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Our reference: 076740-CUR-00-XX-RP-GE-001-V01

13th May 2021

Mr Ian Knight
Manchester Life Development Company Limited
Unit 5, Royal Mill
17 Redhill Street
Manchester
M4 5BA

Dear Ian,

Re: Letter Report for Back of Ancoats, Plot A

1.0 Introduction

Curtins Consulting were instructed by Manchester Life Development Company Limited to undertake an additional site investigation for the proposed Ancoats Plot A, located off Jersey Street, Manchester M4 6JW. It must be noted that this ground investigation is part of a wider site, including Plots A, B and C, this letter report refers only to Plot A.

The investigation was undertaken following the E3P 2019 Ground Investigation to assess and improve the knowledge of the area with respect to the ground conditions, and to aid contamination risk assessment and foundation design.

An exploratory hole plan is included at the end of this report and shows the extent of the E3P 2019 ground investigation and Curtins 2021 supplementary intrusive investigation.

The information provided within this report is intended to supplement the previous phase of investigation, undertaken in November 2019, the findings of which are summarised below.

2.0 Previous Reports and Summary

E3P undertook the following investigation and report for Plot A;

1) **November 2019 –** Phase 2 Geo-environmental Site Assessment, Land at Jersey Street, Ancoats, Manchester PARCEL A (Ref. 13-350-R3)

It is assumed that the above report has previously been made available for review and therefore is not included herein.

2.1 Phase 2 Intrusive Investigation (November 2019)

The E3P investigation was undertaken to characterise the geo-environmental and geotechnical site conditions and comprised cable percussive boreholes to a maximum depth of 19.50m bgl, window sample boreholes and mechanically excavated trial pits, with selected geotechnical and environmental sampling. Groundwater and ground gas monitoring within installed boreholes were completed post-investigation.

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The site is underlain by superficial deposits comprising Glacial Till (diamicton) and bedrock comprising the Manchester Marls Formation.

The site has the following hydrological characteristics; Secondary Undifferentiated Aquifer (superficial deposits) overlying a Principal Aquifer to the west of site and Secondary B Aquifer in the remainder of the site (Bedrock Geology).

The investigation determined a variable thickness of Made Ground between ground level and 2.40m bgl. Suspected basement slabs, obstructions and ingress of ground water flooding prevented the base being encountered in several locations. The Made Ground comprised a surface concrete slab in the majority of locations, underlain by a gravelly black ash with frequent cobbles. The gravel consisted of mudstone, concrete, brick and asphalt, and cobbles of brick. In several locations a strong hydrocarbon odour and sheen were encountered within TT105A, TT105B, TT106A and TP110, in particular to the north of the plot.

The cohesive Glacial Till was identified across the entire site, with the base encountered at depths of between 13.20-18.80mbgl in the cable percussion boreholes, comprising a firm to very stiff brown slightly gravelly Clay. The bedrock was identified from depths between 13.20 and 18.80m bgl, recorded as a dense yellow brown Sandstone. This was corrected during the Curtins 2021 Ground Investigation, see *Section 3.2* for ground condition depths, and was likely to be a dense sand layer within the Glacial Till.

Water strikes were encountered as seepages during the investigation, considered to be water held within the former infilled canals. These were encountered between of depths 0.70 and 2.20m bgl.

Hydrocarbon odours were observed un TT105A, TT105B and TT106A, with a hydrocarbon sheen also observed on the perched water within TP105A and TP105B.

Environmental analysis on eight shallow soil samples for a broad range of contaminants recorded several exceedances above Residential thresholds with respect to arsenic, lead, PAHs and TPHs. Asbestos fibres were also positively identified in TP112 at 0.50m at 0.008%,

Based on site observations, laboratory tests, and nature of the proposed development (high-rise apartments) provision of a structural engineer design will the required to support the structure. Considering this, shallow foundations were not considered suitable for the buildings and a driven or CFA piled foundation solution was recommended to support a pad or strip footing in order to form the building.

Ground bearing slabs are possible but would will require a structural engineering design.

The report made the following recommendations:

- Completion of ground gas monitoring;
- Supplementary vapour risk assessment;
- Geotechnical earthworks strategy;
- Remediation and enabling works strategy; and
- Further investigation of the north of Plot A upon demolition of structures/access.

3.0 Curtins Ground Investigation (2021)

This ground investigation will assess and improve the knowledge of the ground conditions and to aid contamination assessment and foundation design in Plot A, following the ground investigation undertaken by E3P in November 2019.

3.1 Scope of Works

The site works consisted of two rotary cored GeoboreS boreholes, R-A1 and R-A2 advanced to 30.0m bgl.

The following soil and rock samples were obtained during the intrusive investigation to allow for chemical and geotechnical testing to be undertaken:

- 2 No. soil samples from Made Ground soils were scheduled for environmental chemical, detailed in *Table 3.1*, to further assess the contamination risk presented to site end users and construction workers in this area of the site;
- 5 No. 2:1 Water Soluble Sulphate;
- 5 No. pH Value; and
- 11 No. Point Load Tests.

The ground investigation was undertaken generally in accordance with the ICE UK Specification for Ground Investigation (2012) and with techniques outlined in Eurocodes 7 - BS EN 1997-1:2004, BS5930:2015 Code of Practice for Site Investigations.

Table 3.1 - *Environmental testing suite (Soils)*

Suite Ref.	Analyte	LOD
Soils Suite A	Asbestos Screen, asbestos quantification (%), pH, 2;1 Water Soluble Sulphate & Soil Organic Matter (SOM)	-
	Arsenic, Chromium, Chromium VI, Copper, Lead, Selenium, Nickel	1 mg/kg
	Zinc	5 mg/kg
	Boron (water soluble)	1 mg/kg
	Cadmium	0.5 mg/kg
	Mercury	0.17 mg/kg
	Cyanide (total)	1 mg/kg
	Phenols (screen)	0.2 mg/kg
	PAHs (USEPA 16)	0.01 to 0.08 mg/kg
	TPH (Aro/Ali Split)	0.01 to 1.0 mg/kg

3.2 Ground Conditions

A summary of the ground conditions encountered during the site investigation works is presented in *Table 3.2,* below, with detailed information presented in the exploratory hole logs included at the end of this report. A summary of each strata is presented below.

Table 3.2 - *Summary of encountered ground conditions:*

Stratum	Depth to Top of Strata m bgl (m AOD)	Thickness (m)		Description
		Min	Max	
MADE GROUND	0.00 (50.10 – 49.97)	2.10	2.20	MADE GROUND: Concrete. **AND** MADE GROUND: Dark grey to brown gravelly slightly clayey fine to coarse sand with low cobble content. Gravel is angular to subangular

Stratum	Depth to Top of Strata m bgl (m AOD)	Thickness (m)		Description
		Min	Max	
				fine to coarse of brick, ash, clinker, wood and glass. Cobbles are angular to subangular of brick. In R-A1, a strong hydrocarbon odour noted. **In R-A2, also:** MADE GROUND: Red brown and grey intact concrete and brick layer.
GLACIAL TILL	2.10 – 2.20 (47.90 – 47.87)	17.90	18.70	Soft brownish grey slightly gravelly slightly sandy to sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone. **AND** Stiff to very stiff brownish grey slightly gravelly slightly sandy to sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone and coal.
RESIDUAL SOILS	20.00 – 23.00 (29.97 – 27.10)	2.50	2.65	Highly weathered extremely weak to very weak reddish-brown fine to medium grained SANDSTONE, recovered as gravelly/clayey fine to medium sand. **And in R-A2;** Highly weathered light grey and brown fine-grained SANDSTONE, recovered as a stiff very sandy clay.
MANCHESTER MARLS FORMATION	22.50 – 23.55 (27.47 – 26.55)	-[1]	-[1]	Very weak to weak brown thinly laminated MUDSTONE. **AND** Medium strong light grey and reddish-brown fine-grained SANDSTONE with closely spaced to medium spaced thin to thick bands of extremely weak brown mudstone. **AND/OR** Weak reddish-brown fined grained SANDSTONE with localised thin laminations of mudstone **And In R-A2;** Very weak thinly laminated purplish brown MUDSTONE. **AND** Weak purplish brown mottled grey fine to medium grained SANDSTONE.

1 - Base of strata not encountered.

3.3 Groundwater

Groundwater was not able to be recorded due to the presence of water flush used.

3.4 Obstructions

No obstructions were encountered during the intrusive works.

4.0 Ground Contamination Assessment

2 No. soil samples from Made Ground soils were obtained in total, and environmentally chemically analysed according to the testing Suite A outlined in *Table 3.1*. Considering the sites proposed end-use as apartments, results were compared against adopted '*Residential without Home Ground Produce'* Generic Assessment Criteria (GACs).

Soil organic matter (SOM) content has an influence on the volatilisation of organic contaminants (i.e. the higher the SOM, the lower the volatilisation rate and therefore inhalation exposure risk). Soil organic matter (SOM) values for the Made Ground soils ranged from 2.6% to 7.1% by weight. The high organic content encountered is representative of the oily water identified in R-A1 exploratory hole on the site. With consideration for a calculated geometric average, Made Ground features determine an SOM of 4.30%. As such, a comparison

against Tier 1 thresholds for SOM of 2.5% for '*Residential without Home Grown Produce'* end use has been adopted for Made Ground soil features.

The full chemical testing results and adopted GAC's are listed in at the end of this report.

Two exceedances were noted within recovered Made Ground soil samples, as detailed in *Table 4.0* below:

***Table 4.0** – Chemical testing result exceedances against Residential without Home Grown Produce 2.5% GACs*

Determinant	Exploratory Hole ID	Depth (m bgl)	Stratum	Concentration (mg/kg)	GAC (mg/kg)
Lead	R-A1	0.40	Made Ground	1240	310
Dibenzo(ah)anthracene	R-A1	0.40	Made Ground	0.32	0.32

No suspected asbestos containing materials (AMCs) were identified in the exploratory hole logs and no asbestos fibres were positively identified during laboratory screening.

The environmental testing results from the supplementary 2021 investigation identified exceedances of Lead and Dibenzo(ah)anthracene, consistent with the elevated levels of contaminants recorded during the first phase of investigation in 2019. Based on these results it is recommended that the previous measures identified by EP3 for a clean cover system would be suitable to break the source-pathway-receptor link to the contaminants identified in Table 4.0.

5.0 Preliminary Waste Classification

An initial assessment for the waste classification of the shallow and deeper Made Ground soils encountered on site has been carried out through a comparison of the soil testing results from both the 2019 E3P and 2021 Curtins ground investigations.

This preliminary assessment for the waste classification of soils uses the Waste Soils Characterisation Assessment Tool, Cat-Waste Soil, developed by McArdle and Atkins.

The initial assessment revealed that of the 8no Made Ground soils tested from the E3P 2019 investigation and 2no Made Ground soils tested from the Curtins 2021 investigations, four samples have indicated to be hazardous with respect to Environment Agency waste classes, using the guidance given in WM3. These are TP112 at 0.50m, TT105A at 2.0m, TT104A at 2.20m and R-A1 at 0.40.

Where natural soils are being considered for offsite disposal as inert waste, Waste Acceptance Criteria (WAC) testing will be required with confirmation of acceptability from the receiving landfill.

As discussed, preliminary waste classification is undertaken to offer indicative advice with respect to disposal requirements. Landfill operators are not obliged to accept waste and, if they were to do so, may have specific requirements beyond those outlined above prior to acceptance. Landfill operators should be contacted to confirm the above classifications or otherwise.

6.0 Geotechnical Laboratory Analysis

A programme of geotechnical testing was scheduled by Curtins to further confirm the ground model for the site, shallow and deep ground conditions. Geotechnical soil samples for testing were prepared in accordance with BS1377: Part One:1990 and representative sub-samples were taken for testing.

6.1 Geotechnical Testing and Engineering Properties

The following section discusses the ground conditions determined from the Curtins January 2021 Ground Investigation. Where necessary, determination of characteristic parameters has been based on appropriate assessment of results derived from laboratory, published correlations and field tests, complemented with engineering judgement and consideration of the relevant limit state. The parameters are not considered to be absolute and should be referenced with the specific strata text in this section and reviewed when considering a specific area of the site.

6.1.1 Made Ground

Made ground was encountered in both exploratory hole locations however, due to the highly variable nature of made ground, no geotechnical testing was undertaken in this stratum. An intact brick and concrete layer was encountered at 1.30-2.20m which may represent historical foundations.

6.1.2 Glacial Till

Glacial Till was recorded underlying the Made Ground. The predominantly cohesive deposits were described typically as a soft slightly gravelly slight sandy to sandy Clay and a stiff to very stiff slightly gravelly slightly sandy to sandy Clay. In R-A2 a thin 0.10m thick band of dense brown fine to coarse sand was encountered.

The geotechnical test results recorded within the superficial deposits are summarised in *Table 6.1.2.*

Table 6.1.2 – *Summary of Glacial Till geotechnical test results*

Parameter	No. of tests	Minimum	Maximum	Average
pH	2	8.74	8.96	8.85
Water Soluble Sulphate	2	50	80	65
SPT ‘N’ Value	9	23	50	-

A total of nine SPT ‘N’ values were recorded in the strata, ranging from between 23 and 50, where full penetration was met. The SPT ‘N’ results indicate variable ground condition, with an increase in strength with depth. Based on the small cohort of results, the results are not displayed graphically.

No Atterberg testing was undertaken during the Curtins ground investigation due to the depth in which the previous E3P exploratory holes advanced to, therefore testing was continued from the depth at which E3P stopped at from within the bedrock. Based on this, the plasticity index average used was based off E3P Atterberg results.

A moderately conservative characteristic unit weight of 18kN/m^3 is deemed appropriate in accordance with BS8002:2015.

The results of SPT can be correlated to an Undrained Shear Strength (Cu) when undertaken within cohesive deposits. For consolidated clays, Stroud (1974) reported good correlations between N and Cu, where Cu = f1

x N where values of f1 are a factor of the plasticity of the clay. Based on an average plasticity Index of 22% and utilising f1 factor of 5.2 undrained shear strengths ranged between 119.6kPa and 260kPa is correlated, indicative of a high to very high strength clay in accordance with BS EN ISO 14688-2:2004.

The results of SPT can be correlated to a Coefficient of Consolidation (Mv) when undertaken within cohesive deposits. For consolidated clays, Stroud (1974) reported correlations between N and Mv, where Mv=1/(f2 x SPT N), where values of f2 are a factor of the plasticity of the clay. Based on an average plasticity index of 22% and utilising f2 factor of 0.55, Mv values typically range between 0.036 and 0.456 m^2/MN. The majority of results indicate a very low to high compressibility clay.

The Drained and Undrained Young's Modulus, E' and Eu, can be derived through the empirical relationship with Undrained Shear Strength (Cu) described as Eu=330xCu ad E'=200xCu in accordance with the ICE Manual of Geotechnical Engineering (2012). The results range between 39.47 and 85.8 for Eu, and 23.92 and 52 for E'.

6.1.3 Residual Soils

Residual soils were encountered in one of the exploratory holes on site. Due to the highly variable nature of made ground, no geotechnical testing was undertaken in this stratum.

6.1.4 Bedrock

The bedrock was recorded underlying the residual soils. The bedrock was described as an interbedded weak to medium strong fine to medium grained Sandstone and extremely weak to very weak thinly laminated Mudstone.

The geotechnical test results recorded within the bedrock are summarised in *Table 6.1.4a* and *Table 6.1.4b.*

Table 6.1.4a – *Summary of bedrock geotechnical test results for Mudstone*

Parameter			No. of Tests	Summary of Results
Laboratory Test Results	Point Load Indices (Is50)	Axial Plane	6	Min: 0.01 Max: 0.11 Average: 0.052
		Diametral Plane	7	Min: 0.01 Max: 0.15 Average: 0.057
	pH Value		1	8.56
	Water Soluble Sulphate (mg/l)		1	10

Table 6.1.4b – *Summary of bedrock geotechnical test results for Sandstone*

Parameter			No. of Tests	Summary of Results
Laboratory Test Results	Point Load Indices (Is50)	Axial Plane	6	Min: 0.25 Max: 5.47 Average: 1.25
		Diametral Plane	8	Min: 0.16 Max: 4.99 Average: 1.53

	pH Value	2	8.78, 9.03
	Water Soluble Sulphate (mg/l)	2	10, 20

The Rock Quality Designation (RQD) recorded in the Mudstone cored samples ranged from 42 to 84% which classifies it as of very poor to good rock mass quality. Total Core Recovery (TCR) and Solid Core Recovery (SCR) vary between core runs, but overall show a general increase with depth, as shown in *Figure 6.1.4a.*

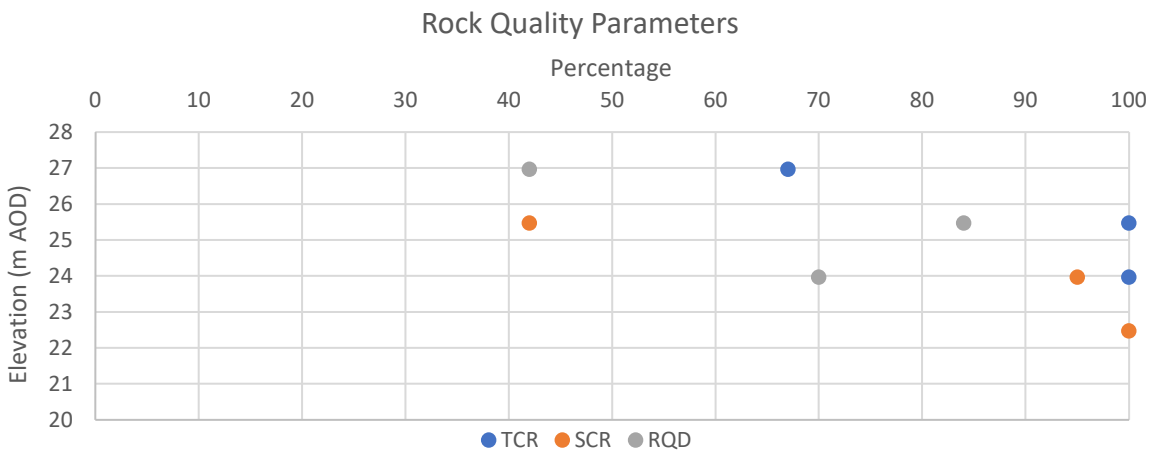

***Figure 6.1.4a** – Summary of Rock Quality Parameters vs Elevation for Mudstone*

UCS samples were unable to be tested due to breakage of the sample, therefore a published correlation factor of 23 has been used for Mudstone to determine an approximation of the unconfined compressive strength (UCS) of the rock. Based on this, estimated UCS values for bedrock range between 0.23MPa and 2.53MPa for axial tests and 0.23MPa and 3.45MPa for diametral tests, indicating the rock tested has strength index from extremely weak to very weak, which is generally consistent with strength described in the field.

The Rock Quality Designation (RQD) recorded in the Sandstone cored samples ranged from 0 to 100% which classifies it as of very poor to excellent rock mass quality. Total Core Recovery (TCR) and Solid Core Recovery (SCR) vary between core runs, but overall show a general increase with depth, as shown in *Figure 6.1.4b.*

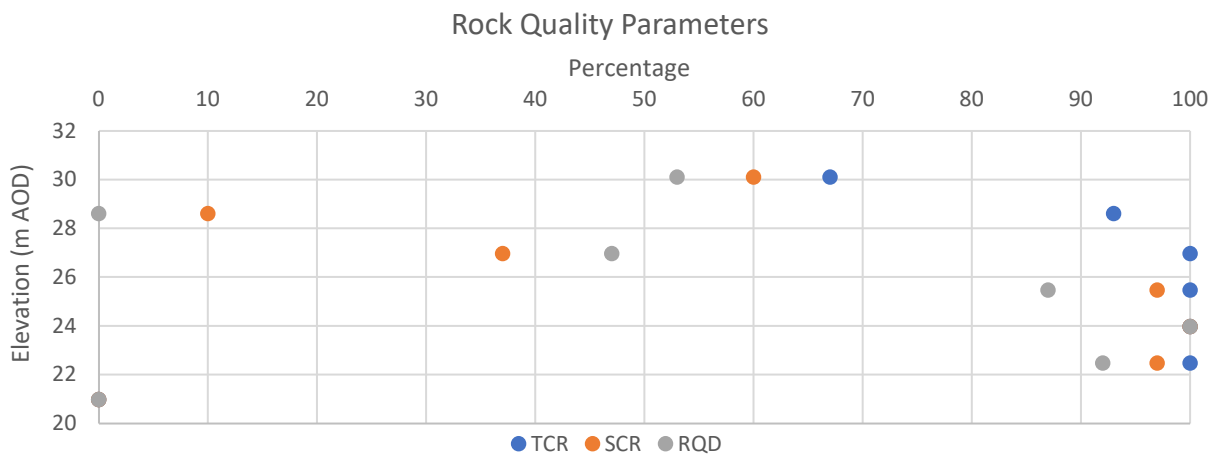

***Figure 6.1.4b** – Summary of Rock Quality Parameters vs Elevation for Sandstone*

UCS samples were unable to be tested due to breakage of the sample, therefore a published correlation factor of 18 has been used for Sandstone to determine an approximation of the unconfined compressive strength (UCS) of the rock. Based on this, estimated UCS values for bedrock range between 4.5MPa and 98.46MPa for

axial tests and 2.88MPa and 89.82MPa for diametral tests, indicating the rock tested has strength index from very weak to strong, which is generally consistent with strength described in the field.

7.0 Geotechnical Assessment and Recommendations

The recommendations provided within this section are based on a review of the encountered ground conditions across the site.

The ground conditions at site generally comprised Made Ground of concrete, overlying a gravelly slightly clayey fine to coarse sand, and brick and concrete layer underlain by Glacial Till. Glacial Till was encountered from depths between 2.10 and 2.20m bgl overlying residual soils which in turn overlies interbedded weak to medium strong Sandstone and extremely weak to very weak Mudstone.

7.1 Chemical Attack on Buried Concrete

The classification of the site in terms of concrete in aggressive ground is based on the guidance provided in Table C2 of the Building Research Establishment (BRE) Special Digest 1, 3rd edition of 2005. A summary of the results obtained during are summarised in *Table 7.2a*, and *Table 7.2b* details the classification.

Table 7.2a – *Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Test Type	No. of Tests	Range
Made Ground	pH	2	8.74 – 8.94
	Water Soluble Sulphate (mg/l)	2	50 - 80
Glacial Till	pH	No testing undertaken.	
	Water Soluble Sulphate (mg/l)		
Bedrock	pH	3	8.56 – 9.03
	Water Soluble Sulphate (mg/l)	3	10 - 20

Table 7.2b – *Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Design Sulphate Class	ACEC Class (1)
Made Ground	DS-1	AC-1
Bedrock	DS-1	AC-1

(1) ACEC assessment was based on the *mobile* groundwater condition in a *brownfield* scheme area

In these conditions it is considered that deterioration of buried concrete due to sulphate or acid attack is unlikely to occur. The preliminary design of buried concrete according to Table C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-1 (AC-1) conditions assuming mobile groundwater.

7.2 Foundation Assessment

It is understood the proposed development comprises several structures comprising residential high rise buildings with some commercial use to the ground floor. The loadings of the proposed structure have not been provided at the time of writing this letter report, however it is anticipated the loads will be relatively high. The loads will pre-determine the suitability of foundations adopted.

Based on the ground and groundwater conditions encountered during the E3P and Curtins ground investigations, it is considered that shallow foundations will not be possible to support the proposed

development. Foundations would need to be taken down below any Made Ground and low strength superficial soils and be placed in the firm to very stiff cohesive Glacial Till deposits encountered, at depths of at least 3.00m bgl below existing ground level (approx. 50m AOD).

Considering the above, and subject to confirmation of building loads, piled foundations may be considered the best option to take the load of the structure to suitable bearing soils at depth. In these ground conditions, it is considered that some form of bored and in-situ cast concrete piled foundation with reinforced concrete ground beam should prove satisfactory.

It is considered likely that driven/Continuous Flight Auger (CFA) piles would be the most suitable piling technique for the site. This suggestion does not however preclude the consideration of the other pile types being used. Should driven piles be proposed then consideration will need to be made for the existing obstructions encountered on site.

It is important to note that the specific pile design will depend on a number of factors including the particular details of the piling system adopted. The advice of a specialist piling contractor should be required such that the final design of the piles can be undertaken, and the suitability of the particular piling system can be considered.

7.3 Ground Floor Slab

The suitable ground floor slab for the development is dependent on the foundation solution. It is likely that ground bearing slabs with relatively low imposed low could be founded on suitable firm to very stiff clays, subject to removal of soft spots and Made Ground. Ground floor slabs must be designed by a structural engineer.

8.0 Closure

If you have any queries with regard to this letter report please do not hesitate to contact us.

Yours sincerely,

[redacted]

Z Henderson
Geo-Environmental Engineer
For and on behalf of
Curtins Consulting Ltd

Author	Signature	Date
Z Henderson BSc (Hons) FGS Geo-Environmental Engineer	[redacted]	13/05/2021
Checked	**Signature**	**Date**
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Authorised	Signature	Date
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Rev	Description	Issued by	Checked	Date

Appendices

Appendix A1 – Drawings

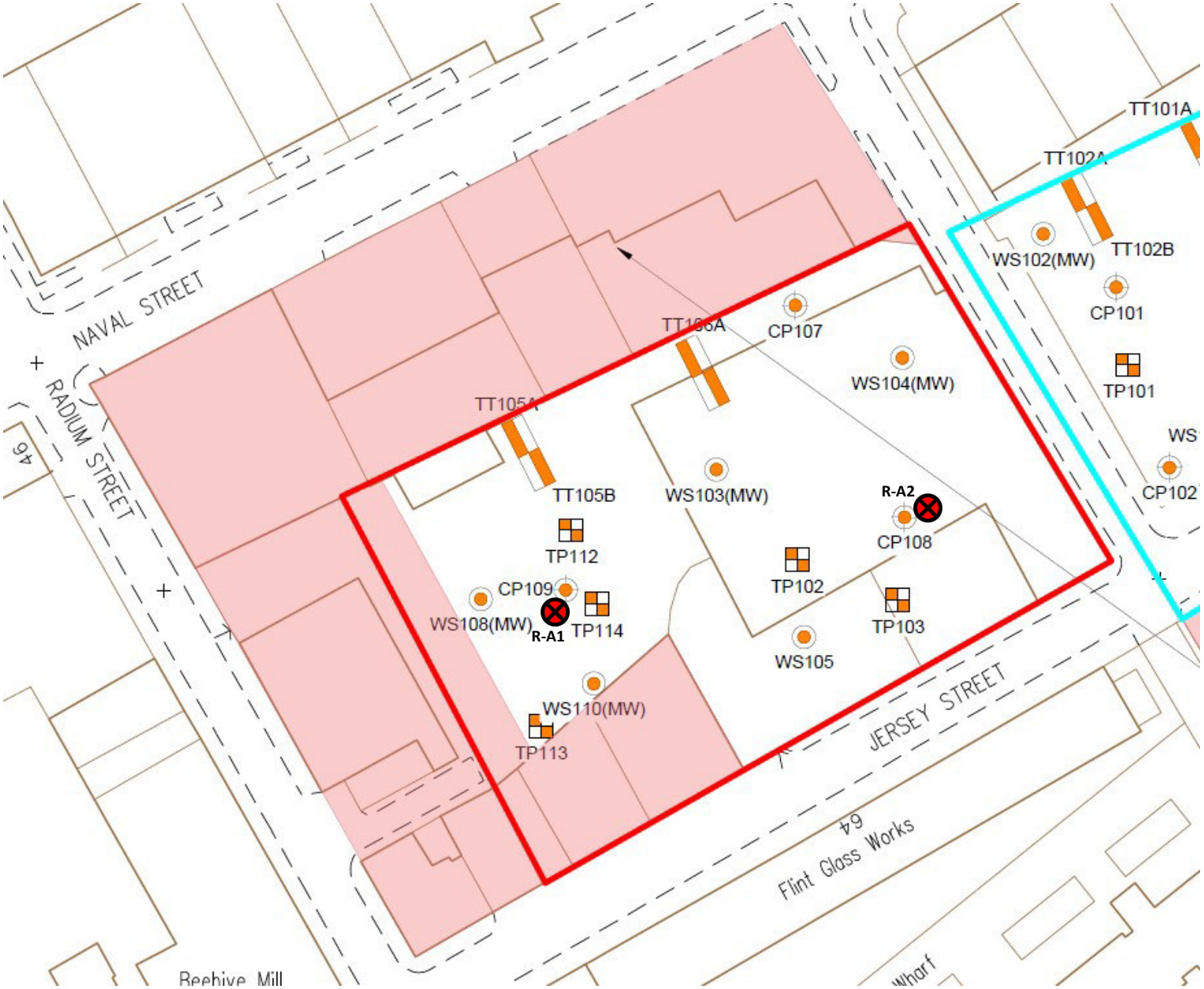
Appendix A2 – Exploratory Hole Logs

Appendix A3 – Geo-Environmental Laboratory Testing Results

Appendix A4 – Generic Assessment Criteria (GACs)

Appendix A5 – Geotechnical Laboratory Testing Results

Appendix A1 – Drawings



Key

EP3 2019 Investigation

Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Trial Pit Location
- Approximate Slit Trench Location
- No Access
- Parcel A
- Parcel B

Curtins 2021 Investigation

- Rotary Cored Boreholes

Note:

The exploratory hole positions are preliminary and subject to change where affected by underground and over ground services.

Scope of Works

2no Rotary Geobore S boreholes to max 30m bgl. Positioned adjacent to EP3 boreholes, which went to 15m bgl. Curtins boreholes to advance using open-hole drilling methods to 10m, continue with SPTs and coring

Back of Ancoats - Parcel A

Proposed Exploratory Hole Location Plan

curtins

Appendix A2 – Exploratory Hole Logs

Borehole Log

Borehole No.
R-A1
Sheet 1 of 4

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 49.97	Scale 1:40
Client: Manchester Life		Dates: 28/01/2021 - 01/02/2021	Logged By ZH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.40	ES		0.25	49.72		MADE GROUND: Concrete.
					2.10	47.87		MADE GROUND: Dark greyish brown gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of brick, sandstone, scrap metal, clinker, ash and wood. Strong hydrocarbon odour. *At 0.50m boulder.* *At 0.70 dark grey/black water with iridescent sheen.*
								Soft brownish grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone.

Continued on next sheet

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush. SPT and Rotary Core details displayed on two separate logs - Borehole Log and Rotary Core Log.

Borehole Log

Borehole No. **R-A1**

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 49.97	Scale 1:40
Client: Manchester Life		Dates: 28/01/2021 - 01/02/2021	Logged By ZH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		10.00		N=48 (3,7/11,11,13,13)					9
					10.50	39.47		Very stiff brownish grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone and coal fragments.	10
		12.50		N=44 (2,6/8,12,12,12)				*From 12.50 to 15.30m no recovery.*	11
		14.00		N=50 (7,11/50 for 230mm)					12
		15.50		N=41 (7,9/41 for 255mm)	15.50	34.47		Very stiff brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to medium of sandstone.	13
									14
									15
									16

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush. SPT and Rotary Core details displayed on two separate logs - Borehole Log and Rotary Core Log.

Borehole Log

Borehole No. **R-A1**

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 49.97	Scale 1:40
Client: Manchester Life		Dates: 28/01/2021 - 01/02/2021	Logged By ZH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		17.00		N=23 (5,6/3,8,9,3)				*From 17.00 to 18.50m no recovery.*	17
									18
								From 18.50 to 18.90m recovered as non-intact core of angular to subangualr cobbles.	
								From 18.90 to 20.00m no recovery.	19
		20.00		50 (25 for 105mm/50 for 30mm)	20.00	29.97		Highly weathered very weak reddish brown fine to medium grained SANDSTONE, recovered as gravelly fine to medium sand.	20
								From 20.55 to 21.10m core intact - weak fine grained sandstone.	21
								From 21.50 to 22.50m no recovery (due to faulty geobore equipment).	22
					22.50	27.47		Weak reddish brown fine grained SANDSTONE with localised thin laminations of mudstone. *22.50 to 23.43m 0 - 10 degrees closely spaced to medium spaced, planar rough.*	23
								From 23.43 to 23.58m recovered as non-intact core of very sandy angular to subangular cobbles. *23.58 to 23.98m 5 - 20 degrees very closely spaced to closely spaced, locally extremely closely spaced, planar rough.*	24

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush. SPT and Rotary Core details displayed on two separate logs - Borehole Log and Rotary Core Log.

AGS

Borehole Log

Borehole No. **R-A1**

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 49.97	Scale 1:40
Client: Manchester Life		Dates: 28/01/2021 - 01/02/2021	Logged By ZH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
								From 23.98 to 24.33m recovered as non-intact core of sandy angular gravel and angular cobbles.	
								24.33 to 28.09m 0 - 15 degrees closely spaced to medium spaced, planar rough to smooth and 1 No. discontinuity 90 degrees, planar rough.	
								From 24.96 to 25.15m grey medium grained sandstone.	25
								From 25.15 to 25.50m weathered fine grained sandstone.	
								From 25.50 to 25.67m light grey.	
								From 25.67 to 25.80m weathered fine grained sandstone.	
					26.00	23.97		Medium strong light grey and reddish brown fine grained SANDSTONE with closely spaced to medium spaced thin to thick bands of extremely weak brown mudstone.	26
									27
									28
								From 28.09 to 28.14m recovered as non-intact core of angular coarse gravel.	
								28.14 to 29.00m 0 - 10 degrees medium spaced, planar smooth.	
								From 29.00 to 30.00m no recovery.	29
					30.00	19.97		End of borehole at 30.00 m	30
									31
									32

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush. SPT and Rotary Core details displayed on two separate logs - Borehole Log and Rotary Core Log.

AGS

Borehole Log

Borehole No.
R-A2
Sheet 1 of 4

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 50.10	Scale 1:40
Client: Manchester Life		Dates: 26/01/2021 - 28/01/2021	Logged By ZH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20	49.90		MADE GROUND: Concrete.
		0.80	ES		1.30	48.80		MADE GROUND: Dark brown gravelly slightly clayey fine to coarse sand with low cobble content. Gravel is angular to subangular fine to coarse of brick, ash and glass. Cobbles are angular to subangular of brick.
					2.20	47.90		MADE GROUND: Red brown and grey concrete and brick layer.
								Soft brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of sandstone.

1 2 3 4 5 6 7 8

Continued on next sheet

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush.

AGS

Borehole Log

Borehole No.
R-A2
Sheet 2 of 4

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 50.10	Scale 1:40
Client: Manchester Life		Dates: 26/01/2021 - 28/01/2021	Logged By ZH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
									9
		10.00		N=50 (2,4/8,11,16,15)	10.00	40.10		Stiff to very stiff brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and coal fragments.	10
									11
								From 11.85 to 14.00m no recovery.	12
		12.50		N=50 (3,5/50 for 275mm)					13
		14.00		N=29 (1,3/6,6,7,10)					14
								From 14.40 to 15.50m no recovery.	15
		15.50		50 (2,4/50 for 200mm)					
								From 15.75 to 20.00m no recovery.	16

Continued on next sheet

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush.

Borehole Log

Borehole No. **R-A2**

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 50.10	Scale 1:40
Client: Manchester Life		Dates: 26/01/2021 - 28/01/2021	Logged By ZH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		17.00		N=40 (1,0/1,2,16,21)					17
		18.50		50 (5,17/50 for 95mm)					18
					18.80	31.30		Dense brown fine to coarse SAND.	
					19.00	31.10		Very stiff brown slightly sandy CLAY. Sand is fine to coarse.	19
									20
					20.90	29.20		Highly weathered extremely weak reddish brown medium grained SANDSTONE, recovered as a slightly clayey medium sand. *From 20.90 to 21.00m recovered as non-intact core of angular fine to coarse gravel and angular cobbles.* *From 21.00 to 21.50m no recovery.* *From 21.50 to 21.65m medium strong medium grained sandstone.*	21
		21.50		50 (25 for 50mm/50 for 40mm)					22
					23.00	27.10		Highly weathered light grey and brown fine grained SANDSTONE, recovered as a stiff very sandy clay. *From 23.00 to 23.40m recovered as non-intact core of sandy angular fine to coarse gravel and angular cobbles.*	23
					23.55	26.55		*23.50 to 26.00m 5 - 20 degrees closely spaced to medium spaced, planar smooth.* Weathered very weak brown thinly laminated	24

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush.

Borehole Log

Borehole No. **R-A2**

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 50.10	Scale 1:40
Client: Manchester Life		Dates: 26/01/2021 - 28/01/2021	Logged By ZH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
								MUDSTONE. *From 24.00 to 24.50m no recovery.*	25
								26.00 to 27.50m 0 - 10 degrees closely spaced to medium spaced, planar to stepped smooth to rough and 1 No. discontinuity 25 degrees, planar rough.	26
					26.30	23.80		Medium strong reddish brown fine to medium grained SANDSTONE.	
					26.80	23.30		Very weak thinly laminated purplish brown MUDSTONE.	27
					27.50	22.60		Weak purplish brown mottled grey fine to medium grained SANDSTONE. *From 27.50 to 27.80m recovered as non-intact core of angular cobble.* *27.80 to 28.30m 0 - 10 degrees closely spaced, planar rough.* *From 28.30 to 28.45m recovered as non-intact core of angular fine to coarse gravel and angular cobbles.* *From 28.45 to 29.00m no recovery.*	28
					29.00	21.10		Weak brown thinly laminated MUDSTONE. *29.00 to 29.65m 0 - 1- degrees closely spaced, planar smooth.* *From 29.65 to 30.00m no recovery.*	29
					30.00	20.10		End of borehole at 30.00 m	30
									31
									32

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush.

AGS

Rotary Core Log

Borehole No.
R-A1
Sheet 1 of 4

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 49.97	Scale 1:40
Client: Manchester Life		Dates: 28/01/2021 - 01/02/2021	Logged By ZH

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		0.40	ES				0.25	49.72		MADE GROUND: Concrete.
							2.10	47.87		MADE GROUND: Dark greyish brown gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of brick, sandstone, scrap metal, clinker, ash and wood. Strong hydrocarbon odour. *At 0.50m boulder.* *At 0.70 dark grey/black water with iridescent sheen.*
										Soft brownish grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone.

Continued on next sheet

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush. SPT and Rotary Core details displayed on two separate logs - Borehole Log and Rotary Core Log.

Rotary Core Log

Borehole No.
R-A1
Sheet 2 of 4

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 49.97	Scale 1:40
Client: Manchester Life		Dates: 28/01/2021 - 01/02/2021	Logged By ZH

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	
											9
											10
							10.50	39.47		Very stiff brownish grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone and coal fragments.	11
											12
										From 12.50 to 15.30m no recovery.	13
											14
											15
							15.50	34.47		Very stiff brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to medium of sandstone.	16

Continued on next sheet

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush. SPT and Rotary Core details displayed on two separate logs - Borehole Log and Rotary Core Log.

Rotary Core Log

Borehole No. **R-A1**

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 49.97	Scale 1:40
Client: Manchester Life		Dates: 28/01/2021 - 01/02/2021	Logged By ZH

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	
										From 17.00 to 18.50m no recovery.	17
											18
										From 18.50 to 18.90m recovered as non-intact core of angular to subangualr cobbles.	
										From 18.90 to 20.00m no recovery.	19
							20.00	29.97		Highly weathered very weak reddish brown fine to medium grained SANDSTONE, recovered as gravelly fine to medium sand.	20
			NI							*From 20.55 to 21.10m core intact - weak fine grained sandstone.*	21
			NR							*From 21.50 to 22.50m no recovery (due to faulty geobore equipment).*	22
							22.50	27.47		Weak reddish brown fine grained SANDSTONE with localised thin laminations of mudstone. *22.50 to 23.43m 0 - 10 degrees closely spaced to medium spaced, planar rough.*	23
			9								
		23.00 - 24.50	NI	100	37	47				*From 23.43 to 23.58m recovered as non-intact core of very sandy angular to subangular cobbles.*	
			10							*23.58 to 23.98m 5 - 20 degrees very closely spaced to closely spaced, locally extremely closely spaced, planar rough.*	24

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush. SPT and Rotary Core details displayed on two separate logs - Borehole Log and Rotary Core Log.

AGS

Rotary Core Log

Borehole No. **R-A1**

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 49.97	Scale 1:40
Client: Manchester Life		Dates: 28/01/2021 - 01/02/2021	Logged By ZH

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	
			NI							*From 23.98 to 24.33m recovered as non-intact core of sandy angular gravel and angular cobbles.*	
		24.50 - 26.00	5	100	97	87				*24.33 to 28.09m 0 - 15 degrees closely spaced to medium spaced, planar rough to smooth and 1 No. discontinuity 90 degrees, planar rough.* *From 24.96 to 25.15m grey medium grained sandstone.* *From 25.15 to 25.50m weathered fine grained sandstone.* *From 25.50 to 25.67m light grey.* *From 25.67 to 25.80m weathered fine grained sandstone.*	25
		26.00 - 27.50		100	100	100	26.00	23.97		Medium strong light grey and reddish brown fine grained SANDSTONE with closely spaced to medium spaced thin to thick bands of extremely weak brown mudstone.	26 27
		27.50 - 29.00	NI 3	100	97	92				*From 28.09 to 28.14m recovered as non-intact core of angular coarse gravel.* *28.14 to 29.00m 0 - 10 degrees medium spaced, planar smooth.*	28
		29.00 - 30.00	NR	0	0	0	30.00	19.97		*From 29.00 to 30.00m no recovery.* End of borehole at 30.00 m	29 30
											31 32

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush. SPT and Rotary Core details displayed on two separate logs - Borehole Log and Rotary Core Log.

Rotary Core Log

Borehole No.
R-A2
Sheet 1 of 4

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 50.10	Scale 1:40
Client: Manchester Life		Dates: 26/01/2021 - 28/01/2021	Logged By ZH

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							0.20	49.90		MADE GROUND: Concrete.
		0.80	ES				1.30	48.80		MADE GROUND: Dark brown gravelly slightly clayey fine to coarse sand with low cobble content. Gravel is angular to subangular fine to coarse of brick, ash and glass. Cobbles are angular to subangular of brick.
							2.20	47.90		MADE GROUND: Red brown and grey concrete and brick layer.
										Soft brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of sandstone.

1 2 3 4 5 6 7 8

Continued on next sheet

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush.

AGS

Rotary Core Log

Borehole No.
R-A2
Sheet 2 of 4

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 50.10	Scale 1:40
Client: Manchester Life		Dates: 26/01/2021 - 28/01/2021	Logged By ZH

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	
											9
							10.00	40.10		Stiff to very stiff brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and coal fragments.	10
											11
										From 11.85 to 14.00m no recovery.	12
											13
											14
										From 14.40 to 15.50m no recovery.	15
										From 15.75 to 20.00m no recovery.	16

Continued on next sheet

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush.

Rotary Core Log

Borehole No. **R-A2**

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 50.10	Scale 1:40
Client: Manchester Life		Dates: 26/01/2021 - 28/01/2021	Logged By ZH

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							18.80	31.30		Dense brown fine to coarse SAND.
							19.00	31.10		Very stiff brown slightly sandy CLAY. Sand is fine to coarse.
		20.00 - 21.50	NI / NR	67	60	53	20.90	29.20		Highly weathered extremely weak reddish brown medium grained SANDSTONE, recovered as a slightly clayey medium sand. *From 20.90 to 21.00m recovered as non-intact core of angular fine to coarse gravel and angular cobbles.* *From 21.00 to 21.50m no recovery.* *From 21.50 to 21.65m medium strong medium grained sandstone.*
		21.50 - 23.00	NI	93	10	0	23.00	27.10		
		23.00 - 24.50	NI	67	42	42	23.55	26.55		Highly weathered light grey and brown fine grained SANDSTONE, recovered as a stiff very sandy clay. *From 23.00 to 23.40m recovered as non-intact core of sandy angular fine to coarse gravel and angular cobbles.* *23.50 to 26.00m 5 - 20 degrees closely spaced to medium spaced, planar smooth.* Weathered very weak brown thinly laminated

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush.

Rotary Core Log

Borehole No. **R-A2**

Project Name: Man Life Back of Ancoats	Project No. 076740	Co-ords: -	Hole Type CP+RC
Location: Ancoats, Manchester		Level: 50.10	Scale 1:40
Client: Manchester Life		Dates: 26/01/2021 - 28/01/2021	Logged By ZH

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	
										MUDSTONE. *From 24.00 to 24.50m no recovery.*	
		24.50 - 26.00	4	100	95	84					25
		26.00 - 27.50	17	100	100	70				*26.00 to 27.50m 0 - 10 degrees closely spaced to medium spaced, planar to stepped smooth to rough and 1 No. discontinuity 25 degrees, planar rough.*	26
							26.30	23.80		Medium strong reddish brown fine to medium grained SANDSTONE.	
			8				26.80	23.30		Very weak thinly laminated purplish brown MUDSTONE.	27
		27.50 - 29.00	NI	67	32	17	27.50	22.60		Weak purplish brown mottled grey fine to medium grained SANDSTONE. *From 27.50 to 27.80m recovered as non-intact core of angular cobble.*	
			12							*27.80 to 28.30m 0 - 10 degrees closely spaced, planar rough.*	28
			NI							*From 28.30 to 28.45m recovered as non-intact core of angular fine to coarse gravel and angular cobbles.*	
			NR							*From 28.45 to 29.00m no recovery.*	
		29.00 - 30.00	4	65	65	56	29.00	21.10		Weak brown thinly laminated MUDSTONE. *29.00 to 29.65m 0 - 1- degrees closely spaced, planar smooth.*	29
										From 29.65 to 30.00m no recovery.	
							30.00	20.10		End of borehole at 30.00 m	30
											31
											32

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater unable to be recorded due to flush.

Appendix A3 – Geo-Environmental Laboratory Testing Results

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/00803
Issue Number: 1 **Date:** 03 February, 2021

Client: Curtins Consulting (Manchester)
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

Project Manager: Siobhán Hyde/Zoe Henderson
Project Name: Ancoats Plot A
Project Ref: B076740
Order No: EBMA2674
Date Samples Received: 28/01/21
Date Instructions Received: 28/01/21
Date Analysis Completed: 03/02/21

Prepared by:

[redacted]

Melanie Marshall
Laboratory Coordinator

Approved by:

[redacted]

Holly Neary-King
Client Services Supervisor

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

envirolab

Envirolab Job Number: 21/00803

Client Project Name: Ancoats Plot A

Client Project Ref: B076740

Lab Sample ID	21/00803/1							Units	Limit of Detection	Method ref
Client Sample No	ES1									
Client Sample ID	R-A2									
Depth to Top	0.80									
Depth To Bottom										
Date Sampled	25-Jan-21									
Sample Type	Soil - ES									
Sample Matrix Code	4AB									
% Stones >10mm$_{A}$	15.5							% w/w	0.1	A-T-044
pH$_{D}^{M\#}$	8.74							pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_{D}^{M\#}$	0.08							g/l	0.01	A-T-026s
Cyanide (total)$_{A}^{M\#}$	<1							mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_{A}$	<0.2							mg/kg	0.2	A-T-050s
Organic matter$_{D}^{M\#}$	2.6							% w/w	0.1	A-T-032 OM
Arsenic$_{D}^{M\#}$	24							mg/kg	1	A-T-024s
Boron (water soluble)$_{D}$	<1.0							mg/kg	1	A-T-027s
Cadmium$_{D}^{M\#}$	1.1							mg/kg	0.5	A-T-024s
Copper$_{D}^{M\#}$	45							mg/kg	1	A-T-024s
Chromium$_{D}^{M\#}$	15							mg/kg	1	A-T-024s
Chromium (hexavalent)$_{D}$	<1							mg/kg	1	A-T-040s
Lead$_{D}^{M\#}$	87							mg/kg	1	A-T-024s
Mercury$_{D}$	<0.17							mg/kg	0.17	A-T-024s
Nickel$_{D}^{M\#}$	19							mg/kg	1	A-T-024s
Selenium$_{D}^{M\#}$	2							mg/kg	1	A-T-024s
Zinc$_{D}^{M\#}$	63							mg/kg	5	A-T-024s

Envirolab Job Number: 21/00803

Client Project Name: Ancoats Plot A

Client Project Ref: B076740

Lab Sample ID	21/00803/1							Units	Limit of Detection	Method ref
Client Sample No	ES1									
Client Sample ID	R-A2									
Depth to Top	0.80									
Depth To Bottom										
Date Sampled	25-Jan-21									
Sample Type	Soil - ES									
Sample Matrix Code	4AB									
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD									A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A									A-T-045

Envirolab Job Number: 21/00803

Client Project Name: Ancoats Plot A

Client Project Ref: B076740

Lab Sample ID	21/00803/1							Units	Limit of Detection	Method ref
Client Sample No	ES1									
Client Sample ID	R-A2									
Depth to Top	0.80									
Depth To Bottom										
Date Sampled	25-Jan-21									
Sample Type	Soil - ES									
Sample Matrix Code	4AB									
PAH-16MS										
Acenaphthene$_{A}^{M\#}$	<0.01							mg/kg	0.01	A-T-019s
Acenaphthylene$_{A}^{M\#}$	0.03							mg/kg	0.01	A-T-019s
Anthracene$_{A}^{M\#}$	0.07							mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	0.40							mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	0.40							mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	0.40							mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	0.17							mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	0.14							mg/kg	0.07	A-T-019s
Chrysene$_{A}^{M\#}$	0.41							mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	0.05							mg/kg	0.04	A-T-019s
Fluoranthene$_{A}^{M\#}$	0.59							mg/kg	0.08	A-T-019s
Fluorene$_{A}^{M\#}$	0.02							mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	0.20							mg/kg	0.03	A-T-019s
Naphthalene $_{A}^{M\#}$	<0.03							mg/kg	0.03	A-T-019s
Phenanthrene$_{A}^{M\#}$	0.25							mg/kg	0.03	A-T-019s
Pyrene$_{A}^{M\#}$	0.57							mg/kg	0.07	A-T-019s
Total PAH-16MS$_{A}^{M\#}$	3.70							mg/kg	0.01	A-T-019s

envirolab

Envirolab Job Number: 21/00803

Client Project Name: Ancoats Plot A

Client Project Ref: B076740

Lab Sample ID	21/00803/1							Units	Limit of Detection	Method ref
Client Sample No	ES1									
Client Sample ID	R-A2									
Depth to Top	0.80									
Depth To Bottom										
Date Sampled	25-Jan-21									
Sample Type	Soil - ES									
Sample Matrix Code	4AB									
TPH CWG										
Ali >C5-C6$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
Ali >C6-C8$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
Ali >C8-C10$_{A}$	<1							mg/kg	1	A-T-055s
Ali >C10-C12$_{A}^{M\#}$	<1							mg/kg	1	A-T-055s
Ali >C12-C16$_{A}^{M\#}$	<1							mg/kg	1	A-T-055s
Ali >C16-C21$_{A}^{M\#}$	2							mg/kg	1	A-T-055s
Ali >C21-C35$_{A}^{M\#}$	4							mg/kg	1	A-T-055s
Total Aliphatics$_{A}$	7							mg/kg	1	A-T-055s
Aro >C5-C7$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
Aro >C7-C8$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
Aro >C8-C10$_{A}$	<1							mg/kg	1	A-T-055s
Aro >C10-C12$_{A}$	<1							mg/kg	1	A-T-055s
Aro >C12-C16$_{A}$	3							mg/kg	1	A-T-055s
Aro >C16-C21$_{A}^{M\#}$	11							mg/kg	1	A-T-055s
Aro >C21-C35$_{A}^{M\#}$	29							mg/kg	1	A-T-055s
Total Aromatics$_{A}$	43							mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_{A}$	50							mg/kg	1	A-T-055s
BTEX - Benzene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
BTEX - Toluene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
BTEX - o Xylene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
MTBE$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. [redacted]

Client: Curtins Consulting (Manchester), Merchant Exchange, 17-19 Whitworth Street , Manchester, UK, M1 5WG

Project: Ancoats Plot A

Clients Project No: B076740

Project No: 21/00803

Date Received: 28/01/2021 (am)

Cool Box Temperatures (°C): 4.9

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/00931
Issue Number: 1 **Date:** 09 February, 2021

Client: Curtins Consulting (Manchester)
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

Project Manager: Siobhán Hyde/Zoe Henderson
Project Name: Ancoats Plot A
Project Ref: B076740
Order No: EBMA2682
Date Samples Received: 01/02/21
Date Instructions Received: 01/02/21
Date Analysis Completed: 08/02/21

Prepared by:

[redacted]

Melanie Marshall
Laboratory Coordinator

Approved by:

[redacted]

Richard Wong
Client Manager

Envirolab Job Number: 21/00931

Client Project Name: Ancoats Plot A

Client Project Ref: B076740

Lab Sample ID	21/00931/1							Units	Limit of Detection	Method ref
Client Sample No	ES1									
Client Sample ID	R-A1									
Depth to Top	0.40									
Depth To Bottom										
Date Sampled	28-Jan-21									
Sample Type	Soil - ES									
Sample Matrix Code	4A									
% Stones >10mm$_{A}$	8.9							% w/w	0.1	A-T-044
pH$_{D}^{M\#}$	8.96							pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_{D}^{M\#}$	0.05							g/l	0.01	A-T-026s
Cyanide (total)$_{A}^{M\#}$	<1							mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_{A}$	<0.2							mg/kg	0.2	A-T-050s
Organic matter$_{D}^{M\#}$	7.1							% w/w	0.1	A-T-032 OM
Arsenic$_{D}^{M\#}$	<1							mg/kg	1	A-T-024s
Boron (water soluble)$_{D}$	4.6							mg/kg	1	A-T-027s
Cadmium$_{D}^{M\#}$	5.8							mg/kg	0.5	A-T-024s
Copper$_{D}^{M\#}$	4180							mg/kg	1	A-T-024s
Chromium$_{D}^{M\#}$	148							mg/kg	1	A-T-024s
Chromium (hexavalent)$_{D}$	<1							mg/kg	1	A-T-040s
Lead$_{D}^{M\#}$	1240							mg/kg	1	A-T-024s
Mercury$_{D}$	1.46							mg/kg	0.17	A-T-024s
Nickel$_{D}^{M\#}$	163							mg/kg	1	A-T-024s
Selenium$_{D}^{M\#}$	6							mg/kg	1	A-T-024s
Zinc$_{D}^{M\#}$	5260							mg/kg	5	A-T-024s

Envirolab Job Number: 21/00931

Client Project Name: Ancoats Plot A

Client Project Ref: B076740

								Units	Limit of Detection	Method ref
Lab Sample ID	21/00931/1									
Client Sample No	ES1									
Client Sample ID	R-A1									
Depth to Top	0.40									
Depth To Bottom										
Date Sampled	28-Jan-21									
Sample Type	Soil - ES									
Sample Matrix Code	4A									
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD									A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A									A-T-045

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Envirolab Job Number: 21/00931

Client Project Name: Ancoats Plot A

Client Project Ref: B076740

Lab Sample ID	21/00931/1							Units	Limit of Detection	Method ref
Client Sample No	ES1									
Client Sample ID	R-A1									
Depth to Top	0.40									
Depth To Bottom										
Date Sampled	28-Jan-21									
Sample Type	Soil - ES									
Sample Matrix Code	4A									
PAH-16MS										
Acenaphthene$_{A}^{M\#}$	0.58							mg/kg	0.01	A-T-019s
Acenaphthylene$_{A}^{M\#}$	<0.02							mg/kg	0.01	A-T-019s
Anthracene$_{A}^{M\#}$	0.31							mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	2.36							mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	0.09							mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	1.55							mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	0.14							mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	0.18							mg/kg	0.07	A-T-019s
Chrysene$_{A}^{M\#}$	6.91							mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	0.32							mg/kg	0.04	A-T-019s
Fluoranthene$_{A}^{M\#}$	8.09							mg/kg	0.08	A-T-019s
Fluorene$_{A}^{M\#}$	2.39							mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	0.14							mg/kg	0.03	A-T-019s
Naphthalene $_{A}^{M\#}$	0.26							mg/kg	0.03	A-T-019s
Phenanthrene$_{A}^{M\#}$	19.4							mg/kg	0.03	A-T-019s
Pyrene$_{A}^{M\#}$	9.30							mg/kg	0.07	A-T-019s
Total PAH-16MS$_{A}^{M\#}$	52							mg/kg	0.01	A-T-019s

Envirolab Job Number: 21/00931

Client Project Name: Ancoats Plot A

Client Project Ref: B076740

Lab Sample ID	21/00931/1							Units	Limit of Detection	Method ref
Client Sample No	ES1									
Client Sample ID	R-A1									
Depth to Top	0.40									
Depth To Bottom										
Date Sampled	28-Jan-21									
Sample Type	Soil - ES									
Sample Matrix Code	4A									
TPH CWG										
Ali >C5-C6$_{A}^{\#}$	<0.05							mg/kg	0.01	A-T-022s
Ali >C6-C8$_{A}^{\#}$	0.15							mg/kg	0.01	A-T-022s
Ali >C8-C10$_{A}$	<20							mg/kg	1	A-T-055s
Ali >C10-C12$_{A}^{M\#}$	31							mg/kg	1	A-T-055s
Ali >C12-C16$_{A}^{M\#}$	211							mg/kg	1	A-T-055s
Ali >C16-C21$_{A}^{M\#}$	1350							mg/kg	1	A-T-055s
Ali >C21-C35$_{A}^{M\#}$	3880							mg/kg	1	A-T-055s
Total Aliphatics$_{A}$	5470							mg/kg	1	A-T-055s
Aro >C5-C7$_{A}^{\#}$	<0.05							mg/kg	0.01	A-T-022s
Aro >C7-C8$_{A}^{\#}$	0.06							mg/kg	0.01	A-T-022s
Aro >C8-C10$_{A}$	<20							mg/kg	1	A-T-055s
Aro >C10-C12$_{A}$	<20							mg/kg	1	A-T-055s
Aro >C12-C16$_{A}$	103							mg/kg	1	A-T-055s
Aro >C16-C21$_{A}^{M\#}$	1660							mg/kg	1	A-T-055s
Aro >C21-C35$_{A}^{M\#}$	1830							mg/kg	1	A-T-055s
Total Aromatics$_{A}$	3600							mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_{A}$	9070							mg/kg	1	A-T-055s
BTEX - Benzene$_{A}^{\#}$	<0.05							mg/kg	0.01	A-T-022s
BTEX - Toluene$_{A}^{\#}$	0.06							mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_{A}^{\#}$	0.10							mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_{A}^{\#}$	<0.05							mg/kg	0.01	A-T-022s
BTEX - o Xylene$_{A}^{\#}$	0.11							mg/kg	0.01	A-T-022s
MTBE$_{A}^{\#}$	<0.05							mg/kg	0.01	A-T-022s

REPORT NOTES

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Analytical results reflect the quality of the sample at the time of analysis only.
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The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. [redacted]

Client: Curtins Consulting (Manchester), Merchant Exchange, 17-19 Whitworth Street , Manchester, UK, M1 5WG

Project: Ancoats Plot A

Clients Project No: B076740

Project No: 21/00931

Date Received: 01/02/2021 (am)

Cool Box Temperatures (°C): 2.4

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Appendix A4 – Generic Assessment Criteria (GACs)

Adopted Soil Generic Assessment Criteria
Sandy loam with 2.5% SOM

Contaminants	Residential with home grown produce	Residential without home grown produce	Allotments	Commercial	Public open space near residential housing POS_{resi}	Public park POS_{park}
Metals						
Beryllium	*1.7*	*1.7*	*35*	*12*	*2.2*	*63*
Boron	*290*	*11,000*	*45*	*240,000*	*21,000*	*46,000*
Cadmium	**10**[13] 22	**85**[13] 150	**1.8** 3.9	**230** 410	*120* 220	*560* 880
Chromium III	*910*	*910*	*18,000*	*8,600*	*1,500*	*33,000*
Chromium VI	*6* 21	*6* 21	*1.8* 170	*33* 49	*7.7* 21	*220* 250
Lead	200	310	80	2,300	630	1,300
Mercury *(elemental)*	**1**	**1**	**26**	**26**	*16*	**26**[8] [*30*]
Mercury (inorganic)	**170**	**240**	**80**	**3600**	*120*	*240*
Nickel	*130*[10]	*180*[10]	*53*[11]	*980*[10]	*230*	*800*
Vanadium	*410*	*1200*	*91*	*9000*	*2000*	*5000*
Copper	*2400*	*7100*	*520*	*68000*	*12000*	*44000*
Zinc	*3700*	*40000*	*620*	*730000*	*81000*	*170000*
Semi-Metals and non-metals						
Arsenic	**32**[12] 37	**35**[12] 40	**43**[12] 49	**640**[12] 640	*79* 79	*170* 170
Antimony		***550***		***7500***	***1500***	***3300***
Selenium	**350**	**600**	**120**	**13000**	*1100*	*1800*
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
$EC_{>5}$ - EC_6	*78*	*78*	*1700*	*5900*	*590000*	*130000*
$EC_{>6}$ - EC_8	*230*	*230*	*5600*	*17000*	*610000*	*220000*
$EC_{>8}$ - EC_{10}	*65*	*65*	*770*	*4800*	*13000*	*18000*
EC_{10}-EC_{12}	*330*	*330*	*4400*	*23000*	*13000*	*23000*
EC_{12}-EC_{16}	*2400*	*2400*	*13000*	*82000*	*13000*	*25000*
$EC_{>16}$ - EC_{35}	*92000*	*92000*	*270000*	*1700000*	*250000*	*480000*
$EC>_{35}$ - EC_{44}	*92000*	*92000*	*270000*	*1700000*	*250000*	*480000*
Aromatic risk banded hydrocarbons - TPHCWG method						
$EC>_5$ - EC_7	*140*	*690*	*27*	*46000*	*56000*	*84000*
$EC>_7$ - EC_8	*290*	*1800*	*51*	*110000*	*56000*	*95000*
$EC_{>8}$ - EC_{10}	*83*	*110*	*21*	*8100*	*5000*	*8500*
EC_{10} - EC_{12}	*180*	*590*	*31*	*28000*	*5000*	*9700*
EC_{12} - EC_{16}	*330*	*2300*	*57*	*37000*	*5100*	*10000*
$EC_{>16}$ - EC_{21}	*540*	*1900*	*110*	*28000*	*3800*	*7700*
$EC_{>21}$ - EC_{35}	*1500*	*1900*	*820*	*28000*	*3800*	*7800*
$EC>_{35}$ - EC_{44}	*1500*	*1900*	*820*	*28000*	*3800*	*7800*
Aliph + Arom EC >44-70	*1800*	*1900*	*2100*	*28000*	3800	7800
Aromatic						
Benzene	**0.16**	**0.49**	**0.035**	**50**	*72*	*100*
Ethyl benzene	**150**	**380**	**39**	**1200**[8] [35000]	**1200**[8] [*24000*]	**1200**[8] [*22000*]
Toluene	**270**	**1300**	**51**	**1900**[8] [110000]	**1900**[8] [*56000*]	**1900**[8] [*95000*]
Xylene[9]	**98**	**120**	**70**	**1200**[8] [14000]	**1200**[8] [*42000*]	**1200**[8] [*23000*]
Phenol	**290**	**420**	**140**	**1500**[14] (35000)	**1500**[14] (*10000*)	**1500**[14] (*8300*)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	*5.6*	*5.6*	*10*	*460*	*4900*	*1900*
Acenaphthylene	*420*	*4600*	*69*	*97000*	*15000*	*30000*
Acenaphthene	*510*	*4700*	*85*	*97000*	*15000*	*30000*
Fluorene	*400*	*3800*	*67*	*68000*	*9900*	*20000*
Phenanthrene	*220*	*1500*	*38*	*22000*	*3100*	*6200*
Anthracene	*5400*	*35000*	*950*	*540000*	*74000*	*150000*
Fluoranthene	*560*	*1600*	*130*	*23000*	*3100*	*6300*
Pyrene	*1200*	*3800*	*270*	*54000*	*7400*	*15000*
Benz(a)anthracene	*11*	*14*	*6.5*	*170*	*29*	*56*
Chrysene	*22*	*31*	*9.4*	*350*	*57*	*110*
Benzo(b)fluoranthene	*3.3*	*4.0*	*2.1*	*44*	*7.2*	*15*
Benzo(k)fluoranthene	*93*	*110*	*75*	*1200*	*190*	*410*
Benzo(a)pyrene	*2.7*	*3.2*	*2*	*35*	*5.7*	*12*
Indeno(123cd)pyrene	*36*	*46*	*21*	*510*	*82*	*170*
Dibenzo(ah)anthracene	*0.28*	*0.32*	*0.27*	*3.6*	*0.57*	*1.3*
Benzo(ghi)perylene	*340*	*360*	*470*	*4000*	*640*	*1500*
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	*0.00087*	*0.001*	*0.001*	*0.077*	*3.5*	*5*
Trichloroethene (TCE)	*0.034*	*0.036*	*0.091*	*2.6*	*120*	*91*
1,1,1,2 Tetrachlorethane	*2.8*	*3.5*	*1.9*	*250*	*1400*	*1800*
Tetrachlorethene (PCE)	*0.39*	*0.4*	*1.5*	*42*	*1400*	*1100*
1,1,1 Trichlorethane	*18*	*18*	*110*	*1300*	*140000*	*76000*

Notes

1. All values above are in mg/kg
2. **Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters**, *numbers in italics are S4ULs*, ***numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters*** and underlined numbers are C4SLs
3. Soil organic matter (SOM) is assumed to be 2.5% - DEFAULT VALUE
4. Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
5. For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
6. For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
7. For classrooms consider increasing the dust loading fator in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m^{-3}
8. Based on vapour saturation limt as suggested by EA / [ ] model value
9. Lowest of o-, m- and p-xylene
10. Based on comparison of inhalation exposure with inhalation TDI
11. Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
12. Based on a comparison of oral and dermal soil exposure with oral Index Dose only
13. Averaged over and based on lifetime exposure
14. Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
15. NA: Not applicable

Appendix A5 – Geotechnical Laboratory Testing Results

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/01571
Issue Number: 1 **Date:** 11 March, 2021

Client: Curtins Consulting (Manchester)
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

Project Manager: EBMA/Siobhán Hyde/Zoe Henderson
Project Name: Ancoats, Plot A
Project Ref: B076740
Order No: EBMA2692
Date Samples Received: 09/02/21
Date Instructions Received: 17/02/21
Date Analysis Completed: 11/03/21

Prepared by:

[redacted]

Melanie Marshall
Laboratory Coordinator

Approved by:

[redacted]

Danielle Brierley
Client Manager

Envirolab Job Number: 21/01571

Client Project Name: Ancoats, Plot A

Client Project Ref: B076740

Lab Sample ID	21/01571/1	21/01571/2	21/01571/3	21/01571/4	21/01571/5	21/01571/6	21/01571/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	R-A1	R-A1	R-A1	R-A1	R-A1	R-A1	R-A2			
Depth to Top	22.10	24.20	25.23	26.75	27.87	28.68	24.80			
Depth To Bottom	22.32	24.39	25.38	27.16	28.09	29.00	25.06			
Date Sampled	28-Jan-21	28-Jan-21	28-Jan-21	28-Jan-21	28-Jan-21	28-Jan-21	26-Jan-21			
Sample Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid			
Sample Matrix Code	7	7	7	7	7	7	7			
% Stones >10mm$_{A}$	<0.1	-	-	<0.1	-	-	-	% w/w	0.1	A-T-044
pH$_{D}^{M\#}$	8.78	-	-	8.56	-	-	-	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_{D}^{M\#}$	0.02	-	-	<0.01	-	-	-	g/l	0.01	A-T-026s
10.03a Point Load (PL) Index of a Single Specimen (Rock Sample) ISRM SM 1974-2006$_{A}^{\#}$	Appended	-	Appended	-	Appended	-	Appended	N/A		Subcon SS
10.04 Uniaxial / Unconfined Compressive Strength (Rock Sample) ISRM SM 1974-2006$_{A}^{\#}$	-	Appended	-	Appended	-	Appended	-	N/A		Subcon SS

Envirolab Job Number: 21/01571

Client Project Name: Ancoats, Plot A

Client Project Ref: B076740

Lab Sample ID	21/01571/8	21/01571/9	21/01571/10	21/01571/11				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	R-A2	R-A2	R-A2	R-A2						
Depth to Top	26.27	27.13	28.16	29.37						
Depth To Bottom	26.57	27.26	28.30	29.52						
Date Sampled	26-Jan-21	26-Jan-21	26-Jan-21	26-Jan-21						
Sample Type	Solid	Solid	Solid	Solid						
Sample Matrix Code	7	7	7	7						
% Stones >10mm$_{A}$	-	-	<0.1	-				% w/w	0.1	A-T-044
pH$_{D}^{M\#}$	-	-	9.03	-				pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_{D}^{M\#}$	-	-	<0.01	-				g/l	0.01	A-T-026s
10.03a Point Load (PL) Index of a Single Specimen (Rock Sample) ISRM SM 1974-2006$_{A}^{\#}$	-	Appended	Appended	Appended				N/A		Subcon SS
10.04 Uniaxial / Unconfined Compressive Strength (Rock Sample) ISRM SM 1974-2006$_{A}^{\#}$	Appended	-	-	-				N/A		Subcon SS

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. [redacted]

Client: Curtins Consulting (Manchester), Merchant Exchange, 17-19 Whitworth Street , Manchester, UK, M1 5WG

Project: Ancoats, Plot A

Clients Project No: B076740

Project No: 21/01571

Date Received: 17/02/2021 (am)

Cool Box Temperatures (°C): 6.0

Lab Sample ID	21/01571/1	21/01571/4	21/01571/10
Client Sample No			
Client Sample ID/Depth	R-A1 22.10-22.32m	R-A1 26.75-27.16m	R-A2 28.16-28.30m
Date Sampled	28/01/21	28/01/21	26/01/21
Deviation Code			
F	✓	✓	✓

Key

F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	21/01571/1	21/01571/4	21/01571/10
Client Sample No			
Client Sample ID/Depth	R-A1 22.10-22.32m	R-A1 26.75-27.16m	R-A2 28.16-28.30m
Date Sampled	28/01/21	28/01/21	26/01/21
Sulphate (water sol 2:1)	✓	✓	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

STRUCTURAL SOILS LTD

TEST REPORT

Report No. 784838 R1

1774

Date	05-March-2021	Contract	21/01571

Client Envirolab Ltd
Address Units 7 & 8 Sandpits Business Park
Mottram Road
Hyde
SK14 3AR

For the Attention of Holly Neary-King

Samples submitted by client	17/02/2021	Client Reference	21/01571
Testing Started	19/02/2021	Client Order No.	
Testing Completed	05/03/2021	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

Non - UKAS Accredited Tests Undertaken

Point Load Index ISRM:1974-2006

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ Tel.01977 552255. E-mail luke.fisher@soils.co.uk

DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A1	21/01571/1	22.10	D	228.52	99.74	2.128	100	0.21	1.36	0.29 (✓)	10	Brown MUDSTONE	C
R-A1	21/01571/1	22.10	A	99.74	108.45	2.768	117	0.20	1.47	0.30 (✓)	10	Brown MUDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **0.3** MN/m^2
$I_s(50)$ Mean Diametral tests = **0.29** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **1.01** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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Castleford
W. Yorkshire WF10 1NJ

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Contr

Compiled By	Date
LORNA WHITWORTH	05.03.21

21/01571

Contract Ref:

784838

AGS

DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A1	21/01571/2	24.20	D	192.79	100.09	1.883	100	0.19	1.37	0.26 (✓)	6.9	Brown SANDSTONE	C
R-A1	21/01571/2	24.20	A	100.07	59.21	2.203	87	0.29	1.28	0.37 (✓)	6.9	Brown SANDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **0.37** MN/m^2
$I_s(50)$ Mean Diametral tests = **0.26** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **1.46** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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[redacted]

Compiled By	Date
LORNA WHITWORTH	05.03.21

21/01571

Contract Ref: 784838

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DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A1	21/01571/3	25.23	I	66.99	39.7	0.430	58	0.13	1.07	0.14	8.7	Brown MUDSTONE	C
R-A1	21/01571/3	25.23	I	102.87	54.28	0.238	84	0.03	1.27	0.04	8.7	Brown MUDSTONE	C

Results

Unable to calculate $I_a(50)$ Strength Anisotropy Index from this dataset.
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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Compiled By: LORNA WHITWORTH

Date: 05.03.21

Contract: 21/01571

Contract Ref: 784838

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DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A1	21/01571/4	26.75	D	190.87	87.63	0.221	88	0.03	1.29	0.04 (✓)	5.9	Brown MUDSTONE	C
R-A1	21/01571/4	26.75	A	87.63	69.14	0.678	88	0.09	1.29	0.11 (✓)	5.9	Brown MUDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **0.11** MN/m^2
$I_s(50)$ Mean Diametral tests = **0.04** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **3.06** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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Compiled By: LORNA WHITWORTH

Date: 05.03.21

21/01571

Contract Ref: 784838

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DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A1	21/01571/5	27.87	D	213.61	93.4	1.227	93	0.14	1.32	0.19 (✓)	8.5	Brown MUDSTONE	C
R-A1	21/01571/5	27.87	A	93.4	89.11	1.949	103	0.18	1.38	0.25 (✓)	8.5	Brown MUDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **0.25** MN/m^2
$I_s(50)$ Mean Diametral tests = **0.19** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **1.37** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
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[redacted] ompiled By: LORNA WHITWORTH
Date: 05.03.21
Con[redacted]
21/01571
Contract Ref: 784838

AGS

DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A1	21/01571/6	28.68	D	272.85	93.47	1.031	93	0.12	1.33	0.16 (✓)	6.2	Brown SANDSTONE	C
R-A1	21/01571/6	28.68	D	160.49	98.82	1.100	99	0.11	1.36	0.15 (✓)	6.2	Brown SANDSTONE	C
R-A1	21/01571/6	28.68	A	98.82	68.5	2.648	93	0.31	1.32	0.41 (✓)	6.2	Brown SANDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **0.41** MN/m^2
$I_s(50)$ Mean Diametral tests = **0.15** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **2.62** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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[redacted]

Compiled By: LORNA WHITWORTH

Date: 05.03.21

C[redacted]

21/01571

Contract Ref: 784838

AGS

DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A2	21/01571/7	24.80	D	91.8	98.05	0.058	98	0.01	1.35	0.01 (✓)	13	Brown MUDSTONE	C
R-A2	21/01571/7	24.80	A	98.05	36.83	0.036	68	0.01	1.15	0.01 (✓)	13	Brown MUDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **0.01** MN/m^2
$I_s(50)$ Mean Diametral tests = **0.01** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **1.1** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

[redacted]

Compiled By: **LORNA WHITWORTH**

Date: **05.03.21**

Contr

21/01571

Contract Ref: **784838**

AGS

DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A2	21/01571/8	26.27	D	212.54	92.01	3.982	92	0.47	1.32	0.62 (✓)	10.0	Brown SANDSTONE	C
R-A2	21/01571/8	26.27	D	217.55	96.32	5.934	96	0.64	1.34	0.86 (✓)	10.0	Brown SANDSTONE	C
R-A2	21/01571/8	26.27	A	96.32	78.58	4.806	98	0.50	1.35	0.68 (✓)	10.0	Brown SANDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **0.68** MN/m^2
$I_s(50)$ Mean Diametral tests = **0.74** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **1.09** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

[redacted]

Compiled By: LORNA WHITWORTH

Date: 05.03.21

Contract Ref: 784838

21/01571

DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A2	21/01571/9	27.13	D	152.4	103.01	0.072	103	0.01	1.38	0.01 (✓)	11	Brown SANDSTONE	C
R-A2	21/01571/9	27.13	A	103.01	52.31	0.097	83	0.01	1.26	0.02 (✓)	11	Brown SANDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **0.02** MN/m^2
$I_s(50)$ Mean Diametral tests = **0.01** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **1.89** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

[redacted]

Compiled By: LORNA WHITWORTH
Date: 05.03.21
Contract Ref: 784838
21/01571

DETERMINATION OF POINT LOAD STRENGTH

In accordance with ISRM 1974-2006

Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A2	21/01571/10	28.16	D	144.95	86.34	29.075	86	3.90	1.28	4.99 (✓)	3.3	Brown SANDSTONE	C
R-A2	21/01571/10	28.16	A	86.34	40.68	18.992	67	4.25	1.14	4.84 (✓)	3.3	Brown SANDSTONE	C
R-A2	21/01571/10	28.16	A	81.45	69.03	30.923	85	4.32	1.27	5.47 (✓)	3.3	Brown SANDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **5.16** MN/m^2
$I_s(50)$ Mean Diametral tests = **4.99** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **1.03** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
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DETERMINATION OF POINT LOAD STRENGTH

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Exploratory Position ID	Sample Ref	Depth (m)	Type of Test	Width or Length (W or L) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MN/m^2)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MN/m^2)	Water Content (%)	Rock Type	Lab location
R-A2	21/01571/11	29.37	D	184.9	92.72	0.045	93	0.01	1.32	0.01 (✓)	12	Brown MUDSTONE	C
R-A2	21/01571/11	29.37	A	92.72	67.99	0.119	90	0.01	1.30	0.02 (✓)	12	Brown MUDSTONE	C

Results

$I_s(50)$ Mean Axial tests = **0.02** MN/m^2
$I_s(50)$ Mean Diametral tests = **0.01** MN/m^2
$I_a(50)$ Strength Anisotropy Index = **2.79** (calculated from highest and lowest diametral and axial $I_s(50)$ ratio)
Note: Size Correction Factor (F) calculated using $F = (D_e/50)^{0.45}$ (where D_e is equivalent core diameter).

Key

Type of Test column:, A = Axial, D = Diametral, I = Irregular, B = Block, L = Parallel, P = Perpendicular, [NS] denotes Non-standard Test.
Point Load Index column: (✓) = included in mean calculations, (χ) = excluded from mean calculations
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Compiled By	Date
LORNA WHITWORTH	05.03.21

21/01571

Contract Ref: 784838

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TESTING VERIFICATION CERTIFICATE

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **05/03/2021 10:49:13**.

Testing reported after this date is not covered by this Verification Certificate.

[redacted]

Approved Signatory
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	Contract:	Job No:
STRUCTURAL SOILS LTD	**21/01571**	**784838**

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Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 05/03/21 - 10:49 | LF1 |