Our Ref: AC00195/AC/02

Date: 25 October 2024

Mr David Brown
Sherwood House
124 Hartshead Lane
Hartshead
Liversedge
West Yorkshire
WF15 8AJ

Dear Mr Brown

Appeal Ref: APP/Z4718/W/23/3334872 (Original Application 2023/62/92340/E)
Plots 1 & 2 - 124 Hartshead Lane, Hartshead, Liversedge, West Yorkshire WF15 8AJ
Ground Aggressivity Testing (in accordance with BRE SD1)

Further to the recommendations made in our Phase 1 Report dated September 2024, four soil samples were taken from hand excavated pits located as indicated on the attached plan at Appendix 1. The bedrock is PLCM sandstone and there was no observed water ingress.

The samples were collected on 10th October 2024, placed in appropriate containers for the required chemical analyses and transported on the same day to the selected accredited laboratory in accordance with chain of custody procedures.

Chemical analyses of the samples have been undertaken by I2 Analytical Ltd in accordance with BRE SD1 2005, '*Concrete in aggressive ground*' to determine the appropriate concrete classification for the site. The analytical certificate 24-047128-01 is included at Appendix B.

Strata	Details	Range of Results	Classification
Weathered sandy clay soils of the Pennine Lower Coal Measures	Number of Tests	4	DSC DS-1 ACEC AC-1
	Water Soluble Sulphates (mg/l)	30-69.1	
	pH	5.2-6.5	
	Total Sulphate mg/kg	300-450	

Based upon the above assessment, and in accordance with the BRE SD1 (2005), '*Concrete in aggressive ground*' guidance, a Design Sulphate Class of DS-1, with an ACEC of AC-1 would apply for all buried concrete used in the development.

Chlorides are also low and other parameters low or below detection limits.

Att. Appendix A – Site plan indicating sample locations
Appendix B – I2 Analytical Ltd, Analytical Certificate No.24-047128-01

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Kind regards

Alison Chitoriski BEng (Hons) CEnv MCIWM
Managing Director / Minerals, Waste and Contaminated Land Surveyor
WAMITAB Level 4 Certified – Landfill, Transfer and Treatment (Hazardous)
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HARTSHEAD LANE

HARTSHEAD

111
119
123
129
133
137
139
141
143
147
151
155
GP
118
120
126.2m
148
152
2b
2a

Plot 1

Plot 2

Plot 3

Sherwood

S1

S2

S3

S4

Patio

Patio

Patio

Patio

N

BLOCK PLAN 1:500

ON A3

SBP
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Analytical Report Number : 24-047128

Project / Site name:	Plots 1 & 2 124 Hartshead Lane, Hartshead	**Samples received on:**	10/10/2024
Your job number:	AC00195-WF15 8AJ	**Samples instructed on/ Analysis started on:**	10/10/2024
Your order number:	ACP024-16	**Analysis completed by:**	22/10/2024
Report Issue Number:	1	**Report issued on:**	23/10/2024
Samples Analysed:	4 soil samples		

Signed:

Anna Goc
PL Head of Reporting Team
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: 24-047128
Project / Site name: Plots 1 & 2 124 Hartshead Lane, Hartshead
Your Order No: ACP024-16

Lab Sample Number				345339	345340	345341	345342
Sample Reference				S1 Plot 1	S2 Plot 1	S3 Plot 2	S4 Plot 2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.40	0.20-0.40	0.20-0.40	0.20-0.40
Date Sampled				10/10/2024	10/10/2024	10/10/2024	10/10/2024
Time Taken				0945	0945	0945	0945
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**				
Stone Content	%	0.1	NONE	23.8	4.3	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	11	19	14
Total mass of sample received	kg	0.1	NONE	0.5	0.5	0.5	0.5
General Inorganics							
pH (L099)	pH Units	N/A	MCERTS	5.2	5.7	6.5	6.1
Total Sulphate as SO_4	mg/kg	50	MCERTS	760	480	480	1000
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	60	28	50	140
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	30	14	24.8	69.1
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	3.6	8.1	25	21
Total Sulphur	mg/kg	50	MCERTS	430	300	340	450
Ammoniacal Nitrogen as NH_4^+	mg/kg	0.5	MCERTS	< 0.5	< 0.5	< 0.5	< 0.5
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	5.7	< 2.0	< 2.0	< 2.0
Heavy Metals / Metalloids							
Magnesium (water soluble)	mg/kg	5	NONE	5.6	< 5.0	< 5.0	9.6

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

Analytical Report Number : 24-047128
Project / Site name: Plots 1 & 2 124 Hartshead Lane, Hartshead

* 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 *
345339	S1 Plot 1	None Supplied	0.20-0.40	Brown loam and clay with vegetation and stones
345340	S2 Plot 1	None Supplied	0.20-0.40	Brown loam and clay with vegetation and stones
345341	S3 Plot 2	None Supplied	0.20-0.40	Brown loam and clay with gravel and vegetation
345342	S4 Plot 2	None Supplied	0.20-0.40	Brown loam and clay with gravel and vegetation

Analytical Report Number : 24-047128
Project / Site name: Plots 1 & 2 124 Hartshead Lane, Hartshead

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 (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES	In-house method based on TRL 447	L038B	D	NONE
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
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	L038B	D	MCERTS
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser	In-house method	L082B	D	MCERTS
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	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

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.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution