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ENERGY AND CLIMATE CHANGE
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PHASE I GEO-ENVIRONMENTAL DESK STUDY

AUGUST 2017

your earth our world



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PHASE I GEO-ENVIRONMENTAL DESK STUDY

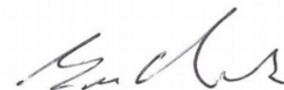
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1 EXECUTIVE SUMMARY

- 1.1 This report is prepared to inform the design of a ground investigation which has been conditioned within the planning consent for the site (application no. 160378) and in accordance with instructions from Dunthorne Parker Architects, on behalf of Lighttoon Ltd, 76 Gladesmore Road, London N15 6TD. The site is the Former Gas Works, Gas Works Road, Reading RG1 3EQ and comprises approximately 0.07 hectares of land occupied by two disused buildings and a yard area. A summary of pertinent information relating to the site along with a qualitative assessment of the potential risk is provided in Table 1.

TABLE 1: Summary of Overall Risk			
Issue	Summary	Risk Category	
		Humans	Property/ Environment
Present and past site use	Past: Gas works Present: Disused former social club and governor house with yard area.	Low to High	Moderate to High
Adjacent land uses	Offices, commercial, residential.	Low	Low
Environmental setting	One revoked discharge consent in vicinity of site.	Low	Low
Asbestos	Asbestos containing materials tentatively identified in building and may be present in made ground.	Moderate	Moderate
Geology, Geotechnical and Mining	Made ground overlying alluvium which in turn overlies Chalk. Thick made ground likely. Alluvium may contain peat layers. Ground gas may be generated by made ground and organic material in alluvium. Karstic features may be present in Chalk. Historical chalk/lime workings off site.	Moderate	Moderate
Past remediation	Site remediated in past on a statutory basis. Site may still be contaminated in terms of proposed end use.	Moderate	Moderate
Groundwater and surface water	Site underlain by Secondary A aquifer which overlies a Principal aquifer. Site is within a source protection zone III. No graded surface water in immediate vicinity of site.	Moderate	High
Flooding	Majority of site does not lie within a floodplain. Southern and northern edges of site lie within Flood Zones 2 and 3 respectively. Very low chance of surface water flooding at the site. Potential for groundwater flooding at the site.	Low	Low/ Moderate
Unexploded Ordnance	Site is within a low risk area for encountering unexploded ordnance.	Low	Low

TABLE 1: Summary of Overall Risk			
Issue	Summary	Risk Category	
		Humans	Property/ Environment
Recommended further work	Phase II site investigation for geoenvironmental and geotechnical purposes. Asbestos demolition survey. Removal of vegetation and making safe of existing buildings. Utilities survey.		
Overall Risk:	Moderate to High		

- 1.2 The executive summary forms part of the overall report and should not be considered in isolation.

2 INTRODUCTION

Instructions

- 2.1 This report is prepared in accordance with instructions from Dunthorne Parker Architects, on behalf of Lightoon Ltd, 76 Gladesmore Road, London N15 6TD. This follows a proposal dated 12 July 2017 by Wardell Armstrong LLP.

Site Location

- 2.2 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 south and east, offices to west and the River Kennet to the north. The site is located approximately 500m east of Reading town centre.

Figure 1: Aerial Image Showing the Approximate Site Boundary



Reproduced from Landmark Information Group

Scope and Objectives

- 2.3 The purpose of this report is to identify and examine in broad terms readily available information relating to the:
- past and current uses of the site and surrounding area;
 - environmental setting including geology, mining, hydrogeology and hydrology;
 - potential contamination sources, pathways and receptors as part of a preliminary conceptual model;
 - potential stability and contamination constraints and liabilities that may arise in connection with the present use or proposed use of the site; and
 - requirement or otherwise for future studies including potential intrusive site investigation prior to redevelopment.
- 2.4 The report has been produced in general accordance with the first incremental stage of a Land Quality Statement as set out by the Royal Institution of Chartered Surveyors (RICS) in their publication "Contamination, the Environment and Sustainability" dated April 2010. The report also draws on Environment Agency Report 11 entitled "Model Procedures for the Management of Land Contamination" dated September 2004 and BS10175:2011+A1:2013 Investigation of Potentially Contaminated Sites – Code of Practice. Further background to government guidance on contamination and the purpose and use of Land Quality Statements in assessing the risk of contamination at a site is described at Appendix II.
- 2.5 The report does not constitute or contain a valuation nor is it a full rigorous environmental audit. In this instance, the report is prepared to inform the design of a ground investigation which has been conditioned within the planning consent for the residential redevelopment of the site (application no. 160378). The opinions and recommendations presented within this report are partly based on documents provided by third party sources. Wardell Armstrong has not verified the accuracy of third party information and for the purpose of this assessment have assumed that it is accurate and complete.

Proposed Site Use

- 2.6 It is proposed to redevelop the site for residential land use. The planning application (application no. 160378) is for the creation of 20 residential units through the extension and conversion of the 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 smaller building has a basement that will be used for cycle storage.
A communal landscaping area is proposed between the two buildings.

3 SITE HISTORY AND CURRENT LAND USE

Data Sources

- 3.1 The history of the site and the surrounding land has been investigated by consultation with a range of archive sources as summarised at Appendix III. In the time available no information has been requested from statutory bodies; this should be obtained and relevant data used to revise the conclusions presented below. The topographical and environmental data is based primarily on an Envirocheck report prepared by the Landmark Information Group (LIG) and dated 28 July 2017. An electronic copy of the Envirocheck report is provided under separate cover.
- 3.2 In addition, the following reports have been provided for information and review:
- Factual Desk Study, Atkins Ltd, 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).

A site walkover survey was also undertaken by a Wardell Armstrong engineer on 4 August 2017. The main findings from the past reports are summarised in Section 4. Where relevant, findings from the past reports are referred to within the body of this report.

Site History

- 3.3 Historic maps provided in the Envirocheck report have been used to identify previous land uses, including any significant potentially contaminative uses. Where other features that may have an effect on development of the site have been identified, they are described.
- 3.4 Table 2 summarises the history of the site and its immediate vicinity from about 1879 to the present day.

TABLE 2: Summary of Land Use

Date	Site Land Use	Adjacent Land Use
1870s - 1880s	Site forms part of larger gas works. Gas works buildings and equipment in north and west of site including pump room, boiler room, chimney, engine room, scrubbers. Tracks run across middle of site from west to east. Parts of workshop buildings and another chimney in southwest corner of site. Part of purifying house in northwest corner of site.	River Kennet bounds site to north. Gas works site surrounds site on west, south and east sides. Experimental gas works including various sized gasometers, scrubbers, purifiers, meter house approximately 10m southeast. Workshops and purifying house adjacent to west boundary. Trough approximately 1m to south. Retort House approximately 11m to west. Condensers approximately 15m to west. Coal store approximately 17m to west. Steam saw mills approximately 33m to south. The Kennet and Avon Canal is present approximately 55m south. Residential properties beyond canal. Biscuit factory buildings approximately 50m west, and also 80m northwest of site on north bank of River Kennet. Sewage pumping station approximately 100m northeast on north bank of River Kennet.
1890s - 1900s	Structures identified as scrubbers in west of site no longer present. Track no longer shown.	Access road along southeast boundary of site. Large building, part of biscuit factory, approximately 30m to north on north bank of River Kennet.
1910s	Building present in southern corner of site (assumed to be governor house). Building in north of site has been extended on its western end.	Road along southeast boundary is identified as Gas Works Road.
1920s	No mapping available.	No mapping available.
1930s - 1940s	No significant change.	Biscuit factory buildings approximately 50 west no longer present. Residential properties approximately 85m southwest no longer present.
1950s	No significant change to site layout, however building use may have changed as wider gasworks site no longer present.	Gas works buildings including large gasometer to southeast no longer present; area now occupied by a building. Biscuit factory building approximately 50m west has been rebuilt. Saw mills south of site replaced by biscuit factory buildings. Park present approximately 85m southwest. Printing works replace residential buildings approximately 86m southwest.
1960s	No mapping available.	No mapping available.
1970s - 1980s	No significant change.	Electricity substation approximately 55m west. Printing works to southwest no longer present; replaced by residential blocks and offices.

TABLE 2: Summary of Land Use		
Date	Site Land Use	Adjacent Land Use
1990s - 2000s	No significant change.	Biscuit factory buildings to north and west no longer present; replaced by offices. Sewage pumping station to northeast no longer present; replaced by a museum. Buildings approximately 10m to south and southeast no longer present. Electricity substation to west no longer present.
Present day	Site occupied by two disused buildings: a former social club and gas works governor house. The yard area between the two buildings is very overgrown.	Residential blocks to south and east, offices to west and offices/commercial buildings on north bank of River Kennet.

Current Site Use

3.5 The site was visited on 4 August 2017 by a Wardell Armstrong engineer. At the time of the visit the site comprised a former gas works building (governor house) and a building formerly used as a social club. The following points are of note:

- The buildings, particularly the former social club building, are in a poor state of repair;
- Exterior areas are overgrown with buddleia and brambles, currently making pedestrian access around the site difficult;
- Buddleia is growing from building and boundary walls, causing structural damage in places;
- The River Kennet bounds the site to the north; the social club building wall forms the wall with the river. No discharge pipes from the site into the river were observed;
- Access to the site is currently only available to pedestrians and steps lead down from the gate into the yard area which is approximately 1m lower than Gas Works Road;
- The former governor building contains above ground pipework; no olfactory or visual evidence of leaks or spills were observed in governor building (although the building was not entered);
- Possible asbestos containing material observed in roof to single storey extension to main building in north of site and likely to be found elsewhere on site;
- Fly tipping of general waste such as mattresses, furniture, children's buggy on site;

- Bulk bags of material (possibly gravel) present next to door to former social club; and
- No storage facilities or evidence of contamination to hardstanding was observed.

3.6 A site visit record is attached at Appendix IV. Due to the dilapidated nature of both buildings, neither was entered during the site visit for health and safety reasons. The overgrown nature of the exterior parts of the site meant that it was difficult to assess the quality of the hardstanding in all areas. The northeast corner of the site was not accessed at all due to its overgrown nature.

Asbestos

- 3.7 The Health and Safety at Work Act, the Control of Asbestos Regulations and the Construction (Design and Management) Regulations impose duties upon employers, site owners, their agents and contractors in respect of hazardous materials including asbestos. Other health and safety and welfare regulations place duties on Employers to undertake appropriate risk assessments. This could include the commissioning of surveys, identification and management of hazardous materials including any proposals for remedial work.
- 3.8 A site walkover survey has been completed. However, the walkover survey does not constitute an asbestos survey and not all areas of the site may have been visited or made available for inspection.
- 3.9 Potentially asbestos containing materials have been identified during our site walkover. Asbestos may also be present in the made ground at the site associated with past historical use. We recommend that a full asbestos survey be carried out at the site. Guidance on the need for asbestos surveys and the method of carrying them out are given in HSE Publication HSG264.

Ecology

- 3.10 There are a number of legal and planning policy considerations relating to certain important habitats and species where they are present on or in the vicinity of a site. Protected habitats and species can also be linked to development related activities via surface or groundwater and effects such as human/vehicular presence, noise, dust or pollution.
- 3.11 Reference to the Envirocheck report indicates no Special Protection Areas, Special Areas of Conservation, National Nature Reserves, Marine Nature Reserves, Local Nature Reserves or Sites of Special Scientific Interest within 1km of the site.

3.12 All protected and important species as well as other non statutory sites (e.g. SINC's and areas of ancient woodland) which are protected by planning policy rather than statute, are omitted. Furthermore, consideration of those habitats defined as 'being of principle importance for the purpose of conserving biodiversity' (NERC Act 2006) which are material planning consideration under the National Planning Policy Framework (NPPF) are beyond the scope of this report.

3.13 Although a site visit has been carried out, this was not specifically for ecological purposes, and was not undertaken by a qualified ecologist. Based on this preliminary assessment the development may trigger legislative or planning considerations for ecology/biodiversity. Notwithstanding this, further information on ecological features should be obtained prior to the onset of works or an application for planning consent.

Japanese Knotweed, Himalayan Balsam and Giant Hogweed

3.14 The Wildlife and Countryside Act, 1981 contains measures for preventing the establishment of non-native species, including 'invasive' plants which may be detrimental to native wildlife, prohibiting the release of animals and planting of plants listed in Schedule 9 in England and Wales. In particular, Japanese knotweed, Himalayan balsam and Giant hogweed can become aggressively dominant, and persistent. Giant hogweed poses certain health risks and Japanese knotweed can cause physical damage to pavements and structures.

3.15 Above ground growth of invasive plant species was not observed in the areas of the site which could be inspected. However, it should be noted that the survey was not specifically for ecological purposes, and consequently was not undertaken by an ecologist or specialist in this area.

Environmental Management

3.16 Other than the buildings being in a state of disrepair due to them being unoccupied, and some general fly tipping present on site, no significant issues relating to environmental management were identified during the site visit.

4 PAST REPORTS

- 4.1 The client has provided a series of reports for review in relation to past investigation works at the site.

Factual Desk Study, 2010

- 4.2 A desk study was produced by Atkins in 2010 (ref. Gas Works Road, Reading Desk Study Factual Rev0). The report was prepared for National Grid Property to provide an initial assessment of potential liabilities associated with the site. The site area did not include the governor house in the south of the site. The report also refers to the remediation of the site which reportedly occurred in 2000 as part of the remediation of the wider gas works area, and provides the Factual Validation Report completed by Waterman Environmental Consulting Engineers in April 2001 (ref. R/EN997.HB.4.4.1) as an appendix. The main points of the Atkins report are as follows:

- Four phases of ground investigation were undertaken by Waterman Environmental and contamination was apparently identified in one area of the subject site (in the west) and nine other areas of land now occupied by Blakes Quay residential blocks to the south. These areas including the identified contamination on the subject site, were subsequently remediated.
- The remediation of the gas works in 2000 was reportedly undertaken on a statutory basis with the aim of removing any potential liability associated with contamination.
- Treatment of groundwater was not required as part of the remediation of the wider gasworks site, although groundwater that was pumped from excavations and from a below ground gasholder was removed from site during the works.
- Contamination on the subject site comprised elevated PAHs considered to relate to small scrubbers and other historic gas works plant.
- 136 tonnes of material was excavated all of which was classified as “Special Waste” due to it having a “very oily” appearance.
- The remediation excavation on the subject site included numerous obstructions including live gas mains, electricity cables and concrete foundations, which constrained the size of the excavation that could be completed.
- The excavation was lined with compacted clay to prevent future infiltration of potential mobile contaminants from adjacent areas and then backfilled with granular material.

- Waterman Environmental stated that the Environment Agency was satisfied that the remediation was completed in accordance with the agreed strategy and further works were not required, unless redevelopment occurs.
- Records of the site walkover carried out by Atkins on 29 January 2010 indicate that the site layout was the same as it is currently. At that time the buildings were also unused. The walkover did not mention that the site was overgrown and photographs also show relatively clear yard areas.
- No evidence of underground or above ground tanks was noted on site and no spillages or contamination at the surface was observed during the Atkins site walkover.

Environmental Investigation and Assessment Report, 2010

- 4.3 Atkins carried out a ground investigation at the subject site in 2010 and reported on it in their Environmental Investigation and Assessment, Final Factual Report dated October 2010 (ref. 5027279/GTG.20100598/Reading_2010/R002rev1). The report was carried out in terms of a commercial end use and included a summary of the previous March 2010 desk study, ground investigation details, borehole logs, and laboratory results. No interpretation of the laboratory results was included in the report. The site area did not include the governor house in the south of the site.

The main details of the report were as follows:

- 5 window sample boreholes were installed to a depth of 5m below ground level (bgl) to allow soil and leachate testing, and gas and groundwater monitoring.
- Ground conditions encountered were made ground over alluvium (further details in section 5). Boreholes were not progressed to a depth where chalk was encountered.
- Visual and olfactory indicators of contamination were identified in all site investigation locations in both made ground and natural deposits to up to 5m bgl (i.e. total depth investigated).
- Groundwater was encountered in four out of five site investigation locations between 1 and 2m bgl within made ground and alluvium.
- Groundwater was considered to flow towards the River Kennet.
- Ground gas and soil vapour analysis was undertaken and data provided but not commented on in the report.

Updated Controlled Waters Quantitative Risk Assessment, 2013

4.4 Atkins produced a controlled waters quantitative risk assessment in May 2013 for the subject site (not including the governor building), presumably based on the findings of their site investigation in 2010 and subsequent groundwater and surface water monitoring (2010 and 2012) and in accordance with comments from the Environment Agency on previous phases of assessment.

The main points from this report are:

- Further groundwater monitoring was undertaken on 17 June 2010, 20 January 2012 and 6 March 2012.
- Previous Atkins reports are referenced including an Interpretative Report dated November 2010 following the previous site investigation works, and a Detailed Quantitative Risk Assessment Report dated December 2011. At the time of writing this report, these documents have not been seen.
- The report identifies pollution linkages between contamination sources within unsaturated soils and groundwater, and the River Kennet and the Chalk principal aquifer.
- Gross contamination was located during works at the office site (currently occupied by Prudential) to the west of the subject site, within underlying unsaturated soils, gravel and Chalk aquifers.
- The volume of groundwater flow from the alluvium on site into the River Kennet is considered to have negligible impact on river quality.
- Contaminant migration to River Kennet via the superficial deposits is considered to be low risk.
- Contaminant migration to the Chalk aquifer is considered to be low risk.
- On the basis of surface water monitoring results, contamination within groundwater at the site did not indicate a measurable negative impact on surface water quality in the River Kennet.
- A plausible risk to the River Kennet and the Chalk aquifer from contaminated unsaturated soil at the site has been identified, but in the context of the likely magnitude of impact on receptors, the site is considered to present a minimal risk to the receptors.

- Remediation of the site is not considered to be required in terms of protecting controlled waters.

Factual Desk Study, 2014

- 4.5 Atkins produced a desk study report dated January 2014 for the disused governor house in the south of the site as this had not previously been included within the site boundary. In general the findings of this report are the same as the previous 2010 desk study report produced for the adjacent site. The report did state that gas pipelines are assumed to be present underlying the site but the status of these are not known.

5 GEOLOGICAL AND HYDROGEOLOGICAL SETTING

Geology

- 5.1 The assessment of the geology of the site is based on the published geological mapping sheet (Sheet No 268, Reading, Solid and Drift Edition, 1:50,000 scale) supplemented by online geological mapping, topographical plans and site visit. Online data from the British Geological Survey (BGS) has been researched and relevant borehole records are attached (Appendix VI). Borehole records from a site investigation undertaken by Atkins in June 2010 and included in their Environmental Investigation and Assessment report dated October 2010, have also been reviewed.
- 5.2 A summary of relevant geological information is provided below in Table 3.

TABLE 3: Summary of Relevant Geological Data	
Strata	Description
Made ground	Made ground with an average thickness of 2-2.5m has been identified on site. A thickness of 5m (full depth not proved) was encountered in the west of the site. Generally described as loose silty sandy gravel and soft slightly sandy clay. Gravels comprise fine to coarse subangular to angular flint, red brick, slate, sandstone, concrete, and glass. Hydrocarbon odours present in all locations and staining observed in two locations where made ground encountered.
Natural superfcials	Published mapping indicates alluvium underlies the site. Alluvium encountered on site from 2-5m bgl (full depth not proved). Generally described as soft to firm clay with peat mottling and loose silty sandy gravel. Gravels were fine to course subrounded to angular flint. Hydrocarbons odours present in present in the majority of locations where superfcials encountered.
Solid strata	Published mapping indicates the Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) underlies the superfcials. Chalk not encountered in Atkins' site investigation. A BGS borehole approximately 80m to the west of site (ref. SU77SW36) encountered Chalk at 5.6m bgl.
Natural cavities	Seven natural cavities recorded within 1km of site. Closest is approximately 597m southeast of site and is identified as comprising three solution pipes in the Chalk, infilled with superficial deposits, namely the Taplow Gravel.
Ground stability	British Geological Information Services indicate a moderate potential for compressible ground stability hazards on site, and a high potential for ground dissolution stability hazards approximately 220m from the site.

Hydrogeology

- 5.3 Hydrogeological information has been obtained from a review of:

- a LIG Envirocheck report;
- Groundwater Protection Policy and Groundwater Vulnerability maps published by the Environment Agency;
- Hydrogeological maps published by the British Geological Survey; and
- An interactive aquifer designation map published by the Environment Agency.

- 5.4 This information indicates the site to be underlain by superficial deposits which are classified as Secondary A Aquifer. The underlying solid strata are classified as a Principal Aquifer.
- 5.5 Principal aquifers are highly permeable formations usually with a known or probable presence of significant fracturing. They are usually highly productive, strategic reserves able to support large abstractions, public water supply and river base flow.
- 5.6 Secondary A aquifers are generally fractured or potentially fractured formations and do not have a high primary permeability. Although not producing large quantities of water for abstraction, they are important for local supplies and may supply base flow to rivers.
- 5.7 A BGS borehole (ref. SU77SW36) located approximately 80m west of the site recorded resting groundwater at approximately 20.6m bgl (or 36.5m above Ordnance Datum), within the Chalk. During the Atkins' site investigation, groundwater was encountered in four out of five borehole locations, at between 1m and 2m depth bgl. Subsequent groundwater monitoring recorded groundwater within made ground at 1.23m bgl in the west of the site, and within the alluvium at 1.29m and 1.9m bgl in the east of the site. By comparing the groundwater level results with an arbitrary datum, Atkins found that groundwater flow direction at the site is towards the north and east. This direction is towards the River Kennet and also follows its downstream flow (towards the east), which suggests that the groundwater on site may potentially be in hydraulic continuity with the river. Although the Atkins boreholes did not penetrate into the Chalk, it is considered that groundwater within the alluvium is likely to be in hydraulic continuity with the underlying Chalk.
- 5.8 There are two active groundwater abstraction licences within 1km of the site, and a further 12 active groundwater abstraction licenses between 1km and 2km of the site. The closest is approximately 358m east of the site (NGR: 472700 173600) and is operated by M J Gleeson Group Plc which is licensed to abstract an undefined volume of groundwater per year for pump and treat pollution remediation purposes.

- 5.9 The site lies within Source Protection Zone III (Total Catchment) for a major public groundwater supply approximately 2km to the south of the site. This supply is operated by the University of Reading and is licensed for the abstraction of groundwater from boreholes in the Chalk.
- 5.10 The BGS has developed a dataset to indicate areas that may be susceptible to groundwater flooding. This can occur when the water table rises causing drainage networks to be ineffective. The dataset has indicated that the site has the potential for groundwater flooding to occur at the surface.

Soil Vulnerability Classification – Leaching Potential

- 5.11 The soil vulnerability classification groups the many different soil types of England and Wales into three soil vulnerability classes and six sub-classes. Each is based on the physical and chemical properties of the soil, which affect the downward passage of water and contaminants. This classification is not applied to soil above non-aquifers. Soil information for urban areas is based on fewer observations than elsewhere. A worst case vulnerability is therefore assumed until proved otherwise.
- 5.12 The soil is considered to have a High Leaching potential (HU) due the site's urban location.

Hydrology

- 5.13 The nearest surface watercourse is the River Kennet, which is adjacent to the northern boundary of the site. This reach of the River Kennet adjacent to the site is ungraded. The nearest reach of the River Kennet that has been graded is approximately 284m to the north of the site and has been given a rating of General Quality Assessment (Chemistry) rating of B (Good) by the Environment Agency.
- 5.14 The Environment Agency maintains national flood maps based on ground levels, predicted flood levels, information on flood defences and local knowledge. The flood maps show the predicted likelihood of flooding in an area in the context of current and also the proposed land use considered in development planning.
- 5.15 For planning purposes, the likelihood of flooding is classed as low, medium or high based on flood zones identified in National Planning Policy Guidance (2014) attached to the National Planning Policy Framework (2012) and the EA map entitled Flood Map for Planning (Rivers and Sea). The Flood Map for Planning only applies if the site is intended for redevelopment. The majority of the site is within Zone 1 and has a low probability of flooding. The chance of flooding each year is less than 0.1% (1 in 1,000).

The southern part of the site is within Zone 2 and has a moderate probability of flooding. The chance of flooding each year is between 1.0% (1 in 100) and 0.1% (1 in 1,000). The northern boundary of the site is within Zone 3 and has a high probability of flooding. The chance of flooding each year is 1.0% (1 in 100) or greater.

- 5.16 The likelihood of surface water flooding (from rainwater not draining away through the normal drainage system) at the site is classed as very low, meaning that the chance of surface water flooding from rainwater is less than 1 in 1000 (0.1%). This type of flooding is based on information such as ground levels and drainage, and cannot be predicted easily due to the difficulty in forecasting where or how much rain will fall in any storm.
- 5.17 There are four surface water abstraction licences within 2km of the site. The closest is approximately 750m north (NGR: 472072 174185) and is operated by The Reading Sustainability Centre, which is licensed to abstract an undefined amount of surface water per year for “other environmental improvements: transfer between sources” purposes. A further surface water abstraction licence is listed within 2km of the site but has been revoked.

6 MINING AND QUARRYING

General

- 6.1 Research of the mining setting is based on examination of the published topographical and geological information as described in Section 5 of this report along with other mining archive information.

Surface Workings

- 6.2 Research of topographical, geological and other archive mining records has indicated evidence of potential surface workings such as a pit or a quarry in three locations within 1km of the site identified as potentially infilled land (non-water). All are to the east of the site and the closest is 819m from the site.

Shallow Underground Workings

- 6.3 Shallow underground mining is generally defined as mining undertaken at depths of less than about 30m to 50m below rockhead. Collapse of strata above shallow underground workings can result in a total loss of support at the surface. As a result, severe subsidence can be experienced within a localised area or region.
- 6.4 From the enquiries made and examination of the published geological information there is evidence for six man-made mining cavities within 1km of the site. The closest is approximately 373m south of the site where historical chalk/lime quarrying may have occurred.

7 ENVIRONMENTAL SETTING AND CONSULTATIONS

Statutory Sources

- 7.1 Information from various statutory sources has been summarised from the Envirocheck report prepared specifically for this site and abridged at Appendix VII. A full copy of the Envirocheck report has been provided electronically under separate cover. The results from a site visit have also been considered as part of this assessment.

Contaminated Land Register Entries and Notices

- 7.2 No contaminated land entries or notices are identified within 1km of the site. However, past reports indicate that the site has been contaminated, and has undergone some remediation works.

Waste Management

- 7.3 Information supplied has indicated the presence of two Environment Agency historic recorded landfill sites within 1km of the site. There is also one licensed waste management facility, one local authority recorded landfill site, one registered landfill site, three records of potentially infilled land (non-water) and five records of potentially infilled land (water) within 1km of the site. The closest recorded facility of each type is shown in Table 4. The local authority recorded landfill site entry is for the same location as the closest historic landfill (Napier Road). The licensed waste management facility and the registered landfill site relate to the same location at Deans Farm.
- 7.4 In addition to the recorded/licensed landfilling activities in the vicinity of the site, the possibility, although remote of there being unrecorded landfilling activities within influencing distance of the site cannot be entirely discounted. If at some time in the future, the presence of such an unrecorded landfill is revealed then its potential influence on the site may need to be investigated and dealt with as necessary.

TABLE 4: Waste Management Facilities	
Location	Details
Historical Landfill Site	
Licence Holder: Not supplied Site Location: Reading Name: Napier Road Grid Ref: 472709 173851 Distance from Site: 513m	Provider Reference: EAHLD13277 First Input Date: Not supplied Last Input Date: Not supplied Specified Waste: Deposited waste included inert and industrial waste WRC ref: 0345/0169
Licensed Waste Management Facility	
Licence Holder: Environment Agency Site Location: Deans Farm, Redlands Pit, Caversham RG4 5JZ Grid Ref: 472833 174100 Distance from Site: 785m	Licence Number: 86148 Authority: Environment Agency Waste Type: Landfills taking other wastes (construction, demolition, dredgings) Licence Status: Surrendered (13/04/10) Issued: 01/06/92 Last Modified: Not supplied
Local Authority Recorded Landfill Site	
Site Location: Napier Road Landfill Grid Ref: 472900 173900 Distance from Site: 686m	Reference: Not supplied Authority: Reading Borough Council Waste Type: Not supplied Last Reported Status: Unknown Date of Closure: not supplied
Potentially Infilled Land (Non-Water)	
Grid Ref: 473163 173660 Distance from Site: 819m	Use: Unknown filled ground (pit, quarry etc) Date of mapping: 1995
Potentially Infilled Land (Water)	
Grid Ref: 471901 173975 Distance from Site: 653m	Use: Unknown filled ground (pond, marsh, river, stream, dock etc) Date of mapping: 1931
Registered Landfill Site	
Licence Holder: Environment Agency Site Location: Deans Farm, Redlands Gravel Pit, Caversham RG4 5JZ Grid Ref: 473100 174100 Distance from Site: 968m	Licence Reference: OCC/106 Authority: Environment Agency Site Category: Landfill Max input rate: Large ($\geq 75,000$ t/yr, $< 250,000$ t/yr) Waste source restrictions: Waste produced/controlled by licence holder Status: Operational as far as is known Dated: 1992 Authorised Waste: Solid river dredgings comprising sub/topsoil, clay, sand, gravel, silt Prohibited Waste: Poisonous, noxious, polluting wastes, wastes N.O.S.

Radon

- 7.5 Radon can be a hazard within built developments and especially within enclosed or confined spaces. The Health Protection Agency and British Geological Survey document "Indicative Atlas of Radon in England and Wales" (2007) provides a summary of the

number of homes in a given area above the “Action Level” for radon. Although the radon atlas relates directly to measurements taken from homes or dwellings, it is also relevant to employers assessing risks for enclosed underground and ground floor work places.

- 7.6 The BRE document "Radon: guidance on protective measures for new buildings" (2015) provides guidance for reducing the concentration of radon in new buildings and a two stage procedure using accompanying maps needed to determine the level of protection for a given site.
- 7.7 These documents have been consulted and the site is shown to lie in an area where no protection against radon is needed should development of residential dwellings or new structures of similar form of construction and compartmentation occur.

Environmental Issues

- 7.8 The Environment Agency data via the Envirocheck report records the following environmental issues at or in the vicinity of the site:
- Two discharge consents (Table 5).

The closest recorded environmental issue is recorded in the following table.

TABLE 5: Discharge Consent	
Consent	Details
Operator: Nabisco Group Ltd Grid Ref: 472230 173460 Distance from Site: 94m	Location: Nabisco Brands Ltd, Kings Road, Reading Discharge Reference: Ctwc.0435 Date: 18/10/85 Type: Discharge of other matter – surface water Receiving Water: River Kennet Status: Authorisation revoked (08/05/91)

Archaeology

- 7.9 Preliminary examination of historical maps indicate no apparent features of significant archaeological interest in the general vicinity of the site.

Unexploded Ordnance

- 7.10 A Zetica regional unexploded ordnance (UXO) risk map has been reviewed. The map shows the site to be in a low risk area.

7.11 Examination of historic plans indicates that the area around the site has not had previous military use and does not appear to have been subject to aerial bombardment during the Second World War. The risk of unexploded ordnance (UXO) at the site can be considered to be very low. Should new evidence indicate that UXO may be an issue, it would be prudent to seek appropriate specialist advice.

8 CONCEPTUAL SITE MODEL

Environmental Issues

8.1 Conclusions are drawn from the preceding information in terms of potential sources of contamination, possible receptors that may be affected by any sources of contamination and the pathways that exist between source and receptor. This basic risk assessment allows identification of the suitability of the site for its current and future use and evaluation of any potential environmental liability that may attach to the site. A description of past or existing uses and any chemicals of potential concern is attached at Appendix VIII. The issues can be broadly addressed as follows: land contamination, groundwater contamination, surface water contamination, ground gases and air pollution.

8.2 The land use history has identified the following potentially significant sources of contamination both on the site and adjacent to the site.

Potentially Significant Contamination Source On Site:

1. Historic and current gas works equipment
2. Made ground present across the site.
3. Organic materials in natural superficial deposits across the site.
4. Potential asbestos containing material.

Potentially Significant Contamination Source Off Site:

5. Surrounding historic gas works and other historical developments.

8.3 As a result of the land use history presented in previous sections of this report the site may have a number of sources of contamination. For land or groundwater to be designated as polluted a linkage must exist between:

- a source of contamination capable of causing significant harm;
- human or environmental receptors; and
- a pathway by which the contamination can reach the receptor.

8.4 The conceptual site model presented in Table 6 details an initial assessment of all potential pollutant linkages.

TABLE 6		
Source (Contaminant)	Pathway	Receptor
No. 1 Historic and current gas works equipment on site (metals, cyanide, sulphate, pH, phenol, hydrocarbons, PAHs, etc)	1. Inhalation 2. Dermal contact 3. Ingestion 4. Surface runoff 5. Groundwater migration 6. Direct contact (aggressive attack) 7. Gas migration 8. Below ground pipework	1. Future occupiers 2. Construction workers 3. Groundwater 4. Surface water 5. Subsurface building materials and plastic service pipes 6. Flora and fauna
No. 2 Made ground present across the site (heavy and phytotoxic metals, PAHs).	1. Inhalation 2. Dermal contact 3. Ingestion 4. Surface runoff 5. Groundwater migration 6. Direct contact (aggressive attack) 7. Gas migration 8. Below ground pipework	1. Future occupiers 2. Construction workers 3. Groundwater 4. Surface water 5. Subsurface building materials and plastic service pipes 6. Flora and fauna
No. 3 Organic materials in natural superficial deposits across the site (ground gas)	1. Inhalation 7. Gas migration	1. Future occupiers 2. Construction workers
No. 4 Historic building material and made ground (asbestos)	1. Disturbance and inhalation	1. Future occupiers 2. Construction workers
No. 5 Surrounding historic gas works and other historical developments. (metals, cyanide, sulphate, pH, phenol, hydrocarbons, PAHs, etc)	1. Inhalation 2. Dermal contact 3. Ingestion 4. Surface runoff 5. Groundwater migration 6. Direct contact (aggressive attack) 7. Gas migration	1. Future occupiers 2. Construction workers 3. Groundwater 4. Surface water 5. Subsurface building materials and plastic service pipes 6. Flora and fauna

9 ENVIRONMENTAL RISK ASSESSMENT

Introduction

9.1 The main issues considered in the risk assessment are:

- The environmental risks identified, if any, that may have implications for the current the proposed use of the site.
- How likely it is that the environmental risks identified may affect the site. This is considered against a background of continuation of the current use and potential for the site to be redeveloped in accordance with the proposed use.
- Other areas of primary concern from a ground engineering and environmental viewpoint that may have been revealed as a result of the research carried out. These features are limited to the scope of work/research carried out and may not cover such factors as the wider planning constraints, archaeology, ecology etc.

9.2 For ease of reference and understanding the risks are assessed against 3 possible levels/categories:

- **Low risk** - site considered suitable for use and environmental setting. Contaminants may be present but unlikely to have an unacceptable impact on key targets. Action unlikely to be needed;
- **Moderate risk** - site may not be suitable for use and environmental setting. Contaminants probably or certainly present and likely to have an unacceptable impact on key targets. Action may be needed in the medium term; and
- **High risk** - site probably or certainly not suitable for use and environmental setting. Contaminants probably or certainly present and very likely to have an unacceptable impact on key targets. Urgent action needed in short term.

9.3 Under each of the categories the environmental issues which have been identified have been assessed with regard to a wide range of topics including (where appropriate):

- the 'source-pathway-receptor' concept;
- the behaviour of potential contaminants within the environment;
- environmental processes;
- industrial operations and best practice;
- current environmental legislation;
- the views and practices of the environmental regulators;
- the likelihood of environmental notices, orders or other enforcement action;
- any requirements to remove waste, contaminated or hazardous materials;

- the health and safety of occupiers or neighbours;
- any redevelopment plans for the site;
- effects on the fabric of buildings caused by contamination; and
- financial and cost implications.

Qualitative Risk Assessment

- 9.4 From the combination of the foregoing information a qualitative assessment of the potential geo-environmental risk is provided in Table 7. Where indicated, these risks may need to be considered for any future redevelopment of the land.
- 9.5 The effect of the present site use on the surrounding area is assessed with regard to the possible contaminant migration from the site off site and with regard to the general environmental setting and land quality of the surrounding area in order to put the on site assessment in context.

TABLE 7			
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:			

TABLE 7			
Issue	Summary	Risk Category	
		Humans	Property/ Environment
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 / superfcials / 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
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

TABLE 7			
Issue	Summary	Risk Category	
		Humans	Property/ Environment
Overall Risk for Site:	Moderate to High		

10 CONCLUSIONS AND RECOMMENDATIONS

- 10.1 Based on the available information summarised in this report the site is considered to present an overall Moderate to High risk from past use, adjacent operations and environmental setting.
- 10.2 The site has not been used for a number of years; its last known use was as an industrial and recreational site. It is understood that the site use is proposed to change to residential with communal landscaping and a private garden area. Based on the information reviewed, it is considered that the site may currently present a significant risk of hazard or environmental liability based on this proposed end use.
- 10.3 An investigation of the ground conditions has been conditioned in the planning approval for the redevelopment of the site. It is anticipated that some made ground or other unsuitable materials could be encountered. Further to this, some minor remedial measures may be necessary depending on the nature and extent of the made ground and any future more sensitive land use.
- 10.4 Previous risk assessment carried out by others following ground investigation works indicated that the requirement for remedial works would be unlikely, however this was based on a commercial end use of the site. In addition, previous ground investigation did not include the former governor building, so the requirement for remediation cannot be completely discounted.
- 10.5 Based on the available information being limited and not specific to the proposed residential end use, it is considered that existing site investigation and risk assessment works would need to be supplemented with additional works before risks can be fully evaluated. It is anticipated that the aim of further site investigation works would be to confirm the findings of previous site investigation works, obtain up to date information on the site conditions and perform a quantitative risk assessment based on a residential end use. This Phase II investigation is likely to comprise:
- Drilling and testing of soil, groundwater and ground gas to target potential sources of contamination within and outside of the current buildings;
 - A quantitative risk assessment to determine if significant contamination is present; and
 - If significant contamination is identified, calculation of site specific remedial targets, liaison with the regulators and remediation.
- 10.6 A geotechnical assessment should be undertaken to:

- Determine the type, strength and bearing characteristics of the shallow superfcials and underlying solid geology;
- Determine the risk from karstic features and the requirement for stabilisation works;
- Provide recommendations for a suitable and economic foundation/floor slab solution for the development; and
- Provide recommendations with regard to any other geotechnical aspects pertaining to the development

10.7 It is recommended that the following areas of further work should be undertaken:

- An asbestos demolition survey to ensure compliance with current regulations;
- Removal of vegetation within the yard area to facilitate access and investigation of the site;
- Removal or making safe of above ground structures to allow inspection and access during the site investigation works;
- A utility survey to locate existing gas works pipework that is likely to be present;
- Liaison with statutory bodies with regards to the potential contamination at the site; and
- Due the proximity of the River Kennet, it may be prudent to carry out an ecological survey for the site.

A P P E N D I X I

Standard Terms and Conditions and Limitations to Reports

STANDARD TERMS AND CONDITIONS AND LIMITATIONS TO REPORTS

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Wardell Armstrong LLP disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report which may come or be brought to Wardell Armstrong LLP's attention after the date of the Report. Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

Where any site observations have been carried out, these have been restricted to a level of detail required to meet the stated objectives of the services. The results from any site observations made may vary and further confirmatory work should be made after the issuance of this Report. Wardell Armstrong LLP does not guarantee or warrant any estimates or projections contained in this Report.

A P P E N D I X I I

Guidance on Contamination and Land Quality Statement

CONTAMINATION

Environmental Protection Act Part IIA

Contaminated land was defined for the first time under Part IIA of the Environmental Protection Act 1990. Part IIA was inserted into the 1990 Act by section 57 of the *Environment Act 1995*. The regime came into effect in England on 1 April 2000, Scotland on 12 July 2000 and Wales on 15 September 2001.

Contaminated land is defined as “any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

- (a) significant harm is being caused or there is a significant possibility of such harm being caused;
- or
- (b) significant pollution of the water environment is being caused or there is a significant possibility of such pollution being caused.”

Harm is described in the EPA 1990 as being “*harm to the health of living organisms or other interference with ecological systems of which they form part and, in the case of man, includes harm to his property*”.

There are a number of important government policies and priorities underlying the Act. The first priority is to prevent the creation of new contamination by use of this Act and other controls such as Environmental Permitting (formerly regulated by Integrated Pollution Prevention and Control and Waste Management licensing). The second is to identify and remove unacceptable risks to human health and the environment. In addition there is a desire to bring contaminated land back into beneficial use whilst seeking to ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

Under Part II(a), Local Authorities are responsible for the inspection of contaminated land and for ensuring that remediation is undertaken where necessary. Local Authorities also maintain a Public Register detailing the regulatory actions that they have implemented. The Environment Agency has a complementary role and act as the enforcing Authority for designated special sites.

The policy objectives are underlain by the “suitable for use” approach to the remediation of contaminated land, which the Government considers is the most appropriate approach to achieving sustainable development. This approach recognises that the risks presented by any given level of contamination will vary greatly on a site by site basis.

In general the responsibility for paying for remediation will, where feasible, follow the “polluter pays” principle. In the first instance, any person who caused or knowingly permitted the contaminating substance to be in, or under the land will be the appropriate person(s) to undertake

the remediation and meet its costs. If it is not possible to find such a person, responsibility will pass to the current owner or occupier of the land.

Planning Regime

Land contamination, or the possibility of it, is a material consideration for the purposes of town and country planning. This means that the planning authority has to consider the potential implications of contamination both when it is developing structure or local plans and when it is considering individual applications for planning permission. Under the suitable for use approach, risks should be assessed and remediation requirements set, on the basis of both the current use and its proposed new use.

Model Procedures for the Management of Contaminated Land - CLR 11

The Model Procedures for the Management of Contaminated Land (CLR11) was published by the Environment Agency and DEFRA in September 2004. It provides a technical framework for applying a risk management process when dealing with land affected by contamination in a way that is consistent with government policies and legislation within the UK.

The approach presented is designed to be applicable to a range of regulatory and non-regulatory contexts including:

- i. Development or redevelopment of land under the planning regime;
- ii. Regulatory intervention under Part IIA of the EPA 1990;
- iii. Voluntary investigation and remediation; and
- iv. Managing potential liabilities of those responsible for individual sites or a portfolio of sites.

The definition of contaminated land is based upon the principles of risk assessment. *“Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence”.*

CLR 11 uses the concept of “pollutant linkage” and identifies that there are three essential elements for any risk:

- A **contaminant** – a substance that is in, on or under the land and has the potential to cause harm or cause pollution
- A **receptor** – something that could be adversely affected by a contaminant, such as people, an ecological system, property or a water body; and
- A **pathway** – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

Each of these elements can exist independently, but they only create a risk when all three are present and linked together.

CLR 11 is structured as follows:

Chapter 1 Overview of Model Procedures		
Chapter 2 Risk Assessment	Chapter 3 Options Appraisal	Chapter 4 Implementation of the Remediation Strategy
Preliminary Risk Assessment	Identification of feasible remediation options	Preparation of the implementation plan
Generic quantitative risk assessment	Detailed evaluation of options	Design, implementation and verification
Detailed quantitative risk assessment	Developing the remediation strategy	Long term monitoring and maintenance
Chapter 5 References and Glossary		

A Phase I Environmental Assessment provides the first stage of the risk assessment (Preliminary Risk Assessment in the table above). Further risk assessment (described in Chapter 2) and the subsequent sections (Chapters 3 and 4) of CLR11 are dealt with through site investigation and any subsequent remediation reports.

CLR11 defines the purpose of the Preliminary Risk Assessment to “*develop an initial **conceptual model** of the site and establish whether or not there are potentially unacceptable risks*”. It identifies that during a preliminary risk assessment “*the assessor collects and reviews largely desk-based information to prepare an initial conceptual model to identify possible pollutant linkages. The assessor then evaluates the possible linkages, using criteria appropriate to the risk assessment context*”.

CLR 11 states that “*Development of the conceptual model forms the main part of preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process*”. The Conceptual model presents the characteristics of the site in diagrammatic or written form and shows the possible relationships between potential contaminants, pathways and receptors. This then forms the basis of the further risk assessment and any site investigation or other works.

RICS Guidance Note: Contamination, the environment and sustainability (GN13/2010)

The document is intended to provide guidance to chartered surveyors (members of RICS). It supersedes an earlier document "Contamination and its implications for Chartered Surveyors" (September 1997) which promoted the concept of a Land Quality Statement (LQS) as the written output of an environmental risk assessment.

In addition to contamination, the document provides a summary and guidance on other factors which might affect land value and environmental duties and/or liabilities. These factors assist with the overall assessment of the site and often provide valuable information to consider within the conceptual model required in CLR11. These factors include, but are not limited to, flooding and flood risk management, invasive species, mineral workings, shallow mining subsidence, natural subsidence risk and radon.

Section 11.8 of the RICS guidance note which sets out what is usually incorporated within a Land Quality Statement as follows:

- *a detailed description of the site and its location, by reference to a plan;*
- *a description of the current uses of the land and of the adjacent land;*
- *a summary of the site history, produced by reference to historical maps, archive records, and statutory, local authority and water authority registers and records;*
- *identification of potential contaminants associated with existing and previous uses, or with geological and hydrogeological features, through site investigation reports and the specialists' own observations;*
- *identification of other relevant issues, including those pertaining to archaeology, ecology, sites of special scientific interest (SSSIs), human population exposure and characteristics of off-site locations that could have an environmental impact or be sensitive to effects from the subject site;*
- *conclusions as to:*
 - *whether remedial treatment is necessary or prudent to enable the continued use of the property for its current use without undue risk to the health of persons using the property;*
 - *whether remedial treatment is necessary or prudent to reduce the risk of damage to a third party's health or property, or damage to the environment, which may give rise to a claim for damages, prosecution or action by the appropriate regulatory authorities;*
 - *if remedial treatment is not warranted, whether a residual risk of future claims from third parties and regulatory authorities remains;*
 - *whether concern regarding the risks associated with the known or suspected presence of contamination restricts the prudent use of the property compared with its likely range of possible uses if the site were uncontaminated;*
 - *if the property is to be redeveloped for a specified purpose, how much additional expense would be incurred in investigating contamination of the property further, and in carrying out any necessary remedial work, as compared with an uncontaminated property. Estimates produced prior to intensive investigations are often extremely broad; and*
 - *whether there is a likely implication from the foregoing for the value and/or the viability of development.*

Further information is available from a range of public and professional bodies including central government, local Council and the Environment Agency. Pertinent documents for additional information include Safe Development of Housing on Contaminated Land, 2014, Managing and Reducing Land Contamination: Guiding Principles, 2010, and the Water Framework Directive (2000/60/EC, 23 October 2000).

A P P E N D I X I I I

Sources of Information

The following principal sources of information have been consulted in the preparation of this report:

- Landmark Envirocheck report dated 28 July 2017 (*a review of information provided by Landmark Information Group Ltd who were commissioned to provide an “Envirocheck” report consisting of published historical plans, environmental data sheets and environmental sensitivity plans;*
- Ordnance Survey County and National Grid Series Plans;
- Other library archive as relevant;
- British Geological Survey published maps and memoirs;
- Environment Agency/NRA Groundwater Vulnerability Map Series;
- British Geological Survey borehole database;
- Environment Agency;
- In house Wardell Armstrong archives;
- Factual Desk Study, Atkins Ltd, 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); and
- Factual Desk Study, Final, Atkins Ltd, January 2014 (ref. GTG2000078/Reading/NGG Desk Study/R002v0).

APPENDIX IV

Site Visit Record

SITE WALKOVER RECORD

Date of Visit:	04/08/17
Client:	
Site Name:	Gas Works Road, Reading
Refer to Drawing No.:	
Visited by:	Emma Singleton
Job No.:	LO10488
Site Contact Name:	
Access (key required):	Padlock
Site Area (Ha):	

GENERAL SITE DETAILS

Relevant Identification (<i>names of buildings, roads</i>):
Southern Gas Social Club, Gasworks Road, Reading
Present Land Use:
Disused site: Former Southern Gas Social Club and former governor house.
Adjacent Land Use:
South - Blakes Quay and Harry Tee Court – residential developments. West - Prudential offices and pedestrian access (restricted vehicles) to River Kemet. North - River Kemet and residential and commercial properties on north bank. East – residential.
Adjacent public highways, roads leading to/crossing/servicing the site:
Gas Works Road runs along south-east boundary.
Site Access (<i>main access points, dimensions, by rig/excavator, footpaths</i>):
1.1m gate on southern boundary – pedestrian access only.
Site Boundary (<i>hedges, walls, fences, open</i>):
South-east boundary – 5ft brick wall and exterior building wall West boundary – 5ft brick wall and exterior building wall North – exterior building wall (river wall)
Topography (<i>general site setting, land gradients, slopes</i>):
Very slight slope towards river (to north). Steps down into site approx 1m drop

EVIDENCE OF LAND USE

Archaeology (<i>old buildings, monuments, mounds, ditches, artefacts in soil, pottery, glass</i>):
Derelict buildings
Site Relics (<i>evidence of past land use, building remains, roads, humps, bumps, hollows</i>):
Derelict buildings. Old governor building still contains pipework

<i>Buildings (general condition, construction e.g. brick/steel framed, asbestos, pits/basements, use):</i>
Two storey brick built building with single storey extension along northern site boundary. Single storey governor house, contains pipe work with basement in south of site (built 1903). Buildings in derelict condition. Possible asbestos roofing in single storey extension to main former social club in north of site. Buddleia growing out of walls and causing damage. Buildings not accessed due to being derelict. Warning signs around buildings indicating they are unsafe.
<i>Storage Facilities: (tanks, drums, chemicals, capacity, condition, bunding, containment, leaks, audit):</i>
None seen.
<i>Activities/Processes on Site (past and present, materials, equipment):</i>
Old social club – Remnants of use - chairs etc inside. Old governor house contains pipe work.
<i>Observable Environment (noise, dust, odours, emissions):</i>
General noise from roads to west.
<i>Waste Management (fly tipping, waste disposal, fires):</i>
General fly tipping – mattresses, furniture, batteries (?), general rubbish, also some bags of gravel adjacent to door to social club (from previous site investigation?)
<i>Underground Services (evidence of manholes, grates, culverts, water supply, telephone):</i>
Usual underground services off Gas Works Road
<i>Overhead Services (overhead cables, pipes):</i>
Overhead lighting on external wall of governor building

EVIDENCE OF GROUND CONDITIONS

<i>Vegetation (description, condition, trees, frequency and age, saplings, bare patches, new growth):</i>
Site overgrown with Buddleia and some brambles making access on foot difficult.
<i>Ecology (woodland, trees, hedges, ponds, running water, water loving plants, wild flowers, wildlife):</i>
River Kemet adjacent to north boundary of site.
<i>Soil Cover (vegetated/unvegetated, soil/made ground/hardstanding, condition, cracks, staining):</i>
Building footprint and hardstanding
<i>Evidence of Geological Setting (made ground, natural superfcials, underlying rock):</i>
None seen
<i>Groundwater and Drainage (ponding, streams, springs, wells, marshes, tides, rivers):</i>
River Kennet adjacent to north site boundary
<i>Subsidence (fissures, abrupt changes in slope, collapse, tilting trees/posts, property damage):</i>
Some cracking to boundary walls, likely to be caused by growth of buddleia

Evidence of Mining (<i>surface features, shafts, trenches, tunnels, caves, wells, boreholes, gas</i>):
None seen
Hazards Identified:
Possible asbestos containing materials. Unstable flooring and derelict buildings. Roosting pigeons.
Additional Remarks:
Site will need to be cleared of buddleia prior to site investigation work. Site investigation equipment will be limited due to current access.
Photographs (<i>yes/no, file location</i>):
Yes

APPENDIX V

British Geological Survey Boreholes

SU 77 SW 136
7225 7350

268/431 B

Licence No. 91222/16/3887.

N. 9114

37 NEW.

Owner

Contractor, consultant, etc.:-

Full details of headings (dimensions and directions)

Full details of permanent lining tubes (position, length, diameter, plain, slotted etc.)

Water struck at depths of

Rest level of water

pumping at

Recovery to rest-level in

Capacity of pump

Date of measurements

DESCRIPTION OF PERMANENT PUMPING EQUIPMENT:

Make and/or type

Capacity

Amount pumped

Well made by

Information from

ADDITIONAL NOTES

ANALYSIS (please attach copy if available)

Visited. OD + 126. The pump of smaller capacity

will be used mainly in winter; the larger 36,000 g.p.h.

mainly in summer. 2.7.59. A.E.S.

Sited by O on 6" Berth. 37 NEW by A.E.S. 2.7.59.

LOG OF STRATA OVERLEAF.

Geological Survey and Museum, SOUTH KENSINGTON, LONDON, S.W.7.

British Geological Survey Section 6.

Date Received

1" O.S. Map No.

Site marked on 1" Map

(use symbol on 6" Map)

268/431B
9122/16/3557
N 1114
S477/398

MINISTRY OF HOUSING AND LOCAL GOVERNMENT

SECTION 14 OF THE WATER ACT, 1945

LICENCE NO. 3557

Thames Valley Area (Conservation of Water) Order, 1951

The Minister of Housing and Local Government, in exercise of his powers under Section 14(6) of the Water Act, 1945, hereby licenses Messrs. Huntley and Palmers limited to construct a well or borehole for the purpose of abstracting underground water at the Company's biscuit factory in Reading, Berkshire the situation of which is more particularly shown on the map annexed hereto and thereon marked 0, subject to the observance of the following conditions:-

1. The depth of the well or borehole shall not exceed 300 feet;
2. Not more than 610,000 gallons of water shall be abstracted from the well or borehole in any one day of 24 hours;
3. Not more water than would, when added to the water taken from the existing borehole at the Company's factory, amount in the aggregate to 110,000,000 gallons, shall be abstracted from the well or borehole in any one year;
4. As soon as practicable apparatus approved by the Minister shall be installed to measure (a) the abstraction from the well or borehole now licensed and (b) the abstraction from the existing borehole at the factory;
5. Readings of the said apparatus shall be taken and recorded to show the quantity of water abstracted in any one day of 24 hours;
6. Any officer of a local authority within whose county or district, or any officer of statutory water undertakers within whose limits of supply, any of the before-mentioned wells or boreholes are situated, being an officer authorised for the purpose of section 14(12)(a) of the Water Act, 1945, shall on request be permitted to inspect or transcribe records required to be kept by the last preceding condition and relating to any period not earlier than 5 years before the request is made.

GIVEN under the official seal of the

Minister of Housing and Local Government

this twenty ninth day of May,
nineteen hundred and fifty-nine

J. E. BEDDOE

Assistant Secretary

Ministry of Housing and Local Government

N.B. UNDER THE WATER ACT, 1945, IT IS AN OFFENCE PUNISHABLE BY FINE TO
CONTRAVENE ANY CONDITION ATTACHED TO THIS LICENCE.

x 5.8.59

200/431 B

[illegible]

EXACT SITE
OF WELL

RECORD OF WELL (SHAFT OR BORE)

"SOUTH FACTORY BORE"

For Survey use only

N. 9114

268/31 B

Licence No. 91222/16/3887.

At H.F. Biscuit Factory in the South bank of the
Kennet & close to the river, about 100 yd East of Blakeney.

Bridge
Town or Village Reading

County Berkshire

Six-inch quarter sheet Berks. 37 NE.W.

For Messrs. Huntley & Palmet

State whether owner, tenant, builder,
contractor, consultant, etc.: Owners

Address (if different from above)

SU77/39B

Level of ground surface
above sea-level (O.D.) 126.5 ft.

If well-top is not at ground
level, state how far .. { above;
below; ft.

SHAFT ft.; diameter ft.; Full details of headings (dimensions and directions)

BORE 300 ft.; diameter of bore: at top 12 ins.; at bottom 9 1/2 ins.

Full details of permanent lining tubes (position, length, diameter, plain, slotted etc.)

12 in. dia. lining from surface to 60 ft. 6 in. 11 1/2 inch bit used to 124 ft.
then 9 1/2 in. bit to 300 ft.

Water struck at depths of ft. below well-top.

Rest level of water 6 ft. 8 ins. above well-top. Suction at 87 ft. Yield on 9 1/2 hours' test

pumping at 36,000 galls. per hour with depression to 50 ft. below well-top.

Recovery to rest-level in one min. Capacity of pump 36,000 g.p.h. Date of measurements 6/5/1959

DESCRIPTION OF PERMANENT PUMPING EQUIPMENT: TWO UNITS WILL BE USED: ONE FOR WINTER, ONE SUMMER

Make and/or type SUBMERSIBLE TYPE Motive power ELECTRIC

Capacity 36,000 galls. per hour.

Suction at 83 ft. APPROX

Amount pumped VARIABLE galls. per day. Estimated consumption DEPENDANT ON AMBIENT TEMPERATURE galls. per week.

Well made by Guthrie Alliebrook & Co. Ltd. Date of well May 1959

Information from G. Alliebrook

ADDITIONAL NOTES

ANALYSIS (please attach copy if available) The water from this bore is to be used for Air Conditioning & they wanted it at as low a temperature as obtainable. 53° Fah was attained.

Visited. O.D. + 126 The pump of smaller capacity will be used mainly in winter; the larger 36,000 g.p.h. mainly in summer. 2.7.59. A.E.T.

Sited by O on 6" Berks. 37 NE.W. by A.E.T. 2.7.59.

LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.

Section 6.

Date Received

1" O.S. Map No.

Site marked on 1" Map

(use symbol) on 6" Map

888.

7.12.59

0

0

(1927) D4574/W137583 12,000 8/54 J.C.S. Gp669

2
(For Survey use only)
GEOLOGICAL
CLASSIFICATION

See GA & Co's Section No. 837

NATURE OF STRATA
British Geological Survey

If measurements start below
ground surface, state how far ...

THICKNESS
British Geological Survey

Feet Inches
.. ..

DEPTH
British Geological Survey

Feet Inches

Upper

Drift River Gravel
Blue Clay
Chalk with flint; much flint
at about 50 ft.

8 6
10 —
281-6

8 6
18-6
300 —

READING

Reading.
Berks

1

BGS Borehole Reference: SU77SW83

Eastern L.S. Thames NRA Borehole
British Gas, Reading Gas works A 268 5 77/170 A SU77SW

owner British Gas Licence No. Nat. Grid Ref. SU 7257 7358
occupier IGS Ref. No. Status
ground Level m OD ft. OD
level of Well Top 37.39 m m OD ft. OD Aquifer Chalk
test Water Level m bwt ft. bwt
Date) British Geological Survey m OD ft. OD British Geological Survey
construction T8/C/E/1/4
Depth bwt Dia. Linings (below well top)
From To Dia. Type
15.5 m 0 13.5 m 150 mm
British Geological Survey British Geological Survey British Geological Survey
abstraction Rates Type of Pump
gph Chem./Bact. Anal. YES NO
gpd Well Driller
insufficient space has been allowed, continue in 'Notes' overleaf.

GROUND EXPLORATIONS LIMITED		SITE: Reading Gas Works		BOREHOLE A	
Telephone: (0095) 31718		Boring Commenced: 26 JAN 91		Sheet 1 of 3	
1: British Gas plc, Southern		Boring Completed: 28 JAN 91		Report No. 10873	
150 mm dia. cased to 13.50 m		Location: See Site Plan		Ground Level: Scale	
m dia. cased to m		Coordinates: 472400E 173600N		m.O.D. 1/50	
Well Sample/Tests	Date	Depth m	Description of Strata (thickness m)	Legend	Level m.O.D.
101	26/01/91	0.00 - 0.30	MODERATE BRICK BARRICADE WITH ASH, GRAVEL AND AN OILY CONTAMINATION (1.50)	XXXXXX	
112	26/01/91	1.00 - 2.45	MODERATE BRICK BARRICADE WITH ASH, GRAVEL AND AN OILY CONTAMINATION (0.50)	XXXXXX	
421	26/01/91	2.45 - 3.30	FINE BROWN MOTTLED PEATY SILTY CLAY WITH SOME GRAVEL AND AN OILY CONTAMINATION (0.50)	XXXXXX	
412	26/01/91	3.30 - 4.45	DENSE BROWN CLAYEY COARSE GRAVEL (0.50)	XXXXXX	
321	26/01/91	4.45 - 5.45	DENSE BECOMING MEDIUM DENSE ORANGE WELL GRADED SANDY GRAVEL (1.00)	XXXXXX	
271	26/01/91	5.45 - 6.95	MEDIUM DENSE GRAY-ORANGE WELL GRADED SANDY GRAVEL	XXXXXX	
81	26/01/91	6.95 - 8.45		XXXXXX	
41	26/01/91	8.45 - 9.45		XXXXXX	

JOHN LIMITED		Reading Gas Works		BOREHOLE A	
J 31718		Boring Commenced: 26 JAN 91		Sheet 2 of 3	
at plc, Southern		Boring Completed: 28 JAN 91		Report No. 10873	
150 mm dia. cased to 13.50 m		Location: See Site Plan		Ground Level: Scale	
m dia. cased to m		Coordinates: 472400E 173600N		m.O.D. 1/50	
Tests	Date	Depth m	Description of Strata (thickness m)	Legend	Level m.O.D.
1	27/04/91	12.00	Sound bed of moderately hard off-white CHALK (13.45)		
1251	28/04/91	12.15 - 12.45			
3	13.50				
10 (27)	13.45 - 13.95				
7	14.00 - 14.50				
9	15.00				
11 (24)	15.15 - 15.45				
	28/04/91	15.45			

British Geological Survey

Upper Chalk

British Geological Survey

13/1/93

A P P E N D I X V I

Summary of Landmark Information Group Report

STATUTORY SOURCES OF INFORMATION

Information from the Landmark Information Group Ltd has been summarised in the Table below. The site sensitivity map and full copy of the Envirocheck data is available on request.

Distance from an Approximate Central Point on Site*				
Agency & Hydrological	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
BGS Groundwater Flooding Susceptibility	Yes		Yes	n/a
Contaminated Land Register Entries and Notices				
Discharge Consents		2	10	24
Enforcement and Prohibition Notices				
Integrated Pollution Controls				
Integrated Pollution Prevention and Control				
Local Authority Integrated Pollution Prevention and Control				
Local Authority Pollution Prevention and Controls			2	7
Local Authority Pollution Prevention and Control Enforcements				
Nearest Surface Water Feature	Yes			
Pollution Incidents to Controlled Waters		25	21	127
Prosecutions Relating to Authorised Processes				
Prosecutions Relating to Controlled Waters		n/a	n/a	n/a
Registered Radioactive Substances			10	3
River Quality			1	2
River Quality Biology Sampling Points				1
River Quality Chemistry Sampling Points				2
Substantiated Pollution Incident Register				2
Water Abstractions			1	3 (*28)
Water Industry Act Referrals				
Groundwater Vulnerability	Yes	n/a	n/a	n/a
Source Protection Zones	1		1	n/a
Extreme Flooding from Rivers or Sea without Defences	Yes	Yes	n/a	n/a
Flooding from Rivers or Sea with Defences	Yes	Yes	n/a	n/a
Areas Benefiting from Flood Defences			n/a	n/a
Flood Water Storage Areas			n/a	n/a
Flood Defences			n/a	n/a
OS Water Network Lines		7	10	59
Waste	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
BGS Recorded Landfill Sites				
Historic Landfill Sites				2
Integrated Pollution Control Registered Waste Sites				
Licensed Waste Management Facilities (Landfill Boundaries)				1
Licensed Waste Management Facilities (Locations)				1
Local Authority Recorded Landfill Sites				1
Potentially Infilled Land (Non-Water)				3
Potentially Infilled Land (Water)				5
Registered Landfill Sites				1
Registered Waste Transfer Sites				
Registered Waste Treatment or Disposal Sites				

Hazardous Substances	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Control of Major Accident Hazards Sites (COMAH)			1	3
Explosive Sites				
Notification of Installations Handling Hazardous Substances (NIHHS)			1	
Planning Hazardous Substance Consents				4
Planning Hazardous Substance Enforcements				
Geological	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Brine Compensation Areas		n/a	n/a	n/a
Coal Mining Affected Areas		n/a	n/a	n/a
Mining Instability		n/a	n/a	n/a
Natural and Mining Cavities			1	12
Potential for Collapsible Ground Stability Hazards		Yes	n/a	n/a
Potential for Compressible Ground Stability Hazards	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards	Yes	Yes	n/a	n/a
Potential for Landslide Ground Stability Hazards	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	Yes		n/a	n/a
Radon Affected Areas		n/a	n/a	n/a
Radon Protection Measures		n/a	n/a	n/a
Industrial Land Use	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Contemporary Trade Directory Entries		17	38	152
Fuel Station Entries			2	2
Sensitive Land Use	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Ancient Woodland				
Areas of Adopted Green Belt				
Areas of Unadopted Green Belt				
Areas of Outstanding Natural Beauty				
Environmentally Sensitive Areas				
Forest Parks				
Local Nature Reserves				
Marine Nature Reserves				
National Nature Reserves				
National Parks				
National Sensitive Areas				
Nitrate Vulnerable Zones			1	1
RAMSAR Sites				
Sites of Special Scientific Interest				
Special Areas of Conservation				
Special Protection Areas				
World Heritage Sites				

*The distances recorded are approximate and measured from the site boundary.

** Where 'Yes' and 'No' are referred to this indicates the presence or absence of data and does not imply a potential risk or hazard.

APPENDIX VII

List of Land Uses and Associated Chemicals of Potential Concern

		Metals and non-metals				Inorganics					Organics						Other chemicals and compounds	
Industry	Common metal suite (Cd, Cr, Cu, Ni, Pb, Zn)	Hg	As	B	Se	CN	Nitrate	Sulphate	Asbestos	pH	Phenol	Acetone	Hydro-carbons	PAHs	Chlorinated hydro-carbons	PCBs		
Airports	✓					✓			✓	✓		✓	✓		✓	✓		
Animal and animal products processing works	✓		✓					✓			✓		✓	✓	✓		Dieldrin	
Asbestos manufacturing works	✓							✓	✓				✓	✓	✓	✓		
Ceramics, cement and asphalt manufacturing works	✓	✓	✓					✓	✓	✓		✓	✓	✓		✓		
Charcoal works	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		
Chemical works	coatings (paints and printing inks) manufacturing	✓						✓	✓	✓	✓	✓	✓	✓	✓		Ba, S, organotin compounds	
	cosmetics and toiletries manufacturing works	✓						✓	✓	✓	✓	✓	✓	✓	✓			
	disinfectants manufacturing works	✓	✓					✓	✓	✓	✓		✓		✓	✓	Ba, chloro-phenol, dioxins/furans	
	explosives, propellants and pyrotechnics works	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	Ba	
	fertiliser manufacturing works	✓							✓	✓	✓		✓	✓		✓		
	fine chemical manufacturing works	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	V, dioxins/furans	
	inorganic chemicals manufacturing works	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓		Ba	
	linoleum, vinyl and bitumen-based floor coverings	✓		✓				✓	✓	✓	✓		✓	✓	✓	✓	organotin compounds	
	mastics, sealants, adhesives, roofing felt works.	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	Ba	
	organic chemicals manufacturing works	✓		✓					✓	✓	✓	✓	✓	✓		✓	V	
	pesticides manufacturing works	✓	✓	✓						✓	✓	✓		✓		✓	✓	chloro-phenol, hexachloro-cyclohexane, Dieldrin, dioxins/furans, organotin
	pharmaceuticals manufacturing works	✓	✓	✓						✓	✓		✓	✓		✓	✓	
rubber processing works (including tyres)								✓			✓		✓		✓	✓	S, Zn,	
soap and detergent manufacturing works										✓		✓	✓	✓				
Dockyards and dockland	✓	✓	✓					✓	✓		✓		✓	✓	✓	✓	hexachloro-cyclohexane	
Dry cleaners	✓	✓	✓		✓	✓	✓	✓	✓	✓			✓		✓	✓		
Engineering work	aircraft manufacturing works	✓					✓	✓	✓	✓		✓	✓		✓	✓		
	electrical and electronic equipment works	✓	✓	✓	✓			✓	✓	✓			✓		✓	✓		
	mechanical engineering and ordnance works	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	V, Be	
	railway engineering works	✓		✓				✓	✓	✓			✓	✓	✓	✓	S	
	shipbuilding repair and shipbreaking	✓		✓			✓		✓	✓		✓	✓		✓	✓	organotin compounds	
	vehicle manufacturing works	✓				✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		
Fibreglass and fibreglass resin manufacturing works	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Gasworks, coke works and coal carbonisation plants	✓	✓	✓				✓	✓	✓	✓	✓	✓		✓			V, S	
Glass manufacturing works	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓		✓	✓		
Metal works	electroplating and other metal finishing works	✓			✓		✓	✓	✓	✓	✓	✓			✓			
	iron and steelworks	✓					✓	✓	✓	✓	✓		✓			✓	V, S	
	lead works	✓		✓					✓	✓	✓		✓	✓		✓		
	non-ferrous metals (excluding lead works)	✓	✓		✓				✓	✓			✓	✓		✓	V	
	precious metal recovery works	✓	✓	✓				✓	✓	✓	✓				✓	✓		
Oil refineries and bulk storage	✓					✓		✓	✓	✓	✓	✓				✓	organolead compounds	
Photographic processing industry	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓			✓	✓		
Power stations (excluding nuclear power stations)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	V, Ba, Be	
Printing and bookbinding works	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		
Pulp and paper manufacturing works	✓							✓	✓	✓			✓		✓	✓	hexachloro-cyclohexane, dioxins/furans	
Railway land	✓							✓	✓					✓	✓	✓	V	
Road vehicle: garages and filling stations	✓								✓	✓			✓	✓	✓	✓	organolead compounds	
Road vehicle: transport and haulage centres	✓								✓	✓		✓	✓	✓	✓	✓	V, S, organolead compounds	
Sewage works and sewage farm	✓	✓	✓			✓	✓	✓	✓	✓			✓		✓	✓		
Textile works and dye works	✓	✓		✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	Dieldrin	
Timber products and manufacturing works	✓		✓	✓				✓	✓	✓	✓	✓	✓	✓	✓			
Timber treatment works	✓		✓	✓					✓	✓	✓	✓	✓	✓	✓		chloro-phenol, hexachloro-cyclohexane, Dieldrin, organotin	
Waste management	drum and tank cleaning and recyling plants							✓	✓			✓	✓				✓	
	hazardous waste treatment plants	✓	✓	✓		✓		✓		✓	✓				✓	✓	V, Ba, hexachloro-cyclohexane, Dieldrin	
	landfills and other waste treatment/disposal sites	✓		✓				✓	✓	✓			✓	✓	✓	✓	dioxins/furans	
	solvent recovery works	✓								✓					✓	✓		
	metal recyling sites	✓	✓	✓		✓		✓	✓	✓			✓		✓	✓	Ba	

* The information in this table is indicative only and does not present a comprehensive review. The data is summarised from R&D Publication CLR 8, Potential Contaminants for the Assessment of Land, DEFRA and EA, 2002.

Assessment of individual sites requires knowledge of historic land use and specific site processes. Irrespective of the information present above there are several contaminants of concern such as hydrocarbons and PCBs, that can be found on any industrial site of significant size.

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)178 227 6700

BIRMINGHAM
Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
B31 2TS
Tel: +44 (0)121 580 0909

CARDIFF
22 Windsor Place
Cardiff
CF10 3BY
Tel: +44 (0)292 072 9191

CUMBRIA
Marconi Road
Burgh Road Industrial Estate
Carlisle
Cumbria
CA2 7NA
Tel: +44 (0)122 856 4820

EDINBURGH
Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GLASGOW
2 West Regent Street
Glasgow
G2 1RW
Tel: +44 (0)141 433 7210

LONDON
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)207 242 3243

MANCHESTER (City Centre)
76 King Street
Manchester
M2 4NH
Tel: +44 (0)161 817 5038

MANCHESTER (Greater)
2 The Avenue
Leigh
Greater Manchester
WN7 1ES
Tel: +44 (0)194 226 0101

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle Upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

SHEFFIELD
Unit 5
Newton Business Centre
Newton Chambers Road
Thorncliffe Park
Chapelton
Sheffield
S35 2PH
Tel: +44 (0)114 245 6244

TRURO
Baldhu House
Wheal Jane Earth Science Park
Baldhu
Truro
TR3 6EH
Tel: +44 (0)187 256 0738

International offices:
ALMATY
29/6 Satpaev Avenue
Regency Hotel Office Tower
Almaty Kazakhstan
050040
Tel: +7(727) 334 1310

MOSCOW
21/5 Kuznetskiy Most St.
Moscow
Russia
Tel: +7(495) 626 07 67