

Reading Football Club
Royal Elm Park
Geo-environmental Interpretive
Report

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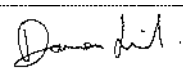
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Executive Summary

The Royal Elm Park is an exciting and appropriate development of an existing brownfield site to bring high quality private residential, hotel, leisure and conferencing facilities to a strategic location in Reading. The design proposals include robust earthworks, drainage and foundation techniques that address a unique landscape of ground conditions, developed through rigorous assessment and in close collaboration with key stakeholder approval bodies including the Environment Agency (EA) regarding groundwater and Reading Borough Council's Environmental Health department for the design of ground gas protection measures.

This report reassesses historical data complimented with new site investigations and monitoring to establish the gas characterisation for the site. The proposed measures for mitigating gas ingress to the buildings are assessed the potential for further gas generation due to the proposed construction works. A conservative interpretation suggests worst case values of concentration and flow for gas design.

The primary ground contamination challenges are the presence and continuing slow generation of landfill gases in the underlying ground and the potential for groundwater contamination potentially released during the development works. The existing ground gas conditions and potential future landfill gas generation have been assessed through review of historical gas monitoring, carried out over a 20 year period, and supplemented through additional monitoring carried out in 2016. These indicate "Characteristic Situation 4" under the CIRIA¹ guidance, for gas design. The proposed building design includes robust ground floor constructions designed to prevent ingress of gas. The constructions include gas trenches, a mechanically vented void below a suspended concrete ground floor slab and a gas protection membrane. The more sensitive residential accommodation has a further protection of a naturally ventilated semi-basement car park.

Whilst this report concerns ground gases, the mitigation of the potential groundwater contamination shares similar risks and construction solutions. This has been reviewed in detail with the EA separately and is detailed in the 'Environmental Strategy' report, dated 27 June 2016. This strategy includes a comprehensive schedule of ongoing monitoring prior to, during and post construction. It also includes an action plan for sharing monitoring results with key stakeholders including the EA and EHO. It details the proposed construction methods for controlled earthworks and a specific foundation piling technique developed from that already successfully implemented at the site for the construction of the on-site Madejski Stadium and adjoining Millennium Hotel.

¹ CIRIA C665 (2007), Assessing Risks Posed by Hazardous Ground Gases to Buildings.

1 Introduction

Ove Arup & Partners Ltd (Arup) has been commissioned by Reading Football Club (RFC) to provide various services in respect of proposals for redevelopment of the Madejski Stadium site.

The current Madejski Complex and development site lies over an area of made ground (formerly the Smallmead Landfill site) which is licensed by the Environment Agency (EA) under the Environmental Permitting Regulations (EPR). RFC has always operated the permit requirements efficiently and effectively and the site is regarded by the EA as very well-managed.

The site location and site layout are shown in Figure 1 and Figure 2.

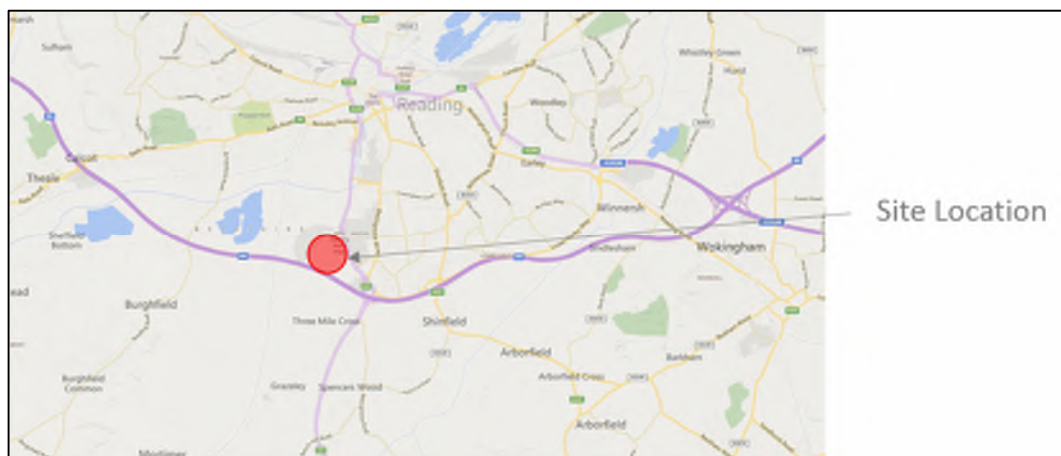


Figure 1: Site Location



Figure 2: Site Layout

1.1 Proposed Development for Planning

A hybrid planning application (No 160199) was submitted in February 2016 to Reading Borough Council (RBC) for residential and mixed use development comprising: residential units (apartment blocks) and commercial developments which include a convention centre, an ice rink, a hotel and up to 102 serviced

apartments. A part of the proposed development will include decked and multi – storey car parking, retail space, public open space, associated access, landscaping, and related infrastructure. An overall plan of the proposed development is shown in Figure 3 below.



Figure 3: Plan showing proposed development

An Environmental Statement [1] has been produced and was submitted as part of the planning application. A Land Contamination chapter was included which provides background information, a conceptual site model and risk assessment based on the known activities at the site and the proposed future redevelopment.

Consultation meetings have been held with the Environmental Health Officer (EHO) at Reading Borough Council and the Environment Agency, as follows:

Table 1: Consultation meetings

Reading Borough Council	Environment Agency
17 August 2015	20 May 2015
20 June 2016	28 July 2015
13 October 2016	7 October 2015
	16 November 2015

Throughout 2015, quarterly consultation meetings were held with the EA, regarding the proposed development to discuss potential groundwater issues. Three consultation meetings (August 2015 and June and October 2016) have been held with the EHO at RBC to discuss potential landfill gas issues.

1.2 Aim and Objectives

The purpose of this report is twofold:

- Firstly, to report on findings from monitoring data obtained from additional gas and leachate wells (Gas wells – GW01, GW02 and GW03; and leachate wells – LW01, LW02 and LW03). This information has been reviewed in the context of the body of existing historical data, to assess proposals for mitigation of gas into the proposed buildings, and
- Secondly, to report on the installation of three replacement monitoring wells BH01, BH02 and BH03 in order to comply with the EP as a number of monitoring wells required have become damaged or blocked, over time..

A supplementary objective was to obtain geotechnical information to inform civil and geotechnical design.

Installation of the three gas monitoring boreholes (GW01-GW03), together with the existing Boreholes R, S and T gives six monitoring points within the main body of the waste material, approximating to a 50m grid, across the permitted area.

The three replacement boreholes (BH01, BH02 and BH03) are located outside of the permitted area and therefore are not placed through the landfill waste. These replacement boreholes are aimed at groundwater monitoring in the secondary and principal aquifers. .

The three gas wells (GW01, GW02 and GW03) and the three leachate wells (LW01, LW02 and LW03) are located within the permitted area, and are installed in the landfill waste. Further details are given in section 3.1.

The above borehole locations are illustrated in Appendix A.

2 Context

2.1 Location

The site is located to the south of Reading off Junction 11 of the M4. The site is located at National Grid Reference SU707698 (Figure 1).

2.2 Historical Context

The following reports have been produced by Arup [1] [2] this year (2016);

- Ove Arup & Partners (2016). Royal Elm Park (Land at Madejski Stadium) ES Chapter 10: Land Contamination[1]
- Ove Arup & Partners (2015). Reading Football Club. Environmental Strategy [2].

The above reports document and summarise numerous other historical reports, produced about the site since 1995 and these (and the referenced material therein) should be read in conjunction with this report. A brief synopsis of the site history, taken from these documents is presented below:

Historical maps, dated 1883 to 2015, show that prior to 1972 the site was relatively low lying, flat, marshy ground. By 1972, the north eastern most part of the site known as the Smallmead Tip was used as a land raise for waste disposal. The historical maps show the main body of the landraise was located immediately adjacent to the site's north eastern boundary with landfill activity extending onto the site [1]. This is confirmed by later ground investigation boreholes.

Records indicate that the components of waste within the Smallmead Tip were predominantly municipal solid waste and building waste. Waste was originally deposited in the form of landraise, under the 'dilute and disperse' philosophy, whereby the landraise was unlined to allow percolation of rainwater through the waste material, which was common practice at the time. The landraise originally covered approximately 24ha (in the northeast of the site), with between 6m and 8m of fill. By 1985, historical maps indicate that the waste disposal site was grassed over with no further changes evident.

During 1997, the northern part of the Smallmead Tip was re-located to enable construction of the retail parks to the East of the Site. The tip material was re-deposited across the site under a Waste Management Licence. As part of the works, a series of environmental control measures and monitoring infrastructure were installed on the site to mitigate potential risks to the environment and human health; Section 6.0 of the Environmental Strategy Report [2] gives details of these.

From June 1997 the development and construction of the Madejski Stadium, the Royal Berkshire Conference Centre and associated infrastructure commenced. In January 1999, the construction of the Millennium Hotel commenced which was later extended in 2006. All such development work on site has been carefully specified, controlled and monitored, following the appropriate risk assessments and in liaison with the Regulatory Authorities [2].

Madejski Stadium site is a closed landfill which is licensed by the EA under an Environmental Permit (EP).

2.3 Topography and Hydrology

The landfill material forms a plateau, with levels varying from around 51mAOD in the south western area of the site down to around 41mAOD at the approach road to the North East. Ground levels slope away from the centre of the filled area towards the site boundaries to between 38 and 40m AOD.

The Foudry Brook flows from south west to north east along the western and northern boundary. An additional brook flows north, alongside the A33, and joins with the Foudry Brook beneath the roundabout to the north east of the Site.

3 Ground Investigation

There have been numerous ground investigations and reports produced [1][2] for the site and wider Madejski Stadium Complex. These relate to the various development phases which have taken place since the late 1980s.

3.1 2016 Ground Investigation

The 2016 ground investigation was undertaken by Geotechnical Engineering Limited (GEL) between 6th June 2016 and 30th August 2016. The ground investigation contractor's factual report (including borehole (BH) records and laboratory testing results) is included as Appendix B.

3.1.1 Additional Gas and Leachate Wells

Three gas monitoring boreholes were drilled within the permitted area to a maximum depth of 6m. GW01 and GW03 were installed with 50mm standpipes with a response zone from 4.00-5.00m, and GW02 was installed with a response zone from 4.70-5.70m.

The first well, GW02, was drilled using a cable percussive rig. At 6m depth, landfill gas began venting visibly from the BH, triggering gas monitors at the higher threshold of the personal monitors at 2m distance from the hole in open air. The borehole was left to vent overnight but was still gassing at the start of the next shift. Due to the potential health & safety risk, it was decided not to progress this hole further, and to install a gas monitoring standpipe from 4.7-5.7m depth to provide information on the ground gas conditions at that depth. The remaining wells within the permitted landfill were then drilled using water-flush rotary coring. Further discussion of this occurrence and its implications is included in Section 6.1.

In situ data loggers (GasClams) were installed in each of the three new gas wells to allow continuous in situ monitoring of methane and carbon dioxide concentrations. In situ monitoring of the existing boreholes R, S and T were included in the weekly in situ monitoring programme, although it was not possible to install GasClams into these wells.

As requested by the EA, the leachate wells (LW01, LW02 and LW03) were installed as nested wells in order to monitor leachate elevations from both the "old" waste at the bottom of the landfill, and the re-deposited waste in the top 5m. The wells were installed to a maximum depth of 12.70m (LW01). Natural ground was encountered at 11.90m below ground level (BGL) in LW01, 9.70mBGL in LW02 and 10.20mBGL in LW03. In all cases, the natural ground was sealed with bentonite and the standpipe (well) installations installed to the bottom of the waste. The following 50mm nested monitoring standpipes were installed:

- LW01: Standpipes installed to 11.70m and 5.00m, with slotted granular response zones from 11.70-10.70m and 5.00-4.00m;

- LW02: Standpipes installed to 9.70m and 5.00m, with slotted granular response zones from 9.70-8.70m and 5.00-4.00m; and
- LW03: Standpipes installed to 9.70m and 5.00m, with slotted granular response zones from 9.70-8.70m and 5.00-4.00m.

Full details of the gas and leachate standpipe installations are included in Appendix B (Contractor's Factual Report).

3.1.2 EPR Replacement Monitoring Wells

Three replacement BHs were constructed around the stadium perimeter (See Appendix A):

- BH01 installed to the south east of the stadium, to replace blocked BH X. BH01 was drilled to depth of 35m, with the response zone installed within the principal Chalk aquifer between 32m and 35m below ground level (BGL).
- BH02 installed to the north east of the stadium, to replace BH M. BH02 was drilled using a Terrier Rig to a depth of 7.37m. The response zone was installed within the gravels beds which were encountered between 3m to 3.6m BGL.
- The existing BH328 was to be redeveloped, by flushing out silt that had built up over the years, however attempts to remove the silt proved unsuccessful. It is proposed that a new BH be drilled following land access agreement with the third party land owners. The proposed borehole will be drilled within close proximity to the existing BH, with a response zone within the Chalk, at approximately 40m depth. BH328 is located northwest of the stadium and is shown in Appendix A.

3.2 Stratigraphy

The following sections describe the sequence of strata found during the historical ground investigations and reconfirmed during this most recent ground investigations.

3.2.1 Made Ground

The general composition of the waste is described as:

'MADE GROUND comprising firm greyish brown and dark brown slightly sandy gravelly CLAY with low subrounded brick cobble content and 20-30% fragments of glass (up to 50mm), plastic (bags), timber fragments (up to 100mm), paper (up to 40mm) and metal fragments (up to 50mm). Gravel is angular to rounded fine to coarse of brick, flint, sandstone and concrete.'

The borehole logs (both historical and recent) indicate that the site contains a range of waste materials such as demolition waste, other minor constituents such as brick, glass, rubber, rootlets, porcelain, metal, steel reinforcement, fabric,

geotextiles, plastic mesh, cardboard, paper, refuse, organic material and fragments of timber, hair and plastic bags and bottles. Other natural minor constituents include clay, chalk, flint, sandstone, and gravel. Made ground depth varies from 2.4m to 12m. Frequent shell fragments were also noted in some of the boreholes at a depth of 6.6m.

As expected, these findings concur with volumetric analysis previously carried out (1987) by Geo-Testing Services on the waste material of the original Smallmead Tip. The material was categorised as listed in Table 2: Volumetric Analysis of waste material on site 2.

Table 2: Volumetric Analysis of waste material on site

Description		% Volume
Matter > 5mm particle size	Paper	23.5
	Plastic	6.4
	Glass	2.9
	Ferrous metal	1.0
	Non-ferrous metal	0.2
	China	0.3
	Bone	0.1
	Asbestos	0.2
	Building materials	4.6
	Mineral aggregates	13.9
Matter < 5mm particle size	Organic matter	14.4
	Mineral matter	32.5

3.2.2 Anticipated Geology

Data from all the previous site investigations undertaken across the development site has been collated and a summary is given in Table 3: Summary of Ground Conditions below showing the proven strata and thicknesses across the site.

Table 3: Summary of Ground Conditions

Strata	Thickness (m)	Typical level of base (mAOD)
Made Ground (engineered clay cap)	1 - 1.3*	42.4
Made Ground (waste soils)	6 – 12**	37.7
Alluvial Clays	0 - 2.0	37.2

Alluvial/Terrace Gravels	0.3 - 2.0	36.2
London Clay Soft to Firm becoming Stiff sandy Clay	1.0 - 7.5	30.3
London Clay Basement Bed Dense grey silty fine sand locally cemented to form a strong grey green conglomerate	2.0 - 4.0	27.2
Lambeth Group (formerly Reading Beds) Stiff to very Stiff mottled blue grey and red slightly sandy Clay	~ 20	~ 7.2
Upper Chalk	Not proven	

*The 2016 investigation indicated a consistent depth to the base of the engineered clay cap of 1.05-1.10m

** The 2016 investigation indicated that the depth to the base of the made ground (waste) was 10.10-11.90m (36.5 to 37.80mAOD)

It should be noted that contrary to the British Geological Survey (BGS) maps, the London Clay and the London Clay Basement beds are present over the majority of the development site, albeit with differing thicknesses.

4 Monitoring Programme

Groundwater, leachate and gas data have been regularly collected from the Site since July 1996 prior to the development of Madejski Stadium under the provision of the Environment Permit. Over the years, the monitoring programme for these components have been reviewed, rationalised and amended.

Gas monitoring data is collected from the historical boreholes labelled A to O (See Appendix A for locations) on a monthly basis and is reported to the Environment Agency as part of the EP. This ensures that the historical gas monitoring data has been collected over the full variety of seasonal conditions, with associated changes in atmospheric pressure and water table elevation.

Three of these boreholes (R, S and T) are located within the waste material and have consistently shown elevated concentrations of methane and carbon dioxide. Gas emission flow rates have also been monitored in these three standpipes. The results of the gas monitoring in these standpipes is given in section 4.1.2.

The remaining lettered series boreholes are located around the permitted area and may be regarded as “boundary” monitoring wells for the waste mass. These boreholes predominantly have installations in the underlying river terrace gravels, although BHs L and M have response zones which also intercept waste material.

Methane has not been measured in the boundary wells although slightly elevated carbon dioxide concentrations have been recorded in BHs L, M and N.

In addition to the existing EP monitoring regime, gas and leachate monitoring data were collected for a period of two months from the recently installed wells (Gas Wells – GW01, GW02 and GW03; Leachate Wells – LW01, LW02 and LW03). The schedule for gas and leachate monitoring is listed in Table 4 below. These boreholes will be added to the EP monitoring programme to gather data.

Table 4: 2016 Gas and leachate monitoring schedule

Test	Frequency	Date Received
In situ gas readings	Weekly	19 July 2016
		26 July 2016
		01 Aug 2016
		08 Aug 2016
		15 Aug 2016
		22 Aug 2016
GasClam readings	Weekly	20 July 2016
		26 July 2016
		01 Aug 2016
		08 Aug 2016
		15 Aug 2016
		22 Aug 2016
Lab gas testing	Monthly	28 Jul 2016
		22 Aug 2016
In situ Leachate Testing	Weekly	19 Jul 2016
		25 Jul 2016
		01 Aug 2016
		08 Aug 2016
		15 Aug 2016
		22 Aug 2016
Lab Leachate Testing	Monthly	30 Aug 2016
		22 Jul 2016
		15 Aug 2016

The following sections review the monitoring results from the 2016 investigation, within the context of previously recorded historical data.

4.1 Ground Gas Monitoring

4.1.1 Monitoring prior to waste re-location

Gas monitoring within the waste of the Smallmead Tip conducted in 1996, prior to the re-location of the waste from the retail park area onto the top of the northern and western areas of the site, indicated that the gas composition comprised approximately 65% v/v CH₄ and 35%v/v CO₂ [2]. This was reported to be in agreement with monitoring results obtained in 1995 (70% v/v CH₄, 30%v/v CO₂) [2]. In 1996, methane was not detected in the lettered series standpipes sited outside of the permitted area, although CO₂ fluctuated with an average of 2.94%v/v [2]. These landfill bulk gas concentrations are very similar to those recorded in BHs R, S and T during the last 20 years or so of monthly monitoring (see 4.1.2 below).

The greatest standpipe gas emission flow rate recorded in the Smallmead tip waste before the site was re-profiled in 1997, (in BH109 which was previously located approximately in the centre of the current car parking area) was a peak flow of 0.7 l/h. This is consistent with the highest flow rate readings measured in BHs R, S and T in 2016.

4.1.2 Monitoring in borehole standpipes BHR, BHS and BHT

Methane and carbon dioxide concentrations recorded from monitoring visits in BHT, BHS and BHT over the past 2.5 years, with response zones in unsaturated waste, are illustrated in the Figure 4 and Figure 5. Whilst the original records identifying the depth and the construction of these boreholes are no longer available, the gas results are clearly consistent with gas levels expected from the waste and not from the underlying natural strata.

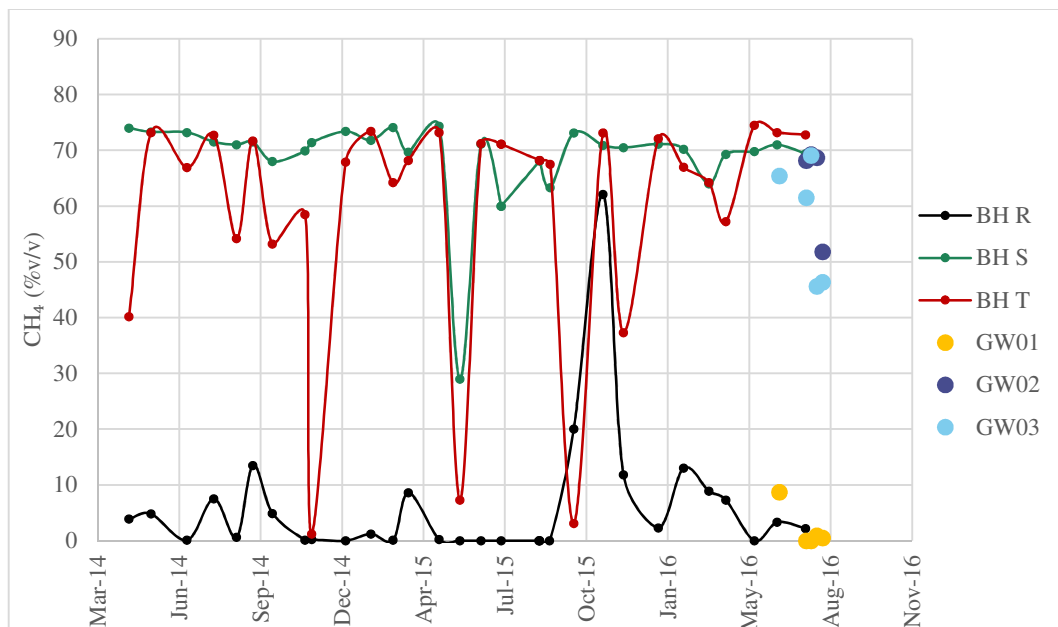


Figure 4: Methane (CH₄) monitoring results

The CH₄ concentrations in boreholes S and T (BHS and BHT) are consistently high as seen in **Error! Reference source not found.** and correspond to the levels recorded in the older waste during the 1990s. Borehole R (BHR) also recorded a peak of up to 60%v/v CH₄ although readings in this borehole were generally stabilised below 15%v/v.

The 2016 monthly data for the lettered series boreholes showed steady concentrations of methane ranging from 57.2% (April 2016) to 74.5% (May 2016) in BHT. Similar concentrations were measured in BHS (71% methane); lower, but still elevated, concentrations of 13% methane (max.) were recorded in BH R

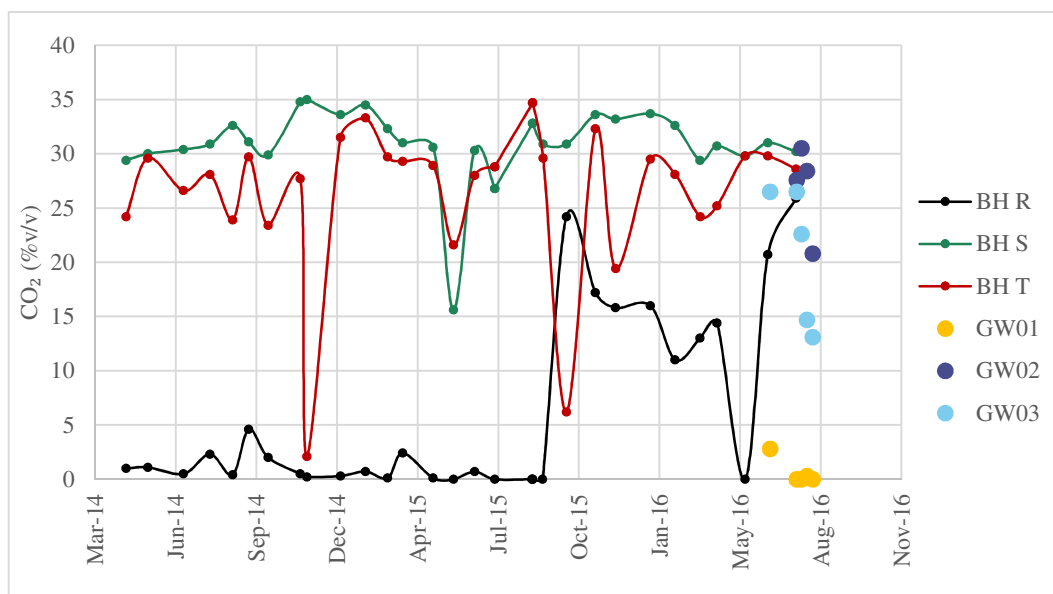


Figure 5: Carbon dioxide (CO₂) monitoring results

CO₂ concentrations in BHS and BHT are consistently high. CO₂ concentrations in BH R are generally below 5%v/v, however, towards the latter half of 2015, concentrations are more variable with a peak of 26% v/v.

Considering only the 2016 data, elevated concentrations of carbon dioxide (24.2 - 29.8%) were measured in BHT and similar but slightly higher concentrations were measured in BHS (33.7% carbon dioxide). Generally lower but still elevated CO₂ concentrations (max. 25.9%) were recorded in BH R.

Standpipe gas flows have also been intermittently measured in these three wells, with a peak flow of 0.8 l/h measured in BHR in January 2016. A plot of the results is presented as Figure 6 below.

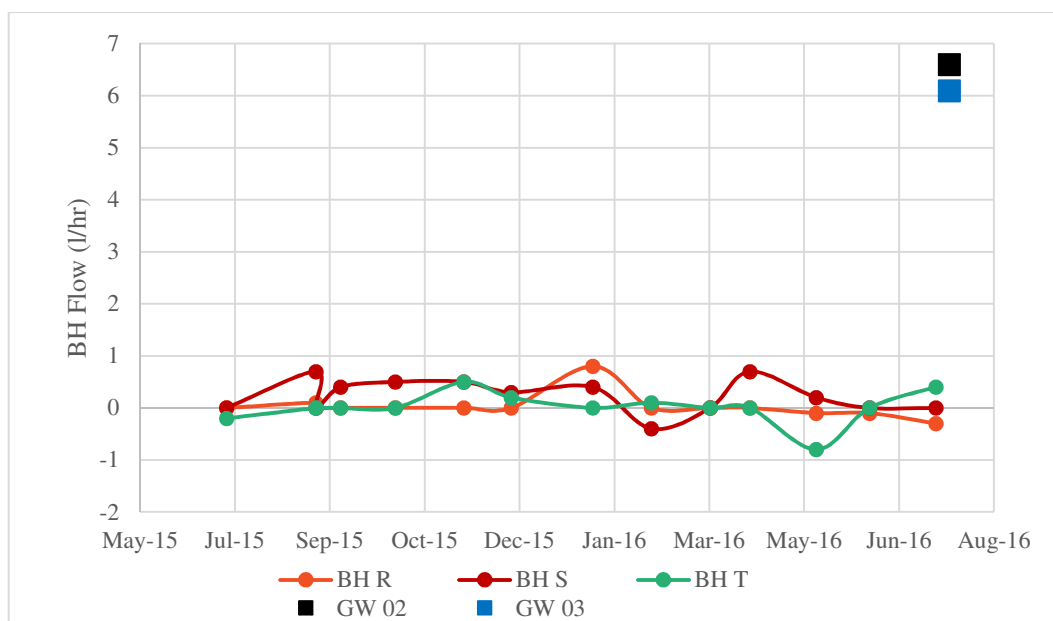


Figure 6: Flow rates (l/hr) BHs R, S and T, GW01, GW03

4.1.3 Other Gases

Low concentrations of hydrogen sulphide (H_2S) have been periodically measured in BHs S and T only of the lettered series. Concentrations are typically <10ppm although a maximum concentration of 52ppm was recorded in BHT in April 2016.

Hydrogen sulphide is a typical trace landfill gas found in landfills of this type and age and is released by the action of acidic groundwater on sulphate containing materials, such as plasterboard, under anaerobic conditions.

Carbon monoxide (CO) was measured at only low concentrations in the lettered series boreholes in July 2016.

4.1.4 2016 Gas Monitoring in GW01, GW02 and GW03

The 2016 monitoring data was collected at weekly visits between 19th July and 30th August with atmospheric pressures ranging from 1008 to 1017mb. Readings were collected every minute over a 15 minute period or until steady state was reached.

GasClam continuous monitoring equipment was installed in the three gas monitoring wells within the landfill (GW01 to GW03). The GasClams are set to record hourly gas concentration readings. These data supplement the weekly in situ field monitoring. Monthly gas samples were also collected for laboratory analysis for the following suites:

- Suite G1 (Bulk Gas Screen);
- Suite A;
- Arsenic; and
- Trace Landfill Gas Suite.

Full suite details are provided in Appendix C.

Weekly monitoring results

The results of the weekly monitoring are plotted on Figures 4 and 5 (alongside the results for BHR, BHS and BHT). The data collected from the new gas monitoring wells shows that GW02 and GW03 have similar methane levels to that of BHS and BHT between 45 and 70 %v/v and carbon dioxide concentrations between 13 and 31%v/v.

GW01 recorded lower concentrations of CH_4 and CO_2 as compared to GW02 and GW03. The much lower concentrations in GW01 are assessed to be due to the standpipe void space in GW01 being sealed above a flooded response zone and no significant bubbles of landfill gas arising from that response zone.

Standpipe gas emission flows were only recorded (above zero) on one of the 7 monitoring occasions, in both GW02 and GW03 (on 25th July 2016). The measurements recorded on that one occasion were much higher than those recorded in BHs R, S and T, as shown on Figure 6, with a maximum flow of 6.5

l/h measured in GW02. It is noted that a borehole differential pressure of 4.5 and 5 millibars were also recorded in GW02 and GW03 on 25th July and that the atmospheric pressure was moderate (1016 millibars). There is no obvious reason why the differential pressure existed on that day and not on the other monitoring occasions.

GasClam Measurements

Readings from the GasClams (Figure 7 and **Error! Reference source not found.** 8) are summarised in Table 5: GasClam data summary below.

Table 5: GasClam data summary

Monitoring location	Methane (max %)	Carbon Dioxide (max %)	Oxygen (min %)	VOC (max ppm)	Hydrogen Sulphide (max ppm)	Carbon Monoxide (max ppm)	Differential pressure range (min to max readings)
GW01	2.5	2.7	17.1	5	2	10	-45 to +8
GW02	76.1	33.5	0	89	11	142	-6 to 16
GW03	82.8	34.3	0	39	9	746	-12 to 6

The GasClam data was broadly in line with in-situ field gas monitoring carried out on a weekly basis during the months of July and August 2016 and with the historical data set. GasClam monitoring data was obtained for a period of seven weeks.

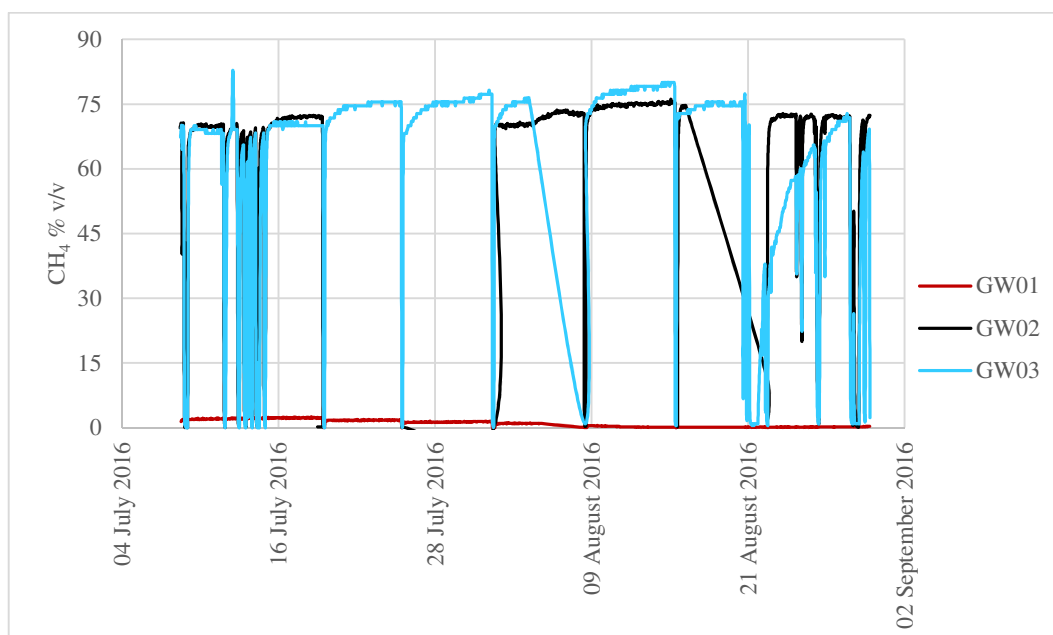


Figure 7: Methane (CH₄) GasClam Monitoring

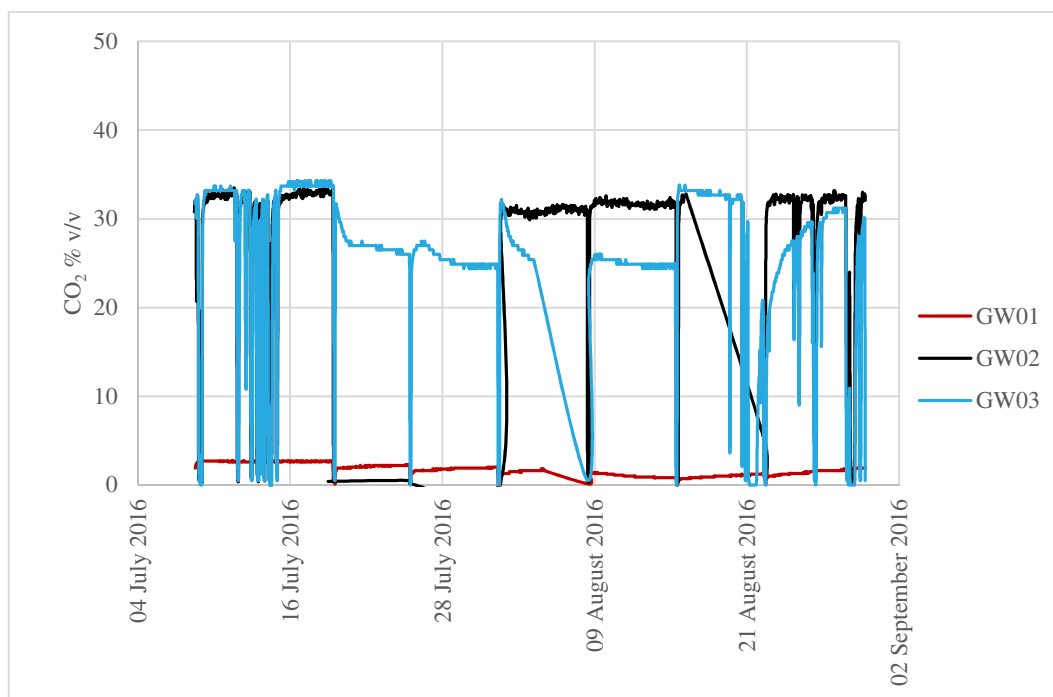


Figure 8: Carbon Dioxide (CO₂) GasClam Monitoring

From Figure 7: Methane (CH₄) GasClam Monitoring

7 and 8, it is observed that the CH₄ and CO₂ concentrations recorded in GW01 were consistently lower than the concentrations recorded in GW02 and GW03. Since these readings are significantly lower than GW02 and GW03, the design of protection measures have been considered in respect of the more onerous readings from GW02 and GW03. These results are in line with the site visit monitoring data obtained and the reasons are discussed in the sub-section above.

Low concentrations of H₂S, CO and volatiles (VOCs) were picked up in the continuous monitoring. In GW01 these were low (all were generally less than 5ppm). In GW02 and GW03 slightly higher concentrations of CO and VOCs were measured; typically 40-100ppm CO and 20ppm VOCs.

Laboratory analysis of gas samples

Laboratory analysis was carried out on the gas bag samples that were collected from GW01, GW02 and GW03 and the results are summarised in Table 6: Laboratory gas analysis 6 below.

Table 6: Laboratory gas analysis

Monitoring location	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Carbon Monoxide (%)	Nitrogen (%)
GW01 - 01 Aug 2016	<0.02	0.09	22	<0.01	78
GW01 - 15 Aug 2016	<0.02	0.09	22	<0.01	78

GW02 - 08 Aug 2016	<0.02	0.10	22	<0.01	78
GW02 - 15 Aug 2016	0.05	0.11	22	<0.01	78
GW03 - 01 Aug 2016	<0.02	0.08	22	<0.01	78
GW03 - 15 Aug 2016	<0.02	0.09	22	<0.01	78

The results obtained from laboratory analysis of the gas bags do not reflect the field data obtained. The results are indicative of ambient air concentrations. The reason for this is not known, but it could be due to analytical error or poor sampling methods. Hence, these results have not been considered in the assessment of the proposed gas protection measures.

4.2 Leachate

4.2.1 Existing Leachate wells

Leachate samples are collected from the leachate sumps located around the site, as a requirement of the EP. The leachate collects in the sumps which are gravity fed by fin drains situated at the base of the waste material (“old” and re-deposited waste). The sumps themselves are located at a depth of 1m above the highest recorded leachate level and were designed to drain any leachate rising above this level within the waste body.

Available leachate monitoring data recorded from 2012 to 2014 indicates that mean concentrations of iron, nitrate, sodium, sulphate, calcium, magnesium and chloride are within UK Drinking water standards (UK DWS) with occasional exceedances in concentrations of sodium, calcium, magnesium and chloride above UK DWS. Mean concentrations for potassium and manganese are elevated at 31.5mg/l and 784 mg/l respectively which are well above the UK DWS.

Field monitoring in 2011-2014 indicated that the depth to groundwater in the leachate wells were generally stable, showing a slight seasonal increase, during the summer months. Field monitoring of the leachate during May, June, July and August of 2014 recorded the average pH to be 6.95. Dissolved oxygen ranged from a depleted concentration of 0.3mg/l in LD10, located on the southern boundary of the site and the highest of 4.4mg/l in LD14 located on the eastern site boundary, although this value still indicates oxygen depletion.

Concentrations of ammoniacal nitrogen within the leachate wells have been recorded annually. Concentrations of ammoniacal nitrogen monitored in 2012, 2013 and 2014 within the leachate appear constant within each well over this three year period. The general level of ammoniacal nitrogen ranges from <0.27mg/l to a maximum of 34mg/l in LD5. Elevated levels of ammoniacal nitrogen outside of the normal trend was seen in LD7, on the north western boundary where 83.6mg/l was recorded and in LD10 in the south west, where the highest value of 167mg/l was measured in 2013.

4.2.2 2016 Leachate Data

New leachate monitoring wells have been installed in 2016. Samples were collected from the upper and lower sections of LW01, LW02 and LW03 (LW01U, LW01L, LW02U, LW02L and LW03L). Full suite details are provided in Appendix C.

UK and EU Drinking water standards were compared with the upper and lower sections of the leachate wells (see Table 7: Concentrations of ammoniacal nitrogen in leachate wells). Chemical analysis of the leachate samples during both the rounds of monitoring show occasional exceedances in all the leachate wells. In the first round of monitoring, LW02U recorded higher concentrations of ammoniacal nitrogen as compared to LW02L whereas, in the second round of monitoring LW02L recorded ammoniacal nitrogen concentration of approximately 30 times higher than in LW02U. The highest concentration of ammoniacal nitrogen was recorded in LW02L as 650mg/l.

Table 7: Concentrations of ammoniacal nitrogen in leachate wells

Date	LW01U (mg/l)	LW01L (mg/l)	LW02U (mg/l)	LW02L (mg/l)	LW03U (mg/l)	LW03L (mg/l)	UK DWS (mg/l)
01 August 2016	24	-	28	5.2	-	280	0.39
15 August 2016	88	-	22	650	440	-	

The leachate laboratory results with exceedances are summarised in Table 8: Summary of leachate laboratory results .

Table 8: Summary of leachate laboratory results

Contaminant	Unit	Min	Max	Groundwater criteria (UK DWS 2000)	Total no. of exceedances
Arsenic	µg/l	<0.15	17.6	10	1
Cadmium	µg/l	<0.02	0.11	5	0
Copper	µg/l	<0.5	5.1	2000	0
Iron	mg/l	0.23	1200	200	1
Lead	µg/l	<0.2	21	10	1
Mercury	µg/l	<0.05	0.26	1	0
Nickel	µg/l	<0.5	100	20	1
Zinc	µg/l	<0.5	72	5000*	0
Nitrate as NO ₃	mg/l	0.89	12.4	50	0
Potassium	mg/l	4.6	420	12*	8
Sodium	mg/l	24	680	200	7
Sulphate	mg/l	9.9	543	250	1
Magnesium	mg/l	4.1	360	50*	4
				*UK DWS (1989)	

The chemical analysis of leachate samples indicates that the main contaminants of concern are ammoniacal nitrogen, potassium, sodium and magnesium. LW02L

has exceedances of the following contaminants; ammoniacal nitrogen, sulphate, iron, magnesium, potassium, sodium, arsenic and lead.

Sampling and analysis of leachate in these wells has been added to the EP monitoring schedule.

5 Interpretation of Gas Monitoring Results

As expected, in situ and continuous gas monitoring undertaken at the Site (19th July -30th August 2016) in new gas monitoring wells GW02 and GW03 has confirmed the presence of landfill bulk and trace gases within the waste material. CH₄ and CO₂ were at concentrations commensurate with the data from BHs R, S and T.

GW02 and GW03 are located in the central and northern areas of the existing car park and the proposed public car park and square which is where the proposed convention centre, ice rink, hotel and serviced apartments will be located, see Figure 3 and Appendix A.

The 2016 monitoring of the GW series wells was undertaken during conditions of relatively high atmospheric pressure which on an uncapped site, would tend to inhibit gas evolution from the ground. However the site has an engineered cap which would substantially reduce the effect of ambient atmospheric pressures. Also, historically monthly gas monitoring in the lettered borehole series has taken place over the full range of seasonal conditions (atmospheric pressure and water table elevations).

Gas monitoring measurements from GW01 indicated much lower concentrations of methane and carbon dioxide. This is very likely to be due to the presence of perched water at this location, inhibiting gas movement into the standpipe. Data for GW01 does however, indicate the presence of more minor landfill gas constituents, such as H₂S, VOCs and CO which is consistent with the body of historical data.

5.1 Conceptual model and site characterization for ground gases

The conceptual model for the development site has been described in Chapter 10 of the environmental statement [1]. The source of the bulk ground gases of concern (methane and carbon dioxide) is biological and chemical degradation of organic matter in the municipal and commercial wastes deposited in the Smallmead tip between 1972 and 1985. Since the wastes were deposited 30 to more than 40 years ago, much of the CH₄ and CO₂ that will be produced by the organic matter in the wastes has already been generated and has either been emitted to atmosphere (during initial landfilling operations, during the relocation of wastes in 1997, through the initial landfill cap and through the vent stack system that has been in place since the Madejski stadium development was built) or remains in the landfill waste (as pore gases in the unsaturated zone and to a

much lesser extent as dissolved gases in perched leachate and leachate at the base of the landfill). The much higher concentrations of methane compared to carbon dioxide are entirely as expected for an aged landfill.

Predictions of landfill gas generation against time are described in Section 4.2 of the Ground Gas Handbook [3]. A simplistic analysis proposed by Nastev (1998) indicates that after 35 to 40 years nearly 80% of the total gas generation will be complete and that in the next 50 years there will only be 10% more gas generated (see Figure 4.2 of the Ground Gas Handbook). More accurate estimations of landfill gas generation rates and the changes over time can be developed using the GasSim computer modelling program developed for the Environment Agency.

Modelling that Arup has undertaken for another project using this program where a 6m thickness of municipal and commercial waste was deposited over the period the period 1970 to 1982 (i.e. similar in time to the Smallmead tip) is shown below (50 percentile). The modelling indicated that by 2016 more than 90% of the total landfill gas would have already been generated and the gas generation rate would be about 180m³/h, which for the size of the landfill corresponds to a generation rate of 0.56 l/h/m².

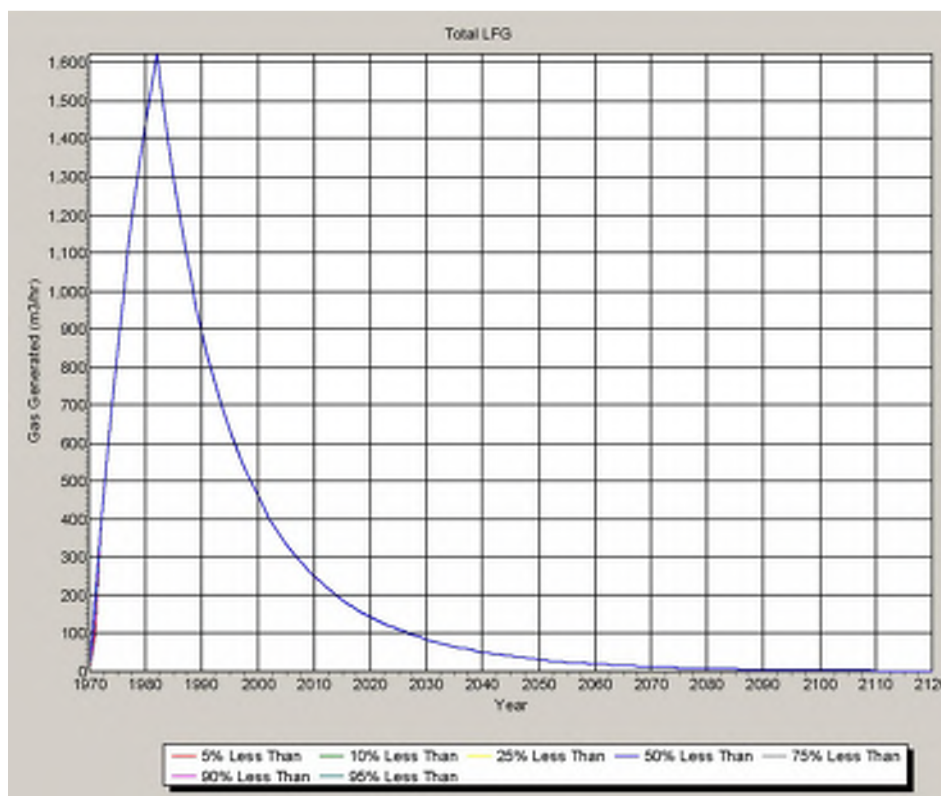


Figure 9: GasSim output for a comparable landfill (6m deep, filled from 1970-1982)

At the Proposed redevelopment site, the receptors to be protected from the present and future ground gases that will be generated are occupiers and users of the future development and maintenance workers in enclosed spaces where gas might be present. Risks to these receptors arises if sufficient volumes of methane or carbon dioxide accumulate in enclosed spaces.

The pathways by which the landfill gases could reach the future occupiers of the development are ingress into the below ground and ground level parts of the buildings and service spaces and if there were inadequate protection.

5.2 Calculation of Characteristic Situation

The characterization of the site has been assessed using the method set out in CIRIA C665 [3] and in BS8485:2015 **Error! Reference source not found.** and involves the assignment of a design gas screening value (GSV) using site gas monitoring measurements, from which the site's characteristic gas situation (CS) is determined. For the Royal Elm Park site, the monitoring measurements in BHs R, S and T and GW02 & GW03 have been used.

In accordance with BNS8485:2015, when there is a “temporally or spatially limited dataset” the highest measurements of concentration and flow rate from any standpipe on any occasion are combined. Therefore, using the worst case flow rate of 6.6 l/hr recorded from GW02 and maximum CH₄ and CO₂ concentrations of 82.8%v/v and 34.3%v/v respectively from GW03, the GSV can be calculated as follows.

CH₄ GSV = 82.8%v/v CH₄ * 6.6 l/hr = 5.47 l/hr ~ Characteristic Situation 4 (CS4)
CO₂ GSV = 34.3%v/v CO₂ * 6.6 l/hr = 2.26 l/hr ~ Characteristic Situation 3 (CS3)

It is noted that these GSV standpipe flow rates compare well with the GasSim modelling that Arup carried out (shown on Figure 9), since the conservative empirical assumption is that a standpipe emission represents an area around the standpipe of 10m².

Using the CS4 as a semi-quantitative estimate of risk for a site, the site is classified as moderate to high risk. According to CIRIA C665 [3], the gas protective measures are listed in Table 9: Typical scope of gas protective measures (CIRIA 665).

Table 9: Typical scope of gas protective measures (CIRIA 665)

Characteristic Situation	Residential building		Office/commercial/industrial development	
	Number of levels of protection	Typical scope of protective measures	Number of levels of protection	Typical scope of protective measures
1	None	No special precautions	None	No special precautions
2	2	a) Reinforced concrete cast in situ floor slab (suspended, non suspended or raft) with at least 1200 g DPM2 and underfloor venting. b) Beam and block or pre-cast concrete and 2000 g DPM/reinforced gas	1 to 2	a) Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200 g DPM2. b) Beam and block or pre cast concrete slab and minimum 2000 g

		membrane and underfloor venting. All joints and penetrations sealed.		DPM/reinforced gas membrane. c) Possibly underfloor venting or pressurisation in combination with a) and b) depending on use. All joints and penetrations sealed
3	2	All types of floor slab as above. All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space.	1 to 2	All types of floor slab as above. All joints and penetrations sealed. Minimum 2000 g/reinforced gas proof membrane and passively ventilated underfloor sub-space or positively pressurised underfloor sub-space
4	3	All types of floor slab as above. All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated underfloor subspace or positively pressurised underfloor sub-space, oversite capping or blinding and in-ground venting layer.	2 to 3	All types of floor slab as above. All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space with monitoring facility.
5	4	Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft). All joints and penetrations sealed. Proprietary gas resistant membrane and ventilated or positively pressurised underfloor sub-space, over site capping and in-ground venting layer and in ground venting wells or barriers.	3 to 4	Reinforced concrete cast in-situ floor slab (suspended, non-suspended or raft). All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space with monitoring facility. In ground venting wells or barriers.
6	5	Not suitable unless gas regime is reduced first and quantitative risk assessment carried out to assess design of protection measures in conjunction with foundation design.	4 to 5	Reinforced concrete cast in-situ floor slab (suspended, non-suspended or raft). All joints and penetrations sealed. Proprietary gas resistant membrane and actively ventilated or positively

				pressurised underfloor sub-space with monitoring facility, with monitoring. In ground venting wells and reduction of gas regime.
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6 Main Findings

6.1 Gas

Measurements from recent investigation were taken over the summer, during a general period of high atmospheric pressure. However, as the site is capped, the effect of atmospheric pressure on gas evolution may be lessened.

Variations in flow rate are to be expected and will relate to variation in fill material and its state of decay. The easily degradable material is likely to have already broken down.

Concentrations of methane and carbon dioxide in the waste material are elevated but consistent, as illustrated by BHS R, S, T, GW02 and GW03. These concentrations (together with the occasional occurrence of H₂S) are indicative of aerobic and anaerobic degradation occurring within the waste mass.

The worst case flow rates recorded during 2016 in GW02 and GW03 were 6.6l/hr, 6.1l/hr respectively. These concentrations are an order of magnitude higher than those previously recorded in the lettered series boreholes.

The maximum CH₄ concentrations recorded in GW02, GW03 were 76.1%v/v and 82.8%v/v. These are consistent with the historical gas data obtained from the other boreholes in the vicinity and the previously collected data.

The proposed commercial development is planned around GW02 and GW03 and this development is considered less sensitive as compared to the residential developments. However, during drilling of GW02, a significant quantity of landfill gas was encountered, which was vented to atmosphere. It is possible that other similar pockets of gas are present within the waste body and this has been taken into account in developing the proposed gas protective measures. Similarly, disturbance of the fill during the construction works has been assessed. The primary concerns are the introduction of oxygen and water. The foundation design and method of construction have been designed to limit both, as detailed in the Environmental Strategy and summarised as follows:

- All piles will be constructed using the CFA piling technique. This is closed bore method of piling where the pile shaft gradually extracts the fill material as concrete is pumped in. The pile bore is never open to the atmosphere so there is no direct path for water or oxygen to penetrate the pile shaft.
- All soft and hard-landscaping will be permanently capped to replace the existing cap that prevents water ingress to the fill. Service trenches,

drainage pipes and manholes will be constructed with the capping layer wrapped below as illustrated in *Figure 10*.

- Where the existing capping layer is removed during construction, for example for construction of deep pilecaps below the hotel and convention centre, temporary capping layers will be used to drain storm water to the site sewers (ref section 9 of the Environmental Strategy).
- The storm and foul sewer network have been designed to accommodate the anticipated future settlement of the landfill material (for further details refer to the 'Drainage Design Report', dated January 2016).
- All hardstandings will be constructed using traditional 'ground bearing' details with generous falls to accommodate storm water run-off to sewers to take account of anticipated future ground settlement. It is not proposed to pile the roads, hardstandings, drainage or below ground services.

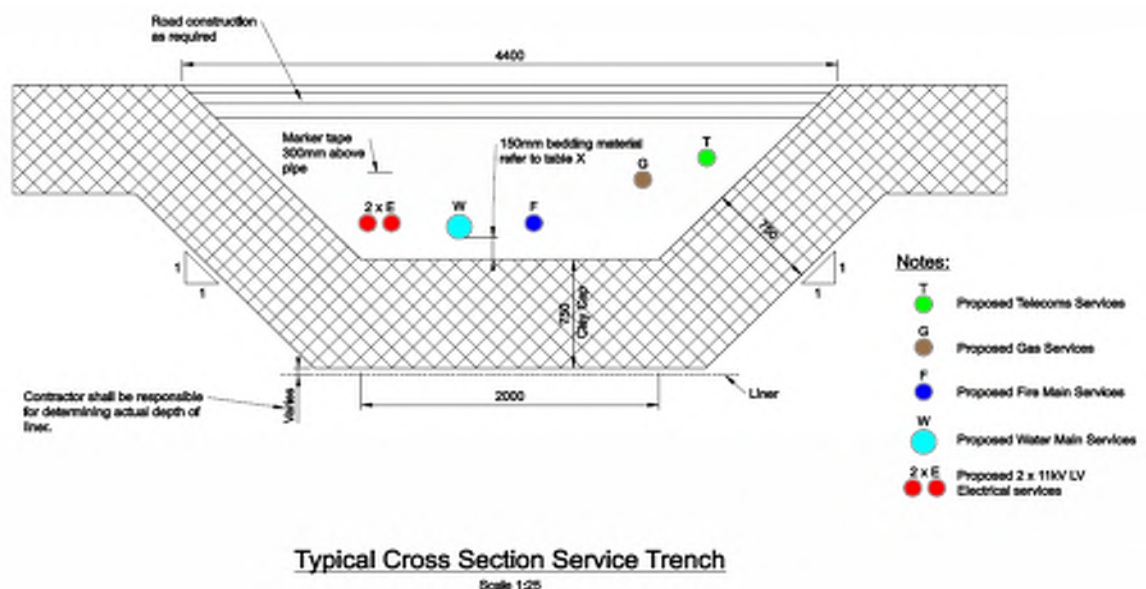


Figure 10; Typical capping layer construction below services

The ground floor constructions are designed so that they all provide a high level of gas protection integrity in excess of that required for the CS4 classification in accordance with CIRIA C665. The design solutions are detailed in the Environmental Strategy report and are summarised here:

Residential Accommodation:

- A mechanically vented void formed using proprietary void formers placed below the ground floor slab.
- A proprietary gas membrane placed on top of the void former, lapped and tapped to all penetrations and to the existing membrane around the perimeter of the building

- A suspended reinforced concrete ground floor slab, reinforced to limit crack widths to 0.3mm
- A naturally ventilated car park
- A further reinforced concrete suspended slab to all accommodation

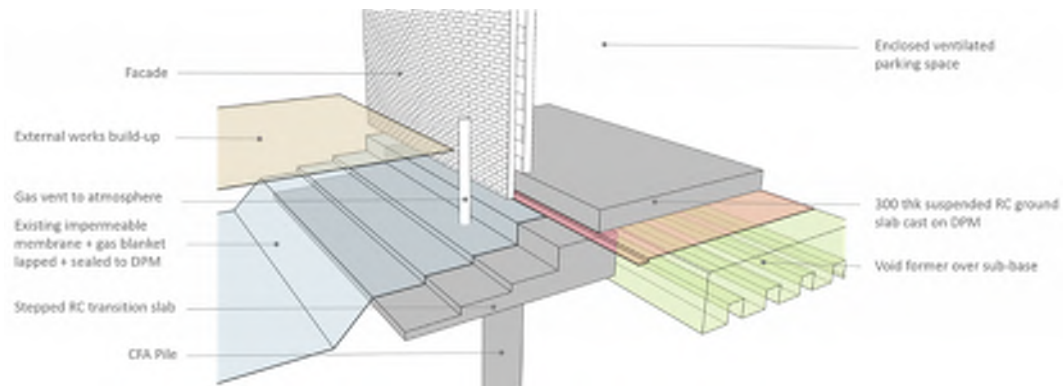


Figure 11: Ground Floor construction to residential accommodation

Conference Centre accommodation, including office, leisure and hotel at ground floor level:

- A mechanically vented void formed using proprietary void formers placed below the ground floor slab.
- A polythene membrane placed below the ground floor slab and on top of the void former. The purpose of this layer is to contain the in situ concrete during construction but also adds to gas protection.
- A suspended reinforced concrete ground floor slab, reinforced to limit crack widths to 0.3mm
- A proprietary gas membrane placed on top of the void former, lapped and tapped to all penetrations and to the existing membrane around the perimeter of the building. The position of this layer provides increased confidence in its integrity during construction.
- Insulation and floated floor will be placed on top of the membrane to protect it in operation.

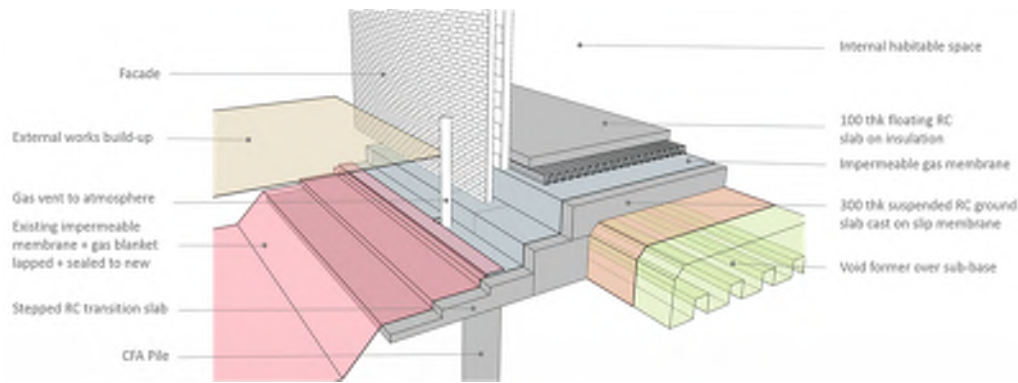


Figure 12: Ground floor construction to the Conference Centre

In addition, it is proposed to construct shallow stone gas trenches below the ground floor slab. These trenches will be linked to the below slab void ventilation to provide a further measure for mitigating the build-up and ingress of gas to the buildings.

With the additional stone gas trenches, the number of levels of protection provided for the residential and conference buildings is five. In accordance with CIRIA C665, this would be adequate protection for a CS5 classification. The proposed construction provides a level of protection for gas concentrations far in excess of the most onerous readings recorded on site historically or from the recent site investigation and is therefore considered to be very robust.

6.2 Leachate

As expected, the chemical analysis of leachate samples indicates that the main contaminants of concern are ammoniacal nitrogen, potassium, sodium and magnesium. This is in line with previously recorded historical leachate data. The most elevated contaminant concentrations were measured in the lower well of LW02 which have exceedances of ammoniacal nitrogen, sulphate, iron, magnesium, potassium, sodium, arsenic and lead.

Going forward, it is proposed to add monitoring of the 2016 gas and leachate wells (GW01, GW02, GW03, LW01, LW02 and LW03) to the existing EPR monitoring schedule.

7 Conclusions

Ground gases, groundwater and leachate have been monitored on the site for nearly 20 years with all data regularly submitted to the EA for review. These historical data has been re-assessed and complimented with new site investigations and monitoring to establish the gas characterisation for the site so that design proposals for mitigating gas ingress to the buildings can be assessed.

The recent site investigation monitoring results identify gas concentrations and flow rates that are in line with the 20 years' of historical data. A conservative

interpretation suggests worst case values of concentration and flow for gas design Characteristic Situation 4 (CS4) in accordance with the CIRIA² guidance.

The design proposals for planning provide robust protection measures suitable for preventing gas ingress to the proposed accommodations for a CS4 site. The potential for the construction works to change the gas regime will be rigorously controlled. The proposed slab provides a level of protection consistent with CS5 classification and therefore is considered to robustly cater for any slight gas increases due to construction.

Mitigation of potential groundwater contamination has been reviewed in detail with the EA separately and is detailed in the report 'Environmental Strategy' dated 27 June 2016. This strategy includes a comprehensive schedule of ongoing monitoring prior to, during and post construction. It also includes an action plan for sharing monitoring results with key stakeholders including the EA and EHO. It details the proposed construction methods for controlled earthworks and a specific foundation piling technique developed from those already successfully implemented for the construction of the on-site Madejski Stadium and adjoining Millennium Hotel.

² CIRIA C665 (2007), Assessing Risks Posed by Hazardous Ground Gases to Buildings.

References

- [1] Ove Arup & Partners (2016). Royal Elm Park (Land at Madejski Stadium) ES. Chapter 10: Land Contamination
- [2] Ove Arup & Partners (2016). Reading Football Club. Environmental Strategy.
- [3] Steve Wilson, Geoff Card and Sarah Haines (2009). Ground Gas Handbook
- [4] CIRIA C665 (2007). Assessing Risks Posed by Hazardous Ground Gases to Buildings.

Appendix A

Borehole Locations

Appendix B

Ground Investigation Factual Report

Appendix C

Laboratory Testing Schedule

C1 Gas Laboratory Suite

Determinand	Detection level required/offered ¹	Test method required/offered ¹	Accreditation required/offered ¹
SUITE G1 – Bulk Gas Screen			
Carbon dioxide	0.01 % v/v	GC/TCD	NONE
Hydrogen	0.01 % v/v	GC/TCD	NONE
Methane	0.02 % v/v	GC/TCD	NONE
Nitrogen	0.01 % v/v	GC/TCD	NONE
Oxygen	0.01 % v/v	GC/TCD	NONE
Carbon monoxide	0.01% v/v	GC/TCD	NONE
Suite A			
Acetaldehyde	0.1µg	HPLC (DNPH derivative)	UKAS
Formaldehyde	0.1µg	HPLC (DNPH derivative)	UKAS
Arsenic			
Arsenic	<1µg	ICP-OES	UKAS
Trace Landfill Gas Suite			
1 Pentane	10 ng	GC/MS (TD SIR)	UKAS
1,1-Dichloroethane	10 ng	GC/MS (TD SIR)	UKAS
1,1-Dichloroethylene	30 ng	GC/MS (TD SIR)	UKAS
1,2-Dichloroethane	10 ng	GC/MS (TD SIR)	NONE
1,2-Dichloroethylene	10 ng	GC/MS (TD SIR)	UKAS
1,3-Butadiene	10 ng	GC/MS (TD SIR)	UKAS
1,4 epoxy 1,3-butadiene	10 ng	GC/MS (TD SIR)	NONE
1-Propanethiol	10 ng	GC/MS (TD SIR)	UKAS
2-butoxyethanol	10 ng	GC/MS (TD SIR)	NONE
Benzene	10 ng	GC/MS (TD SIR)	UKAS
Butric Acid	10 ng	GC/MS (TD SIR)	NONE
Carbon Disulphide	10 ng	GC/MS (TD SIR)	NONE
Carbon Tetrachloride	10 ng	GC/MS (TD SIR)	UKAS
Chloroethane	30 ng	GC/MS (TD SIR)	NONE
Dichloromethane	10 ng	GC/MS (TD SIR)	NONE
Dimethyl disulphide	10 ng	GC/MS (TD SIR)	NONE
Dimethyl Sulphide	10 ng	GC/MS (TD SIR)	UKAS
Ethyl butyrate	25 ng	GC/MS (TD SIR)	NONE
Ethyl Mercaptan	10 ng	GC/MS (TD SIR)	NONE
Hydrogen Sulphide	60 ng	GC/MS (TD SIR)	NONE
Methyl mercaptan	30 ng	GC/MS (TD SIR)	NONE

Determinand	Detection level required/offered ¹	Test method required/offered ¹	Accreditation required/offered ¹
N-Butyl Mercaptan	10 ng	GC/MS (TD SIR)	UKAS
Styrene	10 ng	GC/MS (TD SIR)	NONE
Toluene	10 ng	GC/MS (TD SIR)	NONE
Trichloroethylene	10 ng	GC/MS (TD SIR)	UKAS
Vinyl chloride monomer	10 ng	GC/MS (TD SIR)	UKAS
¹ Either Investigation Supervisor to specify method required or Contractor to indicate method(s) offered			

C2 Leachate Laboratory Suite

Matrix	Determinand	Accreditation Status	Methodology	Detection Limit	Units
Water	Insitu readings				
Water	Temperature				
Water	TOC				
Water	TON				
Water	Electrical Conductivity				
Water	PH				
Water	Dissolved Oxygen				
Water	Suite F1 - Water Samples General				
Water	pH	ISO17025	Potentiometric	+ / - 0.1	pH units
Water	Hardness - Total (as CaCO ₃)	ISO17025	ICP-OES & Calculation	<2	
Water	Arsenic (dissolved)	ISO17025	ICP-MS	< 0.15	µg/l
Water	Cadmium (dissolved)	ISO17025	ICP-MS	< 0.02	µg/l
Water	Chromium (dissolved)	ISO17025	ICP-MS	< 0.2	µg/l
Water	Copper (dissolved)	ISO17025	ICP-MS	< 0.5	µg/l
Water	Lead (dissolved)	ISO17025	ICP-MS	< 0.2	µg/l
Water	Mercury (dissolved)	ISO17025	ICP-MS	< 0.05	µg/l
Water	Nickel (dissolved)	ISO17025	ICP-MS	< 0.5	µg/l
Water	Selenium (dissolved)	ISO17025	ICP-MS	< 0.6	µg/l
Water	Zinc (dissolved)	ISO17025	ICP-MS	< 0.5	µg/l
Water	Antimony (dissolved)	ISO17025	ICP-MS	< 0.4	µg/l
Water	Beryllium (dissolved)	ISO17025	ICP-MS	< 0.1	µg/l

Water	Vanadium (dissolved)	ISO17025	ICP-MS	< 0.2	µg/l
Water	Ammoniacal Nitrogen	ISO17025	ISE	<15	µg/l
Water	Chloride	ISO17025	Discrete Analyser	< 0.15	mg/l
Water	Cyanide - Total	ISO17025	Skalar CFA	<10	µg/l
Water	Phenols - Total (monohydric)	ISO17025	Skalar CFA	<10	µg/l
Water	Suite F2 - Water Samples Spectiated TPH				
Water	TPH CWG inc BTEX & MTBE (C5-C44)	None	GC/MS	<10	µg/l
Water	Suite F3 - Water Samples PAH and BTEX				
Water	BTEX	ISO17025	HS-GC/MS	<1	µg/l
Water	PAH - Speciated (EPA 16)	ISO17025	GC/MS	<0.01	µg/l
Water	Suite F4 - Water Samples VOC and SVOC				
Water	VOCs	ISO17025 (Dependin g on compound)	HS-GC/MS	<1	µg/l
Water	SVOC (see appendix for full technical spec)	ISO17025 (Depending on compound)	GC/MS	<0.01 - <0.1 (Depending on compound)	µg/l
Water	Suite F6 Hydrocarbon Identification				
Water	TPH Total (C8 – C40)	None	GC/MS	<10	µg/l
Water	Diesel Range Organics (C10 - C25)	None	GC/MS	<10	µg/l
Water	PRO (C6 - C10)	None	HS-GC/MS	<10	µg/l
Water	Mineral Oil (C10 - C40)	None	GC/MS	<10	µg/l
Water	Suite F7 - Cyanides				
Water	Cyanide - Ferri - Ferro	None	Skalar CFA	< 1	µg/l
Water	Cyanide - Free	ISO17025	Skalar CFA	< 1	µg/l
Water	Thiocyanate (as SCN)	ISO17025	Discrete Analyser	< 200	µg/l

Water	Suite F8 - Chromium Hexavalent				
Water	Chromium - Hexavalent	ISO17025	Skalar CFA	<5	µg/l
Water	Suite F9 - Speciated Phenols				
Water	Phenols - Speciated (see appendix for full tec	None	HPLC	<0.5	µg/l
Water	Suite F10 - Oxygen Demand				
Water	Biochemical Oxygen Demand (BOD) - 5 day	ISO17025	Probe	<1	mg/l
Water	Chemical Oxygen Demand (COD)	ISO 17025	Colorimetric	<2	mg/l
Water	Suite F14 - Others				
Water	Calcium (dissolved)	ISO17025	ICP-OES	< 0.012	mg/l
Water	Iron (dissolved)	ISO17025	ICP-OES	< 4	µg/l
Water	Magnesium (dissolved)	ISO17025	ICP-OES	< 0.005	mg/l
Water	Manganese (dissolved)	ISO17025	ICP-MS	< 0.05	µg/l
Water	Sodium (dissolved)	ISO17025	ICP-OES	< 0.010	mg/l
Water	Potassium (dissolved)	ISO17025	ICP-OES	< 0.025	mg/l
Water	Sulphate as SO ₄	ISO17025	ICP-OES	<0.03	mg/l
Water	Sulphide	None	ISE	<5	µg/l
Water	Nitrate (as N ₀₃)	ISO17025	Discrete Analyser	< 0.05	mg/l
Water	Nitrite (as N ₀₂)	ISO17025	Discrete Analyser	< 5	µg/l

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cc	Catherine Lewis - Reading Borough Council Ewan Tweedie - Tweedie Evans Consulting	File reference	
Prepared by	Ruveetha Pereira, Arup	Date	31 March 2017
Subject	Site Characterisation Update Report		

1 Introduction

This technical note reports findings of in-situ monitoring completed between 12th December 2016 and 29th March 2017 at the Madejski Stadium site. It is an addendum to work completed in summer 2016¹.

The Madejski Complex overlies an area of made ground (formerly the Smallmead Landfill site) which is licensed by the Environment Agency (EA) under the Environmental Permitting Regulations (EPR).

2 Site work

The 2017 in-situ gas monitoring was undertaken by Geotechnical Engineering Limited (GEL) on a weekly basis at 8 boreholes (GW01, GW02, GW03, GW04, GW05, GW06, GW08 and GW09).

The above borehole locations are illustrated in the attached Appendix Figure 1, with borehole records and gas monitoring data included as Appendix B.

3 Monitoring Results

Measurements of atmospheric pressure (from both the GasClams® and in situ) have been made over the monitoring period (22 December 2016 – 14th February 2017). These data show reasonably good correlation with each other and demonstrate that the monitoring has taken place during both high and low atmospheric pressure conditions (See Appendix A, Figure 2). This is important as

¹ Ove Arup and Partners (2016), Geo Environmental Interpretive report

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changes in barometric pressure (particularly rapid ones) can be a major influence on gas emission rates².

Water table elevations have also been measured at weekly intervals throughout the in-situ monitoring period (22 December 2016 – 29th March) (See Appendix A, Figure 3). These data indicate that water levels are relatively stable over the monitoring period to date.

3.1 Boreholes R, S and T

Boreholes R, S and T are located within the Permitted area and methane (CH₄) and carbon dioxide (CO₂) concentrations and gas flow are routinely measured at these locations, as part of the EPR. The results are illustrated in Appendix A and show that gas flow rates are typically around 0.3-0.4 L/h, with a maximum flow rate of 0.9L/h recorded in BHS in August 2016 (see Appendix A, Figure 4).

CH₄ and CO₂ concentrations are consistently elevated with maximum concentrations of 79%v/v in BHS and 34.7%v/v in BHT recorded (see Appendix A, Figures 5 and 6).

3.2 2017 In-situ Monitoring (GW01-GW09)

The maximum CH₄ concentrations recorded were in GW09 (80% v/v) and GW02 (79% v/v). These are consistent with the historical gas data obtained from the other boreholes in the vicinity and the previously collected data.

The continuous GasClam® monitors were taken off on 27th February. A weekly insitu monitoring programme has been in place since 16th March. This has enabled us to monitor gas concentrations and flows in the boreholes.

Gas flow rates were measured in the boreholes with the most elevated values recorded in boreholes GW08 (37.9 l/hr) and GW09 (37.2 l/hr), located in the central and south-western areas of the site respectively. High gas flows of up to 34.9l/hr and 27.3l/hr were measured for the first time in boreholes GW02 and GW03 respectively as these boreholes were previously flooded.

3.3 Calculation of Characteristic Situation

The characterisation of the site has been assessed using the empirical method set out in CIRIA C665³ and in BS8485:2015 and involves the assignment of a design gas screening value (GSV) using site gas monitoring measurements, from which the site's characteristic gas situation (CS) is determined.

In accordance with the approach set out in Annex F of BS8485:2015, we have calculated the hazardous gas flow rate (GSV value) for methane for each in-situ monitoring occasion in 2017 at each borehole location using the flow rate recorded by the gas analyser and also using the gas concentration recorded at that time by the GasClam®. Only CH₄ concentrations were considered as these are always higher than CO₂, and therefore define the design case. The measurements used and the calculated GSVs and inferred CSs are shown in Appendix A, Table 1 and in Figure 1 below.

² Assessing Risks Posed by Hazardous Ground Gases to Buildings , CIRIA C665 (2007)

\\GLOBAL.ARUP.COM\EUROPE\MIDLANDS\JOBS\240000\240524-00 MADEJSKI REDEVELOPMENT\4 INTERNAL DATA\4-04 REPORTS\4-04-01 MULTIDISC\REP-240524-98 SITE CHARACTERISATION 2017\SITE CHARACTERISATION UPDATE TECHNICAL NOTE 31 03 17.DOCX

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As can be seen, most of the measurement sets when a measureable emission flow rate is recorded falls into either CS3 or CS4; and on few occasions in the lower CS5 range when a high gas flow rate is recorded.

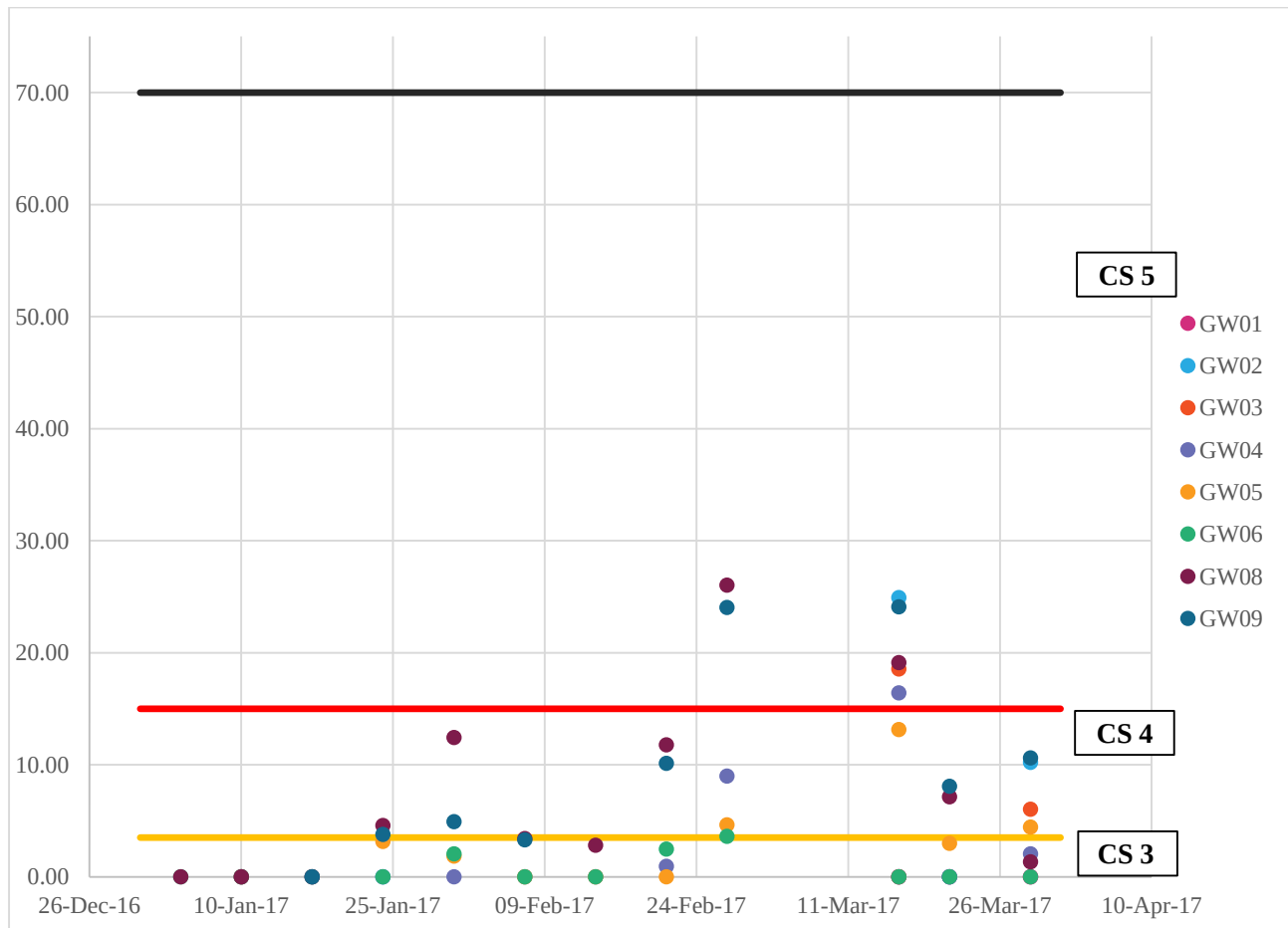


Figure 1: Methane Gas Screening Values (GSVs) - Gas Analyser Measurements

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	Ruveetha Pereira, Arup		
Signature			

Appendix A

Figures and Tables



Legend:

Proposed Building Outlines

Previous Monitoring Locations

GIXX-Name Previous Ground Investigation Location

+ Name Monitoring Location (Lost)

+ Name Monitoring Locations

Name Borehole Location

Location of Drain

GI Name Description:

GI XX - Name

Contractor Year - Hole Name

Notes:

1. Topo Survey dated 2015-02 by Midland Survey LTD

2. OS Mapping © Crown copyright (2016). All rights reserved. Licence Number 100039628.

3. The location of LW01, LW02, and LW03 have been artificially moved 5m to the East to aid drawing clarification.

01	15/02/17	IJ	RP	LS
For Information				
Issue	Date	By	Chkd	Appd

ARUP

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Client

Reading Football Club Ltd

Job Title

Royal Elm Park
(Land at Madejski Stadium)

Site Characterisation Update
Report

Scale at A1

1:1250

Discipline

Geotechnical

Job No

240524-98

Drawing Status

For Information

Drawing No

Figure 01

Issue

01

Do not scale

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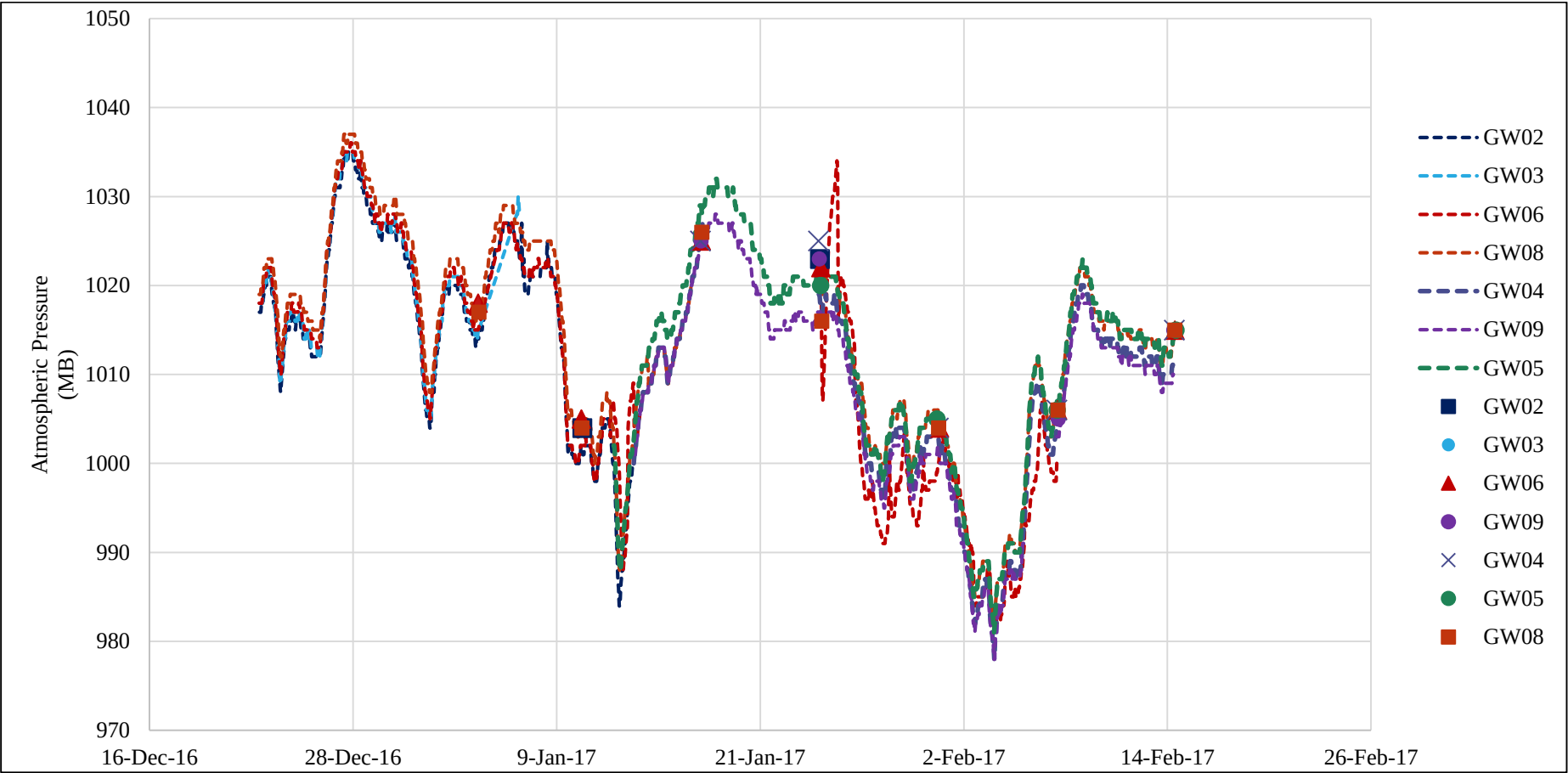


Figure 2: Atmospheric Pressure (GasClams and Insitu)

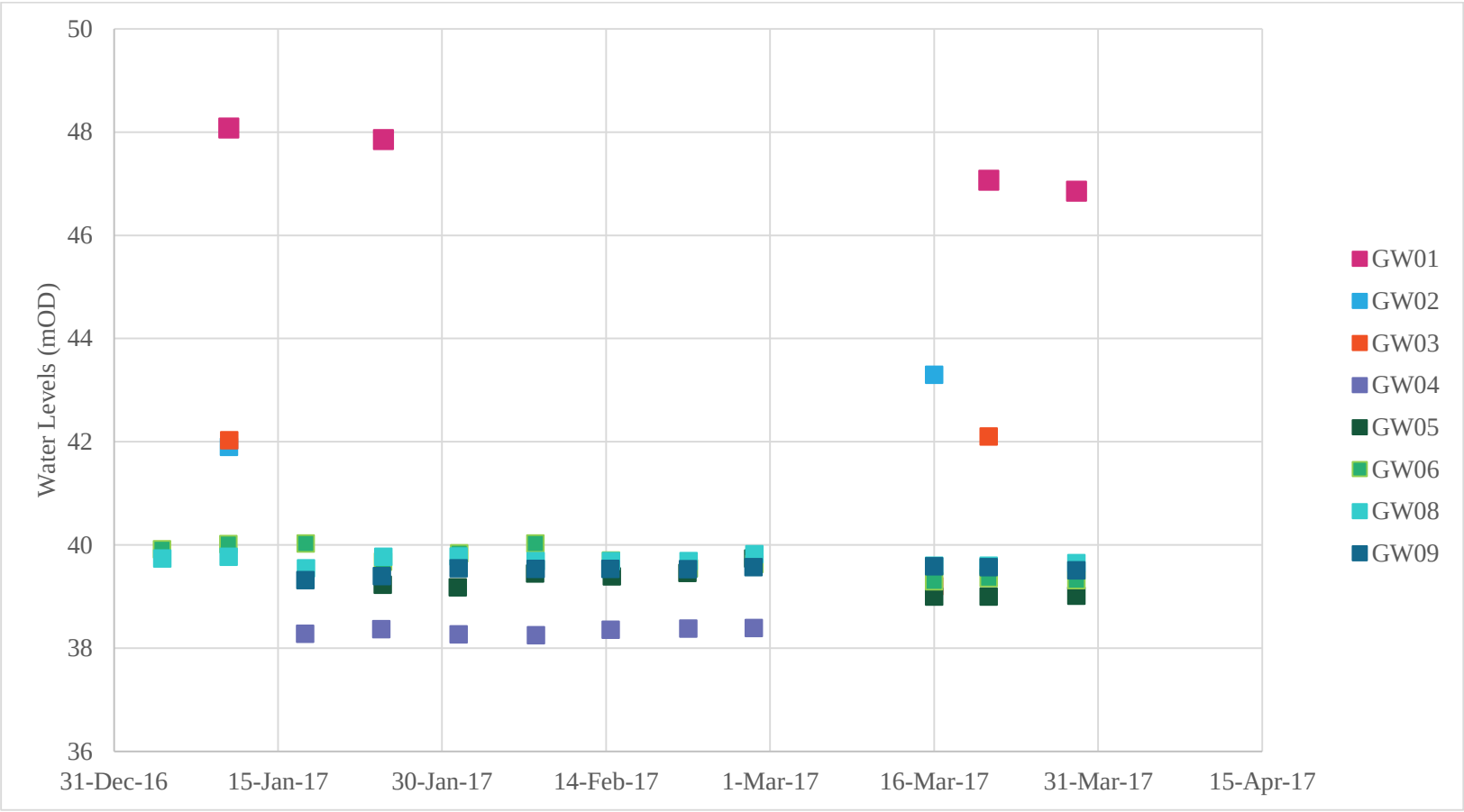


Figure 3: Water levels (mOD) measured at weekly intervals.

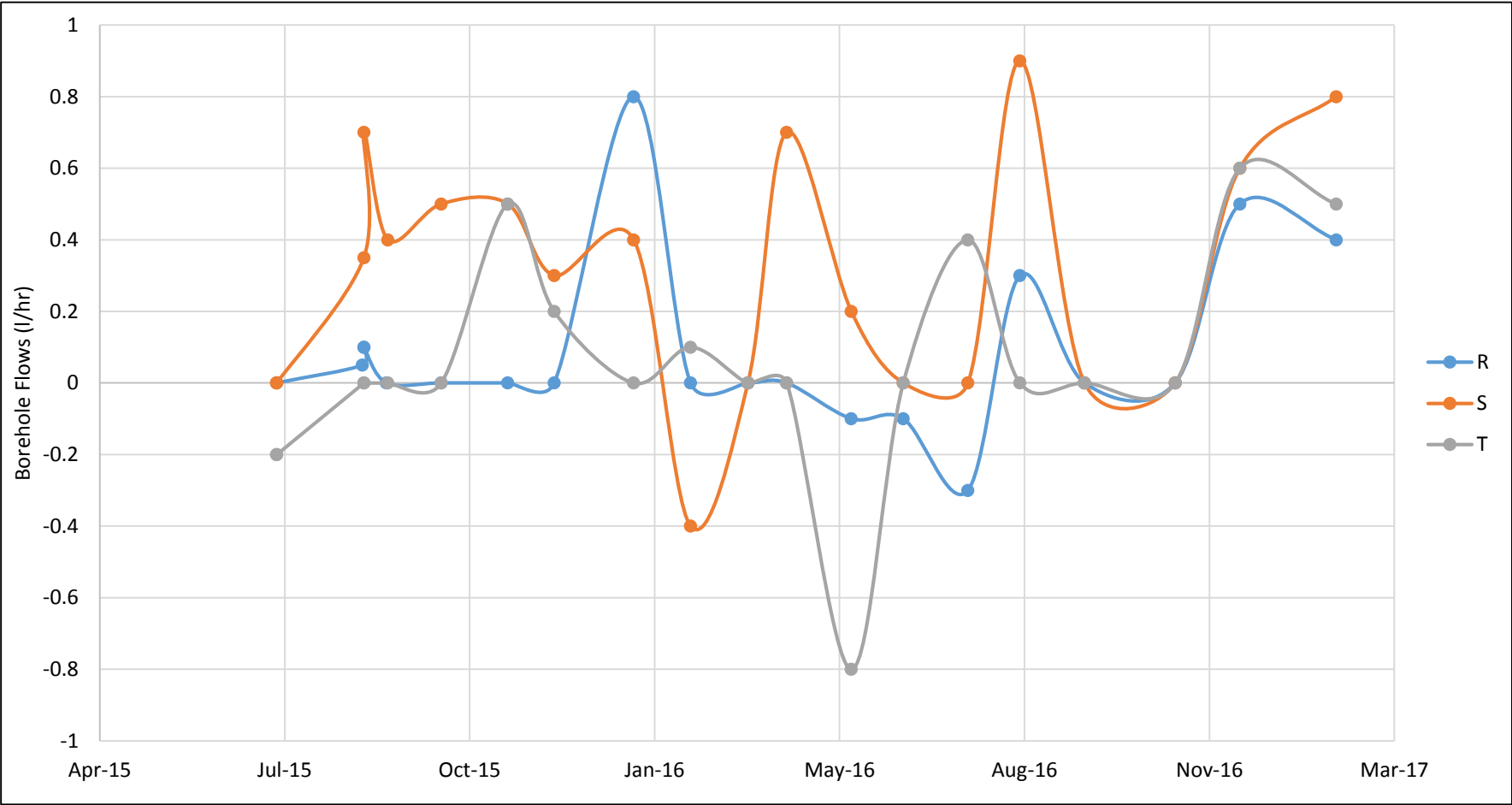


Figure 4: Boreholes R, S and T flows (l/hr).

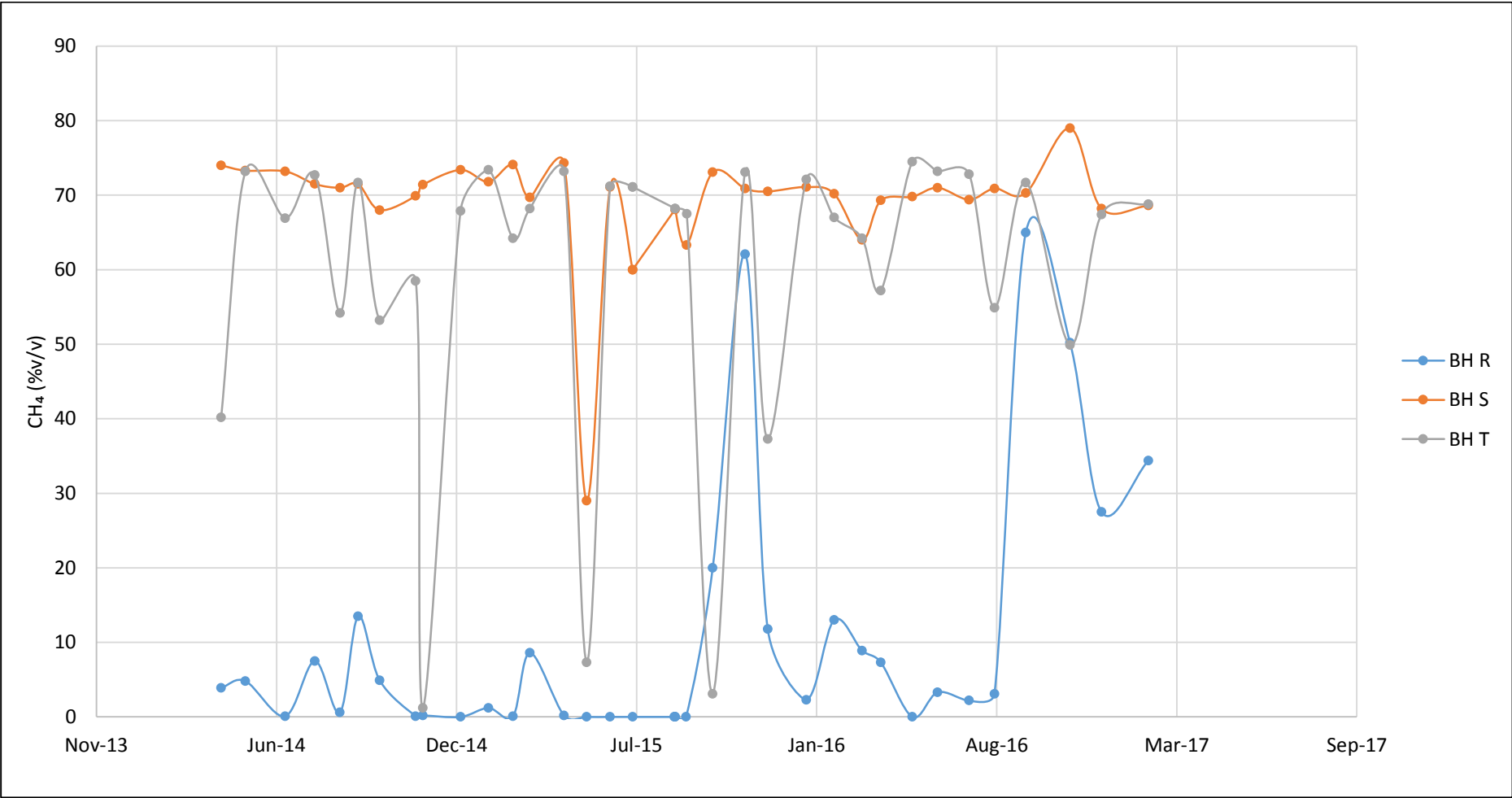


Figure 5: Methane concentrations recorded in boreholes R, S and T

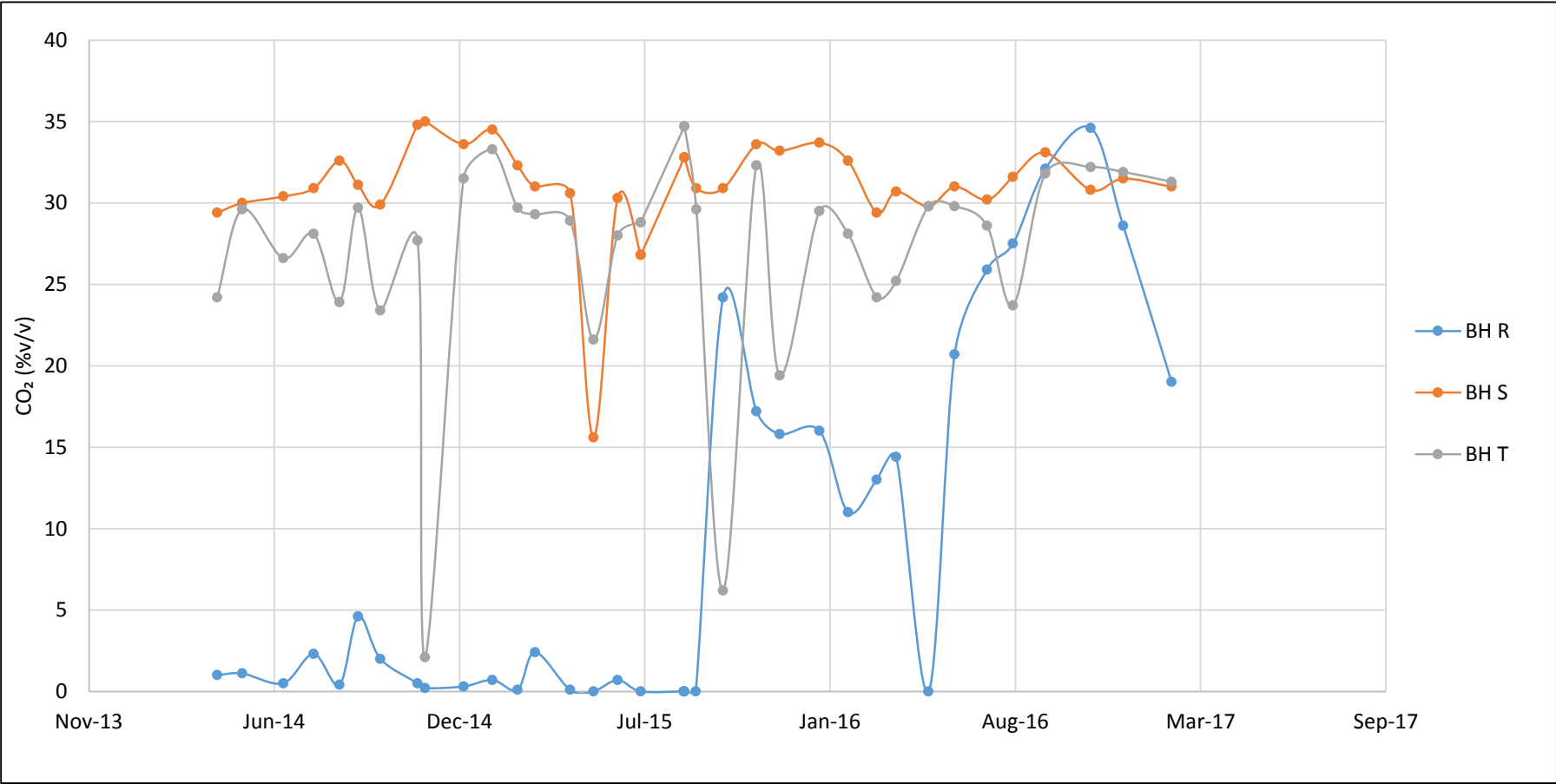


Figure 6: Carbon dioxide concentrations recorded in boreholes R, S and T

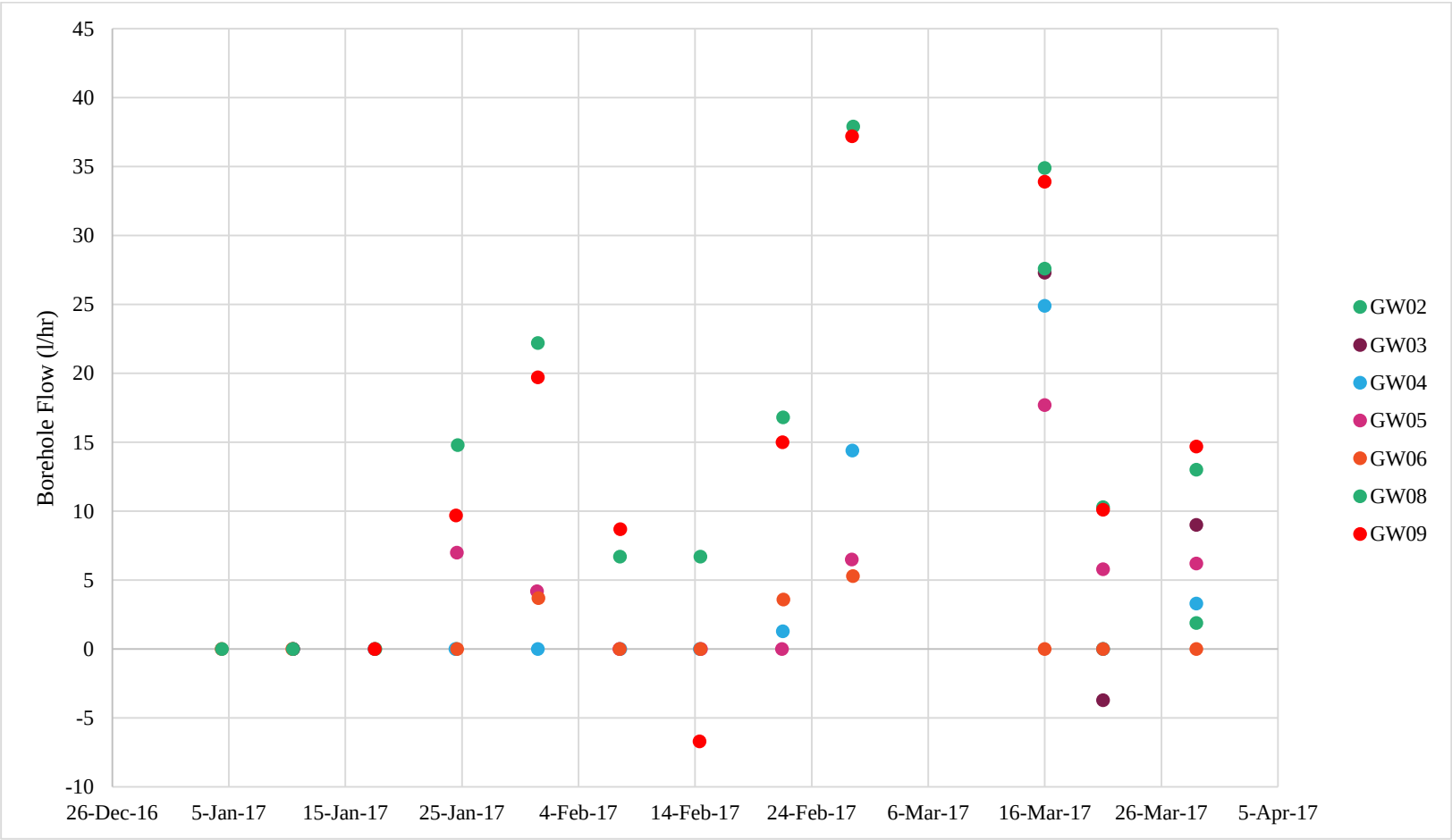


Figure 7: Borehole flows (l/hr) recorded in GW02, GW03, GW04, GW05, GW06, GW08 and GW09.

Table 1: Insitu gas data used for GSV Calculations.

Measurement Date	Standpipe	Atm Pressure (mbar)	Diff BH Pressure (mbar)	Max CH4 (%)	Max CO2 (%)	Flow (L/h)	Methane GSV (L/h)	Methane CS (analyser)	Round
04-Jan-17	GW01								0
10-Jan-17		1004	0	2	7	0	0.00	1	1
24-Jan-17		1016	-21	0	0	-4.5			3
16-Mar-17		1019	0	56	13	0	0.00	1	9
16-Mar-17		1018	0	9	6	0	0.00	1	9
21-Mar-17		1006	0	28	6	0	0.00	1	10
21-Mar-17		1006	0	1	1	0	0.00	1	10
29-Mar-17		1018	0	25	7	0	0.00	1	11
29-Mar-17		1017	0	2	1	0	0.00	1	11
04-Jan-17	GW02								0
10-Jan-17		1004	0	78	19	0	0.00	1	1
24-Jan-17		1023	0	46	22	0	0.00	1	3
16-Mar-17		1017	302	71	18	34.9	24.92	5	9
16-Mar-17		1016	0	8	2	0	0.00	1	9
21-Mar-17		1005	0	69	31	0	0.00	1	10
29-Mar-17		1018	116	79	29	13	10.21	4	11
10-Jan-17	GW03	1004	0	62	7	0	0.00	1	1

16-Mar-17		1017	271	68	32	27.3	18.54	5	9
16-Mar-17		1017	0	15	8	0	0.00	1	9
21-Mar-17		1007	-20	74	24	-3.7			10
29-Mar-17		1019	73	67	24	9	6.02	4	11
17-Jan-17	GW04	1025	0	30	13	0	0.00	1	2
24-Jan-17		1025	0	31	14	0	0.00	1	3
31-Jan-17		1004	0	33	15	0	0.00	1	4
07-Feb-17		1006	0	20	10	0	0.00	1	5
14-Feb-17		1015	0	0	1	0	0.00	1	6
21-Feb-17		1014	6	71	29	1.3	0.92	3	7
27-Feb-17		985	129	62	31	14.4	8.99	4	8
16-Mar-17		1017	237	66	31	24.9	16.41	5	9
21-Mar-17		1007	0	57	28	0	0.00	1	10
29-Mar-17		1018	14	62	28	3.3	2.06	3	11
24-Jan-17	GW05	1020	0	45	16	7	3.15	3	3
31-Jan-17		1005	2.1	44	13	4.2	1.85	3	4
07-Feb-17		1006	0	56	17	0	0.00	1	5
14-Feb-17		1015	0	77	21	0	0.00	1	6
21-Feb-17		1016	37	75	24	0	0.00	1	7
27-Feb-17		987	22	71	26	6.5	4.63	4	8
16-Mar-17		1017	170	74	24	17.7	13.13	4	9
21-Mar-17		1006	43	51	23	5.8	2.98	3	10
29-Mar-17		1019	47	71	26	6.2	4.42	4	11

04-Jan-17	GW06	1018	0	70	30	0	0.00	1	0
10-Jan-17		1005	0	71	29	0	0.00	1	1
17-Jan-17		1025	0	47	20	0	0.00	1	2
24-Jan-17		1022	0	27	13	0	0.00	1	3
31-Jan-17		1004	1.7	55	24	3.7	2.04	3	4
07-Feb-17		1006	0	64	28	0	0.00	1	5
14-Feb-17		1015	0	70	30	0	0.00	1	6
21-Feb-17		1013	19	69	31	3.6	2.48	3	7
27-Feb-17		982	37	68	31	5.3	3.62	4	8
16-Mar-17		1021	0	69	31	0	0.00	1	9
21-Mar-17		1007	0	68	31	0	0.00	1	10
29-Mar-17		1019	0	69	31	0	0.00	1	11
04-Jan-17	GW08	1017	0	70	30	0	0.00	1	0
10-Jan-17		1004	0	70	31	0	0.00	1	1
17-Jan-17		1026	0	48	21	0	0.00	1	2
24-Jan-17		1016	0	31	14	14.8	4.59	4	3
31-Jan-17		1004	17.9	56	24	22.2	12.43	4	4
07-Feb-17		1006	4.3	51	24	6.7	3.42	3	5
14-Feb-17		1015	2.7	42	21	6.7	2.82	3	6
21-Feb-17		1013	158	70	30	16.8	11.78	4	7
27-Feb-17		982	450	69	30	37.9	26.04	5	8
16-Mar-17		1019	271	69	29	27.6	19.10	5	9
21-Mar-17		1005	90	69	29	10.3	7.13	4	10
29-Mar-17		1018	8	71	30	1.9	1.35	3	11

17-Jan-17	GW09	1025	0	26	11	0	0.00	1	2
24-Jan-17		1025	0	39	18	9.7	3.78	4	3
31-Jan-17		1005	15.7	25	6	19.7	4.93	4	4
07-Feb-17		1005	6	38	17	8.7	3.31	3	5
14-Feb-17		1015	-42	2	2	-6.7	-0.14		6
21-Feb-17		1016	120	67	33	15	10.11	4	7
27-Feb-17		985	429	65	31	37.2	24.03	5	8
16-Mar-17		1018	354	71	30	33.9	24.10	5	9
21-Mar-17		1005	87	80	20	10.1	8.06	4	10
29-Mar-17		1018	137	72	29	14.7	10.60	4	11

Appendix B

Borehole Logs



Sample type

D	Small disturbed	U	Undisturbed	X/L	Dynamic	D*/ES	Environmental - soil	Cs	Core subsample (prepared)
B	Bulk disturbed	UT	Undisturbed thin wall	C	Core	EW	Environmental - water	Xs/Ls	Dynamic subsample (prepared)
LB	Large bulk disturbed	P	Piston	W	Water				

Test type

S SPT - Split spoon sampler followed by uncorrected SPT 'N' Value

C SPT - Solid cone followed by uncorrected SPT 'N' Value

(*250 - Where full test drive not completed, linearly extrapolated 'N' value reported, ** - Denotes no effective penetration)

H Hand vane - direct reading in kPa - not corrected for BS1377 (1990). Re* denotes refusal

M Mackintosh probe - number of blows to achieve 100mm penetration

PP Pocket penetrometer - direct reading in kg/sq.cm

Vo Headspace vapour reading, uncorrected peak values in ppm, using a PID (calibrated with Isobutylene, using a 10.6eV bulb)

Sample/core range/L.

| Dynamic sample

Undisturbed sample - open drive including thin wall. Symbol length reflects recovery

x x = Total Core Recovery (TCR) as percentage of core run

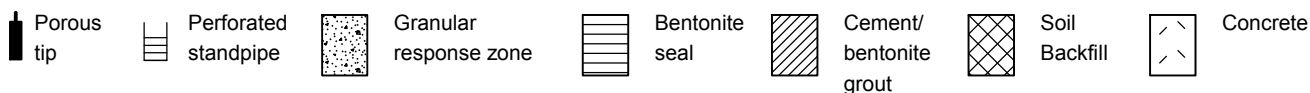
y = Solid Core Recovery (SCR) as percentage of core run. Assessment of core is based on full diameter.

z z = Rock Quality Designation (RQD). The amount of solid core greater than 100mm expressed as percentage of core run.

Where SPT has been carried out at beginning of core run, disturbed section of core excluded from SCR and RQD assessment.

l_f - fracture spacing - the modal fracture spacing (mm) over the indicated length of core. Where spacing varies significantly, the minimum, mode and maximum values are given. NI = non-intact core NA = not applicable

Instrumentation



Stratum boundaries

----- Estimated boundary -.-.-.-.- Grading boundary

Logging

The logging of soils and rocks has been carried out in general accordance with BS 5930:2015.

Chalk is logged in general accordance with Lord et al (2002) CIRIA C574. Where possible, dynamic samples in chalk have been logged in accordance with CIRIA C574: descriptions and gradings (if presented) should be treated with caution given the potential for sample disturbance.

For rocks the term fracture has been used to identify a mechanical break within the core. Where possible incipient and drilling induced fractures have been excluded from the assessment of fracture state. Where doubt exists, a note has been made in the descriptions. All fractures are considered to be continuous unless otherwise reported.

Made Ground is readily identifiable when, within the material make up, man made constituents are evident. Where Made Ground appears to be reworked natural material the differentiation between in situ natural deposits and Made Ground is much more difficult to ascertain. The interpretation of Made Ground within the logs should therefore be treated with caution.

The descriptors "topsoil" and "tarmacadam" are used as generic terms and do not imply conformation to any particular standard or composition.

Rootlets are defined as being less than 2mm in diameter, roots are defined as in excess of 2mm diameter.

General Comments

The process of drilling and sampling will inevitably lead to disturbance, mixing or loss of material in some soil and rocks.

Indicated water levels are those recorded during the process of drilling or excavating exploratory holes and may not represent standing water levels.

All depths are measured along the axis of the borehole and are related to ground level at the point of entry. All inclinations are measured normal to the axis of the core.

BOREHOLE LOG**GW04**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 1 of 3

Start Date 20 December 2016 Easting 470545

Scale 1 : 25

End Date 12 January 2017 Northing 169797 Ground level 46.80mOD Depth 11.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
20/12/16 1100hrs	L	0.00 - 1.20	Nil				Dark brownish grey sandy subangular fine to coarse brick, concrete and flint GRAVEL. (MADE GROUND)	0.15	46.65	
							Dark brownish grey slightly clayey sandy subangular fine to coarse concrete, flint and brick GRAVEL. Rare fibrous textile material. (MADE GROUND)	0.85	45.95	
20/12/16 1300hrs Dry							Firm brownish grey slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse chalk, flint and brick. (MADE GROUND)			
11/01/17 1100hrs Dry	L	1.20 - 1.60	1.20				1.20m: Geotextile membrane.	1.30	45.50	
							MADE GROUND comprising firm dark grey mottled black slightly sandy gravelly (ashy) CLAY with 10% fragments (up to 110mm) of textile and plastic. Gravel is angular and subangular fine to coarse brick, mudstone and flint.	1.60	45.20	
	L	1.60 - 2.20	1.60				1.50 - 1.55m: Subangular brick cobble.			
							MADE GROUND comprising light grey and brown angular and subangular fine to coarse concrete and flint GRAVEL with a high subangular concrete cobble content and 10% fragments (up to 120mm) of wood, plastic and polythene.	2.20	44.60	
	L	2.20 - 2.30	1.60							
	C	2.30 - 2.70	2.20		75		MADE GROUND comprising concrete COBBLES with 5% fragments of (up to 50mm) of plastic, steel and wood.	2.60	44.20	
	C	2.70 - 2.90	2.70		75		Greyish brown mottled yellowish brown gravelly fine to coarse SAND. Gravel is angular and subangular fine to coarse flint. (MADE GROUND)	2.85	43.95	
	C	2.90 - 4.00	2.70		100		MADE GROUND comprising light brown and grey CONCRETE.	3.30	43.50	
							Stiff locally very stiff slightly sandy gravelly CLAY. Gravel is angular to subrounded flint, concrete and brick. (MADE GROUND)	3.65	43.15	
							MADE GROUND comprising fragments (up to 120mm) of metal, rubber, batteries, aluminium cans (John Smith's Ale, Newcastle Brown Ale), polythene, paper, plastic (low fat gooseberry flavour yoghurt pot) and rare glass.			
							Continued Next Page	{4.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m (backfilled prior to drilling). Dynamic sampled (128mm) 0.00-1.20m (sample not retained), 1.20-2.20m, 4.00-4.60m, 6.50-7.60m, 10.60-11.00m and (113mm) 2.20-2.30m and 7.60-7.65m. Waterflush rotary core drilled (146mm) 2.30-4.00m, 4.60-6.50m and 7.60-10.60m. CASING: 168mm diam to 9.50m.

BACKFILL: On completion, borehole sidewalls collapsed 11.00-10.50m, then backfilled with bentonite 10.50-9.50m. Two slotted standpipe (50mm) were installed to 9.50m, granular response zone 9.50m-0.90m, bentonite seal 0.90-0.35m, gravel drain 0.35-0.25m, concrete and stopcock cover 0.25- 0.00m. A gas clam was installed in one standpipe and a dual gas tap was installed on the second standpipe.

REMARKS: Driller notes no flush returns 8.00-10.60m and limited flush returns 2.90-4.00m (50%) and 7.60-8.00m (20%). Gas noted by driller during installation.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m) casing (m) rose to (m) time to rise (min) remarks

Groundwater not encountered prior to use of water flush.



CONTRACT

32534

CHECKED

EC

BOREHOLE LOG

CLIENT READING FOOTBALL CLUB

GW04

SITE MADEJSKI STADIUM, READING

Sheet 2 of 3

Start Date 20 December 2016 Easting 470545

Scale 1 : 25

End Date 12 January 2017 Northing 169797 Ground level 46.80mOD

Depth 11.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
11/01/17 1715hrs 0.20m 12/01/17 0800hrs 0.22m	L	4.00 - 4.60	4.00							
	C	4.60 - 5.00	4.00		100					
	C	5.00 - 6.50	5.00		87		MADE GROUND comprising dark brown rarely mottled black slightly sandy clayey angular and subangular fine to coarse brick, concrete, flint and sandstone GRAVEL with 5% fragments (up to 90mm) of plastic.	5.00	41.80	
							MADE GROUND comprising fragments (up to 120mm) of plastic, paper, electrical wire, rubber and polythene. 5.60m: Broken badminton racket head.	5.55	41.25	
	L	6.50 - 7.60	6.50				MADE GROUND comprising firm brownish grey rarely mottled black slightly sandy gravelly CLAY with 10-15% fragments (up to 60mm) of metal, wood, plastic (food wrapper) and a plastic cup. Gravel is angular and subangular fine to coarse brick and flint.	6.50	40.30	
	C	7.60 - 8.00	6.50		100		7.00 - 7.30m: Sandy.			
	C	7.60 - 8.00	6.50		100		7.55 - 7.60m: Subangular brick cobble.	7.80	39.00	
	C	8.00 - 9.10	7.60		64		MADE GROUND comprising fragments (up to 150mm) of tyre rubber, plastic, paper, wood, plastic bag (Tesco), aluminium cans and rare glass.			
							8.10 - 8.25m: Roll of carpet.			
							Continued Next Page	{9.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks							Groundwater not encountered prior to use of water flush.	CONTRACT 32534		CHECKED EC

BOREHOLE LOG

CLIENT READING FOOTBALL CLUB

GW04

SITE MADEJSKI STADIUM, READING

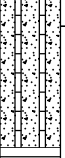
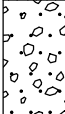
Sheet 3 of 3

Start Date 20 December 2016 Easting 470545

Scale 1 : 25

End Date 12 January 2017 Northing 169797 Ground level 46.80mOD

Depth 11.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
12/01/17 1345hrs 9.70m	C	9.10 - 10.60	7.60		40		NO RECOVERY.	9.10	37.70	
										
							Firm greyish brown slightly gravelly sandy CLAY with rare fragments of plastic (up to 60mm). Gravel is subangular fine to coarse flint. (MADE GROUND)	9.90	36.90	
							Light brown and orangish brown sandy angular and subangular fine to coarse flint GRAVEL.	10.20	36.60	
	L	10.60 - 11.00	9.50							
							Borehole completed at 11.00m.	11.00	35.80	
								{14.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks							Groundwater not encountered prior to use of water flush.	CONTRACT 32534		CHECKED EC

BOREHOLE LOG**GW05**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 1 of 3

Start Date 9 January 2017 Easting 470748

Scale 1 : 25

End Date 10 January 2017 Northing 169890 Ground level 47.50mOD Depth 12.10 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
20/12/16 1140hrs	C	0.00 - 0.06	Nil				MADE GROUND comprising dark grey and black TARMACADAM.	0.06	47.44	
							Brown slightly silty slightly sandy angular and subangular fine to coarse concrete, brick, flint and tarmacadam GRAVEL with a low angular brick cobble content. (MADE GROUND)	0.40	47.10	
							0.35m: Black angular metal fragment (100mm). 0.40m: Root (15mm diam) on eastern edge of pit.	0.70	46.80	
							Light yellowish brown rarely mottled orange slightly clayey fine to coarse SAND with rare organic fragments (up to 15mm). Rare rootlets. (MADE GROUND)	0.90	46.60	
20/12/16 1230hrs Dry	L	1.13 - 1.20	Nil				Soft brown and greyish brown slightly sandy slightly gravelly CLAY with rare pockets of fibrous organic material (up to 50mm). Gravel is angular and subangular fine to coarse flint and rare chalk. (MADE GROUND)	1.13	46.37	
09/01/17 1340hrs Dry	L	1.20 - 2.10	1.20				Soft locally firm dark grey slightly sandy gravelly CLAY. Gravel is angular and subangular fine to coarse flint and brick. (MADE GROUND) 1.13m: Geotextile membrane.			
							MADE GROUND comprising firm dark grey mottled black slightly sandy gravelly CLAY with 5-10% fragments (up to 50mm) of metal and textile. Gravel is angular fine to coarse brick. 1.40m: Subangular tarmacadam cobble.			
	L	2.10 - 3.60	2.10				2.05m: Metal lid (70mm diam). Firm light brown slightly gravelly sandy CLAY. Gravel is angular fine to coarse brick and mudstone. (MADE GROUND)	2.10	45.40	
								2.90	44.60	
							MADE GROUND comprising firm dark greyish brown slightly sandy gravelly CLAY with 20-30% fragments (up to 60mm) of wood, plastic, polythene and rare glass. Gravel is angular and subangular brick and mudstone.			
	L	3.60 - 5.10	2.10					3.80	43.70	
							Stiff to very stiff greyish brown slightly sandy gravelly CLAY. Gravel is angular to subrounded brick, flint and			
							Continued Next Page	{4.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Rotary core drilled (300mm) 0.00-0.06m. Hand dug inspection pit 0.06-1.13m. Dynamic sampled (128mm) 1.13m-6.70m and (113mm) 6.70-7.70m and 8.20-12.10m. Waterflush rotary core drilled (146mm) 7.70-8.20m.

CASING: 168mm diam to 10.70m.

BACKFILL: On completion, borehole backfilled with bentonite 12.10-10.70m. Two slotted standpipe (50mm) were installed to 10.70m, granular response zone 10.70m-1.00, bentonite seal 1.00-0.30m, concrete and stopcock cover 0.30-0.00m. A gas clam was installed in one standpipe and a dual gas tap was installed on the second standpipe.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.67	Nil			Seepage.


CONTRACT
32534
CHECKED
EC

BOREHOLE LOG**GW05**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 2 of 3

Start Date 9 January 2017 Easting 470748

Scale 1 : 25

End Date 10 January 2017 Northing 169890 Ground level 47.50mOD Depth 12.10 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
09/01/17 1800hrs Dry							mudstone. (MADE GROUND)	4.90	42.60	
10/01/17 0815hrs Dry	L	5.10 - 6.60	5.00				Reddish orange sandy angular and subangular fine to coarse brick GRAVEL. (MADE GROUND)	5.05	42.45	
							MADE GROUND comprising orangish brown clayey subangular and subrounded fine to coarse brick and mudstone GRAVEL with 30-40% fragments (up to 150mm) of newspaper, plastic, polythene, wood and glass.	5.80	41.70	
							MADE GROUND comprising dark grey mottled reddish brown clayey angular and subangular fine to coarse mudstone and brick GRAVEL with 5% fragments (up to 90mm) of plastic and rare glass.			
	L	6.60 - 6.70	5.00							
	L	6.70 - 7.70	5.00							
							6.80 - 6.90m: Plastic wrapping paper.	6.90	40.60	
							Orangish grey subangular fine to coarse flint GRAVEL. (MADE GROUND)	7.00	40.50	
							MADE GROUND comprising stiff brownish grey slightly sandy gravelly CLAY with 10-20% fragments (up to 80mm) of plastic, wood, textile and newspaper. Gravel is angular and subangular fine to coarse brick and flint.	7.40	40.10	
	C	7.70 - 8.20	7.70		50		MADE GROUND comprising fragments (up to 100mm) of wood, plastic, glass, paper, textiles and metal with 5-10% slightly sandy subangular fine to coarse flint gravel. 7.50 - 7.90m: Metal rod (50mm diam).			
							7.95 - 8.05m: Clothing and furniture catalogue (potentially Littlewoods, year unknown).			
	L	8.20 - 9.70	7.70					8.60	38.90	
							MADE GROUND comprising stiff dark grey mottled reddish brown slightly sandy gravelly CLAY with 5-10% fragments (up to 70mm) of plastic. Gravel is angular and subangular fine to coarse brick, flint and mudstone.			
							Continued Next Page	{9.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks							AGS	CONTRACT 32534		CHECKED EC

BOREHOLE LOG**GW05**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 3 of 3

Start Date 9 January 2017 Easting 470748

Scale 1 : 25

End Date 10 January 2017 Northing 169890 Ground level 47.50mOD

Depth 12.10 m

progress date/time water depth	sample no & type	depth (m) from to		casing depth (m)	test type & value	samp. /core range		instru- ment	description	depth (m)	reduced level (m)	legend	
10/01/17 1815hrs 6.35m	L	9.70 - 11.10		7.70						10.20	37.30		
									Very stiff dark grey slightly sandy CLAY. (MADE GROUND)				
									10.60 - 10.70m: Polythene bags.	10.70	36.80		
										Light grey and yellowish grey slightly silty very sandy fine to coarse flint GRAVEL.			
	L	11.10 - 12.10		10.70						12.10	35.40		
									Borehole completed at 12.10m.				
										{14.00}			
water strike (m) casing (m) rose to (m) time to rise (m) remarks												CONTRACT 32534	CHECKED EC

BOREHOLE LOG**GW06**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 1 of 4

Start Date 12 December 2016 Easting 470484

Scale 1 : 25

End Date 13 December 2016 Northing 169622 Ground level 50.90mOD Depth 14.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
12/12/16 1345hrs	B	0.00 - 1.20					Light brown sandy subrounded medium flint GRAVEL over black and dark brown slightly sandy (ashy) subangular fine to coarse slag, concrete and brick GRAVEL. (MADE GROUND)	0.10 0.20	50.80 50.70	
							Brown slightly silty slightly sandy angular and subangular fine to coarse concrete, brick and slag GRAVEL with a low subangular brick and concrete cobble content. (MADE GROUND) 0.20m: Geotextile membrane.			
12/12/16 1500hrs Dry	L	1.20 - 2.50	Nil				Firm dark grey and dark brownish grey slightly sandy gravelly silty CLAY with a medium angular brick cobble content. Gravel is angular to rounded fine to coarse brick, concrete and flint. (MADE GROUND) 1.00m: Geotextile membrane.	1.00	49.90	
13/12/16 0800hrs Dry							MADE GROUND comprising firm dark grey locally black slightly sandy slightly gravelly CLAY with 20-30% fragments (up to 120mm) of plastic sheet, textiles, wood and rare sponge. Gravel is subangular and subrounded fine to coarse brick, sandstone, and chalk.			
	L	2.50 - 4.00	2.50							
Continued Next Page								{4.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-5.00m and (113mm) 5.00-6.50m, 8.00-8.70m and 12.30-12.60m. Waterflush rotary core drilled (146mm) 6.50-8.00m, 8.70-12.30m and 12.60-14.20m with polymer added.

CASING: 168mm diam to 10.80m.

BACKFILL: On completion, borehole sidewall collapsed 14.20-13.60m, bentonite seal 13.60-12.50m. Two slotted standpipe (50mm) were installed to 12.50m, granular response zone 12.50-1.00m, bentonite seal 1.00-0.50m, concrete and stopcock cover 0.50-0.00m. A gas clam was installed in one standpipe and a dual gas tap was installed on the second standpipe.

REMARKS: Driller notes reduced flush returns 6.50-14.20 (30-65% returned).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m) casing (m) rose to (m) time to rise (min) remarks

Groundwater not encountered prior to use of water flush.

CONTRACT
32534CHECKED
EC

BOREHOLE LOG**GW06**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 2 of 4

Start Date 12 December 2016 Easting 470484

Scale 1 : 25

End Date 13 December 2016 Northing 169622 Ground level 50.90mOD Depth 14.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
	L	4.00 - 5.00	4.00					4.40	46.50	
							MADE GROUND comprising firm light brown slightly sandy gravelly CLAY with up to 10% fragments of plastic sheet and bags. Gravel is angular and subangular fine to coarse flint and brick.	4.55	46.35	
	L	5.00 - 6.50	4.00				MADE GROUND comprising firm black mottled greyish brown slightly gravelly CLAY with 10-20% fragments (up to 50mm) of plastic sheet and plywood (up to 120mm). Gravel is angular to rounded fine and medium flint, brick, pumice and glass.	4.90	46.00	
							MADE GROUND comprising firm black slightly sandy slightly gravelly CLAY with 40-50% fragments (up to 120mm) of plastic sheet, plastic lids, metal wire, plywood and carpet. Gravel is angular to rounded fine to coarse flint, brick and concrete.			
							6.00 - 6.20m: Abundant fibrous textile fragments (up to 0.5mm diam).			
	C	6.50 - 8.00	6.50		73		MADE GROUND comprising fragments (up to 120mm) of wood, plastic sheet and rare metal, wire and textile with 5% dark grey and brown angular to rounded fine to coarse flint gravel.	6.50	44.40	
							MADE GROUND comprising firm grey mottled black sandy gravelly CLAY with 10-20% fragments (up to 80mm) of plastic sheet, wood and metal wire (2mm diam). Gravel is angular to rounded fine and medium flint, concrete, brick and glass.	7.25	43.65	
	L	8.00 - 8.70	8.00				8.00 - 10.00m: Malodourous.	8.20	42.70	
							MADE GROUND comprising firm to stiff dark grey mottled brownish grey and yellowish brown slightly sandy slightly gravelly CLAY with up to 10% fragments (up to 60mm) of glass, wood and metal. Gravel is subangular fine to coarse brick, flint and concrete.	8.70	42.20	
	C	8.70 - 9.30	8.00		100		MADE GROUND comprising brown and grey slightly clayey subangular and subrounded fine to coarse flint, brick and concrete GRAVEL with up to 10% fragments (up to 120mm) of plastic sheet, plastic lids, metal wire, plywood and carpet. Gravel is angular to rounded fine to coarse flint, brick and concrete.	9.00	41.90	
							Continued Next Page	{9.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks							Groundwater not encountered prior to use of water flush.	CONTRACT 32534		CHECKED EC

BOREHOLE LOG**GW06**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 3 of 4

Start Date 12 December 2016 Easting 470484

Scale 1 : 25

End Date 13 December 2016 Northing 169622 Ground level 50.90mOD Depth 14.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
13/12/16 1630hrs 0.00m	C	9.30 - 10.80	8.00		40		to 50mm) of wood, plastic and hair.			
							MADE GROUND comprising fragments of fabric (up to 200mm), wood and plywood (up to 30mm thick), plastic (up to 2mm), rubber gloves and hair with 5% brown and grey subangular and subrounded fine to coarse flint and concrete gravel. 9.00m: Subangular flint cobble. 9.10 - 9.30m: Layers of fabric, carpet, newspaper (April 1980) and fragments of low fat yoghurt pot (up to 80mm). 9.30 - 9.80m: Limited recovery.			
14/12/16 0800hrs Dry	C	10.80 - 12.30	10.80		67		MADE GROUND comprising grey and light brown subangular and subrounded medium and coarse flint, brick and concrete GRAVEL with a low subangular brick and concrete cobble content and 30-40% fragments (up to 120mm) of wood, plastic sheet, metal, tin and glass.	10.80	40.10	
	L	12.30 - 12.60	10.80				MADE GROUND comprising stiff greyish brown mottled grey slightly gravelly CLAY with up to 10% fragments (up to 50mm) of foil, paper and plastic. Gravel is angular to subrounded fine to coarse flint and brick.	12.30	38.60	
	C	12.60 - 13.00	10.80		100		MADE GROUND comprising fragments (up to 100mm) of plastic, paper, plywood and metal sheet and up to 5% of yellow fine to coarse sand. 12.70 - 12.95m: Daily Express newspaper dated 1978. 12.95m: Subangular concrete cobble with steel reinforcement bars (5mm diam).	12.50	38.40	
	C	13.00 - 14.20	10.80		50					
							Stiff grey mottled brown sandy CLAY. Rare rootlets.	13.70	37.20	
Continued Next Page								{14.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks Groundwater not encountered prior to use of water flush. AGS CONTRACT 32534 CHECKED EC										



GW06

Sheet 4 of 4

Scale 1 : 25

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru- ment	description	depth (m)	reduced level (m)	legend
14/12/16 1630hrs 2.85m									14.20	36.70	
								Borehole completed at 14.20m.			



CONTRACT
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BOREHOLE LOG**GW07**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 1 of 1

Start Date 15 December 2016 Easting 470372

Scale 1 : 25

End Date 15 December 2016 Northing 169612 Ground level 50.55mOD Depth 2.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
15/12/16 0800hrs	B	0.00 - 1.20					Grass over brown slightly clayey slightly gravelly fine to coarse SAND. Gravel is subangular and subrounded fine and medium flint. Frequent fragments of artificial grass (up to 80mm). (MADE GROUND)	0.70	49.85	
	L	1.20 - 2.50	Nil				Brown gravelly fine to coarse SAND with a low subangular brick and concrete cobble content. Gravel is angular and subangular fine to coarse brick, concrete and slag. (MADE GROUND) 0.95m: Geotextile membrane. 1.20 - 1.30m: Brownish yellow fine to coarse sand with frequent artificial grass (up to 80mm). Firm dark brown mottled black slightly sandy slightly gravelly CLAY. Gravel is subangular and subrounded fine to coarse flint and brick. Rare plastic fragments (up to 20mm). (MADE GROUND)	1.30	49.25	
							Firm light brown mottled black slightly sandy very gravelly CLAY. Gravel is subangular fine to coarse flint and brick. (MADE GROUND)	1.90	48.65	
15/12/16 1015hrs 2.10m	L	2.50 - 2.80	2.50				Soft dark grey mottled black slightly gravelly sandy clayey SILT. Gravel is subangular and subrounded fine and medium flint and chalk. (MADE GROUND)	2.50	48.05	
							White and grey subangular fine and medium chalk GRAVEL. (MADE GROUND)	2.65	47.90	
							Borehole completed at 2.80m.	2.80	47.75	
								{4.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-2.80m, (113mm) attempted from 2.80m yielding no penetration.

CASING: 168mm diam to 2.50m.

BACKFILL: On completion, hole backfilled with bentonite pellets 2.80-0.90m and arisings 0.90-0.00m.

REMARKS: Borehole terminated on Consultant's request due to perched water table.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks	AGS	CONTRACT	CHECKED
2.10	Nil	2.10	20	Struck following run 2.50-2.80m.		32534	EC

BOREHOLE LOG**GW08**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 1 of 4

Start Date 15 December 2016 Easting 470419

Scale 1 : 25

End Date 20 December 2016 Northing 169717 Ground level 50.10mOD

Depth 14.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
15/12/16 1350hrs	B	0.00 - 1.20					Grass over brown slightly clayey slightly gravelly fine to coarse SAND with a low subangular concrete cobble content and frequent fragments of artificial plastic grass (up to 80mm). Gravel is angular to subrounded fine to coarse flint. (MADE GROUND)			
	L	1.20 - 2.50	Nil				Firm dark brown and brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse flint, brick and rare chalk. (MADE GROUND)	1.00	49.10	
	L	2.50 - 4.00	2.50				MADE GROUND comprising dark brown and black slightly sandy gravelly CLAY with 30-40% fragments (up to 100mm) of plastic sheet, plastic tubes, plastic lids, tin, glass bottles, newspaper, wood and textiles. Gravel is angular and subangular fine to coarse brick and chalk. Low subangular brick cobble content.	2.40	47.70	
15/12/16 1645hrs 0.80m							Continued Next Page	{4.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-6.70m and (113mm) 6.70-7.70m and 13.40-14.50m. Waterflush rotary core drilled (146mm) 7.70-13.40m.

CASING: 168mm diam to 12.20m.

BACKFILL: On completion, borehole sidewall collapsed 14.50-13.40m, bentonite seal 13.40-12.40m. Two slotted standpipes (50mm) was installed to 12.40m, granular response zone 12.40-1.00m, bentonite seal 1.00-0.50m, concrete and stopcock cover 0.50-0.00m. A gas clam was installed in one standpipe and a dual gas tap was installed in the second standpipe.

REMARKS: Driller notes reduced flush returns 7.70-9.20m and 12.20-13.30m (40-70%) and loss of flush returns 9.20-12.20m and 13.30-13.40m. Driller notes presence of gas at 14.50m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m) casing (m) rose to (m) time to rise (min) remarks

Groundwater not encountered prior to use of water flush.

CONTRACT
32534CHECKED
EC

BOREHOLE LOG

CLIENT READING FOOTBALL CLUB

GW08

SITE MADEJSKI STADIUM, READING

Sheet 2 of 4

Start Date 15 December 2016 Easting 470419

Scale 1 : 25

End Date 20 December 2016 Northing 169717 Ground level 50.10mOD

Depth 14.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
16/12/16 0745hrs 0.90m	L	4.00 - 5.50	4.00							
	L	5.50 - 6.70	5.50				5.10 - 7.70m: Limited recovery.			
	L	6.70 - 7.70	5.50							
	C	7.70 - 9.20	7.70		60		MADE GROUND comprising fragments (up to 150mm) of metal, plastic bags, plastic tubes, netting, textiles, carpet, glass, paper and wood with 10-20% brown and dark grey subangular fine to coarse brick and flint gravel.	7.70	42.40	
							Continued Next Page	{9.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks							Groundwater not encountered prior to use of water flush.	CONTRACT 32534		CHECKED EC

BOREHOLE LOG**GW08**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 3 of 4

Start Date 15 December 2016 Easting 470419

Scale 1 : 25

End Date 20 December 2016 Northing 169717 Ground level 50.10mOD

Depth 14.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
	C	9.20 - 10.70	7.70		63					
	C	10.70 - 12.20	7.70		53		MADE GROUND comprising white and grey slightly sandy slightly clayey subangular fine to coarse chalk, flint and brick GRAVEL with 40-50% fragments (up to 80mm) of plastic and textiles. Limited recovery.	10.70	39.40	
16/12/16 1500hrs 10.50m										
19/12/16 0915hrs 4.30m	C	12.20 - 13.30	12.20		80		MADE GROUND comprising fragments (up to 150mm) of metal, plastic bags, tubes, netting, textiles, carpet, glass, paper and wood with 10-20% brown and dark grey subangular fine to coarse brick and flint gravel.	12.20	37.90	
	C	13.30 - 13.40	12.20		100					
	L	13.40 - 14.50	12.20							
							Greyish brown sandy subangular and subrounded fine to coarse flint GRAVEL.	13.80	36.30	
							Continued Next Page	{14.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks							Groundwater not encountered prior to use of water flush.	CONTRACT 32534		
								CHECKED EC		



GW08

End Date	20 December 2016	Northing	169717	Ground level	50.10mOD	Depth	14.50 m
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progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru- ment	description	depth (m)	reduced level (m)	legend
19/12/16 1120hrs 10.20m									14.50	35.60	
								Borehole completed at 14.50m.			
									{19.00}		
water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks							
Groundwater not encountered prior to use of water flush.								AGS	CONTRACT 32534	CHECKED EC	

BOREHOLE LOG**GW09**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 1 of 3

Start Date 20 December 2016 Easting 470547

Scale 1 : 25

End Date 21 December 2016 Northing 169743 Ground level 48.25mOD Depth 10.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
20/12/16 1345hrs	L	0.00 - 1.50	Nil				Brown sandy angular to rounded flint, concrete and brick GRAVEL. (MADE GROUND)			
							0.30 - 0.60m: High subangular brick and concrete cobble content.			
							0.50 - 0.60m: Fragments (up to 100mm) of plastic sheet.	0.70	47.55	
20/12/16 1445hrs Dry							Firm brownish grey sandy gravelly CLAY. Gravel is angular and subangular fine to coarse concrete, brick and flint. (MADE GROUND)	1.00	47.25	
21/12/16 1230hrs Dry	L	1.50 - 3.00	Nil				Greenish brown slightly gravelly fine to coarse SAND. Gravel is subangular fine to coarse chalk, brick and concrete. (MADE GROUND)			
							MADE GROUND comprising firm black rarely mottled light yellowish grey slightly sandy slightly gravelly CLAY with 10-20% fragments (up to 100mm) of plastic bag, wood and fibres. Gravel is angular to subrounded fine to coarse flint, brick, glass and concrete. Oily sheen.	2.00	46.25	
	L	3.00 - 4.50	Nil							
Continued Next Page								{4.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m (backfilled prior to drilling). Dynamic sampled (128mm) 0.00-1.50m and (113mm) 1.50-6.00m and 9.00-10.50m. Waterflush rotary core drilled (146mm) 6.00-9.00m.

CASING: 168mm diam to 6.00m.

BACKFILL: On completion, borehole backfilled with bentonite 10.50-9.50m. Two slotted standpipe (50mm) were installed to 9.50m, granular response zone 9.50m-1.00, bentonite seal 1.00-0.30m, concrete and stopcock cover 0.30-0.00m. A gas clam was installed in one standpipe and a dual gas tap was installed on the second standpipe.

REMARKS: Driller notes presence of gas at 10.00m. Driller notes loss of flush returns 6.00-9.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks	AGS	CONTRACT	CHECKED
1.00	Nil	1.00	20	Encountered following run 0.00-1.50m.		32534	EC

BOREHOLE LOG**GW09**

CLIENT READING FOOTBALL CLUB

SITE MADEJSKI STADIUM, READING

Sheet 2 of 3

Start Date 20 December 2016 Easting 470547

Scale 1 : 25

End Date 21 December 2016 Northing 169743 Ground level 48.25mOD Depth 10.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru- ment	description	depth (m)	reduced level (m)	legend
	L	4.50 - 6.00	Nil				4.45m: Subangular brick cobble (80mm). MADE GROUND comprising grey slightly clayey slightly sandy subangular fine to coarse concrete, flint and brick GRAVEL with up to 10% fragments (up to 80mm) of plastic bags and glass.	4.50	43.75	
							Firm greyish brown gravelly CLAY. Gravel is subangular to rounded fine to coarse flint and brick. (MADE GROUND)	5.20	43.05	
							Firm grey mottled brown slightly sandy CLAY with rare subangular fine flint gravel. (MADE GROUND)	5.60	42.65	
	C	6.00 - 7.50	6.00		33		MADE GROUND comprising angular and subangular fine and medium flint, concrete and brick gravel with 10-20% fragments (up to 80mm) of wood. Limited recovery.	5.95	42.30	
	C	7.50 - 9.00	6.00		33		7.40m: Three wood fragments (up to 130x80x70mm). MADE GROUND comprising fragments (up to 100mm) of textile, plastic sheet, wood and paper with up to 10% subangular and subrounded fine to coarse brick and flint gravel and a low subrounded brick cobble content. Limited recovery.	7.50	40.75	
							Continued Next Page	9.00 {9.00}	39.25	
water strike (m) casing (m) rose to (m) time to rise (m) remarks							AGS	CONTRACT 32534		CHECKED EC

BOREHOLE LOG

CLIENT READING FOOTBALL CLUB

GW09

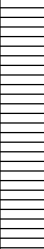
SITE MADEJSKI STADIUM, READING

Sheet 3 of 3

Start Date 20 December 2016 Easting 470547

Scale 1 : 25

End Date 21 December 2016 Northing 169743 Ground level 48.25mOD Depth 10.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru- ment	description	depth (m)	reduced level (m)	legend
21/12/16 1630hrs 7.90m	L	9.00 - 10.50	6.00					MADE GROUND comprising fragments (up to 100mm) of textile, plastic sheet, wood and paper with up to 10% slightly silty subangular and subrounded fine to coarse brick and flint gravel with a low subrounded brick cobble content.	9.50	38.75	
								Stiff dark greenish grey mottled orangish brown slightly sandy CLAY. Rare rootlets.	9.70	38.55	
								No recovery.			
								Borehole completed at 10.50m.	10.50	37.75	
									{14.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks									CONTRACT 32534	CHECKED EC	

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW01		10/01/17 11:15:00	1004	0								0.0	7		
GW01		10/01/17 11:16:00										0.0			
GW01		10/01/17 11:17:00										0.0			
GW01		10/01/17 11:18:00										0.0			
GW01		10/01/17 11:19:00										0.0			
GW01		10/01/17 11:20:00			6.3	1.9	16.9	38.0	0	0	0.0				
GW01		10/01/17 11:21:00			7.2	2.1	16.3	42.0	0	0	0.0				
GW01		10/01/17 11:22:00			6.5	1.9	16.9	38.0	0	0	0.0				
GW01		10/01/17 11:23:00			5.8	1.7	17.3	34.0	0	0	0.0				
GW01		10/01/17 11:24:00			5.1	1.6	17.7	32.0	0	0	0.0				
GW01		10/01/17 11:25:00			4.7	1.4	18.0	28.0	0	0	0.0				
GW01		10/01/17 11:26:00			4.5	1.3	18.2	26.0	0	0	0.0				
GW01		10/01/17 11:27:00			4.2	1.2	18.4	24.0	0	0	0.0				
GW01		10/01/17 11:28:00			3.9	1.1	18.6	22.0	0	0	0.0				
GW01		10/01/17 11:29:00			3.5	0.9	18.8	18.0	0	0	0.0				
GW01		10/01/17 11:30:00												1.62	
GW01		24/01/17 14:50:00	1016	-21								-4.5	8		
GW01		24/01/17 14:51:00		-13								-3.3			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW01		24/01/17 14:52:00		-10								-3.0			
GW01		24/01/17 14:53:00		-11								-3.1			
GW01		24/01/17 14:54:00		-12								-3.2			
GW01		24/01/17 14:55:00			0.4	0.0	21.1	0.0	0	0	0.0				
GW01		24/01/17 14:56:00			0.4	0.0	21.1	0.0	0	0	0.0				
GW01		24/01/17 14:57:00			0.4	0.0	21.1	0.0	0	0	0.0				
GW01		24/01/17 14:58:00			0.4	0.0	21.2	0.0	0	0	0.0				
GW01		24/01/17 14:59:00			0.4	0.0	21.2	0.0	0	0	0.0				
GW01		24/01/17 15:05:00												1.84	
GW01		31/01/17 13:25:00													Borehole flooded
GW01		07/02/17 13:05:00													Borehole flooded
GW01		14/02/17 10:25:00													Borehole flooded
GW01		21/02/17 00:00:00													Borehole flooded
GW01		27/02/17 00:00:00													Borehole flooded
GW01		16/03/17 00:00:00													Borehole flooded
GW01		16/03/17 11:30:00	1019										10		GW01A Upper
GW01		16/03/17 11:31:00		0								0.0			
GW01		16/03/17 11:32:00		0								0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW01		16/03/17 11:33:00		0								0.0			
GW01		16/03/17 11:34:00		0								0.0			
GW01		16/03/17 11:35:00		0								0.0			
GW01		16/03/17 11:36:00			12.9	55.7	6.6	#	0	0	0.0				
GW01		16/03/17 11:37:00			12.8	54.0	6.0	#	0	0	0.0				
GW01		16/03/17 11:38:00			11.7	49.0	7.9	#	0	0	0.0				
GW01		16/03/17 11:39:00			10.7	45.3	8.8	#	0	0	0.0				
GW01		16/03/17 11:40:00			9.6	41.3	9.9	#	0	0	0.0				
GW01		16/03/17 11:41:00			9.2	39.2	10.4	#	0	0	0.0				
GW01		16/03/17 11:42:00			8.7	36.8	11.4	#	0	0	0.0				
GW01		16/03/17 11:43:00			8.5	36.0	12.0	#	0	0	0.0				
GW01		16/03/17 11:44:00			7.7	33.4	12.1	#	0	0	0.0				
GW01		16/03/17 11:45:00			7.6	32.6	12.2	#	0	0	0.0				
GW01		16/03/17 11:46:00			7.5	32.0	12.3	#	0	0	0.0				
GW01		16/03/17 11:47:00			7.1	31.5	12.5	#	0	0	0.0				
GW01		16/03/17 11:48:00			6.4	30.0	12.9	#	0	0	0.0				
GW01		16/03/17 11:49:00			6.3	29.7	13.1	#	0	0	0.0				
GW01		16/03/17 11:50:00			6.2	28.4	13.2	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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	
GW01		16/03/17 11:51:00	1018										10	2.84	GW01A Lower	
GW01		16/03/17 11:53:00														
GW01		16/03/17 11:54:00		0								0.0				
GW01		16/03/17 11:55:00		0								0.0				
GW01		16/03/17 11:56:00		0								0.0				
GW01		16/03/17 11:57:00		0								0.0				
GW01		16/03/17 11:58:00		0								0.0				
GW01		16/03/17 11:59:00			5.7	9.1	14.0	#	0	0	0.0					
GW01		16/03/17 12:00:00			4.1	6.4	15.7	#	0	0	0.0					
GW01		16/03/17 12:01:00			3.6	4.9	16.7	#	0	0	0.0					
GW01		16/03/17 12:02:00			3.1	4.4	17.1	#	0	0	0.0					
GW01		16/03/17 12:03:00			2.7	3.9	17.6	#	0	0	0.0					
GW01		16/03/17 12:04:00			2.3	3.4	18.0	#	0	0	0.0					
GW01		16/03/17 12:05:00			2.1	2.9	18.3	#	0	0	0.0					
GW01		16/03/17 12:06:00			2.0	2.7	18.5	#	0	0	0.0					
GW01		16/03/17 12:07:00			1.7	2.3	18.5	#	0	0	0.0					
GW01		16/03/17 12:08:00			1.5	2.1	19.0	#	0	0	0.0					
GW01		16/03/17 12:09:00			1.5	2.0	19.0	#	0	0	0.0					
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534		CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW01		16/03/17 12:10:00			1.6	2.2	18.0	#	0	0	0.0				
GW01		16/03/17 12:11:00			1.6	2.1	18.0	#	0	0	0.0				
GW01		16/03/17 12:12:00			1.6	2.1	18.0	#	0	0	0.0				
GW01		16/03/17 12:13:00			1.6	2.1	18.0	#	0	0	0.0				
GW01		16/03/17 12:14:00													
GW01		21/03/17 00:00:00													Borehole flooded
GW01		21/03/17 10:27:00	1006										10		GW01A Upper
GW01		21/03/17 10:28:00		0								0.0			
GW01		21/03/17 10:29:00		0								0.0			
GW01		21/03/17 10:30:00		0								0.0			
GW01		21/03/17 10:31:00		0								0.0			
GW01		21/03/17 10:32:00		0								0.0			
GW01		21/03/17 10:33:00			5.9	24.7	13.5	#	0	0	0.0				
GW01		21/03/17 10:34:00			5.4	28.2	14.8	#	0	0	0.0				
GW01		21/03/17 10:35:00			5.0	17.4	15.3	#	0	0	0.0				
GW01		21/03/17 10:36:00			4.3	15.0	15.9	#	0	0	0.0				
GW01		21/03/17 10:37:00			4.1	14.1	16.3	#	0	0	0.0				
GW01		21/03/17 10:38:00			4.1	14.4	16.1	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW01		21/03/17 10:39:00			3.5	12.4	16.7	#	0	0	0.0				
GW01		21/03/17 10:40:00			3.3	11.7	16.7	#	0	0	0.0				
GW01		21/03/17 10:41:00			3.0	10.6	17.2	#	0	0	0.0				
GW01		21/03/17 10:42:00			2.7	9.9	17.4	#	0	0	0.0				
GW01		21/03/17 10:43:00			2.4	9.2	17.7	#	0	0	0.0				
GW01		21/03/17 10:44:00			2.0	8.6	18.1	#	0	0	0.0				
GW01		21/03/17 10:45:00			1.6	8.0	18.4	#	0	0	0.0				
GW01		21/03/17 10:46:00			1.4	7.4	18.8	#	0	0	0.0				
GW01		21/03/17 10:47:00			1.2	7.2	19.0	#	0	0	0.0				
GW01		21/03/17 10:48:00													
GW01		21/03/17 10:50:00	1006										10	2.63	GW01A Lower
GW01		21/03/17 10:51:00		0								0.0			
GW01		21/03/17 10:52:00		0								0.0			
GW01		21/03/17 10:53:00		0								0.0			
GW01		21/03/17 10:54:00		0								0.0			
GW01		21/03/17 10:55:00		0								0.0			
GW01		21/03/17 10:56:00		3	0.9	1.2	10.1	28.0	0	0	2.7				
GW01		21/03/17 10:57:00			0.5	0.0	19.7	#	0	0	2.8				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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	
GW01		21/03/17 10:58:00			0.3	0.0	19.9	#	0	0	2.5					
GW01		21/03/17 10:59:00			0.3	0.0	19.9	#	0	0	2.3					
GW01		21/03/17 11:00:00			0.2	0.0	19.9	#	0	0	2.0					
GW01		21/03/17 11:01:00			0.2	0.0	20.0	#	0	0	1.9					
GW01		21/03/17 11:02:00			0.1	0.0	20.0	#	0	0	1.8					
GW01		21/03/17 11:03:00			0.1	0.0	20.0	#	0	0	1.8					
GW01		21/03/17 11:04:00			0.1	0.0	20.0	#	0	0	1.9					
GW01		21/03/17 11:05:00			0.1	0.0	20.0	#	0	0	1.9					
GW01		21/03/17 11:06:00			0.1	0.0	20.1	#	0	0	1.9					
GW01		21/03/17 11:07:00			0.1	0.0	20.1	#	0	0	1.8					
GW01		21/03/17 11:08:00			0.1	0.0	20.1	#	0	0	1.8					
GW01		21/03/17 11:09:00			0.1	0.0	20.1	#	0	0	1.8					
GW01		21/03/17 11:10:00			0.1	0.0	20.1	#	0	0	1.8					
GW01		21/03/17 11:11:00														
GW01		29/03/17 00:00:00													Borehole flooded	
GW01		29/03/17 11:46:00	1018										13		GW01A Upper	
GW01		29/03/17 11:47:00		0								0.0				
GW01		29/03/17 11:48:00		0								0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534		CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW01		29/03/17 11:49:00		0								0.0			
GW01		29/03/17 11:50:00		0								0.0			
GW01		29/03/17 11:51:00		0								0.0			
GW01		29/03/17 11:52:00			6.9	24.6	14.1	#	0	0	0.0				
GW01		29/03/17 11:53:00			6.3	22.0	14.8	#	0	0	0.0				
GW01		29/03/17 11:54:00			5.1	17.9	15.0	#	0	0	0.0				
GW01		29/03/17 11:55:00			4.5	15.4	16.5	#	0	0	0.0				
GW01		29/03/17 11:56:00			4.1	14.1	16.9	#	0	0	0.0				
GW01		29/03/17 11:57:00			4.0	13.7	17.0	#	0	0	0.0				
GW01		29/03/17 11:58:00			4.0	13.6	17.1	#	0	0	0.0				
GW01		29/03/17 11:59:00			3.3	11.5	17.7	#	0	0	0.0				
GW01		29/03/17 12:00:00			2.8	10.1	18.1	#	0	0	0.0				
GW01		29/03/17 12:01:00			2.7	9.9	18.2	#	0	0	0.0				
GW01		29/03/17 12:02:00			2.7	9.4	18.2	#	0	0	0.0				
GW01		29/03/17 12:03:00			2.6	9.9	18.4	#	0	0	0.0				
GW01		29/03/17 12:04:00			2.3	8.6	18.4	#	0	0	0.0				
GW01		29/03/17 12:05:00			2.4	8.4	18.4	#	0	0	0.0				
GW01		29/03/17 12:06:00			2.4	8.4	18.4	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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	
GW01		29/03/17 12:07:00	1017										13	2.84	GW01 Lower	
GW01		29/03/17 12:09:00														
GW01		29/03/17 12:10:00		0								0.0				
GW01		29/03/17 12:11:00		0								0.0				
GW01		29/03/17 12:12:00		0								0.0				
GW01		29/03/17 12:13:00		0								0.0				
GW01		29/03/17 12:14:00		0								0.0				
GW01		29/03/17 12:15:00			1.3	1.8	18.3	#	0	0	0.0					
GW01		29/03/17 12:16:00			0.9	1.3	18.6	#	0	0	0.0					
GW01		29/03/17 12:17:00			0.6	0.0	20.1	#	0	0	0.0					
GW01		29/03/17 12:18:00			0.2	0.0	20.7	#	0	0	0.0					
GW01		29/03/17 12:19:00			0.1	0.0	20.8	#	0	0	0.0					
GW01		29/03/17 12:20:00			0.0	0.0	20.9	#	0	0	0.0					
GW01		29/03/17 12:21:00			0.0	0.0	20.9	#	0	0	0.0					
GW01		29/03/17 12:22:00			0.0	0.0	20.9	#	0	0	0.0					
GW01		29/03/17 12:23:00			0.0	0.0	20.9	#	0	0	0.0					
GW01		29/03/17 12:24:00			0.0	0.0	20.9	#	0	0	0.0					
GW01		29/03/17 12:25:00			0.0	0.0	20.9	#	0	0	0.0					
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534		CHECKED EC

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS



CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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	
GW01		29/03/17 12:26:00			0.0	0.0	20.9	#	0	0	0.0					
GW01		29/03/17 12:27:00			0.0	0.0	20.9	#	0	0	0.0					
GW01		29/03/17 12:28:00			0.0	0.0	20.9	#	0	0	0.0					
GW01		29/03/17 12:29:00			0.0	0.0	20.9	#	0	0	0.0					
GW01		29/03/17 12:30:00												Dry		
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534		CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW02		10/01/17 12:10:00	1004	0								0.0	8		
GW02		10/01/17 12:11:00										0.0			
GW02		10/01/17 12:12:00										0.0			
GW02		10/01/17 12:13:00										0.0			
GW02		10/01/17 12:14:00										0.0			
GW02		10/01/17 12:15:00			9.6	77.8	1.0	#	0	10	0.0				
GW02		10/01/17 12:16:00			10.4	77.7	0.4	#	0	10	0.0				
GW02		10/01/17 12:17:00			11.4	77.7	0.5	#	0	10	0.0				
GW02		10/01/17 12:18:00			12.8	77.2	0.3	#	0	10	0.0				
GW02		10/01/17 12:19:00			13.1	77.0	0.1	#	0	10	0.0				
GW02		10/01/17 12:20:00			16.6	75.4	0.0	#	0	10	0.0				
GW02		10/01/17 12:21:00			17.2	75.0	0.0	#	0	10	0.0				
GW02		10/01/17 12:22:00			17.9	74.7	0.0	#	0	10	0.0				
GW02		10/01/17 12:23:00			18.1	74.5	0.0	#	0	10	0.0				
GW02		10/01/17 12:24:00			18.7	74.3	0.0	#	0	10	0.0				
GW02		10/01/17 12:25:00												5.60	
GW02		24/01/17 12:25:00	1023	0								0.0	6		
GW02		24/01/17 12:26:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW02		24/01/17 12:27:00										0.0			
GW02		24/01/17 12:28:00										0.0			
GW02		24/01/17 12:29:00										0.0			
GW02		24/01/17 12:30:00			17.4	36.3	9.6	#	0	0	0.0				
GW02		24/01/17 12:31:00			18.4	39.1	8.9	#	0	0	0.0				
GW02		24/01/17 12:32:00			19.3	41.1	8.3	#	0	0	0.0				
GW02		24/01/17 12:33:00			19.7	42.5	7.9	#	0	0	0.0				
GW02		24/01/17 12:34:00			20.7	44.3	7.4	#	0	0	0.0				
GW02		24/01/17 12:35:00			20.7	44.6	7.3	#	0	0	0.0				
GW02		24/01/17 12:36:00			20.9	44.8	7.2	#	0	0	0.0				
GW02		24/01/17 12:37:00			21.2	45.2	7.1	#	0	0	0.0				
GW02		24/01/17 12:38:00			21.3	45.6	7.0	#	0	0	0.0				
GW02		24/01/17 12:39:00			21.5	45.9	6.9	#	0	0	0.0				
GW02		24/01/17 12:40:00												Dry	
GW02		31/01/17 12:20:00													Borehole flooded, Gas clam damaged
GW02		07/02/17 11:05:00													Borehole flooded
GW02		14/02/17 09:05:00													Borehole flooded
GW02		21/02/17 00:00:00													Borehole flooded
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW02		27/02/17 00:00:00	1017										11		Borehole flooded
GW02		16/03/17 00:00:00													Borehole flooded with surface water
GW02		16/03/17 15:54:00													GW02A Upper
GW02		16/03/17 15:55:00		302								34.9			
GW02		16/03/17 15:56:00		191								19.6			
GW02		16/03/17 15:57:00		144								15.7			
GW02		16/03/17 15:58:00		123								13.5			
GW02		16/03/17 15:59:00		112								12.4			
GW02		16/03/17 16:00:00			17.6	68.7	0.0	#	0	0	0.0				
GW02		16/03/17 16:01:00			17.7	69.3	0.0	#	0	0	0.0				
GW02		16/03/17 16:02:00			17.7	69.5	0.0	#	0	0	0.0				
GW02		16/03/17 16:03:00			17.7	69.6	0.0	#	0	0	0.0				
GW02		16/03/17 16:04:00			17.8	69.8	0.0	#	0	0	0.0				
GW02		16/03/17 16:05:00			17.8	70.2	0.0	#	0	0	0.0				
GW02		16/03/17 16:06:00			17.8	7.2	0.0	#	0	0	0.0				
GW02		16/03/17 16:07:00			17.8	70.5	0.0	#	0	0	0.0				
GW02		16/03/17 16:08:00			17.8	70.7	0.0	#	0	0	0.0				
GW02		16/03/17 16:09:00			17.9	70.7	0.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW02		16/03/17 16:10:00			17.8	70.8	0.0	#	0	0	0.0				
GW02		16/03/17 16:11:00			17.8	71.3	0.0	#	0	0	0.0				
GW02		16/03/17 16:12:00			17.8	71.2	0.0	#	0	0	0.0				
GW02		16/03/17 16:13:00			17.8	71.4	0.0	#	0	0	0.0				
GW02		16/03/17 16:14:00			17.9	71.4	0.0	#	0	0	0.0				
GW02		16/03/17 16:15:00													
GW02		16/03/17 16:18:00	1016										11	4.20	GW02A Lower
GW02		16/03/17 16:19:00		0								0.0			
GW02		16/03/17 16:20:00		0								0.0			
GW02		16/03/17 16:21:00		0								0.0			
GW02		16/03/17 16:22:00		0								0.0			
GW02		16/03/17 16:23:00		0								0.0			
GW02		16/03/17 16:24:00			1.6	8.1	16.5	#	0	0	0.0				
GW02		16/03/17 16:25:00			1.3	6.4	17.4	#	0	0	0.0				
GW02		16/03/17 16:26:00			1.0	5.3	17.5	#	0	0	0.0				
GW02		16/03/17 16:27:00			0.9	4.8	18.0	#	0	0	0.0				
GW02		16/03/17 16:28:00			0.9	4.6	18.1	#	0	0	0.0				
GW02		16/03/17 16:29:00			0.9	4.3	18.3	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW02		16/03/17 16:30:00			0.8	4.2	18.4	94.2	0	0	0.0				
GW02		16/03/17 16:31:00			0.8	3.8	18.6	78.9	0	0	0.0				
GW02		16/03/17 16:32:00			0.8	3.7	18.6	77.8	0	0	0.0				
GW02		16/03/17 16:33:00			0.7	3.5	18.7	72.3	0	0	0.0				
GW02		16/03/17 16:34:00			0.7	3.5	18.7	71.9	0	0	0.0				
GW02		16/03/17 16:35:00			0.7	3.3	18.8	68.6	0	0	0.0				
GW02		16/03/17 16:36:00			0.7	3.1	18.9	64.5	0	0	0.0				
GW02		16/03/17 16:37:00			0.6	2.8	19.1	58.7	0	0	0.0				
GW02		16/03/17 16:38:00			0.4	2.6	19.5	53.3	0	0	0.0				
GW02		16/03/17 16:39:00													
GW02		21/03/17 14:30:00	1005										12	8.37	
GW02		21/03/17 14:31:00		0								0.0			
GW02		21/03/17 14:32:00		0								0.0			
GW02		21/03/17 14:33:00		0								0.0			
GW02		21/03/17 14:34:00		0								0.0			
GW02		21/03/17 14:35:00		0								0.0			
GW02		21/03/17 14:36:00			30.2	69.3	0.0	#	0	0	0.0				
GW02		21/03/17 14:37:00			30.5	69.4	0.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW02		21/03/17 14:38:00			30.5	69.4	0.0	#	0	0	0.0				
GW02		21/03/17 14:39:00			20.7	69.3	0.0	#	0	0	0.0				
GW02		21/03/17 14:40:00			20.7	69.3	0.0	#	0	0	0.0				
GW02		21/03/17 14:41:00			30.7	69.2	0.0	#	0	0	0.0				
GW02		21/03/17 14:42:00			30.9	69.2	0.0	#	0	0	0.0				
GW02		21/03/17 14:43:00			30.9	69.3	0.0	#	0	0	0.0				
GW02		21/03/17 14:44:00			31.0	69.1	0.0	#	0	0	0.0				
GW02		21/03/17 14:45:00			31.1	69.0	0.0	#	0	0	0.0				
GW02		21/03/17 14:46:00			31.1	69.1	0.0	#	0	0	0.0				
GW02		21/03/17 14:47:00			31.1	69.0	0.0	#	0	0	0.0				
GW02		21/03/17 14:48:00			31.2	68.9	0.0	#	0	0	0.0				
GW02		21/03/17 14:49:00			31.3	68.8	0.0	#	0	0	0.0				
GW02		21/03/17 14:50:00			31.4	68.8	0.0	#	0	0	0.0				
GW02		21/03/17 14:51:00													
GW02		29/03/17 14:43:00	1018												
GW02		29/03/17 14:44:00		110								12.1			
GW02		29/03/17 14:45:00		113								12.5			
GW02		29/03/17 14:46:00		116								12.9			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW02		29/03/17 14:47:00		116								12.7			
GW02		29/03/17 14:48:00		113								13.0			
GW02		29/03/17 14:49:00			18.6	78.5	0.0	#	0	0	0.0				
GW02		29/03/17 14:50:00			19.1	78.3	0.0	#	0	0	0.0				
GW02		29/03/17 14:51:00			19.4	78.1	0.0	#	0	0	0.0				
GW02		29/03/17 14:52:00			20.1	77.5	0.0	#	0	0	0.0				
GW02		29/03/17 14:53:00			20.8	77.2	0.0	#	0	0	0.0				
GW02		29/03/17 14:54:00			21.6	76.6	0.0	#	0	0	0.0				
GW02		29/03/17 14:55:00			22.4	76.2	0.0	#	0	0	0.0				
GW02		29/03/17 14:56:00			23.1	75.6	0.0	#	0	0	0.0				
GW02		29/03/17 14:57:00			23.8	75.0	0.0	#	0	0	0.0				
GW02		29/03/17 14:58:00			24.3	74.6	0.0	#	0	0	0.0				
GW02		29/03/17 14:59:00			25.3	74.0	0.0	#	0	0	0.0				
GW02		29/03/17 15:00:00			25.2	73.3	0.0	#	0	0	0.0				
GW02		29/03/17 15:01:00			27.1	72.7	0.0	#	0	0	0.0				
GW02		29/03/17 15:02:00			28.7	75.9	0.0	#	0	0	0.0				
GW02		29/03/17 15:03:00			28.6	71.5	0.0	#	0	0	0.0				
GW02		29/03/17 15:04:00												Dry	
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW03		10/01/17 12:30:00	1004	0								0.0	8		
GW03		10/01/17 12:31:00										0.0			
GW03		10/01/17 12:32:00										0.0			
GW03		10/01/17 12:33:00										0.0			
GW03		10/01/17 12:34:00										0.0			
GW03		10/01/17 12:35:00			2.7	50.0	8.7	#	0	0	0.0				
GW03		10/01/17 12:36:00			3.0	52.1	8.4	#	0	0	0.0				
GW03		10/01/17 12:37:00			3.5	53.6	7.7	#	0	0	0.0				
GW03		10/01/17 12:38:00			4.1	54.9	7.4	#	0	0	0.0				
GW03		10/01/17 12:39:00			4.7	56.0	7.1	#	0	0	0.0				
GW03		10/01/17 12:40:00			4.9	56.9	6.8	#	0	0	0.0				
GW03		10/01/17 12:41:00			5.6	58.0	6.4	#	0	0	0.0				
GW03		10/01/17 12:42:00			6.3	59.1	6.1	#	0	0	0.0				
GW03		10/01/17 12:43:00			7.0	60.2	5.8	#	0	0	0.0				
GW03		10/01/17 12:44:00			7.4	61.6	5.1	#	0	0	0.0				
GW03		10/01/17 12:45:00												4.67	
GW03		24/01/17 00:00:00													Car parked on top
GW03		31/01/17 13:20:00													Borehole flooded, Gas clam removed to avoid
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW03		07/02/17 11:00:00	1017										11		damage
GW03		14/02/17 09:00:00													Borehole flooded
GW03		21/02/17 00:00:00													Borehole flooded
GW03		27/02/17 00:00:00													Borehole flooded
GW03		16/03/17 00:00:00													Borehole flooded with surface water
GW03		16/03/17 14:35:00		264											GW03A Upper
GW03		16/03/17 14:36:00		271											
GW03		16/03/17 14:37:00		266											
GW03		16/03/17 14:38:00		268											
GW03		16/03/17 14:39:00		265											
GW03		16/03/17 14:40:00													
GW03		16/03/17 14:41:00													
GW03		16/03/17 14:42:00													
GW03		16/03/17 14:43:00													
GW03		16/03/17 14:44:00													
GW03		16/03/17 14:45:00													
GW03		16/03/17 14:46:00													
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW03		16/03/17 14:47:00			32.2	67.8	0.0	#	0	0	0.0				
GW03		16/03/17 14:48:00			32.2	67.8	0.0	#	0	0	0.0				
GW03		16/03/17 14:49:00			32.2	67.8	0.0	#	0	0	0.0				
GW03		16/03/17 14:50:00			32.2	67.8	0.0	#	0	0	0.0				
GW03		16/03/17 14:51:00			32.2	67.8	0.0	#	0	0	0.0				
GW03		16/03/17 14:52:00			32.2	67.8	0.0	#	0	0	0.0				
GW03		16/03/17 14:53:00			32.2	67.8	0.0	#	0	0	0.0				
GW03		16/03/17 14:54:00			32.2	67.8	0.0	#	0	0	0.0				
GW03		16/03/17 14:55:00			32.2	67.8	0.0	#	0	0	0.0				
GW03		16/03/17 14:56:00												7.50	
GW03		16/03/17 14:57:00	1017										11		GW03A Lower
GW03		16/03/17 14:58:00		0								0.0			
GW03		16/03/17 14:59:00		0								0.0			
GW03		16/03/17 15:00:00		0								0.0			
GW03		16/03/17 15:01:00		0								0.0			
GW03		16/03/17 15:02:00		0								0.0			
GW03		16/03/17 15:03:00			7.7	14.7	15.6	#	0	0	0.0				
GW03		16/03/17 15:04:00			4.5	9.5	17.4	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW03		16/03/17 15:05:00			4.4	7.9	17.5	#	0	0	0.0				
GW03		16/03/17 15:06:00			3.6	6.8	17.9	#	0	0	0.0				
GW03		16/03/17 15:07:00			3.4	6.4	18.5	#	0	0	0.0				
GW03		16/03/17 15:08:00			2.5	5.0	18.8	#	0	0	0.0				
GW03		16/03/17 15:09:00			2.2	4.2	19.1	#	0	0	0.0				
GW03		16/03/17 15:10:00			2.1	4.0	19.3	#	0	0	0.0				
GW03		16/03/17 15:11:00			1.9	3.6	19.4	90.4	0	0	0.0				
GW03		16/03/17 15:12:00			1.8	3.6	19.5	90.3	0	0	0.0				
GW03		16/03/17 15:13:00			1.6	3.4	19.6	86.1	0	0	0.0				
GW03		16/03/17 15:14:00			1.4	3.4	19.8	85.7	0	0	0.0				
GW03		16/03/17 15:15:00			1.2	3.3	19.9	85.3	0	0	0.0				
GW03		16/03/17 15:16:00			1.1	3.1	20.0	83.1	0	0	0.0				
GW03		16/03/17 15:17:00			1.0	3.0	20.1	79.0	0	0	0.0				
GW03		16/03/17 15:18:00												7.50	
GW03		21/03/17 13:57:00	1007										11		
GW03		21/03/17 13:58:00		-20								-3.7			
GW03		21/03/17 13:59:00		-6								-1.2			
GW03		21/03/17 14:00:00		0								0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW03		21/03/17 14:01:00		0								0.0			
GW03		21/03/17 14:02:00		0								0.0			
GW03		21/03/17 14:03:00			20.5	64.7	2.7	#	0	0	0.0				
GW03		21/03/17 14:04:00			21.2	65.5	2.2	#	0	0	0.0				
GW03		21/03/17 14:05:00			21.6	67.4	1.9	#	0	0	0.0				
GW03		21/03/17 14:06:00			21.9	68.0	1.5	#	0	0	0.0				
GW03		21/03/17 14:07:00			22.4	70.1	1.2	#	0	0	0.0				
GW03		21/03/17 14:08:00			22.5	70.8	1.0	#	0	0	0.0				
GW03		21/03/17 14:09:00			22.7	71.2	0.9	#	0	0	0.0				
GW03		21/03/17 14:10:00			23.0	71.8	0.7	#	0	0	0.0				
GW03		21/03/17 14:11:00			23.1	72.5	0.5	#	0	0	0.0				
GW03		21/03/17 14:12:00			23.4	73.4	0.3	#	0	0	0.0				
GW03		21/03/17 14:13:00			23.5	73.7	0.2	#	0	0	0.0				
GW03		21/03/17 14:14:00			23.6	73.9	0.2	#	0	0	0.0				
GW03		21/03/17 14:15:00			23.7	73.9	0.2	#	0	0	0.0				
GW03		21/03/17 14:16:00			23.7	74.0	0.1	#	0	0	0.0				
GW03		21/03/17 14:17:00			23.8	74.0	0.1	#	0	0	0.0				
GW03		21/03/17 14:18:00												4.60	
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW03		29/03/17 13:19:00	1019										13		
GW03		29/03/17 13:20:00		66								8.1			
GW03		29/03/17 13:21:00		64								7.9			
GW03		29/03/17 13:22:00		73								9.0			
GW03		29/03/17 13:23:00		71								8.5			
GW03		29/03/17 13:24:00		68								8.2			
GW03		29/03/17 13:25:00			23.5	62.1	2.1	#	0	0	0.0				
GW03		29/03/17 13:26:00			23.6	62.8	1.9	#	0	0	0.0				
GW03		29/03/17 13:27:00			23.9	63.3	1.7	#	0	0	0.0				
GW03		29/03/17 13:28:00			24.0	64.3	1.6	#	0	0	0.0				
GW03		29/03/17 13:29:00			24.1	64.5	1.5	#	0	0	0.0				
GW03		29/03/17 13:30:00			24.2	65.2	1.4	#	0	0	0.0				
GW03		29/03/17 13:31:00			24.3	65.4	1.2	#	0	0	0.0				
GW03		29/03/17 13:32:00			24.3	65.7	1.1	#	0	0	0.0				
GW03		29/03/17 13:33:00			24.3	66.3	1.1	#	0	0	0.0				
GW03		29/03/17 13:34:00			24.3	66.4	1.0	#	0	0	0.0				
GW03		29/03/17 13:35:00			24.4	66.7	1.0	#	0	0	0.0				
GW03		29/03/17 13:36:00			24.4	66.8	0.9	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

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GAS AND GROUNDWATER LEVELS



CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW03		29/03/17 13:37:00			24.3	66.9	0.8	#	0	0	0.0				
GW03		29/03/17 13:38:00			24.3	66.8	0.7	#	0	0	0.0				
GW03		29/03/17 13:39:00			24.3	66.9	0.7	#	0	0	0.0				
GW03		29/03/17 13:40:00												Dry	
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	
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GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		17/01/17 11:35:00	1025	0								0.0	5		
GW04		17/01/17 11:36:00										0.0			
GW04		17/01/17 11:37:00										0.0			
GW04		17/01/17 11:38:00										0.0			
GW04		17/01/17 11:39:00										0.0			
GW04		17/01/17 11:40:00			0.6	21.6	12.4	#	0	0	0.0				
GW04		17/01/17 11:41:00			6.5	22.4	12.5	#	0	0	0.0				
GW04		17/01/17 11:42:00			13.1	27.5	9.1	#	0	0	0.0				
GW04		17/01/17 11:43:00			12.8	29.4	9.8	#	0	0	0.0				
GW04		17/01/17 11:44:00			13.1	29.7	9.6	#	0	0	0.0				
GW04		17/01/17 11:45:00			13.0	29.6	9.7	#	0	0	0.0				
GW04		17/01/17 11:46:00			13.2	29.8	9.6	#	0	0	0.0				
GW04		17/01/17 11:47:00			13.2	29.7	9.6	#	0	0	0.0				
GW04		17/01/17 11:48:00			13.3	29.7	9.6	#	0	0	0.0				
GW04		17/01/17 11:49:00			13.3	29.8	9.6	#	0	0	0.0				
GW04		17/01/17 11:50:00												8.52	
GW04		24/01/17 10:15:00	1025	0								0.0	2		
GW04		24/01/17 10:16:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		24/01/17 10:17:00										0.0			
GW04		24/01/17 10:18:00										0.0			
GW04		24/01/17 10:19:00										0.0			
GW04		24/01/17 10:20:00			14.0	30.3	11.8	#	0	0	0.0				
GW04		24/01/17 10:21:00			14.0	30.6	11.8	#	0	0	0.0				
GW04		24/01/17 10:22:00			14.1	30.6	11.8	#	0	0	0.0				
GW04		24/01/17 10:23:00			14.1	30.8	11.8	#	0	0	0.0				
GW04		24/01/17 10:24:00			14.1	31.0	11.8	#	0	0	0.0				
GW04		24/01/17 10:25:00			14.2	31.2	11.8	#	0	0	0.0				
GW04		24/01/17 10:26:00			14.3	31.0	11.7	#	0	0	0.0				
GW04		24/01/17 10:27:00			14.3	31.1	11.7	#	0	0	0.0				
GW04		24/01/17 10:28:00			14.3	31.1	11.7	#	0	0	0.0				
GW04		24/01/17 10:29:00			14.3	31.2	11.7	#	0	0	0.0				
GW04		24/01/17 10:30:00												8.43	
GW04		31/01/17 12:00:00	1004	0								0.0	7		
GW04		31/01/17 12:01:00										0.0			
GW04		31/01/17 12:02:00										0.0			
GW04		31/01/17 12:03:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		31/01/17 12:04:00										0.0			
GW04		31/01/17 12:05:00			10.3	20.5	14.6	#	0	0	0.0				
GW04		31/01/17 12:06:00			12.4	24.5	13.3	#	0	0	0.0				
GW04		31/01/17 12:07:00			13.0	25.9	12.8	#	0	0	0.0				
GW04		31/01/17 12:08:00			13.2	26.2	12.7	#	0	0	0.0				
GW04		31/01/17 12:09:00			13.7	27.4	12.2	#	0	0	0.0				
GW04		31/01/17 12:10:00			13.9	29.0	12.1	#	0	0	0.0				
GW04		31/01/17 12:11:00			14.1	29.9	11.9	#	0	0	0.0				
GW04		31/01/17 12:12:00			14.4	31.0	11.5	#	0	0	0.0				
GW04		31/01/17 12:13:00			15.0	32.4	11.0	#	0	0	0.0				
GW04		31/01/17 12:14:00			15.2	32.8	10.8	#	0	0	0.0				
GW04		31/01/17 12:15:00												8.53	Base 9.65m
GW04		07/02/17 11:35:00	1006	0								0.0	10		
GW04		07/02/17 11:36:00										0.0			
GW04		07/02/17 11:37:00										0.0			
GW04		07/02/17 11:38:00										0.0			
GW04		07/02/17 11:39:00										0.0			
GW04		07/02/17 11:40:00			0.0	0.0	21.3	0.0	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		07/02/17 11:41:00			0.0	0.0	21.4	0.0	0	0	0.0				
GW04		07/02/17 11:42:00			0.0	0.0	21.6	0.0	0	0	0.0				
GW04		07/02/17 11:43:00			0.0	0.0	21.6	0.0	0	0	0.0				
GW04		07/02/17 11:44:00			0.0	0.0	21.6	0.0	0	0	0.0				
GW04		07/02/17 11:45:00												8.55	
GW04		07/02/17 14:00:00	1005	0								0.0	11		
GW04		07/02/17 14:01:00										0.0			
GW04		07/02/17 14:02:00										0.0			
GW04		07/02/17 14:03:00										0.0			
GW04		07/02/17 14:04:00										0.0			
GW04		07/02/17 14:05:00			9.2	18.1	10.8	#	0	0	0.0				
GW04		07/02/17 14:06:00			9.2	18.0	10.9	#	0	0	0.0				
GW04		07/02/17 14:07:00			9.1	17.9	11.0	#	0	0	0.0				
GW04		07/02/17 14:08:00			9.5	17.2	10.6	#	0	0	0.0				
GW04		07/02/17 14:09:00			9.5	16.8	10.5	#	0	0	0.0				
GW04		07/02/17 14:10:00			9.6	16.5	10.3	#	0	0	0.0				
GW04		07/02/17 14:11:00			9.7	17.2	10.3	#	0	0	0.0				
GW04		07/02/17 14:12:00			9.8	19.6	10.1	#	0	0	0.0				
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GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		07/02/17 14:13:00			9.9	19.9	10.0	#	0	0	0.0				
GW04		07/02/17 14:14:00			10.1	20.3	9.8	#	0	0	0.0				
GW04		07/02/17 14:15:00												8.55	
GW04		14/02/17 09:50:00	1015	0								0.0	4		
GW04		14/02/17 09:51:00										0.0			
GW04		14/02/17 09:52:00										0.0			
GW04		14/02/17 09:53:00										0.0			
GW04		14/02/17 09:54:00										0.0			
GW04		14/02/17 09:55:00			0.1	0.0	21.0	0.0	0	0	0.0				
GW04		14/02/17 09:56:00			0.1	0.0	21.3	0.0	0	0	0.0				
GW04		14/02/17 09:57:00			0.1	0.0	21.2	0.0	0	0	0.0				
GW04		14/02/17 09:58:00			0.2	0.0	21.2	0.0	0	0	0.0				
GW04		14/02/17 09:59:00			0.3	0.0	21.2	0.0	0	0	0.0				
GW04		14/02/17 10:00:00			0.4	0.0	21.2	0.0	0	0	0.0				
GW04		14/02/17 10:01:00			0.4	0.0	21.2	0.0	0	0	0.0				
GW04		14/02/17 10:02:00			0.4	0.0	21.1	0.0	0	0	0.0				
GW04		14/02/17 10:03:00			0.4	0.0	21.1	0.0	0	0	0.0				
GW04		14/02/17 10:04:00			0.4	0.0	21.1	0.0	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		14/02/17 10:05:00			0.4	0.0	21.1	0.0	0	0	0.0				
GW04		14/02/17 10:06:00			0.4	0.0	21.1	0.0	0	0	0.0				
GW04		14/02/17 10:07:00			0.5	0.0	21.0	0.0	0	0	0.0				
GW04		14/02/17 10:08:00			0.5	0.0	21.0	0.0	0	0	0.0				
GW04		14/02/17 10:09:00			0.5	0.0	21.0	0.0	0	0	0.0				
GW04		14/02/17 10:10:00												8.44	
GW04		21/02/17 12:20:00	1014	6								1.3	10		
GW04		21/02/17 12:21:00										0.7			
GW04		21/02/17 12:22:00										0.1			
GW04		21/02/17 12:23:00										0.0			
GW04		21/02/17 12:24:00										0.0			
GW04		21/02/17 12:25:00			32.7	66.5	0.1	#	0	0	1.0				
GW04		21/02/17 12:26:00			32.8	67.1	0.0	#	0	0	1.1				
GW04		21/02/17 12:27:00			32.8	67.1	0.0	#	0	0	1.2				
GW04		21/02/17 12:28:00			27.6	68.6	0.0	#	0	0	0.9				
GW04		21/02/17 12:29:00			28.2	70.7	0.0	#	0	0	0.9				
GW04		21/02/17 12:30:00			28.4	71.0	0.0	#	0	0	0.9				
GW04		21/02/17 12:31:00			28.4	70.9	0.0	#	0	0	1.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		21/02/17 12:32:00			28.5	70.9	0.0	#	0	0	1.0				
GW04		21/02/17 12:33:00			28.6	70.8	0.0	#	0	0	1.0				
GW04		21/02/17 12:34:00			28.6	70.9	0.0	#	0	0	1.1				
GW04		21/02/17 12:35:00			28.6	70.7	0.0	#	0	0	1.1				
GW04		21/02/17 12:36:00			28.5	70.8	0.0	#	0	0	1.1				
GW04		21/02/17 12:37:00			28.6	70.7	0.0	#	0	0	1.1				
GW04		21/02/17 12:38:00			28.6	70.7	0.0	#	0	0	1.1				
GW04		21/02/17 12:39:00			28.6	70.8	0.0	#	0	0	1.1				
GW04		21/02/17 12:40:00												8.42	
GW04		27/02/17 11:45:00	985	129								13.3	8		
GW04		27/02/17 11:46:00										13.9			
GW04		27/02/17 11:47:00										14.4			
GW04		27/02/17 11:48:00										13.8			
GW04		27/02/17 11:49:00										13.9			
GW04		27/02/17 11:50:00			30.1	60.4	0.1	#	0	0	0.7				
GW04		27/02/17 11:51:00			30.8	62.2	0.0	#	0	0	1.0				
GW04		27/02/17 11:52:00			30.9	62.4	0.0	#	0	0	1.2				
GW04		27/02/17 11:53:00			31.0	62.4	0.0	#	0	0	1.3				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		27/02/17 11:54:00			30.9	62.3	0.0	#	0	0	1.4				
GW04		27/02/17 11:55:00			31.0	62.4	0.0	#	0	0	1.5				
GW04		27/02/17 11:56:00			31.0	62.4	0.0	#	0	0	1.6				
GW04		27/02/17 11:57:00			31.0	62.4	0.0	#	0	0	1.7				
GW04		27/02/17 11:58:00			31.0	62.4	0.0	#	0	0	1.8				
GW04		27/02/17 11:59:00			31.0	62.4	0.0	#	0	0	1.9				
GW04		27/02/17 12:00:00			31.0	62.4	0.0	#	0	0	2.0				
GW04		27/02/17 12:01:00			31.0	62.4	0.0	#	0	0	2.1				
GW04		27/02/17 12:02:00			31.0	62.4	0.0	#	0	0	2.1				
GW04		27/02/17 12:03:00			31.0	62.4	0.0	#	0	0	2.2				
GW04		27/02/17 12:04:00			31.0	62.4	0.0	#	0	0	2.3				
GW04		27/02/17 12:05:00												8.41	
GW04		16/03/17 15:24:00	1017										11		
GW04		16/03/17 15:25:00		202								21.2			
GW04		16/03/17 15:26:00		201								21.0			
GW04		16/03/17 15:27:00		238								24.9			
GW04		16/03/17 15:28:00		237								24.9			
GW04		16/03/17 15:29:00		238								24.9			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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	
GW04		16/03/17 15:30:00			29.4	64.0	0.0	#	0	0	0.0					
GW04		16/03/17 15:31:00			30.1	65.1	0.0	#	0	0	0.0					
GW04		16/03/17 15:32:00			30.5	65.0	0.0	#	0	0	0.0					
GW04		16/03/17 15:33:00			30.7	64.9	0.0	#	0	0	0.0					
GW04		16/03/17 15:34:00			30.8	64.9	0.0	#	0	0	0.0					
GW04		16/03/17 15:35:00			30.8	64.9	0.0	#	0	0	0.0					
GW04		16/03/17 15:36:00			30.8	65.0	0.0	#	0	0	0.0					
GW04		16/03/17 15:37:00			30.8	65.0	0.0	#	0	0	0.0					
GW04		16/03/17 15:38:00			30.8	65.9	0.0	#	0	0	0.0					
GW04		16/03/17 15:39:00			30.7	64.8	0.0	#	0	0	0.0					
GW04		16/03/17 15:40:00			30.8	64.7	0.0	#	0	0	0.0					
GW04		16/03/17 15:41:00			30.6	64.9	0.0	#	0	0	0.0					
GW04		16/03/17 15:42:00			30.6	65.0	0.0	#	0	0	0.0					
GW04		16/03/17 15:43:00			30.7	65.1	0.0	#	0	0	0.0					
GW04		16/03/17 15:44:00			30.8	64.9	0.0	#	0	0	0.0					
GW04		16/03/17 15:45:00												8.50		
GW04		21/03/17 12:09:00	1007										11			
GW04		21/03/17 12:10:00		0								0.0				
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GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		21/03/17 12:11:00		0								0.0			
GW04		21/03/17 12:12:00		0								0.0			
GW04		21/03/17 12:13:00		0								0.0			
GW04		21/03/17 12:14:00		0								0.0			
GW04		21/03/17 12:15:00			25.4	50.7	1.6	#	0	10	0.0				
GW04		21/03/17 12:16:00			25.8	51.9	1.3	#	0	10	0.0				
GW04		21/03/17 12:17:00			25.1	52.8	1.1	#	0	10	0.0				
GW04		21/03/17 12:18:00			26.4	53.3	1.0	#	0	10	0.0				
GW04		21/03/17 12:19:00			26.5	53.9	0.9	#	0	10	0.0				
GW04		21/03/17 12:20:00			26.7	54.2	0.7	#	0	10	0.0				
GW04		21/03/17 12:21:00			26.8	54.9	0.6	#	0	10	0.0				
GW04		21/03/17 12:22:00			27.1	54.9	0.6	#	0	10	0.0				
GW04		21/03/17 12:23:00			27.1	54.9	0.6	#	0	10	0.0				
GW04		21/03/17 12:24:00			27.2	55.2	0.6	#	0	10	0.0				
GW04		21/03/17 12:25:00			27.4	55.6	0.6	#	0	10	0.0				
GW04		21/03/17 12:26:00			27.6	56.9	0.4	#	0	10	0.0				
GW04		21/03/17 12:27:00			27.8	56.3	0.4	#	0	10	0.0				
GW04		21/03/17 12:28:00			28.1	56.0	0.4	#	0	10	0.0				
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GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW04		21/03/17 12:29:00	1018		28.3	55.7	0.4	#	0	10	0.0		13	8.50	
GW04		21/03/17 12:30:00													
GW04		29/03/17 13:57:00													
GW04		29/03/17 13:58:00		8								1.8			
GW04		29/03/17 13:59:00		13								3.0			
GW04		29/03/17 14:00:00		12								2.7			
GW04		29/03/17 14:01:00		12								2.7			
GW04		29/03/17 14:02:00		14								3.3			
GW04		29/03/17 14:03:00			27.8	60.8	0.1	#	0	0	0.0				
GW04		29/03/17 14:04:00			28.1	61.2	0.1	#	0	0	0.0				
GW04		29/03/17 14:05:00			28.0	61.2	0.0	#	0	0	0.0				
GW04		29/03/17 14:06:00			28.0	61.4	0.0	#	0	0	0.0				
GW04		29/03/17 14:07:00			28.0	61.3	0.0	#	0	0	0.0				
GW04		29/03/17 14:08:00			28.1	61.5	0.0	#	0	0	0.0				
GW04		29/03/17 14:09:00			28.1	61.6	0.0	#	0	0	0.0				
GW04		29/03/17 14:10:00			28.1	61.7	0.0	#	0	0	0.0				
GW04		29/03/17 14:11:00			28.1	61.8	0.0	#	0	0	0.0				
GW04		29/03/17 14:12:00			28.1	61.9	0.0	#	0	0	0.0				
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GAS AND GROUNDWATER LEVELS



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Borehole /trial pit no.	pipe	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
GW04		29/03/17 14:13:00			28.1	62.0	0.0	#	0	0	0.0				
GW04		29/03/17 14:14:00			28.1	62.1	0.0	#	0	0	0.0				
GW04		29/03/17 14:15:00			28.0	62.0	0.0	#	0	0	0.0				
GW04		29/03/17 14:16:00			28.1	62.2	0.0	#	0	0	0.0				
GW04		29/03/17 14:17:00			28.1	62.3	0.0	#	0	0	0.0				
GW04		29/03/17 14:18:00												8.48	
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GAS AND GROUNDWATER LEVELS

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SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW05		24/01/17 13:30:00	1020	0								7.0	8		
GW05		24/01/17 13:31:00										6.7			
GW05		24/01/17 13:32:00										6.8			
GW05		24/01/17 13:33:00										6.9			
GW05		24/01/17 13:34:00										7.0			
GW05		24/01/17 13:35:00			14.7	44.4	8.9	#	0	0	0.0				
GW05		24/01/17 13:36:00			14.8	44.9	8.6	#	0	0	0.0				
GW05		24/01/17 13:37:00			15.3	45.7	8.3	#	0	0	0.0				
GW05		24/01/17 13:38:00			15.5	45.0	8.4	#	0	0	0.0				
GW05		24/01/17 13:39:00			15.5	44.8	8.6	#	0	0	0.0				
GW05		24/01/17 13:40:00			15.5	44.7	8.6	#	0	0	0.0				
GW05		24/01/17 13:41:00			15.5	44.7	8.6	#	0	0	0.0				
GW05		24/01/17 13:42:00			15.5	44.9	8.5	#	0	0	0.0				
GW05		24/01/17 13:43:00			15.7	45.0	8.4	#	0	0	0.0				
GW05		24/01/17 13:44:00			15.6	44.9	8.4	#	0	0	0.0				
GW05		24/01/17 13:45:00												8.27	
GW05		31/01/17 10:15:00	1005	19								3.7	6		
GW05		31/01/17 10:16:00		21								4.2			
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GAS AND GROUNDWATER LEVELS

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Borehole /trial pit no.	pipe	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
GW05		31/01/17 10:17:00		19								3.9			
GW05		31/01/17 10:18:00		21								4.2			
GW05		31/01/17 10:19:00		21								4.2			
GW05		31/01/17 10:20:00			12.4	42.9	9.3	#	0	0	0.0				
GW05		31/01/17 10:21:00			12.5	43.4	9.2	#	0	0	0.0				
GW05		31/01/17 10:22:00			12.6	43.6	9.2	#	0	0	0.0				
GW05		31/01/17 10:23:00			12.7	43.7	9.2	#	0	0	0.0				
GW05		31/01/17 10:24:00			12.7	43.7	9.2	#	0	0	0.0				
GW05		31/01/17 10:25:00			12.6	43.7	9.2	#	0	0	0.0				
GW05		31/01/17 10:26:00			12.6	43.9	9.2	#	0	0	0.0				
GW05		31/01/17 10:27:00			12.6	43.9	9.2	#	0	0	0.0				
GW05		31/01/17 10:28:00			12.6	43.8	9.2	#	0	0	0.0				
GW05		31/01/17 10:29:00			12.6	43.7	9.1	#	0	0	0.0				
GW05		31/01/17 10:30:00												8.32	
GW05		07/02/17 12:00:00	1006	0								0.0	11		
GW05		07/02/17 12:01:00										0.0			
GW05		07/02/17 12:02:00										0.0			
GW05		07/02/17 12:03:00										0.0			
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Borehole /trial pit no.	pipe	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
GW05		07/02/17 12:04:00										0.0			
GW05		07/02/17 12:05:00			16.1	55.9	2.9	#	0	0	0.0				
GW05		07/02/17 12:06:00			16.9	56.1	3.0	#	0	0	0.0				
GW05		07/02/17 12:07:00			16.6	53.4	3.6	#	0	0	0.0				
GW05		07/02/17 12:08:00			16.0	51.8	4.1	#	0	0	0.0				
GW05		07/02/17 12:09:00			15.1	48.2	4.7	#	0	0	0.0				
GW05		07/02/17 12:10:00			14.2	46.5	5.4	#	0	0	0.0				
GW05		07/02/17 12:11:00			14.2	45.9	5.3	#	0	0	0.0				
GW05		07/02/17 12:12:00			14.2	46.0	5.3	#	0	0	0.0				
GW05		07/02/17 12:13:00			14.3	46.2	5.2	#	0	0	0.0				
GW05		07/02/17 12:14:00			14.5	47.2	4.8	#	0	0	0.0				
GW05		07/02/17 12:15:00												8.08	
GW05		14/02/17 12:10:00	1015	0								0.0	4		
GW05		14/02/17 12:11:00										0.0			
GW05		14/02/17 12:12:00										0.0			
GW05		14/02/17 12:13:00										0.0			
GW05		14/02/17 12:14:00										0.0			
GW05		14/02/17 12:15:00			19.5	74.9	0.4	#	0	0	0.0				
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Borehole /trial pit no.	pipe	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
GW05		14/02/17 12:16:00			19.9	75.0	0.2	#	0	0	0.0				
GW05		14/02/17 12:17:00			20.4	76.4	0.0	#	0	0	0.0				
GW05		14/02/17 12:18:00			20.5	76.8	0.0	#	0	0	0.0				
GW05		14/02/17 12:19:00			20.6	77.0	0.0	#	0	0	0.0				
GW05		14/02/17 12:20:00			20.7	77.2	0.0	#	0	0	0.0				
GW05		14/02/17 12:21:00			20.8	77.5	0.0	#	0	0	0.0				
GW05		14/02/17 12:22:00			20.8	77.4	0.0	#	0	0	0.0				
GW05		14/02/17 12:23:00			20.6	76.5	0.0	#	0	0	0.0				
GW05		14/02/17 12:24:00			20.8	77.2	0.0	#	0	0	0.0				
GW05		14/02/17 12:25:00			20.8	77.3	0.0	#	0	0	0.0				
GW05		14/02/17 12:26:00			20.8	77.3	0.0	#	0	0	0.0				
GW05		14/02/17 12:27:00			20.8	77.4	0.0	#	0	0	0.0				
GW05		14/02/17 12:28:00			20.8	77.4	0.0	#	0	0	0.0				
GW05		14/02/17 12:29:00			20.9	77.3	0.0	#	0	0	0.0				
GW05		14/02/17 12:30:00												8.11	
GW05		21/02/17 10:30:00	1016	37								6.5	10		
GW05		21/02/17 10:31:00										4.0			
GW05		21/02/17 10:32:00										1.8			
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Borehole /trial pit no.	pipe	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
GW05		21/02/17 10:33:00										0.2			
GW05		21/02/17 10:34:00										0.0			
GW05		21/02/17 10:35:00			23.1	74.2	0.2	#	0	0	0.0				
GW05		21/02/17 10:36:00			23.4	75.0	0.0	#	0	0	0.0				
GW05		21/02/17 10:37:00			23.5	75.2	0.0	#	0	0	0.0				
GW05		21/02/17 10:38:00			23.5	75.3	0.0	#	0	0	0.0				
GW05		21/02/17 10:39:00			23.6	75.2	0.0	#	0	0	0.0				
GW05		21/02/17 10:40:00			23.6	75.1	0.0	#	0	0	0.0				
GW05		21/02/17 10:41:00			23.7	75.1	0.0	#	0	0	0.0				
GW05		21/02/17 10:42:00			23.7	75.1	0.0	#	0	0	0.0				
GW05		21/02/17 10:43:00			23.7	75.1	0.0	#	0	0	0.0				
GW05		21/02/17 10:44:00			23.8	75.2	0.0	#	0	0	0.0				
GW05		21/02/17 10:45:00			23.8	75.1	0.0	#	0	0	0.0				
GW05		21/02/17 10:46:00			23.8	75.1	0.0	#	0	0	0.0				
GW05		21/02/17 10:47:00			23.8	75.1	0.0	#	0	0	0.0				
GW05		21/02/17 10:48:00			23.8	75.1	0.0	#	0	0	0.0				
GW05		21/02/17 10:49:00			23.8	75.1	0.0	#	0	0	0.0				
GW05		21/02/17 10:50:00												8.04	
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GAS AND GROUNDWATER LEVELS

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SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW05		27/02/17 10:25:00	987	22								2.5	8		
GW05		27/02/17 10:26:00										3.9			
GW05		27/02/17 10:27:00										3.8			
GW05		27/02/17 10:28:00										3.8			
GW05		27/02/17 10:29:00										3.8			
GW05		27/02/17 10:30:00			25.3	69.5	0.1	#	0	0	0.0				
GW05		27/02/17 10:31:00			26.0	71.2	0.0	#	0	0	0.0				
GW05		27/02/17 10:32:00			26.1	71.3	0.0	#	0	0	0.0				
GW05		27/02/17 10:33:00			26.1	71.3	0.0	#	0	0	0.0				
GW05		27/02/17 10:34:00			26.4	71.3	0.0	#	0	0	0.0				
GW05		27/02/17 10:35:00			26.4	71.4	0.0	#	0	0	0.0				
GW05		27/02/17 10:36:00			26.4	71.3	0.0	#	0	0	0.0				
GW05		27/02/17 10:37:00			26.4	71.3	0.0	#	0	0	0.0				
GW05		27/02/17 10:38:00			26.4	71.3	0.0	#	0	0	0.0				
GW05		27/02/17 10:39:00			26.4	71.4	0.0	#	0	0	0.0				
GW05		27/02/17 10:40:00			26.4	71.3	0.0	#	0	0	0.0				
GW05		27/02/17 10:41:00			26.4	71.3	0.0	#	0	0	0.0				
GW05		27/02/17 10:42:00			26.4	71.3	0.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW05		27/02/17 10:43:00	1017		26.4	71.3	0.0	#	0	0	0.0		11	7.76	
GW05		27/02/17 10:44:00			26.4	71.3	0.0	#	0	0	0.0				
GW05		27/02/17 10:45:00													
GW05		16/03/17 13:57:00		170								17.7			
GW05		16/03/17 13:58:00		169								17.6			
GW05		16/03/17 13:59:00		165								17.4			
GW05		16/03/17 14:00:00		166								17.6			
GW05		16/03/17 14:01:00		161								17.2			
GW05		16/03/17 14:02:00			22.6	73.4	0.2	#	0	0	0.0				
GW05		16/03/17 14:03:00			23.4	74.0	0.1	#	0	0	0.0				
GW05		16/03/17 14:04:00			23.6	74.2	0.0	#	0	0	0.0				
GW05		16/03/17 14:05:00			23.8	74.1	0.0	#	0	0	0.0				
GW05		16/03/17 14:06:00			24.0	73.9	0.0	#	0	0	0.0				
GW05		16/03/17 14:07:00			24.2	73.8	0.0	#	0	0	0.0				
GW05		16/03/17 14:08:00			24.2	73.8	0.0	#	0	0	0.0				
GW05		16/03/17 14:09:00			24.2	73.6	0.0	#	0	0	0.0				
GW05		16/03/17 14:10:00			24.2	73.7	0.0	#	0	0	0.0				
GW05		16/03/17 14:11:00													
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser															

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW05		16/03/17 14:12:00	1006		24.3	73.7	0.0	#	0	0	0.0			8.14	
GW05		16/03/17 14:13:00			24.3	73.6	0.0	#	0	0	0.0				
GW05		16/03/17 14:14:00			24.3	73.6	0.0	#	0	0	0.0				
GW05		16/03/17 14:15:00			24.3	73.6	0.0	#	0	0	0.0				
GW05		16/03/17 14:16:00			24.3	73.6	0.0	#	0	0	0.0				
GW05		16/03/17 14:17:00			24.3	73.6	0.0	#	0	0	0.0				
GW05		16/03/17 14:18:00													
GW05		21/03/17 13:08:00													
GW05		21/03/17 13:09:00		38								5.4			
GW05		21/03/17 13:10:00		37								5.2			
GW05		21/03/17 13:11:00		35								5.1			
GW05		21/03/17 13:12:00		37								5.2			
GW05		21/03/17 13:13:00		43								5.8			
GW05		21/03/17 13:14:00			20.3	47.3	5.0	#	0	0	0.0				
GW05		21/03/17 13:15:00			20.3	47.0	5.0	#	0	0	0.0				
GW05		21/03/17 13:16:00			20.3	46.2	4.1	#	0	0	0.0				
GW05		21/03/17 13:17:00			22.4	48.1	2.0	#	0	0	0.0				
GW05		21/03/17 13:18:00			22.4	48.9	2.5	#	0	10	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser															

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW05		21/03/17 13:19:00			22.6	49.3	2.4	#	0	10	0.0				
GW05		21/03/17 13:20:00			22.7	49.7	2.3	#	0	10	0.0				
GW05		21/03/17 13:21:00			22.9	50.2	2.2	#	0	10	0.0				
GW05		21/03/17 13:22:00			22.9	50.4	2.1	#	0	10	0.0				
GW05		21/03/17 13:23:00			22.9	50.4	2.1	#	0	10	0.0				
GW05		21/03/17 13:24:00			23.0	50.9	2.1	#	0	10	0.0				
GW05		21/03/17 13:25:00			23.1	51.0	2.0	#	0	10	0.0				
GW05		21/03/17 13:26:00			23.2	51.4	1.9	#	0	10	0.0				
GW05		21/03/17 13:27:00			23.2	51.4	1.8	#	0	10	0.0				
GW05		21/03/17 13:28:00			23.2	51.4	1.8	#	0	10	0.0				
GW05		21/03/17 13:29:00												8.07	
GW05		29/03/17 12:52:00	1019										13		
GW05		29/03/17 12:53:00		40								5.2			
GW05		29/03/17 12:54:00		41								5.6			
GW05		29/03/17 12:55:00		47								6.2			
GW05		29/03/17 12:56:00		47								6.2			
GW05		29/03/17 12:57:00		41								4.6			
GW05		29/03/17 12:58:00			23.1	70.4	0.4	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW05		29/03/17 12:59:00			23.1	70.7	0.3	#	0	0	0.0				
GW05		29/03/17 13:00:00			23.3	71.1	0.2	#	0	0	0.0				
GW05		29/03/17 13:01:00			24.0	71.3	0.0	#	0	0	0.0				
GW05		29/03/17 13:02:00			24.3	71.2	0.0	#	0	0	0.0				
GW05		29/03/17 13:03:00			24.9	71.1	0.0	#	0	0	0.0				
GW05		29/03/17 13:04:00			26.0	71.1	0.0	#	0	0	0.0				
GW05		29/03/17 13:05:00			25.3	71.0	0.0	#	0	0	0.0				
GW05		29/03/17 13:06:00			25.5	70.9	0.0	#	0	0	0.0				
GW05		29/03/17 13:07:00			25.6	70.9	0.0	#	0	0	0.0				
GW05		29/03/17 13:08:00			25.7	70.9	0.0	#	0	0	0.0				
GW05		29/03/17 13:09:00			25.7	70.8	0.0	#	0	0	0.0				
GW05		29/03/17 13:10:00			25.8	70.9	0.0	#	0	0	0.0				
GW05		29/03/17 13:11:00			25.8	70.8	0.0	#	0	0	0.0				
GW05		29/03/17 13:12:00			25.8	70.9	0.0	#	0	0	0.0				
GW05		29/03/17 13:13:00												8.09	
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GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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	
GW06		04/01/17 09:05:00	1018	0								0.0	7			
GW06		04/01/17 09:06:00										0.0				
GW06		04/01/17 09:07:00										0.0				
GW06		04/01/17 09:08:00										0.0				
GW06		04/01/17 09:09:00										0.0				
GW06		04/01/17 09:10:00			29.7	70.2	0.0	#	0	0	0.0					
GW06		04/01/17 09:11:00			29.8	70.1	0.0	#	0	0	0.0					
GW06		04/01/17 09:12:00			29.9	70.1	0.0	#	0	0	0.0					
GW06		04/01/17 09:13:00			30.0	70.1	0.0	#	0	0	0.0					
GW06		04/01/17 09:14:00			30.0	70.0	0.0	#	0	0	0.0					
GW06		04/01/17 09:15:00			30.1	70.0	0.0	#	0	0	0.0					
GW06		04/01/17 09:16:00			30.0	70.0	0.0	#	0	0	0.0					
GW06		04/01/17 09:17:00			30.1	70.0	0.0	#	0	0	0.0					
GW06		04/01/17 09:18:00			30.1	70.0	0.0	#	0	0	0.0					
GW06		04/01/17 09:19:00			30.0	70.1	0.0	#	0	0	0.0					
GW06		04/01/17 09:20:00												10.98		
GW06		10/01/17 10:50:00	1005	0								0.0	7			
GW06		10/01/17 10:51:00										0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534		CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		10/01/17 10:52:00										0.0			
GW06		10/01/17 10:53:00										0.0			
GW06		10/01/17 10:54:00										0.0			
GW06		10/01/17 10:55:00			26.6	62.7	2.8	#	0	0	0.0				
GW06		10/01/17 10:56:00			28.3	68.5	0.8	#	0	0	0.0				
GW06		10/01/17 10:57:00			28.9	70.1	0.2	#	0	0	0.0				
GW06		10/01/17 10:58:00			29.0	70.5	0.1	#	0	0	0.0				
GW06		10/01/17 10:59:00			29.0	70.9	0.0	#	0	0	0.0				
GW06		10/01/17 11:00:00			29.0	70.9	0.0	#	0	0	0.0				
GW06		10/01/17 11:01:00			29.0	70.9	0.0	#	0	0	0.0				
GW06		10/01/17 11:02:00			29.0	70.9	0.0	#	0	0	0.0				
GW06		10/01/17 11:03:00			29.0	70.9	0.0	#	0	0	0.0				
GW06		10/01/17 11:04:00			29.0	70.9	0.0	#	0	0	0.0				
GW06		10/01/17 11:05:00												10.88	
GW06		17/01/17 12:45:00	1025	0								0.0	4		
GW06		17/01/17 12:46:00										0.0			
GW06		17/01/17 12:47:00										0.0			
GW06		17/01/17 12:48:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		17/01/17 12:49:00										0.0			
GW06		17/01/17 12:50:00			19.9	46.5	7.5	#	0	0	0.0				
GW06		17/01/17 12:51:00			19.3	46.4	7.7	#	0	0	0.0				
GW06		17/01/17 12:52:00			18.9	45.3	8.0	#	0	0	0.0				
GW06		17/01/17 12:53:00			18.8	44.8	8.1	#	0	0	0.0				
GW06		17/01/17 12:54:00			18.2	42.7	8.7	#	0	0	0.0				
GW06		17/01/17 12:55:00			18.2	42.7	8.8	#	0	0	0.0				
GW06		17/01/17 12:56:00			18.2	42.1	8.9	#	0	0	0.0				
GW06		17/01/17 12:57:00			18.1	41.3	9.0	#	0	0	0.0				
GW06		17/01/17 12:58:00			17.9	40.5	9.2	#	0	0	0.0				
GW06		17/01/17 12:59:00			17.8	40.3	9.3	#	0	0	0.0				
GW06		17/01/17 13:00:00												10.87	
GW06		24/01/17 14:00:00	1022	0								0.0	8		
GW06		24/01/17 14:01:00										0.0			
GW06		24/01/17 14:02:00										0.0			
GW06		24/01/17 14:03:00										0.0			
GW06		24/01/17 14:04:00										0.0			
GW06		24/01/17 14:05:00			12.4	25.7	13.3	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		24/01/17 14:06:00			12.4	25.9	13.2	#	0	0	0.0				
GW06		24/01/17 14:07:00			12.5	26.1	13.2	#	0	0	0.0				
GW06		24/01/17 14:08:00			12.6	26.2	13.1	#	0	0	0.0				
GW06		24/01/17 14:09:00			12.6	26.3	13.1	#	0	0	0.0				
GW06		24/01/17 14:10:00			12.6	26.3	13.1	#	0	0	0.0				
GW06		24/01/17 14:11:00			12.6	26.4	13.1	#	0	0	0.0				
GW06		24/01/17 14:12:00			12.6	26.4	13.0	#	0	0	0.0				
GW06		24/01/17 14:13:00			12.6	26.5	13.0	#	0	0	0.0				
GW06		24/01/17 14:14:00			12.6	26.6	13.0	#	0	0	0.0				
GW06		24/01/17 14:15:00												11.22	
GW06		31/01/17 13:30:00	1004	17								3.7	8		
GW06		31/01/17 13:31:00		16								3.7			
GW06		31/01/17 13:32:00		13								3.3			
GW06		31/01/17 13:33:00		16								3.6			
GW06		31/01/17 13:34:00		13								3.3			
GW06		31/01/17 13:35:00			18.0	54.4	5.9	#	0	0	0.0				
GW06		31/01/17 13:36:00			20.3	54.6	5.6	#	0	0	0.0				
GW06		31/01/17 13:37:00			21.5	54.0	5.5	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		31/01/17 13:38:00			22.5	53.6	5.4	#	0	0	0.0				
GW06		31/01/17 13:39:00			22.8	53.3	5.3	#	0	0	0.0				
GW06		31/01/17 13:40:00			23.9	53.0	5.2	#	0	0	0.0				
GW06		31/01/17 13:41:00			23.8	53.3	5.2	#	0	0	0.0				
GW06		31/01/17 13:42:00			23.9	53.2	5.1	#	0	0	0.0				
GW06		31/01/17 13:43:00			24.2	53.1	5.0	#	0	0	0.0				
GW06		31/01/17 13:44:00			24.4	53.0	4.9	#	0	0	0.0				
GW06		31/01/17 13:45:00												11.06	Base 12.50m
GW06		07/02/17 12:40:00	1006	0								0.0	11		Gas Clam Submerged
GW06		07/02/17 12:41:00										0.0			
GW06		07/02/17 12:42:00										0.0			
GW06		07/02/17 12:43:00										0.0			
GW06		07/02/17 12:44:00										0.0			
GW06		07/02/17 12:45:00			27.6	63.7	0.7	#	0	0	0.0				
GW06		07/02/17 12:46:00			27.1	61.2	1.3	#	0	0	0.0				
GW06		07/02/17 12:47:00			28.2	63.6	0.7	#	0	0	0.0				
GW06		07/02/17 12:48:00			28.4	64.0	0.5	#	0	0	0.0				
GW06		07/02/17 12:49:00			28.2	63.6	0.7	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		07/02/17 12:50:00			27.8	62.9	1.0	#	0	0	0.0				
GW06		07/02/17 12:51:00			27.5	62.5	1.1	#	0	0	0.0				
GW06		07/02/17 12:52:00			27.5	62.5	1.1	#	0	0	0.0				
GW06		07/02/17 12:53:00			27.4	62.5	1.2	#	0	0	0.0				
GW06		07/02/17 12:54:00			27.4	62.6	1.1	#	0	0	0.0				
GW06		07/02/17 12:55:00												10.87	Base 12.50m
GW06		14/02/17 10:40:00	1015	0								0.0	4		
GW06		14/02/17 10:41:00										0.0			
GW06		14/02/17 10:42:00										0.0			
GW06		14/02/17 10:43:00										0.0			
GW06		14/02/17 10:44:00										0.0			
GW06		14/02/17 10:45:00			30.1	69.9	0.0	#	0	0	0.0				
GW06		14/02/17 10:46:00			30.3	69.7	0.0	#	0	0	0.0				
GW06		14/02/17 10:47:00			30.3	69.7	0.0	#	0	0	0.0				
GW06		14/02/17 10:48:00			30.2	69.8	0.0	#	0	0	0.0				
GW06		14/02/17 10:49:00			30.5	69.5	0.0	#	0	0	0.0				
GW06		14/02/17 10:50:00			30.2	69.8	0.0	#	0	0	0.0				
GW06		14/02/17 10:51:00			30.3	69.7	0.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		14/02/17 10:52:00			30.6	69.4	0.0	#	0	0	0.0				
GW06		14/02/17 10:53:00			30.4	69.6	0.0	#	0	0	0.0				
GW06		14/02/17 10:54:00			30.3	69.7	0.0	#	0	0	0.0				
GW06		14/02/17 10:55:00			30.2	69.8	0.0	#	0	0	0.0				
GW06		14/02/17 10:56:00			30.2	69.8	0.0	#	0	0	0.0				
GW06		14/02/17 10:57:00			30.3	69.7	0.0	#	0	0	0.0				
GW06		14/02/17 10:58:00			30.4	69.9	0.0	#	0	0	0.0				
GW06		14/02/17 10:59:00			30.4	69.8	0.0	#	0	0	0.0				
GW06		14/02/17 11:00:00												11.20	
GW06		21/02/17 13:25:00	1013	19								3.6	10		
GW06		21/02/17 13:26:00										3.4			
GW06		21/02/17 13:27:00										3.0			
GW06		21/02/17 13:28:00										2.6			
GW06		21/02/17 13:29:00										2.0			
GW06		21/02/17 13:30:00			30.3	67.4	0.3	#	0	0	0.3				
GW06		21/02/17 13:31:00			31.0	68.9	0.0	#	0	0	0.3				
GW06		21/02/17 13:32:00			31.2	68.8	0.0	#	0	0	0.4				
GW06		21/02/17 13:33:00			31.2	68.8	0.0	#	0	0	0.4				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		21/02/17 13:34:00			31.3	68.7	0.0	#	0	0	0.4				
GW06		21/02/17 13:35:00			31.2	68.7	0.0	#	0	0	0.5				
GW06		21/02/17 13:36:00			31.4	68.7	0.0	#	0	0	0.5				
GW06		21/02/17 13:37:00			31.3	68.7	0.0	#	0	0	0.5				
GW06		21/02/17 13:38:00			31.3	68.7	0.0	#	0	0	0.5				
GW06		21/02/17 13:39:00			31.3	68.7	0.0	#	0	0	0.5				
GW06		21/02/17 13:40:00			31.4	68.7	0.0	#	0	0	0.5				
GW06		21/02/17 13:41:00			31.3	68.7	0.0	#	0	0	0.5				
GW06		21/02/17 13:42:00			31.2	68.8	0.0	#	0	0	0.5				
GW06		21/02/17 13:43:00			31.3	68.8	0.0	#	0	0	0.5				
GW06		21/02/17 13:44:00			31.2	68.8	0.0	#	0	0	0.5				
GW06		21/02/17 13:45:00												11.35	
GW06		27/02/17 13:00:00	982	37								5.3	8		
GW06		27/02/17 13:01:00										5.2			
GW06		27/02/17 13:02:00										5.2			
GW06		27/02/17 13:03:00										5.2			
GW06		27/02/17 13:04:00										5.1			
GW06		27/02/17 13:05:00			29.7	65.8	0.2	#	0	0	0.1				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		27/02/17 13:06:00			30.3	68.2	0.0	#	0	0	0.2				
GW06		27/02/17 13:07:00			30.3	68.4	0.0	#	0	0	0.3				
GW06		27/02/17 13:08:00			30.3	68.3	0.0	#	0	0	0.3				
GW06		27/02/17 13:09:00			30.5	68.5	0.0	#	0	0	0.4				
GW06		27/02/17 13:10:00			30.4	68.3	0.0	#	0	0	0.4				
GW06		27/02/17 13:11:00			30.5	68.3	0.0	#	0	0	0.4				
GW06		27/02/17 13:12:00			30.5	68.4	0.0	#	0	0	0.4				
GW06		27/02/17 13:13:00			30.4	68.3	0.0	#	0	0	0.4				
GW06		27/02/17 13:14:00			30.3	68.3	0.0	#	0	0	0.5				
GW06		27/02/17 13:15:00			30.5	68.3	0.0	#	0	0	0.5				
GW06		27/02/17 13:16:00			30.5	68.4	0.0	#	0	0	0.5				
GW06		27/02/17 13:17:00			30.5	68.3	0.0	#	0	0	0.5				
GW06		27/02/17 13:18:00			30.5	68.3	0.0	#	0	0	0.5				
GW06		27/02/17 13:19:00			30.5	68.3	0.0	#	0	0	0.5				
GW06		27/02/17 13:20:00												11.27	
GW06		16/03/17 11:00:00	1021										10		
GW06		16/03/17 11:01:00		0								0.0			
GW06		16/03/17 11:02:00		0								0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		16/03/17 11:03:00		0								0.0			
GW06		16/03/17 11:04:00		0								0.0			
GW06		16/03/17 11:05:00		0								0.0			
GW06		16/03/17 11:06:00			30.9	69.0	0.0	#	0	0	0.0				
GW06		16/03/17 11:07:00			31.0	69.0	0.0	#	0	0	0.0				
GW06		16/03/17 11:08:00			31.1	69.0	0.0	#	0	0	0.0				
GW06		16/03/17 11:09:00			31.1	69.0	0.0	#	0	0	0.0				
GW06		16/03/17 11:10:00			31.2	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:11:00			31.2	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:12:00			31.2	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:13:00			31.1	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:14:00			31.1	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:15:00			31.1	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:16:00			31.1	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:17:00			31.1	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:18:00			31.1	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:19:00			31.1	68.9	0.0	#	0	0	0.0				
GW06		16/03/17 11:20:00			31.1	68.9	0.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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	
GW06		16/03/17 11:21:00	1007										10	11.60		
GW06		21/03/17 10:01:00														
GW06		21/03/17 10:02:00		0								0.0				
GW06		21/03/17 10:03:00		0								0.0				
GW06		21/03/17 10:04:00		0								0.0				
GW06		21/03/17 10:05:00		0								0.0				
GW06		21/03/17 10:06:00		0								0.0				
GW06		21/03/17 10:07:00			29.6	65.0	0.9	#	0	0	0.0					
GW06		21/03/17 10:08:00			30.7	67.8	0.0	#	0	0	0.0					
GW06		21/03/17 10:09:00			30.6	67.6	0.0	#	0	0	0.0					
GW06		21/03/17 10:10:00			30.3	67.4	0.0	#	0	0	0.0					
GW06		21/03/17 10:11:00			29.7	66.0	0.0	#	0	0	0.0					
GW06		21/03/17 10:12:00			28.9	63.5	0.0	#	0	0	0.0					
GW06		21/03/17 10:13:00			28.2	62.2	0.0	#	0	0	0.0					
GW06		21/03/17 10:14:00			28.1	61.7	0.0	#	0	0	0.0					
GW06		21/03/17 10:15:00			28.9	61.5	1.0	#	0	0	0.0					
GW06		21/03/17 10:16:00			28.0	61.3	1.4	#	0	0	0.0					
GW06		21/03/17 10:17:00			28.0	61.2	1.5	#	0	0	0.0					
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534		CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		21/03/17 10:18:00			27.9	61.2	1.6	#	0	0	0.0				
GW06		21/03/17 10:19:00			27.9	61.2	1.6	#	0	0	0.0				
GW06		21/03/17 10:20:00			27.9	61.2	1.6	#	0	0	0.0				
GW06		21/03/17 10:21:00			28.0	61.2	1.6	#	0	0	0.0				
GW06		21/03/17 10:22:00												11.54	
GW06		29/03/17 10:50:00	1019										14		
GW06		29/03/17 10:51:00		0								0.0			
GW06		29/03/17 10:52:00		0								0.0			
GW06		29/03/17 10:53:00		0								0.0			
GW06		29/03/17 10:54:00		0								0.0			
GW06		29/03/17 10:55:00		0								0.0			
GW06		29/03/17 10:56:00			30.9	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 10:57:00			31.0	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 10:58:00			30.9	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 10:59:00			31.0	69.2	0.0	#	0	0	0.0				
GW06		29/03/17 11:00:00			31.1	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 11:01:00			31.1	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 11:02:00			31.0	69.1	0.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW06		29/03/17 11:03:00			31.0	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 11:04:00			31.0	69.2	0.0	#	0	0	0.0				
GW06		29/03/17 11:05:00			31.0	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 11:06:00			31.1	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 11:07:00			31.1	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 11:08:00			31.1	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 11:09:00			31.1	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 11:10:00			31.1	69.1	0.0	#	0	0	0.0				
GW06		29/03/17 11:11:00												11.58	
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		04/01/17 09:50:00	1017	0								0.0	8		
GW08		04/01/17 09:51:00										0.0			
GW08		04/01/17 09:52:00										0.0			
GW08		04/01/17 09:53:00										0.0			
GW08		04/01/17 09:54:00										0.0			
GW08		04/01/17 09:55:00			27.9	65.0	1.8	#	0	0	0.0				
GW08		04/01/17 09:56:00			28.8	67.2	0.5	#	0	0	0.0				
GW08		04/01/17 09:57:00			30.0	70.0	0.0	#	0	0	0.0				
GW08		04/01/17 09:58:00			30.1	69.9	0.0	#	0	0	0.0				
GW08		04/01/17 09:59:00			30.0	70.0	0.0	#	0	0	0.0				
GW08		04/01/17 10:00:00			30.1	69.9	0.0	#	0	0	0.0				
GW08		04/01/17 10:01:00			30.1	70.0	0.0	#	0	0	0.0				
GW08		04/01/17 10:02:00			30.2	69.9	0.0	#	0	0	0.0				
GW08		04/01/17 10:03:00			30.1	69.9	0.0	#	0	0	0.0				
GW08		04/01/17 10:04:00			30.2	69.9	0.0	#	0	0	0.0				
GW08		04/01/17 10:05:00												10.36	
GW08		10/01/17 11:40:00	1004	0								0.0	8		
GW08		10/01/17 11:41:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		10/01/17 11:42:00										0.0			
GW08		10/01/17 11:43:00										0.0			
GW08		10/01/17 11:44:00										0.0			
GW08		10/01/17 11:45:00			30.0	70.0	0.0	#	0	0	0.0				
GW08		10/01/17 11:46:00			30.2	69.9	0.0	#	0	0	0.0				
GW08		10/01/17 11:47:00			30.3	69.8	0.0	#	0	0	0.0				
GW08		10/01/17 11:48:00			30.5	69.6	0.0	#	0	0	0.0				
GW08		10/01/17 11:49:00			30.5	69.7	0.0	#	0	0	0.0				
GW08		10/01/17 11:50:00			30.6	69.6	0.0	#	0	0	0.0				
GW08		10/01/17 11:51:00			30.4	69.7	0.0	#	0	0	0.0				
GW08		10/01/17 11:52:00			30.5	69.4	0.0	#	0	0	0.0				
GW08		10/01/17 11:53:00			30.7	69.9	0.0	#	0	0	0.0				
GW08		10/01/17 11:54:00			30.6	69.5	0.0	#	0	0	0.0				
GW08		10/01/17 11:55:00												10.33	
GW08		17/01/17 13:20:00	1026	0								0.0	5		
GW08		17/01/17 13:21:00										0.0			
GW08		17/01/17 13:22:00										0.0			
GW08		17/01/17 13:23:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		17/01/17 13:24:00										0.0			
GW08		17/01/17 13:25:00			19.7	46.8	7.1	#	0	0	0.0				
GW08		17/01/17 13:26:00			19.9	46.9	6.9	#	0	0	0.0				
GW08		17/01/17 13:27:00			20.0	47.1	6.8	#	0	0	0.0				
GW08		17/01/17 13:28:00			20.3	47.7	6.7	#	0	0	0.0				
GW08		17/01/17 13:29:00			20.6	47.9	6.6	#	0	0	0.0				
GW08		17/01/17 13:30:00			20.6	47.7	6.7	#	0	0	0.0				
GW08		17/01/17 13:31:00			20.7	47.7	6.7	#	0	0	0.0				
GW08		17/01/17 13:32:00			21.0	47.7	6.8	#	0	0	0.0				
GW08		17/01/17 13:33:00			21.1	47.7	6.8	#	0	0	0.0				
GW08		17/01/17 13:34:00			21.0	47.7	6.8	#	0	0	0.0				
GW08		17/01/17 13:35:00												10.55	
GW08		24/01/17 15:05:00	1016	0								14.7	8		
GW08		24/01/17 15:06:00										14.8			
GW08		24/01/17 15:07:00										14.7			
GW08		24/01/17 15:08:00										14.7			
GW08		24/01/17 15:09:00										14.6			
GW08		24/01/17 15:10:00			15.4	31.8	10.7	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		24/01/17 15:11:00			13.4	30.4	12.1	#	0	0	0.0				
GW08		24/01/17 15:12:00			13.6	30.6	12.0	#	0	0	0.0				
GW08		24/01/17 15:13:00			13.6	30.7	12.0	#	0	0	0.0				
GW08		24/01/17 15:14:00			13.6	30.8	12.0	#	0	0	0.0				
GW08		24/01/17 15:15:00			13.7	30.9	12.0	#	0	0	0.0				
GW08		24/01/17 15:16:00			13.6	30.9	11.9	#	0	0	0.0				
GW08		24/01/17 15:17:00			13.6	31.0	12.0	#	0	0	0.0				
GW08		24/01/17 15:18:00			13.6	30.8	12.1	#	0	0	0.0				
GW08		24/01/17 15:19:00			13.5	30.6	12.3	#	0	0	0.0				
GW08		24/01/17 15:20:00												10.33	
GW08		31/01/17 12:25:00	1004	182								22.1	8		
GW08		31/01/17 12:26:00		183								22.2			
GW08		31/01/17 12:27:00		182								22.0			
GW08		31/01/17 12:28:00		182								22.0			
GW08		31/01/17 12:29:00		182								22.0			
GW08		31/01/17 12:30:00			22.8	54.7	5.7	#	0	0	0.0				
GW08		31/01/17 12:31:00			23.1	55.4	4.9	#	0	0	0.0				
GW08		31/01/17 12:32:00			23.5	55.6	4.8	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		31/01/17 12:33:00			23.7	55.4	4.7	#	0	0	0.0				
GW08		31/01/17 12:34:00			23.7	55.8	4.7	#	0	0	0.0				
GW08		31/01/17 12:35:00			23.8	55.8	4.7	#	0	0	0.0				
GW08		31/01/17 12:36:00			23.9	55.8	4.7	#	0	0	0.0				
GW08		31/01/17 12:37:00			23.9	56.0	4.7	#	0	0	0.0				
GW08		31/01/17 12:38:00			23.9	56.1	4.6	#	0	0	0.0				
GW08		31/01/17 12:39:00			24.0	56.1	4.6	#	0	0	0.0				
GW08		31/01/17 12:40:00												10.32	Base 12.55m
GW08		07/02/17 13:10:00	1006	37								6.1	10		
GW08		07/02/17 13:11:00		40								6.3			
GW08		07/02/17 13:12:00		43								6.6			
GW08		07/02/17 13:13:00		44								6.7			
GW08		07/02/17 13:14:00		44								6.7			
GW08		07/02/17 13:15:00			23.7	49.0	2.3	#	0	0	0.0				
GW08		07/02/17 13:16:00			24.5	50.8	1.8	#	0	0	0.0				
GW08		07/02/17 13:17:00			23.8	48.5	2.4	#	0	0	0.0				
GW08		07/02/17 13:18:00			22.1	44.1	5.5	#	0	0	0.0				
GW08		07/02/17 13:19:00			19.8	39.0	5.6	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		07/02/17 13:20:00			20.1	39.4	5.3	#	0	0	0.0				
GW08		07/02/17 13:21:00			20.5	40.2	5.0	#	0	0	0.0				
GW08		07/02/17 13:22:00			20.9	43.9	4.7	#	0	0	0.0				
GW08		07/02/17 13:23:00			21.1	41.2	4.5	#	0	0	0.0				
GW08		07/02/17 13:24:00			21.4	41.8	4.3	#	0	0	0.0				
GW08		07/02/17 13:25:00												10.41	Base 12.55m
GW08		14/02/17 10:40:00	1015	2.7								4.8	4		
GW08		14/02/17 10:41:00		28								5.0			
GW08		14/02/17 10:42:00		40								6.3			
GW08		14/02/17 10:43:00		44								6.7			
GW08		14/02/17 10:44:00		41								6.4			
GW08		14/02/17 10:45:00			28.3	66.9	1.0	#	25	0	0.0				
GW08		14/02/17 10:46:00			28.1	65.9	1.3	#	25	0	0.0				
GW08		14/02/17 10:47:00			27.1	63.2	2.1	#	25	0	0.0				
GW08		14/02/17 10:48:00			25.3	58.3	3.3	#	0	0	0.0				
GW08		14/02/17 10:49:00			23.9	50.2	4.7	#	0	0	0.0				
GW08		14/02/17 10:50:00			20.6	43.6	6.8	#	0	0	0.0				
GW08		14/02/17 10:51:00			20.3	42.2	7.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		14/02/17 10:52:00			20.3	41.6	7.0	#	0	0	0.0				
GW08		14/02/17 10:53:00			20.3	41.8	7.0	#	0	0	0.0				
GW08		14/02/17 10:54:00			20.5	41.8	6.9	#	0	0	0.0				
GW08		14/02/17 10:55:00			20.5	41.8	6.9	#	0	0	0.0				
GW08		14/02/17 10:56:00			20.5	41.8	6.9	#	0	0	0.0				
GW08		14/02/17 10:57:00			20.6	41.9	6.8	#	0	0	0.0				
GW08		14/02/17 10:58:00			20.7	42.1	6.7	#	0	0	0.0				
GW08		14/02/17 10:59:00												10.41	
GW08		21/02/17 13:00:00	1013	158								16.8	10		
GW08		21/02/17 13:01:00										16.8			
GW08		21/02/17 13:02:00										16.7			
GW08		21/02/17 13:03:00										16.7			
GW08		21/02/17 13:04:00										16.6			
GW08		21/02/17 13:05:00			29.3	68.4	0.1	#	0	0	0.7				
GW08		21/02/17 13:06:00			29.7	70.2	0.0	#	0	0	0.9				
GW08		21/02/17 13:07:00			29.9	70.2	0.0	#	0	0	1.0				
GW08		21/02/17 13:08:00			29.8	70.2	0.0	#	0	0	1.1				
GW08		21/02/17 13:09:00			29.9	70.2	0.0	#	0	0	1.2				
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GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		21/02/17 13:10:00			29.9	70.1	0.0	#	0	0	1.2				
GW08		21/02/17 13:11:00			29.9	70.1	0.0	#	0	0	1.3				
GW08		21/02/17 13:12:00			29.8	70.1	0.0	#	0	0	1.3				
GW08		21/02/17 13:13:00			29.9	70.1	0.0	#	0	0	1.3				
GW08		21/02/17 13:14:00			29.8	70.1	0.0	#	0	0	1.3				
GW08		21/02/17 13:15:00			29.9	70.1	0.0	#	0	0	1.3				
GW08		21/02/17 13:16:00			29.9	70.2	0.0	#	0	0	1.3				
GW08		21/02/17 13:17:00			29.8	70.2	0.0	#	0	0	1.3				
GW08		21/02/17 13:18:00			29.8	70.2	0.0	#	0	0	1.4				
GW08		21/02/17 13:19:00			29.9	70.1	0.0	#	0	0	1.4				
GW08		21/02/17 13:20:00												10.41	
GW08		27/02/17 13:30:00	982	450								37.9	8		
GW08		27/02/17 13:31:00										37.8			
GW08		27/02/17 13:32:00										37.7			
GW08		27/02/17 13:33:00										37.7			
GW08		27/02/17 13:34:00										37.7			
GW08		27/02/17 13:35:00			28.9	66.4	0.0	#	0	0	0.8				
GW08		27/02/17 13:36:00			29.5	68.6	0.0	#	0	0	1.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		27/02/17 13:37:00			29.5	68.7	0.0	#	0	0	1.1				
GW08		27/02/17 13:38:00			29.5	68.6	0.0	#	0	0	1.2				
GW08		27/02/17 13:39:00			29.5	68.7	0.0	#	0	0	1.3				
GW08		27/02/17 13:40:00			29.5	68.7	0.0	#	0	0	1.4				
GW08		27/02/17 13:41:00			29.5	68.7	0.0	#	0	0	1.4				
GW08		27/02/17 13:42:00			29.5	68.7	0.0	#	0	0	1.5				
GW08		27/02/17 13:43:00			29.5	68.7	0.0	#	0	0	1.5				
GW08		27/02/17 13:44:00			29.5	68.7	0.0	#	0	0	1.5				
GW08		27/02/17 13:45:00			29.5	68.7	0.0	#	0	0	1.5				
GW08		27/02/17 13:46:00			29.5	68.7	0.0	#	0	0	1.6				
GW08		27/02/17 13:47:00			29.5	68.7	0.0	#	0	0	1.6				
GW08		27/02/17 13:48:00			29.5	68.7	0.0	#	0	0	1.6				
GW08		27/02/17 13:49:00			29.5	68.7	0.0	#	0	0	1.6				
GW08		27/02/17 13:50:00												10.28	
GW08		16/03/17 12:30:00	1019												
GW08		16/03/17 12:31:00		271								27.5			
GW08		16/03/17 12:32:00		271								27.6			
GW08		16/03/17 12:33:00		270								27.5			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		16/03/17 12:34:00		268								27.3			
GW08		16/03/17 12:35:00		269								27.3			
GW08		16/03/17 12:36:00			29.4	68.9	0.1	#	0	0	0.1				
GW08		16/03/17 12:37:00			29.4	69.0	0.1	#	0	0	0.2				
GW08		16/03/17 12:38:00			29.4	69.0	0.1	#	0	0	0.3				
GW08		16/03/17 12:39:00			29.5	69.0	0.1	#	0	0	0.4				
GW08		16/03/17 12:40:00			29.4	69.1	0.1	#	0	0	0.4				
GW08		16/03/17 12:41:00			29.3	69.1	0.1	#	0	0	0.5				
GW08		16/03/17 12:42:00			29.4	69.2	0.1	#	0	0	0.5				
GW08		16/03/17 12:43:00			29.4	69.2	0.1	#	0	0	0.6				
GW08		16/03/17 12:44:00			29.3	69.2	0.1	#	0	0	0.6				
GW08		16/03/17 12:45:00			29.4	69.1	0.1	#	0	0	0.6				
GW08		16/03/17 12:46:00			29.4	69.2	0.1	#	0	0	0.6				
GW08		16/03/17 12:47:00			29.4	69.2	0.1	#	0	0	0.6				
GW08		16/03/17 12:48:00			29.4	69.2	0.1	#	0	0	0.6				
GW08		16/03/17 12:49:00			29.4	69.2	0.1	#	0	0	0.6				
GW08		16/03/17 12:50:00			29.4	69.2	0.1	#	0	0	0.7				
GW08		16/03/17 12:51:00												10.50	
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		21/03/17 11:17:00	1005										10		
GW08		21/03/17 11:18:00		90								9.4			
GW08		21/03/17 11:19:00		90								10.3			
GW08		21/03/17 11:20:00		83								9.7			
GW08		21/03/17 11:21:00		69								8.4			
GW08		21/03/17 11:22:00		88								9.9			
GW08		21/03/17 11:23:00			28.3	66.9	8.3	#	0	0	0.0				
GW08		21/03/17 11:24:00			28.4	67.0	8.2	#	0	0	0.0				
GW08		21/03/17 11:25:00			28.5	65.8	0.0	#	0	0	0.0				
GW08		21/03/17 11:26:00			28.5	65.1	0.0	#	0	0	0.0				
GW08		21/03/17 11:27:00			28.6	69.1	0.0	#	0	0	0.0				
GW08		21/03/17 11:28:00			28.6	69.1	0.0	#	0	0	0.0				
GW08		21/03/17 11:29:00			28.6	69.2	0.0	#	0	0	0.0				
GW08		21/03/17 11:30:00			28.6	69.2	0.0	#	0	0	0.0				
GW08		21/03/17 11:31:00			28.8	69.2	0.0	#	0	0	0.0				
GW08		21/03/17 11:32:00			28.8	69.1	0.0	#	0	0	0.0				
GW08		21/03/17 11:33:00			28.8	69.2	0.0	#	0	0	0.0				
GW08		21/03/17 11:34:00			28.6	65.3	0.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		21/03/17 11:35:00			28.6	65.3	0.0	#	0	0	0.0				
GW08		21/03/17 11:36:00			28.6	65.3	0.0	#	0	0	0.0				
GW08		21/03/17 11:37:00			28.6	65.3	0.0	#	0	0	0.0				
GW08		21/03/17 11:38:00												10.50	
GW08		29/03/17 11:16:00	1018												
GW08		29/03/17 11:17:00		7								1.6			
GW08		29/03/17 11:18:00		4								0.9			
GW08		29/03/17 11:19:00		3								0.7			
GW08		29/03/17 11:20:00		7								1.8			
GW08		29/03/17 11:21:00		8								1.9			
GW08		29/03/17 11:22:00			29.4	70.7	0.0	#	0	0	0.0				
GW08		29/03/17 11:23:00			29.3	70.7	0.0	#	0	0	0.0				
GW08		29/03/17 11:24:00			29.3	70.8	0.0	#	0	0	0.0				
GW08		29/03/17 11:25:00			29.4	70.7	0.0	#	0	0	0.0				
GW08		29/03/17 11:26:00			29.5	70.8	0.0	#	0	0	0.0				
GW08		29/03/17 11:27:00			29.5	70.5	0.0	#	0	0	0.0				
GW08		29/03/17 11:28:00			29.6	70.6	0.0	#	0	0	0.0				
GW08		29/03/17 11:29:00			29.6	70.6	0.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW08		29/03/17 11:30:00			29.6	70.6	0.0	#	0	0	0.0				
GW08		29/03/17 11:31:00			29.6	70.6	0.0	#	0	0	0.0				
GW08		29/03/17 11:32:00			29.6	70.6	0.0	#	0	0	0.0				
GW08		29/03/17 11:33:00			29.7	70.6	0.0	#	0	0	0.0				
GW08		29/03/17 11:34:00			29.7	70.6	0.0	#	0	0	0.0				
GW08		29/03/17 11:35:00			29.7	70.5	0.0	#	0	0	0.0				
GW08		29/03/17 11:36:00			29.7	70.5	0.0	#	0	0	0.0				
GW08		29/03/17 11:37:00												10.45	
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GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		17/01/17 12:10:00	1025	0								0.0	5		
GW09		17/01/17 12:11:00										0.0			
GW09		17/01/17 12:12:00										0.0			
GW09		17/01/17 12:13:00										0.0			
GW09		17/01/17 12:14:00										0.0			
GW09		17/01/17 12:15:00			9.4	24.8	13.3	#	0	0	0.0				
GW09		17/01/17 12:16:00			9.5	25.3	13.1	#	0	0	0.0				
GW09		17/01/17 12:17:00			9.6	25.3	13.1	#	0	0	0.0				
GW09		17/01/17 12:18:00			9.5	25.3	13.1	#	0	0	0.0				
GW09		17/01/17 12:19:00			9.5	25.2	13.1	#	0	0	0.0				
GW09		17/01/17 12:20:00			9.5	25.0	13.1	#	0	0	0.0				
GW09		17/01/17 12:21:00			10.2	25.1	12.7	#	0	0	0.0				
GW09		17/01/17 12:22:00			10.8	25.4	12.4	#	0	0	0.0				
GW09		17/01/17 12:23:00			10.9	25.5	12.3	#	0	0	0.0				
GW09		17/01/17 12:24:00			11.3	25.9	11.8	#	0	0	0.0				
GW09		17/01/17 12:25:00												8.93	
GW09		24/01/17 11:30:00	1023	0								8.2	6		
GW09		24/01/17 11:31:00										8.7			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		24/01/17 11:32:00										8.9			
GW09		24/01/17 11:33:00										9.3			
GW09		24/01/17 11:34:00										9.7			
GW09		24/01/17 11:35:00			16.9	38.2	8.9	#	0	0	0.0				
GW09		24/01/17 11:36:00			17.1	38.7	8.9	#	0	0	0.0				
GW09		24/01/17 11:37:00			17.5	38.6	8.8	#	0	0	0.0				
GW09		24/01/17 11:38:00			17.5	38.5	8.8	#	0	0	0.0				
GW09		24/01/17 11:39:00			17.6	38.4	8.8	#	0	0	0.0				
GW09		24/01/17 11:40:00			17.7	38.5	8.7	#	0	0	0.0				
GW09		24/01/17 11:41:00			17.7	38.4	8.7	#	0	0	0.0				
GW09		24/01/17 11:42:00			17.7	38.4	8.7	#	0	0	0.0				
GW09		24/01/17 11:43:00			17.7	38.3	8.7	#	0	0	0.0				
GW09		24/01/17 11:44:00			17.7	38.2	8.7	#	0	0	0.0				
GW09		24/01/17 11:45:00												8.85	
GW09		31/01/17 12:00:00	1005	157								19.3	6		
GW09		31/01/17 12:01:00		160								19.7			
GW09		31/01/17 12:02:00		158								19.3			
GW09		31/01/17 12:03:00		159								19.4			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		31/01/17 12:04:00		159								19.5			
GW09		31/01/17 12:05:00			5.4	24.3	14.7	#	0	0	0.0				
GW09		31/01/17 12:06:00			5.5	24.2	14.7	#	0	0	0.0				
GW09		31/01/17 12:07:00			5.5	24.3	14.7	#	0	0	0.0				
GW09		31/01/17 12:08:00			5.5	24.3	14.7	#	0	0	0.0				
GW09		31/01/17 12:09:00			5.5	24.4	14.8	#	0	0	0.0				
GW09		31/01/17 12:10:00			5.5	24.5	14.8	#	0	0	0.0				
GW09		31/01/17 12:11:00			5.6	24.5	14.8	#	0	0	0.0				
GW09		31/01/17 12:12:00			5.6	24.7	14.5	#	0	0	0.0				
GW09		31/01/17 12:13:00			5.6	24.9	14.2	#	0	0	0.0				
GW09		31/01/17 12:14:00			5.8	25.1	13.7	#	0	0	0.0				
GW09		31/01/17 12:15:00												8.70	Base 9.70m
GW09		07/02/17 11:15:00	1006	-40								-6.3	10		
GW09		07/02/17 11:16:00		-41								-6.7			
GW09		07/02/17 11:17:00		-45								-7.2			
GW09		07/02/17 11:18:00		-39								-6.3			
GW09		07/02/17 11:19:00		-37								-6.1			
GW09		07/02/17 11:20:00			0.0	0.0	21.5	0.0	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		07/02/17 11:21:00			0.0	0.0	21.5	0.0	0	0	0.0				
GW09		07/02/17 11:22:00			0.0	0.0	21.5	0.0	0	0	0.0				
GW09		07/02/17 11:23:00			0.0	0.0	21.5	0.0	0	0	0.0				
GW09		07/02/17 11:24:00			0.0	0.0	21.5	0.0	0	0	0.0				
GW09		07/02/17 11:25:00												8.72	
GW09		07/02/17 13:35:00	1005	61								8.7	10		
GW09		07/02/17 13:36:00		60								8.6			
GW09		07/02/17 13:37:00		60								8.6			
GW09		07/02/17 13:38:00		60								8.6			
GW09		07/02/17 13:39:00		60								8.6			
GW09		07/02/17 13:40:00			14.7	32.6	9.4	#	0	0	0.0				
GW09		07/02/17 13:41:00			15.9	33.4	9.0	#	0	0	0.0				
GW09		07/02/17 13:42:00			15.7	34.7	8.7	#	0	0	0.0				
GW09		07/02/17 13:43:00			15.7	34.8	8.7	#	0	0	0.0				
GW09		07/02/17 13:44:00			15.9	35.2	8.5	#	0	0	0.0				
GW09		07/02/17 13:45:00			16.4	36.0	8.3	#	0	0	0.0				
GW09		07/02/17 13:46:00			16.7	36.6	8.1	#	0	0	0.0				
GW09		07/02/17 13:47:00			16.9	37.0	7.9	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		07/02/17 13:48:00			17.1	37.6	7.7	#	0	0	0.0				
GW09		07/02/17 13:49:00			17.1	37.7	7.7	#	0	0	0.0				
GW09		07/02/17 13:50:00												8.71	
GW09		14/02/17 09:10:00	1015	-42								-6.7	4		
GW09		14/02/17 09:11:00		-42								-6.7			
GW09		14/02/17 09:12:00		-42								-6.7			
GW09		14/02/17 09:13:00		-42								-6.7			
GW09		14/02/17 09:14:00		-42								-6.7			
GW09		14/02/17 09:15:00			0.5	0.1	21.4	2.0	0	0	0.0				
GW09		14/02/17 09:16:00			0.7	1.1	21.1	22.0	0	0	0.0				
GW09		14/02/17 09:17:00			0.7	1.2	21.1	24.0	0	0	0.0				
GW09		14/02/17 09:18:00			0.8	1.4	21.0	28.4	0	0	0.0				
GW09		14/02/17 09:19:00			0.9	1.5	20.9	30.2	0	0	0.0				
GW09		14/02/17 09:20:00			1.0	1.6	20.8	33.1	0	0	0.0				
GW09		14/02/17 09:21:00			1.3	1.8	20.7	36.0	0	0	0.0				
GW09		14/02/17 09:22:00			1.4	1.8	20.6	37.8	0	0	0.0				
GW09		14/02/17 09:23:00			1.5	1.9	20.5	38.7	0	0	0.0				
GW09		14/02/17 09:24:00			1.5	1.9	20.5	39.4	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		14/02/17 09:25:00			1.5	2.0	20.4	40.1	0	0	0.0				
GW09		14/02/17 09:26:00			1.7	2.0	20.4	40.9	0	0	0.0				
GW09		14/02/17 09:27:00			1.8	2.0	20.4	41.5	0	0	0.0				
GW09		14/02/17 09:28:00			1.8	2.1	20.4	42.4	0	0	0.0				
GW09		14/02/17 09:29:00			1.8	2.1	20.3	43.0	0	0	0.0				
GW09		14/02/17 09:30:00												8.71	
GW09		21/02/17 11:40:00	1016	120								15.0	10		
GW09		21/02/17 11:41:00										14.2			
GW09		21/02/17 11:42:00										13.8			
GW09		21/02/17 11:43:00										13.7			
GW09		21/02/17 11:44:00										13.7			
GW09		21/02/17 11:45:00			31.8	64.1	0.1	#	0	0	0.2				
GW09		21/02/17 11:46:00			32.7	67.2	0.0	#	0	0	0.3				
GW09		21/02/17 11:47:00			32.6	67.3	0.0	#	0	0	0.4				
GW09		21/02/17 11:48:00			32.6	67.3	0.0	#	0	0	0.5				
GW09		21/02/17 11:49:00			32.7	67.4	0.0	#	0	0	0.5				
GW09		21/02/17 11:50:00			32.6	67.4	0.0	#	0	0	0.6				
GW09		21/02/17 11:51:00			32.7	67.4	0.0	#	0	0	0.6				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		21/02/17 11:52:00			32.6	67.4	0.0	#	0	0	0.7				
GW09		21/02/17 11:53:00			32.7	67.4	0.0	#	0	0	0.7				
GW09		21/02/17 11:54:00			32.6	67.4	0.0	#	0	0	0.7				
GW09		21/02/17 11:55:00			32.7	67.4	0.0	#	0	0	0.8				
GW09		21/02/17 11:56:00			32.6	67.4	0.0	#	0	0	0.8				
GW09		21/02/17 11:57:00			32.7	67.3	0.0	#	0	0	0.8				
GW09		21/02/17 11:58:00			32.7	67.3	0.0	#	0	0	0.8				
GW09		21/02/17 11:59:00			32.7	67.4	0.0	#	0	0	0.8				
GW09		21/02/17 12:00:00												8.72	
GW09		27/02/17 11:00:00	985	429								37.2	8		
GW09		27/02/17 11:01:00										36.6			
GW09		27/02/17 11:02:00										36.5			
GW09		27/02/17 11:03:00										36.6			
GW09		27/02/17 11:04:00										36.5			
GW09		27/02/17 11:05:00			30.6	62.2	0.0	#	0	0	0.2				
GW09		27/02/17 11:06:00			31.5	64.3	0.0	#	0	0	0.4				
GW09		27/02/17 11:07:00			31.4	64.4	0.0	#	0	0	0.5				
GW09		27/02/17 11:08:00			31.4	64.4	0.0	#	0	0	0.5				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		27/02/17 11:09:00			31.5	64.7	0.0	#	0	0	0.6				
GW09		27/02/17 11:10:00			31.4	64.5	0.0	#	0	0	0.6				
GW09		27/02/17 11:11:00			31.4	64.5	0.0	#	0	0	0.6				
GW09		27/02/17 11:12:00			31.4	64.5	0.0	#	0	0	0.6				
GW09		27/02/17 11:13:00			31.5	64.5	0.0	#	0	0	0.6				
GW09		27/02/17 11:14:00			31.5	64.5	0.0	#	0	0	0.6				
GW09		27/02/17 11:15:00			31.5	64.6	0.0	#	0	0	0.6				
GW09		27/02/17 11:16:00			31.5	64.6	0.0	#	0	0	0.6				
GW09		27/02/17 11:17:00			31.5	64.6	0.0	#	0	0	0.7				
GW09		27/02/17 11:18:00			31.4	64.6	0.0	#	0	0	0.7				
GW09		27/02/17 11:19:00			31.4	64.6	0.0	#	0	0	0.7				
GW09		27/02/17 11:20:00												8.68	
GW09		16/03/17 13:07:00	1018										11		
GW09		16/03/17 13:08:00		349								32.7			
GW09		16/03/17 13:09:00		350								32.7			
GW09		16/03/17 13:10:00		352								32.0			
GW09		16/03/17 13:11:00		354								33.9			
GW09		16/03/17 13:12:00		354								33.9			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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	
GW09		16/03/17 13:13:00			29.0	71.1	0.0	#	0	0	0.0					
GW09		16/03/17 13:14:00			29.0	71.1	0.0	#	0	0	0.0					
GW09		16/03/17 13:15:00			29.0	71.0	0.0	#	0	0	0.0					
GW09		16/03/17 13:16:00			30.1	70.1	0.0	#	0	0	0.0					
GW09		16/03/17 13:17:00			30.3	69.8	0.0	#	0	0	0.0					
GW09		16/03/17 13:18:00			30.1	70.0	0.0	#	0	0	0.0					
GW09		16/03/17 13:19:00			30.3	70.0	0.0	#	0	0	0.0					
GW09		16/03/17 13:20:00			301.0	70.1	0.0	#	0	0	0.0					
GW09		16/03/17 13:21:00			30.1	70.2	0.0	#	0	0	0.0					
GW09		16/03/17 13:22:00			30.0	70.3	0.0	#	0	0	0.0					
GW09		16/03/17 13:23:00			29.9	70.3	0.0	#	0	0	0.0					
GW09		16/03/17 13:24:00			29.7	70.3	0.0	#	0	0	0.0					
GW09		16/03/17 13:25:00			29.0	70.5	0.0	#	0	0	0.0					
GW09		16/03/17 13:26:00			29.8	70.5	0.0	#	0	0	0.0					
GW09		16/03/17 13:27:00			29.5	70.5	0.0	#	0	0	0.0					
GW09		16/03/17 13:28:00												8.66		
GW09		21/03/17 11:42:00	1005										11			
GW09		21/03/17 11:43:00		73								8.7				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534		CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		21/03/17 11:44:00		87								10.1			
GW09		21/03/17 11:45:00		75								9.4			
GW09		21/03/17 11:46:00		86								9.9			
GW09		21/03/17 11:47:00		83								9.2			
GW09		21/03/17 11:48:00			17.4	79.2	0.0	#	0	0	0.0				
GW09		21/03/17 11:49:00			17.5	79.5	0.0	#	0	0	0.0				
GW09		21/03/17 11:50:00			17.9	79.8	0.0	#	0	0	0.0				
GW09		21/03/17 11:51:00			18.2	79.7	0.0	#	0	0	0.0				
GW09		21/03/17 11:52:00			18.4	79.5	0.0	#	0	0	0.0				
GW09		21/03/17 11:53:00			18.7	18.8	0.0	#	0	0	0.0				
GW09		21/03/17 11:54:00			18.8	79.2	0.0	#	0	0	0.0				
GW09		21/03/17 11:55:00			18.9	79.1	0.0	#	0	0	0.0				
GW09		21/03/17 11:56:00			19.1	78.8	0.0	#	0	0	0.0				
GW09		21/03/17 11:57:00			19.5	78.8	0.0	#	0	0	0.0				
GW09		21/03/17 11:58:00			19.6	78.8	0.0	#	0	0	0.0				
GW09		21/03/17 11:59:00			19.9	78.8	0.0	#	0	0	0.0				
GW09		21/03/17 12:00:00			20.2	78.5	0.0	#	0	0	0.0				
GW09		21/03/17 12:01:00			20.2	78.4	0.0	#	0	0	0.0				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

GAS AND GROUNDWATER LEVELS

CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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	
GW09		21/03/17 12:02:00	1018		20.2	78.4	0.0	#	0	0	0.0		13	8.68		
GW09		21/03/17 12:03:00														
GW09		29/03/17 14:20:00														
GW09		29/03/17 14:21:00		137								14.7				
GW09		29/03/17 14:22:00		129								14.0				
GW09		29/03/17 14:23:00		128								13.9				
GW09		29/03/17 14:24:00		125								13.6				
GW09		29/03/17 14:25:00		131								13.9				
GW09		29/03/17 14:26:00			27.9	72.1	0.0	#	0	0	0.0					
GW09		29/03/17 14:27:00			28.0	72.0	0.0	#	0	0	0.0					
GW09		29/03/17 14:28:00			28.2	72.0	0.0	#	0	0	0.0					
GW09		29/03/17 14:29:00			28.1	72.0	0.0	#	0	0	0.0					
GW09		29/03/17 14:30:00			28.1	72.0	0.0	#	0	0	0.0					
GW09		29/03/17 14:31:00			28.2	72.0	0.0	#	0	0	0.0					
GW09		29/03/17 14:32:00			28.2	72.0	0.0	#	0	0	0.0					
GW09		29/03/17 14:33:00			28.2	71.9	0.0	#	0	0	0.0					
GW09		29/03/17 14:34:00			28.2	71.9	0.0	#	0	0	0.0					
GW09		29/03/17 14:35:00			28.3	71.9	0.0	#	0	0	0.0					
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser																CONTRACT 32534

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS



CLIENT: READING FOOTBALL CLUB

SITE: MADEJSKI STADIUM, READING

Borehole /trial pit no.	pipe	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
GW09		29/03/17 14:36:00			28.3	71.8	0.0	#	0	0	0.0				
GW09		29/03/17 14:37:00			28.4	71.9	0.0	#	0	0	0.0				
GW09		29/03/17 14:38:00			28.4	71.9	0.0	#	0	0	0.0				
GW09		29/03/17 14:39:00			28.4	71.9	0.0	#	0	0	0.0				
GW09		29/03/17 14:40:00			28.5	71.9	0.0	#	0	0	0.0				
GW09		29/03/17 14:41:00												8.74	
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 32534	CHECKED EC

Appendix D

Methodology for Determination of Trigger Values

D1 .

Appendix D

Methodology for Determination of Trigger Values

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D1 Methodology for Determination of Trigger Level Values

The methodology to be employed to determine trigger levels (contaminant concentrations in groundwater) have been requested by the Environment Agency (EA) as part of the construction monitoring programme (EA meeting 6th October 2015 and EA letter dated 29th October 2017). The proposed methodology is detailed in this appendix.

The methodology will determine reference concentrations (trigger levels) for groundwater in pre-determined monitoring boreholes down-hydraulic gradient of the proposed construction works. Exceedance of the reference concentrations will trigger activities listed in the Action Plan¹ during the course of the construction monitoring programme.

The following general principles have been agreed with the Environment Agency and form the basis of the methodology for determining the trigger levels:

1. The overall objective is to minimise worsening of existing groundwater contamination in the Chalk aquifer;
2. There will be a pre-construction monitoring period of three months;
3. The leachate sumps (LD series) and leachate monitoring wells (LW series) will be pumped out prior to construction;
4. Additional dewatering wells will be constructed into the landraise to extract leachate from the base of the landraise prior to construction. These new wells will be used to dewater leachate prior to construction and leachate will be disposed of to the foul sewer.
5. Ammoniacal Nitrogen is the only contaminant of concern for which trigger levels are required;
6. It is acknowledged that concentrations of Ammoniacal Nitrogen in the groundwater at the site have been rising, since the nearby brewery abstraction well ceased in 2009/10;
7. Groundwater flow directions at the site will be established from review of data from existing boreholes. This is to confirm which boreholes require trigger levels i.e. those in the RTG aquifer which are down-hydraulic gradient of the construction works;

The background Ammoniacal Nitrogen concentration shall be established for each of the down hydraulic gradient RTG BHs. The background concentrations shall be defined as the highest concentration measured in that particular borehole, over the

¹ Reading Football Club Proposed Redevelopment at Madejski Stadium
Environmental Strategy E002 Rev C (8 December 2017)

previous five years (i.e. five years prior to the planned start of construction). The following methodology for determining the trigger levels is proposed:

1. RTG BHs (excluding BHM) already recording Ammoniacal Nitrogen concentrations will have a trigger value of 30% above the background concentration for each well;
2. RTG BHs with little or below detection Ammoniacal Nitrogen will have a trigger level of 10mg/l;
3. Chalk BHs (excluding BHX) with measured Ammoniacal Nitrogen will have a trigger level of 20% above the background concentration;
4. Chalk BHs with little or no measured Ammoniacal Nitrogen will have a trigger level of 3mg/l.

In agreement with the EA, the following should be noted:

- Borehole M is excluded as the response zone is partially in the Made Ground. This was replaced in 2016 with BH02, which will be assigned a trigger value;
- Borehole X is excluded, as it is inaccessible. This was replaced in 2016 by BH01. BH01 shall be used to monitor Ammoniacal Nitrogen concentration in the Chalk and will be assigned a trigger value;
- Borehole 328 is excluded, as it is inaccessible. This was replaced in 2017 by BH03. BH03 shall be used to monitor Ammoniacal Nitrogen concentration in the Chalk and will be assigned a trigger value.
- A list of the proposed trigger values for each borehole recording groundwater data will be drawn up and agreed with the EA.