Chevin Geoenviro Associates Ltd
Tarn
House
77 High Street
Yeadon Leeds LS19 7SP

C/O Rachael Dale of Rone Design

Sent by email

5th August 2024

Ref: C0638-LR-01

Dear Sir/Madam,

GROUND INVESTIGATION: Cashmere Works, Bradford.

Chevin Geoenviro Associates Ltd (CGA), were commissioned by Rone Designs, to carry out an investigation of ground conditions at Cashmere Works, Birksland Street, Bradford, West Yorkshire BD3 9SX. The future proposals will include the construction of a rectangular building, containing a gas holder and nine associated GRP tanks. The study site area is predominantly flat and approximately centred on National Grid Reference: 417840,432660.

CGA have not been provided with any formal design, which will be undertaken by others. The purpose of the investigation was to establish the shallow ground conditions and to collect in-situ test data to provide a range of speculative ground bearing pressures, to be used in the later design of foundations.

Information from the British Geological Survey (BGS), implies that the new structure will be built over an area of recorded Glacial Till, described as clay, sand and gravel. This extends around the study site beyond 100m in all directions. At depth, the solid geology comprises sandstones including the named Kirkburton and Grenoside Sandstone formations, of the Pennine Lower Coal Measures.

The Kirkburton sandstone is recoded to be higher in the geological succession than the Grenoside Sandstone and these are divided by the Black Bed Coal (BL), over the Better Bed Coal (BB), which are shown to outcrop locally and may be up to 1.10m and 0.90m in thickness respectively. The sandstones will be divided by a northwest to southeast trending fault which is mapped to cross just northeast of the proposals and is named the Tong Fault. This is also shown to be downthrown to the west.

One historical British Geological Survey (BGS) borehole (Ref:SE13SE5238), is located approximately 10m northeast of the proposals and is mapped to be east of the ground fault. This has no record to 16ft3inches (4.96m) suggesting deep soil, but records rock to 33ft 9inches (10.29m), over interbedded layers of ragstone, shale or grey rock to 447ft 6inches (136.49m). The borehole notably does not record any coal or shallow coal workings.

Potential unrecorded coal workings are noted by the Coal Authority Interactive Viewer, to progress from the southwest up to the geological fault. However, mining was seldom undertaken in near proximity to a ground fault and a second borehole (Ref:SE13SE5237), mapped within the same fault block at approximately 80m southeast, similarly has no record of coal or shallow workings. This location records made ground to 9ft (2.75m), over comparable interbedded shales and ragstone to 231ft 6inches (70.61m).

The site investigation works utilised a Competitor Dart rig to form the boreholes. The ground conditions encountered during the site works are summarised below, with further details contained in the appended engineering logs.

All locations recorded surface concrete to 0.30m below ground level (bgl).

In WS04 only, the concrete was underlain by a thin layer of yellow brown silty, sandy clay to 1.25m depth. This upper layer was described as locally soft and is thought to have been exposed to a leaking roof. The surface clay covered deeper brown mottled grey, silty, gravelly clay in which the gravel was sub-rounded, fine coal and medium to coarse sandstone. This stratum continued below the base of the borehole at 3.50m and the rockhead was not proven by this one location.

In all other locations (WS01, WS02 and WS03), similar grey slightly sandy, silty, gravelly clay, notably without coal traces, was encountered directly below the concrete. Here the gravel was subangular, medium to coarse sandstone and at WS03 only, with rare sandstone cobbles. The clay layer was encountered to depths of between 2.60m bgl (WS01 and WS02) and 2.75m bgl (WS03).

All three of these boreholes were terminated on light grey silty fine-grained sandstone, that was recovered as sandy angular fine to coarse gravel and in the location of WS01 and WS03 only, was also covered by a thin (0.15m) layer of black friable slightly sandy silty subangular gravel of coal, to 2.75m and 2.90m respectively. The sandstone continued below the base of these three boreholes that penetrated depths of between 3.15m bgl (WS03) and 3.25m bgl (WS01).

No groundwater was recorded in any of the locations.

Four classification tests were conducted on samples taken from the three of the four window sample locations and these are summarised in the tables below.

Table 1.0 of Potential Silt / Clay Fraction in Near Surface Soils

Location	Depth	Clay %	Silt %	Sand %	Gravel %	Coarse %
WS04	1.50	26	42	25	7	0

Table 2.0 of Potential Soil Plasticity and Natural Moisture.

Location	Depth	Moisture Content %	% Passing	Plasticity Index Ip
WS01	1.40	15.9	78	18
WS02	0.80	15.6	85	17
WS04	1.50	16.1	89	23

In the unlikely event that the proposals are within influencing distance of trees, the near surface clay materials should be regarded as intermediate plasticity, with a medium volume change potential. Outside of the zone of influence from trees, foundation depths should exceed 0.90m depth in soils of medium volume change potential and designs accounting for trees, should utilise the methods described in section 4.2 of the current NHBC Standards, which are free to download.

Standard Penetration Tests (SPTs), were conducted at 1.0m intervals in the window sample locations and these are tabulated below, alongside the ground type and depth. M.A. Stroud and F.G. Butler (1974), put forward a well-accepted set of correlations between Standard Penetration Tests and the engineering properties of clay materials, related to clay plasticity values. A factor of 5.0 is often used for silty sandy clays with some gravel and plasticity in the range of 17 to 23 as seen at depths below 1.25m.

Similarly, granular materials have been attributed approximate angles of effective shearing resistance according to density. Peck et. al. (1974); Bowles, (1977).

Table 3.0 Standard Penetration Test (SPT) with Depth and Implied Shear Strength or Effective Shearing Resistance.

Ground Type /Depth	SPT Range	Implied Shear Strength KPa or Angle of Shearing Resistance Degrees
Silty Sandy CLAY 0.30-1.25 (WS04 ONLY)	11	Depth from 1.0m to 1.25m 46Kpa (WS04)
Slightly sandy silty gravelly CLAY (WS01, WS02, WS03) 0.30m 2.70m	15-23 (mean value 18)	Depths from 0.50m to 1.0m 60KPa (WS01, WS02, WS03) Depth from 1.0m to 2.70m 90Kpa Hand Vane Readings 50KPa WS03 circa 0.60m 65KPa WS01 circa 0.80m
Silty gravelly CLAY (WS04) 1.25m 2.60m		Depth from 2.0m to 3.0m 90Kpa
SANDSTONE recovered as sandy angular fine to coarse, gravel of sandstone. (WS01, WS02, WS03)	50 For 130mm penetration 50 for 225mm penetration	Depth below 3.20m >100Kpa/Very Dense >40°

Table 4.0 Bearing values for regular width foundations can be calculated as presented by MJ Tomlinson (1999).

Undrained Shear Strength KPa	Presumed Bearing Value (KPa) for Foundation Width (m) MJ Tomlinson (1999)		
	1m	2m	4m
75-150	200-400	150-250	75-125
40-75	100-200	75-100	50-75
20-40	50-100	25-50	Negligible
>40° Shearing Resistance	800	600	500

Table 4.0 above, does not consider the effects of shallow ground water, it presumes a minimum foundation depth of 1.0m bgl and a maximum permissible settlement of 50mm. It is therefore typically applied to foundations of equal and unchanging load. With respect to the future foundation design of the site, where an exceptionally high loading is

calculated it may prove more economical to pile to rockhead that was penetrated to depths of between 3.15mbgl bgl (WS03) and 3.25m bgl (WS01).

Two water-soluble sulphate tests were carried out on samples of the site soils at 0.80m to 0.90m and 1.40m to 1.50m depth. The results recorded measured water-soluble sulphate content of 400.0mg/kg and 240.0mg/kg respectively, in slightly acidic soils between pH6.6 and pH7.0.

From Building Research Establishment Special Digest No. 1 'Concrete in Aggressive Ground', a cement in accordance with a design sulphate class of DS-1 and ACEC class of AC-1s, is suggested to be used for all concrete site structures. However, basic sulphate resistance is always recommended within any areas of made ground, which by their very nature can vary in constancy.

One of the soil samples from WS03 at a depth of 0.50m was sent for analysis of a wide range of potential contaminants, including asbestos, cyanide, Total Petroleum Hydrocarbons (TPH), Poly-cyclic aromatic hydrocarbons (PAH), heavy metals and metalloids.

No asbestos or cyanide was detected and no detections were made for other potential contaminants above that acceptable for a commercial end use.

The recorded values are tabulated below against the criteria used for a Commercial End Use.

Table 5.0 of Potential Contaminants Compared with Guidance Criteria for Commercial End Use.

Determinant	Assessment Criteria (mg/kg)		Recorded Concentrations Across the Site (mg/kg)	
	C4SL Screening Levels	S4UL Generic Assessment Criteria	Highest Recorded Value	Location(s) of Samples Exceeding GAC
Metals, semi- metals and non-metals				
Arsenic	640	640	7.8	ND
Cadmium	220	190	<0.2	ND
Chromium Total	NC	8600	28	ND
Copper	NC	68000	12	ND
Lead	2300	NC	17	ND
Mercury (elemental)	NC	58	<0.3	ND
Nickel	NC	980	14	ND
Selenium	NC	12000	<1.0	ND
Zinc	300	730000	47	ND
Phenol (total mono)	NC	1500	<1.0	ND
PAH (total)	NC	NC	<0.80	ND
TPH (total)	NC	NC	<10	ND
Naphthalene	NC	480	<0.05	ND
Benzo(a)pyrene	77	35	<0.05	ND
Others				
pH	NC	NC	7.4	ND
SOM (%)	NC	NC	1.2	ND
Cyanide (total)	NC	NC	ND	ND
Asbestos ID	<0.001% fibres	<0.001	ND	ND

(1) C4SL/LQM S4UL 2015 for commercial land use scenario at 6% organic matter content
(2) NC = No criterion.
(3) ND = None Detected

It is understood that the resulting structure will also cover the site and, in this respect, we can conclude that the risks from any potential contamination in the area of the proposals are Low.

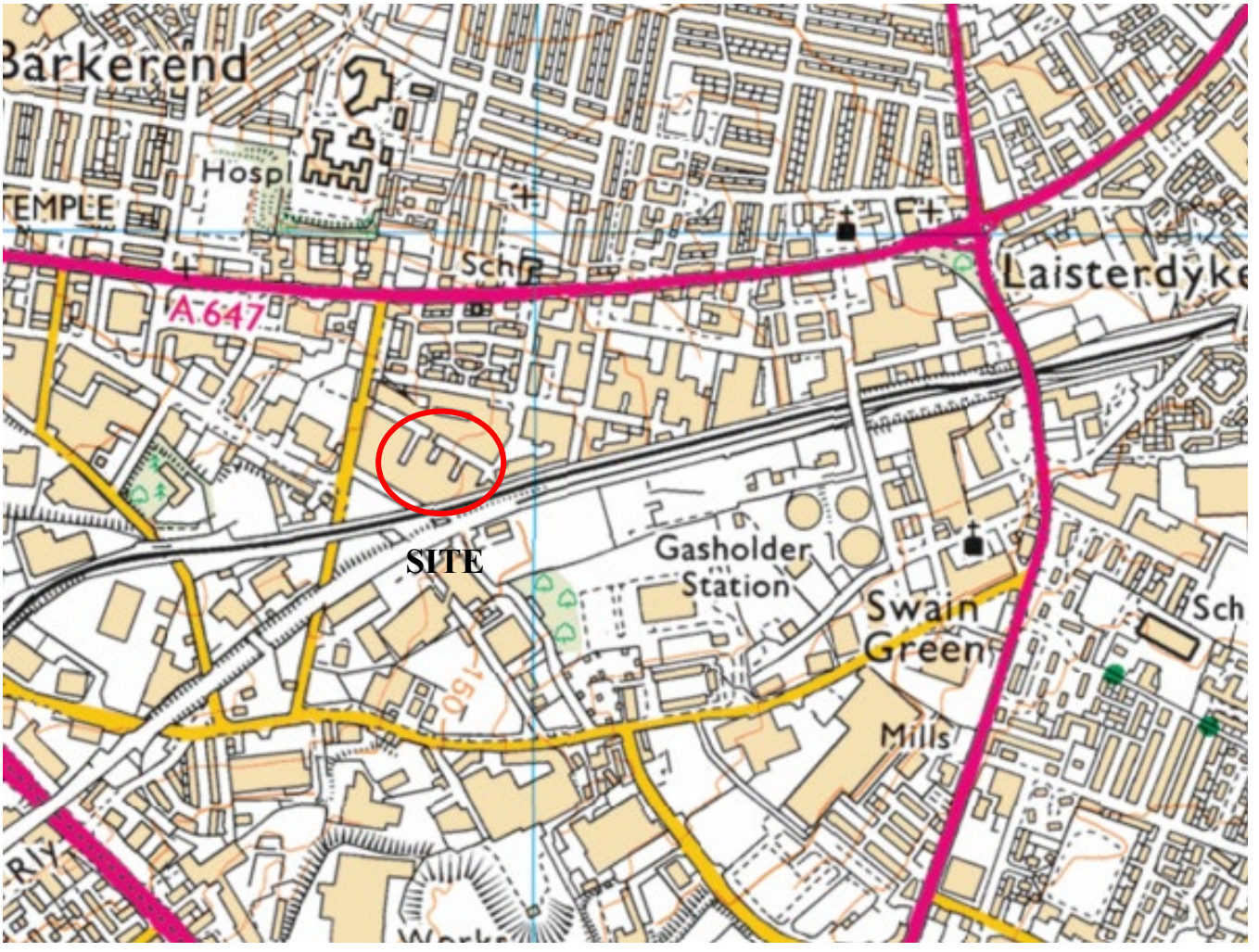
In addition, one Waste Acceptance Criteria (WAC) test was undertaken on a sample directly below that of the general soil suite, from WS03 at a depth of 0.60m depth and this is believed to represent any soil that may require removal from the site. This was interpreted to have values corresponding to stable non-reactive non-hazardous waste and will be suitable for disposal at as Inert Waste.

Yours Faithfully,

Christiaan Wilkinson BSc MRes FGS CSci SiLC
Director: Chevin Geoenviro Associates Ltd.

Site Location Plan

Drawing:C0638-01



North

Chevin Geoenviro Associates LTD

Tel: 01943 470363

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Geo-environmental Consultancy
Ground Technologies & Investigation & Remediation

Project:

Cashmere Works, Bradford

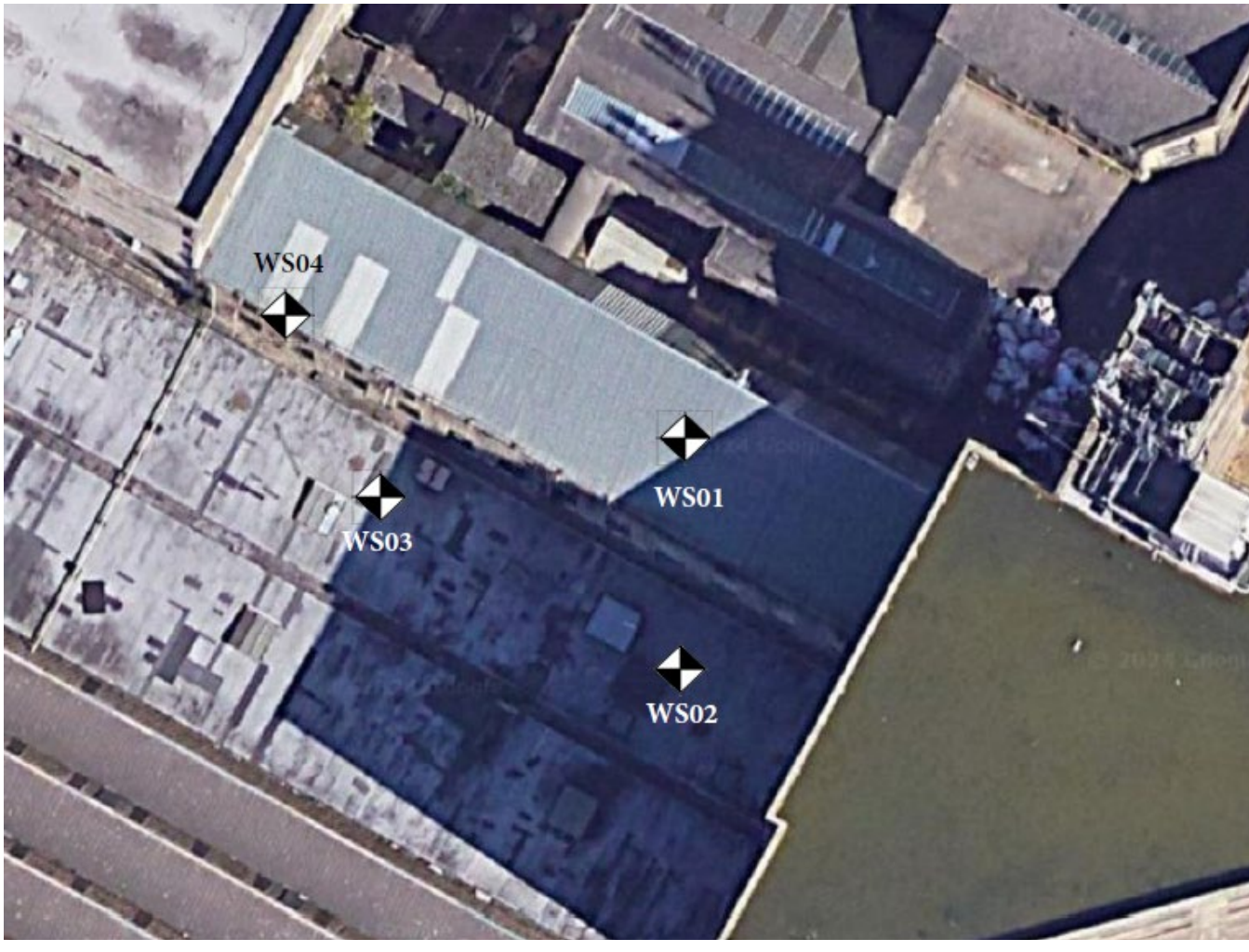
Client: Rone Design

Project No. C0638

Date: 04/08/2024

Borehole Location Plan

Drawing:C0638-02



North

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Geo-environmental Consultancy
Ground Technologies & Investigation & Remediation

Project:

Cashmere Works, Bradford

Client: Rone Design

Project No. C0638

Date: 04/08/2024

Chevin Geoenviro Associates LTD

Borehole Log

Borehole No. **WS01**

Sheet 1 of 1

Project Name: Cashmere Works	Project No. C0638	Co-ords: -	Hole Type WS
Location: Hubert Street, Bradford,		Level:	Scale 1:25
Client: J. B. Langley Associates Ltd		Dates: 05/07/2024 - 05/07/2024	Logged By CW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			CONCRETE
								Grey slightly sandy silty gravelly CLAY, gravel is subangular medium to coarse sandstone.
				HVP=65				
		1.00		N=20 (2,3/4,4,5,7)				
		1.50		N=15 (3,4/3,3,4,5)				
					2.60			Black friable slightly sandy silty subangular GRAVEL of coal.
					2.75			Light grey silty fine grained SANDSTONE recovered as sandy angular fine to coarse gravel.
		3.00		50 (5,6/50 for 225mm)				
					3.25			End of borehole at 3.25 m

Remarks

Hand vane at 0.80m. No groundwater. Backfill with arisings on completion.

AGS

Chevin Geoenviro Associates LTD

Borehole Log

Borehole No. **WS02**

Sheet 1 of 1

Project Name: Cashmere Works	Project No. C0638	Co-ords: -	Hole Type WS
Location: Hubert Street, Bradford,		Level:	Scale 1:25
Client: J. B. Langley Associates Ltd		Dates: 05/07/2024 - 05/07/2024	Logged By CW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			CONCRETE
		1.00		N=22 (2,3/5,7,5,5)				Grey slightly sandy silty gravelly CLAY, gravel is subangular medium to coarse sandstone.
		2.00		N=16 (2,3/3,4,4,5)				
					2.60			Light grey silty fine grained SANDSTONE recovered as sandy angular fine to coarse gravel.
		3.00		50 (6,7/50 for 170mm)				
					3.20			End of borehole at 3.20 m

Remarks
No groundwater. Backfill with arisings on completion.

AGS

Chevin Geoenviro Associates LTD

Borehole Log

Borehole No. **WS03**

Sheet 1 of 1

Project Name: Cashmere Works	Project No. C0638	Co-ords: -	Hole Type WS
Location: Hubert Street, Bradford,		Level:	Scale 1:25
Client: J. B. Langley Associates Ltd		Dates: 05/07/2024 - 05/07/2024	Logged By CW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			CONCRETE
				HVP=50				Grey slightly sandy silty gravelly CLAY and rare cobbles of sandstone, gravel is subangular medium to coarse sandstone.
		1.00		N=16 (2,4/4,4,4,4)				
		1.60		N=23 (4,3/3,3,7,10)				
					2.75			Black friable slightly sandy silty subangular GRAVEL of coal.
					2.90			Light grey silty fine grained SANDSTONE recovered as sandy angular fine to coarse gravel.
		3.00		50 (7,14/50 for 130mm)				
					3.15			End of borehole at 3.15 m

Remarks

Hand vane at 0.60m. No groundwater. Backfill with arisings on completion. Cobble encountered at 1.60m.

AGS

Chevin Geoenviro Associates LTD

Borehole Log

Borehole No. **WS04**

Sheet 1 of 1

Project Name: Cashmere Works	Project No. C0638	Co-ords: -	Hole Type WS
Location: Hubert Street, Bradford,		Level:	Scale 1:25
Client: J. B. Langley Associates Ltd		Dates: 05/07/2024 - 05/07/2024	Logged By CW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			CONCRETE
								Yellow brown silty sandy CLAY.
		1.00		N=11 (1,1/2,2,3,4)				
					1.25			Brown mottled grey silty gravelly CLAY, gravel is subrounded fine coal and medium to coarse sandstone.
		2.00		N=18 (2,4/4,5,4,5)				
		3.00		N=20 (2,2/4,5,6,5)				
					3.50			End of borehole at 3.50 m

Remarks

Very soft to 1.0m possibly due to long term leak in old roof. No groundwater. Backfill with arisings on completion.

AGS

4041

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

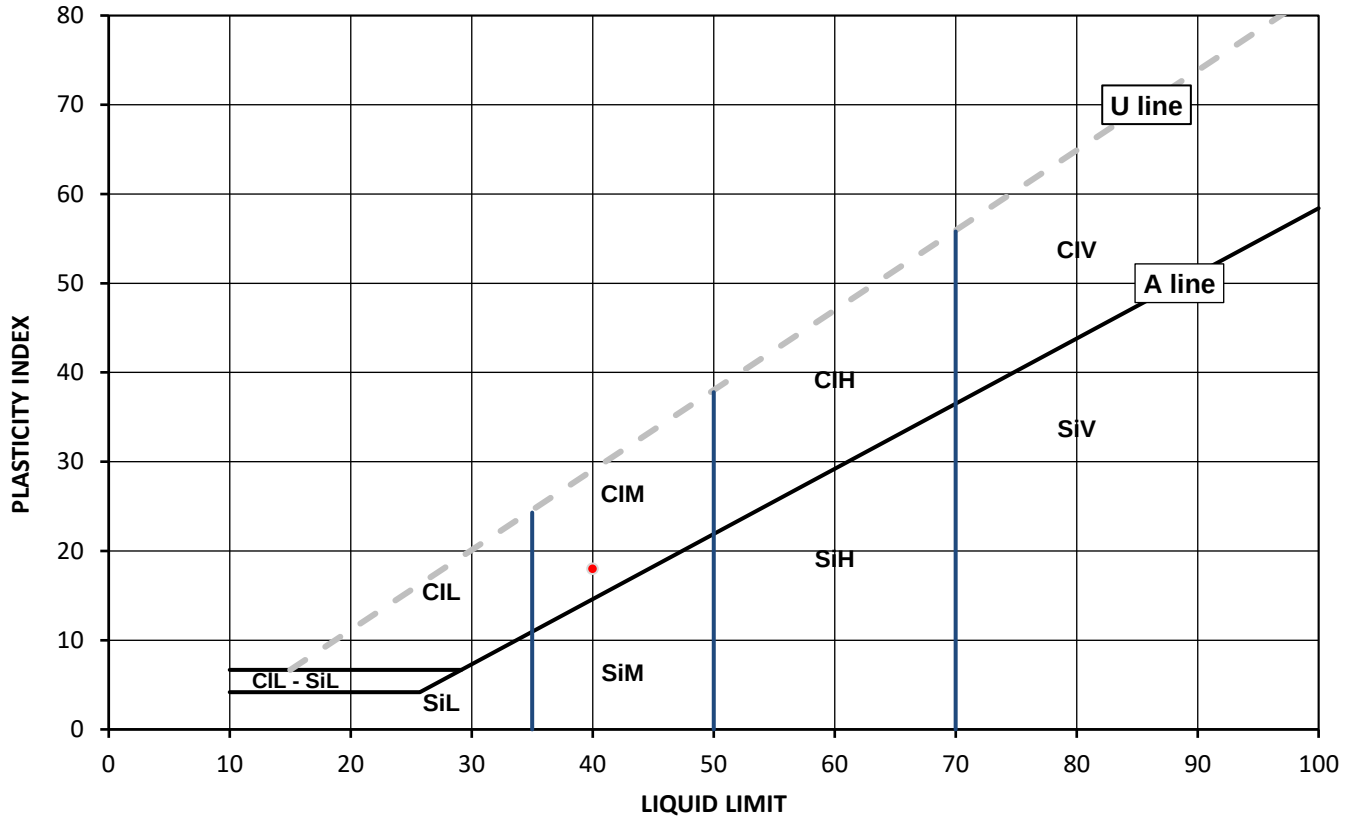
Client:	Chevin Geoenviro Associates LLD	Client Reference:	C0638
Client Address:	Tarn House, 77 High Street, Yeadon	Job Number:	24-029613-1
		Date Sampled:	05/07/2024
		Date Received:	09/07/2024
Contact:	Christiaan Wilkinson	Date Tested:	16/07/2024
Site Address:	Cashmere Works	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	251296	Depth Top [m]:	1.40
Hole No.:	WS1	Depth Base [m]:	1.50
Sample Reference:	1	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		
Sample Preparation:	Tested after washing to remove >0.425mm; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
15.9	40	22	18	-0.33	1.33	78



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 30/07/2024

GF 337.13

4041

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client:	Chevin Geoenviro Associates LLD	Client Reference:	C0638
Client Address:	Tarn House, 77 High Street, Yeadon	Job Number:	24-029613-1
		Date Sampled:	05/07/2024
		Date Received:	09/07/2024
Contact:	Christiaan Wilkinson	Date Tested:	16/07/2024
Site Address:	Cashmere Works	Sampled By:	Not Given

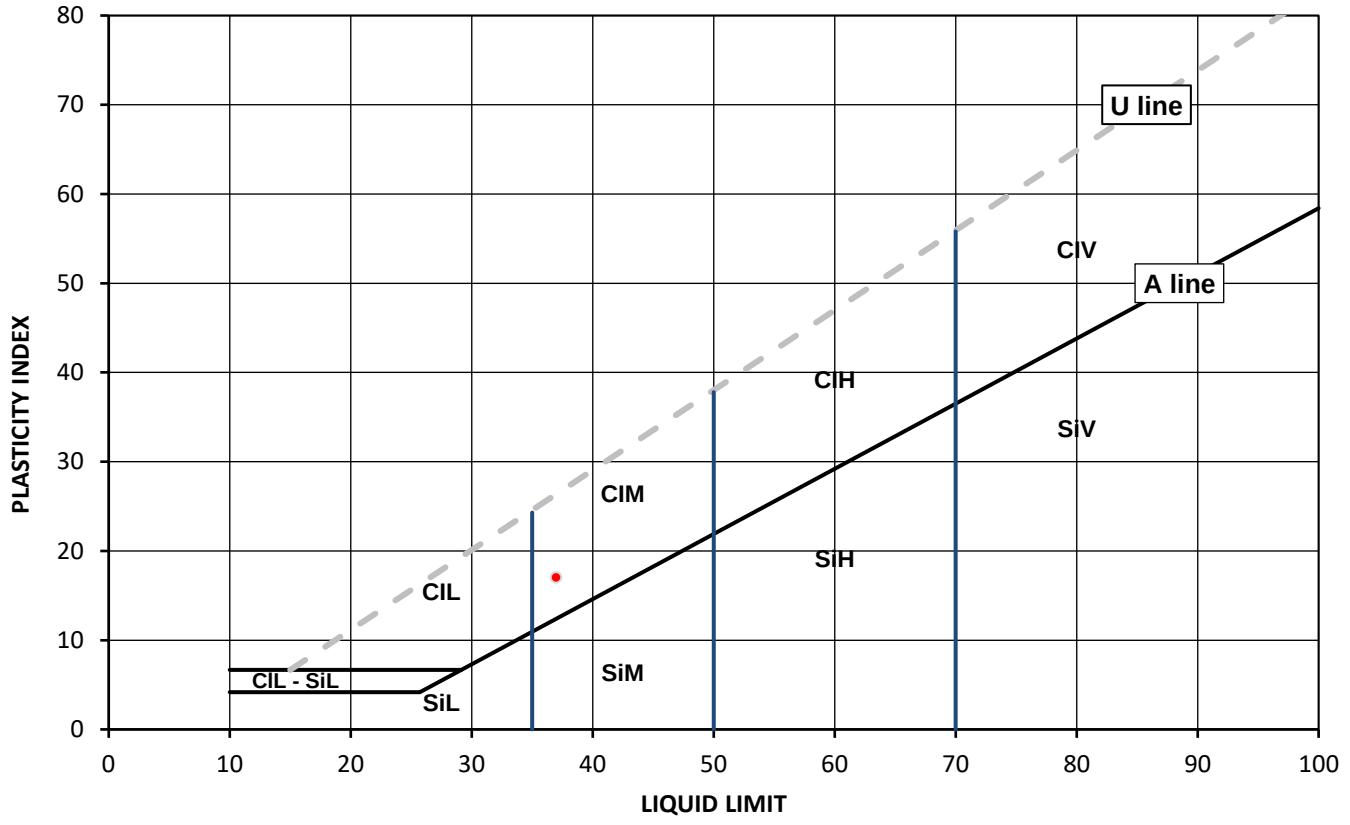
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	251297	Depth Top [m]:	0.80
Hole No.:	WS2	Depth Base [m]:	0.90
Sample Reference:	1	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		

Sample Preparation: Tested after washing to remove >0.425mm; The water content in the sample was increased
Cone Type: 80g/30deg

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
15.6	37	20	17	-0.24	1.24	85



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 30/07/2024

GF 337.13

4041

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

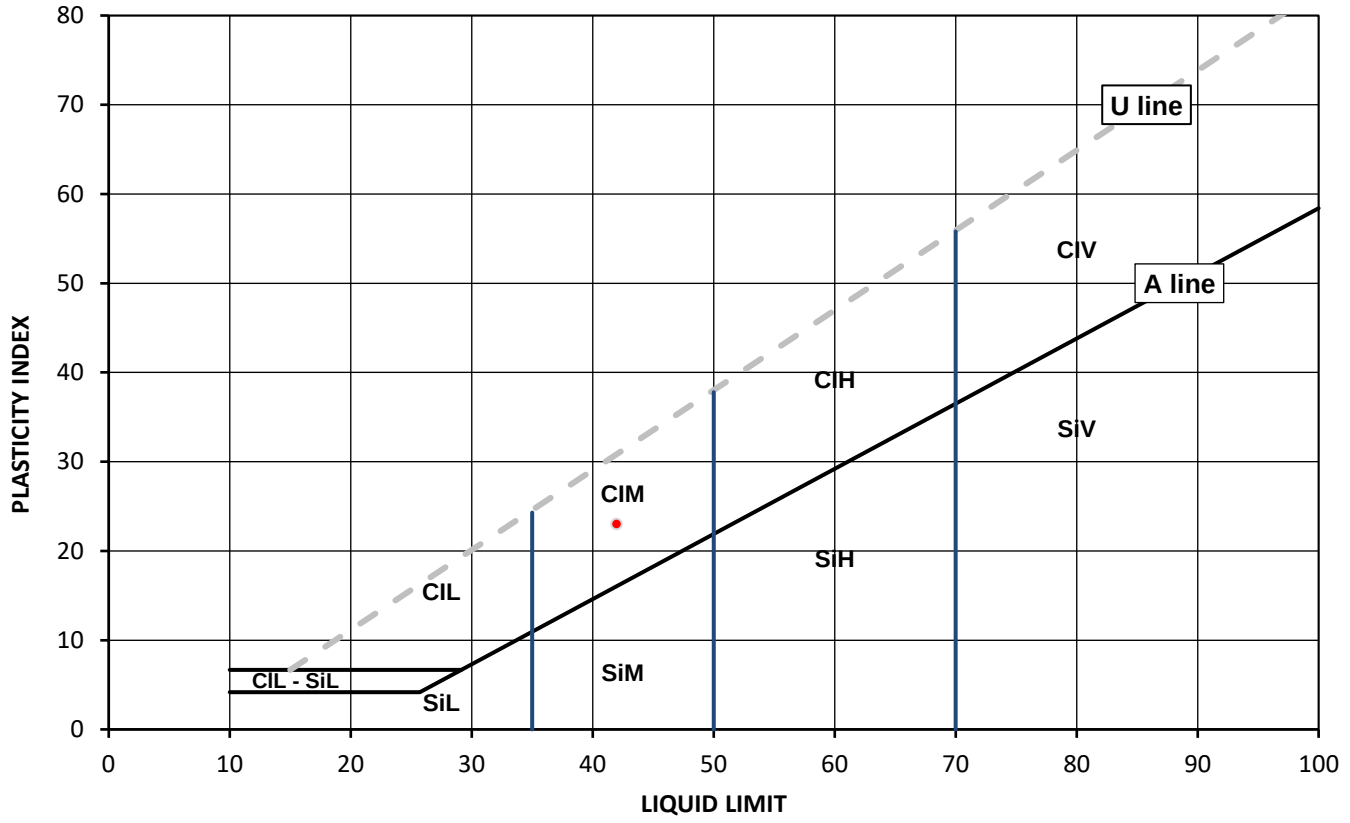
Client:	Chevin Geoenviro Associates LLD	Client Reference:	C0638
Client Address:	Tarn House, 77 High Street, Yeadon	Job Number:	24-029613-1
		Date Sampled:	05/07/2024
		Date Received:	09/07/2024
Contact:	Christiaan Wilkinson	Date Tested:	19/07/2024
Site Address:	Cashmere Works	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	251298	Depth Top [m]:	1.50
Hole No.:	WS04	Depth Base [m]:	2.00
Sample Reference:	1	Sample Type:	B
Sample Description:	Brown slightly sandy slightly gravelly silty CLAY		
Sample Preparation:	Tested after washing to remove >0.425mm; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
16.1	42	19	23	-0.13	1.13	89



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 30/07/2024

GF 337.13

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

4041

Client: Chevin Geoenviro Associates LLD

Client Address: Tarn House, 77 High Street, Yeadon

Contact: Christiaan Wilkinson

Site Address: Cashmere Works

BS EN ISO 17892-12:2018+A2:2022 cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6. W by BS EN ISO 17892-1:2014+A1:2022.

Client Reference: C0638
Job Number: 24-029613-1
Date Sampled: 05/07/2024
Date Received: 09/07/2024
Date Tested: 19/07/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	W	Liquid & Plastic Limit							Density		
		Reference	Depth Top m	Depth Base m	Type			%	% Passing 425um %	WL* %	Correlation Factor	Wp %	Ip %	Cone type	Sample Preparation	bulk Mg/m3	dry Mg/m3	PD Mg/m3
251296	WS1	1	1.40	1.50	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	15.9	78	40	-	22	18	80g/30 deg	W / I			
251297	WS2	1	0.80	0.90	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	15.6	85	37	-	20	17	80g/30 deg	W / I			
251298	WS04	1	1.50	2.00	B	Brown slightly sandy slightly gravelly silty CLAY	Atterberg 4 Point	16.1	89	42	-	19	23	80g/30 deg	W / I			

Note: # Non accredited; NP - Non plastic; N - Tested in natural condition, R - Tested after >0,425mm removed by hand, W - Tested after washing to remove >425mm; I - The water content in the sample was increased , D - The water content in the sample was decreased; * - One point liquid limit corrected as per the report Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Comments:

Signed:

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 30/07/2024 **GF 362.15**

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS EN ISO 17892-4:2016, BS 1377-2:2022 cl. 10

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

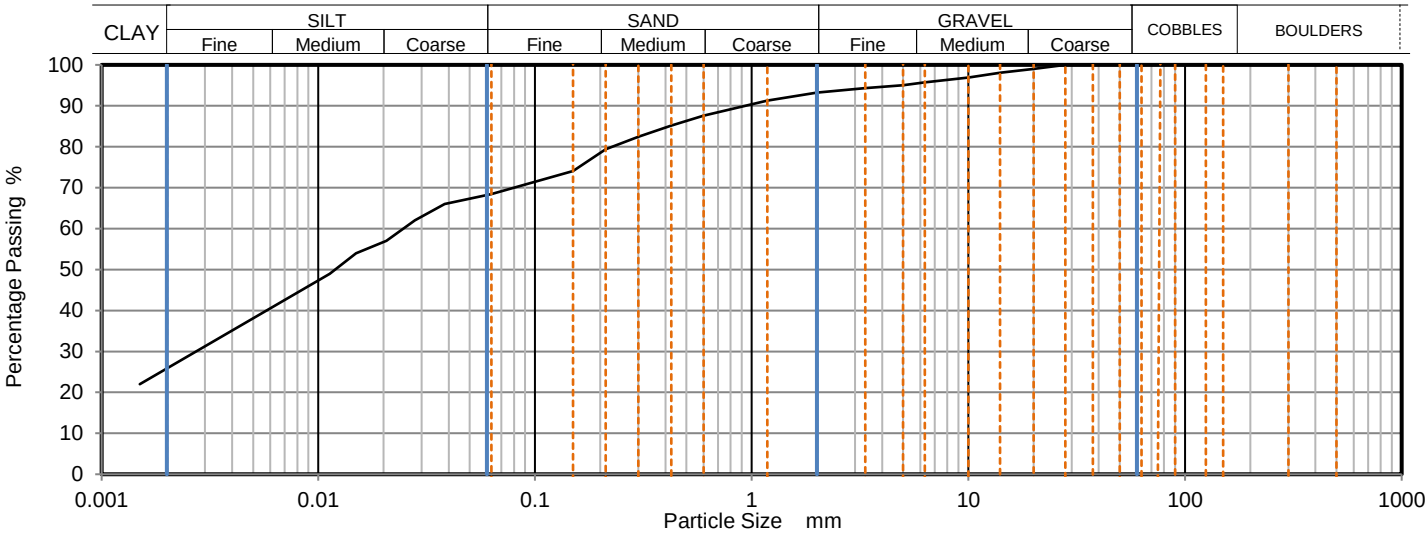
4041

Client:	Chevin Geoenviro Associates LLD	Client Reference:	C0638
Client Address:	Tarn House, 77 High Street, Yeadon	Job Number:	24-029613-1
		Date Sampled:	05/07/2024
		Date Received:	09/07/2024
Contact:	Christiaan Wilkinson	Date Tested:	19/07/2024
Site Address:	Cashmere Works	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	251298	Depth Top [m]:	1.50
Hole No.:	WS04	Depth Base [m]:	2.00
Sample Reference:	1	Sample Type:	B
Sample Description:	Brown slightly sandy slightly gravelly silty CLAY		
Sample Preparation:	Sample was quartered, oven dried at 108.6 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0383	66
300	100	0.0279	62
150	100	0.0206	57
125	100	0.0149	54
90	100	0.0113	49
75	100	0.0015	22
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	98		
10	97		
6.3	96		
5	95		
3.35	94		
2	93		
1.18	91		
0.6	88	Particle density	(assumed)
0.425	85	2.65	Mg/m3
0.3	82		
0.212	79		
0.15	74		
0.063	68		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	7.00
Sand	25.00
Silt	42.00
Clay	26.00

Grading Analysis		
D100	mm	28
D60	mm	0.0242
D30	mm	0.00274
D10	mm	
Uniformity Coefficient		0.38
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with ISO 17892 -4, by sieving and hydrometer sedimentation

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 30/07/2024

GF 366.11

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Analytical Report Number : 24-029614

Project / Site name:	Cashmere Works	**Samples received on:**	09.07.2024
Your job number:	C0638	**Samples instructed on/ Analysis started on:**	09.07.2024
Your order number:		**Analysis completed by:**	15.07.2024
Report Issue Number:	1	**Report issued on:**	15.07.2024
Samples Analysed:	2 soil samples		

Signed:

Rafał Szczepańczyk
Technical Reviewer
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: 24-029614
Project / Site name: Cashmere Works

Lab Sample Number				251299	251300
Sample Reference				WS1	WS2
Sample Number				1	1
Depth (m)				1.40-1.50	0.80-0.90
Date Sampled				05/07/2024	05/07/2024
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	11
Total mass of sample received	kg	0.1	NONE	0.3	0.4

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7	6.6
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	240	400
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	121	198

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

Analytical Report Number : 24-029614
Project / Site name: Cashmere Works

* 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 *
251299	WS1	1	1.40-1.50	Brown clay and sand
251300	WS2	1	0.80-0.90	Brown clay and sand

Analytical Report Number : 24-029614
Project / Site name: Cashmere Works

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
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	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

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Analytical Report Number : 24-029730

Project / Site name:	Cashmere Works	**Samples received on:**	09.07.2024
Your job number:	C0638	**Samples instructed on/ Analysis started on:**	09.07.2024
Your order number:		**Analysis completed by:**	15.07.2024
Report Issue Number:	1	**Report issued on:**	15.07.2024
Samples Analysed:	1 soil sample		

Signed:

Rafał Szczepańczyk
Technical Reviewer
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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An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-029730
Project / Site name: Cashmere Works

Lab Sample Number				251825
Sample Reference				WS03
Sample Number				ES1
Depth (m)				0.50
Date Sampled				05/07/2024
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	20
Total mass of sample received	kg	0.1	NONE	1.3

Asbestos

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

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.4
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Organic Matter (automated)	%	0.1	MCERTS	1.2

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80

Analytical Report Number: 24-029730
Project / Site name: Cashmere Works

Lab Sample Number				251825
Sample Reference				WS03
Sample Number				ES1
Depth (m)				0.50
Date Sampled				05/07/2024
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	7.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12
Lead (aqua regia extractable)	mg/kg	1	MCERTS	17
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47
Petroleum Hydrocarbons				
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10

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

Analytical Report Number : 24-029730
Project / Site name: Cashmere Works

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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 *
251825	WS03	ES1	0.5	Brown clay and sand with gravel

Analytical Report Number : 24-029730
Project / Site name: Cashmere Works

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
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, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
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
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	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	MCERTS
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	L080	W	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	L080	W	MCERTS

Analytical Report Number : 24-029730
Project / Site name: Cashmere Works

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
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	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 - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

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

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Analytical Report Number : 24-029731

Project / Site name:	Cashmere Works	**Samples received on:**	09/07/2024
Your job number:	C0638	**Samples instructed on/ Analysis started on:**	09/07/2024
Your order number:		**Analysis completed by:**	16/07/2024
Report Issue Number:	1	**Report issued on:**	16/07/2024
Samples Analysed:	1 10:1 WAC sample		

Signed:

Rafał Szczepańczyk
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

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

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

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Analytical Report Number: 24-029731
Project / Site name: Cashmere Works

Lab Sample Number				251828
Sample Reference				WS03
Sample Number				ES2
Depth (m)				0.60
Date Sampled				05/07/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	16
Total mass of sample received	kg	0.1	NONE	1.3
General Inorganics				
pH (L005B)	pH Units	N/A	MCERTS	6.5
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.5
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.9
Acid Neutralisation Capacity	+/- mmol/kg	-9999	NONE	-0.63
Speciated PAHs				
Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05
Coronene	mg/kg	0.05	NONE	< 0.05
Total PAH				
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80
Total WAC-17 PAHs	mg/kg	0.85	NONE	< 0.85
Petroleum Hydrocarbons				
Mineral Oil (EC10 - EC40) EH_CU_1D_AL	mg/kg	10	NONE	< 10
VOCs				
Benzene	µg/kg	5	MCERTS	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0
Total BTEX	µg/kg	5	MCERTS	< 5.0

Analytical Report Number: 24-029731
Project / Site name: Cashmere Works

Lab Sample Number				251828
Sample Reference				WS03
Sample Number				ES2
Depth (m)				0.60
Date Sampled				05/07/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**	
PCBs by GC-MS				
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	0.002
PCB Congener 153	mg/kg	0.001	MCERTS	0.002
PCB Congener 180	mg/kg	0.001	MCERTS	0.004
Total PCBs	mg/kg	0.007	MCERTS	0.008

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

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Waste Acceptance Criteria Analytical Results

Report No:	**24-029731**						
					Client:	**CHEVINGEO**	
Location	**Cashmere Works**						
Lab Reference (Sample Number)	251828				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	05/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS03 ES2						
Depth (m)	0.60						
Solid Waste Analysis							
TOC (%)**	0.5				3%	5%	6%
Loss on Ignition (%) **	2.9				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	0.008				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	6.5				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-0.63				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.00703			0.0703	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.0093			0.093	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	< 0.000400			< 0.00400	0.5	10	30
Nickel *	0.00048			0.0048	0.4	10	40
Lead *	0.0023			0.023	0.5	10	50
Antimony *	0.0035			0.035	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.017			0.17	4	50	200
Chloride *	3.4			34	800	15000	25000
Fluoride*	< 0.050			< 0.50	10	150	500
Sulphate *	24			240	1000	20000	50000
TDS*	44			440	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	7.66			76.6	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.3						
Dry Matter (%)	84						
Moisture (%)	16						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 24-029731
Project / Site name: Cashmere Works

* 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 *
251828	WS03	ES2	0.6	Brown clay and sand with gravel

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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
pH at 20°C in soil	Determination of pH in soil by addition of water followed by electrometric measurement	In-house method	L005B	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 (Walkley Black Method)	In-house method	L009B	D	MCERTS
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
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in leachate by ICP-OES	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	L039B	W	ISO 17025
Sample Preparation		In-house method	L043B	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046B	W	NONE
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	NONE
Monohydric phenols 10:1 WAC	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	L080	W	ISO 17025

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Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025

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 - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

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