

Pearson Crescent, Wombwell
Ground Gas/Water Monitoring Report
Bernard Williams Associates

Report Number S120313/GAS

June 2012

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Revision	Date	Prepared	Checked
Final	June 2012	S J Fisk	A Cutts

Pearson Crescent, Wombwell

Ground Gas/Water Monitoring Report

1 INTRODUCTION AND SCOPE OF WORKS

At the request of Bernard Williams Associates a ground investigation involving chemical and geotechnical testing was carried out on a parcel of land at Pearson Crescent, Wombwell.

Scope of Works

The investigation was commissioned to determine the ground conditions for a new residential housing development.

The information provided in this Ground Gas Assessment is based on the investigation fieldwork, and is subject to the comments and approval of the various Regulatory Authorities.

The site investigation report (S120313 April 2012) and desk study report (S120125 February 2012) have previously been compiled for the site and should be read in conjunction with this report. Gas monitoring pipes were installed into three boreholes (BHs 1, 3 and 6) and ground gas/groundwater monitoring was carried out on three occasions between April and June 2012.

There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report. Solmek reserve the right to alter conclusions and recommendations should further information be available or provided. Any schematic representation or opinion of the possible configuration of ground conditions between exploratory boreholes is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

2 GROUND GAS ASSESSMENT

Ground gases such as carbon dioxide and methane can be classed as a form of contamination where there is a potential risk to human health. As a result, gas monitoring has been undertaken. Three visits have been carried out between April and June 2012 to confirm the potential risks posed by ground gases.

The ground gas was monitored by measuring emissions from monitoring points installed into BH's 1, 3 and 6 during the fieldwork. The results are tabulated in Appendix A. The monitoring was generally carried out in accordance with current guidance provided within CIRIA C665:2007.

The atmospheric pressure has an impact on the concentrations of gas released. The atmospheric pressure was between 990 and 1001 millibars during the surveys. Falling and rising atmospheric pressure regional trends were noted during the surveys. This is considered to be a good range of conditions for the time of year.

Carbon dioxide was recorded at concentrations of between 0.30 and 1.30% volume, and oxygen levels were recorded between 18.2 and 19.9%. Methane was not detected. No significant flow rates were noted within any of the boreholes during the visits.

The results obtained have been compared with relevant guidance that includes the following:

- BRE/Environment Agency BR414 (2001) - Protective Measures for housing on gas-contaminated land
- Wilson & Card (1999) - Reliability and Risk in Gas Protection Design
- CIRIA 149 (1995) - Protecting Development from Methane
- CIRIA C665 (2007) – Assessing risks posed by hazardous ground gases to buildings.

The Building Regulations set action levels for both methane and carbon dioxide from which an initial assessment can be made. The action threshold for methane is 1% while for carbon dioxide an initial consideration should be undertaken if gas concentrations exceed 1.5%. Action might be required if carbon dioxide concentrations exceed 5%. If these thresholds are exceeded, reference should be made to specific documentation to determine the nature and extent of the gas control measures required.

The proposed development involves the construction of residential units, the NHBC Traffic light system, shown in Table 1 has therefore been used to assess the gas regime.

Traffic light classification	Methane		Carbon dioxide	
	Typical max concentration (% v/v)	Gas screening value (litres/hr)	Typical max concentration (% v/v)	Gas screening value (litres/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				
TABLE 1: NHBC TRAFFIC LIGHT SYSTEM (FROM CIRIA C665)				

Using Gas Screening Values (GSV) stated above, the site would be classified as **Green**. Table 2 shows the necessary protective measures.

Traffic light classification	Protection measures required
Green	Gas protection measures not considered necessary.
Amber 1	Gas resistant membrane & ventilated sub-floor void to create permeability contrast to limit the ingress of gas into buildings. Gas protection measures should be as per BRE Report 414.
Amber 2	As Amber 1 but membrane should be installed by a specialist contractor; certification of correct installation is also required. Installation & certification 'package' is the ideal way to do this.
Red	Standard residential housing would be unacceptable without further risk assessment.
TABLE 2: NHBC PROTECTION MEASURES	

No radon protection measures are required in accordance with the procedure described in BRE Publication BR211 *Radon: Guidance on Protective Measures for New Dwellings*.

3 GROUNDWATER ASSESSMENT

Groundwater was not encountered during the progression of the boreholes or trial pits or within the standpipe positions during the monitoring phase. Given the information it is unlikely that groundwater will be encountered within shallow excavations. However, should excavations be left open for extended periods or during inclement weather, then provision for dewatering may be required. It should be noted that groundwater levels can fluctuate with seasonal and climatic variations as well as in proximity to local dewatering and abstraction schemes.

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APPENDIX A:



GAS MONITORING RESULTS

SITE	Pearson Crescent, Wombwell
JOB REF	S120313
CLIENT	Bernard William Associates
DATE	10/04/2011
TIME	11:00
VISIT NO	1 of 3
EQUIPMENT USED	GA2000 & GA5.3 Flow Pod
LAST CALIBRATED	September 2011
OPERATOR	S. J. Fisk

Weather Conditions: Cool, bright with slight breeze

Ground Conditions: Damp

Ambient Atmospheric Pressure: 997mb

Regional Trend: Rising

Position	Flow (l/hr)	Atmospheric Pressure (mB)	CH ₄		CO ₂		O ₂ (%v/v)	CO (ppm)	H ₂ S (ppm)	Water Level (mbgl)	Depth to Base (mbgl)	Notes
			(%v/v)	GSV (l/hr)	(%v/v)	GSV (l/hr)						
Ambient	-	997	0.0	N/A	0.1	N/A	19.9	0	0	N/A	N/A	-
BH1	ND	997	0.0	0.0	1.1	0.0011	18.2	0	0	Dry	1.14	-
BH3	ND	997	0.0	0.0	0.3	0.0003	19.5	0	0	Dry	2.93	-
BH6	ND	997	0.0	0.0	0.4	0.0004	19.5	0	0	Dry	2.02	-

KEY

CH₄ = Methane, CO₂ = Carbon Dioxide, O₂ = Oxygen, CO = Carbon Monoxide, H₂S = Hydrogen Sulphide, GSV = Gas Screening Value (If no flow is recorded a value of 0.1 is assumed), ND = Not Detected, * = not measured, N/A = Not applicable, % = By volume, mbgl = m below ground level, ppm = parts per million



GAS MONITORING RESULTS

SITE	Pearson Crescent, Wombwell
JOB REF	S120313
CLIENT	Bernard William Associates
DATE	25/04/2011
TIME	09:00
VISIT NO	2 of 3
EQUIPMENT USED	GA2000 & GA5.3 Flow Pod
LAST CALIBRATED	September 2011
OPERATOR	S. J. Fisk

Weather Conditions: Overcast with showers
Ground Conditions: Wet
Ambient Atmospheric Pressure: 990mb
Regional Trend: Falling

Position	Flow (l/hr)	Atmospheric Pressure (mB)	CH ₄		CO ₂		O ₂ (%v/v)	CO (ppm)	H ₂ S (ppm)	Water Level (mbgl)	Depth to Base (mbgl)	Notes
			(%v/v)	GSV (l/hr)	(%v/v)	GSV (l/hr)						
Ambient	-	990	0.0	N/A	0.1	N/A	20.1	0	0	N/A	N/A	-
BH1	ND	990	0.0	0.0	1.3	0.0013	18.5	0	0	Dry	1.14	-
BH3	ND	990	0.0	0.0	0.4	0.0004	19.7	0	0	Dry	2.93	-
BH6	ND	990	0.0	0.0	0.5	0.0005	19.5	0	0	Dry	2.02	-

KEY

CH₄ = Methane, **CO₂** = Carbon Dioxide, **O₂** = Oxygen, **CO** = Carbon Monoxide, **H₂S** = Hydrogen Sulphide, **GSV** = Gas Screening Value (if no flow is recorded a value of 0.1 is assumed),
ND = Not Detected, * = not measured, **N/A** = Not applicable, % = By volume, **mbgl** = m below ground level, **ppm** = parts per million



GAS MONITORING RESULTS

SITE	Pearson Crescent, Wombwell
JOB REF	S120313
CLIENT	Bernard William Associates
DATE	09/06/2011
TIME	09:00
VISIT NO	3 of 3
EQUIPMENT USED	GA2000 & GA5.3 Flow Pod
LAST CALIBRATED	September 2011
OPERATOR	S. J. Fisk

Weather Conditions: Overcast with showers
Ground Conditions: Damp
Ambient Atmospheric Pressure: 1001mb
Regional Trend: Rising

Position	Flow (l/hr)	Atmospheric Pressure (mB)	CH ₄		CO ₂		O ₂ (%v/v)	CO (ppm)	H ₂ S (ppm)	Water Level (mbgl)	Depth to Base (mbgl)	Notes
			(%v/v)	GSV (l/hr)	(%v/v)	GSV (l/hr)						
Ambient	-	1001	0.0	N/A	0.1	N/A	20.2	0	0	N/A	N/A	-
BH1	ND	1001	0.0	0.0	1.0	0.0010	19.0	0	0	Dry	1.10	-
BH3	ND	1001	0.0	0.0	0.3	0.0003	19.9	0	0	Dry	2.90	-
BH6	ND	1001	0.0	0.0	0.5	0.0005	19.5	0	0	Dry	1.99	-

KEY

CH₄ = Methane, **CO₂** = Carbon Dioxide, **O₂** = Oxygen, **CO** = Carbon Monoxide, **H₂S** = Hydrogen Sulphide, **GSV** = Gas Screening Value (if no flow is recorded a value of 0.1 is assumed),
ND = Not Detected, * = not measured, **N/A** = Not applicable, % = By volume, **mbgl** = m below ground level, **ppm** = parts per million

APPENDIX B:

◆Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2012)

These conditions accompany our tender and supercede any previous conditions issued. Solmek will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by 3rd parties. The report, its content and format and associated data are copyright, and the property of Solmek. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from Solmek. A charge may be levied against such approval, the same to be made at the discretion of Solmek. Solmek was a trading name of Hymas Geoenvironmental Ltd.

Solmek cannot be held liable and do not warrant, or otherwise guarantee the validity of information provided by third parties and subsequently used in our reports. Solmek are not responsible for the action negligent of otherwise of subcontractors or third parties.

Site investigation is a process of sampling. The scope and size of an investigation may be considered proportional to levels of confidence regarding the ground and groundwater conditions. The exploratory holes undertaken investigate only a small volume of the ground in relation to the overall size of the site, and can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions as encountered within each of the exploratory holes. There may be different ground conditions elsewhere on the site which have not been identified by this investigation and which therefore have not been taken into account in this report. Reports are generally subject to the comments of the local authority and Environment Agency. The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that mobile contamination, ground gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. Solmek cannot be held liable for any unrecorded or unforeseen obstructions between exploratory boreholes and trial pits. This includes instances where previous structures on the site (buried man made structures) or the presence of boulder clay (cobbles and/or boulder obstructions) have been anticipated. All types of piling operations should make allowance for obstructions within the construction budget to accommodate this. Unrecorded ancient mining may occur anywhere where seams that have been worked and influence the rock and soil above. Dissolution cavities can occur where gypsum or chalk is present. Rotary drilling is the recommended technique to prove the integrity of the rock.

Where the scope of the investigation is limited via access to information, time constraints, equipment limitations, testing, interpretation or by the client or his agents budgetary constraints, elements not set out in the proposal and excluded from the report are deemed to be omitted from the scope of the investigation.

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as 'exploratory investigations' in accordance with the definitions provided in paragraph 5.4 of BS 10175:2001 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

Where the type, number or/and depth of exploratory hole is specified by others, Solmek cannot and will not be responsible for any subsequent shortfall or inadequacy in data, and any consequent shortfall in interpretation of environmental and geotechnical aspects which may be required at a later date in order to facilitate the design of permanent or temporary works.

All information acquired by Solmek in the course of investigation is the property of Solmek, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. Solmek reserve the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing. The quoted rates do not include VAT, and payment terms are 30 days from dispatch of invoice from our offices. Quotes are subject to a site visit.

We have allowed for 1 mobilisation and normal working hours unless otherwise stated. The scope of the investigation may be reviewed following the desk study and/or fieldwork. The presence or otherwise of Japanese Knotweed or other invasive plants can be difficult to identify especially during winter months. If Japanese Knotweed or other invasive species are suspect, it should be confirmed by an ecologist. We have not allowed for acquiring services information, and cannot be responsible for damage to underground services or pipes not shown to us or not clearly shown on plans. Costs incurred will be passed on to you, and in commissioning Solmek you understand and accept that you/your agent have a contractual relationship with Solmek & you accept this. Our rates assume unobstructed, reasonably level and firm access to the exploratory positions and adequate clear working areas and headroom. We have priced on the basis that you or your client have the necessary permissions, wayleaves and approvals to access land. All boreholes and pits are backfilled with arisings except where gas monitoring pipes are installed with stopcock covers. Solmek are not responsible for any uneven surfaces as a result of siteworks and rutting and backfilled excavations may require re-levelling and/or making good by others after fieldwork is complete, and Solmek has not allowed for this. No price has been provided or requested for a return visit to remove pipework and covers. Hourly rates apply to consultancy only and do not include expenses unless otherwise shown. If warranties are required, legal costs incurred will be passed on to you assuming Solmek agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.

We reserve the right to pursue full payment of the invoice prior to release of any information including reports. We advise you/your client that we may elect to pursue our statutory rights under late payment legislation, and will apply 8% to the base rate for unreasonably late payments. Solmek are exempt from the CIS Scheme. Solmek offer to undertake work only in strict accordance with conditions covered by our current insurances, which are available for inspection. Solmek are not responsible for acts, negligent or otherwise of subcontractors and as a matter of policy cannot indemnify any other parties. Professional indemnity Insurance is limited to ten times the invoice net total except where stated otherwise by Solmek. Solmek give notice that consequential loss as a direct or indirect result of Solmek's activities or omission of the same are excluded.