

030/5003/AG/cc

03rd March 2025

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Dear Jonathan

Lower Edge Quarry – gas & groundwater monitoring results

We have undertaken the fourth of 12 monthly visits at Lower Edge Quarry to inform a landfill permit application, results of which are included in this letter.

This letter should be read in conjunction with the Factual Letter Report issued by Lithos on the 28th October 2024 (Ref. 017/5003/AG/cc) and the letter detailing the findings of the previous (third) monitoring visit (Ref. 026/5003/AG/cc), issued on the 27th January 2025.

Background

The site is located off Lower Edge Road, approximately 5.3km southeast of Halifax town centre and currently comprises an active quarry operated by Rand & Asquith. We understand the quarry is partially infilled with “stone, shale and pockets of fly ash”, however, in places the existing quarry void is c. 20m deep.

Lithos supervised the drilling of 5 rotary openhole boreholes between the 7th and 15th October 2024, to allow for the installation of dual gas and groundwater monitoring wells around the perimeter of the site. A total of 12 monthly visits will be undertaken to aid the application of a landfill permit. Details of the monitoring wells are listed below.

Monitoring well	Coordinates		Level	Installation	Response zone depths m bgl (m AOD)	Response zone lithology
	easting	northing				
BH01	412845.1	421374.6	160.149	19mm HDPE pipe	1.0 – 3.0 (159.15 – 157.15)	Quarry backfill
				50mm HDPE pipe	18.0 – 22.0 (142.15 – 138.15)	Quarry backfill
BH02	412729.9	421182.0	172.376	19mm HDPE pipe	1.0 – 3.0 (171.38 – 169.38)	Elland Flags
				50mm HDPE pipe	18.0 – 22.0 (154.38 – 150.38)	Elland Flags
BH03	412813.4	421106.3	177.696	19mm HDPE pipe	1.0 – 3.0 (176.70 – 174.70)	Granular Residual Soils
				50mm HDPE pipe	28.0 – 32.0 (149.70 – 145.70)	Elland Flags
BH04	412940.4	421050.0	176.317	19mm HDPE pipe	1.0 – 3.0 (175.32 – 173.32)	Quarry backfill
				50mm HDPE pipe	36.0 – 40.0 (140.32 – 136.32)	Possible Elland Flags
BH05	413013.5	421099.8	173.108	19mm HDPE pipe	1.0 – 3.0 (172.12 – 170.12)	Elland Flags
				50mm HDPE pipe	35.5 – 39.5 (137.61 – 133.61)	Elland Flags



Groundwater dip results

A total of four groundwater visits have been undertaken to determine the level of groundwater within the boreholes.

The initial visit was undertaken to assess the water level depths and allow for appropriate design of well development. Given the limited amount of water in most of the wells, 1 litre bailers were used to develop the wells on visit 1 undertaken on the 7th November 2024.

The second visit was undertaken on the 4th December 2024 and only assessed groundwater levels.

The third visit was undertaken on the 6th January to undertake both gas monitoring and groundwater sampling, however, it was discovered that BH04 & BH05 had been severely damaged by an excavator over the Christmas period. Consequently, only BHs 01 to 03 were monitored on the 6th January.

A follow-up visit was undertaken on the 13th January 2025 to repair and recover BHs 04 & 05 and obtain groundwater samples if possible. Full details of the repairs are given in letter 025/5003/AG/cc issued on the 23rd January 2025.

Results of groundwater dips to date are summarised below:

Date	Visit	Well	Groundwater level m bgl	Remarks
31/10/24	Initial dip	BH01	19.23	-
07/11/24	Visit 1		20.30	Bailed 8 Litres to 21.34m bgl at 09:39. Re-dipped at 20.41m bgl at 14:45
04/12/24	Visit 2		17.93	-
06/01/25	Visit 3		ND	-
10/02/25	Visit 4		ND	-
31/10/24	Initial dip	BH02	20.68	-
07/11/24	Visit 1		20.82	Bailed 11 litres to 22.05m bgl at 10:00. Re-dipped at 22.05m bgl at 14:40
04/12/24	Visit 2		20.15	-
06/01/25	Visit 3		20.01	-
10/02/25	Visit 4		21.83	-
31/10/24	Initial dip	BH03	>30.00	-
07/11/24	Visit 1		32.33	Bailed 2 litres to 32.61m bgl at 10:21. Re-dipped at 32.61m bgl at 14:38
04/12/24	Visit 2		31.70	-
06/01/25	Visit 3		29.66	-
10/02/25	Visit 4		31.38	-
31/10/24	Initial dip	BH04	>30.00	-
07/11/24	Visit 1		34.85	Bailed 33 litres to 37.49m bgl at 11:05. Re-dipped at 38.01m at 14:21.
04/12/24	Visit 2		31.11	-
13/01/25	Visit 3A		29.51	-
10/02/25	Visit 4		31.16	-
31/10/24	Initial dip	BH05	28.66	-
07/11/24	Visit 1		29.08	Bailed 60 litres to 35.33m bgl at 14:15
04/12/24	Visit 2		27.00	-
13/01/25	Visit 3A		25.87	-
10/02/25	Visit 4		27.69	-

Groundwater sampling

Monthly groundwater samples are required to aid the landfill permit application. To date, two rounds of groundwater sampling have been undertaken.

During the second visit, purging of groundwater was undertaken using 13mm low flow waterra tubing prior to sampling. On completion of sampling, water samples were kept in cold storage until being collected by the laboratory.

As expected, there was insufficient water in BHs 01 to 03 to obtain a representative water sample.

Groundwater levels and field observations made by the engineer during the second sampling visit are summarised in the table below.

Monitoring well	Response zone (m)	Groundwater level (m bgl)	Depth to base (m)	Sampling method	Comments
BH01	18.0 – 22.0 (142.15 – 138.15)	ND	20.82	No sampling undertaken (well dry)	-
BH02	18.0 – 22.0 (154.38 – 150.38)	21.83	22.17	No sampling undertaken (slow recharge)	-
BH03	28.0 – 32.0 (149.70 – 145.70)	31.38	32.92		-
BH04	36.0 – 40.0 (140.32 – 136.32)	31.16	36.70	Low flow waterra	30 litres of water purged prior to sampling.
BH05	35.5 – 39.5 (137.61 – 133.61)	27.69	38.44		45 litres of water purged prior to sampling

Surface water sampling

During the second water sampling visit undertaken on the 10th January 2025, Lithos were instructed to obtain a sample of surface water ponded at the base of the existing open quarry in the northeast of the site.

Due to health and safety concerns associated with access into the base of the quarry, the water sample was collected from the outflow pipe where the ponded water is pumped and discharged. No treatment of the water (i.e. filtration) is undertaken and therefore it is considered that the sample collected from the outflow pipe is representative of the groundwater ponded at the base of the quarry.

Laboratory testing

Two samples of groundwater (BH04 & BH05) and surface water (SW1) were sent to a UKAS accredited laboratory for analysis. Each sample was scheduled for a suite including:

- Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn & B)
- Chloride
- Ammoniacal nitrogen
- Conductivity
- Dissolved organic carbon
- pH
- Total phenol
- Speciated TPH
- Speciated PAH

Laboratory results are appended to this letter and summarised in the Table on page 5. Lithos does not hold information regarding the critical concentrations, and therefore no values have been included.

Gas monitoring results

A standard procedure was followed in accordance with CIRIA guidance; this procedure involved measurement, in the following order of:

- Atmospheric temperature, pressure and ambient oxygen concentration on site immediately prior to and on completion of monitoring
- Methane, oxygen and carbon dioxide concentrations and flow rates using a Gas Data GFM436 infra-red gas analyser
- Standing water level using a dipmeter

To date, four monthly gas monitoring visits have been undertaken. The monitoring results from visit 4 of 12 are enclosed and summarised in the table below.

Well		Response zone	Range of methane concentrations (% v/v)	Range of carbon dioxide concentrations (% v/v)	Range of steady flow rates (litre/hour)
BH01	50mm	Quarry backfill	ND	ND	ND
	19mm	Quarry backfill	ND	0.6	ND
BH02	50mm	Elland Flags	ND	2.1	ND
	19mm	Elland Flags	ND	1.1	ND
BH03	50mm	Granular Residual Soils	ND	ND	ND
	19mm	Elland Flags	ND	0.7	ND
BH04	50mm	Quarry backfill	ND	ND	ND
	19mm	Possible Elland Flags	ND	0.4	0.2
BH05	50mm	Elland Flags	ND	ND	ND
	19mm	Elland Flags	ND	0.3	ND

Note: Atmospheric pressures varied between 1007mb and 1035mb. ND – None detected.

During the visit on the 10th February atmospheric pressure was rising from 1008 to 1035 across the day.

Should you require any further information, please contact the undersigned.

Yours sincerely



Adam Gombocz
Director

for and on behalf of
LITHOS CONSULTING LIMITED

Encl.

Gas & Groundwater monitoring data – visit 4
Drawing 5003/6 BH location plan
Borehole logs
Chemical test results

SUMMARY OF GROUNDWATER TESTING

Expl Hole	pH	As	B	Cd	Cr	Cu	Pb	Hg	Ni	Se	Zn	Cl ⁻	Ammoniacal N	Conductivity	Dissolved Organic Carbon	Total Phenol	PAHs	TPH
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	uS/cm	mg/l	ug/l	ug/l	C ₁ – C ₄₀
BH04	7.3	0.62	202.7	<0.03	0.74	1.4	0.61	<0.01	2.0	11	43	44	0.034	979	3.6	<0.5	1.4	18
BH05	7.4	0.22	55.0	0.03	0.39	2.0	0.11	0.01	1.6	<0.25	59	140	0.038	2870	7.1	<0.5	1.6	16
SW1	7.5	0.57	279.5	<0.03	0.74	1.6	0.26	<0.01	4.6	9.3	110	43	10	43	4.4	<0.5	0.44	<10

Visit 4

Job Title:				Job No:	
Quarry at Rastrick, Brighouse				5003	
Client:				Sheet :	
Britology				5 of 5	
Date:	Arrival Time:	Depart Time:	Operator:		
10/02/2025	08:15	12:00	George Costley		



Gas Monitoring Results:

Ambient Concentration (% Volume):	CH ₄ :	ND	CO ₂ :	ND	O ₂ :	20.4
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Monitoring Point	Groundwater level	Concentrations					Gas Flow Rates			Bottom of well	Remarks
		Initial / Highest		Steady concentrations		Lowest concn	Initial / Maximum	Steady	Time to fall from highest to steady		
		CH ₄	CO ₂	CH ₄	CO ₂	O ₂					
		% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs		
BH01 (50mm)	ND	ND	ND	ND	ND	20.3	ND	ND	120.0	20.82	
BH02 (50mm)	21.83	ND	2.1	ND	2.1	28.6	ND	ND	120.0	22.17	
BH03 (50mm)	31.38	ND	ND	ND	ND	20.3	ND	ND	120.0	32.92	
BH04 (50mm)	31.16	ND	ND	ND	ND	20.3	ND	ND	120.0	36.70	
BH05 (50mm)	27.69	ND	ND	ND	ND	20.1	0.3	ND	120.0	38.44	
BH01 (19mm)	ND	ND	0.6	ND	0.6	19.7	ND	ND	120.0	2.84	
BH02 (19mm)	ND	ND	1.1	ND	1.1	18.6	ND	ND	120.0	2.72	
BH03 (19mm)	ND	ND	0.7	ND	0.7	19.7	ND	ND	120.0	2.78	
BH04 (19mm)	ND	ND	0.4	ND	0.4	19.8	1.4	0.2	120.0	2.45	Bailed 30L
BH05 (19mm)	ND	ND	0.3	ND	0.3	20.1	0.3	ND	120.0	3.11	Bailed 45L

Equipment Used:

Gas Data GFM436 Infrared Gas Analyser
Geotechnical Instruments Dipmeter

Next Calibration Date

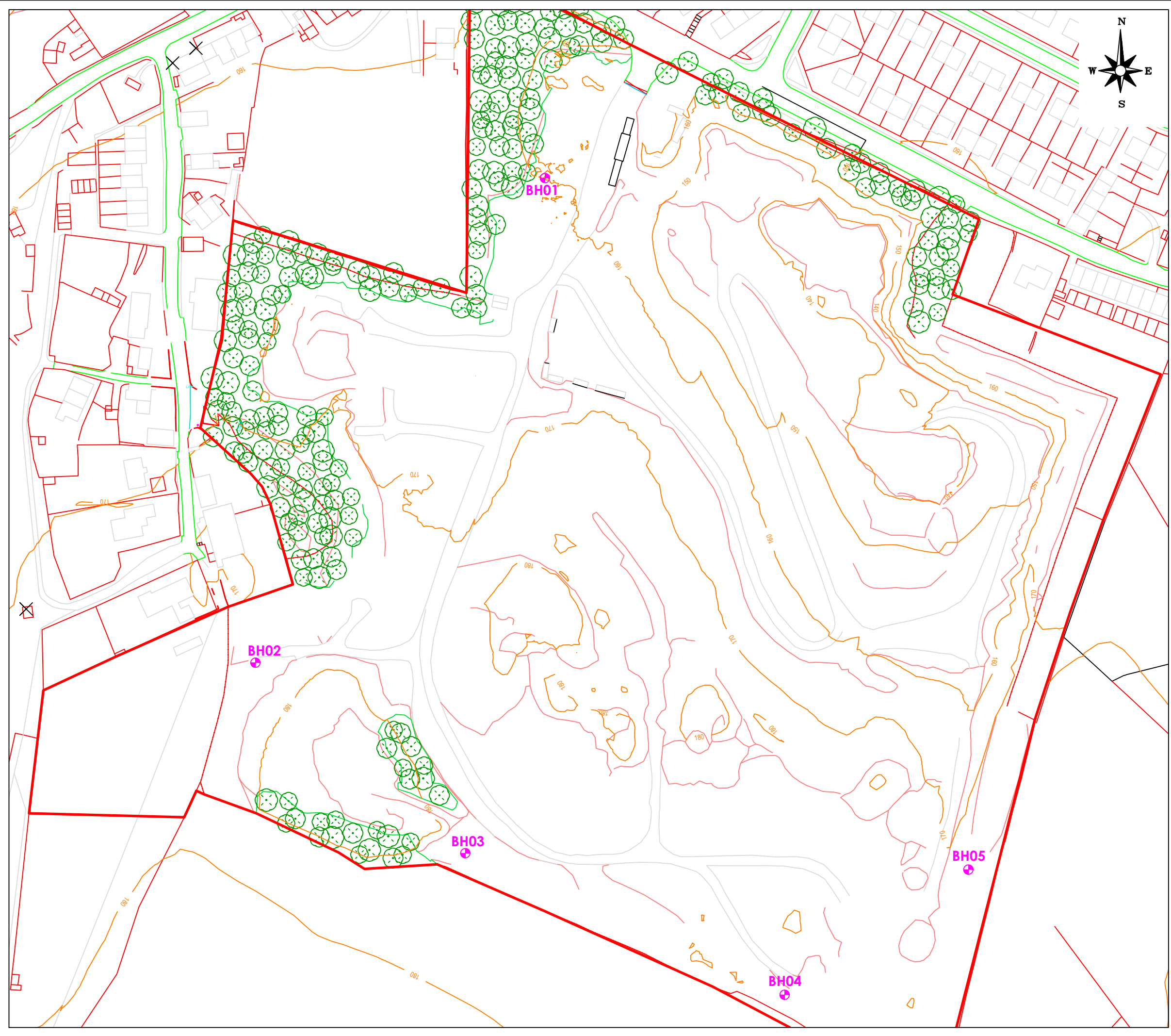
27/03/2025

Key

ND	None Detected
NR	Not Recorded
1.0	Recorded value does not breach trigger levels
5.0	Recorded value breaches trigger level 1
10.0	Recorded value breaches trigger level 2

	Site Data:			Weather Station Data (Ganton Weather Station)							CH ₄	CO ₂	O ₂	
	Temp (°C):		1.8 > 2.2	Barometric Pressure Trend:			Falling							
Time:	08:15	10:00	12:00	00:00	06:15	08:15	10:00	12:00	14:00	Trigger level 1	1.0	5.0	16.0	
Pressure (mb):	1008	1009	1008	1037	1035	1035	1034	1033	1032	Trigger level 2	5.0	10.0	10.0	
	Weather Conditions:		Overcast< Cold, Raining											
	Surface Ground Conditions:		Wet, Boggy											

Ganton Weather station is located approximately 2 miles south from the site (Quarry at Rastrick, Brighouse)



NOTES

 BOREHOLE LOCATION

 APPROXIMATE SITE BOUNDARY

EXPLORATORY HOLE LOCATIONS HAVE BEEN SURVEYED
IN (COORDINATES & GROUND LEVEL) ON COMPLETION

REV.	DESCRIPTION	DATE



info@lithos.co.uk
www.lithos.co.uk
Tel 01937 545330

CLIENT

BRITOLGY

JOB TITLE

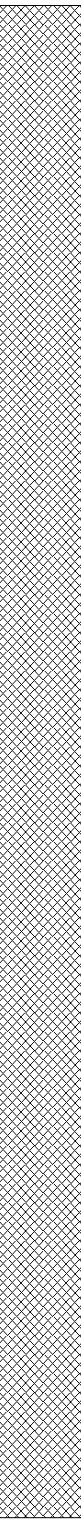
QUARRY NEAR
RASTRICK,
BRIGHOUSE

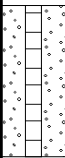
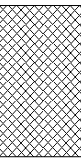
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EXPLORATORY HOLE LOCATIONS

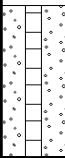
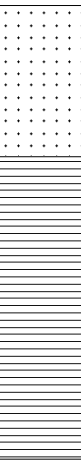
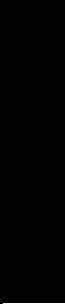
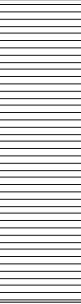
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				FINAL	☒

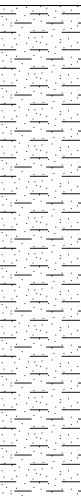
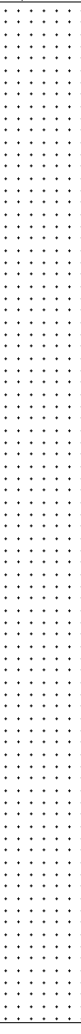
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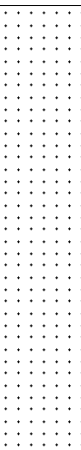
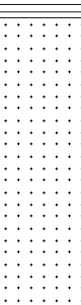
					Borehole Log			Borehole No. BH01 Sheet 1 of 2			
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 412845.06 - 421374.61		Hole Type PH		
Location: Rastrick					Level: 160.15		Scale 1:100		Logged By CC		
Client: Britology					Dates: 15/10/2024 - 15/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
								MADE GROUND: Light brown QUARRY BACKFILL. Recovered as sandstone with occasional flecks of mudstone. (QUARRY BACKFILL)	1		
									2		
										3	
										4	
										5	
										6	
										7	
										8	
										9	
										10	
										11	
										12	
										13	
										14	
										15	
										16	
										17	
										18	
										19	
										20	
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Remarks 1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not encountered. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.											

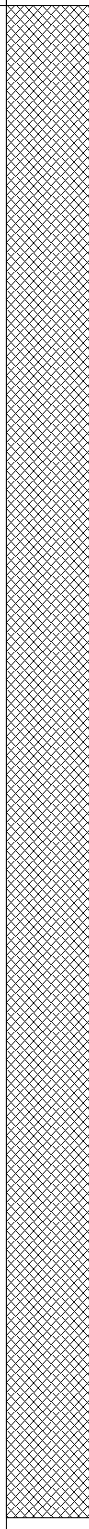
					Borehole Log			Borehole No. BH01 Sheet 2 of 2			
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 412845.06 - 421374.61		Hole Type PH		
Location: Rastrick					Level: 160.15		Scale 1:100		Logged By CC		
Client: Britology					Dates: 15/10/2024 - 15/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					22.00	138.15		End of borehole at 22.00 m	21		
									22		
									23		
									24		
									25		
									26		
									27		
									28		
									29		
									30		
									31		
									32		
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									38		
									39		
									40		
Remarks 1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not encountered. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.											

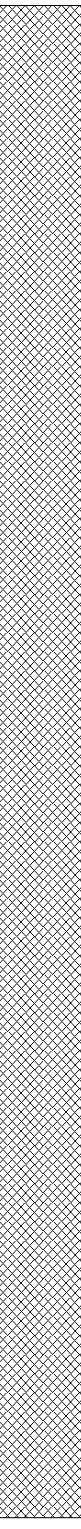
LITHOS CONSULTING					Borehole Log			Borehole No. BH02 Sheet 1 of 2		
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 412729.92 - 421181.99		Hole Type PH	
Location: Rastrick							Level: 172.40		Scale 1:100	
Client: Britology							Dates: 07/10/2024 - 07/10/2024		Logged By CC	
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					1.50	170.90		Overburden. (GRANULAR RESIDUAL SOIL)	1	
								Light brown SANDSTONE. (ELLAND FLAGS)	2	
										3
										4
										5
										6
										7
										8
										9
										10
					7.00	165.40		Interbedded SANDSTONE and MUDSTONE. (ELLAND FLAGS)	7	
								Light brown SANDSTONE. (ELLAND FLAGS)	8	
										9
										10
										11
										12
										13
										14
										15
										16
								17		
								18		
								19		
								20		
Continued on next sheet										
Remarks 1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater encountered between 17.3m and 20.3m depth. 3. Flush returns were lost from 12.4m and 15.4m depth. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.										
AGS										

					Borehole Log			Borehole No. BH02 Sheet 2 of 2			
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 412729.92 - 421181.99		Hole Type PH		
Location: Rastrick					Level: 172.40		Scale 1:100		Logged By CC		
Client: Britology					Dates: 07/10/2024 - 07/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					22.00	150.40		Dark grey MUDSTONE. (ELLAND FLAGS)	21		
										22	
					26.00	146.40		End of borehole at 26.00 m	23		
										24	
									25		
										26	
									27		
										28	
									29		
										30	
									31		
										32	
									33		
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										36	
									37		
										38	
									39		
										40	
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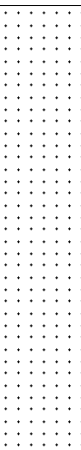
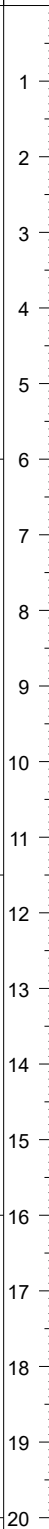
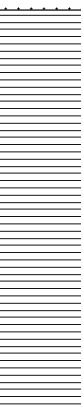
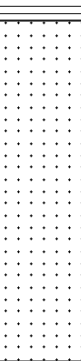
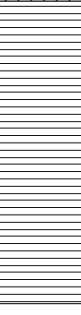
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Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 412813.40 - 421106.28		Hole Type PH		
Location: Rastrick					Level: 177.70		Scale 1:100		Logged By CC		
Client: Britology					Dates: 08/10/2024 - 09/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					6.50	171.20		Overbuden. (GRANULAR RESIDUAL SOIL)	1		
									2		
									3		
									4		
									5		
									6		
								Light brown SANDSTONE with occasional bands of dark grey MUDSTONE. (ELLAND FLAGS)	7		
									8		
									9		
									10		
									11		
									12		
									13		
									14		
									15		
									16		
									17		
									18		
									19		
									20		
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Remarks 1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not encountered. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.											

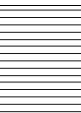
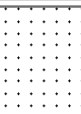
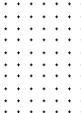
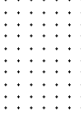
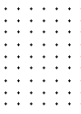
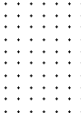
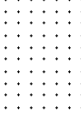
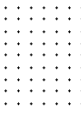
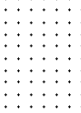
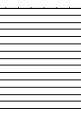
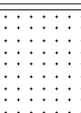
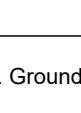
					Borehole Log			Borehole No. BH03 Sheet 2 of 2			
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 412813.40 - 421106.28		Hole Type PH		
Location: Rastrick					Level: 177.70		Scale 1:100		Logged By CC		
Client: Britology					Dates: 08/10/2024 - 09/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
										21	
										22	
										23	
										24	
										25	
					26.00	151.70		Dark grey MUDSTONE. (ELLAND FLAGS)		26	
					27.00	150.70		Interbedded SANDSTONE and MUDSTONE. (ELLAND FLAGS)		27	
										28	
										29	
										30	
					31.00	146.70		Dark grey MUDSTONE. (ELLAND FLAGS)		31	
										32	
					32.40	145.30		End of borehole at 32.40 m		33	
										34	
										35	
										36	
										37	
										38	
										39	
										40	
Remarks 1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not encountered. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.											

					Borehole Log			Borehole No. BH04 Sheet 1 of 3			
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 412940.37 - 421050.00		Hole Type PH		
Location: Rastrick					Level: 176.30		Scale 1:100		Logged By CC		
Client: Britology					Dates: 10/10/2024 - 10/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
								MADE GROUND: Light brown QUARRY BACKFILL. Recovered as a light brown sandstone with occasional bands of dark grey mudstone. (QUARRY BACKFILL)	1		
									2		
										3	
										4	
										5	
										6	
										7	
										8	
										9	
										10	
										11	
										12	
										13	
										14	
										15	
										16	
										17	
										18	
										19	
										20	
Continued on next sheet											
Remarks 1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not encountered. 3. Flush returns were lost from 40.0m and 44.5m depth. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.											

					Borehole Log			Borehole No. BH04 Sheet 2 of 3			
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 412940.37 - 421050.00		Hole Type PH		
Location: Rastrick					Level: 176.30		Scale 1:100		Logged By CC		
Client: Britology					Dates: 10/10/2024 - 10/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
								)	21		
									22		
									23		
									24		
									25		
									26		
									27		
									28		
									29		
									30		
									31		
									32		
									33		
									34		
									35		
									36		
									37		
									38		
									39		
									40		
								Continued on next sheet			
Remarks											
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not encountered. 3. Flush returns were lost from 40.0m and 44.5m depth. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.											

					Borehole Log			Borehole No. BH04 Sheet 3 of 3			
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 412940.37 - 421050.00		Hole Type PH		
Location: Rastrick					Level: 176.30		Scale 1:100		Logged By CC		
Client: Britology					Dates: 10/10/2024 - 10/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
								Soft drilling, limited flush returns. Possible mudstone?			
					44.50	131.80		End of borehole at 44.50 m			
Remarks											
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not encountered. 3. Flush returns were lost from 40.0m and 44.5m depth. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.											
											

					Borehole Log			Borehole No. BH05 Sheet 1 of 2			
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 413013.46 - 421099.76		Hole Type PH		
Location: Rastrick					Level: 173.10		Scale 1:100		Logged By CC		
Client: Britology					Dates: 14/10/2024 - 14/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					6.00	167.10		Light brown SANDSTONE. (ELLAND FLAGS)			
					11.50	161.60		Dark grey MUDSTONE. (ELLAND FLAGS)			
					16.00	157.10		Light brown SANDSTONE. (ELLAND FLAGS)			
								Dark grey MUDSTONE. (ELLAND FLAGS)			
		Continued on next sheet									
		Remarks 1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not encountered. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.									
											

					Borehole Log			Borehole No. BH05 Sheet 2 of 2			
Project Name: Quarry at Rastrick					Project No. 5003		Co-ords: 413013.46 - 421099.76		Hole Type PH		
Location: Rastrick					Level: 173.10		Scale 1:100		Logged By CC		
Client: Britology					Dates: 14/10/2024 - 14/10/2024						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					21.50	151.60		Light brown SANDSTONE. (ELLAND FLAGS)	21		
										22	
										23	
										24	
										25	
										26	
										27	
										28	
										29	
										30	
								31			
								32			
								33			
								34			
								35			
					35.50	137.60		Dark grey MUDSTONE. (ELLAND FLAGS)	36		
					37.00	136.10		Interbedded SANDSTONE and MUDSTONE. (ELLAND FLAGS)	37		
					38.50	134.60		Dark grey MUDSTONE. (ELLAND FLAGS)	38		
					39.50	133.60		End of borehole at 39.50 m	39		
									40		
Remarks 1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not encountered. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.											

Certificate of Analysis

Certificate Number 25-02977

Issued: 18-Feb-25

Client Lithos Consulting Ltd
Parkhill
Walton Rd
Wetherby
LS22 5DZ

Our Reference 25-02977

Client Reference ~ 5003

Order No ~ 23741

Contract Title ~ Lower Edge Quarry

Description 2 Groundwater samples.

Date Received 11-Feb-25

Date Started 11-Feb-25

Date Completed 18-Feb-25

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Louise Cook
Contracts Manager



Summary of Chemical Analysis

Water Samples

Our Ref 25-02977

Client Ref ~ 5003

Contract Title ~ Lower Edge Quarry

Lab No	2462564	2462565
Sample ID ~	BH04	BH05
Depth ~		
Other ID ~		
Sample Type ~	GROUND WATER	GROUND WATER
Sampling Date ~	10/02/2025	10/02/2025
Sampling Time ~	1157	0948

Test	Method	LOD	Units		
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.62	0.22
Boron, Dissolved	DETSC 2306*	12	ug/l	202.7	55.0
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.74	0.39
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.4	2.0
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.61	0.11
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	2.0	1.6
Selenium, Dissolved	DETSC 2306	0.25	ug/l	11	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	43	59
Inorganics					
Conductivity	DETSC 2009	1	uS/cm	979	2870
pH	DETSC 2008		pH	7.3	7.4
Dissolved Organic Carbon	DETSC 2085	2	mg/l	3.6	7.1
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.034	0.038
Chloride	DETSC 2055	0.1	mg/l	44	140
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	7.5	6.3
Aliphatic C16-C21	DETSC 3072*	1	ug/l	9.8	9.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	18	16
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	ug/l	18	16
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	0.07	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.01	0.03
Fluorene	DETSC 3304	0.01	ug/l	0.02	0.02
Phenanthrene	DETSC 3304	0.01	ug/l	0.15	0.19
Anthracene	DETSC 3304	0.01	ug/l	0.03	0.05

Summary of Chemical Analysis

Water Samples

Our Ref 25-02977

Client Ref ~ 5003

Contract Title ~ Lower Edge Quarry

Lab No	2462564	2462565
Sample ID ~	BH04	BH05
Depth ~		
Other ID ~		
Sample Type ~	GROUND WATER	GROUND WATER
Sampling Date ~	10/02/2025	10/02/2025
Sampling Time ~	1157	0948

Test	Method	LOD	Units		
Fluoranthene	DETSC 3304	0.01	ug/l	0.22	0.28
Pyrene	DETSC 3304	0.01	ug/l	0.23	0.24
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	0.11	0.11
Chrysene	DETSC 3304	0.01	ug/l	0.08	0.11
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.14	0.18
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	0.05	0.08
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	0.11	0.16
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	0.06	0.08
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.07	0.10
PAH Total	DETSC 3304	0.2	ug/l	1.4	1.6
Phenols					
Total Phenol	DETSC 3451*	0.5	ug/l	< 0.50	< 0.50

Information in Support of the Analytical Results

Our Ref 25-02977
 Client Ref ~ 5003
 Contract ~ Lower Edge Quarry

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2462564	BH04 GROUND WATER	10/02/25	GB 1L, GV, PB 1L		
2462565	BH05 GROUND WATER	10/02/25	GB 1L, GV, PB 1L		

Key: G-Glass P-Plastic B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:

~ Sample details are provided by the client and can affect the validity of the results
 * -not accredited.
 # -MCERTS (accreditation only applies if report carries the MCERTS logo).
 \$ -subcontracted.
 n/s -not supplied.
 I/S -insufficient sample.
 U/S -unsuitable sample.
 t/f -to follow.
 nd -not detected.

End of Report

Certificate of Analysis

Certificate Number 25-02976

Issued: 18-Feb-25

Client Lithos Consulting Ltd
Parkhill
Walton Rd
Wetherby
LS22 5DZ

Our Reference 25-02976

Client Reference ~ 5003

Order No ~ 23741

Contract Title ~ Lower Edge Quarry

Description 1 River/Surface Water sample.

Date Received 11-Feb-25

Date Started 11-Feb-25

Date Completed 18-Feb-25

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Louise Cook
Contracts Manager



Summary of Chemical Analysis

Water Samples

Our Ref 25-02976

Client Ref ~ 5003

Contract Title ~ Lower Edge Quarry

Lab No	2462563
Sample ID ~	SW1
Depth ~	
Other ID ~	
Sample Type ~	RIVER/SURFACE WATER
Sampling Date ~	10/02/2025
Sampling Time ~	1226

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.57
Boron, Dissolved	DETSC 2306*	12	ug/l	279.5
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.74
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.6
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.26
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	4.6
Selenium, Dissolved	DETSC 2306	0.25	ug/l	9.3
Zinc, Dissolved	DETSC 2306	1.3	ug/l	110
Inorganics				
Conductivity	DETSC 2009	1	uS/cm	1210
pH	DETSC 2008		pH	7.5
Dissolved Organic Carbon	DETSC 2085	2	mg/l	4.4
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	10
Chloride	DETSC 2055	0.1	mg/l	43
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	ug/l	< 10
PAHs				
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.02
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.02
Anthracene	DETSC 3304	0.01	ug/l	0.01

Summary of Chemical Analysis

Water Samples

Our Ref 25-02976

Client Ref ~ 5003

Contract Title ~ Lower Edge Quarry

Lab No	2462563
Sample ID ~	SW1
Depth ~	
Other ID ~	
Sample Type ~	RIVER/SURFACE WATER
Sampling Date ~	10/02/2025
Sampling Time ~	1226

Test	Method	LOD	Units	
Fluoranthene	DETSC 3304	0.01	ug/l	0.13
Pyrene	DETSC 3304	0.01	ug/l	0.11
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	0.03
Chrysene	DETSC 3304	0.01	ug/l	0.02
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.03
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.02
PAH Total	DETSC 3304	0.2	ug/l	0.44
Phenols				
Total Phenol	DETSC 3451*	0.5	ug/l	< 0.50

Information in Support of the Analytical Results

Our Ref 25-02976
 Client Ref ~ 5003
 Contract ~ Lower Edge Quarry

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2462563	SW1 RIVER/SURFACE WATER	10/02/25	GB 1L, GV, PB 1L		

Key: G-Glass P-Plastic B-Bottle V-Vial

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Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

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~ Sample details are provided by the client and can affect the validity of the results
 * -not accredited.
 # -MCERTS (accreditation only applies if report carries the MCERTS logo).
 \$ -subcontracted.
 n/s -not supplied.
 I/S -insufficient sample.
 U/S -unsuitable sample.
 t/f -to follow.
 nd -not detected.

End of Report