



GAS RISK ASSESSMENT

COMMERCIAL DEVELOPMENT INTERBRIDGE SITE, NEW BRIGHTON ROAD, EMSWORTH, HANTS

ON BEHALF OF
NASH & PARTNERS LIMITED
REPORT 08-136.04
MAY 2015

1.0 Introduction

Aviron's Phase II Geo-Environment Risk Assessment report (reference 08-136.02, June 2008) included the installation of three monitoring wells within window sample boreholes BH1, BH4 and BH8. Each well was installed to 5m below ground level (bgl) with the bottom 4m of slotted installation standpipe with 10mm gravel screen, top 1m of plain pipe with bentonite seal and fitted with gas valve and steel cover.

Monitoring of the wells was completed on one occasion (10 June 2008) and recorded notable concentrations of carbon dioxide to 4.4% v/v and depleted oxygen to 10.1% v/v. The single monitoring visit was completed during high (1022mb) atmospheric pressures.

The report recommended further gas monitoring and risk assessment or progression directly to the installation of gas protection within ground floor slabs.

Construction plans are yet to be finalised and thus the project team have instructed further gas monitoring and assessment to determine the requirement for gas protection within new structures.

Our scope of works was to involve the installation of a further three monitoring wells (assuming wells installed in 2008 could not be located) and a further three rounds of ground gas monitoring upon all available wells. Where possible monitoring would be completed during periods of falling and 'sub-1000mB' atmospheric pressure.

2.0 Fieldwork

Three new gas monitoring wells (GW1 to GW3) were installed by hand auger on 23 March 2015. Well location GW1 was positioned in the west of the site, GW2 centrally and GW3 in the east. Each hand auger was completed at 70mm diameter and advanced to a depth of approximately 2.5m below ground level (bgl).

Ground conditions in each hand auger location were consistent across the site and also with works of 2008. A overlying mantle of Topsoil to a mean depth of 0.3m bgl; upon brown, slightly gravelly CLAY to a mean depth of 1.5m bgl; upon brown, grey CLAY to 2.5m bgl.

Upon completion of augering 1.7m of slotted 30mm standpipe screwed with 1m of plain 30mm standpipe was placed into the auger hole. This allows the installation to stand proud 200mm for identification within the overgrown grass land. From 2.5m bgl to 0.8m bgl 10mm pea shingle was introduced into the annulus and from 0.8m bgl to ground level bentonite granules were introduced. The standpipes were fitted with gas valves. The respond zone is therefore 0.8m bgl to 2.5m bgl.

Location BH8 installed in 2008 was identified and serviceable within the east of the site.

The presence of hazardous gases including methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) was undertaken on three occasions using a GA2000 Infra-Red Gas Analyser from Geotechnical Instruments Ltd. The flow rate and atmospheric pressure, in millibars (mb), was also measured during the monitoring process. Depth to groundwater was measured using an electronic dip meter. Monitoring was completed upon four monitoring wells; GW1, GW2, GW3 and BH8.

Figure 1 is presented as a Monitoring Well Location Plan.

Monitoring work was completed on the dates specified within table 1 which also summarises weather conditions and atmosphere pressure.

Table 1 - Background Gas Monitoring Data			
Date	Atmospheric Pressure	Rising/Falling Pressure?	Weather Conditions
1 April 2015	992mB	Falling	Raining
15 April 2015	1018mB	Constant	Mild and sunny
5 May 2015	994B	Falling	Raining and over-cast

3.0 Summary of Results

Results obtained during the monitoring process are **appended** to this letter.

The following summaries the results obtained;

- Methane was not recorded at detectable concentrations (0.0% v/v) on any occasion.
- Carbon dioxide was recorded at generally acceptable concentrations within all monitoring wells on all occasions. The maximum concentration recorded was within BH8 at 3.6%v/v on 5 May 2015.
- Oxygen was recorded at generally ambient concentrations within all monitoring wells on all occasions in the range 17.8% v/v to 20.0% v/v. No depleted oxygen concentrations in the range of 10% v/v were recorded.
- Atmospheric pressures were recorded between 992mB and 1018mB during both falling and rising periods of atmospheric pressure. It is considered this gas risk assessment has monitored the most conservative weather conditions (twice below 1000mB and falling) and also covered a suitable range of conditions to conceptualise the site.
- No flow rate of 0.0 L/hour was recorded within any of the wells during any of the three visits.

All monitoring positions remained constant at GW1, GW2 and BH8. No replacement monitoring positions were installed during the period of this project.

4.0 Interpretation of Results

No concentrations of methane were recorded within the Lower and Upper Explosive Limits of 5% and 15% v/v as indicated in the NHBC document 'Guidance on Methane and Carbon Dioxide, 2007'.

Considering the concentration of oxygen and carbon dioxide there is no risk of asphyxiation within dwellings. Oxygen remains ambient and carbon dioxide concentrations have all been recorded below 5%.

It is also noted no flow has been recorded during low and high atmospheric conditions thus ground gases are not susceptible to surface migration.

Under normal use of the site (i.e. above ground), the risk presented by methane and carbon dioxide is dependent on both the concentrations and the rate of flow. In accordance with Wilson and Card methodology specified in the CIRIA C655 document, gas screening values were determined using the following:



$$\text{GSV (litres/hour)} = \frac{\text{Maximum steady state concentration (\%)}}{100} \times \text{Flow Rate (litres/hour)}.$$

Based on the maximum concentrations and flows recorded, the GSV for methane was 0.0 L/hr and the GSV for carbon dioxide was 0.0 L/hr.

On the basis of the GSVs and their comparison with CIRIA C655, a Characteristic Situation 1 (CS1) was determined on the basis of the maximum carbon dioxide concentrations and flow rates.

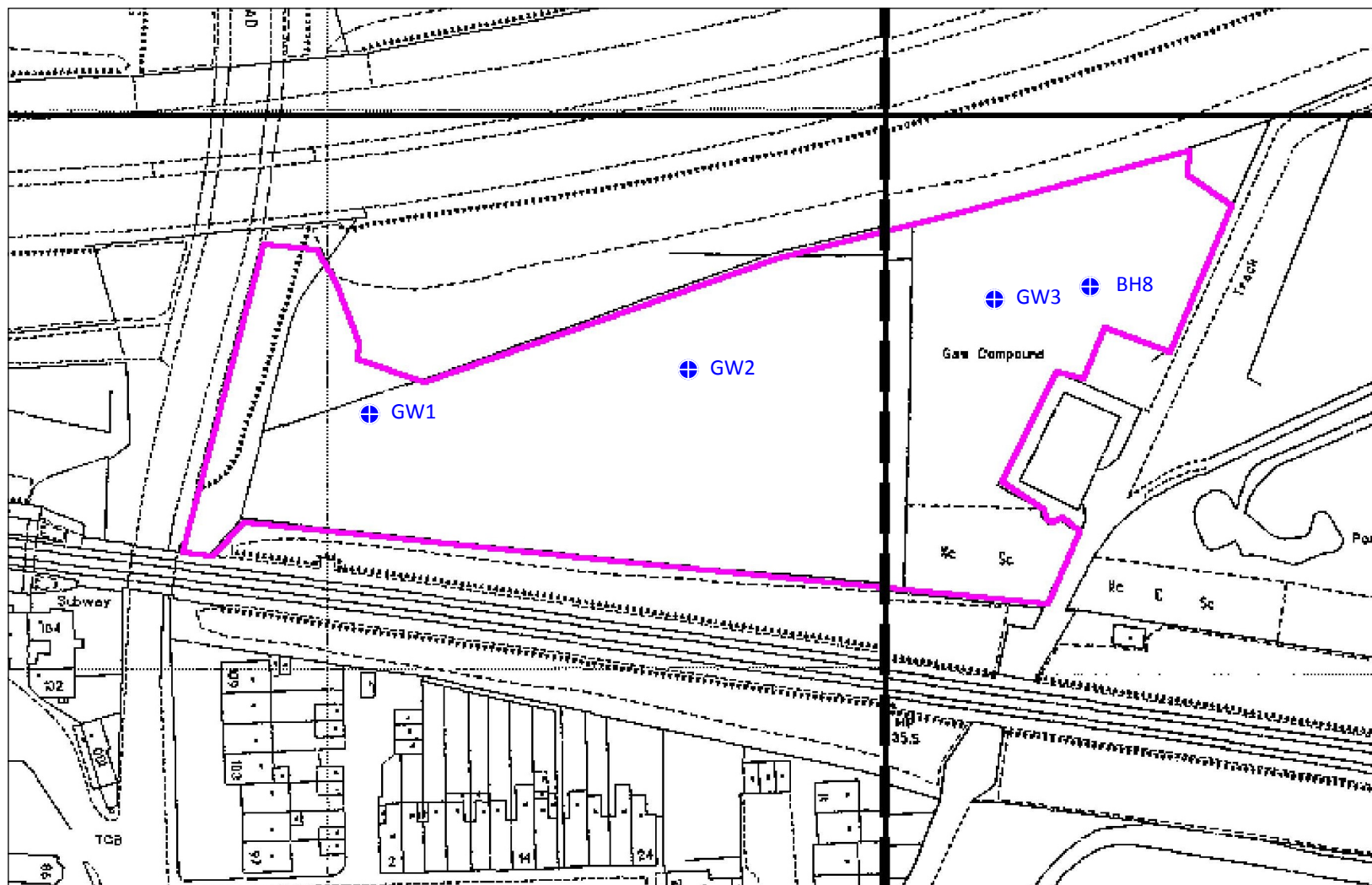
Characteristic Situation 1 is interpreted as representing a very low risk, indicating “natural soils with low organic content and ‘typical’ Made Ground”. It is likely recorded concentrations of carbon dioxide as a result of decayed roots and rootlets within the underlying Clay Formation. However, concentrations do not exceed 5% v/v and no gas flow rate has been recorded.

No special precautions are considered necessary other than ensuring any under floor voids are well ventilated.

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Managing Director

Date 7 May 2015





Legend

⊕ Monitoring Well

Notes

Locations indicative.

BH8 identified from works of 2008.

Figure 1

Drawing Title

Monitoring Well Location Plan

Project Number 08-136.04

Project Title

Interbridges Site, New Brighton Road,
Emsworth

Drawn by JD

Checked by JD

Scale NTS



MONITORING DATA SHEET

SITE Intebidges, Emsworth
PROJECT 08-136.04



Visit number	1	Equipment	GA2000
Date	01/04/2015	Weather	Raining
Taken by	JD	Barometric Trend*	Falling

Record of Stable Concentrations								
Location	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Prs. (mB)	Flow (l/h)	Water (m bgl)	Base Well (m bgl)	PID (ppm)
GW1	0.0	1.4	20.0	992	0.0	DRY	2.50	NT
GW2	0.0	1.9	19.7	992	0.0	DRY	2.45	NT
GW3	0.0	2.5	19.2	992	0.0	DRY	2.48	NT
BH8	0.0	3.5	17.8	992	0.0	DRY	2.00	NT

Max Stable Concs (% v/v)	
CH4	0.0
CO2	3.5

Max Stable Flow
0 l/h

Gas Screening Values (l/h)	
CH4	0
CO2	0

Visit number	2	Equipment	GA2000
Date	15/04/2015	Weather	Clear + sunny
Taken by	JD	Barometric Trend*	Rising

Record of Stable Concentrations								
Location	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Prs. (mB)	Flow (l/h)	Water (m bgl)	Base Well (m bgl)	PID (ppm)
GW1	0.0	1.5	19.9	1018	0.0	DRY	2.50	NT
GW2	0.0	1.8	19.6	1018	0.0	DRY	2.45	NT
GW3	0.0	2.9	19.2	1018	0.0	DRY	2.48	NT
BH8	0.0	3.4	18.1	1018	0.0	DRY	2.00	NT

Max Stable Concs (% v/v)	
CH4	0.0
CO2	3.5

Max Stable Flow
0 l/h

Gas Screening Values (l/h)	
CH4	0
CO2	0

*Source, Met Office

MONITORING DATA SHEET

SITE Intebidges, Emsworth

PROJECT 08-136.04



Visit number 3

Equipment GA2000

Date 05/05/2015

Weather Raining

Taken by JD

Barometric Trend* Falling

Record of Stable Concentrations								
Location	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Prs. (mB)	Flow (l/h)	Water (m bgl)	Base Well (m bgl)	PID (ppm)
GW1	0.0	1.9	19.8	994	0.0	DRY	2.50	NT
GW2	0.0	1.5	19.5	994	0.0	DRY	2.45	NT
GW3	0.0	2.2	19.8	994	0.0	DRY	2.48	NT
BH8	0.0	3.6	17.9	994	0.0	DRY	2.00	NT

Max Stable Concs (% v/v)	
CH4	0.0
CO2	3.6

Max Stable Flow	
0	l/h

Gas Screening Values (l/h)	
CH4	0
CO2	0

Visit number

Equipment

Date

Weather

Taken by

Barometric Trend*

Record of Stable Concentrations								
Location	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Prs. (mB)	Flow (l/h)	Water (m bgl)	Base Well (m bgl)	PID (ppm)

Max Stable Concs (% v/v)	
CH4	
CO2	

Max Stable Flow	
	l/h

Gas Screening Values (l/h)	
CH4	
CO2	

*Source, Met Office