

Cambridge Waste Water Treatment Plant Relocation Project
Anglian Water Services Limited

Appendix 14.6: Groundwater Investigation Report Waterbeach

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**A REPORT ON A GROUND INVESTIGATION FOR
THE WATERBEACH GROWTH SCHEME,
CAMBRIDGESHIRE
(FACTUAL)**

CLIENT: Anglian Water Services Limited

Date: 2 March 2022

Reference: AHm/21.393

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1. INTRODUCTION

It is proposed to install a new water main between Waterbeach and Horningsea just to the north-east of Cambridge in Cambridgeshire (Drawing 21.393/01). This will include sections where the main will be laid by directional drilling and others in open cut excavation.

At the instruction of Anglian Water Services Limited, an investigation was carried out under the Ground Investigation Period Contract, to provide information on the subsoil conditions and relevant geotechnical parameters, and also to assess the characteristics of the ground with respect to potential contamination.

This report provides the factual details of the fieldwork and laboratory testing undertaken during the investigation.

2. FIELDWORK

The fieldwork was carried out between 10 and 26 January 2022 and comprised nine cable percussive boreholes, referenced BH01 to BH09. The exploratory hole positions were selected and set out in general accordance with the requirements of Anglian Water Services Limited, as shown approximately on Drawings 21.393/02a, 02b and 02c.

The National Grid reference and, elevation of the hole locations relative to Ordnance Datum, were measured using a Hemisphere S320 VRS GPS (RTK) system.

A cable avoidance tool (gCAT4+) was used to sweep the borehole positions and the immediate surrounding area to locate any potential services with the position adjusted as necessary. A starter pit was also excavated by hand to a depth of 1.2 m to provide direct inspection for services at the borehole locations.

The **boreholes** were taken to depths between 10 m and 20 m below ground level, using conventional cable percussive techniques ('shell and auger') in 150 mm diameter casing. During advance, sampling and *in situ* testing were carried out in general accordance with BS EN1997-2:2007 Eurocode 7 and its UK National Annex supported by BS 5930:2015+A1:2020. Standard disturbed samples were taken for laboratory testing and to allow later inspection of the materials encountered and facilitate accurate logging.

Open drive samples (U100) were taken in cohesive deposits to allow laboratory testing of undisturbed material. These were generally alternated with standard penetration tests (SPT) which were carried out using a split barrel sampler or a solid cone as appropriate to obtain additional strength information, but were also undertaken in granular deposits to assess their condition. The SPT N value was taken as the number of blows for 300 mm of penetration, following a seating drive of 150 mm or 25 blows.

Hand vane tests (HV) were carried out in suitable material within the inspection pit depth using a Pilcon hand vane to provide an estimate of the undrained shear strength. This is achieved using a four-bladed cruciform stainless steel vane which is pushed into the ground. The torque head is attached to the 19 mm (or 33 mm) diameter vane and is rotated at the rate of one revolution per minute until the material fails. The equipment includes a direct reading scale to give the undrained shear strength.

Dedicated **environmental samples** were taken representative of the strata encountered at the exploratory hole position. They were placed in suitable containers, stored temporarily in cool boxes and delivered to a UKAS accredited facility for analysis of potential contaminants.

The boreholes were monitored for **groundwater** ingress during advance. Upon encountering water, work was temporarily stopped to allow the level to stabilise, recording the water level every five minutes for a period of twenty minutes. On completion, a slotted standpipes piezometer were installed in BH01, BH06 and BH09, which comprised a slotted PVC access tube, surrounded by a granular filter, and sealed at the top and bottom by bentonite. Subsequent to the completion of the fieldwork AFHA returned to site to carry out groundwater monitoring on four separate occasions.

Details of the strata encountered, the sampling, piezometer installation, *in situ* and laboratory testing are shown on records appended to this report.

3. LABORATORY TESTING

3.1 GENERAL

Subsequent to the fieldwork, a programme of laboratory testing was carried out to provide additional quantitative data on the materials encountered. The tests were completed in accordance with the procedures laid down in BS EN ISO 17892 and BS1377: 1990, unless stated otherwise, and consisted of:

- Natural moisture content
- Atterberg limits
- Particle size distribution
- Unconsolidated undrained triaxial testing
- Sulphate content and pH value
- Total sulphur content
- Contamination testing
- WAC testing

3.2 TEST PROCEDURES

3.2.1 NATURAL MOISTURE CONTENT

The natural moisture content (also known as water content) is determined according to BS EN ISO 17892: Part 1: 2014: clause 5.2. This represents the mass of moisture content retained by the soil in its natural state as a percentage of its dry mass. For organic soils and peats care should be taken to avoid heating the sample above 50°C to prevent irreversible physical changes to the material.

3.2.2 ATTERBERG LIMITS

The Atterberg limits are determined in the laboratory by the procedures given in BS EN ISO 17892: Part 12: 2018. The liquid limit (LL) is the moisture content of the soil at the point that its behaviour passes from that of a plastic solid to that of a liquid. The test procedure given as clause 5.3 was used based on the cone penetrometer in which the penetration of a free-fall cone into moistened and cured samples of the soil is measured. The plastic limit (PL) is the moisture content of the soil at the point that its behaviour passes from a plastic solid to a brittle solid. This point is measured according to clause 5.5 and is the point at which a thread of the soil rolled to 3 mm diameter begins to crumble.

Together the Atterberg limits can be used to define the plastic range of the soil. The plasticity index (PI) is the difference between the liquid and plastic limit and is broadly correlated to the engineering behaviour of the soil. When used with the natural moisture content of the soil they can also give an indication of its *in situ* condition.

3.2.3 PARTICLE SIZE DISTRIBUTION

A quantitative assessment of the particle size distribution of the soil down to the fine grained sand size is made according to BS EN ISO 17892: Part 4: 2016: clause 5.2. In this the percentage of certain sized fractions of the soil are found by determining the weight retained on a variety of sieve sizes through which the material is allowed to pass. The combined silt and clay fraction is determined by the difference between the sum of the retained weights and the original sample weight. Variations of the test procedure allow the silt and clay fraction to be removed from the coarser fraction by wet sieving during which the fine material is washed from the surface of the coarser material.

The quantitative determination of the particle size distribution for fine soils, from coarse silt to clay size, is made according to BS EN ISO 17892: Part 4: 2016: clause 5.3 or 5.4, using either the sedimentation by hydrometer method or pipette method. These tests are generally carried out if greater than 10% of the material passes the BS test sieve size of 63 μm . The percentages of the constituents of the fine soil can be linked to the curve obtained by sieving to provide a single curve for the whole material.

3.2.4 UNCONSOLIDATED UNDRAINED TRIAXIAL TESTING

The undrained shear strength of the soil was measured, as stated in BS EN ISO 17892: Part 8: 2018 or BS 1377: Part 7: 1990: clause 8, by axial compression of 100 mm diameter cylindrical specimens cut from the U100 undisturbed samples. The nature of the test is such that no change in moisture content of the specimen is allowed during shear.

The theory of behaviour of saturated clay materials in undrained shear failure gives that the strength will not be influenced by the confining pressure such that the measured angle of internal friction for the material will apparently be equal to zero. Experience has shown that this is true only for samples of unweathered heavily overconsolidated pure clays. Where the material is weathered or it contains a significant granular content a plastic rather than a brittle failure develops which produces a strain hardening during shear. In this

situation measurable apparent undrained angle of internal friction is produced. A similar situation develops in partially saturated materials. The test results are also influenced by sample variation, and in particular the presence of natural fissures or inclusions within the sample.

The use of large diameter specimens is preferred as this compensates for the scale effects of random features in smaller specimens. One of two tests are carried out according to the soil characteristic. Unweathered specimens of heavily overconsolidated clays which have a brittle failure in shear are tested in a single stage according to BS EN ISO 17892: Part 8: 2018. The confining pressure is taken as the total overburden pressure of the sample *in situ*. It is then failed by axial compression and the measured deviator stress reported as the apparent undrained cohesion. Specimens of weathered clay or the clays with granular contents are tested in a multistage manner according to BS 1377: Part 7: 1990: clause 9.

The test procedure is similar to the single stage but at the point that failure begins the confining pressure is increased and the specimen compressed for a further 2% of vertical strain at which point the confining pressure is again increased and held for a further 2% strain. The deviator stresses at each of the confining pressures are used to plot the Mohr envelope and the apparent undrained cohesion and if appropriate the undrained angle of internal friction.

3.2.5 SULPHATE CONTENT AND pH VALUE

In order to aid the evaluation of any aggressive tendency of the subsoil or groundwater to buried concrete, the pH, water soluble and total sulphate concentrations in a number of samples were determined using in-house procedures based on other methodologies.

The pH of a groundwater sample or a soil filtrate was established electrometrically according to BS 1377: Part 3: 1990: clause 9.5, while water soluble sulphate and groundwater sulphate were determined using procedures based on Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition (AWWA & WEF, 2005). This requires the preparation of a soil extract using deionised water at a 2:1 ratio. The filtered extract of the soil, or a water sample, are then injected into an ion exchange chromatograph with a conductivity detector. The samples are compared against commercially available standards to evaluate the sulphate concentration.

The total sulphate content of a soil was measured on a filtrate following digestion of the soil by 10% hydrochloric acid, as shown by BS 1377: Part 3: 1990: clause 5.5 and TRL 447 (Reid *et al* 2005). Subsequently the soil filtrate is introduced into ICP-OES equipment to determine sulphate concentration.

3.2.6 TOTAL SULPHUR CONTENT

To aid the evaluation of aggressive tendency of the subsoil to buried concrete as a result of its pyritic potential, the total potential sulphate content can be determined from the relationship between the total (acid soluble) sulphate content and the amount of total sulphur present. The total sulphur content is determined by a laboratory in-house methodology based on Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition (AWWA & WEF, 2005).

A dried portion of the soil is extracted at 115 °C for 75 minutes using 100% aqua regia. The digest solution is filtered and analysed by ICP-OES. The results are expressed as % S, and include water soluble and acid soluble sulphates and total reduced sulphur, as well as insoluble sulphates and organic sulphur.

3.2.7 CONTAMINATION TESTING

In order to determine the presence of other chemical contamination not otherwise naturally present in the ground, a signature suite of tests was undertaken to provide data on a broad mix of inorganic and organic potential contaminants. This comprised the total content of arsenic, cadmium, chromium, chromium VI, lead, mercury, selenium, copper, nickel, cyanide and zinc, together with pH, phenols, speciated polycyclic aromatic hydrocarbons (PAH) and total organic carbon (TOC).

The samples were also subject to specific hydrocarbon analysis which took place in the form of total petroleum hydrocarbon analysis using the Land Quality Management (LQM) suite, which is based on the Criterial Working Group (CWG) methodology. This provides the split between the aliphatic and aromatic fractions in the C₅ to C₄₄ ranges. The total concentration of petroleum hydrocarbons between C₆ and C₄₀ is also provided, together with the specified hydrocarbons: benzene, toluene, ethylbenzene, xylenes (collectively known as BTEX) and methyl tertiary butyl ether (MTBE).

Additionally, selected samples were screened for the presence of asbestos, but none detected.

Throughout, testing was undertaken using a variety of analytical techniques, and was carried out to MCERTS accredited methods, where applicable, or to UKAS accredited or other acceptable methodologies.

3.2.8 WASTE ACCEPTANCE CRITERIA TESTING

Waste Acceptance Criteria (WAC) assessment was undertaken to assist with waste characterisation and disposal of excavated material. Waste materials fall into three categories, namely 'inert', 'non-hazardous' and 'hazardous', with each category defined by leaching limit values for acceptance at the relevant landfill site. Leaching is carried out to determine the 10:1 liquid/solid ratio. The components analysed are arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium, zinc, chloride, fluoride, sulphate, together with dissolved organic carbon and total dissolved solids; phenols are only relevant to the inert waste category.

Additionally, the inert classification requires the determination of BTEX (a combination of the volatile organic hydrocarbons, as defined previously), polychlorinated biphenyls (total of the EC7 PCBs), mineral oil (in the C₁₀ to C₄₀ range), and polycyclic aromatic hydrocarbons. These suites of tests are not required for the non-hazardous and hazardous categories. pH is determined for non-hazardous waste acceptance and loss on ignition for the hazardous class, while the acid neutralisation capacity is measured for both, and total organic carbon for all three.

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2 March 2022



APPENDIX A: REFERENCES

AMERICAN WATER WORKS ASSOCIATION & WATER ENVIRONMENT FEDERATION. 2005. Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition. American Public Health Association, Washington D.C.

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BRITISH STANDARDS INSTITUTION. BS EN ISO 17892-1:2014 Geotechnical investigation and testing - Laboratory testing of soil. Part 1: Determination of water content. British Standards Institution, London.

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BRITISH STANDARDS INSTITUTION. BS EN ISO 17892-8:2018 Geotechnical investigation and testing - Laboratory testing of soil. Part 8: Unconsolidated undrained triaxial test. British Standards Institution, London.

REID, J. M, CZEREWKO, M. A. and CRIPPS, J.C. Sulphate specification for structural backfills. TRL Report 447, 2005. Transport Research Laboratory, Crowthorne, UK

APPENDIX B: CABLE PERCUSSIVE BOREHOLE RECORDS

B	Bulk disturbed sample
D	Small disturbed sample
ES	Environmental sample
U	100 mm diameter undisturbed open tube drive sample
W	Water sample
X blows	The associated figure 'X' is the number of blows to drive the sample tube over the given depth range
SPT(C)	Standard penetration test using a solid cone. N Value is uncorrected, but the hammer energy ratio is provided (in remarks)
SPT	Standard penetration test using a split spoon sampler. N Value is uncorrected, but the hammer energy ratio is provided (in remarks)
X,X/X,X,X,X	Blows per increment during the standard penetration test. The initial value relates to the seating drive (150 mm) and the remaining four to the 75 mm increments of the test length
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300 mm)
X*/Y	Incomplete standard penetration test where the seating drive could not be completed. The blows 'X' represent the total blows for the given length of seating drive 'Y' (mm)
X/Z	Incomplete standard penetration test where the seating drive was achieved but the full test length was not. The blows 'X' represent the total blows for the given test length 'Z' (mm)
dd/mm/yy: 1.0	Date, water level at the borehole depth at the end of shift
dd/mm/yy: dry	and the start of the following shift

Each sample type is numbered sequentially with depth and relates to the depth range quoted

All depths and measurements are given in metres, except as noted

Strata descriptions compiled by visual examination of samples obtained during boring, after BS 5930:2015+A1:2020 and modified in accordance with laboratory test results where applicable.



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Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH01

Machine : Dando 2500	Casing Diameter 150mm cased to 2.50m Open hole to 20.00m	Ground Level (mOD) 2.04	Client Anglian Water Services Limited	Job Number 21.393
Method : Cable Percussion	Location 550513 E 266169 N	Dates 10/01/2022- 12/01/2022	Engineer	Sheet 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50-1.00 0.65	B1 ES1				1.58	(0.46) 0.46	PLOUGHED SOIL (Black to dark brown slightly gravelly silty clay. Gravel is angular to subrounded fine to coarse flint. With rootlets)		
1.00-1.20	D1					(1.14)	Loose brown slightly silty gravelly fine to coarse SAND. Gravel is subangular to rounded fine to medium flint		▼1
1.20-1.60	B2			Moderate(1) at 1.10m, rose to 0.70m in 20 mins, sealed at 2.50m. 1,1/2,2,2,2	0.44	1.60	Stiff bluish grey mottled greenish grey silty calcareous CLAY		
1.20-1.65 1.60-1.70 1.80 2.00-2.45	SPT(C) N=8 D2 W1 U1	1.20	0.70	39 blows		(1.40)	...indistinctly fissured with rare relic rootlets from 1.90 m		
2.50	D3								
3.00-3.45 3.00-3.45	SPT N=10 D4	2.50	DRY	1,2/2,2,3,3	-0.96	3.00	Stiff indistinctly fissured bluish grey silty calcareous CLAY		
4.00-4.45	U2		DRY	43 blows			... becoming very stiff in places		
4.50	D5								
5.00-5.45 5.00-5.45	SPT N=15 D6	2.50	DRY	2,3/3,3,4,5					
6.00-6.45	U3		DRY	49 blows					
6.50	D7					(7.00)			
7.50-7.95 7.50-7.95	SPT N=15 D8	2.50	DRY	1,2/3,3,4,5					
9.00-9.45	U4		DRY	66 blows			...becoming very stiff and fissured from 9.00 m		
9.50	D9								

Remarks

1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. Groundwater struck at 1.10 m and rose to 1.00 m in 5 mins, 0.80 m in 10 mins, 0.70 m in 15 mins and 20 mins
4. Water added from 1.20 m to 2.00 m approx 50 litres
5. Slotted Standpipe installed to 3.00 m
6. SPT Hammer Energy Ratio = 70.17%

Scale (approx)

1:50

Logged By

JAH

Figure No.

21.393.BH01



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Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH01

Machine : Dando 2500		Casing Diameter 150mm cased to 2.50m Open hole to 20.00m	Ground Level (mOD) 2.04	Client Anglian Water Services Limited		Job Number 21.393	
Method : Cable Percussion				Location 550513 E 266169 N		Dates 10/01/2022- 12/01/2022	

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.50-10.95 10.50-10.95	SPT N=48 D10	2.50	DRY	3,4/8,10,13,17	-7.96	10.00	Very stiff fissured bluish grey silty calcareous CLAY ...with rare light grey speckles between 11.50 m and 13.00 m		
12.00-12.45	U5		DRY	100 blows					
12.50	D11								
13.50-13.95 13.50-13.95	SPT N=27 D12	2.50	DRY	2,3/4,6,8,9					
15.00-15.45	U6		DRY	93 blows		(10.00)			
15.50	D13								
16.50-16.95 16.50-16.95	SPT N=38 D14	2.50	DRY	3,4/7,9,10,12					
				10/01/2022:DRY 12/01/2022:10.30m					
18.00-18.45 18.00-18.45	SPT N=32 D15	2.50	DRY	2,3/4,6,9,13					
19.50-19.95 19.50-20.00	SPT N=39 D16	2.50	DRY	3,3/5,8,12,14					
				12/01/2022:DRY	-17.96	20.00			

Remarks

Scale (approx)
1:50

Logged By
JAH

Figure No.
21.393.BH01



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Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH02

Machine : Dando 2500 Method : Cable Percussion		Casing Diameter 150mm cased to 2.50m Open Hole to 20.00m	Ground Level (mOD) 0.99	Client Anglian Water Services Limited	Job Number 21.393
		Location 550586 E 266176 N	Dates 13/01/2022- 14/01/2022	Engineer	Sheet 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.50-10.95	U4	2.50	DRY	73 blows	-9.01	10.00	Very stiff indistinctly fissured bluish grey silty calcareous CLAY ...becoming fissured from 12.50 m		
11.00	D10								
12.00-12.45 12.00-12.45	SPT N=26 D11	2.50	DRY	2,3/4,6,8,8					
13.50-13.95 13.50-13.95	SPT N=30 D12	2.50	DRY	3,4/6,6,7,11					
15.00-15.45 15.00-15.45	SPT N=33 D13	2.50	DRY	2,3/5,7,9,12		(10.00)			
16.50-16.95 16.50-16.95	SPT N=34 D14	2.50	DRY	3,3/6,8,9,11					
18.00-18.45 18.00-18.45	SPT N=38 D15	2.50	DRY	4,5/7,9,10,12					
19.50-19.95 19.50-20.00	SPT N=37 D16	2.50	DRY	5,5/6,8,10,13					
				14/01/2022:DRY	-19.01	20.00			

Remarks	Scale (approx)	Logged By
	1:50	JAH
	Figure No. 21.393.BH02	



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Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH03

Machine : Dando 2500	Casing Diameter 150mm cased to 2.50m Open Hole to 15.00m	Ground Level (mOD) 1.31	Client Anglian Water Services Limited	Job Number 21.393
Method : Cable Percussion	Location 550522 E 265816 N	Dates 12/01/2022- 13/01/2022	Engineer	Sheet 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.60-0.80	B1 HV 25kPa				0.71	(0.60)	PLOUGHED SOIL (Dark brown to black silty slightly sandy clay. With rootlets)		
0.75	ES1			24, 26, 24/Av. 24.67		0.60	Firm greyish brown silty sandy CLAY		
0.75	D1					(0.90)	...mottled orange-brown from 1.10 m		
1.00-1.10									
1.20-1.65	SPT N=19 D2	1.20	DRY	1,3/4,4,5,6	-0.19	1.50	Orange-brown slightly silty very sandy subangular to rounded occasionally angular fine to coarse flint GRAVEL		
1.20-1.65	W1			Slow(1) at 1.50m, rose to 1.40m in 20 mins, sealed at 2.50m.	-0.64	(0.45)	Firm grey silty slightly gravelly CLAY. Gravel is subangular fine flint		
1.50	B2			2,2/2,2,3,3		1.95			
1.50-1.90						(0.45)	Stiff indistinctly fissured bluish grey silty calcareous CLAY		
2.00-2.45	SPT(C) N=10 D3	2.00	1.80		-1.09	2.40			
2.00									
3.00-3.45	U1	2.80	DRY	61 blows			... sample recovered in a softened condition		
3.50	D4								
4.00-4.45	D5			12/01/2022:DRY					
4.00-4.45	SPT N=13	2.80	DRY	13/01/2022:DRY 2,3/3,3,3,4					
5.00-5.45	U2	2.80	DRY	56 blows					
5.50	D6								
6.00-6.45	SPT N=15 D7	2.80	DRY	2,3/3,3,4,5		(7.60)			
6.00-6.45									
7.50-7.95	U3	2.80	DRY	68 blows					
8.00	D8								
9.00-9.45	SPT N=21 D9	2.80	DRY	2,4/4,5,5,7			...very stiff and fissured from 9.00 m		
9.00-9.45									

Remarks

1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. Groundwater struck at 1.50 m and rose to 1.50 m in 5 mins, 1.40 m in 10 mins and 15 mins and 20 mins
4. SPT Hammer Energy Ratio = 70.17% [12/01/2022]
5. SPT Hammer Energy Ratio = 66.38% [13/01/2022]
6. Hand vane tests (HV) carried out in inspection pit [Serial No. DR-2743]
7. Borehole backfilled with arisings

Scale (approx)
1:50

Logged By
JAH

Figure No.
21.393.BH03



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Site
WATERBEACH GROWTH SCHEME

Borehole Number
BH03

Machine : Dando 2500	Casing Diameter 150mm cased to 2.50m Open Hole to 15.00m	Ground Level (mOD) 1.31	Client Anglian Water Services Limited	Job Number 21.393
Method : Cable Percussion	Location 550522 E 265816 N	Dates 12/01/2022- 13/01/2022	Engineer	Sheet 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.50-10.95	U4	2.80	DRY	100 blows	-8.69	10.00	Very stiff fissured bluish grey silty calcareous CLAY ...with rare light grey speckles between 11.50 m and 13.00 m		
11.00	D10					(5.45)			
12.00-12.45 12.00-12.45	SPT N=24 D11	2.80	DRY	1,3/4,6,6,8					
13.50-13.95 13.50-13.95	SPT N=39 D12	2.80	DRY	2,4/5,7,8,19					
15.00-15.45 15.00-15.45	SPT N=29 D13	2.80	DRY	3,3/4,6,8,11					
				13/01/2022:DRY	-14.14	15.45	Complete at 15.45m		

Remarks	Scale (approx)	Logged By
	1:50	JAH
Figure No. 21.393.BH03		



A F Howland Associates Geotechnical Engineers

Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH04

Machine : Dando 2500		Casing Diameter 150mm cased to 2.50m Open Hole to 20.00m	Ground Level (mOD) 1.65	Client Anglian Water Services Limited		Job Number 21.393
Method : Cable Percussion				Dates 17/01/2022- 18/01/2022		Engineer
		Location 550422 E 265028 N				

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.30	ES1				1.45	(0.20)	TOPSOIL (Grass over dark brown silty slightly sandy clay with occasional roots and rootlets)		
0.30-0.60	B1					(0.60)	Plastic dark brown pseudo-fibrous PEAT with rare rootlets and brown plant fibres trending to organic silty clay		▼2
0.80	W1			Slight seepage(1) at 0.80m, no rise after 20 mins. 20,14,12/Av. 15.33 18,18,16/Av. 17.33 17/01/2022:0.80m	0.85	0.80	Very soft light grey mottled brown silty CLAY with rare sand pockets and siltstone gravels ...becoming bluish grey with some semi-decomposed plant remains		▼1
0.80-1.20	ES2								
1.00	D1								
0.80	HV 15kPa								
1.10	HV 17kPa								
1.20-1.65	B2								
1.20-1.65	D2								
1.20-1.65	SPT N=4	1.20	0.80	18/01/2022:0.40m 1,0/1,1,1,1					
2.00-2.45	SPT N=24	2.00	DRY	1,1/2,7,8,7					
2.00-2.45	D3				-0.65	2.30	Medium dense brown slightly silty very sandy subangular to rounded occasionally angular fine to medium flint GRAVEL. Occasional coarse flint and rare fine quartzite		▼2
2.30	W2			fast(2) at 2.30m, rose to 0.50m in 20 mins.					
2.30-2.60	B3								
3.00-3.45	SPT(C) N=14	3.00	0.80	2,3/5,3,3,3		(1.40)			
3.00-3.45	B4								
3.70-3.90	D4				-2.05	3.70	Firm grey silty slightly gravelly CLAY. Gravel is subangular fine flint		
4.00-4.45	SPT N=11	4.00	3.50	1,2/2,3,3,3	-2.35	4.00			
4.00-4.45	D5						Firm thickly laminated bluish grey silty calcareous CLAY		
						(1.00)			
5.00-5.45	U1	4.50	DRY	66 blows	-3.35	5.00	Stiff to very stiff indistinctly fissured bluish grey silty calcareous CLAY with occasional crystal flecks and rare pyritic pockets and black subrounded medium nodules		
5.45	D6								
6.00-6.45	SPT N=26	4.50	DRY	3,5/6,6,6,8					
6.00-6.45	D7								
7.50-7.95	U2	4.50	DRY	69 blows			... becoming very stiff, with rare fossil shell fragments		
7.95	D8								
9.00-9.45	SPT N=31	4.50	DRY	4,5/7,8,7,9					
9.00-9.45	D9					(9.00)			

Remarks 1. Location CAT scanned prior to excavation 2. Hand dug inspection pit to 1.20 m 3. Groundwater struck at 0.80 m. No rise 4. Groundwater struck at 2.30 m and rose to 0.50 m in 5 mins and 10 mins and 15 mins and 20 mins 5. SPT Hammer Energy Ratio = 66.38% 6. Hand vane tests (HV) carried out in inspection pit [Serial No. DR-2743] 7. Borehole backfilled with arisings	Scale (approx)	Logged By
	1:50	PJM
	Figure No. 21.393.BH04	



A F Howland Associates Geotechnical Engineers

Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH04

Machine : Dando 2500		Casing Diameter 150mm cased to 2.50m Open Hole to 20.00m	Ground Level (mOD) 1.65		Client Anglian Water Services Limited		Job Number 21.393		
Method : Cable Percussion			Location 550422 E 265028 N		Dates 17/01/2022- 18/01/2022		Engineer		Sheet 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.50-10.95	U3	4.50	DRY	90 blows			Very stiff fissured bluish grey silty calcareous CLAY with occasional crystal flecks and rare pyritic pockets and black subrounded medium nodules		
10.95	D10								
12.00-12.45 12.00-12.45	SPT N=35 D11	4.50	DRY	4,7/8,8,9,10			...becoming grey with rare fossil shell fragments		
13.50-13.95	U4	4.50	DRY	75 blows					
13.95	D12				-12.35	14.00	Very stiff fissured dark bluish grey silty calcareous CLAY with rare black subrounded medium nodules and fossil shell fragments		
15.00-15.45 15.00-15.45	SPT N=41 D13	4.50	DRY	5,8/9,10,10,12					
16.50-16.95	U5	4.50	DRY	80 blows		(5.00)	...with some fossil fragments and whole ammonites		
16.95	D14								
18.00-18.45 18.00-18.45	SPT N=50 D15	4.50	DRY	5,8/10,12,14,14					
19.50-19.95	U6	4.50	DRY	100 blows		(1.00)	Very stiff fissured dark grey calcareous CLAY with rare fossil fragments and light grey silt and pyritic pockets		
19.95	D16			18/01/2022:DRY	-18.35	20.00			

Remarks	Scale (approx)	Logged By
	1:50	PJM
	Figure No. 21.393.BH04	



A F Howland Associates Geotechnical Engineers

Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH05

Boring Method Cable Percussion	Casing Diameter 150mm cased to 6.00m open hole to 20.00m	Ground Level (mOD) 1.82	Client Anglian Water Services Limited	Job Number 21.393
	Location 550520 E 264914 N	Dates 21/01/2022	Engineer	Sheet 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30 0.35	D1 ES1					(0.60)	PLOUGHED SOIL (Dark brown very sandy slightly gravelly clay. Gravel is subangular fine to medium flint and occasional rootlets)		
0.60-1.00 0.70	B1 ES2				1.22	0.60	Plastic dark brown to black clayey slightly sandy pseudo-fibrous PEAT, with occasional brown wood fragments		▼1
1.20-1.65 1.20-1.65	SPT N=0 D2		DRY	1,0/0,0,0,0		(1.40)			
2.00-2.45 2.00-2.45 2.10	SPT N=0 D3 ES3	1.50	DRY	0,0/0,0,0,0	-0.18	2.00	Very soft greyish brown silty organic CLAY. With occasional shell fragments, semi-decomposed plant matter and wood fragments (10-40 mm)		
2.50-3.00	B2						... with frequent pockets of black mottled grey amorphous peat		
3.00-3.45 3.00-3.45	SPT N=0 D4	3.00	DRY	0,0/0,0,0,0		(2.30)			
4.00-4.45 4.00-4.45	SPT N=0 D5	4.00	DRY	0,0/0,0,0,0 Quick(1) at 4.10m, rose to 0.95m in 20 mins, sealed at 6.00m.	-2.48	4.30	... with occasional sand pockets		▽1
4.50-5.00	B3					(0.90)	Greyish brown silty very sandy subangular to subrounded fine to coarse flint and quartzite GRAVEL. Occasional shell fragments		
5.00-5.45 5.00 5.20-5.30	SPT(C) N=13 W1 D6	5.00	1.50	1,1/2,3,4,4	-3.38	5.20	Firm indistinctly fissured grey silty calcareous CLAY		
6.00-6.45	U1	6.00	DRY	52 blows			... becoming stiff and fissured		
6.45	D7								
7.00	D8								
7.50-7.95 7.50-7.95	SPT N=25 D9	6.00	DRY	3,5/6,6,7,6					
9.00-9.45	U2	6.00	DRY	60 blows					
9.45	D10								

Remarks

1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. SPT rods sank under self weight at 2.00, 3.00 and 4.00 m depths
4. Groundwater struck at 4.10 m and rose to 1.72 m in 5 mins, 1.25 m in 10 mins, 1.00 m in 15 mins and 0.95 m in 20 mins
5. Groundwater seepage at 13.00 m
6. SPT Hammer Energy Ratio = 66.38%

Scale (approx)

1:50

Logged By

AHm

Figure No.

21.393.BH05



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Geotechnical Engineers

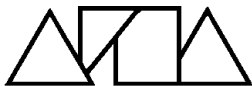
Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH05

Boring Method Cable Percussion	Casing Diameter 150mm cased to 6.00m open hole to 20.00m	Ground Level (mOD) 1.82	Client Anglian Water Services Limited	Job Number 21.393
	Location 550520 E 264914 N	Dates 21/01/2022	Engineer	Sheet 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.50-10.95 10.50-10.95	SPT N=26 D11	6.00	DRY	4,5/6,6,7,7			Stiff fissured grey silty calcareous CLAY with rare fossil fragments		
12.00-12.45	U3	6.00		75 blows			... becoming very stiff		
12.45	D12					(14.80)			
13.50-13.95 13.50-13.95	SPT N=37 D13	6.00	13.00	Seepage(2) at 13.00m. 5,6/8,9,9,11					V ₂
15.00-15.45	U4	6.00		90 blows					
15.45	D14								
16.50-16.95 16.50-16.95	SPT N=41 D17	6.00	16.00	6,8/9,9,11,12					
18.00-18.45 18.00-18.45	SPT N=45 D18	6.00	17.20	4,8/9,10,12,14					
19.50-19.92 19.50-19.95	SPT 50/265 D19	6.00	18.50	6,8/11,12,15,12 21/01/2022:18.50m	-18.18	20.00			

Remarks	Scale (approx) 1:50	Logged By AHm
Figure No. 21.393.BH05		



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Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH06

Boring Method Cable Percussion	Casing Diameter 150mm cased to 4.50m open hole to 10.00m	Ground Level (mOD) 6.93	Client Anglian Water Services Limited	Job Number 21.393
	Location 550515 E 264248 N	Dates 19/01/2022	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.25 0.30 0.50-1.00 0.60	ES1 D1 B1 ES2				6.43	(0.50) 0.50	PLOUGHED SOIL (Dark brown very sandy clay. Occasional fine to medium flint gravel and rootlets)		
1.20-1.65 1.20-1.65 1.30 1.50	SPT N=7 D2 ES3 D3		DRY	1,2/1,2,2,2	5.73	(0.70) 1.20	Light brown clayey sandy slightly gravelly SILT. With roots. Gravel is subangular to subrounded mainly fine to medium and a little coarse chalk and flint		
2.00-2.45 2.10	U1 No recovery D4		DRY	10 blows			Off-white mottled light yellowish brown structureless CHALK recovered as silty slightly sandy subangular to rounded fine to coarse extremely weak to very weak low density gravel and with occasional subrounded cobbles of chalk and flint. White chalk cobbles are very weak to weak low to medium density. With occasional disturbed pockets of very soft chalk matrix		
3.00-3.45 3.00-3.45	SPT N=3 D5	3.00	DRY	1,1/1,0,1,1		(3.30)			
4.00-4.45 4.00-4.45	SPT(C) N=6 B2	4.00	DRY	1,0/1,1,2,2					
4.60	D6				2.43	4.50	Firm to stiff fissured grey silty calcareous CLAY		
5.00-5.45	U2	4.50	DRY	55 blows			... becoming stiff		
5.45	D7								
6.00-6.45 6.00-6.45	SPT N=25 D8	4.50	DRY	3,4/6,6,6,7					
7.00	D9					(5.50)			
7.50-7.95	U3	4.50	DRY	80 blows					
7.95	D10						... becoming very stiff		
8.50	D11								
9.00-9.45 9.00-9.45	SPT N=33 D12	4.50	DRY	3,7/7,8,8,10					
10.00	D13				-3.07	10.00			

Remarks

1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. No groundwater encountered, but dampness noted at 3.00 m
4. Slotted Standpipe installed to 4.00 m
5. SPT Hammer Energy Ratio = 66.38%

Scale (approx)
1:50

Logged By
AHm

Figure No.
21.393.BH06



A F Howland Associates Geotechnical Engineers

Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH07

Boring Method Cable Percussion	Casing Diameter 150mm cased to 3.00m open hole to 10.00m	Ground Level (mOD) 7.55	Client Anglian Water Services Limited	Job Number 21.393
	Location 550127 E 263647 N	Dates 24/01/2022- 25/01/2022	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.20	ES1						MADE GROUND (Dark brown slightly sandy gravelly clay. Gravel is subangular to subrounded fine to coarse flint with some whole brick and fragments) ...mainly brick fragments to 0.4 m		
0.50-1.00	B1					(1.10)			
0.90	HV 68kPa			80,58,66/Av. 68.00	6.45	1.10	...becoming firm		
1.10-1.20 1.20-1.65 1.20-1.65	ES2 SPT N=6 D1		DRY	1,2/1,2,1,2			Firm light brown slightly mottled light grey sandy slightly gravelly CLAY. Gravel is subangular fine to coarse flint with occasional chalk and dark brown organic silt lenses ...damp		
2.00-2.45 2.00-2.45 2.00-2.45	SPT N=26 B2 D2	1.50	DRY	5,6/7,6,6,7		(1.70)	...with some grey mottling ...with flint cobble		
2.70-2.80	D3				4.75	2.80	... from 2.70 m: becoming light grey slightly mottled brown silty, with occasional mudstone lithorelics		
3.00-3.45 3.45	U1 D4	3.00	DRY	24/01/2022:DRY 25/01/2022:DRY 55 blows			Stiff fissured grey silty calcareous CLAY		
4.00-4.45 4.00-4.45	SPT N=13 D5	3.00	DRY	1,2/2,3,4,4					
5.00-5.45	U2	3.00	DRY	68 blows			... becoming stiff to very stiff, locally with fine gravel		
5.45	D6								
6.00-6.45 6.00-6.45	SPT N=20 D7	3.00	DRY	2,4/4,4,6,6		(7.20)			
7.00	D8								
7.50-7.95	U3	3.00	DRY	70 blows					
7.95	D9						... with rare fossil shell fragments		
9.00-9.45 9.00-9.45	SPT N=35 D10	3.00	DRY	4,6/6,8,10,11					
10.00	D11			25/01/2022:DRY	-2.45	10.00			

Remarks

1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. No groundwater encountered
4. SPT Hammer Energy Ratio = 66.38%

Scale (approx)
1:50

Logged By
AHm/PJM

Figure No.
21.393.BH07



A F Howland Associates Geotechnical Engineers

Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH08

Boring Method Cable Percussion	Casing Diameter 150mm cased to 3.00m open hole to 10.00m	Ground Level (mOD) 5.60	Client Anglian Water Services Limited	Job Number 21.393
	Location 549860 E 263087 N	Dates 24/01/2022- 25/01/2022	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30 0.35	D1 ES1					(0.60)	MADE GROUND (Dark brown sandy slightly gravelly clay. Occasional rootlets. Gravel is subangular fine to medium flint and rare brick fragments)		
0.60-1.00 0.80	B1 ES2				5.00	0.60	Medium dense orange-brown silty slightly gravelly fine to medium SAND. Gravel is subrounded fine flint		
1.20-1.65 1.20-1.65 1.20-1.65	SPT N=17 B2 D2		DRY	1,2/4,4,4,5		(1.20)	... absence of gravel		
1.80-2.00	D3				3.80	1.80	Soft to firm grey silty slightly sandy CLAY		
2.00-2.45 2.00-2.45	SPT N=9 D4	1.50	DRY	1,1/1,2,3,3	3.30	2.30	Stiff fissured grey silty calcareous CLAY		
3.00-3.45	U1	3.00	DRY	37 blows					
3.45	D5								
4.00-4.45 4.00-4.45	SPT N=14 D6	3.00	DRY	1,2/3,3,4,4					
5.00-5.45	U2	3.00	DRY	52 blows					
5.45	D7								
6.00-6.45 6.00-6.45	SPT N=20 D8	3.00	DRY	2,3/4,4,6,6		(7.70)			
7.50-7.95	U3	3.00	DRY	70 blows					
7.95	D9						... becoming very stiff		
9.00-9.45 9.00-9.45	SPT N=32 D10	3.00	DRY	4,5/6,8,8,10					
10.00	D11			25/01/2022:DRY	-4.40	10.00			

Remarks

1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. No groundwater encountered
4. SPT Hammer Energy Ratio = 66.38%

Scale (approx)

1:50

Logged By

AHm

Figure No.

21.393.BH08



A F Howland Associates Geotechnical Engineers

Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH09

Boring Method Cable Percussion	Casing Diameter 150mm cased to 3.00m open hole to 10.00m	Ground Level (mOD) 7.92	Client Anglian Water Services Limited	Job Number 21.393
	Location 549596 E 262555 N	Dates 26/01/2022	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.25 0.40-0.80	ES1 B1				7.72	(0.20) 0.20	TOPSOIL (Dark brown very sandy clay. Occasional subrounded fine to coarse flint gravel and rootlets)		
1.00	D1					(1.00)	Light brown clayey silty very gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse chalk and flint		
1.20-1.65 1.20-1.65 1.35 1.50	SPT N=4 D2 ES2 D3		DRY	1,0/1,1,1,1	6.72	1.20	Soft light yellowish brown silty sandy slightly gravelly calcareous CLAY. Gravel is subangular to rounded fine to coarse mainly chalk and occasional flint		
2.00-2.45	SPT N=3	1.50	DRY	1,0/1,0,1,1		(1.30)			
2.45 2.50 2.60	D4 D5 ES3			Seepage(1) at 2.50m, not sealed.	5.42	2.50	Stiff fissured grey silty calcareous CLAY		▽1
3.00-3.45	U1	3.00	DRY	50 blows					
3.45	D6								
4.00-4.45 4.00-4.45	SPT N=14 D7	3.00	DRY	1,2/2,3,4,5					
5.00-5.45	U2	3.00	DRY	61 blows					
5.45	D8								
6.00-6.45 6.00-6.45	SPT N=21 D9	3.00	DRY	2,3/5,5,6,5		(7.50)			
7.00	D10								
7.50-7.95	U3	3.00	DRY	65 blows					
7.95	D11								
9.00-9.45 9.00-9.45	SPT N=32 D12	3.00	DRY	4,4/6,7,9,10			... becoming stiff to very stiff		
10.00	D13			26/01/2022:DRY	-2.08	10.00			

Remarks

1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. Groundwater seepage at 2.50 m
4. Slotted Standpipe installed to 4.00 m
5. SPT Hammer Energy Ratio = 66.38%

Scale (approx)

1:50

Logged By

AHm

Figure No.

21.393.BH09



A F Howland Associates Geotechnical Engineers

Site
WATERBEACH GROWTH SCHEME

Borehole
Number
BH09

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm

Client
Anglian Water Services Limited

Job
Number
21.393

Location
549596 E 262555 N

Ground Level (mOD)
7.92

Engineer

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description	Groundwater Strikes During Drilling															
						Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)						
			7.72	0.20	Concrete																
			6.92	1.00	Bentonite Seal	26/01/22		2.50		Seepage											NOT
					Slotted Standpipe	Groundwater Observations During Drilling															
							Start of Shift					End of Shift									
						Date	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)					
			3.92	4.00	Gravel Filter	26/01/22						10.00	3.00	DRY							
			3.72	4.20																	
					Bentonite Seal	Instrument Groundwater Observations															
			2.72	5.20	General Backfill	Inst. [A] Type : Slotted Standpipe															
							Instrument [A]			Remarks											
						Date	Time	Depth (m)	Level (mOD)												
						04/02/22	10:50	1.08	6.84												
						10/02/22	10:30	1.11	6.81												
						18/02/22	13:11	0.88	7.04												
					25/02/22	11:36	0.77	7.15													
			-2.08	10.00																	

Remarks

APPENDIX C: LABORATORY TESTING

Natural moisture content

Atterberg limits

Particle size distribution

Unconsolidated undrained triaxial testing

Sulphate, sulphur and pH values

Contamination testing

WAC testing





Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

Engineer :

Job Number
21.393

Sheet
1 / 1

**DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT
AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX**

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %						
BH01	2.00	U1	36.2	100	36.2	74	30	44	0.14	CV	Stiff grey mottled brown fissured CLAY.
BH01	4.00	U2	34.5	100	34.5	83	34	49	0.02	CV	Very stiff fissured grey CLAY.
BH02	3.00	U1	34.4	100	34.4	78	29	49	0.10	CV	Very stiff grey CLAY.
BH02	5.00	U2	33.0	100	33.0	78	30	48	0.06	CV	Very stiff grey CLAY.
BH03	0.60	B1	28.2	100	28.2	40	19	21	0.43	CI	Multicoloured slightly sandy CLAY.
BH03	5.00	U2	33.0	100	33.0	82	35	47	-0.04	CV	Grey CLAY with pockets of black slightly sandy CLAY.
BH04	1.20	B2	43.2	99	43.6	67	27	40	0.43	CH	Grey slightly gravelly silty CLAY. Gravel is fine to medium chalk.
BH04	3.70	D4	29.2	79	37.0	69	27	42	0.24	CH	Grey mottled greenish grey slightly gravelly silty CLAY.
BH04	5.00	U1	29.5	100	29.5	72	27	45	0.07	CV	Very stiff fissured dark grey silty CLAY.
BH05	2.50	B2	177.0	100	177.0	230	140	90	0.41	ME	Black mottled grey amorphous PEAT.
BH05	6.00	U1	32.5	100	32.5	73	27	46	0.13	CV	Stiff fissured grey silty CLAY.
BH06	5.00	U2	27.7	100	27.7	69	23	46	0.11	CH	Very stiff fissured grey silty CLAY.
BH07	2.00	B2	13.7	82	16.7	20	13	7	0.57	CL	Brown and grey slightly gravelly sandy silty CLAY. Sand is fine. Gravel is fine to medium chalk.
BH07	3.00	U1	31.2	100	31.2	64	24	40	0.18	CH	Stiff grey silty CLAY.
BH08	3.00	U1	34.5	100	34.5	76	30	46	0.11	CV	Stiff fissured grey silty CLAY.
BH09	1.50	D3	14.4	72	20.0	24	14	10	0.60	CL	Brown and grey slightly gravelly sandy silty CLAY. Sand is fine. Gravel is fine to medium chalk.
BH09	3.00	U1	33.0	100	33.0	71	23	48	0.21	CV	Stiff fissured grey silty CLAY.

Method of Preparation : BS EN ISO 17892:PART 1:2014:5.1 Test specimen preparation (moisture content). BS EN ISO 17892:PART 1:2018:5.2 Preparation of samples for classification tests

Method of Test : BS EN ISO 17892:PART 1:2014:5.2 Test execution (moisture content) BS EN ISO 17892: PART 12:5.3 & 6.2 Determination of the liquid limit BS EN ISO 17892:PART 5.5, 6.4 & 6.5 Determination of the plastic limit and plasticity index

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

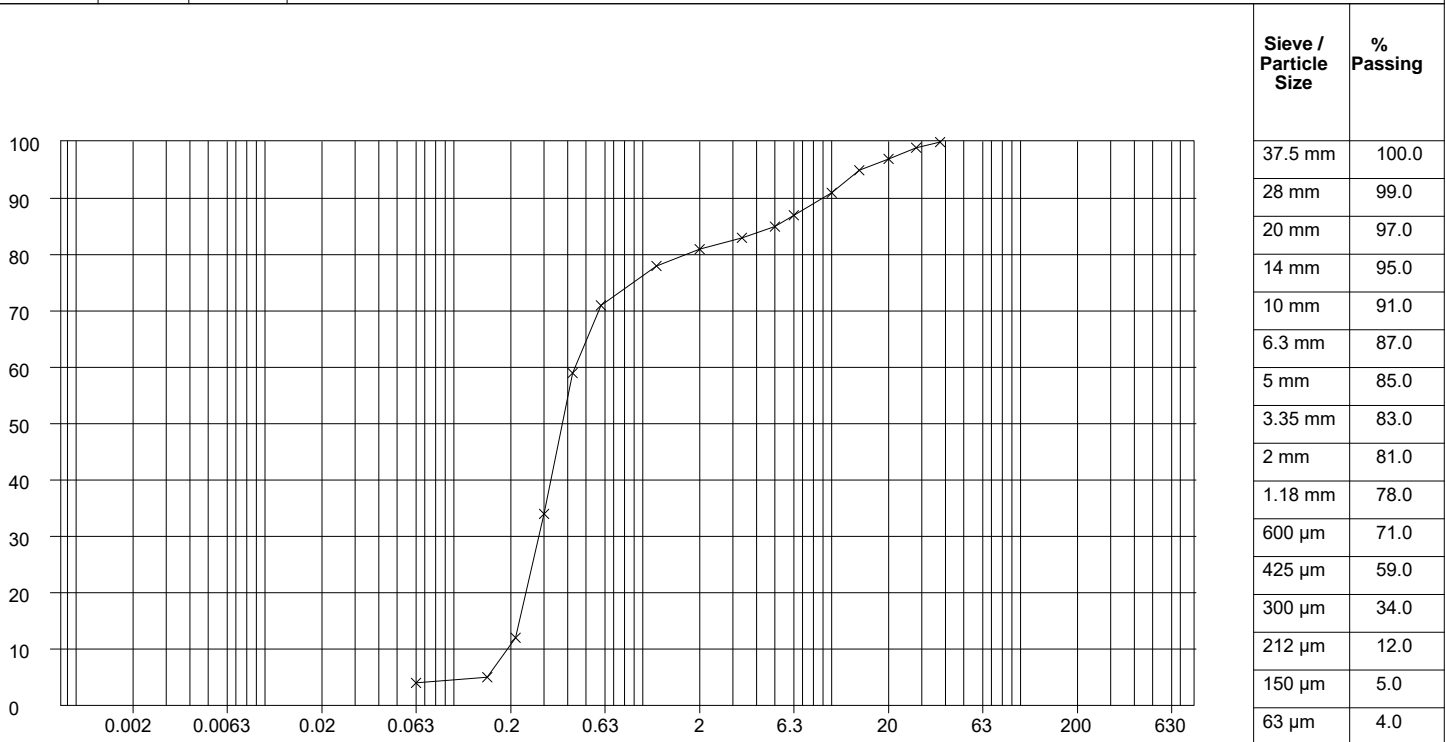
Engineer :

Job Number
21.393

Sheet
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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH01	0.50	B1	Brown gravelly SAND.



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

Grading Analysis	
D85	5.0 mm
D60	439.6 µm
D10	194.3 µm
Uniformity Coefficient	2.3

Particle Proportions	
Cobbles + Boulders	-
Gravel	19.0%
Sand	77.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

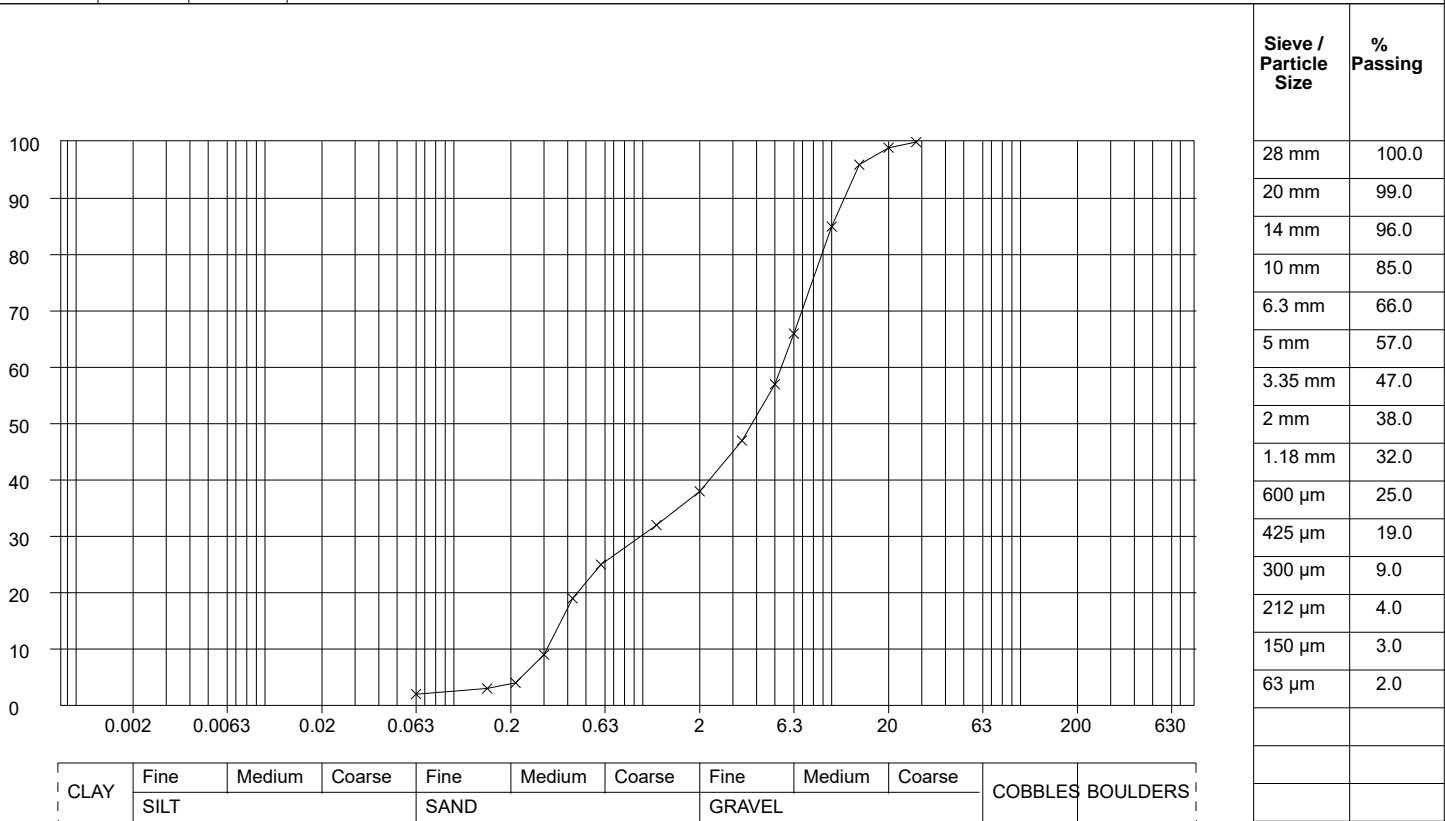
Engineer :

Job Number
21.393

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	1.30	B1	Dark brown very sandy GRAVEL.



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

Grading Analysis	
D85	10.0 mm
D60	5.4 mm
D10	312.5 µm
Uniformity Coefficient	17.4

Particle Proportions	
Cobbles + Boulders	-
Gravel	62.0%
Sand	36.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

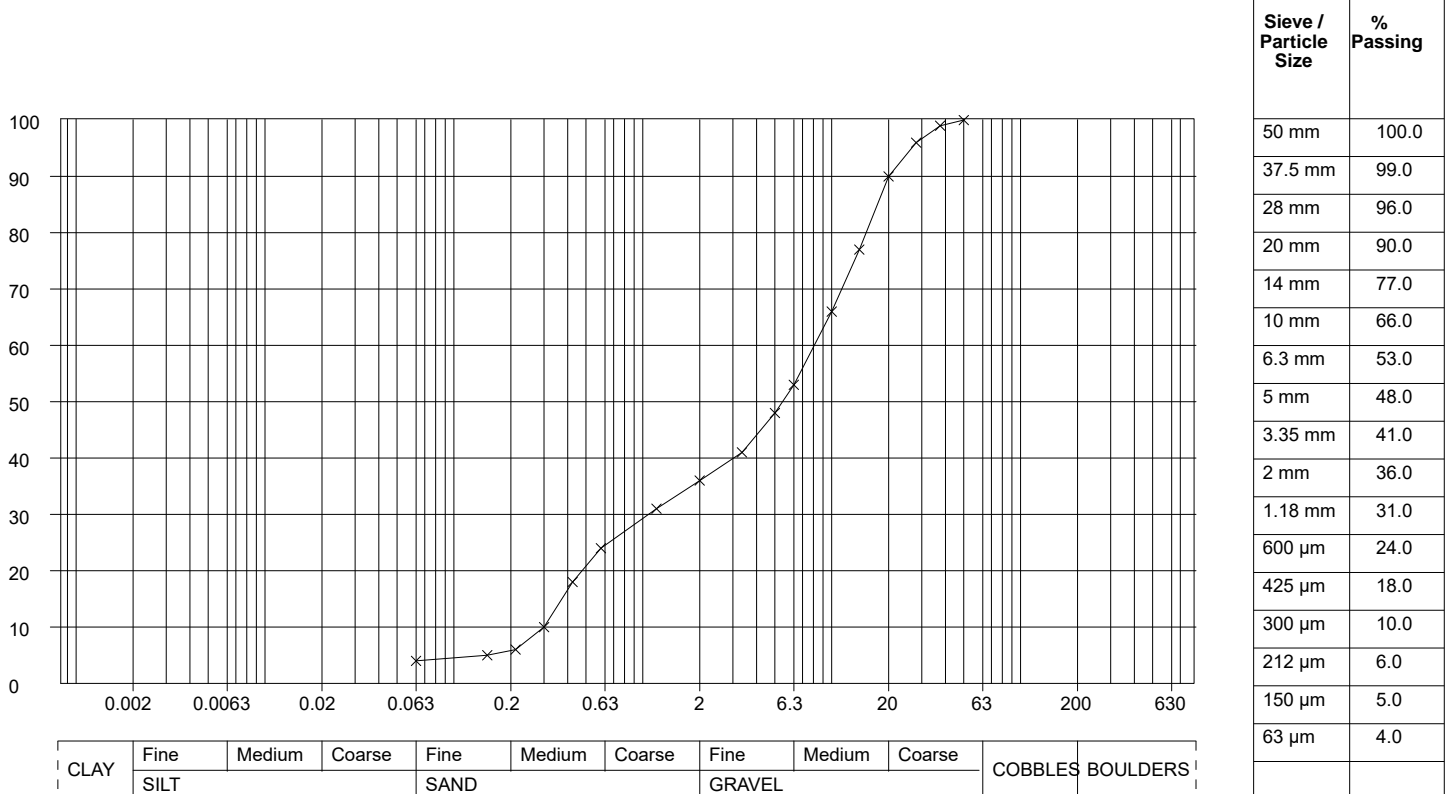
Engineer :

Job Number
21.393

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH03	1.50	B2	Dark brown very sandy GRAVEL.



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

Grading Analysis	
D85	17.7 mm
D60	8.3 mm
D10	300.0 µm
Uniformity Coefficient	27.6

Particle Proportions	
Cobbles + Boulders	-
Gravel	64.0%
Sand	32.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

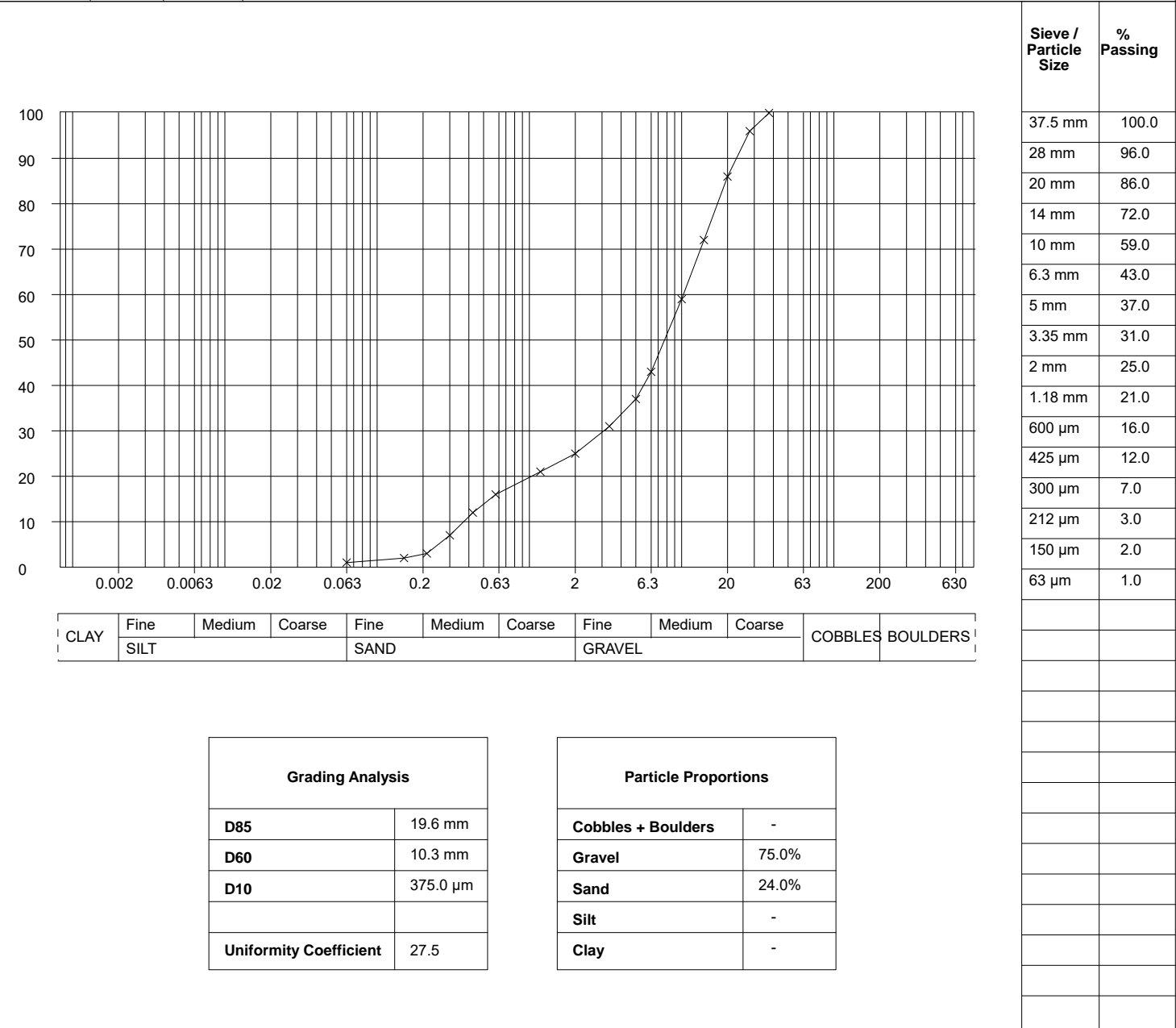
Engineer :

Job Number
21.393

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH04	2.30	B3	Greyish brown very sandy GRAVEL.



Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

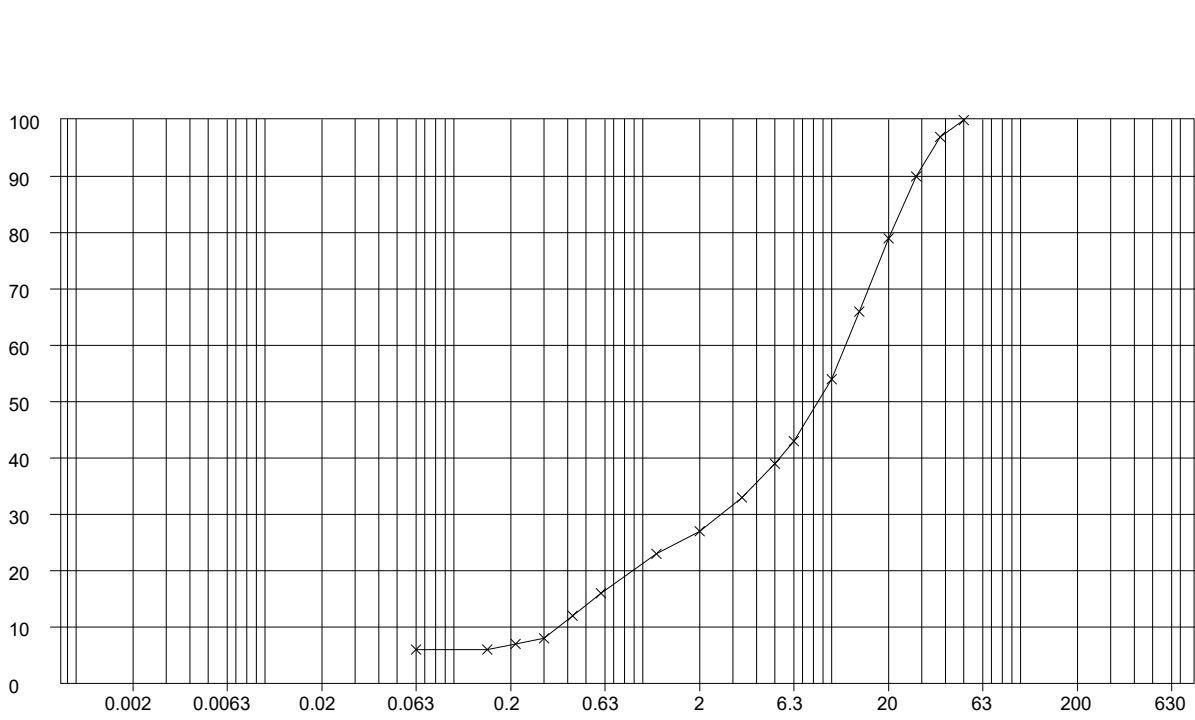
Engineer :

Job Number
21.393

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH05	4.50	B3	Dark grey very sandy silty GRAVEL with shell fragments.



Sieve / Particle Size	% Passing
50 mm	100.0
37.5 mm	97.0
28 mm	90.0
20 mm	79.0
14 mm	66.0
10 mm	54.0
6.3 mm	43.0
5 mm	39.0
3.35 mm	33.0
2 mm	27.0
1.18 mm	23.0
600 µm	16.0
425 µm	12.0
300 µm	8.0
212 µm	7.0
150 µm	6.0
63 µm	6.0

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

Grading Analysis	
D85	24.4 mm
D60	12.0 mm
D10	362.5 µm
Uniformity Coefficient	33.1

Particle Proportions	
Cobbles + Boulders	-
Gravel	73.0%
Sand	21.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

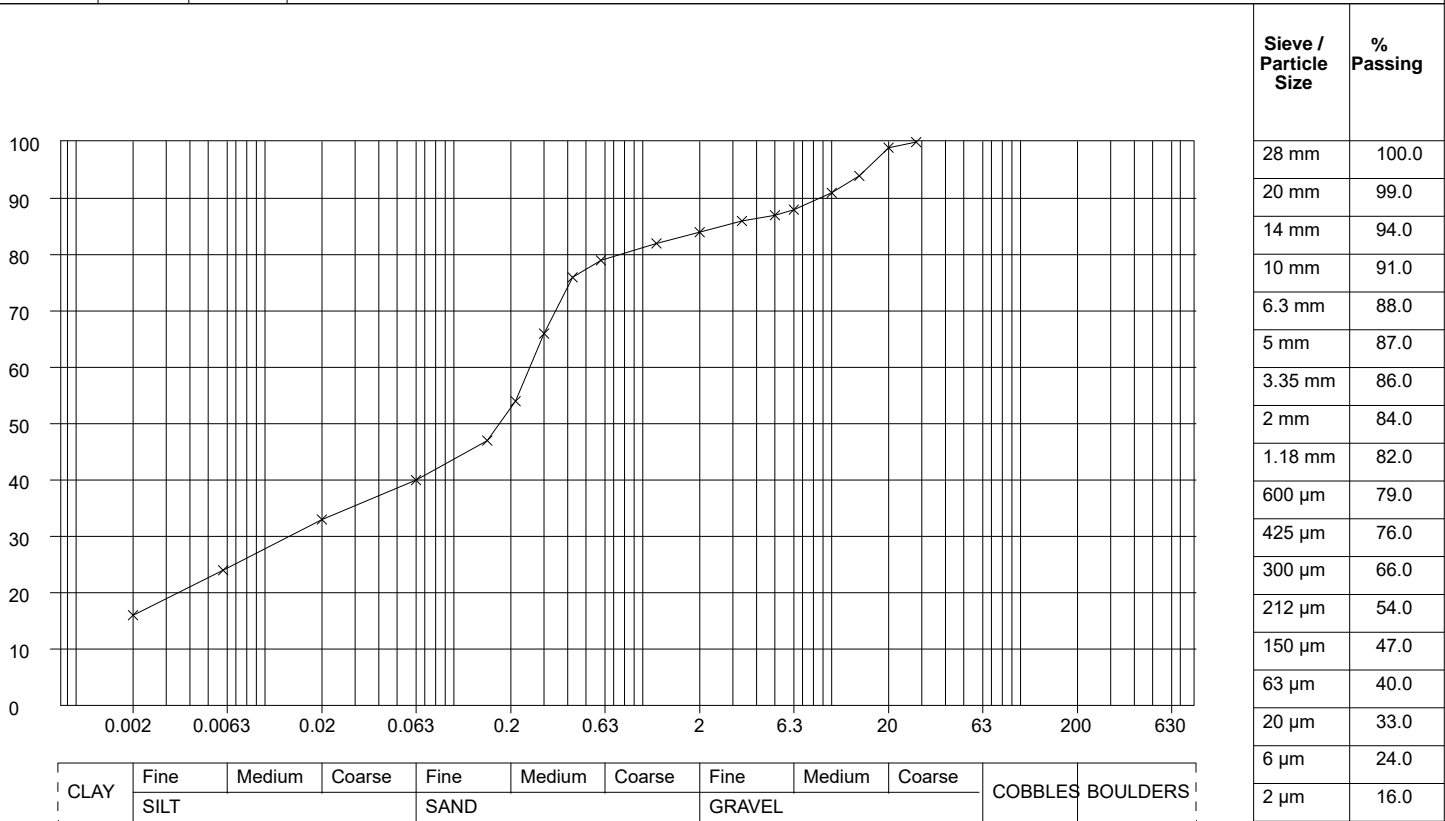
Engineer :

Job Number
21.393

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH06	0.50	B1	Greyish brown slightly gravelly sandy clayey SILT with roots.



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

Grading Analysis	
D85	2.7 mm
D60	256.0 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	16.0%
Sand	44.3%
Silt	23.7%
Clay	16.0%

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

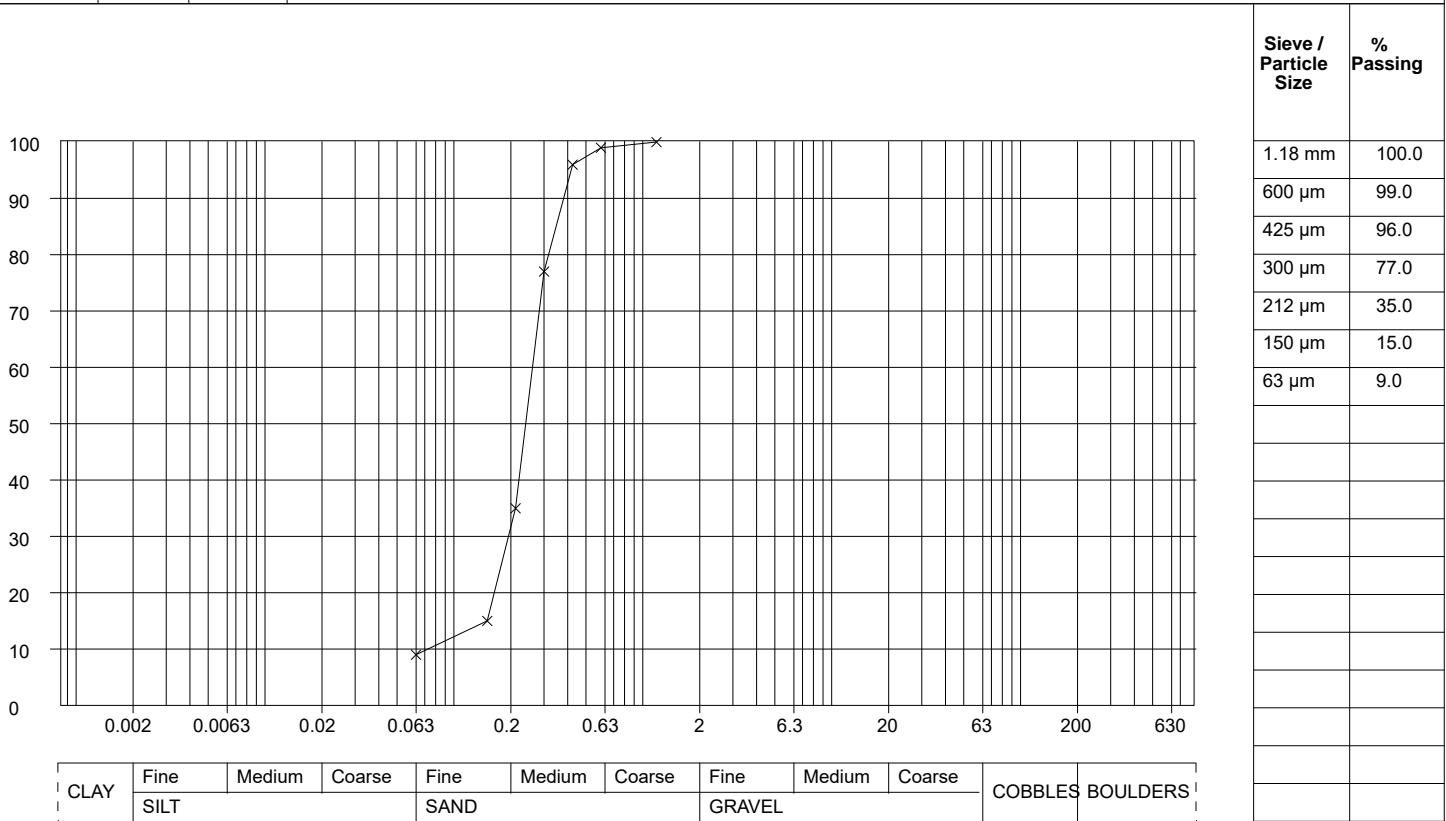
Engineer :

Job Number
21.393

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH08	1.20	B2	Yellowish brown silty SAND.



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

Grading Analysis	
D85	352.6 µm
D60	264.4 µm
D10	77.5 µm
Uniformity Coefficient	3.4

Particle Proportions	
Cobbles + Boulders	-
Gravel	-
Sand	91.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

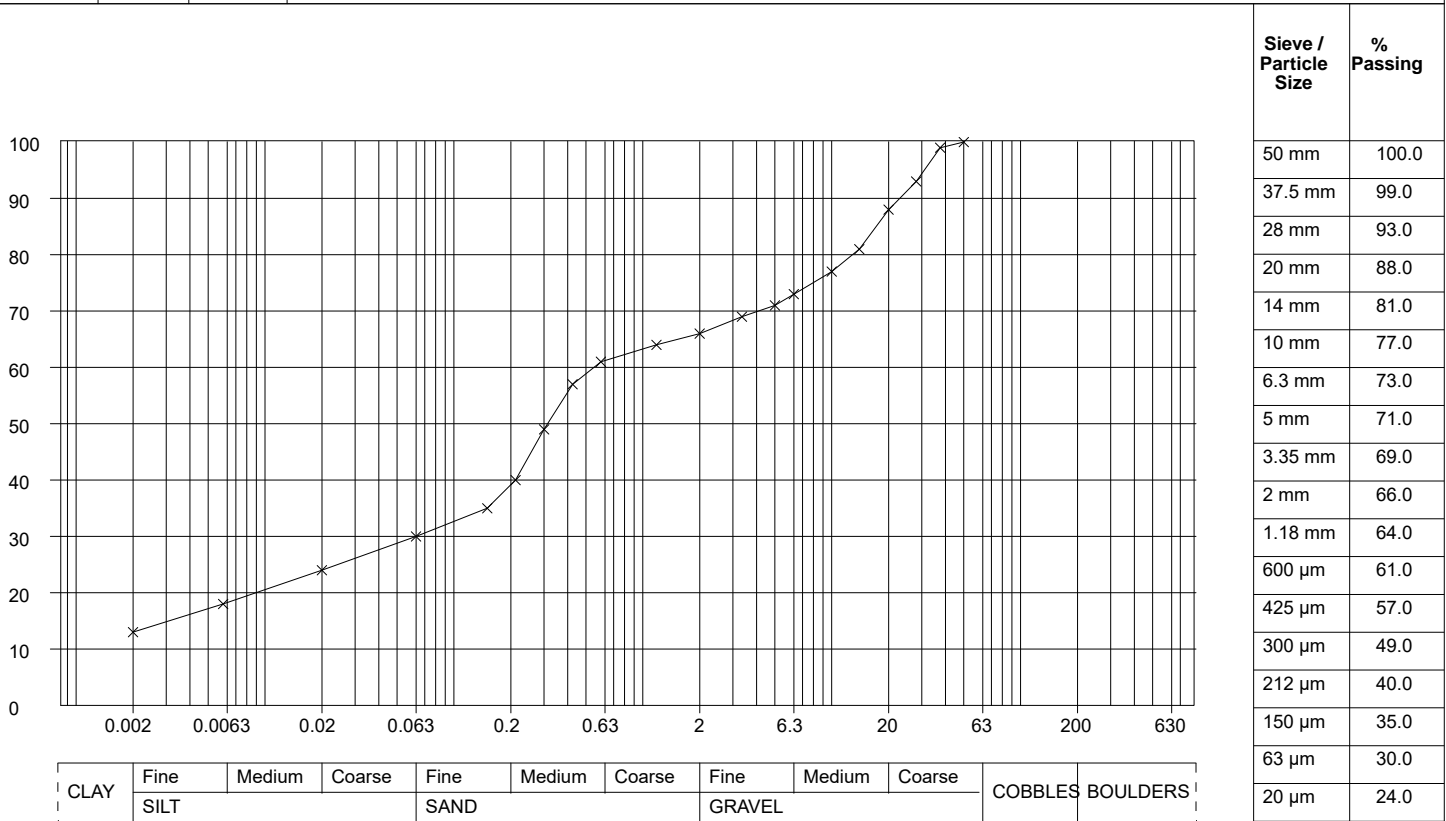
Engineer :

Job Number
21.393

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH09	0.40	B1	Greyish brown very gravelly clayey silty SAND with roots.



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

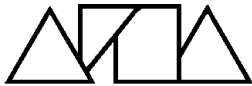
Grading Analysis	
D85	17.4 mm
D60	556.3 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	34.0%
Sand	36.3%
Silt	16.7%
Clay	13.0%

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

Engineer :

Job Number
21.393

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**DETERMINATION OF DENSITY, MOISTURE CONTENT AND UNDRAINED SHEAR STRENGTH
IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE**

Borehole/ Trial Pit	Depth (m)	Sample	Moisture Content %	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kN/m ²)	Deviator Stress (kN/m ²)	Apparent Cohesion (kN/m ²)	Angle of Shearing Resistance (degrees)	Laboratory Description
BH01	2.00	U1	36.2	1.91	1.40	40	111	55		Stiff grey mottled brown fissured CLAY.
BH01	4.00	U2	34.5	1.88	1.40	80	164	82		Very stiff fissured grey CLAY.
BH01	6.00	U3	31.6	1.95	1.48	120	291	145		Very stiff grey CLAY.
BH02	3.00	U1	34.4	1.83	1.36	60	126	63		Very stiff grey CLAY.
BH02	5.00	U2	33.0	1.89	1.42	100	105	52		Very stiff grey CLAY.
BH03	3.00	U1	37.3	1.84	1.34	60	36	18		Soft greyish mottled brown CLAY with rare fine gravel.
BH04	5.00	U1	29.5	1.99	1.53	100	128	64		Very stiff fissured dark grey silty CLAY.
BH04	7.50	U2	30.5	1.92	1.47	150	168	84		Very stiff fissured grey slightly gravelly silty CLAY. Gravel is fine to medium.
BH04	10.50	U3	28.9	1.88	1.46	210	97	49		Very stiff fissured grey silty CLAY.
BH05	6.00	U1	32.5	1.91	1.44	120	112	56		Stiff fissured grey silty CLAY.
BH05	9.00	U2	34.7	1.93	1.43	180	65	33		Stiff fissured grey silty CLAY.
BH05	12.00	U3	30.3	1.94	1.49	240	251	126		Very stiff fissured grey silty CLAY.
BH06	5.00	U2	27.7	1.98	1.55	100	173	86		Very stiff fissured grey silty CLAY.
BH06	7.50	U3	30.2	1.93	1.49	150	194	97		Very stiff fissured grey silty CLAY
BH07	3.00	U1	31.2	1.94	1.48	60	221	111		Stiff grey silty CLAY.
BH07	5.00	U2	29.9	1.92	1.48	100	155	77		Very stiff fissured grey mottled brown slightly gravelly silty CLAY. Gravel is fine.
BH08	3.00	U1	34.5	1.90	1.41	60	127	63		Stiff fissured grey silty CLAY.
BH09	3.00	U1	33.0	1.94	1.46	60	207	104		Stiff fissured grey silty CLAY.
BH09	5.00	U2	30.6	1.94	1.48	100	162	81		Stiff fissured grey silty CLAY.

Method of Preparation : BS EN ISO 17892:PART 1:2014:5.1 Test specimen preparation (moisture content). BS EN ISO 17892:PART 8:2018: 6.2 Preparation of undisturbed samples for testing

Method of Test : BS EN ISO 17892:PART 1:2014:5.2 Test execution (moisture content) and PART 2:2014 Determination of density. BS EN ISO 17892: PART 8: 2018: 6,7 + 8 Undrained shear strength (Single stage). BS 1377:PART 7:1990:9 Multistage loading

Remarks :



Site : WATERBEACH GROWTH SCHEME

Client : Anglian Water Services Limited

Engineer :

Job Number
21.393

Sheet
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DETERMINATION OF pH, SULPHATE CONTENT AND TOTAL SULPHUR OF SOIL AND GROUNDWATER

Borehole/ Trial Pit	Depth (m)	Sample	Concentration of Soluble Sulphate			Total Sulphur %	Percentage of sample passing 2mm Sieve %	pH	Laboratory Description
			Soil		Groundwater g / l				
			Total S04 %	S03 in 2:1 water:soil g / l					
BH01	0.65	ES1	0.02	0.03		< 0.02		8.2	Light brown sandy clay with stones
BH01	1.80	W1			0.02			8.3	Water sample
BH02	1.00	W1			0.03			7.0	Water sample
BH02	1.10	ES2	0.04	0.03		< 0.02		7.9	Brown gravelly sand with stones
BH03	0.75	ES1	0.28	0.97		0.12		7.4	Brown sandy clay
BH03	1.50	W1			0.00			7.3	Water sample
BH04	0.20	ES1	0.26	0.11		0.29		6.8	Brown loamy clay with vegetation
BH04	0.80	W1			0.02			7.0	Water sample
BH05	0.70	ES2	0.35	0.62		0.32		6.5	Brown loamy clay
BH05	2.10	ES3	0.15	0.19		0.77		6.9	Brown loamy clay
BH06	1.30	ES3	0.05	0.03		0.02		7.8	Brown sandy clay with stones
BH07	1.10	ES2	0.05	0.03		< 0.02		7.9	Brown sandy clay with stones
BH07	2.70	D3	0.05	0.06		< 0.02		7.8	Grey sandy clay
BH08	0.80	ES2	0.02	<0.01		< 0.02		8.0	Brown sand
BH09	2.60	ES3	0.13	0.38		0.13		7.9	Grey clay

Method of Preparation : BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests

Method of Test : Laboratory in-house methods based on BS1377: Part 3 for ph and total sulphate and TRL 447 (2005) for total sulphate, Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition (2005) for water soluble sulphate and total sulphur.

Remarks :



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AF Howland Associates Ltd
The Old Exchange
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Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 22-00319

Site Reference: Waterbeach Growth Scheme - AFHA Suites

Project / Job Ref: 21.393

Order No: GNB/21.393/00/01/02/04/05

Sample Receipt Date: 14/01/2022 - 28/01/2022

Sample Scheduled Date: 14/01/2022 - 28/01/2022

Report Issue Number: 3

Reporting Date: 09/02/2022


Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.
This report supersedes 22-00319, issue no.2.
Reason for re-issue:
Job details amended
Sample descriptions amended

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DETS Ltd
 Unit 1, Rose Lane Industrial Estate
 Rose Lane
 Lenham Heath
 Maidstone
 Kent ME17 2JN
 Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 22-00319	Date Sampled	10/01/22	13/01/22	12/01/22	17/01/22	21/01/22
AF Howland Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Waterbeach Growth Scheme - AFHA Suites	TP / BH No	BH01	BH02	BH03	BH04	BH05
Project / Job Ref: 21.393	Additional Refs	ES1	ES3	ES1	ES2	ES1
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	0.65	2.00	0.75	0.80	0.35
Reporting Date: 09/02/2022	DETS Sample No	581934	582337	582338	582979	584135

Determinand	Unit	RL	Accreditation	10/01/22	13/01/22	12/01/22	17/01/22	21/01/22
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected		Not Detected		Not Detected
pH	pH Units	N/a	MCERTS	7.8	8.3	7.6	7.3	
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	0.3	0.7	0.4	2.6	
Arsenic (As)	mg/kg	< 2	MCERTS	7	3	17	17	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	
Chromium (Cr)	mg/kg	< 2	MCERTS	10	12	15	17	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	< 4	27	12	24	
Lead (Pb)	mg/kg	< 3	MCERTS	5	12	9	18	
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	8	54	24	32	
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	
Zinc (Zn)	mg/kg	< 3	MCERTS	18	52	38	73	
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
TPH - Aliphatic >C35 - C40	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	
TPH - Aromatic >C35 - C40	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	
TPH - Aliphatic / Aromatic (C6 - C40) Total	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
 Subcontracted analysis (S)



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 Rose Lane
 Lenham Heath
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 Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 22-00319	Date Sampled	21/01/22	19/01/22	19/01/22	24/01/22	25/01/22
AF Howland Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Waterbeach Growth Scheme - AFHA Suites	TP / BH No	BH05	BH06	BH06	BH07	BH08
Project / Job Ref: 21.393	Additional Refs	ES3	ES1	ES3	ES1	ES1
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	2.10	0.25	1.30	0.10 - 0.20	0.35
Reporting Date: 09/02/2022	DETS Sample No	584136	582980	583531	584137	584138

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected		Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.2	7.4	8.1	7.8	
Total Cyanide	mg/kg	< 2	NONE	6	< 2	< 2	< 2	
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	10.7	2.7	2.2	1.5	
Arsenic (As)	mg/kg	< 2	MCERTS	< 2	11	4	9	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	
Chromium (Cr)	mg/kg	< 2	MCERTS	5	15	5	16	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	22	13	7	12	
Lead (Pb)	mg/kg	< 3	MCERTS	4	27	3	24	
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	14	15	8	14	
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	
Zinc (Zn)	mg/kg	< 3	MCERTS	44	41	11	47	
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
TPH - Aliphatic >C35 - C40	mg/kg	< 10	NONE	< 10	< 10		< 10	< 10
TPH - Aromatic >C35 - C40	mg/kg	< 10	NONE	< 10	< 10		< 10	< 10
TPH - Aliphatic / Aromatic (C6 - C40) Total	mg/kg	< 42	NONE	< 42	< 42		< 42	< 42

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
 Subcontracted analysis (S)



DETS Ltd
 Unit 1, Rose Lane Industrial Estate
 Rose Lane
 Lenham Heath
 Maidstone
 Kent ME17 2JN
 Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 22-00319	Date Sampled	25/01/22	26/01/22			
AF Howland Associates Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Waterbeach Growth Scheme - AFHA Suites	TP / BH No	BH08	BH09			
Project / Job Ref: 21.393	Additional Refs	ES2	ES2			
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	0.80	1.35			
Reporting Date: 09/02/2022	DETS Sample No	584139	584140			

Determinand	Unit	RL	Accreditation				
Asbestos Screen ^(S)	N/a	N/a	ISO17025				
pH	pH Units	N/a	MCERTS	8.2	7.9		
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2		
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	0.3	0.4		
Arsenic (As)	mg/kg	< 2	MCERTS	11	6		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	MCERTS	11	9		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS	5	7		
Lead (Pb)	mg/kg	< 3	MCERTS	5	5		
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS	13	13		
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3		
Zinc (Zn)	mg/kg	< 3	MCERTS	22	18		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2		
TPH - Aliphatic >C35 - C40	mg/kg	< 10	NONE				
TPH - Aromatic >C35 - C40	mg/kg	< 10	NONE				
TPH - Aliphatic / Aromatic (C6 - C40) Total	mg/kg	< 42	NONE				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
 Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 22-00319	Date Sampled	10/01/22	13/01/22	12/01/22	17/01/22	21/01/22
AF Howland Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Waterbeach Growth Scheme AFHA Suites	TP / BH No	BH01	BH02	BH03	BH04	BH05
Project / Job Ref: 21.393	Additional Refs	ES1	ES3	ES1	ES2	ES3
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	0.65	2.00	0.75	0.80	2.10
Reporting Date: 09/02/2022	DETS Sample No	581934	582337	582338	582979	584136

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Coronene	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Oily Waste PAHs	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Dutch 10 PAHs	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6
Total WAC-17 PAHs	mg/kg	< 1.7	NONE	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 22-00319	Date Sampled	19/01/22	19/01/22	24/01/22	25/01/22	26/01/22
AF Howland Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Waterbeach Growth Scheme AFHA Suites	TP / BH No	BH06	BH06	BH07	BH08	BH09
Project / Job Ref: 21.393	Additional Refs	ES1	ES3	ES1	ES2	ES2
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	0.25	1.30	0.10 - 0.20	0.80	1.35
Reporting Date: 09/02/2022	DETS Sample No	582980	583531	584137	584139	584140

Determinand	Unit	RL	Accreditation	19/01/22	19/01/22	24/01/22	25/01/22	26/01/22
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	0.18	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.12	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.11	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Coronene	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Oily Waste PAHs	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Dutch 10 PAHs	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6
Total WAC-17 PAHs	mg/kg	< 1.7	NONE	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7



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Soil Analysis Certificate - TPH LOM Banded

DETS Report No: 22-00319	Date Sampled	10/01/22	13/01/22	12/01/22	17/01/22	21/01/22
AF Howland Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Waterbeach Growth Scheme - AFHA Suites	TP / BH No	BH01	BH02	BH03	BH04	BH05
Project / Job Ref: 21.393	Additional Refs	ES1	ES3	ES1	ES2	ES3
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	0.65	2.00	0.75	0.80	2.10
Reporting Date: 09/02/2022	DETS Sample No	581934	582337	582338	582979	584136

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	< 30
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	< 30
Total >C5 - C44	mg/kg	< 60	NONE	< 60	< 60	< 60	< 60	< 60



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Soil Analysis Certificate - TPH LOM Banded						
DETS Report No: 22-00319	Date Sampled	19/01/22	24/01/22	25/01/22		
AF Howland Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Waterbeach Growth Scheme - AFHA Suites	TP / BH No	BH06	BH07	BH08		
Project / Job Ref: 21.393	Additional Refs	ES1	ES1	ES1		
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	0.25	0.10 - 0.20	0.35		
Reporting Date: 09/02/2022	DETS Sample No	582980	584137	584138		

Determinand	Unit	RL	Accreditation				
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3
Aliphatic >C16 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30
Total >C5 - C44	mg/kg	< 60	NONE	< 60	< 60	< 60	< 60



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 22-00319	Date Sampled	10/01/22	13/01/22	12/01/22	17/01/22	21/01/22
AF Howland Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Waterbeach Growth Scheme AFHA Suites	TP / BH No	BH01	BH02	BH03	BH04	BH05
Project / Job Ref: 21.393	Additional Refs	ES1	ES3	ES1	ES2	ES3
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	0.65	2.00	0.75	0.80	2.10
Reporting Date: 09/02/2022	DETS Sample No	581934	582337	582338	582979	584136

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	4	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 22-00319	Date Sampled	19/01/22	24/01/22	25/01/22		
AF Howland Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Waterbeach Growth Scheme AFHA Suites	TP / BH No	BH06	BH07	BH08		
Project / Job Ref: 21.393	Additional Refs	ES1	ES1	ES1		
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	0.25	0.10 - 0.20	0.35		
Reporting Date: 09/02/2022	DETS Sample No	582980	584137	584138		

Determinand	Unit	RL	Accreditation				
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	



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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 22-00319	
AF Howland Associates Ltd	
Site Reference: Waterbeach Growth Scheme - AFHA Suites	
Project / Job Ref: 21.393	
Order No: GNB/21.393/00/01/02/04/05	
Reporting Date: 09/02/2022	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
581934	BH01	ES1	0.65	18.9	Light brown clayey sand
582337	BH02	ES3	2.00	22.4	Grey clay
582338	BH03	ES1	0.75	18.7	Brown sandy clay
582979	BH04	ES2	0.80	34.4	Brown clay
584136	BH05	ES3	2.10	46.5	Brown loamy clay
582980	BH06	ES1	0.25	14.4	Brown sandy clay
583531	BH06	ES3	1.30	12.7	Light grey clay with chalk
584137	BH07	ES1	0.10 - 0.20	10.4	Brown sandy clay with stones
584138	BH08	ES1	0.35	12.9	Brown sandy clay with stones
584139	BH08	ES2	0.80	7.1	Brown sand
584140	BH09	ES2	1.35	9.7	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{U/S}

Unsuitable Sample ^{U/S}

Soil Analysis Certificate - Methodology & Miscellaneous Information	
DETS Report No:	22-00319
AF Howland Associates Ltd	
Site Reference:	Waterbeach Growth Scheme - AFHA Suites
Project / Job Ref:	21.393
Order No:	GNB/21.393/00/01/02/04/05
Reporting Date:	09/02/2022

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content: determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



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DETS Report No: 22-00320

Site Reference: Waterbeach Growth Scheme - WAC Analysis

Project / Job Ref: 21.393

Order No: GNB/21.393/00/01/02/04/05

Sample Receipt Date: 14/01/2022 - 28/01/2022

Sample Scheduled Date: 14/01/2022 - 28/01/2022

Report Issue Number: 3

Reporting Date: 09/02/2022


Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.
This report supersedes 22-00320, issue no.2.
Reason for re-issue:
Job details amended
Sample descriptions amended

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. 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.

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.



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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2									
DETS Report No: 22-00320		Date Sampled	10/01/22		Landfill Waste Acceptance Criteria Limits				
AF Howland Associates Ltd		Time Sampled	None Supplied						
Site Reference: Waterbeach Growth Scheme - WAC Analysis		TP / BH No	BH01						
Project / Job Ref: 21.393		Additional Refs	ES1						
Order No: GNB/21.393/00/01/02/04/05		Depth (m)	0.65						
Reporting Date: 09/02/2022		DETS Sample No	581935						
Determinand	Unit	MDL							
TOC ^{MU}	%	< 0.1	0.4						
Loss on Ignition	%	< 0.01	0.90						
BTEX ^{MU}	mg/kg	< 0.05	< 0.05						
Sum of PCBs	mg/kg	< 0.1	< 0.1						
Mineral Oil ^{MU}	mg/kg	< 10	< 10						
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7						
pH ^{MU}	pH Units	N/a	7.8						
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1						
Eluate Analysis			10:1 mg/l			Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U			< 0.01			< 0.1	0.5	2	25
Barium ^U			< 0.02			< 0.2	20	100	300
Cadmium ^U			< 0.0005			< 0.005	0.04	1	5
Chromium ^U			< 0.005			< 0.05	0.5	10	70
Copper ^U			0.01			0.1	2	50	100
Mercury ^U			< 0.0005			< 0.005	0.01	0.2	2
Molybdenum ^U			< 0.001			< 0.01	0.5	10	30
Nickel ^U			< 0.007			< 0.07	0.4	10	40
Lead ^U			< 0.005			< 0.05	0.5	10	50
Antimony ^U			< 0.005			< 0.05	0.06	0.7	5
Selenium ^U			< 0.005			< 0.05	0.1	0.5	7
Zinc ^U			0.007			0.07	4	50	200
Chloride ^U			6.8			68	800	15000	25000
Fluoride ^U			< 0.5			< 5	10	150	500
Sulphate ^U			6.1			61	1000	20000	50000
TDS			64			640	4000	60000	100000
Phenol Index			< 0.01			< 0.1	1	-	-
DOC			16			160	500	800	1000
Leach Test Information									
Sample Mass (kg)			0.11						
Dry Matter (%)			81.1						
Moisture (%)			23.4						
Stage 1									
Volume Eluate L10 (litres)			0.88						
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion									
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation									
M Denotes MCERTS accredited test									
U Denotes ISO17025 accredited test									



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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2							
DETS Report No: 22-00320	Date Sampled	13/01/22	Landfill Waste Acceptance Criteria Limits				
AF Howland Associates Ltd	Time Sampled	None Supplied					
Site Reference: Waterbeach Growth Scheme - WAC Analysis	TP / BH No	BH02					
Project / Job Ref: 21.393	Additional Refs	ES3					
Order No: GNB/21.393/00/01/02/04/05	Depth (m)	2.00					
Reporting Date: 09/02/2022	DETS Sample No	582339					
Determinand	Unit	MDL	Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill		
TOC ^{MU}	%	< 0.1	0.7	3%	5%	6%	
Loss on Ignition	%	< 0.01	4.90	--	--	10%	
BTEX ^{MU}	mg/kg	< 0.05	< 0.05	6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--	
Mineral Oil ^{MU}	mg/kg	< 10	< 10	500	--	--	
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7	100	--	--	
pH ^{MU}	pH Units	N/a	8.2	--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	3.3	--	To be evaluated	To be evaluated	
Eluate Analysis		10:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01		< 0.1	0.5	2	25
Barium ^U		< 0.02		< 0.2	20	100	300
Cadmium ^U		< 0.0005		< 0.005	0.04	1	5
Chromium ^U		< 0.005		< 0.05	0.5	10	70
Copper ^U		< 0.01		< 0.1	2	50	100
Mercury ^U		< 0.0005		< 0.005	0.01	0.2	2
Molybdenum ^U		0.002		0.02	0.5	10	30
Nickel ^U		< 0.007		< 0.07	0.4	10	40
Lead ^U		< 0.005		< 0.05	0.5	10	50
Antimony ^U		< 0.005		< 0.05	0.06	0.7	5
Selenium ^U		< 0.005		< 0.05	0.1	0.5	7
Zinc ^U		< 0.005		< 0.05	4	50	200
Chloride ^U		3.5		35	800	15000	25000
Fluoride ^U		< 0.5		< 5	10	150	500
Sulphate ^U		18.1		181	1000	20000	50000
TDS		82		820	4000	60000	100000
Phenol Index		< 0.01		< 0.1	1	-	-
DOC		11.1		111	500	800	1000
Leach Test Information							
Sample Mass (kg)		0.12					
Dry Matter (%)		77.6					
Moisture (%)		29					
Stage 1							
Volume Eluate L10 (litres)		0.87					
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
M Denotes MCERTS accredited test							
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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 22-00320		Date Sampled	12/01/22	Landfill Waste Acceptance Criteria Limits			
AF Howland Associates Ltd		Time Sampled	None Supplied	Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Site Reference: Waterbeach Growth Scheme - WAC Analysis		TP / BH No	BH03				
Project / Job Ref: 21.393		Additional Refs	ES1				
Order No: GNB/21.393/00/01/02/04/05		Depth (m)	0.75				
Reporting Date: 09/02/2022		DETS Sample No	582340				
Determinand	Unit	MDL					
TOC ^{MU}	%	< 0.1	0.6	3%	5%	6%	
Loss on Ignition	%	< 0.01	4.60	--	--	10%	
BTEX ^{MU}	mg/kg	< 0.05	< 0.05	6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--	
Mineral Oil ^{MU}	mg/kg	< 10	< 10	500	--	--	
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7	100	--	--	
pH ^{MU}	pH Units	N/a	7.5	--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.2	--	To be evaluated	To be evaluated	
Eluate Analysis			10:1 mg/l	Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01		< 0.1	0.5	2	25
Barium ^U		0.04		0.4	20	100	300
Cadmium ^U		< 0.0005		< 0.005	0.04	1	5
Chromium ^U		< 0.005		< 0.05	0.5	10	70
Copper ^U		< 0.01		< 0.1	2	50	100
Mercury ^U		< 0.0005		< 0.005	0.01	0.2	2
Molybdenum ^U		0.002		0.02	0.5	10	30
Nickel ^U		< 0.007		< 0.07	0.4	10	40
Lead ^U		< 0.005		< 0.05	0.5	10	50
Antimony ^U		< 0.005		< 0.05	0.06	0.7	5
Selenium ^U		< 0.005		< 0.05	0.1	0.5	7
Zinc ^U		0.009		0.09	4	50	200
Chloride ^U		3.4		34	800	15000	25000
Fluoride ^U		< 0.5		< 5	10	150	500
Sulphate ^U		215.3		2153	1000	20000	50000
TDS		253		2529	4000	60000	100000
Phenol Index		< 0.01		< 0.1	1	-	-
DOC		15.4		154	500	800	1000
Leach Test Information							
Sample Mass (kg)		0.11					
Dry Matter (%)		81.3					
Moisture (%)		23					
Stage 1							
Volume Eluate L10 (litres)		0.88					
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
M Denotes MCERTS accredited test							
U Denotes ISO17025 accredited test							

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 22-00320		Date Sampled	17/01/22	Landfill Waste Acceptance Criteria Limits			
AF Howland Associates Ltd		Time Sampled	None Supplied	Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Site Reference: Waterbeach Growth Scheme - WAC Analysis		TP / BH No	BH04				
Project / Job Ref: 21.393		Additional Refs	ES2				
Order No: GNB/21.393/00/01/02/04/05		Depth (m)	0.80				
Reporting Date: 09/02/2022		DETS Sample No	582981				
Determinand	Unit	MDL					
TOC ^{MU}	%	< 0.1	2	3%	5%	6%	
Loss on Ignition	%	< 0.01	9.10	--	--	10%	
BTEX ^{MU}	mg/kg	< 0.05	< 0.05	6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--	
Mineral Oil ^{MU}	mg/kg	< 10	< 10	500	--	--	
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7	100	--	--	
pH ^{MU}	pH Units	N/a	7.1	--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1	--	To be evaluated	To be evaluated	
Eluate Analysis			10:1 mg/l	Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01		< 0.1	0.5	2	25
Barium ^U		< 0.02		< 0.2	20	100	300
Cadmium ^U		< 0.0005		< 0.005	0.04	1	5
Chromium ^U		< 0.005		< 0.05	0.5	10	70
Copper ^U		< 0.01		< 0.1	2	50	100
Mercury ^U		< 0.0005		< 0.005	0.01	0.2	2
Molybdenum ^U		0.001		0.01	0.5	10	30
Nickel ^U		< 0.007		< 0.07	0.4	10	40
Lead ^U		< 0.005		< 0.05	0.5	10	50
Antimony ^U		< 0.005		< 0.05	0.06	0.7	5
Selenium ^U		< 0.005		< 0.05	0.1	0.5	7
Zinc ^U		0.006		0.06	4	50	200
Chloride ^U		4.8		48	800	15000	25000
Fluoride ^U		< 0.5		< 5	10	150	500
Sulphate ^U		17.9		179	1000	20000	50000
TDS		79		790	4000	60000	100000
Phenol Index		< 0.01		< 0.1	1	-	-
DOC		17		170	500	800	1000
Leach Test Information							
Sample Mass (kg)		0.14					
Dry Matter (%)		65.6					
Moisture (%)		52.4					
Stage 1							
Volume Eluate L10 (litres)		0.85					
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
M Denotes MCERTS accredited test							
U Denotes ISO17025 accredited test							

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 22-00320		Date Sampled	21/01/22	Landfill Waste Acceptance Criteria Limits			
AF Howland Associates Ltd		Time Sampled	None Supplied	Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Site Reference: Waterbeach Growth Scheme - WAC Analysis		TP / BH No	BH05				
Project / Job Ref: 21.393		Additional Refs	ES3				
Order No: GNB/21.393/00/01/02/04/05		Depth (m)	2.10				
Reporting Date: 09/02/2022		DETS Sample No	584141				
Determinand	Unit	MDL					
TOC ^{MU}	%	< 0.1	10.7	3%	5%	6%	
Loss on Ignition	%	< 0.01	67.40	--	--	10%	
BTEX ^{MU}	mg/kg	< 0.05	< 0.05	6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--	
Mineral Oil ^{MU}	mg/kg	< 10	< 10	500	--	--	
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7	100	--	--	
pH ^{MU}	pH Units	N/a	7.0	--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.9	--	To be evaluated	To be evaluated	
Eluate Analysis			10:1 mg/l	Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01		< 0.1	0.5	2	25
Barium ^U		0.06		0.6	20	100	300
Cadmium ^U		< 0.0005		< 0.005	0.04	1	5
Chromium ^U		< 0.005		< 0.05	0.5	10	70
Copper ^U		< 0.01		< 0.1	2	50	100
Mercury ^U		< 0.0005		< 0.005	0.01	0.2	2
Molybdenum ^U		0.004		0.04	0.5	10	30
Nickel ^U		< 0.007		< 0.07	0.4	10	40
Lead ^U		< 0.005		< 0.05	0.5	10	50
Antimony ^U		< 0.005		< 0.05	0.06	0.7	5
Selenium ^U		< 0.005		< 0.05	0.1	0.5	7
Zinc ^U		0.008		0.08	4	50	200
Chloride ^U		11.5		115	800	15000	25000
Fluoride ^U		< 0.5		< 5	10	150	500
Sulphate ^U		30.2		302	1000	20000	50000
TDS		226		2259	4000	60000	100000
Phenol Index		< 0.01		< 0.1	1	-	-
DOC		34.5		345	500	800	1000
Leach Test Information							
Sample Mass (kg)		0.17					
Dry Matter (%)		53.4					
Moisture (%)		87.2					
Stage 1							
Volume Eluate L10 (litres)		0.82					
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 22-00320		Date Sampled	19/01/22	Landfill Waste Acceptance Criteria Limits			
AF Howland Associates Ltd		Time Sampled	None Supplied	Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Site Reference: Waterbeach Growth Scheme - WAC Analysis		TP / BH No	BH06				
Project / Job Ref: 21.393		Additional Refs	ES1				
Order No: GNB/21.393/00/01/02/04/05		Depth (m)	0.25				
Reporting Date: 09/02/2022		DETS Sample No	582982				
Determinand	Unit	MDL					
TOC ^{MU}	%	< 0.1	3.6	3%	5%	6%	
Loss on Ignition	%	< 0.01	5.20	--	--	10%	
BTEX ^{MU}	mg/kg	< 0.05	< 0.05	6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--	
Mineral Oil ^{MU}	mg/kg	< 10	< 10	500	--	--	
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7	100	--	--	
pH ^{MU}	pH Units	N/a	7.4	--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.3	--	To be evaluated	To be evaluated	
Eluate Analysis			10:1 mg/l	Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01		< 0.1	0.5	2	25
Barium ^U		< 0.02		< 0.2	20	100	300
Cadmium ^U		< 0.0005		< 0.005	0.04	1	5
Chromium ^U		< 0.005		< 0.05	0.5	10	70
Copper ^U		< 0.01		< 0.1	2	50	100
Mercury ^U		< 0.0005		< 0.005	0.01	0.2	2
Molybdenum ^U		< 0.001		< 0.01	0.5	10	30
Nickel ^U		< 0.007		< 0.07	0.4	10	40
Lead ^U		< 0.005		< 0.05	0.5	10	50
Antimony ^U		< 0.005		< 0.05	0.06	0.7	5
Selenium ^U		< 0.005		< 0.05	0.1	0.5	7
Zinc ^U		< 0.005		< 0.05	4	50	200
Chloride ^U		2.5		25	800	15000	25000
Fluoride ^U		< 0.5		< 5	10	150	500
Sulphate ^U		4.9		49	1000	20000	50000
TDS		58		580	4000	60000	100000
Phenol Index		< 0.01		< 0.1	1	-	-
DOC		20.1		201	500	800	1000
Leach Test Information							
Sample Mass (kg)		0.11					
Dry Matter (%)		85.6					
Moisture (%)		16.8					
Stage 1							
Volume Eluate L10 (litres)		0.88					
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 22-00320		Date Sampled	19/01/22	Landfill Waste Acceptance Criteria Limits			
AF Howland Associates Ltd		Time Sampled	None Supplied				
Site Reference: Waterbeach Growth Scheme - WAC Analysis		TP / BH No	BH06				
Project / Job Ref: 21.393		Additional Refs	ES3				
Order No: GNB/21.393/00/01/02/04/05		Depth (m)	1.30				
Reporting Date: 09/02/2022		DETS Sample No	583532				
Determinand	Unit	MDL					Inert Waste Landfill
TOC ^{MU}	%	< 0.1	0.7	3%	5%	6%	
Loss on Ignition	%	< 0.01	1.37	--	--	10%	
BTEX ^{MU}	mg/kg	< 0.05	< 0.05	6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--	
Mineral Oil ^{MU}	mg/kg	< 10	< 10	500	--	--	
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7	100	--	--	
pH ^{MU}	pH Units	N/a	7.9	--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	2.3	--	To be evaluated	To be evaluated	
Eluate Analysis			10:1 mg/l	Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01		< 0.1	0.5	2	25
Barium ^U		< 0.02		< 0.2	20	100	300
Cadmium ^U		< 0.0005		< 0.005	0.04	1	5
Chromium ^U		< 0.005		< 0.05	0.5	10	70
Copper ^U		< 0.01		< 0.1	2	50	100
Mercury ^U		< 0.0005		< 0.005	0.01	0.2	2
Molybdenum ^U		< 0.001		< 0.01	0.5	10	30
Nickel ^U		< 0.007		< 0.07	0.4	10	40
Lead ^U		< 0.005		< 0.05	0.5	10	50
Antimony ^U		< 0.005		< 0.05	0.06	0.7	5
Selenium ^U		< 0.005		< 0.05	0.1	0.5	7
Zinc ^U		< 0.005		< 0.05	4	50	200
Chloride ^U		3.2		32	800	15000	25000
Fluoride ^U		< 0.5		< 5	10	150	500
Sulphate ^U		4.9		49	1000	20000	50000
TDS		71		710	4000	60000	100000
Phenol Index		< 0.01		< 0.1	1	-	-
DOC		9.5		95	500	800	1000
Leach Test Information							
Sample Mass (kg)		0.10					
Dry Matter (%)		87.3					
Moisture (%)		14.6					
Stage 1							
Volume Eluate L10 (litres)		0.89					

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
 Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
 M Denotes MCERTS accredited test
 U Denotes ISO17025 accredited test

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 22-00320		Date Sampled	24/01/22	Landfill Waste Acceptance Criteria Limits			
AF Howland Associates Ltd		Time Sampled	None Supplied	Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Site Reference: Waterbeach Growth Scheme - WAC Analysis		TP / BH No	BH07				
Project / Job Ref: 21.393		Additional Refs	ES1				
Order No: GNB/21.393/00/01/02/04/05		Depth (m)	0.10 - 0.20				
Reporting Date: 09/02/2022		DETS Sample No	584142				
Determinand	Unit	MDL					
TOC ^{MU}	%	< 0.1	1.4	3%	5%	6%	
Loss on Ignition	%	< 0.01	4.23	--	--	10%	
BTEX ^{MU}	mg/kg	< 0.05	< 0.05	6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--	
Mineral Oil ^{MU}	mg/kg	< 10	< 10	500	--	--	
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7	100	--	--	
pH ^{MU}	pH Units	N/a	7.7	--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1	--	To be evaluated	To be evaluated	
Eluate Analysis			10:1 mg/l	Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01		< 0.1	0.5	2	25
Barium ^U		< 0.02		< 0.2	20	100	300
Cadmium ^U		< 0.0005		< 0.005	0.04	1	5
Chromium ^U		< 0.005		< 0.05	0.5	10	70
Copper ^U		< 0.01		< 0.1	2	50	100
Mercury ^U		< 0.0005		< 0.005	0.01	0.2	2
Molybdenum ^U		0.001		0.01	0.5	10	30
Nickel ^U		< 0.007		< 0.07	0.4	10	40
Lead ^U		< 0.005		< 0.05	0.5	10	50
Antimony ^U		< 0.005		< 0.05	0.06	0.7	5
Selenium ^U		< 0.005		< 0.05	0.1	0.5	7
Zinc ^U		< 0.005		< 0.05	4	50	200
Chloride ^U		< 1.0		< 10	800	15000	25000
Fluoride ^U		< 0.5		< 5	10	150	500
Sulphate ^U		2.8		28	1000	20000	50000
TDS		60		600	4000	60000	100000
Phenol Index		< 0.01		< 0.1	1	-	-
DOC		23.9		239	500	800	1000
Leach Test Information							
Sample Mass (kg)		0.10					
Dry Matter (%)		89.6					
Moisture (%)		11.6					
Stage 1							
Volume Eluate L10 (litres)		0.89					
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
M Denotes MCERTS accredited test							
U Denotes ISO17025 accredited test							

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 22-00320				Date Sampled	25/01/22	Landfill Waste Acceptance Criteria Limits			
AF Howland Associates Ltd				Time Sampled	None Supplied	Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Site Reference: Waterbeach Growth Scheme - WAC Analysis				TP / BH No	BH08				
Project / Job Ref: 21.393				Additional Refs	ES2				
Order No: GNB/21.393/00/01/02/04/05				Depth (m)	0.80				
Reporting Date: 09/02/2022				DETS Sample No	584143				
Determindand				Unit	MDL				
TOC ^{MU}				%	< 0.1	0.4	3%	5%	6%
Loss on Ignition				%	< 0.01	1.70	--	--	10%
BTEX ^{MU}				mg/kg	< 0.05	< 0.05	6	--	--
Sum of PCBs				mg/kg	< 0.1	< 0.1	1	--	--
Mineral Oil ^{MU}				mg/kg	< 10	< 10	500	--	--
Total PAH ^{MU}				mg/kg	< 1.7	< 1.7	100	--	--
pH ^{MU}				pH Units	N/a	8.1	--	>6	--
Acid Neutralisation Capacity				mol/kg (+/-)	< 1	< 1	--	To be evaluated	To be evaluated
Eluate Analysis				10:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U				< 0.01		< 0.1	0.5	2	25
Barium ^U				< 0.02		< 0.2	20	100	300
Cadmium ^U				< 0.0005		< 0.005	0.04	1	5
Chromium ^U				< 0.005		< 0.05	0.5	10	70
Copper ^U				< 0.01		< 0.1	2	50	100
Mercury ^U				< 0.0005		< 0.005	0.01	0.2	2
Molybdenum ^U				< 0.001		< 0.01	0.5	10	30
Nickel ^U				< 0.007		< 0.07	0.4	10	40
Lead ^U				< 0.005		< 0.05	0.5	10	50
Antimony ^U				< 0.005		< 0.05	0.06	0.7	5
Selenium ^U				< 0.005		< 0.05	0.1	0.5	7
Zinc ^U				< 0.005		< 0.05	4	50	200
Chloride ^U				3.3		33	800	15000	25000
Fluoride ^U				0.6		6.3	10	150	500
Sulphate ^U				4.2		42	1000	20000	50000
TDS				65		650	4000	60000	100000
Phenol Index				< 0.01		< 0.1	1	-	-
DOC				16.7		167	500	800	1000
Leach Test Information									
Sample Mass (kg)				0.10					
Dry Matter (%)				92.9					
Moisture (%)				7.8					
Stage 1									
Volume Eluate L10 (litres)				0.89					
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion									
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation									
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U Denotes ISO17025 accredited test									

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 22-00320		Date Sampled	26/01/22	Landfill Waste Acceptance Criteria Limits			
AF Howland Associates Ltd		Time Sampled	None Supplied	Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Site Reference: Waterbeach Growth Scheme - WAC Analysis		TP / BH No	BH09				
Project / Job Ref: 21.393		Additional Refs	ES2				
Order No: GNB/21.393/00/01/02/04/05		Depth (m)	1.35				
Reporting Date: 09/02/2022		DETS Sample No	584144				
Determinand	Unit	MDL					
TOC ^{MU}	%	< 0.1	0.4	3%	5%	6%	
Loss on Ignition	%	< 0.01	1.89	--	--	10%	
BTEX ^{MU}	mg/kg	< 0.05	< 0.05	6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--	
Mineral Oil ^{MU}	mg/kg	< 10	< 10	500	--	--	
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7	100	--	--	
pH ^{MU}	pH Units	N/a	7.8	--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	4.7	--	To be evaluated	To be evaluated	
Eluate Analysis			10:1 mg/l	Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01		< 0.1	0.5	2	25
Barium ^U		< 0.02		< 0.2	20	100	300
Cadmium ^U		< 0.0005		< 0.005	0.04	1	5
Chromium ^U		< 0.005		< 0.05	0.5	10	70
Copper ^U		< 0.01		< 0.1	2	50	100
Mercury ^U		< 0.0005		< 0.005	0.01	0.2	2
Molybdenum ^U		0.001		0.01	0.5	10	30
Nickel ^U		< 0.007		< 0.07	0.4	10	40
Lead ^U		< 0.005		< 0.05	0.5	10	50
Antimony ^U		< 0.005		< 0.05	0.06	0.7	5
Selenium ^U		< 0.005		< 0.05	0.1	0.5	7
Zinc ^U		< 0.005		< 0.05	4	50	200
Chloride ^U		1.9		19	800	15000	25000
Fluoride ^U		< 0.5		< 5	10	150	500
Sulphate ^U		2.6		25	1000	20000	50000
TDS		68		680	4000	60000	100000
Phenol Index		< 0.01		< 0.1	1	-	-
DOC		12.5		125	500	800	1000
Leach Test Information							
Sample Mass (kg)		0.10					
Dry Matter (%)		90.4					
Moisture (%)		10.8					
Stage 1							
Volume Eluate L10 (litres)		0.89					
Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion							
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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 22-00320	
AF Howland Associates Ltd	
Site Reference: Waterbeach Growth Scheme - WAC Analysis	
Project / Job Ref: 21.393	
Order No: GNB/21.393/00/01/02/04/05	
Reporting Date: 09/02/2022	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
581935	BH01	ES1	0.65	18.9	Light brown clayey sand
582339	BH02	ES3	2.00	22.4	Grey clay
582340	BH03	ES1	0.75	18.7	Brown sandy clay
582981	BH04	ES2	0.80	34.4	Brown clay
584141	BH05	ES3	2.10	46.5	Brown loamy clay
582982	BH06	ES1	0.25	14.4	Brown sandy clay
583532	BH06	ES3	1.30	12.7	Light brown clay with chalk
584142	BH07	ES1	0.10 - 0.20	10.4	Brown sandy clay with stones
584143	BH08	ES2	0.80	7.1	Brown sand
584144	BH09	ES2	1.35	9.7	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{U/S}

Unsuitable Sample ^{U/S}

Soil Analysis Certificate - Methodology & Miscellaneous Information	
DETS Report No: 22-00320	
AF Howland Associates Ltd	
Site Reference: Waterbeach Growth Scheme - WAC Analysis	
Project / Job Ref: 21.393	
Order No: GNB/21.393/00/01/02/04/05	
Reporting Date: 09/02/2022	

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content: determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



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Water Analysis Certificate - Methodology & Miscellaneous Information	
DETS Report No: 22-00320	
AF Howland Associates Ltd	
Site Reference: Waterbeach Growth Scheme - WAC Analysis	
Project / Job Ref: 21.393	
Order No: GNB/21.393/00/01/02/04/05	
Reporting Date: 09/02/2022	

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LOM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
 UF Unfiltered

Parameter	Matrix Type	Suite Reference	Expanded Uncertainty Measurement	Unit
TOC	Soil	BS EN 12457	20.0	%
Loss on Ignition	Soil	BS EN 12457	35.0	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	23.0	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	11.6	%
pH	Soil	BS EN 12457	0.28	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	18.7	%
Barium	Leachate	BS EN 12457	11.6	%
Cadmium	Leachate	BS EN 12457	20.3	%
Chromium	Leachate	BS EN 12457	18.3	%
Copper	Leachate	BS EN 12457	24.3	%
Mercury	Leachate	BS EN 12457	23.7	%
Molybdenum	Leachate	BS EN 12457	14.7	%
Nickel	Leachate	BS EN 12457	16.1	%
Lead	Leachate	BS EN 12457	15.7	%
Antimony	Leachate	BS EN 12457	17.9	%
Selenium	Leachate	BS EN 12457	22.0	%
Zinc	Leachate	BS EN 12457	17.4	%
Chloride	Leachate	BS EN 12457	15.3	%
Fluoride	Leachate	BS EN 12457	16.4	%
Sulphate	Leachate	BS EN 12457	20.6	%
TDS	Leachate	BS EN 12457	12.0	%
Phenol Index	Leachate	BS EN 12457	14.0	%
DOC	Leachate	BS EN 12457	10.0	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	35.0	%
pH	Soil	BS 3882: 2015	0.14	Units
Carbonate	Soil	BS 3882: 2015	16.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	14.9	%
Copper	Soil	BS 3882: 2015	16.0	%
Nickel	Soil	BS 3882: 2015	17.7	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%

APPENDIX D: DRAWINGS

Drawing 21.393/01	Site Location Plan
Drawings 21.393/02a	Exploratory Hole Location Plan
Drawings 21.393/02b	Exploratory Hole Location Plan
Drawings 21.393/02c	Exploratory Hole Location Plan





North



Boxes indicates approximate location of drawings 02a to 02c



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Site: Site Name Here

SITE LOCATION PLAN

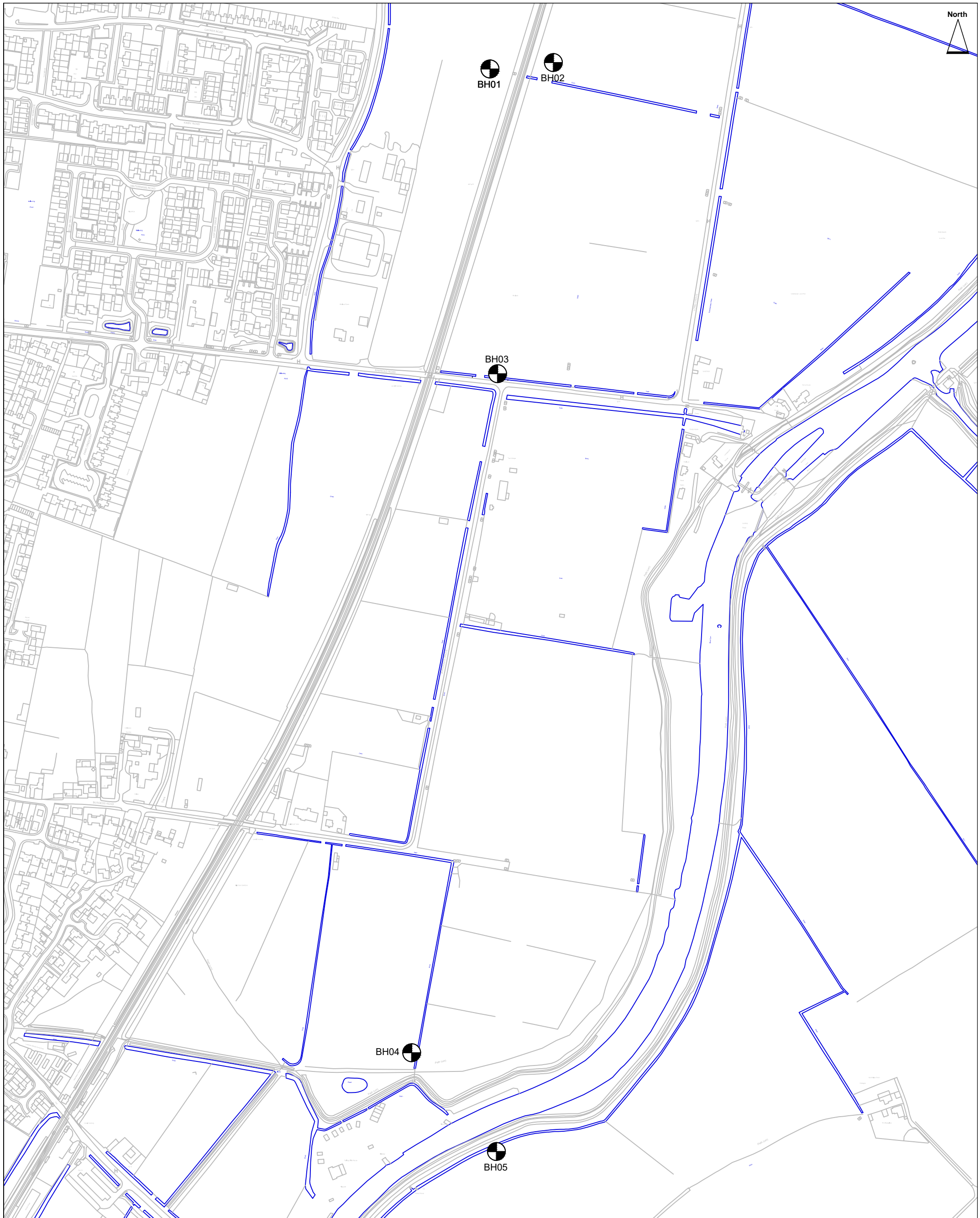
Client : Anglian Water Services Limited

Date : February 2022


Dwg : 21.393/01

Scale 1: 50,000 @ A4

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Key:

 Borehole location and reference

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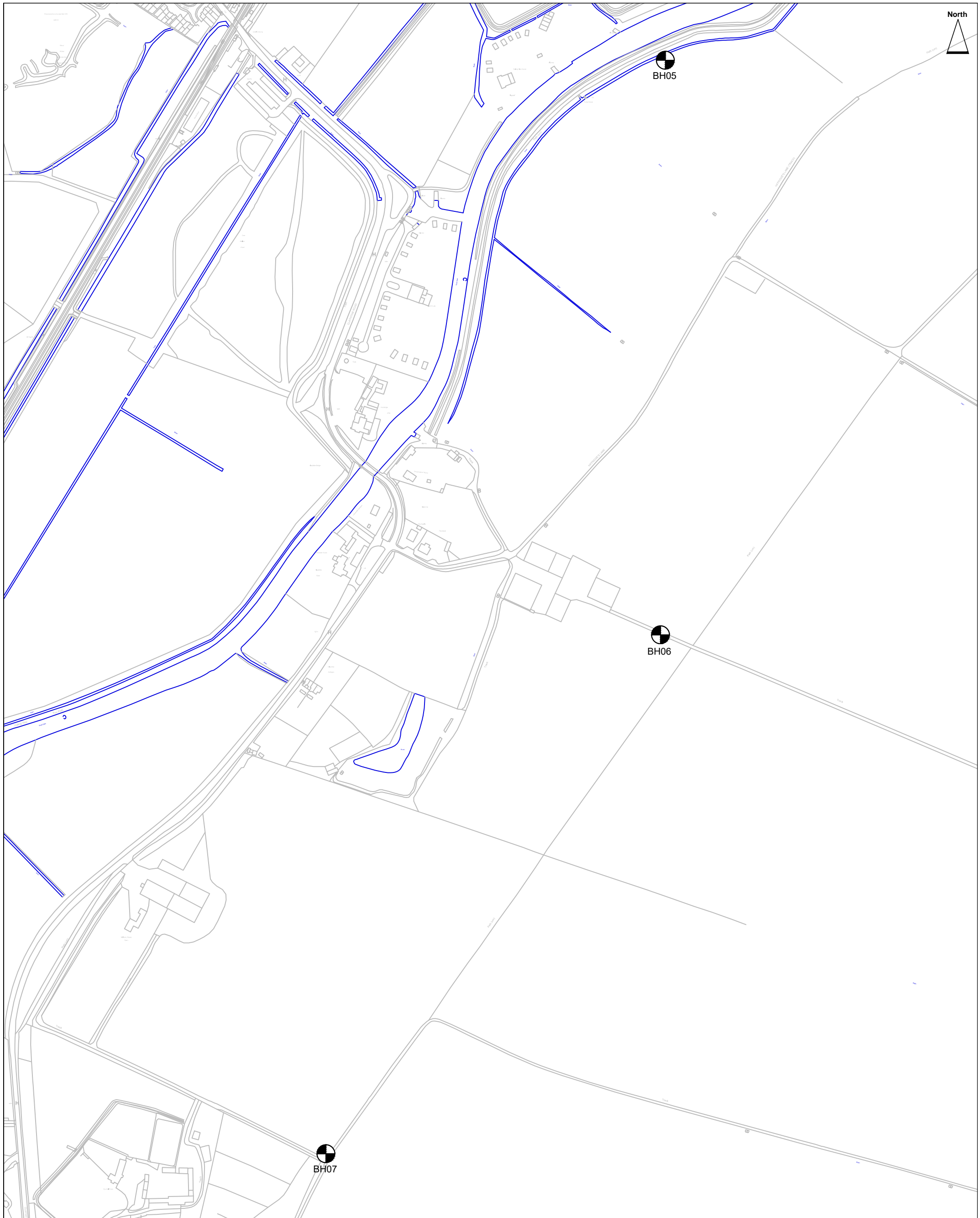
Rev	Date	Revision Description	Drwn	Chkd

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 web: www.howland.co.uk
 mail: admin@howland.co.uk

Client: Anglian Water Services Limited
Site: WATERBEACH GROWTH SCHEME
Job No.: 21.393
Drawing Title: EXPLORATORY HOLE LOCATION PLAN
Date: March 2022
Drawing No.: 21.393/02a
Scale: 1:4000 @ A3



Key:

 Borehole location and reference

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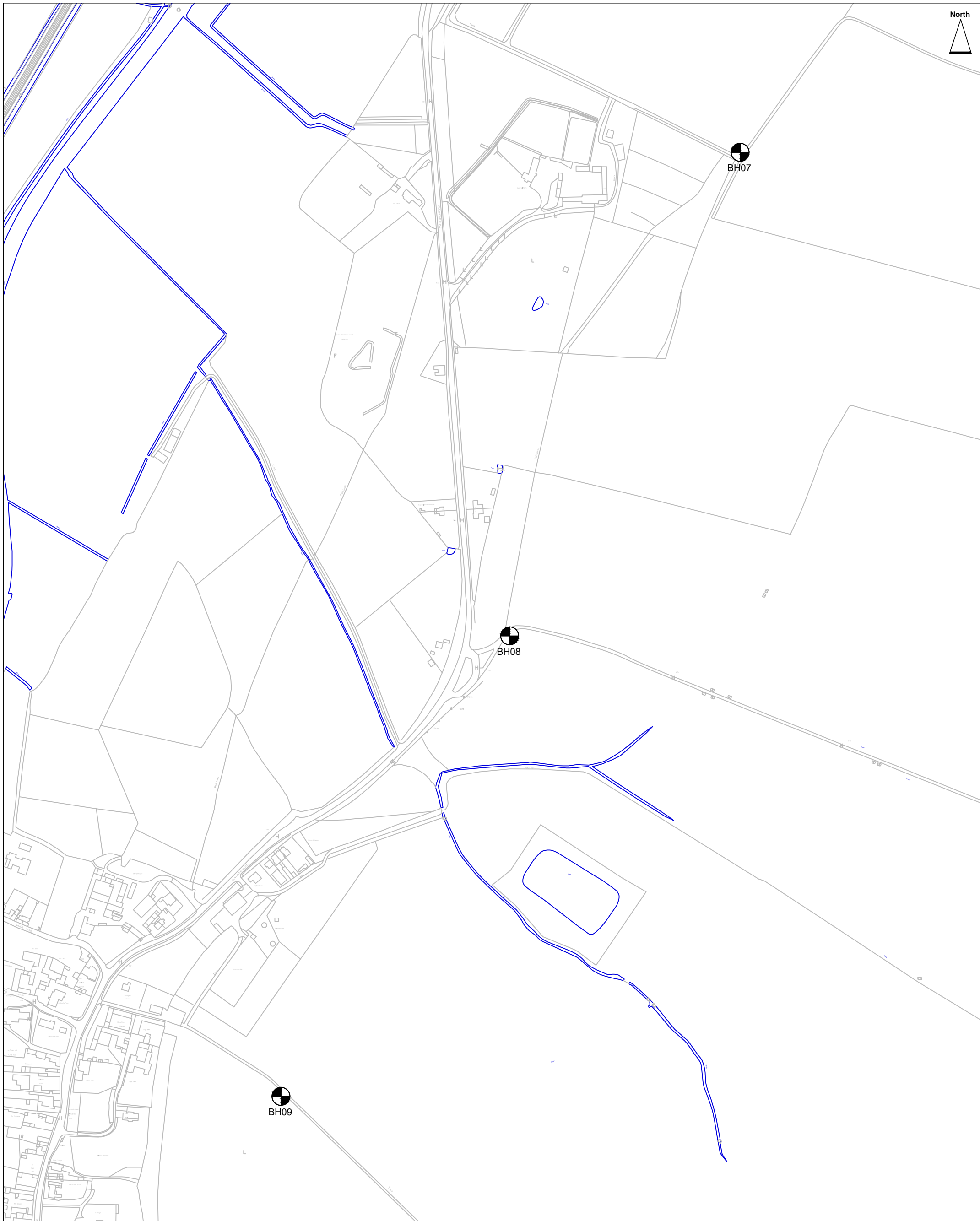
Rev	Date	Revision Description	Drwn	Chkd

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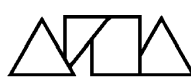
Client: Anglian Water Services Limited
Site: WATERBEACH GROWTH SCHEME
Job No.: 21.393
Drawing Title: EXPLORATORY HOLE LOCATION PLAN
Date: March 2022
Drawing No.: 21.393/02b
Scale: 1:4000 @ A3



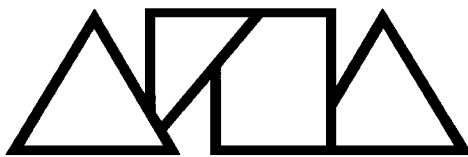
BH07

BH08

BH09

Key:  Borehole location and reference						 A F Howland Associates Geotechnical Engineers A F Howland Associates Ltd The Old Exchange Newmarket Road Cringleford Norwich NR4 6UF Tel: 01603 250754 Fax: 01603 250749 web: www.howland.co.uk mail: admin@howland.co.uk	Client: Anglian Water Services Limited Site: WATERBEACH GROWTH SCHEME Job No.: 21.393 Drawing Title: EXPLORATORY HOLE LOCATION PLAN Date: March 2022 Drawing No.: 21.393/02c Scale: 1:4000 @ A3
	Rev Date Revision Description Drwn Chkd						

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Writing to us at **Freepost: CWWTPR**

You can view all our DCO application documents and updates on the application on The Planning Inspectorate website:

<https://infrastructure.planninginspectorate.gov.uk/projects/eastern/cambridge-waste-water-treatment-plant-relocation/>