Appendix 10-6: Ground investigation Ireland additional airfield boreholes ground investigation report

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Ground Investigations Ireland

Additional Airfield Boreholes

Ground Investigation Report

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GROUND INVESTIGATIONS IRELAND

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1.0 Preamble

On the instructions of Balfour Beatty Infrastructure Group, a site investigation was carried out by Ground Investigations Ireland Ltd., between May and June 2018 at a number of locations on the Airside Section of Dublin Airport.

2.0 Overview

2.1. Background

The Ground Investigation was carried out to assist in the design of future works being carried out on this section of the airport.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 6 No. Cable Percussion boreholes to a maximum depth of 7.0m BGL
- Carry out 6 No. Rotary Core Boreholes to a maximum depth of 38.0m BGL
- Geotechnical & Environmental Laboratory testing
- Factual Report

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled at the locations shown in Appendix 1. The borehole were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.

The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata.
Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 2 of this Report.

3.3. Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the ground surface or alternatively, where noted on the individual borehole log, from the base of the cable percussion borehole where a temporary liner was installed to facilitate follow-on rotary coring.
The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the "overshoot" recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit, and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids.
It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are

provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 2 of this Report.

3.4. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Environmental testing, including Waste Acceptance Criteria (WAC) testing was carried out by Jones Environmental Laboratory in the UK.
Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer, California Bearing Ratio (CBR), Moisture Condition Value (MCV) and pH and sulphate tests were carried out in GSTL's Geotechnical Laboratory in Wales. Specialist shear strength testing consisting of quick undrained triaxial testing was also carried out in GSTL's Geotechnical Laboratory in Wales.
Rock testing consisting of point load and uniaxial compression tests were carried out in the Geotechnical Laboratory of Trinity College, Dublin.
The results of the laboratory testing are included in Appendix 3 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and are generally comprised;

- Made Ground
- Cohesive Deposits
- Granular Deposits
- Residual Report
- Weathered Rock
- Bedrock

MADE GROUND: Made Ground deposits were encountered in BH04 and was present to a maximum depth of 2.0m BGL across the site. These deposits were described generally as *brown sandy slightly gravelly CLAY with frequent cobbles and boulders.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground to a maximum depth of 28.70m BGL and were described typically as *brown sandy gravelly CLAY with occasional cobbles and boulders* overlying a *stiff dark brown/grey sandy gravelly CLAY with occasional cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses

occasionally present in the glacial till matrix. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: Two Types of granular deposits were encountered in a number of the boreholes. In BH02A a *brown fine SAND* was found interlaminated with the *stiff thinly laminated CLAY* between 22.10 to 22.70m BGL and again between 26.70m and 27.20m BGL. In BH03 a *brown fine SAND* was found *interlaminated with the stiff thinly laminated CLAY* between 8.60m and 13.90m BGL. In BH05 a *very dense brown sandy clayey sub-angular to sub-rounded fine to coarse GRAVEL with occasional sub-rounded cobbles* was encountered between 15.0m to 17.30m BGL

RESIDUAL ROCK: Residual rock was recovered in BH06 to a maximum depth of 27.50m BGL and was typically described as a *very stiff brown with orange and black mottling slightly sandy CLAY with relic bedding and occasional angular cobbles* or as *angular cobbles and boulders in a brown sandy CLAY matrix.* The secondary sand and gravel constituents varied across the site and with depth, with lenses of Sand occurring throughout the sequence

WEATHERED ROCK: Weathered rock was recovered in BH06 between 21.20m to 24.50m BGL where it was found interbedded with the residual rock sequence. The weathered rock was typically described as a *weak to medium strong laminated grey fine grained LIMESTONE distinctly weathered*.

BEDROCK: Bedrock was encountered in all the boreholes to a maximum depth of 38.0m BGL. The bedrock was typically encountered beneath the cohesive deposits with the exception of BH06 where it was encountered beneath the residual rock sequence. The bedrock was typically described as a *Medium strong to strong laminated grey fine grained LIMESTONE partially to distinctly weathered.*

4.2. Groundwater

No groundwater was noted during the investigation however we would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the time of year, rainfall, nearby construction and other factors.

APPENDIX 1 - Site Location Plan

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General Notes

NOTE:
THE INFORMATION SHOWN ON THIS PLAN IS A GENERAL GUIDE AND THE ACCURACY THEREOF CANNOT BE GUARANTEED.

DRAWINGS ARE AMALGAMATION OF HISTORICAL RECORD DRAWINGS, DESIGN DRAWINGS AND AS BUILT DRAWINGS. REDUNDANT SERVICES MAY BE SHOWN IN SOME INSTANCES.

NO LIABILITY IS ACCEPTED FOR ANY DISCREPANCY, OMISSION OR DEVIATION AND THE ACTUAL POSITIONS OF MAINS AND SERVICES MUST BE VERIFIED AND ESTABLISHED ON SITE BEFORE ANY MECHANICAL EXCAVATING PLANT IS USED.

Legend

BH1 Borehole Location

STATUS

Rev	Description	Issued By	Date
SK	Information	JM	May 18

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PROJECT:
daa
Dublin Airport
CIP2020

TITLE:
Proposed Borehole Locations

Drawn By:		Checked By:		Approved:
CAD	Designer	Discp. Lead	Design Lead	Design Manager
JM	JM			

Date: May 2018 | Scale : NTS | A1 | Stage: Information

Drawing No.: D18011-SK-001 | Rev: 04

APPENDIX 2 - Borehole Records

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Site Additional Airfield Boreholes			**Borehole Number** BH01
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S	**Casing Diameter** 200mm cased to 3.50m 102mm cased to 32.70m	**Ground Level (mOD)** 64.02	**Client** DAA	**Job Number** 7687-04-18
	Location 315950.6 E 242860.5 N	**Dates** 21/05/2018	**Engineer** Balfour Beatty	**Sheet** 1/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(1.20)	Open Hole - Air Excavation		
1.20-1.65 1.20-1.20					1,1/1,2,2,2 SPT(C) N=7 B	62.82	1.20 (0.60)	Stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
2.00-2.45 2.00-2.00					3,6/7,7,7,8 SPT(C) N=29 B	62.22	1.80 (1.20)	Stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
3.00-3.30 3.00-3.00					1,8/13,11,26 SPT(C) 50/150 B	61.02	3.00 (0.50)	Very stiff black slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
3.50	100					60.52	3.50	Very stiff dark grey/brown slightly sandy gravelly CLAY with frequent sub-rounded cobbles and occasional boulders. Gravel is fine to coarse sub-angular to sub-rounded		
4.30 4.30-4.45	100				16,17/50 SPT(C) 50/0					
5.80 5.80-5.95	100				19,25/50 SPT(C) 50/0		(5.90)			
7.30 7.30-7.45	100				20,25/50 SPT(C) 50/0					
8.80 8.80-85.00	100				27,25/50 SPT(C) 50/0	54.62	9.40	Very stiff brown slightly sandy gravelly CLAY with frequent sub-rounded cobbles and occasional boulders. Gravel is fine to coarse sub-angular to sub-rounded		

Remarks
Cable Percussion borehole terminated due to Obstrction - Presumed Boulder
Geobore S techniques carried out from 3.50m to 32.70m BGL
Borehole backfilled upon completion with bentonite grout
Chiselling from 3.30m to 3.50m for 1 hour.

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH01

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Site Additional Airfield Boreholes			**Borehole Number** BH01
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S	**Casing Diameter** 200mm cased to 3.50m 102mm cased to 32.70m	**Ground Level (mOD)** 64.02	**Client** DAA	**Job Number** 7687-04-18
	Location 315950.6 E 242860.5 N	**Dates** 21/05/2018	**Engineer** Balfour Beatty	**Sheet** 2/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.30 10.30-10.45	93				19,25/50 SPT(C) 50/0					
11.80 11.80-11.95	100				22,25/50 SPT(C) 50/0		(6.10)			
13.30 13.30-13.45	100				25,25/50 SPT(C) 50/0					
14.80 14.80-14.95	100				27,25/50 SPT(C) 50/0	48.52	15.50	Very stiff dark grey/brown slightly sandy gravelly CLAY with frequent sub-rounded cobbles and boulders. Gravel is fine to coarse sub-angular to sub-rounded		
16.30 16.30-16.45	100				24,25/50 SPT(C) 50/0					
17.80 17.80-17.95	100				25,25/50 SPT(C) 50/0		(5.30)	.....Lense of brown sandy clayey fine to coarse sub-angular to sub-rounded GRAVEL occurs between 17.85m to 18.35m BGL		
19.30 19.30-19.45					25,25/50 SPT(C) 50/0					

Remarks

Scale (approx)	Logged By
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Figure No. 7687-04-18.BH01

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Site Additional Airfield Boreholes			**Borehole Number** BH01
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S	**Casing Diameter** 200mm cased to 3.50m 102mm cased to 32.70m	**Ground Level (mOD)** 64.02	**Client** DAA	**Job Number** 7687-04-18
	Location 315950.6 E 242860.5 N	**Dates** 21/05/2018	**Engineer** Balfour Beatty	**Sheet** 3/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	100									
20.80 20.80-20.95	100				25,25/50 SPT(C) 50/0	43.22	20.80	Very stiff dark grey/black slightly sandy gravelly CLAY with frequent sub-rounded cobbles and occasional boulders. Gravel is fine to coarse sub-angular to sub-rounded		
22.30 22.30-22.45	100				25,25/50 SPT(C) 50/0					
23.80 23.80-23.95	100				25,25/50 SPT(C) 50/0		(7.50)			
25.30 25.30-25.45	100				25,25/50 SPT(C) 50/0					
26.80 26.80-26.95	100				25,25/50 SPT(C) 50/0					
28.30	100	87	18	16		35.72	28.30	Medium strong thinly bedded grey fine to medium LIMESTONE partially to distinctly weathered with calcite veins. Interbedded with a weak to medium strong thickly laminated MUDSTONE partially to distinctly weathered Sequence contains one set of fratures. F1 are very close to closely spaced, dipping between 10-30 degrees, planar to stepped rough with some surface staining and clay infilling		
29.80							(3.00)			

Remarks

Scale (approx)	Logged By
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Figure No. 7687-04-18.BH01

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Site Additional Airfield Boreholes			**Borehole Number** BH01
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S	**Casing Diameter** 200mm cased to 3.50m 102mm cased to 32.70m	**Ground Level (mOD)** 64.02	**Client** DAA	**Job Number** 7687-04-18
	Location 315950.6 E 242860.5 N	**Dates** 21/05/2018	**Engineer** Balfour Beatty	**Sheet** 4/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	100	88	26							
31.30	100	52	7	NI		32.72	31.30 (1.40)	Medium strong thinly bedded grey fine to medium LIMESTONE partially to distinctly weathered with calcite veins. Interbedded with a weak to medium strong thickly laminated MUDSTONE partially to distinctly weathered Non Intact		
32.70						31.32	32.70	Complete at 32.70m		

Remarks

Scale (approx)	Logged By
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Figure No. 7687-04-18.BH01

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Site Additional Airfield Boreholes			**Borehole Number** BH02
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 5.40m	**Ground Level (mOD)** 62.30	**Client** DAA	**Job Number** 7687-04-18
	Location 316328.6 E 242937.8 N	**Dates** 16/05/2018-21/05/2018	**Engineer** Balfour Beatty	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(1.20)	OPEN HOLE - Air Excavation		
1.50-1.95 1.50	SPT(C) N=5 B			1,1/1,1,1,1,2	61.10	1.20 (0.70)	Soft to firm brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
2.50-2.95 2.50	SPT(C) N=38 B			3,5/5,9,10,14	60.40	1.90 (1.60)	Very stiff brown slightly sandy gravelly CLAY with ocasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
3.50-3.88 3.50	SPT(C) 50/225 B			6,7/9,12,21,8	58.80	3.50 (1.50)	Very stiff brown slightly sandy gravelly CLAY with ocasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
4.50-4.65 4.50	SPT(C) 50/0 B			25,25/50	57.30	5.00 (2.00)	Very stiff black slightly sandy gravelly CLAY with ocasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
5.40-5.85 5.40	SPT(C) N=50 B			25,25/50	55.30	7.00	Complete at 7.00m		

Remarks
Air excavations carried out to 1.20m BGL
Borehole terminated due to Obstrction - Presumed Boulder
Chiselling from 5.20m to 5.40m for 1 hour.

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH02

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Site Additional Airfield Boreholes			**Borehole Number** BH02A
Machine : Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Rotary Cored	**Casing Diameter** 102mm cased to 28.70m 64mm cased to 33.50m	**Ground Level (mOD)** 62.27	**Client** DAA	**Job Number** 7687-04-18
	Location 316329 E 242933.5 N	**Dates** 25/05/2018-29/05/2018	**Engineer** Balfour Beatty	**Sheet** 1/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(1.00)	OPEN HOLE		
1.00	40					61.27	1.00 (0.70)	Firm brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
1.70	93					60.57	1.70 (1.50)	Firm brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded .....Lense of brown sandy clayey fine to coarse sub-angular to sub-rounded GRAVEL occurs between 1.70m to 2.40m BGL		
3.20 3.20-3.35	100				19,25/50 SPT(C) 50/0	59.07	3.20 (1.50)	Very stiff dark brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
4.70 5.20-5.35	86				25,25/50 SPT(C) 50/0	57.57	4.70	Very stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
6.20 6.20-6.35	100				25,25/50 SPT(C) 50/0					
7.70 7.70-7.85	100				25,25/50 SPT(C) 50/0		(6.00)			
9.20 9.20-9.35	100				25,25/50 SPT(C) 50/0					

Remarks
Borehole carried out from ground level
Air excavtion carried out to 1.0m BGL to avoid serivces
Geobore S techniques carried out to 28.70m BGL and Conventional HQ Rotary techniques carried out 33.50m BGL
Borehole backfilled upon completion

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH02A

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Site Additional Airfield Boreholes			**Borehole Number** BH02A
Machine : Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Rotary Cored	**Casing Diameter** 102mm cased to 28.70m 64mm cased to 33.50m	**Ground Level (mOD)** 62.27	**Client** DAA	**Job Number** 7687-04-18
	Location 316329 E 242933.5 N	**Dates** 25/05/2018-29/05/2018	**Engineer** Balfour Beatty	**Sheet** 2/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						51.57	10.70			
10.70 10.70-10.85	100				25,25/50 SPT(C) 50/0			Very stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
							(3.00)			
12.20 12.20-12.35	70				25,25/50 SPT(C) 50/0			....Brown slightly clayey sandy fine to coarse GRAVEL between 12.95m - 13.25m BGL		
						48.57	13.70			
13.70 13.70-13.85	96				25,25/50 SPT(C) 50/0			Very stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles and boulders. Gravel is fine to coarse sub-angular to sub-rounded		
							(1.48)			
						47.09	15.18			
15.20 15.20-15.35	100				25,25/50 SPT(C) 50/0			Very stiff dark brown/grey sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
16.70 16.70-16.85	100				25,25/50 SPT(C) 50/0					
18.00 18.20-18.35	100				25,25/50 SPT(C) 50/0					
							(6.92)			
19.70 19.70-19.85					25,25/50 SPT(C) 50/0					

Remarks

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH02A

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Site Additional Airfield Boreholes			**Borehole Number** BH02A
Machine : Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Rotary Cored	**Casing Diameter** 102mm cased to 28.70m 64mm cased to 33.50m	**Ground Level (mOD)** 62.27	**Client** DAA	**Job Number** 7687-04-18
	Location 316329 E 242933.5 N	**Dates** 25/05/2018-29/05/2018	**Engineer** Balfour Beatty	**Sheet** 3/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	95									
21.20	95					40.17	22.10	Very stiff thinly laminated dark brown slightly gravelly CLAY interlaiminated with a brown fine SAND		
							(0.60)			
22.70	100					39.57	22.70	Very stiff dark brown/grey sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
24.20	100						(4.00)			
25.70	100					35.57	26.70	Very stiff dark brown/grey sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded		
							(0.50)			
27.20	96					35.07	27.20	Very stiff dark brown/grey sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
							(1.50)			
28.70	100	66	50			33.57	28.70	Medium strong to strong thinly bedded grey fine to medium grained LIMESTONE partially weathered. Interbedded with a black thickly laminated fine grained MUDSTONE		
30.00										

Remarks

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH02A

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Site	Borehole Number
Additional Airfield Boreholes	BH02A

Machine	Casing Diameter	Ground Level (mOD)	Client	Job Number
Beretta T44	102mm cased to 28.70m 64mm cased to 33.50m	62.27	DAA	7687-04-18
Flush : Polymer				
Core Dia : 102&64 mm	**Location**	**Dates**	**Engineer**	**Sheet**
Method : Rotary Cored	316329 E 242933.5 N	25/05/2018- 29/05/2018	Balfour Beatty	4/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	93	68	36	7			(2.80)	Sequence contains two sets of fractures. F1 are very close to closely spaced dipping between 10-20 degrees, undulating to planar smooth with some clay infilling. F2 are close to medium spaced, dipping between 60-70 degrees, undulating to stepped rough with some clay smearing. Non Intact Zone between 29.45m - 29.70m BGL		
31.50						30.77	31.50			
31.70	97	71	52	7			(2.00)	Medium strong to strong thinly bedded grey fine to medium grained LIMESTONE partially weathered. Interbedded with a black thickly laminated fine grained MUDSTONE Sequence contains two sets of fractures. F1 are very close to mediumspaced dipping between 10-20 degrees, undulating to planar smooth with some clay infilling. F2 are widely spaced, dipping between 60-70 degrees, undulating to stepped rough with some clay smearing. Non Intact Zone between 31.70m to 31.80m BGL		
33.50						28.77	33.50	Complete at 33.50m		

Remarks

Scale (approx)	Logged By
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Figure No. 7687-04-18.BH02A

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Site Additional Airfield Boreholes			**Borehole Number** BH03
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S	**Casing Diameter** 200mm cased to 3.10m 102mm cased to 22.50m	**Ground Level (mOD)**	**Client** DAA	**Job Number** 7687-04-18
	Location 315805.4 E 243177.1 N	**Dates** 15/05/2018-19/06/2018	**Engineer** Balfour Beatty	**Sheet** 1/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(1.20)	OPEN HOLE - Air Excavation		
1.20					B		1.20			
1.50-1.95					4,4/3,3,3,3 SPT(C) N=12		(0.90)	Firm brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
1.50					B		2.10			
	100							Very stiff dark brown/grey slightly sandy gravelly CLAY with ocasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
2.50-2.80					7,8/11,12,27 SPT(C) 50/150		(1.00)			
2.50					B		3.10			
								Very stiff dark brown slightly sandy gravelly CLAY with ocasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
4.50										
4.50-4.80					5,7/12,14,24 SPT(C) 50/150					
	100									
							(5.50)			
6.00										
6.20-6.35					21,25/50 SPT(C) 50/0					
	100									
7.50										
7.50-7.65					25,25/50 SPT(C) 50/0					
	88									
							8.60			
								Very dense brown slightly silty fine to coare SAND		
9.00										
9.00-9.45					5,6/7,6,7,8 SPT(C) N=28					
							(1.65)			
	97									

Remarks
Air excavations carried out to 1.20m BGL
Cable percsuuion borehole terminated due to Obstrction - Presumed Boulder
Borehlole backfilled with bentonite upon completion
Chiselling from 3.00m to 3.10m for 1 hour.

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH03

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Site Additional Airfield Boreholes			**Borehole Number** BH03
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S	**Casing Diameter** 200mm cased to 3.10m 102mm cased to 22.50m	**Ground Level (mOD)**	**Client** DAA	**Job Number** 7687-04-18
	Location 315805.4 E 243177.1 N	**Dates** 15/05/2018-19/06/2018	**Engineer** Balfour Beatty	**Sheet** 2/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							10.25			
10.50 10.50-10.88	94				8,11/11,12,14,13 SPT(C) 50/225		(0.65) 10.90	Very stiff brown sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded		
							(0.70) 11.60	Very stiff brown laminated CLAY with lenses of brown fine to medium SAND		
12.00 12.00-12.38	93				10,11/12,14,14,10 SPT(C) 50/225		(0.55) 12.15 (0.35) 12.50	Very dense brown slightly silty fine to coarse SAND Very stiff dark brown gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
							(0.90)	Very stiff dark brown slightly gravelly CLAY with lenses of brown fine SAND		
13.50 13.50-13.65	85				14,21/50 SPT(C) 50/0		13.40 13.50 (0.30) 13.80 13.90	Very dense brown fine to caorse SAND Very stiff brown slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded Very dense brown fine to medium SAND		
							(1.10)	Very stiff brown very sandy slightly gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded		
15.00 15.00-15.15	100				24,25/50 SPT(C) 50/0		15.00	Very stiff brown sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded		
							(2.35)			
16.50 16.50-16.65					21,25/50 SPT(C) 50/0					
17.35	100	30	17				17.35	Medium strong thinly bedded grey/dark grey fine grained LIMESTONE partially to distinctly weathered		
18.00	97	66	38					Sequnce contains two sets of fractures. F1 are close to medium spaced, dipping between 10-30 degrees, undulating to planar rough with some surface staining and clay infilling. F2 are widely spaced, dipping between 50-70 degress, planar smooth with some surface staining and Clay infilling		
19.50				5						

Remarks

Scale (approx)	Logged By
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Site Additional Airfield Boreholes			**Borehole Number** BH03
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S	**Casing Diameter** 200mm cased to 3.10m 102mm cased to 22.50m	**Ground Level (mOD)**	**Client** DAA	**Job Number** 7687-04-18
	Location 315805.4 E 243177.1 N	**Dates** 15/05/2018-19/06/2018	**Engineer** Balfour Beatty	**Sheet** 3/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	98	92	6				(5.15)			
21.00	100	81	63							
22.50							22.50	Complete at 22.50m		

Remarks

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH03

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Site Additional Airfield Boreholes			**Borehole Number** BH04
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Cable Percsussion & Geobre S	**Casing Diameter** 200mm cased to 7.00m 102mm cased to 20.00m 64mm cased to 32.70m	**Ground Level (mOD)** 62.73	**Client** DAA	**Job Number** 7687-04-18
	Location 316249 E 243108.1 N	**Dates** 16/05/2018-24/05/2018	**Engineer** Balfour Beatty	**Sheet** 1/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(1.20)	OPEN HOLE - Air Excavation		
1.30-1.75 1.30					1,1/1,2,1,2 SPT(C) N=6 B	61.53	1.20 (0.80)	MADE GROUND consisting of brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
2.50-2.95 2.50					1,3/4,6,6,11 SPT(C) N=27 B	60.73	2.00 (1.50)	Stiff dark brown/grey slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
3.50-3.95 3.50					4,7/8,10,15,18 SPT(C) N=51 B	59.23	3.50 (1.00)	Very stiff dark brown/grey slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
4.50-4.80 4.50					7,10/17,25,8 SPT(C) 50/150 B	58.23	4.50	Very stiff black slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
5.50-5.60 5.50					25,25/50 SPT(C) B		(2.50)			
6.50-6.65 6.50					25,25/50 SPT(C) 50/0 B					
7.00	100					55.73	7.00	Very stiff brown/grey slightly sandy gravelly CLAY with occasional sub-rounded cobbles and boulders. Gravel is fine to coarse sub-angular to sub-rounded		
8.50 8.50-8.65	100				20,25/50 SPT(C) 50/0					
10.00										

Remarks
Air excavations carried out to 1.20m BGL
Cable percussion borehole terminated due to Obstrction - Presumed Boulder
Smaple disturbance from 4.50m to 6.50m BGL due to borehole collapse
Geobore S techniques carried out from 4.50m BGL to 20.0m BGL and Conventionla HQ rotary coring carried out from 20.0m BGL to 32.70m BGL
Borehole backfilled with bentonite upon completion
Chiselling from 6.90m to 7.00m for 1 hour.

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH04

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Site Additional Airfield Boreholes			**Borehole Number** BH04
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Cable Percsussion & Geobre S	**Casing Diameter** 200mm cased to 7.00m 102mm cased to 20.00m 64mm cased to 32.70m	**Ground Level (mOD)** 62.73	**Client** DAA	**Job Number** 7687-04-18
	Location 316249 E 243108.1 N	**Dates** 16/05/2018-24/05/2018	**Engineer** Balfour Beatty	**Sheet** 2/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00-10.15	97				22,25/50 SPT(C) 50/0		(6.00)			
11.50 11.50-11.65	100				19,25/50 SPT(C) 50/0			.....Lense of brown sandy clayey sub-angular to sub-rounded fine to coarse GRAVEL occurs between 11.40m - 11.90m BGL		
13.00 13.00-13.15	97				25,25/50 SPT(C) 50/0	49.73	13.00	Very stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles and boulders. Gravel is fine to coarse sub-angular to sub-rounded		
14.50 14.50-14.65	96				22,25/50 SPT(C) 50/0		(3.85)			
16.00 16.00-16.15	60				19,25/50 SPT(C) 50/0	45.88	16.85	Poor Recovery - Driller notes gravelly CLAY. Recovery consists grey fine to coarse angular to sub-angular Gravel with Clay washed away		
17.40 17.40-17.55	100				22,25/50 SPT(C) 50/0		(1.15)			
18.00 18.00-18.15	0				25,25/50 SPT(C) 50/0	44.73	18.00	Core Loss - Driller notes silty sandy CLAY		
19.00 19.00-19.23	0				11,14/15 SPT(C) 15/75		(2.00)			
20.00										

Remarks

Scale (approx)	Logged By
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Figure No. 7687-04-18.BH04

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Site Additional Airfield Boreholes			**Borehole Number** BH04
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia:** 102&64 mm **Method :** Cable Percsussion & Geobre S	**Casing Diameter** 200mm cased to 7.00m 102mm cased to 20.00m 64mm cased to 32.70m	**Ground Level (mOD)** 62.73	**Client** DAA	**Job Number** 7687-04-18
	Location 316249 E 243108.1 N	**Dates** 16/05/2018-24/05/2018	**Engineer** Balfour Beatty	**Sheet** 3/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
20.00-20.15	60				22,25/ SPT(C)	42.73	20.00	Very stiff dark brown/grey slightly sandy gravelly CLAY with occasional sub-rounded cobbles and boulders. Gravel is fine to coarse sub-angular to sub-rounded		
21.20	60						(4.20)			
22.70	80									
24.20	100					38.53	24.20	Very stiff grey slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded .....Lense of brown sandy clayey sub-angular to sub-rounded fine to coarse GRAVEL occurs between 24.35m - 24.50m BGL		
25.70	86						(3.35)			
27.20										
27.55	100	75	98			35.18	27.55	Medium strong thinly bedded dark grey fine grained LIMESTONE partially to distinctly weathered interbedded with a dark grey black thickly laminated MUDSTONE		
28.70	100	91	63	7			(4.15)	The sequence contains two sets of fractures. F1 are close to medium spaced, dipping 5-25 degrees, undulating rough with some clay surface staining. F2 are widely spaced, dipping between 45-80 degrees, undulating rough with some surface staining		

Remarks

Scale (approx)	Logged By
1:50	S Kealy

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Site Additional Airfield Boreholes			**Borehole Number** BH04
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Cable Percsussion & Geobre S	**Casing Diameter** 200mm cased to 7.00m 102mm cased to 20.00m 64mm cased to 32.70m	**Ground Level (mOD)** 62.73	**Client** DAA
	Location 316249 E 243108.1 N	**Dates** 16/05/2018-24/05/2018	**Engineer** Balfour Beatty
			Job Number 7687-04-18
			Sheet 4/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
30.20	93	86	57							
31.70	95	94	32	5		31.03	31.70 (1.00)	Medium strong thinly bedded dark grey fine grained LIMESTONE partially to distinctly weathered interbedded with a dark grey black thickly laminated MUDSTONE The sequence contains one set of fractures. F1 are close to medium spaced, dipping 5-25 degrees, undulating rough with some clay surface staining		
32.70						30.03	32.70	Complete at 32.70m		

Remarks

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH04

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Site Additional Airfield Boreholes			**Borehole Number** BH05
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S Rotary Cored	**Casing Diameter** 200mm cased to 4.70m 102mm cased to 28.50m	**Ground Level (mOD)** 65.10	**Client** DAA	**Job Number** 7687-04-18
	Location 316004.1 E 243983.1 N	**Dates** 17/05/2018-01/06/2018	**Engineer** Balfour Beatty	**Sheet** 1/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(1.20)	OPEN HOLE - Air Excavation		
1.20					B	63.90	1.20			
1.50-1.95					4,4/3,3,3,3 SPT(C) N=12		(0.90)	Firm brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
2.00					B	63.00	2.10			
2.50-2.80					7,8/11,12,27 SPT(C) 50/150		(0.90)	Stiff dark brown/grey slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
3.00					B	62.10	3.00			
4.00					B		(1.70)	Very stiff black slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
4.70	100					60.40	4.70			
							(1.50)	Very stiff dark brown/grey slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded .....Lense of brown sandy clayey sub-angular to sub-rounded fine to coarse GRAVEL occurs between 4.70m - 4.90m BGL		
6.20 6.20-6.35	100				19,25/50 SPT(C) 50/0	58.90	6.20	Very stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
7.50 7.50-7.65	96				21,25/50 SPT(C) 50/0		(2.80)			
9.00 9.00-9.15	100				19,25/50 SPT(C) 50/0	56.10	9.00	Very stiff dark brown/grey slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		

Remarks
Air excavations carried out to 1.20m BGL
Cable Percussion borehole terminated at 4.20m BGL due to Obstrction
Geobore S Rotary techniques carried out from 4.20m to 28.50m BGL
Borehole backfilled with bentonite upon completion
Chiselling from 4.10m to 4.20m for 1 hour.

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH05

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Site Additional Airfield Boreholes			**Borehole Number** BH05
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S Rotary Cored	**Casing Diameter** 200mm cased to 4.70m 102mm cased to 28.50m	**Ground Level (mOD)** 65.10	**Client** DAA	**Job Number** 7687-04-18
	Location 316004.1 E 243983.1 N	**Dates** 17/05/2018-01/06/2018	**Engineer** Balfour Beatty	**Sheet** 2/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(2.05)			
10.50 10.50-10.65	100				22,25/50 SPT(C) 50/0	54.05	11.05	Very stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
							(1.30)			
12.00 12.00-12.15	100				22,25/50 SPT(C) 50/0	52.75	12.35	Very stiff dark brown/grey slightly sandy gravelly CLAY with frequent sub-rounded cobbles and occasional boulders. Gravel is fine to coarse sub-angular to sub-rounded		
							(1.15)			
13.50 13.50-13.65	100				25,25/50 SPT(C) 50/0	51.60 51.40	13.50 (0.20) 13.70	Very stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
							(1.30)	Very stiff dark brown/grey slightly sandy gravelly CLAY with frequent sub-rounded cobbles and occasional boulders. Gravel is fine to coarse sub-angular to sub-rounded		
15.00 15.00-15.15	100				22,25/50 SPT(C) 50/0	50.10	15.00	Very dense brown sandy clayey sub-angular to sub-rounded fine to coarse GRAVEL with occasional sub-rounded cobbles		
							(2.30)			
16.50 16.50-16.65	100				25,25/50 SPT(C) 50/0	47.80	17.30	Very stiff black slightly sandy gravelly CLAY with frequent sub-rounded cobbles and occasional boulders. Gravel is fine to coarse sub-angular to sub-rounded		
18.00 18.00-18.15	100				25,25/50 SPT(C) 50/0					
19.50 19.50-19.65					25,25/50 SPT(C) 50/0			.....Lense of brown sandy clayey sub-angular to sub-rounded fine to coarse GRAVEL occurs between 19.50m - 19.90m BGL		

Remarks

Scale (approx)	Logged By
1:50	S Kealy

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Site Additional Airfield Boreholes			**Borehole Number** BH05
Machine : Dando 2000 & Beretta T44 **Flush :** Polymer **Core Dia :** 102 mm **Method :** Cable Percussion & Geobore S Rotary Cored	**Casing Diameter** 200mm cased to 4.70m 102mm cased to 28.50m	**Ground Level (mOD)** 65.10	**Client** DAA	**Job Number** 7687-04-18
	Location 316004.1 E 243983.1 N	**Dates** 17/05/2018-01/06/2018	**Engineer** Balfour Beatty	**Sheet** 3/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	100						(6.50)			
21.00 21.00-21.15	100				25,25/50 SPT(C) 50/0					
22.50	100									
						41.30	23.80	Very stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
24.00							(0.40)			
24.20	100	80	53			40.90	24.20	Medium strong thickly laminated to thinly bedded dark grey fine grained LIMESTONE with calcite veins partially to distinctly weathered. Interbedded with a weak thickly laminated brown/black MUDSTONE partially to distinctly weathered Sequence contains one set of fractures. F1 is medium spaced, dipping between 20-30 degrees, planar rough with some Clay smearing		
25.50	100	73	63	5			(2.70)			
26.90 27.00	100	36	16	6		38.20	26.90	Medium strong thickly laminated to thinly bedded dark grey fine grained LIMESTONE with calcite veins partially to distinctly weathered. Interbedded with a weak thickly laminated brown/black MUDSTONE partially to distinctly weathered Sequence contains two sets of fractures. F1 is very close to closely spaced, dipping between 20-30 degrees, undulating rough with clay infilling. F2 are widely spaced , dipping between 75-85 degrees, planar smooth with sme clay smearing ....Residual rock recovered as a brown sandy slightly gravelly CLAY with relic bedding betweeen 28.0 - 28.40m BGL		
28.50						36.60	28.50	Complete at 28.50m		

Remarks

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH05

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Site Additional Airfield Boreholes			**Borehole Number** BH06
Machine : Dando 2000 Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Geobore S & HQ Rotary Coring	**Casing Diameter** 200mm cased to 3.60m 102mm cased to 27.50m 64mm cased to 38.00m **Location** 315504.6 E 244020.6 N	**Ground Level (mOD)** 67.81 **Dates** 18/05/2018-11/06/2018	**Client** DAA **Engineer** Balfour Beatty	**Job Number** 7687-04-18 **Sheet** 1/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(1.20)	OPEN HOLE		
1.20-1.65 1.20					1,1/3,2,2,3 SPT(C) N=10 B	66.61	1.20 (0.80)	Firm brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
2.00-2.45 2.00					3,9/9,10,14,17 SPT(C) N=50 B	65.81	2.00 (0.30)	Stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
						65.51	2.30 (0.70)	Very stiff brown slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
3.00-3.15 3.00					25,25/50 SPT(C) 50/0 B	64.81	3.00 (0.90)	Very stiff black slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to sub-rounded		
3.60	86					63.91	3.90	Very stiff brown/grey slightly sandy gravelly CLAY with occasional sub-rounded cobbles. Gravel is fine to coarse sub-angular to subrounded .....Lense of brown sandy clayey sub-angular to sub-rounded fine to coarse GRAVEL occurs between 4.60m - 4.90m BGL		
4.70 4.70-4.85	100				14,19/50 SPT(C) 50/0					
6.20 6.20-6.35	100				23,25/50 SPT(C) 50/0		(5.60)			
7.70 7.70-7.85	100				22,25/50 SPT(C) 50/0					
9.20 9.20-9.35	100				25,25/50 SPT(C) 50/0	58.31	9.50 (0.70)	Residual Rock - Recovered as very stiff brown slightly sandy gravelly CLAY with relic bedding fabric throughout and lenses of fine brown Sand		

Remarks
Air excavations carried out to 1.20m BGL
Cable percsussion terminated at 3.60m BGL due to Obstrction - Presumed Boulder
Geobore S techniques carried out from 3.60m to 27.50m BGL
Conventional HQ Rotary Techniques carried out from 27.50m to 31.50m BGL
Borehole backfilled with bentonite upon completion
Chiselling from 3.30m to 3.60m for 1 hour.

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH06

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Ground Investigations Ireland Ltd
www.gii.ie

Site Additional Airfield Boreholes			**Borehole Number** BH06
Machine : Dando 2000 Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Geobore S & HQ Rotary Coring	**Casing Diameter** 200mm cased to 3.60m 102mm cased to 27.50m 64mm cased to 38.00m	**Ground Level (mOD)** 67.81	**Client** DAA	**Job Number** 7687-04-18
	Location 315504.6 E 244020.6 N	**Dates** 18/05/2018-11/06/2018	**Engineer** Balfour Beatty	**Sheet** 2/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						57.61	10.20	Residual Rock - Recovered as very stiff brown with orange and black mottling slightly sandy CLAY with relic bedding and occasional angular cobbles		
10.70 10.70-10.85	100				24,25/50 SPT(C) 50/0		(3.50)			
12.20 12.20-12.35	100				25,25/50 SPT(C) 50/0					
13.70 13.70-13.85	100				25,25/50 SPT(C) 50/0	54.11	13.70	Residual Rock - Recovered as angular cobbles and boulders in a brown sandy CLAY matrix		
15.20	100						(4.50)			
16.70	100									
18.20	93					49.61	18.20	Residual Rock - Recovered as brown/grey with orange and black mottling CLAY with relic bedding and lenses of Sand		
19.70							(3.00)			

Remarks

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH06

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Ground Investigations Ireland Ltd
www.gii.ie

Site Additional Airfield Boreholes			**Borehole Number** BH06
Machine : Dando 2000 Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Geobore S & HQ Rotary Coring	**Casing Diameter** 200mm cased to 3.60m 102mm cased to 27.50m 64mm cased to 38.00m	**Ground Level (mOD)** 67.81	**Client** DAA	**Job Number** 7687-04-18
	Location 315504.6 E 244020.6 N	**Dates** 18/05/2018-11/06/2018	**Engineer** Balfour Beatty	**Sheet** 3/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	96									
21.20	100					46.61	21.20 (1.50)	Weathered Rock - Recovered as medium strong laminated grey fine grained LIMESTONE distinctly weathered		
22.70	91.3					45.11	22.70	Residual Rock - Residual Rock - Recovered as angular cobbles and boulders in a brown sandy CLAY matrix with relic bedding		
23.00	100					44.01	(1.10) 23.80	Weathered Rock - Recovered as medium strong laminated grey fine grained LIMESTONE distinctly weathered		
24.50	53					43.31	(0.70) 24.50 (1.50)	Residual Rock - Recovered as angular cobbles and boulders in a brown sandy CLAY matrix with relic bedding		
26.00	100					41.81	26.00 (1.50)	Residual Rock - Recovered as light brown with grey/black mottling CLAY with occasional lenses of Sand		
27.50	56					40.31	27.50 (1.50)	Weathered Rock - Recovered as angular cobbles of Limestone in a brown sandy Clay matrix		
29.00	80	43	43			38.81	29.00	Medium strong to strong laminated grey fine grained LIMESTONE partially to distinctly weatheredwith clay seams		

Remarks

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH06

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Ground Investigations Ireland Ltd
www.gii.ie

Site Additional Airfield Boreholes			**Borehole Number** BH06
Machine : Dando 2000 Beretta T44 **Flush :** Polymer **Core Dia :** 102&64 mm **Method :** Geobore S & HQ Rotary Coring	**Casing Diameter** 200mm cased to 3.60m 102mm cased to 27.50m 64mm cased to 38.00m	**Ground Level (mOD)** 67.81	**Client** DAA	**Job Number** 7687-04-18
	Location 315504.6 E 244020.6 N	**Dates** 18/05/2018-11/06/2018	**Engineer** Balfour Beatty	**Sheet** 4/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				7			(2.50)	The sequence contains two sets of fractures F(1) are closely spaced, dipping between 10-20 degrees, planar to stepped rough with Clay smearing. F(2) are closely spaced, dipping between 70-90 degrees, planar to stepped rough with some Clay infilling		
30.50	93	59	50							
31.50						36.31	31.50	Medium strong to strong laminated grey fine grained LIMESTONE partially to distinctly weatheredwith clay seams		
32.00	73	73	39							
33.50	83	50	20					The sequence contains two sets of fractures F(1) are closely spaced, dipping between 10-20 degrees, planar to stepped rough with Clay smearing. F(2) are closely spaced, dipping between 60-80 degrees, undulating to stepped rough with some surface staining and clay infilling		
							(6.50)			
35.00	80	40	55					Zones of non-intact between 32.0m to 32.05m BGL and 35.90m and 36.60m BGL		
36.50	22	20	20							
38.00						29.81	38.00	Complete at 38.00m		

Remarks

Scale (approx)	Logged By
1:50	S Kealy

Figure No. 7687-04-18.BH06

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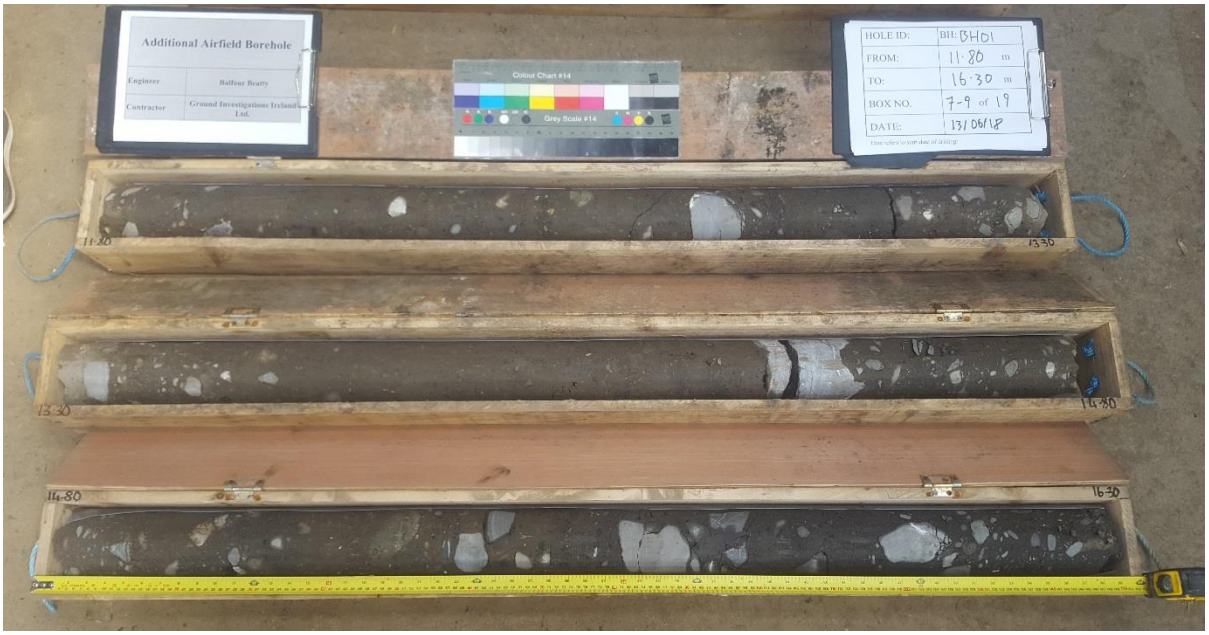
Rotary Core – Photographs Additional Airfield Boreholes



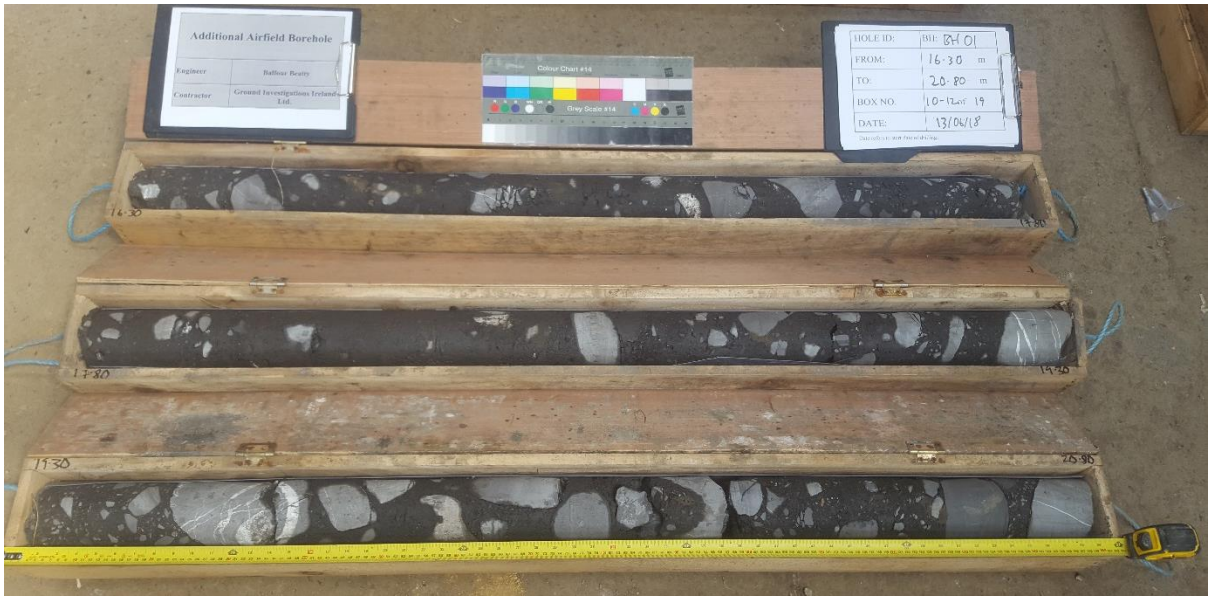
BH01



BH01


Additional Airfield Borehole
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: BH01
FROM:
11·80 m
TO:
16·30 m
BOX NO.
7-9 of 19
DATE:
13/06/18
11·80
13·30
13·30
14·80
14·80
16·30

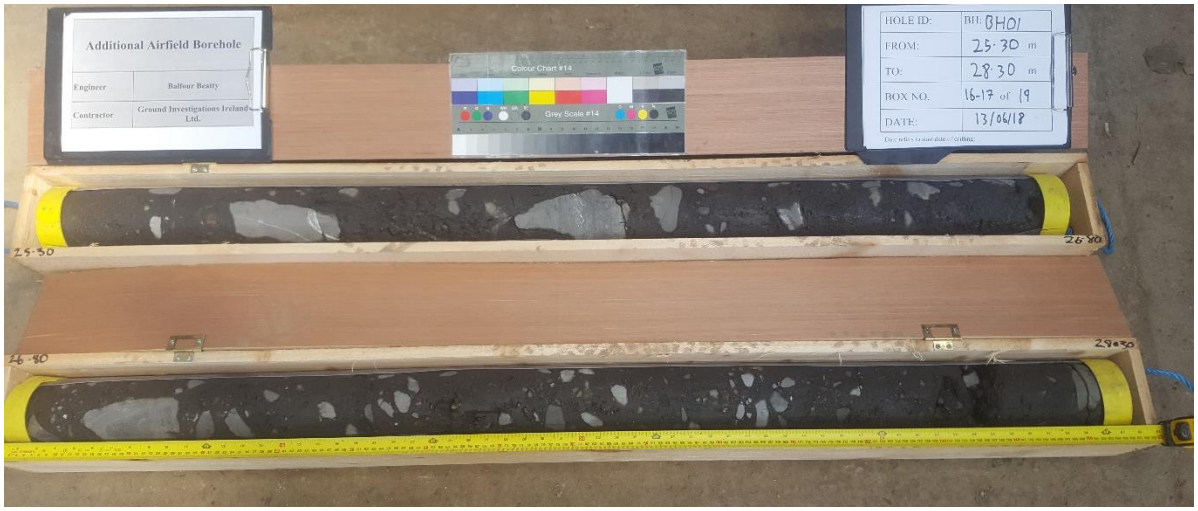
BH01


Additional Airfield Borehole
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: BH01
FROM:
16·30 m
TO:
20·80 m
BOX NO.
10-12 of 19
DATE:
13/06/18
16·30
17·80
17·80
19·30
19·30
20·80

BH01



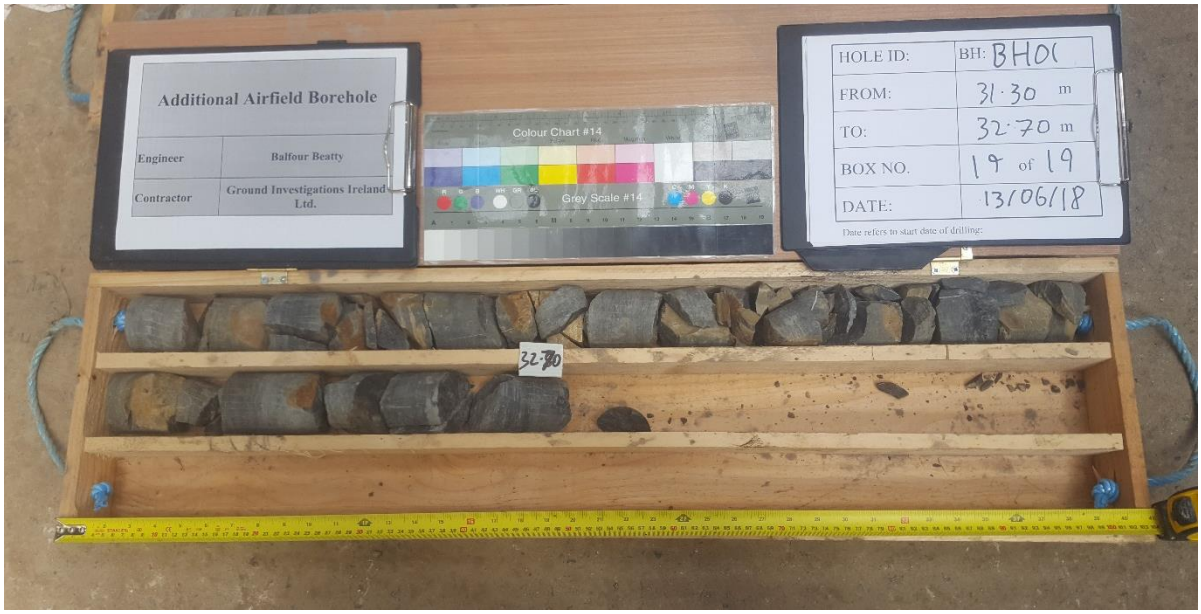
BH01



BH01



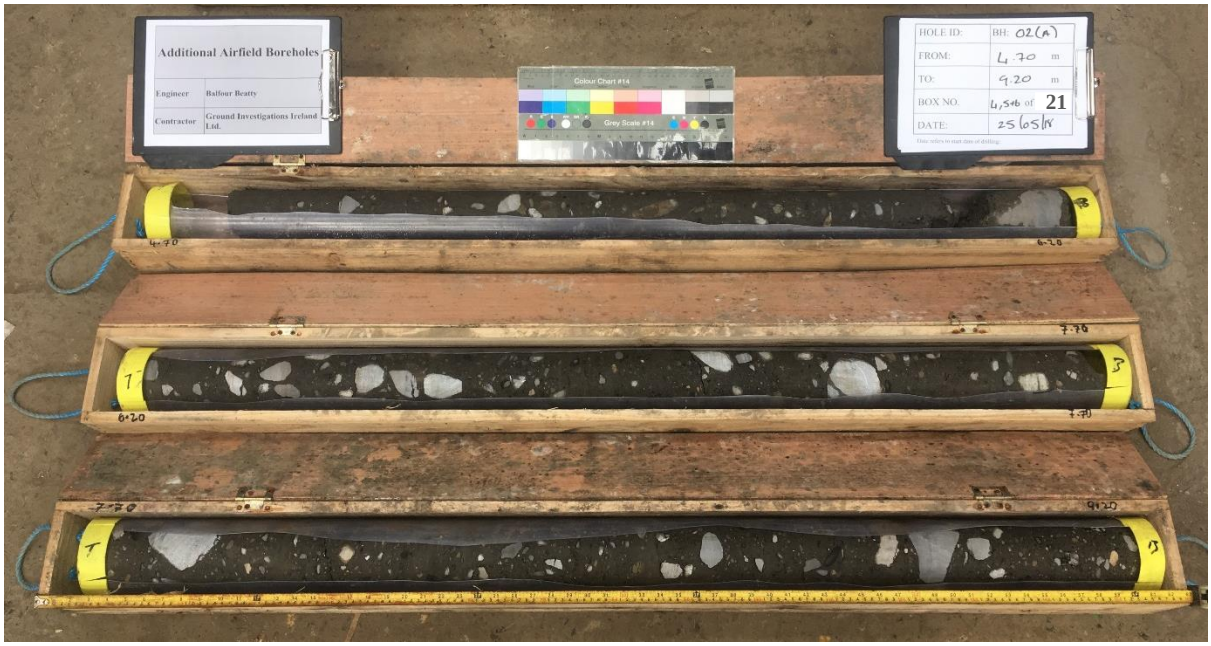
BH01


Additional Airfield Borehole
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: BH01
FROM:
31·30 m
TO:
32·70 m
BOX NO.
19 of 19
DATE:
13/06/18
Date refers to start date of drilling.
32·70

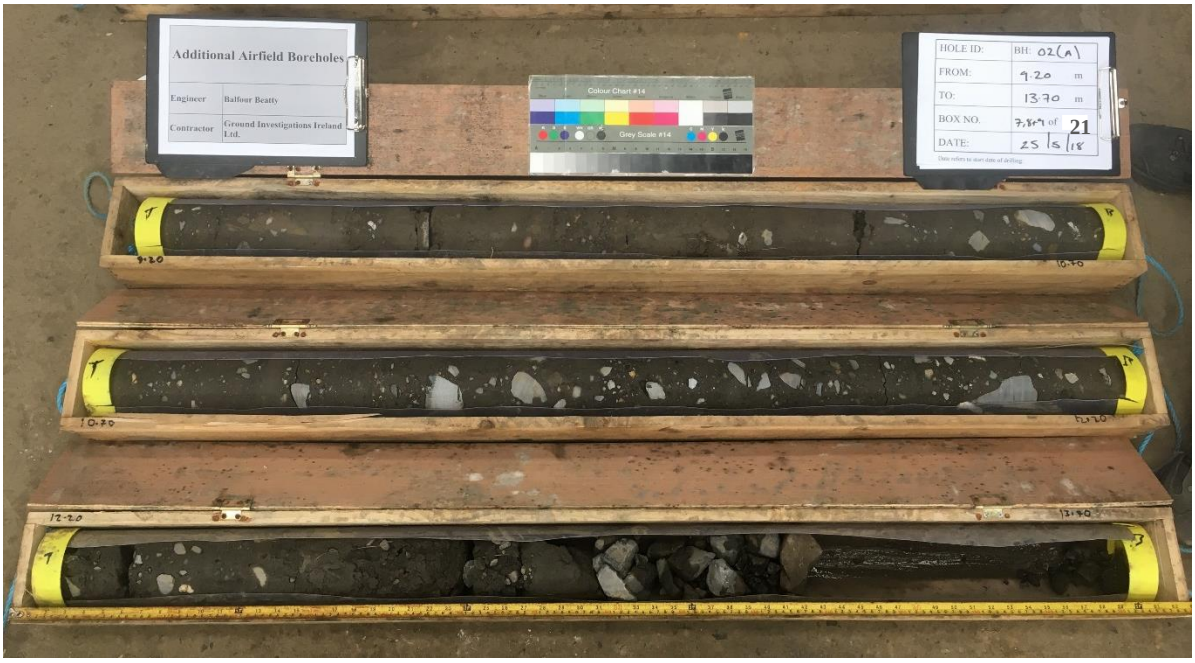
BH01


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: 02(A)
FROM:
1·0 m
TO:
4·70 m
BOX NO.
1,2&3 of 21
DATE:
25/05/18

BH02A


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: 02(A)
FROM:
4.70 m
TO:
9.20 m
BOX NO.
4,5th of 21
DATE:
25/05/18

BH02A


Additional Airfield Borcholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: 02(A)
FROM:
9.20 m
TO:
13.70 m
BOX NO.
7,8th of 21
DATE:
25/5/18

BH02A


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
HOLE ID:
BH: 02(A)
FROM:
13.70 m
TO:
18.20 m
BOX NO:
10,11+12of 21
DATE:
25/5/18

BH02A


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
HOLE ID:
BH: 02(A)
FROM:
18.20 m
TO:
22.70 m
BOX NO:
13,14+15of 21
DATE:
25/5/18

BH02A


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: 02(A)
FROM:
22.70 m
TO:
27.20 m
BOX NO.
16 of 21
DATE:
25/5/18

BH02A


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: 02(A)
FROM:
27.20 m
TO:
28.70 m
BOX NO.
19 of 21
DATE:
25/5/18

BH02A


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: 02(A)
FROM:
28·70 m
TO:
31·50 m
BOX NO.
20 of 21
DATE:
25/5/18
Date refers to start date of drilling.
28·70
30·00

BH02A


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: 02(A)
FROM:
31·10 m
TO:
33 m
BOX NO.
21 of 21
DATE:
25/5/18
Date refers to start date of drilling.

BH02A


Additional Airfield Borehole
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID: BH07
FROM: 3.00 m
TO: 7.50 m
BOX NO. 1-3 of 13
DATE: 18/06/18
4.50
6.00
7.50
8.00

BH03


Additional Airfield Borehole
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID: BH: BH03
FROM: 7.50 m
TO: 12.00 m
BOX NO. 4-6 of 13
DATE: 18/06/18
7.50
9.00
10.50
12.00

BH03



BH03



BH03



BH03


Additional Airfield Borehole
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: BH04
FROM:
5.50 m
TO:
10.00 m
BOX NO.
1-3 of 13
DATE:
23/05/18

BH04


Additional Airfield Borehole
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: BH04
FROM:
10.00 m
TO:
16.50 m
BOX NO.
4-6 of 13
DATE:
23/05/18

BH04


Additional Airfield Borehole
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
HOLE ID:
BH: BH04
FROM:
14.50 m
TO:
18.00 m
BOX NO.
7-9 of 13
DATE:
23/05/18

BH04


Additional Airfield Borehole
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
Colour Chart #14
Grey Scale #14
HOLE ID:
BH: BH04
FROM:
20 m
TO:
24.20 m
BOX NO.
10 of 13
DATE:
24/05/18
Date refers to start date of drilling:

BH04



BH04



BH04



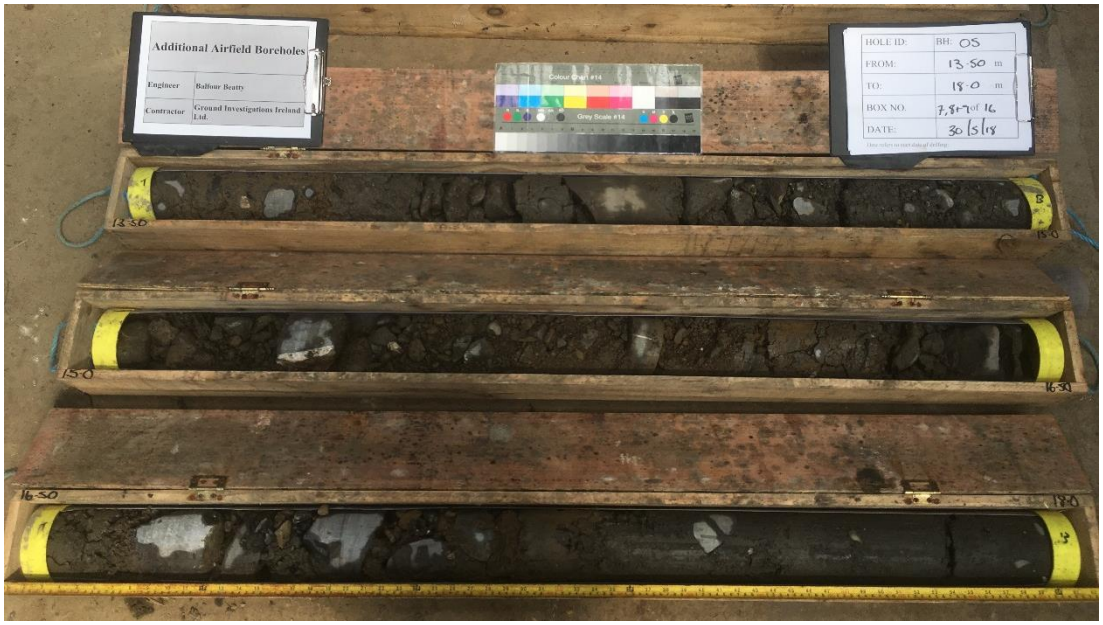
BH04


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
HOLE ID: BH 05
FROM: 4.70 m
TO: 9.0 m
BOX NO. 4 of 16
DATE: 30/5/18

BH05


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
HOLE ID: BH 05
FROM: 9.0 m
TO: 13.50 m
BOX NO. 5 of 16
DATE: 30/5/18

BH05


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
HOLE ID:
BH: 05
FROM:
13.50 m
TO:
18.0 m
BOX NO.
7,8+9 of 16
DATE:
30/5/18

BH05


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
HOLE ID:
BH: 05
FROM:
18.0 m
TO:
22.50 m
BOX NO.
10,11+12 of 16
DATE:
30/5/18

BH05



BH05



BH05



BH06


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
HOLE ID:
BH: 06
FROM:
7.70 m
TO:
12.20 m
BOX NO.
4,5 of 20
DATE:
5/6/18
7.70
9.20
9.20
10.70
10.70
12.20

BH06


Additional Airfield Boreholes
Engineer
Balfour Beatty
Contractor
Ground Investigations Ireland Ltd.
HOLE ID:
BH: 06
FROM:
12.20 m
TO:
16.70 m
BOX NO.
7,8 of 20
DATE:
5/6/18
12.20
13.70
13.70
15.20
15.20
16.70

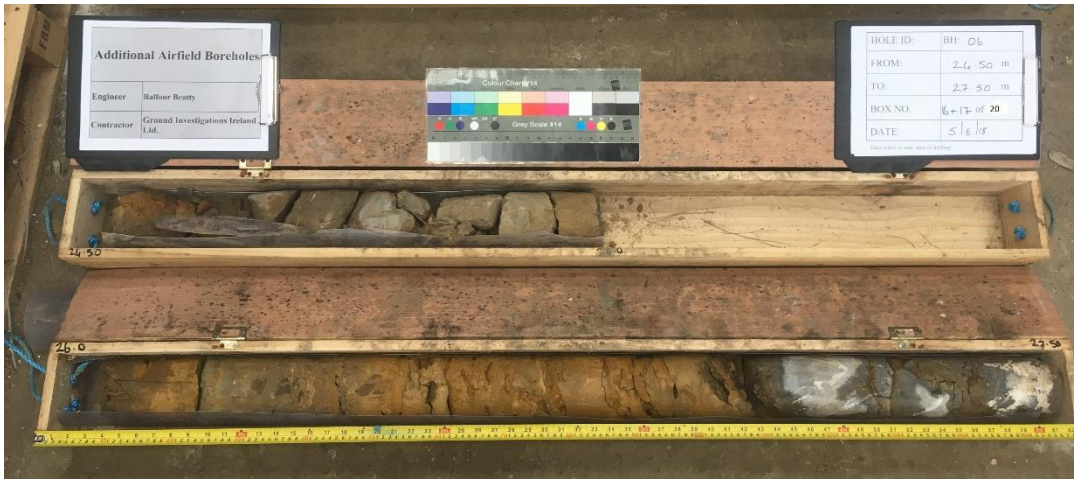
BH06



BH06



BH06



BH06



BH06



BH06



BH06

APPENDIX 3 – Laboratory Testing

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 39874

Client Ref: **7687-04-18**
Client PO:

Report Date: **17-07-2018**

Client **Ground Investigation Ireland**
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin

Contract Title: **Additional Airfield Boreholes**
For the attention of: **Stephen Kealy**

Date Received: **30-06-2018**
Date Commenced: **30-06-2018**
Date Completed: **17-07-2018**

Test Description	Qty
Moisture Content BS 1377 : Part 2 : 3.2 - * UKAS	13
4 Point Liquid & Plastic Limit (LL/PL) BS 1377 Part 2 : 4.3 & 5.3 - * UKAS	13
PSD Wet Sieve method BS 1377 : 1990 Part 2 : 9.2 - * UKAS	23
Organic Matter Content-dichromate method 1377 : 1990 Part 3 : 3 - @ Non Accredited Test	1
Water Soluble Sulphate 2:1 extract 1377 : 1990 Part 3 : 5 - @ Non Accredited Test	6
pH Value of Soil. BS1377-3:1990 Cl9 - @ Non Accredited Test	6

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

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 except in full, without the prior written approval of the laboratory.

Approved Signatories:
Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative/Accounts Assistant)
Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 39874

Test Description	Qty
Quick Undrained Triaxial Compression test - single specimen at one confining pressure (100mm or 38mm diameter) BS1377 : 1990 Part 7 : 8 - * UKAS	1
(MCV) at as received Moisture Content BS1377:1990 Part 4 : 5.4 - * UKAS	4
Disposal of Samples on Project	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

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 except in full, without the prior written approval of the laboratory.

Approved Signatories:
Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative/Accounts Assistant)
Wayne Honey (Administrative/Quality Assistant)

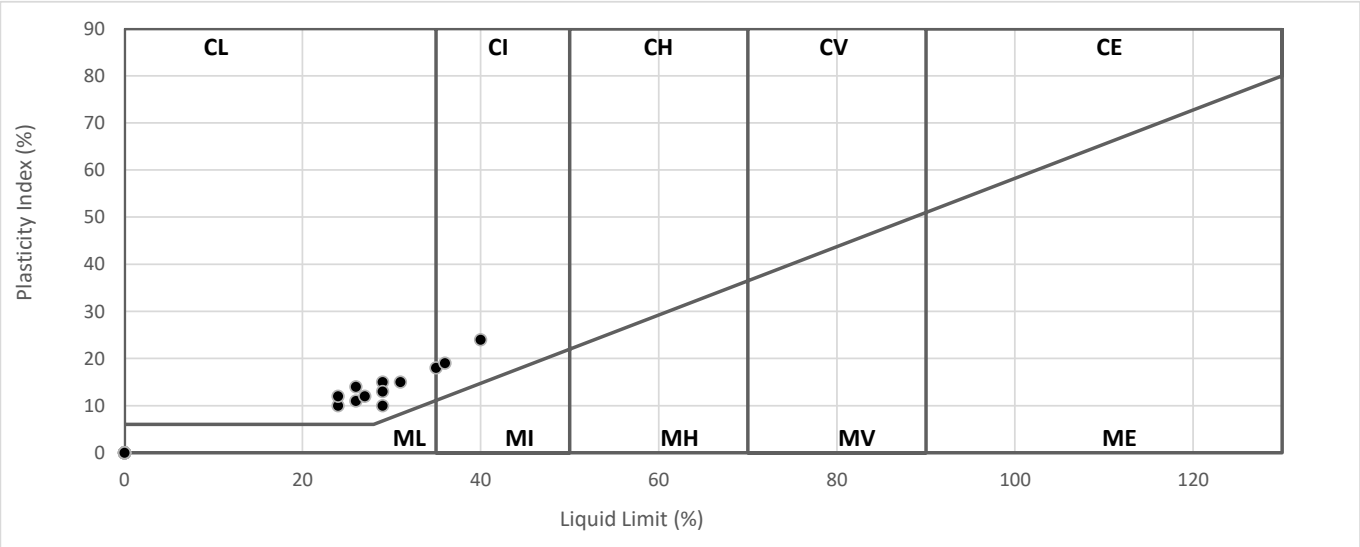
GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5)	
Contract Number	**39874**	
Site Name	**Additional Airfield Boreholes**	

Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing .425mm %	Remarks
BH01			1.20	-		10	29	14	15	50	CL Low Plasticity
BH01			13.85	-	14.35	7.8	24	14	10	58	CL Low Plasticity
BH01			27.80	-	28.30	16	26	15	11	59	CL Low Plasticity
BH02A			1.70	-	2.40	16	24	12	12	48	CL Low Plasticity
BH02A			12.20	-	12.80	7	27	15	12	60	CL Low Plasticity
BH03			5.70	-	6.70	6.1	26	12	14	73	CL Low Plasticity
BH04			14.70	-	15.00	12	29	19	10	85	CL Low Plasticity
BH05			6.50	-		11	31	16	15	63	CL Low Plasticity
BH05			4.70	-	5.10	6.9	29	16	13	46	CL Low Plasticity
BH05			15.50	-	15.90	8.4		NP		4	
BH06			2.00	-		13	35	17	18	59	CL/I Low/Inter. Plasticity
BH06			13.20	-	13.70	26	36	17	19	55	CI Intermediate Plasticity
BH06			26.00	-	26.60	24	40	16	24	93	CI Intermediate Plasticity
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:1999+A2:2010



Operators	Checked	16-07-18	Emma Sharp	
DB	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	Certificate of Chemical Analysis onsuling	Contract Number	39874
		Client Reference	7687-04-18
Client	Ground Investigation Ireland	Date Received	
Site Name	Additional Airfield Boreholes	Date Started	12-07-18
		Date Completed	17-07-18
		No. of Samples	7

Hole Number	Sample Number	Sample Type	Depth (m)			Acid Soluble Sulphate	Aqueous Extract Sulphate	Water Soluble Chloride	PH Value	Organic Matter Content	Acid Soluble Chloride	Loss On Ignition
BH01		B	1.20	-						6.8		
BH01		C	6.25	-	6.75		0.03		7.41			
BH02A		C	22.10	-	22.70		0.02		7.69			
BH03		C	5.70	-	6.70		0.02		8.11			
BH04		B	6.50	-			0.03		6.94			
BH05		C	18.55	-	18.95		0.03		7.89			
BH06		C	13.20	-	13.70		0.03		8.01			
				-								
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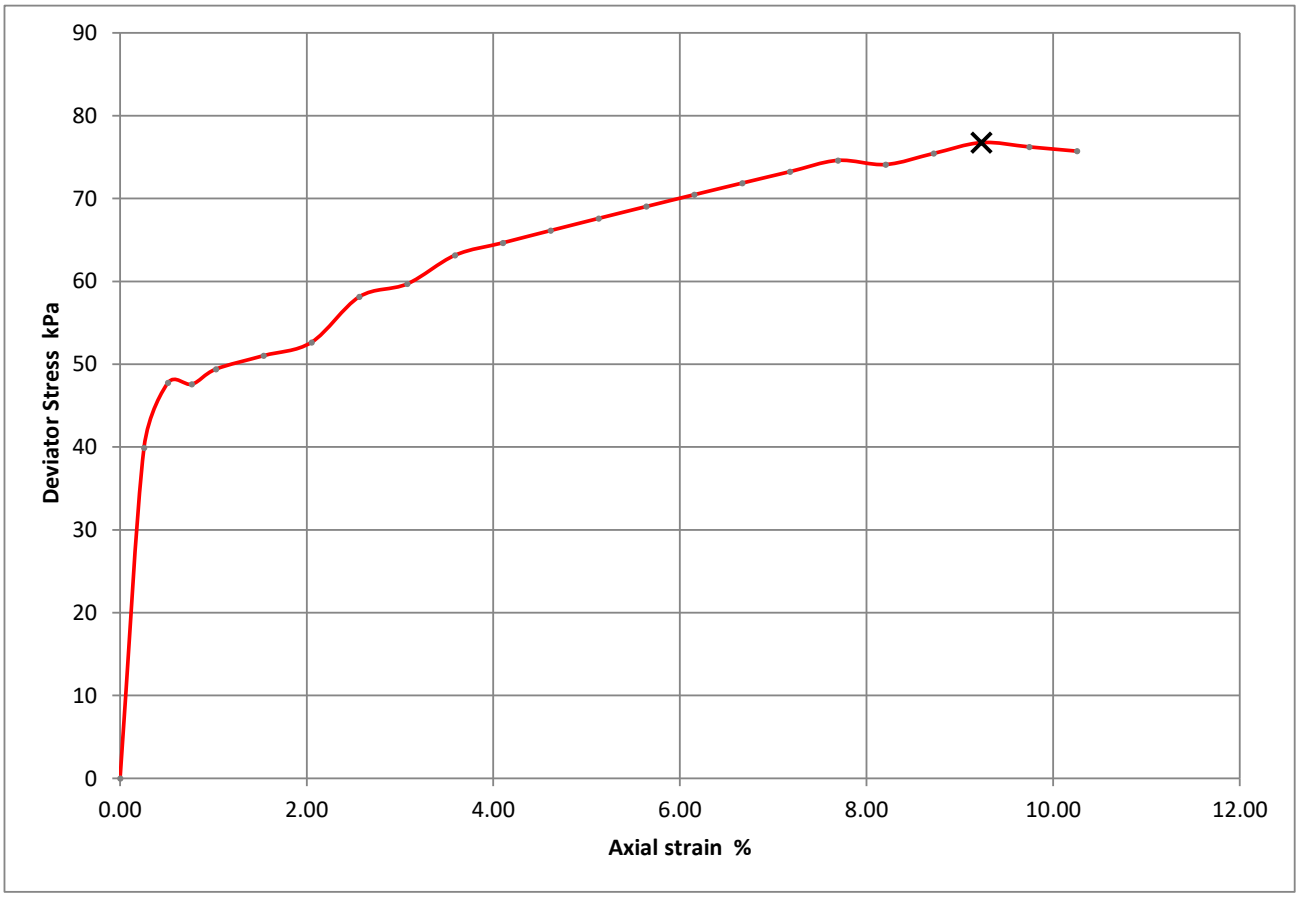
Key	Reported As	Clause
Acid Soluble Sulphate	% SO_3	Clause 5.2 & 5.5
Aqueous Extract Sulphate	g/l SO_3	Clause 5.3 & 5.5
2/1 Chloride	%	Clause 7.2
PH Value	@ 25°	Clause 9.5
Organic	%	Clause 3
Redox Mv	Mv	Clause 4
LOI	%	Clause 4

Remarks

NCP = No Chloride Present

Test Operator	Checked and Authorised by		Ben Sharp	
Darren Bourne	Date	17-07-18		

GSTL	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	39874
		Borehole/Pit No.	BH06
Site Name	Additional Airfield Boreholes	Sample No.	
Soil Description	Light brown sandy fine to coarse gravelly silty CLAY	Depth Top (m)	26.00
		Depth Base (m)	26.60
		Sample Type	U



Moisture Content (%)	33
Bulk Density (Mg/m^3)	2.07
Dry Density (Mg/m^3)	1.56
Specimen Length (mm)	195
Specimen Diameter (mm)	103
Cell Pressure (kPa)	530
Deviator Stress (kPa)	77
Undrained Shear Strength (kPa)	38
Failure Strain (%)	9.23
Mode Of Failure	Plastic
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.00

Specimen Post Test



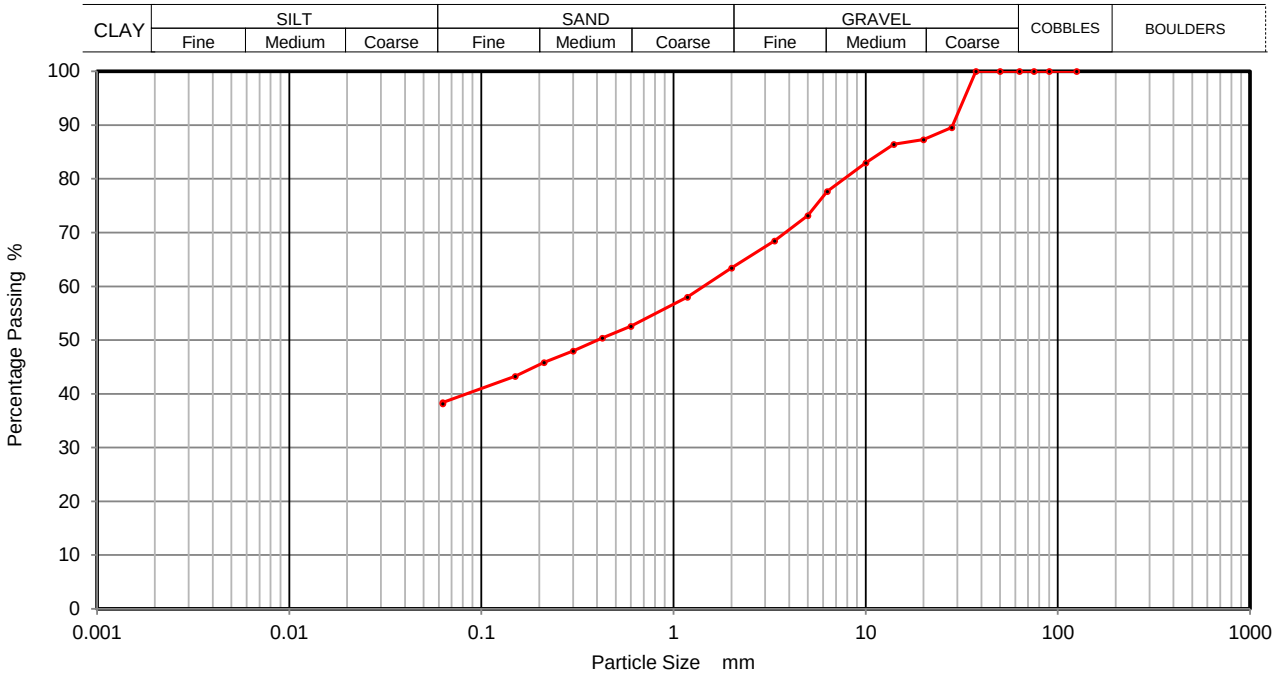
Sample Split



Checked	16-07-18	Emma Sharp	
Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH01
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy fine to coarse gravelly silty CLAY.	Depth Top	1.20
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	90		
20	87		
14	86		
10	83		
6.3	78		
5	73		
3.35	68		
2	63		
1.18	58		
0.6	53		
0.425	50		
0.3	48		
0.212	46		
0.15	43		
0.063	38		

Sample Proportions	% dry mass
Cobbles	0
Gravel	37
Sand	25
Silt and Clay	38

Grading Analysis	
Uniformity Coefficient	

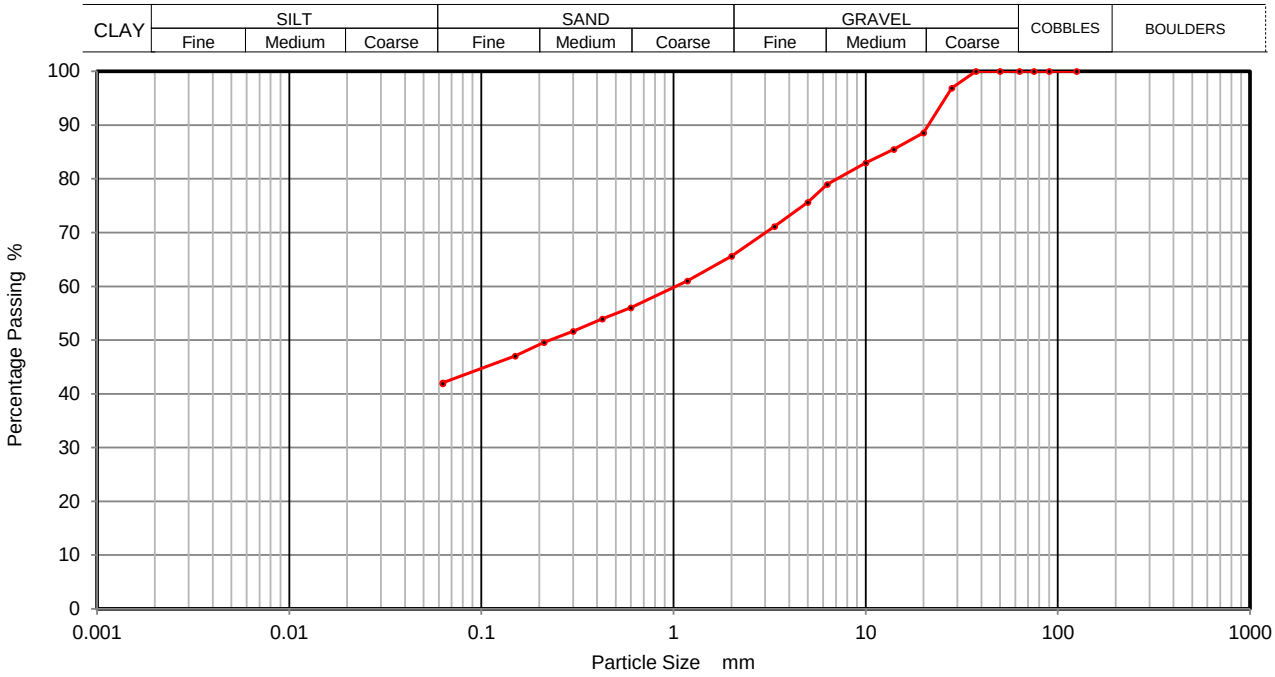
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH01
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy fine to coarse gravelly silty CLAY.	Depth Top	6.25
		Depth Base	6.75
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	97		
20	89		
14	86		
10	83		
6.3	79		
5	76		
3.35	71		
2	66		
1.18	61		
0.6	56		
0.425	54		
0.3	52		
0.212	50		
0.15	47		
0.063	42		

Sample Proportions	% dry mass
Cobbles	0
Gravel	34
Sand	24
Silt and Clay	42

Grading Analysis	
Uniformity Coefficient	

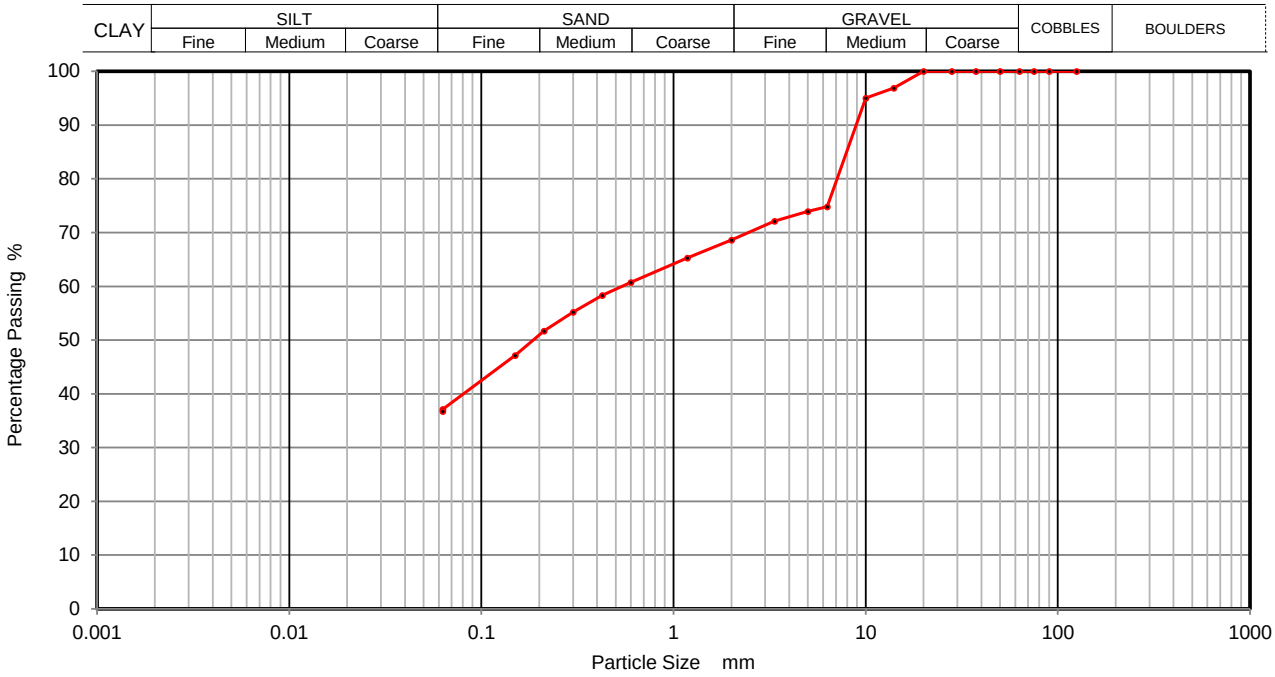
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH01
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse gravelly fine to coarse sandy silty CLAY.	Depth Top	13.85
		Depth Base	14.35
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	95		
6.3	75		
5	74		
3.35	72		
2	69		
1.18	65		
0.6	61		
0.425	58		
0.3	55		
0.212	52		
0.15	47		
0.063	37		

Sample Proportions	% dry mass
Cobbles	0
Gravel	31
Sand	32
Silt and Clay	37

Grading Analysis	
Uniformity Coefficient	

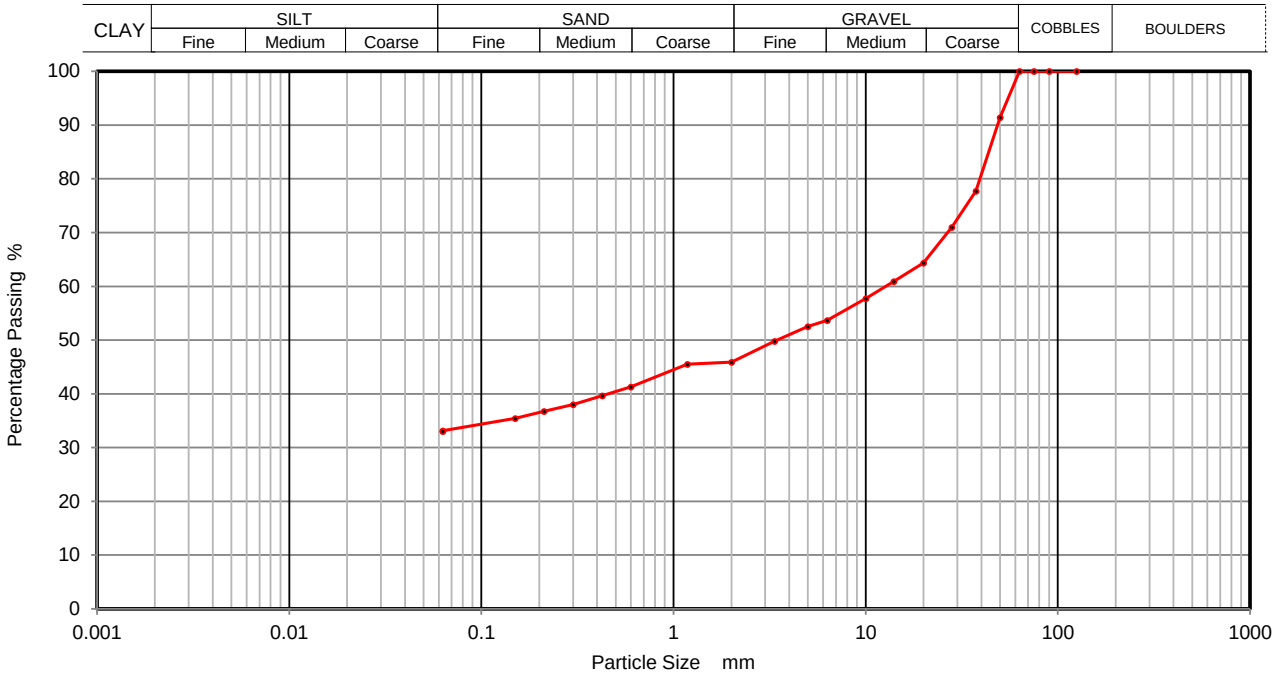
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH01
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy silty clayey fine to coarse GRAVEL.	Depth Top	17.85
		Depth Base	18.35
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	91		
37.5	78		
28	71		
20	64		
14	61		
10	58		
6.3	54		
5	53		
3.35	50		
2	46		
1.18	46		
0.6	41		
0.425	40		
0.3	38		
0.212	37		
0.15	35		
0.063	33		

Sample Proportions	% dry mass
Cobbles	0
Gravel	54
Sand	13
Silt and Clay	33

Grading Analysis	
Uniformity Coefficient	

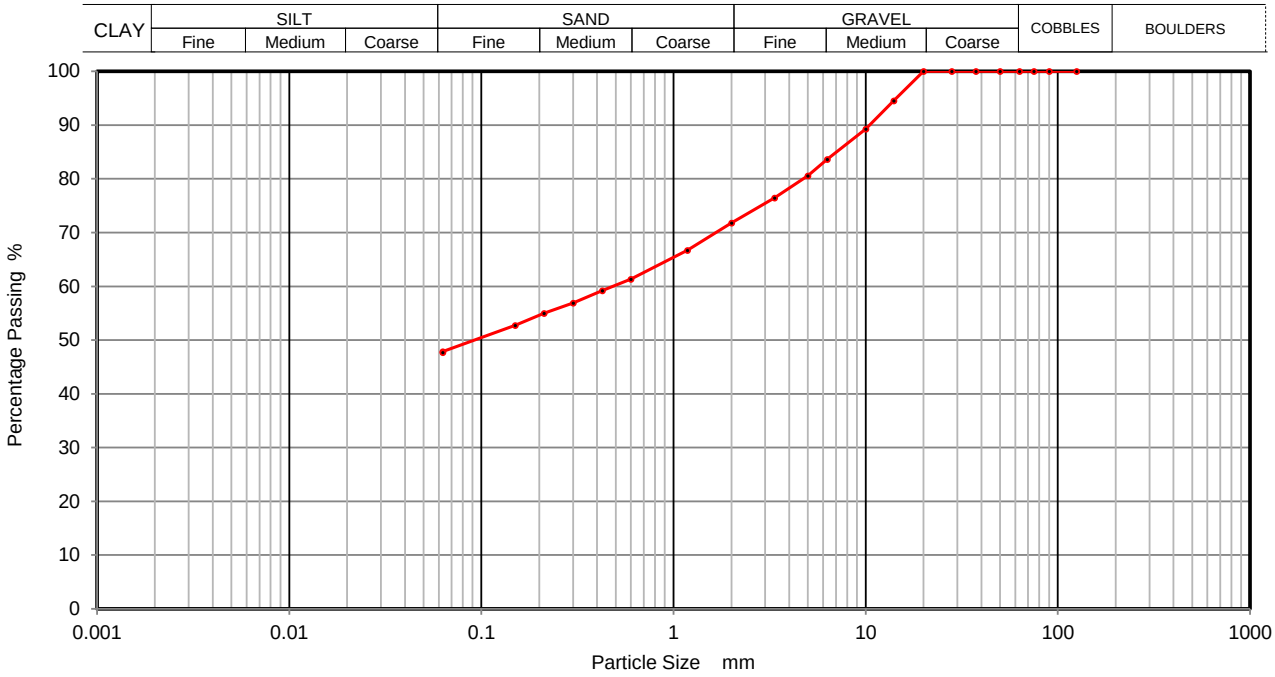
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH01
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy fine to coarse gravelly silty CLAY.	Depth Top	27.80
		Depth Base	28.30
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	95		
10	89		
6.3	84		
5	81		
3.35	76		
2	72		
1.18	67		
0.6	61		
0.425	59		
0.3	57		
0.212	55		
0.15	53		
0.063	48		

Sample Proportions	% dry mass
Cobbles	0
Gravel	28
Sand	24
Silt and Clay	48

Grading Analysis	
Uniformity Coefficient	

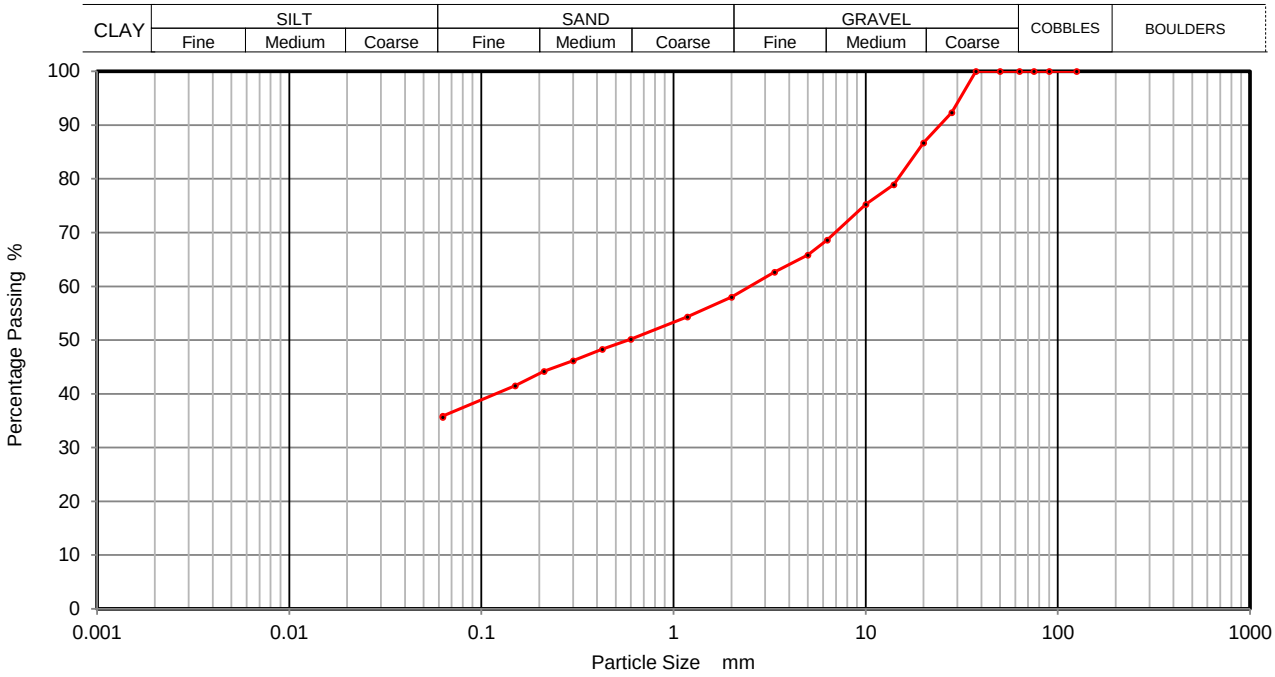
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH02A
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy silty clayey fine to coarse GRAVEL.	Depth Top	1.70
		Depth Base	2.40
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	92		
20	87		
14	79		
10	75		
6.3	69		
5	66		
3.35	63		
2	58		
1.18	54		
0.6	50		
0.425	48		
0.3	46		
0.212	44		
0.15	42		
0.063	36		

Sample Proportions	% dry mass
Cobbles	0
Gravel	42
Sand	22
Silt and Clay	36

Grading Analysis	
Uniformity Coefficient	

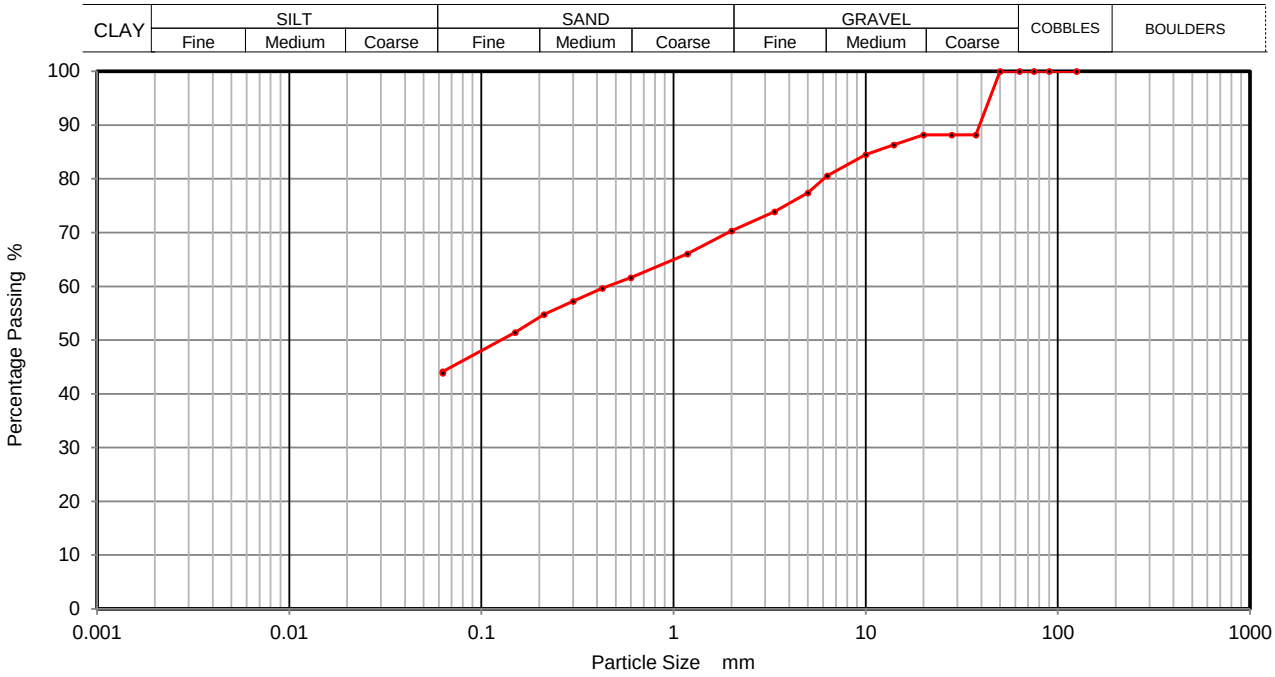
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH02A
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy fine to coarse gravelly silty CLAY.	Depth Top	12.20
		Depth Base	12.80
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	88		
28	88		
20	88		
14	86		
10	84		
6.3	81		
5	77		
3.35	74		
2	70		
1.18	66		
0.6	62		
0.425	60		
0.3	57		
0.212	55		
0.15	51		
0.063	44		

Sample Proportions	% dry mass
Cobbles	0
Gravel	30
Sand	26
Silt and Clay	44

Grading Analysis	
Uniformity Coefficient	

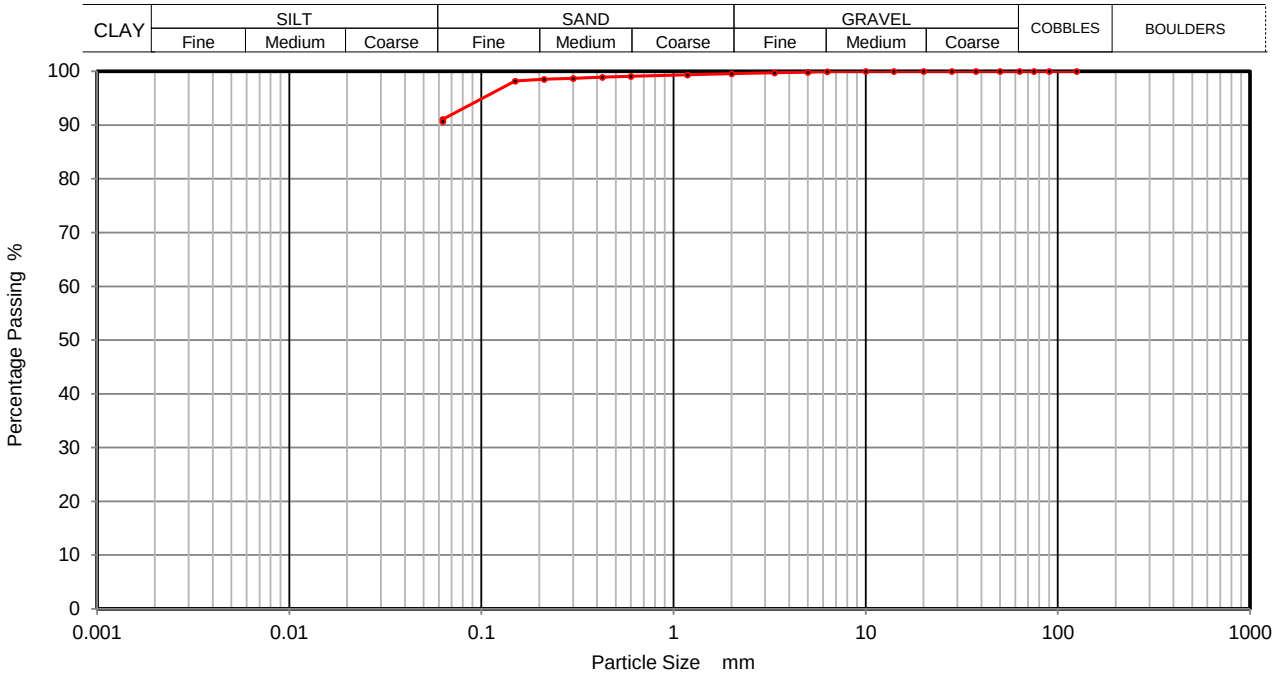
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH02A
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Grey fine to medium sandy silty CLAY.	Depth Top	22.10
		Depth Base	22.70
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
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	99		
0.15	98		
0.063	91		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	9
Silt and Clay	91

Grading Analysis	
Uniformity Coefficient	

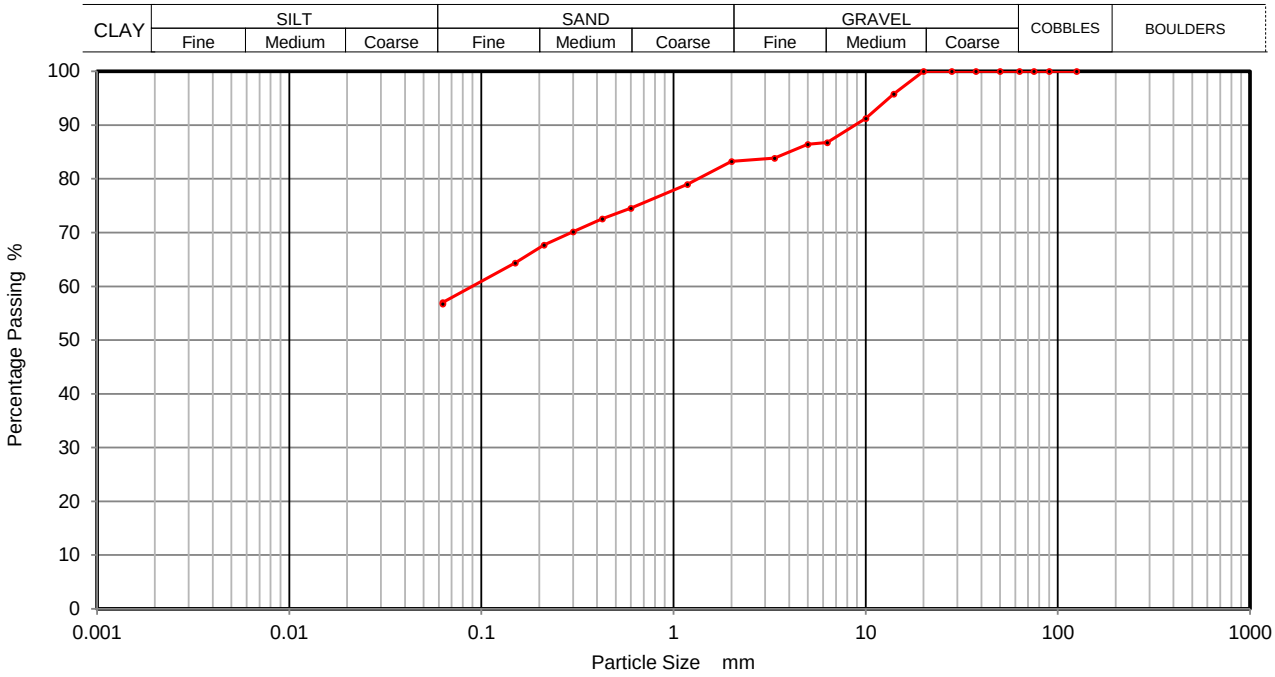
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH03
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse gravelly fine to coarse sandy silty CLAY.	Depth Top	5.70
		Depth Base	6.70
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	96		
10	91		
6.3	87		
5	86		
3.35	84		
2	83		
1.18	79		
0.6	75		
0.425	73		
0.3	70		
0.212	68		
0.15	64		
0.063	57		

Sample Proportions	% dry mass
Cobbles	0
Gravel	17
Sand	26
Silt and Clay	57

Grading Analysis	
Uniformity Coefficient	

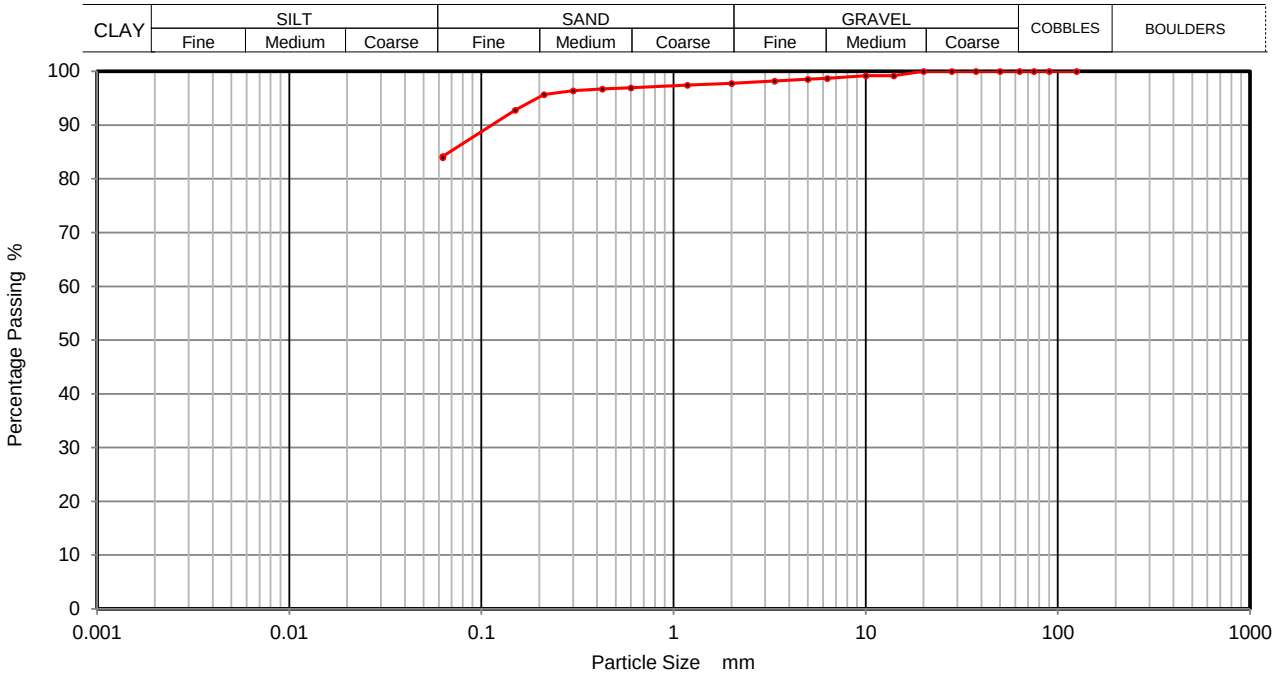
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH03
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to medium slightly gravelly fine to coarse sandy silty CLAY.	Depth Top	12.28
		Depth Base	12.68
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	99		
5	99		
3.35	98		
2	98		
1.18	97		
0.6	97		
0.425	97		
0.3	96		
0.212	96		
0.15	93		
0.063	84		

Sample Proportions	% dry mass
Cobbles	0
Gravel	2
Sand	14
Silt and Clay	84

Grading Analysis	
Uniformity Coefficient	

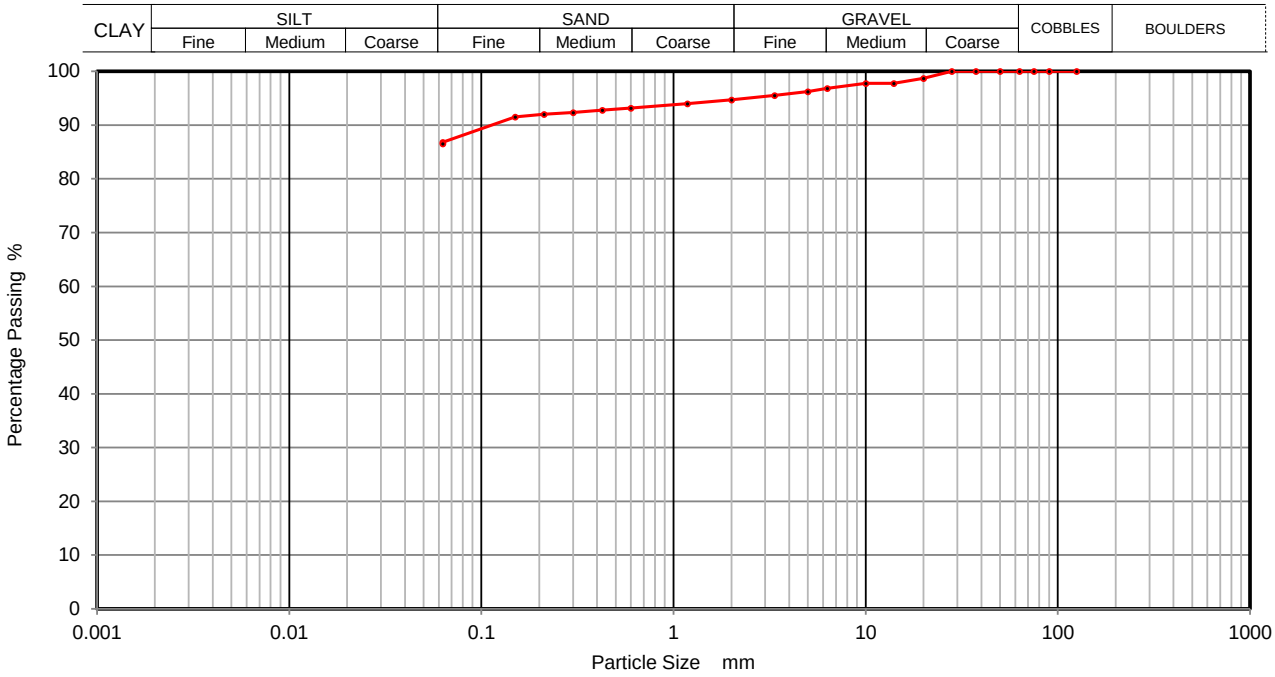
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH03
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse slightly gravelly fine to coarse slightly sandy silty CLAY.	Depth Top	13.00
		Depth Base	13.50
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	98		
10	98		
6.3	97		
5	96		
3.35	96		
2	95		
1.18	94		
0.6	93		
0.425	93		
0.3	92		
0.212	92		
0.15	92		
0.063	87		

Sample Proportions	% dry mass
Cobbles	0
Gravel	5
Sand	8
Silt and Clay	87

Grading Analysis	
Uniformity Coefficient	

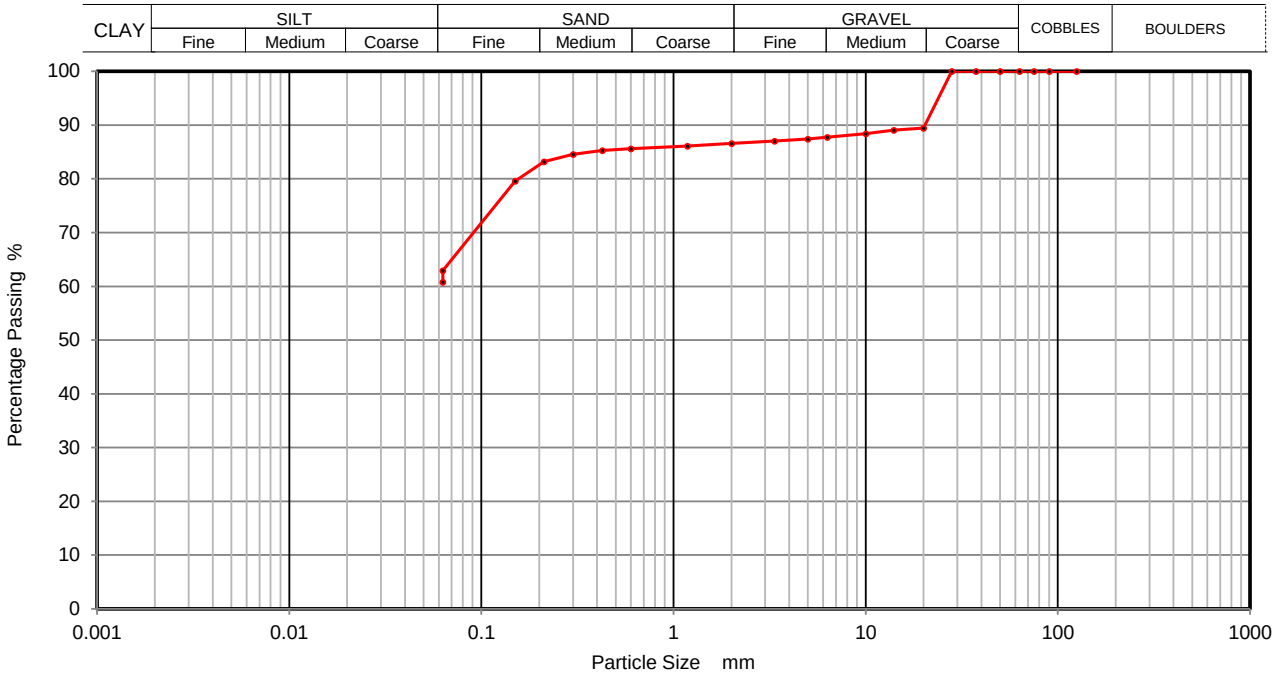
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH03
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse gravelly fine to coarse sandy silty CLAY.	Depth Top	14.70
		Depth Base	15.00
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	89		
14	89		
10	88		
6.3	88		
5	87		
3.35	87		
2	87		
1.18	86		
0.6	86		
0.425	85		
0.3	85		
0.212	83		
0.15	80		
0.063	63		

Sample Proportions	% dry mass
Cobbles	0
Gravel	13
Sand	24
Silt and Clay	63

Grading Analysis	
Uniformity Coefficient	

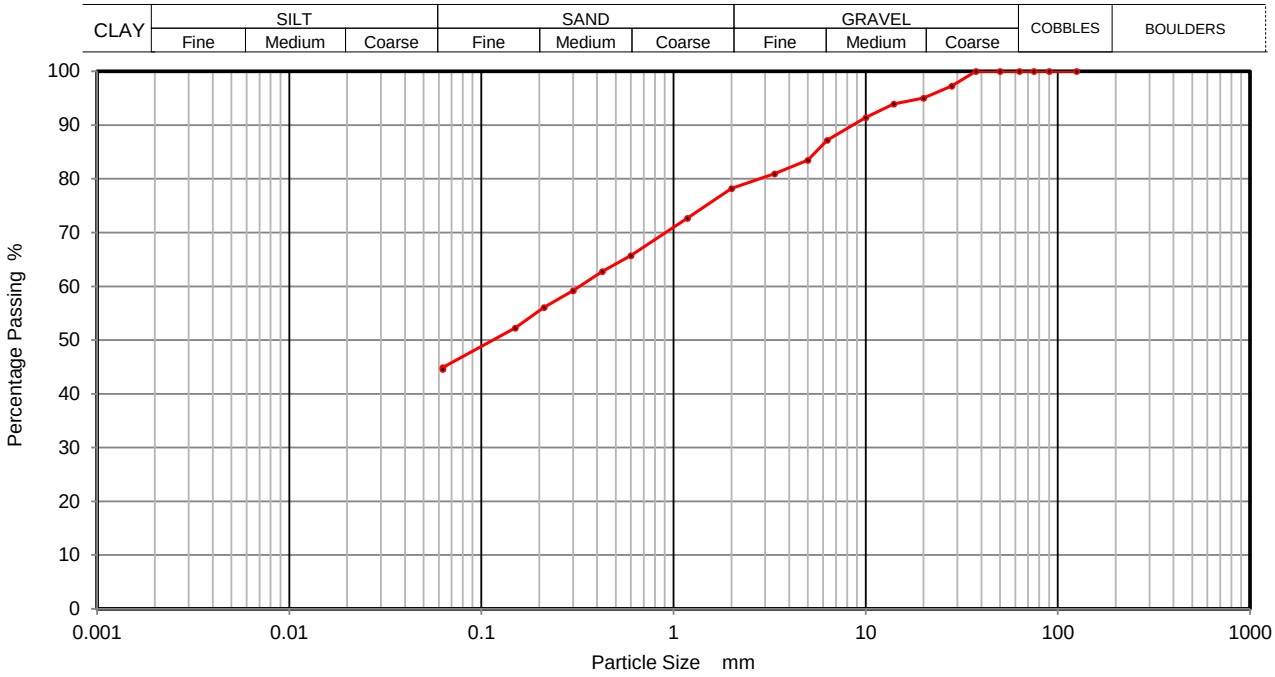
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH04
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse gravelly fine to coarse sandy silty CLAY.	Depth Top	6.50
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	97		
20	95		
14	94		
10	91		
6.3	87		
5	83		
3.35	81		
2	78		
1.18	73		
0.6	66		
0.425	63		
0.3	59		
0.212	56		
0.15	52		
0.063	45		

Sample Proportions	% dry mass
Cobbles	0
Gravel	22
Sand	33
Silt and Clay	45

Grading Analysis	
Uniformity Coefficient	

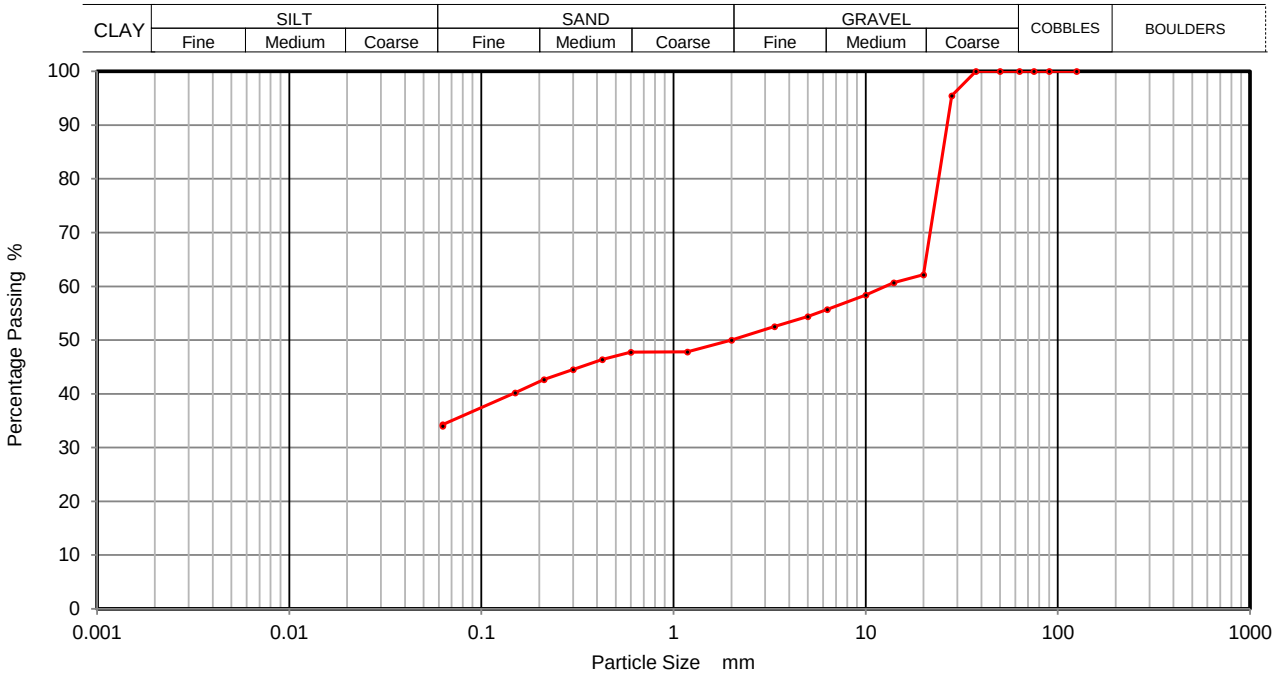
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH04
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy silty clayey fine to coarse GRAVEL.	Depth Top	11.40
		Depth Base	11.90
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	95		
20	62		
14	61		
10	58		
6.3	56		
5	54		
3.35	53		
2	50		
1.18	48		
0.6	48		
0.425	46		
0.3	45		
0.212	43		
0.15	40		
0.063	34		

Sample Proportions	% dry mass
Cobbles	0
Gravel	50
Sand	16
Silt and Clay	34

Grading Analysis	
Uniformity Coefficient	

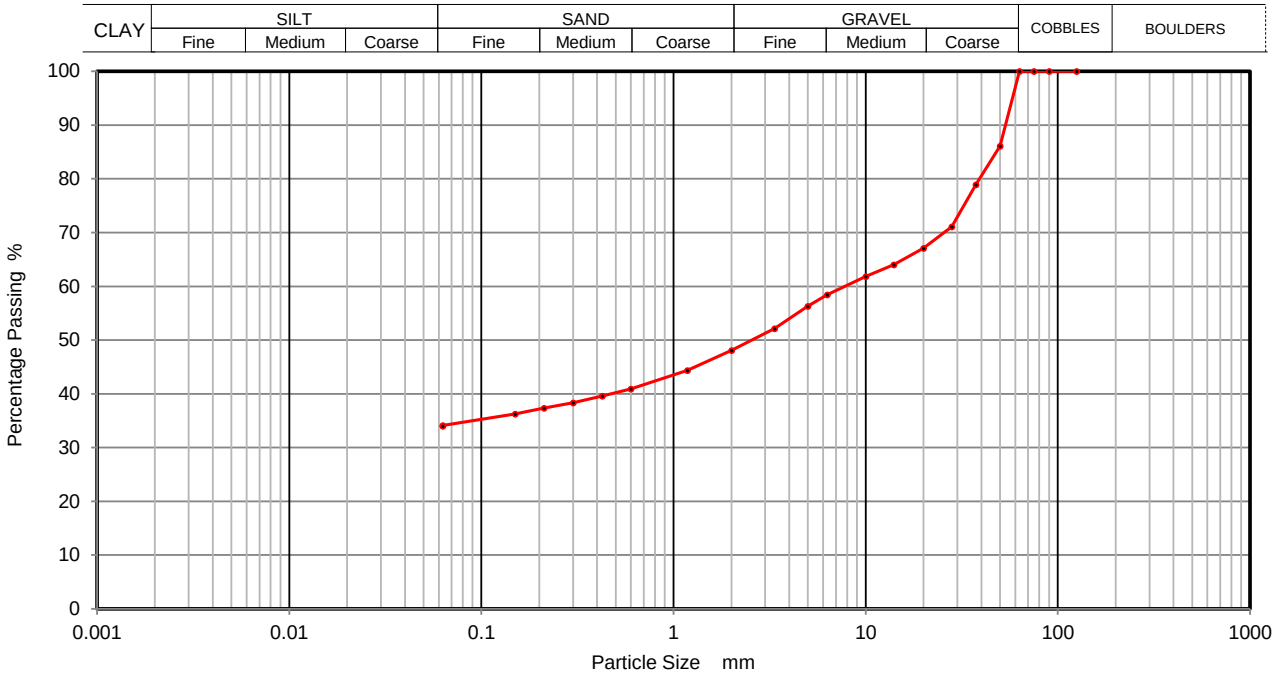
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH04
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy silty clayey fine to coarse GRAVEL.	Depth Top	24.35
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	86		
37.5	79		
28	71		
20	67		
14	64		
10	62		
6.3	58		
5	56		
3.35	52		
2	48		
1.18	44		
0.6	41		
0.425	40		
0.3	38		
0.212	37		
0.15	36		
0.063	34		

Sample Proportions	% dry mass
Cobbles	0
Gravel	52
Sand	14
Silt and Clay	34

Grading Analysis	
Uniformity Coefficient	

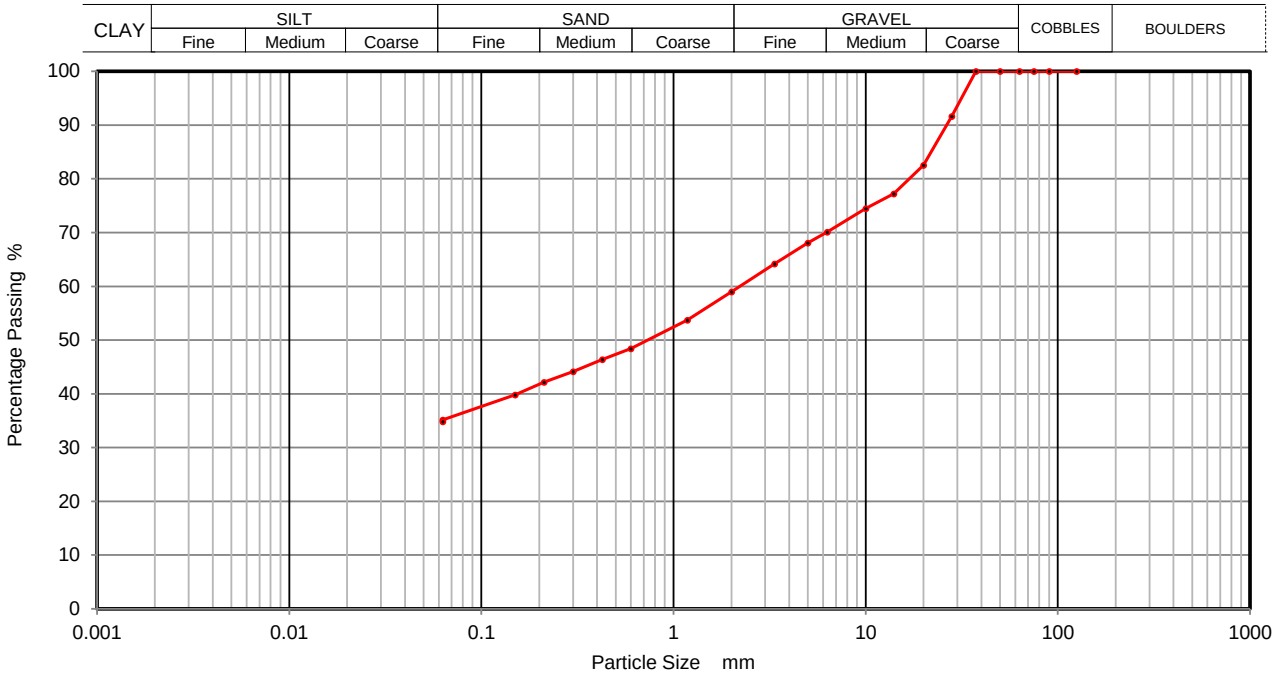
Remarks

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Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH05
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy silty clayey fine to coarse GRAVEL.	Depth Top	4.70
		Depth Base	5.10
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	92		
20	83		
14	77		
10	74		
6.3	70		
5	68		
3.35	64		
2	59		
1.18	54		
0.6	48		
0.425	46		
0.3	44		
0.212	42		
0.15	40		
0.063	35		

Sample Proportions	% dry mass
Cobbles	0
Gravel	41
Sand	24
Silt and Clay	35

Grading Analysis	
Uniformity Coefficient	

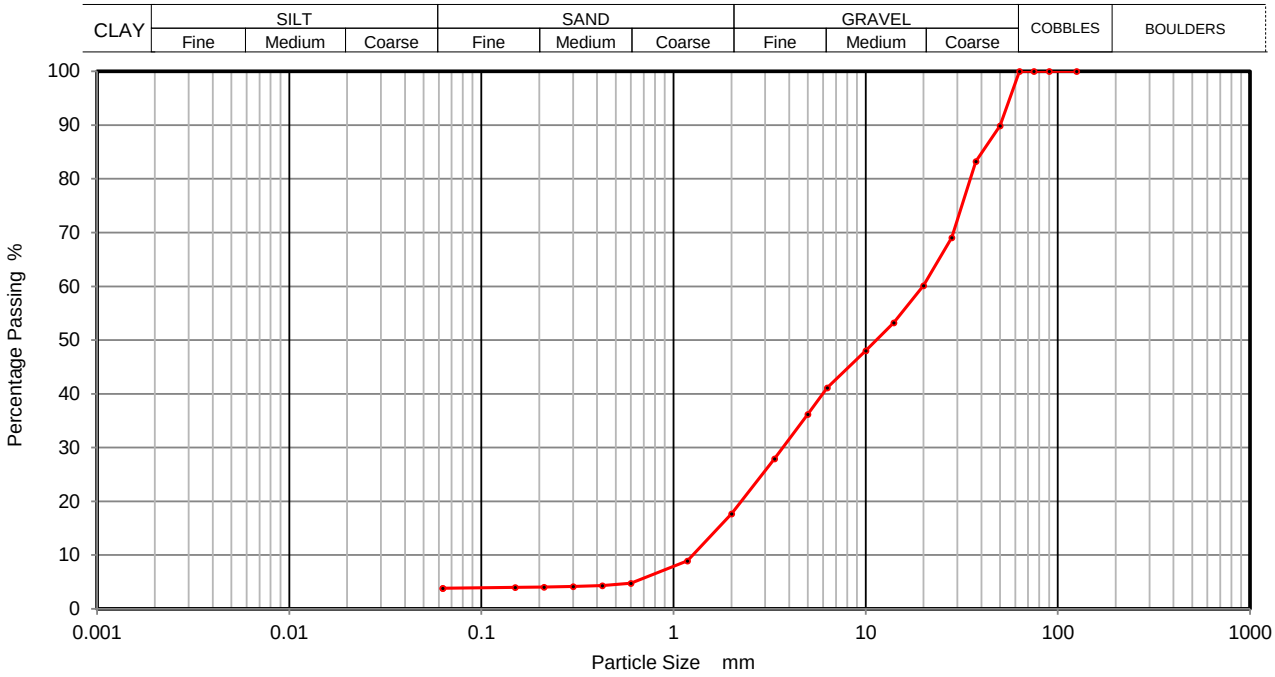
Remarks

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Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH05
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown silty fine to coarse sandy fine to coarse GRAVEL.	Depth Top	15.50
		Depth Base	15.90
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	90		
37.5	83		
28	69		
20	60		
14	53		
10	48		
6.3	41		
5	36		
3.35	28		
2	18		
1.18	9		
0.6	5		
0.425	4		
0.3	4		
0.212	4		
0.15	4		
0.063	4		

Sample Proportions	% dry mass
Cobbles	0
Gravel	82
Sand	14
Silt and Clay	4

Grading Analysis	
Uniformity Coefficient	

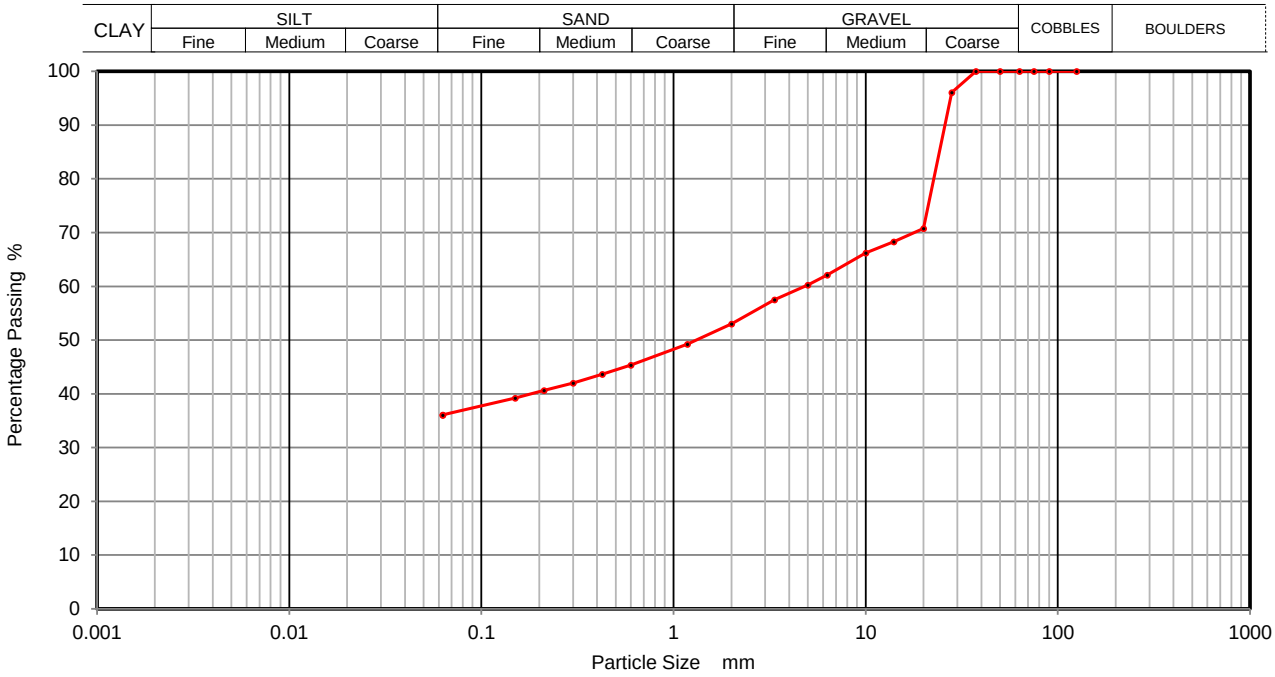
Remarks

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Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH05
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy silty clayey fine to coarse GRAVEL.	Depth Top	19.50
		Depth Base	19.90
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	96		
20	71		
14	68		
10	66		
6.3	62		
5	60		
3.35	58		
2	53		
1.18	49		
0.6	45		
0.425	44		
0.3	42		
0.212	41		
0.15	39		
0.063	36		

Sample Proportions	% dry mass
Cobbles	0
Gravel	47
Sand	17
Silt and Clay	36

Grading Analysis	
Uniformity Coefficient	

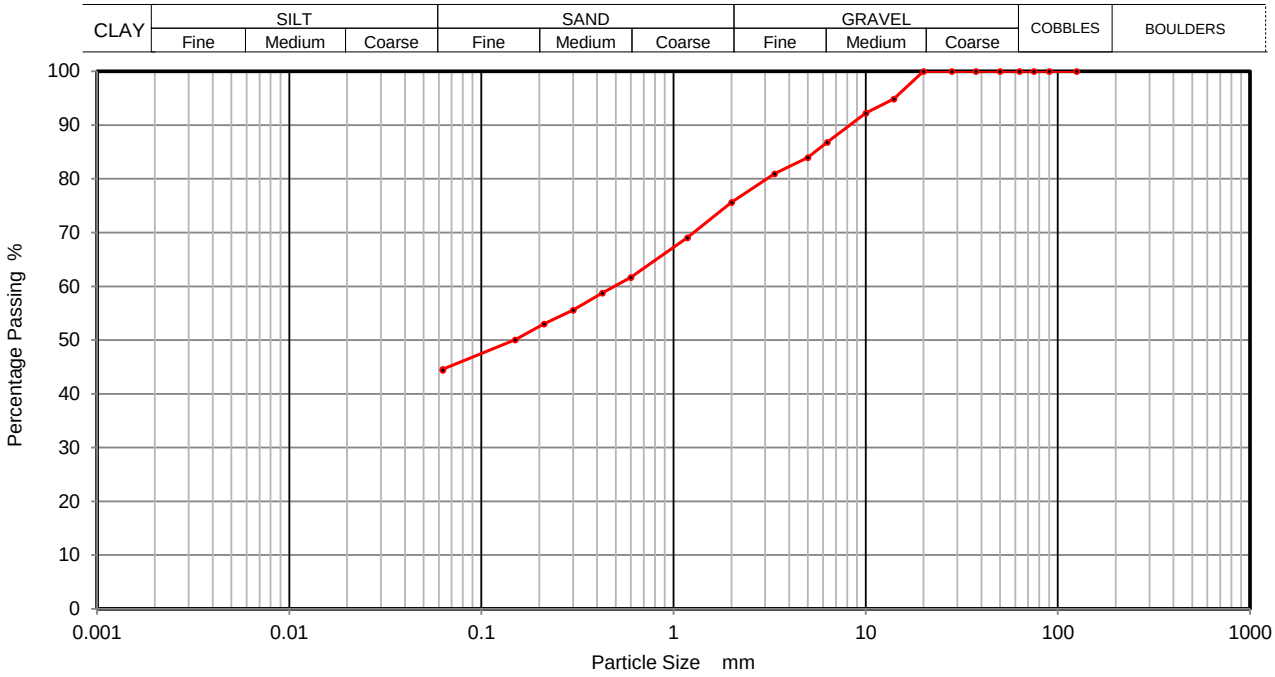
Remarks

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Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH06
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse gravelly fine to coarse sandy silty CLAY.	Depth Top	2.00
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	95		
10	92		
6.3	87		
5	84		
3.35	81		
2	76		
1.18	69		
0.6	62		
0.425	59		
0.3	56		
0.212	53		
0.15	50		
0.063	45		

Sample Proportions	% dry mass
Cobbles	0
Gravel	24
Sand	31
Silt and Clay	45

Grading Analysis	
Uniformity Coefficient	

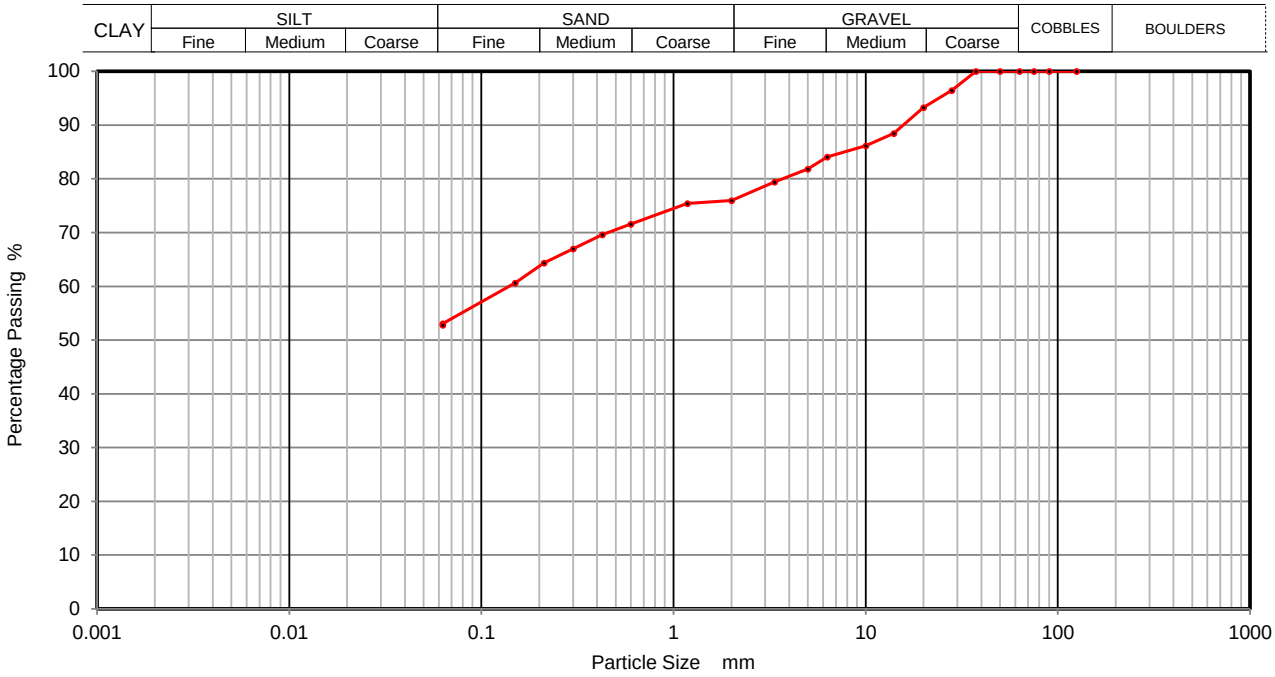
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Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH06
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse gravelly fine to coarse sandy silty CLAY.	Depth Top	4.10
		Depth Base	4.70
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	96		
20	93		
14	88		
10	86		
6.3	84		
5	82		
3.35	79		
2	76		
1.18	75		
0.6	72		
0.425	70		
0.3	67		
0.212	64		
0.15	61		
0.063	53		

Sample Proportions	% dry mass
Cobbles	0
Gravel	24
Sand	23
Silt and Clay	53

Grading Analysis	
Uniformity Coefficient	

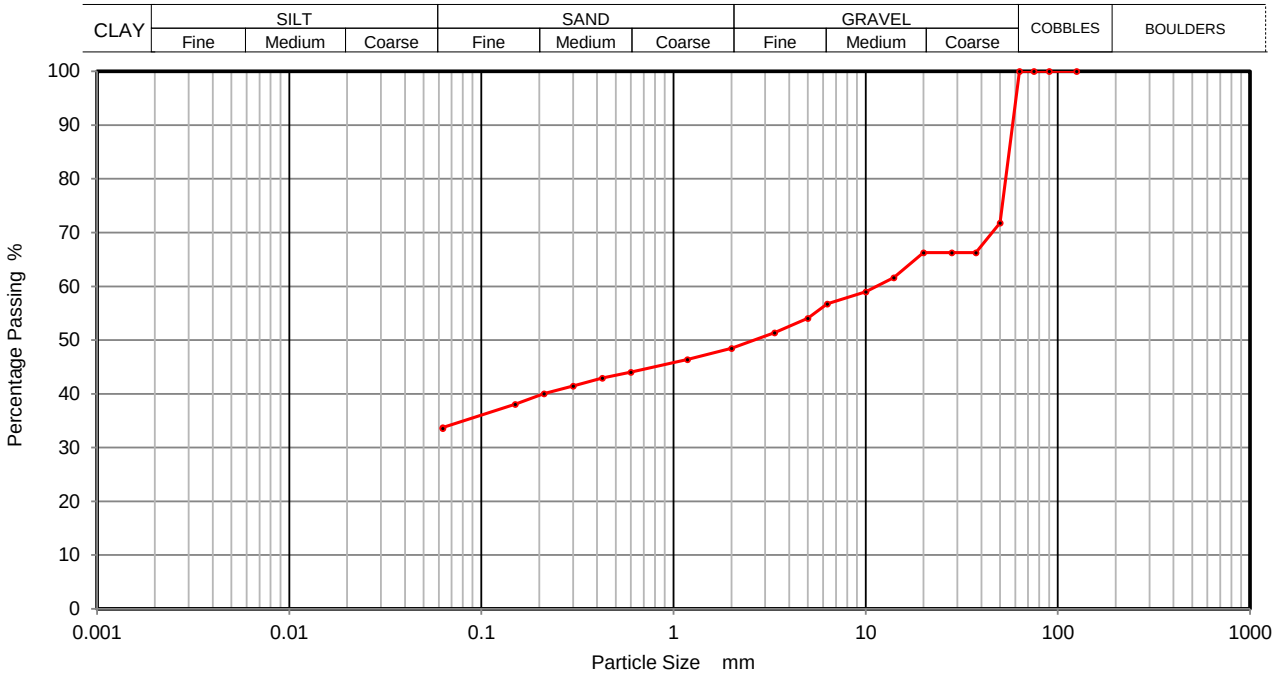
Remarks

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RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH06
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy silty clayey fine to coarse GRAVEL.	Depth Top	4.60
		Depth Base	4.90
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	72		
37.5	66		
28	66		
20	66		
14	62		
10	59		
6.3	57		
5	54		
3.35	51		
2	48		
1.18	46		
0.6	44		
0.425	43		
0.3	41		
0.212	40		
0.15	38		
0.063	34		

Sample Proportions	% dry mass
Cobbles	0
Gravel	52
Sand	14
Silt and Clay	34

Grading Analysis	
Uniformity Coefficient	

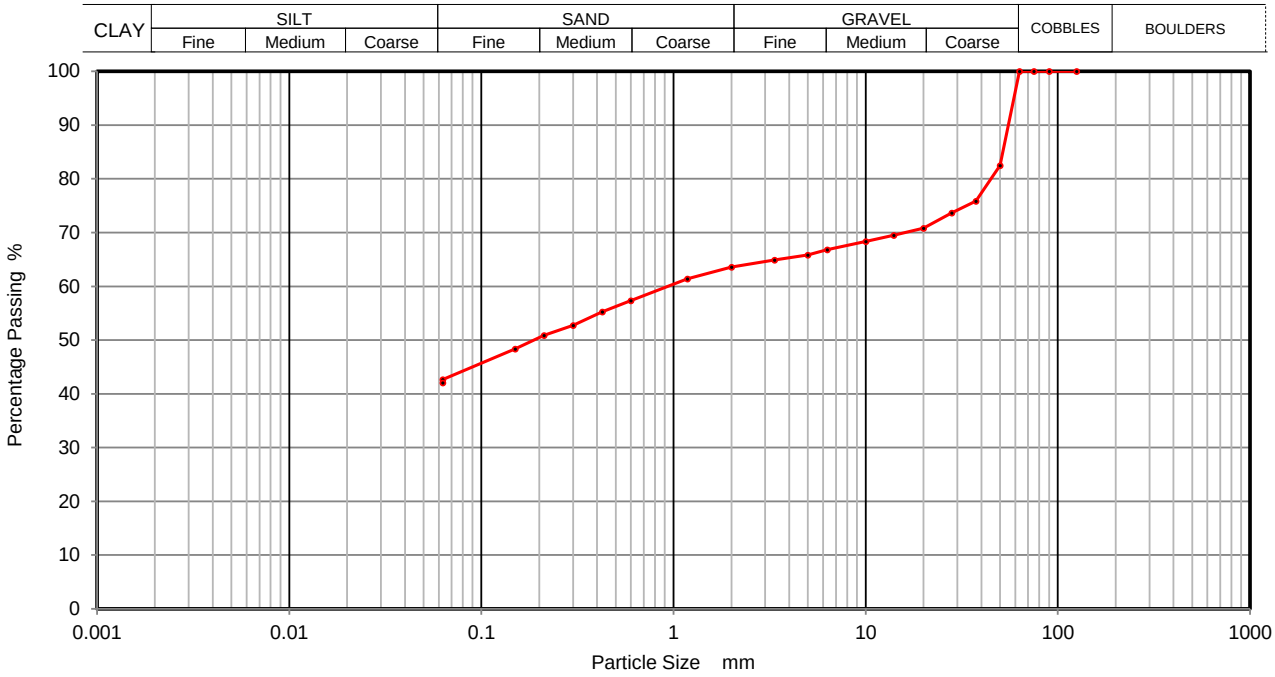
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RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH06
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to coarse sandy fine to coarse gravelly silty CLAY.	Depth Top	13.20
		Depth Base	13.70
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	82		
37.5	76		
28	74		
20	71		
14	70		
10	68		
6.3	67		
5	66		
3.35	65		
2	64		
1.18	61		
0.6	57		
0.425	55		
0.3	53		
0.212	51		
0.15	48		
0.063	43		

Sample Proportions	% dry mass
Cobbles	0
Gravel	36
Sand	21
Silt and Clay	43

Grading Analysis	
Uniformity Coefficient	

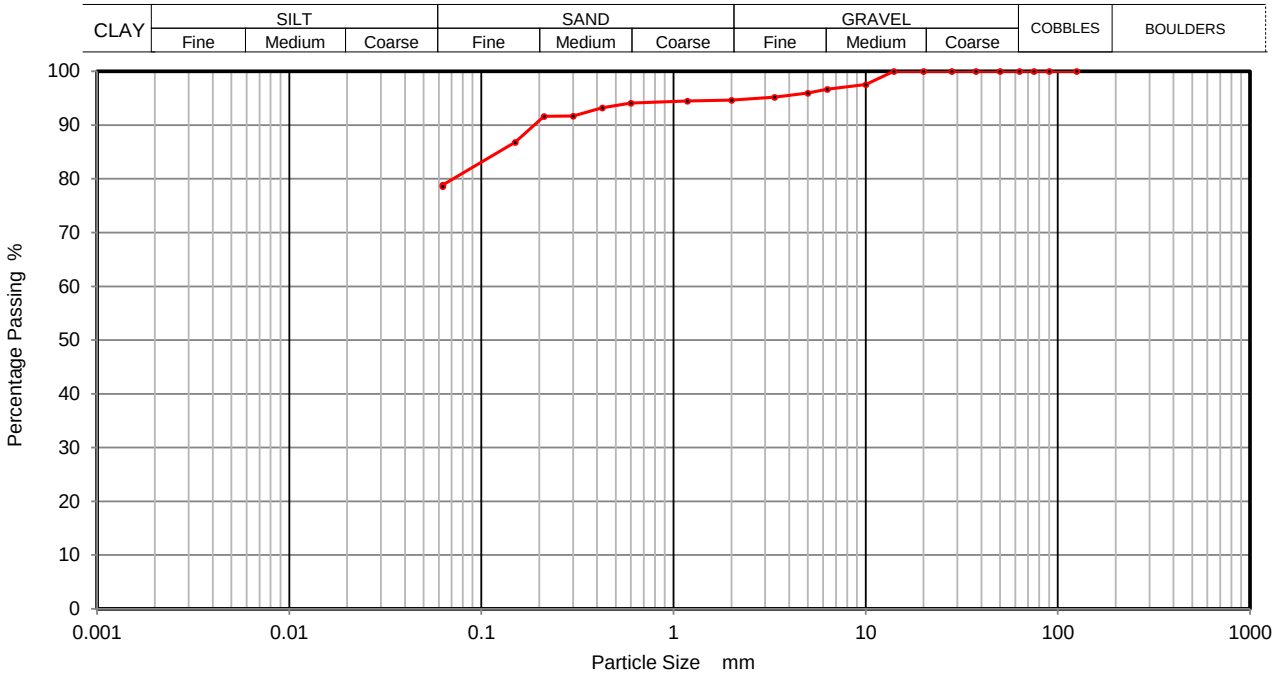
Remarks

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Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	39874
		Borehole/Pit No.	BH06
Site Name	**Additional Airfield Boreholes**	Sample No.	
Soil Description	Brown fine to medium slightly gravelly fine to coarse sandy silty CLAY.	Depth Top	26.00
		Depth Base	26.60
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	98		
6.3	97		
5	96		
3.35	95		
2	95		
1.18	94		
0.6	94		
0.425	93		
0.3	92		
0.212	92		
0.15	87		
0.063	79		

Sample Proportions	% dry mass
Cobbles	0
Gravel	5
Sand	16
Silt and Clay	79

Grading Analysis	
Uniformity Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

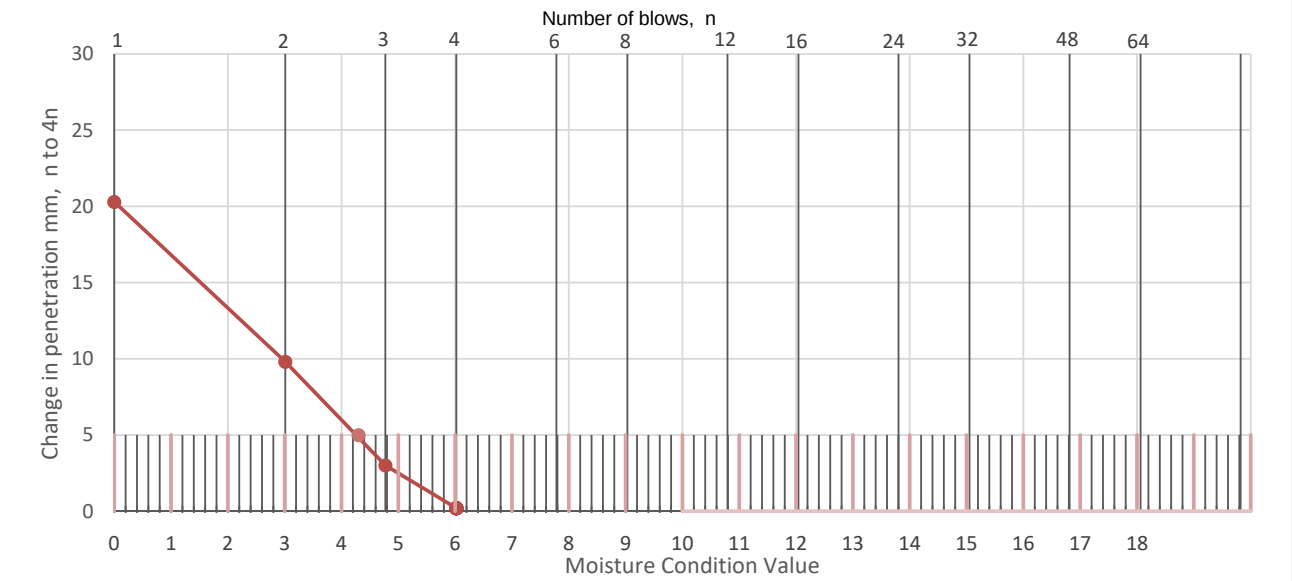
Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

UKAS TESTING 2788

GSTL	Moisture Condition Value BS1377:Part4:1990:Clause 5.4	Contract Number	39874
		Borehole/Pit No.	BH01
Site Name	Additional Airfield Boreholes	Sample No.	
Soil Description	Brown fine to medium gravelly silty CLAY.	Depth Top	2.00
		Depth Base	
		Sample Type	B

Number of blows	Penetration mm	Change in Penetration n to 4n blows
1	66.1	20.3
2	55.4	9.8
3	48.6	3.0
4	45.8	0.2
6	45.6	
8	45.6	
12	45.6	
16	45.6	
24		
32		
48		
64		
96		
128		
192		
256		

Material Retained 20mm (%)	3
Moisture Content (%)	11
MCV Value (%)	4.3



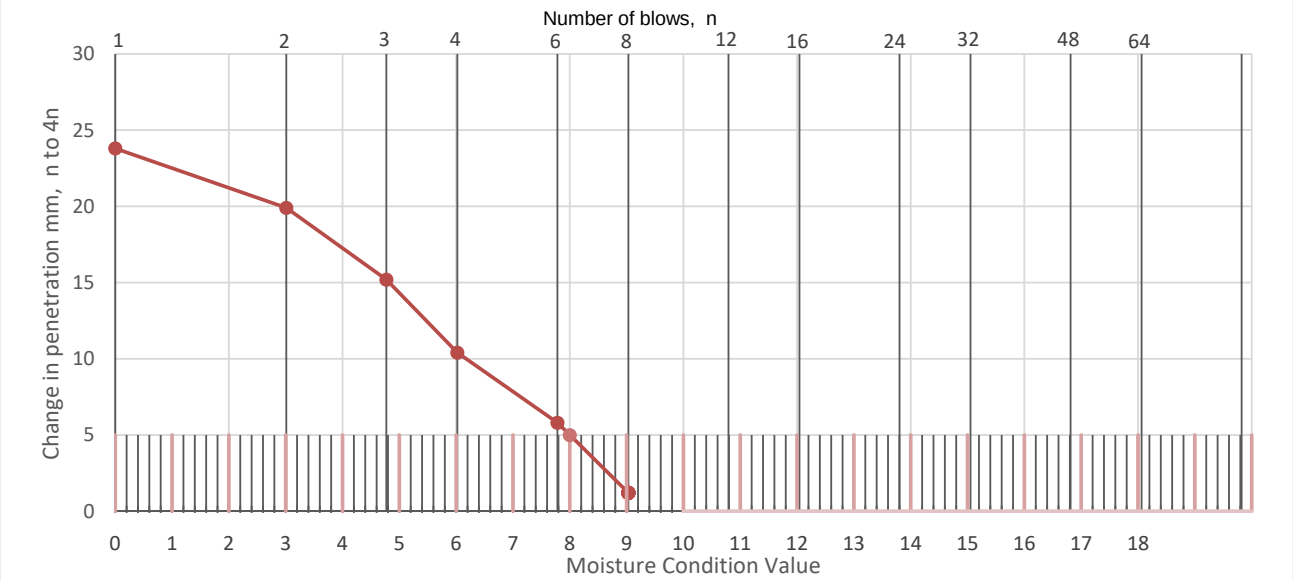
Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

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GSTL	Moisture Condition Value BS1377:Part4:1990:Clause 5.4	Contract Number	39874
		Borehole/Pit No.	BH02A
Site Name	Additional Airfield Boreholes	Sample No.	
Soil Description	Brown fine to medium gravelly silty CLAY.	Depth Top	4.50
		Depth Base	
		Sample Type	B

Number of blows	Penetration mm	Change in Penetration n to 4n blows
1	69.3	23.8
2	56.2	19.9
3	50.3	15.2
4	45.5	10.4
6	40.9	5.8
8	36.3	1.2
12	35.1	
16	35.1	
24	35.1	
32	35.1	
48		
64		
96		
128		
192		
256		

Material Retained 20mm (%)	7.2
Moisture Content (%)	11
MCV Value (%)	8.0



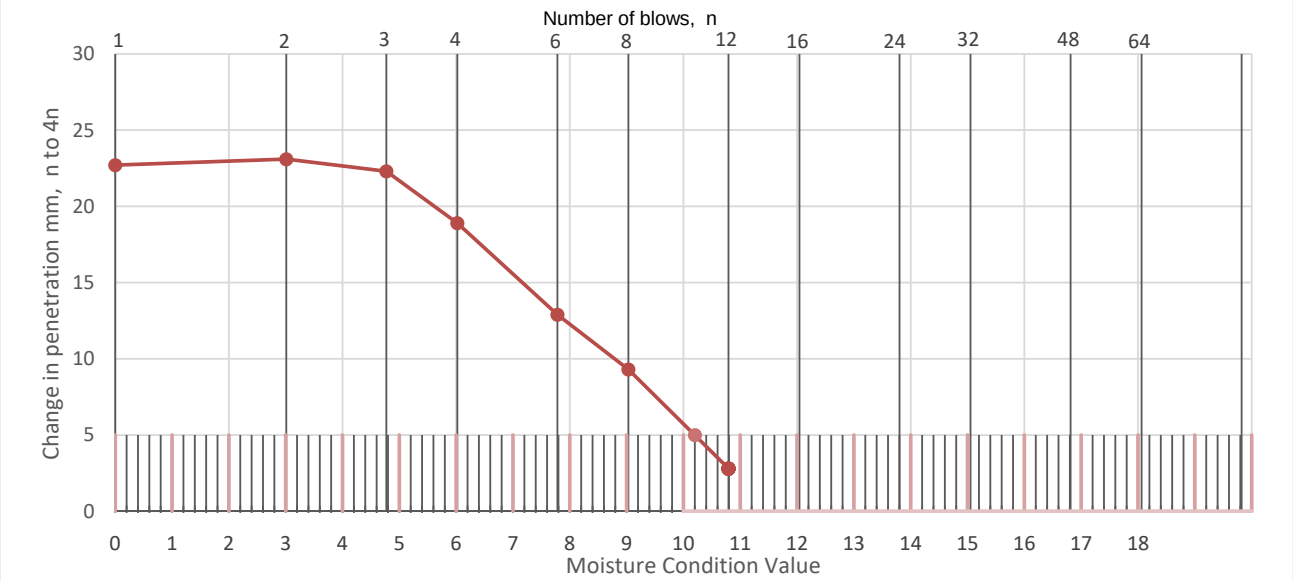
Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

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GSTL	Moisture Condition Value BS1377:Part4:1990:Clause 5.4	Contract Number	39874
		Borehole/Pit No.	BH05
Site Name	Additional Airfield Boreholes	Sample No.	
Soil Description	Brown fine to medium gravelly silty CLAY.	Depth Top	1.20
		Depth Base	
		Sample Type	B

Number of blows	Penetration mm	Change in Penetration n to 4n blows
1	80.3	22.7
2	69.7	23.1
3	62.4	22.3
4	57.6	18.9
6	50.3	12.9
8	46.6	9.3
12	40.1	2.8
16	38.7	
24	37.4	
32	37.3	
48	37.3	
64		
96		
128		
192		
256		

Material Retained 20mm (%)	9.2
Moisture Content (%)	14
MCV Value (%)	10.2



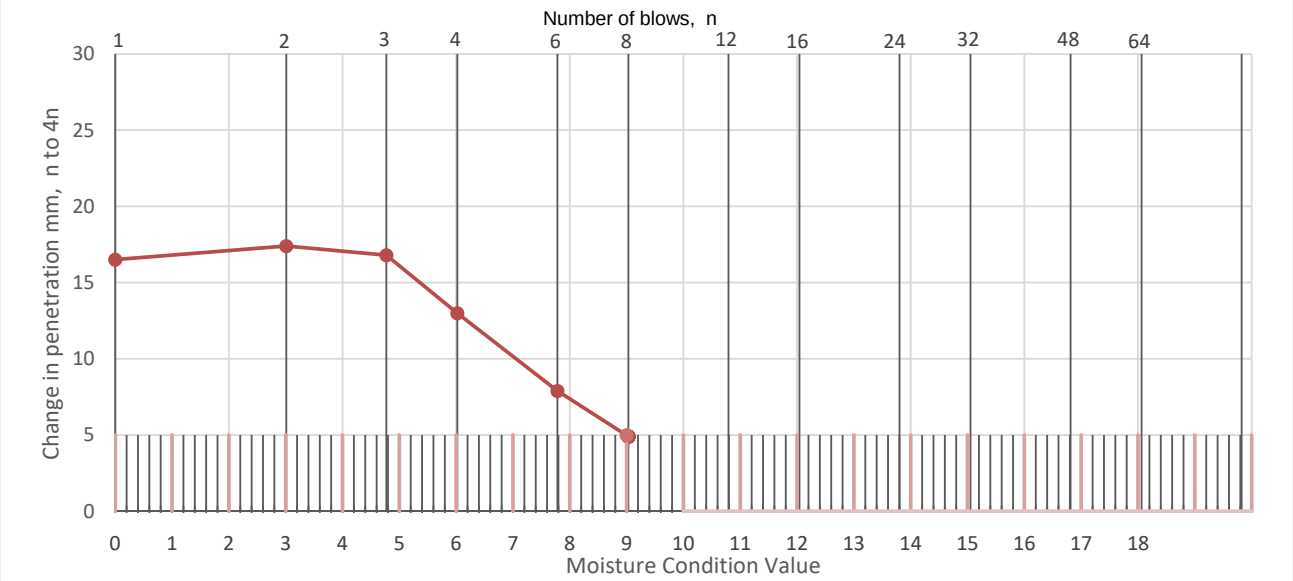
Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

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GSTL	Moisture Condition Value BS1377:Part4:1990:Clause 5.4	Contract Number	39874
		Borehole/Pit No.	BH06
Site Name	Additional Airfield Boreholes	Sample No.	
Soil Description	Brown fine to medium gravelly silty CLAY.	Depth Top	3.00
		Depth Base	
		Sample Type	B

Number of blows	Penetration mm	Change in Penetration n to 4n blows
1	82.9	16.5
2	75.7	17.4
3	70.2	16.8
4	66.4	13.0
6	61.3	7.9
8	58.3	4.9
12	53.4	
16	53.4	
24	53.4	
32	53.4	
48		
64		
96		
128		
192		
256		

Material Retained 20mm (%)	4.8
Moisture Content (%)	6.0
MCV Value (%)	9.0



Operators	Checked	16-07-18	Emma Sharp	
RO/MH	Approved	17-07-18	Paul Evans	

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Trinity College Dublin
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Catherinestown House,
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Unconfined Compression Tests On Rock Cores

Project: Additional Airfield Boreholes

Project No: 7687 - 04 - 18

Delivery Date: 09.07.2018

Test Date: 16.07.2018

Borehole Number	Depth (m)	Average Diameter (mm)	Height (mm)	Length/Dia. (Ratio)	Unconfined Compressive Strength (Mpa)	Density (Mg/m^3)
BH - 02A	32.15	62.7	171.1	2.73	99.0	2.72
BH - 03	19.60 - 19.95	101.6	187.7	1.85	86.5	2.71
BH - 04	28.55	63.2	143.3	2.27	61.7	2.73
BH - 05	26.35 - 26.75	101.8	200.3	1.97	90.8	2.64
BH - 06	35.40	63.1	171.5	2.72	29.3	2.67

Prof. B. O'Kelly

Specimens prepared and tested in accordance with suggested method from International Society for Rock Mechanics (ISRM), 1985

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Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin

Point Load Index Tests (single diametral determination)

Project: Additional Airfield Boreholes

Project No: 7687 - 04 - 18

Delivery date: 09.07.2018

Test Date: 16.07.2018

Diametric samples

Borehole No.	Depth (m)	$I_{s(50)}$ (Mpa)
BH - 01	28.55	0.82
BH - 01	31.63	1.48
BH - 01	32.30	4.16
BH - 02A	31.63	1.48
BH - 03	32.30	4.16
BH - 04	28.65	0.61
BH - 05	22.35	1.88
BH - 06	31.90	3.07

Prof. Brendan O'Kelly

Specimens prepared and tested in accordance with suggested method from International Society for Rock Mechanics (ISRM), 1985

Exova Jones Environmental

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Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Stephen Kealy
Date :	16th July, 2018
Your reference :	7687-04-18
Our reference :	Test Report 18/10144 Batch 1
Location :	Additional Airfield Boreholes
Date samples received :	28th June, 2018
Status :	Final report
Issue :	1

Two samples were received for analysis on 28th June, 2018 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: Ground Investigations Ireland
Reference: 7687-04-18
Location: Additional Airfield Boreholes
Contact: Stephen Kealy
JE Job No.: 18/10144

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6									LOD/LOR	Units	Method No.
Sample ID	BH04	BH04											
Depth	1.30	1.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	16/05/2018	16/05/2018											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	28/06/2018	28/06/2018											
Antimony	5	2									<1	mg/kg	TM30/PM15
Arsenic #	23.3	10.0									<0.5	mg/kg	TM30/PM15
Barium #	135	126									<1	mg/kg	TM30/PM15
Cadmium #	4.8	1.5									<0.1	mg/kg	TM30/PM15
Chromium #	78.0	64.3									<0.5	mg/kg	TM30/PM15
Copper #	51	23									<1	mg/kg	TM30/PM15
Lead #	36	14									<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1									<0.1	mg/kg	TM30/PM15
Molybdenum #	9.6	6.1									<0.1	mg/kg	TM30/PM15
Nickel #	93.8	38.5									<0.7	mg/kg	TM30/PM15
Selenium #	2	3									<1	mg/kg	TM30/PM15
Zinc #	123	64									<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05									<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	0.12									<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	0.07									<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	0.10									<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	<0.22									<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64									<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	0.07									<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	0.03									<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1									<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	85	92									<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30									<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 7687-04-18
Location: Additional Airfield Boreholes
Contact: Stephen Kealy
JE Job No.: 18/10144

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6											
Sample ID	BH04	BH04											
Depth	1.30	1.50									Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J T	V J T											
Sample Date	16/05/2018	16/05/2018											
Sample Type	Soil	Soil											
Batch Number	1	1									LOD/LOR	Units	Method No.
Date of Receipt	28/06/2018	28/06/2018											
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1 SV									<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1 SV									<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1 SV									<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2									<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4									<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7									<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7									<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7									<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26									<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10	<0.1	<0.1 SV									<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10									<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	<10									<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1 SV									<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1 SV									<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1 SV									<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2									<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4									<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7									<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7									<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	<7	<7									<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	<26	<26									<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40)	<52	<52									<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 #	<0.1	<0.1 SV									<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10	<10									<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	<10	<10									<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5 SV									<5	ug/kg	TM31/PM12
Benzene #	<5	<5 SV									<5	ug/kg	TM31/PM12
Toluene #	<5	<5 SV									<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5 SV									<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5 SV									<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5 SV									<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5									<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35									<35	ug/kg	TM17/PM8

Client Name: Ground Investigations Ireland
Reference: 7687-04-18
Location: Additional Airfield Boreholes
Contact: Stephen Kealy
JE Job No.: 18/10144

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6									LOD/LOR	Units	Method No.
Sample ID	BH04	BH04											
Depth	1.30	1.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	16/05/2018	16/05/2018											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	28/06/2018	28/06/2018											
Natural Moisture Content	29.9	13.3									<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	23.0	11.7									<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3									<0.3	mg/kg	TM38/PM20
Chromium III	78.0	64.3									<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.71	0.50									<0.02	%	TM21/PM24
pH #	8.18	8.84									<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1066	0.1031										kg	NONE/PM17
Mass of dried test portion	0.09	0.09										kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 7687-04-18
Location: Additional Airfield Boreholes
Contact: Stephen Kealy
JE Job No.: 18/10144

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6									LOD/LOR	Units	Method No.
Sample ID	BH04	BH04											
Depth	1.30	1.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	16/05/2018	16/05/2018											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	28/06/2018	28/06/2018											
Dissolved Antimony #	0.002	<0.002									<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025									<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025									<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.003	0.011									<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.03	0.11									<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005									<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005									<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015									<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015									<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007									<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07									<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005									<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05									<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	0.020									<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	0.20									<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002									<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001									<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001									<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01									<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1									<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3									<0.3	mg/l	TM173/PM0
Fluoride	<3	<3									<3	mg/kg	TM173/PM0
Sulphate as SO4 #	8.42	2.10									<0.05	mg/l	TM38/PM0
Sulphate as SO4 #	84.2	21.0									<0.5	mg/kg	TM38/PM0
Chloride #	0.3	<0.3									<0.3	mg/l	TM38/PM0
Chloride #	3	<3									<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	5	2									<2	mg/l	TM60/PM0
Dissolved Organic Carbon	50	20									<20	mg/kg	TM60/PM0
pH	8.13	8.44									<0.01	pH units	TM73/PM0
Total Dissolved Solids #	69	43									<35	mg/l	TM20/PM0
Total Dissolved Solids #	690	430									<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 7687-04-18
Location: Additional Airfield Boreholes
Contact: Stephen Kealy
JE Job No.: 18/10144

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6														
Sample ID	BH04	BH04														
Depth	1.30	1.50														
COC No / misc																
Containers	V J T	V J T														
Sample Date	16/05/2018	16/05/2018														
Sample Type	Soil	Soil														
Batch Number	1	1														
Date of Receipt	28/06/2018	28/06/2018														
Solid Waste Analysis												Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Total Organic Carbon #	0.71	0.50										3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025 [SV]										6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035										1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30										500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22										-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64										100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																	
Arsenic #	<0.025	<0.025										0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.03	0.11										20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005										0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015										0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07										2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001										0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	0.20										0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02										0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05										0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	0.02	<0.02										0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03										0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03										4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	690	430										4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	50	20										500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1066	0.1031										-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	84.1	87.1										-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.883	0.887										-	-	-		l	NONE/PM17
Eluate Volume	0.85	0.8										-	-	-		l	NONE/PM17
pH #	8.18	8.84										-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1										1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3										-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	84.2	21.0										1000	20000	50000	<0.5	mg/kg	TM38/PM0
Chloride #	3	<3										800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland
Reference: 7687-04-18
Location: Additional Airfield Boreholes
Contact: Stephen Kealy

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
18/10144	1	BH04	1.30	1-3	No interpretation possible
18/10144	1	BH04	1.50	4-6	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 18/04/7687
Location: Additional Airfield Boreholes
Contact: Stephen Kealy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/10144	1	BH04	1.30	2	11/07/2018	**General Description (Bulk Analysis)**	soil/stones
					11/07/2018	**Asbestos Fibres**	NAD
					11/07/2018	**Asbestos Fibres (2)**	NAD
					11/07/2018	**Asbestos ACM**	NAD
					11/07/2018	**Asbestos ACM (2)**	NAD
					11/07/2018	**Asbestos Type**	NAD
					11/07/2018	**Asbestos Type (2)**	NAD
					11/07/2018	**Asbestos Level Screen**	NAD
18/10144	1	BH04	1.50	5	11/07/2018	**General Description (Bulk Analysis)**	soil/stones
					11/07/2018	**Asbestos Fibres**	NAD
					11/07/2018	**Asbestos Fibres (2)**	NAD
					11/07/2018	**Asbestos ACM**	NAD
					11/07/2018	**Asbestos ACM (2)**	NAD
					11/07/2018	**Asbestos Type**	NAD
					11/07/2018	**Asbestos Type (2)**	NAD
					11/07/2018	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland

Reference: 7687-04-18

Location: Additional Airfield Boreholes

Contact: Stephen Kealy

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
18/10144	1	BH04	1.30	1-3	EPH, GRO, PAH, PCB, pH, TOC	Sample holding time exceeded prior to receipt
18/10144	1	BH04	1.30	1-3	GRO	Solid Samples were received at a temperature above 9°C.
18/10144	1	BH04	1.50	4-6	EPH, GRO, PAH, PCB, pH, TOC	Sample holding time exceeded prior to receipt
18/10144	1	BH04	1.50	4-6	GRO	Solid Samples were received at a temperature above 9°C.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

Please include all sections of this report if it is reproduced

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/10144

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 18/10144

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes
NONE	No Method Code	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Appendix - Methods used for WAC (2003/33/EC)

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS

**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.