

Our Ref: E23/8073/JF/001

25th March 2024

(Email Only)



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

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FAO Shaun Joyce

shaun-joyce@sky.com

Dear Shaun,

Re : Development at The Willows, Hallas Road, Kirkburton

Further to the intrusive site investigation works detailed in the Haigh Huddleston & Associates Geo-environmental Ground Investigation Report (Ref: E23/8073/R001 Dated: August 2023), gas testing was undertaken at the above development to confirm if ground gas migration from infill material to former quarry on site would adversely affect the development.

Kindly note that this letter only addresses issues with regards to ground gas migration affecting properties. It must be read in conjunction with the aforementioned report. For the preparation of this letter, the following best practice guidance has been taken into account:

- BS8485:2015+A1:2019 “Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings”;
- BS8576:2013 “Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds (VOCs)”;
- CIRIA “Assessing Risks Posed by Hazardous Ground Gases to Buildings”, report C665, 2007;
- CIRIA “The VOCs Handbook. Investigating, Assessing and Managing Risks from Inhalation of VOCs at Land Affected by Contamination”, report C682, 2009;
- CL:AIRE “A Pragmatic Approach to Ground Gas Risk Assessment”, report ref. RB17, November 2012;
- NHBC “Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present”, report version 04, March 2007.

Seven boreholes were drilled to depths of between 3.0 – 9.3m beneath the site. In addition to this, three additional shallower boreholes were drilled and installed with gas monitoring standpipes consisting of 1m of plain pipe at the surface and 2-3m of slotted pipe. The standpipes were constructed with lockable covers, backfilled with single size gravels and sealed with bentonite.

Six rounds of gas monitoring were undertaken over a minimum of 3 month period between 26th July 2023 and 17th November 2023 using a Gas Data GFM 436. The results are tabulated in the Appendix to the rear of this letter.

The gas monitoring was undertaken over a range in barometric pressure between 996mb and 1001mb. The readings taken on four visits were carried out under falling barometric pressure, with the remaining two visits carried out under equalised barometric pressure. The air pressure on 29th August 2023 was recorded as a gradual fall, with the barometric pressure falling only 2mb over an 8-hour period.

On site, no methane was detected. Carbon dioxide values were found between 0 and 0.6% with oxygen levels between 19.9 and 21.0%. No flow rates were detected throughout the duration of the monitoring. Due to no flow rates being detected throughout the duration of the visits, a value of 0.1 shall be used in the GSV calculation.

Discussions

Consulting CIRIA C665, the GSV value corresponds to the site being characterised as **Green**. The GSV value is obtained by multiplying the maximum gas concentration by maximum steady borehole flow rate (Where a peak flow rate is recorded at the start of the monitoring session, this can be discounted due to the artificially high pressure within the standpipe).

i.e. Carbon Dioxide - $0.006 \times 0.1 = \mathbf{0.0006}$ l/hr.

We can confirm that the UK Radon maps indicate the property is not in a Radon Affected Area, as less than 1% of properties are above the radon action level. Therefore, **NO Radon Protection Measures being required for this development.**

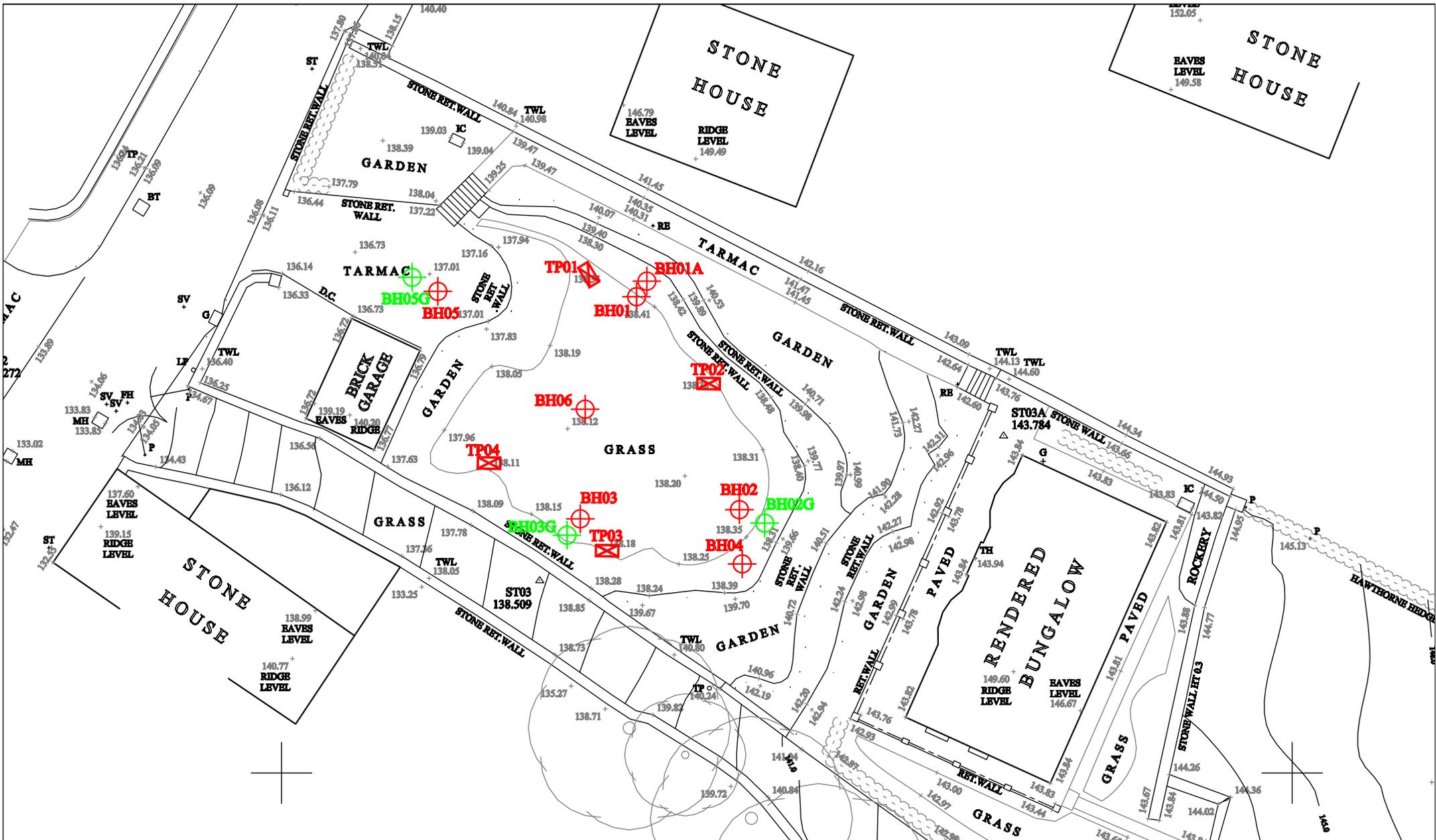
The low level of carbon dioxide recorded, and no methane indicates that the site may be classified as Green when referred to the NHBC standards or CS1 by BS 8485:2015+A1:2019 Table 2. We can confirm that **NO Gas Protection Measures are required for the proposed development.**

We hope that the above is sufficient for your requirements. However, should you have any queries please do not hesitate to contact me direct.

Yours sincerely,

JAMES FARRAR
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Appendix



Haigh Huddleston & Associates

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Unit 4, Midgley Business Park, Bar Lane, Midgley, Wakefield, WF4 4JJ t 01924 574074
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Client	SHAUN JOYCE
Project	HALLAS ROAD, KIRKBURTON
Detail	TRIAL PIT LOCATION PLAN
Scale	Dwn
1:250	SR
Chkd	
Date	JUN'23
Dwg No.	E23/8073/203A

Rev A Borehole locations added

13.07.23 MD



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SITE:	Hallas Road, Kirkburton
CLIENT:	Shaun Joyce
JOB NO:	8073
SHEET NO:	1

GAS MONITORING RESULTS

Monitoring Point	GAS CONCENTRATIONS								FLOW DATA				Qhg per borehole		WELL AND WATER DATA			A Pressure (mB)	Comments				
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Oxygen (%v/v)		H2S (ppm)	CO (ppm)	Hex (%)	PIDcf (l)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)			CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Response Zone
	Peak	Steady	Peak	Steady	Peak	Steady	Min	Steady					Steady	Peak									
AIR	ND	ND	ND	ND	ND	ND	20.0	20.0	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	996	Time: 9:00 Date: 26.07.23
BH02	ND	ND	ND	ND	0.6	0.6	19.9	19.9	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0006	3.00	3.00	1.0-3.00	997	Sunny, Dry, Warm
BH03	ND	ND	ND	ND	0.1	0.1	20.3	20.3	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0001	3.00	3.00	1.0-3.00	997	Falling A.P
BH05	ND	ND	ND	ND	0.3	0.3	20.2	20.2	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0003	3.00	3.00	1.0-3.00	996	From 1011 - 1007mB over 8 hour period
AIR	ND	ND	ND	ND	ND	ND	20.7	20.7	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	1001	Time: 9:45 Date: 09.08.23
BH02	ND	ND	ND	ND	0.6	1.6	20.2	20.2	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0006	3.00	3.00	1.0-3.00	1000	Sunny, Windy, Warm
BH03	ND	ND	ND	ND	ND	ND	20.7	20.7	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	3.00	3.00	1.0-3.00	1001	Equalised A.P
BH05	ND	ND	ND	ND	0.2	1.2	20.6	20.6	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0002	3.00	3.00	1.0-3.00	1001	From 1011 - 1007mB over 8 hour period
AIR	ND	ND	ND	ND	ND	ND	21.0	21.0	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	1000	Time: 10:45 Date: 29.08.23
BH02	ND	ND	ND	ND	0.5	0.5	20.0	20.0	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0005	3.00	3.00	1.0-3.00	999	Windy, Dry, Cold
BH03	ND	ND	ND	ND	ND	ND	21.0	21.0	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	3.00	3.00	1.0-3.00	1000	Falling A.P
BH05	ND	ND	ND	ND	0.2	0.2	20.3	20.3	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0002	3.00	3.00	1.0-3.00	1000	From 1011 - 1009mB over 8 hour period
AIR	ND	ND	ND	ND	ND	ND	21.0	21.0	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	997	Time: 12:15 Date: 26.09.23
BH02	ND	ND	ND	ND	0.5	0.5	20.5	20.5	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0005	3.00	3.00	1.0-3.00	996	Cloudy, Wet, Warm
BH03	ND	ND	ND	ND	ND	ND	20.8	20.8	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	3.00	3.00	1.0-3.00	996	Equalised A.P
BH05	ND	ND	ND	ND	0.3	0.3	20.7	20.7	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0003	3.00	3.00	1.0-3.00	997	From 1012 - 1012mB over 8 hour period
AIR	ND	ND	ND	ND	ND	ND	20.8	20.8	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	1001	Time: 16:45 Date: 25.10.23
BH02	ND	ND	ND	ND	0.4	0.4	20.1	20.1	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0004	3.00	3.00	1.0-3.00	1001	Cloudy, Wet, Cold
BH03	ND	ND	ND	ND	ND	ND	20.6	20.6	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	3.00	3.00	1.0-3.00	1000	Falling A.P
BH05	ND	ND	ND	ND	0.3	0.3	20.6	20.6	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0003	3.00	3.00	1.0-3.00	1000	From 1007 - 1004mB over 8 hour period
AIR	ND	ND	ND	ND	ND	ND	20.4	20.4	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	1005	Time: 12:00 Date: 17.11.23
BH02	Could not Monitor - Station destroyed during excavations																					1005	Sunny, Wet, Cold
BH03	Could not Monitor - Station destroyed during excavations																					1005	Falling A.P
BH05	ND	ND	ND	ND	0.2	0.2	20.3	20.3	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0002	3.00	3.00	1.0-3.00	1003	From 1013 - 1010mB over 8 hour period

ND - Not detected

NR - Not recorded

NB: where no flow (ND) recorded Qhg values are calculated using equipment limit of detection (0.1 l/hr). Where negative flows recorded, these are converted to positive values for calculation of Qhg.