

**Environmental
Geotechnical
Specialists**



ENVIRONMENTAL REPORT

job number	date
site address	
written by	
checked by	
issued by	

Rogers Geotechnical Services Ltd

Telephone 0843 50 666 87 **Fax** 0843 51 599 30

Email enquiries@rogersgeotech.co.uk

www.rogersgeotech.co.uk

Offices 1 & 2, Barncliffe Business Park, Near Bank, Shelley,
Huddersfield, West Yorkshire HD8 8LU.



GEOTECHNICAL
ENVIRONMENTAL



Contents

		Page
1.	Introduction	1
2.	Limitations	2
3.	Fieldworks	2
4.	Geology	3
5.	Strata Conditions	3
5.1	General Strata	3
5.2	Groundwater	4
6.	Insitu Testing	4
6.1	Soakaway Testing	4
7.	Laboratory Testing - Environmental	5
8.	Laboratory Testing - Geotechnical	6
9.	Discussion of Ground Conditions	6
9.1	Discussion of Test Results	6
9.1.1	Soil Samples	6
9.1.2	BS3882 Testing	8
9.1.3	Calorific Testing	9
9.1.4	Waste Acceptance Criterion	9
9.1.5	Water Samples	11
9.1.6	CBR Testing	12
9.1.7	Soakaways	12
9.2	Site Specific Risk Assessment	12
9.2.1	Approach	12
9.2.2	Conceptual Ground Model and Risk Assessment	13
10	Remediation Strategy	16
10.1	Remediation Objectives	16
10.1	Development Requirements	16
10.3	Strategy	16
10.3.1	Groundworks	16
10.3.1	Construction	17
10.3.3	Allotments	17
10.4	Fill Materials	18
10.5	Verification Report	19
11.	Recommendations for Further Work	20
12.	References	20



Appendices

- | | |
|----|----------------------------|
| 1. | Site Plan |
| 2. | Trial Pit Records |
| 3. | Soakaways |
| 4. | Laboratory Testing Results |
| 5. | Fill Screening Values |



Report on an Environmental Investigation

Location: Land off Ravensthorpe Road,
Dewsbury Riverside, Thornhill Lees, Dewsbury, WF12 9EG.

For: Kirklees Council

Report No. C1035/20/E/1613/R2

Report date: May 2021

For and on behalf of **Rogers Geotechnical Services Ltd**

Steve Rogers CEng CGeol MICE MCIHT FGS ACIEH
Technical Director

Rob Palmer MSc FGS ACIEH
Senior Geo-environmental Engineer

Report Summary¹

Item	Comments	Section
Development	The site is under consideration for re-purposing as allotments.	1.
Geology	Superficial geology – River Terrace Deposits (Eastern edge of site only). Solid geology – Pennine Lower Coal Measures Formation.	4.
Strata Conditions	Generally topsoil overlying the weathered fraction of the Pennine Lower Coal Measures Formation. One limited area of made ground.	6.
Contamination	Potential arsenic contamination revealed. Whilst readings are above appropriate SSV's, elevated levels of arsenic are anticipated to be due to naturally occurring conditions, albeit some remediation may be required.	7.1.1
BS3882 Testing	All the soils tested are suitable for use as multi-purpose topsoil.	7.1.2

1. Introduction

It is understood that the site is under consideration for re-purposing as allotments. Consequently, a site investigation has been undertaken in accordance with the instruction from the client. This work was required in order to determine the nature of the underlying soils and to take into consideration the risk of any contamination present as well as to assess their suitability for use as topsoil. Calorific testing and CBR testing have also been undertaken, the results of which are also discussed. This report describes the work undertaken, presents the data obtained and discusses the ground conditions in relation to the proposed works.

¹ This summary should not be relied upon to provide a comprehensive review. All of the information contained in this document should be considered.



2. Limitations

The recommendations made and opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site and of the laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between trial pit positions, these are for guidance only and no liability can be accepted for their accuracy.

This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of issue.

It should be appreciated that the risks from shallow coal workings on the site are not considered within this report, however they are discussed in Report reference C1035/20/E/1615, dated 14th October 2020.

3. Fieldworks

The fieldworks were undertaken on the 2nd October 2020 and included ten hand-dug trialpits, to reveal the nature of the near surface soils and to obtain soil samples. Whilst initial plans also included the excavation of five machine dug trial pits for soakaway testing, due to site constraints attributed to boggy ground, these locations also had to be undertaken with hand sampling equipment. The investigatory locations are shown on the site plan which is presented in Appendix 1 of this report.

The encountered soils were logged on site in general accordance with BS5930: 2015, and full descriptions are given on the trialpit records which are presented in Appendix 2. Soakaway tests were conducted within TP4, TP5, TP9, TP12 and TP15. Once excavation and testing was completed, the trialpits were carefully re-instated with the arisings.

Samples from the trial pits were collected for environmental (BS3882, contamination, WAC and calorific) and geotechnical (laboratory based CBR) testing. The location of these pits is indicated on the site plan in Appendix 1. The chemical test specimens were retained in the appropriate air tight containers within cool boxes for onward transition to the chemical laboratory with the geotechnical samples stored in suitable bulk sampling bags.



4. Geology

The available published geological data for the site has been examined and the following table presents the anticipated geology.

Table 1: Geological Data for the Site

BGS MAPPING DATA			
Strata Type	Strata Name ²	Previous Name ⁴	Description ³
Superficial Geology (Eastern edge of site only)	River Terrace Deposits	-	Sand and gravel, locally with lenses of silt, clay or peat. [Generic description].
Solid Geology	Pennine Lower Coal Measures Formation	Lower Coal Measures	Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the base, and more numerous and thicker coal seams in the upper part.

5. Strata Conditions

In accordance with the geology of the area, the succession has been shown to include the following:

Table 2: Generalised Strata Profile

Depth m below ground level to underside of layer	Strata Type	Positions Encountered	Groundwater Strikes m below ground level
0.15 – 0.6+	TOPSOIL (Dark brown organic, locally sandy or gravelly, CLAY).	All	None
0.6+	MADE GROUND (Dark brown clayey gravelly SAND).	TP8	None
0.4+ – 1.3+	Yellowish brown, locally mottled grey, sandy CLAY (Weathered Lower Pennine Coal Measures).	TP2 – TP7, TP9 – TP15	None

'+' denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated

5.1 General Strata

In general, the trial pit records indicate that a capping of 0.15m to 0.6m of topsoil, comprising dark brown organic, locally gravelly/sandy clay was revealed at all positions.

Below this capping, granular made ground was revealed to the termination depth of TP8 (close to the sites eastern border) at 0.6m below ground level (bgl). At positions TP2 – TP7 and TP9 – TP15, yellowish brown locally mottled grey clay was revealed to the termination depth of between 0.4m and 1.3m bgl. It is considered that this material is representative of the weathered fraction of the Pennine Lower Coal Measures Formation which are indicated to be present below the site.

² Sources: British Geological Survey (NERC) Map Sheets 77; Huddersfield; Solid and Drift Edition, and Geology of Britain Viewer [online resource from www.bgs.ac.uk]

³ Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]



5.2 Groundwater

One groundwater strike was observed at TP5 during the site investigation. However, it should be appreciated that groundwater levels are subject to seasonal variation or changes on local drainage conditions.

In addition, an exposed water bearing pipe was located across the central section of the site, which was sampled at two locations, the positions of which are shown on the site plan in Appendix 1.

6. Insitu Testing

6.1 Soakaway Testing

On reaching the elected soakaway test depth, the hand dug trial pits were trimmed and squared as much as practicable. Water was then introduced into the pit at a controlled rate to prevent collapse of the sides and the level monitored at time intervals relative to a reference bar at ground level. The results obtained from the soakaway tests are presented at Appendix 3 and are summarised below:

Table 3: Soakaway Test Results

Location	Soakage Area Dimensions (average) (m)	Depths of soaked strata (m)	Soil Description (of soaked strata)	Infiltration Rate (m/sec)	Drainage Characteristics
TP4	0.3 x 0.3	0.3 to 0.7	Side – CLAY Base – CLAY	N/A ⁺	Practically impermeable
TP5	0.3 x 0.5	0.3 to 0.6	Side – CLAY Base – CLAY	N/A [#]	-
TP9	0.3 x 0.6	0.35 to 1.3	Side – CLAY Base – CLAY	N/A ⁺	Practically impermeable
TP13	0.3 x 0.3	0.3 to 0.6	Side – CLAY Base – CLAY	N/A ⁺	Practically impermeable
TP15	0.3 x 0.3	0.3 to 0.9	Side – CLAY Base – CLAY	N/A ⁺	Practically impermeable

+Movement ceased during observation.

#Naturally filled with water.

During the soakaway tests within TP4, TP9, TP13 and TP15, the water level practically ceased falling before achieving a fall from 75% to 25% of the effective depth of the storage volume. In the case of TP5, the trialpit naturally filled with water over the course of the test. It is considered that the initial movement observed within TP4, TP9, TP13 and TP15 was due to water filling any gaps and fissures at the side of the pit. On this basis, the tests could not be completed within the scope of the method provided in BRE Digest 365 due to the poor soakage rate of the exposed soils.



7. Laboratory Testing - Environmental

A suite of testing was conducted on samples from across the site and the following regime was undertaken.

RGS Standard Suite (ATRISK)

- Metals – Cd, Cr(VI), Cu, Hg, Ni, Pb, V and Zn.
- Semi and Non-Metals - As, Se, Free CN⁻ and Phenols.
- Polycyclic aromatic hydrocarbons (PAHs).
- Petroleum hydrocarbons (TPHs).
- Others – pH, organic content and total/soluble SO₄²⁻.
- Asbestos Screen.

Additional Metal Suite (As per Phase 1)

- Metals – Cd, Cr(VI), Cu, Hg, Ni, Pb, V and Zn.
- Others – pH and organic content.

BS3882 Suite

- Nutrients – C, Ca, K, N, Na, P, S, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Mo and Zn.
- Visible Contaminants.
- Phytotoxic Elements – Cu, Ni, Zn.
- Loss on Ignition.
- Soil Texture – Clay Content, Silt Content, Sand Content, Texture Class, Stones >2mm, >20mm, >50mm.
- Others – pH, electrical conductivity.

Waste Acceptance Criteria (WAC)

- Metals – Ba, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Mo and Zn.
- Semi and Non-Metals - As, Cl⁻, F⁻, Se, Free CN⁻ and Phenols.
- Polycyclic aromatic hydrocarbons (PAHs).
- Petroleum hydrocarbons (TPHs).
- BTEX – Benzene, Toluene, Ethylbenzene, Xylenes.
- PCBs.
- Others – pH, acid neutralisation capacity, loss on ignition, total organic carbon, total dissolved solids, phenol index and dissolved organic carbon.

Standard Water Suite

- Metals – Cr(VI)
- Dissolved Metals – B, Cd, Cu, Hg, Ni, Pb and Zn.
- Dissolved Semi and Non-Metals – As and Se.
- Polycyclic aromatic hydrocarbons (PAHs).
- Petroleum hydrocarbons (TPHs).
- Others – pH and SO₄²⁻.



This testing was undertaken by Eurofins Ltd and the results of all of the chemical testing are presented in Appendix 4 of this report.

8. Laboratory Testing - Geotechnical

The following programme of laboratory testing has been undertaken on samples obtained during this investigation:

- Soluble sulphate content BS 1377: 1990: Pt3: 5
- pH value BS 1377: 1990: Pt3: 9
- Lab based CBR's BS1377 : Pt 4: 7

The test results are presented in Appendix 4 and are summarised below:

Table 4: Summary of Geotechnical Test Results

Test type	Number of tests	Range of results	Comments
Soluble sulphate & pH	11	SO ₄ <1 to 1 mg/l pH 7.6 to 8.5	
Lab based CBR's	2	Average: <3%	TOPSOIL
	2	Average: 3.9%	CLAY

9. Discussion of Ground Conditions

9.1 Discussion of Test Results

It is understood that the site is under consideration for re-purposing as allotments. As such, it was considered that the site soils be screened against residential with plant uptake criteria, as this represents the most onerous case.

9.1.1 Soil Samples

The results of the chemical testing undertaken on soil samples obtained during this investigation have been compared to the ATRISK soil screening values (SSVs) as compiled by WS Atkins plc. Organic matter within the samples averaged over 6%, therefore it is considered that screening values associated with 6% SOM should be adopted. These values have been derived in such a way as to adhere to the principles within the revised CLEA model and include the most current release of the SGVs. A list of subscribers is provided within the website⁴ and these include many local authorities. A comparison of the results of the testing, together with the data given above, can be found within Appendix 4.

⁴ <http://www.atrisksoil.co.uk/pages/general/subscribers.asp>



It should be appreciated that the soil screening values for PAHs and TPHs (where appropriate) represents vapour saturation limits. The inhalation of vapour pathway contributes less than 10% of total exposure, which is unlikely to significantly affect the combined assessment criterion⁵. In view of this, the ATRISK soil SSVs notes that the users may wish to consider using a combined assessment criterion if free product is not observed, the values for which are also provided on the summary of contamination analysis. It is therefore considered that the criteria for no free product should be adopted for the PAHs and TPHs at this site. The results of the contaminants found to exceed these screening values are tabulated below:

Table 5: Summary of areas contaminated by PAHs & TPHs

Location	Depth (m)	Strata	Contaminants found to be exceeding SSVs (Residential with Plant Uptake)
RGS Contamination Suite			
TP1	0.3 – 0.6m	TOPSOIL	None.
TP2	0 – 0.4m	TOPSOIL	None.
TP3	0.3 – 0.6m	CLAY	Arsenic.
TP4A	0 – 0.1m	TOPSOIL	None.
TP5	0.4 – 0.6m	CLAY	None.
TP6	0 – 0.15m	TOPSOIL	Arsenic.
TP7	0 – 0.1m	TOPSOIL	None.
TP8	0.4 – 0.6	MADE GROUND	Arsenic.
TP10	0 – 0.2	TOPSOIL	None.
TP11	0.4 – 0.6	CLAY	Arsenic.
TP14	0.35 – 0.5	CLAY	None.
Additional Metal Tests*			
TP4B	0 – 0.3m	TOPSOIL	None.
TP9	0 – 0.3m	TOPSOIL	None.
TP12	0 – 0.3m	TOPSOIL/CLAY	None.
TP15	0 – 0.3m	TOPSOIL	None.

*It should be noted that these samples were not tested for arsenic as a semi-metal.

Concentrations of cyanide, chromium (VI), phenols and all TPHs, were below the detection limits for the tests. Detectable levels of all other contaminants were recorded, but these fell below the associated Atrisk Soil Screening Values, with the exception of arsenic. In addition, no asbestos was detected by the asbestos screen.

On the basis of the above information, the results of the investigation have concluded that the soils tested are affected by arsenic. In light of this, the following should be noted:

- The estimated background concentration of arsenic in the area is anticipated to be 25 - 35 mg/kg (based on BGS Estimated Background Soil Chemistry, see Appendix 1 within the Phase 1 report).

⁵ Ref: ATRISK soil, SSVs derived using CLEA v1.071 for 6% SOM, Residential With Plant Uptake, 23.06.17.



- The average value within the soils tested for arsenic is 42 mg/kg.
- The test values for arsenic range between 12 mg/kg and 110 mg/kg.
- The more elevated values of arsenic appear to be randomly spread across site.

Given the above information, the average level of arsenic appears to be only 20% higher than the expected background value. In light of this, and due to the greenfield nature of the site, it is considered that these readings may be due to slightly elevated naturally occurring concentrations of arsenic, with some natural variation across the site. No visual or olfactory evidence of anthropogenic arsenic contamination was identified during the site investigation, or within the Phase 1 Desk Study.

As arsenic was the only contaminant that was above the chosen soil screening value, it was subject to analysis to assess its bioaccessibility in humans. The results of this work are shown on the test results sheets in Appendix 4 and are summarised below.

Table 6: Bioaccessibility of Arsenic

Location	Depth (m)	Arsenic Mg/kg	Bioaccessibility of Arsenic				Chosen SSV (mg/kg)
			Stomach (mg/kg)	Intestinal 1 (mg/kg)	Intestinal 2 (mg/kg)	Fraction (%)	
TP3	0.3 – 0.6	38	<0.20	0.60	0.86	2.3	37
TP6	0.0 – 0.15	53	0.92	4.1	6.0	11	37
TP7	0.0 – 0.1	37	1.0	2.6	4.6	12	37
TP8	0.4 – 0.6	100	2.8	6.3	8.2	8.2	37
TP10	0.0 – 0.2	31	0.57	1.2	2.0	6.5	37
TP11	0.4 – 0.6	110	<0.20	0.30	0.43	0.39	37

The results of the bio testing for arsenic indicate that if the soils were to be consumed by humans, the concentrations that could be absorbed in the stomach and intestines are significantly below the chosen SSVs for the site. Therefore, it may be reasoned that the arsenic is not likely to adversely affect human receptors.

9.1.2 BS3882 Testing

It should be appreciated that the topsoil samples test from the site were not compliant with the BS3882 standard for topsoil for the following reasons;

- Low Nitrogen (TP10)
- High C:N Ratio (TP10)
- Low Phosphorous (TP6)
- Low Potassium (TP6)

However, no visible contamination was noted and phytotoxic elements were within acceptable levels.

It should be appreciated that based upon DEFRA data (<https://magic.defra.gov.uk/magicmap>), the soils in the area are defined as *slowly permeable seasonally wet slightly acidic but base-rich loamy and clayey soils*, classified as Agricultural Land Classification Grade 3. Grade 3 is a mid-range



classification (Grades range from 1 to 5) of agricultural soils which fits the soils being classified as a lower fertility and the expected clayey nature of the soils fits with the clayey nature observed.

In light of the above, it is considered that the soils are lacking in some nutrients, but are probably representative of the generally low fertility soils across the local area.

9.1.3 Calorific Testing

Table 7: Summary of Calorific Testing

Test type	Number of tests	Range of results	Comments
Calorific Value	1	1.5 MJ/kg	TOPSOIL
	2	<0.10 MJ/kg	CLAY

Based on the above results it is considered that the clay strata observed has negligible calorific values and would have no risk of combustion.

The topsoil materials appear to have a low calorific value, likely associated with organic plant materials within these soils. This would not be considered elevated in comparison to a fuel source such as coal (<https://www.gov.uk/government/statistics/dukes-calorific-values>), with an average of 25.6 MJ/kg (net) or even wood at 14.7 MJ/kg (net).

It is therefore considered that the near surface soils would be of low combustibility.

9.1.4 Waste Acceptance Criterion

Analysis of the sample was undertaken to assess the suitability of the site material for use in a landfill. In order to achieve this, WAC testing has been undertaken to demonstrate compliance and the results are presented in Appendix 4. The WAC have been set as maximum limit values which must not be exceeded and should not be viewed as minimum treatment specifications for landfill. The following table has been extracted from the Environment Agency⁶ and adapted to compare against the chemical test results.

⁶ Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures, Version 1, April 2005.

**Table 8: Landfill Waste Acceptance Criteria**

Determinand	Maximum Concentration (mg/kg)	Landfill Waste Acceptance Criteria Limits			Class of Landfill Maximum
		Inert	Non-Hazardous	Hazardous	
Total Organic Carbon %	6.7	3	5	6	Hazardous
Loss on Ignition %	12	-	-	10	Hazardous
BTEX	0.099	6	-	-	Inert
PCBs (7 Congeners)	<0.1	1	-	-	Inert
TPH (Mineral Oil)	<10	500	-	-	Inert
Total (of 17) PAHs	7.7	100	-	-	Inert
pH	8.5	-	>6	-	Non-Hazardous
Acid Neutralisation Capacity	0.041	-	To be evaluated	To be evaluated	-
	Maximum Cumulative Concentration (mg/kg) 10:1	Limit values (mg/kg) for compliance leaching test using BS EN 12457 - 3 at L/S 10 l/kg			
As	<0.05	0.5	2	25	Inert
Ba	<0.5	20	100	300	Inert
Cd	<0.01	0.04	1	5	Inert
Cr	<0.05	0.5	10	70	Inert
Cu	<0.05	2	50	100	Inert
Hg	<0.005	0.01	0.2	2	Inert
Mo	<0.05	0.5	10	30	Inert
Ni	<0.05	0.4	10	40	Inert
Pb	<0.01	0.5	10	50	Inert
Sb	<0.01	0.06	0.7	5	Inert
Se	<0.01	0.1	0.5	7	Inert
Zn	<0.5	4	50	200	Inert
Cl	25	800	15 000	25 000	Inert
F	13	10	150	500	Inert
SO ₄	60	1000	20 000	50 000	Inert
Total Dissolved Solids (TDS)	1100	4000	60000	100 000	Inert
Phenol index	<0.5	1	-	-	Inert
Dissolved Organic Carbon at own pH or pH 7.5-8.0	<50	500	800	1000	Inert

Given that the soils at the site are unlikely to characterise banned wastes, it is considered that the spoil produced will be suitable for disposal to landfill. However, whilst the above information



suggests that the soil samples tested generally fell within the parameters required for inert waste, the sample from TP8 indicated that the organic matter content and mass loss on ignition are above the associated WAC.

As a consequence, it will be necessary to determine the appropriate waste code and treat the material prior to disposal. If further testing is carried out following the treatment and it is established that the treated material meets the WAC for inert waste, it may be disposed of as such. However, should no further testing be undertaken, the results above suggest that it will be suitable for disposal as non-hazardous waste.

For further guidance, please refer to the following documents which are available on the www.gov.uk website:

- Environment Agency – LIT 5234 *Waste Acceptance at Landfills - Guidance on waste acceptance procedures and criteria* – November 2010
- Environment Agency – LIT 5902 *Treatment of waste for landfill* – June 2014

9.1.5 Water Samples

It is understood that there is an exposed water bearing pipe on the site thus water samples were taken from the source, which have been subject to contamination testing, the results of which are presented in Appendix 4.

It should be appreciated that the following determinants were below detection limits;

- All PAH's.
- All aliphatic TPH's.
- All aromatic TPH's.
- Most metals (Cadmium, chromium, copper, mercury, lead and zinc)
- Semi-metals – non-metals (Selenium)

With regards to those contaminants above detection limit, it is considered that EQS limits for *drinking water*, *freshwater*, *surface water* and *surface water intended for abstraction for drinking water* media types are appropriate. The associated EQS limits are shown in the table below along with the respective concentrations detected in the water samples.

Table 9: Summary of Leachate Concentration and Associated EQSs

Determinand	Maximum Concentration	Most onerous EA EQS limit			
		Drinking Water	Freshwater	Surface Water	Surface Water Intended for Abstraction for Drinking Water
Sulphate	170 mg/l	250mg/l	-	400mg/l (Guideline)	250mg/l
Arsenic	0.49 µg/l	10 µg/l	-	50 µg/l	50 µg/l
Boron	170 µg/l	1000 µg/l	-	-	-
Nickel	4.1 µg/l	20 µg/l	-	50 µg/l*	-



In view of the above it can be shown that the water is of drinking water standard, thus it is not associated with mines water and cannot be regarded as being contaminated. It is likely that it represents a land drain and is not associated with mining activity.

9.1.6 CBR Testing

It is considered that the topsoil at the site is poor with a CBR ratio of <3%. However, the clays at the site appear to possess a CBR ratio of around 3.9%. It is therefore recommended that any hard-standing at the site should not be constructed on top of the topsoil, but rather the topsoil should be removed from underneath areas of hardstanding.

Once the topsoil is removed any hardstanding could be constructed employing traditional pavement design. A design California Bearing Ratio (CBR) of 3.5% could be employed in the pavement design⁷. However, it is recommended that proof rolling of the sub-grade be undertaken to establish the suitability of the soils, to expose any soft or weak ground and to ensure the sub-grade is well compacted prior to construction. Any areas of soft or weak ground should be remediated by increasing the sub-base thickness. Alternatively, weak material could be locally removed and replaced with a compacted granular capping layer. If construction were to be undertaken during the winter or after periods of prolonged rainfall, it may be prudent to employ a geotextile and/or a geogrid between the sub-base and sub-grade.

9.1.7 Soakaways

In this instance, the infiltration testing has revealed that the clays revealed at the site have practically impermeable drainage characteristics. Therefore, soakaways cannot be recommended at this site and an alternative form of drainage should be adopted.

9.2 Site Specific Risk Assessment

9.2.1 Approach

The presence of contamination hazards and the risks associated with them should be assessed in accordance with industry practice and the 'suitable for use' approach. This has been conducted with reference to The Department for Environment, Food and Rural Affairs (DEFRA) and The Environment Agency⁸ advice on the assessment of risks arising from the presence of contamination in soils and using the source-pathway-receptor approach.⁹ This method dictates that there must be a risk of contaminant produced at a 'source' in sufficient concentration to cause harm and there must be a 'pathway' for the contaminant to reach an identifiable 'receptor' for the linkage to be proved and a contamination hazard to be considered present. Not all substances are contaminants and not all contaminants are considered to be a risk. Indeed DEFRA and The Environment Agency state that 'a contaminant is a substance which has the potential to cause harm, while a risk itself is

⁷ Table 11.1, *Reproduction of TRRL Report LR1132 (1984)*, Smith (2006), Smith's Elements of Soil Mechanics, 8th ed.

⁸ R&D Publication CLR 8, 'Assessment of Risks to Human Health from Land Contamination: An overview of the Development of Soil Guideline Values and Related Research'.

⁹ The pollution linkage approach was developed by 'Circular 2/2000 Contaminated Land: Implementation of Part II of The Environmental Protection Act 1990' which provides meanings for the terms contained in The Environmental Protection Act 1990 Part IIA, the primary legislation for addressing the issues of contaminated land.



considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.¹⁰

9.2.2 Conceptual Ground Model and Risk Assessment

In view of the results of the chemical testing undertaken the conceptual site model is presented accordingly as Table 10. Sources of contamination include the following:

On-site – arsenic.

The preliminary risk assessment has been evaluated with reference to the following ratings and definitions:

N/A -	A source-pathway-receptor linkage is not considered to exist and therefore a risk assessment is not required.
Low -	A pollution linkage is unlikely and/or the likelihood of harm occurring is low and of minor consequence.
Moderate -	The linkage exists but the likelihood of harm occurring is not considered to be significant although remedial action may be necessary.
High -	The linkage exists and the available data indicates that significant harm may be caused and remedial action could be necessary.

The results of the risk assessment are presented in Table 10.

¹⁰ See 'Circular 2/2000 Contaminated Land: Implementation of Part II of The Environmental Protection Act 1990', appendix A.

**Table 10: Conceptual Site Model and Site Specific Risk Assessment [Contamination: Arsenic]**

Conceptual Site Model			Site Specific Risk Assessment	
Pathways	Receptor	Linkage Present?	Risk Rating	Notes
Direct contact/dermal absorption/soil ingestion	Operative	Yes – elevated levels of arsenic observed within the site soils. These levels are anticipated to represent a slightly elevated natural background.	Low (Moderate)	Bioaccessibility testing has been undertaken which indicates that arsenic is not likely to adversely affect human receptors. (However, due to the sensitive nature of the development a risk rating of moderate has been assumed).
	End User		Low (Moderate)	
	Neighbours	Yes – elevated levels of arsenic observed within the site soils. However, the site is underlain by cohesive soils of low permeability through which the arsenic contamination is not anticipated to be particularly mobile. In addition, arsenic is anticipated to be naturally occurring.	Low	
Inhalation of Dust/Vapours	Operative	Yes – elevated levels of arsenic observed within the site soils. These levels are anticipated to represent a slightly elevated natural background.	Dust - Low (Moderate) Vapours - Low	Bioaccessibility testing has been undertaken which indicates that arsenic is not likely to adversely affect human receptors. (However, due to the sensitive nature of the development a risk rating of moderate has been assumed).
	End User		Dust - Low (Moderate) Vapours - Low	
	Neighbours	However, arsenic is not anticipated to pose a vapour risk.	Dust - Low (Moderate) Vapours - Low	
Ingestion of fruit/vegetables and/or waters	Operative	Yes – elevated levels of arsenic observed within the site soils.	Moderate	It is possible that accumulation of arsenic could occur within plants and as the end use is allotments the risk rating is moderate.
	End User		Moderate	
	Neighbours		Moderate	
Migration of hazardous gases via permeable strata or shallow mining activity	Operative	No – no obvious on or off site sources of ground gas identified.	N/A	
	End User	No – site is to be used as allotments and no buildings are likely to be constructed, thus the presence of ground gasses is not considered to be an issue.	N/A	



	Neighbours	No – no obvious on or off site sources of ground gas identified.	N/A	
Spillage/loss/run off direct to receiving water	Controlled Waters	Yes – elevated levels of arsenic observed within the site soils. However, these levels are anticipated to represent a slightly elevated natural background and as such are not considered to pose a risk to controlled waters. Furthermore, the site is underlain by cohesive soils of low permeability through which the arsenic contamination is not anticipated to be particularly mobile.	Low	It is possible that accumulation of arsenic could occur within plants and as the end use is allotments the risk rating is moderate.
Migration via permeable unsaturated strata	Controlled Waters		Low	
Run off via drainage/sewers etc	Controlled Waters		Low	
Direct contact with contaminated soils	Plants	Yes – elevated levels of arsenic observed within the site soils.	Moderate	
Uptake via root system			Moderate	



10. Remediation Strategy

In view of the site specific risk assessment, together with the sensitive nature of the development, it is considered that remediation will be required at this site. The remediation strategy is provided below.

10.1 Remediation Objectives

Based on the site specific risk assessment the object of remediation at the site is as follows:

- To protect the site operatives during the development process from the ingestion of soil or dust, dermal contact with the soil and inhalation of dust.
- To protect the end user from the ingestion of soil or dust, dermal contact with the soil and inhalation of dust.
- To protect the neighbours from the ingestion and inhalation of dust during the construction process.
- To protect the plants from contaminated ground and to protect the end user from the ingestion of contaminated fruit and vegetables.

10.2 Development Requirements.

The site under consideration is to be re-purposed as allotment gardens, with associated infrastructure.

10.3 Strategy.

In order to fulfill the objectives defined above the following remedial strategy will be utilised. A pragmatic approach will be undertaken, with observational techniques being employed at each stage of the work.

10.3.1 Groundworks

During the ground-works phase of the development, protection to the site operatives is required. The risk to site operatives is considered under the Health and Safety at Work Act 1974, together with regulations made under the act, which includes the Control of Substances Hazardous to Health (COSHH) regulations. Therefore, the risks to site personnel will be considered under the Construction Design and Management (CDM) regulations at the planning stage and be included in the contractor's Health and Safety Plan and site specific Method Statements. These documents shall include the following main elements.

- Site operatives at all levels shall be made aware of the hazards of working with potentially contaminated soils.



- Personal hygiene facilities, including washing and messing, will be provided and site operatives will be encouraged to use them.
- Where work is undertaken in dry weather the site will be dampened down to avoid dust. In addition, dust masks will be provided to all site operatives for use in dry weather.
- Where vehicles are transferring soil to the landfill site they will be covered to prevent contamination of the surrounding area by dust.
- Any stockpiles of contaminated soil on site will be sheeted over to prevent excessive amounts of airborne dust.
- Where work is undertaken in wet weather, vehicle and wheel washing facilities will be provided to ensure that the vehicles leaving the site do not transfer contamination to surrounding areas.

On completion of the ground-works a careful site inspection of the sub-grade will take place. Should visual or olfactory evidence of contamination be revealed, then suitably qualified specialists will be consulted. Further testing and updates to the site specific ground model, risk assessment, and remediation strategy will be undertaken where necessary

10.3.2 Construction

During the development the following items are required to protect the end user from the potential contaminants revealed at this site.

- Beneath any buildings, pavements and hard-standings clean inert granular sub-base shall be employed.
- Any redundant services revealed at this site will be de-commissioned and piped services sealed. Any existing services that are to be employed in the new development will be carefully inspected to ensure that they are serviceable and will not allow the ingress of contamination.

10.3.3 Allotments

In view of the presence of arsenic within the underlying soils and bearing in mind the sensitive end use, it is considered that remediation will be required. This will be undertaken by the provision of a clean cover system including a capping layer of 500mm of inert material (250mm sub-base and 250mm topsoil), which will put the contaminated ground out of the end users' dig range. At the base of this layer, a granular capillary break of 100mm of free draining granular soil shall be placed in order to prevent mobile contamination rising upward. This expedient will also provide a suitable root barrier to isolate the plants from the underlying contaminated ground. This could be undertaken by removing 600mm of material to a licenced landfill site and replacing it with the clean inert capillary break, subsoil and topsoil. Alternatively, the topsoil could be removed to a licenced landfill site and the site built up with clean inert capillary break, subsoil and topsoil, which will increase the overall site level.



10.4 Fill Materials

Imported materials shall be subjected to the following assessment to determine its suitability.

Fill materials should be initially screened, by a suitably qualified engineer to establish that:

- It is a suitable growing media if it is to be employed as such, including compliance with BS3882 (2015)
- It is free from obvious contamination i.e. visual or olfactory evidence
- It has not come from areas where Japanese Knotweed or other invasive or injurious plants are suspected to be growing
- It is not a statutory nuisance, such as being odorous
- It is free from unsuitable material i.e. whole bricks, brick ties, timber or glass.

It should also be appreciated that any fill should be subjected to validation testing to assess its suitability. The following table has been taken from YALPAG¹¹ documentation and may be used as a guide. Depending on the origin and nature of the material, not all fill will require the sampling frequency and testing indicated, although this should be in agreement with any regulatory bodies (such as the Local Authority).

Table 11: Validation Sampling and Testing

Fill Type	Frequency	Minimum Determinands
Virgin Quarried Material	1 or 2 depending on the type of stone (to confirm the inert nature of the material)	Standard metals/metalloids (As, Cd, Cr, Cr(VI), Cu, Hg, Ni, Pb, Se, Zn)
Crushed Hardcore, Stone, Brick	Minimum 1 per 1000m ³	Standard metals/metalloids as above plus PAH (16 USEPA) and Asbestos
Greenfield/ Manufactured Soils	The greater of a minimum of 3 or 1 per 250m ³	Standard metals/metalloids as above plus PAH (16 USEPA) and Asbestos
Brownfield/ Screened Soils	The greater of a minimum of 6 or 1 per 100m ³	Standard metals/metalloids as above plus PAH (16 USEPA), TPH (CWG banded) and Asbestos Any additional analysis dependant on the history of the donor site.

The screening values for the above regime should also be agreed with any regulatory bodies; however, the following is recommended.

¹¹ YALPAG Technical Guidance for Developers, Landowners and Consultants – Verification Requirements for Cover Systems V3.3 Appendix 1a, October 2016.

**Table 12: Fill Screening Values**

Contaminant	Screening Value (Residential with Plant Uptake) (mg/kg)		Reference
	1% SOM	6% SOM	
As	37	37	Atrisk ^{SOIL} SSVs
Cd	22.1	22.1	Atrisk ^{SOIL} SSVs
Cr(VI)	3.62	3.63	Atrisk ^{SOIL} SSVs
Cu	4730	4790	Atrisk ^{SOIL} SSVs
Hg	8.81	15.8	Atrisk ^{SOIL} SSVs
Ni	136	136	Atrisk ^{SOIL} SSVs
Pb	200	200	Atrisk ^{SOIL} SSVs
V	136	138	Atrisk ^{SOIL} SSVs
Zn	20000	20300	Atrisk ^{SOIL} SSVs
TPH CWG	See attached summary sheet		Atrisk ^{SOIL} SSVs
PAH 16 USEPA	See attached summary sheet		Atrisk ^{SOIL} SSVs

The above screening values should be considered with respect to the Soil Organic Matter (SOM) of the subject material i.e. 1% SOM would be typical for granular fill and 6% SOM for topsoil. Testing should comply with UKAS and MCERTS, where applicable, and undertaken by an accredited laboratory.

Where the material has been derived from a commercial company, certificates or other industry quality protocol compliance i.e. WRAP should be obtained. However, it will be necessary to ensure that this documentation specifically related to the material being imported, it is no more than two months old and complies with the screening and frequency requirements given above.

Suitable fill materials should be either placed immediately or sufficiently quarantined to prevent cross-contamination. If it is necessary, the quarantined material should be placed on appropriate sheeting and covered to prevent it becoming mixed with contaminated soils or dust, or penetrated by mobile contaminants.

The report detailed above should be produced by a suitably qualified engineer. The number of verification areas for the development should be confirmed with any statutory authorities for the site.

10.5 Verification Report

In order to demonstrate that the remedial works and provision of clean cover has been sufficiently carried, it will be necessary to produce a verification report for submission to any statutory authorities.

It will be necessary for this report to include the following:

- Characterisation of the suitability of the clean material including the derivation of the material, comments from a visual screen, the tests results of chemical screening, delivery tickets where appropriate and the conditions by which the clean material has been stored and handled on site.
- Photographic and logged evidence the clean material has been handled on site and placed in a sufficient thickness. This may be either at the time of placement or after placement by means of



hand excavated trialpits. Photographs should include visual site references or reference boards to prove the location and date taken. A measurement reference should be visible in the photographs to substantiate the thickness of material placed. Please note that it may also be necessary to undertake a topographical survey and the requirement for which should be checked with any statutory authorities.

The report detailed above should be produced by a suitably qualified engineer. The number of verification areas for the development should be confirmed with any statutory authorities for the site.

11. Recommendations for Further Work

- This report should be forwarded to the relevant authorities as soon as practicable to ensure they have sufficient time to review and discuss any issues.

Clearly Rogers Geotechnical Services Ltd would be happy to offer advice with respect to the above and assist where necessary.

12. References

- British Geological Survey (NERC) (2021), BGS, Keyworth.
 - Geology of Britain Viewer:
(http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html)
 - Lexicon of Named Rock Units:
(<http://www.bgs.ac.uk/lexicon/>)
- British Standards Institution (1990) BS1377: *British standard methods of test for soils for civil engineering purposes*, B.S.I., London.
- British Standards Institution (2015 +A1: 2020) BS 5930: *Code of practice for ground investigations*, B.S.I., London.
- British Standards Institution (2011), BS 10175: *Investigation of potentially contaminated sites – Code of Practice*, British Standards Institute.
- British Standards Institution (2017) BS EN ISO 14688: *Geotechnical investigation and testing – Identification and classification of soil*, B.S.I., London.
- Department for Environment, Food and Rural Affairs and the Environment Agency (2009) DEFRA Science Report – Final SC050021/SR2, *Human Health toxicological assessment of contaminants in soil*. Environment Agency, Bristol.



- Department for Environment, Food and Rural Affairs and the Environment Agency (2009) DEFRA Science Report – SC050021/SR3, *Updated technical background to the CLEA model*. Environment Agency, Bristol.
- Department for Environment, Food and Rural Affairs (2014) SP1010: *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document*.



Appendix 1

Site Plan



Notes:

Environmental
Geotechnical
Specialists



Rogers Geotechnical Services Ltd

Offices 1 & 2, Barncliffe
Business Park,
Near Bank,
Shelley,
Huddersfield,
HD8 8LU

Telephone: 0843 50 66 87
www.rogersgeotech.co.uk

Client:

Kirkless Council

Job Number:

C1035/20/E/1613

Project Details:

Land off Ravensthorpe Road,
Thornhill Lees, Dewsbury

Scale: Not to scale - reference only





Appendix 2

Trial Pit Records



Trial Pit Log

Trialpit No

TP1

Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments

Project No.
C1035/20/E/1615Co-ords: -
Level:Date
02/11/2020

Location: Ravensthorpe Road, Dewsbury, WF12 9EG

Dimensions
(m):Depth
0.60Scale
1:50Logged
MC

Client: AHR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30 - 0.60	D		0.60			TOPSOIL (Very soft dark brown slightly gravelly sandy CLAY).	
							----- End of pit at 0.60 m	
								1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:

Stability:





Trial Pit Log

Trialpit No

TP2

Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments

Project No.
C1035/20/E/1615Co-ords: -
Level:Date
02/11/2020

Location: Ravensthorpe Road, Dewsbury, WF12 9EG

Dimensions
(m):Depth
0.60Scale
1:50Logged
MC

Client: AHR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30 - 0.60	D		0.60 0.70			TOPSOIL (Very soft dark brown silty CLAY).	
							Soft light brown sandy slightly gravelly CLAY. Gravel is subangular fine of sandstone. End of pit at 0.60 m	1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:

Stability:





Trial Pit Log

Trialpit No

TP3

Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments

Project No.
C1035/20/E/1615Co-ords: -
Level:Date
02/11/2020

Location: Ravensthorpe Road, Dewsbury, WF12 9EG

Dimensions
(m):Depth
0.60Scale
1:50Logged
MC

Client: AHR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30			TOPSOIL (Soft dark brown silty gravelly CLAY. Gravel is subangular fine of brick and sandstone).	
				0.60			Soft yellowish brown sandy CLAY.	
							----- End of pit at 0.60 m	
								1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:

Stability:





Trial Pit Log

Trialpit No
TP4/SA1
Sheet 1 of 1

Project Name:	Dewsbury Riverside Allotments	Project No.	C1035/20/E/1615	Co-ords: -	Level:	Date	02/11/2020
Location:	Ravensthorpe Road, Dewsbury, WF12 9EG			Dimensions (m):		Scale	1:50
Client:	AHR			Depth		0.70	Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30			TOPSOIL (Soft dark brown organic silty CLAY).	
				0.70			Soft brown mottled grey sandy CLAY.	
							----- End of pit at 0.70 m -----	
								1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:	
Stability:	





Trial Pit Log

Trialpit No
TP5/SA2
Sheet 1 of 1

Project Name:	Dewsbury Riverside Allotments	Project No.	C1035/20/E/1615	Co-ords: -	Level:	Date	02/11/2020
Location:	Ravensthorpe Road, Dewsbury, WF12 9EG			Dimensions (m):		Scale	1:50
Client:	AHR			Depth		0.60	Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.40			TOPSOIL (Soft dark brown organic silty CLAY).	
				0.60			Soft brown mottled grey sandy CLAY.	
							End of pit at 0.60 m	
								1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:	
Stability:	



Trial Pit Log

Trialpit No

TP6

Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments

Project No.
C1035/20/E/1615Co-ords: -
Level:Date
02/11/2020

Location: Ravensthorpe Road, Dewsbury, WF12 9EG

Dimensions
(m):Depth
0.70Scale
1:50Logged
MC

Client: AHR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20			TOPSOIL (Soft dark brown silty CLAY with rootlets).
				0.50			Soft yellowish brown silty CLAY with occasional coal flecks.
							----- End of pit at 0.70 m
							1
							2
							3
							4
							5
							6
							7
							8
							9
							10

Remarks:

Stability:





Trial Pit Log

Trialpit No

TP8

Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments

Project No.
C1035/20/E/1615

Co-ords: -
Level:

Date
02/11/2020

Location: Ravensthorpe Road, Dewsbury, WF12 9EG

Dimensions
(m):

Depth
0.60

Scale
1:50

Logged
MC

Client: AHR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.40			MADE GROUND (Soft dark brown silty slightly gravelly CLAY. Gravel is subangular to subrounded fine of sandstone and brick).	
				0.60			MADE GROUND (Dark brown silty gravelly, slightly clayey SAND. Gravel is subangular to subrounded of ash, clinker and mortar).	
							End of pit at 0.60 m	
								1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:

Stability:





Trial Pit Log

Trialpit No

TP9/SA3

Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments

Project No.
C1035/20/E/1615Co-ords: -
Level:Date
02/11/2020

Location: Ravensthorpe Road, Dewsbury, WF12 9EG

Dimensions
(m):Depth
1.30Scale
1:50Logged
MC

Client: AHR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10 - 0.30	D					TOPSOIL (Soft dark brown organic silty CLAY).	
				0.35			Soft becoming firm brown mottled grey sandy CLAY.	
				1.30			End of pit at 1.30 m	
								1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:

Stability:





Trial Pit Log

Trialpit No

TP10

Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments

Project No.
C1035/20/E/1615Co-ords: -
Level:Date
02/11/2020

Location: Ravensthorpe Road, Dewsbury, WF12 9EG

Dimensions
(m):Depth
0.40Scale
1:50Logged
MC

Client: AHR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30 0.40			TOPSOIL (Very soft dark brown silty CLAY with rootlets). Soft brown mottled grey sandy slight gravelly CLAY. Gravel is fine of sandstone and coal. End of pit at 0.40 m	1 2 3 4 5 6 7 8 9 10

Remarks:

Stability:









Trial Pit Log

Trialpit No
TP13/SA4
Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments	Project No. C1035/20/E/1615	Co-ords: - Level:	Date 02/11/2020
Location: Ravensthorpe Road, Dewsbury, WF12 9EG		Dimensions (m): Depth 0.60	Scale 1:50 Logged MC
Client: AHR			

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20 - 0.50	D		0.20			TOPSOIL (Soft dark brown organic silty CLAY).	
				0.60			Soft yellowish brown sandy silty CLAY.	
							----- End of pit at 0.60 m	
								1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:	
Stability:	



Trial Pit Log

Trialpit No

TP14

Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments

Project No.
C1035/20/E/1615Co-ords: -
Level:Date
02/11/2020

Location: Ravensthorpe Road, Dewsbury, WF12 9EG

Dimensions
(m):Depth
0.50Scale
1:50Logged
MC

Client: AHR

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.35			TOPSOIL (Very soft dark brown silty CLAY with rootlets).	
				0.50			Soft light brown silty CLAY.	
							End of pit at 0.50 m	
								1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:

Stability:





Trial Pit Log

Trialpit No
TP15/SA5
Sheet 1 of 1

Project Name: Dewsbury Riverside Allotments	Project No. C1035/20/E/1615	Co-ords: - Level:	Date 02/11/2020
Location: Ravensthorpe Road, Dewsbury, WF12 9EG		Dimensions (m): Depth 0.90	Scale 1:50 Logged MC
Client: AHR			

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30 - 0.60	D		0.30			TOPSOIL (Soft dark brown organic silty CLAY).	
				0.90			Soft brown mottled grey sandy CLAY	
							End of pit at 0.90 m	1
								2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:	
Stability:	



Appendix 3

Soakaways

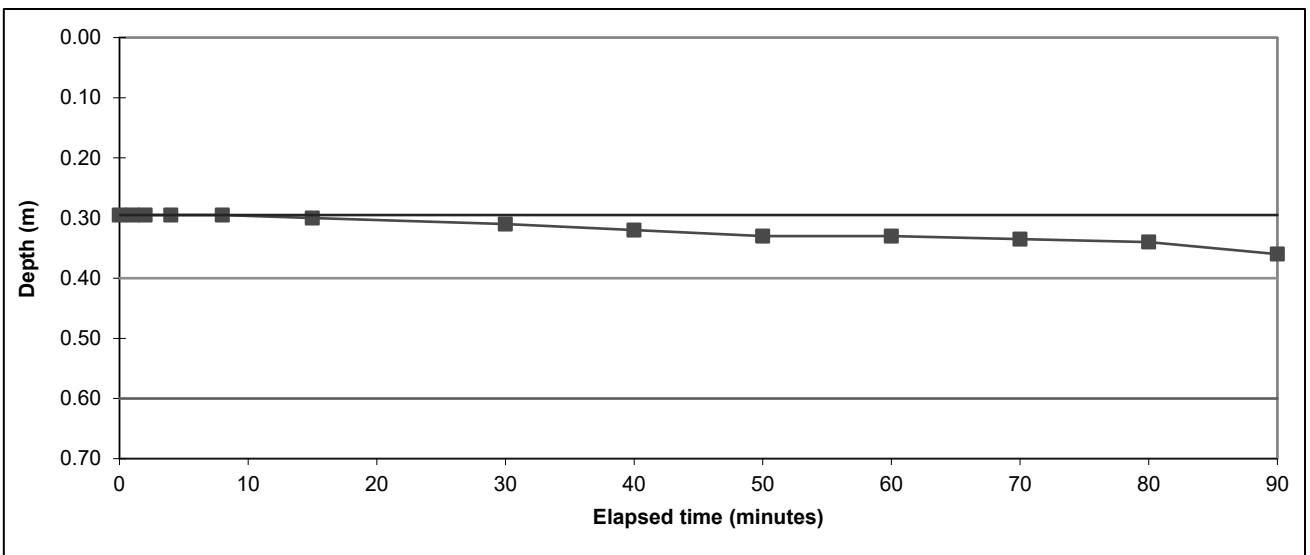
Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP4/SA	Test No:	1	Date:	02/10/2020
Length (m):	0.300	Datum Height:			0.00 m agl
Width (m):	0.30	Granular infill:	None		
Depth (m):	0.70	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.295		
1	0.295		
2	0.295		
4	0.295		
8	0.295		
15	0.300		
30	0.310		
40	0.320		
50	0.330		
60	0.330		
70	0.335		
80	0.340		
90	0.360		

COMPELTE STOP



Start water depth for analysis (mbgl):	0.30	Elapsed time (mins):	#N/A
75% effective depth (mbgl):	0.40		
50% effective depth (mbgl):	0.50	Elapsed time (mins):	#N/A
25% effective depth (mbgl):	0.60		
Base of soakage zone (mbgl):	0.70		

Volume outflow between 75% and 25% effective depth (m³):

Mean surface area of outflow (m²): 0.33
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins):

Soil infiltration rate (m/s):	Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.
--------------------------------------	--

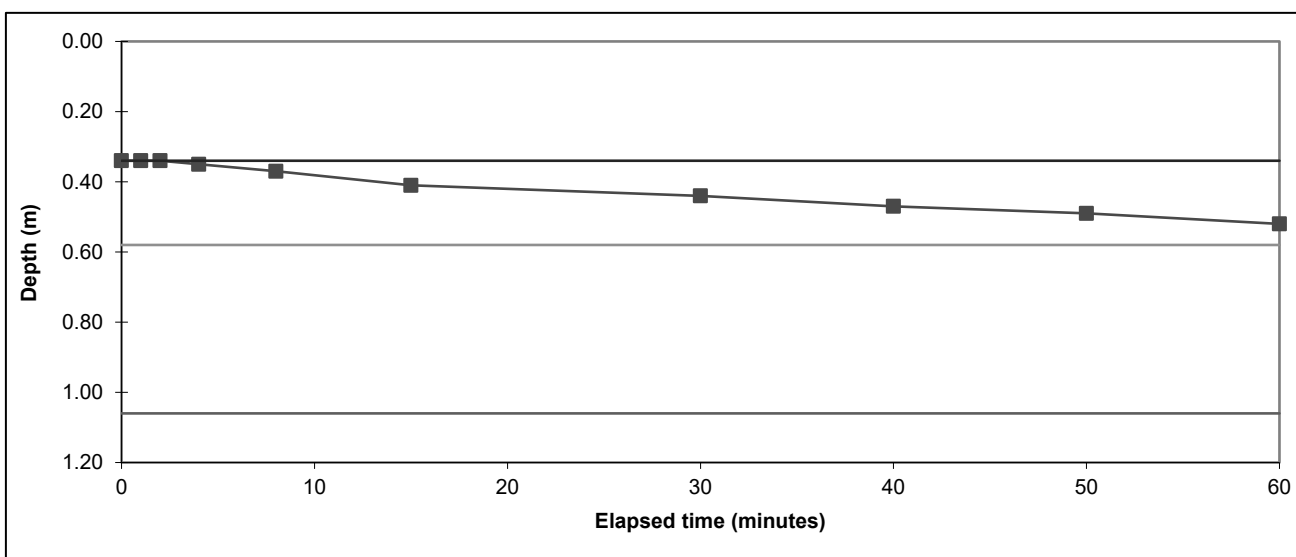
Remarks	Results processed following BRE 365 (2007).
----------------	---

Client:	Kirklees Council	Job No:	C1035/20/E
Site:	Dewsbury Riverside Allotments		

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP9/SA	Test No:	1	Date:	02/10/2020
Length (m):	0.600	Datum Height:			0.00 m agl
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.30	Porosity of infill:	1	(assumed)	
	Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)	
	0	0.340			
	1	0.340			
	2	0.340			
	4	0.350			
	8	0.370			
	15	0.410			
	30	0.440			
	40	0.470			
	50	0.490			
	60	0.520			
	COMPLETE STOP				



Start water depth for analysis (mbgl):	0.34	Elapsed time (mins):	#N/A
75% effective depth (mbgl):	0.58		
50% effective depth (mbgl):	0.82	Elapsed time (mins):	#N/A
25% effective depth (mbgl):	1.06		
Base of soakage zone (mbgl):	1.30		
Volume outflow between 75% and 25% effective depth (m ³):			
Mean surface area of outflow (m ²):			1.04
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):			

Soil infiltration rate (m/s):	Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.
-------------------------------	---

Remarks	Results processed following BRE 365 (2007).
---------	---

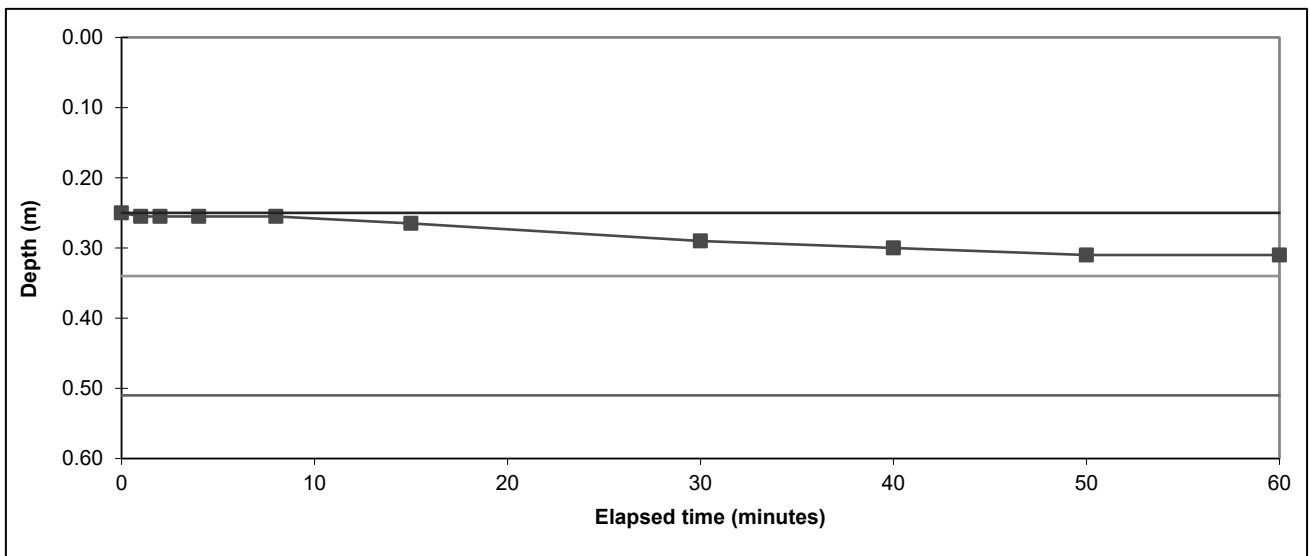
Client:	Kirklees Council	Job No:
Site:	Dewsbury Riverside Allotments	C1035/20/E

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP13/SA	Test No:	1	Date:	02/10/2020
Length (m):	0.300	Datum Height:			0.00 m agl
Width (m):	0.30	Granular infill:	None		
Depth (m):	0.60	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.250		
1	0.255		
2	0.255		
4	0.255		
8	0.255		
15	0.265		
30	0.290		
40	0.300		
50	0.310		
60	0.310		
COMPLETE STOP			



Start water depth for analysis (mbgl):	0.25	Elapsed time (mins):	#N/A
75% effective depth (mbgl):	0.34		
50% effective depth (mbgl):	0.43	Elapsed time (mins):	#N/A
25% effective depth (mbgl):	0.51		
Base of soakage zone (mbgl):	0.60		

Volume outflow between 75% and 25% effective depth (m³):

Mean surface area of outflow (m²): 0.29
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins):

Soil infiltration rate (m/s):	Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.
--------------------------------------	--

Remarks	Results processed following BRE 365 (2007).
----------------	---

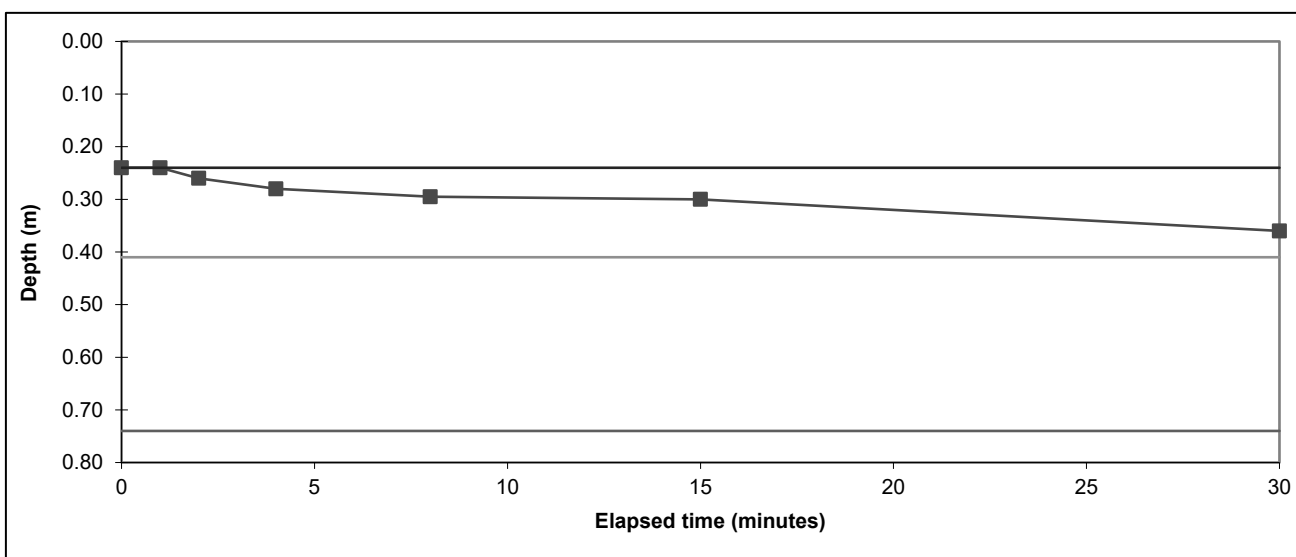
Client:	Kirklees Council	Job No:	C1035/20/E
Site:	Dewsbury Riverside Allotments		

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP15/SA	Test No:	1	Date:	02/10/2019
Length (m):	0.300	Datum Height:			0.00 m agl
Width (m):	0.30	Granular infill:	None		
Depth (m):	0.90	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.240		
1	0.240		
2	0.260		
4	0.280		
8	0.295		
15	0.300		
30	0.360		
COMPLETE STOP			



Start water depth for analysis (mbgl):	0.24		
75% effective depth (mbgl):	0.41	Elapsed time (mins):	#N/A
50% effective depth (mbgl):	0.57		
25% effective depth (mbgl):	0.74	Elapsed time (mins):	#N/A
Base of soakage zone (mbgl):	0.90		
Volume outflow between 75% and 25% effective depth (m³):			
Mean surface area of outflow (m²):		0.49	
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):			

Soil infiltration rate (m/s):	Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.
--------------------------------------	--

Remarks	Results processed following BRE 365 (2007).
----------------	---

Client:	Kirklees Council	Job No:	C1035/20/E
Site:	Dewsbury Riverside Allotments		



Appendix 4

Laboratory Testing Results

**Environmental
Geotechnical
Specialists**



LABORATORY REPORT

job number	client ref
site address	client address
consultant	
date scheduled	date issued
issued by	job title

Rogers Geotechnical Services Ltd Telephone 01484 607 977
Email jude.norcliffe@rogersgeotech.co.uk www.rogersgeotech.co.uk
Unit 4, Barncliffe Business Park, Near Bank, Shelley,
Huddersfield, West Yorkshire HD8 8LU.



GEOTECHNICAL
ENVIRONMENTAL



8948

Environmental
Geotechnical
Specialists



Schedule of UKAS Accredited Laboratory Tests

1. CLASSIFICATION OF SOIL	BS 1377-2:1990	BS EN 150 17892	Accredited (A)	Unaccredited (U)
1.1 Moisture / Water content determination				
i. Oven drying	Pt 2 : 3.2	Pt 1 : 2014 Pt 12 : 2018 : 5.3 / 5.5	A	
ii. Saturation m/c of chalk	Pt 2 : 3.3			U
1.2 Index Properties				
i. Liquid limit – cone penetrometer	Pt 2 : 4.3		A	
ii. Plastic limit	Pt 2 : 5.3		A	
iii. Shrinkage limit	Pt 2 : 6.3			U
iv. Linear shrinkage	Pt 2 : 6.5		A	
1.3 Particle Density				
i. Gas jar	Pt 2 : 8.2			U
ii. Large pycnometer	Pt 2 : 8.3			U
iii. Small pycnometer	Pt 2 : 8.4	Pt 3 : 2015 : 5.1		U
1.4 Density Tests				
i. Linear measurement	Pt 2 : 7.2	Pt 2 : 2014 : 5.1	A	
ii. Immersion in water	Pt 2 : 7.3	Pt 2 : 2014 : 5.2		U
iii. Fluid / Water displacement	Pt 2 : 7.4	Pt 2 : 2014 : 5.3		U
iv. Sand replacement	Pt 9 : 2.1, 2.2			U
v. Core cutter	Pt 9 : 2.4			U
1.5 Particle Size Distribution				
i. Dry Sieve	Pt 2 : 9.2	Pt 4 : 2016 : 5.2	A	
ii. Wet Sieve	Pt 2 : 9.3	Pt 4 : 2016 : 5.2	A	
iii. Sedimentation by pipette	Pt 2 : 9.4	Pt 4 : 2016 : 5.3 / 5.4	A	
iv. Sedimentation by hydrometer	Pt 2 : 9.5			U
2. CHEMICAL TESTS	BS 1377-3:2018			
ii. Mass loss on ignition	Pt 3 : 4			U
3. COMPACTION RELATED TESTS	BS 1377-4:1990			
3.1 Dry density/moisture relationship				
i. 2.5kg rammer – 1 litre mould	Pt 4 : 3			U
- CBR mould	Pt 4 : 3			U
ii. 4.5kg rammer – 1 litre mould	Pt 4 : 3			U
- CBR mould	Pt 4 : 3			U
3.2 Moisture Condition Value				
i. Single point test	Pt 4 : 5.4			U
ii. MCV/moisture content relationship	Pt 4 : 5.5			U
3.3 California Bearing Ratio				
i. Undisturbed sample	Pt 5 : 7			U
ii. Recompacted sample	Pt 5 : 7			U
iii. Soaked, inc measurement of swell	Pt 5 : 7			U
4. COMPRESSIBILITY OF SOIL	BS 1377-5:1990			
i. One dimensional consolidation	Pt 5 : 3			U
ii. Swelling pressure test	Pt 5 : 3			U
5. SHEAR STRENGTH OF SOIL	BS 1377-7:1990			
i. Hand shear vane	Makers instructions			U
ii. Shear box (100mm square sample)	BS 1377 : Pt 7 : 4			U
iii. Triaxial – quick undrained	BS 1377 : Pt 7 : 8, 9			U
6. PERMEABILITY				
i. Falling head	K. H. Head Vol 2			U
ii. Constant head	BS 1377 : Pt 6 : 6			U
iii Triaxial cell	BS 1377 : Pt 6 : 6			U
7. ROCK TESTS				
7.1 Classification Tests				
i. Natural moisture content	-			U
ii. Saturated moisture content	-			U
iii. Natural density	-			U
iv. Porosity	-			U
7.2 Strength Tests				
i. Point load index	ISRM '85			U
ii. Uniaxial compression test	ISRM '81			U



GEOTECHNICAL LAB RESULTS

GEOTECHNICAL
ENVIRONMENTAL



Blank Page

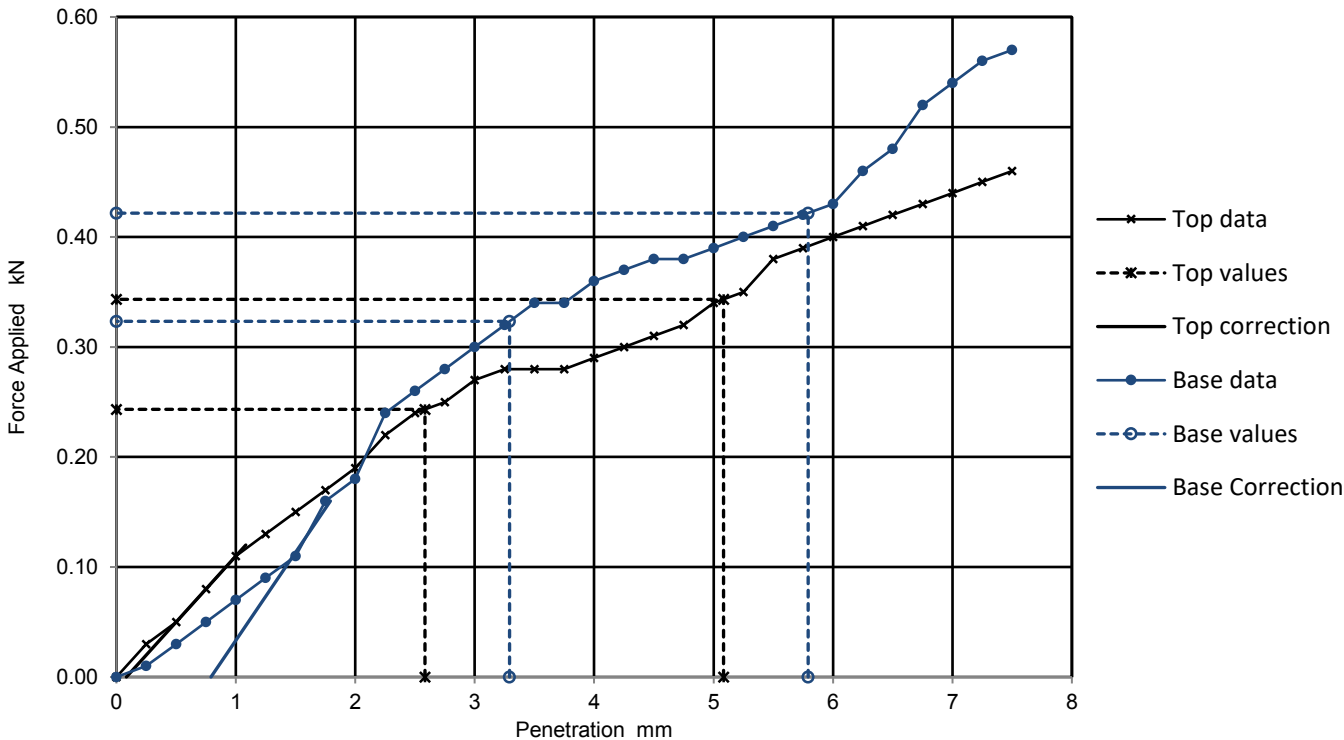
GEOTECHNICAL
ENVIRONMENTAL

	California Bearing Ratio (CBR)			Job Ref	C1035/20/E/1615
				Borehole/Pit No.	TP1
Site Name	Dewsbury Riverside Allotments			Sample No.	1
Soil Description	Yellowish brown mottled grey sandy CLAY.			Depth m	0.30
Specimen Reference	d1	Specimen Depth	0.30 m	Sample Type	D
Specimen Description	Yellowish brown mottled grey sandy CLAY.			KeyLAB ID	1
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED		Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer		Period of soaking	days	
			Time to surface	days	
			Amount of swell recorded	mm	
Material retained on 20mm sieve removed	1	%	Dry density after soaking	Mg/m3	
Initial Specimen details	Bulk density	1.97 Mg/m3	Surcharge applied	2	kg
	Dry density	1.61 Mg/m3		1	kPa
	Moisture content	22.6 %			

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
Yes	1.8	1.7	1.8	<3%
Yes	2.4	2.1	2.4	

Moisture Content %
22.1
22.4

General remarks

Test specific remarks

Approved

		Jude
--	--	------

Fig No.

1

Sheet No

1

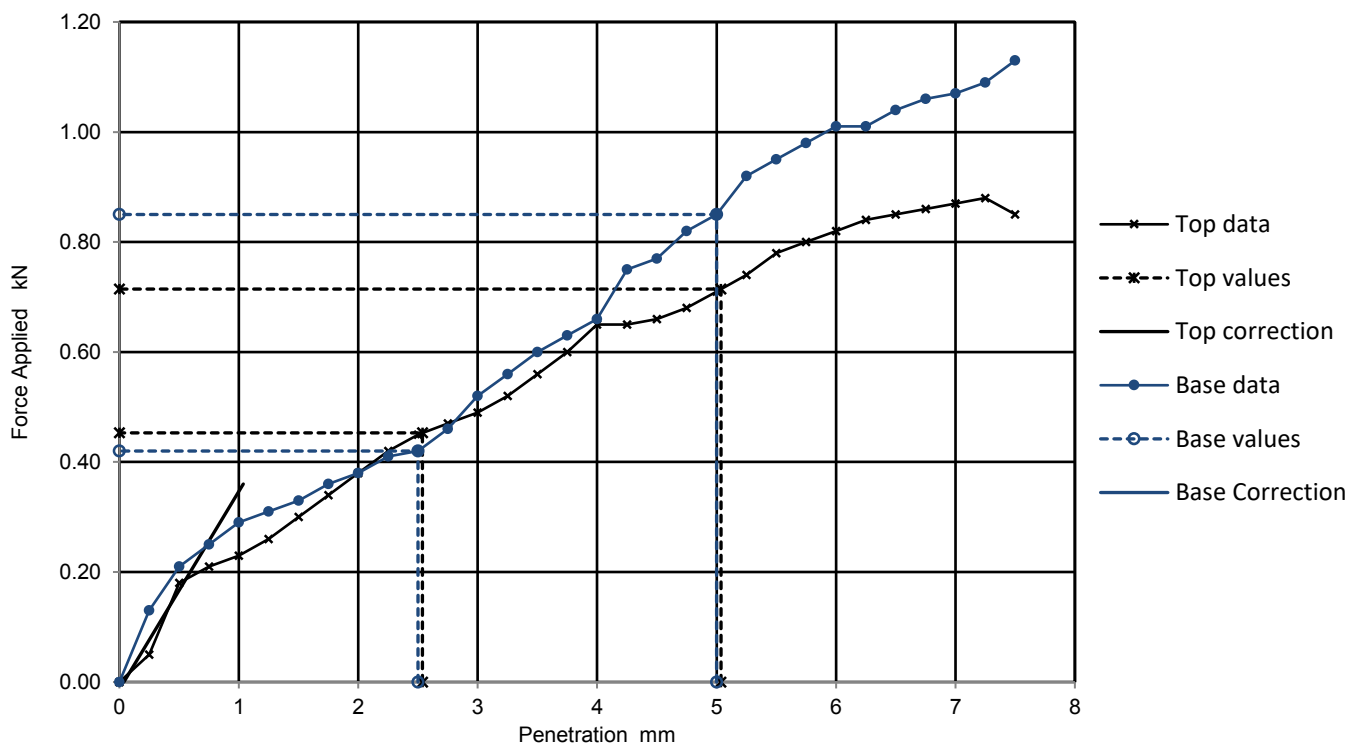
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	C1035/20/E/1615
				Borehole/Pit No.	TP13/SA4
Site Name	Dewsbury Riverside Allotments			Sample No.	4
Soil Description	Yellowish brown mottled grey very sandy CLAY.			Depth m	0.20
Specimen Reference	D4	Specimen Depth	0.20 m	Sample Type	D
Specimen Description	Yellowish brown mottled grey very sandy CLAY.			KeyLAB ID	4
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED		Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer		Period of soaking	days	
			Time to surface	days	
			Amount of swell recorded	mm	
Material retained on 20mm sieve removed	0	%	Dry density after soaking	Mg/m3	
Initial Specimen details	Bulk density	1.98 Mg/m3	Surcharge applied	2	kg
	Dry density	1.63 Mg/m3		1	kPa
	Moisture content	21.2 %			

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
Yes	3.4	3.6	3.6	3.9
	3.2	4.3	4.3	

Moisture Content %
22.6
21.1

General remarks

Test specific remarks

Approved

		Jude
--	--	------

Fig No.

1

Sheet No

2

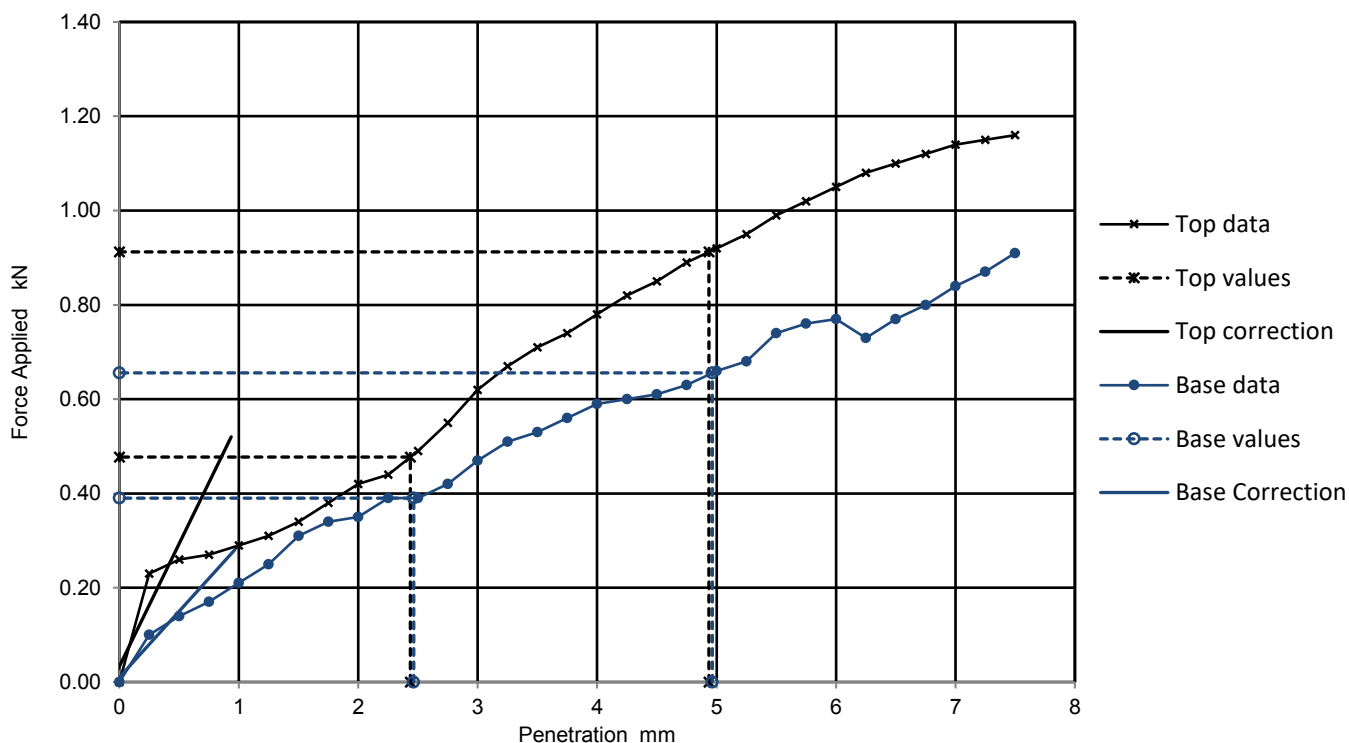
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	C1035/20/E/1615
				Borehole/Pit No.	TP15/SA5
Site Name	Dewsbury Riverside Allotments			Sample No.	5
Soil Description	Yellowish brown mottled grey sandy CLAY.			Depth m	0.30
Specimen Reference	D5	Specimen Depth	0.30 m	Sample Type	D
Specimen Description	Yellowish brown mottled grey sandy CLAY.			KeyLAB ID	5
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED		Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer		Period of soaking	days	
			Time to surface	days	
			Amount of swell recorded	mm	
Material retained on 20mm sieve removed	1	%	Dry density after soaking	Mg/m3	
Initial Specimen details	Bulk density	2.06 Mg/m3	Surcharge applied	2	kg
	Dry density	1.73 Mg/m3		1	kPa
	Moisture content	19.3 %			

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
Yes	3.6	4.6	4.6	3.9
Yes	3.0	3.3	3.3	

Moisture Content %
19.2
19.0

General remarks

Test specific remarks

Approved

		Jude
--	--	------

Fig No.

1

Sheet No

3

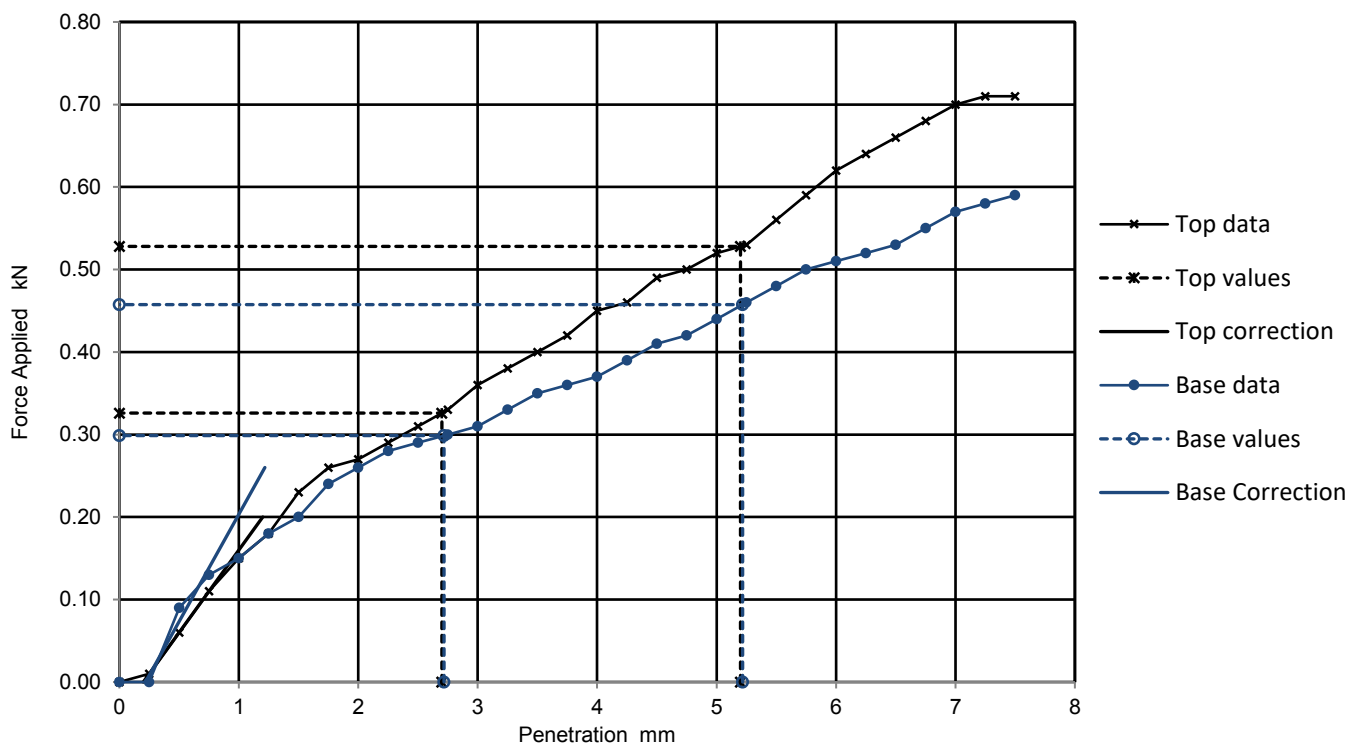
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	C1035/20/E/1615
				Borehole/Pit No.	TP2
Site Name	Dewsbury Riverside Allotments			Sample No.	2
Soil Description	Yellowish brown sandy CLAY.			Depth m	0.30
Specimen Reference	D2	Specimen Depth	0.30 m	Sample Type	D
Specimen Description	Yellowish brown sandy CLAY.			KeyLAB ID	2
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED		Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer		Period of soaking	days	
			Time to surface	days	
			Amount of swell recorded	mm	
Material retained on 20mm sieve removed	0	%	Dry density after soaking	Mg/m3	
Initial Specimen details	Bulk density	2.02 Mg/m3	Surcharge applied	2	kg
	Dry density	1.65 Mg/m3		1	kPa
	Moisture content	22.3 %			

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
Yes	2.5	2.6	2.6	<3
Yes	2.3	2.3	2.3	

Moisture Content %
22.3
22.3

General remarks

Test specific remarks

Approved

		Jude
--	--	------

Fig No.

1

Sheet No

4

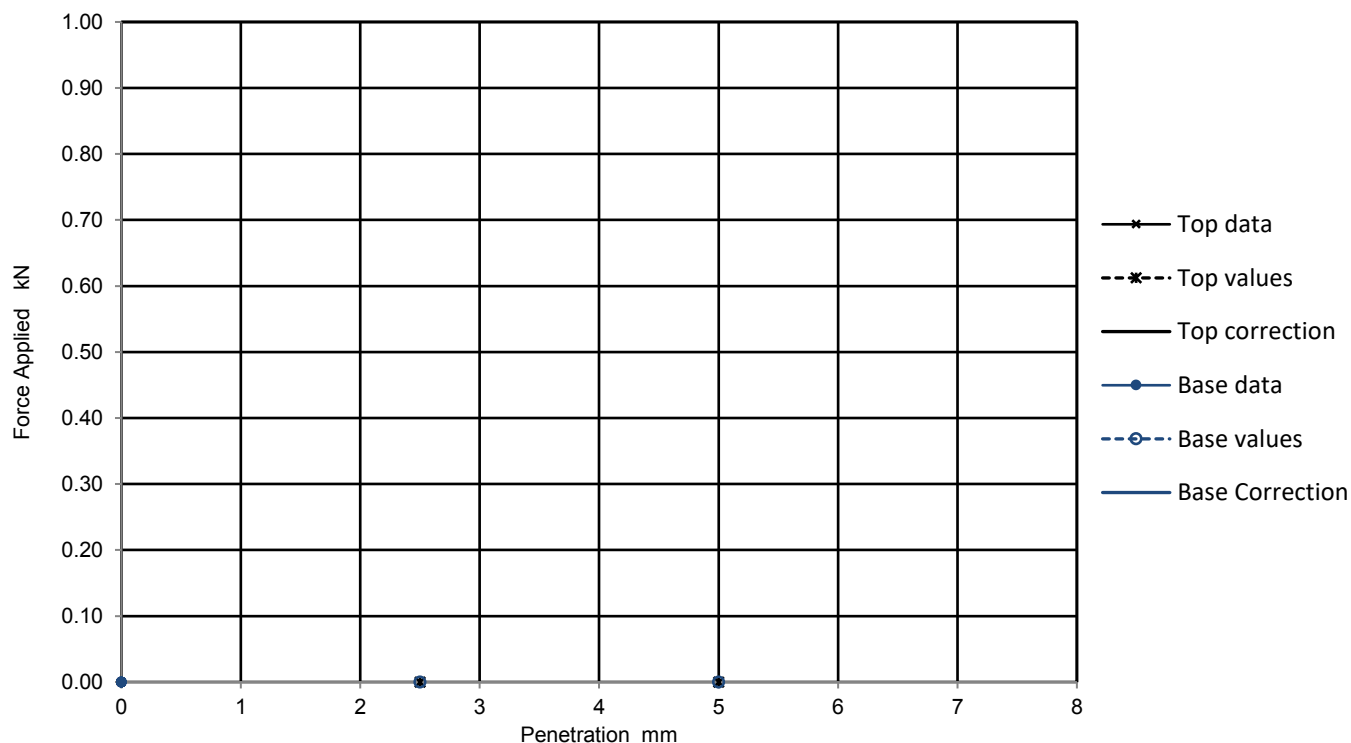
Lab Sheet Reference :

	California Bearing Ratio (CBR)			Job Ref	C1035/20/E/1615
				Borehole/Pit No.	TP9/SA3
Site Name	Dewsbury Riverside Allotments			Sample No.	3
Soil Description	Brown organic slightly sandy CLAY.			Depth m	0.10
Specimen Reference	D3	Specimen Depth	0.10 m	Sample Type	D
Specimen Description	Brown organic slightly sandy CLAY.			KeyLAB ID	3
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking	days
				Time to surface	days
				Amount of swell recorded	mm
Material retained on 20mm sieve removed	0	%		Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density	1.80	Mg/m3	Surcharge applied	2 kg
	Dry density	1.34	Mg/m3		1 kPa
	Moisture content	34.1	%		

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No				0
No				

Moisture Content %
33.0
33.8

General remarks

Test specific remarks

Approved

	Material Unclassified. Assumed 0%CBR. Silty organic nature of material provided no resistance to plunger.	Jude
--	---	------

Fig No.

1

Sheet No

5

Lab Sheet Reference :



ENVIRONMENTAL LAB RESULTS

GEOTECHNICAL
ENVIRONMENTAL

Rogers Geotechnical Services: Soil Screening Values Comparison Sheet

Rogers Geotechnical Services Ltd					Soil Screening Value (SSV) Comparison Sheet											
Job Number	C1035/20/E/1615			A = WS Atkins PLC, Atrisk Soil Screening Values. A+ = Values updated June 2017. A* = Atrisk's SSV is lower than Chemtest's detectable limit for this compound. B = health criterion values, which are available from toxicological reviews published in the C4SL project methodology report. C = Category 4 Screening Levels (C4SLs) based on 6% soil organic matter. D = Value provided is based on Methyl Mercury. Should elemental mercury be observed or a source be known then a Exceeds SSV Exceeds Free Phase, Below No Free Phase Below limit of detection (LOD) KEY												
Job Name	Dewsbury Riverside, Ravensthorpe Road, WF12 9EG															
Date	23/11/2020															
Client	AHR			Sample Location	TP1	TP2	TP3	TP4A	TP5	TP6	TP7	TP8	TP10	TP11	TP14	
				Depth Top	0.3	0	0.3	0	0.4	0	0	0.4	0	0.4	0.35	
				Depth Base	0.6	0.25	0.6	0.1	0.6	0.15	0.1	0.6	0.2	0.6	0.5	
Determinand	Units	Ref	LOD	Residential With Plant Uptake 6%												
				Atrisk 2015 (No Free Product)	Atrisk 2017											
ACM Type			N/A			-	-	-	-	-	-	-	-	-	-	-
Asbestos Identification	%		0.001			No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage			N/A			-	-	-	-	-	-	-	-	-	-	-
Moisture	%		0.020			13	22	13	22	14	19	19	15	25	16	20
Soil Colour			N/A			Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material			N/A			Stones and	Stones and	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture			N/A			Clay	Clay	Clay	Clay	Clay	Clay	Clay	Sand	Clay	Clay	Clay
pH			N/A			8.5	7.6	8.4	8.2	8.1	8.1	8.1	8.2	8.2	8.5	8.4
Sulphate (2:1 Water Soluble) as SO4	g/l		0.010			< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Cyanide (Free)	mg/kg	A	0.50		34	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Total)	%		0.010			0.045	0.12	0.041	0.065	0.026	0.14	0.13	0.36	0.14	0.43	0.062
Arsenic	mg/kg	C	1.0		37	15	34	38	15	12	53	37	100	31	110	15
Cadmium	mg/kg	C	0.10		22.1	0.15	0.27	0.17	< 0.10	0.13	0.25	0.21	0.37	0.25	0.37	0.16
Copper	mg/kg	A+	0.50		4790	23	44	29	22	23	59	44	44	35	51	21
Mercury	mg/kg	A/D	0.10		15.8	< 0.10	0.25	0.12	0.10	0.11	0.48	0.31	0.19	0.24	0.27	0.11
Nickel	mg/kg	A+	0.50		136	34	23	36	15	33	25	23	41	21	41	17
Lead	mg/kg	C	0.50		200	35	85	46	35	29	100	77	84	66	98	42
Selenium	mg/kg	A	0.20		375	27	44	29	25	28	44	36	44	37	45	32
Vanadium	mg/kg	A+	5.0		138	27	44	29	25	28	44	36	44	37	45	32
Zinc	mg/kg	A+	0.50		20300	63	82	61	41	51	77	72	79	72	85	61
Chromium (Hexavalent)	mg/kg	B/C	0.5	20.5	3.62	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	%		0.40			5.2	6.2	1.7	6.2	1.7	15	14	12	13	2.4	3.1
Aliphatic TPH >C5-C6	mg/kg	A+	1.0		369	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	mg/kg	A+	1.0	1240	768	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	mg/kg	A+	1.0		204	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	mg/kg	A+	1.0	1180	297	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	mg/kg	A+	1.0	4130	125	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	mg/kg	A+	1.0		210100	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	mg/kg	A+	1.0		210100	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	mg/kg		1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	mg/kg		5.0			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	mg/kg	A+	1.0		0.871	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	mg/kg	A+	1.0		780	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	mg/kg	A+	1.0		232	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	mg/kg	A+	1.0		468	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	mg/kg	A+	1.0	830	830	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	mg/kg	A+	1.0		1040	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	mg/kg	A+	1.0		1710	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	mg/kg		1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	mg/kg		5.0			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	mg/kg		10.0			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	mg/kg	A+	0.10		12.2	1.2	< 0.10	< 0.10	3.6	< 0.10	2.4	2.1	0.27	2.2	< 0.10	< 0.10
Acenaphthylene	mg/kg		0.10			0.37	< 0.10	< 0.10	0.51	< 0.10	0.43	0.47	0.40	0.43	< 0.10	< 0.10
Acenaphthene	mg/kg	A+	0.10		2760	0.30	< 0.10	< 0.10	0.95	< 0.10	0.25	0.28	0.22	0.47	< 0.10	< 0.10
Fluorene	mg/kg	A+	0.10		2610	0.46	< 0.10	< 0.10	0.78	< 0.10	0.40	0.45	0.56	0.44	< 0.10	< 0.10
Phenanthrene	mg/kg		0.10			2.5	2.3	< 0.10	3.8	< 0.10	1.1	1.7	0.88	2.4	< 0.10	0.64
Anthracene	mg/kg	A+	0.10		26200	0.83	0.47	< 0.10	0.73	< 0.10	0.16	0.47	0.11	0.41	< 0.10	0.12
Fluoranthene	mg/kg	A+	0.10		2980	2.7	2.3	< 0.10	3.2	< 0.10	1.4	1.8	0.55	2.9	< 0.10	0.79
Pyrene	mg/kg	A+	0.10		2120	2.6	2.3	< 0.10	2.9	< 0.10	1.4	1.5	0.67	3.1	< 0.10	0.78
Benzo[a]anthracene	mg/kg	A	0.10		8.54	1.1	1.2	< 0.10	1.2	< 0.10	0.96	0.45	0.65	1.3	< 0.10	0.27
Chrysene	mg/kg	A	0.10	927	2.64	0.59	1.0	< 0.10	1.6	< 0.10	1.3	0.96	0.63	1.9	< 0.10	0.41

Rogers Geotechnical Services: Soil Screening Values Comparison Sheet

Benzo[b]fluoranthene	mg/kg	A	0.10	9.86	7.29	1.4	1.9	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.58	2.2	< 0.10	< 0.10
Benzo[k]fluoranthene	mg/kg	A	0.10	100	4.12	0.68	0.75	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.44	0.96	< 0.10	< 0.10
Benzo[a]pyrene	mg/kg	B/C	0.10	5	0.998	1.2	1.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.56	1.6	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	mg/kg	A*	0.10	9.75	0.368	0.49	0.55	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.45	0.98	< 0.10	< 0.10
Dibenz(a,h)Anthracene	mg/kg	A	0.10	1	0.0236	0.19	0.33	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.27	0.80	< 0.10	< 0.10
Benzo[g,h,i]perylene	mg/kg	A	0.10	103	0.112	0.63	0.74	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.45	0.96	< 0.10	< 0.10
Total Of 16 PAH's	mg/kg		2.0			17	15	< 2.0	19	< 2.0	9.8	10	7.7	23	< 2.0	3.0
Total Phenols	mg/kg	A	0.30		1200	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Rogers Geotechnical Services: Soil Screening Values Comparison Sheet

Rogers Geotechnical Services Ltd				Soil Screening Value (SSV) Comparison Sheet											
Job Number	C1035/20/E/1615			A = WS Atkins PLC, Atrisk Soil Screening Values. A+ = Values updated June 2017. A* = Atrisk's SSV is lower than Chemtest's detectable limit for this compound. B = health criterion values, which are available from toxicological reviews published in the C4SL project methodology report. C = Category 4 Screening Levels (C4SLs) based on 6% soil organic matter. D = Value provided is based on Methyl Mercury. Should elemental mercury be observed or a source be known then a Exceeds SSV Exceeds Free Phase, Below No Free Phase Below limit of detection (LOD) KEY											
Job Name	Dewsbury Riverside, Ravensthorpe Road, WF12 9EG														
Date	23/11/2020			Sample Location	TP4B	TP9	TP12	TP15							
Client	AHR			Depth Top	0.00	0.00	0.00	0.00							
				Depth Base	0.30	0.30	0.30	0.30							
Determinand	Units	Ref	LOD	Residential With Plant Uptake 6%											
				Atrisk 2015 (No Free Product)	Atrisk 2017										
Moisture	%		0.020			17	21	16	16						
Soil Colour			N/A			Brown	Brown	Brown	Brown						
Other Material			N/A			None	None	None	Stones						
Soil Texture			N/A			Clay	Clay	Clay	Sand						
pH			N/A			8.7	8.5	8.4	8.5						
Cadmium	mg/kg	C	0.10		22.1	0.10	< 0.10	0.23	0.13						
Copper	mg/kg	A+	0.50		4790	24	18	25	11						
Mercury	mg/kg	A/D	0.10		15.8	0.12	< 0.10	0.11	< 0.10						
Nickel	mg/kg	A+	0.50		136	16	12	30	19						
Lead	mg/kg	C	0.50		200	23	19	38	21						
Vanadium	mg/kg	A+	5.0		138	26	23	24	23						
Zinc	mg/kg	A+	0.50		20300	34	32	56	40						
Organic Matter	%		0.40			2.1	2.9	4.0	1.6						



Amended Report

Report No.:	20-30407-2		
Initial Date of Issue:	18-Nov-2020	Date of Re-Issue:	03-Dec-2020
Client	Rogers Geotechnical Services Ltd		
Client Address:	Unit 4, Barncliffe Business Park Near Bank Shelley Huddersfield West Yorkshire HD8 8LU		
Contact(s):	Jude Norcliffe		
Project	PO-1024 Dewsbury		
Quotation No.:		Date Received:	10-Nov-2020
Order No.:	C1035/20/E/1615	Date Instructed:	10-Nov-2020
No. of Samples:	13		
Turnaround (Wkdays):	20	Results Due:	07-Dec-2020
Date Approved:	03-Dec-2020		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: PO-1024 Dewsbury

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				20-30407	20-30407	20-30407	20-30407	20-30407	20-30407	20-30407	20-30407
Quotation No.:	Chemtest Sample ID.:				1094159	1094160	1094161	1094162	1094163	1094164	1094165	1094166
	Sample Location:				TP1	TP2	TP3	TP4A	TP5	TP6	TP7	TP8
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0..3	0	0.3	0	0.4	0	0	0.4
	Bottom Depth (m):				0.6	0.25	0.6	0.1	0.6	0.15	0.1	0.6
	Date Sampled:				03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Cadmium	M	2450	mg/kg	0.10	0.15	0.27	0.17	< 0.10	0.13	0.25	0.21	0.37
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper	M	2450	mg/kg	0.50	23	44	29	22	23	59	44	44
Mercury	M	2450	mg/kg	0.10	< 0.10	0.25	0.12	0.10	0.11	0.48	0.31	0.19
Nickel	M	2450	mg/kg	0.50	34	23	36	15	33	25	23	41
Lead	M	2450	mg/kg	0.50	35	85	46	35	29	100	77	84
Zinc	M	2450	mg/kg	0.50	63	82	61	41	51	77	72	79
Vanadium	U	2450	mg/kg	5.0	27	44	29	25	28	44	36	44
Arsenic	M	2450	mg/kg	1.0	15	34	38	15	12	53	37	100
Selenium	M	2450	mg/kg	0.20	0.51	0.54	0.54	0.47	0.38	0.52	0.50	0.46
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Naphthalene	M	2700	mg/kg	0.10	1.2	< 0.10	< 0.10	3.6	< 0.10	2.4	2.1	0.27
Acenaphthylene	M	2700	mg/kg	0.10	0.37	< 0.10	< 0.10	0.51	< 0.10	0.43	0.47	0.40
Acenaphthene	M	2700	mg/kg	0.10	0.30	< 0.10	< 0.10	0.95	< 0.10	0.25	0.28	0.22
Fluorene	M	2700	mg/kg	0.10	0.46	< 0.10	< 0.10	0.78	< 0.10	0.40	0.45	0.56
Phenanthrene	M	2700	mg/kg	0.10	2.5	2.3	< 0.10	3.8	< 0.10	1.1	1.7	0.88
Anthracene	M	2700	mg/kg	0.10	0.83	0.47	< 0.10	0.73	< 0.10	0.16	0.47	0.11
Fluoranthene	M	2700	mg/kg	0.10	2.7	2.3	< 0.10	3.2	< 0.10	1.4	1.8	0.55
Pyrene	M	2700	mg/kg	0.10	2.6	2.3	< 0.10	2.9	< 0.10	1.4	1.5	0.67
Benzo[a]anthracene	M	2700	mg/kg	0.10	1.1	1.2	< 0.10	1.2	< 0.10	0.96	0.45	0.65
Chrysene	M	2700	mg/kg	0.10	0.59	1.0	< 0.10	1.6	< 0.10	1.3	0.96	0.63
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	1.4	1.9	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.58
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.68	0.75	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.44
Benzo[a]pyrene	M	2700	mg/kg	0.10	1.2	1.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.56
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	0.49	0.55	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.45
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	0.19	0.33	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.27
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	0.63	0.74	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.45
Total Of 16 PAH's	M	2700	mg/kg	2.0	17	15	< 2.0	19	< 2.0	9.8	10	7.7
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: PO-1024 Dewsbury

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				20-30407	20-30407	20-30407	20-30407	20-30407	20-30407	20-30407	20-30407
Quotation No.:	Chemtest Sample ID.:				1094159	1094160	1094161	1094162	1094163	1094164	1094165	1094166
	Sample Location:				TP1	TP2	TP3	TP4A	TP5	TP6	TP7	TP8
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0..3	0	0.3	0	0.4	0	0	0.4
	Bottom Depth (m):				0.6	0.25	0.6	0.1	0.6	0.15	0.1	0.6
	Date Sampled:				03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
pH	M	2010		4.0	8.5	7.6	8.4	8.2	8.1	8.1	8.1	8.2
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	13	22	13	22	14	19	19	15
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones and Roots	Stones and Roots	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Sand
Sulphate (Total)	M	2430	%	0.010	0.045	0.12	0.041	0.065	0.026	0.14	0.13	0.36
Organic Matter	M	2625	%	0.40	5.2	6.2	1.7	6.2	1.7	15	14	12
As Stomach Bioaccessibility	N	2630	mg/kg	0.20			< 0.20			0.92	1.0	2.8
As Intestinal Bioaccessibility 1	N	2630	mg/kg	0.20			0.60			4.1	2.6	6.3
As Intestinal Bioaccessibility 2	N	2630	mg/kg	0.20			0.86			6.0	4.6	8.2
As Bioaccessible Fraction	N	2630	%	0.10			2.3			11	12	8.2

Results - Soil

Project: PO-1024 Dewsbury

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				20-30407	20-30407	20-30407	20-30407	20-30407
Quotation No.:	Chemtest Sample ID.:				1094167	1094168	1094169	1094170	1094171
	Sample Location:				TP10	TP11	TP10	TP6	TP14
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0	0.4	0	0	0.35
	Bottom Depth (m):				0.2	0.6	0.2	0.15	0.5
	Date Sampled:				03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020
	Asbestos Lab:				COVENTRY	COVENTRY			DURHAM
Determinand	Accred.	SOP	Units	LOD					
Cadmium	M	2450	mg/kg	0.10	0.25	0.37			0.16
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50			< 0.50
Copper	M	2450	mg/kg	0.50	35	51			21
Mercury	M	2450	mg/kg	0.10	0.24	0.27			0.11
Nickel	M	2450	mg/kg	0.50	21	41			17
Lead	M	2450	mg/kg	0.50	66	98			42
Zinc	M	2450	mg/kg	0.50	72	85			61
Vanadium	U	2450	mg/kg	5.0	37	45			32
Arsenic	M	2450	mg/kg	1.0	31	110			15
Selenium	M	2450	mg/kg	0.20	0.50	0.53			0.36
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50			< 0.50
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30			< 0.30
Naphthalene	M	2700	mg/kg	0.10	2.2	< 0.10			< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	0.43	< 0.10			< 0.10
Acenaphthene	M	2700	mg/kg	0.10	0.47	< 0.10			< 0.10
Fluorene	M	2700	mg/kg	0.10	0.44	< 0.10			< 0.10
Phenanthrene	M	2700	mg/kg	0.10	2.4	< 0.10			0.64
Anthracene	M	2700	mg/kg	0.10	0.41	< 0.10			0.12
Fluoranthene	M	2700	mg/kg	0.10	2.9	< 0.10			0.79
Pyrene	M	2700	mg/kg	0.10	3.1	< 0.10			0.78
Benzo[a]anthracene	M	2700	mg/kg	0.10	1.3	< 0.10			0.27
Chrysene	M	2700	mg/kg	0.10	1.9	< 0.10			0.41
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	2.2	< 0.10			< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.96	< 0.10			< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	1.6	< 0.10			< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	0.98	< 0.10			< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	0.80	< 0.10			< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	0.96	< 0.10			< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	23	< 2.0			3.0
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0

Results - Soil

Project: PO-1024 Dewsbury

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				20-30407	20-30407	20-30407	20-30407	20-30407
Quotation No.:	Chemtest Sample ID.:				1094167	1094168	1094169	1094170	1094171
	Sample Location:				TP10	TP11	TP10	TP6	TP14
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0	0.4	0	0	0.35
	Bottom Depth (m):				0.2	0.6	0.2	0.15	0.5
	Date Sampled:				03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020	03-Nov-2020
	Asbestos Lab:				COVENTRY	COVENTRY			DURHAM
Determinand	Accred.	SOP	Units	LOD					
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0			< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0			< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0			< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10			< 10
pH	M	2010		4.0	8.2	8.5			8.4
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	< 0.010			0.010
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	25	16	18	24	20
Soil Colour	N	2040		N/A	Brown	Brown			Brown
Other Material	N	2040		N/A	Stones	Stones			Stones
Soil Texture	N	2040		N/A	Clay	Clay			Clay
Sulphate (Total)	M	2430	%	0.010	0.14	0.43			0.062
Organic Matter	M	2625	%	0.40	13	2.4			3.1
As Stomach Bioaccessibility	N	2630	mg/kg	0.20	0.57	< 0.20			
As Intestinal Bioaccessibility 1	N	2630	mg/kg	0.20	1.2	0.30			
As Intestinal Bioaccessibility 2	N	2630	mg/kg	0.20	2.0	0.43			
As Bioaccessible Fraction	N	2630	%	0.10	6.5	0.39			

Results - 2 Stage WAC

Project: PO-1024 Dewsbury

Chemtest Job No: 20-30407							Landfill Waste Acceptance Criteria			
Chemtest Sample ID: 1094166							Limits			
Sample Ref:							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID:										
Sample Location: TP8										
Top Depth(m): 0.4										
Bottom Depth(m): 0.6										
Sampling Date: 03-Nov-2020										
Determinand	SOP	Accred.	Units							
Total Organic Carbon	2625	M	%				6.7	3	5	6
Loss On Ignition	2610	M	%				12	--	--	10
Total BTEX	2760	M	mg/kg				0.099	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg				< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg				< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg				7.7	100	--	--
pH	2010	M					8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.041	--	To evaluate	To evaluate			
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg			
Arsenic	1450	U	0.0045	0.0045	< 0.050	< 0.050	0.5	2	25	
Barium	1450	U	0.0056	0.0014	< 0.50	< 0.50	20	100	300	
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5	
Chromium	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	70	
Copper	1450	U	0.0022	0.0013	< 0.050	< 0.050	2	50	100	
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2	
Molybdenum	1450	U	0.0056	0.0022	< 0.050	< 0.050	0.5	10	30	
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40	
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50	
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5	
Selenium	1450	U	0.0015	< 0.0010	< 0.010	< 0.010	0.1	0.5	7	
Zinc	1450	U	0.0020	< 0.0010	< 0.50	< 0.50	4	50	200	
Chloride	1220	U	6.2	< 1.0	11	< 10	800	15000	25000	
Fluoride	1220	U	1.4	1.3	2.6	13	10	150	500	
Sulphate	1220	U	19	4.2	35	60	1000	20000	50000	
Total Dissolved Solids	1020	N	220	91	400	1100	4000	60000	100000	
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-	
Dissolved Organic Carbon	1610	U	11	4.1	< 50	< 50	500	800	1000	

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	15

Leachate Test Information	
Leachant volume 1st extract/l	0.293
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.226

Waste Acceptance Criteria

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

Results - 2 Stage WAC

Project: PO-1024 Dewsbury

Chemtest Job No: 20-30407							Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 1094168							Limits		
Sample Ref:							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:									
Sample Location: TP11									
Top Depth(m): 0.4									
Bottom Depth(m): 0.6									
Sampling Date: 03-Nov-2020									
Determinand	SOP	Accred.	Units						
Total Organic Carbon	2625	M	%				1.4		
Loss On Ignition	2610	M	%				5.3		
Total BTEX	2760	M	mg/kg				0.044		
Total PCBs (7 Congeners)	2815	M	mg/kg				< 0.10		
TPH Total WAC (Mineral Oil)	2670	M	mg/kg				< 10		
Total (Of 17) PAH's	2700	N	mg/kg				< 2.0		
pH	2010	M					8.5		
Acid Neutralisation Capacity	2015	N	mol/kg	0.014			--	>6	--
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.0039	0.0017	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0012	< 0.0010	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0036	< 0.0010	< 0.50	< 0.50	4	50	200
Chloride	1220	U	7.8	2.2	15	25	800	15000	25000
Fluoride	1220	U	0.85	0.76	1.7	7.6	10	150	500
Sulphate	1220	U	9.7	2.9	19	32	1000	20000	50000
Total Dissolved Solids	1020	N	78	31	150	340	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	9.9	3.4	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	16

Leachate Test Information	
Leachant volume 1st extract/l	0.315
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.092

Waste Acceptance Criteria

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

Results - Topsoil Report

BS3882:2015

Chemtest Job No.: 20-30407
 Chemtest Sample ID.: 1094169
 Client Sample Ref.:
 Sample Location: TP10
 Client Sample ID.:
 Top Depth (m): 0
 Bottom Depth (m): 0.2
 Date Sampled: 03-Nov-2020
 Time Sampled:

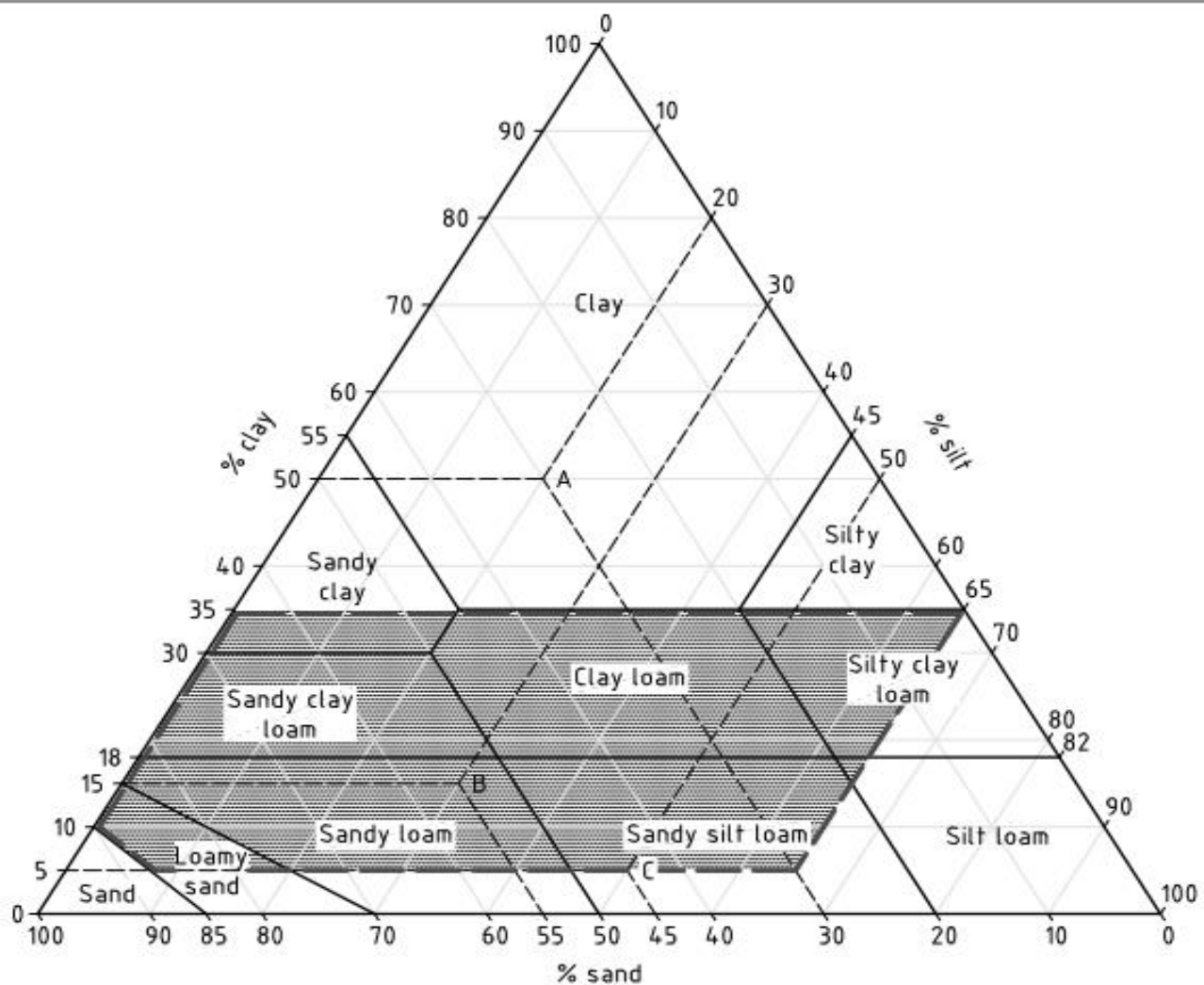
Parameter	Units	Multipurpose Range	Result	Compliant with Multipurpose Range? (Y/N)	Compliant with Specific Purpose Range? (Y/N)		
Texture					Acid	Low F	Calc.
Clay content	%		24				
Silt content	%		31				
Sand content	%		45				
Soil texture class		See Attached Chart	Clay Loam	YES			
Mass Loss on Ignition							
Clay 5-20%		3.0-20	10	YES	YES	YES	YES
Clay 20-35%		5.0-20					
Stone Content	% m/m						
>2mm		0-30	23	YES			
>20mm		0-10	< 0.020	YES			
>50mm		0	< 0.020	YES			
Soil pH value		5.5-8.5	7.9	YES	NO	YES	YES
Carbonate (Calcareous only)	%		1.1				YES
Electrical Conductivity	µS/cm	If >3300 do ESP	1700	YES			
Available Nutrient Content							
Nitrogen %		>0.15	0.13	NO	NO		NO
Extractable phosphorus	mg/l	16-140	20	YES	YES	YES	YES
Extractable potassium	mg/l	121-1500	150	YES	YES		YES
Extractable magnesium	mg/l	51-600	310	YES	YES		YES
Carbon : Nitrogen Ratio		<20:1	45.3/1	NO	NO	NO	NO
Exchangeable sodium	%	<15	0.45				
Available Calcium	mg/l		3500				
Available Sodium	mg/l		21				
Phytotoxic Contaminants (by soil pH)		< 6.0	6.0-7.0	> 7.0			
Zinc (Nitric Acid extract)	mg/kg	<200	<200	<300	64	YES	
Copper (Nitric Acid extract)	mg/kg	<100	<135	<200	57	YES	
Nickel (Nitric Acid extract)	mg/kg	<60	<75	<110	16	YES	
Visible Contaminants	% mm						
>2mm		<0.5	0.000	YES			
..... of which plastics		<0.25	0.000	YES			
..... man-made sharps		zero in 1kg	0.000	YES			

Results - Topsoil Report

BS3882:2015

Chemtest Job No.: 20-30407
 Chemtest Sample ID.: 1094170
 Client Sample Ref.:
 Sample Location: TP6
 Client Sample ID.:
 Top Depth (m): 0
 Bottom Depth (m): 0.15
 Date Sampled: 03-Nov-2020
 Time Sampled:

Parameter	Units	Multipurpose Range	Result	Compliant with Multipurpose Range? (Y/N)	Compliant with Specific Purpose Range? (Y/N)		
Texture					Acid	Low F	Calc.
Clay content	%		32				
Silt content	%		29				
Sand content	%		39				
Soil texture class		See Attached Chart	Clay Loam	YES			
Mass Loss on Ignition							
Clay 5-20%		3.0-20	5.9	YES	YES	YES	YES
Clay 20-35%		5.0-20					
Stone Content	% m/m						
>2mm		0-30	18	YES			
>20mm		0-10	< 0.020	YES			
>50mm		0	< 0.020	YES			
Soil pH value		5.5-8.5	7.7	YES	NO	YES	YES
Carbonate (Calcareous only)	%		< 0.10				NO
Electrical Conductivity	µS/cm	If >3300 do ESP	1900	YES			
Available Nutrient Content							
Nitrogen %		>0.15	0.36	YES	YES		YES
Extractable phosphorus	mg/l	16-140	8.5	NO	NO	YES	NO
Extractable potassium	mg/l	121-1500	95	NO	NO		NO
Extractable magnesium	mg/l	51-600	110	YES	YES		YES
Carbon : Nitrogen Ratio		<20:1	9.7/1	YES	YES	YES	YES
Exchangeable sodium	%	<15	0.84				
Available Calcium	mg/l		1200				
Available Sodium	mg/l		14				
Phytotoxic Contaminants (by soil pH)		< 6.0	6.0-7.0	> 7.0			
Zinc (Nitric Acid extract)	mg/kg	<200	<200	<300	52	YES	
Copper (Nitric Acid extract)	mg/kg	<100	<135	<200	24	YES	
Nickel (Nitric Acid extract)	mg/kg	<60	<75	<110	17	YES	
Visible Contaminants	% mm						
>2mm		<0.5	0.000	YES			
..... of which plastics		<0.25	0.000	YES			
..... man-made sharps		zero in 1kg	0.000	YES			

Texture Classification Chart**Key**

Area within which the texture of topsoil is required to fall

NOTE Examples of textural classification are as follows.

- Soil A with 30% sand, 20% silt and 50% clay is in the "clay" textural class.
- Soil B with 55% sand, 30% silt and 15% clay is in the "sandy loam" textural class.
- Soil C with 45% sand, 50% silt and 5% clay is in the "sandy silt loam" textural class.

Permission to reproduce extracts from BS 3882:2015 is granted by BSI.

British Standards can be obtained in PDF or hard copy formats from the BSI online shop: www.bsigroup.com/Shop or by contacting BSI Customer Services for hardcopies only: Tel: +44 (0)20 8996 9001, Email: cservices@bsigroup.com.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2020	Electrical Conductivity	Electrical conductivity (EC) of aqueous extract or calcium sulphate solution for topsoil	Measurement of the electrical resistance of a 2:1 water/soil extract.
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
2115	Total Nitrogen in Soils	Nitrogen	Determination by elemental analyser
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2260	Carbonate	Carbonate	Titration
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2400	Cations	Cations	ICP-MS
2420	Phosphate	Phosphate	Spectrophotometry - Discrete analyser
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
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.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2620	LOI 440	LOI 440 Trommel Fines	Determination of the proportion by mass that is lost from a soil by ignition at 440°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2630	PBET	PBET	Extraction at 37C / ICP-MS
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID

Test Methods

SOP	Title	Parameters included	Method summary
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)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
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.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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"

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



2183

Final Report

Report No.: 21-11535-1
Initial Date of Issue: 19-Apr-2021
Client Rogers Geotechnical Services Ltd
Client Address: Unit 4, Barncliffe Business Park
Near Bank
Shelley
Huddersfield
West Yorkshire
HD8 8LU
Contact(s): Harry Letch
Jude Norcliffe
Project C1035/21/E/2519 Dewsbury Riverside

Quotation No.:		Date Received:	12-Apr-2021
Order No.:	PO-1438	Date Instructed:	12-Apr-2021
No. of Samples:	2		
Turnaround (Wkdays):	7	Results Due:	20-Apr-2021
Date Approved:	19-Apr-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Water

Project: C1035/21/E/2519 Dewsbury Riverside

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				21-11535	21-11535
Quotation No.:	Chemtest Sample ID.:				1177132	1177133
	Client Sample ID.:				W1	W1
	Sample Location:				Top	Bottom
	Sample Type:				WATER	WATER
	Date Sampled:				08-Apr-2021	08-Apr-2021
Determinand	Accred.	SOP	Units	LOD		
Chromium (Hexavalent)	U	1490	µg/l	20	[B] < 20	[B] < 20
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10
Chrysene	N	1700	µg/l	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0	< 2.0	< 2.0
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10
pH	U	1010		N/A	8.2	8.2
Sulphate	U	1220	mg/l	1.0	170	150

Results - Water

Project: C1035/21/E/2519 Dewsbury Riverside

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				21-11535	21-11535
Quotation No.:	Chemtest Sample ID.:				1177132	1177133
	Client Sample ID.:				W1	W1
	Sample Location:				Top	Bottom
	Sample Type:				WATER	WATER
	Date Sampled:				08-Apr-2021	08-Apr-2021
Determinand	Accred.	SOP	Units	LOD		
Arsenic (Dissolved)	U	1455	µg/l	0.20	0.49	0.28
Boron (Dissolved)	U	1455	µg/l	10.0	170	100
Cadmium (Dissolved)	U	1455	µg/l	0.12	< 0.12	< 0.12
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Copper (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	µg/l	0.50	4.1	3.1
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	3.0	< 3.0	< 3.0

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1177132		W1	Top	08-Apr-2021	B	Coloured Winchester 1000ml
1177132		W1	Top	08-Apr-2021	B	EPA Vial 40ml
1177132		W1	Top	08-Apr-2021	B	Plastic Bottle 1000ml
1177133		W1	Bottom	08-Apr-2021	B	Coloured Winchester 1000ml
1177133		W1	Bottom	08-Apr-2021	B	EPA Vial 40ml
1177133		W1	Bottom	08-Apr-2021	B	Plastic Bottle 1000ml

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	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	Pentane extraction / GCxGC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters 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)

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



Appendix 5

Fill Screening Values

Rogers Geotechnical Services Ltd.

Atkins ATRISK Soil Screening Values (SSVs) - Residential With Plant Uptake Landuse

Tox Data Report No.	Compound	Residential with Homegrown Produce Landuse (mg/kg)				Reference
	<i>Metals</i>	SOM: 1%		SOM: 6%		
3	Cadmium	22.1		22.1		C
4	Chromium VI	3.62	20.5	3.62	20.5	B/C
	Copper	4730		4790		A+
7	Mercury	8.81		15.80		A/D
8	Nickel	136		136		A+
	Lead	200		200		C
	Zinc	20000		20300		A+
	Vanadium	136		138		A+
	<i>Semi and Non Metals</i>					
1	Arsenic	37		37		C
10	Selenium	375		375		A
	Free Cyanide	34		34		A
9	Phenols (total)	267		1200		A
	<i>Poly Aromatic Hydrocarbons</i>	Free product	No free product	Free product	No free product	
20	Napthalene	0.829		12.2		A+
	Acenaphthene	157	608	2760		A+
	Fluorene	735		2610		A+
	Anthracene	10200		26200		A+
	Fluoranthene	983		2980		A+
	Pyrene	668		2120		A+
	Benzo(a)anthracene	1.71	4.52	8.54		A
2	Chrysene	0.44	585	2.64	927	A
2	Benzo(b)fluoranthene	1.22	7.72	7.29	9.86	A
2	Benzo(k)fluoranthene	0.686	84.4	4.12	100	A
2	Benzo(a)pyrene	1.51	4.95	0.998	5	B/C
2	Dibenzo(a,h)anthracene	0.00393	0.838	2.05	4.95	A*
2	Indeno(1,2,3-cd)pyrene	0.0614	7.31	0.368	9.75	A
2	Benzo(g,h,i)perylene	0.0187	96.2	0.112	103	A
	<i>Petroleum Hydrocarbons</i>					
	Aliphatic C5-C6	42.7		369		A+
	Aliphatic C6-C8	99.3		768	1240	A+
	Aliphatic C8-C10	13.9		204		A+
	Aliphatic C10-C12	49.9	81.7	297	1180	A+
	Aliphatic C12-C16	20.9	385	125	4130	A+
	Aliphatic C16-C21	210000		210100		A+
	Aliphatic C21-C35	210000		210100		A+
	Aromatic C5-C7 (Benzene)	0.137		0.871		A+
	Aromatic C7-C8 (Toluene)	113		780		A+
	Aromatic C8-C10	20.5		232		A+
	Aromatic C10-C12	70		468		A+
	Aromatic C12-C16	155	165	830		A+
	Aromatic C16-C21	319		1040		A+
	Aromatic C21-C35	1120		1710		A+
A+ = Values update June 2017.						
A* Atrisk's SSV is lower than Chemtest's detectable limit for this compound.						
B = Health Criterion Values (available from toxicological reviews published in the C4SL project methodology report).						
C = Category 4 Screening Levels (C4SLs).						
D = SSV provided is for Methyl Mercury.						