

Ref: 15-395-L1
Date: 6th September 2023

Richard Hutchinson
CHALLENGER BUILDING SERVICES LTD
140 Lee Lane
Horwich
Bolton
BL6 7AF

BY Email

RB17 GROUND GAS ASSESSMENT SULBY STREET, SALFORD

1. BACKGROUND AND OBJECTIVES

E3P are acting as the Geoenvironmental Engineer to Challenger Building Services Ltd to produce an RB-17 ground gas assessment with respect to the proposed scheme to construct a new residential development on a parcel of land located to the north of Sulby Street, herein referred to as the Site.

Challenger Building Services has recently received comments from the planners regarding the updated Phase II report (Ref: 15-395-R2-2; dated August 2023) to clear Condition 7 for any additional monitoring beneath the existing structure.

2. PREVIOUS REPORTS

The initial ground investigation was undertaken based on the findings of the desk study, with exploratory holes advanced to target specific potential contaminant sources including the general ground conditions, any obstructions, and the historical infilled pond.

The following previous reports have been completed for the site:

- ✿ E3P – Phase II Geoenvironmental Site Assessment – Sulby Street, Manchester. (Ref: 15-395-R2-2), dated August 2023.

A Remediation Strategy was also completed for the site, which indicated a supplementary investigation was required following the demolition of the existing St Luke's Social Club.

- ✿ E3P – Remediation and Enabling Works Strategy – Sulby Street, Manchester. (Ref: 15-395-R3-1), dated March 2023.

E3P completed a supplementary intrusive site investigation in the position of the former St Lukes's Social Club following its demolition and in the vicinity of historically mapped infilled pond feature in July 2023.

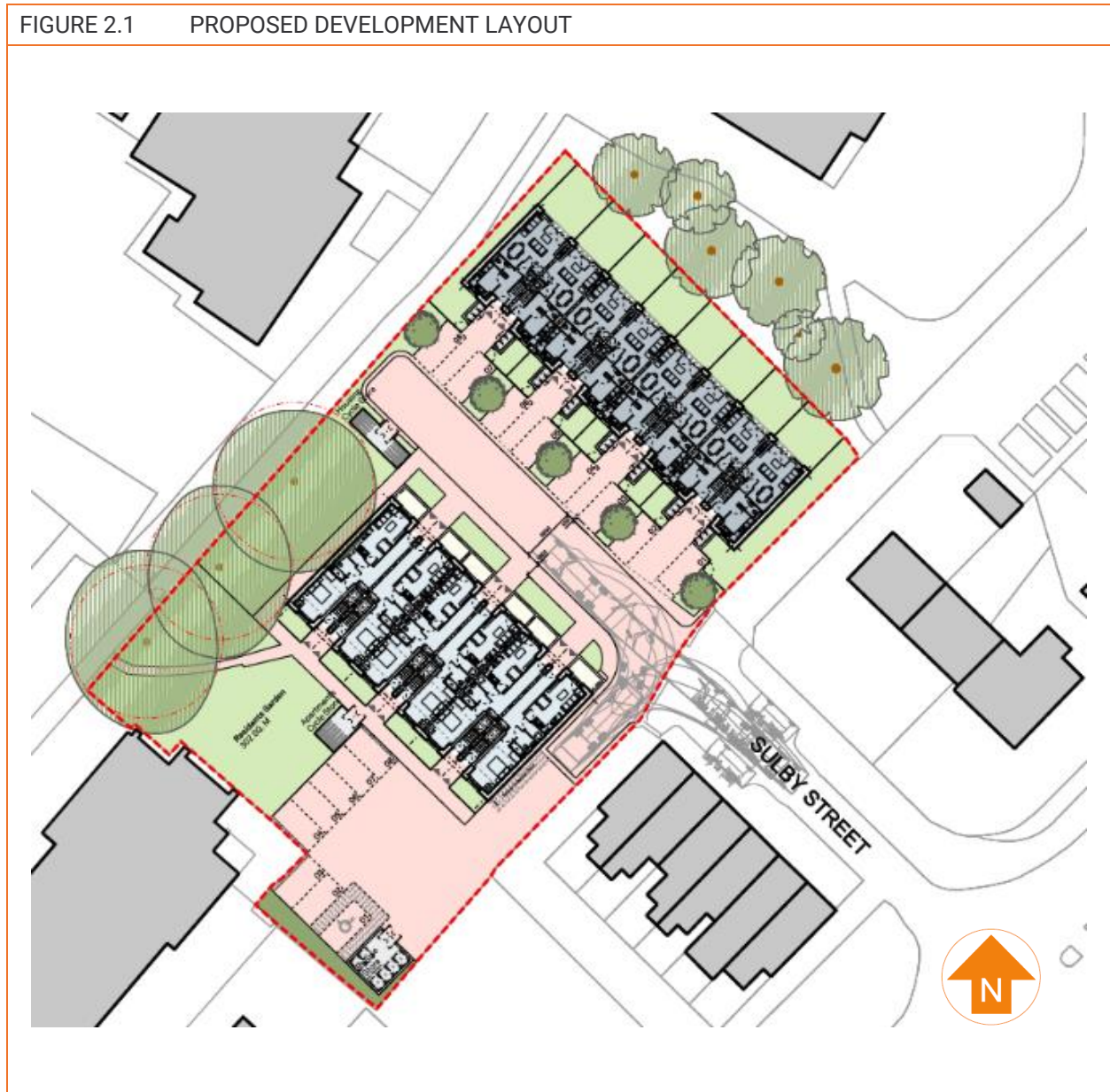


2.1. PROPOSED DEVELOPMENT

Challenger Homes intends to construct eight townhouses and twelve apartments with associated adopted estate roads, landscaping/private gardens, and utility infrastructure.

The Proposed Development Layout is presented in Drawing 15-395-002 within Figure 2.1 below and Appendix I.

FIGURE 2.1 PROPOSED DEVELOPMENT LAYOUT



3. GROUND GAS

A full ground gas risk assessment was undertaken in the accessible areas of the site prior to the demolition of the building (Ref: Ground Gas Addendum Report – 15-395-R4-1; July 2023). The main points of the assessment are summarised below.

- ✿ Ground gas monitoring suggests that the site can be classified as CS1, and it is considered that gas protection measures will not be required.
- ✿ Marginally elevated CO₂ readings have been identified during visit 6 in WS101 and WS102, during a period of low pressure, no further elevated readings have been noted. Further assessment was carried out on the data and plotted the gas concentrations on the Land Quality Management (LQM) gas composition ternary plot tool.
- ✿ As all of the data points plot within either the zone indicative of ambient air or the area indicative of air / CO₂ mixing there no further validation sampling is required and the marginally elevated CO₂ and the depleted O₂ are not seen to be risk to the future development.
- ✿ Made Ground has been encountered in localised areas at a maximum depth of 2.50m bgl but more generally was encountered at a depth less than 1.00m bgl.
- ✿ The site is predominantly CLAY at depths of 0.28m bgl to 5.45 m bgl.

A supplementary phase of trial pits were undertaken in July 2023 (TP101 to TP103) in the area of the former building. At the time of the supplementary investigation, foundations had been constructed for the proposed building in the north of the site, and therefore investigations were limited.

Due to the progression of site construction, the installation of monitoring wells and ground gas monitoring was not considered appropriate, and therefore an RB17 was undertaken to assess the ground gas risk in the northern area of the site.

The area is underlain by shallow Made Ground deposits between 0.20m bgl and 1.80m bgl, and therefore an RB17 assessment has been undertaken using the chemical analysis samples taken of the soils in the area of the former building (TP101 to TP103).

It was also concluded that the historic infilled pond was not encountered during the supplementary investigation at TP104 and TP105. Therefore, there is not considered to be a possible source of ground gas.

3.1. RB17 APPROACH

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIEH Research Bulletin 17 *A Pragmatic Approach to Ground Gas Risk Assessment* (RB17).

This approach is considered appropriate given the age and limited thickness of Made Ground identified. The desk-based analysis and subsequent ground investigations has identified the following potential sources of ground gas:

- ✿ Made Ground.



Mine gas is not considered to be a risk to the site.

Given the low sensitivity of the site with respect to hazardous ground gas, it was considered that a ground gas assessment undertaken in accordance with the latest guidance provided by CL:AIRE in their research bulletin RB17 would be suitable.

CL:AIRE Research Bulletin RB17 provides an alternative framework for the investigation and assessment of ground gas that takes into account other factors such as site history and the nature of the ground conditions beneath a site. It has been prepared to allow gas well installation and monitoring to be avoided where appropriate and may also be used in conjunction with gas monitoring to reduce the monitoring period or to avoid extra gas monitoring where anomalous results are recorded.

3.2. RB17 ASSESSMENT

TABLE 3.1 RB17 GROUND GAS RISK ASSESSMENT

ITEM	OUTCOME	ACTION	RISK SCORE
Have any credible OFF SITE ground gas sources been identified within the Desk Study & ICSM that would include: <i>Registered landfill within 250m; Historical landfill; Infilled pond within 50m; Infilled ground 100m.</i>	No	A historical landfill site is located 169m north east of the site.	Low
Is the site located within close proximity to a variable groundwater regime (river or tidal) that could potentially influence the ground gas regime.	No	None.	Very Low
Has a credible pathway for the migration of gas from historical mine workings been identified.	No	The site is not situated within a Development High Risk Area.	Very Low
Average depth of Made Ground >5.0m	No	No Made Ground over 1.80mbgl recorded.	Very Low
Average depth Made Ground >3.0m	No	As above.	Very Low



ITEM	OUTCOME	ACTION	RISK SCORE
Average Depth Made Ground >1.0m	Yes	Made Ground was encountered to a maximum depth of 1.80 m bgl (TP103) within the supplementary ground investigation. However in the initial investigation, Made Ground was encountered at WS101 at 2.50m bgl. Although in general, beneath the former building footprint, the Made Ground was encountered at less than 0.70m bgl.	Low
TOC <1	Yes	TOC of 0.70% recorded within the underlying natural soils at TP101 at 1.50m bgl.	Very Low
TOC 1-3	Yes	TOC of 1.00% - 1.90% recorded within the underlying shallow Made Ground and natural CLAY.	Very Low
TOC >3	No	None recorded.	Very Low
Made Ground In-situ >20 Years	Yes	The historical maps indicate the building in the north of the site was present from 1931, with minimal historical development prior to this time. However, given the historic development the Made Ground was potentially in-situ for >50 years.	Very Low
Only natural soils with no potential to generate CH4	Yes	Made Ground present to a depth between 0.20m bgl and 1.80m bgl beneath the former building, that has the potential to contain material that may degrade and form CH4.	Very Low
Recorded coal gas emission	No	None	Very Low
Radon Protection Measures Required	No	None	Very Low
Risk Score			Very Low



3.3. RB17 CONCLUSION

The RB17 assessment indicates a very low risk with a high sensitivity end use as British Standard BS8485:2015+A1(2019) has assessed the building type to be a Type B Building.

The gas monitoring confirmed the average carbon dioxide and methane concentrations are less than 5% and 1%, respectively and there is no evidence of pressure driven (advective) flow or persistent gas flow.

In addition, the RB17 assessment using chemical analysis of the soils confirms there is no evidence of material that could cause surface emissions of gas at volume which would pose a risk to future site users, as indicated within Scenario 3 in Table A1 of the CL:AIRE RB17 Research Bulletin (November 2012). This scenario states that no ground gas monitoring or gas protection measure are required in areas where natural soils with low organic content have been identified at less than 1.00m of Made Ground that comprises general infill and car park construction materials, e.g. Made Ground over London Clay, Mercia Mudstone, Lias Clay, Chalk, Gault Clay, Glacial Til.

The Made Ground soils are typically less than 1.00m deep across the site and underlain by Glacial Till and in summary the site is deemed to have a low ground gas generation potential based on the lines of evidence. Therefore, the site falls under Characteristic Situation 1 and no ground gas protection measures are required.

I trust this information is satisfactory to your requirements, and should I be able to be of any further assistance, please do not hesitate to contact me.

Yours sincerely,

For and on behalf of E3P Ltd

Written by
Elizabeth Fearn
Geoenvironmental Project Manager

Approved by
Alex Smith
Associate Director

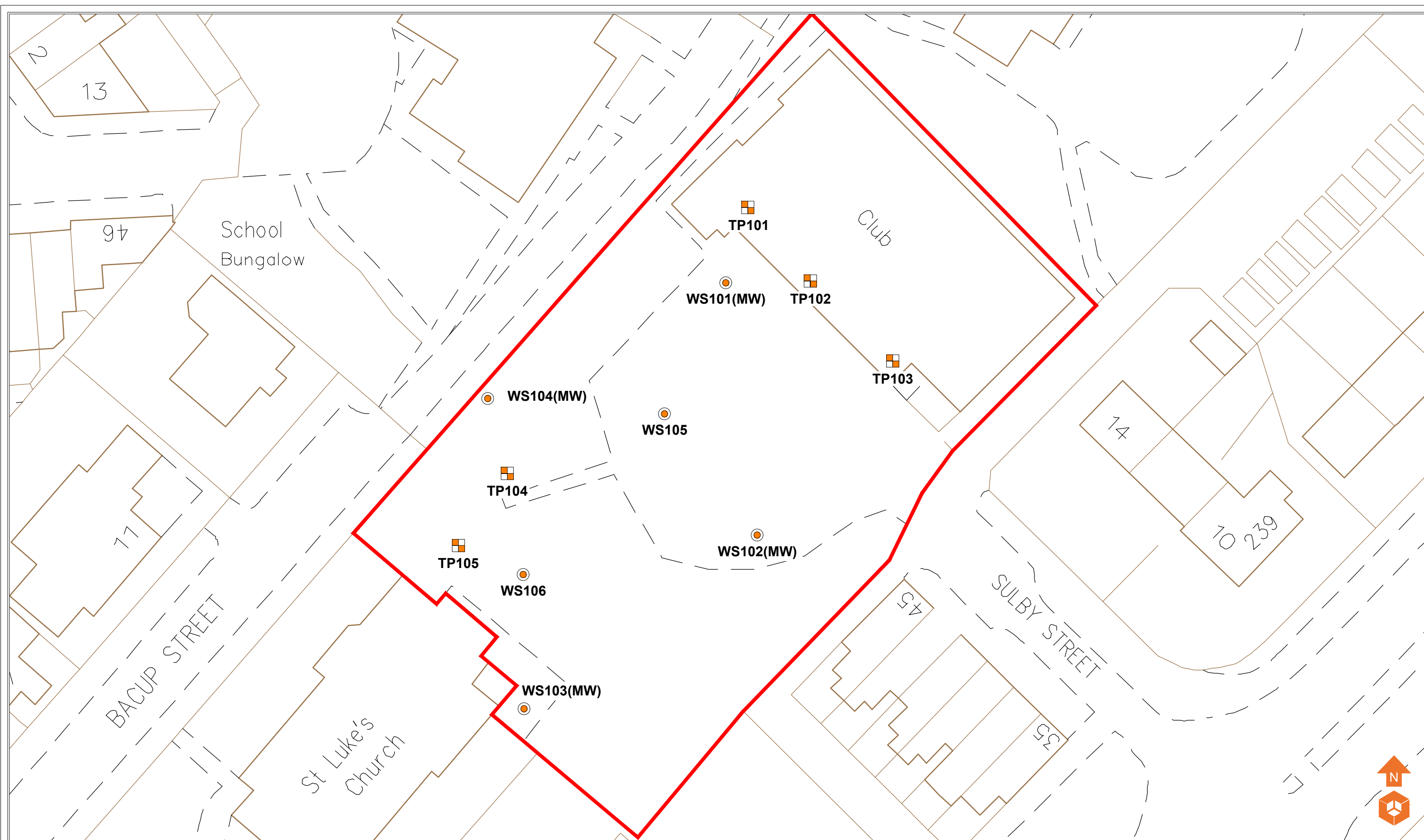
Enclosed

Appendix I Drawings
16-169-005 – Exploratory Hole Plan
Appendix II Chemical Analysis Results - 23-45684 I2 Analytical Report; July 2023



APPENDIX I

DRAWINGS



Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install
- Approximate Trial Pit Location

Notes:

P1	REVB	24.07.2023	CB	MJ
P1	REVA	06.01.2023	OW	NG
Phase	Issue	Date	Drawn	Checked

Client:

Challenger Homes

Job Title:

Sulby Street, Moston

Job No:

15-395

Drawing No:

005

Date:

24.07.2023

Scale:

NTS @ A3

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APPENDIX II

CHEMICAL ANALYSIS

TESTING RESULTS

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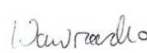
e: mjackson@e3p.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 23-45684

Project / Site name:	Sulby Street, Manchester	Samples received on:	18/07/2023
Your job number:	15-395	Samples instructed on/ Analysis started on:	18/07/2023
Your order number:	005537	Analysis completed by:	24/07/2023
Report Issue Number:	1	Report issued on:	24/07/2023
Samples Analysed:	1 leachate sample - 6 soil samples		


Signed:

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-45684
Project / Site name: Sulby Street, Manchester
Your Order No: 005537

Lab Sample Number				2752021	2752022	2752023	2752024	2752025
Sample Reference				TP101	TP101	TP102	TP103	TP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	0.15	0.50	1.60
Date Sampled				17/07/2023	17/07/2023	17/07/2023	17/07/2023	17/07/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	19	14	16	20	20
Total mass of sample received	kg	0.001	NONE	0.8	0.3	0.3	0.3	0.8

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DSA	DSA	DSA	DSA	DSA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7	7.3	7.6	7.2	7.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	1.1	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	710	160	740	840	250
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.16	0.016	0.16	0.24	0.034
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	320	31	320	480	68
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	161	15.6	158	242	34.2
Sulphide	mg/kg	1	MCERTS	4.5	< 1.0	5.5	11	9.8
Total Sulphur	mg/kg	50	MCERTS	610	84	710	830	600
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.7	0.7	1.6	1.9	1.1

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.8	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.1	0.07	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.75	< 0.05	0.53	0.67	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.45	< 0.05	0.56	0.57	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	4.4	< 0.05	3.5	4.9	0.33
Anthracene	mg/kg	0.05	MCERTS	0.85	< 0.05	0.59	0.83	0.06
Fluoranthene	mg/kg	0.05	MCERTS	6.3	< 0.05	3.6	5.7	0.52
Pyrene	mg/kg	0.05	MCERTS	5.6	< 0.05	3.2	5.8	0.57
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.4	< 0.05	1.2	2.3	0.23
Chrysene	mg/kg	0.05	MCERTS	2.5	< 0.05	1.4	2.4	0.25
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	2.8	< 0.05	1.3	2.7	0.32
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.79	< 0.05	0.49	0.77	0.09
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.9	< 0.05	0.96	2.1	0.16
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1	< 0.05	0.51	1.1	0.12
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.3	< 0.05	0.14	0.35	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.2	< 0.05	0.63	1.4	0.14

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	31.3	< 0.80	18.7	33.4	2.79
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Analytical Report Number: 23-45684
Project / Site name: Sulby Street, Manchester
Your Order No: 005537

Lab Sample Number				2752021	2752022	2752023	2752024	2752025
Sample Reference				TP101	TP101	TP102	TP103	TP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	0.15	0.50	1.60
Date Sampled				17/07/2023	17/07/2023	17/07/2023	17/07/2023	17/07/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	8.7	11	14	9.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	28	20	28	29
Copper (aqua regia extractable)	mg/kg	1	MCERTS	73	32	33	40	35
Lead (aqua regia extractable)	mg/kg	1	MCERTS	68	13	40	58	25
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	28	40	19	28	38
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	130	61	64	79	73

Petroleum Hydrocarbons

TPH (C5 - C6) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	15	< 10	12	< 10	< 10
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	44	< 10	43	18	11
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	NONE	< 10	< 10	12	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	NONE	66	< 10	68	29	23

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-45684
 Project / Site name: Sulby Street, Manchester
 Your Order No: 005537

Lab Sample Number				2752026
Sample Reference				TP103
Sample Number				None Supplied
Depth (m)				2.00
Date Sampled				17/07/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	14
Total mass of sample received	kg	0.001	NONE	0.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DSA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	270
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.076
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	150
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	76.4
Sulphide	mg/kg	1	MCERTS	1.2
Total Sulphur	mg/kg	50	MCERTS	200
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.12
Fluorene	mg/kg	0.05	MCERTS	0.13
Phenanthrene	mg/kg	0.05	MCERTS	0.9
Anthracene	mg/kg	0.05	MCERTS	0.15
Fluoranthene	mg/kg	0.05	MCERTS	1.3
Pyrene	mg/kg	0.05	MCERTS	1.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.4
Chrysene	mg/kg	0.05	MCERTS	0.59
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.52
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.23
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.34
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.21
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.31

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	6.38
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Analytical Report Number: 23-45684
 Project / Site name: Sulby Street, Manchester
 Your Order No: 005537

Lab Sample Number					2752026
Sample Reference					TP103
Sample Number					None Supplied
Depth (m)					2.00
Date Sampled					17/07/2023
Time Taken					None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	43	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	26	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	39	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	78	

Petroleum Hydrocarbons

TPH (C5 - C6) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	
TPH (C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	< 2.0	
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	< 4.0	
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	< 10	
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	13	
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	NONE	< 10	
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	NONE	21	

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



4041



Analytical Report Number: 23-45684

Project / Site name: Sulby Street, Manchester

Your Order No: 005537

Lab Sample Number	2752027			
Sample Reference	TP103			
Sample Number	None Supplied			
Depth (m)	1.60			
Date Sampled	17/07/2023			
Time Taken	None Supplied			
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status	

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	7.6
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	2.1
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	1.1
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.8
Copper (dissolved)	µg/l	0.7	ISO 17025	11
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.7
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	4.8

Monoaromatics & Oxygenates

Benzene	µg/l	3	ISO 17025	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0##
p & m-xylene	µg/l	3	ISO 17025	< 3.0##
o-xylene	µg/l	3	ISO 17025	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10



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Analytical Report Number: 23-45684

Project / Site name: Sulby Street, Manchester

Your Order No: 005537

Lab Sample Number	2752027			
Sample Reference	TP103			
Sample Number	None Supplied			
Depth (m)	1.60			
Date Sampled	17/07/2023			
Time Taken	None Supplied			
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status	

Petroleum Hydrocarbons

TPH1 (C10 - C40) EH_ID_TOTAL_MS	µg/l	10	NONE	< 10
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TPH-CWG - Aliphatic >C5 - C6 HS_ID_AL	µg/l	1	ISO 17025	< 1.0#
TPH-CWG - Aliphatic >C6 - C8 HS_ID_AL	µg/l	1	ISO 17025	< 1.0#
TPH-CWG - Aliphatic >C8 - C10 HS_ID_AL	µg/l	1	ISO 17025	< 1.0#
TPH-CWG - Aliphatic >C10 - C12 EH_ID_AL_MS	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16 EH_ID_AL_MS	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21 EH_ID_AL_MS	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35 EH_ID_AL_MS	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35) HS+EH_ID_AL_MS	µg/l	10	NONE	< 10

TPH-CWG - Aromatic >C5 - C7 HS_ID_AR	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8 HS_ID_AR	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10 HS_ID_AR	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12 EH_ID_AR_MS	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16 EH_ID_AR_MS	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21 EH_ID_AR_MS	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35 EH_ID_AR_MS	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35) HS+EH_ID_AR_MS	µg/l	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2752021	TP101	None Supplied	0.5	Brown clay and loam.
2752022	TP101	None Supplied	1.5	Brown clay and sand.
2752023	TP102	None Supplied	0.15	Brown clay and sand.
2752024	TP103	None Supplied	0.5	Brown clay and sand.
2752025	TP103	None Supplied	1.6	Brown clay.
2752026	TP103	None Supplied	2	Brown clay.

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Project / Site name: Sulby Street, Manchester

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

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Project / Site name: Sulby Street, Manchester

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS

Analytical Report Number : 23-45684

Project / Site name: Sulby Street, Manchester

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC. Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

- Quality control parameter has a high recovery (outside of limit); however the associated result is below the reporting limit, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.