



SUB SURFACE CONSULTANTS

GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS



Your ref:

Our ref:

Reg. Office

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SCB/ 7124

11th May 2021

Ms. Caroline Hollies,
27 Farmside Lane,
Biddulph Moor,
Staffordshire,
ST8 7LY

For the attention of Ms. Caroline Hollies

**RE: MOSS COTTAGE BARN, MACCLESFIELD ROAD, RUSHTON SPENCER,
STAFFORDSHIRE, SK11 0SE**

Dear Madam,

This report has been prepared in accordance with an email dated 17th November 2020 of the Client.

The brief was set out in our estimate, ref. E4252 and dated 13th July 2020, with amendments as the investigation proceeded and includes:

- Three No Hand Dug Trial Pits
- Provision of a contamination analysis interpretative letter report on the above.

Introduction

The site is located off Macclesfield Road, Rushton Spencer, Staffordshire, SK11 0SE, as indicated on Figure 1. The approximate National Grid Reference of the centre of the site is 393399, 362770.

As shown on Figure 1, the irregular shaped about 0.01- hectare site is bounded to the north west by an unspecified depot, to the north east by Macclesfield Road and to the north east and south west by fields.

Investigation

Three hand dug trial pits were taken out at the positions determined and set out by Sub Surface, as shown on Figure 2. The hand dug trial pits were excavated to depths of one metre, logged in accordance with BS EN ISO 14688-1: 2002 and BS EN ISO 14689-1: 2003 and samples were taken for contamination analysis. The resulting Hand Dug Trial Pit Records and Photographs are appended. On completion the hand dug trial pits were backfilled with arisings.

Contamination Analysis and Assessment

Contamination analyses have been performed on three soil samples to determine: pH and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, speciated total petroleum hydrocarbons (TPHs), the speciated polynuclear aromatic hydrocarbons (PAHs) suite, the benzene/ ethylbenzene/ toluene/ xylene (BTEX) suite and phenols. In addition, three soil samples were subjected to an asbestos screen. The results of the above analyses are appended.

At the outset it should be noted that this contamination investigation is a baseline survey in order to provide a contamination risk assessment. Based upon the findings additional sampling, analysis and assessment may be required. Analysis of a suite of common determinants has been undertaken in the absence of historical evidence of the source of the Made Ground. However, the absence of other specific contaminants cannot be guaranteed.

Levels of the determinants have been compared against the most recently published guideline values. Contaminated Land: Applications in Real Environments (CL:AIRE) published guideline values in December 2009 to supplement previous guideline values. The Department for Environment, Food and Rural Affairs (DEFRA) published in March 2014 Category 4 Screening Levels (C4SLs) for arsenic, cadmium, lead, hexavalent chromium, benzo(a)pyrene and benzene. Land Quality Management Limited (LQM)/ Chartered Institute of Environmental Health (CIEH) then published Suitable for Use Levels (S4ULs) in November 2014, which largely superseded the previous guideline values. Updated S4ULs values for cadmium and phenols were published in July 2015 and for nickel in August 2015. The guideline values (S4ULs and occasionally C4SLs and CL:AIRE) these are derived using the Environment Agency's CLEA Model and vary dependent upon the land use; allotment and residential use being the most sensitive and commercial/ industrial use being the least sensitive.

For the purposes of assessment, as the proposed development is a new residential development with private garden, contamination analyses have been compared with the guideline values for a standard land use of residential with plant uptake (with homegrown produce).

The chemical analysis indicates elevated levels of lead and three of the seven genotoxic polycyclic aromatic hydrocarbons (PAH); these being polybenzo(b)fluoranthene, benzo(a)pyrene and dibenzo(ah)anthracene when assessed against S4UL levels. Further analysis was subsequently carried out to assess the risk of the three elevated PAH's tested.

TABLE 1 ASSESSMENT OF SOIL CONTAMINATION

Determinant	Expl. Hole No.	Depth (m)	Recorded Level (mg/kg)	Published Guideline Value (mg/kg)
lead	HD2	0.10-0.20	500	200
	HD3	0.10-0.20	420	200
benzo(b)fluoranthene	HD2	0.10-0.20	13	3.7
	HD3	0.10-0.20	5.8	3.7
benzo(a)pyrene	HD2	0.10-0.20	10	3.0
	HD3	0.10-0.20	4.5	3.0
dibenzo(ah)anthracene	HD2	0.10-0.20	1.9	0.30
	HD3	0.10-0.20	0.79	0.30

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Guideline values for the assessment can be supplied directly to the Regulator, if requested. To assess the polycyclic aromatic hydrocarbon (PAH) contamination the surrogate marker approach has been used. The ratios of the seven genotoxic PAH's (benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(123-cd)pyrene, dibenzo(ah)anthracene and benzo(ghi)perylene) to benzo(a)pyrene, have been determined and compared with the published ratio profile of a coal tar test material (Culp et al in 1998). The comparison indicates that the PAH contamination matches the Culp profile within reasonable bounds (as defined in Defra 2014) allowing the genotoxic PAHs to be assessed against the C4SL for benzo(a)pyrene as a surrogate marker (see appended Benzo(a)pyrene Surrogate Marker Test).

When compared with the GAC's the contamination analyses determined an elevated concentration of genotoxic PAH in one location, as detailed in Table 2 below:

TABLE 2 ASSESSMENT OF PAH SOIL CONTAMINATION

Determinant	C4SL (mg/kg)	Min Site Conc. (mg/kg)	Max Site Conc. (mg/kg)	Number of exceedances
Genotoxic PAH (benzo(a)pyrene as surrogate marker)	5.0	4.50	10	1

Guideline values for the assessment can be supplied directly to the Regulator, if requested.

An asbestos screen was undertaken on three soil samples and no asbestos was detected.

Conclusions and Recommendations

The ground investigation found two layers of Made Ground at depths between 0.55 and 0.60m with an orangish brown gravelly fine to coarse sand beneath. In HD1 the Made Ground comprised of a greyish brown, very gravelly slightly silty fine to coarse sand with low concrete cobble size fragments to 0.18m. The second strata to 0.55m, comprised of a light brown gravelly fine to coarse sand with low stone cobble size fragments. HD1 soil sample, 0.25-0.35m, showed no elevated levels of the contaminants tested.

The Made Ground found in HD2 and 3 was first comprised of a topsoil at depths between 0.30-0.35m and was composed of a dark brown gravelly silty fine to coarse sand with some rootlets. In HD3 at 0.20m, fragments of an old metal cable were identified. Gravel sized fragments included stone, brick and occasional tile. HD2, 0.35 to 0.60m, Made Ground then consisted of a light brown, gravelly fine to coarse sand with occasional rootlets and the gravel sized fragments were of stone and brick. In HD3 the Made Ground comprised of a brown gravelly, slightly silt fine to coarse sand with occasional rootlets and the gravel sized fragments were of stone and concrete. HD2 and 3 soil samples, 0.10-0.20m identified elevated lead levels and an elevated benzo(a)pyrene level in HD2.

We recommend that the made ground encountered in the hand excavated trial pits to a depth of up to 0.60m is excavated out and disposed of at an appropriately licenced tip. The remaining natural strata should then be sampled and tested to confirm that all the contaminated material had been removed. The level could then be built up as required with a clean topsoil material.

Alternatively, a 600mm blanket of clean topsoil/ subsoil (equivalent to two spade depths) could be provided on top of the contaminated made ground to break any pathway for the contamination. In addition, any deeper rooted bushes and trees should be pit planted on and in clean topsoil.

Consideration could be given to excavating additional Hand Dug Pits around HD1 due to HD2 and 3 being excavated close to the south east boundary and HD1 being excavated close to the north western boundary (see Figure 2) in order to determine the extent of 'clean' material on site and consequently reduce the size of the area to be removed.

General

Our recommendation is subject to Local Authority Environmental Health Officers approval. Following the approval of the Local Authority a Phase III remediation statement should be carried out at the end of the remediation scheme and a Phase IV verification report submitted to the Local Authority.

We trust that this letter report fulfils your present requirements but if you have any queries or we can be of further assistance please contact the undersigned or Miss Anna Marsden at our Preston office.

Your faithfully

A handwritten signature in black ink, appearing to read 'S. C. Boot', with a stylized flourish at the end.

S. C. Boot B.Sc.(Hons.), F.G.S.
Geo-environmental Engineer
For and on behalf of
Sub Surface Consultants Limited



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SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
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Photographs

Site: MOSS COTTAGE BARN, MACCLESFIELD ROAD, RUSHTON SPENCER, STAFF, SK11 0SE

Client: MS. CAROLINE HOLLIES

Job Number:

7124

Sheet:

1 / 2

Survey Date:

16/04/21

HAND DUG TRIAL PIT PHOTOGRAPHS

1 HD1



2



3



4

HD2



5



6





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Client: MS. CAROLINE HOLLIES

Job Number:

7124

Sheet:

2 / 2

Survey Date:

16/04/21

HAND DUG TRIAL PIT PHOTOGRAPHS

7 HD3



8



9



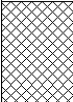
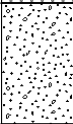


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Site
 MOSS COTTAGE BARN, MACCLESFIELD ROAD,
 RUSHTON SPENCER, STAFFORDSHIRE

Trial Pit Number
HD2

Excavation Method HAND DUG		Dimensions 0.30m x 0.30m		Ground Level (mOD)		Client CAROLINE HOLLIES		Job Number 7124	
		Location AS PLAN		Dates 16/04/2021		Engineer		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.20	B				(0.35)	MADE GROUND: dark brown gravelly silty fine to coarse sand with some rootlets. Gravel sized fragments are fine to coarse stone, brick and occasional tile. (Topsoil).		
0.10-0.20	DA V				0.35			
0.45-0.55	B				(0.25)	MADE GROUND: light brown gravelly fine to coarse sand with occasional rootlets. Gravel sized fragments are fine to coarse stone and brick.		
0.45-0.55	DA V				0.60			
0.70-0.90	B				(0.40)	Orangish brown gravelly fine to coarse SAND. Gravel is subangular fine to medium quartz and sandstone.		
			16/04/2021: DRY		1.00	Complete at 1.00m		

Plan

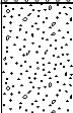
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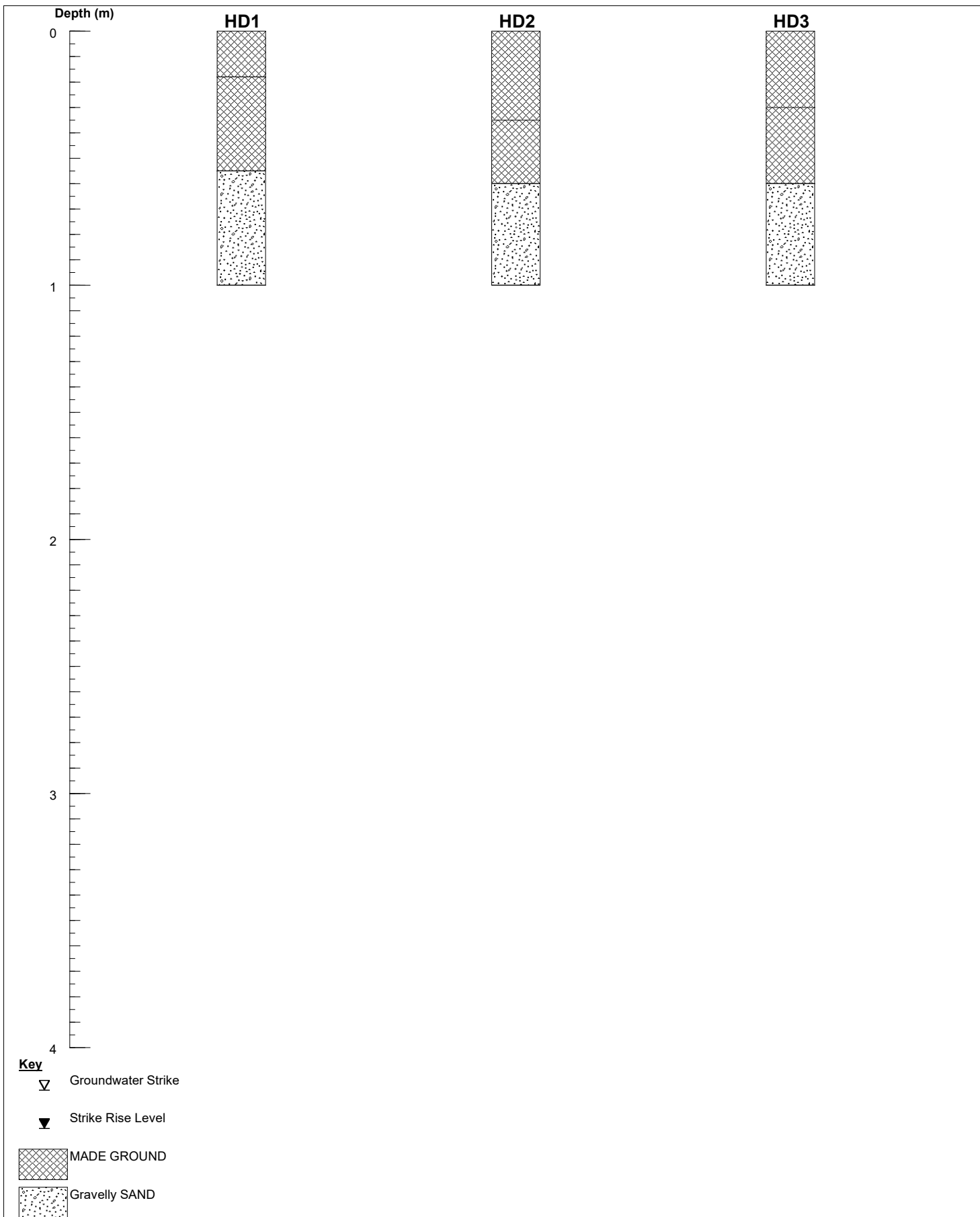
Remarks

Pit sides remained vertical and stable.
 No groundwater encountered.
 A = Amber Glass Jar sample
 V = Vial sample
 On completion backfilled with arisings.

Scale (approx)	Logged By	Figure No.
1:25	MSB/SJ	7124.HD2

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S S SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907						Site MOSS COTTAGE BARN, MACCLESFIELD ROAD, RUSHTON SPENCER, STAFFORDSHIRE		Trial Pit Number HD3		
Excavation Method HAND DUG		Dimensions 0.30m x 0.30m		Ground Level (mOD)		Client CAROLINE HOLLIES		Job Number 7124		
		Location AS PLAN		Dates 16/04/2021		Engineer		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water		
0.10-0.20 0.10-0.20	B DA V		16/04/2021:DRY		(0.30)	MADE GROUND: dark brown gravelly silty fine to coarse sand with some rootlets. Gravel sized fragments are fine to coarse stone, (Topsoil). at 0.20m : fragment of old metal cable				
0.40-0.50 0.40-0.50	B DA V				(0.30)	MADE GROUND: brown gravelly slightly silty fine to coarse sand with occasional rootlets. Gravel sized fragments are fine to coarse stone and occasional concrete.				
0.70-0.90	B				(0.40)	Orangish brown gravelly fine to coarse SAND. Gravel is subangular fine to medium quartz and sandstone.				
					1.00	Complete at 1.00m				
Plan					Remarks					
.					Pit sides remained vertical and stable.					
.					No groundwater encountered.					
.					A = Amber Glass Jar sample					
.					V = Vial sample					
.					On completion backfilled with arisings.					
.										
.										
					Scale (approx)		Logged By		Figure No.	
					1:25		MSB/SJ		7124.HD3	



SS SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907	Nominal Section			
Site MOSS COTTAGE BARN, MACCLESFIELD ROAD, RUSHTON SPENCER, STAFFORDSHIRE	Date Drawn 11/05/2021	Date Checked	Sheet 1/1	Job Number 7124
Client CAROLINE HOLLIES	Drawn By	Checked By	Scale 1:20[V]	Figure No. 7124.1



2183

Final Report

Report No.: 21-12590-1
Initial Date of Issue: 28-Apr-2021
Client Sub Surface
Client Address: 3 Peel Street
Preston
Lancashire
PR2 2QS
Contact(s): Simon Gabbatt
Project 7124 MOSS COTTAGE BARN.
MACLESFIELD ROAD

Quotation No.: **Date Received:** 20-Apr-2021

Order No.: **Date Instructed:** 20-Apr-2021

No. of Samples: 3

Turnaround (Wkdays): 7 **Results Due:** 28-Apr-2021

Date Approved: 28-Apr-2021

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 7124 MOSS COTTAGE BARN. MACLESFIELD ROAD

Client: Sub Surface	Chemtest Job No.:				21-12590	21-12590	21-12590
Quotation No.:	Chemtest Sample ID.:				1182380	1182381	1182382
	Client Sample ID.:				591 592 593	596 597 598	605 606 607
	Sample Location:				HD1	HD2	HD3
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				0.25	0.10	0.10
	Bottom Depth (m):				0.35	0.20	0.20
	Date Sampled:				16-Apr-2021	16-Apr-2021	16-Apr-2021
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-
Moisture	N	2030	%	0.020	11	20	14
pH	U	2010		4.0	8.2	6.9	6.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	1.2	< 0.40	0.42
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	4.0	2.0
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	2.3	2.4	2.4
Sulphate (Total)	U	2430	%	0.010	0.068	0.10	0.11
Arsenic	U	2450	mg/kg	1.0	7.4	13	12
Cadmium	U	2450	mg/kg	0.10	0.16	1.6	1.3
Chromium	U	2450	mg/kg	1.0	10	14	13
Molybdenum	U	2450	mg/kg	2.0	< 2.0	2.8	2.4
Copper	U	2450	mg/kg	0.50	17	42	43
Mercury	U	2450	mg/kg	0.10	< 0.10	0.16	0.20
Nickel	U	2450	mg/kg	0.50	9.1	19	16
Lead	U	2450	mg/kg	0.50	51	500	420
Selenium	U	2450	mg/kg	0.20	0.39	0.49	0.50
Zinc	U	2450	mg/kg	0.50	52	450	430
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
TPH >C6-C10	N	2670	mg/kg	1.0	< 1.0	2.9	< 1.0
TPH >C10-C21	N	2670	mg/kg	1.0	< 1.0	290	21
TPH >C21-C40	N	2670	mg/kg	1.0	< 1.0	320	75
Total TPH >C6-C40	U	2670	mg/kg	10	< 10	610	96
Naphthalene	U	2700	mg/kg	0.10	< 0.10	12	1.7
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	0.85	0.47
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	2.3	0.76
Fluorene	U	2700	mg/kg	0.10	< 0.10	2.3	0.84
Phenanthrene	U	2700	mg/kg	0.10	0.85	19	6.9
Anthracene	U	2700	mg/kg	0.10	0.26	3.6	1.9
Fluoranthene	U	2700	mg/kg	0.10	1.5	25	11
Pyrene	U	2700	mg/kg	0.10	1.6	25	11
Benzo[a]anthracene	U	2700	mg/kg	0.10	0.55	11	5.0
Chrysene	U	2700	mg/kg	0.10	0.82	14	5.5
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	13	5.8

Results - Soil

Project: 7124 MOSS COTTAGE BARN. MACLESFIELD ROAD

Client: Sub Surface	Chemtest Job No.:				21-12590	21-12590	21-12590
Quotation No.:	Chemtest Sample ID.:				1182380	1182381	1182382
	Client Sample ID.:				591 592 593	596 597 598	605 606 607
	Sample Location:				HD1	HD2	HD3
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				0.25	0.10	0.10
	Bottom Depth (m):				0.35	0.20	0.20
	Date Sampled:				16-Apr-2021	16-Apr-2021	16-Apr-2021
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD			
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	5.1	2.3
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	10	4.5
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	7.1	3.2
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	1.9	0.79
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	6.9	2.9
Total Of 16 PAH's	U	2700	mg/kg	2.0	5.6	160	65
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Phenols	U	2920	mg/kg	0.10	< 0.30	< 0.30	< 0.30

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

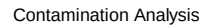
All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

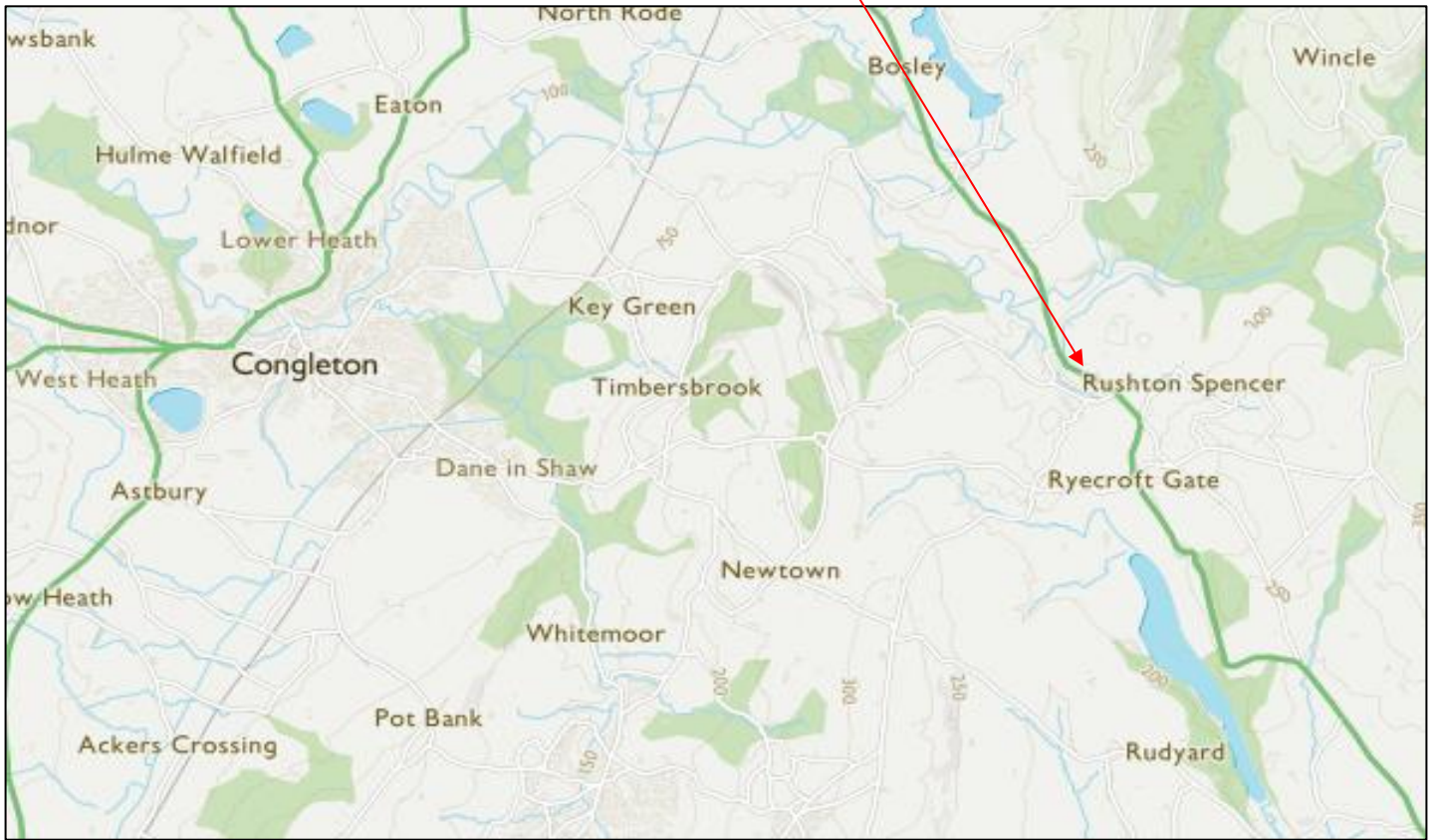
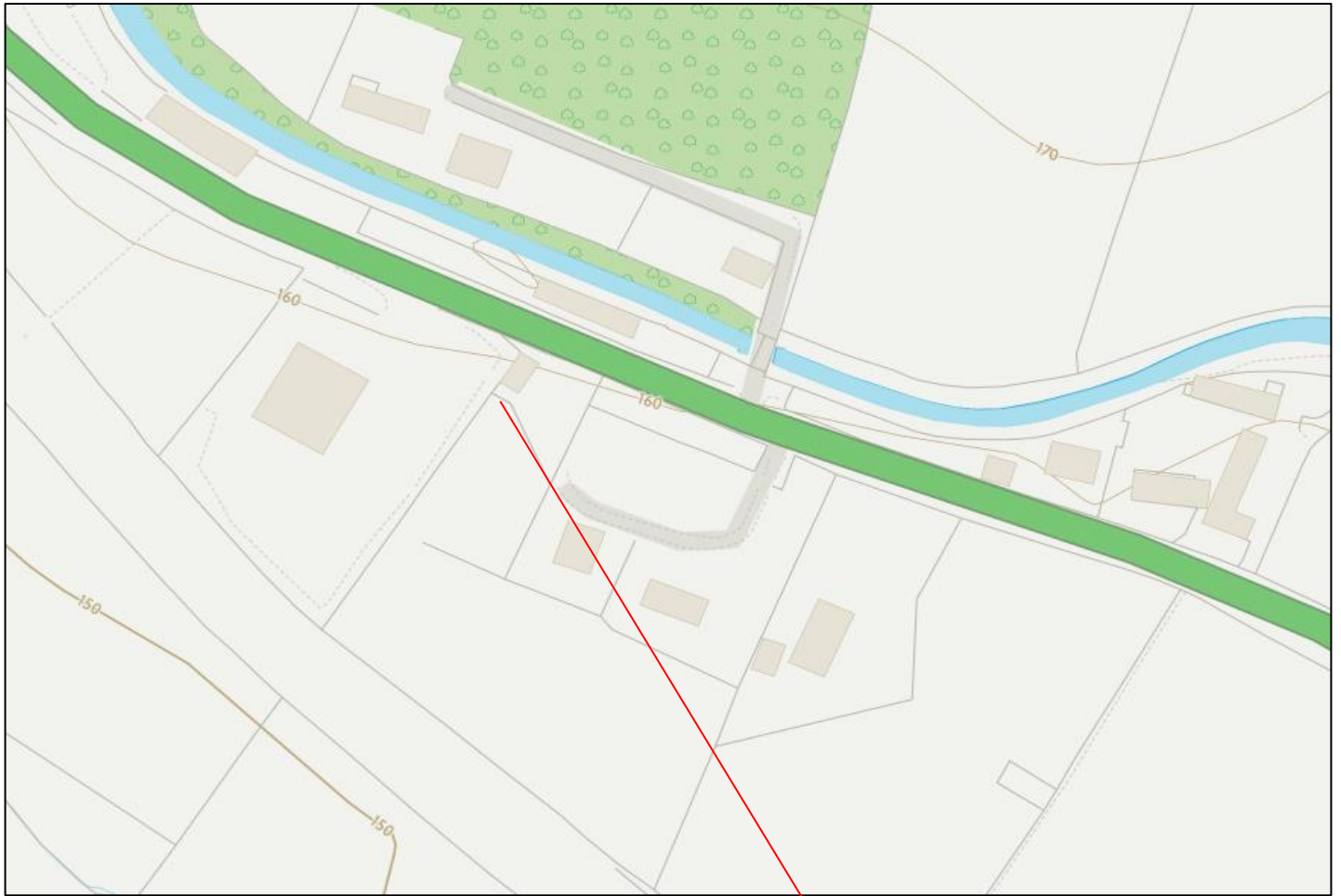
customerservices@chemtest.com



Job Number:

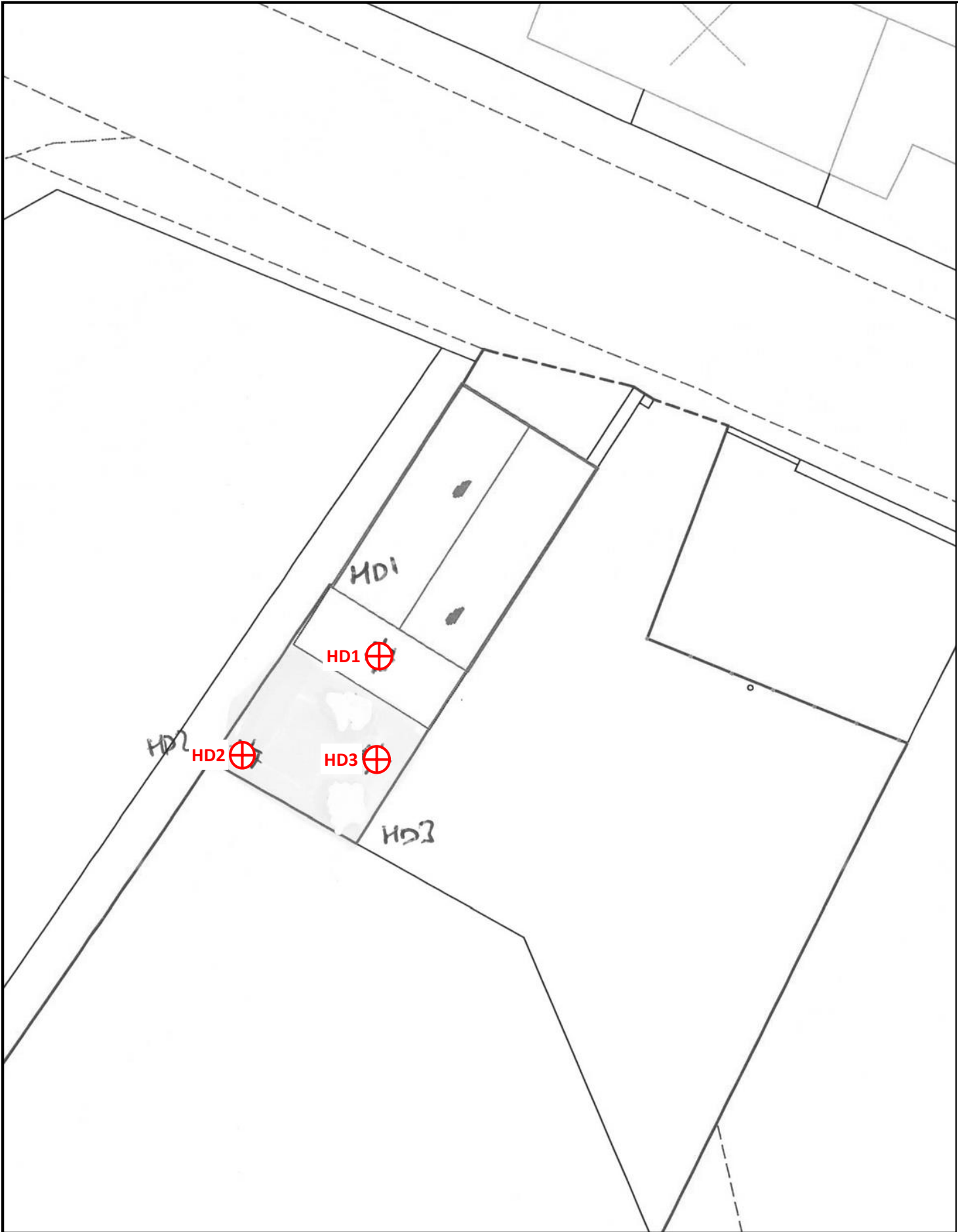
Sheet:

Assessed in accordance with Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010 Appendix E



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S S SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907	Site Location Plan			
Site: MOSS COTTAGE BARN, MACCLESFIELD ROAD, RUSHTON SPENCER, STAFFORDSHIRE	Date Drawn: 07-May-21	Date Checked:	Orientation:	Job Number: 7124
Client: CAROLINE HOLLIES	Drawn By: SCB	Checked By:	Scale: —	Figure Number: 1



S SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907	Site Investigation Location Plan			
Site: MOSS COTTAGE BARN, MACCLESFIELD ROAD, RUSHTON SPENCER, STAFFORDSHIRE	Date Drawn: 07-May-21	Date Checked: 29-Apr-21	Orientation: 	Job Number: 7124
CAROLINE HOLLIES	Drawn By: SCB	Checked By: CAM	Scale: —	Figure Number: 2