026/5003/AG/cc

27th January 2025

Mr J Scott
Britology
jonathan@britology.co.uk

LITHOS CONSULTING

Registered in England 07068066

Parkhill
Wetherby
West Yorkshire
LS22 5DZ

T 01937 545 330

www.lithos.co.uk

Dear Jonathan

Lower Edge Quarry – gas & groundwater monitoring results

We have undertaken the third 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 (second) monitoring visit (Ref. 020/5003/AG/cc), issued on the 20th December 2024.

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 three 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	-
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	-
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	-
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	-
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	-

Groundwater sampling

Following reinstatement of BH04 & BH05 on the 13th January 2025, all boreholes were dipped to establish depth to groundwater and check that sufficient response zone (at least 2.0m) was clear to allow free movement of groundwater.

Purging of groundwater was undertaken using 16mm waterra tubing, followed by collection of samples using 13mm low flow waterra tubing. On completion, 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 sampling 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	20.78	No sampling undertaken (well dry)	-
BH02	18.0 – 22.0 (154.38 – 150.38)	20.01	22.17	No sampling undertaken (slow recharge)	-
BH03	28.0 – 32.0 (149.70 – 145.70)	29.66	32.44		-
BH04	36.0 – 40.0 (140.32 – 136.32)	29.51	38.31	Low flow waterra	50 litres of water purged prior to sampling
BH05	35.5 – 39.5 (137.61 – 133.61)	25.87	39.02		60 litres of water purged prior to sampling

Groundwater samples are required monthly to aid the landfill permit application. Given the lack of recharge in BHs 01, 02 & 03, it is unlikely that samples will be recovered during further monitoring visits.

Laboratory testing

Samples of groundwater 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, three monthly gas monitoring visits have been undertaken. The monitoring results from visit 3/3A 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	0.1	ND
	19mm	Quarry backfill	ND	0.1	ND
BH02	50mm	Elland Flags	ND	0.1	ND
	19mm	Elland Flags	ND	0.1	ND
BH03	50mm	Granular Residual Soils	ND	ND	ND
	19mm	Elland Flags	ND	1.7	ND
BH04	50mm	Quarry backfill	ND	ND	ND
	19mm	Possible Elland Flags	ND	2.0	ND
BH05	50mm	Elland Flags	ND	ND	ND
	19mm	Elland Flags	ND	ND	ND

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

During the visit on the 6th January (BH01 to BH03) atmospheric pressure was rising from 978 to 1006 across the day. During the visit on the 13th January (BH04 & BH05) visit, atmospheric pressure was rising from 1011mb to 1039 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 3 & 3A
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	7.2	0.34	99	<0.03	<0.025	2.1	<0.09	<0.01	<0.5	1.5	120	6.5	0.034	257	2.5	<100	<0.2	<10
BH05	7.3	<0.16	190	<0.03	<0.025	0.6	<0.09	0.02	<0.5	<0.25	98	290	0.029	1800	4.6	<100	<0.2	<10

Visit 3

Job Title:				Job No:
Quarry at Rastrick, Brighouse				5003
Client:				Sheet :
Britology				3 of 4
Date:	Arrival Time:	Depart Time:	Operator:	
06/01/2025	08:30	10:30	George Costley & Charlotte Copley	

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	15.6

Monitoring Point	Groundwater level	Concentrations: Initial / Highest CH_4	Initial / Highest CO_2	Steady concentrations CH_4	Steady concentrations CO_2	Lowest concn O_2	Gas Flow Rates: Initial / Maximum	Steady	Time to fall from highest to steady	Bottom of well	Remarks
	(m) bgl	% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs	m	
BH01 (50mm)	ND	ND	0.1	ND	0.1	15.2	ND	ND	120.0	20.78	
BH02 (50mm)	20.01	ND	0.1	ND	0.1	15.4	ND	ND	120.0	22.17	
BH03 (50mm)	29.66	ND	ND	ND	ND	15.4	ND	ND	120.0	32.44	
BH04 (50mm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Well Destroyed
BH05 (50mm)	24.17	NR	NR	NR	NR	NR	NR	NR	NR	38.60	Well Partially Destroyed
BH01 (19mm)	ND	ND	0.1	ND	0.1	15.2	ND	ND	120.0	2.82	
BH02 (19mm)	ND	ND	0.1	ND	0.1	15.4	ND	ND	120.0	2.77	
BH03 (19mm)	ND	ND	1.7	ND	1.7	13.8	ND	ND	120.0	2.88	
BH04 (19mm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Well Destroyed
BH05 (19mm)	ND	ND	0.8	ND	0.8	15.5	ND	ND	120.0	2.90	

Equipment Used:	Next Calibration Date
Gas Data GFM436 Infrared Gas Analyser Geotechnical Instruments Dipmeter	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)					
Temp (°C):	-1.8		Barometric Pressure Trend:			Steady		
Time:	08:30	09:30	10:30	00:00	06:30	08:30	09:30	10:30	12:30
Pressure (mb):	978	980	982	1004	1005	1006	1006	1006	1005
Weather Conditions:	Clear skies, Cold								
Surface Ground Conditions:	Wet, Icey								

	CH_4	CO_2	O_2
Trigger level 1	1.0	5.0	16.0
Trigger level 2	5.0	10.0	10.0

Remarks:

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

Visit 3A

Job Title:				Job No:
Quarry at Rastrick, Brighouse				5003
Client:				Sheet :
Britology				4 of 4
Date:	Arrival Time:	Depart Time:	Operator:	
13/01/2025	12:30	13:30	George Costley	

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	14.7

Monitoring Point	Groundwater level	Concentrations: Initial / Highest		Concentrations: Steady concentrations		Concentrations: Lowest concn	Gas Flow Rates: Initial / Maximum	Gas Flow Rates: Steady	Gas Flow Rates: Time to fall from highest to steady	Bottom of well	Remarks
		CH_4	CO_2	CH_4	CO_2	O_2					
	(m) bgl	% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs	m	
BH01 (50mm)	-	-	-	-	-	-	-	-	-	-	
BH02 (50mm)	-	-	-	-	-	-	-	-	-	-	
BH03 (50mm)	-	-	-	-	-	-	-	-	-	-	
BH04 (50mm)	29.51	ND	ND	ND	ND	**14.7**	ND	ND	120.0	38.31	
BH05 (50mm)	25.87	ND	ND	ND	ND	**13.7**	ND	ND	120.0	39.02	
BH01 (19mm)	-	-	-	-	-	-	-	-	-	-	
BH02 (19mm)	-	-	-	-	-	-	-	-	-	-	
BH03 (19mm)	-	-	-	-	-	-	-	-	-	-	
BH04 (19mm)	ND	ND	2.0	ND	2.0	**9.2**	ND	ND	120.0	120.00	
BH05 (19mm)	ND	ND	ND	ND	ND	**14.7**	3.8	ND	120.0	120.00	

Equipment Used:

Gas Data GFM436 Infrared Gas Analyser
Geotechnical Instruments Dipmeter

Next Calibration Date

27/03/2025

Key

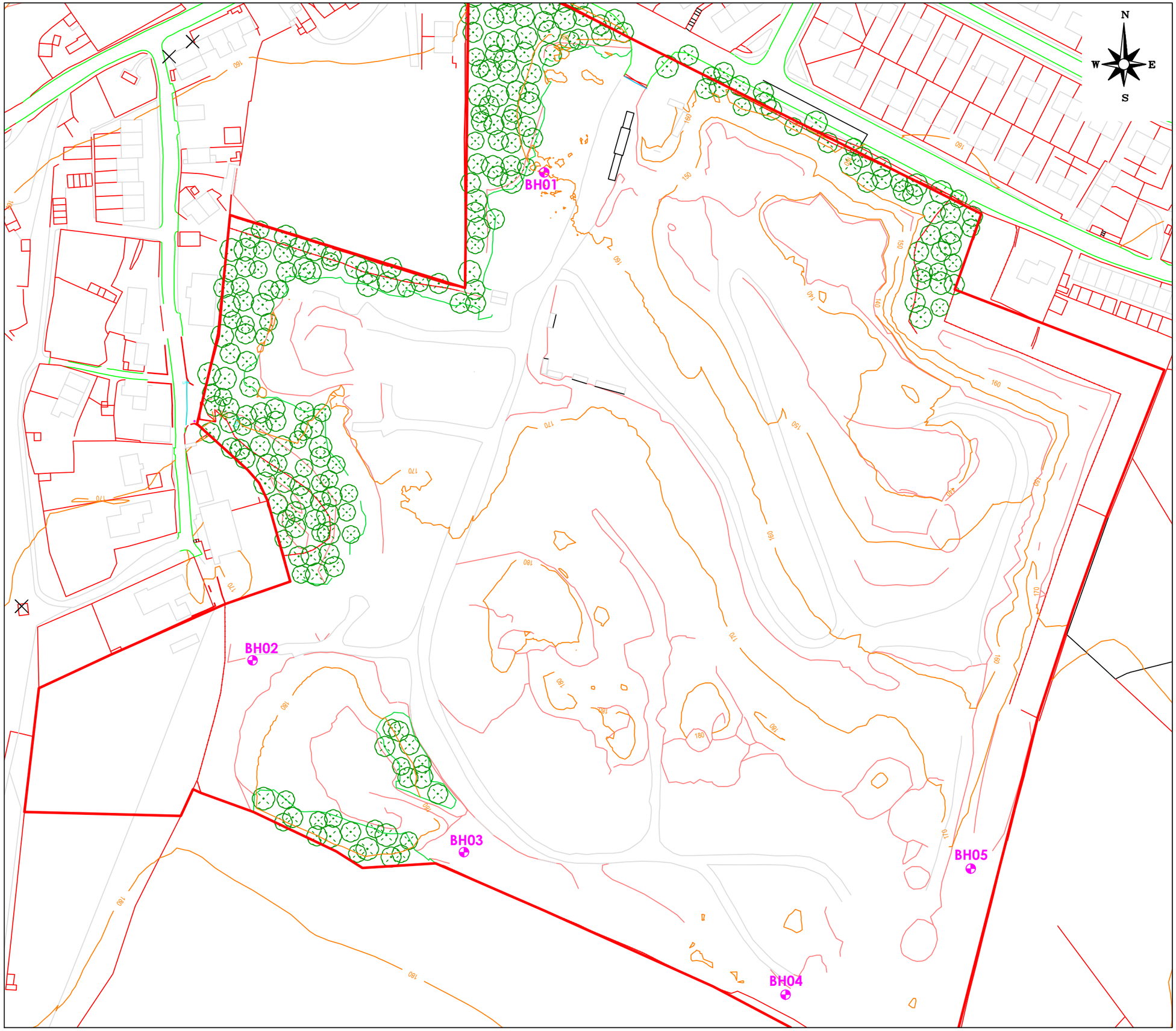
ND	None Detected
NR	Not Recorded
1.0	Recorded value does not breach trigger levels
5.0	Recorded value breaches trigger level 1
10.0	Recorded value breaches trigger level 2

	Site Data:			Weather Station Data (Ganton Weather Station)					
	Temp (°C):	4.8		Barometric Pressure Trend:			Steady		
Time:	12:30	13:00	13:30	00:00	11:30	12:30	13:00	13:30	15:30
Pressure (mb):	1011	1011	1011	1039	1036	1036	1036	1036	1035
	Weather Conditions:	Overcast, Cold							
	Surface Ground Conditions:	Wet, Boggy							

	CH_4	CO_2	O_2
Trigger level 1	1.0	5.0	16.0
Trigger level 2	5.0	10.0	10.0

Remarks:

Ganton Weather station is located approximately 2 miles south from the site (Quarry at Rastrick, Brighouse) DATA COLLECTED FROM FIXED WELLS



NOTES

BOREHOLE LOCATION

APPROXIMATE SITE BOUNDARY

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

REV.	DESCRIPTION	DATE

LITHOS CONSULTING

info@lithos.co.uk
www.lithos.co.uk

Tel 01937 545330

CLIENT

BRITOLOGY

JOB TITLE

QUARRY NEAR RASTRICK, BRIGHOUSE

DRAWING TITLE

EXPLORATORY HOLE LOCATIONS

DRAWN	DATE	STATUS
LEW	16 10 2025	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	16 10 2025	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
1:1500	A3	5003/6	

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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
Client:	Britology		Dates:	15/10/2024 - 15/10/2024	Logged By CC

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)

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.

AGS

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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
Client:	Britology		Dates:	15/10/2024 - 15/10/2024	Logged By CC

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

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.

AGS

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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				
								Overburden. (GRANULAR RESIDUAL SOIL)
					1.50	170.90		Light brown SANDSTONE. (ELLAND FLAGS)
					7.00	165.40		Interbedded SANDSTONE and MUDSTONE. (ELLAND FLAGS)
					8.40	164.00		Light brown SANDSTONE. (ELLAND FLAGS) *Between 12.4m and 15.4m depth, loss of flush.*
	▼				16.30	156.10		Dark grey MUDSTONE. (ELLAND FLAGS) *Between 17.3m and 20.3m, water strike. Exact depth of strike difficult to determine.*
					18.00	154.40		Light brown SANDSTONE with fine bands of 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 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

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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
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				
					22.00	150.40		Dark grey MUDSTONE. (ELLAND FLAGS)
					26.00	146.40		End of borehole at 26.00 m

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

LITHOS CONSULTING			Borehole No. **BH03** Sheet 1 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
Client: Britology		Dates: 08/10/2024 - 09/10/2024	Logged By CC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Overbuden. (GRANULAR RESIDUAL SOIL)
					6.50	171.20		Light brown SANDSTONE with occasional bands of dark grey MUDSTONE. (ELLAND FLAGS)
								Between 11.5m and 17.4m depth, loss of flush.
								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.

AGS

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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
Client:	Britology		Dates:	08/10/2024 - 09/10/2024	Logged By CC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					26.00	151.70		Dark grey MUDSTONE. (ELLAND FLAGS)
					27.00	150.70		Interbedded SANDSTONE and MUDSTONE. (ELLAND FLAGS)
					31.00	146.70		Dark grey MUDSTONE. (ELLAND FLAGS)
					32.40	145.30		End of borehole at 32.40 m

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.

AGS

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
Client:	Britology		Dates:	10/10/2024 - 10/10/2024	Logged By CC

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)
								Between 8.5m and 11.5m, wood returned.
								At 16.0m, textiles returned.
								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.

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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
Client:	Britology		Dates:	10/10/2024 - 10/10/2024	Logged By CC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								)
								At 33.5m, wood returned.
								At 37.0m, clinker returned.
					40.00	136.30		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.

AGS

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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
Client:	Britology		Dates:	10/10/2024 - 10/10/2024	Logged By CC

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

41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

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.

AGS

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
Client: Britology		Dates: 14/10/2024 - 14/10/2024	Logged By CC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Light brown SANDSTONE. (ELLAND FLAGS)
					6.00	167.10		Dark grey MUDSTONE. (ELLAND FLAGS)
					11.50	161.60		Light brown SANDSTONE. (ELLAND FLAGS)
					16.00	157.10		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.

LITHOS CONSULTING

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
Client:	Britology		Dates:	14/10/2024 - 14/10/2024	Logged By CC

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)
					35.50	137.60		Dark grey MUDSTONE. (ELLAND FLAGS)
					37.00	136.10		Interbedded SANDSTONE and MUDSTONE. (ELLAND FLAGS)
					38.50	134.60		Dark grey MUDSTONE. (ELLAND FLAGS)
					39.50	133.60		End of borehole at 39.50 m

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.

AGS

Certificate of Analysis

Certificate Number	25-00772	*Issued:*	20-Jan-25

Client Lithos Consulting Ltd
Parkhill
Walton Rd
Wetherby
LS22 5DZ

Our Reference	25-00772
Client Reference ~	5003
Order No ~	PO23579
Contract Title ~	Lower Edge Quarry
Description	2 Groundwater samples.
Date Received	14-Jan-25
Date Started	15-Jan-25
Date Completed	20-Jan-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

Kirk Bridgewood
General Manager

ilac-MRA UKAS TESTING 2139

Summary of Chemical Analysis
Water Samples

Our Ref 25-00772
Client Ref ~ 5003
Contract Title ~ Lower Edge Quarry

			Lab No	2448683	2448684
			Sample ID ~	BH04	BH05
			Depth ~		
			Other ID ~		
			Sample Type ~	GROUND WATER	GROUND WATER
			Sampling Date ~	13/01/2025	13/01/2025
			Sampling Time ~	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.34	< 0.16
Boron, Dissolved	DETSC 2306*	12	ug/l	99	190
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.1	0.6
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09	< 0.09
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	0.02
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.5	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	120	98
Inorganics					
Conductivity	DETSC 2009	1	uS/cm	257	1800
pH	DETSC 2008		pH	7.2	7.3
Dissolved Organic Carbon	DETSC 2085	2	mg/l	2.5	4.6
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.034	0.029
Chloride	DETSC 2055	0.1	mg/l	6.5	290
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	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
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	< 10	< 10
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	0.14	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.02	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	0.01

Summary of Chemical Analysis
Water Samples

Our Ref 25-00772
Client Ref ~ 5003
Contract Title ~ Lower Edge Quarry

			Lab No	2448683	2448684
			Sample ID ~	BH04	BH05
			Depth ~		
			Other ID ~		
			Sample Type ~	GROUND WATER	GROUND WATER
			Sampling Date ~	13/01/2025	13/01/2025
			Sampling Time ~	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Fluoranthene	DETSC 3304	0.01	ug/l	0.02	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
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	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	< 0.20
Phenols					
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100

Information in Support of the Analytical Results

Our Ref 25-00772
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
2448683	BH04 GROUND WATER	13/01/25	GB 1L, GV, PB 1L		
2448684	BH05 GROUND WATER	13/01/25	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