

SP Associates

CLIENT R and R Engineering PROJECT NAME R and R Engineering
 PROJECT NUMBER S1728 PROJECT LOCATION Wrexham
 DATE STARTED 5/3/21 COMPLETED 5/3/21 GROUND ELEVATION _____ HOLE SIZE _____
 DRILLING CONTRACTOR _____ GROUND WATER LEVELS:
 DRILLING METHOD Window Sampler AT TIME OF DRILLING ---
 LOGGED BY PVC CHECKED BY SMP AT END OF DRILLING ---
 NOTES Standpipe installed to 4m, 1m plain, 3m slotted. AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0.20	UD 1			Loose, dark brown, silty SAND with some shale fragments (Made Ground) Firm, dark brown CLAY (Glacial Till)
1.50	UD 2	SPT N @ 1m = 15		Stiff, brown and grey mottled CLAY (Glacial Till)
	UD 3	SPT N @ 2m = 19		
	UD 4	SPT N @ 3m = 18		
4.45	SPT 5	SPT N @ 4m = 22		

Bottom of borehole at 4.45 meters.

APPENDIX E

Laboratory Test Results



Final Report

Report No.:	21-08057-1		
Initial Date of Issue:	19-Mar-2021		
Client	SP Associates Ltd		
Client Address:	1 Market Place Warwick Warwickshire CV34 4SA		
Contact(s):	Steven Peters		
Project	51728 R+R Engineering, Wrexham		
Quotation No.:		Date Received:	15-Mar-2021
Order No.:		Date Instructed:	15-Mar-2021
No. of Samples:	10		
Turnaround (Wkdays):	5	Results Due:	19-Mar-2021
Date Approved:	19-Mar-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: 51728 R+R Engineering, Wrexham

Client: SP Associates Ltd		Chemtest Job No.:			
Quotation No.:	Chemtest Sample ID.:	21-08057	21-08057	21-08057	21-08057
	Sample Location:	1159513	1159514	1159515	1159516
	Sample Type:	BH1	BH1	BH2	BH2
	Top Depth (m):	SOIL	SOIL	SOIL	SOIL
	Bottom Depth (m):	0.0	0.4	0.0	0.2
		0.4	0.6	0.2	0.4
	Date Sampled:	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
	Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	
Asbestos Identification	U	2192		N/A	
ACM Detection Stage	U	2192		N/A	
Moisture	N	2030	%	0.020	
pH	U	2010		4.0	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	
Arsenic	U	2450	mg/kg	1.0	17
Cadmium	U	2450	mg/kg	0.10	0.62
Chromium	U	2450	mg/kg	1.0	37
Copper	U	2450	mg/kg	0.50	36
Mercury	U	2450	mg/kg	0.10	0.58
Nickel	U	2450	mg/kg	0.50	23
Lead	U	2450	mg/kg	0.50	220
Selenium	U	2450	mg/kg	0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	260
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C35-C44	U	2680	mg/kg	1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C35-C44	U	2680	mg/kg	1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	5.0	< 1.0
Naphthalene	N	2680	mg/kg	10.0	< 1.0
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10

Results - Soil

Project: 51728 R+R Engineering, Wrexham

Client: SP Associates Ltd		Chemtest Job No.:		21-08057	21-08057	21-08057	21-08057	21-08057	21-08057	21-08057	21-08057	21-08057
Quotation No.:		Chemtest Sample ID.:		1159513	1159514	1159515	1159516	1159517	1159518	1159519	1159520	21-08057
		Sample Location:		BH1	BH1	BH2	BH2	BH3	BH3	BH4	BH4	21-08057
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	21-08057
		Top Depth (m):		0.0	0.4	0.0	0.2	0.0	0.2	0.0	0.2	21-08057
		Bottom Depth (m):		0.4	0.6	0.2	0.4	0.2	0.5	0.2	0.5	21-08057
		Date Sampled:		05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	21-08057
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	21-08057
Determinand	Accred.	SOP	Units	LOD								
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.65	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	2.9	2.8	0.51	< 0.10	2.8	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	0.77	0.89	0.15	< 0.10	0.80	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	5.6	6.8	1.3	0.50	2.7	0.82	0.80	0.93
Pyrene	U	2700	mg/kg	0.10	5.5	8.1	1.2	0.54	2.7	0.97	1.1	1.2
Benzo[a]anthracene	U	2700	mg/kg	0.10	2.6	4.2	0.99	0.57	1.5	1.1	1.4	0.67
Chrysene	U	2700	mg/kg	0.10	2.4	4.2	1.1	0.59	1.5	1.2	1.3	0.51
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	2.7	7.4	1.4	< 0.10	1.6	1.6	1.7	1.8
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	1.5	3.4	0.80	< 0.10	0.75	0.81	0.87	0.68
Benzo[a]pyrene	U	2700	mg/kg	0.10	2.2	6.3	0.87	< 0.10	1.1	0.97	1.0	1.2
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	1.6	5.2	0.92	< 0.10	0.77	0.83	0.82	1.8
Dibenz[a,h]Anthracene	U	2700	mg/kg	0.10	0.61	2.0	0.50	< 0.10	0.45	0.34	0.46	0.73
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	1.0	5.7	0.70	< 0.10	0.91	0.93	1.1	2.4
Total Of 16 PAH's	U	2700	mg/kg	2.0	30	57	10	2.2	21	9.6	11	12
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Project: 51728 R+R Engineering, Wrexham

Client: SP Associates Ltd		Chemtest Job No.:		21-08057
Quotation No.:		Chemtest Sample ID.:	1159522	
		Sample Location:	BH5	
		Sample Type:	SOIL	
		Top Depth (m):	0.2	
		Bottom Depth (m):	0.5	
		Date Sampled:	05-Mar-2021	
		Asbestos Lab:	COVENTRY	
Determinand	Accred.	SOP	Units	LOD
ACM Type	U	2192		N/A
Asbestos Identification	U	2192		No Asbestos Detected
ACM Detection Stage	U	2192		N/A
Moisture	N	2030	%	0.020
pH	U	2010		4.0
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010
Arsenic	U	2450	mg/kg	1.0
Cadmium	U	2450	mg/kg	0.10
Chromium	U	2450	mg/kg	1.0
Copper	U	2450	mg/kg	0.50
Mercury	U	2450	mg/kg	0.10
Nickel	U	2450	mg/kg	0.50
Lead	U	2450	mg/kg	0.50
Selenium	U	2450	mg/kg	0.20
Zinc	U	2450	mg/kg	0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0
Naphthalene	U	2700	mg/kg	0.10
Acenaphthylene	U	2700	mg/kg	0.10
Acenaphthene	U	2700	mg/kg	0.10

Results - Soil

Project: 51728 R+R Engineering, Wrexham

Client: SP Associates Ltd		Chemtest Job No.:		21-08057
Quotation No.:		Chemtest Sample ID.:		1159522
		Sample Location:		BH5
		Sample Type:		SOIL
		Top Depth (m):		0.2
		Bottom Depth (m):		0.5
		Date Sampled:		05-Mar-2021
		Asbestos Lab:		COVENTRY
Determinand	Accred.	SOP	Units	LOD
Fluorene	U	2700	mg/kg	0.10
Phenanthrene	U	2700	mg/kg	0.10
Anthracene	U	2700	mg/kg	0.10
Fluoranthene	U	2700	mg/kg	0.10
Pyrene	U	2700	mg/kg	0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10
Chrysene	U	2700	mg/kg	0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10
Dibenz[a,h]Anthracene	U	2700	mg/kg	0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0
Total Phenols	U	2920	mg/kg	0.30

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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



Liquid and Plastic Limits and Plasticity Indices

Report No: DAM0080539/424/M1 **Report Date:** 30 March 2021

Client: SP ASSOCIATES LTD **Our Contract Ref:** 51061629

Address: 1 MARKET PLACE
 WARWICK
 WARWICKSHIRE
 CV34 4SA
 GB **Tested By:** SOCOTEC Central

Client Contact: Steve Peters **Date Sampled:** Not given

Site: R and R Engineering, Wrexham **Date Received:** 12 Mar 2021

Material Supplier: Client **Date Tested:** 23 Mar 2021

Material Source: Site **Sample Type:** BULK

Method of preparation: BS1377-1:1990 7.4.3 & BS 1377-2:1990 4.2 **Sampling Certificate:** Not Received

Samples Submitted by: Client

Sampled by: Client

Results:

Sample Reference	Client's Ref	Location	Description	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing on 425 µm
45378420	BH1	BH1 - 1-2m 1.00 - 2.00	Brown Slightly Sandy CLAY	21	49	24	25	**100
45378421	BH2	BH2 - 1-1.5m 1.00 - 2.00	Brown Slightly Sandy CLAY with Slight Silt	19	51	22	29	**100
45378422	BH3	BH3 - 1-1.5m 1.00 - 2.00	Brown Slightly Sandy CLAY	20	53	25	28	**100
45378423	BH4	BH4 - 1.5-2m 1.00 - 2.00	Brown Slightly Sandy CLAY	21	51	26	25	**100
45378424	BH5	BH5 - 1.5-2m 1.00 - 2.00	Grey/Brown Slightly Sandy CLAY with Slight Silt	20	47	24	23	**100

* Washed over 425µm BS Test Sieve

** As received, coarse particles removed by hand prior to test

Certified that the Liquid and Plastic Limits and Plasticity Indices were determined in accordance with BS1377-2:1990
 Clauses 4.4, 5.0 and 5.4 respectively
 Certified that the Moisture Content was determined in accordance with BS1377-2:1990 3.2

Signed:

Darren Berrill - General Manager
 for and on behalf of SOCOTEC UK Limited

APPENDIX F

Amended CSM

R & R Engineering, Wtexham

Amended Conceptual Site Model

Source	Pathway	Receptor	Risk Matrix Assessment	Assessment of Linkage Significance/Potential Mitigation Measures
Contaminated Soils and Groundwater from historical and current on-site sources.	Direct Ingestion, direct contact and inhalation of dust, vapours and liquids	Future site users	Low	Thin Made Ground materials are present across the site; however, concentrations of potential contaminants of concern are mostly below threshold levels for an industrial site use. No particular soil remedial measures are proposed to protect human health.
		Construction workers	Low	Site workers to wear appropriate PPE to mitigate short term risks to human health. They should also adopt appropriate hygiene and safe working practices including a 'hotspot protocol to be established
	Leaching and vertical and lateral migration	Controlled waters	Low	Leaching through near surface Made Ground materials could impact controlled waters. However, it is unlikely that any significant contamination would migrate to sensitive surface water receptors through the Glacial Till formation that contains significant horizons of low permeability cohesive soils.
	Direct infiltration in water supply pipes	Service Conduits	Low	Requirement for upgraded pipework considered to be low.
	Plant uptake	Vegetation within soft landscape areas	Low	No evidence of significant phytotoxic contamination within near surface soils. Clean sub-soil and imported topsoil cover in soft landscape areas is not proposed.
	Lateral migration through groundwater	Off-site neighbouring properties	Low	Significant lateral migration unlikely due to the cohesive nature of the Glacial Till.

Potentially contaminated groundwater: migration from off-site sources onto site	Direct contact or ingestion and inhalation of dust and vapours Vertical and lateral migration	Future site users	Very low	No significant upstream sources in terms of groundwater flow.
Ground gases generated on-site	Vertical and lateral migration	Controlled waters	Low	Geology not conducive to migration.
Ground gas migration onto site from off-site sources	Vertical and lateral migration Lateral migration	Buildings and human occupiers Buildings and human occupiers	Very Low Low	The ground gas regime conforms to Characteristic Situation 1 whereby no gas mitigation measures are required. As above.
High sulphate and low pH in site soils	Direct contact and within shallow groundwater	Below ground concrete	Very Low	pH and soluble sulphate conditions within the natural formation conform to the most benign category.