



**THE PROPOSED HEIGHTS PRIMARY SCHOOL
MAPLEDURHAM PLAYING FIELDS, UPPER WOODCOTE ROAD, READING
RG4 7LH**

**PHASE 1 PRELIMINARY RISK ASSESSMENT AND PHASE 2
ENVIRONMENTAL AND GEOTECHNICAL SITE INVESTIGATION REPORT**

FOR

THE EDUCATION FUNDING AGENCY



March 2017

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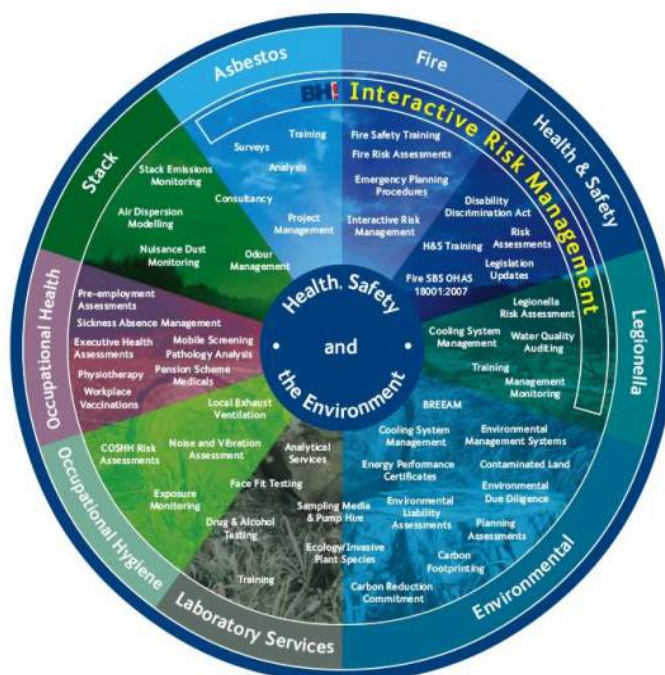
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This report has been prepared in the RPS Group Quality Management System to British Standard EN ISO 9001:2008

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RPS Health, Safety & Environment (London office) is certified to Environmental Management Standard ISO 14001.





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EXECUTIVE SUMMARY

RPS Health, Safety & Environment (RPS) was commissioned by the Education Funding Agency to undertake a Phase 1 Preliminary Risk Assessment and a Phase 2 Environmental and Geotechnical Site Investigation at the site of the proposed Heights Primary School, located on Mapledurham Playing fields, Off Upper Woodcote Road, Reading RG4 7LH. The report has been commissioned in relation to the proposed redevelopment of the site with a two storey school building, with associated areas of car parking, hardstanding play areas and soft landscaping.

The site investigation comprised two cable percussion boreholes to a depth of 10.00m below ground level (bgl), six window sample boreholes to depths of up to 5.00m bgl and the installation of monitoring wells within three boreholes.

A limited thickness of topsoil was present from the ground surface across the site. This was underlain by the Boyn Hill Gravel Member, overlying the White Chalk Subgroup.

Environmental

The Phase 1 Preliminary Risk Assessment for the site identified a number of potential pollutant linkages to human health receptors and controlled water receptors associated with the site. A Phase 2 Environmental and Geotechnical Site Investigation was therefore undertaken to determine whether these linkages were active and to inform preliminary foundation and floor slab design.

*Contaminants of concern were not recorded within soil samples analysed from beneath the site at concentrations in excess of adopted assessment criteria (AC). The potential risk to human health receptors from these concentrations of contaminants of concern is therefore considered to be **LOW**.*

Groundwater was not encountered within monitoring wells installed as part of the intrusive works, screened across the Boyn Hill Gravel Member and White Chalk Subgroup to depths of up to 10.00m bgl and an assessment of the contamination status of groundwater beneath the site could not be made. However, contaminants of concern were not recorded within soils sampled from beneath the site at concentrations considered to represent a significant risk to groundwater receptors. The significant thickness of variably permeable unsaturated zone beneath the site is also considered to offer a significant degree of protection against the downward migration of potential contaminants of concern toward groundwater receptors.

*Based on the available information, the potential risk to groundwater receptors from concentrations of contaminants of concern detected beneath the site is considered to be **LOW**.*

Based on ground gas monitoring undertaken on site as part of the current investigation CIRIA Characteristic Situation 1 (CS1) is applicable to the site, whereby ground gas protection measures are not required for new buildings. The risk posed by ground gas to human health receptors and infrastructure is therefore considered to be **LOW**.

Geotechnical

The composition of the Boyn Hill Gravel Member was found to be variable, with a greater cohesive content in its upper layers. SPT results obtained from the stratum were also highly variable, ranging from $N = 4$ to $N = 39$. A medium allowable bearing pressure will be required, should traditional strip or pad foundations be adopted.

Should pad foundations greater than 1.00m in width be required in order to support heavier loads, excessive settlement in excess of 25mm is likely to occur. In this case, ground improvement methods should be considered.

It would be prudent to probe the location of each pad foundation beneath the proposed school building (once these are known) in order to prove the absence of dissolution or mining features in the surface of the chalk (using a dynamic probe rig, or similar).

It is understood that no basement is proposed beneath the new development. In this case, it is likely that ground conditions immediately underlying the floor slab of this structure at a presumed depth of approximately 0.60m bgl, will comprise the Boyn Hill Gravel Member. Ground bearing floor slabs are anticipated to be suitable for the development where the Boyn Hill Gravel Member is at least a medium strength cohesive material.

Testing has indicated that a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Classification of AC1 would be appropriate for all buried concrete structures.

1 INTRODUCTION

1.1 Preamble

RPS Health, Safety & Environment (RPS) was commissioned by *the Education Funding Agency* to undertake a Phase 1 Preliminary Risk Assessment and a Phase 2 Environmental and Geotechnical Site Investigation at Mapledurham Playing fields, off Upper Woodcote Road, Reading RG4 7LH. The report has been commissioned in relation to the proposed redevelopment of the site with The Heights Primary School.

1.2 Objectives

The principal objectives of this assessment were as follows:

- To determine the contamination status of soil and groundwater beneath the site;
- To assess whether contamination is present within soil and/or groundwater beneath the site at concentrations that could impact future site users/occupiers and the wider environment;
- To assess the suitability of the site for its proposed use and to support the discharge of the planning conditions pertaining to the investigation of potentially contaminated land; and
- To determine the engineering properties of the underlying soils and to provide geotechnical parameters to assist preliminary foundation, floor slab and pavement design.

1.3 Legislation and Guidance

This report has been produced in general accordance with:

- Contaminated Land (England) Regulations 2006 (as amended);
- DEFRA Environmental Protection Act 1990: Part 2A - *Contaminated Land Statutory Guidance (2012)*;
- Environment Agency (EA) Contaminated Land Report 11 (CLR 11): *Model Procedures for the Management of Land Contamination*;
- National Planning Policy Framework (2012);
- CIRIA Document C665: *Assessing Risks Posed by Hazardous Ground Gases to Buildings*;
- British Standard requirements for the '*Investigation of potentially contaminated sites - Code of practice*' (ref. BS10175:2011);
- British Standard requirements for the '*Code of practice for ground investigations*' (ref. BS5930:2015+A1:2013);
- EN 1997-1 (2004): *Eurocode 7: Geotechnical design - Part 1: General rules*; and

- EN 1997-2 (2007): Eurocode 7: *Geotechnical design - Part 2: Ground investigation and testing*.

Where appropriate, consideration has also been given to the following:

- The potential for environmental liabilities to occur under other associated regimes, for example the *Water Resources Act (1991)* and the *Environmental Damage Regulations (2009)*; and
- Key constraints on site redevelopment.

Details of the limitations of this type of assessment are described in Appendix A.

2 PRELIMINARY RISK ASSESSMENT: SITE RECONNAISSANCE AND DESK STUDY

2.1 Site Reconnaissance

This section of the report is based upon observations made during a site walkover carried out on 8th February 2017. The site location and site boundary plans are shown as Figure 1 and Figure 2 respectively. Selected photographs taken during the site walkover are presented within Appendix B.



General view of the site (facing west). Further Photos are included within Appendix B.

2.1.1 The Site

Table 1 – Summary of Site Reconnaissance

Section	Description
Background:	The site is located on Mapledurham playing fields, approximately 2.50km to the northwest of the centre of Reading, at National Grid Coordinates 469848,175660. The site is irregular in shape and covers an area of approximately 11.10ha. The proposed building development area is located in the northwest of the site.
Site Layout:	At the time of the walkover, the majority of the site comprised grassed playing fields, with a hard surfaced basketball court in the east and a hard surfaced children's play area in the centre (see Photo 1). A disused pavilion was present in the north of the site (see Photo 2). This was locked and not accessible to the public at the time of the walkover. Hard surfaced tennis courts were present on the eastern side of the pavilion (see Photo 3). Access to the site was via a track in the north of the site, off Upper Woodcote Road which

Section	Description
	led to a car park.
Topography and Surface Cover:	The topography of the site was mainly flat. The northwest of the site sloped gently downwards to the south. The majority of site was covered with grass, the car park was laid to tarmac/gravel (noted to be in poor condition) and tarmac tennis courts in the north (noted to be in good condition). A hard surfaced basketball court was present in the east and a hard surfaced children's play area in the centre of the site (noted to be in good condition). Areas of dense vegetation were present towards the eastern and northwestern boundaries of the site.
Drainage:	Manhole covers were observed in the northwest of the site. No oil/water interceptors were observed on site. No site drainage plans have been provided to RPS for review as part of this assessment.
Bulk Storage / Tanks:	No above or below ground storage tanks were observed to be present on site during the walkover. A representative of Reading City Council stated that they had no knowledge of any present on site.
Waste:	A large wheeled bin was present in the northwest of the site. This contained general domestic waste. A number of small bins were located around the periphery of the playing fields. The general area was tidy and well maintained.
Electrical Substations /Transformers:	No electrical substations or transformers were observed on site at the time of the walkover.
Visual Evidence of Contamination:	No visual evidence of contamination was observed during the walkover.
Other Issues:	No readily discernible asbestos containing materials (ACMs) were observed on site during the site walkover. However given its age the pavilion, located in the northeast of the site, may contain ACMs. The site representative advised that an asbestos register may have been undertaken for the site, a copy of this was not available for review by RPS at the time of the walkover. No <i>Japanese Knotweed</i> or <i>Giant Hogweed</i> (invasive plant species) were readily identified on or adjacent to the site at the time of the survey. <i>(It should be noted that the identification can be limited by the seasons and in areas of dense vegetation growth).</i>

2.1.2 The Surrounding Area

The site is located in an area of predominantly residential land use. At the time of the site inspection, neighbouring land consisted of the following:

Table 2 – Neighbouring Land Uses

Direction	Description
<i>North:</i>	Residential dwellings with gardens.
<i>East:</i>	Residential dwellings with gardens.
<i>South:</i>	Residential dwellings with gardens.
<i>West:</i>	Residential dwellings with gardens beyond which was a golf course.

2.2 Site History

2.2.1 Historical Map Review

The following review is based on past editions of readily available Ordnance Survey (OS) maps. These include scales of 1:1,250, 1:2,500 and 1:10,000 dated 1850 to present. Extracts from selected and historical maps are given as Figures 3 to 8.

Table 3 – Historical Site Uses

On-site Land Use and Features	Dates
The site comprised open fields.	1878 to c.1957
An old chalk pit was indicated to be present in the northeast of the site. <i>Then likely infilled.</i>	1882 to c.1913 1913 to Present
A building labelled Mapledurham War Memorial Hall (MWMH) was present in the north of the site.	1957 to c.1993
A tennis court was present adjacent to the east of MWMH. A footpath transacted the site from north to south.	1957 to Present
A playground was present in the west of the site.	1973 to c.1993
The tennis courts were extended to the south.	1973 to Present
A building labelled as a Hall was present in the north of the site.	1992 to Present
The site was labelled as comprising Mapledurham War Memorial Playing Fields. <i>Then labelled as Mapledurham Playing fields.</i>	1959 to c.1982 1982 to Present

Table 4 – Historical Potentially Contaminative Surrounding Land Uses

Surrounding Land Uses (250m radius)	Orientation	Distance	Dates	
			From	To
Old chalk pits	East	Adjacent	1882	1913
Pumping Station	Southeast	Adjacent	1990	Present
Electrical Sub Station	Northwest	Adjacent	1973	Present
Nurseries	North	Adjacent	1932	c.1959
Electrical Substation	Southwest	35m	1972	Present
Electrical Substation	North	60m	1973	Present
Electrical Substation	Northwest	70m	1973	Present
Electrical Substation	South	70m	1973	1993
Electrical Substation	South	185m	1992	Present
Electrical Substation	East	250m	1967	Present

2.2.2 Site Planning History

The following planning applications for the site were available on Reading Council's planning website:

- Ref: 890904: Single storey flat roof extension to the pavilion's changing rooms. Regulation 4. Approved on 10th January 1990; and
- Ref: 930614: Creation of a tennis court. Approved on 28th April 1994.

No planning conditions relating to the investigation of potentially contaminated land were included in the decision notices for these applications.

2.3 Proposed Development

It is proposed to develop the northwestern area of the site as The Heights Primary School comprising a two storey school building, with associated areas of car parking, hard surfaced play areas and soft landscaping. A proposed development plan is included as Figure 9 of this report.

2.4 Environmental Setting

2.4.1 Geology

Based on British Geological Survey (BGS) mapping (1:50,000-scale), EA Groundwater Vulnerability mapping (1:100,000-scale), the stratigraphic sequence and aquifer classifications beneath the site are as follows:

Table 5 – Descriptions of Geological Strata

Strata	Description & approximate thickness	Aquifer Classification
Boyn Hill Gravel Member	Sand and gravel. Like to be of limited thickness beneath the site.	Secondary A
White Chalk Subgroup	Chalk. Likely to be present to depths in excess of 200m below ground level (bgl) beneath the site.	Principal

2.4.2 Hydrogeology

The site is located above a Secondary A Aquifer, relating to the Boyn Hill Gravel Member. These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.

The White Chalk Subgroup is classified as a Principal Aquifer. These formations have high intergranular and/or fracture permeability, meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

According to EA data, the site is not located in a groundwater Source Protection Zone (SPZ).

Information provided by the EA indicates that there are no active licensed groundwater abstractions within 1km of the site.

Under the EA Local River Basin Management Plan, the chemical quality of the groundwater body beneath the site (known as the South-West Chilterns Chalk) has been classified as **poor**.

2.4.3 Surface Water

The nearest surface water body to the site is the River Thames, located approximately 420m to the south of the site. Under the Local River Basin Management Plan, the chemical quality of this watercourse is classified as good and the ecological quality as moderate.

A water hazard within a golf course is located approximately 740m to the northwest of the site. This feature is not classified under the Local River Basin Management Plan.

No other surface water features have been identified within 1km of the site.

Information provided by the EA indicates that there are no records of any active licensed surface water abstractions within 1km of the site.

2.4.4 Fluvial / Tidal Flood Risk

According to the EA flood map, the site is located within Flood Zone 1, whereby the land is assessed as having less than a 1 in 1000 annual probability of flooding from the rivers or the sea (>0.1%) in any year.

2.4.5 Ecologically Sensitive Sites

Natural England data indicates that no ecologically sensitive sites that constitute environmental receptors as defined within Table 1 of the DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012), are located within a 1km radius of the site.

The Chilterns Area of Outstanding Natural Beauty (AONB) is located approximately 75m to the west of the site.

2.4.6 Radon

According to the Indicative Atlas of Radon in England and Wales published by the Health Protection Agency and the British Geological Survey, the site is located within a low probability radon area as less than 1% of properties are above the action level. No radon protective measures are necessary in the construction of new dwellings or extensions.

2.4.7 Coal Authority

According to Coal Authority data, the site is not located in an area potentially affected by coal mining activities.

2.5 Authorised Processes and Pollution Incidents

2.5.1 Landfills and Waste Sites

Information provided by the EA and Local Authority shows that there are no records of any historical or current landfill sites or waste transfer/treatment sites within 500m of the site.

2.5.2 Environmental Permits

EA and Local Authority data indicates that there are no active processes regulated by an Environmental Permit (under the Environmental Permitting Regulations 2010) registered within 500m of the subject site.

2.5.3 COMAH Sites

There are no records of any operations under the Control of Major Accident Hazards (COMAH) Regulations 1999, located within 500m of the site.

2.5.4 Pollution Incidents

EA data indicates that there are no records of any ~~on major or significant~~ pollution incidents within 500m of the site.

2.6 Regulatory Consultations

The Environmental Health Department at the Reading City Council was contacted regarding any known contamination issues at the site. RPS is currently awaiting a response.

3 OUTLINE CONCEPTUAL SITE MODEL

3.1 Background

An outline conceptual site model (CSM) consists of an appraisal of the *source-pathway-receptor* 'contaminant linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'pollutant linkage'.

- **Source** referring to the source of contamination.
- **Pathway** for the contaminant to move/migrate to receptor(s).
- **Receptor** that could be affected by the contaminant(s).

Receptors include human beings, other living organisms, crops, controlled waters and buildings / structures. The National Planning Policy Framework, used to address contaminated land through the planning process, follows the same principles as those set out under Part 2A. Further details on the Part 2A regime are presented within Appendix C.

3.2 Potential Pollutant Linkages

Each stage of the potential pollutant linkages have been assessed individually on the basis of information obtained during the site reconnaissance and desk study exercise and is discussed in the following section.

3.2.1 Potential Contaminant Sources

On Site

The historical uses of the site as sports pitches are not considered to represent potentially significant sources of contaminants of concern. An old chalk pit was identified to be present in the northeast of the site from 1882 to c.1913. However, this is outside the proposed development area. The only structure on site at the time of the walkover was a pavilion in the northwest of the site and a shelter in the north of the site. An inspection inside the pavilion was not possible as part of this assessment. However, it is not considered likely to represent a potentially significant source of contaminants of concern.

Made Ground may be present beneath the site as a result of historical construction and demolition activities and may represent a potential source of ground gas as well as contaminants of concern. The potential infilling of the chalk pit may also represent a potential source of ground gas as well as contaminants of concern.

Off-site

Former potentially contaminative land uses in the vicinity of the site include old chalk pits (potentially infilled), electricity substations and a pumping station.

An electrical substation was present adjacent to the northwest boundary of the site at the time of the walkover. This may represent a potential source of polychlorinated biphenyls (PCBs).

3.2.2 Potential Pathways

Following redevelopment, the potential risks to future site users via the dermal contact and ingestion pathways in areas of the site comprising building cover and hardstanding will be mitigated. In areas of soft landscaping, the pathways of dermal contact and ingestion could still be active. Furthermore, there would be potential for the airborne off-site migration of soil/dust from these areas.

There is the potential for ground gas and volatile contaminants of concern in soil and/or groundwater (if present) beneath the site to impact future site users via the inhalation pathway in indoor areas.

Groundwater within granular horizons of the underlying Boyn Hill Gravel Formation and within the White Chalk Subgroup may constitute a potential pathway for the on or off-site migration of contaminants of concern. The pathways of dermal contact, ingestion and vapour inhalation to neighbouring residential properties from potential contaminants of concern originating from the site may therefore also be active.

3.2.3 Potential Receptors

Potential human health receptors include future site users and neighbouring residential properties.

Providing construction workers adopt appropriate levels of hygiene and personal protective equipment, they are not considered to be at significant risk from potential contaminants of concern and have not been considered further as part of this assessment.

The site is situated on a Secondary A Aquifer, relating to the Boyn Hill Gravel Member and a Principal Aquifer relating to the White Chalk Subgroup. The site is not located within a groundwater SPZ and there are no water abstractions within 1km of the site.

The River Thames is located approximately 420m to the south of the site. A number of surface water features, associated with a golf course, are also located from approximately 740m northwest of the site. Given their distance from the site, these watercourses are not considered to be at significant risk from potential contaminants of concern beneath the site and have not been considered further as potential receptors.

3.3 Outline Conceptual Site Model

An outline CSM has been developed on the basis of the site reconnaissance and desk study. The CSM is used to identify potential sources, pathways and receptors (i.e. potential pollutant linkages) on site and is summarised in the table below:

Table 6 - Outline Conceptual Site Model

Potential Source	Contaminants of Concern	Via	Potential Pathways	Linkage Potentially Active?	Receptors
On site – historical: Old chalk pit (potentially infilled) On site – current: Made Ground	Hydrocarbons, metals and asbestos	Soil	Direct contact/ingestion	✓	Future site users
			Inhalation of volatiles	✓	Future site users
			Airborne migration of soil or dust	✓	Off-site users
			Leaching of mobile contaminants	✓ ✓	Secondary A Aquifer Boyn Hill Gravel Member Principal Aquifer White Chalk Subgroup
		Groundwater	Direct contact/ingestion	✓ ✓	Future site users Off-site users
			Inhalation of volatiles	✓ ✓	Future site users Off-site users
			Vertical and lateral migration in permeable strata	✓ ✓ x x	Secondary A Aquifer Boyn Hill Gravel Member Principal Aquifer White Chalk Subgroup River Thames Golf course water features
Off site – historical: Old chalk pits (potentially infilled), electricity substations and a pumping station Off-site – current: Electrical substation	Metals, PCBs and hydrocarbons	Groundwater	Direct contact/ingestion	✓	Future site users
			Inhalation of volatiles	✓	Future site users
On and off-site – Potentially infilled chalk pit, Made Ground / natural strata or bio-degradation of contamination	Carbon dioxide and methane	Ground Gas	Inhalation of ground gas	✓ ✓	Future site users Off-site users
			Explosive risks	✓ ✓	Future site users Off-site users

4 INTRUSIVE SITE INVESTIGATION

4.1 Introduction

An intrusive site investigation has been carried out in order to provide a preliminary assessment of whether pollutant linkages identified within the outline CSM (presented as Table 6) are currently active or will be made active upon redevelopment of the site. The investigation also provided information on ground conditions and data for the assessment geotechnical properties of the strata underlying the site.

4.2 Description of Works

Site investigation works were carried out from 8th to 9th February 2017 and comprised:

- Two cable percussion boreholes (BH1 and BH2) to depths of approximately 10.00m bgl;
- Six window sample boreholes (WS1 to WS6) to depths of up to approximately 5.00m bgl;
- In situ geotechnical testing and sampling throughout the depth of the boreholes; and
- Installation of groundwater/gas monitoring wells in selected boreholes (BH1, BH2 and WS5).

The rationale for the scope of works was as follows:

- Boreholes BH1 and BH2 were positioned within the footprint of proposed school building in order to provide geotechnical soil parameters to enable foundation design;
- Boreholes WS1 to WS6 were positioned within areas of proposed soft landscaping, hard surfaced play areas and car parking; and
- Groundwater/ground gas monitoring wells were installed in order to monitor the ground gas regime, to determine groundwater level beneath the site, as well as to collect groundwater samples for chemical laboratory analysis.

Exploratory hole locations are presented on Figure 10.

The soil arisings from each hole were carefully examined for visual and olfactory evidence of contamination. Headspace testing was undertaken on site for ionisable volatile organic compounds (iVOCs) using a portable Photo-Ionisation Detector (PID).

A return visit for groundwater sampling was carried out on 17th February 2017. The monitoring wells were dry during the groundwater sampling visit.

Ground gas monitoring was undertaken on three occasions, from 17th February to 9th March 2017. Installations were monitored for concentrations of methane, carbon dioxide, carbon monoxide, hydrogen sulphide, oxygen and iVOCs. In addition, groundwater level, ground gas flow rate and barometric pressure were recorded.

4.3 Laboratory Testing

4.3.1 Environmental Laboratory Testing - Soil

One sample of topsoil and seven samples of the Boyn Hill Gravel Member were submitted to a UKAS/MCERTS accredited laboratory and analysed for a number of determinands including:

Inorganic Determinands:

pH, arsenic, cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, sulphide, total cyanide, sulphate, sulphur, selenium, zinc and asbestos.

Organic Determinands:

PAH, benzene, toluene, ethylbenzene and xylenes (BTEX), methyl tert-butyl ether (MTBE), speciated total petroleum hydrocarbons (TPH CWG), monohydric phenol and poly-chlorinated biphenyls (PCBs).

4.3.2 Geotechnical Laboratory Testing

Samples of the Boyn Hill Gravel Member and White Chalk Subgroup were submitted to a UKAS accredited geotechnical testing laboratory and analysed for soil classification, total stress parameters, pH and water soluble sulphate content.

5 SITE INVESTIGATION FINDINGS

5.1 Ground Conditions

5.1.1 Geology

The strata encountered during the intrusive investigation are summarised in the table below, and described in the following section.

Table 7 – Encountered Strata

Strata	Depth to Top of Strata (m bgl)	Thickness (m)
Topsoil	Ground level	0.30 to 0.40
Boyn Hill Gravel Member	0.30 to 0.40	3.10 to 4.70
White Chalk Subgroup	3.40 to 4.70	Not proven to a maximum depth of 10.00m bgl

A limited thickness of topsoil was present from the ground surface across the site. This was underlain by the Boyn Hill Gravel Member, overlying the White Chalk Subgroup.

General descriptions of the strata encountered during the intrusive investigation are summarised below. Reference should be made to the borehole logs within Appendix D of this report for full descriptions of ground conditions underlying the site.

Boyn Hill Gravel Member

The Boyn Gravel Member was encountered beneath topsoil and ranged in thickness from 3.10m to 4.70m. The stratum was variable in nature, but generally comprised orange-brown sandy gravelly clay to depths ranging from 2.80m to 3.80m bgl. This was underlain by a layer of sandy clayey gravel, which ranged in thickness from 0.40m to 1.20m. Gravel comprised fine to coarse angular to subrounded flint.

Atterberg Limit testing was undertaken on four soil samples collected from the Boyn Hill Gravel Member at depths ranging from 1.50m to 2.50m bgl. This testing was undertaken to determine values for Liquid Limit (LL), Plastic Limit (PL) and Plasticity Index (PI). The results for LL ranged from 34% to 44%. The results for PL ranged from 17% to 21%. The results for PI ranged from 17% to 23%. This is indicative of a low to intermediate plasticity clay. Modified plasticity index values indicate that these samples have a low to moderate volume change potential. The natural moisture content of these samples ranged from 19% to 21%. Geotechnical laboratory certificates are presented as Appendix E of this report.

Six Standard Penetration Test (SPT) results obtained from within predominately granular layers the Boyn Hill Gravel Member at depths ranging from approximately 2.00m to 4.00m bgl were variable and gave results ranging from $N = 4$ to in excess of $N = 39$. This is indicative of a loose to dense granular material. A plot of SPT results versus depth is presented as Figure 11 of this report.

Twenty-one Standard Penetration Test (SPT) results obtained from within predominately cohesive layers the Boyn Hill Gravel Member at depths ranging from approximately 1.00m to 3.00m bgl were variable and gave results ranging from $N = 7$ to $N = 19$.

Approximate undrained shear strengths were calculated from SPT results using the correlation by Stroud:

$$C = f_1 \times N$$

Where, for high plasticity clays, $f_1 = 4.5$.

SPT results correspond approximately to undrained shear strength values ranging from 13kN/m^2 to 86kN/m^2 , which is indicative of a low, ranging to a high strength cohesive material. A plot of shear strength versus depth is presented as Figure 12 of this report.

Particle Size Distribution (PSD) testing was undertaken on six samples collected from the Boyn Hill Gravel Member at depths ranging from approximately 0.30m to 4.00m bgl. The constituents of the samples are summarised below:

- Gravel: 1% to 28%;
- Sand: 11% to 19%; and
- Silt/Clay: 58% to 82%.

White Chalk Subgroup

The White Chalk Subgroup was encountered beneath the Boyn Hill Gravel Member (where proven) at depths ranging from 3.40m to 4.70m bgl. The stratum was recovered as structureless chalk, composed of white slightly sandy slightly gravelly silt. Gravel is very weak, low density white, with rare black specs, subrounded and fine to medium. Matrix is very soft white and cream. Rare grey rounded flint gravel was observed.

Atterberg Limit testing was undertaken on two soil samples collected from the White Chalk Subgroup at depths of 4.00m bgl. The results for LL were 32% and 37%. The results for PL were 26% and 28%. The results for PI were 6% and 9%. This is indicative of a low to intermediate plasticity silt. Modified plasticity index values indicate that these samples have a low volume change potential. The natural moisture content of these samples ranged were 19% and 24%.

Thirteen SPT results obtained from within the White Chalk Subgroup at depths ranging from approximately 4.00m to 10.00m bgl gave results ranging from N = 11 to in excess of N = 50.

5.2 Groundwater

Groundwater was not encountered during intrusive works or subsequent monitoring visits.

5.3 Field Evidence of Contamination

5.3.1 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was noted within soils or groundwater during intrusive works or subsequent monitoring visits.

5.3.2 Photo-Ionising Detector Readings

Soil arisings from each exploratory hole were screened for the presence of VOCs using a PID. All readings were below the instrument limit of detection (<0.1ppm).

During the subsequent monitoring, all readings were below the instrument limit of detection (<0.1ppm).

5.4 Ground Gas Monitoring

Ground gas monitoring was undertaken in the three monitoring wells on three occasions from 17th February to 9th March 2017. Installations were monitored for concentrations of methane, carbon dioxide and oxygen. In addition, the flow rate and barometric pressure were recorded. The results of the ground gas monitoring are presented in Appendix F.

Methane was not recorded at concentrations in excess of the instrument limit of detection (<0.1% by volume (v/v)). Carbon dioxide was recorded at concentrations of up to 2.3% v/v within monitoring well BH2, screened within the White Chalk Subgroup on 28th February 2017.

A maximum ground gas flow rate of 0.2 l/hr was recorded in monitoring well BH1 on 9th March 2017. The lowest recorded oxygen concentration was 17.0% v/v within monitoring well BH2 on 28th February 2017. Atmospheric pressure ranged from 1016mb to 979mb during the monitoring visits.

The CIRIA Report C665 *Assessing risks posed by hazardous ground gases to buildings* outlines indicative guideline concentrations for carbon dioxide and methane in association with gas flow rates for which gas protection measures may be required in new residential or commercial developments. The methodology is based on the Modified Wilson and Card approach that characterises the gas

regime into a series of Characteristic Situations (1 to 5), with corresponding indicative gas protection measures. Using this methodology, the ground gas regime at this site corresponds to Characteristic Situation 1 (CS1), whereby gas protection measures are not required for new developments.

6 CHEMICAL RESULTS AND ASSESSMENT

The field investigation findings indicate that pathways are present by which contaminants of concern can impact identified receptors. Chemical analysis has been carried out on soils and groundwater sampled from beneath the site. The concentrations of contaminants of concern within soil and groundwater can be compared to assessment criteria (AC) to determine whether these represent an unacceptable risk to identified receptors. The derivation of AC to be used and the comparison of these criteria to the results of the chemical analyses are presented below.

6.1 Human Health Assessment Criteria

In order to assess risks to future site users, concentrations of contaminants of concern have been compared to Suitable 4 Use Levels (S4UL) generic Assessment Criteria (AC) published by Land Quality Management: Chartered Institute of Environmental Health (LQM:CIEH) in 2015. In accordance with the copyright notice the Publication Number for RPS Group is S4UL3177.

Given the proposed use of the site as a school, the assessment has been based on a conservative residential end-use with homegrown produce.

Soil Organic Matter (SOM) for soil samples collected from beneath the site ranged from <0.10% to 1.50%. Concentrations of contaminants of concern have therefore been compared to the most conservative S4UL (1.00% SOM) values.

A notable exclusion from the S4ULs is lead. In the absence of a S4UL for lead, the Category 4 Screening Level (C4SL) has been selected, published by DEFRA in 2014. It is noted that the C4SL are based on the acceptance of a low level of toxicological concern, rather than the more conservative standard adopted in the derivation of S4ULs, which are based on a tolerable or minimal level of risk.

The potential risk posed to controlled waters from contaminants of concern within soils beneath the site is not addressed by these screening criteria.

6.2 Comparison of Soil Analyses to Human Health Assessment Criteria

Chemical analysis was undertaken on one sample of topsoil and seven samples of the Boyn Hill Gravel Member. Analytical certificates for soils are presented in Appendix G. A comparison of soil analyses to the relevant assessment criteria is summarised below and presented as Appendix H.

6.2.1 Inorganic Determinands

No inorganic contaminants of concern were recorded within any of the soil samples analysed from beneath the site at concentrations in excess of adopted AC.

6.2.2 PAH

PAH contaminants were not recorded within soil samples analysed from beneath the site at concentrations in excess of adopted AC.

6.2.3 TPH CWG (incl. BTEX/MTBE)

TPH CWG contaminants of concern were not recorded within soil samples analysed from beneath the site at concentrations in excess of adopted AC.

6.2.4 PCBs

PCBs were not recorded within the soil sample analysed from beneath the site at concentrations in excess of the laboratory limit of detection.

6.2.5 Other Organic Determinands

Monohydric phenol was not recorded within soil samples analysed from beneath the site at concentrations in excess of adopted AC.

6.2.6 Asbestos

Asbestos containing materials (ACMs) were not identified in any soil samples submitted for screening.

6.3 Groundwater Assessment Criteria

The preliminary conceptual site model identified a Secondary A Aquifer, relating to the Boyn Hill Gravel Member and a Principal Aquifer, relating to the White Chalk Subgroup, to be present beneath the site that could potentially be sensitive to contaminants of concern (if present). However, the site does not lie within a groundwater SPZ and no licensed groundwater abstractions were indicated to be located within 1km of the site.

Groundwater was not encountered within monitoring wells installed as part of the intrusive works, screened across the Boyn Hill Gravel Member and White Chalk Subgroup to depths of up to

10.00m bgl and an assessment of the contamination status of groundwater beneath the site could not be made.

7 REVISED CONCEPTUAL SITE MODEL

The UK approach to the management of land contamination through the development process is risk-based, as was formerly implemented by Planning Policy Statement Number 23 (PPS23). PPS23 was formally withdrawn on 27th March 2012 and replaced by the National Planning Policy Framework.

The Local Authority is likely to have based their strategy for the implementation of the National Planning Policy Framework on the withdrawn PPS23. Therefore, this risk assessment will be based primarily on the withdrawn PPS23, with broad consideration for the contents of the National Planning Policy Framework.

The risk assessment methods adopted by PPS23 reflected those adopted by Part 2A of the Environmental Protection Act (1990). Part 2A identifies that harm to human health and the environment arises not solely from the presence of contaminating substances or ~~sources~~ but from their migration along a ~~pathway~~ to where they can impact a ~~receptor~~.

The potential pollutant linkages identified as part of the outline CSM have been assessed in light of the findings of the site investigation and are discussed below for each of the individual receptors identified.

7.1 Future Site Users

Contaminants of concern were not recorded within soil samples analysed from beneath the site at concentrations in excess of adopted AC. The potential risk to future site users from these concentrations of contaminants of concern is therefore considered to be **LOW**.

7.2 Construction/ Maintenance Workers

S4ULs or C4SLs cannot be used to assess the acute (short term exposure) risk that personnel in close contact with exposed soils may experience during demolition, redevelopment or site maintenance duties.

Potential risks to construction workers can easily be controlled in most site areas by the use of appropriate personal protective equipment (disposable coveralls, gloves, and particulate/vapour masks) and by adopting high levels of personal hygiene.

Providing contractors undertake and implement a site specific risk assessment and resulting mitigation measures are taken, based on the available information, the potential risk to ground workers is considered to be **LOW**.

7.3 Off-site Human Health Receptors

Contaminants of concern were not recorded within soil samples analysed from beneath the site at concentrations in excess of adopted AC. The potential risk to neighbouring site users from these concentrations of contaminants of concern is therefore considered to be **LOW**.

7.4 Groundwater

Groundwater was not encountered within monitoring wells installed as part of the intrusive works, screened across the Boyn Hill Gravel Member and White Chalk Subgroup to depths of up to 10.00m bgl and an assessment of the contamination status of groundwater beneath the site could not be made.

The preliminary conceptual site model identified a Secondary A Aquifer, relating to the Boyn Hill Gravel Member and a Principal Aquifer, relating to the White Chalk Subgroup, to be present beneath the site that could potentially be sensitive to contaminants of concern (if present). However, the site does not lie within a groundwater SPZ and no licensed groundwater abstractions were indicated to be located within 1km of the site. The aquifers are therefore considered to be of limited resource potential. Furthermore, contaminants of concern were not recorded within soils sampled from beneath the site at concentrations considered to represent a significant risk to groundwater receptors. The significant thickness of variably permeable unsaturated zone beneath the site is also considered to offer a significant degree of protection against the downward migration of potential contaminants of concern toward groundwater receptors.

Based on the available information, the potential risk to groundwater receptors from concentrations of contaminants of concern detected beneath the site is considered to be **LOW**.

7.5 Structures and Infrastructure

7.5.1 Buildings (on site and off site)

Based on ground gas monitoring undertaken on site as part of the current investigation CIRIA CS1 is applicable to the site, whereby no gas protection measures are required for new buildings.

The risk posed by ground gas to human health receptors and infrastructure is therefore considered to be **LOW**.

7.5.2 Polymeric Utility Pipes

Elevated concentrations of hydrocarbon contaminants were not recorded within samples collected from soils beneath the site. Standard polymeric utility pipes are therefore likely to be suitable for the proposed development.

Requirements should be discussed with service providers before the development stage. However, the risk posed to buried services is considered to be **LOW**.

7.6 Revised Conceptual Site Model

The potential source-pathway-receptor linkages and associated risks upon completion of the proposed development at the site, as identified following completion of the assessment, are summarised in the revised CSM below.

Table 8 - Revised CSM

Potential Source	Via	Potential Pathways	Linkage Potentially Active?	Receptors
On site – historical: Old chalk pit (potentially infilled) On site – current: Made Ground	Soil	Direct contact/ingestion	x	Future site users
		Inhalation of volatiles	x	Future site users
		Airborne migration of soil or dust	x	Off-site users
		Leaching of mobile contaminants	x x	Secondary A Aquifer Boyn Hill Gravel Member Principal Aquifer White Chalk Subgroup
	Groundwater	Direct contact/ingestion	x x	Future site users Off-site users
		Inhalation of volatiles	x x	Future site users Off-site users
		Vertical and lateral migration in permeable strata	x x x x	Secondary A Aquifer Boyn Hill Gravel Member Principal Aquifer White Chalk Subgroup River Thames Golf course water features
Off site – historical: Old chalk pits (potentially infilled), electricity substations and a pumping station Off-site – current: Electrical substation	Groundwater	Direct contact/ingestion	x	Future site users
		Inhalation of volatiles	x	Future site users
On and off-site – Potentially infilled chalk pit, Made Ground / natural strata or bio-degradation of contamination	Ground Gas	Inhalation of ground gas	x x	Future site users Off-site users
		Explosive risks	x x	Future site users Off-site users



The risk assessment is based upon the available information relating to the site. Should ground conditions inconsistent with those outlined in this report be encountered RPS should be contacted to enable further assessment.

8 GEOTECHNICAL ANALYSIS

8.1 Introduction

It is proposed to develop the northwestern area of the site as a two storey school building, with associated areas of car parking, hard surfaced play areas and soft landscaping. A proposed development plan is included as Figure 9 of this report.

Detailed development plans have not been made available to RPS for review as part of this assessment and no preliminary structural loads have been received. Therefore, the preliminary recommendations below may need to be reviewed in light of subsequent detailed design.

8.2 Preliminary Geotechnical Risk Register

The table below summarises the potential geotechnical hazards associated with the development. It includes an assessment of whether the site is likely to be affected by the hazard and the possible consequences and engineering considerations.

Table 9 – Geotechnical Risk Register

Hazard Description	Is hazard likely to be present / affect the site? (H / M / L / NA?)	Comments / possible engineering requirements where hazard present
Sudden lateral / vertical changes in ground conditions	M	The ground conditions are generally consistent with a limited thickness of topsoil, overlying the Boyn Hill Gravel Member. Where encountered, the White Chalk Subgroup was present at depths ranging from 3.40m to 4.70m bgl. The depth to the White Chalk Subgroup was variable across the site, being in excess of 5.00m bgl in several locations. This variation may be due to the possible presence of dissolution features within the surface of the chalk. The main variations in ground conditions (if present) are likely to be associated with the composition of the Boyn Hill Gravel Member and the depth to the White Chalk Subgroup.
Highly compressible / low bearing capacity soils, (including peat and soft clay)	M	The composition of the Boyn Hill Gravel Member was found to be variable, with a greater cohesive content in its upper layers. SPT results obtained from the stratum were also highly variable, ranging from N = 4 to N = 39. A low/medium allowable bearing pressure will be required, should traditional strip or pad foundations be adopted, in order to mitigate against the risk of excess total or differential settlement. Alternatively if higher bearing pressures are required, ground improvement (such as the installation of vibro stone columns beneath the building footprint) is likely to be required.

Hazard Description	Is hazard likely to be present / affect the site? (H / M / L / NA?)	Comments / possible engineering requirements where hazard present
Ground dissolution features / natural cavities	M	Soluble rock in the form of the White Chalk Subgroup is present at relatively shallow depth beneath the Boyn Hill Gravel Member. Furthermore, the depth to the White Chalk Subgroup was variable across the site, which may be due to collapsed dissolution features in the shallow chalk deposits. Whereas un-collapsed shallow dissolution features within the chalk cannot be completely discounted, they are considered unlikely to be present beneath proposed school on site. However, it would be prudent to probe the location of each pad foundation beneath the proposed school building (once these are known) in order to prove the absence of dissolution features in the surface of the chalk (using a dynamic probe rig, or similar).
Shrinking and swelling clays	L/M	Testing has indicated that the Boyn Hill Gravel Member is of low to moderate volume change potential. However, although the potential risk of damage caused by shrinking and swelling clays is relatively low, foundations should be designed in accordance with the guidance within Appendix 4.2-H of Chapter 4.2 of the NHBC Standards: Building Near Trees).
Slope stability issues	L	Whilst no significant slopes are present on site, any temporary or permanent slopes created as part of the development should be subject to appropriate geotechnical design based on site-specific site investigation information.
High groundwater table (including waterlogged ground)	L	Groundwater was not encountered during intrusive works or subsequent monitoring to a maximum depth of approximately 10.00m bgl.
Filled and Made Ground (including embankments)	L	Made Ground was not encountered within boreholes completed within the proposed development area.
Obstructions (including foundations, services, basements, tunnels and adjacent sub-structures)	L	Previous development of the site has been limited. Should relic foundations or services be encountered during the development of the proposed school, it is likely that these may be removed using standard construction plant.
Underground mining	M	Information provided by the BGS indicates that there is the potential for unrecorded historical chalk mining to have occurred on site and historical workings are located to the east of the site. Whereas no evidence of this was encountered during the intrusive works, it cannot be completely discounted. Accordingly, it would be prudent to probe the location of each pad foundation beneath the proposed school building (once these are known) in order to prove the absence of mining features in the shallow chalk (using a dynamic probe rig, or similar).
Concrete classification	L	Testing has indicated that a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Classification of AC1 would be appropriate for all buried concrete structures.
Seismic Activity	L	The Eurocode 8 seismic hazard zoning maps for the UK (Musson and Sargeant, 2007) indicate that horizontal Peak Ground Acceleration (PGA) values with 10% probability of being exceeded in 50 years (475 year return period) are between 0.00g and 0.02g, which is considered very low.

8.3 Foundation Solutions

8.3.1 Traditional Foundations

The composition of the Boyn Hill Gravel Member was found to be variable. The upper horizon was found to be typically slightly sandy slightly gravelly clay. The Boyn Hill Gravel Member is generally recorded as a granular deposit however the occurrence of fine grained materials cannot be discounted. There is no historical evidence of these deposits being worked in this area and such excavations being backfilled. In addition, no evidence of man-made materials was observed within the clay that would be indicative of Made Ground. Therefore, this is considered to be a natural and not man made material, with a greater cohesive content in its upper layers. SPT results obtained from the stratum were also highly variable, ranging from $N = 4$ to $N = 39$. A medium allowable bearing pressure will be required, should traditional strip or pad foundations be adopted.

In accordance with the guidance set out in Eurocode 7, a 1.00m width pad foundation placed at a depth of 1.00m bgl (or at least 300mm into the Boyn Hill Gravel Member) should be capable of supporting building loads of up to 100kN/m^2 .

In accordance with the guidance set out in Eurocode 7 to satisfy Ultimate Limit State (ULS) and Serviceability Limit State (SLS) design, settlement underlying a 1.00m width pad foundation, loaded at 100kN/m^2 , bearing within the Boyn Hill Gravel Member is anticipated to be within acceptable limits ($<25\text{mm}$). Settlement beneath foundations of greater size than this is likely to lead to settlements in excess of 25mm.

The formation should be inspected by the site engineer before placing concrete. If Made Ground, low strength cohesive or evidence of disturbed ground is encountered at the target bearing depth, foundations should be taken deeper to an appropriate formation level or unsuitable material should be excavated and replaced with compacted granular fill.

It is anticipated that cohesive material will be present a founding depth for traditional shallow spread or trench filled foundations. However, if granular material is encountered foundations should avoid spanning both cohesive and granular strata. Reinforcement may be incorporated so that strip foundations are able to span small limited areas of marginal bearing strata.

The effects of dissolution features within the upper surface of the chalk cannot be fully discounted at the site and is discussed further in Section 8.6.

Should pad foundations greater than 1.00m in width be required in order to support heavier loads, this would result in increase of stress within lower materials that were found to be variable in terms of

material type and relative density. This is likely to result in a greater degree of total and differential settlement.

8.3.2 Ground Improvement

Ground improvement via the installation of Vibro Stone Columns (VSCs) in conjunction with a load transfer platform may be a suitable option to improve the strength characteristics of Boyn Hill Gravel Member beneath the site. This would enable the adoption of large pad sizes to resist structural loads without increasing the amount of settlement

VSCs improve the density of strata using a vibrating probe, which penetrates the ground to the required depth (in this case, to the base of the Boyn Hill Gravel Member). The resulting hole is backfilled with concrete and compacted using the probe, further increasing the density of the surrounding soil. Safe allowable bearing pressures of in excess of 100kN/m^2 are typically achievable in soils improved using VSCs at depths from 0.60m bgl. It is recommended that a ground improvement contractor should be consulted to determine suitability of the ground conditions and the likely improvement which may be achieved. Should VSCs prove suitable at the site, an appropriate grid of columns should be designed to extend just beyond the footprint of all settlement sensitive structures.

8.4 Floor Slab

It is understood that no basement is proposed beneath the new development. In this case, it is likely that ground conditions immediately underlying the floor slab of this structure at a presumed depth of approximately 0.60m bgl, will comprise the Boyn Hill Gravel Member. Ground bearing floor slabs are anticipated to be suitable for the development where the Boyn Hill Gravel Member is at least a medium strength cohesive material.

8.5 Chemical Attack on Buried Concrete

Samples of the Boyn Hill Gravel Member and White Chalk Subgroup were tested for pH and for sulphate content. The results are presented below:

Table 10 – Results of pH and sulphate testing

Stratum	No. Samples	Range of pH	Characteristic pH	Range of Sulphate (mg/kg)	Characteristic Sulphate (mg/kg)	Design Sulphate Class	ACEC Class
Boyn Hill Gravel Member	8	7.8 to 8.0	7.85	<10	<10	DS1	AC1
White Chalk Subgroup	2	8.1 to 8.2	8.10	23 to 42	42	DS1	AC1

The data was used to assess appropriate concrete classification for buried concrete in accordance with BRE Special Digest 1, based on the following assumptions:

- Brownfield ground conditions;
- Mobile groundwater conditions;
- For a dataset of one to four samples, the characteristic value for soluble sulphate has been taken as the highest of the results, while the characteristic value for pH is taken as the lowest of pH results. The characteristic values for the White Chalk Subgroup are therefore taken as 42mg/l for soluble sulphate and 8.1 for pH value; and
- For a dataset of five to nine samples, the characteristic value for soluble sulphate has been taken as the average of the highest two results, while the characteristic value for pH is taken as the average of the lowest two pH results. The characteristic values for the Boyn Hill Gravel Member are therefore taken as 10mg/l for soluble sulphate and 7.85 for pH value

Based on the above, it is considered that a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Classification of AC1 would be appropriate for all buried concrete structures.

8.6 Dissolution Features and Underground Chalk Mining

The occurrence of dissolution features that may be open or infilled are known of within the Reading area. The depth to chalk recorded during the investigation was found to vary between 3.40m to in excess of 5.00m (WS1 and WS3). In WS3 the borehole log shows that low SPT $\bar{m}_{60}$ values were recorded in the lower half of the borehole and there were lengths of no recovery. This may represent disturbed ground that could be associated with an underlying dissolution feature.

Reading also has a history of problems with historical chalk mining occurring sporadically across the city with minimal records of these locations. Known chalk mine workings are at Emmer Green (Hanover) Chalk Mine which is located approximately 2.5km to the northeast of the site. Information provided by the BGS indicates that there is the potential for unrecorded historical chalk mining to have occurred on site. Whereas no evidence of this was encountered during the intrusive works, it cannot be completely discounted.

Whilst it is considered that the occurrence of dissolution features within the chalk is probably low beneath the proposed school building the information from the site investigation indicates that they cannot be fully discounted. Accordingly it is considered that it would be prudent to probe the location of each pad foundation beneath the proposed school building (once these are known) in order to prove the absence of dissolution or mining features in the shallow chalk (using a dynamic probe rig, or similar).

8.7 Soakaways

Soakaway testing was not part of the scope of this work, therefore infiltration rates have not been determined. However the site is generally underlain by the Boyn Hill Gravel Formation which within the site is a clayey material with likely low permeability. This is underlain by the White Chalk Subgroup which is a Principal Aquifer. A preliminary assessment would suggest the Boyn Hill Gravel Formation was unsuitable for soakaway drainage. The soakaway characteristics of the White Chalk Subgroup may be suitable, but it is known to be highly variable at shallow depths. To assess the soakaway characteristics of the White Chalk Subgroup further investigation and assessment would be necessary. It should be noted that the White Chalk Subgroup is a highly soluble rock which under natural conditions has a low risk of causing subsidence due to solution features. The introduction of additional water into this formation may cause solution features to occur and result in subsidence. This should be taken into account when drainage planning is undertaken.

8.8 Temporary Works and Excavations

Previous development of the site has been limited. Should relic foundations or services be encountered during the development of the proposed school, it is likely that these may be removed using standard construction plant.

Groundwater was not encountered during intrusive works or subsequent monitoring to a maximum depth of approximately 10.00m bgl. Significant groundwater exclusion and control measures are therefore unlikely to be required for proposed foundation excavations. Should limited quantities of perched water be encountered within excavations, this may be controlled via pumping from a localised sump.

Groundwater is unlikely to be encountered during excavation, degradation of the formation may still occur from adverse weather conditions and should be adequately protected. If the formation layer becomes wet resulting in softening or loosening of the surface materials, then excavation may have to be taken deeper in order to find a suitable bearing layer. Instability of excavations in granular material should be expected, especially during periods of adverse weather. Suitable shoring measures or battering back of slopes may be required for any excavations greater than 1.20m bgl. All temporary excavations should be undertaken in accordance with CIRIA Report 97 'Trenching Practice'.

9 CONCLUSIONS AND RECOMMENDATIONS

Environmental

Contaminants of concern were not recorded within soil samples analysed from beneath the site at concentrations in excess of adopted AC. The potential risk to human health receptors from these concentrations of contaminants of concern is therefore considered to be **LOW**.

Groundwater was not encountered within monitoring wells installed as part of the intrusive works, screened across the Boyn Hill Gravel Member and White Chalk Subgroup to depths of up to 10.00m bgl and an assessment of the contamination status of groundwater beneath the site could not be made. However, contaminants of concern were not recorded within soils sampled from beneath the site at concentrations considered to represent a significant risk to groundwater receptors. The significant thickness of variably permeable unsaturated zone beneath the site is also considered to offer a significant degree of protection against the downward migration of potential contaminants of concern toward groundwater receptors.

Based on the available information, the potential risk to groundwater receptors from concentrations of contaminants of concern detected beneath the site is considered to be **LOW**.

Based on ground gas monitoring undertaken on site as part of the current investigation CIRIA CS1 is applicable to the site, whereby ground gas protection measures are not required for new buildings. The risk posed by ground gas to human health receptors and infrastructure is therefore considered to be **LOW**.

Geotechnical

The composition of the Boyn Hill Gravel Member was found to be variable, with a greater cohesive content in its upper layers. SPT results obtained from the stratum were also highly variable, ranging from N = 4 to N = 39. A medium allowable bearing pressure will be required, should traditional strip or pad foundations be adopted.

Should pad foundations greater than 1.00m in width be required in order to support heavier loads, excessive settlement in excess of 25mm is likely to occur. In this case, ground improvement methods should be considered.

It would be prudent to probe the location of each pad foundation beneath the proposed school building (once these are known) in order to prove the absence of dissolution or mining features on the chalk surface (using a dynamic probe rig, or similar).

It is understood that no basement is proposed beneath the new development. In this case, it is likely that ground conditions immediately underlying the floor slab of this structure at a presumed depth of approximately 0.60m bgl, will comprise the Boyn Hill Gravel Member. Ground bearing floor slabs are anticipated to be suitable for the development where the Boyn Hill Gravel Member is at least a medium strength cohesive material.

Testing has indicated that a Design Sulphate Class of DS-1 and an ACEC Classification of AC1 would be appropriate for all buried concrete structures.

FIGURES

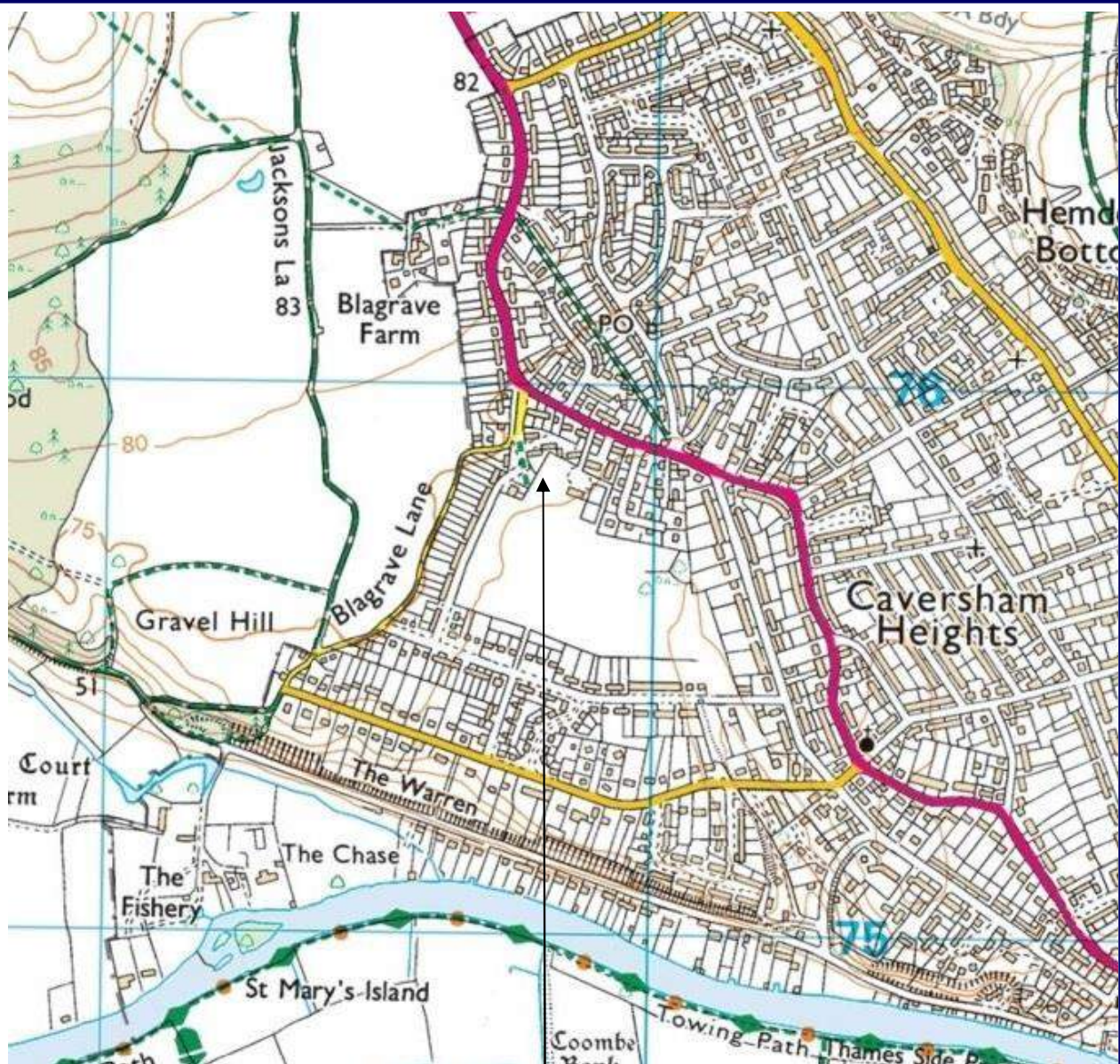


Figure 1: Site Location Plan

Map Date: Current

Scale: Not to scale

Site Location

RPS
35 New Bridge Street
London
EC4V 6BW

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Figure 2: Site Boundary Plan

Map Date: Current

Scale: Not to scale

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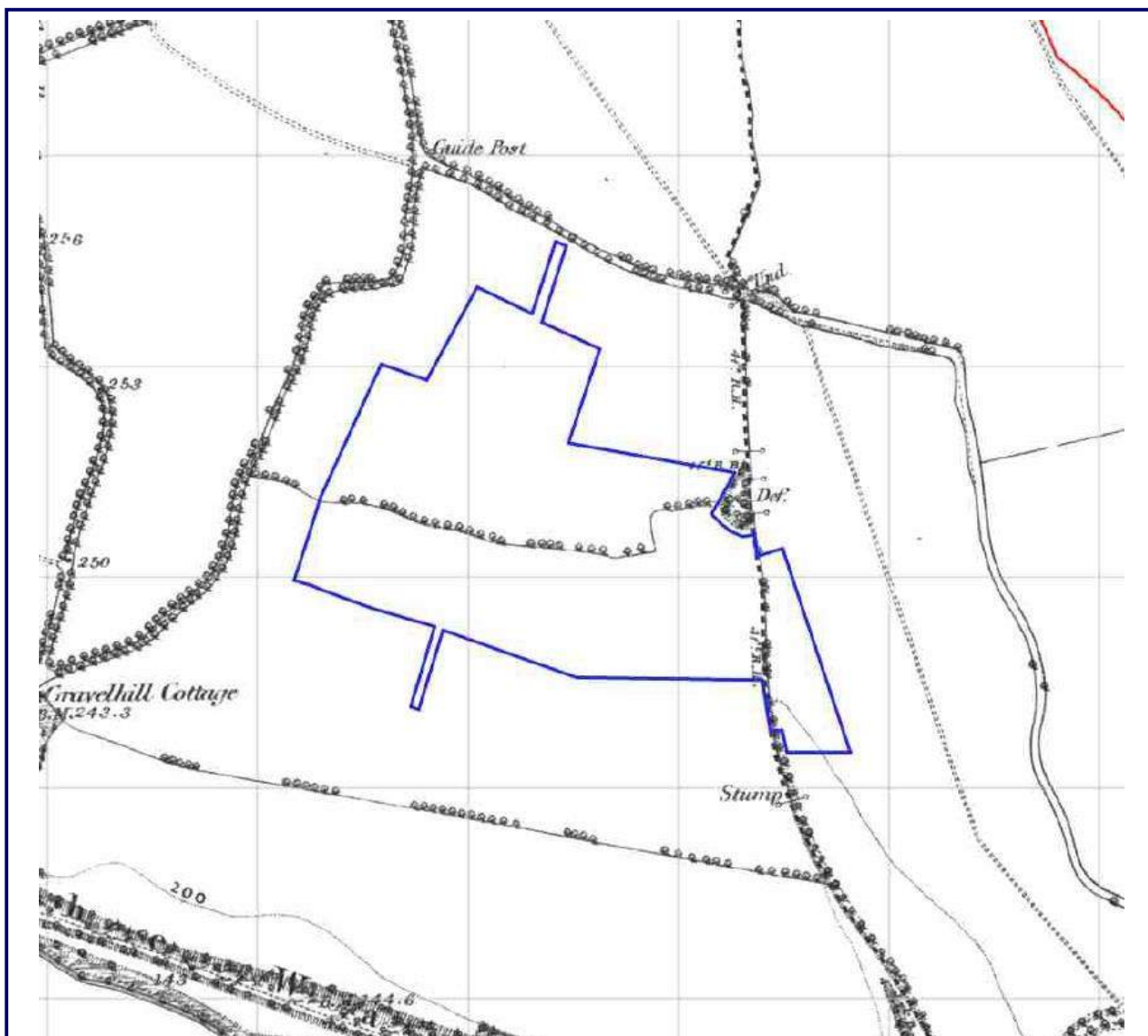


Figure 3: Historical Map Extract

Map Date: 1878

Scale: Not to scale

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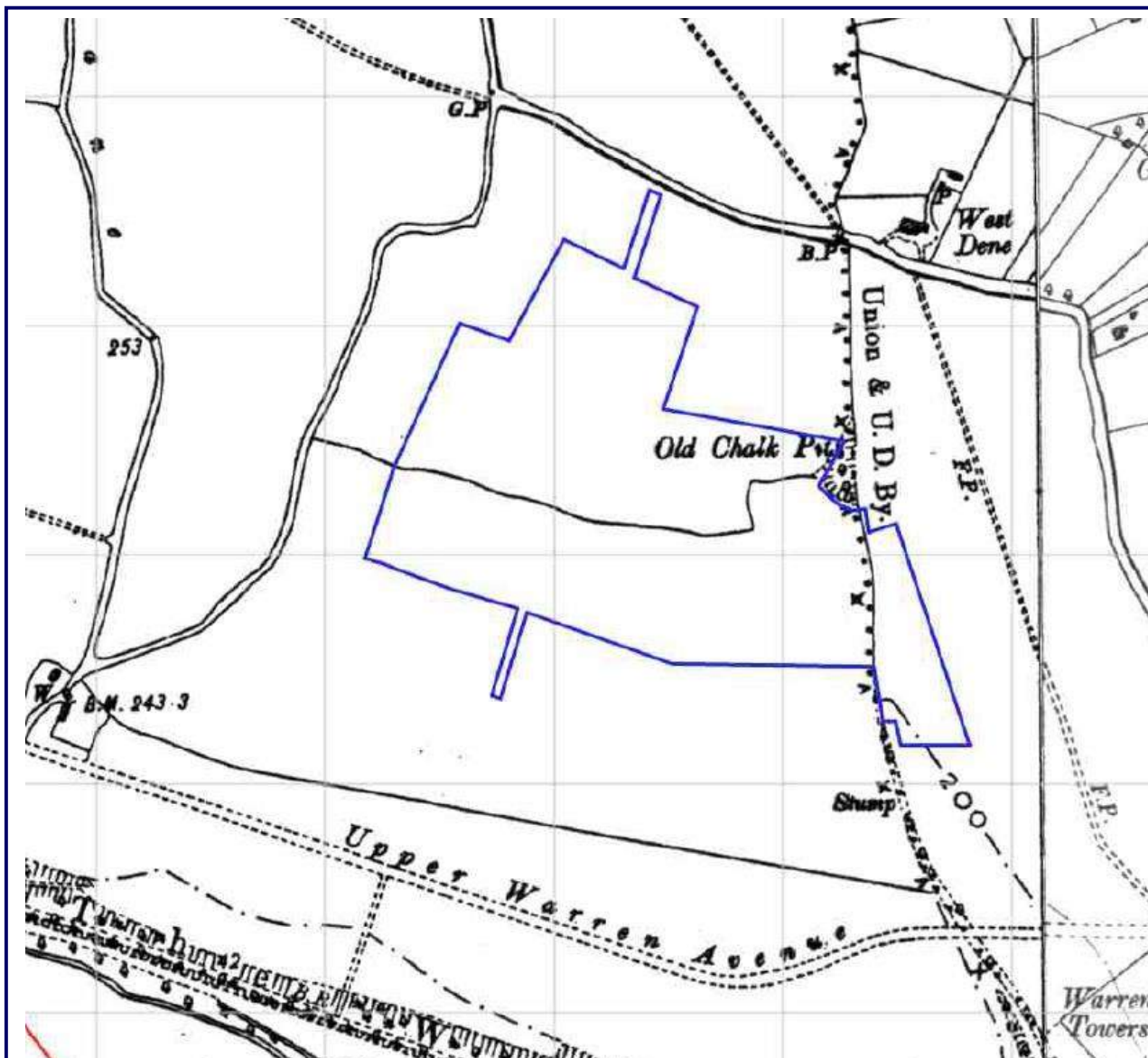


Figure 4: Historical Map Extract

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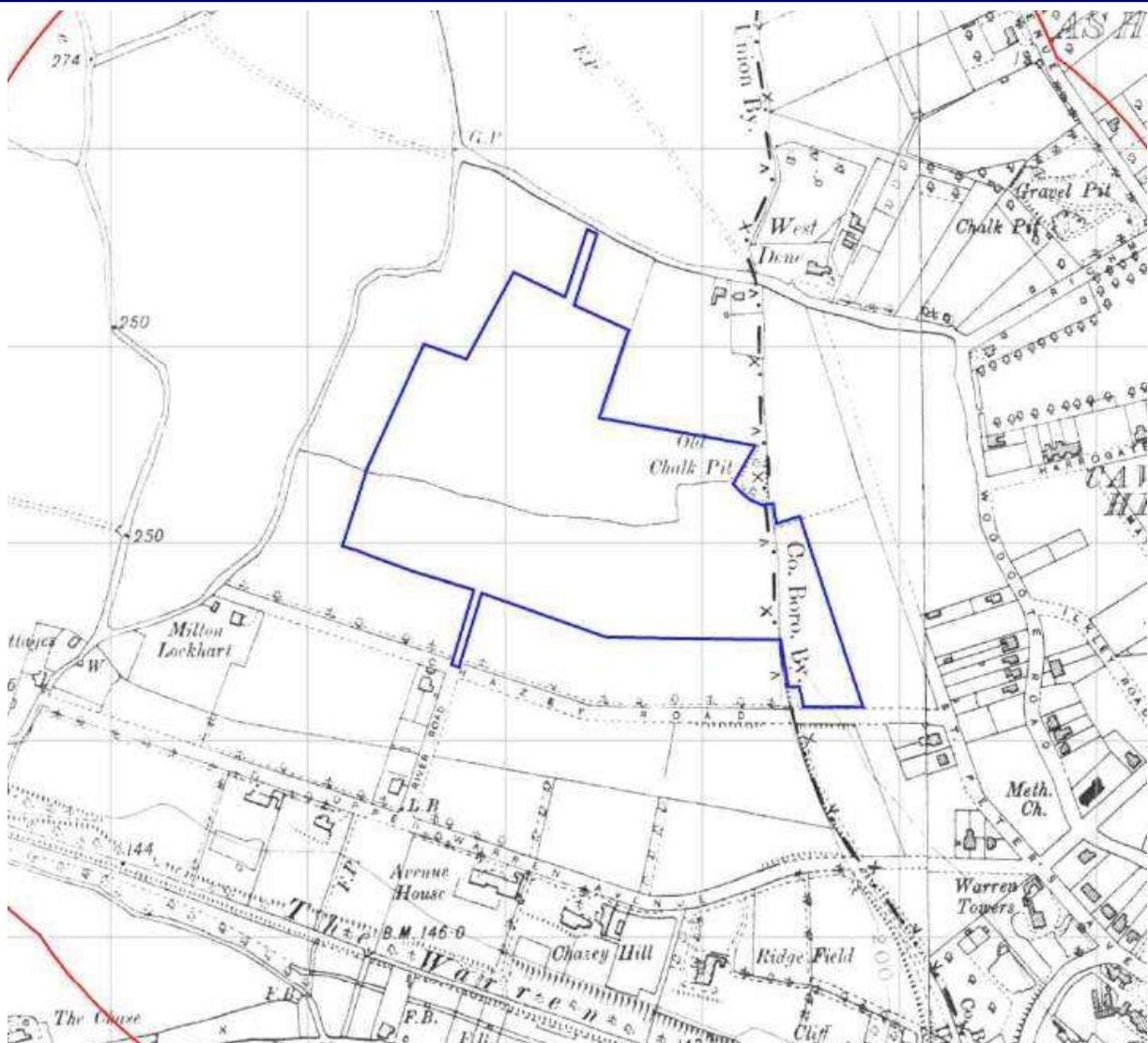


Figure 5: Historical Map Extract

Map Date: 1910

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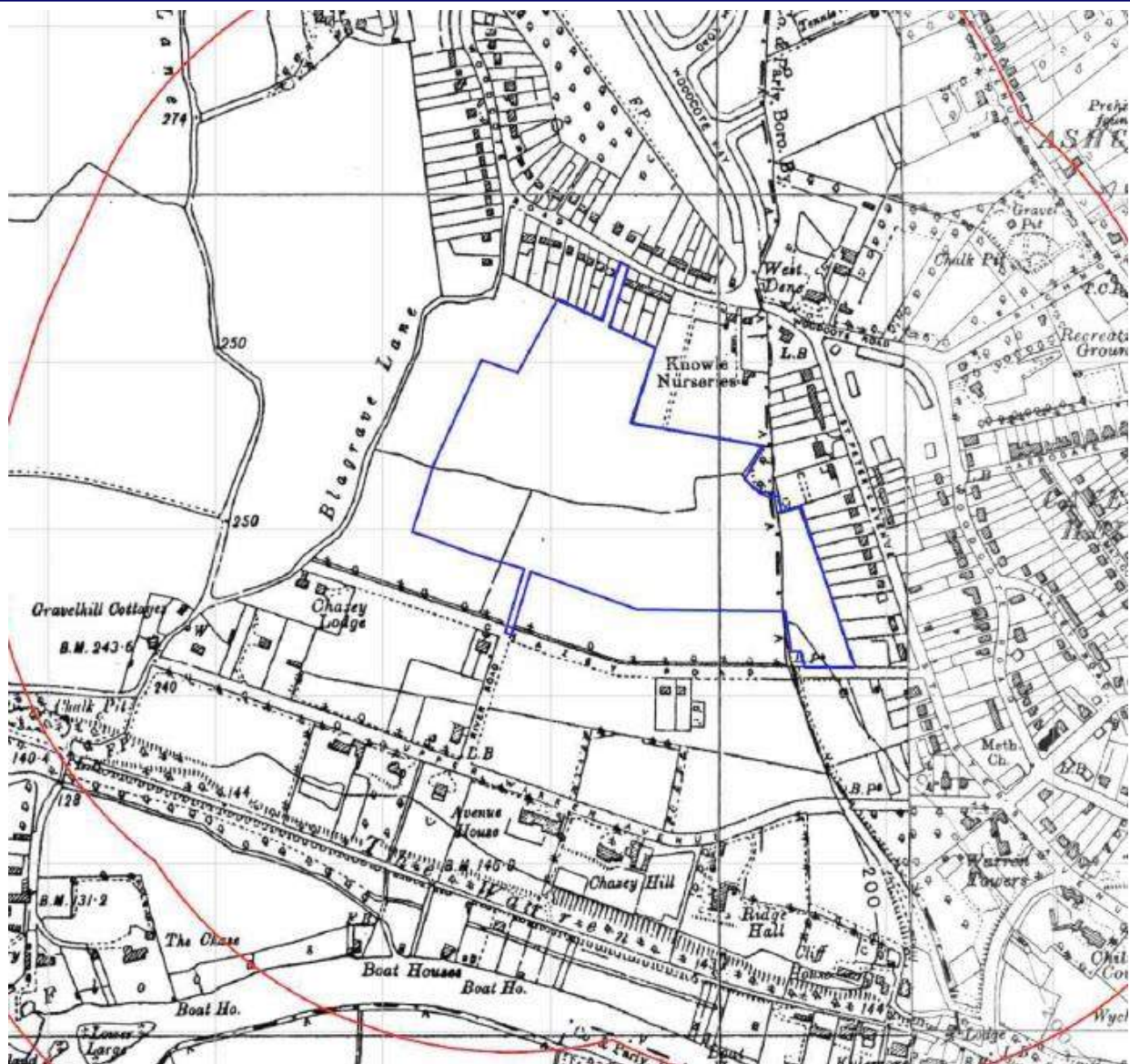


Figure 6: Historical Map Extract

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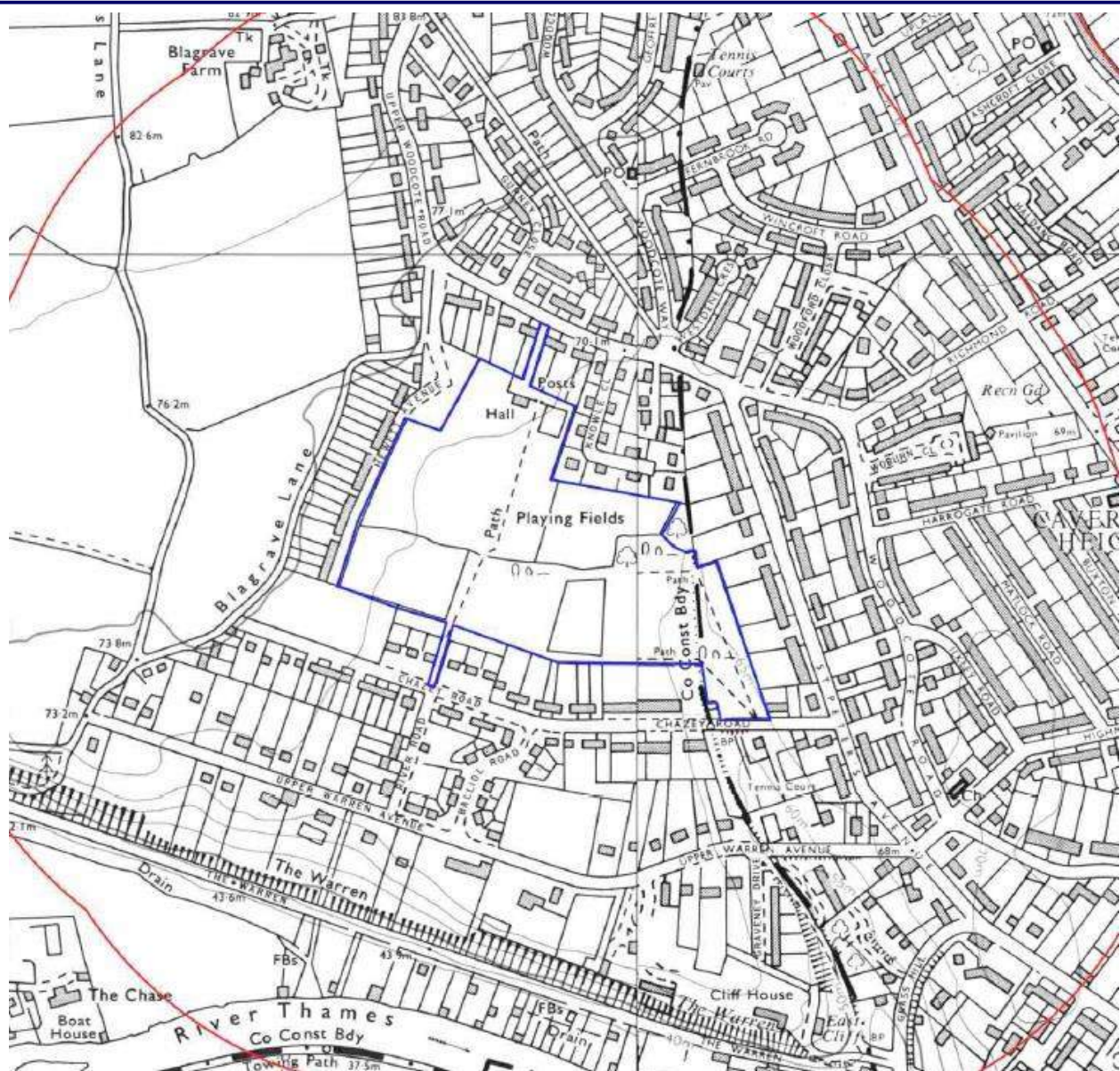


Figure 7: Historical Map Extract

Map Date: 1973

Scale: Not to scale

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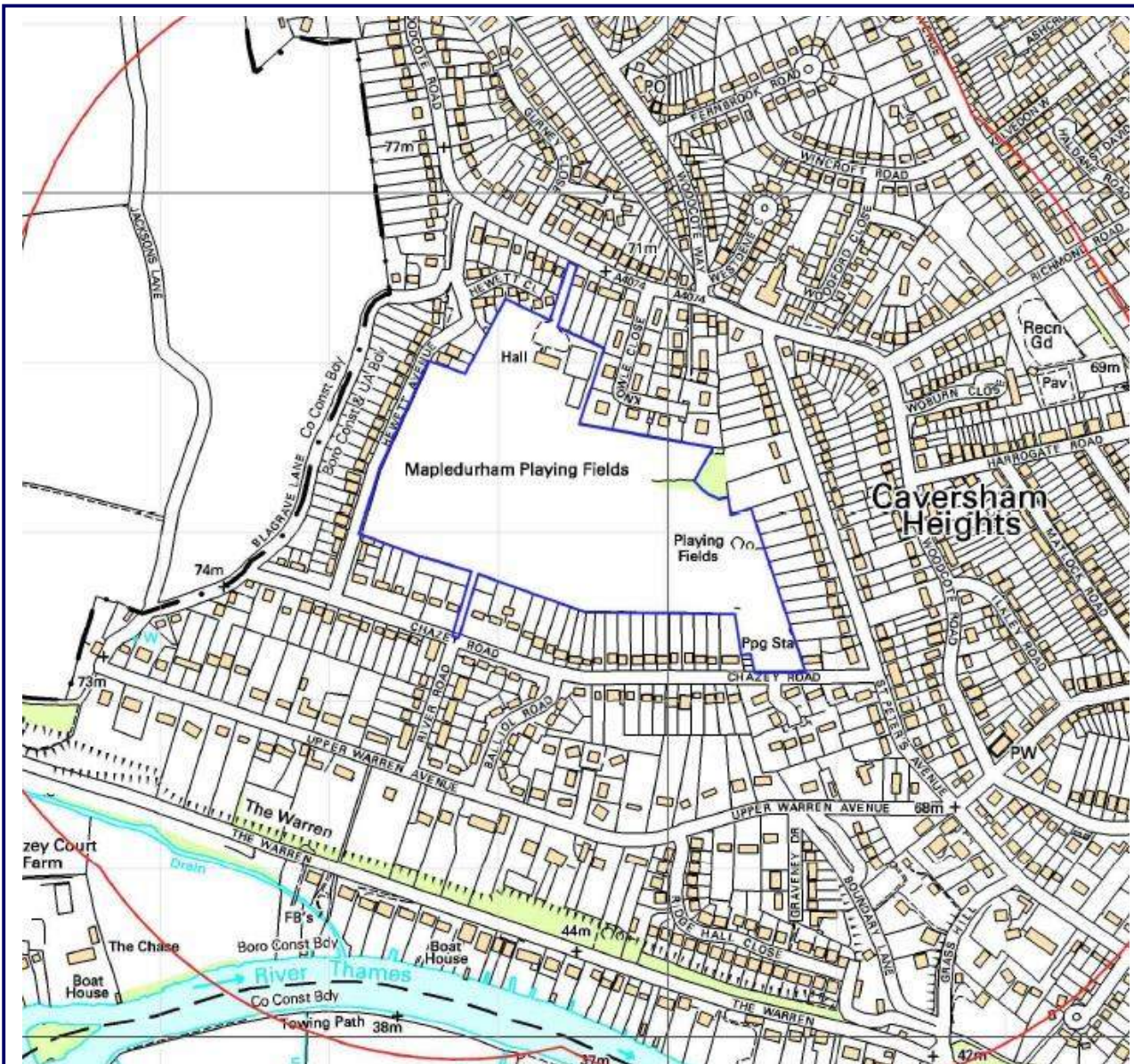


Figure 8: Historical Map Extract

Map Date: 2002

Scale: Not to scale

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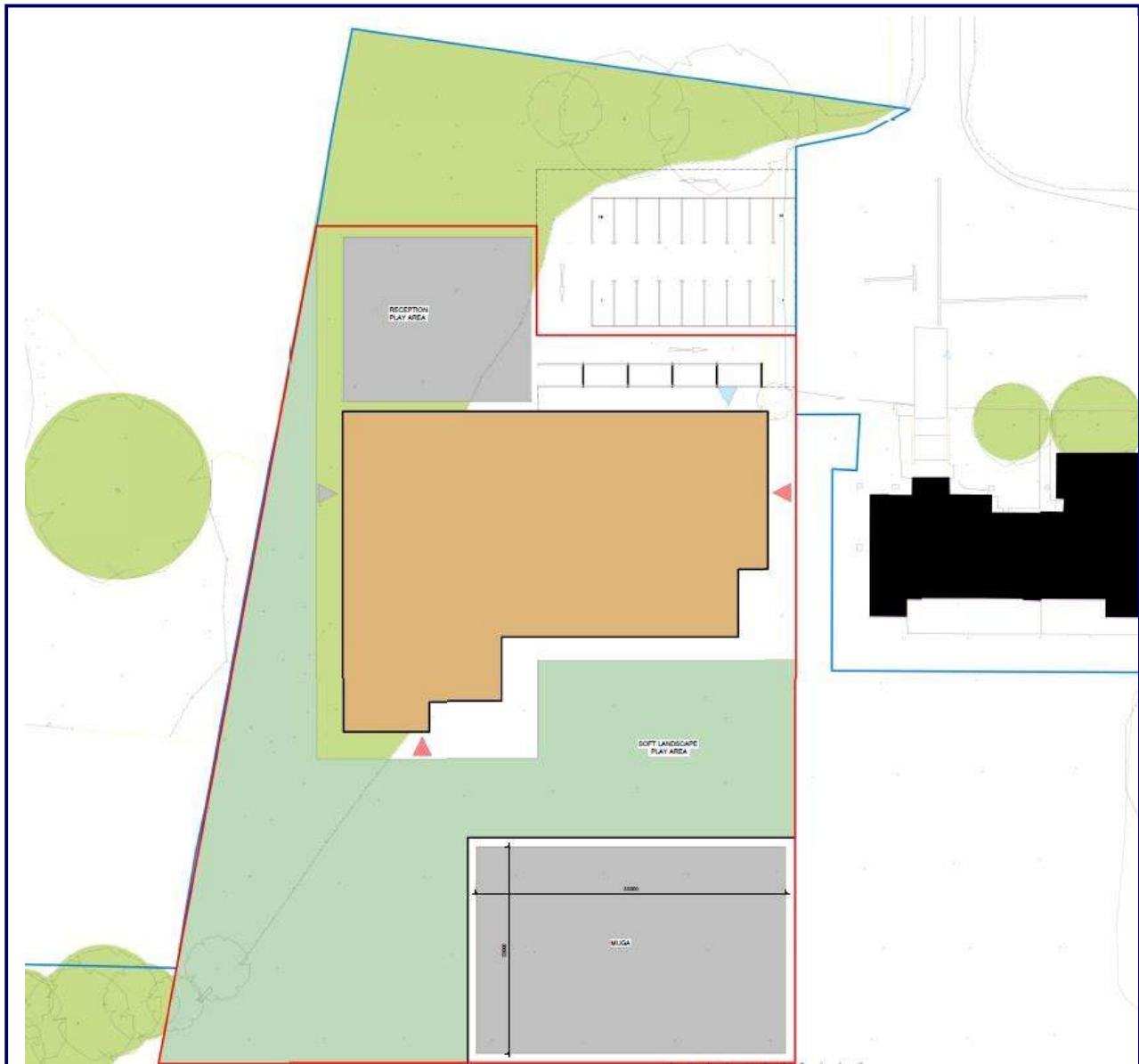
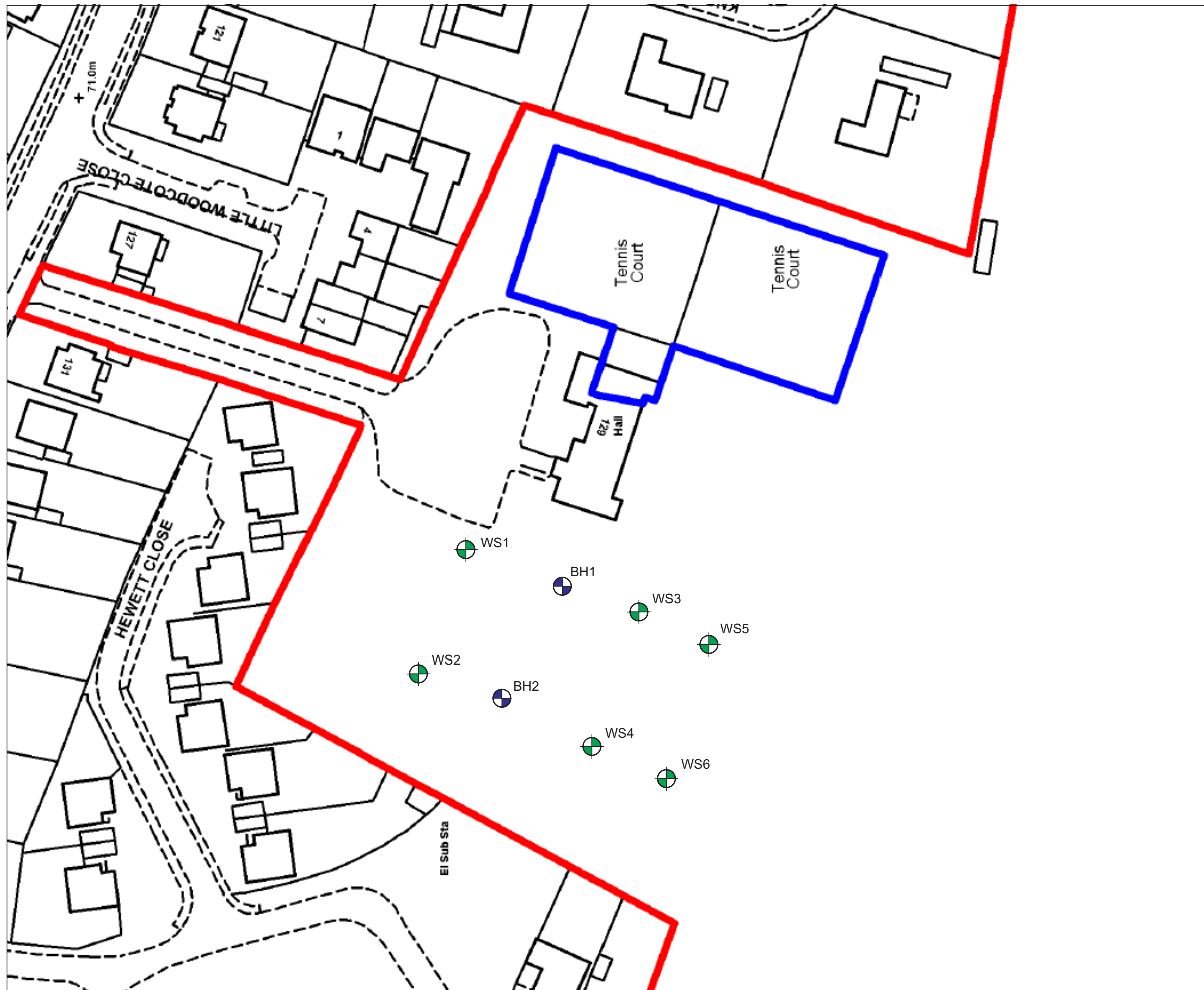


Figure 9: Proposed Development Plan

Scale: Not to scale

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-  Site boundary
-  Cable Percussive Borehole
-  Window Sample Borehole

Drawing source: The Ratcliffe Groves Partnership
 Title: Site Location Plan
 Ref: 9802 P100 C
 Dated: 31/08/2016



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 DEVELOPMENT

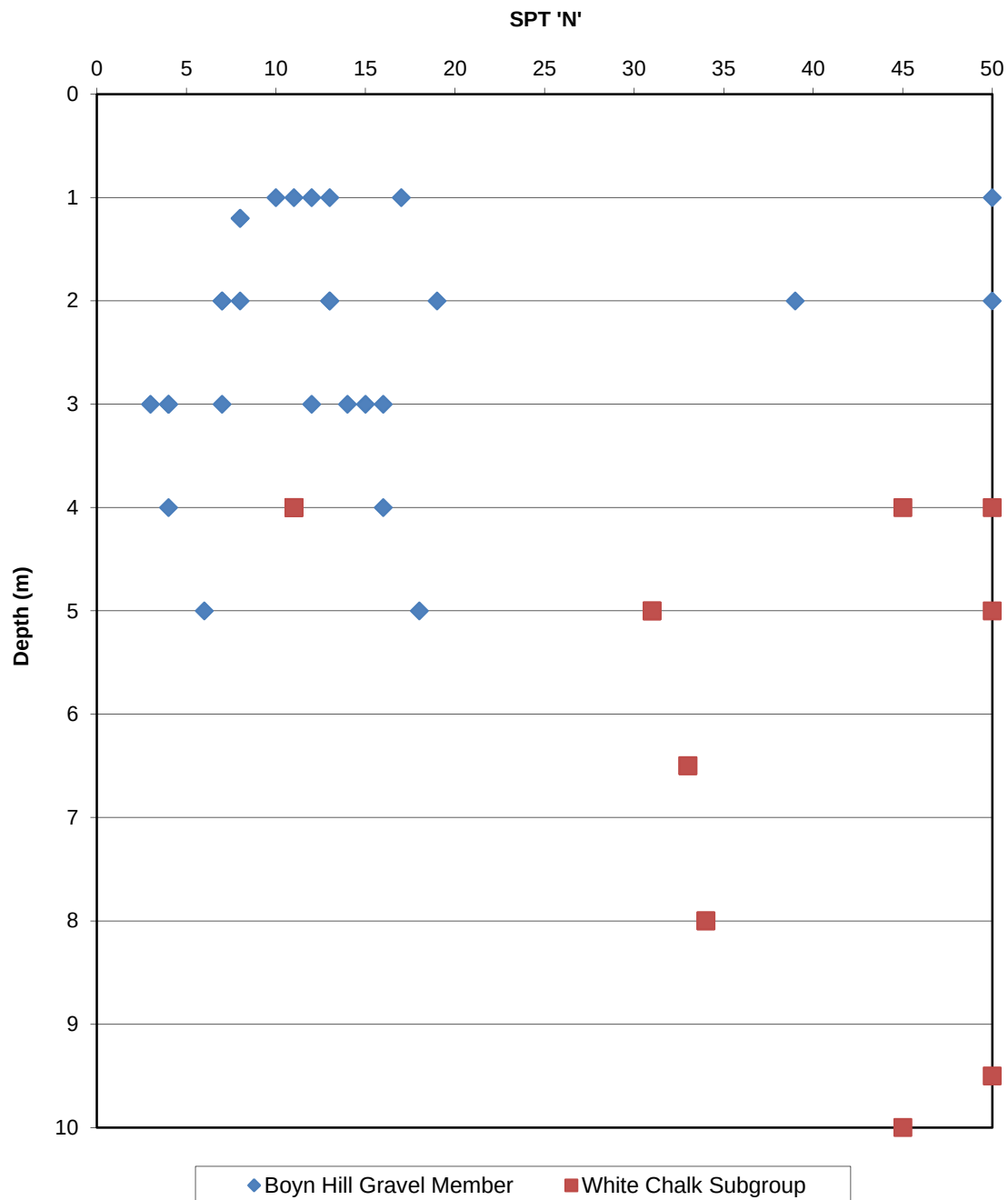
Project: THE HEIGHTS PRIMARY
 Title: EXPLORATORY HOLE LOCATION
 PLAN

Job Ref: HLEI48086	Scale: NTS	Date: Mar 2017
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Figure Number: 10 Rev: 00

www.rpsgroup.com

The Heights Primary School



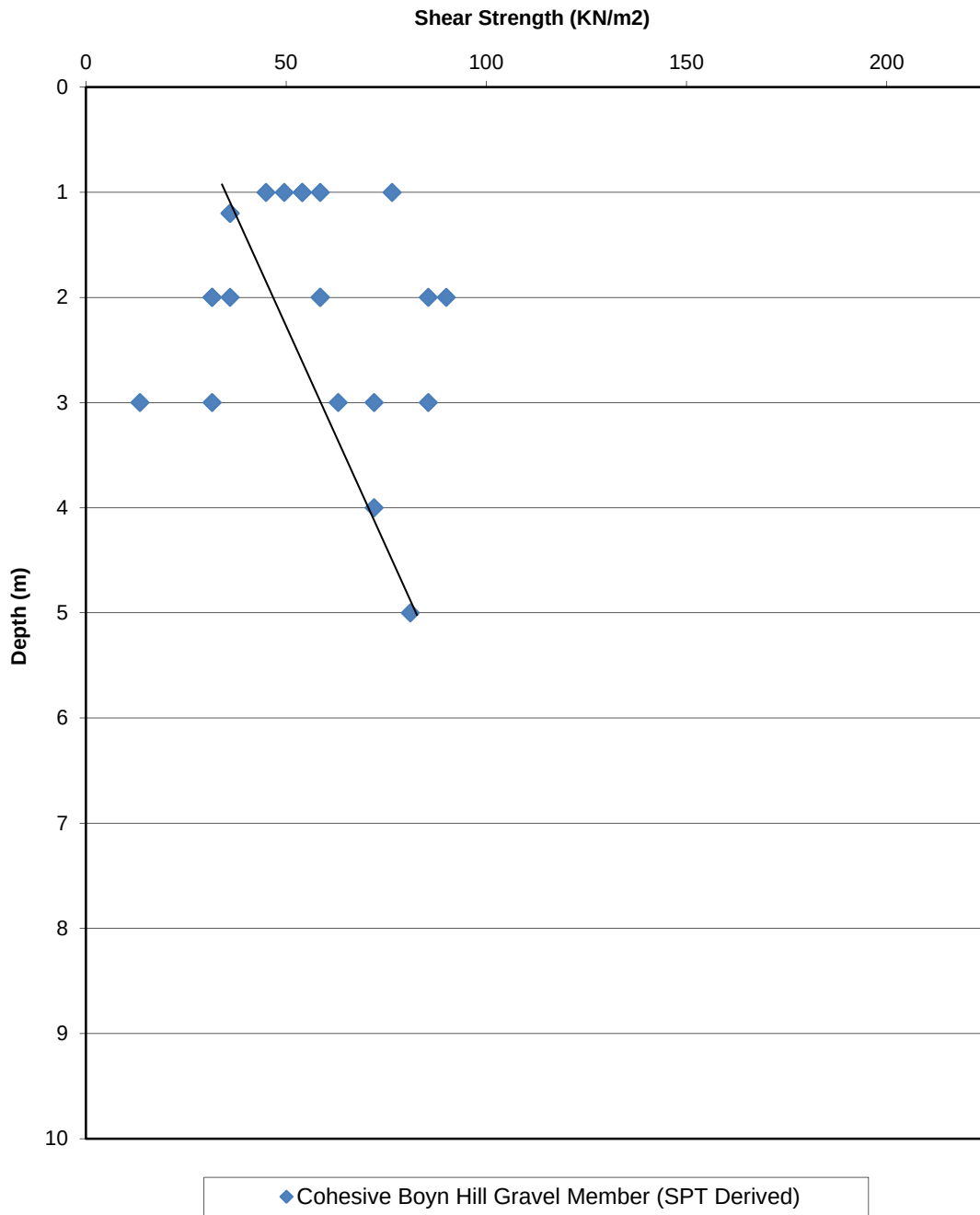
Project: The Heights Primary School
Project no: HLEI 48086
Date: Mar-17

Figure 11: SPT 'N' vs. Depth



35 New Bridge Street
 London
 EC4V 6BW
 T: 020 7280 3200
 F: 020 7283 9248
www.rpsgroup.com

The Heights Primary School



Project: The Heights Primary School
Project no: HLEI 48086
Date: Mar-17

Figure 12: Shear strength vs. Depth



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 London
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 T: 020 7280 3200
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APPENDIX A

General Notes

RPS HEALTH, SAFETY & ENVIRONMENT

Phase 1 - Environmental Risk Assessment / Desk Study Environmental Review

General Notes

1. A "desk study" means that no site visits have been carried out as any part thereof, unless otherwise specified.
2. This report provides available factual data for the site obtained only from the sources described in the text and related to the site on the basis of the location information provided by the Client.
3. The desk study information is not necessarily exhaustive and further information relevant to the site may be available from other sources.
4. The accuracy of maps cannot be guaranteed and it should be recognised that different conditions on site may have existed between and subsequent to the various map surveys.
5. No sampling or analysis has been undertaken in relation to this desk study.
6. Any borehole data from British Geological Survey sources is included on the basis that: "The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation".
7. Where any data supplied by the Client or from other sources, including that from previous site investigations, have been used it has been assumed that the information is correct. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.
8. This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or in part after its original submission.
9. The copyright in the written materials shall remain the property of the RPS Company but with a royalty-free perpetual licence to the Client deemed to be granted on payment in full to the RPS Company by the Client of the outstanding amounts.
10. The report is provided for sole use by the Client and is confidential to them, their professional advisors, no responsibility whatsoever for the contents of the report will be accepted to any person other than the Client. [Unless otherwise agreed]
11. These terms apply in addition to the RPS HSED "Standard Terms & Conditions" (or in addition to another written contract which may be in place instead thereof) unless specifically agreed in writing. (In the event of a conflict between these terms and the said Standard Terms & Conditions the said Standard Terms & Conditions shall prevail.) In the absence of such a written contract the Standard Terms & Conditions will apply.



RPS HEALTH, SAFETY & ENVIRONMENT

Phase 2 – Site Investigations

General Notes

1. The assessments made in this report are based on the ground conditions as revealed by intrusive investigations, together with the results of any field or laboratory testing or chemical analysis undertaken and other relevant data which may have been obtained including previous site investigations. In any event, ground contamination often exists as small discrete areas of contamination ("hot spots") and there can be no certainty that any or all such areas have been located and/or sampled.
2. There may be special conditions appertaining to the site which have not been taken into account in the report. The assessment may be subject to amendment in the light of additional information becoming available.
3. Where any data supplied by the Client or from other sources, including that from previous site investigations, have been used it has been assumed that the information is correct. No responsibility can be accepted by RPS Companies for inaccuracies within the data supplied by other parties.
4. Whilst the report may express an opinion on possible ground conditions between or beyond trial pit or borehole locations, or on the possible presence of features based on either visual, verbal or published evidence this is for guidance only and no liability can be accepted for the accuracy thereof.
5. Comments on groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. Groundwater conditions may vary due to seasonal or other effects.
6. This report is prepared and written in the context of the agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or part after its original submission.
7. The copyright in the written materials shall remain the property of the RPS Company but with a royalty-free perpetual licence to the client deemed to be granted on payment in full to the RPS Company by the client of the outstanding amounts.
8. The report is provided for sole use by the Client and is confidential to them and their professional advisors. No responsibility whatsoever for the contents of the report will be accepted to any person other than the Client.
9. These terms apply in addition to the RPS Group "Standard Terms of Business" (or in addition to another written contract which may be in place instead thereof) unless specifically agreed in writing. (In the event of a conflict between these terms and the said Standard Terms of Business the said Standard Terms of Business shall prevail). In the absence of such a written contract the Standard Terms of Business will apply.



APPENDIX B

Photos



Photo 1 i Hard Surfaced Play Area



Photo 2 i Pavilion



Photo 3 i Tennis Courts



APPENDIX C

Part 2A (The Contaminated Land Regime)

Contaminated Land Definition

Under Section 57 of the Environmental Act 1995, Part 2A was inserted into the Environmental Protection Act 1990 to include provisions for the management of contaminated land.

Subsequent regulations were first implemented in England in April 2000, Scotland in July 2000 and Wales in July 2001¹, providing a definition of 'contaminated land' and setting out the nature of liabilities that can be incurred by owners of contaminated land and groundwater.

According to the Act, contaminated land is defined as 'any land which appears to the local authority in whose area the land 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 controlled waters² is being caused or there is a significant possibility of such pollution being caused³

The guidance on determining whether a particular possibility is significant is based on the principles of risk assessment and in particular on considerations of the magnitude or consequences of the different types of significant harm caused. The term 'possibility of significant harm being caused' should be taken, as referring to a measure of the probability, or frequency, of the occurrence of circumstances that could lead to significant harm being caused.

The following situations are defined where harm is to be regarded as significant:

- i. Chronic or acute toxic effect, serious injury or death to humans
- ii. Irreversible or other adverse harm to the ecological system
- iii. Substantial damage to, or failure of, buildings
- iv. Disease, other physical damage or death of livestock or crops
- v. The pollution of controlled waters⁴.

¹ In England by The Contaminated Land (England) Regulations 2000, updated by The Contaminated Land (England) (Amendment) Regulations 2012; in Scotland by The Contaminated Land (Scotland) Regulations 2000, updated by the Contaminated Land (Scotland) Regulations 2005; and in Wales by The Contaminated Land (Wales) Regulations 2001, updated by the Contaminated Land (Wales) Regulations 2006.

² In Scotland the term 'controlled water' has been updated to 'water environment' under the Contaminated Land (Scotland) Regulations 2005 in line with the Water Environment and Water Services (Scotland) Act 2003.

³ The definition was amended in 2012 by implementation of the Water Act 2003.

⁴ Groundwater in this context does not include waters within underground strata but above the saturated zone.

With regard to radioactivity, contaminated land is defined as any land which appears to be in such a condition, by reason of substances in, on or under the land that harm is being caused, or there is a *significant possibility of such harm being caused*⁵

The Risk Assessment Methodology

Risk assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential risks to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected with the hazard via one or several exposure pathways (e.g. the pathway of direct contact). Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source (hazard), pathway and receptor, there can be no risk. Thus, the mere presence of a hazard at a site does not mean that there will necessarily be attendant risks.

The Risk Assessment

By considering where a viable pathway exists which connects a source with a receptor, this assessment will identify where pollutant linkages may exist. A pollutant linkage is the term used by the DEFRA in their standard procedure on risk assessment. If there is no pollutant linkage, then there is no risk. Therefore, only where a viable pollutant linkage is established does this assessment go on to consider the level of risk. Risk should be based on a consideration of both:

- The likelihood of an event (probability) - takes into account both the presence of the hazard and receptor and the integrity of the pathway.
- The severity of the potential consequence - takes into account both the potential severity of the hazard and the sensitivity of the receptor.

For further information please see the Contaminated Land section on the DEFRA website (www.defra.gov.uk).

⁵ The Radioactive Contaminated Land (Modification of Enactments) (England) Regulations 2006 and Contaminated Land (Wales) Regulations 2006.



APPENDIX D

Exploratory Hole Logs







		BOREHOLE LOG						Borehole No. BH2 Sheet 2 of 3				
Project Name: The Heights Primary School		Co-ordinates:		Date(s): 09/02/2017				Final Depth:				
Project No: HLEI48086		Easting: 469808		Drilling Method:		Pipe Diameter: 50mm		10.00m				
Location: Reading		Northing: 175818		Cable Percussive Drill Rig		Casing Diameter (mm) 150	Casing Depth (m) 3.00	Scale: 1:25				
Client: Education Funding Agency		Ground Level (mAOD): 71.17		Logged By: LF								
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale		
		Depth (m)	Type	Results								
		6.00 6.00	D PID7	0.0ppm						6		
		6.50 6.50	SPTLS SPT(S)	N=33 (3,5/4,6,10,13)								
		7.00 7.00	D ES		(5.60)					7		
		8.00 8.00 8.00 8.00	D SPTLS PID8 SPT(S)	0.0ppm N=34 (6,7/7,8,9,10)						8		
		9.00	D		9.00		62.17		Recovered as very high strength structureless CHALK composed of white slightly sandy gravelly SILT. Gravel is very weak to weak, mostly medium dense white with rare black specs, subangular to subrounded and fine to medium. Matrix is soft white and cream. Rare grey rounded flint gravel. (WHITE CHALK SUBGROUP)	9		
		9.50 9.50	SPTLS SPT(S)	N=45 (7,9/10,10,12,13)		(1.00)						
		10.00 10.00	D PID9	0.0ppm					Continued on next sheet	10		
Remarks: Cable percussive drilling techniques from GL to 10.00m bgl. No groundwater encountered.						Groundwater		Chiselling				
Depth Strike (m)		Depth Casing (m)		Level After 20 Mins		Duration (hh:mm)		Top Depth (m)			Base Depth (m)	

		BOREHOLE LOG							Borehole No. BH2 Sheet 3 of 3		
Project Name: The Heights Primary School		Co-ordinates:		Date(s): 09/02/2017				Final Depth:			
Project No: HLEI48086		Easting: 469808		Drilling Method:		Pipe Diameter: 50mm		10.00m			
Location: Reading		Northing: 175818		Cable Percussive Drill Rig		Casing Diameter (mm) 150	Casing Depth (m) 3.00	Scale:			
Client: Education Funding Agency		Ground Level (mAOD): 71.17		Logged By: LF				1:25			
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale	
		Depth (m)	Type	Results					Terminated at design depth. End of Borehole at 10.00m		
										11	
										12	
										13	
										14	
										15	
Remarks: Cable percussive drilling techniques from GL to 10.00m bgl. No groundwater encountered.					Groundwater			Chiselling			
					Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)	

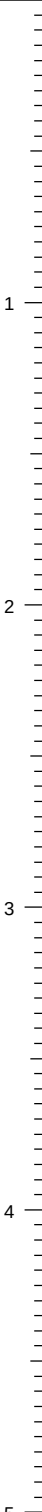
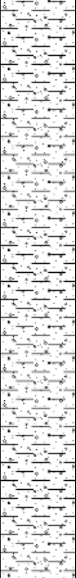
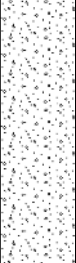




		BOREHOLE LOG						Borehole No. WS3 Sheet 1 of 2	
Project Name: The Heights Primary School		Co-ordinates:		Date(s): 09/02/2017				Final Depth:	
Project No: HLEI48086		Easting: 469823		Drilling Method:				5.00m	
Location: Reading		Northing: 175797		Window Sample Drill Rig		Casing Diameter (mm)	Casing Depth (m)	Scale:	
Client: Education Funding Agency		Ground Level (mAOD): 70.50		Logged By: LF				1:25	

Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale	
		Depth (m)	Type	Results							
					0.00		70.50		Brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subrounded fine to coarse of flint. Sand is fine to coarse. (TOPSOIL)		
					0.30	(0.30)	70.20		Medium strength orangish brown slightly sandy slightly gravelly occasionally gravelly CLAY. Gravel is angular to subangular fine to medium of flint. Sand is fine. (BOYN HILL GRAVEL MEMBER)		
	0.50	D									
	0.50	PID1	0.0ppm								
	1.00	SPT(C)	N=11 (2,2/2,3,3,3)		(1.80)						
	1.50	D									
	1.50	PID2	0.0ppm								
	2.00	SPT(C)	N=13 (3,2/3,3,3,4)		2.10		68.40		Orangish brown very sandy slightly gravelly SILT. Gravel is angular to subangular, fine to medium of flint. Sand is fine to medium. (BOYN HILL GRAVEL MEMBER)		
	2.50	D				(0.90)					
	2.50	ES									
					3.00		67.50	NO RECOVERY (NO RECOVERY)	3		
					3.70		66.80	Loose brown slightly sandy slightly clayey angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (BOYN HILL GRAVEL MEMBER)	4		
					4.70		65.80	NO RECOVERY. (NO RECOVERY)			
					5.00			Continued on next sheet	5		
Remarks: Window sample drilling from GL to 5.00m bgl. No groundwater encountered.					Groundwater Depth Strike (m) Depth Casing (m) Level After 20 Mins			Chiselling Duration (hh:mm) Top Depth (m) Base Depth (m)			

		BOREHOLE LOG							Borehole No. WS3 Sheet 2 of 2		
Project Name: The Heights Primary School		Co-ordinates:		Date(s): 09/02/2017				Final Depth:			
Project No: HLEI48086		Easting: 469823		Drilling Method:				5.00m			
Location: Reading		Northing: 175797		Window Sample Drill Rig		Casing Diameter (mm)	Casing Depth (m)	Scale:			
Client: Education Funding Agency		Ground Level (mAOD): 70.50		Logged By: LF				1:25			
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale	
		Depth (m)	Type	Results					Terminated at design depth. End of Borehole at 5.00m		
										6	
										7	
										8	
										9	
										10	
Remarks: Window sample drilling from GL to 5.00m bgl. No groundwater encountered.					Groundwater			Chiselling			
					Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)	

		BOREHOLE LOG						Borehole No. WS4			
Project Name: The Heights Primary School		Co-ordinates:		Date(s): 09/02/2017				Final Depth:			
Project No: HLEI48086		Easting: 469800		Drilling Method:				5.00m			
Location: Reading		Northing: 175805		Window Sample Drill Rig		Casing Diameter (mm)		Casing Depth (m)			
Client: Education Funding Agency		Ground Level (mAOD): 71.08		Logged By: LF				Scale: 1:25			
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale	
		Depth (m)	Type	Results							
					0.00		71.08		Brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subrounded fine to coarse of flint. Sand is fine to coarse. (TOPSOIL)		
					0.40	(0.40)	70.68				
	0.50	ES									
	0.50	PID1	0.0ppm								
	1.00	D									
	1.00	SPT(C)	N=12 (2,2/2,3,3,4)								
	1.50	PID2	0.0ppm			(1.95)					
	2.00	D									
	2.00	SPT(C)	N=13 (3,2/2,4,4,3)								
	2.50	ES				2.35		68.73			Low strength orangish brown very sandy occasionally slightly gravelly SILT. Sand is fine. Rare lenses (<40mm thick) of fine sand. (BOYN HILL GRAVEL MEMBER)
2.50	PID3	0.0ppm									
3.00	D										
3.00	SPT(C)	N=7 (1,2/1,2,2,2)			(1.45)						
3.50	PID4	0.0ppm									
4.00	D				3.80		67.28		Dense orangish brown slightly gravelly fine to medium SAND. Gravel is angular to subangular fine to medium of flint. (BOYN HILL GRAVEL MEMBER)		
4.00	SPT(C)	N=11 (2,2/2,3,3,3)			(0.90)						
4.50	PID5	0.0ppm									
					4.70		66.38		Recovered as very high strength structureless CHALK composed of white slightly sandy slightly gravelly SILT. Gravel is very weak, low density white with rare black specs, subrounded and fine to medium. Matrix is very soft white		
5.00	SPT(C)	50 (25 for 60mm/50 for 95mm)			(0.30)						
Continued on next sheet											
Remarks: Window sample drilling from GL to 5.00m bgl. No groundwater encountered.						Groundwater			Chiselling		
						Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
											

		BOREHOLE LOG						Borehole No. WS4 Sheet 2 of 2			
Project Name: The Heights Primary School		Co-ordinates:		Date(s): 09/02/2017				Final Depth:			
Project No: HLEI48086		Easting: 469800		Drilling Method:				5.00m			
Location: Reading		Northing: 175805		Window Sample Drill Rig		Casing Diameter (mm)		Casing Depth (m)			
Client: Education Funding Agency		Ground Level (mAOD): 71.08		Logged By: LF				Scale: 1:25			
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale	
		Depth (m)	Type	Results					and cream. Rare grey rounded flint gravel. (WHITE CHALK SUBGROUP) Terminated at design depth. End of Borehole at 5.00m		
										6	
										7	
										8	
										9	
										10	
Remarks: Window sample drilling from GL to 5.00m bgl. No groundwater encountered.					Groundwater			Chiselling			
					Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)	



APPENDIX E

Geotechnical Laboratory Certificates



LABORATORY REPORT



4043

Contract Number: PSL17/0773

Report Date: 27 February 2017
Client's Reference: HLEI 48086
Client Name: RPS Health, Safety and Environment
14 Cornhill
London
EC3V 3ND

For the attention of: Rob Phillip

Contract Title: Mapledurham Playing Fields, Reading
Date Received: 21/2/2017
Date Commenced: 21/2/2017
Date Completed: 27/2/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)

L Knight
(Senior Technician)

S Royle
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH1		B	0.30		Brown slightly gravelly sandy CLAY.
BH1		B	1.00		Brown slightly gravelly sandy CLAY.
BH1		D	1.60		Brown slightly gravelly sandy CLAY.
BH1		D	2.50		Brown gravelly sandy CLAY.
BH1		B	4.00		White structureless CHALK.
BH2		B	0.30		Brown slightly gravelly sandy CLAY.
BH2		B	1.00		Brown slightly gravelly sandy CLAY.
BH2		D	1.50		Brown slightly gravelly sandy CLAY.
BH2		D	2.50		Brown slightly gravelly sandy CLAY.
BH2		B	4.00		White structureless CHALK.



Mapledurham Playing Fields, Reading

Contract No:
PSL17/0773
Client Ref:
HLEI 48086

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH1		B	0.30		21							
BH1		B	1.00		21							
BH1		D	1.60		21			44	21	23	93	Intermediate plasticity CI.
BH1		D	2.50		17			38	19	19	79	Intermediate plasticity CI.
BH1		B	4.00		16			32	26	6	63	Low plasticity ML.
BH2		B	0.30		20							
BH2		B	1.00		18							
BH2		D	1.50		19			36	18	18	93	Intermediate plasticity CI.
BH2		D	2.50		19			34	17	17	93	Low plasticity CL.
BH2		B	4.00		24			37	28	9	87	Intermediate plasticity MI.

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.



Mapledurham Playing Fields, Reading

Contract No:

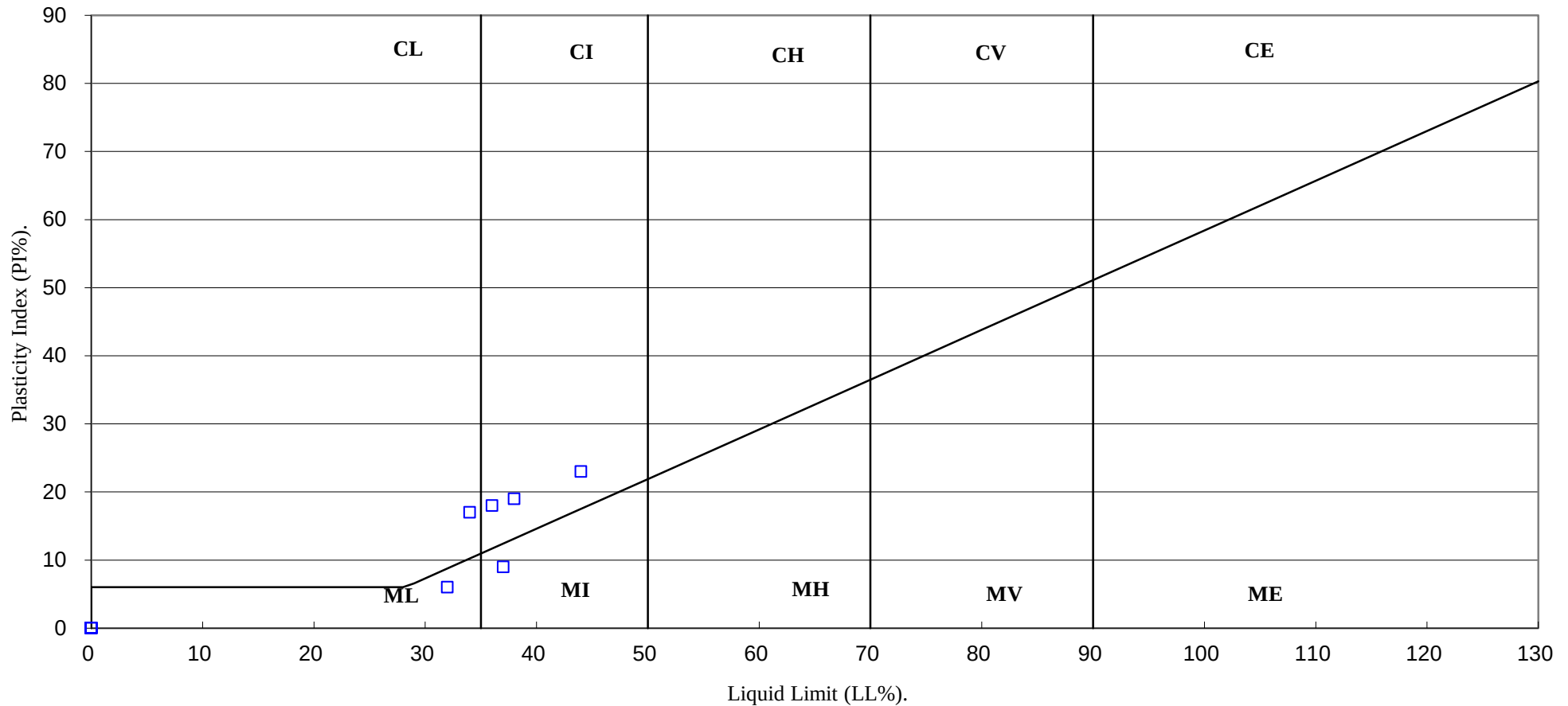
PSL17/0773

Client Ref:

HLEI 48086

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



PSL
Professional Soils Laboratory

Mapledurham Playing Fields, Reading

Contract No:

PSL17/0773

Client Ref:

HLEI 48086

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

BH1

Top Depth (m):

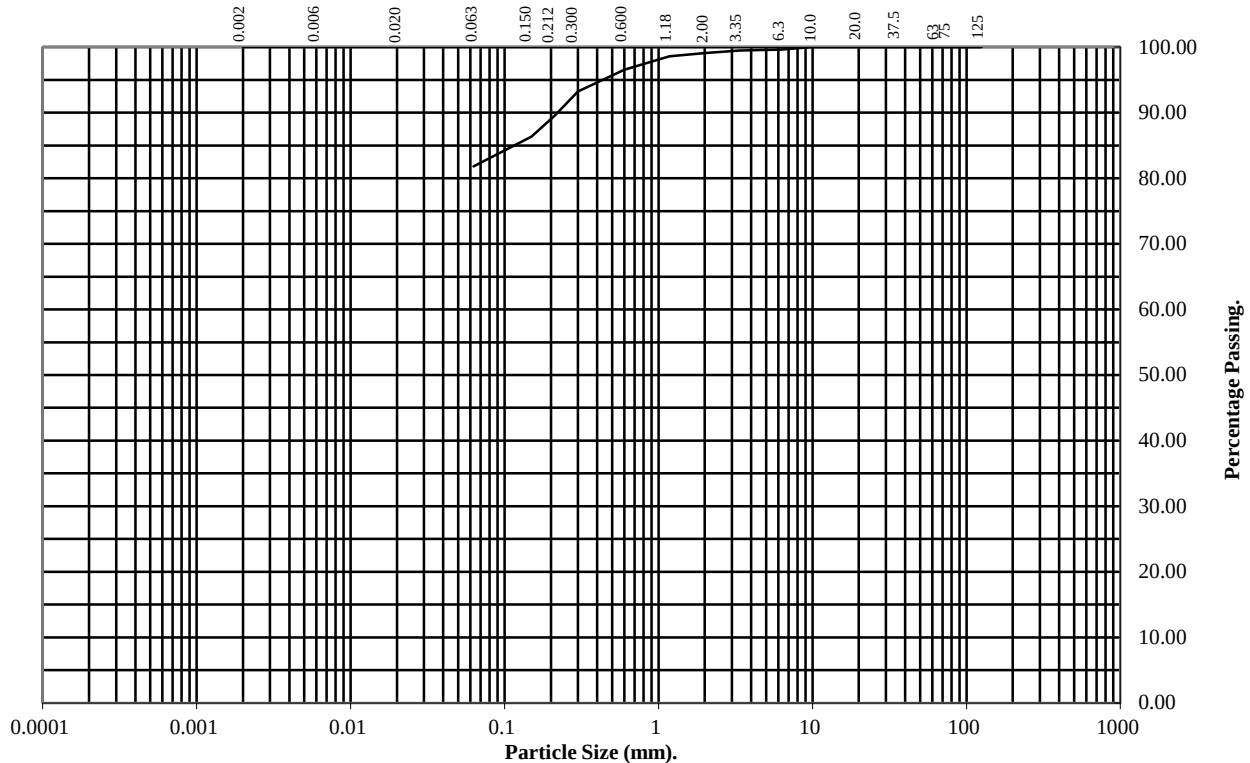
0.30

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	99
1.18	99
0.6	97
0.3	93
0.212	90
0.15	86
0.063	82

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	17
Silt/Clay	82

Remarks:

See summary of soil descriptions.



Mapledurham Playing Fields, Reading

Contract No:

PSL17/0773

Client Ref:

HLEI 48086

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

BH1

Top Depth (m):

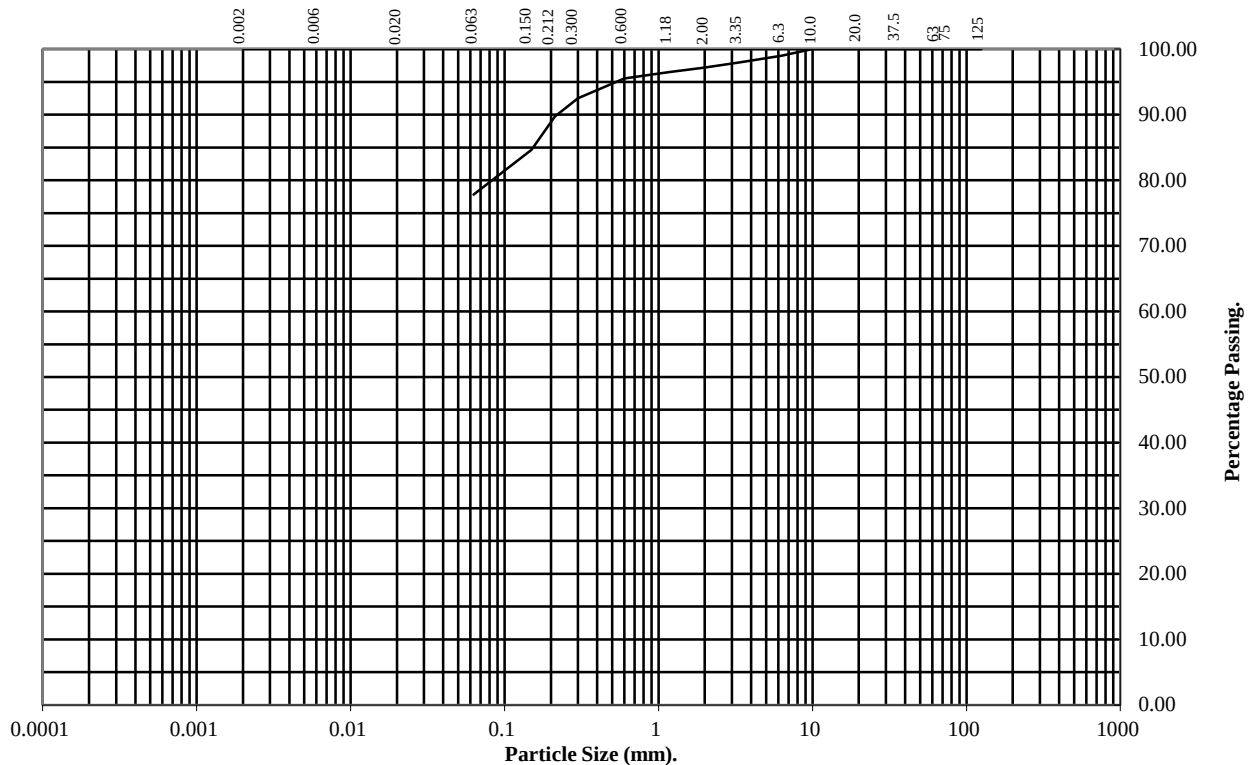
1.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	98
2	97
1.18	96
0.6	96
0.3	93
0.212	90
0.15	85
0.063	78

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	19
Silt/Clay	78

Remarks:

See summary of soil descriptions.



Mapledurham Playing Fields, Reading

Contract No:

PSL17/0773

Client Ref:

HLEI 48086

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

BH1

Top Depth (m):

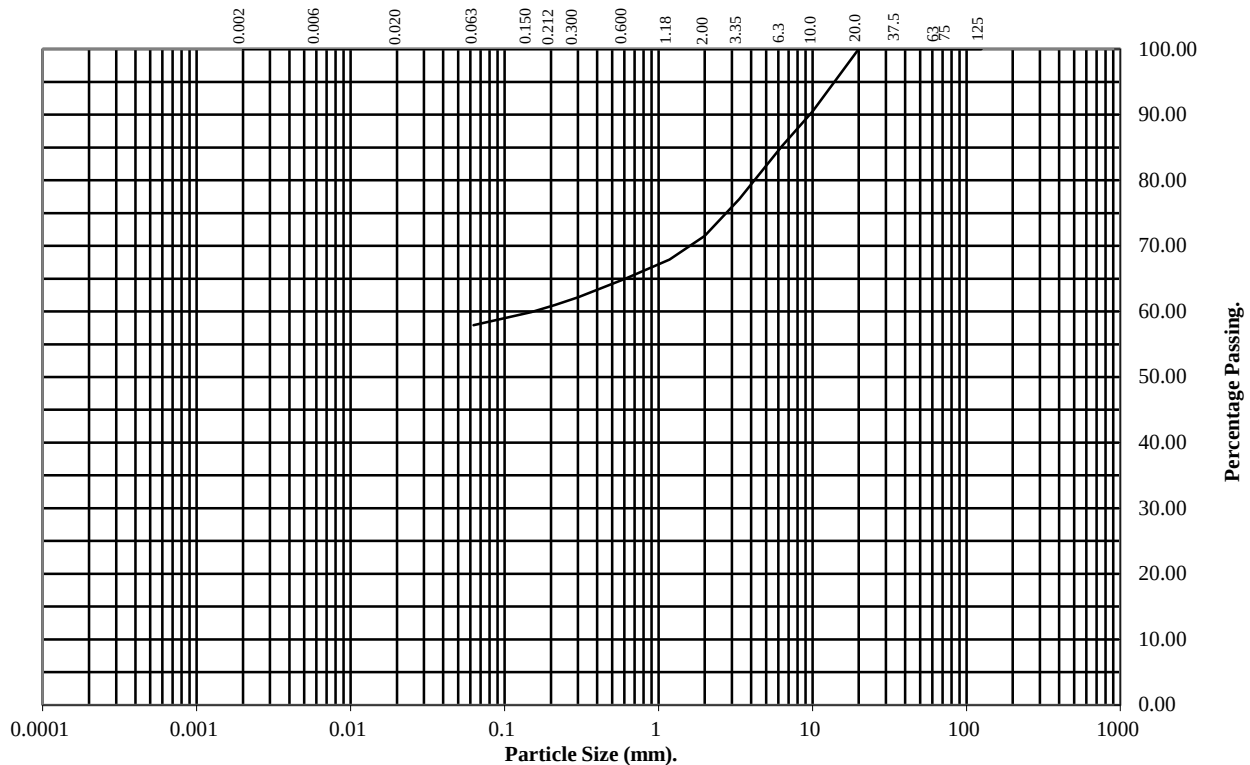
4.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	91
6.3	85
3.35	77
2	72
1.18	68
0.6	65
0.3	62
0.212	61
0.15	60
0.063	58

Soil Fraction	Total Percentage
Cobbles	0
Gravel	28
Sand	14
Silt/Clay	58

Remarks:

See summary of soil descriptions.



PSL
Professional Soils Laboratory

Mapledurham Playing Fields, Reading

Contract No:

PSL17/0773

Client Ref:

HLEI 48086

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

BH2

Top Depth (m):

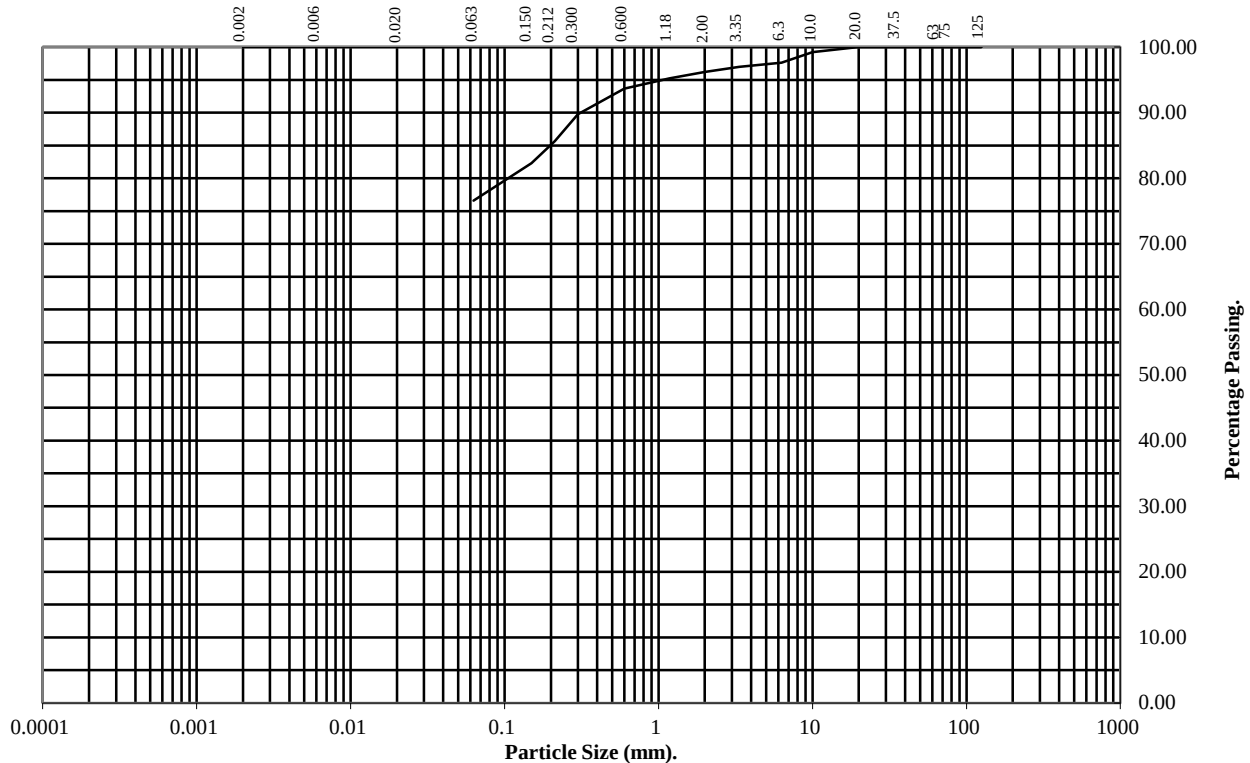
0.30

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	98
3.35	97
2	96
1.18	95
0.6	94
0.3	90
0.212	86
0.15	82
0.063	77

Soil Fraction	Total Percentage
Cobbles	0
Gravel	4
Sand	19
Silt/Clay	77

Remarks:

See summary of soil descriptions.



PSL
Professional Soils Laboratory

Mapledurham Playing Fields, Reading

Contract No:

PSL17/0773

Client Ref:

HLEI 48086

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

BH2

Top Depth (m):

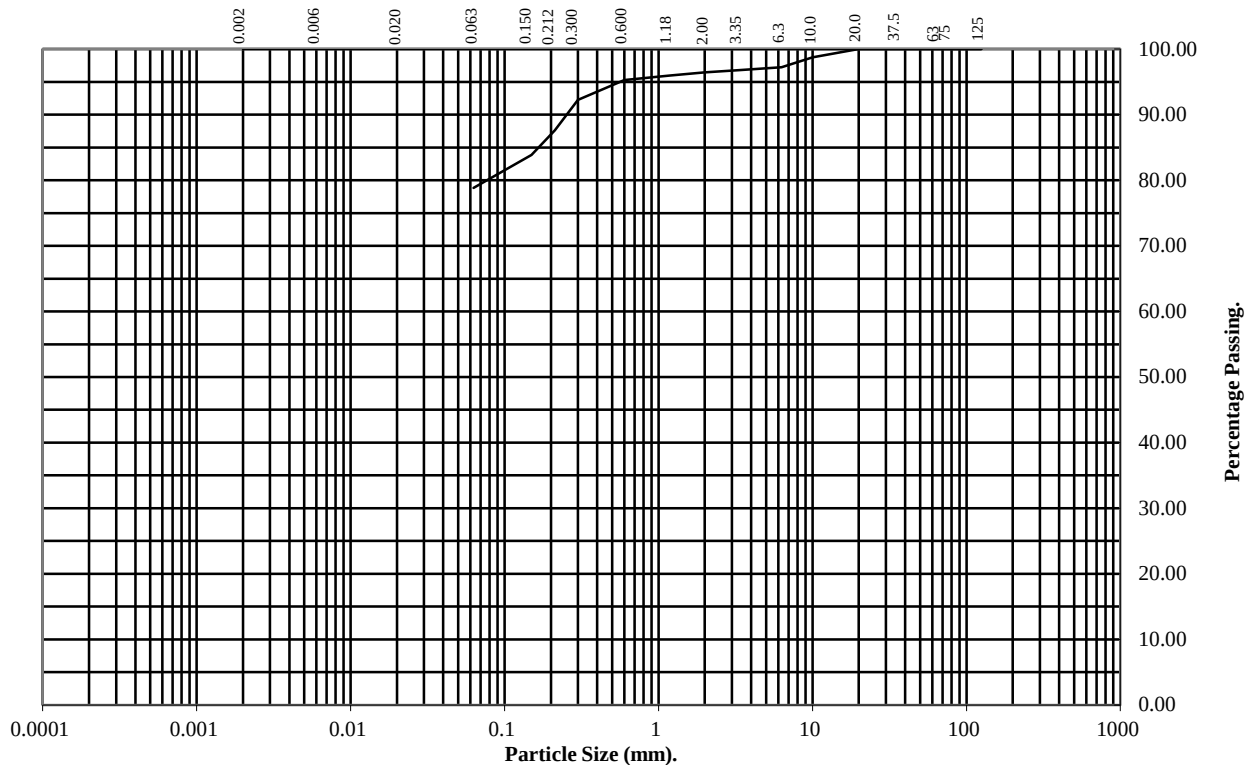
1.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	97
3.35	97
2	96
1.18	96
0.6	95
0.3	92
0.212	88
0.15	84
0.063	79

Soil Fraction	Total Percentage
Cobbles	0
Gravel	4
Sand	17
Silt/Clay	79

Remarks:

See summary of soil descriptions.



Mapledurham Playing Fields, Reading

Contract No:

PSL17/0773

Client Ref:

HLEI 48086

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

BH2

Top Depth (m):

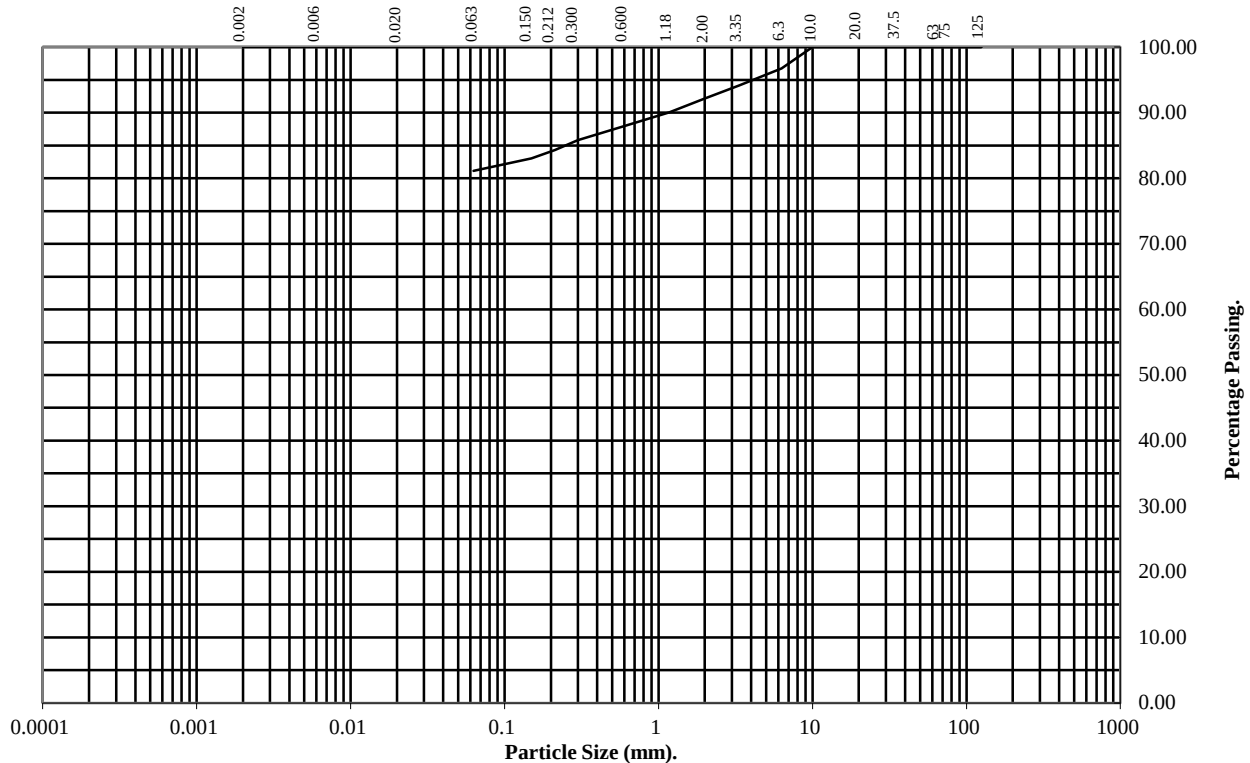
4.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	97
3.35	94
2	92
1.18	90
0.6	88
0.3	86
0.212	84
0.15	83
0.063	81

Soil Fraction	Total Percentage
Cobbles	0
Gravel	8
Sand	11
Silt/Clay	81

Remarks:

See summary of soil descriptions.



PSL
Professional Soils Laboratory

Mapledurham Playing Fields, Reading

Contract No:

PSL17/0773

Client Ref:

HLEI 48086



Certificate of Analysis

Certificate Number 17-93014

07-Mar-17

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 17-93014

Client Reference PSL17/0773

Order No (not supplied)

Contract Title Mapledurham Playing Fields, Reading

Description 2 Soil samples.

Date Received 28-Feb-17

Date Started 28-Feb-17

Date Completed 07-Mar-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 17-93014

Client Ref PSL17/0773

Contract Title Mapledurham Playing Fields, Reading

Lab No	1135529	1135530
Sample ID	BH1	BH2
Depth	4.50	4.50
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	n/s	n/s
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Inorganics					
pH	DETSC 2008#			8.1	8.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	23	42

Information in Support of the Analytical Results

Our Ref 17-93014
 Client Ref PSL17/0773
 Contract Mapledurham Playing Fields, Reading

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1135529	BH1 4.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1135530	BH2 4.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



APPENDIX F

Field Monitoring Data

Ground Gas Monitoring Results

Ground gas concentrations 17th February 2017

Borehole ID	Flow Rate (l/hr)		Methane (% vol)		Carbon Dioxide (% vol)		Oxygen (% vol)	iVOCs (ppm)
	Peak	Steady	Peak	Steady	Peak	Steady		
BH1	<0.1	<0.1	<0.1	<0.1	0.5	0.5	20.3	1.0
BH2	Well damaged & repaired for monitoring during the following visit.							
WS5	<0.1	<0.1	<0.1	<0.1	0.1	0.1	20.9	1.0

Atmospheric Pressure: 1016mb

Ground gas concentrations 28th February 2017

Borehole ID	Flow Rate (l/hr)		Methane (% vol)		Carbon Dioxide (% vol)		Oxygen (% vol)	iVOCs (ppm)
	Peak	Steady	Peak	Steady	Peak	Steady		
BH1	<0.1	<0.1	<0.1	<0.1	0.5	0.5	20.0	1.0
BH2	<0.1	<0.1	<0.1	<0.1	2.3	2.3	17.0	1.0
WS5	<0.1	<0.1	<0.1	<0.1	1.5	1.5	18.8	0.9

Atmospheric Pressure: 979mb

Ground gas concentrations 9th March 2017

Borehole ID	Flow Rate (l/hr)		Methane (% vol)		Carbon Dioxide (% vol)		Oxygen (% vol)	iVOCs (ppm)
	Peak	Steady	Peak	Steady	Peak	Steady		
BH1	0.2	<0.1	<0.1	<0.1	0.2	0.2	20.8	1.0
BH2	<0.1	<0.1	<0.1	<0.1	1.3	1.3	19.1	1.0
WS5	<0.1	<0.1	<0.1	<0.1	0.9	0.7	20.1	0.9

Atmospheric Pressure: 1012mb



APPENDIX G

Analytical Data



Certificate of Analysis

Certificate Number 17-91552

22-Feb-17

Client RPS Group
35 New Bridge Street
London
EC4V 6BW

Our Reference 17-91552

Client Reference HLE1 48086

Order No (not supplied)

Contract Title The Heights Primary School

Description 8 Soil samples, 3 Leachate samples.

Date Received 13-Feb-17

Date Started 13-Feb-17

Date Completed 22-Feb-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 17-91552

Client Ref HLE1 48086

Contract Title The Heights Primary School

Lab No	1126328	1126329	1126330	1126331	1126332	1126333
Sample ID	BH1	BH2	WS1	WS2	WS3	WS4
Depth	0.20	0.50	0.50	2.50	2.50	0.50
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	12	14	12	16	14	17
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	21	29	30	25	22	40
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	13	14	14	14	12	19
Lead	DETSC 2301#	0.3	mg/kg	41	16	15	11	10	30
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	17	23	24	29	20	30
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	47	44	45	52	39	58
Inorganics									
pH	DETSC 2008#			8.0	7.9	7.9	8.0	8.0	7.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	1.5	0.8	0.6	0.1	< 0.1	0.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	< 10	< 10	< 10	< 10	< 10	< 10
Sulphide	DETSC 2024#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Summary of Chemical Analysis

Soil Samples

Our Ref 17-91552

Client Ref HLE1 48086

Contract Title The Heights Primary School

Lab No	1126328	1126329	1126330	1126331	1126332	1126333
Sample ID	BH1	BH2	WS1	WS2	WS3	WS4
Depth	0.20	0.50	0.50	2.50	2.50	0.50
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6
PCBs									
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg		< 0.01				< 0.01
PCB 52	DETSC 3401#	0.01	mg/kg		< 0.01				< 0.01
PCB 101	DETSC 3401#	0.01	mg/kg		< 0.01				< 0.01
PCB 118	DETSC 3401#	0.01	mg/kg		< 0.01				< 0.01
PCB 153	DETSC 3401#	0.01	mg/kg		< 0.01				< 0.01
PCB 138	DETSC 3401#	0.01	mg/kg		< 0.01				< 0.01
PCB 180	DETSC 3401#	0.01	mg/kg		< 0.01				< 0.01
PCB 7 Total	DETSC 3401#	0.01	mg/kg		< 0.01				< 0.01
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	1.0	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis

Soil Samples

Our Ref 17-91552

Client Ref HLE1 48086

Contract Title The Heights Primary School

Lab No	1126334	1126335
Sample ID	WS5	WS6
Depth	0.50	1.00
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	09/02/17	09/02/17
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	9.1	17
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	18	28
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	8.6	15
Lead	DETSC 2301#	0.3	mg/kg	13	13
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	15	24
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	32	39
Inorganics					
pH	DETSC 2008#			7.9	7.8
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	0.6	0.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	< 10	< 10
Sulphide	DETSC 2024#	10	mg/kg	< 10	< 10
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	0.02
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1

Summary of Chemical Analysis

Soil Samples

Our Ref 17-91552

Client Ref HLE1 48086

Contract Title The Heights Primary School

Lab No	1126334	1126335
Sample ID	WS5	WS6
Depth	0.50	1.00
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	09/02/17	09/02/17
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.3
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	0.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6
PCBs					
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg		
PCB 52	DETSC 3401#	0.01	mg/kg		
PCB 101	DETSC 3401#	0.01	mg/kg		
PCB 118	DETSC 3401#	0.01	mg/kg		
PCB 153	DETSC 3401#	0.01	mg/kg		
PCB 138	DETSC 3401#	0.01	mg/kg		
PCB 180	DETSC 3401#	0.01	mg/kg		
PCB 7 Total	DETSC 3401#	0.01	mg/kg		
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3

Summary of Asbestos Analysis Soil Samples

Our Ref 17-91552

Client Ref HLE1 48086

Contract Title The Heights Primary School

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1126328	BH1 0.20	SOIL	NAD	none	Steven Lambert
1126329	BH2 0.50	SOIL	NAD	none	Steven Lambert
1126330	WS1 0.50	SOIL	NAD	none	Steven Lambert
1126331	WS2 2.50	SOIL	NAD	none	Steven Lambert
1126332	WS3 2.50	SOIL	NAD	none	Steven Lambert
1126333	WS4 0.50	SOIL	NAD	none	Steven Lambert
1126334	WS5 0.50	SOIL	NAD	none	Steven Lambert
1126335	WS6 1.00	SOIL	NAD	none	Steven Lambert

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 17-91552
Client Ref HLE1 48086
Contract Title The Heights Primary School
Sample Id BH1 0.20

Sample Numbers 1126328 1126336
Date Analysed 20/02/2017

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084* Total Organic Carbon	%	0.9
DETSC 2003# Loss On Ignition	%	4.8
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC 2008# pH	pH Units	8.0
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate		
Determinand and Method Reference	Conc in Eluate ug/l	Amount Leached mg/kg
	10:1	LS10
DETSC 2306 Arsenic as As	1.3	0.01
DETSC 2306 Barium as Ba	11	0.1
DETSC 2306 Cadmium as Cd	< 0.03	< 0.02
DETSC 2306 Chromium as Cr	2.9	< 0.1
DETSC 2306 Copper as Cu	1.9	< 0.02
DETSC 2306 Mercury as Hg	0.02	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 0.1
DETSC 2306 Nickel as Ni	2.5	< 0.1
DETSC 2306 Lead as Pb	1.7	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.05
DETSC 2306 Selenium as Se	0.28	< 0.03
DETSC 2306 Zinc as Zn	8.1	0.08
DETSC 2055 Chloride as Cl	5400	< 100
DETSC 2055* Fluoride as F	170	1.7
DETSC 2055 Sulphate as SO4	5200	< 100
DETSC 2009* Total Dissolved Solids	6900	69
DETSC 2130 Phenol Index	< 100	< 1
* Dissolved Organic Carbon	9700	97

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

Additional Information

DETSC 2008 pH	6.8
DETSC 2009 Conductivity uS/cm	9.9
* Temperature*	17

Mass of Sample Kg	0.110
Mass of dry Sample Kg	0.094
Stage 1	
Volume of Leachant L2	0.925
Volume of Eluate VE1	0.88

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions.
Values are correct at time of issue.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 17-91552
Client Ref HLE1 48086
Contract Title The Heights Primary School
Sample Id BH2 0.50

Sample Numbers 1126329 1126337
Date Analysed 20/02/2017

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084* Total Organic Carbon	%	0.5
DETSC 2003# Loss On Ignition	%	4.7
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC 2008# pH	pH Units	7.9
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate		
Determinand and Method Reference	Conc in Eluate ug/l	Amount Leached mg/kg
	10:1	LS10
DETSC 2306 Arsenic as As	1.1	0.01
DETSC 2306 Barium as Ba	4.4	< 0.1
DETSC 2306 Cadmium as Cd	< 0.03	< 0.02
DETSC 2306 Chromium as Cr	2	< 0.1
DETSC 2306 Copper as Cu	1.3	< 0.02
DETSC 2306 Mercury as Hg	< 0.01	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 0.1
DETSC 2306 Nickel as Ni	1.7	< 0.1
DETSC 2306 Lead as Pb	0.93	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.03
DETSC 2306 Zinc as Zn	8.9	0.09
DETSC 2055 Chloride as Cl	3000	< 100
DETSC 2055* Fluoride as F	140	1.4
DETSC 2055 Sulphate as SO4	2200	< 100
DETSC 2009* Total Dissolved Solids	< 5000	< 50
DETSC 2130 Phenol Index	< 100	< 1
* Dissolved Organic Carbon	6200	62

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

Additional Information

DETSC 2008 pH	6.8
DETSC 2009 Conductivity uS/cm	6.4
* Temperature*	17
Mass of Sample Kg	0.110
Mass of dry Sample Kg	0.095
Stage 1	
Volume of Leachant L2	0.93
Volume of Eluate VE1	0.89

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions.
Values are correct at time of issue.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 17-91552
Client Ref HLE1 48086
Contract Title The Heights Primary School
Sample Id WS5 0.50

Sample Numbers 1126334 1126338
Date Analysed 20/02/2017

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084* Total Organic Carbon	%	0.3
DETSC 2003# Loss On Ignition	%	3.1
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	120
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC 2008# pH	pH Units	7.9
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate		
Determinand and Method Reference	Conc in Eluate ug/l	Amount Leached mg/kg
	10:1	LS10
DETSC 2306 Arsenic as As	0.26	< 0.01
DETSC 2306 Barium as Ba	1.5	< 0.1
DETSC 2306 Cadmium as Cd	< 0.03	< 0.02
DETSC 2306 Chromium as Cr	0.5	< 0.1
DETSC 2306 Copper as Cu	< 0.4	< 0.02
DETSC 2306 Mercury as Hg	< 0.01	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 0.1
DETSC 2306 Nickel as Ni	< 0.5	< 0.1
DETSC 2306 Lead as Pb	0.17	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.03
DETSC 2306 Zinc as Zn	1.6	0.02
DETSC 2055 Chloride as Cl	3600	< 100
DETSC 2055* Fluoride as F	120	1.2
DETSC 2055 Sulphate as SO4	2800	< 100
DETSC 2009* Total Dissolved Solids	< 5000	< 50
DETSC 2130 Phenol Index	< 100	< 1
* Dissolved Organic Carbon	6800	68

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

Additional Information

DETSC 2008 pH	6.8
DETSC 2009 Conductivity uS/cm	5.2
* Temperature*	17

Mass of Sample Kg	0.110
Mass of dry Sample Kg	0.095
Stage 1	
Volume of Leachant L2	0.931
Volume of Eluate VE1	0.88

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions.
Values are correct at time of issue.

Information in Support of the Analytical Results

Our Ref 17-91552
 Client Ref HLE1 48086
 Contract The Heights Primary School

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1126328	BH1 0.20 SOIL	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126329	BH2 0.50 SOIL	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126330	WS1 0.50 SOIL	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126331	WS2 2.50 SOIL	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126332	WS3 2.50 SOIL	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126333	WS4 0.50 SOIL	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126334	WS5 0.50 SOIL	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126335	WS6 1.00 SOIL	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126336	BH1 0.20 LEACHATE	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126337	BH2 0.50 LEACHATE	09/02/17	GJ 250ml, GJ 60ml, PT 1L		
1126338	WS5 0.50 LEACHATE	09/02/17	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

APPENDIX H

Comparison of Analytical Data to Assessment Criteria



Key:
10 Exceeds LOD
10 Exceeds S4UL

Analyte (by group)	Units	LOD	S4UL	BH1 0.20 09/02/17	BH2 0.50 09/02/17	WS1 0.50 09/02/17	WS2 2.50 09/02/17	WS3 2.50 09/02/17	WS4 0.50 09/02/17	WS5 0.50 09/02/17	WS6 1.00 09/02/17
General Inorganics											
Asbestos				NAD na	NAD na	NAD na	NAD na	NAD na	NAD na	NAD na	NAD na
Asbestos Comment				Steven Lambert	Steven Lambert	Steven Lambert	Steven Lambert	Steven Lambert	Steven Lambert	Steven Lambert	Steven Lambert
Asbestos Analyst				KWI	KWI	KWI	KWI	KWI	KWI	KWI	KWI
Asbestos Checker				12	14	12	16	14	17	9.1	17
Arsenic	mg/kg	0.2	37	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1
Cadmium	mg/kg	0.1	11	21	29	30	25	22	40	18	28
Chromium	mg/kg	0.15	910	1	1	1	1	1	1	1	1
Chromium, Hexavalent	mg/kg	1	6	13	14	14	14	12	19	8.6	15
Copper	mg/kg	0.2	2400	41	16	15	11	10	30	13	13
Lead *	mg/kg	0.3	200	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Mercury	mg/kg	0.05	40	17	23	24	29	20	30	15	24
Nickel	mg/kg	1	130	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Selenium	mg/kg	0.5	250	47	44	45	52	39	58	32	39
Zinc	mg/kg	1	3700	8	7.9	7.9	8	8	7.9	7.9	7.8
pH				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cyanide, Total	mg/kg	0.1	-	1.5	0.8	0.6	0.1	0.1	0.3	0.6	0.3
Organic matter	%	0.1	-	10	10	10	10	10	10	10	10
Sulphate Aqueous Extract as SO4	mg/l	10	-	10	10	10	10	10	10	10	10
Sulphide	mg/kg	10	-	10	10	10	10	10	10	10	10
Petroleum Hydrocarbons											
Aliphatic C5-C6	mg/kg	0.01	42	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Aliphatic C6-C8	mg/kg	0.01	100	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Aliphatic C8-C10	mg/kg	0.01	27	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Aliphatic C10-C12	mg/kg	1.5	130	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Aliphatic C12-C16	mg/kg	1.2	1100	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Aliphatic C16-C21	mg/kg	1.5	65000	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Aliphatic C21-C35	mg/kg	3.4	65000	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Aliphatic C5-C35	mg/kg	10	-	10	10	10	10	10	10	10	10
Aromatic C5-C7	mg/kg	0.01	70	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Aromatic C7-C8	mg/kg	0.01	130	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Aromatic C8-C10	mg/kg	0.01	34	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Aromatic C10-C12	mg/kg	0.9	74	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Aromatic C12-C16	mg/kg	0.5	140	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Aromatic C16-C21	mg/kg	0.6	260	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Aromatic C21-C35	mg/kg	1.4	1100	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Aromatic C5-C35	mg/kg	10	-	10	10	10	10	10	10	10	10
TPH Ali/Aro Total	mg/kg	10	-	10	10	10	10	10	10	10	10
Benzene	mg/kg	0.01	0.087	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Ethylbenzene	mg/kg	0.01	47	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Toluene	mg/kg	0.01	130	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Xylene	mg/kg	0.01	56	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
MTBE	mg/kg	0.01	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Polycyclic Aromatic Hydrocarbons (PAH)											
Naphthalene	mg/kg	0.1	2.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Acenaphthylene	mg/kg	0.1	170	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Acenaphthene	mg/kg	0.1	210	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Fluorene	mg/kg	0.1	170	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Phenanthrene	mg/kg	0.1	95	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anthracene	mg/kg	0.1	2400	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Fluoranthene	mg/kg	0.1	280	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
Pyrene	mg/kg	0.1	620	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Benzo(a)anthracene	mg/kg	0.1	7.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chrysene	mg/kg	0.1	15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Benzo(b)fluoranthene	mg/kg	0.1	2.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Benzo(k)fluoranthene	mg/kg	0.1	77	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Benzo(a)pyrene	mg/kg	0.1	2.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	27	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	0.1	0.24	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Benzo(g,h,i)perylene	mg/kg	0.1	320	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PAH Total	mg/kg	1.6	-	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Polychlorinated Biphenyls (PCBs)											
PCB 28 + PCB 31	mg/kg	0.01			0.01				0.01		
PCB 52	mg/kg	0.01			0.01				0.01		
PCB 101	mg/kg	0.01			0.01				0.01		
PCB 118	mg/kg	0.01			0.01				0.01		
PCB 153	mg/kg	0.01			0.01				0.01		
PCB 138	mg/kg	0.01			0.01				0.01		
PCB 180	mg/kg	0.01			0.01				0.01		
PCB 7 Total	mg/kg	0.01			0.01				0.01		
Phenol - Monohydric	mg/kg	0.3	120	1	0.3	0.3	0.3	0.3	0.3	0.3	0.3

* C4SL used in absence of S4UL