

Saunderson Road, Penistone
Ground Gas/Water Monitoring Report
Yorkshire Housing

Report Number S120731/GAS

October 2012

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Contract Number: S120731/GAS
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Revision	Date	Prepared	Checked
Final	October 2012	R. Woods	D. Simpson

Saunderson Road, Penistone

Ground Gas/Water Monitoring Report

1 INTRODUCTION AND SCOPE OF WORKS

At the request of Billingham George and Partners on behalf of Yorkshire Housing a site investigation involving geotechnical and chemical testing was carried out on a parcel of land to the east of Saunderson Road, Penistone, South Yorkshire.

Scope of Works

The investigation was commissioned to determine the ground conditions for the proposed new development of a series of one and two storey residential dwellings.

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 Phase 1 Desk Study Report (S120731, August 2012) and Phase 2 Site Investigation Report (S120731/SI, September 2011) should be read in conjunction with this report. Gas monitoring pipes were installed into three selected boreholes (BH1, BH3 & BH4) and gas/groundwater monitoring was carried out on six occasions between August 2012 and October 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 positions 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. Six visits have been carried out between August 2012 and October 2012 to assess the potential risks posed by ground gases.

The gas was monitored by measuring emissions from monitoring points installed into BH1, BH3 and BH4 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 997 and 1019 millibars during the surveys. Times of both rising and falling atmospheric pressure regional trends were noted during the survey. Therefore, ground gas results are likely to have captured worse case conditions as these usually occur during time of falling atmospheric pressure and/or when the pressure is below 1000mb.

Carbon dioxide concentrations were recorded between 0.0 and 1.8% volume, and oxygen levels were between 19.0 and 20.2%. Methane was not detected in any of the boreholes during the survey and no flow was recorded.

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.

A Characteristic Situation ranking of between 1 and 6 is given based on the ground gas monitoring results coupled with the gas flow rate. These combined produce a Gas Screening Value (GSV). Where no flow is recorded a flow rate of 0.1l/hr is assumed. The GSV and risk classification define the characteristic situation, which are comparable to Table 1 below, taken from CIRIA C665, and derived from CIRIA R149.

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)

The gas screening values from the monitoring visits would place the site in **NHBC Green**.

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

The actual groundwater table was not encountered during the site works; however perched groundwater as seepage was encountered within all of the boreholes between 0.15 and 1.9mbgl during drilling. Subsequent monitoring visits of the standpipes showed that groundwater levels in the standpipes are present between 0.74mbgl and 1.90mbgl. Given the information it is possible that groundwater may be encountered within shallow excavations. If excavations are to be left open for long periods of time or during inclement weather allowances for dewatering will be required. It should be noted the rapid rate of advancement of the exploratory holes may mask minor seepages and it should be borne in mind that water levels fluctuate with a number of influences including season, rainfall, dewatering and pumping activities. Therefore, water levels significantly higher than those found during this investigation may be encountered.

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APPENDIX A



Client:	Yorkshire Housing
Project:	Saunderson Road, Penistone
Title:	Borehole & Trial Pit Location Map
Drawing No:	Figure 1
Date	October 2012



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CONDITIONS : WEATHER – OVERCAST, GROUND – DRY
REGIONAL TREND : RISING
PRESSURE : 1016mb
CLIENT : YORKSHIRE HOUSING
LOCATION : SAUNDERSON ROAD, PENISTONE
DATE : 16/08/2012
VISIT : 1 OF 6
EQUIPMENT : GA2000

Position	Flow (l/hr)	CH ₄			CO ₂			O ₂ (%v/v)	CO (ppm)	VOC (ppm)	Water Level (mbgl)	Depth of standpipe (m)
		(%v/v) Peak	(%v/v) Steady	GSV (l/hr)	(%v/v) Peak	(%v/v) Steady	GSV (l/hr)					
BH1	ND	ND	ND	-	ND	ND	-	20.1	ND	ND	1.90	2.0
BH3	ND	ND	ND	-	0.1	0.1	0.0001	20.0	ND	ND	1.82	2.0
BH4	ND	ND	ND	-	ND	ND	-	20.2	ND	ND	1.88	2.0

KEY

CH₄ = Methane, CO₂ = Carbon Dioxide, O₂ = Oxygen, GSV = Gas Screening Value, CO = Carbon Monoxide
ND = Not Detected, * = not measured, N/A = Not applicable, % = By volume, mbgl = m below ground level, VOC = Volatile Organic Compounds (measured using a PID metre)



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CONDITIONS : WEATHER – CLOUDY AND DAMP
REGIONAL TREND : RISING
PRESSURE : 1001mb
CLIENT : YORKSHIRE HOUSING
LOCATION : SAUNDERSON ROAD, PENISTONE
DATE : 24/08/2012
VISIT : 2 OF 6
EQUIPMENT : GA2000

Position	Flow (l/hr)	CH ₄			CO ₂			O ₂ (%v/v)	CO (ppm)	VOC (ppm)	Water Level (mbgl)	Depth of standpipe (m)
		(%v/v) Peak	(%v/v) Steady	GSV (l/hr)	(%v/v) Peak	(%v/v) Steady	GSV (l/hr)					
BH1	ND	ND	ND	-	0.1	0.1	0.0001	19.9	ND	ND	1.88	2.0
BH3	ND	ND	ND	-	0.3	0.3	0.0003	19.4	ND	ND	1.70	2.0
BH4	ND	ND	ND	-	0.1	0.1	0.0001	20.2	ND	ND	1.72	2.0

KEY

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CONDITIONS : CLOUDY AND DAMP
REGIONAL TREND : FALLING
PRESSURE : 1000mb
CLIENT : YORKSHIRE HOUSING
LOCATION : SAUNDERSON ROAD, PENISTONE
DATE : 03/09/2012
VISIT : 3 OF 6
EQUIPMENT : GA2000

Position	Flow (l/hr)	CH ₄			CO ₂			O ₂ (%v/v)	CO (ppm)	VOC (ppm)	Water Level (mbgl)	Depth of standpipe (m)
		(%v/v) Peak	(%v/v) Steady	GSV (l/hr)	(%v/v) Peak	(%v/v) Steady	GSV (l/hr)					
BH1	ND	ND	ND	-	0.4	0.4	0.0004	19.7	ND	ND	1.80	2.0
BH3	ND	ND	ND	-	0.7	0.7	0.0007	19.8	ND	ND	1.74	2.0
BH4	ND	ND	ND	-	0.6	0.6	0.0006	19.7	ND	ND	0.99	2.0

KEY

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CONDITIONS : HEAVY RAIN, WET
REGIONAL TREND : FALLING
PRESSURE : 997mb
CLIENT : YORKSHIRE HOUSING
LOCATION : SAUNDERSON ROAD, PENISTONE
DATE : 20/09/2012
VISIT : 4 OF 6
EQUIPMENT : GA2000

Position	Flow (l/hr)	CH ₄			CO ₂			O ₂ (%v/v)	CO (ppm)	VOC (ppm)	Water Level (mbgl)	Depth of standpipe (m)
		(%v/v) Peak	(%v/v) Steady	GSV (l/hr)	(%v/v) Peak	(%v/v) Steady	GSV (l/hr)					
BH1	ND	ND	ND	-	0.7	0.7	0.0007	19.4	ND	ND	1.77	2.0
BH3	ND	ND	ND	-	1.8	1.8	0.0018	19.0	ND	ND	1.75	2.0
BH4	ND	ND	ND	-	0.4	0.4	0.0004	20.0	ND	ND	0.74	2.0

KEY

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CONDITIONS : SUNNY WITH WET GROUND
 REGIONAL TREND : RISING
 PRESSURE : 1009mb
 CLIENT : YORKSHIRE HOUSING
 LOCATION : SAUNDERSON ROAD, PENISTONE
 DATE : 11/10/2012
 VISIT : 5 OF 6
 EQUIPMENT : GA2000

Position	Flow (l/hr)	CH ₄			CO ₂			O ₂ (%v/v)	CO (ppm)	VOC (ppm)	Water Level (mbgl)	Depth of standpipe (m)
		(%v/v) Peak	(%v/v) Steady	GSV (l/hr)	(%v/v) Peak	(%v/v) Steady	GSV (l/hr)					
BH1	ND	ND	ND	-	0.4	0.4	0.0004	20.0	ND	ND	1.40	2.0
BH3	ND	ND	ND	-	0.7	0.7	0.0007	19.7	ND	ND	1.09	2.0
BH4	ND	ND	ND	-	0.1	0.1	0.0001	20.0	ND	ND	0.74	2.0

KEY

CH₄ = Methane, CO₂ = Carbon Dioxide, O₂ = Oxygen, GSV = Gas Screening Value, CO = Carbon Monoxide
 ND = Not Detected, * = not measured, N/A = Not applicable, % = By volume, mbgl = m below ground level, VOC = Volatile Organic Compounds (measured using a PID metre)



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CONDITIONS : SUNNY INTERVALS, DAMP
REGIONAL TREND : RISING
PRESSURE : 1019mb
CLIENT : YORKSHIRE HOUSING
LOCATION : SAUNDERSON ROAD, PENISTONE
DATE : 15/10/2012
VISIT : 6 OF 6
EQUIPMENT : GA2000

Position	Flow (l/hr)	CH ₄			CO ₂			O ₂ (%v/v)	CO (ppm)	VOC (ppm)	Water Level (mbgl)	Depth of standpipe (m)
		(%v/v) Peak	(%v/v) Steady	GSV (l/hr)	(%v/v) Peak	(%v/v) Steady	GSV (l/hr)					
BH1	ND	ND	ND	-	0.7	0.7	0.0007	19.7	ND	ND	1.64	2.0
BH3	ND	ND	ND	-	1.1	1.1	0.0011	19.1	ND	ND	1.70	2.0
BH4	ND	ND	ND	-	0.4	0.4	0.0004	20.0	ND	ND	1.01	2.0

KEY

CH₄ = Methane, CO₂ = Carbon Dioxide, O₂ = Oxygen, GSV = Gas Screening Value, CO = Carbon Monoxide
ND = Not Detected, * = not measured, N/A = Not applicable, % = By volume, mbgl = m below ground level, VOC = Volatile Organic Compounds (measured using a PID metre)

APPENDIX B

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.