Directors:
J K C CAMPBELL, BSc, MSc, CEng, CSci, CGeol, FGS, EurGeol, FIMM

S M M RICE, BEng, PhD, CEng, CGeol, MICE, FGS, CEnv

G S J SOMMERWILL, BSc, MSc, CGeol, FGS

M R EYNON, BSc, MSc, CGeol, EurGeol, PGeo, FGS

Consultant:
PROFESSOR PAUL BARDOS, BSc, PhD, CIWM

EARTH SCIENCE PARTNERSHIP
CONSULTING ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

33 Cardiff Road
Taff's Well
CARDIFF
CF15 7RB

TEL: (029) 2081 3385
FAX: (029) 2081 3386

www.earthsciencepartnership.com enquiries@earthsciencepartnership.com

Our Ref: hd/4715ePh2.1805
15th December 2011

Mr Campbell Grossey
NJP
20 St Andrews Crescent
Cardiff
CF10 3DD

BY POST AND EMAIL

Dear Campbell,

PROPOSED NEW BRANCH SURGERY, COELBREN
GROUND GAS ASSESSMENT

1.0 INTRODUCTION

Further to completion of site works and our previous Geoenvironmental Assessment (Ref: 4715e/1681REV1, November 2010), we are pleased to present our Ground Gas Assessment report which considers ground gas hazards.

Our previous Geoenvironmental Assessment (Ref: 4715e/1681REV1) should be read in conjunction with this report.

A potential source of soil gas is present in the form of a nearby former landfill approximately 50m to the west. Specific data from within the landfill itself provided by the Local Authority Waste Compliance Officer, suggests that it has a low gas generation potential and a low permeability cohesive Glacial Till horizon present is likely to further mitigate on-site ground gas migration by forming a low permeability barrier beneath site. Utilising the recommendations in the relevant guidance (C665) there is a low likelihood of occurrence and this is of low to moderate risk.

As a precaution, gas protection measures have been recommended (2000g Damp Proof Membrane), however we understand that the Local Authority have concerns regarding the potential for soil gas generation, and state that the solution must include site specific gas monitoring data. This work is targeted at specifically proving the potential flow and concentrations of ground gasses beneath the site through borehole installation construction and ongoing monitoring.

2.0 EXPLORATORY WORKS

The windowless sampling technique was selected for the investigation to provide ground gas monitoring installations. 4no. windowless sample drillholes (WS101 to WS104) were constructed on the 3rd and 4th of October 2011 to a maximum depth of 2m. A hydraulically powered rig is used to drive plastic lined sampling tubes into the ground, with the soil recovered within the tubes.

Access was restricted in some areas in the vicinity of the underground foul sewer and surface drainage identified were unexplored (see Figure 1). WS101 to WS103 were located at the perimeter of the site between the identified source and the proposed building and WS104 was located in the proposed building footprint as shown on Figure 1.

Considering Table 4.2 of C665 a very close (<25m) nominal spacing was achieved. This would be suitable for a potential high risk gas hazard, and therefore is robust considering the low to moderate risk presented by the identified sources.

The windowless sampling provided generally good recovery to the depth of refusal.

3.0 DEVELOPMENT OF THE CONCEPTUAL MODEL

The main features of the geological environment are a thin covering of Made Ground/Topsoil followed by Glacial Till underlain by Lower Coal Measures Bedrock. The following ground conditions were encountered in the exploratory holes undertaken during this phase of works:

Made Ground: encountered to a maximum depth of 0.9m as a thin tarmacadam surface and sub base layer followed by a soft dark brown to black gravelly clay layer. Rare china, brick and carbonaceous fragments were encountered.

Glacial Till: encountered beneath the Made Ground to a maximum depth of 2m as soft to firm becoming stiff brown mottled orange and grey gravelly clays with rare cobbles.

Previous exploratory works (ESP4715e/1681REV1) encountered the Glacial Till to a maximum depth of 7.3m as firm becoming stiff brown gravelly clays and medium dense brown clayey to clayey sandy gravels. Cobbles were rare in the upper portion, however they increased in abundance with depth with rare boulders also being described by the driller. Ground conditions were generally saturated between 2m and 4m in this horizon.

Coal Measures Bedrock: encountered to a maximum depth of 20m as light grey to dark grey Mudstones and Siltstones. Within the Lower Coal Measures bedrock, no solid coal seams, voids or anomalous drilling conditions have been identified beneath the site.

4.0 GROUND GAS CONDITIONS

50mm diameter gas and groundwater monitoring wells comprising slotted HDPE pipe with a gravel surround and a lockable vandal proof cover, were installed in each of the four windowless sample holes (WS101 – WS104) in order to monitor for ground gases.

During preparatory construction works, WS104 was destroyed after two monitoring visits had been undertaken. Monitoring of WS102 was unable to be undertaken on the final visit due to construction materials preventing access (covered at surface).

The wells were installed within the near surface Made Ground horizon and Glacial Till deposits in order to assess the potential for ground gas generation that may be present due to historic development and the historic landfill to the west and south west. Monitoring of the installed gas wells was undertaken on six occasions over a eight week period.

A Gas Data LMSxi G3.18e portable monitoring equipment was used, which uses an infra red methane (CH_4) and carbon dioxide (CO_2) detector, coupled with pressure, temperature and flow sensors. A calibration certificate is presented as Appendix B.

The results of the on-site monitoring are summarised on Table 1 below.

Table 1: Summary of Monitoring Data

Borehole	Response zone/strata	Evidence of contamination	No. of monitoring visits	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Flow (l/h)	Water levels (mBGL)	Range of atmospheric pressures during monitoring round (mbar)
BH101	MG	No	5	ND	ND – 4.5	13.7 – 20.8	ND – 0.1	0.26 – 0.61	957 - 1010
BH102	MG		6	ND – 2.3	ND – 7.3	4.1 – 18.5	-0.3 – 0.6	Dry	
BH103	MG		6	ND	ND – 2.7	17.9 – 20.8	-0.8 – 0.4	0.61 – 1.54	
BH104	MG		2	ND	ND	18.7 – 21.9	-0.3 – 0.5	0.9 – 0.98	

MG = Made Ground, A = Alluvium, GT = Glacial Till Deposits, ND = Non Detect.

The monitoring indicated levels of methane between non detect and 2.3% and carbon dioxide between non detect and 7.3%. Oxygen was depleted where the levels of carbon dioxide were elevated. Gas flows rates between non detect and 0.6l/h were recorded. Gas Monitoring data is presented in Appendix A.

5.0 GROUND GAS PROTECTION MEASURES

A risk assessment and site characterisation has been carried out in relation to a source, pathway and target methodology. The likelihood and severity of an event is considered as part of the risk assessment process and in accordance with C665, the hazard (potential effect) associated with explosion/asphyxiation is severe. The occurrence is considered of low likelihood with regard to the Made Ground encountered and the off-site risk posed from the former landfill. A moderate potential risk to the development is present considering the proved sources and end use of the site.

This preliminary risk assessment has been carried out on the results obtained. The results have been assessed in accordance with the recently published CIRIA document C665, *Assessing Risks Posed by Hazardous Ground Gases to Buildings*. This guidance introduces the risk assessment concept with a consideration of the reliability of the data i.e. the presence of shallow groundwater and appropriate response zones.

Gas Screening Values (GSV) of 0.0138 for Methane and 0.0438 for carbon dioxide have been calculated using the worst case results obtained to date during the monitoring. It should be noted that the GSV is a guideline value and not an absolute threshold. The assessment has been conducted in-line with the modified Wilson and Card Classification (as presented in CIRIA C665 2007 – Page 88).

Using the results obtained, the site would be classified as CS1. However as a precaution, due to the proximity of the development to the historical landfill and to protect against any potential future fluxes, we recommend that the site should be classified as CS2, for which the following nominal mitigating measures are recommended in accordance with Table 8.6 of C665 (page 90, Table 8.6 – office/commercial end-use):

- Reinforced concrete cast in situ floor slab with 1200 gauge Damp Proof Membrane;
- All joints and penetrations sealed;
- Venting of confined spaces.

Due to the loss of the monitoring well situated in the footprint, the CS2 recommendation has been discussed with the Local Authority Contaminated Land Officer to ensure it is satisfactory. The officer has agreed that the precautionary measures recommended are sufficient to mitigate the identified risk and no further works are required.

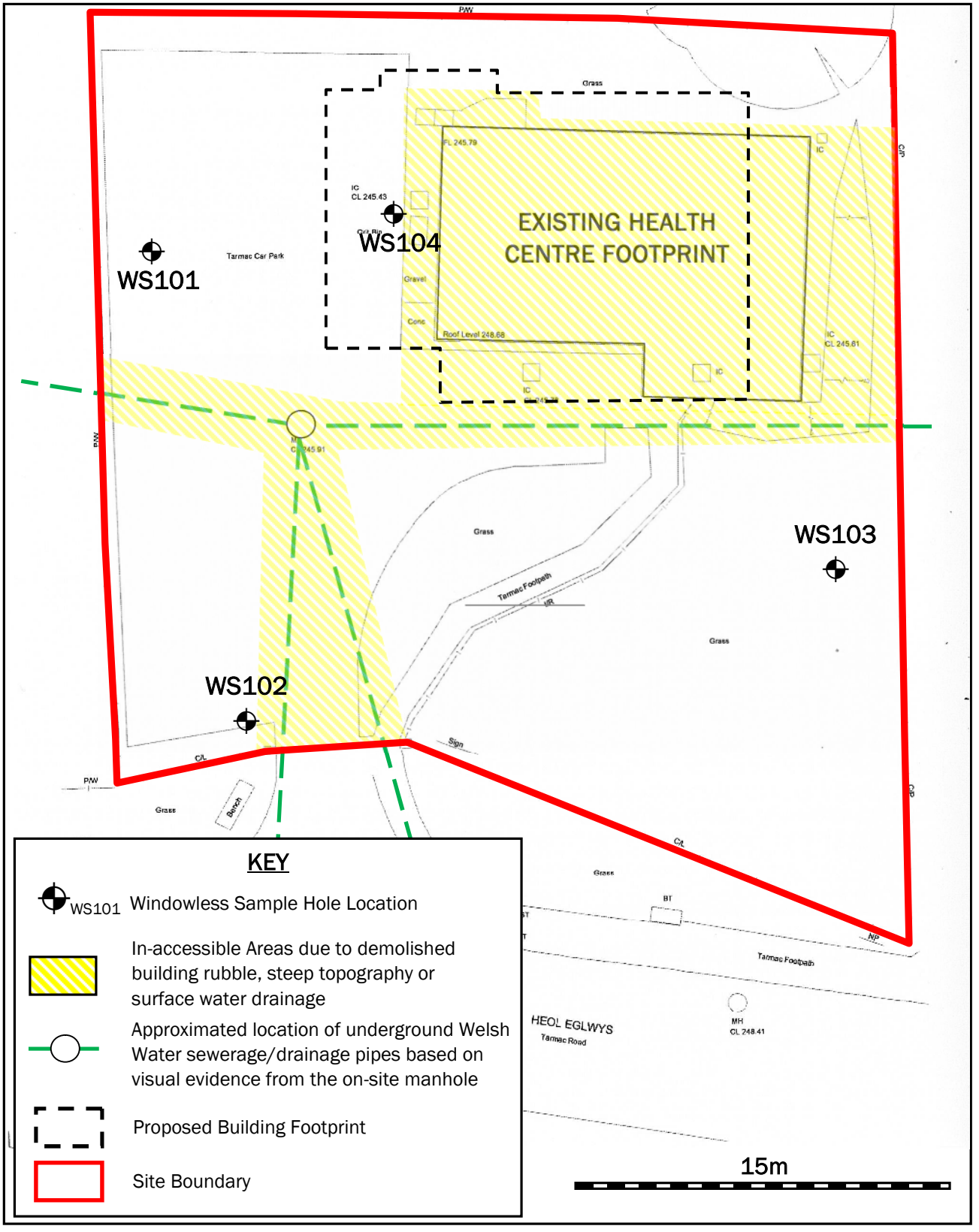
I trust the above and enclosed meets your present requirements however, should you have any queries then do not hesitate to contact Mathew Eynon or the undersigned.

Yours sincerely,

Hywel Davies

Enc. Figure 1 – Exploratory Hole Location Plan
Appendix A – Ground Gas Monitoring Results
Appendix B – LMS Calibration Certificate
General Notes

FIGURES



N

Exploratory hole location plan based on a Existing Site Plan provided by NJP (Dwg No: 1000).

PROJECT:	PROPOSED NEW BRANCH SURGERY, COELBREN NEATH	
SCALE	AS SHOWN	FIGURE 1
TITLE:	EXPLORATORY HOLE LOCATION PLAN	
	EARTH SCIENCE PARTNERSHIP	

APPENDIX A

Ground Gas Monitoring Results

RESULTS OF GROUNDWATER AND GAS MONITORING

Date:	13/10/2011	Atmospheric Pressure (mb):	1010 mb
Time:	11.30am	Weather:	Dry but Overcast
Engineer:	AH	Site Condition/Status:	Old Surgery

Well ID: WS101	Well Depth (m): 1.90		G/W Depth (m): 0.48			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	78.6	3.1	0	18.2	0	0
After 30 Seconds	0	0	79.1	0.5	0	20.3	0	0
After 1 Minute	0	0	79.3	0.1	0	20.5	0	0
After 3 Minutes	0	0	79.3	0	0	20.6	0	0
Influential Comments								

Well ID: WS102	Well Depth (m): 1.0		G/W Depth (m): Dry			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	82.4	0	0	17.5	0	0
After 30 Seconds	0	0	85.3	4.9	0	9.7	0	0
After 1 Minute	0	0	84.9	5.8	0	9.2	0	0
After 3 Minutes	0	0	83	3.7	0	13.2	0	0
Influential Comments								

Well ID: WS103	Well Depth (m): 2.03		G/W Depth (m): 1.15			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	80.9	0	0	19	0	0
After 30 Seconds	0	0	80.3	1.5	0	18.1	0	0
After 1 Minute	0	0	80.2	1.6	0	18.1	0	0
After 3 Minutes	0	0	80.1	0.9	0	18.9	0	0
Influential Comments								

Well ID: WS104	Well Depth (m): 1.94		G/W Depth (m): 0.90			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	78.1	0	0	21.8	0	0
After 30 Seconds	1	0	78.2	0	0	21.7	0	0.5
After 1 Minute	0	0	78.2	0	0	21.7	0	0.1
After 3 Minutes	0	0	78.2	0	0	21.7	0	0
Influential Comments								

RESULTS OF GROUNDWATER AND GAS MONITORING

Date:	20/10/2011	Atmospheric Pressure (mb):	997 mb
Time:	10.30am	Weather:	Dry
Engineer:	AH	Site Condition/Status:	Old Surgery

Well ID: WS101	Well Depth (m): 1.90		G/W Depth (m): 0.59			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	82.2	4	0	13.7	0	0
After 30 Seconds	0	0	78.9	0.6	0	20.4	0	0
After 1 Minute	0	0	79.2	0.1	0	20.6	0	0.1
After 3 Minutes	0	0	79.1	0	0	20.8	0	0
Influential Comments								

Well ID: WS102	Well Depth (m): 1.0		G/W Depth (m): Dry			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	79.7	1.7	0	18.5	0	0
After 30 Seconds	0	0	83.6	4.5	0	11.8	0	0
After 1 Minute	0	0	83.5	4.4	0	12	0	0
After 3 Minutes	0	0	83.2	4.2	0	12.5	0	0
Influential Comments								

Well ID: WS103	Well Depth (m): 2.03		G/W Depth (m): 1.29			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	80	0	0	19.9	0	0
After 30 Seconds	1	0	79.7	1.4	0	18.8	0	0.4
After 1 Minute	0	0	79.5	1.9	0	18.5	0	0
After 3 Minutes	0	0	79.6	0.9	0	19.4	0	0
Influential Comments								

Well ID: WS104	Well Depth (m): 1.94		G/W Depth (m): 0.98			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	-1	0	78	0	0	21.9	0	-0.3
After 30 Seconds	-1	0	81.2	0	0	18.7	0	-0.1
After 1 Minute	0	0	81.2	0	0	18.7	0	0
After 3 Minutes	0	0	80.8	0	0	19.1	0	0
Influential Comments	B/H cover dislodged by machine.							

RESULTS OF GROUNDWATER AND GAS MONITORING

Date:	03/11/2011	Atmospheric Pressure (mb):	957 mb
Time:	1pm	Weather:	Fine but Cold
Engineer:	AH	Site Condition/Status:	Old Surgery

Well ID: WS101	Well Depth (m): 1.86		G/W Depth (m): 0.26			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	79.7	0.6	0	19.6	0	0
After 30 Seconds	0	0	79.1	0.1	0	20.7	0	0
After 1 Minute	0	0	79.1	0	0	20.8	0	0
After 3 Minutes	0	0	79.1	0	0	20.8	0	0
Influential Comments								

Well ID: WS102	Well Depth (m): 1.0		G/W Depth (m): Dry			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	3	0.2	81.6	2.9	0	15.4	0	0.6
After 30 Seconds	0	0	82.9	4.2	0	12.8	0	-0.2
After 1 Minute	-2	0	81.8	1.7	0	16.4	0	-0.3
After 3 Minutes	0	0	82.1	0.7	0	17.1	0	0.1
Influential Comments								

Well ID: WS103	Well Depth (m): 2.03		G/W Depth (m): 0.61			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	79.1	0	0	20.8	0	0
After 30 Seconds	0	0	79.1	0	0	20.8	0	0
After 1 Minute	0	0	79.1	0	0	20.8	0	0
After 3 Minutes	0	0	79.4	0	0	20.5	0	0
Influential Comments								

Well ID: WS104	Well Depth (m):		G/W Depth (m):			Ground Surface:		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading								
After 30 Seconds								
After 1 Minute								
After 3 Minutes								
Influential Comments	Intallation destroyed/covered by construction works.							

RESULTS OF GROUNDWATER AND GAS MONITORING

Date:	11/11/2011	Atmospheric Pressure (mb):	978 mb
Time:		Weather:	Overcast/Rain
Engineer:	AH	Site Condition/Status:	Old Surgery

Well ID: WS101	Well Depth (m): 1.83		G/W Depth (m): 0.61			Ground Surface: Tarmac		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	78.4	4.5	0	17	0	0
After 30 Seconds	0	0	79.1	0.8	0	20	0	0
After 1 Minute	0	0	79.4	0.2	0	20.3	0	0
After 3 Minutes	0	0	79.3	0	0	20.6	0	0
Influential Comments								

Well ID: WS102	Well Depth (m): 0.99		G/W Depth (m): Dry			Ground Surface: - Tarmac		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	1	0	82	0.3	0	17.6	0	0.1
After 30 Seconds	0	0	88.5	7.3	0	4.1	0	0
After 1 Minute	0	0	86.3	7	0	6.6	0	0
After 3 Minutes	0	0	86.5	4.6	0	8.8	0	0.1
Influential Comments								

Well ID: WS103	Well Depth (m): 2.04		G/W Depth (m): 1.20			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	80.2	0	0	19.7	0	0
After 30 Seconds	0	0	80.3	0.8	0	18.8	0	0
After 1 Minute	0	0	80.1	1.1	0	18.7	0	0
After 3 Minutes	0	0	79.9	0.7	0	19.3	0	0
Influential Comments								

Well ID: WS104	Well Depth (m):		G/W Depth (m):			Ground Surface:		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading								
After 30 Seconds								
After 1 Minute								
After 3 Minutes								
Influential Comments	Intallation destroyed/covered by construction works.							

RESULTS OF GROUNDWATER AND GAS MONITORING

Date:	22/11/2011	Atmospheric Pressure (mb):	990 mb
Time:	15.20	Weather:	Sunny
Engineer:	AH	Site Condition/Status:	Old Surgery

Well ID: WS101	Well Depth (m): 1.82		G/W Depth (m): 0.41			Ground Surface:		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	79.8	1	0	19.1	0	0
After 30 Seconds	0	0	80.1	0.2	0	19.6	0	0
After 1 Minute	0	0	79.5	0	0	20.4	0	0
After 3 Minutes	0	0	79.1	0	0	20.8	0	0
Influential Comments								

Well ID: WS102	Well Depth (m): 1.0		G/W Depth (m): Dry			Ground Surface: - Tarmac		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	1.3	72.2	11	2.3	14.4	0	0
After 30 Seconds	0	0	82.8	6.2	0.4	10.5	0	0
After 1 Minute	0	0	83.2	2.2	0	14.5	0	0.1
After 3 Minutes	0	0	83.4	0.9	0	15.6	0	0
Influential Comments								

Well ID: WS103	Well Depth (m): 2.02		G/W Depth (m): 1.54			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	0	0	79.8	0	0	20.1	0	0
After 30 Seconds	0	0	80	1.1	0	18.8	0	0
After 1 Minute	0	0	79.7	1.5	0	18.7	0	0
After 3 Minutes	0	0	79.6	1	0	19.3	0	0
Influential Comments								

Well ID: WS104	Well Depth (m):		G/W Depth (m):			Ground Surface:		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading								
After 30 Seconds								
After 1 Minute								
After 3 Minutes								
Influential Comments	Intallation destroyed/covered by construction works.							

RESULTS OF GROUNDWATER AND GAS MONITORING

Date:	07/12/2011	Atmospheric Pressure (mb):	983 mb
Time:	9:30am	Weather:	Sunny
Engineer:	HD	Site Condition/Status:	Old Surgery

Well ID: WS101	Well Depth (m):		G/W Depth (m):			Ground Surface:		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading								
After 30 Seconds								
After 1 Minute								
After 3 Minutes								
Influential Comments	Installation obscured by construction materials.							

Well ID: WS102	Well Depth (m): 1.0		G/W Depth (m): Dry			Ground Surface: - Tarmac		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	-1	0	81.8	0	0	18.1	0	0
After 30 Seconds	0	0	85.3	2.3	0	12.3	0	0
After 1 Minute	0	0	85.2	2.4	0	12.3	0	0.1
After 3 Minutes	2	0	85.3	2.4	0	12.2	0	0.4
Influential Comments								

Well ID: WS103	Well Depth (m): 2.02		G/W Depth (m): 1.38			Ground Surface: -		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading	-1	0	79.3	2.7	0	17.9	0	-0.8
After 30 Seconds	0	0	79.5	1.3	0	19.1	0	0.2
After 1 Minute	1	0	79.7	0.9	0	19.3	0	0.3
After 3 Minutes	1	0	79.6	0.8	0	19.5	0	0.4
Influential Comments								

Well ID: WS104	Well Depth (m):		G/W Depth (m):			Ground Surface:		
Monitored Variables	dP (Pa)	LEL (%)	N2 (%)	CO2 (%)	CH4 (%)	O2 (%)	H2S (ppm)	Flow (l/h)
Immediate Reading								
After 30 Seconds								
After 1 Minute								
After 3 Minutes								
Influential Comments	Intallation destroyed/covered by construction works.							

APPENDIX B

LMS Calibration Certificate

Test Date and Conditions	
Date	06/10/2011
Atmospheric Pressure	998 mbar
Ambient Temp	18 °C

GAS DATA LTD
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel 02476303311 Fax 02476307711

LMS FINAL INSPECTION & CALIBRATION CERTIFICATE

INSTRUMENT DETAILS		
Serial No	1823	CUSTOMER
S/W Version	G3.18v-LTBXV	Earth Science Partnership

INSTRUMENT CHECKS			
Keyboard	✓	Clock Set / Running	✓
Pump In/Out	✓	Labels Fitted	✓
Display Contrast	✓	Recalibration Due	06/10/2012

GASES					
CH4		CO2		O2	
Test %	Reading %	Test %	Reading %	Test %	Reading
0 accept <= 0.1	0.0	0 accept <= 0.1	0.0	0 accept <= 0.1	0.0
5 accept 4.9-5.1	5.0	10 accept 9.8-10.2	10.0	21 accept 20.5-21.2	20.8
50 accept 48.0-52.0	51.0	40 accept 37.0-45.0	40.0		
Environics Serial No :5089					

PRESSURES			
Absolute/Relative		Differential	
Atmos accept current +/-1	998	0.0	--
Atmos + 50 mbar accept current +48-+52	1048	+30 mbar accept 29.5-30.5	--
Atmos - 50 mbar accept current -48--52	949	-30 mbar accept -29.5--30.5	--

TEMPERATURE	
Applied °C	Reading °C
0 accept -0.1-+0.1	0.0
25 accept 24.5-25.5	24.8
40 accept 37.5-40.5	39.0

OPTIONS					
Borehole Flow (See other sheet)	✓	LEL	✓	Temp Probe (see above)	x
Extraction Flow	x			Toxic Gasses (see other sheet)	✓

PACKING						
Charger	UK✓	~~US~~	~~Euro~~	Sample Pipe	~~Standard~~	~~Flow~~
Manual	x			Serial Cable	x	
Leather Bag	✓			Software	x	
Strap	✓			Cal Certificate	✓	

Tested .....

Approved .....

Test Date and Conditions	
Date	06/10/2011
Atmospheric Pressure	998 mbar
Ambient Temp	18 °C

GAS DATA LTD
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel: 024 76 303311 Fax: 024 76 307711

LMS FINAL INSPECTION & CALIBRATION CERTIFICATE

(OPTIONS)

INSTRUMENT DETAILS		
Serial No	1823	CUSTOMER
S/W Version	G3.18v-LTBXV	Earth Science Partnership

Toxic Gasses			
Gas Type	Range	Tested @	Reading
H2S	0 - 200 ppm	100 ppm	100 ppm

Cross Gas Effects					
Applied gas		Readings			
Type	Concentration	Toxic 1:	Toxic 2:	Toxic 3:	Toxic 4:

Flow Tests - Low Range Option					
Target Flow	-5 L/Hr	0 L/Hr	5 L/Hr	10 L/Hr	20 L/Hr
Applied	-5	0	5	10	20
Flow Reading	-5 accept applied +/-0.5	0 accept applied +/-0.0	5 accept applied +/-0.5	10 accept applied +/-0.7	20 accept applied +/-3.0
dp Applied (Pa)	-16	0	16	37	93
dp Reading (Pa)	-16 accept applied +/-5	0 accept applied +/-0.0	16 accept applied +/-5	37 accept applied +/-10	94 accept applied +/-20
Flow Tests - High Range Option					
Target Flow	-30 L/Hr	0 L/Hr	30 L/Hr	60 L/Hr	120 L/Hr
Applied					
Flow Reading	accept applied +/-3.0	accept applied +/-0.0	accept applied +/-3.0	accept applied +/-4.0	accept applied +/-15
dp Applied (Pa)					
dp Reading (Pa)	accept applied +/-15	accept applied +/-0.0	accept applied +/-15	accept applied +/-50	accept applied +/-200

Tested ..... Approved .....

GENERAL NOTES

1. Earth Science Partnership (ESP) believes that providing information about limitations is essential to help clients identify and therefore manage their risks. These risks can be mitigated through further investigation or research, but they cannot be eliminated.

2. This report includes available factual data for the site as obtained only from the sources described in the text. The data are related to the site on the basis of the site location and boundary information provided by the client. The findings and opinions conveyed in this assessment are based on the information obtained from a variety of sources as detailed in the report, which ESP believe are reliable. Nevertheless, ESP cannot and does not guarantee the authenticity or reliability of the information it has relied on. It is possible that the assessment failed to indicate the existence of further sources of information on the site. Assuming such sources do exist, their information could not have been considered in the formulation of the opinions and findings in this report. It should be recognised that different conditions on site may have existed between and subsequent to the various map surveys.

3. In preparing this report it has been assumed that all past and present occupants of the site have provided all relevant and other information, especially relating to known or potential hazards. This report is not required to identify insufficiencies or mistakes in the information provided by the user/owner or from any other source, but has sought to compensate for these where obvious in the light of other information.

4. Reports are normally be prepared and written in the context of a stated purpose, and should not, therefore be used in a different context. Furthermore, new information, improved practices and legislation may necessitate an alteration to the report in whole or in part after its submission.

5. The opinions presented in this report are based on the findings derived from a site inspection, investigations and a review of historical and other records. The report details any indicators that may suggest that hazardous substances exist at the site at levels likely to warrant mitigation. Not finding such indicators does not mean that hazardous substances do not exist at the site. The most recent site inspection was undertaken as detailed in Section 3.1. Circumstances on sites are subject to change and certain indicators of the presence of hazardous substances that may have been latent at the time of this inspection may subsequently have become observable.

6. The work carried out for the assessment can only investigate a small portion of the subsurface conditions. Certain indicators or evidence of hazardous substances may have been outside the limited portion of the subsurface investigated, latent at the time of the work or only partially intercepted by the works, and thus their full significance could not be appreciated. In this regard, groundwater levels are particularly susceptible to variation. Accordingly, it is possible that the assessment failed to indicate the presence or significance of hazardous substances. Assuming such substances exist, their presence could not have been considered in the formulation of the report's findings and opinions.

7. The assessment was prepared for the sole internal use and reliance of the Client. The report shall not be relied upon by or transferred to other parties without the express written authorisation of the Earth Science Partnership. If an unauthorised party comes into possession of the report, they rely on it at their peril and the authors owe them no duty of care and skill.

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