



UNIVERSITY OF READING - HEALTH AND LIFE
SCIENCES BUILDING

SUPPLEMENTARY GROUND GAS RISK ASSESSMENT

Prepared for UNIVERSITY OF READING

Report Ref: 32362

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UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

SUPPLEMENTARY GROUND GAS RISK ASSESSMENT

Prepared for UNIVERSITY OF READING

Report Ref: 32362

PROJECT: Proposed development
PROJECT MANAGER: WSP / Parsons Brinckerhoff
CONSULTANT: AECOM

VOLUME - VERSION	STATUS	ORIGINATOR	CHECKER	APPROVED	DATE
1 of 1 – A	FINAL	JI	NP	NP	10/10/16
ORIGINATOR			APPROVER		
Jonathan Ind BSc (Hons) MSc FGS Geotechnical Consultant			N Parry BEng MSc CEng MICE MCIHT SiLC Director		

The report is not to be used for contractual or engineering purposes unless this sheet is signed and the report designated "Final".

The report has been prepared for the sole use and reliance by the University of Reading. GEL accepts no liability as a result of the use or reliance of this report by any other parties.



CONTENTS

REPORT	PAGE
1. INTRODUCTION	1
2. BACKGROUND SETTING	2
2.1 Site Location and Description	2
2.2 Radon	2
3. CONCEPTUAL SITE MODEL.....	3
4. GROUD GAS RISK ASSESSMENT	3
4.1 Basis of Assessment	3
4.2 Comparison of Results.....	4
4.3 Ground Gas Protection Measures.....	5
5. REFERENCES	7

FIGURES	Nos.
LOCATION PLAN	1
EXPLORATORY HOLE LOCATION PLAN	2

APPENDICES

APPENDIX A	GAS MONITORING RESULTS
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1. INTRODUCTION

It is proposed to replace the existing Engineering Building at the University of Reading with a new purpose-built facility. Geotechnical Engineering Limited (GEL) previously carried out a ground investigation to provide a geotechnical and geoenvironmental assessment to assist in the development of the site (GEL Report Ref: 31710 Rev B, dated 24th May 2016). As recommended in Report 31710, GEL was instructed by WSP/Parsons Brinckerhoff (acting on behalf of the University of Reading), to carry out further ground gas risk assessment and provide recommendations for precautionary measures, in accordance with CIRIA C665 (Wilson et al, 2007) and BS8485:2015. This report presents the results of additional gas monitoring and comments accordingly; it should be read in conjunction with Report 31710 (2016).

The scope of work and terms and conditions of appointment were defined in correspondence by GEL, reference T24652 dated 16th September 2016.

This report describes the investigation, presents the findings and comments accordingly.

The comments given in this report and the opinions expressed assume that ground conditions do not vary beyond the range revealed by this investigation. There may however, be conditions at or adjacent to the site, which have not been disclosed by the investigation and which, therefore, have not been considered in this report. Accordingly, a careful watch should be maintained during any future groundworks and the recommendations of this report reviewed as necessary.

The recommendations given in this report should not be used for any other schemes on or adjacent to this site without further reference to GEL.



2. BACKGROUND SETTING

The site setting is recorded in detail within the Report 31710 (GEL, 2016), with a summary of key information taken from this report presented below.

2.1 Site Location and Description

The site is situated at the University of Reading Whiteknights Campus and may be located by its National Grid co-ordinates SU 7352, 7151 or the post code RG6 6UR. A location plan is presented as Figure 1.

The existing Engineering Building was roughly T-shaped in plan, comprising a four-storey brick structure at the northern end with a single-storey element extending to the south. The ground level fell gradually from southwest to northeast, up to around 2.5m. The building was bound by a tarmacadam-surfaced car park to the east with the entrance at its southern end. The area to the north and south was mainly surfaced with grass with pedestrian pathways and a number of semi-mature/mature trees. A block-paved pathway was located west of the building. The building was bound by various buried services which are highlighted on Figure 2.

2.2 Radon

The Building Research Establishment (BRE) indicates that no radon protective measures are necessary for the area (BR 211, 2007). It is advised that the local Building Control body is contacted to determine their minimum requirements in respect of radon protection.



3. CONCEPTUAL SITE MODEL

Notwithstanding the limitations of the desk study carried out as part of Report 31710 (2016) (and recommendations for further assessment to suitably establish the environmental setting), a significant thickness of Made Ground was recorded within the vicinity of the existing Engineering Building, up to 1.90m thick. Despite the material not containing any obvious putrescible material, the Made Ground is considered to represent a potential source of ground gases.

4. GROUD GAS RISK ASSESSMENT

4.1 Basis of Assessment

Approved Document Part C2 of the Building Regulations (DoE) recommends a tiered risk assessment approach in respect of “methane and other gases” (used to define hazardous soil gases which originate either from waste deposited in landfill sites or are generated naturally). Approved Document C does not include radon (which is dealt with separately) but does include volatile organic compounds (VOC’s). The methodology for the semi-quantitative risk assessment is defined in BS 8485:2015, which provides a framework in line with CLR 11 (Environment Agency, 2004). For gases not covered by BS8485:2015, a risk assessment basis is considered appropriate with standards taken from occupational exposure limits or other accepted data. Reference should also be made to CIRIA Report C665 (Wilson et al, 2007).

For the determination of the acceptability of volatile vapours (VOCs) in soils, values derived from Soil Gas Acceptance Criteria for the Protection of Indoor Air Quality for a commercial end-use, documented in the New Zealand Guidelines (1999) shall be used. A “trigger” value



of 100ppm was used for the determination of acceptability of soils based on the New Zealand Guidelines.

4.2 Comparison of Results

In order to address the risk of hazardous ground gases to the proposed development, four observation wells were installed in the boreholes, referenced BH01 to BH04, as part of the previous investigation (GEL, 2016). An exploratory hole location plan is presented as Figure 2. The standpipes were monitored on four occasions following completion of the ground investigation in order to provide a comprehensive data set in accordance with CIRIA guidance. The results are included in Appendix A and summarised in Table 4.1 below.



Borehole	Response Zone/Strata (m bgl)	Evidence of Contamination	No. of Monitoring Visits	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Flow (l/hr)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)	Volatile Organic Compounds (ppm)	Water Level (m bgl)	Atmospheric Pressure (Mb)
BH01	1.00 – 6.20/ HD & BHG	No	4	0.0-0.1	1.4-4.1	9.9-20.5	0.0	0-14	0	0.0-1.8	3.50-4.34	1003-1019
BH02	1.00-4.30/ MG, HD & BHG	No	4	0.0	0.6-5.1	11.2-20.0	0.0	0-20	0	0.0-1.7	3.22-3.85	1003-1018
BH03	1.00 – 6.30/ HD & BHG	No	4	0.0-0.1	0.0-9.2	0.0-20.5	-0.2 - 0.0	0-1	0-2	0.0—6.7	3.25-3.79	1004-1020
BH04	1.00 – 6.20/ HD & BHG	No	4	0.0	1.1-4.6	12.7-20.4	0.0	0-14	0	0.0-1.7	3.83-4.3	1003-1014

Notes: MG – Made Ground; HD – Head deposits; BHG – Boyn Hill Gravel Member

Table 4.1: Summary of Gas Monitoring Data

4.3 Ground Gas Protection Measures

The risk posed by gassing sites can be determined from a semi-quantitative assessment of the risk, as proposed by Wilson and Card (1999), following development of the system as detailed in BS8485:2015. The method uses both gas concentrations and borehole flow rates to define a characteristic situation (CS) for a site based on the limiting borehole gas volume-flow or “Gas Screening Value” (GSV) for methane and carbon dioxide. The GSV (litres of gas per hour) can be calculated from the borehole flow rate (litres per hour) and gas



concentration (%). The calculation is carried out for both methane and carbon dioxide and the worst case GSV value is generally adopted for comparison with the Classification Situation.

The results in Table 4.1 indicate a maximum concentration of carbon dioxide (CO₂) at 9.2% and methane (CH₄) at 0.1%. Carbon monoxide and hydrogen sulphide was recorded at a maximum concentration of 20ppm and 2ppm respectively. Oxygen concentrations varied between 0.0% and 20.5%. No positive gas flow was detected during the four visits, with a maximum negative flow of -0.2l/hr.

In accordance with the guidance in BS8485:2015, the GSV would indicate a Characteristic Gas Situation 1 (CS1), with a very low hazard, however since that the maximum recorded concentration of carbon dioxide is nearly twice the maximum “five percent” threshold, it is recommended that ground gas precautionary measures be adopted in accordance with Characteristic Situation 2 (CS2).

Once the proposed scheme has been finalised, details of the protection measures should be designed in accordance with BS8485:2015.

A maximum soil vapour concentration (VOCs) of 6.7ppm was recorded using the PID during the monitoring visits. Based on these results, vapour protection measures are not considered necessary for the site.

The requirements for radon protection (if any) should be agreed with the Local Authority.

GEOTECHNICAL ENGINEERING LIMITED



5. REFERENCES

British Standards Institution (2015): Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. BS 8485.

Building Research Establishment (2007): Radon: guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment). BRE Report BR211.

Environment Agency (2004): Model Procedures for the Management of Land Contamination (CLR 11).

Geotechnical Engineering Ltd (2016): Interpretative Report on Ground investigation: University of Reading – Health and Life Sciences Building. Report No. 31710 Rev B, dated 24th May 2016.

New Zealand Ministry for the Environment (1999): Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. August 1999.

Wilson S and Card G (1999): Reliability and Risk in Gas Protection Design. Ground Engineering.

Wilson S, Oliver S, Mallett H, Hutchings H & Card G. (2007). Assessing risks posed by hazardous gases to buildings. CIRIA Report C665 (London)



Geotechnical Engineering Limited

LOCATION PLAN



CLIENT UNIVERSITY OF READING
SITE UNIVERSITY OF READING - HEALTH & LIFE SCIENCES BUILDING
SCALE Approximately 1:50,000

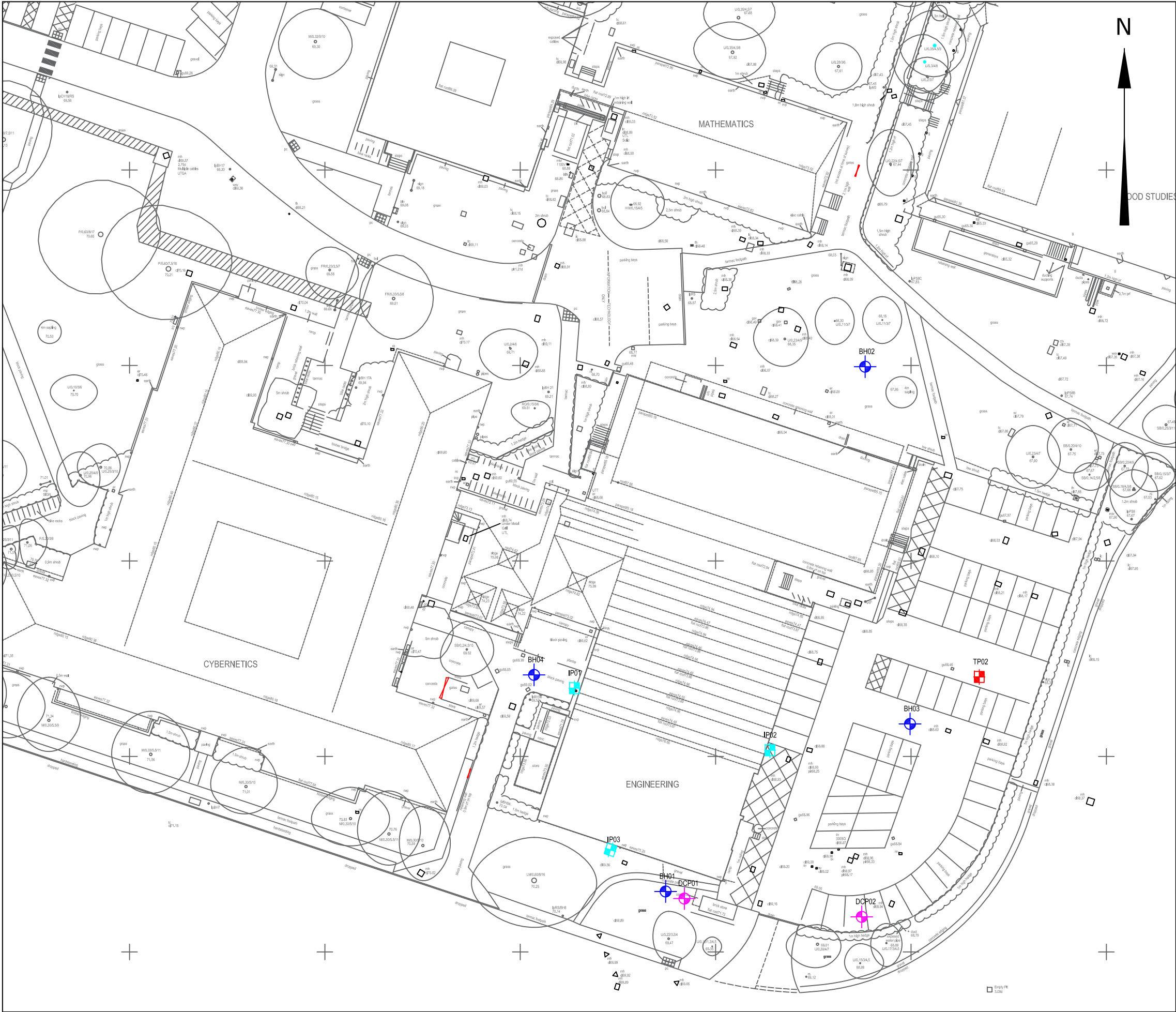
Reproduced from the 2012, 1:50,000 Ordnance Survey Map (Sheet 175 Reading & Windsor) with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationary Office, Crown Copyright. Geotechnical Engineering Limited, Gloucester. AL100002447.

CONTRACT

FIGURE

32362

1



Key.

Borehole Location

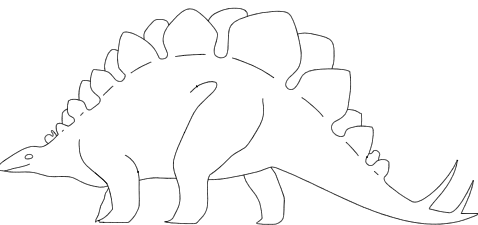
DCP Location

Trial Pit Location

Inspection Pit Location

Notes:

Drawing supplied by client.



geotechnical
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Client:

UNIVERSITY OF READING

Engineer:

AECOM

Site:

UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Title:

EXPLORATORY HOLE LOCATION PLAN

Drawn By:	GJS	Checked By:	JJ	Paper Size:	A3
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Scale:	1:500	Date:	October 2016
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Contract:	32362	Figure:	02
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APPENDIX A

GROUND GAS MONITORING RESULTS

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	15/04/16 12:00:00	1001										10		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH01	16/04/16 12:00:00	1005										5		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH01	17/04/16 12:00:00	1016										9		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH01	18/04/16 09:50:00	1017	-0.52								0.0	8		Weather Underground data (Farnborough): rising barometric pressure, partly cloudy.
BH01	18/04/16 09:51:00										0.0			
BH01	18/04/16 09:52:00										0.0			
BH01	18/04/16 09:53:00										0.0			
BH01	18/04/16 09:54:00										0.0			
BH01	18/04/16 09:55:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 09:56:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 09:57:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 09:58:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 09:59:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 10:00:00			3.4	0.0	13.0	0.0	0	0	1.7				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	18/04/16 10:01:00			3.3	0.0	13.0	0.0	0	0	1.7				
BH01	18/04/16 10:02:00			3.2	0.0	13.0	0.0	0	1	1.7				
BH01	18/04/16 10:03:00			3.1	0.0	13.0	0.0	0	1	1.6				
BH01	18/04/16 10:04:00			3.1	0.0	13.1	0.0	0	1	1.5				
BH01	18/04/16 10:05:00												3.91	
BH01	22/04/16 12:00:00	1021										10		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH01	23/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH01	24/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH01	25/04/16 10:00:00	1003	0.38								0.0	9		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH01	25/04/16 10:01:00										0.0			
BH01	25/04/16 10:02:00										0.0			
BH01	25/04/16 10:03:00										0.0			
BH01	25/04/16 10:04:00										0.0			
BH01	25/04/16 10:05:00			2.8	0.1	11.2	2.0	0	0	1.8				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	25/04/16 10:06:00			2.8	0.1	11.1	2.0	0	0	1.8				
BH01	25/04/16 10:07:00			2.9	0.1	11.0	2.0	0	0	1.8				
BH01	25/04/16 10:08:00			2.9	0.1	11.0	2.0	0	0	1.8				
BH01	25/04/16 10:09:00			3.2	0.1	10.7	2.0	0	0	1.8				
BH01	25/04/16 10:10:00			3.5	0.1	10.5	2.0	0	0	1.8				
BH01	25/04/16 10:11:00			3.7	0.1	10.3	2.0	0	0	1.8				
BH01	25/04/16 10:12:00			3.9	0.1	10.1	2.0	0	0	1.8				
BH01	25/04/16 10:13:00			4.0	0.1	10.0	2.0	0	0	1.8				
BH01	25/04/16 10:14:00			4.1	0.1	9.9	2.0	0	0	1.8				
BH01	25/04/16 10:15:00												3.50	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	15/04/16 12:00:00	1001										10		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH02	16/04/16 12:00:00	1005										5		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH02	17/04/16 12:00:00	1016										9		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH02	18/04/16 11:30:00	1010	-0.51								0.0	8		Weather Underground data (Farnborough): rising barometric pressure, partly cloudy.
BH02	18/04/16 11:31:00										0.0			
BH02	18/04/16 11:32:00										0.0			
BH02	18/04/16 11:33:00										0.0			
BH02	18/04/16 11:34:00										0.0			
BH02	18/04/16 11:35:00			4.3	0.0	11.9	0.0	0	1	1.4				
BH02	18/04/16 11:36:00			4.3	0.0	11.8	0.0	0	0	1.4				
BH02	18/04/16 11:37:00			4.6	0.0	11.6	0.0	0	0	1.3				
BH02	18/04/16 11:38:00			4.8	0.0	11.4	0.0	0	0	1.3				
BH02	18/04/16 11:39:00			5.0	0.0	11.3	0.0	0	0	0.2				
BH02	18/04/16 11:40:00			5.1	0.0	11.2	0.0	0	0	1.1				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	18/04/16 11:41:00			5.1	0.0	11.2	0.0	0	0	1.1				
BH02	18/04/16 11:42:00			5.1	0.0	11.2	0.0	0	0	1.1				
BH02	18/04/16 11:43:00			5.1	0.0	11.2	0.0	0	0	1.1				
BH02	18/04/16 11:44:00			5.0	0.0	11.3	0.0	0	0	1.1				
BH02	18/04/16 11:45:00												3.22	
BH02	22/04/16 12:00:00	1021										10		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH02	23/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH02	24/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH02	25/04/16 11:00:00	1003	0.33								0.0	9		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH02	25/04/16 11:01:00										0.0			
BH02	25/04/16 11:02:00										0.0			
BH02	25/04/16 11:03:00										0.0			
BH02	25/04/16 11:04:00										0.0			
BH02	25/04/16 11:05:00			2.2	0.0	17.7	0.0	0	0	0.6				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	25/04/16 11:06:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:07:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:08:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:09:00			2.2	0.0	17.8	0.0	0	0	0.6				
BH02	25/04/16 11:10:00			2.1	0.0	17.9	0.0	0	0	0.6				
BH02	25/04/16 11:11:00			2.1	0.0	17.8	0.0	0	0	0.6				
BH02	25/04/16 11:12:00			2.1	0.0	17.8	0.0	0	0	0.6				
BH02	25/04/16 11:13:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:14:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:15:00												3.82	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	15/04/16 12:00:00	1001										10		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH03	16/04/16 12:00:00	1005										5		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH03	17/04/16 12:00:00	1016										9		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH03	18/04/16 09:00:00	1019	-0.81								0.0	8		Weather Underground data (Farnborough): rising barometric pressure, partly cloudy.
BH03	18/04/16 09:01:00										0.0			
BH03	18/04/16 09:02:00										0.0			
BH03	18/04/16 09:03:00										0.0			
BH03	18/04/16 09:04:00										0.0			
BH03	18/04/16 09:05:00			0.2	0.0	19.8	0.0	0	0	0.9				
BH03	18/04/16 09:06:00			0.2	0.0	19.9	0.0	0	0	0.8				
BH03	18/04/16 09:07:00			0.3	0.0	19.7	0.0	0	0	0.8				
BH03	18/04/16 09:08:00			0.3	0.0	19.5	0.0	0	0	0.8				
BH03	18/04/16 09:09:00			0.4	0.0	19.2	1.0	0	0	0.8				
BH03	18/04/16 09:10:00			0.5	0.0	18.7	1.0	0	0	0.9				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	18/04/16 09:11:00			0.7	0.1	18.2	1.0	0	0	0.9				
BH03	18/04/16 09:12:00			0.9	0.1	17.9	1.0	0	1	0.9				
BH03	18/04/16 09:13:00			0.9	0.1	17.9	1.0	0	1	0.9				
BH03	18/04/16 09:14:00			0.9	0.1	18.0	1.0	0	1	0.9				
BH03	18/04/16 09:15:00												3.52	
BH03	22/04/16 12:00:00	1021										10		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH03	23/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH03	24/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH03	25/04/16 10:00:00	1004									0.0	9		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH03	25/04/16 10:01:00										0.0			
BH03	25/04/16 10:02:00										0.0			
BH03	25/04/16 10:03:00										0.0			
BH03	25/04/16 10:04:00										0.0			
BH03	25/04/16 10:05:00			3.4	0.0	16.1	0.0	0	0	0.8				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	25/04/16 10:06:00			3.8	0.1	15.6	1.0	0	0	0.8				
BH03	25/04/16 10:07:00			4.3	0.1	15.0	1.0	0	0	0.7				
BH03	25/04/16 10:08:00			5.0	0.1	14.2	1.0	0	0	0.6				
BH03	25/04/16 10:09:00			5.2	0.1	14.0	1.0	0	0	0.5				
BH03	25/04/16 10:10:00			5.0	0.1	14.3	1.0	0	0	0.5				
BH03	25/04/16 10:11:00			5.0	0.1	14.3	1.0	0	0	0.5				
BH03	25/04/16 10:12:00			4.7	0.1	14.6	1.0	0	0	0.5				
BH03	25/04/16 10:13:00			4.7	0.1	14.7	1.0	0	0	0.5				
BH03	25/04/16 10:14:00			4.7	0.1	14.8	1.0	0	0	0.5				
BH03	25/04/16 10:15:00												3.25	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH04	15/04/16 12:00:00	1001										10		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH04	16/04/16 12:00:00	1005										5		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH04	17/04/16 12:00:00	1016										9		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH04	18/04/16 10:20:00	1016	-0.29								0.0	8		Weather Underground data (Farnborough): rising barometric pressure, partly cloudy.
BH04	18/04/16 10:21:00										0.0			
BH04	18/04/16 10:22:00										0.0			
BH04	18/04/16 10:23:00										0.0			
BH04	18/04/16 10:24:00										0.0			
BH04	18/04/16 10:25:00			1.3	0.0	18.4	0.0	0	1	0.7				
BH04	18/04/16 10:26:00			1.3	0.0	18.5	0.0	0	0	0.7				
BH04	18/04/16 10:27:00			1.3	0.0	18.4	0.0	0	1	0.7				
BH04	18/04/16 10:28:00			1.1	0.0	18.7	0.0	0	0	0.6				
BH04	18/04/16 10:29:00			1.1	0.0	18.8	0.0	0	0	0.6				
BH04	18/04/16 10:30:00			1.3	0.0	18.6	0.0	0	0	0.6				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH04	18/04/16 10:31:00			1.4	0.0	18.4	0.0	0	0	0.6				
BH04	18/04/16 10:32:00			1.4	0.0	18.5	0.0	0	0	0.6				
BH04	18/04/16 10:33:00			1.6	0.0	18.2	0.0	0	0	0.6				
BH04	18/04/16 10:34:00			1.7	0.0	18.1	0.0	0	0	0.6				
BH04	18/04/16 10:35:00												3.83	
BH04	22/04/16 12:00:00	1021										10		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH04	23/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH04	24/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH04	25/04/16 10:40:00	1003	0.68								0.0	9		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH04	25/04/16 10:41:00										0.0			
BH04	25/04/16 10:42:00										0.0			
BH04	25/04/16 10:43:00										0.0			
BH04	25/04/16 10:44:00										0.0			
BH04	25/04/16 10:45:00			2.6	0.0	16.1	0.0	0	1	1.6				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH04	25/04/16 10:46:00			2.7	0.0	16.0	0.0	0	0	1.7				
BH04	25/04/16 10:47:00			2.7	0.0	15.9	0.0	0	0	1.7				
BH04	25/04/16 10:48:00			2.8	0.0	15.8	0.0	0	0	1.6				
BH04	25/04/16 10:49:00			2.9	0.0	15.7	0.0	0	0	1.6				
BH04	25/04/16 10:50:00			3.0	0.0	15.6	0.0	0	0	1.5				
BH04	25/04/16 10:51:00			3.0	0.0	15.5	0.0	0	0	1.4				
BH04	25/04/16 10:52:00			3.0	0.0	15.5	0.0	0	0	1.4				
BH04	25/04/16 10:53:00			3.0	0.0	15.6	0.0	0	0	1.4				
BH04	25/04/16 10:54:00			3.0	0.0	15.6	0.0	0	0	1.4				
BH04	25/04/16 10:55:00												3.91	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	20/09/16 12:00:00	1021										15		Weather Underground data (Farnborough): steady barometric pressure, overcast.
BH01	21/09/16 12:00:00	1018										19		Weather Underground data (Farnborough): steady barometric pressure, partly cloudy.
BH01	22/09/16 12:00:00	1019										17		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH01	23/09/16 12:02:00	1013	0									20		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH01	23/09/16 12:03:00										0.0			
BH01	23/09/16 12:04:00										0.0			
BH01	23/09/16 12:05:00										0.0			
BH01	23/09/16 12:06:00										0.0			
BH01	23/09/16 12:07:00										0.0			
BH01	23/09/16 12:08:00										0.0			
BH01	23/09/16 12:09:00										0.0			
BH01	23/09/16 12:10:00										0.0			
BH01	23/09/16 12:11:00										0.0			
BH01	23/09/16 12:12:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH01	23/09/16 12:13:00			1.4	0.0	19.6	0.0	0	0	0.6					
BH01	23/09/16 12:14:00			1.5	0.0	19.6	0.0	0	0	0.6					
BH01	23/09/16 12:15:00			1.5	0.0	19.7	0.0	0	10	0.6					
BH01	23/09/16 12:16:00			1.6	0.0	19.6	0.0	0	10	0.4					
BH01	23/09/16 12:17:00			1.6	0.0	19.6	0.0	0	10	0.2					
BH01	23/09/16 12:18:00			1.6	0.0	19.6	0.0	0	10	0.2					
BH01	23/09/16 12:19:00			1.6	0.0	19.6	0.0	0	11	0.2					
BH01	23/09/16 12:20:00			1.6	0.0	19.6	0.0	0	11	0.2					
BH01	23/09/16 12:21:00			1.6	0.0	19.6	0.0	0	14	0.2					
BH01	23/09/16 12:22:00			1.6	0.0	19.6	0.0	0	0	0.2					
BH01	23/09/16 12:23:00												4.34		
BH01	30/09/16 12:00:00	1013										17		Weather Underground data (Farnborough): falling barometric pressure, scattered clouds.	
BH01	01/10/16 12:00:00	1005										12		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.	
BH01	02/10/16 11:50:00	1017										13		Weather Underground data (Farnborough): rising barometric pressure, scattered clouds.	
BH01	03/10/16 11:00:00	1019	0								0.0	18		Weather Underground data (Farnborough): steady barometric	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362	CHECKED JI

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	03/10/16 11:01:00										0.0			pressure.
BH01	03/10/16 11:02:00										0.0			
BH01	03/10/16 11:03:00										0.0			
BH01	03/10/16 11:04:00										0.0			
BH01	03/10/16 11:05:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:06:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:07:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:08:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:09:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:15:00												4.34	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	20/09/16 12:00:00	1021										15		Weather Underground data (Farnborough): steady barometric pressure, overcast.
BH02	21/09/16 12:00:00	1018										19		Weather Underground data (Farnborough): steady barometric pressure, partly cloudy.
BH02	22/09/16 12:00:00	1019										17		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH02	23/09/16 10:52:00	1014	0									20		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH02	23/09/16 10:53:00										0.0			
BH02	23/09/16 10:54:00										0.0			
BH02	23/09/16 10:55:00										0.0			
BH02	23/09/16 10:56:00										0.0			
BH02	23/09/16 10:57:00										0.0			
BH02	23/09/16 10:58:00										0.0			
BH02	23/09/16 10:59:00										0.0			
BH02	23/09/16 11:00:00										0.0			
BH02	23/09/16 11:01:00										0.0			
BH02	23/09/16 11:02:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH02	23/09/16 11:03:00			4.4	0.0	15.6	0.0	0	0	1.7					
BH02	23/09/16 11:04:00			4.8	0.0	15.2	0.0	0	0	1.6					
BH02	23/09/16 11:05:00			5.0	0.0	15.1	0.0	0	0	1.2					
BH02	23/09/16 11:06:00			5.1	0.0	15.1	0.0	0	0	1.0					
BH02	23/09/16 11:07:00			5.1	0.0	15.1	0.0	0	0	0.9					
BH02	23/09/16 11:08:00			5.0	0.0	15.1	0.0	0	0	0.7					
BH02	23/09/16 11:09:00			5.0	0.0	15.1	0.0	0	0	0.6					
BH02	23/09/16 11:10:00			4.9	0.0	15.1	0.0	0	0	0.6					
BH02	23/09/16 11:11:00			5.0	0.0	15.4	0.0	0	0	0.5					
BH02	23/09/16 11:12:00			5.0	0.0	15.1	0.0	0	0	0.4					
BH02	23/09/16 11:13:00	1013										17	3.45	Weather Underground data (Farnborough): falling barometric pressure, scattered clouds.	
BH02	30/09/16 12:00:00														
BH02	01/10/16 12:00:00														
BH02	02/10/16 11:50:00														
BH02	03/10/16 11:40:00	1018	0								0.0	18	Weather Underground data (Farnborough): steady barometric		
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362	CHECKED JI

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	03/10/16 11:41:00										0.0			pressure.
BH02	03/10/16 11:42:00										0.0			
BH02	03/10/16 11:43:00										0.0			
BH02	03/10/16 11:44:00										0.0			
BH02	03/10/16 11:45:00			0.6	0.0	20.0	0.0	0	0	0.0				
BH02	03/10/16 11:46:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:47:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:48:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:49:00			0.7	0.0	20.0	0.0	0	0	0.0				
BH02	03/10/16 11:50:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:51:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:52:00			0.7	0.0	20.0	0.0	0	0	0.0				
BH02	03/10/16 11:53:00			0.7	0.0	19.8	0.0	0	10	0.0				
BH02	03/10/16 11:54:00			0.7	0.0	19.9	0.0	0	20	0.0				
BH02	03/10/16 11:55:00												3.44	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	20/09/16 12:00:00	1021										15		Weather Underground data (Farnborough): steady barometric pressure, overcast.
BH03	21/09/16 12:00:00	1018										19		Weather Underground data (Farnborough): steady barometric pressure, partly cloudy.
BH03	22/09/16 12:00:00	1019										17		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH03	23/09/16 10:14:00	1015	0									20		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH03	23/09/16 10:15:00										-0.2			
BH03	23/09/16 10:16:00										-0.1			
BH03	23/09/16 10:17:00										0.0			
BH03	23/09/16 10:18:00										0.0			
BH03	23/09/16 10:19:00										0.0			
BH03	23/09/16 10:20:00										0.0			
BH03	23/09/16 10:21:00										0.0			
BH03	23/09/16 10:22:00										0.0			
BH03	23/09/16 10:23:00										0.0			
BH03	23/09/16 10:24:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH03	23/09/16 10:25:00			8.0	0.0	0.0	2.6	0	0	4.2					
BH03	23/09/16 10:26:00			8.3	0.0	0.0	1.6	0	0	5.8					
BH03	23/09/16 10:27:00			8.6	0.0	0.0	0.9	0	0	6.3					
BH03	23/09/16 10:28:00			8.9	0.0	0.0	0.4	0	0	6.6					
BH03	23/09/16 10:29:00			9.0	0.0	0.0	0.4	1	0	6.7					
BH03	23/09/16 10:30:00			9.0	0.0	0.0	0.6	0	0	6.4					
BH03	23/09/16 10:31:00			9.1	0.0	0.0	0.2	0	0	6.6					
BH03	23/09/16 10:32:00			9.1	0.0	0.1	0.3	2	0	6.7					
BH03	23/09/16 10:33:00			9.2	0.0	0.0	0.3	0	0	6.7					
BH03	23/09/16 10:34:00			9.2	0.0	0.0	0.3	0	0	6.7					
BH03	23/09/16 10:35:00												3.77		
BH03	30/09/16 12:00:00	1013										17		Weather Underground data (Farnborough): falling barometric pressure, scattered clouds.	
BH03	01/10/16 12:00:00	1005										12		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.	
BH03	02/10/16 11:50:00	1017										13		Weather Underground data (Farnborough): rising barometric pressure, scattered clouds.	
BH03	03/10/16 10:45:00	1020	0								0.0	17		Weather Underground data (Farnborough): steady barometric	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362	CHECKED JI

GAS AND GROUNDWATER LEVELS

CLIENT: UNIVERSITY OF READING

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	03/10/16 10:46:00										0.0			pressure.
BH03	03/10/16 10:47:00										0.0			
BH03	03/10/16 10:48:00										0.0			
BH03	03/10/16 10:49:00										0.0			
BH03	03/10/16 10:50:00			0.2	0.0	20.4	0.0	0	0	0.0				
BH03	03/10/16 10:51:00			0.2	0.0	20.5	0.0	0	0	0.0				
BH03	03/10/16 10:52:00			0.1	0.0	20.4	0.0	0	0	0.0				
BH03	03/10/16 10:53:00			0.0	0.0	20.4	0.0	0	0	0.0				
BH03	03/10/16 10:54:00			0.0	0.0	20.4	0.0	0	0	0.0				
BH03	03/10/16 11:00:00												3.79	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: UNIVERSITY OF READING

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH04	20/09/16 12:00:00	1021										15		Weather Underground data (Farnborough): steady barometric pressure, overcast.
BH04	21/09/16 12:00:00	1018										19		Weather Underground data (Farnborough): steady barometric pressure, partly cloudy.
BH04	22/09/16 12:00:00	1019										17		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH04	23/09/16 11:25:00	1014	0									18		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH04	23/09/16 11:26:00										0.0			
BH04	23/09/16 11:27:00										0.0			
BH04	23/09/16 11:28:00										0.0			
BH04	23/09/16 11:29:00										0.0			
BH04	23/09/16 11:30:00										0.0			
BH04	23/09/16 11:31:00										0.0			
BH04	23/09/16 11:32:00										0.0			
BH04	23/09/16 11:33:00										0.0			
BH04	23/09/16 11:34:00										0.0			
BH04	23/09/16 11:35:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: UNIVERSITY OF READING

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH04	23/09/16 11:36:00			4.2	0.0	14.4	0.0	0	14	0.2					
BH04	23/09/16 11:37:00			4.3	0.0	13.3	0.0	0	0	0.5					
BH04	23/09/16 11:38:00			4.0	0.0	12.7	0.0	0	0	0.5					
BH04	23/09/16 11:39:00			4.5	0.0	13.0	0.0	0	0	0.4					
BH04	23/09/16 11:40:00			4.5	0.0	13.0	0.0	0	0	0.3					
BH04	23/09/16 11:41:00			4.6	0.0	13.0	0.0	0	0	0.4					
BH04	23/09/16 11:42:00			4.6	0.0	13.0	0.0	0	0	0.4					
BH04	23/09/16 11:43:00			4.6	0.0	13.0	0.0	0	0	0.4					
BH04	23/09/16 11:44:00			4.6	0.0	12.9	0.0	0	0	0.2					
BH04	23/09/16 11:45:00			4.6	0.0	12.8	0.0	0	0	0.2					
BH04	23/09/16 11:46:00												4.29		
BH04	30/09/16 12:00:00	1013										17		Weather Underground data (Farnborough): falling barometric pressure, scattered clouds.	
BH04	01/10/16 12:00:00	1005										12		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.	
BH04	02/10/16 11:50:00	1017										13		Weather Underground data (Farnborough): rising barometric pressure, scattered clouds.	
BH04	03/10/16 11:20:00	1013									0.0	14		Weather Underground data (Farnborough): steady barometric	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362	CHECKED JI



SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH04	03/10/16 11:21:00										0.0			pressure.	
BH04	03/10/16 11:22:00										0.0				
BH04	03/10/16 11:23:00										0.0				
BH04	03/10/16 11:24:00										0.0				
BH04	03/10/16 11:25:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:26:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:27:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:28:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:29:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:30:00											4.30			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362	CHECKED JI



UNIVERSITY OF READING - HEALTH AND LIFE
SCIENCES BUILDING

SUPPLEMENTARY GROUND GAS RISK ASSESSMENT

Prepared for UNIVERSITY OF READING

Report Ref: 32362

Geotechnical Engineering Ltd
Centurion House, Olympus Park
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UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

SUPPLEMENTARY GROUND GAS RISK ASSESSMENT

Prepared for UNIVERSITY OF READING

Report Ref: 32362

PROJECT: Proposed development

PROJECT MANAGER: WSP / Parsons Brinckerhoff

CONSULTANT: AECOM

VOLUME - VERSION	STATUS	ORIGINATOR	CHECKER	APPROVED	DATE
1 of 1 – A	FINAL	JI	NP	NP	10/10/16
ORIGINATOR			APPROVER		
Jonathan Ind BSc (Hons) MSc FGS Geotechnical Consultant			N Parry BEng MSc CEng MICE MCIHT SiLC Director		

The report is not to be used for contractual or engineering purposes unless this sheet is signed and the report designated "Final".

The report has been prepared for the sole use and reliance by the University of Reading. GEL accepts no liability as a result of the use or reliance of this report by any other parties.



CONTENTS

REPORT	PAGE
1. INTRODUCTION	1
2. BACKGROUND SETTING	2
2.1 Site Location and Description	2
2.2 Radon	2
3. CONCEPTUAL SITE MODEL.....	3
4. GROUD GAS RISK ASSESSMENT	3
4.1 Basis of Assessment	3
4.2 Comparison of Results.....	4
4.3 Ground Gas Protection Measures.....	5
5. REFERENCES	7

FIGURES	Nos.
LOCATION PLAN	1
EXPLORATORY HOLE LOCATION PLAN	2

APPENDICES

APPENDIX A	GAS MONITORING RESULTS
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1. INTRODUCTION

It is proposed to replace the existing Engineering Building at the University of Reading with a new purpose-built facility. Geotechnical Engineering Limited (GEL) previously carried out a ground investigation to provide a geotechnical and geoenvironmental assessment to assist in the development of the site (GEL Report Ref: 31710 Rev B, dated 24th May 2016). As recommended in Report 31710, GEL was instructed by WSP/Parsons Brinckerhoff (acting on behalf of the University of Reading), to carry out further ground gas risk assessment and provide recommendations for precautionary measures, in accordance with CIRIA C665 (Wilson et al, 2007) and BS8485:2015. This report presents the results of additional gas monitoring and comments accordingly; it should be read in conjunction with Report 31710 (2016).

The scope of work and terms and conditions of appointment were defined in correspondence by GEL, reference T24652 dated 16th September 2016.

This report describes the investigation, presents the findings and comments accordingly.

The comments given in this report and the opinions expressed assume that ground conditions do not vary beyond the range revealed by this investigation. There may however, be conditions at or adjacent to the site, which have not been disclosed by the investigation and which, therefore, have not been considered in this report. Accordingly, a careful watch should be maintained during any future groundworks and the recommendations of this report reviewed as necessary.

The recommendations given in this report should not be used for any other schemes on or adjacent to this site without further reference to GEL.



2. BACKGROUND SETTING

The site setting is recorded in detail within the Report 31710 (GEL, 2016), with a summary of key information taken from this report presented below.

2.1 Site Location and Description

The site is situated at the University of Reading Whiteknights Campus and may be located by its National Grid co-ordinates SU 7352, 7151 or the post code RG6 6UR. A location plan is presented as Figure 1.

The existing Engineering Building was roughly T-shaped in plan, comprising a four-storey brick structure at the northern end with a single-storey element extending to the south. The ground level fell gradually from southwest to northeast, up to around 2.5m. The building was bound by a tarmacadam-surfaced car park to the east with the entrance at its southern end. The area to the north and south was mainly surfaced with grass with pedestrian pathways and a number of semi-mature/mature trees. A block-paved pathway was located west of the building. The building was bound by various buried services which are highlighted on Figure 2.

2.2 Radon

The Building Research Establishment (BRE) indicates that no radon protective measures are necessary for the area (BR 211, 2007). It is advised that the local Building Control body is contacted to determine their minimum requirements in respect of radon protection.



3. CONCEPTUAL SITE MODEL

Notwithstanding the limitations of the desk study carried out as part of Report 31710 (2016) (and recommendations for further assessment to suitably establish the environmental setting), a significant thickness of Made Ground was recorded within the vicinity of the existing Engineering Building, up to 1.90m thick. Despite the material not containing any obvious putrescible material, the Made Ground is considered to represent a potential source of ground gases.

4. GROUD GAS RISK ASSESSMENT

4.1 Basis of Assessment

Approved Document Part C2 of the Building Regulations (DoE) recommends a tiered risk assessment approach in respect of “methane and other gases” (used to define hazardous soil gases which originate either from waste deposited in landfill sites or are generated naturally). Approved Document C does not include radon (which is dealt with separately) but does include volatile organic compounds (VOC’s). The methodology for the semi-quantitative risk assessment is defined in BS 8485:2015, which provides a framework in line with CLR 11 (Environment Agency, 2004). For gases not covered by BS8485:2015, a risk assessment basis is considered appropriate with standards taken from occupational exposure limits or other accepted data. Reference should also be made to CIRIA Report C665 (Wilson et al, 2007).

For the determination of the acceptability of volatile vapours (VOCs) in soils, values derived from Soil Gas Acceptance Criteria for the Protection of Indoor Air Quality for a commercial end-use, documented in the New Zealand Guidelines (1999) shall be used. A “trigger” value



of 100ppm was used for the determination of acceptability of soils based on the New Zealand Guidelines.

4.2 Comparison of Results

In order to address the risk of hazardous ground gases to the proposed development, four observation wells were installed in the boreholes, referenced BH01 to BH04, as part of the previous investigation (GEL, 2016). An exploratory hole location plan is presented as Figure 2. The standpipes were monitored on four occasions following completion of the ground investigation in order to provide a comprehensive data set in accordance with CIRIA guidance. The results are included in Appendix A and summarised in Table 4.1 below.



Borehole	Response Zone/Strata (m bgl)	Evidence of Contamination	No. of Monitoring Visits	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Flow (l/hr)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)	Volatile Organic Compounds (ppm)	Water Level (m bgl)	Atmospheric Pressure (Mb)
BH01	1.00 – 6.20/ HD & BHG	No	4	0.0-0.1	1.4-4.1	9.9-20.5	0.0	0-14	0	0.0-1.8	3.50-4.34	1003-1019
BH02	1.00-4.30/ MG, HD & BHG	No	4	0.0	0.6-5.1	11.2-20.0	0.0	0-20	0	0.0-1.7	3.22-3.85	1003-1018
BH03	1.00 – 6.30/ HD & BHG	No	4	0.0-0.1	0.0-9.2	0.0-20.5	-0.2 - 0.0	0-1	0-2	0.0—6.7	3.25-3.79	1004-1020
BH04	1.00 – 6.20/ HD & BHG	No	4	0.0	1.1-4.6	12.7-20.4	0.0	0-14	0	0.0-1.7	3.83-4.3	1003-1014

Notes: MG – Made Ground; HD – Head deposits; BHG – Boyn Hill Gravel Member

Table 4.1: Summary of Gas Monitoring Data

4.3 Ground Gas Protection Measures

The risk posed by gassing sites can be determined from a semi-quantitative assessment of the risk, as proposed by Wilson and Card (1999), following development of the system as detailed in BS8485:2015. The method uses both gas concentrations and borehole flow rates to define a characteristic situation (CS) for a site based on the limiting borehole gas volume-flow or “Gas Screening Value” (GSV) for methane and carbon dioxide. The GSV (litres of gas per hour) can be calculated from the borehole flow rate (litres per hour) and gas



concentration (%). The calculation is carried out for both methane and carbon dioxide and the worst case GSV value is generally adopted for comparison with the Classification Situation.

The results in Table 4.1 indicate a maximum concentration of carbon dioxide (CO₂) at 9.2% and methane (CH₄) at 0.1%. Carbon monoxide and hydrogen sulphide was recorded at a maximum concentration of 20ppm and 2ppm respectively. Oxygen concentrations varied between 0.0% and 20.5%. No positive gas flow was detected during the four visits, with a maximum negative flow of -0.2l/hr.

In accordance with the guidance in BS8485:2015, the GSV would indicate a Characteristic Gas Situation 1 (CS1), with a very low hazard, however since that the maximum recorded concentration of carbon dioxide is nearly twice the maximum “five percent” threshold, it is recommended that ground gas precautionary measures be adopted in accordance with Characteristic Situation 2 (CS2).

Once the proposed scheme has been finalised, details of the protection measures should be designed in accordance with BS8485:2015.

A maximum soil vapour concentration (VOCs) of 6.7ppm was recorded using the PID during the monitoring visits. Based on these results, vapour protection measures are not considered necessary for the site.

The requirements for radon protection (if any) should be agreed with the Local Authority.

GEOTECHNICAL ENGINEERING LIMITED



5. REFERENCES

British Standards Institution (2015): Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. BS 8485.

Building Research Establishment (2007): Radon: guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment). BRE Report BR211.

Environment Agency (2004): Model Procedures for the Management of Land Contamination (CLR 11).

Geotechnical Engineering Ltd (2016): Interpretative Report on Ground investigation: University of Reading – Health and Life Sciences Building. Report No. 31710 Rev B, dated 24th May 2016.

New Zealand Ministry for the Environment (1999): Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. August 1999.

Wilson S and Card G (1999): Reliability and Risk in Gas Protection Design. Ground Engineering.

Wilson S, Oliver S, Mallett H, Hutchings H & Card G. (2007). Assessing risks posed by hazardous gases to buildings. CIRIA Report C665 (London)



Geotechnical Engineering Limited

LOCATION PLAN



CLIENT UNIVERSITY OF READING
SITE UNIVERSITY OF READING - HEALTH & LIFE SCIENCES BUILDING
SCALE Approximately 1:50,000

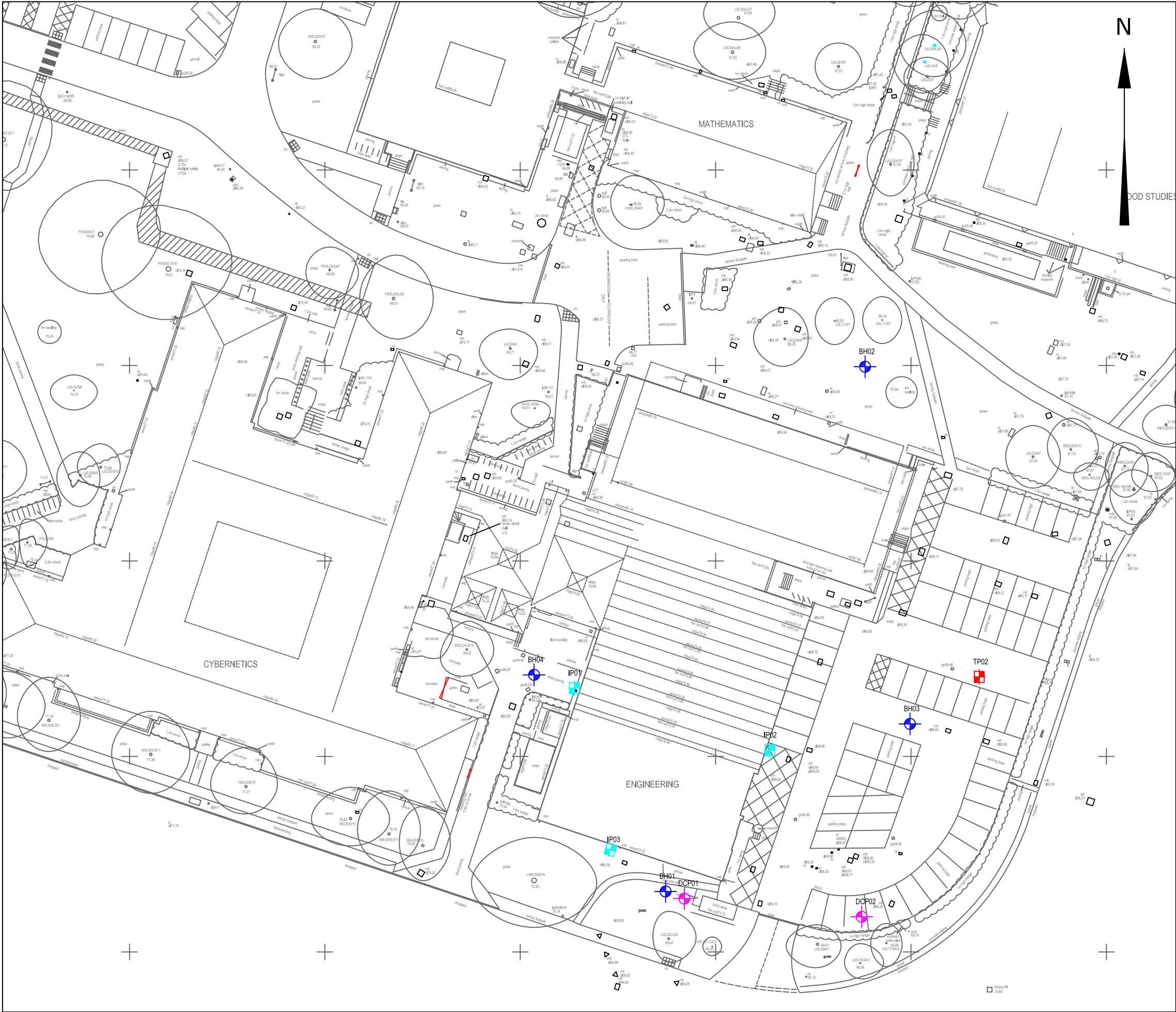
Reproduced from the 2012, 1:50,000 Ordnance Survey Map (Sheet 175 Reading & Windsor) with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationary Office, Crown Copyright. Geotechnical Engineering Limited, Gloucester. AL100002447.

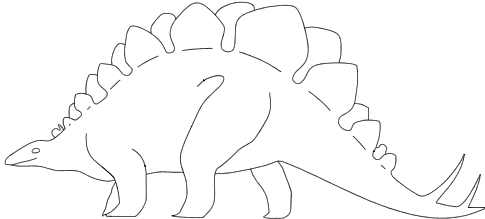
CONTRACT

FIGURE

32362

1



Key.				Borehole Location
				DCP Location
				Trial Pit Location
				Inspection Pit Location
Notes:			Drawing supplied by client.	
			 geotechnical Geotechnical Engineering Ltd Centurion House, Olympus Park, Quedgeley, Gloucester GL2 4NF Telephone: (01452) 527743 Facsimile: (01452) 729314 E-mail: geotech@geoeng.co.uk Web: www.geoeng.co.uk	
Client:			UNIVERSITY OF READING	
Engineer:			AECOM	
Site:			UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING	
Title:			EXPLORATORY HOLE LOCATION PLAN	
Drawn By:	GJS	Checked By:	JJ	Paper Size: A3
Scale:	1:500		Date: October 2016	
Contract:	32362		Figure: 02	



APPENDIX A

GROUND GAS MONITORING RESULTS

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	15/04/16 12:00:00	1001										10		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH01	16/04/16 12:00:00	1005										5		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH01	17/04/16 12:00:00	1016										9		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH01	18/04/16 09:50:00	1017	-0.52								0.0	8		Weather Underground data (Farnborough): rising barometric pressure, partly cloudy.
BH01	18/04/16 09:51:00										0.0			
BH01	18/04/16 09:52:00										0.0			
BH01	18/04/16 09:53:00										0.0			
BH01	18/04/16 09:54:00										0.0			
BH01	18/04/16 09:55:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 09:56:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 09:57:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 09:58:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 09:59:00			3.4	0.0	13.0	0.0	0	0	1.8				
BH01	18/04/16 10:00:00			3.4	0.0	13.0	0.0	0	0	1.7				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	18/04/16 10:01:00			3.3	0.0	13.0	0.0	0	0	1.7				
BH01	18/04/16 10:02:00			3.2	0.0	13.0	0.0	0	1	1.7				
BH01	18/04/16 10:03:00			3.1	0.0	13.0	0.0	0	1	1.6				
BH01	18/04/16 10:04:00			3.1	0.0	13.1	0.0	0	1	1.5				
BH01	18/04/16 10:05:00												3.91	
BH01	22/04/16 12:00:00	1021										10		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH01	23/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH01	24/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH01	25/04/16 10:00:00	1003	0.38								0.0	9		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH01	25/04/16 10:01:00										0.0			
BH01	25/04/16 10:02:00										0.0			
BH01	25/04/16 10:03:00										0.0			
BH01	25/04/16 10:04:00										0.0			
BH01	25/04/16 10:05:00			2.8	0.1	11.2	2.0	0	0	1.8				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	25/04/16 10:06:00			2.8	0.1	11.1	2.0	0	0	1.8				
BH01	25/04/16 10:07:00			2.9	0.1	11.0	2.0	0	0	1.8				
BH01	25/04/16 10:08:00			2.9	0.1	11.0	2.0	0	0	1.8				
BH01	25/04/16 10:09:00			3.2	0.1	10.7	2.0	0	0	1.8				
BH01	25/04/16 10:10:00			3.5	0.1	10.5	2.0	0	0	1.8				
BH01	25/04/16 10:11:00			3.7	0.1	10.3	2.0	0	0	1.8				
BH01	25/04/16 10:12:00			3.9	0.1	10.1	2.0	0	0	1.8				
BH01	25/04/16 10:13:00			4.0	0.1	10.0	2.0	0	0	1.8				
BH01	25/04/16 10:14:00			4.1	0.1	9.9	2.0	0	0	1.8				
BH01	25/04/16 10:15:00												3.50	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	15/04/16 12:00:00	1001										10		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH02	16/04/16 12:00:00	1005										5		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH02	17/04/16 12:00:00	1016										9		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH02	18/04/16 11:30:00	1010	-0.51								0.0	8		Weather Underground data (Farnborough): rising barometric pressure, partly cloudy.
BH02	18/04/16 11:31:00										0.0			
BH02	18/04/16 11:32:00										0.0			
BH02	18/04/16 11:33:00										0.0			
BH02	18/04/16 11:34:00										0.0			
BH02	18/04/16 11:35:00			4.3	0.0	11.9	0.0	0	1	1.4				
BH02	18/04/16 11:36:00			4.3	0.0	11.8	0.0	0	0	1.4				
BH02	18/04/16 11:37:00			4.6	0.0	11.6	0.0	0	0	1.3				
BH02	18/04/16 11:38:00			4.8	0.0	11.4	0.0	0	0	1.3				
BH02	18/04/16 11:39:00			5.0	0.0	11.3	0.0	0	0	0.2				
BH02	18/04/16 11:40:00			5.1	0.0	11.2	0.0	0	0	1.1				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

SITE: UNIVERSITY OF READING - HEALTH AND LIFE SCIENCES BUILDING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	18/04/16 11:41:00			5.1	0.0	11.2	0.0	0	0	1.1				
BH02	18/04/16 11:42:00			5.1	0.0	11.2	0.0	0	0	1.1				
BH02	18/04/16 11:43:00			5.1	0.0	11.2	0.0	0	0	1.1				
BH02	18/04/16 11:44:00			5.0	0.0	11.3	0.0	0	0	1.1				
BH02	18/04/16 11:45:00												3.22	
BH02	22/04/16 12:00:00	1021										10		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH02	23/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH02	24/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH02	25/04/16 11:00:00	1003	0.33								0.0	9		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH02	25/04/16 11:01:00										0.0			
BH02	25/04/16 11:02:00										0.0			
BH02	25/04/16 11:03:00										0.0			
BH02	25/04/16 11:04:00										0.0			
BH02	25/04/16 11:05:00			2.2	0.0	17.7	0.0	0	0	0.6				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	25/04/16 11:06:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:07:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:08:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:09:00			2.2	0.0	17.8	0.0	0	0	0.6				
BH02	25/04/16 11:10:00			2.1	0.0	17.9	0.0	0	0	0.6				
BH02	25/04/16 11:11:00			2.1	0.0	17.8	0.0	0	0	0.6				
BH02	25/04/16 11:12:00			2.1	0.0	17.8	0.0	0	0	0.6				
BH02	25/04/16 11:13:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:14:00			2.2	0.0	17.7	0.0	0	0	0.6				
BH02	25/04/16 11:15:00												3.82	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	15/04/16 12:00:00	1001										10		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH03	16/04/16 12:00:00	1005										5		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH03	17/04/16 12:00:00	1016										9		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH03	18/04/16 09:00:00	1019	-0.81								0.0	8		Weather Underground data (Farnborough): rising barometric pressure, partly cloudy.
BH03	18/04/16 09:01:00										0.0			
BH03	18/04/16 09:02:00										0.0			
BH03	18/04/16 09:03:00										0.0			
BH03	18/04/16 09:04:00										0.0			
BH03	18/04/16 09:05:00			0.2	0.0	19.8	0.0	0	0	0.9				
BH03	18/04/16 09:06:00			0.2	0.0	19.9	0.0	0	0	0.8				
BH03	18/04/16 09:07:00			0.3	0.0	19.7	0.0	0	0	0.8				
BH03	18/04/16 09:08:00			0.3	0.0	19.5	0.0	0	0	0.8				
BH03	18/04/16 09:09:00			0.4	0.0	19.2	1.0	0	0	0.8				
BH03	18/04/16 09:10:00			0.5	0.0	18.7	1.0	0	0	0.9				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	18/04/16 09:11:00			0.7	0.1	18.2	1.0	0	0	0.9				
BH03	18/04/16 09:12:00			0.9	0.1	17.9	1.0	0	1	0.9				
BH03	18/04/16 09:13:00			0.9	0.1	17.9	1.0	0	1	0.9				
BH03	18/04/16 09:14:00			0.9	0.1	18.0	1.0	0	1	0.9				
BH03	18/04/16 09:15:00												3.52	
BH03	22/04/16 12:00:00	1021										10		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH03	23/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH03	24/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH03	25/04/16 10:00:00	1004									0.0	9		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH03	25/04/16 10:01:00										0.0			
BH03	25/04/16 10:02:00										0.0			
BH03	25/04/16 10:03:00										0.0			
BH03	25/04/16 10:04:00										0.0			
BH03	25/04/16 10:05:00			3.4	0.0	16.1	0.0	0	0	0.8				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	25/04/16 10:06:00			3.8	0.1	15.6	1.0	0	0	0.8				
BH03	25/04/16 10:07:00			4.3	0.1	15.0	1.0	0	0	0.7				
BH03	25/04/16 10:08:00			5.0	0.1	14.2	1.0	0	0	0.6				
BH03	25/04/16 10:09:00			5.2	0.1	14.0	1.0	0	0	0.5				
BH03	25/04/16 10:10:00			5.0	0.1	14.3	1.0	0	0	0.5				
BH03	25/04/16 10:11:00			5.0	0.1	14.3	1.0	0	0	0.5				
BH03	25/04/16 10:12:00			4.7	0.1	14.6	1.0	0	0	0.5				
BH03	25/04/16 10:13:00			4.7	0.1	14.7	1.0	0	0	0.5				
BH03	25/04/16 10:14:00			4.7	0.1	14.8	1.0	0	0	0.5				
BH03	25/04/16 10:15:00												3.25	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH04	15/04/16 12:00:00	1001										10		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH04	16/04/16 12:00:00	1005										5		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH04	17/04/16 12:00:00	1016										9		Weather Underground data (Farnborough): rising barometric pressure, mostly cloudy.
BH04	18/04/16 10:20:00	1016	-0.29								0.0	8		Weather Underground data (Farnborough): rising barometric pressure, partly cloudy.
BH04	18/04/16 10:21:00										0.0			
BH04	18/04/16 10:22:00										0.0			
BH04	18/04/16 10:23:00										0.0			
BH04	18/04/16 10:24:00										0.0			
BH04	18/04/16 10:25:00			1.3	0.0	18.4	0.0	0	1	0.7				
BH04	18/04/16 10:26:00			1.3	0.0	18.5	0.0	0	0	0.7				
BH04	18/04/16 10:27:00			1.3	0.0	18.4	0.0	0	1	0.7				
BH04	18/04/16 10:28:00			1.1	0.0	18.7	0.0	0	0	0.6				
BH04	18/04/16 10:29:00			1.1	0.0	18.8	0.0	0	0	0.6				
BH04	18/04/16 10:30:00			1.3	0.0	18.6	0.0	0	0	0.6				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH04	18/04/16 10:31:00			1.4	0.0	18.4	0.0	0	0	0.6				
BH04	18/04/16 10:32:00			1.4	0.0	18.5	0.0	0	0	0.6				
BH04	18/04/16 10:33:00			1.6	0.0	18.2	0.0	0	0	0.6				
BH04	18/04/16 10:34:00			1.7	0.0	18.1	0.0	0	0	0.6				
BH04	18/04/16 10:35:00												3.83	
BH04	22/04/16 12:00:00	1021										10		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH04	23/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH04	24/04/16 12:00:00	1021										8		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH04	25/04/16 10:40:00	1003	0.68								0.0	9		Weather Underground data (Farnborough): falling barometric pressure, partly cloudy.
BH04	25/04/16 10:41:00										0.0			
BH04	25/04/16 10:42:00										0.0			
BH04	25/04/16 10:43:00										0.0			
BH04	25/04/16 10:44:00										0.0			
BH04	25/04/16 10:45:00			2.6	0.0	16.1	0.0	0	1	1.6				
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

CLIENT: KNOWLES & SON (OXFORD) LIMITED

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH04	25/04/16 10:46:00			2.7	0.0	16.0	0.0	0	0	1.7				
BH04	25/04/16 10:47:00			2.7	0.0	15.9	0.0	0	0	1.7				
BH04	25/04/16 10:48:00			2.8	0.0	15.8	0.0	0	0	1.6				
BH04	25/04/16 10:49:00			2.9	0.0	15.7	0.0	0	0	1.6				
BH04	25/04/16 10:50:00			3.0	0.0	15.6	0.0	0	0	1.5				
BH04	25/04/16 10:51:00			3.0	0.0	15.5	0.0	0	0	1.4				
BH04	25/04/16 10:52:00			3.0	0.0	15.5	0.0	0	0	1.4				
BH04	25/04/16 10:53:00			3.0	0.0	15.6	0.0	0	0	1.4				
BH04	25/04/16 10:54:00			3.0	0.0	15.6	0.0	0	0	1.4				
BH04	25/04/16 10:55:00												3.91	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 31710	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	20/09/16 12:00:00	1021										15		Weather Underground data (Farnborough): steady barometric pressure, overcast.
BH01	21/09/16 12:00:00	1018										19		Weather Underground data (Farnborough): steady barometric pressure, partly cloudy.
BH01	22/09/16 12:00:00	1019										17		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH01	23/09/16 12:02:00	1013	0									20		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH01	23/09/16 12:03:00										0.0			
BH01	23/09/16 12:04:00										0.0			
BH01	23/09/16 12:05:00										0.0			
BH01	23/09/16 12:06:00										0.0			
BH01	23/09/16 12:07:00										0.0			
BH01	23/09/16 12:08:00										0.0			
BH01	23/09/16 12:09:00										0.0			
BH01	23/09/16 12:10:00										0.0			
BH01	23/09/16 12:11:00										0.0			
BH01	23/09/16 12:12:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH01	23/09/16 12:13:00			1.4	0.0	19.6	0.0	0	0	0.6					
BH01	23/09/16 12:14:00			1.5	0.0	19.6	0.0	0	0	0.6					
BH01	23/09/16 12:15:00			1.5	0.0	19.7	0.0	0	10	0.6					
BH01	23/09/16 12:16:00			1.6	0.0	19.6	0.0	0	10	0.4					
BH01	23/09/16 12:17:00			1.6	0.0	19.6	0.0	0	10	0.2					
BH01	23/09/16 12:18:00			1.6	0.0	19.6	0.0	0	10	0.2					
BH01	23/09/16 12:19:00			1.6	0.0	19.6	0.0	0	11	0.2					
BH01	23/09/16 12:20:00			1.6	0.0	19.6	0.0	0	11	0.2					
BH01	23/09/16 12:21:00			1.6	0.0	19.6	0.0	0	14	0.2					
BH01	23/09/16 12:22:00			1.6	0.0	19.6	0.0	0	0	0.2					
BH01	23/09/16 12:23:00												4.34		
BH01	30/09/16 12:00:00	1013										17		Weather Underground data (Farnborough): falling barometric pressure, scattered clouds.	
BH01	01/10/16 12:00:00	1005										12		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.	
BH01	02/10/16 11:50:00	1017										13		Weather Underground data (Farnborough): rising barometric pressure, scattered clouds.	
BH01	03/10/16 11:00:00	1019	0								0.0	18		Weather Underground data (Farnborough): steady barometric	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362	CHECKED JI

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH01	03/10/16 11:01:00										0.0			pressure.
BH01	03/10/16 11:02:00										0.0			
BH01	03/10/16 11:03:00										0.0			
BH01	03/10/16 11:04:00										0.0			
BH01	03/10/16 11:05:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:06:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:07:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:08:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:09:00			0.0	0.0	20.5	0.0	0	0	0.0				
BH01	03/10/16 11:15:00												4.34	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	20/09/16 12:00:00	1021										15		Weather Underground data (Farnborough): steady barometric pressure, overcast.
BH02	21/09/16 12:00:00	1018										19		Weather Underground data (Farnborough): steady barometric pressure, partly cloudy.
BH02	22/09/16 12:00:00	1019										17		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH02	23/09/16 10:52:00	1014	0									20		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH02	23/09/16 10:53:00										0.0			
BH02	23/09/16 10:54:00										0.0			
BH02	23/09/16 10:55:00										0.0			
BH02	23/09/16 10:56:00										0.0			
BH02	23/09/16 10:57:00										0.0			
BH02	23/09/16 10:58:00										0.0			
BH02	23/09/16 10:59:00										0.0			
BH02	23/09/16 11:00:00										0.0			
BH02	23/09/16 11:01:00										0.0			
BH02	23/09/16 11:02:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH02	23/09/16 11:03:00			4.4	0.0	15.6	0.0	0	0	1.7					
BH02	23/09/16 11:04:00			4.8	0.0	15.2	0.0	0	0	1.6					
BH02	23/09/16 11:05:00			5.0	0.0	15.1	0.0	0	0	1.2					
BH02	23/09/16 11:06:00			5.1	0.0	15.1	0.0	0	0	1.0					
BH02	23/09/16 11:07:00			5.1	0.0	15.1	0.0	0	0	0.9					
BH02	23/09/16 11:08:00			5.0	0.0	15.1	0.0	0	0	0.7					
BH02	23/09/16 11:09:00			5.0	0.0	15.1	0.0	0	0	0.6					
BH02	23/09/16 11:10:00			4.9	0.0	15.1	0.0	0	0	0.6					
BH02	23/09/16 11:11:00			5.0	0.0	15.4	0.0	0	0	0.5					
BH02	23/09/16 11:12:00			5.0	0.0	15.1	0.0	0	0	0.4					
BH02	23/09/16 11:13:00	1013										17	3.45	Weather Underground data (Farnborough): falling barometric pressure, scattered clouds.	
BH02	30/09/16 12:00:00														
BH02	01/10/16 12:00:00														
BH02	02/10/16 11:50:00														
BH02	03/10/16 11:40:00	1018	0								0.0	18		Weather Underground data (Farnborough): steady barometric	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362	CHECKED JI

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH02	03/10/16 11:41:00										0.0			pressure.
BH02	03/10/16 11:42:00										0.0			
BH02	03/10/16 11:43:00										0.0			
BH02	03/10/16 11:44:00										0.0			
BH02	03/10/16 11:45:00			0.6	0.0	20.0	0.0	0	0	0.0				
BH02	03/10/16 11:46:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:47:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:48:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:49:00			0.7	0.0	20.0	0.0	0	0	0.0				
BH02	03/10/16 11:50:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:51:00			0.7	0.0	19.9	0.0	0	0	0.0				
BH02	03/10/16 11:52:00			0.7	0.0	20.0	0.0	0	0	0.0				
BH02	03/10/16 11:53:00			0.7	0.0	19.8	0.0	0	10	0.0				
BH02	03/10/16 11:54:00			0.7	0.0	19.9	0.0	0	20	0.0				
BH02	03/10/16 11:55:00												3.44	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	20/09/16 12:00:00	1021										15		Weather Underground data (Farnborough): steady barometric pressure, overcast.
BH03	21/09/16 12:00:00	1018										19		Weather Underground data (Farnborough): steady barometric pressure, partly cloudy.
BH03	22/09/16 12:00:00	1019										17		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH03	23/09/16 10:14:00	1015	0									20		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH03	23/09/16 10:15:00										-0.2			
BH03	23/09/16 10:16:00										-0.1			
BH03	23/09/16 10:17:00										0.0			
BH03	23/09/16 10:18:00										0.0			
BH03	23/09/16 10:19:00										0.0			
BH03	23/09/16 10:20:00										0.0			
BH03	23/09/16 10:21:00										0.0			
BH03	23/09/16 10:22:00										0.0			
BH03	23/09/16 10:23:00										0.0			
BH03	23/09/16 10:24:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH03	23/09/16 10:25:00			8.0	0.0	0.0	2.6	0	0	4.2					
BH03	23/09/16 10:26:00			8.3	0.0	0.0	1.6	0	0	5.8					
BH03	23/09/16 10:27:00			8.6	0.0	0.0	0.9	0	0	6.3					
BH03	23/09/16 10:28:00			8.9	0.0	0.0	0.4	0	0	6.6					
BH03	23/09/16 10:29:00			9.0	0.0	0.0	0.4	1	0	6.7					
BH03	23/09/16 10:30:00			9.0	0.0	0.0	0.6	0	0	6.4					
BH03	23/09/16 10:31:00			9.1	0.0	0.0	0.2	0	0	6.6					
BH03	23/09/16 10:32:00			9.1	0.0	0.1	0.3	2	0	6.7					
BH03	23/09/16 10:33:00			9.2	0.0	0.0	0.3	0	0	6.7					
BH03	23/09/16 10:34:00			9.2	0.0	0.0	0.3	0	0	6.7					
BH03	23/09/16 10:35:00												3.77		
BH03	30/09/16 12:00:00	1013										17		Weather Underground data (Farnborough): falling barometric pressure, scattered clouds.	
BH03	01/10/16 12:00:00	1005										12		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.	
BH03	02/10/16 11:50:00	1017										13		Weather Underground data (Farnborough): rising barometric pressure, scattered clouds.	
BH03	03/10/16 10:45:00	1020	0								0.0	17		Weather Underground data (Farnborough): steady barometric	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362	CHECKED JI

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH03	03/10/16 10:46:00										0.0			pressure.
BH03	03/10/16 10:47:00										0.0			
BH03	03/10/16 10:48:00										0.0			
BH03	03/10/16 10:49:00										0.0			
BH03	03/10/16 10:50:00			0.2	0.0	20.4	0.0	0	0	0.0				
BH03	03/10/16 10:51:00			0.2	0.0	20.5	0.0	0	0	0.0				
BH03	03/10/16 10:52:00			0.1	0.0	20.4	0.0	0	0	0.0				
BH03	03/10/16 10:53:00			0.0	0.0	20.4	0.0	0	0	0.0				
BH03	03/10/16 10:54:00			0.0	0.0	20.4	0.0	0	0	0.0				
BH03	03/10/16 11:00:00												3.79	
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (litr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH04	20/09/16 12:00:00	1021										15		Weather Underground data (Farnborough): steady barometric pressure, overcast.
BH04	21/09/16 12:00:00	1018										19		Weather Underground data (Farnborough): steady barometric pressure, partly cloudy.
BH04	22/09/16 12:00:00	1019										17		Weather Underground data (Farnborough): steady barometric pressure, mostly cloudy.
BH04	23/09/16 11:25:00	1014	0									18		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.
BH04	23/09/16 11:26:00										0.0			
BH04	23/09/16 11:27:00										0.0			
BH04	23/09/16 11:28:00										0.0			
BH04	23/09/16 11:29:00										0.0			
BH04	23/09/16 11:30:00										0.0			
BH04	23/09/16 11:31:00										0.0			
BH04	23/09/16 11:32:00										0.0			
BH04	23/09/16 11:33:00										0.0			
BH04	23/09/16 11:34:00										0.0			
BH04	23/09/16 11:35:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.													CONTRACT 32362	CHECKED Jl

GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks		
BH04	23/09/16 11:36:00			4.2	0.0	14.4	0.0	0	14	0.2						
BH04	23/09/16 11:37:00			4.3	0.0	13.3	0.0	0	0	0.5						
BH04	23/09/16 11:38:00			4.0	0.0	12.7	0.0	0	0	0.5						
BH04	23/09/16 11:39:00			4.5	0.0	13.0	0.0	0	0	0.4						
BH04	23/09/16 11:40:00			4.5	0.0	13.0	0.0	0	0	0.3						
BH04	23/09/16 11:41:00			4.6	0.0	13.0	0.0	0	0	0.4						
BH04	23/09/16 11:42:00			4.6	0.0	13.0	0.0	0	0	0.4						
BH04	23/09/16 11:43:00			4.6	0.0	13.0	0.0	0	0	0.4						
BH04	23/09/16 11:44:00			4.6	0.0	12.9	0.0	0	0	0.2						
BH04	23/09/16 11:45:00			4.6	0.0	12.8	0.0	0	0	0.2						
BH04	23/09/16 11:46:00												4.29			
BH04	30/09/16 12:00:00	1013										17		Weather Underground data (Farnborough): falling barometric pressure, scattered clouds.		
BH04	01/10/16 12:00:00	1005										12		Weather Underground data (Farnborough): falling barometric pressure, mostly cloudy.		
BH04	02/10/16 11:50:00	1017										13		Weather Underground data (Farnborough): rising barometric pressure, scattered clouds.		
BH04	03/10/16 11:20:00	1013									0.0	14		Weather Underground data (Farnborough): steady barometric		
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362		CHECKED JI



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Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH04	03/10/16 11:21:00										0.0			pressure.	
BH04	03/10/16 11:22:00										0.0				
BH04	03/10/16 11:23:00										0.0				
BH04	03/10/16 11:24:00										0.0				
BH04	03/10/16 11:25:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:26:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:27:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:28:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:29:00			0.0	0.0	20.4	0.0	0	0	0.0					
BH04	03/10/16 11:30:00											4.30			
remarks # denotes result exceeding capacity of gas monitoring equipment VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.														CONTRACT 32362	CHECKED JI