

# Norfolk Boreas Offshore Wind Farm TerraConsult Ground Investigations Report

Part 5 of 6 Crossings 6 & 7

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Photo: Ormonde Offshore Wind Farm

# TerraConsult









DRAINAGE STONE

COLLIERY SEALJ

November 2017 Report No 3318-R005-2

**East Anglia (North) Offshore Wind Farm** 

**Crossings 6 & 7 Site Investigation** 

**Carried out for:** 

Gutteridge, Haskins and Davey Ltd (GHD)

**TerraConsult** 

# East Anglia (North) Offshore Wind Farm

# **Crossings 6 & 7 Site Investigation**

Date: November 2017

Report No 3318-R005-2

**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



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

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

By:

## DOCUMENT INFORMATION AND CONTROL SHEET

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Prepared by:	Victoria Smith	Victoria Smith	Engineering Geologist
Approved by:	Derek Daniels		Operations Manager
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## East Anglia (North) Offshore Wind Farm

## **Crossings 6 & 7 Site Investigation**

## **1 INTRODUCTION**

0

TerraConsult Limited (TCL) was commissioned by Gutteridge, Haskins and Davey Ltd (GHD) to carry out a ground investigation for the proposed cable route crossing of the A149, Cromer Road (Crossing 6) and the railway line (Crossing 7), near North Walsham, 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 13/07/17 and 28/07/17.

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 6 is located approximately 2.2 km north-west of the centre North Walsham, Norfolk. The approximate location of Crossing 6 is located between Ordnance Survey National Grid Reference TG 266 315 and TG 261 312.

Crossing 7 is located approximately 1.8 km north west of the centre of North Walsham, Norfolk. The approximate location of Crossing 7 is located between Ordnance Survey National Grid Reference TG 268 316 and TG 267 314.

Site location plans are presented as drawings reference 3318(C6)D001-1 and 3318(C7)D001-1.

#### 2.2 Published Geology

The online British Geological Survey (BGS) 1:50,000 scale map shows the sites to be underlain by the Happisburgh Glacigenic Formation sand and gravel and the Briton's Lane Formation sand and gravel.

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

## **3 FIELDWORK**

#### 3.1 General

Fieldwork was undertaken between 20/07/17 and 28/07/17. 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-C6-01										
Cable percussion, SPTs, variable head permeability test	BH17-C6-02										
Cable percussion, SPTs, variable head permeability test, install	BH17-C6-03										
Cable percussion, SPTs, variable head permeability test	BH17-C6-04										
Cable percussion, SPTs, variable head permeability test, install	BH17-C7-01										
Cable percussion, SPTs, variable head permeability test	BH17-C7-02										
Cable percussion, SPTs, variable head permeability test, install	BH17-C7-03										
Cable percussion, SPTs, variable head permeability test	BH17-C7-04										

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. 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:	ratory n: Type: do (r		Easting (mE):	Northing (mN):	Level (mAOD):	Start date:	End date:					
BH17-C6-01	CP	15.45	626336.80	331280.87	34.59	14/07/2017	17/07/2017					
BH17-C6-02	СР	15.45	626383.55	331326.99	35.22	13/07/2017	14/07/2017					
BH17-C6-03	CP	15.00	636508.14	331291.05	35.66	14/07/2017	14/07/2017					
BH17-C6-04	СР	15.00	626550.48	331321.08	35.39	14/07/2017	17/07/2017					
BH17-C7-01	CP	20.00	626749.29	331461.97	34.10	27/07/2017	28/07/2017					
BH17-C7-02	CP	20.00	626792.09	331492.52	32.74	25/07/2017	25/07/2017					
BH17-C7-03	CP	20.00	626802.16	331579.34	28.11	20/07/2017	21/07/2017					
BH17-C7-04	СР	20.00	626845.20	331611.63	25.84	24/07/2017	25/07/2017					

Type: CP - cable percussion;

Prior to commencement, all exploratory positions were checked for services by reference to available plans, visual inspection and CAT 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(C6)D002-1 and 3318(C7)D002-1.

#### Sampling 3.3

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-C6-01	Standpipe	BH17-C6-01	50	15.45	19.14	5.00	15.00						
BH17-C6-03	Standpipe	BH17-C6-03	50	15.00	20.66	10.00	15.00						
BH17-C7-01	Standpipe	BH17-C7-01	50	20	14.10	12.7	20						
BH17-C7-03	Standpipe	BH17-C7-03	50	20	8.11	19.7	20						

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, Camarthenshire, 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	5	BS1377: Part 2: 4.3 & 5.3									
Particle size distribution	4	BS1377: Part 2: 9.2									
BRE SD1	2	BRE SD1									
One-dimensional consolidation	2	BS1377: Part 5: 3									
Triaxial – 100mm single stage	3	BS1377: Part 7: 8									

#### 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(C6)D001-1 Site Location Plan3318(C7)D001-1 Site Location Plan3318(C6)D002-1 Exploratory Hole Location Plan3318(C7)D002-1 Exploratory Hole Location Plan

# Site Location Plan

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# Site Location Plan

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# **Exploratory Hole Location Plan**

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AGS

Issue:

Scale:

Locations By Type - CP



# **Exploratory Hole Location Plan**

**TerraConsult** 



Issue:

Scale:

Project No: 3318

GHD Ltd

Client:

1:3000

## APPENDICES

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## APPENDIX A Exploratory Hole Records

Key sheet

Boreholes

# Exploratory Hole Key Sheet

## **TerraConsult**

Undisturbed:												
	Driven tube sample											
UT	Thin wall driven tube sample											
TW	Pushed thin wall tube sample											
Р	Pushed piston sample											
L	Liner sample (from windowless or similar sampler), full recovery unless otherwise stated	1										
CBR	CBR mould sample	Block sample										
BLK	BIOCK sample Core sample (from rotary core) taken for laboratory testing											
C	Core sample (from rotary core) taken for laboratory testing											
Disturbed:												
	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' indicate	s 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 increment	al blow coun	ts are given									
	in the Field Records column; each increment is 75mm unless stated otherwise and any	penetration u	nder self									
	weight in mm (SW) is noted. Where the full 300mm test drive is achieved the total numb	per of blows t	or the test									
	drive is presented as N = ** in the Test column. Where the test drive blows reach 50 (eil	ther in total o	r 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), ki a											
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											
	lest results provided in Field Records column											
DRILLING RECORDS:												
The mechanical indiana (T(	PRODUCT & If are defined in RS 5020: 2015 and RS EN ISO 22575 1 (2006)											
The mechanical indices (TC	r/SCR/RQD & II) are defined in BS 5950. 2015 and BS EN ISO 22575-1 (2000)											
TCR	Total Core Recovery, %											
I SCR	Solid Core Recovery, %											
505	Rock Quality Designation, %											
RQD	Rock Quality Designation, %											
RQD If	Rock Quality Designation, % Fracture spacing, mm. Minimum, typical and maximum spacings are presented.											
RQD If NI	Rock Quality Designation, % Fracture spacing, mm. Minimum, typical and maximum spacings are presented. Non intact is used where the core is fragmented.											
RQD If NI	Rock Quality Designation, % Fracture spacing, mm. Minimum, typical and maximum spacings are presented. Non intact is used where the core is fragmented.											
RQD If NI CRF AZCL	Rock Quality Designation, % Fracture spacing, mm. Minimum, typical and maximum spacings are presented. Non intact is used where the core is fragmented. Core recovered (length in m) in the following run Assessed zone of core loss											
RQD If NI CRF AZCL NR	Rock Quality Designation, % Fracture spacing, mm. Minimum, typical and maximum spacings are presented. Non intact is used where the core is fragmented. Core recovered (length in m) in the following run Assessed zone of core loss Not recovered											
RQD If NI CRF AZCL NR	Rock Quality Designation, % Fracture spacing, mm. Minimum, typical and maximum spacings are presented. Non intact is used where the core is fragmented. Core recovered (length in m) in the following run Assessed zone of core loss Not recovered	1										
RQD If NI CRF AZCL NR GROUNDWATER:	Rock Quality Designation, % Fracture spacing, mm. Minimum, typical and maximum spacings are presented. Non intact is used where the core is fragmented. Core recovered (length in m) in the following run Assessed zone of core loss Not recovered	DEPTH RE	MARKS:									
RQD If NI CRF AZCL NR GROUNDWATER:	Rock Quality Designation, % Fracture spacing, mm. Minimum, typical and maximum spacings are presented. Non intact is used where the core is fragmented. Core recovered (length in m) in the following run Assessed zone of core loss Not recovered	DEPTH RE	MARKS:									
RQD If NI CRF AZCL NR GROUNDWATER:	Convertee strikes	DEPTH RE EoS SoS	MARKS: End of Shift Start of Shift									
RQD If NI CRF AZCL NR GROUNDWATER:	Groundwater strike	DEPTH RE EoS SoS EoBH	MARKS: End of Shift Start of Shift End of Borehole									
RQD If NI CRF AZCL NR GROUNDWATER:	Groundwater strike	DEPTH RE EoS SoS EoBH	MARKS: End of Shift Start of Shift End of Borehole									
RQD If NI CRF AZCL NR GROUNDWATER:	Groundwater level after standing period	DEPTH RE EoS SoS EoBH	MARKS: End of Shift Start of Shift End of Borehole									
RQD If NI CRF AZCL NR GROUNDWATER:	Groundwater level after standing period	DEPTH RE EoS SoS EoBH	MARKS: End of Shift Start of Shift End of Borehole									
RQD If NI CRF AZCL NR GROUNDWATER:	Groundwater level after standing period	DEPTH RE EoS SoS EoBH	MARKS: End of Shift Start of Shift End of Borehole									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Quality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted	DEPTH RE EoS SoS EoBH EXPLORAT	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Guality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is	DEPTH RE EoS SoS EoBH EXPLORAT	MARKS: End of Shift Start of Shift End of Borehole FORY HOLE TYPE: Cable percussion Dynamic probe									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Guality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is to the Legend column at the base of the instrument.	DEPTH RE EoS SoS EoBH EXPLORAT	MARKS: End of Shift Start of Shift End of Borehole FORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Guality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.         Standpine	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA	MARKS: End of Shift Start of Shift End of Borehole FORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Guality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.         Standpipe         Standpipe	DEPTH RE EoS SoS EoBH EXPLORAT CP DCP HA IP	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Guality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.         Standpipe         Standpipe         Standpipe piezometer	DEPTH RE EoS SoS EoBH EXPLORAT CP DCP HA IP OP PC	MARKS: End of Shift Start of Shift End of Borehole FORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Quality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.         Standpipe         Standpipe piezometer         Pneumatic piezometer         Pneumatic piezometer         Electronic piezometer	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DP DCP HA IP OP PC RC	MARKS: End of Shift Start of Shift End of Borehole FORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Botary core									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Guality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is in to the Legend column at the base of the instrument.         Standpipe         Standpipe piezometer         Pneumatic piezometer         Pneumatic piezometer         Hydraulic piezometer	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary core Botary copen hole									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Guality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.         Standpipe         Standpipe         Standpipe fiezometer         Pneumatic piezometer         Pneumatic piezometer         Hydraulic piezometer         Hydraulic piezometer         Gas monitoring standpipe	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary core Rotary open hole Shaft									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Guality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.         Standpipe         Standpipe         Standpipe         Gas monitoring standpipe         Internal ciazometer         Hydraulic piezometer         Gas monitoring standpipe         Internal diameter	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary core Rotary cope hole Shaft Sonic (resonance)									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Outlity Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered    Groundwater strike Groundwater level after standing period  iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.  Standpipe Standpipe piezometer Pneumatic piezometer Hydraulic piezometer Hydraulic piezometer Hydraulic piezometer Biavial inclinometer	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC TP	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary core Rotary open hole Shaft Sonic (resonance) Trial pit/trench									
RQD If NI CRF AZCL NR GROUNDWATER:	Book Outlity Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.         Standpipe         Standpipe         Standpipe piezometer         Pneumatic piezometer         Hydraulic piezometer         Hydraulic piezometer         Biaxial inclinometer         Biaxial inclinometer	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SNC TP TRAV	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary open hole Shaft Sonic (resonance) Trial pit/trench Traverse									
RQD If NI CRF AZCL NR GROUNDWATER: INSTRUMENTATION: Details of installations are of pipe section or tip depth, re indicated by a code adjacent SP SPIE PPIE EPIE HPIE EPIE HPIE GMP (xx) ICE ICM SLIP	Book Quality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered    Groundwater strike Groundwater level after standing period     iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.          Standpipe         Standpipe         Standpipe         Standpipe piezometer         Pneumatic piezometer         Hydraulic piezometer         Hydraulic piezometer         Biaxial inclinometer         Inclinometer tubing for use with probe         Slip indicator	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC TP TRAV WLS	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary open hole Shaft Sonic (resonance) Trial pit/trench Traverse Windowless (dynamic) sample									
RQD If NI CRF AZCL NR GROUNDWATER: INSTRUMENTATION: Details of installations are of pipe section or tip depth, re indicated by a code adjacent SP SPIE PPIE EPIE HPIE EPIE HPIE GMP (xx) ICE ICM SLIP	Book Out book of the orgination, %         Rock Quality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.         Standpipe         Standpipe         Standpipe piezometer         Precursic piezometer         Hydraulic piezometer         Biaxial inclinometer         Internal diameter         Biaxial inclinometer         Inclinometer tubing for use with probe         Slip indicator	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC TP TRAV WLS WS	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary core Rotary open hole Shaft Sonic (resonance) Trial pit/trench Traverse Windowless (dynamic) sample									
RQD If NI CRF AZCL NR GROUNDWATER: INSTRUMENTATION: Details of installations are of pipe section or tip depth, re indicated by a code adjacent SP SPIE PPIE EPIE HPIE EPIE HPIE EPIE HPIE EPIE HPIE EPIE HPIE EPIE HPIE ESET	Book Quality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered    Groundwater strike Groundwater strike Groundwater level after standing period  iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.  Standpipe Standpipe piezometer Pneumatic piezometer Hydraulic piezometer Gas monitoring standpipe Internal diameter Biaxial inclinometer Inclinometer tubing for use with probe Slip indicator Electronic settlement cell/gauge	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC TP TRAV WLS WS	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary open hole Shaft Sonic (resonance) Trial pit/trench Traverse Windowless (dynamic) sample									
RQD If NI CRF AZCL NR GROUNDWATER: INSTRUMENTATION: Details of installations are of pipe section or tip depth, re indicated by a code adjacent SP SPIE PPIE EPIE HPIE EPIE HPIE EPIE HPIE CMP (xx) ICE ICM SLIP ESET ETM	Book Quality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered    Groundwater strike Groundwater strike Groundwater level after standing period  iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.  Standpipe Standpipe piezometer Pneumatic piezometer Electronic piezometer Gas monitoring standpipe Internal diameter Biaxial inclinometer Inclinometer tubing for use with probe Slip indicator Electronic settlement cell/gauge Magnetic extensometer settlement point	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC TP TRAV WLS WS	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary open hole Shaft Sonic (resonance) Trial pit/trench Traverse Windowless (dynamic) sample									
RQD If NI CRF AZCL NR GROUNDWATER: INSTRUMENTATION: Details of installations are of pipe section or tip depth, re indicated by a code adjacent SP SPIE PPIE EPIE HPIE EPIE HPIE GMP (xx) ICE ICM SLIP ESET ETM ETR	Book Quality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered    Groundwater strike Groundwater level after standing period  iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is to the Legend column at the base of the instrument. Standpipe Standpipe piezometer Pneumatic piezometer Electronic piezometer Gas monitoring standpipe Internal diameter Biaxial inclinometer Inclinometer tubing for use with probe Slip indicator Electronic settlement cell/gauge Magnetic extensometer settlement point Rod extensometer	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC TP TRAV WLS WS	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary open hole Shaft Sonic (resonance) Trial pit/trench Traverse Windowless (dynamic) sample									
RQD If NI CRF AZCL NR GROUNDWATER: INSTRUMENTATION: Details of installations are of pipe section or tip depth, re indicated by a code adjacent SP SPIE PPIE EPIE HPIE EPIE HPIE GMP (xx) ICE ICM SLIP ESET ETM ETR	Rock Quality Designation, % Fracture spacing, mm. Minimum, typical and maximum spacings are presented. Non intact is used where the core is fragmented. Core recovered (length in m) in the following run Assessed zone of core loss Not recovered Groundwater strike Groundwater strike Groundwater level after standing period iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument. Standpipe Standpipe piezometer Pneumatic piezometer Hydraulic piezometer Hydraulic piezometer Hydraulic piezometer Biaxial inclinometer Internal diameter Biaxial inclinometer Inclinometer tubing for use with probe Slip indicator	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC TP TRAV WLS WS	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary core Rotary open hole Shaft Sonic (resonance) Trial pit/trench Traverse Windowless (dynamic) sample									
RQD If NI CRF AZCL NR GROUNDWATER: INSTRUMENTATION: Details of installations are of pipe section or tip depth, re indicated by a code adjacent SP SPIE PPIE EPIE HPIE EPIE HPIE EPIE HPIE EPIE HPIE EFIE HPIE ETIE TTM ETTR	Rock Quality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered         Groundwater strike         Groundwater level after standing period         iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.         Standpipe         Standpipe         Standpipe         Standpipe         Biaxial inclinometer         Inclinometer         Inclinometer         Inclinometer tubing for use with probe         Slip indicator         Electronic settlement cell/gauge         Magnetic extensometer settlement point         Rock actensometer         Project:       East Anglia (North) Offshore Wind Farm	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC TP TRAV WLS WS	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary core Rotary open hole Shaft Sonic (resonance) Trial pit/trench Traverse Windowless (dynamic) sample Window (dynamic) sample									
RQD If NI CRF AZCL NR GROUNDWATER: INSTRUMENTATION: Details of installations are of pipe section or tip depth, re indicated by a code adjacent SP SPIE PPIE EPIE HPIE EPIE HPIE GMP (xx) ICE ICM SLIP ESET ETR ETR	Rock Quality Designation, %         Fracture spacing, mm. Minimum, typical and maximum spacings are presented.         Non intact is used where the core is fragmented.         Core recovered (length in m) in the following run         Assessed zone of core loss         Not recovered    Groundwater strike Groundwater strike Groundwater level after standing period     iven on the Record. Legend column shows installed instrument depths including slotted sponse zone filter material type and layers of backfill. The type of instrument installed is it to the Legend column at the base of the instrument.     Standpipe Standpipe Standpipe piezometer Pneumatic piezometer Hydraulic piezometer Biaxial inclinometer Inclinometer tubing for use with probe Slip indicator Electronic settlement cell/gauge Magnetic extensometer settlement point Rod extensometer Project: East Anglia (North) Offshore Wind Farm Project No: 3318	DEPTH RE EoS SoS EoBH EXPLORAT CP DP DCP HA IP OP PC RC RO SH SNC TP TRAV WLS WS	MARKS: End of Shift Start of Shift End of Borehole TORY HOLE TYPE: Cable percussion Dynamic probe Dynamic probe Dynamic cone penetrometer Hand auger Inspection pit Observation pit/trench Pavement core Rotary core Rotary open hole Shaft Sonic (resonance) Trial pit/trench Traverse Windowless (dynamic) sample Window (dynamic) sample									

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From Start date End date Plant: Barrel type: Drill Bit: Logged: Remarks: To Crew Logger 626336.80 mΕ 14-07-17 14-07-17 0.00 1.20 14-07-17 ΤМ Hand tools n/a n/a VS mN: 331280.87 CP 0.00 15.45 14-07-17 17-07-17 ΤМ Dando 2000 n/a n/a 17-07-17 VS SPT hammer ID: SI 4 E(r)% 74 mAOD: 34.59 Grid OSGB Samples & In Situ Testing Backfill/ Instal'n Legend Depth Water-strike (thick-ness) l evel Stratum Description Water Casing Depth Type & No Results/Remarks Soft dark brown sandy slightly gravelly CLAY. Gravel of subangular to subrounded fine to coarse flint. (0.50)(TOPSOIL) 34 09 0.50 0.50 D1 Soft dark orangish brown slightly gravelly clayey fine to medium SAND. 0.50 ES1 Gravel of subangular to subrounded fine to coarse flint. 0.50 - 1.00 B1 (0.60) (GLACIOFLUVIÃL DEPOSITS) 0.90 - 1.10 m: Becomes slightly clayey fine to coarse SAND 1.00 D2 33.49 1.10 1.00 ES2 Medium dense dark yellowish brown slightly silty fine to coarse SAND and fine to coarse GRAVEL. Gravel of subangular to subrounded fine to coarse flint. 1.50 1.50 N=14 (1,2/2,2,4,6) Dry С (GLACIOFLUVIAL DEPOSITS) D3 1.50 1.50 ES3 2.00 D4 (1.90) 2 00 FS4 3.00 3.00 N=12 (1,1/2,2,4,4) 31.59 3.00 С Drv Medium dense light yellowish brown gravelly slightly silty fine to coarse 3.00 D5 SAND. Gravel of subangular to subrounded fine to coarse flint. (GLACIOFLUVIAL DEPOSITS) (2.00)4.00 D6 4.00 - 5.00 m: Becomes dark yellowish brown Dry 4.50 С N=8 (1,2/1,2,2,3) 29 59 5.00 5 00 D7 Soft light orangish brown mottled dark orangish brown and light grey sandy CLAY. (GLACIOFLUVIAL DEPOSITS) (1.00) 28.59 6.00 Dry 6.00 6.00 S N=9 (1,2/2,2,2,3) Loose dark grevish brown clayey fine to medium SAND. Occasionally 6.00 - 6.45 D8 mottled dark orangish brown. (GLACIOFLUVIAL DEPOSITS) (1.50) 27.09 7.50 7.50 7.50 N=8 (1,1/2,1,2,3) Dry Loose locally medium dense dark orangish brown very silty fine to medium 7.50 - 7.95 D9 SAND V (GLACIOFLUVIAL DEPOSITS) 9.00 9.00 N=11 (1.2/2.2.3.4) Drv S 9.00 - 9.45 D10 Water Casing Depth Results Type & No Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Dia (mm): Depth: Struck: Rose to: Casing: Sealed: From: To: Remarks: From: Duration: Tool: Casing to: 8.50 7.83 8.50 200 4 50 4.50 14.50 150 14.50 ation of symbols and Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm AGS ab BH17-C6-01 Project No: 3318 FINAL Log issue: Client: GHD Ltd Scale: 1:50

Sheet 1 of 2

B	or	eh	ole	Log	J								Teri	aC	onsult
Bor	ehol	e for	mation	details:											Location details:
Type IP CP	:: F ( (	rom: ).00 ).00	To: 1.20 15.45	Start date: 14-07-17 14-07-17	End date: 14-07-17 17-07-17	Crew: TM TM	Plant: Hand tools Dando 2000	Barrel type n/a n/a	: Drill Bit: n/a n/a	Logged: 14-07-17 17-07-17	Logger: VS VS	Remarks	s: mmer ID: SI 4 E(r	)% 74	mE:         626336.80           mN:         331280.87           mAOD:         34.59           Grid:         OSGB
skfill/ tal'n	ater- ike	lend	l evel	Depth (thick-			Stratum	Description					Samples	& In Situ Te	esting
Bac Inst	Wa str	Leg	Levei	ness)			Stratum	Description			Water	Casing	Depth	Type & No	Results/Remarks
											Dry	10.50	10.50 10.50 - 10.95	S B3	N=6 (1,1/2,1,1,2)
				· · · · · · · · · · · · · · · · · · ·							- Dry	12.00	12.00 12.00 - 12.45	S D11	N=6 (1,/1,2,1,2)
				· · · · · · · · · · · · · · · · · · ·							- Dry	13.00	13.50 13.50 - 13.95	S D12	N=8 (2,2/1,2,2,3)
	SP			15.45		Bor	rehole ends at 1	14.90 - 1 <u>5.00</u> 5.45m (Targ	<u>m: Becomes da</u> et depth)	rk greyish brow	n Dry	14.00	15.00 15.00 - 15.45	S D13	N=12 (2,2/2,3,3,4)
	Inst										- - - - - - - - - - - - - - - - - - -	Casing	Depth	Type & No	Results
Grou	undw	ater e	entries:	a. Soolod.	Diameter	& casin	ig:	Depth relat	ed remarks	Domo	rke:	C	Chiselling deta	ails:	
Stru	Note	s: For exp	Lanation of symb	y: Sealed:	ріа (mm) Project:	East /	Anglia (North)	From:	nd Farm	Kema	ικs: 	E	From: to:	Duration refere	лп. 1001: ence:
Loa i	All de	epths and r	FINAL	re in metres.	Project No	: 3318	/						BH	17-	C6-01
Scal	e:		1:50		Client:	GHD	Ltd								Sheet 2 of 2

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From Start date End date Plant: Barrel type: Drill Bit: Logged: Remarks: To Crev Logger 626383.55 mΕ 0.00 1.20 13-07-17 13-07-17 13-07-17 ΤМ Hand tools n/a n/a VS mN: 331326.99 CP 0.00 15.45 13-07-17 14-07-17 ΤМ Dando 2000 n/a n/a 14-07-17 VS SPT hammer ID: SI 4 E(r)% 74 mAOD: 35.22 Grid OSGB Samples & In Situ Testing Backfill/ Instal'n Legend Depth Water-strike l evel (thick-ness) Stratum Description Water Casing Depth Type & No Results/Remarks Soft dark brown slightly gravelly sandy CLAY. Gravel of subangular to (0.40) subrounded fine to coarse flint. (TOPSOIL) 34.82 0.40 Dark orangish brown slightly gravelly slightly silty clayey fine to medium 0.50 D1 0.50 ES1 SAND. Gravel of subangular to subrounded fine to coarse flint. Occasional 0.50 - 1.00 B1 rootlets (GLACIOFLUVIAL DEPOSITS) (1.10)1.00 D2 1.00 ES2 33.72 C ES3 N=27 (2,4/5,6,8,8) 1.50 Dry 1.50 Medium dense dark orangish brown slightly gravelly slightly silty fine to 1.50 coarse SAND. Gravel of subangular to subrounded fine to coarse flint. 1.50 - 1.95 1.50 - 2.00 2.00 (0.50)D3 Occasional pockets of dark brown sandy CLAY. R2 33.22 2.00 (GLACIOFLUVIAL DEPOSITS) ES4 Medium dense dark orangish brown slightly silty very gravelly fine to coarse SAND. Gravel of subangular to subrounded fine to medium flint. (GLACIOFLUVIAL DEPOSITS) 3.00 3.00 N=14 (1,2/2,3,4,5) Drv С 3.00 3.00 - 3.45 D4 B3 (3.00) 4.00 D5 Dry 4.50 4.50 С N=13 (2,3/3,3,3,4) 30 22 5.00 5 00 D6 Light yellowish brown gravelly silty fine to coarse SAND. Rare fine to coarse pockets of dark orangish brown slightly sandy CLAY. (GLACIOFLUVIAL DEPOSITS) (1.00)29.22 6.00 Dry 6.00 6.00 C D7 N=6 (1,1/1,2,1,2) Soft dark orangish brown sandy CLAY. Occasionally mottled dark reddish 6.00 brown (GLACIOFLUVIAL DEPOSITS) (1.00) 28.22 7.00 7.00 - 8.00 B4 Medium dense dark orangish brown slightly silty clayey fine to coarse SAND (GLACIOFLUVIAL DEPOSITS) (1.00)Dry 7.50 7.50 N=10 (1,1/1,2,3,4) T 7.50 - 7.95 D8 $\bigtriangledown$ 27.22 8.00 Firm dark orangish brown sandy CLAY. Occasionally mottled dark reddish brown (GLACIOFLUVIAL DEPOSITS) 9.00 9.00 N=8 (1.2/1.1.2.4) Drv S 9.00 - 9.45 D10 Water Casing Depth Type & No Results Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Struck: Rose to: Casing: Sealed: Dia (mm): Depth: From: Remarks: From: Duration: Tool: Casing To: to: 8.00 7.60 8.00 200 6.00 6.00 150 14.50 14.50 nation of symbols and Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm No abi All AGS BH17-C6-02 Project No: 3318 FINAL Log issue:

Client:

Scale:

1:50

GHD Ltd

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B	Borehole Log TerraConsult														
Bord Type IP CP	ehole f : From 0.00 0.00	formation details:         Logged:         Logged:         Logger:         Remarks:         n         n           0         1.20         13-07-17         13-07-17         TM         Hand tools         n/a         n/a         13-07-17         VS         SPT hammer ID: SI 4 E(r)% 74         n         n         n         n/a         14-07-17         VS         SPT hammer ID: SI 4 E(r)% 74         n         n         n         n         n         n         n/a         14-07-17         VS         SPT hammer ID: SI 4 E(r)% 74         n <t< th=""><th>Location details:           mE:         626383.55           mN:         331326.99           mAOD:         35.22           Grid:         OSGB</th></t<>								Location details:           mE:         626383.55           mN:         331326.99           mAOD:         35.22           Grid:         OSGB					
ckfill/ stal'n	ater- rike	Level	Depth (thick-			Stratum	Description						Samples	& In Situ Te	esting
an ≕		2	ness)								Water	Casing	Depth	Type & No	Results/Remarks
											Dry	10.00	10.50	S	N=14 (1,1/1,3,4,6)
			(7.45)				12.00 <u>- 15.00</u>	) m: Mottles dai	k greyish brow	- - - - - - - - - - - - -	Dry	12.00	12.00 12.00 - 12.45	S D11	N=9 (1,2/1,2,3,3)
											Dry	13.00	13.50 13.50 - 13.95	S D12	N=11 (1,2/2,3,3,3)
		19.77	15.45		Bore	ehole ends at 1	15.45m (Target	depth)			Dry 13.00 9.00	14.50 0.00 14.50	15.00 15.00 - 15.45 15.45 15.45	S D13	N=13 (2,3/3,3,3,4) 14/07/2017 00:00:00 14/07/2017 01:00:00
										· · · · · · · · · · · · · · · · · · ·					
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	Inst		1							-	Water	Casing	Depth	Type & No	Results
Stru	ck: Ros	e to: Casi	ng: Sealed	Dia (mm):	<mark>∝ casin</mark> Depth:	<b>y:</b> Casing:	<b>μερτη relate</b> From: Τα	u remarks: ):	Rema	arks:			From: to:	ans: Duratio	on: Tool:
AGS Log i	All depths	FINAI	are in metres.	Project: Project No	East A : 3318	nglia (North)	Offshore Win	d Farm				E	≥xploratory pos BH		ence: C6-02
Scale	e:	1:50		Client:	GHD	Ltd									Sheet 2 of 2

Sheet 2 of 2	
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Bc	oreh	ole	Lo	g									Terr	raC	onsult
Borel	ole for	mation	details	s:											Location details:
Type: IP CP	From: 0.00 0.00	To: 1.20 15.00	Start da 14-07- 14-07-	ate: End 17 14- 17 14-	d date: -07-17 -07-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 14-07-17 14-07-17	Logger: VS VS	Remarks	s: mmer ID: SI 3 E(r	)% 75	mE: 626508.14 mN: 331291.05 mAOD: 35.66 Grid: OSGB
kfill/ tal'n	end		Depth (thick-				Stratum	Description					Samples	& In Situ Te	esting
Inst	str Leg	Level	ness)				Stratum	Description			Wate	er Casing	Depth	Type & No	Results/Remarks
П			(0.50)	Soft da subroui (TOPS)	ark brow Inded fir OIL)	n sligh ie to co	tly gravelly san barse flint.	dy CLAY. Gra	vel of suba	ngular to	-				
П		35.16	0.50 -	Mediun Gravel to coars	n dense of suba se pock	e dark o ngular ets of o	orangish brown to subrounded dark brown san	silty gravelly fine to coarse dy CLAY.	fine to coar e flint. Occa	se SAND. Isionally fin	e -		0.50 0.50	D1 ES1	
П		• • •		(GLACI	IOFLU	IAL DE	EPOSITS)	-					1.00 1.00	D2 ES2	
П		- - -	(2.00) -	-							- Dry	1.40	1.50 1.50 1.50 - 1.95	C ES3 B1	N=16 (2,3/4,4,4,4)
П	× × × ×		-										2.00	ES4	
		33.16	2.50 -	Mediun coarse (GLACI	n dense SAND.	dark y Grave /IAL DI	vellowish browr I of subangular EPOSITS)	n slightly silty v to subrounde	very gravell d fine to co	y fine to arse flint.	Dry	2.50	2.50 2.50 - 2.95	C B2	N=18 (3,5/4,4,5,5)
	***										- - - - Dry	5.50	3.50	С	N=24 (4,5/6,6,6,6)
		> - - -	(3.00)	-									3.50 - 3.95	B3	
		- - - - - -	-	-							- Dry	4.50	4.50 4.50 - 4.95	C B4	N=19 (2,3/4,4,5,6)
		30.16	5 50 -	-							- - - - - - - - - - - - - - - - - - -	5.50	5 50	C	N=27 (3 4/5 7 7 8)
	***	29.66	(0.50) 6.00 -	Mediun coarse coarse (GLACI	n dense SAND flint. IOFLU\	e dark y and Gr /IAL DE	vellowish browr avel. Gravel of EPOSITS)	slightly silty subangular to	very gravell	y fine to ed fine to			5.50 - 5.95	B5	
			-	slightly coarse (GLACI	silty sa flint.	ndy CL	AY. Gravel of s	subangular to	subrounded	d fine to			6.50	D3	
			(2.00) -										7.00 - 7.45	U1	36 (100%)
			- - - -	-									7.50	D4	
		27.66	8.00 -	Firm da dark re (GLACI	ark grav eddish b IOFLU\	elly bro rown s /IAL DI	own occasional andy CLAY. EPOSITS)	ly mottled dar	k orangish	brown and		8.00	8.50		
			(2.00)	-							- Dry - - -	8.00	8.50 - 8.95	D5	IN= IZ (1,2/2,3,3,4)
			· · · · · · · · · · · · · · · · · · ·	-											
		25.66	- 10.00								- - - - - - - - - - - - - - - - - - -	10.00 r_Casing	10.00 Depth	S Type & No	N=34 (3,5/6,9,9,10) Résults
Groun	dwater e	entries:	-	Dia	ameter a	& casi	ng:	Depth relate	d remarks:	_			Chiselling deta	ails:	
Struck 10.0	x: Rose t 9.10	o: Casin ) 8.00	g: Seal )	ed: Dia	a (mm): 150	Deptf ) 15	n: Casing: 5.00 15.00	From: Tc	):	Rema	rks:		From: to:	Duratio	on: Tool:
AGS Log iss	Notes: For exp abbreviations s All depths and r	lanation of symb ee Key Sheet. reduced levels at	ols and e in metres.	Pro Pro Clie	oject: oject No ent:	East 3318 GHD	Anglia (North)	Offshore Wind	d Farm			E	Exploratory pos	sition refere	ence: C6-03

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From: 0.00 Logged: 14-07-17 Logger VS To Start date End date Plant: Barrel type: Drill Bit: Remarks: Crew mE: 626508.14 14-07-17 14-07-17 1.20 MJ Hand tools n/a n/a mN: 331291.05 CP 0.00 15.00 14-07-17 14-07-17 MJ Dando 2000 n/a n/a 14-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 35.66 Grid: OSGB Depth (thick-ness) Backfill/ Instal'n Legend Samples & In Situ Testing Water-strike Stratum Description Level Type & No Water Casing Depth Results/Remarks Dense becoming very dense dark orangish brown slightly gravelly silty fine 10.00 - 10.45 D6 to medium SAND. Gravel of subangular to subrounded fine to coarse flint. (GLACIOFLUVIAL DEPOSITS) 11.50 11.50 - 11.95 Dry S D7 N=37 (2,6/8,9,10,10) (5.00) Dry 13.00 N=38 (4,5/7,9,10,12) S 13.00 - 13.45 D8 14.50 14.50 - 14.95 Dry S 50 (5,9/50 for 255mm) D9 SP 20.66 15.00 Borehole ends at 15.00m (Target depth) Water Casing Depth Type & No Results Depth related remarks: Chiselling details: Groundwater entries: Diameter & casing: From: Struck: Rose to: Casing: Sealed: Dia (mm): Depth: Casing: From: To: Remarks: to: Duration: Tool: anation of symbols and ee Key Sheet Notes: For ex abbreviations and All depths and Exploratory position reference: East Anglia (North) Offshore Wind Farm AGS Project: BH17-C6-03 Project No: 3318 Log issue: FINAL Client: GHD Ltd Scale: 1:50

Sheet 2 of 2

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From Start date End date Plant: Barrel type: Drill Bit: Logged: Remarks: To Crew Logger 626550.48 mΕ 1.20 14-07-17 14-07-17 0.00 14-07-17 MJ Hand tools n/a n/a VS mN: 331321.08 CP 0.00 15.00 14-07-17 17-07-17 MJ Dando 2000 n/a n/a 17-07-17 VS SPT hammer ID: SI 3 E(r)% 75 35.39 mAOD: Grid OSGB Samples & In Situ Testing Backfill/ Instal'n Legend Depth Water-strike l evel (thick-ness) Stratum Description Water Casing Depth Type & No Results/Remarks Soft dark brown slightly gravelly sandy CLAY. Gravel of subangular to (0.40) subrounded fine to coarse flint. (TOPSOIL) 34.99 0.40 Firm to stiff dark orangish brown mottled light grey and dark brown slightly 0.50 D1 0.50 ES1 gravelly sandy CLAY. Gravel of subangular to subrounded medium to coarse flint. Occasional black organic staining. (0.90) (GLACIOFLUVIAL DEPOSITS) 1.00 D2 1.00 ES2 34.09 1.30 Medium dense dark orangish brown gravelly fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. Fine to coarse gravel Dry 1.00 N=15 (2,3/3,4,4,4) 1.50 С ES3 1.50 sized and cobble sized pockets of dark brown sandy CLAY. 1.50 - 1.95 B1 (GLACIOFLUVIAL DEPOSITS) (1.20) 2.00 ES4 2.00 - 2.50 m: Clay pockets become frequent and mottle light grey 32.89 2.50 2.40 2.50 С N=27 (3,4/6,6,7,8) Dry Medium dense dark greyish brown gravelly clayey fine to medium SAND. 2.50 - 2.95 B2 Gravel of subangular to subrounded fine to coarse flint. (GLACIOFLUVIAL DEPOSITS) (2.00)Dry 3.95 3.50 С N=25 (3.6/5.6.7.7) 3.50 - 3.95 В3 30.89 4.50 Dry 4.95 4.50 С N=30 (4,5/6,7,8,9) Medium dense dark orangish brown gravelly slightly silty fine to coarse B4 4.50 - 4.95 SAND. Gravel of subangular to subrounded fine to coarse flint. Medium to coarse gravel sized pockets of dark orangish brown silty slightly sandy CLAY. (GLACIOFLUVIAL DEPOSITS) (1.30)Drv 5.50 5.50 С N=21 (8,5/6,6,5,4) 29.59 5.80 Medium dense dark grey mottled dark orangish brown and black organic staining silty clayey fine to medium SAND. Rare gravel. 6.00 D3 (GLACIOFLUVIAL DEPOSITS) 7.00 - 7.45 В5 40 (0%) 7.00 - 15.00 m: Becomes dark orangish brown 7 00 - 7 45 UNR Dry 6.00 7.50 N=19 (2,2/3,5,5,6) S 7.50 - 7.95 D4 8.50 D5 ▼ 6.00 9.00 N=14(2.2/3.3.4.4)Drv S 9.00 - 9.50 D6 Water Casing Depth Type & No Results Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Dia (mm): Depth: Struck: Rose to: Casing: Sealed: Casing From: From: Duration: Tool: To: Remarks: to: 10.0 8.90 6.00 150 12.00 12.00 nation of symbols and Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm No abi All AGS Project No: 3318 BH17-C6-04 FINAL Log issue:

Client:

Scale:

1:50

GHD Ltd

Sheet 1 of 2

B	or	eh	ole	Lo	9								Terr	aC	onsult
Bore Type IP CP	ehol : F (	e for: rom: 0.00 0.00	To: 1.20 15.00	details: Start date 14-07-17 14-07-17	End date: 14-07-17 17-07-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 14-07-17 17-07-17	Logger: VS VS	Remarks SPT har	3: mmer ID: SI 3 E(r)% 75		Location details:           mE:         626550.48           mN:         331321.08           mAOD:         35.39           Grid:         OSGB
kfill/ tal'n	iter- ike	end	l evel	Depth (thick-			Stratum	Description					Samples	& In Situ Te	esting
Bac	Wa str	Leg	20001	ness)		40.00 41					Wate	er Casing	Depth	Type & No	Results/Remarks
		× ×		-		10.00 - 18	5.00 m: Rare grave	l of suban <u>gular to</u>	subrounded fil	ne to coarse m	<u>-</u>				
				(9.20) -							- Dry	10.40	10.50 10.50 - 10.95	S D7	N=12 (1,2/3,3,3,3)
								12. <u>00 - 15</u>	.00 m: Become	es slightly clay	- - - - - - Dry	12.00	12.00 12.00 - 12.45	S D8	N=23 (3,4/6,6,5,6)
											- Dry	13.40	13.50 13.50 - 13.95	S D9	N=35 (4,6/7,9,9,10)
			20.39	15.00		Bore	ehole ends at 1	5.00m (Target	depth)		- - - - - -	14.80	15.00 15.00 - 15.45	S D10	N=40 (3,6/8,9,10,13)
				-							-				
				-											
				-							-				
				-							-				
				-											
				-											
	Inst				1						Wate	r Casing	Depth	Type & No	Results
Grou Strue	ndw ck: F	ater e	ntries:	q: Sealed	Diameter	& casin Depth	g: Casino:	Depth relate	d remarks:	Rem	arks:	C	From: to	ails: Duratio	on: Tool:
				s. Staleu		Echul.	Cuoniy.			i territ				Durail	1001.
AGS	Note abbre All de	s: For expl eviations see opths and r	anation of symb e Key Sheet. educed levels a	ols and re in metres.	Project: Project No	East A	Anglia (North)	Offshore Wind	d Farm			E	Exploratory pos	sition refere	
Log i Scale	ssue e:		FINAL 1:50		Client:	GHD	Ltd						DL	/ =	Sheet 2 of 2

# **Borehole Log**

## **TerraConsult**

	Borehole formation details:																	
Bor	eho	le forr	nation	details	i.	0	Direct	Demaltance	D.:II Dit	Lanadi	1		Deverende			Location details:		
IP CP	: 1	0.00 0.00	1.20 20.00	27-07- 27-07-	17 27-07-17 17 28-07-17	MJ MJ	Hant: Hand tools Dando 2000	n/a n/a	n/a n/a	Logged: 27-07-17 28-07-17		igger: VS VS	SPT ha	s: mmer ID: SI 3 E(r)	% 75	mE: 626749.29 mN: 331461.97 mAOD: 34.10 Grid: OSGR		
≧ e	50	p		Depth										Samples	& In Situ Te	esting		
Backfi Instal	Wate	Leger	Level	(thick- ness)			Stratum	Description				Water	Casing	Depth	Type & No	Results/Remarks		
				(0.40)	Soft dark orai	ngish bi	rown slightly gr	avelly slightly s	sandy CLA	Y. Gravel								
			33.70	0.40	(TOPSOIL)	SUDIOL			asional roc	ollets.		-						
				-	Dark orangisł (GLACIOFLU	ו brown VIAL D	i fine to coarse EPOSITS)	SAND.			-	-		0.50 0.50	D1 ES1			
				(1 10)								-						
				(										1.00	ES2			
			22.60	1 50										1.50	6	N=12 (1 2/2 4 2 2)		
			32.00	1.50 -	Medium dens	e dark VIAL D	orangish browr EPOSITS)	n fine to mediu	m SAND.		Diy		1.50	D3	N-13 (1,3/3,4,3,3)			
				-			,			_			2.00	ES4				
				-								-						
				(2.00) -							-	Dry	2.50	2.50	S	N=16 (2,2/3,3,4,6)		
				-								-		2.50 - 2.95	D4			
				-							_	-						
				-														
			30.60	3.50 -	Medium dens	e dark	orangish browr	slightly clave	v siltv fine t	o medium		Dry	3.50	3.50	S	N=21 (2,3/4,5,6,6)		
		×		(0.40)	SAND.			ronging oldyo	y only mid t				3.50 - 3.95	D5				
		X	30.20	3.90 _	Medium dens	e dark	orangish browr	n gravelly silty	fine to coar		-							
		××.		-	Gravel of sub flint.	angular	r to subrounded	d fine to coarse	e flint. Rare	Cobbles o	of .	-						
		× × ,		-	(GLACIOFLU	VIAL D	EPOSITS)				-	Dry	4.50	4.50	C	N=28 (3,5/6,7,7,8)		
		× × >		(1.80)								-		4.50 - 4.95	ы			
		××		_							-							
		××		-														
		$\times$		-							-	Dry	5.50	5.50 5.50 - 5.95	C B2	N=19 (5,6/5,5,4,5)		
			28.40	5.70	Firm light gre	yish bro	own slightly gra	velly slightly sa	andy CLAY	Gravel of	nish							
					brown stainin	g.				dank ording		-		6.00	D6			
				-	(GLACIOFLU	VIAL D	EP05115)											
				(1.80)							-	-						
												-		7.00 7.45		40 (4000()		
				-										7.00 - 7.45	01	40 (100%)		
			26.60	7 50 -								-		7 50	D7			
			20.00		Firm light ora (GLACIOFLU	ngish g VIAL D	rey slightly san EPOSITS)	dy CLAY.				-		1.50				
				_							_							
				-														
				(2.00) -							-	Dry	8.00	8.50	S	N=13 (1,2/3,3,3,4)		
				-								-		8.50 - 8.95	D8			
				-							_	-						
												-						
			24.60	9.50 -	Firm light bro	wnish q	rey slightly san	ndy CLAY.										
				-	(GLAČIOFLU	VIAL Ď	EPOSITS)	,				-						
	Inst											Water	Casing	10.00 - 10.45 Depth	U2 Type & No	60 (100%) Results		
Grou	undv	vater e	ntries:		Diameter	& casi	ng:	Depth related	d remarks:	_				Chiselling deta	ails:			
Stru	ick: I	Rose to	o: Casin	g: Seal	ed: Dia (mm 20 15	): Dept  0     0     0	h: Casing: 6.00 6.00 9.50 19.50	From: To		Rema	arks	c		From: to:	Duratio	n: Tool:		
	Not	es: For expl	anation of syml	ools and	Project:	East	Anglia (North)	Offshore Wind	d Farm					Exploratory pos	ition refere	ence:		
ACS		lepths and r	FINIAI	ire in metres.	Project N	Project No: 3318								BH17-C7-01				
Scal	e:		1:50		Client:	GHE	D Ltd									Sheet 1 of 2		

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP Logged: 27-07-17 From Start date End date Plant: Barrel type: Drill Bit: Logger Remarks: Crew mE: 626749.29 0.00 27-07-17 1.20 27-07-17 MJ Hand tools VS n/a n/a mN: 331461.97 CP 0.00 20.00 27-07-17 28-07-17 MJ Dando 2000 n/a n/a 28-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 34.10 Grid: OSGB Depth (thick-ness) Backfill/ Instal'n Legend Samples & In Situ Testing Water-strike Stratum Description l evel Type & No Water Casing Depth Results/Remarks Firm light brownish grey slightly sandy CLAY. (GLACIOFLUVIAL DEPOSITS) 10.50 D9 (3.20) 11.50 11.50 - 11.95 Dry 10.00 S D10 N=17 (2,3/3,4,4,6) 21.40 12.70 Medium dense dark brownish grey silty fine to medium SAND. $\mathbf{X}$ (WROXHAM CRAG FORMATION) 10.00 13.00 S N=14 (3,2/3,3,4,4) Drv Dry 14.50 14.50 S N=13 (2,2/3,3,3,4) 14.50 - 14.95 D12 (6.30) Dry 16.00 16.00 S N=22 (3,3/5,5,6,6) 16.00 - 16.45 D13 17.50 N=35 (2,3/7,8,9,11) Dry 17.50 S 17.50 - 17.95 D14 50 (3,5/50 for 170mm) 15.10 19.00 Drv 19.00 19.00 Very dense dark grey silty fine to medium SAND. Rare gravel. (WROXHAM CRAG FORMATION) S 19.00 - 19.45 D15 (1.00) 4 10 20.00 Borehole ends at 20.00m (Target depth) Water Casing Depth Type & No Results Depth related remarks: Chiselling details: Groundwater entries: Diameter & casing: From: Struck: Rose to: Casing: Sealed: Dia (mm): Depth: Casing: To: Remarks: From: to: Duration: Tool: 13.0 12.9 10.0 anation of symbols and e Key Sheet Exploratory position reference: No abi All For e Project: East Anglia (North) Offshore Wind Farm AGS BH17-C7-01 Project No: 3318 Log issue: FINAL Client: GHD Ltd

Scale:

1:50

# **Borehole Log**

## TerraConsult

Borehole formation details:												Location details:				
Туре	:   F	rom:	To:	Start d	ate: End date	: Crew:	Plant:	Barrel type:	Drill Bit:	Logged:	Logge	er: F	Remarks	:		mE: 626792.09
IP CP		0.00 0.00	1.20 20.00	25-07-	17 25-07-1 17 25-07-1	7 MJ 7 MJ	Hand tools Dando 2000	n/a n/a	n/a n/a	25-07-17 25-07-17	VS VS	5	SPT har	nmer ID: SI 3 E(r)	)% 75	mN: 331492.52
														()		mAOD: 32.74
																Grid: OSGB
kfill/ al'n	ter- ke	end	Loval	Depth			Stratum	Description						Samples a	& In Situ Te	esting
Bac	Wa	Leg	Levei	ness)			Siratum	Description			v	Vater	Casing	Depth	Type & No	Results/Remarks
				(0.40)	Soft dark or	angish b	rown slightly gra	avelly slightly	sandy CLA	Y. Gravel	-					
			32 34	0.40	(TOPSOIL)	to subrol	unded fine to co	barse filnt. Occ	asional roo	otiets.	-					
			02.04	-	Medium der	nse dark	orangish brown	clayey gravel	ly fine to c	oarse SAN	D			0.50	D1 ES1	
		-			(GLACIOFL	UVIAL D	EPOSITS)				-			0.50	ES1	
											_			1.00	D2	
														1.00 1.00	ES2 ES2	
				-								Dry	1.40	1.00 1.50	ES2 C	N=21 (2,3/5,5,6,5)
				(2.60)							-			1.50 1.50	ES3 ES3	
											_			1.50 - 1.95	B1	
											-			2.00	ES2 ES4	
											-			2.00	ES4	
				-								Dry	2.50	2.50 2.50 - 2.95	B2	N=22 (1,3/4,5,6,7)
											-					
			29.74	3.00 -	Soft orangis	h brown	slightly gravelly	sandy CLAY.	Gravel of	subangular	to -					
					subrounded	fine to n	nedium flint.				-					
				(0.90)	(GLACIOFL	UVIAL D	EF03113)				-	Dry	3.30	3.50	s	N=10 (1,2/2,2,3,3)
											]			3.50 - 3.95	D3	
		**** * *	28.84	3.90	Medium der	nse dark	orangish brown	slightly claye	y slightly si	Ity fine to	_					
		XX			coarse SAN	D. Fine t	to coarse grave	I sized pockets	s of dark bi	rown sandy	-					
		(××			(GLACIOFL	UVIAL D	EPOSITS)				-		4 40	4.50		
		(××		(1.60)							-		4.40	4.50 4.50 - 4.95	D4	N=13 (2,3/2,3,4,4)
		×××		(1.00)							-					
		×××		-							-					
		×,									-					
		×	27.24	5.50 -	Firm orangi	sh brown	sandy CLAY.					Dry	5.50	5.50	S D5	N=15 (1,1/3,3,4,5)
		<u> </u>			(GLACIOFL	UVIAL D	EPOSITS)				-			5.50 - 5.55		
		<u> </u>									_					
				(1.30)							-					
			-	-							_					
											-					
			25.94	6.80	Firm to stiff	brownish	n grey locally mo	ottled greyish	brown sligh	ntly sandy	-			6.90	D6	40 (400%)
					and flint. Oc	AY. Grave casional	el of subangulai ly stained orang	r to subrounde gish brown.	d fine to co	barse chalk	-			7.00 - 7.45	U1	40 (100%)
					(GLACIOFL	UVIAL D	EPOSITS)				-					
				-							-			7.50	D7	
											]					
				-							-					
											-					
			1	-							-	Dry	7.50	8.50	S	N=12 (1,2/2,3,3,4)
				(3.70)										8.50 - 8.95	D8	
			1	-							_					
											1					
											-					
				-												
				•							-			10.0-		
	Inst					-					V	/ater	Casing	10.00 - 10.45 Depth	Type & No	75 (100%) Results
Grou	undw	ater e	entries:	a. Sool	Diamet	er & casi	ing:	Depth related	d remarks	: Roma	arke:		C	From: to:	ails:	n: Tool:
Suu	UR. 19		o. Odsin	y. seal		и). Dept 200	7.00 7.00			Reina	ai N.S.				Duratio	л. тоот.
						150 1	9.00 19.00									
L												_				
AGS	All de	s: For exp eviations s	lanation of syml ee Key Sheet. educed levels a	ools and	Project:	Eas	t Anglia (North)	Offshore Wind	d Farm				E	xploratory pos	ition refere	ence:
Logi	issue		FINAL		Project	No: 331	8							BH	17-	C7-02
Scale	e:		1:50		Client:	GHE	) Ltd									Sheet 1 of 2

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Logged: 25-07-17 Type: IP From Start date End date Plant: Barrel type: Drill Bit: Remarks: Crew Logger mE: 626792.09 0.00 1.20 25-07-17 25-07-17 MJ Hand tools n/a n/a VS mN: 331492.52 CP 0.00 20.00 25-07-17 25-07-17 MJ Dando 2000 n/a n/a 25-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 32.74 Grid OSGB Backfill/ Instal'n Legend Depth Samples & In Situ Testing Water-strike (thick-ness) Stratum Description l evel Water Casing Depth Type & No Results/Remarks Firm to stiff brownish grey locally mottled greyish brown slightly sandy gravelly CLAY. Gravel of subangular to subrounded fine to coarse chalk and flint. Occasionally stained orangish brown. 22 24 10 50 (GLACIOFLUVIAL DEPOSITS) 10.50 D9 22.14 10.60 Firm brownish grey slightly gravelly sandy CLAY. Gravel of subangular to subrounded fine to medium chalk and flint. (GLACIOFLUVIAL DEPOSITS) Loose becoming medium dense dark orangish brown silty fine to medium SAND $\Box$ (GLACIOFLUVIAL DEPOSITS) 11.50 11.50 - 11.95 Dry 11.50 N=9 (1,1/2,2,2,3) S D10 13.00 N=11 (1,2/2,3,3,3) Drv 13.00 S 13.00 - 13.45 D11 (6.90)Dry 14.50 14.50 S N=27 (2,2/5,6,7,9) 14.50 - 14.95 D12 Dry 16.00 16.00 S N=34 (2,3/5,7,9,13) D13 16.00 - 16.45 N=41 (3,5/6,9,10,16) 15.24 17.50 Dry 17.50 17.50 Dense dark greyish brown slightly gravelly slightly silty medium to coarse 17.50 - 17.95 D14 SAND. Gravel of subangular to subrounded fine to medium flint. (WROXHAM CRAG FORMATION) (2.50)50 (4,9/12,17,21,) Drv 19.00 19.00 S 19.00 - 19.45 D15 20.00 12 74 20.00 Depth D16 Type & No Borehole ends at 20.00m (Target depth) Water Casing Results Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Dia (mm): Depth: Struck: Rose to: Casing: Sealed: Casing From: To: Remarks: From: to: Duration: Tool: 11.30 8.10 11.30 nation of symbols and a Key Sheet Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm AGS No abi All BH17-C7-02 Project No: 3318 FINAL Log issue: Client: GHD Ltd 1:50 Sheet 2 of 2 Scale:

B	0	eh	ole	Lo	bg								Ter	raC	onsult
Во	reho	le for	mation	detail	s:										Location details:
Typ IP CF	e:	From: 0.00 0.00	To: 1.20 20.00	Start d 20-07 20-07	ate: End d -17 20-07 -17 21-07	ate: Crew .17 MJ .17 MJ	: Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 20-07-17 21-07-17	Logger: VS VS	Remarks	s: mmer ID: SI 3 E(i	)% 75	mE:         626802.16           mN:         331579.34           mAOD:         28.11           Grid:         OSGB
ckfill/ stal'n	ater- rike	gend	Level	Depth (thick-			Stratum	Description					Samples	& In Situ Te	esting
a si	st č	Ē		ness)	Soft dark	orangish k	rown slightly sa	ndy slightly sil		aro	Water	r Casing	Depth	Type & No	Results/Remarks
			27.71	(0.40) 0.40	Subangula (TOPSOII Firm dark CLAY. Ra laminatior	ar to subro <u>)</u> orangish l re subang is of fine to	brown mottled li brown mottled li ular to subround o medium SANI	gravel. Freque ght grey and d led fine flint gr ). Occasional	ark reddisl avel. Occa rootlets.	h brown sar Isional	idy		0.50 0.50	D1 ES1	
				(1.00)		ARTH)					-		1.00 1.00	D2 ES2	
			26.71	1.40	Loose bed fine to me (BRICKE/	coming me dium SAN ARTH)	edium dense da ID. Occasionally	rk orangish bro v mottled dark	own slightly reddish bro	y clayey silt <u>y</u> own.	/ - Dry		1.50 1.50 1.50 - 1.95 2.00 2.00 - 2.40	S ES3 D3 ES4 B1	N=7 (1,1/1,2,2,2)
				-	-						- Dry	2.50	2.50 2.50 - 2.95	S D4	N=7 (1,0/1,1,2,3)
				. (4.50)							- Dry	3.50	3.50 3.50 - 3.95	S D5	N=10 (1,2/2,2,3,3)
				-							- Dry	4.50	4.50 4.50 - 4.95	S D6	N=16 (1,2/3,4,4,5)
			22.21	5.90	- Firm dark	brownish	grey occasional	ly mottled dark	5.50 - 5.90 m: k orangish	Becomes claye	Dry tly	5.50	5.50 5.50 - 5.95	S D7	N=14 (2,2/3,3,4,4)
					Coarse ch (BRICKE/	alk and ra	re flint.		Subjound				6.50	D8	38 (100%)
				(3.10) _	-								7.50	D9	
				-				8. <u>50 - 9.</u> 1	00 m: Become	es sandy and so	ft Dry	6.00	8.50 8.50 - 8.95	S D10	N=22 (3,3/4,5,6,7)
			19.11	9.00 -	Medium d Occasiona (BRICKE/	ense dark al pockets ARTH)	grey silty slight of dark grey gra	ly clayey fine t avelly CLAY wi	o medium th chalk gr	SAND. avel.			9.50 - 9.90	B2	
	Inst	×		(2.00)	-						- Dry Water	10.00 Casing	10.00 Depth	S Type & No	N=29 (2,3/3,7,9,10) Results
Gro	ound	vater e	entries:	0	Diame	eter & cas	sing:	Depth relate	d remarks	:			Chiselling det	ails:	Task
Stru 9	uck: .00	Rose t 8.40	o: Casin 0 6.00	g: Sea )	led:   Dia (i	nm): Dep 200 150	oth: Casing: 6.00 6.00 16.00 16.00	From: Tc	):	Rema	rks:		From: to:	Duratio	on: Tool:
AG Log		tes: For exp previations s depths and r	lanation of symb ee Key Sheet. reduced levels ar FINAL	ols and re in metres.	Projec Projec Client	t: Eas t No: 331 GH	st Anglia (North) 8 D Ltd	Offshore Wind	d Farm			E	Exploratory pos	sition refere	ence: C7-03
- 50															2500 1 51 0

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B	or	eh	ole	e Lo	bg									Teri	raC	onsult
Bor Type IP CP	eho ::	le fori From: 0.00 0.00	To: 1.20 20.00	details Start d 20-07 20-07	<b>S:</b> ate: E -17 2 -17 2	End date: 20-07-17 21-07-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 20-07-17 21-07-17	Logger: VS VS	Remarks SPT ha	s: mmer ID: SI 3 E(r	)% 75	Location         details:           mE:         626802.16           mN:         331579.34           mAOD:         28.11
2 6		77		Denth										Complete		Grid: OSGB
3ackfil Instal'r	Water- strike	egenc	Level	(thick- ness)				Stratum	Description			10/=+	0	Samples		
			17.11		- Mediu Occa - (BRIC	um dense isional po CKEARTI	e dark g ockets o H)	grey silty slightl f dark grey gra	ly clayey fine t avelly CLAY wi	o medium S	SAND. avel.			10.00 - 10.45	D11	
				-		CKEART	H)					Dry	11.50	11.50 11.50 - 11.95	S D12	N=42 (3,5/6,9,13,14)
				- (5.30)	-							- Dry	13.00	13.00 13.00 - 13.45	S D13	63 (5,9/63 for 215mm)
				-	-							- Dry	14.50	14.50 14.50 - 14.95	S D14	50 (5,9/50 for 215mm)
			11.81	- - 16.30 -	-Stiff c	dark grey	slightly I fine to	sandy slightly coarse chalk a	gravelly CLA	7. Gravel of I flint.	subangula	- Dry	16.00	16.00 16.00 - 16.45	S D15	N=43 (3,6/14,12,9,8)
					-(BRIC	JKEARTI	H)							17.00 17.50 - 17.95	D16 U2	70 (100%)
												- Dry	16.00	19.00 19.00 - 19.45 19.00 - 19.45	S D111 D18	N=34 (4,5/7,8,9,10)
	SP Inst		8.41 8.11	19.70 (0.30) <del>- 20.00</del>	-Dark fine to	grey gra o coarse	velly slig flint. Po	ghtly silty SAN ockets of dark (	D. Gravel of s grey CLAY.	ubangular 1	o subround	Jed- Water	Casing	20.00 Depth	B3 Type & No	Results
Grou Stru 19	undv ck: ).7	vater e Rose ti 8.90	entries: o: Casir ) 16.	ng: Sea 5	led: [	Diameter	& casir Depth	ng: n: Casing:	Depth related From: To	d remarks:	Rema	arks:		Chiselling deta From: to:	ails: Duratio	on: Tool:
AGS Log Scal	issue	es: For exp reviations so depths and r	lanation of sym ee Key Sheet. reduced levels a FINAL 1:50	bols and are in metres.	P P C	Project: Project No Client:	East 3318 GHD	Anglia (North)	Offshore Wind	d Farm			E	Exploratory pos	sition refere	ence: <b>C7-03</b> Sheet 2 of 3

#### Sheet 2 of 3

B	or	eh	ole	Lo	DQ	J									Teri	raC	on	sult
Bor Type IP CP	ehole E: Fi C	e for rom: .00 .00	To: 1.20 20.00	details Start d 20-07 20-07	<b>s:</b> ate: -17 -17	End date: 20-07-17 21-07-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 20-07-17 21-07-17	Logger VS VS	r: Re SF	emarks: PT ham	imer ID: SI 3 E(r	·)% 75	Locati mE: mN: mAOD: Grid:	on details: 626802.16 331579.34 28.11 OSGB
ckfill/ tal'n	ater- rike	gend	Level	Depth (thick-				Stratum	Description						Samples	& In Situ T	esting	
Bac	We str	Leg	20101	ness)	VIA				200010001			W	ater C	Casing	Depth	Type & No	Res	sults/Remarks
						RUXHAM	Boi	rehole ends at 2	0.00m (Target	depth)								
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	Inst											Wa	ater C	Casing	Depth	Type & No		Results
Grou Stru	ck: R	ater e ose t	entries: o: Casin	g: Sea	led:	Diameter Dia (mm)	& casir	ng: Casing:	From: To	d remarks	: Rem	arks:		C F	hiselling det From: to:	ails: Duratio	on:	Tool:
								-										
AGS	Notes abbre All de	: For exp viations s pths and r	lanation of symb ee Key Sheet. educed levels a	ols and re in metres.		Project:	East	Anglia (North)	Offshore Win	d Farm				E	xploratory pos	sition refere	ence:	• •
Log	issue:		FINAL			Project No Client	о: 3318 GHD	Ltd							BH	117-	<b>C7</b> .	-03
Scal	e:		1:50				0.10											Sheet 3 of 3

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From Start date End date Plant: Barrel type: Drill Bit: Logged: Remarks: To Crew Logger 626845.20 mΕ 0.00 1.20 24-07-17 24-07-17 24-07-17 MJ Hand tools n/a n/a VS mN: 331611.63 CP 0.00 20.00 24-07-17 25-07-17 MJ Dando 2000 n/a n/a 25-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 25.84 Grid OSGB Samples & In Situ Testing Backfill/ Instal'n Legend Depth Water-strike l evel (thick-ness) Stratum Description Water Casing Depth Type & No Results/Remarks Soft dark orangish brown slightly sandy slightly silty CLAY. Rare (0.40) subangular to subrounded fine flint gravel. Frequent rootlets. (TOPSOIL) 25.44 0.40 Stiff dark orangish brown slightly sandy CLAY. Occasionally mottled light 0.50 D1 0.50 ES1 grey. (0.60) (BRICKEARTH) 24.84 1.00 1.00 D2 Loose becoming medium dense light orangish brown slightly clayey silty 1.00 ES2 fine to medium SAND. Rare gravel of subangular to subrounded fine to coarse flint. Occasional fine to coarse gravel and cobble sized pockets of dark brown mottled light grey and reddish brown sandy CLAY. Dry N=9 (1,1/2,2,2,3) 1.50 S ES3 (BRICKEARTH) 1.50 1.50 - 1.95 D3 2.00 ES4 Dry 2.40 2.50 S N=11 (1,2/2,3,3,3) 2.50 - 2.95 D4 Drv 3.40 3.50 S N=17 (1,2/3,4,4,6) 3.50 - 3.95 D5 (5.40)Dry 4.50 4.50 S N=22 (2,3/5,5,6,6) 4.50 - 5.50 m: Becomes fine sand 4.50 - 4.95 D6 Dry 5.50 5.50 N=18 (1,2/3,4,5,6) S 5.50 - 5.95 D7 19.44 6.40 Medium dense dark orangish brown gravelly silty slightly clayey fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (BRICKEARTH) N=19 (2,3/5,4,5,5) Dry 7.00 7.00 С (1.30) 7 00 - 7 45 B1 18.14 7.70 Firm to stiff dark brownish grey mottled dark orangish brown and dark brown slightly gravelly sandy CLAY. Gravel of subangular to subrounded 8.00 D8 fine to coarse flint. Rare shell fragments. (BRICKEARTH) 8.50 - 8.95 40 (0%) B2 8.50 - 8.95 UNR (2.30)10.00 N=8 (1,2/2,2,2,2) Results 15 04 Dry 8.00 Water Casing 10.00 Depth Type & No Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Struck: Rose to: Casing: Sealed: Dia (mm): Depth: Casing From: Remarks: From: Duration: Tool: To: to: 10.0 5.10 8.00 200 8.00 8.00 17.00 150 17.00 nation of symbols and a Key Sheet Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm AGS No abi All BH17-C7-04 Project No: 3318

FINAL

1:50

Client:

GHD Ltd

Log issue:

Scale:

Sheet 1 of 2

#### **TerraConsult Borehole Log** Borehole formation details: Location details: Type: IP From: 0.00 Logged: 24-07-17 To Start date: End date Plant: Barrel type: Drill Bit: Logger Remarks: Crew mE: 626845.20 24-07-17 1.20 24-07-17 MJ Hand tools VS n/a n/a mN: 331611.63 CP 0.00 20.00 24-07-17 25-07-17 MJ Dando 2000 n/a n/a 25-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 25.84 Grid: OSGB Depth (thick-ness) Backfill/ Instal'n Legend Samples & In Situ Testing Water-strike Stratum Description Level Type & No Water Casing Depth Results/Remarks Loose becoming medium dense dark grey silty fine to coarse SAND. Rare 10.00 - 10.45 D9 subangular to subrounded fine to medium flint. (WROXHAM CRAG FORMATION) 11.50 11.50 - 11.95 Dry 11.40 S D10 N=7 (1,0/1,2,2,2) 13.00 13.00 N=20 (1,3/3,4,6,7) Drv S 13.00 - 13.45 D11 (6.70) Dry 14.40 14.50 14.50 - 14.95 S N=18 (1,2/2,4,5,7) D12 Dry 16.00 16.00 S N=31 (2,2/4,4,10,13) D13 16.00 - 16.45 9.14 16.70 Firm to stiff dark brownish grey slightly gravelly slightly sandy CLAY. Gravel of subangular to subrounded fine to coarse flint. (WROXHAM CRAG FORMATION) 17.50 - 17.95 U2 68 (100%) 18.00 D14 (3.30) Drv 17.00 19.00 N=29 (3,4/5,7,8,9) S 19.00 - 19.45 D15 20.00 D16 Type & No 5 04 20.00 Depth Borehole ends at 20.00m (Target depth) Water Casing Results Depth related remarks: Chiselling details: Groundwater entries: Diameter & casing: Dia (mm): Depth: From: Struck: Rose to: Casing: Sealed: Casing: From: To: Remarks: to: Duration: Tool: ee Key Sheet Notes: For ex abbreviations and All depths and Exploratory position reference: Project: East Anglia (North) Offshore Wind Farm AGS BH17-C7-04 Project No: 3318 Log issue: FINAL Client: GHD Ltd Scale: 1:50

## APPENDIX B Photographs
#### BH17-C6-01



0.50 m









### BH17-C6-02



1.50 m









### BH17-C6-03



3.50 m





#### 6.50 m





### BH17-C6-04



0.50 m



4.50 m pockets of clay





### BH17-C7-01



#### 0.50 m



5.70 m



12.70 m

### BH17-C7-02



#### 4.50 m



6.90 m



#### 11.50 m





### BH17-C7-03



0.50 m





#### 5.50 m





9.50 m







### BH17-C7-04



1.00 m









# APPENDIX C In Situ Testing Results

Variable head permeability test



#### TerraConsult Static water level (m) 7.60 Test 1 Internal Diameter (D) 0.15 Time (t0) 0 Length of Standpipe below Ground Level (m) 0.00 Time (t) 3600 Head of Water Height of Water above Ground Level (m) 0.00 Length of Standpipe above Ground Level (m) 0.00 Initial Head (h0) at (t0) 7.84 Water level at start of test (m) 0.16 Final Head (h(t)) at (t) 7.73 Top of Response Zone 7.50 Length of Response Zone (L) 0.50 Bottom of Response Zone Cross Sectional Area (S) 8.00 0.0177 Description Slightly silty clayey SAND. Water Elapsed Head of Time below Variable Head Test Water (seconds) Datum 7.84 0 0.160 0.000 10 0.160 7.84 20 0.170 7.83 30 0.170 7.83 60 0.180 7.82 7.81 120 0.190 0.050 7.81 180 0.190 7.80 240 0.200 300 0.200 7.80 Depth of Water below datum (m) 007 001 001 001 001 001 001 600 0.220 7.78 7.77 900 0.230 7.77 1200 0.230 7.76 1500 0.240 1800 0.250 7.75 0.260 7.74 2400 7.73 3000 0.270 3600 0.270 7.73

Shape Factor (F) calculated according to ISO 22282-1:2012

$$F = \frac{2 \pi L}{ln \left\{ (L/D) + \sqrt{\left( (L/D)^2 + 1 \right)} \right\}}$$
$$= \frac{3.14}{1.90}$$
$$= 1.66$$

 $k = \frac{S \ln \left( \frac{h_0}{h(t)} \right)}{F(t - t_0)}$ 

Equation for borehole permeability tests after BS EN ISO 22282-2:2012

3000

4000

2000

Elapsed Time (seconds)

Calculated by:	JMT	Project:	East Anglia (North) Offshore Wind Farm	Exploratory position reference:
		Project No:	3318	BH17-C6-02
Checked by:	DD	Client:	GHD	

1000

0.250

0.300 0







### APPENDIX D Instrumentation Sampling and Monitoring Records

# TerraConsult

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**GROUNDWATER AND GROUND GAS MONITORING** 

East Anglia OWF

Site:

3318

No:

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<b>DNITORING</b>
WATER MO
D GROUND
D GAS AN
GROUN

			Well E	Details		U	Sroundwater	F							Gas							Weathe	r
Location	Date	Monitored by	Standpipe diameter (mm)	Depth to Base (m bgl)	Water Depth (m bgl)	Water Sample Taken?	Water Temp oC	Odour	Colour	Atmospher ic Pressure i (mbar)	Atmospher ic Pressure Comment	Relative Pressure (Pa)	Flow (I/h)	CH4 (% v/v)	GSV CH <sub>4</sub> (l/hr)	CO <sub>2</sub> (% v/v)	GSV CO <sub>2</sub> (l/hr)	O2 % v/v)	CO (ppm)	H2S (ppm)	VOC (ppm)	Conditions	Ambient Temp °C
	11/08/17	κw	51	12.74	6.74	≻				1018	MN	0.0	0.0	0.0	0.0000	0.1	0.0000.C	20.9	0	0	WN	sunny, dry	21
	22/08/17	۸S	51	11.96	6.70	z				1015	MN	0.0	0.0	0.0	0.0000	0.1	0000°C	20.8	0	0	WN	sunny, dry	19
	31/08/17	NS	51	11.82	6.76	z				1013	NM	0.0	0.0	0.0	0.0000	0.4	0.0000.0	20	0	0	NM	sunny, dry	18
	14/09/17	VS	51	11.90	6.77	z				995	NM	0.0	0.0	0.0	0.0000	0.0	0.0000	20.9	0	0	NM	Showers	15
	10/08/17	κw	51	14.65	8.71	≻				1020	MN	0.0	0.0	0.0	0.0000	0.0	0.0000.C	20.6	0	0	WN	sunny, dry	20
	22/08/17	۸S	51	14.40	8.69	z				1015	MN	0.0	0.0	0.0	0.0000	0.1	0000°C	20.4	0	0	WN	sunny, dry	19
20-00-71 LIG	31/08/17	NS	51	14.40	8.73	z				1013	NM	0.0	0.0	0.0	0.0000	0.2	0.000 C	20.9	0	0	NM	sunny, dry	18
	14/09/17	VS	51	14.38	8.79	z				995	NM	0.0	0.0	0.0	0.0000	0.1	0.000 C	20.5	0	0	NM	Showers	15
	10/08/17	κw	51	17.36	8.80	≻				1020	MN	0.0	0.0	0.0	0.0000	0.2	0000°C	20.3	0	0	WN	sunny, dry	20
	22/08/17	NS	51	19.68	8.80	z				1014	NM	0.0	0.0	0.0	0.0000	0.1	0.000 C	21	0	0	NM	sunny, dry	19
	31/08/17	VS	51	19.46	8.86	z				1013	NM	0.0	0.0	0.0	0.0000	0.1	0.0000	20.7	0	0	MM	sunny, dry	18
	14/09/17	VS	51	17.16	8.91	z				995	NM	0.0	0.0	0.0	0.0000	0.7	0.0000	19.5	0	0	NM	Showers	15
	10/08/17	κw	51	18.48	3.71	Υ				1020	NM	0.0	0.0	0.0	0.0000	0.5	0.0000.0	20.2	0	0	NM	sunny, dry	20
BH17_C7_03	22/08/17	NS	51	18.41	3.43	z				1014	NM	0.0	0.0	0.0	0.0000	0.2	0.0000	21.2	0	0	MM	sunny, dry	19
	31/08/17	NS	51	18.32	3.54	z				1014	MN	0.0	0.0	0.0	0.0000	0.6	0.0000	20.3	0	0	WN	sunny, dry	18

5

Showers

NM

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20.2

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0.0000

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0.0

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MM

997

z

18.21

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14/09/17

## APPENDIX E Geotechnical Laboratory Test Results

Report References:

GSTL 35625

CLS 684646



#### LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5)

Contract Number

Site Name

#### 36525

#### E Anglia Wind Farm - Cable Route

					-						
Hole Reference	Sample Number	Sample Type	D	epth (ı	m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing .425mm %	Remarks
BH17-C6-01	7	D	5.00	-		19	23	16	7	100	CL Low Plasticity
BH17-C6-02	7	D	6.00	-		18	23	16	7	100	CL Low Plasticity
BH17-C6-03	5	D	8.50	-	8.95	37		NP		100	
BH17-C7-02	5	D	5.50	-	5.95	26	25	21	4	100	ML Low Plasticity
BH17-C7-04	8	D	8.00	-		17	22	18	4	100	ML Low Plasticity
				-							
				-							
				-							
				-							
				-							
				-							
				-							



#### PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION

BS 5930:1999+A2:2010





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





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


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

CCTI	ONE DIMENSIONAL CONSOLIDATION TEST	Contract Number	36525
USIL	BS1377:Part 5:1990, clause 3	Borehole/Trialpit No.	BH17-C6-03
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	1
Soil Description	Prown cilty condy CLAV	Depth Top (m)	7.00
	BIOWH Silly Salidy CLAT	Depth Base (m)	7.45
Lab Temperature	20°c	Sample Location	Middle
Remarks	Cv Calculated Using T90	Sample Type	U



	Pressure Range		IVIV m2/IVIN	Cv Pressure Range		Mv m2/MN	m2/yr		
18	0	-	100	0.6	5.8		-		
2.24	100	-	200	0.16	6.1		-		
1.89	200	-	400	0.092	11		-		
3999	400	-	800	0.0	11		-		
22.2	800	-	400	-0.00099	26		-		
9.83	400	-	200	-0.00085	10		-		
74.9		-					-		
2.65		-					-		
	18 2.24 1.89 3999 22.2 9.83 74.9 2.65	18         0           2.24         100           1.89         200           3999         400           22.2         800           9.83         400           74.9         2.65	18     0     -       2.24     100     -       1.89     200     -       3999     400     -       22.2     800     -       9.83     400     -       74.9     -       2.65     -	18       0       -       100         2.24       100       -       200         1.89       200       -       400         3999       400       -       800         22.2       800       -       400         9.83       400       -       200         74.9       -       -         2.65       -       -	18       0       -       100       0.6         2.24       100       -       200       0.16         1.89       200       -       400       0.092         3999       400       -       800       0.0         22.2       800       -       400       -0.00099         9.83       400       -       200       -0.00085         74.9       -       -       -         2.65       -       -       -	18       0       -       100       0.6       5.8         2.24       100       -       200       0.16       6.1         1.89       200       -       400       0.092       11         3999       400       -       800       0.0       11         22.2       800       -       400       -0.00099       26         9.83       400       -       200       -0.00085       10         74.9       -       -       -       -         2.65       -       -       -       -	18       0       -       100       0.6       5.8         2.24       100       -       200       0.16       6.1         1.89       200       -       400       0.092       11         3999       400       -       800       0.0       11         22.2       800       -       400       -0.0099       26         9.83       400       -       200       -0.00085       10         74.9       -       -       -       -       -         2.65       -       -       -       -       -	18       0       -       100       0.6       5.8       -         2.24       100       -       200       0.16       6.1       -         1.89       200       -       400       0.092       11       -         3999       400       -       800       0.0       11       -         22.2       800       -       400       -0.0099       26       -         9.83       400       -       200       -0.00085       10       -         74.9       -       -       -       -       -         2.65       -       -       -       -       -	18       0       -       100       0.6       5.8       -       -       -         2.24       100       -       200       0.16       6.1       -       -       -         1.89       200       -       400       0.092       11       -       -       -         3999       400       -       800       0.0       11       -       -       -         22.2       800       -       400       -0.0099       26       -       -       -         9.83       400       -       200       -0.00085       10       -       -       -         74.9       -       -       -       -       -       -       -       -         2.65       -       -       -       -       -       -       -       -

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

CCTI	ONE DIMENSIONAL CONSOLIDATION TEST	Contract Number	36525
USIL	BS1377:Part 5:1990, clause 3	Borehole/Trialpit No.	BH17-C7-01
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	2
Soil Description	Prown cilty condy CLAV	Depth Top (m)	10.00
	BIOWH SILLY SAINLY CLAT	Depth Base (m)	10.45
Lab Temperature	20°c	Sample Location	Middle
Remarks	Cv Calculated Using T90	Sample Type	U



Initial Sample Conditions		Pressure Range		Mv m2/MN	Cv m2/yr	Pressure Range		Mv m2/MN	Cv m2/yr		
Moisture Content (%)	17	0	-	100	0.63	3.5		-			
Bulk Density (Mg/m3)	2.23	100	-	200	0.11	6.1		-			
Dry Density (Mg/m3)	1.90	200	-	400	0.096	7.4		-			
Voids Ratio	0.3926	400	-	800	0.1	8.4		-			
Degree of saturation	116.8	800	-	400	0.00028	18		-			
Height (mm)	19.77	400	-	200	0.0028	5.6		-			
Diameter (mm)	74.91		-					-			
Particle Density (Mg/m3)	2.65		-					-			

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

CCTI	Single Stage Unconsolidated-Undrained Triaxial Test	Contract Number	36525
GOIL	BS 1377 : 1990 Part 7 : 8	Borehole/Pit No.	BH17-C6-03
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	1
Soil Description	Brown silty candy CLAV	Depth Top (m)	7.00
	blown sing sandy CLAT	Depth Base (m)	7.45
		Sample Type	U



Moisture Content (%)	17			
Bulk Density (Mg/m <sup>3</sup> )		2.25		
Dry Density (Mg/m <sup>3</sup> )		1.92		
Specimen Length (mm)	)	203		
Specimen Diameter (mm	ו)	102		
Cell Pressure (kPa)	Cell Pressure (kPa)			
Deviator Stress (kPa)	63			
Undrained Shear Strength (kPa)		31		
Failure Strain (%)		12.3		
Mode Of Failure		Plastic		
Membrane Used/Thickne	SS	Rubber/0.3mm		
Rate of Strain (%/min)		3.00		
Checked		20/09/2017		

Approved

21/09/2017

Specimen Post Test	Sample Split
PICTURE NOT AVAILABLE	PICTURE NOT AVAILABLE
	*

Sean Penn	
Paul Evans	
	2788

CCTI	Single Stage Unconsolidated-Undrained Triaxial	Contract Number	36525
GOIL	BS 1377 : 1990 Part 7 : 8		BH17-C7-01
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	1
Soil Description	Brown find to coored gravelly sitty CLAV	Depth Top (m)	7.00
	Brown line to coarse gravely sity GLAT	Depth Base (m)	7.45
		Sample Type	U



Moisture Content (%)	15			
Bulk Density (Mg/m <sup>3</sup> )	2.23			
Dry Density (Mg/m <sup>3</sup> )	1.94			
Specimen Length (mm)	203			
Specimen Diameter (mm)	102			
Cell Pressure (kPa)	200			
Deviator Stress (kPa)	74			
Undrained Shear Strength (kPa)	37			
Failure Strain (%)	9.9			
Mode Of Failure	Plastic			
Membrane Used/Thickness	Rubber/0.3mm			
Rate of Strain (%/min)	3.00			

Specimen Post Test	Sample Split
PICTURE NOT AVAILABLE	PICTURE NOT AVAILABLE



CCTI	Single Stage Unconsolidated-Undrained Triaxial	Contract Number	36525
GOIL	BS 1377 : 1990 Part 7 : 8	Borehole/Pit No.	BH17-C7-03
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	1
Soil Description	Crowlergue alightly conduiting to modium growelly aith CLAV	Depth Top (m)	7.00
		Depth Base (m)	7.45
		Sample Type	U



Moisture Content (%)	15			
Bulk Density (Mg/m <sup>3</sup> )	2.31			
Dry Density (Mg/m <sup>3</sup> )	2.01			
Specimen Length (mm)	204			
Specimen Diameter (mm)	102			
Cell Pressure (kPa)	140			
Deviator Stress (kPa)	84			
Undrained Shear Strength (kPa)	42			
Failure Strain (%)	15.7			
Mode Of Failure	Plastic			
Membrane Used/Thickness	Rubber/0.3mm			
Rate of Strain (%/min)	3.00			
	•			

Specimen Post Test	Sample Split
PICTURE NUT AVAILABLE	PICTURE NUT AVAILABLE

Checked	20/09/2017	Sean Penn		
Approved	21/09/2017	Paul Evans		UKAS UKAS TESTING 2788



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 1E 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 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 Advis

Concept Reference:	684646						
Project Site:	Happisburgh/East Anglia						
Customer Reference:							
Soil BRE SD1 (SE)	Analysed a	as Soil					
				Conce	pt Reference	684646 008	684646 009
			Custon	ner Samp	le Reference	BH17-C6-01 D7 @ 5.00m	17-C7-03 D8 @ 6.50m
				[	Date Sampled	Deviating	Deviating
					Matrix Class	Sandy Soil	Clay
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	0.02
Magnesium		T112	A40	1	mg/l	<1	3
(Water soluble) NO3		T710	A40	0.01	g/l	<0.01	<0.01
рН		T7	A40			8.1	8.3
(Water Soluble) SO4 expressed as S	04	T242	A40	0.01	g/l	0.02	0.03
SO4(Total)		T102	A40	0.02	%	<0.02	0.02
Sulphur (total)		Т6	A40	0.01	%	<0.01	0.01
Moisture @105C		T162	AR	0.1	%	16	14
Retained on 2mm		T2	A40	0.1	%	2.3	2.4

# Index to symbols used in Supplement 1E to Report Number 684646-1

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

## Notes

Supplement 1E Report reissued to include only samples 008 and 009
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

## **Method Index**

Value	Description
T2	Grav
T7	Probe
T710	2:1 Extraction / Discrete Analyser
T102	ICP/OES (HCI extract)
Т6	ICP/OES
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T112	ICP/OES (SIM)(Water Extract)
T162	Grav (1 Dec) (105 C)

# **Accreditation Summary**

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
(Water soluble) Ammonia expressed as NH4	T710	AR	0.01	g/l	N	008-009
(Water soluble) Cl-	T710	A40	0.01	g/l	N	008-009
Magnesium	T112	A40	1	mg/l	N	008-009
(Water soluble) NO3	T710	A40	0.01	g/l	N	008-009
рН	T7	A40			М	008-009
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	М	008-009
SO4(Total)	T102	A40	0.02	%	М	008-009
Sulphur (total)	T6	A40	0.01	%	М	008-009
Moisture @105C	T162	AR	0.1	%	N	008-009
Retained on 2mm	T2	A40	0.1	%	N	008-009

# APPENDIX F Geoenvironmental Laboratory Test Results

Report References:	672447
	674086
	675177



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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 672447-1

Date of Report: 23-Oct-2017

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

Customer Contact: Mr Derek Daniels

Customer Job Reference: 3318 Customer Purchase Order: PO-001748 Customer Site Reference: Norfolk Vanguard Cable Route Date Job Received at Concept: 13-Jul-2017 Date Analysis Started: 03-Aug-2017 Date Analysis Completed: 11-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





Report checked and authorised by : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service Advis

Analysed as Soil

Soil

Miscellaneous

			Conce	ot Reference	672447 026	672447 030	672447 034	672447 038	672447 042
		Custor	ner Sampl	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C6-04 ES2 @ 1.00m	BH17-C6-01 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m
			D	ate Sampled	14-JUL-2017	13-JUL-2017	17-JUL-2017	18-JUL-2017	20-JUL-2017
Matrix Class					Sandy Soil	Sandy Soil	Clay	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T257	A40	2	mg/kg	8	7	10	9	8
Barium	T257	A40	2	mg/kg	41	33	38	32	25
Beryllium	T245	A40	0.5	mg/kg	<0.5	<0.5	0.7	<0.5	0.5
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	T257	A40	0.5	mg/kg	13	12	19	13	11
Copper	T257	A40	2	mg/kg	11	7	14	7	8
Lead	T257	A40	2	mg/kg	27	14	12	9	8
Mercury	T245	A40	1.0	mg/kg	1.3	<1.0	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	9.1	9.0	17	10	9.6
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3	<3
Vanadium	T257	A40	0.1	mg/kg	19	19	31	20	18
Zinc	T257	A40	2	mg/kg	32	27	37	24	24
Soil Organic Matter	T287	A40	0.1	%	1.4	0.9	-	-	0.2
Moisture @105C	T162	AR	0.1	%	8.8	7.1	15	3.7	16
Retained on 2mm	T2	A40	0.1	%	1.0	5.5	8.1	6.5	1.3

Concept Reference: 672447 Project Site: Norfolk Vanguard Cable Route

Customer	Reference	3318					
Soil		Analysed	as Soil				
Miscellaneous							
		1	Conce	ot Reference	672447 054	672447 066	672447 074
		Custor	ner Samp	le Reference	BH17-C7-02 ES2 @ 1.00m	BH17-C7-04 ES2 @ 1.00m	BH17-C7-01 ES2 @ 1.00m
			D	ate Sampled	25-JUL-2017	24-JUL-2017	27-JUL-2017
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units			1003104
Arsenic	T257	A40	2	mg/kg	10	5	3
Barium	T257	A40	2	mg/kg	29	23	14
Beryllium	T245	A40	0.5	mg/kg	<0.5	<0.5	<0.5
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	<0.1	<0.1	<0.1
Chromium	T257	A40	0.5	mg/kg	33	6.1	5.9
Copper	T257	A40	2	mg/kg	8	3	3
Lead	T257	A40	2	mg/kg	10	4	4
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	11	5.1	5.6
Selenium	T257	A40	3	mg/kg	<3	<3	<3
Vanadium	T257	A40	0.1	mg/kg	20	13	8.6
Zinc	T257	A40	2	mg/kg	25	12	11
Soil Organic Matter	T287	A40	0.1	%	0.5	-	-
Moisture @105C	T162	AR	0.1	%	7.5	6.0	5.0
Retained on 2mm	T2	A40	0.1	%	40.6	2.6	<0.1

Concept F	Reference:	672447								
Pr	oject Site:	Norfolk V	folk Vanguard Cable Route							
Customer F	Reference:	3318								
Soil Asbestos		Analysed	as Soil							
			Concep	ot Reference	672447 025	672447 029	672447 041	672447 053		
		Custor	ner Sampl	e Reference	BH17-C6-03 ES1 @ 0.50m	BH17-C6-02 ES1 @ 0.50m	BH17-C7-03 ES1 @ 0.50m	BH17-C7-02 ES1 @ 0.50m		
			Da	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017		
Determinand	Method	Test Sample	LOD	Units						
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected		

Soil

Analysed as Soil Total and Speciated USEPA16 PAH (SE) (MCERTS)

			Concep	t Reference	672447 026	672447 030	672447 042	672447 054
		Custon	ner Sampl	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
			Da	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units				
Naphthalene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
PAH(total)	T16	AR	0.1	ma/ka	<0.1	<0.1	<0.1	<0.1



Soil

Analysed as Soil

TPH	CWG

IFICWG								
			Concep	ot Reference	672447 026	672447 030	672447 042	672447 054
		Custor	ner Sampl	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
			Da	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
			I	Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units				
Benzene	T209	AR	10	µg/kg	<10	<10	<10	<10
Toluene	T209	AR	10	µg/kg	<10	<10	<10	<10
EthylBenzene	T209	AR	10	µg/kg	<10	<10	<10	<10
M/P Xylene	T209	AR	10	µg/kg	<10	<10	<10	<10
O Xylene	T209	AR	10	µg/kg	<10	<10	<10	<10
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	2	<2	<2	<2
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	2	<2	<2	<2
TPH (C35-C40 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C35-C40 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (Aliphatic+Aromatic) C10-C25 (Sum)	T85	AR	4	mg/kg	(62) <5	(62) <5	(62) <5	(62) <5
TPH (Aliphatic+Aromatic) C25-C40 (Sum)	T85	AR	4	ma/ka	(62) <5	(62) <5	(62) <5	(62) <5

Concept Reference: 672447 Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318

Analysed as Soil

Organochlorine insecticides

Soil

			Conce	ot Reference	672447 026	672447 030	672447 042	672447 054
		Custor	ner Samp	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
				ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units		201		
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	T1	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Heptachlor	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Aldrin	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Chlordane	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Endosulphan	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
DDE	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Dieldrin	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Endrin	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
DDD	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
тла	T16	AR	0.01	ma/ka	<0.01	<0.01	<0.01	<0.01

Analysed as Soil

Organophosphorous insecticides

Soil

			Conce	ot Reference	672447 026	672447 030	672447 042	672447 054
		Custor	ner Sampl	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
			D	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units				
Dichlorvos	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Mevinphos	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Dimethoate	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Diazinon	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Pirimiphos methyl	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Malathion	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Fenitrothion	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Parathion	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Azinphos methyl	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01

#### Concept Reference: 672447

Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318

Analysed as Soil

Soil Triazines Suite

			Concep	t Reference	672447 026	672447 030	672447 042	672447 054 BH17-C7-02 ES2 @ 1.00m
		Custon	ner Sampl	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	
			Da	te Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
			r	latrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units				
Simazine	T16	AR	0.01	mg/kg	(64) < 0.01	(64) < 0.01	(64) < 0.01	<sup>(64)</sup> <0.01
Atrazine	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01
Propazine	T16	AR	0.01	mg/kg	(64) < 0.01	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01
Trietazine	T16	AR	0.01	mg/kg	(64) < 0.01	(64) < 0.01	(64) < 0.01	<sup>(64)</sup> <0.01
Prometryn	T16	AR	0.01	mg/kg	(64) < 0.01	(64) < 0.01	(64) < 0.01	<sup>(64)</sup> <0.01
Terbutryn	T16	AR	0.01	mg/kg	(64) < 0.01	(64) < 0.01	(64) < 0.01	(64) < 0.01

Concept F	Reference:	erence: 672447								
Pr	oject Site:	te: Norfolk Vanguard Cable Route								
Customer F	Reference:	3318								
Soil Urons	Analysed as Soil									
			Conce	ot Reference	672447 026	672447 030	672447 042	672447 054		
		Customer Sample Reference         BH17-C6-03 ES2 @ 1.00m         BH17-C6-02 ES2 @ 1.00m         BH17-C7-03 ES2 @ 1.00m         BH17-C7-02 ES2 @ 1.00m								
			D	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017		
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil		
Determinand	Method	Test Sample	LOD	Units						
Chlorotoluron	T310	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01		
Diuron	T310	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01		
Isoproturon	T310	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01		
Linuron	T310	AR	0.01 mg/kg		<0.01	<0.01	<0.01	<0.01		
Monuron	T310	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01		

Analysed as Soil

Phenoxy Acetic acid herbicides

Soil

Soil

			Conce	ot Reference	672447 026	672447 030	672447 042	672447 054
		Custon	ner Samp	le Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
			D	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units				
Mecoprop	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Phenoxy Acetic acid herbicide: MCPA	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Dichlorprop	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Phenoxy Acetic acid herbicide: 2,4-D	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Fenoprop	T16	AR	0.01	mg/kg	<sup>(36)</sup> <0.02	<sup>(36)</sup> <0.02	(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	(36) < 0.02	(36) < 0.02

Concept Reference: 672447

Project Site: Norfolk Vanguard Cable Route

Customer Reference: 3318

	Concept Re
Phenols (Speciated)	
Soil	Analysed as Soil

			Conce	pt Reference	672447 026	672447 030	672447 042	672447 054	
		Custor	ner Samp	le Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m	
			D	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017	
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units	100				
Resorcinol	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	
Catechol	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	
Phenol	T17	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	
Cresols	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	
Xylenols	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	
Naphthols	T17	AR	0.05	mg/kg	<0.05	< 0.05	<0.05	<0.05	
Trimethyl phenol	T17	AR	0.05	mg/kg	(62) < 0.10	(62) < 0.10	(62) < 0.10	(62) < 0.10	
Total Phenols	T17	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	

## Index to symbols used in Supplement 1C to Report Number 672447-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
64	Analysis was performed by an alternative technique
62	LOD was raised due to the method performance of the analytical procedure used
36	LOD Raised due to low Matrix spike recovery
S	Analysis was subcontracted
М	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

## Notes

026, 030, 042, 054, - BTEX - Samples submitted for GC/MS (Headspace) analysis were submitted in inappropriate containers. It is possible therefore that the results provided may be compromised						
OCP & OPP - 026, 030, 042 - These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.						
Supplement 1C report reissued to include only samples 025, 026, 029, 030, 034, 038, 041, 042, 053, 054, 066 and 074						
TPH, PAH & BTEX - 026, 030 - These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.						
OCP, OPP and PAAH analysis transferred to Concept Life Sciences Manchester						
Speciated phenols - 026, 030, 042, 054- These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.						
Asbestos subcontracted to REC Limited						
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except TPH c5-c35 aro/ali split, Urons, Triazines, OCP/OPP and PAAH						
Retained on 2mm is removed before analysis						

## **Method Index**

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

# **Accreditation Summary**

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2	mg/kg	М	026,030,034,038,042,054,066,074
Barium	T257	A40	2	mg/kg	U	026,030,034,038,042,054,066,074
Beryllium	T245	A40	0.5	mg/kg	U	026,030,034,038,042,054,066,074
Boron (water-soluble)	T82	A40	1	mg/kg	N	026,030,034,038,042,054,066,074
Cadmium	T257	A40	0.1	mg/kg	М	026,030,034,038,042,054,066,074
Chromium	T257	A40	0.5	mg/kg	М	026,030,034,038,042,054,066,074
Copper	T257	A40	2	mg/kg	М	026,030,034,038,042,054,066,074
Lead	T257	A40	2	mg/kg	М	026,030,034,038,042,054,066,074
Mercury	T245	A40	1.0	mg/kg	U	026,030,034,038,042,054,066,074
Nickel	T257	A40	0.5	mg/kg	М	026,030,034,038,042,054,066,074
Selenium	T257	A40	3	mg/kg	U	026,030,034,038,042,054,066,074
Vanadium	T257	A40	0.1	mg/kg	U	026,030,034,038,042,054,066,074
Zinc	T257	A40	2	mg/kg	М	026,030,034,038,042,054,066,074
Soil Organic Matter	T287	A40	0.1	%	N	026,030,042,054
Moisture @105C	T162	AR	0.1	%	N	026,030,034,038,042,054,066,074
Retained on 2mm	T2	A40	0.1	%	N	026,030,034,038,042,054,066,074
Asbestos ID	T27	A40			SU	025,029,041,053
Naphthalene	T16	AR	0.1	mg/kg	U	026,030,042,054
Acenaphthylene	T16	AR	0.1	mg/kg	U	026,030,042,054
Acenaphthene	T16	AR	0.1	mg/kg	М	026,030,042,054
Fluorene	T16	AR	0.1	mg/kg	М	026,030,042,054
Phenanthrene	T16	AR	0.1	mg/kg	U	026,030,042,054
Anthracene	T16	AR	0.1	mg/kg	М	026,030,042,054
Fluoranthene	T16	AR	0.1	mg/kg	N	026,030,042,054
Pyrene	T16	AR	0.1	mg/kg	N	026,030,042,054
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	М	026,030,042,054
Chrysene	T16	AR	0.1	mg/kg	М	026,030,042,054
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	026,030,042,054
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	026,030,042,054
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	М	026,030,042,054
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	М	026,030,042,054
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	М	026,030,042,054
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	М	026,030,042,054
PAH(total)	T16	AR	0.1	mg/kg	U	026,030,042,054
Benzene	T209	AR	10	µg/kg	М	026,030,042,054
Toluene	T209	AR	10	µg/kg	М	026,030,042,054
EthylBenzene	T209	AR	10	µg/kg	М	026,030,042,054
M/P Xylene	T209	AR	10	µg/kg	M	026,030,042,054
O Xylene	T209	AR	10	µg/kg	M	026,030,042,054
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	026,030,042,054
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	026,030,042,054

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	Ν	026,030,042,054
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	Ν	026,030,042,054
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	Ν	026,030,042,054
TPH (C35-C40 aliphatic)	T219	AR	2	mg/kg	Ν	026,030,042,054
TPH (C35-C40 aromatic)	T219	AR	2	mg/kg	Ν	026,030,042,054
TPH (Aliphatic+Aromatic) C10-C25 (Sum)	T85	AR	4	mg/kg	Ν	026,030,042,054
TPH (Aliphatic+Aromatic) C25-C40 (Sum)	T85	AR	4	mg/kg	N	026,030,042,054
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	U	026,030,042,054
Hexachlorobenzene	T1	AR	0.01	mg/kg	U	026,030,042,054
Heptachlor	T16	AR	0.01	mg/kg	U	026,030,042,054
Aldrin	T16	AR	0.01	mg/kg	U	026,030,042,054
Heptachlor epoxide	T16	AR	0.01	mg/kg	U	026,030,042,054
Chlordane	T16	AR	0.01	mg/kg	U	026,030,042,054
Endosulphan	T16	AR	0.01	mg/kg	U	026,030,042,054
DDE	T16	AR	0.01	mg/kg	U	026,030,042,054
Dieldrin	T16	AR	0.01	mg/kg	U	026,030,042,054
Endrin	T16	AR	0.01	mg/kg	U	026,030,042,054
DDD	T16	AR	0.01	mg/kg	U	026,030,042,054
DDT	T16	AR	0.01	mg/kg	U	026,030,042,054
Dichlorvos	T16	AR	0.01	mg/kg	U	026,030,042,054
Mevinphos	T16	AR	0.01	mg/kg	U	026,030,042,054
Dimethoate	T16	AR	0.01	mg/kg	U	026,030,042,054
Diazinon	T16	AR	0.01	mg/kg	U	026,030,042,054
Pirimiphos methyl	T16	AR	0.01	mg/kg	U	026,030,042,054
Malathion	T16	AR	0.01	mg/kg	U	026,030,042,054
Fenitrothion	T16	AR	0.01	mg/kg	U	026,030,042,054
Parathion	T16	AR	0.01	mg/kg	U	026,030,042,054
Azinphos methyl	T16	AR	0.01	mg/kg	U	026,030,042,054
Simazine	T16	AR	0.01	mg/kg	N	026,030,042,054
Atrazine	T16	AR	0.01	mg/kg	N	026,030,042,054
Propazine	T16	AR	0.01	mg/kg	N	026,030,042,054
Trietazine	T16	AR	0.01	mg/kg	N	026,030,042,054
Prometryn	T16	AR	0.01	mg/kg	Ν	026,030,042,054
Terbutryn	T16	AR	0.01	mg/kg	Ν	026,030,042,054
Chlorotoluron	T310	AR	0.01	mg/kg	N	026,030,042,054
Diuron	T310	AR	0.01	mg/kg	N	026,030,042,054
Isoproturon	T310	AR	0.01	mg/kg	N	026,030,042,054
Linuron	T310	AR	0.01	mg/kg	N	026,030,042,054
Monuron	T310	AR	0.01	mg/kg	N	026,030,042,054
Месоргор	T16	AR	0.01	mg/kg	N	026,030,042,054
Phenoxy Acetic acid herbicide: MCPA	T16	AR	0.01	mg/kg	N	026,030,042,054
Dichlorprop	T16	AR	0.01	mg/kg	N	026,030,042,054
Phenoxy Acetic acid herbicide: 2,4-D	T16	AR	0.01	mg/kg	N	026,030,042,054
Fenoprop	T16	AR	0.01	mg/kg	N	026,030,042,054
Phenoxy Acetic acid herbicide: 2,4,5-T	T16	AR	0.01	mg/kg	N	026,030,042,054
Resorcinol	T17	AR	0.05	mg/kg	М	026,030,042,054
Catechol	T17	AR	0.05	mg/kg	N	026,030,042,054
Phenol	T17	AR	0.1	mg/kg	М	026,030,042,054
Cresols	T17	AR	0.05	mg/kg	М	026,030,042,054
Xylenols	T17	AR	0.05	mg/kg	М	026,030,042,054
Naphthols	T17	AR	0.05	mg/kg	N	026,030,042,054
Trimethyl phenol	T17	AR	0.05	mg/kg	М	026,030,042,054
Total Phenols	T17	AR	0.1	mg/kg	N	026,030,042,054



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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 674086-1

Date of Report: 23-Oct-2017

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

Customer Contact: Mr 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 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 : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service Adv

Analysed as Soil

CLEA metals, Braintree

Soil

Braintree

	674086 014								
	BH17-C7-02 ES2 @ 1.00m								
	27-JUL-2017								
	Matrix Class								
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T257	A40	2	mg/kg	43				
Barium	T257	A40	2	mg/kg	75				
Beryllium	T245	A40	0.5	mg/kg	1.1				
Boron (water-soluble)	T82	A40	1	mg/kg	<1				
Cadmium	T257	A40	0.1	mg/kg	0.2				
Chromium	T257	A40	0.5	mg/kg	23				
Copper	T257	A40	2	mg/kg	13				
Lead	T257	A40	2	mg/kg	14				
Mercury	T245	A40	1.0	mg/kg	<1.0				
Nickel	T257	A40	0.5	mg/kg	26				
Selenium	T257	A40	3	mg/kg	<3				
Vanadium	T257	A40	0.1	mg/kg	47				
Zinc	T257	A40	2	mg/kg	45				
Soil Organic Matter	T287	A40	0.1	%	0.2				
Moisture @105C	T162	AR	0.1	%	15				
Retained on 2mm	T2	A40	0.1	%	3.3				

с	oncept R	eference:	674086	12.1					
	Project Site: Norfolk Vanguard Cable Route								
Cu	Customer Reference: 3318								
Soil Asbestos			Analysed	as Soil					
	Concept Reference 674086 013								
	Customer Sample Reference BH17-C7-02 ES1 @ 0.50m								
				D	ate Sampled	27-JUL-2017			
	Matrix Class Clay								
Determina	ind	Method	Test Sample	LOD	Units				
Asbestos ID		T27	A40			Asbestos not detected			

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

	674086 014				
	BH17-C7-02 ES2 @ 1.00m				
	27-JUL-2017				
	Clay				
Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T16	AR	0.1	mg/kg	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	<0.1
Anthracene	T16	AR	0.1	mg/kg	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	0.1
Pyrene	T16	AR	0.1	mg/kg	0.1
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	<0.1
Chrysene	T16	AR	0.1	mg/kg	<0.1
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	<0.1
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	0.1
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	<0.1
PAH(total)	T16	AR	0.1	mg/kg	0.5

Concept Reference: 674086 Project Site: Norfolk Vanguard Cable Route

TPH (Aliphatic+Aromatic) C25-C40 (Sum)

Customer Reference: 3318 Soil Analysed as Soil TPH CWG **Concept Reference** 674086 014 BH17-C7-02 ES2 @ 1.00m **Customer Sample Reference** Date Sampled 27-JUL-2017 Matrix Class Clay Test Sample Determinand Method LOD Units T209 Benzene AR 10 µg/kg <10 Toluene T209 AR 10 µg/kg <10 EthylBenzene T209 AR 10 <10 µg/kg T209 AR 10 <10 M/P Xylene µg/kg T209 O Xylene AR 10 µg/kg <10 Methyl tert-Butyl Ether T54 AR <1 1 µg/kg TPH (C5-C6 aliphatic) AR <0.010 T54 0.010 mg/kg TPH (C6-C7 aromatic) T54 AR 0.010 mg/kg <0.010 TPH (C6-C8 aliphatic) T54 0.010 AR mg/kg < 0.010 TPH (C7-C8 aromatic) T54 AR 0.010 mg/kg <0.010 TPH (C8-C10 aliphatic) T54 AR 0.010 <0.010 mg/kg TPH (C8-C10 aromatic) T54 AR 0.010 <0.010 mg/kg TPH (C10-C12 aliphatic) T219 AR 2 <2 mg/kg TPH (C10-C12 aromatic) T219 AR 2 mg/kg <2 TPH (C12-C16 aliphatic) T219 AR 2 <2 mg/kg TPH (C12-C16 aromatic) T219 AR 2 mg/kg <2 TPH (C16-C21 aliphatic) T219 AR 2 <2 mg/kg TPH (C16-C21 aromatic) T219 AR 2 mg/kg <2 TPH (C21-C35 aliphatic) T219 AR <2 2 mg/kg TPH (C21-C35 aromatic) T219 AR 2 mg/kg <2 TPH (C35-C40 aliphatic) T219 AR 2 mg/kg <2 TPH (C35-C40 aromatic) T219 AR 2 mg/kg <2 TPH (Aliphatic+Aromatic) C10-C25 (Sum) T85 AR 4 mg/kg <4

T85

AR

4

mg/kg

<4

Analysed as Soil

Phenols (Speciated) **Concept Reference** 674086 014 BH17-C7-02 ES2 @ 1.00m **Customer Sample Reference** Date Sampled 27-JUL-2017 Matrix Class Clay Test Sample Method LOD Determinand Units T17 0.05 <0.05 Resorcinol AR mg/kg Catechol T17 AR 0.05 <0.05 mg/kg Phenol T17 AR <0.1 0.1 mg/kg T17 AR 0.05 <0.05 Cresols mg/kg T17 <0.05 Xylenols AR 0.05 mg/kg T17 Naphthols AR 0.05 <0.05 mg/kg T17 Trimethyl phenol AR 0.05 mg/kg <0.05 Total Phenols T17 AR 0.1 <0.1 mg/kg

#### Concept Reference: 674086 Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318

Analysed as Soil

Soil

#### Soil

Organochlorine insecticides

-	674086 014 BH17-C7-02 ES2 @ 1.00m								
	27-JUL-2017								
				Matrix Class	Clay				
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	<sup>(131)</sup> <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				

Concep	t Reference:	674086	674086						
	Project Site:	Norfolk V	Norfolk Vanguard Cable Route						
Custome	r Reference:	3318							
Soil		Analysed	as Soil						
Organophosphorous	insecticides								
	674086 014								
Customer Sample Reference BH17-C7- 1.0									
			D	ate Sampled	27-JUL-2017				
				Matrix Class	Clay				
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				
Pirimiphos 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	ma/ka	<0.01				

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### Concept Reference: 674086 Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318 Analysed as Soil

Soil

Triazines Suite								
	674086 014							
	BH17-C7-02 ES2 @ 1.00m							
	27-JUL-2017							
	Clay							
Determinand	Method	Test Sample	LOD	Units				
Simazine	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			
Atrazine	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			
Propazine	T16	AR	0.01	mg/kg	(64) < 0.01			
Trietazine	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			
Prometryn	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			
Terbutryn	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			

Concept	Reference:	674086	674086							
Р	roject Site:	Norfolk Va	Norfolk Vanguard Cable Route							
Customer	Reference:	3318								
Soil Urons		Analysed	as Soil							
			Concep	t Reference	674086 014					
Customer Sample Reference BH17-C7-02 E 1.00m										
	ate Sampled	27-JUL-2017								
			I	Matrix Class	Clay					
Determinand	Method	Test Sample	LOD	Units	100					
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: 67	74086		1.19	-92.5						
Proiect Site: N	Norfolk Vanguard Cable Route									
Customer Reference: 33	318									
Soil A Phenoxy Acetic acid herbicides	nalysed as S	oil								
			Conce	ot Reference	674086 014					
	Customer Sample Reference BH17-C7-02 ES2 @ 1.00m									
			D	ate Sampled	27-JUL-2017					
				Matrix Class	Clay					
Determinand	Method	Test Sample	LOD	Units	long V/					
Месоргор	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
100	LOD determined by sample aliquot used for analysis
64	Analysis was performed by an alternative technique
S	Analysis was subcontracted

Produced by Concept Life Sciences, 3 Crittall Drive, Springwood Industrial Estate, Braintree, Essex, CM7 2RT Page 5 of 8 This document has been printed from a digitally signed mas@upplement 1C to Report Number 674086-1

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

## Notes

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, OCP, OPP and PAAH
Triazines & Urons analysis transferred to Concept Life Sciences Cambridge
OCP, OPP and PAAH analysis transferred to Concept Life Sciences Manchester
Supplement 1C Report reissued to include only samples 013 and 014

## **Method Index**

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

## **Accreditation Summary**

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2	mg/kg	М	014
Barium	T257	A40	2	mg/kg	U	014
Beryllium	T245	A40	0.5	mg/kg	U	014
Boron (water-soluble)	T82	A40	1	mg/kg	N	014
Cadmium	T257	A40	0.1	mg/kg	М	014
Chromium	T257	A40	0.5	mg/kg	М	014
Copper	T257	A40	2	mg/kg	М	014
Lead	T257	A40	2	mg/kg	М	014
Mercury	T245	A40	1.0	mg/kg	U	014
Nickel	T257	A40	0.5	mg/kg	М	014
Selenium	T257	A40	3	mg/kg	U	014
Vanadium	T257	A40	0.1	mg/kg	U	014
Zinc	T257	A40	2	mg/kg	М	014
Soil Organic Matter	T287	A40	0.1	%	Ν	014
Moisture @105C	T162	AR	0.1	%	N	014
Retained on 2mm	T2	A40	0.1	%	N	014
Asbestos ID	T27	A40			SU	013
Naphthalene	T16	AR	0.1	mg/kg	U	014
Acenaphthylene	T16	AR	0.1	mg/kg	U	014
Acenaphthene	T16	AR	0.1	mg/kg	М	014
Fluorene	T16	AR	0.1	mg/kg	М	014
Phenanthrene	T16	AR	0.1	mg/kg	U	014
Anthracene	T16	AR	0.1	mg/kg	М	014
Fluoranthene	T16	AR	0.1	mg/kg	N	014
Pyrene	T16	AR	0.1	mg/kg	N	014
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	М	014
Chrysene	T16	AR	0.1	mg/kg	М	014
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	014
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	014
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	М	014
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	М	014
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	М	014
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	М	014

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
PAH(total)	T16	AR	0.1	mg/kg	U	014
Benzene	T209	AR	10	µg/kg	М	014
Toluene	T209	AR	10	µg/kg	М	014
EthylBenzene	T209	AR	10	µg/kg	M	014
M/P Xylene	T209	AR	10	µg/kg	M	014
O Xylene	1209	AR	10	µg/kg	M	014
TPH (C5-C6 aliphatic)	T54	AR	0.010	ma/ka	N	014
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	014
TPH (C6-C8 aliphatic)	T54	AR	0.010	ma/ka	N	014
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	014
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	014
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	014
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	014
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	014
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	014
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	014
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	014
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	014
TPH (C21-C35 aliphatic)	T219		2	mg/kg	N	014
TPH (C21-C35 aronatic)	T219		2	mg/kg	N	014
TPH (C35-C40 aromatic)	T219	AR	2	ma/ka	N	014
TPH (Aliphatic+Aromatic) C10-C25 (Sum)	T85	AR	4	mg/kg	N	014
TPH (Aliphatic+Aromatic) C25-C40 (Sum)	T85	AR	4	ma/ka	N	014
Resorcinol	T17	AR	0.05	mg/kg	M	014
Catechol	T17	AR	0.05	mg/kg	N	014
Phenol	T17	AR	0.1	mg/kg	М	014
Cresols	T17	AR	0.05	mg/kg	М	014
Xylenols	T17	AR	0.05	mg/kg	М	014
Naphthols	T17	AR	0.05	mg/kg	N	014
Trimethyl phenol	T17	AR	0.05	mg/kg	М	014
Total Phenols	T17	AR	0.1	mg/kg	N	014
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	U	014
Hexachlorobenzene	11 T10	AR	0.01	mg/kg	U	014
Aldrin	T16		0.01	mg/kg	0	014
Heptachlor epoxide	T16	AR	0.01	mg/kg	U	014
Chlordane	T16	AR	0.01	ma/ka	U	014
Endosulphan	T16	AR	0.01	mg/kg	U	014
DDE	T16	AR	0.01	mg/kg	U	014
Dieldrin	T16	AR	0.01	mg/kg	U	014
Endrin	T16	AR	0.01	mg/kg	U	014
DDD	T16	AR	0.01	mg/kg	U	014
DDT	T16	AR	0.01	mg/kg	U	014
Dichlorvos	T16	AR	0.01	mg/kg	U	014
Mevinphos	T16	AR	0.01	mg/kg	U	014
Dimethoate	116 T10	AR	0.01	mg/kg	0	014
Diazinon Biriminhaa mathul	T16		0.01	mg/kg	0	014
Malathion	T16	AR	0.01	mg/kg	U	014
Fenitrothion	T16	AR	0.01	mg/kg	U	014
Parathion	T16	AR	0.01	mg/kg	U	014
Azinphos methyl	T16	AR	0.01	mg/kg	U	014
Simazine	T16	AR	0.01	mg/kg	N	014
Atrazine	T16	AR	0.01	mg/kg	N	014
Propazine	T16	AR	0.01	mg/kg	N	014
Trietazine	T16	AR	0.01	mg/kg	N	014
Prometryn	T16	AR	0.01	mg/kg	N	014
Terbutryn	T16	AR	0.01	mg/kg	N	014
Chlorotoluron	T310	AR	0.01	mg/kg	N	014
Diuron	1310	AR	0.01	mg/kg	N	014
	1310 T240	AR	0.01	mg/kg	N	014
Monuron	T310		0.01	mg/kg	N	014
Mecoprop	T16	AR	0.01	mg/kg	N	014
Phenoxy Acetic acid herbicide: MCPA	T16	AR	0.01	ma/ka	N	014
Dichlorprop	T16	AR	0.01	ma/ka	N	014
Phenoxy Acetic acid herbicide: 2,4-D	T16	AR	0.01	mg/kg	N	014
Fenoprop	T16	AR	0.01	mg/kg	N	014

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Phenoxy Acetic acid herbicide: 2,4,5-T	T16	AR	0.01	mg/kg	N	014





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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 672447-1 A

Date of Report: 16-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-001748 Customer Site Reference: Norfolk Vanguard Cable Route Date Job Received at Concept: 13-Jul-2017 Date Analysis Started: 03-Aug-2017 Date Analysis Completed: 11-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





Report checked and authorised by : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service A



Page 1 of 7

Customer Sample Reference : BH17-C6-03 ES2 @ 1.00m

SAL Sample Reference : 672447 026

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 14-JUL-2017

Matrix Class : Sandy Soil

	Soil Summary	Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill			
Determinand	Technique	LOD	Units	Symbol				
pН	Probe			М	7.3		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	2.9			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.8	3.0	5.0	6.0
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	М	<10	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	8.8			
Retained on 2mm	Grav	0.1	%	N	1.0			

	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	0.0069	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.074	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	87	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	0.041	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	51	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	5.2	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	0.014	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	55	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	250	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.055	4.0	50.0	200.0

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

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

Customer Sample Reference : BH17-C6-02 ES2 @ 1.00m

SAL Sample Reference : 672447 030

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 13-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			М	7.5		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	2.3			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.5	3.0	5.0	6.0
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	М	<10	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	7.1			
Retained on 2mm	Grav	0.1	%	N	5.5			

	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	0.0063	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.023	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	45	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	0.050	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	60	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	6.4	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	39	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	160	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.077	4.0	50.0	200.0

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

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

Customer Sample Reference : BH17-C7-03 ES2 @ 1.00m

SAL Sample Reference : 672447 042

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 20-JUL-2017

Matrix Class : Sandy Soil

	Soil Summary				Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pН	Probe			М	8.2		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	1.3			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.1	3.0	5.0	6.0
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	М	<10	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	16			
Retained on 2mm	Grav	0.1	%	N	1.3			

	10:1 Leachate			1.0	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	0.013	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	Ν	0.14	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	320	800.0	15000.0	25000.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.011	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.084	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	62	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	5.1	10.0	150.0	500.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.0067	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	0.020	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	110	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	1300	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.050	4.0	50.0	200.0

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

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

Customer Sample Reference : BH17-C7-02 ES2 @ 1.00m

SAL Sample Reference : 672447 054

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 25-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			М	8.0		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	1.8			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.3	3.0	5.0	6.0
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	М	<10	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	7.5			
Retained on 2mm	Grav	0.1	%	N	40.6			

	10:1 Leachate			1.0	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	0.0048	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	Ν	0.025	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	35	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	61	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	0.016	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	27	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	280	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.030	4.0	50.0	200.0

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

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

Soil Analysed as Soil Total and Speciated USEPA16 PAH (SE) (MCERTS)

			Concep	t Reference	672447 026	672447 030	672447 042	672447 054
		Custo	mer Sampl	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
			٦	Fest Sample	AR	AR	AR	AR
			Da	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
			1	Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	LOD	Units	Symbol				
Naphthalene	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1
Pyrene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Coronene	GC/MS (MCERTS)	0.1	ma/ka	N	<0.1	<0.1	<0.1	<0.1

Concept Reference: 672447

Project Site:	Norfolk Vanguard Cable Route							
Customer Reference:	3318							
Soil	Analysed as Soil							
ЗТЕХ								
			Concep	t Reference	672447 026	672447 030	672447 042	672447 054
		Custor	mer Sample	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
			T	Test Sample	AR	AR	AR	AR
			Da	te Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
			N	Aatrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	LOD	Units	Symbol				
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10
Foluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10

Concept Reference:	672447								
Project Site:	Norfolk '	Vanguard Cal	ble Route						
Customer Reference:	3318								
Soil PCBs EC7 (SE)	Analyse	d as Soil							
				Concep	t Reference	672447 026	672447 030	672447 042	672447 054
			Custo	mer Sample	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
				I	lest Sample	AR	AR	AR	AR
				Da	te Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
				ľ	Aatrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand		Method	LOD	Units	Symbol				
Polychlorinated biphenyl B2	Z#28	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#52	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#101	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#118	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B	Z#153	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#138	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#180	GC/MS	20	µg/kg	М	<20	<20	<20	<20

# Index to symbols used in Supplement 1B to Report Number 672447-1 A

	D 1.0
Value	Description
AR	As Received
A40	Assisted dried < 40C
8:1	Leachate to BS EN 12457-3 (8:1)
2:1	Leachate to BS EN 12457-3 (2:1)
110	LOD raised due to low internal standard recovery.
М	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
Ν	Analysis is not UKAS accredited

## Notes

Supplement 1B report reissued to include only samples 026, 030, 042 and 054
026, 030, 042, 054, - 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
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except ANC
pH, LOI & TOC were performed on assisted dried samples (<40 degree centigrade). All other results relate to samples as received.
TPH, PAH, PCB & BTEX - 026, 030 - These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.





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 1A 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 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 : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service



Page 1 of 4

Customer Sample Reference : BH17-C7-02 ES2 @ 1.00m

SAL Sample Reference: 674086 014

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 27-JUL-2017

Matrix Class : Clay

	Soil Summary				Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pH	Probe			М	8.2		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	3.0			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	М	<10	500.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	15			
Retained on 2mm	Grav	0.1	%	N	3.3			

	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	0.0024	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.11	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	37	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	<0.0050	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	150	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	10	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	0.025	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	26	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	620	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 ammended)

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

# Concept Reference: 674086 Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318 Soil Analysed as Soil

Total and Speciated USEPA16 PAH (SE) (MCERTS)

			Concep	t Reference	674086 014
Customer Sample Reference					BH17-C7-02 ES2 @ 1.00m
	Test Sample				
			Da	ate Sampled	27-JUL-2017
			I	Matrix Class	Clay
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	М	<0.1
Fluorene	GC/MS	0.1	mg/kg	М	<0.1
Phenanthrene	GC/MS	0.1	mg/kg	U	<0.1
Anthracene	GC/MS	0.1	mg/kg	М	<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	М	<0.1
Chrysene	GC/MS	0.1	mg/kg	М	<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	М	0.1
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	М	<0.1
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	М	<0.1
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	М	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS	0.1	mg/kg	U	0.5

	074000				
Concept Reference	674086				
Project Site	Norfolk Vanguard Cable Route				
Customer Reference	3318				
Soil	Analysed as Soil				
BTEX					
			Concep	t Reference	674086 014
		Custo	mer Sample	e Reference	BH17-C7-02 ES2 @ 1.00m
			1	Fest Sample	AR
			Da	te Sampled	27-JUL-2017
			ľ	Atrix Class	Clay
Determinand	Method	LOD	Units	Symbol	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10

Concept Reference:	674086						
Project Site:	Norfolk Vanguard Cable Route						
Customer Reference:	3318	3318					
Soil	Analyse	Analysed as Soil					
PCBs EC7 (SE)							
				Concep	t Reference	674086 014	
Customer Sample Reference BH17-C7-02 ES. @ 1.00m				BH17-C7-02 ES2 @ 1.00m			
	Test Sample			AR			
	Date Sampled			27-JUL-2017			
	Matrix Class					Clay	
Determinand		Method	LOD	Units Symbol			
Polychlorinated biphenyl B2	Z#28	GC/MS	20	µg/kg	М	<20	
Polychlorinated biphenyl B2	Z#52	GC/MS	20	µg/kg	М	<20	
Polychlorinated biphenyl B2	Z#101	GC/MS	20	µg/kg	М	<20	
Polychlorinated biphenyl B2	Z#118	GC/MS	20	µg/kg	М	<20	
Polychlorinated biphenyl B	Z#153	GC/MS	20	µg/kg	М	<20	
Polychlorinated biphenyl B2	Z#138	GC/MS	20	µg/kg	М	<20	
Polychlorinated biphenyl B2	Z#180	GC/MS	20	µg/kg	М	<20	

# Index to symbols used in Supplement 1A to Report Number 674086-1 A

Value	Description
A40	Assisted dried < 40C
2:1	Leachate to BS EN 12457-3 (2:1)
AR	As Received
8:1	Leachate to BS EN 12457-3 (8:1)
М	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

## Notes

pH, LOI & TOC were performed on assisted dried samples (<40 degree centigrade). All other results relate to samples as received.
Retained on 2mm is removed before analysis
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except ANC
Supplement 1A Report reissued to include only sample 014


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 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





Report checked and authorised by : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service Advi

#### Concept Reference: 675177 Project Site: East Anglia OWF Customer Reference: 3318

Analysed as Water

Water

Heavy Metals (9)								
			Concep	t Reference	675177 005	675177 006	675177 007	675177 008
		Custor	ner Sampl	e Reference	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03
			Da	ate Sampled	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017
Determinand	Method	Test Sample	LOD	Units		-		
As (Dissolved)	T281	F	0.0002	mg/l	0.0003	0.0005	0.0007	0.0011
Cd (Dissolved)	T281	F	0.00002	mg/l	<0.00002	<0.00002	<0.00002	<0.00002
Cr (Dissolved)	T281	F	0.001	mg/l	<0.001	<0.001	<0.001	<0.001
Cu (Dissolved)	T281	F	0.0005	mg/l	0.0015	0.0008	0.0007	0.0006
Pb (Dissolved)	T281	F	0.0003	mg/l	<0.0003	< 0.0003	<0.0003	< 0.0003
Hg (Dissolved)	T281	F	0.00005	mg/l	<0.00005	<0.00005	<0.00005	< 0.00005
Ni (Dissolved)	T281	F	0.001	mg/l	0.001	<0.001	0.002	0.002
Se (Dissolved)	T281	F	0.0005	mg/l	0.0012	< 0.0005	0.0012	<0.0005
Zn (Dissolved)	T281	F	0.002	ma/l	0.003	<0.002	<0.002	0.045

Concept Reference: 675177 Project Site: East Anglia OWF

Customer Reference: 3318

#### Water Analysed as Water

Total and Speciated USEPA16 PAH (SE)

			Conce	ot Reference	675177 005	675177 006	675177 007	675177 008
		Custon	ner Sampl	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03	
			D	ate Sampled	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017
Determinand	Method	Test Sample	LOD	Units				
Naphthalene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Acenaphthene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Fluorene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Phenanthrene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(a)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Chrysene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(a)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
PAH(total)	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01

#### Produced by Concept Life Sciences, 3 Crittall Drive, Springwood Industrial Estate, Braintree, Essex, CM7 2RT Page 2 of 5 This document has been printed from a digitally signed massagement 1C to Report Number 675177-1

#### Concept Reference: 675177 Project Site: East Anglia OWF Customer Reference: 3318

Analysed as Water

TPH (CWG) with MTBE & BTEX SE

Water

			Conce	pt Reference	675177 005	675177 006	675177 007	675177 008
		Custor	ner Samp	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03	
			D	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017	
Determinand	Method	Test Sample	LOD	Units				
Benzene	T54	AR	1	µg/l	<1	<1	<1	<1
EthylBenzene	T54	AR	1	µg/l	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/l	<1	<1	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/l	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/l	<1	<1	<1	<1
Toluene	T54	AR	1	µg/l	<1	<1	<1	<1
TPH (C5-C6 aliphatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C6-C7 aromatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C6-C8 aliphatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C7-C8 aromatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C8-C10 aliphatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C8-C10 aromatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C10-C12 aliphatic)	T219	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01
TPH (C10-C12 aromatic)	T219	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01
TPH (C12-C16 aliphatic)	T219	AR	0.01	mg/l	<0.01	0.01	<0.01	<0.01
TPH (C12-C16 aromatic)	T219	AR	0.01	mg/l	0.02	0.02	0.02	0.03
TPH (C16-C21 aliphatic)	T219	AR	0.01	mg/l	<0.01	<0.01	0.02	<0.01
TPH (C16-C21 aromatic)	T219	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01
TPH (C21-C35 aliphatic)	T219	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01
TPH (C21-C35 aromatic)	T219	AR	0.01	mg/l	< 0.01	< 0.01	0.02	0.02

Concept Reference: 675177 Project Site: East Anglia OWF Customer Reference: 3318

Custor

Analysed as Water

Organochlorine insecticides

Water

			Concep	t Reference	675177 005	675177 006	675177 007	675177 008
		Custon	ner Sampl	e Reference	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03
			Da	ate Sampled	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017
Determinand	Method	Test Sample	LOD	Units				

Hexachlorocyclohexane	T16	AR	0.01	µg/l	(36) < 0.02	(36) < 0.02	(36) < 0.02	(36) < 0.02
Hexachlorobenzene	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Heptachlor	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Aldrin	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Chlordane	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Endosulphan	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
DDE	T16	AR	0.01	µg/l	<0.02	<0.02	<0.02	<0.02
Dieldrin	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Endrin	T16	AR	0.01	µg/l	(36) < 0.02	(36) < 0.02	<sup>(36)</sup> < 0.02	(36) < 0.02
DDD	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
DDT	T16	AR	0.01	µg/l	(36) < 0.02	(36) < 0.02	(36) < 0.02	(36) < 0.02

Concept R	eference:	675177	675177								
Pro	oject Site:	East Anglia OWF									
Customer R	eference:	3318									
Water Organophosphorous ins	secticides	Analysed	as Water								
			Concep	ot Reference	675177 005	675177 006	675177 007	675177 008			
		Custon	ner Sampl	e Reference	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03			
			Da	ate Sampled	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017			
Determinand	Method	Test Sample	LOD	Units			_				
Dichlorvos	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01			
Mevinphos	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01			
Dimethoate	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01			
Diazinon T16		AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01			
Pirimiphos methyl	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01			
Malathion	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01			
Fenitrothion	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01			
Parathion	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01			
Azinphos methyl	T16	AR	0.01	µg/l	(36) < 0.02	<sup>(36)</sup> <0.02	(36) < 0.02	(36) < 0.02			

## Index to symbols used in Supplement 1C to Report Number 675177-1

Value	Description						
F	Filtered						
AR	As Received						
36	OD Raised due to low Matrix spike recovery						
100	LOD determined by sample aliquot used for analysis						
110	LOD raised due to low internal standard recovery.						
U	Analysis is UKAS accredited						
N	Analysis is not UKAS accredited						

#### Notes

Supplement 1C report reissued to include only samples 005, 006, 007 and 008 OCP and OPP transferred to Concept Life Sciences Manchester

#### **Method Index**

Value	Description
T219	GC/FID (SE)
T16	GC/MS
T149	GC/MS (SIR)
T281	ICP/MS (Filtered)
T54	GC/MS (Headspace)

#### **Accreditation Summary**

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
As (Dissolved)	T281	F	0.0002	mg/l	U	005-008
Cd (Dissolved)	T281	F	0.00002	mg/l	U	005-008
Cr (Dissolved)	T281	F	0.001	mg/l	U	005-008
Cu (Dissolved)	T281	F	0.0005	mg/l	U	005-008
Pb (Dissolved)	T281	F	0.0003	mg/l	U	005-008
Hg (Dissolved)	T281	F	0.00005	mg/l	U	005-008
Ni (Dissolved)	T281	F	0.001	mg/l	U	005-008
Se (Dissolved)	T281	F	0.0005	mg/l	U	005-008
Zn (Dissolved)	T281	F	0.002	mg/l	U	005-008
Naphthalene	T149	AR	0.01	µg/l	U	005-008
Acenaphthylene	T149	AR	0.01	µg/l	U	005-008
Acenaphthene	T149	AR	0.01	µg/l	U	005-008
Fluorene	T149	AR	0.01	µg/l	U	005-008
Phenanthrene	T149	AR	0.01	µg/l	U	005-008
Anthracene	T149	AR	0.01	µg/l	U	005-008
Fluoranthene	T149	AR	0.01	µg/l	U	005-008
Pyrene	T149	AR	0.01	µg/l	U	005-008

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	005-008
Chrysene	T149	AR	0.01	µg/l	U	005-008
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	N	005-008
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	U	005-008
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	005-008
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	005-008
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	005-008
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	005-008
PAH(total)	T149	AR	0.01	µg/l	N	005-008
Benzene	T54	AR	1	µg/l	U	005-008
EthylBenzene	T54	AR	1	µg/l	U	005-008
M/P Xylene	T54	AR	1	µg/l	U	005-008
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	005-008
O Xylene	T54	AR	1	µg/l	U	005-008
Toluene	T54	AR	1	µg/l	U	005-008
TPH (C5-C6 aliphatic)	T54	AR	0.020	mg/l	Ν	005-008
TPH (C6-C7 aromatic)	T54	AR	0.020	mg/l	Ν	005-008
TPH (C6-C8 aliphatic)	T54	AR	0.020	mg/l	N	005-008
TPH (C7-C8 aromatic)	T54	AR	0.020	mg/l	N	005-008
TPH (C8-C10 aliphatic)	T54	AR	0.020	mg/l	N	005-008
TPH (C8-C10 aromatic)	T54	AR	0.020	mg/l	N	005-008
TPH (C10-C12 aliphatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C10-C12 aromatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C12-C16 aliphatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C12-C16 aromatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C16-C21 aliphatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C16-C21 aromatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C21-C35 aliphatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C21-C35 aromatic)	T219	AR	0.01	mg/l	N	005-008
Hexachlorocyclohexane	T16	AR	0.01	µg/l	N	005-008
Hexachlorobenzene	T16	AR	0.01	µg/l	N	005-008
Heptachlor	T16	AR	0.01	µg/l	N	005-008
Aldrin	T16	AR	0.01	µg/l	N	005-008
Heptachlor epoxide	T16	AR	0.01	µg/l	N	005-008
Chlordane	T16	AR	0.01	µg/l	Ν	005-008
Endosulphan	T16	AR	0.01	µg/l	Ν	005-008
DDE	T16	AR	0.01	µg/l	N	005-008
Dieldrin	T16	AR	0.01	µg/l	Ν	005-008
Endrin	T16	AR	0.01	µg/l	Ν	005-008
DDD	T16	AR	0.01	µg/l	Ν	005-008
DDT	T16	AR	0.01	µg/l	Ν	005-008
Dichlorvos	T16	AR	0.01	µg/l	Ν	005-008
Mevinphos	T16	AR	0.01	µg/l	N	005-008
Dimethoate	T16	AR	0.01	µg/l	N	005-008
Diazinon	T16	AR	0.01	µg/l	N	005-008
Pirimiphos methyl	T16	AR	0.01	µg/l	N	005-008
Malathion	T16	AR	0.01	µg/l	N	005-008
Fenitrothion	T16	AR	0.01	µg/l	N	005-008
Parathion	T16	AR	0.01	µg/l	N	005-008
Azinphos methyl	T16	AR	0.01	µg/l	N	005-008

## APPENDIX G Calibration Certificates

SPT hammer(s)
Gas monitor(s)

SI 3, SI 4, SI 5 GFM 435 s/n 11378

## Equipe Group



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## Equipe Group



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## Equipe Group



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TEST DA	TE AND CONDITIONS				
Date	21/06/2017				
Atmospheric P	ressure 997	mB			
Ambient Temp	erature 23.0	°C			
Environics Seri	al No. 508	39			

GFM435 Final Inspection & Calibration Check Certificate

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

**GAS DATA LTD** Pegasus House Seven Stars Estate

Tel 02476303311 Fax 02476307711

Wheler Rd Coventry CV3 4LB

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

Instrument Checks						
Keyboard		1	Display Contrast		1	
Pump Flow In	400	Accept > 200 cc/min	Pump Flow @ -200mB	200	Accept > 200 cc/min	
Clock Set / Running	1		Labels Fitted	1		

			Gas Checks				
Sensor	Ch	14	C	02	02		
	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	00	Accept +/- 3.0	10	Accept +/- 0.5	miere	
	5.0	5	4.8	5	6.0	6	
	Accept +/- 0.3		Accept. +/- 0.3		Accept +/+ 0.3	in the second	
Zero Reading	0.0	0.0	0.0	0.0	0.0	0.0	
100% N <sub>2</sub>	Accept +/- 0.0	0.0	Accept +/- 0.0		Accept + 0.1	010	

		Option	al Gas Check	KS				
Applied Gas &	Applied Gas & Range of GFM Concentration			Instrument Readings (ppm)				
Gas Type	Gas Type Range (ppm) Tested @ (p		Zer	o Reading	Instrument Gas Reading			
H2S	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		

Applied	Gas (ppm)			Inst	rument	Readings (ppn	n)	
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	СО	Toxic 3:	Hex	Toxic 4:
H2S	1500	150	00	0		0		
CO	1000	60	)	100	0	0		
Hexane	2.0%	0	5	0		1.9	9	

	Pressure Checks	S	
Atr	nospheric Pressure [A	P] (mB)	
Current Atmospheric Pressure (mB)	tmospheric 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 (1/h)		Differential Pressure				
Applied Flow Reading (1/h)			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		











# TerraConsult

Leaders in waste management environmental & ground engineering consultancy

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

Tel: +44 (0) 1206 585600

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

Tel: +44 (0) 1925 291111 Fax: +44 (0) 1925 291191

Email: mailbox@terraconsult.co.uk Website: www.terraconsult.co.uk





FS 573193



EMS 573194

TerraConsult

From:	Gemma Keenan
То:	Tracey Williams
Cc:	<u>Norfolk Vanguard; Sian Evans; rebecca.sherwood@vattenfall.com; "ruari.lean@vattenfall.com"; Josh Taylor</u> (josh.taylor@wbd-uk.com)
Subject:	Norfolk Vanguard - Email 12 of 18 Deadline 1 Submissions
Date:	16 January 2019 14:58:42
Attachments:	ExA;WQApp16.6;10.D1.3 Norfolk Vanguard WQ Appendix 16.6 Crossing 6-7 GI.pdf

Dear Tracey

This is email 12 of 18 of the Applicant's submission for Norfolk Vanguard Examination Deadline 1.

We enclose the following documents:

Appendix to Written Questions:

• Appendix 16.6 TerraConsult Crossing 6&7

Please could you kindly confirm receipt.

Best Regards

Gemma Keenan BSc, MIEMA, CEnv Senior Environmental Consultant

T +44 131 561 2265 | E gemma.keenan@rhdhv.com | W www.royalhaskoningdhv.com HaskoningDHV UK Ltd., a company of **Royal HaskoningDHV** | 74/2 Commercial Quay, Commercial Street, Leith, Edinburgh, EH6 6LX. United Kingdom. Registered Office: Rightwell House, Bretton, Peterborough PE3 8DW | Registered in England 1336844



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# Norfolk Vanguard Offshore Wind Farm **The Applicant Responses to First Written Questions** Appendix 16.6 – TerraConsult 2017 Ground Investigations Report:

Applicant: Norfolk Vanguard Limited Document Reference: ExA;WQApp16.6;10.D1.3 Deadline 1

Crossing 6&7 (Q16.8)

Date: January 2019

Photo: Kentish Flats Offshore Wind Farm

# TerraConsult









DRAINAGE STONE

COLLIERY SEALJ

November 2017 Report No 3318-R005-2

**East Anglia (North) Offshore Wind Farm** 

**Crossings 6 & 7 Site Investigation** 

**Carried out for:** 

Gutteridge, Haskins and Davey Ltd (GHD)

**TerraConsult** 

# East Anglia (North) Offshore Wind Farm

# **Crossings 6 & 7 Site Investigation**

Date: November 2017

Report No 3318-R005-2

**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



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

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

By:

## DOCUMENT INFORMATION AND CONTROL SHEET

#### **Document Status and Approval Schedule**

Report No.	Title
3318-R005-2	East Anglia (North) Offshore Wind Farm
	Crossings 6 & 7 Site Investigation

Prepared by:	Victoria Smith	Victoria Smith	Engineering Geologist
Approved by:	Derek Daniels		Operations Manager
Date:	01/11/17		

Issue:	Date:	Description:	Prepared by:
1	11/10/17	Draft for Approval	VS
2	01/11/17	Final	DD

#### 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.

This report is issued solely to the client and TerraConsult cannot accept any responsibility to any third parties to whom this report may be circulated, in part or in full, and any such parties rely on the contents at their own risk.



## East Anglia (North) Offshore Wind Farm

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3318(C6)D002-1	Exploratory Hole Location Plan
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APPENDIX A Exploratory Hole Records

- APPENDIX B Photographs
- APPENDIX C In Situ Testing Results

APPENDIX D Instrumentation Sampling and Monitoring Records

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## East Anglia (North) Offshore Wind Farm

## **Crossings 6 & 7 Site Investigation**

#### **1 INTRODUCTION**

0

TerraConsult Limited (TCL) was commissioned by Gutteridge, Haskins and Davey Ltd (GHD) to carry out a ground investigation for the proposed cable route crossing of the A149, Cromer Road (Crossing 6) and the railway line (Crossing 7), near North Walsham, 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 13/07/17 and 28/07/17.

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 6 is located approximately 2.2 km north-west of the centre North Walsham, Norfolk. The approximate location of Crossing 6 is located between Ordnance Survey National Grid Reference TG 266 315 and TG 261 312.

Crossing 7 is located approximately 1.8 km north west of the centre of North Walsham, Norfolk. The approximate location of Crossing 7 is located between Ordnance Survey National Grid Reference TG 268 316 and TG 267 314.

Site location plans are presented as drawings reference 3318(C6)D001-1 and 3318(C7)D001-1.

#### 2.2 Published Geology

The online British Geological Survey (BGS) 1:50,000 scale map shows the sites to be underlain by the Happisburgh Glacigenic Formation sand and gravel and the Briton's Lane Formation sand and gravel.

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

#### **3 FIELDWORK**

#### 3.1 General

Fieldwork was undertaken between 20/07/17 and 28/07/17. 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-C6-01											
Cable percussion, SPTs, variable head permeability test	BH17-C6-02											
Cable percussion, SPTs, variable head permeability test, install	BH17-C6-03											
Cable percussion, SPTs, variable head permeability test	BH17-C6-04											
Cable percussion, SPTs, variable head permeability test, install	BH17-C7-01											
Cable percussion, SPTs, variable head permeability test	BH17-C7-02											
Cable percussion, SPTs, variable head permeability test, install	BH17-C7-03											
Cable percussion, SPTs, variable head permeability test	BH17-C7-04											

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. Photographs are presented in Appendix B.

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

1 able 2: Summary of Exploratory Positions												
Exploratory position:	Туре:	Final depth (m):	Easting (mE):	Northing (mN):	Level (mAOD):	Start date:	End date:					
BH17-C6-01	CP	15.45	626336.80	331280.87	34.59	14/07/2017	17/07/2017					
BH17-C6-02	СР	15.45	626383.55	331326.99	35.22	13/07/2017	14/07/2017					
BH17-C6-03	CP	15.00	636508.14	331291.05	35.66	14/07/2017	14/07/2017					
BH17-C6-04	СР	15.00	626550.48	331321.08	35.39	14/07/2017	17/07/2017					
BH17-C7-01	CP	20.00	626749.29	331461.97	34.10	27/07/2017	28/07/2017					
BH17-C7-02	CP	20.00	626792.09	331492.52	32.74	25/07/2017	25/07/2017					
BH17-C7-03	CP	20.00	626802.16	331579.34	28.11	20/07/2017	21/07/2017					
BH17-C7-04	СР	20.00	626845.20	331611.63	25.84	24/07/2017	25/07/2017					

Type: CP - cable percussion;

Prior to commencement, all exploratory positions were checked for services by reference to available plans, visual inspection and CAT 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(C6)D002-1 and 3318(C7)D002-1.

#### Sampling 3.3

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-C6-01	Standpipe	BH17-C6-01	50	15.45	19.14	5.00	15.00					
BH17-C6-03	Standpipe	BH17-C6-03	50	15.00	20.66	10.00	15.00					
BH17-C7-01	Standpipe	BH17-C7-01	50	20	14.10	12.7	20					
BH17-C7-03	Standpipe	BH17-C7-03	50	20	8.11	19.7	20					

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, Camarthenshire, 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	5	BS1377: Part 2: 4.3 & 5.3										
Particle size distribution	4	BS1377: Part 2: 9.2										
BRE SD1	2	BRE SD1										
One-dimensional consolidation	2	BS1377: Part 5: 3										
Triaxial – 100mm single stage	3	BS1377: Part 7: 8										

#### 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(C6)D001-1 Site Location Plan3318(C7)D001-1 Site Location Plan3318(C6)D002-1 Exploratory Hole Location Plan3318(C7)D002-1 Exploratory Hole Location Plan

# Site Location Plan

**TerraConsult** 



# Site Location Plan

**TerraConsult** 



# **Exploratory Hole Location Plan**

**TerraConsult** 



AGS

Issue:

Scale:

Locations By Type - CP



# **Exploratory Hole Location Plan**

**TerraConsult** 



Issue:

Scale:

Project No: 3318

GHD Ltd

Client:

1:3000

#### APPENDICES

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## APPENDIX A Exploratory Hole Records

Key sheet

Boreholes

# Exploratory Hole Key Sheet

## **TerraConsult**

SAMPLES:													
Lindisturbed:													
U	Driven tube sample												
UT	Thin wall driven tube sample												
TW	Pushed thin wall tube sample												
Р	Pushed piston sample												
L	Liner sample (from windowless or similar sampler), full recovery unless otherwise stated	ł											
CBR	CBR mould sample												
BLK	Block sample												
C	Core sample (from rotary core) taken for laboratory testing												
Disturbed													
	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	'NP' indicate	s 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 increment	tal blow count	ts are given										
	in the Field Records column; each increment is 75mm unless stated otherwise and any weight in mm (SW) is noted. Where the full 300mm test drive is achieved the total numl drive is presented as N = ** in the Test column. Where the test drive here reach 50 (a)	penetration u ber of blows f	nder self or the test										
	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	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 (TC	R/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, %												
lf	Fracture spacing, mm. Minimum, typical and maximum spacings are presented.												
NI	Non intact is used where the core is fragmented.												
CPE	Core recovered (length in m) in the following run												
NR	Not recovered												
GROUNDWATER:		DEPTH RE	MARKS:										
		5.0											
		EoS	End of Shift										
	Groundwater strike	505	Start of Shift End of Borebole										
		ЕОВП											
	Groundwater level after standing period												
INSTRUMENTATION			ORY HOLE TYPE										
Details of installations are gi	ven on the Record. Legend column shows installed instrument depths including slotted	CP	Cable percussion										
pipe section or tip depth, res	ponse zone filter material type and layers of backfill. The type of instrument installed is	DP	Dynamic probe										
indicated by a code adjacent	t to the Legend column at the base of the instrument.		Dynamic cone penetrometer										
SP	Standpipe		nanu auger Inspection pit										
SPIE	Standpipe piezometer	OP	Observation nit/trench										
PPIE	Pneumatic piezometer	PC	Pavement core										
	Electronic piezometer	RC	Rotary core										
	HPIE Hydraulic piezometer RO Rotary open hole												
GMP	Gas monitoring stanopipe	SH	Shaft										
(**)	xx) Internal diameter SNC Sonic (resonance)												
ICE	Biaxial inclinometer		Irial pit/trench										
ICM	ICM Inclinometer tubing for use with probe												
SLIP	SLIP     Slip indicator												
			timeow (dynamic) sample										
ESET	Electronic settlement cell/gauge												
	iviagnetic extensioneter settlement point												
	Project: Fact Anglia (North) Offebore Wind Farm	Reference											
		I VEIGI GIICG											
100	Project NO: 3318		KEY SHEET										
AUD	Client: GHD Ltd		Sheet 1 of 1										

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From Start date End date Plant: Barrel type: Drill Bit: Logged: Remarks: To Crew Logger 626336.80 mΕ 14-07-17 14-07-17 0.00 1.20 14-07-17 ΤМ Hand tools n/a n/a VS mN: 331280.87 CP 0.00 15.45 14-07-17 17-07-17 ΤМ Dando 2000 n/a n/a 17-07-17 VS SPT hammer ID: SI 4 E(r)% 74 mAOD: 34.59 Grid OSGB Samples & In Situ Testing Backfill/ Instal'n Legend Depth Water-strike (thick-ness) l evel Stratum Description Water Casing Depth Type & No Results/Remarks Soft dark brown sandy slightly gravelly CLAY. Gravel of subangular to subrounded fine to coarse flint. (0.50)(TOPSOIL) 34 09 0.50 0.50 D1 Soft dark orangish brown slightly gravelly clayey fine to medium SAND. 0.50 ES1 Gravel of subangular to subrounded fine to coarse flint. 0.50 - 1.00 B1 (0.60) (GLACIOFLUVIÃL DEPOSITS) 0.90 - 1.10 m: Becomes slightly clayey fine to coarse SAND 1.00 D2 33.49 1.10 1.00 ES2 Medium dense dark yellowish brown slightly silty fine to coarse SAND and fine to coarse GRAVEL. Gravel of subangular to subrounded fine to coarse flint. 1.50 1.50 N=14 (1,2/2,2,4,6) Dry С (GLACIOFLUVIAL DEPOSITS) D3 1.50 1.50 ES3 2.00 D4 (1.90) 2 00 FS4 3.00 3.00 N=12 (1,1/2,2,4,4) 31.59 3.00 С Drv Medium dense light yellowish brown gravelly slightly silty fine to coarse 3.00 D5 SAND. Gravel of subangular to subrounded fine to coarse flint. (GLACIOFLUVIAL DEPOSITS) (2.00)4.00 D6 4.00 - 5.00 m: Becomes dark yellowish brown Dry 4.50 С N=8 (1,2/1,2,2,3) 29 59 5.00 5 00 D7 Soft light orangish brown mottled dark orangish brown and light grey sandy CLAY. (GLACIOFLUVIAL DEPOSITS) (1.00) 28.59 6.00 Dry 6.00 6.00 S N=9 (1,2/2,2,2,3) Loose dark grevish brown clayey fine to medium SAND. Occasionally 6.00 - 6.45 D8 mottled dark orangish brown. (GLACIOFLUVIAL DEPOSITS) (1.50) 27.09 7.50 7.50 7.50 N=8 (1,1/2,1,2,3) Dry Loose locally medium dense dark orangish brown very silty fine to medium 7.50 - 7.95 D9 SAND ▼ (GLACIOFLUVIAL DEPOSITS) 9.00 9.00 N=11 (1.2/2.2.3.4) Drv S 9.00 - 9.45 D10 Water Casing Depth Results Type & No Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Dia (mm): Depth: Struck: Rose to: Casing: Sealed: From: To: Remarks: From: Duration: Tool: Casing to: 8.50 7.83 8.50 200 4 50 4.50 14.50 150 14.50 ation of symbols and Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm AGS ab BH17-C6-01 Project No: 3318 FINAL Log issue: Client: GHD Ltd Scale: 1:50

Sheet 1 of 2

B	or	eh	ole	Log	J								Teri	aC	onsult
Bor	ehol	e for	mation	details:											Location details:
Type IP CP	:: F ( (	rom: ).00 ).00	To: 1.20 15.45	Start date: 14-07-17 14-07-17	End date: 14-07-17 17-07-17	Crew: TM TM	Plant: Hand tools Dando 2000	Barrel type n/a n/a	: Drill Bit: n/a n/a	Logged: 14-07-17 17-07-17	Logger: VS VS	Remarks	s: nmer ID: SI 4 E(r	)% 74	mE:         626336.80           mN:         331280.87           mAOD:         34.59           Grid:         OSGB
skfill/ tal'n	ater- ike	lend	l evel	Depth (thick-			Stratum	Description					Samples	& In Situ Te	esting
Bac Inst	Wa str	Leg	Levei	ness)			Stratum	Description			Water	Casing	Depth	Type & No	Results/Remarks
											Dry	10.50	10.50 10.50 - 10.95	S B3	N=6 (1,1/2,1,1,2)
				· · · · · · · · · · · · · · · · · · ·							Dry	12.00	12.00 12.00 - 12.45	S D11	N=6 (1,/1,2,1,2)
				· · · · · · · · · · · · · · · · · · ·							- Dry	13.00	13.50 13.50 - 13.95	S D12	N=8 (2,2/1,2,2,3)
	SP			15.45		Bor	rehole ends at 1	14.90 - 1 <u>5.00</u> 5.45m (Targ	<u>m: Becomes da</u> et depth)	rk greyish brow	n Dry	14.00	15.00 15.00 - 15.45	S D13	N=12 (2,2/2,3,3,4)
	Inst										- - - - - - - - - - - - - - - - - - -	Casing	Depth	Туре & No	Results
Grou	undw	ater e	entries:	a. Soolod.	Diameter	& casin	ig:	Depth relat	ed remarks	Domo	urke:	C	Chiselling deta	ails:	
Stru	Note	s: For exp	Lanation of symb	y: Sealed:	ріа (mm) Project:	East /	Anglia (North)	From:	nd Farm	Kema	икs: 	E	From: to:	Duratio	on. 1001:
Loa i	All de	epths and r	FINAL	re in metres.	Project No	: 3318	_ 、 /						BH	17-	C6-01
Scal	e:		1:50		Client:	GHD	Ltd								Sheet 2 of 2

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From Start date End date Plant: Barrel type: Drill Bit: Logged: Remarks: To Crev Logger 626383.55 mΕ 0.00 1.20 13-07-17 13-07-17 13-07-17 ΤМ Hand tools n/a n/a VS mN: 331326.99 CP 0.00 15.45 13-07-17 14-07-17 ΤМ Dando 2000 n/a n/a 14-07-17 VS SPT hammer ID: SI 4 E(r)% 74 mAOD: 35.22 Grid OSGB Samples & In Situ Testing Backfill/ Instal'n Legend Depth Water-strike l evel (thick-ness) Stratum Description Water Casing Depth Type & No Results/Remarks Soft dark brown slightly gravelly sandy CLAY. Gravel of subangular to (0.40) subrounded fine to coarse flint. (TOPSOIL) 34.82 0.40 Dark orangish brown slightly gravelly slightly silty clayey fine to medium 0.50 D1 0.50 ES1 SAND. Gravel of subangular to subrounded fine to coarse flint. Occasional 0.50 - 1.00 B1 rootlets (GLACIOFLUVIAL DEPOSITS) (1.10)1.00 D2 1.00 ES2 33.72 C ES3 N=27 (2,4/5,6,8,8) 1.50 Dry 1.50 Medium dense dark orangish brown slightly gravelly slightly silty fine to 1.50 coarse SAND. Gravel of subangular to subrounded fine to coarse flint. 1.50 - 1.95 1.50 - 2.00 2.00 (0.50)D3 Occasional pockets of dark brown sandy CLAY. R2 33.22 2.00 (GLACIOFLUVIAL DEPOSITS) ES4 Medium dense dark orangish brown slightly silty very gravelly fine to coarse SAND. Gravel of subangular to subrounded fine to medium flint. (GLACIOFLUVIAL DEPOSITS) 3.00 3.00 N=14 (1,2/2,3,4,5) Drv С 3.00 3.00 - 3.45 D4 B3 (3.00) 4.00 D5 Dry 4.50 4.50 С N=13 (2,3/3,3,3,4) 30 22 5.00 5 00 D6 Light yellowish brown gravelly silty fine to coarse SAND. Rare fine to coarse pockets of dark orangish brown slightly sandy CLAY. (GLACIOFLUVIAL DEPOSITS) (1.00)29.22 6.00 Dry 6.00 6.00 C D7 N=6 (1,1/1,2,1,2) Soft dark orangish brown sandy CLAY. Occasionally mottled dark reddish 6.00 brown (GLACIOFLUVIAL DEPOSITS) (1.00) 28.22 7.00 7.00 - 8.00 B4 Medium dense dark orangish brown slightly silty clayey fine to coarse SAND (GLACIOFLUVIAL DEPOSITS) (1.00)Dry 7.50 7.50 N=10 (1,1/1,2,3,4) T 7.50 - 7.95 D8 $\bigtriangledown$ 27.22 8.00 Firm dark orangish brown sandy CLAY. Occasionally mottled dark reddish brown (GLACIOFLUVIAL DEPOSITS) 9.00 9.00 N=8 (1.2/1.1.2.4) Drv S 9.00 - 9.45 D10 Water Casing Depth Type & No Results Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Struck: Rose to: Casing: Sealed: Dia (mm): Depth: From: Remarks: From: Duration: Tool: Casing To: to: 8.00 7.60 8.00 200 6.00 6.00 150 14.50 14.50 nation of symbols and Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm No abi All AGS BH17-C6-02 Project No: 3318 FINAL Log issue:

Client:

Scale:

1:50

GHD Ltd

Sheet 1 of 2

B	Borehole Log TerraConsult															
Bord Type IP CP	rehole formation details:         pe:       From:       To:       Start date:       End date:       Crew:       Plant:       Barrel type:       Drill Bit:       Logged:       Logger:       Remarks:       Plants:       Plants:       N/a       n/a       13-07-17       VS       SPT hammer ID: SI 4 E(r)% 74       Plants:       Plants:       N/a       N/a       N/a       14-07-17       VS       SPT hammer ID: SI 4 E(r)% 74       Plants:       Plants:       N/a       N/a <th>Location details:           mE:         626383.55           mN:         331326.99           mAOD:         35.22           Grid:         OSGB</th>											Location details:           mE:         626383.55           mN:         331326.99           mAOD:         35.22           Grid:         OSGB				
ckfill/ stal'n	ater- trike	gend	Level	Depth (thick-			Stratum	Description						Samples	& In Situ Te	esting
	≥ io 	ے۔ 		ness)				-				Water	Casing	Depth	Type & No	Results/Remarks
				- - - - - - - - - - - - -								Dry	10.00	10.50	S	N=14 (1,1/1,3,4,6)
				(7.45)				12.00 <u>- 15.00</u>	) m: Mottles da	'k greyish brow	- - - - - - - - - - - - - - - - - - -	Dry	12.00	12.00 12.00 - 12.45	S D11	N=9 (1,2/1,2,3,3)
				· · · · · · · · · · · · · · · · · · ·								Dry	13.00	13.50 13.50 - 13.95	S D12	N=11 (1,2/2,3,3,3)
											-	Dry	14.50	15.00 15.00 - 15.45	S D13	N=13 (2,3/3,3,3,4)
~~~~~		<u> </u>	19.77	15.45		Bor	ehole ends at 1	5.45m (Targe	t depth)			13.00 9.00	0.00	15.45 15.45		14/07/2017 00:00:00 14/07/2017 01:00:00
Gro	Inst		ntrice		Diamotor	& caein	<b>a</b> :	Denth relate	d romarko	1		Water	Casing	Depth	Type & No	Results
Stru	ck: Ro	se to	: Casing	g: Sealed	Dia (mm):	Depth	: Casing:	From: To	):	Rema	arks:			From: to:	Duratio	on: Tool:
AGS	All depth	ations see	Key Sheet. duced levels ar	e in metres.	Project: Project No	⊨ast A : 3318	Anglia (North)		u Farm				ľ	zpioratory pos		C6-02
Scale	3308. 9:		1:50		Client:	GHD	Ltd									Sheet 2 of 2

Sheet 2 of 2	
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Bc	Borehole Log TerraConsult														
Borel	ole for	mation	details	s:											Location details:
Type: IP CP	From: 0.00 0.00	To: 1.20 15.00	Start da 14-07- 14-07-	ate: End 17 14- 17 14-	e: End date: Crew: Plant: Barrel type: Drill Bit: Logged: Logger: Remarks: r 7 14-07-17 MJ Hand tools n/a n/a 14-07-17 VS 7 14-07-17 MJ Dando 2000 n/a n/a 14-07-17 VS SPT hammer ID: SI 3 E(r)% 75 r 14-07-17 VS SPT hammer ID: SI 3 E(r)% 75 r							mE: 626508.14 mN: 331291.05 mAOD: 35.66 Grid: OSGB			
kfill/ tal'n	end		Depth (thick-				Stratum	Description					Samples	& In Situ Te	esting
Inst	str Leg	Level	ness)				Stratum	Description			Wate	er Casing	Depth	Type & No	Results/Remarks
П			(0.50)	Soft da subroui (TOPS)	ark brow Inded fir OIL)	n sligh ie to co	tly gravelly san barse flint.	dy CLAY. Gra	vel of suba	ngular to	-				
П		35.16	0.50 -	Mediun Gravel to coars	n dense of suba se pock	e dark o ngular ets of o	orangish brown to subrounded dark brown san	silty gravelly fine to coarse dy CLAY.	fine to coar e flint. Occa	se SAND. Isionally fin	e -		0.50 0.50	D1 ES1	
П		• • •		(GLACI	IOFLU	IAL DE	EPOSITS)	-					1.00 1.00	D2 ES2	
П		- - -	(2.00) -	-							- Dry	1.40	1.50 1.50 1.50 - 1.95	C ES3 B1	N=16 (2,3/4,4,4,4)
П	× × × ×		-										2.00	ES4	
		33.16	2.50 -	Mediun coarse (GLACI	n dense SAND.	dark y Grave /IAL DI	vellowish browr I of subangular EPOSITS)	n slightly silty v to subrounde	very gravell d fine to co	y fine to arse flint.	Dry	2.50	2.50 2.50 - 2.95	C B2	N=18 (3,5/4,4,5,5)
	***											5.50	3.50	С	N=24 (4,5/6,6,6,6)
		> - - - -	(3.00)	-									3.50 - 3.95	B3	
		- - - - - -	-	-							- Dry	4.50	4.50 4.50 - 4.95	C B4	N=19 (2,3/4,4,5,6)
		30.16	5 50 -	-							- - - - - - - - - - - - - - - - - - -	5.50	5 50	C	N=27 (3 4/5 7 7 8)
	***	29.66	(0.50) 6.00 -	Mediun coarse coarse (GLACI	n dense SAND flint. IOFLU\	e dark y and Gr /IAL DE	vellowish browr avel. Gravel of EPOSITS)	slightly silty subangular to	very gravell	y fine to ed fine to			5.50 - 5.95	B5	
			-	slightly coarse (GLACI	silty sa flint.	ndy CL	AY. Gravel of s	subangular to	subrounded	d fine to			6.50	D3	
			(2.00) -										7.00 - 7.45	U1	36 (100%)
			- - - -	-									7.50	D4	
		27.66	8.00 -	Firm da dark re (GLACI	ark grav eddish b IOFLU\	elly bro rown s /IAL DI	own occasional andy CLAY. EPOSITS)	ly mottled dar	k orangish	brown and		8.00	8.50		
			(2.00)	-							- Dry - - -	8.00	8.50 - 8.95	D5	IN= IZ (1,2/2,3,3,4)
			· · · · · · · · · · · · · · · · · · ·	-											
		25.66	- 10.00								- - - - - - - - - - - - - - - - - - -	10.00 r_Casing	10.00 Depth	S Type & No	N=34 (3,5/6,9,9,10) Résults
Groun	dwater e	entries:	-	Dia	ameter a	& casi	ng:	Depth relate	d remarks:	_			Chiselling deta	ails:	
Struck 10.0	x: Rose t 9.10	o: Casin ) 8.00	g: Seal )	ed: Dia	a (mm): 150	Deptf ) 15	n: Casing: 5.00 15.00	From: Tc	):	Rema	rks:		From: to:	Duratio	on: Tool:
AGS Log iss	Notes: For exp abbreviations s All depths and r	lanation of symb ee Key Sheet. reduced levels at	ols and e in metres.	Pro Pro Clie	oject: oject No ent:	East 3318 GHD	Anglia (North)	Offshore Wind	d Farm			E	Exploratory pos	sition refere	ence: C6-03

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From: 0.00 Logged: 14-07-17 Logger VS To Start date End date Plant: Barrel type: Drill Bit: Remarks: Crew mE: 626508.14 14-07-17 14-07-17 1.20 MJ Hand tools n/a n/a mN: 331291.05 CP 0.00 15.00 14-07-17 14-07-17 MJ Dando 2000 n/a n/a 14-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 35.66 Grid: OSGB Depth (thick-ness) Backfill/ Instal'n Legend Samples & In Situ Testing Water-strike Stratum Description Level Type & No Water Casing Depth Results/Remarks Dense becoming very dense dark orangish brown slightly gravelly silty fine 10.00 - 10.45 D6 to medium SAND. Gravel of subangular to subrounded fine to coarse flint. (GLACIOFLUVIAL DEPOSITS) 11.50 11.50 - 11.95 Dry S D7 N=37 (2,6/8,9,10,10) (5.00) Dry 13.00 N=38 (4,5/7,9,10,12) S 13.00 - 13.45 D8 14.50 14.50 - 14.95 Dry S 50 (5,9/50 for 255mm) D9 SP 20.66 15.00 Borehole ends at 15.00m (Target depth) Water Casing Depth Type & No Results Depth related remarks: Chiselling details: Groundwater entries: Diameter & casing: From: Struck: Rose to: Casing: Sealed: Dia (mm): Depth: Casing: From: To: Remarks: to: Duration: Tool: anation of symbols and ee Key Sheet Notes: For ex abbreviations and All depths and Exploratory position reference: East Anglia (North) Offshore Wind Farm AGS Project: BH17-C6-03 Project No: 3318 Log issue: FINAL Client: GHD Ltd Scale: 1:50

Sheet 2 of 2
#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From Start date End date Plant: Barrel type: Drill Bit: Logged: Remarks: To Crew Logger 626550.48 mΕ 1.20 14-07-17 14-07-17 0.00 14-07-17 MJ Hand tools n/a n/a VS mN: 331321.08 CP 0.00 15.00 14-07-17 17-07-17 MJ Dando 2000 n/a n/a 17-07-17 VS SPT hammer ID: SI 3 E(r)% 75 35.39 mAOD: Grid OSGB Samples & In Situ Testing Backfill/ Instal'n Legend Depth Water-strike l evel (thick-ness) Stratum Description Water Casing Depth Type & No Results/Remarks Soft dark brown slightly gravelly sandy CLAY. Gravel of subangular to (0.40) subrounded fine to coarse flint. (TOPSOIL) 34.99 0.40 Firm to stiff dark orangish brown mottled light grey and dark brown slightly 0.50 D1 0.50 ES1 gravelly sandy CLAY. Gravel of subangular to subrounded medium to coarse flint. Occasional black organic staining. (0.90) (GLACIOFLUVIAL DEPOSITS) 1.00 D2 1.00 ES2 34.09 1.30 Medium dense dark orangish brown gravelly fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. Fine to coarse gravel Dry 1.00 N=15 (2,3/3,4,4,4) 1.50 С ES3 1.50 sized and cobble sized pockets of dark brown sandy CLAY. 1.50 - 1.95 B1 (GLACIOFLUVIAL DEPOSITS) (1.20) 2.00 ES4 2.00 - 2.50 m: Clay pockets become frequent and mottle light grey 32.89 2.50 2.40 2.50 С N=27 (3,4/6,6,7,8) Dry Medium dense dark greyish brown gravelly clayey fine to medium SAND. 2.50 - 2.95 B2 Gravel of subangular to subrounded fine to coarse flint. (GLACIOFLUVIAL DEPOSITS) (2.00)Dry 3.95 3.50 С N=25 (3.6/5.6.7.7) 3.50 - 3.95 В3 30.89 4.50 Dry 4.95 4.50 С N=30 (4,5/6,7,8,9) Medium dense dark orangish brown gravelly slightly silty fine to coarse B4 4.50 - 4.95 SAND. Gravel of subangular to subrounded fine to coarse flint. Medium to coarse gravel sized pockets of dark orangish brown silty slightly sandy CLAY. (GLACIOFLUVIAL DEPOSITS) (1.30)Drv 5.50 5.50 С N=21 (8,5/6,6,5,4) 29.59 5.80 Medium dense dark grey mottled dark orangish brown and black organic staining silty clayey fine to medium SAND. Rare gravel. 6.00 D3 (GLACIOFLUVIAL DEPOSITS) 7.00 - 7.45 В5 40 (0%) 7.00 - 15.00 m: Becomes dark orangish brown 7 00 - 7 45 UNR Dry 6.00 7.50 N=19 (2,2/3,5,5,6) S 7.50 - 7.95 D4 8.50 D5 ▼ 6.00 9.00 N=14(2.2/3.3.4.4)Drv S 9.00 - 9.50 D6 Water Casing Depth Type & No Results Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Dia (mm): Depth: Struck: Rose to: Casing: Sealed: Casing From: From: Duration: Tool: To: Remarks: to: 10.0 8.90 6.00 150 12.00 12.00 nation of symbols and Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm No abi All AGS Project No: 3318 BH17-C6-04 FINAL Log issue:

Client:

Scale:

1:50

GHD Ltd

Sheet 1 of 2

B	or	eh	ole	Lo	9								Terr	aC	onsult
Borehole formation deta       Type:     From:     To:     Start       IP     0.00     1.20     14-0       CP     0.00     15.00     14-0					End date: 14-07-17 17-07-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 14-07-17 17-07-17	Logger: VS VS	Remarks SPT har	: nmer ID: SI 3 E(r	)% 75	Location details:       mE:     626550.48       mN:     331321.08       mAOD:     35.39       Grid:     OSGB
kfill/ tal'n	iter- ike	end	l evel	Depth (thick-			Stratum	Description		Samples & In Situ Testing					
Bac	Wa str	Leg	20001	ness)		40.00 41			er Casing	Depth	Type & No	Results/Remarks			
		× ×		-		10.00 - 18	5.00 m: Rare grave	l of suban <u>gular to</u>	subrounded fil	ne to coarse m	<u>nt</u>				
				(9.20) -		Dry								S D7	N=12 (1,2/3,3,3,3)
								12. <u>00 - 15</u>	.00 m: Become	es slightly clay	- - - - - - Dry	12.00	12.00 12.00 - 12.45	S D8	N=23 (3,4/6,6,5,6)
											- Dry	13.40	13.50 13.50 - 13.95	S D9	N=35 (4,6/7,9,9,10)
			20.39	15.00		Bore	ehole ends at 1	5.00m (Target	depth)		- - - Dry	14.80	15.00 15.00 - 15.45	S D10	N=40 (3,6/8,9,10,13)
				-											
				-											
				-											
				-											
				-											
				-											
	Inst				1						Wate	r Casing	Depth	Type & No	Results
Grou Strue	undw ck: 두	ater e	ntries:	a: Sealed	Diameter	& casin Depth	g: Casino:	Depth related	d remarks:	Rem	arks:	C	Chiselling deta From: to	ails: Duratio	on: Tool <sup>.</sup>
	υπ. Γ			S. Cealeu		Doput.	ousing.			i territ				Durail	1001.
AGS	Note abbre All de	s: For expl eviations se opths and r	anation of symb e Key Sheet. educed levels a	ols and re in metres.	Project: Project No	East A	Anglia (North)	Offshore Wind	d Farm			E	Exploratory pos	sition refere	
Log i Scale	ssue e:		FINAL 1:50		Client:	GHD	Ltd						DL	/ =	Sheet 2 of 2

# **Borehole Log**

# **TerraConsult**

Borehole formation details:																				
Bor	eho	le forr	nation	details	i.	End data: Crow Diant: Parrol type: Drill Rit: Loggad: L										Location details:				
IP CP	: 1	0.00 0.00	1.20 20.00	27-07- 27-07-	17 27-07-17 17 28-07-17	MJ MJ	Hant: Hand tools Dando 2000	n/a n/a	n/a n/a	Logged: 27-07-17 28-07-17		igger: VS VS	SPT ha	s: mmer ID: SI 3 E(r)	% 75	mE: 626749.29 mN: 331461.97 mAOD: 34.10 Grid: OSGR				
≧ e	50	p		Depth											Samples & In Situ Testina					
Backfi Instal	Wate	Leger	Level	(thick- ness)			Stratum	Description				Water	Casing	Depth	Type & No	Results/Remarks				
				(0.40)	Soft dark orai	ngish bi	rown slightly gr	avelly slightly s	sandy CLA	Y. Gravel										
			33.70	0.40	(TOPSOIL)															
				-	Dark orangisł (GLACIOFLU	ו brown VIAL D	i fine to coarse EPOSITS)	SAND.		-	-		0.50 0.50	D1 ES1						
				(1 10)								-								
				(										1.00	ES2					
			22.60	1 50										1.50	6	N=12 (1 2/2 4 2 2)				
			32.00	1.50 -	Medium dens	e dark VIAL D	orangish browr EPOSITS)	n fine to mediu	m SAND.			Diy		1.50	D3	N=13 (1,3/3,4,3,3)				
				-			,				_			2.00	ES4					
				-								-								
				(2.00) -							-	Dry	2.50	2.50	S	N=16 (2,2/3,3,4,6)				
				-								-		2.50 - 2.95	D4					
				-							_	-								
				-																
			30.60	3.50 -	Medium dens	e dark	orangish browr	slightly clave	v siltv fine t	o medium		Dry	3.50	3.50	S	N=21 (2,3/4,5,6,6)				
		×		(0.40)	SAND.			ronging orayo	y only mid t	omoulain				3.50 - 3.95	D5					
		X	30.20	3.90 _	Medium dens	e dark	orangish browr	n gravelly silty	fine to coar	se SAND.		-								
		××.		-	Gravel of sub flint.	angular	r to subrounded	d fine to coarse	e flint. Rare	Cobbles o	t.	-								
		××		-	(GLACIOFLU	VIAL D	EPOSITS)				-	Dry	4.50	4.50	C B1	N=28 (3,5/6,7,7,8)				
		××		(1.80)								-		4.50 - 4.55						
		××		_							-									
		××		-																
		××	00.40	-							-	Dry	5.50	5.50 5.50 - 5.95	C B2	N=19 (5,6/5,5,4,5)				
			28.40	5.70	Firm light gre	yish bro	own slightly gra	velly slightly sa parse flint Free	andy CLAY	Gravel of	uish <sup>.</sup>	-								
				-	brown stainin	g.			44011110041					6.00	D6					
				-	GLACIOFLO	VIAL D	EFUSITS)					-								
				(1.80)							-	-								
				-								-		7.00 7.45	114	40 (100%)				
				-										7.00 - 7.45	01	40 (100%)				
			26 60	7 50 -										7 50	D7					
			20.00	-	Firm light ora (GLACIOFLU	ngish g VIAL D	rey slightly san EPOSITS)	dy CLAY.						1.00	5.					
				_							_									
				-																
				(2.00) -							-	Dry	8.00	8.50	S	N=13 (1,2/3,3,3,4)				
				-										8.50 - 8.95	D8					
											-									
				-								-								
			24.60	9.50 -	Firm light bro	wnish g	rey slightly san	ndy CLAY.												
				-	(GLACIOFLU	VIAL D	EPOSITS)													
	Inst							1				Water	Casing	10.00 - 10.45 Depth	U2 Type & No	60 (100%) Results				
Grou	undv	vater e	ntries:	a. Sool	Diameter	& casi	ng: h: Casing:	Depth related	d remarks:	Roma	arko		(	Chiselling deta	ails:					
Stru	200 6.00 6.00 150 19.50 19.50									ח: וססו:										
	Not	es: For expl	anation of syml	ools and	Project:	East	Anglia (North)	Offshore Wind	d Farm					Exploratory pos	ition refere	ence:				
ACS		lepths and r	FINIAI	re in metres.	Project N	o: 3318	3						[	<b>BH17_C7_01</b>						
Scal	e:		1:50		Client:	GHE	D Ltd							DIII/-C/-VI Sheet 1 of 2						

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP Logged: 27-07-17 From Start date End date Plant: Barrel type: Drill Bit: Logger Remarks: Crew mE: 626749.29 0.00 27-07-17 1.20 27-07-17 MJ Hand tools VS n/a n/a mN: 331461.97 CP 0.00 20.00 27-07-17 28-07-17 MJ Dando 2000 n/a n/a 28-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 34.10 Grid: OSGB Depth (thick-ness) Backfill/ Instal'n Legend Samples & In Situ Testing Water-strike Stratum Description l evel Type & No Water Casing Depth Results/Remarks Firm light brownish grey slightly sandy CLAY. (GLACIOFLUVIAL DEPOSITS) 10.50 D9 (3.20) 11.50 11.50 - 11.95 Dry 10.00 S D10 N=17 (2,3/3,4,4,6) 21.40 12.70 Medium dense dark brownish grey silty fine to medium SAND. $\mathbf{X}$ (WROXHAM CRAG FORMATION) 10.00 13.00 S N=14 (3,2/3,3,4,4) Drv Dry 14.50 14.50 S N=13 (2,2/3,3,3,4) 14.50 - 14.95 D12 (6.30) Dry 16.00 16.00 S N=22 (3,3/5,5,6,6) 16.00 - 16.45 D13 17.50 N=35 (2,3/7,8,9,11) Dry 17.50 S 17.50 - 17.95 D14 50 (3,5/50 for 170mm) 15.10 19.00 Drv 19.00 19.00 Very dense dark grey silty fine to medium SAND. Rare gravel. (WROXHAM CRAG FORMATION) S 19.00 - 19.45 D15 (1.00) 4 10 20.00 Borehole ends at 20.00m (Target depth) Water Casing Depth Type & No Results Depth related remarks: Chiselling details: Groundwater entries: Diameter & casing: From: Struck: Rose to: Casing: Sealed: Dia (mm): Depth: Casing: To: Remarks: From: to: Duration: Tool: 13.0 12.9 10.0 anation of symbols and e Key Sheet Exploratory position reference: No abi All For e Project: East Anglia (North) Offshore Wind Farm AGS BH17-C7-01 Project No: 3318 Log issue: FINAL Client: GHD Ltd

Scale:

1:50

# **Borehole Log**

# TerraConsult

Bor	ahol	o for	mation	dotaile												Location details:
Туре	Promise formation defans.     Start date:     End date:     Crew:     Plant:     Barrel type:     Drill Bit:     Logged:     Logger:     Remarks:       P     0.00     1.20     25-07-17     25-07-17     MJ     Hand tools     n/a     n/a     25-07-17     VS       CP     0.00     20.00     25-07-17     25-07-17     MJ     Dando 2000     n/a     n/a     25-07-17     VS     SPT hammer ID: 1											:		mE: 626792.09		
IP CP		0.00 0.00	1.20 20.00	25-07-	17 25-07-1 17 25-07-1	7 MJ 7 MJ	Hand tools Dando 2000	n/a n/a	n/a n/a	25-07-17 25-07-17	VS VS	5	SPT har	nmer ID: SI 3 E(r)	)% 75	mN: 331492.52
														()		mAOD: 32.74
																Grid: OSGB
kfill/ al'n	ter- ke	end	Loval	Depth			Stratum	Description						Samples a	& In Situ Te	esting
Bac	Wa	Leg	Levei	ness)			Stratum	Description			v	Vater	Casing	Depth	Type & No	Results/Remarks
				(0.40)	Soft dark or	angish b	rown slightly gra	avelly slightly	sandy CLA	Y. Gravel	-					
			32 34	0.40	(TOPSOIL)	to subroi	unded fine to co	barse filnt. Occ	asional roo	otiets.	-					
			02.04	-	Medium der	nse dark	orangish brown	clayey gravel	ly fine to c	oarse SAN	D			0.50	D1 ES1	
		-			(GLACIOFL	UVIAL D	EPOSITS)				-			0.50	ES1	
											_			1.00	D2	
														1.00 1.00	ES2 ES2	
				-								Dry	1.40	1.00 1.50	ES2 C	N=21 (2,3/5,5,6,5)
				(2.60)							-			1.50 1.50	ES3 ES3	
											_			1.50 - 1.95	B1	
											-			2.00	ES2 ES4	
											-			2.00	ES4	
				-								Dry	2.50	2.50 2.50 - 2.95	B2	N=22 (1,3/4,5,6,7)
											-					
			29.74	3.00 -	Soft orangis	h brown	slightly gravelly	sandy CLAY.	Gravel of	subangular	to -					
					subrounded	fine to n	nedium flint.				-					
				(0.90)	(GLACIOFL	UVIAL D	EF03113)				-	Dry	3.30	3.50	s	N=10 (1,2/2,2,3,3)
											]			3.50 - 3.95	D3	
		**** * *	28.84	3.90	Medium der	ise dark	orangish brown	slightly claye	y slightly si	Ity fine to	_					
		××			coarse SAN	D. Fine I	to coarse grave	I sized pockets	s of dark bi	rown sandy	-					
		(××			(GLACIOFL	UVIAL D	EPOSITS)				-		4 40	4.50		
		(××		(1.60)							-		4.40	4.50 4.50 - 4.95	D4	N=13 (2,3/2,3,4,4)
		×××		(1.00)							-					
		×××		-							-					
		×,									-					
		×	27.24	5.50 -	Firm orangi	sh brown	sandy CLAY.					Dry	5.50	5.50	S D5	N=15 (1,1/3,3,4,5)
		<u> </u>			(GLACIOFL	UVIAL D	EPOSITS)				-			5.50 - 5.55		
		<u> </u>									_					
				(1.30)							-					
			-	-							_					
											-					
			25.94	6.80	Firm to stiff	brownish	n grey locally mo	ottled greyish	brown sligh	ntly sandy	-			6.90	D6	40 (400%)
					and flint. Oc	AY. Grave casional	el of subangulai	r to subrounde gish brown.	d fine to co	barse chalk	-			7.00 - 7.45	U1	40 (100%)
					(GLACIOFL	UVIAL D	ÉPOSITS)				-					
				-							-			7.50	D7	
											]					
				-							-					
											-					
			1	-							-	Dry	7.50	8.50	S	N=12 (1,2/2,3,3,4)
				(3.70)							-			8.50 - 8.95	D8	
			1	-							_					
											1					
											-					
				-												
				•							-			10.0-		
	Inst							_	-		V	Vater	Casing	10.00 - 10.45 Depth	U2 Type & No	75 (100%) Results
Grou	undw	ater e	entries:	a. Sool	Diamet	er & cas	ing:	Depth related	d remarks	: Roma	arke:		C	From: to:	ails:	n: Tool
Suu	UR. 19		o. Odsin	y. seal		200	7.00 7.00			Reina	ai N.S.				Duratio	л. тоот.
						150 1	9.00 19.00									
	150 19.00 19.00															
L																
AGS	All de	s: For exp eviations s	lanation of syml ee Key Sheet. educed levels a	ools and	Project:	Eas	t Anglia (North)	Offshore Wind	d Farm				E	xploratory pos	ition refere	ence:
Logi	issue		FINAL		Project	No: 331	8							BH	17-	C7-02
Scale	e:		1:50		Client:	GHI	D Ltd									Sheet 1 of 2

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Logged: 25-07-17 Type: IP From Start date End date Plant: Barrel type: Drill Bit: Remarks: Crew Logger mE: 626792.09 0.00 1.20 25-07-17 25-07-17 MJ Hand tools n/a n/a VS mN: 331492.52 CP 0.00 20.00 25-07-17 25-07-17 MJ Dando 2000 n/a n/a 25-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 32.74 Grid OSGB Backfill/ Instal'n Legend Depth Samples & In Situ Testing Water-strike (thick-ness) Stratum Description l evel Water Casing Depth Type & No Results/Remarks Firm to stiff brownish grey locally mottled greyish brown slightly sandy gravelly CLAY. Gravel of subangular to subrounded fine to coarse chalk and flint. Occasionally stained orangish brown. 22 24 10 50 (GLACIOFLUVIAL DÉPOSITS) 10.50 D9 22.14 10.60 Firm brownish grey slightly gravelly sandy CLAY. Gravel of subangular to subrounded fine to medium chalk and flint. (GLACIOFLUVIAL DEPOSITS) Loose becoming medium dense dark orangish brown silty fine to medium SAND $\Box$ (GLACIOFLUVIAL DEPOSITS) 11.50 11.50 - 11.95 Dry 11.50 N=9 (1,1/2,2,2,3) S D10 13.00 N=11 (1,2/2,3,3,3) Drv 13.00 S 13.00 - 13.45 D11 (6.90)Dry 14.50 14.50 S N=27 (2,2/5,6,7,9) 14.50 - 14.95 D12 Dry 16.00 16.00 S N=34 (2,3/5,7,9,13) D13 16.00 - 16.45 N=41 (3,5/6,9,10,16) 15.24 17.50 Dry 17.50 17.50 Dense dark greyish brown slightly gravelly slightly silty medium to coarse 17.50 - 17.95 D14 SAND. Gravel of subangular to subrounded fine to medium flint. (WROXHAM CRAG FORMATION) (2.50)50 (4,9/12,17,21,) Drv 19.00 19.00 S 19.00 - 19.45 D15 20.00 12 74 20.00 Depth D16 Type & No Borehole ends at 20.00m (Target depth) Water Casing Results Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Dia (mm): Depth: Struck: Rose to: Casing: Sealed: Casing From: To: Remarks: From: to: Duration: Tool: 11.30 8.10 11.30 nation of symbols and a Key Sheet Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm AGS No abi All BH17-C7-02 Project No: 3318 FINAL Log issue: Client: GHD Ltd 1:50 Sheet 2 of 2 Scale:

B	0	eh	ole	Lo	bg								Ter	raC	onsult	
Во	reho	le for	mation	detail	s:										Location details:	
Typ IP CF	e:	From: 0.00 0.00	To: 1.20 20.00	Start d 20-07 20-07	ate: End d -17 20-07 -17 21-07	ate: Crew .17 MJ .17 MJ	: Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Remarks	s: mmer ID: SI 3 E(i	mE:     626802.16       mN:     331579.34       mAOD:     28.11       Grid:     OSGB					
ckfill/ stal'n	ater- rike	gend	Level	Depth (thick-			Stratum	Description					Samples	& In Situ Te	esting	
a si	st č	Ē		ness)	Soft dark	orangish k	rown slightly sa	ndy slightly sil		aro	Wate	r Casing	Depth	Type & No	Results/Remarks	
			27.71	(0.40) 0.40	Subangula (TOPSOII Firm dark CLAY. Ra laminatior	ar to subro <u>)</u> orangish l re subang is of fine to	brown mottled li brown mottled li ular to subround o medium SANI	gravel. Freque ght grey and d led fine flint gr ). Occasional	ark reddisl avel. Occa rootlets.	h brown sar Isional	idy		0.50 0.50	D1 ES1		
				(1.00)		ARTH)					-		1.00 1.00	D2 ES2		
			26.71	1.40	Loose bed fine to me (BRICKE/	coming me dium SAN ARTH)	edium dense da ID. Occasionally	rk orangish bro v mottled dark	own slightly reddish bro	y clayey silt <u>y</u> own.	/ - Dry		1.50 1.50 1.50 - 1.95 2.00 2.00 - 2.40	S ES3 D3 ES4 B1	N=7 (1,1/1,2,2,2)	
				-	-						- Dry	2.50	2.50 2.50 - 2.95	S D4	N=7 (1,0/1,1,2,3)	
				. (4.50)							- Dry	3.50	3.50 3.50 - 3.95	S D5	N=10 (1,2/2,2,3,3)	
				-							- Dry	4.50	4.50 4.50 - 4.95	S D6	N=16 (1,2/3,4,4,5)	
			22.21	5.90	- Firm dark	brownish	grey occasional	ly mottled dark	5.50 - 5.90 m: k orangish	Becomes claye	Dry tly	5.50	5.50 5.50 - 5.95	S D7	N=14 (2,2/3,3,4,4)	
					Coarse ch (BRICKE/	alk and ra	re flint.		Subjound				6.50	D8	38 (100%)	
				(3.10) _	-								7.50	D9		
				-				8. <u>50 - 9.</u> 1	00 m: Become	es sandy and so	ft Dry	6.00	8.50 8.50 - 8.95	S D10	N=22 (3,3/4,5,6,7)	
			19.11	9.00 -	Medium d Occasiona (BRICKE/	ense dark al pockets ARTH)	grey silty slight of dark grey gra	ly clayey fine t avelly CLAY wi	o medium th chalk gr	SAND. avel.			9.50 - 9.90	B2		
	Inst	×		(2.00)	-						- Dry Water	10.00 Casing	10.00 Depth	S Type & No	N=29 (2,3/3,7,9,10) Results	
Gro	ound	vater e	entries:	0	Diame	eter & cas	sing:	Depth relate	d remarks	:			Chiselling det	ails:	Task	
Stru 9	uck: .00	Rose t 8.40	o: Casin 0 6.00	g: Sea )	led:   Dia (i	nm): Dep 200 150	oth: Casing: 6.00 6.00 16.00 16.00	From: Tc	):	Rema	rks:		From: to:	Duratio	on: Tool:	
AG Log		tes: For exp previations s depths and r	lanation of symb ee Key Sheet. reduced levels ar FINAL	ols and re in metres.	Projec Projec Client	t: Eas t No: 331 GH	st Anglia (North) 8 D Ltd	Offshore Wind	d Farm			E	Exploratory position reference: BH17-C7-03			
- 50															250( 1.510	

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B	or	eh	ole	e Lo	bg									Teri	raC	onsult
Bor Type IP CP	eho ::	le fori From: 0.00 0.00	To: 1.20 20.00	details Start d 20-07 20-07	<b>S:</b> ate: E -17 2 -17 2	End date: 20-07-17 21-07-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 20-07-17 21-07-17	Logger: VS VS	Remarks SPT ha	s: mmer ID: SI 3 E(r	)% 75	Location     details:       mE:     626802.16       mN:     331579.34       mAOD:     28.11
2 6		77		Denth										Complete		Grid: OSGB
3ackfil Instal'r	Water- strike	egenc	Level	(thick- ness)				Stratum	Description			10/-+	0	Samples		
			17.11		- Mediu Occa - (BRIC	um dense isional pc CKEARTI	e dark g ockets o H)	grey silty slightl f dark grey gra	ly clayey fine t avelly CLAY wi	o medium s	SAND. avel.			10.00 - 10.45	D11	
				-		CKEART	H)					- Dry	11.50	11.50 11.50 - 11.95	S D12	N=42 (3,5/6,9,13,14)
				- (5.30)	-							- - - - - - - - -	13.00	13.00 13.00 - 13.45	S D13	63 (5,9/63 for 215mm)
				-	-							- - - Dry -	14.50	14.50 14.50 - 14.95	S D14	50 (5,9/50 for 215mm)
			11.81	- - 16.30 -	-Stiff c	dark grey	slightly I fine to	sandy slightly coarse chalk a	gravelly CLA	Y. Gravel of Il flint.	fsubangula	- Dry	16.00	16.00 16.00 - 16.45	S D15	N=43 (3,6/14,12,9,8)
					-(BRIC	JKEARTI	H)							17.00 17.50 - 17.95	D16 U2	70 (100%)
												- - - Dry	16.00	19.00 19.00 - 19.45 19.00 - 19.45	S D111 D18	N=34 (4,5/7,8,9,10)
	SP Inst		8.41 8.11	19.70 (0.30) <del>- 20.00</del>	-Dark fine to	grey gra o coarse	velly slig flint. Po	ghtly silty SAN ockets of dark (	D. Gravel of s grey CLAY.	ubangular 1	to subround	Jed- Water	Casing	20.00 Depth	B3 Type & No	Results
Grou Stru 19	undv ck: ).7	vater e Rose ti 8.90	entries: o: Casir ) 16.	ng: Sea 5	led: [	Diameter	& casir Depth	ng: n: Casing:	Depth related From: To	d remarks:	Rema	arks:		Chiselling deta From: to:	ails: Duratio	on: Tool:
AGS Log Scal	issue	es: For exp reviations so depths and r	lanation of sym ee Key Sheet. reduced levels a FINAL 1:50	bols and are in metres.	P P C	Project: Project No Client:	East 3318 GHD	Anglia (North)	Offshore Wind	d Farm			E	Exploratory pos	sition refere	ence: <b>C7-03</b> Sheet 2 of 3

#### Sheet 2 of 3

B	or	eh	ole	Lo	DQ	J									Teri	raC	on	sult
Bor Type IP CP	Borehole for   Type: From:   IP 0.00   CP 0.00		To: 1.20 20.00	details Start d 20-07 20-07	<b>s:</b> ate: -17 -17	End date: 20-07-17 21-07-17	Crew: MJ MJ	Plant: Hand tools Dando 2000	Barrel type: n/a n/a	Drill Bit: n/a n/a	Logged: 20-07-17 21-07-17	Logger VS VS	r: Re SF	emarks: PT ham	imer ID: SI 3 E(r	·)% 75	Locati mE: mN: mAOD: Grid:	on details: 626802.16 331579.34 28.11 OSGB
ckfill/ tal'n	ater- rike	gend	Level	Depth (thick-				Stratum	Description						Samples	& In Situ T	esting	
Bac	We str	Leg	20101	ness)	VIA				200010001			W	ater C	Casing	Depth	Type & No	Res	sults/Remarks
						ROXHAM	Boi	rehole ends at 2	0.00m (Target	depth)								
				-								-						
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	Inst											Wa	ater C	Casing	Depth	Type & No		Results
Grou Stru	ck: R	ater e ose t	entries: o: Casin	g: Sea	led:	Diameter Dia (mm)	& casir	ng: Casing:	From: To	d remarks	: Rem	arks:		C F	hiselling det From: to:	ails: Duratio	on:	Tool:
	Callon, root to, Cabing, Sediet							-										
AGS	Notes abbre All de	: For exp viations s pths and r	lanation of symb ee Key Sheet. educed levels a	ols and re in metres.		Project:	East	Anglia (North)	Offshore Win	d Farm				E	xploratory pos	sition refere	ence:	• •
Log	issue:		FINAL			Project No Client	о: 3318 GHD	Ltd							BH	117-	<b>C7</b> .	-03
Scal	e:		1:50			Chefft.	UnD											Sheet 3 of 3

#### **Borehole Log TerraConsult** Borehole formation details: Location details: Type: IP From Start date End date Plant: Barrel type: Drill Bit: Logged: Remarks: To Crew Logger 626845.20 mΕ 0.00 1.20 24-07-17 24-07-17 24-07-17 MJ Hand tools n/a n/a VS mN: 331611.63 CP 0.00 20.00 24-07-17 25-07-17 MJ Dando 2000 n/a n/a 25-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 25.84 Grid OSGB Samples & In Situ Testing Backfill/ Instal'n Legend Depth Water-strike l evel (thick-ness) Stratum Description Water Casing Depth Type & No Results/Remarks Soft dark orangish brown slightly sandy slightly silty CLAY. Rare (0.40) subangular to subrounded fine flint gravel. Frequent rootlets. (TOPSOIL) 25.44 0.40 Stiff dark orangish brown slightly sandy CLAY. Occasionally mottled light 0.50 D1 0.50 ES1 grey. (0.60) (BRICKEARTH) 24.84 1.00 1.00 D2 Loose becoming medium dense light orangish brown slightly clayey silty 1.00 ES2 fine to medium SAND. Rare gravel of subangular to subrounded fine to coarse flint. Occasional fine to coarse gravel and cobble sized pockets of dark brown mottled light grey and reddish brown sandy CLAY. Dry N=9 (1,1/2,2,2,3) 1.50 S ES3 (BRICKEARTH) 1.50 1.50 - 1.95 D3 2.00 ES4 Dry 2.40 2.50 S N=11 (1,2/2,3,3,3) 2.50 - 2.95 D4 Drv 3.40 3.50 S N=17 (1,2/3,4,4,6) 3.50 - 3.95 D5 (5.40)Dry 4.50 4.50 S N=22 (2,3/5,5,6,6) 4.50 - 5.50 m: Becomes fine sand 4.50 - 4.95 D6 Dry 5.50 5.50 N=18 (1,2/3,4,5,6) S 5.50 - 5.95 D7 19.44 6.40 Medium dense dark orangish brown gravelly silty slightly clayey fine to coarse SAND. Gravel of subangular to subrounded fine to coarse flint. (BRICKEARTH) N=19 (2,3/5,4,5,5) Dry 7.00 7.00 С (1.30) 7 00 - 7 45 B1 18.14 7.70 Firm to stiff dark brownish grey mottled dark orangish brown and dark brown slightly gravelly sandy CLAY. Gravel of subangular to subrounded 8.00 D8 fine to coarse flint. Rare shell fragments. (BRICKEARTH) 8.50 - 8.95 40 (0%) B2 8.50 - 8.95 UNR (2.30)10.00 N=8 (1,2/2,2,2,2) Results 15 04 Dry 8.00 Water Casing 10.00 Depth Type & No Groundwater entries: Diameter & casing: Depth related remarks: Chiselling details: Struck: Rose to: Casing: Sealed: Dia (mm): Depth: Casing From: Remarks: From: Duration: Tool: To: to: 10.0 5.10 8.00 200 8.00 8.00 17.00 150 17.00 nation of symbols and a Key Sheet Exploratory position reference: For e Project: East Anglia (North) Offshore Wind Farm AGS No abi All BH17-C7-04 Project No: 3318

FINAL

1:50

Client:

GHD Ltd

Log issue:

Scale:

Sheet 1 of 2

#### **TerraConsult Borehole Log** Borehole formation details: Location details: Type: IP From: 0.00 Logged: 24-07-17 To Start date: End date Plant: Barrel type: Drill Bit: Logger Remarks: Crew mE: 626845.20 24-07-17 1.20 24-07-17 MJ Hand tools VS n/a n/a mN: 331611.63 CP 0.00 20.00 24-07-17 25-07-17 MJ Dando 2000 n/a n/a 25-07-17 VS SPT hammer ID: SI 3 E(r)% 75 mAOD: 25.84 Grid: OSGB Depth (thick-ness) Backfill/ Instal'n Legend Samples & In Situ Testing Water-strike Stratum Description Level Type & No Water Casing Depth Results/Remarks Loose becoming medium dense dark grey silty fine to coarse SAND. Rare 10.00 - 10.45 D9 subangular to subrounded fine to medium flint. (WROXHAM CRAG FORMATION) 11.50 11.50 - 11.95 Dry 11.40 S D10 N=7 (1,0/1,2,2,2) 13.00 13.00 N=20 (1,3/3,4,6,7) Drv S 13.00 - 13.45 D11 (6.70) Dry 14.40 14.50 14.50 - 14.95 S N=18 (1,2/2,4,5,7) D12 Dry 16.00 16.00 S N=31 (2,2/4,4,10,13) D13 16.00 - 16.45 9.14 16.70 Firm to stiff dark brownish grey slightly gravelly slightly sandy CLAY. Gravel of subangular to subrounded fine to coarse flint. (WROXHAM CRAG FORMATION) 17.50 - 17.95 U2 68 (100%) 18.00 D14 (3.30) Drv 17.00 19.00 N=29 (3,4/5,7,8,9) S 19.00 - 19.45 D15 20.00 D16 Type & No 5 04 20.00 Depth Borehole ends at 20.00m (Target depth) Water Casing Results Depth related remarks: Chiselling details: Groundwater entries: Diameter & casing: Dia (mm): Depth: From: Struck: Rose to: Casing: Sealed: Casing: From: To: Remarks: to: Duration: Tool: ee Key Sheet Notes: For ex abbreviations and All depths and Exploratory position reference: Project: East Anglia (North) Offshore Wind Farm AGS BH17-C7-04 Project No: 3318 Log issue: FINAL Client: GHD Ltd Scale: 1:50

# APPENDIX B Photographs

### BH17-C6-01



0.50 m









# BH17-C6-02



1.50 m









# BH17-C6-03



3.50 m





#### 6.50 m





# BH17-C6-04



0.50 m



4.50 m pockets of clay





# BH17-C7-01



# 0.50 m



5.70 m



12.70 m

# BH17-C7-02



#### 4.50 m



6.90 m



#### 11.50 m





# BH17-C7-03



0.50 m





### 5.50 m





9.50 m







# BH17-C7-04



1.00 m









# APPENDIX C In Situ Testing Results

Variable head permeability test


#### TerraConsult Static water level (m) 7.60 Test 1 Internal Diameter (D) 0.15 Time (t0) 0 Length of Standpipe below Ground Level (m) 0.00 Time (t) 3600 Head of Water Height of Water above Ground Level (m) 0.00 Length of Standpipe above Ground Level (m) 0.00 Initial Head (h0) at (t0) 7.84 Water level at start of test (m) 0.16 Final Head (h(t)) at (t) 7.73 Top of Response Zone 7.50 Length of Response Zone (L) 0.50 Bottom of Response Zone Cross Sectional Area (S) 8.00 0.0177 Description Slightly silty clayey SAND. Water Elapsed Head of Time below Variable Head Test Water (seconds) Datum 7.84 0 0.160 0.000 10 0.160 7.84 20 0.170 7.83 30 0.170 7.83 60 0.180 7.82 7.81 120 0.190 0.050 7.81 180 0.190 7.80 240 0.200 300 0.200 7.80 Depth of Water below datum (m) 007 001 001 001 001 001 001 001 600 0.220 7.78 7.77 900 0.230 7.77 1200 0.230 7.76 1500 0.240 1800 0.250 7.75 0.260 7.74 2400 7.73 3000 0.270 3600 0.270 7.73

Shape Factor (F) calculated according to ISO 22282-1:2012

$$F = \frac{2 \pi L}{ln \left\{ (L/D) + \sqrt{\left( (L/D)^2 + 1 \right)} \right\}}$$
$$= \frac{3.14}{1.90}$$
$$= 1.66$$

 $k = \frac{S \ln \left( \frac{h_0}{h(t)} \right)}{F(t - t_0)}$ 

Equation for borehole permeability tests after BS EN ISO 22282-2:2012

3000

4000

2000

Elapsed Time (seconds)

Calculated by:	JMT	Project:	East Anglia (North) Offshore Wind Farm	Exploratory position reference:
		Project No:	3318	BH17-C6-02
Checked by:	DD	Client:	GHD	

1000

0.250

0.300 0







# APPENDIX D Instrumentation Sampling and Monitoring Records

# TerraConsult

# **GROUND GAS AND GROUNDWATER MONITORING DATA**

GROUNDWATER AND GROUND GAS MONITORING

East Anglia OWF

Site:

3318

No:

her	Ambient Temp °C	21	19	18	15	20	19	18	15	20	19	18	15	00
Weat	Conditions	Sunny, dry	Sunny, dry	Sunny, dry	Showers	Sunny, dry	Sunny, dry	Sunny, dry	Showers	Sunny, dry	Sunny, dry	Sunny, dry	Showers	Sunny dry
	VOC (ppm)	MN	NM	NM	NM	MN	NM	NM	NM	MN	NM	MN	NM	MN
	H2S (ppm)	0	0	0	0	0	0	0	0	0	0	0	0	c
	CO (ppm)	0	0	0	0	0	0	0	0	0	0	0	0	c
	O <sub>2</sub> (% v/v)	20.9	20.8	20	20.9	20.6	20.4	20.9	20.5	20.3	21	20.7	19.5	20.2
	GSV CO <sub>2</sub> (l/hr)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	00000
	CO <sub>2</sub> (% v/v)	0.1	0.1	0.4	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.1	0.7	0.5
Gas	GSV CH4 (I/hr)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	00000
	CH4 (% v/v)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	00
	Flow (I/h)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	00
	Relative Pressure (Pa)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	00
	Atmospher ic Pressure Comment	MN	MN	MN	NM	MN	MN	MN	NM	MN	MN	MN	MN	MN
	Atmospher ic Pressure (mbar)	1018	1015	1013	995	1020	1015	1013	995	1020	1014	1013	995	1020
	Colour													
	Odour													
roundwate	Water Temp oC													
0	Water Sample Taken?	Y	z	z	z	≻	z	z	Z	Y	z	z	z	>
	Water Depth (m bgl)	6.74	6.70	6.76	6.77	8.71	8.69	8.73	8.79	8.80	8.80	8.86	8.91	3 71
etails	Depth to Base (m bgl)	12.74	11.96	11.82	11.90	14.65	14.40	14.40	14.38	17.36	19.68	19.46	17.16	18 48
Well D	Standpipe diameter (mm)	51	51	51	51	51	51	51	51	51	51	51	51	51
	Monitored by	ΚW	VS	VS	VS	ΚW	VS	VS	VS	κw	VS	NS	VS	KW
	Date	11/08/17	22/08/17	31/08/17	14/09/17	10/08/17	22/08/17	31/08/17	14/09/17	10/08/17	22/08/17	31/08/17	14/09/17	10/08/17
	Location			0-00-/110				CO-00-/1Ug			10 20 21 D			

19 18

Sunny, dry Sunny, dry Showers

WN NN MM

> 0 0

00 0

20.2

0.0000.0

0.0

0.2 0.0000 21.2 0.6 0.0000 20.3

0.0000

0.0 0.0

0.0 0.0

0.0 0.0

MN NN MN

1014 1014 997

z z z

3.43 3.54 3.61

18.41 18.32 18.21

51 51

VS S

BH17-C7-03 22/08/17 31/08/17

51

4/09/17

# APPENDIX E Geotechnical Laboratory Test Results

Report References:

GSTL 35625

CLS 684646



#### LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5)

Contract Number

Site Name

#### 36525

#### E Anglia Wind Farm - Cable Route

					-						
Hole Reference	Sample Number	Sample Type	D	epth (ı	m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing .425mm %	Remarks
BH17-C6-01	7	D	5.00	-		19	23	16	7	100	CL Low Plasticity
BH17-C6-02	7	D	6.00	-		18	23	16	7	100	CL Low Plasticity
BH17-C6-03	5	D	8.50	-	8.95	37		NP		100	
BH17-C7-02	5	D	5.50	-	5.95	26	25	21	4	100	ML Low Plasticity
BH17-C7-04	8	D	8.00	-		17	22	18	4	100	ML Low Plasticity
				-							
				-							
				-							
				-							
				-							
				-							
				-							



#### PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION

BS 5930:1999+A2:2010





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





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



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

CCTI	ONE DIMENSIONAL CONSOLIDATION TEST	Contract Number	36525	
USIL	BS1377:Part 5:1990, clause 3	Borehole/Trialpit No.	BH17-C6-03	
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	1	
Soil Description	Prown cilty condy CLAV	Depth Top (m)	7.00	
	BIOWH Silly Salidy CLAT	Depth Base (m)	7.45	
Lab Temperature	20°c	Sample Location	Middle	
Remarks	Cv Calculated Using T90	Sample Type	U	



			ungo	IVIV m2/IVIN	m2/yr	Press	ure Range	Mv m2/MN	m2/yr
18	0	-	100	0.6	5.8		-		
2.24	100	-	200	0.16	6.1		-		
1.89	200	-	400	0.092	11		-		
3999	400	-	800	0.0	11		-		
22.2	800	-	400	-0.00099	26		-		
9.83	400	-	200	-0.00085	10		-		
74.9		-					-		
2.65		-					-		
	18 2.24 1.89 3999 22.2 9.83 74.9 2.65	18         0           2.24         100           1.89         200           3999         400           22.2         800           9.83         400           74.9         2.65	18     0     -       2.24     100     -       1.89     200     -       3999     400     -       22.2     800     -       9.83     400     -       74.9     -       2.65     -	18       0       -       100         2.24       100       -       200         1.89       200       -       400         3999       400       -       800         22.2       800       -       400         9.83       400       -       200         74.9       -       -         2.65       -       -	18       0       -       100       0.6         2.24       100       -       200       0.16         1.89       200       -       400       0.092         3999       400       -       800       0.0         22.2       800       -       400       -0.00099         9.83       400       -       200       -0.00085         74.9       -       -       -         2.65       -       -       -	18       0       -       100       0.6       5.8         2.24       100       -       200       0.16       6.1         1.89       200       -       400       0.092       11         3999       400       -       800       0.0       11         22.2       800       -       400       -0.00099       26         9.83       400       -       200       -0.00085       10         74.9       -       -       -       -         2.65       -       -       -       -	18       0       -       100       0.6       5.8         2.24       100       -       200       0.16       6.1         1.89       200       -       400       0.092       11         3999       400       -       800       0.0       11         22.2       800       -       400       -0.0099       26         9.83       400       -       200       -0.00085       10         74.9       -       -       -       -       -         2.65       -       -       -       -       -	18       0       -       100       0.6       5.8       -         2.24       100       -       200       0.16       6.1       -         1.89       200       -       400       0.092       11       -         3999       400       -       800       0.0       11       -         22.2       800       -       400       -0.0099       26       -         9.83       400       -       200       -0.00085       10       -         74.9       -       -       -       -       -         2.65       -       -       -       -       -	18       0       -       100       0.6       5.8       -       -       -         2.24       100       -       200       0.16       6.1       -       -       -         1.89       200       -       400       0.092       11       -       -       -         3999       400       -       800       0.0       11       -       -       -         22.2       800       -       400       -0.0099       26       -       -       -         9.83       400       -       200       -0.00085       10       -       -       -         74.9       -       -       -       -       -       -       -       -         2.65       -       -       -       -       -       -       -       -

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

CCTI	ONE DIMENSIONAL CONSOLIDATION TEST	Contract Number	36525	
USIL	BS1377:Part 5:1990, clause 3	Borehole/Trialpit No.	BH17-C7-01	
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	2	
Soil Description	Prown cilty condy CLAV	Depth Top (m)	10.00	
	BIOWH SILLY SAINLY CLAT	Depth Base (m)	10.45	
Lab Temperature	20°c	Sample Location	Middle	
Remarks	Cv Calculated Using T90	Sample Type	U	



Initial Sample Condit	ions	Pres	sure R	lange	Mv m2/MN	Cv m2/yr	Pres	sure R	ange	Mv m2/MN	Cv m2/yr
Moisture Content (%)	17	0	-	100	0.63	3.5		-			
Bulk Density (Mg/m3)	2.23	100	-	200	0.11	6.1		-			
Dry Density (Mg/m3)	1.90	200	-	400	0.096	7.4		-			
Voids Ratio	0.3926	400	-	800	0.1	8.4		-			
Degree of saturation	116.8	800	-	400	0.00028	18		-			
Height (mm)	19.77	400	-	200	0.0028	5.6		-			
Diameter (mm)	74.91		-					-			
Particle Density (Mg/m3)	2.65		-					-			

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

CCTI	Single Stage Unconsolidated-Undrained Triaxial Test	Contract Number	36525
GOIL	BS 1377 : 1990 Part 7 : 8	Borehole/Pit No.	BH17-C6-03
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	1
Soil Description	Brown silty candy CLAV	Depth Top (m)	7.00
	blown sing sandy CLAT	Depth Base (m)	7.45
		Sample Type	U



Moisture Content (%)		17		
Bulk Density (Mg/m <sup>3</sup> )		2.25		
Dry Density (Mg/m <sup>3</sup> )		1.92		
Specimen Length (mm)	)	203		
Specimen Diameter (mm	ו)	102		
Cell Pressure (kPa)		140		
Deviator Stress (kPa)		63		
Undrained Shear Strength (kPa)		31		
Failure Strain (%)		12.3		
Mode Of Failure		Plastic		
Membrane Used/Thickne	SS	Rubber/0.3mm		
Rate of Strain (%/min)		3.00		
Checked		20/09/2017		

Approved

21/09/2017

Specimen Post Test	Sample Split
PICTURE NOT AVAILABLE	PICTURE NOT AVAILABLE
	*

Sean Penn	
Paul Evans	
	2788

CCTI	Single Stage Unconsolidated-Undrained Triaxial	Contract Number	36525
GOIL	BS 1377 : 1990 Part 7 : 8	Borehole/Pit No.	BH17-C7-01
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	1
Soil Description	Brown find to coored gravelly sitty CLAV	Depth Top (m)	7.00
	Brown line to coarse gravely sity GLAT	Depth Base (m)	7.45
		Sample Type	U



Moisture Content (%)	15		
Bulk Density (Mg/m <sup>3</sup> )	2.23		
Dry Density (Mg/m <sup>3</sup> )	1.94		
Specimen Length (mm)	203		
Specimen Diameter (mm)	102		
Cell Pressure (kPa)	200		
Deviator Stress (kPa)	74		
Undrained Shear Strength (kPa)	37		
Failure Strain (%)	9.9		
Mode Of Failure	Plastic		
Membrane Used/Thickness	Rubber/0.3mm		
Rate of Strain (%/min)	3.00		

Specimen Post Test	Sample Split
PICTURE NOT AVAILABLE	PICTURE NOT AVAILABLE



CCTI	Single Stage Unconsolidated-Undrained Triaxial	Contract Number	36525
BS 1377 : 1990 Part 7 : 8		Borehole/Pit No.	BH17-C7-03
Site Name	E Anglia Wind Farm - Cable Route	Sample No.	1
Soil Description	Crowlergue alightly conduiting to modium growelly aith CLAV	Depth Top (m)	7.00
		Depth Base (m)	7.45
		Sample Type	U



Moisture Content (%)	15		
Bulk Density (Mg/m <sup>3</sup> )	2.31		
Dry Density (Mg/m <sup>3</sup> )	2.01		
Specimen Length (mm)	204		
Specimen Diameter (mm)	102		
Cell Pressure (kPa)	140		
Deviator Stress (kPa)	84		
Undrained Shear Strength (kPa)	42		
Failure Strain (%)	15.7		
Mode Of Failure	Plastic		
Membrane Used/Thickness	Rubber/0.3mm		
Rate of Strain (%/min)	3.00		
	•		

Specimen Post Test	Sample Split
PICTURE NUT AVAILABLE	PICTURE NUT AVAILABLE

Checked	20/09/2017	Sean Penn		
Approved	21/09/2017	Paul Evans		UKAS UKAS TESTING 2788



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 1E 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 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 Advis

Concept Reference:	684646						
Project Site:	Happisbur	gh/East Ar	nglia				
Customer Reference:							
Soil BRE SD1 (SE)	Analysed a	as Soil					
				Conce	pt Reference	684646 008	684646 009
			Custon	ner Samp	le Reference	BH17-C6-01 D7 @ 5.00m	17-C7-03 D8 @ 6.50m
				[	Date Sampled	Deviating	Deviating
					Matrix Class	Sandy Soil	Clay
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	0.02
Magnesium		T112	A40	1	mg/l	<1	3
(Water soluble) NO3		T710	A40	0.01	g/l	<0.01	<0.01
рН		T7	A40			8.1	8.3
(Water Soluble) SO4 expressed as S	04	T242	A40	0.01	g/l	0.02	0.03
SO4(Total)		T102	A40	0.02	%	<0.02	0.02
Sulphur (total)		Т6	A40	0.01	%	<0.01	0.01
Moisture @105C		T162	AR	0.1	%	16	14
Retained on 2mm		T2	A40	0.1	%	2.3	2.4

# Index to symbols used in Supplement 1E to Report Number 684646-1

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

#### Notes

Supplement 1E Report reissued to include only samples 008 and 009
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

#### **Method Index**

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

# **Accreditation Summary**

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
(Water soluble) Ammonia expressed as NH4	T710	AR	0.01	g/l	N	008-009
(Water soluble) Cl-	T710	A40	0.01	g/l	N	008-009
Magnesium	T112	A40	1	mg/l	N	008-009
(Water soluble) NO3	T710	A40	0.01	g/l	N	008-009
рН	T7	A40			М	008-009
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	М	008-009
SO4(Total)	T102	A40	0.02	%	М	008-009
Sulphur (total)	T6	A40	0.01	%	М	008-009
Moisture @105C	T162	AR	0.1	%	N	008-009
Retained on 2mm	T2	A40	0.1	%	N	008-009

# APPENDIX F Geoenvironmental Laboratory Test Results

Report References:	672447
	674086
	675177



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 672447-1

Date of Report: 23-Oct-2017

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

Customer Contact: Mr Derek Daniels

Customer Job Reference: 3318 Customer Purchase Order: PO-001748 Customer Site Reference: Norfolk Vanguard Cable Route Date Job Received at Concept: 13-Jul-2017 Date Analysis Started: 03-Aug-2017 Date Analysis Completed: 11-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





Report checked and authorised by : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service Advis

Analysed as Soil

Soil

Miscellaneous

			Conce	ot Reference	672447 026	672447 030	672447 034	672447 038	672447 042
Customer Sample Reference					BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C6-04 ES2 @ 1.00m	BH17-C6-01 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m
			D	ate Sampled	14-JUL-2017	13-JUL-2017	17-JUL-2017	18-JUL-2017	20-JUL-2017
				Matrix Class	Sandy Soil	Sandy Soil	Clay	Sandy Soil	Sandy Soil
Determinand	Determinand Method Test LOD Units								
Arsenic	T257	A40	2	mg/kg	8	7	10	9	8
Barium	T257	A40	2	mg/kg	41	33	38	32	25
Beryllium	T245	A40	0.5	mg/kg	<0.5	<0.5	0.7	<0.5	0.5
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	T257	A40	0.5	mg/kg	13	12	19	13	11
Copper	T257	A40	2	mg/kg	11	7	14	7	8
Lead	T257	A40	2	mg/kg	27	14	12	9	8
Mercury	T245	A40	1.0	mg/kg	1.3	<1.0	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	9.1	9.0	17	10	9.6
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3	<3
Vanadium	T257	A40	0.1	mg/kg	19	19	31	20	18
Zinc	T257	A40	2	mg/kg	32	27	37	24	24
Soil Organic Matter	T287	A40	0.1	%	1.4	0.9	-	-	0.2
Moisture @105C	T162	AR	0.1	%	8.8	7.1	15	3.7	16
Retained on 2mm	T2	A40	0.1	%	1.0	5.5	8.1	6.5	1.3

Concept Reference: 672447 Project Site: Norfolk Vanguard Cable Route

Customer	Reference	3318					
Soil		Analysed	as Soil				
Miscellaneous							
		1	Conce	ot Reference	672447 054	672447 066	672447 074
		Custor	ner Samp	le Reference	BH17-C7-02 ES2 @ 1.00m	BH17-C7-04 ES2 @ 1.00m	BH17-C7-01 ES2 @ 1.00m
			D	ate Sampled	25-JUL-2017	24-JUL-2017	27-JUL-2017
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units			1003104
Arsenic	T257	A40	2	mg/kg	10	5	3
Barium	T257	A40	2	mg/kg	29	23	14
Beryllium	T245	A40	0.5	mg/kg	<0.5	<0.5	<0.5
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	<0.1	<0.1	<0.1
Chromium	T257	A40	0.5	mg/kg	33	6.1	5.9
Copper	T257	A40	2	mg/kg	8	3	3
Lead	T257	A40	2	mg/kg	10	4	4
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	11	5.1	5.6
Selenium	T257	A40	3	mg/kg	<3	<3	<3
Vanadium	T257	A40	0.1	mg/kg	20	13	8.6
Zinc	T257	A40	2	mg/kg	25	12	11
Soil Organic Matter	T287	A40	0.1	%	0.5	-	-
Moisture @105C	T162	AR	0.1	%	7.5	6.0	5.0
Retained on 2mm	T2	A40	0.1	%	40.6	2.6	<0.1

Concept F	Reference:	672447								
Pr	oject Site:	Norfolk V	orfolk Vanguard Cable Route							
Customer F	Reference:	3318								
Soil Asbestos		Analysed	as Soil							
			Concep	ot Reference	672447 025	672447 029	672447 041	672447 053		
Customer Sample Reference					BH17-C6-03 ES1 @ 0.50m	BH17-C6-02 ES1 @ 0.50m	BH17-C7-03 ES1 @ 0.50m	BH17-C7-02 ES1 @ 0.50m		
			Da	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017		
Determinand	Method	Test Sample	LOD	Units						
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected		

Soil

Analysed as Soil Total and Speciated USEPA16 PAH (SE) (MCERTS)

			Concep	t Reference	672447 026	672447 030	672447 042	672447 054
		Custon	ner Sampl	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
			Da	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units				
Naphthalene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
PAH(total)	T16	AR	0.1	ma/ka	<0.1	<0.1	<0.1	<0.1



Soil

Analysed as Soil

TPH	CWG

IFICWG								
			Concep	ot Reference	672447 026	672447 030	672447 042	672447 054
		Custor	ner Sampl	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m	
			Da	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
			I	Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units				
Benzene	T209	AR	10	µg/kg	<10	<10	<10	<10
Toluene	T209	AR	10	µg/kg	<10	<10	<10	<10
EthylBenzene	T209	AR	10	µg/kg	<10	<10	<10	<10
M/P Xylene	T209	AR	10	µg/kg	<10	<10	<10	<10
O Xylene	T209	AR	10	µg/kg	<10	<10	<10	<10
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	2	<2	<2	<2
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	2	<2	<2	<2
TPH (C35-C40 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C35-C40 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (Aliphatic+Aromatic) C10-C25 (Sum)	T85	AR	4	mg/kg	(62) <5	(62) <5	(62) <5	(62) <5
TPH (Aliphatic+Aromatic) C25-C40 (Sum)	T85	AR	4	ma/ka	(62) <5	(62) <5	(62) <5	(62) <5

Concept Reference: 672447 Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318

Analysed as Soil

Organochlorine insecticides

Soil

			Conce	ot Reference	672447 026	672447 030	672447 042	672447 054
	Customer Sample Reference				BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
Date Sampled					14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units		201		
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	T1	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Heptachlor	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Aldrin	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Chlordane	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Endosulphan	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
DDE	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Dieldrin	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
Endrin	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
DDD	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01
тла	T16	AR	0.01	ma/ka	<0.01	<0.01	<0.01	<0.01

Analysed as Soil

Organophosphorous insecticides

Soil

			Conce	ot Reference	672447 026	672447 026 672447 030		672447 054			
Customer Sample Reference					BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m			
			D	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017			
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil			
Determinand	Method	Test Sample	LOD	Units							
Dichlorvos	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Mevinphos	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Dimethoate	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Diazinon	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Pirimiphos methyl	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Malathion	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Fenitrothion	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Parathion	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Azinphos methyl	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			

#### Concept Reference: 672447

Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318

Analysed as Soil

Soil Triazines Suite

Concept Reference Customer Sample Reference					672447 026	672447 030	672447 042	672447 054 BH17-C7-02 ES2 @ 1.00m
					BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	
			Da	te Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
Matrix Class				latrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units				
Simazine	T16	AR	0.01	mg/kg	(64) < 0.01	(64) < 0.01	(64) < 0.01	<sup>(64)</sup> <0.01
Atrazine	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01
Propazine	T16	AR	0.01	mg/kg	(64) < 0.01	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01	<sup>(64)</sup> <0.01
Trietazine	T16	AR	0.01	mg/kg	(64) < 0.01	(64) < 0.01	(64) < 0.01	<sup>(64)</sup> <0.01
Prometryn	T16	AR	0.01	mg/kg	(64) < 0.01	(64) < 0.01	(64) < 0.01	<sup>(64)</sup> <0.01
Terbutryn	T16	AR	0.01	mg/kg	(64) < 0.01	(64) < 0.01	(64) < 0.01	(64) < 0.01

Concept F	Concept Reference: 672447										
Pr	oject Site:	Site: Norfolk Vanguard Cable Route									
Customer F	Customer Reference: 3318										
Soil Urons	bil     Analysed as Soil       rons										
			Conce	ot Reference	672447 026	672447 030	672447 042	672447 054			
	Customer Sample Reference         BH17-C6-03 ES2 @ 1.00m         BH17-C6-02 ES2 @ 1.00m         BH17-C7-03 ES2 @ 1.00m         BH17-C7-03 ES2 @ 1.00m										
			D	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017			
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil			
Determinand	Method	Test Sample	LOD	Units							
Chlorotoluron	T310	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Diuron	T310	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Isoproturon	T310	AR	AR 0.01 mg/kg		<0.01	<0.01	<0.01	<0.01			
Linuron	T310	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			
Monuron	T310	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01			

Analysed as Soil

Phenoxy Acetic acid herbicides

Soil

Soil

			Conce	ot Reference	672447 026 672447 030		672447 042	672447 054	
	ner Samp	le Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m			
			D	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017	
Matrix Class Sandy Soil Sandy Soil Sandy Soil Sandy Soil Sandy Soil									
Determinand	Method	Test Sample	LOD	Units					
Mecoprop	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	
Phenoxy Acetic acid herbicide: MCPA	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	
Dichlorprop	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	
Phenoxy Acetic acid herbicide: 2,4-D	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	
Fenoprop	T16	AR	0.01	mg/kg	<sup>(36)</sup> <0.02	<sup>(36)</sup> <0.02	(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	(36) < 0.02	(36) < 0.02	

Concept Reference: 672447

Project Site: Norfolk Vanguard Cable Route

Customer Reference: 3318

	Concept Re
Phenols (Speciated)	
Soil	Analysed as Soil

			Conce	pt Reference	672447 026	672447 030	672447 042	672447 054	
Customer Sample Reference					BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m	
			D	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017	
				Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units	100				
Resorcinol	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	
Catechol	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	
Phenol	T17	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	
Cresols	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	
Xylenols	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	
Naphthols	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	
Trimethyl phenol	T17	AR	0.05	mg/kg	(62) < 0.10	(62) < 0.10	(62) < 0.10	(62) < 0.10	
Total Phenols	T17	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	

#### Index to symbols used in Supplement 1C to Report Number 672447-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
64	Analysis was performed by an alternative technique
62	LOD was raised due to the method performance of the analytical procedure used
36	LOD Raised due to low Matrix spike recovery
S	Analysis was subcontracted
М	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

#### Notes

026, 030, 042, 054, - BTEX - Samples submitted for GC/MS (Headspace) analysis were submitted in inappropriate containers. It is possible therefore that the results provided may be compromised
OCP & OPP - 026, 030, 042 - These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.
Supplement 1C report reissued to include only samples 025, 026, 029, 030, 034, 038, 041, 042, 053, 054, 066 and 074
TPH, PAH & BTEX - 026, 030 - These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.
OCP, OPP and PAAH analysis transferred to Concept Life Sciences Manchester
Speciated phenols - 026, 030, 042, 054- These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.
Asbestos subcontracted to REC Limited
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except TPH c5-c35 aro/ali split, Urons, Triazines, OCP/OPP and PAAH
Retained on 2mm is removed before analysis

#### **Method Index**

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

# **Accreditation Summary**

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2	mg/kg	М	026,030,034,038,042,054,066,074
Barium	T257	A40	2	mg/kg	U	026,030,034,038,042,054,066,074
Beryllium	T245	A40	0.5	mg/kg	U	026,030,034,038,042,054,066,074
Boron (water-soluble)	T82	A40	1	mg/kg	N	026,030,034,038,042,054,066,074
Cadmium	T257	A40	0.1	mg/kg	М	026,030,034,038,042,054,066,074
Chromium	T257	A40	0.5	mg/kg	М	026,030,034,038,042,054,066,074
Copper	T257	A40	2	mg/kg	М	026,030,034,038,042,054,066,074
Lead	T257	A40	2	mg/kg	М	026,030,034,038,042,054,066,074
Mercury	T245	A40	1.0	mg/kg	U	026,030,034,038,042,054,066,074
Nickel	T257	A40	0.5	mg/kg	М	026,030,034,038,042,054,066,074
Selenium	T257	A40	3	mg/kg	U	026,030,034,038,042,054,066,074
Vanadium	T257	A40	0.1	mg/kg	U	026,030,034,038,042,054,066,074
Zinc	T257	A40	2	mg/kg	М	026,030,034,038,042,054,066,074
Soil Organic Matter	T287	A40	0.1	%	N	026,030,042,054
Moisture @105C	T162	AR	0.1	%	N	026,030,034,038,042,054,066,074
Retained on 2mm	T2	A40	0.1	%	N	026,030,034,038,042,054,066,074
Asbestos ID	T27	A40			SU	025,029,041,053
Naphthalene	T16	AR	0.1	mg/kg	U	026,030,042,054
Acenaphthylene	T16	AR	0.1	mg/kg	U	026,030,042,054
Acenaphthene	T16	AR	0.1	mg/kg	М	026,030,042,054
Fluorene	T16	AR	0.1	mg/kg	М	026,030,042,054
Phenanthrene	T16	AR	0.1	mg/kg	U	026,030,042,054
Anthracene	T16	AR	0.1	mg/kg	М	026,030,042,054
Fluoranthene	T16	AR	0.1	mg/kg	N	026,030,042,054
Pyrene	T16	AR	0.1	mg/kg	N	026,030,042,054
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	М	026,030,042,054
Chrysene	T16	AR	0.1	mg/kg	М	026,030,042,054
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	026,030,042,054
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	026,030,042,054
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	М	026,030,042,054
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	М	026,030,042,054
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	М	026,030,042,054
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	М	026,030,042,054
PAH(total)	T16	AR	0.1	mg/kg	U	026,030,042,054
Benzene	T209	AR	10	µg/kg	М	026,030,042,054
Toluene	T209	AR	10	µg/kg	М	026,030,042,054
EthylBenzene	T209	AR	10	µg/kg	М	026,030,042,054
M/P Xylene	T209	AR	10	µg/kg	M	026,030,042,054
O Xylene	T209	AR	10	µg/kg	M	026,030,042,054
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	026,030,042,054
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	026,030,042,054
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	026,030,042,054

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	Ν	026,030,042,054
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	Ν	026,030,042,054
TPH (C35-C40 aliphatic)	T219	AR	2	mg/kg	Ν	026,030,042,054
TPH (C35-C40 aromatic)	T219	AR	2	mg/kg	N	026,030,042,054
TPH (Aliphatic+Aromatic) C10-C25 (Sum)	T85	AR	4	mg/kg	Ν	026,030,042,054
TPH (Aliphatic+Aromatic) C25-C40 (Sum)	T85	AR	4	mg/kg	N	026,030,042,054
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	U	026,030,042,054
Hexachlorobenzene	T1	AR	0.01	mg/kg	U	026,030,042,054
Heptachlor	T16	AR	0.01	mg/kg	U	026,030,042,054
Aldrin	T16	AR	0.01	mg/kg	U	026,030,042,054
Heptachlor epoxide	T16	AR	0.01	mg/kg	U	026,030,042,054
Chlordane	T16	AR	0.01	mg/kg	U	026,030,042,054
Endosulphan	T16	AR	0.01	mg/kg	U	026,030,042,054
DDE	T16	AR	0.01	mg/kg	U	026,030,042,054
Dieldrin	T16	AR	0.01	mg/kg	U	026,030,042,054
Endrin	T16	AR	0.01	mg/kg	U	026,030,042,054
DDD	T16	AR	0.01	mg/kg	U	026,030,042,054
DDT	T16	AR	0.01	mg/kg	U	026,030,042,054
Dichlorvos	T16	AR	0.01	mg/kg	U	026,030,042,054
Mevinphos	T16	AR	0.01	mg/kg	U	026,030,042,054
Dimethoate	T16	AR	0.01	mg/kg	U	026,030,042,054
Diazinon	T16	AR	0.01	mg/kg	U	026,030,042,054
Pirimiphos methyl	T16	AR	0.01	mg/kg	U	026,030,042,054
Malathion	T16	AR	0.01	mg/kg	U	026,030,042,054
Fenitrothion	T16	AR	0.01	mg/kg	U	026,030,042,054
Parathion	T16	AR	0.01	mg/kg	U	026,030,042,054
Azinphos methyl	T16	AR	0.01	mg/kg	U	026,030,042,054
Simazine	T16	AR	0.01	mg/kg	N	026,030,042,054
Atrazine	T16	AR	0.01	mg/kg	N	026,030,042,054
Propazine	T16	AR	0.01	mg/kg	N	026,030,042,054
Trietazine	T16	AR	0.01	mg/kg	N	026,030,042,054
Prometryn	T16	AR	0.01	mg/kg	Ν	026,030,042,054
Terbutryn	T16	AR	0.01	mg/kg	Ν	026,030,042,054
Chlorotoluron	T310	AR	0.01	mg/kg	N	026,030,042,054
Diuron	T310	AR	0.01	mg/kg	N	026,030,042,054
Isoproturon	T310	AR	0.01	mg/kg	N	026,030,042,054
Linuron	T310	AR	0.01	mg/kg	N	026,030,042,054
Monuron	T310	AR	0.01	mg/kg	N	026,030,042,054
Месоргор	T16	AR	0.01	mg/kg	N	026,030,042,054
Phenoxy Acetic acid herbicide: MCPA	T16	AR	0.01	mg/kg	N	026,030,042,054
Dichlorprop	T16	AR	0.01	mg/kg	N	026,030,042,054
Phenoxy Acetic acid herbicide: 2,4-D	T16	AR	0.01	mg/kg	N	026,030,042,054
Fenoprop	T16	AR	0.01	mg/kg	N	026,030,042,054
Phenoxy Acetic acid herbicide: 2,4,5-T	T16	AR	0.01	mg/kg	N	026,030,042,054
Resorcinol	T17	AR	0.05	mg/kg	М	026,030,042,054
Catechol	T17	AR	0.05	mg/kg	N	026,030,042,054
Phenol	T17	AR	0.1	mg/kg	М	026,030,042,054
Cresols	T17	AR	0.05	mg/kg	М	026,030,042,054
Xylenols	T17	AR	0.05	mg/kg	М	026,030,042,054
Naphthols	T17	AR	0.05	mg/kg	N	026,030,042,054
Trimethyl phenol	T17	AR	0.05	mg/kg	М	026,030,042,054
Total Phenols	T17	AR	0.1	mg/kg	N	026,030,042,054



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: 23-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 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 : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service Adv

Analysed as Soil

CLEA metals, Braintree

Soil

Braintree

	674086 014				
	BH17-C7-02 ES2 @ 1.00m				
	27-JUL-2017				
	Clay				
Determinand	Method	Test Sample	LOD	Units	
Arsenic	T257	A40	2	mg/kg	43
Barium	T257	A40	2	mg/kg	75
Beryllium	T245	A40	0.5	mg/kg	1.1
Boron (water-soluble)	T82	A40	1	mg/kg	<1
Cadmium	T257	A40	0.1	mg/kg	0.2
Chromium	T257	A40	0.5	mg/kg	23
Copper	T257	A40	2	mg/kg	13
Lead	T257	A40	2	mg/kg	14
Mercury	T245	A40	1.0	mg/kg	<1.0
Nickel	T257	A40	0.5	mg/kg	26
Selenium	T257	A40	3	mg/kg	<3
Vanadium	T257	A40	0.1	mg/kg	47
Zinc	T257	A40	2	mg/kg	45
Soil Organic Matter	T287	A40	0.1	%	0.2
Moisture @105C	T162	AR	0.1	%	15
Retained on 2mm	T2	A40	0.1	%	3.3

с	oncept R	eference:	674086	12.1					
	Pro	oject Site:	Norfolk Vanguard Cable Route						
Cu	stomer R	eference:	3318						
Soil Asbestos			Analysed	as Soil					
	Concept Reference 674086 013								
Customer Sample Reference BH17-C7-02 ES1 @ 0.50m									
	Date Sampled 27-JUL-2017								
Matrix Class Clay									
Determina	ind	Method	Test Sample	LOD	Units				
Asbestos ID		T27	A40			Asbestos not detected			

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

	ot Reference	674086 014			
	BH17-C7-02 ES2 @ 1.00m				
			D	ate Sampled	27-JUL-2017
				Matrix Class	Clay
Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T16	AR	0.1	mg/kg	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	<0.1
Anthracene	T16	AR	0.1	mg/kg	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	0.1
Pyrene	T16	AR	0.1	mg/kg	0.1
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	<0.1
Chrysene	T16	AR	0.1	mg/kg	<0.1
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	<0.1
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	0.1
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	<0.1
PAH(total)	T16	AR	0.1	mg/kg	0.5

Concept Reference: 674086 Project Site: Norfolk Vanguard Cable Route

TPH (Aliphatic+Aromatic) C25-C40 (Sum)

Customer Reference: 3318 Soil Analysed as Soil TPH CWG **Concept Reference** 674086 014 BH17-C7-02 ES2 @ 1.00m **Customer Sample Reference** Date Sampled 27-JUL-2017 Matrix Class Clay Test Sample Determinand Method LOD Units T209 Benzene AR 10 µg/kg <10 Toluene T209 AR 10 µg/kg <10 EthylBenzene T209 AR 10 <10 µg/kg T209 AR 10 <10 M/P Xylene µg/kg T209 O Xylene AR 10 µg/kg <10 Methyl tert-Butyl Ether T54 AR <1 1 µg/kg TPH (C5-C6 aliphatic) AR <0.010 T54 0.010 mg/kg TPH (C6-C7 aromatic) T54 AR 0.010 mg/kg <0.010 TPH (C6-C8 aliphatic) T54 0.010 AR mg/kg < 0.010 TPH (C7-C8 aromatic) T54 AR 0.010 mg/kg <0.010 TPH (C8-C10 aliphatic) T54 AR 0.010 <0.010 mg/kg TPH (C8-C10 aromatic) T54 AR 0.010 <0.010 mg/kg TPH (C10-C12 aliphatic) T219 AR 2 <2 mg/kg TPH (C10-C12 aromatic) T219 AR 2 mg/kg <2 TPH (C12-C16 aliphatic) T219 AR 2 <2 mg/kg TPH (C12-C16 aromatic) T219 AR 2 mg/kg <2 TPH (C16-C21 aliphatic) T219 AR 2 <2 mg/kg TPH (C16-C21 aromatic) T219 AR 2 mg/kg <2 TPH (C21-C35 aliphatic) T219 AR <2 2 mg/kg TPH (C21-C35 aromatic) T219 AR 2 mg/kg <2 TPH (C35-C40 aliphatic) T219 AR 2 mg/kg <2 TPH (C35-C40 aromatic) T219 AR 2 mg/kg <2 TPH (Aliphatic+Aromatic) C10-C25 (Sum) T85 AR 4 mg/kg <4

T85

AR

4

mg/kg

<4

Analysed as Soil

Phenols (Speciated) **Concept Reference** 674086 014 BH17-C7-02 ES2 @ 1.00m **Customer Sample Reference** Date Sampled 27-JUL-2017 Matrix Class Clay Test Sample Method LOD Determinand Units T17 0.05 <0.05 Resorcinol AR mg/kg Catechol T17 AR 0.05 <0.05 mg/kg Phenol T17 AR <0.1 0.1 mg/kg T17 AR 0.05 <0.05 Cresols mg/kg T17 <0.05 Xylenols AR 0.05 mg/kg T17 Naphthols AR 0.05 <0.05 mg/kg T17 Trimethyl phenol AR 0.05 mg/kg <0.05 Total Phenols T17 AR 0.1 <0.1 mg/kg

#### Concept Reference: 674086 Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318

Analysed as Soil

Soil

#### Soil

Organochlorine insecticides

-	Concept Reference 674086 0 Customer Sample Reference BH17-C7-02 1.00m							
			D	ate Sampled	27-JUL-2017			
				Matrix Class	Clay			
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	<sup>(131)</sup> <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			

Concep	t Reference:	674086	674086						
	Norfolk V	Norfolk Vanguard Cable Route							
Custome	r Reference:	3318	3318						
Soil	Analysed	as Soil							
Organophosphorous	insecticides								
			Conce	pt Reference	674086 014				
	le Reference	BH17-C7-02 ES2 @ 1.00m							
			D	27-JUL-2017					
				Clay					
Determinand	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				
Pirimiphos methyl	T16	AR	0.01	<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	ma/ka	<0.01				

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#### Concept Reference: 674086 Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318 Analysed as Soil

Soil

Triazines Suite								
	ot Reference	674086 014						
	e Reference	BH17-C7-02 ES2 @ 1.00m						
			D	ate Sampled	27-JUL-2017			
				Matrix Class	Clay			
Determinand	Method	Test Sample	LOD	Units				
Simazine	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			
Atrazine	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			
Propazine	T16	AR	0.01	mg/kg	(64) < 0.01			
Trietazine	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			
Prometryn	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			
Terbutryn	T16	AR	0.01	mg/kg	<sup>(64)</sup> <0.01			

Concept	674086	674086 Norfolk Vanguard Cable Route						
Р	Norfolk Va							
Customer	Reference:	3318	3318					
Soil Urons		Analysed	Analysed as Soil					
			Concep	t Reference	674086 014			
		Custon	ner Sampl	BH17-C7-02 ES2 @ 1.00m 27-JUL-2017				
			Da					
			I	Matrix Class	Clay			
Determinand	Method	Test Sample	LOD	Units	100			
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: 67	74086		1.19	-92.5				
Proiect Site: N	Iorfolk Vanguard Cable Route							
Customer Reference: 33	3318							
Soil A Phenoxy Acetic acid herbicides	Analysed as Soil							
			Conce	ot Reference	674086 014			
	Customer Sample Reference BH17-C7-02 ES2 @ 1.00m							
	Date Sampled 27-JUL-2017							
				Matrix Class	Clay			
Determinand	Method	Test Sample	LOD	Units	long V/			
Месоргор	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					
100	LOD determined by sample aliquot used for analysis					
64	Analysis was performed by an alternative technique					
S	Analysis was subcontracted					

Produced by Concept Life Sciences, 3 Crittall Drive, Springwood Industrial Estate, Braintree, Essex, CM7 2RT Page 5 of 8 This document has been printed from a digitally signed mas@upplement 1C to Report Number 674086-1

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

#### Notes

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, OCP, OPP and PAAH
Triazines & Urons analysis transferred to Concept Life Sciences Cambridge
OCP, OPP and PAAH analysis transferred to Concept Life Sciences Manchester
Supplement 1C Report reissued to include only samples 013 and 014

#### **Method Index**

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

#### **Accreditation Summary**

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2	mg/kg	М	014
Barium	T257	A40	2	mg/kg	U	014
Beryllium	T245	A40	0.5	mg/kg	U	014
Boron (water-soluble)	T82	A40	1	mg/kg	N	014
Cadmium	T257	A40	0.1	mg/kg	М	014
Chromium	T257	A40	0.5	mg/kg	М	014
Copper	T257	A40	2	mg/kg	М	014
Lead	T257	A40	2	mg/kg	М	014
Mercury	T245	A40	1.0	mg/kg	U	014
Nickel	T257	A40	0.5	mg/kg	М	014
Selenium	T257	A40	3	mg/kg	U	014
Vanadium	T257	A40	0.1	mg/kg	U	014
Zinc	T257	A40	2	mg/kg	М	014
Soil Organic Matter	T287	A40	0.1	%	N	014
Moisture @105C	T162	AR	0.1	%	N	014
Retained on 2mm	T2	A40	0.1	%	N	014
Asbestos ID	T27	A40			SU	013
Naphthalene	T16	AR	0.1	mg/kg	U	014
Acenaphthylene	T16	AR	0.1	mg/kg	U	014
Acenaphthene	T16	AR	0.1	mg/kg	М	014
Fluorene	T16	AR	0.1	mg/kg	М	014
Phenanthrene	T16	AR	0.1	mg/kg	U	014
Anthracene	T16	AR	0.1	mg/kg	М	014
Fluoranthene	T16	AR	0.1	mg/kg	N	014
Pyrene	T16	AR	0.1	mg/kg	Ν	014
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	М	014
Chrysene	T16	AR	0.1	mg/kg	М	014
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	014
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	014
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	М	014
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	М	014
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	М	014
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	М	014

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
PAH(total)	T16	AR	0.1	mg/kg	U	014
Benzene	T209	AR	10	µg/kg	М	014
Toluene	T209	AR	10	µg/kg	М	014
EthylBenzene	T209	AR	10	µg/kg	M	014
M/P Xylene	1209	AR	10	µg/kg	M	014
O Xylene	1209	AR	10	µg/kg	M	014
TPH (C5-C6 aliphatic)	T54	AR	0.010	ma/ka	N	014
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	014
TPH (C6-C8 aliphatic)	T54	AR	0.010	ma/ka	N	014
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	014
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	014
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	014
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	014
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	014
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	014
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	014
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	014
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	014
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	N	014
TPH (C21-C35 aronatic)	T219		2	mg/kg	N	014
TPH (C35-C40 aromatic)	T219	AR	2	mg/kg	N	014
TPH (Aliphatic+Aromatic) C10-C25 (Sum)	T85	AR	4	mg/kg	N	014
TPH (Aliphatic+Aromatic) C25-C40 (Sum)	T85	AR	4	ma/ka	N	014
Resorcinol	T17	AR	0.05	mg/kg	M	014
Catechol	T17	AR	0.05	mg/kg	N	014
Phenol	T17	AR	0.1	mg/kg	М	014
Cresols	T17	AR	0.05	mg/kg	М	014
Xylenols	T17	AR	0.05	mg/kg	М	014
Naphthols	T17	AR	0.05	mg/kg	N	014
Trimethyl phenol	T17	AR	0.05	mg/kg	М	014
Total Phenols	T17	AR	0.1	mg/kg	N	014
Hexachlorocyclohexane	T16	AR	0.01	mg/kg	U	014
Hexachlorobenzene	11	AR	0.01	mg/kg	U	014
Heptachior	T16	AR	0.01	mg/kg	0	014
Hentachlor epoxide	T16	AR	0.01	mg/kg	U	014
Chlordane	T16	AR	0.01	mg/kg	U	014
Endosulphan	T16	AR	0.01	ma/ka	U	014
DDE	T16	AR	0.01	mg/kg	U	014
Dieldrin	T16	AR	0.01	mg/kg	U	014
Endrin	T16	AR	0.01	mg/kg	U	014
DDD	T16	AR	0.01	mg/kg	U	014
DDT	T16	AR	0.01	mg/kg	U	014
Dichlorvos	T16	AR	0.01	mg/kg	U	014
Mevinphos	T16	AR	0.01	mg/kg	U	014
Dimethoate	T16	AR	0.01	mg/kg	U	014
Diazinon	T16	AR	0.01	mg/kg	U	014
Pirimiphos methyl Molethian	T16	AR	0.01	mg/kg	U	014
Fenitrothion	T16		0.01	mg/kg	0	014
Parathion	T16	AR	0.01	ma/ka	U	014
Azinphos methyl	T16	AR	0.01	mg/kg	U	014
Simazine	T16	AR	0.01	mg/kg	N	014
Atrazine	T16	AR	0.01	mg/kg	N	014
Propazine	T16	AR	0.01	mg/kg	N	014
Trietazine	T16	AR	0.01	mg/kg	N	014
Prometryn	T16	AR	0.01	mg/kg	N	014
Terbutryn	T16	AR	0.01	mg/kg	N	014
Chlorotoluron	T310	AR	0.01	mg/kg	N	014
Diuron	T310	AR	0.01	mg/kg	N	014
Isoproturon	T310	AR	0.01	mg/kg	N	014
Linuron	1310	AR	0.01	mg/kg	N	014
Mecoprop	1310 T10	AR	0.01	mg/kg	N	014
Phenoxy Acetic acid berbicide: MCDA	T16		0.01	mg/kg	N	014
Dichlorprop	T16	AR	0.01	mg/kg	N	014
Phenoxy Acetic acid herbicide: 2.4-D	T16	AR	0.01	ma/ka	N	014
Fenoprop	T16	AR	0.01	mg/kg	N	014
Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
----------------------------------------	--------	----------------	------	-------	--------	--------------------
Phenoxy Acetic acid herbicide: 2,4,5-T	T16	AR	0.01	mg/kg	N	014





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 672447-1 A

Date of Report: 16-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-001748 Customer Site Reference: Norfolk Vanguard Cable Route Date Job Received at Concept: 13-Jul-2017 Date Analysis Started: 03-Aug-2017 Date Analysis Completed: 11-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





Report checked and authorised by : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service A



Page 1 of 7

Customer Sample Reference : BH17-C6-03 ES2 @ 1.00m

SAL Sample Reference : 672447 026

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 14-JUL-2017

Matrix Class : Sandy Soil

	Soil Summary							Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pН	Probe			М	7.3		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	2.9			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.8	3.0	5.0	6.0
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	М	<10	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	8.8			
Retained on 2mm	Grav	0.1	%	N	1.0			

	10:1 Leachate							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	0.0069	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.074	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	87	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	0.041	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	51	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	5.2	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	0.014	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	55	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	250	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.055	4.0	50.0	200.0

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

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

Customer Sample Reference : BH17-C6-02 ES2 @ 1.00m

SAL Sample Reference : 672447 030

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 13-JUL-2017

Matrix Class : Sandy Soil

	Soil Summary							Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pH	Probe			М	7.5		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	2.3			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.5	3.0	5.0	6.0
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	М	<10	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	7.1			
Retained on 2mm	Grav	0.1	%	N	5.5			

	10:1 Leachate							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	0.0063	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.023	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	45	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	0.050	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	60	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	6.4	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	39	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	160	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.077	4.0	50.0	200.0

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

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

Customer Sample Reference : BH17-C7-03 ES2 @ 1.00m

SAL Sample Reference : 672447 042

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 20-JUL-2017

Matrix Class : Sandy Soil

	Soil Summary				Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pН	Probe			М	8.2		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	1.3			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.1	3.0	5.0	6.0
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	М	<10	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	16			
Retained on 2mm	Grav	0.1	%	N	1.3			

	10:1 Leachate	1.0	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	0.013	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	Ν	0.14	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	320	800.0	15000.0	25000.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.011	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.084	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	62	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	5.1	10.0	150.0	500.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.0067	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	0.020	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	110	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	1300	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.050	4.0	50.0	200.0

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

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

Customer Sample Reference : BH17-C7-02 ES2 @ 1.00m

SAL Sample Reference : 672447 054

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 25-JUL-2017

Matrix Class : Sandy Soil

	Soil Summary							Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol				
pH	Probe			М	8.0		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	1.8			10.0
Total Organic Carbon	OX/IR	0.1	%	N	0.3	3.0	5.0	6.0
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	М	<10	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	N	<0.14	1.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	7.5			
Retained on 2mm	Grav	0.1	%	N	40.6			

	10:1 Leachate			1.0	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	0.0048	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	Ν	0.025	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	35	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	61	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	0.016	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	27	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	280	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.030	4.0	50.0	200.0

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

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

#### Concept Reference: 672447 Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318

Soil Analysed as Soil Total and Speciated USEPA16 PAH (SE) (MCERTS)

			Concep	t Reference	672447 026	672447 030	672447 042	672447 054
		Custo	mer Sampl	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
			٦	Fest Sample	AR	AR	AR	AR
			Da	ate Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
			1	Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	LOD	Units	Symbol				
Naphthalene	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1
Pyrene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	М	<0.1	<0.1	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1
Coronene	GC/MS (MCERTS)	0.1	ma/ka	N	<0.1	<0.1	<0.1	<0.1

Concept Reference: 672447

Project Site:	Norfolk Vanguard Cable Route							
Customer Reference:	3318							
Soil	Analysed as Soil							
ЗТЕХ								
			Concep	t Reference	672447 026	672447 030	672447 042	672447 054
		Custor	mer Sample	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
			T	Test Sample	AR	AR	AR	AR
			Da	te Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
			N	Aatrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	LOD	Units	Symbol				
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10
Foluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10	<10	<10	<10

Concept Reference:	672447								
Project Site:	Norfolk '	Vanguard Cal	ble Route						
Customer Reference:	3318								
Soil PCBs EC7 (SE)	Analyse	d as Soil							
				Concep	t Reference	672447 026	672447 030	672447 042	672447 054
			Custo	mer Sample	e Reference	BH17-C6-03 ES2 @ 1.00m	BH17-C6-02 ES2 @ 1.00m	BH17-C7-03 ES2 @ 1.00m	BH17-C7-02 ES2 @ 1.00m
				I	lest Sample	AR	AR	AR	AR
				Da	te Sampled	14-JUL-2017	13-JUL-2017	20-JUL-2017	25-JUL-2017
				ľ	Aatrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand		Method	LOD	Units	Symbol				
Polychlorinated biphenyl B2	Z#28	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#52	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#101	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#118	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B	Z#153	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#138	GC/MS	20	µg/kg	М	<20	<20	<20	<20
Polychlorinated biphenyl B2	Z#180	GC/MS	20	µg/kg	М	<20	<20	<20	<20

### Index to symbols used in Supplement 1B to Report Number 672447-1 A

	D
Value	Description
AR	As Received
A40	Assisted dried < 40C
8:1	Leachate to BS EN 12457-3 (8:1)
2:1	Leachate to BS EN 12457-3 (2:1)
110	LOD raised due to low internal standard recovery.
М	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
Ν	Analysis is not UKAS accredited

#### Notes

Supplement 1B report reissued to include only samples 026, 030, 042 and 054
026, 030, 042, 054, - 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
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except ANC
pH, LOI & TOC were performed on assisted dried samples (<40 degree centigrade). All other results relate to samples as received.
TPH, PAH, PCB & BTEX - 026, 030 - These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.





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 1A 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 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 : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service



Page 1 of 4

Customer Sample Reference : BH17-C7-02 ES2 @ 1.00m

SAL Sample Reference: 674086 014

Project Site : Norfolk Vanguard Cable Route

Customer Reference: 3318

Test Portion Mass (g): 175

Date Sampled : 27-JUL-2017

Matrix Class : Clay

	Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill				
Determinand	Technique	LOD	Units	Symbol				
pH	Probe			М	8.2		>6.0	
Loss on Ignition @450C	lgn @450C/Grav	0.1	%	М	3.0			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	М	<10	500.0		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	15			
Retained on 2mm	Grav	0.1	%	N	3.3			

	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	0.0024	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.11	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	37	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	<0.0050	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	150	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	10	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	0.025	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	26	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	100	mg/kg	N	620	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 ammended)

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

# Concept Reference: 674086 Project Site: Norfolk Vanguard Cable Route Customer Reference: 3318 Soil Analysed as Soil

Total and Speciated USEPA16 PAH (SE) (MCERTS)

	674086 014							
	BH17-C7-02 ES2 @ 1.00m							
	Test Sample							
			Da	ate Sampled	27-JUL-2017			
			I	Matrix Class	Clay			
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	М	<0.1			
Fluorene	GC/MS	0.1	mg/kg	М	<0.1			
Phenanthrene	GC/MS	0.1	mg/kg	U	<0.1			
Anthracene	GC/MS	0.1	mg/kg	М	<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	М	<0.1			
Chrysene	GC/MS	0.1	mg/kg	М	<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	М	0.1			
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	М	<0.1			
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	М	<0.1			
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	М	<0.1			
Polyaromatic Hydrocarbons (Total)	GC/MS	0.1	mg/kg	U	0.5			

	074000				
Concept Reference	674086				
Project Site	Norfolk Vanguard Cable Route				
Customer Reference	: 3318				
Soil	Analysed as Soil				
BTEX					
			Concep	t Reference	674086 014
		Custo	mer Sample	e Reference	BH17-C7-02 ES2 @ 1.00m
			1	Fest Sample	AR
			Da	te Sampled	27-JUL-2017
			ľ	Aatrix Class	Clay
Determinand	Method	LOD	Units	Symbol	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	М	<10

Concept Reference:	674086	374086									
Project Site:	Norfolk	Jorfolk Vanguard Cable Route									
Customer Reference:	3318	318									
Soil	Analyse	Analysed as Soil									
PCBs EC7 (SE)											
				Concep	t Reference	674086 014					
Customer Sample Reference BH17-C7-02 ES2 @ 1.00m											
	Test Sample AR										
	Date Sampled 27-JUL-2017										
				r	latrix Class	Clay					
Determinand		Method	LOD	Units	Symbol						
Polychlorinated biphenyl B2	Z#28	GC/MS	20	µg/kg	М	<20					
Polychlorinated biphenyl B2	Z#52	GC/MS	20	µg/kg	М	<20					
Polychlorinated biphenyl B2	Z#101	GC/MS	20	µg/kg	М	<20					
Polychlorinated biphenyl B2	Z#118	GC/MS	20	µg/kg	М	<20					
Polychlorinated biphenyl B	Z#153	GC/MS	20	µg/kg	М	<20					
Polychlorinated biphenyl B2	Z#138	GC/MS	20	µg/kg	М	<20					
Polychlorinated biphenyl B2	Z#180	GC/MS	20	µg/kg	М	<20					

### Index to symbols used in Supplement 1A to Report Number 674086-1 A

Value	Description
A40	Assisted dried < 40C
2:1	Leachate to BS EN 12457-3 (2:1)
AR	As Received
8:1	Leachate to BS EN 12457-3 (8:1)
М	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
Ν	Analysis is not UKAS accredited

#### Notes

pH, LOI & TOC were performed on assisted dried samples (<40 degree centigrade). All other results relate to samples as received.							
Retained on 2mm is removed before analysis							
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except ANC							
Supplement 1A Report reissued to include only sample 014							



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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 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





Report checked and authorised by : Claire Brown Crociquia Customer Service Manager Issued by : Aislinn Arthey Customer Service Advi

#### Concept Reference: 675177 Project Site: East Anglia OWF Customer Reference: 3318

Analysed as Water

Water

Heavy Metals (9)								
			Concep	t Reference	675177 005	675177 006	675177 007	675177 008
		Custor	ner Sampl	e Reference	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03
			Da	ate Sampled	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017
Determinand	Method	Test Sample	LOD	Units		-		-
As (Dissolved)	T281	F	0.0002	mg/l	0.0003	0.0005	0.0007	0.0011
Cd (Dissolved)	T281	F	0.00002	mg/l	<0.00002	<0.00002	<0.00002	<0.00002
Cr (Dissolved)	T281	F	0.001	mg/l	<0.001	<0.001	<0.001	<0.001
Cu (Dissolved)	T281	F	0.0005	mg/l	0.0015	0.0008	0.0007	0.0006
Pb (Dissolved)	T281	F	0.0003	mg/l	<0.0003	< 0.0003	<0.0003	<0.0003
Hg (Dissolved)	T281	F	0.00005	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
Ni (Dissolved)	T281	F	0.001	mg/l	0.001	<0.001	0.002	0.002
Se (Dissolved)	T281	F	0.0005	mg/l	0.0012	<0.0005	0.0012	<0.0005
Zn (Dissolved)	T281	F	0.002	mg/l	0.003	< 0.002	< 0.002	0.045

Concept Reference: 675177 Project Site: East Anglia OWF

Customer Reference: 3318

#### Water Analysed as Water

Total and Speciated USEPA16 PAH (SE)

			Conce	ot Reference	675177 005	675177 006	675177 007	675177 008
	ner Sampl	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03			
			D	ate Sampled	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017
Determinand	Method	Test Sample	LOD	Units				
Naphthalene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Acenaphthene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Fluorene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Phenanthrene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(a)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Chrysene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(a)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	<0.01	< 0.01	<0.01	<0.01
PAH(total)	T149	AR	0.01	µg/l	<0.01	< 0.01	< 0.01	<0.01

#### Produced by Concept Life Sciences, 3 Crittall Drive, Springwood Industrial Estate, Braintree, Essex, CM7 2RT Page 2 of 5 This document has been printed from a digitally signed massagement 1C to Report Number 675177-1

#### Concept Reference: 675177 Project Site: East Anglia OWF Customer Reference: 3318

Analysed as Water

TPH (CWG) with MTBE & BTEX SE

Water

			Conce	pt Reference	675177 005	675177 006	675177 007	675177 008
	ner Samp	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03			
			D	ate Sampled	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017
Determinand	Method	Test Sample	LOD	Units				
Benzene	T54	AR	1	µg/l	<1	<1	<1	<1
EthylBenzene	T54	AR	1	µg/l	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/l	<1	<1	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/l	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/l	<1	<1	<1	<1
Toluene	T54	AR	1	µg/l	<1	<1	<1	<1
TPH (C5-C6 aliphatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C6-C7 aromatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C6-C8 aliphatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C7-C8 aromatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C8-C10 aliphatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C8-C10 aromatic)	T54	AR	0.020	mg/l	<0.020	<0.020	<0.020	<0.020
TPH (C10-C12 aliphatic)	T219	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01
TPH (C10-C12 aromatic)	T219	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01
TPH (C12-C16 aliphatic)	T219	AR	0.01	mg/l	<0.01	0.01	<0.01	<0.01
TPH (C12-C16 aromatic)	T219	AR	0.01	mg/l	0.02	0.02	0.02	0.03
TPH (C16-C21 aliphatic)	T219	AR	0.01	mg/l	<0.01	<0.01	0.02	<0.01
TPH (C16-C21 aromatic)	T219	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01
TPH (C21-C35 aliphatic)	T219	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01
TPH (C21-C35 aromatic)	T219	AR	0.01	mg/l	< 0.01	< 0.01	0.02	0.02

Concept Reference: 675177 Project Site: East Anglia OWF Customer Reference: 3318

Custor

Analysed as Water

Organochlorine insecticides

Water

			Conce	ot Reference	675177 005	675177 006	675177 007	675177 008
		Custor	ner Sampl	e Reference	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03
			D	ate Sampled	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017
rminand	Method	Test		Unite				

Determinand	Method	Test Sample	LOD	Units				
Hexachlorocyclohexane	T16	AR	0.01	µg/l	(36) < 0.02	(36) < 0.02	(36) < 0.02	(36) < 0.02
Hexachlorobenzene	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Heptachlor	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Aldrin	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Chlordane	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Endosulphan	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
DDE	T16	AR	0.01	µg/l	<0.02	<0.02	<0.02	<0.02
Dieldrin	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
Endrin	T16	AR	0.01	µg/l	(36) < 0.02	<sup>(36)</sup> < 0.02	<sup>(36)</sup> < 0.02	(36) < 0.02
DDD	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01
DDT	T16	AR	0.01	µg/l	(36) < 0.02	(36) < 0.02	(36) < 0.02	(36) < 0.02

Concept R	675177	675177								
Pro	East Angli	East Anglia OWF								
Customer R	eference:	3318								
Water Organophosphorous ins	secticides	Analysed	as Water							
			Concep	ot Reference	675177 005	675177 006	675177 007	675177 008		
		Custon	ner Sampl	e Reference	BH17-C6-01	BH17-C6-03	BH17-C7-01	BH17-C7-03		
			Da	ate Sampled	10-AUG-2017	10-AUG-2017	10-AUG-2017	10-AUG-2017		
Determinand	Method	Test Sample	LOD	Units			_			
Dichlorvos	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01		
Mevinphos	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01		
Dimethoate	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01		
Diazinon	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01		
Pirimiphos methyl	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01		
Malathion	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01		
Fenitrothion	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01		
Parathion	T16	AR	0.01	µg/l	<0.01	<0.01	<0.01	<0.01		
Azinphos methyl	T16	AR	0.01	µg/l	(36) < 0.02	<sup>(36)</sup> <0.02	(36) < 0.02	(36) < 0.02		

### Index to symbols used in Supplement 1C to Report Number 675177-1

Value	Description						
F	Filtered						
AR	As Received						
36	LOD Raised due to low Matrix spike recovery						
100	LOD determined by sample aliquot used for analysis						
110	LOD raised due to low internal standard recovery.						
U	Analysis is UKAS accredited						
N	Analysis is not UKAS accredited						

#### Notes

Supplement 1C report reissued to include only samples 005, 006, 007 and 008 OCP and OPP transferred to Concept Life Sciences Manchester

#### **Method Index**

Value	Description						
T219	GC/FID (SE)						
T16	GC/MS						
T149	GC/MS (SIR)						
T281	ICP/MS (Filtered)						
T54	GC/MS (Headspace)						

#### **Accreditation Summary**

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
As (Dissolved)	T281	F	0.0002	mg/l	U	005-008
Cd (Dissolved)	T281	F	0.00002	mg/l	U	005-008
Cr (Dissolved)	T281	F	0.001	mg/l	U	005-008
Cu (Dissolved)	T281	F	0.0005	mg/l	U	005-008
Pb (Dissolved)	T281	F	0.0003	mg/l	U	005-008
Hg (Dissolved)	T281	F	0.00005	mg/l	U	005-008
Ni (Dissolved)	T281	F	0.001	mg/l	U	005-008
Se (Dissolved)	T281	F	0.0005	mg/l	U	005-008
Zn (Dissolved)	T281	F	0.002	mg/l	U	005-008
Naphthalene	T149	AR	0.01	µg/l	U	005-008
Acenaphthylene	T149	AR	0.01	µg/l	U	005-008
Acenaphthene	T149	AR	0.01	µg/l	U	005-008
Fluorene	T149	AR	0.01	µg/l	U	005-008
Phenanthrene	T149	AR	0.01	µg/l	U	005-008
Anthracene	T149	AR	0.01	µg/l	U	005-008
Fluoranthene	T149	AR	0.01	µg/l	U	005-008
Pyrene	T149	AR	0.01	µg/l	U	005-008

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	005-008
Chrysene	T149	AR	0.01	µg/l	U	005-008
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	N	005-008
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	U	005-008
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	005-008
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	005-008
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	005-008
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	005-008
PAH(total)	T149	AR	0.01	µg/l	N	005-008
Benzene	T54	AR	1	µg/l	U	005-008
EthylBenzene	T54	AR	1	µg/l	U	005-008
M/P Xylene	T54	AR	1	µg/l	U	005-008
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	005-008
O Xylene	T54	AR	1	µg/l	U	005-008
Toluene	T54	AR	1	µg/l	U	005-008
TPH (C5-C6 aliphatic)	T54	AR	0.020	mg/l	Ν	005-008
TPH (C6-C7 aromatic)	T54	AR	0.020	mg/l	N	005-008
TPH (C6-C8 aliphatic)	T54	AR	0.020	mg/l	N	005-008
TPH (C7-C8 aromatic)	T54	AR	0.020	mg/l	N	005-008
TPH (C8-C10 aliphatic)	T54	AR	0.020	mg/l	N	005-008
TPH (C8-C10 aromatic)	T54	AR	0.020	mg/l	N	005-008
TPH (C10-C12 aliphatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C10-C12 aromatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C12-C16 aliphatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C12-C16 aromatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C16-C21 aliphatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C16-C21 aromatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C21-C35 aliphatic)	T219	AR	0.01	mg/l	N	005-008
TPH (C21-C35 aromatic)	T219	AR	0.01	mg/l	N	005-008
Hexachlorocyclohexane	T16	AR	0.01	µg/l	N	005-008
Hexachlorobenzene	T16	AR	0.01	µg/l	N	005-008
Heptachlor	T16	AR	0.01	µg/l	N	005-008
Aldrin	T16	AR	0.01	µg/l	N	005-008
Heptachlor epoxide	T16	AR	0.01	µg/l	N	005-008
Chlordane	T16	AR	0.01	µg/l	N	005-008
Endosulphan	T16	AR	0.01	µg/l	Ν	005-008
DDE	T16	AR	0.01	µg/l	Ν	005-008
Dieldrin	T16	AR	0.01	µg/l	N	005-008
Endrin	T16	AR	0.01	µg/l	Ν	005-008
DDD	T16	AR	0.01	µg/l	Ν	005-008
DDT	T16	AR	0.01	µg/l	N	005-008
Dichlorvos	T16	AR	0.01	µg/l	Ν	005-008
Mevinphos	T16	AR	0.01	µg/l	N	005-008
Dimethoate	T16	AR	0.01	µg/l	N	005-008
Diazinon	T16	AR	0.01	µg/l	N	005-008
Pirimiphos methyl	T16	AR	0.01	µg/l	N	005-008
Malathion	T16	AR	0.01	µg/l	N	005-008
Fenitrothion	T16	AR	0.01	µg/l	Ν	005-008
Parathion	T16	AR	0.01	µg/l	N	005-008
Azinphos methyl	T16	AR	0.01	µg/l	N	005-008

## **APPENDIX G** Calibration Certificates

SPT hammer(s)
Gas monitor(s)

SI 3, SI 4, SI 5 GFM 435 s/n 11378

# Equipe Group



© Copyright 2016 Equipe Group, The Paddocks, Home Farm Offices, The Upton Estate, Banbury, Oxfordshire, OX15 6HU Tel: +44 (0)1295 670990 Fax: +44 (0)1295 678232 Email: info@equipegroup.com

## Equipe Group



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TEST DA	TE AND CONDITIONS					
Date	21/06/2017					
Atmospheric P	ressure 997	mB				
Ambient Temp	erature 23.0	°C				
Environics Seri	al No. 508	39				

GFM435 Final Inspection & Calibration Check Certificate

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

**GAS DATA LTD** Pegasus House Seven Stars Estate

Tel 02476303311 Fax 02476307711

Wheler Rd Coventry CV3 4LB

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

Instrument Checks								
Keyboard		1	Display Contrast	1				
Pump Flow In	400	Accept > 200 cc/min	Pump Flow @ -200mB	200	Accept > 200 cc/min			
Clock Set / Running	1		Labels Fitted	1				

			Gas Checks				
Sensor	CH	14	C	<b>D</b> <sub>2</sub>	02		
	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	00	Accept +/- 3.0	10	Accept +/- 0.5	an terre	
	5.0	5	4.8	5	6.0	6	
	Accept +/- 0.3		Accept. +/- 0.3		Accept +/- 0,3		
Zero Reading	0.0	0.0	0.0	0.0	0.0	0.0	
100% N <sub>2</sub>	Accept +/- 0.0	0.0	Accept +/- 0.0	010	Accept + 0.1	010	

Optional Gas Checks								
Applied Gas &	& Range of GFM	Concentration Tested @ (ppm)	Instrument Readings (ppm)					
Gas Type	Range (ppm)		Zer	o Reading	Instrument Gas Reading			
H2S	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		

Applied Gas (ppm)		Instrument Readings (ppm)						
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	СО	Toxic 3:	Hex	Toxic 4:
H2S	1500	1500		0		0		
CO	1000	60		1000		0		
Hexane	2.0%	0		0		1.9	9	

Pressure Checks Atmospheric Pressure [AP] (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	In stand out Fl	Dealing (1/h)	Differential Pressure					
Applied Flow Reading (1/h)	Instrument Fi	ow Reading (I/n)	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			











# TerraConsult

Leaders in waste management environmental & ground engineering consultancy

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

Tel: +44 (0) 1206 585600

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

Tel: +44 (0) 1925 291111 Fax: +44 (0) 1925 291191

Email: mailbox@terraconsult.co.uk Website: www.terraconsult.co.uk





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EMS 573194

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