GEOTECHNICAL INVESTIGATION – HIGH BARN, CRAYS LANE, GOOSE GREEN PULBOROUGH RH20 2LR

Jolliff Developments Limited

Your Environment
Head Office, Unit 2, Woodhorn Business Centre, Chichester, West Sussex, PO20 2BX
Tel: 01243 787150

Report Number: YEX2150, Date: May 2021

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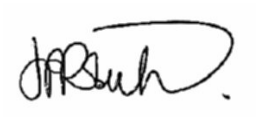
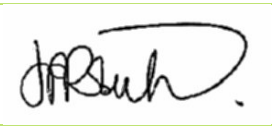
	Name	Position	Signature	Date
Prepared by:	Jonny Roberts	Principal Geoenvironmental Engineer		May 2021
Reviewed by:	Jonny Roberts	Principal Geoenvironmental Engineer		May 2021
Approved:	Colin Hiscock	Director		May 2021
For and on behalf of *Your*Environment				

Issue	Date	Description	Prepared	Reviewed	Approved
00	28.05.2021	DRAFT Report	JR	JR	CH
01	11.06.2021	FINAL Report	JR	JR	CH

1.0 Introduction

*Your*Environment (YE) was instructed by Jolliff Developments Limited (Quote No: YEX2150, Dated: May 6th 2021) to conduct a Site Investigation (SI) at a site identified as High Barn, Crays Lane, Goose Green, Pulborough, RH20 2LR.

The purpose of this investigation was to provide a factual and interpretative report on our findings in respect to works completed at the site by YE, which comprised three (3no.) mini percussive boreholes with associated SPTs, geotechnical and contamination laboratory testing.

This report presents a full factual record of all site works carried out, the results of *insitu* testing and subsequent laboratory testing of selected samples obtained during these works. BS5930:2015 '*Code of Practice for Site investigations*' and from the National Planning Policy Framework.

YE take no responsibility for conditions which have not been revealed by the mini percussive boreholes, or which occur between mini percussive boreholes. Whilst every effort has been made to interpret the conditions between investigation locations, such information is only indicative and liability cannot be accepted for its accuracy.

The information contained in this report is intended for the use of the named client (or their approved contractors). Should a third party rely on any part of this report, that party does so wholly at its own risk and YE disclaim any liability to such parties. Should the purposes for which the report is used, or the proposed use of the site change, this report may no longer be valid and further use of reliance upon the report in those circumstances shall be at the client's sole and own risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. YE should in all such altered circumstances be commissioned to review and update this report accordingly.

2.0 Proposed Development

We understand from reference to the Local Planning Department and current plans provided by the client that development of the site includes:

- Conversion of existing building into four (4no) single storey residential dwellings.

The proposed redevelopment plans for the site can be reviewed within **Appendix A.**

3.0 Physical Setting

3.1 Site Information

The site is located within the village of Goose Green to the east of Pulborough, West Sussex and lies north of Crays Lane and immediately north of Crays Barn. An existing barn occupies the site, which is understood to be currently used for storage of agricultural equipment. The site is bounded on all sides by agricultural land and associated buildings to the north and southwest.

3.2 Geology

The relevant British Geological Survey (BGS) online mapping information indicates the site to be devoid of superficial deposits. The bedrock underlying the site comprise Cretaceous strata of the Weald Clay Formation (mudstone).

4.0 Fieldworks

4.1 Site Investigation

All SI works were completed on May 6th 2021 under the supervision of a Geo-Environmental Engineer contracted from YE. In summary the investigation included:

- A two man team ascertained the routes of any below ground services in close proximity to the proposed exploratory hole positions, using a CAT scan and lifting up of any man hole covers. Following the CAT scan, hand dug starter pits were completed to a depth of 1.2 metres below ground level (mbgl).
- Three (3no.) mini percussive boreholes (WS01 to WS03) were completed to a maximum depth of 5.45mbgl.
- The boreholes were logged with any groundwater conditions noted and representative soil samples removed in accordance with current guidelines.
- Soil samples were removed from shallow sub surface locations, with further samples taken at depth at every 0.5mbgl or when the underlying stratum changed. Samples were subsequently placed in suitable containers including 1kg tubs and 250ml glass jars and placed in cool boxes with cool packs prior to storage within our *in-house* laboratory fridges and then subsequent forwarding to our designated laboratory for analysis.
- Standard Penetration Tests were undertaken during the drilling to provide an assessment of the strength of the underlying deposits with depth.
- Upon completion, all exploratory holes were back filled, compacted and made good to existing levels and finishes, with any surplus spoil bagged up and removed from site.

The positions of exploratory holes in relation to the existing site layout can be reviewed within **Appendix B**. Exploratory mini percussive borehole logs are located in **Appendix C**.

5.0 Geology & Ground Conditions

A surface cover of reworked Topsoil was present in all boreholes at thickness of between 300 and 400mm.

Beneath the reworked Topsoil, Made Ground comprising either firm very sandy gravelly clay or sandy gravel with variable content of brick and concrete was present to depths of between 0.5 and 0.6mbgl.

Underlying the Made Ground, natural soft to firm, becoming firm and stiff with depth, clays were proved to the base of the boreholes to a maximum depth of 5.45mbgl.

Reference to the Standard Penetration Tests results show a marked increase in “N” value with depth indicating increasing strength/relative density of the strata with depth. Within the natural clays, N values of between N=8 and N=16 were recorded at 1.0m depth, N=20 and N=23 at 2.0m depth, N=19 and N=49 at 3.0m depth, N=31 and N>50 at 4.00m and N=21 and N=39 at 5.0m depth.

6.0 Groundwater Conditions

No free groundwater was encountered during the advancement of the boreholes to a maximum depth of 5.45mbgl.

It should be noted that groundwater levels are dependent upon seasonal variations and can change after periods of prolonged rainfall or drought.

7.0 Visual and Olfactory Observations

With the exception of general anthropogenic material identified, no visual and/or olfactory evidence of potential contamination was noted within any soils encountered as part of the investigative works undertaken.

8.0 Geotechnical Soil Laboratory Testing

Four (4no.) soil samples were forwarded to the laboratory of *Your*Geotechnical with ten (10no.) soil samples forwarded to a UKAS and MCERTs accredited laboratory, Chemtech Environmental Ltd. The testing comprised the following:

8.1 Sulphates and pH

Four (4no.) samples of the underlying natural deposits were submitted for assessment of water-soluble sulphate, total sulphate, pH value and total sulphur concentrations.

Water-soluble sulphate concentrations of between 25mg/l and 266mg/l were recorded, total (acid) sulphate concentrations of 0.02% and 0.2%, total sulphur concentrations of <0.01% and 0.1% with pH values varying between 5.0 and 8.4 units. Total Potential Sulphates were between <0.01% and 0.3%.

8.2 Atterberg Limits and Natural Moisture Content

Four (4no.) samples from the natural clays were submitted for determination of their Natural Moisture Content and Plasticity Index.

Natural Moisture Contents of the samples of the natural clays were between 18% and 30%.

Modified Plasticity Indices of between 22% and 59% were recorded for the natural clays. As a consequence, these clays can be classed as being of medium and high volume change potential, in accordance with NHBC guidelines.

All geotechnical laboratory certificates can be reviewed within **Appendix D.**

8.3 Contamination Testing

Eight (8no.) samples of the Made Ground and natural soils have been subject to contamination testing comprising a general screening suite of testing; metals/metalloids, speciated Total Petroleum Hydrocarbons (TPH CWG Aromatic/aliphatic split) and speciated Polycyclic Aromatic Hydrocarbons (PAH) including the more carcinogenic benzo(a)pyrene (BaP) and naphthalene, BTEX, MTBE, phenols, soil organic matter (SOM) content, cyanides, pH and sulphates and asbestos presence determination.

The results of the chemical laboratory testing and subsequent discussion and recommendations are included in a separate report issued under separate cover.

All chemical laboratory certificates can be reviewed within **Appendix E.**

9.0 Discussion of Ground Conditions

9.1 General

We understand that current redevelopment plans for the site are to include:

- Conversion of existing building into four (4no) single storey residential dwellings.

The proposed redevelopment plans for the site can be reviewed within **Appendix A**

9.2 Construction Consideration

The existing building is anticipated to comprise a portal framed structure which will be lightly loaded and likely supported on pad and strip foundations. Similar foundations are anticipated as part of the proposed redevelopment.

The proposed redevelopment is likely to be capable of being constructed on conventional shallow strip or spread/pad foundations. These could be placed at depths of 1.0m in natural cohesive soils described as having at least a firm in situ condition. However, final placement of foundations should be done in accordance with the guidance regards construction in shrinkable soils and taking cognisance of the clays of high volume change potential recorded in the investigation and the potential influence of existing or proposed trees or hedges. It is considered that strip or spread/pad foundations constructed within the underlying natural firm clays could be designed assuming an allowable increase in load given below in Table 1: Allowable Increase in Stress

Foundation Type	Strip Foundations (m)			Spread/Pad Foundations (m)		
Foundation Width	0.6	1.0	1.5	1.0	2.0	3.0
Foundation Depth	1.0			1.0		
Allowable increase in stress (kN/m^2)	125	115	105	135	125	115

Table 1: Allowable Increase in Stress

The allowable increase in stress given above assumes a factor of safety of 3 against general shear failure, with a cohesion of 50kN/m^2 at the foundation depths. Settlements at the above loading intensities should remain within tolerable limits for the type of structure proposed provided that the underlying soils are carefully inspected immediately final trimming has taken place. Should any soft or weak material be encountered they should be locally removed and replaced with lean-mix concrete or compacted granular soil.

The excavator must be set up with care and operated correctly to ensure trench walls are vertical and base horizontal as any slight inclination will result in eccentric loading on such deep trench fill footings. In addition, if the excavations are required to stand open for any period of time then a blinding layer of lean-mix concrete should be placed in the excavation bases. This expedient will reduce loosening of the sub-grade due to the ingress of surface water.

9.3 Floor Slabs

As a consequence of the potential for soil swelling to occur due to the presence of underlying shallow natural clay soils classified as being of high volume change potential that may potentially lie within the zone of influence of existing or proposed trees or hedges, it is recommended that suspended floor slabs are adopted for development.

However, should a ground bearing floor slab be required, then it may be possible if the shallow natural clays are excavated and replaced with engineered granular materials. This would be subject to incorporation of appropriate mitigation measures should remaining clays, themselves classified as being of high volume change potential, be identified as being potentially influenced by trees and resultant volume changes.

9.4 Sulphates

Reference to BRE Special Digest 1 and the test results indicates the results from the fall within Design Sulphate Class DS-2. Consequently, concrete may be designed to AC-1s concrete classification, due to slightly elevated total potential sulphate concentrations and assuming static groundwater conditions.

9.5 Excavations

No free groundwater was encountered during the investigation. However, it should be appreciated that groundwater levels are subject to seasonal variation or changes on local drainage conditions.

Groundwater is unlikely to represent a particular problem to the construction of the development at this site. However, it should be recognized that slight seepages and minor water entries may combine in any long trench excavations to create a significant volume of water which may cause local problems during the construction phase. Any minor groundwater seepages or significant standing water within excavations made upon this site may be removed by using a simple form of de-watering. Such a system could include the excavation of sumps from which the water could be pumped. Advice on Groundwater Control is given in CIRIA Report No 515 – Groundwater Control Design and Practice.

The stability of the excavation faces cannot be guaranteed thus temporary support to the excavation faces may become necessary unless the foundations are constructed using trench-fill techniques. In this method the foundation trenches should be excavated, inspected and backfilled with concrete as a continuous operation. Under no circumstances should operatives be allowed to enter unsupported excavations.

Consideration should be given to installing trench support/shoring or battering to maintain excavation stability during foundation construction/services installation. Due to the potential for unpredictable collapse, excavations requiring man entry should be either battered back to a safe angle or adequately shored to provide safe working conditions within excavations. Advice on excavation support is given in CIRIA Report No 97 – Trenching Practice.

Where trench support/shoring is utilised an appropriately qualified and experienced engineer should design the support system. The shoring/support will require regular inspection in accordance with published guidelines to ensure that the support/shoring is adequate for the ground conditions present.

9.6 Groundworks Watching Brief

We would recommend that a watching brief be maintained during the course of the development, particularly during the ground works stage.

During construction works visual and olfactory appraisal of the underlying soils should be made. If during construction works any material is noted to show visual and/or olfactory signs of contamination an environmental consultant should be contacted to

supervise/guide further works. This material should be stockpiled separately and tested prior to its appropriate removal off site or re-use as necessary.

If any landscaping materials are to be imported on site they should be tested to check that they are suitable for the intended use. Clean, uncontaminated rock, subsoil brick rubble, crushed concrete, ceramics and topsoil only should be permitted as infill material.

9.7 Services

Given that new services will be installed as part of the redevelopment of the site, we would recommend the local water board be contacted to determine their specification for the type of pipework, which should be used on this site.

All services and in particular potable water supply pipework should comprise of material that is resistant to attack and degradation to chemical attack.

Further information can be found within the published guidance for the '*Selection of Water Supply Pipes to be used in Brownfield Sites'*, issued in January 2011 by the UK Water Industry Research (UKWIR), this supersedes the Water Regulations Advisory Scheme (WRAS) Information and Guidance Note – '*Laying Pipes in Contaminated Land'* which has been withdrawn.

9.8 Muckaway

If any soils are to be removed off site, a copy of the chemical laboratory results should be given to the waste contractors and/or landfill operators involved to ascertain their requirements with regards to removal of soils from this area of the site and the acceptance of the waste at landfill. It may be prudent to undertake Waste Acceptance Criteria (WAC) analyses on the soils to be removed.

All materials must be transported in compliance with the Duty of Care Regulations by authorising movements with Carrier's individually numbered Duty of Care conveyance notes, complete with the appropriate EWC Codes. All relevant dockets will need to be kept to provide evidence of the removal as these may be required as part of a Validation Report.

10.0 Limitations

YE have prepared this report with all reasonable skill, care and diligence. The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources.

The opinions given in this report have been dictated by the finite data on which are they based and are relevant only to the purpose for which the report was commissioned.

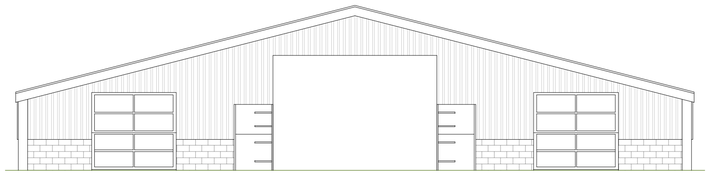
Information reviewed should not be considered exhaustive and has accepted in good faith as providing true and representative data with respect to site conditions. Should additional information become available which may influence the opinion expressed in this report, YE reserves the right to review such information and, if warranted, to alter the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed.

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices at this time and as such are not a guarantee that the study site is free of hazardous conditions.

This report has been prepared solely for the use of the named client, and may not be relied upon by other parties without written consent from YE. YE disclaim any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

APPENDIX A: Proposed redevelopment plan



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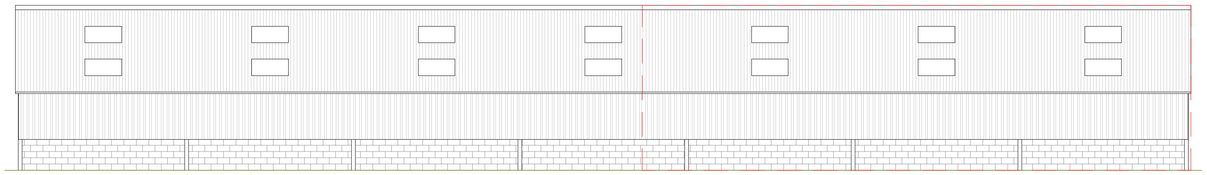

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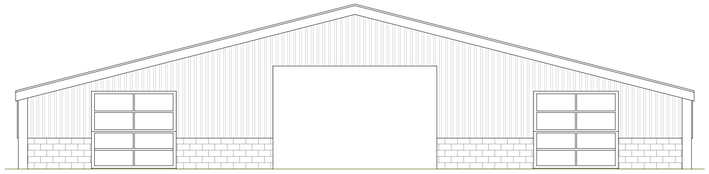

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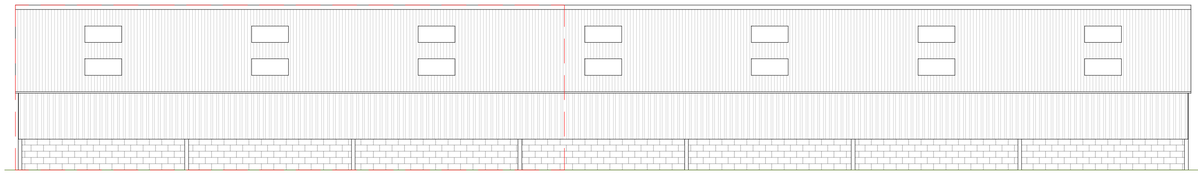

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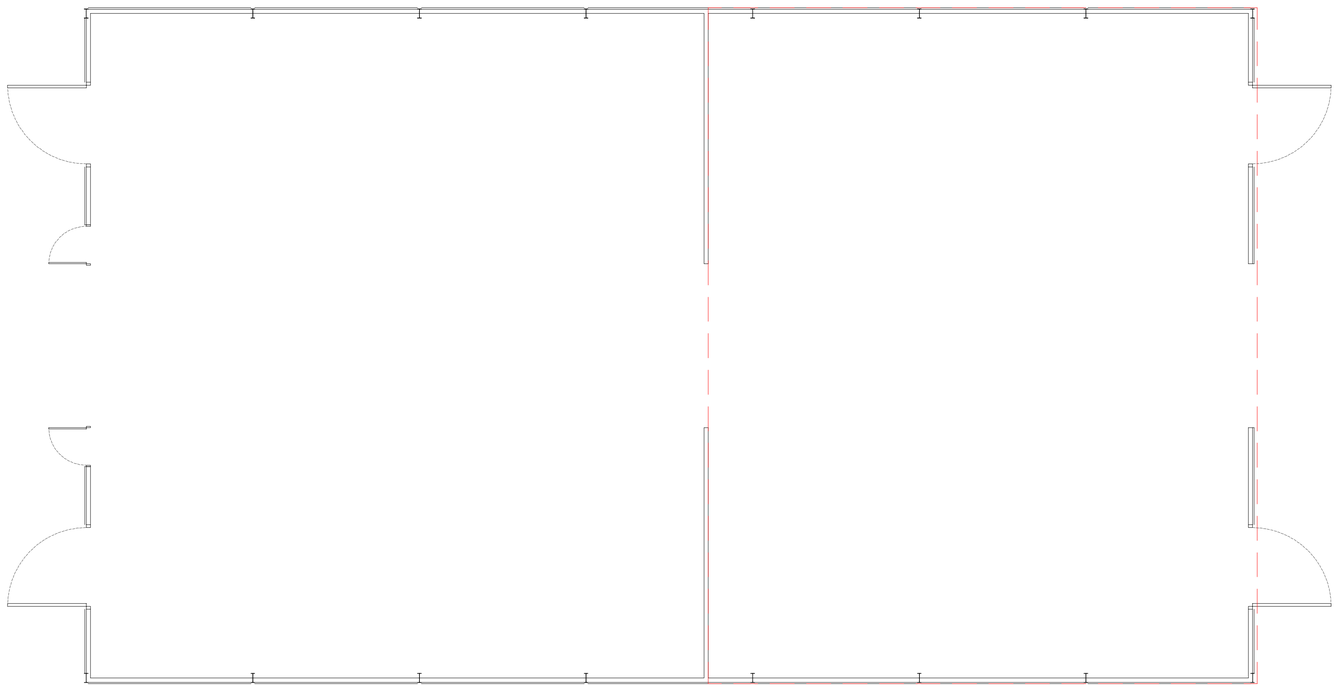

Ground Floor Plan
1:100

Block Plan - Existing
1:200

Legend

Area to be demolished prior to occupation

Client
Mr & Mrs Holt

Job
Crays Barn Farm
Crays Lane
Goose Green
Pulborough
RH20 2GU

Drawing
Existing:

Plans, Elevations, Block Plan

Scale @ A1
1:100 & 1:200

Date
19.06.2017

Drawn
MD

Job No.
170619.2

Rev. No.
1

Drawing No.
001

Status
For Comment

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1250

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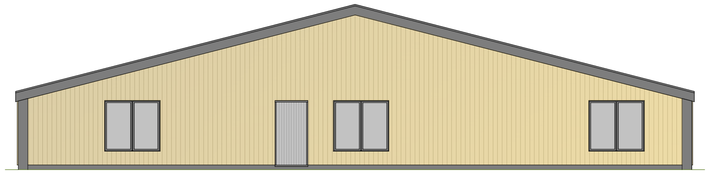

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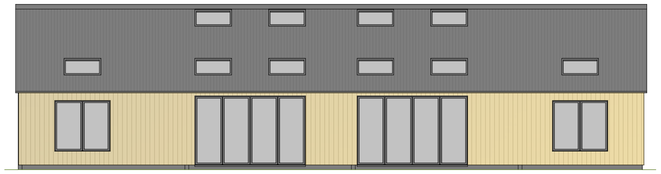

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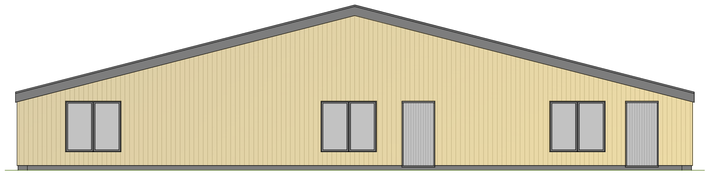

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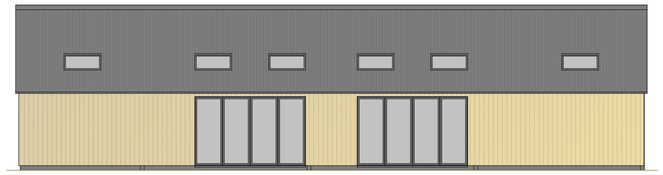

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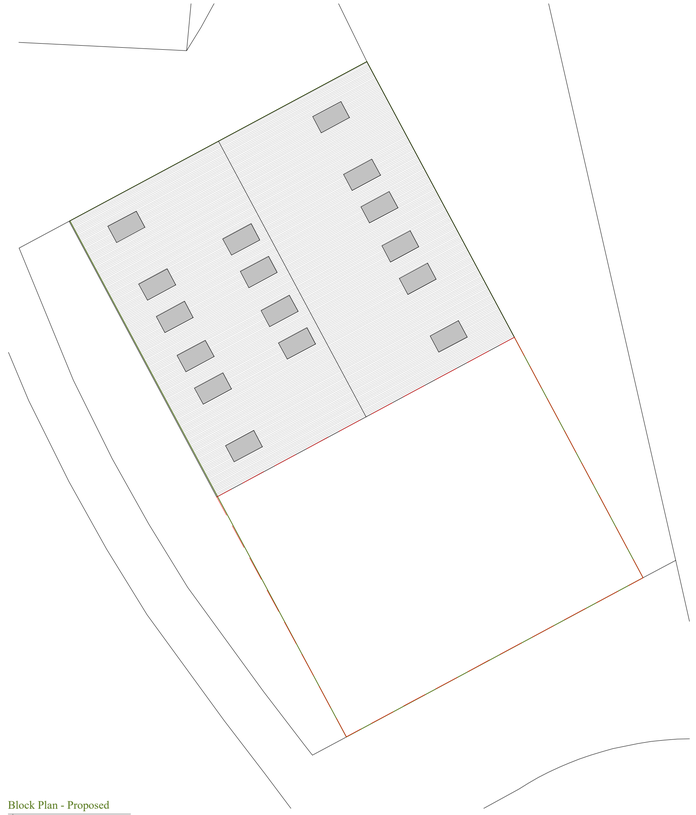

Block Plan - Proposed
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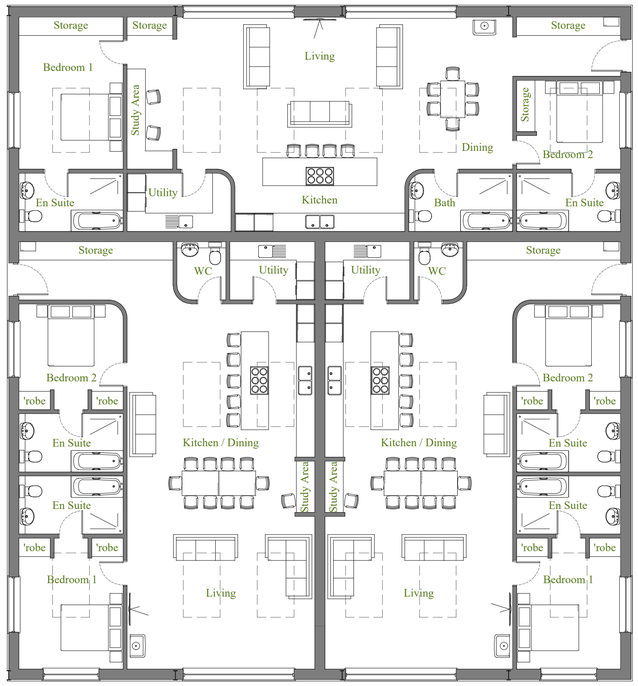

Ground Floor Plan
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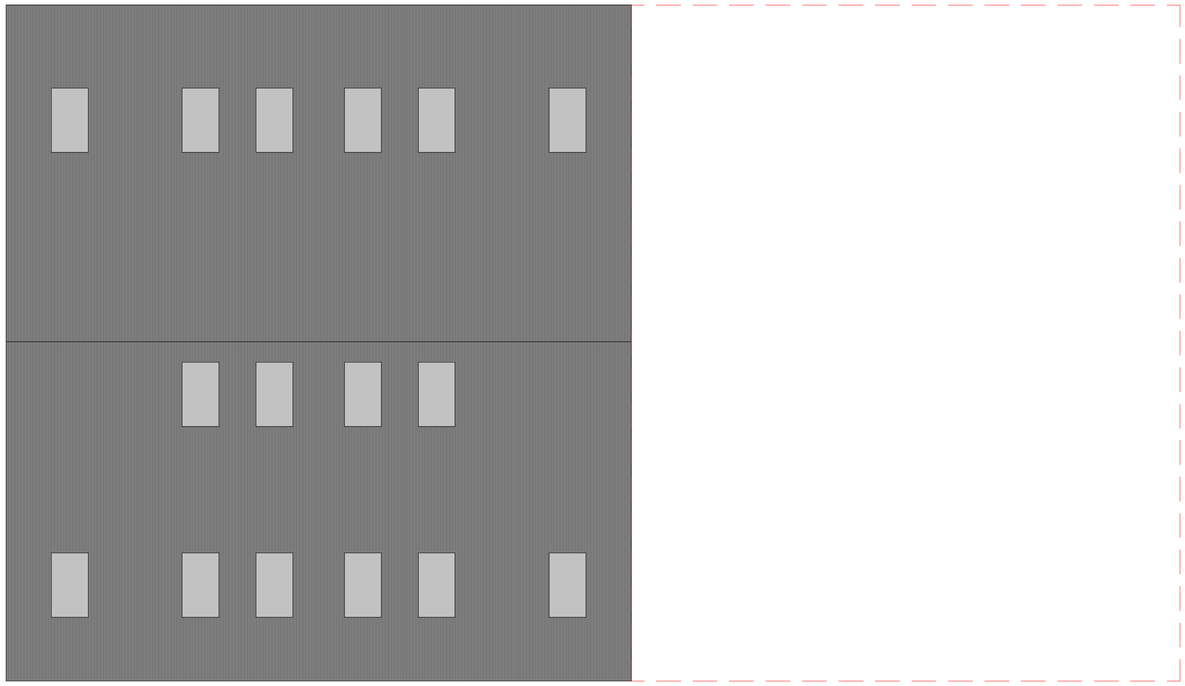

Legend

Area to be demolished prior to occupation

Client
Mr & Mrs Holt

Job
Crays Barn Farm
Crays Lane
Goose Green
Pulborough
RH20 2GU

Drawing
Proposed:

Plans, Elevations, Block Plan

Scale @ A1
1:100 & 1:200

Date
19.06.2017

Drawn
MD

Job No.
170619.2

Rev. No.
1

Drawing No.
002

Status
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APPENDIX B: Site investigation plan

Title: **Investigation Location Plan**

Your Environment	Site Name: **High Barn Crays Lane**	Job No: **YEX2150**

APPENDIX C: Borehole Logs

YourGeotechnical

Borehole Log

Borehole No. **WS01**

Sheet 1 of 1

Project Name: High Barn	Project No. YEX2150	Co-ords:	Hole Type WLS
Location: Crays Lane, Goose Green, Pulborough RH20 2GU		Level:	Scale 1:50
Client: Jolliff Developments Ltd		Dates: 06/05/2021	Logged By JvM

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			Grass over stiff brown sandy CLAY. Sand is fine to medium (Reworked TOPSOIL)
					0.60			Firm blackish brown very sandy gravelly CLAY with frequent wood. Gravel is fine to medium, angular to rounded of brick and flint (MADE GROUND).
		1.00	S	N=8 (0,0/1,2,2,3)	1.00			Soft to firm brown CLAY.
		2.00	S	N=20 (2,4/6,4,5,5)	2.00			Firm brown CLAY.
					2.20			Stiff brown slightly sandy CLAY.
		3.00	S	N=19 (3,4/4,4,5,6)	3.20			Firm to stiff orange brown CLAY.
		4.00	S	N=40 (4,6/7,9,11,13)				Firm to stiff orange grey CLAY.
		5.00	S	N=39 (3,6/6,9,12,12)	5.45			End of Borehole at 5.45m

Remarks

No groundwater encountered.

AGS

YourGeotechnical

Borehole Log

Borehole No. **WS02**

Sheet 1 of 1

Project Name: High Barn	Project No. YEX2150	Co-ords:	Hole Type WLS
Location: Crays Lane, Goose Green, Pulborough RH20 2GU		Level:	Scale 1:50
Client: Jolliff Developments Ltd		Dates: 06/05/2021	Logged By JvM

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			Grass over brown slightly clayey gravelly fine to medium SAND. Gravel is fine to medium, angular to rounded of brick and concrete (Reworked TOPSOIL)
					0.50			Red brown sandy GRAVEL. Gravel is fine to medium, angular to subrounded of concrete (MADE GROUND)
					0.60			Yellow fine to medium SAND.
		1.00	S	N=11 (1,2/2,2,3,4)				Soft to firm becoming firm orange brown CLAY.
		2.00	S	N=23 (4,4/5,6,6,6)	2.00			Firm orange brown CLAY.
		3.00	S	N=19 (2,3/4,5,4,6)	3.00			Firm brown mottled grey CLAY.
		4.00	S	N=31 (5,6/6,6,8,11)	4.00			Stiff greyish brown CLAY.
		5.00	S	N=21 (3,5/4,5,5,7)				
					5.45			End of Borehole at 5.45m

1 2 3 4 5 6 7 8 9 10

Remarks

No groundwater encountered.

AGS

YourGeotechnical

Borehole Log

Borehole No. **WS03**

Sheet 1 of 1

Project Name: High Barn	Project No. YEX2150	Co-ords:	Hole Type WLS
Location: Crays Lane, Goose Green, Pulborough RH20 2GU		Level:	Scale 1:50
Client: Jolliff Developments Ltd		Dates: 06/05/2021	Logged By JvM

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.40			Grass over yellowish brown slightly clayey slightly gravelly CLAY. Gravel is fine, angular to subrounded of flint (Reworked TOPSOIL).
					0.60			Firm brown very sandy gravelly CLAY. Gravel is fine to medium, subangular to subrounded of brick. Sand is fine to medium, yellow (MADE GROUND)
		1.00	S	N=16 (2,2/3,4,4,5)	1.00			Soft to firm orange brown CLAY.
								Firm orange brown CLAY.
		2.00	S	N=22 (3,3/4,5,6,7)	2.00			Stiff brown mottled grey CLAY.
		3.00	S	N=49 (5,9/11,13,13,12)	3.00			Stiff grey CLAY.
		4.00	S	N=50 (5,7/50 for 235mm)				
					4.45			End of Borehole at 4.45m

Remarks

No groundwater encountered.

AGS

APPENDIX D: Geotechnical Lab Results

YourGeotechnical

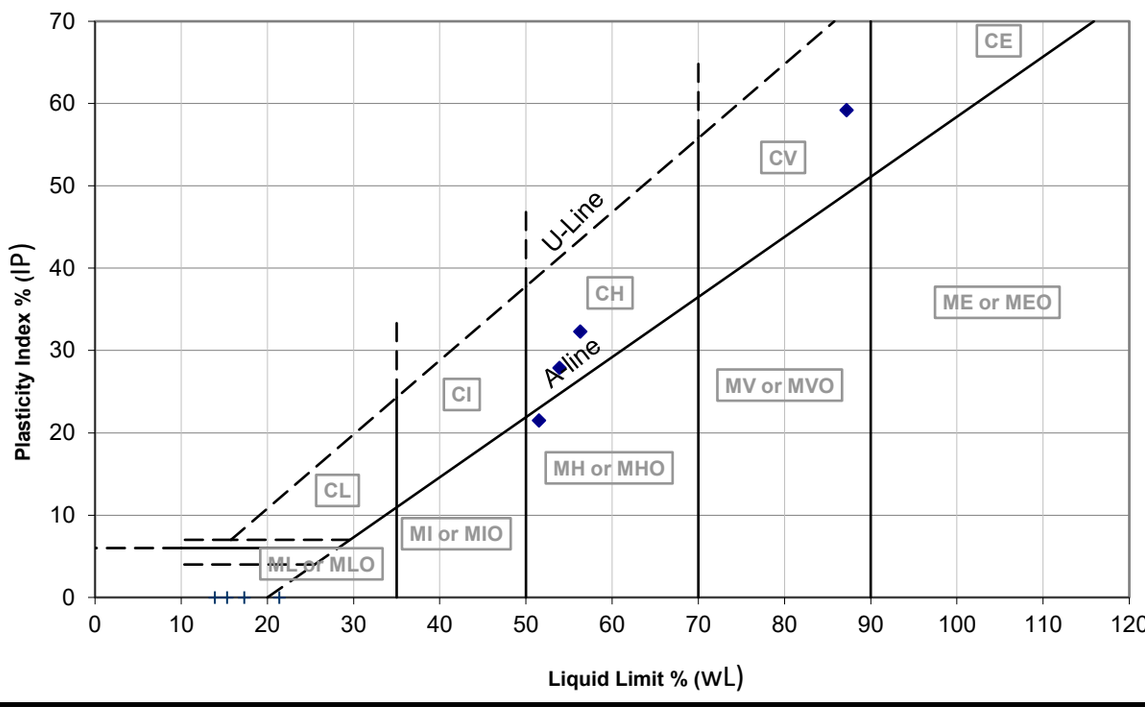
Chilgrove Business Centre
Chilgrove Park Road
Chichester
PO18 9HU

Client: Jolliff Developments Ltd

Job No:	Site:	Date:	Sheet:
YEX 2150	HIGH BARN	11/06/2021	1

Interpretation of Moisture Content, Liquid and Plastic Limits

Location	Depth	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	Retained by 0.425mm	Modified (w)	Modified (I_P)	Liquidity/ Consistency		Casagrande Class	N.H.B.C Class
		(w)	(w_L)	(w_P)	(I_P)		(w')	(I_P')	(I_L)	(I_C)		
	(m)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)		(%)
WS01	1.20	29.7	87.2	28	59.2	0	30	59	0.0	1.0	C V	HIGH
WS02	0.80	25.87	53.9	26	27.9	0	26	28	0.0	1.0	C H	MEDIUM
WS02	2.60	18.33	51.5	30	21.5	0	18	22	-0.5	1.5	M H	MEDIUM
WS03	1.10	24.41	56.3	24	32.3	0	24	32	0.0	1.0	C H	MEDIUM



APPENDIX E: Chemical laboratory results

ANALYTICAL TEST REPORT

Contract no: 96629

Contract name: High Barn

Client reference: YEX2150

Clients name: YourEnvironment

Clients address: Unit 2 Woodhorn Business Centre
Chichester
West Sussex
PO20 2BX

Samples received: 26 May 2021

Analysis started: 26 May 2021

Analysis completed: 03 June 2021

Report issued: 03 June 2021

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.
BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

Rachael Burton
Customer Support Squad Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
96629-1	WS01	0.20	Loam with Gravel	-	-	16.7
96629-2	WS01	0.50	Loamy Clay with Gravel	-	-	23.5
96629-3	WS01	0.80	Sandy Clay	-	-	19.3
96629-4	WS01	2.10	Sandy Clay	-	-	15.2
96629-5	WS02	0.40	Sand with Gravel	-	-	4.9
96629-6	WS02	0.60	Sandy Clay with Gravel	-	-	17.0
96629-7	WS03	0.20	Sandy Clay with Roots & Gravel	-	-	13.0
96629-8	WS03	0.50	Sandy Clay with Gravel	-	-	21.8
96629-9	WS03	0.70	Sandy Clay with Gravel	-	-	15.2
96629-10	WS03	1.50	Sandy Clay	-	-	14.9

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SOILS

Lab number			96629-1	96629-2	96629-3	96629-4	96629-5	96629-6
Sample id			WS01	WS01	WS01	WS01	WS02	WS02
Depth (m)			0.20	0.50	0.80	2.10	0.40	0.60
Date sampled			24/05/2021	24/05/2021	24/05/2021	24/05/2021	24/05/2021	24/05/2021
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	16	17	13	-	15	13
Cadmium (total)	CE127 M	mg/kg Cd	0.3	1.0	<0.2	-	0.6	<0.2
Chromium (total)	CE127 M	mg/kg Cr	45	49	56	-	64	69
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	-	<1	<1
Copper (total)	CE127 M	mg/kg Cu	64	2090	24	-	8.6	15
Lead (total)	CE127 M	mg/kg Pb	38	150	18	-	466	25
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	-	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	15	23	18	-	9.2	16
Selenium (total)	CE127 M	mg/kg Se	1.1	0.8	1.3	-	0.7	1.0
Zinc (total)	CE127 M	mg/kg Zn	90	350	50	-	90	55
pH	CE004 M	units	8.3	8.1	8.0	6.2	8.4	8.0
Sulphate (2:1 water soluble)	CE061	mg/l SO_4	25	56	28	80	128	42
Sulphate (2:1 water soluble)	CE061	g/l SO_4	-	-	0.03	0.08	-	-
Sulphate (total)	CE062	mg/kg SO_4	-	-	164	256	-	-
Sulphate (total)	CE062	% w/w SO_4	-	-	0.02	0.03	-	-
Sulphur (total)	CE119	% w/w S	-	-	0.01	<0.01	-	-
Cyanide (total)	CE077	mg/kg CN	<1	<1	<1	-	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	-	<0.5	<0.5
Total Organic Carbon (TOC)	CE197	% w/w C	3.0	4.7	0.5	-	0.7	1.0
Estimate of OMC (calculated from TOC)	CE197	% w/w	5.1	8.1	0.8	-	1.2	1.8
PAH								
Naphthalene	CE087 M	mg/kg	<0.02	<0.02	<0.02	-	<0.02	<0.02
Acenaphthylene	CE087 M	mg/kg	<0.02	<0.02	<0.02	-	<0.02	<0.02
Acenaphthene	CE087 M	mg/kg	<0.02	<0.02	<0.02	-	<0.02	<0.02
Fluorene	CE087 U	mg/kg	<0.02	<0.02	<0.02	-	<0.02	<0.02
Phenanthrene	CE087 M	mg/kg	0.03	<0.02	<0.02	-	<0.02	<0.02
Anthracene	CE087 U	mg/kg	<0.02	<0.02	<0.02	-	<0.02	<0.02
Fluoranthene	CE087 M	mg/kg	0.10	0.03	<0.02	-	<0.02	0.03
Pyrene	CE087 M	mg/kg	0.09	0.04	0.06	-	<0.02	0.03
Benzo(a)anthracene	CE087 U	mg/kg	0.07	0.04	0.03	-	<0.02	0.03
Chrysene	CE087 M	mg/kg	0.08	0.03	<0.03	-	<0.03	<0.03
Benzo(b)fluoranthene	CE087 M	mg/kg	0.11	0.05	0.03	-	<0.02	0.03
Benzo(k)fluoranthene	CE087 M	mg/kg	0.05	<0.03	<0.03	-	<0.03	<0.03
Benzo(a)pyrene	CE087 U	mg/kg	0.09	0.05	0.03	-	<0.02	0.02
Indeno(123cd)pyrene	CE087 M	mg/kg	0.07	0.08	0.03	-	<0.02	0.02
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	<0.02	<0.02	-	<0.02	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	0.07	0.12	0.04	-	<0.02	0.02
PAH (total of USEPA 16)	CE087	mg/kg	0.77	0.45	<0.34	-	<0.34	<0.34
BTEX & TPH								
MTBE	CE192 U	mg/kg	<0.02	<0.02	<0.02	-	<0.02	<0.02
Benzene	CE192 U	mg/kg	<0.01	<0.01	<0.01	-	<0.01	<0.01

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SOILS

Lab number			96629-1	96629-2	96629-3	96629-4	96629-5	96629-6
Sample id			WS01	WS01	WS01	WS01	WS02	WS02
Depth (m)			0.20	0.50	0.80	2.10	0.40	0.60
Date sampled			24/05/2021	24/05/2021	24/05/2021	24/05/2021	24/05/2021	24/05/2021
Test	**Method**	**Units**						
Toluene	CE192 [U]	mg/kg	<0.01	<0.01	<0.01	-	<0.01	<0.01
Ethylbenzene	CE192 [U]	mg/kg	<0.01	<0.01	<0.01	-	<0.01	<0.01
m & p-Xylene	CE192 [U]	mg/kg	<0.02	<0.02	<0.02	-	<0.02	<0.02
o-Xylene	CE192 [U]	mg/kg	<0.01	<0.01	<0.01	-	<0.01	<0.01
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	-	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	-	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	-	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	-	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1	-	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	<1	<1	<1	-	<1	<1
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	<1	<1	<1	-	<1	<1
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	<1	-	<1	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	-	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	-	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	-	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4	-	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	<4	<4	-	<4	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	10	293	452	-	9	<4
EPH Aliphatic (>C35-C44)	CE068	mg/kg	<10	46	92	-	<10	<10
Subcontracted analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	-	NAD	NAD

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SOILS

Lab number			96629-7	96629-8	96629-9	96629-10
Sample id			WS03	WS03	WS03	WS03
Depth (m)			0.20	0.50	0.70	1.50
Date sampled			24/05/2021	24/05/2021	24/05/2021	24/05/2021
Test	**Method**	**Units**				
Arsenic (total)	CE127 [M]	mg/kg As	10	11	12	-
Cadmium (total)	CE127 [M]	mg/kg Cd	<0.2	<0.2	0.2	-
Chromium (total)	CE127 [M]	mg/kg Cr	54	57	57	-
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	-
Copper (total)	CE127 [M]	mg/kg Cu	24	28	16	-
Lead (total)	CE127 [M]	mg/kg Pb	25	27	23	-
Mercury (total)	CE127 [M]	mg/kg Hg	<0.5	<0.5	<0.5	-
Nickel (total)	CE127 [M]	mg/kg Ni	27	26	17	-
Selenium (total)	CE127 [M]	mg/kg Se	1.4	1.3	1.8	-
Zinc (total)	CE127 [M]	mg/kg Zn	87	61	66	-
pH	CE004 [M]	units	8.1	7.8	8.0	5.0
Sulphate (2:1 water soluble)	CE061	mg/l SO_4	241	48	266	93
Sulphate (2:1 water soluble)	CE061	g/l SO_4	-	-	0.27	0.09
Sulphate (total)	CE062	mg/kg SO_4	-	-	1951	645
Sulphate (total)	CE062	% w/w SO_4	-	-	0.20	0.06
Sulphur (total)	CE119	% w/w S	-	-	0.10	0.02
Cyanide (total)	CE077	mg/kg CN	<1	<1	<1	-
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	-
Total Organic Carbon (TOC)	CE197	% w/w C	1.6	0.6	1.9	-
Estimate of OMC (calculated from TOC)	CE197	% w/w	2.8	1.1	3.2	-
PAH						
Naphthalene	CE087 [M]	mg/kg	<0.02	<0.02	0.03	-
Acenaphthylene	CE087 [M]	mg/kg	<0.02	<0.02	<0.02	-
Acenaphthene	CE087 [M]	mg/kg	<0.02	<0.02	0.05	-
Fluorene	CE087 [U]	mg/kg	<0.02	<0.02	0.04	-
Phenanthrene	CE087 [M]	mg/kg	0.13	<0.02	0.25	-
Anthracene	CE087 [U]	mg/kg	0.07	<0.02	0.07	-
Fluoranthene	CE087 [M]	mg/kg	0.32	<0.02	0.65	-
Pyrene	CE087 [M]	mg/kg	0.30	<0.02	0.56	-
Benzo(a)anthracene	CE087 [U]	mg/kg	0.21	<0.02	0.42	-
Chrysene	CE087 [M]	mg/kg	0.25	<0.03	0.45	-
Benzo(b)fluoranthene	CE087 [M]	mg/kg	0.47	<0.02	0.56	-
Benzo(k)fluoranthene	CE087 [M]	mg/kg	0.16	<0.03	0.23	-
Benzo(a)pyrene	CE087 [U]	mg/kg	0.32	<0.02	0.43	-
Indeno(123cd)pyrene	CE087 [M]	mg/kg	0.38	<0.02	0.34	-
Dibenz(ah)anthracene	CE087 [M]	mg/kg	0.08	<0.02	0.08	-
Benzo(ghi)perylene	CE087 [M]	mg/kg	0.40	<0.02	0.32	-
PAH (total of USEPA 16)	CE087	mg/kg	3.11	<0.34	4.48	-
BTEX & TPH						
MTBE	CE192 [U]	mg/kg	<0.02	<0.02	<0.02	-
Benzene	CE192 [U]	mg/kg	<0.01	<0.01	<0.01	-

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SOILS

Lab number			96629-7	96629-8	96629-9	96629-10
Sample id			WS03	WS03	WS03	WS03
Depth (m)			0.20	0.50	0.70	1.50
Date sampled			24/05/2021	24/05/2021	24/05/2021	24/05/2021
Test	**Method**	**Units**				
Toluene	CE192 U	mg/kg	<0.01	<0.01	<0.01	-
Ethylbenzene	CE192 U	mg/kg	<0.01	<0.01	<0.01	-
m & p-Xylene	CE192 U	mg/kg	<0.02	<0.02	<0.02	-
o-Xylene	CE192 U	mg/kg	<0.01	<0.01	<0.01	-
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	-
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	-
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1	-
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	<1	<1	3	-
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	3	<1	4	-
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	<1	-
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	-
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4	-
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	<4	<4	-
EPH Aliphatic (>C16-C35)	CE068	mg/kg	52	<4	20	-
EPH Aliphatic (>C35-C44)	CE068	mg/kg	43	<10	37	-
Subcontracted analysis						
Asbestos (qualitative)	$	-	NAD	NAD	NAD	-

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		10	mg/l SO_4
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		0.01	g/l SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry		100	mg/kg SO_4
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		0.01	% w/w S
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	As received		0.5	mg/kg PhOH
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE197	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE192	MTBE	Headspace GC-FID	As received	U	0.02	mg/kg
CE192	Benzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Toluene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Ethylbenzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	m & p-Xylene	Headspace GC-FID	As received	U	0.02	mg/kg
CE192	o-Xylene	Headspace GC-FID	As received	U	0.01	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	As received		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	As received		10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
96629-1	WS01	0.20	N	
96629-2	WS01	0.50	N	
96629-3	WS01	0.80	N	
96629-4	WS01	2.10	N	
96629-5	WS02	0.40	N	
96629-6	WS02	0.60	N	
96629-7	WS03	0.20	N	
96629-8	WS03	0.50	N	
96629-9	WS03	0.70	N	
96629-10	WS03	1.50	N	