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GEO ENGINEERING



59 Gloucester Road, Reading, RG30 2TH

Site Contamination Risk Assessment



Daniella Reynard

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Milton Keynes: The Log Cabin, Manor Farm, Whaddon Road, Newton Longville, Milton Keynes, MK17 0AU

Swindon/Oxford: 21 Tyrell Close, Stanford in the Vale, Oxon, SN7 8EY

T: 44 (0) 1908 764032

M: 44 (0) 7377 422528

E: matt@paddockgeoengineering.co.uk

W: www.paddockgeoengineering.co.uk

Company Number: 8613165
VAT Number: GB 166 8087 72

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ISSUE	DATE	Written By	Comments
1	30/07/2026	Edoardo Angelone MSc FGS	-
		Checked by	
		Matthew Paddock MSc FGS	
For and on behalf of Paddock Geo Engineering Limited			

1.0 INTRODUCTION

Paddock Geo Engineering Limited (PGE) was instructed by Daniella Reynard; the Client, to undertake an intrusive Ground Investigation and Generic Contamination Risk Assessment, in accordance with Stage 1 Tier 2 of the guidance set out in Land Contamination Risk Management (LCRM) 2023, for the subject site, referred to as 59 Gloucester Road, Reading, RG30 2TH.

The overall objective of the Contamination Risk Assessment was to inform the Client of the ground conditions, and any potential environmental or ground-related risks associated with the development of the site. The Risk Assessment undertaken relates to the residential redevelopment of the site.

1.1 Terms of Reference

- British Standard BS10175:2011+A2:2017 Investigation of Potentially Contaminated Sites - Code of Practice;
- CLR7 Assessment of Risks to Human Health from Land Contamination 2002, DEFRA / Environment Agency (withdrawn);
- CLR8 Potential Contaminants for the assessment of Land 2002, DEFRA / Environment Agency (withdrawn);
- CLR11 Model Procedures for the Management of Land Contamination 2010, DEFRA / Environment Agency;
- PPG23 (PPS23) Planning and pollution control (contaminated land aspects) 2002;
- GPLC1 Guiding Principles for Land Contamination 2010, Environment Agency;
- Environmental Protection Act: 1990 – Contaminated Land Statutory Guidance, April 2012, DEFRA;
- CIRIA C665 Assessing risks posed by hazardous ground gases to buildings, CIRIA 2007;
- BS 8576:2013 Guidance on investigations for ground gas - Permanent Gases and Volatile Organic Compounds (VOCs); and
- Land Contamination Risk Management (LCRM) 2023, Environment Agency

1.2 Objectives

The objective of the investigation for the site comprised the following elements:

- An Intrusive Investigation
- A Site Contamination Assessment including a Generic Human Health Risk Assessment

The agreed scope of work was to undertake a ground investigation to allow characterisation of the geological and hydrogeological environment at the site.

The investigation included the recovery of soil samples for chemical laboratory analysis. The data obtained as part of the investigation was used to derive a ground model for the site and complete a Generic Quantitative Risk assessment in accordance with Stage 1 Tier 2 of the guidance set out in Land Contamination Risk Management (LCRM) 2023.

2.0 SITE DETAILS

2.1 Site Description

The subject site is located within a residential area of Reading, approximately 1.5km west of the town centre.

The site comprises an irregularly shaped parcel of land that generally slopes down towards the north. It is currently occupied by a single structure located within the southeastern corner of the site. The remainder of the site is predominantly covered by soft landscaping, with a timber shed located in the northwestern corner and an area of asphalt hardstanding present within the northern part of the site.

A retaining wall is present within the southeastern corner, while the site boundaries are generally defined by timber fencing and vegetation.

The surrounding area is predominantly residential in all directions, with a school located approximately 25m northeast of the site.

Site Location Plans and an Aerial Photograph are presented in Appendix A.

2.2 Proposed Development

The proposed development is understood to comprise the change of use/conversion of the existing building is a Class E (g) office to Class F1 (a) – a state funded school for learning and non-residential institutions for the provision of education.

The soil contamination exposure characteristics employed for the proposed development will be residential with plant uptake.

A proposed development plan is presented within Appendix A.

3.0 PREVIOUS INVESTIGATIONS

The relevant details of the available previous investigations and reports, completed for the site, are summarised in the following sub-sections. Reference should be made to the full reports for detailed information.

3.1 Stage 1, Tier 1 – Preliminary Risk Assessment

Ground Condition Consultants, Phase 1 Desk Study Report, reference J22-042-R01, August 2022

A Preliminary Contamination Risk Assessment (PRA) was carried out for the site by Ground Condition Consultants in August 2022. A summary of the main findings of the PRA report is included within Table 1 below.

Table 1: Summary of PRA Information

Brief	The brief was to undertake a site visit and use the information provided in an Environmental Database Search relating to the site to assess and report on the findings with respect to potential ground contamination and potential associated future liabilities in accordance with the Preliminary Risk Assessment procedure outlined in Land Contamination Risk Management (LCRM), published by the Environment Agency.
Site History	The historical maps from 1881 to 2022 indicate that the site was an undeveloped field in 1881 and remained an undeveloped parcel of land until the existing studio building (identified on the historical maps as a Hall) was constructed between 1900 and 1911. No Other development on the site is evident on the historical maps. The historical aerial photographs indicate several small structures (likely to be play equipment) and several large trees on site. A particularly large tree in the southeast of the site appears to have been removed between 2013 and 2019.
Geology	Reference to the British Geological Survey (BGS) Map extracts indicates the site to overlie superficial Lynch Hill Gravel Member (sand and gravel) over the bedrock geology of the Lambeth Group (clay, silt and sand) over the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated). An investigation of the site adjacent to the west indicates the presence of interbedded clay, silt and sand to approximately 4.5mbgl over Chalk.
Hydrogeology	The Environment Agency Groundwater Vulnerability Map extracts indicate the site to be overlying a superficial and bedrock Secondary A Aquifers, interpreted as the Lynch Hill Gravel Member and Lambeth Group respectively. The Chalk beneath the Lambeth Group is identified as a principal aquifer.
Hydrology	There are no identified surface water features within 250m of the site.
Conclusions and Recommendations	The preliminary risk assessment has not identified any likely sources of contamination on site. The risks to human health from potential soil contamination are therefore considered to be very low as no potentially significant pollutant linkage have been identified. As such, an intrusive investigation, including ground gas monitoring, is not specifically recommended to further assess the contamination risks, although it would be prudent to take samples as part of the proposed geotechnical investigation to confirm the findings of this assessment. It should be noted that additional sources of contamination may become apparent during any development of the site. In particular, while no suspect asbestos containing materials were observed during the walkover survey, vigilance should be maintained throughout the development works for such materials. Although the Preliminary Risk Assessment concluded that an intrusive investigation was not required, the Local Authority's Environmental Protection Team raised concerns regarding potential contamination associated with the adjacent former brickworks and the proposed sensitive educational use.

PGE are not aware of any other intrusive ground investigations or contamination risk assessments being carried out on the subject site.

4.0 INTRUSIVE INVESTIGATION FIELDWORKS

4.1 Ground Investigation

Although the Preliminary Risk Assessment concluded that an intrusive investigation was not required, the Local Authority's Environmental Protection team raised concerns regarding potential contamination associated with the adjacent former brickworks and the proposed sensitive educational use. Consequently, a ground investigation was designed to enable detailed characterisation of the geological and hydrogeological ground conditions at the site.

The findings of the ground investigation were used to assess the contamination status of the near surface soils and potential for gaseous / volatile contamination on site to facilitate the refinement of the preliminary CSM, as detailed within the PRA.

The intrusive works were completed on 17th July 2026 and comprised;

- the progression of 5no. percussion liner sampler boreholes (WS01 to WS05) to a targeted depth of 3.00m below ground level (bgl)

The exploratory locations were positioned to provide general site wide coverage, inclusive of areas of potential Made Ground. It should be noted that the borehole WS05 was terminated at depth 1.80m bgl due to refusal on dense coarse-grained strata.

The exploratory points were positioned in open accessible areas and to clear buried services following the principles of PAS 128:2022 and HSG47:2014, a Cable Avoidance Tool (CAT) survey and consultation of buried services plans where available. Service inspection chamber covers were lifted to determine the exact runs of buried services.

The exploratory locations were progressed to depths comprised between 1.80m and 3.00m bgl to facilitate inspection and sampling of the near surface soils for contamination. Soil arisings for all exploratory positions were logged by a PGE engineer in accordance with BS5930:2015+A1:2020.

On completion soil logging and sampling, the exploratory holes were backfilled with compacted arisings.

Environmental samples were recovered for contamination assessment by the PGE site engineer in accordance with the guidance set out in BS 10175:2011+A2:2017. During sampling all reasonable effort was maintained to prevent cross-contamination or general failure of the sampling strategy.

All samples were collected in new, clean bags or jars as appropriate and instructed by the laboratory, using a stainless-steel trowel, which was cleaned prior to the collection of each sample. The recovered samples were temporarily stored in cool boxes with freeze packs to maintain low temperatures during transfer to the laboratory.

Detailed records of the boreholes inclusive of the in-situ testing and sampling data have been produced in accordance with BS5930:2015+A1,2020 and are included as Appendix B along with an Exploratory Point Location Plan and a series of photographs taken during the fieldworks.

4.2 Ground Gas monitoring

The PRA concluded that the risk of ground gases and vapour impacting the site from potential on- and off-site sources is Very Low.

Therefore, given the above, dedicated ground-gas monitoring and quantitative risk assessment are not considered necessary at this stage.

5.0 GROUND CONDITIONS

Detailed records of the boreholes have been produced in accordance with BS5930:2015+A1,2020 and are included as Appendix B.

Geological mapping indicates the site is underlain by superficial deposit of the Lynch Hill Gravel Member over bedrock of the Lambeth Group. The bedrock soils were not encountered during the site investigations.

5.1 Encountered Strata

A summary of the recorded succession of strata across the site is included within the following subsections. Depths are related to ground level as it existed at the time of the ground investigation.

Topsoil/Reworked Natural

Topsoil or Reworked Natural soils were encountered in all exploratory locations from ground surface to depths proven depths ranging between 0.30m to 0.80m bgl and can be described as dark grey brown gravelly sandy CLAY or clayey organic SAND with occasional rootlets. Gravel is composed of fine to coarse and subrounded quartzite;

Wooden chippings were noted within the area of the WS01, and ash fragments and rare brick fragments were recorded within the WS02.

Lynch Hill Gravel Member

The superficial deposits of the Lynch Hill Gravel Member were encountered to underlie the Topsoil in all boreholes to the proven depths ranging between 1.80m to 3.00m bgl. These superficial deposits generally can be separated into two units and described as:

- Fine grained unit comprising brown to orange brown slightly gravelly sandy CLAY with gravel composed of fine to coarse subangular to rounded quartzite, encountered only within boreholes WS01.
- Coarse grained unit comprising either orange brown to yellow brown silty fine to medium SAND or, brown to orange brown very clayey sandy fine to coarse subangular to rounded quartzite GRAVEL.

The base of the Lynch Hill Gravel Member was not proven in any boreholes.

5.2 Visual Contamination

No further visual and olfactory evidence of gross contamination was identified as part of the site investigation.

Some inert anthropogenic debris including rare brick and ash fragments were noted within borehole WS02.

5.3 Hydrogeology

Groundwater was not encountered within any of the boreholes to the proven depth of 3.00m bgl.

It should be noted that groundwater levels may vary seasonally and with other factors. The reviewer should satisfy themselves with the groundwater levels at the time of any construction works.

6.0 CONTAMINATION ASSESSMENT

6.1 Chemical Analysis

A total of 6 no. soil samples were sent to an external UKAS/MCERTS accredited laboratory to obtain total soil concentrations for a range of priority contaminants.

The suite of analysis was decided based on consultation of the Contamination Exposure Assessment (CLEA) supporting documents and consideration for the site-specific criteria as set out above.

The suite of testing included:

- Asbestos screen, for near surface samples
- Metals and Inorganic compounds
- Polycyclic Aromatic Hydrocarbons (PAH) USPEA Priority 16 Compounds
- Total Petroleum Hydrocarbons (TPH) EC10-EC40 screen

Results of the chemical analysis are presented in Appendix C.

6.2 Human Health Assessment Criteria

The assessment has been carried out in accordance with the Contaminated Land Exposure Assessment (CLEA) methodology as detailed within LCRM 2023. The assessment criteria employed are based on a worst-case proposed land use of 'residential with plant uptake'.

In March 2014 DEFRA published new guidance detailing the Category 4 Screening Levels (C4SL) system for the classification of contaminated land. The C4SL system was published to assist with revised statutory guidance published in 2012 for Part 2a of the Environmental Protection Act.

It introduces a new four category system for the classification of land under Part 2a where a Significant Possibility of Significant Harm to human health has been concluded. The categories correspond to Category 1 – land where the level of risk is clearly unacceptable, to Category 4 – where the level of risk posed is acceptably low. In short, land that passes the category 4 test “should not be capable of being determined as contaminated land under Part 2a”.

Currently no statutory chemical guidance levels for land contamination exist in the UK. Therefore, the reported soil total contaminant concentrations will be compared to In-House Generic Assessment Criteria (GAC) used as C4SLs.

These In-House GACs are presented in Appendix C and are generally based on the LQM/CIEH S4UL values.

The S4UL values employed are based on a Soil Organic Material (SOM) concentration of 2.5% for the initial screening.

An S4UL has not been published for lead. Therefore, the GAC value employed has been derived using the DEFRA C4SL1 toxicological data and exposure parameters and the CLEA Software V1.071:2015.

The C4SL value employed for the lead GAC, for a Residential with Home Grown Produce land use scenario, is based on a blood lead level of 3.5ug/dl for the lower level of toxicological concern employing the Integrated Exposure Uptake Biokinetic model (IEUBK) estimated blood lead concentrations in children and employs the exposure parameters within paragraph 37 of the DEFRA C4SL report SP1010, dated December 2014.

A minimal risk approach was employed to derive the S4UL values, whereas the C4SL model uses a lower level for risk model, which is deemed generally less conservative than the minimal risk approach. However, the use of a lower level for risk model screening criteria is considered strongly precautionary and is generally considered appropriate for use within the planning regime.

However, with consideration of the C4SL and S4UL values there remains some gaps in the available chemical and/or toxicological data for non-priority contaminants and therefore a limited number of previously used CLEA SGVs and ICRL guideline values have been retained and include those for pH, sulphide, sulphur and water-soluble boron.

Should an exceedance be noted when site priority contaminant concentrations are compared to the employed GACs, site specific assessment criteria can be derived using CLEA software or similar human health risk assessment software. This can also include consideration of bioavailability of the contaminants if required.

Further to the above, samples of Made Ground are generally screened for asbestos presence. Generic assessment criteria do not exist currently for asbestos presence in soil within the UK.

¹ DEFRA SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Final Project Report (Revision 2) 2014

Therefore, where asbestos is identified in soil it is recommended that further risk assessment be carried out by suitably qualified and registered persons.

7.0 GENERIC HUMAN HEALTH SITE CONTAMINATION RISK ASSESSMENT

Statistical analysis of the data set is carried out employing the statistical method detailed in CL: AIRE Document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', if exceedances are noted on individual comparison of the contaminant concentrations to the employed assessment criteria, which allows a derivation of a true mean concentration (μ)

A summary of the findings of the human health risk assessment is detailed in the following section of this report. A full set of soil contamination test results are included in Appendix C.

7.1 Total Soil Concentrations – Shallow Soils <1.0m Depth

A summary of the findings of the human health risk assessment is detailed in the following section of this report. The assessment considers all samples obtained from both Topsoil and the underlying natural strata. A full set of soil contamination test results are included in Appendix C.

7.2 Heavy Metals

With the exception of lead, individual heavy metal exceedances were not detected at concentrations in exceedance of their associated GAC values for a residential with plant uptake end-use in any of the assessed samples. Lead concentrations were detected to exceed its associated GAC (200mgkg^{-1}) within shallow Topsoil in the boreholes WS01 at 0.10m (780mgkg^{-1}) and WS04 0.20m bgl (300mgkg^{-1}).

The reported copper and zinc concentrations were also compared to their respective phytotoxicity guidance concentrations individually with no samples exceeding the phytotoxic copper and zinc screening levels of 111mgkg^{-1} or 330mgkg^{-1} respectively.

The details of the detected exceedances are summarised in Table 3.

Table 2: Heavy Metal Exceedances

Determinand	Assessment Criteria (mgkg^{-1})	Location and Depth (m bgl)	Exceeding Concentration (mgkg^{-1})
Lead	200	WS01 (0.10)	780
		WS04 (0.20)	300

7.3 Hydrocarbons

No TPH fractions or PAH compound were detected at concentrations in exceedance of their associated GAC values for Residential with Home Grown Produce GACs in any of the assessed samples.

The results of the chemical analysis are presented in Appendix C.

Assessment of the arisings on site using a PID employing a 10.6 eV bulb calibrated with 100ppm isobutylene prior to use did not indicate any significant detectable VOCs within the samples tested on site. Olfactory assessment of the samples recovered, and soil arisings did not indicate any detectable hydrocarbon or agrichemical odours.

7.4 Asbestos

Five samples of Topsoil were screened for the presence of asbestos fibres with no samples returning a positive result. Additionally, no soil samples contained obvious ACM materials.

The laboratory testing results are included within Appendix C.

7.5 Ground Gas Risk Assessment

Based on the findings of the Preliminary Risk Assessment and subsequent ground investigation, the potential risk from hazardous ground gases to future site users is considered to be Very Low. This assessment is supported by the absence of significant Made Ground or organic-rich soils within the exploratory locations, together with the absence of visual or olfactory evidence of contamination during the intrusive works.

PID screening of the recovered soil samples did not identify elevated concentrations of volatile organic compounds.

On the basis of the conceptual site model and the ground conditions encountered, the installation of ground-gas monitoring standpipes and subsequent monitoring were not considered necessary.

7.6 Potable Water Supply Pipe

Guidance on the type of potable water supply pipe to be employed on residential development sites is given by UKWIR, who have published guidance for the type of potable water supply pipework to be employed for new structures on reused land.

Samples of shallow Topsoil and natural strata which extend below suspected pipe burial depths and route (c. 0.60m – 1.00m depth). These samples were analysed for a suite of contaminants which are in generally accordance with the UKWIR requirements. The analysis results indicated generally below detection and low-level concentrations of hydrocarbons within the samples of Topsoil and natural soils analysed around target depths of 0.60m and 1.00m.

Therefore, conventional PE pipe may be suitable for the potable water supply pipework on the site where services are laid within the natural soils. Where services are laid within or penetrate through the Made Ground soils conventional PE pipe may not be suitable and consideration should be given to the use of barrier pipe in these areas.

The classification will be decided by the local water company, and their advice should be sought prior to the laying of any potable water supply pipework. The local water company may require further, more detailed sampling, testing and assessment prior to pipe selection.

All pipework should be laid in corridors of clean soil as best practice.

7.7 Controlled Waters Risk Assessment

Localized lead contaminant concentration exceedances were noted from shallow soils within WS01 and WS04. Lead is generally of relatively low mobility under typical soil conditions, and no groundwater was encountered during the investigation. Notwithstanding the above, the detected exceedances are marginal and will generally require remediation to make the site suitable for its proposed use. Further to this given the localised low level of the detected exceeding contaminant concentrations, it is considered that these impacted soils are unlikely to give rise to a significant mobile contaminant to migrate and impact the underlying aquifer. As such, the risk to controlled waters post development is low.

8.0 SITE CONTAMINATION ASSESSMENT DISCUSSION

8.1 Introduction

The proposed development is understood to comprise the change of use/conversion of the existing building is a Class E (g) office to Class F1 (a) – a state funded school for learning and non-residential institutions for the provision of education.

The soil contamination exposure characteristics for the assessment of the site in relation to the proposed development are comparable to residential with plant uptake.

8.2 Soil contamination

The soil contamination assessment identified lead concentrations exceeding the relevant Generic Assessment Criterion within the Topsoil at two exploratory locations. Further details are provided below.

Metals

Lead

Lead concentrations were detected to exceed its associated GAC (200 mgkg^{-1}) within shallow Topsoil in the boreholes WS01 at 0.10m (780 mgkg^{-1}) and WS04 0.20m bgl (300 mgkg^{-1}).

Consideration was given to these elevated lead concentrations and their distribution to assess if further risk assessment and possible further analysis, such as bio-accessibility analysis employing the BARGE method, would be suitable. However, given that the elevated sample was near surface Topsoil with no natural soils noted elevated concentrations, it is considered that the elevated lead concentrations are likely anthropogenic and further analysis would not pragmatically reduce the stated risk to the end site users.

No elevated heavy metal determinants concentrations were detected in relation to phytotoxicity guidance levels.

Hydrocarbons

No TPH fractions or PAH compound were detected at concentrations in exceedance of their associated GAC values for Residential with Home Grown Produce GACs in any of the assessed samples.

Asbestos

No asbestos was present in any of the assessed samples.

Discussion

An active SPR linkage is considered to be present between the elevated concentrations of the priority determinand lead identified within boreholes WS01 and WS04, and end users of the site through direct contact and ingestion pathways in open soft landscaped areas of the site, as well as to users of adjacent land from windblown dusts sourced from the site. Further assessment or risk reduction measures are considered necessary with respect to the impacted soils to reduce the risk posed to the end site users.

Should the proposed design be changed and incorporate any new soft landscaped private gardens into the area of the impacted soil then further assessment of the potential risks should be considered.

Notwithstanding the above assessment, if any unforeseen contamination is discovered during the site development works, a suitably qualified and experienced person should be contacted so any further assessment required can be carried out.

9.0 CONCEPTUAL SITE MODEL

An assessment of the risk posed by the identified contaminant concentrations has been carried out employing the Source-Pathway-Receptor (S-P-R) methodology detailed within the CLEA methodology.

The conceptual site model include within Table 3 reflects the assumption that the existing external soft-landscaped areas within the site curtilage may be accessible to children as part of the proposed educational use. Accordingly, direct contact, incidental ingestion and inhalation of soil-derived dust are considered potentially complete pathways where lead-impacted Topsoil remains exposed.

Table 3: Updated SPR Flowchart

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete
No significant deposits of Putrescible Made Ground or natural soils identified.	Dermal / direct contact	Current site users (Disused Studio)	No
	Direct ingestion		No
	Direct inhalation		No
	Inhalation of Radon		No
	Inhalation of wind-blown dust		Yes
	Vapour migration		No
	Ground gas migration		No
Elevated Lead within shallow Topsoil at WS01 (0.10m bgl) and WS04 (0.20m bgl).	Dermal / direct contact	Future site users (Educational use - Residential with Plant Uptake)	Yes
	Direct ingestion		Yes
	Direct inhalation		Yes
	Inhalation of Radon gas		No
	Inhalation of wind-blown dust		Yes
	Vapour Migration onto the site		No
	Ground gas migration		No
No Asbestos identified	Direct contact	On Site Services (following redevelopment)	Yes
	Migration of contaminants: non-aqueous phase		No
Very low ground gas risk			

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete
	Migration of contaminants: aqueous phase		No
	Migration of contaminants off-site: non-aqueous phase	Adjacent Properties	No
	Migration of contaminants off site: aqueous phase		No
	Vapour migration		No
	Inhalation of wind-blown dust	Ecological Impacts	No
	Migration of contaminants: non-aqueous phase		No
	Migration of contaminants: aqueous phase		No
	Migration of contaminants from site: non-aqueous phase	Controlled groundwater	No
	Migration of contaminants from site: aqueous phase		No
	Migration of Contaminants: non-aqueous phase	Surface Waters	No
	Migration of contaminants: aqueous phase		No

Any risks posed to site construction workers from identified contamination can be mitigated through good site practices and robust sitework risk assessment following guidance stated in CIRIA Report 132: 'A Guide for Safe Working on Contaminated Sites' and CIRIA Report C741: 'Environmental Good Practice on Site' during development works. Adequate standard personal protective equipment should be available, and the implementation of basic hygiene measures should be ensured. Works carried out on sites where asbestos fibres have been identified **must** be carried out by a suitable contractor and a site-specific Health and Safety Plan for site construction workers must be produced in line with CAR 2012.²

² Control of Asbestos Regulations 2012

CERTIFICATION

This report is produced for the sole use of the Client, and no responsibility of any kind, whether for negligence or otherwise, can be accepted for any Third Party who may rely upon it.

The conclusions and recommendations given in this report are based on our understanding of the future for the site and based on a scope of works agreed by the Client and afforded by the agreed budget. No responsibility is accepted for conditions not encountered, which are between exploratory points or outside of the agreed scope of work or if construction is commenced before regulatory approval of designs.

If the future plans for the site are changed, such as the site is developed for a more or less sensitive use, then a different interpretation might be appropriate.

The report has been prepared generally following the guidelines and principles established in the British Standards, BS5930:1999+A2:2010, BS 10175:2011, entitled 'Investigation of Potentially Contaminated Sites – Code of Practice' and the DEFRA/EA Contaminated Land Reports CLR7 and CLR8.

It necessarily relies on the co-operation of other organisations and the free availability of information and total access. No responsibility can, therefore, be accepted for conditions arising from information that was not available to the investigating team as a result of information being withheld or access being denied.

This report may suggest an opinion on a suspected configuration of strata or conditions between exploratory points and below the maximum depth of investigation. However, this is for guidance only and no liability can be accepted for its accuracy. Comments on the groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. It should be noted, however, that groundwater levels might vary due to seasonal or other effects.

It should be noted that this report is based solely on the samples collected in the borehole locations investigated. During the works and following general site clearance, should the sub-soil conditions in other areas of the site appear to be inconsistent with those found in the areas sampled then this geotechnical appraisal and site contamination assessment may need to be reviewed.

This report is prepared and written in the context of the proposals stated in the introduction to this report and it should not be used in a differing context. Furthermore, new information, improved practices and changes in legislation may require an alteration to the report in whole or in part after its submission. Therefore, with any changes in circumstances, or after one year from the date of the report, the report should be referred back to Paddock Geo Engineering Limited for re-assessment (and, if necessary, for an estimate for the cost of such).

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- 19) Contaminated Land Management – Ready Reference, J Nathanail, P Bardos and P Nathanail, Land Quality Press, 2002.
- 20) BRE Digest 412 'Desiccation in Clay Soils', 1996.

- 21) Hydrogeological Risk Assessment for Land Contamination Remedial Targets Worksheet, release 3.1 – October 2006.
- 22) Assessing risks posed by hazardous ground gases to buildings – CIRIA C665, 2007 – Wilson, Oliver, Mallet, Hutchings and Card.
- 23) NHBC & RSK Group publication 'Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present' (March 2007).
- 24) Mobilising Natures Army: Monitored Natural Attenuation – dealing with pollution using natural processes, Environment Agency. 2004.
- 25) Remediation Targets Methodology: Hydrogeological Risk Assessment for Land Contamination, Environment Agency. 2006.
- 26) BRE Report BR211 - Radon: Protective measures for new dwellings, November 2007.
- 27) GPLC1 - Guiding Principles for Land Contamination Environment Agency, 2010.
- 28) Perimeter soil gas emissions criteria and associated management. Industry Guidance v1.01. BIFFA et al. January 2011.
- 29) Environment Agency, Briefing Note – Monitoring Frequencies and Non-Compliance Recording.
- 30) LFTGN03. Guidance on the Management of Landfill Gas. Environment Agency. 2003.
- 31) Environment Agency, Final R&D Technical Report P1-471 Techniques for the Interpretation of Landfill Monitoring Data – Guidance Notes.

APPENDIX A

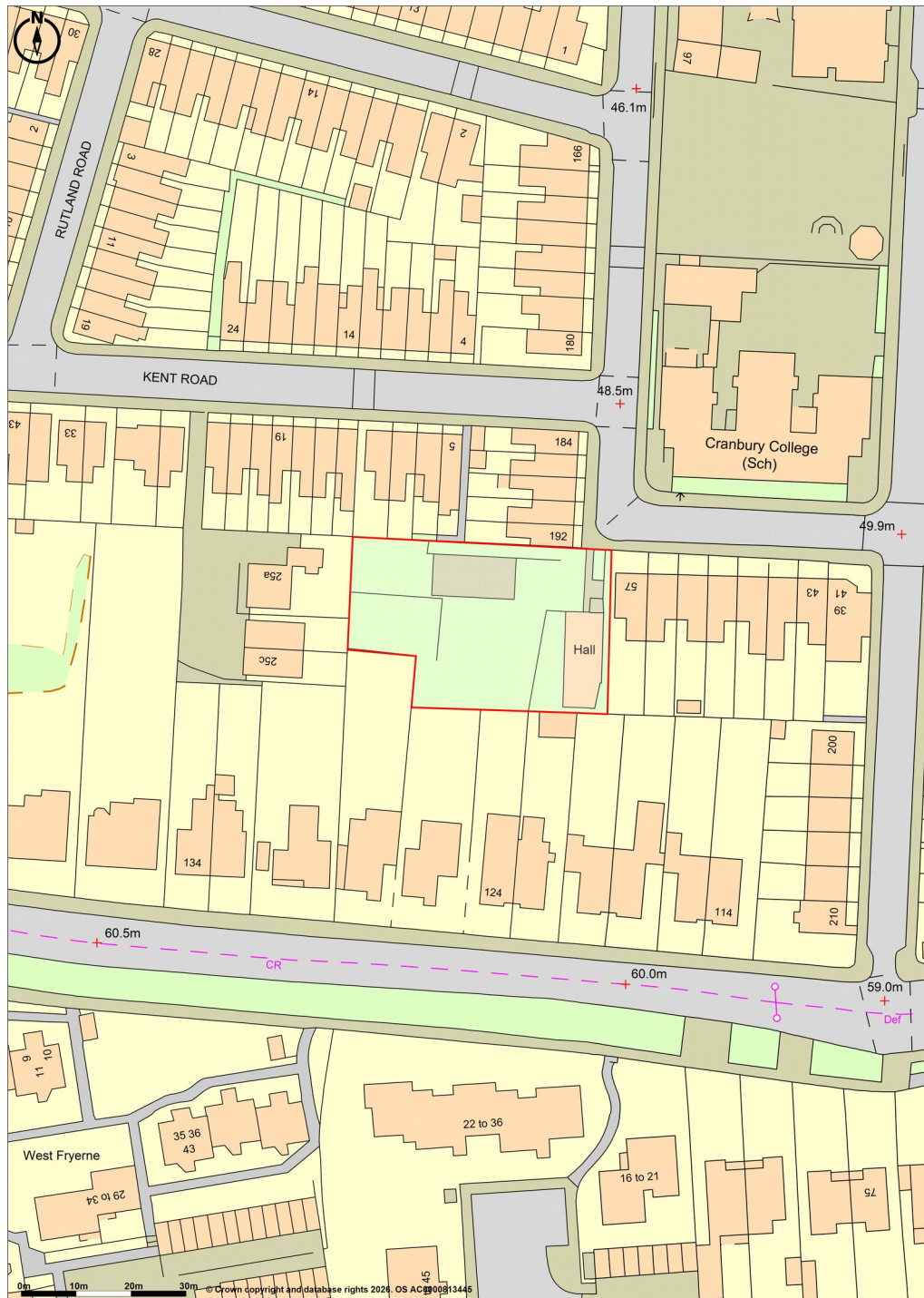
Site Location

Site Plan

Aerial Photograph

Proposed Development Plan

59 Gloucester Road, Reading, RG30 2TH

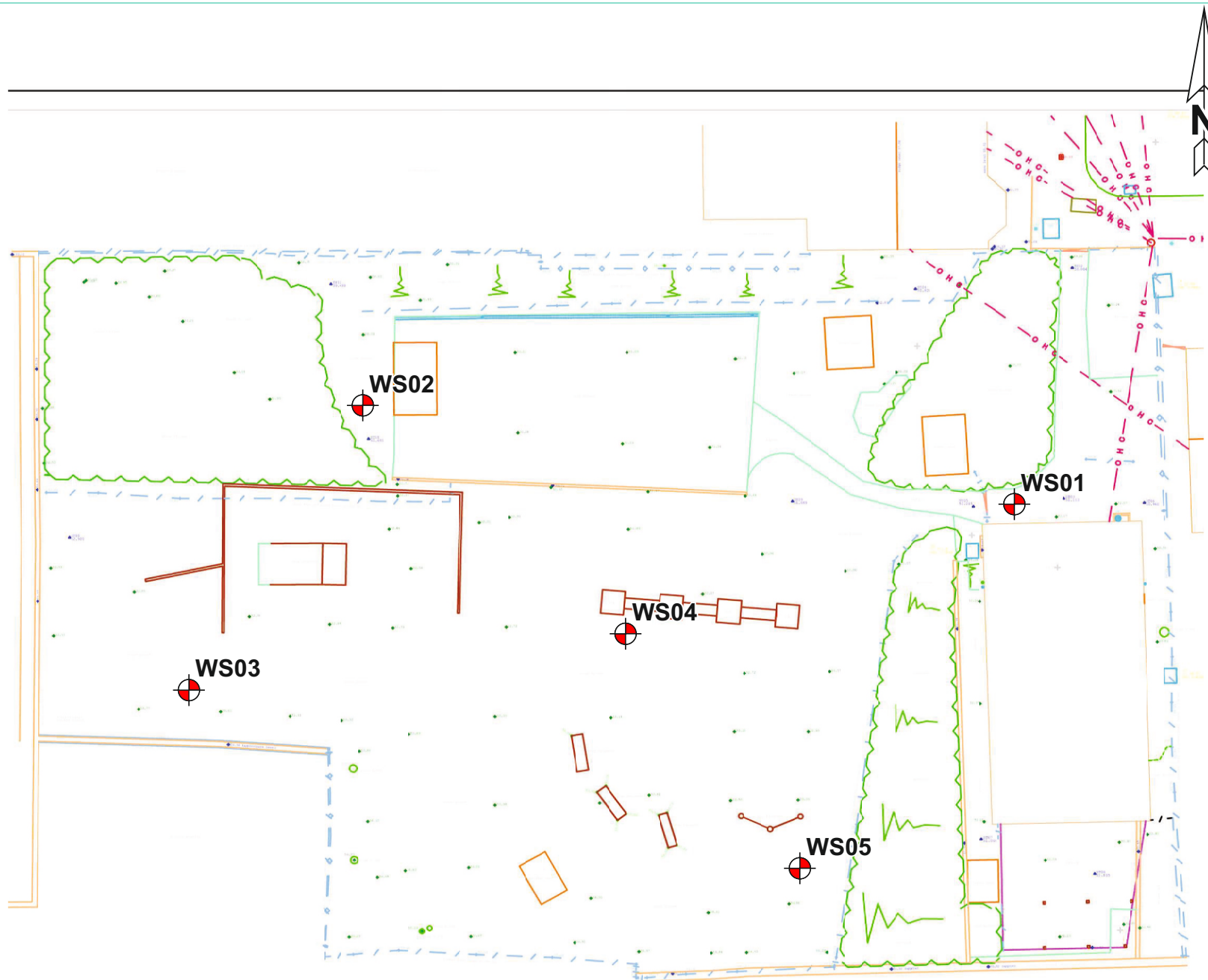


APPENDIX B

Exploratory Point Location Plan

Borehole Logs

Sitework Photographs



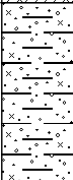
Legend:



Percussion Liner Sampling
Borehole Locations

Notes:

- 1) Not to scale
- 2) Dimensions as shown
- 3) All positions are approximate
- 4) Drawing to be viewed in colour
- 5) Drawing to be viewed digitally
- 6) Not for construction detail
- 7) Based on plans provided the Client

						Site 59 Gloucester Road, Reading, RG30 2TH		Number WS01	
Excavation Method Percussion Liner Rig		Dimensions		Ground Level (mOD)		Client Daniella Reynard		Job Number P26-231	
		Location		Dates 17/07/2026		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10	ES				(0.30) 0.30	Wooden chippings onto dark grey brown slightly gravelly sandy organic CLAY with occasional rootlets and occasional ash fragments. Gravel is fine to coarse subrounded quartzite. (TOPSOIL)			
0.80	ES				(0.60) 0.90	Brown to orange brown slightly gravelly sandy CLAY. Gravel is fine to coarse subangular to rounded quartzite. (LYNCH HILL GRAVEL MEMBER)			
1.50	D				(1.70) 2.60 (0.40) 3.00	Brown to orange brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded quartzite. (LYNCH HILL GRAVEL MEMBER)			
						Yellowish brown fine to medium SAND. (LYNCH HILL GRAVEL MEMBER)			
						Complete at 3.00m			
Remarks Borehole completed at 3.00m depth No groundwater was encountered during excavation to the investigated depth. The exploratory hole was backfilled on completion. The excavation remained stable throughout.								Scale (approx) 1:25	Logged By EA
Logged in accordance BS5930:2015+A1-2020								Figure No. P26-231.WS01	

						Site 59 Gloucester Road, Reading, RG30 2TH		Number WS02	
Excavation Method Percussion Liner Rig		Dimensions		Ground Level (mOD)		Client Daniella Reynard		Job Number P26-231	
		Location		Dates 17/07/2026		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.30	ES				(0.80)	Dark grey brown gravelly sandy organic CLAY with occasional rootlets and roots up to 5mm diameter, and rare brick fragments. Gravel ls fine to coarse subrounded quartzite. (TOPSOIL/REWORKED NATURAL)			
1.00	ES				0.80	Brown to orange brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded quartzite. (LYNCH HILL GRAVEL MEMBER)			
									
					(1.80)				
									
1.80	D				2.60	Brown clayey sandy fine to coarse subangular to rounded quartzite GRAVEL. (LYNCH HILL GRAVEL MEMBER)			
					(0.40)				
					3.00	Complete at 3.00m			
Remarks Borehole completed at 3.00m depth No groundwater was encountered during excavation to the investigated depth. The exploratory hole was backfilled on completion. The excavation remained stable throughout.								Scale (approx) 1:25	
								Logged By EA	
								Figure No. P26-231.WS02	

						Site 59 Gloucester Road, Reading, RG30 2TH		Number WS03	
Excavation Method Percussion Liner Rig		Dimensions		Ground Level (mOD)		Client Daniella Reynard		Job Number P26-231	
		Location		Dates 17/07/2026		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.10	ES				(0.30) 0.30	Dark grey brown gravelly sandy organic CLAY with occasional rootlets. Gravel ls fine to coarse subrounded quartzite. (TOPSOIL)			
0.60	ES					Brown to orange brown slightly clayey sandy fine to coarse subangular to rounded quartzite GRAVEL with moderate cobble content. (LYNCH HILL GRAVEL MEMBER)			
									
									
									
1.50	D				(2.10)				
									
									
									
					2.40	Orange brown to yellow brown silty fine to medium SAND. (LYNCH HILL GRAVEL MEMBER)			
					(0.60)				
					3.00	Complete at 3.00m			
Remarks Borehole completed at 3.00m depth No groundwater was encountered during excavation to the investigated depth. The exploratory hole was backfilled on completion. The excavation remained stable throughout.						Scale (approx)		Logged By	
						1:25		EA	
						Figure No. P26-231.WS03			
Logged in accordance BS5930:2015									

						Site 59 Gloucester Road, Reading, RG30 2TH		Number WS04	
Excavation Method Percussion Liner Rig		Dimensions		Ground Level (mOD)		Client Daniella Reynard		Job Number P26-231	
		Location		Dates 17/07/2026		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	ES				(0.40)	Dark grey brown gravelly sandy organic CLAY with occasional rootlets. Gravel ls fine to coarse subrounded quartzite and occasional limestone. (TOPSOIL)			
0.80	ES				0.40	Brown to orange brown very clayey sandy fine to coarse subangular to rounded quartzite GRAVEL. (LYNCH HILL GRAVEL MEMBER)			
1.50	D				(2.00)	...becoming slightly clayey from 2.00m depth.			
					2.40	Orange brown to yellow brown silty fine to medium SAND. (LYNCH HILL GRAVEL MEMBER)			
					(0.60)				
					3.00	Complete at 3.00m			
Remarks Borehole completed at 3.00m depth No groundwater was encountered during excavation to the investigated depth. The exploratory hole was backfilled on completion. The excavation remained stable throughout.								Scale (approx) 1:25	
Logged in accordance BS5930:2015+A1-2020								Logged By EA	
								Figure No. P26-231.WS04	

Excavation Method Percussion Liner Rig	Dimensions	Ground Level (mOD)	Client Daniella Reynard	Job Number P26-231
	Location	Dates 17/07/2026	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	ES				(0.30)	Dark grey brown gravelly clayey organic SAND with occasional rootlets. Gravel ls fine to coarse subrounded quartzite. (TOPSOIL)		
0.80	ES				0.30	Brown to orange brown slightly clayey sandy fine to coarse subangular to rounded quartzite GRAVEL. (LYNCH HILL GRAVEL MEMBER)		
					(1.50)			
								
								
					1.80	Complete at 3.00m		

Remarks Borehole refused at 1.80m depth. No groundwater was encountered during excavation to the investigated depth. The exploratory hole was backfilled on completion. The excavation remained stable throughout.	Scale (approx) 1:25	Logged By EA
	Figure No. P26-231.WS05	
	Logged in accordance BS5930:2015+A1-2020	



Photo of the investigated area facing northeast



Photo of the investigated area facing northwest



Photo of the investigated area facing southwest



Photo of the investigated area facing east



Photo of WS01



Photo of WS02



Photo of WS03



Photo of WS04



Photo of WS05



APPENDIX C

Chemical Analysis Reports
CLEA Analysis Results Summary
PGE In-House GAC's

Paddock Geo Engineering
The Log Cabin
Manor Farm
Whaddon Road
Newton Longville
Milton Keynes
MK17 0AU

t: 01908 271366

e: labs@paddockgeoengineering.co.uk

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

t: 01923 225404

f: 01923 237404

e: info-i2analytical@normecgroup.com

Analytical Report Number : 26-038633

Project / Site name:	59 Gloucester Road, Reading, RG30 2TH	Samples received on:	17/07/2026
Your job number:	P26 231	Samples instructed on/ Analysis started on:	17/07/2026
Your order number:		Analysis completed by:	28/07/2026
Report Issue Number:	1	Report issued on:	28/07/2026
Samples Analysed:	6 soil samples		



Signed: _____

Eric Crociquia
Customer Service
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
air	- once the analysis is complete

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

Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 26-038633

Project / Site name: 59 Gloucester Road, Reading, RG30 2TH

Lab Sample Number	985833	985834	985835	985836	985837
Sample Reference	WS01-ES	WS01-ES	WS02-ES	WS03-ES	WS04-ES
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix	N/A	N/A	N/A	N/A	N/A
Depth (m)	0.10	0.80	0.30	0.10	0.20
Date Sampled	17/07/2026	17/07/2026	17/07/2026	17/07/2026	17/07/2026
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status		

Mass of stone >10mm	%	0.1	NONE	< 0.1	6.4	29	43.9	48.2
Moisture Content	%	0.01	NONE	9.2	11	4.5	3.4	8.2
Total mass of sample received	kg	0.1	NONE	0.8	1	1	1	0.9

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	-	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	CZJ	-	CZJ	CZJ	CZJ
Analysis completed	N/A	N/A	N/A	28/07/2026	-	28/07/2026	28/07/2026	28/07/2026

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.3	7.9	7.4	7.1	6.8
Total Sulphate as SO ₄	mg/kg	50	MCERTS	380	200	490	530	610
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.9	1.5	4.6	4.3	5.9

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.11	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.72	0.06	0.19	0.15	0.26
Anthracene	mg/kg	0.05	MCERTS	0.15	< 0.05	< 0.05	< 0.05	0.06
Fluoranthene	mg/kg	0.05	MCERTS	2.1	0.08	0.55	0.46	0.73
Pyrene	mg/kg	0.05	MCERTS	1.9	0.07	0.55	0.45	0.7
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1	0.06	0.35	0.24	0.41
Chrysene	mg/kg	0.05	MCERTS	1	< 0.05	0.35	0.31	0.42
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	1.4	< 0.05	0.48	0.41	0.61
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.66	< 0.05	0.19	0.17	0.22
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.2	< 0.05	0.39	0.33	0.48
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.59	< 0.05	0.19	0.18	0.24
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.12	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.81	< 0.05	0.28	0.22	0.33

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	11.7	< 0.80	3.53	2.92	4.51
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	11	16	28	23
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.87	0.62	0.76	0.94	0.87
Boron (water soluble)	mg/kg	0.2	MCERTS	1.4	0.2	0.7	1	1.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.3	< 0.2	0.3
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	17	20	23	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20	9	20	22	30
Lead (aqua regia extractable)	mg/kg	1	MCERTS	780	15	150	65	300
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	1.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	16	21	26	23
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.6	1	1.5	< 1.0	1.3
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	45	34	40	53	48
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	97	40	160	89	250

Analytical Report Number: 26-038633

Project / Site name: 59 Gloucester Road, Reading, RG30 2TH

Lab Sample Number	985833	985834	985835	985836	985837
Sample Reference	WS01-ES	WS01-ES	WS02-ES	WS03-ES	WS04-ES
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix	N/A	N/A	N/A	N/A	N/A
Depth (m)	0.10	0.80	0.30	0.10	0.20
Date Sampled	17/07/2026	17/07/2026	17/07/2026	17/07/2026	17/07/2026
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status		

Petroleum Hydrocarbons

TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	40	< 10	14	18	15
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U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 26-038633

Project / Site name: 59 Gloucester Road, Reading, RG30 2TH

Lab Sample Number	985838			
Sample Reference	WS05-ES			
Sample Number	None Supplied			
Water Matrix	N/A			
Depth (m)	0.20			
Date Sampled	17/07/2026			
Time Taken	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status	

Mass of stone >10mm	%	0.1	NONE	29.9
Moisture Content	%	0.01	NONE	3.9
Total mass of sample received	kg	0.1	NONE	0.9

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	CZJ
Analysis completed	N/A	N/A	N/A	28/07/2026

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.6
Total Sulphate as SO ₄	mg/kg	50	MCERTS	590
Loss on Ignition @ 450°C	%	0.2	MCERTS	4.7

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	0.2
Anthracene	mg/kg	0.05	MCERTS	0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.55
Pyrene	mg/kg	0.05	MCERTS	0.55
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.32
Chrysene	mg/kg	0.05	MCERTS	0.34
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.49
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.15
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.36
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.2
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.28

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	3.49
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	27
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	32
Copper (aqua regia extractable)	mg/kg	1	MCERTS	25
Lead (aqua regia extractable)	mg/kg	1	MCERTS	68
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	49
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.8
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	60
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	130

Analytical Report Number: 26-038633

Project / Site name: 59 Gloucester Road, Reading, RG30 2TH

Lab Sample Number				985838
Sample Reference				WS05-ES
Sample Number				None Supplied
Water Matrix				N/A
Depth (m)				0.20
Date Sampled				17/07/2026
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status	

Petroleum Hydrocarbons

TPH (EC10 - EC40)	EH_CU_1D_TOTAL	mg/kg	10	MCERTS	13
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U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 26-038633

Project / Site name: 59 Gloucester Road, Reading, RG30 2TH

* 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 *
985833	WS01-ES	None Supplied	0.1	Brown loam and clay with gravel and vegetation
985834	WS01-ES	None Supplied	0.8	Brown clay and sand with gravel and stones
985835	WS02-ES	None Supplied	0.3	Brown loam with vegetation and stones
985836	WS03-ES	None Supplied	0.1	Brown loam with vegetation and stones
985837	WS04-ES	None Supplied	0.2	Brown loam with vegetation and stones
985838	WS05-ES	None Supplied	0.2	Brown loam with vegetation and stones

Analytical Report Number : 26-038633

Project / Site name: 59 Gloucester Road, Reading, RG30 2TH

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)

Final Sewage Effluent (FSE) Landfill Leachate (LL)

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 dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Moisture Content (Wet Weight)	Moisture content (% wet weight), determined gravimetrically (up to 30°C)	In-house-procedure based on BS EN 12880:2000	L019B	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.	L019B	D	NONE
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	L038B	D	MCERTS
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	L038B	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047-PL	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
Total petroleum hydrocarbons by GC-FID in soil	Determination of total petroleum hydrocarbons in soil by GC-FID	In-house method	L076B	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099-PL	D	MCERTS
Soil Descriptions	Textural classification	In-house method	L019B	W	NONE

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL' or 'B' 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 300C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Where coal tar is reported as "indicative/not indicative", PAH source attribution has been assessed using the ratio of parent PAHs to alkylated PAHs to indicate a likely pyrogenic (coal tar-related) or petrogenic (bitumen-related) origin. This assessment is independent of total residue and/or benzo(a)pyrene concentrations and is provided for indicative purposes only; it represents a single line of evidence and does not, in isolation, constitute confirmation or classification as hazardous under WM3 guidance.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution

Human Health Generic Contamination Risk Assessment - 59 Gloucester Road, Reading, RG30 2TH (6 Samples)

Determinand	Units	Reported Determinand Range	Assessment Criteria Residential with Home Grown Produce Concentration (cc)	Individual Samples Exceeding Assessment criteria? [Y/N?]	Exceeding Samples
Metals/Metaloids					
Arsenic	mg kg ⁻¹	11 - 28	37.0		
Beryllium	mg kg ⁻¹	0.62 - 1.1	1.7		
Boron (water soluble)	mg kg ⁻¹	0.2 - 1.4	290.0		
Cadmium	mg kg ⁻¹	0.2 - 0.3	22.0		
Chromium	mg kg ⁻¹	17 - 32	910.0		
Copper	mg kg ⁻¹	9 - 30	2400.0		
Lead	mg kg ⁻¹	15 - 780	200.0	Y	WS01-ES at 0.1m WS04-ES at 0.2m
Mercury	mg kg ⁻¹	0.3 - 1.3	40.0		
Nickel	mg kg ⁻¹	16 - 49	180.0		
Selenium	mg kg ⁻¹	1 - 1.8	250.0		
Vanadium	mg kg ⁻¹	34 - 60	410.0		
Zinc	mg kg ⁻¹	40 - 250	3700.0		

Phytotoxic Metals (Phytotoxicity)					
Copper	mg kg ⁻¹	0 - 30	111		
Zinc	mg kg ⁻¹	0 - 250	330		

Hydrocarbons					
Total Petroleum Hydrocarbons					
TPH EC6-EC10 (PRO)	mg kg ⁻¹	N/A	65		
TPH EC10-EC21 (DRO)	mg kg ⁻¹	N/A	300		
TPH EC21-EC40 (Min.Oil)	mg kg ⁻¹	N/A	1500		
Total TPH	mg kg ⁻¹	10 - 40	600		
Poly-cyclic Aromatic					
Napthalene	mg kg ⁻¹	0.05 - 0.05	5.60		
Flourene	mg kg ⁻¹	0.05 - 0.05	400.00		
Benzo(b)fluoranthene	mg kg ⁻¹	0.05 - 1.4	3.30		
Benzo(k)fluoranthene	mg kg ⁻¹	0.05 - 0.66	93.00		
Benzo(a)pyrene	mg kg ⁻¹	0.05 - 1.2	5.00		
Dibenzo(a,h) anthracene	mg kg ⁻¹	0.05 - 0.12	0.28		
Phenols	mg kg ⁻¹	NE	420.00		

OTHER					
pH	-	6.8 - 7.9	<5, >12		
Sulphur	mg kg ⁻¹	200 - 610	2500		
Water Soluble Boron	mg kg ⁻¹	0.2 - 1.4	290		
Asbestos Screen	Detection	Not-Detected	N/A		
Asbestos Quantification	%				

NOTE:

na - Not applicable

ne - Not evaluated, all results below the appropriate guideline level

nc - not displayed as results are not meaningful due to large uncertainty from small data set

GENERIC HUMAN HEALTH SCREENING TOTAL SOIL CONCENTRATION ASSESSMENT CRITERIA (GAC)

DETERMINAND		RESIDENTIAL (mg/kg)		COMMERCIAL (mg/kg)
Chemical	GAC Sources and units	With Home Grown produce	Without Home Grown produce	
Asbestos Screen & ID*	-	Detected	Detected	Detected
Cyanide - Total	SNIFFER	53.25	53.25	53.25
Cyanide - Free	SNIFFER	53.25	53.25	53.25
Loss on Ignition @ 450°C	-	-	-	-
Sulphate (as SO ₄) - Total	BRE****	2400	2400	2400
Sulphide	ICRCL	2500	2500	2500
Sulphur - Total	ICRCL	2500	2500	2500
Phenol (Total Monohydric)	CLEA	420	420	3200
pH	ICRCL	<5,>12	<5,>12	-
Metals and Metalloids (CLEA Metals)				
Arsenic	LQM S4UL	37	40	640
Beryllium	LQM S4UL	1.7	1.7	12
Cadmium	LQM S4UL	22	150	410
Chromium III	LQM S4UL	910	910	8600
Lead	DEFRA C4SL	200	310	2300
Mercury (Total)	LQM S4UL (Inorganic)	40	56	1100
Selenium	LQM S4UL	250	430	12000
Copper (phytotoxicity)	LQM S4UL	2400 (111)	7100	68000
Nickel	LQM S4UL	180	180	980
Zinc (phytotoxicity)	LQM S4UL	3700 (330)	40000	730000
Vanadium	LQM S4UL	410	1200	9000
Boron - Water Soluble	LQM S4UL	290	11000	240000
Total Petroleum Hydrocarbons**				
TPH (EC6-EC10) - PRO	LQM S4UL (2.5% SOM)	65	100	4800
TPH (EC10-EC21) - DRO	LQM S4UL (2.5% SOM)	300	600	23000
TPH (EC21-EC40) - Min.	LQM S4UL (2.5% SOM)	1500	1900	28000
Total TPH (EC10-EC40)	LQM S4UL (2.5% SOM)	600	900	23000
Polycyclic Aromatic Hydrocarbons***				
Benzo(a)anthracene	LQM S4UL (2.5% SOM)	11	14	170
Benzo(b)fluoranthene	LQM S4UL (2.5% SOM)	3.3	4	44
Naphthalene	LQM S4UL (2.5% SOM)	5.6	5.6	460
Flourene	LQM S4UL (2.5% SOM)	400	3800	68000
Benzo[a]pyrene	LQM S4UL (2.5% SOM)	5.0	5.3	77
Dibenzo[a,h]anthracene	LQM S4UL (2.5% SOM)	0.28	0.32	3.6

Notes

The Generic Assessment Criteria (GAC) are based on CLEA Soil Guidance Values published values and CIEH/LQM S4CLs where available or ICRCL, DoE, BRE and HSE levels where necessary. Where gaps remain GACs were calculated using the latest CLEA spreadsheet using DEFRA C4SL toxicology and physiochemical parameters from DEFRA SP1010.

* Guidance level set at any fibre identification.

** TPH 3 band is employed as a screening tool to instigate detailed speciated analysis to the TPHCWG methodology. Based on mean of fractions included Testing based on USEPA Priority 16 compounds. GACs for four compounds

and total PAH with published GACs only, used as a screening tool.

**** BRE SD1 - DS-1 Concrete Sulphate Design Class limit. Sulphate is not considered to pose a significant risk to human health under normal circumstances.



CLIENT:

PROJECT No:

PROJECT TITLE:

Daniella Reynard

P26-231

59 Gloucester Road, Reading, RG30 2TH

APPENDIX D

Ground Gas Monitoring Data - Not Used