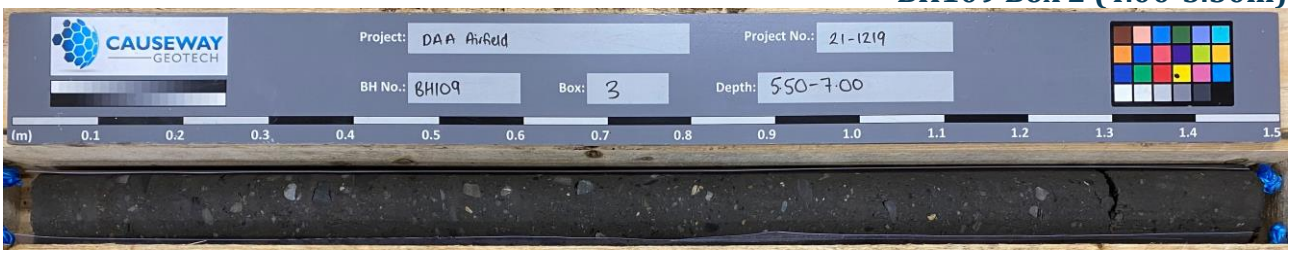
BH108 Box 18 (29.50-30.50m)



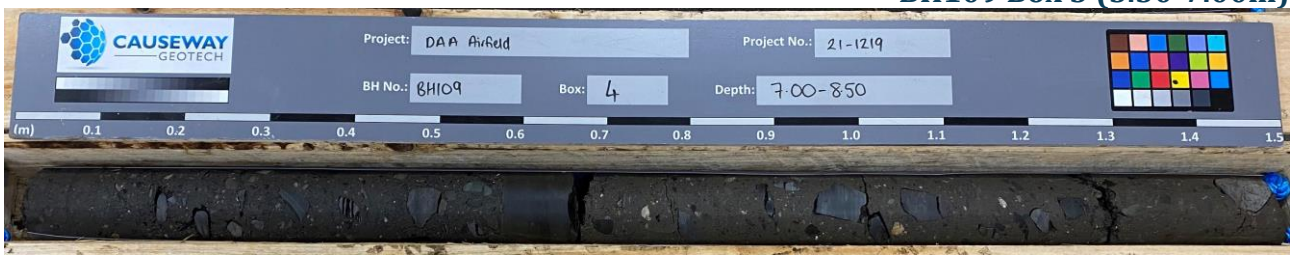
BH109 Box 1 (2.50-4.00m)



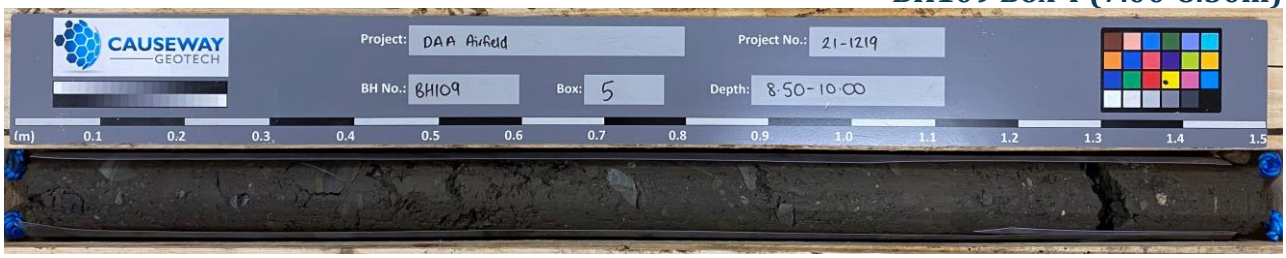
BH109 Box 2 (4.00-5.50m)



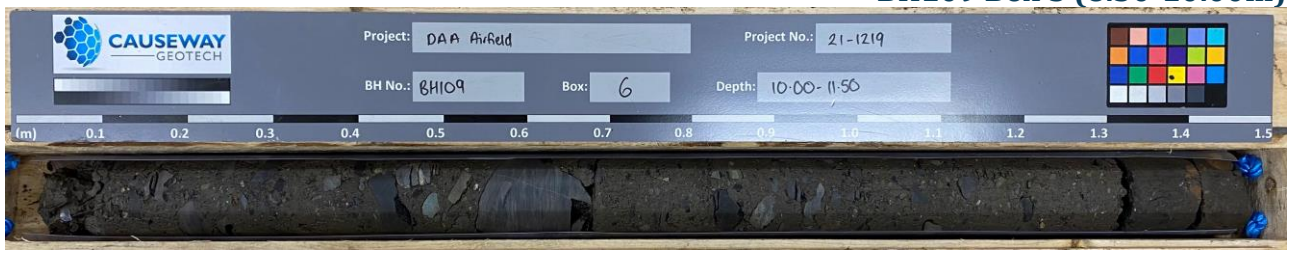
BH109 Box 3 (5.50-7.00m)



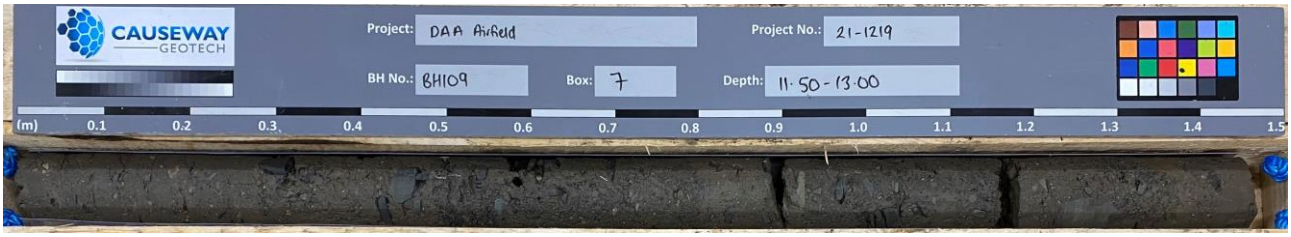
BH109 Box 4 (7.00-8.50m)



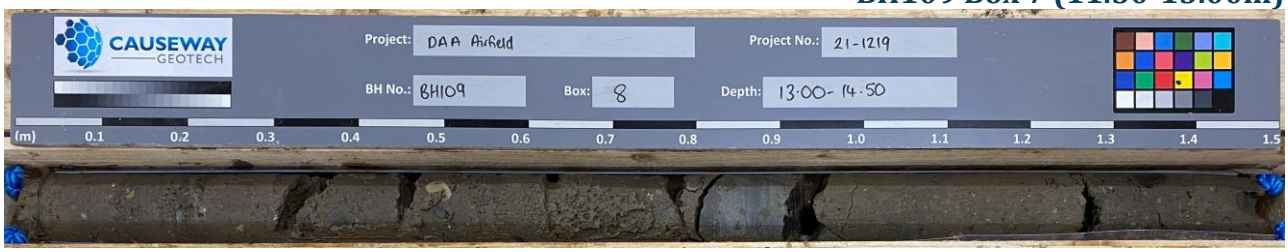
BH109 Box 5 (8.50-10.00m)



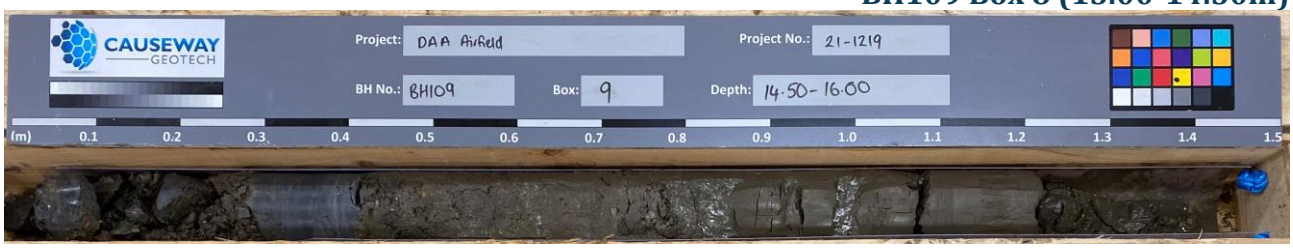
BH109 Box 6 (10.00-11.50m)



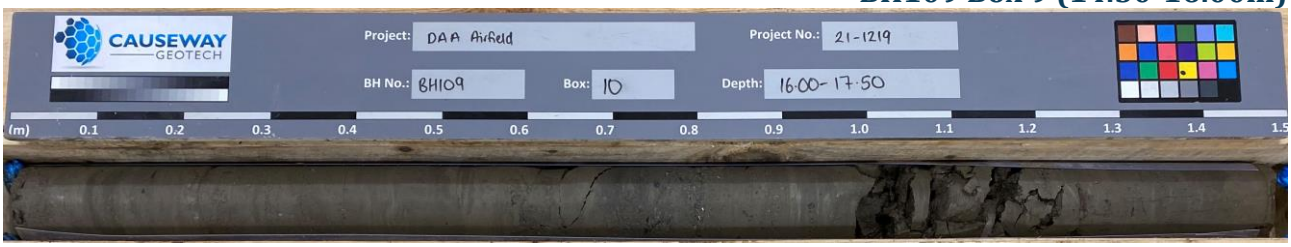
BH109 Box 7 (11.50-13.00m)



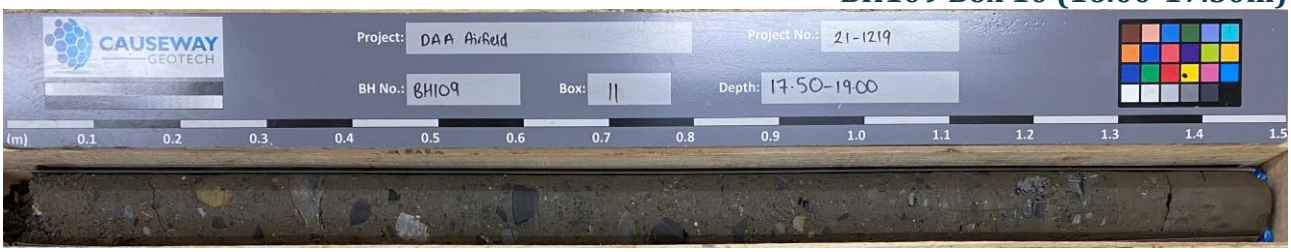
BH109 Box 8 (13.00-14.50m)



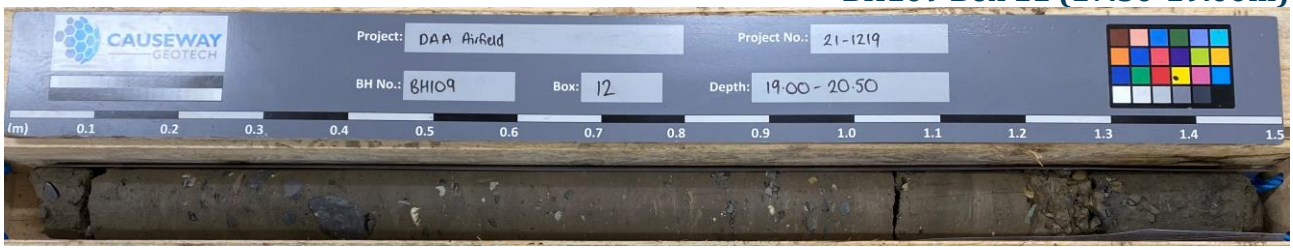
BH109 Box 9 (14.50-16.00m)



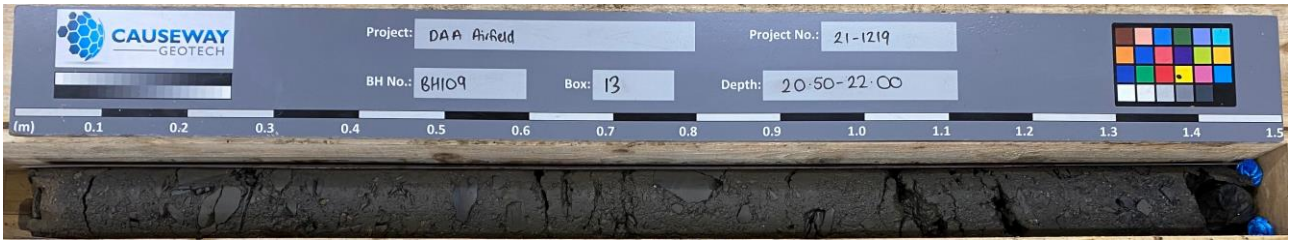
BH109 Box 10 (16.00-17.50m)



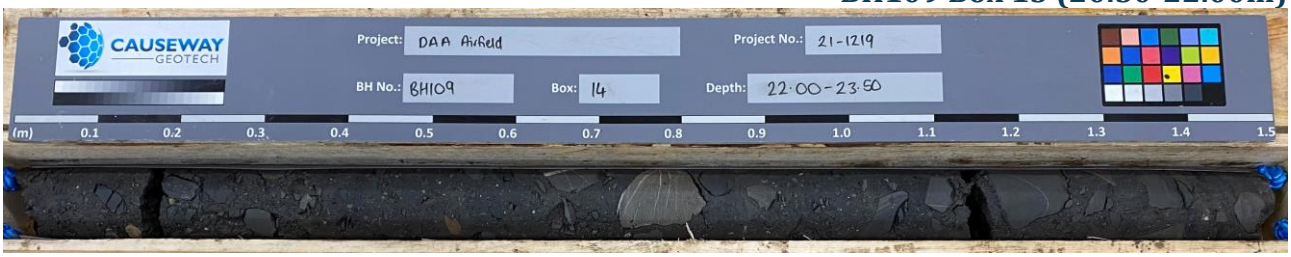
BH109 Box 11 (17.50-19.00m)



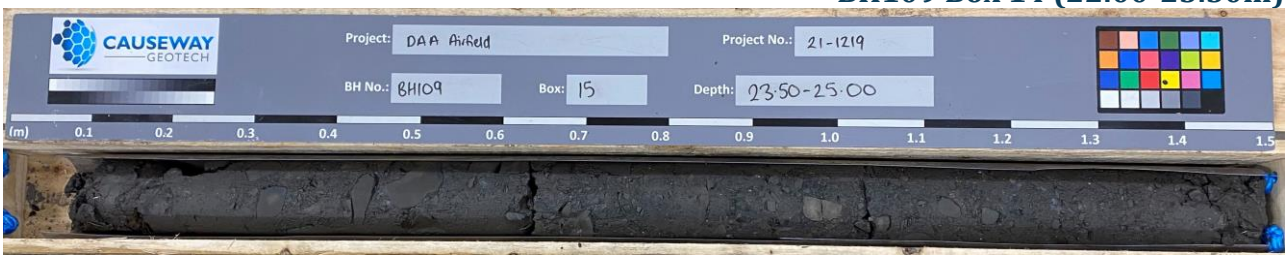
BH109 Box 12 (19.00-20.50m)



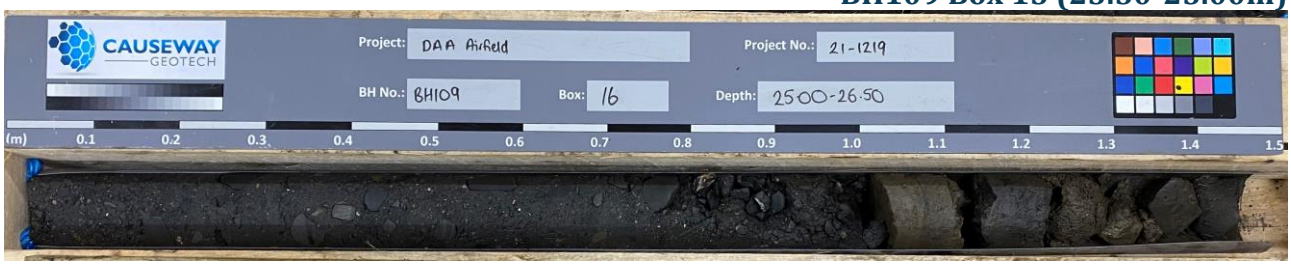
BH109 Box 13 (20.50-22.00m)



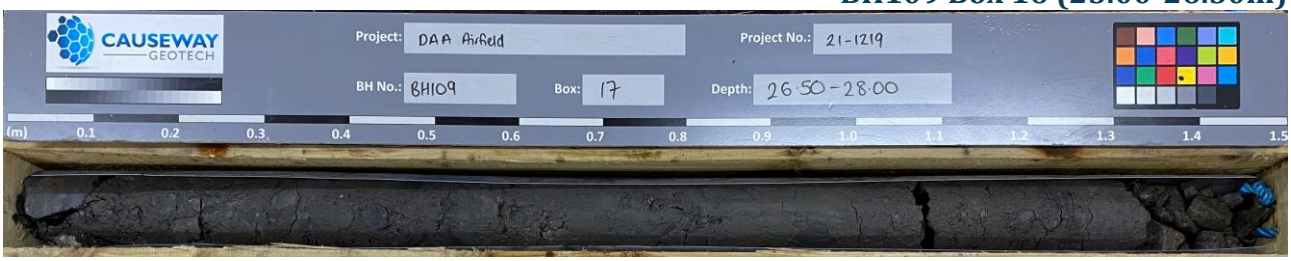
BH109 Box 14 (22.00-23.50m)



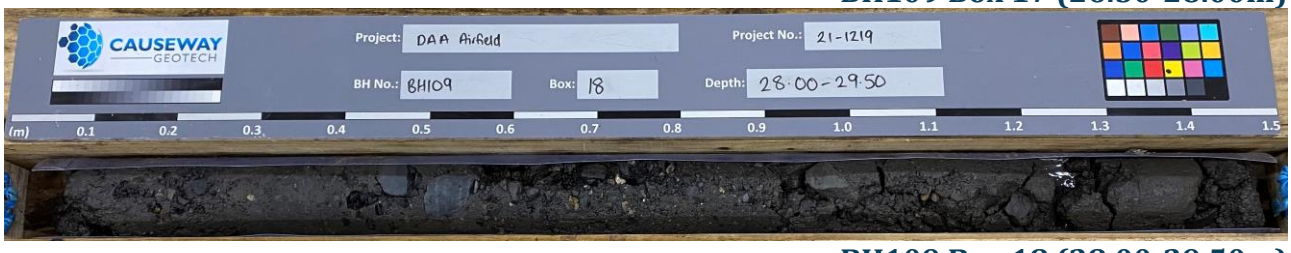
BH109 Box 15 (23.50-25.00m)



BH109 Box 16 (25.00-26.50m)



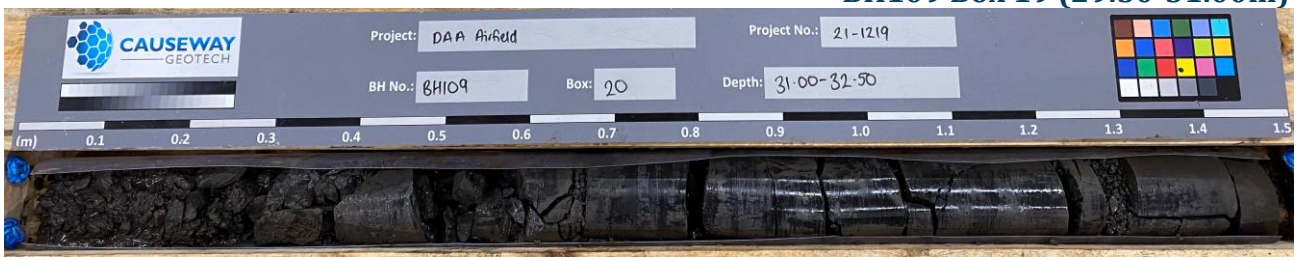
BH109 Box 17 (26.50-28.00m)



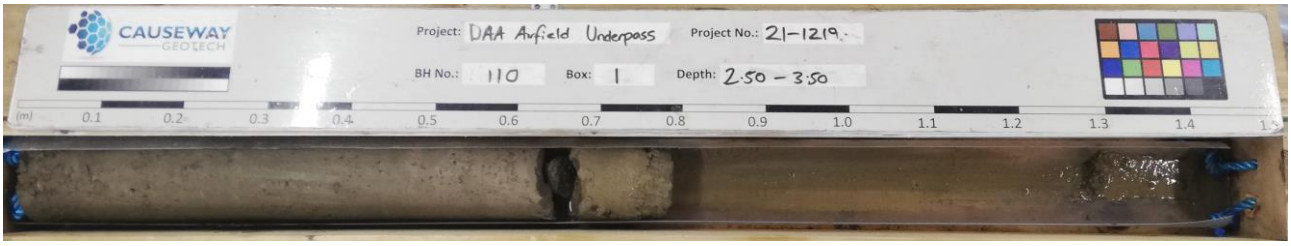
BH109 Box 18 (28.00-29.50m)



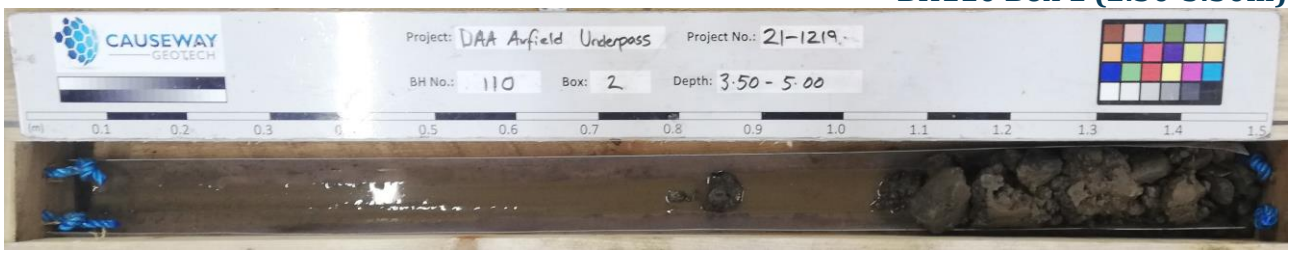
BH109 Box 19 (29.50-31.00m)



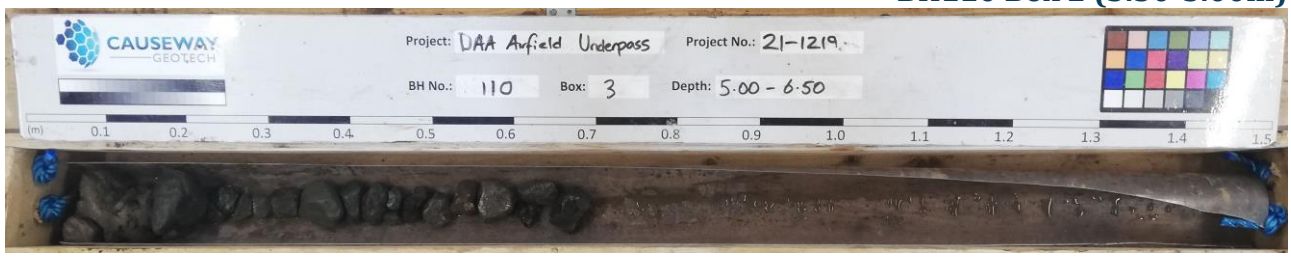
BH109 Box 20 (31.00-32.50m)



BH110 Box 1 (2.50-3.50m)



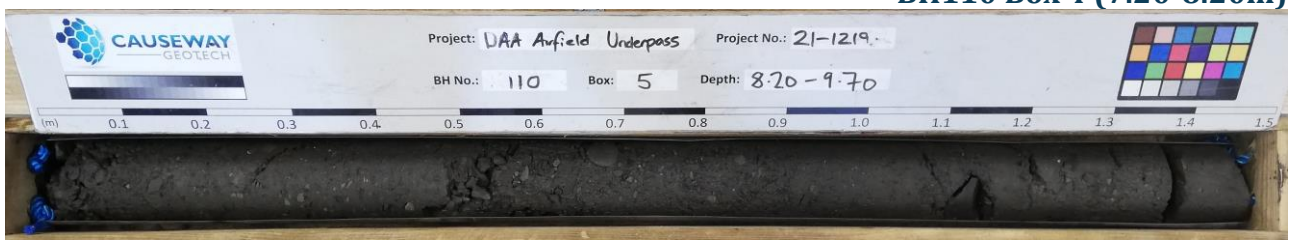
BH110 Box 2 (3.50-5.00m)



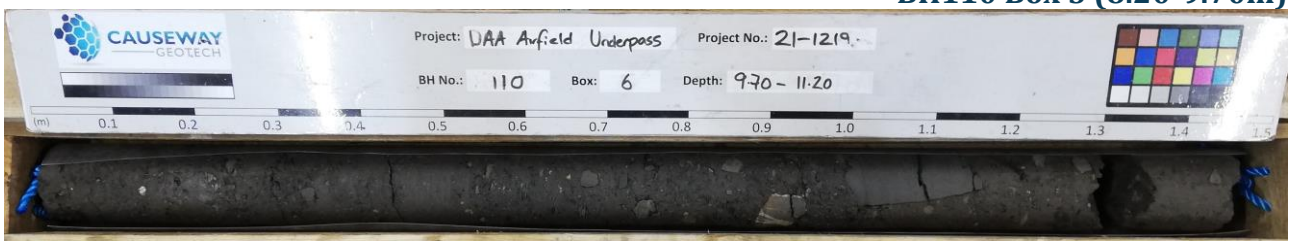
BH110 Box 3 (5.00-6.50m)



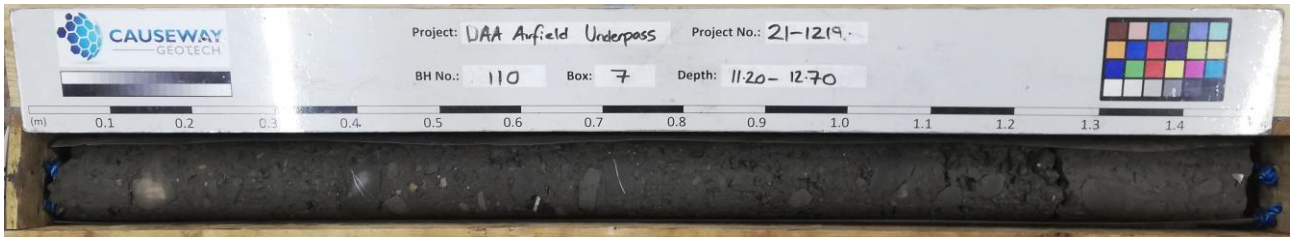
BH110 Box 4 (7.20-8.20m)



BH110 Box 5 (8.20-9.70m)



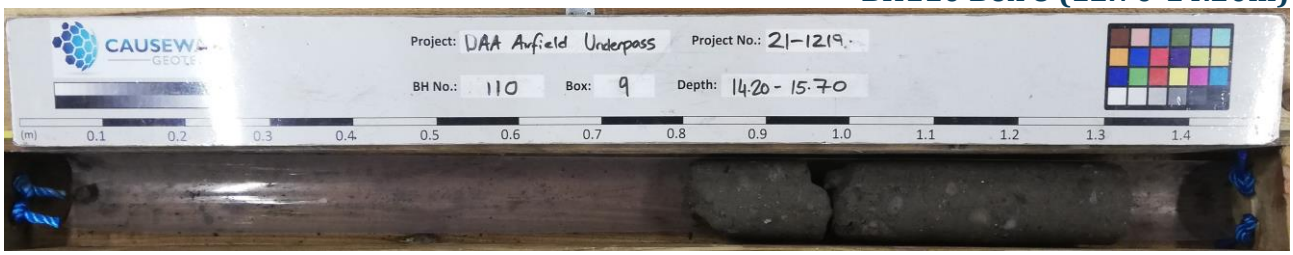
BH110 Box 6 (9.70-11.20m)



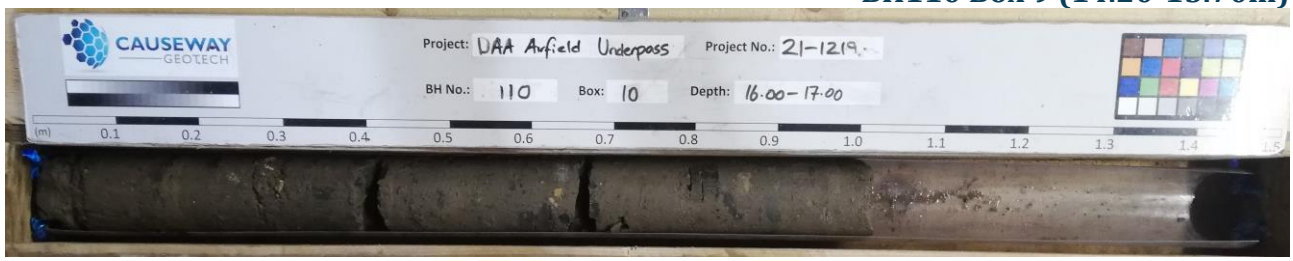
BH110 Box 7 (11.20-12.70m)



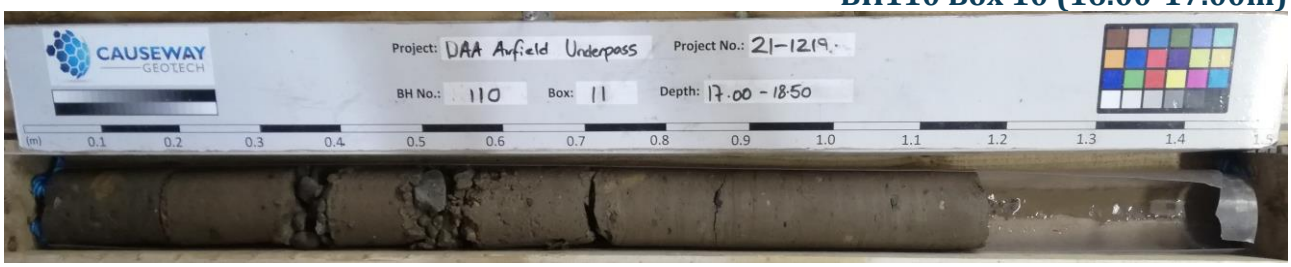
BH110 Box 8 (12.70-14.20m)



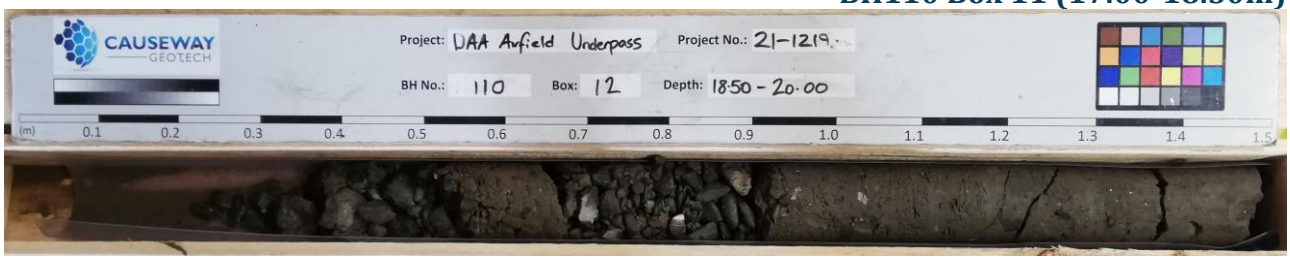
BH110 Box 9 (14.20-15.70m)



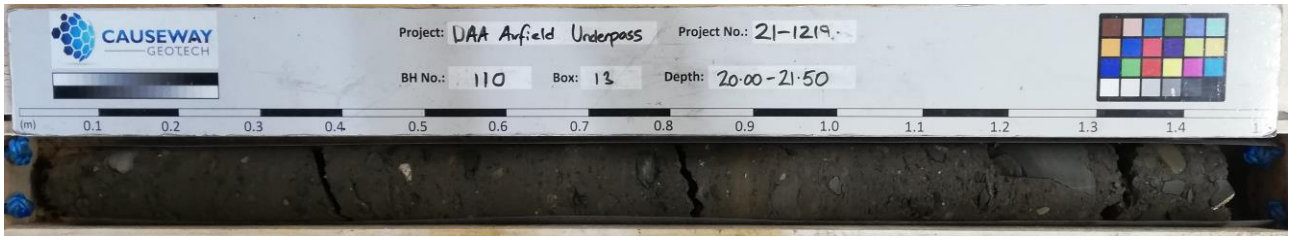
BH110 Box 10 (16.00-17.00m)



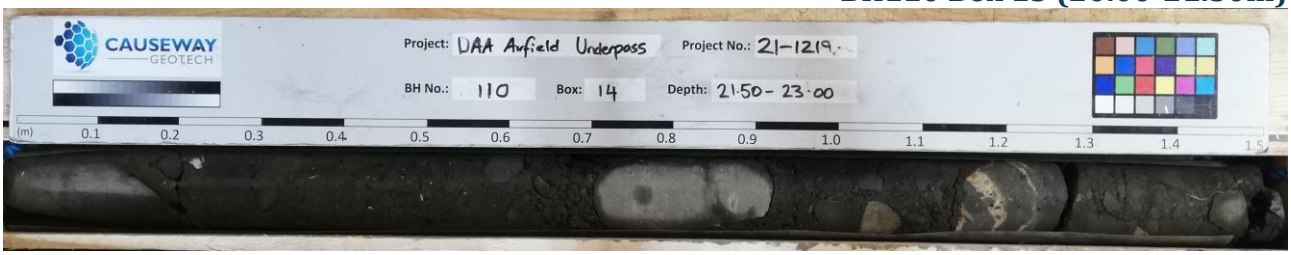
BH110 Box 11 (17.00-18.50m)



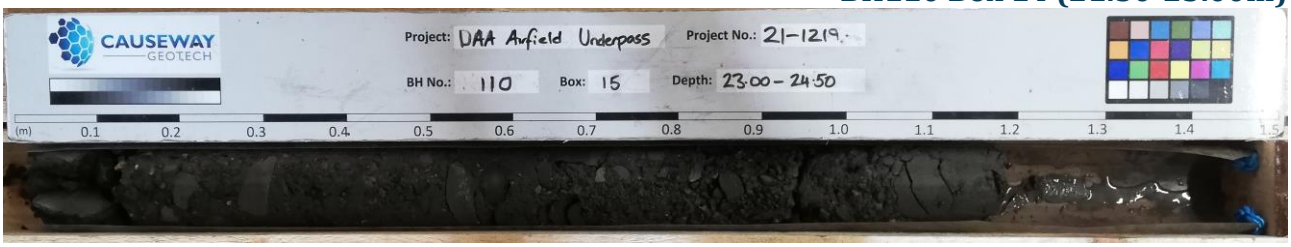
BH110 Box 12 (18.50-20.00m)



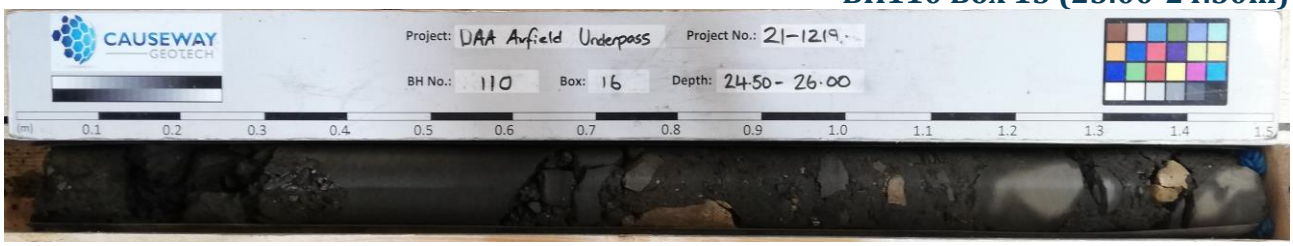
BH110 Box 13 (20.00-21.50m)



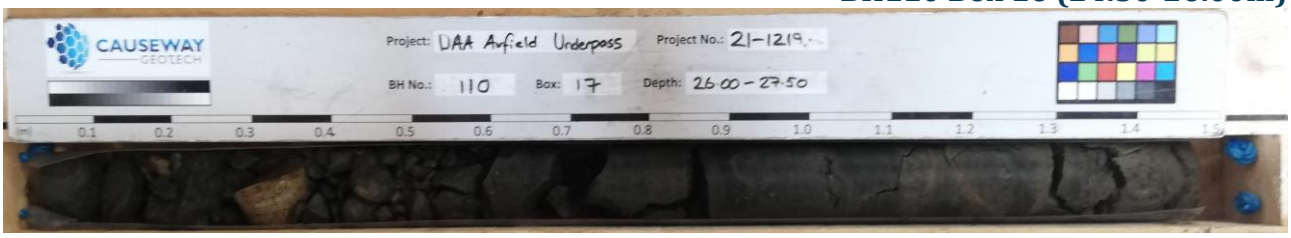
BH110 Box 14 (21.50-23.00m)



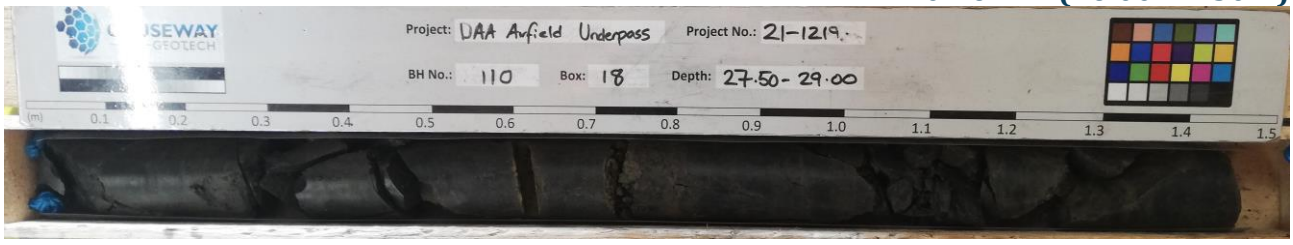
BH110 Box 15 (23.00-24.50m)



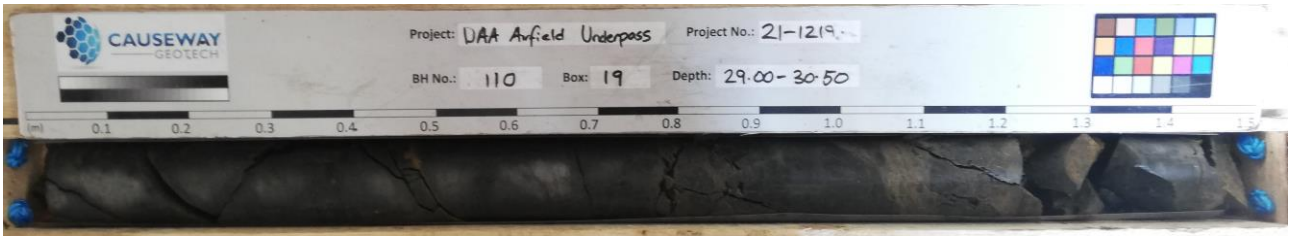
BH110 Box 16 (24.50-26.00m)



BH110 Box 17 (26.00-27.50m)



BH110 Box 18 (27.50-29.00m)



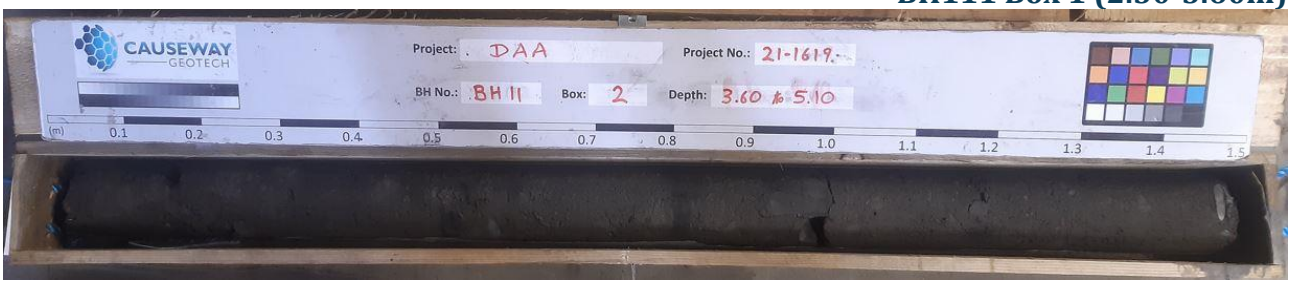
BH110 Box 19 (29.00-30.50m)



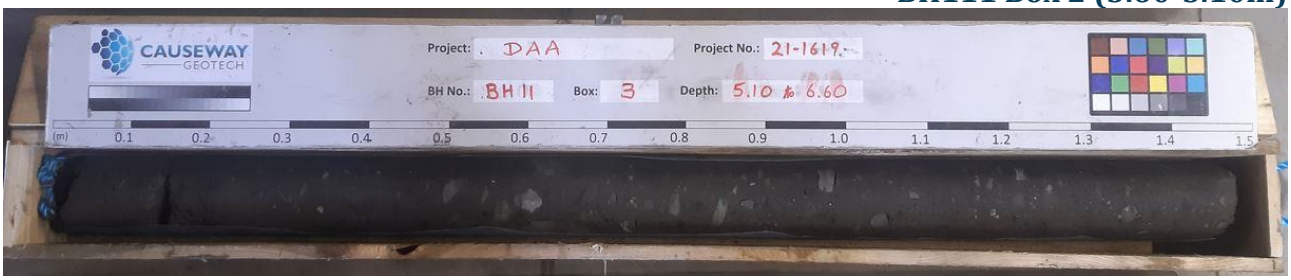
BH110 Box 20 (30.50-32.00m)



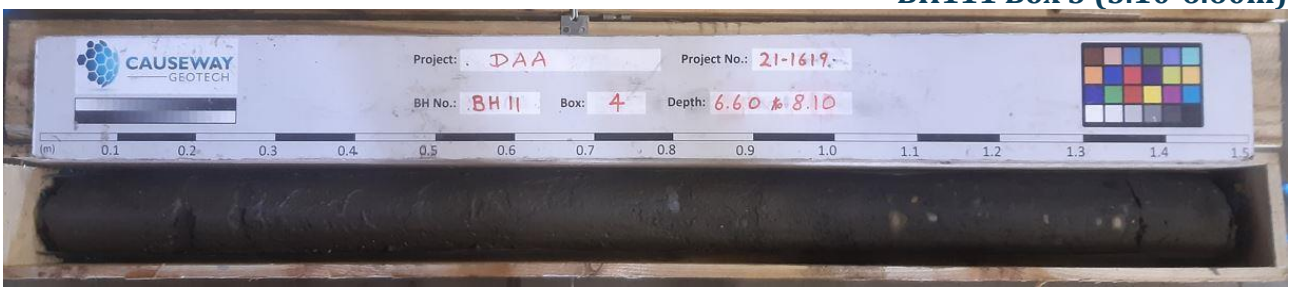
BH111 Box 1 (2.50-3.60m)



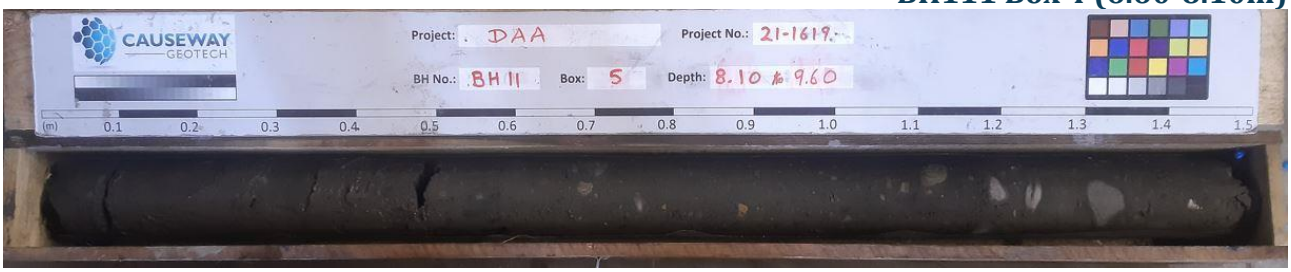
BH111 Box 2 (3.60-5.10m)



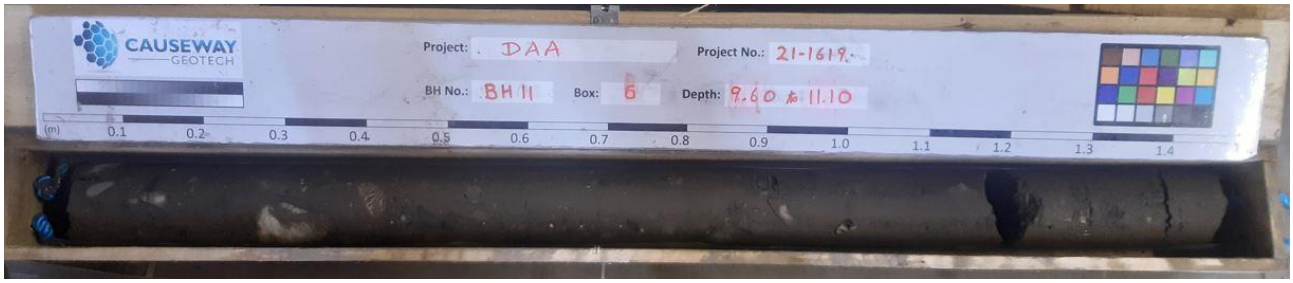
BH111 Box 3 (5.10-6.60m)



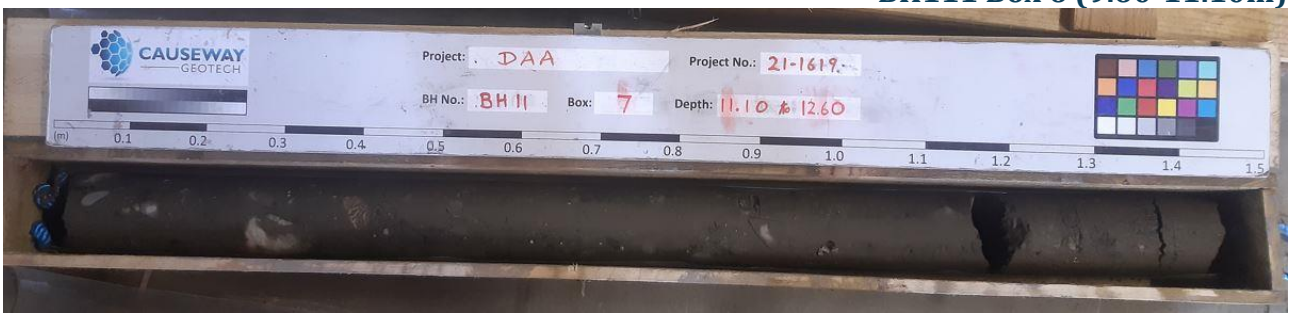
BH111 Box 4 (6.60-8.10m)



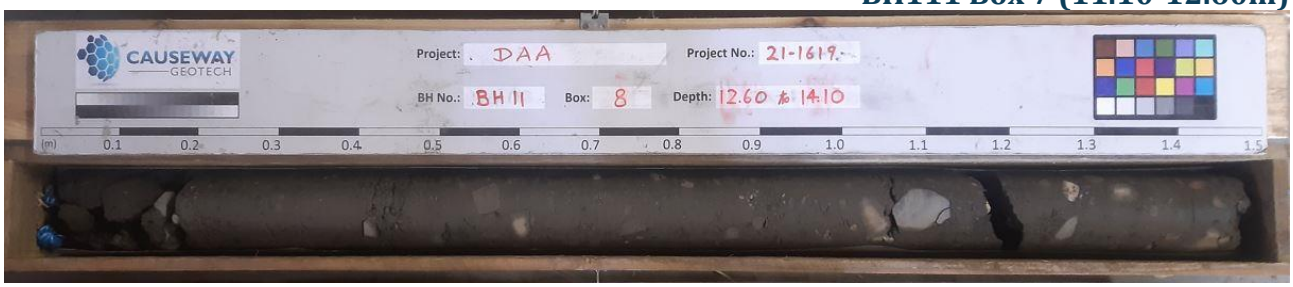
BH111 Box 5 (8.10-9.60m)



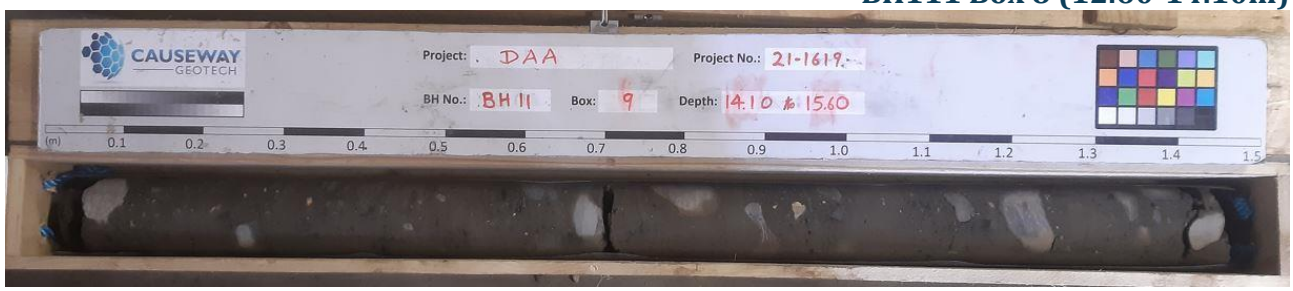
BH111 Box 6 (9.60-11.10m)



BH111 Box 7 (11.10-12.60m)



BH111 Box 8 (12.60-14.10m)



BH111 Box 9 (14.10-15.60m)

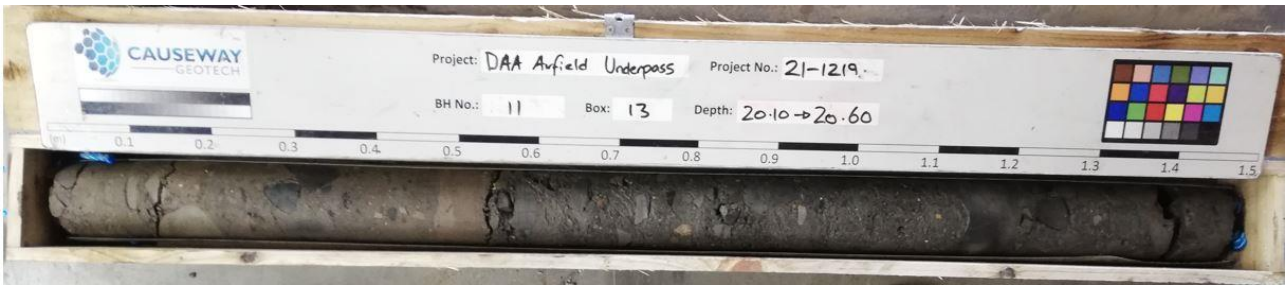


BH111 Box 10 (15.60-17.10m)



BH111 Box 11 (17.10-18.60m)

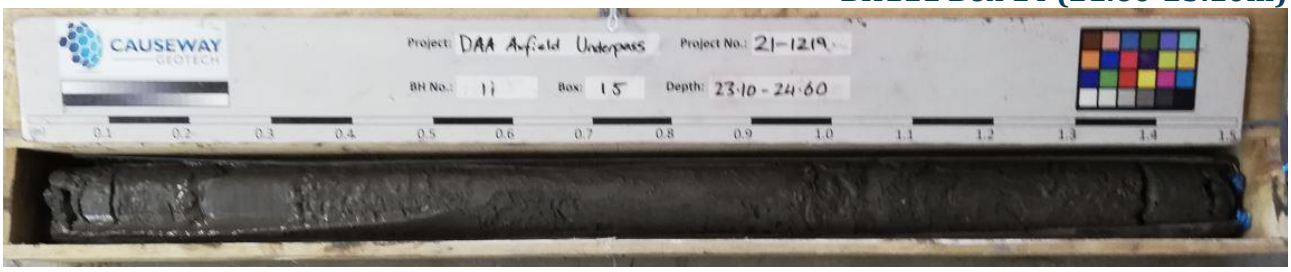
BH111 Box 12 (18.60-20.10m)



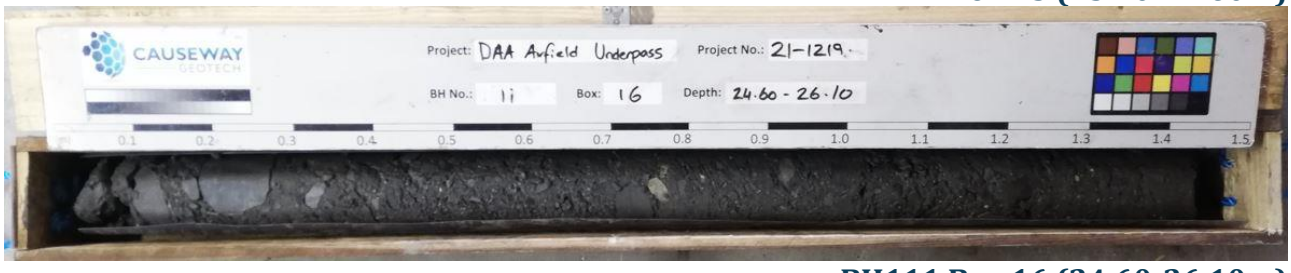
BH111 Box 13 (20.10-21.60m)



BH111 Box 14 (21.60-23.10m)



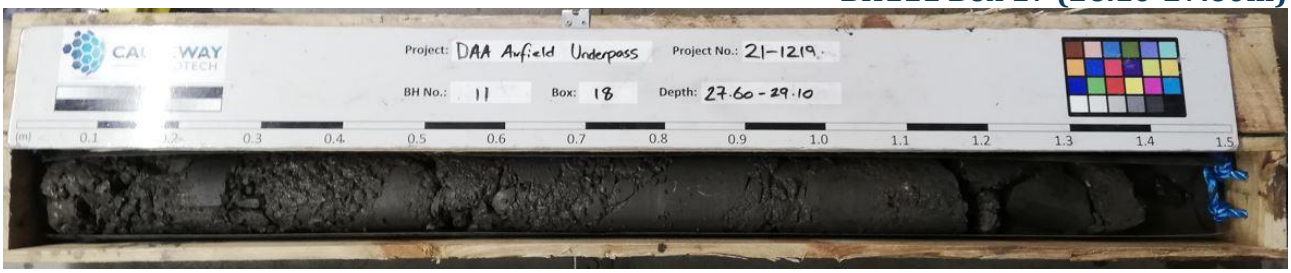
BH111 Box 15 (23.10-24.60m)



BH111 Box 16 (24.60-26.10m)



BH111 Box 17 (26.10-27.60m)



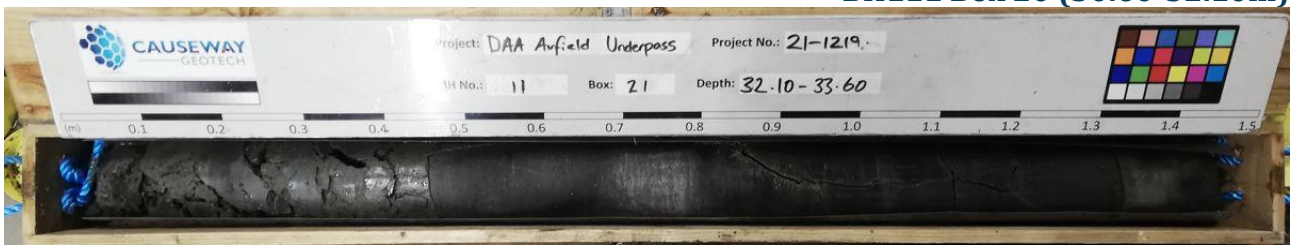
BH111 Box 18 (27.60-29.10m)



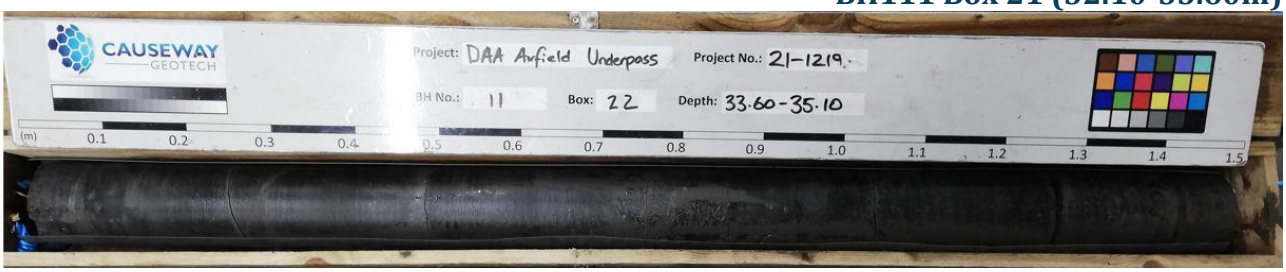
BH111 Box 19 (29.10-30.60m)



BH111 Box 20 (30.60-32.10m)



BH111 Box 21 (32.10-33.60m)



BH111 Box 22 (33.60-35.10m)

CAUSEWAY GEOTECH

APPENDIX D

PUMP TEST DATA
(PROVIDED ELECTRONICALLY TO THE CLIENT)



CAUSEWAY GEOTECH

APPENDIX E

GEOTECHNICAL LABORATORY TEST RESULTS



CAUSEWAY GEOTECH

HEAD OFFICE
Causeway Geotech Ltd
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ROI: +353 (0)1 526 7465
Registered in Ireland.
Company Number: 633786

www.causewaygeotech.com

SOIL AND ROCK SAMPLE ANALYSIS
LABORATORY TEST REPORT

12 May 2022

Project Name:	DAA Airfield Underpass Ground Investigation
Project No.:	21-1219
Client:	DAA
Engineer:	Ramboll Consulting Engineers

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 10/04/2022 and 12/05/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.



Stephen Watson

Laboratory Manager

Signed for and on behalf of Causeway Geotech Ltd

Project Name: DAA Airfield Underpass Ground Investigation

Report Reference: Schedule 1 - FINAL

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	8
SOIL	Liquid and Plastic Limits of soil-1 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	8
SOIL	Bulk and dry density by Linear Measurement Method	BS 1377-2: 1990: Cl 7.2	8
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	15
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	8
SOIL	Dry density/moisture content relationship (2.5 kg rammer)	BS 1377-4: 1990: Cl 3.3 & 3.4	2
SOIL	California Bearing Ratio (CBR)	BS 1377-4: 1990: Cl 7	2
SOIL	Consolidation properties in oedometer - Using 5 pressures (up to 5 days total duration)	BS 1377-5: 1990: Cl 3: 1	1
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 8	6
ROCK	Point load index	ISRM Commission on Testing Methods. Suggested Method for Determining Point Load Strength 1985	10
ROCK	Uniaxial Compressive Strength (UCS)*	ISRM Suggested Methods -Rock Characterization Testing and Monitoring, Ed. E T Brown - 1981	2

SUB-CONTRACTED TESTS

In agreement with Client, the following tests were conducted by an approved sub-contractor. All sub-contracting laboratories used are UKAS accredited.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – subcontracted to Pro Soils Limited *(UKAS 4043)*	Effective shear strength consolidated-undrained triaxial compression test with measurement of pore pressure (up to 4 days)	BS 1377-8:1990	3
	Extra over days (more than initial 4 days)		0
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	Organic Matter Content		4
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	BRE Test - Suite C		3
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	BRE Test - Suite D		3

CAUSEWAY GEOTECH

Summary of Classification Test Results

Project No.: 21-1219

Project Name: DAA Airfield Underpass Ground Investigation

Hole No.	Sample Ref	Top	Base	Type	Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
BH101	1	4.60	4.85	B	Brown sandy gravelly silty CLAY with cobbles.	1.85	1.66	4.8	68	24 -1pt	15	9		CL
BH101	2	8.50	8.80	B	Brown sandy gravelly silty CLAY	2.48	2.28	7.0	76	28 -1pt	13	15		CL
BH101	5	19.10	19.50	B	Brown sandy slightly gravelly silty CLAY	2.08	1.72	21.0	76	26 -1pt	16	10		CL
BH110	1	2.50	3.50	B	Brown sandy slightly gravelly silty CLAY	2.03	1.61	26.0	81	38 -1pt	19	19		CI
BH110	2	8.20	8.55	B	Brown sandy gravelly silty CLAY	2.29	2.07	11.0	64	29 -1pt	14	15		CL
BH110	4	16.25	16.55	B	Brown sandy gravelly silty CLAY	2.26	2.06	9.4	77	28 -1pt	14	14		CL
BH111	1	2.50	3.50	B	Brown sandy gravelly silty CLAY	2.13	1.96	7.1	73	28 -1pt	14	14		CL
BH111	2	6.25	6.60	B	Brown sandy gravelly silty CLAY	2.32	2.15	2.3	58	28 -1pt	15	13		CL

All tests performed in accordance with BS1377:1990 unless specified otherwise

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Key

Density test | Liquid Limit | Particle density

Linear measurement unless : | 4pt cone unless : | sp - small pyknometer

wd - water displacement | cas - Casagrande method | gj - gas jar

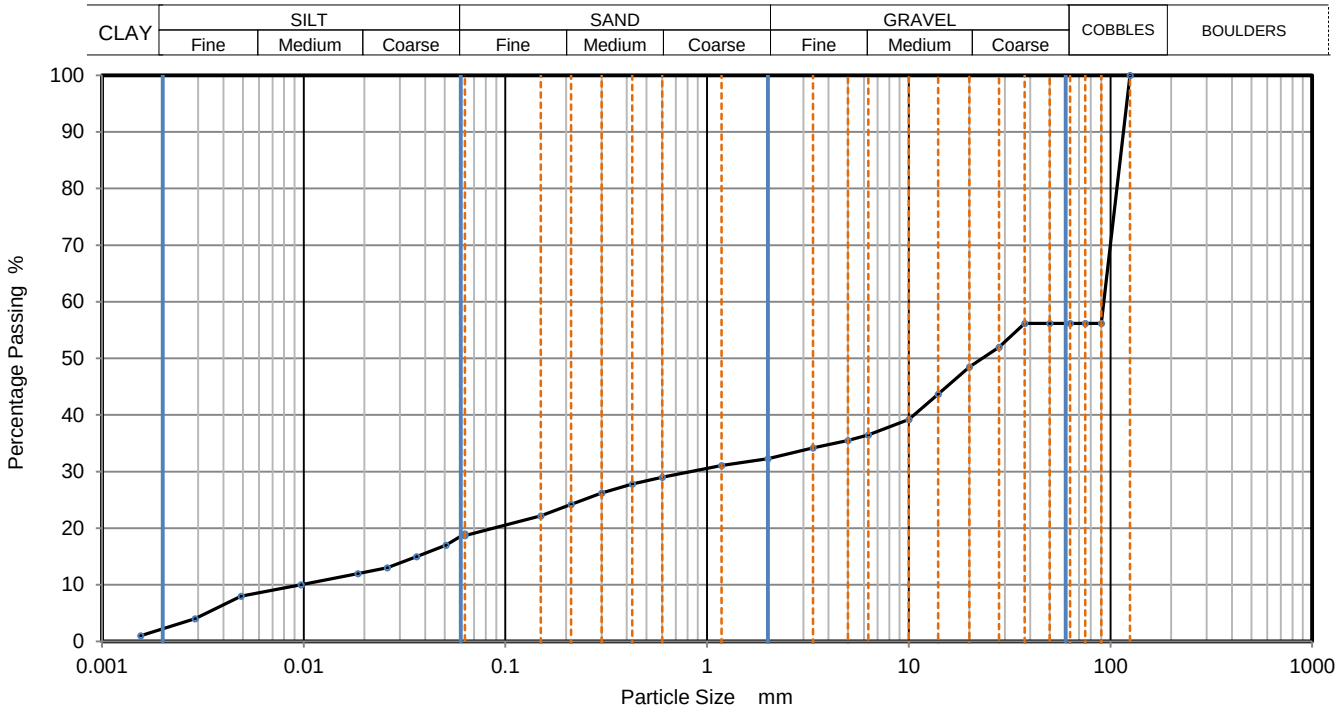
wi - immersion in water | 1pt - single point test

Date Printed: 05/05/2022 00:00

Approved By: Stephen.Watson

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH101
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Brown sandy gravelly silty CLAY with cobbles.			Depth, m	4.60
Specimen Reference	8	Specimen Depth	4.6 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202204067



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	19
90	56	0.05065	17
75	56	0.03625	15
63	56	0.02594	13
50	56	0.01855	12
37.5	56	0.00969	10
28	52	0.00490	8
20	49	0.00289	4
14	44	0.00155	1
10	39		
6.3	37		
5	36		
3.35	34		
2	32		
1.18	31		
0.6	29	Particle density	(assumed)
0.425	28	2.65	Mg/m3
0.3	26		
0.212	24		
0.15	22		
0.063	19		

Dry Mass of sample, g	5844

Sample Proportions	% dry mass
Cobbles	43.8
Gravel	23.9
Sand	13.6
Silt	16.4
Clay	2.3

Grading Analysis		
D100	mm	125
D60	mm	92.6
D30	mm	0.822
D10	mm	0.0104
Uniformity Coefficient		8900
Curvature Coefficient		0.7

Remarks

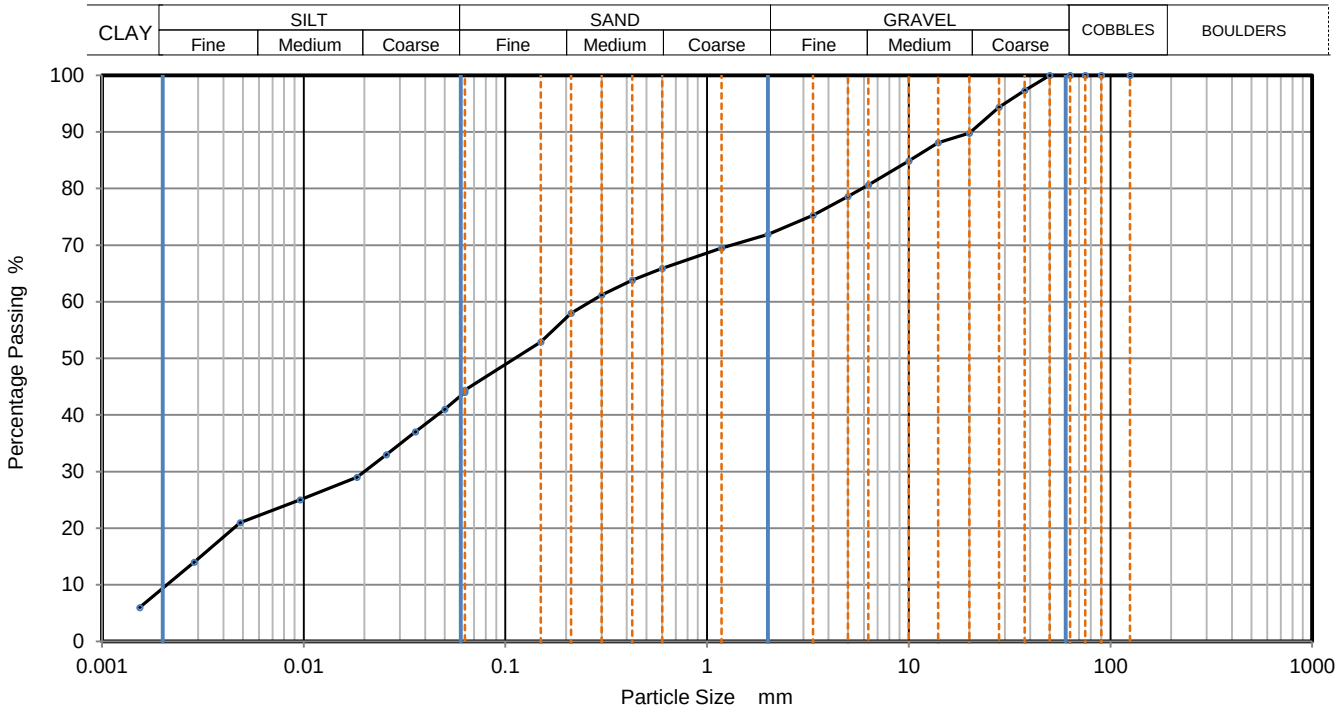
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UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH101
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	8.50
Specimen Reference	10	Specimen Depth	8.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202204068



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	44
90	100	0.05002	41
75	100	0.03581	37
63	100	0.02563	33
50	100	0.01834	29
37.5	97	0.00958	25
28	94	0.00485	21
20	90	0.00286	14
14	88	0.00154	6
10	85		
6.3	81		
5	79		
3.35	75		
2	72		
1.18	70		
0.6	66	Particle density	(assumed)
0.425	64	2.65	Mg/m3
0.3	61		
0.212	58		
0.15	53		
0.063	44		

Dry Mass of sample, g	6149

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	28.1
Sand	27.6
Silt	35.2
Clay	9.1

Grading Analysis		
D100	mm	
D60	mm	0.263
D30	mm	0.0201
D10	mm	0.00216
Uniformity Coefficient		120
Curvature Coefficient		0.71

Remarks

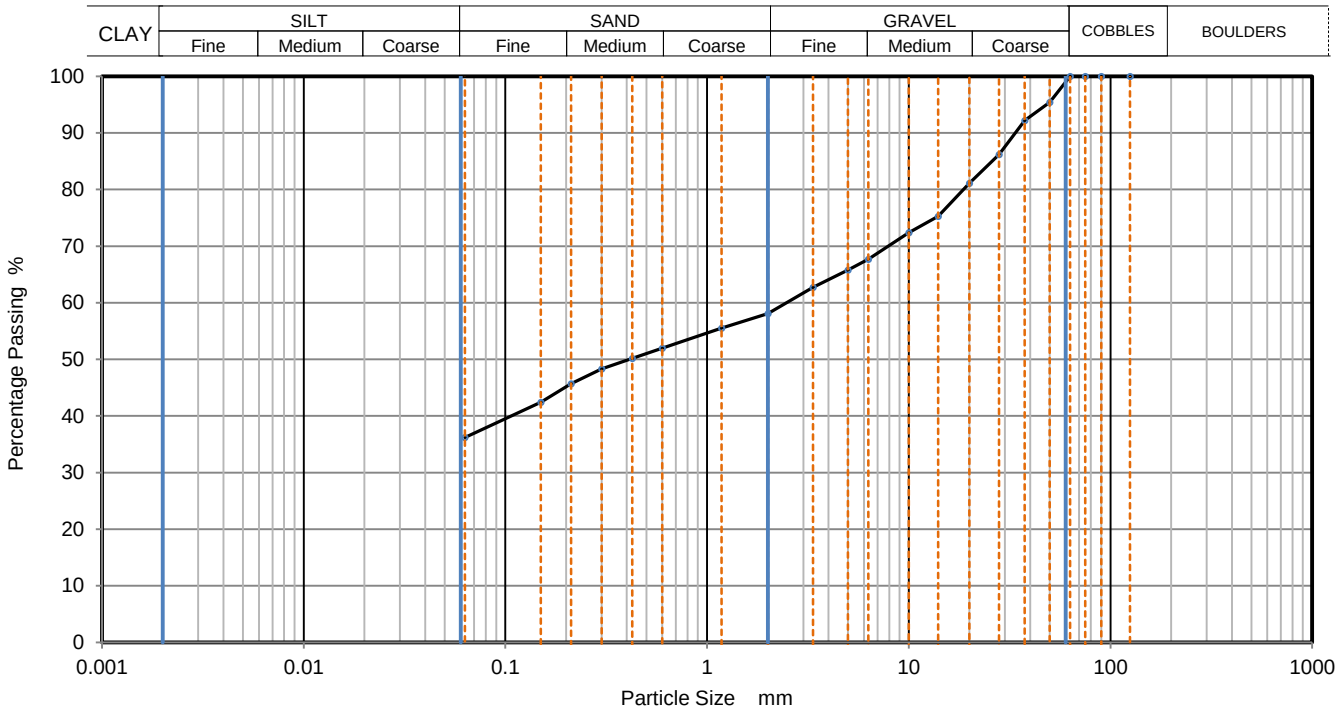
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH101
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	3
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	11.90
Specimen Reference	2	Specimen Depth	11.9 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022040610



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	95		
37.5	92		
28	86		
20	81		
14	75		
10	72		
6.3	68		
5	66		
3.35	63		
2	58		
1.18	56		
0.6	52		
0.425	50		
0.3	48		
0.212	46		
0.15	42		
0.063	36		

Dry Mass of sample, g	5062

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	41.9
Sand	22.0
Fines <0.063mm	36.0

Grading Analysis		
D100	mm	
D60	mm	2.47
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

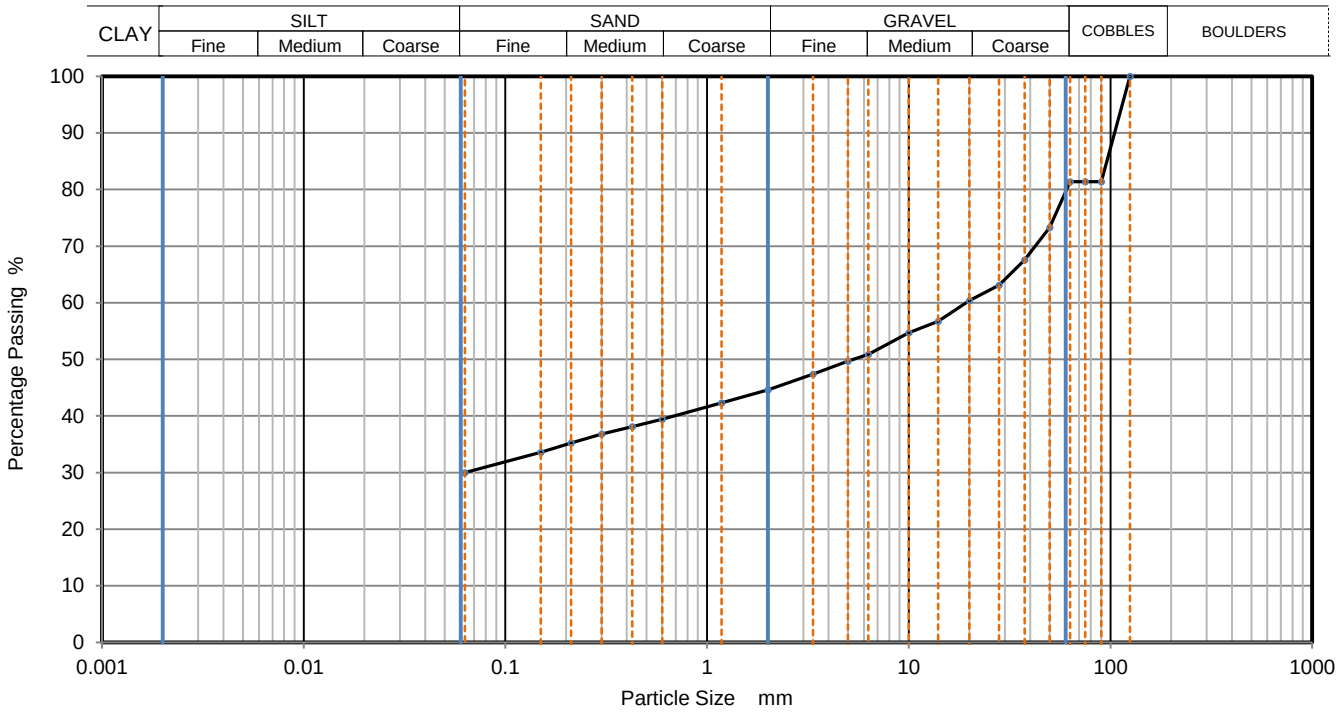
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH101
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	4
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	15.00
Specimen Reference	2	Specimen Depth	15 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022040611



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	81		
75	81		
63	81		
50	73		
37.5	68		
28	63		
20	60		
14	57		
10	55		
6.3	51		
5	50		
3.35	47		
2	45		
1.18	42		
0.6	39		
0.425	38		
0.3	37		
0.212	35		
0.15	34		
0.063	30		

Dry Mass of sample, g	7813

Sample Proportions	% dry mass
Cobbles	18.6
Gravel	36.8
Sand	14.6
Fines <0.063mm	30.0

Grading Analysis		
D100	mm	125
D60	mm	19.3
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

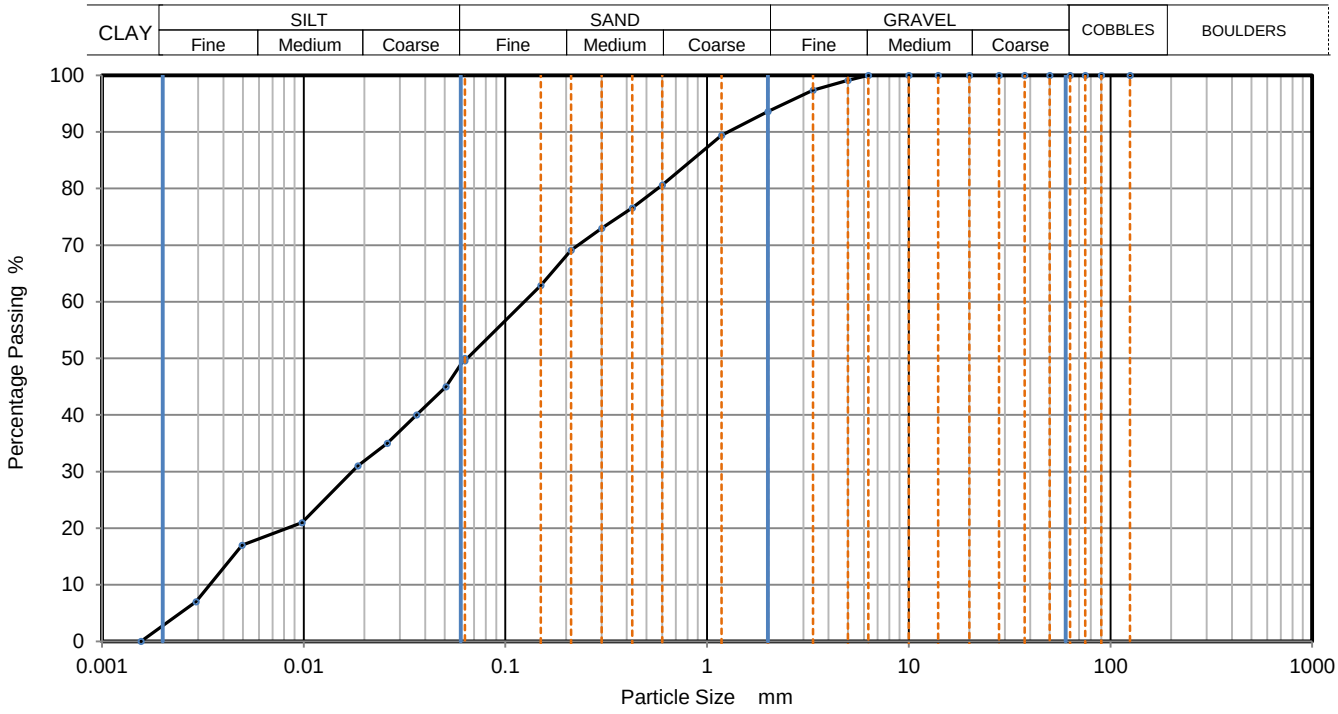
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH101
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	5
Soil Description	Brown sandy slightly gravelly silty CLAY			Depth, m	19.10
Specimen Reference	8	Specimen Depth	19.1 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022040613



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	50
90	100	0.05065	45
75	100	0.03625	40
63	100	0.02594	35
50	100	0.01855	31
37.5	100	0.00980	21
28	100	0.00495	17
20	100	0.00292	7
14	100	0.00156	0
10	100		
6.3	100		
5	99		
3.35	97		
2	94		
1.18	89		
0.6	81	Particle density	(assumed)
0.425	77	2.65	Mg/m3
0.3	73		
0.212	69		
0.15	63		
0.063	50		

Dry Mass of sample, g	209

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	6.4
Sand	44.0
Silt	46.8
Clay	2.8

Grading Analysis		
D100	mm	
D60	mm	0.124
D30	mm	0.0177
D10	mm	0.00344
Uniformity Coefficient		36
Curvature Coefficient		0.74

Remarks

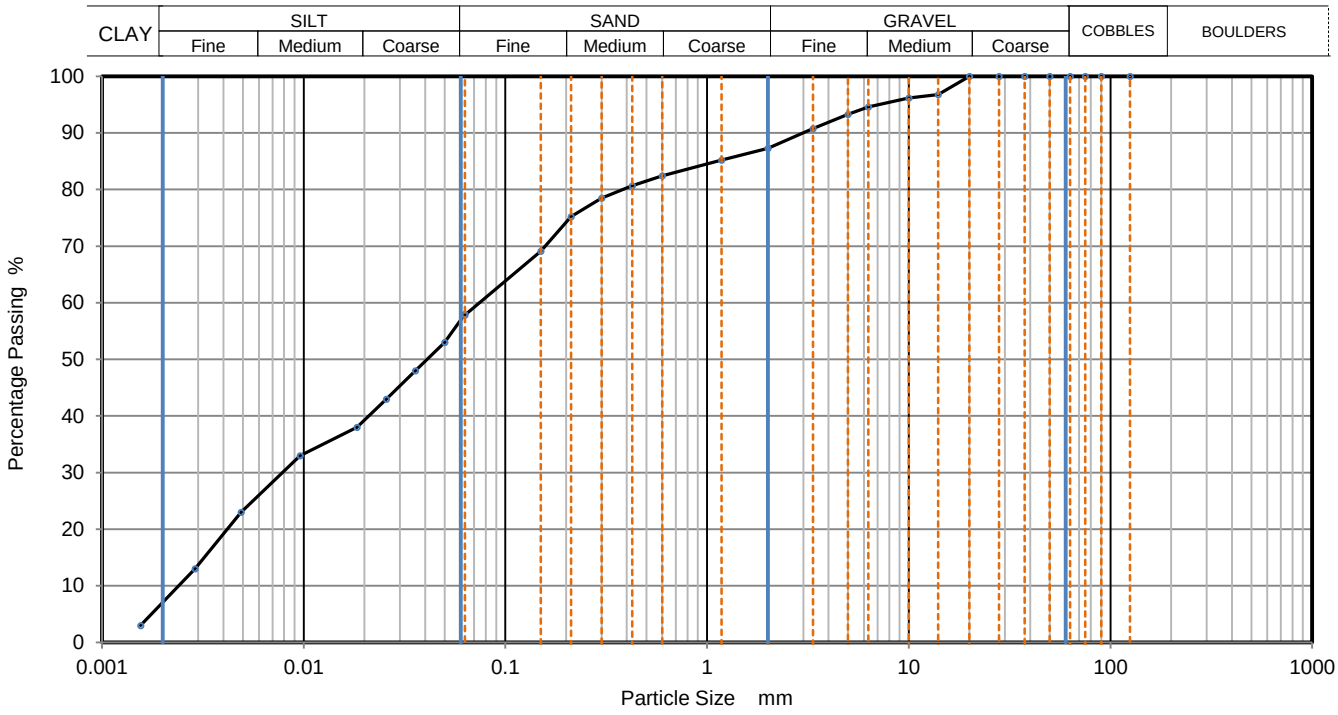
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH110
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Brown sandy slightly gravelly silty CLAY			Depth, m	2.50
Specimen Reference	10	Specimen Depth	2.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022040614



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	58
90	100	0.05002	53
75	100	0.03581	48
63	100	0.02563	43
50	100	0.01834	38
37.5	100	0.00958	33
28	100	0.00490	23
20	100	0.00289	13
14	97	0.00155	3
10	96		
6.3	95		
5	93		
3.35	91		
2	87		
1.18	85		
0.6	82	Particle density	(assumed)
0.425	81	2.65	Mg/m3
0.3	79		
0.212	75		
0.15	69		
0.063	58		

Dry Mass of sample, g	505

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	12.7
Sand	29.5
Silt	51.2
Clay	6.6

Grading Analysis		
D100	mm	
D60	mm	0.0748
D30	mm	0.00802
D10	mm	0.00247
Uniformity Coefficient		30
Curvature Coefficient		0.35

Remarks

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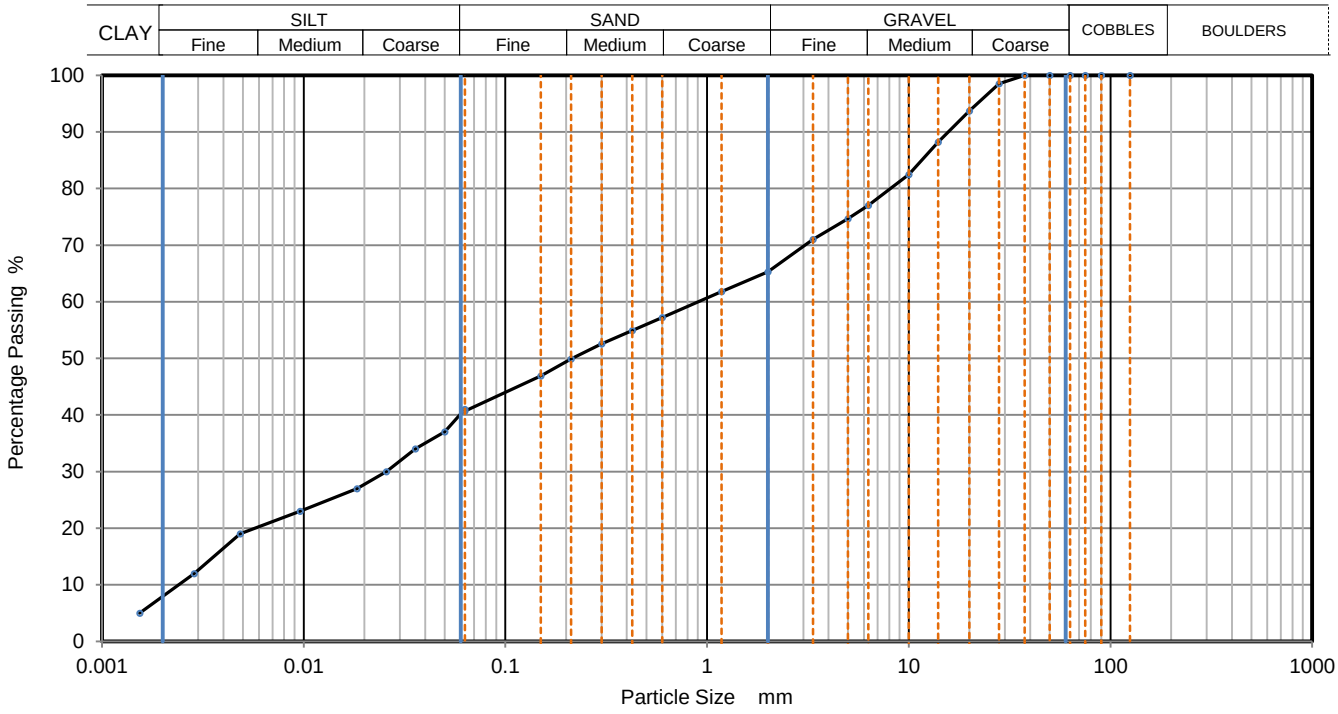
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UKAS TESTING

10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH110
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	8.20
Specimen Reference	8	Specimen Depth	8.2 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022040616



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	41
90	100	0.05002	37
75	100	0.03581	34
63	100	0.02563	30
50	100	0.01834	27
37.5	100	0.00958	23
28	99	0.00485	19
20	94	0.00286	12
14	88	0.00154	5
10	83		
6.3	77		
5	75		
3.35	71		
2	65		
1.18	62		
0.6	57	Particle density (assumed)	
0.425	55	2.65 Mg/m3	
0.3	53		
0.212	50		
0.15	47		
0.063	41		

Dry Mass of sample, g	4719

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	34.7
Sand	24.6
Silt	32.4
Clay	8.3

Grading Analysis		
D100	mm	
D60	mm	0.909
D30	mm	0.0254
D10	mm	0.00232
Uniformity Coefficient		390
Curvature Coefficient		0.31

Remarks

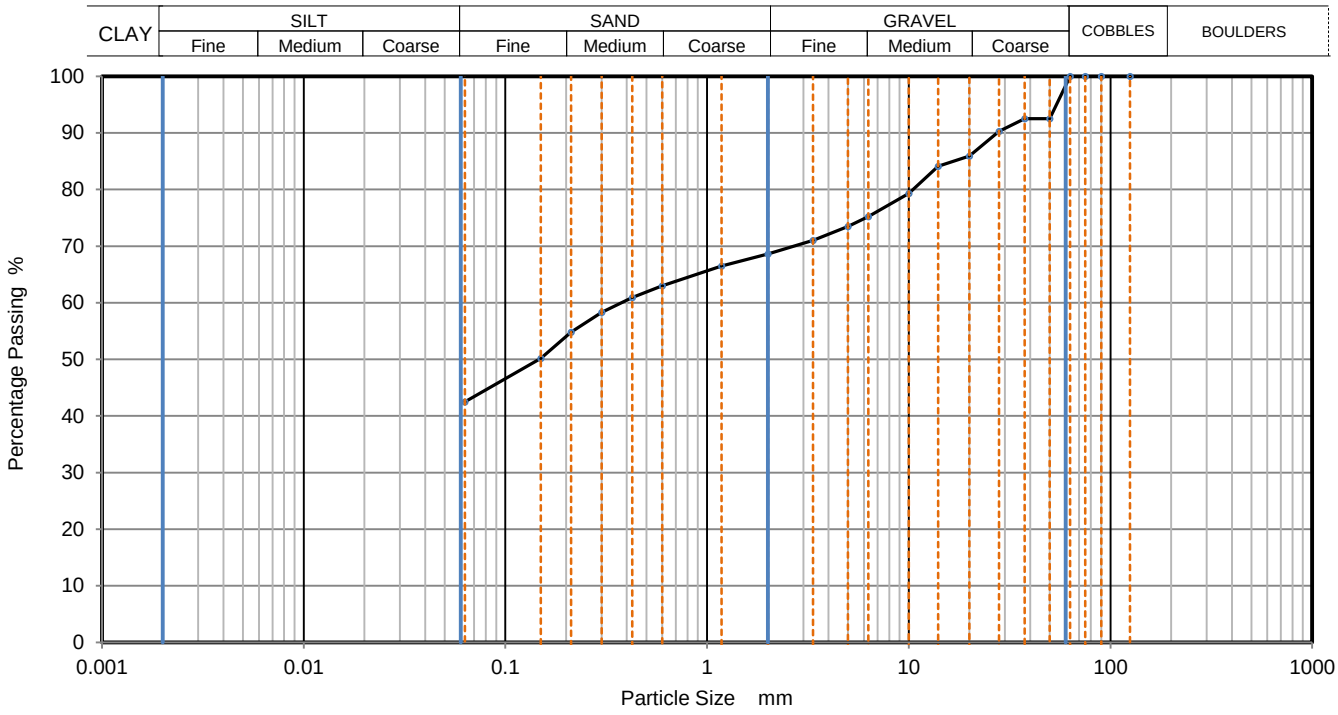
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH110
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	3
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	11.50
Specimen Reference	2	Specimen Depth	11.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022040617



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	93		
37.5	93		
28	90		
20	86		
14	84		
10	79		
6.3	75		
5	74		
3.35	71		
2	69		
1.18	67		
0.6	63		
0.425	61		
0.3	58		
0.212	55		
0.15	50		
0.063	43		

Dry Mass of sample, g	6128

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	31.4
Sand	26.1
Fines <0.063mm	42.0

Grading Analysis		
D100	mm	
D60	mm	0.378
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

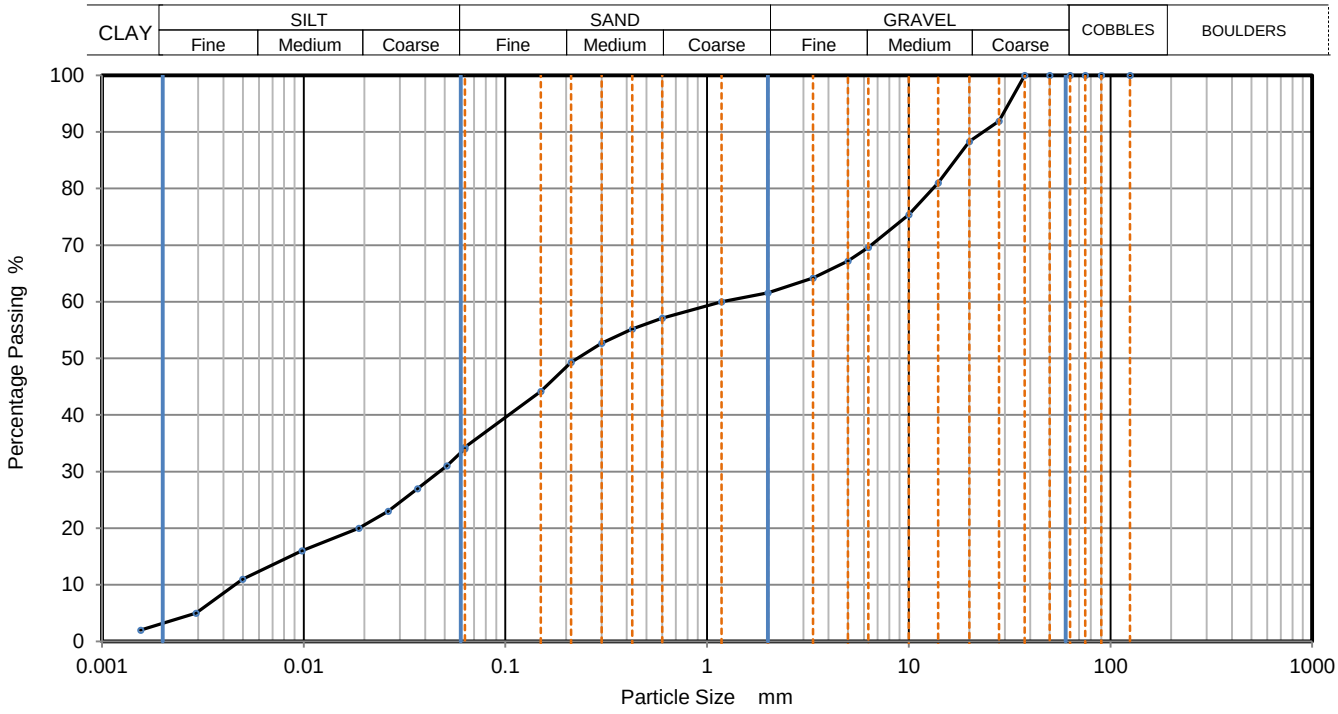
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH110
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	4
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	16.25
Specimen Reference	8	Specimen Depth	16.25 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022040619



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	34
90	100	0.05127	31
75	100	0.03668	27
63	100	0.02624	23
50	100	0.01877	20
37.5	100	0.00980	16
28	92	0.00498	11
20	88	0.00292	5
14	81	0.00155	2
10	75		
6.3	70		
5	67		
3.35	64		
2	62		
1.18	60		
0.6	57	Particle density	(assumed)
0.425	55	2.65	Mg/m3
0.3	53		
0.212	49		
0.15	44		
0.063	34		

Dry Mass of sample, g	4072

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	38.4
Sand	27.3
Silt	31.0
Clay	3.3

Grading Analysis		
D100	mm	
D60	mm	1.17
D30	mm	0.0481
D10	mm	0.00459
Uniformity Coefficient		260
Curvature Coefficient		0.43

Remarks

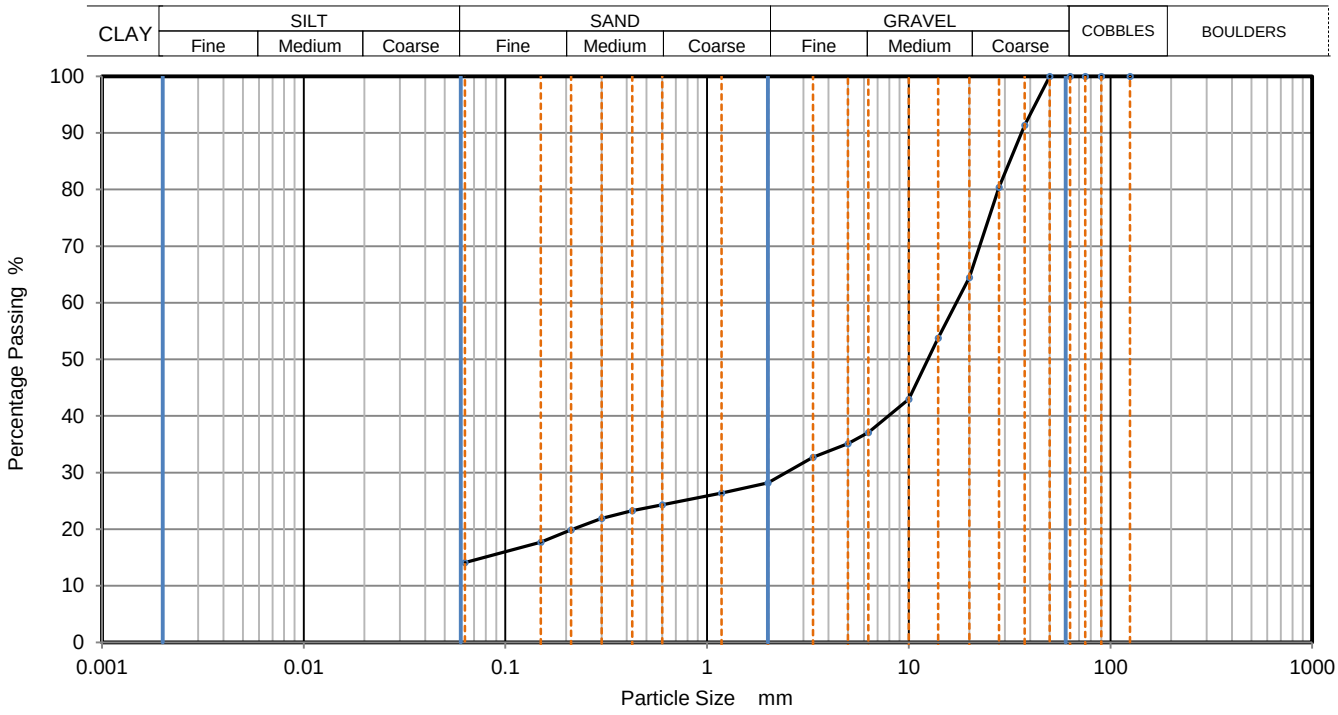
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH110
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	5
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	18.80
Specimen Reference	2	Specimen Depth	18.8 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022040621



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	91		
28	80		
20	65		
14	54		
10	43		
6.3	37		
5	35		
3.35	33		
2	28		
1.18	26		
0.6	24		
0.425	23		
0.3	22		
0.212	20		
0.15	18		
0.063	14		

Dry Mass of sample, g	4320

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	71.8
Sand	14.0
Fines <0.063mm	14.0

Grading Analysis		
D100	mm	
D60	mm	17.2
D30	mm	2.47
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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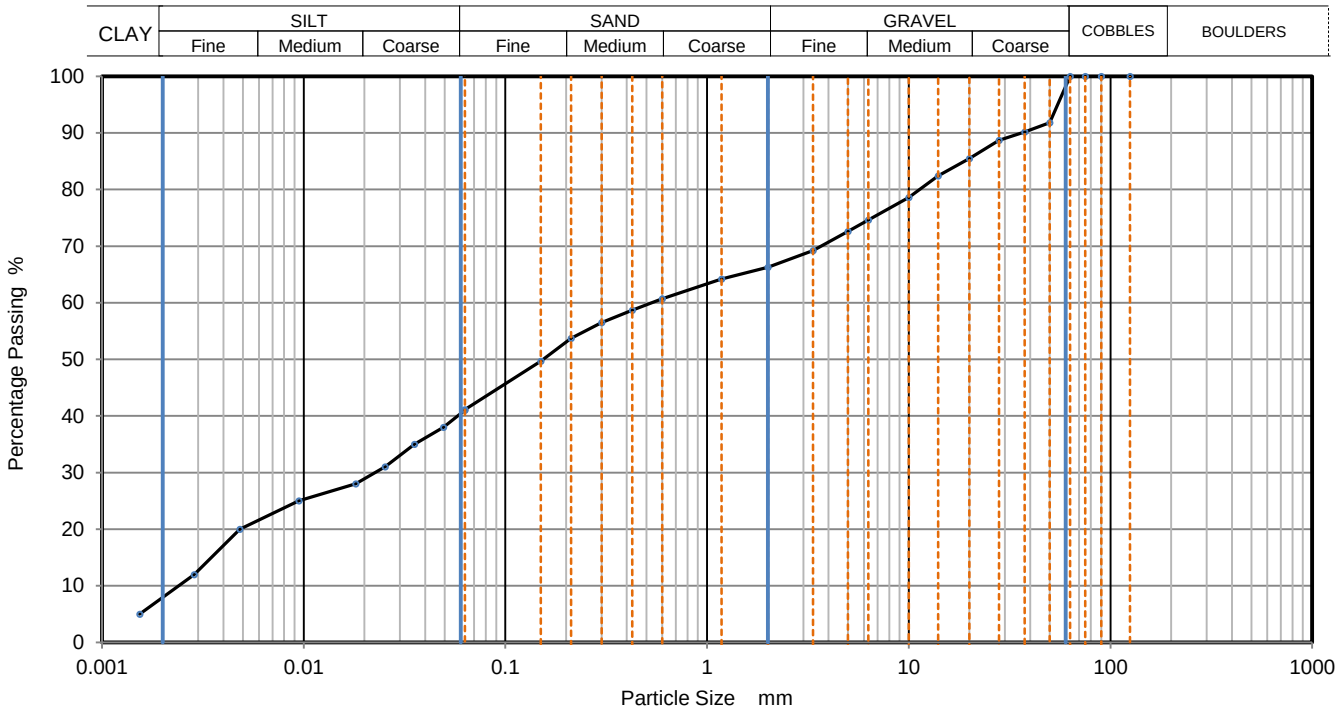
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**21-1219**
				Borehole/Pit No.	BH111
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	2.50
Specimen Reference	10	Specimen Depth	2.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022040622



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	41
90	100	0.04939	38
75	100	0.03537	35
63	100	0.02532	31
50	92	0.01813	28
37.5	90	0.00947	25
28	89	0.00482	20
20	86	0.00286	12
14	82	0.00154	5
10	79		
6.3	75		
5	73		
3.35	69		
2	66		
1.18	64		
0.6	61	Particle density	(assumed)
0.425	59	2.65	Mg/m3
0.3	57		
0.212	54		
0.15	50		
0.063	41		

Dry Mass of sample, g	6145

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	33.7
Sand	25.2
Silt	33.4
Clay	7.7

Grading Analysis		
D100	mm	
D60	mm	0.533
D30	mm	0.0223
D10	mm	0.00248
Uniformity Coefficient		210
Curvature Coefficient		0.38

Remarks

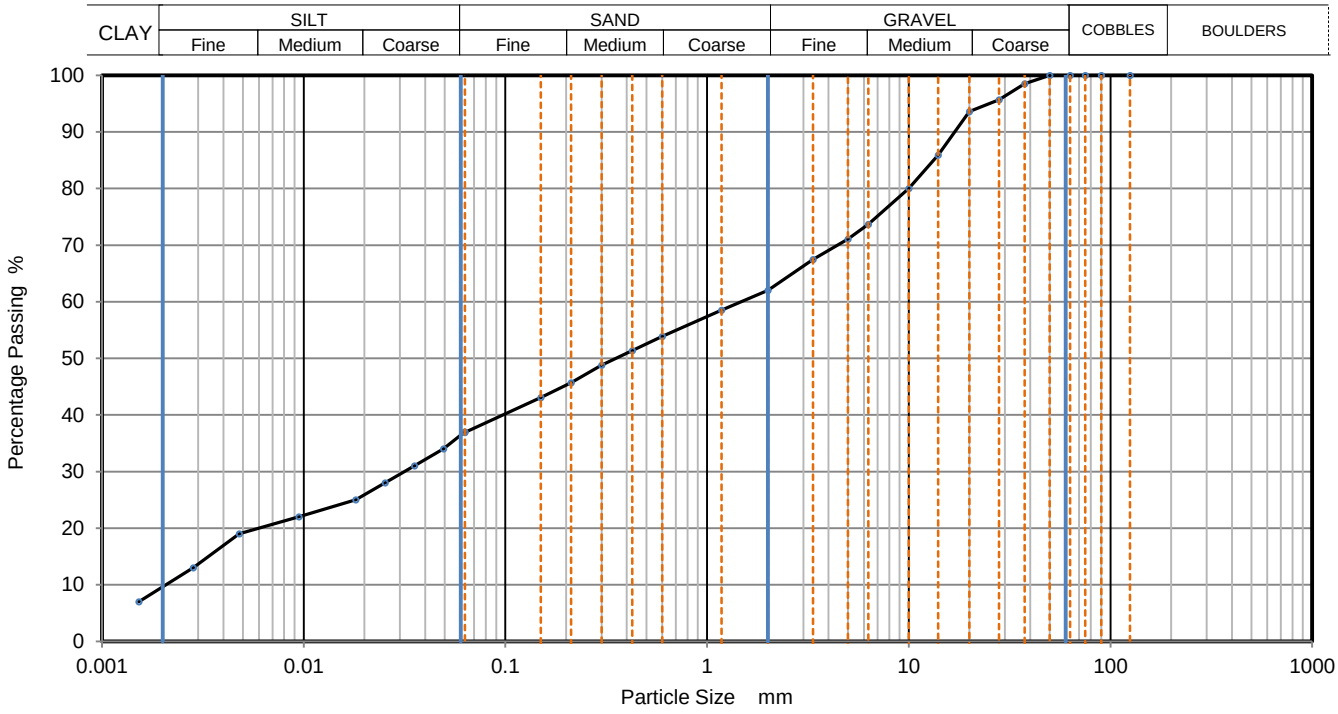
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10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH111
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	6.25
Specimen Reference	8	Specimen Depth	6.25 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022040623



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	37
90	100	0.04939	34
75	100	0.03537	31
63	100	0.02532	28
50	100	0.01813	25
37.5	99	0.00947	22
28	96	0.00479	19
20	94	0.00283	13
14	86	0.00152	7
10	80		
6.3	74		
5	71		
3.35	68		
2	62		
1.18	59		
0.6	54	Particle density (assumed)	
0.425	51	2.65 Mg/m3	
0.3	49		
0.212	46		
0.15	43		
0.063	37		

Dry Mass of sample, g	6524

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	38.0
Sand	25.2
Silt	26.8
Clay	10.0

Grading Analysis		
D100	mm	
D60	mm	1.48
D30	mm	0.0316
D10	mm	0.002
Uniformity Coefficient		740
Curvature Coefficient		0.34

Remarks

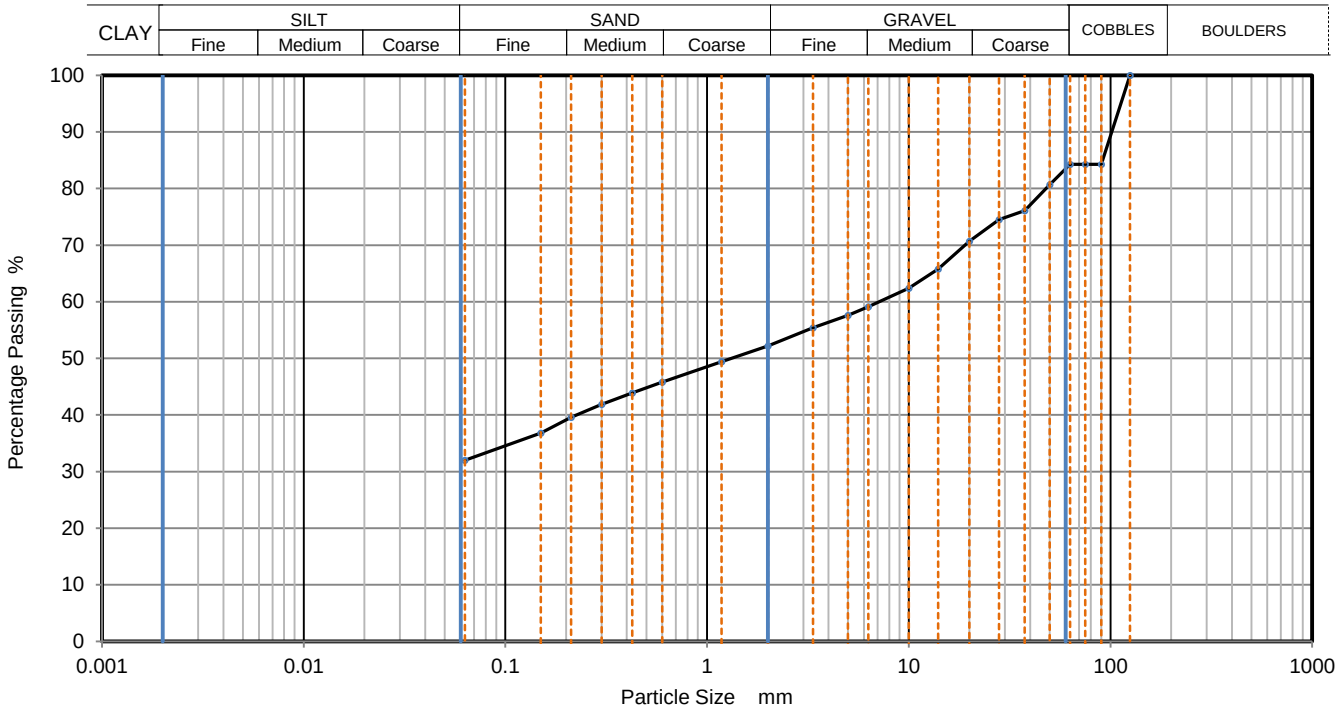
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

LAB 05R - Version 5

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH111
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	3
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	9.70
Specimen Reference	2	Specimen Depth	9.7 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022040625



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	84		
75	84		
63	84		
50	81		
37.5	76		
28	75		
20	71		
14	66		
10	62		
6.3	59		
5	58		
3.35	55		
2	52		
1.18	49		
0.6	46		
0.425	44		
0.3	42		
0.212	40		
0.15	37		
0.063	32		

Dry Mass of sample, g	5954

Sample Proportions	% dry mass
Cobbles	15.7
Gravel	32.0
Sand	20.3
Fines <0.063mm	32.0

Grading Analysis		
D100	mm	125
D60	mm	7.15
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

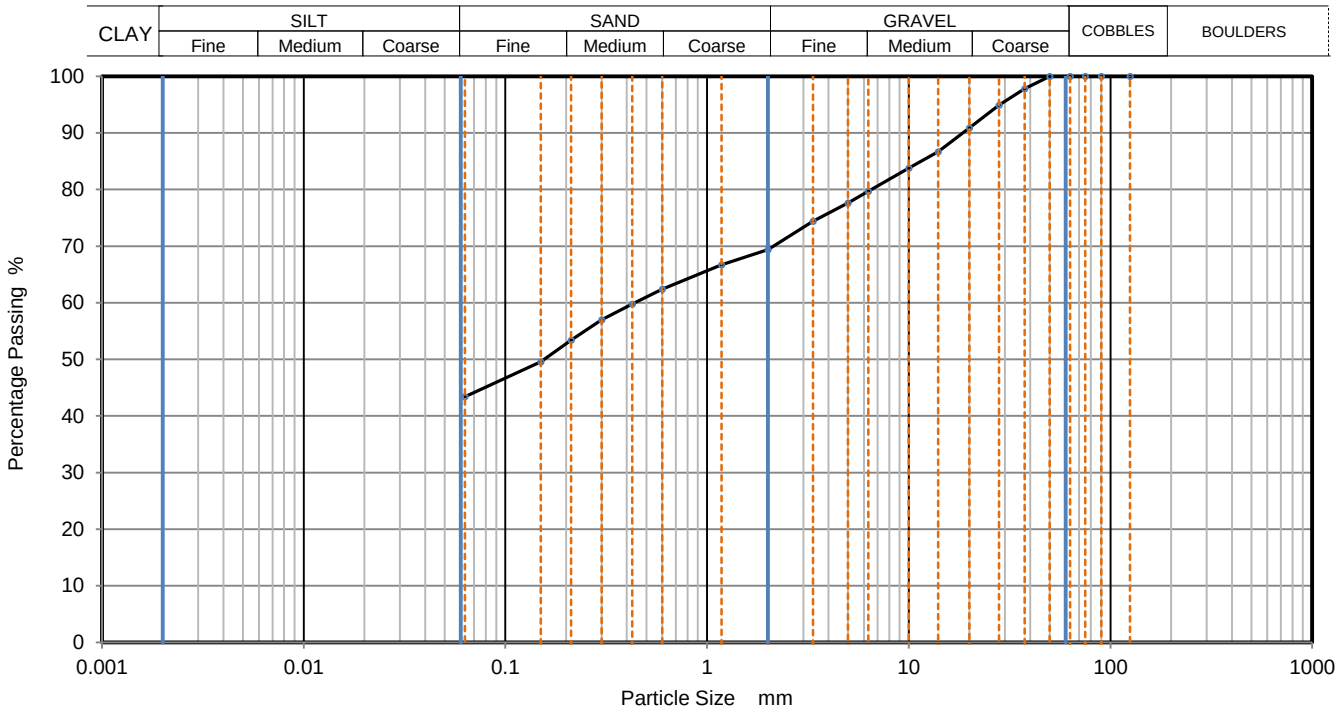
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH111
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	4
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	12.80
Specimen Reference	2	Specimen Depth	12.8 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022040626



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	91		
14	87		
10	84		
6.3	80		
5	78		
3.35	74		
2	69		
1.18	67		
0.6	62		
0.425	60		
0.3	57		
0.212	53		
0.15	50		
0.063	43		

Dry Mass of sample, g	6121

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	30.6
Sand	26.0
Fines <0.063mm	43.0

Grading Analysis		
D100	mm	
D60	mm	0.434
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

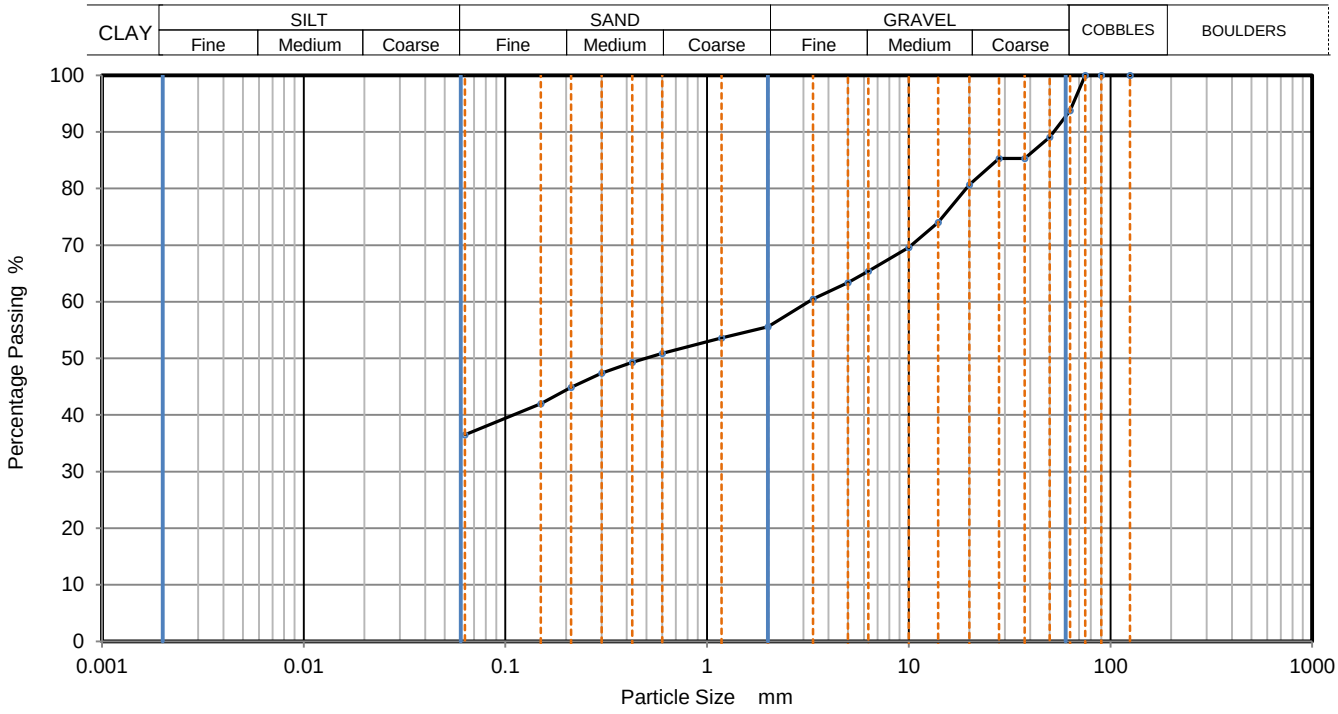
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH111
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	5
Soil Description	Brown sandy gravelly silty CLAY			Depth, m	16.25
Specimen Reference	2	Specimen Depth	16.25 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022040628



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	94		
50	89		
37.5	85		
28	85		
20	81		
14	74		
10	70		
6.3	65		
5	63		
3.35	61		
2	56		
1.18	54		
0.6	51		
0.425	49		
0.3	47		
0.212	45		
0.15	42		
0.063	37		

Dry Mass of sample, g	6614

Sample Proportions	% dry mass
Cobbles	6.2
Gravel	38.1
Sand	19.1
Fines <0.063mm	37.0

Grading Analysis		
D100	mm	
D60	mm	3.17
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

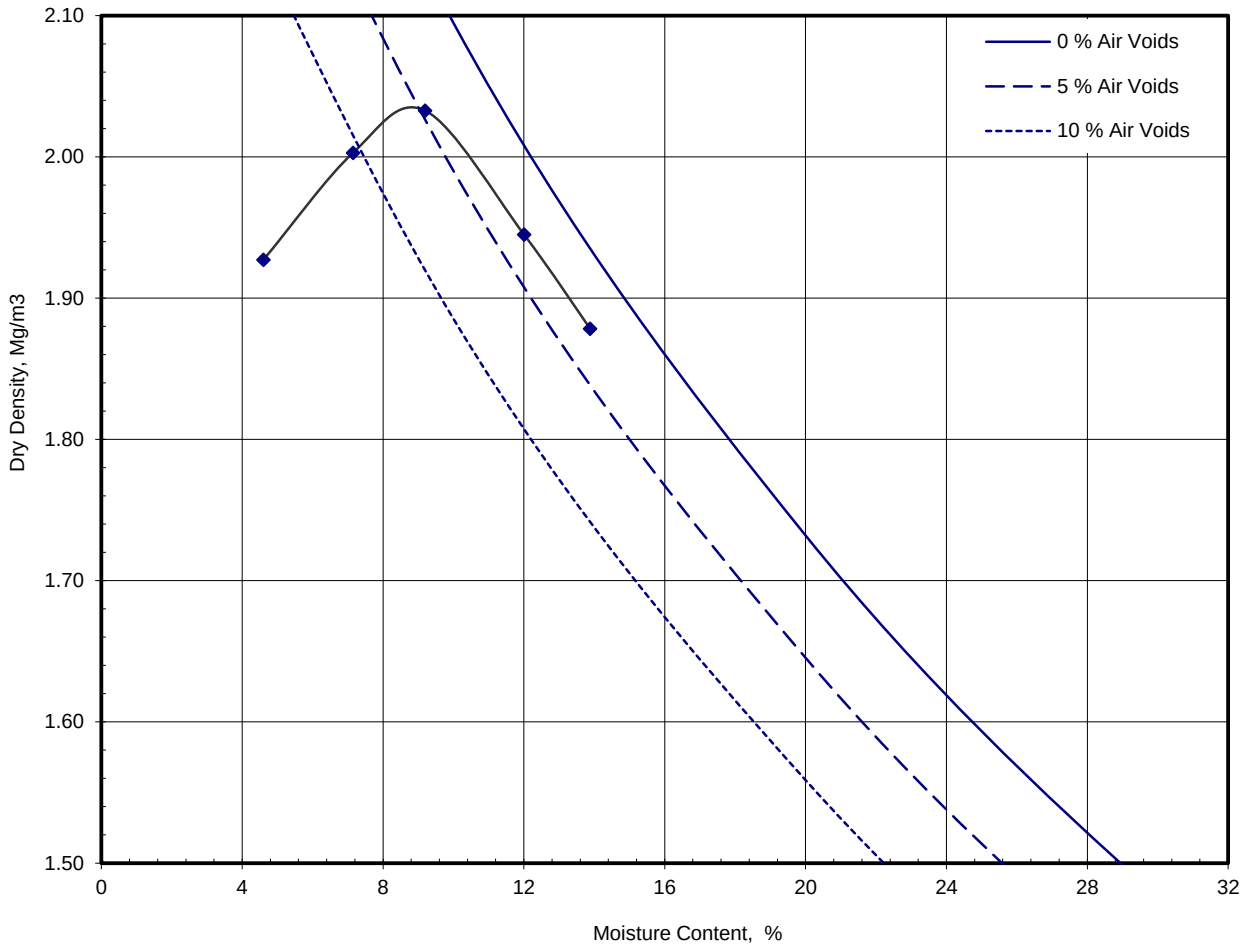
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

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UKAS TESTING 10122

CAUSEWAY GEOTECH	**Dry Density / Moisture Content Relationship Light Compaction**			Job Ref	**21-1219**
				Borehole / Pit No	BH101
Site Name	**DAA Airfield Underpass Ground Investigation**			Sample No	2
Soil Description	Brown sandy gravelly silty CLAY			Depth	8.50 m
Specimen Ref.	11	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	Caus202204068



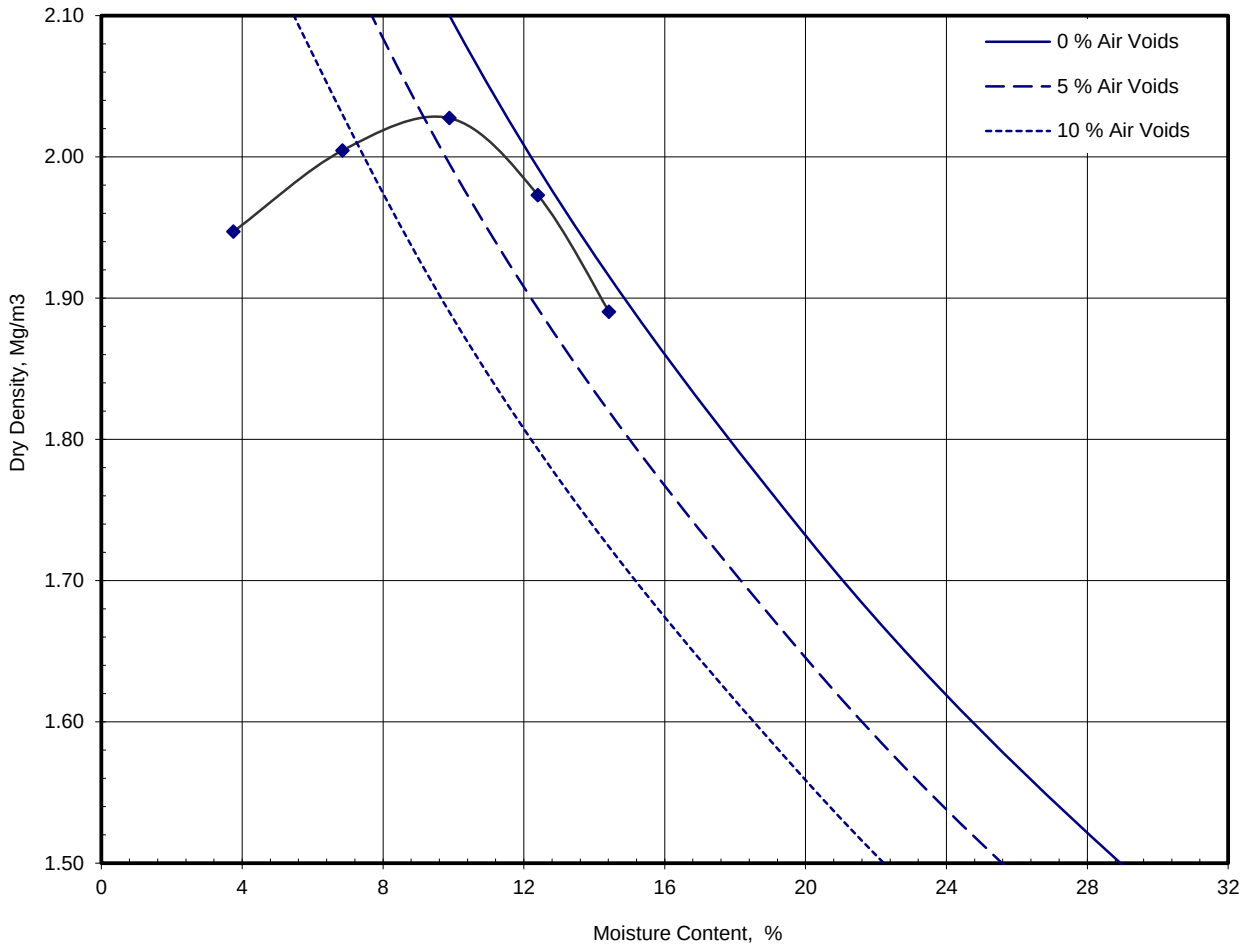
Preparation		Material used was air dried
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	2
Material Retained on 20.0 mm Sieve	%	6
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.03**

Optimum Moisture Content	%	**9.2**

Approved	Remarks	UKAS TESTING 10122
Stephen.Watson	LAB 08R - Version 5	

CAUSEWAY GEOTECH	**Dry Density / Moisture Content Relationship Light Compaction**			Job Ref	**21-1219**
				Borehole / Pit No	BH111
Site Name	**DAA Airfield Underpass Ground Investigation**			Sample No	1
Soil Description	Brown sandy gravelly silty CLAY			Depth	2.50 m
Specimen Ref.	11	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	Caus2022040622



Preparation		Material used was air dried
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	1
Material Retained on 20.0 mm Sieve	%	13
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.03**

Optimum Moisture Content	%	**9.9**

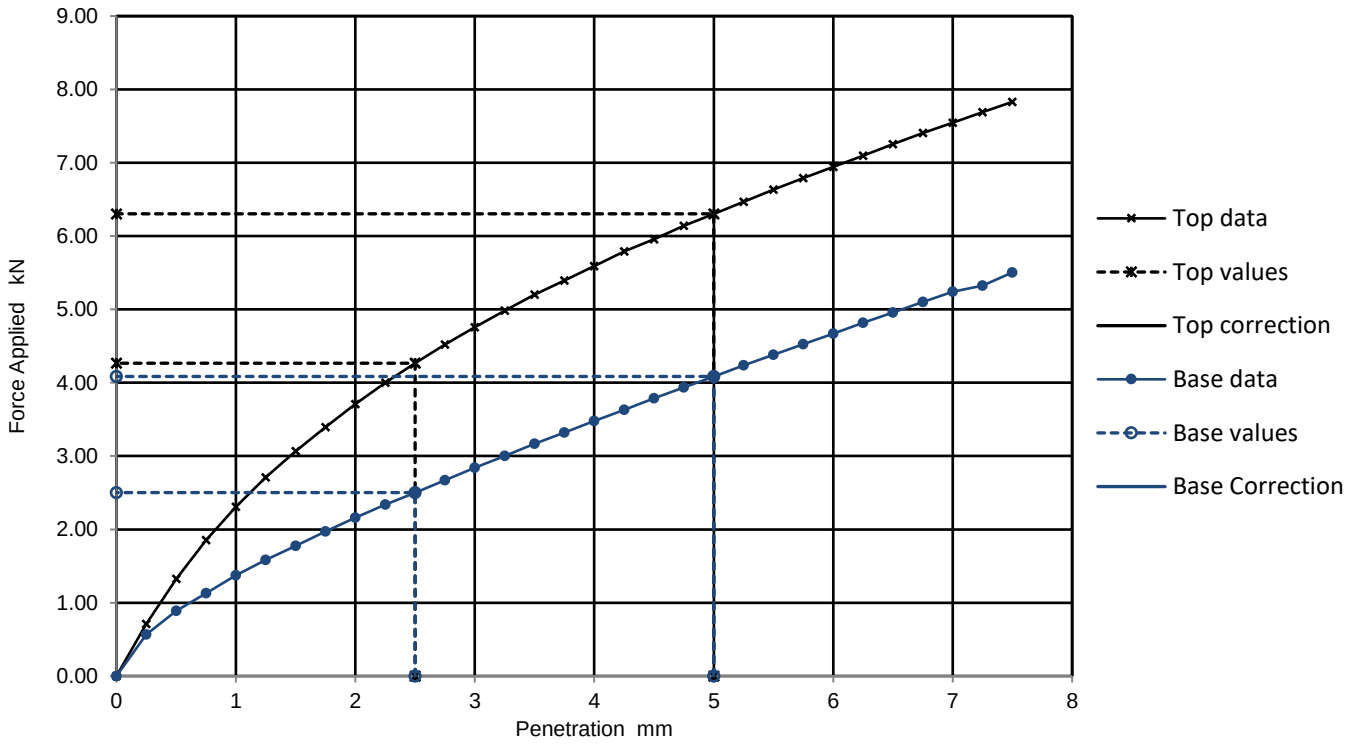
Approved	Remarks	UKAS TESTING 10122
Stephen.Watson	LAB 08R - Version 5	

CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	21-1219
				Borehole/Pit No.	BH101
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Brown sandy gravelly silty CLAY			Depth m	8.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown sandy gravelly silty CLAY			KeyLAB ID	Caus202204068
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		9	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.10	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.94	Mg/m3		3	kPa
	Moisture content	8	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	32.0	32.0	32.0		8
BASE	No	19.0	20.0	20.0		8

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen.Watson

UKAS TESTING 10122

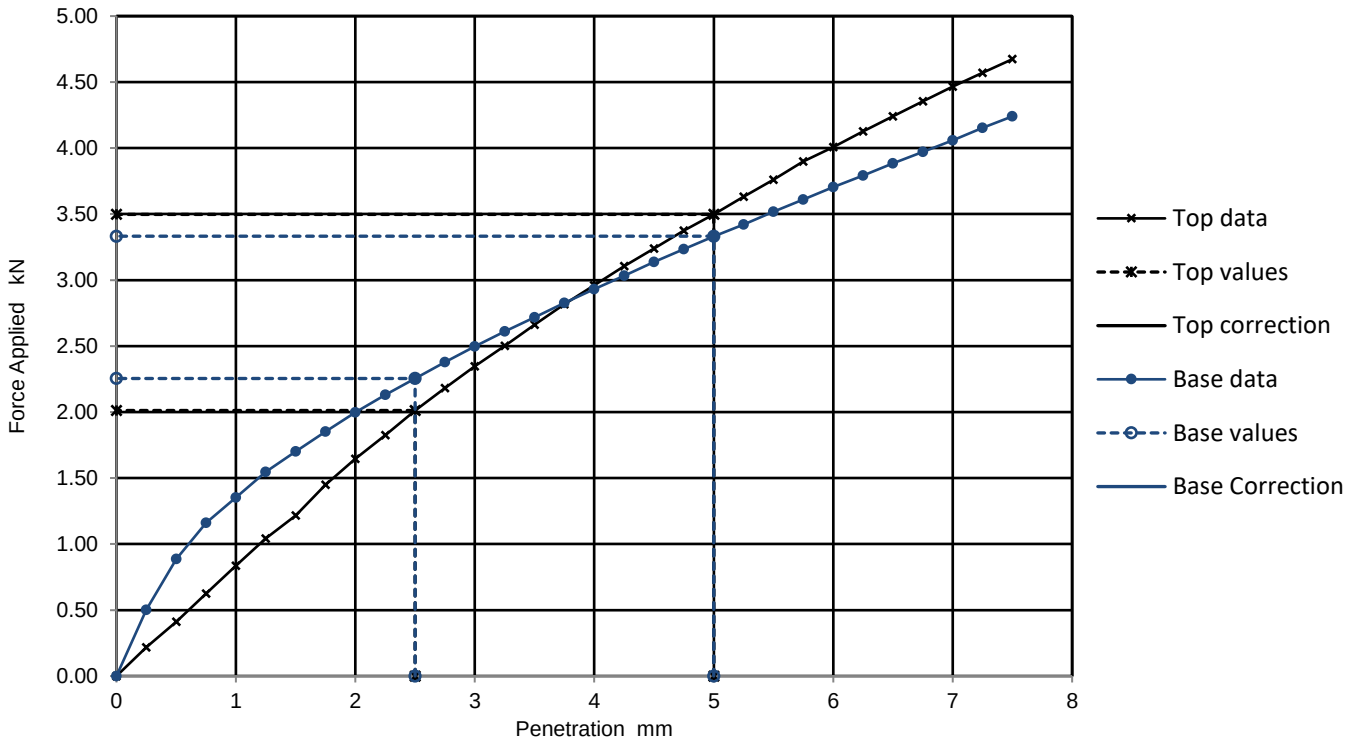
LAB 11R - Version 6

CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	21-1219
				Borehole/Pit No.	BH111
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Brown sandy gravelly silty CLAY			Depth m	2.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown sandy gravelly silty CLAY			KeyLAB ID	Caus2022040622
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		15	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.13	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.96	Mg/m3		3	kPa
	Moisture content	9	%			

Force v Penetration Plots



Results

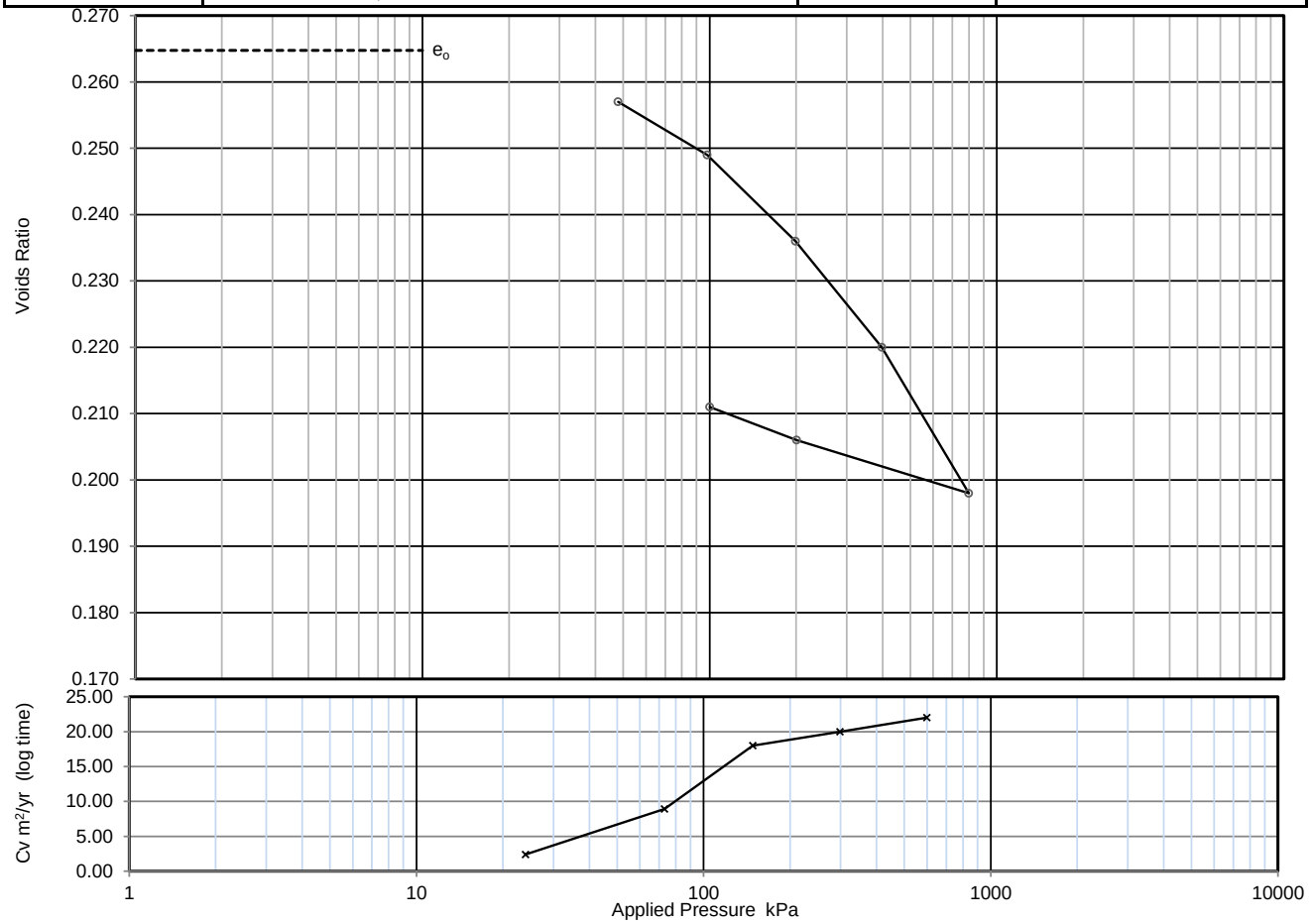
	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	15.0	17.0	17.0	17.0	9
BASE	No	17.0	17.0	17.0		9

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen.Watson

UKAS TESTING 10122

LAB 11R - Version 6

CAUSEWAY GEOTECH	**ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3**					Job Ref	21-1219
						Borehole/Pit No.	BH110
Site Name	DAA Airfield Underpass Ground Investigation					Sample No.	3
Soil Description	Greyish brown sandy silty CLAY.					Depth	13.75
Specimen Reference	2	Specimen Depth	13.75	m		Sample Type	C
Specimen Description	Greyish brown sandy silty CLAY.					KeyLAB ID	Caus2022040618
Test Method	BS1377:Part 5:1990, clause 3					Date started	22/04/2022



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.265	-	-	-	-
48	0.257	0.12	2.4	2.9	0.00055
98	0.249	0.14	8.9	160	0.00042
199	0.236	0.1	18	70	0.00065
398	0.220	0.067	20	97	0.00049
799	0.198	0.044	22	78	0.00092
201	0.206	0.011			
100	0.211	0.044			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.30	-	mm
Height	19.80	18.96	mm
Moisture Content	11.8	11.1	%
Bulk density	2.34	2.43	Mg/m3
Dry density	2.10	2.19	Mg/m3
Voids Ratio	0.265	0.211	
Saturation	118	140	%
Average temperature for test			oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen.Watson

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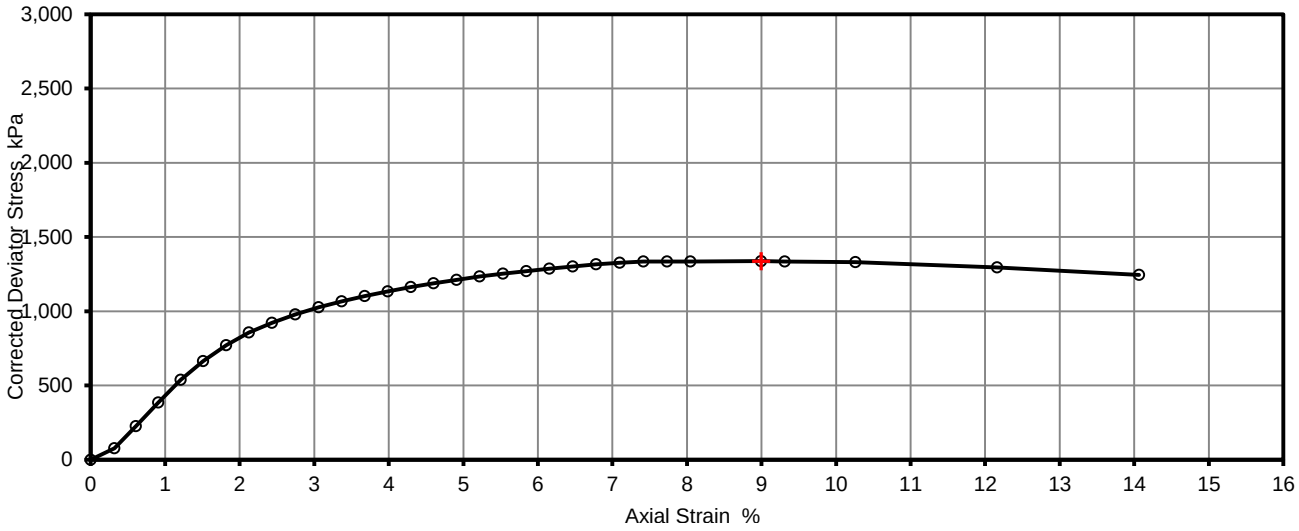
LAB 13R - Version 5

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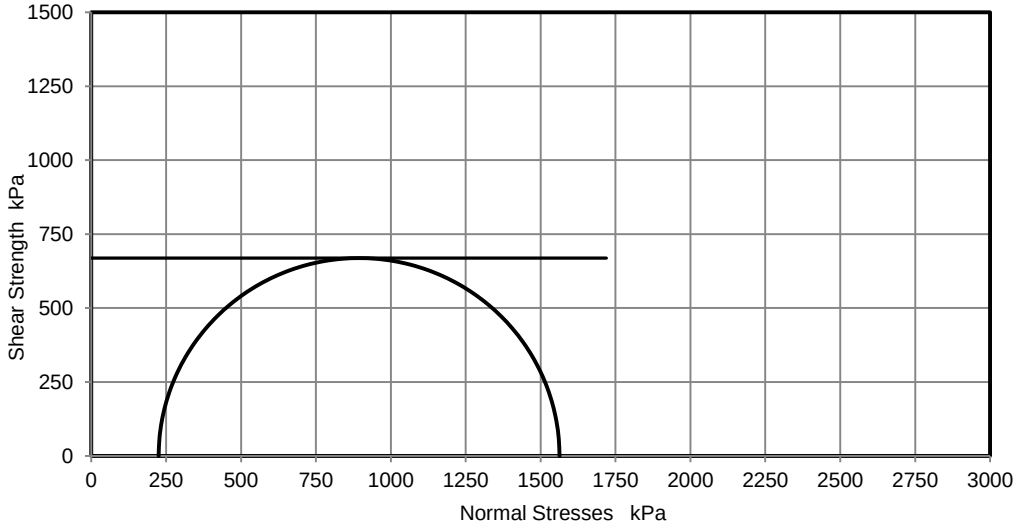
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH101
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	2
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth	10.90
Specimen Reference	2	Specimen Depth	10.95	m	Sample Type	C
Specimen Description	Very stiff greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus202204069
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	04/05/2022

Test Number		1	
Length		210.0	mm
Diameter		104.7	mm
Bulk Density		2.23	Mg/m3
Moisture Content		9	%
Dry Density		2.05	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		225	kPa
At failure	Axial Strain	9.0	%
	Deviator Stress, (σ1 - σ3)f	1338	kPa
	Undrained Shear Strength, cu	669	kPa ½(σ1 - σ3)f
	Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

Approved	Printed
Stephen.Watson	05/05/2022 09:57

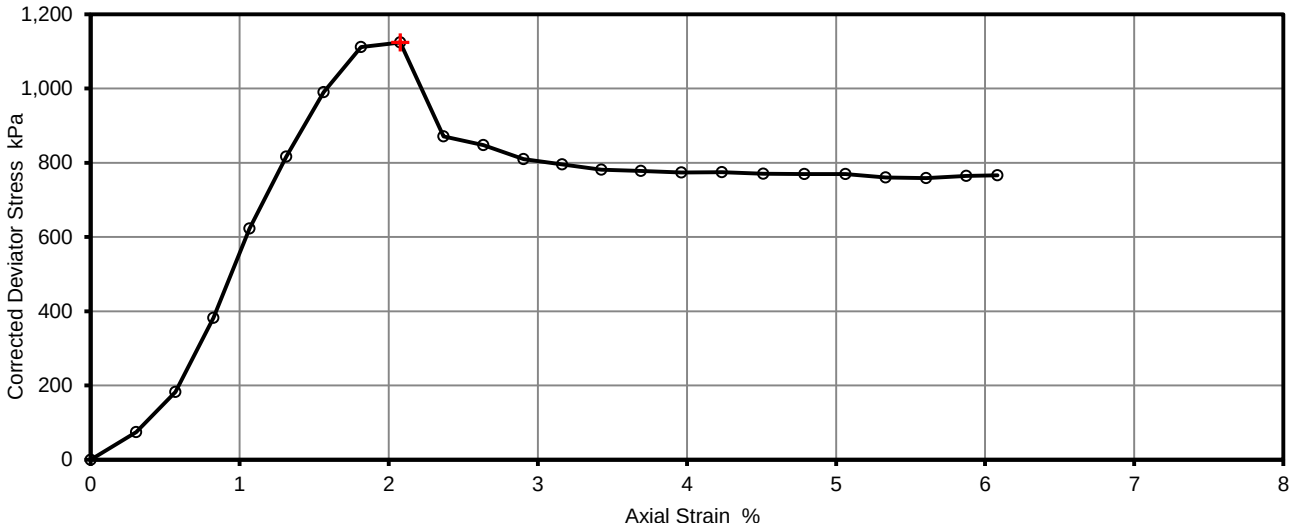
LAB 15R - Version 5

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10122

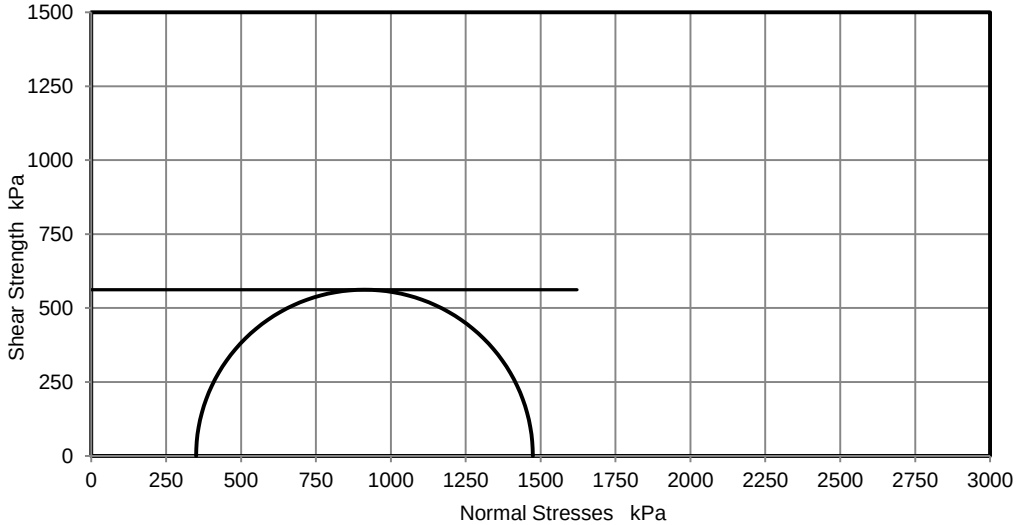
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH101
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	3
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth	17.55
Specimen Reference	2	Specimen Depth	17.55	m	Sample Type	C
Specimen Description	Very stiff greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus2022040612
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	04/05/2022

Test Number		1	
Length		184.5	mm
Diameter		105.6	mm
Bulk Density		1.88	Mg/m3
Moisture Content		21	%
Dry Density		1.56	Mg/m3
Rate of Strain		3.0	%/min
Cell Pressure		350	kPa
At failure	Axial Strain	2.1	%
	Deviator Stress, (σ1 - σ3)f	1124	kPa
	Undrained Shear Strength, cu	562	kPa ½(σ1 - σ3)f
	Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

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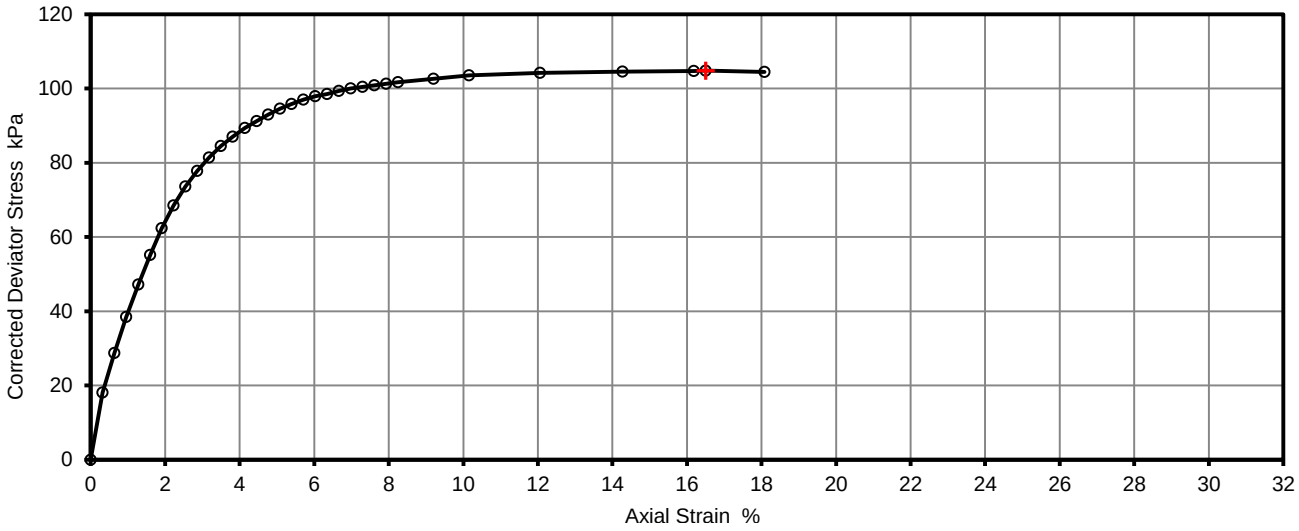
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10122

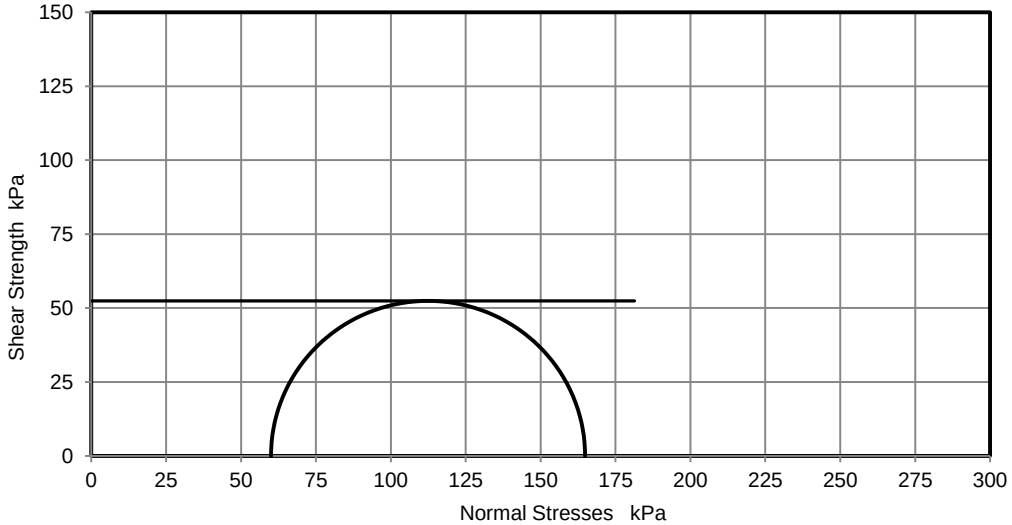
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**					Job Ref	21-1219
						Borehole/Pit No.	BH110
Site Name	DAA Airfield Underpass Ground Investigation					Sample No.	1
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.					Depth	2.85
Specimen Reference	2	Specimen Depth	2.85	m		Sample Type	C
Specimen Description	Firm greyish brown sandy slightly gravelly silty CLAY.					KeyLAB ID	Caus2022040615
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen					Date of test	04/05/2022

Test Number		1	
Length		210.0	mm
Diameter		105.4	mm
Bulk Density		1.71	Mg/m3
Moisture Content		33	%
Dry Density		1.29	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		60	kPa
At failure	Axial Strain	16.5	%
	Deviator Stress, (σ1 - σ3)f	105	kPa
	Undrained Shear Strength, cu	52	kPa ½(σ1 - σ3)f
	Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

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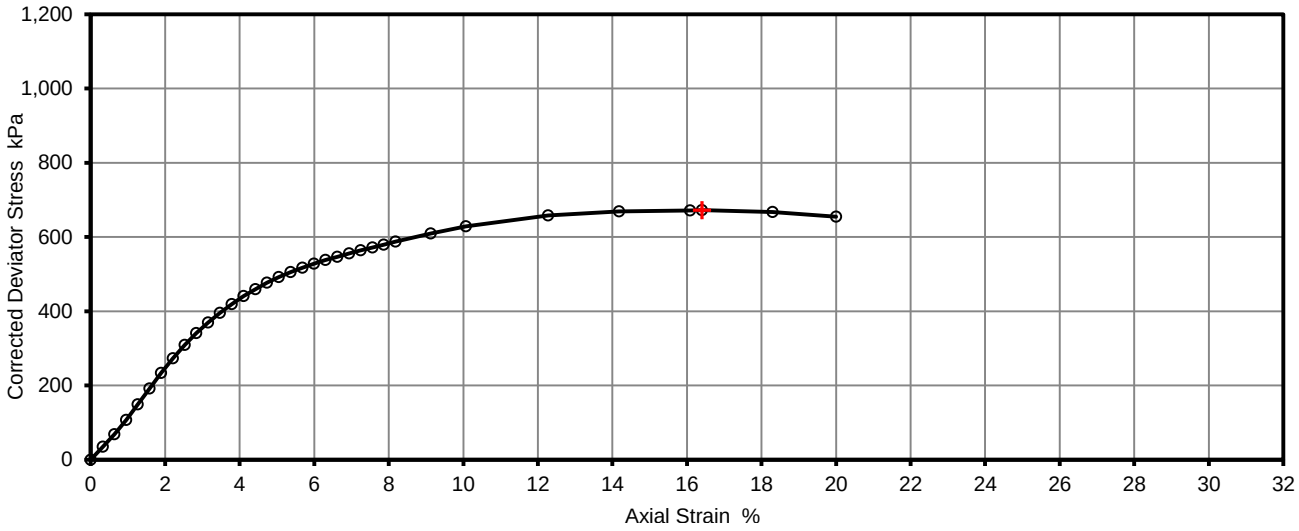
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UKAS TESTING
10122

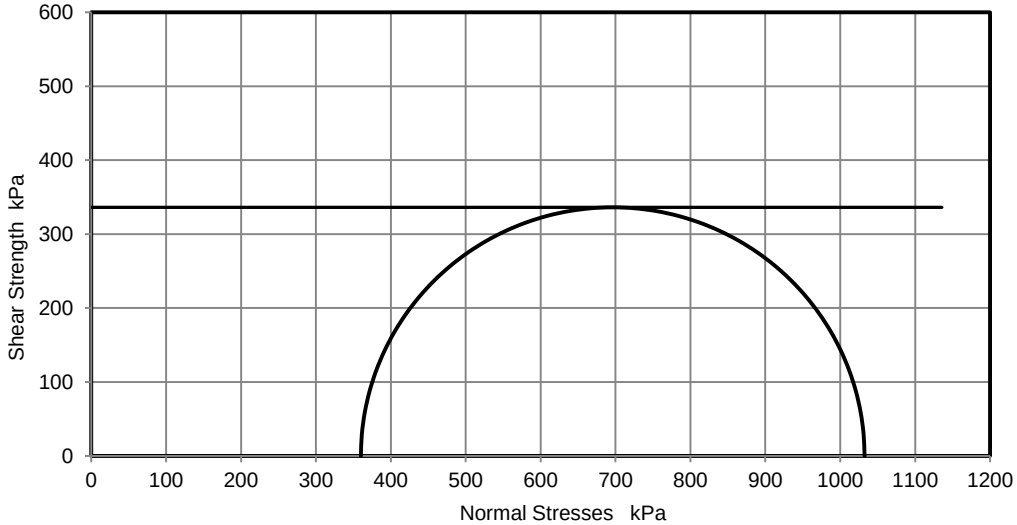
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**					Job Ref	21-1219
						Borehole/Pit No.	BH110
Site Name	DAA Airfield Underpass Ground Investigation					Sample No.	4
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.					Depth	17.85
Specimen Reference	2	Specimen Depth	17.85	m		Sample Type	C
Specimen Description	Stiff greyish brown sandy slightly gravelly silty CLAY.					KeyLAB ID	Caus2022040620
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen					Date of test	04/05/2022

Test Number		1	
Length		210.0	mm
Diameter		104.4	mm
Bulk Density		2.09	Mg/m3
Moisture Content		12	%
Dry Density		1.86	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		360	kPa
At failure	Axial Strain	16.4	%
	Deviator Stress, (σ1 - σ3)f	672	kPa
	Undrained Shear Strength, cu	336	kPa ½(σ1 - σ3)f
	Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

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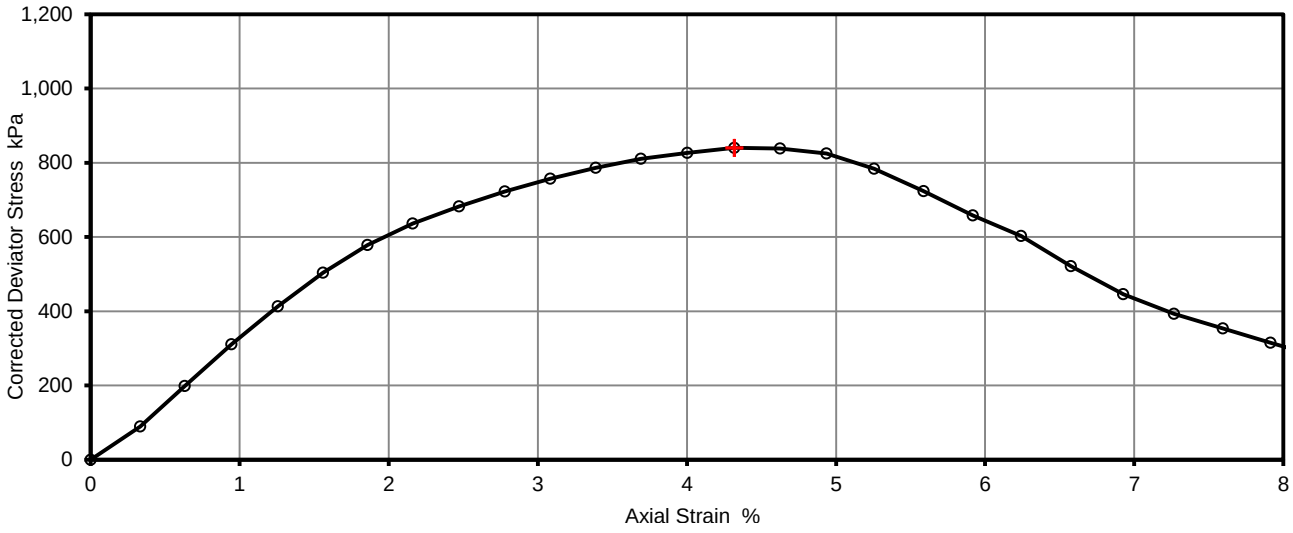
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10122

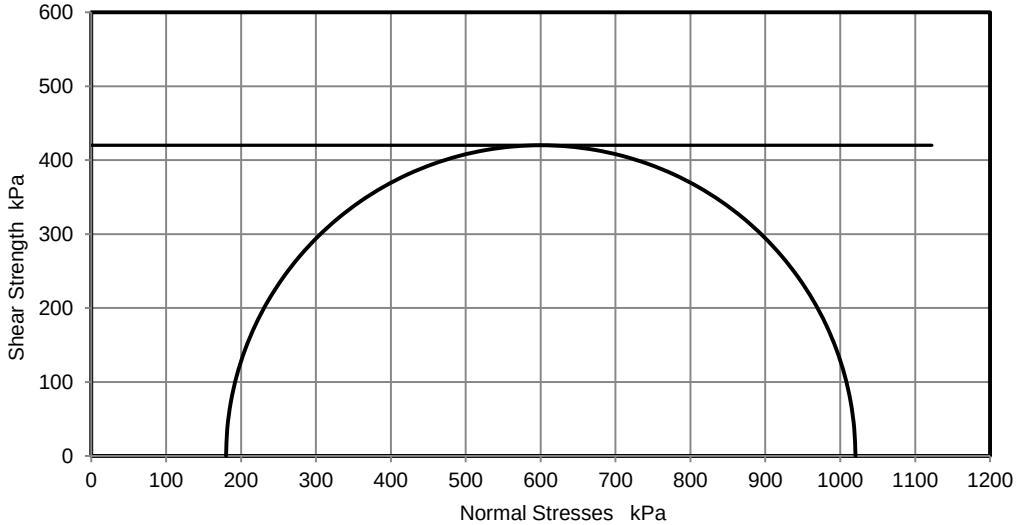
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH111
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	2
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth	8.55
Specimen Reference	2	Specimen Depth	8.55	m	Sample Type	C
Specimen Description	Very stiff greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus2022040624
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	05/05/2022

Test Number		1	
Length		210.0	mm
Diameter		104.9	mm
Bulk Density		2.27	Mg/m3
Moisture Content		6	%
Dry Density		2.13	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		180	kPa
At failure	Axial Strain	4.3	%
	Deviator Stress, (σ1 - σ3)f	840	kPa
	Undrained Shear Strength, cu	420	kPa ½(σ1 - σ3)f
	Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

Approved	Printed
Stephen.Watson	05/05/2022 09:57

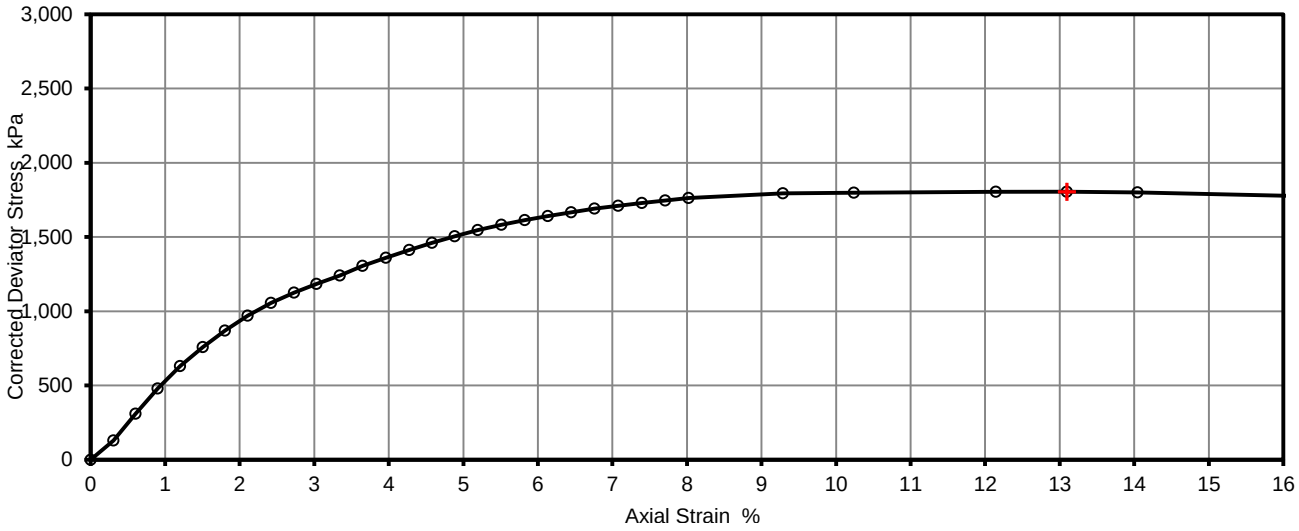
LAB 15R - Version 5

UKAS TESTING
10122

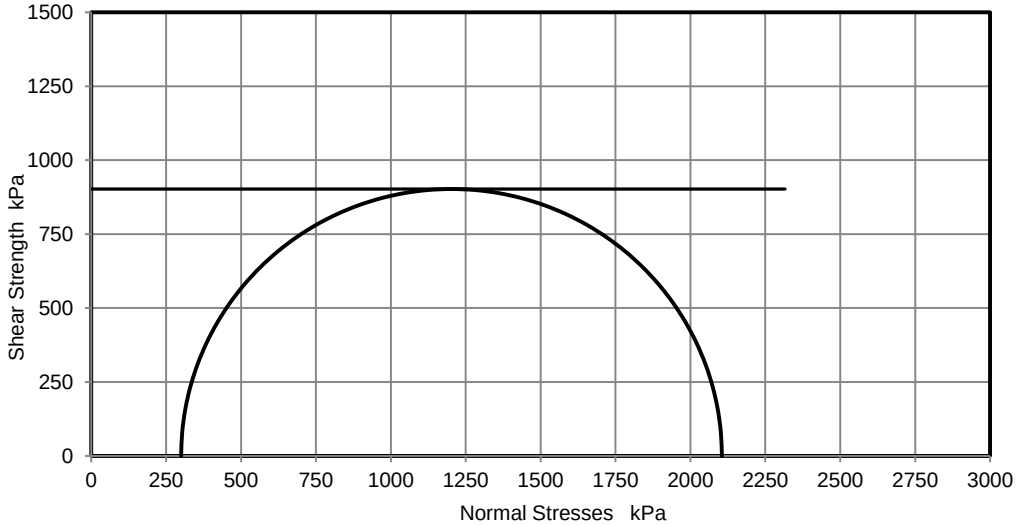
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH111
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	3
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth	14.37
Specimen Reference	2	Specimen Depth	14.37	m	Sample Type	C
Specimen Description	Very stiff greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus2022040627
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	04/05/2022

Test Number		1	
Length		210.0	mm
Diameter		104.9	mm
Bulk Density		2.26	Mg/m3
Moisture Content		8	%
Dry Density		2.10	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		300	kPa
At failure	Axial Strain	13.1	%
	Deviator Stress, (σ1 - σ3)f	1805	kPa
	Undrained Shear Strength, cu	903	kPa ½(σ1 - σ3)f
	Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

Approved	Printed
Stephen.Watson	05/05/2022 09:57

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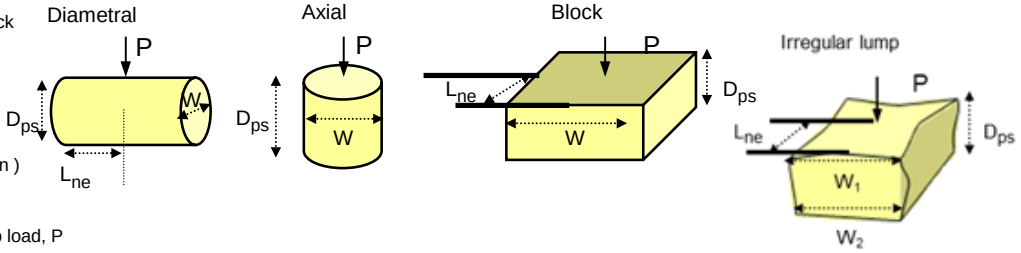
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10122

Point Load Strength Index Tests
Summary of Results

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Borehole No.	Sample			Specimen		Rock Type	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth	Ref.	Type	Ref.	Depth		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m				m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BH101	22.35	5	C	2	22.35	LIMESTONE	D	U	YES	83.2	100.1	100.1	99.0	9.3	99.5	0.9	1.3	
BH101	24.97	5	C	2	24.97	LIMESTONE	D	U	YES	95.3	100.8	100.8	99.0	0.4	99.9	0.0	0.1	
BH101	25.65	5	C	3	25.65	LIMESTONE	A	U	YES		100.3	94.0	89.0	9.5	106.6	0.8	1.2	
BH101	26.20	5	C	2	26.20	LIMESTONE	A	U	YES		100.3	92.0	84.0	7.2	103.6	0.7	0.9	
BH110	27.62	5	C	2	27.62	LIMESTONE	A	U	YES		100.1	97.0	91.0	3.4	107.7	0.3	0.4	
BH110	29.50	5	C	2	29.50	LIMESTONE	D	U	YES	102.2	100.3	100.3	96.0	14.7	98.1	1.5	2.1	
BH110	31.30	5	C	2	31.30	LIMESTONE	A	U	YES		99.9	97.0	92.0	16.5	108.2	1.4	2.0	
BH111	33.90	5	C	2	33.90	LIMESTONE	D	U	YES	82.9	100.8	100.8	98.0	12.3	99.4	1.2	1.7	
BH111	34.88	5	C	2	34.88	LIMESTONE	D	U	YES	72.3	101.0	101.0	99.0	11.1	100.0	1.1	1.5	
BH111	35.80	5	C	2	35.80	LIMESTONE	A	U	YES		100.7	94.0	90.0	10.9	107.4	0.9	1.3	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise

Detailed legend for test and dimensions, based on ISRM, is shown above.

Size factor, F = (De/50)0.45 for all tests.

LAB 17R - Version 5

Date Printed: 05/05/2022 00:00

Approved By: Stephen.Watson

UKAS TESTING 10122

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Hole No.	Sample				Rock Type	Specimen Dimensions2			Bulk Density2	Water Content 1	Uniaxial Compression3			Remarks
	Ref	Top	Base	Type		Dia. mm	Length mm	H/D	Mg/m3	%	Condition	Mode of failure	UCS MPa	
BH101	5	25.65	26.08	C	LIMESTONE	100.3	206.3	2.1	2.76	1.1	as received	S	19.5	
BH111	5	34.10	34.36	C	LIMESTONE	101.0	206.1	2.0	2.71	1.1	as received	F	20.5	

Notes

1 ISRM p87 test 1, water content at 105 ± 3 oC, specimen as tested for UCS

2 ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density

3 ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials

above notes apply unless annotated otherwise in the remarks

Mode of failure :

S - Single shear MS - multiple shear

AC - Axial cleavage F - Fragmented

Test Specification	Date Printed	Approved By	Table
International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007	05/05/2022 00:00	Stephen.Watson	1 sheet 1

LABORATORY REPORT

4043

Contract Number: PSL22/2906

Report Date: 12 May 2022

Client's Reference: 21-1219

Client Name: Causeway Geotech
8 Drumahiskey Road
Ballymoney
Co.Antrim
BT53 7QL

For the attention of: Stephen Watson

Contract Title: DAA Airfield Underpass Ground Investigation

Date Received: 22/4/2022
Date Commenced: 22/4/2022
Date Completed: 12/5/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

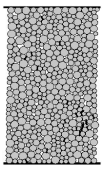
A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	D Burton (Advanced Testing Manager)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
 *sketch showing specimen location in original sample*	Depth	6.25-6.60m		
	Description	Grey very gravelly slightly sandy CLAY.		
	Type	Undisturbed, vertical orientation.		
	Initial Sample Length	L_0	(mm)	211.0
	Initial Sample Diameter	D_0	(mm)	104.7
	Initial Sample Weight	W_0	(gr)	4047.0
	Initial Bulk Density	ρ_0	(Mg/m3)	2.23
	Particle Density	ρ_s	(Mg/m3)	2.66

Initial Conditions			Stage 1	2
Initial Cell Pressure	σ_{3i}	(kPa)	980	
Initial Back Pressure	U_{bi}	(kPa)	850	
Membrane Thickness	m_b	(mm)	0.600	
Displacement Input	L_{IP}	(mm)	CH 2	
Load Input	N_{IP}	(N)	CH 1	
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	
Sample Volume	V	(cc)	CH 2	
Initial Moisture	ω_i	(%)	7.83	
Initial Dry Density	ρ_{di}	(Mg/m3)	2.07	
Initial Voids Ratio	e_i	.	0.288	
Initial Degree of Saturation	S_i	(%)	72	
B Value	B	.	0.96	

Final Conditions				
Final Moisture	ω_f	(%)	8.98	
Final Dry Density	ρ_{df}	(Mg/m3)	2.08	
Final Voids Ratio	e_f	.	0.280	
Final Degree of Saturation	S_f	(%)	85.4	
			Stage 1	2
Failure Criteria		.	Max. Dev. Stress	
Strain At Failure	ε_f	(%)	15.02	
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	943.0	
Minor Stress At Failure	σ_3'	(kPa)	349.6	
Major Stress At Failure	σ_1'	(kPa)	1292.6	
Principal Stress Ratio At Failure	σ_1'/σ_3'		3.697	

Notes



Plastic

UKAS TESTING 4043

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH101 6.25-6.60m C1
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH101
		Sample	6.25-6.60m
Client	Causeway Geotech	Depth	6.25-6.60m

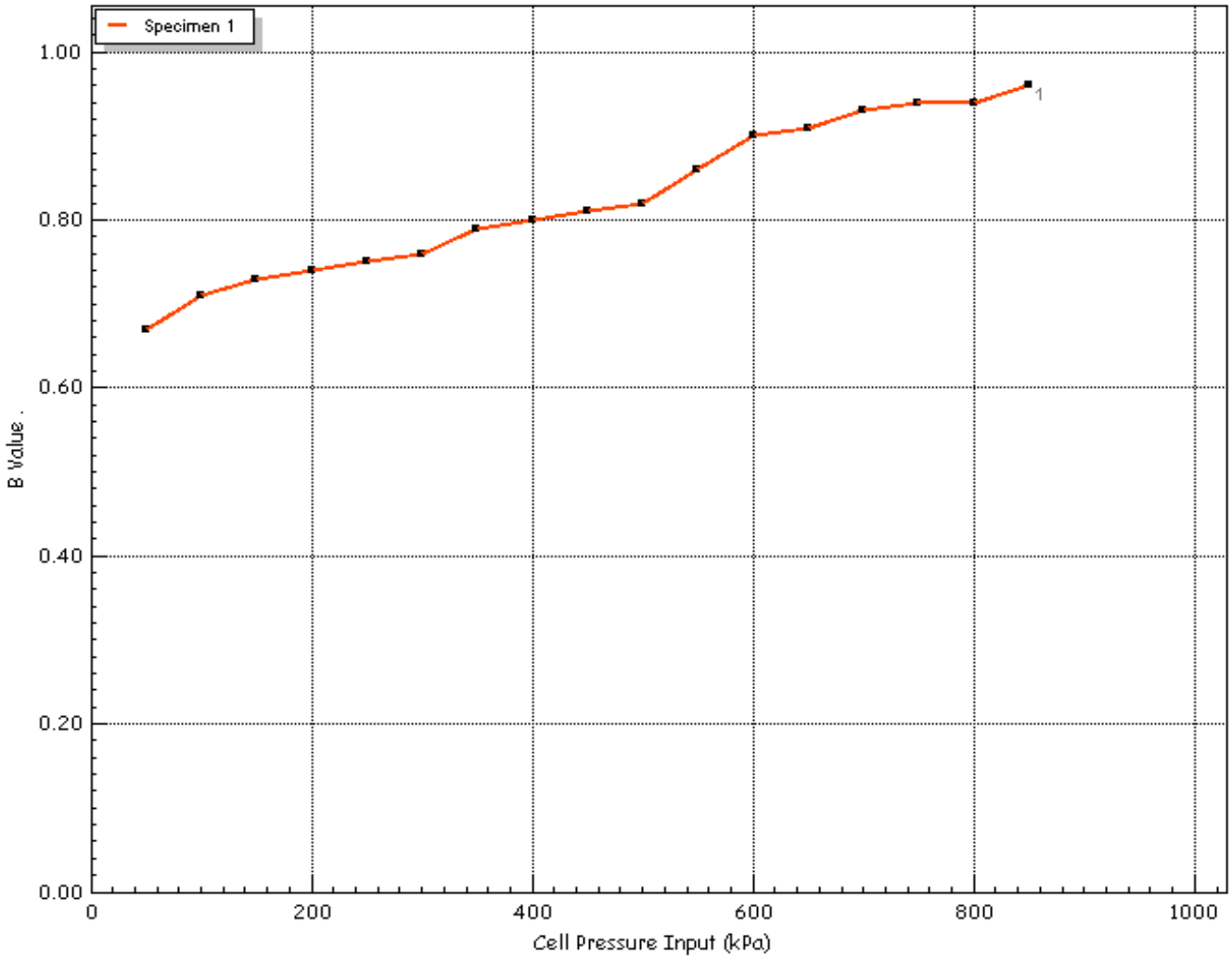
PSL Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	850
Pore Water Pressure Input	u pwp	(kPa)	842
B Value	B	.	0.96



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH101 6.25-6.60m C1
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH101
		Sample	6.25-6.60m
Client	Causeway Geotech	Depth	6.25-6.60m

UKAS TESTING 4043

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Effective Stress Triaxial Compression

Consolidated Undrained

Consolidation Plots

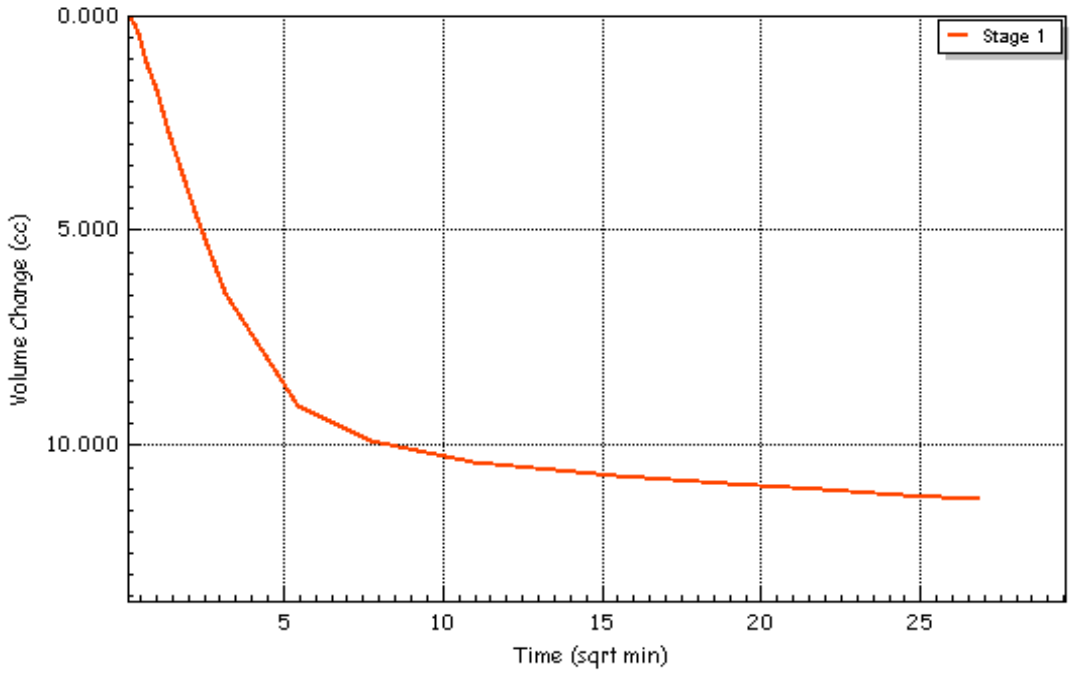
Initial Conditions

Initial Cell Pressure	σ_3	(kPa)	980
Initial Back Pressure	u_{bi}	(kPa)	850
Pore Water Pressure Input	u_{pwp}	(kPa)	921
Drainage Method			Radial+One End

Final Conditions

PWP Dissipation %	U%	(%)	100.00
Volumetric Strain	ε_v%	(%)	0.62
Corrected Length	L_C	(mm)	210.6
Corrected Area	A_C	(cm2)	85.74
Corrected Volume	V_C	(cc)	1805.380
T100 Time to Failure	t_{100}	(min)	25.58
Consolidation	c_V	(m2/year)	8.849
Compressibility	m_V	(m2/MN)	0.088
Test Time	t_F	(h:m:s)	02:00:00
Estimated Strain to Failure	ε %	(%)	5.0
Shear Machine Speed	d_r	(mm/min)	0.08774

Notes



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH101 6.25-6.60m C1
		Test Date	06/05/2022
Site Reference	DAA Airfield Underpass Ground Investigation	Borehole	BH101
Jobfile		Sample	6.25-6.60m
Client	Causeway Geotech	Depth	6.25-6.60m

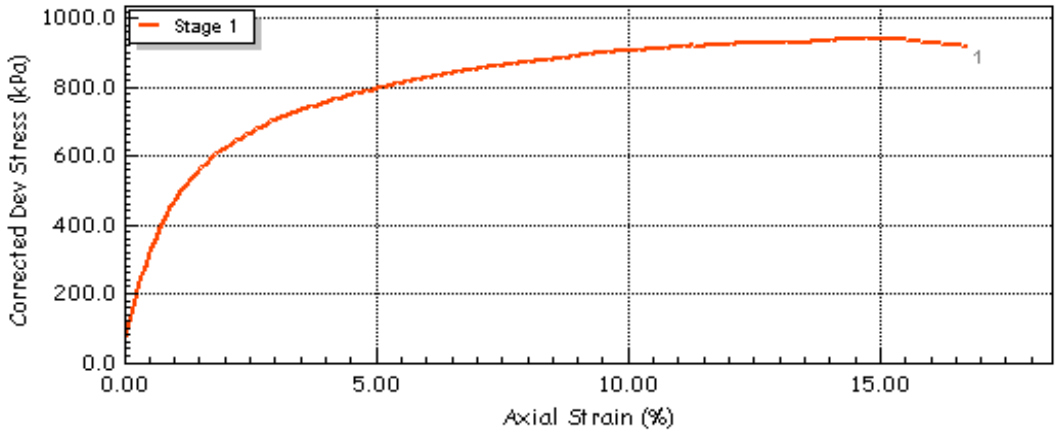
UKAS TESTING 4043

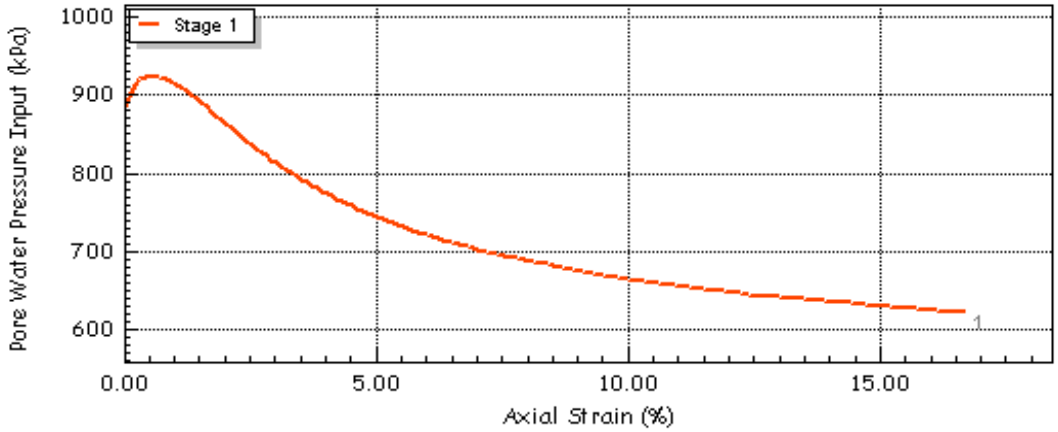
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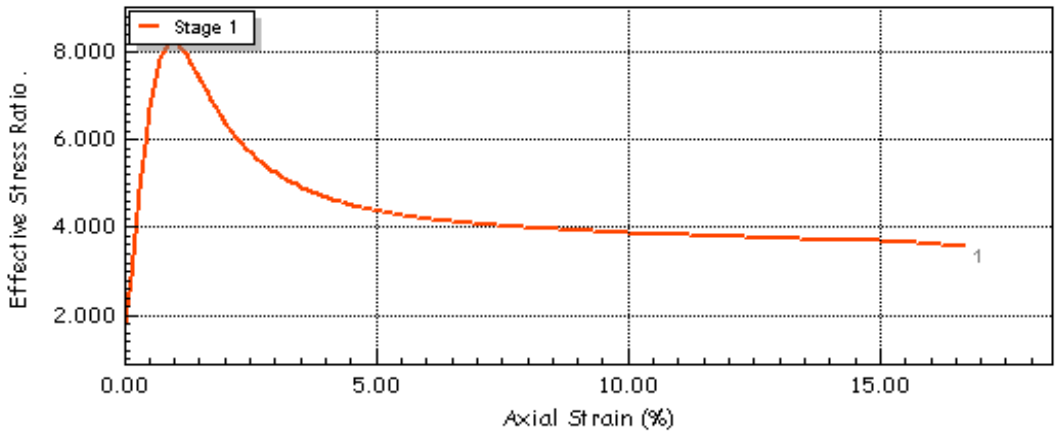
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH101 6.25-6.60m C1
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH101
		Sample	6.25-6.60m
Client	Causeway Geotech	Depth	6.25-6.60m

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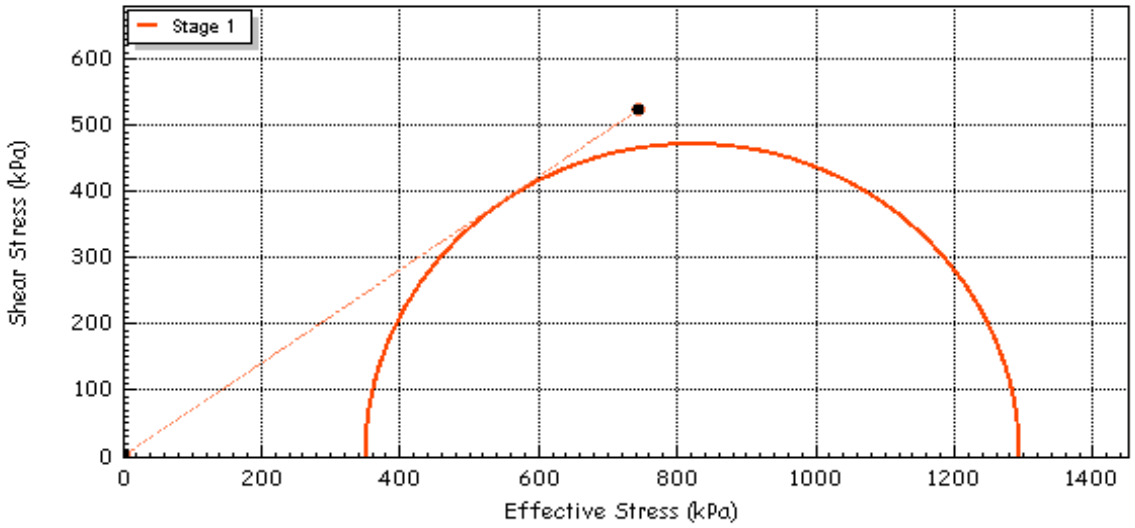
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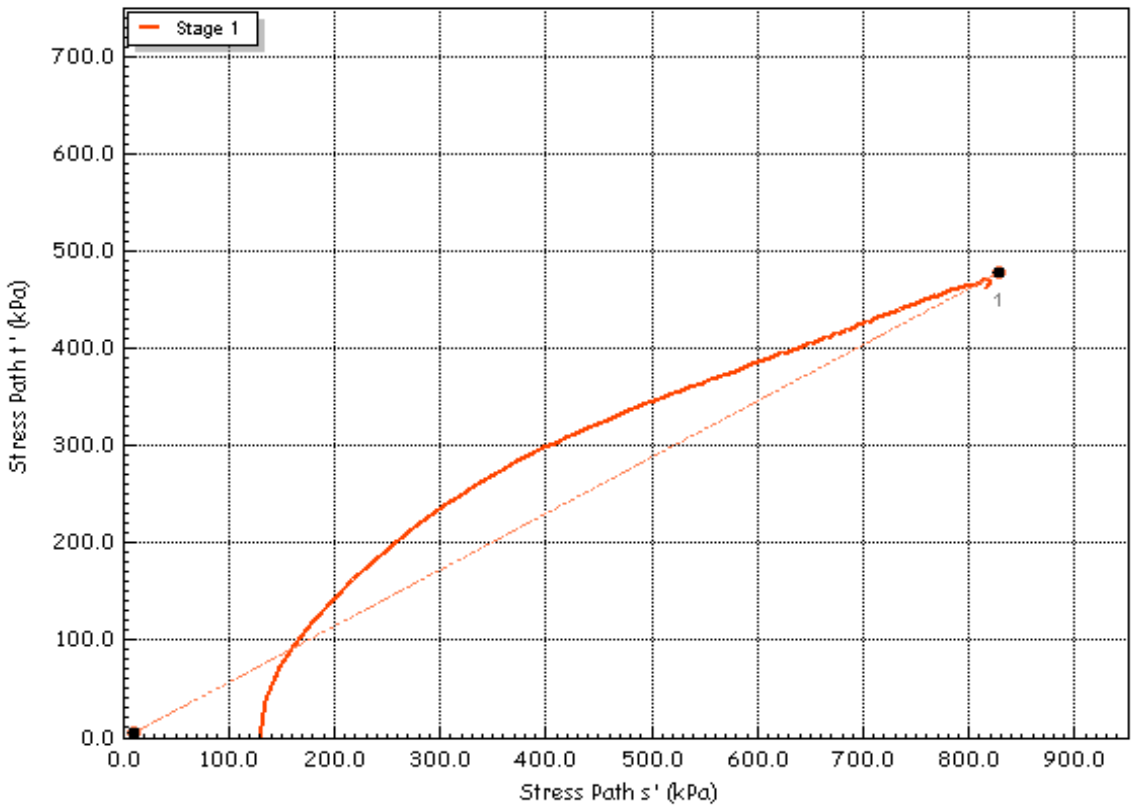
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective	c'	(kPa)	0.00	Effective Cohesion	c'	(kPa)	0.00
Effective Friction	ϕ'	(deg)	35.2	Effective Friction	ϕ'	(deg)	35.2





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH101 6.25-6.60m C1
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH101
		Sample	6.25-6.60m
Client	Causeway Geotech	Depth	6.25-6.60m

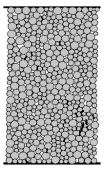
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Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
	Depth			8.80-9.10m
	Description			Brown very gravelly slightly sandy CLAY.
	Type			Undisturbed, vertical orientation.
	Initial Sample Length	L_0	(mm)	211.0
	Initial Sample Diameter	D_0	(mm)	105.0
	Initial Sample Weight	W_0	(gr)	3939.0
	Initial Bulk Density	ρ_0	(Mg/m3)	2.16
	Particle Density	ρ_s	(Mg/m3)	2.66

sketch showing specimen location in original sample

Initial Conditions			Stage 1	2
Initial Cell Pressure	σ_{3i}	(kPa)	980	
Initial Back Pressure	U_{bi}	(kPa)	800	
Membrane Thickness	m_b	(mm)	0.600	
Displacement Input	L_{IP}	(mm)	CH 2	
Load Input	N_{IP}	(N)	CH 1	
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	
Sample Volume	V	(cc)	CH 2	
Initial Moisture	ω_i	(%)	10	
Initial Dry Density	ρ_{di}	(Mg/m3)	1.96	
Initial Voids Ratio	e_i	.	0.358	
Initial Degree of Saturation	S_i	(%)	75	
B Value	B	.	1.00	

Final Conditions				
Final Moisture	ω_f	(%)	11	
Final Dry Density	ρ_{df}	(Mg/m3)	2.04	
Final Voids Ratio	e_f	.	0.307	
Final Degree of Saturation	S_f	(%)	96.0	
			Stage 1	2
Failure Criteria		.	Max. Dev. Stress	
Strain At Failure	ε_f	(%)	20.00	
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	139.6	
Minor Stress At Failure	σ_3'	(kPa)	56.0	
Major Stress At Failure	σ_1'	(kPa)	195.6	
Principal Stress Ratio At Failure	σ_1'/σ_3'		3.493	

Notes



Plastic

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH110 8.80-9.10m C2
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH110
		Sample	8.80-9.10m
Client	Causeway Geotech	Depth	8.80-9.10m

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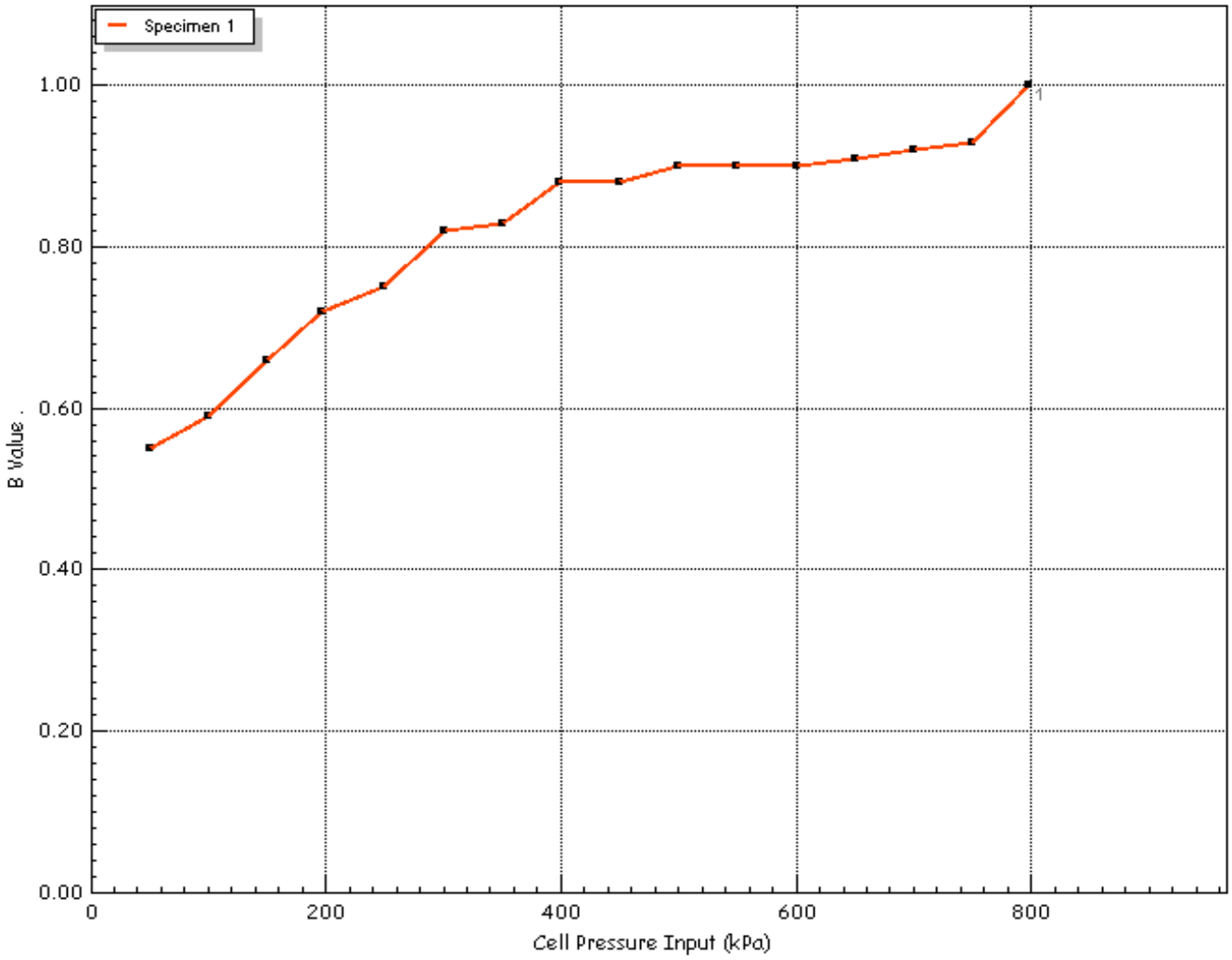
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Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	798
Pore Water Pressure Input	u pwp	(kPa)	785
B Value	B	.	1.00



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH110 8.80-9.10m C2
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH110
		Sample	8.80-9.10m
Client	Causeway Geotech	Depth	8.80-9.10m

UKAS TESTING 4043

PSL Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Consolidation Plots

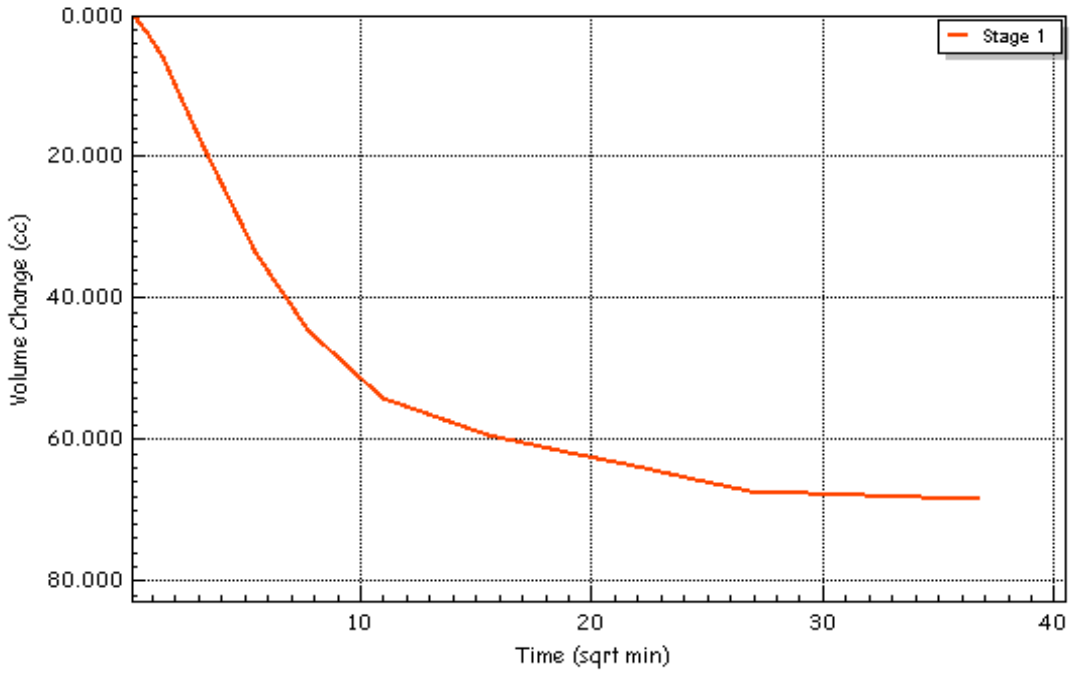
Initial Conditions

Initial Cell Pressure	σ_3	(kPa)	980
Initial Back Pressure	u_{bi}	(kPa)	800
Pore Water Pressure Input	u_{pwp}	(kPa)	954
Drainage Method			Radial+One End

Final Conditions

PWP Dissipation %	U%	(%)	100.00
Volumetric Strain	ε_v%	(%)	3.74
Corrected Length	L_C	(mm)	208.4
Corrected Area	A_C	(cm2)	84.43
Corrected Volume	V_C	(cc)	1758.646
T100 Time to Failure	t_{100}	(min)	90.67
Consolidation	c_V	(m2/year)	2.511
Compressibility	m_V	(m2/MN)	0.243
Test Time	t_F	(h:m:s)	02:43:12
Estimated Strain to Failure	ε%	(%)	5.0
Shear Machine Speed	d_r	(mm/min)	0.06384

Notes



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH110 8.80-9.10m C2
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH110
		Sample	8.80-9.10m
Client	Causeway Geotech	Depth	8.80-9.10m

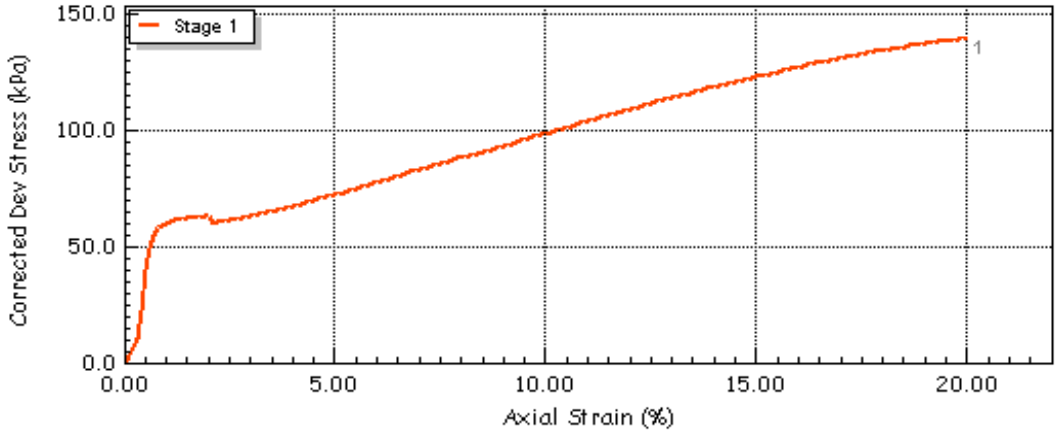
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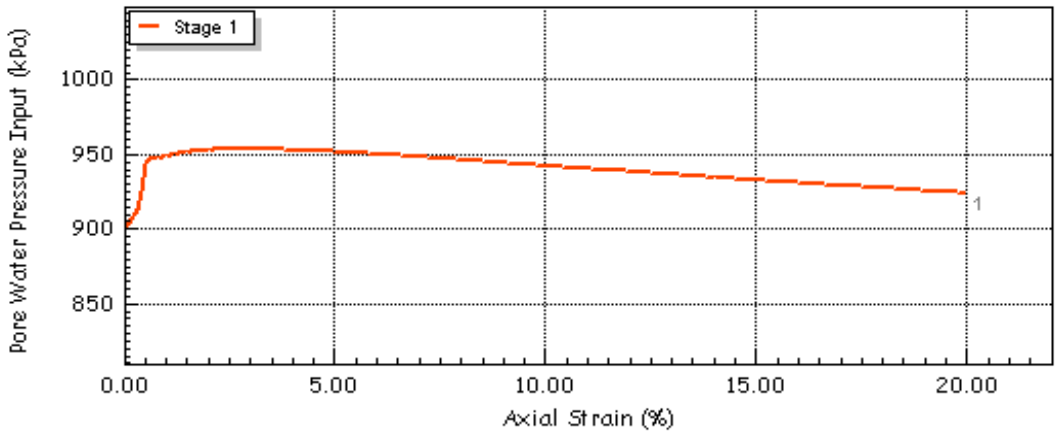
PSL Professional Soils Laboratory

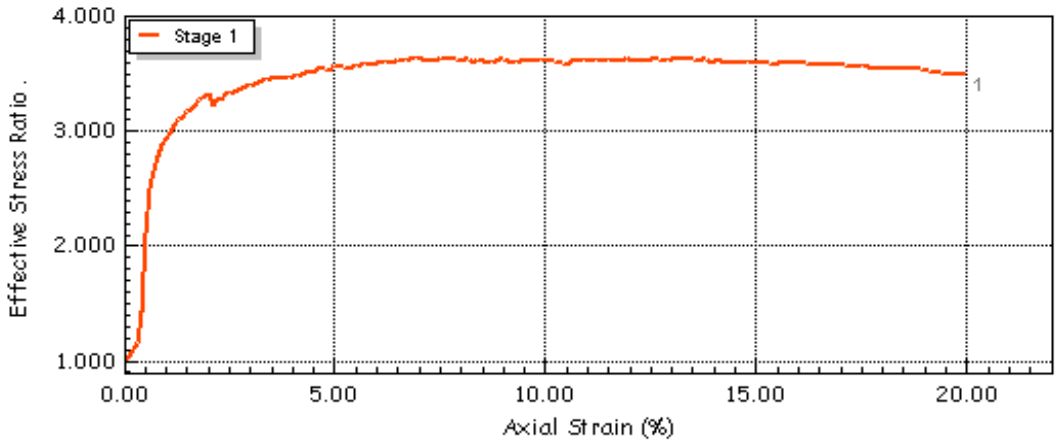
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH110 8.80-9.10m C2
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH110
		Sample	8.80-9.10m
Client	Causeway Geotech	Depth	8.80-9.10m

UKAS TESTING 4043

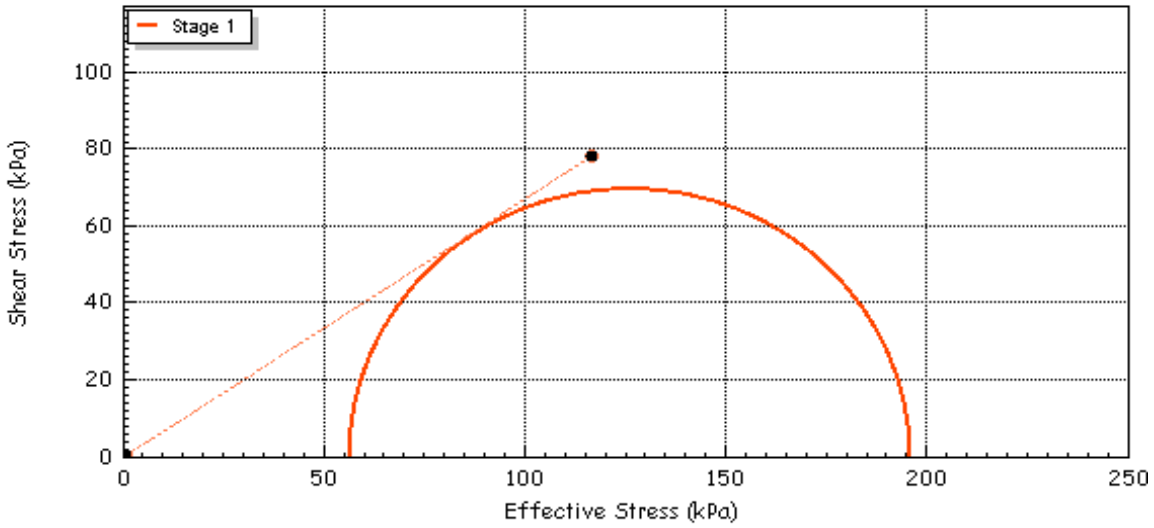
PSL Professional Soils Laboratory

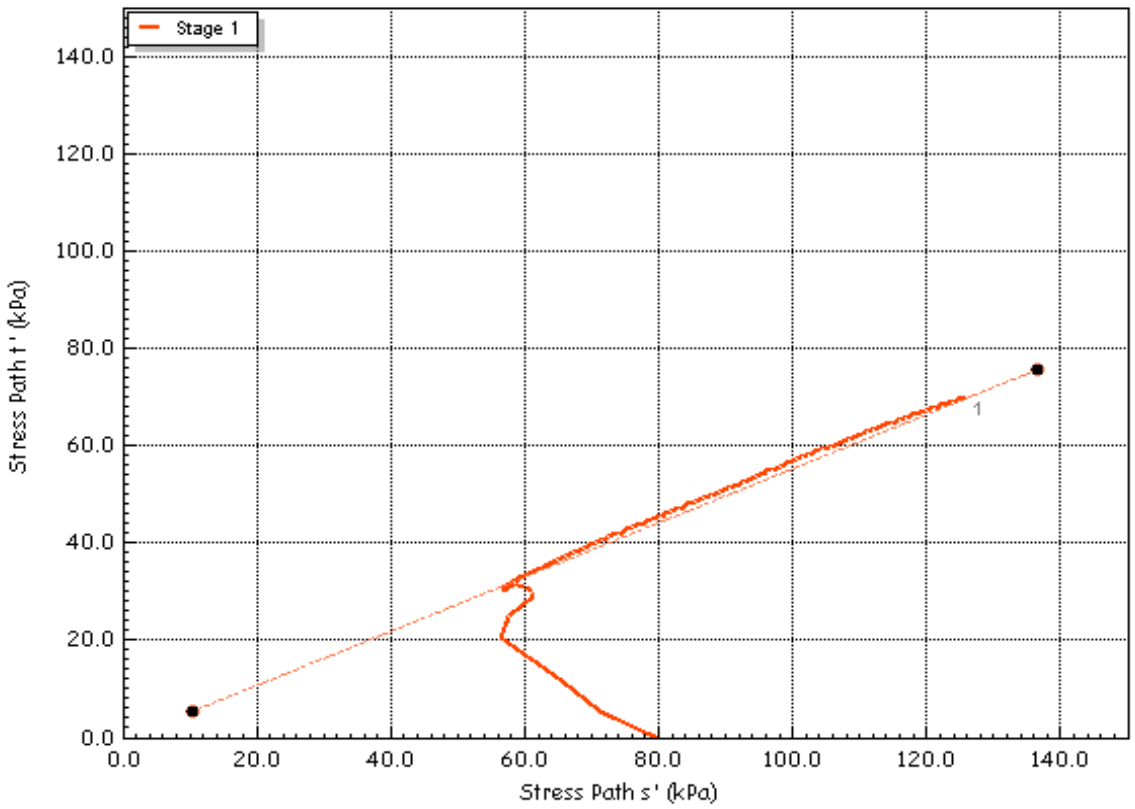
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective	c'	(kPa)	0.00	Effective Cohesion	c'	(kPa)	0.00
Effective Friction	ϕ'	(deg)	33.9	Effective Friction	ϕ'	(deg)	33.9





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH110 8.80-9.10m C2
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH110
		Sample	8.80-9.10m
Client	Causeway Geotech	Depth	8.80-9.10m

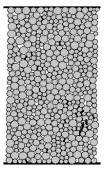
UKAS TESTING 4043

PSL Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
	Depth			3.80-4.10m
	Description			Grey very gravelly very sandy CLAY.
	Type			Undisturbed, vertical orientation.
	Initial Sample Length	L_0	(mm)	211.5
	Initial Sample Diameter	D_0	(mm)	105.4
	Initial Sample Weight	W_0	(gr)	4122.6
	Initial Bulk Density	ρ_0	(Mg/m3)	2.23
	Particle Density	ρ_s	(Mg/m3)	2.66

sketch showing specimen location in original sample

Initial Conditions			Stage 1	2
Initial Cell Pressure	σ_{3i}	(kPa)	530	
Initial Back Pressure	U_{bi}	(kPa)	450	
Membrane Thickness	m_b	(mm)	0.600	
Displacement Input	L_{IP}	(mm)	CH 2	
Load Input	N_{IP}	(N)	CH 1	
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	
Sample Volume	V	(cc)	CH 2	
Initial Moisture	ω_i	(%)	8.95	
Initial Dry Density	ρ_{di}	(Mg/m3)	2.05	
Initial Voids Ratio	e_i	.	0.297	
Initial Degree of Saturation	S_i	(%)	80	
B Value	B	.	0.95	

Final Conditions				
Final Moisture	ω_f	(%)	8.88	
Final Dry Density	ρ_{df}	(Mg/m3)	2.07	
Final Voids Ratio	e_f	.	0.286	
Final Degree of Saturation	S_f	(%)	82.6	
			Stage 1	2
Failure Criteria		.	Max. Dev. Stress	
Strain At Failure	ε_f	(%)	18.91	
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	492.6	
Minor Stress At Failure	σ_3'	(kPa)	211.0	
Major Stress At Failure	σ_1'	(kPa)	703.6	
Principal Stress Ratio At Failure	σ_1'/σ_3'		3.335	

Notes



Plastic

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH111 3.80-4.10m C1
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH111
		Sample	3.80-4.10m
Client	Causeway Geotech	Depth	3.80-4.10m

UKAS TESTING 4043

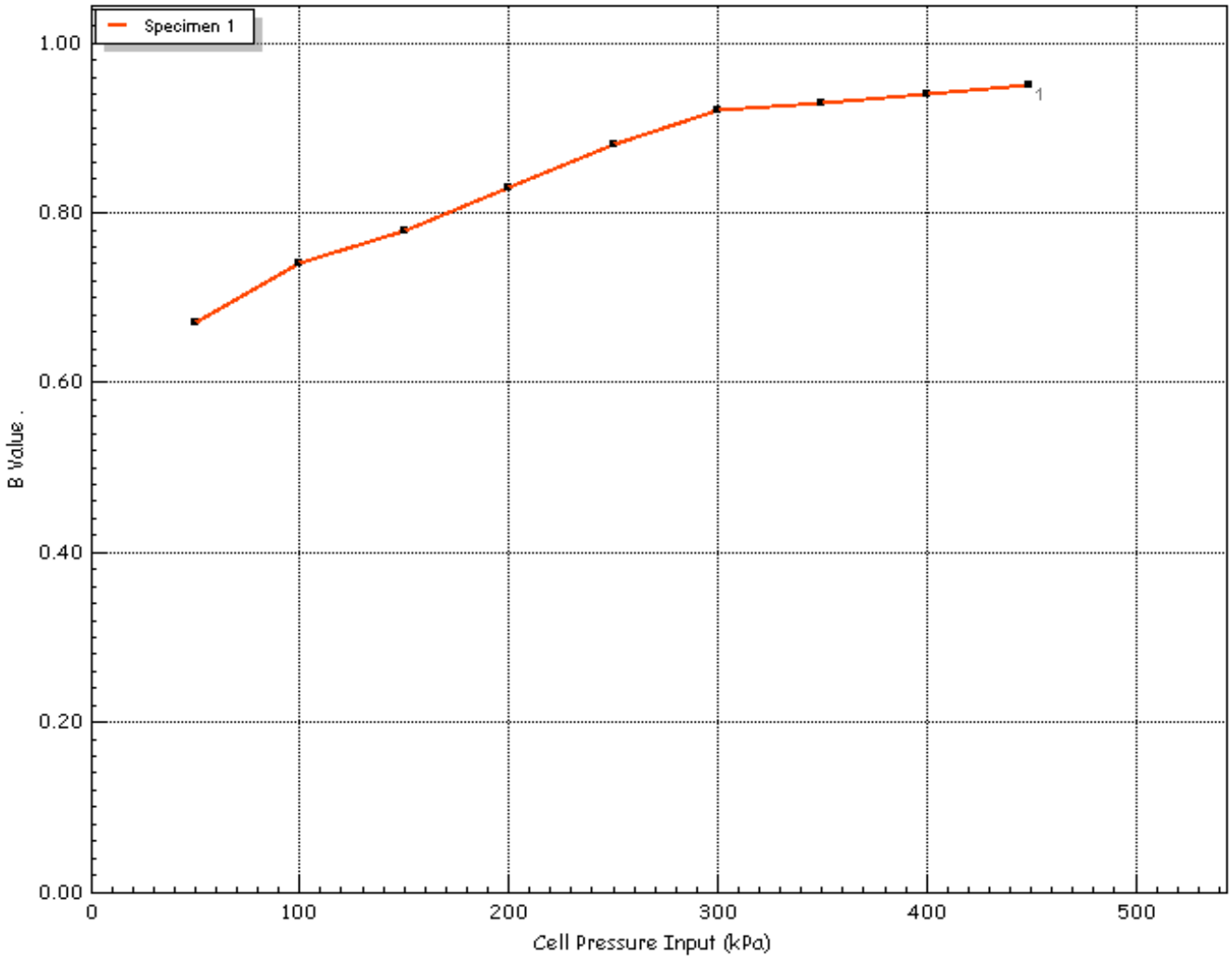
PSL Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	449
Pore Water Pressure Input	u pwp	(kPa)	439
B Value	B	.	0.95



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH111 3.80-4.10m C1
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH111
		Sample	3.80-4.10m
Client	Causeway Geotech	Depth	3.80-4.10m

UKAS TESTING 4043

PSL Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Consolidation Plots

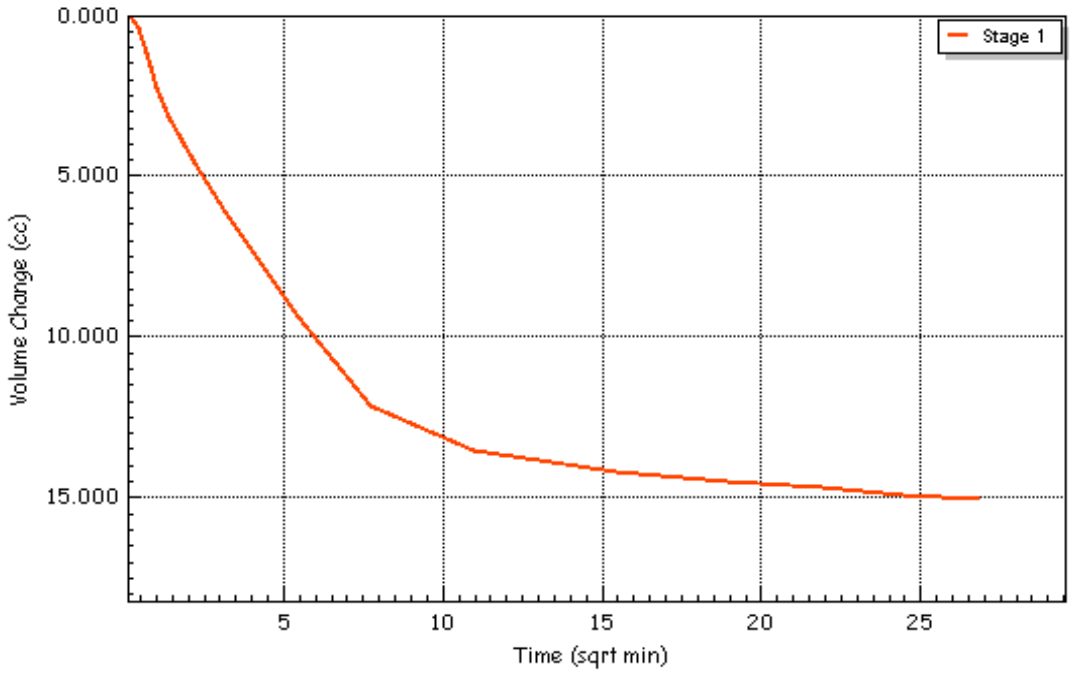
Initial Conditions

Initial Cell Pressure	σ_3	(kPa)	530
Initial Back Pressure	u_{bi}	(kPa)	450
Pore Water Pressure Input	u_{pwp}	(kPa)	512
Drainage Method			Radial+One End

Final Conditions

PWP Dissipation %	U%	(%)	100.00
Volumetric Strain	ε_v%	(%)	0.82
Corrected Length	L_C	(mm)	210.9
Corrected Area	A_C	(cm2)	86.78
Corrected Volume	V_C	(cc)	1830.318
T100 Time to Failure	t_{100}	(min)	65.01
Consolidation	c_V	(m2/year)	3.529
Compressibility	m_V	(m2/MN)	0.132
Test Time	t_F	(h:m:s)	02:00:00
Estimated Strain to Failure	ε%	(%)	5.0
Shear Machine Speed	d_r	(mm/min)	0.08789

Notes



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH111 3.80-4.10m C1
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH111
		Sample	3.80-4.10m
Client	Causeway Geotech	Depth	3.80-4.10m

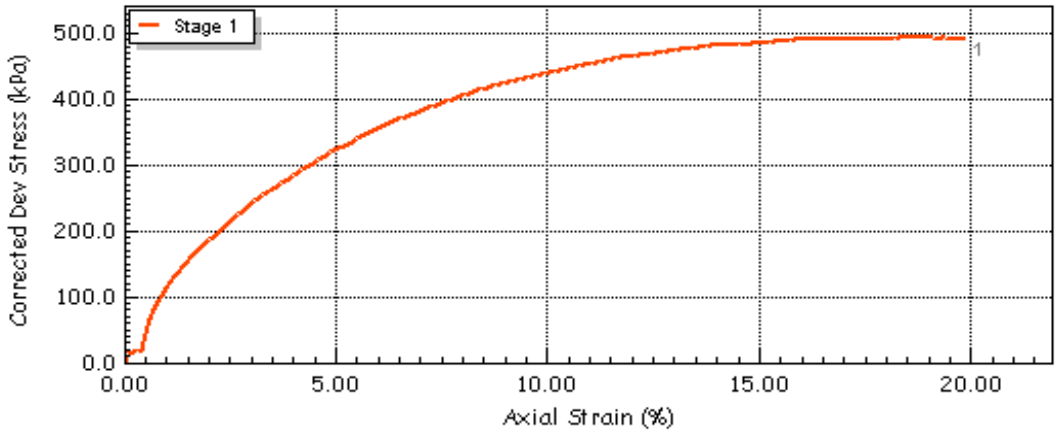
UKAS TESTING 4043

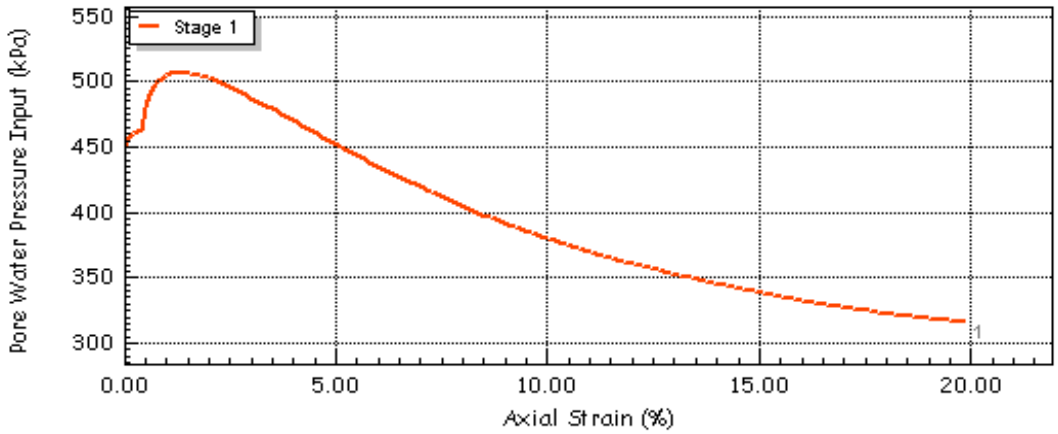
PSL Professional Soils Laboratory

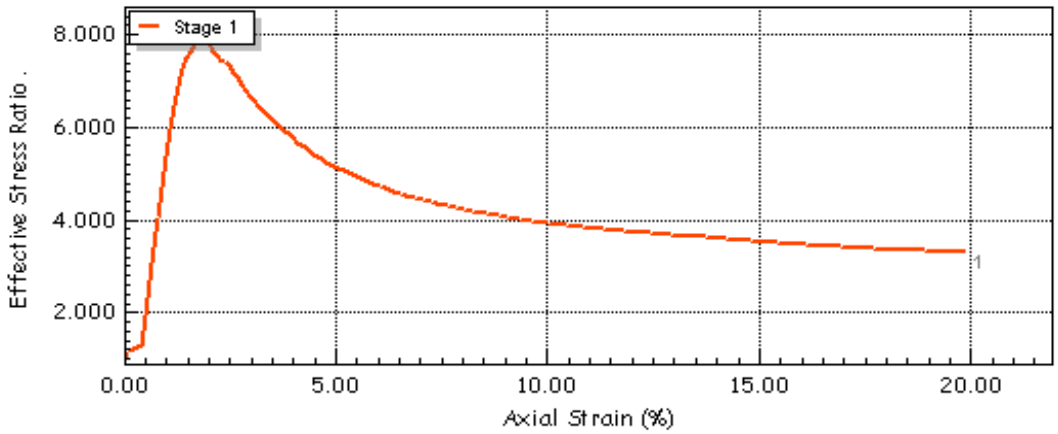
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH111 3.80-4.10m C1
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH111
		Sample	3.80-4.10m
Client	Causeway Geotech	Depth	3.80-4.10m

UKAS TESTING 4043

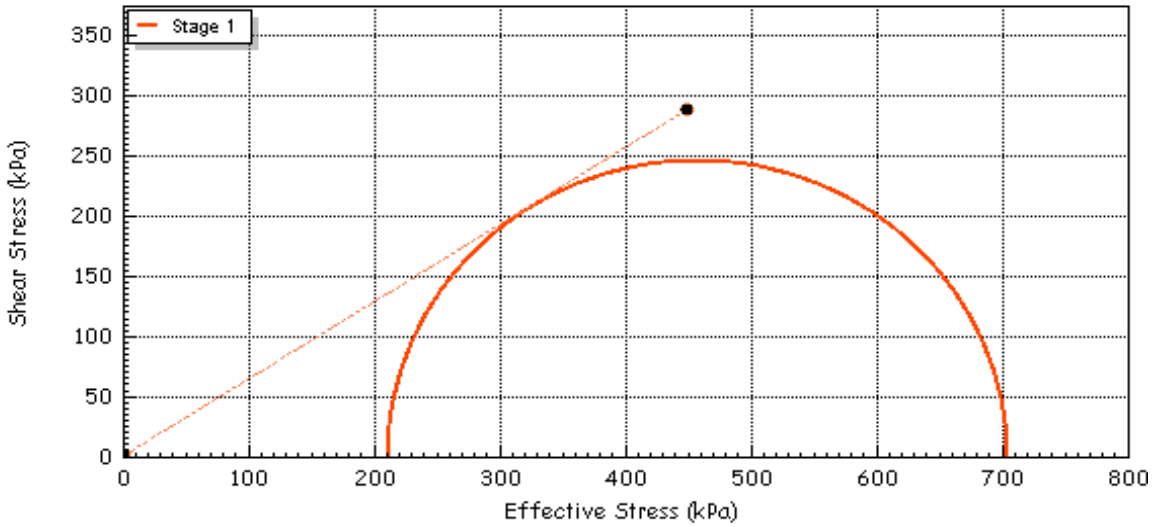
PSL Professional Soils Laboratory

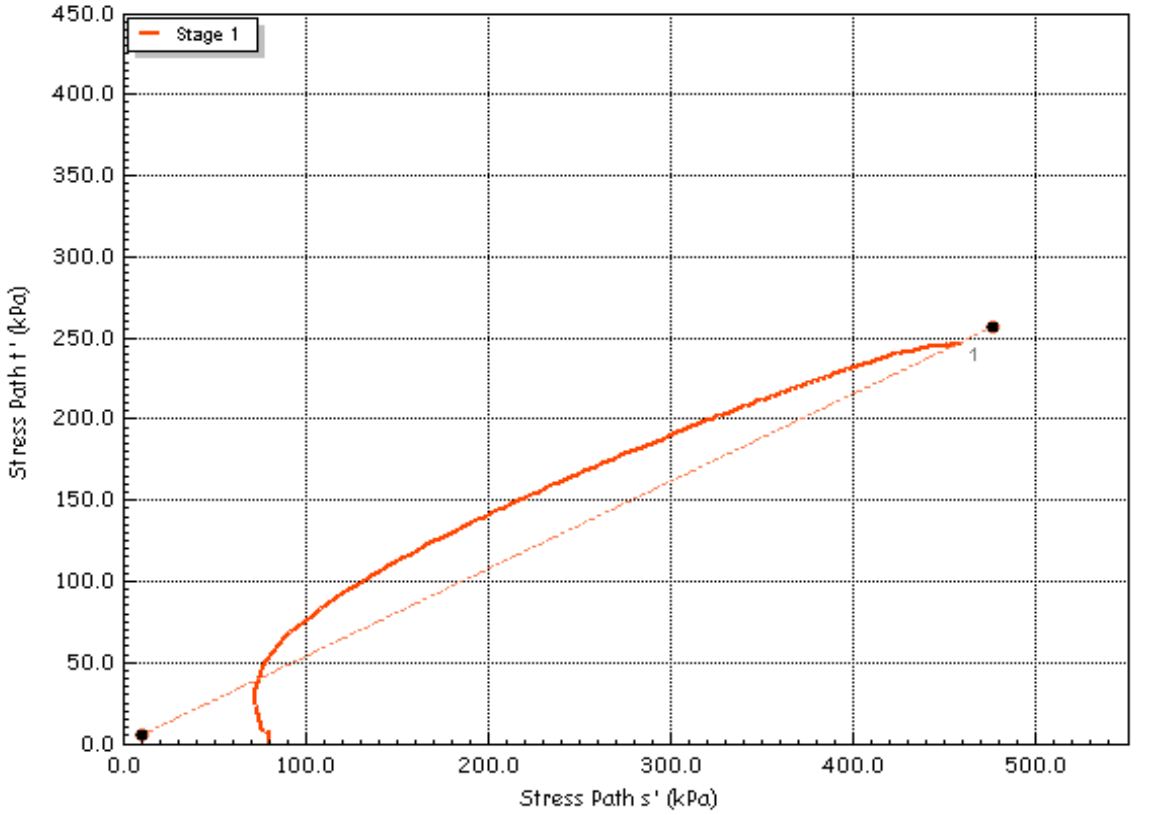
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective	c'	(kPa)	0.00	Effective Cohesion	c'	(kPa)	0.00
Effective Friction	ϕ'	(deg)	32.7	Effective Friction	ϕ'	(deg)	32.7





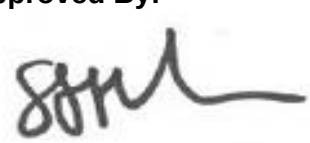
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH111 3.80-4.10m C1
		Test Date	06/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH111
		Sample	3.80-4.10m
Client	Causeway Geotech	Depth	3.80-4.10m

UKAS TESTING 4043

PSL Process and Soils Laboratory

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Amended Report

Report No.:	22-14852-2		
Initial Date of Issue:	26-Apr-2022	**Date of Re-Issue:**	12-May-2022
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister		
Project	1`-1219 DAA Airfield Underpass		
Quotation No.:		**Date Received:**	21-Apr-2022
Order No.:	COLM HURLEY	**Date Instructed:**	21-Apr-2022
No. of Samples:	10		
Turnaround (Wkdays):	16	**Results Due:**	13-May-2022
Date Approved:	12-May-2022		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: 1`-1219 DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-14852	22-14852	22-14852	22-14852	22-14852	22-14852	22-14852	22-14852	22-14852
Quotation No.:			**Chemtest Sample ID.:**		1415021	1415022	1415023	1415024	1415025	1415026	1415027	1415028	1415029
Order No.: COLM HURLEY			Client Sample Ref.:		2	3	4	5	1	2	3	4	1
			Sample Location:		BH101	BH101	BH101	BH101	BH110	BH110	BH110	BH110	BH111
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		2.7	4.2	6.1	8.4	1.2	2.2	7.2	7.8	2.5
			Date Sampled:		15-Apr-2022	15-Apr-2022	15-Apr-2022	15-Apr-2022	15-Apr-2022	15-Apr-2022	15-Apr-2022	15-Apr-2022	15-Apr-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Moisture	N	2030	%	0.020	8.1	14	5.9	9.0	6.3	21	9.4	9.5	21
pH	U	2010		4.0	8.0	8.2			8.8	8.3			
pH (2.5:1)	N	2010		4.0			9.0	9.1			8.7	7.9	8.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			0.042	0.022			0.033	0.084	0.042
Total Sulphur	U	2175	%	0.010			0.27				0.16		0.061
Sulphate (Acid Soluble)	U	2430	%	0.010			0.032				0.037		0.030
Organic Matter	U	2625	%	0.40	0.88	0.69			0.74	2.6			

Results - Soil

Project: 1`-1219 DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-14852
Quotation No.:			**Chemtest Sample ID.:**		1415030
Order No.: COLM HURLEY			Client Sample Ref.:		1
			Sample Location:		BH111
			Sample Type:		SOIL
			Top Depth (m):		4.3
			Date Sampled:		15-Apr-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Moisture	N	2030	%	0.020	7.1
pH	U	2010		4.0	
pH (2.5:1)	N	2010		4.0	8.6
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.13
Total Sulphur	U	2175	%	0.010	
Sulphate (Acid Soluble)	U	2430	%	0.010	
Organic Matter	U	2625	%	0.40	

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
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

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

LABORATORY RESTRICTION REPORT

Project Reference	21-1219	To	Colm Hurley
		Position	Project Manager
Project Name	DAA Airfield Underpass Ground Investigation	From	Stephen Watson
TR reference	21-1219 /	Position	Laboratory Manager

The following sample(s) and test(s) are restricted as detailed below. Could you please complete the "Required Action" column and return the completed form to the laboratory.

Hole Number	Sample			Test Type	Reason for Restriction	Required Action
	Number	Depth (m)	Type			
BH110	1	2.50-3.50	B	Dry Density / WC Relationship (2.5kg rammer)	Insufficient material	Priority given to classification testing
BH110	1	2.50-3.50	B	California Bearing Ratio (CBR)	Insufficient material	Priority given to classification testing

For electronic reporting a form of electronic signature or printed name is acceptable

Laboratory Signature Stephen Watson	Project Manager Signature Colm Hurley
Date 25 April 2022	Date 25 April 2022

CAUSEWAY GEOTECH

HEAD OFFICE
Causeway Geotech Ltd
8 Drumahiskey Road
Ballymoney
Co. Antrim, N. Ireland, BT53 7QL
NI: +44 (0)28 276 66640
Registered in Northern Ireland.
Company Number: NI610766

REGIONAL OFFICE
Causeway Geotech (IRL) Ltd
Unit 1 Fingal House
Stephenstown Industrial Estate
Balbriggan, Co Dublin, Ireland, K32 VR66
ROI: +353 (0)1 526 7465
Registered in Ireland.
Company Number: 633786

www.causewaygeotech.com

SOIL AND ROCK SAMPLE ANALYSIS
LABORATORY TEST REPORT

30 May 2022

Project Name:	DAA Airfield Underpass Ground Investigation
Project No.:	21-1219
Client:	DAA
Engineer:	Ramboll Consulting Engineers

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 10/05/2022 and 30/05/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.



Stephen Watson

Laboratory Manager

Signed for and on behalf of Causeway Geotech Ltd

Project Name: DAA Airfield Underpass Ground Investigation

Report Reference: Schedule 2 - FINAL

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	7
SOIL	Liquid and Plastic Limits of soil-1 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	7
SOIL	Bulk and dry density by Linear Measurement Method	BS 1377-2: 1990: Cl 7.2	8
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	25
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	14
SOIL	Dry density/moisture content relationship (2.5 kg rammer)	BS 1377-4: 1990: Cl 3.3 & 3.4	3
SOIL	California Bearing Ratio (CBR)	BS 1377-4: 1990: Cl 7	4
SOIL	Consolidation properties in oedometer - Using 5 pressures (up to 5 days total duration)	BS 1377-5: 1990: Cl 3: 1	2
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 8	5
ROCK	Point load index	ISRM Commission on Testing Methods. Suggested Method for Determining Point Load Strength 1985	11
ROCK	Uniaxial Compressive Strength (UCS)*	ISRM Suggested Methods -Rock Characterization Testing and Monitoring, Ed. E T Brown - 1981	3

SUB-CONTRACTED TESTS

In agreement with Client, the following tests were conducted by an approved sub-contractor. All sub-contracting laboratories used are UKAS accredited.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – subcontracted to Pro Soils Limited *(UKAS 4043)*	Effective shear strength consolidated-undrained triaxial compression test with measurement of pore pressure (up to 4 days)	BS 1377-8:1990	2
	Extra over days (more than initial 4 days)		0
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	Organic Matter Content		8
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	BRE Test - Suite D		8

Summary of Classification Test Results

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Hole No.	Sample				Soil Description	Density bulk Mg/m3	Density dry Mg/m3	*w* %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
	Ref	Top	Base	Type										
BH104	2	6.40	7.40	B	Greyish brown sandy gravelly silty CLAY with cobbles.	2.12	1.88	7.2	66	29 -1pt	15	14		CL
BH104	3	11.95	12.50	B	Greyish brown sandy gravelly silty CLAY.	2.39	2.19	7.3	69	30 -1pt	15	15		CL
BH106	7	9.50	10.50	B	Greyish brown sandy slightly gravelly silty CLAY.	2.18	1.98	12.0	64	30 -1pt	15	15		CL
BH106	20	19.40	20.40	B	Greyish brown sandy gravelly silty CLAY with some cobbles.	2.54	2.23	6.3	61	33 -1pt	17	16		CL
BH107	4	12.00	13.00	B	Brownish grey sandy gravelly silty CLAY with some cobbles.	2.03	1.83	6.9	74	29 -1pt	15	14		CL
BH107	6	14.60	15.60	B	Greyish brown sandy gravelly silty CLAY with cobbles.	2.20	1.98	6.2	71	30 -1pt	14	16		CL
BH108	4	13.35	14.35	B	Greyish brown sandy gravelly silty CLAY.	2.26	2.02	11.0	71	29 -1pt	14	15		CL

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key

Density test | Liquid Limit | Particle density

Linear measurement unless : | 4pt cone unless : | sp - small pyknometer

wd - water displacement | cas - Casagrande method | gj - gas jar

wi - immersion in water | 1pt - single point test

Date Printed: 25/05/2022

Approved By: Stephen.Watson

UKAS TESTING 10122

CAUSEWAY GEOTECH

Density Tests - Summary of Results

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Hole No.	Sample				Soil Description	Linear Measurement			Immersion in water			Water displacement			Remarks
	Ref	Top	Base	Type		Bulk density Mg/m3	Dry density Mg/m3	w %	Bulk density Mg/m3	Dry density Mg/m3	w %	Bulk density Mg/m3	Dry density Mg/m3	w %	
BH104	2	6.40	7.40	B	Greyish brown sandy gravelly silty CLAY with cobbles.	2.12	1.88	13							
BH104	3	11.95	12.50	B	Greyish brown sandy gravelly silty CLAY.	2.39	2.19	9							
BH104	13	20.25	20.55	B	Grey sandy silty CLAY.	2.01	1.75	15							
BH106	7	9.50	10.50	B	Greyish brown sandy slightly gravelly silty CLAY.	2.18	1.98	10							
BH106	20	19.40	20.40	B	Greyish brown sandy gravelly silty CLAY with some cobbles.	2.54	2.23	14							
BH107	4	12.00	13.00	B	Brownish grey sandy gravelly silty CLAY with some cobbles.	2.03	1.83	11							
BH107	6	14.60	15.60	B	Greyish brown sandy gravelly silty CLAY with cobbles.	2.20	1.98	11							
BH108	4	13.35	14.35	B	Greyish brown sandy gravelly silty CLAY.	2.26	2.02	12							

Legend w moisture content of the density test specimen

LAB 03R - Version 5

Notes

Tests carried out in accordance with BS1377:Part2:1990 and the following clauses unless annotated otherwise

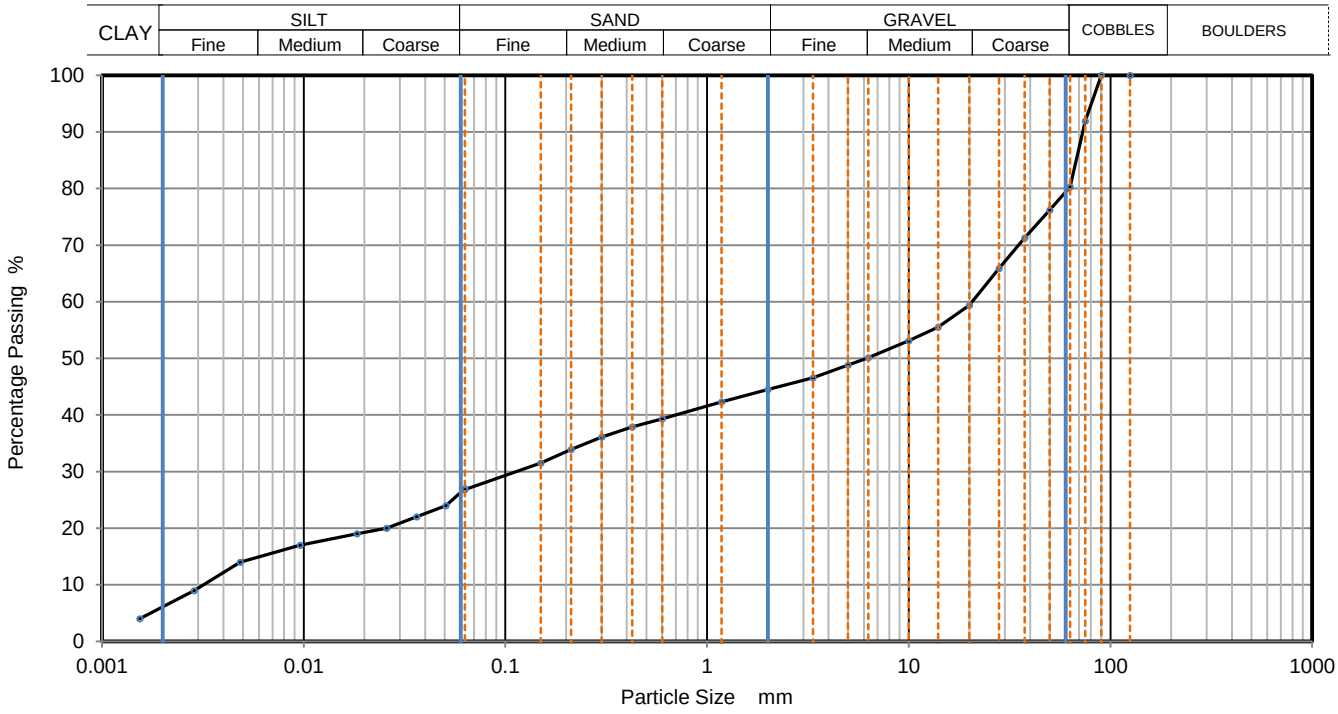
Linear measurement	clause 7.2
Immersion in water	clause 7.3
Water displacement	clause 7.4

Date Printed: 25/05/2022

Approved By: Stephen.Watson

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Greyish brown sandy gravelly silty CLAY with cobbles.			Depth, m	6.40
Specimen Reference	8	Specimen Depth	6.4 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051010



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	27
90	100	0.05065	24
75	92	0.03625	22
63	80	0.02579	20
50	76	0.01834	19
37.5	71	0.00958	17
28	66	0.00485	14
20	59	0.00286	9
14	56	0.00154	4
10	53		
6.3	50		
5	49		
3.35	47		
2	45		
1.18	42		
0.6	39	Particle density	(assumed)
0.425	38	2.65	Mg/m3
0.3	36		
0.212	34		
0.15	32		
0.063	27		

Dry Mass of sample, g	9342

Sample Proportions	% dry mass
Cobbles	19.7
Gravel	35.8
Sand	17.7
Silt	20.8
Clay	6.0

Grading Analysis		
D100	mm	
D60	mm	20.6
D30	mm	0.114
D10	mm	0.00319
Uniformity Coefficient		6500
Curvature Coefficient		0.2

Remarks

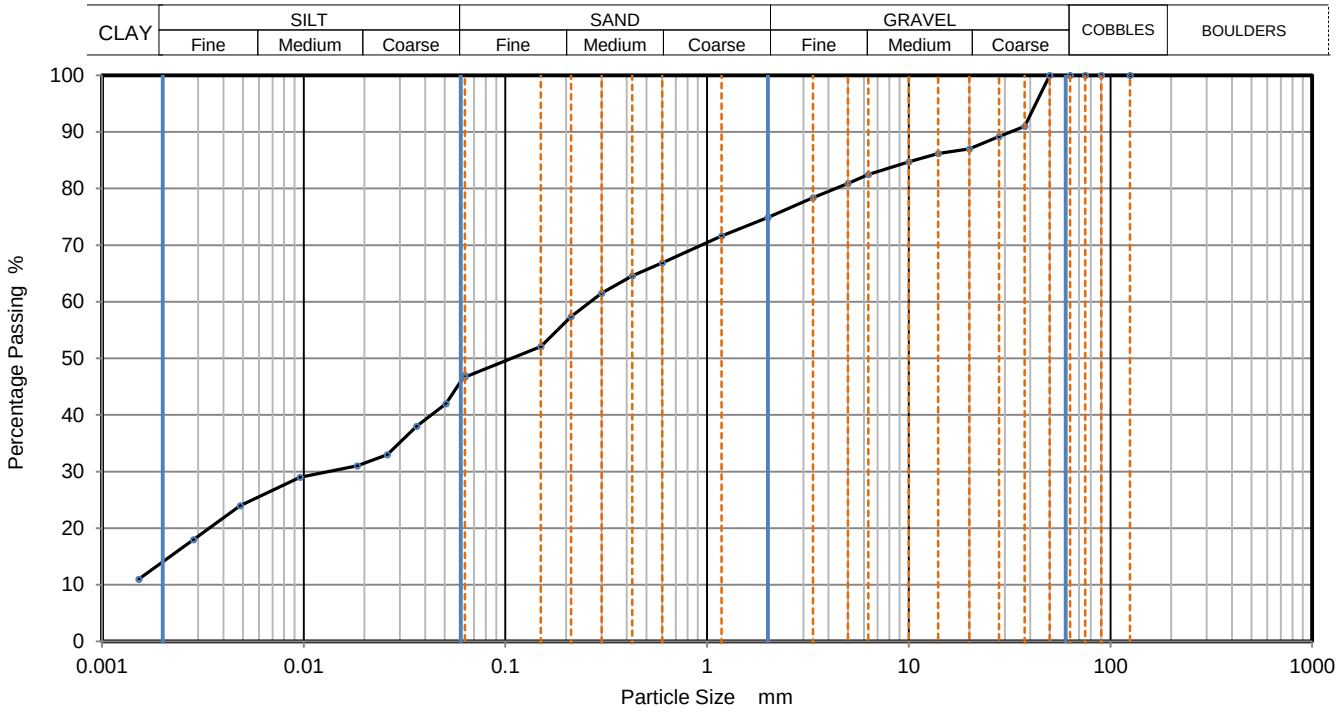
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	3
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	11.95
Specimen Reference	8	Specimen Depth	11.95 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051012



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	47
90	100	0.05065	42
75	100	0.03625	38
63	100	0.02594	33
50	100	0.01845	31
37.5	91	0.00958	29
28	89	0.00485	24
20	87	0.00284	18
14	86	0.00152	11
10	85		
6.3	83		
5	81		
3.35	78		
2	75		
1.18	72		
0.6	67	Particle density	(assumed)
0.425	65	2.65	Mg/m3
0.3	62		
0.212	57		
0.15	52		
0.063	47		

Dry Mass of sample, g	4606

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	25.1
Sand	28.2
Silt	32.7
Clay	14.0

Grading Analysis		
D100	mm	
D60	mm	0.265
D30	mm	0.0132
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

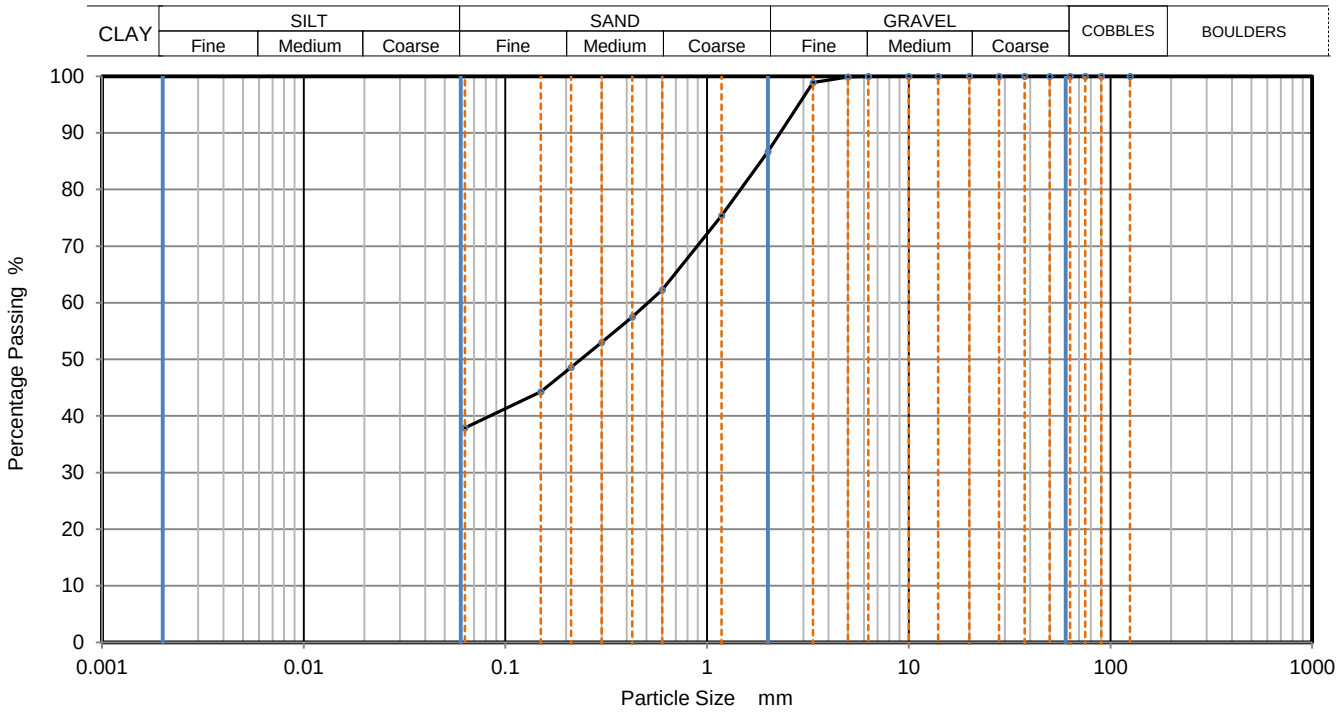
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	4
Soil Description	Greyish brown slightly gravelly clayey fine to coarse SAND.			Depth, m	12.50
Specimen Reference	2	Specimen Depth	12.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051013



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	87		
1.18	75		
0.6	62		
0.425	58		
0.3	53		
0.212	49		
0.15	44		
0.063	38		

Dry Mass of sample, g	221

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	13.3
Sand	48.8
Fines <0.063mm	38.0

Grading Analysis		
D100	mm	
D60	mm	0.508
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

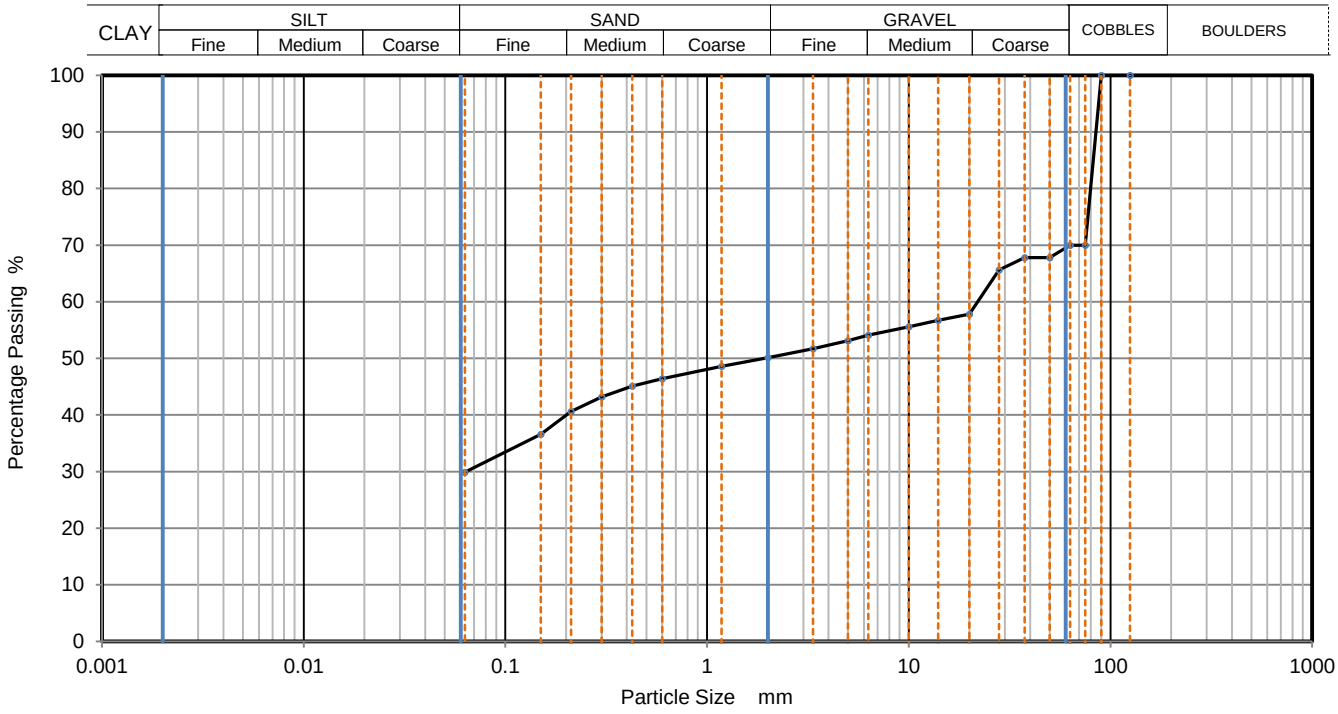
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	5
Soil Description	Greyish brown sandy gravelly silty CLAY with cobbles.			Depth, m	12.80
Specimen Reference	2	Specimen Depth	12.8 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051014



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	70		
63	70		
50	68		
37.5	68		
28	66		
20	58		
14	57		
10	56		
6.3	54		
5	53		
3.35	52		
2	50		
1.18	49		
0.6	46		
0.425	45		
0.3	43		
0.212	41		
0.15	37		
0.063	30		

Dry Mass of sample, g	7388

Sample Proportions	% dry mass
Cobbles	30.0
Gravel	19.9
Sand	20.2
Fines <0.063mm	30.0

Grading Analysis		
D100	mm	
D60	mm	22
D30	mm	0.0642
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

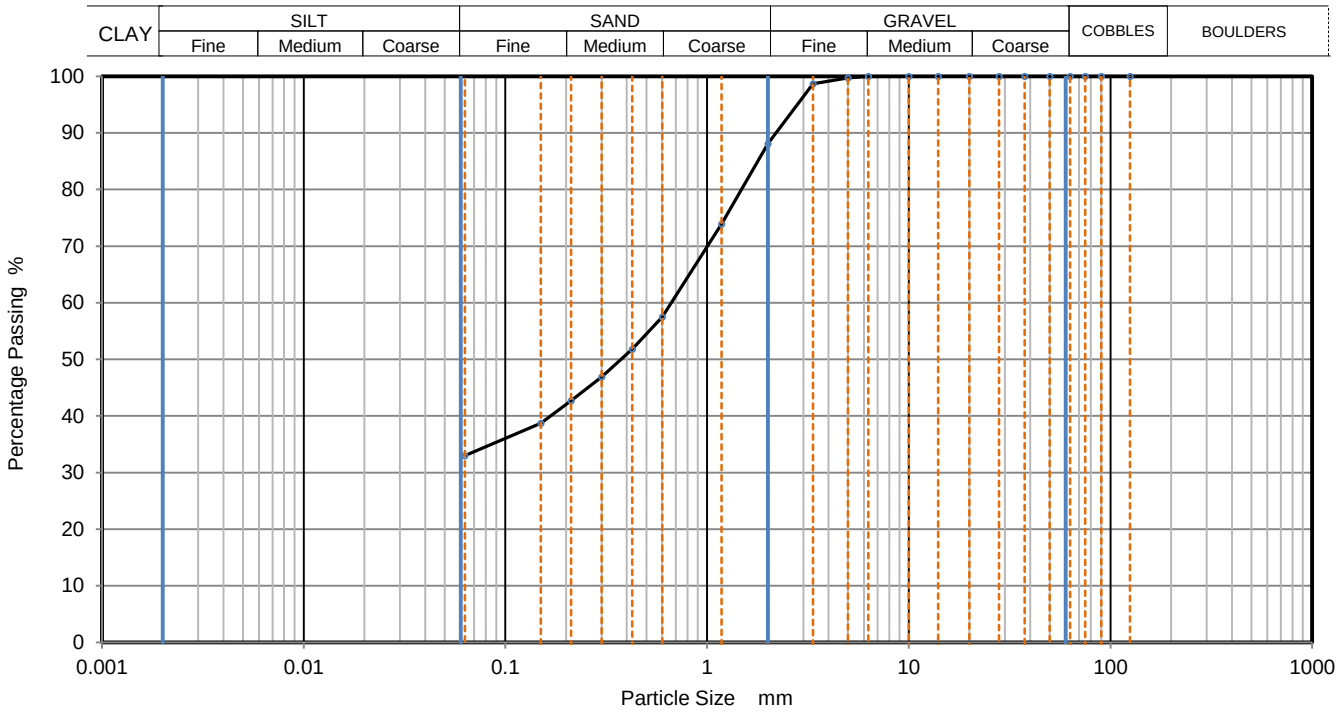
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	9
Soil Description	Grey slightly gravelly clayey fine to coarse SAND.			Depth, m	15.50
Specimen Reference	2	Specimen Depth	15.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051015



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	88		
1.18	74		
0.6	58		
0.425	52		
0.3	47		
0.212	43		
0.15	39		
0.063	33		

Dry Mass of sample, g	215

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	11.9
Sand	55.0
Fines <0.063mm	33.0

Grading Analysis		
D100	mm	
D60	mm	0.666
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

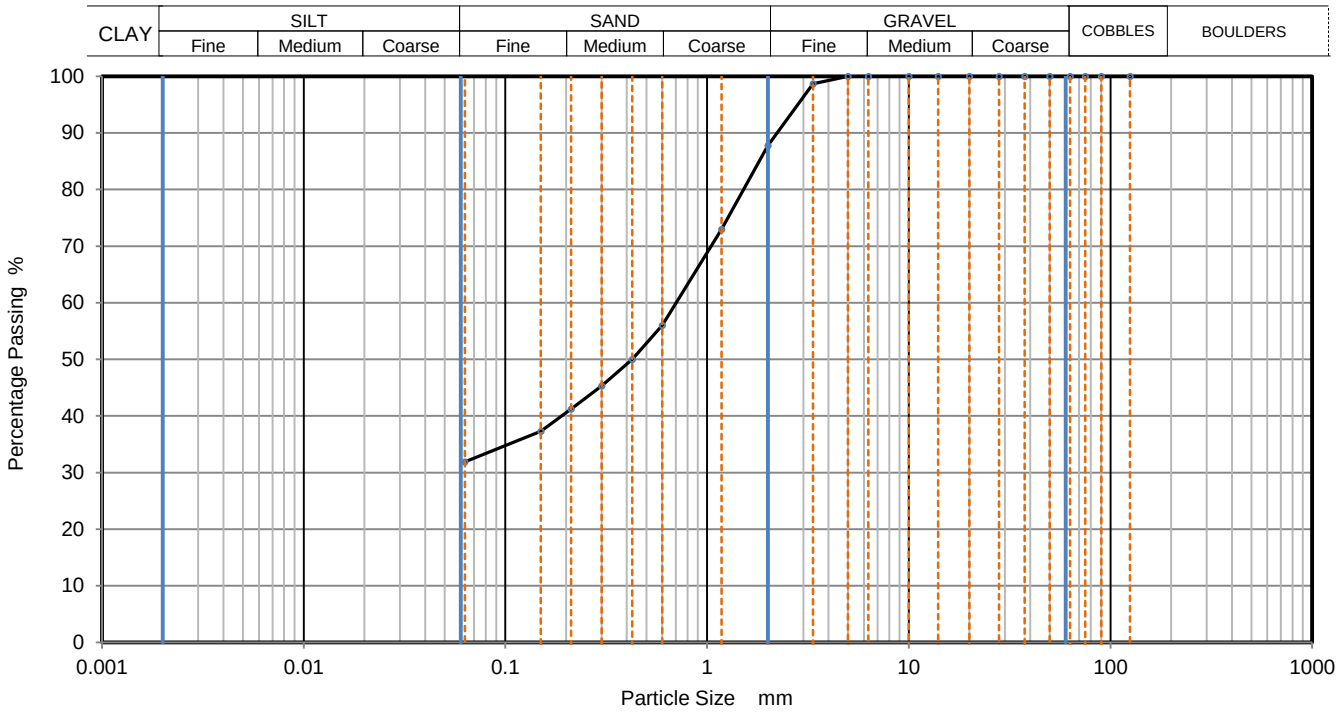
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	11
Soil Description	Grey slightly gravelly clayey fine to coarse SAND.			Depth, m	17.00
Specimen Reference	2	Specimen Depth	17 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051016



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	88		
1.18	73		
0.6	56		
0.425	50		
0.3	45		
0.212	41		
0.15	37		
0.063	32		

Dry Mass of sample, g	223

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	12.2
Sand	55.9
Fines <0.063mm	32.0

Grading Analysis		
D100	mm	
D60	mm	0.704
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

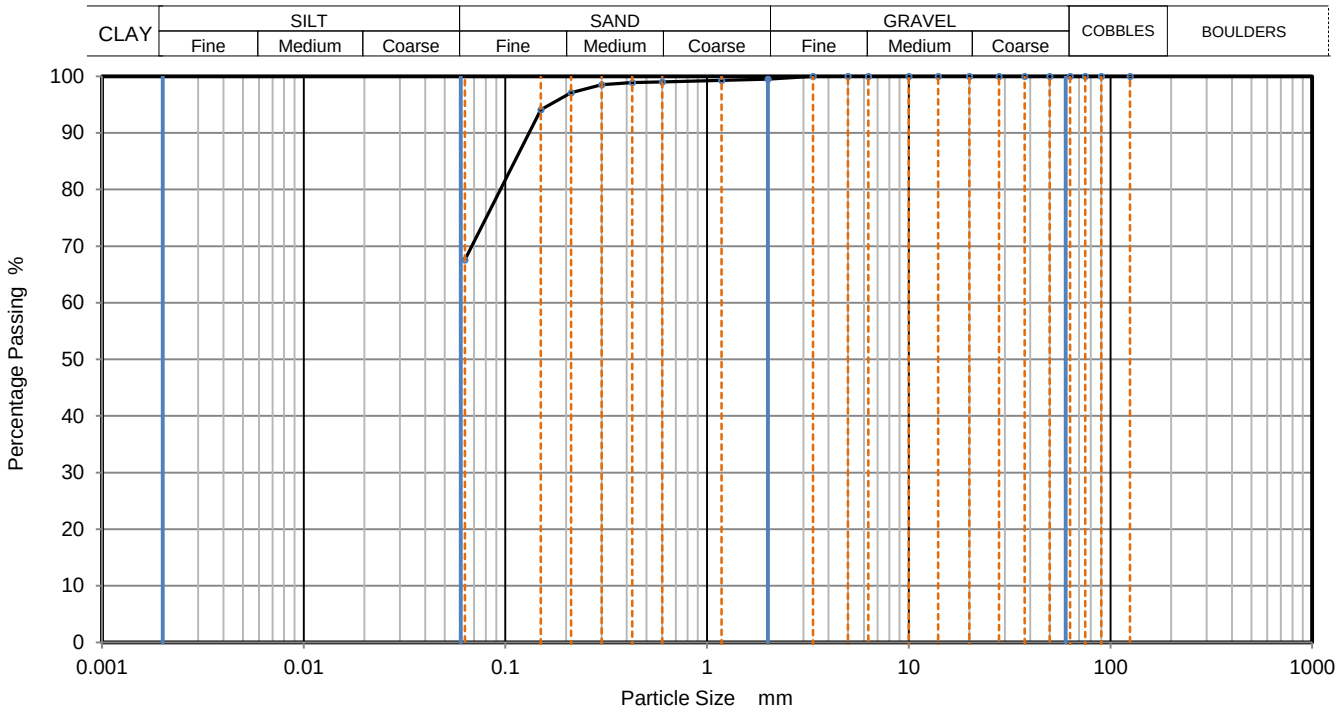
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	13
Soil Description	Grey sandy silty CLAY.			Depth, m	20.25
Specimen Reference	4	Specimen Depth	20.25 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051018



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	97		
0.15	94		
0.063	68		

Dry Mass of sample, g	220

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	0.5
Sand	31.9
Fines <0.063mm	68.0

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

Remarks

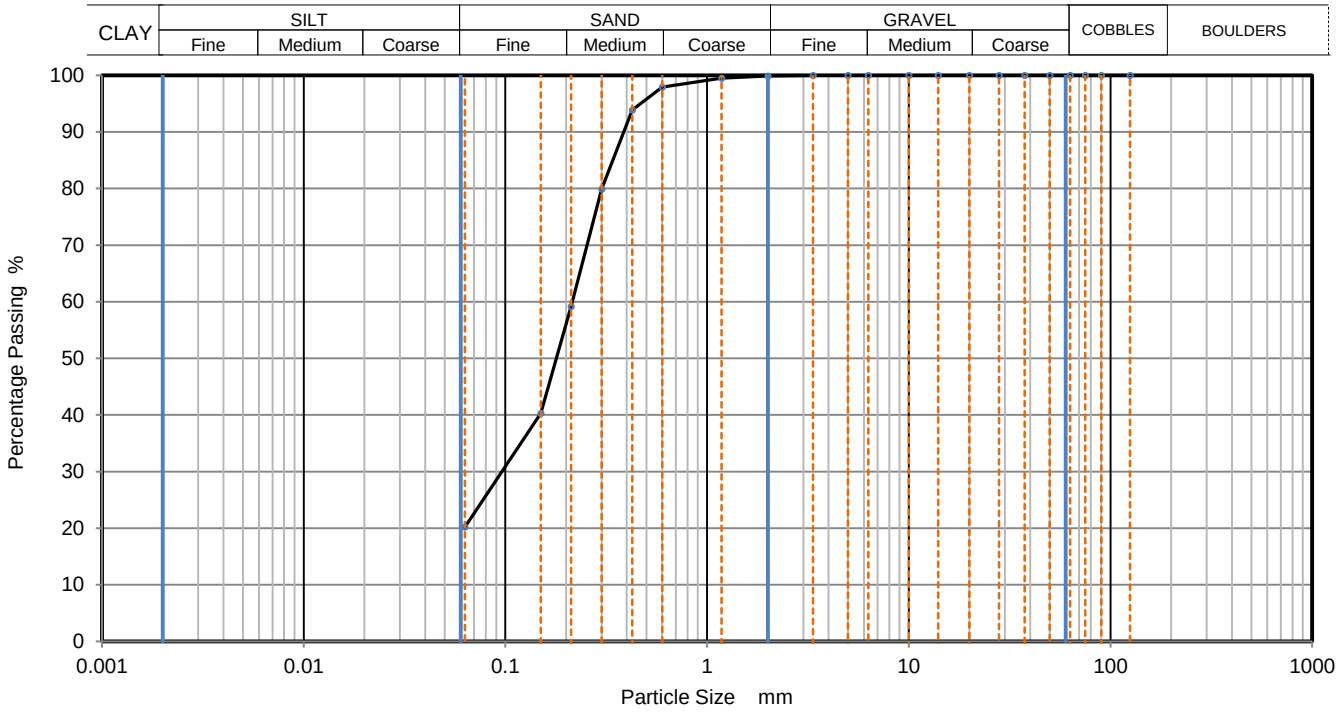
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	41
Soil Description	Grey clayey fine to coarse SAND.			Depth, m	22.55
Specimen Reference	2	Specimen Depth	22.55 m	Sample Type	D
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051019



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	98		
0.425	94		
0.3	80		
0.212	59		
0.15	40		
0.063	20		

Dry Mass of sample, g	210

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	0.1
Sand	79.7
Fines <0.063mm	20.0

Grading Analysis		
D100	mm	
D60	mm	0.215
D30	mm	0.0963
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

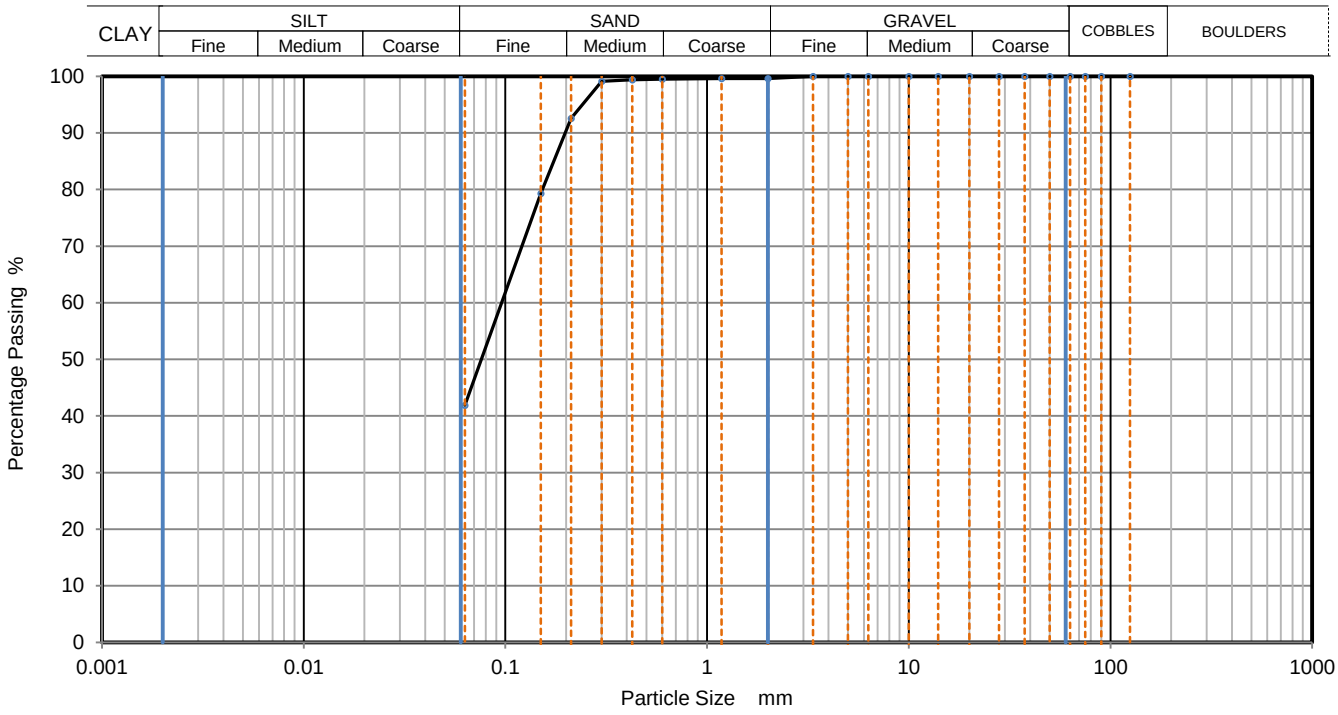
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	18
Soil Description	Grey clayey fine to coarse SAND.			Depth, m	25.05
Specimen Reference	2	Specimen Depth	25.05 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051020



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	99		
0.3	99		
0.212	93		
0.15	79		
0.063	42		

Dry Mass of sample, g	210

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	0.4
Sand	57.7
Fines <0.063mm	42.0

Grading Analysis		
D100	mm	
D60	mm	0.0959
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

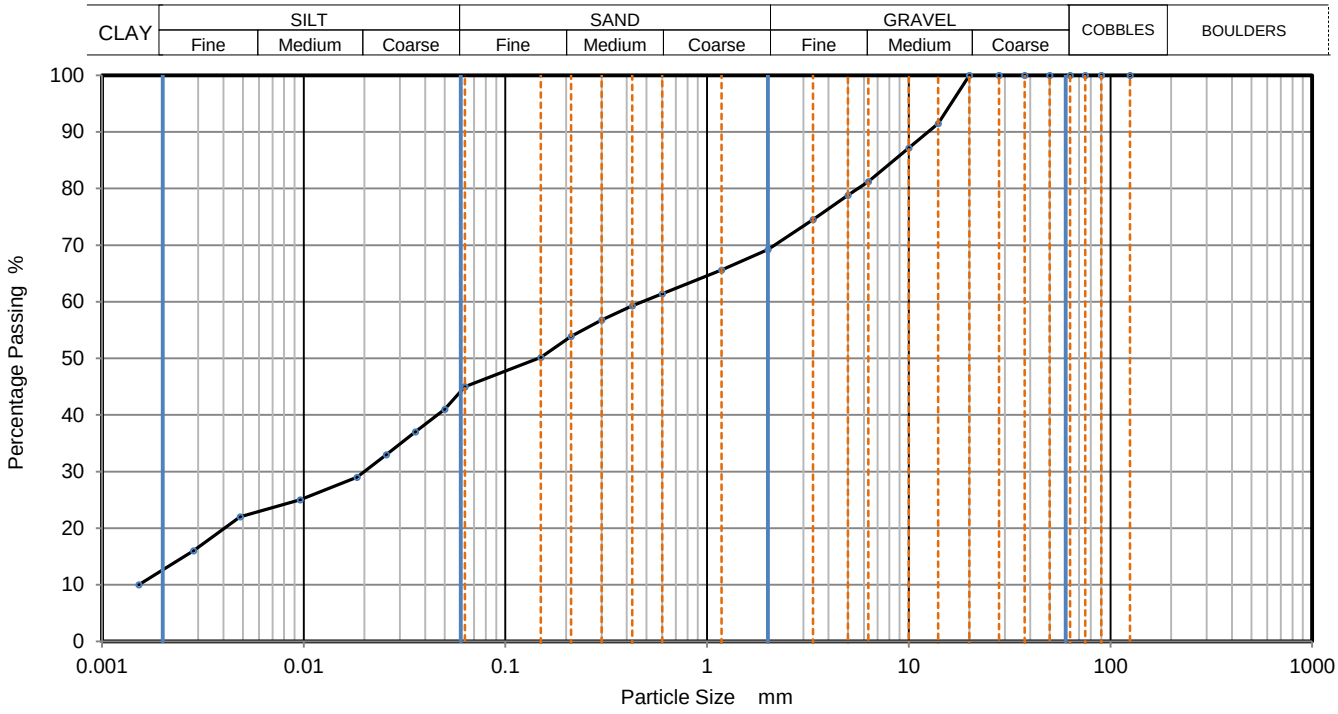
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH106
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	7
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	9.50
Specimen Reference	8	Specimen Depth	9.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051022



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	45
90	100	0.05002	41
75	100	0.03581	37
63	100	0.02563	33
50	100	0.01834	29
37.5	100	0.00958	25
28	100	0.00485	22
20	100	0.00284	16
14	92	0.00152	10
10	87		
6.3	81		
5	79		
3.35	75		
2	69		
1.18	66		
0.6	61	Particle density	(assumed)
0.425	59	2.65	Mg/m3
0.3	57		
0.212	54		
0.15	50		
0.063	45		

Dry Mass of sample, g: 502

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	30.8
Sand	24.2
Silt	32.6
Clay	12.4

Grading Analysis		
D100	mm	
D60	mm	0.477
D30	mm	0.0194
D10	mm	0.00156
Uniformity Coefficient		310
Curvature Coefficient		0.51

Remarks

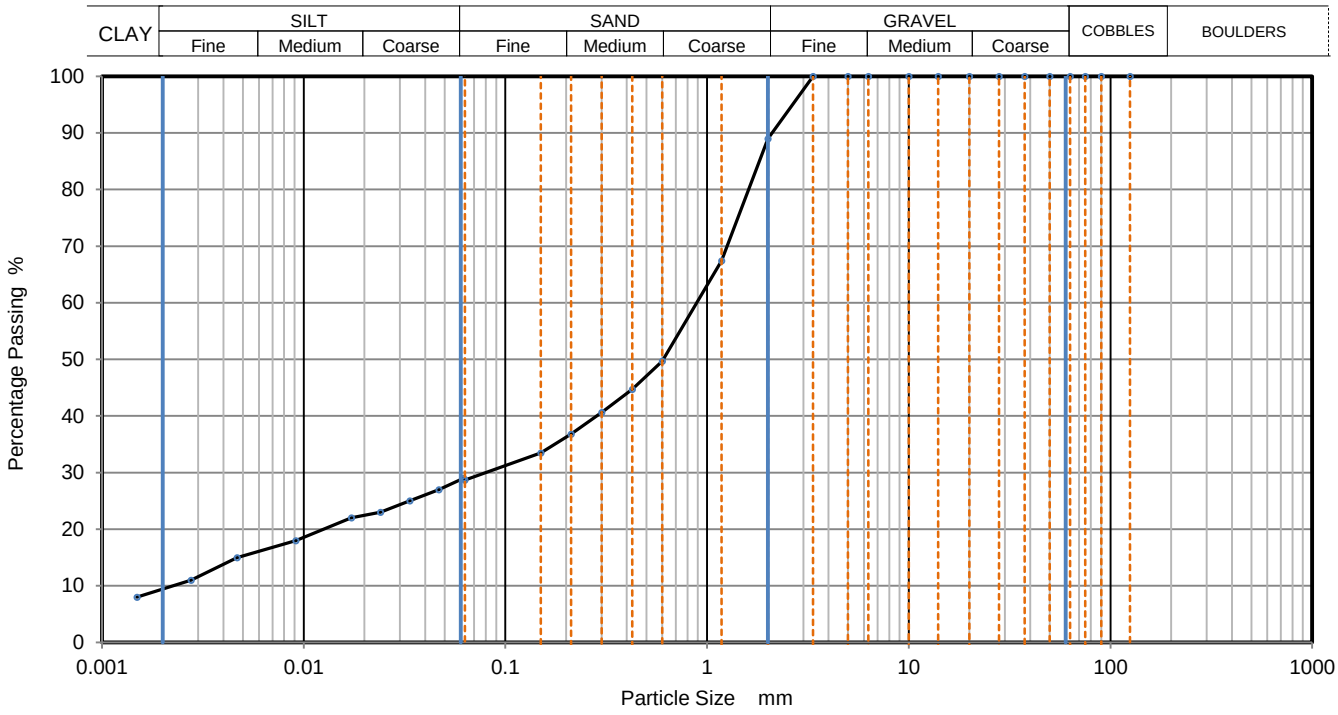
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH106
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	8
Soil Description	Greyish brown slightly gravelly clayey fine to coarse SAND.			Depth, m	12.50
Specimen Reference	2	Specimen Depth	12.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06199	29
90	100	0.04677	27
75	100	0.03355	25
63	100	0.02405	23
50	100	0.01724	22
37.5	100	0.00913	18
28	100	0.00468	15
20	100	0.00277	11
14	100	0.00149	8
10	100		
6.3	100		
5	100		
3.35	100		
2	89		
1.18	67		
0.6	50	Particle density	(assumed)
0.425	45	2.65	Mg/m3
0.3	41		
0.212	37		
0.15	34		
0.063	29		

Dry Mass of sample, g	212

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	11.0
Sand	60.3
Silt	19.2
Clay	9.5

Grading Analysis		
D100	mm	
D60	mm	0.889
D30	mm	0.0796
D10	mm	0.00219
Uniformity Coefficient		410
Curvature Coefficient		3.3

Remarks

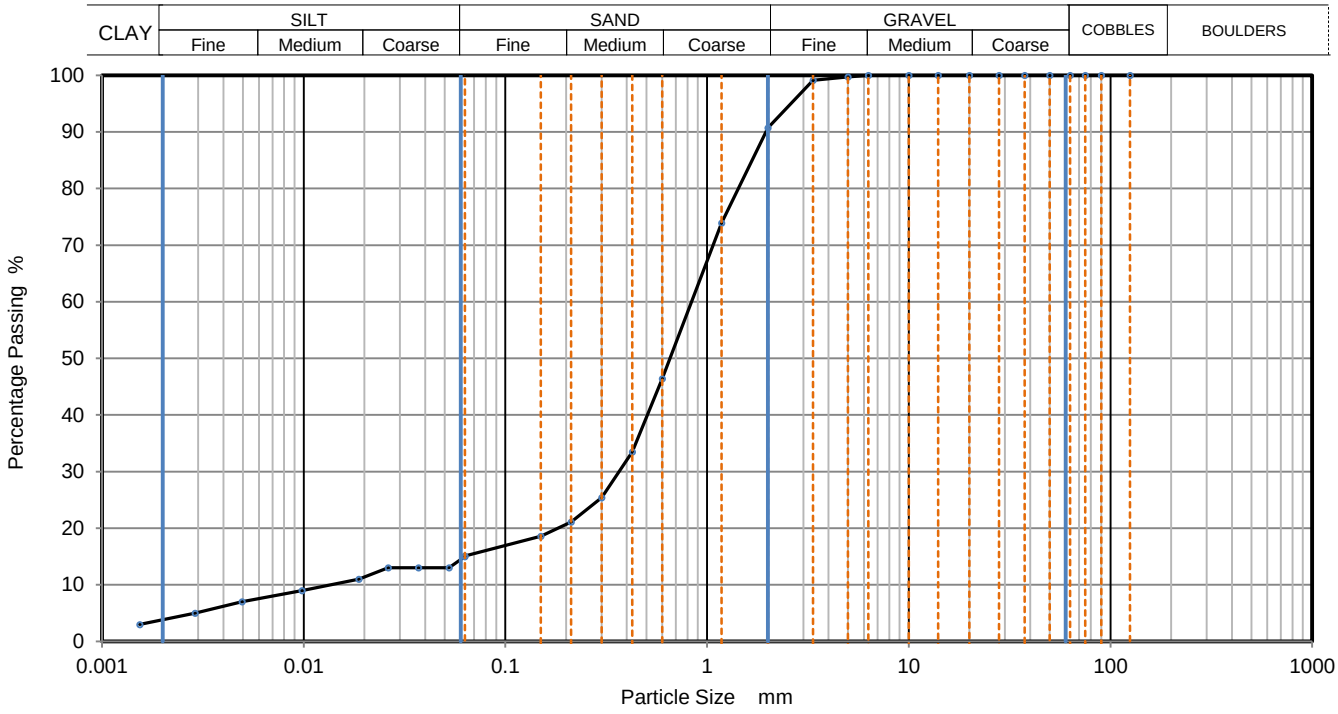
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH106
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	10
Soil Description	Greyish brown slightly gravelly clayey fine to coarse SAND.			Depth, m	14.00
Specimen Reference	2	Specimen Depth	14 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051025



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	15
90	100	0.05248	13
75	100	0.03711	13
63	100	0.02624	13
50	100	0.01877	11
37.5	100	0.00980	9
28	100	0.00495	7
20	100	0.00289	5
14	100	0.00154	3
10	100		
6.3	100		
5	100		
3.35	99		
2	91		
1.18	74		
0.6	46	Particle density	(assumed)
0.425	34	2.65	Mg/m3
0.3	25		
0.212	21		
0.15	19		
0.063	15		

Dry Mass of sample, g	214

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	9.3
Sand	75.6
Silt	11.2
Clay	3.9

Grading Analysis		
D100	mm	
D60	mm	0.838
D30	mm	0.365
D10	mm	0.0133
Uniformity Coefficient		63
Curvature Coefficient		12

Remarks

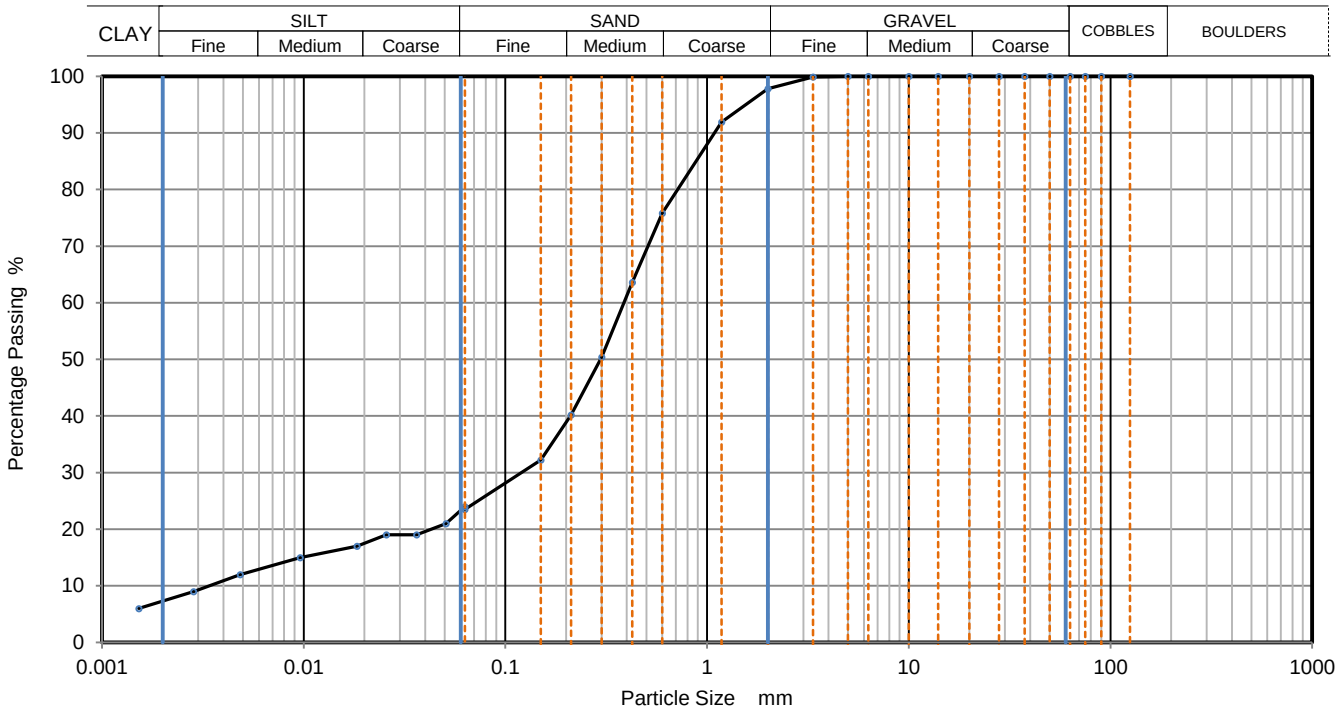
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH106
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	13
Soil Description	Greyish brown slightly gravelly clayey fine to coarse SAND.			Depth, m	16.00
Specimen Reference	2	Specimen Depth	16 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051026



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	24
90	100	0.05065	21
75	100	0.03625	19
63	100	0.02563	19
50	100	0.01834	17
37.5	100	0.00958	15
28	100	0.00485	12
20	100	0.00284	9
14	100	0.00152	6
10	100		
6.3	100		
5	100		
3.35	100		
2	98		
1.18	92		
0.6	76	Particle density	(assumed)
0.425	64	2.65	Mg/m3
0.3	50		
0.212	40		
0.15	32		
0.063	24		

Dry Mass of sample, g	202

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	2.2
Sand	74.3
Silt	16.4
Clay	7.1

Grading Analysis		
D100	mm	
D60	mm	0.386
D30	mm	0.121
D10	mm	0.00336
Uniformity Coefficient		120
Curvature Coefficient		11

Remarks

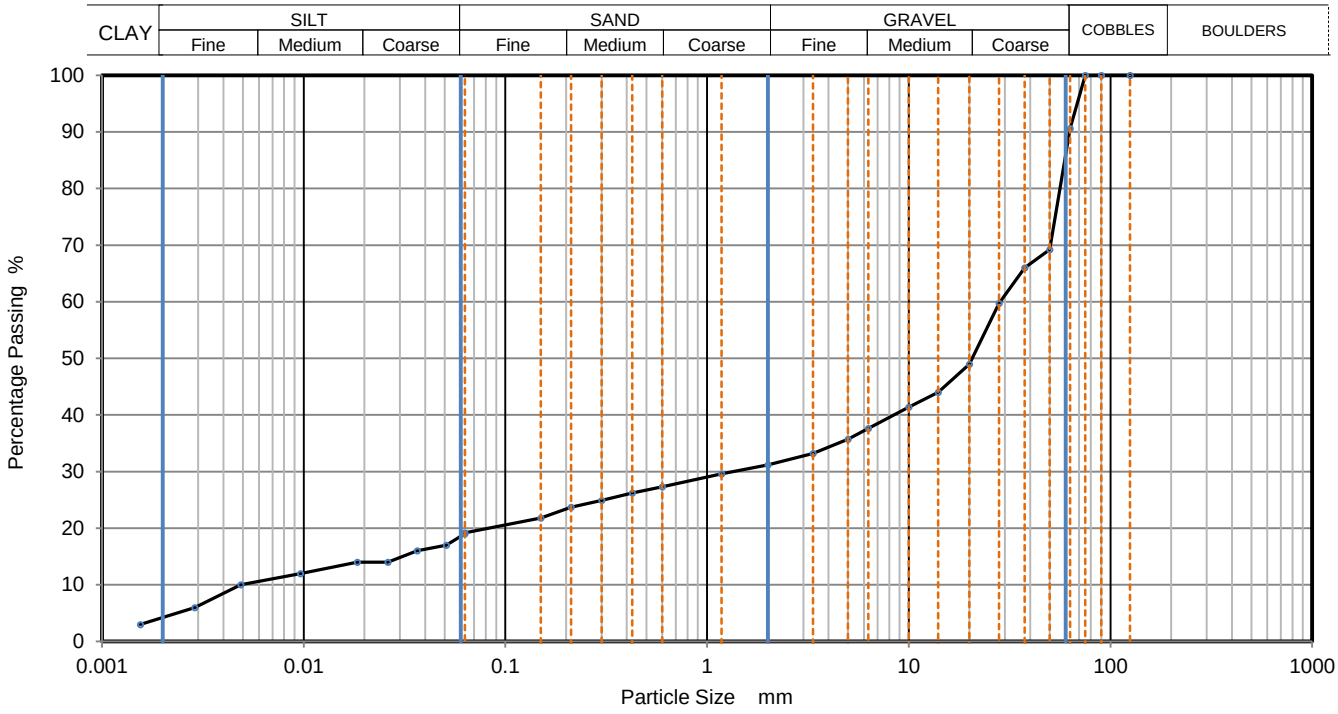
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UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH106
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	20
Soil Description	Greyish brown sandy gravelly silty CLAY with some cobbles.			Depth, m	19.40
Specimen Reference	8	Specimen Depth	19.4 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051028



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	19
90	100	0.05097	17
75	100	0.03649	16
63	91	0.02611	14
50	69	0.01846	14
37.5	66	0.00965	12
28	60	0.00488	10
20	49	0.00288	6
14	44	0.00155	3
10	41		
6.3	38		
5	36		
3.35	33		
2	31		
1.18	30		
0.6	27	Particle density	(assumed)
0.425	26	2.65	Mg/m3
0.3	25		
0.212	24		
0.15	22		
0.063	19		

Dry Mass of sample, g	6519

Sample Proportions	% dry mass
Cobbles	9.4
Gravel	59.4
Sand	12.0
Silt	14.9
Clay	4.3

Grading Analysis		
D100	mm	
D60	mm	28.4
D30	mm	1.35
D10	mm	0.00484
Uniformity Coefficient		5900
Curvature Coefficient		13

Remarks

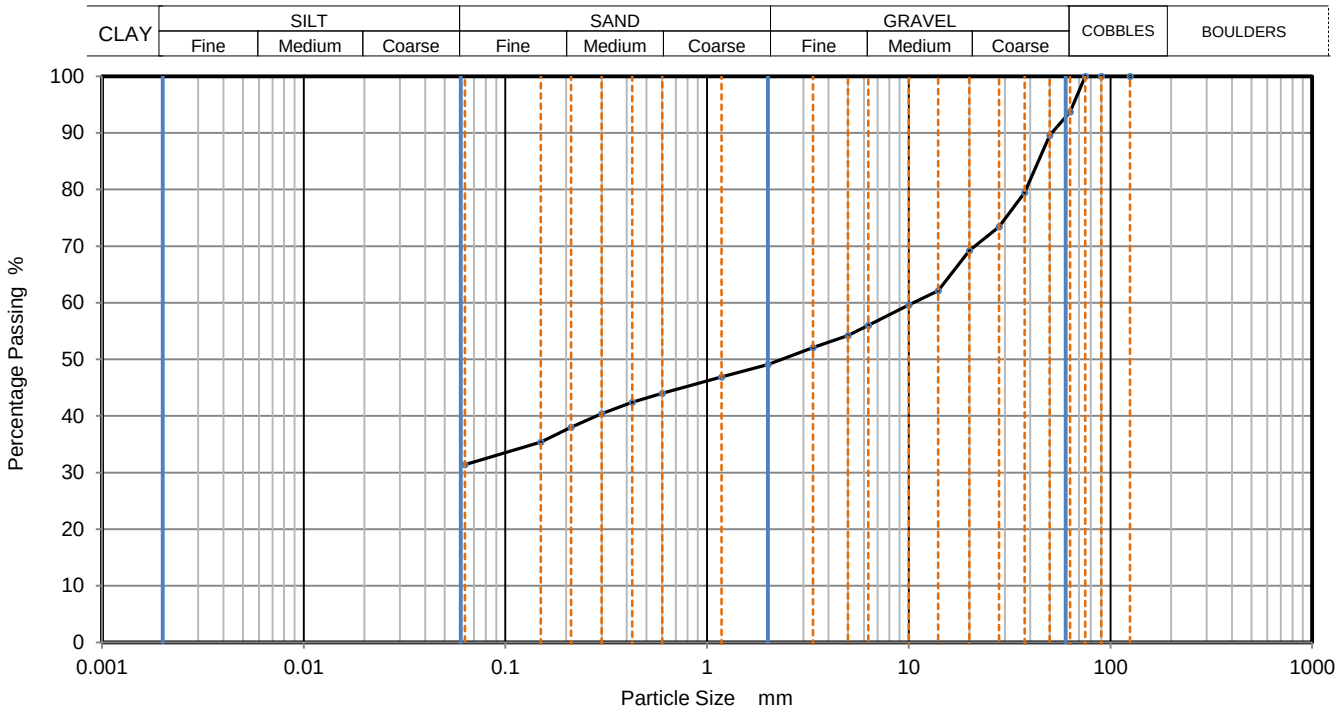
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH107
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	3
Soil Description	Greyish brown sandy gravelly silty CLAY with some cobbles.			Depth, m	6.60
Specimen Reference	2	Specimen Depth	6.6 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051030



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	94		
50	90		
37.5	80		
28	73		
20	69		
14	62		
10	60		
6.3	56		
5	54		
3.35	52		
2	49		
1.18	47		
0.6	44		
0.425	42		
0.3	40		
0.212	38		
0.15	35		
0.063	31		

Dry Mass of sample, g	5428

Sample Proportions	% dry mass
Cobbles	6.3
Gravel	44.6
Sand	17.7
Fines <0.063mm	31.0

Grading Analysis		
D100	mm	
D60	mm	10.6
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

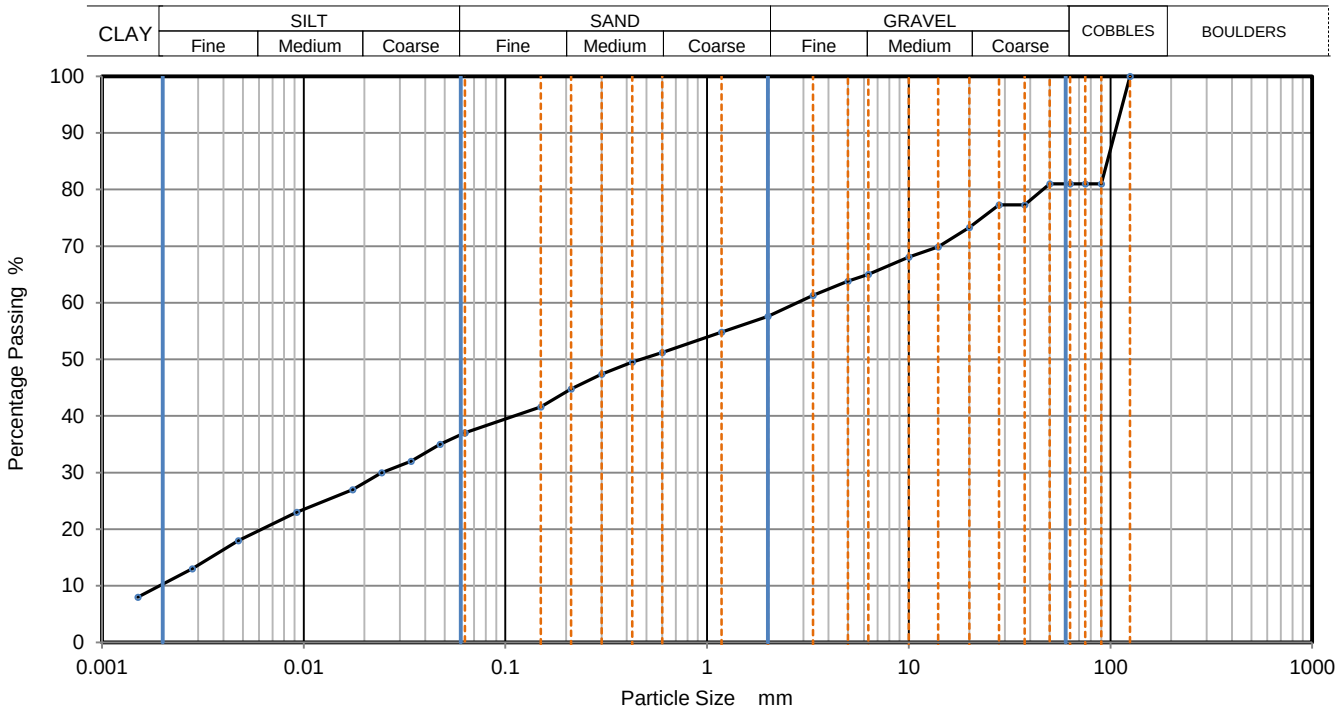
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH107
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	4
Soil Description	Brownish grey sandy gravelly silty CLAY with some cobbles.			Depth, m	12.00
Specimen Reference	8	Specimen Depth	12 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051032



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06290	37
90	81	0.04744	35
75	81	0.03401	32
63	81	0.02437	30
50	81	0.01746	27
37.5	77	0.00925	23
28	77	0.00474	18
20	73	0.00280	13
14	70	0.00150	8
10	68		
6.3	65		
5	64		
3.35	61		
2	58		
1.18	55		
0.6	51	Particle density (assumed)	
0.425	50	2.65 Mg/m3	
0.3	47		
0.212	45		
0.15	42		
0.063	37		

Dry Mass of sample, g	7111

Sample Proportions	% dry mass
Cobbles	19.0
Gravel	23.4
Sand	20.6
Silt	26.5
Clay	10.5

Grading Analysis		
D100	mm	125
D60	mm	2.78
D30	mm	0.0249
D10	mm	0.00186
Uniformity Coefficient		1500
Curvature Coefficient		0.12

Remarks

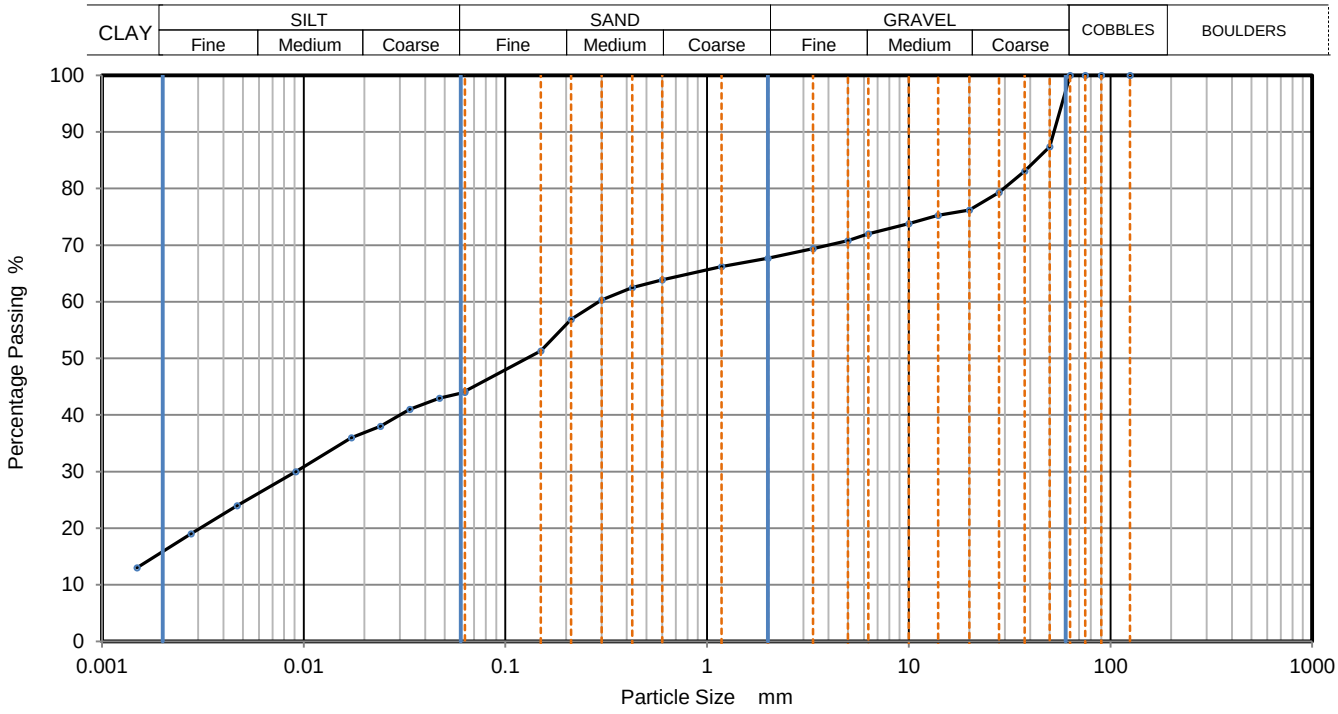
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH107
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	5
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	13.00
Specimen Reference	2	Specimen Depth	13 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051034



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06290	44
90	100	0.04711	43
75	100	0.03355	41
63	100	0.02405	38
50	87	0.01724	36
37.5	83	0.00913	30
28	79	0.00468	24
20	76	0.00277	19
14	75	0.00149	13
10	74		
6.3	72		
5	71		
3.35	69		
2	68		
1.18	66		
0.6	64	Particle density	(assumed)
0.425	63	2.65	Mg/m3
0.3	60		
0.212	57		
0.15	51		
0.063	44		

Dry Mass of sample, g	5361

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	32.3
Sand	23.4
Silt	28.7
Clay	15.6

Grading Analysis		
D100	mm	
D60	mm	0.292
D30	mm	0.00919
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

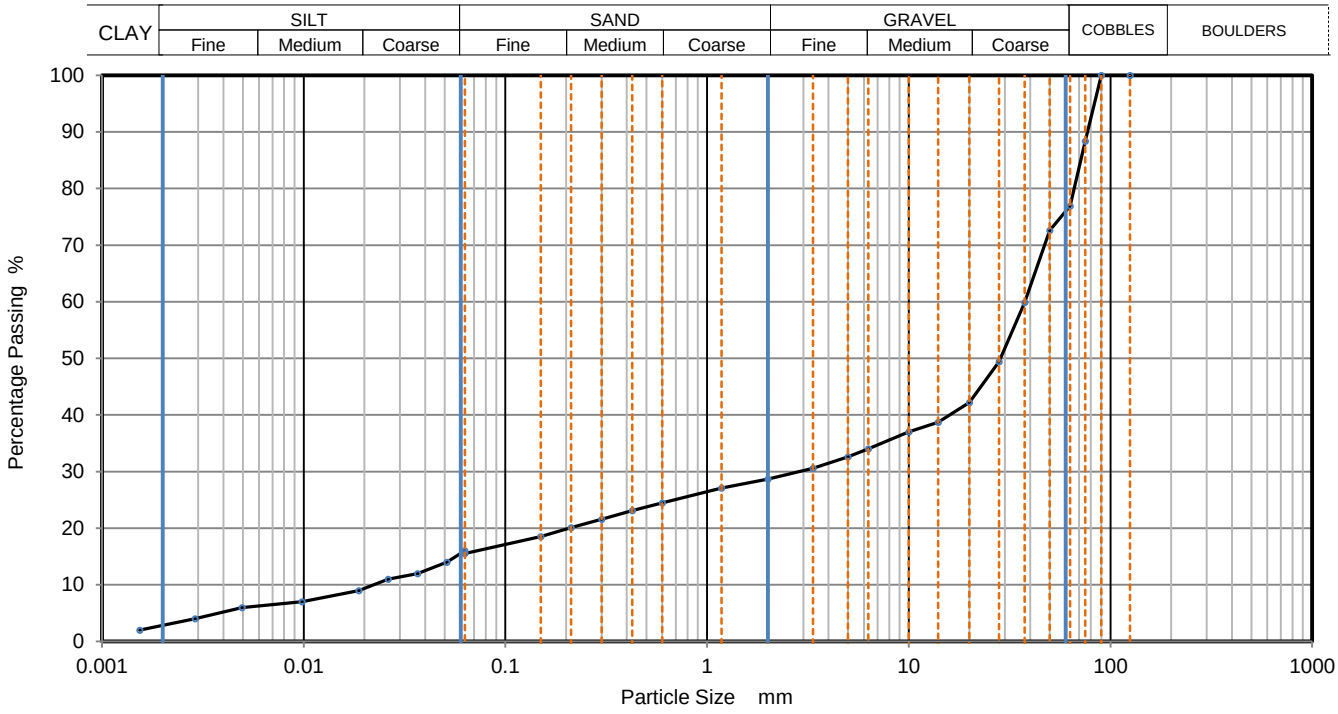
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH107
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	6
Soil Description	Greyish brown sandy gravelly silty CLAY with cobbles.			Depth, m	14.60
Specimen Reference	8	Specimen Depth	14.6 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051036



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	16
90	100	0.05127	14
75	88	0.03668	12
63	77	0.02624	11
50	73	0.01877	9
37.5	60	0.00980	7
28	49	0.00495	6
20	42	0.00289	4
14	39	0.00154	2
10	37		
6.3	34		
5	33		
3.35	31		
2	29		
1.18	27		
0.6	25	Particle density	(assumed)
0.425	23	2.65	Mg/m3
0.3	22		
0.212	20		
0.15	19		
0.063	16		

Dry Mass of sample, g	7905

Sample Proportions	% dry mass
Cobbles	23.1
Gravel	48.2
Sand	13.2
Silt	12.4
Clay	3.1

Grading Analysis		
D100	mm	
D60	mm	37.6
D30	mm	2.87
D10	mm	0.0232
Uniformity Coefficient		1600
Curvature Coefficient		9.4

Remarks

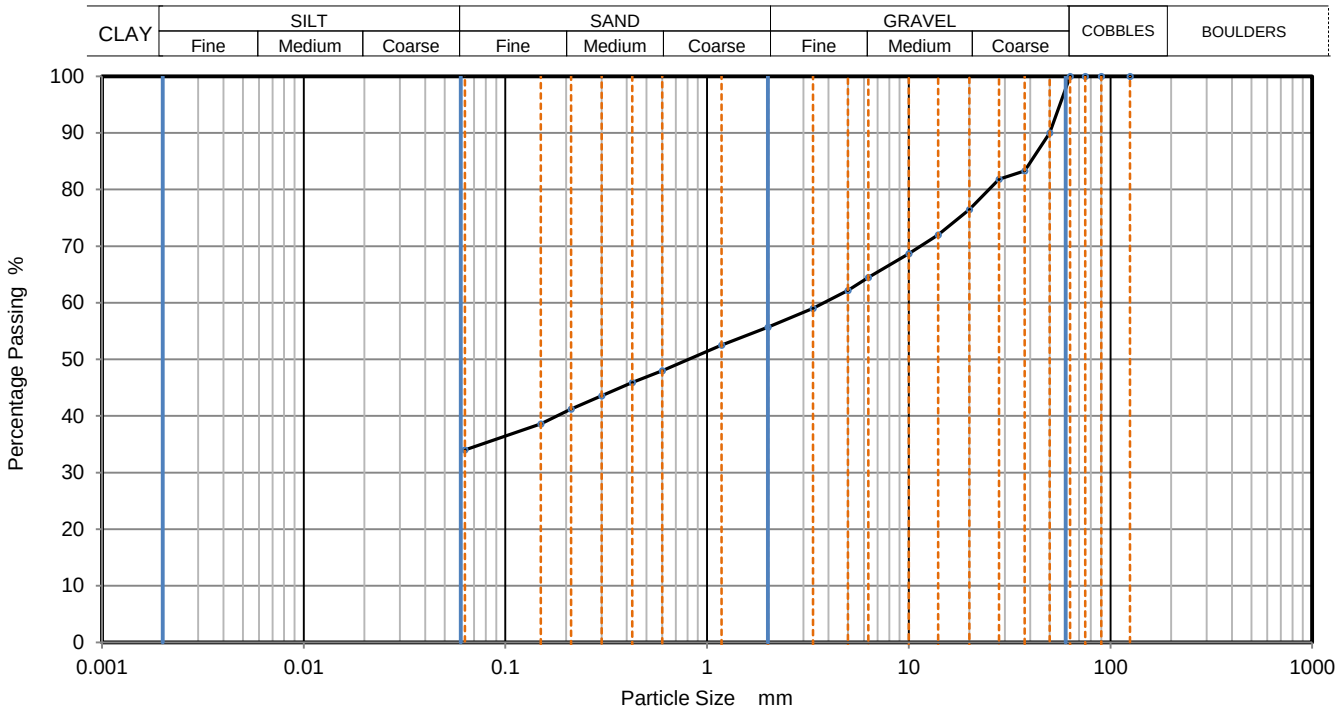
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH107
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	8
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	18.00
Specimen Reference	2	Specimen Depth	18 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051038



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	90		
37.5	83		
28	82		
20	77		
14	72		
10	69		
6.3	65		
5	62		
3.35	59		
2	56		
1.18	53		
0.6	48		
0.425	46		
0.3	44		
0.212	41		
0.15	39		
0.063	34		

Dry Mass of sample, g	4301

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	44.3
Sand	21.7
Fines <0.063mm	34.0

Grading Analysis		
D100	mm	
D60	mm	3.78
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

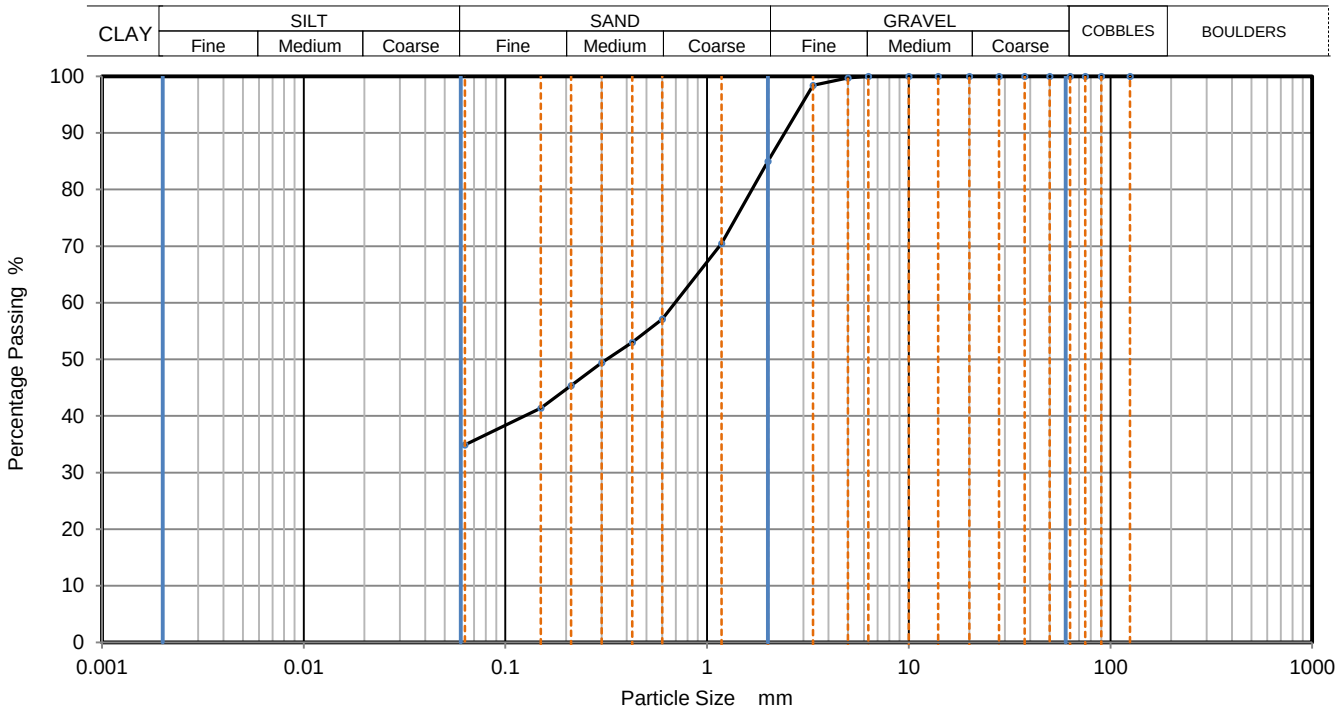
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH107
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	9
Soil Description	Greyish brown slightly gravelly clayey fine to coarse SAND.			Depth, m	19.30
Specimen Reference	2	Specimen Depth	19.3 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051039



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	98		
2	85		
1.18	71		
0.6	57		
0.425	53		
0.3	49		
0.212	45		
0.15	41		
0.063	35		

Dry Mass of sample, g	209

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	15.0
Sand	50.1
Fines <0.063mm	35.0

Grading Analysis		
D100	mm	
D60	mm	0.694
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

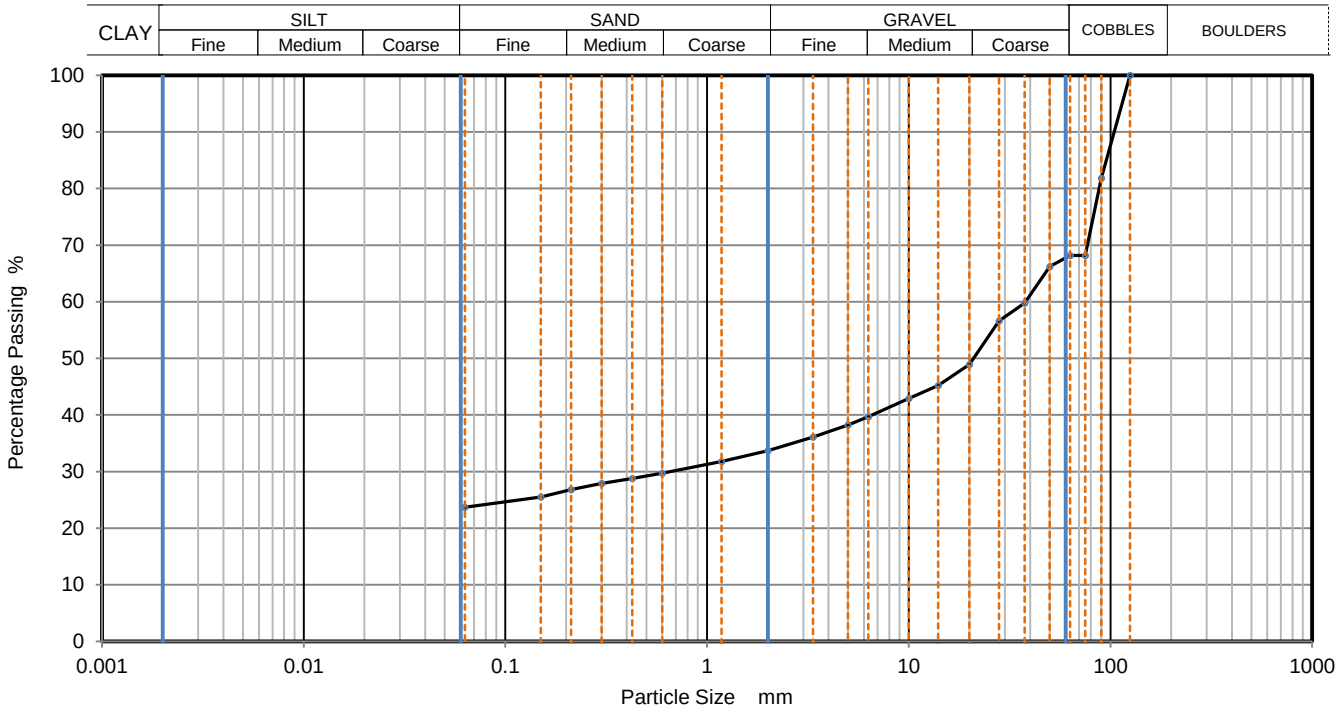
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH107
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	10
Soil Description	Greyish brown sandy gravelly silty CLAY with cobbles.			Depth, m	20.20
Specimen Reference	2	Specimen Depth	20.2 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022051040



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	82		
75	68		
63	68		
50	66		
37.5	60		
28	57		
20	49		
14	45		
10	43		
6.3	40		
5	38		
3.35	36		
2	34		
1.18	32		
0.6	30		
0.425	29		
0.3	28		
0.212	27		
0.15	26		
0.063	24		

Dry Mass of sample, g	7676

Sample Proportions	% dry mass
Cobbles	31.8
Gravel	34.5
Sand	10.0
Fines <0.063mm	24.0

Grading Analysis		
D100	mm	125
D60	mm	37.8
D30	mm	0.667
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

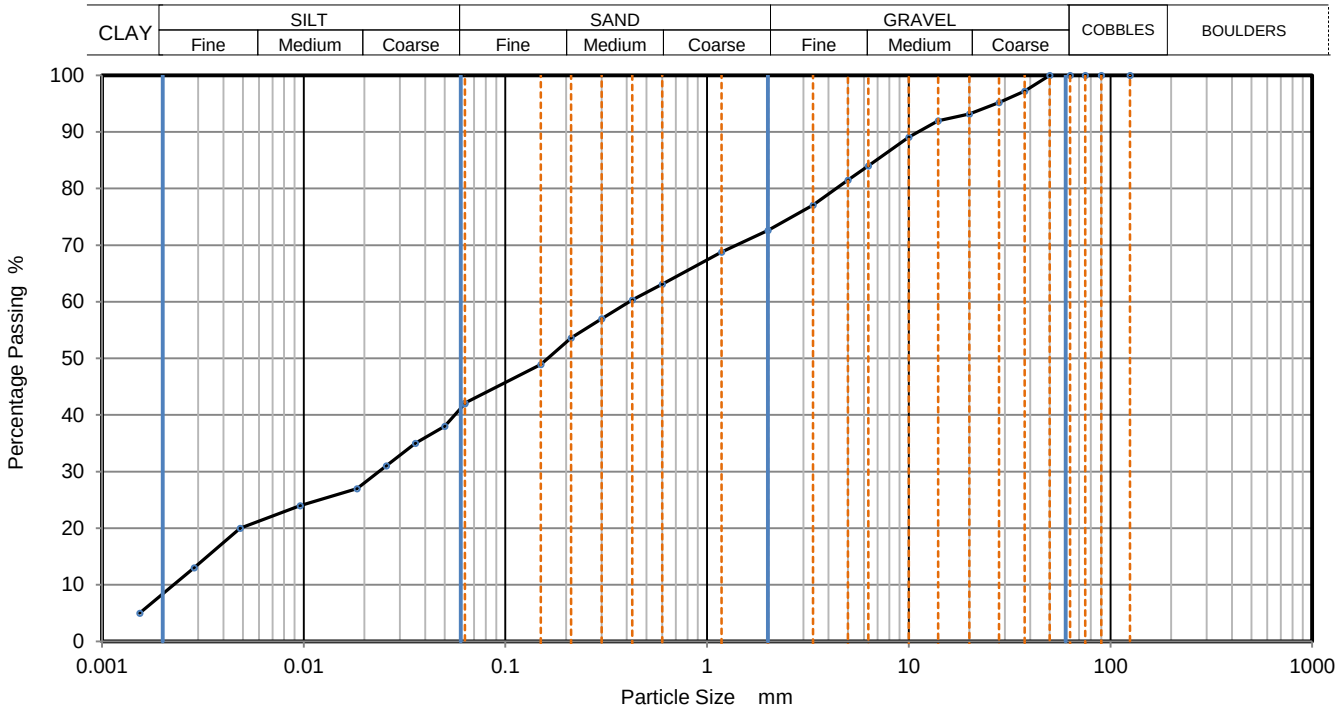
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH108
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	4.00
Specimen Reference	6	Specimen Depth	4 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051041



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	42
90	100	0.05002	38
75	100	0.03581	35
63	100	0.02563	31
50	100	0.01834	27
37.5	97	0.00958	24
28	95	0.00485	20
20	93	0.00286	13
14	92	0.00154	5
10	89		
6.3	84		
5	82		
3.35	77		
2	73		
1.18	69		
0.6	63	Particle density	(assumed)
0.425	60	2.65	Mg/m3
0.3	57		
0.212	54		
0.15	49		
0.063	42		

Dry Mass of sample, g	3181

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	27.4
Sand	30.5
Silt	33.5
Clay	8.6

Grading Analysis		
D100	mm	
D60	mm	0.412
D30	mm	0.0231
D10	mm	0.00225
Uniformity Coefficient		180
Curvature Coefficient		0.58

Remarks

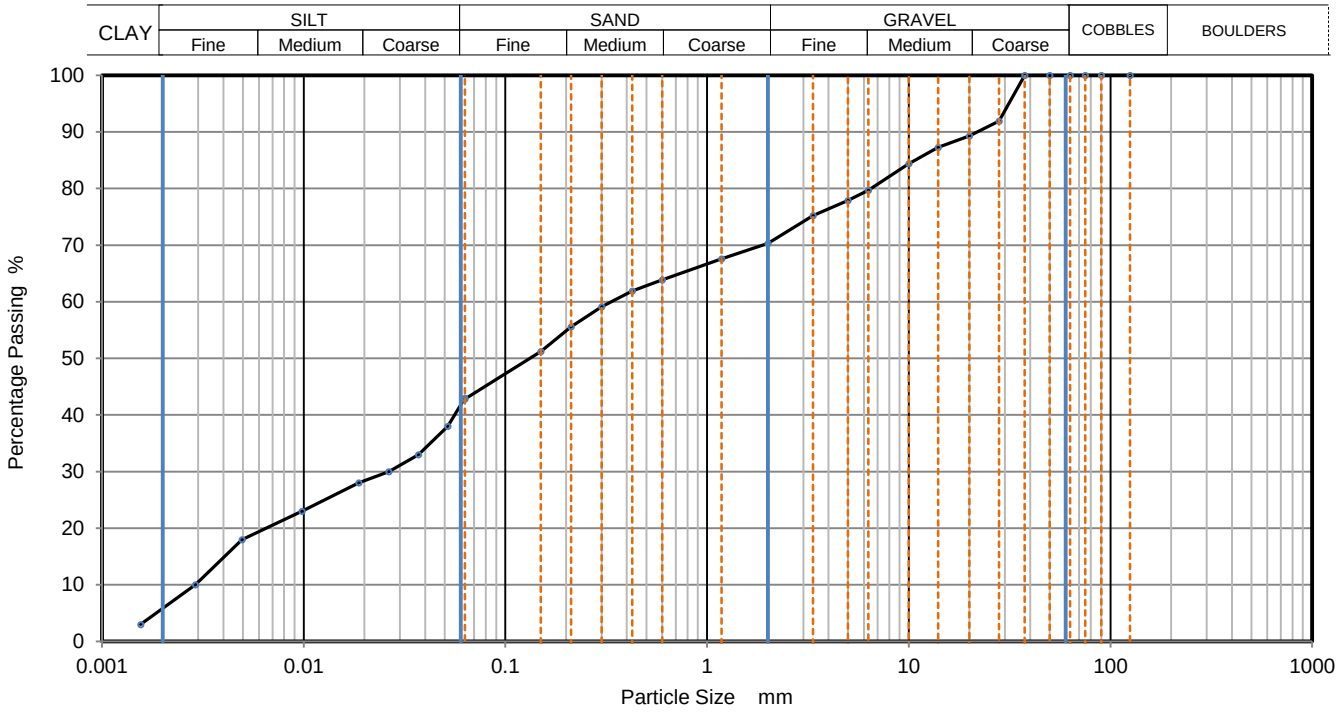
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH108
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	4
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	13.35
Specimen Reference	8	Specimen Depth	13.35 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051044



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	43
90	100	0.05188	38
75	100	0.03711	33
63	100	0.02639	30
50	100	0.01877	28
37.5	100	0.00980	23
28	92	0.00495	18
20	89	0.00290	10
14	87	0.00155	3
10	84		
6.3	80		
5	78		
3.35	75		
2	70		
1.18	68		
0.6	64	Particle density	(assumed)
0.425	62	2.65	Mg/m3
0.3	59		
0.212	56		
0.15	51		
0.063	43		

Dry Mass of sample, g	3400

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	29.7
Sand	27.5
Silt	37.2
Clay	5.6

Grading Analysis		
D100	mm	
D60	mm	0.334
D30	mm	0.0256
D10	mm	0.00289
Uniformity Coefficient		120
Curvature Coefficient		0.68

Remarks

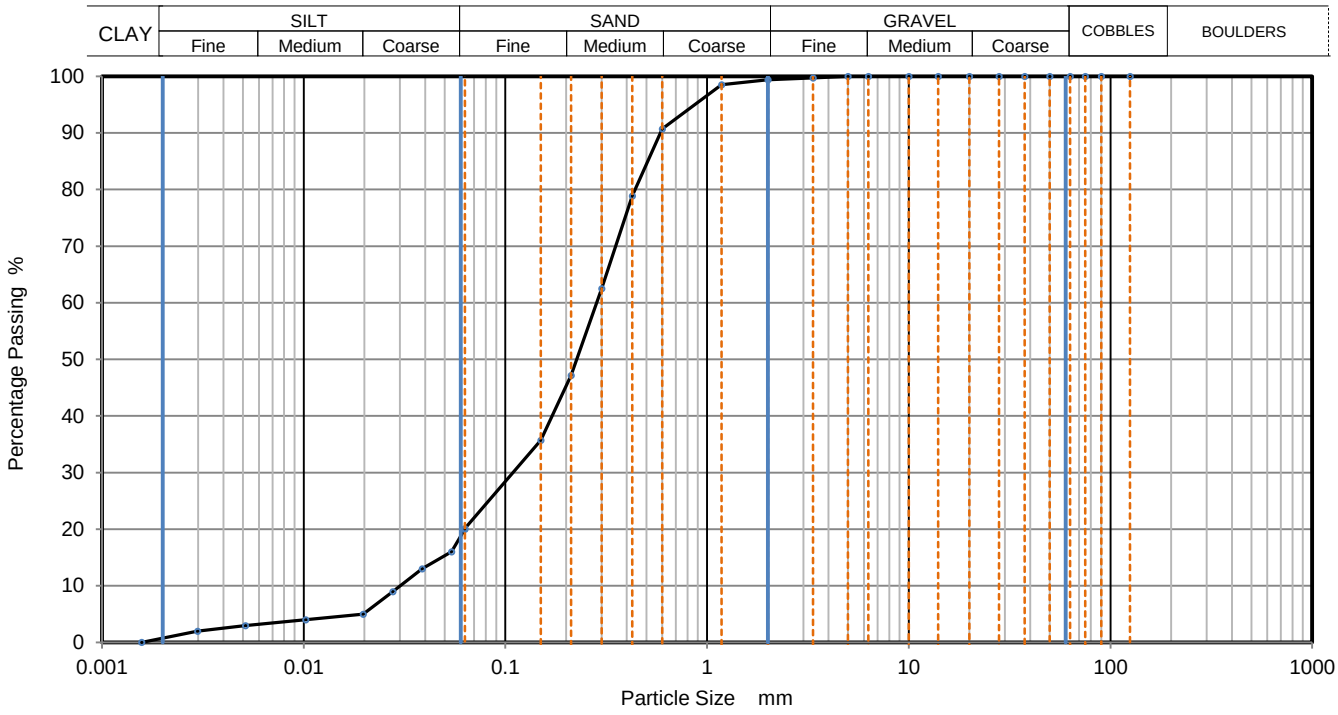
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH108
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	5
Soil Description	Greyish brown clayey fine to ocarse SAND.			Depth, m	14.50
Specimen Reference	2	Specimen Depth	14.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051045



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	20
90	100	0.05405	16
75	100	0.03864	13
63	100	0.02761	9
50	100	0.01973	5
37.5	100	0.01024	4
28	100	0.00514	3
20	100	0.00297	2
14	100	0.00157	0
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	91	Particle density	(assumed)
0.425	79	2.65	Mg/m3
0.3	63		
0.212	47		
0.15	36		
0.063	20		

Dry Mass of sample, g	228

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	0.6
Sand	79.4
Silt	19.3
Clay	0.7

Grading Analysis		
D100	mm	
D60	mm	0.283
D30	mm	0.109
D10	mm	0.0299
Uniformity Coefficient		9.5
Curvature Coefficient		1.4

Remarks

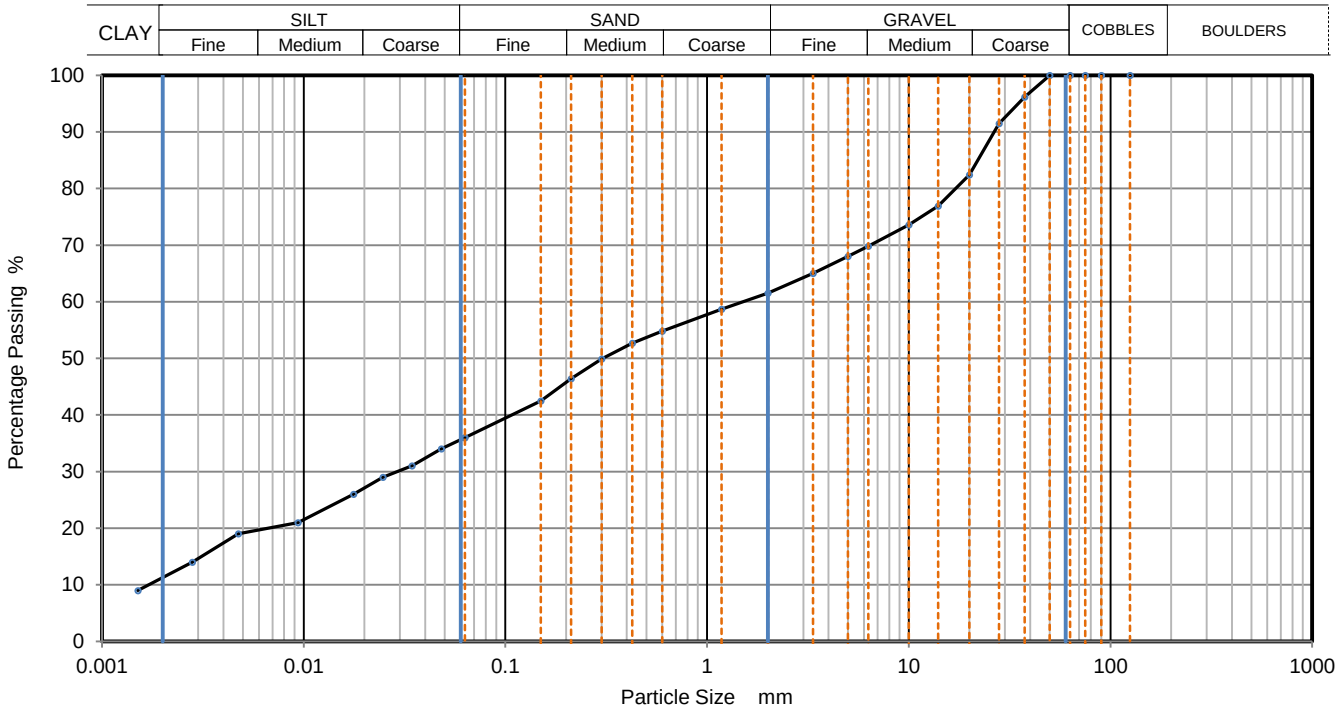
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH108
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	6
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	15.40
Specimen Reference	2	Specimen Depth	15.4 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051046



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	36
90	100	0.04810	34
75	100	0.03447	31
63	100	0.02470	29
50	100	0.01769	26
37.5	96	0.00936	21
28	92	0.00474	19
20	82	0.00280	14
14	77	0.00150	9
10	74		
6.3	70		
5	68		
3.35	65		
2	62		
1.18	59		
0.6	55	Particle density	(assumed)
0.425	53	2.65	Mg/m3
0.3	50		
0.212	46		
0.15	43		
0.063	36		

Dry Mass of sample, g	4398

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	38.5
Sand	25.5
Silt	25.0
Clay	11.0

Grading Analysis		
D100	mm	
D60	mm	1.51
D30	mm	0.03
D10	mm	0.00177
Uniformity Coefficient		850
Curvature Coefficient		0.34

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

LAB 05R - Version 5

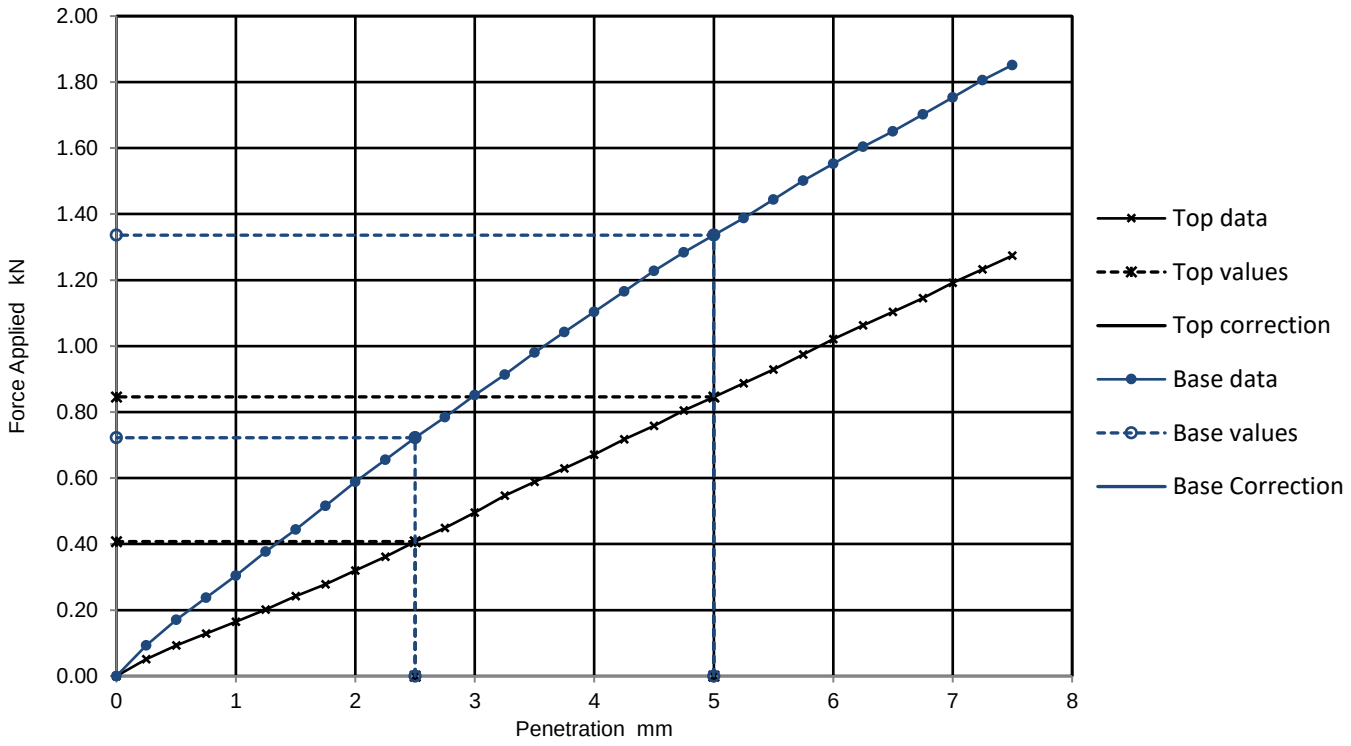
UKAS TESTING 10122

CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	21-1219
				Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Greyish brown sandy gravelly silty CLAY.			KeyLAB ID	Caus202205109
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		24	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.26	Mg/m3	Surcharge applied	4.5	kg
	Dry density	2.06	Mg/m3		3	kPa
	Moisture content	10	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	3.1	4.2	4.2		10
BASE	No	5.5	6.7	6.7		10

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen.Watson

UKAS TESTING

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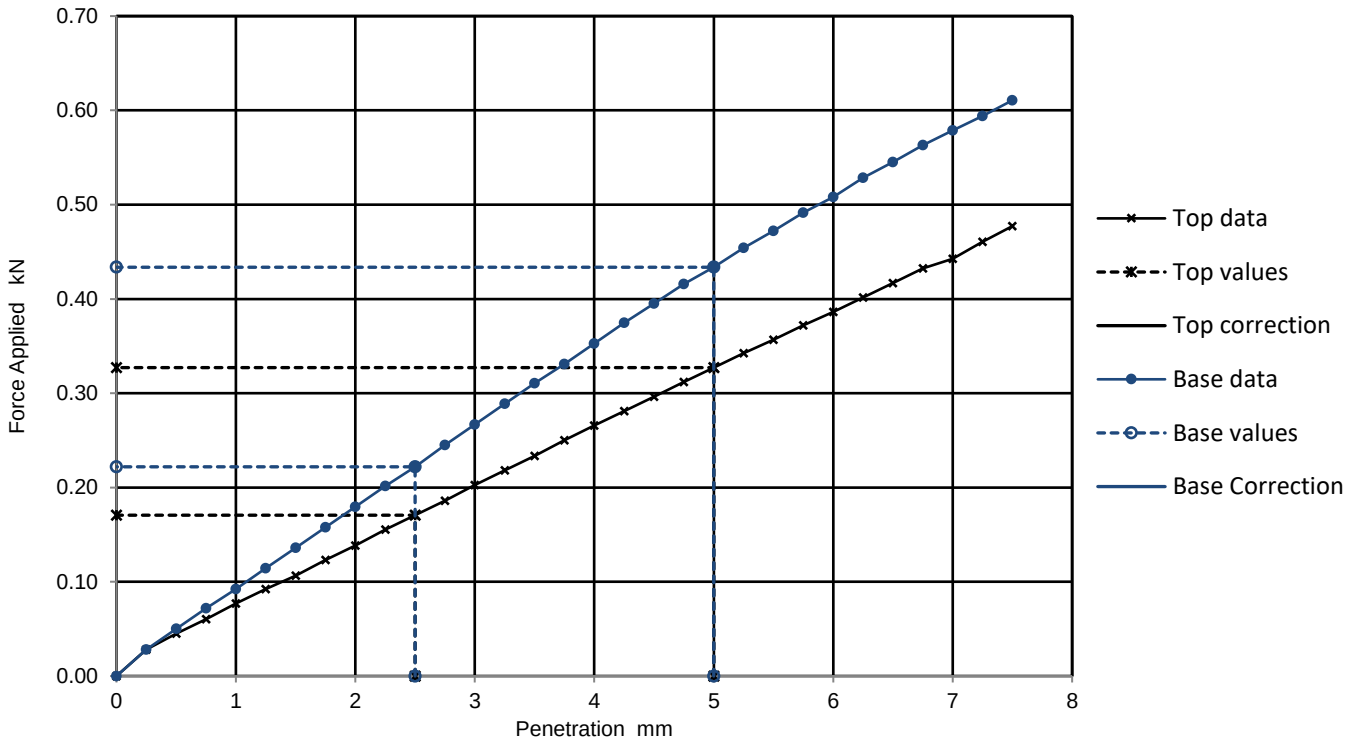
LAB 11R - Version 6

CAUSEWAY GEOTECH	California Bearing Ratio (CBR)			Job Ref	21-1219
				Borehole/Pit No.	BH106
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	6
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth m	4.30
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Greyish brown sandy gravelly silty CLAY.			KeyLAB ID	Caus2022051021
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		44	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.25	Mg/m3	Surcharge applied	4.5	kg
	Dry density	2.02	Mg/m3		3	kPa
	Moisture content	12	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	1.3	1.6	1.6		12
BASE	No	1.7	2.2	2.2		11

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen.Watson

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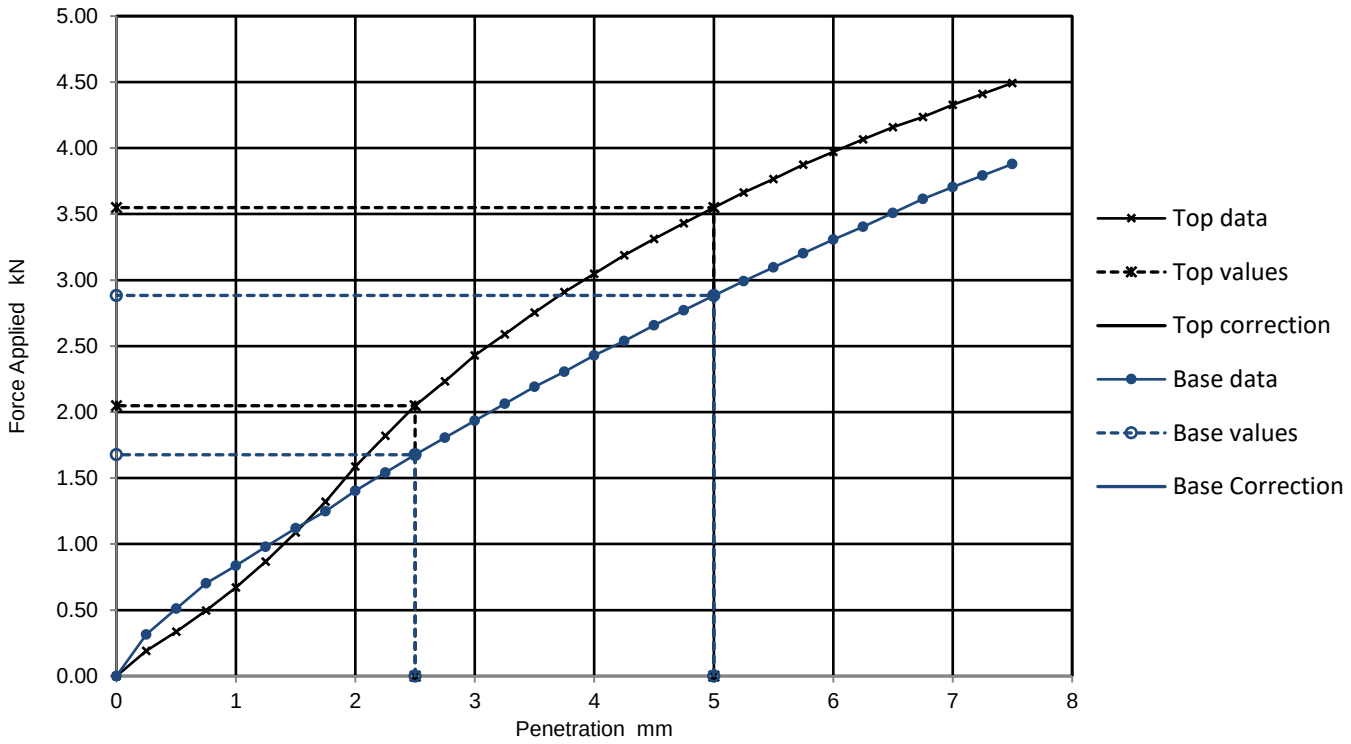
California Bearing Ratio (CBR)

				Job Ref	21-1219
				Borehole/Pit No.	BH107
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Brownish grey sandy gravelly silty CLAY.			Depth m	3.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brownish grey sandy gravelly silty CLAY.			KeyLAB ID	Caus2022051029
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		18	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.19	Mg/m3	Surcharge applied	4.5	kg
	Dry density	2.01	Mg/m3		3	kPa
	Moisture content	9	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	16.0	18.0	18.0		9
BASE	No	13.0	14.0	14.0		9

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen.Watson

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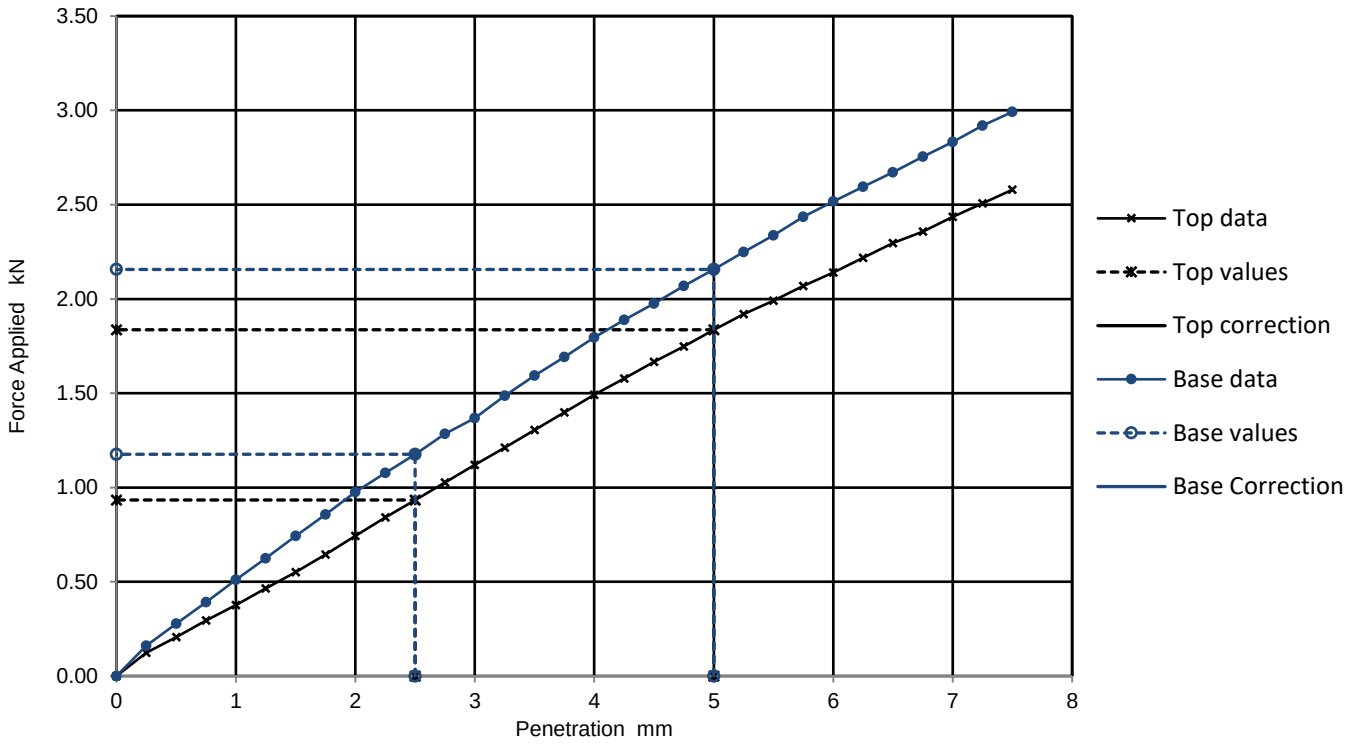
LAB 11R - Version 6

CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	21-1219
				Borehole/Pit No.	BH108
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Greyish brown sandy gravelly silty CLAY.			KeyLAB ID	Caus2022051041
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		16	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.26	Mg/m3	Surcharge applied	4.5	kg
	Dry density	2.06	Mg/m3		3	kPa
	Moisture content	10	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	7.1	9.2	9.2	10.0	10
BASE	No	8.9	11.0	11.0		9

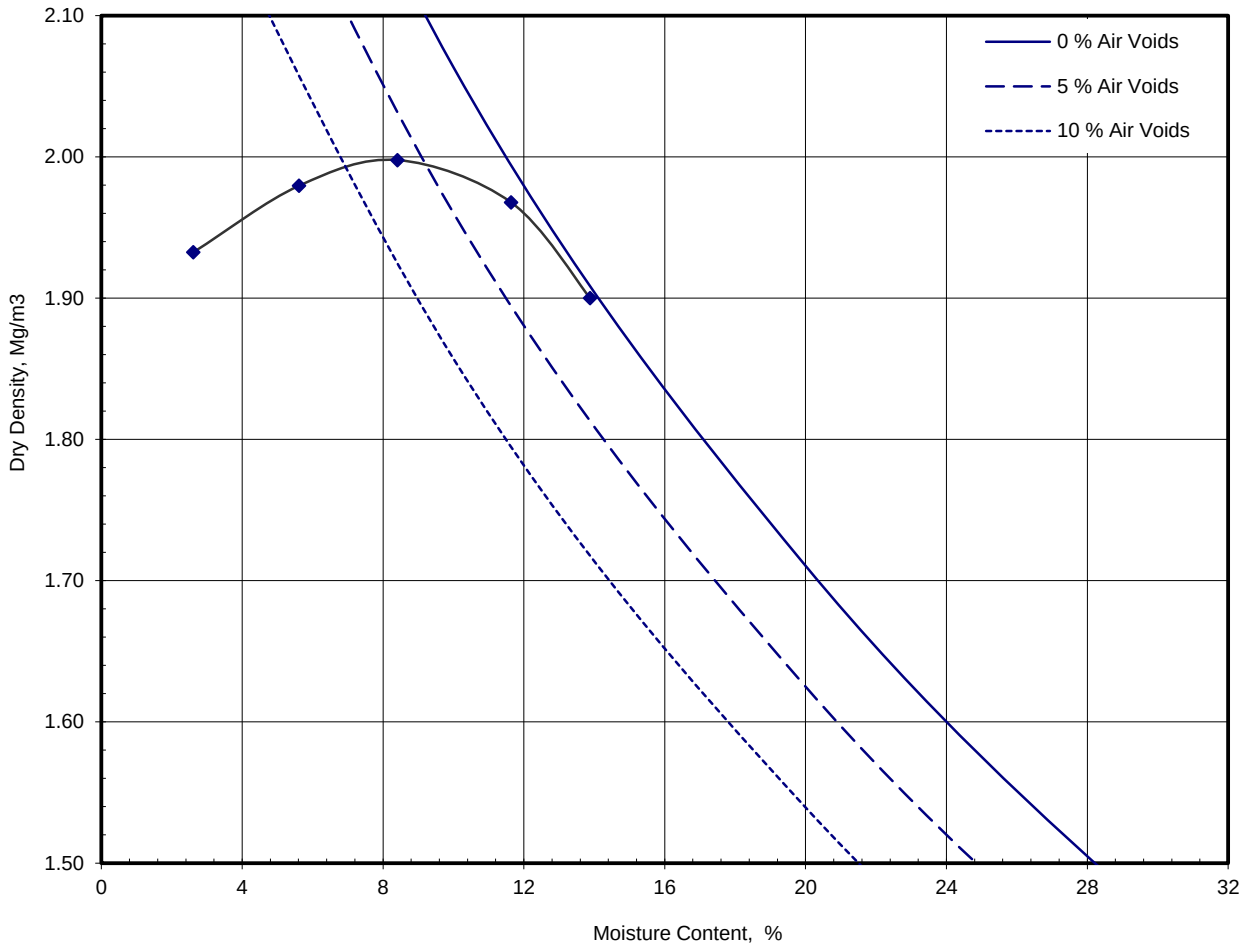
General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen.Watson

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LAB 11R - Version 6

CAUSEWAY GEOTECH	**Dry Density / Moisture Content Relationship Light Compaction**			Job Ref	**21-1219**
				Borehole / Pit No	BH104
Site Name	**DAA Airfield Underpass Ground Investigation**			Sample No	1
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth	4.00 m
Specimen Ref.	3	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.3, 2.5kg rammer			Keylab ID	Caus202205109

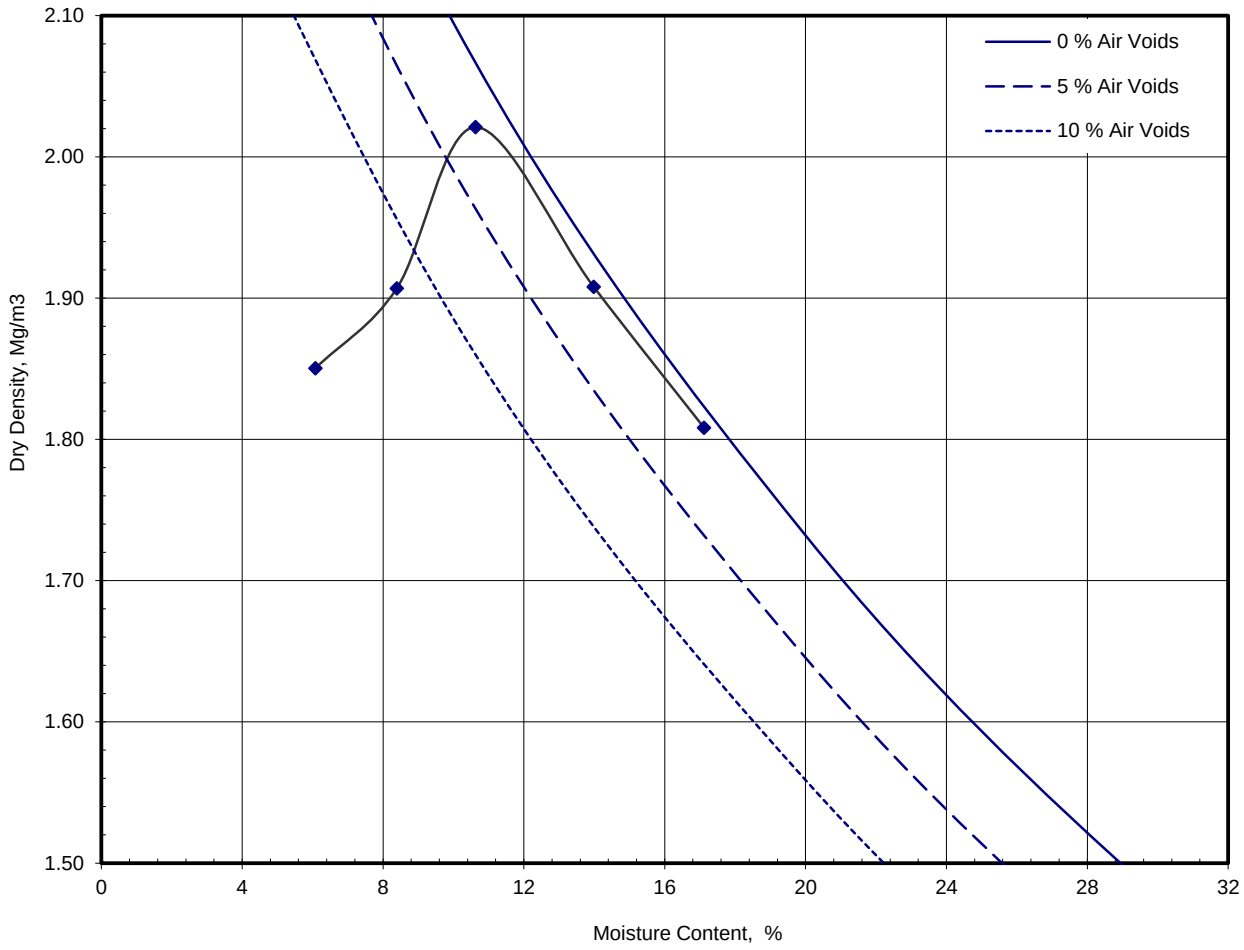


Preparation		Material used was air dried
Mould Type		1 LITRE
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	18
Material Retained on 20.0 mm Sieve	%	24
Particle Density - Assumed	Mg/m³	2.60

Maximum Dry Density	Mg/m³	**2.00**
Optimum Moisture Content	%	**8.4**

Approved	Remarks Non-Standard	UKAS TESTING 10122
Stephen.Watson	LAB 08R - Version 5	

CAUSEWAY GEOTECH	**Dry Density / Moisture Content Relationship Light Compaction**			Job Ref	**21-1219**
				Borehole / Pit No	BH107
Site Name	**DAA Airfield Underpass Ground Investigation**			Sample No	2
Soil Description	Brownish grey sandy gravelly silty CLAY.			Depth	3.50 m
Specimen Ref.	3	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.3, 2.5kg rammer			Keylab ID	Caus2022051029



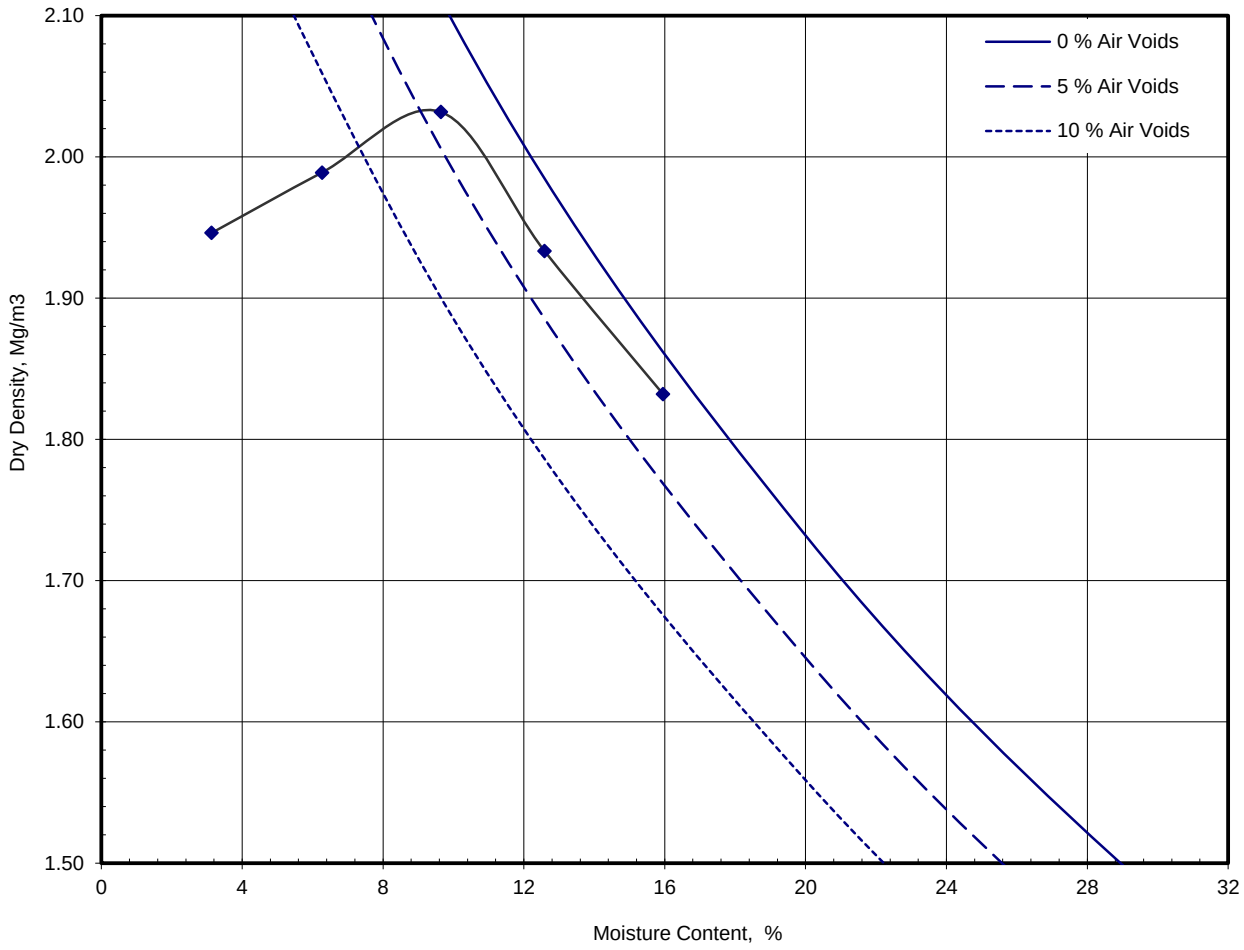
Preparation		Material used was air dried
Mould Type		1 LITRE
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	11
Material Retained on 20.0 mm Sieve	%	18
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.02**

Optimum Moisture Content	%	**11**

Approved	Remarks Non-Standard	UKAS TESTING 10122
Stephen.Watson	LAB 08R - Version 5	

CAUSEWAY GEOTECH	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	21-1219
				Borehole / Pit No	BH108
Site Name	DAA Airfield Underpass Ground Investigation			Sample No	1
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth	4.00 m
Specimen Ref.	4	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	Caus2022051041



Preparation		Material used was air dried
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	8
Material Retained on 20.0 mm Sieve	%	16
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.03**

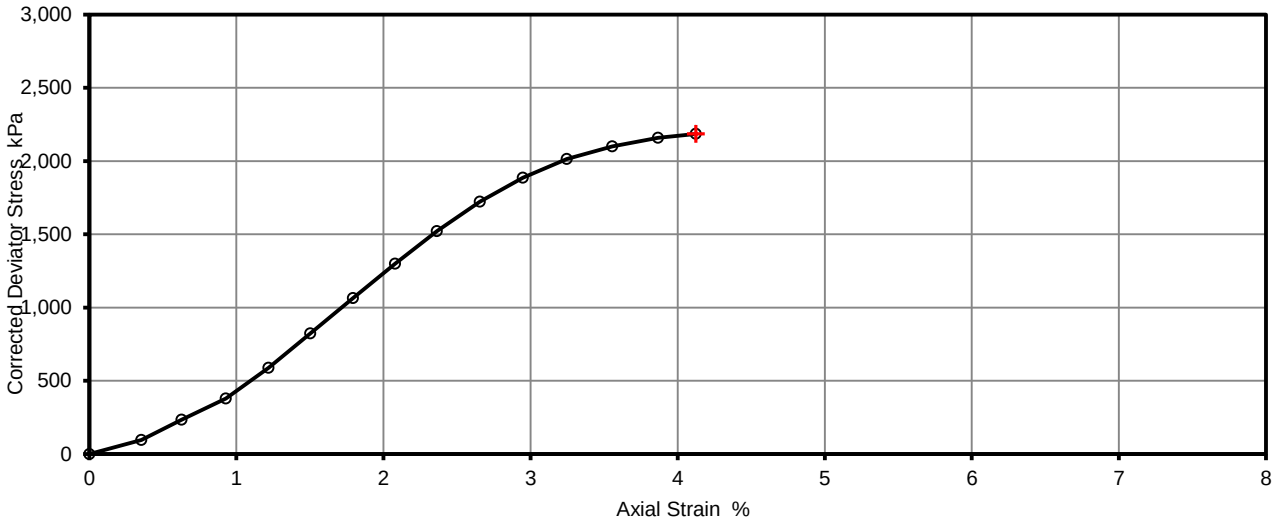
Optimum Moisture Content	%	**9.6**

Approved	Remarks	UKAS TESTING 10122
Stephen.Watson	LAB 08R - Version 5	

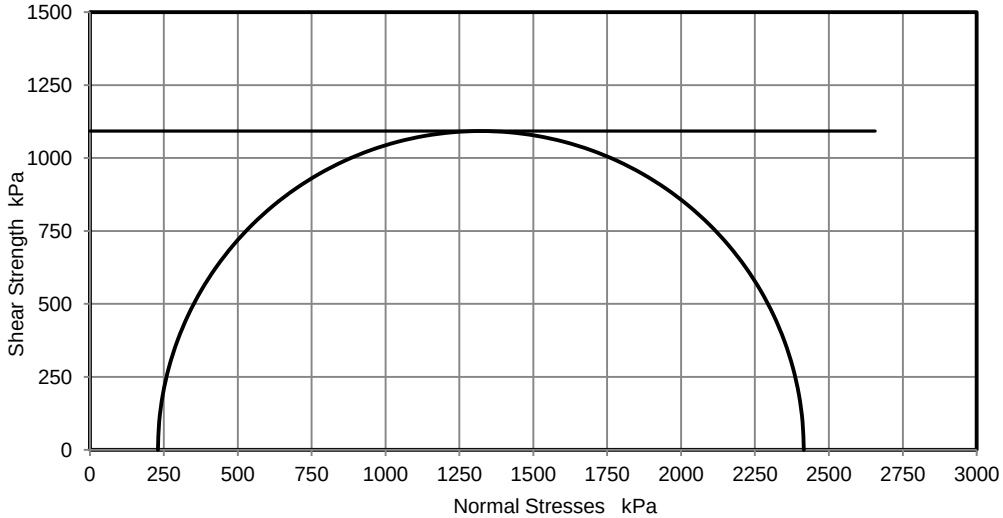
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	21
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth	11.45
Specimen Reference	2	Specimen Depth	11.50	m	Sample Type	U
Specimen Description	Very stiff greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus2022051011
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	21/05/2022

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.1	mm
Diameter		105.1	mm
Bulk Density		2.26	Mg/m3
Moisture Content		8	%
Dry Density		2.09	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		230	kPa
At failure	Axial Strain	4.1	%
	Deviator Stress, (σ1 - σ3)f	2185	kPa
	Undrained Shear Strength, cu	1093	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

No failure defined. Maximum capacity of load ring met.

Approved: Stephen.Watson

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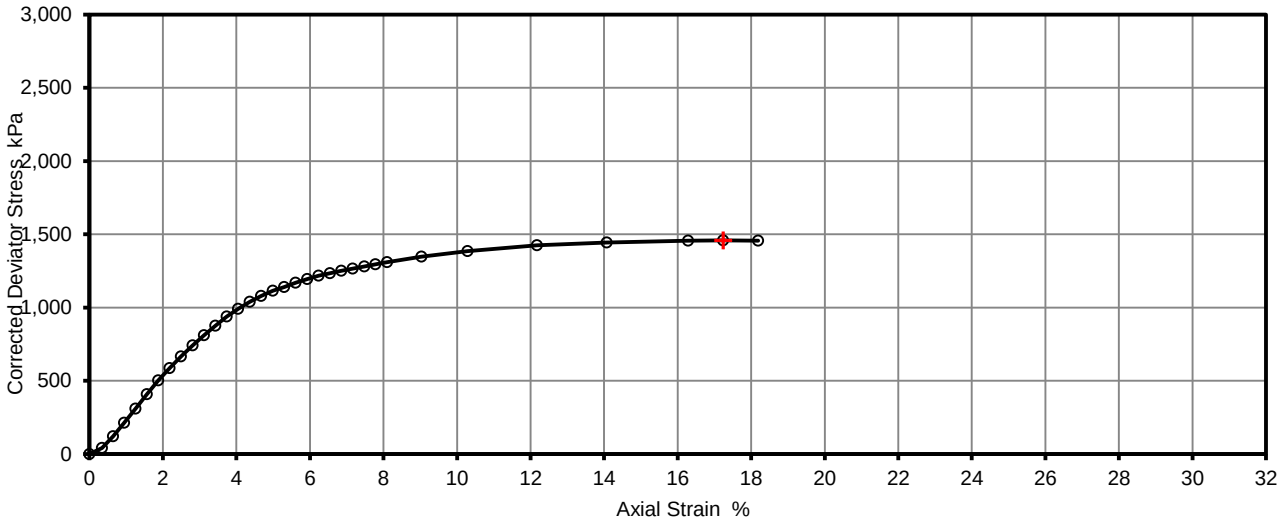
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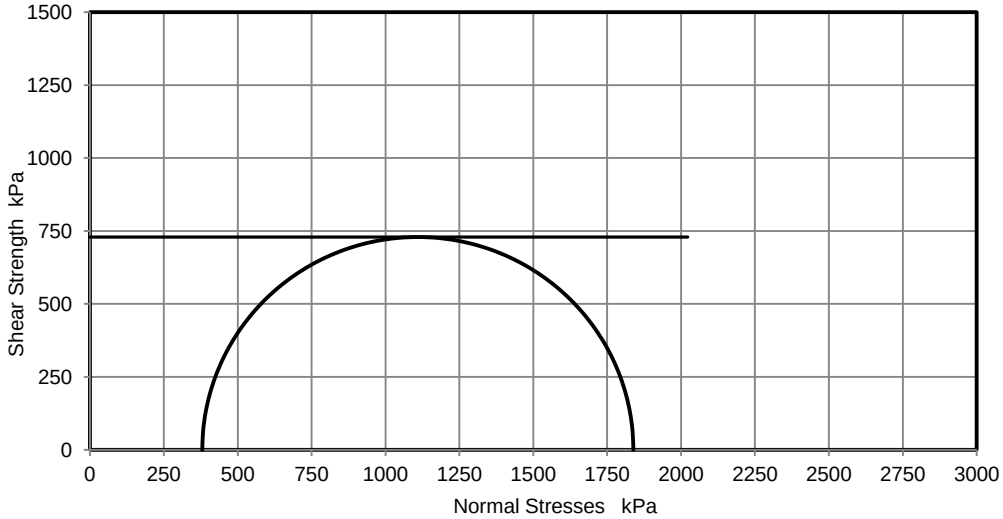
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	22
Soil Description	Grey sandy slightly gravelly silty CLAY.				Depth	19.20
Specimen Reference	3	Specimen Depth	19.25	m	Sample Type	U
Specimen Description	Very stiff grey sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus2022051017
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	23/05/2022

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		105.4	mm
Bulk Density		2.29	Mg/m3
Moisture Content		9	%
Dry Density		2.11	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		380	kPa
At failure	Axial Strain	17.2	%
	Deviator Stress, (σ1 - σ3)f	1459	kPa
	Undrained Shear Strength, cu	729	kPa ½(σ1 - σ3)f
	Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

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Stephen.Watson	25/05/2022 12:21

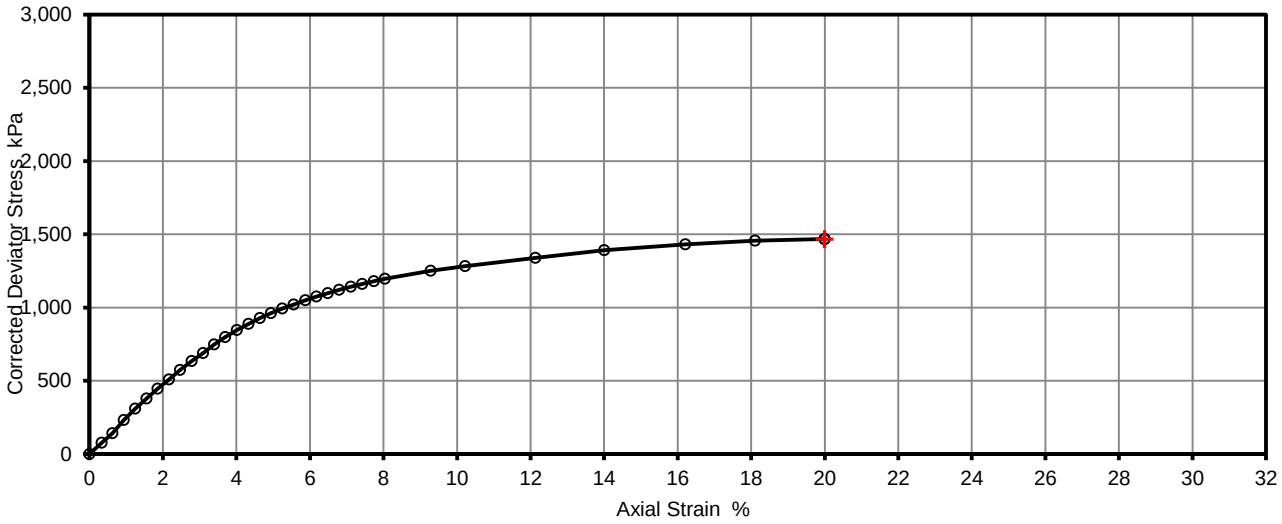
LAB 15R - Version 5

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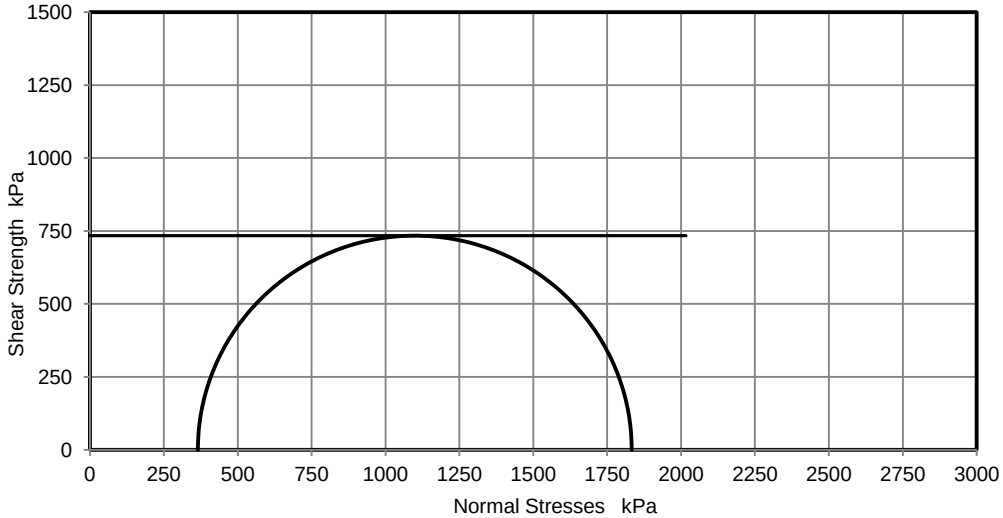
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH106
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	40
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth	17.95
Specimen Reference	2	Specimen Depth	17.95	m	Sample Type	U
Specimen Description	Very stiff greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus2022051027
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	23/05/2022

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		104.3	mm
Bulk Density		2.27	Mg/m3
Moisture Content		9	%
Dry Density		2.08	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		365	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	1468	kPa
	Undrained Shear Strength, cu	734	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

No faliure defined. Testing terminated at 20% axial strain.

Approved: Stephen.Watson

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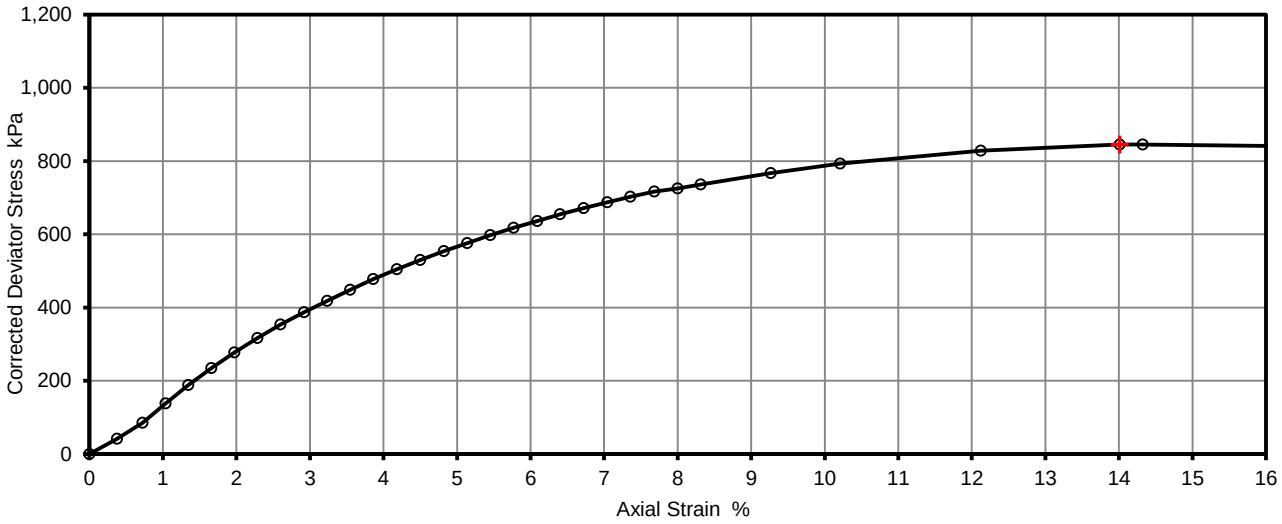
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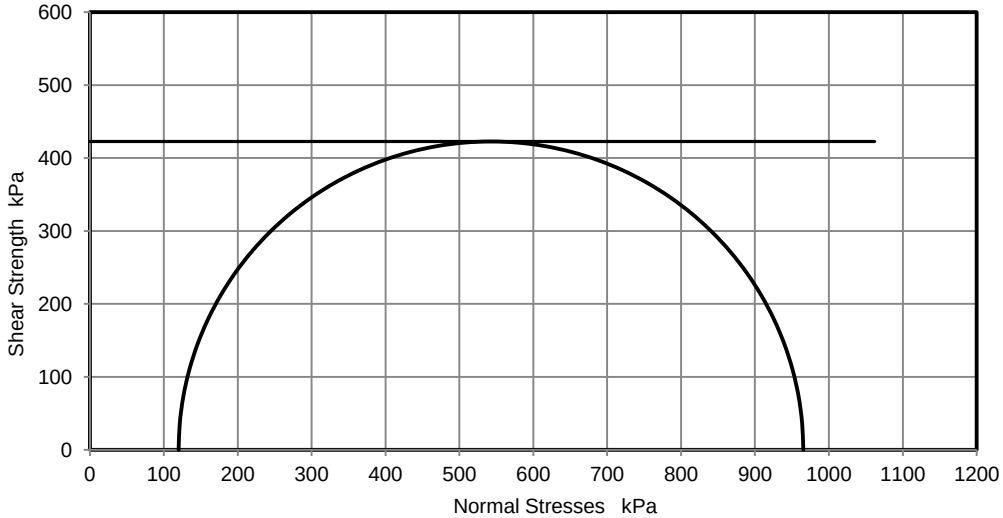
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH108
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	28
Soil Description	Greyish brown sandy gravelly silty CLAY.				Depth	5.85
Specimen Reference	2	Specimen Depth	5.85	m	Sample Type	U
Specimen Description	Very stiff greyish brown sandy gravelly silty CLAY.				KeyLAB ID	Caus2022051042
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	23/05/2022

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		104.6	mm
Bulk Density		2.28	Mg/m3
Moisture Content		10	%
Dry Density		2.08	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		120	kPa
At failure	Axial Strain	14.0	%
	Deviator Stress, (σ1 - σ3)f	845	kPa
	Undrained Shear Strength, cu	423	kPa ½(σ1 - σ3)f
	Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

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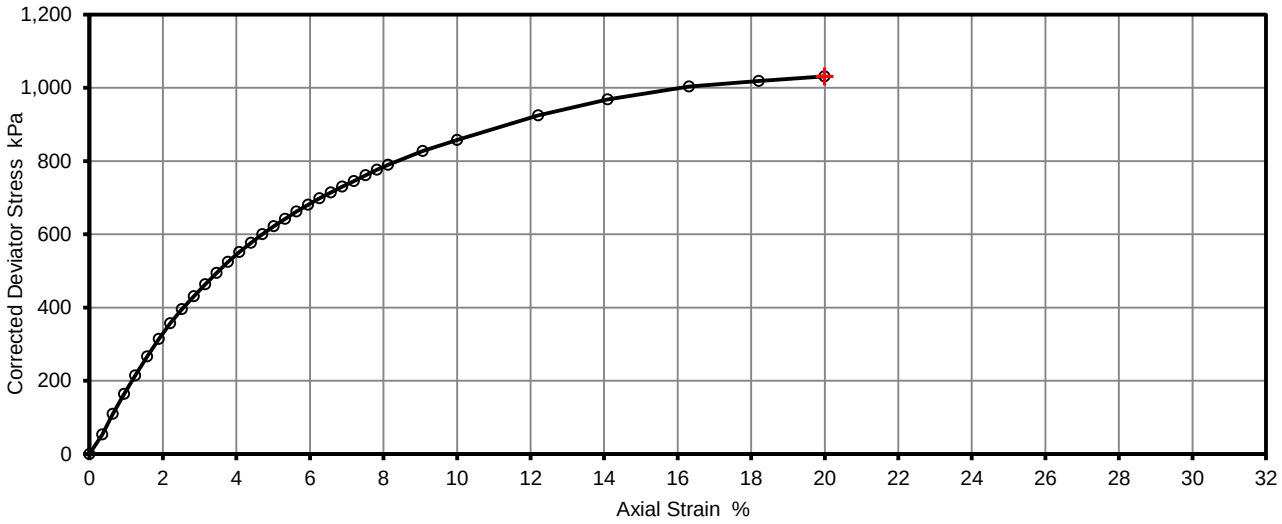
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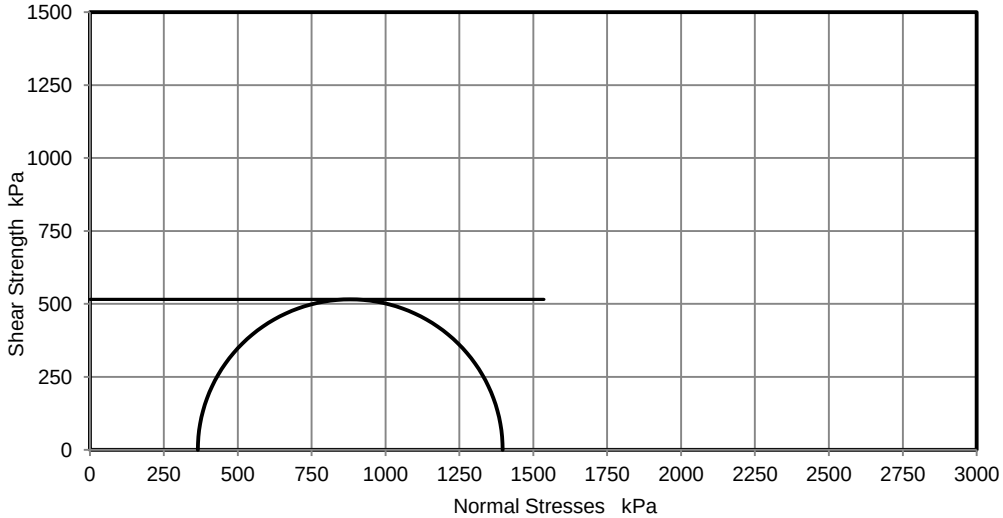
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH108
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	29
Soil Description	Greyish brown sandy gravelly silty CLAY.				Depth	18.30
Specimen Reference	3	Specimen Depth	18.35	m	Sample Type	U
Specimen Description	Very stiff greyish brown sandy gravelly silty CLAY.				KeyLAB ID	Caus2022051047
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	23/05/2022

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		105.1	mm
Bulk Density		2.30	Mg/m3
Moisture Content		10	%
Dry Density		2.10	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		365	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	1031	kPa
	Undrained Shear Strength, cu	516	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

No failure defined. Testing terminated at 20% axial strain.

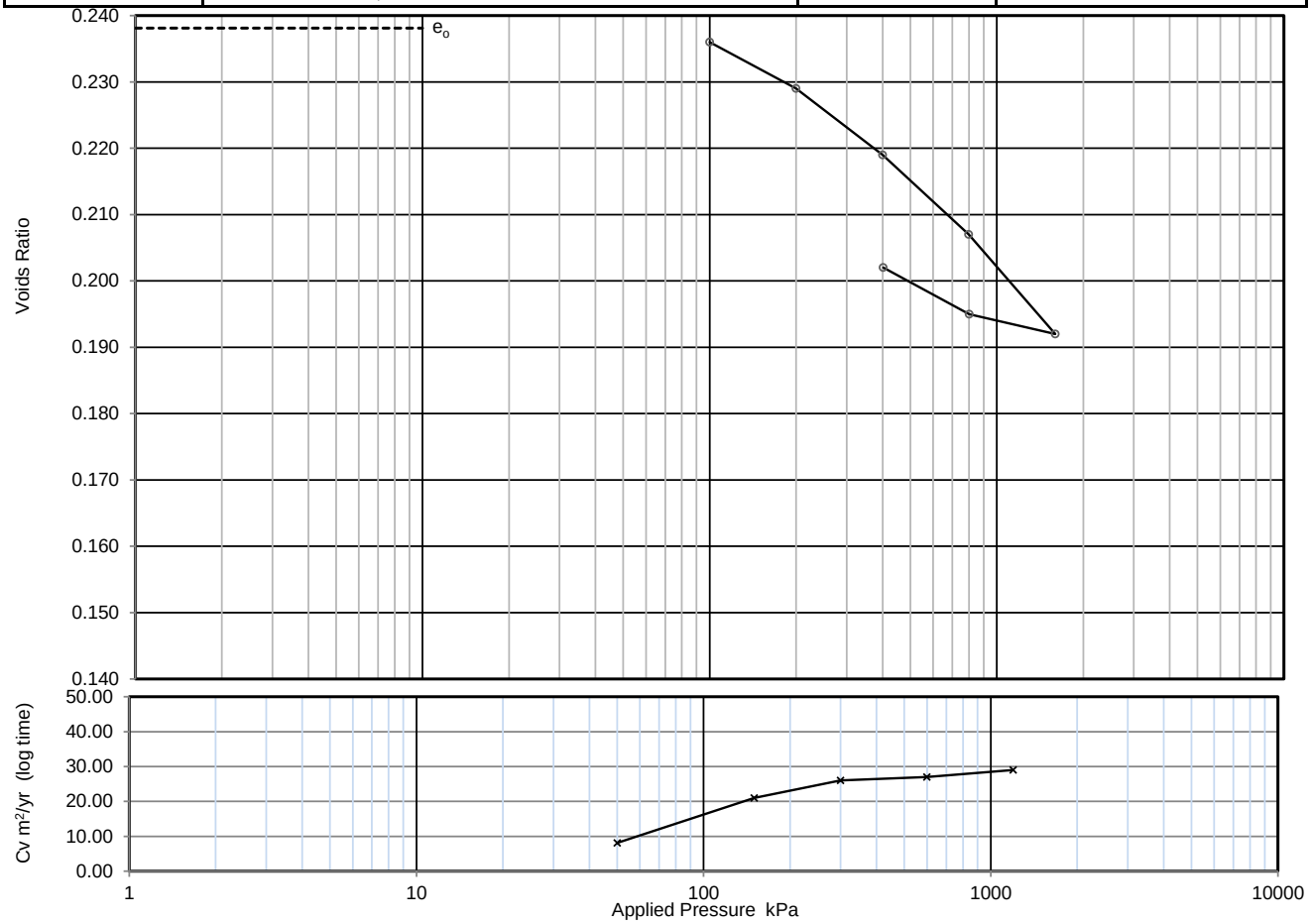
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CAUSEWAY GEOTECH	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3				Job Ref	21-1219
					Borehole/Pit No.	BH104
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	22
Soil Description	Grey sandy slightly gravelly silty CLAY.				Depth	19.2
Specimen Reference	4	Specimen Depth	19.2	m	Sample Type	U
Specimen Description	Grey sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus2022051017
Test Method	BS1377:Part 5:1990, clause 3				Date started	19/05/2022



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.238	-	-	-	-
100	0.236	0.019	8.1	10	0.00018
200	0.229	0.056	21	190	0.00002
400	0.219	0.039	26	200	0.00027
798	0.207	0.025	27	62	0.00044
1,598	0.192	0.016	29	180	0.00079
802	0.195	0.0033			
402	0.202	0.015			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.10	-	mm
Height	20.00	19.41	mm
Moisture Content	9.6	10.1	%
Bulk density	2.35	2.43	Mg/m3
Dry density	2.14	2.21	Mg/m3
Voids Ratio	0.238	0.202	
Saturation	107	132	%
Average temperature for test	20.0		oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

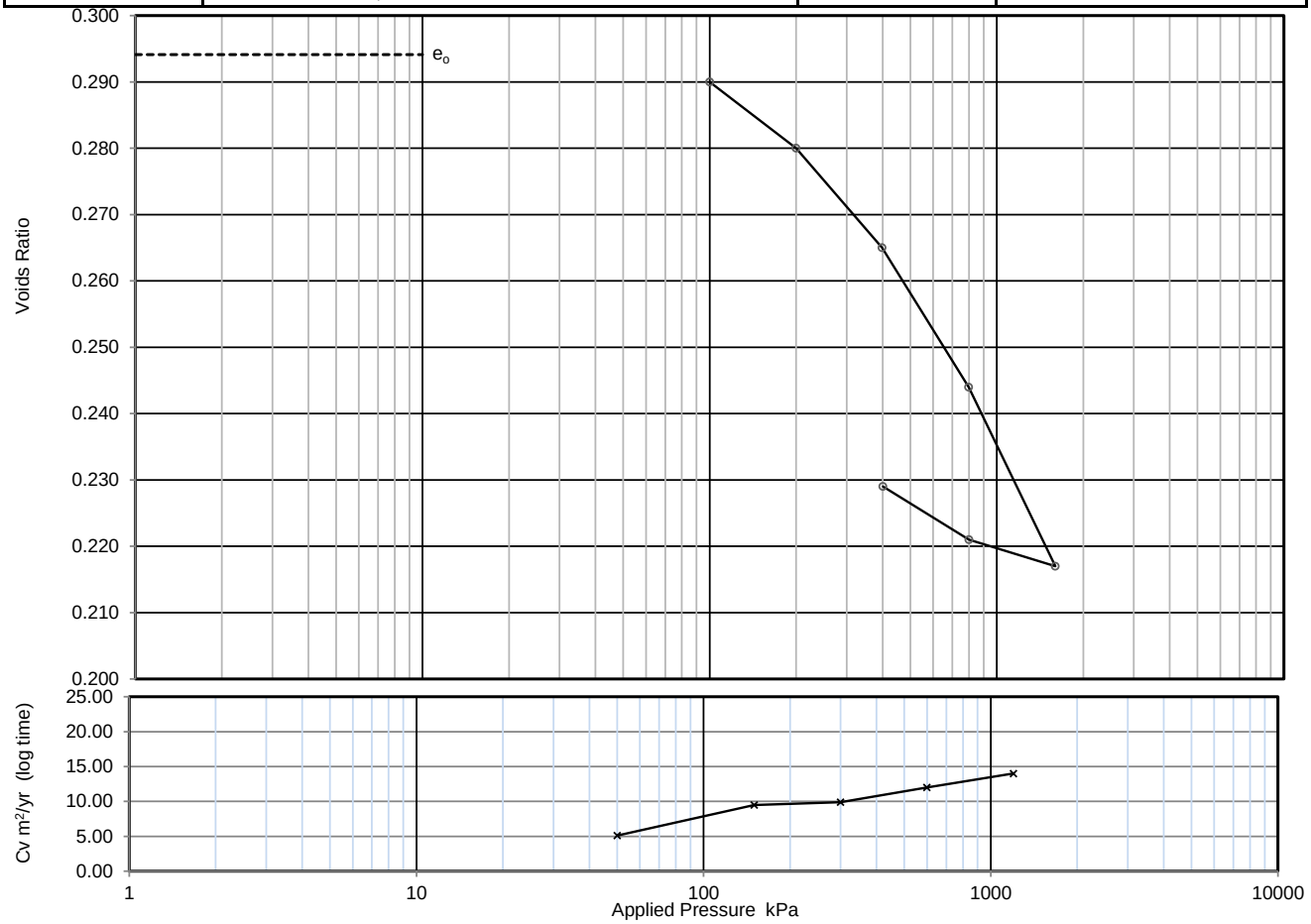
Approved: Stephen.Watson

Printed : 25/05/2022 12:20

LAB 13R - Version 5

UKAS TESTING 10122

CAUSEWAY GEOTECH	**ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3**					Job Ref	21-1219
						Borehole/Pit No.	BH108
Site Name	DAA Airfield Underpass Ground Investigation					Sample No.	29
Soil Description	Greyish brown sandy gravelly silty CLAY.					Depth	18.3
Specimen Reference	4	Specimen Depth	18.3	m		Sample Type	U
Specimen Description	Greyish brown sandy gravelly silty CLAY.					KeyLAB ID	Caus2022051047
Test Method	BS1377:Part 5:1990, clause 3					Date started	20/05/2022



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.294	-	-	-	-
100	0.290	0.033	5.1	7.5	0.00032
200	0.280	0.078	9.5	160	0.00016
399	0.265	0.059	9.9	290	0.00038
798	0.244	0.041	12	410	0.0008
1,599	0.217	0.027	14	410	0.0012
801	0.221	0.0049			
401	0.229	0.016			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.10	-	mm
Height	19.80	18.81	mm
Moisture Content	11.8	11.6	%
Bulk density	2.29	2.41	Mg/m3
Dry density	2.05	2.16	Mg/m3
Voids Ratio	0.294	0.229	
Saturation	106	134	%
Average temperature for test			oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen.Watson

Printed : 25/05/2022 12:20

LAB 13R - Version 5

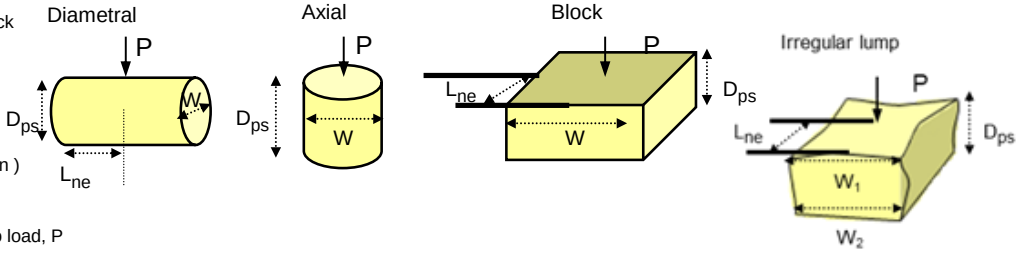
UKAS TESTING 10122

Point Load Strength Index Tests
Summary of Results

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Borehole No.	Sample			Specimen		Rock Type	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth	Ref.	Type	Ref.	Depth		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m				m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BH104	27.45	24	C	1	27.45	LIMESTONE	A	U	NO		100.5	52.0	48.0	9.2	78.4	1.5	1.8	
BH104	27.83	25	C	1	27.83	LIMESTONE	A	U	YES		99.9	81.0	80.0	5.2	100.9	0.5	0.7	
BH104	28.20	23	C	1	28.20	LIMESTONE	D	U	NO	121.3	100.6	100.6	97.0	16.4	98.8	1.7	2.3	
BH104	28.70	26	C	1	28.70	LIMESTONE	D	U	YES	67.4	100.2	100.2	98.0	12.2	99.1	1.2	1.7	
BH106	26.40	2	C	1	26.40	LIMESTONE	D	U	NO	79.2	100.3	100.3	97.0	8.3	98.6	0.9	1.2	
BH106	27.50	3	C	1	27.50	LIMESTONE	D	U	YES	65.4	98.4	98.4	96.0	8.3	97.2	0.9	1.2	
BH106	27.95	4	C	1	27.95	LIMESTONE	A	U	NO		100.3	87.0	78.0	6.6	99.8	0.7	0.9	
BH107	29.60	1	C	1	29.60	LIMESTONE	A	U	YES		101.2	62.0	54.0	11.4	83.4	1.6	2.1	
BH108	29.05	1	C	1	29.05	LIMESTONE	A	U	YES		101.3	102.0	93.0	6.2	109.5	0.5	0.7	
BH108	29.60	1	C	1	29.60	LIMESTONE	D	U	YES	85.4	100.5	10.5	98.0	13.5	99.2	1.4	1.9	
BH108	29.85	1	C	1	29.85	LIMESTONE	D	U	YES	78.3	101.4	101.4	100.0	5.8	100.7	0.6	0.8	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise

Detailed legend for test and dimensions, based on ISRM, is shown above.

Size factor, F = (De/50)0.45 for all tests.

LAB 17R - Version 5

Date Printed: 30/05/2022

Approved By: Stephen.Watson

UKAS TESTING 10122

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Hole No.	Sample				Rock Type	Specimen Dimensions2			Bulk Density2	Water Content 1	Uniaxial Compression3			Remarks
	Ref	Top	Base	Type		Dia. mm	Length mm	H/D	Mg/m3	%	Condition	Mode of failure	UCS MPa	
BH106	1	28.15	28.45	C	LIMESTONE	100.7	186.2	1.8	2.69	0.9	as received	F	48.2	
BH107	1	29.80	30.05	C	LIMESTONE	100.2	198.0	2.0	2.69	0.9	as received	F	67.0	
BH108	1	29.30	29.60	C	LIMESTONE	101.4	200.5	2.0	2.73	0.9	as received	F	37.6	

Notes

1 ISRM p87 test 1, water content at 105 ± 3 oC, specimen as tested for UCS

2 ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density

3 ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials

above notes apply unless annotated otherwise in the remarks

Mode of failure :

S - Single shear MS - multiple shear

AC - Axial cleavage F - Fragmented

Test Specification	Date Printed	Approved By	Table
International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007	30/05/2022	Stephen.Watson	1 sheet 1

LABORATORY REPORT

4043

Contract Number: PSL22/3409

Report Date: 26 May 2022

Client's Reference: 21-1219

Client Name: Causeway Geotech
8 Drumahiskey Road
Ballymoney
Co.Antrim
BT53 7QL

For the attention of: Stephen Watson

Contract Title: DAA Airfield Underpass Ground Investigation

Date Received: 12/5/2022
Date Commenced: 12/5/2022
Date Completed: 26/5/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

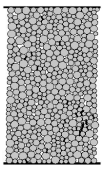
A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	D Burton (Advanced Testing Manager)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
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fax: +44 (0)844 815 6642
e-mail: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
	Depth	9.70-9.95m		
	Description	Brown gravelly slightly sandy CLAY.		
	Type	Undisturbed, vertical orientation.		
	Initial Sample Length	L_0	(mm)	211.0
	Initial Sample Diameter	D_0	(mm)	105.1
	Initial Sample Weight	W_0	(gr)	4116.0
sketch showing specimen location in original sample	Initial Bulk Density	ρ_0	(Mg/m3)	2.25
	Particle Density	ρ_s	(Mg/m3)	2.66

Initial Conditions			Stage 1	2
Initial Cell Pressure	σ_{3i}	(kPa)	700	
Initial Back Pressure	U_{bi}	(kPa)	500	
Membrane Thickness	m_b	(mm)	0.600	
Displacement Input	L_{IP}	(mm)	CH 2	
Load Input	N_{IP}	(N)	CH 4	
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	
Sample Volume	V	(cc)	CH 2	
Initial Moisture	ω_i	(%)	9.09	
Initial Dry Density	ρ_{di}	(Mg/m3)	2.06	
Initial Voids Ratio	e_i	.	0.291	
Initial Degree of Saturation	S_i	(%)	83	
B Value	B	.	0.96	

Final Conditions				
Final Moisture	ω_f	(%)	8.93	
Final Dry Density	ρ_{df}	(Mg/m3)	2.09	
Final Voids Ratio	e_f	.	0.274	
Final Degree of Saturation	S_f	(%)	86.6	
			Stage 1	2
Failure Criteria		.	Max. Dev. Stress	
Strain At Failure	ε_f	(%)	11.70	
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	1363.8	
Minor Stress At Failure	σ_3'	(kPa)	606.0	
Major Stress At Failure	σ_1'	(kPa)	1969.8	
Principal Stress Ratio At Failure	σ_1'/σ_3'		3.251	

Notes



Plastic

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 9.70-9.95m U27
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	9.70-9.95m U27
Client	Causeway	Depth	9.70-9.95m

UKAS TESTING 4043

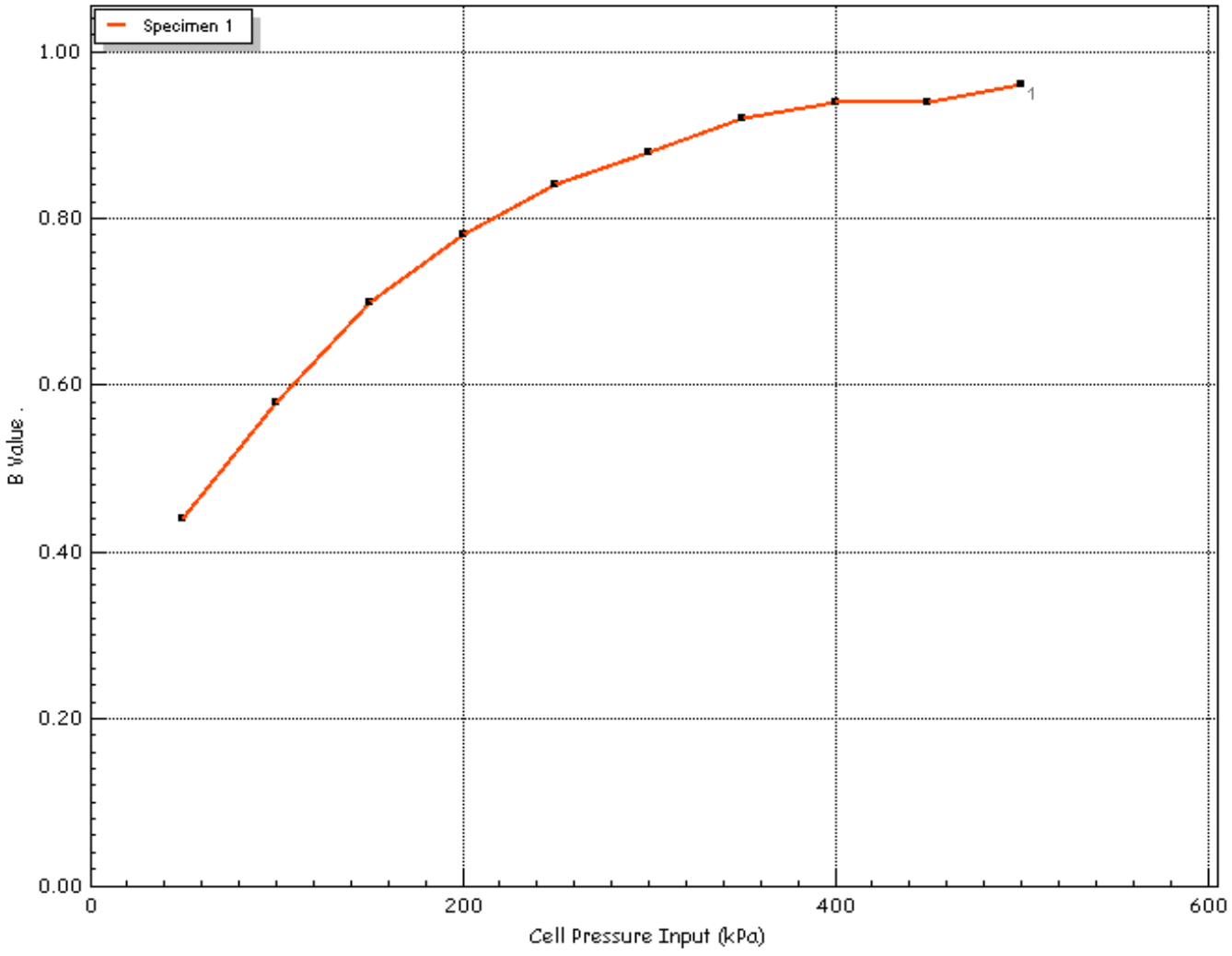
PSL Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	500
Pore Water Pressure Input	u pwp	(kPa)	487
B Value	B	.	0.96



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 9.70-9.95m U27
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	9.70-9.95m U27
Client	Causeway	Depth	9.70-9.95m

UKAS TESTING 4043

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Effective Stress Triaxial Compression

Consolidated Undrained

Consolidation Plots

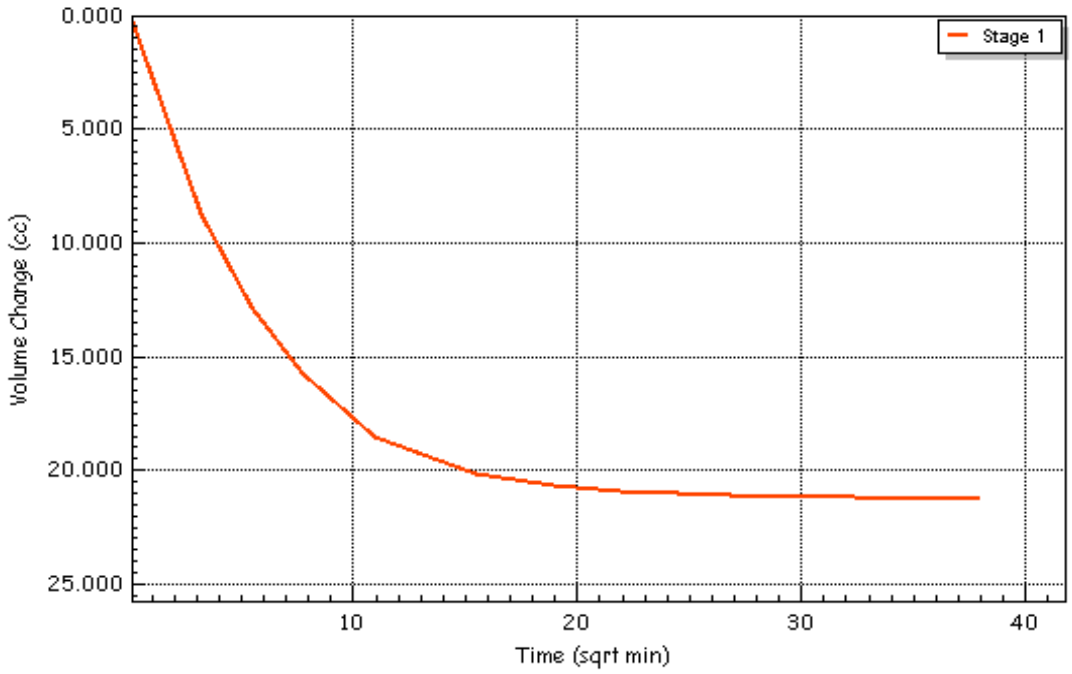
Initial Conditions

Initial Cell Pressure	σ_3	(kPa)	700
Initial Back Pressure	u_{bi}	(kPa)	500
Pore Water Pressure Input	u_{pwp}	(kPa)	674
Drainage Method			Radial+One End

Final Conditions

PWP Dissipation %	U%	(%)	100.00
Volumetric Strain	ε_v%	(%)	1.16
Corrected Length	L_C	(mm)	210.2
Corrected Area	A_C	(cm2)	86.08
Corrected Volume	V_C	(cc)	1809.266
T100 Time to Failure	t_{100}	(min)	58.83
Consolidation	c_V	(m2/year)	3.877
Compressibility	m_V	(m2/MN)	0.067
Test Time	t_F	(h:m:s)	02:00:00
Estimated Strain to Failure	ε%	(%)	5.0
Shear Machine Speed	d_r	(mm/min)	0.08758

Notes



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 9.70-9.95m U27
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	9.70-9.95m U27
Client	Causeway	Depth	9.70-9.95m

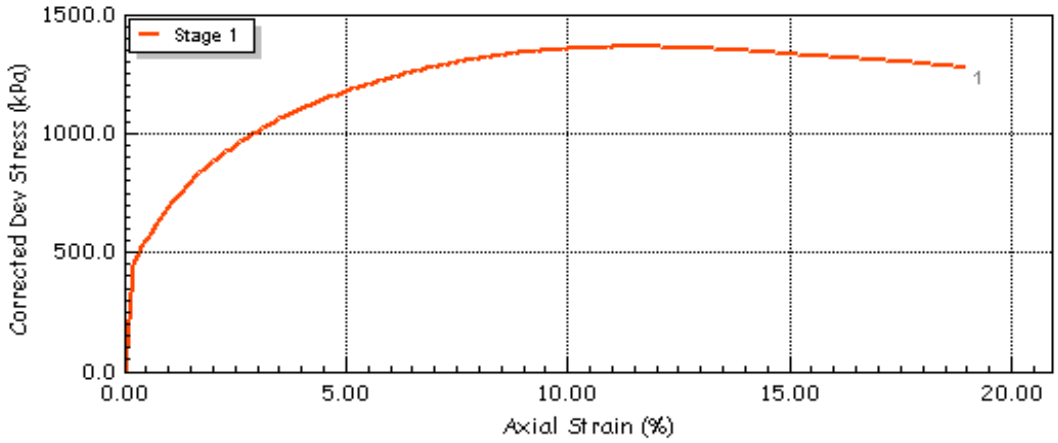
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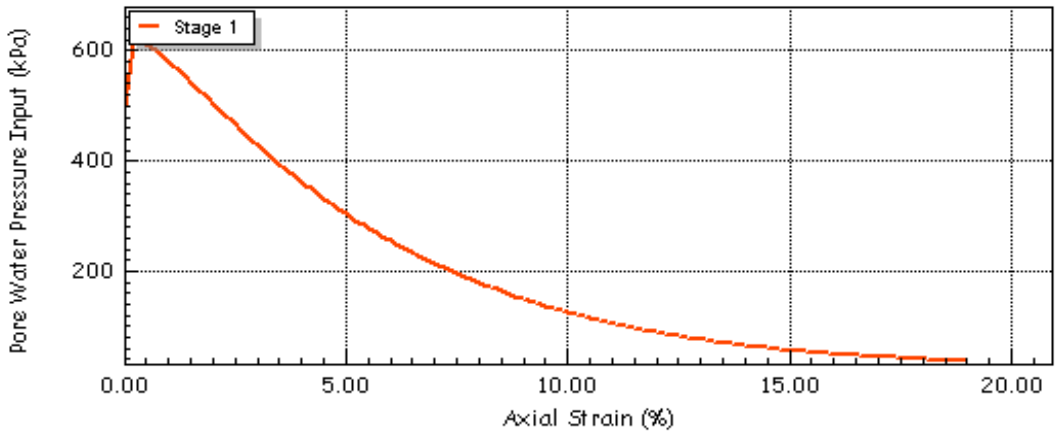
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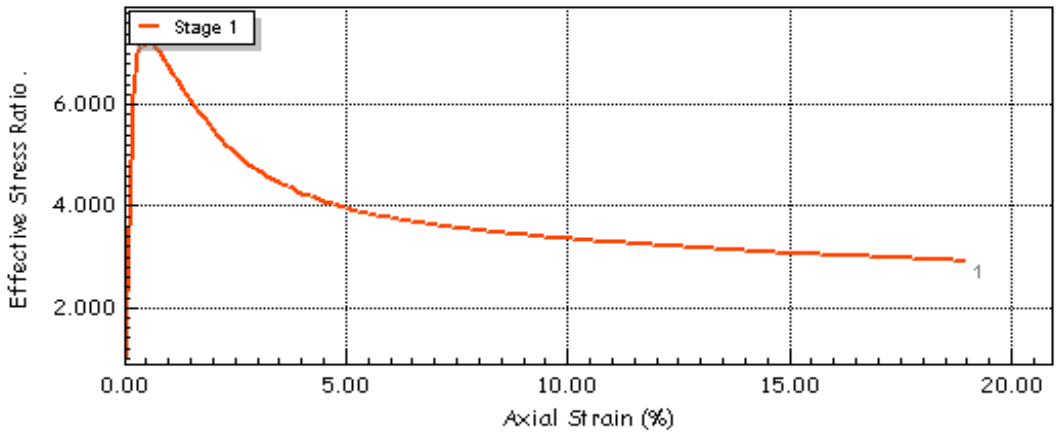
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 9.70-9.95m U27
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	9.70-9.95m U27
Client	Causeway	Depth	9.70-9.95m

UKAS TESTING 4043

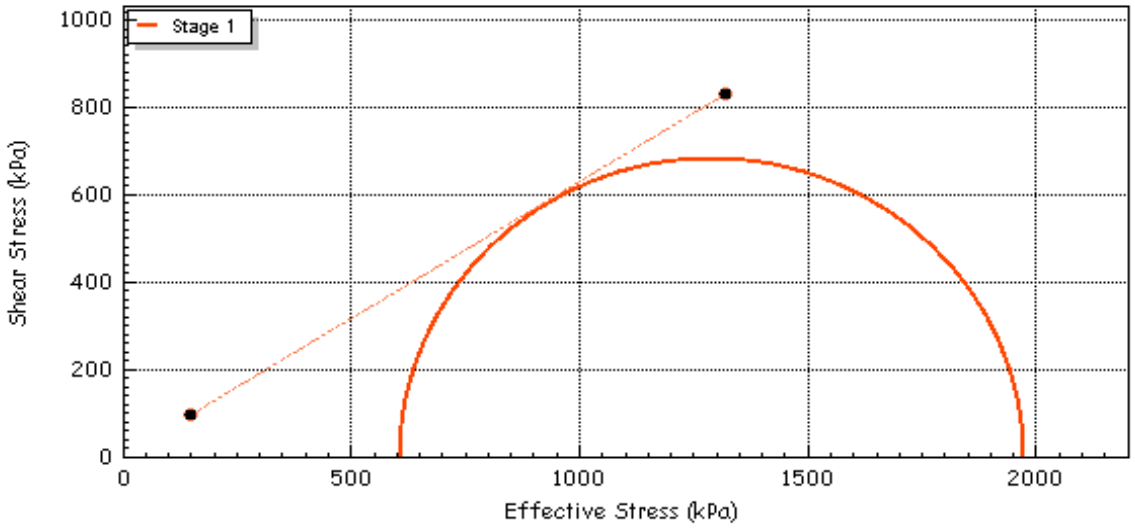
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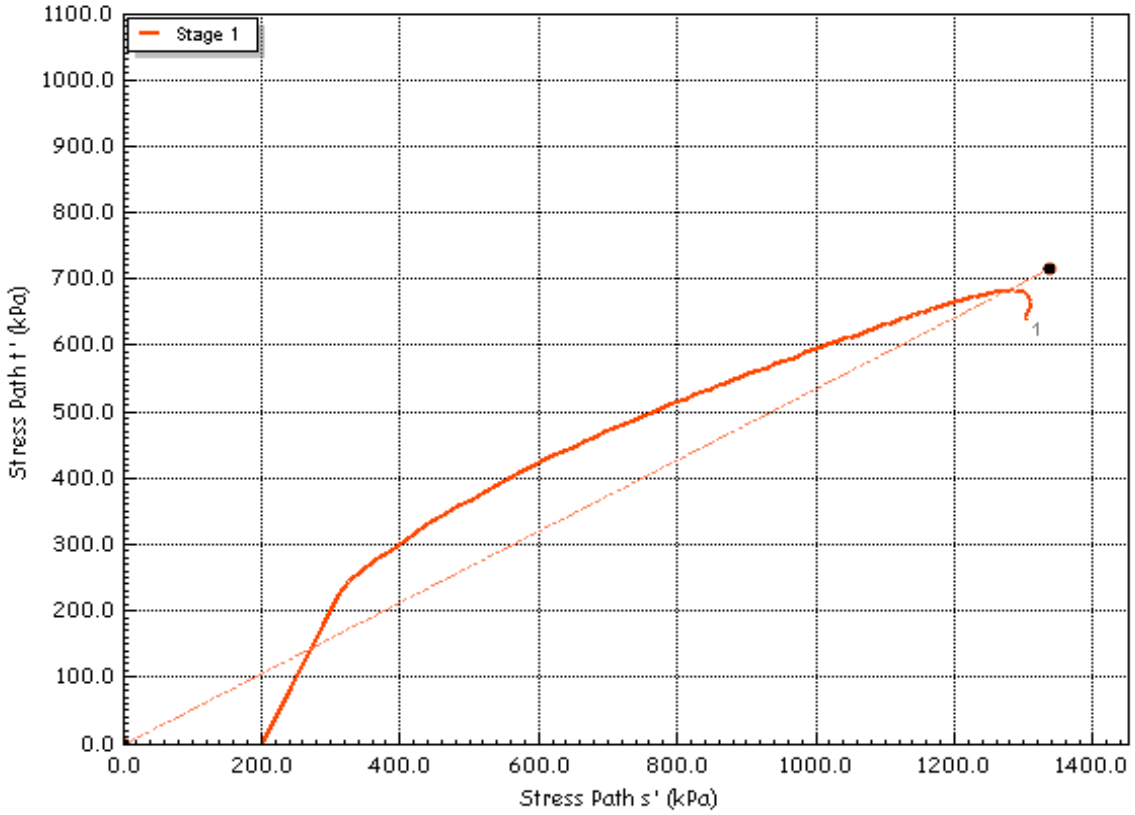
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective	c'	(kPa)	0.00	Effective Cohesion	c'	(kPa)	0.00
Effective Friction	ϕ'	(deg)	32.3	Effective Friction	ϕ'	(deg)	32.3





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 9.70-9.95m U27
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	9.70-9.95m U27
Client	Causeway	Depth	9.70-9.95m

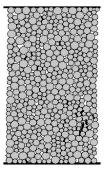
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Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
 *sketch showing specimen location in original sample*	Depth	13.20-13.45m		
	Description	See summary of soil descriptions.		
	Type	Undisturbed, vertical orientation.		
	Initial Sample Length	L_0	(mm)	211.0
	Initial Sample Diameter	D_0	(mm)	103.8
	Initial Sample Weight	W_0	(gr)	3993.0
	Initial Bulk Density	ρ_0	(Mg/m3)	2.24
	Particle Density	ρ_s	(Mg/m3)	2.66

Initial Conditions			Stage 1	2
Initial Cell Pressure	σ_{3i}	(kPa)	560	
Initial Back Pressure	U_{bi}	(kPa)	300	
Membrane Thickness	m_b	(mm)	0.600	
Displacement Input	L_{IP}	(mm)	CH 2	
Load Input	N_{IP}	(N)	CH 1	
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	
Sample Volume	V	(cc)	CH 6	
Initial Moisture	ω_i	(%)	10	
Initial Dry Density	ρ_{di}	(Mg/m3)	2.03	
Initial Voids Ratio	e_i	.	0.310	
Initial Degree of Saturation	S_i	(%)	87	
B Value	B	.	0.97	

Final Conditions				
Final Moisture	ω_f	(%)	9.87	
Final Dry Density	ρ_{df}	(Mg/m3)	2.09	
Final Voids Ratio	e_f	.	0.274	
Final Degree of Saturation	S_f	(%)	95.7	
			Stage 1	2
Failure Criteria		.	Max. Dev. Stress	
Strain At Failure	ε_f	(%)	15.24	
Stress At Failure	$(\sigma_1-\sigma_3)_f$	(kPa)	1388.6	
Minor Stress At Failure	σ_3'	(kPa)	538.0	
Major Stress At Failure	σ_1'	(kPa)	1926.6	
Principal Stress Ratio At Failure	σ_1'/σ_3'		3.581	

Notes



Plastic

UKAS TESTING 4043

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 13.20-13.45m U26
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	13.20-13.45m U26
Client	Causeway	Depth	13.20-13.45m

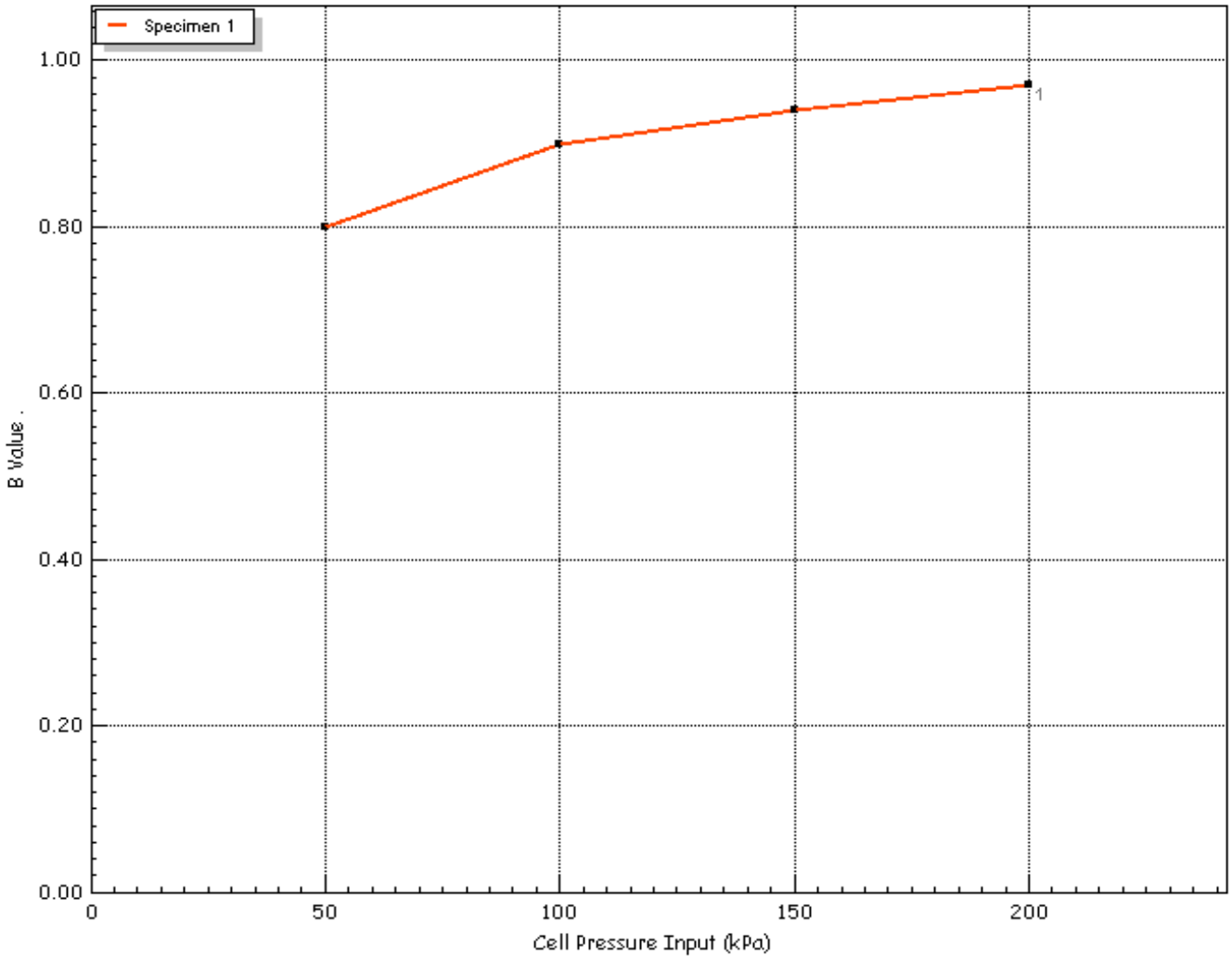
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Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	200
Pore Water Pressure Input	u pwp	(kPa)	186
B Value	B	.	0.97



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 13.20-13.45m U26
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	13.20-13.45m U26
Client	Causeway	Depth	13.20-13.45m

UKAS TESTING 4043

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Effective Stress Triaxial Compression

Consolidated Undrained

Consolidation Plots

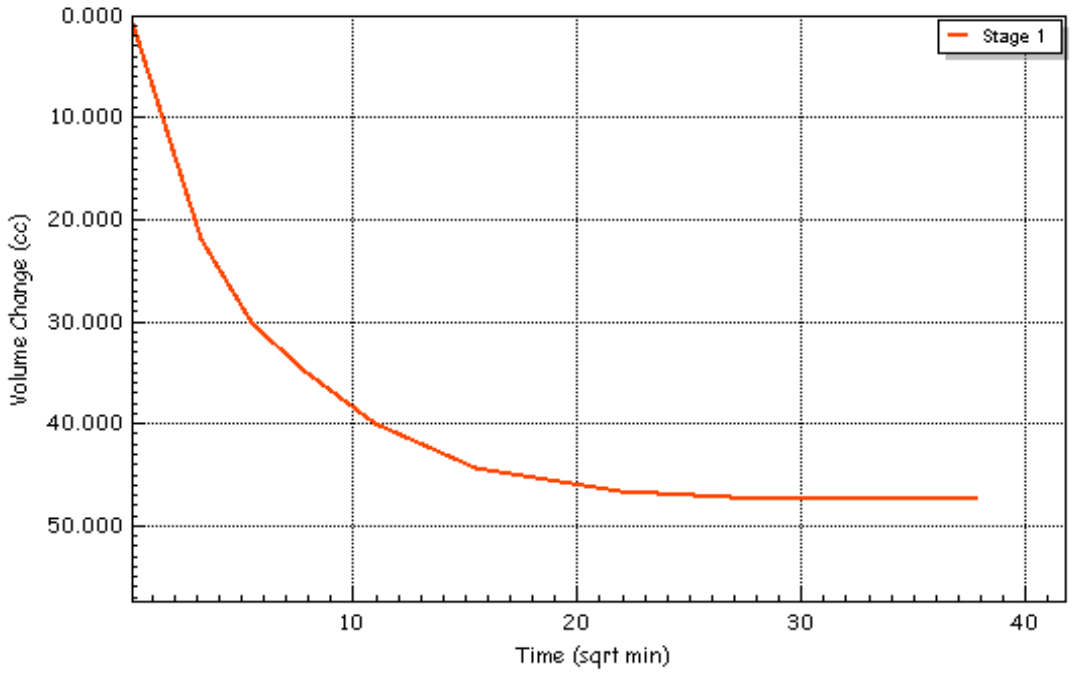
Initial Conditions

Initial Cell Pressure	σ_3	(kPa)	560
Initial Back Pressure	u_{bi}	(kPa)	300
Pore Water Pressure Input	u_{pwp}	(kPa)	545
Drainage Method			Radial+One End

Final Conditions

PWP Dissipation %	U%	(%)	100.00
Volumetric Strain	ε_v%	(%)	2.65
Corrected Length	L_C	(mm)	209.1
Corrected Area	A_C	(cm2)	83.12
Corrected Volume	V_C	(cc)	1738.139
t100	t_{100}	(min)	46.41
Consolidation	c_v	(m2/year)	4.794
Compressibility	m_v	(m2/MN)	0.108
Test Time	t_F	(h:m:s)	02:00:00
Estimated Strain to Failure	ε %	(%)	5.0
Shear Machine Speed	d_r	(mm/min)	0.08714

Notes



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 13.20-13.45m U26
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	13.20-13.45m U26
Client	Causeway	Depth	13.20-13.45m

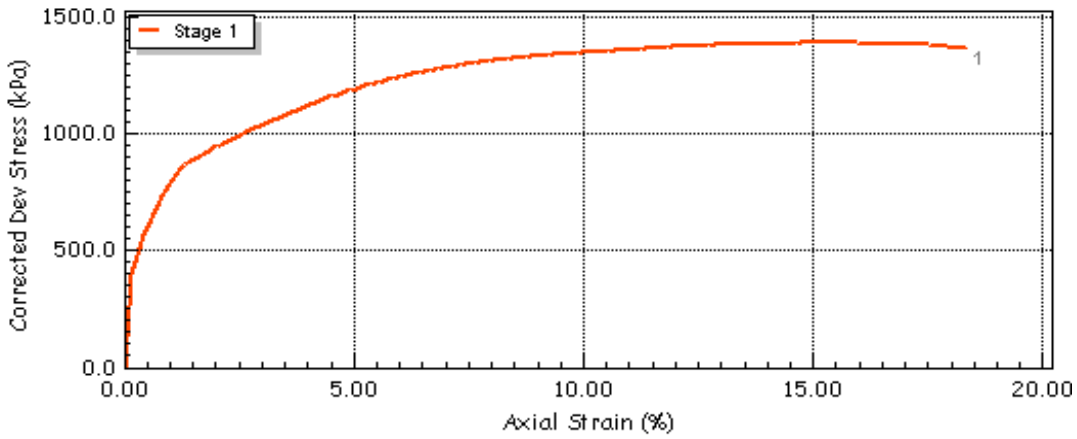
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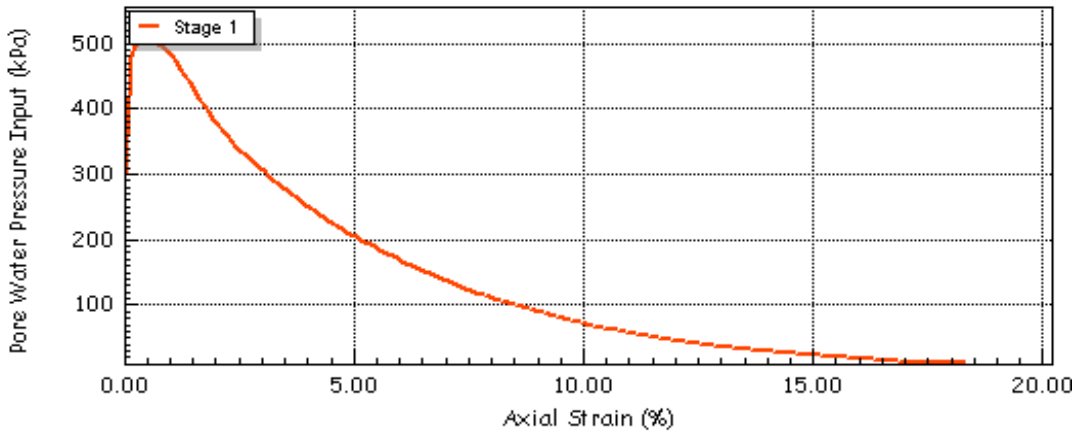
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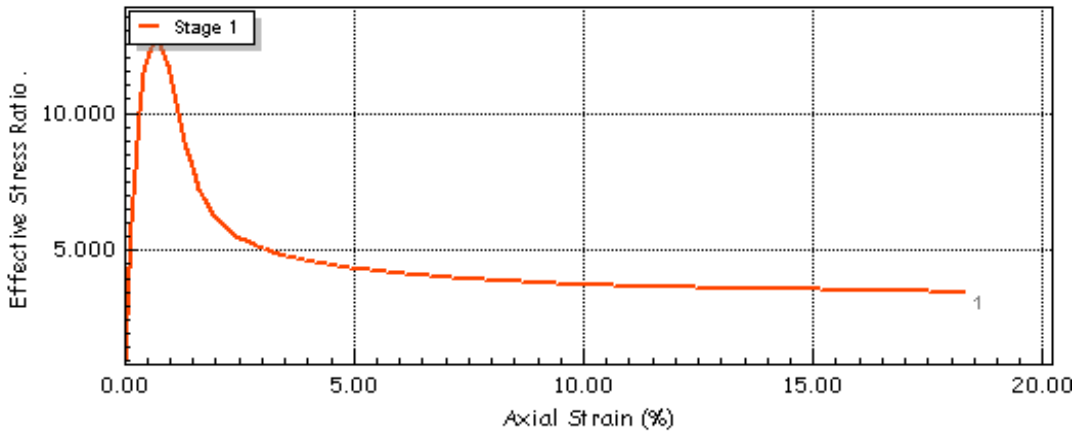
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 13.20-13.45m U26
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	13.20-13.45m U26
Client	Causeway	Depth	13.20-13.45m

UKAS TESTING 4043

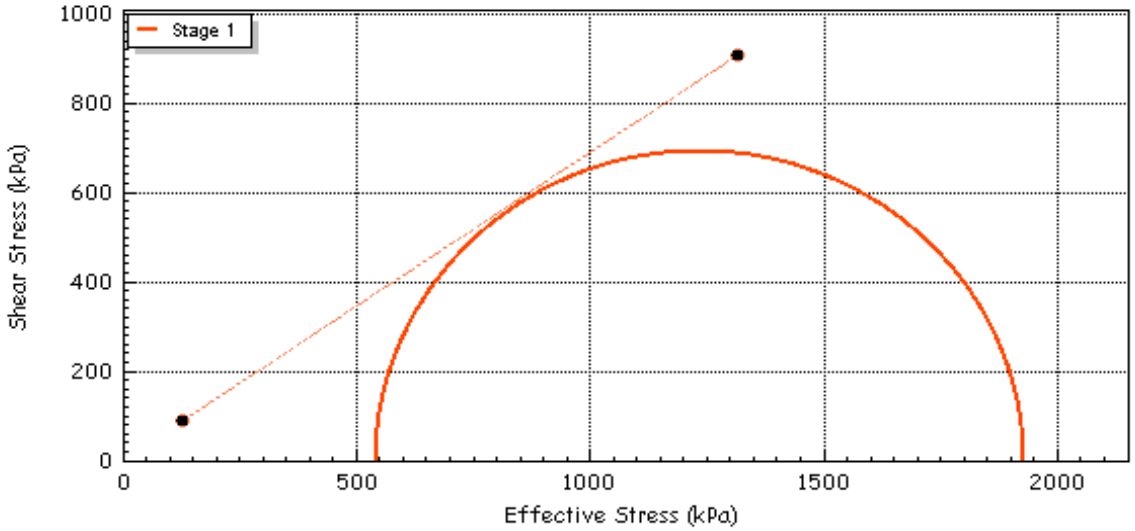
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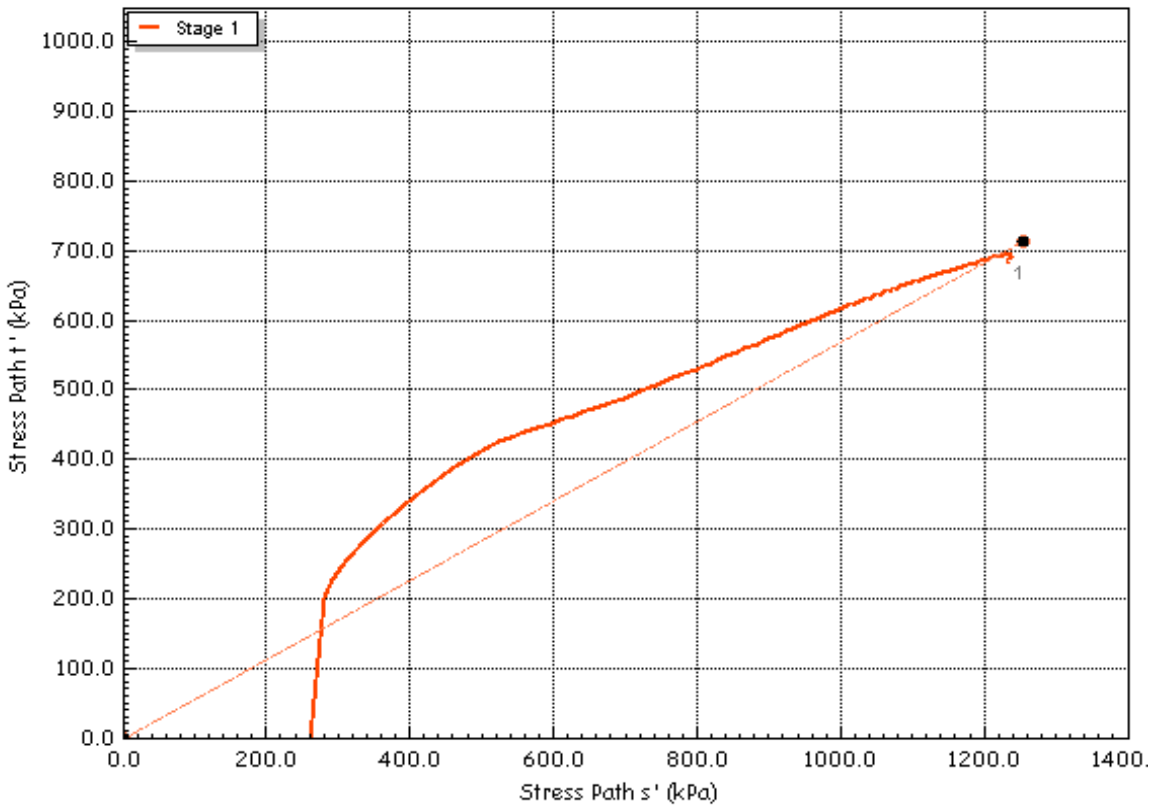
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective	c'	(kPa)	0.00	Effective Cohesion	c'	(kPa)	0.00
Effective Friction	ϕ'	(deg)	34.6	Effective Friction	ϕ'	(deg)	34.6





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH107 13.20-13.45m U26
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH107
		Sample	13.20-13.45m U26
Client	Causeway	Depth	13.20-13.45m

UKAS TESTING 4043

PSL Professional Soils Laboratory

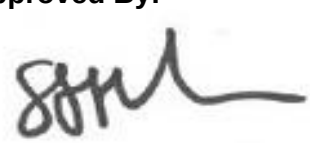
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-18277-1
Initial Date of Issue:	24-May-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	21-1219 DAA Airfield Underpass

Quotation No.:		**Date Received:**	17-May-2022
Order No.:		**Date Instructed:**	17-May-2022
No. of Samples:	10		
Turnaround (Wkdays):	7	**Results Due:**	25-May-2022
Date Approved:	24-May-2022		

Approved By:



Details: Stuart Henderson, Technical Manager

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: 21-1219 DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-18277	22-18277	22-18277	22-18277	22-18277	22-18277	22-18277	22-18277
Quotation No.:			**Chemtest Sample ID.:**		1430305	1430306	1430307	1430308	1430309	1430310	1430311	1430312
Order No.:			Client Sample Ref.:		2	3	7	1	25	8	18	19
			Sample Location:		BH104	BH104	BH106	BH108	BH106	BH106	BH107	BH107
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		6.40	11.95	9.50	4.00	9.50	12.50	13.00	14.60
			Date Sampled:		16-May-2022	16-May-2022	16-May-2022	16-May-2022	16-May-2022	16-May-2022	16-May-2022	16-May-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Moisture	N	2030	%	0.020	8.5	6.9	7.8	8.5	6.1	20	8.1	8.4
pH (2.5:1)	N	2010		4.0	9.2	9.3			9.2	9.1	9.0	9.0
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010	< 0.010			< 0.010	< 0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.044	< 0.010			0.043	0.023	0.021	0.049
Total Sulphur	U	2175	%	0.010	0.15	0.13			0.17	0.35	0.063	0.055
Chloride (Water Soluble)	U	2220	g/l	0.010	< 0.010	< 0.010			0.012	< 0.010	< 0.010	< 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010			< 0.010	< 0.010	< 0.010	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010	0.034	0.026			0.027	0.037	0.015	0.021
Organic Matter	U	2625	%	0.40	0.60	0.76	0.59	1.4				

Results - Soil

Project: 21-1219 DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-18277	22-18277
Quotation No.:			**Chemtest Sample ID.:**		1430313	1430314
Order No.:			Client Sample Ref.:		3	5
			Sample Location:		BH108	BH108
			Sample Type:		SOIL	SOIL
			Top Depth (m):		13.00	14.50
			Date Sampled:		16-May-2022	16-May-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Moisture	N	2030	%	0.020	16	17
pH (2.5:1)	N	2010		4.0	9.2	9.4
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.059	0.018
Total Sulphur	U	2175	%	0.010	0.16	0.15
Chloride (Water Soluble)	U	2220	g/l	0.010	< 0.010	< 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010	0.028	0.020
Organic Matter	U	2625	%	0.40		

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
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

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

LABORATORY RESTRICTION REPORT

Project Reference	21-1219	To	Colm Hurley
		Position	Project Manager
Project Name	DAA Airfield Underpass GI	From	Joseph Nicholl
TR reference	21-1219 / G02	Position	Laboratory Quality Manager

The following sample(s) and test(s) are restricted as detailed below. Could you please complete the "Required Action" column and return the completed form to the laboratory.

Hole Number	Sample			Test Type	Reason for Restriction	Required Action
	Number	Depth (m)	Type			
BH106	6	4.30	B	Dry density/ moisture content	>10% retained on 37.5mm sieve >30% retained on 20mm sive	
BH104	25	27.83	C	UCS	Too bady fractured	Carry out point load

For electronic reporting a form of electronic signature or printed name is acceptable

Laboratory Signature Joseph Nicholl	Project Manager Signature Colm Hurley
Date 18 May 2022	Date

CAUSEWAY GEOTECH

HEAD OFFICE
Causeway Geotech Ltd
8 Drumahiskey Road
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NI: +44 (0)28 276 66640
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Company Number: NI610766

REGIONAL OFFICE
Causeway Geotech (IRL) Ltd
Unit 1 Fingal House
Stephenstown Industrial Estate
Balbriggan, Co Dublin, Ireland, K32 VR66
ROI: +353 (0)1 526 7465
Registered in Ireland.
Company Number: 633786

www.causewaygeotech.com

SOIL AND ROCK SAMPLE ANALYSIS
LABORATORY TEST REPORT

31 May 2022

Project Name:	DAA Airfield Underpass Ground Investigation
Project No.:	21-1219
Client:	DAA
Engineer:	Ramboll Consulting Engineers

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 10/05/2022 and 31/05/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.



Stephen Watson

Laboratory Manager

Signed for and on behalf of Causeway Geotech Ltd

Project Name: DAA Airfield Underpass Ground Investigation

Report Reference: Schedule 2 - FINAL

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	7
SOIL	Liquid and Plastic Limits of soil-1 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	7
SOIL	Bulk and dry density by Linear Measurement Method	BS 1377-2: 1990: Cl 7.2	7
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	11
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	10
SOIL	Dry density/moisture content relationship (2.5 kg rammer)	BS 1377-4: 1990: Cl 3.3 & 3.4	2
SOIL	California Bearing Ratio (CBR)	BS 1377-4: 1990: Cl 7	2
SOIL	Consolidation properties in oedometer - Using 5 pressures (up to 5 days total duration)	BS 1377-5: 1990: Cl 3: 1	1
	Extra over days (more than initial 5 days)		2
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 8	2
ROCK	Point load index	ISRM Commission on Testing Methods. Suggested Method for Determining Point Load Strength 1985	5

SUB-CONTRACTED TESTS

In agreement with Client, the following tests were conducted by an approved sub-contractor. All sub-contracting laboratories used are UKAS accredited.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – subcontracted to Pro Soils Limited *(UKAS 4043)*	Effective shear strength consolidated-undrained triaxial compression test with measurement of pore pressure (up to 4 days)	BS 1377-8:1990	1
	Extra over days (more than initial 4 days)		0
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	Organic Matter Content		2
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	BRE Test - Suite D		4

Summary of Classification Test Results

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Hole No.	Sample				Soil Description	Density bulk Mg/m3	Density dry Mg/m3	*w* %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
	Ref	Top	Base	Type										
BH105	4	12.95	13.95	B	Greyish brown sandy gravelly silty CLAY.	2.24	1.98	11.0	67	28 -1pt	15	13		CL
BH105	5	17.00	18.10	B	Greyish brown sandy gravelly silty CLAY.	1.97	1.81	8.4	67	29 -1pt	16	13		CL
BH105	8	24.30	25.30	B	Greyish brown sandy gravelly silty CLAY.	2.10	1.88	8.2	71	30 -1pt	17	13		CL
BH109	2	3.50	4.50	B	Greyish brown sandy gravelly silty CLAY.	2.36	2.13	6.7	61	29 -1pt	16	13		CL
BH109	3	7.70	8.70	B	Greyish brown sandy gravelly silty CLAY.	2.19	2.02	7.8	70	27 -1pt	14	13		CL
BH109	4	11.70	12.70	B	Greyish brown sandy gravelly silty CLAY.	2.17	1.95	10.0	82	26 -1pt	14	12		CL
BH109	5	14.90	15.90	B	Greyish brown slightly gravelly silty fine to coarse SAND.	2.17	1.91	14.0	100	20 -1pt	16	4		ML

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key

Density test	Liquid Limit	Particle density
Linear measurement unless :	4pt cone unless :	sp - small pyknometer
wd - water displacement	cas - Casagrande method	gj - gas jar
wi - immersion in water	1pt - single point test	

Date Printed

31/05/2022

Approved By

Stephen.Watson

UKAS TESTING

10122

CAUSEWAY GEOTECH

Density Tests - Summary of Results

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Hole No.	Sample				Soil Description	Linear Measurement			Immersion in water			Water displacement			Remarks
	Ref	Top	Base	Type		Bulk density Mg/m3	Dry density Mg/m3	w %	Bulk density Mg/m3	Dry density Mg/m3	w %	Bulk density Mg/m3	Dry density Mg/m3	w %	
BH105	4	12.95	13.95	B	Greyish brown sandy gravelly silty CLAY.	2.24	1.98	13							
BH105	5	17.00	18.10	B	Greyish brown sandy gravelly silty CLAY.	1.97	1.81	9							
BH105	8	24.30	25.30	B	Greyish brown sandy gravelly silty CLAY.	2.10	1.88	12							
BH109	2	3.50	4.50	B	Greyish brown sandy gravelly silty CLAY.	2.36	2.13	11							
BH109	3	7.70	8.70	B	Greyish brown sandy gravelly silty CLAY.	2.19	2.02	9							
BH109	4	11.70	12.70	B	Greyish brown sandy gravelly silty CLAY.	2.17	1.95	11							
BH109	5	14.90	15.90	B	Greyish brown slightly gravelly silty fine to coarse SAND.	2.17	1.91	14							

Legend w moisture content of the density test specimen

LAB 03R - Version 5

Notes

Tests carried out in accordance with BS1377:Part2:1990 and the following clauses unless annotated otherwise

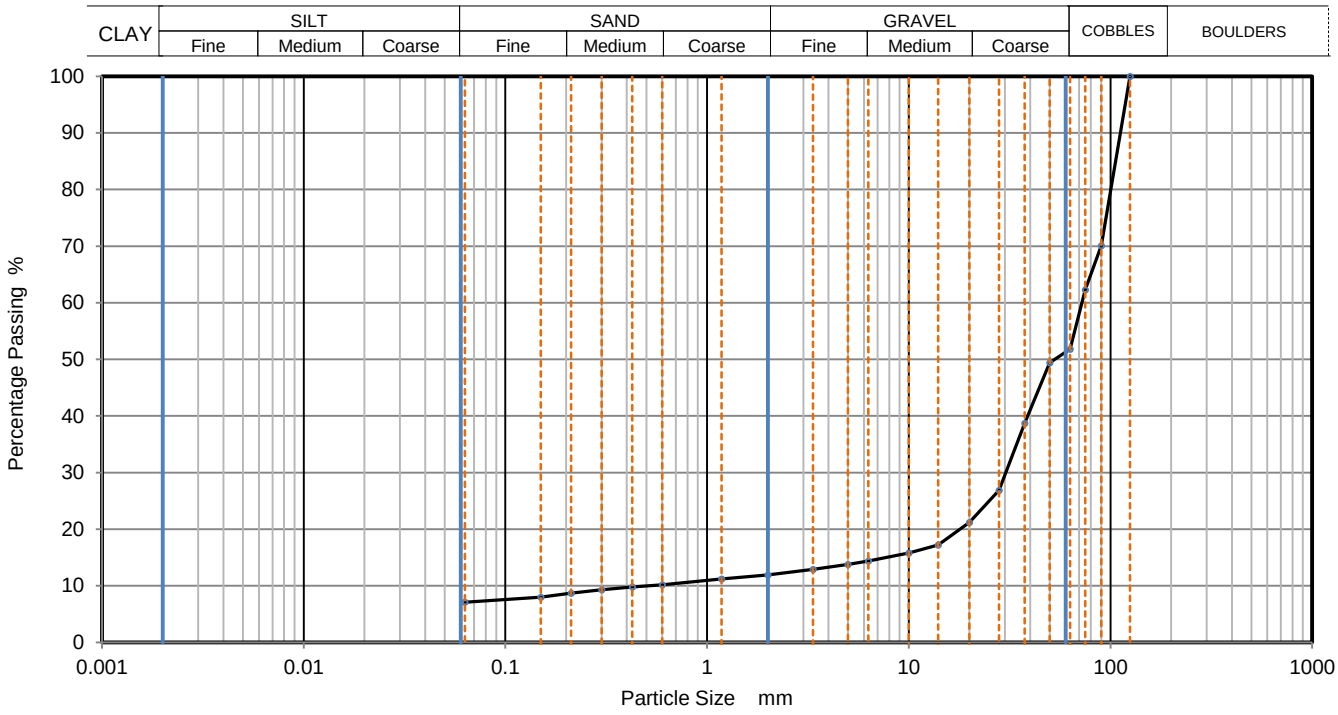
Linear measurement	clause 7.2
Immersion in water	clause 7.3
Water displacement	clause 7.4

Date Printed: 31/05/2022

Approved By: Stephen.Watson

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH105
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Greyish brown sandy slightly clayey subangular fine to coarse GRAVEL.			Depth, m	5.00
Specimen Reference	2	Specimen Depth	5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus202205111



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	70		
75	62		
63	52		
50	49		
37.5	39		
28	27		
20	21		
14	17		
10	16		
6.3	14		
5	14		
3.35	13		
2	12		
1.18	11		
0.6	10		
0.425	10		
0.3	9		
0.212	9		
0.15	8		
0.063	7		

Dry Mass of sample, g	8569

Sample Proportions	% dry mass
Cobbles	48.2
Gravel	39.9
Sand	4.8
Fines <0.063mm	7.0

Grading Analysis		
D100	mm	125
D60	mm	72.2
D30	mm	30.3
D10	mm	0.502
Uniformity Coefficient		140
Curvature Coefficient		25

Remarks

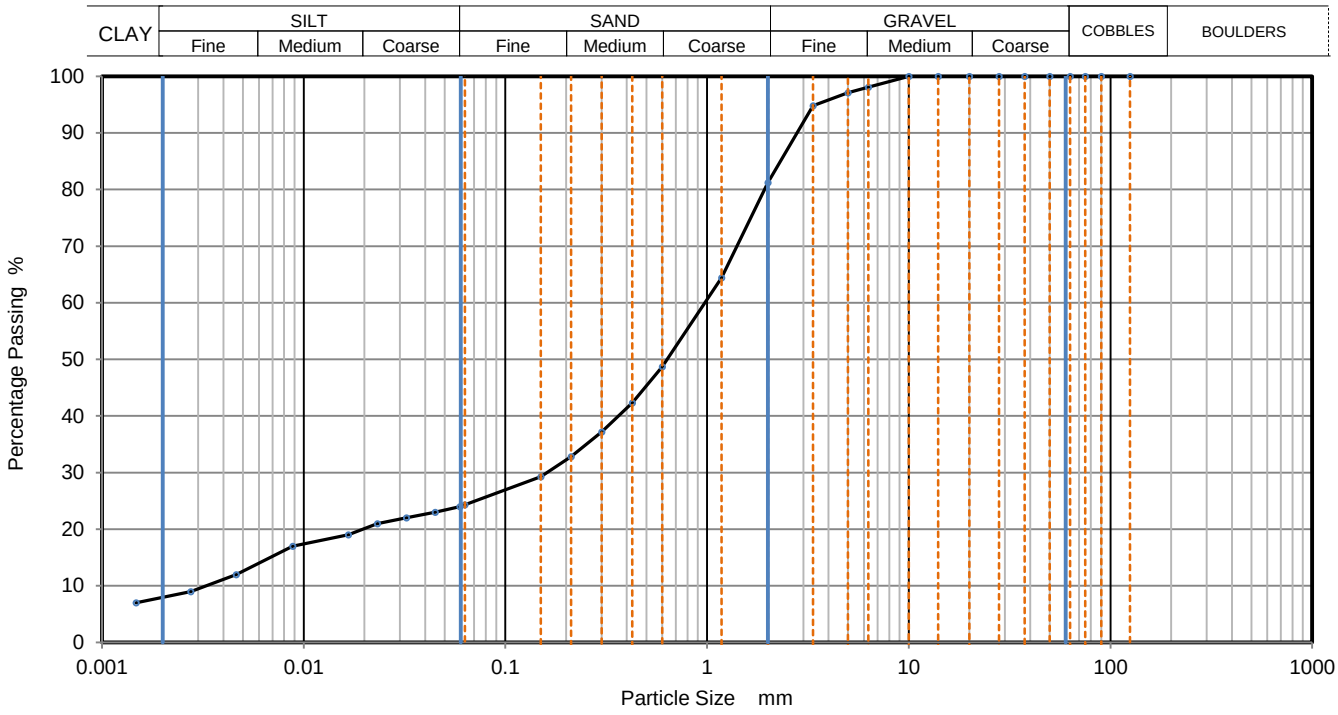
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

LAB 05R - Version 5

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH105
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	3
Soil Description	Grey slightly gravelly clayey fine to coarse SAND.			Depth, m	8.00
Specimen Reference	2	Specimen Depth	8 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202205112



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.05942	24
90	100	0.04491	23
75	100	0.03226	22
63	100	0.02316	21
50	100	0.01662	19
37.5	100	0.00883	17
28	100	0.00462	12
20	100	0.00275	9
14	100	0.00147	7
10	100		
6.3	98		
5	97		
3.35	95		
2	81		
1.18	64		
0.6	49	Particle density	(assumed)
0.425	42	2.65	Mg/m3
0.3	37		
0.212	33		
0.15	29		
0.063	24		

Dry Mass of sample, g	211

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	18.8
Sand	56.8
Silt	16.0
Clay	8.4

Grading Analysis		
D100	mm	
D60	mm	0.975
D30	mm	0.161
D10	mm	0.00307
Uniformity Coefficient		320
Curvature Coefficient		8.7

Remarks

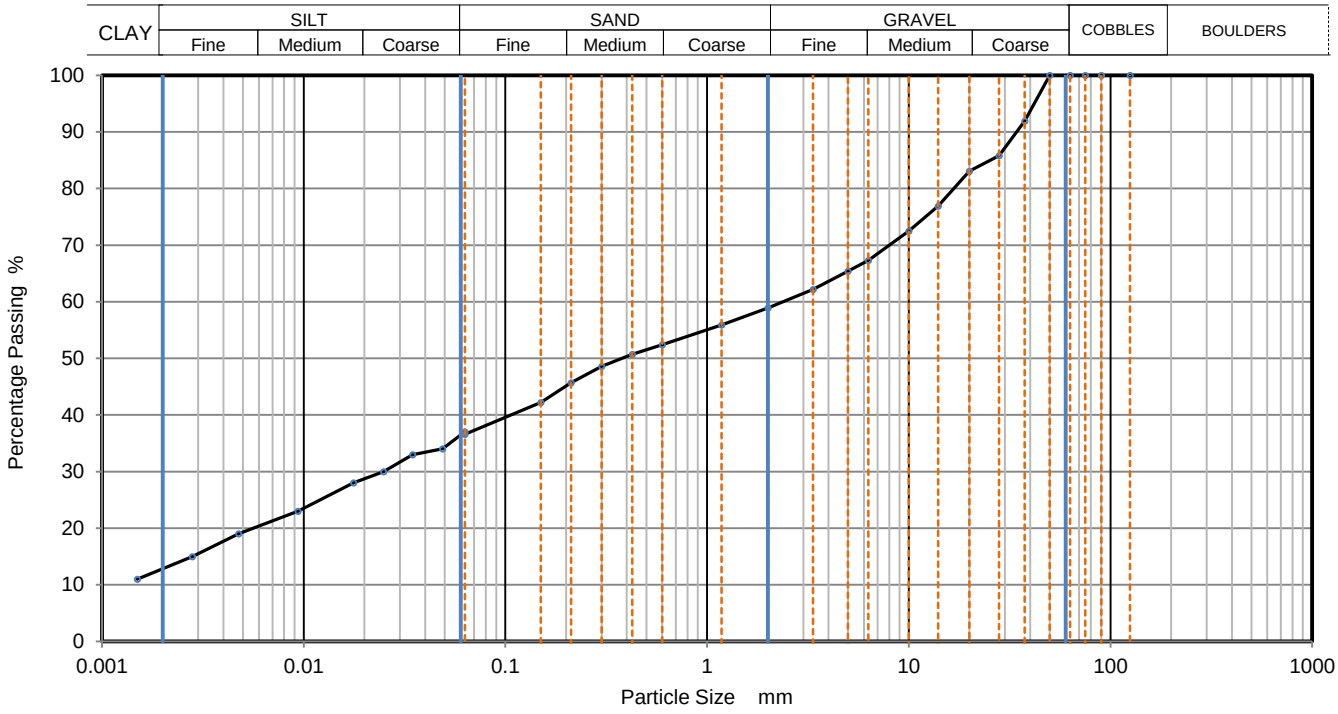
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

LAB 05R - Version 5

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH105
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	4
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	12.95
Specimen Reference	5	Specimen Depth	12.95 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202205113



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	37
90	100	0.04875	34
75	100	0.03470	33
63	100	0.02485	30
50	100	0.01769	28
37.5	92	0.00936	23
28	86	0.00476	19
20	83	0.00280	15
14	77	0.00150	11
10	73		
6.3	67		
5	65		
3.35	62		
2	59		
1.18	56		
0.6	52	Particle density (assumed)	
0.425	51	2.65 Mg/m3	
0.3	49		
0.212	46		
0.15	42		
0.063	37		

Dry Mass of sample, g	3489

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	41.1
Sand	22.3
Silt	23.9
Clay	12.7

Grading Analysis		
D100	mm	
D60	mm	2.38
D30	mm	0.0254
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

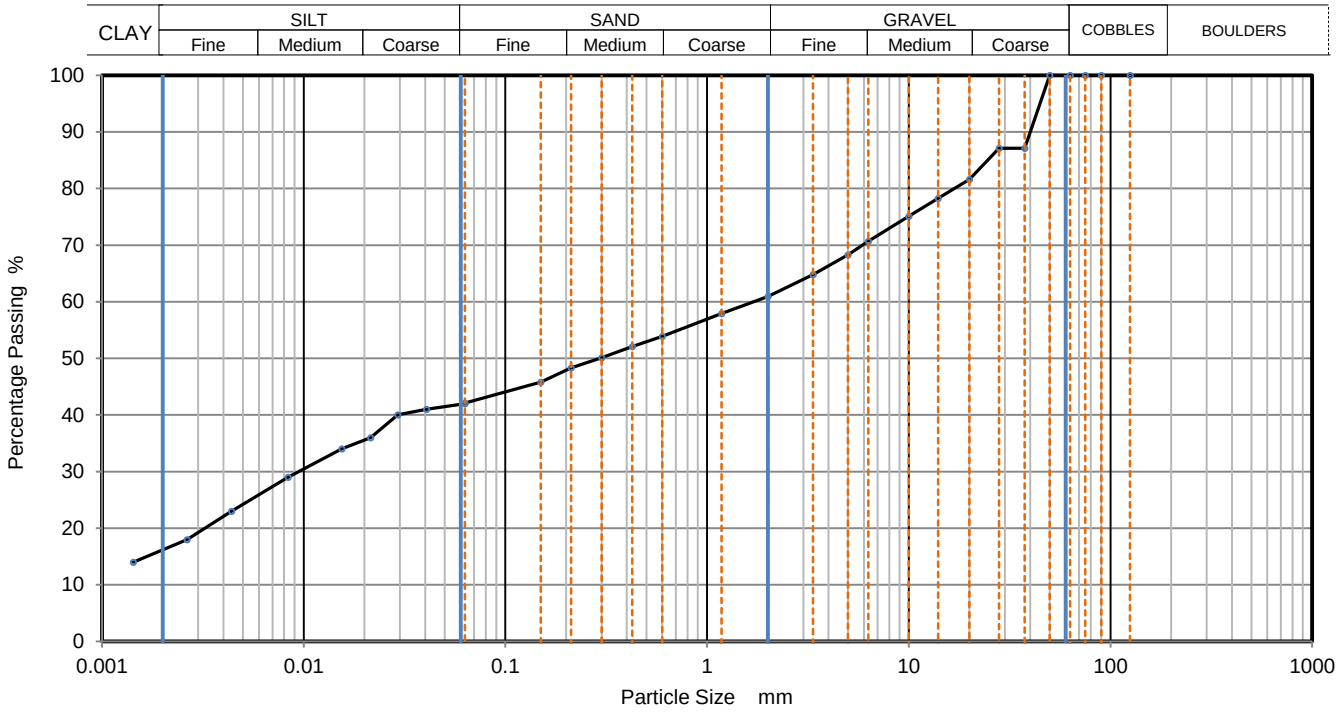
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

LAB 05R - Version 5

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH105
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	5
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	17.00
Specimen Reference	5	Specimen Depth	17 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202205114



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	42
90	100	0.04065	41
75	100	0.02929	40
63	100	0.02146	36
50	100	0.01543	34
37.5	87	0.00835	29
28	87	0.00439	23
20	82	0.00264	18
14	78	0.00143	14
10	75		
6.3	71		
5	68		
3.35	65		
2	61		
1.18	58		
0.6	54	Particle density	(assumed)
0.425	52	2.65	Mg/m3
0.3	50		
0.212	48		
0.15	46		
0.063	42		

Dry Mass of sample, g	3457

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	39.1
Sand	18.8
Silt	26.0
Clay	16.1

Grading Analysis		
D100	mm	
D60	mm	1.7
D30	mm	0.00917
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

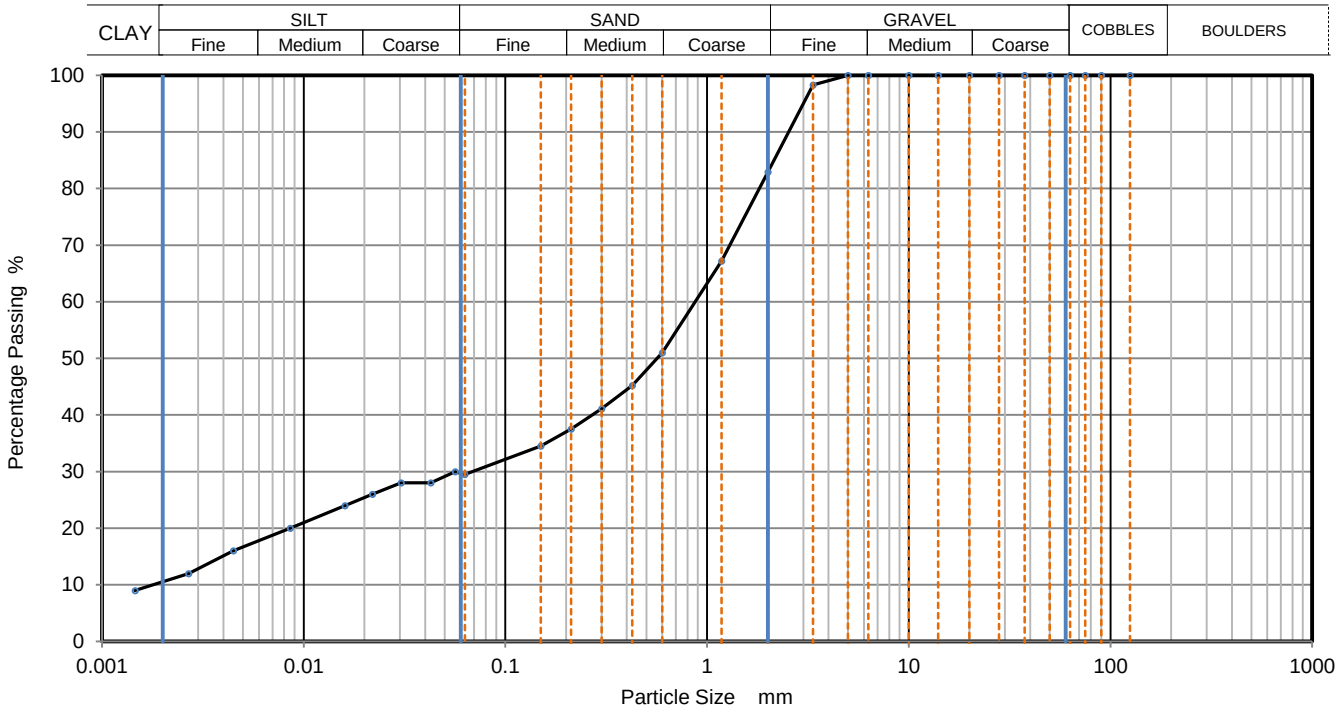
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

LAB 05R - Version 5

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH105
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	6
Soil Description	Greyish brown clayey fine to coarse SAND.			Depth, m	18.10
Specimen Reference	2	Specimen Depth	18.1 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202205115



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.05639	30
90	100	0.04269	28
75	100	0.03046	28
63	100	0.02191	26
50	100	0.01600	24
37.5	100	0.00858	20
28	100	0.00448	16
20	100	0.00269	12
14	100	0.00146	9
10	100		
6.3	100		
5	100		
3.35	98		
2	83		
1.18	67		
0.6	51	Particle density	(assumed)
0.425	45	2.65	Mg/m3
0.3	41		
0.212	38		
0.15	35		
0.063	30		

Dry Mass of sample, g	217

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	17.1
Sand	53.4
Silt	18.6
Clay	10.9

Grading Analysis		
D100	mm	
D60	mm	0.874
D30	mm	0.0687
D10	mm	0.0017
Uniformity Coefficient		510
Curvature Coefficient		3.2

Remarks

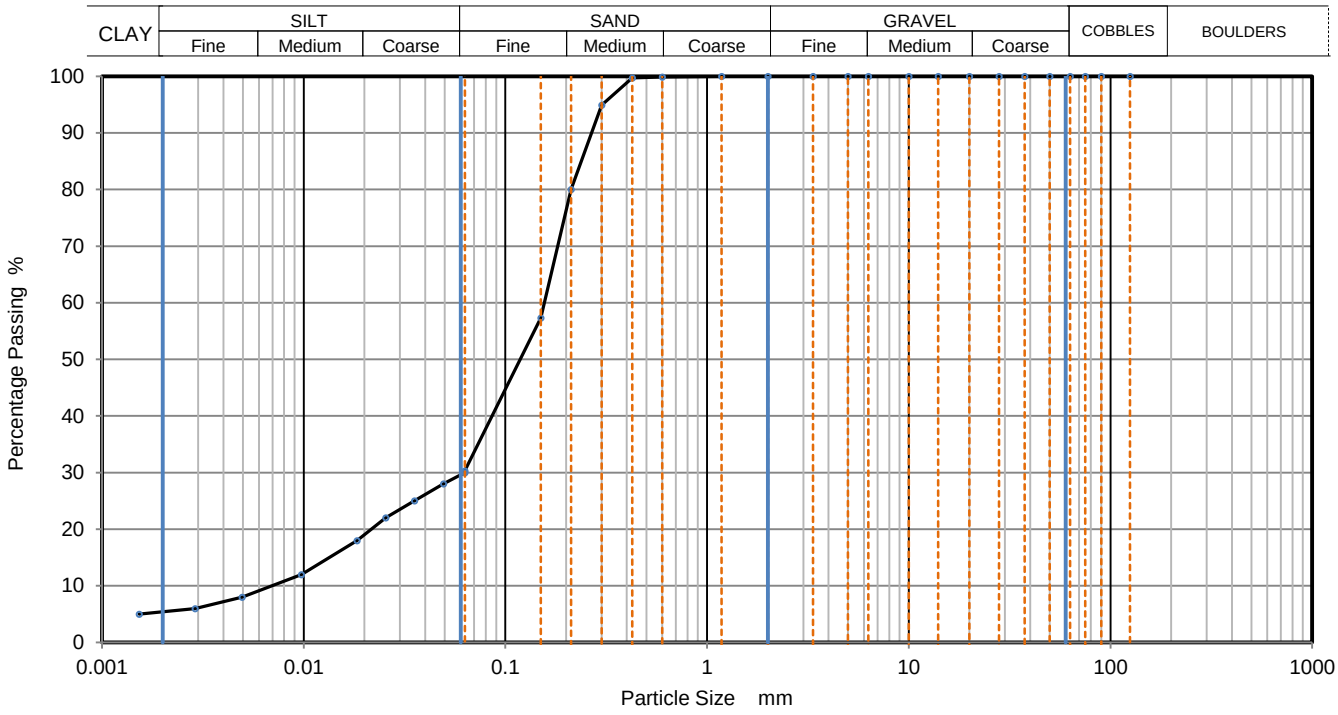
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

LAB 05R - Version 5

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH105
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	7
Soil Description	Greyish brown clayey fine to coarse SAND.			Depth, m	22.75
Specimen Reference	2	Specimen Depth	22.75 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202205116



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	30
90	100	0.04939	28
75	100	0.03537	25
63	100	0.02548	22
50	100	0.01834	18
37.5	100	0.00974	12
28	100	0.00495	8
20	100	0.00289	6
14	100	0.00153	5
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density	(assumed)
0.425	100	2.65	Mg/m3
0.3	95		
0.212	80		
0.15	57		
0.063	30		

Dry Mass of sample, g	209

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	0.0
Sand	69.7
Silt	24.9
Clay	5.4

Grading Analysis		
D100	mm	
D60	mm	0.156
D30	mm	0.0609
D10	mm	0.00657
Uniformity Coefficient		24
Curvature Coefficient		3.6

Remarks

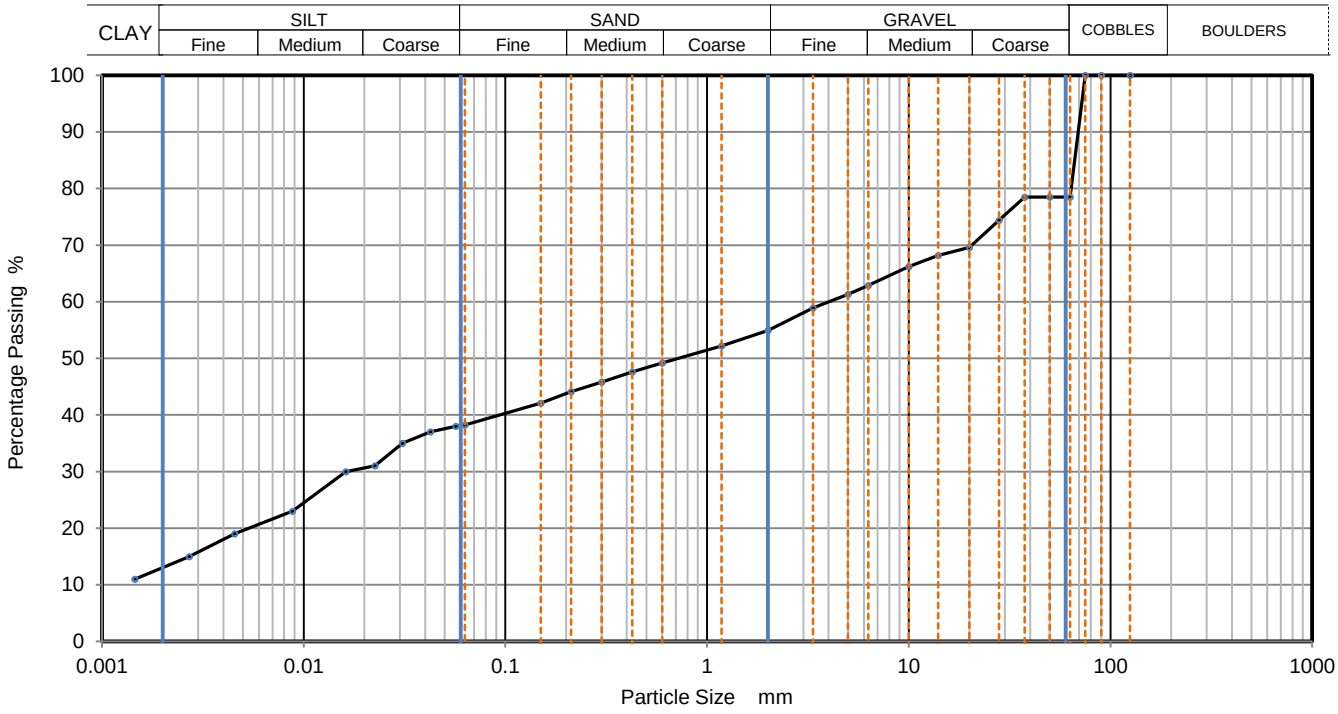
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH105
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	8
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	24.30
Specimen Reference	5	Specimen Depth	24.3 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202205117



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.05672	38
90	100	0.04254	37
75	100	0.03086	35
63	79	0.02253	31
50	79	0.01618	30
37.5	79	0.00878	23
28	74	0.00454	19
20	70	0.00270	15
14	68	0.00146	11
10	66		
6.3	63		
5	61		
3.35	59		
2	55		
1.18	52		
0.6	49	Particle density (assumed)	
0.425	48	2.65 Mg/m3	
0.3	46		
0.212	44		
0.15	42		
0.063	38		

Dry Mass of sample, g	3492

Sample Proportions	% dry mass
Cobbles	21.5
Gravel	23.6
Sand	16.7
Silt	25.1
Clay	13.1

Grading Analysis		
D100	mm	
D60	mm	4.04
D30	mm	0.0177
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

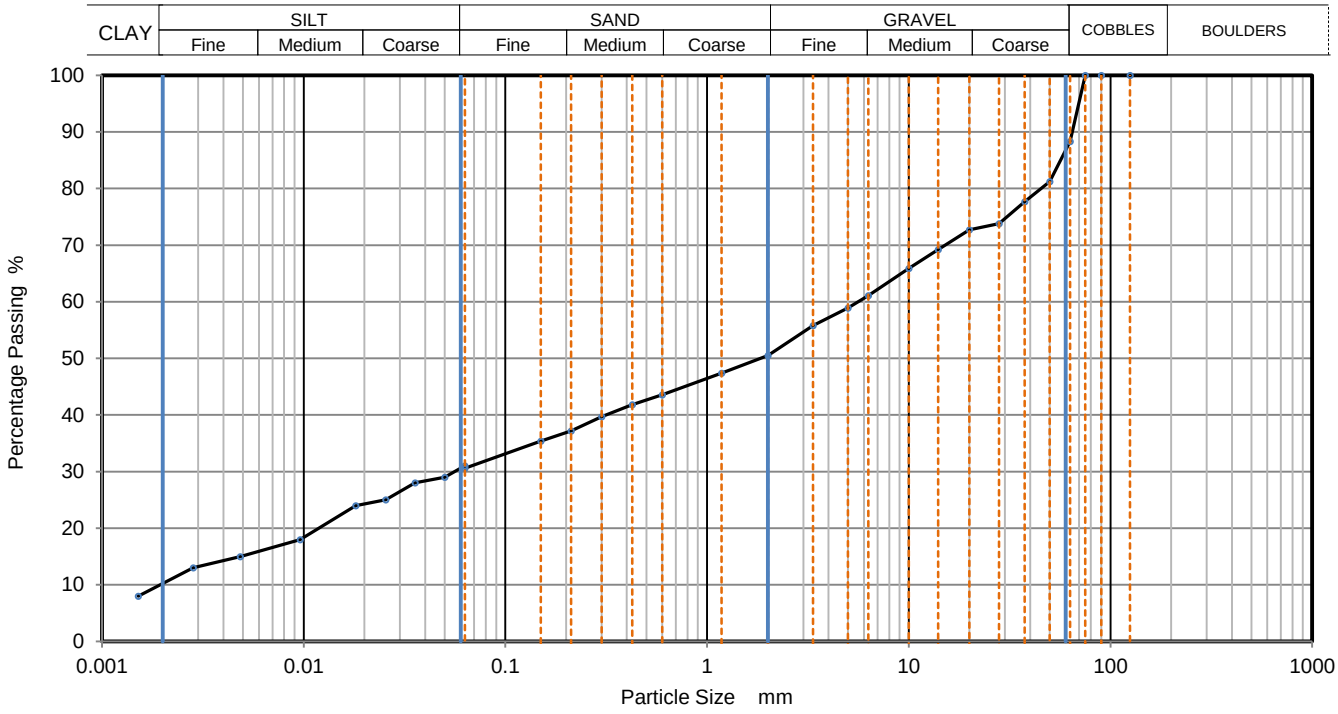
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UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH109
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	3.50
Specimen Reference	5	Specimen Depth	3.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051111



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	31
90	100	0.05002	29
75	100	0.03559	28
63	88	0.02548	25
50	81	0.01813	24
37.5	78	0.00958	18
28	74	0.00485	15
20	73	0.00283	13
14	69	0.00151	8
10	66		
6.3	61		
5	59		
3.35	56		
2	51		
1.18	47		
0.6	44	Particle density	(assumed)
0.425	42	2.65	Mg/m3
0.3	40		
0.212	37		
0.15	35		
0.063	31		

Dry Mass of sample, g	4565

Sample Proportions	% dry mass
Cobbles	11.7
Gravel	37.8
Sand	19.9
Silt	20.4
Clay	10.2

Grading Analysis		
D100	mm	
D60	mm	5.62
D30	mm	0.0568
D10	mm	0.00194
Uniformity Coefficient		2900
Curvature Coefficient		0.3

Remarks

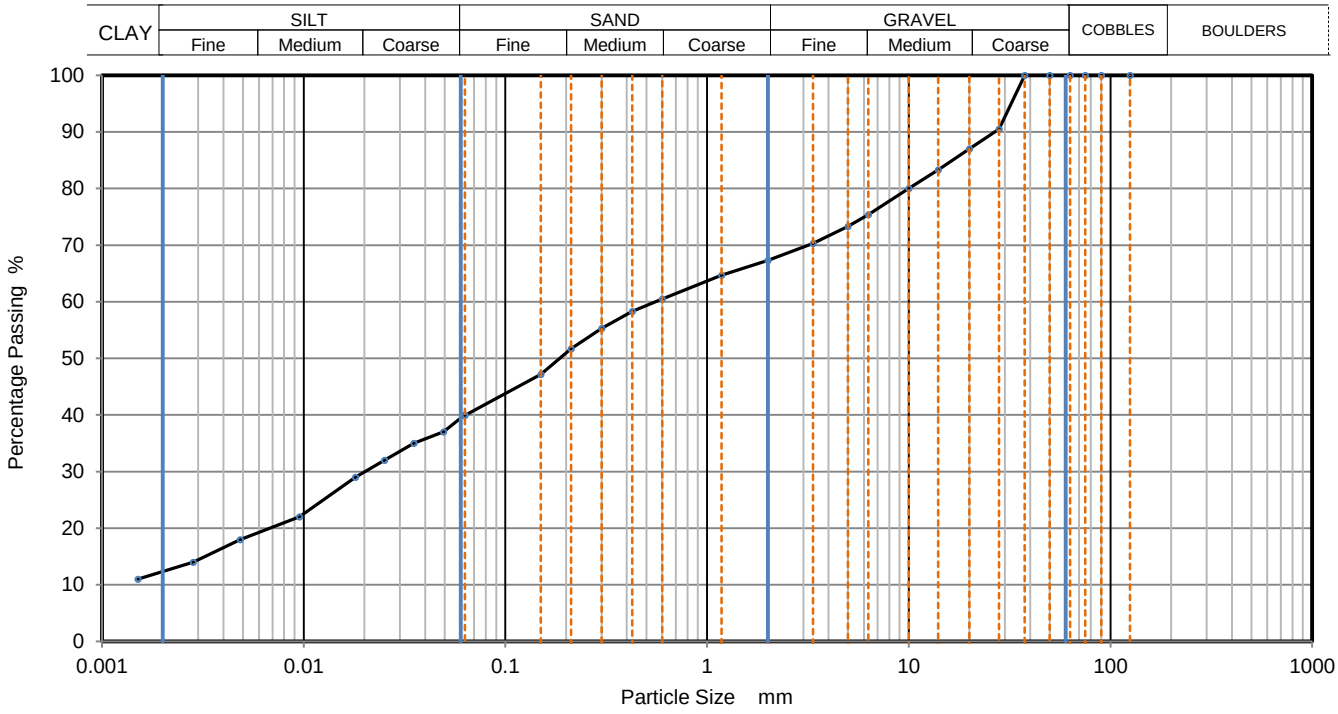
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UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH109
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	3
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	7.70
Specimen Reference	5	Specimen Depth	7.7 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051113



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	40
90	100	0.04939	37
75	100	0.03515	35
63	100	0.02517	32
50	100	0.01802	29
37.5	100	0.00953	22
28	91	0.00485	18
20	87	0.00283	14
14	83	0.00150	11
10	80		
6.3	75		
5	73		
3.35	70		
2	67		
1.18	65		
0.6	61	Particle density	(assumed)
0.425	58	2.65	Mg/m3
0.3	55		
0.212	52		
0.15	47		
0.063	40		

Dry Mass of sample, g	4032

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	32.7
Sand	27.5
Silt	27.2
Clay	12.6

Grading Analysis		
D100	mm	
D60	mm	0.552
D30	mm	0.0206
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

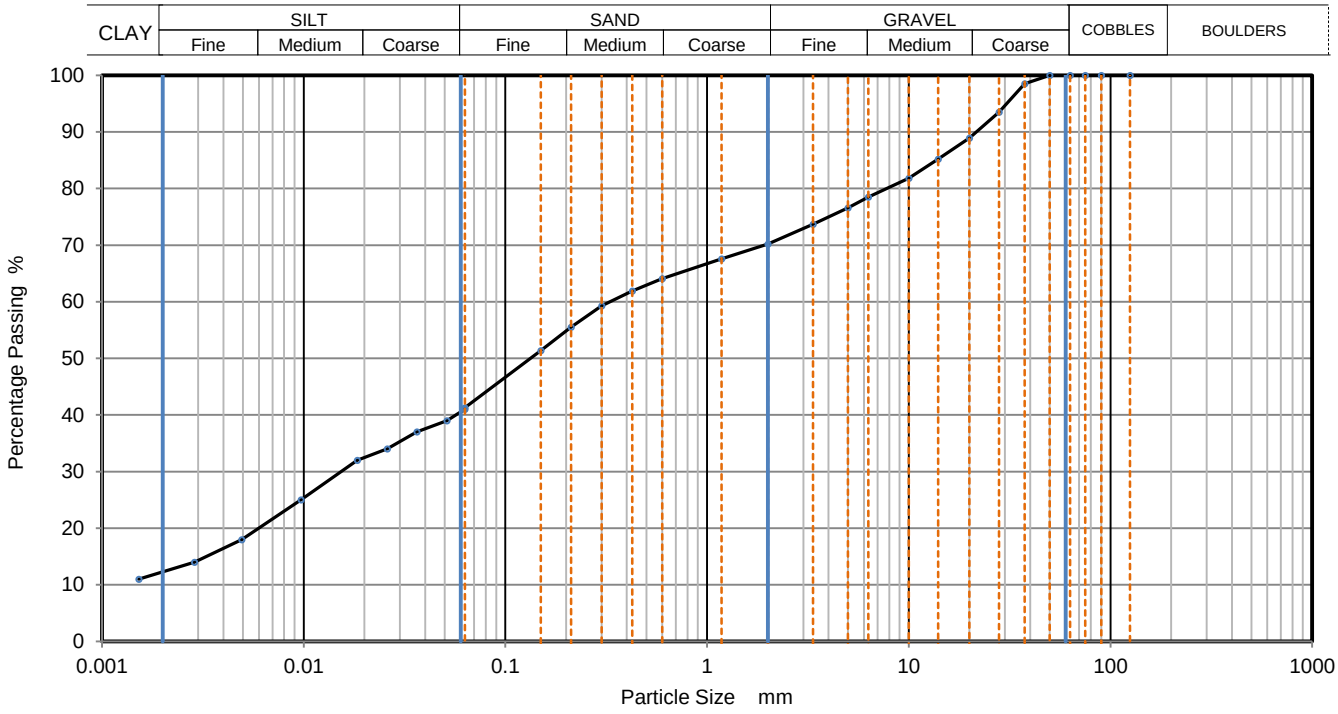
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UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH109
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	4
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	11.70
Specimen Reference	5	Specimen Depth	11.7 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051115



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	41
90	100	0.05127	39
75	100	0.03647	37
63	100	0.02594	34
50	100	0.01845	32
37.5	99	0.00969	25
28	94	0.00493	18
20	89	0.00287	14
14	85	0.00152	11
10	82		
6.3	79		
5	77		
3.35	74		
2	70		
1.18	68		
0.6	64	Particle density	(assumed)
0.425	62	2.65	Mg/m3
0.3	59		
0.212	56		
0.15	51		
0.063	41		

Dry Mass of sample, g	3672

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	29.8
Sand	28.8
Silt	28.9
Clay	12.5

Grading Analysis		
D100	mm	
D60	mm	0.33
D30	mm	0.0151
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

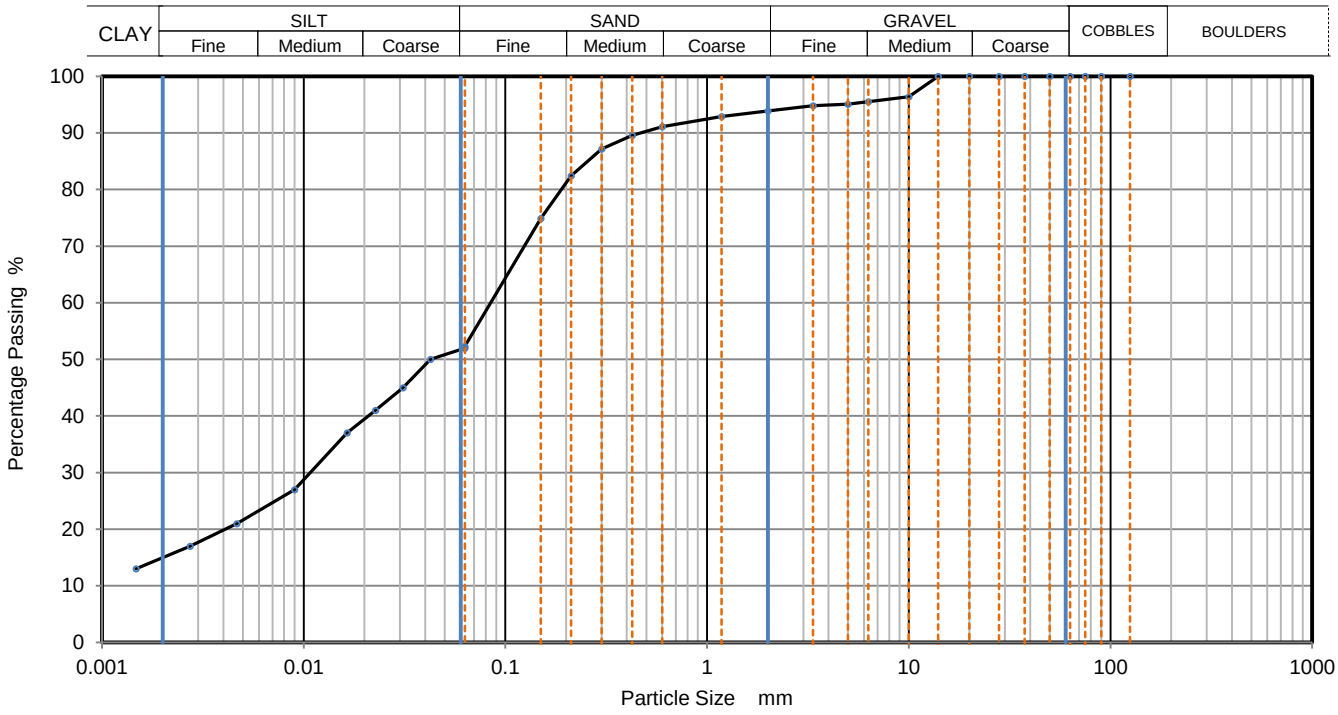
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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH109
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	5
Soil Description	Greyish brown slightly gravelly silty fine to coarse SAND.			Depth, m	14.90
Specimen Reference	5	Specimen Depth	14.9 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022051116



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	52
90	100	0.04254	50
75	100	0.03111	45
63	100	0.02270	41
50	100	0.01642	37
37.5	100	0.00902	27
28	100	0.00465	21
20	100	0.00273	17
14	100	0.00147	13
10	96		
6.3	96		
5	95		
3.35	95		
2	94		
1.18	93		
0.6	91	Particle density	(assumed)
0.425	90	2.65	Mg/m3
0.3	87		
0.212	82		
0.15	75		
0.063	52		

Dry Mass of sample, g	225

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	6.1
Sand	41.6
Silt	37.2
Clay	15.1

Grading Analysis		
D100	mm	
D60	mm	0.0847
D30	mm	0.0109
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

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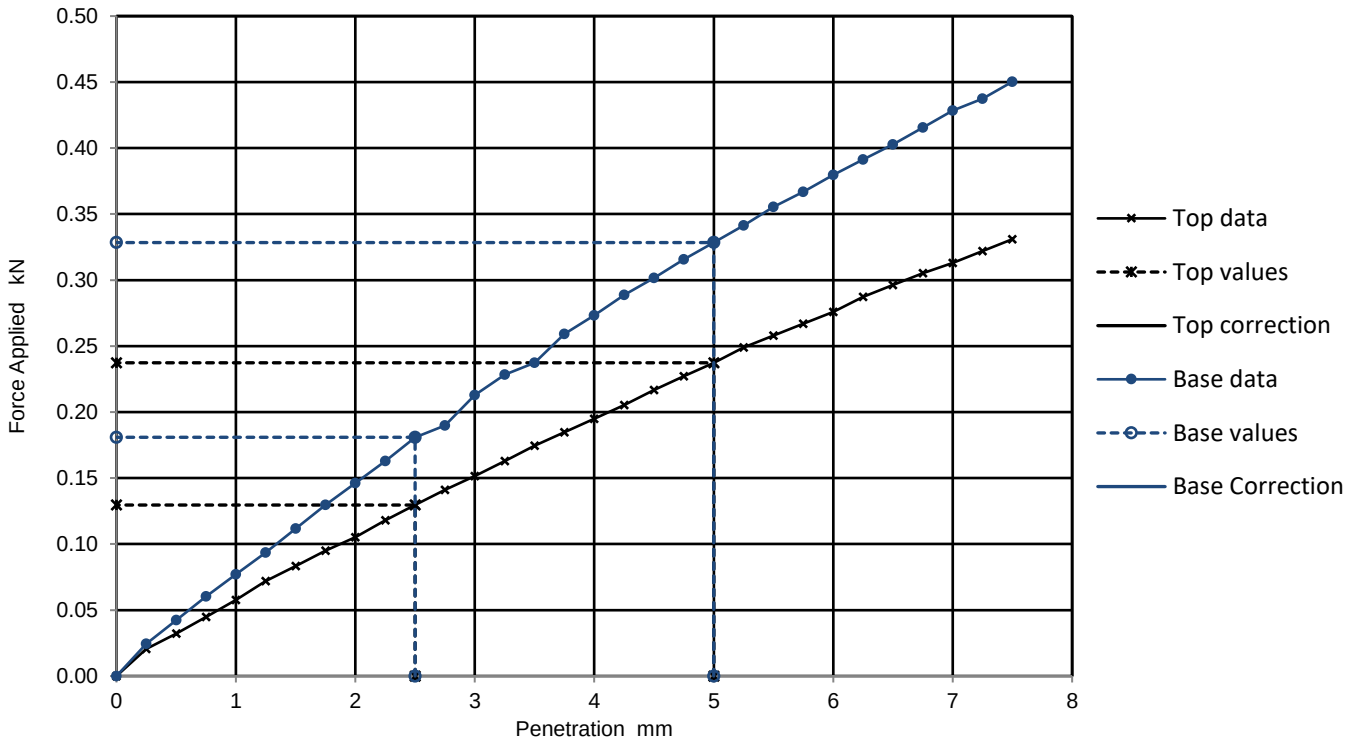
UKAS TESTING 10122

CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	21-1219
				Borehole/Pit No.	BH105
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Greyish brown sandy gravelly silty CLAY.			KeyLAB ID	Caus202205110
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		24	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.26	Mg/m3	Surcharge applied	4.5	kg
	Dry density	2.03	Mg/m3		3	kPa
	Moisture content	11	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	1.0	1.2	1.2		11
BASE	No	1.4	1.6	1.6		11

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen.Watson

UKAS TESTING
10122

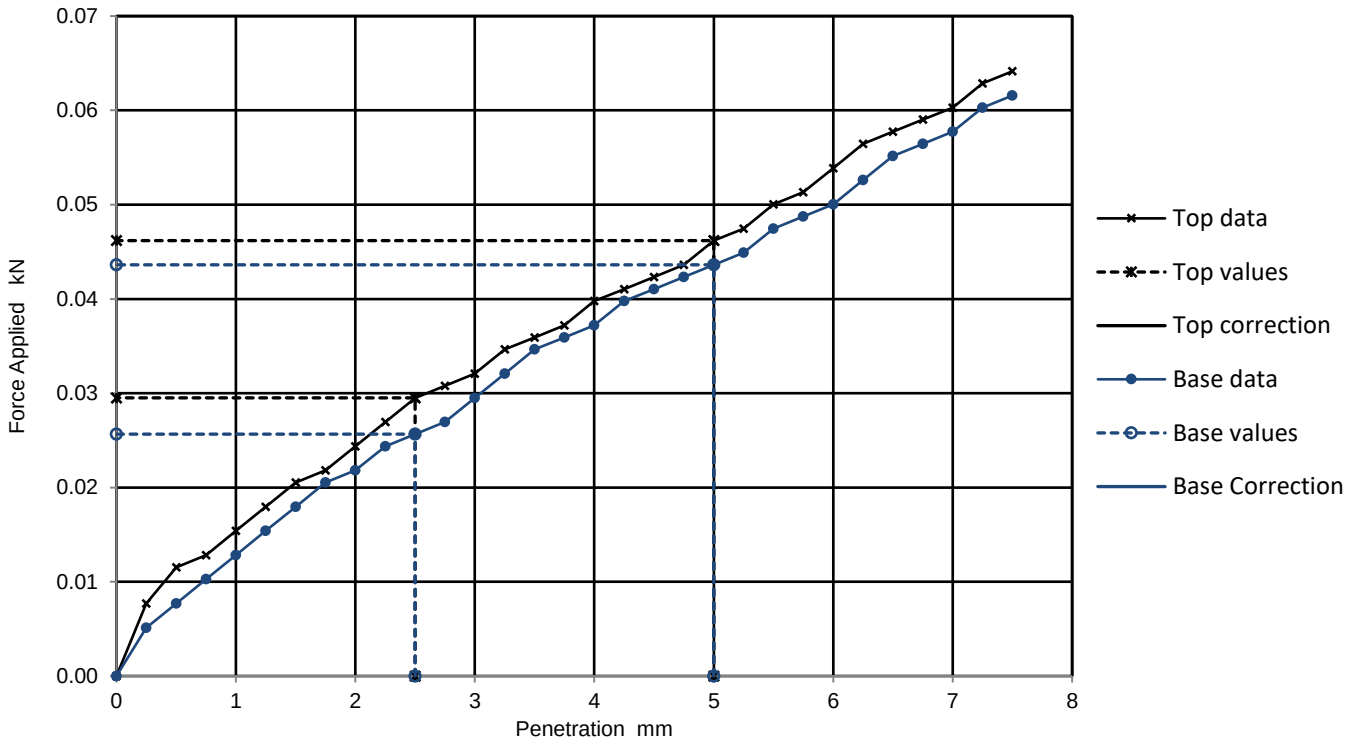
LAB 11R - Version 6

CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	21-1219
				Borehole/Pit No.	BH109
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth m	2.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Greyish brown sandy gravelly silty CLAY.			KeyLAB ID	Caus202205118
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		15	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.00	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.62	Mg/m3		3	kPa
	Moisture content	23	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	0.2	0.2	0.2	0.2	23
BASE	No	0.2	0.2	0.2		23

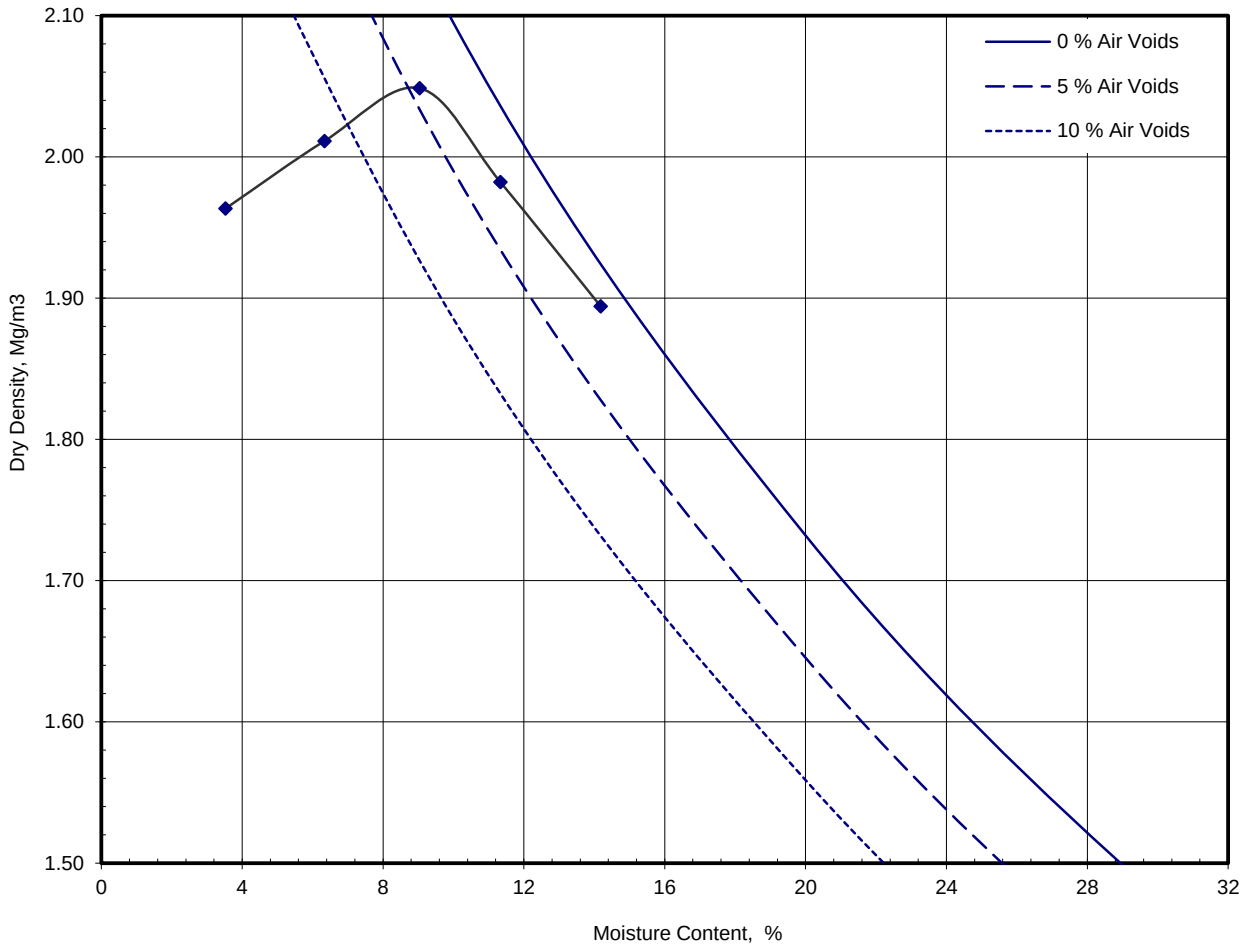
General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen.Watson

UKAS TESTING

10122

LAB 11R - Version 6

CAUSEWAY GEOTECH	**Dry Density / Moisture Content Relationship Light Compaction**			Job Ref	**21-1219**
				Borehole / Pit No	BH105
Site Name	**DAA Airfield Underpass Ground Investigation**			Sample No	1
Soil Description				Depth	4.00 m
Specimen Ref.	3	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.3, 2.5kg rammer			Keylab ID	Caus202205110



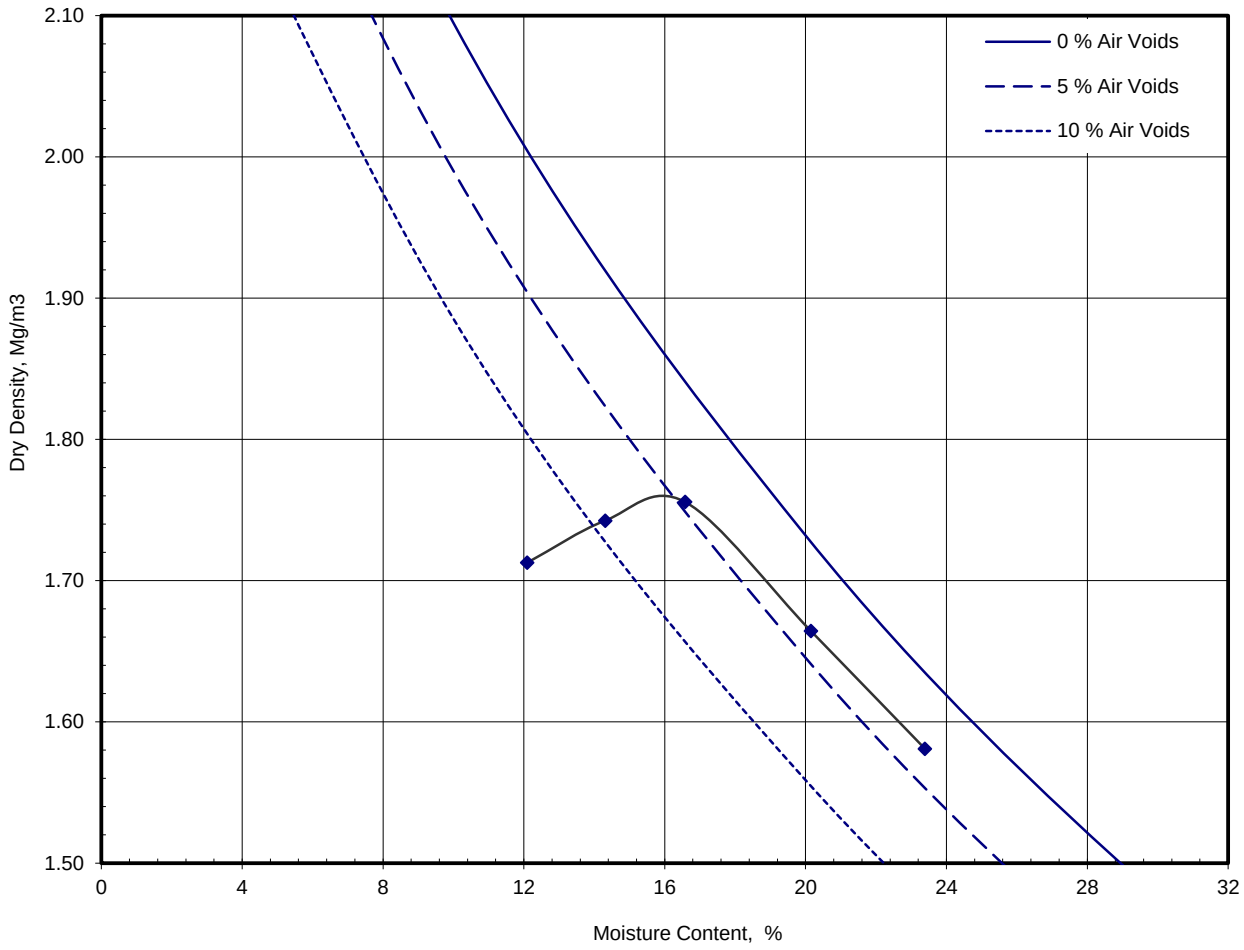
Preparation		Material used was air dried
Mould Type		1 LITRE
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	17
Material Retained on 20.0 mm Sieve	%	24
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.05**

Optimum Moisture Content	%	**9**

Approved	Remarks	UKAS TESTING 10122
Stephen.Watson	LAB 08R - Version 5	

CAUSEWAY GEOTECH	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	21-1219
				Borehole / Pit No	BH109
Site Name	DAA Airfield Underpass Ground Investigation			Sample No	1
Soil Description				Depth	2.50 m
Specimen Ref.	3	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.3, 2.5kg rammer			Keylab ID	Caus202205118



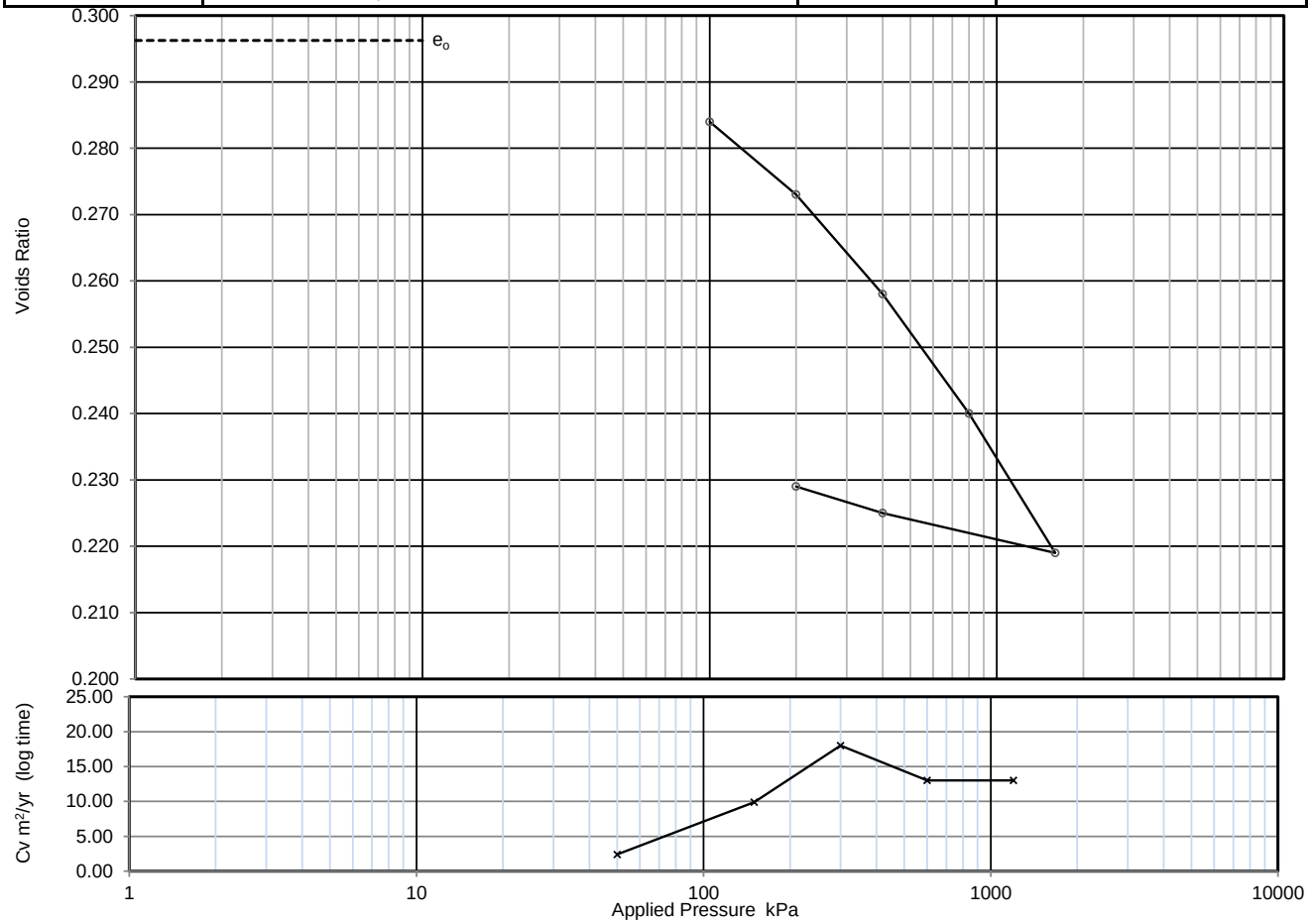
Preparation		Material used was air dried
Mould Type		1 LITRE
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	5
Material Retained on 20.0 mm Sieve	%	15
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**1.76**

Optimum Moisture Content	%	**17**

Approved	Remarks	UKAS TESTING 10122
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CAUSEWAY GEOTECH	**ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3**					Job Ref	21-1219
						Borehole/Pit No.	BH109
Site Name	DAA Airfield Underpass Ground Investigation					Sample No.	22
Soil Description	Greyish brown sandy gravelly silty CLAY.					Depth	9.55
Specimen Reference	3	Specimen Depth	9.55	m		Sample Type	U
Specimen Description	Greyish brown sandy gravelly silty CLAY.					KeyLAB ID	Caus2022051114
Test Method	BS1377:Part 5:1990, clause 3					Date started	20/05/2022



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.296	-	-	-	-
100	0.284	0.095	2.4	3.5	0.00041
200	0.273	0.089	9.9	39	0.0011
400	0.258	0.057	18	75	0.00069
800	0.240	0.036	13	50	0.00087
1,598	0.219	0.022	13	260	0.0011
400	0.225	0.0042			
200	0.229	0.019			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.10	-	mm
Height	19.90	18.87	mm
Moisture Content	12.5	11.6	%
Bulk density	2.30	2.41	Mg/m3
Dry density	2.04	2.16	Mg/m3
Voids Ratio	0.296	0.229	
Saturation	111	134	%
Average temperature for test	20.0		oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen.Watson

Printed : 31/05/2022 14:34

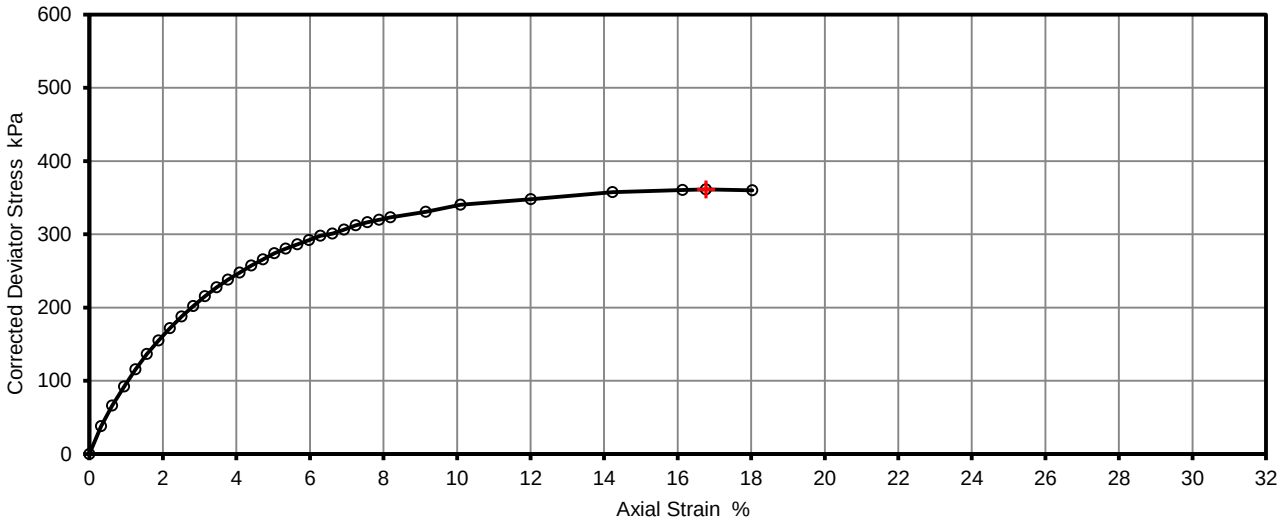
LAB 13R - Version 5

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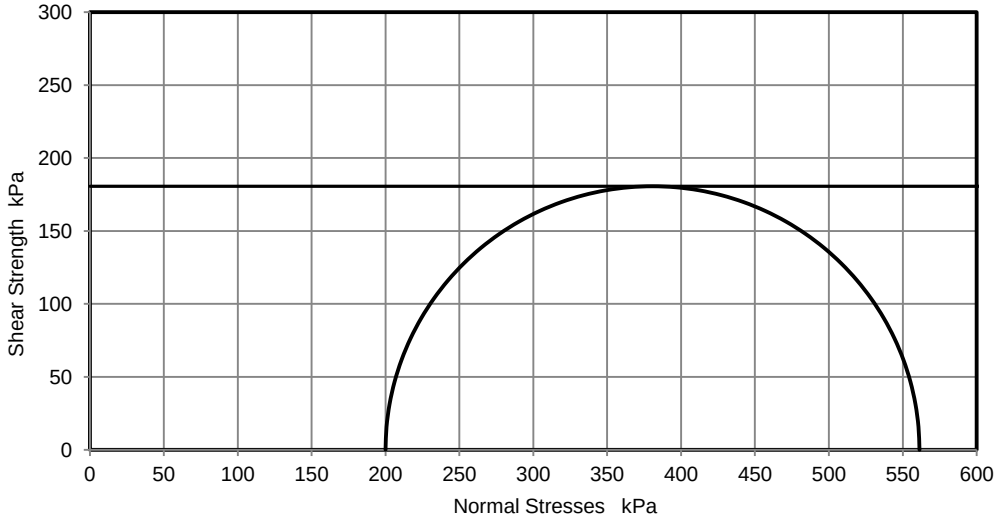
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH109
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	22
Soil Description	Greyish brown sandy gravelly silty CLAY.				Depth	9.55
Specimen Reference	4	Specimen Depth	9.60	m	Sample Type	U
Specimen Description	Stiff greyish brown sandy gravelly silty CLAY.				KeyLAB ID	Caus2022051114
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	26/05/2022

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		105.3	mm
Bulk Density		2.28	Mg/m3
Moisture Content		12	%
Dry Density		2.05	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		200	kPa
At failure	Axial Strain	16.8	%
	Deviator Stress, (σ1 - σ3)f	361	kPa
	Undrained Shear Strength, cu	181	kPa ½(σ1 - σ3)f
	Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

Approved	Printed
Stephen.Watson	31/05/2022 14:40

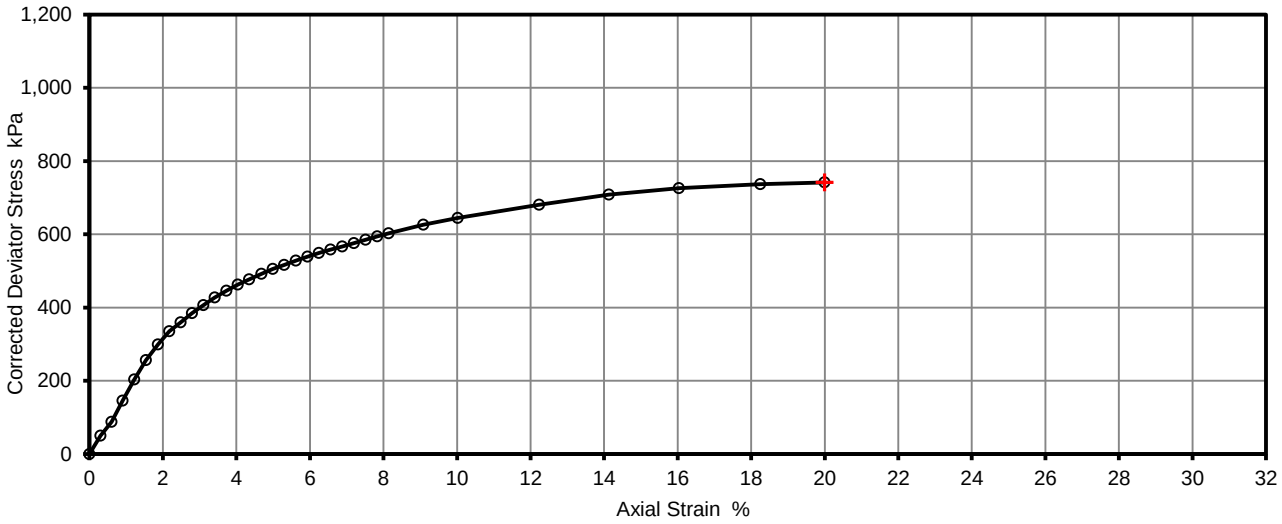
LAB 15R - Version 5

UKAS TESTING
10122

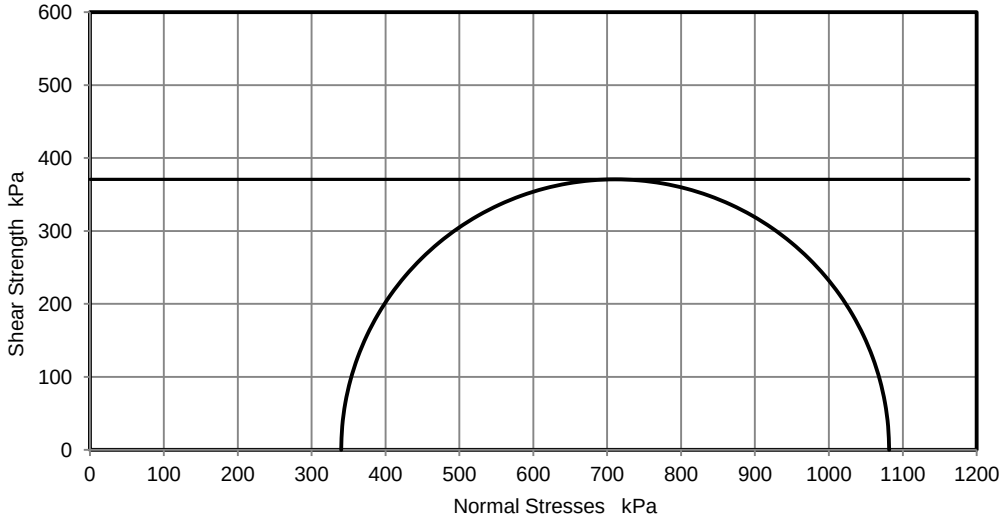
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	21-1219
					Borehole/Pit No.	BH109
Site Name	DAA Airfield Underpass Ground Investigation				Sample No.	23
Soil Description	Greyish brown sandy gravelly silty CLAY.				Depth	16.70
Specimen Reference	3	Specimen Depth	16.75	m	Sample Type	U
Specimen Description	Stiff greyish brown sandy gravelly silty CLAY.				KeyLAB ID	Caus2022051117
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	26/05/2022

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.1	mm
Diameter		105.8	mm
Bulk Density		2.08	Mg/m3
Moisture Content		12	%
Dry Density		1.85	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		340	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	742	kPa
	Undrained Shear Strength, cu	371	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

No failure defined. Testing terminated at 20% axial strain.

Approved: Stephen.Watson

Printed: 31/05/2022 14:40

LAB 15R - Version 5

UKAS TESTING
10122

CAUSEWAY GEOTECH

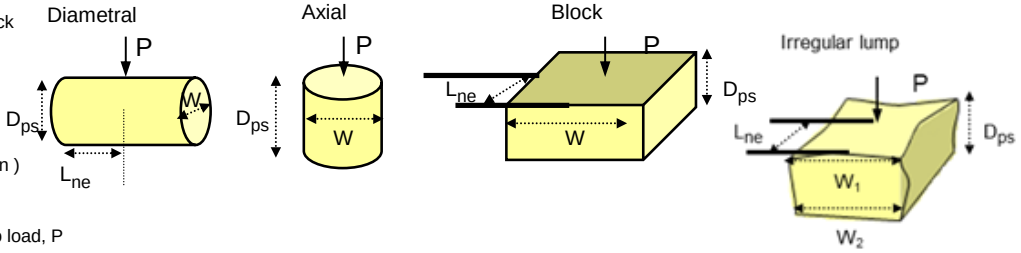
Point Load Strength Index Tests
Summary of Results

Project No.: 21-1219

Project Name: DAA Airfield Underpass Ground Investigation

Borehole No.	Sample			Specimen		Rock Type	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth	Ref.	Type	Ref.	Depth		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m				m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BH105	25.90	23	C	2	25.90	LIMESTONE	A	U	YES		100.5	80.0	71.0	13.3	95.3	1.5	2.0	
BH105	26.20	23	C	2	26.20	LIMESTONE	D	U	YES	59.4	100.4	100.4	98.0	11.1	99.2	1.1	1.5	
BH109	31.68	23	C	2	31.68	LIMESTONE	D	U	YES	72.3	101.5	101.5	100.0	5.6	100.7	0.6	0.8	
BH109	31.80	23	C	2	31.80	LIMESTONE	A	U	YES		101.8	81.0	80.0	1.2	101.8	0.1	0.2	
BH109	32.00	23	C	2	32.00	LIMESTONE	A	U	YES		101.2	74.0	72.0	1.3	96.3	0.1	0.2	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise

Detailed legend for test and dimensions, based on ISRM, is shown above.

Size factor, F = (De/50)0.45 for all tests.

LAB 17R - Version 5

Date Printed: 31/05/2022

Approved By: Stephen.Watson

UKAS TESTING 10122

LABORATORY REPORT

4043

Contract Number: PSL22/3407

Report Date: 26 May 2022

Client's Reference: 21-1219

Client Name: Causeway Geotech
8 Drumahiskey Road
Ballymoney
Co.Antrim
BT53 7QL

For the attention of: Stephen Watson

Contract Title: DAA Airfield Underpass Ground Investigation

Date Received: 12/5/2022
Date Commenced: 12/5/2022
Date Completed: 26/5/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

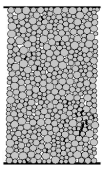
A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	D Burton (Advanced Testing Manager)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
	Depth	4.25-4.50m		
	Description	Brown gravelly slightly sandy CLAY.		
	Type	Undisturbed, vertical orientation.		
	Initial Sample Length	L_0	(mm)	211.0
	Initial Sample Diameter	D_0	(mm)	104.9
	Initial Sample Weight	W_0	(gr)	4266.0
sketch showing specimen location in original sample	Initial Bulk Density	ρ_0	(Mg/m3)	2.34
	Particle Density	ρ_s	(Mg/m3)	2.66

Initial Conditions			Stage 1	2
Initial Cell Pressure	σ_{3i}	(kPa)	630	
Initial Back Pressure	U_{bi}	(kPa)	550	
Membrane Thickness	m_b	(mm)	0.600	
Displacement Input	L_{IP}	(mm)	CH 2	
Load Input	N_{IP}	(N)	CH 1	
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	
Sample Volume	V	(cc)	CH 2	
Initial Moisture	ω_i	(%)	7.56	
Initial Dry Density	ρ_{di}	(Mg/m3)	2.17	
Initial Voids Ratio	e_i	.	0.223	
Initial Degree of Saturation	S_i	(%)	90	
B Value	B	.	0.96	

Final Conditions				
Final Moisture	ω_f	(%)	7.72	
Final Dry Density	ρ_{df}	(Mg/m3)	2.21	
Final Voids Ratio	e_f	.	0.204	
Final Degree of Saturation	S_f	(%)	100.0	
			Stage 1	2
Failure Criteria		.	Max. Dev. Stress	
Strain At Failure	ε_f	(%)	6.30	
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	393.7	
Minor Stress At Failure	σ_3'	(kPa)	129.0	
Major Stress At Failure	σ_1'	(kPa)	522.7	
Principal Stress Ratio At Failure	σ_1'/σ_3'		4.052	

Notes



Plastic

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH109 4.25-4.50m
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH109
		Sample	4.25-4.50m
Client	Causeway	Depth	4.25-4.50m

UKAS TESTING 4043

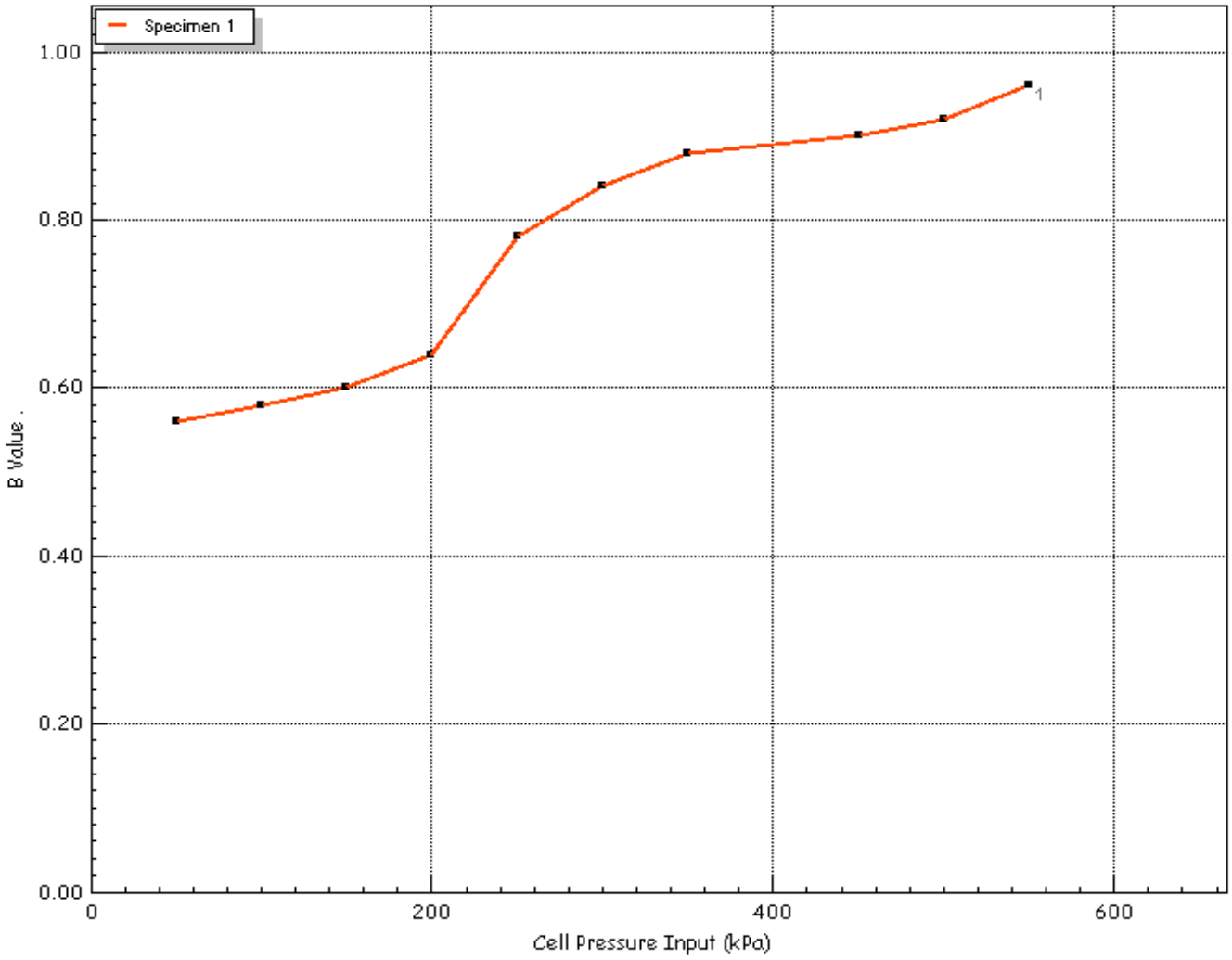
PSL Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	550
Pore Water Pressure Input	u pwp	(kPa)	528
B Value	B	.	0.96



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH109 4.25-4.50m
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH109
		Sample	4.25-4.50m
Client	Causeway	Depth	4.25-4.50m

UKAS TESTING 4043

PSL Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Consolidation Plots

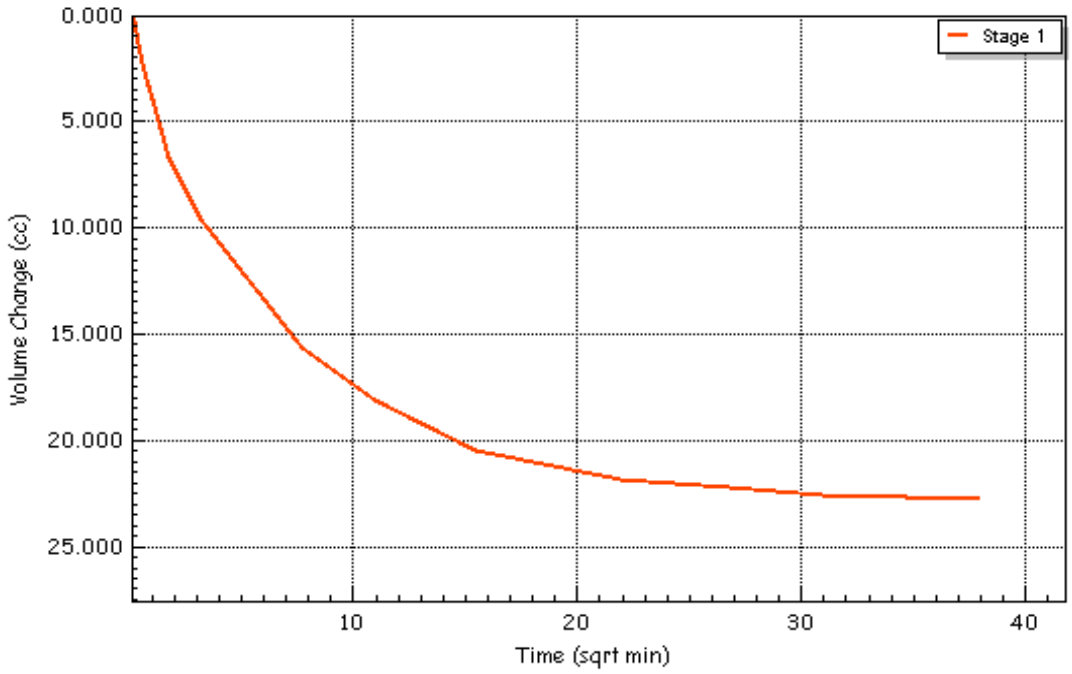
Initial Conditions

Initial Cell Pressure	σ_3	(kPa)	630
Initial Back Pressure	u_{bi}	(kPa)	550
Pore Water Pressure Input	u_{pwp}	(kPa)	606
Drainage Method			Radial+One End

Final Conditions

PWP Dissipation %	U%	(%)	100.00
Volumetric Strain	ε_v%	(%)	1.25
Corrected Length	L_C	(mm)	210.1
Corrected Area	A_C	(cm2)	85.71
Corrected Volume	V_C	(cc)	1800.806
t100	t_{100}	(min)	66.24
Consolidation	c_V	(m2/year)	3.430
Compressibility	m_V	(m2/MN)	0.223
Test Time	t_F	(h:m:s)	02:00:00
Estimated Strain to Failure	ε%	(%)	5.0
Shear Machine Speed	d_r	(mm/min)	0.08755

Notes



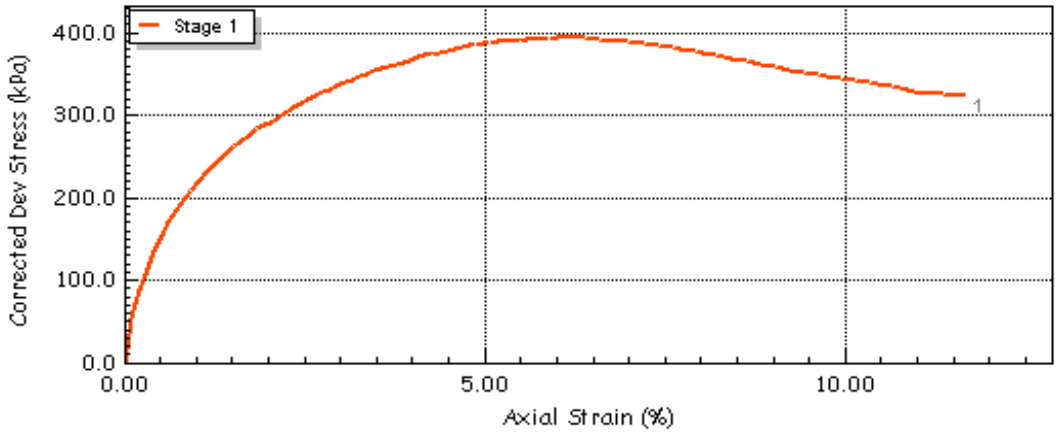
UKAS TESTING 4043	Test Method	BS1377-8 : 1990 : Clause 7	Test Name: BH109 4.25-4.50m Test Date: 19/05/2022
	Jobfile: DAA Airfield Underpass Ground Investigation Client: Causeway		Borehole: BH109 Sample: 4.25-4.50m Depth: 4.25-4.50m

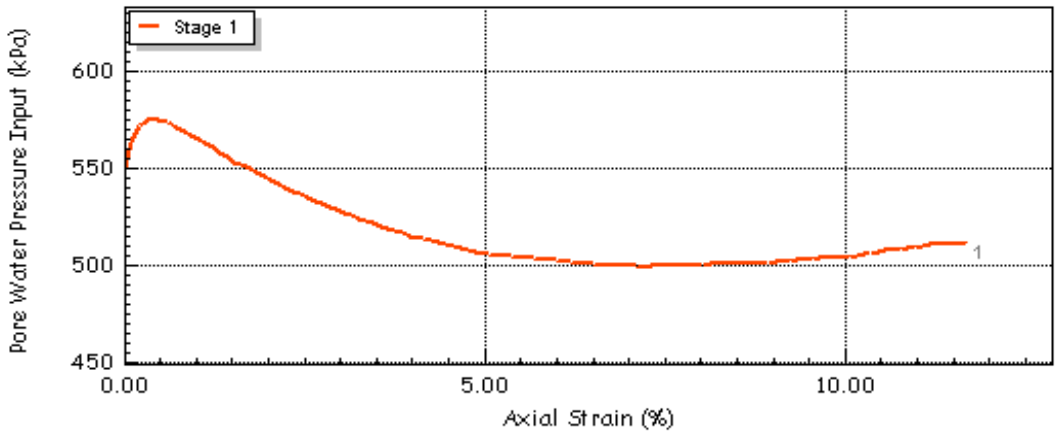
PSL Professional Soils Laboratory

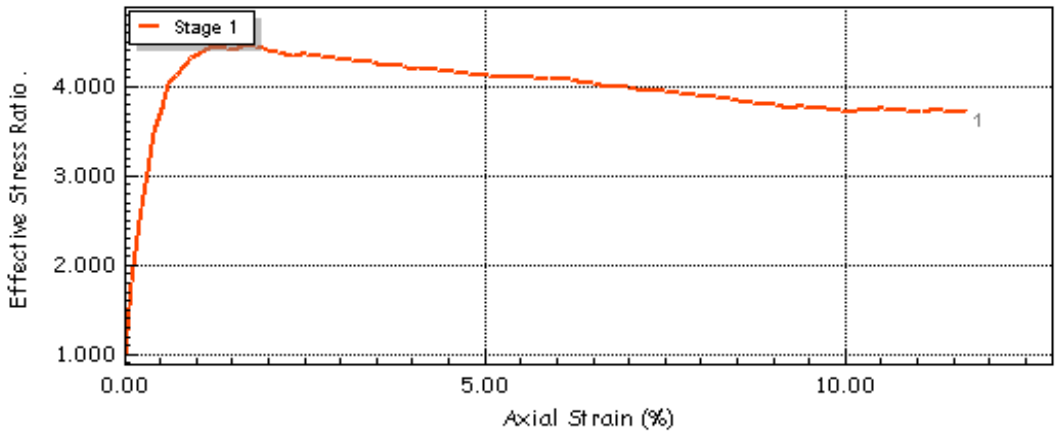
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







UKAS TESTING 4043	Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH109 4.25-4.50m
			Test Date	19/05/2022
	Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH109
			Sample	4.25-4.50m
	Client	Causeway	Depth	4.25-4.50m

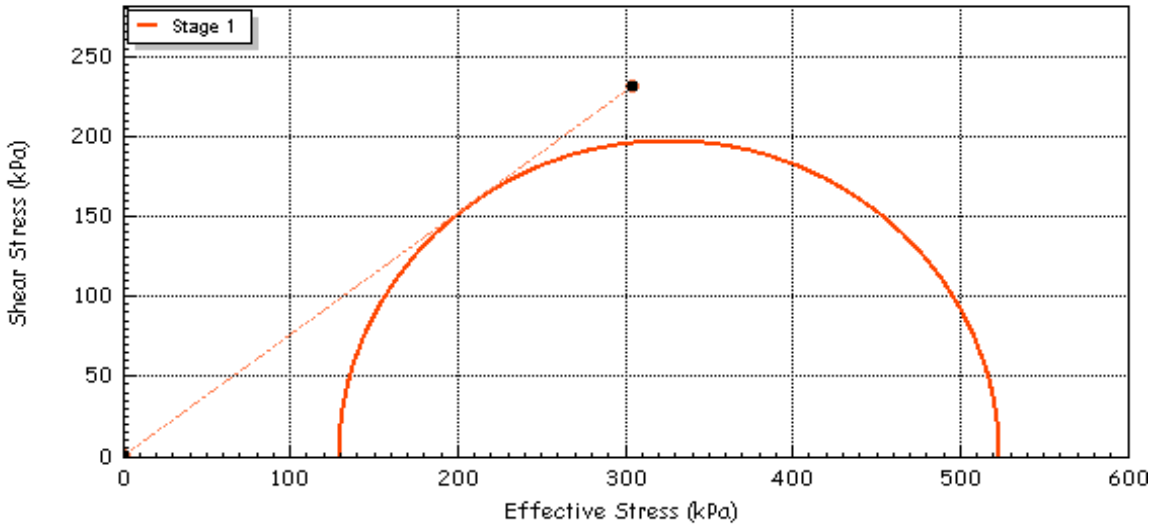
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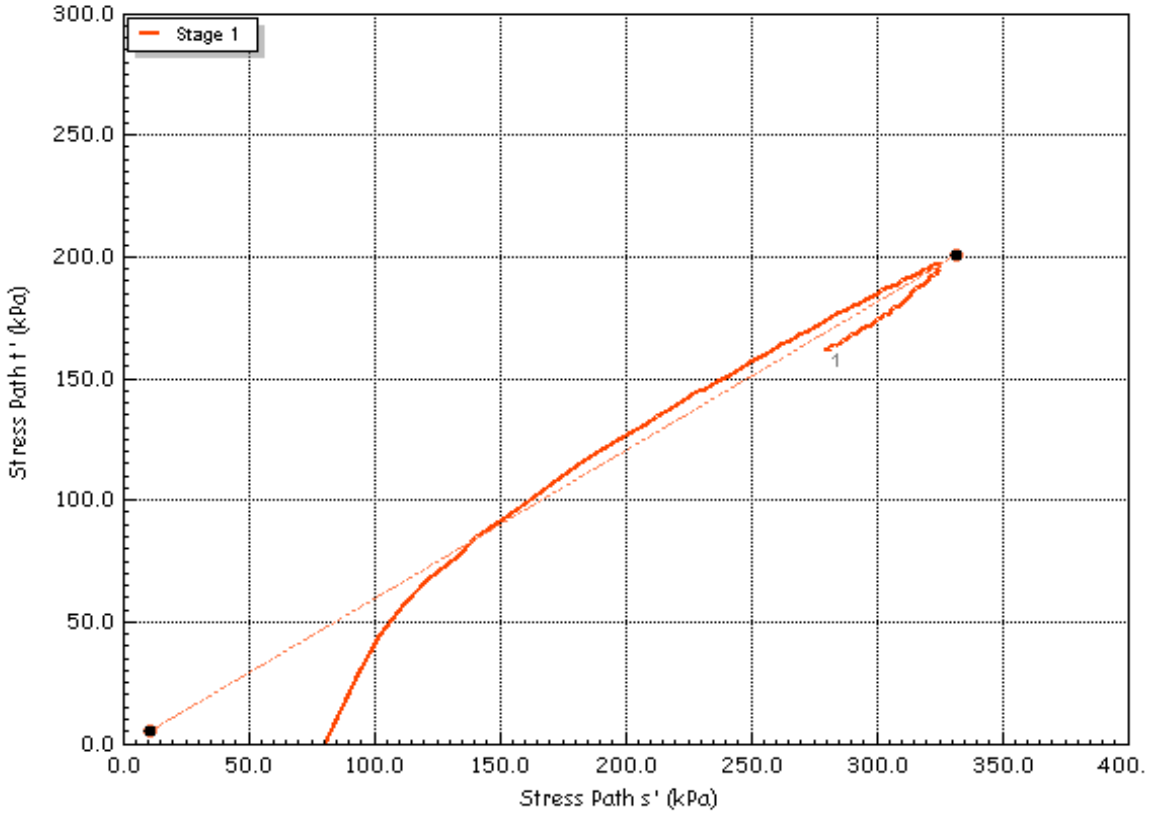
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective	c'	(kPa)	0.00	Effective Cohesion	c'	(kPa)	0.00
Effective Friction	ϕ'	(deg)	37.4	Effective Friction	ϕ'	(deg)	37.4





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH109 4.25-4.50m
		Test Date	19/05/2022
Jobfile	DAA Airfield Underpass Ground Investigation	Borehole	BH109
		Sample	4.25-4.50m
Client	Causeway	Depth	4.25-4.50m

UKAS TESTING 4043

PSL Professional Soils Laboratory

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

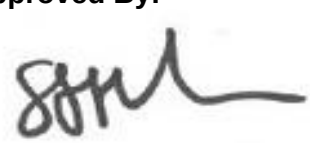
UKAS TESTING
2183

Final Report

Report No.:	22-18273-1
Initial Date of Issue:	24-May-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron0 Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	21-1219 DAA Airfield Underpass

Quotation No.:		**Date Received:**	17-May-2022
Order No.:		**Date Instructed:**	17-May-2022
No. of Samples:	4		
Turnaround (Wkdays):	7	**Results Due:**	25-May-2022
Date Approved:	24-May-2022		

Approved By:



Details: Stuart Henderson, Technical Manager

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: 21-1219 DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-18273	22-18273	22-18273	22-18273
Quotation No.:			**Chemtest Sample ID.:**		1430289	1430290	1430291	1430292
Order No.:			Client Sample Ref.:		2	3	11	12
			Sample Location:		BH105	BH105	BH109	BH109
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		5.0	8.0	2.5	3.5
			Date Sampled:		16-May-2022	16-May-2022	16-May-2022	16-May-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Moisture	N	2030	%	0.020	6.4	14	18	11
pH (2.5:1)	N	2010		4.0	9.7	9.8	9.2	9.4
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.13	0.11	< 0.010	0.023
Total Sulphur	U	2175	%	0.010	0.45	0.29	0.10	0.049
Chloride (Water Soluble)	U	2220	g/l	0.010	0.012	0.010	< 0.010	< 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010	0.023	0.039	0.076	0.023
Organic Matter	U	2625	%	0.40			1.3	0.45

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
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

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

HEAD OFFICE
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Unit 1 Fingal House
Stephenstown Industrial Estate
Balbriggan, Co Dublin, Ireland, K32 VR66
ROI: +353 (0)1 526 7465
Registered in Ireland.
Company Number: 633786

www.causewaygeotech.com

SOIL AND ROCK SAMPLE ANALYSIS
LABORATORY TEST REPORT

8 June 2022

Project Name:	DAA Airfield Underpass Ground Investigation
Project No.:	21-1219
Client:	DAA
Engineer:	Ramboll Consulting Engineers

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 26/05/2022 and 08/06/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Stephen Watson

Laboratory Manager

Signed for and on behalf of Causeway Geotech Ltd

SCS ISO 9001 CERTIFIED
SCS ISO 14001 CERTIFIED
SCS ISO 45001 CERTIFIED
UKAS MANAGEMENT SYSTEMS 9235
UKAS TESTING 10122
AGS
BRITISH DRILLING ASSOCIATION

Project Name: DAA Airfield Underpass Ground Investigation

Report Reference: Schedule 4 - FINAL

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	3
SOIL	Liquid and Plastic Limits of soil-1 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	3
SOIL	Bulk and dry density by Linear Measurement Method	BS 1377-2: 1990: Cl 7.2	3
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	7
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	2
SOIL	Dry density/moisture content relationship (2.5 kg rammer)	BS 1377-4: 1990: Cl 3.3 & 3.4	1
SOIL	California Bearing Ratio (CBR)	BS 1377-4: 1990: Cl 7	1
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 8	1
ROCK	Point load index	ISRM Commission on Testing Methods. Suggested Method for Determining Point Load Strength 1985	2
ROCK	Uniaxial Compressive Strength (UCS)*	ISRM Suggested Methods -Rock Characterization Testing and Monitoring, Ed. E T Brown - 1981	1

SUB-CONTRACTED TESTS

In agreement with Client, the following tests were conducted by an approved sub-contractor. All sub-contracting laboratories used are UKAS accredited.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	pH Value of Soil		1
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	Organic Matter Content		1
SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)*	BRE Test - Suite D		1

Summary of Classification Test Results

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Hole No.	Sample				Soil Description	Density bulk	Density dry	*w*	Passing 425µm	LL	PL	PI	Particle density	Casagrande Classification
	Ref	Top	Base	Type		Mg/m3		%	%	%	%	%	Mg/m3	
BH102	2	5.00	13.00	B	Greyish brown sandy gravelly silty CLAY.	2.54	2.31	9.2	80	21 -1pt	14	7		CL
BH102	7	16.40	20.25	B	Greyish brown sandy silty CLAY.	1.99	1.65	19.0	97	25 -1pt	19	6		ML/CL
BH103	4	11.25	13.15	B	Grey sandy gravelly silty CLAY.	2.22	2.04	9.4	62	28 -1pt	15	13		CL

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key

Density test	Liquid Limit	Particle density
Linear measurement unless :	4pt cone unless :	sp - small pyknometer
wd - water displacement	cas - Casagrande method	gj - gas jar
wi - immersion in water	1pt - single point test	

Date Printed

06/08/2022 00:00

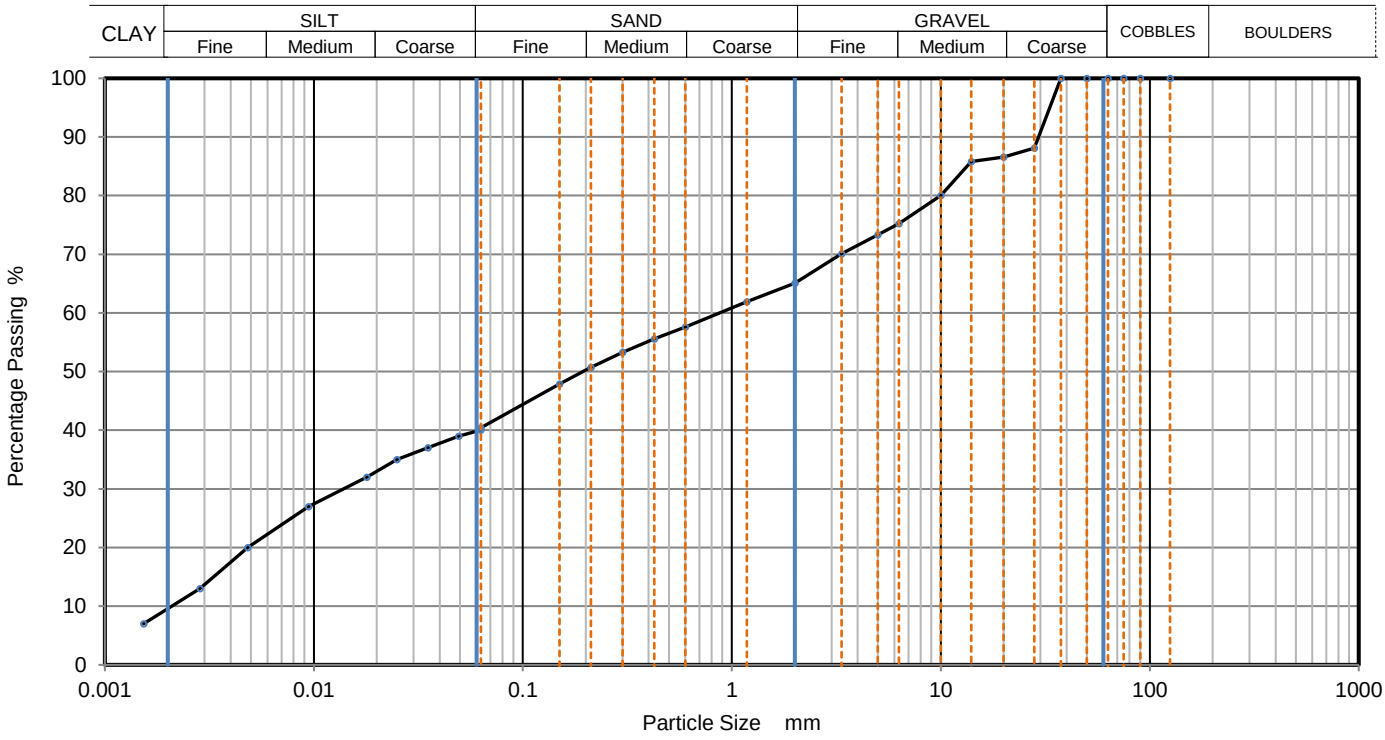
Approved By

Stephen.Watson

UKAS TESTING

10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH102
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	5.00
Specimen Reference	10	Specimen Depth	5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202205237



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	40
90	100	0.04935	39
75	100	0.03513	37
63	100	0.02500	35
50	100	0.01791	32
37.5	100	0.00942	27
28	88	0.00482	20
20	87	0.00285	13
14	86	0.00153	7
10	80		
6.3	75		
5	73		
3.35	70		
2	65		
1.18	62		
0.6	58	Particle density	(assumed)
0.425	56	2.65	Mg/m3
0.3	53		
0.212	51		
0.15	48		
0.063	40		

Dry Mass of sample, g: 2928

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	34.9
Sand	24.7
Silt	30.8
Clay	9.6

Grading Analysis		
D100	mm	
D60	mm	0.875
D30	mm	0.0139
D10	mm	0.00207
Uniformity Coefficient		420
Curvature Coefficient		0.11

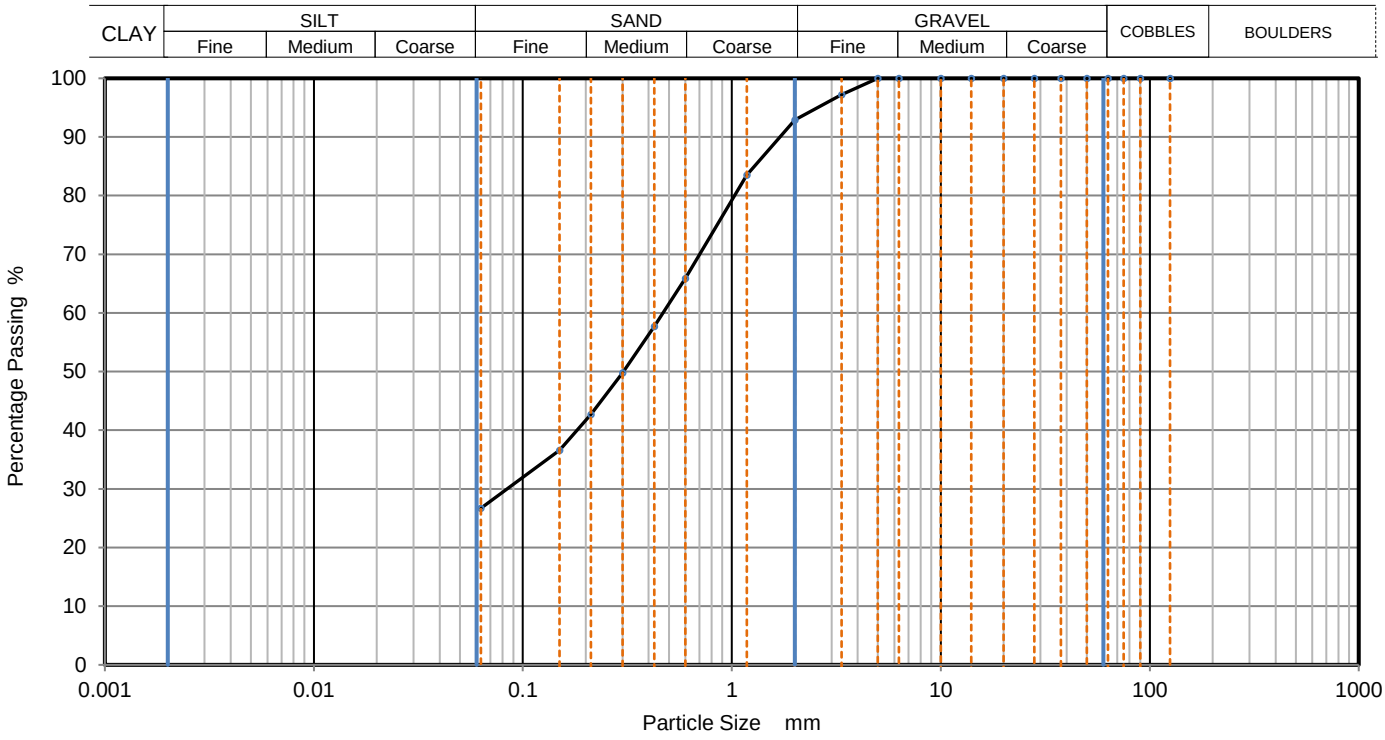
Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH102
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	3
Soil Description	Greyish brown clayey fine to coarse SAND.			Depth, m	13.00
Specimen Reference	3	Specimen Depth	13 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus202205238



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	97		
2	93		
1.18	84		
0.6	66		
0.425	58		
0.3	50		
0.212	43		
0.15	37		
0.063	27		

Dry Mass of sample, g	211

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	7.1
Sand	66.2
Fines <0.063mm	27.0

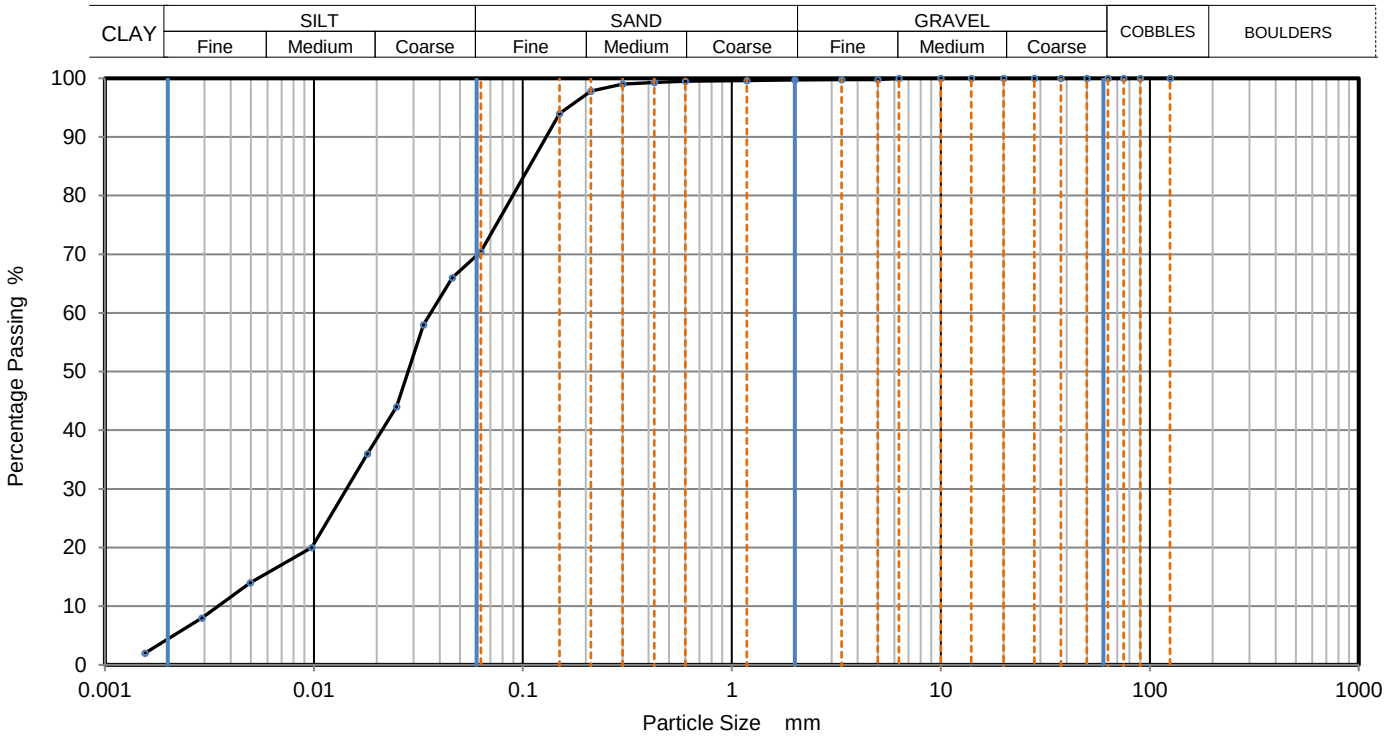
Grading Analysis		
D100	mm	
D60	mm	0.468
D30	mm	0.0841
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH102
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	7
Soil Description	Greyish brown sandy silty CLAY.			Depth, m	16.40
Specimen Reference	11	Specimen Depth	16.4 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202205239



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06086	70
90	100	0.04596	66
75	100	0.03348	58
63	100	0.02484	44
50	100	0.01802	36
37.5	100	0.00976	20
28	100	0.00496	14
20	100	0.00291	8
14	100	0.00156	2
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density	(assumed)
0.425	99	2.65	Mg/m3
0.3	99		
0.212	98		
0.15	94		
0.063	70		

Dry Mass of sample, g: 241

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	0.3
Sand	29.3
Silt	66.0
Clay	4.4

Grading Analysis		
D100	mm	
D60	mm	0.0358
D30	mm	0.0142
D10	mm	0.00346
Uniformity Coefficient		10
Curvature Coefficient		1.6

Remarks

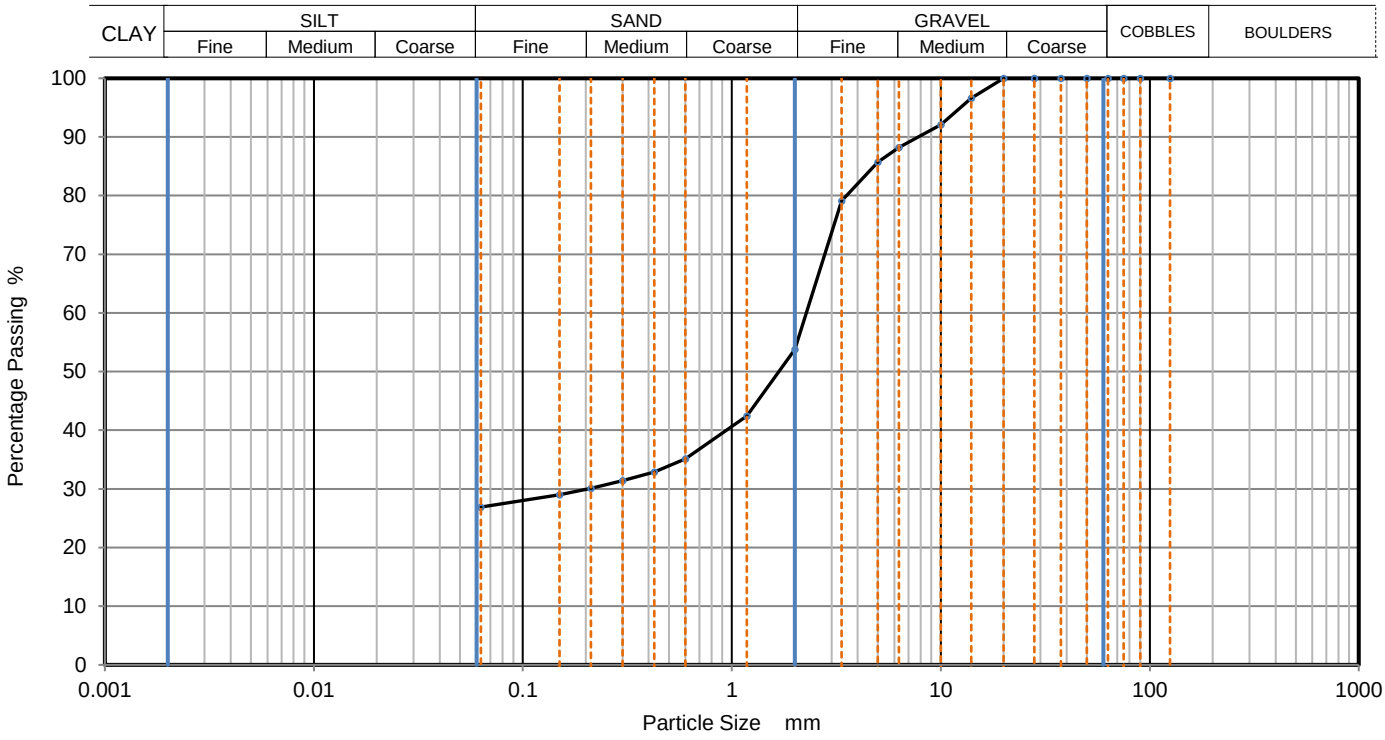
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

UKAS TESTING

10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH103
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	2
Soil Description	Grey slightly gravelly slightly clayey fine to coarse SAND.			Depth, m	4.90
Specimen Reference	3	Specimen Depth	4.9 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022052313



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	92		
6.3	88		
5	86		
3.35	79		
2	54		
1.18	42		
0.6	35		
0.425	33		
0.3	31		
0.212	30		
0.15	29		
0.063	27		

Dry Mass of sample, g: 505

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	46.2
Sand	26.9
Fines <0.063mm	27.0

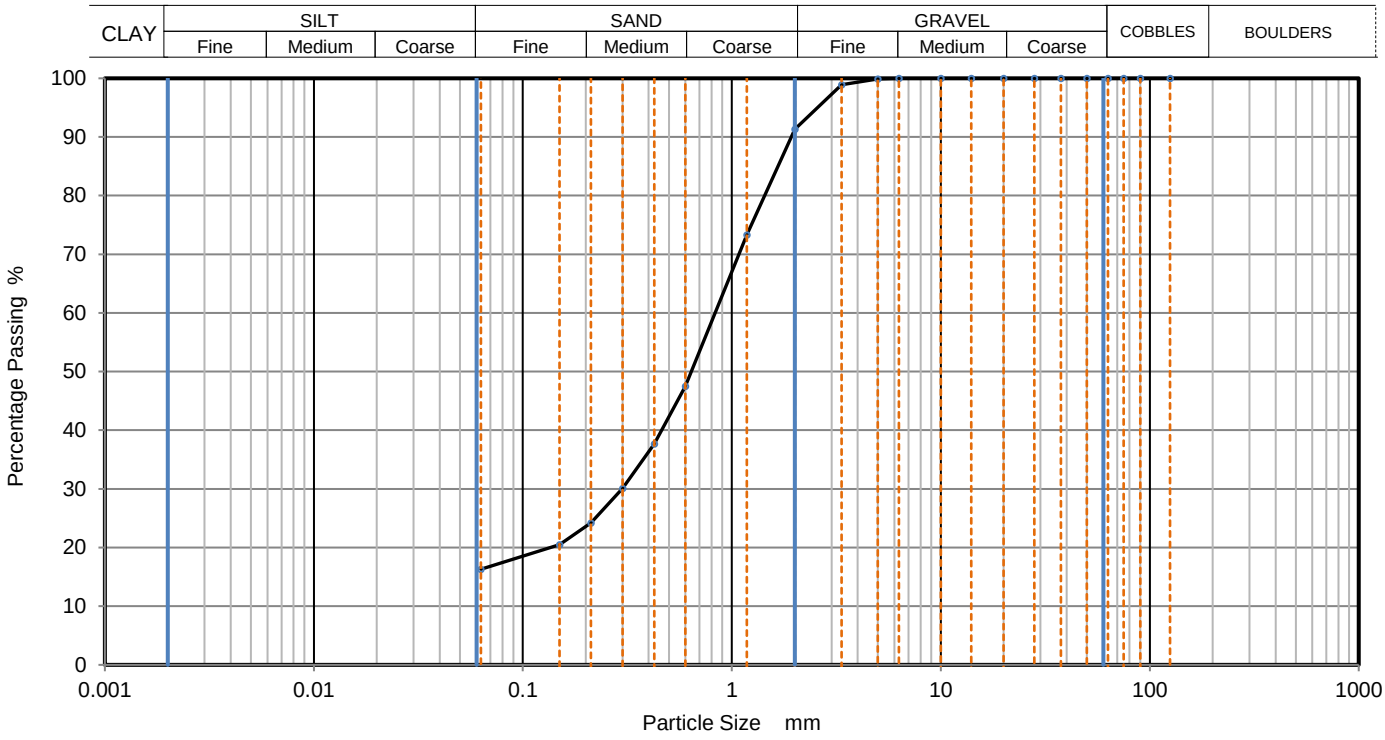
Grading Analysis		
D100	mm	
D60	mm	2.27
D30	mm	0.208
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH103
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	3
Soil Description	Grey slightly gravelly slightly clayey fine to coarse SAND.			Depth, m	9.50
Specimen Reference	3	Specimen Depth	9.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022052314



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	91		
1.18	73		
0.6	48		
0.425	38		
0.3	30		
0.212	24		
0.15	21		
0.063	16		

Dry Mass of sample, g	238

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	8.7
Sand	74.9
Fines <0.063mm	16.0

Grading Analysis		
D100	mm	
D60	mm	0.833
D30	mm	0.298
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

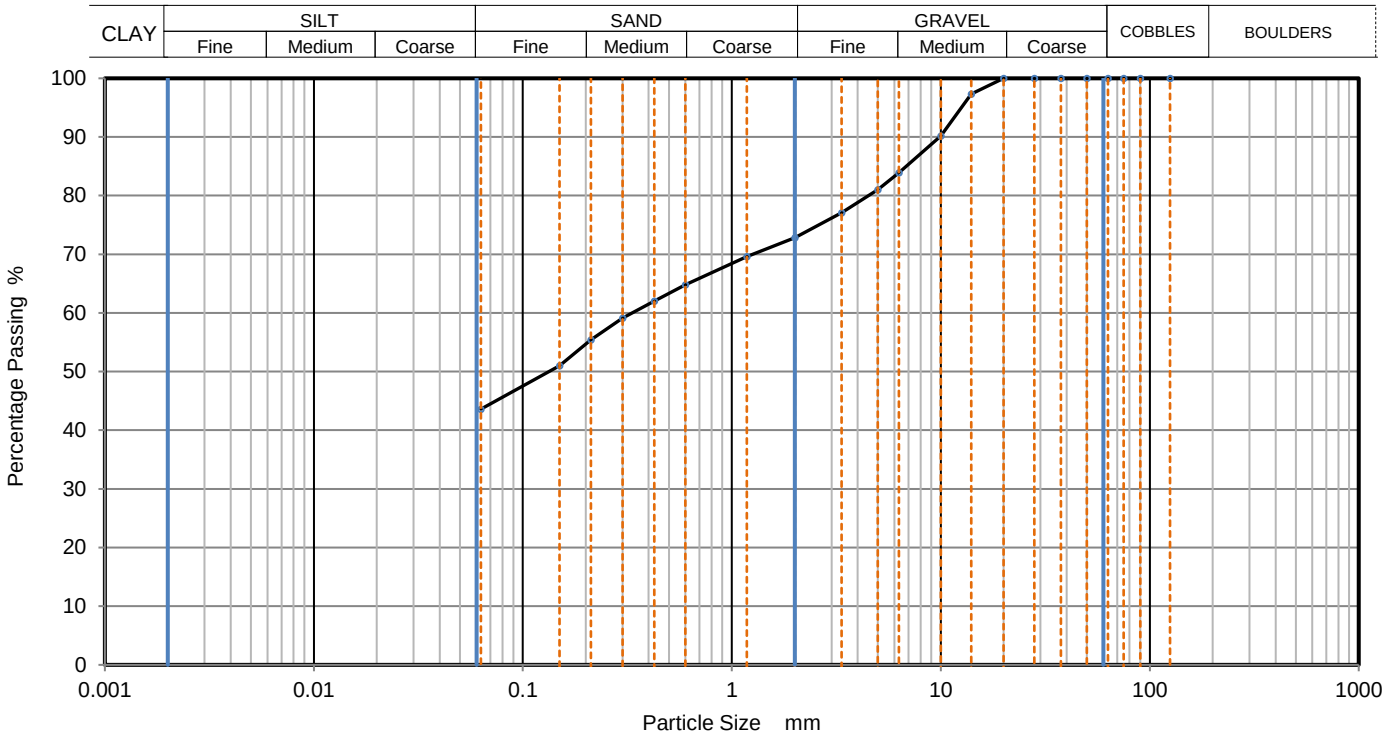
Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

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CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH103
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	4
Soil Description	Grey sandy gravelly silty CLAY.			Depth, m	11.25
Specimen Reference	11	Specimen Depth	11.25 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022052315



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	90		
6.3	84		
5	81		
3.35	77		
2	73		
1.18	70		
0.6	65		
0.425	62		
0.3	59		
0.212	55		
0.15	51		
0.063	44		

Dry Mass of sample, g	506

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	27.2
Sand	29.2
Fines <0.063mm	44.0

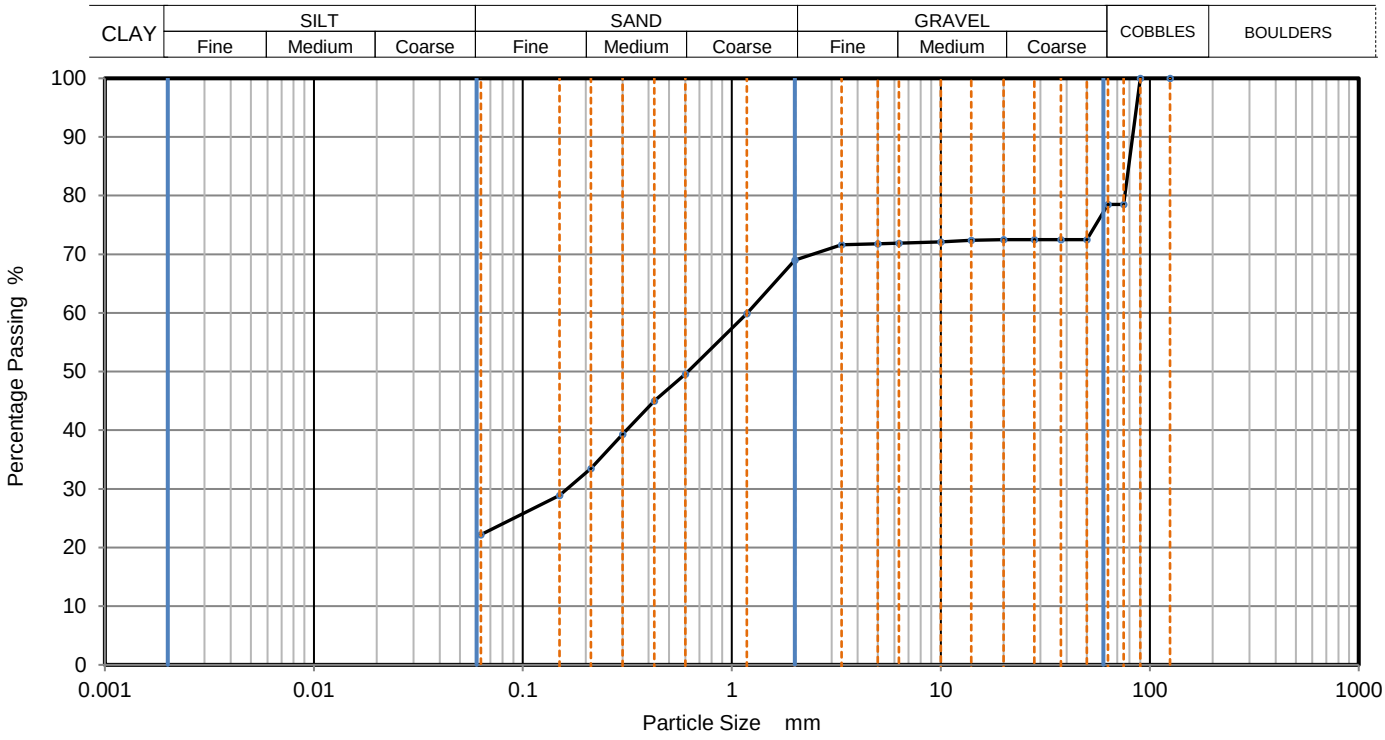
Grading Analysis		
D100	mm	
D60	mm	0.335
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**21-1219**
				Borehole/Pit No.	BH103
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	6
Soil Description	Grey slightly gravelly slightly clayey fine to coarse SAND.			Depth, m	16.90
Specimen Reference	3	Specimen Depth	16.9 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2022052317



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	79		
63	79		
50	73		
37.5	73		
28	73		
20	73		
14	72		
10	72		
6.3	72		
5	72		
3.35	72		
2	69		
1.18	60		
0.6	50		
0.425	45		
0.3	39		
0.212	34		
0.15	29		
0.063	22		

Dry Mass of sample, g	5165

Sample Proportions	% dry mass
Cobbles	21.5
Gravel	9.5
Sand	46.8
Fines <0.063mm	22.0

Grading Analysis		
D100	mm	
D60	mm	1.19
D30	mm	0.163
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson

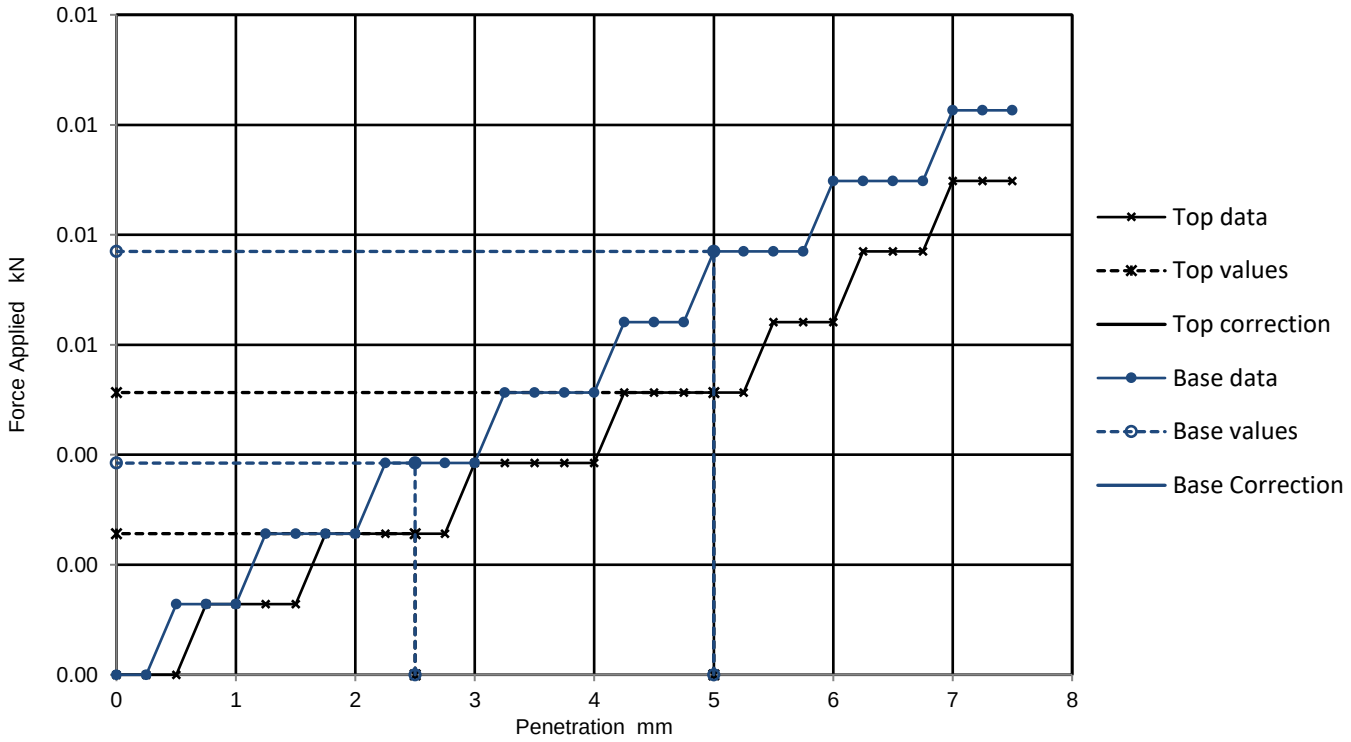
California Bearing Ratio (CBR)

				Job Ref	21-1219
				Borehole/Pit No.	BH102
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	1
Soil Description	Dark brown sandy slightly gravelly silty CLAY.			Depth m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Dark brown sandy slightly gravelly silty CLAY.			KeyLAB ID	Caus202205236
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.79	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.34	Mg/m3		3	kPa
	Moisture content	34	%			

Force v Penetration Plots

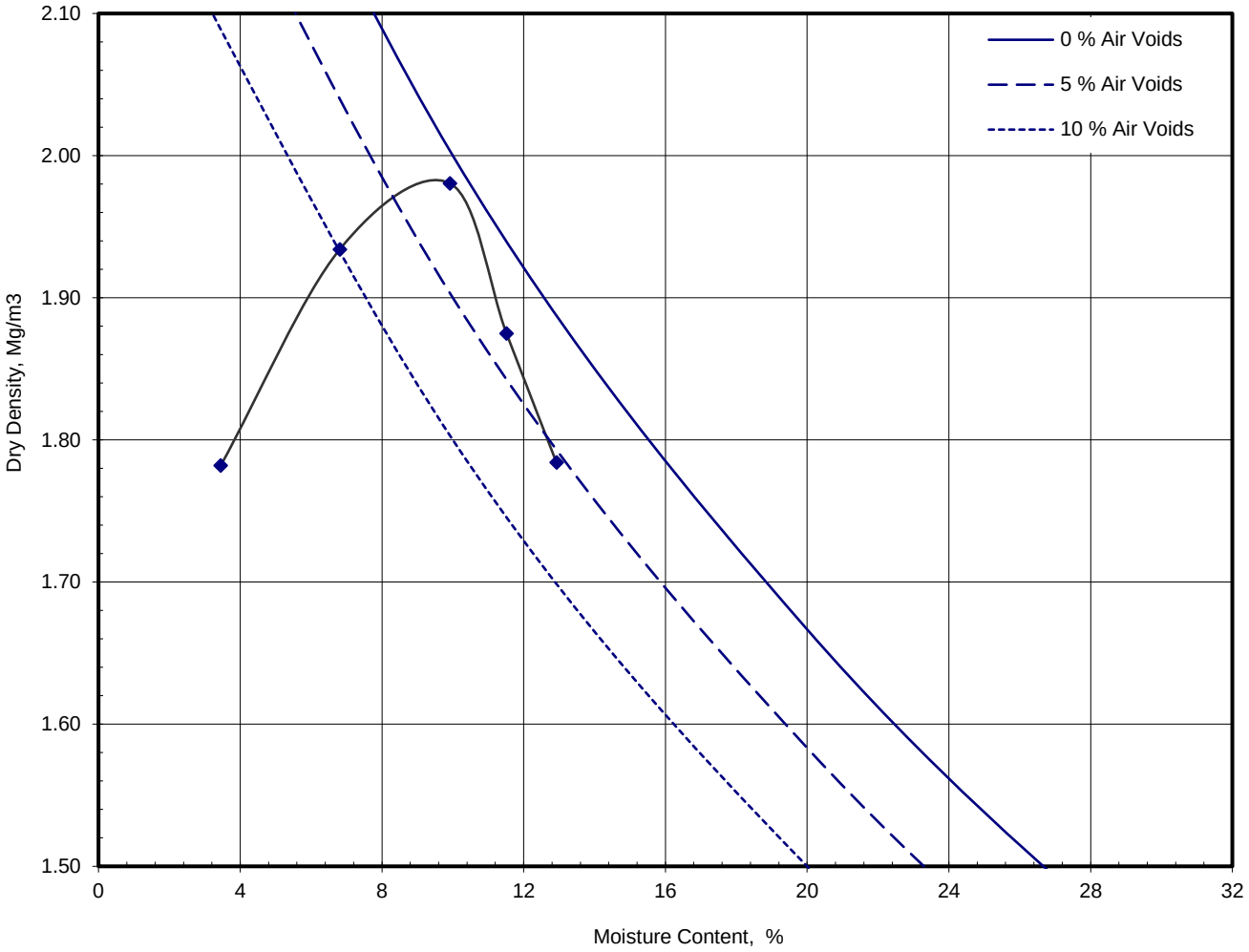


Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	0.0	0.0	0.0		34
BASE	No	0.0	0.0	0.0		36

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen.Watson

CAUSEWAY GEOTECH	**Dry Density / Moisture Content Relationship Light Compaction**			Job Ref	**21-1219**
				Borehole / Pit No	BH102
Site Name	**DAA Airfield Underpass Ground Investigation**			Sample No	1
Soil Description	Dark brown sandy slightly gravelly silty CLAY.			Depth	4.00 m
Specimen Ref.	5	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.3, 2.5kg rammer			Keylab ID	Caus202205236



Preparation		Material used was air dried
Mould Type		1 LITRE
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.50

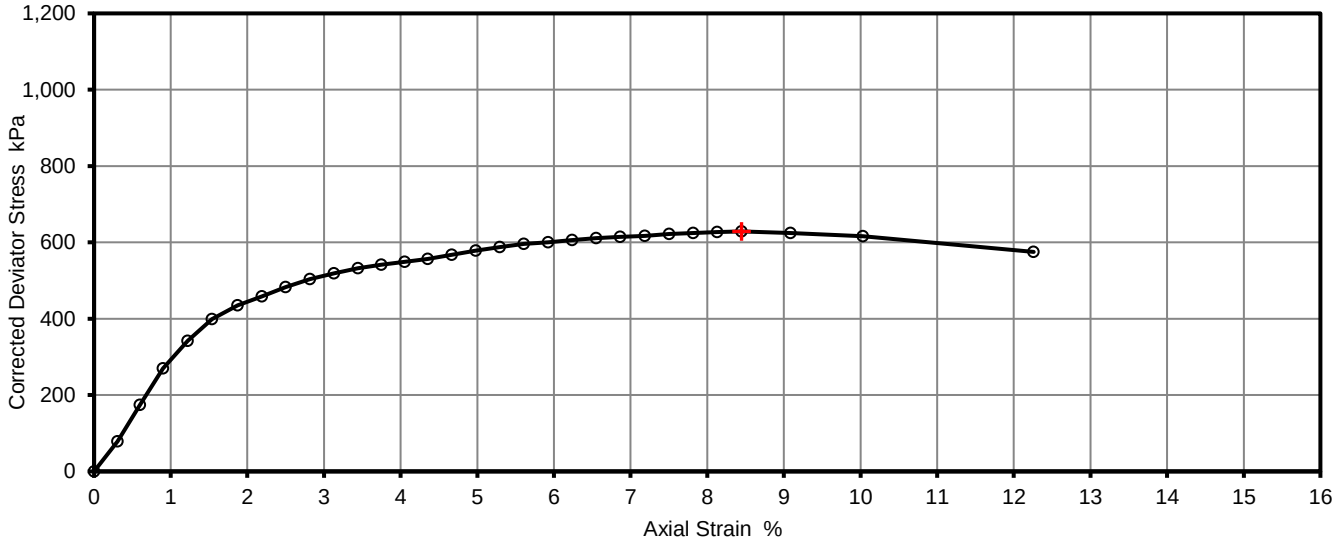
Maximum Dry Density	Mg/m³	**1.98**
Optimum Moisture Content	%	**9.9**

Approved	Remarks	UKAS TESTING 10122
Stephen.Watson	LAB 08R - Version 5	

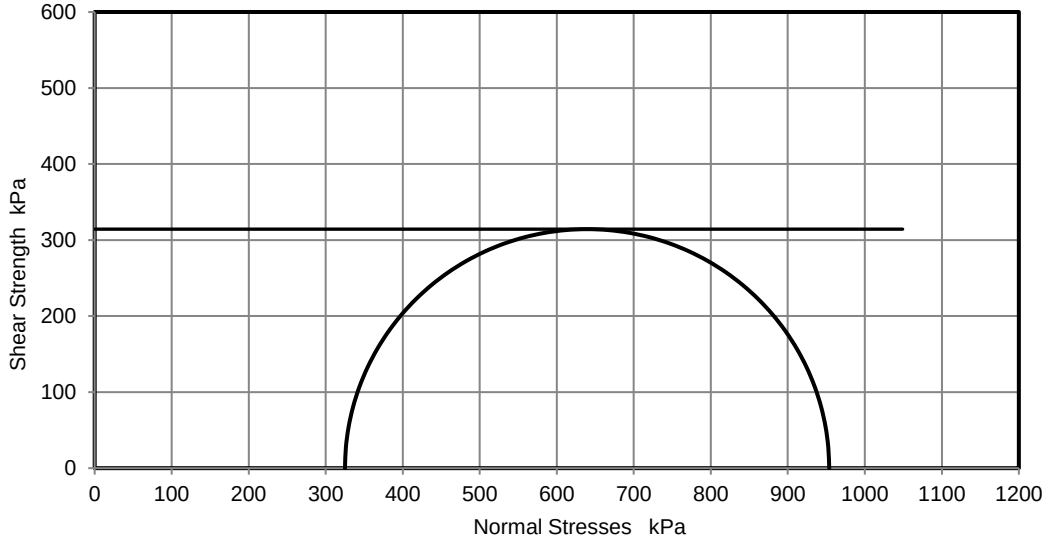
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	21-1219
				Borehole/Pit No.	BH103
Site Name	DAA Airfield Underpass Ground Investigation			Sample No.	22
Soil Description	Brownish grey sandy slightly gravelly silty CLAY.			Depth	16.10
Specimen Reference	3	Specimen Depth	16.15 m	Sample Type	U
Specimen Description	Stiff brownish grey sandy slightly gravelly silty CLAY.			KeyLAB ID	Caus2022052316
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	07/06/2022

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		105.0	mm
Bulk Density		2.30	Mg/m3
Moisture Content		9	%
Dry Density		2.11	Mg/m3
Rate of Strain		4.0	%/min
Cell Pressure		325	kPa
At failure	Axial Strain	8.4	%
	Deviator Stress, (σ1 - σ3)f	629	kPa
	Undrained Shear Strength, cu	314	kPa ½(σ1 - σ3)f
	Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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

Remarks

Approved	Printed
Stephen.Watson	08/06/2022 11:43

UKAS TESTING

10122

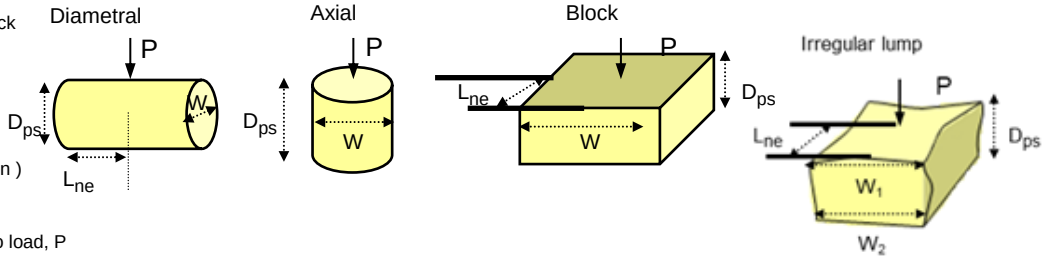
CAUSEWAY GEOTECH

Point Load Strength Index Tests
Summary of Results

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Borehole No.	Sample			Specimen		Rock Type	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth	Ref.	Type	Ref.	Depth		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m				m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BH102	23.05	6	C	3	23.05	LIMESTONE	D	U	YES	91.1	100.7	100.7	99.0	9.0	99.8	0.9	1.2	
BH103	24.75	6	C	3	24.75	LIMESTONE	D	U	YES	116.2	101.5	101.5	100.0	20.7	100.7	2.0	2.8	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise

Detailed legend for test and dimensions, based on ISRM, is shown above.

Size factor, F = (De/50)0.45 for all tests.

LAB 17R - Version 5

Date Printed: 06/08/2022 00:00

Approved By: Stephen.Watson

UKAS TESTING
10122

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Project No.	Project Name
21-1219	DAA Airfield Underpass Ground Investigation

Hole No.	Sample				Rock Type	Specimen Dimensions[2]			Bulk Density[2]	Water Content[1]	Uniaxial Compression[3]			Remarks
	Ref	Top	Base	Type		Dia. mm	Length mm	H/D	Mg/m^3	%	Condition	Mode of failure	UCS MPa	
BH102	6	23.40	23.50	C	LIMESTONE	100.8	199.7	2.0	2.72	0.7	as received	F	86.2	

Notes

1 ISRM p87 test 1, water content at 105 ± 3 °C, specimen as tested for UCS

2 ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density

3 ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials

above notes apply unless annotated otherwise in the remarks

Mode of failure :

S - Single shear MS - multiple shear

AC - Axial cleavage F - Fragmented

Test Specification	Date Printed	Approved By	Table
International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007	08/06/2022	Stephen.Watson	1 sheet 1

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
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CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

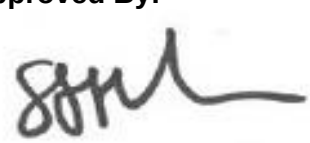
UKAS TESTING
2183

Final Report

Report No.:	22-19763-1
Initial Date of Issue:	31-May-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	21-1219 DAA Airfield Underpass

Quotation No.:		**Date Received:**	26-May-2022
Order No.:		**Date Instructed:**	26-May-2022
No. of Samples:	2		
Turnaround (Wkdays):	7	**Results Due:**	07-Jun-2022
Date Approved:	31-May-2022		

Approved By:



Details: Stuart Henderson, Technical Manager

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: 21-1219 DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-19763	22-19763
Quotation No.:			**Chemtest Sample ID.:**		1436873	1436874
Order No.:			Client Sample Ref.:		1	1
			Sample Location:		BH102	BH103
			Sample Type:		SOIL	SOIL
			Top Depth (m):		4	4
			Date Sampled:		25-May-2022	25-May-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Moisture	N	2030	%	0.020	33	16
pH (2.5:1)	N	2010		4.0	11.3	11.2
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.20	0.15
Total Sulphur	U	2175	%	0.010	0.34	0.32
Chloride (Water Soluble)	U	2220	g/l	0.010	0.013	< 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010	0.040	0.030
Organic Matter	U	2625	%	0.40	1.2	1.4

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
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

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

LABORATORY RESTRICTION REPORT

Project Reference	21-1219	To	Colm Hurley
		Position	Project Manager
Project Name	DAA Airfield Underpass GI	From	Joseph Nicholl
TR reference	21-1219 / G04	Position	Laboratory Quality Manager

The following sample(s) and test(s) are restricted as detailed below. Could you please complete the "Required Action" column and return the completed form to the laboratory.

Hole Number	Sample			Test Type	Reason for Restriction	Required Action
	Number	Depth (m)	Type			
BH102	10	23.05	U	UU Triaxial	LIMESTONE	CANCEL
BH102	9	23.40	U	UU Triaxial	LIMESTONE	CANCEL
BH103	1	4.00	B	CBR	Insufficient material to conduct test	CANCEL
BH103	1	4.00	B	Dry density/ moisture content	Insufficient material to conduct test	CANCEL

For electronic reporting a form of electronic signature or printed name is acceptable

Laboratory Signature Joseph Nicholl	Project Manager Signature Colm Hurley
Date 24 May 2022	Date

CAUSEWAY GEOTECH

APPENDIX F

ENVIRONMENTAL LABORATORY TEST RESULTS



Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-12231-1
Initial Date of Issue:	12-Apr-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	DAA Airfield Underpass
Quotation No.:	Q18-13245
Order No.:	
No. of Samples:	2
Turnaround (Wkdays):	7
Date Approved:	12-Apr-2022
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	31-Mar-2022
Date Instructed:	04-Apr-2022
Results Due:	12-Apr-2022

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-12231	22-12231
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1402848	1402850
			Sample Location:		BH110	BH110
			Sample Type:		SOIL	SOIL
			Top Depth (m):		2.60	7.65
			Date Sampled:		29-Mar-2022	29-Mar-2022
			Asbestos Lab:		NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	24	2.5
pH	U	2010		4.0	8.3	9.1
Arsenic	U	2450	mg/kg	1.0	12	14
Barium	U	2450	mg/kg	10	120	85
Cadmium	U	2450	mg/kg	0.10	2.2	0.92
Chromium	U	2450	mg/kg	1.0	27	10
Molybdenum	U	2450	mg/kg	2.0	3.2	3.6
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	42	12
Mercury	U	2450	mg/kg	0.10	0.27	0.12
Nickel	U	2450	mg/kg	0.50	45	20
Lead	U	2450	mg/kg	0.50	65	9.8
Selenium	U	2450	mg/kg	0.20	1.1	3.3
Zinc	U	2450	mg/kg	0.50	120	33
Chromium (Trivalent)	N	2490	mg/kg	1.0	27	10
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Total Organic Carbon	U	2625	%	0.20	4.2	0.72
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10

Results - Soil

Project: DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-12231	22-12231
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1402848	1402850
			Sample Location:		BH110	BH110
			Sample Type:		SOIL	SOIL
			Top Depth (m):		2.60	7.65
			Date Sampled:		29-Mar-2022	29-Mar-2022
			Asbestos Lab:		NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Benzene	U	2760	µg/kg	1.0	< 1.0	1.3
Toluene	U	2760	µg/kg	1.0	< 1.0	3.5
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	0.57	< 0.10
Anthracene	U	2800	mg/kg	0.10	0.13	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	0.23	< 0.10
Pyrene	U	2800	mg/kg	0.10	0.30	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	0.19	< 0.10
Chrysene	U	2800	mg/kg	0.10	0.16	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10

Results - Single Stage WAC

Project: DAA Airfield Underpass

Chemtest Job No:	22-12231				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1402848						
Sample Ref:							
Sample ID:							
Sample Location:	BH110						
Top Depth(m):	2.60						
Bottom Depth(m):							
Sampling Date:	29-Mar-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	4.2	3	5	6
Loss On Ignition	2610	U	%	11	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0022	0.022	0.5	2	25
Barium	1455	U	0.026	0.26	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0053	0.053	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.012	0.12	0.5	10	30
Nickel	1455	U	0.0023	0.024	0.4	10	40
Lead	1455	U	0.0006	0.0058	0.5	10	50
Antimony	1455	U	0.0027	0.027	0.06	0.7	5
Selenium	1455	U	0.0006	0.0055	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	1.6	16	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	6.6	66	1000	20000	50000
Total Dissolved Solids	1020	N	120	1200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.9	89	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	24

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield Underpass

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-12231						
Chemtest Sample ID:	1402850						
Sample Ref:							
Sample ID:							
Sample Location:	BH110						
Top Depth(m):	7.65						
Bottom Depth(m):							
Sampling Date:	29-Mar-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	0.72	3	5	6
Loss On Ignition	2610	U	%	1.1	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		9.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.058	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0050	0.5	2	25
Barium	1455	U	0.034	0.34	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0015	0.015	2	50	100
Mercury	1455	U	0.00009	0.00086	0.01	0.2	2
Molybdenum	1455	U	0.012	0.12	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0018	0.019	0.06	0.7	5
Selenium	1455	U	0.022	0.22	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	4.9	49	800	15000	25000
Fluoride	1220	U	0.17	1.7	10	150	500
Sulphate	1220	U	27	270	1000	20000	50000
Total Dissolved Solids	1020	N	98	980	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	2.5

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
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.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
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
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.

Test Methods

SOP	Title	Parameters included	Method summary
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-12969-1
Initial Date of Issue:	14-Apr-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	21-12231 DAA Airfields Underpass
Quotation No.:	Q18-13245
Order No.:	
No. of Samples:	2
Turnaround (Wkdays):	8
Date Approved:	14-Apr-2022
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	06-Apr-2022
Date Instructed:	06-Apr-2022
Results Due:	19-Apr-2022

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: 21-12231 DAA Airfields Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-12969	22-12969
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1406469	1406470
			Sample Location:		BH101	BH101
			Sample Type:		SOIL	SOIL
			Top Depth (m):		4.30	5.55
			Date Sampled:		03-Apr-2022	03-Apr-2022
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	9.8	5.0
pH	U	2010		4.0	9.1	9.3
Arsenic	U	2450	mg/kg	1.0	20	23
Barium	U	2450	mg/kg	10	87	79
Cadmium	U	2450	mg/kg	0.10	1.6	1.3
Chromium	U	2450	mg/kg	1.0	19	17
Molybdenum	U	2450	mg/kg	2.0	4.1	3.4
Antimony	N	2450	mg/kg	2.0	2.0	< 2.0
Copper	U	2450	mg/kg	0.50	27	27
Mercury	U	2450	mg/kg	0.10	0.12	0.19
Nickel	U	2450	mg/kg	0.50	44	36
Lead	U	2450	mg/kg	0.50	22	22
Selenium	U	2450	mg/kg	0.20	2.3	1.4
Zinc	U	2450	mg/kg	0.50	65	88
Chromium (Trivalent)	N	2490	mg/kg	1.0	19	17
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Total Organic Carbon	U	2625	%	0.20	0.55	0.72
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10

Results - Soil

Project: 21-12231 DAA Airfields Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-12969	22-12969
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1406469	1406470
			Sample Location:		BH101	BH101
			Sample Type:		SOIL	SOIL
			Top Depth (m):		4.30	5.55
			Date Sampled:		03-Apr-2022	03-Apr-2022
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	0.89
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	3.0
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	0.86
Fluorene	U	2800	mg/kg	0.10	< 0.10	1.4
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	3.7
Anthracene	U	2800	mg/kg	0.10	< 0.10	0.52
Fluoranthene	U	2800	mg/kg	0.10	0.14	2.1
Pyrene	U	2800	mg/kg	0.10	0.15	2.6
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	0.51
Chrysene	U	2800	mg/kg	0.10	< 0.10	0.46
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	0.55
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	0.21
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	0.56
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	17
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10

Results - Single Stage WAC

Project: 21-12231 DAA Airfields Underpass

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-12969						
Chemtest Sample ID:	1406469						
Sample Ref:							
Sample ID:							
Sample Location:	BH101						
Top Depth(m):	4.30						
Bottom Depth(m):							
Sampling Date:	03-Apr-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	0.55	3	5	6
Loss On Ignition	2610	U	%	1.7	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		9.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.069	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0049	0.5	2	25
Barium	1455	U	0.048	0.48	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0048	0.048	0.5	10	70
Copper	1455	U	0.0028	0.028	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.012	0.12	0.5	10	30
Nickel	1455	U	0.0032	0.032	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0014	0.014	0.06	0.7	5
Selenium	1455	U	0.021	0.21	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	3.5	35	800	15000	25000
Fluoride	1220	U	0.35	3.5	10	150	500
Sulphate	1220	U	27	270	1000	20000	50000
Total Dissolved Solids	1020	N	98	970	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.1	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.8

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 21-12231 DAA Airfields Underpass

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-12969						
Chemtest Sample ID:	1406470						
Sample Ref:							
Sample ID:							
Sample Location:	BH101						
Top Depth(m):	5.55						
Bottom Depth(m):							
Sampling Date:	03-Apr-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	0.72	3	5	6
Loss On Ignition	2610	U	%	1.9	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	170	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	17	100	--	--
pH	2010	U		9.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.10	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0009	0.0090	0.5	2	25
Barium	1455	U	0.006	0.056	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0057	0.057	0.5	10	70
Copper	1455	U	0.0024	0.025	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0011	0.011	0.5	10	30
Nickel	1455	U	0.0038	0.038	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0012	0.012	0.06	0.7	5
Selenium	1455	U	0.0016	0.016	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	1.3	13	800	15000	25000
Fluoride	1220	U	0.21	2.1	10	150	500
Sulphate	1220	U	1.7	17	1000	20000	50000
Total Dissolved Solids	1020	N	39	390	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	5.0

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
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.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
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
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.

Test Methods

SOP	Title	Parameters included	Method summary
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-13471-1
Initial Date of Issue:	19-Apr-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	21-1219 DAA Airfield Underpass
Quotation No.:	Q18-13245
Order No.:	
No. of Samples:	2
Turnaround (Wkdays):	5
Date Approved:	19-Apr-2022
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	08-Apr-2022
Date Instructed:	11-Apr-2022
Results Due:	19-Apr-2022

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: 21-1219 DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-13471	22-13471
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1408738	1408739
			Sample Location:		BH111	BH111
			Sample Type:		SOIL	SOIL
			Top Depth (m):		3.00	9.50
			Date Sampled:		05-Apr-2022	05-Apr-2022
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	7.4	7.0
pH	U	2010		4.0	9.4	8.9
Arsenic	U	2450	mg/kg	1.0	2.6	20
Barium	U	2450	mg/kg	10	29	110
Cadmium	U	2450	mg/kg	0.10	< 0.10	2.4
Chromium	U	2450	mg/kg	1.0	7.2	24
Molybdenum	U	2450	mg/kg	2.0	< 2.0	4.1
Antimony	N	2450	mg/kg	2.0	< 2.0	2.0
Copper	U	2450	mg/kg	0.50	59	30
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	85	49
Lead	U	2450	mg/kg	0.50	1.4	23
Selenium	U	2450	mg/kg	0.20	< 0.20	2.0
Zinc	U	2450	mg/kg	0.50	63	80
Chromium (Trivalent)	N	2490	mg/kg	1.0	7.2	24
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Total Organic Carbon	U	2625	%	0.20	0.21	0.58
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10

Results - Soil

Project: 21-1219 DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-13471	22-13471
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1408738	1408739
			Sample Location:		BH111	BH111
			Sample Type:		SOIL	SOIL
			Top Depth (m):		3.00	9.50
			Date Sampled:		05-Apr-2022	05-Apr-2022
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	0.64
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	0.89
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	2.7
Fluorene	U	2800	mg/kg	0.10	< 0.10	2.6
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	34
Anthracene	U	2800	mg/kg	0.10	< 0.10	9.0
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	57
Pyrene	U	2800	mg/kg	0.10	< 0.10	50
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	28
Chrysene	U	2800	mg/kg	0.10	< 0.10	25
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	30
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	11
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	28
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	15
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	3.2
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	15
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	310
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10

Results - Single Stage WAC

Project: 21-1219 DAA Airfield Underpass

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-13471						
Chemtest Sample ID:	1408738						
Sample Ref:							
Sample ID:							
Sample Location:	BH111						
Top Depth(m):	3.00						
Bottom Depth(m):							
Sampling Date:	05-Apr-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	0.21	3	5	6
Loss On Ignition	2610	U	%	1.6	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		9.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0040	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0007	0.0067	0.5	2	25
Barium	1455	U	0.052	0.52	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0046	0.046	0.5	10	70
Copper	1455	U	0.0038	0.038	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.019	0.19	0.5	10	30
Nickel	1455	U	0.0043	0.043	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0025	0.025	0.06	0.7	5
Selenium	1455	U	0.049	0.49	0.1	0.5	7
Zinc	1455	U	0.006	0.057	4	50	200
Chloride	1220	U	9.6	96	800	15000	25000
Fluoride	1220	U	0.35	3.5	10	150	500
Sulphate	1220	U	31	310	1000	20000	50000
Total Dissolved Solids	1020	N	98	970	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.1	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.4

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 21-1219 DAA Airfield Underpass

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-13471						
Chemtest Sample ID:	1408739						
Sample Ref:							
Sample ID:							
Sample Location:	BH111						
Top Depth(m):	9.50						
Bottom Depth(m):							
Sampling Date:	05-Apr-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	0.58	3	5	6
Loss On Ignition	2610	U	%	2.3	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	310	100	--	--
pH	2010	U		8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.052	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0050	0.5	2	25
Barium	1455	U	0.028	0.28	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0047	0.047	0.5	10	70
Copper	1455	U	0.0031	0.031	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.013	0.13	0.5	10	30
Nickel	1455	U	0.0034	0.034	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0006	0.0056	0.06	0.7	5
Selenium	1455	U	0.018	0.18	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	3.0	30	800	15000	25000
Fluoride	1220	U	0.23	2.3	10	150	500
Sulphate	1220	U	11	110	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	22	220	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.0

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
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.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
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
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.

Test Methods

SOP	Title	Parameters included	Method summary
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-17599-1
Initial Date of Issue:	20-May-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	DAA Airfield
Quotation No.:	Q18-13245
Order No.:	
No. of Samples:	11
Turnaround (Wkdays):	7
Date Approved:	20-May-2022
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	12-May-2022
Date Instructed:	12-May-2022
Results Due:	20-May-2022

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Leachate

Project: DAA Airfield

Client: Causeway Geotech Ltd						**Chemtest Job No.:**	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599
Quotation No.: Q18-13245						**Chemtest Sample ID.:**	1427259	1427260	1427261	1427262	1427263	1427264	1427265	1427266
Order No.:						Client Sample Ref.:	1	2	1	1	2	1	2	1
						Sample Location:	BH104	BH104	BH105	BH106	BH106	BH107	BH107	BH108
						Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
						Top Depth (m):	4.00	9.50	8.90	4.00	9.50	2.00	7.60	8.70
						Bottom Depth (m):	4.50	10.00	9.50	4.30	10.00	2.40	8.00	9.00
						Date Sampled:	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**									
Ammonium	U	1220	10:1	mg/l	0.050		0.24	0.19	0.12	0.21	0.20	0.15	0.20	0.18
Ammonium	N	1220	10:1	mg/kg	0.10		2.7	2.5	1.5	2.5	2.6	1.7	2.4	2.3

Results - Leachate

Project: DAA Airfield

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-17599	22-17599	22-17599
Quotation No.: Q18-13245				**Chemtest Sample ID.:**		1427267	1427268	1427269
Order No.:				Client Sample Ref.:		2	1	2
				Sample Location:		BH108	BH109	BH109
				Sample Type:		SOIL	SOIL	SOIL
				Top Depth (m):		9.70	4.50	8.70
				Bottom Depth (m):		10.00	5.00	9.00
				Date Sampled:		11-May-2022	11-May-2022	11-May-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**			
Ammonium	U	1220	10:1	mg/l	0.050	0.13	0.14	0.26
Ammonium	N	1220	10:1	mg/kg	0.10	2.1	1.9	3.3

Results - Soil

Project: DAA Airfield

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1427259	1427260	1427261	1427262	1427263	1427264	1427265	1427266	1427267
Order No.:			Client Sample Ref.:		1	2	1	1	2	1	2	1	2
			Sample Location:		BH104	BH104	BH105	BH106	BH106	BH107	BH107	BH108	BH108
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		4.00	9.50	8.90	4.00	9.50	2.00	7.60	8.70	9.70
			Bottom Depth (m):		4.50	10.00	9.50	4.30	10.00	2.40	8.00	9.00	10.00
			Date Sampled:		11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
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	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	6.0	9.4	12	3.0	8.5	19	7.6	9.0	7.2
pH	M	2010		4.0	9.2	9.3	9.0	9.0	8.9	8.9	8.9	9.2	9.1
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	1.4	0.70	1.1	0.82	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Sulphur (Elemental)	M	2180	mg/kg	1.0	110	140	8.1	7.1	6.0	8.1	7.4	1.1	1.3
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	15	13	12	9.1	6.9	10	12	11	11
Sulphate (Total)	U	2430	%	0.010	0.27	0.28	0.53	0.45	0.74	0.90	0.70	0.59	0.67
Arsenic	M	2455	mg/kg	0.5	5.9	5.7	50	12	9.3	10	12	8.1	7.8
Barium	M	2455	mg/kg	0	23	26	66	78	56	64	70	72	68
Cadmium	M	2455	mg/kg	0.10	0.36	0.30	1.2	1.5	1.0	1.1	1.3	0.98	1.2
Chromium	M	2455	mg/kg	0.5	11	11	9.5	14	11	9.9	11	14	14
Molybdenum	M	2455	mg/kg	0.5	0.9	0.9	1.8	2.8	2.2	2.3	2.5	2.8	2.9
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	5.8	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	M	2455	mg/kg	0.50	15	16	17	21	16	17	18	19	19
Mercury	M	2455	mg/kg	0.05	0.25	0.33	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	13	13	23	33	24	26	27	31	30
Lead	M	2455	mg/kg	0.50	63	74	35	27	18	20	25	14	13
Selenium	M	2455	mg/kg	0.25	0.56	0.54	1.7	1.9	2.0	2.0	1.9	2.3	2.3
Zinc	M	2455	mg/kg	0.50	48	40	96	100	88	110	110	52	57
Chromium (Trivalent)	N	2490	mg/kg	1.0	11	11	9.5	14	11	9.9	11	14	14
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20	1.8	1.8	0.96	0.85	0.84	0.66	0.64	0.47	0.67
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	49	110	< 10	40	73	< 10	120	61
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	6.8	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	49	99	< 1.0	40	73	< 1.0	120	61
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	49	110	< 5.0	40	73	< 5.0	120	61
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: DAA Airfield

Client: Causeway Geotech Ltd		**Chemtest Job No.:**			22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599
Quotation No.: Q18-13245		**Chemtest Sample ID.:**			1427259	1427260	1427261	1427262	1427263	1427264	1427265	1427266	1427267
Order No.:		Client Sample Ref.:			1	2	1	1	2	1	2	1	2
		Sample Location:			BH104	BH104	BH105	BH106	BH106	BH107	BH107	BH108	BH108
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			4.00	9.50	8.90	4.00	9.50	2.00	7.60	8.70	9.70
		Bottom Depth (m):			4.50	10.00	9.50	4.30	10.00	2.40	8.00	9.00	10.00
		Date Sampled:			11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022
		Asbestos Lab:			DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	150	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	70	92	< 1.0	72	< 1.0	< 1.0	87	82
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	70	92	< 5.0	72	< 5.0	< 5.0	240	82
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	120	200	< 10	110	73	< 10	360	140
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	M	2800	mg/kg	0.10	< 0.10	0.72	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	0.28	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	1.3	2.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	0.37	0.59	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	1.6	3.4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	1.5	3.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	0.83	1.5	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	0.79	1.8	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	1.1	1.8	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	0.28	0.63	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	0.94	1.5	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	0.95	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	0.91	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	8.7	20	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: DAA Airfield

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599	22-17599
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1427259	1427260	1427261	1427262	1427263	1427264	1427265	1427266	1427267
Order No.:			Client Sample Ref.:		1	2	1	1	2	1	2	1	2
			Sample Location:		BH104	BH104	BH105	BH106	BH106	BH107	BH107	BH108	BH108
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		4.00	9.50	8.90	4.00	9.50	2.00	7.60	8.70	9.70
			Bottom Depth (m):		4.50	10.00	9.50	4.30	10.00	2.40	8.00	9.00	10.00
			Date Sampled:		11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022	11-May-2022
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	0.48	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: DAA Airfield

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-17599	22-17599
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1427268	1427269
Order No.:			Client Sample Ref.:		1	2
			Sample Location:		BH109	BH109
			Sample Type:		SOIL	SOIL
			Top Depth (m):		4.50	8.70
			Bottom Depth (m):		5.00	9.00
			Date Sampled:		11-May-2022	11-May-2022
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	7.7	7.9
pH	M	2010		4.0	9.1	9.1
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.54	0.72
Sulphur (Elemental)	M	2180	mg/kg	1.0	1.3	< 1.0
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	9.2	9.3
Sulphate (Total)	U	2430	%	0.010	0.54	0.66
Arsenic	M	2455	mg/kg	0.5	6.8	6.9
Barium	M	2455	mg/kg	0	66	65
Cadmium	M	2455	mg/kg	0.10	0.74	0.75
Chromium	M	2455	mg/kg	0.5	12	13
Molybdenum	M	2455	mg/kg	0.5	2.6	2.4
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0
Copper	M	2455	mg/kg	0.50	17	16
Mercury	M	2455	mg/kg	0.05	< 0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	26	26
Lead	M	2455	mg/kg	0.50	11	12
Selenium	M	2455	mg/kg	0.25	1.9	2.0
Zinc	M	2455	mg/kg	0.50	42	44
Chromium (Trivalent)	N	2490	mg/kg	1.0	12	13
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20	0.60	0.40
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	42	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	42	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	42	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0

Results - Soil

Project: DAA Airfield

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-17599	22-17599
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1427268	1427269
Order No.:			Client Sample Ref.:		1	2
			Sample Location:		BH109	BH109
			Sample Type:		SOIL	SOIL
			Top Depth (m):		4.50	8.70
			Bottom Depth (m):		5.00	9.00
			Date Sampled:		11-May-2022	11-May-2022
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	55	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	55	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	96	< 10
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010

Results - Soil

Project: DAA Airfield

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-17599	22-17599
Quotation No.: Q18-13245			**Chemtest Sample ID.:**		1427268	1427269
Order No.:			Client Sample Ref.:		1	2
			Sample Location:		BH109	BH109
			Sample Type:		SOIL	SOIL
			Top Depth (m):		4.50	8.70
			Bottom Depth (m):		5.00	9.00
			Date Sampled:		11-May-2022	11-May-2022
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427259						
Sample Ref:	1						
Sample ID:							
Sample Location:	BH104						
Top Depth(m):	4.00						
Bottom Depth(m):	4.50						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	1.8	3	5	6
Loss On Ignition	2610	M	%	3.6	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	8.7	100	--	--
pH	2010	M		9.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.025	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0056	0.5	2	25
Barium	1455	U	0.040	0.40	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0011	0.011	0.5	10	70
Copper	1455	U	0.0025	0.025	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.011	0.11	0.5	10	30
Nickel	1455	U	0.0012	0.012	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0015	0.015	0.06	0.7	5
Selenium	1455	U	0.016	0.16	0.1	0.5	7
Zinc	1455	U	0.005	0.048	4	50	200
Chloride	1220	U	2.3	23	800	15000	25000
Fluoride	1220	U	0.21	2.1	10	150	500
Sulphate	1220	U	40	400	1000	20000	50000
Total Dissolved Solids	1020	N	98	980	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.0

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427260						
Sample Ref:	2						
Sample ID:							
Sample Location:	BH104						
Top Depth(m):	9.50						
Bottom Depth(m):	10.00						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	1.8	3	5	6
Loss On Ignition	2610	M	%	4.1	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	120	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	20	100	--	--
pH	2010	M		9.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.057	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0009	0.0090	0.5	2	25
Barium	1455	U	0.020	0.20	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0010	0.010	0.5	10	70
Copper	1455	U	0.0013	0.013	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.014	0.14	0.5	10	30
Nickel	1455	U	0.0009	0.0085	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0067	0.067	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	4.1	41	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.6	86	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.4

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427261						
Sample Ref:	1						
Sample ID:							
Sample Location:	BH105						
Top Depth(m):	8.90						
Bottom Depth(m):	9.50						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	0.96	3	5	6
Loss On Ignition	2610	M	%	1.9	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	200	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		9.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.012	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0007	0.0067	0.5	2	25
Barium	1455	U	0.045	0.45	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0008	0.0084	0.5	10	70
Copper	1455	U	0.0014	0.014	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0092	0.092	0.5	10	30
Nickel	1455	U	0.0011	0.011	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0009	0.0093	0.06	0.7	5
Selenium	1455	U	0.0071	0.071	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	1.4	14	800	15000	25000
Fluoride	1220	U	0.22	2.2	10	150	500
Sulphate	1220	U	8.8	88	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.6	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427262						
Sample Ref:	1						
Sample ID:							
Sample Location:	BH106						
Top Depth(m):	4.00						
Bottom Depth(m):	4.30						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	0.85	3	5	6
Loss On Ignition	2610	M	%	2.4	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		9.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.025	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0003	0.0029	0.5	2	25
Barium	1455	U	0.025	0.25	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0013	0.013	0.5	10	70
Copper	1455	U	0.0015	0.015	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.022	0.22	0.5	10	30
Nickel	1455	U	0.0016	0.016	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0017	0.017	0.06	0.7	5
Selenium	1455	U	0.039	0.39	0.1	0.5	7
Zinc	1455	U	0.003	0.034	4	50	200
Chloride	1220	U	14	140	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	61	610	1000	20000	50000
Total Dissolved Solids	1020	N	130	1300	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	3.0

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427263						
Sample Ref:	2						
Sample ID:							
Sample Location:	BH106						
Top Depth(m):	9.50						
Bottom Depth(m):	10.00						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	0.84	3	5	6
Loss On Ignition	2610	M	%	2.7	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	110	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.068	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0012	0.012	0.5	2	25
Barium	1455	U	0.082	0.82	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0009	0.0085	0.5	10	70
Copper	1455	U	0.0026	0.026	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0065	0.065	0.5	10	30
Nickel	1455	U	0.0009	0.0088	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0005	0.0055	0.06	0.7	5
Selenium	1455	U	0.015	0.15	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	4.1	41	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	11	110	1000	20000	50000
Total Dissolved Solids	1020	N	72	710	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.2	82	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.5

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427264						
Sample Ref:	1						
Sample ID:							
Sample Location:	BH107						
Top Depth(m):	2.00						
Bottom Depth(m):	2.40						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	0.66	3	5	6
Loss On Ignition	2610	M	%	2.6	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	73	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.021	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0008	0.0082	0.5	2	25
Barium	1455	U	0.029	0.29	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0010	0.0099	0.5	10	70
Copper	1455	U	0.0043	0.043	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.022	0.22	0.5	10	30
Nickel	1455	U	0.0020	0.020	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0021	0.021	0.06	0.7	5
Selenium	1455	U	0.0006	0.0062	0.1	0.5	7
Zinc	1455	U	0.013	0.14	4	50	200
Chloride	1220	U	1.8	18	800	15000	25000
Fluoride	1220	U	0.27	2.7	10	150	500
Sulphate	1220	U	11	110	1000	20000	50000
Total Dissolved Solids	1020	N	98	970	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.3	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	19

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427265						
Sample Ref:	2						
Sample ID:							
Sample Location:	BH107						
Top Depth(m):	7.60						
Bottom Depth(m):	8.00						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	0.64	3	5	6
Loss On Ignition	2610	M	%	3.1	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.026	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0059	0.5	2	25
Barium	1455	U	0.052	0.52	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0019	0.019	2	50	100
Mercury	1455	U	0.00025	0.0025	0.01	0.2	2
Molybdenum	1455	U	0.011	0.11	0.5	10	30
Nickel	1455	U	0.0008	0.0081	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0011	0.011	0.06	0.7	5
Selenium	1455	U	0.018	0.17	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.30	3.0	10	150	500
Sulphate	1220	U	27	270	1000	20000	50000
Total Dissolved Solids	1020	N	98	970	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.6

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427266						
Sample Ref:	1						
Sample ID:							
Sample Location:	BH108						
Top Depth(m):	8.70						
Bottom Depth(m):	9.00						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	0.47	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	360	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		9.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.021	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0008	0.0081	0.5	2	25
Barium	1455	U	0.037	0.37	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0008	0.0083	0.5	10	70
Copper	1455	U	0.0017	0.017	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.011	0.11	0.5	10	30
Nickel	1455	U	0.0008	0.0080	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0005	0.0054	0.06	0.7	5
Selenium	1455	U	0.015	0.15	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.30	3.0	10	150	500
Sulphate	1220	U	7.2	72	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	13	130	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.0

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427267						
Sample Ref:	2						
Sample ID:							
Sample Location:	BH108						
Top Depth(m):	9.70						
Bottom Depth(m):	10.00						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	0.67	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	140	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		9.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.023	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0004	0.0036	0.5	2	25
Barium	1455	U	0.012	0.12	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0009	0.0092	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0015	0.015	0.5	10	30
Nickel	1455	U	0.0009	0.0089	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0026	0.026	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.12	1.2	10	150	500
Sulphate	1220	U	1.6	16	1000	20000	50000
Total Dissolved Solids	1020	N	39	390	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.2

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427268						
Sample Ref:	1						
Sample ID:							
Sample Location:	BH109						
Top Depth(m):	4.50						
Bottom Depth(m):	5.00						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	0.60	3	5	6
Loss On Ignition	2610	M	%	2.5	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	96	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		9.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.028	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0004	0.0043	0.5	2	25
Barium	1455	U	0.049	0.49	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0010	0.0099	0.5	10	70
Copper	1455	U	0.0017	0.017	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.013	0.13	0.5	10	30
Nickel	1455	U	0.0009	0.0091	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0020	0.020	0.06	0.7	5
Selenium	1455	U	0.030	0.30	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	4.9	49	800	15000	25000
Fluoride	1220	U	0.31	3.1	10	150	500
Sulphate	1220	U	23	230	1000	20000	50000
Total Dissolved Solids	1020	N	91	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.6	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.7

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17599						
Chemtest Sample ID:	1427269						
Sample Ref:	2						
Sample ID:							
Sample Location:	BH109						
Top Depth(m):	8.70						
Bottom Depth(m):	9.00						
Sampling Date:	11-May-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	0.40	3	5	6
Loss On Ignition	2610	M	%	2.7	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		9.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0060	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0007	0.0073	0.5	2	25
Barium	1455	U	0.054	0.54	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0011	0.011	0.5	10	70
Copper	1455	U	0.0020	0.020	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.016	0.16	0.5	10	30
Nickel	1455	U	0.0010	0.010	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0010	0.010	0.06	0.7	5
Selenium	1455	U	0.022	0.22	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	1.1	11	800	15000	25000
Fluoride	1220	U	0.53	5.3	10	150	500
Sulphate	1220	U	17	170	1000	20000	50000
Total Dissolved Solids	1020	N	85	840	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.0	80	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.9

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
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
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
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
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.

Test Methods

SOP	Title	Parameters included	Method summary
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
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.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-19134-1
Initial Date of Issue:	31-May-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	DAA Airfield
Quotation No.:	Q21-25458
Order No.:	
No. of Samples:	5
Turnaround (Wkdays):	7
Date Approved:	31-May-2022
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	23-May-2022
Date Instructed:	23-May-2022
Results Due:	31-May-2022

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: DAA Airfield

Client: Causeway Geotech Ltd				**Chemtest Job No.:**	22-19134	22-19134	22-19134	22-19134	22-19134
Quotation No.: Q21-25458				**Chemtest Sample ID.:**	1433814	1433815	1433816	1433817	1433818
				Sample Location:	BH102	BH102	BH103	BH103	BH103
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	7.70	10.70	7.00	8.50	9.00
				Bottom Depth (m):	8.00	11.00	7.30	8.80	9.30
				Asbestos Lab:	COVENTRY	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	No Asbestos Detected
Moisture	N	2030	%	0.020	12	8.1	16	24	0.36
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40
Sulphur (Elemental)	M	2180	mg/kg	1.0	[A] 5.5	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 7.3	[A] 10	[A] 9.4	[A] 12	[A] 5.6
Sulphate (Total)	U	2430	%	0.010	[A] 0.037	[A] 0.18	[A] 0.32	[A] 0.51	[A] 0.58
Arsenic	M	2455	mg/kg	0.5	6.0	9.5	5.1	6.8	2.3
Barium	M	2455	mg/kg	0	36	44	24	28	20
Cadmium	M	2455	mg/kg	0.10	0.77	0.85	0.68	0.95	0.33
Chromium	M	2455	mg/kg	0.5	10	7.8	6.6	7.8	2.4
Molybdenum	M	2455	mg/kg	0.5	1.4	1.3	1.5	1.7	1.4
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	M	2455	mg/kg	0.50	16	14	13	14	4.5
Mercury	M	2455	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	30	21	17	21	4.4
Lead	M	2455	mg/kg	0.50	13	20	9.5	11	6.0
Selenium	M	2455	mg/kg	0.25	1.4	1.0	1.2	1.4	< 0.25
Zinc	M	2455	mg/kg	0.50	52	46	66	110	15
Chromium (Trivalent)	N	2490	mg/kg	1.0	10	7.8	6.6	7.8	2.4
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20	[A] 0.29	[A] 0.70	[A] 0.59	[A] 0.77	[A] 1.0
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: DAA Airfield

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-19134	22-19134	22-19134	22-19134	22-19134
Quotation No.: Q21-25458			**Chemtest Sample ID.:**		1433814	1433815	1433816	1433817	1433818
			Sample Location:		BH102	BH102	BH103	BH103	BH103
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		7.70	10.70	7.00	8.50	9.00
			Bottom Depth (m):		8.00	11.00	7.30	8.80	9.30
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10
Benzene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Toluene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
o-Xylene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.18	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.17	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 52	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 90+101	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 118	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 153	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 138	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 180	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Single Stage WAC

Project: DAA Airfield

Chemtest Job No:	22-19134				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1433814						
Sample Ref:							
Sample ID:							
Sample Location:	BH102						
Top Depth(m):	7.70				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Bottom Depth(m):	8.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.29	3	5	6
Loss on Ignition					--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH					--	>6	--
Acid Neutralisation Capacity					--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0062	0.5	2	25
Barium	1455	U	0.041	0.41	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0009	0.0087	0.5	10	70
Copper	1455	U	0.0030	0.030	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.026	0.26	0.5	10	30
Nickel	1455	U	0.0007	0.0069	0.4	10	40
Lead	1455	U	0.0011	0.011	0.5	10	50
Antimony	1455	U	0.0007	0.0070	0.06	0.7	5
Selenium	1455	U	0.0032	0.032	0.1	0.5	7
Zinc	1455	U	0.004	0.039	4	50	200
Chloride	1220	U	1.4	14	800	15000	25000
Fluoride	1220	U	0.48	4.8	10	150	500
Sulphate	1220	U	10	100	1000	20000	50000
Total Dissolved Solids	1020	N	91	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.1	71	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-19134						
Chemtest Sample ID:	1433815						
Sample Ref:							
Sample ID:							
Sample Location:	BH102						
Top Depth(m):	10.70						
Bottom Depth(m):	11.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 0.70	3	5	6
Loss on Ignition					--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH					--	>6	--
Acid Neutralisation Capacity					--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0062	0.5	2	25
Barium	1455	U	0.056	0.56	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0009	0.0094	0.5	10	70
Copper	1455	U	0.0023	0.023	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0086	0.086	0.5	10	30
Nickel	1455	U	0.0005	0.0051	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0006	0.0060	0.06	0.7	5
Selenium	1455	U	0.010	0.10	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	1.8	18	800	15000	25000
Fluoride	1220	U	0.28	2.8	10	150	500
Sulphate	1220	U	9.7	97	1000	20000	50000
Total Dissolved Solids	1020	N	72	710	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.1

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

Chemtest Job No:	22-19134				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1433816						
Sample Ref:							
Sample ID:							
Sample Location:	BH103						
Top Depth(m):	7.00						
Bottom Depth(m):	7.30						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 0.59	3	5	6
Loss on Ignition					--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH					--	>6	--
Acid Neutralisation Capacity					--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0011	0.011	0.5	2	25
Barium	1455	U	0.035	0.35	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0011	0.011	0.5	10	70
Copper	1455	U	0.0021	0.021	2	50	100
Mercury	1455	U	0.00026	0.0026	0.01	0.2	2
Molybdenum	1455	U	0.0092	0.092	0.5	10	30
Nickel	1455	U	0.0009	0.0094	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0016	0.016	0.06	0.7	5
Selenium	1455	U	0.011	0.11	0.1	0.5	7
Zinc	1455	U	0.003	0.028	4	50	200
Chloride	1220	U	22	220	800	15000	25000
Fluoride	1220	U	0.32	3.2	10	150	500
Sulphate	1220	U	15	150	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.6	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	16

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-19134						
Chemtest Sample ID:	1433817						
Sample Ref:							
Sample ID:							
Sample Location:	BH103						
Top Depth(m):	8.50						
Bottom Depth(m):	8.80						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 0.77	3	5	6
Loss on Ignition					--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH					--	>6	--
Acid Neutralisation Capacity					--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0012	0.012	0.5	2	25
Barium	1455	U	0.037	0.37	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0017	0.017	0.5	10	70
Copper	1455	U	0.0038	0.038	2	50	100
Mercury	1455	U	0.00029	0.0029	0.01	0.2	2
Molybdenum	1455	U	0.0083	0.083	0.5	10	30
Nickel	1455	U	0.0015	0.015	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0014	0.015	0.06	0.7	5
Selenium	1455	U	0.0092	0.092	0.1	0.5	7
Zinc	1455	U	0.007	0.074	4	50	200
Chloride	1220	U	2.3	23	800	15000	25000
Fluoride	1220	U	0.33	3.3	10	150	500
Sulphate	1220	U	11	110	1000	20000	50000
Total Dissolved Solids	1020	N	78	770	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.5	55	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	24

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: DAA Airfield

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-19134						
Chemtest Sample ID:	1433818						
Sample Ref:							
Sample ID:							
Sample Location:	BH103						
Top Depth(m):	9.00						
Bottom Depth(m):	9.30						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 1.0	3	5	6
Loss on Ignition					--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH					--	>6	--
Acid Neutralisation Capacity					--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0003	0.0034	0.5	2	25
Barium	1455	U	0.012	0.12	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0014	0.014	0.5	10	70
Copper	1455	U	0.0017	0.017	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0007	0.0073	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0008	0.0078	0.06	0.7	5
Selenium	1455	U	0.0009	0.0090	0.1	0.5	7
Zinc	1455	U	0.003	0.032	4	50	200
Chloride	1220	U	1.1	11	800	15000	25000
Fluoride	1220	U	1.1	11	10	150	500
Sulphate	1220	U	3.7	37	1000	20000	50000
Total Dissolved Solids	1020	N	39	390	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	0.36

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1433814			BH102		A	Amber Glass 250ml
1433814			BH102		A	Amber Glass 60ml
1433814			BH102		A	Plastic Tub 500g
1433815			BH102		A	Amber Glass 250ml
1433815			BH102		A	Amber Glass 60ml
1433815			BH102		A	Plastic Tub 500g
1433816			BH103		A	Amber Glass 250ml
1433816			BH103		A	Amber Glass 60ml
1433816			BH103		A	Plastic Tub 500g
1433817			BH103		A	Amber Glass 250ml
1433817			BH103		A	Amber Glass 60ml
1433817			BH103		A	Plastic Tub 500g
1433818			BH103		A	Amber Glass 250ml
1433818			BH103		A	Amber Glass 60ml
1433818			BH103		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
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
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
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
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS

Test Methods

SOP	Title	Parameters included	Method summary
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
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.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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

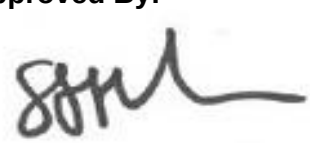
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-16300-1
Initial Date of Issue:	13-May-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	DAA Airfield Underpass

Quotation No.:	Q22-27411	**Date Received:**	03-May-2022
Order No.:		**Date Instructed:**	03-May-2022
No. of Samples:	2		
Turnaround (Wkdays):	7	**Results Due:**	11-May-2022
Date Approved:	13-May-2022	**Subcon Results Due:**	24-May-2022

Approved By:



Details: Stuart Henderson, Technical Manager

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Water

Project: DAA Airfield Underpass

Client: Causeway Geotech Ltd			**Chemtest Job No.:**	22-16300	22-16300
Quotation No.: Q22-27411			**Chemtest Sample ID.:**	1421449	1421450
			Sample Location:	BH107	BH105
			Sample Type:	WATER	WATER
			Top Depth (m):	0.00	0.00
			Date Sampled:	27-Apr-2022	28-Apr-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
PFAS in Waters (Subcon)	SN			0.0200000	See Attached	See Attached
pH	U	1010		N/A	7.5	7.8
Ammonia (Free)	N	1220	mg/l	0.050	< 0.050	< 0.050
Ammonium	U	1220	mg/l	0.050	0.91	0.30
Sulphate	U	1220	mg/l	1.0	5.2	31
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050
Arsenic (Dissolved)	U	1455	µg/l	0.20	1.0	1.2
Boron (Dissolved)	U	1455	µg/l	10.0	37	55
Cadmium (Dissolved)	U	1455	µg/l	0.11	0.13	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50	7.0
Copper (Dissolved)	U	1455	µg/l	0.50	3.2	2.2
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	µg/l	0.50	5.7	2.9
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	1.3	4.1
Zinc (Dissolved)	U	1455	µg/l	2.5	18	23
TPH >C6-C10	N	1670	µg/l	0.10	7.2	< 0.10
TPH >C10-C21	N	1670	µg/l	0.10	740	< 0.10
TPH >C21-C40	N	1670	µg/l	0.10	33	< 0.10
Total TPH >C6-C40	U	1670	µg/l	10	780	< 10
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) 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

eurofins | Omegam

Eurofins Chemtest Ltd
Attn. Mr. J. King
Depot Road 11
GB-CB8 0AL NEWMARKET
GROOT BRITTANIE

Your reference	:	22218
Our reference	:	Project 1349910
Validation Ref.	:	1349910_certificaat_v1
Verificationcode	:	HTNS-XQJY-YKIM-YGIF
Enclosure(s)	:	2 table(s) + 1 supplement(s)

Amsterdam, 13 May 2022

I hereby enclose the results of the laboratory tests that have been carried out on your request on the samples that you supplied to us.

I would like to point out to you that the results apply only to the samples supplied, such as these were presented for testing.

The research has been carried out according to the methods that are set out in the current accreditation certificate L086 and/or in the volume "Analysevoorschriften Eurofins Omegam". These protocols are, as far as possible, based on the NEN- EN- and/or ISO standards.

Do also note that the enclosed report may not be copied or reproduced in any way except in its entirety. I trust that we have completed your order as agreed and to your full satisfaction. If you have any questions reading this report, then please don't hesitate to contact our Customer Service.

Yours sincerely,
On behalf of Eurofins Omegam,



BSc J. Tukker
Production manager

Conditions of delivery of Eurofins Omegam have been registered.
This certificate may not be reproduced other than in full, except with the prior written approval of Eurofins Omegam.

Eurofins Omegam B.V.
H.J.E. Wenckebachweg 120
NL-1114 AD Amsterdam-Duivendrecht
Netherlands

T +31-(0)20-597 66 80

CSOmegam@eurofins.com
www.eurofins.nl/en

IBAN NL 16 BNPA 0227667980
Swiftaddress BNPANL2A
VAT: NL8139.67.132.B01
Trade register No. 34215654

CERTIFICATE

Project code	:	**1349910**
Your Project Description	:	**22218**
Client	:	**Eurofins Chemtest Ltd**

Your Sample identification
7169069 = 1421449
7169070 = 1421450

			BH107	BH105
Client sampling date	:		**27/04/2022**	**28/04/2022**
Date of receipt	:		**05/05/2022**	**05/05/2022**
Startdate	:		**05/05/2022**	**05/05/2022**
Reference number	:		**7169069**	**7169070**
Your Matrix	:		**Water**	**Water**
Organic compounds - per- and polyfluoroalkylsubstances (PFAS)				
Perfluorinated carboxylic acids:				
PFBA		µg/l	**< 0,03**	**< 0,02**
PFPeA		µg/l	**< 0,02**	**< 0,02**
PFHxA		µg/l	**< 0,02**	**< 0,02**
PFHpA		µg/l	**< 0,02**	**< 0,02**
PFOA linear		µg/l	**< 0,02**	**< 0,02**
PFOA branched		µg/l	**< 0,02**	**< 0,02**
PFNA		µg/l	**< 0,02**	**< 0,02**
PFDA		µg/l	**< 0,02**	**< 0,02**
PFUnDA		µg/l	**< 0,02**	**< 0,02**
PFDoDA		µg/l	**< 0,02**	**< 0,02**
PFTrDA		µg/l	**< 0,02**	**< 0,02**
PFTeDA		µg/l	**< 0,02**	**< 0,02**
PFHxDA		µg/l	**< 0,02**	**< 0,02**
PFODA		µg/l	**< 0,02**	**< 0,02**
Perfluorinated sulfonic acids:				
PFBS		µg/l	**< 0,02**	**< 0,02**
PFPeS		µg/l	**< 0,02**	**< 0,02**
PFHxS		µg/l	**< 0,02**	**< 0,02**
PFHpS		µg/l	**< 0,02**	**< 0,02**
PFOS linear		µg/l	**< 0,02**	**< 0,02**
PFOS branched		µg/l	**< 0,02**	**< 0,02**
PFDS		µg/l	**< 0,02**	**< 0,02**
Perfluorinated alkyl substances - precursors:				
4:2 FTS		µg/l	**< 0,05**	**< 0,05**
6:2 FTS		µg/l	**< 0,05**	**< 0,05**
8:2 FTS		µg/l	**< 0,1**	**< 0,1**
10:2 FTS		µg/l	**< 0,05**	**< 0,05**
PFOSA		µg/l	**< 0,02**	**< 0,02**
Perfluorinated alkyl substances - remainder:				
HPFHpA		µg/l	**< 0,5**	**< 0,5**
4H-PFUnDA		µg/l	**< 0,05**	**< 0,05**
8:2 FTUCA		µg/l	**< 0,05**	**< 0,05**
9Cl-PF3ONS (F53-B)		µg/l	**< 0,02**	**< 0,02**
ADONA		µg/l	**< 0,02**	**< 0,02**
EtFOSA		µg/l	**< 0,05**	**< 0,05**
EtFOSAA		µg/l	**< 0,02**	**< 0,02**
MeFBSA		µg/l	**< 0,02**	**< 0,02**
MeFOSAA		µg/l	**< 0,1**	**< 0,1**
P37DMOA		µg/l	**< 0,5**	**< 0,5**
PFBSA		µg/l	**< 0,02**	**< 0,02**
MeFOSA		µg/l	**< 0,05**	**< 0,05**
MeFBSAA		µg/l	**< 0,02**	**< 0,02**
8:2 DiPAP		µg/l	**< 0,1**	**< 0,1**
sum PFOA		µg/l	**0,03**	**0,03**
sum PFOS		µg/l	**0,03**	**0,03**

CERTIFICATE

Project code	:	**1349910**
Your Project Description	:	**22218**
Client	:	**Eurofins Chemtest Ltd**

Notes related to analyses

General comments

The following information has been provided by the client if applicable:
Project description, Sample identificaton, Client sampling date, Client Matrix, Sample depth, Pot number (Barcode), Field data, Field observations and sampling data. The client sampling date can affect the validity of the results.

Quantification of branched PFOS/POA is based on DIN 38414-14.

Summation of concentrations for group parameters
Summation is calculated according to AS3000 protocol, paragraph 2.5.2 and appendix 3.

Sample identification	:	**1421449**
Reference number	:	**7169069**
Results Note(s):		
perfluorobutanoic acid (PFBA):	-	Raised reporting limit because of interference by the matrix.

CERTIFICATE

Project code	:	**1349910**
Your Project Description	:	**22218**
Client	:	**Eurofins Chemtest Ltd**

Appendix Index PFAS

PFAS component	Full name PFAS component
10:2 FTS	10:2 FTS (10:2 Fluorotelomer sulfonic acid)
4:2 FTS	4:2 FTS (4:2 Fluorotelomer sulfonic acid)
4H-PFUnDA	4H-PFUnDA (2H,2H,3H,3H-Perfluoroundecanoic acid)
6:2 FTS	6:2 FTS (6:2 Fluorotelomer sulfonic acid)
8:2 DiPAP	8:2 DiPAP (8:2 Fluorotelomer phosphate diester)
8:2 FTS	8:2 FTS (8:2 Fluorotelomer sulfonic acid)
8:2 FTUCA	8:2 FTUCA (8:2 Fluorotelomer unsaturated carboxylic acid)
9Cl-PF3ONS (F53-B)	9Cl-PF3ONS (F53-B) (9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid)
ADONA	ADONA (ammonium 4,8-dioxa-3H-perfluorononanoate)
EtFOSA	EtFOSA (N-ethyl perfluorooctanesulfonamide)
EtFOSAA	EtFOSAA (perfluorooctanesulfonylamide(N-ethyl)acetate)
HPFHpA	HPFHpA (7H-perfluoroheptanoic acid)
MeFBSA	MeFBSA (N-methylperfluorobutanesulfonylamide)
MeFBSAA	MeFBSAA (perfluorobutanesulfonylamide(N-methyl)acetate)
MeFOSA	MeFOSA (N-methyl perfluorooctanesulfonamide)
MeFOSAA	MeFOSAA (N-methyl perfluorooctanesulfonamidoacetic acid)
P37DMOA	P37DMOA (perfluoro-3,7-dimethyloctanoic acid)
PFBA	PFBA (perfluorobutanoic acid)
PFBS	PFBS (perfluorobutanesulfonic acid)
PFBSA	PFBSA (perfluorobutanesulfonamide)
PFDA	PFDA (perfluorodecanoic acid)
PFDoDA	PFDoDA (perfluorododecanoic acid)
PFDS	PFDS (perfluorodecanesulfonic acid)
PFHpA	PFHpA (perfluoroheptanoic acid)
PFHpS	PFHpS (perfluoroheptanesulfonic acid)
PFHxA	PFHxA (perfluorohexanoic acid)
PFHxDA	PFHxDA (perfluorohexadecanoic acid)
PFHxS	PFHxS (perfluorohexanesulfonic acid)
PFNA	PFNA (perfluorononanoic acid)
PFOA branched	PFOA branched (perfluorooctanoic acid)
PFOA linear	PFOA lineair (perfluorooctanoic acid)
PFODA	PFODA (perfluorooctadecanoic acid)
PFOS branched	PFOS branched (perfluorooctanesulfonic acid)
PFOS linear	PFOS lineair (perfluorooctanesulfonic acid)
PFOSA	PFOSA (perfluorooctanesulfonamide)
PFPeA	PFPeA (perfluoropentanoic acid)
PFPeS	PFPeS (perfluoropentanesulfonic acid)
PFTeDA	PFTeDA (perfluorotetradecanoic acid)
PFTrDA	PFTrDA (perfluorotridecanoic acid)
PFUnDA	PFUnDA (perfluoroundecanoic acid)

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Eurofins Chemtest Ltd
Attn. Mr. J. King
Depot Road 11
GB-CB8 0AL NEWMARKET
GROOT BRITTANIE

Your reference	:	22218
Our reference	:	Project 1349910 (concerns updated certificate)
Validation Ref.	:	1349910_certificaat_v2
Verificationcode	:	HTNS-XQJY-YKIM-YGIF
Modification	:	20/5 Monster omshriving aangepast van 1421449 naar 1421449/1421449 / BH107 en1421450 naar1421450 / BH105
Enclosure(s)	:	2 table(s) + 1 supplement(s)

Amsterdam, 20 May 2022

I hereby enclose the results of the laboratory tests that have been carried out on your request on the samples that you supplied to us.

I would like to point out to you that the results apply only to the samples supplied, such as these were presented for testing.

The research has been carried out according to the methods that are set out in the current accreditation certificate L086 and/or in the volume "Analysevoorschriften Eurofins Omegam". These protocols are, as far as possible, based on the NEN- EN- and/or ISO standards.

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Yours sincerely,
On behalf of Eurofins Omegam,



BSc J. Tukker
Production manager

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IBAN NL 16 BNPA 0227667980
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Trade register No. 34215654

CERTIFICATE

Project code	:	**1349910**
Your Project Description	:	**22218**
Client	:	**Eurofins Chemtest Ltd**

Your Sample identification
7169069 = 1421449/BH107
7169070 = 1421450/BH105

			BH107	BH105
Client sampling date	:		**27/04/2022**	**28/04/2022**
Date of receipt	:		**05/05/2022**	**05/05/2022**
Startdate	:		**05/05/2022**	**05/05/2022**
Reference number	:		**7169069**	**7169070**
Your Matrix	:		**Water**	**Water**
Organic compounds - per- and polyfluoroalkylsubstances (PFAS)				
Perfluorinated carboxylic acids:				
PFBA		µg/l	**< 0,03**	**< 0,02**
PFPeA		µg/l	**< 0,02**	**< 0,02**
PFHxA		µg/l	**< 0,02**	**< 0,02**
PFHpA		µg/l	**< 0,02**	**< 0,02**
PFOA linear		µg/l	**< 0,02**	**< 0,02**
PFOA branched		µg/l	**< 0,02**	**< 0,02**
PFNA		µg/l	**< 0,02**	**< 0,02**
PFDA		µg/l	**< 0,02**	**< 0,02**
PFUnDA		µg/l	**< 0,02**	**< 0,02**
PFDoDA		µg/l	**< 0,02**	**< 0,02**
PFTrDA		µg/l	**< 0,02**	**< 0,02**
PFTeDA		µg/l	**< 0,02**	**< 0,02**
PFHxDA		µg/l	**< 0,02**	**< 0,02**
PFODA		µg/l	**< 0,02**	**< 0,02**
Perfluorinated sulfonic acids:				
PFBS		µg/l	**< 0,02**	**< 0,02**
PFPeS		µg/l	**< 0,02**	**< 0,02**
PFHxS		µg/l	**< 0,02**	**< 0,02**
PFHpS		µg/l	**< 0,02**	**< 0,02**
PFOS linear		µg/l	**< 0,02**	**< 0,02**
PFOS branched		µg/l	**< 0,02**	**< 0,02**
PFDS		µg/l	**< 0,02**	**< 0,02**
Perfluorinated alkyl substances - precursors:				
4:2 FTS		µg/l	**< 0,05**	**< 0,05**
6:2 FTS		µg/l	**< 0,05**	**< 0,05**
8:2 FTS		µg/l	**< 0,1**	**< 0,1**
10:2 FTS		µg/l	**< 0,05**	**< 0,05**
PFOSA		µg/l	**< 0,02**	**< 0,02**
Perfluorinated alkyl substances - remainder:				
HPFHpA		µg/l	**< 0,5**	**< 0,5**
4H-PFUnDA		µg/l	**< 0,05**	**< 0,05**
8:2 FTUCA		µg/l	**< 0,05**	**< 0,05**
9Cl-PF3ONS (F53-B)		µg/l	**< 0,02**	**< 0,02**
ADONA		µg/l	**< 0,02**	**< 0,02**
EtFOSA		µg/l	**< 0,05**	**< 0,05**
EtFOSAA		µg/l	**< 0,02**	**< 0,02**
MeFBSA		µg/l	**< 0,02**	**< 0,02**
MeFOSAA		µg/l	**< 0,1**	**< 0,1**
P37DMOA		µg/l	**< 0,5**	**< 0,5**
PFBSA		µg/l	**< 0,02**	**< 0,02**
MeFOSA		µg/l	**< 0,05**	**< 0,05**
MeFBSAA		µg/l	**< 0,02**	**< 0,02**
8:2 DiPAP		µg/l	**< 0,1**	**< 0,1**
sum PFOA		µg/l	**0,03**	**0,03**
sum PFOS		µg/l	**0,03**	**0,03**

CERTIFICATE

Project code	:	**1349910**
Your Project Description	:	**22218**
Client	:	**Eurofins Chemtest Ltd**

Notes related to analyses

General comments

The following information has been provided by the client if applicable:
Project description, Sample identificaton, Client sampling date, Client Matrix, Sample depth, Pot number (Barcode), Field data, Field observations and sampling data. The client sampling date can affect the validity of the results.

Quantification of branched PFOS/POA is based on DIN 38414-14.

Summation of concentrations for group parameters
Summation is calculated according to AS3000 protocol, paragraph 2.5.2 and appendix 3.

Sample identification	:	**1421449/BH107**
Reference number	:	**7169069**
Results Note(s): perfluorobutanoic acid (PFBA):	-	Raised reporting limit because of interference by the matrix.

CERTIFICATE

Project code	:	**1349910**
Your Project Description	:	**22218**
Client	:	**Eurofins Chemtest Ltd**

Appendix Index PFAS

PFAS component	Full name PFAS component
10:2 FTS	10:2 FTS (10:2 Fluorotelomer sulfonic acid)
4:2 FTS	4:2 FTS (4:2 Fluorotelomer sulfonic acid)
4H-PFUnDA	4H-PFUnDA (2H,2H,3H,3H-Perfluoroundecanoic acid)
6:2 FTS	6:2 FTS (6:2 Fluorotelomer sulfonic acid)
8:2 DiPAP	8:2 DiPAP (8:2 Fluorotelomer phosphate diester)
8:2 FTS	8:2 FTS (8:2 Fluorotelomer sulfonic acid)
8:2 FTUCA	8:2 FTUCA (8:2 Fluorotelomer unsaturated carboxylic acid)
9Cl-PF3ONS (F53-B)	9Cl-PF3ONS (F53-B) (9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid)
ADONA	ADONA (ammonium 4,8-dioxa-3H-perfluorononanoate)
EtFOSA	EtFOSA (N-ethyl perfluorooctanesulfonamide)
EtFOSAA	EtFOSAA (perfluorooctanesulfonylamide(N-ethyl)acetate)
HPFHpA	HPFHpA (7H-perfluoroheptanoic acid)
MeFBSA	MeFBSA (N-methylperfluorobutanesulfonylamide)
MeFBSAA	MeFBSAA (perfluorobutanesulfonylamide(N-methyl)acetate)
MeFOSA	MeFOSA (N-methyl perfluorooctanesulfonamide)
MeFOSAA	MeFOSAA (N-methyl perfluorooctanesulfonamidoacetic acid)
P37DMOA	P37DMOA (perfluoro-3,7-dimethyloctanoic acid)
PFBA	PFBA (perfluorobutanoic acid)
PFBS	PFBS (perfluorobutanesulfonic acid)
PFBSA	PFBSA (perfluorobutanesulfonamide)
PFDA	PFDA (perfluorodecanoic acid)
PFDoDA	PFDoDA (perfluorododecanoic acid)
PFDS	PFDS (perfluorodecanesulfonic acid)
PFHpA	PFHpA (perfluoroheptanoic acid)
PFHpS	PFHpS (perfluoroheptanesulfonic acid)
PFHxA	PFHxA (perfluorohexanoic acid)
PFHxDA	PFHxDA (perfluorohexadecanoic acid)
PFHxS	PFHxS (perfluorohexanesulfonic acid)
PFNA	PFNA (perfluorononanoic acid)
PFOA branched	PFOA branched (perfluorooctanoic acid)
PFOA linear	PFOA lineair (perfluorooctanoic acid)
PFODA	PFODA (perfluorooctadecanoic acid)
PFOS branched	PFOS branched (perfluorooctanesulfonic acid)
PFOS linear	PFOS lineair (perfluorooctanesulfonic acid)
PFOSA	PFOSA (perfluorooctanesulfonamide)
PFPeA	PFPeA (perfluoropentanoic acid)
PFPeS	PFPeS (perfluoropentanesulfonic acid)
PFTeDA	PFTeDA (perfluorotetradecanoic acid)
PFTrDA	PFTrDA (perfluorotridecanoic acid)
PFUnDA	PFUnDA (perfluoroundecanoic acid)

Southern Testing
Environmental & Geotechnical

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref:	0208
Test Date:	12/02/2022
Report Date:	14/02/2022
File Name:	0208.spt
Test Operator:	NPB

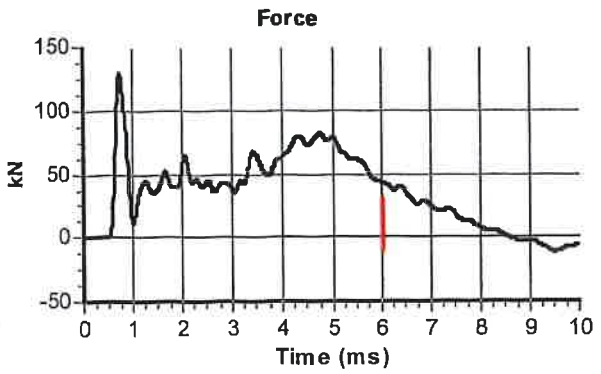
Instrumented Rod Data

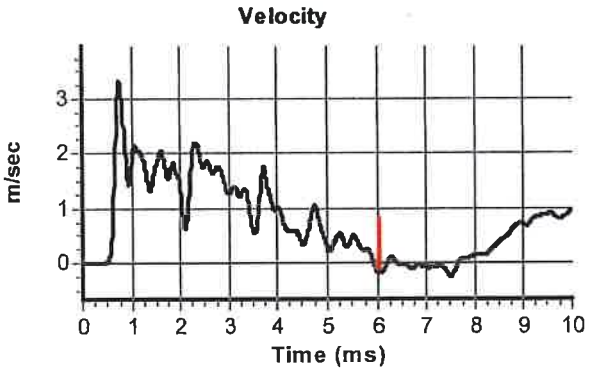
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	64786
Accelerometer No.2:	64789

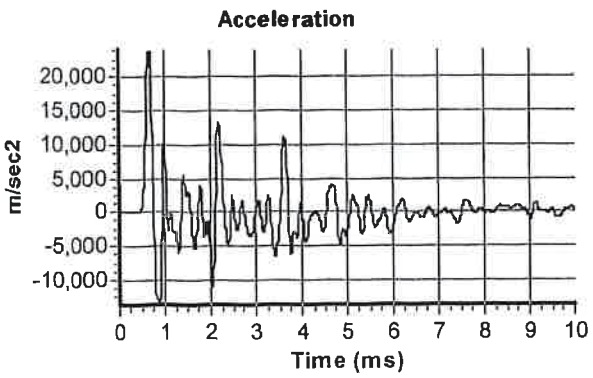
SPT Hammer Information

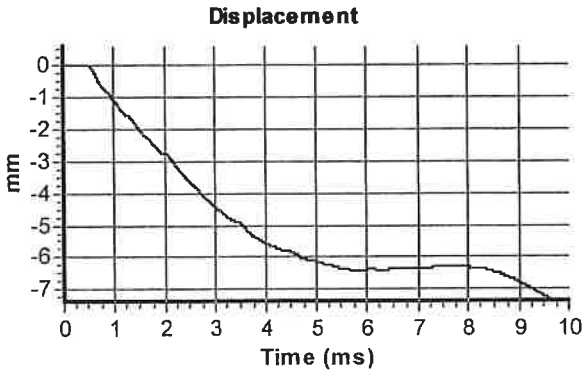
Hammer Mass m (kg):	63.0
Falling Height h (mm):	760
SPT String Length L (m):	12.0

Comments / Location
CAUSEWAY









Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	357

Energy Ratio E_r (%): **76**

N Burrows

Signed: N Burrows
Title: FOC Manager

The recommended calibration interval is 12 months

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Southern Testing
Environmental & Geotechnical

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref:	0643
Test Date:	12/02/2022
Report Date:	14/02/2022
File Name:	0643.spt
Test Operator:	NPB

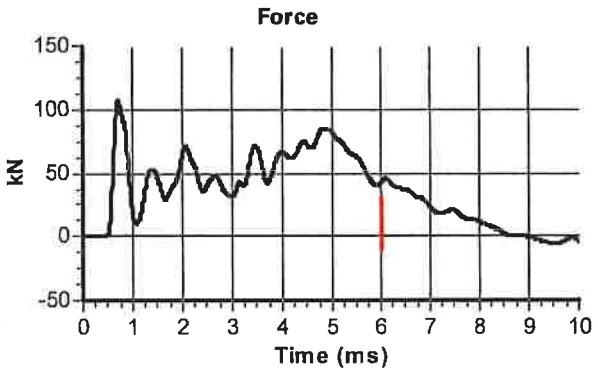
Instrumented Rod Data

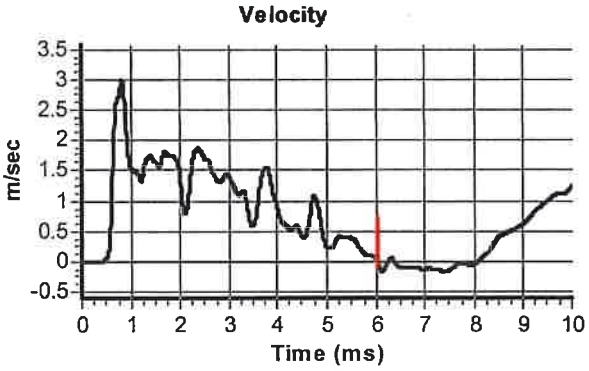
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	64786
Accelerometer No.2:	64789

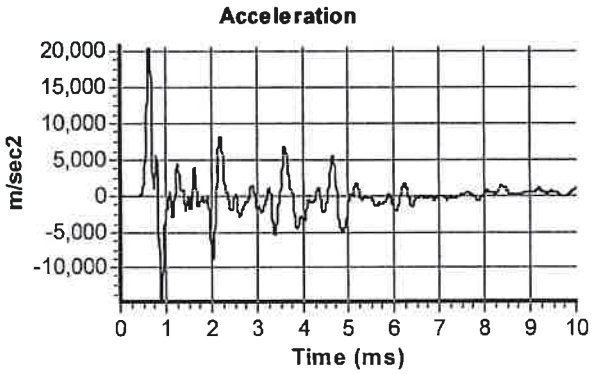
SPT Hammer Information

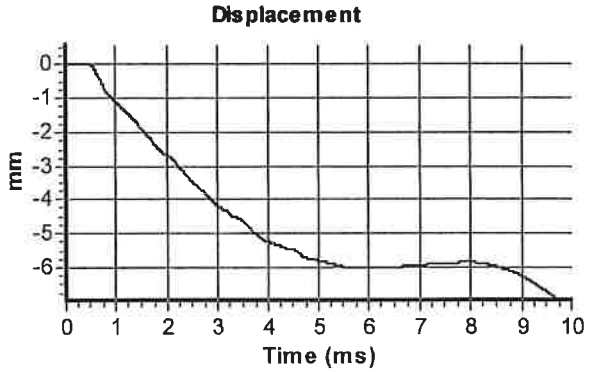
Hammer Mass m (kg):	63.0
Falling Height h (mm):	760
SPT String Length L (m):	12.0

Comments / Location
CAUSEWAY









Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	340

Energy Ratio E_r (%): 72

The recommended calibration interval is 12 months

N Burrows

Signed: N Burrows
Title: FOC Manager

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Southern Testing
Environmental & Geotechnical

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref:	1387
Test Date:	12/02/2022
Report Date:	14/02/2022
File Name:	1387.spt
Test Operator:	NPB

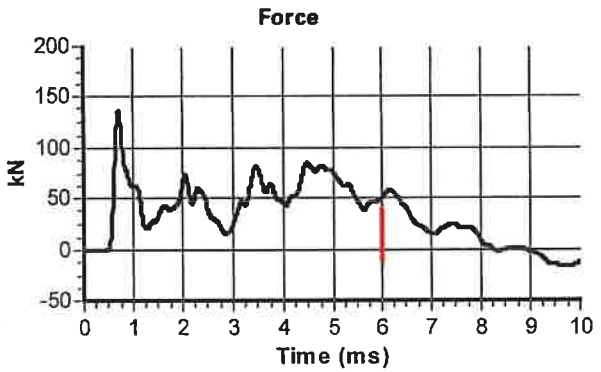
Instrumented Rod Data

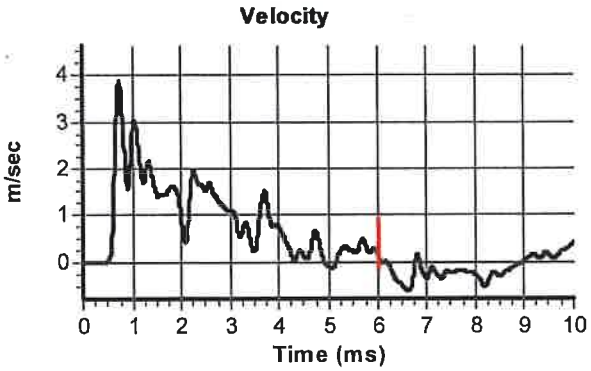
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	64786
Accelerometer No.2:	64789

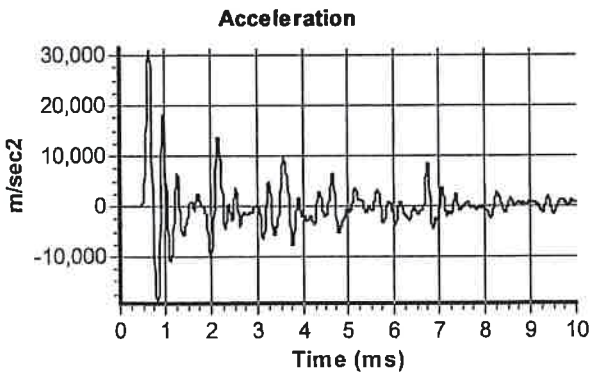
SPT Hammer Information

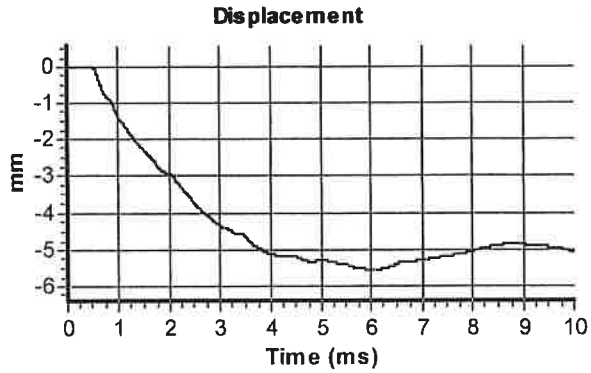
Hammer Mass m (kg):	63.0
Falling Height h (mm):	760
SPT String Length L (m):	12.0

Comments / Location
CAUSEWAY









Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	308

Energy Ratio E_r (%): **65**

The recommended calibration interval is 12 months

Signed: N Burrows
Title: FOC Manager

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CAUSEWAY GEOTECH

APPENDIX G

SPT HAMMER ENERGY MEASUREMENT REPORT

