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Ref: 15-707-L1
Date: 18th January 2023

Bellway Homes Manchester
304 Bridgewater Place
Birchwood
Warrington
Cheshire
WA3 6XG

By Email

Dear Sir/Madam,

HOTSPOT VALIDATION LETTER SOUTH HEYWOOD PHASE 1

1. BACKGROUND

E3P previously completed a Phase II Geoenvironmental Site Assessment for the subject site (Ref: 12-709-R1) dated October 2018.

The sampling identified the presence of marginally elevated benzo(b)fluoranthene in TP120 and TP126 and dibenzo(a,h)anthracene in TP120. The exceedances were recorded in the shallow topsoil deposits at 0.20 m bgl.

In the case of non-volatile PAH compounds the viable exposure pathway is associated direct contact and ingestion of soil. Therefore it was recommended that during a process of cut fill enabling works, a hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity.

2. VALIDATION SAMPLING

A hotspot removal was completed at two locations where exceedances were previously identified within TP120 and TP126 on 3rd August 2022. Material was excavated in a 3m x 3m area down to natural strata, typically between 0.30-0.40 m bgl.

Samples from the sidewalls and base of the excavations along with the excavated arisings were submitted for chemical analysis.

Exceedances were noted in the north, east and west sidewalls during the initial excavation of TP120, therefore further material was excavated an additional 1.50m laterally in each direction, and additional samples were taken on 25th August 2022.

The chemical testing results are included in I2 Analytical Reports Ref: 22-75631 and 22-80695 (attached). The validation sample locations are shown on Drawing 15-707-018 (attached).

At Tier 1 stage, the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published in LQM/CIEH S4UL (S4UL3267).

The results of this comparison have been summarised within Table 2.1.

TABLE 2.1 SUMMARY OF INORGANIC AND HYDROCARBON TOXICITY ASSESSMENT FOR A RESIDENTIAL END USE

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Arsenic	mg/kg	37	2	18	-	1	No Further Action
Cadmium	mg/kg	11	2	<0.2	-	1	No Further Action
Chromium (VI)	mg/kg	6.0	2	-	-	1	No Further Action
Lead	mg/kg	200	2	95	-	1	No Further Action
Mercury	mg/kg	1.2	2	<0.3	-	4	No Further Action
Nickel	mg/kg	130	2	13	-	1	No Further Action
Selenium	mg/kg	250	2	<1.0	-	1	No Further Action
Copper	mg/kg	2400	2	84	-	1	No Further Action
Zinc	mg/kg	3700	2	87	-	1	No Further Action
Cyanide – Total	mg/kg	791	2	1.0	-	1	No Further Action
Phenols – Total	mg/kg	120	2	<1.0	-	1	No Further Action
Asbestos	Fibres	NFD	2	NFD	-	3	No Further Action
Naphthalene	mg/kg	2.3	15	0.25	-	4	No Further Action
Acenaphthylene	mg/kg	170	15	<0.05	-	2	No Further Action
Acenaphthene	mg/kg	210	15	2.4	-	1	No Further Action
Fluorene	mg/kg	170	15	1.6	-	1	No Further Action
Phenanthrene	mg/kg	95	15	16	-	2	No Further Action
Anthracene	mg/kg	2400	15	4.2	-	2	No Further Action
Fluoranthene	mg/kg	280	15	17	-	2	No Further Action
Pyrene	mg/kg	620	15	15	-	2	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	15	8.3	TP126 Arisings	2	Further Action
Chrysene	mg/kg	15	15	5.6	-	2	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	15	6.2 5.4 4.0 3.4 2.8	TP126 Arisings TP120 East TP120 West TP120 North TP120 Arisings	2	Further Action

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Benzo(k)Fluoranthene	mg/kg	77	15	3.4	-	2	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	15	6.4 5.2 3.6 3.5 2.7 2.5	TP126 Arisings TP120 East TP120 North TP120 West TP120 Arisings TP120 E2	2	Further Action
Indeno(123-cd)Pyrene	mg/kg	27	15	2.6	-	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	15	0.75 0.56 0.38	TP120 East TP120 West TP120 Arisings	2	Further Action
Benzo(ghi)Perylene	mg/kg	320	15	3.3	-	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	2	<1.0	-	4	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	2	<0.1	-	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	2	<0.1	-	4	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	74	2	3.7	-	4	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	140	2	11	-	4	No Further Action
TPH C16-C21 (aromatic)*	mg/kg	260	2	29	-	1	No Further Action
TPH C21-C35 (aromatic)*	mg/kg	1100	2	54	-	1	No Further Action

Notes

PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants

Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration; Loc of Ex = location of exceedance; NFD = no fibres detected.

* The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 1 values for aromatic compound for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

Referring to Table 2.1, the result of this direct comparison indicates that the data exceeds the screening criteria for a residential end use for the following contaminants:

- ✳ Benzo(a)Anthracene
- ✳ Benzo(b)Fluoranthene
- ✳ Benzo(a)Pyrene
- ✳ Dibenzo(a,h)Anthracene

The initial sampling at TP120 identified exceedances in the north, east and west sidewalls. The further sampling in this location (TP120 N2, E2, W2) identified one minor exceedance for benzo(a)pyrene in sample TP120 E2 (2.5 mg/kg). No further exceedances were identified in the sidewall and base samples.

When compared to the S4UL for benzo(a)pyrene at 2.5 % SOM (2.7 mg/kg) no exceedances are identified. This is applicable given the identified TOC of 5.4 % in this sample which equates to 9.29 % SOM.

No exceedances were identified in the sidewall and base samples from TP126.

Exceedances for benzo(a)anthracene, benzo(b)fluoranthene and benzo(a)pyrene were recorded in TP126 arisings. Exceedances for benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene were recorded in TP120 arisings.

3. CONCLUSIONS AND RECOMMENDATIONS

The hotspot sampling confirms that no exceedances remain in the sidewalls or base samples at TP120 and TP126.

The hotspot arisings from TP120 and TP126 were stockpiled on Visqueen for placement in an area of low sensitivity such as POS.

Further sampling will be completed of the stockpiled topsoil during remediation and enabling works to confirm the suitability for re-use. Stockpiled materials including site-won and imported soils will be carefully managed throughout the duration of the works to ensure no cross-contamination occurs.

The installation of a suitable cover system is recommended in proposed garden areas in the vicinity of TP120 and TP126 and in areas of Made Ground to remove any potential for direct exposure to impacted soils.

Across the remainder of the site, no specific clean cover to mitigate risk from contaminants is required, however the NHBC will require the construction of gardens with a suitable growing medium that comprises as a minimum 150mm topsoil over 150mm sub-soil.

I trust that the content of this letter is suitable for your requirements; however, should you require any additional information, please do not hesitate to contact me.

Yours sincerely,
For and on behalf of E3P Ltd

Written by;
Nicola Dawson
Geoenvironmental Project Manager

Reviewed by;
Alex Smith
Associate Director



Attached:

-  Photographs
-  Chemical Laboratory Test Results
-  Hotspot Validation Sampling Plan

PLATE 1 TP126 HOTSPOT EXCAVATION



PLATE 2 TP120 HOTSPOT EXCAVATION



PLATE 3

TP120 HOTSPOT EXTENSION



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Analytical Report Number : 22-75631

Project / Site name:	South Heywood Phase 1	Samples received on:	03/08/2022
Your job number:	15-707	Samples instructed on/ Analysis started on:	03/08/2022
Your order number:		Analysis completed by:	11/08/2022
Report Issue Number:	1	Report issued on:	11/08/2022
Samples Analysed:	12 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: 22-75631
Project / Site name: South Heywood Phase 1

Lab Sample Number	2375232	2375233	2375234	2375235	2375236
Sample Reference	TP126 North	TP126 East	TP126 South	TP126 West	TP126 Base
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	03/08/2022	03/08/2022	03/08/2022	03/08/2022	03/08/2022
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
Moisture Content	%	0.01	NONE	23	19
Total mass of sample received	kg	0.001	NONE	0.5	0.5

Asbestos in Soil	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	-	-	-
Total Cyanide	mg/kg	1	MCERTS	-	-	-	-	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	-	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-	-	-	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-	-	-	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-	-	-	-	-
Sulphide	mg/kg	1	MCERTS	-	-	-	-	-
Total Sulphur	mg/kg	50	MCERTS	-	-	-	-	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	6.4	7.1	7.1	7.4	1
Total Organic Carbon (TOC) - Manual	%	0.1	MCERTS	-	-	-	-	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.46	0.41	< 0.05	0.36	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	1.1	1	0.77	0.81	< 0.05
Pyrene	mg/kg	0.05	MCERTS	1.1	0.99	0.71	0.78	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.74	0.78	0.51	0.59	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.64	0.52	0.45	0.42	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.79	0.58	0.5	0.45	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.54	0.51	0.3	0.35	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.8	0.67	0.52	0.52	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.4	0.34	< 0.05	0.28	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.43	0.46	< 0.05	0.3	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	7.01	6.28	3.76	4.86	< 0.80
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Analytical Report Number: 22-75631
Project / Site name: South Heywood Phase 1

Lab Sample Number	2375232	2375233	2375234	2375235	2375236
Sample Reference	TP126 North	TP126 East	TP126 South	TP126 West	TP126 Base
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	03/08/2022	03/08/2022	03/08/2022	03/08/2022	03/08/2022
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	-	-	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-	-	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH (C5 - C6) HS_ID_TOTAL	mg/kg	1	NONE	-	-	-	-	-
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH (C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	-	-	-	-	-
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	-	-	-	-	-
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	-	-	-	-	-
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	-	-	-	-	-
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	-	-	-	-	-
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	MCERTS	-	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

*Unsuitable for analysis due to high colour intensity.

Analytical Report Number: 22-75631
Project / Site name: South Heywood Phase 1

Lab Sample Number	2375237	2375238	2375239	2375240	2375241
Sample Reference	TP126 Arisings	TP120 North	TP120 East	TP120 South	TP1260 West
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	03/08/2022	03/08/2022	03/08/2022	03/08/2022	03/08/2022
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
Moisture Content	%	0.01	NONE	24	18
Total mass of sample received	kg	0.001	NONE	0.3	0.5

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.6	-	-	-	-
Total Cyanide	mg/kg	1	MCERTS	< 1.0	-	-	-	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	850	-	-	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.042	-	-	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	85	-	-	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	42.3	-	-	-	-
Sulphide	mg/kg	1	MCERTS	48	-	-	-	-
Total Sulphur	mg/kg	50	MCERTS	570	-	-	-	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	6.4	7	5	6.5	-
Total Organic Carbon (TOC) - Manual	%	0.1	MCERTS	-	-	-	-	8.4

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	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	2.4	0.61	1.8	< 0.05	0.98
Fluorene	mg/kg	0.05	MCERTS	1.6	0.42	1.1	< 0.05	0.57
Phenanthrene	mg/kg	0.05	MCERTS	16	3.7	11	1.3	6
Anthracene	mg/kg	0.05	MCERTS	4.2	0.87	1.8	0.29	1.4
Fluoranthene	mg/kg	0.05	MCERTS	17	6.2	14	1.9	8.4
Pyrene	mg/kg	0.05	MCERTS	15	5.5	12	1.7	7.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	8.3	3.5	5.9	1	3.9
Chrysene	mg/kg	0.05	MCERTS	5.6	2.9	5.4	0.85	3.3
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	6.2	3.4	5.4	1	4
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.4	2.1	2.8	0.4	1.3
Benzo(a)pyrene	mg/kg	0.05	MCERTS	6.4	3.6	5.2	0.92	3.5
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.6	1.8	2.3	0.41	1.6
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.75	< 0.05	0.56
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.3	1.9	3.1	0.61	2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	91.9	36.6	72.5	10.4	44.7
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Analytical Report Number: 22-75631
Project / Site name: South Heywood Phase 1

Lab Sample Number				2375237	2375238	2375239	2375240	2375241
Sample Reference				TP126 Arisings	TP120 North	TP120 East	TP120 South	TP1260 West
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				03/08/2022	03/08/2022	03/08/2022	03/08/2022	03/08/2022
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	18	-	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	U/S*	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	-	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	84	-	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	95	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	-	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	87	-	-	-	-
Petroleum Hydrocarbons								
TPH (C5 - C6) HS_ID_TOTAL	mg/kg	1	NONE	< 1.0	-	-	-	-
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
TPH (C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	3.7	-	-	-	-
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	11	-	-	-	-
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	29	-	-	-	-
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	54	-	-	-	-
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	11	-	-	-	-
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	MCERTS	110	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

*Unsuitable for analysis due to high colour intensity.

Analytical Report Number: 22-75631
Project / Site name: South Heywood Phase 1

Lab Sample Number				2375242	2375243
Sample Reference				TP120 Base	TP120 Arisings
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				03/08/2022	03/08/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	20
Total mass of sample received	kg	0.001	NONE	0.5	0.3

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	6.7
Total Cyanide	mg/kg	1	MCERTS	-	1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	820
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-	0.0093
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-	19
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-	9.3
Sulphide	mg/kg	1	MCERTS	-	4.7
Total Sulphur	mg/kg	50	MCERTS	-	570
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.8	-
Total Organic Carbon (TOC) - Manual	%	0.1	MCERTS	-	8.3

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	0.25
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.57
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.39
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	3.6
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.78
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	5.6
Pyrene	mg/kg	0.05	MCERTS	< 0.05	5.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	3.5
Chrysene	mg/kg	0.05	MCERTS	< 0.05	2.3
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	2.8
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.5
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	2.7
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.2
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.38
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	1.5

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	32
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Analytical Report Number: 22-75631
Project / Site name: South Heywood Phase 1

Lab Sample Number				2375242	2375243
Sample Reference				TP120 Base	TP120 Arisings
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				03/08/2022	03/08/2022
Time Taken				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	-	17
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-	U/S*
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	48
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	83
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	53

Petroleum Hydrocarbons					
TPH (C5 - C6) HS_ID_TOTAL	mg/kg	1	NONE	-	< 1.0
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	MCERTS	-	< 0.1
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	MCERTS	-	< 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	1	MCERTS	-	15
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	-	33
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	-	< 10
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	MCERTS	-	49

U/S = Unsuitable Sample I/S = Insufficient Sample

*Unsuitable for analysis due to high colour intensity.

Analytical Report Number : 22-75631

Project / Site name: South Heywood Phase 1

* 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 *
2375232	TP126 North	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
2375233	TP126 East	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
2375234	TP126 South	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
2375235	TP126 West	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
2375236	TP126 Base	None Supplied	None Supplied	Brown clay and sand with gravel.
2375237	TP126 Arisings	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
2375238	TP120 North	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
2375239	TP120 East	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2375240	TP120 South	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2375241	TP1260 West	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2375242	TP120 Base	None Supplied	None Supplied	Brown clay with gravel and vegetation.
2375243	TP120 Arisings	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 22-75631
Project / Site name: South Heywood Phase 1

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
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
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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 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
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
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
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 organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS
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 : 22-75631
Project / Site name: South Heywood Phase 1

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
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
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' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' 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

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e:

Analytical Report Number : 22-80695

Project / Site name:	South Heywood Phase 1	Samples received on:	26/08/2022
Your job number:	15 707	Samples instructed on/ Analysis started on:	26/08/2022
Your order number:	002689	Analysis completed by:	06/09/2022
Report Issue Number:	1	Report issued on:	06/09/2022
Samples Analysed:	3 soil samples		

Izabela Wójcik
Signed:
Izabela Wójcik
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

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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: 22-80695
Project / Site name: South Heywood Phase 1
Your Order No: 002689

Lab Sample Number				2404984	2404985	2404986
Sample Reference				TP120 N2	TP120 E2	TP120 W2
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				25/08/2022	25/08/2022	25/08/2022
Time Taken				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
Moisture Content	%	0.01	NONE	15	13	15
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4

General Inorganics

Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	7	5.4	7.1
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.81	0.33
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.44	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.9	4.6	1.9
Anthracene	mg/kg	0.05	MCERTS	0.62	1.1	0.45
Fluoranthene	mg/kg	0.05	MCERTS	3.9	5.4	2.7
Pyrene	mg/kg	0.05	MCERTS	3.7	5	2.6
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.8	3.2	2
Chrysene	mg/kg	0.05	MCERTS	1.4	2.3	1.5
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.2	2.5	1.9
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.79	1.3	0.64
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.4	2.5	1.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.68	1.1	0.75
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.23	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.84	1.5	0.95

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	19.5	31.8	17
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-80695

Project / Site name: South Heywood Phase 1

* 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 *
2404984	TP120 N2	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
2404985	TP120 E2	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
2404986	TP120 W2	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 22-80695

Project / Site name: South Heywood Phase 1

Water matrix abbreviations:

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

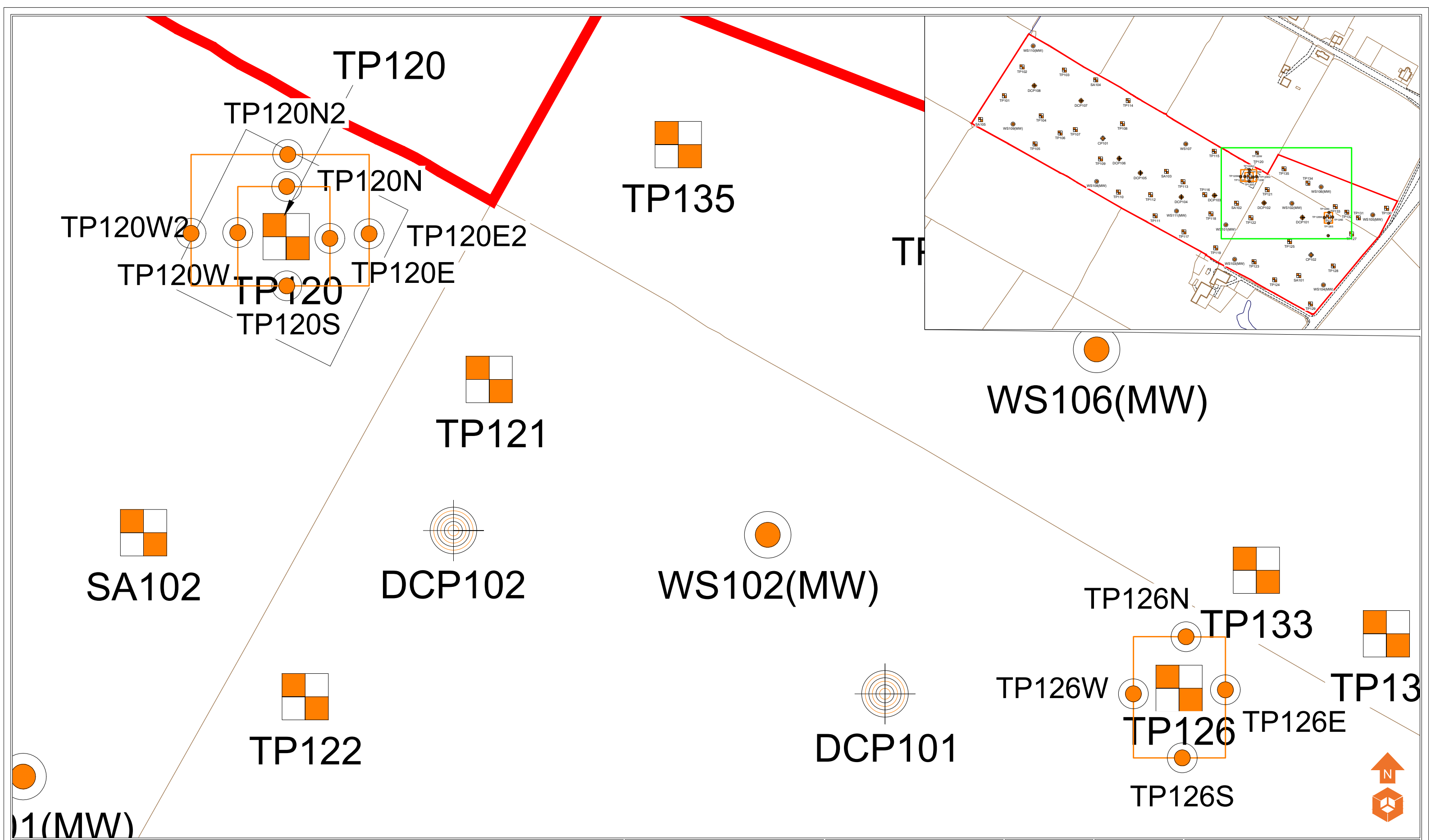
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in 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
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 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

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' 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.



Location Symbols  WS101 Approximate Window Sample Probehole Location  WS101 (DOWN) Approximate Window Sample Probehole Location with Install  TP101 Approximate Trial Pit Location  SA101 Approximate Soakaway Test Location					Notes:					Client: Bellway Homes		Job No: 15-707		Date: 18.01.2023		 Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk	
										Drawing No: 021		Scale: NTS@ A3					
					Job Title: South Heywood Phase 1					Drawing Title: Hotspot Location Plan				The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.			
P1 REVA 18.01.2023 EB ND PhaseIssueDateDrawnChecked																	