

Norfolk Boreas Offshore Wind Farm

TerraConsult Ground

Investigations

Report

Part 4 of 6

Crossings 4 & 5

Applicant: Norfolk Boreas Limited
Document Reference: Exa.AS-3.D2.V1
Deadline 2

Date: December 2019
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Author: TerraConsult

Norfolk Vanguard Offshore Wind Farm

The Applicant

Responses to First

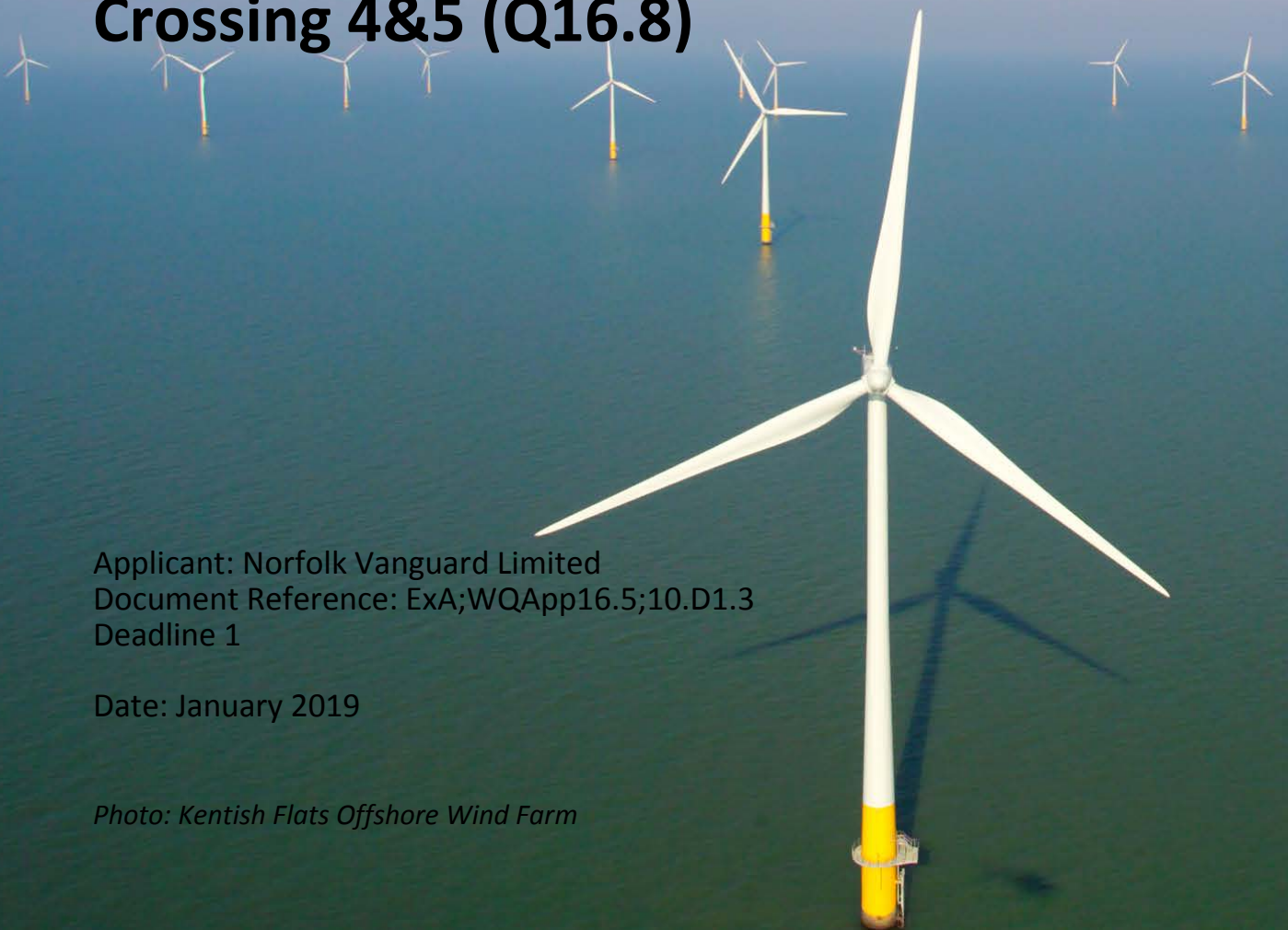
Written Questions

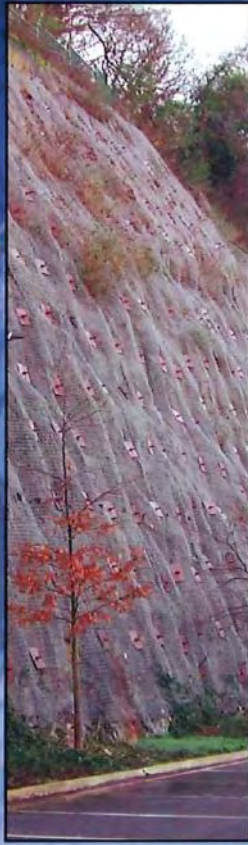
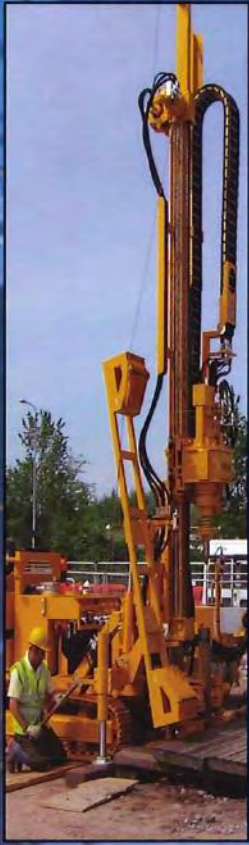
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November 2017
Report No 3318-R004-2

East Anglia (North) Offshore Wind Farm
Crossings 4 & 5 Site Investigation

Carried out for:

Gutteridge, Haskins and Davey Ltd (GHD)

TerraConsult

East Anglia (North) Offshore Wind Farm

Crossings 4 & 5 Site Investigation

Date: November 2017

Report No 3318-R004-2

Prepared for:



Gutteridge, Haskins & Davey Ltd
The Studio,
51 Brookfield Road,
Cheadle,
SK8 1ES

Engineer:



Gutteridge, Haskins & Davey Ltd
The Studio,
51 Brookfield Road,
Cheadle,
SK8 1ES

By:

TerraConsult


Bold Business Centre
Bold Lane, Sutton
St. Helens,
Merseyside
WA9 4TX

Tel: 01925 291111
Fax: 01925 291191
www.terraconsult.co.uk

DOCUMENT INFORMATION AND CONTROL SHEET

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3318-R004-2	East Anglia (North) Offshore Wind Farm Crossings 4 & 5 Site Investigation

Prepared by:	Victoria Smith	<i>Victoria Smith</i>	Engineering Geologist
Approved by:	Derek Daniels		Operations Manager
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DISCLAIMER

This site investigation contract was completed by TerraConsult Ltd on the basis of a specification and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget, the degree of manpower and resources allocated to the project as agreed.

TerraConsult Ltd cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered outwith the agreed scope of works.

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East Anglia (North) Offshore Wind Farm

Crossings 4 & 5 Site Investigation CONTENTS

1	INTRODUCTION	1
2	SITE DESCRIPTION	1
	2.1 Location and Topography	1
	2.2 Published Geology	2
3	FIELDWORK	2
	3.1 General	2
	3.2 Exploratory Holes	2
	3.3 Sampling	3
	3.4 In Situ Testing	3
	3.5 Instrumentation and Monitoring	3
	3.6 Surveying	4
4	LABORATORY TESTING.....	4
	4.1 Geotechnical Testing.....	4
	4.2 Geoenvironmental Testing.....	4
5	REFERENCES.....	5
6	LICENCES.....	5

DRAWINGS

3318(C4)D001-1 Site Location Plan
3318(C5)D001-1 Site Location Plan
3318(C4)D002-1 Exploratory Hole Location Plan
3318(C5)D002-1 Exploratory Hole Location Plan

APPENDICES

APPENDIX A Exploratory Hole Records
APPENDIX B Photographs
APPENDIX C In Situ Testing Results
APPENDIX D Instrumentation Sampling and Monitoring Records
APPENDIX E Geotechnical Laboratory Test Results
APPENDIX F Geoenvironmental Laboratory Test Results
APPENDIX G Calibration Certificates

East Anglia (North) Offshore Wind Farm

Crossings 4 & 5 Site Investigation

1 INTRODUCTION

TerraConsult Limited (TCL) was commissioned by Gutteridge, Haskins and Davey Ltd (GHD) to carry out a ground investigation for the proposed cable route crossing the River Bure (Crossing 4) and the A140 (Crossing 5) near Aylsham, Norfolk.

This report presents the factual records of the fieldwork and laboratory testing. The data is also presented separately in digital format following AGS4 (2011).

The scope of the investigation, which was specified by GHD, comprised:

- Boreholes formed by cable percussive techniques;
- In situ testing comprising of;
 - Standard penetration tests in boreholes;
 - Variable head permeability testing;
- Post fieldwork monitoring and sampling;
- Geotechnical laboratory testing;
- Geoenvironmental laboratory testing;
- Factual report (GIR) and AGS data.

The investigation was carried out in accordance with the contract specification and relevant standards (see References). The fieldwork was carried out between 31/07/17 and 11/08/17.

Whilst every attempt is made to record full details of the strata encountered in the exploratory holes, techniques of exploratory hole formation and sampling will inevitably lead to disturbance, mixing or loss of material in some soils and rocks.

All information given in this report is based on the ground conditions encountered during the site work and on the results of laboratory and field tests performed during the investigation. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations and water conditions between or below exploratory holes. It should be noted that groundwater levels, gas concentrations and gas flows usually vary due to seasonal, atmospheric and/or other effects and may at times differ to those measured during the investigation.

2 SITE DESCRIPTION

2.1 Location and Topography

Crossing 4 is located approximately 2.0 km north east of the centre of Aylsham, Norfolk. The approximate location of Crossing 4 is located between Ordnance Survey National Grid Reference TG 196 286 and TG 200 288.

Crossing 5 is located approximately 2.3 km north-east of the centre of Aylsham, Norfolk. The approximate location of Crossing 5 is located between Ordnance Survey National Grid Reference TG 208 289 and TG 205 290.

Site location plans are presented as drawings reference 3318(C4)D001-1 and 3318(C5)D001-1.

2.2 Published Geology

The online British Geological Survey (BGS) 1:50,000 scale map shows Crossing 4 to be underlain by clay, silt, sand, and gravel Alluvium deposits, and Crossing 5 to be underlain by glaciofluvial sand and gravel from the Happisburgh Glacigenic Formation and Briton's Lane Formation.

Beneath these lies the Wroxham Crag Formation bedrock comprising of sand and gravel.

3 FIELDWORK

3.1 General

Fieldwork was undertaken between 31/07/17 and 11/08/17. The scope of the works, as provided by GHD comprised:

Table 1: Scope of Intrusive Works and In Situ Testing	
Exploratory Hole/In Situ Test Type	Proposed number
Cable percussion, SPTs, variable head permeability test, install	BH17-C4-01
Cable percussion, SPTs, variable head permeability test	BH17-C4-02
Cable percussion, SPTs, variable head permeability test, install	BH17-C4-03
Cable percussion, SPTs, variable head permeability test	BH17-C4-04
Cable percussion, SPTs, variable head permeability test, install	BH17-C5-01
Cable percussion, SPTs, variable head permeability test	BH17-C5-02
Cable percussion, variable head permeability test, SPTs, install	BH17-C5-03
Cable percussion, SPTs, variable head permeability test	BH17-C5-04

The exploratory hole locations were selected by GHD. The locations were set out by the GHD site representative prior to commencement.

3.2 Exploratory Holes

The exploratory holes were logged by an engineer in accordance with the recommendations of BS5930:2015, which incorporates the requirements of BS EN ISO 14688-1, 14688-2 and 14689-1. Methods of formation and geological descriptions, together with sample records, in situ test results and observations made during formation of the exploratory hole are given in the logs presented in Appendix A and should be read in conjunction with the Key included therein. Sample photographs are presented in Appendix B.

A summary of the exploratory holes formed is listed in the following table.

Table 2: Summary of Exploratory Positions

Exploratory position:	Type:	Final depth (m):	Easting (mE):	Northing (mN):	Level (mAOD):	Start date:	End date:
BH17-C4-01	CP	20.00	619687.49	328656.77	12.81	09/08/2017	10/08/2017
BH17-C4-02	CP	20.00	619734.74	328684.81	12.55	10/08/2017	11/08/2017
BH17-C4-03	CP	20.00	620032.35	328829.95	12.58	04/08/2017	07/08/2017
BH17-C4-04	CP	20.00	620061.55	328848.17	12.71	07/08/2017	08/08/2017
BH17-C5-01	CP	15.00	620536.65	329029.86	20.32	02/08/2017	02/08/2017
BH17-C5-02	CP	15.00	620598.48	329046.06	20.65	03/08/2017	03/08/2017
BH17-C5-03	CP	15.00	620770.38	329039.70	20.70	31/07/2017	31/07/2017
BH17-C5-04	CP	15.00	620807.28	329057.98	20.98	01/08/2017	01/08/2017

Type: CP – cable percussion;

Prior to commencement, all exploratory positions were checked for services by reference to available plans, visual inspection and CAT/Genny survey. Inspection pits were excavated by hand and rechecked with a CAT at all borehole locations.

Exploratory hole location plans are presented as drawings 3318(C4)D002-1 and 3318(C5)D002-1.

3.3 Sampling

Samples for geotechnical and geoenvironmental testing and strata description were taken during the formation of the exploratory holes in general accordance with the specification, BS5930:2015, BS10175:2011 and BS EN ISO 22475-1:2006. Soil and water samples for geochemical analysis were taken in accordance with the specification and stored in cool boxes for despatch directly to Concept Life Sciences (Formerly Scientific Analysis Laboratories, SAL) in Braintree, Essex.

A summary of water samples taken from monitoring installations is presented in Appendix D.

3.4 In Situ Testing

In situ testing was carried in accordance with BS 5930:2015, BS 1377-9 (1990), BS EN ISO 22282-1:2012 and BS EN ISO 22282-2:2012 unless otherwise stated. SPT results are presented on individual exploratory hole logs. Information relating to the identification and calibration of SPT hammers can also be found on the individual borehole logs. Hammer calibration certificates are presented in Appendix G.

Falling head tests were carried out in suitable strata in the boreholes upon instruction from GHD. Results are presented in Appendix C.

3.5 Instrumentation and Monitoring

Details of instrumentation installed is presented on the exploratory hole logs. A summary of the installed instrumentation is listed in the following table.

Table 3: Summary of Instrumentation

Exploratory position:	Instrument type:	Instrument reference:	Internal diameter (mm):	Installed depth (m bgl):	Depth (m AOD):	Top of response zone (m bgl):	Base of response zone (m bgl):
BH17-C4-01	Standpipe	BH17-C4-01	50	20.00	-7.19	4.50	20.00
BH17-C4-03	Standpipe	BH17-C4-03	50	20.00	-7.42	4.20	20.00
BH17-C5-01	Standpipe	BH17-C5-01	50	15.00	5.32	1.00	12.00
BH17-C5-03	Standpipe	BH17-C5-03	50	15.00	5.70	1.00	15.00

Records of monitoring and gas/groundwater sampling carried out by TerraConsult during and after the fieldwork period to the date of issue of this report are presented in Appendix D. Calibration certificates are presented in Appendix G.

3.6 Surveying

On completion of the fieldworks, all exploratory positions were surveyed by use of GPS. Coordinates and reduced levels to Ordnance Survey are provided on the exploratory hole logs.

4 LABORATORY TESTING

4.1 Geotechnical Testing

The testing was scheduled by GHD and was carried out by GEO Site Testing Services Ltd (GSTL), Llanelli, Carmarthenshire, in accordance with BS 1377 (1990) and BRE SD1 unless otherwise stated. The testing is summarised below and the results are presented in Appendix <E>.

Table 4: Summary of Geotechnical Laboratory Testing

Lab test:	Number undertaken:	Method:	Remarks:
Atterburg Limit 4 Point Method	4	BS1377: Part 2: 4.3 & 5.3	
Particle size distribution	8	BS1377: Part 2: 9.2	
BRE SD1 Suite	2	BRE SD1	

4.2 Geoenvironmental Testing

The testing was scheduled by GHD and carried out by Concept Life Sciences. The results are presented in Appendix F.

5 REFERENCES

- AGS: 2010: Electronic transfer of geotechnical and geoenvironmental data (Edition 4 including addendum 3, 2011). Association of Geotechnical and Geoenvironmental Specialists.
- BRE Special Digest 1: 2005 Concrete in aggressive ground.
- BS 1377 : 1990 : Methods of test for soils for civil engineering purposes. Published in nine parts. British Standards Institution.
- BS 5930 : 2015 : Code of practice for site investigation. British Standards Institution.
- BS 10175 : 2011: Investigation of potentially contaminated sites – Code of Practice. British Standards Institution
- BS EN 1997-1: 2004 : Eurocode 7 – Geotechnical Design – Part 1: General rules. Including UK National Appendix of November 2007. British Standards Institution.
- BS EN ISO 14688-1 : 2002 : Geotechnical investigation and testing – Identification and classification of soil – Part 1: Identification and description. British Standards Institution.
- BS EN ISO 14688-2 : 2004 : Geotechnical investigation and testing – Identification and classification of soil – Part 2: Principles for a classification. British Standards Institution.
- BS EN ISO 14689-1 : 2003 : Geotechnical investigation and testing – Identification and classification of rock – Part 1: Identification and description. British Standards Institution.
- BS EN ISO 22282-1 : 2012 Geotechnical investigation and testing. Geohydraulic testing Part1: General Rules
- BS EN ISO 22282-2 : 2012 Geotechnical investigation and testing. Geohydraulic testing Part 2: Water Permeability Tests in a borehole using open systems
- BS EN ISO 22475-1 : 2006 : Geotechnical investigation and testing – Sampling methods and groundwater measurements – Part 1: Technical principals for execution (July 2011 reprint). British Standards Institution.
- BS EN ISO 22476-3 : 2005 : Geotechnical investigation and testing – Field Testing – Part 3: Standard penetration test

6 LICENCES

British Geological Survey Reproduction Licence Number: IPR/187-68CF CO8/053-CSL

Ordnance Survey Reproduction Licence Number. 100035365

DRAWINGS

3318(C4)D001-1 Site Location Plan

3318(C5)D001-1 Site Location Plan

3318(C4)D002-1 Exploratory Hole Location Plan

3318(C5)D002-1 Exploratory Hole Location Plan

Site Location Plan



Address:
East Anglia

Notes:

AGS
Issue: FINAL
Scale: 1:25000

Project: East Anglia (North) Offshore Wind Farm
Project No: 3318
Client: GHD Ltd

Drawing No:
3318(C4)D001-1

Site Location Plan



Address:
East Anglia

Notes:

Exploratory Hole Location Plan



Legend Key
Locations By Type - CP

AGS
Issue: FINAL
Scale: 1:3000

Project: East Anglia (North) Offshore Wind Farm
Project No: 3318
Client: GHD Ltd

Drawing No:
3318(C4)D002-1

Exploratory Hole Location Plan



Legend Key
Locations By Type - CP

AGS
Issue: FINAL
Scale: 1:3000

Project: East Anglia (North) Offshore Wind Farm
Project No: 3318
Client: GHD Ltd

Drawing No:
3318(C5)D002-1

APPENDICES

APPENDIX A Exploratory Hole Records

APPENDIX B Photographs

APPENDIX C In Situ Testing Results

APPENDIX D Instrumentation Sampling and Monitoring Records

APPENDIX E Geotechnical Laboratory Test Results

APPENDIX F Geoenvironmental Laboratory Test Results

APPENDIX G Calibration Certificates

APPENDIX A

Exploratory Hole Records

Key sheet

Boreholes

Exploratory Hole Key Sheet

SAMPLES:

Undisturbed:	
U	Driven tube sample
UT	Thin wall driven tube sample
TW	Pushed thin wall tube sample
P	Pushed piston sample
L	Liner sample (from windowless or similar sampler), full recovery unless otherwise stated
CBR	CBR mould sample
BLK	Block sample
C	Core sample (from rotary core) taken for laboratory testing
Disturbed:	
D	Small sample
B	Bulk sample
AMAL	Amalgamated sample
Environmental:	
ES	Environmental soil sample
EW	Environmental water sample
Comments:	Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that an attempt was made to take a tube sample; however, there was no recovery. Sample recovery is given as a percentage.

TESTS:

SPT S or SPT C	Standard Penetration Test, open shoe (S) or solid cone (C)
	The Standard Penetration Test is defined in BS EN ISO 22476-3 (2005). The incremental blow counts are given in the Field Records column; each increment is 75mm unless stated otherwise and any penetration under self weight in mm (SW) is noted. Where the full 300mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 (either in total or for a single increment) the total blow count beyond the seating drive is given (without the N = prefix).
ICBR	In situ CBR
IV	In situ vane shear strength, peak (p) and remoulded (r), kPa
HV	Hand vane shear strength, peak (p) and remoulded (r), kPa
PP	Pocket penetrometer test, converted to shear strength, kPa
KFH, KRH, KPI	Variable head permeability tests (KFH = falling head test, KRH = rising head test, KPI = packer test), permeability value
PID/FID	Photo-ionisation detector/Flame-ionisation detector
	Test results provided in Field Records column

DRILLING RECORDS:

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930: 2015 and BS EN ISO 22575-1 (2006)

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacings are presented.
NI	Non intact is used where the core is fragmented.
CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss
NR	Not recovered

GROUNDWATER:



Groundwater strike



Groundwater level after standing period

DEPTH REMARKS:

EoS	End of Shift
SoS	Start of Shift
EoBH	End of Borehole

INSTRUMENTATION:

Details of installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill. The type of instrument installed is indicated by a code adjacent to the Legend column at the base of the instrument.

SP	Standpipe
SPIE	Standpipe piezometer
PPIE	Pneumatic piezometer
EPIE	Electronic piezometer
HPIE	Hydraulic piezometer
GMP	Gas monitoring standpipe
(xx)	Internal diameter
ICE	Biaxial inclinometer
ICM	Inclinometer tubing for use with probe
SLIP	Slip indicator
ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point
ETR	Rod extensometer

EXPLORATORY HOLE TYPE:

CP	Cable percussion
DP	Dynamic probe
DCP	Dynamic cone penetrometer
HA	Hand auger
IP	Inspection pit
OP	Observation pit/trench
PC	Pavement core
RC	Rotary core
RO	Rotary open hole
SH	Shaft
SNC	Sonic (resonance)
TP	Trial pit/trench
TRAV	Traverse
WLS	Windowless (dynamic) sample
WS	Window (dynamic) sample



Project: **East Anglia (North) Offshore Wind Farm**
 Project No: **3318**
 Client: **GHD Ltd**

Reference

KEY SHEET

Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 20.00	Start date: 09-08-17	End date: 09-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 09-08-17 10-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75	Location details:	
											mE:	619687.49	
											mN:	328656.77	
											mAOD:	12.81	
											Grid:	OSGB	

Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
			12.41	0.40	Soft dark orangish brown mottled light brownish grey slightly gravelly slightly sandy CLAY. Gravel of subangular to subrounded fine to medium flint. (TOPSOIL)			0.50	D1	
				0.40	Soft dark orangish brown mottled light brownish grey slightly gravelly slightly sandy CLAY. Gravel of subangular to subrounded fine to medium flint. Occasional rootlets (ALLUVIUM)			0.50	ES1	
				(1.70)	1.00 - 2.10 m: Occasionally mottles dark reddish brown			1.00	D2	
				1.00				1.00	ES2	
			10.71	2.10	Soft dark grey slightly gravelly sandy CLAY. Gravel of subangular to subrounded fine to medium flint. (ALLUVIUM)	Dry		1.50	S	N=14 (2,2/3,3,4,4)
				1.40				1.50	ES3	
				1.40				1.50 - 1.95	D3	
				2.00				2.00	ES4	
			9.31	3.50	Medium dense dark greyish brown slightly gravelly slightly clayey silty fine to medium SAND. Gravel of subangular to subrounded fine to medium flint. (ALLUVIUM)	Dry	2.40	2.50	S	N=15 (2,3/3,4,4,4)
				(1.00)				2.50 - 2.95	D4	
				3.50				3.50	S	N=16 (3,3/4,4,4,4)
				(1.00)				3.50 - 3.95	D5	
			8.31	4.50	Medium dense dark greyish brown slightly silty fine to coarse SAND and subangular to subrounded fine to coarse flint GRAVEL (ALLUVIUM)	Dry	3.40	4.50	C	N=21 (1,3/4,5,5,7)
				(1.30)				4.50 - 4.95	B1	
				4.50				5.50	C	N=24 (2,4/5,6,7,6)
				(1.20)				5.50	D6	
			7.01	5.80	Structureless CHALK recovered as light greyish white slightly gravelly sandy SILT. Gravel of very weak to weak, low density greyish white chalk. Occasional fine to coarse flint. (CHALK)	Dry	5.50	6.00	S	N=9 (1,1/2,2,2,3)
				(1.20)				6.00	D7	
			5.81	7.00	Structureless CHALK recovered as off white with creamy edges around the gravel slightly gravelly sandy SILT. Gravel of very weak to weak, low density greyish white chalk. Occasional fine to coarse flint. (CHALK)	Dry	7.00	7.00	S	N=12 (3,2/2,3,4,3)
								7.00 - 7.45	D8	
				7.00				8.50	S	N=11 (2,3/2,2,3,4)
								8.50 - 8.95	D8	
						Dry	10.00	10.00	S	N=12 (3,2/2,3,4,3)
						Water	Casing	Depth	Type & No	Results

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed: 4.00 2.20 4.00	Dia (mm): Depth: Casing: 150 19.00 19.00	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h1>BH17-C4-01</h1> <p>Sheet 1 of 2</p>
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Borehole Log

Borehole formation details:												Location details:	
Type: IP CP	From: 0.00	To: 1.20 20.00	Start date: 10-08-17	End date: 10-08-17 11-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 10-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75	mE:	619734.74
												mN:	328684.81
												mAOD:	12.55
												Grid:	OSGB

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
			12.25	(0.30) 0.30	Dark orangish brown gravelly clayey fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. Occasional rootlets (TOPSOIL)			0.50 0.50	D1 ES1	
			11.55	(0.70) 1.00	Dark orangish brown gravelly fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. Gravel sized pockets of dark orangish brown sandy CLAY. (ALLUVIUM)			1.00 1.00	D2 ES2	
			11.05	(0.50) 1.50	Medium dense dark brown gravelly slightly clayey fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (ALLUVIUM)	Dry		1.50 1.50 1.50 - 1.95	C ES3 B1	N=15 (2,2/3,4,4,4)
				(2.00)		Dry	2.50	2.50 2.50 - 2.95	C B2	N=18 (2,3/3,4,5,6)
			9.05	3.50 (1.00)	Medium dense light grey slightly silty fine to coarse SAND and subangular to subrounded fine to coarse flint GRAVEL (ALLUVIUM)	Dry	3.50	3.50 3.50 - 3.95	C B3	N=22 (2,3/4,5,6,7)
			8.05	4.50 (1.00)	Medium dense dark orangish grey very gravelly slightly silty fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (ALLUVIUM)	Dry	4.50	4.50 4.50 - 4.95	C B4	N=19 (2,2/4,4,5,6)
			7.05	5.50 (1.10)	Medium dense light brownish grey slightly silty fine to coarse SAND and subangular to subrounded fine to coarse flint GRAVEL. Occasional cobble size pockets of white chalky CLAY. (ALLUVIUM)	Dry	5.50	5.50 5.50 - 5.95	C B5	N=26 (3,5/6,6,7,7)
			5.95	6.60 (0.40)	Structureless CHALK recovered as light brownish white slightly sandy gravelly SILT. Gravel of weak, low density greyish white chalk. Occasional fine to coarse flint. (CHALK)	Dry		6.60	D3	
			5.55	7.00	Structureless CHALK recovered as white with occasional light orangish brown staining slightly sandy gravelly SILT. Gravel of weak, medium density off white chalk. Occasional fine to coarse flint. (CHALK)	Dry	7.00	7.00 7.00 - 7.45	S D4	N=13 (2,2/3,3,3,4)
						Dry	8.40	8.50 8.50 - 8.95	S D5	N=15 (1,2/3,4,4,4)
						Dry	10.00	10.00	S	N=19 (3,4/3,4,5,7)

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed: 2.60 1.70 2.50	Dia (mm): Depth: Casing: 150 19.00 19.00	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h2>BH17-C4-02</h2> <p>Sheet 1 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 20.00	Start date: 10-08-17	End date: 10-08-17 11-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 10-08-17 11-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	619734.74
mN:	328684.81
mAOD:	12.55
Grid:	OSGB

Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
					Structureless CHALK recovered as white with occasional light orangish brown staining slightly sandy gravelly SILT. Gravel of weak, medium density off white chalk. Occasional fine to coarse flint. (CHALK)			10.00 - 10.45	D6	
						Dry	11.50	11.50 11.50 - 11.95	S D7	N=23 (4,4/5,5,7,6)
						Dry	13.00	13.00 13.00 - 13.45	S D8	N=24 (2,3/5,6,6,7)
			(13.00)			Dry	14.50	14.50 14.50 - 14.95	S D9	N=17 (1,3/4,6,4,3)
						Dry	16.00	16.00 16.00 - 16.45	S D10	N=30 (4,5/6,8,8,8)
						Dry	17.40	17.50 17.50 - 17.95	S D11	N=22 (2,3/3,5,6,8)
						Dry	19.00	19.00 19.00 - 19.45	S D12	N=29 (3,5/6,6,8,9)
			-7.45	20.00	Borehole ends at 20.00m (Target depth)					

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed:	Dia (mm): Depth: Casing:	From: To: Remarks:	From: to: Duration: Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue: FINAL Scale: 1:50	Project: East Anglia (North) Offshore Wind Farm Project No: 3318 Client: GHD Ltd	Exploratory position reference: <h1>BH17-C4-02</h1> Sheet 2 of 2
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00 0.00	To: 1.20 20.00	Start date: 04-08-17 04-08-17	End date: 04-08-17 07-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 04-08-17 07-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	620032.35
mN:	328829.95
mAOD:	12.58
Grid:	OSGB

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
			12.08	(0.50)	Soft dark brown mottled light grey sandy CLAY. Frequent rootlets and plant matter. (TOPSOIL)			0.50	D1	
			11.18	(0.90)	Soft dark brown mottled light grey sandy CLAY. Occasionally mottled light orangish brown. Occasional rootlets and plant matter. (ALLUVIUM)			0.50 1.00	ES1 D2 ES2	
			9.78	(1.40)	Medium dense dark grey slightly silty clayey SAND. (ALLUVIUM)	Dry		1.50 1.50 1.50 - 1.95	S ES3 D3	N=15 (2,3/3,4,4,4)
			8.38	(1.40)	Medium dense dark greyish brown slightly clayey slightly silty very sandy GRAVEL. Gravel of subangular to subrounded fine to coarse flint. Occasional coarse gravel and cobble sized pockets of chalky CLAY. (ALLUVIUM)	Dry	2.40	2.50 2.50 - 2.95	S D4	N=15 (2,2/3,4,4,4)
			8.38	(1.40)	Structureless CHALK recovered as off white with light orangish brown staining gravelly slightly sandy SILT. Gravel of weak low to medium density, white chalk with occasional light orangish brown staining. Occasional fine to coarse black flint. (CHALK)	Dry	3.50	3.50 3.50 - 3.95	C B1	N=25 (3,5/5,6,7,7)
						Dry	4.50	4.50 4.50 - 4.95	S D5	N=9 (1,1/2,2,2,3)
								5.50 - 5.95 5.50 - 5.95	B2 UNR	30 (0%)
						Dry	6.00	7.00 7.00 - 7.45	S D6	N=12 (1,2/3,4,3,2)
					8.50 - 8.90 m: Becomes silty GRAVEL	Dry	8.50	8.50 8.50 - 8.95	S D7	N=16 (2,3/3,3,4,6)
						Dry	10.00	10.00	S	N=19 (3,3/4,6,5,4)

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: 8.00 Rose to: 2.60 Casing: 7.50 Sealed: 7.50	Dia (mm): 150 Depth: 19.00 Casing: 19.00	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h1>BH17-C4-03</h1> <p>Sheet 1 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 20.00	Start date: 04-08-17 04-08-17	End date: 04-08-17 07-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 04-08-17 07-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	620032.35
mN:	328829.95
mAOD:	12.58
Grid:	OSGB

Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
					10.00 - 20.00 m: Silt matrix stiffens			10.00 - 10.45	D8	
			(15.80)			Dry	11.40	11.50 11.50 - 11.95	S D9	N=13 (1,1/3,2,3,5)
					13.00 - 20.00 m: Chalk gravel becomes weak to medium strong, medium density	Dry	13.00	13.00 13.00 - 13.45	S D10	N=26 (2,3/5,6,8,7)
					14.00 - 20.00 m: Chalk gravel has occasional black spots	Dry	14.50	14.50 14.50 - 14.95	S D11	N=27 (3,5/6,6,7,8)
						Dry	16.00	16.00 16.00 - 16.45	S D12	N=30 (2,4/5,7,9,9)
					17.50 - 17.90 m: Becomes silty GRAVEL	Dry	17.00	17.50 17.50 - 17.95	S D13	N=34 (4,6/7,8,9,10)
						Dry	19.00	19.00	S	N=32 (3,5/6,8,9,9)
			-7.42	20.00	Borehole ends at 20.00m (Target depth)					

Water	Casing	Depth	Type & No	Results
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Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed:	Dia (mm): Depth: Casing:	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h1>BH17-C4-03</h1> <p>Sheet 2 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 20.00	Start date: 07-08-17	End date: 07-08-17 08-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 07-08-17 08-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	620061.55
mN:	328848.17
mAOD:	12.71
Grid:	OSGB

Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
			12.21	(0.50)	Soft dark brown mottled light grey slightly silty sandy CLAY. Frequent rootlets and plant matter. (TOPSOIL)			0.50	D1	
			11.71	(0.50)	Soft to firm light brownish grey mottled light orangish brown slightly sandy CLAY. Gravel of subangular to subrounded fine to medium flint. Occasionally layered with soft dark brown silty slightly sandy slightly gravelly CLAY. (ALLUVIUM)			0.50	ES1	
			10.91	(0.80)	Firm organic rich dark brown slightly sandy slightly gravelly CLAY. Gravel of subangular to subrounded fine to medium flint. Frequent rootlets and plant matter. (ALLUVIUM)	Dry		1.00	D2	
			10.91	1.80	Firm locally very soft dark grey slightly sandy CLAY. (ALLUVIUM)			1.00	ES2	
				(1.50)		Dry		1.50	S	N=11 (1,2/2,3,3,3)
								1.50 - 1.95	ES3	
								2.00	D3	
									ES4	
			9.41	(1.00)	Firm dark grey slightly sandy slightly gravelly CLAY. Gravel of subangular to subrounded fine to coarse flint. Occasional gravel sized pockets of white chalky CLAY. (ALLUVIUM)	Dry	2.40	2.50	S	N=17 (2,3/3,4,5,5)
								2.50 - 2.95	D4	
			8.41	(4.30)	Structureless CHALK recovered as light cream slightly sandy gravelly SILT. Gravel of weak, low to medium density, light creamy chalk with occasional light orangish brown staining. Occasional flint. (CHALK)	Dry	3.50	3.50	C	N=27 (4,5/6,6,7,8)
								3.50 - 3.95	B1	
						Dry	4.50	4.50	S	N=8 (1,1/2,2,2,2)
								4.50 - 4.95	D5	
						Dry	5.50	5.50	S	N=6 (1,0/1,1,2,2)
								5.50 - 5.95	D6	
				(5.70)		Dry	7.00	7.00	S	N=7 (2,2/1,2,2,2)
								7.00 - 7.45	D7	
						Dry	8.40	8.50	S	N=11 (1,3/4,3,2,2)
								8.50 - 8.95	D8	
			2.71	10.00		Dry	10.00	10.00	S	N=23 (3,3/4,6,8,5)
						Water	Casing	Depth	Type & No	Results

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed: 8.10 4.60 7.80	Dia (mm): Depth: Casing: 150 19.00 19.00	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h1>BH17-C4-04</h1> <p>Sheet 1 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 20.00	Start date: 07-08-17	End date: 07-08-17 08-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 07-08-17 08-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	620061.55
mN:	328848.17
mAOD:	12.71
Grid:	OSGB

Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
					Structureless CHALK recovered as off white with orangish brown staining slightly sandy gravelly SILT. Gravel of weak, low to medium density, white chalk. Occasional flint. (CHALK)			10.00 - 10.45	D9	
						Dry	11.30	11.50 11.50 - 11.95	S D10	N=19 (2,2/3,5,5,6)
						Dry	13.00	13.00 13.00 - 13.45	S D11	N=19 (1,3/3,4,5,7)
					14.00 m: Dark brown colouration surrounding flint gravel					
						Dry	14.30	14.50 14.50 - 14.95	S D12	N=25 (4,4/5,6,7,7)
					16.00 m: Softens					
						Dry	16.00	16.00 16.00 - 16.45	S D13	N=30 (2,4/6,7,8,9)
						Dry	17.40	17.50 17.50 - 17.95	S D14	N=32 (3,5/6,8,9,9)
						Dry	19.00	19.00 19.00 - 19.45	S D15	N=30 (4,4/4,8,8,10)
			7.29	20.00	Borehole ends at 20.00m (Target depth)					

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed:	Dia (mm): Depth: Casing:	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h1>BH17-C4-04</h1> <p>Sheet 2 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 15.00	Start date: 02-08-17	End date: 02-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 02-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75	Location details:	
											mE:	620536.65	
											mN:	329029.86	
											mAOD:	20.32	
											Grid:	OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
			19.92	(0.40)	Dark orangish brown slightly gravelly slightly clayey slightly silty fine to medium SAND. Gravel of subangular to subrounded fine to medium flint. (TOPSOIL)			0.40	D1	
			19.32	(0.60)	Dark orangish brown slightly gravelly slightly silty clayey fine to medium SAND. Gravel of subangular to subrounded fine to medium flint. Frequent rootlets. (BRICKEARTH)			0.50 0.50	ES1	
			19.32	1.00	Medium dense dark orangish brown slightly silty fine to medium SAND. (BRICKEARTH)			1.00 1.00	D2 ES2	
						Dry	1.40	1.50 1.50 1.50 - 1.95	S ES3 D3	N=14 (2,2/3,4,4)
				(3.00)		Dry	2.40	2.50 2.50 - 2.95	S D4	N=18 (3,4/5,4,5,4)
						Dry	3.50	3.50 3.50 - 3.95	S D5	N=23 (3,4/5,6,6,6)
			16.32	4.00	Medium dense becoming dense dark orangish brown very sandy slightly clayey slightly silty subangular to subrounded fine to coarse flint GRAVEL. Gravel sized pockets of brown sandy CLAY. (WROXHAM CRAG FORMATION)	Dry	4.50	4.50 4.50 - 4.95	C B1	N=25 (4,5/5,6,6,8)
				(3.00)		Dry	5.50	5.50 5.50 - 5.95	C B2	N=35 (5,7/8,8,9,10)
			13.32	7.00	Dense dark orangish brown gravelly silty medium to coarse SAND. Gravel of subangular to subrounded fine to medium flint. (WROXHAM CRAG FORMATION)	Dry	7.00	7.00 7.00 - 7.45	S D6	50 (4,6/50 for 240mm)
				(3.00)		Dry	8.50	8.50 8.50 - 8.95	S D7	N=29 (2,3/5,6,7,11)
			10.32	10.00		Dry	10.00	10.00	S	N=43 (4,6/7,9,13,14)

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed: 6.00 4.60 6.00	Dia (mm): Depth: Casing: 150 14.80 14.80	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h2>BH17-C5-01</h2> <p>Sheet 1 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 15.00	Start date: 02-08-17	End date: 02-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 02-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	620536.65
mN:	329029.86
mAOD:	20.32
Grid:	OSGB

Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
				0.60	Dense dark orangish brown slightly silty fine to coarse flint GRAVEL. (WROXHAM CRAG FORMATION)			10.00 - 10.45	D8	
			9.72	10.60	Dense dark grey gravelly silty medium to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. Frequent shell fragments. Occasional cobbles of flint. (WROXHAM CRAG FORMATION)	Dry	11.50	11.50 11.50 - 11.95	C B3	N=37 (5,6/8,9,10,10)
			8.32	12.00	Structureless CHALK recovered as white grey slightly gravelly slightly sandy SILT. Gravel of weak, low to medium density, subangular to subrounded white grey CHALK. Rare medium to coarse black flint. (CHALK)	Dry	11.50	13.00 13.00 - 13.45	S D9	N=20 (2,3/3,4,6,7)
				(3.00)						
						Dry	14.40	14.50 14.50 - 14.95	S D10	N=20 (2,3/3,4,6,7)
			5.32	15.00	Borehole ends at 15.00m (Target depth)					

Inst	Water	Casing	Depth	Type & No	Results
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Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed:	Dia (mm): Depth: Casing:	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h1>BH17-C5-01</h1> <p>Sheet 2 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 15.00	Start date: 03-08-17	End date: 03-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 03-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	620598.48
mN:	329046.06
mAOD:	20.65
Grid:	OSGB

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
			20.25	(0.40)	Dark brown slightly gravelly sandy CLAY. Gravel of subangular to subrounded fine to medium flint. Frequent rootlets. (TOPSOIL)					
				(0.60)	Dark brown clayey fine to medium SAND. (BRICKEARTH)			0.50 0.50	D1 ES1	
			19.65	(0.50)	Dark orangish brown slightly clayey fine to medium SAND. (BRICKEARTH)			1.00 1.00	D2 ES2	
			19.15	(1.00)	Medium dense dark orangish brown fine to coarse SAND. (BRICKEARTH)	Dry		1.50 1.50 1.50 - 1.95 2.00	S ES3 D3 ES4	N=18 (2,4/4,5,4,5)
			18.15	(1.00)	Medium dense dark orangish brown gravelly silty fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (BRICKEARTH)	Dry	2.50	2.50 2.50 - 2.95	S D4	N=22 (3,4/5,5,6,6)
			17.15	(1.00)	Medium dense dark orangish brown fine to coarse SAND. (BRICKEARTH)	Dry	3.50	3.50 3.50 - 3.95	S D5	N=27 (2,4/6,6,7,8)
			16.15	(1.00)	Dense dark orangish brown gravelly slightly clayey fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint and occasional chalk. (WROXHAM CRAG FORMATION)	Dry	4.50	4.50 4.50 - 4.95	C B1	N=30 (4,5/7,7,8,8)
			15.15	(1.50)	Dense dark orangish brown gravelly silty fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (WROXHAM CRAG FORMATION)	Dry	5.50	5.50 5.50 - 5.95	C B2	N=35 (4,6/7,8,10,10)
			13.65	(3.80)	Dense dark orangish brown slightly gravelly silty fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (WROXHAM CRAG FORMATION)	Dry	7.00	7.00 7.00 - 7.45	S D6	N=47 (3,5/7,10,12,18)
						Dry	8.50	8.50 8.50 - 8.95	S D7	N=40 (4,6/7,9,10,14)
						Dry	10.00	10.00	S	N=48 (3,5/9,10,14,15)

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed: 6.00 4.40 6.00	Dia (mm): Depth: Casing: 150 14.80 14.80	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h1>BH17-C5-02</h1> <p>Sheet 1 of 2</p>
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Borehole Log

Borehole formation details:											Location details:		
Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:	mE:	620598.48
IP	0.00	1.20	03-08-17	03-08-17	MJ	Hand tools	n/a	n/a	03-08-17	VS	SPT hammer ID: SI 3 E(r)% 75	mN:	329046.06
CP	0.00	15.00	03-08-17	03-08-17	MJ	Dando 2000	n/a	n/a	03-08-17	VS		mAOD:	20.65
											Grid:	OSGB	

Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
			9.85	10.80	Dense dark orangish brown slightly gravelly silty fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (WROXHAM CRAG FORMATION)			10.00 - 10.45	D8	
				(1.60)	Dense dark brownish grey slightly gravelly fine to coarse SAND. Gravel of fine to medium flint. (WROXHAM CRAG FORMATION)	Dry	11.50	11.50 11.50 - 11.95	C B3	N=41 (4,6/7,10,11,13)
			8.25	12.40	Structureless CHALK recovered as white grey slightly gravelly slightly sandy SILT. Gravel of weak, low to medium density, subangular to subrounded white grey CHALK. Rare medium to coarse black flint. (CHALK)	Dry	13.00	13.00 13.00 - 13.45	S D9	N=20 (3,3/4,5,5,6)
				(2.60)						
			5.65	15.00	Borehole ends at 15.00m (Target depth)					

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed:	Dia (mm): Depth: Casing:	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h2>BH17-C5-02</h2> <p>Sheet 2 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 15.00	Start date: 31-07-17	End date: 31-07-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 31-07-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	620770.38
mN:	329039.70
mAOD:	20.70
Grid:	OSGB

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
			20.30	(0.40)	Soft dark brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse flint. Frequent rootlets. (TOPSOIL)			0.50	D1	
			19.80	(0.50)	Soft dark brown slightly gravelly slightly sandy CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk. (BRICKEARTH)			0.50	ES1	
			18.90	(0.90)	Soft dark orangish brown slightly silty slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse flint. (BRICKEARTH)	Dry		1.00	D2	
			17.70	(1.80)	Firm dark orangish brown CLAY. Occasional lenses of dark orangish brown fine to medium SAND. (BRICKEARTH)			1.00	ES2	
				(1.20)		Dry		1.50	C	N=14 (3,3/4,4,3,3)
				(3.50)				1.50	ES3	
				(4.80)				1.50 - 1.95	B1	
				(4.80)		Dry	2.50	2.00	ES4	
				(4.80)				2.50	S	N=10 (1,2/2,2,3,3)
				(4.80)				2.50 - 2.95	D3	
				(4.80)		Dry	3.50	2.50	S	N=11 (1,1/2,3,3,3)
				(4.80)				3.50	D4	
				(4.80)				3.50 - 3.95	S	N=16 (2,2/3,4,4,5)
				(4.80)		Dry	4.50	4.50	S	N=18 (1,2/3,4,5,6)
				(4.80)				4.50 - 4.95	D5	
				(4.80)				5.50	S	N=19 (1,3/3,4,5,7)
				(4.80)		Dry	7.00	7.00	S	N=14 (2,2/3,3,4,4)
				(4.80)				7.00 - 7.45	D7	
				(4.80)				8.50	S	N=23 (3,4/4,5,7,7)
				(4.80)		Dry	8.50	8.50	S	N=14 (2,2/3,3,4,4)
				(4.80)				8.50 - 8.95	D8	
				(4.80)				10.00	S	N=23 (3,4/4,5,7,7)
				(4.80)		Dry	10.00	10.00	S	N=23 (3,4/4,5,7,7)
				(4.80)		Water	Casing	Depth	Type & No	Results

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed: 6.00 5.10 6.00	Dia (mm): Depth: Casing: 150 14.50 14.50	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h1>BH17-C5-03</h1> <p>Sheet 1 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 15.00	Start date: 31-07-17	End date: 31-07-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 31-07-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	620770.38
mN:	329039.70
mAOD:	20.70
Grid:	OSGB

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
					Firm locally soft and stiff orangish brown very sandy CLAY. Occasionally stained reddish brown. (BRICEARTH)			10.00 - 10.45	D9	
			9.40	11.30 (0.90)	Dense dark orangish brown slightly gravelly silty fine to coarse SAND. Gravel of subangular to subrounded fine to medium flint (WROXHAM CRAG FORMATION)	Dry	11.50	11.50 11.50 - 11.95	C B2	N=33 (4,6/7,7,9,10)
			8.50	12.20	Structureless CHALK recovered as white grey slightly gravelly slightly sandy SILT. Gravel of weak, low to medium density, subangular to subrounded white grey CHALK. Rare medium to coarse black flint. (CHALK)			12.50 - 13.00	B3	
				(2.80)				13.00 - 13.45	D10	
								14.50 - 14.95	D11	
	SP		5.70	15.00	Borehole ends at 15.00m (Target depth)					

Inst	Water	Casing	Depth	Type & No	Results
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Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed:	Dia (mm): Depth: Casing:	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h1>BH17-C5-03</h1> <p>Sheet 2 of 2</p>
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Borehole Log

Borehole formation details:

Type: IP CP	From: 0.00	To: 1.20 15.00	Start date: 01-08-17	End date: 01-08-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 01-08-17	Logger: VS VS	Remarks: SPT hammer ID: SI 3 E(r)% 75
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Location details:

mE:	620807.28
mN:	329057.98
mAOD:	20.98
Grid:	OSGB

Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
				(0.40)	Soft dark orangish brown slightly gravelly slightly silty CLAY. Gravel is subangular to subrounded fine to coarse flint. Frequent rootlets. (TOPSOIL)					
			20.58	0.40	Soft dark orangish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint. (GLACIOFLUVIAL DEPOSITS)			0.50 0.50	D1 ES1	
			19.98	1.00	Medium dense orangish brown silty fine to medium SAND. (GLACIOFLUVIAL DEPOSITS)			1.00 1.00	D2 ES2	
				(1.50)	<i>1.50 - 2.50 m: Becomes fine to coarse</i>	Dry		1.50 1.50 1.50 - 1.95	S ES3 D3	N=15 (2,2/3,3,4,5)
			18.48	2.50	Medium dense dark orangish brown slightly silty fine to coarse SAND. Occasional gravel sized pockets of dark brown mottled grey CLAY. (GLACIOFLUVIAL DEPOSITS)	Dry	2.50	2.50 2.50 - 2.95	S D4	N=21 (2,4/5,6,5,5)
			17.48	3.50	Medium dense dark orangish brown slightly gravelly very silty fine to medium SAND. Occasional gravel sized pockets of dark brown mottled grey CLAY. (GLACIOFLUVIAL DEPOSITS)	Dry	3.50	3.50 3.50 - 3.95	S D5	N=24 (2,3/4,6,7,7)
				(2.00)		Dry	4.50	4.50 4.50 - 4.95	S D6	N=19 (3,4/5,4,5,5)
			15.48	5.50	Medium dense dark orangish brown silty fine to coarse SAND. (GLACIOFLUVIAL DEPOSITS)	Dry	5.50	5.50 5.50 - 5.95	S D7	N=23 (2,33/4,6,6,7)
			14.98	6.00	Medium dense dark orangish brown very gravelly silty clayey fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (GLACIOFLUVIAL DEPOSITS)					
				(1.70)		Dry	7.00	7.00 7.00 - 7.45	C B1	N=28 (4,4/5,7,7,9)
			13.28	7.70	Medium dense orangish brown slightly silty fine to coarse SAND. (GLACIOFLUVIAL DEPOSITS)	Dry	8.50	8.50 8.50 - 8.95	S D8	N=28 (2,4/5,6,8,9)
				(3.80)						
						Dry	10.00	10.00	S	N=29 (3,5/6,7,7,9)

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed: 6.00 4.90 6.00	Dia (mm): Depth: Casing: 150 14.50 14.50	From: To: Remarks:	From: to: Duration: Tool:

Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue: FINAL Scale: 1:50	Project: East Anglia (North) Offshore Wind Farm Project No: 3318 Client: GHD Ltd	Exploratory position reference: <h1>BH17-C5-04</h1> Sheet 1 of 2
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Borehole Log

Borehole formation details:												Location details:	
Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logger:	Remarks:	mE:	620807.28
IP	0.00	1.20	01-08-17	01-08-17	MJ	Hand tools	n/a	n/a	01-08-17	VS	SPT hammer ID: SI 3 E(r)% 75	mN:	329057.98
CP	0.00	15.00	01-08-17	01-08-17	MJ	Dando 2000	n/a	n/a	01-08-17	VS		mAOD:	20.98
												Grid:	OSGB

Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results/Remarks
					Medium dense orangish brown slightly silty fine to coarse SAND. (GLACIOFLUVIAL DEPOSITS)			10.00 - 10.45	D9	
			9.48	11.50 (0.40)	Dense dark greyish brown gravelly silty fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (WROXHAM CRAG FORMATION)	Dry	11.50	11.50 11.50 - 11.95	C B2	N=35 (5,7/8,10,9,8)
			9.08	11.90	Structureless CHALK recovered as white grey slightly gravelly slightly sandy SILT. Gravel of weak, low to medium density, subangular to subrounded white grey CHALK. Rare medium to coarse black flint. (CHALK)			12.00 - 12.50	B3	
				(3.10)		Dry	13.00	13.00 13.00 - 13.45	S D10	N=16 (1,3/4,5,4,3)
						Dry	14.50	14.50 14.50 - 14.95	S D11	N=18 (2,3/3,3,5,7)
			5.98	15.00	Borehole ends at 15.00m (Target depth)					

Groundwater entries:	Diameter & casing:	Depth related remarks:	Chiselling details:
Struck: Rose to: Casing: Sealed:	Dia (mm): Depth: Casing:	From: To: Remarks:	From: to: Duration: Tool:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: FINAL</p> <p>Scale: 1:50</p>	<p>Project: East Anglia (North) Offshore Wind Farm</p> <p>Project No: 3318</p> <p>Client: GHD Ltd</p>	<p>Exploratory position reference:</p> <h2>BH17-C5-04</h2> <p>Sheet 2 of 2</p>
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APPENDIX B

Photographs

BH17-C4-01



0.50 m



2.50 m



4.50 m



6.00 m



8.50 m



16.00 m

BH17-C4-02



0.50 m



2.50 m



3.50 m



6.60 m



11.50 m



19.00 m

BH17-C4-03



0.50 m



2.50 m



3.50 m



4.50 m



8.50 m



19.00 m

BH17-C4-04



0.50 m



1.00 m



2.50 m



4.50 m



14.50 m



19.00 m

C5-01



2.50 m



8.50 m



11.50 m



13.00 m

C5-02



1.50 m



4.50 m



11.50 m



13.00 m

C5-03



0.50 m



1.00 m and flint cobble



2.50 m



5.50 m



14.50 m

C5-04



1.00 m



5.50 m



10.00 m



12.00 m

APPENDIX C

In Situ Testing Results

Variable head permeability test

APPENDIX D

Instrumentation Sampling and Monitoring Records

No: 3318

GROUNDWATER AND GROUND GAS MONITORING



Site: East Anglia OWF

GROUND GAS AND GROUNDWATER MONITORING DATA

Location	Date	Monitored by	Well Details		Groundwater					Gas										Weather			
			Standpipe diameter (mm)	Depth to Base (m bgl)	Water Depth (m bgl)	Water Sample Taken?	Water Temp oC	Odour	Colour	Atmospheric Pressure (mbar)	Atmospheric Pressure Comment	Relative Pressure (Pa)	Flow (l/h)	CH ₄ (% v/v)	GSV CH ₄ (l/hr)	CO ₂ (% v/v)	GSV CO ₂ (l/hr)	O ₂ (% v/v)	CO (ppm)	H ₂ S (ppm)	VOC (ppm)	Conditions	Ambient Temp °C
BH17-C4-01	22/08/17	VS	51	14.05	1.52	Y				1018	NM	0.0	0.0	0.0	0.0000	0.1	0.0000	20.9	0	0	NM	Sunny, dry	20
	31/08/17	VS	51	13.77	1.55	N				1015	NM	0.0	0.0	0.0	0.0000	0.0	0.0000	21.1	0	0	NM	Sunny, dry	19
	14/09/17	VS	51	13.74	1.54	N				1004	NM	0.0	0.0	0.0	0.0000	0.3	0.0000	20.7	0	0	NM	Showers	15
BH17-C4-03	22/08/17	VS	51	13.94	1.22	Y				1019	NM	0.0	0.0	0.0	0.0000	0.1	0.0000	20.7	0	0	NM	Sunny, dry	20
	31/08/17	VS	51	13.57	1.21	N				1016	NM	0.0	0.0	0.0	0.0000	0.1	0.0000	20.6	0	0	NM	Sunny, dry	19
	14/09/17	VS	51	13.60	1.20	N				1004	NM	0.0	0.0	0.0	0.0000	0.1	0.0000	20.7	0	0	NM	Showers	15
BH17-C5-01	11/08/17	KW	51	11.01	5.72	Y				1016	NM	0.0	0.0	0.0	0.0000	2.8	0.0000	17.8	0	0	NM	Sunny, dry	21
	22/08/17	VS	51	10.90	5.73	N				1017	NM	0.0	0.0	0.0	0.0000	2.3	0.0000	18.9	0	0	NM	Sunny, dry	20
	31/08/17	VS	51	10.88	5.77	N				1015	NM	0.0	0.0	0.0	0.0000	1.0	0.0000	19.8	0	0	NM	Sunny, dry	18
	14/09/17	VS	51	10.88	5.78	N				1005	NM	0.0	0.0	0.0	0.0000	1.4	0.0000	20.3	0	0	NM	Showers	15
BH17-C5-03	11/08/17	KW	51	12.38	5.30	Y				1016	NM	0.0	0.0	0.0	0.0000	1.3	0.0000	17.5	0	0	NM	Sunny, dry	21
	22/08/17	VS	51	12.24	5.36	N				1017	NM	0.0	0.0	0.0	0.0000	1.6	0.0000	17.9	0	0	NM	Sunny, dry	20
	31/08/17	VS	51	12.09	5.38	N				1015	NM	0.0	0.0	0.0	0.0000	0.3	0.0000	20.6	0	0	NM	Sunny, dry	18
	14/09/17	VS	51	9.91	5.42	N				1003	NM	0.0	0.0	0.0	0.0000	0.1	0.0000	21	0	0	NM	Showers	15

NOTES:
 NM = Not Measured.
 (x) = Peak value recorded.
 [grey] = Below detection limit.

$$GSV (l/hr) = \text{[gas concentration (\%v/v)]} \times \text{[gas well flow rate (l/hr)]}$$

APPENDIX E

Geotechnical Laboratory Test Results

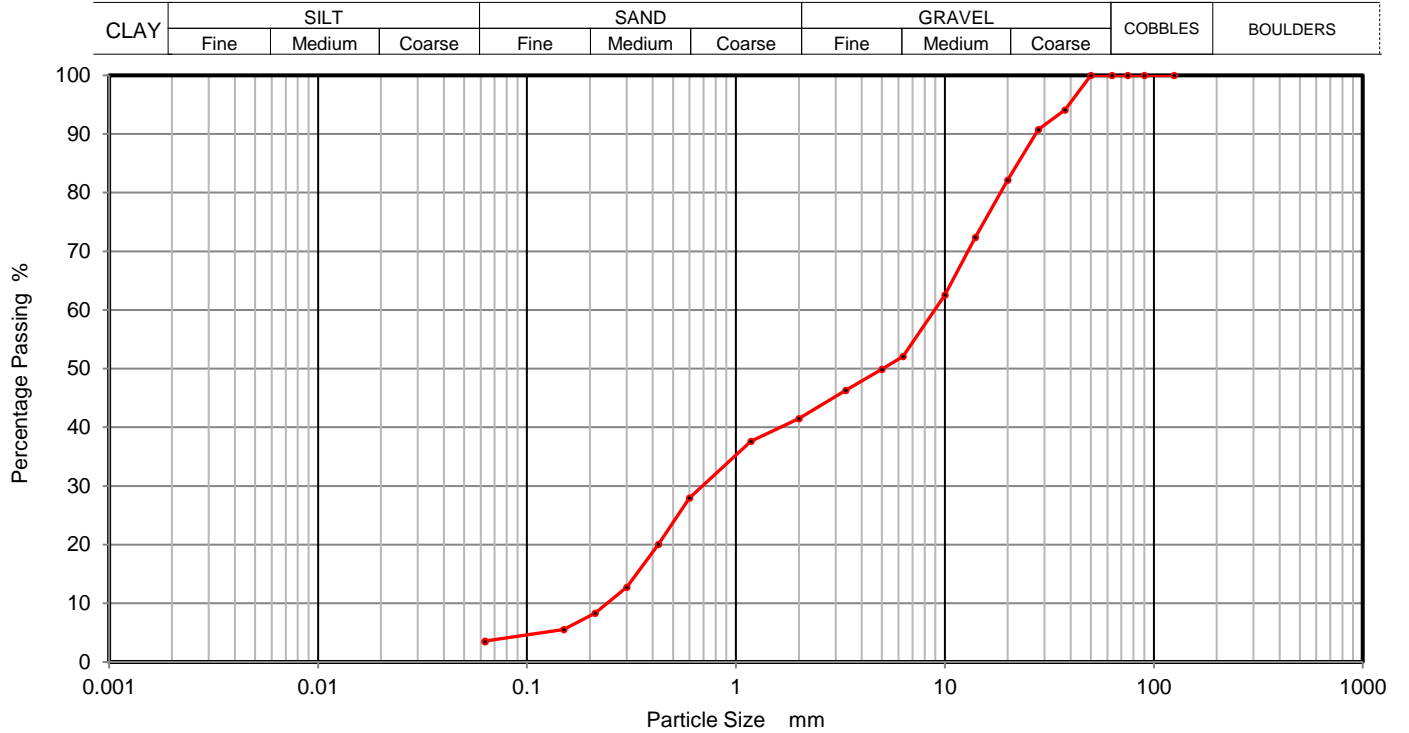
Report References: GSTL 35625
 CLS 684646



**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	36525
Borehole/Pit No.	BH17-C4-01
Sample No.	1
Depth Top	4.50
Depth Base	4.95
Sample Type	B

Site Name	E Anglia Wind Farm - Cable Route
Soil Description	Brown slightly silty fine to coarse sandy fine to coarse GRAVEL



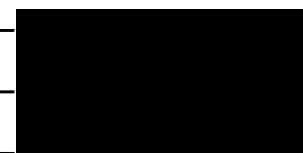
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	94		
28	91		
20	82		
14	72		
10	63		
6.3	52		
5	50		
3.35	46		
2	41		
1.18	38		
0.6	28		
0.425	20		
0.3	13		
0.212	8		
0.15	6		
0.063	4		

Sample Proportions	% dry mass
Cobbles	0
Gravel	59
Sand	37
Silt and Clay	4

Grading Analysis	
Uniformity Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/09/2017	Sean Penn
RO/MH	Approved	21/09/2017	Ben Sharp

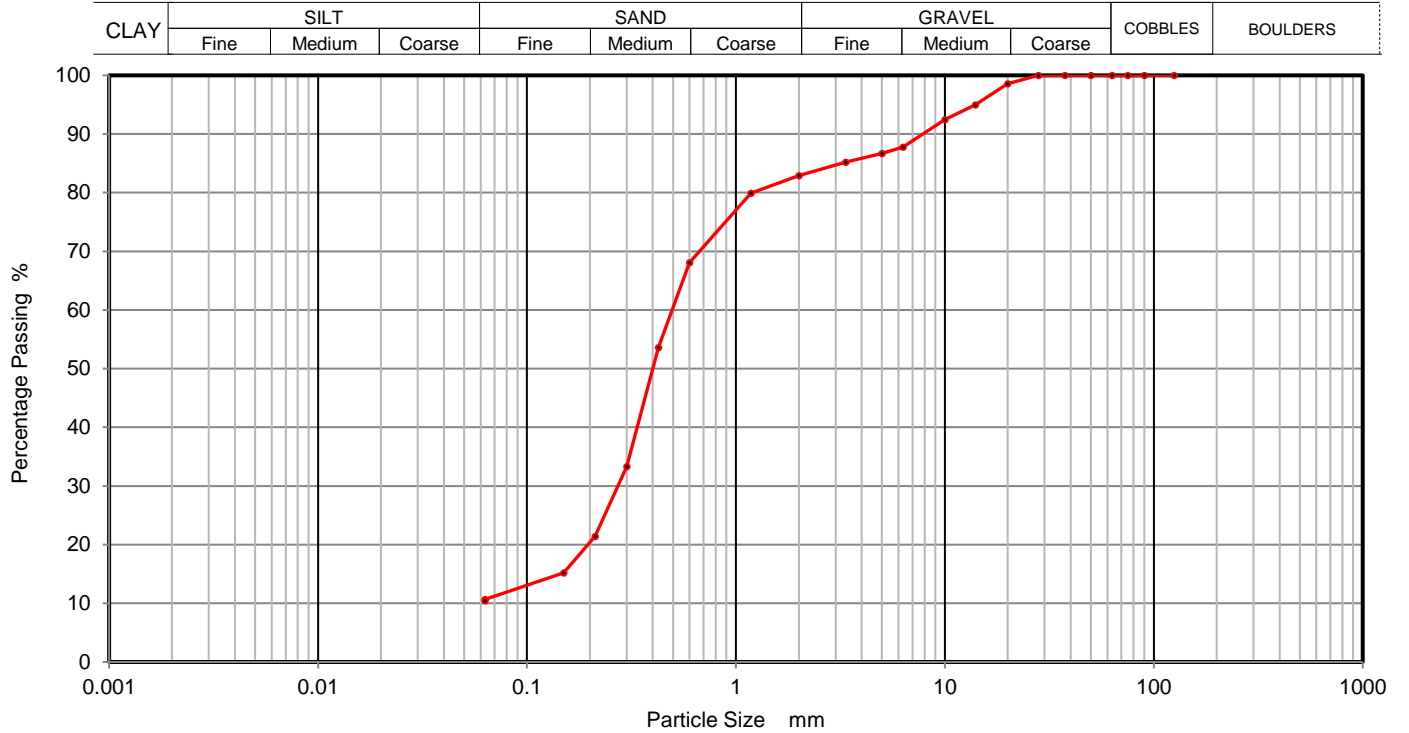




**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	36525
Borehole/Pit No.	BH17-C4-02
Sample No.	2
Depth Top	2.50
Depth Base	2.95
Sample Type	B

Site Name	E Anglia Wind Farm - Cable Route
Soil Description	Brown slightly clayey silty fine to coarse gravelly fine to coarse SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	95		
10	92		
6.3	88		
5	87		
3.35	85		
2	83		
1.18	80		
0.6	68		
0.425	54		
0.3	33		
0.212	21		
0.15	15		
0.063	11		

Sample Proportions	% dry mass
Cobbles	0
Gravel	17
Sand	72
Silt and Clay	11

Grading Analysis	
Uniformity Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/09/2017	Sean Penn
RO/MH	Approved	21/09/2017	Ben Sharp

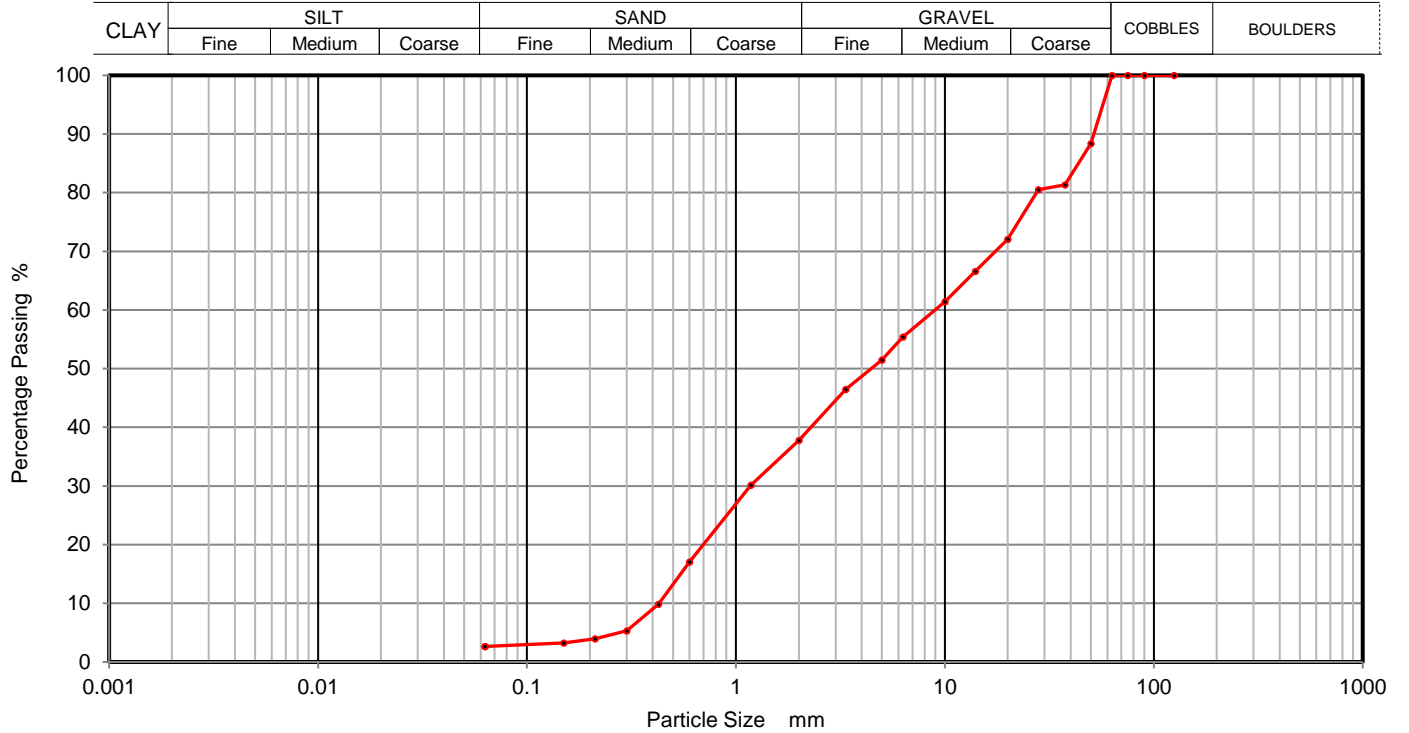




**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	36525
Borehole/Pit No.	BH17-C4-02
Sample No.	5
Depth Top	5.50
Depth Base	5.95
Sample Type	B

Site Name	E Anglia Wind Farm - Cable Route
Soil Description	Brown slightly silty fine to coarse sandy fine to coarse GRAVEL



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	88		
37.5	81		
28	81		
20	72		
14	67		
10	61		
6.3	55		
5	51		
3.35	46		
2	38		
1.18	30		
0.6	17		
0.425	10		
0.3	5		
0.212	4		
0.15	3		
0.063	3		

Sample Proportions	% dry mass
Cobbles	0
Gravel	62
Sand	35
Silt and Clay	3

Grading Analysis	
Uniformity Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/09/2017	Sean Penn
RO/MH	Approved	21/09/2017	Ben Sharp

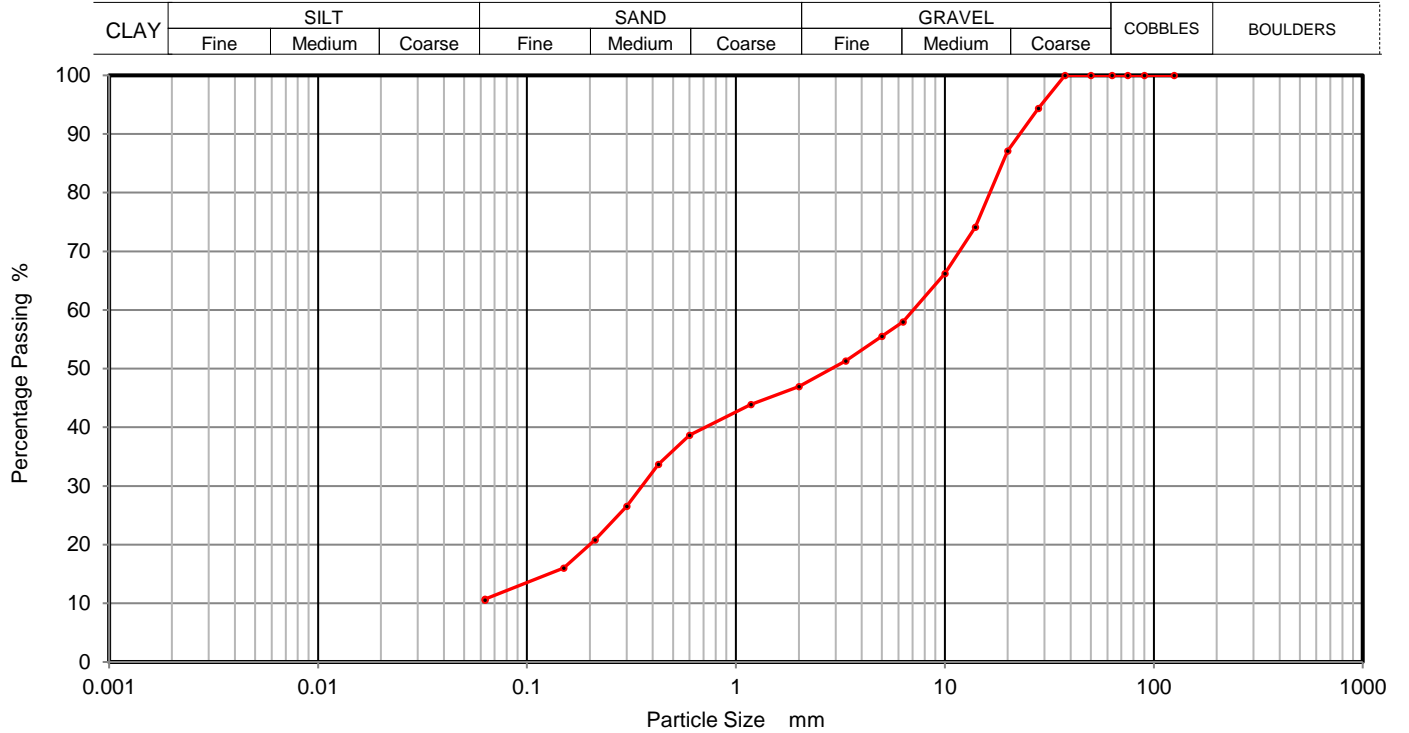




**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	36525
Borehole/Pit No.	BH17-C4-03
Sample No.	1
Depth Top	3.50
Depth Base	3.95
Sample Type	B

Site Name	E Anglia Wind Farm - Cable Route
Soil Description	Brown silty fine to coarse sandy fine to coarse GRAVEL



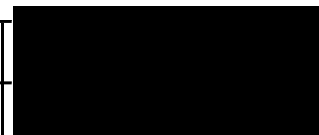
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	94		
20	87		
14	74		
10	66		
6.3	58		
5	56		
3.35	51		
2	47		
1.18	44		
0.6	39		
0.425	34		
0.3	27		
0.212	21		
0.15	16		
0.063	11		

Sample Proportions	% dry mass
Cobbles	0
Gravel	53
Sand	36
Silt and Clay	11

Grading Analysis	
Uniformity Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/09/2017	Sean Penn
RO/MH	Approved	21/09/2017	Ben Sharp

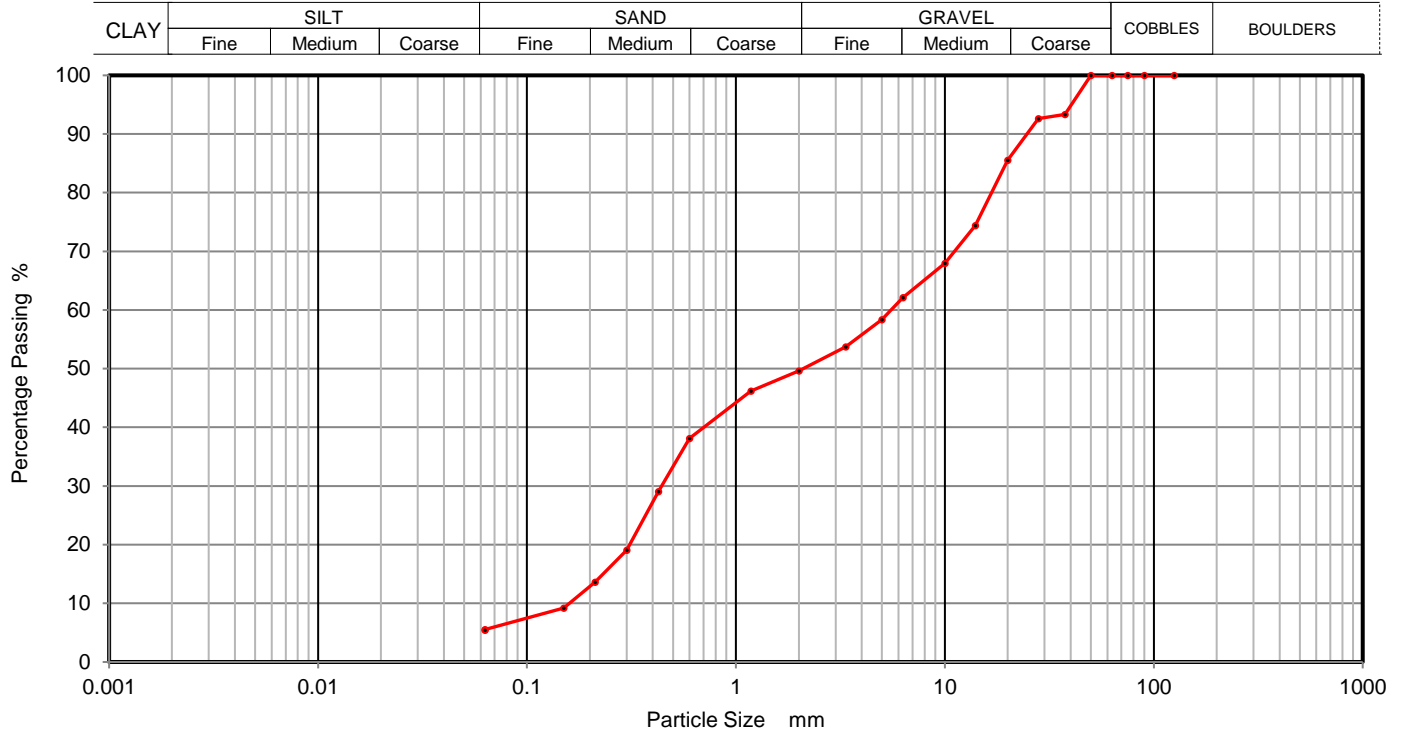




**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	36525
Borehole/Pit No.	BH17-C5-01
Sample No.	1
Depth Top	4.50
Depth Base	4.95
Sample Type	B

Site Name	E Anglia Wind Farm - Cable Route
Soil Description	Brown slightly silty fine to coarse sandy fine to coarse GRAVEL



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	93		
28	93		
20	86		
14	74		
10	68		
6.3	62		
5	58		
3.35	54		
2	50		
1.18	46		
0.6	38		
0.425	29		
0.3	19		
0.212	14		
0.15	9		
0.063	6		

Sample Proportions	% dry mass
Cobbles	0
Gravel	50
Sand	44
Silt and Clay	6

Grading Analysis	
Uniformity Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/09/2017	Sean Penn
RO/MH	Approved	21/09/2017	Ben Sharp

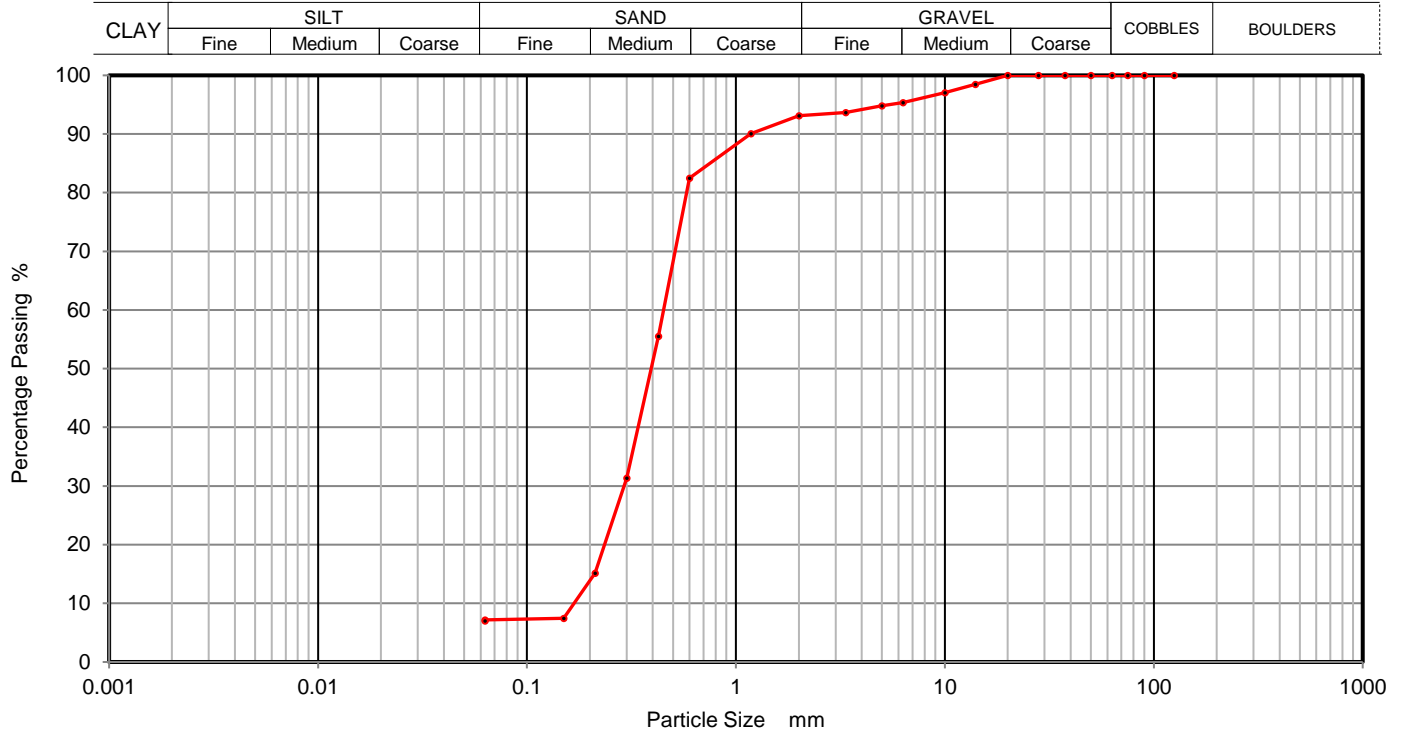




**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	36525
Borehole/Pit No.	BH17-C5-02
Sample No.	4
Depth Top	2.50
Depth Base	2.95
Sample Type	D

Site Name	E Anglia Wind Farm - Cable Route
Soil Description	Brown slightly fine to medium gravelly slightly silty fine to coarse SAND



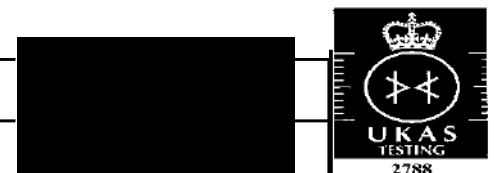
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	98		
10	97		
6.3	95		
5	95		
3.35	94		
2	93		
1.18	90		
0.6	82		
0.425	56		
0.3	31		
0.212	15		
0.15	7		
0.063	7		

Sample Proportions	% dry mass
Cobbles	0
Gravel	7
Sand	86
Silt and Clay	7

Grading Analysis	
Uniformity Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/09/2017	Sean Penn
RO/MH	Approved	21/09/2017	Ben Sharp

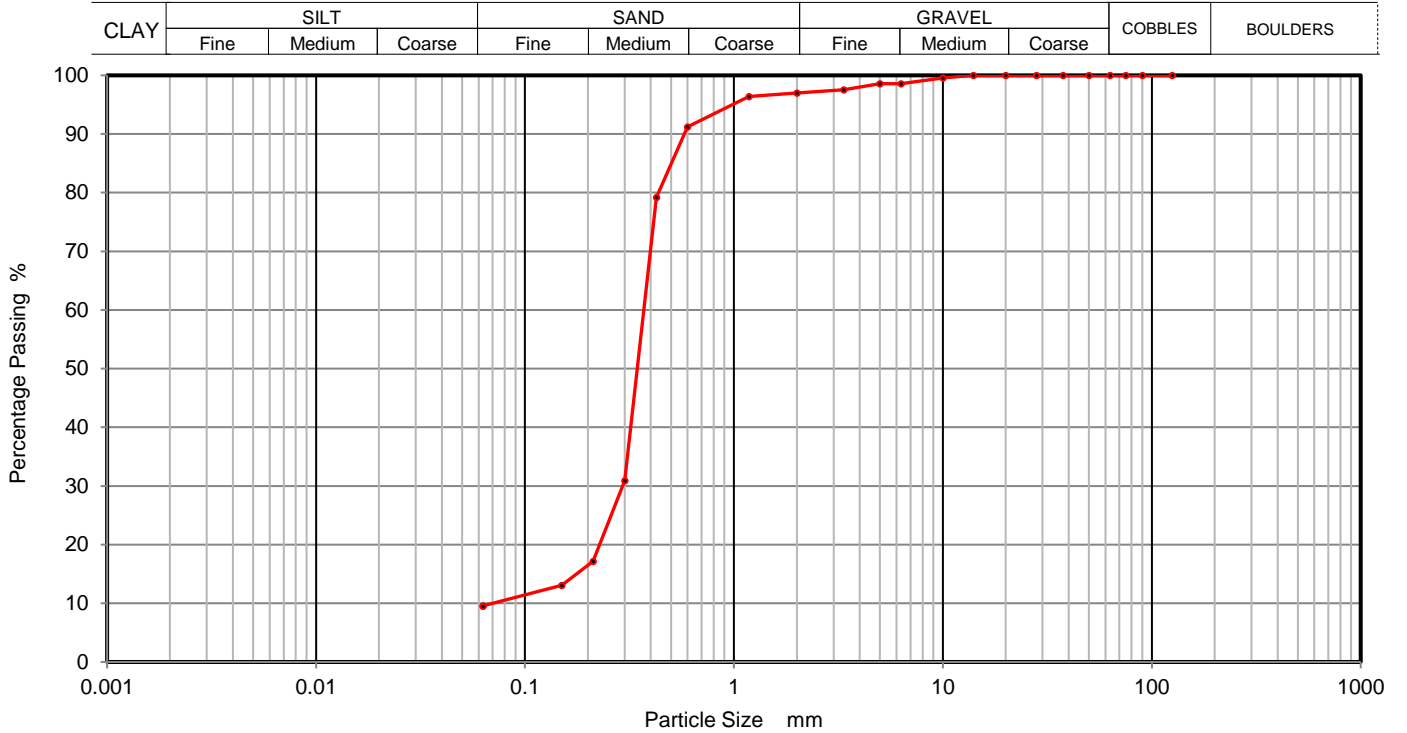




**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	36525
Borehole/Pit No.	BH17-C5-02
Sample No.	7
Depth Top	8.50
Depth Base	8.95
Sample Type	D

Site Name	E Anglia Wind Farm - Cable Route
Soil Description	Brown slightly fine to medium gravelly silty fine to coarse SAND



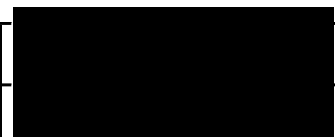
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	98		
2	97		
1.18	96		
0.6	91		
0.425	79		
0.3	31		
0.212	17		
0.15	13		
0.063	10		

Sample Proportions	% dry mass
Cobbles	0
Gravel	3
Sand	87
Silt and Clay	10

Grading Analysis	
Uniformity Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/09/2017	Sean Penn
RO/MH	Approved	21/09/2017	Ben Sharp

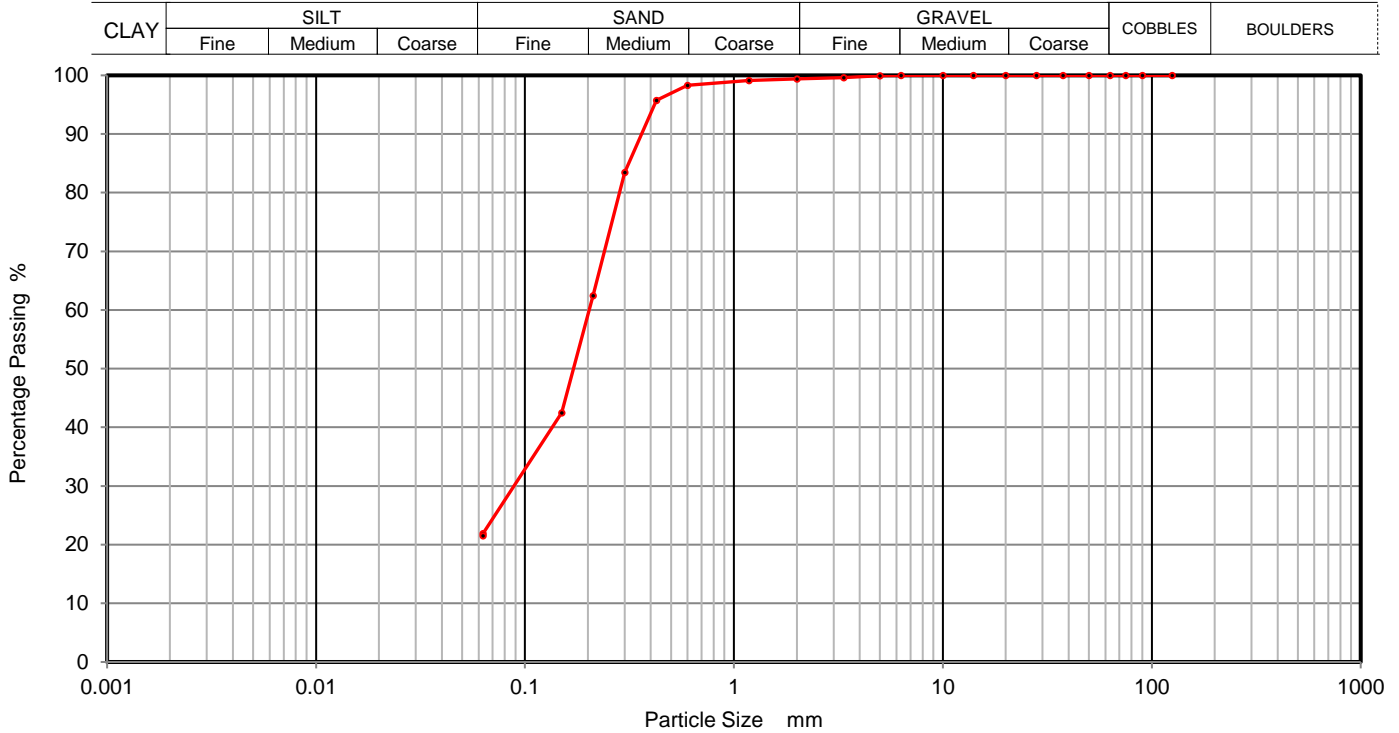




**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	36525
Borehole/Pit No.	BH17-C5-04
Sample No.	5
Depth Top	3.50
Depth Base	3.95
Sample Type	D

Site Name	E Anglia Wind Farm - Cable Route
Soil Description	Brown slightly fine gravelly silty fine to coarse SAND



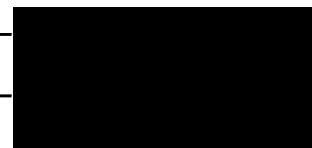
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	98		
0.425	96		
0.3	83		
0.212	62		
0.15	42		
0.063	22		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	77
Silt and Clay	22

Grading Analysis	
Uniformity Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/09/2017	Sean Penn
RO/MH	Approved	21/09/2017	Ben Sharp





CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of
Concept Life Sciences Analytical & Development
Services Limited registered in England and
Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: Supplement 1D to Report Number
684646-1

Date of Report: 23-Oct-2017

Customer: TerraConsult (South) Limited
Suite F17 Dugard House
Peartree Road
Colchester
Essex
CO3 0UL

Customer Contact: Victoria Smith

Customer Job Reference:

Customer Site Reference: Happisburgh/East Anglia

Date Job Received at Concept: 05-Sep-2017

Date Analysis Started: 26-Sep-2017

Date Analysis Completed: 29-Sep-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

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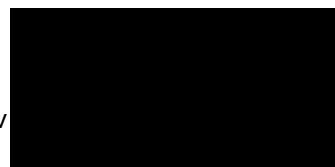
Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Chelsea Entwistle
Senior Customer Service
Advisor

Issued by :
Aislinn Arthey
Customer Service Adv



Concept Reference: 684646						
Project Site: Happisburgh/East Anglia						
Customer Reference:						
Soil Analysed as Soil						
BRE SD1 (SE)						
Concept Reference			684646 006		684646 007	
Customer Sample Reference			17-C4-04 D3 @ 1.50-1.95m		17-C5-04 D3 @ 1.50-1.95m	
Date Sampled			Deviating		Deviating	
Matrix Class			Sandy Soil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
(Water soluble) Ammonia expressed as NH4	T710	AR	0.01	g/l	<0.01	<0.01
(Water soluble) Cl-	T710	A40	0.01	g/l	<0.01	<0.01
Magnesium	T112	A40	1	mg/l	3	<1
(Water soluble) NO3	T710	A40	0.01	g/l	<0.01	<0.01
pH	T7	A40			7.7	8.3
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	0.05	0.02
SO4(Total)	T102	A40	0.02	%	0.02	<0.02
Sulphur (total)	T6	A40	0.01	%	0.02	<0.01
Moisture @105C	T162	AR	0.1	%	21	17
Retained on 2mm	T2	A40	0.1	%	0.5	<0.1

Index to symbols used in Supplement 1D to Report Number 684646-1

Value	Description
A40	Assisted dried < 40C
AR	As Received
M	Analysis is MCERTS accredited
N	Analysis is not UKAS accredited

Notes

Retained on 2mm is removed before analysis
The date of sampling has not been provided and therefore the time from sampling to analysis is unknown. It is possible therefore that the results provided may be compromised
Supplement 1D Report reissued to include only samples 006 and 007

Method Index

Value	Description
T2	Grav
T7	Probe
T112	ICP/OES (SIM)(Water Extract)
T6	ICP/OES
T102	ICP/OES (HCl extract)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T162	Grav (1 Dec) (105 C)
T710	2:1 Extraction / Discrete Analyser

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
(Water soluble) Ammonia expressed as NH4	T710	AR	0.01	g/l	N	006-007
(Water soluble) Cl-	T710	A40	0.01	g/l	N	006-007
Magnesium	T112	A40	1	mg/l	N	006-007
(Water soluble) NO3	T710	A40	0.01	g/l	N	006-007
pH	T7	A40			M	006-007
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	M	006-007
SO4(Total)	T102	A40	0.02	%	M	006-007
Sulphur (total)	T6	A40	0.01	%	M	006-007
Moisture @105C	T162	AR	0.1	%	N	006-007
Retained on 2mm	T2	A40	0.1	%	N	006-007

APPENDIX F

Geoenvironmental Laboratory Test Results

Report References: 674086
 675010
 675177
 677813
 677853



CONCEPT LIFE SCIENCES
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Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: Supplement 1D to Report Number
677813-1

Date of Report: 23-Oct-2017

Customer: TerraConsult Limited
Unit 34
Bold Business Centre
Bold Lane
Sutton
St Helens
WA9 4TX

Customer Contact: Mr Jimmy Thorburn

Customer Job Reference: 3318

Customer Purchase Order: PO-001839

Customer Site Reference: Norfolk Vanguard Cable Route

Date Job Received at Concept: 31-Jul-2017

Date Analysis Started: 29-Aug-2017

Date Analysis Completed: 12-Sep-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

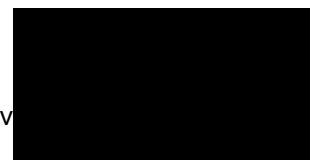
Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Chelsea Entwistle
Senior Customer Service
Advisor

Issued by :
Aislinn Arthey
Customer Service Adv



Concept Reference: 677813										
Project Site: Norfolk Vanguard Cable Route										
Customer Reference: 3318										
Soil Analysed as Soil										
Miscellaneous										
Concept Reference		677813 010			677813 022		677813 030		677813 034	
Customer Sample Reference		BH17-C4-03 ES2 @ 1.00m			BH17-C4-02 ES2 @ 1.00m		BH17-C4-04 ES2 @ 1.00m		BH17-C4-01 ES2 @ 1.00m	
Date Sampled		04-AUG-2017			11-AUG-2017		08-AUG-2017		09-AUG-2017	
Matrix Class		Sandy Soil			Sandy Soil		Sandy Soil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units						
Arsenic	T257	A40	2	mg/kg	7	6	7	6		
Barium	T257	A40	2	mg/kg	34	19	20	27		
Beryllium	T245	A40	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5		
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1	<1		
Cadmium	T257	A40	0.1	mg/kg	<0.1	<0.1	0.1	<0.1		
Chromium	T257	A40	0.5	mg/kg	8.9	14	6.5	14		
Copper	T257	A40	2	mg/kg	4	5	4	5		
Lead	T257	A40	2	mg/kg	9	7	75	13		
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0		
Nickel	T257	A40	0.5	mg/kg	4.8	7.7	4.3	8.0		
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3		
Vanadium	T257	A40	0.1	mg/kg	12	20	12	21		
Zinc	T257	A40	2	mg/kg	9	21	18	23		
Moisture @105C	T162	AR	0.1	%	13	8.9	7.6	12		
Retained on 2mm	T2	A40	0.1	%	3.7	28.1	3.8	<0.1		

Concept Reference: 677813						
Project Site: Norfolk Vanguard Cable Route						
Customer Reference: 3318						
Soil Analysed as Soil						
Asbestos						
Concept Reference		677813 009			677813 021	
Customer Sample Reference		BH17-C4-03 ES1 @ 0.50m			BH17-C4-02 ES1 @ 0.50m	
Date Sampled		04-AUG-2017			11-AUG-2017	
Determinand	Method	Test Sample	LOD	Units		
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected

Concept Reference: 677813						
Project Site: Norfolk Vanguard Cable Route						
Customer Reference: 3318						
Soil Analysed as Soil						
Soil Organic Matter						
Concept Reference		677813 010			677813 022	
Customer Sample Reference		BH17-C4-03 ES2 @ 1.00m			BH17-C4-02 ES2 @ 1.00m	
Date Sampled		04-AUG-2017			11-AUG-2017	
Matrix Class		Sandy Soil			Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Soil Organic Matter	T287	A40	0.1	%	1.7	1.0

Concept Reference: 677813						
Project Site: Norfolk Vanguard Cable Route						
Customer Reference: 3318						
Soil Analysed as Soil						
TPH CWG						
Concept Reference			677813 010		677813 022	
Customer Sample Reference			BH17-C4-03 ES2 @ 1.00m		BH17-C4-02 ES2 @ 1.00m	
Date Sampled			04-AUG-2017		11-AUG-2017	
Matrix Class			Sandy Soil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Benzene	T209	AR	10	µg/kg	<10	<10
Toluene	T209	AR	10	µg/kg	<10	<10
EthylBenzene	T209	AR	10	µg/kg	<10	<10
M/P Xylene	T209	AR	10	µg/kg	<10	<10
O Xylene	T209	AR	10	µg/kg	<10	<10
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	3	3
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	<2	<2
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	<2	<2
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	<2	<2
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	<2	<2
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	<2	<2
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	<2	<2
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	3	<2
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	6	<2
TPH (C35-C40 aliphatic)	T219	AR	2	mg/kg	<2	<2
TPH (C35-C40 aromatic)	T219	AR	2	mg/kg	<2	<2

Concept Reference: 677813						
Project Site: Norfolk Vanguard Cable Route						
Customer Reference: 3318						
Soil Analysed as Soil						
Organochlorine insecticides						
Concept Reference			677813 010		677813 022	
Customer Sample Reference			BH17-C4-03 ES2 @ 1.00m		BH17-C4-02 ES2 @ 1.00m	
Date Sampled			04-AUG-2017		11-AUG-2017	
Matrix Class			Sandy Soil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	<0.01	<0.01
Hexachlorobenzene	T1	AR	0.01	mg/kg	<0.01	<0.01
Heptachlor	T16	AR	0.01	mg/kg	<0.01	<0.01
Aldrin	T16	AR	0.01	mg/kg	<0.01	<0.01
Heptachlor epoxide	T16	AR	0.01	mg/kg	<0.01	<0.01
Chlordane	T16	AR	0.01	mg/kg	<0.01	<0.01
Endosulphan	T16	AR	0.01	mg/kg	<0.01	<0.01
DDE	T16	AR	0.01	mg/kg	<0.01	<0.01
Dieldrin	T16	AR	0.01	mg/kg	<0.01	<0.01
Endrin	T16	AR	0.01	mg/kg	<0.01	<0.01
DDD	T16	AR	0.01	mg/kg	<0.01	<0.01
DDT	T16	AR	0.01	mg/kg	(131) <0.01	(131) <0.01

Concept Reference: 677813						
Project Site: Norfolk Vanguard Cable Route						
Customer Reference: 3318						
Soil Analysed as Soil						
Phenoxy Acetic acid herbicides						
Concept Reference			677813 010		677813 022	
Customer Sample Reference			BH17-C4-03 ES2 @ 1.00m		BH17-C4-02 ES2 @ 1.00m	
Date Sampled			04-AUG-2017		11-AUG-2017	
Matrix Class			Sandy Soil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Mecoprop	T16	AR	0.01	mg/kg	(36) <0.02	(36) <0.02
Phenoxy Acetic acid herbicide: MCPA	T16	AR	0.01	mg/kg	(36) <0.02	(36) <0.02
Dichlorprop	T16	AR	0.01	mg/kg	(36) <0.02	(36) <0.02
Phenoxy Acetic acid herbicide: 2,4-D	T16	AR	0.01	mg/kg	(36) <0.02	(36) <0.02
Fenoprop	T16	AR	0.01	mg/kg	(36) <0.02	(36) <0.02
Phenoxy Acetic acid herbicide: 2,4,5-T	T16	AR	0.01	mg/kg	(36) <0.02	(36) <0.02

Concept Reference: 677813						
Project Site: Norfolk Vanguard Cable Route						
Customer Reference: 3318						
Soil Analysed as Soil						
Phenols (Speciated)						
Concept Reference			677813 010		677813 022	
Customer Sample Reference			BH17-C4-03 ES2 @ 1.00m		BH17-C4-02 ES2 @ 1.00m	
Date Sampled			04-AUG-2017		11-AUG-2017	
Matrix Class			Sandy Soil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Resorcinol	T17	AR	0.05	mg/kg	<0.05	<0.05
Catechol	T17	AR	0.05	mg/kg	<0.05	<0.05
Phenol	T17	AR	0.1	mg/kg	<0.1	<0.1
Cresols	T17	AR	0.05	mg/kg	<0.05	<0.05
Xylenols	T17	AR	0.05	mg/kg	<0.05	<0.05
Naphthols	T17	AR	0.05	mg/kg	<0.05	<0.05
Trimethyl phenol	T17	AR	0.05	mg/kg	<0.05	<0.05
Total Phenols	T17	AR	0.1	mg/kg	<0.1	<0.1

Index to symbols used in Supplement 1D to Report Number 677813-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
131	Result is outside of the scope of accreditation due to a QC Failure
36	LOD Raised due to low Matrix spike recovery
64	Analysis was performed by an alternative technique
162	LOD determined by matrix spike recovery
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Urons and Triazines analysis transferred to Concept Life Sciences Cambridge
PAAH, OCP and OPP analysis transferred to Concept Life Sciences Manchester
BTEX: Samples submitted for GC/MS (Headspace) analysis were submitted in inappropriate containers. It is possible therefore that the results provided may be compromised.
Retained on 2mm is removed before analysis
Asbestos subcontracted to REC Limited
Phenols, OCP, OPP, BTEX/MTBE, and TPH: These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except OCP, OPP and PAAH
Supplement 1D report reissued to include only samples 009, 010, 021, 022, 030 and 034

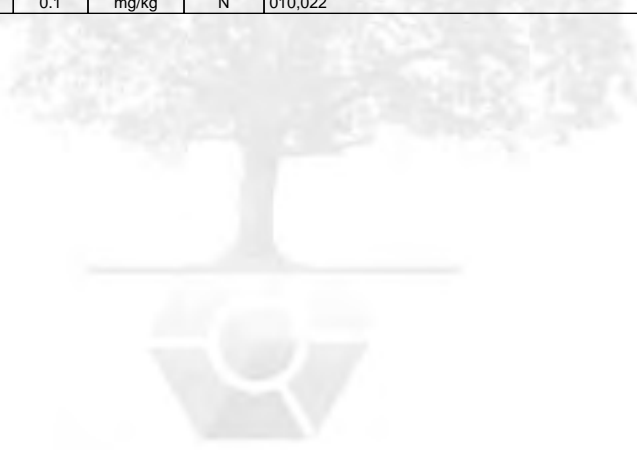
Method Index

Value	Description
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T82	ICP/OES (Sim)
T16	GC/MS
T209	GC/MS (Head Space)(MCERTS)
T287	Calc TOC/0.58
T27	PLM
T162	Grav (1 Dec) (105 C)
T245	ICP/OES (Aqua Regia Extraction)
T310	LC/MS/MS
T1	GC/MS (HR)
T2	Grav
T17	HPLC
T219	GC/FID (SE)
T54	GC/MS (Headspace)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2	mg/kg	M	010,022,030,034
Barium	T257	A40	2	mg/kg	U	010,022,030,034
Beryllium	T245	A40	0.5	mg/kg	U	010,022,030,034
Boron (water-soluble)	T82	A40	1	mg/kg	N	010,022,030,034
Cadmium	T257	A40	0.1	mg/kg	M	010,022,030,034
Chromium	T257	A40	0.5	mg/kg	M	010,022,030,034
Copper	T257	A40	2	mg/kg	M	010,022,030,034
Lead	T257	A40	2	mg/kg	M	010,022,030,034
Mercury	T245	A40	1.0	mg/kg	U	010,022,030,034
Nickel	T257	A40	0.5	mg/kg	M	010,022,030,034
Selenium	T257	A40	3	mg/kg	U	010,022,030,034
Vanadium	T257	A40	0.1	mg/kg	U	010,022,030,034
Zinc	T257	A40	2	mg/kg	M	010,022,030,034
Moisture @ 105C	T162	AR	0.1	%	N	010,022,030,034
Retained on 2mm	T2	A40	0.1	%	N	010,022,030,034
Asbestos ID	T27	A40			SU	009,021
Soil Organic Matter	T287	A40	0.1	%	N	010,022
Benzene	T209	AR	10	µg/kg	M	010,022
Toluene	T209	AR	10	µg/kg	M	010,022
EthylBenzene	T209	AR	10	µg/kg	M	010,022
M/P Xylene	T209	AR	10	µg/kg	M	010,022
O Xylene	T209	AR	10	µg/kg	M	010,022
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	010,022
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	010,022
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	010,022
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	010,022
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	010,022
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	010,022
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	010,022
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	010,022
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	010,022
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	010,022
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	010,022
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	010,022
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	010,022
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	N	010,022
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	N	010,022
TPH (C35-C40 aliphatic)	T219	AR	2	mg/kg	N	010,022
TPH (C35-C40 aromatic)	T219	AR	2	mg/kg	N	010,022
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	U	010,022
Hexachlorobenzene	T1	AR	0.01	mg/kg	U	010,022
Heptachlor	T16	AR	0.01	mg/kg	U	010,022
Aldrin	T16	AR	0.01	mg/kg	U	010,022
Heptachlor epoxide	T16	AR	0.01	mg/kg	U	010,022
Chlordane	T16	AR	0.01	mg/kg	U	010,022
Endosulphan	T16	AR	0.01	mg/kg	U	010,022
DDE	T16	AR	0.01	mg/kg	U	010,022
Dieldrin	T16	AR	0.01	mg/kg	U	010,022

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Endrin	T16	AR	0.01	mg/kg	U	010,022
DDD	T16	AR	0.01	mg/kg	U	010,022
DDT	T16	AR	0.01	mg/kg	U	010,022
Dichlorvos	T16	AR	0.01	mg/kg	U	010,022
Mevinphos	T16	AR	0.01	mg/kg	U	010,022
Dimethoate	T16	AR	0.01	mg/kg	U	010,022
Diazinon	T16	AR	0.01	mg/kg	U	010,022
Pirimiphos methyl	T16	AR	0.01	mg/kg	U	010,022
Malathion	T16	AR	0.01	mg/kg	U	010,022
Fenitrothion	T16	AR	0.01	mg/kg	U	010,022
Parathion	T16	AR	0.01	mg/kg	U	010,022
Azinphos methyl	T16	AR	0.01	mg/kg	U	010,022
Simazine	T16	AR	0.01	mg/kg	N	010,022
Atrazine	T16	AR	0.01	mg/kg	N	010,022
Propazine	T16	AR	0.01	mg/kg	N	010,022
Trietazine	T16	AR	0.01	mg/kg	N	010,022
Prometryn	T16	AR	0.01	mg/kg	N	010,022
Terbutryn	T16	AR	0.01	mg/kg	N	010,022
Chlorotoluron	T310	AR	0.01	mg/kg	N	010,022
Diuron	T310	AR	0.01	mg/kg	N	010,022
Isoproturon	T310	AR	0.01	mg/kg	N	010,022
Linuron	T310	AR	0.01	mg/kg	N	010,022
Monuron	T310	AR	0.01	mg/kg	N	010,022
Mecoprop	T16	AR	0.01	mg/kg	N	010,022
Phenoxy Acetic acid herbicide: MCPA	T16	AR	0.01	mg/kg	N	010,022
Dichlorprop	T16	AR	0.01	mg/kg	N	010,022
Phenoxy Acetic acid herbicide: 2,4-D	T16	AR	0.01	mg/kg	N	010,022
Fenoprop	T16	AR	0.01	mg/kg	N	010,022
Phenoxy Acetic acid herbicide: 2,4,5-T	T16	AR	0.01	mg/kg	N	010,022
Resorcinol	T17	AR	0.05	mg/kg	M	010,022
Catechol	T17	AR	0.05	mg/kg	N	010,022
Phenol	T17	AR	0.1	mg/kg	M	010,022
Cresols	T17	AR	0.05	mg/kg	M	010,022
Xylenols	T17	AR	0.05	mg/kg	M	010,022
Naphthols	T17	AR	0.05	mg/kg	N	010,022
Trimethyl phenol	T17	AR	0.05	mg/kg	M	010,022
Total Phenols	T17	AR	0.1	mg/kg	N	010,022





CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of
Concept Life Sciences Analytical & Development
Services Limited registered in England and
Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: Supplement 1C to Report Number
674086-1

Date of Report: 17-Oct-2017

Customer: TerraConsult Limited
Unit 34
Bold Business Centre
Bold Lane
Sutton
St Helens
WA9 4TX

Customer Contact: Mr Derek Daniels

Customer Job Reference: 3318

Customer Purchase Order: PO-001839

Customer Site Reference: Norfolk Vanguard Cable Route

Date Job Received at Concept: 08-Aug-2017

Date Analysis Started: 09-Aug-2017

Date Analysis Completed: 22-Aug-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

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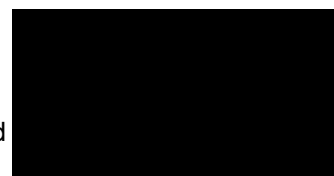
Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Claire Brown Crociquia
Customer Service Manager

Issued by :
Aislinn Arthey
Customer Service Ad



Concept Reference: 674086					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
Phenols (Speciated)					
Concept Reference					674086 010
Customer Sample Reference					BH17-C5-02 ES2 @ 1.00m
Date Sampled					03-AUG-2017
Matrix Class					Sandy Soil
Determinand	Method	Test Sample	LOD	Units	
Resorcinol	T17	AR	0.05	mg/kg	<0.05
Catechol	T17	AR	0.05	mg/kg	<0.05
Phenol	T17	AR	0.1	mg/kg	<0.1
Cresols	T17	AR	0.05	mg/kg	<0.05
Xylenols	T17	AR	0.05	mg/kg	<0.05
Naphthols	T17	AR	0.05	mg/kg	<0.05
Trimethyl phenol	T17	AR	0.05	mg/kg	<0.05
Total Phenols	T17	AR	0.1	mg/kg	<0.1

Concept Reference: 674086					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
Organochlorine insecticides					
Concept Reference					674086 010
Customer Sample Reference					BH17-C5-02 ES2 @ 1.00m
Date Sampled					03-AUG-2017
Matrix Class					Sandy Soil
Determinand	Method	Test Sample	LOD	Units	
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	<0.01
Hexachlorobenzene	T1	AR	0.01	mg/kg	<0.01
Heptachlor	T16	AR	0.01	mg/kg	⁽¹³¹⁾ <0.01
Aldrin	T16	AR	0.01	mg/kg	<0.01
Heptachlor epoxide	T16	AR	0.01	mg/kg	<0.01
Chlordane	T16	AR	0.01	mg/kg	<0.01
Endosulphan	T16	AR	0.01	mg/kg	<0.01
DDE	T16	AR	0.01	mg/kg	<0.01
Dieldrin	T16	AR	0.01	mg/kg	<0.01
Endrin	T16	AR	0.01	mg/kg	<0.01
DDD	T16	AR	0.01	mg/kg	<0.01
DDT	T16	AR	0.01	mg/kg	⁽¹³¹⁾ <0.01

Concept Reference: 674086					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
Organophosphorous insecticides					
Concept Reference					674086 010
Customer Sample Reference					BH17-C5-02 ES2 @ 1.00m
Date Sampled					03-AUG-2017
Matrix Class					Sandy Soil
Determinand	Method	Test Sample	LOD	Units	
Dichlorvos	T16	AR	0.01	mg/kg	<0.01
Mevinphos	T16	AR	0.01	mg/kg	<0.01
Dimethoate	T16	AR	0.01	mg/kg	<0.01
Diazinon	T16	AR	0.01	mg/kg	<0.01
Pyrimiphos methyl	T16	AR	0.01	mg/kg	<0.01
Malathion	T16	AR	0.01	mg/kg	<0.01
Fenitrothion	T16	AR	0.01	mg/kg	<0.01
Parathion	T16	AR	0.01	mg/kg	<0.01
Azinphos methyl	T16	AR	0.01	mg/kg	<0.01

Concept Reference: 674086					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
Triazines Suite					
Concept Reference					674086 010
Customer Sample Reference					BH17-C5-02 ES2 @ 1.00m
Date Sampled					03-AUG-2017
Matrix Class					Sandy Soil
Determinand	Method	Test Sample	LOD	Units	
Simazine	T16	AR	0.01	mg/kg	⁽⁶⁴⁾ <0.01
Atrazine	T16	AR	0.01	mg/kg	⁽⁶⁴⁾ <0.01
Propazine	T16	AR	0.01	mg/kg	⁽⁶⁴⁾ <0.01
Trietazine	T16	AR	0.01	mg/kg	⁽⁶⁴⁾ <0.01
Prometryn	T16	AR	0.01	mg/kg	⁽⁶⁴⁾ <0.01
Terbutryn	T16	AR	0.01	mg/kg	⁽⁶⁴⁾ <0.01

Concept Reference: 674086					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
Urons					
Concept Reference					674086 010
Customer Sample Reference					BH17-C5-02 ES2 @ 1.00m
Date Sampled					03-AUG-2017
Matrix Class					Sandy Soil
Determinand	Method	Test Sample	LOD	Units	
Chlorotoluron	T310	AR	0.01	mg/kg	<0.01
Diuron	T310	AR	0.01	mg/kg	<0.01
Isoproturon	T310	AR	0.01	mg/kg	<0.01
Linuron	T310	AR	0.01	mg/kg	<0.01
Monuron	T310	AR	0.01	mg/kg	<0.01

Concept Reference: 674086					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
Phenoxy Acetic acid herbicides					
Concept Reference					674086 010
Customer Sample Reference					BH17-C5-02 ES2 @ 1.00m
Date Sampled					03-AUG-2017
Matrix Class					Sandy Soil
Determinand	Method	Test Sample	LOD	Units	
Mecoprop	T16	AR	0.01	mg/kg	⁽¹⁰⁰⁾ <0.05
Phenoxy Acetic acid herbicide: MCPA	T16	AR	0.01	mg/kg	⁽¹⁰⁰⁾ <0.05
Dichlorprop	T16	AR	0.01	mg/kg	⁽¹⁰⁰⁾ <0.05
Phenoxy Acetic acid herbicide: 2,4-D	T16	AR	0.01	mg/kg	⁽¹⁰⁰⁾ <0.05
Fenoprop	T16	AR	0.01	mg/kg	⁽¹⁰⁰⁾ <0.05
Phenoxy Acetic acid herbicide: 2,4,5-T	T16	AR	0.01	mg/kg	⁽¹⁰⁰⁾ <0.05

Index to symbols used in Supplement 1C to Report Number 674086-1

Value	Description
A40	Assisted dried < 40C
AR	As Received
131	Result is outside of the scope of accreditation due to a QC Failure
64	Analysis was performed by an alternative technique
100	LOD determined by sample aliquot used for analysis
S	Analysis was subcontracted

M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Triazines & Urons analysis transferred to Concept Life Sciences Cambridge
OCF, OPP and PAAH analysis transferred to Concept Life Sciences Manchester
Supplement 1C Report reissued to include only samples 006, 009 and 010
Asbestos subcontracted to REC Limited
Retained on 2mm is removed before analysis
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except TPH c5-c40 aro/ali split, OCF, OPP and PAAH

Method Index

Value	Description
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T287	Calc TOC/0.58
T17	HPLC
T82	ICP/OES (Sim)
T245	ICP/OES (Aqua Regia Extraction)
T54	GC/MS (Headspace)
T85	Calc
T162	Grav (1 Dec) (105 C)
T1	GC/MS (HR)
T209	GC/MS (Head Space)(MCERTS)
T2	Grav
T27	PLM
T219	GC/FID (SE)
T310	LC/MS/MS
T16	GC/MS

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2	mg/kg	M	006,010
Barium	T257	A40	2	mg/kg	U	006,010
Beryllium	T245	A40	0.5	mg/kg	U	006,010
Boron (water-soluble)	T82	A40	1	mg/kg	N	006,010
Cadmium	T257	A40	0.1	mg/kg	M	006,010
Chromium	T257	A40	0.5	mg/kg	M	006,010
Copper	T257	A40	2	mg/kg	M	006,010
Lead	T257	A40	2	mg/kg	M	006,010
Mercury	T245	A40	1.0	mg/kg	U	006,010
Nickel	T257	A40	0.5	mg/kg	M	006,010
Selenium	T257	A40	3	mg/kg	U	006,010
Vanadium	T257	A40	0.1	mg/kg	U	006,010
Zinc	T257	A40	2	mg/kg	M	006,010
Soil Organic Matter	T287	A40	0.1	%	N	010
Moisture @ 105C	T162	AR	0.1	%	N	006,010
Retained on 2mm	T2	A40	0.1	%	N	006,010
Asbestos ID	T27	A40			SU	009
Naphthalene	T16	AR	0.1	mg/kg	U	010
Acenaphthylene	T16	AR	0.1	mg/kg	U	010
Acenaphthene	T16	AR	0.1	mg/kg	M	010
Fluorene	T16	AR	0.1	mg/kg	M	010
Phenanthrene	T16	AR	0.1	mg/kg	U	010
Anthracene	T16	AR	0.1	mg/kg	M	010
Fluoranthene	T16	AR	0.1	mg/kg	N	010
Pyrene	T16	AR	0.1	mg/kg	N	010
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	M	010
Chrysene	T16	AR	0.1	mg/kg	M	010
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	010
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	010
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	M	010
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	M	010
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	M	010
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	M	010

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
PAH(total)	T16	AR	0.1	mg/kg	U	010
Benzene	T209	AR	10	µg/kg	M	010
Toluene	T209	AR	10	µg/kg	M	010
EthylBenzene	T209	AR	10	µg/kg	M	010
M/P Xylene	T209	AR	10	µg/kg	M	010
O Xylene	T209	AR	10	µg/kg	M	010
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	010
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	010
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	010
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	010
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	010
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	010
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	010
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	010
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	010
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	N	010
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	N	010
TPH (C35-C40 aliphatic)	T219	AR	2	mg/kg	N	010
TPH (C35-C40 aromatic)	T219	AR	2	mg/kg	N	010
TPH (Aliphatic+Aromatic) C10-C25 (Sum)	T85	AR	4	mg/kg	N	010
TPH (Aliphatic+Aromatic) C25-C40 (Sum)	T85	AR	4	mg/kg	N	010
Resorcinol	T17	AR	0.05	mg/kg	M	010
Catechol	T17	AR	0.05	mg/kg	N	010
Phenol	T17	AR	0.1	mg/kg	M	010
Cresols	T17	AR	0.05	mg/kg	M	010
Xylenols	T17	AR	0.05	mg/kg	M	010
Naphthols	T17	AR	0.05	mg/kg	N	010
Trimethyl phenol	T17	AR	0.05	mg/kg	M	010
Total Phenols	T17	AR	0.1	mg/kg	N	010
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	U	010
Hexachlorobenzene	T1	AR	0.01	mg/kg	U	010
Heptachlor	T16	AR	0.01	mg/kg	U	010
Aldrin	T16	AR	0.01	mg/kg	U	010
Heptachlor epoxide	T16	AR	0.01	mg/kg	U	010
Chlordane	T16	AR	0.01	mg/kg	U	010
Endosulphan	T16	AR	0.01	mg/kg	U	010
DDE	T16	AR	0.01	mg/kg	U	010
Dieldrin	T16	AR	0.01	mg/kg	U	010
Endrin	T16	AR	0.01	mg/kg	U	010
DDD	T16	AR	0.01	mg/kg	U	010
DDT	T16	AR	0.01	mg/kg	U	010
Dichlorvos	T16	AR	0.01	mg/kg	U	010
Mevinphos	T16	AR	0.01	mg/kg	U	010
Dimethoate	T16	AR	0.01	mg/kg	U	010
Diazinon	T16	AR	0.01	mg/kg	U	010
Pirimiphos methyl	T16	AR	0.01	mg/kg	U	010
Malathion	T16	AR	0.01	mg/kg	U	010
Fenitrothion	T16	AR	0.01	mg/kg	U	010
Parathion	T16	AR	0.01	mg/kg	U	010
Azinphos methyl	T16	AR	0.01	mg/kg	U	010
Simazine	T16	AR	0.01	mg/kg	N	010
Atrazine	T16	AR	0.01	mg/kg	N	010
Propazine	T16	AR	0.01	mg/kg	N	010
Trietazine	T16	AR	0.01	mg/kg	N	010
Prometryn	T16	AR	0.01	mg/kg	N	010
Terbutryn	T16	AR	0.01	mg/kg	N	010
Chlorotoluron	T310	AR	0.01	mg/kg	N	010
Diuron	T310	AR	0.01	mg/kg	N	010
Isoproturon	T310	AR	0.01	mg/kg	N	010
Linuron	T310	AR	0.01	mg/kg	N	010
Monuron	T310	AR	0.01	mg/kg	N	010
Mecoprop	T16	AR	0.01	mg/kg	N	010
Phenoxy Acetic acid herbicide: MCPA	T16	AR	0.01	mg/kg	N	010
Dichlorprop	T16	AR	0.01	mg/kg	N	010
Phenoxy Acetic acid herbicide: 2,4-D	T16	AR	0.01	mg/kg	N	010
Fenoprop	T16	AR	0.01	mg/kg	N	010

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Phenoxy Acetic acid herbicide: 2,4,5-T	T16	AR	0.01	mg/kg	N	010





CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of
Concept Life Sciences Analytical & Development
Services Limited registered in England and
Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: Supplement 1B to Report Number
677813-1

Date of Report: 18-Oct-2017

Customer: TerraConsult Limited
Unit 34
Bold Business Centre
Bold Lane
Sutton
St Helens
WA9 4TX

Customer Contact: Mr Jimmy Thorburn

Customer Job Reference: 3318

Customer Purchase Order: PO-001839

Customer Site Reference: Norfolk Vanguard Cable Route

Date Job Received at Concept: 31-Jul-2017

Date Analysis Started: 29-Aug-2017

Date Analysis Completed: 12-Sep-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

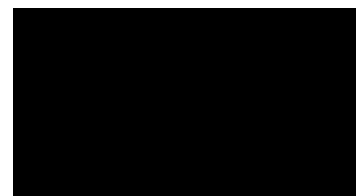
Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Chelsea Entwistle
Senior Customer Service
Advisor

Issued by :
Aislinn Arthey
Customer Service



Waste Acceptance Criteria

Customer Sample Reference : BH17-C4-03 ES2 @ 1.00m
 SAL Sample Reference : 677813 010
 Project Site : Norfolk Vanguard Cable Route
 Customer Reference : 3318
 Test Portion Mass (g) : 175
 Date Sampled : 04-AUG-2017
 Matrix Class : Sandy Soil

Soil Summary					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pH	Probe			M	7.3		>6.0	
Loss on Ignition @450C	Ign @450C/Grav	0.1	%	M	2.7			10.0
Total Organic Carbon	OX/IR	0.1	%	N	1.0	3.0	5.0	6.0
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	M	(13) 15	500.0		
Coronene	GC/MS (MCERTS)	0.1	mg/kg	N	<0.1			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	13			
Retained on 2mm	Grav	0.1	%	N	3.7			

10:1 Leachate					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.06	0.7	5.0
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.0064	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.019	20.0	100.0	300.0
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc / Discrete Analyser	10	mg/kg	N	27	800.0	15000.0	25000.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.021	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	110	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	3.7	10.0	150.0	500.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.5	10.0	30.0
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.4	10.0	40.0
Phenols(Mono)	Calc / Colorimetry (CF)	0.20	mg/kg	N	<0.20	1.0		
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
SO4--	Calc / Discrete Analyser	5.0	mg/kg	N	61	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	260	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as amended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Waste Acceptance Criteria

Customer Sample Reference : BH17-C4-02 ES2 @ 1.00m
 SAL Sample Reference : 677813 022
 Project Site : Norfolk Vanguard Cable Route
 Customer Reference : 3318
 Test Portion Mass (g) : 175
 Date Sampled : 11-AUG-2017
 Matrix Class : Sandy Soil

Soil Summary					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pH	Probe			M	7.9		>6.0	
Loss on Ignition @450C	Ign @450C/Grav	0.1	%	M	2.4			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.6	3.0	5.0	6.0
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	M	(13) <10	500.0		
Coronene	GC/MS (MCERTS)	0.1	mg/kg	N	<0.1			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	8.9			
Retained on 2mm	Grav	0.1	%	N	28.1			

10:1 Leachate					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.06	0.7	5.0
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.014	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.13	20.0	100.0	300.0
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc / Discrete Analyser	10	mg/kg	N	49	800.0	15000.0	25000.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.017	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.041	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	200	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	1.2	10.0	150.0	500.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.011	0.5	10.0	50.0
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.013	0.5	10.0	30.0
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.013	0.4	10.0	40.0
Phenols(Mono)	Calc / Colorimetry (CF)	0.20	mg/kg	N	<0.20	1.0		
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
SO4--	Calc / Discrete Analyser	5.0	mg/kg	N	21	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	990	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.075	4.0	50.0	200.0

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as amended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Concept Life Sciences

Certificate of Analysis

Report Number: Supplement 1 to Report Number 674086-1 A

Date of Report: 17-Oct-2017

Customer: TerraConsult Limited
Unit 34
Bold Business Centre
Bold Lane
Sutton
St Helens
WA9 4TX

Customer Contact: Mr Derek Daniels

Customer Job Reference: 3318

Customer Purchase Order: PO-001839

Customer Site Reference: Norfolk Vanguard Cable Route

Date Job Received at Concept: 08-Aug-2017

Date Analysis Started: 09-Aug-2017

Date Analysis Completed: 22-Aug-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

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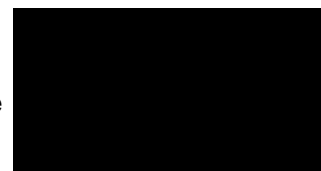
Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Claire Brown Crociquia
Customer Service Manager

Issued by :
Aislinn Arthey
Customer Service



Waste Acceptance Criteria

Customer Sample Reference : BH17-C5-02 ES2 @ 1.00m
 SAL Sample Reference : 674086 010
 Project Site : Norfolk Vanguard Cable Route
 Customer Reference : 3318
 Test Portion Mass (g) : 175
 Date Sampled : 03-AUG-2017
 Matrix Class : Sandy Soil

Soil Summary					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pH	Probe			M	8.1		>6.0	
Loss on Ignition @450C	Ign @450C/Grav	0.1	%	M	1.4			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.1	3.0	5.0	6.0
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
Coronene	GC/MS (MCERTS)	0.1	mg/kg	N	<0.1			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	M	<10	500.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	7.5			
Retained on 2mm	Grav	0.1	%	N	<0.1			

10:1 Leachate					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.06	0.7	5.0
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.0060	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.026	20.0	100.0	300.0
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc / Discrete Analyser	10	mg/kg	N	17	800.0	15000.0	25000.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.0086	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	130	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	3.6	10.0	150.0	500.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.5	10.0	30.0
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.4	10.0	40.0
Phenols(Mono)	Calc / Colorimetry (CF)	0.20	mg/kg	N	<0.20	1.0		
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
SO4--	Calc / Discrete Analyser	5.0	mg/kg	N	24	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	400	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as amended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Concept Reference: 674086					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
Total and Speciated USEPA16 PAH (SE) (MCERTS)					
Concept Reference					674086 010
Customer Sample Reference					BH17-C5-02 ES2 @ 1.00m
Test Sample					AR
Date Sampled					03-AUG-2017
Matrix Class					Sandy Soil
Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS	0.1	mg/kg	U	<0.1
Acenaphthylene	GC/MS	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS	0.1	mg/kg	M	<0.1
Fluorene	GC/MS	0.1	mg/kg	M	<0.1
Phenanthrene	GC/MS	0.1	mg/kg	U	<0.1
Anthracene	GC/MS	0.1	mg/kg	M	<0.1
Fluoranthene	GC/MS	0.1	mg/kg	N	<0.1
Pyrene	GC/MS	0.1	mg/kg	N	<0.1
Benzo(a)Anthracene	GC/MS	0.1	mg/kg	M	<0.1
Chrysene	GC/MS	0.1	mg/kg	M	<0.1
Benzo(b)fluoranthene	GC/MS	0.1	mg/kg	U	<0.1
Benzo(k)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1
Benzo(a)Pyrene	GC/MS	0.1	mg/kg	M	<0.1
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	M	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS	0.1	mg/kg	U	<0.1

Concept Reference: 674086					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
BTEX					
Concept Reference					674086 010
Customer Sample Reference					BH17-C5-02 ES2 @ 1.00m
Test Sample					AR
Date Sampled					03-AUG-2017
Matrix Class					Sandy Soil
Determinand	Method	LOD	Units	Symbol	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10

Concept Life Sciences

Certificate of Analysis

Report Number: Supplement 1 to Report Number 675010-1 A

Date of Report: 25-Oct-2017

Customer: TerraConsult Limited
Unit 34
Bold Business Centre
Bold Lane
Sutton
St Helens
WA9 4TX

Customer Contact: Mr Jimmy Thorburn

Customer Job Reference: 3318

Customer Purchase Order: PO-001839

Customer Site Reference: Norfolk Vanguard Cable Route

Date Job Received at Concept: 03-Aug-2017

Date Analysis Started: 15-Aug-2017

Date Analysis Completed: 06-Sep-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

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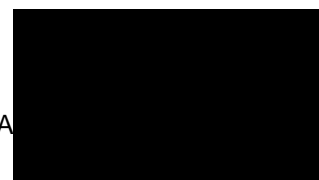
Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Aislinn Arthey
Customer Service Advisor

Issued by :
Aislinn Arthey
Customer Service A



Waste Acceptance Criteria

Customer Sample Reference : BH17-C5-03 ES2 @ 1.00m
 SAL Sample Reference : 675010 002
 Project Site : Norfolk Vanguard Cable Route
 Customer Reference : 3318
 Test Portion Mass (g) : 175
 Date Sampled : 31-JUL-2017
 Matrix Class : Sandy Soil

Soil Summary					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pH	Probe			M	8.1		>6.0	
Loss on Ignition @450C	Ign @450C/Grav	0.1	%	M	1.4			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.2	3.0	5.0	6.0
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	M	<10	500.0		
Coronene	GC/MS (MCERTS)	0.1	mg/kg	N	<0.1			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	7.6			
Retained on 2mm	Grav	0.1	%	N	18.7			

10:1 Leachate					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.06	0.7	5.0
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.0028	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.024	20.0	100.0	300.0
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc / Discrete Analyser	10	mg/kg	N	25	800.0	15000.0	25000.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.011	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	120	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	2.6	10.0	150.0	500.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.0051	0.5	10.0	50.0
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.5	10.0	30.0
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.4	10.0	40.0
Phenols(Mono)	Calc / Colorimetry (CF)	0.20	mg/kg	N	<0.20	1.0		
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
SO4--	Calc / Discrete Analyser	5.0	mg/kg	N	29	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	240	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as amended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Concept Reference: 675010					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
Total and Speciated USEPA16 PAH (SE) (MCERTS)					
Concept Reference					675010 002
Customer Sample Reference					BH17-C5-03 ES2 @ 1.00m
Test Sample					AR
Date Sampled					31-JUL-2017
Matrix Class					Sandy Soil
Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS	0.1	mg/kg	U	<0.1
Acenaphthylene	GC/MS	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS	0.1	mg/kg	M	<0.1
Fluorene	GC/MS	0.1	mg/kg	M	<0.1
Phenanthrene	GC/MS	0.1	mg/kg	U	<0.1
Anthracene	GC/MS	0.1	mg/kg	M	<0.1
Fluoranthene	GC/MS	0.1	mg/kg	N	<0.1
Pyrene	GC/MS	0.1	mg/kg	N	<0.1
Benzo(a)Anthracene	GC/MS	0.1	mg/kg	M	<0.1
Chrysene	GC/MS	0.1	mg/kg	M	<0.1
Benzo(b)fluoranthene	GC/MS	0.1	mg/kg	U	<0.1
Benzo(k)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1
Benzo(a)Pyrene	GC/MS	0.1	mg/kg	M	<0.1
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	M	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS	0.1	mg/kg	U	<0.1

Concept Reference: 675010					
Project Site: Norfolk Vanguard Cable Route					
Customer Reference: 3318					
Soil Analysed as Soil					
BTEX					
Concept Reference					675010 002
Customer Sample Reference					BH17-C5-03 ES2 @ 1.00m
Test Sample					AR
Date Sampled					31-JUL-2017
Matrix Class					Sandy Soil
Determinand	Method	LOD	Units	Symbol	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10



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Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: Supplement 1C to Report Number
677853-1

Date of Report: 18-Oct-2017

Customer: TerraConsult (South) Limited
Suite F17 Dugard House
Peartree Road
Colchester
Essex
CO3 0UL

Customer Contact: Victoria Smith

Customer Job Reference: 3318

Customer Site Reference: East Anglia OWF

Date Job Received at Concept: 24-Aug-2017

Date Analysis Started: 25-Aug-2017

Date Analysis Completed: 04-Sep-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

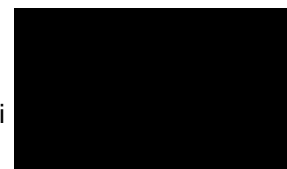
All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



1549

Report checked
and authorised by :
Aislinn Arthey
Customer Service Advisor

Issued by :
Aislinn Arthey
Customer Service Adv



Concept Reference: 677853						
Project Site: East Anglia OWF						
Customer Reference: 3318						
Water Analysed as Water						
Heavy Metals (9)						
Concept Reference					677853 004	677853 005
Customer Sample Reference					C4-01	C4-03
Date Sampled					22-AUG-2017	22-AUG-2017
Determinand	Method	Test Sample	LOD	Units		
As (Dissolved)	T281	F	0.0002	mg/l	0.0006	0.0005
Cd (Dissolved)	T281	F	0.00002	mg/l	<0.00002	0.00004
Cr (Dissolved)	T281	F	0.001	mg/l	<0.001	<0.001
Cu (Dissolved)	T281	F	0.0005	mg/l	0.0006	0.0011
Pb (Dissolved)	T281	F	0.0003	mg/l	<0.0003	<0.0003
Hg (Dissolved)	T281	F	0.00005	mg/l	<0.00005	<0.00005
Ni (Dissolved)	T281	F	0.001	mg/l	0.001	0.003
Se (Dissolved)	T281	F	0.0005	mg/l	<0.0005	0.0009
Zn (Dissolved)	T281	F	0.002	mg/l	0.022	0.038

Concept Reference: 677853						
Project Site: East Anglia OWF						
Customer Reference: 3318						
Water Analysed as Water						
Total and Speciated USEPA16 PAH (SE)						
Concept Reference					677853 004	677853 005
Customer Sample Reference					C4-01	C4-03
Date Sampled					22-AUG-2017	22-AUG-2017
Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T149	AR	0.01	µg/l	<0.01	<0.01
Acenaphthylene	T149	AR	0.01	µg/l	<0.01	<0.01
Acenaphthene	T149	AR	0.01	µg/l	<0.01	<0.01
Fluorene	T149	AR	0.01	µg/l	<0.01	<0.01
Phenanthrene	T149	AR	0.01	µg/l	<0.01	<0.01
Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01
Fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01
Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(a)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01
Chrysene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(a)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	<0.01	<0.01
PAH(total)	T149	AR	0.01	µg/l	<0.01	<0.01

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Pyrene	T149	AR	0.01	µg/l	U	004-005
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	004-005
Chrysene	T149	AR	0.01	µg/l	U	004-005
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	N	004-005
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	U	004-005
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	004-005
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	004-005
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	004-005
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	004-005
PAH(total)	T149	AR	0.01	µg/l	N	004-005
Benzene	T54	AR	1	µg/l	U	004-005
Toluene	T54	AR	1	µg/l	U	004-005
EthylBenzene	T54	AR	1	µg/l	U	004-005
M/P Xylene	T54	AR	1	µg/l	U	004-005
O Xylene	T54	AR	1	µg/l	U	004-005
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	004-005
TPH (C5-C6 aliphatic)	T54	AR	0.020	mg/l	N	004-005
TPH (C6-C7 aromatic)	T54	AR	0.020	mg/l	N	004-005
TPH (C6-C8 aliphatic)	T54	AR	0.020	mg/l	N	004-005
TPH (C7-C8 aromatic)	T54	AR	0.020	mg/l	N	004-005
TPH (C8-C10 aliphatic)	T54	AR	0.020	mg/l	N	004-005
TPH (C8-C10 aromatic)	T54	AR	0.020	mg/l	N	004-005
TPH (C10-C12 aliphatic)	T219	AR	0.01	mg/l	N	004-005
TPH (C10-C12 aromatic)	T219	AR	0.01	mg/l	N	004-005
TPH (C12-C16 aliphatic)	T219	AR	0.01	mg/l	N	004-005
TPH (C12-C16 aromatic)	T219	AR	0.01	mg/l	N	004-005
TPH (C16-C21 aliphatic)	T219	AR	0.01	mg/l	N	004-005
TPH (C16-C21 aromatic)	T219	AR	0.01	mg/l	N	004-005
TPH (C21-C35 aliphatic)	T219	AR	0.01	mg/l	N	004-005
TPH (C21-C35 aromatic)	T219	AR	0.01	mg/l	N	004-005
Hexachlorocyclohexane	T16	AR	0.01	µg/l	N	004-005
Hexachlorobenzene	T16	AR	0.01	µg/l	N	004-005
Heptachlor	T16	AR	0.01	µg/l	N	004-005
Aldrin	T16	AR	0.01	µg/l	N	004-005
Heptachlor epoxide	T16	AR	0.01	µg/l	N	004-005
Chlordane	T16	AR	0.01	µg/l	N	004-005
Endosulphan	T16	AR	0.01	µg/l	N	004-005
DDE	T16	AR	0.01	µg/l	N	004-005
Dieldrin	T16	AR	0.01	µg/l	N	004-005
Endrin	T16	AR	0.01	µg/l	N	004-005
DDD	T16	AR	0.01	µg/l	N	004-005
DDT	T16	AR	0.01	µg/l	N	004-005
Dichlorvos	T16	AR	0.01	µg/l	N	004-005
Mevinphos	T16	AR	0.01	µg/l	N	004-005
Dimethoate	T16	AR	0.01	µg/l	N	004-005
Diazinon	T16	AR	0.01	µg/l	N	004-005
Pirimiphos methyl	T16	AR	0.01	µg/l	N	004-005
Malathion	T16	AR	0.01	µg/l	N	004-005
Fenitrothion	T16	AR	0.01	µg/l	N	004-005
Parathion	T16	AR	0.01	µg/l	N	004-005
Azinphos methyl	T16	AR	0.01	µg/l	N	004-005



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Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: Supplement 1B to Report Number
675177-1

Date of Report: 18-Oct-2017

Customer: TerraConsult (South) Limited
Suite F17 Dugard House
Peartree Road
Colchester
Essex
CO3 0UL

Customer Contact: Victoria Smith

Customer Job Reference: 3318

Customer Site Reference: East Anglia OWF

Date Job Received at Concept: 11-Aug-2017

Date Analysis Started: 14-Aug-2017

Date Analysis Completed: 25-Aug-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



1549

Report checked
and authorised by :
Claire Brown Crociquia
Customer Service Manager

Issued by :
Aislinn Arthey
Customer Service Adv

Concept Reference: 675177						
Project Site: East Anglia OWF						
Customer Reference: 3318						
Water Analysed as Water						
Heavy Metals (9)						
Concept Reference			675177 003	675177 004		
Customer Sample Reference			BH17-C5-01	BH17-C5-03		
Date Sampled			11-AUG-2017	11-AUG-2017		
Determinand	Method	Test Sample	LOD	Units		
As (Dissolved)	T281	F	0.0002	mg/l	0.0057	0.0007
Cd (Dissolved)	T281	F	0.00002	mg/l	<0.00002	<0.00002
Cr (Dissolved)	T281	F	0.001	mg/l	<0.001	<0.001
Cu (Dissolved)	T281	F	0.0005	mg/l	<0.0005	<0.0005
Pb (Dissolved)	T281	F	0.0003	mg/l	<0.0003	<0.0003
Hg (Dissolved)	T281	F	0.00005	mg/l	<0.00005	<0.00005
Ni (Dissolved)	T281	F	0.001	mg/l	0.003	0.002
Se (Dissolved)	T281	F	0.0005	mg/l	0.0036	0.0024
Zn (Dissolved)	T281	F	0.002	mg/l	<0.002	<0.002

Concept Reference: 675177						
Project Site: East Anglia OWF						
Customer Reference: 3318						
Water Analysed as Water						
Total and Speciated USEPA16 PAH (SE)						
Concept Reference			675177 003	675177 004		
Customer Sample Reference			BH17-C5-01	BH17-C5-03		
Date Sampled			11-AUG-2017	11-AUG-2017		
Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T149	AR	0.01	µg/l	<0.01	<0.01
Acenaphthylene	T149	AR	0.01	µg/l	<0.01	<0.01
Acenaphthene	T149	AR	0.01	µg/l	<0.01	<0.01
Fluorene	T149	AR	0.01	µg/l	<0.01	<0.01
Phenanthrene	T149	AR	0.01	µg/l	<0.01	<0.01
Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01
Fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01
Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(a)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01
Chrysene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(a)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	<0.01	<0.01
PAH(total)	T149	AR	0.01	µg/l	<0.01	<0.01

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Fluoranthene	T149	AR	0.01	µg/l	U	003-004
Pyrene	T149	AR	0.01	µg/l	U	003-004
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	003-004
Chrysene	T149	AR	0.01	µg/l	U	003-004
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	N	003-004
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	U	003-004
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	003-004
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	003-004
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	003-004
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	003-004
PAH(total)	T149	AR	0.01	µg/l	N	003-004
Benzene	T54	AR	1	µg/l	U	003-004
EthylBenzene	T54	AR	1	µg/l	U	003-004
M/P Xylene	T54	AR	1	µg/l	U	003-004
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	003-004
O Xylene	T54	AR	1	µg/l	U	003-004
Toluene	T54	AR	1	µg/l	U	003-004
TPH (C5-C6 aliphatic)	T54	AR	0.020	mg/l	N	003-004
TPH (C6-C7 aromatic)	T54	AR	0.020	mg/l	N	003-004
TPH (C6-C8 aliphatic)	T54	AR	0.020	mg/l	N	003-004
TPH (C7-C8 aromatic)	T54	AR	0.020	mg/l	N	003-004
TPH (C8-C10 aliphatic)	T54	AR	0.020	mg/l	N	003-004
TPH (C8-C10 aromatic)	T54	AR	0.020	mg/l	N	003-004
TPH (C10-C12 aliphatic)	T219	AR	0.01	mg/l	N	003-004
TPH (C10-C12 aromatic)	T219	AR	0.01	mg/l	N	003-004
TPH (C12-C16 aliphatic)	T219	AR	0.01	mg/l	N	003-004
TPH (C12-C16 aromatic)	T219	AR	0.01	mg/l	N	003-004
TPH (C16-C21 aliphatic)	T219	AR	0.01	mg/l	N	003-004
TPH (C16-C21 aromatic)	T219	AR	0.01	mg/l	N	003-004
TPH (C21-C35 aliphatic)	T219	AR	0.01	mg/l	N	003-004
TPH (C21-C35 aromatic)	T219	AR	0.01	mg/l	N	003-004
Hexachlorocyclohexane	T16	AR	0.01	µg/l	N	003-004
Hexachlorobenzene	T16	AR	0.01	µg/l	N	003-004
Heptachlor	T16	AR	0.01	µg/l	N	003-004
Aldrin	T16	AR	0.01	µg/l	N	003-004
Heptachlor epoxide	T16	AR	0.01	µg/l	N	003-004
Chlordane	T16	AR	0.01	µg/l	N	003-004
Endosulphan	T16	AR	0.01	µg/l	N	003-004
DDE	T16	AR	0.01	µg/l	N	003-004
Dieldrin	T16	AR	0.01	µg/l	N	003-004
Endrin	T16	AR	0.01	µg/l	N	003-004
DDD	T16	AR	0.01	µg/l	N	003-004
DDT	T16	AR	0.01	µg/l	N	003-004
Dichlorvos	T16	AR	0.01	µg/l	N	003-004
Mevinphos	T16	AR	0.01	µg/l	N	003-004
Dimethoate	T16	AR	0.01	µg/l	N	003-004
Diazinon	T16	AR	0.01	µg/l	N	003-004
Pirimiphos methyl	T16	AR	0.01	µg/l	N	003-004
Malathion	T16	AR	0.01	µg/l	N	003-004
Fenitrothion	T16	AR	0.01	µg/l	N	003-004
Parathion	T16	AR	0.01	µg/l	N	003-004
Azinphos methyl	T16	AR	0.01	µg/l	N	003-004

APPENDIX G

Calibration Certificates

SPT hammer(s)

SI 3, SI 4, SI 5

Gas monitor(s)

GFM 435 s/n 11378

SPT Calibration Report



Hammer Energy Measurement Report

Type of Hammer: SPT HAMMER
 Client: SI DRILLING
 Test No: EQU1695
 Test Depth (m): 8.70
 Date of Test: **29 December 2016**
 Valid until: **29 December 2017**
 Hammer ID: **SI 3**

Mass of the hammer: $m = 63.5\text{kg}$
 Falling height: $h = 0.76\text{m}$
 Theoretical energy: $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter: $d_r = 0.052\text{m}$
 Length of the instrumented rod: 0.558m
 Area: $A = 11.61\text{cm}^2$
 Modulus: $E_a = 206843\text{MPa}$

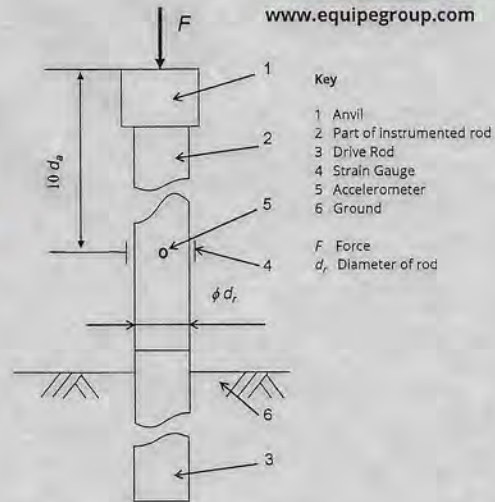
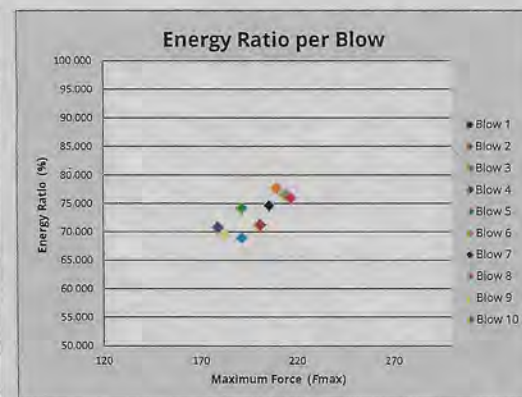
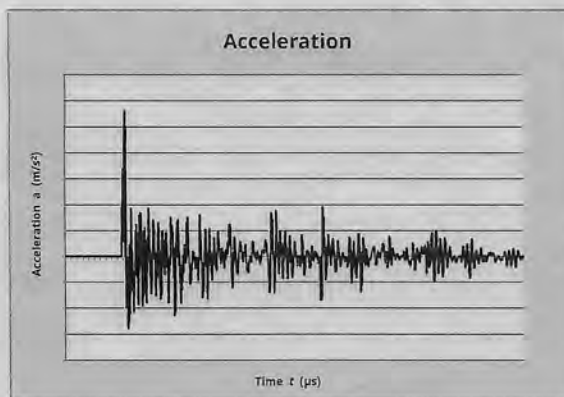
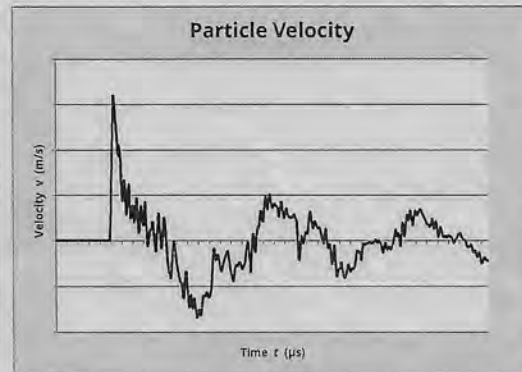


Fig. B.1 and B.2 BS EN ISO 22476-3 : 2005 + A1 : 2011



Observations:
1.

$E_{\text{meas}} = 0.355\text{ kN-m}$
 $E_{\text{theor}} = 0.473\text{ kN-m}$

$$\text{Energy Ratio} = \frac{E_{\text{meas}}}{E_{\text{theor}}} = 75.14\%$$

Equipe SPT Analyzer Operators:

KS

Prepared by:

Checked by:

Date

10/01/2017

SPT Calibration Report



www.equipegroup.com

Hammer Energy Measurement Report

Type of Hammer SPT HAMMER
 Client SI DRILLING
 Test No EQU1694
 Test Depth (m) 8.70
 Date of Test **29 December 2016**
 Valid until **29 December 2017**
 Hammer ID **4 CUT DOWN**

Mass of the hammer $m = 63.5\text{kg}$
 Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter $d_r = 0.052\text{m}$
 Length of the instrumented rod 0.558m
 Area $A = 11.61\text{cm}^2$
 Modulus $E_a = 206843\text{MPa}$

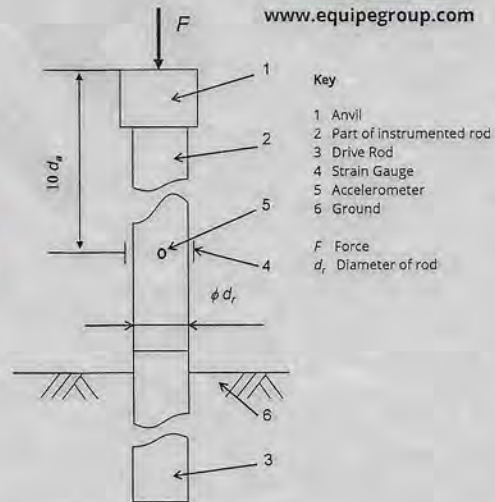
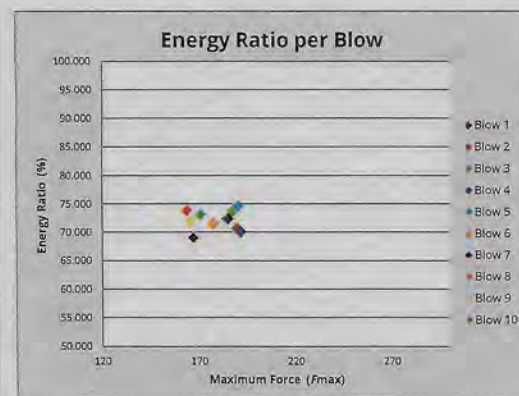
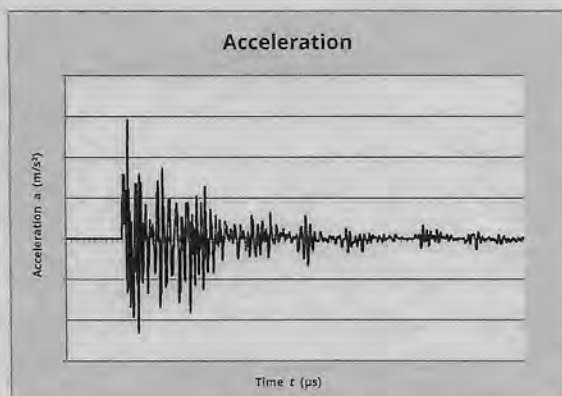
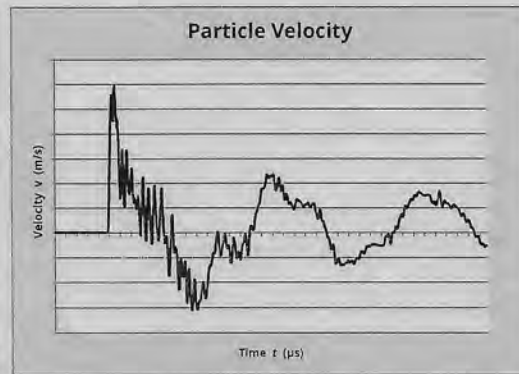


Fig. B.1 and B.2 BS EN ISO 22476-3 : 2005 + A1 : 2011



Observations:

1.

$E_{\text{meas}} = 0.351\text{ kN-m}$

$E_{\text{theor}} = 0.473\text{ kN-m}$

$$\text{Energy Ratio} = \frac{E_{\text{meas}}}{E_{\text{theor}}} = 74.14\%$$

Equipe SPT Analyzer Operators:

KS

Prepared by:

Checked by:

Date

10/01/2017

SPT Calibration Report



Hammer Energy Measurement Report

Type of Hammer: SPT HAMMER
 Client: SI DRILLING
 Test No: EQU1690
 Test Depth (m): 8.70
 Date of Test: **29 December 2016**
 Valid until: **29 December 2017**
 Hammer ID: **SI 05**

Mass of the hammer: $m = 63.5\text{kg}$
 Falling height: $h = 0.76\text{m}$
 $E_{theor} = m \times g \times h = 473\text{J}$

Characteristics of the Instrumented rod

Diameter: $d_r = 0.052\text{m}$
 Length of the instrumented rod: 0.558m
 Area: $A = 11.61\text{cm}^2$
 Modulus: $E_\sigma = 206843\text{MPa}$

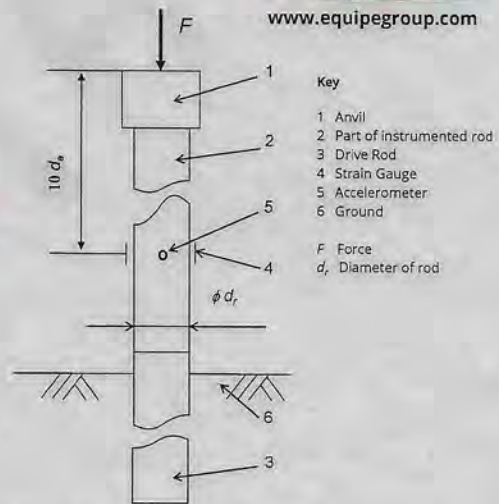
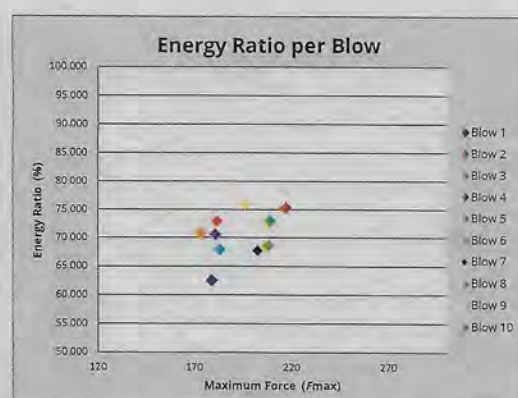
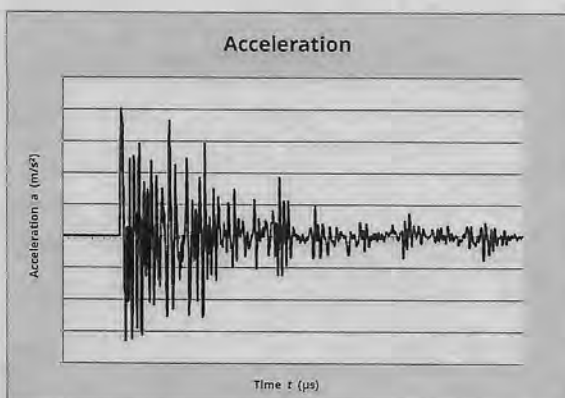
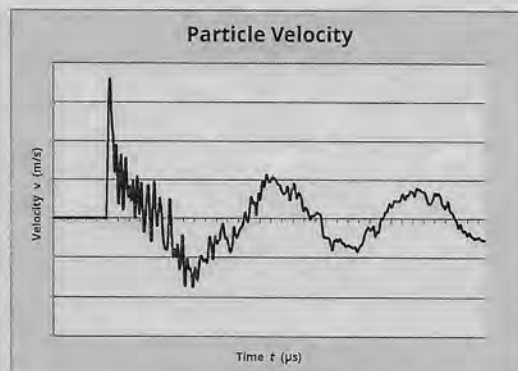


Fig. B.1 and B.2 BS EN ISO 22476-3: 2005 + A1: 2011



Observations:
1.

$E_{meas} = 0.343\text{ kN-m}$
 $E_{theor} = 0.473\text{ kN-m}$

Energy Ratio $\left(\frac{E_{meas}}{E_{theor}} \right) = 72.53\%$

Equipe SPT Analyzer Operators:

KS

Prepared by:

Checked by:

Date

10/01/2017

TEST DATE AND CONDITIONS		
Date	21/06/2017	
Atmospheric Pressure	997	mB
Ambient Temperature	23.0	°C
Envionics Serial No.	5089	

GAS DATA LTD	
Pegasus House	
Seven Stars Estate	
Wheler Rd	
Coventry	
CV3 4LB	
Tel 02476303311 Fax 02476307711	



**GFM435 Final Inspection & Calibration
Check Certificate**

Customer	Terraconsult (South) Ltd		
Certificate Number	119385		
Order Number	317112		

Serial Number	11378	Recalibration DUE Date
Software Version	G435-00.0024/0004	21/06/2018

Instrument Checks				
Keyboard	✓		Display Contrast	✓
Pump Flow In	400	Accept > 200 cc/min	Pump Flow @ -200mB	200
Clock Set / Running	✓		Labels Fitted	✓

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %
	59.7	60	39.7	40	20.8	20.9
	Accept +/- 3.0		Accept +/- 3.0		Accept +/- 0.5	
	5.0	5	4.8	5	6.0	6
	Accept +/- 0.3		Accept +/- 0.3		Accept +/- 0.3	
Zero Reading 100% N ₂	0.0	0.0	0.0	0.0	0.0	0.0
	Accept +/- 0.0		Accept +/- 0.0		Accept +/- 0.1	

Optional Gas Checks						
Applied Gas & Range of GFM		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H ₂ S	5000	1500	0	Accept +/- 0.0	1500	Accept +/- 5.0
CO	2000	1000	0	Accept +/- 0.0	1000	Accept +/- 5.0
				Accept +/- 0.0		Accept +/- 5.0
				Accept +/- 0.0		Accept +/- 5.0
Hexane	2.0%	2.0%	0	Accept +/- 0.0	1.99	Accept +/- 10.0

Cross Gas Effects								
Applied Gas (ppm)		Instrument Readings (ppm)						
Gas Type	Concentration	Toxic 1:	H ₂ S	Toxic 2:	CO	Toxic 3:	Hex	Toxic 4:
H ₂ S	1500	1500		0		0		
CO	1000	60		1000		0		
Hexane	2.0%	0		0		1.99		

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)	Instrument Atmospheric Pressure Reading (mB)		
All Ports Open to Atmosphere	Open Ports	997	Accept +/- 2.0
AP Port (Internal)	+800 mB	801	Accept +/- 5.0
AP Port (Internal)	+1200mB	1199	Accept +/- 5.0

Flow Checks					
Borehole Flow	Instrument Flow Reading (l/h)	Differential Pressure			
		Instrument DP Reading (Pa)		Applied DP Pressure (Pa)	
-30.0	-29.8	Accept +/- 3.0	-272	Accept +/- 50	-276
-3.0	-3.1	Accept +/- 1.0	-15	Accept +/- 6.0	-14
0.0	0.0	Accept +/- 0.0	0.0	Accept +/- 0.5	0.0
+3.0	3.0	Accept +/- 0.5	13	Accept +/- 3.0	14
+30.0	30.0	Accept +/- 3.0	294	Accept +/- 50	295
+60.0	58.5	Accept +/- 6.0	843	Accept +/- 130	876
+90.0	85.9	Accept +/- 9.0	1616	Accept +/- 250	1717

All test performed with equipment that is traceable to National Standards unless otherwise stated



TerraConsult

**Leaders in
waste management
environmental &
ground engineering
consultancy**

**TerraConsult (South) Limited
Dugard House
Peartree Road
Colchester, Essex
CO3 0UL**

**TerraConsult Limited
Bold Business Centre
Bold Lane, Sutton
St. Helens
WA9 4TX**

Tel: +44 (0) 1206 585600

Tel: +44 (0) 1925 291111

Fax: +44 (0) 1925 291191

Email: mailbox@terraconsult.co.uk

Website: www.terraconsult.co.uk



FS 573193



EMS 573194



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