

Our Ref: E19/7567/JF/008

18th March 2024

(Email Only)



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

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FAO Stephen Byram

SB Homes Limited

stephen@sbhomes.co.uk

Dear Stephen,

Re : Development off Lingards Road, Slaithwaite

Further to the intrusive site investigation works detailed in the Haigh Huddleston & Associates Mining Risk Assessment report (Ref: E19/7567/R001 Dated: October 2023), gas testing was undertaken at the above development to confirm if ground gas migration from three historical landfill sites within 250m of the 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.

Ten boreholes were drilled to depths of between 3.0 - 18m beneath the site. In addition to this, six 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 983mb and 999mb. 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 4.7% with oxygen levels between 14.2 and 21.3%. The depleted oxygen levels were associated with the slightly higher carbon dioxide values recorded. 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 - $0.047 \times 0.1 = 0.0047$ l/hr.

We can confirm that the UK Radon maps indicate the site is within an area where 1 - 3% 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

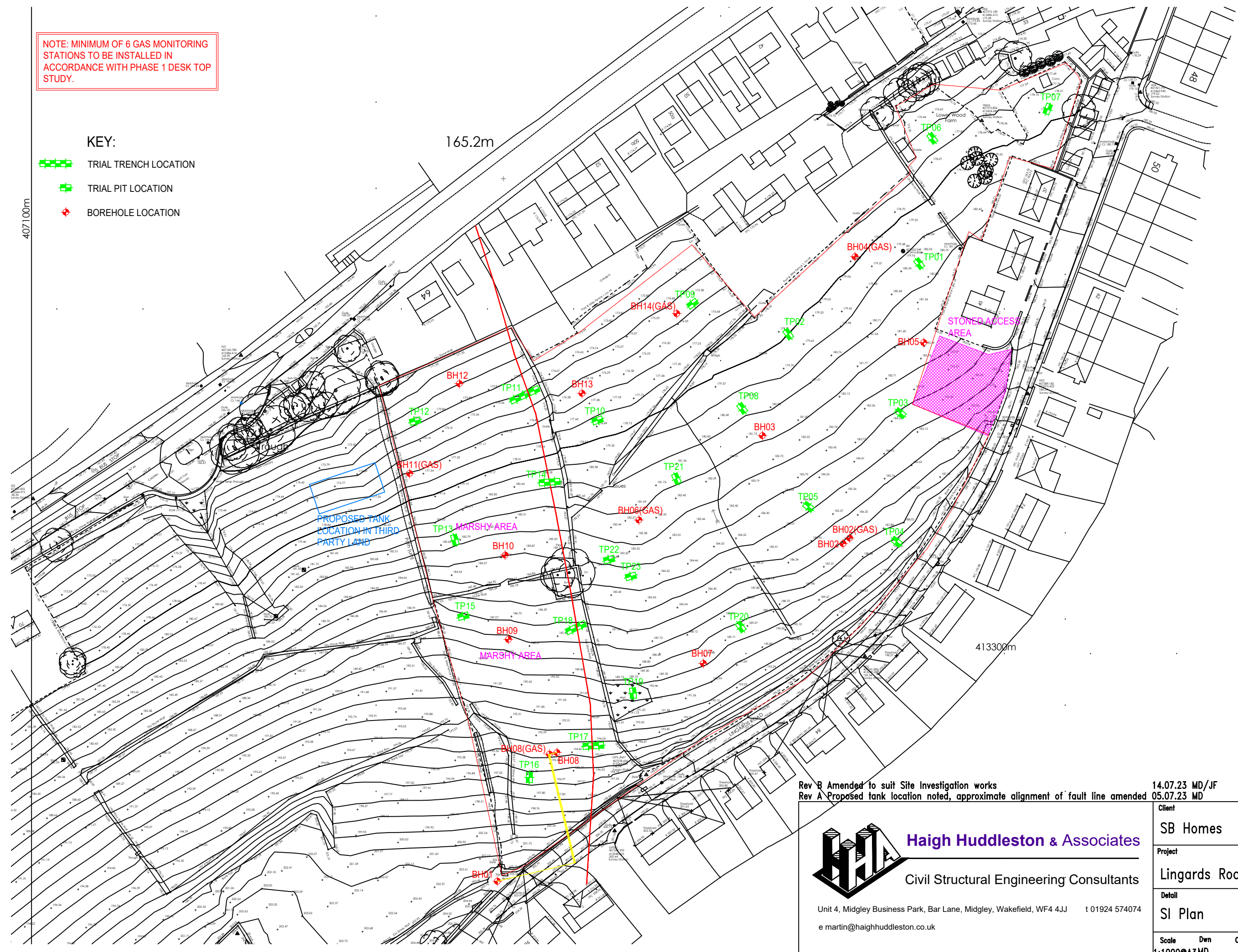
j.farrar@haighhuddleston.co.uk

Appendix

NOTE: MINIMUM OF 6 GAS MONITORING STATIONS TO BE INSTALLED IN ACCORDANCE WITH PHASE 1 DESK TOP STUDY.

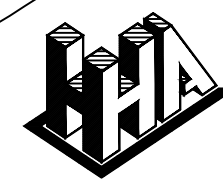
KEY:

- TRIAL TRENCH LOCATION
- TRIAL PIT LOCATION
- BOREHOLE LOCATION



Rev B Amended to suit Site Investigation works
Rev A Proposed tank location noted, approximate alignment of fault line amended

14.07.23 MD/JF
05.07.23 MD



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03/23 MD				
Client				
SB Homes				
Project				
Lingards Road, Slaithwaite				
Detail				
SI Plan				
Scale	Dwn	Chkd	Date	Dwg No.
1:1000@A3MD			Apr'23	E19/7567/037/01B



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SITE:	Lingards Road, Slaithwaite	
CLIENT:	SB Homes	
JOB NO:	7567	
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 ()	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	21.8	21.8	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	986	Time: 14:45	Date: 26.07.23	
BH02	ND	ND	ND	ND	1.9	1.9	18.6	18.6	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0019	1.80	3.00	1.0-1.80	986			
BH04	ND	ND	ND	ND	ND	ND	21.4	21.4	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	4.00	4.00	1.0-4.00	986	Cloudy, Windy, Warm		
BH06	ND	ND	ND	ND	2.2	2.2	15.1	15.1	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0022	4.00	4.00	1.0-4.00	986			
BH08	ND	ND	ND	ND	ND	ND	18.4	18.4	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	1.80	4.00	1.0-1.80	983	Falling A.P		
BH11	ND	ND	ND	ND	1.5	1.5	19.5	19.5	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0015	1.40	4.00	1.1-1.40	985	From 1011 - 1007mB over 8 hour period		
BH14	ND	ND	ND	ND	ND	ND	21.3	21.3	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	4.00	NR	986			
AIR	ND	ND	ND	ND	ND	ND	20.9	20.9	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	994	Time: 10:30	Date: 09.08.23	
BH02	ND	ND	ND	ND	2.3	2.3	18.6	18.6	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0023	2.10	3.00	1.0-2.10	994			
BH04	ND	ND	ND	ND	ND	ND	20.9	20.9	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	4.00	4.00	1.0-4.00	995	Sunny, Windy, Warm		
BH06	ND	ND	ND	ND	4.2	4.2	15.8	15.8	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0042	4.00	4.00	1.0-4.00	994			
BH08	ND	ND	ND	ND	ND	ND	17.0	17.0	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	2.20	4.00	1.0-2.20	992	Equalised A.P		
BH11	ND	ND	ND	ND	0.9	0.9	19.8	19.8	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0009	1.40	4.00	1.0-1.40	994	Consistent at 1017mB over 8 hour period		
BH14	ND	ND	ND	ND	ND	ND	20.9	20.9	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	4.00	4.00	1.0-4.00	995			
AIR	ND	ND	ND	ND	ND	ND	20.2	20.2	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	988	Time: 12:00	Date: 29.08.23	
BH02	ND	ND	ND	ND	2.4	2.4	18.9	18.9	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0024	1.80	3.00	1.0-1.80	988			
BH04	ND	ND	ND	ND	1.2	1.2	19.9	19.9	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0012	4.00	4.00	1.0-4.00	986	Raining, Wet, Cold		
BH06	ND	ND	ND	ND	4.2	4.2	17.1	17.1	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0042	4.00	4.00	1.0-4.00	988			
BH08	ND	ND	ND	ND	ND	ND	17.3	17.3	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	1.90	4.00	1.0-1.90	985	Falling A.P		
BH11	ND	ND	ND	ND	3.5	3.5	16.2	16.2	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0035	1.40	4.00	1.0-1.40	986	From 1011 - 1009mB over 8 hour period		
BH14	ND	ND	ND	ND	0.7	0.7	20.2	20.2	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0007	4.00	4.00	1.0-4.00	986			
																	0	0							
																	0	0							
																	0	0							
																	0	0							
																	0	0							

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.



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SITE:	Lingards Road, Slaithwaite	
CLIENT:	SB Homes	
JOB NO:	7567	
SHEET NO:	2	

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 ()	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	20.9	20.9	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	NR	NR	NR	989	Time: 13:30	Date: 26.09.23	
BH02	ND	ND	ND	ND	2.1	2.1	18.6	18.6	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0021	2.20	3.00	1.0-2.20	988			
BH04	ND	ND	ND	ND	ND	ND	20.7	20.7	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	4.00	4.00	1.0-4.00	988	Sunny, Dry, Warm		
BH06	ND	ND	ND	ND	4.2	4.2	16.3	16.3	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0042	4.00	4.00	1.0-4.00	989			
BH08	ND	ND	ND	ND	ND	ND	17.6	17.6	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	2.30	4.00	1.0-2.30	987	Equalised A.P		
BH11	ND	ND	ND	ND	3.4	3.4	16.7	16.7	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0034	1.65	4.00	1.0-1.65	989	From 989 - 990mB over 8 hour period		
BH14	ND	ND	ND	ND	0.7	0.7	20.1	20.1	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0007	4.00	4.00	1.0-4.00	989			
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	992	Time: 15:30	Date: 25.10.23	
BH02	ND	ND	ND	ND	1.2	1.2	19.1	19.1	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0012	1.10	3.00	1.0-1.10	992			
BH04	ND	ND	ND	ND	ND	ND	20.4	20.4	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	3.70	4.00	1.0-3.70	990	Sunny, Wet, Cold		
BH06	ND	ND	ND	ND	4.0	4.0	16.9	16.9	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.004	3.70	4.00	1.0-3.70	992			
BH08	ND	ND	ND	ND	ND	ND	18.1	18.1	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	2.10	4.00	1.0-2.10	992	Falling A.P		
BH11	ND	ND	ND	ND	1.8	1.8	19.0	19.0	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0018	0.90	4.00	1.0-0.90	991	From 992 - 988mB over 8 hour period		
BH14	ND	ND	ND	ND	0.5	0.5	20.2	20.2	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0005	3.60	4.00	1.0-3.60	991			
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	999	Time: 10:45	Date: 17.11.23	
BH02	Unable to monitor - Destroyed during ground works																								
BH04	Unable to monitor - Destroyed during ground works																					Sunny, Wet, Cold			
BH06	ND	ND	ND	ND	4.7	4.7	14.2	14.2	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0047	4.00	4.00	1.0-4.00	998			
BH08	ND	ND	ND	ND	ND	ND	17.3	17.3	ND	ND	ND	1.0	ND	ND	ND	ND	NR	NR	1.7	4.00	1.0-1.7	997	Falling A.P		
BH11	ND	ND	ND	ND	0.8	0.8	17.6	17.6	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0008	1.10	4.00	1.0-1.10	997	From 1003 - 999mB over 8 hour period		
BH14	ND	ND	ND	ND	1.6	1.6	19.2	19.2	ND	ND	ND	1.0	ND	ND	ND	ND	NR	0.0016	4.00	4.00	1.0-4.00	997			

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.