



Haigh Huddleston & Associates

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Our Ref: E21/7786/JF/003

06th May 2022

(Email Only)

FAO: Will Livermore

will.livermore@barratthomes.co.uk

Dear Sir,

Re: Development at Coniston Avenue, Darton

Gas Monitoring was originally undertaken for the main body of the site following the initial site investigation works, from 14th June to 25th August 2021 and are reported on in letter reference E21/7786/JF/001. This original gas monitoring proved no methane, with carbon dioxide levels between 0.9 and 4.9% in the area to be developed. No flow rates were detected.

Further site investigation works were carried out on 13th January 2022 within an additional northern piece of land connecting to the main body of the site (detailed in the report Ref: E21/7786/R001B Dated: March 2022). Two additional boreholes were drilled in this area of the site and installed with gas monitoring standpipes and further gas testing was undertaken to confirm if ground gas migration from historic opencast and probable shallow mine workings beneath the site would adversely affect this area of 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.

Two boreholes were undertaken to a depth of 30m to identify the extents of the opencast workings and determine the presence of shallow mine workings. Evidence of coal was found in both boreholes. An additional two shallow boreholes were drilled and installed with gas monitoring standpipes consisting of 1m of plain pipe at the surface and 2m 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 between 3rd February 2022 and 6th May 2022 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 976mb and 1012mb. The readings taken on five of the six visits were recorded under falling pressure.

On site, no methane was detected. Carbon dioxide values were found between 0.4 and 2.9% with oxygen levels between 16.5 and 20.4%. 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

Based on a high sensitivity end use under the NHBC traffic light system in conjunction with CIRIA C665, the GSV value corresponds to this area of site being characterised as **Green**. The GSV value is obtained by multiplying the maximum gas concentration by maximum steady borehole flow rate (Where the 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 - $0.029 \times 0.1 = 0.0029 \text{ l/hr.}$

We can confirm that the site is within a Radon Affected Area, as between 1 - 3% of properties are above the action level. Therefore, **No Radon Protection Measures are required.**

The low levels of carbon dioxide and methane recorded indicate that this area of the site may be classified as **Green** when referred to the NHBC standards or **CS1** by BS 8485:2015 Table 2. We can confirm that **no gas protection measures are required** for this area of the proposed development.

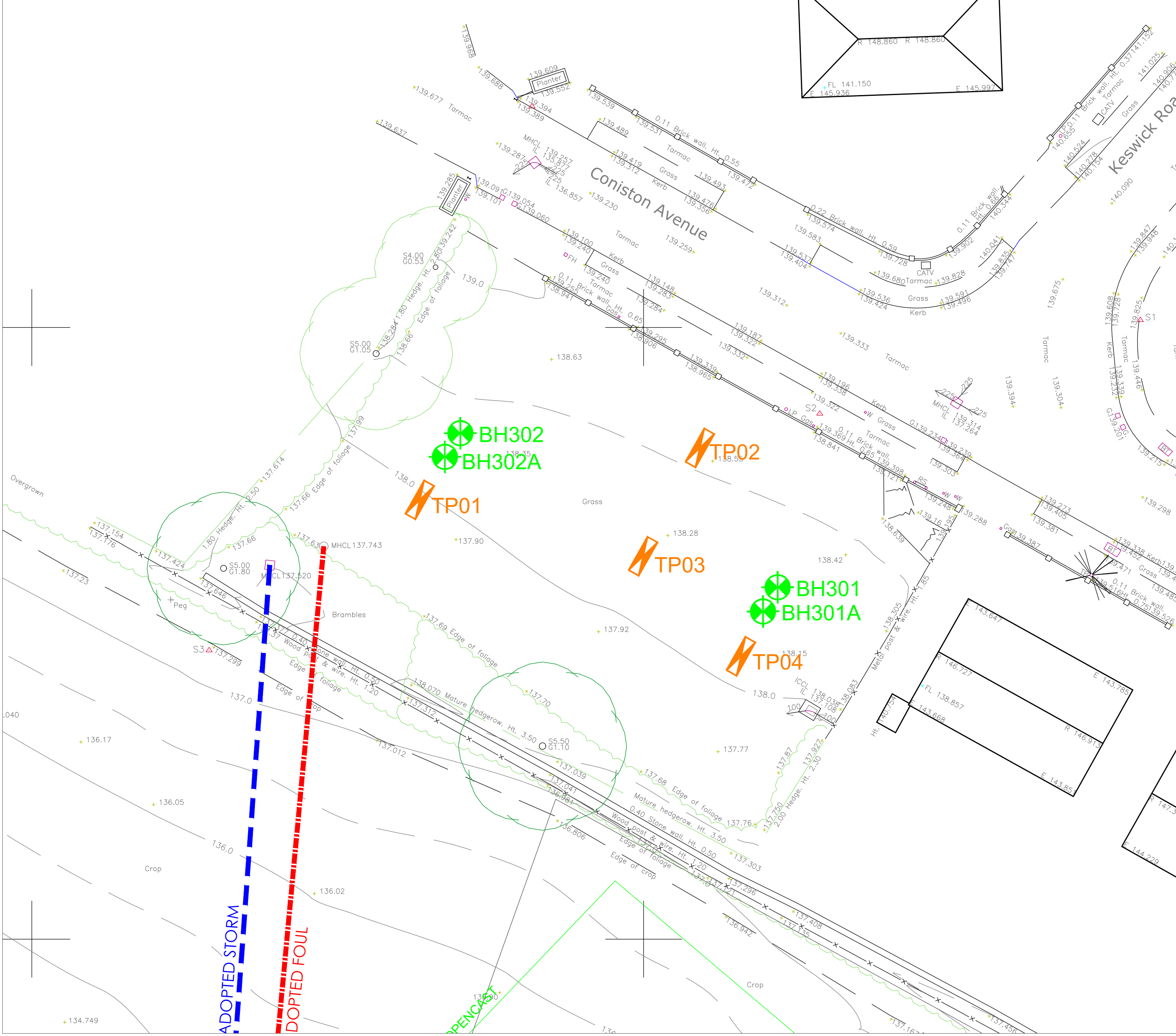
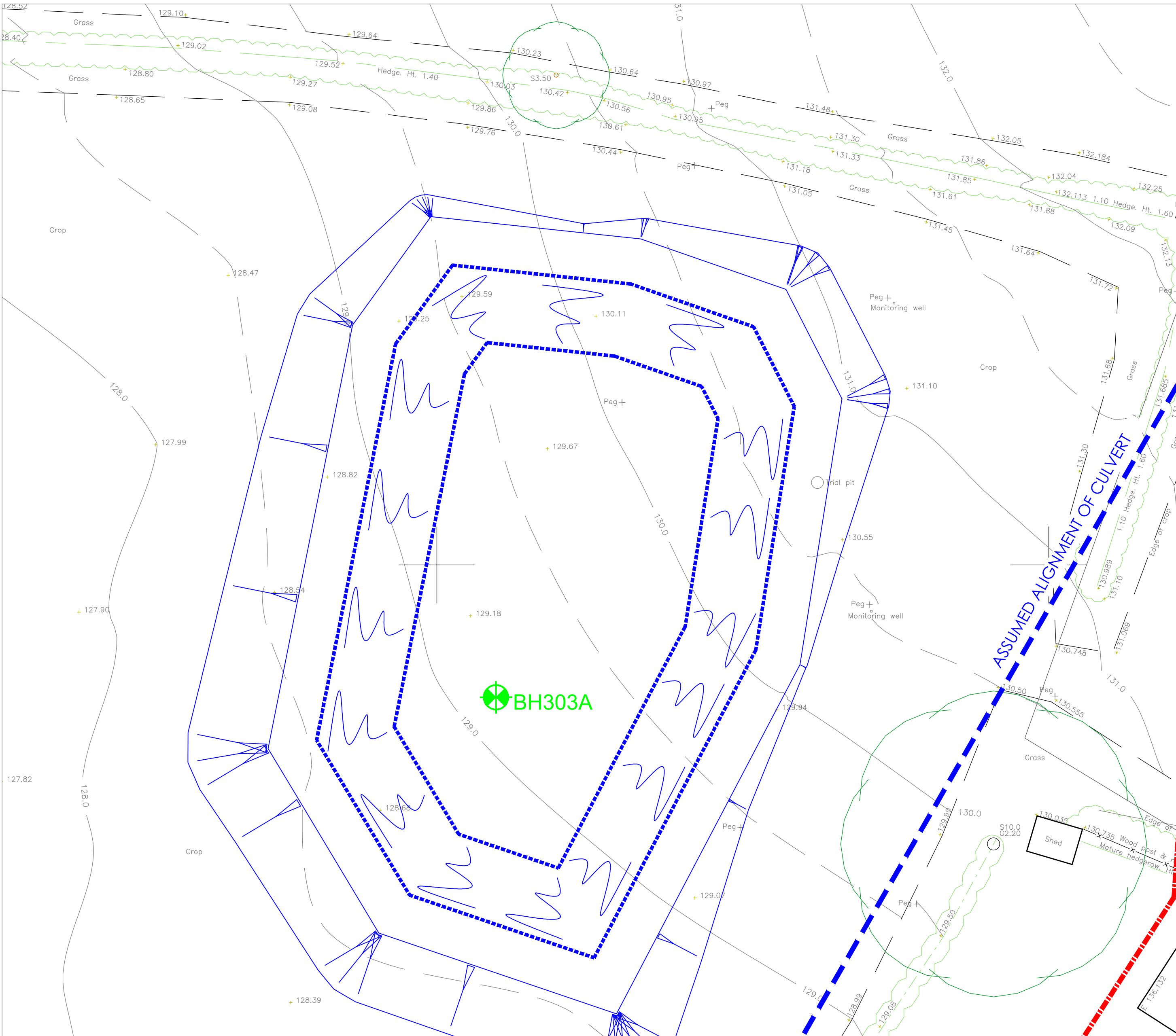
We hope that the above is sufficient for your requirements. However, should you have any queries please do not hesitate to contact me direct.

Yours sincerely,



JAMES FARRAR
j.farrar@haighhuddleston.co.uk

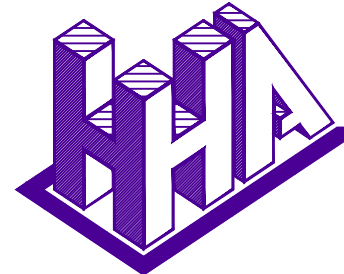
Appendix



PH3 - TRIAL PIT LOCATION



PH3 - BOREHOLE LOCATION



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Client
BARRATT DAVID WILSON HOMES

Project
CONISTON AVENUE, DARTON

Detail
SITE INVESTIGATION PLAN - Phase 3

Dwn	Chkd	Date	Scale	Dwg No.
JF	MD	Jan'22	1:100@A1	E20/7786/003/03

SITE:	Coniston Avenue, Darton - Additional Area	
CLIENT:	Barratt David Wilson Homes	
JOB NO:	7786	
SHEET NO:	1	

GAS MONITORING RESULTS

	GAS CONCENTRATIONS												FLOW DATA				Qhg per borehole		WELL AND WATER DATA				A Pressure (mB)	Comments	
Monitoring Point	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	20.3	20.3	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	997	Time: 11:45	Date: 03.02.22	
BH301A	ND	ND	ND	ND	0.9	0.9	16.5	16.5	ND	ND	0.000	1.0	0.0	-2.6	ND	45.0	NR	0	0.65	3.00	NR	996			
BH302A	ND	ND	ND	ND	2.1	2.1	19.1	19.1	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0021	3.00	3.00	1.0-3.00	995		Cloudy, Dry, Cold	
AIR	ND	ND	ND	ND	ND	ND	20.4	20.4	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	997	Time: 12:30	Date: 23.02.22	
BH301A	ND	ND	ND	ND	1.6	1.6	19.0	19.0	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0016	0.60	3.00	NR	997		Sunny, Windy, Cold	
BH302A	ND	ND	ND	ND	1.9	1.9	19.0	19.0	ND	ND	0.000	1.0	11.4	11.8	118.0	60.0	NR	0.2166	0.10	3.00	NR	996	BH302A reading terminated after 2 mins due to water ingress. Falling A.P		
AIR	ND	ND	ND	ND	ND	ND	20.5	20.5	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	997	Time: 10:30	Date: 09.03.22	
BH301A	ND	ND	ND	ND	2.2	2.2	17.8	17.8	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0022	2.60	3.00	1.0-2.60	997		Sunny, Windy, Dry	
BH302A	ND	ND	ND	ND	0.4	0.4	20.2	20.2	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0004	0.60	3.00	NR	998			
																							Falling A.P		
AIR	ND	ND	ND	ND	ND	ND	21	21	ND	ND	0.016	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	1012	Time: 14:30	Date: 22.03.22	
BH301A	ND	ND	ND	ND	1.9	1.9	18.2	18.2	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0019	3.00	3.00	1.0-3.00	1012		Sunny, Warm, Dry	
BH302A	ND	ND	ND	ND	0.4	0.4	20.4	20.4	ND	ND	0.000	1.0	-3	-3	-17	ND	NR	0.012	1.2	3.00	1.0-1.20	1011			
																							Falling A.P		
AIR	ND	ND	ND	ND	0.2	0.2	20.4	20.4	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0002	NR	NR	NR	977	Time: 10:30	Date: 06.04.22	
BH301A	ND	ND	ND	ND	2.1	2.1	18.4	18.4	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0021	2.9	3.00	1.0-2.90	977		Sunny, Windy, Dry	
BH302A	ND	ND	ND	ND	0.5	0.5	20	20	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0005	1.1	3.00	1.0-1.10	976			
																							Falling A.P		
AIR	ND	ND	ND	ND	ND	ND	20.5	20.5	ND	ND	0.003	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	1010	Time: 9:45	Date: 06.05.22	
BH301A	ND	ND	ND	ND	2.9	2.9	17.8	17.8	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0029	3.00	3.00	1.0-3.00	1010		Sunny, Dry, Warm	
BH302A	ND	ND	ND	ND	1.9	1.9	17.4	17.4	ND	ND	0.000	1.0	ND	ND	ND	ND	NR	0.0019	1.90	3.00	1.0-1.90	1011			
																							Falling A.P		

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.