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CHARLY45 LIMITED

FORMER GAS WORKS, GAS WORKS ROAD, READING

PHASE 2 INTERPRETATIVE SITE INVESTIGATION REPORT

DECEMBER 2017

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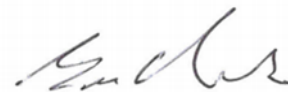


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DRAWINGS	TITLE	SCALE
LO10488/050	Site Investigation Location Plan	1:100 (A2)
LO10488/051	Schematic Ground Conditions and Contamination Section	1:100V, 1:200H (A2)

1 INTRODUCTION

Instructions

- 1.1 This report is prepared in accordance with instructions from Dunthorne Parker Architects, on behalf of Charly45 Ltd. This follows a proposal dated 12 July 2017 by Wardell Armstrong LLP.
- 1.2 The site is the Former Gas Works, Gas Works Road, Reading RG1 3EQ, and is located as shown on Figure 1. The site comprises approximately 0.07 hectares of land occupied by two disused buildings and a yard area and is bordered by residential buildings to the south and east, offices to the west and the River Kennet to the north. The site is located approximately 500m east of Reading town centre.

Figure 1: Aerial Image Showing Approximate Site Boundary



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Proposed Site Use

- 1.3 It is proposed to redevelop the site for residential use with gardens. The planning application (no. 160378) is for the creation of 20 residential units through the extension and conversion of the two existing buildings. The largest building will be extended to the west and upwards and will have flats on five levels. One flat is proposed to have a private garden. The ground floor level of the larger building will be reduced by up to 0.8m. The smaller building has an existing basement that will be used for cycle storage. A communal landscaped area is proposed between the two buildings. The single storey part of the northern building has been demolished as part of site clearance works. It is understood that no further demolition will be taking place.

Purpose of Report

- 1.4 This report provides an assessment of geo-environmental conditions associated with the site. The report assesses the potential for soil, groundwater and surface water contamination at the site in order to satisfy planning condition 5 of the planning permission (no. 160378). This report builds on the results of previous site investigation to enable assessment of the suitability of the site for residential development.

Previous Reports

- 1.5 The following reports have been provided for information:
- Factual Desk Study, Atkins, March 2010 (ref. Gas Works Road, Reading, Desk Study Factual Rev0);
 - Environmental Investigation and Assessment, Final Factual Report, Atkins Ltd, October 2010 (ref. 5027279/GTG.20100598/Reading_2010/R002rev1);
 - Factual Desk Study, Final, Atkins Ltd, January 2014 (ref. GTG2000078/Reading/NGG Desk Study/R002v0);
 - Updated Controlled Waters Quantitative Risk Assessment, Atkins, May 2013.
- 1.6 Wardell Armstrong prepared a Phase 1 Geo-Environmental Desk Study report dated August 2017 (ref. LO10488/RPT-001) for the site. This report should be read in conjunction with the Phase 1 Geo-Environmental Desk Study report.
- 1.7 Table 1 presents the preliminary conceptual site model developed from the Phase 1 Geo-Environmental Desk Study report.

Table 1: Preliminary Conceptual Site Model			
Issue	Summary	Risk Category	
		Humans	Property/ Environment
Contamination Potential:			
Present site use	Disused former social club and governor house with yard area	Low	Moderate
Past site use	Gas works	High	High
Impact to site from past and present adjacent land uses	Past: surrounding gas works Present: offices, commercial, residential	High	High
Mining history	Historical shallow chalk/lime workings off site	Low/ Moderate	Low/ Moderate
Emissions, pollution incidents, discharges etc.	One revoked discharge consent 44m from site	Low	Low
Asbestos	Asbestos containing material has tentatively been identified in the building and may also be in made ground.	Moderate	Moderate
Ground gas	Presence of made ground and organic materials in natural superficial deposits may give rise to ground gas	Moderate	Moderate
Waste management	No waste management facilities within 500m of the site	Low	Low
Past remediation	Contamination identified on site in the past and remediated on a statutory basis. Site may still be contaminated in terms of proposed residential use.	Moderate	Moderate
Environmental Sensitivity:			
Geology	Made ground overlying alluvium which in turn overlies Chalk	n/a	n/a
Groundwater vulnerability	This site is situated on a Secondary A aquifer which overlies a Principal aquifer. The closest active groundwater abstraction licence is 358m east. Site is within a Source Protection Zone III for a public water supply 2km to south.	Moderate	High
Surface water vulnerability	The nearest graded surface watercourse is a reach of the River Kennet, 284m north of site. The closest surface water abstraction licence is 750m north.	Low	Moderate
Geological constraints:			
Made ground / superficals / solid geology	Thick made ground likely at site. Alluvium may contain peat layers. Compressible ground stability hazards identified on site, likely to be due to possible peat layers. Chalk underlying alluvium – karstic or drift filled hollow features may be present within the Chalk.	Low	Low/ Moderate

Table 1: Preliminary Conceptual Site Model			
Issue	Summary	Risk Category	
		Humans	Property/Environment
Mining setting	Historical shallow chalk/lime workings off site	Low/ Moderate	Low/ Moderate
Risks relating to other constraints (miscellaneous):			
Services	Pipework encountered during remediation in west of site. Pipework associated with governor building likely.	Low	Moderate
Flooding	Majority of site does not lie within a designated floodplain. The southern and northern edges of the site lie within Flood Zone 2 and 3 respectively. There is a very low chance of surface water flooding at the site. There is the potential for groundwater flooding to occur at the site.	Low	Low/ Moderate
Buried obstructions	Buried concrete encountered during remediation in west of site.	Low	Low/ Moderate
Unexploded ordnance	Site is within a low risk area for encountering unexploded ordnance.	Low	Low
Liability Issues:			
Risk of liability with past use of site.	Gas works	High	High
Risk of liability with current use of site	Disused former social club and governor house with yard area	Low	Low/ Moderate
Risk of liability for proposed use of site	Residential	Low	Low
Overall Risk for Site:	Moderate to High		

- 1.8 Where appropriate, the results from the recent site investigation works have been compared to/used with the results from previous site investigation carried out at the site. The previous site investigation locations have been identified on Drawing LO10488/050.

2 SITE INVESTIGATION

Introduction

- 2.1 A site investigation was carried out by Geotechnical Engineering Ltd (GE Ltd), a specialist site investigation contractor between 6 and 14 November 2017 (seven days on site) with subsequent groundwater and gas monitoring rounds and laboratory testing. The investigation including sampling techniques was carried out in accordance with BS5930:2015, Code of Practice for Ground Investigations and BS10175:2011+A1:2013 Investigation of potentially contaminated sites – code of practice.
- 2.2 The current investigation was designed around the preliminary conceptual site model that identified all potential sources, pathways and receptors. This allowed a targeted sampling approach to be undertaken and also provide general coverage of the site. Results of the investigation are used to revise the conceptual site model, establish whether linkages identified are plausible and ascertain the level of risk associated with the site.
- 2.3 The site investigation comprised hand dug trial pitting and dynamic rotary cored boreholes. Gas and/or groundwater monitoring standpipes were installed in the boreholes. Soil samples were taken for geochemical and geotechnical laboratory testing. Groundwater samples were taken for geochemical testing. Falling head tests were undertaken within two boreholes during the subsequent monitoring rounds. The investigation locations are shown on a Drawing LO10488/050.
- 2.4 Prior to carrying out intrusive works, a service clearance survey was undertaken by GE Ltd for the proposed borehole and trial pit locations.

Trial Pits

- 2.5 Five hand dug trial pits were excavated as part of the investigation. These were all located adjacent to/inside existing buildings and were to allow investigation of existing foundation type and depth, ground conditions at founding level and for general site coverage for geochemical testing. The trial pits were hand dug to a maximum depth of 1.5m below ground level (bgl). The trial pits were logged by GE Ltd and the logs are provided in Appendix 1. Soil samples were taken for geochemical analysis.

Boreholes

- 2.6 Five boreholes were drilled to a maximum depth of 9.15m bgl. The proposed borehole positions were situated across the site to provide a spread of data, however, these positions were amended during site works due to access restrictions, in ground

obstructions, underground utilities and health and safety reasons. For example, boreholes that had been proposed to be undertaken within existing buildings could not be safely carried out due to the dilapidated condition of the structures and were therefore moved to external areas. A sixth proposed borehole (BH05) could not be undertaken in the east of the site due to access restrictions.

- 2.7 The arisings were logged by GE Ltd and borehole logs are provided in Appendix 1. Disturbed soil samples were taken for geochemical testing. A handheld photoionisation detector (PID) was used on selected samples on site to obtain volatile organic compound (VOC) levels within the soils. VOC results were used to schedule geochemical testing on soil samples. The trial pit and borehole identifications and installation details are summarised in Table 2.

Table 2: Summary of Trial Pits/Boreholes						
Trial Pit/ Borehole Identification	Depth (m bgl)	Installation type gas/groundwater		Response Zone (m bgl)	Purpose of trial pit/borehole	Comments
TP01	1.2	-		-	Existing foundation, founding horizon, site wide ground conditions	Interior northern building
TP02	1.2	-		-	Existing foundation, founding horizon, site wide ground conditions	Interior northern building
TP03	1.5	-		-	Existing foundation, founding horizon, site wide ground conditions	Interior northern building
TP04	1.2	-		-	Existing foundation, founding horizon, site wide ground conditions	Interior northern building
TP05	1.2	-		-	Existing foundation, founding horizon, site wide ground conditions	Exterior southern building
BH01	9.15	Groundwater and gas		0.90-4.00 (made ground)	Site wide ground conditions	In footprint of demolished building
BH02	9.15	Groundwater and gas		3.60-6.80 (alluvium)	Site wide ground conditions and within previously remediated zone	
BH03C	9.15	Groundwater and gas		2.80-6.80 (alluvium)	Site wide ground conditions and within previously remediated zone	Relocated from inside building. 3 previous attempts abandoned due to obstructions.
BH04B	9.15	Dual	Gas	0.80-2.00 (made ground)	Site wide ground conditions	Relocated from inside building. 2 previous attempts abandoned due to services.
			Groundwater	2.90-7.10 (alluvium)		

Table 2: Summary of Trial Pits/Boreholes

Trial Pit/ Borehole Identification	Depth (m bgl)	Installation type gas/groundwater		Response Zone (m bgl)	Purpose of trial pit/borehole	Comments
BH5	-	-		-	Site wide ground conditions	Could not be carried out due to access restrictions
BH06A	9.15	Dual	Gas	2.90-6.10 (alluvium)	Site wide ground conditions	Relocated due to access restrictions. 1 previous attempt abandoned due to obstructions.
			Groundwater	7.60-9.15 (chalk)		

Laboratory Testing

2.8 The soil and groundwater samples were collected, transferred to the laboratory under chain of custody and analysed to ensure traceability and reliability of analytical results.

2.9 26 soil samples were scheduled for geochemical testing which was undertaken by i2 Analytical in their UKAS accredited laboratory. The samples taken to target to areas of suspected contamination and also to provide an analysis of site wide conditions. Samples were tested for a “full suite” and a “basic suite”. The suites included a range of contaminants such as:

- Asbestos;
- Metals;
- Cyanide;
- Boron;
- Total petroleum hydrocarbons (TPHs);
- Polycyclic aromatic hydrocarbons (PAHs);
- pH;
- Phenols;
- Benzene, toluene, ethylbenzene, xylene (BTEX);
- Methyl Tertiary Butyl Ether (MTBE);
- Polychlorinated biphenyls (PCBs);
- Ammoniacal nitrogen.

The results are provided in Appendix 2.

Groundwater Monitoring

2.10 Groundwater monitoring visits were carried out by a GE Ltd technician. Due to various access restrictions all boreholes could not be monitored on the same day. BH01 was monitored on three occasions on 27 November 2017, 4 and 12 December 2017. BH02, BH03C and BH06A were monitored on two occasions on 4 and 12 December 2017. BH04B was monitored on two occasions on 7 and 12 December 2017. In addition two boreholes from the previous 2010 site investigation (WS001 and WS005) were monitored once on 4 December 2017. WS002, WS003 and WS004 could not be accessed. Falling head tests were also carried out in BH03C and BH06A on 7 December 2017. The results are included in Appendix 3 and discussed in Section 6.

Surface Water Monitoring

2.11 Two surface water samples were obtained from the River Kennet, one upstream (River01) and one downstream (River 02) of the site (see locations on Drawing LO10488/050) on 27 November 2017.

2.12 The groundwater and surfaces samples were scheduled for geochemical testing which was undertaken by i2 Analytical in their UKAS accredited laboratory. Samples were tested for a range of contaminants such as:

- Metals;
- Cyanide;
- TPHs;
- PAHs;
- Phenols;
- BTEX;
- MTBE;
- PCBs;
- Ammonium.

The results are included in Appendix 4.

Ground Gas Monitoring

- 2.13 Ground gas monitoring was undertaken at the site by a GE Ltd technician. Monitoring visits were carried out on three occasions for BH01, on 27 November 2017, 4 and 12 December 2017. Monitoring was carried out on two occasions at BH02, BH03C and BH06A on 4 and 12 December 2017. Monitoring was carried out on two occasions at BH04B on 7 and 12 December 2017. WS001 and WS005 were monitored on 4 December 2017. The results are included in Appendix 3 and discussed in Section 6. Monitoring is ongoing and assessment will be updated once all results are received.

Limitations

- 2.14 This report has been prepared for the exclusive benefit of the Client for the purpose of providing geo-environmental recommendations for the site. The report contents shall only be used in that context. Furthermore, new information, changes in practice or new legislation may necessitate revised interpretation of the report after the date of its production.
- 2.15 Wardell Armstrong has used reasonable skill and care in the design of the site investigation work to comply with currently available industry guidance and to meet the requirements of the commission.
- 2.16 Whilst reasonable attempts have been made to identify the potential ground related constraints, it should be noted that the ground conditions encountered are representative only of the areas investigated at the time of investigation and may not be representative of the site as a whole. As part of the interpretation process reasonable inferences have been drawn between the investigation points, however, it should be recognised that ground and groundwater conditions can vary significantly both laterally and vertically over time due to changing conditions such as seasonal or climatic fluctuations etc. The potential for areas of loose/soft materials, contaminated materials and/or other potential problems cannot be completely discounted.
- 2.17 The positions of site investigation locations were restricted due to access, in ground obstructions, underground utilities and health and safety reasons. For example, boreholes that had been proposed to be undertaken within existing buildings could not be safely carried out due to the dilapidated condition of the structures and were therefore moved to external areas. A sixth proposed borehole (BH05) could not be undertaken in the east of the site due to access restrictions. Additionally trial pits were restricted to hand dug excavations due to access into the building and its dilapidated condition. Whilst all boreholes have been monitored, a full round of groundwater and ground gas monitoring to include all boreholes on the same day could not be carried out due to access restrictions on site.

3 GROUND CONDITIONS

Hardstanding

- 3.1 Areas of hardstanding were surfaced completely with tarmac/concrete, underlain immediately at the associated borehole and trial pit locations by made ground. The tarmac/concrete was typically 0.05m thick.

Geology

- 3.2 The geology encountered in the trial pits and boreholes was found to comprise made ground overlying superficial deposits (alluvium), which were in turn underlain by Chalk. The sequence of strata is summarised in Table 3.

Table 3: Summary of Encountered Ground Conditions			
Strata	Depths from (m bgl)	Depths to (m bgl)	Thickness (m)
Made Ground	0.0	3.90	1.50-3.90
Alluvium (Clay and Silt)	1.50	4.95	0-3.05
Alluvium (Sand and Gravel)	3.20	7.80	2.20-3.95
Chalk	6.10	9.15*	N/A
*Depth of end of borehole; base of deposit not proved			

- 3.3 The sequence of geological strata encountered was consistent with the recorded geology at the site.

Made Ground

- 3.4 Made ground was present in all site investigation locations and ranged in thickness between 1.5m and 3.9m, with an average thickness of 2.15m. The full depth of made ground was not proved in the trial pit locations. The maximum depth of made ground was encountered in BH01 in the northwest of the site, where it was present to 3.9m bgl. The made ground is generally described as soft to very soft dark grey/brown mottled black slightly sandy gravelly clay/slightly gravelly sandy silt with brick, concrete and rare flint, glass fragments and wood, and grey/brown sandy subangular and subrounded brick, sandstone and concrete coarse gravel/cobbles. Where the made ground comprised a cohesive material (i.e. clay/silt) it was often described as being stained black and having a faint/strong hydrocarbon odour. In

BH06A reinforced concrete was encountered between 0.8m and 1.7m bgl. Roots were encountered with made ground in BH01 to 3.9m bgl.

- 3.5 The description of the made ground encountered during the recent site investigation was similar to that encountered during the 2010 site investigation.

Superficial Deposits

- 3.6 Superficial deposits were encountered in all boreholes at the site. They comprised alluvium which was seen to be clay and silt overlying sands and gravels. The clay and silt ranged in thickness between 0m and 3.05m, with the average thickness being 1.7m. Clay and silt was absent under thick made ground at BH01 in the northwest of the site and was thickest in BH04B in the centre of the site (to 4.95m bgl). The clay and silt was generally described as soft to firm greenish grey mottled black silty clay/clayey silt with shell fragments and rare shells, gravelly/sandy in places. The clay and silt was noted to have a strong or faint hydrocarbon odour in all borehole locations and in some places was stained black. Roots were encountered within the clay and silt which were noted to be stained black by hydrocarbons in places.
- 3.7 The sand and gravel ranged in thickness between 2.2m and 3.95m thick, with the average thickness being 3.1m. The sands and gravels were generally described as medium dense to dense grey clayey sandy angular to rounded fine to coarse flint gravel, and medium dense to very dense grey slightly gravelly fine to coarse sand. The sands and gravels were noted to have a strong or faint hydrocarbon odour in all locations except BH04B. In BH03C a sheen and brown hydrocarbon staining was observed in the sand. Roots were not encountered in the sand and gravel deposits. The maximum depth of the sand and gravel was 7.8m bgl in BH04B in the centre of the site.

Solid Strata

- 3.8 Chalk was encountered underlying the sands and gravels of the alluvium in all borehole locations. The Chalk was described as structureless chalk composed of white/light brown slightly gravelly sandy silt. Gravel is subrounded and rounded fine to coarse very weak low and medium density white chalk and subangular and subrounded medium to coarse rinded flint. The CIRIA grade has been determined as Dm. The Chalk was not described as having a hydrocarbon odour or black staining at any location. The minimum depth it was encountered was 6.1m bgl in BH01 and the maximum depth was at 7.8m in BH04B. The full depth of the Chalk was not proved.
- 3.9 Drawing LO10488/051 shows a schematic cross section of the ground conditions encountered at the site based on the borehole logs.

4 GUIDANCE ON CONTAMINATION RISK ASSESSMENT

Introduction

4.1 The following section aims to assess the magnitude and significance of potential risks to human health, surface water, groundwater, ecosystems and buildings from contaminated soil and groundwater. The assessment provides information that is fit for purpose given the regulatory context and completed in accordance with UK best practice. A summary of the risk assessment process is presented below. More detailed information on risk assessments is contained in various reports published by the Environment Agency and DEFRA including:

- Contaminated Land Science Reports (SR2 to 4); and
- Model Procedures for the Management of Land Contamination (CLR 11).

General Soil Contamination Guidance

4.2 The Environment Agency (EA) has a statutory duty to ensure the protection of the environment and the remediation of contaminated land and groundwater. In order to achieve this, the EA employs the principle of risk assessment - the risk of a contaminant source causing harm or pollution via a given pathway to an identified receptor. If one of the source-pathway-receptor linkages is not considered to be present then there is deemed to be no risk. However, if a contaminant source is present and there is a pathway for that contaminant to reach a receptor then there is a potential risk of significant harm to the receptor. Therefore, if the source-pathway-receptor linkages are complete, there is a requirement to undertake a risk assessment related to the receptor of concern, be it human health, surface water, groundwater, buildings or other property or ecological issues.

4.3 The first stage in the assessment of a site is development of a conceptual model. This includes consideration of all possible sources of contamination on the site, the potential receptors and whether there is a plausible pathway between the two. This allows evaluation of whether further more complicated risk assessment for an identified receptor is necessary. A site-specific conceptual model is presented in previous reports and is revised here in Section 6 based on the findings of the site investigations.

Generic Assessment Criteria

4.4 In March 2002 the Environment Agency and the Department of Environment, Food and Rural Affairs (DEFRA) released a package of guidance to assess the health risks posed by contaminated land as part of the statutory framework for contaminated

land. The Contaminated Land Exposure Assessment (CLEA) model is a framework for estimating the likely exposure to contaminants in soil as part of the wider approach of the UK's assessment of risk and suitability for use. The methodology adopted for CLEA builds upon the source-pathway-receptor model for the assessment of risk. Following the CLEA model, generic Soil Guideline Values (SGVs) were developed to act as triggers for intervention in a number of end-use scenarios. The Environment Agency commenced a programme looking at 55 contaminants. The CLEA methodology has been updated and the SGVs were withdrawn from use in August 2008. New SGVs have been published by the EA since March 2009 onwards.

- 4.5 The CLEA SGVs are derived using specific parameters, which may not be relevant to each site. The CLEA software allows parameters to be changed and site specific assessment criteria (SSAC) can be developed. The CLEA methodology also uses a statistical evaluation of all the data collected in order to give an overall impression of the site and therefore the exposure to a modelled receptor rather than using individual contaminant values, which may vary dramatically across the site. The statistical tests calculate a normalised upper bound value for the site as a whole and also give an indication of whether a particular data value is a statistical outlier (potential hotspot) or whether it is part of the whole population of samples.
- 4.6 The Soil Guideline Values derived from the CLEA model are intended for use in assessing the risk to long term human users of the site. There is also a requirement to consider the potential for harm from short-term exposure to contaminants at the site, e.g. to construction workers who may be exposed to risk via inhalation of dust or dermal contact with the contaminated material.
- 4.7 In the absence of SGVs published under the new CLEA methodology, Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH) published their third edition of generic assessment criteria (GAC) for 82 inorganic and organic substances in January 2015 which are termed Suitable 4 Use Levels or S4UL's. In addition, GAC values for 30 separate organic compounds were published in December 2009 by the Environmental Industries Commission (EIC), the Association of Geotechnical and Geoenvironmental Specialists (AGS) and CL:AIRE. These GAC values have been derived in the same vein as SGVs and are intended to be used in the same manner. Additionally, the GAC values have been produced for varying soil organic matter content (i.e. 1%, 2.5% and 6%).

Category 4 Screening Levels (C4SLs)

- 4.8 Revised Statutory Guidance to support Part 2A of the Environmental Protection Act 1990 was published in April 2012 by DEFRA. This Guidance introduced a new four-

category system for classifying land under Part 2A for cases of a Significant Possibility of Significant Harm to human health:

- Category 1 includes land where the level of risk is clearly unacceptable;
- Category 2/3 border defines the point at which land is determined under the legislation;
- Category 3 would include sites that regulators conclude should not be designated as contaminated under Part 2A; and
- Category 4 includes land where the level of risk posed is acceptably low.

- 4.9 Land is determined as 'contaminated land' under Part 2A if it falls within Categories 1 or 2.
- 4.10 In March 2014, DEFRA published C4SLs for four generic land-uses comprising residential, commercial, allotments and public open space for six substances – arsenic, benzene, benzo(a)pyrene, cadmium, chromium (VI) and lead.
- 4.11 The C4SLs have been derived in support of Defra's revised Statutory Guidance for Part 2A of the Environmental Protection Act 1990 but it was anticipated that they could be used under the planning regime as generic screening criteria within a GQRA, albeit describing a higher level of risk than the currently or previously available SGVs.
- 4.12 In the case of lead where the SGV was removed in 2008 and was not replaced, the C4SL for lead is considered a suitable generic screening value.

Statistical analysis

- 4.13 Statistical analysis has been completed to identify if the data set for each substance tested contains outliers, has as normal or non-normal distribution and if there is significant evidence that the mean concentration, as defined by the 95% upper confidence level (UCL), is less than the adopted screening value. This process follows the CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008. Results from this statistical testing can be used to inform decisions on whether land is suitable for use under the land use planning system without mitigation to break identified pollutant linkages.

General Water Contamination Guidance

- 4.14 Concentrations of contaminants detected in groundwater have been compared to the UK Drinking Water Standards (UKDWS) encompassing the Water Supply (Water Quality) Regulations 1989 and Water Supply (Water Quality) Regulations 2016 where drinking water is the receptor. Where surface water is the receptor, Water

Framework Directive, Environmental Quality Standards (EQS) and The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 have also been used.

- 4.15 Where no UKDWS and EQS are available or applicable, reference is made to other appropriate guidance. This includes the World Health Organisation (WHO) Guidelines for Drinking-water Quality (2011) and the United States Environmental Protection Agency (US EPA) Regional Screening Levels (RSL's) for tap water.

Bioavailable EQS

- 4.16 Bioavailable EQS values for copper, manganese, nickel and zinc have been derived by the regulators as part of the Water Framework Directive requirements. The Metal Bioavailability Assessment Tool (M-BAT) is a UK method which can be used to estimate the bioavailable concentrations of these metals under the conditions found at a site, which can then be compared with the published bioavailable EQS values.
- 4.17 The M-BAT requires the measured dissolved phase concentration and site parameters including calcium, pH and dissolved organic carbon (DOC). Where the DOC concentration is reported at less than the LOD, the LOD value has been adopted in the M-BAT calculation.

Ground Gas Assessment Guidance

- 4.18 Guidance within CIRIA 665 "Assessing risks posed by hazardous ground gases to buildings" (2007) is used to calculate a Gas Screening Value (GSV) and generate a Characteristic Situation (CS) for the site. CS1 represents a very low risk and CS6 represents a very high risk from ground gas.
- 4.19 CIRIA 665 also provides some guidance on gas protection measures for each CS. Design of gas protection is also covered within BS8485:2015 "Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings". Where the end use is residential the NHBC published guidance (traffic light system) can also be used as an alternative provided the construction of the buildings proposed is compliant with their guidance.

5 SOIL CONTAMINATION RESULTS AND ASSESSMENT

Soil Contamination

- 5.1 A total of 26 soil samples were submitted for laboratory geochemical analysis. Samples were obtained from a range of depths (up to 8.6m bgl) to allow each material type identified by the site investigation to be tested. The sample locations were targeted to provide a general spread over the whole site and also to where contamination was suspected, where possible but were heavily constrained by the presence of buildings and services.
- 5.2 Observations of soil contamination noted during the site investigation are presented on the borehole and trial pit logs included in Appendix 1. These are summarised in Table 4.

Table 4: Summary of Soil Contamination Observations		
Borehole/trial pit	Depth, m bgl	Observation
BH01	1.4-3.9	Made ground is mottled black and has a strong hydrocarbon odour. Rootlets are stained with hydrocarbons.
	3.9-4.45	Alluvium has a strong hydrocarbon odour.
BH02	1.6-3.7	Alluvium has a faint hydrocarbon odour and is stained black at 1.6-2.0m.
	3.7-6.7	Alluvium has a faint hydrocarbon odour.
BH03C	1.5-3.2	Alluvium has a faint hydrocarbon odour and black hydrocarbon staining.
	3.2-4.1	Alluvium has brown hydrocarbon staining, a sheen and a strong hydrocarbon odour.
BH04B	1.6-1.9	Made ground has a strong hydrocarbon odour.
	1.9-3.4	Alluvium has a strong hydrocarbon odour and rootlets are stained with hydrocarbons.
	3.4-4.95	Alluvium has a faint hydrocarbon odour.
BH06A	1.85-3.5	Alluvium has a strong hydrocarbon odour and rootlets are stained with hydrocarbons.
	3.5-4.2	Alluvium has a faint hydrocarbon odour.
TP01	0.4-1.2	Made ground contains rare slag
TP04	0.3-0.7	Made ground contains slag.
TP05	0.1-1.2	Made ground contains rare slag.

- 5.3 Made ground in BH01 and BH04B and alluvium in all boreholes were described as having a hydrocarbon odour. Selected samples were tested where this suggested the potential presence of contamination.
- 5.4 A PID was used on site to analyse VOC levels on selected soil samples. The results are included in Appendix 1 and are summarised in Table 5 below. Soil samples were tested in the laboratory from areas where VOC samples were high.

Table 5: VOC Results		
Borehole/trial pit Identification	Soil Type	VOC levels
BH01	Made Ground	0.0 – 208.1
	Alluvium (Sand and Gravel)	0.1 – 6.6
	Chalk	0.2
BH02	Made Ground	0.0
	Clay	0.0
	Alluvium (Sand and Gravel)	0.0 – 1.5
	Chalk	N/A
BH03C	Made Ground	0.1 – 0.2
	Alluvium (Clay)	2.4 – 9.9
	Alluvium (Sand and Gravel)	12.6 – 829.7
	Chalk	9.9
BH04B	Made Ground	4.3 – 14.1
	Alluvium (Clay)	41.9
	Alluvium (Sand and Gravel)	3.2
	Chalk	2.3
BH06A	Made Ground	0.1 – 1.3
	Alluvium (Silt)	56.1
	Alluvium (Sand and Gravel)	7.9 – 16.8
	Chalk	5.6
TP01	Made Ground	1.0
TP02	Made Ground	0.2 – 0.6
TP03	Made Ground	0.1 – 0.4
TP04	Made Ground	0.1 – 0.2
TP05	Made Ground	0.2 – 0.6

- 5.5 It is understood the proposed development is for residential units with a garden area for one flat. Initial screening was therefore undertaken using published values for a residential with home grown produce end use.
- 5.6 The soil contamination testing results are provided in Appendix 2 and summarised in Table 6. Initial assessment of the data has been undertaken by directly comparing the results to screening values. Where the screening values are exceeded statistical assessment has been undertaken and the results are discussed further below.

Table 6: Summary of Soil Contamination Test Results

Determinand	Units	Screening Value	Number of Samples	Range of Results	Number of Exceedances of Assessment Criteria
Asbestos	N/A	Detection of Asbestos Containing Materials (ACM)	22	No asbestos detected	0
Arsenic	mg/kg	37 ^a	22	<1.0 – 22	0
Cadmium	mg/kg	11 ^a	22	<0.2 – 0.4	0
Chromium (Total)	mg/kg	6 ^b	22	<0.1 – 22	16 Made ground in all locations. Alluvium: BH01 5.5-6.0m, BH02 1.8-1.9m, 6.6-6.1m, BH04B 3.7-3.8m, BH06A 1.85-1.95m.
Copper	mg/kg	2,400 ^a	22	3.3 – 160	0
Lead	mg/kg	200 ^c	22	1.6 – 330	4 Made ground: BH01 0.5-0.7m, BH04B 0.5-0.7m, TP02 0.7-0.8m, TP03 0.5-0.6m.
Mercury	mg/kg	1.2 ^d	22	<0.3 – 1.9	1 Made ground: TP04 0.5-0.7m.
Nickel	mg/kg	180 ^a	22	4.1 – 26	0
Selenium	mg/kg	250 ^a	22	<1 – 2.7	0
Zinc	mg/kg	3,700 ^a	22	9.5 – 75	0
Phenols (Total)	mg/kg	120 ^a	22	<1.3	0
Cyanide (Total)	mg/kg	50 ^f	22	<1.0 – 14	0
Cyanide (Free)	mg/kg	50 ^f	22	<1.0	0
Cyanide (Complex)	mg/kg	50 ^f	22	<1.0 – 14	0
Ammonium	mg/kg	n/a	14	<0.5 – 410	n/a
Elemental sulphur	mg/kg	n/a	16	<5.0 – 1,800	n/a
Boron	mg/kg	410 ^a	22	<0.2 – 4.9	0
pH	-	-	19	7.9 – 11.7	n/a
TPH					
Aliphatics >C5-C6	mg/kg	4.2 ^a	16	<0.001	0
Aliphatics >C6-C8	mg/kg	100 ^a	16	<0.001	0
Aliphatics >C8-C10	mg/kg	27 ^a	16	<0.001	0
Aliphatics >C10-C12	mg/kg	130 ^a	16	<1.0 – 12	0
Aliphatics >C12-C16	mg/kg	1,100 ^a	16	<2.0 – 99	0
Aliphatics >C16-C21	mg/kg	65,000 ^a	16	<8.0 – 72	0
Aliphatics >C21-C35	mg/kg	65,000 ^a	16	<8.0 – 180	0
Aromatics >EC5-EC7	mg/kg	70 ^a	16	<0.001 – 0.059	0
Aromatics >EC7-EC8	mg/kg	130 ^a	16	<0.001 – 1.8	0
Aromatics >EC8-EC10	mg/kg	34 ^a	16	<0.001 – 14	0
Aromatics >EC10-EC12	mg/kg	74 ^a	16	<1.0 – 350	2 Made ground: BH01 3.6-3.7m. Alluvium: BH03C 3.5-3.6m.
Aromatics >EC12-EC16	mg/kg	140 ^a	16	<2.0 – 1,200	3 Made ground: BH01 3.6-3.7m. Alluvium: BH03C 3.5-3.6m. Chalk: BH04B 8.5-8.6.

Table 6: Summary of Soil Contamination Test Results

Determinand	Units	Screening Value	Number of Samples	Range of Results	Number of Exceedances of Assessment Criteria
Aromatics >EC16-EC21	mg/kg	260 ^a	16	<10 – 2,600	4 Made ground: BH02 3.6-3.7m, BH04B 0.5-0.7m. Alluvium: BH03C 3.5-3.6m. Chalk: BH04B 8.5-8.6m
Aromatics >EC21-EC35	mg/kg	1,100 ^a	16	<10 – 2,900	3 Made ground: BH02 3.6 – 3.7m, BH04B 0.5 – 0.7m. Alluvium: BH03C 3.5 – 3.6m
PAH					
Acenaphthylene	mg/kg	170 ^a	16	<0.05 - 210	1 Alluvium: BH03C 3.5-3.6m
Acenaphthene	mg/kg	210 ^a	16	<0.05 - 100	0
Anthracene	mg/kg	2,400 ^a	16	<0.05 – 210	0
Benzo(a)anthracene	mg/kg	7.2 ^a	16	<0.05 - 190	6 Made ground: BH01 3.6-3.7m, BH04B 0.5-0.7m, TP04 0.5-0.7m. Alluvium: BH02 1.8-1.9m, BH03C 3.5-3.6m. Chalk: BH04B 8.5-8.6m
Benzo(a)pyrene	mg/kg	2.2 ^a	16	<0.05 - 140	8 Made ground: BH01 3.6-3.7m, BH04B 0.5-0.7m, BH06A 1.6-1.7m, TP01 0.5-0.6m, TP04 0.5-0.7m. Alluvium: BH02 1.8-1.9m, BH03C 3.5-3.6m. Chalk: BH04B 8.5-8.6m
Benzo(b)fluoranthene	mg/kg	2.6 ^a	16	<0.05 - 140	8 Made ground: BH01 3.6 – 3.7m, BH04B 0.5 – 0.7m, BH06B 1.6 – 1.7m, TP01 0.5 – 0.6m, TP04 0.5 – 0.7m. Alluvium: BH02 1.8 – 1.9m, BH03C 3.5 – 3.6m. Chalk: BH04B 8.5 – 8.6m
Benzo(g,h,i)perylene	mg/kg	320 ^a	16	<0.05 - 85	0
Benzo(k)fluoranthene	mg/kg	77 ^a	16	<0.05 - 90	1 Made Ground: BH04B 0.5-0.7m
Chrysene	mg/kg	15 ^a	16	<0.05 - 140	5 Made ground: BH01 3.6-3.7m, BH04B 0.5-0.7m, TP04 0.5-0.7m. Alluvium: BH03C 3.5-3.6m. Chalk: BH04B 8.5-8.6m
Dibenzo(a,h)anthracene	mg/kg	0.24 ^a	16	<0.05 - 24	8 Made ground: BH01 3.6-3.7m, BH04B 0.5-0.7m, BH06A 1.6-1.7m, TP01 0.5-0.6m, TP04 0.5-0.7m. Alluvium: BH02 1.8-1.9m, BH03C 3.5-3.6m. Chalk: BH04B 8.5-8.6m
Fluoranthene	mg/kg	280 ^a	16	<0.05 - 460	3 Made ground: BH01 3.6-3.7m, BH04B 0.5-0.7m. Alluvium: BH03C 3.5-3.6m.
Fluorene	mg/kg	170 ^a	16	<0.05 – 230	1 Alluvium: BH03C 3.5-3.6m.
Indeno(1,2,3-cd)pyrene	mg/kg	27 ^a	16	<0.05 – 81	2 Made ground: BH04B 0.5-0.7m. Alluvium: BH03C 3.5-3.6m.

Table 6: Summary of Soil Contamination Test Results

Determinand	Units	Screening Value	Number of Samples	Range of Results	Number of Exceedances of Assessment Criteria
Naphthalene	mg/kg	2.3 ^a	16	<0.05 - 490	7 Made ground: BH01 3.6-3.7m, BH04B 0.5-0.7m, BH04B 1.8-1.9m. Alluvium: BH03C 2.6-2.7m, BH03C 3.5-3.6m, BH06A 1.85-1.95m. Chalk: BH04B 8.5-8.6m
Phenanthrene	mg/kg	95 ^a	16	<0.05 - 680	4 Made ground: BH01 3.6-3.7m, BH04B 0.5-0.7m, Alluvium: BH03C 3.5-3.6m. Chalk: BH04B 8.5-8.6m
Pyrene	mg/kg	620 ^a	16	<0.05 - 310	0
BTEX - MTBE					
Benzene	mg/kg	0.087 ^a	16	<0.001 – 0.059	0
Toluene	mg/kg	130 ^a	16	<0.001 – 1.8	0
Ethylbenzene	mg/kg	47 ^a	16	<0.001 – 0.62	0
p&m - xylene	mg/kg	115 ^a	16	<0.001 – 5.2	0
o-xylene	mg/kg	60 ^a	16	<0.001 – 2.1	0
MTBE	mg/kg	49 ^a	16	<0.001	0
PCB					
PCB 28	mg/kg	0.08	16	<0.001	0
PCB 52	mg/kg	0.08	16	<0.001	0
PBC 101	mg/kg	0.08	16	<0.001 – 0.003	0
PCB 118	mg/kg	0.08	16	<0.001	0
PCB 138	mg/kg	0.08	16	<0.001 – 0.02	0
PCB 153	mg/kg	0.08	16	<0.001 – 0.021	0
PCB 180	mg/kg	0.08	16	<0.001 – 0.031	0
Notes <i>a Published S4UL for residential with home grown produce end use. Where the S4UL is dependent upon soil organic matter (SOM)(e.g. PAHs), soil organic matter has conservatively been assumed to be 1%. Previous SOM results reported in Atkins reports were variable. During this investigation 3 made ground and 1 alluvium sample identified as "clean" based on VOC results. Test results for SOM are included in Appendix 2.</i> <i>b Published S4UL for chromium VI for residential with home grown produce end use.</i> <i>c Published C4SL for residential with home grown produce end use.</i> <i>d Published S4UL for elemental mercury for residential with home grown produce end use.</i> <i>e Derived value based on acute risk.</i> <i>f WA in house screening value. No SVG or S4UL is available for cyanide. Accordingly, a criteria of 50mg/kg has been adopted based on UK legislation concerning allowable concentrations of hydrogen cyanide in food (Flavourings in Food Regulations, 1992).</i>					

5.7 The analysis of geochemical results indicate that the level of potential contaminants recorded within the made ground and natural materials across the site are below the relevant screening levels for the proposed development with the exception of:

- Chromium;

- Lead;
- Mercury;
- PAHs; and
- Aromatic TPHs.

- 5.8 Concentrations of ammonium and sulphur were also detected in made ground, alluvium and chalk at the site, however these are not considered significant chemicals of concern in terms of human health. These may however need addressing in terms of controlled waters which could include a detailed quantitative controlled waters risk assessment to ascertain whether remediation is necessary and, if so, to produce remediation targets for agreement with regulators.
- 5.9 The remaining contaminants of concern were detected at levels that are not considered to represent a potential risk to human health in terms of the proposed end use.
- 5.10 Additional statistical assessment was considered appropriate for chromium, lead, mercury, PAHs and TPHs in the made ground, chromium, PAHs and TPHs in the alluvium, and PAHs and TPHs in the Chalk. Results of the statistical assessments are provided in Appendix 5.
- 5.11 Test results for made ground samples from the 2010 site investigation were also included in statistical assessments on made ground contamination. Assessments combining the 2017 and 2010 site investigation data are included in Appendix 5. As the 2010 investigation did not include testing on natural materials, results could not be included in the statistical assessments.
- 5.12 Statistical assessments were based on samples taken that were targeted to areas of suspected contamination and also samples taken to obtain a general spread across the site. For the purpose of the statistical assessments, made ground and natural materials were separated.

Chromium

- 5.13 Statistical analysis for chromium in made ground indicates that the samples that exceeded the screening values were not outliers. This suggests that elevated levels of chromium are present in made ground across the site. Chromium is known as a potential chemical of concern associated with gasworks sites. It is therefore considered likely that previous gasworks activities at the site have led to general contamination of the made ground by chromium. Statistical analysis was carried out

to include results from the previous 2010 site investigation and this also showed chromium contamination in made ground across the site.

- 5.14 Statistical analysis also indicates that chromium contamination is present in the natural alluvium deposits across the site.
- 5.15 It is noted however, that the screening level for chromium is conservative as it uses chromium-VI and the levels measured in the laboratory are for total chromium.

Lead

- 5.16 Statistical analysis for lead in made ground indicates that the samples that exceeded the screening values were not outliers. This suggests that elevated levels of lead are present in made ground across the site. Lead is known as a potential chemical of concern associated with various activities on gasworks sites. It is therefore considered likely that these previous activities at the site have caused general contamination of the made ground by lead. Statistical analysis was carried out to include results from the previous 2010 site investigation and this also showed lead contamination in made ground across the site. It is noted however that the 2010 concentrations of lead were higher than those measured during the recent site investigation, suggesting that the lead levels have degraded between 2010 and 2017.

PAHs

- 5.17 Statistical analysis for PAHs in made ground indicates that the samples that exceeded the screening values were not outliers. This suggests that elevated levels of naphthalene, phenanthrene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, indeno(123cd)pyrene and dibenzo(ah)anthracene are present in made ground across the site. PAHs are known as potential chemicals of concern associated with various processes on gasworks sites, such as purification techniques. It is therefore considered likely that these previous activities at the site have caused general contamination of the made ground by these PAHs. Statistical analysis was carried out to include results from the previous 2010 site investigation, and this also showed the same fractions of PAHs contamination in made ground across the site. It is noted however that the 2010 concentrations of PAHs were in general higher than those measured during the recent site investigation.
- 5.18 Statistical analysis also indicates that contamination by naphthalene, acenaphthylene, fluorene, phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, indeno(123cd)pyrene

and dibenzo(ah)anthracene is present in the natural materials (alluvium and chalk) across the site.

TPHs

- 5.19 Statistical analysis for TPHs in made ground indicates that the samples that exceeded the screening values were in general not outliers. The fractions of TPHs that were elevated were the heavier aromatic fractions (EC10-EC12, EC12-EC16, EC16-EC21, EC21-EC35). This suggests that elevated levels of these TPHs are present in made ground across the site. TPHs are known as potential chemicals of concern associated with gasworks site processes. It is therefore considered likely that these previous activities at the site have caused general contamination of the made ground by aromatic TPHs. Statistical analysis was carried out to include results from the previous 2010 site investigation, and this also showed the same fractions of aromatic TPHs contamination in made ground across the site. It is noted however that the 2010 concentrations of TPHs were in general higher than those measured during the recent site investigation.
- 5.20 Statistical analysis also indicates that contamination by the same fractions of TPHs is present in the natural materials (alluvium and chalk) across the site. It is noted that the maximum concentrations of these TPHs in the natural materials are higher than in the made ground, but are less than concentrations recorded in made ground in 2010.

Mercury

- 5.21 Statistical analysis for mercury in made ground indicates that the sample that exceeded the screening value (TP04 at 0.5-0.7m bgl) was an outlier. Mercury is known as a potential chemical of concern associated with gasworks sites. The trial pit log has been examined to determine whether an obvious source of elevated mercury has been identified; the soil description includes a reference to slag material which could be the source. Statistical analysis was carried out to include results from the previous 2010 site investigation. This indicated mercury contamination in made ground across the site rather than in a localised area.
- 5.22 In summary, elevated levels of chromium, lead, mercury, naphthalene, phenanthrene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, indeno(123cd)pyrene and dibenzo(ah)anthracene, and TPH fractions EC10-EC12, EC12-EC16, EC16-EC21, EC21-EC35 are indicated to be present in made ground across the site. Elevated levels of chromium, naphthalene, acenaphthylene, fluorene, phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene,

benzo(k)fluoranthene, indeno(123cd)pyrene and dibenzo(ah)anthracene and TPH fractions EC10-EC12, EC12-EC16, EC16-EC21, EC21-EC35 are indicated to be present in natural materials across the site. The deepest elevated levels of each contaminant are indicated in Table 7. Drawing LO10488/051 shows a schematic cross section of the site based on investigation results and also indicates locations of elevated contaminants within the soil profile.

Table 7: Depths of Elevated Contaminants		
Soil Type	Contaminant	Deepest elevated level of contaminant, m bgl
Made ground	Chromium	1.9
	Lead	1.5
	Mercury	1.5
	PAHs	3.7
	TPHs	3.7
Alluvium	Chromium	6.1
	PAHs	3.6
	TPHs	3.6
Chalk	PAHs	8.6
	TPHs	8.6

- 5.23 Asbestos identification analysis undertaken on 22 samples taken from across the site did not record the presence of any asbestos containing material (ACM). Due to the nature of made ground encountered (demolition type material) and the historical uses of the site, the potential for asbestos to be present elsewhere on the site cannot be completely discounted. If unexpected or suspicious material is encountered during the redevelopment work, it is recommended that additional testing is undertaken. A remediation strategy should include procedures to follow should asbestos be encountered in the ground during redevelopment works.

6 GROUNDWATER, SURFACE WATER AND GROUND GAS RESULTS ASSESSMENT

Hydrogeology

- 6.1 Groundwater was not encountered in the boreholes before the use of water flush during the drilling process.
- 6.2 Gas and groundwater monitoring standpipes were installed in BH01, BH02, BH03C, BH04B and BH06A. The screening intervals for each borehole are detailed in Table 8 below. Due to various access restrictions all boreholes could not be monitored on the same day. Monitoring visits were carried out on three occasions for BH01, on 27 November 2017, 4 and 12 December 2017. Monitoring was carried out on two occasions at BH02, BH03C and BH06A on 4 and 12 December 2017. Monitoring was carried out on two occasions at BH04B on 7 and 12 December 2017. WS001 and WS005 were monitored on 4 December 2017. Falling head tests were carried out in BH03C and BH06A on 7 December 2017. The results are included in Appendix 3 and discussed below.
- 6.3 Groundwater levels are summarised in Table 8.

Table 8: Summary of Groundwater Levels

Borehole	Ground Level, m AOD	Installation Type		Response Zone, m bgl	27/11/17		04/12/17		07/12/17		12/12/17	
					Depth, m bgl	Depth, m AOD	Depth, m bgl	Depth, m AOD	Depth, m bgl	Depth, m AOD	Depth, m bgl	Depth, m AOD
BH01	37.74	Groundwater and gas		0.9-4.0 (made ground)	1.64	36.10	1.67	36.07	-	-	1.49	36.25
BH02	37.74	Groundwater and gas		3.6-6.8 (alluvium)	-	-	1.76	35.98	-	-	1.61	36.13
BH03C	37.77	Groundwater and gas		2.6-6.8 (alluvium)	-	-	1.79	35.98	-	-	1.79	35.98
BH04B	37.97	Dual	Gas	0.8-2.0 (made ground)	-	-	-	-	1.30	36.67	1.31	36.66
			Groundwater	2.9-7.1 alluvium	-	-	-	-	-	-	1.97	36.00
BH06A	37.92	Dual	Gas	2.9-6.1 (alluvium)	-	-	1.95	35.97	-	-	1.95	35.97
			Groundwater	7.6-9.15 (chalk)	-	-	2.06	35.86	-	-	2.06	35.86

Table 8: Summary of Groundwater Levels

Borehole	Ground Level, m AOD	Installation Type	Response Zone, m bgl	27/11/17		04/12/17		07/12/17		12/12/17	
				Depth, m bgl	Depth, m AOD	Depth, m bgl	Depth, m AOD	Depth, m bgl	Depth, m AOD	Depth, m bgl	Depth, m AOD
WS001	n/a*	Groundwater and gas	3.5-4.0 (made ground)	-	-	1.40	n/a	-	-	-	-
WS005	n/a*	Groundwater and gas	3.5-4.5 (alluvium)	-	-	1.96	n/a	-	-	-	-

**Survey of ground level at borehole taken from arbitrary surface datum so unable to compare against recent borehole levels.*

- 6.4 Groundwater levels in the made ground are between 36.25m AOD and 36.66m AOD. Groundwater levels in the alluvium are 36.13m AOD and 35.97m AOD and indicated a slight groundwater flow gradient towards the east. Groundwater levels were only measured in one location in the Chalk, at 35.86m AOD. The 2010 site investigation indicated that flow direction was to the north and east. This direction is towards the River Kennet and also follows its downstream flow (towards the east). The northern site boundary with the River Kennet comprises the wall to the existing building on the north side of the site, which may act as a barrier to groundwater flow to the river. The groundwater levels in the made ground are higher than in the underlying alluvium. The groundwater levels in the alluvium are higher than in the underlying chalk.
- 6.5 Falling head tests were scheduled in BH03C (alluvium) and BH06A (chalk). The test could not be completed in BH03C as it was not possible to raise the water level in the borehole in order to perform the test. In BH06A the water take was very quick and it was therefore not possible to derive an infiltration value. Data from falling head tests undertaken in 2012 by Atkins indicated a variable hydraulic conductivity in the alluvium of between 1.0E-09 and 6.9E-09m/s, and in the made ground of 1.7E-09m/s.

Groundwater Geochemical Analysis

- 6.6 During the monitoring visit on 27 November 2017 five samples of groundwater were retrieved from BH02, BH03C, BH06A, WS001 and WS005. Due to access restrictions, a groundwater sample from BH04B could not be retrieved on that date and instead was recovered on 7 December 2017. All samples underwent geochemical testing. The results are provided in Appendix 4 and are summarised in Table 9.
- 6.7 Due to the proximity of the River Kennet to the site boundary, concentrations of contaminants detected in groundwater have been compared to both Environmental Quality Standards (EQS) derived from The Water Framework Directive (Standards and

Classifications) England and Wales Directive 2015, and UK Drinking Water Standards (DWS).

Table 9: Summary of Groundwater Contamination Test Results

Determinand	Units	Screening Value ^a	Number of Samples	Results	Exceedance of Assessment Criteria
Arsenic	µg/l	50 ^b	6	0.55-12	No
Cadmium	µg/l	0.08 ^b	6	<0.02-0.03	No
Chromium (Total)	µg/l	3.4 ^b	6	<0.2-0.4	No
Copper	µg/l	1 ^b	6	<0.5-0.8	No
Lead	µg/l	1.2 ^b	6	<0.2-0.3	No
Mercury	µg/l	0.07 ^b	6	<0.05-0.09	Yes BH04B
Nickel	µg/l	4 ^b	6	0.5-2.2	No
Selenium	µg/l	10 ^c	6	<0.6-1.2	No
Zinc	µg/l	10.9 ^b	6	<0.5-3.9	No
Phenols (Total)	µg/l	7.7 ^b	6	<3.5	No
Cyanide (Total)	µg/l	1 ^b	6	<10-100	Yes - BH02, BH03, BH04B, WS001 (BH06A & WS005) ^g
Sulphate	µg/l	400,000	6	4,460-297,000	No
Sulphide	µg/l	2 ^d	6	<5	(BH02, BH03C, BH04B, WS001, WS005) ^g
PCBs (Total)	µg/l	n/a	6	<0.14	n/a All <LOD
Ammonium	µg/l	500	6	3,000-11,000	Yes All boreholes
BTEX					
Benzene	µg/l	10 ^b	6	<1-93.6	Yes BH03C
Toluene	µg/l	74 ^b	6	<1-51.7	No
Ethylbenzene	µg/l	20	6	<1-9.8	No
p & m-xylenes	µg/l	30	6	<1-18.8	No
o-xylene	µg/l	30	6	<1-7.8	No
MTBE	µg/l	n/a	6	<1	n/a All <LOD
TPH					
Aliphatics >C5-C6	µg/l	n/a	6	<1	n/a All <LOD
Aliphatics >C6-C8	µg/l	n/a	6	<1	n/a All <LOD
Aliphatics >C8-C10	µg/l	n/a	6	<1	n/a All <LOD
Aliphatics >C10-C12	µg/l	n/a	6	<10	n/a All <LOD
Aliphatics >C12-C16	µg/l	n/a	6	<10-66	n/a
Aliphatics >C16-C21	µg/l	n/a	6	<10-150	n/a
Aliphatics >C21-C35	µg/l	n/a	6	<10-110	n/a
Aromatics >EC5-EC7	µg/l	n/a	6	<1-94	n/a
Aromatics >EC7-EC8	µg/l	n/a	6	<1-52	n/a

Table 9: Summary of Groundwater Contamination Test Results

Determinand	Units	Screening Value ^a	Number of Samples	Results	Exceedance of Assessment Criteria
Aromatics >EC8-EC10	µg/l	n/a	6	<1-43	n/a
Aromatics >EC10-EC12	µg/l	n/a	6	28-250	n/a
Aromatics >EC12-EC16	µg/l	n/a	6	19-300	n/a
Aromatics >EC16-EC21	µg/l	n/a	6	<10-570	n/a
Aromatics >EC21-EC35	µg/l	n/a	6	<10	n/a All <LOD
Total Aliphatics/ Aromatics (>C5-C35)	µg/l	10	6	64-1,210	Yes All boreholes
PAH					
Acenaphthylene	µg/l	n/a	6	0.34-8.14	n/a
Acenaphthene	µg/l	17 ^d	6	16.3-3.94	Yes BH02, BH03C, BH04B, WS001, WS005
Anthracene	µg/l	0.1 ^e	6	<0.01-12.6	Yes BH02, WS001
Benzo(a)anthracene	µg/l	n/a	6	<0.01-1.6	n/a
Benzo(a)pyrene	µg/l	1.7x10 ^{-4b}	6	<0.01-0.52	(BH02, BH03C, BH04B, WS001, WS005) ^g
Benzo(b)fluoranthene	µg/l	0.03 ^e	6	<0.01-0.76	Yes BH04B, WS001
Benzo(g,h,i)perylene	µg/l	n/a	6	<0.01-0.17	n/a
Benzo(k)fluoranthene	µg/l	0.03 ^e	6	<0.01-0.31	Yes BH04B, WS001
Chrysene	µg/l	n/a	6	<0.01-1.6	n/a
Dibenzo(a,h)anthracene	µg/l	n/a	6	<0.01	n/a All <LOD
Fluoranthene	µg/l	0.0063 ^b	6	0.22-15.1	Yes All boreholes
Fluorene	µg/l	n/a	6	0.18-37.9	n/a
Indeno(1,2,3-cd)pyrene	µg/l	0.002 ^e	6	<0.01-0.16	(BH02, BH03C, BH04B, WS001, WS005) ^g
Naphthalene	µg/l	2 ^b	6	<0.01-19.1	Yes BH03C, BH04B
Phenanthrene	µg/l	n/a	6	0.24-54.9	n/a
Pyrene	µg/l	n/a	6	0.14-9.37	n/a
Total PAH ^f	µg/l	0.1 ^c	6	<0.04-1.4	Yes WS001
Notes ^a EQS Freshwater (HMSO 1989) used unless otherwise indicated ^b EQS Freshwater (The Water Framework Directive 2015) ^c UKDWS ^d Freshwater Chronic Screening Value, Region 4 USEPA Ecological Risk Assessment bulletin November 30, 2001, ^e EU EQS Inland Annual Average, Official Journal of the European Union 24.12.2008 ^f Sum of 4: benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene ^g Limit of detection higher than screening value					

6.8 Elevated levels of mercury, ammonium, total cyanide, sulphide, benzene, TPHs and PAHs (Acenaphthene, Anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Naphthalene) were

indicated in groundwater samples. Table 10 shows where contaminants were found to be elevated.

Table 10: Summary of Contaminants in Groundwater			
Contaminant	Groundwater		
	Made ground (perched)	Alluvium	Chalk
Mercury		✓	
Ammonium	✓	✓	✓
Total cyanide	✓	✓	✓
Sulphide ¹	✓	✓	✓
Benzene		✓	
TPHs	✓	✓	✓
Acenaphthene	✓	✓	
Anthracene	✓	✓	
Benzo(a)pyrene ¹	✓	✓	✓
Benzo(b)fluoranthene	✓	✓	
Benzo(k)fluoranthene	✓	✓	
Fluoranthene	✓	✓	✓
Indeno(1,2,3-cd)pyrene ¹	✓	✓	✓
Naphthalene		✓	
Notes			
¹ Limit of detection higher than screening value			

Surface Water Geochemical Analysis

6.9 Two samples of surface water (River01 and River02) were retrieved from the River Kennet to the north of the site. The samples were taken on the upstream (River 01) and downstream (River02) sides of the site, and the locations are shown on Drawing LO10488/050. The samples underwent geochemical testing. The results are provided in Appendix 4 and are summarised in Table 11.

Table 11: Summary of Surface Water Contamination Test Results

Determinand	Units	Screening Value ^a	Number of Samples	Results	Exceedance of Assessment Criteria
Arsenic	µg/l	50 ^b	2	0.39-0.54	No
Cadmium	µg/l	0.08 ^b	2	<0.02	No
Chromium (Total)	µg/l	3.4 ^b	2	<0.2-0.3	No
Copper	µg/l	1 ^b	2	0.9-1.7	Yes River01
Lead	µg/l	1.2 ^b	2	<0.2	No
Mercury	µg/l	0.07 ^b	2	<0.05	No
Nickel	µg/l	4 ^b	2	1.4-1.7	No
Selenium	µg/l	10 ^c	2	<0.6-1.0	No
Zinc	µg/l	10.9 ^b	2	7.2-8.4	No
Phenols (Total)	µg/l	7.7 ^b	2	<3.5	No
Cyanide (Total)	µg/l	1 ^b	2	<10	(River01, River02) ^g
Sulphate	µg/l	400,000	2	26,400-26,500	No
Sulphide	µg/l	2 ^d	2	<5	(River01, River02) ^g
PCBs (Total)	µg/l	n/a	2	<0.14	n/a Both <LOD
Ammonium	µg/l	500	2	90-130	No
BTEX					
Benzene	µg/l	10 ^b	2	<1	No
Toluene	µg/l	74 ^b	2	<1	No
Ethylbenzene	µg/l	20	2	<1	No
p & m-xylenes	µg/l	30	2	<1	No
o-xylene	µg/l	30	2	<1	No
MTBE	µg/l	n/a	2	<1	n/a Both <LOD
TPH					
Aliphatics >C5-C6	µg/l	n/a	2	<1	n/a Both <LOD
Aliphatics >C6-C8	µg/l	n/a	2	<1	n/a Both <LOD
Aliphatics >C8-C10	µg/l	n/a	2	<1	n/a Both <LOD
Aliphatics >C10-C12	µg/l	n/a	2	<10	n/a Both <LOD
Aliphatics >C12-C16	µg/l	n/a	2	<10	n/a Both <LOD
Aliphatics >C16-C21	µg/l	n/a	2	<10	n/a Both <LOD
Aliphatics >C21-C35	µg/l	n/a	2	<10	n/a Both <LOD
Aromatics >EC5-EC7	µg/l	n/a	2	<1	n/a Both <LOD
Aromatics >EC7-EC8	µg/l	n/a	2	<1	n/a Both <LOD
Aromatics >EC8-EC10	µg/l	n/a	2	<1	n/a Both <LOD
Aromatics >EC10-EC12	µg/l	n/a	2	<10	n/a Both <LOD

Table 11: Summary of Surface Water Contamination Test Results

Determinand	Units	Screening Value ^a	Number of Samples	Results	Exceedance of Assessment Criteria
Aromatics >EC12-EC16	µg/l	n/a	2	<10	n/a Both <LOD
Aromatics >EC16-EC21	µg/l	n/a	2	<10	n/a Both <LOD
Aromatics >EC21-EC35	µg/l	n/a	2	<10	n/a Both <LOD
Total Aliphatics/ Aromatics (>C5-C35)	µg/l	10	2	<20	(River01, River02) ^g
PAH					
Acenaphthylene	µg/l	n/a	2	<0.01	n/a Both <LOD
Acenaphthene	µg/l	17 ^d	2	<0.01	No
Anthracene	µg/l	0.1 ^e	2	<0.01	No
Benzo(a)anthracene	µg/l	n/a	2	<0.01	n/a Both <LOD
Benzo(a)pyrene	µg/l	1.7x10 ⁻⁴	2	<0.01	No
Benzo(b)fluoranthene	µg/l	0.03 ^e	2	<0.01	No
Benzo(g,h,i)perylene	µg/l	n/a	2	<0.01	n/a Both <LOD
Benzo(k)fluoranthene	µg/l	0.03 ^e	2	<0.01	No
Chrysene	µg/l	n/a	2	<0.01	n/a Both <LOD
Dibenzo(a,h)anthracene	µg/l	n/a	2	<0.01	n/a Both <LOD
Fluoranthene	µg/l	0.0063 ^b	2	<0.01	(River01, River02) ^g
Fluorene	µg/l	n/a	2	<0.01	n/a Both <LOD
Indeno(1,2,3-cd)pyrene	µg/l	0.002 ^e	2	<0.01	(River01, River02) ^g
Naphthalene	µg/l	2 ^b	2	<0.01	No
Phenanthrene	µg/l	n/a	2	<0.01	n/a Both <LOD
Pyrene	µg/l	n/a	2	<0.01	n/a Both <LOD
Total PAH ^f	µg/l	0.1 ^c	2	<0.04	No
Notes ^a EQS Freshwater (HMSO 1989) used unless otherwise indicated ^b EQS Freshwater (The Water Framework Directive 2015) ^c UKDWS ^d Freshwater Chronic Screening Value, Region 4 USEPA Ecological Risk Assessment bulletin November 30, 2001, ^e EU EQS Inland Annual Average, Official Journal of the European Union 24.12.2008 ^f Sum of 4: benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene ^g Limit of detection higher than screening value					

6.10 Elevated levels of copper, total cyanide, sulphide, TPHs, fluoranthene and Indeno(1,2,3-cd)pyrene were indicated in surface water samples.

6.11 The groundwater flow direction is expected to be to the north and east. This direction is towards the River Kennet and also follows its downstream flow (towards the east).

The northern site boundary with the River Kennet comprises the wall to the existing building on the north side of the site, which may act as a barrier to groundwater flow to the river.

- 6.12 The elevated zinc level was in the upstream sample of surface water and so the source may not be on site.

Summary of Contamination Test Results

- 6.13 Table 12 provides a comparison of contamination within soils, groundwater and surface water.

Table 12: Comparison of Contamination in Soil, Groundwater and Surface Water								
Contaminant of concern identified from soil, groundwater and/or surface water assessment		Soil (Human Health)		Groundwater (Controlled Water)		Surface Water (Controlled Water)		
		Made ground	Natural	Made ground (perched)	Alluvium	Chalk	Upstream	Downstream
Chromium		✓	✓				✓	
Lead		✓						
Mercury		✓			✓			
Ammonium				✓	✓	✓		
Total cyanide				✓	✓	✓ ¹	✓ ²	✓ ²
Sulphur/ Sulphide		✓	✓	✓ ¹	✓ ¹	✓ ¹	✓ ²	✓ ²
Benzene					✓			
TPHs	EC10-EC12	✓	✓	✓	✓	✓	✓ ²	✓ ²
	EC12-EC16	✓	✓					
	EC16-EC21	✓	✓					
	EC21-EC35	✓	✓					
Acenaphthene				✓	✓			
Acenaphthylene			✓					
Anthracene			✓	✓	✓			
Benzo(a)anthracene		✓	✓					
Benzo(a)pyrene		✓	✓	✓ ¹	✓ ¹	✓ ¹		
Benzo(b)fluoranthene		✓	✓	✓	✓			
Benzo(k)fluoranthene		✓	✓	✓	✓			
Chrysene		✓	✓					
Dibenzo(ah)anthracene		✓	✓					
Fluoranthene		✓	✓	✓	✓	✓	✓ ²	✓ ²
Fluorene			✓					
Indeno(1,2,3-cd)pyrene		✓	✓	✓ ¹	✓ ¹	✓ ¹	✓ ²	✓ ²
Naphthalene		✓	✓		✓			
Phenanthrene		✓	✓					
Notes								

Table 12: Comparison of Contamination in Soil, Groundwater and Surface Water

Contaminant of concern identified from soil, groundwater and/or surface water assessment	Soil (Human Health)		Groundwater (Controlled Water)			Surface Water (Controlled Water)	
	Made ground	Natural	Made ground (perched)	Alluvium	Chalk	Upstream	Downstream
✓ Contaminant of concern identified from soil, groundwater and/or surface water assessment 1 Limit of detection higher than screening value for groundwater 2 Limit of detection higher than screening value for surface water							

- 6.14 The comparison of soil, groundwater and surface water contamination indicates that further detailed quantitative risk assessment (DQRA) of lead, acenaphthylene, benzo(a)anthracene, chrysene, dibenzo(ah)anthracene, fluorene, and phenanthrene in groundwater is not required. In addition it is indicated that there is no pathway between the soil and surface water for elevated levels of chromium, so further DQRA is not required for this contaminant.
- 6.15 The comparison of soil, groundwater and surface water contamination indicates that further DQRA of mercury, ammonium, total cyanide, sulphide, benzene, TPHs, acenaphthene, anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, fluoranthene, indeno(1,2,3-cd)pyrene and naphthalene in groundwater is likely to be required and may require additional testing where limit of detection values are higher than screening values. The DQRA will analyse whether remediation is required in terms of each contaminant. If remediation is deemed necessary, the DQRA will also provide remedial targets for agreement with the regulators.

Ground Gas Assessment

- 6.16 Ground gas monitoring was undertaken at the site by a technician from GE Ltd to provide an assessment of the ground gas regime at the site. Monitoring visits were carried out on three occasions for BH01, on 27 November 2017, 4 and 12 December 2017. Monitoring was carried out on two occasions at BH02, BH03C and BH06A on 4 and 12 December 2017. Monitoring was carried out on two occasions at BH04B on 7 and 12 December 2017. WS001 and WS005 were monitored on 4 December 2017. The results are included in Appendix 4. A summary of monitoring results is shown in Table 13.

Table 13: Summary of Ground Gas Monitoring Results

Borehole	Response Zone, m bgl	Evidence of contamination	No. of monitoring rounds	Methane, %	Carbon dioxide, %	Oxygen, %	Flow rate, l/h ¹	Water level, m bgl	Range of atmospheric pressure during monitoring round, mb
BH01	0.9-4.0 Made ground	Yes	3	2.5-9.3	0.5-4.6	0.1-16.8	<0.1	1.49-1.67	975-1031
BH02	3.6-6.8 Alluvium	Yes	2	0	0-0.7	18.8-20.3	<0.1	1.61-1.76	978-1029
BH03C	2.6-6.8 Alluvium	Yes	2	0	0.3-0.4	18.7-19.7	<0.1	1.79	978-1029
BH04B	0.8-2.0 Made ground	Yes	2	0-1.4	0-1.6	18-20	<0.1	1.30-1.31	979-1003
	2.9-7.1 Alluvium	Yes	2	0	0	19.5-19.8	<0.1	1.97	979
BH06A	2.9-6.1 Alluvium	Yes	2	0	0-0.1	20-20.4	<0.1	1.95	978-1029
	7.6-9.15 Chalk	Yes	2	0	0-0.1	19.9-20.4	<0.1	2.06	978-1029
WS001	3.5-4.0 Made ground	Yes	1	0	0	20.2-20.3	<0.1	1.40	1009
WS005	3.5-4.5 Alluvium	Yes	1	0	0-0.1	20.2-20.3	<0.1	1.96	1029
Notes 1 A flow rate of 0l/hr was recorded on site so limit of detection of gas monitor has been assumed as 0.1l/hr									

- 6.17 In order to pose a risk to the end users of the site, the recorded concentrations of carbon dioxide and methane would need to migrate from the ground and accumulate in confined spaces within the development. A maximum gas flow of <0.1l/h has been assumed as a worst case. As result of this, the probability of carbon dioxide and methane migrating beneath the site or into a confined space at such a rate as to result in concentrations sufficient to cause harm to health is considered “low”.
- 6.18 In order to assess the potential risk posed by the recorded gas volumes at the site, as an initial screen, the methodology presented within CIRIA Report C665 “Assessing risk posed by hazardous ground gasses to buildings 2007” has been used.
- 6.19 BS8485 and CIRIA C665 requires the calculation of a Gas Screening Value (GSV) (Litres of gas per hour) using the formula below:

- Borehole flow rate (l/h) x gas concentration (%) = GSV (l/hr)

6.20 This calculation has been carried out for methane and carbon dioxide using the highest recorded concentration, therefore adapting the worst case volume. Whilst a maximum flow of 0l/h was measured during the monitoring process a worst case flow rate of 0.1l/hr has been assumed.

Methane $GSV = 9.3\%/100\% \times 0.1\text{l/h} = 0.0093 \text{ l/hr}$

Carbon Dioxide $GSV = 4.6\%/100\% \times 0.1\text{l/h} = 0.0046 \text{ l/hr}$

6.21 CIRIA C665 have produced two models for qualitative analysis depending upon building type: NHBC's "Situation B – Low rise housing with a ventilated under floor void (min 150mm)" and the modified Wilson and Card Classification system "for all development types except situation B". Given the proposed, the Wilson and Card Classification Scheme is considered the most appropriate system for this site. The comparison of the calculated GSV with the classification tables show the site lies within Characterisation situation 1, however, it is recommended that the site is upgraded to Characteristic situation 2 due to the elevated concentrations of methane recorded. This characteristic situation is typical of made ground, and will require low level gas protection measures.

Drinking Water Supply Pipes

6.22 In January 2011 the UK Water Industry Research (UKWIR) published "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Ref 10/WM/03/21; the "UKWIR Guidance"). This document supersedes the Water Regulations Advisory Scheme (WRAS) guidance note 9-04-03 "Laying Pipes in Contaminated Land" which has subsequently been withdrawn.

6.23 The UKWIR guidance is for use by developers, water companies and consultants when planning, designing and constructing water mains and/or services in brownfield sites. The guidance requires the implementation of a preliminary risk assessment and screening against a set of generic assessment criteria. The results of the preliminary assessment and comparison of the laboratory chemical analysis against the specified screening criteria would suggest the use of polyethylene pipes may not be acceptable and barrier pipes may need to be employed. This should be re-evaluated when surface runs and final site levels are known and subsequent discussions have been held with Thames Water.

Revised Conceptual Site Model

- 6.24 Environment Agency guidance ('Model Procedures for the Management for Land Contamination – Contamination Land Report (CLR) 11) provides advice on the approach for the assessment of contamination on a site. This approach includes the production of a conceptual site model depicting the environmental processes that occur on and in the vicinity of the site and identifying the potential pollution linkages. The assessment of the significance of these pollution linkages can then be carried out through the risk assessment process.
- 6.25 The production of the revised conceptual site model and the assessment of the associated risks is based upon the identification of the possible sources of contamination ("the sources"), the identification of who or what may be affected by the contaminants ("the receptors") and the possible pathways by which contaminants may migrate to one or more of the receptors ("the pathways").
- 6.26 The results from our ground investigation and risk assessments have been used to assess the significance of these potential pollution linkages and identify the necessary remediation/risk management actions to be undertaken. A revised conceptual site model is shown in Table 14.

Table 14: Revised Conceptual Site Model			
Issue	Summary	Risk Category	
		Humans	Property/ Environment
Contamination Potential:			
Present site use	Disused former social club and governor house with yard area	Low	Moderate
Past site use	Gas works	High	High
Impact to site from past and present adjacent land uses	Past: surrounding gas works Present: offices, commercial, residential	High	High
Mining history	Historical shallow chalk/lime workings off site. No evidence on site.	Low	Low
Emissions, pollution incidents, discharges etc.	One revoked discharge consent 44m from site	Low	Low
Asbestos	Asbestos containing material (ACM) has tentatively been identified in the building. No ACM detected in made ground during site investigation but may still be encountered during site works.	Low/ Moderate	Low/ Moderate

Table 14: Revised Conceptual Site Model			
Issue	Summary	Risk Category	
		Humans	Property/ Environment
Ground gas	Presence of made ground and organic materials in natural superficial deposits may give rise to ground gas	Moderate	Moderate
Waste management	No waste management facilities within 500m of the site	Low	Low
Past remediation	Contamination identified on site in the past and remediated on a statutory basis. Site may still be contaminated in terms of proposed residential use with gardens.	High	High
Environmental Sensitivity:			
Geology	Made ground overlying alluvium which in turn overlies Chalk	n/a	n/a
Groundwater vulnerability	This site is situated on a Secondary A aquifer which overlies a Principal aquifer. The closest active groundwater abstraction licence is 358m east. Site is within a Source Protection Zone III for a public water supply 2km to south.	Moderate	High
Surface water vulnerability	The nearest graded surface watercourse is a reach of the River Kennet, 284m north of site. The closest surface water abstraction licence is 750m north.	Low	Moderate
Geological constraints:			
Made ground / superficals / solid geology	Made ground up to 3.9m proved at site (>5m recorded in 2010 investigation). Alluvium not indicated to contain peat layers.	Low	Low/ Moderate
Mining setting	Historical shallow chalk/lime workings off site	Low	Low
Risks relating to other constraints (miscellaneous):			
Services	Pipework encountered during remediation in west of site. Pipework associated with governor building likely.	Low	Moderate

Table 14: Revised Conceptual Site Model

Issue	Summary	Risk Category	
		Humans	Property/ Environment
Flooding	Majority of site does not lie within a designated floodplain. The southern and northern edges of the site lie within Flood Zone 2 and 3 respectively. There is a very low chance of surface water flooding at the site. There is the potential for groundwater flooding to occur at the site.	Low	Low/ Moderate
Buried obstructions	Buried concrete encountered during remediation in west of site and during recent site investigation.	Low	Low/ Moderate
Unexploded ordnance	Site is within a low risk area for encountering unexploded ordnance.	Low	Low
Liability Issues:			
Risk of liability with past use of site.	Gas works	High	High
Risk of liability with current use of site	Disused former social club and governor house with yard area	Low	Low/ Moderate
Risk of liability for proposed use of site	Residential	Low	Low
Overall Risk for Site:	Moderate to High		

Construction Works

- 6.27 During the construction works, there is a potential for site workers to come into contact with contaminated soils/waters. It will be necessary to adopt appropriate health and safety measures, including for the risks of gas in confined spaces, to mitigate the risks posed to construction workers. It is recommended that appropriate risk assessments are undertaken to identify safe working procedures and that these measures are included with the health and safety file and are passed to any future maintenance workers.
- 6.28 There is a potential for the mobilisation of contaminants during the construction works themselves. These contaminants could pose a risk to site workers, adjacent site users and controlled waters. Mitigation measures should be adopted to minimise off site migration of contaminants.
- 6.29 Stockpiling should be avoided if possible. If needed, stockpiles should be sensitively sited away from surface water, placed on low permeability sheeting, covered and bunded to prevent run off. During dry periods dust suppression should be adopted, particularly during excavation works to prevent the production of contaminated dust.

Assessment of Waste for Disposal to Landfill

- 6.30 During the redevelopment works should it be necessary to take any material off site It would be prudent to classify material in accordance with Environment Agency guidance documents. Additional Waste Acceptance Criteria (WAC) testing may be required for material destined for disposal to landfill depending on its classification as hazardous or non-hazardous waste.

7 CONCLUSIONS AND RECOMMENDATIONS

- 7.1 This report provides an assessment of geo-environmental conditions associated with the site. The report assesses the potential for soil, groundwater and surface water contamination at the site in order to satisfy planning condition 5 of the planning permission (no. 160378). This report builds on the results of previous site investigation to enable assessment of the suitability of the site for residential development.
- 7.2 An intrusive site investigation has been completed which included boreholes, trial pits, groundwater, surface water and ground gas monitoring, and laboratory testing. The positions of site investigation locations were restricted due to access, in ground obstructions, underground utilities and health and safety reasons.
- 7.3 A full round of groundwater and ground gas monitoring to include all boreholes on the same day could not be carried out due to access restrictions on site. Whilst a number of rounds of gas monitoring has been carried out, additional gas monitoring rounds are due to be undertaken over three months. The gas monitoring results will be included as part of the DQRA as discussed in Section 7.9.
- 7.4 Whilst reasonable attempts have been made to identify the potential ground related constraints, it should be noted that the ground conditions encountered are representative only of the areas investigated at the time of investigation and may not be representative of the site as a whole. As part of the interpretation process reasonable inferences have been drawn between the investigation points, however, it should be recognised that ground and groundwater conditions can vary significantly both laterally and vertically over time due to changing conditions such as seasonal or climatic fluctuations etc. The potential for areas of loose/soft materials, contaminated materials and/or other potential problems cannot be completely discounted.
- 7.5 A revised conceptual site model has been completed following the site investigation works and interpretation of results. This indicated the site is considered to present a overall moderate to high risk from past site use, adjacent operations and environmental setting.
- 7.6 Elevated levels of chromium, lead, mercury, naphthalene, phenanthrene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, indeno(123cd)pyrene and dibenzo(ah)anthracene, and TPH fractions EC10-EC12, EC12-EC16, EC16-EC21, EC21-EC35 are indicated to be present in made ground across the site. Elevated levels of chromium, naphthalene, acenaphthylene, fluorene, phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, indeno(123cd)pyrene and dibenzo(ah)anthracene and TPH fractions EC10-EC12, EC12-EC16, EC16-EC21, EC21-EC35 are indicated to be present in natural materials across the site.

- 7.7 In terms of human health, it is recommended that either remediation of the soils is required at the site or clean cover installed across the site to break the pathway between the contamination and the receptors (site users). A detailed remediation strategy should include a remediation design for this.
- 7.8 Broadly speaking, groundwater is impacted by contamination in the made ground and alluvium and to a lesser extent in the chalk.
- 7.9 In terms of controlled waters (groundwater and surface water,) the comparison of soil, groundwater and surface water contamination indicates that a DQRA for mercury, ammonium, total cyanide, sulphide, benzene, TPHs, acenaphthene, anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, fluoranthene, indeno(1,2,3-cd)pyrene and naphthalene is required and may require additional testing where limit of detection values are higher than screening values. The DQRA will analyse whether remediation is required in terms of each contaminant. If remediation is deemed necessary, the DQRA will also provide remedial targets for agreement with the regulators.
- 7.10 This report has assessed the nature and extent of contamination at the site in accordance with planning condition 5 of the planning permission (no. 160378). It also addresses planning condition 9 of the same consent, in terms of ground gas assessment. As discussed, further works are required including a DQRA which will be undertaken to satisfy planning condition 6 as part of the development remedial targets for a detailed remediation scheme, to include, details of works to be undertaken, proposed remediation objectives and remediation criteria, timetable of works and site management procedures and will be provided as a separate report.

APPENDICES

Appendix 1: Trial Pit and Borehole Logs

KEY TO EXPLORATORY HOLE 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_f

| Dynamic sample

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

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

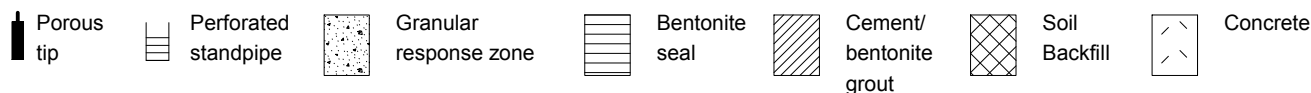
y y = Solid Core Recovery (SCR) as percentage of core run. Assessment of core is based on full diameter.

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

CLIENT WARDELL ARMSTRONG

BH01

SITE GAS WORKS ROAD, READING

Sheet 1 of 2

Start Date 6 November 2017

Scale 1 : 50

End Date 7 November 2017

Depth 9.15 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
06/11/17 1300hrs	1B 1ES	0.10 - 0.30 0.10 - 0.30		Vo 0.0			MADE GROUND comprising light grey CONCRETE.	0.10		
	2B 2ES	0.50 - 0.70 0.50 - 0.70		Vo 0.0			Soft dark greyish brown slightly sandy gravelly silty CLAY with a medium subrounded brick and concrete cobble content. Gravel is subangular and subrounded fine to coarse brick and concrete. Rare fragments (up to 40mm) of glass. (MADE GROUND)	0.70		
	3B 3ES	1.00 - 1.20 1.00 - 1.20		Vo 0.3			Very soft dark greyish brown mottled greyish brown slightly sandy slightly gravelly CLAY with a low subrounded brick and concrete cobble content. Gravel is subangular and subrounded fine to coarse brick and concrete. Rare fragments (up to 30mm) of glass. (MADE GROUND)	1.40		
	4D 5L	1.20 - 1.65 1.20 - 2.70	Nil	S 2			0.70 - 0.90m: Concrete boulder (200x300x400mm).			
	4ES	1.65 - 1.75		Vo 26.9			Very soft dark grey and dark greyish brown mottled black slightly gravelly sandy SILT. Gravel is subrounded and rounded fine to coarse brick and flint. Rare fragments of wood (up to 40mm) and glass (up to 25mm). Strong hydrocarbon odour. Frequent relict roots (up to 10mm diam.) and rootlets with hydrocarbon staining. (MADE GROUND)			
	5ES	2.60 - 2.70		Vo 208.1			1.40 - 1.50m: Black mottled light grey. 2.70 - 2.90m: Black 3.60 - 3.90m: Brown			
	6D 7L	2.70 - 3.15 2.70 - 4.20		Nil S 1			Grey slightly clayey sandy subrounded to well rounded fine to coarse flint GRAVEL with a strong hydrocarbon odour.	3.90		
06/11/17 1600hrs 0.00m	6ES	3.60 - 3.70		Vo 117.6			Light grey and grey subangular and subrounded fine and medium flint GRAVEL with a faint hydrocarbon odour.	4.45		
	7ES	3.90 - 4.00		Vo 6.6			4.45 - 4.50m: Gravel is coarse.	4.90		
	8D 9L	4.20 - 4.65 4.20 - 5.70	4.20	S 13			Grey very gravelly medium and coarse SAND. Gravel is angular to subrounded fine and medium flint.			
07/11/17 0900hrs 0.00m							5.70m: Very dense.	6.10		
	10L 8ES	5.70 - 6.11 5.70 - 7.20 5.90 - 6.00	5.70	C*56 Vo 0.1			Structureless CHALK composed of white slightly gravelly sandy SILT. Gravel is subrounded and rounded fine to coarse very weak low and medium density white chalk and subangular and subrounded medium and coarse rinded flint. (Probably CIRIA Grade Dm)			
	11D 12L	7.20 - 7.65 7.20 - 8.70	7.20	S 11						
Continued Next Page								{8.00}		

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10m. Hand dug inspection pit 0.10-1.20m. Dynamic sampled (128mm) 1.20-5.70m and (113mm) 5.70-8.70m.

CASING: 168mm diam to 4.20m and 140mm diam to 7.20m.

BACKFILL: On completion, hole was backfilled with bentonite pellets 9.15-4.00m. A slotted standpipe (50mm) with geosock was installed to 3.90m, granular response zone 4.00-0.90m, bentonite seal 0.90-0.30m, concrete and stopcock cover 0.30-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered prior to use of water flush.



CONTRACT

33572

CHECKED



BH01

Depth 9.15 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
	9ES	7.90 - 8.00		Vo 0.2							
07/11/17 1100hrs 1.85m	13D	8.70 - 9.15	7.20	S 4				Borehole completed at 9.15m.	9.15		
									{18.00}		
water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks							
				Groundwater not encountered prior to use of water flush.							

BOREHOLE LOG

CLIENT WARDELL ARMSTRONG

BH02

SITE GAS WORKS ROAD, READING

Sheet 1 of 2

Start Date 7 November 2017

Scale 1 : 50

End Date 8 November 2017

Depth 9.15 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
07/11/17 1200hrs	1B 1ES 2B 2ES	0.10 - 0.30 0.10 - 0.30 0.50 - 0.70 0.50 - 0.70		Vo 0.0 Vo 0.0			MADE GROUND comprising dark grey TARMACADAM. Pinkish grey slightly silty sandy subangular and subrounded fine to coarse brick, sandstone and concrete GRAVEL. (MADE GROUND)	0.05 0.10		
	3B 3ES 4L	1.00 - 1.20 1.00 - 1.20 1.20 - 1.65 1.20 - 2.70	Nil	Vo 0.0 C 7			Reddish brown and light grey subangular and subrounded brick and concrete COBBLES with some light grey sandy subangular and subrounded fine to coarse brick and concrete gravel. (MADE GROUND) 1.20m: Loose.	1.60		
	4ES	1.80 - 1.90		Vo 0.0			Soft light greenish grey silty CLAY with frequent shell fragments (up to 5mm) and rare shells (up to 10mm). Faint hydrocarbon odour. Rare roots (up to 10mm diam.). 1.60 - 2.00m: Stained black. Gravelly. Gravel is subrounded and rounded medium and coarse flint.			
	5D 6D 7L	2.50 - 2.60 2.70 - 3.15 2.70 - 4.20	2.70	S 11			2.60 - 2.60m: Mottled orangish brown. 2.70m: Firm.			
							3.50 - 3.70m: Sandy.	3.70		
	5ES 8D 9L	4.10 - 0.20 4.20 - 4.65 4.20 - 5.70	4.20	Vo 1.5 S 42			Dense dark grey sandy subrounded and rounded fine to coarse flint GRAVEL with a faint hydrocarbon odour. 4.00 - 4.20m: Slightly silty slightly sandy.			
							4.60m: Becoming slightly sandy.			
	10D 11L 6ES	5.70 - 6.15 5.70 - 7.20 6.00 - 0.00	5.70	S 23 Vo 0.0			Medium dense grey mottled greenish grey gravelly fine to coarse SAND. Gravel is subrounded and rounded fine to coarse flint. Faint hydrocarbon odour.	5.95 6.70		
07/11/17 1500hrs NR							Structureless CHALK composed of white slightly gravelly sandy SILT. Gravel is subrounded and rounded fine to coarse very weak low and medium density white chalk and sub angular and subrounded medium to coarse rinded flint. (Probably CIRIA Grade Dm)			
08/11/17 0930hrs 1.48m	12L	7.20 - 8.70	7.20							
Continued Next Page								{8.00}		

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10m. Hand dug inspection pit 0.10-1.20m. Dynamic sampled (113mm) 1.20-8.70m.

CASING: 140mm diam to 7.20m.

BACKFILL: On completion, hole was backfilled with bentonite pellets 9.15-6.80m A slotted standpipe (50mm) with geosock was installed to 6.70m, granular response zone 6.80-3.60m, bentonite seal 3.60-0.40m and concrete and stopcock cover 0.40-0.00m.

REMARKS: Driller notes unable to take end of shift water depth on 07/11/2017 and SPT at 7.20m due to rig breakdown.

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
33572

CHECKED

BOREHOLE LOG

CLIENT WARDELL ARMSTRONG

BH02

SITE GAS WORKS ROAD, READING

Sheet 2 of 2

Start Date 7 November 2017

Scale 1 : 50

End Date 8 November 2017

Depth 9.15 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
08/11/17 1015hrs 2.43m	13D	8.70 - 9.15	7.20	S 8			Borehole completed at 9.15m.	9.15		
DRAFT										
								{18.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks Groundwater not encountered prior to use of water flush.								AGS CONTRACT 33572		CHECKED

BOREHOLE LOG



CLIENT WARDELL ARMSTRONG

BH03

SITE GAS WORKS ROAD, READING

Sheet 1 of 1

Start Date 8 November 2017

Scale 1 : 50

End Date 8 November 2017

Depth 0.80 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
08/11/17 1200hrs	1B 1ES	0.10 - 0.30 0.10 - 0.30		Vo 5.7				MADE GROUND comprising dark grey TARMACADAM.	0.05 0.10		
08/11/17 1230hrs Dry	2B 2ES	0.50 - 0.70 0.50 - 0.70		Vo 6.2				Pinkish grey slightly silty sandy subangular and subrounded fine to coarse brick and sandstone GRAVEL. (MADE GROUND)	0.80		
								Reddish brown and light grey subangular and subrounded brick and concrete COBBLES with some light grey sandy subangular and subrounded fine to coarse brick and concrete gravel. (MADE GROUND). 0.80m: Concrete obstruction across pit. Borehole completed at 0.80m.			

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10. Hand dug inspection pit 0.10-0.80m.

CASING: None used.

BACKFILL: On completion hole was backfilled with soil arisings.

REMARKS: Hole terminated at 0.80m due to concrete obstruction and reattempted aproximately 1.5m to the west as BH03A.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
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Groundwater not encountered.



CONTRACT
33572

CHECKED

BOREHOLE LOG



CLIENT WARDELL ARMSTRONG

BH03A

SITE GAS WORKS ROAD, READING

Sheet 1 of 1

Start Date 8 November 2017

Scale 1 : 50

End Date 8 November 2017

Depth 0.70 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
08/11/17 1300hrs	1B	0.10 - 0.30						MADE GROUND comprising dark grey TARMACADAM.	0.05		
08/11/17 1340hrs Dry	2B	0.50 - 0.70						Pinkish grey slightly silty sandy subangular and subrounded fine to coarse brick and sandstone GRAVEL. (MADE GROUND)	0.10		
								Reddish brown and light grey subangular and subrounded brick and concrete COBBLES with some light grey sandy subangular and subrounded fine to coarse brick and concrete gravel. (MADE GROUND)	0.70		
								0.70m: Concrete obstruction across pit. Borehole completed at 0.70m.			

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10. Hand dug inspection pit 0.10-0.80m.

CASING: None used.

BACKFILL: On completion hole was backfilled with soil arisings.

REMARKS: Hole terminated at 0.80m due to concrete obstruction and reattempted approximately 1.0m to the west as BH03B.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
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Groundwater not encountered.



CONTRACT
33572

CHECKED

BOREHOLE LOG



CLIENT WARDELL ARMSTRONG

BH03B

SITE GAS WORKS ROAD, READING

Sheet 1 of 1

Start Date 8 November 2017

Scale 1 : 50

End Date 8 November 2017

Depth 0.80 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
08/11/17 1400hrs	1B	0.10 - 0.30						MADE GROUND comprising dark grey TARMACADAM.	0.05		
08/11/17 1440hrs Dry	2B	0.50 - 0.70						Pinkish grey slightly silty sandy subangular and subrounded fine to coarse brick and sandstone GRAVEL. (MADE GROUND)	0.10		
								Reddish brown and light grey subangular and subrounded brick and concrete COBBLES with some light grey sandy subangular and subrounded fine to coarse brick and concrete gravel. (MADE GROUND) 0.80m: Concrete obstruction across pit. Borehole completed at 0.80m.	0.80		

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10. Hand dug inspection pit 0.10-0.70m.

CASING: None used.

BACKFILL: On completion hole was backfilled with soil arisings.

REMARKS: Hole terminated at 0.80m due to concrete obstruction and reattempted approximately 1.0m to the northwest as BH03C.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
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Groundwater not encountered.



CONTRACT
33572

CHECKED

BOREHOLE LOG

CLIENT WARDELL ARMSTRONG

BH03C

SITE GAS WORKS ROAD, READING

Sheet 1 of 2

Start Date 8 November 2017

Scale 1 : 50

End Date 9 November 2017

Depth 9.15 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
08/11/17 1500hrs	1B 1ES 2B 2ES	0.10 - 0.30 0.10 - 0.30 0.50 - 0.70 0.50 - 0.70		Vo 0.2 Vo 0.1			MADE GROUND comprising dark grey TARMACADAM. Pinkish grey slightly silty sandy subangular and subrounded fine to coarse brick and sandstone GRAVEL. (MADE GROUND)	0.05 0.30		
08/11/17 1600hrs Dry	3B 3ES	1.00 - 1.20 1.00 - 1.20		Vo 0.2 C*100			Reddish brown and light grey subangular and subrounded brick and concrete COBBLES with some light grey sandy subangular and subrounded fine to coarse brick and concrete gravel. (MADE GROUND)			
09/11/17 0800hrs Dry	4L 4ES	1.20 - 2.70 1.60 - 1.70	Nil				1.20m: Very dense. Soft light grey mottled black slightly sandy silty CLAY with a faint hydrocarbon odour. Frequent shell fragments (up to 5mm) and rare shells (up to 15mm) and relict roots (up to 10mm diam.) with black hydrocarbon staining.	1.50		
	5ES 5L	2.60 - 2.70 2.70 - 3.15 2.70 - 4.20	2.70	Vo 9.9 S 4			1.50 - 1.90m: Stained black. Gravelly. Gravel is subrounded and rounded medium and coarse flint. 2.40 - 2.70m: Mottled orangish brown.	3.20		
	6ES	3.50 - 3.60		Vo 829.7			Grey slightly gravelly medium and coarse SAND with frequent pockets (up to 10mm) of medium and coarse sand with brown hydrocarbon staining, sheen and a strong hydrocarbon odour. Gravel is angular fine flint.	4.10		
	6D 7L	4.20 - 4.65 4.20 - 5.70	4.20	S 21			Medium dense light grey becoming grey and bluish grey slightly sandy angular to subrounded fine to coarse flint GRAVEL.			
	8D 9L 7ES	5.70 - 6.15 5.70 - 7.20 5.90 - 6.00	5.70	S 34 Vo 12.6			Dense greyish brown slightly gravelly fine to coarse SAND. Gravel is subangular to rounded fine and medium flint. 5.85 - 5.87m: Gravelly. 5.90 - 6.00m: Grey. 6.00 - 6.05m: Dark grey. 6.05 - 6.10m: Dark brown.	5.60		
	8ES 10D 11L	6.80 - 6.90 7.20 - 7.65 7.20 - 8.70	7.20	Vo 9.9 S 4			Structureless CHALK composed of light brown mottled white slightly sandy gravelly SILT. Gravel is subrounded and rounded fine to coarse very weak low and medium density white chalk and subangular and subrounded medium to coarse rounded flint. (Probably CIRIA Grade Dm)	6.70		
Continued Next Page								{8.00}		

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10m. Hand dug inspection pit 0.10-1.20m. Dynamic sampled (113mm) 1.20-8.70m.

CASING: 140mm diam to 7.20m.

BACKFILL: On completion, hole was backfilled with bentonite pellets 9.15-6.80m. A slotted standpipe (50mm) with geosock was installed to 6.70m, granular response zone 6.80-2.80m, bentonite seal 2.80-0.30m, concrete and stopcock cover 0.30-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered prior to use of water flush.



CONTRACT

33572

CHECKED



BH03C

End Date 9 November 2017

Depth 9.15 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
09/11/17 1200hrs 3.74m	12D	8.70 - 9.15	7.20	S 6				Borehole completed at 9.15m.	9.15		
DRAFT											
									{18.00}		
water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks							
Groundwater not encountered prior to use of water flush.											
									CONTRACT 33572		CHECKED

BOREHOLE LOG



CLIENT WARDELL ARMSTRONG

BH04

SITE GAS WORKS ROAD, READING

Sheet 1 of 1

Start Date 13 November 2017

Scale 1 : 50

End Date 13 November 2017

Depth 0.50 m

progress date/time	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
13/11/17 0930hrs								MADE GROUND comprising dark grey TARMACADAM.	0.05		
13/11/17 1000hrs								Soft dark greyish brown slightly sandy gravelly clayey SILT with a low subangular and subrounded brick and concrete cobble content. Gravel is subangular and subrounded fine to coarse brick, concrete and rare flint. (MADE GROUND)	0.50		
Dry								Borehole completed at 0.50m.			

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10. Hand dug inspection pit 0.10-0.80m.

CASING: None used.

BACKFILL: On completion hole was backfilled with soil arisings.

REMARKS: Hole terminated at 0.80m due to service and reattempted aproximately 1.0m to the north as BH04A.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
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Groundwater not encountered.



CONTRACT
33572

CHECKED

BOREHOLE LOG

CLIENT WARDELL ARMSTRONG

BH04A

SITE GAS WORKS ROAD, READING

Sheet 1 of 1

Start Date 13 November 2017

Scale 1 : 50

End Date 13 November 2017

Depth 0.70 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
13/11/17 1000hrs							MADE GROUND comprising dark grey TARMACADAM.	0.05		
13/11/17 1030hrs Dry							Soft dark greyish brown slightly sandy gravelly clayey SILT with a low subangular and subrounded brick and concrete cobble content. Gravel is subangular and subrounded fine to coarse brick, concrete and rare flint. (MADE GROUND) Borehole completed at 0.70m.	0.70		
									{8.00}	

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10. Hand dug inspection pit 0.10-0.70m.

CASING: None used.

BACKFILL: On completion hole was backfilled with soil arisings.

REMARKS: Hole terminated at 0.80m due to service and reattempted approximately 1.5m to the northwest as BH04B.

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.

CONTRACT
33572

CHECKED

BOREHOLE LOG

CLIENT WARDELL ARMSTRONG

BH04B

SITE GAS WORKS ROAD, READING

Sheet 1 of 2

Start Date 13 November 2017

Scale 1 : 50

End Date 14 November 2017

Depth 9.15 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
13/11/17 1300hrs	1B 1ES 2B 2ES	0.10 - 0.30 0.10 - 0.30 0.50 - 0.70 0.50 - 0.70		Vo 5.3 Vo 4.3			MADE GROUND comprising dark grey TARMACADAM.	0.05		
	3B 3ES 4D 5L	1.00 - 1.20 1.00 - 1.20 1.20 - 1.65 1.20 - 2.70		Vo 5.1 S 4			Soft dark greyish brown slightly sandy gravelly clayey SILT with a low subangular and subrounded brick and concrete cobble content. Gravel is subangular and subrounded fine to coarse brick, concrete and rare flint. (MADE GROUND)	1.00		
	4ES	1.80 - 1.90		Vo 14.1			Soft light greyish brown slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine to coarse brick and concrete. (MADE GROUND)	1.90		
	6D 7L	2.70 - 3.15 2.70 - 4.20		Nil S 4			1.60 - 1.90m: Dark greyish brown with a strong hydrocarbon odour. Soft brown mottled grey-silty CLAY with a strong hydrocarbon odour. Frequent shell fragments (up to 5mm) and rare shells (up to 15mm) and relict roots (up to 10mm) and rootlets with hydrocarbon staining. 1.90 - 2.00m: Dark greenish grey mottled grey.	3.40		
	5ES 8D 9L	3.70 - 3.80 4.20 - 4.65 4.20 - 5.70		Vo 41.9 Nil S 9 4.20			3.00m: Becoming light greenish grey mottled orangish brown. 3.40 - 3.90m: Greenish grey. Soft light greenish grey slightly sandy silty CLAY with a faint hydrocarbon odour. Rare shell fragments (up to 3mm). 4.20m: Firm.	4.95		
13/11/17 1545hrs 1.98m	10D 11L	5.70 - 6.15 5.70 - 7.20	5.70	S 26			4.95 - 5.65m: Light grey and grey. Medium dense dark bluish grey and grey angular to rounded fine to coarse flint GRAVEL. 5.55 - 5.65m: Slightly sandy.	6.50		
14/11/17 0830hrs 1.50m	6ES 12D 13L	6.60 - 6.70 7.20 - 7.65 7.20 - 8.70		Vo 3.2 S 16			6.40 - 6.50m: Gravel is fine and medium. Dark grey and brownish grey slightly gravelly medium and coarse SAND. Gravel is angular to subrounded fine and medium flint. Medium dense light brownish grey sandy angular to subrounded fine to coarse flint GRAVEL.	7.80		
Continued Next Page								{8.00}		

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10m. Hand dug inspection pit 0.10-1.20m. Dynamic sampled (128mm) 1.20-4.20m and (113mm) 4.20-8.70m.

CASING: 140mm diam to 8.70m.

BACKFILL: On completion, hole was backfilled with bentonite pellets 9.15-7.10m. A slotted standpipe (50mm) with geosock was installed to 7.00m, granular response zone 7.10-2.90m, bentonite seals 2.90-2.00m. A second standpipe (19mm) with geosock was installed to 1.90m, granular response zone 2.00-0.80m, bentonite seal 0.80-0.30m, concrete and stopcock cover 0.30-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered prior to use of water flush.



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BOREHOLE LOG

CLIENT WARDELL ARMSTRONG

BH04B

SITE GAS WORKS ROAD, READING

Sheet 2 of 2

Start Date 13 November 2017

Scale 1 : 50

End Date 14 November 2017

Depth 9.15 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
14/11/17 1030hrs 1.54m	7ES 14D	8.50 - 8.60 8.70 - 9.15	8.70	Vo 2.3 S 9			Structureless CHALK composed of light brown and light grey slightly sandy gravelly SILT. Gravel is subrounded and rounded fine to coarse very weak low and medium density white chalk and subangular and subrounded medium to coarse rinded flint. (Probably CIRIA Grade Dm) 8.20m: Becoming light grey and grey.	9.15		
							Borehole completed at 9.15m.			
water strike (m) casing (m) rose to (m) time to rise (m) remarks										
							Groundwater not encountered prior to use of water flush.	CONTRACT 33572		CHECKED

BOREHOLE LOG

CLIENT WARDELL ARMSTRONG

BH06

SITE GAS WORKS ROAD, READING

Sheet 1 of 1

Start Date 9 November 2017

Scale 1 : 50

End Date 9 November 2017

Depth 0.80 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
09/11/17 1420hrs	1B	0.10 - 0.30					MADE GROUND comprising dark grey TARMACADAM.	0.05		
09/11/17 1505hrs Dry	2B	0.50 - 0.80					Dark pinkish grey slightly silty sandy subangular and subrounded fine to coarse brick and sandstone GRAVEL. (MADE GROUND)	0.10 0.40		
							Dark greyish brown sandy angular to subrounded fine to coarse brick, concrete and rare flint GRAVEL with a low subangular and subrounded brick and concrete cobble content. (MADE GROUND)	0.80		
							Yellowish grey slightly gravelly fine to coarse SAND. Gravel is angular to subrounded medium and coarse brick, concrete and sandstone. (MADE GROUND) 0.80m: Light grey concrete. Borehole completed at 0.80m.			
								{8.00}		

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10. Hand dug inspection pit 0.10-0.80m.

CASING: None used.

BACKFILL: On completion hole was backfilled with soil arisings.

REMARKS: Hole terminated at 0.80m due to concrete obstruction and uncovered service and reattempted approximately 1.0m to the west as BH06B.

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.

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BOREHOLE LOG

CLIENT WARDELL ARMSTRONG

BH06A

SITE GAS WORKS ROAD, READING

Sheet 1 of 2

Start Date 10 November 2017

Scale 1 : 50

End Date 10 November 2017

Depth 9.15 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
10/11/17 0830hrs	1B 1ES 2B 2ES	0.10 - 0.30 0.10 - 0.30 0.50 - 0.70 0.50 - 0.70		Vo 0.4 Vo 0.1			MADE GROUND comprising dark grey TARMACADAM. Dark pinkish grey slightly silty sandy subangular and subrounded fine to coarse brick and sandstone GRAVEL. (MADE GROUND)	0.05 0.10 0.40		
	3C	0.80 - 1.20	Nil		100		Dark greyish brown sandy angular to subrounded fine to coarse brick, concrete and rare flint GRAVEL with a low subangular and subrounded brick and concrete cobble content. (MADE GROUND)	0.80		
	4L	1.20 - 2.70	1.20				Yellowish grey slightly gravelly fine to coarse SAND. Gravel is angular to subrounded medium and coarse brick, concrete and sandstone. (MADE GROUND)	1.20		
	3ES 4ES	1.60 - 1.70 1.85 - 1.95		Vo 1.3 Vo 56.1			MADE GROUND comprising light grey CONCRETE. 0.80 - 1.70m: Subvertical 30mm diam. steel tube. Light brown gravelly fine to coarse SAND. Gravel is subangular and subrounded fine to coarse brick and concrete. (MADE GROUND)	1.85		
	5D 6L	2.70 - 3.15 2.70 - 4.20	2.70	S 13			Soft dark greenish grey mottled black clayey SILT with a strong hydrocarbon odour. Rare shell fragments (up to 5mm) and shells (up to 10mm). 1.85 - 1.90m: Black 2.40m: Becoming dark grey. 2.40 - 2.70m: Frequent relict rootlets with black hydrocarbon staining. 2.60m: Becoming light greyish brown. 2.70m: Firm 3.30 - 3.50m: Slightly sandy.	3.50		
	5ES 7D 8L	3.70 - 3.90 4.20 - 4.65 4.20 - 5.70	4.20	Vo 16.8 S 18			Light brownish grey gravelly fine to coarse SAND with a faint hydrocarbon odour.. Gravel is angular and subangular fine and medium flint. 4.20m: Medium Dense. Bluish grey and dark grey slightly sandy subangular and subrounded fine to coarse flint GRAVEL.	4.20		
	9D 10L	5.70 - 6.15 5.70 - 7.20	5.70	S 35			5.70m: Dense	6.15		
	6ES	6.40 - 6.50		Vo 7.9			Light brown sandy angular and subangular fine flint GRAVEL. 6.15 - 6.35m: Gravel is fine and medium.			
	11D 12L	7.20 - 7.65 7.20 - 8.70	7.20	S 15			Structureless CHALK composed of light brown, white and light grey slightly sandy gravelly SILT. Gravel is subrounded and rounded fine to coarse very weak low	7.45		
							Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig and hydraulic breaker.

METHOD: Surface broken out with hydraulic breaker 0.00-0.10m. Hand dug inspection pit 0.10-0.80m. Waterflush rotary core drilled (146mm) 0.80-1.20m.

Dynamic sampled (113mm) 1.20-8.70m.

CASING: 140mm diam to 8.70m.

BACKFILL: On completion, a slotted standpipe (50mm) with geosock was installed to 8.70m, granular response zone 9.15-7.60m, bentonite seal 7.60-6.10m. A second slotted standpipe (19mm) with geosock was installed to 6.00m, granular response zone 6.10-2.90m, bentonite seal 2.90-0.30m, concrete and stopcock cover 0.30-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered prior to use of water flush.



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BOREHOLE LOG**BH06A**

CLIENT WARDELL ARMSTRONG

SITE GAS WORKS ROAD, READING

Sheet 2 of 2

Start Date 10 November 2017

Scale 1 : 50

End Date 10 November 2017

Depth 9.15 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
10/11/17 1300hrs 1.34m	7ES 13D	8.50 - 8.60 8.70 - 9.15	8.70	Vo 5.6 S 6			and medium density white chalk and subangular and subrounded medium and coarse rinded flint. (Probably CIRIA Grade Dm) 8.10 - 8.20m: Grey coarse sand.	9.15		
							Borehole completed at 9.15m.			
water strike (m) casing (m) rose to (m) time to rise (m) remarks										
Groundwater not encountered prior to use of water flush.							CONTRACT 33572		CHECKED	

Geotechnical Engineering Limited

STANDARD PENETRATION TEST



CLIENT WARDELL ARMSTRONG

SITE GAS WORKS ROAD, READING

borehole no.	borehole depth (m)	s.w.p (m)	bottom depth (m)	casing depth (m)	water level (m)	seating drive		test drive				test type	N	energy ratio (%)
						blows	pen (mm)	blows	pen (mm)	pen (mm)	pen (mm)			
BH01	1.20		1.65	Nil	Dry	1 1	75 75	0 0 1 1	75 75 75 75			S	2	
BH01	2.70		3.15	Nil	Dry	1 0	75 75	1 0 0 0	75 75 75 75			S	1	
BH01	4.20		4.65	4.20	1.50	2 3	75 75	4 3 3 3	75 75 75 75			S	13	
BH01	5.70		6.11	5.70	0.00	11 11	75 75	18 16 10 4	75 75 75 30			C	56	
BH01	7.20		7.65	7.20	0.00	4 4	75 75	3 3 3 2	75 75 75 75			S	11	
BH01	8.70		9.15	7.20	1.85	1 1	75 75	1 1 1 1	75 75 75 75			S	4	
BH02	1.20		1.65	Nil	Dry	4 2	75 75	1 2 2 2	75 75 75 75			C	7	79
BH02	2.70		3.15	2.70	1.40	1 2	75 75	3 3 3 2	75 75 75 75			S	11	79
BH02	4.20		4.65	4.20	0.45	6 8	75 75	8 12 13 9	75 75 75 75			S	42	79
BH02	5.70		6.15	5.70	0.00	10 7	75 75	6 6 6 5	75 75 75 75			S	23	79
BH02	8.70		9.15	7.20	2.43	3 3	75 75	3 1 2 2	75 75 75 75			S	8	79
BH03C	1.20		1.50	Nil	Dry	14 11	75 75	20 30	75 75			C	100	79
BH03C	2.70		3.15	2.70	0.00	3 1	75 75	1 1 1 1	75 75 75 75			S	4	79
BH03C	4.20		4.65	4.20	1.06	5 8	75 75	5 5 6 5	75 75 75 75			S	21	79
BH03C	5.70		6.15	5.70	1.61	5 7	75 75	8 8 8 10	75 75 75 75			S	34	79
BH03C	7.20		7.65	7.20	2.14	3 1	75 75	1 1 1 1	75 75 75 75			S	4	79
BH03C	8.70		9.15	7.20	3.74	1 1	75 75	1 0 2 3	75 75 75 75			S	6	79
BH04B	1.20		1.65	Nil	Dry	1 1	75 75	1 1 1 1	75 75 75 75			S	4	79
BH04B	2.70		3.15	Nil	Dry	1 1	75 75	1 1 1 1	75 75 75 75			S	4	79
BH04B	4.20		4.65	Nil	3.80	1 1	75 75	2 2 2 3	75 75 75 75			S	9	79
BH04B	5.70		6.15	5.70	1.04	2 3	75 75	5 7 7 7	75 75 75 75			S	26	79
BH04B	7.20		7.65	7.20	1.59	3 3	75 75	4 4 4 4	75 75 75 75			S	16	79
BH04B	8.70		9.15	8.70	1.54	3 2	75 75	1 2 3 3	75 75 75 75			S	9	79
BH06A	2.70		3.15	2.70	0.00	1 1	75 75	2 3 4 4	75 75 75 75			S	13	79

notes:

1. Test carried out in general accordance with BS EN ISO 22476-3:2005 + A1:2011
2. s.w.p = self weight penetration.
3. N values have not been subjected to any correction.
4. Test carried out using split spoon S, solid cone C.
5. Where full test drive not completed, linearly extrapolated N value reported.
6. ** Denotes no effective penetration.

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Geotechnical Engineering Limited

STANDARD PENETRATION TEST



CLIENT WARDELL ARMSTRONG

SITE GAS WORKS ROAD, READING

borehole no.	borehole depth (m)	s.w.p (m)	bottom depth (m)	casing depth (m)	water level (m)	seating drive		test drive				test type	N	energy ratio (%)
						blows	pen (mm)	blows		pen (mm)				
BH06A	4.20		4.65	4.20	1.31	4 4	75 75	4 4 4 6	75 75 75 75		S	18	79	
BH06A	5.70		6.15	5.70	1.76	6 7	75 75	8 9 9 9	75 75 75 75		S	35	79	
BH06A	7.20		7.65	7.20	1.84	5 3	75 75	3 4 3 5	75 75 75 75		S	15	79	
BH06A	8.70		9.15	8.70	1.34	4 2	75 75	2 2 1 1	75 75 75 75		S	6	79	

notes:

- Test carried out in general accordance with BS EN ISO 22476-3:2005 + A1:2011
- s.w.p = self weight penetration.
- N values have not been subjected to any correction.
- Test carried out using split spoon S, solid cone C.
- Where full test drive not completed, linearly extrapolated N value reported.
- ** Denotes no effective penetration.

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TRIAL PIT LOG



TP01

CLIENT WARDELL ARMSTRONG

SITE GAS WORKS ROAD, READING

Start Date 10 November 2017

End Date 10 November 2017

Sheet 1 of 1

Scale 1 : 25

Depth 1.20 m

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
Dry				MADE GROUND comprising light grey CONCRETE with cobble-sized brick clasts.			
	1B 1ES	Vo 1.0	0.50- 0.60 0.50- 0.60	Light greyish brown slightly silty sandy subangular and subrounded fine to coarse brick, concrete and rare slag GRAVEL with a low subangular and subrounded brick, concrete and slag cobble content. (MADE GROUND)	0.40		
	2B 2ES	Vo 1.0	0.80- 0.90 0.80- 0.90	Soft greyish brown slightly sandy gravelly silty CLAY. Gravel is subangular and subrounded fine to coarse brick, concrete and rare slag. (MADE GROUND)	0.80		
				Trial pit completed at 1.20m.	1.20		

Notes

Surface broken out with hydraulic breaker 0.00-0.40m, trial pit excavated using hand tools 0.40-1.20m.
Groundwater was not encountered.
Trial pit dimensions 1.30x0.70x1.20m.
Trial pit sides remained stable.
On completion, the trial pit was backfilled with soil arisings.
REMARKS: Trial pit sketch referenced TP01 presented separately.

Sketch of Foundation - Not to scale. All dimensions in metres.



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TRIAL PIT LOG



TP02

CLIENT WARDELL ARMSTRONG
 SITE GAS WORKS ROAD, READING
 Start Date 9 November 2017
 End Date 9 November 2017

Sheet 1 of 1
 Scale 1 : 25
 Depth 1.20 m

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
Dry				MADE GROUND comprising light grey CONCRETE.	0.05		
				MADE GROUND comprising orangish red brickwork MASONRY.			
	1B 1ES	Vo 0.6	0.70- 0.80 0.70- 0.80	Soft dark brown slightly sandy gravelly silty CLAY. Gravel is subangular and subrounded fine to coarse brick and flint. (MADE GROUND) 0.70 - 1.20m: Orangish red brickwork masonry in north half of pit.	0.70		
	2B 2ES	Vo 0.2	1.10- 1.20 1.10- 1.20	Trial pit completed at 1.20m.	1.20		

Notes

Surface broken out with hydraulic breaker 0.00-0.70m, trial pit excavated using hand tools 0.70-1.20m.
 Groundwater was not encountered.
 Trial pit dimensions 1.00x0.65x1.20m.
 Trial pit sides remained stable.
 On completion, the trial pit was backfilled with soil arisings.
 REMARKS: Trial pit sketch referenced TP02 presented separately.

Sketch of Foundation - Not to scale. All dimensions in metres.



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TRIAL PIT LOG



TP03

CLIENT WARDELL ARMSTRONG

SITE GAS WORKS ROAD, READING

Sheet 1 of 1

Start Date 10 November 2017

Scale 1 : 25

End Date 10 November 2017

Depth 1.50 m

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
Seepage 1.47m				MADE GROUND comprising bluish grey subangular brick COBBLES.	0.10		
	1B 1ES	Vo 0.3	0.20- 0.30 0.20- 0.30	Yellowish grey slightly silty gravelly fine to coarse SAND with a low subrounded concrete and brick cobble content. Gravel is subangular and subrounded fine to coarse sandstone, concrete and brick (MADE GROUND)	0.20		
	2B 2ES	Vo 0.4	0.50- 0.60 0.50- 0.60	Soft yellowish brown slightly sandy gravelly CLAY with a low subrounded brick and concrete cobble content. Gravel is subangular and subrounded fine to coarse brick and concrete. (MADE GROUND) 0.40m: Becoming brown.			
	3B 3ES	Vo 0.1	1.10- 1.20 1.10- 1.20	0.70 - 1.00m: Half of pit (north) light yellowish brown gravelly fine to coarse sand. Gravel is subangular fine to coarse sandstone and rare brick and concrete. 0.90m: Becoming dark brown.			
				Trial pit completed at 1.50m.	1.50		

Notes

Surface broken out with hydraulic breaker 0.00-0.10m, trial pit excavated using hand tools 0.70-1.50m.
Groundwater was encountered at 1.50m and rose to 1.47m.
Trial pit dimensions 0.70x0.80x1.50m.
Trial pit sides remained stable.
On completion, the trial pit was backfilled with soil arisings.
REMARKS: Trial pit sketch referenced TP03 presented separately.

Sketch of Foundation - Not to scale. All dimensions in metres.



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TRIAL PIT LOG

CLIENT WARDELL ARMSTRONG

TP04

SITE GAS WORKS ROAD, READING

Sheet 1 of 1

Start Date 9 November 2017

Scale 1 : 25

End Date 9 November 2017

Depth 1.20 m

water record	sample/test			description	depth (m)	level (m)	legend		
	no/type	result	depth (m)						
Dry	1B	Vo 0.2	0.10- 0.20	MADE GROUND comprising orangish red brick tiles.	0.02				
	1ES		0.10- 0.20	MADE GROUND comprising orangish brown brick tiles.	0.05				
				Light grey sandy gravelly SILT with a high subangular brick and concrete cobble content. Gravel is subangular to subrounded fine to coarse brick and concrete. (MADE GROUND)	0.30				
	2B	Vo 0.1	0.50- 0.70	Greyish brown slightly sandy gravelly SILT with a high subangular and subrounded concrete, brick and slag cobble content. Gravel is subrounded and rounded fine to coarse concrete, brick, flint and rare slag. (MADE GROUND)	0.70				
	2ES		0.50- 0.70						
				0.50m: 25mm diam. root.					
				0.60 - 1.10m: Light grey concrete structure in south half of pit.					
	3B	Vo 0.2	0.90- 1.00	Firm light yellowish brown mottled greyish brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular and subrounded fine to coarse brick, concrete and flint. (MADE GROUND)					
	3ES		0.90- 1.00						
				Trial pit completed at 1.20m.	1.30				

Notes

Surface broken out with hydraulic breaker 0.00-0.05m, trial pit excavated using hand tools 0.05-1.20m.
 Groundwater was not encountered.
 Trial pit dimensions 0.90x0.70x1.30m.
 Trial pit sides remained stable.
 On completion, the trial pit was backfilled with soil arisings.
 REMARKS: Trial pit sketch referenced TP04 presented separately.

Sketch of Foundation - Not to scale. All dimensions in metres.



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TRIAL PIT LOG**TP05**

CLIENT WARDELL ARMSTRONG
 SITE GAS WORKS ROAD, READING
 Start Date 10 November 2017
 End Date 10 November 2017

Sheet 1 of 1
 Scale 1 : 25
 Depth 1.20 m

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
Dry				MADE GROUND comprising dark grey TARMACADAM.	0.10		
	1B 1ES	Vo 0.2	0.30- 0.40 0.30- 0.40	Soft slightly sandy gravelly silty CLAY. Gravel is subangular and subrounded fine to coarse brick, concrete, flint and rare slag. (MADE GROUND) 0.10 - 0.50m: Medium subrounded brick and concrete cobble content.			
	2B 2ES	Vo 0.5	0.70- 0.80 0.70- 0.80				
	3B 3ES	Vo 0.6	1.00- 1.10 1.00- 1.10				
				Trial pit completed at 1.20m.	1.20		

Notes

Surface broken out with hydraulic breaker 0.00-0.10m, trial pit excavated using hand tools 0.10-1.20m.
 Groundwater was not encountered.
 Trial pit dimensions 1.20x0.80x1.20m.
 Trial pit sides remained stable.
 On completion, the trial pit was backfilled with soil arisings.
 REMARKS: Trial pit sketch referenced TP05 presented separately.

Sketch of Foundation - Not to scale. All dimensions in metres.



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Appendix 2: Soil Geochemical Test Results

**Gary Riches**

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Analytical Report Number : 17-68142

Project / Site name:	Gasworks Road	Samples received on:	09/11/2017
Your job number:	33572	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	2 leachate samples - 3 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 17-68142

Project / Site name: Gasworks Road

Your Order No: L00356

Lab Sample Number				860888	860889	860890		
Sample Reference				BH03C	BH03C	TP04		
Sample Number				1	2	5		
Depth (m)				0.10-0.30	0.50-0.70	0.50-0.70		
Date Sampled				09/11/2017	09/11/2017	09/11/2017		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	5.9	6.7	10		
Total mass of sample received	kg	0.001	NONE	2.0	2.0	1.9		

Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	Not-detected		
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	11.7	8.4		
Total Cyanide	mg/kg	1	MCERTS	-	< 1	1		
Complex Cyanide	mg/kg	1	MCERTS	-	< 1	1		
Free Cyanide	mg/kg	1	MCERTS	-	< 1	< 1		
Thiocyanate as SCN	mg/kg	5	NONE	-	< 5.0	< 5.0		
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	240	870		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.12	0.44		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	118	435		
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-	-	51		
Elemental Sulphur	mg/kg	5	MCERTS	-	-	23		
Ammonium - Exchangeable as NH ₄	mg/kg	0.5	MCERTS	-	-	< 0.5		
Organic Matter	%	0.1	MCERTS	1.5	-	2.5		
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.9	-	1.4		
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.0	-	4.3		

Analytical Report Number: 17-68142

Project / Site name: Gasworks Road

Your Order No: L00356

Lab Sample Number				860888	860889	860890		
Sample Reference				BH03C	BH03C	TP04		
Sample Number				1	2	5		
Depth (m)				0.10-0.30	0.50-0.70	0.50-0.70		
Date Sampled				09/11/2017	09/11/2017	09/11/2017		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	-	< 0.10	< 0.10		
Resorcinol	mg/kg	0.1	ISO 17025	-	< 0.10	< 0.10		
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	-	< 0.30	< 0.30		
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	-	< 0.20	< 0.20		
2-Isopropylphenol	mg/kg	0.1	ISO 17025	-	< 0.10	< 0.10		
Phenol	mg/kg	0.1	ISO 17025	-	< 0.10	< 0.10		
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	-	< 0.10	< 0.10		
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	-	< 0.30	< 0.30		

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	-	< 1.3	< 1.3		
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	1.1		
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	2.5		
Acenaphthene	mg/kg	0.05	MCERTS	-	-	0.42		
Fluorene	mg/kg	0.05	MCERTS	-	-	1.4		
Phenanthrene	mg/kg	0.05	MCERTS	-	-	20		
Anthracene	mg/kg	0.05	MCERTS	-	-	7.4		
Fluoranthene	mg/kg	0.05	MCERTS	-	-	32		
Pyrene	mg/kg	0.05	MCERTS	-	-	25		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	24		
Chrysene	mg/kg	0.05	MCERTS	-	-	17		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	22		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	12		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	23		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	9.6		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	2.1		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	8.5		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-	208		
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	9.9	17		
Boron (water soluble)	mg/kg	0.2	MCERTS	-	3.6	1.9		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	20	19		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	19	44		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	37	140		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	1.9		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	16	26		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	< 1.0		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	49	49		

Analytical Report Number: 17-68142

Project / Site name: Gasworks Road

Your Order No: L00356

Lab Sample Number				860888	860889	860890		
Sample Reference				BH03C	BH03C	TP04		
Sample Number				1	2	5		
Depth (m)				0.10-0.30	0.50-0.70	0.50-0.70		
Date Sampled				09/11/2017	09/11/2017	09/11/2017		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics

Benzene	ug/kg	1	MCERTS	-	-	< 1.0		
Toluene	ug/kg	1	MCERTS	-	-	< 1.0		
Ethylbenzene	ug/kg	1	MCERTS	-	-	< 1.0		
p & m-xylene	ug/kg	1	MCERTS	-	-	< 1.0		
o-xylene	ug/kg	1	MCERTS	-	-	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	< 1.0		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	3.7		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	< 8.0		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	9.3		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	19		

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	11		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	38		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	180		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	190		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	420		

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	-	-	< 0.001		
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	< 0.001		
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	< 0.001		
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	< 0.001		
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	< 0.001		
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	< 0.001		
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	< 0.001		

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	-	-	< 0.007		
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Analytical Report Number: 17-68142

Project / Site name: Gasworks Road

Your Order No: L00356

Lab Sample Number				860891	860892			
Sample Reference				BH03C	TP04			
Sample Number				2	5			
Depth (m)				0.50-0.70	0.50-0.70			
Date Sampled				09/11/2017	09/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	< 10	14			
Complex Cyanide	µg/l	10	ISO 17025	< 10	14			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200			
Sulphate as SO ₄	mg/l	0.1	ISO 17025	86.4	16.8			
Chloride	mg/l	0.15	ISO 17025	2.1	4.1			
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	83	87			
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	6.82	4.39			

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01			
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01			
Acenaphthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Fluorene	µg/l	0.01	NONE	< 0.01	< 0.01			
Phenanthrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2			
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	3.8			
Boron (dissolved)	µg/l	10	ISO 17025	23	35			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (dissolved)	µg/l	0.4	ISO 17025	9.4	0.5			
Copper (dissolved)	µg/l	0.7	ISO 17025	11	9.8			
Lead (dissolved)	µg/l	1	ISO 17025	3.1	2.3			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Nickel (dissolved)	µg/l	0.3	ISO 17025	< 0.3	< 0.3			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Zinc (dissolved)	µg/l	0.4	ISO 17025	5.3	6.8			



Analytical Report Number: 17-68142

Project / Site name: Gasworks Road

Your Order No: L00356

Lab Sample Number				860891	860892			
Sample Reference				BH03C	TP04			
Sample Number				2	5			
Depth (m)				0.50-0.70	0.50-0.70			
Date Sampled				09/11/2017	09/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 52	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 118	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 138	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 153	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 180	µg/l	0.05	NONE	< 0.05	< 0.05			

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40	< 0.40			
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Analytical Report Number : 17-68142

Project / Site name: Gasworks Road

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860888	BH03C	1	0.10-0.30	Brown gravelly sand with rubble and brick.
860889	BH03C	2	0.50-0.70	Brown sand with rubble and brick.
860890	TP04	5	0.50-0.70	Brown loam and sand with gravel and rubble.

Analytical Report Number : 17-68142

Project / Site name: Gasworks Road

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Exchangeable Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Exchangeable Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68142

Project / Site name: Gasworks Road

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS

Iss No 17-68142-1 Gasworks Road 33572

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68142

Project / Site name: Gasworks Road

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

**Gary Riches**

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Analytical Report Number : 17-68143

Project / Site name:	Gasworks Road, Reading	Samples received on:	07/11/2017
Your job number:	33572-TW	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	2 leachate samples - 2 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-68143

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860893	860894			
Sample Reference				BH01	BH01			
Sample Number				7	9			
Depth (m)				3.60-3.70	5.90-6.00			
Date Sampled				07/11/2017	07/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	77			
Moisture Content	%	N/A	NONE	41	3.8			
Total mass of sample received	kg	0.001	NONE	1.7	2.0			

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.3			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Complex Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	560	68			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.28	0.034			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	278	33.8			
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	60	8.3			
Elemental Sulphur	mg/kg	5	MCERTS	220	130			
Ammonium - Exchangeable as NH ₄	mg/kg	0.5	MCERTS	540	< 0.5			

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20			
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3			
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Analytical Report Number: 17-68143

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860893	860894			
Sample Reference				BH01	BH01			
Sample Number				7	9			
Depth (m)				3.60-3.70	5.90-6.00			
Date Sampled				07/11/2017	07/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	150	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	12	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	100	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	96	0.32			
Phenanthrene	mg/kg	0.05	MCERTS	300	1.5			
Anthracene	mg/kg	0.05	MCERTS	80	0.58			
Fluoranthene	mg/kg	0.05	MCERTS	210	1.9			
Pyrene	mg/kg	0.05	MCERTS	140	1.4			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	92	0.79			
Chrysene	mg/kg	0.05	MCERTS	48	0.45			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	62	0.52			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	36	0.39			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	61	0.53			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	23	0.26			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	6.0	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	23	0.22			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1440	8.77			
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	3.0	5.2			
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	2.5			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	< 0.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	5.9	11			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	4.9	7.2			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	4.6	3.2			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	8.5	17			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.7	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	12	10			

Analytical Report Number: 17-68143

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860893	860894			
Sample Reference				BH01	BH01			
Sample Number				7	9			
Depth (m)				3.60-3.70	5.90-6.00			
Date Sampled				07/11/2017	07/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0			
Toluene	ug/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	ug/kg	1	MCERTS	19	< 1.0			
p & m-xylene	ug/kg	1	MCERTS	20	< 1.0			
o-xylene	ug/kg	1	MCERTS	7.4	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	< 1.0			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	0.14	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	180	1.6			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	600	4.3			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	1200	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	1200	15			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	3200	30			



Analytical Report Number: 17-68143

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860893	860894			
Sample Reference				BH01	BH01			
Sample Number				7	9			
Depth (m)				3.60-3.70	5.90-6.00			
Date Sampled				07/11/2017	07/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001			

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007			
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Analytical Report Number: 17-68143

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860895	860896			
Sample Reference				BH01	BH01			
Sample Number				7	9			
Depth (m)				3.60-3.70	5.90-6.00			
Date Sampled				07/11/2017	07/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200			
Sulphate as SO ₄	mg/l	0.1	ISO 17025	17.0	7.9			
Chloride	mg/l	0.15	ISO 17025	2.5	0.74			
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	24000	73			
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	23.3	3.53			

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	21	< 0.01			
Acenaphthylene	µg/l	0.01	NONE	1.6	< 0.01			
Acenaphthene	µg/l	0.01	NONE	25	< 0.01			
Fluorene	µg/l	0.01	NONE	8.1	< 0.01			
Phenanthrene	µg/l	0.01	NONE	5.7	< 0.01			
Anthracene	µg/l	0.01	NONE	0.89	< 0.01			
Fluoranthene	µg/l	0.01	NONE	0.82	< 0.01			
Pyrene	µg/l	0.01	NONE	0.45	< 0.01			
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	64	< 0.2			
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	< 1.1			
Boron (dissolved)	µg/l	10	ISO 17025	13	74			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4			
Copper (dissolved)	µg/l	0.7	ISO 17025	20	5.7			
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Nickel (dissolved)	µg/l	0.3	ISO 17025	0.6	< 0.3			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Zinc (dissolved)	µg/l	0.4	ISO 17025	4.5	4.2			



Analytical Report Number: 17-68143

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860895	860896			
Sample Reference				BH01	BH01			
Sample Number				7	9			
Depth (m)				3.60-3.70	5.90-6.00			
Date Sampled				07/11/2017	07/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	43	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	35	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	78	< 10			

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 52	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 118	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 138	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 153	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 180	µg/l	0.05	NONE	< 0.05	< 0.05			

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40	< 0.40			
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Analytical Report Number : 17-68143

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860893	BH01	7	3.60-3.70	Grey sandy clay with gravel.
860894	BH01	9	5.90-6.00	Grey sand with gravel and stones.

Analytical Report Number : 17-68143

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Exchangeable Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Exchangeable Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025

Iss No 17-68143-1 Gasworks Road, Reading 33572-TW

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68143

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Iss No 17-68143-1 Gasworks Road, Reading 33572-TW

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The results included within the report are representative of the samples submitted for analysis.

Page 10 of 10

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Analytical Report Number : 17-68145

Project / Site name:	Gasworks Road, Reading	Samples received on:	21/11/2017
Your job number:	33572-TW	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	5 leachate samples - 5 soil samples		

Signed:

Rexona Rahman
Customer Services Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-68145

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860907	860908	860909	860910	860911
Sample Reference				BH04B	BH04B	BH04B	BH03C	BH03C
Sample Number				4	5	7	5	6
Depth (m)				1.80-1.90	3.70-3.80	8.50-8.60	2.60-2.70	3.50-3.60
Date Sampled				14/11/2017	14/11/2017	14/11/2017	14/11/2017	14/11/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	26	34	22	27	26
Total mass of sample received	kg	0.001	NONE	1.7	1.7	1.9	2.0	2.0

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	8.2	8.5	8.7	8.4
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	9	1
Complex Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	9	1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	940	83	60	260	420
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.47	0.041	0.030	0.13	0.21
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	470	41.4	30.0	131	208
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	60	47	31	16	50
Elemental Sulphur	mg/kg	5	MCERTS	1300	64	59	15	76
Ammonium - Exchangeable as NH ₄	mg/kg	0.5	MCERTS	43	40	4.2	410	200

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	14	1.3	6.0	2.5	490
Acenaphthylene	mg/kg	0.05	MCERTS	0.23	< 0.05	5.3	0.40	210
Acenaphthene	mg/kg	0.05	MCERTS	0.75	0.44	53	0.54	42
Fluorene	mg/kg	0.05	MCERTS	0.57	0.45	62	1.8	230
Phenanthrene	mg/kg	0.05	MCERTS	1.2	0.96	220	5.5	680
Anthracene	mg/kg	0.05	MCERTS	0.26	0.23	60	1.1	210
Fluoranthene	mg/kg	0.05	MCERTS	1.1	0.48	150	2.0	460
Pyrene	mg/kg	0.05	MCERTS	0.83	0.42	110	1.3	310
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.36	< 0.05	55	0.56	190
Chrysene	mg/kg	0.05	MCERTS	0.40	< 0.05	25	0.58	130
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.32	< 0.05	38	0.42	140
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.25	< 0.05	19	0.37	70
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.32	< 0.05	37	0.57	130
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.17	< 0.05	18	0.22	52
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	5.0	< 0.05	13
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.23	< 0.05	18	0.21	56

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	21.0	4.30	878	18.2	3420
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Analytical Report Number: 17-68145

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number	860907	860908	860909	860910	860911
Sample Reference	BH04B	BH04B	BH04B	BH03C	BH03C
Sample Number	4	5	7	5	6
Depth (m)	1.80-1.90	3.70-3.80	8.50-8.60	2.60-2.70	3.50-3.60
Date Sampled	14/11/2017	14/11/2017	14/11/2017	14/11/2017	14/11/2017
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	2.9	1.5	9.3	4.0
Boron (water soluble)	mg/kg	0.2	MCERTS	4.6	0.9	0.2	0.7	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	0.3	0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	12	< 1.0	14	4.1
Copper (aqua regia extractable)	mg/kg	1	MCERTS	33	5.6	3.7	5.2	3.3
Lead (aqua regia extractable)	mg/kg	1	MCERTS	97	4.4	2.4	4.1	1.6
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	15	2.2	15	4.4
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.1	< 1.0	< 1.0	2.5
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	46	20	14	25	9.5

Monoaromatics

Benzene	ug/kg	1	MCERTS	8.7	8.3	< 1.0	3.5	59
Toluene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	7.5	1800
Ethylbenzene	ug/kg	1	MCERTS	19	16	< 1.0	3.4	620
p & m-xylene	ug/kg	1	MCERTS	2.7	4.8	< 1.0	16	5200
o-xylene	ug/kg	1	MCERTS	6.2	6.7	< 1.0	4.9	2100
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	2.0	1.4	< 1.0	12
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	21	23	18	< 2.0	57
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	32	23	29	< 8.0	31
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	19	20	32	< 8.0	15
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	72	68	80	< 10	110

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	0.009	0.008	< 0.001	0.003	0.059
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	0.007	1.8
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	0.12	0.18	0.13	0.035	14
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	14	2.8	19	7.4	350
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	40	22	350	21	1200
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	44	14	660	20	2600
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	37	< 10	560	20	2900
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	140	49	1600	68	7000

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
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Analytical Report Number: 17-68145

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860912	860913	860914	860915	860916
Sample Reference				BH04B	BH04B	BH04B	BH03C	BH03C
Sample Number				4	5	7	5	6
Depth (m)				1.80-1.90	3.70-3.80	8.50-8.60	2.60-2.70	3.50-3.60
Date Sampled				14/11/2017	14/11/2017	14/11/2017	14/11/2017	14/11/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200	< 200	< 200	< 200
Sulphate as SO ₄	mg/l	0.1	ISO 17025	18.5	8.4	2.6	8.2	22.3
Chloride	mg/l	0.15	ISO 17025	3.7	2.8	1.9	1.7	4.0
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	2800	2400	260	25000	11000
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	11.1	7.55	4.82	9.05	12.3

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	8.3	8.1	170	25	950
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01	2.3	1.1	69
Acenaphthene	µg/l	0.01	NONE	0.19	0.47	37	1.2	6.6
Fluorene	µg/l	0.01	NONE	0.10	0.13	11	1.6	12
Phenanthrene	µg/l	0.01	NONE	0.13	0.13	8.0	2.2	10
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	0.99	0.23	4.7
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	0.56	0.26	0.56
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	0.36	0.14	0.29
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	8.7	8.8	230	31	1100
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Analytical Report Number: 17-68145

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860912	860913	860914	860915	860916
Sample Reference				BH04B	BH04B	BH04B	BH03C	BH03C
Sample Number				4	5	7	5	6
Depth (m)				1.80-1.90	3.70-3.80	8.50-8.60	2.60-2.70	3.50-3.60
Date Sampled				14/11/2017	14/11/2017	14/11/2017	14/11/2017	14/11/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	1.8	< 1.1	9.0	6.7
Boron (dissolved)	µg/l	10	ISO 17025	110	13	< 10	16	22
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.4	0.5	< 0.4	4.6	0.5
Copper (dissolved)	µg/l	0.7	ISO 17025	18	11	7.8	22	14
Lead (dissolved)	µg/l	1	ISO 17025	1.8	1.7	< 1.0	1.4	2.3
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	0.5	2.1	< 0.3	9.0	1.5
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	4.0	< 4.0	< 4.0	19
Zinc (dissolved)	µg/l	0.4	ISO 17025	5.4	4.9	4.5	23	3.8

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	51
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	250
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	25
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	90
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	70
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	51
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	250
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	270
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	170	37	1000
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	180	13	490
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	100	< 10	16
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	450	50	2100

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
PCB Congener 52	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PCB Congener 118	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
PCB Congener 138	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
PCB Congener 153	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
PCB Congener 180	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
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Analytical Report Number : 17-68145

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860907	BH04B	4	1.80-1.90	Brown clay.
860908	BH04B	5	3.70-3.80	Grey sandy clay with gravel and vegetation.
860909	BH04B	7	8.50-8.60	Beige chalk with gravel. **
860910	BH03C	5	2.60-2.70	Grey clay.
860911	BH03C	6	3.50-3.60	Grey sandy clay with gravel and oil / petroleum.

** Non MCerts Matrix

Analytical Report Number : 17-68145

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Exchangeable Ammonium as NH ₄ in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Exchangeable Ammonium as NH ₄ in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68145

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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The results included within the report are representative of the samples submitted for analysis.

Page 8 of 8

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Analytical Report Number : 17-68146

Project / Site name:	Gasworks Road, Reading	Samples received on:	08/11/2017
Your job number:	33572-TW	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	2 leachate samples - 2 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-68146

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860917	860918			
Sample Reference				BH02	BH02			
Sample Number				4	6			
Depth (m)				1.80-1.90	6.00-6.10			
Date Sampled				08/11/2017	08/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	33	< 0.1			
Moisture Content	%	N/A	NONE	21	12			
Total mass of sample received	kg	0.001	NONE	1.7	2.0			

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.6	8.6			
Total Cyanide	mg/kg	1	MCERTS	14	2			
Complex Cyanide	mg/kg	1	MCERTS	14	2			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	750	68			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.38	0.034			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	377	34.1			
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	28	-			
Elemental Sulphur	mg/kg	5	MCERTS	620	-			
Ammonium - Exchangeable as NH ₄	mg/kg	0.5	MCERTS	100	-			

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20			
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3			
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.3	-			
Acenaphthylene	mg/kg	0.05	MCERTS	0.68	-			
Acenaphthene	mg/kg	0.05	MCERTS	0.82	-			
Fluorene	mg/kg	0.05	MCERTS	3.2	-			
Phenanthrene	mg/kg	0.05	MCERTS	16	-			
Anthracene	mg/kg	0.05	MCERTS	5.4	-			
Fluoranthene	mg/kg	0.05	MCERTS	16	-			
Pyrene	mg/kg	0.05	MCERTS	12	-			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	7.5	-			
Chrysene	mg/kg	0.05	MCERTS	4.8	-			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	6.1	-			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	2.7	-			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.9	-			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.2	-			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.48	-			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.0	-			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	86.9	-			
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Analytical Report Number: 17-68146

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860917	860918			
Sample Reference				BH02	BH02			
Sample Number				4	6			
Depth (m)				1.80-1.90	6.00-6.10			
Date Sampled				08/11/2017	08/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.3	4.3			
Boron (water soluble)	mg/kg	0.2	MCERTS	2.1	0.3			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	10			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	4.3			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	19	4.3			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	7.7			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	25	14			

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	-			
Toluene	ug/kg	1	MCERTS	< 1.0	-			
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	-			
p & m-xylene	ug/kg	1	MCERTS	< 1.0	-			
o-xylene	ug/kg	1	MCERTS	< 1.0	-			
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	-			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.5	-			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	5.5	-			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	12	-			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	26	-			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	4.5	-			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	19	-			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	71	-			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	58	-			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	150	-			



Analytical Report Number: 17-68146

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860917	860918			
Sample Reference				BH02	BH02			
Sample Number				4	6			
Depth (m)				1.80-1.90	6.00-6.10			
Date Sampled				08/11/2017	08/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-			

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-			
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Analytical Report Number: 17-68146

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number	860919	860920			
Sample Reference	BH02	BH02			
Sample Number	4	6			
Depth (m)	1.80-1.90	6.00-6.10			
Date Sampled	08/11/2017	08/11/2017			
Time Taken	None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	42	11			
Complex Cyanide	µg/l	10	ISO 17025	42	11			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200			
Sulphate as SO ₄	mg/l	0.1	ISO 17025	61.7	10.1			
Chloride	mg/l	0.15	ISO 17025	3.9	1.3			
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	3400	780			
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	6.86	3.67			

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	2.0	1.1			
Acenaphthylene	µg/l	0.01	NONE	0.61	0.33			
Acenaphthene	µg/l	0.01	NONE	0.91	0.79			
Fluorene	µg/l	0.01	NONE	1.5	0.32			
Phenanthrene	µg/l	0.01	NONE	2.2	0.18			
Anthracene	µg/l	0.01	NONE	0.32	0.26			
Fluoranthene	µg/l	0.01	NONE	0.36	0.11			
Pyrene	µg/l	0.01	NONE	0.21	< 0.01			
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	8.1	3.1			
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Analytical Report Number: 17-68146

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860919	860920			
Sample Reference				BH02	BH02			
Sample Number				4	6			
Depth (m)				1.80-1.90	6.00-6.10			
Date Sampled				08/11/2017	08/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	7.1	< 1.1			
Boron (dissolved)	µg/l	10	ISO 17025	130	< 10			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.1	0.4			
Copper (dissolved)	µg/l	0.7	ISO 17025	14	6.4			
Lead (dissolved)	µg/l	1	ISO 17025	1.1	1.2			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.4	< 0.3			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Zinc (dissolved)	µg/l	0.4	ISO 17025	3.0	4.8			

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			



Analytical Report Number: 17-68146

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860919	860920			
Sample Reference				BH02	BH02			
Sample Number				4	6			
Depth (m)				1.80-1.90	6.00-6.10			
Date Sampled				08/11/2017	08/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 52	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 118	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 138	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 153	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 180	µg/l	0.05	NONE	< 0.05	< 0.05			

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40	< 0.40			
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Analytical Report Number : 17-68146

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860917	BH02	4	1.80-1.90	Light brown sandy clay with gravel and stones.
860918	BH02	6	6.00-6.10	Light brown sandy clay with gravel.

Analytical Report Number : 17-68146

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Exchangeable Ammonium as NH ₄ in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Exchangeable Ammonium as NH ₄ in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68146

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68147

Project / Site name:	Gasworks Road, Reading	Samples received on:	13/11/2017
Your job number:	33572-TW	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	3 leachate samples - 4 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-68147

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860921	860922	860923	860924	
Sample Reference				BH06A	BH06A	BH06A	BH06A	
Sample Number				3	4	6	7	
Depth (m)				1.60-1.70	1.85-1.95	6.40-6.50	8.50-8.60	
Date Sampled				13/11/2017	13/11/2017	13/11/2017	13/11/2017	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	12	24	13	20	
Total mass of sample received	kg	0.001	NONE	1.9	1.7	2.0	2.0	

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Not-detected	
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.8	8.0	-	8.2	
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	
Complex Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0	-	< 5.0	
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	200	860	-	30	
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.10	0.43	-	0.015	
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	102	430	-	14.8	
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	20	86	-	14	
Elemental Sulphur	mg/kg	5	MCERTS	16	1800	-	7.0	
Ammonium - Exchangeable as NH ₄	mg/kg	0.5	MCERTS	< 0.5	360	-	5.8	
Organic Matter	%	0.1	MCERTS	-	-	0.2	-	
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	< 0.1	-	
Loss on Ignition @ 450°C	%	0.2	MCERTS	-	-	0.4	-	

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	-	< 0.10	
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	-	< 0.10	
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	-	< 0.30	
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	-	< 0.20	
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	-	< 0.10	
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	-	< 0.10	
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	-	< 0.10	
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	-	< 0.30	

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	-	< 1.3	
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.29	4.6	-	< 0.05	
Acenaphthylene	mg/kg	0.05	MCERTS	0.64	< 0.05	-	< 0.05	
Acenaphthene	mg/kg	0.05	MCERTS	0.57	0.35	-	< 0.05	
Fluorene	mg/kg	0.05	MCERTS	0.61	0.33	-	< 0.05	
Phenanthrene	mg/kg	0.05	MCERTS	7.9	0.45	-	< 0.05	
Anthracene	mg/kg	0.05	MCERTS	2.2	< 0.05	-	< 0.05	
Fluoranthene	mg/kg	0.05	MCERTS	14	0.34	-	< 0.05	
Pyrene	mg/kg	0.05	MCERTS	12	0.31	-	< 0.05	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	7.0	< 0.05	-	< 0.05	
Chrysene	mg/kg	0.05	MCERTS	4.7	< 0.05	-	< 0.05	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	6.5	< 0.05	-	< 0.05	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.3	< 0.05	-	< 0.05	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	6.1	< 0.05	-	< 0.05	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.1	< 0.05	-	< 0.05	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.68	< 0.05	-	< 0.05	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.7	< 0.05	-	< 0.05	

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	73.1	6.36	-	< 0.80	
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Analytical Report Number: 17-68147

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number	860921	860922	860923	860924	
Sample Reference	BH06A	BH06A	BH06A	BH06A	
Sample Number	3	4	6	7	
Depth (m)	1.60-1.70	1.85-1.95	6.40-6.50	8.50-8.60	
Date Sampled	13/11/2017	13/11/2017	13/11/2017	13/11/2017	
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	13	-	< 1.0	
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	4.9	-	< 0.2	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	0.3	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.1	17	-	< 1.0	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	160	-	5.9	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22	81	-	2.2	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.3	-	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12	19	-	3.3	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	19	75	-	11	

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
Toluene	ug/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	12	-	< 1.0	
p & m-xylene	ug/kg	1	MCERTS	< 1.0	6.2	-	< 1.0	
o-xylene	ug/kg	1	MCERTS	< 1.0	15	-	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	5.0	4.0	-	< 1.0	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	99	50	-	< 2.0	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	72	47	-	< 8.0	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	25	< 8.0	-	< 8.0	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	200	110	-	< 10	

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	0.085	-	< 0.001	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	3.6	17	-	< 1.0	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	41	70	-	< 2.0	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	130	54	-	< 10	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	230	39	-	< 10	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	410	180	-	< 10	

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007	-	< 0.007	
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Analytical Report Number: 17-68147

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number	860925	860926	860927		
Sample Reference	BH06A	BH06A	BH06A		
Sample Number	3	4	7		
Depth (m)	1.60-1.70	1.85-1.95	8.50-8.60		
Date Sampled	13/11/2017	13/11/2017	13/11/2017		
Time Taken	None Supplied	None Supplied	None Supplied		
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10		
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10		
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10		
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200	< 200		
Sulphate as SO ₄	mg/l	0.1	ISO 17025	8.2	26.7	1.5		
Chloride	mg/l	0.15	ISO 17025	1.4	6.4	1.1		
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	89	16000	590		
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	4.66	15.5	3.54		

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5		
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	2.8	5.0	< 0.01		
Acenaphthylene	µg/l	0.01	NONE	0.10	0.15	< 0.01		
Acenaphthene	µg/l	0.01	NONE	0.47	0.36	< 0.01		
Fluorene	µg/l	0.01	NONE	0.27	0.22	< 0.01		
Phenanthrene	µg/l	0.01	NONE	0.58	0.14	< 0.01		
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Fluoranthene	µg/l	0.01	NONE	0.11	< 0.01	< 0.01		
Pyrene	µg/l	0.01	NONE	0.09	< 0.01	< 0.01		
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	4.4	5.8	< 0.2		
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Analytical Report Number: 17-68147

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860925	860926	860927		
Sample Reference				BH06A	BH06A	BH06A		
Sample Number				3	4	7		
Depth (m)				1.60-1.70	1.85-1.95	8.50-8.60		
Date Sampled				13/11/2017	13/11/2017	13/11/2017		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	2.0	3.9	< 1.1		
Boron (dissolved)	µg/l	10	ISO 17025	< 10	88	< 10		
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08		
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.9	0.9	< 0.4		
Copper (dissolved)	µg/l	0.7	ISO 17025	8.0	24	6.1		
Lead (dissolved)	µg/l	1	ISO 17025	2.2	3.1	< 1.0		
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5		
Nickel (dissolved)	µg/l	0.3	ISO 17025	< 0.3	1.6	< 0.3		
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0		
Zinc (dissolved)	µg/l	0.4	ISO 17025	3.5	6.9	3.8		

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10	< 10		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10		

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10		

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05		
PCB Congener 52	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05		
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02		
PCB Congener 118	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05		
PCB Congener 138	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05		
PCB Congener 153	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05		
PCB Congener 180	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05		

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40	< 0.40	< 0.40		
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Analytical Report Number : 17-68147

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860921	BH06A	3	1.60-1.70	Light brown sand with gravel and brick.
860922	BH06A	4	1.85-1.95	Brown clay with gravel.
860923	BH06A	6	6.40-6.50	Light brown sand with gravel.
860924	BH06A	7	8.50-8.60	Beige chalk. **

** Non MCERTS matrix.

Analytical Report Number : 17-68147

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Exchangeable Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Exchangeable Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68147

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68147

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

**Gary Riches**

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Analytical Report Number : 17-68148

Project / Site name:	Gasworks Road, Reading	Samples received on:	06/11/2017
Your job number:	33572-TW	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	1 leachate sample - 2 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-68148

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860928	860929			
Sample Reference				BH01	BH01			
Sample Number				1	2			
Depth (m)				0.10-0.30	0.50-0.70			
Date Sampled				06/11/2017	06/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	14	8.0			
Total mass of sample received	kg	0.001	NONE	2.0	1.8			

Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected			
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	10.6			
Total Cyanide	mg/kg	1	MCERTS	-	5			
Complex Cyanide	mg/kg	1	MCERTS	-	5			
Free Cyanide	mg/kg	1	MCERTS	-	< 1			
Thiocyanate as SCN	mg/kg	5	NONE	-	7.1			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	600			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.30			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	300			
Organic Matter	%	0.1	MCERTS	3.7	-			
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.1	-			
Loss on Ignition @ 450°C	%	0.2	MCERTS	6.0	-			

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	-	< 0.10			
Resorcinol	mg/kg	0.1	ISO 17025	-	< 0.10			
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	-	< 0.30			
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	-	< 0.20			
2-Isopropylphenol	mg/kg	0.1	ISO 17025	-	< 0.10			
Phenol	mg/kg	0.1	ISO 17025	-	< 0.10			
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	-	< 0.10			
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	-	< 0.30			

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	-	< 1.3			
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	15			
Boron (water soluble)	mg/kg	0.2	MCERTS	-	2.5			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	16			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	38			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	250			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	26			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	63			



Analytical Report Number: 17-68148

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860930				
Sample Reference				BH01				
Sample Number				2				
Depth (m)				0.50-0.70				
Date Sampled				06/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	160				
Complex Cyanide	µg/l	10	ISO 17025	160				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	350				
Sulphate as SO ₄	mg/l	0.1	ISO 17025	23.3				
Chloride	mg/l	0.15	ISO 17025	3.9				
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	250				
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	7.99				

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	< 0.01				
Acenaphthylene	µg/l	0.01	NONE	< 0.01				
Acenaphthene	µg/l	0.01	NONE	< 0.01				
Fluorene	µg/l	0.01	NONE	< 0.01				
Phenanthrene	µg/l	0.01	NONE	< 0.01				
Anthracene	µg/l	0.01	NONE	< 0.01				
Fluoranthene	µg/l	0.01	NONE	< 0.01				
Pyrene	µg/l	0.01	NONE	< 0.01				
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01				
Chrysene	µg/l	0.01	NONE	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01				

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2				
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Analytical Report Number: 17-68148

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860930				
Sample Reference				BH01				
Sample Number				2				
Depth (m)				0.50-0.70				
Date Sampled				06/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	7.0				
Boron (dissolved)	µg/l	10	ISO 17025	28				
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08				
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.8				
Copper (dissolved)	µg/l	0.7	ISO 17025	24				
Lead (dissolved)	µg/l	1	ISO 17025	3.1				
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5				
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.6				
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0				
Zinc (dissolved)	µg/l	0.4	ISO 17025	5.7				

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10				



Analytical Report Number: 17-68148

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860930				
Sample Reference				BH01				
Sample Number				2				
Depth (m)				0.50-0.70				
Date Sampled				06/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05				
PCB Congener 52	µg/l	0.05	NONE	< 0.05				
PCB Congener 101	µg/l	0.02	NONE	< 0.02				
PCB Congener 118	µg/l	0.05	NONE	< 0.05				
PCB Congener 138	µg/l	0.05	NONE	< 0.05				
PCB Congener 153	µg/l	0.05	NONE	< 0.05				
PCB Congener 180	µg/l	0.05	NONE	< 0.05				

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40				
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Analytical Report Number : 17-68148

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860928	BH01	1	0.10-0.30	Brown loam and sand with gravel and rubble.
860929	BH01	2	0.50-0.70	Brown loam and clay with gravel and rubble.

Analytical Report Number : 17-68148

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Exchangeable Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE

Iss No 17-68148-1 Gasworks Road, Reading 33572-TW

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68148

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH01	1	S	17-68148	860928	c	Total organic carbon (Automated) in soil	L009-PL	c
BH01	2	S	17-68148	860929	c	Free cyanide in soil	L080-PL	c
BH01	2	S	17-68148	860929	c	Complex Cyanide in soil	L080-PL	c
BH01	2	S	17-68148	860929	c	Thiocyanate in soil	L082-PL	c
BH01	2	S	17-68148	860929	c	Total cyanide in soil	L080-PL	c

**Gary Riches**

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Analytical Report Number : 17-68149

Project / Site name:	Gasworks Road, Reading	Samples received on:	10/11/2017
Your job number:	33572-TW	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	2 leachate samples - 2 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-68149

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860931	860932			
Sample Reference				TP01	TP02			
Sample Number				1	1			
Depth (m)				0.50-0.60	0.70-0.80			
Date Sampled				10/11/2017	10/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	7.6	15			
Total mass of sample received	kg	0.001	NONE	2.0	1.9			

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.0	8.3			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Complex Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	870	1200			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.43	0.60			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	435	602			
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	17	-			
Elemental Sulphur	mg/kg	5	MCERTS	< 5.0	-			
Ammonium - Exchangeable as NH ₄	mg/kg	0.5	MCERTS	< 0.5	-			

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20			
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3			
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.34	-			
Acenaphthylene	mg/kg	0.05	MCERTS	0.48	-			
Acenaphthene	mg/kg	0.05	MCERTS	0.11	-			
Fluorene	mg/kg	0.05	MCERTS	0.23	-			
Phenanthrene	mg/kg	0.05	MCERTS	4.8	-			
Anthracene	mg/kg	0.05	MCERTS	1.3	-			
Fluoranthene	mg/kg	0.05	MCERTS	9.3	-			
Pyrene	mg/kg	0.05	MCERTS	7.4	-			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	6.9	-			
Chrysene	mg/kg	0.05	MCERTS	4.1	-			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.9	-			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.7	-			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	6.1	-			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.0	-			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.65	-			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.8	-			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	56.8	-			
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Analytical Report Number: 17-68149

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number	860931	860932			
Sample Reference	TP01	TP02			
Sample Number	1	1			
Depth (m)	0.50-0.60	0.70-0.80			
Date Sampled	10/11/2017	10/11/2017			
Time Taken	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.1	14			
Boron (water soluble)	mg/kg	0.2	MCERTS	1.9	1.8			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	17			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	26			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	220			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	23			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	29	55			

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	-			
Toluene	ug/kg	1	MCERTS	< 1.0	-			
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	-			
p & m-xylene	ug/kg	1	MCERTS	< 1.0	-			
o-xylene	ug/kg	1	MCERTS	< 1.0	-			
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	-			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	2.1	-			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	8.5	-			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	47	-			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	85	-			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	140	-			

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-			
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-			

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-			
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Analytical Report Number: 17-68149

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860933	860934			
Sample Reference				TP01	TP02			
Sample Number				1	1			
Depth (m)				0.50-0.60	0.70-0.80			
Date Sampled				10/11/2017	10/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	< 10	12			
Complex Cyanide	µg/l	10	ISO 17025	< 10	12			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200			
Sulphate as SO ₄	mg/l	0.1	ISO 17025	49.3	63.0			
Chloride	mg/l	0.15	ISO 17025	0.73	2.6			
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	130	130			
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	5.53	4.94			

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	2.4	< 0.01			
Acenaphthylene	µg/l	0.01	NONE	0.12	< 0.01			
Acenaphthene	µg/l	0.01	NONE	0.47	< 0.01			
Fluorene	µg/l	0.01	NONE	0.51	< 0.01			
Phenanthrene	µg/l	0.01	NONE	0.95	< 0.01			
Anthracene	µg/l	0.01	NONE	0.14	< 0.01			
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	4.6	< 0.2			
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Analytical Report Number: 17-68149

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860933	860934			
Sample Reference				TP01	TP02			
Sample Number				1	1			
Depth (m)				0.50-0.60	0.70-0.80			
Date Sampled				10/11/2017	10/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	3.0	1.9			
Boron (dissolved)	µg/l	10	ISO 17025	58	34			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.7	0.9			
Copper (dissolved)	µg/l	0.7	ISO 17025	14	9.9			
Lead (dissolved)	µg/l	1	ISO 17025	3.5	3.7			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Nickel (dissolved)	µg/l	0.3	ISO 17025	< 0.3	0.4			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.8	6.3			

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 52	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 118	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 138	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 153	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 180	µg/l	0.05	NONE	< 0.05	< 0.05			

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40	< 0.40			
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Analytical Report Number : 17-68149

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860931	TP01	1	0.50-0.60	Light brown sand with gravel and rubble.
860932	TP02	1	0.70-0.80	Brown sandy clay with gravel and rubble.

Analytical Report Number : 17-68149

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Exchangeable Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Exchangeable Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68149

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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The results included within the report are representative of the samples submitted for analysis.

Page 8 of 8

**Gary Riches**

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Analytical Report Number : 17-68160

Project / Site name:	Gasworks Road, Reading	Samples received on:	21/11/2017
Your job number:	33572	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	1 leachate sample - 1 soil sample		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-68160

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860956				
Sample Reference				BH04B				
Sample Number				2				
Depth (m)				0.50-0.70				
Date Sampled				13/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	32				
Moisture Content	%	N/A	NONE	13				
Total mass of sample received	kg	0.001	NONE	1.6				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.0				
Total Cyanide	mg/kg	1	MCERTS	3				
Complex Cyanide	mg/kg	1	MCERTS	3				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0				
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	85				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.042				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	42.3				
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	6.2				
Elemental Sulphur	mg/kg	5	MCERTS	< 5.0				
Ammonium - Exchangeable as NH ₄	mg/kg	0.5	MCERTS	< 0.5				

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10				
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10				
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30				
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20				
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10				
Phenol	mg/kg	0.1	ISO 17025	< 0.10				
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10				
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30				

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3				
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Analytical Report Number: 17-68160

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860956				
Sample Reference				BH04B				
Sample Number				2				
Depth (m)				0.50-0.70				
Date Sampled				13/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	3.7				
Acenaphthylene	mg/kg	0.05	MCERTS	15				
Acenaphthene	mg/kg	0.05	MCERTS	2.5				
Fluorene	mg/kg	0.05	MCERTS	12				
Phenanthrene	mg/kg	0.05	MCERTS	190				
Anthracene	mg/kg	0.05	MCERTS	57				
Fluoranthene	mg/kg	0.05	MCERTS	340				
Pyrene	mg/kg	0.05	MCERTS	270				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	180				
Chrysene	mg/kg	0.05	MCERTS	140				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	140				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	90				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	140				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	81				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	24				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	85				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1760				
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	22				
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	36				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	200				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	63				

Analytical Report Number: 17-68160

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number	860956				
Sample Reference	BH04B				
Sample Number	2				
Depth (m)	0.50-0.70				
Date Sampled	13/11/2017				
Time Taken	None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0				
Toluene	ug/kg	1	MCERTS	< 1.0				
Ethylbenzene	ug/kg	1	MCERTS	< 1.0				
p & m-xylene	ug/kg	1	MCERTS	< 1.0				
o-xylene	ug/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	2.2				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	9.4				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	17				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	28				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	56				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	4.5				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	90				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	1100				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	1500				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	2700				

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001				

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007				
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Analytical Report Number: 17-68160

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860957				
Sample Reference				BH04B				
Sample Number				2				
Depth (m)				0.50-0.70				
Date Sampled				13/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	< 10				
Complex Cyanide	µg/l	10	ISO 17025	< 10				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200				
Sulphate as SO ₄	mg/l	0.1	ISO 17025	5.3				
Chloride	mg/l	0.15	ISO 17025	0.86				
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	120				
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	4.80				

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	0.36				
Acenaphthylene	µg/l	0.01	NONE	0.27				
Acenaphthene	µg/l	0.01	NONE	0.35				
Fluorene	µg/l	0.01	NONE	< 0.01				
Phenanthrene	µg/l	0.01	NONE	0.31				
Anthracene	µg/l	0.01	NONE	0.29				
Fluoranthene	µg/l	0.01	NONE	0.58				
Pyrene	µg/l	0.01	NONE	0.45				
Benzo(a)anthracene	µg/l	0.01	NONE	0.30				
Chrysene	µg/l	0.01	NONE	0.23				
Benzo(b)fluoranthene	µg/l	0.01	NONE	0.34				
Benzo(k)fluoranthene	µg/l	0.01	NONE	0.13				
Benzo(a)pyrene	µg/l	0.01	NONE	0.22				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	0.16				
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	NONE	0.17				

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	4.2				
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Analytical Report Number: 17-68160

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860957				
Sample Reference				BH04B				
Sample Number				2				
Depth (m)				0.50-0.70				
Date Sampled				13/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	5.4				
Boron (dissolved)	µg/l	10	ISO 17025	< 10				
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08				
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.9				
Copper (dissolved)	µg/l	0.7	ISO 17025	10				
Lead (dissolved)	µg/l	1	ISO 17025	6.6				
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5				
Nickel (dissolved)	µg/l	0.3	ISO 17025	< 0.3				
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0				
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.7				

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10				



Analytical Report Number: 17-68160

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860957				
Sample Reference				BH04B				
Sample Number				2				
Depth (m)				0.50-0.70				
Date Sampled				13/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05				
PCB Congener 52	µg/l	0.05	NONE	< 0.05				
PCB Congener 101	µg/l	0.02	NONE	< 0.02				
PCB Congener 118	µg/l	0.05	NONE	< 0.05				
PCB Congener 138	µg/l	0.05	NONE	< 0.05				
PCB Congener 153	µg/l	0.05	NONE	< 0.05				
PCB Congener 180	µg/l	0.05	NONE	< 0.05				

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40				
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Analytical Report Number : 17-68160

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860956	BH04B	2	0.50-0.70	Brown clay and sand with gravel and stones.

Analytical Report Number : 17-68160

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Exchangeable Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Exchangeable Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68160

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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The results included within the report are representative of the samples submitted for analysis.

Page 10 of 10

**Gary Riches**

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Analytical Report Number : 17-68164

Project / Site name:	Gasworks Road, Reading	Samples received on:	21/11/2017
Your job number:	33572	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	2 leachate samples - 2 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-68164

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860975	860976			
Sample Reference				TP05	TP03			
Sample Number				2	2			
Depth (m)				0.70-0.80	0.50-0.60			
Date Sampled				10/11/2017	10/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	21			
Moisture Content	%	N/A	NONE	20	12			
Total mass of sample received	kg	0.001	NONE	1.6	1.9			

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	8.3			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Complex Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	330	290			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.16	0.15			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	164	145			

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20			
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3			
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	13			
Boron (water soluble)	mg/kg	0.2	MCERTS	1.5	1.1			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	17			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	29			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	26	330			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22	25			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	41	43			



Analytical Report Number: 17-68164

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860977	860978			
Sample Reference				TP05	TP03			
Sample Number				2	2			
Depth (m)				0.70-0.80	0.50-0.60			
Date Sampled				10/11/2017	10/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200			
Sulphate as SO ₄	mg/l	0.1	ISO 17025	18.9	23.9			
Chloride	mg/l	0.15	ISO 17025	5.2	1.5			
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	170	130			
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	5.47	4.06			

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01			
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01			
Acenaphthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Fluorene	µg/l	0.01	NONE	< 0.01	< 0.01			
Phenanthrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2			
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	3.4	< 1.1			
Boron (dissolved)	µg/l	10	ISO 17025	26	27			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.9	0.8			
Copper (dissolved)	µg/l	0.7	ISO 17025	7.4	6.6			
Lead (dissolved)	µg/l	1	ISO 17025	1.2	5.6			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Nickel (dissolved)	µg/l	0.3	ISO 17025	< 0.3	0.6			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Zinc (dissolved)	µg/l	0.4	ISO 17025	4.6	4.2			



Analytical Report Number: 17-68164

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860977	860978			
Sample Reference				TP05	TP03			
Sample Number				2	2			
Depth (m)				0.70-0.80	0.50-0.60			
Date Sampled				10/11/2017	10/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 52	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 118	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 138	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 153	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 180	µg/l	0.05	NONE	< 0.05	< 0.05			

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40	< 0.40			
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Analytical Report Number : 17-68164

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860975	TP05	2	0.70-0.80	Brown clay and sand with gravel and vegetation.
860976	TP03	2	0.50-0.60	Brown clay and sand with gravel and stones.

Analytical Report Number : 17-68164

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Exchangeable Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE

Iss No 17-68164-1 Gasworks Road, Reading 33572

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The results included within the report are representative of the samples submitted for analysis.

Page 6 of 7

Analytical Report Number : 17-68164

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

**Gary Riches**

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Analytical Report Number : 17-68167

Project / Site name:	Gasworks Road, Reading	Samples received on:	08/11/2017
Your job number:	33572	Samples instructed on:	21/11/2017
Your order number:	L00356	Analysis completed by:	27/11/2017
Report Issue Number:	1	Report issued on:	27/11/2017
Samples Analysed:	1 leachate sample - 2 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-68167

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860985	860986			
Sample Reference				BH02	BH02			
Sample Number				2	3			
Depth (m)				0.50-0.70	1.00-1.20			
Date Sampled				07/11/2017	07/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	7.6	9.3			
Total mass of sample received	kg	0.001	NONE	2.0	1.9			

Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected			
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	10.7			
Total Cyanide	mg/kg	1	MCERTS	-	< 1			
Complex Cyanide	mg/kg	1	MCERTS	-	< 1			
Free Cyanide	mg/kg	1	MCERTS	-	< 1			
Thiocyanate as SCN	mg/kg	5	NONE	-	< 5.0			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	1900			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.96			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	965			
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	-	89			
Elemental Sulphur	mg/kg	5	MCERTS	-	< 5.0			
Ammonium - Exchangeable as NH ₄	mg/kg	0.5	MCERTS	-	< 0.5			
Organic Matter	%	0.1	MCERTS	0.7	-			
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.4	-			
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.4	-			

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	-	< 0.10			
Resorcinol	mg/kg	0.1	ISO 17025	-	< 0.10			
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	-	< 0.30			
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	-	< 0.20			
2-Isopropylphenol	mg/kg	0.1	ISO 17025	-	< 0.10			
Phenol	mg/kg	0.1	ISO 17025	-	< 0.10			
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	-	< 0.10			
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	-	< 0.30			

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	-	< 1.3			
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	-	0.62			
Anthracene	mg/kg	0.05	MCERTS	-	0.20			
Fluoranthene	mg/kg	0.05	MCERTS	-	1.7			
Pyrene	mg/kg	0.05	MCERTS	-	1.5			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	1.6			
Chrysene	mg/kg	0.05	MCERTS	-	0.85			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	2.0			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.76			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	1.8			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	1.0			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	0.23			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	1.1			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	13.1			
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Analytical Report Number: 17-68167

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number	860985	860986			
Sample Reference	BH02	BH02			
Sample Number	2	3			
Depth (m)	0.50-0.70	1.00-1.20			
Date Sampled	07/11/2017	07/11/2017			
Time Taken	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	8.8			
Boron (water soluble)	mg/kg	0.2	MCERTS	-	2.2			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	22			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	34			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	52			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	17			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	70			

Monoaromatics

Benzene	ug/kg	1	MCERTS	-	< 1.0			
Toluene	ug/kg	1	MCERTS	-	< 1.0			
Ethylbenzene	ug/kg	1	MCERTS	-	< 1.0			
p & m-xylene	ug/kg	1	MCERTS	-	< 1.0			
o-xylene	ug/kg	1	MCERTS	-	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	< 1.0			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	7.8			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	32			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	180			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	220			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	5.4			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	9.3			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	29			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	140			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	180			

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	-	< 0.001			
PCB Congener 52	mg/kg	0.001	MCERTS	-	< 0.001			
PCB Congener 101	mg/kg	0.001	MCERTS	-	0.003			
PCB Congener 118	mg/kg	0.001	MCERTS	-	< 0.001			
PCB Congener 138	mg/kg	0.001	MCERTS	-	0.020			
PCB Congener 153	mg/kg	0.001	MCERTS	-	0.021			
PCB Congener 180	mg/kg	0.001	MCERTS	-	0.031			

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	-	0.076			
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Analytical Report Number: 17-68167

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860987				
Sample Reference				BH02				
Sample Number				3				
Depth (m)				1.00-1.20				
Date Sampled				07/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	< 10				
Complex Cyanide	µg/l	10	ISO 17025	< 10				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200				
Sulphate as SO ₄	mg/l	0.1	ISO 17025	32.3				
Chloride	mg/l	0.15	ISO 17025	1.7				
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	130				
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	4.26				

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	< 0.01				
Acenaphthylene	µg/l	0.01	NONE	< 0.01				
Acenaphthene	µg/l	0.01	NONE	< 0.01				
Fluorene	µg/l	0.01	NONE	< 0.01				
Phenanthrene	µg/l	0.01	NONE	< 0.01				
Anthracene	µg/l	0.01	NONE	< 0.01				
Fluoranthene	µg/l	0.01	NONE	< 0.01				
Pyrene	µg/l	0.01	NONE	< 0.01				
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01				
Chrysene	µg/l	0.01	NONE	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01				

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2				
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	3.3				
Boron (dissolved)	µg/l	10	ISO 17025	33				
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08				
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.4				
Copper (dissolved)	µg/l	0.7	ISO 17025	11				
Lead (dissolved)	µg/l	1	ISO 17025	4.1				
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5				
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.8				
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0				
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.0				



Analytical Report Number: 17-68167

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				860987				
Sample Reference				BH02				
Sample Number				3				
Depth (m)				1.00-1.20				
Date Sampled				07/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05				
PCB Congener 52	µg/l	0.05	NONE	< 0.05				
PCB Congener 101	µg/l	0.02	NONE	< 0.02				
PCB Congener 118	µg/l	0.05	NONE	< 0.05				
PCB Congener 138	µg/l	0.05	NONE	< 0.05				
PCB Congener 153	µg/l	0.05	NONE	< 0.05				
PCB Congener 180	µg/l	0.05	NONE	< 0.05				

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40				
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Analytical Report Number : 17-68167

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
860985	BH02	2	0.50-0.70	Brown sand with rubble and brick.
860986	BH02	3	1.00-1.20	Brown sand with rubble and brick.

Analytical Report Number : 17-68167

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Exchangeable Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Exchangeable Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS

Iss No 17-68167-1 Gasworks Road, Reading 33572

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-68167

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS

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Analytical Report Number : 17-68167

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

**Gary Riches**

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Analytical Report Number : 17-69087

Project / Site name:	Gasworks Road, Reading	Samples received on:	27/11/2017
Your job number:	33572-TW	Samples instructed on:	29/11/2017
Your order number:	L00356	Analysis completed by:	05/12/2017
Report Issue Number:	1	Report issued on:	05/12/2017
Samples Analysed:	1 leachate sample - 1 soil sample		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-69087

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				866207				
Sample Reference				BH02				
Sample Number				7				
Depth (m)				6.70-6.90				
Date Sampled				24/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	18				
Total mass of sample received	kg	0.001	NONE	1.7				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Complex Cyanide	mg/kg	1	MCERTS	< 1				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.022				
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	16				
Elemental Sulphur	mg/kg	5	MCERTS	130				
Ammonium - Exchangeable as NH ₄	mg/kg	0.5	MCERTS	6.1				

Phenols by HPLC

Catechol	mg/kg	0.1	ISO 17025	< 0.10				
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10				
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30				
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20				
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10				
Phenol	mg/kg	0.1	ISO 17025	< 0.10				
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10				
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30				

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3				
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Pyrene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80				
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Analytical Report Number: 17-69087

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				866207				
Sample Reference				BH02				
Sample Number				7				
Depth (m)				6.70-6.90				
Date Sampled				24/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	1.5				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	4.8				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	2.5				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	4.1				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.4				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	13				

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0				
Toluene	ug/kg	1	MCERTS	< 1.0				
Ethylbenzene	ug/kg	1	MCERTS	< 1.0				
p & m-xylene	ug/kg	1	MCERTS	< 1.0				
o-xylene	ug/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001				

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007				
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Analytical Report Number: 17-69087

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				866208				
Sample Reference				BH02				
Sample Number				7				
Depth (m)				6.70-6.90				
Date Sampled				24/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Total Cyanide	µg/l	10	ISO 17025	< 10				
Complex Cyanide	µg/l	10	ISO 17025	< 10				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200				
Sulphate as SO ₄	mg/l	0.1	ISO 17025	1.4				
Chloride	mg/l	0.15	ISO 17025	0.88				
Ammonium - Exchangeable as NH ₄	µg/l	15	NONE	280				
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	2.66				

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
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Speciated PAHs

Naphthalene	µg/l	0.01	NONE	< 0.01				
Acenaphthylene	µg/l	0.01	NONE	< 0.01				
Acenaphthene	µg/l	0.01	NONE	< 0.01				
Fluorene	µg/l	0.01	NONE	< 0.01				
Phenanthrene	µg/l	0.01	NONE	< 0.01				
Anthracene	µg/l	0.01	NONE	< 0.01				
Fluoranthene	µg/l	0.01	NONE	< 0.01				
Pyrene	µg/l	0.01	NONE	< 0.01				
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01				
Chrysene	µg/l	0.01	NONE	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01				

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2				
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1				
Boron (dissolved)	µg/l	10	ISO 17025	< 10				
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08				
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4				
Copper (dissolved)	µg/l	0.7	ISO 17025	5.6				
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0				
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5				
Nickel (dissolved)	µg/l	0.3	ISO 17025	0.4				
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0				
Zinc (dissolved)	µg/l	0.4	ISO 17025	4.8				



Analytical Report Number: 17-69087

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				866208				
Sample Reference				BH02				
Sample Number				7				
Depth (m)				6.70-6.90				
Date Sampled				24/11/2017				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				

PCBs by GC-MS

PCB Congener 28	µg/l	0.05	NONE	< 0.05				
PCB Congener 52	µg/l	0.05	NONE	< 0.05				
PCB Congener 101	µg/l	0.02	NONE	< 0.02				
PCB Congener 118	µg/l	0.05	NONE	< 0.05				
PCB Congener 138	µg/l	0.05	NONE	< 0.05				
PCB Congener 153	µg/l	0.05	NONE	< 0.05				
PCB Congener 180	µg/l	0.05	NONE	< 0.05				

PCBs by GC-MS

Total PCBs	µg/l	0.4	NONE	< 0.40				
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Analytical Report Number : 17-69087

Project / Site name: Gasworks Road, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
866207	BH02	7	6.70-6.90	Beige clay and sand with chalk.

Analytical Report Number : 17-69087

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Elemental sulphur in soil	Determination of elemental sulphur in soil by extraction in acetonitrile followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	D	MCERTS
Exchangeable Ammonium as NH4 in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Exchangeable Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-69087

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discrete analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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The results included within the report are representative of the samples submitted for analysis.

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Appendix 3: Gas and Groundwater Monitoring Results and Falling Head Test Results

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH01		27/11/17 13:20:00	1009	0.00								0.0	10		
BH01		27/11/17 13:21:00										0.0			
BH01		27/11/17 13:22:00										0.0			
BH01		27/11/17 13:23:00										0.0			
BH01		27/11/17 13:24:00										0.0			
BH01		27/11/17 13:25:00			3.5	9.1	0.6	0.0	0	0	2.5				
BH01		27/11/17 13:26:00			3.5	9.2	0.4	0.0	0	0	3.2				
BH01		27/11/17 13:27:00			3.5	9.2	0.4	0.0	0	0	3.7				
BH01		27/11/17 13:28:00			3.5	9.3	0.4	0.0	0	0	4.1				
BH01		27/11/17 13:29:00			3.5	9.3	0.3	0.0	0	0	4.3				
BH01		27/11/17 13:30:00			3.5	9.3	0.3	0.0	0	0	4.7				
BH01		27/11/17 13:31:00			3.5	9.3	0.3	0.0	0	0	5.0				
BH01		27/11/17 13:32:00			3.5	9.3	0.4	0.0	0	0	5.4				
BH01		27/11/17 13:33:00			3.5	9.1	0.7	0.0	0	0	5.9				
BH01		27/11/17 13:34:00			3.6	8.8	1.2	0.0	0	0	6.4				
BH01		27/11/17 13:35:00												1.64	
BH01		04/12/17 09:50:00	1031	0.00								0.0	9		
BH01		04/12/17 09:51:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH01		04/12/17 09:52:00										0.0			
BH01		04/12/17 09:53:00										0.0			
BH01		04/12/17 09:54:00										0.0			
BH01		04/12/17 09:55:00			4.0	4.7	0.3	0.0	0	0	9.1				
BH01		04/12/17 09:56:00			4.1	4.7	2.0	0.0	0	0	10.6				
BH01		04/12/17 09:57:00			4.1	4.7	0.1	0.0	0	0	11.9				
BH01		04/12/17 09:58:00			4.1	4.7	0.1	0.0	0	0	12.6				
BH01		04/12/17 09:59:00			4.1	4.7	0.1	0.0	0	0	13.4				
BH01		04/12/17 10:00:00			4.1	4.7	0.1	0.0	0	0	14.6				
BH01		04/12/17 10:01:00			4.2	4.7	0.2	0.0	0	0	15.7				
BH01		04/12/17 10:02:00			4.3	4.5	0.4	0.0	0	0	17.0				
BH01		04/12/17 10:03:00			4.4	4.4	0.8	0.0	0	0	18.5				
BH01		04/12/17 10:04:00			4.6	4.2	1.4	0.0	0	0	20.7				
BH01		04/12/17 10:05:00												1.67	
BH01		12/12/17 10:15:00	975	0.00								0.0	3		
BH01		12/12/17 10:16:00										0.0			
BH01		12/12/17 10:17:00										0.0			
BH01		12/12/17 10:18:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH01		12/12/17 10:19:00										0.0			
BH01		12/12/17 10:20:00			1.3	6.0	12.7	0.0	0	0	4.6				
BH01		12/12/17 10:21:00			1.1	4.6	13.9	0.0	0	0	5.6				
BH01		12/12/17 10:22:00			0.9	4.3	14.5	0.0	0	0	6.4				
BH01		12/12/17 10:23:00			0.8	3.9	15.2	0.0	0	0	8.1				
BH01		12/12/17 10:24:00			0.7	3.4	15.8	0.0	0	0	8.7				
BH01		12/12/17 10:25:00			0.7	3.2	16.0	0.0	0	0	8.9				
BH01		12/12/17 10:26:00			0.6	2.9	16.2	0.0	0	0	8.9				
BH01		12/12/17 10:27:00			0.6	2.7	16.7	0.0	0	0	8.8				
BH01		12/12/17 10:28:00			0.6	2.6	16.6	0.0	0	0	8.7				
BH01		12/12/17 10:29:00			0.5	2.5	16.8	0.0	0	0	8.8				
BH01		12/12/17 10:30:00												1.49	
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH02		04/12/17 10:15:00	1029	0.00								0.0	9		
BH02		04/12/17 10:16:00										0.0			
BH02		04/12/17 10:17:00										0.0			
BH02		04/12/17 10:18:00										0.0			
BH02		04/12/17 10:19:00										0.0			
BH02		04/12/17 10:20:00			0.2	0.0	19.3	0.0	0	0	18.2				
BH02		04/12/17 10:21:00			0.0	0.0	20.2	0.0	0	0	15.5				
BH02		04/12/17 10:22:00			0.0	0.0	20.3	0.0	0	0	13.4				
BH02		04/12/17 10:23:00			0.0	0.0	20.3	0.0	0	0	12.4				
BH02		04/12/17 10:24:00			0.0	0.0	20.3	0.0	0	0	11.5				
BH02		04/12/17 10:25:00			0.0	0.0	20.3	0.0	0	0	10.8				
BH02		04/12/17 10:26:00			0.0	0.0	20.3	0.0	0	0	10.3				
BH02		04/12/17 10:27:00			0.0	0.0	20.3	0.0	0	0	10.0				
BH02		04/12/17 10:28:00			0.0	0.0	20.3	0.0	0	0	9.6				
BH02		04/12/17 10:29:00			0.0	0.0	20.3	0.0	0	0	9.2				
BH02		04/12/17 10:30:00												1.76	
BH02		12/12/17 09:50:00	978	0.00								0.0	3		
BH02		12/12/17 09:51:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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	
BH02		12/12/17 09:52:00										0.0				
BH02		12/12/17 09:53:00										0.0				
BH02		12/12/17 09:54:00										0.0				
BH02		12/12/17 09:55:00			0.7	0.0	19.3	0.0	0	0	2.9					
BH02		12/12/17 09:56:00			0.7	0.0	19.4	0.0	0	0	2.9					
BH02		12/12/17 09:57:00			0.7	0.0	19.3	0.0	0	0	2.5					
BH02		12/12/17 09:58:00			0.7	0.0	19.2	0.0	0	0	2.3					
BH02		12/12/17 09:59:00			0.7	0.0	19.1	0.0	0	0	1.9					
BH02		12/12/17 10:00:00			0.7	0.0	19.0	0.0	0	0	1.7					
BH02		12/12/17 10:01:00			0.7	0.0	19.0	0.0	0	0	1.5					
BH02		12/12/17 10:02:00			0.7	0.0	19.0	0.0	0	0	1.4					
BH02		12/12/17 10:03:00			0.7	0.0	19.0	0.0	0	0	1.3					
BH02		12/12/17 10:04:00			0.7	0.0	18.9	0.0	0	0	1.2					
BH02		12/12/17 10:05:00												1.61		
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572		CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH03C		04/12/17 10:40:00	1029	0.00								0.0	9		
BH03C		04/12/17 10:41:00										0.0			
BH03C		04/12/17 10:42:00										0.0			
BH03C		04/12/17 10:43:00										0.0			
BH03C		04/12/17 10:44:00										0.0			
BH03C		04/12/17 10:45:00			0.4	0.0	19.7	0.0	0	0	11.3				
BH03C		04/12/17 10:46:00			0.4	0.0	19.7	0.0	0	0	10.7				
BH03C		04/12/17 10:47:00			0.4	0.0	19.7	0.0	0	0	10.5				
BH03C		04/12/17 10:48:00			0.3	0.0	19.7	0.0	0	0	10.3				
BH03C		04/12/17 10:49:00			0.3	0.0	19.7	0.0	0	0	10.3				
BH03C		04/12/17 10:50:00			0.3	0.0	19.7	0.0	0	0	10.3				
BH03C		04/12/17 10:51:00			0.3	0.0	19.7	0.0	0	0	10.2				
BH03C		04/12/17 10:52:00			0.3	0.0	19.7	0.0	0	0	10.2				
BH03C		04/12/17 10:53:00			0.3	0.0	19.7	0.0	0	0	10.3				
BH03C		04/12/17 10:54:00			0.3	0.0	19.7	0.0	0	0	10.3				
BH03C		04/12/17 10:55:00												1.79	
BH03C		12/12/17 10:40:00	976	14.00								0.0	3		
BH03C		12/12/17 10:41:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH03C		12/12/17 10:42:00										0.0			
BH03C		12/12/17 10:43:00										0.0			
BH03C		12/12/17 10:44:00										0.0			
BH03C		12/12/17 10:45:00			0.3	0.0	18.7	0.0	0	0	34.9				
BH03C		12/12/17 10:46:00			0.3	0.0	18.7	0.0	0	0	35.6				
BH03C		12/12/17 10:47:00			0.3	0.0	18.6	0.0	0	0	37.6				
BH03C		12/12/17 10:48:00			0.3	0.0	18.7	0.0	0	0	38.5				
BH03C		12/12/17 10:49:00			0.3	0.0	18.7	0.0	0	0	39.8				
BH03C		12/12/17 10:50:00			0.3	0.0	18.7	0.0	0	0	40.4				
BH03C		12/12/17 10:51:00			0.3	0.0	18.8	0.0	0	0	40.6				
BH03C		12/12/17 10:52:00			0.3	0.0	18.8	0.0	0	0	40.7				
BH03C		12/12/17 10:53:00			0.3	0.0	18.8	0.0	0	0	40.9				
BH03C		12/12/17 10:54:00			0.3	0.0	18.8	0.0	0	0	40.2				
BH03C		12/12/17 10:55:00												1.79	
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	
														CHECKED	

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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		
BH04B	19mm	07/12/17 09:05:00	1003	0.00								0.0	12		Bore Hole Purged		
BH04B	19mm	07/12/17 09:06:00										0.0					
BH04B	19mm	07/12/17 09:07:00										0.0					
BH04B	19mm	07/12/17 09:08:00										0.0					
BH04B	19mm	07/12/17 09:09:00										0.0					
BH04B	19mm	07/12/17 09:10:00			1.0	1.4	18.0	0.0	0	0	5.0						
BH04B	19mm	07/12/17 09:11:00			1.0	1.4	18.0	0.0	0	0	5.4						
BH04B	19mm	07/12/17 09:12:00			1.6	1.4	18.0	0.0	0	0	5.5						
BH04B	19mm	07/12/17 09:13:00			1.6	1.4	18.0	0.0	0	0	5.3						
BH04B	19mm	07/12/17 09:14:00			1.5	1.3	18.0	0.0	0	0	5.3						
BH04B	19mm	07/12/17 09:15:00			1.5	1.3	18.7	0.0	0	0	5.3						
BH04B	19mm	07/12/17 09:16:00			1.5	1.3	18.1	0.0	0	0	5.4						
BH04B	19mm	07/12/17 09:17:00			1.5	1.3	18.2	0.0	0	0	5.5						
BH04B	19mm	07/12/17 09:18:00			1.4	1.3	18.2	0.0	0	0	5.4						
BH04B	19mm	07/12/17 09:19:00			1.4	1.3	18.2	0.0	0	0	5.4						
BH04B	19mm	07/12/17 09:21:00												1.30	Base 1.93m		
BH04B	19mm	12/12/17 12:16:00												1.31			
BH04B	19mm	12/12/17 12:17:00	979	-5.00								0.0	3				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser															CONTRACT 33572		CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH04B	19mm	12/12/17 12:18:00										0.0			
BH04B	19mm	12/12/17 12:19:00										0.0			
BH04B	19mm	12/12/17 12:20:00										0.0			
BH04B	19mm	12/12/17 12:21:00										0.0			
BH04B	19mm	12/12/17 12:22:00			0.0	0.0	19.8	0.0	0	0	0.5				
BH04B	19mm	12/12/17 12:23:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH04B	19mm	12/12/17 12:24:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH04B	19mm	12/12/17 12:25:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH04B	19mm	12/12/17 12:26:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH04B	19mm	12/12/17 12:27:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH04B	19mm	12/12/17 12:28:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH04B	19mm	12/12/17 12:29:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH04B	19mm	12/12/17 12:30:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH04B	19mm	12/12/17 12:31:00			0.0	0.0	20.0	0.0	0	0	0.4				
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH04B	50mm	12/12/17 12:00:00	979	-5.00								0.0	3		
BH04B	50mm	12/12/17 12:01:00										0.0			
BH04B	50mm	12/12/17 12:02:00										0.0			
BH04B	50mm	12/12/17 12:03:00										0.0			
BH04B	50mm	12/12/17 12:04:00										0.0			
BH04B	50mm	12/12/17 12:05:00			0.0	0.0	19.5	0.0	0	0	1.2				
BH04B	50mm	12/12/17 12:06:00			0.0	0.0	19.5	0.0	0	0	1.3				
BH04B	50mm	12/12/17 12:07:00			0.0	0.0	19.7	0.0	0	0	1.3				
BH04B	50mm	12/12/17 12:08:00			0.0	0.0	19.8	0.0	0	0	1.2				
BH04B	50mm	12/12/17 12:09:00			0.0	0.0	19.7	0.0	0	0	1.3				
BH04B	50mm	12/12/17 12:10:00			0.0	0.0	19.7	0.0	0	0	1.3				
BH04B	50mm	12/12/17 12:11:00			0.0	0.0	19.8	0.0	0	0	1.3				
BH04B	50mm	12/12/17 12:12:00			0.0	0.0	19.8	0.0	0	0	1.2				
BH04B	50mm	12/12/17 12:13:00			0.0	0.0	19.8	0.0	0	0	1.2				
BH04B	50mm	12/12/17 12:14:00			0.0	0.0	19.8	0.0	0	0	1.2				
BH04B	50mm	12/12/17 12:15:00												1.97	Base 6.89m
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	
														CHECKED	

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH06A	19mm	04/12/17 11:16:00	1029	0.00								0.0	9		
BH06A	19mm	04/12/17 11:17:00										0.0			
BH06A	19mm	04/12/17 11:18:00										0.0			
BH06A	19mm	04/12/17 11:19:00										0.0			
BH06A	19mm	04/12/17 11:20:00										0.0			
BH06A	19mm	04/12/17 11:21:00			0.1	0.0	20.1	0.0	0	0	10.4				
BH06A	19mm	04/12/17 11:22:00			0.0	0.0	20.4	0.0	0	0	9.4				
BH06A	19mm	04/12/17 11:23:00			0.0	0.0	20.4	0.0	0	0	5.2				
BH06A	19mm	04/12/17 11:24:00			0.0	0.0	20.4	0.0	0	0	5.0				
BH06A	19mm	04/12/17 11:25:00			0.0	0.0	20.4	0.0	0	0	0.4				
BH06A	19mm	04/12/17 11:26:00			0.0	0.0	20.4	0.0	0	0	0.4				
BH06A	19mm	04/12/17 11:27:00			0.0	0.0	20.4	0.0	0	0	0.4				
BH06A	19mm	04/12/17 11:28:00			0.0	0.0	20.4	0.0	0	0	0.3				
BH06A	19mm	04/12/17 11:29:00			0.0	0.0	20.4	0.0	0	0	0.3				
BH06A	19mm	04/12/17 11:30:00			0.0	0.0	20.4	0.0	0	0	0.3				
BH06A	19mm	04/12/17 11:31:00												1.95	Base 5.96m
BH06A	19mm	12/12/17 11:41:00	978	6.00								0.0	3		
BH06A	19mm	12/12/17 11:42:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH06A	19mm	12/12/17 11:43:00										0.0			
BH06A	19mm	12/12/17 11:44:00										0.0			
BH06A	19mm	12/12/17 11:45:00										0.0			
BH06A	19mm	12/12/17 11:46:00			0.0	0.0	20.0	0.0	0	0	0.6				
BH06A	19mm	12/12/17 11:47:00			0.0	0.0	20.0	0.0	0	0	0.6				
BH06A	19mm	12/12/17 11:48:00			0.0	0.0	20.0	0.0	0	0	0.6				
BH06A	19mm	12/12/17 11:49:00			0.0	0.0	20.0	0.0	0	0	0.5				
BH06A	19mm	12/12/17 11:50:00			0.0	0.0	20.0	0.0	0	0	0.5				
BH06A	19mm	12/12/17 11:51:00			0.0	0.0	20.0	0.0	0	0	0.5				
BH06A	19mm	12/12/17 11:52:00			0.0	0.0	20.0	0.0	0	0	0.5				
BH06A	19mm	12/12/17 11:53:00			0.0	0.0	20.0	0.0	0	0	0.5				
BH06A	19mm	12/12/17 11:54:00			0.0	0.0	20.0	0.0	0	0	0.5				
BH06A	19mm	12/12/17 11:55:00			0.0	0.0	20.0	0.0	0	0	0.5				
BH06A	19mm	12/12/17 11:56:00												1.95	Base 5.96m
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	
														CHECKED	

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH06A	50mm	04/12/17 11:00:00	1029	0.00								0.0	9		Base 8.68
BH06A	50mm	04/12/17 11:01:00										0.0			fine
BH06A	50mm	04/12/17 11:02:00										0.0			
BH06A	50mm	04/12/17 11:03:00										0.0			
BH06A	50mm	04/12/17 11:04:00										0.0			
BH06A	50mm	04/12/17 11:05:00			0.1	0.0	20.1	0.0	0	0	9.9				
BH06A	50mm	04/12/17 11:06:00			0.0	0.0	20.1	0.0	0	0	9.2				
BH06A	50mm	04/12/17 11:07:00			0.0	0.0	20.2	0.0	0	0	9.1				
BH06A	50mm	04/12/17 11:08:00			0.0	0.0	20.2	0.0	0	0	9.5				
BH06A	50mm	04/12/17 11:09:00			0.0	0.0	20.3	0.0	0	0	7.9				
BH06A	50mm	04/12/17 11:10:00			0.0	0.0	20.3	0.0	0	0	7.4				
BH06A	50mm	04/12/17 11:11:00			0.0	0.0	20.3	0.0	0	0	7.1				
BH06A	50mm	04/12/17 11:12:00			0.0	0.0	20.3	0.0	0	0	6.8				
BH06A	50mm	04/12/17 11:13:00			0.0	0.0	20.3	0.0	0	0	6.5				
BH06A	50mm	04/12/17 11:14:00			0.0	0.0	20.4	0.0	0	0	6.1				
BH06A	50mm	04/12/17 11:15:00												2.06	
BH06A	50mm	12/12/17 11:25:00	978	0.00								0.0	3		
BH06A	50mm	12/12/17 11:26:00										0.0			
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	CHECKED

GAS AND GROUNDWATER LEVELS

CLIENT: WARDELL ARMSTRONG

SITE: GAS WORKS ROAD, 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
BH06A	50mm	12/12/17 11:27:00										0.0			
BH06A	50mm	12/12/17 11:28:00										0.0			
BH06A	50mm	12/12/17 11:29:00										0.0			
BH06A	50mm	12/12/17 11:30:00			0.0	0.0	20.0	0.0	0	0	2.6				
BH06A	50mm	12/12/17 11:31:00			0.0	0.0	19.9	0.0	0	0	2.5				
BH06A	50mm	12/12/17 11:32:00			0.0	0.0	20.0	0.0	0	0	2.5				
BH06A	50mm	12/12/17 11:33:00			0.0	0.0	20.0	0.0	0	0	2.3				
BH06A	50mm	12/12/17 11:34:00			0.0	0.0	20.0	0.0	0	0	2.2				
BH06A	50mm	12/12/17 11:35:00			0.0	0.0	20.0	0.0	0	0	2.1				
BH06A	50mm	12/12/17 11:36:00			0.0	0.0	20.0	0.0	0	0	2.1				
BH06A	50mm	12/12/17 11:37:00			0.0	0.0	20.0	0.0	0	0	2.0				
BH06A	50mm	12/12/17 11:38:00			0.0	0.0	20.0	0.0	0	0	1.9				
BH06A	50mm	12/12/17 11:39:00			0.0	0.0	20.0	0.0	0	0	1.9				
BH06A	50mm	12/12/17 11:40:00												2.06	Base 8.68m
remarks # denotes result exceeding capacity of gas monitoring equipment Equipment used - Gas Data GFM 435 Gas Analyser														CONTRACT 33572	
														CHECKED	

WS001

Date and Time	Barro	Differential	Temp	Ch4	CO2	O2	H2S	CO	LEL	PID	Flow	Water	Base	Operator
04/12/2017 11:40	1009	0	8.5								0			DM
04/12/2017 11:41											0			
04/12/2017 11:42											0			
04/12/2017 11:43											0			
04/12/2017 11:44											0			
04/12/2017 11:45				0	0	20.2	0	0	0	0.7				
04/12/2017 11:46				0	0	20.2	0	0	0	0.7				
04/12/2017 11:47				0	0	20.2	0	0	0	0.6				
04/12/2017 11:48				0	0	20.3	0	0	0	0.6				
04/12/2017 11:49				0	0	20.3	0	0	0	0.6				
04/12/2017 11:50				0	0	20.3	0	0	0	0.6				
04/12/2017 11:51				0	0	20.3	0	0	0	0.6				
04/12/2017 11:52				0	0	20.3	0	0	0	0.6				
04/12/2017 11:53				0	0	20.3	0	0	0	0.6				
04/12/2017 11:54				0	0	20.3	0	0	0	0.6				
04/12/2017 11:55												1.4	2.91	

WS005

Date and Time	Barro	Differential	Temp	Ch4	CO2	O2	H2S	CO	LEL	PID	Flow	Water	Base	Operator
04/12/2017 12:05	1029	-1	8.5								0			DM
04/12/2017 12:06											0			
04/12/2017 12:07											0			
04/12/2017 12:08											0			
04/12/2017 12:09											0			
04/12/2017 12:10				0	0.1	20.2	0	0	0	0.7				
04/12/2017 12:11				0	0	20.3	0	0	0	0.6				
04/12/2017 12:12				0	0	20.3	0	0	0	0.6				
04/12/2017 12:13				0	0	20.3	0	0	0	0.6				
04/12/2017 12:14				0	0	20.3	0	0	0	0.6				
04/12/2017 12:15				0	0	20.3	0	0	0	0.6				
04/12/2017 12:16				0	0	20.3	0	0	0	0.6				
04/12/2017 12:17				0	0	20.3	0	0	0	0.6				
04/12/2017 12:18				0	0	20.3	0	0	0	0.6				
04/12/2017 12:19				0	0	20.3	0	0	0	0.6				
04/12/2017 12:20												1.96	4.28	

Further comments on falling head tests from Geotechnical Engineering Ltd email dated 15/12/17

The water take was very quick and it was not possible to derive an infiltration, however, please see below field notes from the technician which provides further information:

With Regards the falling head test on BH06A Results as follows(I did the test 3 times)

Base level 8.68m

Ground water level 2.06m

Test 1 20ltrs of water took 25 seconds from 0.00 ground level to disperse to 2.06 ground water level

Test 2 20ltrs of water took 28 seconds from 0.00 ground level to disperse to 2.06 ground water level

Test 3 20ltrs of water took 28 seconds from 0.00 ground level to disperse to 2.06 ground water level

It took 40 second to fill the 20ltrs water butt and 15 seconds to fill the 50mm standpipe

Appendix 4: Groundwater and Surface Water Geochemical Test Results

**Gary Riches**

Geotechnical Engineering Ltd
Centurion House
Olympus Park
Quedgeley
Gloucester
GL2 4NF

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f: 01452 729 314
e: gary.riches@geoeng.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 17-70557

Project / Site name:	Gasworks Road, Reading	Samples received on:	11/12/2017
Your job number:	33572-TW	Samples instructed on:	11/12/2017
Your order number:		Analysis completed by:	14/12/2017
Report Issue Number:	1	Report issued on:	14/12/2017
Samples Analysed:	1 water sample		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-70557

Project / Site name: Gasworks Road, Reading

Lab Sample Number				874615				
Sample Reference				BH04A				
Sample Number				None Supplied				
Depth (m)				1.98-6.90				
Date Sampled				07/12/2017				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	610				
Total Cyanide	µg/l	10	ISO 17025	41				
Complex Cyanide	µg/l	10	ISO 17025	41				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200				
Sulphate as SO ₄	µg/l	45	ISO 17025	4460				
Sulphate as SO ₄	mg/l	0.045	ISO 17025	4.5				
Total Sulphur	µg/l	15	NONE	1500				
Sulphide	µg/l	5	NONE	< 5.0				
Ammonium as NH ₄	µg/l	15	ISO 17025	3000				
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	10.2				
Total Suspended Solids	mg/l	2	NONE	690				

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	19.1				
Acenaphthylene	µg/l	0.01	ISO 17025	0.34				
Acenaphthene	µg/l	0.01	ISO 17025	28.7				
Fluorene	µg/l	0.01	ISO 17025	1.57				
Phenanthrene	µg/l	0.01	ISO 17025	3.78				
Anthracene	µg/l	0.01	ISO 17025	0.79				
Fluoranthene	µg/l	0.01	ISO 17025	1.91				
Pyrene	µg/l	0.01	ISO 17025	1.58				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	0.30				
Chrysene	µg/l	0.01	ISO 17025	0.28				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	0.28				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	0.08				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	0.18				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	58.9				
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.04				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02				
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2				
Copper (dissolved)	µg/l	0.5	ISO 17025	0.8				
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2				
Mercury (dissolved)	µg/l	0.05	ISO 17025	0.09				
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.3				
Selenium (dissolved)	µg/l	0.6	ISO 17025	0.7				
Zinc (dissolved)	µg/l	0.5	ISO 17025	2.6				



Analytical Report Number: 17-70557

Project / Site name: Gasworks Road, Reading

Lab Sample Number				874615				
Sample Reference				BH04A				
Sample Number				None Supplied				
Depth (m)				1.98-6.90				
Date Sampled				07/12/2017				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics

Benzene	µg/l	1	ISO 17025	7.7				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	66				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	49				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	110				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	220				

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	7.7				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	2.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	73				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	100				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	180				

PCBs by GC-MS

PCB Congener 28	µg/l	0.02	NONE	< 0.02				
PCB Congener 52	µg/l	0.02	NONE	< 0.02				
PCB Congener 101	µg/l	0.02	NONE	< 0.02				
PCB Congener 118	µg/l	0.02	NONE	< 0.02				
PCB Congener 138	µg/l	0.02	NONE	< 0.02				
PCB Congener 153	µg/l	0.02	NONE	< 0.02				
PCB Congener 180	µg/l	0.02	NONE	< 0.02				

PCBs by GC-MS

Total PCBs	µg/l	0.14	NONE	< 0.14				
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U/S = Unsuitable Sample I/S = Insufficient Sample



Preliminary Report Number : 17-70557

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonium as NH ₄ in water	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Complex cyanide in water	Determination of complex cyanide by calculation. Accredited matrices SW, PW, GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement.	In-house method	L031-PL	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
PCB's By GC-MS in water	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-PL	W	NONE
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode.	In-house method	L029-PL	W	NONE
Suspended solids in water	Determined gravimetrically with GFC filtration papers.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	NONE
Thiocyanate in water	Determination of thiocyanate in water by discreet analyser (colorimetry). Accredited matrices SW, GW, PW.	In house method based on SMWW 4500-CN-M. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Total Sulphur in water	Determination of total sulphur in water by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	NONE

Iss No 17-70557-1 Gasworks Road, Reading 33572-TW

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The results included within the report are representative of the samples submitted for analysis.

Page 4 of 6



Preliminary Report Number : 17-70557

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH04A		W	17-70557	874615	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH04A		W	17-70557	874615	c	Ammonium as NH4 in water	L082-PL	c
BH04A		W	17-70557	874615	c	Electrical conductivity at 20oC of water	L031-PL	c
BH04A		W	17-70557	874615	c	Settleable Solids in water	L004-PL	c
BH04A		W	17-70557	874615	c	Suspended solids in water	L004-PL	c

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Analytical Report Number : 17-69239

Project / Site name:	Gasworks Road, Reading	Samples received on:	28/11/2017
Your job number:	33572-TW	Samples instructed on:	30/11/2017
Your order number:	L00356	Analysis completed by:	07/12/2017
Report Issue Number:	1	Report issued on:	07/12/2017
Samples Analysed:	7 water samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-69239

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				867187	867188	867189	867190	867191
Sample Reference				BH03	WS001	BH02	BH06A	WS005
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.76-6.67	1.31-2.90	1.75-6.70	2.00-8.70	1.94-4.10
Date Sampled				27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

Electrical Conductivity at 20 °C	µS/cm	10	NONE	620	1300	610	590	740
Total Cyanide	µg/l	10	ISO 17025	30	100	92	< 10	< 10
Complex Cyanide	µg/l	10	ISO 17025	30	100	92	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200	< 200	< 200	< 200
Sulphate as SO ₄	µg/l	45	ISO 17025	9620	297000	11300	17900	35900
Sulphate as SO ₄	mg/l	0.045	ISO 17025	9.6	297	11.3	17.9	35.9
Total Sulphur	µg/l	15	NONE	3200	99000	3800	6000	12000
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ammonium as NH ₄	µg/l	15	ISO 17025	6900	7700	6900	4100	11000
Ammonium as NH ₄	mg/l	0.015	ISO 17025	6.9	7.7	6.9	4.1	11
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	8.19	12.2	3.18	3.11	4.73
Total Suspended Solids	mg/l	2	NONE	20	15000	530	570	600

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	3.97	1.09	< 0.01	0.17	0.17
Acenaphthylene	µg/l	0.01	ISO 17025	3.39	8.14	0.67	0.50	0.48
Acenaphthene	µg/l	0.01	ISO 17025	39.4	19.0	26.8	16.3	26.3
Fluorene	µg/l	0.01	ISO 17025	11.1	37.9	11.6	1.84	0.18
Phenanthrene	µg/l	0.01	ISO 17025	9.33	54.9	18.6	0.42	0.24
Anthracene	µg/l	0.01	ISO 17025	0.98	12.6	2.26	0.26	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	3.95	15.1	5.29	0.58	0.22
Pyrene	µg/l	0.01	ISO 17025	2.43	9.37	3.18	1.65	0.15
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	1.60	0.16	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	1.30	0.09	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	0.76	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	0.31	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	0.52	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	0.16	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	0.17	< 0.01	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.16	NONE	74.5	163	68.6	21.7	27.7
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.63	6.06	1.28	12.0	0.55
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02	0.03	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.4	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.3	< 0.2	0.3	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	0.5	1.8	0.8	2.2	0.9
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	1.2	1.1	0.7	1.0
Zinc (dissolved)	µg/l	0.5	ISO 17025	< 0.5	1.1	0.9	3.9	2.4



Analytical Report Number: 17-69239

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				867187	867188	867189	867190	867191
Sample Reference				BH03	WS001	BH02	BH06A	WS005
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.76-6.67	1.31-2.90	1.75-6.70	2.00-8.70	1.94-4.10
Date Sampled				27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics

Benzene	µg/l	1	ISO 17025	93.6	< 1.0	< 1.0	9.8	< 1.0
Toluene	µg/l	1	ISO 17025	51.7	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	9.8	< 1.0	< 1.0	1.4	< 1.0
p & m-xylene	µg/l	1	ISO 17025	18.8	< 1.0	5.1	6.9	< 1.0
o-xylene	µg/l	1	ISO 17025	8.7	< 1.0	< 1.0	7.8	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	50	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	150	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	110	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	310	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	94	< 1.0	< 1.0	9.8	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	52	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	43	< 1.0	7.0	21	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	250	28	180	77	27
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	180	300	230	19	27
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	280	570	29	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	900	900	450	130	54

PCBs by GC-MS

PCB Congener 28	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PCB Congener 52	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PCB Congener 118	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PCB Congener 138	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PCB Congener 153	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PCB Congener 180	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

PCBs by GC-MS

Total PCBs	µg/l	0.14	NONE	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
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U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number: 17-69239

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				867192	867193			
Sample Reference				River 01	River 02			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.00-0.50	0.00-0.50			
Date Sampled				27/11/2017	27/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

Electrical Conductivity at 20 °C	µS/cm	10	NONE	580	580			
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200			
Sulphate as SO ₄	µg/l	45	ISO 17025	26400	26500			
Sulphate as SO ₄	mg/l	0.045	ISO 17025	26.4	26.5			
Total Sulphur	µg/l	15	NONE	8800	8800			
Sulphide	µg/l	5	NONE	< 5.0	< 5.0			
Ammonium as NH ₄	µg/l	15	ISO 17025	130	90			
Ammonium as NH ₄	mg/l	0.015	ISO 17025	0.13	0.090			
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	3.72	3.73			
Total Suspended Solids	mg/l	2	NONE	210	78			

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.16	NONE	< 0.16	< 0.16			
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.39	0.54			
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02			
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.3	< 0.2			
Copper (dissolved)	µg/l	0.5	ISO 17025	1.7	0.9			
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2			
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05			
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.4	1.7			
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	1.0			
Zinc (dissolved)	µg/l	0.5	ISO 17025	8.4	7.2			

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number: 17-69239

Project / Site name: Gasworks Road, Reading

Your Order No: L00356

Lab Sample Number				867192	867193			
Sample Reference				River 01	River 02			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.00-0.50	0.00-0.50			
Date Sampled				27/11/2017	27/11/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

PCBs by GC-MS

PCB Congener 28	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 52	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 118	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 138	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 153	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 180	µg/l	0.02	NONE	< 0.02	< 0.02			

PCBs by GC-MS

Total PCBs	µg/l	0.14	NONE	< 0.14	< 0.14			
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U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 17-69239

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonium as NH ₄ in water	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammonium as NH ₄ in water	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Complex cyanide in water	Determination of complex cyanide by calculation. Accredited matrices SW, PW, GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement.	In-house method	L031-PL	W	NONE
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
PCB's By GC-MS in water	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-PL	W	NONE
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	NONE
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode.	In-house method	L029-PL	W	NONE
Suspended solids in water	Determined gravimetrically with GFC filtration papers.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	NONE
Thiocyanate in water	Determination of thiocyanate in water by discreet analyser (colorimetry). Accredited matrices SW, GW, PW.	In house method based on SMWW 4500-CN-M. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Total Sulphur in water	Determination of total sulphur in water by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	NONE

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-69239

Project / Site name: Gasworks Road, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Appendix 5: Statistical Analysis of Soil Contamination Data



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number:

LO10488

Assessor:

AS

Proposed Land Use:

Residential with Home Grown Produce

Job Name:

Former Gas Works, Reading

Date:

08-Dec-17

Zone:

Made Ground (WA)

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)			Chromium (Cr) mg/kg		Lead (Pb) mg/kg	Mercury (Hg) mg/kg										
BH01	0.50-0.70			16		250	0.3										
BH01	3.60-3.70			5.9		4.6	0.3										
BH02	1.00-1.20			22		52	0.3										
BH03C	0.5-0.7			20		37	0.3										
BH04B	0.50-0.70			15		200	0.6										
BH04B	1.80-1.90			13		97	0.3										
BH06A	1.60-1.70			8.1		22	0.3										
TP01	0.50-0.60			14		110	0.3										
TP02	0.70-0.80			17		220	0.3										
TP03	0.50-0.60			17		330	0.3										
TP04	0.5-0.7			19		140	2										
TP05	0.70-0.80			16		26	0.3										
Number of samples (N)				12		12	12										
Minimum				5.9		4.6	0.3										
Maximum				22.0		330	1.9										
Standard Deviation				5		105	0										
Screening Value (Critical Conc.; Cc)				6		200	1.2										
Source of Screening Value				S4UL		C4SL	S4UL										
Outlier Identification																	
Standardised Value (Tn)				1.114		1.187	2.961										
Critical Value (Tcrit)				2.285		2.285	2.285										
Is there an Outlier (Tn > Tcrit)				NO		NO	YES										
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)				YES		YES	NO										
Shapiro-Wilk statistic (W)				0.94		0.92	0.41										
Shapiro-Wilk Test (is W > Sig(0.05))				YES		YES	NO										
Mean Concentration (95% UCL)				18		179	n/a										
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?				NO		YES	n/a										
Level of Evidence (p1, %)				<51		99	n/a										
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.				NO		NO	YES										
Mean Concentration (95% UCL)				n/a		n/a	1										
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?				n/a		n/a	YES										
Level of Evidence (p1, %)				n/a		n/a	96										

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: LO10488

Job Name: Former Gas Works, Reading

Assessor: AS

Date: 15-Dec-17

Proposed Land Use: Residential with Home Grown Produce

Zone: Made Ground (WA and Atkins)

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)			Chromium (Cr) mg/kg		Lead (Pb) mg/kg	Mercury (Hg) mg/kg										
BH01	0.50-0.70			16		250	0.3										
BH01	3.60-3.70			5.9		4.6	0.3										
BH02	1.00-1.20			22		52	0.3										
BH03C	0.5-0.7			20		37	0.3										
BH04B	0.50-0.70			15		200	0.6										
BH04B	1.80-1.90			13		97	0.3										
BH06A	1.60-1.70			8.1		22	0.3										
TP01	0.50-0.60			14		110	0.3										
TP02	0.70-0.80			17		220	0.3										
TP03	0.50-0.60			17		330	0.3										
TP04	0.5-0.7			19		140	2										
TP05	0.70-0.80			16		26	0.3										
WS001	0.50			24		130	0.25										
WS001	1.00			20		68	0.25										
WS002	0.50			18		1800	2										
WS002	1.50			14		1100	3										
WS003	0.50			16		810	2										
WS003	1.50			15		420	1										
WS004	0.50			12		720	1										
WS004	1.50			15		430	1										
WS005	0.50			15		760	1										
WS005	1.50			17		980	2										
Number of samples (N)				22		22	22										
Minimum				5.9		4.6	0.25										
Maximum				24.0		1800	3										
Standard Deviation				4		458	1										
Screening Value (Critical Conc.; Cc)				6		200	1.2										
Source of Screening Value				S4UL		C4SL	S4UL										
Outlier Identification																	
Standardised Value (Tn)				1.467		1.540	1.879										
Critical Value (Tcrit)				2.603		2.603	2.603										
Is there an Outlier (Tn > Tcrit)				NO		NO	NO										
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)				YES		NO	NO										
Shapiro-Wilk statistic (W)				0.96		0.80	0.75										
Shapiro-Wilk Test (is W > Sig(0.05))				YES		NO	NO										
Mean Concentration (95% UCL)				17		n/a	n/a										
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?				NO		n/a	n/a										
Level of Evidence (p1, %)				<51		n/a	n/a										
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.				NO		YES	YES										
Mean Concentration (95% UCL)				n/a		822	2										
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?				n/a		NO	NO										
Level of Evidence (p1, %)				n/a		80	79										

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: LO10488

Job Name: Former Gas Works, Reading

Assessor: AS

Date: 08-Dec-17

Proposed Land Use: Residential with Home Grown Produce

Zone: Natural (WA)

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
		Chromium (Cr) mg/kg															
BH01	5.90-6.00			11													
BH02	1.80-1.90			15													
BH02	6.00-6.10			10													
BH02	6.70-6.90			1.5													
BH03C	2.60-2.70			14													
BH03C	3.50-3.60			4.1													
BH04B	3.70-3.80			12													
BH06A	1.85-1.95			17													
BH04B	8.50-8.60			1													
BH06A	8.50-8.60			1													
Number of samples (N)				10													
Minimum				1													
Maximum				17.0													
Standard Deviation				6													
Screening Value (Critical Conc.; Cc)				6													
Source of Screening Value				S4UL													
Outlier Identification																	
Standardised Value (Tn)				0.958													
Critical Value (Tcrit)				2.176													
Is there an Outlier (Tn > Tcrit)				NO													
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)				YES													
Shapiro-Wilk statistic (W)				0.88													
Shapiro-Wilk Test (is W > Sig(0.05))				YES													
Mean Concentration (95% UCL)				12													
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?				NO													
Level of Evidence (p1, %)				<51													
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.				NO													
Mean Concentration (95% UCL)				n/a													
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?				n/a													
Level of Evidence (p1, %)				n/a													

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: LO10488

Assessor: AS

Proposed Land Use: Residential with Home Grown Produce

Job Name: Former Gas Works, Reading

Date: 08-Dec-17

Zone: Made Ground (WA)

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISICAL RESULT															
Location	Depth (mbgl)	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a) anthracene	Chrysene	Benzo(b) fluoranthene	Benzo(a) pyrene	Benzo(k) fluoranthene	Indeno(123cd) pyrene	Dibenzo(ah) anthracene	Benzo(ghi) perylene
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01	3.60-3.70	150	12.0	100	96	300	80	210	140	92	48	62	36	61	23	6	23
BH02	1.00-1.20	0.05	0.05	0.05	0.05	0.6	0.2	1.7	1.5	1.6	0.9	2.0	0.8	1.8	1.0	0.2	1.1
BH04B	0.50-0.70	4	15.0	3	12	190	57	340	270	180	140	140	90	140	81	24	85
BH04B	1.80-1.90	14	0.2	0.8	0.6	1.2	0.3	1.1	0.8	0.4	0.4	0.3	0.3	0.3	0.2	0.05	0.23
BH06A	1.60-1.70	0.3	0.6	1	1	8	2	14	12	7	5	7	3.3	6	3	0.68	4
TP01	0.50-0.60	0.3	0.5	0.1	0.2	5	1	9	7	7	4	6	3.7	6	3	0.65	3
TP04	0.5-0.7	1	2.5	0.4	1	20	7	32	25	24	17	22	12	23	10	2.1	9
Number of samples (N)		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Minimum		0.05	0.05	0.05	0.05	0.62	0.2	1.1	0.83	0.36	0.4	0.32	0.25	0.32	0.17	0.05	0.23
Maximum		150	15	100.0	96	300	80	340	270	180	140	140	90	140	81	24	85
Standard Deviation		56	6	38	36	121	33	134	103	68	51	51	33	51	29	9	31
Screening Value (Critical Conc.; Cc)		2.3	170	210	170	95	2400	280	620	7.2	15	2.6	2.2	77	27	0.24	320
Source of Screening Value		S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL
Outlier Identification																	
Standardised Value (Tn)		1.663	1.264	1.941	1.701	1.372	1.324	1.346	1.375	1.315	1.431	1.327	1.384	1.325	1.439	1.518	1.497
Critical Value (Tcrit)		1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938
Is there an Outlier (Tn > Tcrit)		NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Shapiro-Wilk statistic (W)		0.52	0.72	0.47	0.53	0.69	0.70	0.71	0.71	0.73	0.68	0.73	0.71	0.73	0.66	0.63	0.64
Shapiro-Wilk Test (is W > Sig(0.05))		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Mean Concentration (95% UCL)		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Level of Evidence (p1, %)		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Mean Concentration (95% UCL)		116	15	77	75	274	76	308	235	156	115	119	75	119	65	19	68
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO	YES	YES	YES	NO	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO	YES
Level of Evidence (p1, %)		52	99	99	99	<51	99	93	99	67	<51	72	69	83	<51	66	99

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: LO10488

Job Name: Former Gas Works, Reading

Assessor: AS

Date: 15-Dec-17

Proposed Land Use: Residential with Home Grown Produce

Zone: Made Ground (WA and Atkins)

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(a) pyrene	Benzo(k)fluoranthene	Indeno(123cd)pyrene	Dibenzo(ah)anthracene	Benzo(ghi)perylene
Location	Depth (mbgl)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01	3.60-3.70	150	12.0	100	96	300	80	210	140	92	48	62	36	61	23	6	23
BH02	1.00-1.20	0.05	0.05	0.05	0.05	0.05	0.6	0.2	1.7	1.5	1.6	0.9	2.0	1.8	1.0	0.2	1.1
BH04B	0.50-0.70	4	15.0	3	12	190	57	340	270	180	140	140	90	140	81	24	85
BH04B	1.80-1.90	14	0.2	0.8	0.6	1.2	0.3	1.1	0.8	0.4	0.4	0.3	0.3	0.3	0.2	0.05	0.23
BH06A	1.60-1.70	0.3	0.6	1	1	8	2	14	12	7	5	7	3.3	6	3	0.68	4
TP01	0.50-0.60	0.3	0.5	0.1	0.2	5	1	9	7	7	4	6	3.7	6	3	0.65	3
TP04	0.5-0.7	1	2.5	0.4	1	20	7	32	25	24	17	22	12	23	10	2.1	9
WS001	0.50	1	1.00	1	1	3	1	7	6	5	6	8	3	4	3	1	3
WS001	1.00	1	1.0	1	1	1	1	1	1	1	1	1	1.00	1	1	1	1
WS002	0.50	24	47	7	12	170	80	360	290	160	140	260	64	130	110	16	94
WS002	1.50	18	42	5	11	130	66	290	230	130	110	210	48	110	94	13	80
WS003	0.50	15	44	6	13	260	84	490	390	180	150	260	65	150	120	18	100
WS003	1.50	11	22	3	6	130	42	230	190	100	89	150	42	86	71	12	61
WS004	0.50	10	17	2	4	63	25	190	170	91	79	150	37	83	75	12	65
WS004	1.50	10	18	2	4	77	27	190	170	88	77	130	39	81	68	11	58
WS005	0.50	12	26	6	12	170	58	300	250	120	110	170	45	110	92	14	79
WS005	1.50	18	41	10	25	290	89	460	380	170	150	230	59	150	120	20	110
Number of samples (N)		17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Minimum		0.05	0.05	0.05	0.05	0.62	0.2	1	0.83	0.36	0.4	0.32	0.25	0.32	0.17	0.05	0.23
Maximum		150	47	100.0	96	300	89	490	390	180	150	260	90	150	120	24	110
Standard Deviation		35	17	24	23	108	35	171	138	70	59	98	28	58	47	8	41
Screening Value (Critical Conc.; Cc)		2.3	170	210	170	95	2400	280	620	7.2	15	2.6	2.2	77	27	0.24	320
Source of Screening Value		S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL
Outlier Identification																	
Standardised Value (Tn)		1.750	1.029	2.237	1.787	1.036	0.963	0.981	0.978	0.904	0.919	0.945	1.044	0.903	0.940	1.033	0.969
Critical Value (Tcrit)		2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475
Is there an Outlier (Tn > Tcrit)		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO
Shapiro-Wilk statistic (W)		0.45	0.84	0.36	0.51	0.86	0.85	0.88	0.88	0.86	0.85	0.86	0.90	0.86	0.84	0.89	0.85
Shapiro-Wilk Test (is W > Sig(0.05))		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO
Mean Concentration (95% UCL)		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	44	n/a	n/a	n/a	n/a
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	NO	n/a	n/a	n/a	n/a
Level of Evidence (p ₁ , %)		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<51	n/a	n/a	n/a	n/a
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
Mean Concentration (95% UCL)		54	35	34	36	221	73	364	295	153	129	210	n/a	129	101	17	89
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO	YES	YES	YES	NO	YES	NO	YES	NO	NO	NO	n/a	NO	NO	NO	YES
Level of Evidence (p ₁ , %)		75	99	99	99	<51	99	84	99	94	92	94	n/a	<51	82	95	99

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: **LO10488**

Assessor: **AS**

Proposed Land Use: **Residential with Home Grown Produce**

Job Name: **Former Gas Works, Reading**

Date: **08-Dec-17**

Zone: **Natural (WA)**

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISICAL RESULT															
Location	Depth (mbgl)	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(a) pyrene	Benzo(k)fluoranthene	Indeno(123cd)pyrene	Dibenzo(ah)anthracene	Benzo(ghi)perylene
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01	5.90-6.00	0.05	0.05	0.05	0.32	2	1	2	1	1	0.5	1	0.39	1	0.3	0.1	0.2
BH02	1.80-1.90	1.30	0.68	0.82	3	16	5.4	16	12	7.5	4.8	6.1	2.7	5.9	2.2	0.48	2
BH02	6.70-6.90	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
BH03C	2.60-2.70	2.5	0.4	0.54	1.8	5.5	1.1	2	1.3	0.56	0.58	0.42	0.37	0.57	0.22	0.05	0.21
BH03C	3.50-3.60	490	210	42	230	680	210	460	310	190	130	140	70	130	52	13.00	56
BH04B	3.70-3.80	1	0.05	0.44	0.45	1	0.23	0.48	0.42	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
BH06A	1.85-1.95	4.60	0.05	0.4	0.3	0.5	0.05	0.3	0.3	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
BH04B	8.50-8.60	6	5.30	53.00	62.00	220.00	60.00	150.00	110.00	55.00	25.00	38.00	19.00	37.00	18.00	5.00	18.00
BH06A	8.50-8.60	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Number of samples (N)		9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Minimum		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Maximum		490	210	53.0	230	680	210	460	310	190	130	140	70	130	52	13	56
Standard Deviation		163	70	21	77	228	70	154	104	63	43	46	23	43	17	4	19
Screening Value (Critical Conc.; Cc)		2.3	170	210	170	95	2400	280	620	7.2	15	2.6	2.2	77	27	0.24	320
Source of Screening Value		S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL
Outlier Identification																	
Standardised Value (Tn)		2.001	2.192	1.651	1.768	1.615	1.709	1.629	1.641	1.675	1.760	1.705	1.757	1.690	1.753	1.867	1.780
Critical Value (Tcrit)		2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110
Is there an Outlier (Tn > Tcrit)		NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Shapiro-Wilk statistic (W)		0.40	0.40	0.57	0.52	0.54	0.53	0.55	0.56	0.54	0.50	0.53	0.53	0.54	0.56	0.56	0.55
Shapiro-Wilk Test (is W > Sig(0.05))		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Mean Concentration (95% UCL)		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Level of Evidence (p1, %)		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Mean Concentration (95% UCL)		293	125	41	144	434	133	294	200	120	80	88	44	82	33	8	36
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?		NO	YES	YES	YES	NO	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO	YES
Level of Evidence (p1, %)		<51	97	99	96	<51	99	94	99	<51	<51	57	52	94	91	61	99

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: LO10488

Job Name: Former Gas Works, Reading

Assessor: AS

Date: 08-Dec-17

Proposed Land Use: Residential with Home Grown Produce

Zone: Made Ground (WA)

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq Cc$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < Cc$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)	Aliphatic >EC5 - EC6	Aliphatic >EC6 - EC8	Aliphatic >EC8 - EC10	Aliphatic >EC10 - EC12	Aliphatic >EC12 - EC16	Aliphatic >EC16 - EC21	Aliphatic >EC21 - EC35	Aromatic >EC5 - EC7	Aromatic >EC7 - EC8	Aromatic >EC8 - EC10	Aromatic >EC10 - EC12	Aromatic >EC12 - EC16	Aromatic >EC16 - EC21	Aromatic >EC21 - EC35		
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
BH01	3.60-3.70	0.001	0.001	0.001	1	2	8	8	0.001	0.001	0.140	180	600	1200	1200		
BH02	1.00-1.20	0.001	0.001	0.001	1	7.8	32	180	0.001	0.001	0.001	5.4	9.3	29	140		
BH04B	0.50-0.70	0.001	0.001	0.001	2.2	9.4	17	28	0.001	0.001	0.001	4.5	90	1100	1500		
BH04B	1.80-1.90	0.001	0.001	0.001	1	21	32	19	0.009	0.001	0.120	14	40	44	37		
BH06A	1.60-1.70	0.001	0.001	0.001	5	99	72	25	0.001	0.001	0.001	4	41.00	130	230		
TP01	0.50-0.60	0.001	0.001	0.001	1	2	8	8	0.001	0.001	0.001	2	8.50	47	85		
TP04	0.5-0.7	0.001	0.001	0.001	1	4	8	9	0.001	0.001	0.001	11	38.00	180	190		
Number of samples (N)		7	7	7	7	7	7	7	7	7	7	7	7	7	7		
Minimum		0.001	0.001	0.001	1	2	8	8	0.001	0.001	0.001	2.1	8.5	29	37		
Maximum		0.001	0.001	0.0	5	99	72	180	0.009	0.001	0.14	180	600	1200	1500		
Standard Deviation		0	0	0	2	35	23	62	0	0	0	66	214	523	602		
Screening Value (Critical Conc.; Cc)		4.2	100	27	130	1100	65000	65000	70	130	34	74	140	260	1100		
Source of Screening Value		S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL		
Outlier Identification																	
Standardised Value (Tn)		#DIV/0!	#DIV/0!	#DIV/0!	2.007	1.792	1.583	1.984	2.268	#DIV/0!	1.496	2.036	1.829	1.359	1.392		
Critical Value (Tcrit)		1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938	1.938		
Is there an Outlier (Tn > Tcrit)		#DIV/0!	#DIV/0!	#DIV/0!	YES	NO	NO	YES	YES	#DIV/0!	NO	YES	NO	NO	NO		
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		n/a stdev=0	n/a stdev=0	n/a stdev=0	NO	NO	NO	NO	NO	n/a stdev=0	NO	NO	NO	NO	NO		
Shapiro-Wilk statistic (W)		n/a stdev=0	n/a stdev=0	n/a stdev=0	0.60	0.61	0.79	0.57	0.45	n/a stdev=0	0.63	0.51	0.56	0.70	0.73		
Shapiro-Wilk Test (is W > Sig(0.05))		n/a stdev=0	n/a stdev=0	n/a stdev=0	NO	NO	NO	NO	NO	n/a stdev=0	NO	NO	NO	NO	NO		
Mean Concentration (95% UCL)		0	0	0	n/a	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a	n/a	n/a		
Is there significant evidence that the mean concentration is less than the screening value (μ < Cc)?		YES	YES	YES	n/a	n/a	n/a	n/a	n/a	YES	n/a	n/a	n/a	n/a	n/a		
Level of Evidence (p1, %)		#DIV/0!	#DIV/0!	#DIV/0!	n/a	n/a	n/a	n/a	n/a	#DIV/0!	n/a	n/a	n/a	n/a	n/a		
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		NO	NO	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES		
Mean Concentration (95% UCL)		n/a	n/a	n/a	4	79	64	143	0	n/a	0	140	471	1251	1475		
Is there significant evidence that the mean concentration is less than the screening value (μ < Cc)?		n/a	n/a	n/a	YES	YES	YES	YES	YES	n/a	YES	NO	NO	NO	NO		
Level of Evidence (p1, %)		n/a	n/a	n/a	99	99	99	99	99	n/a	99	74	<51	<51	88		

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: LO10488

Job Name: Former Gas Works, Reading

Assessor: AS

Date: 15-Dec-17

Proposed Land Use: Residential with Home Grown Produce

Zone: Made Ground (WA + Atkins)

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISTICAL RESULT															
Location	Depth (mbgl)		Aliphatic >EC6 - EC8	Aliphatic >EC8 - EC10	Aliphatic >EC10 - EC12	Aliphatic >EC12 - EC16	Aliphatic >EC16 - EC21	Aliphatic >EC21 - EC35	Aromatic >EC5 - EC7	Aromatic >EC7 - EC8	Aromatic >EC8 - EC10	Aromatic >EC10 - EC12	Aromatic >EC12 - EC16	Aromatic >EC16 - EC21	Aromatic >EC21 - EC35		
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
BH01	3.60-3.70		0.001	0.001	1	2	8	8	0.001	0.001	0.140	180	600	1200	1200		
BH02	1.00-1.20		0.001	0.001	1	7.8	32	180	0.001	0.001	5.4	9.3	29	140			
BH04B	0.50-0.70		0.001	0.001	2.2	9.4	17	28	0.001	0.001	0.001	4.5	90	1100	1500		
BH04B	1.80-1.90		0.001	0.001	1	21	32	19	0.009	0.001	0.120	14	40	44	37		
BH06A	1.60-1.70		0.001	0.001	5	99	72	25	0.001	0.001	0.001	4	41.00	130	230		
TP01	0.50-0.60		0.001	0.001	1	2	8	8	0.001	0.001	0.001	2	8.50	47	85		
TP04	0.5-0.7		0.001	0.001	1	4	8	9	0.001	0.001	0.001	11	38.00	180	190		
WS001	0.50		0.14	0.14	1.4	3	21	140	0.014	0.014	0.14	1.4	13	27	230		
WS001	1.00		0.11	0.11	1.1	4	17	100	0.011	0.011	0.11	1.1	11	27	160		
WS002	0.50		0.14	0.23	13	89	140	320	0.062	0.052	0	59	360	1900	7800		
WS002	1.50		0.10	0.18	6	44	73	190	0.059	0.050	0	1.0	210	1200	5000		
WS003	0.50		0.12	0.12	1.2	10	48	240	0.045	0.026	0.12	29	220	1700	6300		
WS003	1.50		0.13	0.13	1.3	1.3	9	25	0.038	0.023	0.13	1.3	40	330	1300		
WS004	0.50		0.2	0.20	1.2	6	16	57	0.025	0.014	0.12	1.2	32	300	1700		
WS004	1.50		0.13	0.13	1.3	8	13	31	0.031	0.019	0.13	6	34	260	1900		
WS005	0.50		0.12	0.12	4	43	96	400	0.047	0.029	0.12	1.2	290	2100	7700		
WS005	1.50		0.13	0.13	2	21	66	210	0.043	0.036	0.13	140	500	2400	7300		
Number of samples (N)			17	17	17	17	17	17	17	17	17	17	17	17	17		
Minimum			0.001	0.001	1	1.3	8	8	0.001	0.001	0.001	1	8.5	27	37		
Maximum			0.15	0.2	13	99	140	400	0.062	0.052	0.16	180	600	2400	7800		
Standard Deviation			0	0	3	30	38	121	0	0	0	53	186	836	2985		
Screening Value (Critical Conc.; Cc)			100	27	130	1100	65000	65000	70	130	34	74	140	260	1100		
Source of Screening Value			S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL		
Outlier Identification																	
Standardised Value (Tn)			0.882	0.993	2.536	1.745	1.765	1.432	1.111	1.249	0.725	1.967	1.573	1.260	1.247		
Critical Value (Tcrit)			2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475	2.475		
Is there an Outlier (Tn > Tcrit)			NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		
Shapiro-Wilk statistic (W)			0.74	0.84	0.59	0.69	0.82	0.84	0.86	0.84	0.73	0.56	0.76	0.82	0.76		
Shapiro-Wilk Test (is W > Sig(0.05))			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		
Mean Concentration (95% UCL)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
Level of Evidence (p ₁ , %)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.			YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
Mean Concentration (95% UCL)			0	0	6	54	80	246	0	0	0	83	346	1647	5673		
Is there significant evidence that the mean concentration is less than the screening value ($\mu < C_c$)?			YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO		
Level of Evidence (p ₁ , %)			99	99	99	99	99	99	99	99	99	93	<51	86	79		

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.



STATISTICAL ANALYSIS OF SOIL CONTAMINATION DATA - PLANNING SCENARIO

(Based on CL:AIRE/CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008)

Job Number: LO10488

Job Name: Former Gas Works, Reading

Assessor: AS

Date: 08-Dec-17

Proposed Land Use: Residential with Home Grown Produce

Zone: Natural (WA)

Key Question: Is there significant evidence that the true mean concentration of the contaminant is less than the screening value (critical concentration)?

Null Hypothesis (H0): The true mean concentration is equal to or greater than the screening value (critical concentration; $\mu \geq C_c$)

Alternative Hypothesis (H1): The true mean concentration is less than the screening value (critical concentration; $\mu < C_c$)

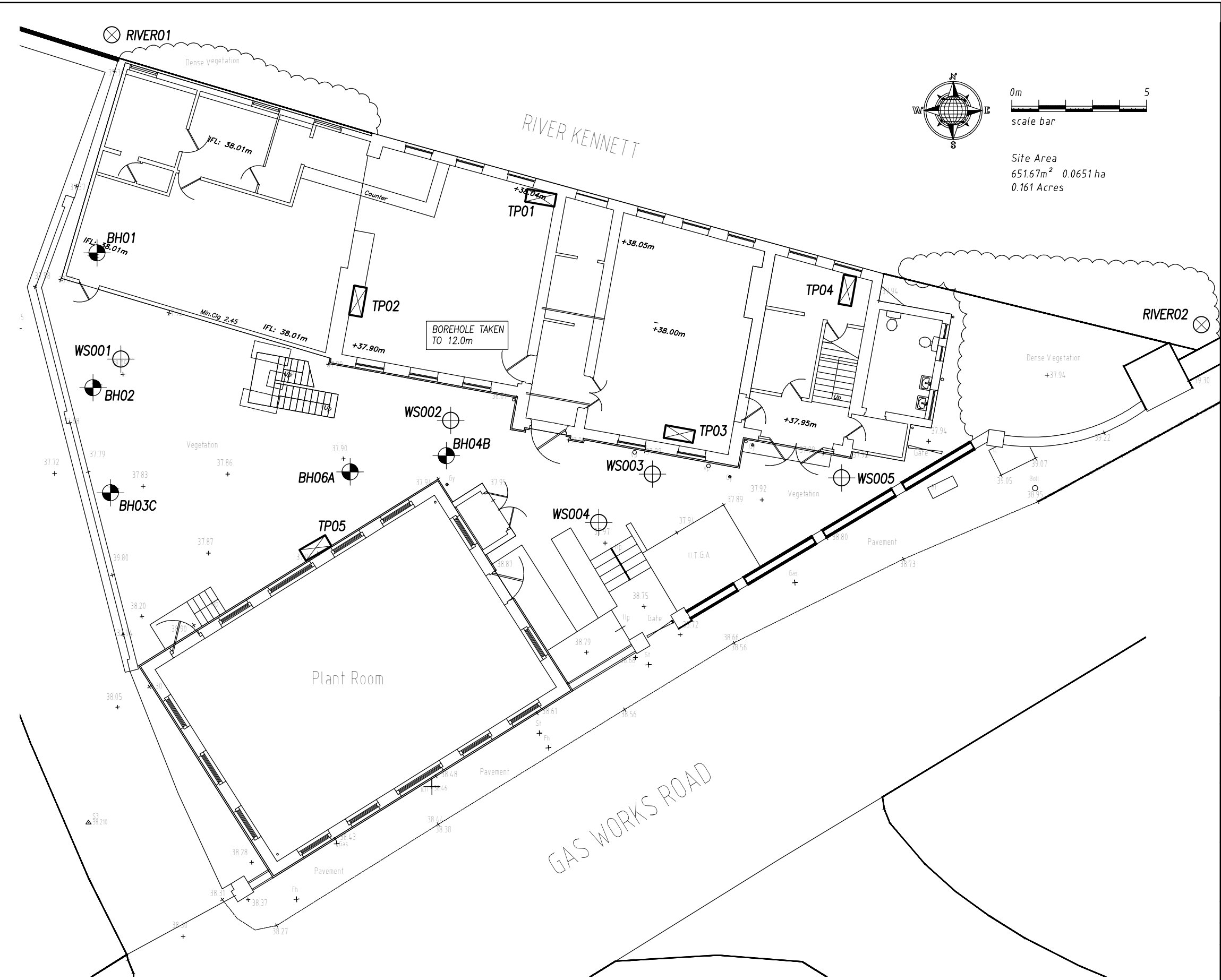
SAMPLE IDENTIFICATION / STATISTICAL TEST		RECORDED CONCENTRATION / STATISICAL RESULT															
		Aliphatic >EC5 - EC6	Aliphatic >EC6 - EC8	Aliphatic >EC8 - EC10	Aliphatic >EC10 - EC12	Aliphatic >EC12 - EC16	Aliphatic >EC16 - EC21	Aliphatic >EC21 - EC35	Aromatic >EC5 - EC7	Aromatic >EC7 - EC8	Aromatic >EC8 - EC10	Aromatic >EC10 - EC12	Aromatic >EC12 - EC16	Aromatic >EC16 - EC21	Aromatic >EC21 - EC35		
Location	Depth (mbgl)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
BH01	5.90-6.00	0.001	0.001	0.001	1	2	8	8	0.001	0.001	0.001	1.6	4.3	10	15		
BH02	1.80-1.90	0.001	0.001	0.001	1.5	5.5	8	12	0.001	0.001	0.001	4.5	19	71	58		
BH02	6.70-6.90	0.001	0.001	0.001	1	2	8	8	0.001	0.001	0.001	1	2	10	10		
BH03C	2.60-2.70	0.001	0.001	0.001	1	2	8	8	0.003	0.007	0.035	7.4	21	20	20		
BH03C	3.50-3.60	0.001	0.001	0.001	12	57	31	15	0.059	1.800	14	350	1200	2600	2900		
BH04B	3.70-3.80	0.001	0.001	0.001	2	23	23	20	0.008	0.001	0.18	2.8	22	14	10		
BH06A	1.85-1.95	0.001	0.001	0.001	4	50	47	8	0.001	0.001	0.085	17	70	54	39		
BH04B	8.50-8.60	0.001	0.001	0.001	1.4	18	29	32	0.001	0.001	0.13	19	350	660	560		
BH06A	8.50-8.60	0.001	0.001	0.001	1	2	8	8	0.001	0.001	0.001	1	2	10	10		
Number of samples (N)		9	9	9	9	9	9	9	9	9	9	9	9	9	9		
Minimum		0.001	0.001	0.001	1	2	8	8	0.001	0.001	0.001	1	2	10	10		
Maximum		0.001	0.001	0.0	12	57	47	32	0.059	1.8	14	350	1200	2600	2900		
Standard Deviation		0	0	0	4	22	14	8	0	1	5	115	395	858	953		
Screening Value (Critical Conc.; Cc)		4.2	100	27	130	1100	65000	65000	70	130	34	74	140	260	1100		
Source of Screening Value		S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL		
Outlier Identification																	
Standardised Value (Tn)		#DIV/0!	#DIV/0!	#DIV/0!	2.240	1.374	1.565	1.990	2.291	2.577	1.937	2.151	1.746	1.960	2.048		
Critical Value (Tcrit)		2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110	2.110		
Is there an Outlier (Tn > Tcrit)		#DIV/0!	#DIV/0!	#DIV/0!	YES	NO	NO	NO	YES	YES	NO	YES	NO	NO	NO		
Outlier location(s) and depth(s)																	
Outlier status																	
Does the Data have a Normal Distribution?																	
Visual Estimate (probability plot)		n/a stdev=0	n/a stdev=0	n/a stdev=0	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		
Shapiro-Wilk statistic (W)		n/a stdev=0	n/a stdev=0	n/a stdev=0	0.57	0.77	0.79	0.73	0.46	0.39	0.40	0.44	0.55	0.52	0.49		
Shapiro-Wilk Test (is W > Sig(0.05))		n/a stdev=0	n/a stdev=0	n/a stdev=0	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		
Mean Concentration (95% UCL)		0	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
Is there significant evidence that the mean concentration is less than the screening value (μ < Cc)?		YES	YES	YES	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
Level of Evidence (p1, %)		#DIV/0!	#DIV/0!	#DIV/0!	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
Does the Data have a Non-normal Distribution?																	
Chebychev Theorem.		NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
Mean Concentration (95% UCL)		n/a	n/a	n/a	8	49	40	25	0	1	8	211	763	1629	1788		
Is there significant evidence that the mean concentration is less than the screening value (μ < Cc)?		n/a	n/a	n/a	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO		
Level of Evidence (p1, %)		n/a	n/a	n/a	99	99	99	99	99	99	99	<51	<51	<51	82		

NB: 1) values shown in bold exceed the critical concentration (adopted generic screening value); 2) Non-detects have been entered as the limit of detection for that substance and these values are shown in italics.

DRAWINGS

LEGEND

-  APPROXIMATE BOREHOLE LOCATION 2017
-  APPROXIMATE TRIAL PIT LOCATION 2017
-  APPROXIMATE BOREHOLE LOCATION 2010
-  APPROXIMATE POSITION OF SURFACE WATER SAMPLE 2017



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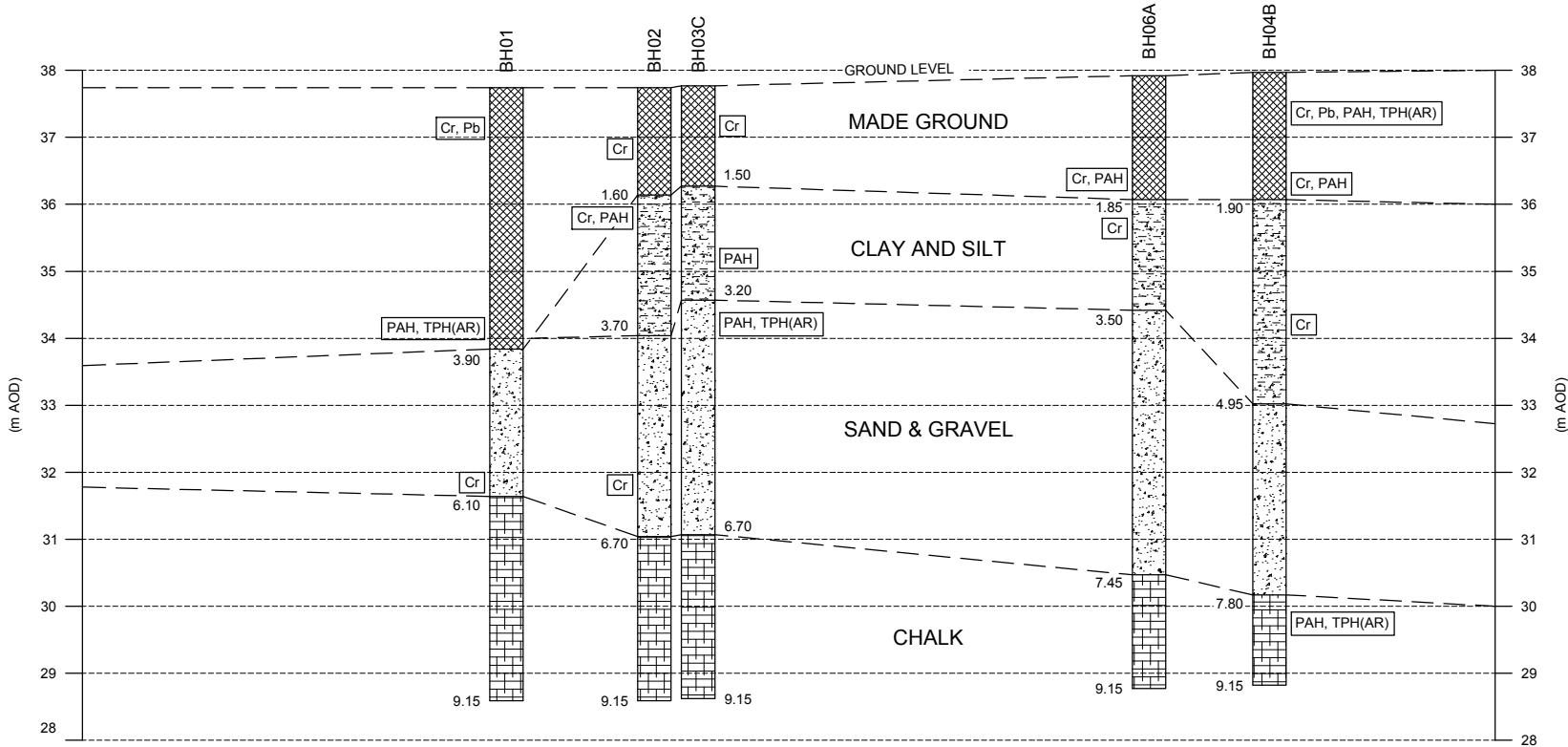
N:\LO\LO10488 - THE FORMER GAS WORKS READING\03 - DESIGN\AutoCAD\LO10488-050.DWG

CLIENT		
CHARLY45 LTD		
PROJECT		
FORMER GAS WORKS BUILDINGS GAS WORKS ROAD READING RG1 3EE		
DRAWING TITLE		
SITE INVESTIGATION LOCATION PLAN		
DRG No.	SCALE	DATE
LO10488-050	1:100 AT A2	DEC 2017
DRAWN BY	CHECKED BY	APPROVED BY
OP	ES	JL
☐ STOKE-ON-TRENT (HEAD OFFICE)	TEL 01782 276700	☐ CARDIFF TEL 029 2072 9191
☐ NEWCASTLE UPON TYNE	TEL 0191 232 0943	☐ LEIGH TEL 01942 260101
☐ BIRMINGHAM	TEL 0121 580 0909	☐ SHEFFIELD TEL 0114 245 6244
☐ LONDON	TEL 020 7287 2872	☐ EDINBURGH TEL 0131 556 3311
		☐ TAUNTON TEL 01823 703100
 wardell armstrong your earth our world		

LEGEND KEY

- MADE GROUND
- CLAY AND SILT
- SAND AND GRAVEL
- CHALK

- CrCHROMIUM
- PAHPOLYCYCLIC AROMATIC HYDROCARBONS
- PbLEAD
- TPH(AR)AROMATIC TOTAL PETROLEUM HYDROCARBONS



REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

CHARLY45 LTD

PROJECT

FORMER GAS WORKS BUILDINGS
GAS WORKS ROAD
READING RG1 3EE

DRAWING TITLE

SCHEMATIC GROUND CONDITIONS
AND SOIL CONTAMINATION SECTION

DRG No. LO10488-051	SCALE 1:100V, 1:200H	DATE DEC 2017
DRAWN BY OP	CHECKED BY ES	APPROVED BY JL
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☐ NEWCASTLE UPON TYNE TEL 0191 232 0943	☐ LEIGH TEL 01942 260101	
☐ BIRMINGHAM TEL 0121 580 0909	☐ SHEFFIELD TEL 0114 245 6244	
☒ LONDON TEL 020 7287 2872	☐ EDINBURGH TEL 0131 555 3311	
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