019/4721/JR/wn

31st March 2024

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[redacted]

Dear Ben

Pit Lane, Wombwell – gas risk assessment

Further to issue of our Geoenvironmental Appraisal Report (No. 4721/1, dated September 2023), gas monitoring at the above site has now been completed and we are able to issue this supplementary letter report together with copies of the monitoring results. This letter, which should be read in conjunction with Report No 4721/1, reviews soil-gas conditions, assesses risks and details any mitigation measures required to render the site suitable for the proposed development.

Background

The site is located approximately 5km southeast of Barnsley town centre at NGR SE 387 029, it comprises two parcels (A & B) of arable farmland, covering a total area of approximately 8.3 hectares (20.5 acres). Parcel A is to be redeveloped with housing and Parcel B used for the construction of a drainage basin. This gas risk assessment considers only parcel A.

In relation to hazardous gas, the above-mentioned report found:

- An area of former landfill located approximately 170m to the west. Records suggest the landfill accepted household waste between 1953 and 1971.
- Former underground coal workings underlie the east.

Based on the above, it was considered that the site might be at risk from hazardous gas and therefore monitoring wells were installed in 14 probeholes. Details of the individual installations are provided in Appendix E of this letter report.

The proposed residential development comprises 229 traditional two storey domestic dwellings, associated gardens, POS, adoptable roads and sewers, as shown on Drawing 4721/2 in Report No 4721/1. The houses will be founded on traditional strip/trench-fill foundations in Cohesive or Granular Residual Soil.

Scope of works

The generation potential of the gas source was initially considered to be Low, consequently, in accordance with CIRIA Report C665, given the proposed residential end use, 9 visits have been completed over a 6-month period, between September 2023 and March 2024.

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

Gas monitoring results

The monitoring results are enclosed and summarised below:

Well	Response zone	Range of methane concentrations (% v/v)	Range of carbon dioxide concentrations (% v/v)	Range of steady flow rates (litre/hour)
PH101	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	ND to 0.2	ND
PH102	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	0.3 to 2.2	ND
PH103	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	0.5 to 4.3	ND to 0.2
PH104	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	0.2 to 0.9	ND to 0.1
PH105	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	ND to 1.7	-0.1 to 0.1
PH106	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	ND to 0.3	ND
PH107	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	0.1 to 0.6	ND
PH108	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	ND to 2.3	ND
PH109	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	ND to 0.1	ND
PH110	3.0 – 4.5m (Coal & Mudstone)	ND	ND to 4.9	ND to 0.1
PH111	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	0.9 to 1.8	ND
PH112	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	0.4 to 2.6	ND to 0.1
PH113	2.5 - 4.5m (Coal & Mudstone)	ND	ND to **5.3**	ND
PH114	1.5 – 4.5m (Cohesive residual soil & Mudstone)	ND	0.1 to 2.5	ND

Note: Atmospheric pressure recorded on site varied between 987mb and 1018mb.

ND – Non-detected

Numbers (gas concentrations) in **bold** exceed the CS1 threshold (there are no threshold concentrations for CS2 and above; CS is dictated by Gas Screening Value).

Plots of atmospheric pressure versus time, with the monitoring visits indicated, are presented in Appendix D of this letter report.

In accordance with the DETR approach, a gas flow rate of 0.2 litres/hour has been used to calculate gas screening values as the highest recorded sustained flow.

Gas spot monitoring was completed at each well for 10 minutes for flow and a further 10 minutes for gas concentration unless a steady sustained rate was reached for over 2 minutes.

Current guidance

Generic Notes (01 Site Characterisation) outlining how monitoring results are interpreted are enclosed.

Reference has also been made to CL:AIRE guidance[1].

Current gas regime

The proposed residential development comprises traditional two storey domestic dwellings. Consequently, the gas regime has been characterised in accordance with the Situation A (Wilson & Card) methodology outlined in CIRIA Report C665[2] and BS8485:2015+A1:2019[3].

No methane was recorded during any of the monitoring visits.

Based on worst-case (peak) gas concentrations for carbon dioxide (5.3%), and a maximum steady flow of (0.2l/hr), a Gas Screening Value (GSV)[4] for carbon dioxide of 0.01l/hr has been calculated. These GSVs equate to Characteristic Situation **CS1**.

A single carbon dioxide concentration above 5% weas recorded during Visit 1 and one location (5.3% in PH113), a depleted oxygen concentration (<10%) was also recorded at PH113 during Visit 1. Both are highly likely to be the result of aerobic microbial degradation of carbonaceous material within the substrata.

Whilst the elevated carbon dioxide concentration marginally exceeds the **CS2** threshold of 5%, the isolated occurrence is not considered to be significant and requires no further assessment.

In light of the single isolated marginal exceedance and the very low flow rates recorded, it is not considered necessary to raise the site's classification to **CS2**.

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1 *Good Practice for Risk Assessment for Coal Mine Gas Emissions – CL:AIRE, October 2021*
2 *CIRIA C665: Assessing risks posed by hazardous ground gases to buildings (2007).*
3 *Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.*
4 *Gas Screening Values (GSVs) are calculated by the equation: GSV = flow x (gas concentration / 100).*

Scope of protection measures

Based on the site characterisation discussed above, the proposed foundation solution, and with reference to the gas protection "scoring" system outlined in BS8485:2015+A1:2019, Lithos consider that the following protective measures should be incorporated in all new buildings:

Charac. situation (Wilson & Card, '99)	Gas "score" req'd by BS8485	Protective measures (Residential)		
		Floor slab (BS8485 "score")	Sub-floor ventilation (BS8485 "score")	Membrane Type (BS8485 score")
1	0	Well constructed ground-bearing or suspended	Not required for ground bearing slab, otherwise to comply with Building Regulations (Part C).	Waterproof DPM

Footnotes:

1. Building Type A is defined in Table 3 and Section 7 of BS8485:2015+A1:2019 as: private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Examples include private housing and some retail premises.
2. If radon is the only gas of concern, adopt protection as per CS = 1 (but with lapping & sealing of DPM) for basic radon measures, and protection as per CS = 2 for full radon measures.

Radon

The HSA website radon map indicates that the site is in an area where **3% to 5%** of homes are estimated to be above the action level, and **basic** radon protection measures are required in new dwellings.

Basic radon measures comprise a radon resistant barrier* (membrane) laid within the floor construction and across the wall cavity in accordance with BR211:2023[5]. The joints between the sheets that form the membrane and cross the cavity **must** be sealed, along with all service penetrations, to make the construction as airtight as possible. A separate cavity tray should be installed in the cavity one brick course above the radon membrane. In order to withstand the installation and follow on construction process membranes should be no less than 400 microns thick.[6]

BRE211:2023 highlights the importance of good practice and a high standard of workmanship to ensure radon membranes are installed to a high standard.

A building site is a harsh environment and barriers can easily become damaged during construction by operatives or equipment moving across or working over a completed section of barrier. As a consequence, where there is a risk of puncturing the membrane, it should be ensured that the membrane is well protected with sand or lean mix concrete before advancing construction.

The radon protection system should be subject to inspection and verification by a third party inspector that has a full understanding of all elements of the radon protection system.

Verification should be carried out at a minimum frequency of 1 in 10 plots where groundworkers carry out installation, and 1 in 20 plots where accredited installers are used. Plots selected for inspection should be located across the development and not clustered.

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[5] *BRE Report BR211, 2023: "Radon: guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects"*

* *Confirmation of resistance to radon must be obtained from the manufacturer.*

[6] *BS8485:2015+A1:2019. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. January 2019.*

We trust the above is sufficient for your present needs, but should you have any queries please contact the undersigned.

Yours sincerely

[redacted]

Principal Engineer
for and on behalf of
LITHOS CONSULTING LIMITED

Enclosures:

Appendix A – General Notes
Appendix B - Drawings
Appendix C - Gas Monitoring Results
Appendix D - Plot of Atmospheric vs Time
Appendix E - Borehole Logs

APPENDIX A
General notes

Current guidance

CIRIA Report 151 (1995)[i] identified that there was inadequate guidance on trigger concentrations for ground gases. CIRIA concluded that the most important aspect of a gas regime below or adjacent to a site was the surface emission rate, i.e. how quickly the gas is coming out of the ground. The lower the surface emission rate the lower the risk. CIRIA Report C665 (2006)[ii] advocates two methodologies (both refer to Gas Screening Values - GSV) for characterising sites:

A – All developments except low rise housing. The advocated methodology is that proposed by Wilson & Card, 1999[iii]

B – Low rise housing. An alternative (traffic light) methodology, derived by Boyle and Witherington, 2006[iv] for NHBC

Other relevant UK guidance includes:

- BS8485:2015+A1:2019 – Code of Practice for the characterisation & remediation from ground gas in affected developments.
- BS8576:2013 Guidance on investigations for ground gas – permanent gases and volatile organic compounds
- Boyle & Witherington (2007) – Guidance on evaluation on development proposals on sites where methane and carbon dioxide are present, incorporating "traffic lights". Report Ref. 10627-R01-(02), for NHBC
- Wilson, Card & Haines (CIEH, 208) The Local Authority Guide to Ground Gas
- CL:AIRE Research Bulletin RB17 (November 2012) A Pragmatic Approach to Ground Gas Risk Assessment
- CL:AIRE Research Bulletin RB13 (February 2011) The Utility of Continuous Monitoring in Detection & Prediction of 'Worst-Case' Ground Gas Concentration
- BRE\Environment Agency Report BR 414 (2001) – "Protective Measures for housing on gas-contaminated land".
- YALPAG (December 2016) - Verification Requirements for Gas Protection Systems - Technical Guidance for Developers, Landowners and Consultants.
- Environment Agency Report LFTGN 03 - Guidance on the management of landfill gas, June 2014

A – All developments except low rise housing. (Wilson & Card, 1999)[v] revised Table 28 of CIRIA 149[v] in terms of borehole gas volume flow rate (now GSV) in order to achieve a more consistent design of protection measures. This was done to reflect the importance of recognising the gas surface emission rate. Wilson & Card then developed a method for classifying gassing sites (Table 1 below), which took into account the combined gas concentration and GSV.

Table 1 – Site classification (Wilson & Card)

Characteristic Situation (W&C, 1999)	Gas Screening Value, CH_4 or CO_2 (l/hr)	Additional limiting factors	Typical source of generation
1	<0.07	Methane not to exceed 1% v/v and carbon dioxide not to exceed 5% v/v	Natural soils with low organic content
2	<0.7	Borehole air flow rate not to exceed 70 litre/hr otherwise increase to Characteristic Situation 3	Natural soil, high peat/organic content
3	<3.5		Old landfill, inert waste, mineworking flooded.
4	<15	Quantitative Risk Assessment required to evaluate scope of protection measures.	Mineworking – susceptible to flooding, completed landfill, inert waste (WMP 26B criteria)
5	<70		Mineworking unflooded, inactive
6	>70		Recent landfill site

Notes:

Borehole flow rate = volume of gas (regardless of composition) which is escaping from well (l/hr)

Gas Screening Value (litre/hour) = gas concentration (%) / 100 x borehole flow rate (l/hr)

To facilitate design implementation, the limiting values for both methane and carbon dioxide are identical

B – Low rise housing. NHBC have developed a characterisation system similar to that of Wilson & Card above, but specific to low-rise housing development (Boyle and Witherington) (Table 8.7). This approach compares measured gas emission rates with generic "Traffic Lights". The Traffic Lights include "Typical Maximum Concentrations" for initial screening, and risk-based Gas Screening Values (GSVs) for consideration of situations where the Typical Maximum Concentrations are exceeded. Calculations are carried out for both methane and carbon dioxide and the worst case adopted in order to establish the appropriate protection measures.

Table 8.7 NHBC Traffic light system for 150 mm void

Traffic Light Classification	Methane [1]		Carbon Dioxide [1]	
	Typical Maximum Concentration [5] (%v/v)	Gas Screening Value [2,4,6] (l/hr)	Typical Maximum Concentration [5] (%v/v)	Gas Screening Value [2,3,4,6] (l/hr)
Green	1	0.16	5	0.78
Amber 1	5	0.63	10	1.56
Amber 2	20	1.56	30	3.13
Red				

Notes:

1. The worst gas-regime identified at the site, either methane or carbon dioxide, recorded from monitoring in the worst temporal conditions, will be the decider for which Traffic Light and GSV is allocated.
2. Generic GSVs are based on guidance contained within "The Building Regulations: Approved Document C" (2004) and assume a sub-floor void of 150 mm thickness.
3. The small room is considered to be a downstairs toilet, with dimensions of 1.50 × 1.50 × 2.50 m, with a soil pipe passing into the sub-floor void.
4. The GSV, in litres per hour, is as defined in Wilson and Card (1999) as the borehole flow rate multiplied by the concentration in the air stream of the particular gas being considered.
5. The Typical Maximum Concentrations can be exceeded in certain circumstances should the conceptual site model indicate it is safe to do so. This is where professional judgment will be required, based on a thorough understanding of the gas regime identified at the site where monitoring in the worst temporal conditions has occurred.
6. The GSV thresholds should not generally be exceeded without completion of a detailed gas risk assessment taking into account site-specific conditions.

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i *Harries CR, Witherington PJ and McEntee JM (1995). Interpreting measurements of gas in the ground. CIRIA Report 151*

ii *CIRIA (2006) – Assessing risks posed by hazardous ground gases to buildings.*

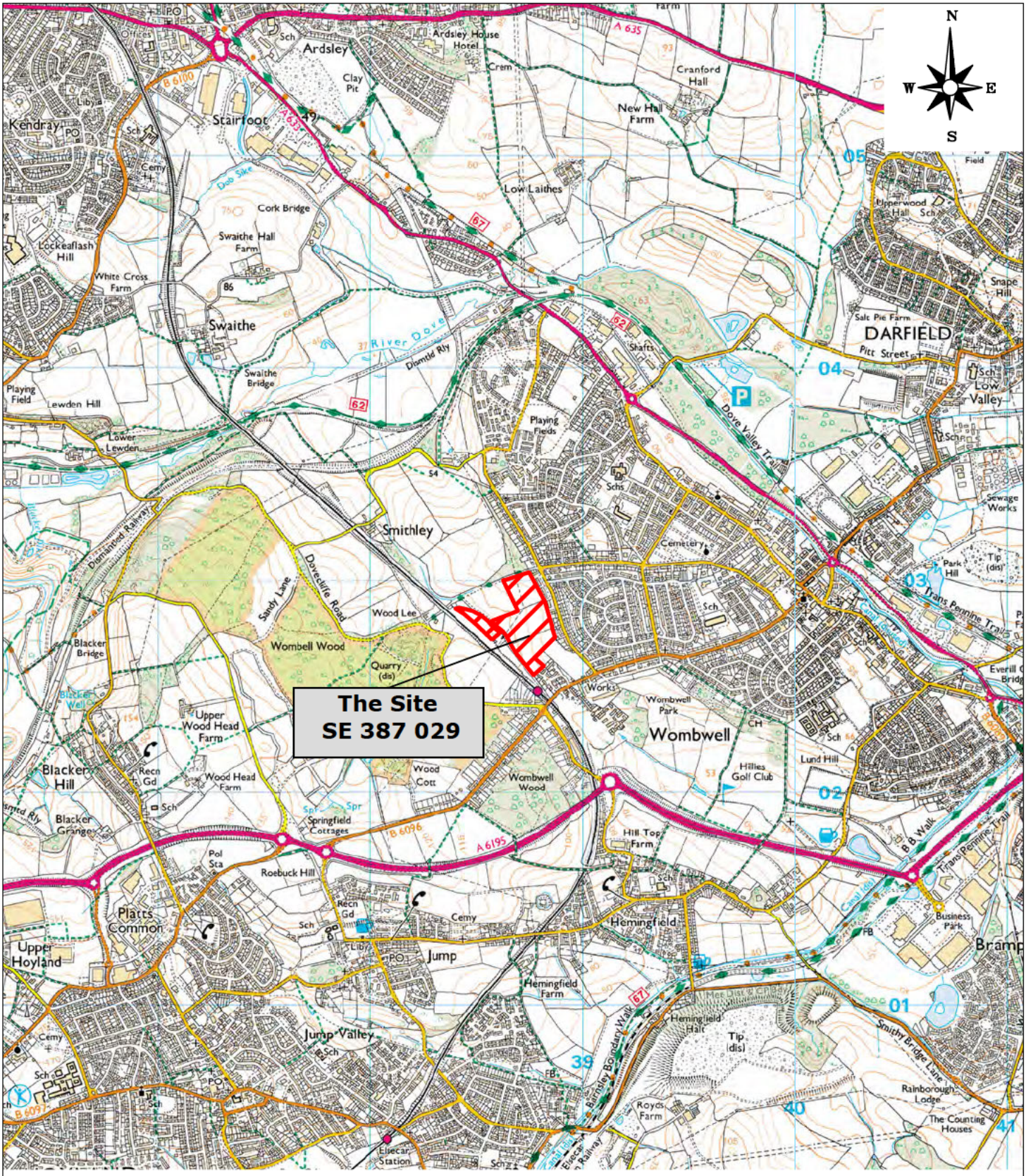
iii *Wilson SA and Card GB (February 1999). Reliability and Risk in Gas Protection Design. Ground Engineering.*

iv *Boyle & Witherington (2006) – Guidance on evaluation on development proposals on sites where methane and carbon dioxide are present, incorporating "traffic lights". Report Ref. 10627-R01-(02), for NHBC.*

v *Wilson SA and Card GB (February 1999). Reliability and Risk in Gas Protection Design. Ground Engineering.*

APPENDIX B

Drawings



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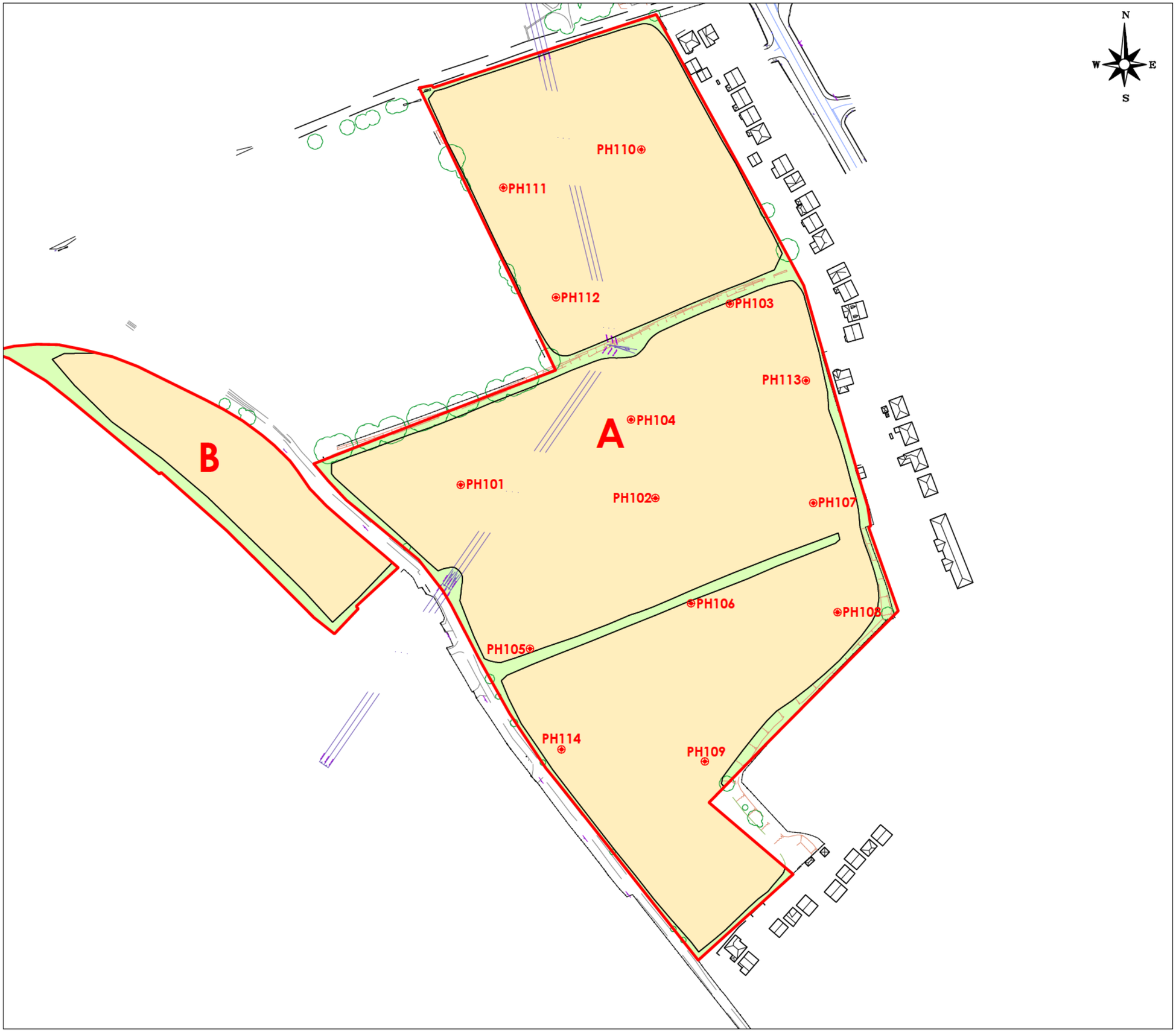
CLIENT	CREST NICHOLSON YORKSHIRE
JOB TITLE	PIT LANE, WOMBWELL
DRAWING TITLE	SITE LOCATION PLAN
DRAWN	DP
DATE	18 07 2023
CHECKED	ASw
DATE	18 07 2023
STATUS	FOR COMMENT ☐ FOR APPROVAL ☐ DRAFT ☐ FINAL ☑
SCALE	1:25,000
SHEET	A4
DRAWING NO.	4721/1
REVISION	



NOTES

- CROPPED FIELD
- GRASS & OVERGROWN AREAS
- MONITORING WELL LOCATION
- APPROXIMATE SITE BOUNDARY

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

MONITORING WELLS ARE ASSOCIATED WITH A CORRESPONDING DEEPER BOREHOLE (PH101 & PH01 etc.),
WITH THE EXCEPTION OF PH113 & PH113 WHICH ARE STANDALONE MONITORING WELL LOCATIONS

REV.	DESCRIPTION	DATE

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CLIENT

CREST NICHOLSON YORKSHIRE

JOB TITLE

PIT LANE, WOMBWELL

DRAWING TITLE

MONITORING WELL LOCATIONS

DRAWN	DATE	STATUS
DP	02 08 23	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
ASw	02 08 23	DRAFT ☑
		FINAL ☐

SCALE	SHEET	DRAWING NO.	REVISION
1:2000	A3	4721/6A	

APPENDIX C

Gas monitoring results

Visit 1

Job Title:				Job No:
Pit Lane, Wombwell				4721
Client:				Sheet :
Crest Nicholson Yorkshire				9 of 6
Date:	Arrival Time:	Depart Time:	Operator:	
12/09/2023	13:00	14:15	Erin Waddilove	

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	20.7

Monitoring Point	Groundwater level	Concentrations					Gas Flow Rates			Bottom of well	Remarks
		Initial / Highest		Steady concentrations		Lowest concn	Initial / Maximum	Steady	Time to fall from highest to steady		
		CH_4	CO_2	CH_4	CO_2	O_2					
	(m) bgl	% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs	m	
PH101	3.56	ND	0.2	ND	0.2	20.5	ND	ND	30.0	4.08	
PH102	2.52	ND	2.2	ND	2.2	**15.0**	ND	ND	30.0	4.11	
PH103	ND	ND	4.3	ND	4.3	**13.6**	0.1	ND	40.0	3.60	
PH104	1.33	ND	0.9	ND	0.9	17.5	-3.0	ND	60.0	4.15	
PH105	0.84	ND	1.7	ND	1.7	18.6	-0.3	ND	50.0	4.32	
PH106	ND	ND	0.3	ND	0.3	20.5	-1.0	ND	60.0	4.30	
PH107	4.14	ND	0.5	ND	0.5	20.0	ND	ND	30.0	4.34	
PH108	ND	ND	0.9	ND	0.9	19.4	ND	ND	30.0	4.32	
PH109	ND	ND	ND	ND	ND	20.8	-7.0	ND	60.0	4.34	
PH110	ND	ND	4.9	ND	4.9	**13.6**	-0.3	ND	60.0	3.89	
PH111	ND	ND	0.9	ND	0.9	18.6	ND	ND	30.0	4.15	
PH112	2.50	ND	2.6	ND	2.6	17.6	9.6	ND	120.0	4.25	
PH113	3.46	ND	**5.3**	ND	**5.3**	**6.6**	ND	ND	30.0	4.27	
PH114	0.88	ND	2.5	ND	2.5	**15.1**	ND	ND	30.0	4.16	

Equipment Used:	Next Calibration Date
Gas Data GFM436 Infrared Gas Analyser Geotechnical Instruments Dipmeter	24/03/2024

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 (Stocksbridge Station)					
	Temp (°C):	13 to 14		Barometric Pressure Trend:			Rising		
Time:	13:00	13:40	14:15	01:02	11:01	13:02	13:47	14:17	16:17
Pressure (mb):	1007	1005	1004	1013	1015	1016	1016	1016	1017

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

Weather Conditions:	Heavy rain, heavy cloud
Surface Ground Conditions:	Wet

Remarks:

Stocksbridge station located 10 miles south west from the site (Pit Lane Wombwell).

Visit 2

Job Title:	Job No:
Pit Lane, Wombwell	4721
Client:	**Sheet :**
Crest Nicholson Yorkshire	2 of 6

Date:	Arrival Time:	Depart Time:	Operator:
05/10/2023	12:00	14:00	Erin Waddilove

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	20.7

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	Gas Flow Rates: Steady	Time to fall from highest to steady	Bottom of well	Remarks
	(m) bgl	% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs	m	
PH101	ND	ND	ND	ND	ND	20.4	ND	ND	30.0	4.07	
PH102	2.01	ND	1.5	ND	1.5	**15.5**	ND	ND	40.0	4.11	
PH103	ND	ND	0.6	ND	0.6	19.8	ND	ND	30.0	3.57	
PH104	1.00	ND	0.4	ND	0.4	20.6	ND	ND	40.0	4.18	Bailed 12:20 - 12:25 12L to 1.38m. Remonitored at 13:40, fully recharged to 1.00m and no change in gas concentrations.
PH105	2.25	ND	ND	ND	ND	20.7	ND	ND	30.0	4.35	
PH106	ND	ND	ND	ND	ND	20.8	ND	ND	30.0	4.36	
PH107	3.60	ND	0.5	ND	0.5	20.5	ND	ND	30.0	4.30	
PH108	ND	ND	0.6	ND	0.6	19.0	ND	ND	40.0	4.36	
PH109	ND	ND	ND	ND	ND	20.8	ND	ND	30.0	4.34	
PH110	ND	ND	0.9	ND	0.9	20.1	ND	ND	30.0	3.92	
PH111	ND	ND	1.3	ND	1.3	18.2	ND	ND	40.0	4.15	
PH112	2.05	ND	0.4	ND	0.4	20.6	ND	ND	30.0	4.26	
PH113	3.44	ND	ND	ND	ND	20.8	ND	ND	30.0	4.30	
PH114	1.22	ND	0.1	ND	0.1	20.7	ND	ND	30.0	4.70	Bailed 12:40 - 12:45 12L to 4.25m. Remonitored at 13:45 to 3.63m, no change in gas concentrations.

Equipment Used:

Gas Data GFM436 Infrared Gas Analyser
Geotechnical Instruments Dipmeter

Next Calibration Date

24/03/2024

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 (Stocksbridge Station)					
	Temp (°C):	14 to 14		Barometric Pressure Trend:			Steady to falling		
Time:	12:00	13:00	14:00	01:01	10:01	12:01	13:07	14:01	16:01
Pressure (mb):	1016	1013	1012	1020	1021	1021	1021	1020	1018

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

Weather Conditions:	Rain, heavy cloud, light breeze
Surface Ground Conditions:	Wet

Remarks:

Stocksbridge station located 10 miles south west from the site (Pit Lane Wombwell).

Visit 3

Job Title:				Job No:
Pit Lane, Wombwell				4721
Client:				Sheet :
Crest Nicholson Yorkshire				3 of 6
Date:	Arrival Time:	Depart Time:	Operator:	
30/10/2023	11:30	13:30	Erin Waddilove	

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	20.4

Monitoring Point	Groundwater level	Concentrations					Gas Flow Rates			Bottom of well	Remarks
		Initial / Highest		Steady concentrations		Lowest concn	Initial / Maximum	Steady	Time to fall from highest to steady		
		CH_4	CO_2	CH_4	CO_2	O_2					
	(m) bgl	% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs	m	
PH101	4.08	ND	ND	ND	ND	20.4	ND	ND	30.0	4.10	
PH102	1.81	ND	0.4	ND	0.4	20.3	-2.0	ND	45.0	4.12	
PH103	3.50	ND	0.8	ND	0.8	19.4	0.1	ND	40.0	3.59	
PH104	0.25	NR	NR	NR	NR	NR	NR	NR	NR	4.18	Bailing attempted, water recharged straight away so well flooded.
PH105	0.25	NR	NR	NR	NR	NR	NR	NR	NR	4.33	Bailing attempted, water recharged straight away so well flooded.
PH106	ND	ND	ND	ND	ND	20.5	-0.4	ND	45.0	4.30	
PH107	3.75	ND	0.5	ND	0.5	20.1	0.1	ND	40.0	4.33	
PH108	ND	ND	2.2	ND	2.2	**15.5**	0.4	ND	45.0	4.34	
PH109	ND	ND	ND	ND	ND	20.4	ND	ND	30.0	4.37	
PH110	ND	ND	0.7	ND	0.7	19.1	0.4	0.1	60.0	3.91	
PH111	ND	ND	1.8	ND	1.8	**15.2**	ND	ND	30.0	4.17	
PH112	1.61	ND	0.8	ND	0.8	20.1	-0.4	ND	45.0	4.28	
PH113	3.50	ND	ND	ND	ND	20.4	0.1	ND	40.0	4.32	
PH114	1.21	ND	0.6	ND	0.6	20.2	ND	ND	30.0	4.39	

Equipment Used:

Gas Data GFM436 Infrared Gas Analyser
Geotechnical Instruments Dipmeter

Next Calibration Date

24/03/2024

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 (Stocksbridge Station)					
	Temp (°C):	8 to 8		Barometric Pressure Trend:			Rising to steady		
Time:	11:30	12:15	13:30	01:00	09:30	11:30	12:15	13:30	15:30
Pressure (mb):	988	988	987	991	995	995	996	995	995

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

Weather Conditions:	Rain, overcast, light breeze.
Surface Ground Conditions:	Wet, very boggy and flooded.

Remarks:

Stocksbridge station located 10 miles south west from the site (Pit Lane, Wombwell).

Visit 4

Job Title:	Job No:
Pit Lane, Wombwell	**4721**
Client:	**Sheet :**
Crest Nicholson Yorkshire	1 of 6

Date:	Arrival Time:	Depart Time:	Operator:
21/11/2023	09:00	10:30	Erin Waddilove

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	20.6

Monitoring Point	Groundwater level	Concentrations					Gas Flow Rates			Bottom of well	Remarks
		Initial / Highest		Steady concentrations		Lowest concn	Initial / Maximum	Steady	Time to fall from highest to steady		
		CH_4	CO_2	CH_4	CO_2	O_2					
	(m) bgl	% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs	m	
PH101	ND	ND	ND	ND	ND	20.5	0.9	ND	40.0	4.10	
PH102	1.77	ND	0.3	ND	0.3	20.1	0.4	ND	40.0	4.08	
PH103	3.30	ND	1.4	ND	1.4	19.0	-0.2	ND	40.0	4.58	
PH104	0.93	NR	NR	NR	NR	NR	NR	NR	NR	4.17	Bailing attempted, water recharged straight away so well flooded.
PH105	3.50	ND	0.4	ND	0.4	20.3	1.2	ND	40.0	4.34	
PH106	ND	ND	0.1	ND	0.1	20.5	0.1	ND	40.0	4.40	
PH107	3.91	ND	0.1	ND	0.1	20.5	ND	ND	30.0	4.38	
PH108	ND	ND	2.3	ND	2.3	**15.1**	0.1	ND	40.0	4.37	
PH109	ND	ND	ND	ND	ND	20.5	-0.2	ND	40.0	4.39	
PH110	ND	ND	ND	ND	ND	20.7	-0.6	0.1	60.0	3.93	
PH111	ND	ND	1.7	ND	1.7	16.4	0.4	ND	40.0	4.20	
PH112	1.92	ND	0.4	ND	0.4	20.4	0.1	0.1	45.0	4.29	
PH113	3.40	ND	ND	ND	ND	20.6	-0.8	ND	40.0	4.29	
PH114	1.02	ND	2.4	ND	2.4	20.4	1.2	ND	40.0	4.38	

Equipment Used:	Next Calibration Date
Gas Data GFM436 Infrared Gas Analyser Geotechnical Instruments Dipmeter	24/03/2024

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 (Stocksbridge Station)					
	Temp (°C):	7		Barometric Pressure Trend:			Rising		
Time:	09:00	09:45	10:30	00:12	07:12	09:12	09:57	10:27	12:27
Pressure (mb):	1018	1017	1015	1017	1023	1025	1026	1026	1027

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

Weather Conditions: Overcast, light rain, light breeze

Surface Ground Conditions: Wet

Remarks: Stocksbridge station located 10 miles south west from the site (Pit Lane, Wombwell).

Visit 5

Job Title:	Job No:
Pit Lane, Wombwell	4721
Client:	**Sheet :**
Crest Nicholson Yorkshire	5 of 6

Date:	Arrival Time:	Depart Time:	Operator:
15/12/2023	08:45	10:30	Erin Waddilove

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	20.6

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	
PH101	ND	ND	ND	ND	ND	20.4	ND	ND	30.0	4.12	
PH102	1.34	ND	0.3	ND	0.3	20.3	0.2	ND	40.0	4.09	
PH103	3.00	ND	1.3	ND	1.3	19.6	1.2	ND	40.0	3.58	
PH104	0.53	NR	NR	NR	NR	NR	NR	NR	NR	4.15	Bailing attempted, water recharged straight away so well flooded.
PH105	2.10	ND	0.5	ND	0.5	19.9	ND	ND	30.0	4.35	
PH106	ND	ND	ND	ND	ND	20.5	ND	ND	30.0	4.36	
PH107	3.72	ND	0.3	ND	0.3	20.3	0.1	ND	40.0	4.36	
PH108	ND	ND	1.1	ND	1.1	**14.9**	0.2	ND	40.0	4.34	
PH109	ND	ND	ND	ND	ND	20.4	ND	ND	30.0	4.37	
PH110	ND	ND	1.2	ND	1.2	19.5	0.1	ND	40.0	3.96	
PH111	ND	ND	1.7	ND	1.7	**14.1**	1.8	ND	40.0	4.21	
PH112	1.56	ND	0.4	ND	0.4	20.7	0.1	ND	30.0	4.26	
PH113	3.25	ND	ND	ND	ND	20.6	ND	ND	30.0	4.28	
PH114	0.77	NR	NR	NR	NR	NR	NR	NR	NR	4.37	Bailing attempted, water recharged straight away so well flooded.

Equipment Used:

Gas Data GFM436 Infrared Gas Analyser
Geotechnical Instruments Dipmeter

Next Calibration Date

24/03/2024

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 (Stocksbridge Station)					
	Temp (°C):	4 to 4		Barometric Pressure Trend:			Rising		
Time:	08:45	09:30	10:30	00:07	06:37	08:37	09:22	10:37	12:37
Pressure (mb):	1006	1008	1009	1017	1016	1016	1017	1018	1019

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

Weather Conditions: Heavy cloud, light breeze

Surface Ground Conditions: Damp

Remarks:

Stocksbridge station located 10 miles south west from the site (Pit Lane, Wombwell).

Visit 6

Job Title:	Job No:
Pit Lane, Wombwell	4721
Client:	**Sheet :**
Crest Nicholson Yorkshire	6 of 6

Date:	Arrival Time:	Depart Time:	Operator:
04/01/2024	09:30	11:30	Erin Waddilove

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	20.4

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	
PH101	4.17	ND	0.1	ND	0.1	20.4	0.7	ND	40.0	4.17	
PH102	1.26	ND	0.3	ND	0.3	20.3	ND	ND	30.0	4.10	
PH103	2.65	ND	1.1	ND	1.1	19.7	0.3	ND	40.0	3.58	
PH104	0.50	NR	NR	NR	NR	NR	NR	NR	NR	4.13	Bailing attempted, water recharged straight away so well flooded.
PH105	3.16	ND	0.6	ND	0.6	19.9	1.5	ND	60.0	4.32	
PH106	ND	ND	0.1	ND	0.1	20.1	0.5	ND	40.0	4.37	
PH107	3.54	ND	0.4	ND	0.4	20.1	1.0	ND	40.0	4.35	
PH108	ND	ND	ND	ND	ND	20.4	0.7	ND	40.0	4.35	
PH109	ND	ND	ND	ND	ND	20.5	ND	ND	30.0	4.41	
PH110	3.90	ND	1.5	ND	1.5	17.9	1.5	ND	40.0	3.92	
PH111	ND	ND	1.7	ND	1.7	**13.4**	0.7	ND	40.0	4.10	
PH112	1.39	ND	0.6	ND	0.6	20.2	1.5	ND	45.0	4.23	
PH113	3.18	ND	ND	ND	ND	20.4	0.3	ND	40.0	4.32	
PH114	0.50	NR	NR	NR	NR	NR	NR	NR	NR	4.37	Bailing attempted, water recharged straight away so well flooded.

Equipment Used:

Gas Data GFM436 Infrared Gas Analyser
Geotechnical Instruments Dipmeter

Next Calibration Date

24/03/2024

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 (Stocksbridge Station)					
Temp (°C):	6 to 6		Barometric Pressure Trend:			Rising to steady		
Time:	09:30	10:30	11:30	00:02	07:32	09:32	10:32	11:32	13:32
Pressure (mb):	993	992	991	996	999	1000	1000	1000	999

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

Weather Conditions:	Light cloud, sunny, mild
Surface Ground Conditions:	Heavy mud, wet

Remarks:

Stocksbridge station located 10 miles south west from the site (Pit Lane, Wombwell).

Visit 7

Job Title:	Job No:
Pit Lane, Wombwell	4721
Client:	**Sheet :**
Crest Nicholson Yorkshire	7 of 6

Date:	Arrival Time:	Depart Time:	Operator:
29/01/2024	12:00	13:30	Erin Waddilove

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	20.6

Monitoring Point	Groundwater level	Concentrations					Gas Flow Rates			Bottom of well	Remarks
		Initial / Highest		Steady concentrations		Lowest concn	Initial / Maximum	Steady	Time to fall from highest to steady		
		CH_4	CO_2	CH_4	CO_2	O_2					
	(m) bgl	% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs	m	
PH101	3.85	ND	ND	ND	ND	20.5	-0.7	ND	40.0	4.14	
PH102	2.05	ND	0.6	ND	0.6	19.5	0.4	ND	30.0	4.09	
PH103	2.80	ND	0.5	ND	0.5	20.4	0.4	0.2	30.0	3.60	
PH104	1.25	ND	0.2	ND	0.2	20.4	1.8	0.1	60.0	4.14	
PH105	2.10	ND	0.7	ND	0.7	19.9	0.4	-0.1	30.0	4.35	
PH106	ND	ND	ND	ND	ND	20.6	-1.3	ND	40.0	4.40	
PH107	3.91	ND	0.3	ND	0.3	20.5	0.8	ND	30.0	4.37	
PH108	ND	ND	1.4	ND	1.4	18.5	1.8	ND	60.0	4.34	
PH109	ND	ND	ND	ND	ND	20.5	-2.5	ND	60.0	5.40	
PH110	ND	ND	0.3	ND	0.3	20.4	-1.2	ND	40.0	3.95	
PH111	ND	ND	1.5	ND	1.5	**14.8**	0.1	ND	30.0	4.20	
PH112	2.65	ND	1.0	ND	1.0	19.8	1.8	ND	60.0	4.25	
PH113	3.26	ND	0.2	ND	0.2	20.6	2.1	ND	60.0	4.28	
PH114	0.30	NR	NR	NR	NR	NR	NR	NR	NR	NR	Bailing attempted, water recharged straight away so well flooded.

Equipment Used:	Next Calibration Date
Gas Data GFM436 Infrared Gas Analyser Geotechnical Instruments Dipmeter	24/03/2024

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 (Stocksbridge Station)					
	Temp (°C):	8 to 8		Barometric Pressure Trend:			Steady		
Time:	12:00	12:45	13:30	00:13	09:59	11:59	12:44	13:29	15:29
Pressure (mb):	1012	1010	1009	1018	1020	1020	1019	1019	1019

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

Weather Conditions:	Heavy rain, heavy cloud, light winds
Surface Ground Conditions:	Wet

Remarks:

Stocksbridge station located 10 miles south west from the site (Pit Lane, Wombwell).

Visit 8

Job Title:	Job No:
Pit Lane, Wombwell	4721
Client:	**Sheet :**
Crest Nicholson Yorkshire	8 of 6

Date:	Arrival Time:	Depart Time:	Operator:
28/02/2024	08:45	10:30	Erin Waddilove

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	20.5

Monitoring Point	Groundwater level	Concentrations					Gas Flow Rates			Bottom of well	Remarks
		Initial / Highest		Steady concentrations		Lowest concn	Initial / Maximum	Steady	Time to fall from highest to steady		
		CH_4	CO_2	CH_4	CO_2	O_2					
	(m) bgl	% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs	m	
PH101	ND	ND	0.1	ND	0.1	20.3	0.6	ND	90.0	4.12	
PH102	2.02	ND	0.9	ND	0.9	18.5	0.2	ND	60.0	4.10	
PH103	3.58	ND	1.3	ND	1.3	19.6	0.1	ND	45.0	3.60	
PH104	1.64	ND	0.9	ND	0.9	19.5	-0.7	ND	90.0	4.14	
PH105	3.89	ND	0.9	ND	0.9	19.6	0.6	ND	90.0	4.33	
PH106	ND	ND	0.1	ND	0.1	20.4	0.2	ND	45.0	4.40	
PH107	4.30	ND	0.2	ND	0.2	20.3	0.4	ND	60.0	4.33	
PH108	ND	ND	0.5	ND	0.5	19.9	3.6	ND	120.0	4.35	
PH109	ND	ND	0.1	ND	0.1	20.3	0.6	ND	90.0	4.40	
PH110	ND	ND	0.6	ND	0.6	19.7	0.2	ND	45.0	3.95	
PH111	ND	ND	1.7	ND	1.7	**14.0**	-0.3	ND	90.0	4.20	
PH112	3.26	ND	0.8	ND	0.8	20.0	1.8	ND	120.0	4.26	
PH113	4.27	ND	0.3	ND	0.3	20.2	ND	ND	30.0	4.29	
PH114	1.66	ND	0.3	ND	0.3	20.3	ND	ND	30.0	4.38	

Equipment Used:

Gas Data GFM436 Infrared Gas Analyser
Geotechnical Instruments Dipmeter

Next Calibration Date

24/03/2024

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 (Stocksbridge Station)					
	Temp (°C):	4 to 6		Barometric Pressure Trend:			Falling		
Time:	08:45	09:40	10:30	00:00	06:45	08:45	09:45	10:30	12:31
Pressure (mb):	1008	1005	1004	1018	1017	1016	1016	1015	1013

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

Weather Conditions:	Heavy cloud, light rain, light winds, dry
Surface Ground Conditions:	Damp / boggy

Remarks:

Stocksbridge station located 10 miles south west from the site (Pit Lane, Wombwell).

Visit 9

Job Title:	Job No:
Pit Lane, Wombwell	4721
Client:	**Sheet :**
Crest Nicholson Yorkshire	4 of 6

Date:	Arrival Time:	Depart Time:	Operator:
20/03/2024	09:40	11:45	Erin Waddilove

Gas Monitoring Results:

Ambient Concentration (% Volume):	CH_4:	ND	CO_2:	ND	O_2:	20.8

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	Gas Flow Rates: Steady	Time to fall from highest to steady	Bottom of well	Remarks
	(m) bgl	% v/v	(%)	% v/v	(%)	(%)	litre/hr	litre/hr	secs	m	
PH101	ND	ND	ND	ND	ND	20.6	ND	ND	60.0	4.13	
PH102	2.59	ND	1.3	ND	1.3	18.2	ND	ND	60.0	4.10	
PH103	2.96	ND	1.0	ND	1.0	20.0	ND	ND	60.0	3.86	
PH104	1.90	ND	0.2	ND	0.2	20.6	0.1	ND	90.0	4.12	
PH105	3.57	ND	1.0	ND	1.0	19.9	1.9	ND	240.0	4.32	
PH106	ND	ND	ND	ND	ND	20.7	-5.0	ND	300.0	4.41	
PH107	4.05	ND	0.6	ND	0.6	20.4	ND	ND	60.0	4.37	
PH108	ND	ND	1.5	ND	1.5	17.8	ND	ND	60.0	4.36	
PH109	ND	ND	ND	ND	ND	20.7	-1.2	ND	180.0	4.41	
PH110	ND	ND	0.8	ND	0.8	20.2	ND	ND	60.0	3.97	
PH111	ND	ND	1.7	ND	1.7	**14.0**	ND	ND	60.0	4.21	
PH112	2.30	ND	1.0	ND	1.0	20.1	0.8	ND	120.0	4.23	
PH113	3.27	ND	ND	ND	ND	20.7	ND	ND	30.0	4.30	
PH114	0.28	NR	NR	NR	NR	NR	NR	NR	NR	4.37	Bailing attempted, couldn't reach response zone.

Equipment Used:	Next Calibration Date
Gas Data GFM436 Infrared Gas Analyser Geotechnical Instruments Dipmeter	24/03/2024

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 (Stocksbridge Station)					
	Temp (°C):	10		Barometric Pressure Trend:			Rising		
Time:	09:40	10:30	11:30	00:12	07:42	09:42	10:42	11:42	13:57
Pressure (mb):	1007	1005	1005	1015	1016	1016	1016	1017	1018

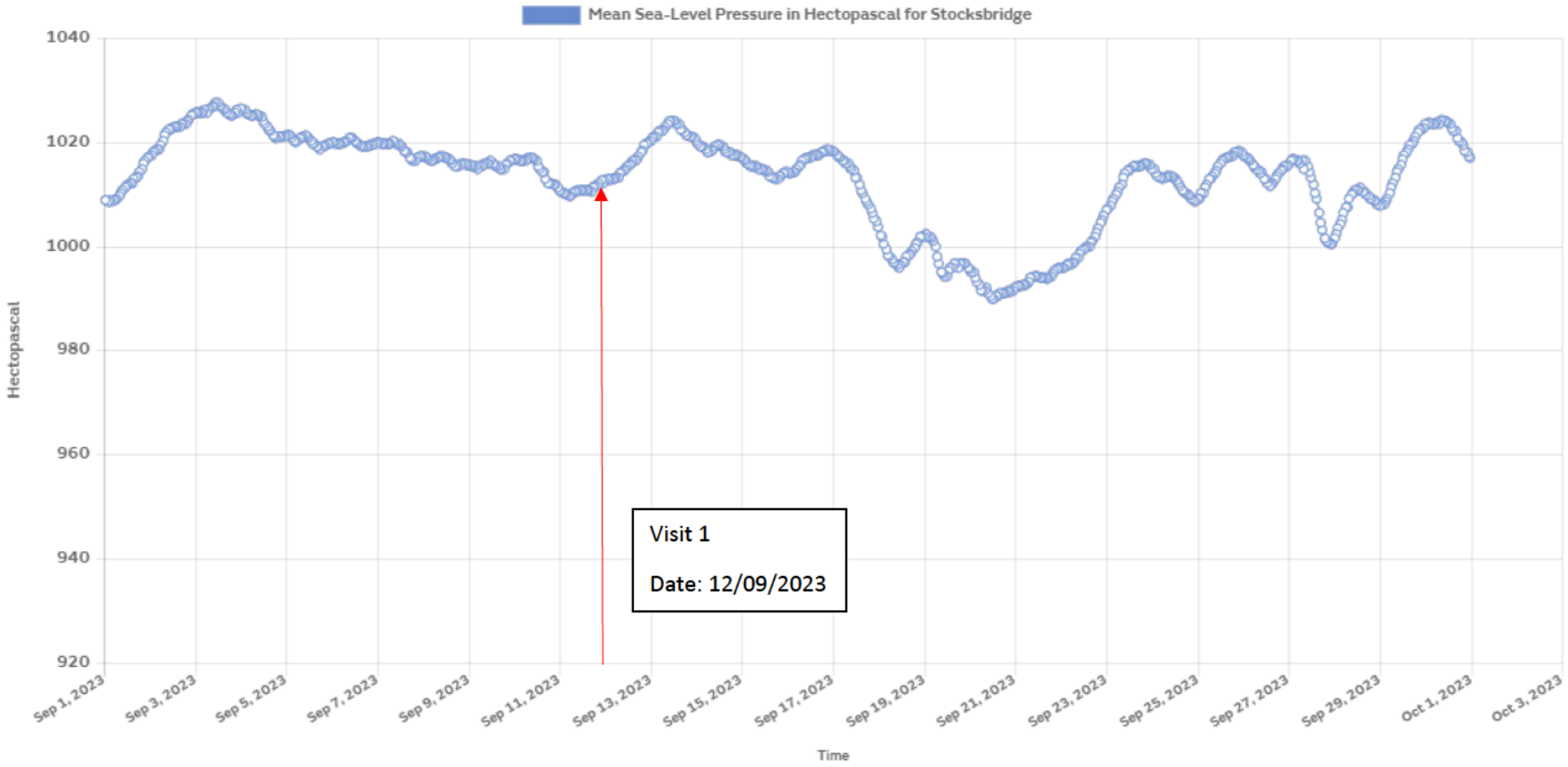
	CH_4	CO_2	O_2
Trigger level 1	1.0	5.0	16.0
Trigger level 2	5.0	10.0	10.0

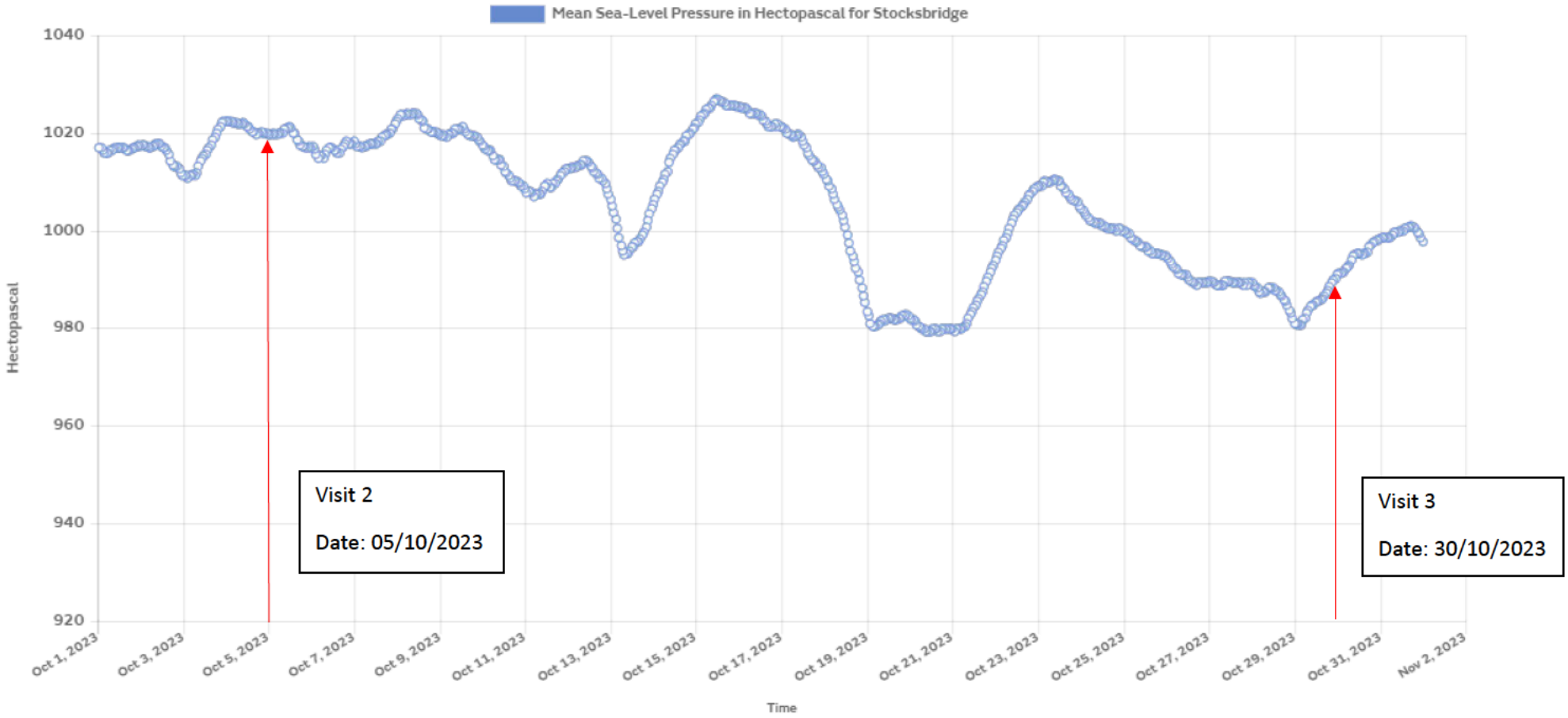
Weather Conditions:	Light rain, heavy cloud, mild
Surface Ground Conditions:	Boggy

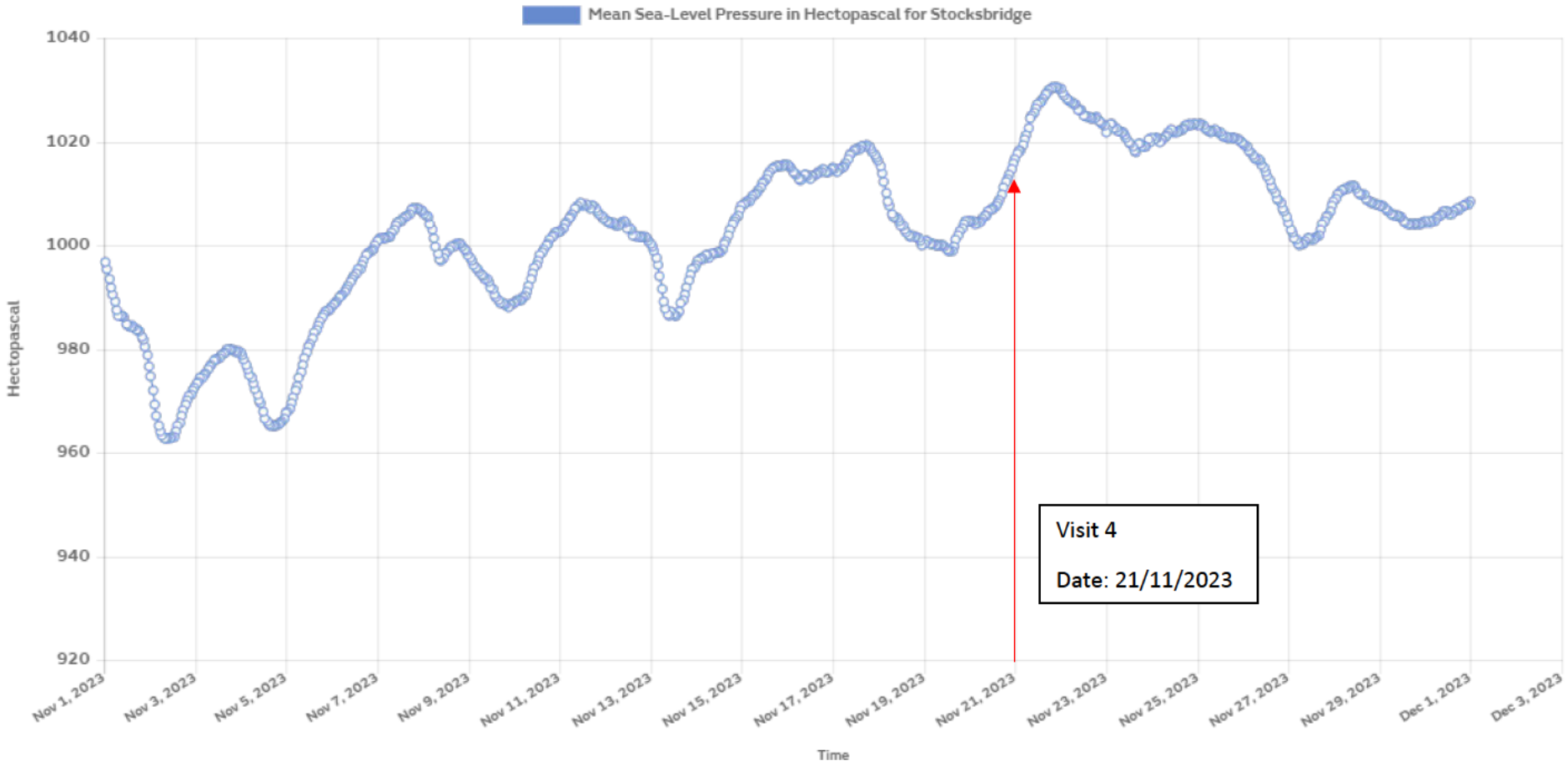
Remarks:	Hire monitor used so recalibration date incorrect.

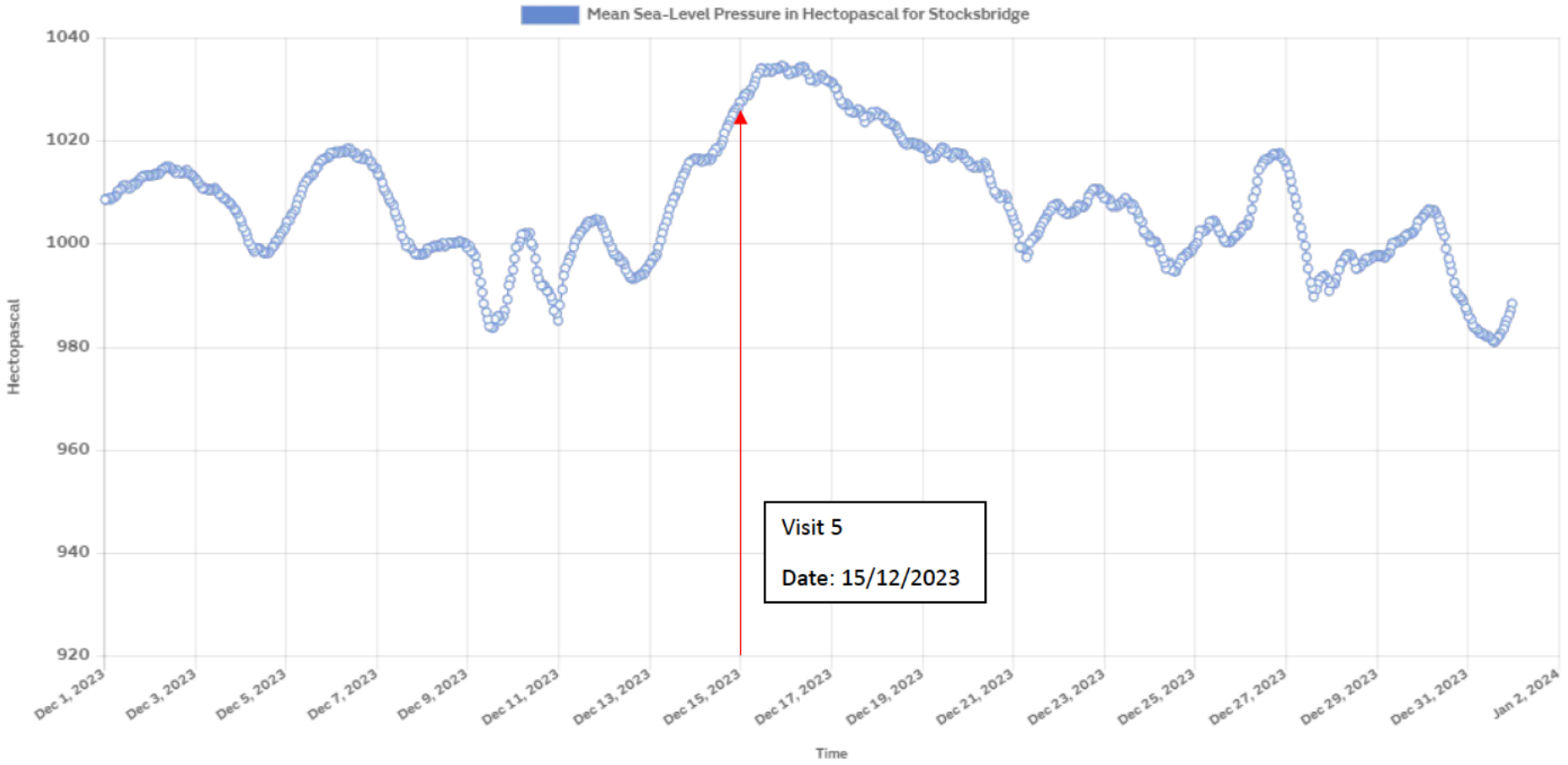
APPENDIX D

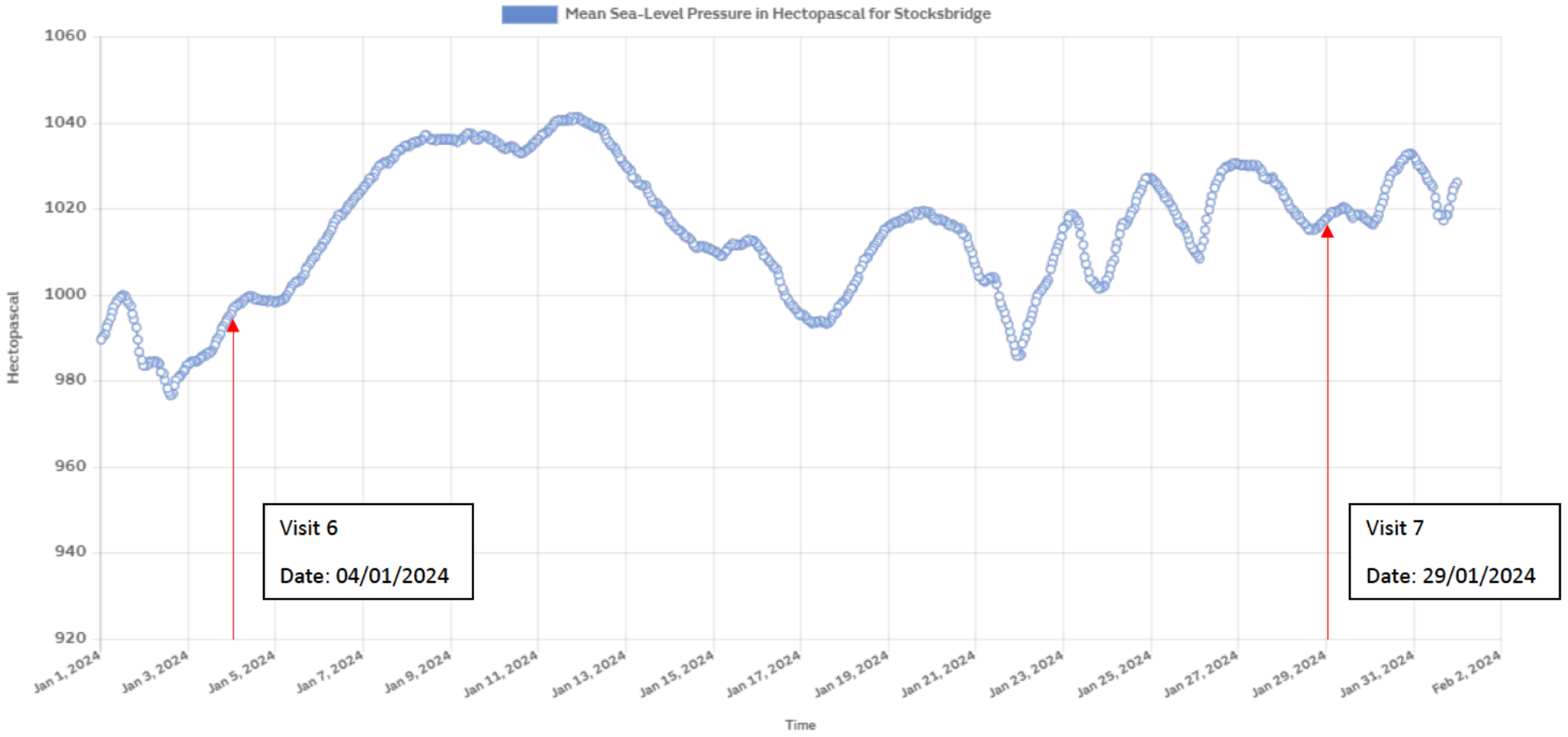
Atmospheric Pressure Graphs

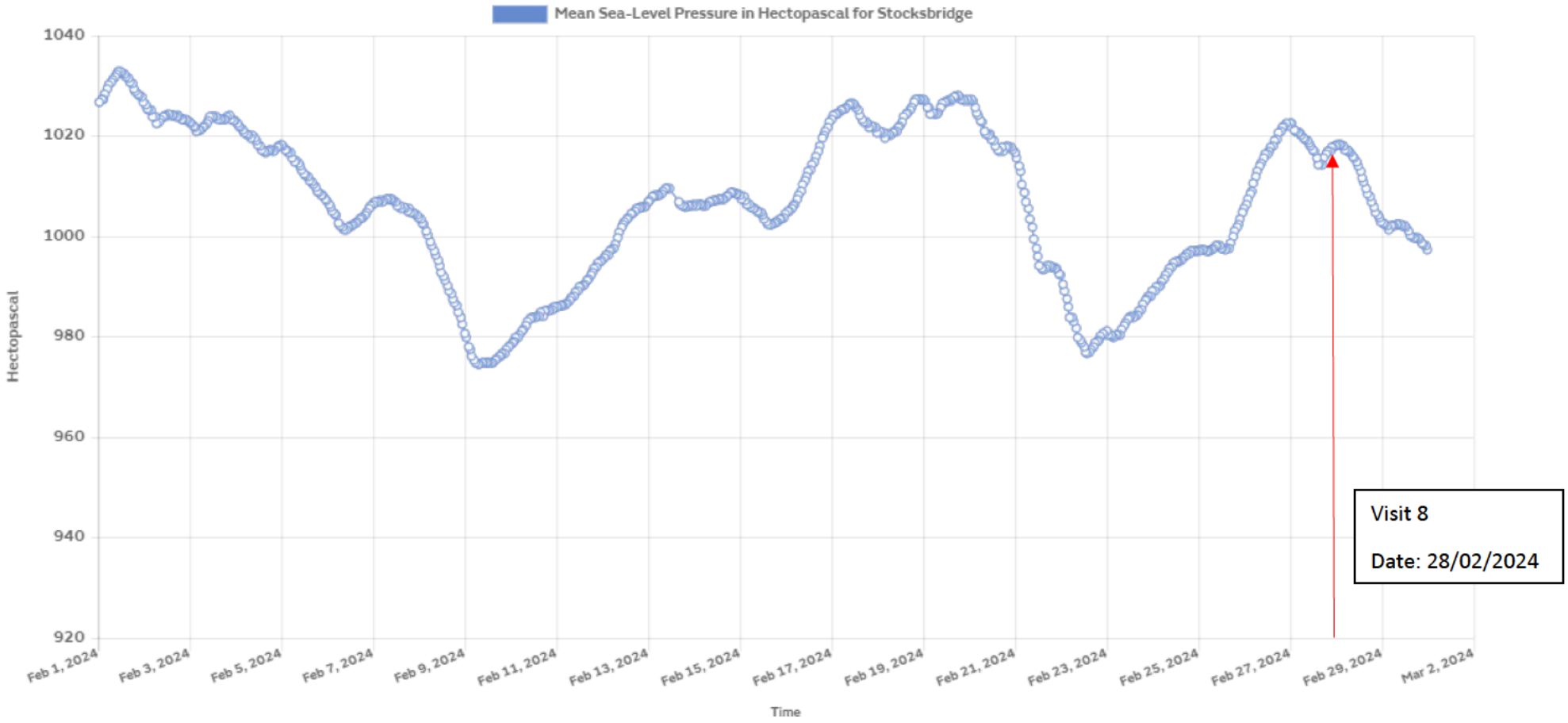

Mean Sea-Level Pressure in Hectopascal for Stocksbridge
1040
1020
1000
980
960
940
920
Hectopascal
Visit 1
Date: 12/09/2023
Sep 1, 2023
Sep 3, 2023
Sep 5, 2023
Sep 7, 2023
Sep 9, 2023
Sep 11, 2023
Sep 13, 2023
Sep 15, 2023
Sep 17, 2023
Sep 19, 2023
Sep 21, 2023
Sep 23, 2023
Sep 25, 2023
Sep 27, 2023
Sep 29, 2023
Oct 1, 2023
Oct 3, 2023
Time

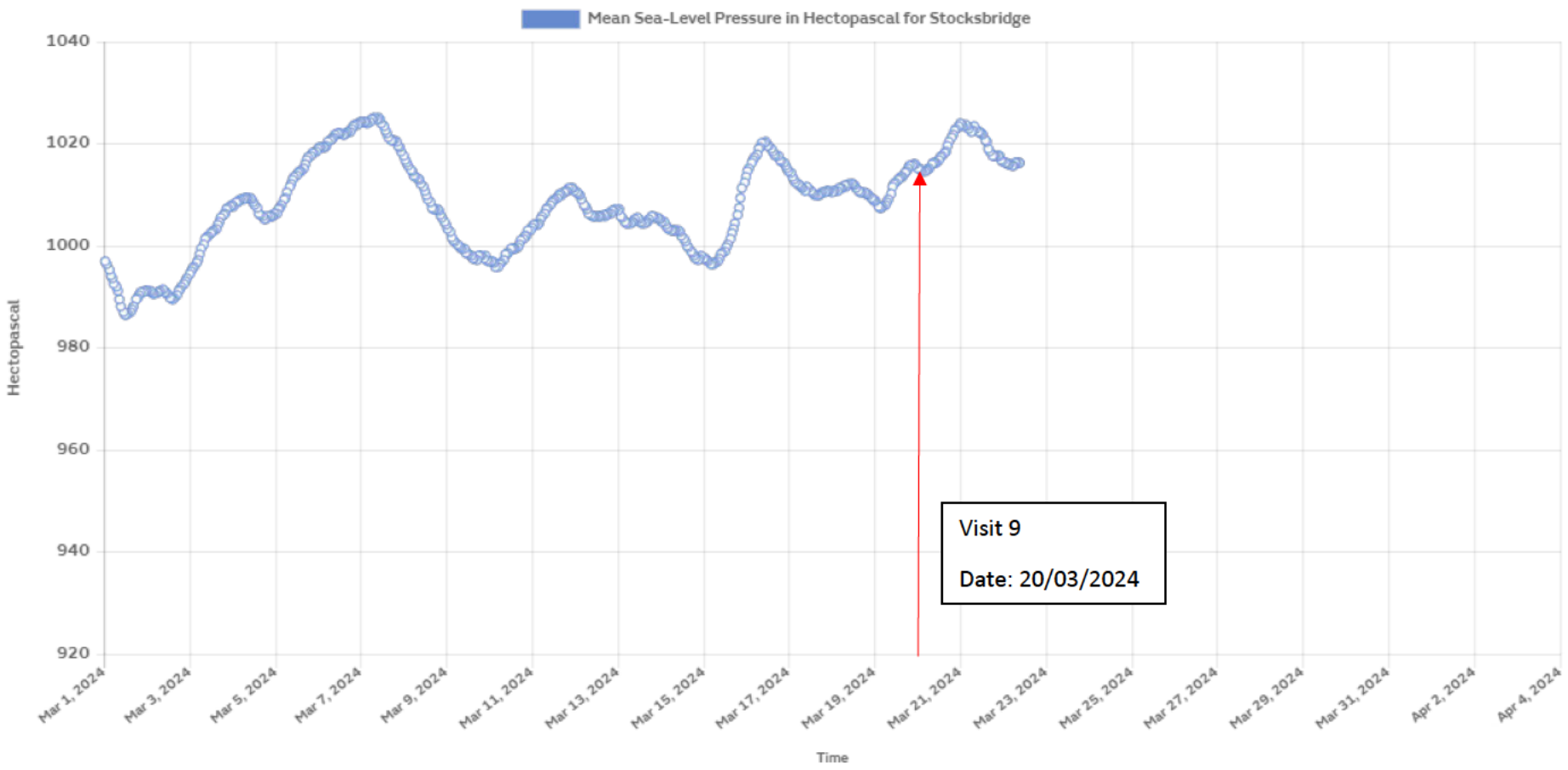

Mean Sea-Level Pressure in Hectopascal for Stocksbridge
1040
1020
1000
980
960
940
920
Hectopascal
Oct 1, 2023
Oct 3, 2023
Oct 5, 2023
Oct 7, 2023
Oct 9, 2023
Oct 11, 2023
Oct 13, 2023
Oct 15, 2023
Oct 17, 2023
Oct 19, 2023
Oct 21, 2023
Oct 23, 2023
Oct 25, 2023
Oct 27, 2023
Oct 29, 2023
Oct 31, 2023
Nov 2, 2023
Time
Visit 2
Date: 05/10/2023
Visit 3
Date: 30/10/2023


Mean Sea-Level Pressure in Hectopascal for Stocksbridge
1040
1020
1000
980
960
940
920
Hectopascal
Nov 1, 2023
Nov 3, 2023
Nov 5, 2023
Nov 7, 2023
Nov 9, 2023
Nov 11, 2023
Nov 13, 2023
Nov 15, 2023
Nov 17, 2023
Nov 19, 2023
Nov 21, 2023
Nov 23, 2023
Nov 25, 2023
Nov 27, 2023
Nov 29, 2023
Dec 1, 2023
Dec 3, 2023
Time
Visit 4
Date: 21/11/2023


Mean Sea-Level Pressure in Hectopascal for Stocksbridge
1040
1020
1000
980
960
940
920
Hectopascal
Visit 5
Date: 15/12/2023
Dec 1, 2023
Dec 3, 2023
Dec 5, 2023
Dec 7, 2023
Dec 9, 2023
Dec 11, 2023
Dec 13, 2023
Dec 15, 2023
Dec 17, 2023
Dec 19, 2023
Dec 21, 2023
Dec 23, 2023
Dec 25, 2023
Dec 27, 2023
Dec 29, 2023
Dec 31, 2023
Jan 2, 2024
Time


Mean Sea-Level Pressure in Hectopascal for Stocksbridge
Hectopascal
1060
1040
1020
1000
980
960
940
920
Jan 1, 2024
Jan 3, 2024
Jan 5, 2024
Jan 7, 2024
Jan 9, 2024
Jan 11, 2024
Jan 13, 2024
Jan 15, 2024
Jan 17, 2024
Jan 19, 2024
Jan 21, 2024
Jan 23, 2024
Jan 25, 2024
Jan 27, 2024
Jan 29, 2024
Jan 31, 2024
Feb 2, 2024
Time
Visit 6
Date: 04/01/2024
Visit 7
Date: 29/01/2024


Mean Sea-Level Pressure in Hectopascal for Stocksbridge
1040
1020
1000
980
960
940
920
Hectopascal
Feb 1, 2024
Feb 3, 2024
Feb 5, 2024
Feb 7, 2024
Feb 9, 2024
Feb 11, 2024
Feb 13, 2024
Feb 15, 2024
Feb 17, 2024
Feb 19, 2024
Feb 21, 2024
Feb 23, 2024
Feb 25, 2024
Feb 27, 2024
Feb 29, 2024
Mar 2, 2024
Time
Visit 8
Date: 28/02/2024


Mean Sea-Level Pressure in Hectopascal for Stocksbridge
1040
1020
1000
980
960
940
920
Hectopascal
Mar 1, 2024
Mar 3, 2024
Mar 5, 2024
Mar 7, 2024
Mar 9, 2024
Mar 11, 2024
Mar 13, 2024
Mar 15, 2024
Mar 17, 2024
Mar 19, 2024
Mar 21, 2024
Mar 23, 2024
Mar 25, 2024
Mar 27, 2024
Mar 29, 2024
Mar 31, 2024
Apr 2, 2024
Apr 4, 2024
Time
Visit 9
Date: 20/03/2024

APPENDIX E
Monitoring Well Installations

LITHOS CONSULTING

Borehole Log

Borehole No.
PH101
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438641.46 - 402796.25	Hole Type PH
Location:	Barnsley		Level:	73.11	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	26/07/2023 - 26/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					2.40	70.71		Grey MUDSTONE (COAL MEASURES)
					4.50	68.61		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

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Borehole Log

Borehole No.
PH102
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438742.73 - 402789.40	Hole Type PH
Location:	Barnsley		Level:	79.45	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	26/07/2023 - 26/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					2.60	76.85		Grey MUDSTONE (COAL MEASURES)
					4.50	74.95		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

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Borehole Log

Borehole No.
PH103
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438781.51 - 402890.56	Hole Type PH
Location:	Barnsley		Level:	82.10	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	27/07/2023 - 27/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					3.00	79.10		Dark grey MUDSTONE (COAL MEASURES)
					4.50	77.60		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

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Borehole Log

Borehole No.
PH104
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438730.05 - 402830.19	Hole Type PH
Location:	Barnsley		Level:	79.04	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	27/07/2023 - 27/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					1.80	77.24		Greyish brown MUDSTONE (COAL MEASURES)
								At 3.10m, Ground water encountered.
					4.50	74.54		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater encountered at 3.10m depth.
3. Exploratory hole surveyed in (level and co-ordinates) on completion.

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Borehole Log

Borehole No.
PH105
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438677.53 - 402710.99	Hole Type PH
Location:	Barnsley		Level:	73.65	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	27/07/2023 - 27/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					1.70	71.95		Dark brownish grey MUDSTONE (COAL MEASURES)
					4.50	69.15		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

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Borehole Log

Borehole No.
PH106
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438761.28 - 402734.64	Hole Type PH
Location:	Barnsley		Level:	80.77	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	27/07/2023 - 27/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					1.80	78.97		Grey MUDSTONE (COAL MEASURES)
					4.50	76.27		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

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Borehole Log

Borehole No.
PH107
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438824.92 - 402786.81	Hole Type PH
Location:	Barnsley		Level:	85.94	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	28/07/2023 - 28/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					1.90	84.04		Dark grey MUDSTONE (COAL MEASURES)
					4.50	81.44		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No.
PH108
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438837.50 - 402730.01	Hole Type PH
Location:	Barnsley		Level:	86.45	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	28/07/2023 - 28/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					2.00	84.45		Dark brownish grey MUDSTONE (COAL MEASURES)
					4.50	81.95		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No.
PH109
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438765.18 - 402655.62	Hole Type PH
Location:	Barnsley		Level:	79.86	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	28/07/2023 - 28/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					2.20	77.66		Dark brownish grey MUDSTONE (COAL MEASURES)
					9.00	70.86		End of borehole at 9.00 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

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Borehole Log

Borehole No.
PH110
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438735.41 - 402970.74	Hole Type PH
Location:	Barnsley		Level:	84.73	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	31/07/2023 - 31/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					2.50	82.23		
					2.80	81.93		Dark grey MUDSTONE (COAL MEASURES)
					2.90	81.83		
					3.20	81.53		Black Coal (THIN COAL)
					3.40	81.33		Dark grey MUDSTONE (COAL MEASURES)
					4.50	80.23		Black Coal (THIN COAL)
								Dark grey MUDSTONE (COAL MEASURES)
								End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

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Borehole Log

Borehole No.
PH111
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438663.60 - 402950.95	Hole Type PH
Location:	Barnsley		Level:	81.57	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	31/07/2023 - 31/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					1.50	80.07		Dark brownish grey MUDSTONE (COAL MEASURES)
					4.50	77.07		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

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Borehole Log

Borehole No.
PH112
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438691.01 - 402893.81	Hole Type PH
Location:	Barnsley		Level:	79.14	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	31/07/2023 - 31/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					1.90	77.24		Dark brownish grey MUDSTONE (COAL MEASURES)
					4.50	74.64		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No.
PH113
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438821.11 - 402850.57	Hole Type PH
Location:	Barnsley		Level:	85.55	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	26/07/2023 - 26/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					1.80	83.75		Black Coal (THIN COAL)
					2.10	83.45		Dark grey MUDSTONE (COAL MEASURES)
					4.50	81.05		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

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Borehole Log

Borehole No.
PH114
Sheet 1 of 1

Project Name:	Pit Lane, Wombwell	Project No. 4721	Co-ords:	438693.92 - 402658.65	Hole Type PH
Location:	Barnsley		Level:	73.95	Scale 1:100
Client:	Crest Nicholson Yorkshire		Dates:	27/07/2023 - 27/07/2023	Logged By DP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown OVERBURDEN (COHESIVE RESIDUAL SOIL)
					1.80	72.15		Dark brownish grey MUDSTONE (COAL MEASURES)
					4.50	69.45		End of borehole at 4.50 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS