Our Ref C2960/25/E/7736
22nd August 2025

Thirteen Housing Group Ltd,
2 Hudson Quay,
Winward Way,
Middlesbrough,
TS2 1QG.

For the attention of Nick Corrado,

Dear Sir,

Ref: Highmoor Lane, Cleckheaton.

Further to our report on a geo-environmental investigation (C2960/22/E/4487), which was presented in December 2022, we have now completed the additional gas monitoring and present our findings.

Monitoring

Gas monitoring standpipes were installed to between 1m and 2.5m depth in boreholes WS01, WS01a, WS02, WS02a, WS05, WS06, WS06a WS07, the locations of which are provided on the site plan attached to this letter. The installation details are shown on the appropriate borehole record which are also attached.

It should be appreciated that monitoring readings were initially taken between 27th October and 17th November 2022. During this period, it was found that WS01 was damaged and could not be monitored.

In order to complete the monitoring regime, at the instruction of the client, further visits were undertaken in February/March 2025. However, prior to completing the monitoring, it was necessary to reinstall the standpipes at WS01, WS02, WS06 as these locations could not be found subsequently. Additional dynamic probes were also undertaken adjacent to WS01a and WS06a.

Four visits were undertaken as part of the original investigation in 2022, with a further four being undertaken in January, February and August 2025. The results of the gas monitoring are tabulated below. It should be appreciated that it was not possible to reinstall borehole WS07 due to access restrictions placed on site on account of badgers being present to the southwestern section.

Table 1: Gas monitoring								
Location	**Date**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**Flow (l/hr)**	**Barometric Pressure (mb)**	**Water Level (m)**	**Standpipe Depth (m)**
WS01	27.10.2022	Well destroyed						1.30
	03.11.2022							
	10.11.2022							
	17.11.2022							
WS01a (reinstalled)	07.08.2025	0.0	1.7	19.7	0.0	1000↑	DRY	1.70
	14.08.2025	0.0	1.5	20.1	0.0	1006↑	DRY	
WS02	27.10.2022	0.0	1.1	20.3	0.0	994↔	1.62	1.75
	03.11.2022	0.0	1.2	20.3	0.0	982↔	1.76	
	10.11.2022	0.0	1.3	19.9	0.0	995↔	DRY	
	17.11.2022	0.1	1.5	19.8	0.0	965↔	1.69	
	24.02.2025	Unable to locate due to groundworks.						
	03.03.2025							
WS02a (reinstalled)	07.08.2025	0.0	0.8	20.4	0.0	1000↑	DRY	1.00
	14.08.2025	0.0	0.7	20.6	0.0	1006↑	DRY	
WS05	27.10.2022	0.0	2.3	19.5	0.0	994↔	-	2.00
	03.11.2022	0.0	3.2	18.6	0.0	982↔	-	
	10.11.2022	0.0	3.0	19.0	0.0	996↔	-	
	17.11.2022	0.0	3.0	19.0	0.1	965↔	-	
	24.02.2025	0.0	3.0	18.4	0.0	987↔	0.70	
	03.03.2025	0.1	0.6	21.1	0.0	1008↓	0.89	
	07.08.2025	0.0	4.0	18.4	0.0	1000↑	DRY	
	14.08.2025	0.0	3.9	18.5	0.0	1006↑	DRY	
WS06	27.10.2022	0.0	2.0	19.9	1.4	995↔	1.17	2.25
	03.11.2022	0.0	1.1	20.5	0.2	982↔	1.22	
	10.11.2022	0.0	0.7	21.8	0.8	996↔	1.28	
	17.11.2022	0.0	0.7	21.1	0.1	965↔	1.69	
	24.02.2025	Unable to locate due to overgrown vegetation.						
	03.03.2025							
WS06a	07.08.2025	0.0	3.4	19.0	0.0	1000↑	DRY	2.00
	14.08.2025	0.0	2.7	19.5	0.0	1006↑	DRY	
WS07	27.10.2022	0.1	2.3	17.0	0.0	985↔	-	2.50
	03.11.2022	0.1	2.7	16.8	0.1	982↔	-	
	10.11.2022	0.0	3.1	16.2	0.0	996↔	-	
	17.11.2022	0.0	3.3	16.3	0.5	965↔	2.15	
	24.02.2025	Unable to locate due to overgrown vegetation.						
	03.03.2025							

↑ rising pressure ↓ falling pressure ↔ steady pressure

The monitoring visits up to the 17th November 2022 were undertaken using a Geotechnical Instruments (UK) Ltd. GA5000 (serial No G503524) which was last calibrated on the 17th August 2022, and on the 25th October 2024. Visits carried out between 7th and the 14th August 2025 were undertaken using a GFM Series (serial 13747/270525) which was last calibrated on the 27th May 2025.

Gas Concentrations

With respect to ground gas, the results of the completed monitoring regime indicated a maximum concentration of 0.1% methane, with concentrations of carbon dioxide ranging between 0.6% and 4.0% in association with oxygen levels of between 18.4% and 21.8%.

It should be appreciated that on non-contaminated sites there is generally about 20% by volume of oxygen, associated with low levels of carbon dioxide. In addition, a maximum flow rate of 0.1 to 1.4 litres per hour was recorded and should be employed in the any calculations.

The principal driving force for initiating the movement of gas in the ground is a change in barometric pressure. The most onerous gas condition on a site is usually observed on days of low or falling barometric pressure, preferably below 1000mb. It has been noted that measurements undertaken solely during high pressure conditions may be of lesser value. At this site the readings undertaken to date were at atmospheric pressures of between 965mb and 1008mb.

In view of the above, it may be appreciated that the continued gas monitoring has revealed no increases in methane concentrations or flow rates. Moreover, the monitoring included visits on days of both falling and low barometric pressure (i.e. below 1000mb). However, levels of carbon dioxide have increased slightly during the extended monitoring, therefore, the risk assessment and remediation strategy provided in the geo-environmental report should be considered with the comments below.

Risk Assessment

In order to establish the gas screening value (GSV) for carbon dioxide or methane, the maximum gas concentration (expressed as a decimal) is multiplied by the borehole flow rate (l/hr). In this case 0.1% (0.001) methane was recorded along with 4.0% (0.040) carbon dioxide, in association with a maximum flow rate of 1.4 l/hr. This results in a GSV of 0.0014 l/hr for methane and a GSV of 0.0560 l/hr for carbon dioxide.

In accordance with Table 8.5, *Modified Wilson and Card classification* of the CIRIA report C665, *Assessing risks posed by ground gasses to building,* the site may be characterised as *Characteristic Situation Level 1*. It is therefore considered that there is a very low risk of harm to end users and site operatives and no special precautionary measures are required in accordance to Table 8.6, *Typical scope of gas protection measures,* of CIRIA report C665.

With regard to the number of monitoring visits required reference is made to Tables 5.5a and 5.5b of CIRIA report C665 (2007)[1].

Accepting that the proposed development is of high sensitivity (residential with gardens) and that the generation potential is very low, these tables suggest that 6 readings could be undertaken over a period of at least 3 months. However, C665 notes that *not all sites will require gas monitoring for the period and frequency indicated in Tables 5.5a and 5.5b.* Notwithstanding the gap in the monitoring, in this case, a total of eight monitoring visits were undertaken over an eight-week time period.

In view of the above it is considered that with respect to gas monitoring, the site is fully characterised.

[1] Adapted from tables 5.5a and 5.5b of CIRIA C665, 2007, *Assessing risks posed by hazardous ground gas to buildings, p60.*

Remediation Strategy for Ground Gas

As a consequence of the above, the site may be fully characterised as *Characteristic Situation Level 1*. This conclusion was provisionally considered in the geo-environmental report. However, on the basis that further monitoring would be necessary to fully characterise the site, recommendations were discussed regarding protection appropriate for *Characteristic Situation Level 2*. This was to ensure that the most onerous possible costs were considered but also to provide appropriate recommendations in case the further monitoring could not be completed. In this instance, it should be appreciated that the final monitoring regime has reinforced the characterisation of a low risk. As such, no specific remediation will be required to protect against bulk ground gases.

References

- British Standards Institution (2013), BS 8576 Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds.
- British Standards Institution (2015 +A1:2019) BS8485: *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings,* B.S.I., London.
- CIRIA Report C665, *Assessing risks posed by ground gasses to building.*

We trust that this information is of interest and should you have any other requirements do not hesitate to contact us.

For Rogers Geotechnical Services Ltd,

Yours Faithfully,

Imran Sakoor BEng FGS
Geo-environmental Engineer

Steven Hale BSc FGS
Geo-environmental Technician

Notes:

RGS Environmental Geotechnical Specialists

Rogers Geotechnical Services Ltd

Offices 1 & 2, Barncliffe
Business Park,
Near Bank,
Shelley,
Huddersfield,
HD8 8LU

Telephone: 0843 50 66 87
www.rogersgeotech.co.uk

Client:

Thirteen Housing Group

Job Number:

C2960/22/E/4487

Project Details:

Highmoor Lane, Cleckheaton

Scale:	Not to scale - reference only

Notes:

Investigation positions approximated from site operative's notes.

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Project Details:

Highmoor Lane, Cleckheaton

Scale:	Not to scale - reference only

Borehole Log

Environmental Geotechnical Specialists

Borehole No. **WS1A**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/25/E/7736	Co-ords:	Hole Type WLS
Location: Cleckheaton, West Yorkshire, BD19 6LW		Level:	Scale 1:25
Client: Spirit Regeneration & Development Co LLP		Dates: 24/07/2025	Logged By SH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.50	B	105	100		0.20			TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular and fine to medium of various lithologies).
							0.65			MADE GROUND (Firm, brown, slightly sandy, gravelly, silty CLAY. Sand is fine to coarse. Gravel is angular to sub-angular and fine to coarse of concrete and sandstone). [REWORKED]
				57	100					Firm, orangish brown mottled grey, slightly sandy, gravelly, silty CLAY. Sand is fine to coarse. Gravel is tabular, angular to sub-angular and fine to coarse sandstone.
							1.65 1.70			Extremely weak, orangish brown and grey, weathered SANDSTONE recovered as gravel. [PENNINE LOWER COAL MEASURES FORMATION]
										End of Borehole at 1.70m

1 2 3 4 5

Remarks

AGS

Borehole Log

Environmental Geotechnical Specialists

Borehole No. **WS2A**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/25/E/7736	Co-ords:	Hole Type WLS
Location: Cleckheaton, West Yorkshire, BD19 6LW		Level:	Scale 1:25
Client: Spirit Regeneration & Development Co LLP		Dates: 24/07/2025	Logged By IMY

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.15			TOPSOIL (Dark brown silty fine SAND with frequent rootlets).
				102	90		0.80			MADE GROUND (Light brown, locally dark brown silty gravelly fine to medium SAND. Gravel is sub-angular to sub-rounded, fine to medium of sandstone and rare limestone). [REWORKED].
							1.00			Extremely weak, light brown SANDSTONE, recovered as medium to coarse gravel.
										End of Borehole at 1.00m

1 2 3 4 5

Remarks

AGS

Borehole Log

Borehole No. **WS6A**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/25/E/7736	Co-ords:	Hole Type WLS
Location: Cleckheaton, West Yorkshire, BD19 6LW		Level:	Scale 1:25
Client: Spirit Regeneration & Development Co LLP		Dates: 24/07/2025	Logged By IMY

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.35			MADE GROUND (Creamish brown silty very gravelly SAND. Sand is fine. Gravel is sub-angular to sub-rounded, fine to medium of dolostone).
				87	100		1.10			Firm yellowish brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is sub-angular to sub-rounded, tabular, fine of mudstone.
				77	100		1.75			Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is sub-angular to sub-rounded, tabular, fine of mudstone.
							2.00			Extremely weak thinly laminated brown MUDSTONE with rare carbonaceous staining.
										End of Borehole at 2.00m

1 2 3 4 5

Remarks

Borehole Log

Environmental Geotechnical Specialists

Borehole No. **WS01**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/22/E/4487	Co-ords:	Hole Type WLS
Location: Cleckheaton		Level:	Scale 1:50
Client: 13 Group		Dates: 17/10/2022	Logged By IMY

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.50	ES	87	100		0.45			TOPSOIL (Dark brown slightly gravelly SAND with frequent rootlets).
		1.00	SPT			77 (11,13/77 for 225mm)	0.90			Medium dense light brown silty very gravelly SAND. Gravel is sub-angular to sub-rounded, tabular, fine to medium of sandstone. [COMPLETELY WEATHERED SANDSTONE].
							1.30			Extremely weak thinly laminated light brown SANDSTONE.
										End of Borehole at 1.30m

Remarks

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Borehole Log

Environmental Geotechnical Specialists

Borehole No. **WS02**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/22/E/4487	Co-ords:	Hole Type WLS
Location: Cleckheaton		Level:	Scale 1:50
Client: 13 Group		Dates: 17/10/2022	Logged By IMY

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.65	ES	87	95		0.40			TOPSOIL (Dark brown clayey SILT with frequent rootlets).
							0.65			RELICT TOPSOIL (Dark brown slightly gravelly silty SAND with frequent rootlets. Gravel is sub-angular to sub-rounded, fine to medium of sandstone and occasional mudstone).
				87	95		1.60			Medium dense brown becoming light brown slightly clayey silty very gravelly SAND. Gravel is sub-angular to sub-rounded, fine to medium of sandstone. [RESIDUAL SANDSTONE].
							2.00			Extremely weak thinly laminated brown clayey MUDSTONE.
										End of Borehole at 2.00m

Remarks

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Borehole Log

Environmental Geotechnical Specialists

Borehole No. **WS03**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/22/E/4487	Co-ords:	Hole Type WLS
Location: Cleckheaton		Level:	Scale 1:50
Client: 13 Group		Dates: 17/10/2022	Logged By IMY

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.40	ES	87	100		0.30			TOPSOIL (Dark brown slightly gravelly silty CLAY with frequent rootlets. Gravel is sub-angular to sub-rounded, fine to medium of brick, sandstone and occasional concrete).
		0.60	D				0.70			Firm yellowish brown mottled grey silty CLAY with occasional orangish staining.
		1.00	SPT			N=34 (6,7/8,9,7,10)	0.90			Firm yellowish brown mottled grey slightly gravelly sandy CLAY with occasional orangish staining. Gravel is sub-angular to sub-rounded, fine to medium of sandstone.
				57	90					Extremely weak thinly laminated greyish brown clayey MUDSTONE, with local bands of very stiff thinly laminated clay.
		2.00	SPT			68 (16,17/68 for 150mm)	2.00			End of Borehole at 2.00m

Remarks

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Borehole Log

Environmental Geotechnical Specialists

Borehole No. **WS04**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/22/E/4487	Co-ords:	Hole Type WLS
Location: Cleckheaton		Level:	Scale 1:50
Client: 13 Group		Dates: 17/10/2022	Logged By IMY

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.15			TOPSOIL (Dark brown slightly gravelly silty CLAY with frequent rootlets. Gravel is sub-angular to sub-rounded, fine to medium of sandstone).
				57	90		0.30			MADE GROUND (Brown silty gravelly SAND. Gravel is sub-angular to sub-rounded, fine to medium of sandstone and asphalt fragments).
		0.90	SPT			50 (24,29/50 for 75mm)	0.70			MADE GROUND (Soft brown and brown mottled grey silty CLAY).
							0.85			Soft yellowish brown slightly gravelly silty CLAY. Grave; is sub-angular to sub-rounded, fine to medium of sandstone.
							0.90			Extremely weak thinly laminated light brown clayey SANDSTONE.
										End of Borehole at 0.90m

1 2 3 4 5 6 7 8 9 10

Remarks

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Borehole Log

Environmental Geotechnical Specialists

Borehole No. **WS05**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/22/E/4487	Co-ords:	Hole Type WLS
Location: Cleckheaton		Level:	Scale 1:50
Client: 13 Group		Dates: 17/10/2022	Logged By IMY

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.60 0.70	ES D	87 57	100 95		0.30 0.95 1.60 2.00			TOPSOIL (Dark brown slightly clayey silty SAND with frequent rootlets). Firm to stiff friable light brown mottled grey slightly gravelly silty CLAY with occasional orangish staining. Gravel is sub-angular to sub-rounded, fine to medium of mudstone. [Dry]. Stiff light brown mottled grey slightly gravelly silty CLAY with occasional orangish staining. Gravel is sub-angular to sub-rounded, tabular, fine to medium of mudstone. Extremely weak thinly laminated brown MUDSTONE. End of Borehole at 2.00m

Remarks

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Borehole Log

Environmental Geotechnical Specialists

Borehole No. **WS06**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/22/E/4487	Co-ords:	Hole Type WLS
Location: Cleckheaton		Level:	Scale 1:50
Client: 13 Group		Dates: 17/10/2022	Logged By IMY

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.60	ES	87	100		0.05			TOPSOIL (Dark brown clayey SILT with frequent rootlets).
		0.80	D				0.45			MADE GROUND (Creamish brown silty very gravelly SAND. Gravel is sub-angular to sub-rounded, fine to medium of dolomitic limestone).
				87	95		0.95			Firm yellowish brown mottled grey slightly gravelly silty CLAY with occasional orangish staining. Gravel is sub-angular to sub-rounded, fine to medium of mudstone. Rare well rounded to sub-angular, medium gravel sized nodules of ferruginous siltstone.
				57	100		1.80			Firm to stiff brown mottled grey slightly gravelly silty CLAY with occasional orangish staining and rare carbonaceous staining.
							2.34			Extremely weak thinly laminated brown MUDSTONE with occasional carbonaceous staining and grey mottling.
										End of Borehole at 2.34m

Remarks

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Borehole Log

Environmental Geotechnical Specialists

Borehole No. **WS07**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/22/E/4487	Co-ords:	Hole Type WLS
Location: Cleckheaton		Level:	Scale 1:50
Client: 13 Group		Dates: 18/10/2022	Logged By IMY

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.80	D	87	100		0.40			TOPSOIL (Soft dark brown silty CLAY with frequent rootlets).
				87	97		1.65			Firm becoming firm to stiff light brown becoming brown mottled grey slightly gravelly silty CLAY. Gravel is sub-angular to sub-rounded, fine to medium of mudstone.
				77	100		2.60			Extremely weak thinly laminated brown clayey MUDSTONE with occasional carbonaceous staining.
										End of Borehole at 2.60m

Remarks

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Trial Pit Log

Trialpit No **WS08** Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/22/E/4487	Co-ords: - Level:	Date 18/10/2022
Location: Cleckheaton		Dimensions (m): Depth 1.20	Scale 1:50
Client: 13 Group			Logged IMY

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.40	D					TOPSOIL (Dark brown sandy SILT with frequent rootlets).
	0.40 - 0.80	D		0.40			Stiff yellowish brown mottled grey slightly gravelly silty CLAY with occasional orangish staining. Gravel is sub-angular to sub-rounded, fine to medium of mudstone.
	0.40 - 0.80	ES					
	0.80 - 1.20	D					
				1.20			End of pit at 1.20 m

Remarks:

Stability:

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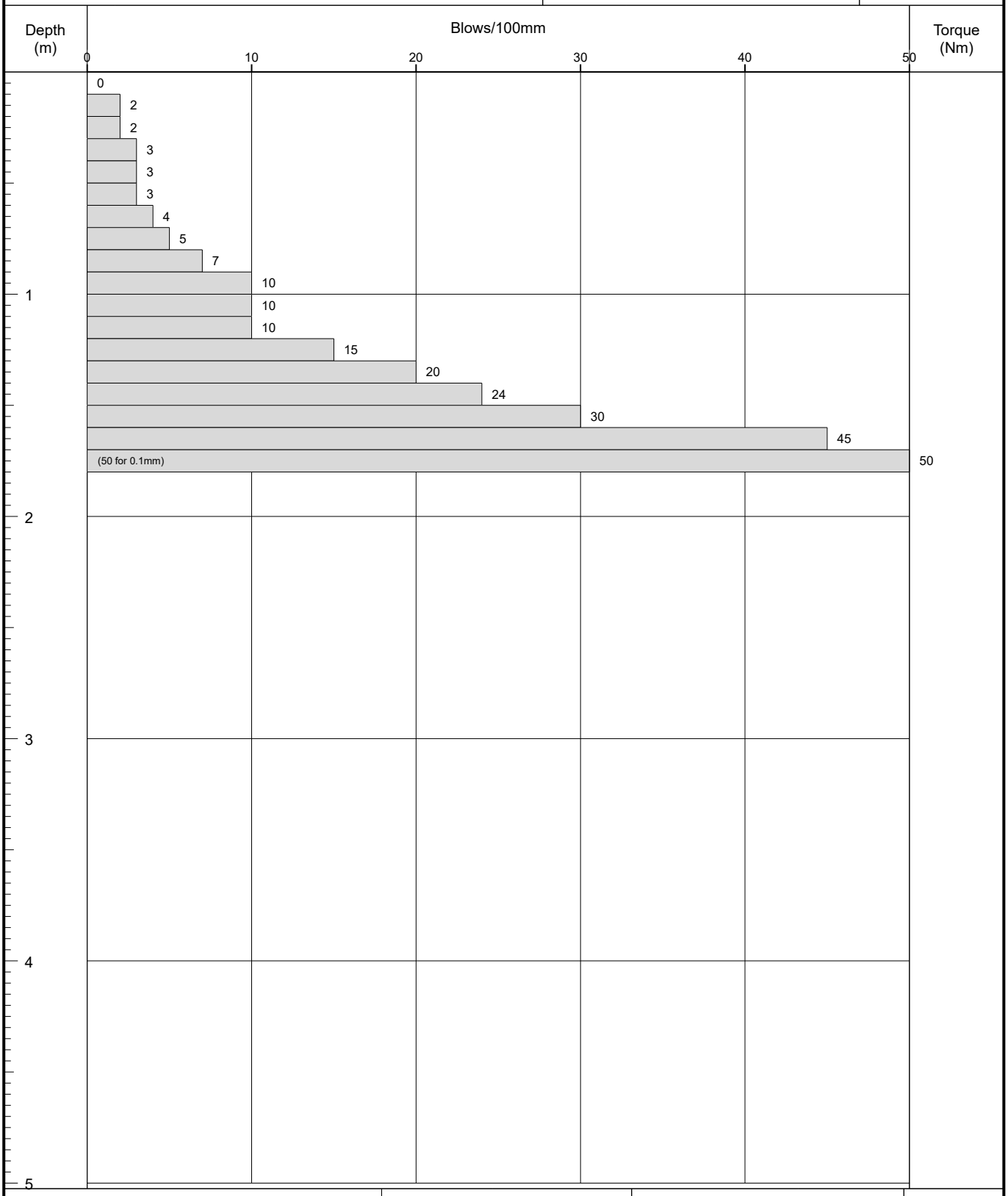
Probe Log

Probe No. **DP1A**

Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/25/E/7736	Co-ords:	Hole Type DCP
Location: Cleckheaton, West Yorkshire, BD19 6LW		Level:	Scale 1:25
Client: Spirit Regeneration & Development Co LLP		Dates: 24/07/2025	Logged By AB



Remarks:

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.71m
Probe Type	DPSH-B		

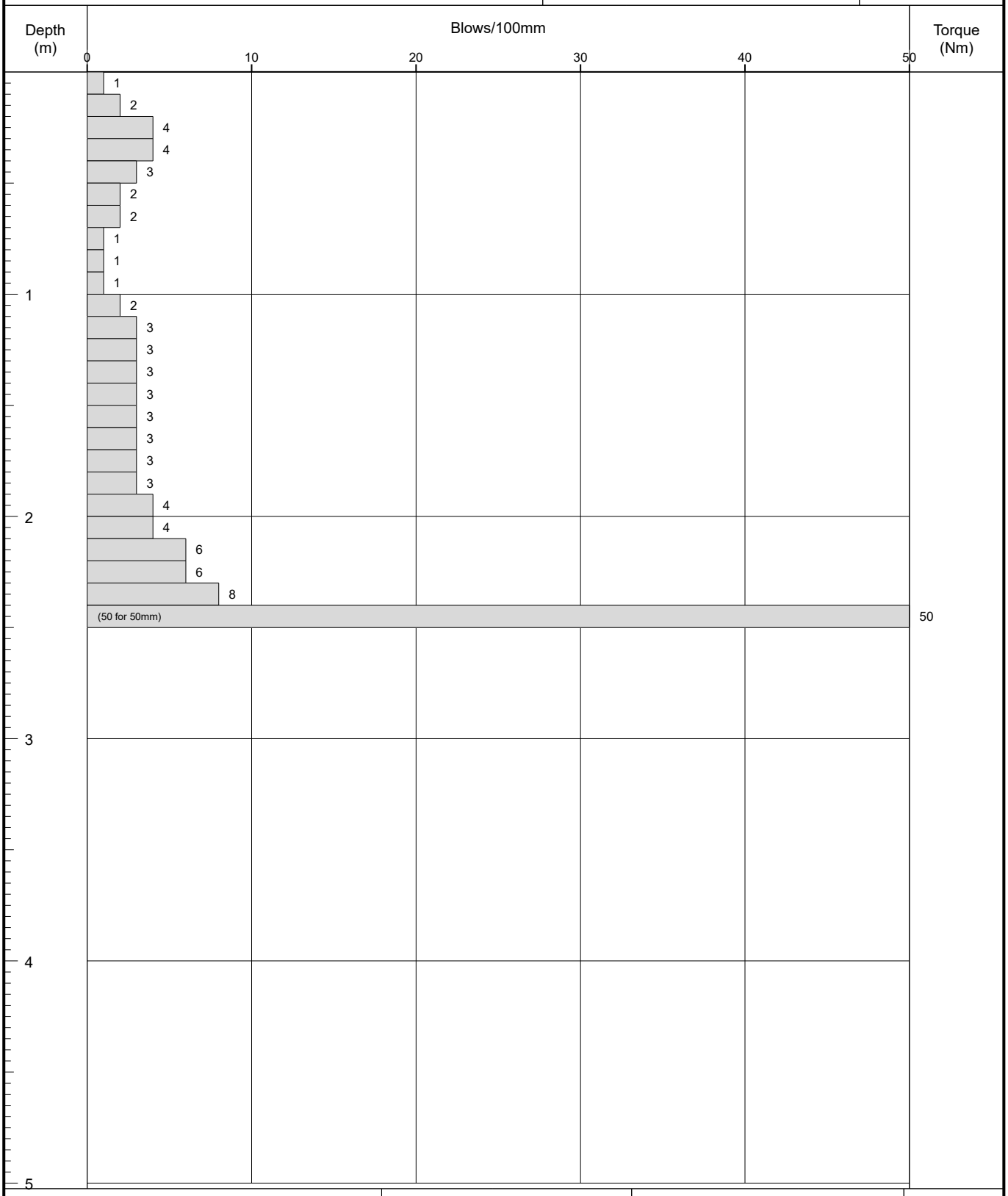
AGS

RGS Environmental Geotechnical Specialists

Probe Log

Probe No.
DP6A
Sheet 1 of 1

Project Name: Highmoor Lane	Project No. C2960/25/E/7736	Co-ords:	Hole Type DCP
Location: Cleckheaton, West Yorkshire, BD19 6LW		Level:	Scale 1:25
Client: Spirit Regeneration & Development Co LLP		Dates: 24/07/2025	Logged By AB



Remarks:

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	2.45m
Probe Type	DPSH-B		

AGS

CERTIFICATION OF CALIBRATION

PJLA Calibration
No. 66916

Date Of Calibration: 25-Oct-2024

Certificate Number: G503524_10/36927

Issued by: QED Environmental Systems Inc.

As received Barometric Pressure recorded at: 23.2 °C/73.7 °F

As received gas check readings are only recorded if the instrument is received in a working condition. Where the instrument is received damaged no reading can be taken.

Date of Issue : 26 Oct 2024

Approved By Signatory

Linda Ostrowski

Laboratory Inspection

www.qedenv.com (800) 624-2026 info@qedenv.com

QED Environmental Systems Inc. 2355 Bishop Circle West, Dexter, MI 48130

CERTIFICATION OF CALIBRATION

PJLA Calibration
No. 66916

Date Of Calibration: 25-Oct-2024

Certificate Number: G503524_10/36927

Issued by: QED Environmental Systems Inc.

The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI). Certification only applies to results shown. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

www.qedenv.com (800) 624-2026 info@qedenv.com

QED Environmental Systems Inc. 2355 Bishop Circle West, Dexter, MI 48130

Ribble Enviro Ltd
www.ribble-enviro.co.uk

...everything gas detection

Test Certificate

Customer:	Ribble Enviro Hire Fleet
Instrument:	GFM Series
Job:	Pre-Hire Test
Serial number:	13747
Fleet Number:	GAS0016
Certificate no:	13747 / 270525
Tested on:	27 May 2025
Tested for:	Methane, Carbon Dioxide, Oxygen, hydrogen Sulphide, Carbon Monoxide, Hexane

Applied Gas Concentration:	Cylinder Reference:	Final Sensor Reading	Pass / Fail
Hexane: 0.3% Vol	52687 / 2416	0.275% vol	Pass
CO2: 50% Vol	9750-11-1	50.1% vol	Pass
CO: 500 ppm	199242	460 ppm	Pass
H2S: 50 ppm	199242	60 ppm	Pass
O2: 18% Vol	199242	17.9% vol	Pass
CH4: 2.5% Vol	199242	2.4% vol	Pass

The instrument has been calibrated after re-zeroing and introducing span calibration gas, using gas that is traceable to national standards and has been prepared in accordance with BS EN ISO 6145-6:2017

Calibration Engineer: BRADLEY HAYHURST

Sign:

Tel: 01200 445 804 **Fax**: 01200 445 809 **Email**: info@ribble-enviro.co.uk
Ribble Enviro Ltd. Unit 4, Gisburn Business Park, Gisburn, Nr Clitheroe, BB7 4JP, UK

TEST DATE AND CONDITIONS		
Date	20/11/2024	
Atmospheric Pressure	992	mB
Ambient Temperature	21.5	°C
Environics Serial No.	5089	

GAS DATA LTD
Unit D
Earlplace Business Park
Fletchamstead Highway
Coventry
CV4 9XL
Tel 02476303311 Fax 02476307711

GFM436 Final Inspection & Calibration Check Certificate

Customer	Ribble Enviro Ltd
Certificate Number	125695
Order Number	340317

Serial Number	13747
Software Version	G436-00.00/00

Recalibration DUE Date
20/11/25

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	500	*Accept > 200 cc/min*	Pump Flow @ -200mB	300	*Accept > 200 cc/min*
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
	CH_4		CO_2		O_2	
Sensor	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %
	60.7 *Accept ±3.0*	*60*	39.7 *Accept ±3.0*	*40*	20.9 *Accept ±0.5*	*20.9*
	5.0 *Accept ±0.3*	*5*	5.0 *Accept ±0.3*	*5*	6.0 *Accept ±0.3*	*6*
Zero Reading 100% N2	0.0 *Accept ±0.0*	*0*	0.0 *Accept ±0.0*	*0*	0.0 *Accept ±0.1*	*0*

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings *(ppm)*			
			Zero Reading		Instrument Gas Reading	
Gas Type	Range *(ppm)*					
H2S	5000	*1500*	0	*Accept ±0.0*	1500	*Accept ±5.0%*
CO	2000	*1000*	0	*Accept ±0.0*	1002	*Accept ±5.0%*
Hexane	*2.0%*	2.0%	0	*Accept ±0.0*	1.99	*Accept ±10.0%*

Cross Gas Effects									
Applied Gas *(ppm)*		Instrument Readings *(ppm)*							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	*1500*	1500		0		0			
CO	*1000*	90		1002		0			
Hexane	*2.0%*	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] *(mB)*			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		991	*Accept ±2.0*
AP Port (Internal)	*+600 mB*	800	*Accept ±5.0*
	+1200mb	1200	*Accept ±5.0*

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading *(l/h)*	Instrument Reading *(l/h)*		Applied Pressure *(Pa)*	Instrument Reading *(Pa)*	
-30	-30.1	*Accept ±3.0*	-432	-436	*Accept ±50*
-3	-3.0	*Accept ±1.0*	-19	-19	*Accept ±6.0*
0	0.0	*Accept ±0.0*	0	0	*Accept ±0.5*
3	3.0	*Accept ±0.5*	16	16	*Accept ±3.0*
30	29.8	*Accept ±3.0*	363	360	*Accept ±50*
60	59.8	*Accept ±6.0*	1115	1111	*Accept ±130*
90	91.8	*Accept ±9.0*	2196	2296	*Accept ±250*

Temperature Checks		
Calibration Temperature Applied Temperature °C	Instrument Temperature Reading °C	
-10	-10.0	*Accept ±2.0*
0	0.0	*Accept ±1.0*
30	30.0	*Accept ±1.0*
60	60.0	*Accept ±1.0*
100	100.0	*Accept ±1.0*

Technician:	Date Tested:
Jack Rutland	*20/11/2024*

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018.

CERTIFICATION OF CALIBRATION

4533

Date Of Calibration: 17-Aug-2022

Certificate Number: G503524_2/31070

Issued by: QED Environmental Systems Ltd.

Customer: **QED Environmental Systems Ltd (Lease)**
Barncliffe Mills Near Bank Shelley
HUDDERSFIELD HD8 8LU UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G503524

UKAS Accredited results:

Results after adjustment :

Methane (CH_4)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.9	0.072
15.0	15.0	0.13
60.0	59.7	0.42

Carbon Dioxide (CO_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	5.0	0.074
15.0	15.0	0.13
40.0	40.1	0.29

Oxygen (O_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
21.2	21.3	0.25

The inwards assessment was carried out 10-Aug-2022.
The maximum adjustment is larger than the specification limit.
Inwards assessment data is available if requested.

All concentrations are molar.

CH_4, CO_2 readings recorded at : 32.9 °C ± 2.5 °C

O2 readings recorded at : 24.6 °C ± 2.5 °C

Barometric Pressure : 1004 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

Instrument has passed calibration as the measurement result is within the specification limit. The specification limit takes into account the measurement uncertainty.
The results relate only to the item calibrated

www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

CERTIFICATION OF CALIBRATION

4533

Date Of Calibration: 17-Aug-2022

Certificate Number: G503524_2/31070

Issued by: QED Environmental Systems Ltd.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

Non-UKAS accredited results after adjustment:

Barometer (mbar)	
Reference	**Instrument Reading**
1004	1005

Internal Flow	
Applied (l/hr)	**Instrument Reading (l/hr)**
5.0	5.0
10.0	10.2

Date of Issue : 24-Aug-2022 **Approved by Signatory**

Keeley Knight

Laboratory Inspection

End of Certificate

Calibration Instance:114 IGC Instance:114

www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

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Instrument Service Report

Unit Type: GA5000	Part Number:	Date:	Next Service Due:	Customer Name:
Serial Number: G503524	GA5KB0C0-301	24-Aug-2022	17-Feb-2023	QED Environmental Systems Ltd (Lease)

Actions/Investigation Description	Result	Comments
Verification of Instrument		

Customer Comments

Returned for full service and calibration

Accessory Test	Result	Comments
Water Trap	Pass	Replaced PTFE Filter, Replaced tubing, Replaced hose barb, Tested ok.
Download Lead	Pass	Data transfer successful.

General Comments/Feedback

Thank you for returning your gas analyser to the QED Service Centre for full service and calibration. We are pleased to inform you that the analyser was received and fully assessed by one of our experienced Service Engineers.

The O2 electrochemical sensor has been replaced due to it being over 3 years old in accordance with the manufacturer's recommendations, and also as a proactive measure based on our experience of the typical lifetime of this type of sensor.

Our extensive service was carried out, and any necessary components replaced. The analyser has successfully passed all of our rigorous testing and quality checks and has been calibrated using our bespoke, state of the art calibration facility.

For further information about how to get the best use from your instrument please visit our YouTube channel http://www.youtube.com/GeotechTV and on our Website http://www.qedenv.com

If you require any further assistance with your instrument please email our Technical Support Team at technical@qedenv.co.uk or call us on +44 (0) 333 800 0088 (Monday to Thursday 08.30 - 17.00 & Friday 08.30 - 15.30) UK time zone.

Service Details:		Service Engineer:	Calibration Engineer:	Approved By:	Signature:
Service Scheme	✓	Nick Sidgwick	Suk Balrey	Anthony Ashbery	
Standard Service					

Instrument Service Report

Unit Type: GA5000	Part Number:	Date:	Next Service Due:	Customer Name:
Serial Number: G503524	GA5KB0C0-301	24-Aug-2022	17-Feb-2023	QED Environmental Systems Ltd (Lease)

Actions/Investigation Description	Result	Comments
Serial Number Check	Yes	
Battery Requires Replacing	No	
Internal Flow Calibrated	Yes	
Full Automatic Calibration	Pass	
Serial Comms Test (USB)	Pass	
Service history of instrument reviewed	Yes	
Inwards gas check data reviewed	Yes	
Instrument turns on	Pass	
Backlight operates correctly	Yes	
External visual inspection performed	Pass	
Internal visual inspection performed	Pass	
All screws tightened to correct torque	Yes	
All connectors are secure	Pass	
Check diagnostic channels	Pass	
Case compression test	Pass	
Impact and stability test	Pass	
Pressure transducer test(s) as per user operation	Pass	

Instrument Service Report

Unit Type: GA5000	Part Number:	Date:	Next Service Due:	Customer Name:
Serial Number: G503524	GA5KB0C0-301	24-Aug-2022	17-Feb-2023	QED Environmental Systems Ltd (Lease)

Actions/Investigation Description	Result	Comments
Final visual inspection on instrument	Pass	
Case assembly closed and screws tightened to correct torque	Yes	
PTFE filters replaced	Yes	
Pump flow greater than 550 ml/min	Pass	
Automated instrument pressure system test (leak test)	Pass	
Pump vacuum greater than -400 mb and flow fails	Pass	
GPS function test	Pass	
Temperature probe tested	Pass	
Anemometer tested	Pass	
Chemical gas sensors calibrated – refer to Calibration Certificate	Pass	
Check main PCB and sensor PCB have the latest software	Yes	
Transducers calibrated	Pass	
As Received Chemical Cell Gas Assessment Performed (CAL16)	Yes	
As Received Gas Assessment Performed (CAL01 or CAL02)	Yes	
Chemical sensor(s) replacement over 2yrs UK and 21mths overseas.	Yes	
O2 sensor replacement over 3yrs UK, 33mths overseas	Pass	