ENVIRONMENT
& HEALTH

Reading Borough Council

FAO: Steven Vigar

PHASE 2, STATION HILL, READING
PLANNING PERMISSION REF. 192032

Date 01/10/2021

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Reading Borough Council has granted full Planning Permission for the proposed development of Station Hill subject to the conditions outlined in Planning Permission Reference 192032. This covering letter summarises the reports that have been prepared and submitted to date to support the discharge of Planning Condition 10 (Land Contamination).

PROPOSED DEVELOPMENT

Phase 2 comprises part of the wider Station Hill North Site which is to be redeveloped into a mixed residential and commercial town quarter realm that will include approximately 538 new homes and approximately 25,000 sq. ft of commercial and leisure space.

Phase 2 proposed development comprises One Station Hill (previously known as Plot G), a seventeen-storey building containing office use and flexible retail, non-residential institution and assembly and leisure uses and a landscaped podium deck providing vehicular access and parking.

No basement excavations are proposed within Phase 2 of the development as the proposed building aligns with existing ground level along the majority of peripheries of the site.

CONDITION 10 – LAND CONTAMINATION

Condition 10 states:

(PCD) No development (other than demolition above existing ground floor, or existing basement floor, slab level) shall be commenced within the Phase 2 site until a scheme that includes the following components to deal with the risks associated with

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contamination of the Phase 2 site (whether or not it originates from the site) has been submitted to and approved in writing by the Local Planning Authority:

(a) A preliminary contaminated land risk assessment which has identified:

- *all previous uses;*
- *potential contaminants associated with those uses (extent, nature and scale of the contamination);*
- *a conceptual model of the site indicating sources, pathways and receptors; and*
- *potentially unacceptable risks arising from contamination at the site.*

The report which satisfies Part A of Condition 10 is the Desk Study, 1620004761-SHR-RAM-GE-001-Desk Study, dated: 16/10/2018 (provided as Appendix 1). The purpose of the desk study is to highlight potential geo-environmental hazards associated with the development site and to identify where further assessment may be required to inform a strategy addressing identified ground contamination risks. The desk study also identifies the key design drivers, residual risks and areas which will be the focus of the next stage of the design (i.e., site investigation).

Ramboll's desk study assessment (October 2018) identified a number of sources of potential contamination, including current and former land uses at the site and in the surrounding area. The assessment concluded that risks from potential contamination to both human health and controlled waters were considered to be low/moderate, dependent on which receptor or pathway is being considered. Potential risks from ground gas were assessed as being high.

The 2018 desk study recommended an intrusive ground investigation to be undertaken prior to redevelopment, in order to properly characterise the ground and groundwater conditions at the site and identify any potential contamination. This investigation was undertaken by Ramboll in June 2019 (as mentioned below).

(b) A site investigation scheme, based on the approved preliminary contaminated land risk assessment (a) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site, including.:

- *human health;*
- *property (existing or proposed) including buildings, crops, livestock, pets, woodland and service lines and pipes;*
- *adjoining land;*
- *groundwaters and surface waters;*
- *ecological systems; and,*
- *archaeological sites and ancient monuments.*

The report which satisfies Condition 10 Part B is the North Site Ground Investigation Report, SHR-RAM-NB-XX-RP-G-00002, dated: 05/07/2020 (provided as Appendix 2). This report analyses the findings of Ramboll's intrusive ground investigation undertaken at the Station Hill North site in June 2019. The objectives of the investigation were to assess the ground conditions, geological and hydrogeological

conditions, and the potential for soil and/or groundwater contamination that could have resulted from current and historic contaminant sources identified within the Phase 1 Desk Study Report.

The investigation comprised five deep boreholes, five window sample holes and seven trial pits across the North site. Chemical analysis of soil and groundwater samples were undertaken along with six groundwater and ground gas monitoring rounds. Two additional groundwater sampling rounds were undertaken at a later stage in October 2019 to further assess hydrocarbons detected in groundwater at BH204 (in the southeast corner of the site adjacent to the NCP car park).

The soil and groundwater chemical results were assessed against Ramboll's Generic Assessment Criteria (GAC) for residential end use without plant uptake and for commercial use, given the proposed development plan comprising residential use in the west (Phase 3) and commercial use in the east (Phase 2).

Asbestos was detected in four soil samples and concentrations of lead and hydrocarbons were identified to exceed the residential GAC within the soils. The location of the contaminants were found within areas of the site proposed to be excavated for the basement (within Phase 3 in the west), or in areas with a proposed commercial use (Phase 2) such that risks would be expected to be mitigated, due to an incomplete contaminant – pathway – receptor linkage as explained within the report. Elevated hydrocarbon concentrations in groundwater and elevated VOC concentrations in ground gas were detected in the southeast corner of the site (at BH204).

The report recommended further environmental assessment within previously inaccessible areas (i.e., beneath the multi-storey NCP car park) to provide further delineation of the hydrocarbon contamination identified in the southeast of the site. This is to be undertaken post demolition during an environmental watching brief, with additional sampling taken where any visual or olfactory evidence of contamination is encountered. A part-time environmental watching brief is recommended during the removal of concrete slabs, earthworks and enabling works to verify the final site condition and to assess any unforeseen ground contamination or structures such as underground tanks (if present).

(c) The results of the site investigation and detailed risk assessment referred to in (b) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken. The strategy shall include all works to be undertaken, proposed remediation objectives and remediation criteria, an appraisal of remedial options, and proposal of the preferred option(s), and a timetable of works and site management procedures. The strategy shall ensure that the site will not qualify as contaminated land under Part 2A of the Environmental Protection Act 1990 and shall be suitable for its intended use after remediation.

The report which satisfies Condition 10 Part C is the Remediation Strategy, SHR-RAM-NB-RP-G-RemStrat, dated: 18/08/2021 (provided at Appendix 3). This report outlines the Remediation Strategy for the Station Hill North Site based on the risk assessment previously undertaken. The following pre-development remedial works and development led mitigation works (relating to Phase 2) have been identified for the site and are detailed within the report:

Pre-development remedial works:

- Excavation and off-site disposal of potentially contaminated Made Ground within the north of Phase 2

- Further assessment of previously identified hydrocarbon hotspot in groundwater (and associated soil impacts, if encountered) in the vicinity of BH204 (southeast of Phase 2).

Development led mitigation works:

- Excavation and removal of shallow Made Ground during enabling works.
- Capping System.
- Potential Ground Gas Protection Measures.
- Water Supply Pipe / Service Corridors.
- Piling Risk Assessment / Foundation Works Risk Assessment.
- Borehole Decommissioning.

A regular watching brief will be implemented by Ramboll during the remediation and earthworks with more frequents visits focussed on previously identified contamination and in areas with limited investigation to date. Verification reports will be produced upon completion of the earthworks. Separate verification reports will be issued for Phase 2 relating to the former Temporary Events Area (north) and the multi-storey NCP car park (south).

(d) A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in (c) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.

Section 8 of the Remediation Strategy (Appendix 3) provides the verification plan. Therefore, the Remediation Strategy relates to discharge of 10(d). A summary of the remediation strategy is provided above.

(e) In the event that contamination not previously identified is found at any time when carrying out the development of the Phase 2 site, development shall be halted on that part of the site and shall be reported in writing to the Local Planning Authority. Following that an assessment of the nature and extent of contamination shall be undertaken and where remediation is necessary a remediation scheme, together with a timetable for its implementation, shall be submitted to and approved in writing by the Local Planning Authority.

The measures in the approved remediation scheme shall be implemented in accordance with the approved timetable. Following completion of measures identified in the approved remediation scheme, a validation report shall be submitted to and approved in writing by the Local Planning Authority.

The development of the Phase 2 site shall only be undertaken in accordance with the approved details in (a)-(e) above, as relevant, save to the extent that the Local Planning Authority approves any variation(s) to the approved details.

Summary

This Statement outlines the relevant reports and assessments which have been prepared previously and support the discharge of Condition 10 Parts A, B, C and D.

Part E remains to be ongoing, and the Contractor will ensure that Condition 10 Part E is complied with should any contamination not previously identified be found at any time.

A part-time environmental watching brief is currently being undertaken by Ramboll to assess the ground conditions as work progresses on site. The information obtained on these visits will provide the basis for the Verification Report to satisfy Condition 10 Part E. The watching brief visits also satisfy the requirement for dealing with previously unforeseen contamination, Part E of the condition.

Once excavations and piling are complete on Phase 2, the Verification Report will be provided (Part E of Condition 10).

Please do not hesitate to contact me if you have any questions.

Yours sincerely

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APPENDIX 1
GEOECHNICAL AND GEOENVIRONMENTAL DESK STUDY

Intended for

Station Hill

Document type

Report

Date

October, 2018

STATION HILL

GEOTECHNICAL AND GEOENVIRONMENTAL DESK STUDY

RAMBOLL

Revision History

Revision	Date	Purpose / Status	Document Ref.	Comments
I01	16/10/18	First Issue	1620004761-SHR-RAM-GE-001-Desk Study	For Information

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EXECUTIVE SUMMARY

Scope	
Purpose of the Report	The purpose of this report is to highlight potential geotechnical and geo-environmental based hazards associated with the development site and to identify where further assessment may be required to inform a strategy addressing identified risks. The report and site surveys will allow recommendations to be made on potential foundation and substructure options for the redevelopment. This report also identifies the key design drivers, residual risks and areas which will be the focus of the next stage of the design.
Proposed Development	The proposed development at the time of writing consists of the demolition of the existing buildings. With the subsequent construction of four residential (plots A,D,E,F) and two office buildings (plots B & C) varying from 8 to 32 storeys.

Site Information			
Grid Reference	471370, 173710	Approx. Area (ha)	3.15
Current Site Description	The site is located in central Reading, bounded by Friars Street to the south, Greyfriars Street to the west, Reading train station and Station Hill road to the north, along with Thames Tower immediately adjacent to the site in the northeast. A number of commercial outlets bordering the site in the south west and south east along Friar Street represent the southern boundary of the site. The Site itself is bisected by Garrard Street splitting the site into a northern and southern section. The northern section hosts a multi-storey car park that is still in use, Xafinity House, and a Temporary Events space which occupies the area of the recently demolished Retail Parade, Western Tower, and former Bingo Hall and Bus Station. The southern section of the site hosts the now disused Telecoms House and the Friars Walk Shopping Centre, being used as a Zombie experience setting.		
Site History	Historical maps date back to 1879, when the site was occupied by terraced housing, a Malt House, a Timber Yard, and a Coal Yard. The remaining northeast section of the site consisted of open fields and woodland. During the 1900s, the site became more developed with a large building constructed in the centre of the site by 1931. From the 1940s onward a factory is observed in the northwest corner of the site in 1957, with the large central building being labelled as a garage. A number of depositories and warehouses were then built on the site, with a carpark present by the 1960s. By the late 1960s a ballroom had been constructed on the western portion of the car park along with a bus station. A coal yard was present in the south of the Site, and Western Tower and its adjoining office block had been built along the northern boundary of the Site. The garage, houses and factory were eventually demolished sometime before 1980 to make way for a multi-storey car park in the centre, an office building in the west and Friar's Walk Shopping Centre, which included a rooftop car park.		
Unexploded Ordnance	London and Greater London is renowned for heavy bombing during World War II and unexploded ordnance (UXO) may present a risk to construction projects. Given Reading's proximity to London it may also be at greater risk. Unexploded ordnance often entered the ground unnoticed and at high velocity and are still buried beneath the surface. 1st Line Defence were commissioned by Ramboll to undertake a Preliminary Express UXO risk assessment and found there to be a "minimal" risk and recommended that no further research be carried out on the site.		
Services and Utilities	Several utility companies were contacted by the Project Manager (Cast). The information made available to Ramboll revealed that Friars Street, Garrard Street, and Greyfriars Road all host a high density of services. There are also a number of known services which cross the site, including a Thames Water deep foul sewer, reportedly flowing west to east across the northern section of the site, with three smaller sewers branching off.		

Environmental Setting	
Geology	The geology of the site comprises superficial deposits of Alluvium and the Taplow Gravel Formation, underlain by the Upper Chalk Formation, the upper layers of which comprise variable and significant thicknesses of Structureless Chalk. This information has been taken from borehole data from a previous site investigation completed by Waterman in 2014, and borehole records from nearby developments, in particular, the Thames Tower.
Groundwater	Groundwater was encountered in seven exploratory locations during the ST Consult intrusive investigation. Revealing shallow groundwater, within the Alluvium, Taplow Gravel Formation, and Upper Chalk Formation. At depths of between 2.7 mbgl and 5.3 mbgl, usually at or near the boundary of the Alluvium and Taplow Gravel Formation, or within the Structureless Chalk when they are absent. The groundwater monitoring indicated water levels between 2.15 mbgl and 2.75 mbgl, corresponding to 36.07m AOD and 36.44 AOD.Isolated perched groundwater bodies may also be present within parts of the Made Ground or Fill.
Hydrology	The nearest surface water feature is a drainage network 320m northwest of the site, associated with the railway line. Followed by the easterly flowing River Thames which, at its closest point, lies 420m northeast of the site. The river Kennet is located approximately 500m southeast of the Site and also flows in an easterly direction..
Hydrogeology	The Made Ground is classified as an Unproductive Strata, with the Environment Agency classifying the Alluvium and Taplow Gravel Formation as Secondary A Aquifers and finally the Upper Chalk Formation is classified as a Principle Aquifer. The Site is not located within a Source Protection Zone (I, II, III). There are 12 recorded groundwater abstractions within a 1km radius of the Site, the closest of which is located 0.16km to the southwest of the Site associated with a Primark and used as drinking and washing water.

Conclusions	
Foundation Recommendations	The foundation options which are deemed potentially feasible for the proposed structures at this stage are as follows: • shallow foundations comprising a raft founded on the Taplow Gravel Formation combined with potential ground improvements for the lower rise buildings; and/or • piled foundations founded within the lower part of the Upper Chalk Formation A raft foundation solution may be feasible for some of the smaller buildings located in the South Site. This solution can be used to spread column loading across a large ground area. The stiffness of the raft assists in limiting total and differential settlements for moderate column loads. Uplift due to water pressures on the underside of the raft should also be considered in both temporary and permanent cases . A fully piled solution is considered feasible for the larger buildings in the northern section of the development. These could be constructed by boring, driven cast-in-place piles or continuous flight auger (CFA) piles, although CFA piles are considered most suitable for the development, as they are relatively quiet and cause limited vibrations. This is dependent on the depth of the formation level and the depth of the rock head. Piles would

	be considered to be founded within the structured chalk of the Upper Chalk Formation, i.e. beneath the structureless chalk. Piled foundations offer the opportunity to construct any potential basement top down (i.e. build structure while excavating basement). Reinforcement cages and large plant are required on site and hence a piling mat is likely to be required. It should be noted that piles can produce pathways for the vertical downwards migration of contaminants, should they be identified, in the upper soils to important aquifers at lower levels.
Geotechnical Risk Assessment	The preliminary geotechnical risk assessment identified that previous ground investigations only cover the northern section of the site, and only one exploratory hole extended below the structureless chalk. The ground conditions in this report have been inferred from the available borehole records from surrounding buildings in particular Thames Tower. The main risks, particularly in the South Site, include the variable/unknown thickness of the Structureless Chalk across the site; the corresponding variable/unkown depth of the structured chalk; the thickness of Alluvium and Taplow Gravel Formation;the presence of buried services and obstructions (e.g. former foundations and/or retaining walls and Thames Water Assets); the unknown thickness, chemical composition and gas generation potential of Made Ground / Infill and Alluvium across the site.
Preliminary Contamination Risk Assessment	The preliminary contaminated land risk assessment has identified a number of sources of potential contamination, including current and former land uses at the site and in the surrounding area. The site has been previously occupied by a garage, car park, coal yard and bus station. The historical maps illustrate a garage located in the centre of the site with a car park and bus station constructed by the early 1960s. A coal yard was present to the south of the site. The historical data report from Envirocheck identified two potentially fuel related tanks on site. Whilst no tanks were identified during the site walkover (September 2018), residual contamination may be present. In addition, three electrical sub-stations were noted across the site during the site walkover, with unknown potential for release of PCBs. A review of the surrounding areas history highlighted industrial land use within 100m of the site. The Great Western Railway runs parallel to the site boundary 60m north, since before first maps in the late 1870s. Garages were situated 90m southwest and 50m southeast of the site by 1957. Engineering works were identified on the historical maps to the northwest and north of the site. Four electrical sub-stations were also identified within 80m of the site. Historical Building Plans Information has identified three underground fuel tanks and oil storage within 100m south of the site. As such there is the potential for ground contamination from off-site sources, which could migrate onto site as a result of groundwater migration. Based on a review of the historical and current uses of the site and the surrounding area, potential risks from potential contamination to both human health and controlled waters is considered likely to be **Low/Moderate**, dependent on which receptor or pathway is being considered. Potential risks from ground gas are assessed as **High.** It is recommended that an intrusive Ground Investigation is undertaken prior to redevelopment at the site, in order to properly characterise the ground and groundwater conditions at the site and identify any potential contamination. The findings of the Ground Investigation should be used to inform the design and construction of the proposed development and identify whether mitigation measures or remediation is required. Information on contamination is also likely to be required as part of the planning process for the future proposed development of the site.
Recommendations	

Scope of Work for Site Investigation	It is essential that further liaison with Thames Water's and other utility owners technical experts is undertaken in order to attain as-built drawings and sections and an accurate location plan of their assets adjacent to and on the site. It is recommended that a phased ground investigation be carried out at the site, in order to:
	
	• Undertake a full geotechnical and geo-environmental assessment of the site to facilitate design of the foundations and substructures for the proposed development. This should include a Ground Investigation and geotechnical design reports, in accordance with Eurocode 7. An intrusive Ground Investigation is recommended to be carried out at site in order to:
	  ○ Target the anticipated location of principal existing foundations and delineate significant party wall foundations adjacent to, and bounding the site. It is likely that this investigation would be combined as a phased structural and environmental assessment. Details of ground investigation works and additional intrusive works will be determined at a later project stage.
	  ○ Establish the underlying ground conditions across the site and geotechnical engineering design parameters for substructure (foundation and retaining wall) design – this should include in-situ and laboratory geotechnical testing;
	  ○ Determine the presence and chemical composition of the Made Ground / Infill through targeted and representative soil sampling;
	  ○ Determine the presence of any potential contamination in natural soils through targeted and representative soil sampling;
	  ○ Undertake a Waste Assessment to determine the status of the soils to be removed as part of the construction works;
	  ○ Characterise the underlying groundwater and ground gas regimes through sampling, monitoring well installation and the development of a monitoring program;
	  ○ Prior to demolition, a pre-demolition asbestos survey should be completed (in accordance with HSG 264, 2012) and any residual ACMs removed for disposal at a suitable licensed facility;
	  ○ Identifying extent of significant foundations for current developments on site prior to demolition works;
	  ○ Qualitatively identify the risk of encountering significant subsurface obstructions such as historic foundations, potential archaeological findings or existing services;
	  ○ Assess the need for stability assessments of adjacent third-party structures or assets.

1. INTRODUCTION

1.1 Brief

Ramboll has been appointed by cRTKL to provide a Geotechnical and Geoenvironmental Desk Study for the Station Hill site, as part of the redevelopment. Both north and south sections of the site, as defined in Drawing 1, are covered in this report.

The purpose of this report is to highlight potential geotechnical and geoenvironmental based hazards associated with the development site and to identify where further assessment may be required to inform a strategy for addressing the identified risks. The report and existing site surveys allow preliminary recommendations to be made on potential foundation and substructure options for the redevelopment. This report also identifies the key design drivers, residual risks and areas which will be the focus of the next stage of the design.

1.2 Proposed Development

The proposed development currently comprises six plots, A-F. Plots A and D are situated north of Garrard Street and both comprise 15 storeys of proposed residential accommodation. Plots B and C are also situated north of Garrard Street and are to contain 19 and 30 storeys of office space. Plots E and F are located south of Garrard Street and both will host residential accommodation, with Plot F consisting of 12 storeys, and Plot E split over 12, 10, and 6 storeys.

1.3 Objectives

The objective of this Geotechnical and Geoenvironmental Desk Study is to collate and review available information regarding the existing site conditions and existing structures which may potentially have an impact on the development proposals and the geological succession and hydrogeological conditions beneath the site, in order to identify potentially significant geotechnical and geoenvironmental hazards and constraints to the proposed development. Moreover, the aim of this report is to make recommendations for further Ground Investigation and to describe options for substructure solutions for the Phase 1 development works. The report also defines the constraints at the site.

The objectives of this report are:

- To identify the existing ground based site conditions based on desktop research, site walkover surveys and through consultation with relevant authorities and stakeholders;
- To review the existing ground conditions based on information from the British Geological Survey (BGS), previous site investigation works and anticipated geology of relevance to the site, contamination source records on or adjacent to the site, and key obstructions, constraints and services;
- To assess potential foundation design constraints and outline preliminary substructure options; and
- To compile a Hazard Register detailing the identified ground based risks relevant to the proposed scheme, and ultimately a set of recommendations for future work shall be made based on the findings within this report.

1.4 Constraints and Limitations

The information within this report is based on data presented by the Landmark Information Group in their Envirocheck report and other resources such as the ST Consult 2014 ground investigation, and consultation with relevant parties and statutory authorities. A summary of the consultation undertaken during the preparation of this report is presented in Section 3.

This report has been prepared for the exclusive use of cRTKL for the purpose of assisting them in evaluating the site in the context of the outlined development. This report should not be used in whole or in part by any third parties without the express permission of Ramboll in writing. Ramboll has endeavoured to assess the accuracy of all information provided during this Geotechnical and Geo-environmental Desktop Study. Ramboll cannot accept any liability for the accuracy or otherwise of any information derived from third party sources.

The preliminary substructure design options provided in this report relate to details of the proposed development at the time of writing. Any substantial changes to the proposed development may require a reassessment of the implications of the hazards identified.

2. EXISTING INFORMATION

Information provided by the Client and archive information that has been made accessible in relation to the site and proposed development is summarised in Table 2.1.

Table 2.1 - Documents Reviewed (see also References)

Title	Institution	Date
Geo-Environmental and Geotechnical Assessment	Waterman	September 2014
Factual Ground Investigation Report	ST Consult	May 2014
Ground Investigation Specification	Waterman	February 2014
Post Demolition Ground Investigation Specification	Waterman	July 2015
Preliminary Environmental Risk Assessment	Waterman	February 2013
Flood Risk Assessment	Waterman	March 2013
Written Scheme of Investigation (Archaeological)	Waterman	June 2017
Archaeological Evaluation and Watching Brief Report	Archaeological South-East	March 2016
Rights of Light Report	GIA	April 2017
Envirocheck Report	Landmark	February 2012
Utility Infrastructure Report	Hoare Lea	July 2014
Site Investigation Report (Thames Tower)	Concept	July 2012

2.1 Geological and Geotechnical Information

Available BGS records, in conjunction with site specific ground investigation data from ST Consult and data from the adjacent Thames Tower development, were consulted to identify the geology on site.

The following BGS records were reviewed:

- Reference the BGS map.
- Maybe also reference the Regional memoirs.
- Reference any relevant historical boreholes.

The ST Consult investigation comprised:

- 5 No cable percussive boreholes to a depth between 6.5m and 12.5m bgl.
- 2 No follow on rotary boreholes to depths of between 16 and 25m bgl.
- 1 No rotary Borehole to 30.2m bgl.
- 1 No flight auger borehole to 12m bgl.
- 2 No DPSH Probes.

Thegeotechnical factual report done for the site investigation of the neighbouring Thames Tower consisted of:

- 3 No Rotary Cored Boreholes to a maximum depth of 30.45m
- 2 No Windowless Sampling Boreholes to a maximum depth of 6.00m
- 3 No Observation Pits to a maximum depth of 3.45m
- 2 No Diamond Cored Holes
- Falling Head Tests
- Parallel Seismic Testing
- Geotechnical and Chemical Laboratory Testing

Geological Information from the Landmark Envirocheck report that was ordered as part of the Preliminary Environmental Risk Assessment has also been reviewed.

A summary of the findings of these sources are discussed in Section 3 with an assessment of the geotechnical implications and risks presented in Section 8.5.

2.2 Topographical Information

The study area is covered by Ordnance Survey (OS) maps at various scales and these illustrate the topography with contours.

Topographical information for the site is included in historical site surveys by XYZ Land Surveys covering the north section of the site. Utilities plans which include topographical information have also been reviewed which cover the majority of the south section of the site.

2.3 Hydrogeological Information

The Envirocheck report (2018) was reviewed for hydrogeological information. Further information on the hydrogeology of the site, including bedrock aquifer designation, has been obtained from the Flood Risk Assessment (2018) and also the EA website.

The key findings from these documents are discussed in Section 4.1 and Section 6.3.

2.4 Environmental Data

The Envirocheck report provides a range of mapping and geographical data for the UK; including information from public registers and other relevant records provided by the Environment Agency, British Geological Society, English Nature, Countryside Agency, Department of Environment, Transport and Regions, The National Radiological Protection Board and the local council. Key findings from the Envirocheck report are detailed within Section 5.1.

2.5 Historical Maps

Within the Envirocheck report (2018), a series of digital scans of original and reprinted maps dating back to the Country Series Maps published in 1879-1880 are available. The maps represent specific times and are therefore not a continuous record. A summary of the potential historical geotechnical and contaminative features surrounding the Station Hill site are summarised in Section 6.

2.6 Unexploded ordnance records

The Zetica website provides information on the unexploded ordinance risk across the UK. Information relating to Reading has been reviewed and a summary can be found in Section 6.3. A preliminary Express UXO risk assessment undertaken by 1st Line Defence classified the risk level as 'Minimal'.

2.7 Utilities

Hoare Lea was commissioned to produce a utility Infrastructure Report. The client has also provided information from the following:

- Energis
- Fibernet

- XYZ Land Surveys
- Kingston Infrastructure
- Ntl
- Scottish and Southern Energy plc
- Thames Water
- GallifordTry
- 40seven
- Peter Brett Associates

These have been reviewed and a summary can be found in Section 5.2. It should be noted that the report was completed in 2014, an additional asset search will be required in the future.

2.8 Previous Reports

A Geo-Environmental and Geotechnical Assessment and Preliminary Environmental Risk Assessment have previously been issued by Waterman. Additional information from archive and anecdotal findings / relevant excerpts for the proposed development and site area has been included within this report.

2.9 Archaeology

An Archaeological evaluation and Watching Brief has been completed by Archaeological South-East and a corresponding Written Scheme for Investigation done by Waterman. Archaeological artefacts may be of concern for excavations – significant finds have been made within the immediate area and further assessments may be required.

3. THIRD PARTY REPORTS

Waterman Ltd had undertaken a preliminary risk assessment as well as the geo-environmental and geotechnical assessment at the subject site. Ramboll has reviewed the following reports to better understand the possible sources, pathways and receptors for ground contamination assessment of the site;

- Preliminary Environmental Risk Assessment - Station Hill, Reading; Waterman Energy, Environment & Design Ltd, dated February 2013; and
- Geo-Environmental and Geotechnical Assessment – Station Hill, Reading; Waterman Energy, Environment & Design Ltd, dated September 2014

3.1 2013 Preliminary Environmental Risk Assessment

This report covers the north side of the site; the south side was largely inaccessible during the investigation in 2013. Appended **Drawing 1** illustrates the current site area boundary in relation to the extent of previous site investigation (North Side).

At the time of the report, the site was described as a largely derelict mixed-use city centre site with a disused shopping centre, high rise tower block, an active multi-storey car park, bus station, taxi rank and an office block. Historical maps indicated that the site uses previously included a coal yard, garage and car park in the centre portion of the site, a factory in the northwestern corner, a bus station in the western portion and a coal yard in the south. A tank was noted in the centre of the site in the later historical maps (1968-1984). After the 1980s, a multi-storey car park, an office building in the west and a shopping centre including a car park were constructed.

During a site walkover, potentially contaminative activities on site were identified by Waterman. These include run-down building fabrics (for asbestos containing materials) oil staining within the car park, waste food oil staining, presence of two tanks within Mecca Bingo and a switch room; and three electrical sub-stations.

The site as a whole was deemed to present a medium overall contamination risk due to the historic land uses, as well as the findings during the site walkover.

The report recommendations included a Phase II intrusive site investigation to be completed prior to the redevelopment works, targeting potential contaminants identified during the preliminary risk assessment. A ground gas monitoring survey was also recommended to provide sufficient data to allow environmental assessment of the site and determine areas which may require additional investigation and/or remediation.

3.2 2014 Geo-Environmental and Geotechnical Assessment

An intrusive geo-environmental investigation designed by Waterman Energy, Environment & Design was carried out following the preliminary risk assessment. Two areas were targeted for the investigation, known as the Temporary Events Space Area and the Outline Application Area (see Figure 7.1). Both were located in the northern part of the current site area.

The investigation comprised the drilling of five shell and auger boreholes, one rotary cored borehole, twenty-two window sample boreholes and seven trial pits. Four boreholes were installed with gas and groundwater monitoring wells. Selected soil and groundwater samples were submitted for laboratory analysis for contaminants associated with the historic and current land uses at the time of the investigation.

The investigation identified Made Ground up to the thickness of 3.75m beneath the site, made up of different soil types. The Made Ground was generally underlain by a layer of silty or sandy gravelly CLAY (Alluvium) between approximately 0.70m and 2.80m in thickness. This is generally underlain by the Taplow Gravel Formation comprised of sandy GRAVEL at 2.95 – 4.30m in depth, which is further underlain by Upper Chalk, which comprised an upper zone of structureless chalk, overlying structured chalk. Groundwater was encountered in seven exploratory holes at a range of depths from 2.70 - 5.30m bgl (below ground level). Ground water was usually ecountered at the boundary of the Alluvium and Taplow Gravel Formation.

Comparison of soil analytical results against Generic Risk Assessment criteria in use at the time of the investigation identified potential risks to future commercial site users associated with metal contamination (principally lead, copper and zinc) and speciated PAHs (poly aromatic hydrocarbons) including benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(123-cd)pyrene and dibenz(ah)anthracene within the Made Ground. Comparison of natural ground against the relevant GAC indicated no exceedances of inorganic and organic contaminants. No consideration of residential site users was completed thus it should be noted that there may be additional risks to the residential receptors currently proposed.

Screening of selected samples for asbestos in both areas of investigation, identified eight samples (out of analysed twenty-three) containing chrysotile asbestos (in the form of free fibres and cement) and amosite (free fibres). Subsequent quantification analysis of asbestos soil gave the maximum value of 0.12% asbestos by weight of the total dried sample.

Four gas monitoring wells were installed, two in natural aluvaium and river terrace gravels and two screening across both Made Ground and natural strata. Concentrations of carbon dioxide were recorded to a maximum 9.1%. Depleted oxygen levels were recorded in the wells with a minimum 5.2%. Carbon monoxide was recorded up to a maximum 8.0ppm, methane up to a maximum 0.4% and the flow rate maximum 2.2l/hr. A Gas Screening Value (GSV) was calculated using maximum flow, carbon dioxide and methane concentrations to provide a Characteristic Situation to assess if any ground gas protective measures are required. Based on the above data, the GSV yielded a Characteristic Situation 2 ("Low Risk") for the site which, in respect to the development proposals, requires low-level gas protective measures.

Comparison of groundwater analytical results against UK Drinking Water Standards, and if absent, against the Environmental Quality Standards identified potential risks to the controlled waters associated with elevated concentrations of ammoniacal nitrogen, benzo(a)pyrene and benzo(ghi)perylene.

Overall the results of the investigation suggest the ground contamination risks are generally low to medium with only limited concentrations of contaminants of concern identified in both soils and controlled waters. Any direct contact pathways between the contaminants and the human health receptors in the Made Ground are expected to be broken given the proposed end use of the site, which comprises of primarily hardstanding cover and soft landscaping areas with at least 450mm of certified clean inert soil cover.

In terms of controlled waters, marginal elevated concentrations of a few contaminants have been identified, however again given the proposed significant percentage of hardstanding and the low concentrations, the pollutant linkage between site soils and the underlying aquifer is not considered to be significant.

Recommendations for future development at the site included:

- Planters and/or capping layers with a minimum thickness of 450mm of clean imported soils are to be used for areas of vegetation, in areas of soft landscaping; and
- A post-demolition ground investigation should be undertaken to provide coverage in currently inaccessible areas; this should include additional environmental and geotechnical assessments.

The Waterman investigations were restricted in area compared to the current site boundary due in part to existing infrastructure. The data obtained is suitable for use to inform the current proposals but will require additional works in areas not previously investigated. The data will also require a reassessment in comparison to generic assessment criteria suitable for the currently proposed development.

4. THE SITE

Information presented in this section is based on observations made during a site walkover undertaken on 1st February 2018, 20th September 2018 and other available desk-based information.

4.1 Site Location

The site is located at National Grid Reference 471370, 173710 on Station Hill, directly to the south of the Reading Mainline Station in Reading town centre. The site occupies approximately 3.15 ha.

A site location plan has been presented as **Drawing 1** of this report, Appendix XXX.

The site is bounded to the north by Reading Mainline Station; to the east by Merchants Place road and a number of commercial use buildings; to the south by Friar Street and further commercial buildings; and to the west by Greyfriars Road. Building heights surrounding the site vary considerably from two and three storey buildings to the southeast to Thames Tower towards the northeast of the site which hosts fifteen storeys and is approximately 53m tall.

4.2 Site Setting

A site walkover was undertaken by Ramboll on the 7th August 2018 and 20th September 2018. A photographic record has been presented as **Appendix A** of this report, and the findings are summarised in **Table 4.1**.

Table 4.1 – A Summary of Walkover Observations (07/08/18) & (20/09/18)

Subject	Notes
Land Use	The North (or northern section of the site) Site has recently been transformed into a temporary events pace following the demolition of the retail parade and bus station. The northwest is occupied by Xafinity House which hosts six storeys of office space. The centre of the site is occupied by the NCP multi storey car park. The south of the site is occupied by the Friars Walk Shopping Centre, currently being used as a Zombie experience setting, and Telecoms House, which hosts retail outlets on the ground floor adjacent to Friar Street. The overlying 5 storeys of Telecoms House are now abandoned office space.
Topography	The ground elevation varies from approximately +41.6m in the west of the site to approximately +46.7m above ordnance datum (AOD)in the east of the site. Then from approximately +46.0mAOD in the north to approximately +45.7mAOD in the south. There is a notable rise along Friar Street with the southern basement level of Telecoms House being at ground level on the north side of the building. The demolished Bingo Hall and Bus Station area is also at a different elevations to surrounding areas, with Station Hill Road to the north gradually rising towards the east and the Temporary Event Space to the east being 2-3m higher. The ground elevation of the multi-storey car park, is also at a lower level than the road on its north side.
Ground Surface	The site is covered by a combination of concrete pavement slabs, brick pavement and asphalt. Any notable features on condition? The site of the former bingo hall and bus station is compacted ground fill.
Services	Surface drains are visible across the site beside roads as well as near building boundaries. In Particular drains were seen in Telecoms house likely feeding a sewer leading to the main Thames Water sewer running beneath the north section of the site. A number of other service manholes were visible accross the site. A Thames Water Main Sewer runs west to east across the north section of the site. With two smaller diameter sewers feeding into it from Garrard Street in the south and one from the north. A full buried services survey is to be commissioned by the project including CCTV of the existing drainage connections.
Site Boundaries	The Reading Mainline Station has recently been redeveloped and contains the creation of taxi rank directly adjacent to the northern boundary of the site. Friar street adjacent to the southern boundary of the site is a busy high street, with a number of bus stops occupying the section directly adjacent to the site.
Ground Contamination	No underground storage tanks (USTs) were reported by the site manager to be present at the site and no visual evidence of USTs was noted by Ramboll during the site inspection (such as unexplained manhole covers, vent pipes, fill points or signage). No above ground storage tanks (ASTs) were reported to be present at the site by the site manager and no visual evidence of current or former ASTs was observed by Ramboll during the site walkover (such as concrete plinths, marking or staining on areas of hardstanding). Three electricity sub-stations were observed to be present on site therefore the possibility of PCB containing oils cannot be ruled out. Responsibility of PCB oils would lie with the sub-station operators. No other potential PCB-containing equipment was observed by Ramboll during the site inspection. No waste is being generated on site as it is currently vacant. No activities with the potential for ground contamination were identified during the site walkover.
Other Observations	A taxi rank is present on Garrard Street. The site of Western Tower and Retail parade is now being used as a Temporary Events Space and is open to the public. The multi storey carpark is also still in use. The Friars Walk Shopping Centre is being

Subject	Notes
	used as a zombie experience and airsoft location. The section of the 1st floor carpark that extended over Garrard Street has now been demolished.

5. CONSULTATION

The agencies, authorities, organisations and individuals which have been contacted and/or their records reviewed during the course of this study are listed in **Table 5.1**.

Table 5.1 - List of Parties Consulted During the Study and Details of Responses

Institution	Consultees	Responses
Envirocheck / Landmark	Envirocheck / Landmark Reports	Landmark was commissioned to collate statutory information pertaining to the site. The information obtained is presented in public registers and includes other relevant records provided by the Environment Agency, British Geological Survey, English Nature, Countryside Agency, Department of Environment, Transport and Regions, the Health Protection Agency and the Local Authority. Historical building records are also included within the Envirocheck report, further detailed in Section 5.1 and presented in **Appendix B** of this report. The information was collated by Landmark, with an Envirocheck report issued on the 7th February 2018, included as **Appendix B** of this report.
Thames Water	General Enquiry	Hoare Lea are currently leading the early stakeholder engagement regarding the Thames Water assets running beneath the north section of the site. Highlighted to Thames Water was the proposed development proposal in order to understand whether a specific damage assessment was required for their assets. Prior to engagement, water utility plans were received from the prior Waterman investigation. As-built drawings and sections for the site and the surrounding area will be requested from Thames Water.
1st Line Defence	Scott Mundy	1st Line Defence was contacted to quote for a preliminary UXO risk assessment.

5.1 Envirocheck Reports

A summary of the environmental search information obtained from the Envirocheck report (ref. 179269911_1_1) is presented in Table 5.2. The data sheets provided within the reports are included in **Appendix B**. All distances quoted are from the site boundary.

Table 5.2 - Summary of Salient Information from the Envirocheck Database

Issue	Location	Information
Agency & Hydrological		
Groundwater Flooding Susceptibility	On Site	The site is located within a Flood Zone 1 and therefore has a low probability of flooding from rivers or sea (less than 1 in 1000 annual probability of river or sea flooding). The site resides in an area that has a very low to high flood risk from surface water, with the high risk zone noted in the centre of the site.
Licensed Discharge Consents	Two (2No.) within 500m Eight (8No.) within 1000m	No discharge consents are listed at the site, or within 250m of the site. The nearest active discharge consent is located 300m north-east of the site, for trade effluent which discharges into The Vastern Ditch. The permit was issued in December 1999.
Nearest Surface Water Feature	One (1No.) within 500m	The nearest surface water feature is a drainage network 320m northwest of the site, associated with the railway line.
Pollution Incidents to Controlled Water	One (1No.) on site. Five (5No.) within 250m.	One 'Category 3 – Minor' pollution incident to controlled waters is listed at the site. It had occurred in April 1993, and pollutant listed is 'Oils – Unknown'. The closest 'Category 2 – Significant Incident' was recorded 570m north-east of the site. It had occurred in March 1996, with 'Miscellaneous – Unknown' pollutant entering the controlled waters.
Substantiated Pollution Incident Register	One (1No.) within 500m. Two (2No.) within 1000m.	The closest substantiated pollution incidents are registered 450m southeast of the site. It has been classified as 'Category 2 – Significant Incident' for water impact and 'Category 4 – No Impact' for air and land impact. The incident is dated June 2005 and the pollutant is 'Oils – Diesel (Including Agricultural)'.
Groundwater Vulnerability	On Site	The nearest groundwater vulnerability information is noted to be on site with the following soil classification: Soils of High Leaching Potential (U) - Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst-case vulnerability classification (H) assumed, until proved otherwise.
Drift Deposits	None	No drift deposit information is noted for the site within the Envirocheck Report. However, BGS (British Geological Survey) geology online resources suggest that Alluvium is present at the site and Taplow Gravel Formation may be encountered underneath this.
Bedrock Aquifer Designations	On Site	The bedrock underlying the site is classified as Principal Aquifer.
Superficial Aquifer Designations	On Site	Superficial deposits underlying the site are classified as Secondary A Aquifer.
Incidents and Enforcements	Fifteen (15No.) within 1000m	One (1No.) Contaminated Land Entries & Notices is recorded 710m to the west of the site. No Enforcement Prohibition Notices are recorded at the site or within 1000m radius of the site. Two (2No.) Local Authority Pollution Prevention and Controls are recorded within 500m of the site, and further twelve (12No.) are recorded within 1000m of the site. The nearest is recorded 290m southeast of the site, at Sketchley Dry Cleaners; the permit application is not yet authorised.
Waste		
Local Authority Landfill Coverage	Two (2No.) within 1000m	No BGS recorded landfill sites, local authority recorded landfill sites or registered landfill sites are recorded at the site or within 1km of the site. Two recorded historical landfill sites are located within 1000m of the site, with the closest recorded 720m northwest of the site. It was in operation between December 1970 and December 1979, and deposited waste included commercial and household waste, and liquid sludge. A second historical landfill site is located 970m west of the site, which has been in operation between December 1950 and December 1959. The deposited waste included inert waste.

Issue	Location	Information
Potentially Infilled Land (Non-Water and Water)	One (1No.) on site. Four (4No.) within 500m Eleven (11No.) within 1000m	One (1No.) record of Potentially Infilled Land (Water) was recorded onsite, however, the use is unknown. It is located beneath Garrard Street Multi Storey Car Park. No Potentially Infilled Land (Non-Water) was recorded within 1000m of the site.
Geology		
Coal Mining Affected Area	None	The site is not located in an area that might be affected by coal mining.
Non-Coal Mining Areas of Great Britain	On Site	The site is classified as highly unlikely to be located on Non-Coal Mining Areas of Great Britain.
Potential for Collapsible Ground Stability Hazards	On Site	The site is located in an area where there is no hazard to very low hazard potential for being affected by collapsible ground stability.
Potential for Compressible Ground Stability Hazards	On Site	The site is located in an area where there is no recorded hazard of being affected by potential for compressible ground stability in the south. Moderate hazard potential has been identified to the southwest of the site.
Potential for Ground Dissolution Stability Hazards	On Site	The site is located in an area where there is very low hazard of being affected by potential for ground dissolution stability.
Potential for Landslide Ground Stability Hazards	On Site	The site is located in an area where there is a very low hazard potential for being affected by landslide ground stability.
Potential for Running Sand Ground Stability Hazards	On Site	The site is located in an area where there is a very low to low hazard potential for being affected by running sand ground stability.
Potential for Shrinking or Swelling Clay Ground Stability Hazards	On Site	The site is located in an area where there is a no hazard to very low hazard potential for being affected by shrinking or swelling clay ground stability.
Radon Potential - Radon Affected Areas	On Site	The site is located in a Lower Probability radon area (less than 1% of homes are estimated to be at or above the Action Level). The Envirocheck Report states no radon protective measures are necessary in the construction of new dwellings or extensions.
Industrial Land Use		
Contemporary Trade Directory Entries	Eleven (11No.) within 250m	There are no active records of contemporary trade directory entries at the site. The nearest active contemporary trade directory entry is recorded 66m southwest of the site for Everest Jewellery, classified as Jewellery Manufacturers & Repairers. Eleven (11No.) are located within 250m, 20No. within 251-500m and 80No. within 501-1000m of the site.
Fuel Station Entries	Five (5No.) within 1000m	There is no open fuel station on site or in the nearest 500m radius. The closest fuel station entry is located 680m northwest of the site and it is operated by BP.

Issue	Location	Information
Points of Interest - Commercial Services	Eleven (11No.) within 250m Twenty-seven (27No.) within 1000m	The closest commercial service point of interest is located 150m west of the subject site at 45 Caversham Road, occupied by the National Tyres and Autocare and Hiq Tyre Services. Further 92No. commercial service points of interest are located within 1000m.
Points of Interest - Manufacturing and Production	Three (3No.) within 250m Fifteen (15No.) within 500m.	The closest manufacturing and production point of interest is located 40m southeast of the site at 1a Merchants Place, occupied by Works (Industrial Features). Further 60No. manufacturing and production points of interest are located within 1000m of the site.
Points of Interest - Public Infrastructure	One (1No.) on site Eight (8No.) within 250m	Reading Rail Station is located 50m north-east of the site. Further 9No. points of interest are recorded within 500m; and 34No. within 1000m of the site.
Sensitive Land Use		
Marine Nature Reserves	None	None are located within 2000m of the subject site.
Nitrate Vulnerable Zones	On Site	A nitrate vulnerable zone of surface water is located on site (Thames Wallingford to Caversham NVZ).
Ramsar Sites	None	None are located within 2000m of the subject site.
Sites of Special Scientific Interest	None	None are located within 2000m of the subject site.
Special Areas of Conservation	None	None are located within 2000m of the subject site.
Special Protection Areas	None	None are located within 2000m of the subject site.

The Historical Building Plans date back to 1885 and were produced as fire insurance plans; the production of these plans ceased in 1970.

Historical Building Plans Information identified three underground fuel tanks and a potential oil store 70m and 90m south of the site, respectively. Gas engine was identified 60m south of the site. Asbestos has been identified on the historical maps within 100m of the site, with the closest located 30m south of the site. There could still be a risk of asbestos being present on site and will need to be searched for. Paint Based Oils were identified to be located 100m south of the site.

Historical Tanks and Energy Facilities data has been obtained and the dataset identifies four electrical sub-station facilities within 100m of the site, with the nearest located 10m southwest of the site. Two potentially fuel related tanks have been identified on site and one within 100m of the site. These were identified on maps between 1957 – 1969 and were located to the east and south of the site. One further tank has been identified to the north of the site, on the 1969 map.

5.2 Services and Utilities

Several utilities companies were contacted by the Project Manager (Cast). Information regarding the services is included in **Appendix C**. Utilities interactions are to be addressed in detail by the project MEP design consultant and subsequently the main contractor.

Energis plans (dated 24/06/03) show cables running below Greyfriars Road and Garrard Street, with Flex points identified as being within the site boundaries.

Fibrenet plans (dated 18/06/03) show a duct running along the northern boundary down past Thames Tower and into Garrard street before heading down Merchants Place.

XYZ Land Surveys drawings (dated 06/03) also highlight that there are a large number of utilities running along the roads on the boarder of the site and under Garrard Street running through the middle of the site. There is also a number of utilities identified running through the site away from the roads.

A Kingston Infrastructure drawing (dated unknown) also shows a duct containing fibre optic cables running along Garrard Street.

As of 08/09/03 Ntl is known to have fibre optic cables running below Garrard Street.

Scottish and Southern Energy plans (dated 27/06/2003) also have electric/gas assets present on site in particular in the southern section of the site beneath Friars Walk Shopping Centre, and around the north, west and south edge of Thames Tower.

Thames Water plans (dated 25/06/03) also have a number of assets running around the site in particular a Main Sewer which runs west to east across the north section of the site.

Despite the evidence showing that the majority of services lie outside of the site boundary, it is recommended that utility scans are undertaken prior to any intrusive works at site to ascertain any potential risks underlying the development area from local utilities and connections.

6. SITE HISTORY

6.1 Introduction

The detailed history of the site and environment has been determined with reference to published literature and Ordnance Survey (OS) Maps dating from 1802 to 2018 obtained as part of the Envirocheck (ref. 37687984_1_1). Salient findings are summarised within **Table 6.1** below. Copies of the historical map data are contained within **Appendix B**.

Table 6.1 - Summary of Historical Mapping

Historical Map (Scale)	Site	Surrounding
Pre 1900's		
1802	Gardens and undeveloped land with drainage ditch.	Residential buildings on Friar Street to the south and open fields to the north.
1879 1899	By 1879, the southwest corner and southern boundary of the Site were occupied by terraced houses, with some larger houses and a **timber yard** located along the western boundary. A few additional houses were also situated on the east side and to the south of the Site. Livery stables were noted to be present in the northeast corner of the Site. A **malt house** and a **coal yard** were located in the central portion, with the remainder of the Site consisting of open fields and an area of woodland. The 1899 Ordnance Survey map indicates the presence of an irregular oval feature in the centre of the Site.	The Great Western ***railway***, situated approximately 60m north, ran parallel to the Site's northern boundary. A ***gasworks*** company was located approximately 100m southeast and east of the Site and was no longer operational by 1879. By 1879 the Royal Horse and Carriageway Depository was constructed approximately 60m southeast of the Site. To the west of the Site, a ***cattle market*** is shown. A ***rifle factory*** was located approximately 12m northwest. A ***timber yard*** is present approximately 20m to the west. Two ***coal yards*** are located approximately 80m to the northwest and 80m to the southwest. A ***veterinary infirmary*** is present, adjacent to the western boundary. Roughly 60m to the east of the Site, near to the station, a ***railway terminus*** had been erected. A ***brewery*** is marked approximately 80m west. Garrard Street was constructed by 1879. 1899 maps indicate a ***public house*** approximately 50m to the west. In addition, a further ***timber yard*** had been established approximately 170m to the northwest.
1900's to 1940's		
1912 1931	The oval feature is no longer present by 1912. Additional buildings are located towards the centre of the Site. In 1931 a large building had been established in the centre of the Site. A separate building of unknown use was constructed on the east of the Site.	Further residential units, commercial facilities and trade units were constructed around the Site. Ordnance Survey maps indicate that by 1912 an ***iron works*** and ***iron foundry*** had been established approximately 280m northeast of the Site. The 1931 historical map indicates that a ***timber yard*** was operational on the Site of the former ***iron works***. A ***paint works*** is situated adjacent the timber yard. A ***smithy*** is located adjacent to the southeastern boundary.
1940's to 1980's		
1957-1961 1962-1972 1968-1984 1980-1988 1979-1989 1986-1991 1993 1994	In 1957 a ***factory*** is shown in the northwest corner of the Site. The large building in the central part of the Site is shown to be a ***garage***. Two depositories are also marked to the south which had turned into warehouses by the early 1960s. By the early 1960s the central, unused area of the Site was made into a ***car park***. By the late 1960s a ballroom had been constructed on the western portion of the car park along with a ***bus station***. A ***coal yard*** was present to the south of the Site. The Western Tower and its adjoining office block had been built along the northern boundary of the Site and a ***tank*** was located in the centre. The garage, houses and factory were eventually demolished sometime before 1980 to make way for a multi- storey car park in the centre, an office building in the west and Friar's Walk Shopping Centre to the south of the Site, including a roof top ***car park***	By 1957 a ***garage*** resided on the Site of the former paint works to the northeast. ***Garages*** are also situated approximately 90m, 110m and 125m southwest and 50m southeast of the Site. Medieval pottery was found adjacent to the northeast Site border. ***Warehouse*** complexes had established approximately 20m and 100m northwest of the Site. An engineering works was situated 115m northwest. An extensive works Site is marked roughly 150m north, whilst a smaller works unit was located approximately 220m east. An ***engineering works*** occupied the Site of the aforementioned ***paint works*** and a ***railway works*** occupied a portion of the extensive works site to the north. By the late 1960s a ***builders yard*** had been established approximately 60m west.
1980's to present		
	By 1986, the former ballroom was marked as a club. At present the former ballroom has been demolished as has the bus station and shopping arcade in the north of the site and replaced with a temporary events space.	By 1984 ***electrical substations*** were evident 75m east, 25m southeast, and 40m and 50m southwest.

*Potentially contaminative uses are shown in bold italics.

6.2 Cultural Heritage

6.2.1 Archaeology

An Archaeological evaluation and Watching Brief has been completed by Archaeological South-East and a corresponding Written Scheme for Investigation done by Waterman, for the excavation of a site-wide sprinkler and wet riser tank. Archaeological artefacts may be of concern for excavations – significant finds have been made within the immediate area and further assessments may be required. It is considered likely that an archaeological watching brief will be in place during the main/additional/ future site

investigation(s). It is anticipated that the site will be of high archaeological interest based on the presence previous finds in the immediate area. Archaeological experts may be required during the next stage of works to understand and highlight the potential risks on site prior to undertaking any intrusive works.

6.3 Unexploded Ordnance

London and Greater London is renowned for heavy bombing during World War II and unexploded ordnance (UXO) presents a risk to construction projects. Unexploded ordnance often entered the ground unnoticed and at high velocity and are still buried beneath the surface. They have the potential to penetrate to a depth of several meters and present significant safety risks to construction workers and surrounding properties. This is reflected in the number of UXO's found since the war, and it is accepted that a significant risk from UXO exists across the London area. On average, 10% of high explosive and 50% of incendiary bombs failed to explode. Due to Reading's proximity to London it may also be at risk.

As the site is located in Reading a considerable distance from central London, the risk of encountering UXO is lower.. However there were around 20 recorded raids on Reading during the war. The soft alluvial deposits present on site may also mean that the ordance could penetrate the ground to greater depths The online Zetica unexploded bomb risk maps give a "low" risk rating.

A preliminary UXO risk assessment undertaken by 1st Line Defence classified the risk level as 'minimal' therefore no further actions are recommended.

7. GROUND CONDITIONS

7.1 Geology

The anticipated ground conditions beneath the site are discussed in this chapter and have been assessed using the following sources:

- Factual Ground Investigation Report, ST Consult, 2014
- Site Investigation Report, Concept, 2012
- Envirocheck Landmark report, 2018
- British Geological Society historical information

The ST Consult report detailed eight distinct types of made ground, overlying Alluvium. The Thames Tower report also identifies another type of made ground. The The Alluvium then overlies Taplow Gravel Formation, which was split into a sand dominated member, a gravel dominated member, and mixed sand and gravel member. The Taplow Gravel Formation overlies the Upper Chalk, which was split into an upper layer of structureless chalk and a lower layer of very weak to weak medium dense structured chalk.

presents the location of the exploratory holes that formed the basis of the previous site investigation of the northern part of the site. Figure 7.2: Thames Tower Exploratory Hole Location Plan (Concept, 2012)Figure 7.2 shows the location of the exploratory holes for the Thames Tower investigationas well as the approximate location of the Thames Water Main sewer running beneath the site, shown in yellow.

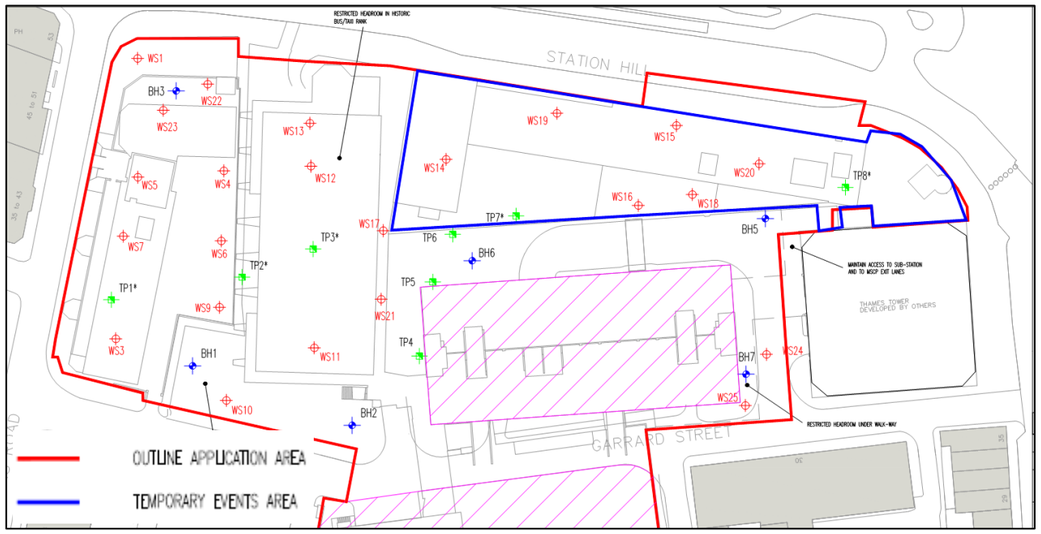

Figure 7.1: Previous site investigation Exploratory Hole Location Plan (ST Consultant, 2014)

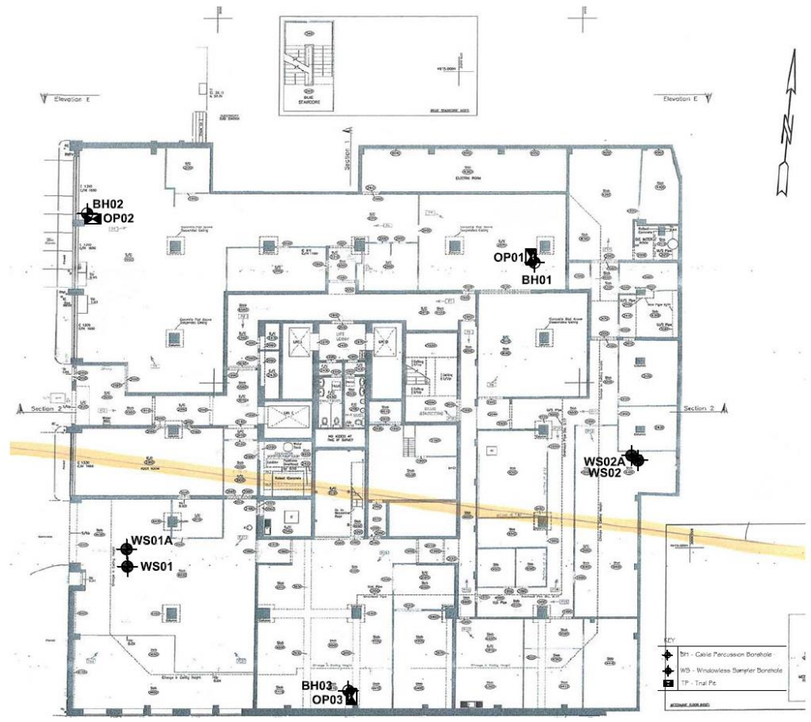

Figure 7.2: Thames Tower Exploratory Hole Location Plan (Concept, 2012)

Made Ground

Made Ground comprises a varying composition and can be split into 9 distinct types detailed in Table 7.1 below.

Table 7.1: Types of Made Ground Encountered in Exploratory Holes ~~during the Waterman 2014 investigation~~

Soil Type	Depth of top of stratum (mbgl)	Thickness (m)	Typical description
Made Ground 1	0 – 0.02	0.04 – 0.45	Hardstanding – Reinforced concrete slab, Tarmac over concrete, Concrete paving slab
Made Ground 2	0	0.5	Dark brown slightly sandy silty TOPSOIL with abundant fine roots and fine to coarse flint gravel.
Made ground 3	0	0.02 – 0.05	Blacktop
Made Ground 4	0.04	0.11	Brown cemented SAND

Soil Type	Depth of top of stratum (mbgl)	Thickness (m)	Typical description
Made Ground 5	0.2	0.3	Subbase
Made Ground 6	0.10 – 0.25	0.2 – 1.57	Fine to coarse yellow brown to pinkish brown sand with coarse to cobble sized brick fragments and fine to coarse flint gravel.
Made Ground 7	0.75	1.05	Blackish grey sandy clayey gravel. Gravels comprise fine to cobble sized brick and concrete, ashy material and occasional organic material.
Made Ground 8	0.15 – 1.8	0.4 – 3.75	Firm orange brown to dark brown to black organic fine to medium sandy/ gravelly / silty clay with frequent fine rounded chalk gravel, fine to coarse brick and concrete fragments, black ashy fragments, slate, rare metal, charcoal, porcelain, clay pipe fragments and weathered chalk fragments.
Made ground 9	0.39 – 2.7	2.31	Soft, brown silty sandy gravelly clay. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of concrete, brick, flint, slag and chalk and subangular to rounded cobbles and boulders of concrete.

7.1.1 Alluvium

The top of the Alluvium was encountered at between 1.5 and 3.1 mbgl with a thickness varying between 0.7 and 2.8m.

It is described as soft to firm, low to medium strength orange brown mottled greenish grey to black organic silty or sandy gravelly CLAY. Gravel is fine to medium of subrounded flint.

7.1.2 Taplow Gravel Formation

Three variations of the Taplow Gravel Formation were identified with one composed of predominantly sand, another gravel and a third one a mix, detailed in Table 7.2 below.

Table 7.2: Encountered Variations in the Taplow Gravel Formation Strata ~~observed during the Waterman 2014 Investigation~~

Soil Type	Depth of top of Stratum (mbgl)	Thickness (m)	Typical Description
Taplow gravel 1	3.0 – 6.5	0.7 – 3.0	Medium dense becoming loose, yellowish brown gravelly sometimes clayey or silty fine to coarse SAND. Gravels comprise fine to medium subrounded flint and rounded quartz.
Taplow gravel 2	3.2 – 4.4	0.6 – 1.8	Medium dense fine to coarse sandy GRAVEL. Gravel is fine to coarse subrounded flint and fine to medium rounded quartz.
Taplow gravel 3	2.95- 4.3	0.4 – 2.7	Medium dense orange brown to dark grey fine to coarse SAND and GRAVEL. Gravel comprises fine to coarse subrounded to subangular flint and fine to medium rounded quartz.

7.1.3 Upper Chalk Formation

The Upper Chalk is split into a structureless chalk layer encountered at between 3.6mbgl and 9.5mbgl with a thickness of 8.7m. It is described as fine to coarse, weak to moderately strong subangular CHALK gravel with abundant coarse to cobble sized flint gravel. Beneath this, structured chalk was encountered at 15.2mbgl in BH1 with an unproved depth to at least 30.2 mbgl. It is typically described as very weak to weak, medium density, white CHALK, with fractures extremely to closely spaced. A Ciria Grade of B5 - B4 at 15.2m, improving to B3-B2 from 24 mbgl, was recorded.

7.2 Hydrogeology/Groundwater

The Made Ground is classified as an Unproductive Strata, with the Environment Agency classifying the Alluvium as a Secondary A Aquifer. The Taplow Gravel Formation is classified as a Secondary A Aquifer and finally the Upper Chalk Formation is classified as a Principle Aquifer. A principal aquifer is a layer of rock or drift deposits that have high intergranular permeability, meaning they usually provide a high level of water storage.

Groundwater was encountered in seven exploratory locations during the ST Consult intrusive investigation, revealing shallow groundwater, associated with the Secondary A aquifers within the Alluvium, Taplow Gravel Formation, and Principle afquifer Upper Chalk Formation. Recorded waterstrike depths during drilling varied between 2.7 mbgl and 5.3mbgl in WS12 (Made Ground), WS13 (Alluvium), BH1 (Alluvium/Taplow Gravel), BH2 (Upper Chalk), BH3 (Taplow Gravel), BH5 (Alluvium/Taplow Gravels), and BH6 (Alluvium/ Taplow Gravels). The Thames Tower investigation had a water strike in WS01A at 3.7m in the Alluvium.

The groundwater levels for both investigation have been summarized in Table 7.3 below. Showing that the groundwater monitoring indicated water levels between 2.15 mbgl and 3.18 mbgl, corresponding to 35.64m AOD and 36.44 AOD.

Taking into consideration the presence of the Made Ground and potential Fill on-site, isolated perched groundwater bodies could be present. Perched water bodies are not necessarily representative of the underlying groundwater regime. It is imperative that a site-specific Site Investigation is undertaken to identify the groundwater regime and across the site.

The Site is not located within a Source Protection Zone (I, II, III), signifying that surface water could be discharged to ground without causing a risk of contamination. There are 12 recorded groundwater abstractions within a 1km radius of the Site, the closest of which is located 0.16km to the southwest of the Site. The abstraction from a single point is licensed to Primark stores that utilize the water for drinking cooking, sanitary and washing (small garden) purposes (Waterman, 2013). The abstraction stratum is not specified but is likely to be from the Chalk.

Table 7.3: Summary of groundwater monitoring results from previous investigations

Waterman, 2014													
Exploratory Hole	Strata	Depth to base of well (m)						Water level (m)					
		12/5	16/5	22/5	30/5	16/6	30/6	12/5	16/5	22/5	30/5	16/6	30/6
WS3	AL, TG	4.9	4.91	4.92	4.92	4.92	4.92	2.28	2.31	2.3	2.22	2.2	2.34
WS12	MG, AL, TG	4.95	4.97	4.96	4.96	4.96	4.96	2.7	2.73	2.72	2.64	2.6	2.75
WS20	MG, AL, TG	4.95	4.87	4.86	4.85	4.85	4.85	2.38	2.41	2.39	2.32	2.31	2.44
WS22	MG, AL, TG	3.9	3.85	3.88	3.87	3.87	3.87	2.23	2.26	2.28	2.16	2.15	2.32

Thames Tower, 2012										
	Strata	Depth	Water level			Strata	Depth	Water level		
			14/06	21/06	05/07			14/06	21/06	05/07
BH01	AL, TG	9.5	2.82	2.66	2.62	SC	15.0	2.34	3.06	2.80
BH02	AL	9.5	3.06	3.08	3.16	SC	15.0	3.06	3.09	3.15
BH03	MG, SC	5.0	2.88	2.94	3.07	SC	20.0	3.03	3.10	3.18
WS01A	MG, AL	5	2.91	3.00	3.05					
WS02A	MG	2.2	Dry	Dry	Dry					

NB: MG= Made Ground, AL = Alluvium, TG = Taplow Gravel Formation, SC = Upper Chalk Formation (Structureless), CH= Upper Chalk Formation

7.3 Hydrology

The nearest surface water feature is a drainage network 320m northwest of the site, associated with the railway line. The closest point of the River Thames, flowing in an easterly direction, is aproximately 420m northeast of the Site. The river Kennet is located approximately 500m southeast of the Site and also flows in an easterly direction.

A Flood Risk Assessment was undertaken by Waterman in 2013, it found the following: The Environment Agency mapping shows the site to be located within Flood Zone 1, and is therefore classified as being at a low risk of tidal and fluvial flooding. The flood risk from pluvial, groundwater and artificial sources has been assessed and found to be low. The current development proposals indicate that over 25% of the site will comprise living roofs, which will reduce the impermeable area of the site and the rate of surface run off. It is anticipated that further attenuation will also be provided by underground storage tanks to ensure that the rate of water run off will not increase over the lifetime of the development.

8. PRELIMINARY SCHEME DESIGN OPTIONS

8.1 Site Overview

The findings of this report indicate that the site is underlain by Made Ground, Alluvium, Taplow Gravels, and Chalk to depth. It should be noted that the chalk comprises a ctructureless chalk layer of variable thickness overlying structured chalk.

Based on the limited extent of historical boreholes and site specific boreholes, there is limited knowledge of the nature and presence of the chalk to depth in the South Site. There is also limited knowledge on the the presence and nature of historic foundations throughout the site. There is also a known basement on site and another potential basement structure within the Plot E area. These will be considered during the phased Site Investigation, design, demolition and construction processes.

It should be noted that the current layout of the site pre-demolition may pose access and plant restrictions. In addition, the northern part of the site is to remain open to the public during the site investigation phase, therefore the phased Site Investigation works developed should consider the least intrusive or disturbing methods.

8.2 Development Proposal

To facilitate the demolition, excavation and construction for the proposed development it is anticipated that liaison will be required with residents, appropriate stakeholders and asset holders adjacent to the site, and highways specialists in order to allow for permanent site access routes.

8.3 Foundations

Possible foundation options may comprise shallow pad or strip footings, raft foundations or deep piled foundations. The selection of these options is influenced by a number of factors relating to the ground conditions and proposed development. These are generally associated with the ability of the ground to support the loads applied by the building above and to the sensitivity of the building to ground movement. **Table 8.1** relates the influences of the various factors on foundation options.

Table 8.1 - Suitability of foundation solutions based on structural options

Item	Influence	Pad or strip footings	Raft foundation	Piled foundation
i	The geology below the site is believed to comprise Made Ground, Alluvium, Taplow Gravel, and underlain by Chalk.	Given the anticipated building loading associated to the proposed development scheme and the uncertainty of the depth and continuity of the Structureless Chalk, as well as the strength caracteristics of the Taplow Gravel and Alluvium, it is unlikely shallow foundations will be possible. Ground improvement methods could be employed for some of the lower elevation buildings.	A raft foundation may be suitable to be founded on the Taplow Gravel for some of the plots, depending on the geotechnical ground properties and the proposed building loadings. A raft foundation option may be suitable if completed in association with ground improvements, and depending on the site specific ground conditions. Ground improvement techniques will be used that best minimise the potential for ground water contamination by eliminating where possible, any potential contaminant pathways.	Piled foundations will be suitable to be founded on the anticipated geology. There is likely to be man made obstructions present however in the form of historic foundations. Flint in the chalk beds may also pose an obstruction to piling.
ii	The column grid at foundation level has an impact on the column loads – larger spans result in increased column loads.	Suitable for regular grid subject to magnitude of load and performance requirements of structure. Close spaced grid may result in pads becoming close together and effectively becoming a raft. Pad or strip footings are unlikely to be viable given the anticipated column loads.	Suitable for variable grid subject to magnitude of load and settlement criteria. May become inefficient for large spans.	A piled solution will be suitable for anticipated column loads and may comprise single or multiple pile groups.
iii	Stability cores for the building are often the most heavily loaded area of the structure.	Large pads suitable for cores subject to magnitude of load, overturning and settlement criteria. Pad or strip footings are unlikely to be economic given the anticipated loads and depths of excavations that may be required.	Suitable for cores subject to magnitude of load, overturning and settlement criteria. A raft foundation may be suitable given anticipated column loads depending on site specific ground conditions. This may require local thickening.	Suitable for cores with pile caps. Tensile loads can be supported by piles.
iv	Selection of construction materials affects foundations loads.	Construction materials which increase foundation loads would lead to increasing sized foundations, which may become inefficient at large loads. Live loading characteristics affecting foundation loads and the geometry of shallow foundations. The height of structure (no. of floors) also	Increasing foundation loads require increasing depth of raft and heavier reinforcement, which may become inefficient at large column spans.	Suitable for variable column loads. May require pile groups to support heavier loads. Using a ground bearing floor slab if founded below the Alluvium. A suspended floor slabs is recommended due to the low CBR value of the natural subgrade, the presence of
v	Live loading characteristics of the proposed building use affects foundation loads.			
vi	Height of structure affects foundation loads.			

		affects foundation loads. A suspended floor slabs is recommended due to the low CBR value of the natural subgrade, the presence of organic alluvium in places and the depth and variability of the made ground.		organic alluvium in places and the depth and variability of the made ground.
vii	Sensitivity of the building to foundation movement either due to sensitivity of the structure to differential settlement between foundations or sensitivity of equipment used inside the building.	An ineffective solution to mitigate the risk of differential settlement posed by the laterally and horizontally variable ground conditions. May result in settlement of the foundations and potential for differential settlement where column loads vary across the site. We could incorporate this into the design of the pads however. This may then result in them becoming uneconomical or challenging to construct due to obstructions, with foundations merging in some areas. Ground improvement would be an additional operation and cost, that may bring additional environemental risks.	Suitable for variable column loads and limits differential settlement but subject to column spacing. It would also be possible to incorporate piles under heavily loaded sections, stone columns, or loacalised thickening of the raft to limit the amount of differential movement.	Suitable for most column loads and layouts and pile design relatively flexible to enable limiting movement to acceptable levels.
viii	Drainage and waterproofing requirements for the proposed development.	Waterproofing can potentially be applied around pad footings. Uplift may need to be considered depending on the relative levels of the groundwater level and founding level.	Waterproofing can be applied below raft foundation. Uplift may need to be considered depending on the relative levels of the groundwater level and founding level.	Waterproofing below floor slab will require penetrations for connections to piles. Uplift may need to be considered depending on the relative levels of the groundwater level and founding level.
ix	Location of the proposed development in relation to adjacent structures and infrastructure.	Ground movement caused by new building loads may affect adjacent buildings but can generally be designed and controlled. The location of underground assets in particular the Thames Water main sewer would have to be considered and incorporated into the design.	Ground movement caused by building loads may affect adjacent buildings but can generally be designed and controlled. The location of underground assets in particular the Thames Water main sewer would have to be considered and incorporated into the design.	Ground movement is generally limited due to the transfer of load to depth within the piles. The location of underground assets in particular the Thames Water main sewer would have to be considered and incorporated into the design.
x	Environmental influences.	Excavation and disposal of material would be required for pad foundations and hence programme and cost considerations must be accounted for. Ground gas protection measures are likely to be required.	Additional excavation and disposal of increased volumes of material may be required for raft foundation compared to other options and hence programme and cost considerations must be accounted for. Ground gas protection measures are likely to be required.	Bored piling methods generate arisings equivalent to the volume of the pile bore and can produce a pathway for contamination to underlying strata. Limited excavation for pile caps may also be required. Ground gas protection measures are likely to be required.
xi	Economic influences.	Reinforcement quantities required and hence programme considerations must be accounted for. Depth or extent of excavation may become uneconomic for larger loads.	Redundancies in the raft design. Local thickening / heave protection may be necessary.	Requires mobilisation of a specialist piling contractor to undertake the work. Expected to require a piling platform. Some piling techniques may require temporary or permanent pile sleeves through unstable material.
xii	Obstructions	Existing foundations have been identified, and will likely remain in the ground as obstructions. Leading to an impact on the proposed foundation programme and cost. Thames water assets are also preent on site and will need to be spanned.	Existing foundations have been identified, and will likely remain in the ground as obstructions. Leading to an impact on the proposed foundation programme and cost. Thames water assets are also preent on site and will need to be spanned.	Existing foundations have been identified, and will likely remain in the ground as obstructions. Leading to an impact on the proposed foundation programme and cost. Thames water assets are also preent on site and will need to be spanned.

8.4 Foundation Recommendations

The foundation options are dependent upon the magnitude of the load, the application and location of the load over the proposed structure, the deformational tolerances of the structure and the findings of the site specific ground conditions confirming the geological and hydrogeological ground conditions.

The available ground condition information is largely inadequate to produce reliable geotechnical parameters for the purpose of preliminary design. A scope of works for additional Ground Investigation to be undertaken has been recommended and is discussed in Section 11.

The proposed Development will comprise the development of two office buildings consisting of 21 and 32 storeys and four residential buildings ranging between 30 and 8 storeys. Based on current proposals, localised excavation may be required in the south west section of the site. The existing retaining wall is to be retained to provide temporaty support, with a new retaining wall cast in-situ against the existing one. The feasibility of the proposed foundation options will be assessed further after a detailed Site Investigation has been undertaken, however, the most feasible foundation options anticipated for the proposed structures at this stage are as follows:

- shallow foundations comprising a raft founded on Taplow Gravel Formation combined with ground improvements for the lower rise buildings; or/and
- piled foundations founded within the Upper Chalk.

8.4.1 Raft Foundation

A raft foundation solution may be feasible, for the lower rise buildings if associated with possible ground improvements. This solution can be used to spread column loading across a large ground area. The stiffness of the raft assists in limiting total and differential settlements for moderate column loads. If a raft solution is used, careful consideration of the founding level of the raft in relation to both a suitably stiff founding layer, beneath the Made Ground, and the site specific water table will also be required. Since the raft may be founded below the water table dewatering may be required during construction. Uplift due to water pressures on the underside of the raft should also be considered in both temporary and permanent cases using an active drainage system. If the raft is founded below the water table, tension piles may be required/incorporated below the raft to combat any significant uplift and heave pressures.

8.4.2 Piled Foundations

Based on the known ground conditions from the historic investigations and understanding of the proposed structure, a fully piled solution is considered feasible for all the proposed buildings. These could be constructed by boring, driven cast-in-place piles, driven pre-formed piles or continuous flight auger (CFA) piles, although CFA piles are considered most suitable for the development, which are relatively quiet and vibration free. This would pose significant advantages compared to other piling methods due to the proximity of adjacent assets such as the Thames Water assets. Piles would be founded within the Chalk. The economical aspects of this foundation option include the requirement of mobilisation of a specialist piling contractor to undertake the work; this specialist contractor can also undertake retaining wall installation if a secant or contiguous wall is considered.

A piled solution is suitable for large column loads and may comprise single piles under columns or multiple piles in groups. Piled foundations are suitable for cores with pile caps. Piles are suitable for supporting tensile loads, variable column loads and limiting movement to acceptable levels where differential settlements cannot be controlled sufficiently by shallow foundations.

Construction of piled foundations from the existing ground level may require cutting down of piles. Waterproofing below the basement floor slab will require penetrations for connections to piles. Reinforcement cages and large plant are required on site and hence a piling mat is likely to be required.

It should be noted that piles can produce pathways for the vertical downwards migration of contaminants, should they be identified, in the upper soils to important aquifers at lower levels.

8.4.3 Retaining wall

The current proposals require a retaining wall to be constructed in the south west section of the site. It is to be cast against the current retaining wall which will provide temporary support. As such there is only one option for retainig wall available, cast in situ.

8.5 Geotechnical Hazards

8.5.1 Unknown Ground Conditions

Although information about the anticipated ground conditions at the site has been presented in this report, site specific ground conditions for the site are largely unknown, as are the engineering parameters of the strata, particularly at depth??. Therefore, recommendations about the foundations and substructures for the development and analysis of potential hazards are of a preliminary nature. It should be noted that as only BH1 from the previous investigation reached below the Structureless Chalk it's depth across the site is unknown and may vary significantly, especially as it was observed to be significantly lower beneath the adjacent Thames Tower.

The nature and extent of the existing/historic foundations is known for the Friars Walk Shopping Centre, NCP Car Park, and Western Tower, however are unknown for Xafinity House, Retail Parade, Telecoms House, and the former Bingo Hall/Bus Station.

8.5.2 Groundwater

The geology beneath the site comprises superficial deposits of Alluvium and Taplow Gravels overlying bedrock in the form of the Upper Chalk. The Alluvium and Taplow Gravels are classified as a highly porous and permeable rock, acting as Secondary aquifers with the Chalk beds being the Principal Aquifer.

Natural groundwater conditions from the available site investigation data indicate the groundwater is anticipated to be approximately 2.15m-2.75mbgl. Really need to relate this to the water bearing strata – Secondary and Principle aquifers would suggest separate aquifers, rather than hydraulic continuity existing between the Alluvium/Taplow and the Chalk.

With the presence of Made Ground, areasof known Fill and potential Fill on-site, isolated perched groundwater bodies could be present. There is an absence of groundwater data available for sections of the site in particular the southern section, therefore it is recommended to undertake site specific investigations and groundwater monitoring to characterise the groundwater regime for detailed design. In order to provide efficient design of such measures, additional pumping trials may be required as the scheme develops.

The presence of groundwater impacts the bearing capacity and settlement response of the ground through time. The groundwater level will therefore need to be considered during substructure and possible retaining wall design. Long-term groundwater monitoring to capture seasonal variations in groundwater levels should mitigate the risk of, for example, foundations being designed for unrepresentative low groundwater levels that may be encountered during periods of low rainfall or in summer months.

Care will need to be taken when drilling/piling into aquifers to avoid contamination.

Groundwater controls may need to be put into place during construction, and health and safety mitigation measures implemented.

8.5.3 Aggressive Ground Conditions

There is potential for contamination from The Great Western Railway that runs parallel to the site boundary 60m north since before first maps in the late 1870's. Garages that were situated 90m southwest and 50m southeast of the site by 1957. Engineering works were also identified on the historical maps to the north-west and north of the site. Four electrical sub-stations were also identified within 80m of the site.

Potential contaminants that may be present as a result of the historic industrial land use in the surrounding area has the potential to migrate onto site.

There is also potential for contamination to be present in Made Ground at the site, with ash, brick rubble and metal fragments encountered. Ramboll have assumed that there is potential for contamination within the ground and groundwater which may create aggressive conditions for concrete. An assessment of the potential contamination and natural chemistry of all strata will therefore need to be carried out, with concrete designed accordingly.

8.5.4 Obstructions

- Foundations and Substructures

There is likely to be foundations from the historic/current buildings present on site, the extent and nature of which are not completely .

Obstructions to future works such as excavations and pile construction if they are not correctly identified during the ground investigation works, and consequently not removed during demolition and excavation works. Re-use of the existing foundations may be possible once a survey has been completed to ascertain their length and hence bearing capacity.

- Services

A high density of services is known to exist in and around the site beneath Greyfriars Road, Garrard Street, and Friar Street although their exact location is currently unknown. Local service connections and other local services such as CCTV, fibre-optic etc. may also exist throughout the site. Services into the site will need to be disconnected as the phased development takes place. There is also the possibility of unknown buried services beneath the site which could present an obstruction to Site Investigation and future intrusive works, while also presents a health and safety risk to site workers.

There is a 1250mm diameter brick foul sewer running west to east beneath the northern section of the site, at a depth of approximately 4 mbgl, with three 225mm diameter sewers branching off, as seen in Figure 8.1 below. Further liaison with Thames Water including the provision of as-built drawings and sections will provide more conclusive certainty of the location details of their tunnel. Protection zones associated with Thames Water tunnel asset may limit the location, proximity and construction methods of foundation and retaining wall structures. Pre- and Post- construction condition surveys may be required, along with monitoring and inspections during the course of the site development. Impact Assessments may also be required by Thames Water to demonstrate the effect of demolition and construction activities associated with the proposed development.

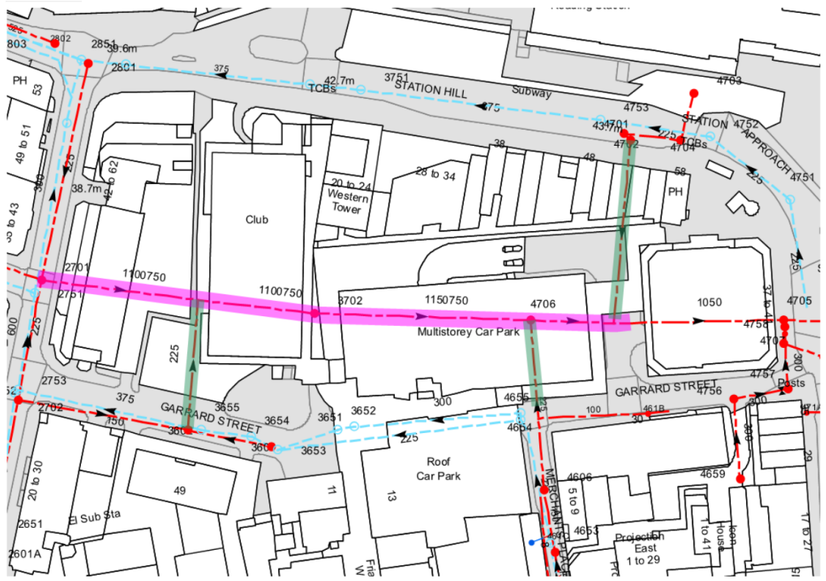

Figure 8.1: Map of Thames Water Sewer, Hoare Lea *Thames Water Note*

8.6 Further Works

A full geotechnical assessment of the site should be carried out in order to facilitate design of the substructures for the proposed developments. This should include a ground investigation and geotechnical design reports, in accordance with Eurocode 7.

The ground investigation should be targeted to the anticipated location of foundations and assess shallow and deep ground conditions. It should include in-situ and laboratory geotechnical testing and ground gas and groundwater monitoring. It is likely that this investigation would be combined with a structural, environmental and archaeological assessment. Details of ground investigation works and additional intrusive works will be determined at a later project stage.

A full search of existing buildings drawings is going to be undertaken in order to gather informations on the existing foundations. A separate site investigation is recommended after demolition, to assess the nature and extent of the existing foundation present on site and confirm the details of existing information.

9. PRELIMINARY CONTAMINATION ASSESSMENT

9.1 Framework for the Assessment of Contamination

Environmental risks are assessed within the risk management framework established in Part IIA of the Environmental Protection Act (EPA) 1990 (HMSO, 1990), which provides a statutory definition of contaminated land. To fall within this definition it is necessary that, as a result of the condition of the land, substances may be present on or under the land such that:

a) Significant harm is being caused or there is a significant possibility of such harm being caused;

b) Pollution of controlled water is being, or is likely to be caused; or

c) Risk from contamination is assessed by consideration of possible linkages between contaminant sources and potential receptors which could be harmed or polluted.

The key aspect of the framework is the development of a Conceptual Site Model (CSM) which illustrates the spatial interaction between the potential sources and receptors on site.

The information presented in the previous sections of this report were collated and evaluated to develop a preliminary CSM to assess ground contamination issues at the site.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- A source, i.e., a substance that is capable of causing pollution or harm;
- A receptor, i.e., something which could be adversely affected by the contaminant; and
- A pathway, i.e., a route by which the contaminant can reach the receptor.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

Potential sources, pathways and receptors are identified in the sections below and the risks associated with possible pollutant linkages outlined.

9.2 Potential Contamination Sources

The main sources of potential contamination that have been identified at the site, or in the vicinity of the site are summarised in **Table 9.1**.

Table 9.1 - Potential Sources Contamination

Source	Detail and Potential Contaminants of Concern
Onsite Sources	
Made Ground **(Ground contamination)**	Made Ground with elevated inorganic and organic contaminants following the site investigation (Waterman, 2014), in particular those mentioned in section 3.2. Visual and olfactory contaminative impacts have been identified during the site investigation, including hydrocarbon staining and strong odour. Made Ground has been identified with ash, brick and concrete rubble and rare scrap metal fragments. Asbestos has been identified across the site. Inaccessible areas of the site have been largely uncharacterised and may have a high likelihood of contaminative impacts. A potentially infilled pond has been identified on site within the Envirocheck report, beneath Garrard Street MSCP. Potential contaminants: heavy metals, Total Petroleum Hydrocarbons (TPH), Poly Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), phenols, chlorides, sulphate, sulphides, Asbestos Containing Material (ACM).
Historical and current site use (including garages, bus station, multi-storey car park) **(Ground and groundwater contamination)**	The site has been previously occupied by a garage, car park, coal yard and bus station. The historical maps illustrate a garage located in the centre of the site with a car park and bus station constructed by the early 1960's. A coal yard was present to the south of the site. Potential contaminants: heavy metals, Total Petroleum Hydrocarbons (TPH), Poly Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), phenols, chlorides, sulphate, sulphides, Asbestos Containing Material (ACM), MTBE.
Electricity Sub-Stations **(ground and groundwater contamination)**	Three electrical sub-stations have been noted during a site walkover (Waterman, 2013) with unknown potential for release of PCBs. Potential contaminants: heavy metals, Polychlorinated Biphenyl (PCBs), Total Petroleum Hydrocarbons (TPH), Poly Aromatic Hydrocarbons (PAH), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs) and Asbestos Containing Material (ACM).
Ground gas and vapours contamination	Generation potential primarily associated with unknown composition of Made Ground and natural ground within the areas where site investigation access was restricted. Elevated concentrations of carbon dioxide (CO2) and methane (CH4) and depleted concentrations of oxygen (O2).
Fuel tanks **(ground contamination)**	The historical data report from Envirocheck identified two potentially fuel related tanks on site, on the 1969 historic map. Whilst no tanks were identified onsite during the site walkover (September 2018), residual contamination may be present. Potential contaminants: heavy metals, Total Petroleum Hydrocarbons (TPH), Poly Aromatic Hydrocarbons (PAHs).
Offsite Sources	
Historic and current industrial land use (including garages, engineering works, railway and electrical sub-stations)	A review of the surrounding areas history highlighted industrial land use within 100m of the site. The Great Western Railway runs parallel to the site boundary 60m north since before first maps in the late 1870s. Garages were situated 90m southwest and 50m southeast of the site by 1957. Engineering works were identified on the historical maps to the northwest and north of the site. Four electrical sub-stations were also identified within 80m of the site.

Source	Detail and Potential Contaminants of Concern
(Ground contamination)	Potential contaminants that may be present beneath the site as a result of the historic industrial land use in the surrounding area have the potential to migrate onto site. Potential contaminants: heavy metals, Total Petroleum Hydrocarbons (TPH), Poly Aromatic Hydrocarbons (PAH), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), Asbestos Containing Material (ACM), phenols, solvents and Polychlorinated Biphenyl (PCBs).
Fuel tanks **(ground contamination)**	Historical Building Plans Information has identified three underground fuel tanks and oil storage within 100m south of the site. Potential contaminants: heavy metals, Total Petroleum Hydrocarbons (TPH), Poly Aromatic Hydrocarbons (PAHs).
Ground Gases **(Made Ground and natural strata)**	Generation potential primarily associated with unknown composition of Made Ground in the surrounding area of the site. Elevated concentrations of carbon dioxide (CO_2) and methane (CH_4) and depleted concentrations of oxygen (O_2).

All potential off-site sources and contemporary trade directories 500m or more from the site have been omitted from further assessment based upon the proximity of the source to the subject site, the nature of the various potential sources and the absence of any reportable environmental incidents

9.3 Potential receptors

The site-specific receptors that could potentially be affected by contamination hazards are summarised in **Table 9.2**.

Table 9.2 - Potential Receptors

Receptor	Details
Future Site Users	The current buildings and structures on site are to be demolished, with high rising residential and office buildings to replace these.
Construction Site Workers	Any workers coming into contact with ground, or material impacted by any contamination.
Adjacent Site Users	The site is situated in an area of residential and commercial/industrial land use. Reading railway station is located to the northeast, residential housing to the west, Friar Street to the south; and hotel and office buildings to the east of the site.
Controlled Waters	The BGS maps reviewed indicate the geology surrounding the site to comprise superficial deposits of Alluvium, Taplow Gravel (River Terrace Deposits) and Seaford Chalk Formation at depth. The superficial River Terrace Deposits (Taplow Gravels) are classified by the Environment Agency as a Secondary A Aquifer. The bedrock of the Seaford Chalk Formation is classified as a Principal Aquifer. According to the Environment Agency sources, the site does not lie within a Source Protection Zone (SPZ). Six groundwater abstractions are located within 1000m of the site; the nearest of these is held by Primark Stores Limited abstracted from a single point located 137m southwest of the subject site, for potable water supply. The nearest surface water abstraction is located 476m south of the site, held by Oracle Shopping Centre Ltd. The water is used for lake and pond throughflow.
Buildings and Structures	Infrastructure and construction materials associated with the future development, including building foundations and potable water supply pipes.
Flora	Areas of soft landscaping may potentially be included within the final design plans for the proposed development.

9.4 Potential Pathways

If contamination is encountered, to reach the receptor there has to be a viable pathway for the contaminant. The site-specific pathways identified during this preliminary appraisal are summarised in **Table 9.3**.

Table 9.3 - Potential Pathways

Receptor	Pathway	Comments
Human Health (Future site users, construction workers and adjacent site users)	Direct contact: Dermal, Ingestion, Inhalation	Construction workers have the potential to come in direct contact with soil during site enabling works and construction activities. The use of Personal Protection Equipment (PPE) would mitigate the exposure to residual contaminants. Construction activities also have the potential to generate dust particulates which therefore presents an inhalation risk to construction workers and adjacent site users. The proposed development includes construction of office space and residential accommodation (Section 1.2). Therefore, future site users are unlikely to come into contact with contaminated soils on the basis that the site will be covered in hardstanding. If considered, soft landscaping areas within the proposed development could present a potential pathway that could impact future site users. If soft landscaping areas are limited to above ground planters, the potential for future

Receptor	Pathway	Comments
		site users to be exposed to contamination in site soils would be limited.
	Accumulation of hazardous vapours, ground gases and dust generation	Future site users and construction workers have the potential to be affected by elevated concentrations of hazardous ground gases (CO_2 & CH_4) and depleted O_2 and also volatile organic compounds which may be present in the ground. Gases may migrate accumulate in internal spaces within the proposed development structure. The use of PPE and Respiratory Protection Equipment (RPE) would mitigate the exposure of Construction Workers to harmful ground gases during the construction phase. Construction workers and adjacent site users may be affected though dust ingestion and inhalation during construction work.
	Vertical migration of soil impacts to the Secondary A and Principal Aquifers	Leachable contaminants have the potential to impact controlled waters via vertical and lateral migration. The majority of the site is currently covered by hardstanding with limited areas of soft landscaping, as such infiltration is likely to be limited. Where hardstanding is present, the potential for infiltration and leaching will remain limited, however potential contamination within these areas could impact groundwater onsite via lateral migration. The site is underlain by Taplow Gravels; the highly permeable nature of this formation may facilitate the vertical migration of contamination into the impermeable Seaford Chalk.
	Lateral migration to surface water	River Thames is situated 460m northeast and River Kennet is situated 550m southeast of the site. Due to presence of groundwater at shallow depths and presence of permeable superficial deposits (Taplow gravels) underlying the site, there is potential pathway by

Receptor	Pathway	Comments
		which the contaminants may laterally migrate to the surface water.
Buildings and Structures	Damage to building materials or services through direct contact with contaminants, contaminant migration	Aggressive ground conditions and hydrocarbons, sulphates and other contaminants which may be present in the ground have the potential to affect subsurface construction materials (in particular water supply pipes, where applicable, and buried concrete). Hazardous ground gases and vapours may also have the potential to migrate and build up in in buildings and confined spaces.
Flora	Plant uptake	Areas of soft landscaping may potentially be included within the final development plans; however it is likely that these areas will be limited.

9.5 Qualitative Risk Assessment

Potential pollutant linkages are identified using the source-pathway-receptor framework detailed above. An assessment of the potential significance of each linkage is then made by consideration of the likely magnitude and mobility of the source, the sensitivity of the receptor and nature of the migration/exposure pathways.

This qualitative hazard assessment has been undertaken in accordance with NHBC and Environment Agency, 2008. Further details of legislative Context are presented in **Appendix E**, including risk categories and the assessment methodology.

An assessment of the likelihood of the risk being realised and the magnitude of potential risk is presented below to give an estimation of the significance of each potential pollutant linkage identified. The assessment is undertaken based on the end use proposed.

9.6 Pollutant Linkages

Table 9.4 forms an assessment of the significance of potential pollutant linkages associated with the site.

Table 9.4 - Preliminary Conceptual Site Model

Source	Pathway	Receptor	Potential Severity	Probability	Level of Risk
Made Ground (Ground contamination)	Dermal contact, ingestion and inhalation of	Future site users	Medium	Low	Moderate/Low
		Construction workers	Medium	Likely	Moderate*

Source	Pathway	Receptor	Potential Severity	Probability	Level of Risk
	dusts and vapours	Adjacent site users	Medium	Unlikely	Low
	Inhalation of free fibres (ACMs)	Future site users	Severe	Unlikely	Moderate/Low
		Construction workers	Severe	Likely	High*
		Adjacent site users (during enabling works / construction)	Severe	Low	Moderate
	Leaching and migration via groundwater	Secondary A and Principal Aquifers	Medium	Likely	Moderate
		River Thames and River Kennet	Medium	Unlikely	Low
	Direct Contact	Construction Materials	Medium	Likely	Moderate
Ground Contamination from Current and Historical Site Use	Dermal Contact, Ingestion and Inhalation of dusts/soils	Future site users	Medium	Unlikely	Low
		Construction workers	Medium	Likely	Moderate*
		Adjacent site users	Medium	Unlikely	Low
	Inhalation of vapours	Future site users	Medium	Low	Moderate / Low
		Construction workers	Medium	Likely	Moderate*
		Adjacent site users	Medium	Unlikely	Low
	Leaching and Migration via groundwater	Secondary A and Principal Aquifers	Medium	Likely	Moderate
		River Thames and River Kennet	Medium	Unlikely	Low
	Direct Contact	Construction Materials	Medium	Low	Moderate / Low
Fuel tanks (ground contamination)	Dermal contact, ingestion and inhalation of dusts/soils	Construction workers	Severe	Low	Moderate*
		Future site users	Medium	Low	Moderate / Low
		Adjacent site users	Medium	Unlikely	Low
	Leaching and Migration via groundwater	Secondary A and Principal Aquifers	Medium	Likely	Moderate
		River Thames and River Kennet	Medium	Unlikely	Low
	Direct Contact	Construction Materials	Medium	Low	Low/moderate
Off-site Ground Contamination from Historical/Current Industrial Sources (Leaching and migration of contaminants from infilled land, Made Ground and historical/current industrial sources such as garages, engineering works, car park)	Dermal contact, Ingestion and Inhalation	Future site users	Medium	Unlikely	Low
		Construction workers	Medium	Likely	Moderate *
	Direct Contact	Construction Materials	Medium	Low	Moderate / Low*

Source	Pathway	Receptor	Potential Severity	Probability	Level of Risk
Electricity Sub-Stations	Dermal contact	Future site users	Medium	Unlikely	Low
		Construction workers	Medium	Low	Moderate / Low *
	Leaching and Migration via groundwater	Secondary and Principal Aquifers	Medium	Low	Moderate / Low
		River Thames and River Kennet	Medium	Unlikely	Low
	Direct Contact	Construction Materials	Medium	Unlikely	Low
Ground Gases (onsite and offsite sources)	Ground gas migration and inhalation	Future site users	Severe	Likely	High
		Construction Workers	Severe	Likely	High*

Notes:

Assessment completed assuming site in current condition. Should site levels be altered during development, a reassessment would be required.

*The risks to construction workers and site operatives will be reduced to Low on the assumption that the contractor will deal with all risk to construction workers, based on the hazards identified within this report and revised according to ground conditions encountered during any on-site activities. The Contractor will be responsible for site Health and Safety and will manage the risk through control of suitable Health and Safety measures including provision of PPE, appropriate site infrastructure, education of the workforce and inductions for all site staff and visitors.

10. HAZARD REGISTER

The risk register contained in Table 10.10.1 is based on a review of documentary evidence concerning the site setting, the ground conditions beneath the site and the historical structures. A number of general and particular hazards to the proposed development have been identified and collated into a register for the site which provides a focus for actions required to mitigate the effects of each item at the earliest stage in the design development. The risks reported are limited to the information available at the time of preparation. The list is not exhaustive and further development of this risk register may be required as further information becomes available.

Table 10.10.1 - Risk Register for Station Hill.

Subject	Hazard	Potential Consequence	Mitigation Measures
Geology			
Ground Conditions	Unkown/ variable thickness of the Made Ground / Infill across the site, especially in the southern section, due to limited site specific exploratory holes. Composition and geotechnical properties of the Made Ground and Taplow Gravels can be variable limiting passive resistance at shallow depths, this would require more extensive temporary works during construction. The presence of Alluvium on site is variable. A comprehensive ground investigation covering the whole site has not been undertaken and therefore site-specific ground conditions and geotechnical design parameters are not fully understood.	Made Ground / Infill, Alluvium, and Structureless Chalk, are unlikely to be suitable as a founding stratum due to variable properties. Over conservative or unsafe foundation and substructure design. Excessive and / or differential settlement. Delays due to unforeseen ground conditions; cost and programme implications. Removal and replacement with engineered fill or ground improvement options may be required to ensure bearing capacity and settlement performance requirements. Such options would also require environmental assessment and there may be increased costs associated with such options.	Undertake a project specific ground investigation to characterise ground conditions for detailed design. The results shall be used for system selection and concept design of the substructure and potential ground improvement works, and update the recommendations for the mitigation and management of ground based risks within this register.
Aggressive Ground Conditions	Ground chemistry and its aggressivity to buried structural materials have not been sufficiently characterised. Potential sulphate bearing minerals. Potential presence of asbestos fragments and organic soils can lead to aggressive conditions. Made Ground could be a source of heavy metals, inorganics, asbestos, phenols, petroleum, hydrocarbons, ground gases etc.	Long term exposure resulting in deterioration of concrete strength, leading to unsafe design and additional maintenance costs. Vertical migration through the weathered soils. Programming and cost implications and excavation complications.	
Ground Gas	Ground gases can be generated from any organic material present in the Made Ground / Infill material or Alluvium on or adjacent to the site. Ground gases can be generated from off-site sources and migrate onto the site through permeable strata. If present, Alluvium can produce ground gas such as Methane and Carbon Dioxied.	Accumulation in confined internal spaces. Potentail for toxic or explosive atmospheres. Risk of inhalation of potentially poisonous gas by construction workers and/or future users of the site. Ground gas/ vapour protection measures may be required.	Undertake an appropriate ground investigation with the installation of ground gas monitoring wells, followed by a period of ground gas monitoring to obtain data to inform the ground gas risk assessment for the site. In the event that ground gas protection measures are required, incorporate the measures into the substructure design of the scheme.
Compressibility	Alluvium generally has a high volume change potential under compression, and can lead to negative skin friction values affecting pile capacity. The extent and depth of the Alluvium is known to be highly variable in the northern section of the site and unknown for the southern section.	Unsafe substructure design and failure of foundations. Differential settlement response across the site. In addition to foundations and substructures, there are also implications for external paving and hard-landscaping features and buried services. Delays due to unforeseen ground conditions; cost and programme implications.	Ground Investigation will establish the parameters of the Alluvium that could contribute to compressibility, such as its depth and volume change potential. An assessment of proposed excavations and associated ground movements will be carried out to assess the impact of the proposed development works, including how these may impact on neighbouring structures and assets. Foundation design to be carried out by taking into account these features if present. The wider implications on the development proposals should consider this.
Hydrology and Hydrogeology			

Subject	Hazard	Potential Consequence	Mitigation Measures
Groundwater	Shallow and perched groundwater potential on site within the Made Ground / Infill. Historic BGS boreholes surrounding the site provide some evidence of perched groundwater. What about the Secondary and Primary aquifers?	Ingress into excavations for foundations or to remove pre-existing and / or existing building foundations could allow contaminated stagnant groundwater migration and infiltration. Health and safety impact on site operatives. Impact of potential dewatering / groundwater control measures of adjacent structures / services. Programming and cost implications and potential environmental liability.	Undertake a project specific ground investigation to characterise groundwater regime for detailed design. Consult a dewatering specialist to design a practical maximum dewatering depth in the temporary case. Consult the receiving authority if necessary to dewater and dispose of groundwater to a foul sewer to determine if any pre-treatment is required prior to discharge and whether a discharge license is required.
		Reduction in the effective unit weight of the ground due to saturation reduces lateral confining pressures, and hence reduces bearing capacity and increases settlements.Uplift pressures may act on shallow foundations and sub-structures. Potential for excessive movement from dewatering schemes. Water ingress into basement areas.	The site investigation will include groundwater monitoring installations in order to better understand and model the groundwater conditions. The groundwater level, including seasonal variations will be considered during substructure design. Undertake early liaison with stakeholders and undertake impact assessments to understand the implications of changing groundwater conditions due to temporary groundwater control measures that may be required to facilitate construction. Adjacent structures and key underground utilities to be monitored for excessive movements and appropriate measures in place to monitor groundwater levels.
		Water entering pile bores can reduce the strength and adhesion of the cohesive strata, negatively influencing pile capacity.	A method of piling will be selected that minismises the potential for groundwater contamination. By using continuous flight auger (CFA) piles, it should be possible to prevent groundwater from the Made Ground / Infill and Taplow Gravels entering the bore.
	The chemistry and aggressivity of the groundwater has not been determined.	Potential use of deep piled foundations or retaining walls may provide a preferential pathway for any underlying contaminants (if any), into the Principle Aquifer. Damage to sub-sruface structural materials.	Undertake a project specific ground investigation to characterise groundwater chemistry across the whole site for detailed design. Design of sub-surface construction materials to account for groundwater chemistry. A Foundation / Piling Works Risk Assessment will ensure that appropriate measures are put in place to protect the aquifers beneath the site.
Flood Risk	The site is located within a Flood Zone 1 and therefore has a low probability of flooding from rivers (less than 1 in 1000 annual probability of river or sea flooding). The risk of flooding from pluvial, groundwater, and artificial sources has been assessed as being low.	May pose risk of flooding to the property. This may result in damage to property, loss of use, risk to site users, affect layout, FFL, uses and cost of the scheme.	A flood risk assessment has previously been completed to investigate the risks and consider the need to incorporate appropriate mitigation measures into the proposed scheme. The assessment concluded the site was at a low risk of flooding.
Surface Water Drainage	Potentially need to reduce runoff rates compared to the existing situation.	Provide strategies for surface runoff attenuation.	Consider drainage implications early in the design process, undertake consultation with lead local flood authority (LLFA) to agree discharge rates.
Ground Contamination	Ground contamination may be present at the site as a result of onsite historic land uses such as Garages, Bus Station, Coal Yard, Factory, Car Park, Timber Yard and Tanks. Ground contamination could also be present as a result of the composition of the Made Ground or infilled ground at the site. During the site investigation carried out by Waterman (2014), some elevated concentrations of inorganic and organic contaminates were identified. The assessment only considered potential future commercial end use not the more sensitive residential use now proposed however, and only covered north side of the current study site.	Potential risk to human health, controlled waters and other receptors. Programming and cost implications. Potential environmental liability. Possible cost and programme implications, increased disposal costs if material is contaminated. Damage to structural materials. Where ground contamination is present care must be taken to ensure that the potential foundation works do not create significant pathways for the vertical downwards migration of contaminants in the upper soils to the Superficial Secondary A Aquifer (River Terrace	Undertake an intrusive Ground Investigation with soils and groundwater chemical analysis to characterise potential contamination at the site. Undertake a screening and risk assessment in order to identify how risks should be managed as part of the proposed development. Undertaken a preliminary waste assessment to characterise the soils that will be taken for offsite disposal.

Subject	Hazard	Potential Consequence	Mitigation Measures
	Potential migration of off-site contamination present as a result of historical and current industrial land use onto site, via groundwater migration. Potential contaminants in groundwater due to leaching and migration, with the potential for vertical migration into underlying Superficial Secondary A and Principal Aquifers.	Deposits) and the Principal Bedrock Aquifers at depth (Thanet Sands and Chalk Group Formation).	
Waste Management	Should materials require off-site disposal they will be subject to waste management regulations e.g. duty of care regulations.	Offsite disposal will be subject to waste management regulation. Cost and programme implications. Increased disposal cost if material is contaminated.	Minimise offsite disposal by optimising cut and fill, subject to suitable testing, and liaising with the client for the potential to store excess spoil on various sections of the site. Ensure contamination testing is undertaken at an early stage. Samples should be collected and tested for waste classification purposes. Depending on the receiving facility, materials destined for landfill disposal may need to meet Waste Acceptance Criteria. Prepare Site Waste Management Plan for the new scheme if required.
Unexploded Ordnance	Reading is known to have been bombed during WWII and unexploded bombs may still exist on or near the site. Being close to the train station the site may have been a target.	Risk of explosion and risk to site workers during site investigation work and construction. Risk to future occupants of the site, the general public and structures within the vicinity of the site. Health and safety implications during construction and final usage.	There is a low risk of encountering unexploded ordnance within underlying strata as understood from the Zetica website. A specialist consultant (1st Line Defence) has been commissioned to carry out a desk based UXO assessment of the site prior to the site based intrusive works. No further reccomendations were suggested.
Asbestos	Asbestos (chrysotile and amosite) has been identified within the Made Ground during the ground investigation by Waterman (2014). These were found as free fibres as well as cement; and the quantification analysis gave a maximum asbestos concentration of 0.12% of weight from total soil sample. It is considered likely that there will be additional asbestos impacts across the areas of the site not yet investigated.	Health and safety implications. Potential programme and cost implications due to removal. Increased disposal costs if soils contain asbestos.	Screen Made Ground / Infill samples taken during the ground investigation for asbestos for contamination testing. Appropriately qualified personnel / consultants should be commissioned to assess the risk of asbestos on site prior to any demolition or intrusive works.
Obstructions			
Historic Foundations and Existing Retaining Walls	Foundations associated with the current and historical buildings may remain in-situ within the ground. The site is known to have undergone a number of developments, the extent of historic foundations is not known exactly. It is also unknown whether historic basements on the site have been infilled and whether the foundations are still present.	Obstructions to future development and intrusive ground works; concrete slab and paving stones present at depth. Delays due to unforeseen ground conditions; cost and programme implications. Excessive dust and noise upon removal of the concrete slabs and potential limited hours of work. Existing foundations may have to be removed, which is an expensive, time-consuming, and energy-intensive activity. Reduction of the strength of the soil and capacity of newly-constructed foundations – may require an appropriate founding fill adding to cost implications. Underpinning works / temporary propping works may be required to allow the required excavation – potential programme and cost implications.	Obtain available information about former structures on the site. An investigation has been planned to assess the presence and extent of underground obstructions that may impact future works. The investigation works are to determine the type and nature of existing foundations and retaining walls on site. Potential structural grid and pile layout alterations to avoid clashes with existing substructure. Undertaken additional targeted investigation following demolition of existing structures. Assessment of potential re-use of onsite building foundations, namely for the retained structures.
Underground Services	A relatively high density of services are located beneath Greyfriars Road and Friars Street bordering the site and Garrard Street within the site boundaries. An existing Thames Water main sewer also runs beneath the north section of the site that could be affected by	Liability through damage – greatest effects could be experienced during demolition, excavation and development construction.	Obtain all existing service drawings for the site; undertake further liaison utilities companies requesting location drawings.

Subject	Hazard	Potential Consequence	Mitigation Measures
	the proposed development works and where resitrictions or easements may apply Services are known to be present beneath the site and site boundary however the extents are unknown. Local services and service connections may exist.	Planning conditions may be imposed. Restrictions or approvals on foundation and sub-structure options may be required. Disturbing underground services whose locations are not precisely known during the ground investigation or construction works. Removal / re-routing of services above those anticipated creating cost and programme implications. Health and safety risk.	Potential to carry out a preliminary condition survey, CCTV survey and / or line-and-level survey of Thames Water asset. Preliminary consultations to be undertaken with Thames Water; the impact of the development on the Thames Water asset to be assessed. Further consultation will be required to coordinate with Thames Water with regards to programme during design development. Guidance on piling techniques and protection zones should be adhered to in relation to subterranean assets. Piling layouts should be agreed with stakeholders to ensure they are satisfied with the suggested spacing. Commission service clearance and mapping (e.g. GPR survey etc.) of the site for potential and / or residual services that may have been left undetected. Any development within the vicinity of the services may be subject to asset protection constraints and liable for damage caused and hence engaging with the service providers may be required in case services are detected through undertaking CAT scans and other survey techniques. Early liaison should be initiated with service providers to discuss the requirements for any necessary diversions. Plans of existing building drawings showing service details e.g. entries, connections and local services should be obtained and reviewed in order to inform the development strategy.
Adjacent Sensitive Structures	The proposed development may have an adverse impact on the adjacent structures and substructures, their foundations and services due to ground movements and vibrations associated with the redevelopment works.	Liability through damage. Programming and cost implications. Planning conditions may be imposed.	Obtain as-built drawings for the substructure of the adjacent buildings and undertake a project specific Site Investigation to inform assessments of any identified sensitive existing structures. Early engagement and liaison with relevant stakeholders. Differential settlements between any retained elements on site and new structures must be controlled through design and monitoring of the retained or adjacent structures may be required.
Site Surrounds and Other Hazards			
Site Access	The main entrance to the site is likely to be via Station Hill for the northern section with egress via Garrard Street, while for the southern section entry will be via Garrard Street and egress also via Garrard Street.	Programming and cost implications and potential environmental liability. Planning conditions and restrictions on access times may be imposed. Health and safety risk. Conflicts with neighbours due to potential road closures or induced traffic delays; this will require negotiation with local stake holders. Potential damage to roads and pavements depending on site machinery required and volume of site vehicles expected. Increased pollution.	The entrance must be examined by potential contractors to ascertain whether plant can access this space safely. Liaison with the asset holders will be required in the future in order to negotiate safe and more logistically appropriate access routes into site. Streamline the preliminary ground investigation works in order to reduce time on site.
Traffic	Site is surrounded by busy pedestrian and traffic routes, which will be utilised by site staff and trucks/plant.	Health and safety risk. Conflicts with neighbours due to potential road closures or induced traffic delays; this will require negotiation with local stake holders. Potential damage to roads and pavements depending on site machinery required and volume of site vehicles expected. Increased pollution.	Contractor to be required to produce a traffic management plan for the operations, with goal of producing as little disruption as practically possible. Early engagement and liaison with relevant stakeholders.

Subject	Hazard	Potential Consequence	Mitigation Measures
Underground Structures	Basements are known to exist to the north of Thames Tower within the Site boundaries. As well as in the southwest section of the site adjacent to Telecoms house. The Envirocheck Report indicated that there are two potential tanks in the E section of the site and one known tank in the NW section of the Site.	Obstruction to exploratory holes during site investigation. Programming and cost implications. Affect pile installation and reduce bearing capacity. Health and safety risk.	Depending on finalised construction levels encountered basements/tanks will either be excavated or in filled.

11. CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusions

This Desktop Site Appraisal Report was prepared for the proposed development in order to highlight potential geotechnical and geo-environmental ground-based risks associated with the development and to provide a strategy for addressing those identified.

The preliminary contaminated land risk assessment identified the potential for ground contamination at the site. Historic and current uses of the land may lead to potential soil and groundwater contamination at the site. The site has been previously occupied by a garage, car park, coal yard and bus station. The historical maps illustrate a garage located in the centre of the site with a car park and bus station constructed by the early 1960s. A coal yard was present to the south of the site. The historical data report from Envirocheck identified two potentially fuel related tanks on site. Whilst no tanks were identified during the site walkover (September 2018), residual contamination may be present. In addition, three electrical sub-stations were noted across the site during the site walkover, with unknown potential for release of PCBs.

A review of the surrounding area's history highlighted industrial land use within 100m of the site. The Great Western Railway runs parallel to the site boundary 60m north, since before first maps in the late 1870s. Garages were situated 90m southwest and 50m southeast of the site by 1957. Engineering works were identified on the historical maps to the northwest and north of the site. Four electrical sub-stations were also identified within 80m of the site. Historical Building Plans Information has identified three underground fuel tanks and oil storage within 100m south of the site. As such there is the potential for ground contamination from off-site sources, which could migrate onto site as a result of groundwater migration.

The Waterman investigaiton of accessible areas in 2014 identified low-moderate ground contamination risks. There is also potential for residual contamination to exist in the shallow soils and groundwater at the site which may have resulted from leaks and spills in areas not investigated previously (the south side of the site, which was inaccessible during the ground investigation in 2014). There is also potential for ground gas generation and accumulation, associated with unknown composition of Made and Natural Ground beneath the buildings on site.

Risks from potential contamination at the site which may present risk to both human health and controlled waters is considered likely to be **Low/Moderate**, dependent on which receptor or pathway is being considered. Potential risks from ground gas are assessed as **High.**

The preliminary geotechnical risk assessment identified that there are a number of existing exploratory hole records directly relevant to the site from a previous site investigation by ST Consult, as well as limited records from nearby buildings. Shallow ground conditions for the northern section are known to a reasonable degree however ground conditions below the structureless chalk are only known for one borehole on site. The ground conditions in the southern section of the site are known to a far lesser degree and can only be inferred from data from the northern section of the site. The main risks include the variability in thickness, distribution and geotechnical characteristics of the Made Ground, Alluvium, Taplow Gravel Formation and structureless chalk across the site, as well as the presence of underground services and buried structures/obstructions on site.

11.2 Recommendations

A full geotechnical and geo-environmental assessment of the site should be carried out in order to facilitate design of the substructures for the proposed development and assess, and mitigate where possible, the hazards currently identified. This should include a Ground Investigation and geotechnical design reports, in accordance with Eurocode 7. An intrusive Ground Investigation is recommended to be carried out at site in order to:

- Target the anticipated location of principal foundations, and delineate significant party wall foundations adjacent to and bounding the site, and assess shallow and deep ground conditions. It is likely that this investigation would be combined as a phased structural and environmental assessment. Details of ground investigation works and additional intrusive works will be determined at a later project stage.
- Establish the underlying ground conditions across the South Site as well as the ground conditions at depth for the North Site and derive appropriate geotechnical engineering design parameters for substructure (foundation and retaining wall) design – this should include in-situ and laboratory geotechnical testing;
- Determine the presence and chemical composition of the Made Ground / Infill and natural soils through targeted and representative soil sampling;
- Undertake a Waste Assessment to determine the status of the soils to be removed as part of the construction works;
- Characterise the underlying groundwater and ground gas regimes through sampling and the development of a monitoring program;
- Prior to demolition, a pre-demolition asbestos survey should be completed (in accordance with HSG 264, 2012) and any residual ACMs removed for disposal at a suitable licensed facility;
- Identifying extent of significant foundations for current developments on site prior to demolition works;
- Identify near-surface utilities;
- Assess the scale and dimensions of significant subsurface obstructions such as historic foundations, potential archaeological findings or existing services; and
- Assess the need for stability assessments of adjacent third-party structures or assets.

Other considerations:

- A material management plan / waste classification assessment should be undertaken if waste material is proposed to be taken off site;
- A Piling Risk Assessment may be required to accompany any piling works;
- Early liaison with Thames Water will be carried out in order to understand their requirements for surveying their asset locations, the level of ground movement impact assessments required, the movements acceptance criteria and the need for any monitoring of their assets during demolition, excavation and construction. Early involvement will be essential to mitigate against programme delays.

DRAWINGS

Drawing 1: Site Location Plan including Site Red Line Boundary

RAMBOLL

Project Title		Station Hill Reading	
Project N°		1620004716	
Sketch N°		SHR-SK-G-SK002	
Title		Site Location Map	
Scale		NTS	
Eng:	Rev:	Date:	Checked:
MT	00	24/08/18	-

Drawing 1

REFERENCES

- Greenspace Information for Greater London, 2016. *Site Details - Greenspace Information for Greater London*. [ONLINE] Available at: http://www.gigl.org.uk/online/site-Details.aspx?sID=HoBI13&sType=sinc. [Accessed 19 July 2016].
- British Geological Survey (2006). *Geology of North London, England & Wales Sheet 256. Solid and Drift Geology, 1:50 000*.
- Saunders, A. (2005). *The London County Council Bomb Damage Maps, 1939-1945*. Thames & Hudson.
- British Geological Survey Borehole Data (BGS, 2018).
- Bombsight *http://bombsight.org* [Accessed February 2018].
- BGS Geology of Britain Viewer website (www.mapapps.bgs.ac.uk)
- BS 10175; 2011+ A1:2013 Investigation of Potentially Contaminated Sites- Code of Practice
- BS EN1997-1:2004 Eurocode 7: Geotechnical design —Part 1: General rules
- BS EN1997-2 Eurocode 7: Geotechnical design — Part 2: Ground investigation and testing.
- CIRIA C552 (2001) Contaminated land risk assessment, a guide to good practice.
- Environment Agency (2004) Model procedures for the management of land contamination. Contaminated land report 11.
- Environment Agency (EA) website (www.environment-agency.gov.uk);
- Google Maps (2017) www.google.com
- Landmark Information Group Limited (2018), Envirocheck Report for Station Hill site, ref: 179269911_1_1
- NHBC and Environment Agency 2008. Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D Publication 66: 2008
- Zetica Unexploded Ordnance (UXO) Risk Map.

APPENDIX A

SITE WALKOVER PHOTOGRAPHIC RECORD

Photo 1: View from Reading Train Station looking south at NCP carpark and Temporary Events Space

Photo 2: View Looking east down Garrard Street

Photo 3: View Looking at carpark beneath Xaffinity House

Photo 4: View Looking east down Garrard Street

Photo 5: View Looking north onto Garrard Street, with the site of the former Bingo Hall/ bus Station opposite.

Photo 6: View Looking north towards Garrard Street with Telecoms House on the right.

Photo 7: View Looking south, towards Friar Street with Friars walk Shopping Centre on the left/ centre and Telecoms house to the right

Photo 8: Inside Telecoms House

Photo 9: Inside Friars Walk Shopping Centre

Photo 10: Inside Friars Walk Shopping Centre

Photo 10: View looking south down Merchants Place from Garrard Street.

Photo 11: View looking north at private carpark not within site boundaries, to the south east of the Site.

Photo 12: View looking south from roof of Friars Walk Shopping Centre at private carpark mentioned in Photo 11.

Photo 13: View looking south at entrance to site of the former Bingo Hall/ Bus Station.

Photo 14: View looking north with Xaffinity House on the left, on the site of the former Bingo Hall/ Bus Station.

Photo 15: View looking east towards the Temporary Events Space. Showing difference in ground level. (Base of wooden fence represents ground level on the Temporary Events Space.)

Photo 16: View looking north towards Station Hill Road. Showing rise in topography towards the east.

Photo 17: View looking north towards Reading Train Station, showing the Temporary Events Space.

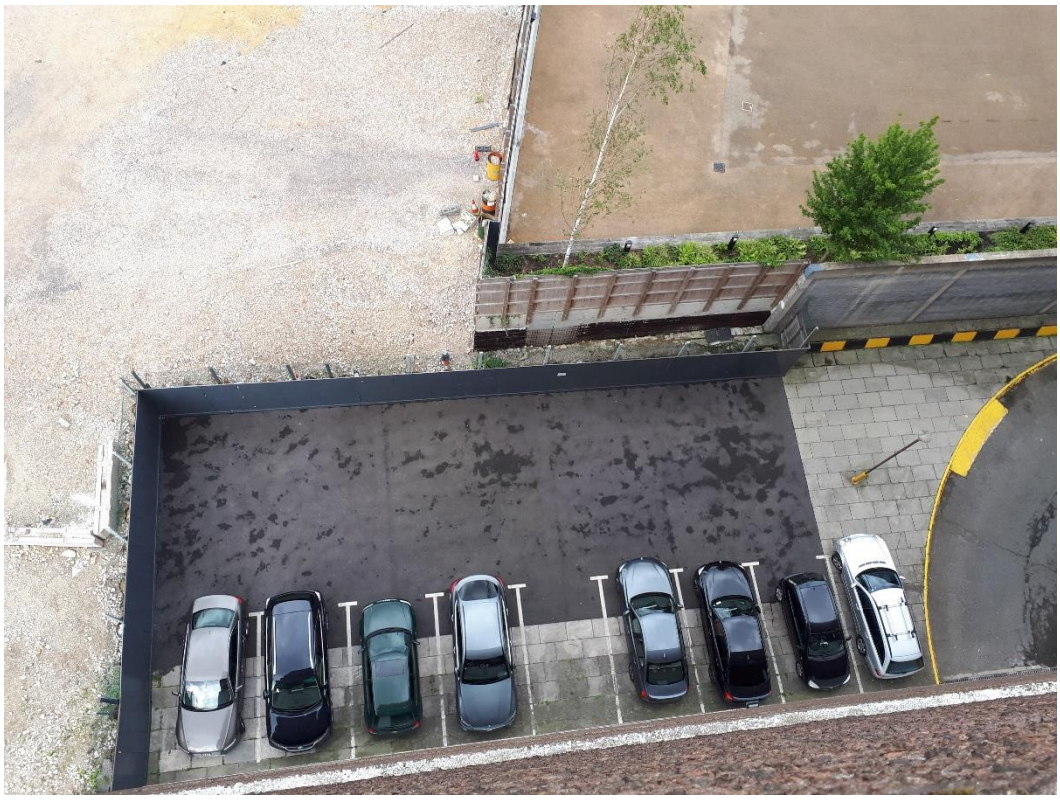

Photo 18: View looking north from the top of the NCP Carpark. Looking at car parking behind the Temporary Events Space.

Photo 19: View looking west at raised bedding area on the south side of the Temporary Events Space.

APPENDIX B

ENVIROCHECK REPORT AND HISTORIC MAPS

Envirocheck® Report:

Historical Data Report Datasheet

Order Details:

Order Number:
179269911_1_1

Customer Reference:
1620004716

National Grid Reference:
471370, 173710

Slice:
A

Site Area (Ha):
3.15

Search Buffer (m):
1000

Site Details:

Flat 2, Garrard House
30
Garrard Street
READING
RG1 1NR

Client Details:

Miss H Quinn
Ramboll UK Ltd
240 Blackfriars Road
London
SE1 8NW

Contents

Report Section	Page Number
Summary	-
Historical Building Plans Information	1
Historical Land Use Information	5
Historical Tanks and Energy Facilities	10
Historical Map List	11
Useful Contacts and Further Information	13

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v53.0

RAMBOLL

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Historical Building Plans Information					
Areas Cleared Due To Enemy Action					
Above Ground Fuel Tanks (100m)				n/a	n/a
Asbestos (100m)	pg 1		56	n/a	n/a
Benzene/Benzole/Naphtha, Naphthalene/Kerosene (100m)				n/a	n/a
Electricity Generation (100m)				n/a	n/a
Electricity Sub-Stations (100m)				n/a	n/a
Gas Industry (100m)				n/a	n/a
Gas Storage (100m)				n/a	n/a
Gas Use (100m)	pg 3		1	n/a	n/a
Oil Industry (100m)				n/a	n/a
Oil Storage (100m)	pg 3		3	n/a	n/a
Oil Use (100m)				n/a	n/a
Paint based Oils (100m)	pg 3		2	n/a	n/a
Paraffin (100m)				n/a	n/a
Petrol and Diesel Industry (100m)				n/a	n/a
Petrol and Diesel Storage (100m)				n/a	n/a
Petrol and Diesel Use (100m)				n/a	n/a
Potential Fuel Gas (100m)				n/a	n/a
Potential Fuel Oil (100m)				n/a	n/a
Potential Fuel Use (100m)				n/a	n/a
Potential Petrol and Diesel (100m)				n/a	n/a
Potential Tanks (100m)				n/a	n/a
Potentially Fuel-related Tanks (100m)				n/a	n/a
Underground Fuel Tanks (100m)	pg 3		3	n/a	n/a
Historical Land Use Information					
Former Marshes	pg 5				1
Historical Flood Liabilities	pg 5			1	5
Potentially Contaminative Industrial Uses (Past Land Use)	pg 5	1	9	15	43
Potentially Infilled Land (Non-Water)	pg 8				2
Potentially Infilled Land (Water)	pg 8	1		4	9

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Historical Tanks and Energy Facilities					
Electrical Sub Station Facilities (100m)	pg 10		4	n/a	n/a
Electricity Industry Facilities (100m)				n/a	n/a
Gas Industry Facilities (100m)				n/a	n/a
Gas Monitoring Facilities (100m)				n/a	n/a
Miscellaneous Power Facilities (100m)				n/a	n/a
Oil Industry Facilities (100m)				n/a	n/a
Petroleum Storage Facilities (100m)				n/a	n/a
Potential Tanks (100m)	pg 10	2	1	n/a	n/a
Tanks (100m)	pg 10	1		n/a	n/a

Historical Building Plans Information

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SW (S)	27	1	471307 173551
1	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SW (S)	33	1	471352 173548
1	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SW (S)	34	1	471352 173548
1	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SW (S)	34	1	471352 173548
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (SE)	44	1	471435 173559
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (SE)	44	1	471435 173558
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (SE)	44	1	471435 173557
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	50	1	471406 173538
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (S)	50	1	471406 173538
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (S)	51	1	471405 173537
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (S)	55	1	471409 173533
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (S)	56	1	471406 173533
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	56	1	471408 173533
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	56	1	471406 173532
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (S)	56	1	471408 173533
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (S)	56	1	471406 173532
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (S)	57	1	471406 173532
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (S)	63	1	471434 173533
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (S)	64	1	471399 173523
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	64	1	471407 173524
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (S)	64	1	471407 173524

Historical Building Plans Information

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	65	1	471396 173522
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (S)	65	1	471396 173522
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	66	1	471411 173522
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (SE)	66	1	471448 173540
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (SE)	66	1	471450 173541
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (S)	66	1	471411 173522
2	**Asbestos** Map Text: ASB Clad Plan Name: 099_008_1953_geo1	A13SE (S)	68	1	471413 173521
2	**Asbestos** Map Text: ASB Clad Plan Name: 099_008_1958_geo1	A13SE (S)	68	1	471413 173521
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (S)	80	1	471428 173512
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	80	1	471428 173512
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (S)	81	1	471428 173512
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (S)	85	1	471428 173507
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	85	1	471428 173507
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (S)	85	1	471428 173507
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (S)	90	1	471404 173497
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	91	1	471405 173497
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (S)	91	1	471405 173497
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (S)	96	1	471452 173506
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SE (SE)	98	1	471458 173507
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SE (SE)	99	1	471458 173506
2	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SE (SE)	100	1	471458 173506

Historical Building Plans Information

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
3	**Asbestos** Map Text: ASB Plan Name: 099_006_1958_geo1	A13NE (E)	47	1	471535 173735
3	**Asbestos** Map Text: ASB Plan Name: 099_006_1958_geo1	A13NE (E)	53	1	471542 173736
3	**Asbestos** Map Text: ASB Plan Name: 099_006_1958_geo1	A13NE (E)	65	1	471552 173729
4	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SW (S)	49	1	471306 173528
4	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SW (SW)	50	1	471291 173532
4	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SW (SW)	70	1	471277 173517
4	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SW (SW)	71	1	471276 173516
4	**Asbestos** Map Text: ASB Plan Name: 099_008_1958_geo1	A13SW (S)	87	1	471301 173491
5	**Asbestos** Map Text: ASB Plan Name: 099_006_1958_geo1	A13SE (E)	76	1	471517 173665
5	**Asbestos** Map Text: ASB Plan Name: 099_006_1958_geo1	A13SE (E)	91	1	471535 173666
6	**Asbestos** Map Text: ASB Plan Name: 099_006_1958_geo1	A13NE (NE)	81	1	471566 173796
6	**Asbestos** Map Text: ASB Cl Plan Name: 099_006_1958_geo1	A13NE (NE)	83	1	471566 173800
7	**Asbestos** Map Text: ASB Plan Name: 099_008_1951_geo1	A13SW (S)	95	1	471326 173483
7	**Asbestos** Map Text: ASB Plan Name: 099_008_1953_geo1	A13SW (S)	100	1	471334 173479
8	**Gas Use** Map Text: Gas Eng Plan Name: 099_008_1895_geo1	A13SW (S)	63	1	471344 173518
9	**Oil Storage** Map Text: Oil Store Plan Name: 099_008_1951_geo1	A13SE (S)	88	1	471429 173504
9	**Oil Storage** Map Text: Oil Store Plan Name: 099_008_1953_geo1	A13SE (S)	88	1	471429 173504
9	**Oil Storage** Map Text: Oil Store Plan Name: 099_008_1958_geo1	A13SE (S)	88	1	471429 173504
10	**Paint based Oils** Map Text: Oil & Color Plan Name: 099_008_1895_geo1	A13SE (S)	100	1	471431 173493
10	**Paint based Oils** Map Text: Oil & Color Plan Name: 099_008_1951_geo1	A13SE (S)	100	1	471431 173493
11	**Underground Fuel Tanks** Map Text: Sunk Petrol Tank Plan Name: 099_008_1951_geo1	A13SW (S)	70	1	471305 173507

Historical Building Plans Information

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
11	**Underground Fuel Tanks** Map Text: Sunk Petrol Tank Plan Name: 099_008_1958_geo1	A13SW (S)	70	1	471305 173507
11	**Underground Fuel Tanks** Map Text: Sunk Petrol Tank Plan Name: 099_008_1953_geo1	A13SW (S)	71	1	471306 173507

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
12	**Former Marshes** Use: Former Marsh Date of Mapping: 1962	A12NW (W)	910	1	470374 173867
13	**Historical Flood Liabilities** Use: Area liable to flood Date of Mapping: 1883	A13NE (NE)	295	1	471677 174002
14	**Historical Flood Liabilities** Use: Area liable to flood Date of Mapping: 1900	A19SW (NE)	609	1	471792 174305
15	**Historical Flood Liabilities** Use: Area liable to flood Date of Mapping: 1883	A12NW (W)	846	1	470445 173911
16	**Historical Flood Liabilities** Use: Area liable to flood Date of Mapping: 1900	A17NW (NW)	895	1	470640 174430
17	**Historical Flood Liabilities** Use: Area liable to flood Date of Mapping: 1883	A15NW (E)	954	1	472430 173927
18	**Historical Flood Liabilities** Use: Area liable to flood Date of Mapping: 1900	A20SW (E)	993	1	472420 174118
19	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Road haulage Date of Mapping: 1995	A13NW (W)	0	1	471347 173712
20	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1883 - 1992	A13NE (N)	8	1	471384 173814
21	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1883 - 1995	A13NE (E)	25	1	471518 173752
22	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1883 - 1995	A13NE (N)	72	1	471397 173879
23	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Transport manufacturing and repair Date of Mapping: 1883 - 1931	A13NW (N)	140	1	471367 173950
24	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962	A13NE (N)	148	1	471398 173952
25	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Animal slaughtering & basic processing of meat [other than poultry] Date of Mapping: 1883	A13NW (NW)	154	1	471151 173884
26	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Sawmilling, planing & impregnation [i.e. treatment of timber] Date of Mapping: 1883	A13NW (NW)	158	1	471233 173958
27	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1883 - 1995	A13NE (E)	212	1	471700 173797
28	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Sawmilling, planing & impregnation [i.e. treatment of timber] Date of Mapping: 1913	A13NW (NW)	240	1	471109 173972
29	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Metal casting/foundries Date of Mapping: 1900 - 1913	A13NE (NE)	276	1	471652 173998
30	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1883 - 1995	A12NE (NW)	285	1	471028 173932
31	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Road haulage Date of Mapping: 1995	A14NW (E)	307	1	471787 173847
32	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Road haulage Date of Mapping: 1913 - 1995	A12NE (W)	341	1	470942 173826

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
33	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Electricity production & distribution [inc large transformers] Date of Mapping: 1900 - 1914	A18SE (NE)	346	1	471561 174125
34	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Road haulage Date of Mapping: 1995	A18SE (NE)	356	1	471574 174132
35	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Sawmilling, planing & impregnation [i.e. treatment of timber] Date of Mapping: 1914 - 1932	A18SE (N)	371	1	471394 174175
36	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Printing: miscellaneous exc. newspapers Date of Mapping: 1914 - 1932	A17SE (NW)	375	1	470997 174048
37	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962	A18SW (N)	378	1	471245 174184
38	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Gas manufacture & distribution Date of Mapping: 1883 - 1913	A8NE (S)	388	1	471563 173234
39	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962	A17SE (NW)	388	1	470987 174057
40	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1995	A17SE (NW)	389	1	470986 174057
41	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Brewing & malting Date of Mapping: 1913 - 1931	A8NE (S)	392	1	471563 173231
42	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962 - 1995	A12NE (NW)	422	1	470922 174025
43	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Road haulage Date of Mapping: 1995	A8NE (SE)	455	1	471687 173228
44	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Transport support & cargo handling Date of Mapping: 1883	A8NE (S)	503	1	471472 173090
45	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Sawmilling, planing & impregnation [i.e. treatment of timber] Date of Mapping: 1883 - 1931	A14SW (SE)	520	1	471929 173473
46	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962	A17SE (NW)	521	1	471007 174250
47	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Hospitals Date of Mapping: 1900	A8NE (S)	545	1	471470 173048
48	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1913 - 1931	A8NW (S)	547	1	471325 173030
49	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Military Land Date of Mapping: 1883	A8NE (SE)	558	1	471674 173100
50	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Sawmilling, planing & impregnation [i.e. treatment of timber] Date of Mapping: 1882	A18NW (N)	568	1	471196 174370
51	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Transport support & cargo handling Date of Mapping: 1913 - 1995	A9NW (SE)	572	1	471914 173331
51	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Transport support & cargo handling Date of Mapping: 1913 - 1931	A9NW (SE)	606	1	471933 173294
52	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Food processing - major Date of Mapping: 1883 - 1931	A14SW (E)	573	1	472055 173648

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
53	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Transport support & cargo handling Date of Mapping: 1883	A8SE (S)	607	1	471383 172974
54	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1913 - 1962	A8SW (S)	609	1	471345 172969
55	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1932 - 1962	A17SE (NW)	614	1	470751 174110
56	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962 - 1995	A14SE (E)	615	1	472098 173645
57	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Machinery: engines, building and general industrial [manufacture] Date of Mapping: 1932	A18NE (N)	649	1	471537 174440
58	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Sawmilling, planing & impregnation [i.e. treatment of timber] Date of Mapping: 1914 - 1932	A18NE (N)	651	1	471594 174433
59	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1913 - 1962	A8SW (S)	653	1	471329 172923
60	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962	A18NE (N)	665	1	471532 174458
61	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962 - 1995	A18NE (N)	665	1	471631 174438
62	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Road haulage Date of Mapping: 1995	A17SW (NW)	679	1	470671 174100
63	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Metal casting/foundries Date of Mapping: 1883 - 1931	A9SW (SE)	698	1	471731 172972
64	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962	A8SE (SE)	705	1	471707 172952
65	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Cemetery or Graveyard Date of Mapping: 1883	A8SE (S)	710	1	471580 172901
66	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Laundries & dry cleaning Date of Mapping: 1900 - 1932	A19NW (NE)	724	1	471889 174380
67	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1995	A17SW (NW)	726	1	470691 174227
68	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Food processing - major Date of Mapping: 1913	A9NW (SE)	734	1	471936 173084
69	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Metal casting/foundries Date of Mapping: 1883	A8SE (S)	735	1	471429 172851
70	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1883 - 1995	A14NE (E)	740	1	472230 173801
71	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Pipelines [transport via] Date of Mapping: 1995	A12NW (W)	783	1	470503 173872
72	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1962	A17SW (NW)	824	1	470526 174128
73	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Gas manufacture & distribution Date of Mapping: 1883 - 1931	A14SE (E)	867	1	472292 173419

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
74	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Paper packaging products [manufacture] Date of Mapping: 1882	A18NW (N)	868	1	471218 174674
75	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Road haulage Date of Mapping: 1995	A12NW (W)	869	1	470429 173959
76	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Sawmilling, planing & impregnation [i.e. treatment of timber] Date of Mapping: 1883	A8SW (S)	887	1	471363 172691
77	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1882 - 1992	A17SW (W)	895	1	470419 174037
78	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Road haulage Date of Mapping: 1995	A11SE (W)	902	1	470368 173678
79	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Quarrying of sand & clay, operation of sand & gravel pits Date of Mapping: 1883	A7NW (SW)	927	1	470543 173061
80	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Clay bricks & tiles [manufacture] Date of Mapping: 1883	A3NE (S)	946	1	471560 172655
81	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1995	A9SW (S)	948	1	471760 172710
82	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1883 - 1992	A11SE (W)	954	1	470318 173647
83	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Tableware & other ceramics [manufacture] Date of Mapping: 1883	A3NW (S)	971	1	471077 172635
84	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1995	A3NW (S)	983	1	471360 172595
85	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Sewage Date of Mapping: 1900 - 1931	A15SW (E)	996	1	472457 173508
86	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1995	A7NW (SW)	927	1	470543 173061
87	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1995	A3NE (S)	946	1	471560 172655
88	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1995	A13NW (N)	0	1	471370 173714
89	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1900	A8NE (SE)	458	1	471685 173227
90	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1931	A14NW (NE)	460	1	471901 173975
91	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1962	A8NE (S)	474	1	471585 173151
92	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1900	A8NE (SE)	499	1	471647 173153
93	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1932	A17SE (NW)	543	1	470889 174179
94	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1932	A17SE (NW)	609	1	470985 174338

Historical Land Use Information

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
95	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1962	A12NW (W)	702	1	470580 173838
96	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1883	A8SW (S)	781	1	471230 172800
97	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1900	A8SW (S)	810	1	471315 172767
98	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1932	A17NE (NW)	836	1	470855 174526
99	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1883	A8SW (S)	855	1	471234 172726
100	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1932	A17NE (NW)	903	1	470774 174553
101	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1883	A3NW (S)	946	1	471230 172634

Historical Tanks and Energy Facilities

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
102	**Electrical Sub Station Facilities** Scale of Mapping: 1:1,250 Date of Mapping: 1969 - 1986	A13SW (SW)	11	1	471280 173663
103	**Electrical Sub Station Facilities** Scale of Mapping: 1:1,250 Date of Mapping: 1969 - 1986	A13SW (SW)	47	1	471297 173533
104	**Electrical Sub Station Facilities** Scale of Mapping: 1:1,250 Date of Mapping: 1986	A13SE (S)	60	1	471382 173526
105	**Electrical Sub Station Facilities** Scale of Mapping: 1:1,250 Date of Mapping: 1969 - 1986	A13SE (SE)	83	1	471452 173522
106	**Potential Tanks** Scale of Mapping: 1:1,250 Date of Mapping: 1957 - 1969	A13NE (E)	0	1	471423 173719
107	**Potential Tanks** Scale of Mapping: 1:1,250 Date of Mapping: 1957 - 1969	A13SE (S)	0	1	471401 173605
108	**Potential Tanks** Scale of Mapping: 1:1,250 Date of Mapping: 1971	A13NE (E)	59	1	471549 173768
109	**Tanks** Scale of Mapping: 1:1,250 Date of Mapping: 1969	A13NW (N)	0	1	471360 173738

The following plans have been analysed for Historical Building Plans Information:

Plan Name:	Town:	Published Date:	Last Pasted Date:
099_006_1895_geo1	Reading	1895	1895
099_006_1958_geo1	Reading	1895	1958
099_008_1895_geo1	Reading	1895	1895
099_008_1951_geo1	Reading	1895	1951
099_008_1953_geo1	Reading	1953	1953
099_008_1958_geo1	Reading	1953	1958
099_007_1895_geo1	Reading	1895	1895
099_007_1958_geo1	Reading	1895	1958
099_009_1895_geo1	Reading	1895	1895
099_009_1947_geo1	Reading	1947	1947

The following mapping has been analysed for Historical Land Use Information:

1:10,560	Mapsheet	Published Date
Oxfordshire	056_00	1882
Berkshire	037_00	1883
Berkshire	029_SE	1900
Berkshire	029_SW	1900
Berkshire	037_NE	1900
Berkshire	037_NW	1900
Oxfordshire	056_SE	1900
Oxfordshire	056_SW	1900
Oxfordshire	058_NE	1900
Berkshire	037_NE	1913
Oxfordshire	058_NE	1913
Berkshire	029_SE	1914
Berkshire	029_SW	1914
Berkshire	037_NW	1914
Oxfordshire	056_SE	1914
Oxfordshire	056_SW	1914
Berkshire	037_NE	1931
Berkshire	029_SE	1932
Berkshire	037_NW	1932
Berkshire	029_SW	1938
Oxfordshire	056_SW	1938
Ordnance Survey Plan	SU77NW	1961
Ordnance Survey Plan	SU77SW	1962
1:10,000	**Mapsheet**	**Published Date**
Ordnance Survey Plan	SU77NW	1991
Ordnance Survey Plan	SU77SW	1995

Historical Map List

The following mapping has been analysed for Historical Tanks and Energy Facilities:

1:2,500	Mapsheet	Published Date
Ordnance Survey Plan	SU7174	1957
1:1,250	**Mapsheet**	**Published Date**
Ordnance Survey Plan	SU7173NE	1957
Ordnance Survey Plan	SU7173NW	1957
Ordnance Survey Plan	SU7173SE	1957
Ordnance Survey Plan	SU7173SW	1957
Ordnance Survey Plan	SU7174SE	1957
Ordnance Survey Plan	SU7174SW	1957
Ordnance Survey Plan	SU7173NE	1962
Ordnance Survey Plan	SU7173NW	1962
Ordnance Survey Plan	SU7173SE	1962
Ordnance Survey Plan	SU7173SW	1962
Ordnance Survey Plan	SU7173SE	1968
Ordnance Survey Plan	SU7173NW	1969
Ordnance Survey Plan	SU7173SW	1970
Ordnance Survey Plan	SU7173NE	1971
Ordnance Survey Plan	SU7174SW	1971
Ordnance Survey Plan	SU7174SE	1972
Ordnance Survey Plan	SU7173SW	1980
Ordnance Survey Plan	SU7174SW	1984
Ordnance Survey Plan	SU7173NE	1986
Ordnance Survey Plan	SU7173NW	1986
Ordnance Survey Plan	SU7173SE	1988

Useful Contacts and Further Information

Contact	Name and Address	Contact Details
1	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9966 Fax: 0844 844 9951 Email: helpdesk@landmark.co.uk Website: www.landmark.co.uk

Historical Building Plans Information

This data set contains potentially contaminative features such as asbestos, petrol, oil and tanks captured from Historical Building Plans. The Historical Building Plans were produced by the London-based firm Charles E. Goad Ltd. as fire insurance plans, dating back to 1885. The firm ceased production of fire insurance plans in 1970. Most of the important towns and cities of the British Isles are covered. Historical Building Plans are usually at the scales of 1:480 (1 inch to 40 feet) for the British Isles. They were updated every 5-6 years by means of revision sheets designed to be pasted on to the original plans.

It should be noted that Historical Building Plans are only available for certain major towns and cities and in some cases there may only be partial coverage of the search area. It cannot therefore be assumed that the absence of responses under the Historical Building Plans section of this report indicates that no hazards exist. Please check the Historical Building Plans Map List table in the Historical Map List section of this report to establish if Historical Building Plans are available for this search area.

Historical Land Use Information

Landmark's Historical Land Use Data is the result of combined analysis of historical map data captured at 1:10,560 and 1:10,000. A unique comprehensive database of Historic Land Use from the 1840's to 1996 it includes 67 different types of potentially contaminated past industrial land use. This entailed analysing over 60,000 maps and is drawn from at least four, and up to six historical map editions. In addition a seventh layer was also created, known as the land use layer, containing areas of infilled land which are plotted via comparison between two or more map editions.

Historical Tanks and Energy Facilities

In addition to HLUD, additional analysis uncovered some of the most dangerous sources of contamination (past and present tanks, petrol storage, oil, gas, electricity, miscellaneous facilities). This data set covers over 390,000 Historical Tanks and Energy facilities in Great Britain and was captured from post war 1:2500 and 1:1250 Ordnance Survey historical mapping covering a period from 1943 to 1996.

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Gravel Pit
Sand Pit
Other Pits
Quarry
Shingle
Orchard
Osiers
Reeds
Marsh
Mixed Wood
Deciduous
Brushwood
Fir
Furze
Rough Pasture
Arrow denotes flow of water
Trigonometrical Station
Site of Antiquities
Bench Mark
Pump, Guide Post, Signal Post
Well, Spring, Boundary Post
·285 Surface Level
Sketched Contour
Instrumental Contour
Main Roads
Fenced
Un-Fenced
Minor Roads
Fenced
Un-Fenced
Sunken Road
Raised Road
Road over Railway
Railway over River
Railway over Road
Level Crossing
Road over River or Canal
Road over Stream
Road over Stream
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy. County Borough Boundary (England)
Co. Burgh Bdy. County Burgh Boundary (Scotland)
R.D. Bdy. Rural District Boundary
Civil Parish Boundary

Ordnance Survey Plan 1:10,000

Chalk Pit, Clay Pit or Quarry
Gravel Pit
Sand Pit
Disused Pit or Quarry
Refuse or Slag Heap
Lake, Loch or Pond
Dunes
Boulders
Coniferous Trees
Non-Coniferous Trees
Orchard
Scrub
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Direction of Flow of Water
Shingle
Sand
Glasshouse
Pylon
Pylon
Electricity Transmission Line
Sloping Masonry
Cutting
Embankment
Standard Gauge Multiple Track
Road Under
Road Over
Level Crossing
Foot Bridge
Standard Gauge Single Track
Siding, Tramway or Mineral Line
Narrow Gauge
Geographical County
Administrative County, County Borough or County of City
Municipal Borough, Urban or Rural District, Burgh or District Council
Borough, Burgh or County Constituency
Shown only when not coincident with other boundaries
Civil Parish
Shown alternately when coincidence of boundaries occurs

BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping

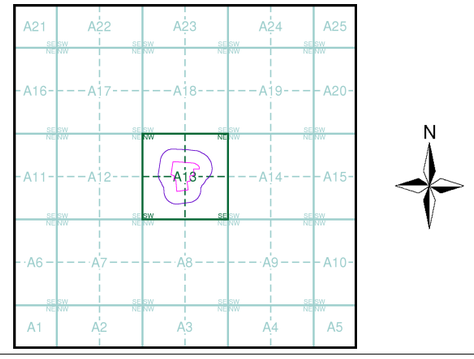
Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community boundary
District, Unitary, Metropolitan, London Borough boundary
Constituency boundary
Area of wooded vegetation
Non-coniferous trees
Non-coniferous trees (scattered)
Coniferous trees
Coniferous trees (scattered)
Positioned tree
Orchard
Coppice or Osiers
Rough Grassland
Heath
Scrub
Marsh, Salt Marsh or Reeds
Water feature
Flow arrows
MHW(S) Mean high water (springs)
MLW(S) Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
BM 123.45 m Bench mark (where shown)
Triangulation station
Point feature (e.g. Guide Post or Mile Stone)
Pylon, flare stack or lighting tower
Site of (antiquity)
Glasshouse
General Building
Important Building

RAMBOLL

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Oxfordshire	1:10,560	1882	3
Berkshire	1:10,560	1883	4
Berkshire	1:10,560	1900	5
Oxfordshire	1:10,560	1900	6
Berkshire	1:10,560	1901	7
Oxfordshire	1:10,560	1901	8
Berkshire	1:10,560	1913 - 1914	9
Berkshire	1:10,560	1932 - 1933	10
Berkshire	1:10,560	1938	11
Berkshire	1:10,560	1938	12
Historical Aerial Photography	1:10,560	1947 - 1948	13
Ordnance Survey Plan	1:10,000	1961 - 1962	14
Ordnance Survey Plan	1:10,000	1973	15
Ordnance Survey Plan	1:10,000	1979	16
Ordnance Survey Plan	1:10,000	1990 - 1991	17
Reading	1:10,000	1990	18
Ordnance Survey Plan	1:10,000	1995	19
10K Raster Mapping	1:10,000	1999	20
10K Raster Mapping	1:10,000	2006	21
VectorMap Local	1:10,000	2018	22

Historical Map - Slice A



Order Details

Order Number: 179269911_1_1
Customer Ref: 1620004716
National Grid Reference: 471370, 173710
Slice: A
Site Area (Ha): 3.15
Search Buffer (m): 1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Fireproof Building
- Prominent Fireproof Building
- Non-fireproof Building
- Non-fireproof Building (non-dwelling)
- Factory, mill, and flour mill, with chimneys
- Factory, mill, and flour mill, without chimneys
- Power Station, drawn to scale
- Hydroelectric Power Station
- Radio Station, drawn to scale
- Telephone Station, drawn to scale
- Abandoned Open-pit Mine or Quarry
- Open-pit Salt Mine
- Pit
- Oil Deposit or Well
- Oil Seepage
- Tailings Pile
- Fuel Storage Tanks
- Natural Gas Tank
- Bench Mark
- Drill Hole
- Burial Mound
- Triangulation Point on Burial Mound
- Single-track Railroad
- Double-track Railroad and Station Building
- Coniferous Forest
- Deciduous Forest
- Mixed Forest
- Lawns
- Citrus Orchard
- Wet Ground
- Scattered Vegetation

243,8 — Values for prominent elevations

186.0 — Numbers for spot elevations, depth soundings, contour lines, etc.

0,2 — Velocity of the current, width of river bed, depth of river

Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (For reference and phonetic interpretation of map text)

А а (A)	З з (Z)	П п (P)	Ч ч (CH)
Б б (B)	И и (I)	Р р (R)	Ш ш (SH)
В в (V)	Й й (Y)	С с (S)	Щ щ (SHCH)
Г г (G)	К к (K)	Т т (T)	ъ (–)
Д д (D)	Л л (L)	У у (U)	ы (Y)
Е е (E)	М м (M)	Ф ф (F)	ь (')
Ё ё (YO)	Н н (N)	Х х (KH)	Э э (E)
Ж ж (ZH)	О о (O)	Ц ц (TS)	Ю ю (YU or IU)
			Я я (YA or IA)

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Partly Demolished Buildings
- Demolished Buildings
- Built-Up Area with Fireproof Buildings Predominant
- Built-Up Area with Non-Fireproof Buildings Predominant
- Individual Fireproof Building
- Prominent Industrial Building
- Individual Dwelling, Fireproof
- Ruins of an Individual Dwelling
- Factory or Mill Chimney
- Factory or Mill with Chimney
- Factory or Mill without Chimney
- Mine or Open Pit Mine
- Operating Shaft or Mine
- Non-Operating Shaft or Mine
- Salt Mine
- Tailings Pile
- Pit
- Stone Quarry
- Gas Pump or Service Station
- Fuel Storage or Natural Gas Tank
- Oil or Natural Gas Derrick
- Small Hydroelectric Power Station
- Power Station
- Transformer Station
- Cemetery
- Burial Mound (height in metres)
- Triangulation Point on Burial Mound
- Triangulation Point
- Bench Mark
- Bench Mark (monumented)
- Telegraph Office
- Telephone Station
- Radio Station
- Radio Tower
- Airfield or Seaplane Base
- Landing Strip
- Main Highway
- Highway under Construction
- Improved Dirt Road (former truck road)
- Double-track Railroad with First Class Station
- Dismantled Railroad
- Railroad Under Construction
- Shore Embankment
- River or Ditch with Embankment
- Direction and velocity of current
- Well
- Water Reservoir or Rain Water Pit
- Spring
- Isobath with value
- Heavy (Index) Contour Line
- Contour Line and Value
- Half Contour Line
- Spot Elevation Value
- Coniferous
- Deciduous
- Mixed
- Scrub

Key to Numbers on Mapping

SU77SW_Reading

No.	Description
1	Bank(S)
3	Factories (Including Machinery, Radio Electronics And Tubing)
7	Factory (Use Unknown)
14	Factory (Use Unknown)
19	Factories (Radio Electronics And Electro Technical)
26	Police Station/Headquarters
40	Railway Station (Freight)
41	Railway Station (Freight And Passenger)
57	Prison

RAMBOLL

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Oxfordshire	1:10,560	1882	3
Berkshire	1:10,560	1883	4
Berkshire	1:10,560	1900	5
Oxfordshire	1:10,560	1900	6
Berkshire	1:10,560	1901	7
Oxfordshire	1:10,560	1901	8
Berkshire	1:10,560	1913 - 1914	9
Berkshire	1:10,560	1932 - 1933	10
Berkshire	1:10,560	1938	11
Berkshire	1:10,560	1938	12
Historical Aerial Photography	1:10,560	1947 - 1948	13
Ordnance Survey Plan	1:10,000	1961 - 1962	14
Ordnance Survey Plan	1:10,000	1973	15
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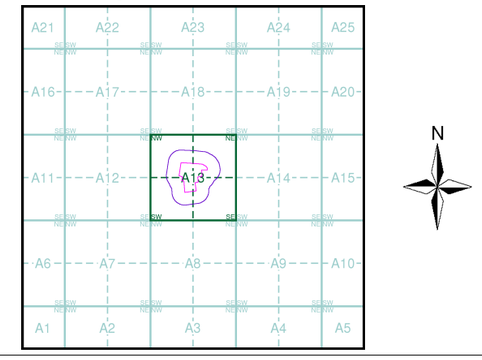
Reading	1:10,000	1990	18
Ordnance Survey Plan	1:10,000	1995	19
10K Raster Mapping	1:10,000	1999	20
10K Raster Mapping	1:10,000	2006	21
VectorMap Local	1:10,000	2018	22

Russian Map - Slice A



Order Details

Order Number: 179269911_1_1
Customer Ref: 1620004716
National Grid Reference: 471370, 173710
Slice: A
Site Area (Ha): 3.15
Search Buffer (m): 1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR

Landmark INFORMATION GROUP
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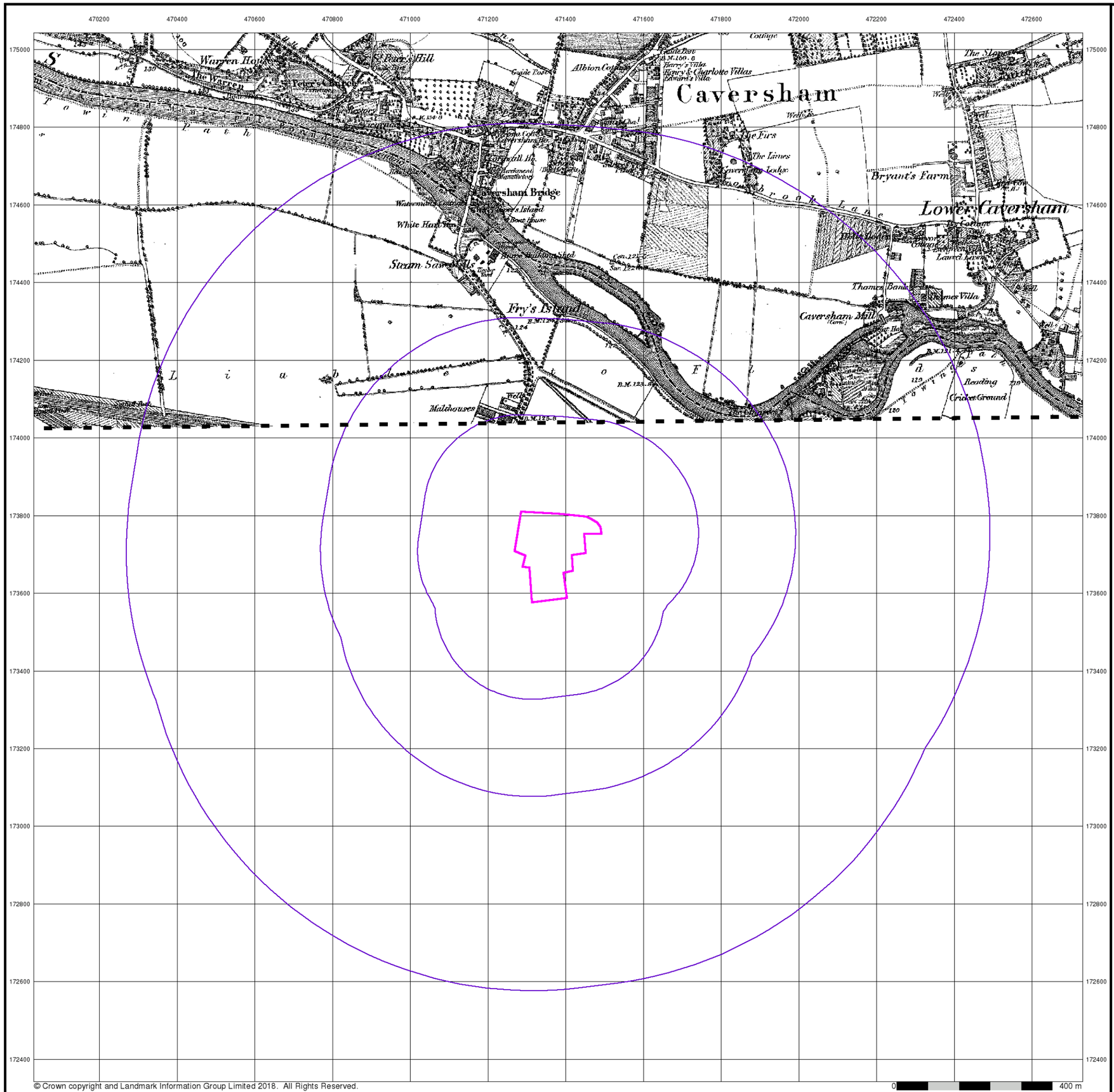
Web: www.envirocheck.co.uk



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RAMBOLL

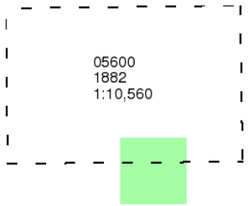
Oxfordshire

Published 1882

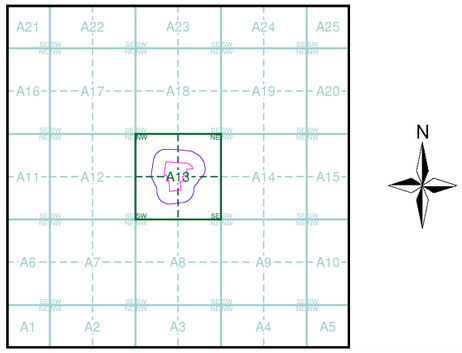
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



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Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR

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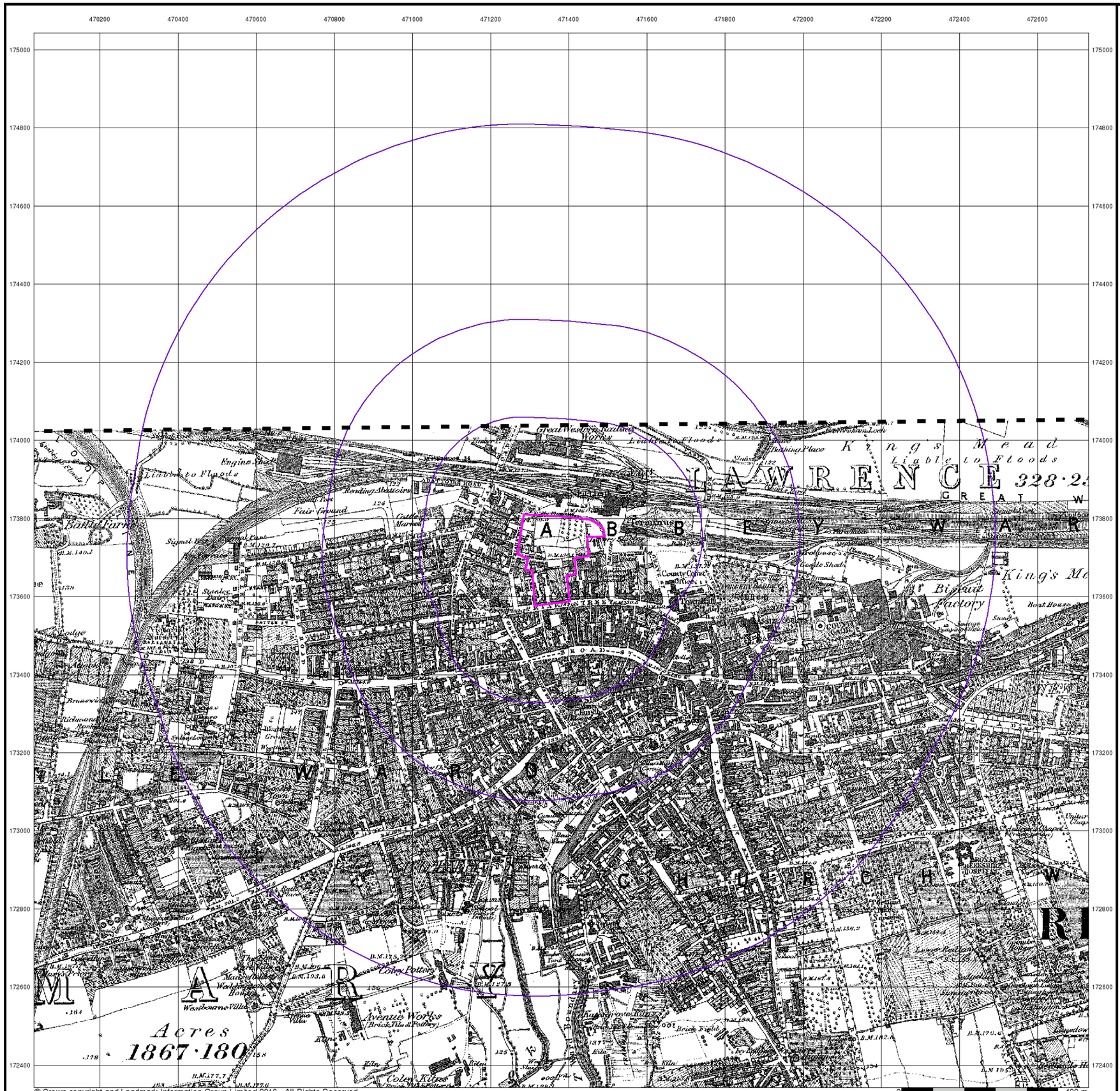
Web: www.envirocheck.co.uk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173800
173600
173400
173200
173000
172800
172600
172400
LAWRENCE
GREAT
WESTERN
BROAD
STREET
CHURCH
Acres
1867·180
Avenue Works
Brick, Tile & Pottery
Colour Pottery
Coleys Kilns
Great Western Railway Works
Engine Shed
Reading Sheds
Fair Ground
Cattle Market
Bath Place
Flooded
Liable to Floods
King's Mead
Biscuit Factory
Stanley Dale
Brunswick Hill
Richmond Hill
Weldale
Grove
Wellington Villas
Washbourne Villas
Brunswick Terrace
Cemetery
Chapel
Meeting House
Workhouse
Union
Infirmary
Gaol
County Court
Offices
Police Station
Lodge
Pump
Tank
Sewage Disposal Works
Gasometer
Sidings
Goods Shed
Signal Box
Signal Post
Telegraph Office
Post Office
Public House
Inn
Bridge
Lock
Weir
Footbridge
Level Crossing
Tunnel
Cutting
Embankment
Quarry
Pit
Kiln
Brick Field
Sand Pit
Clay Pit
Ley Pond
Reservoir
Tower
Spire
Church
Chapel
Vicarage
Rectory
Parsonage
Cottages
Terrace
Villa
Villas
Lodge
Gate
Gates
Entrance
Drive
Path
Steps
Wall
Hedge
Fence
Trees
Wood
Plantation
Orchard
Garden
Allotments
Recreation Ground
Cricket Ground
Football Ground
Golf Course
Bowling Green
Tennis Court
Swimming Pool
Baths
Library
Museum
Art Gallery
Theatre
Cinema
Hall
Institute
Club
Hotel
Restaurant
Café
Shop
Bank
Market
Fire Station
Police Station
Prison
Barracks
Drill Hall
Armoury
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Battery
Fort
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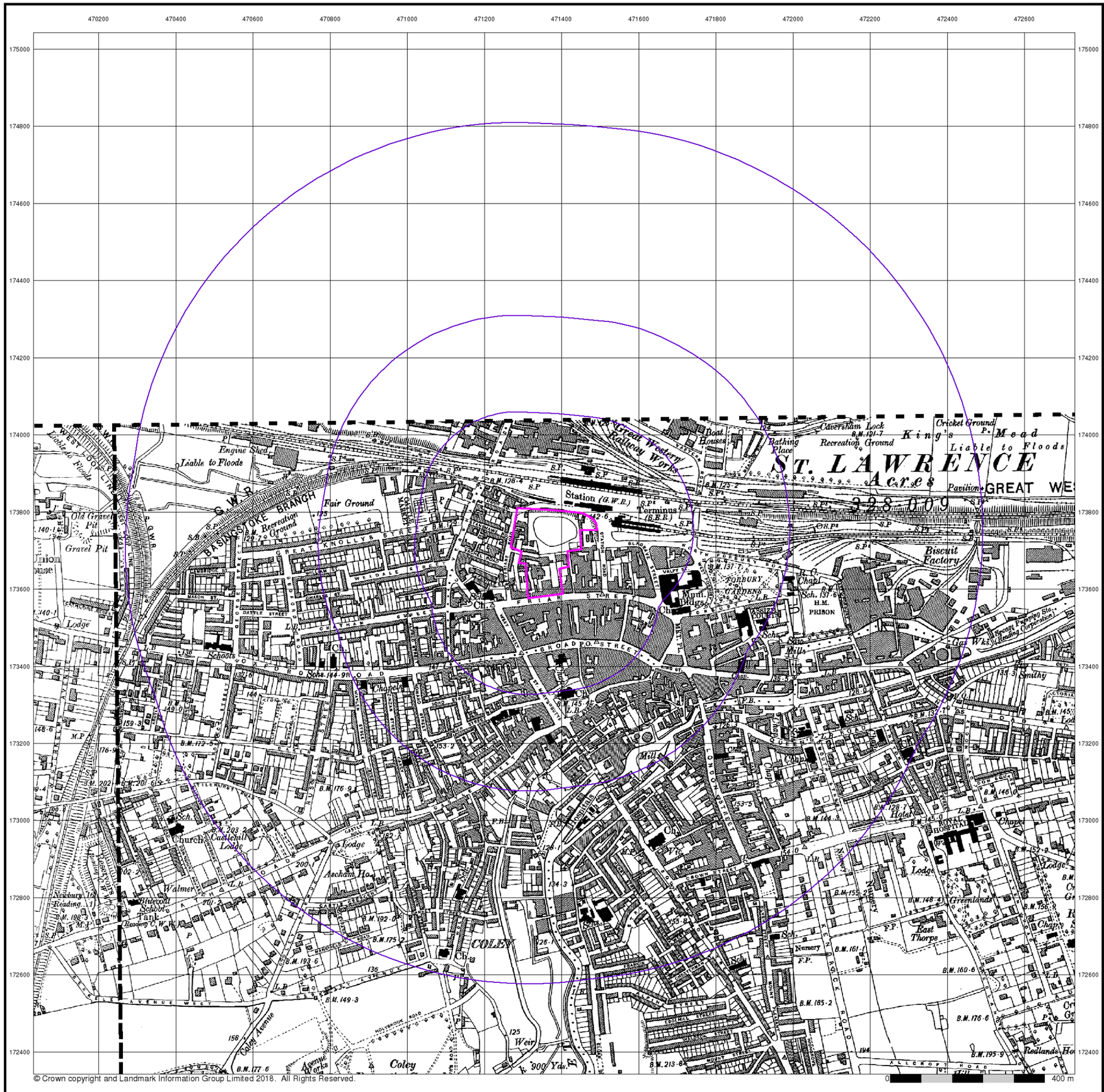
Aerodrome
Hangar
Control Tower
Runway
Taxiway
Apron
Terminal
Control Tower
Hangar



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RAMBOLL

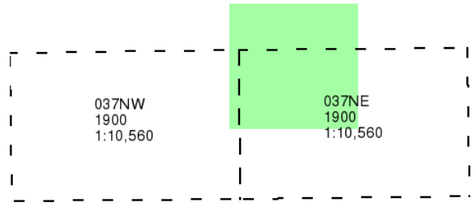
Berkshire

Published 1900

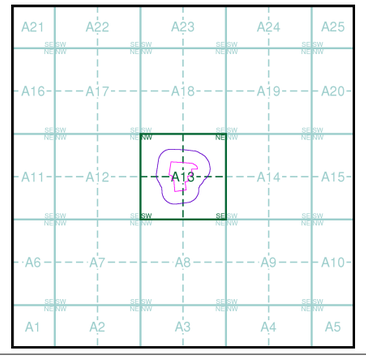
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	179269911_1_1
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

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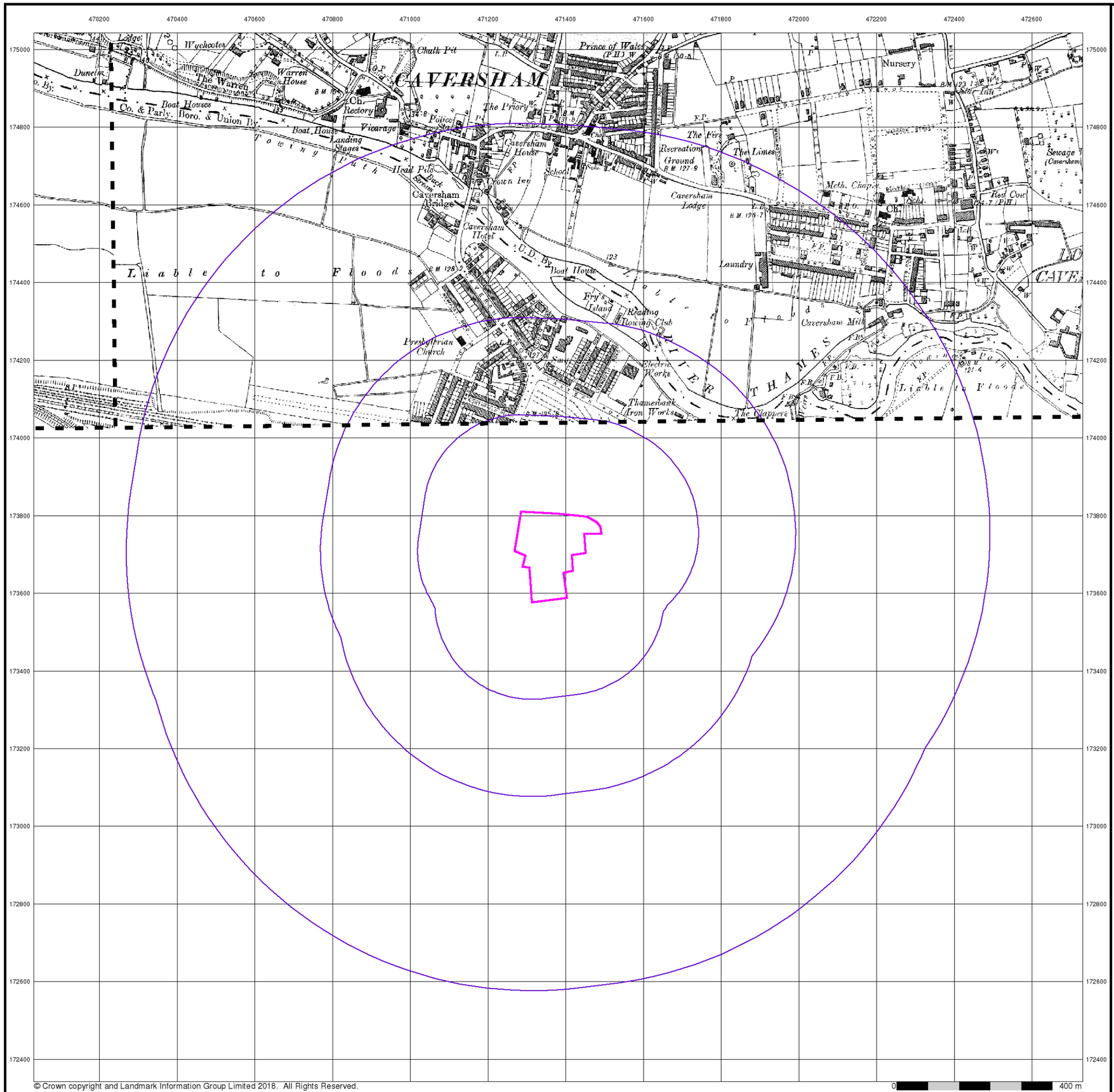

RAMBOLL

Oxfordshire

Published 1900

Source map scale - 1:10,560

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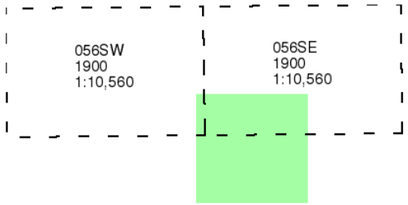
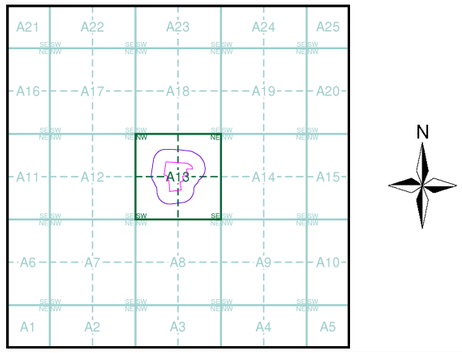
Map Name(s) and Date(s)



Historical Map - Slice A



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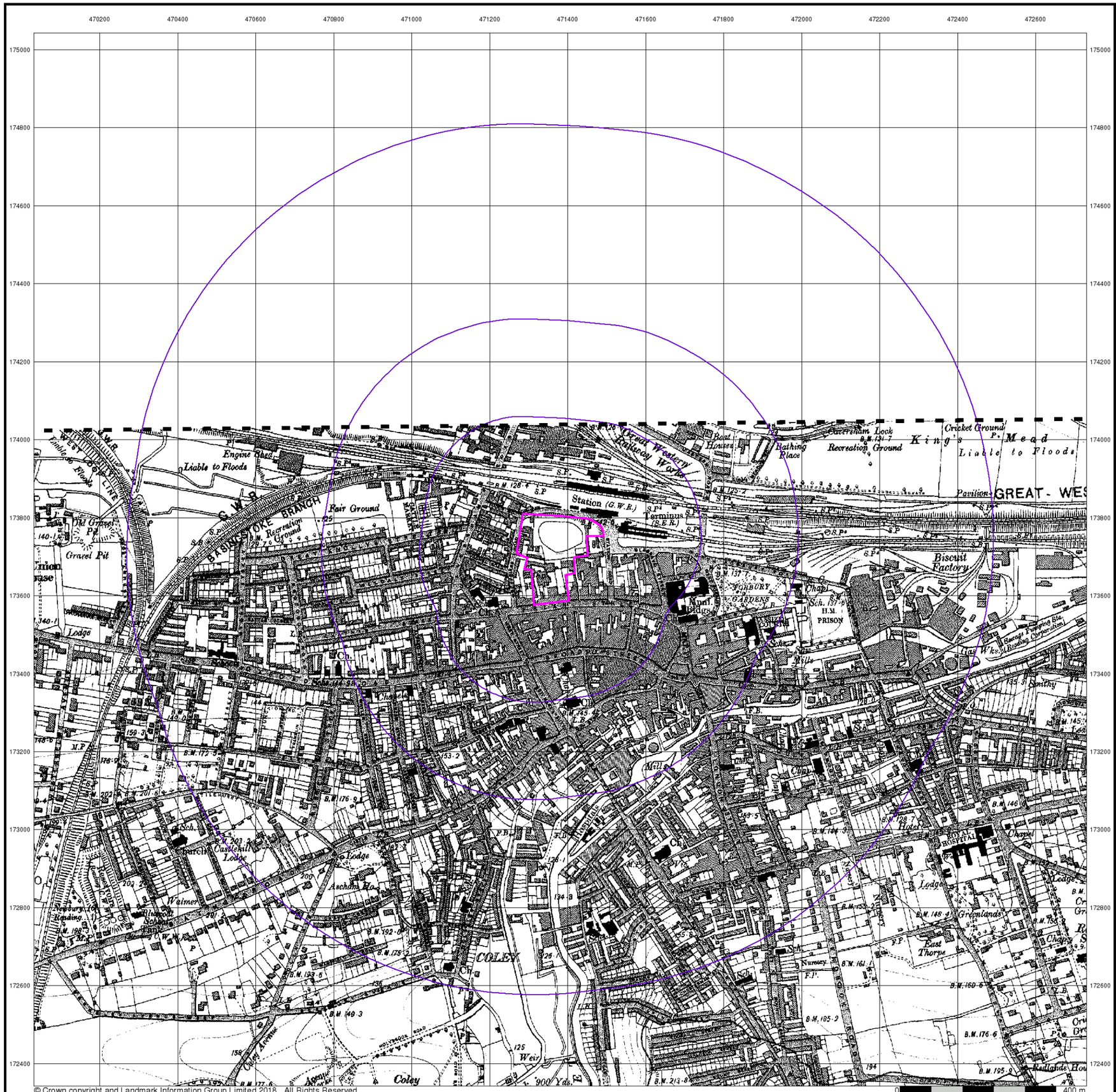

RAMBOLL

Berkshire

Published 1901

Source map scale - 1:10,560

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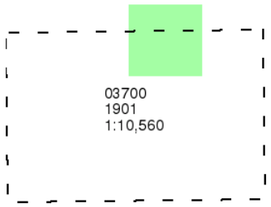
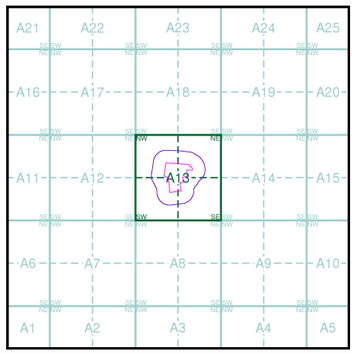


Historical Map - Slice A



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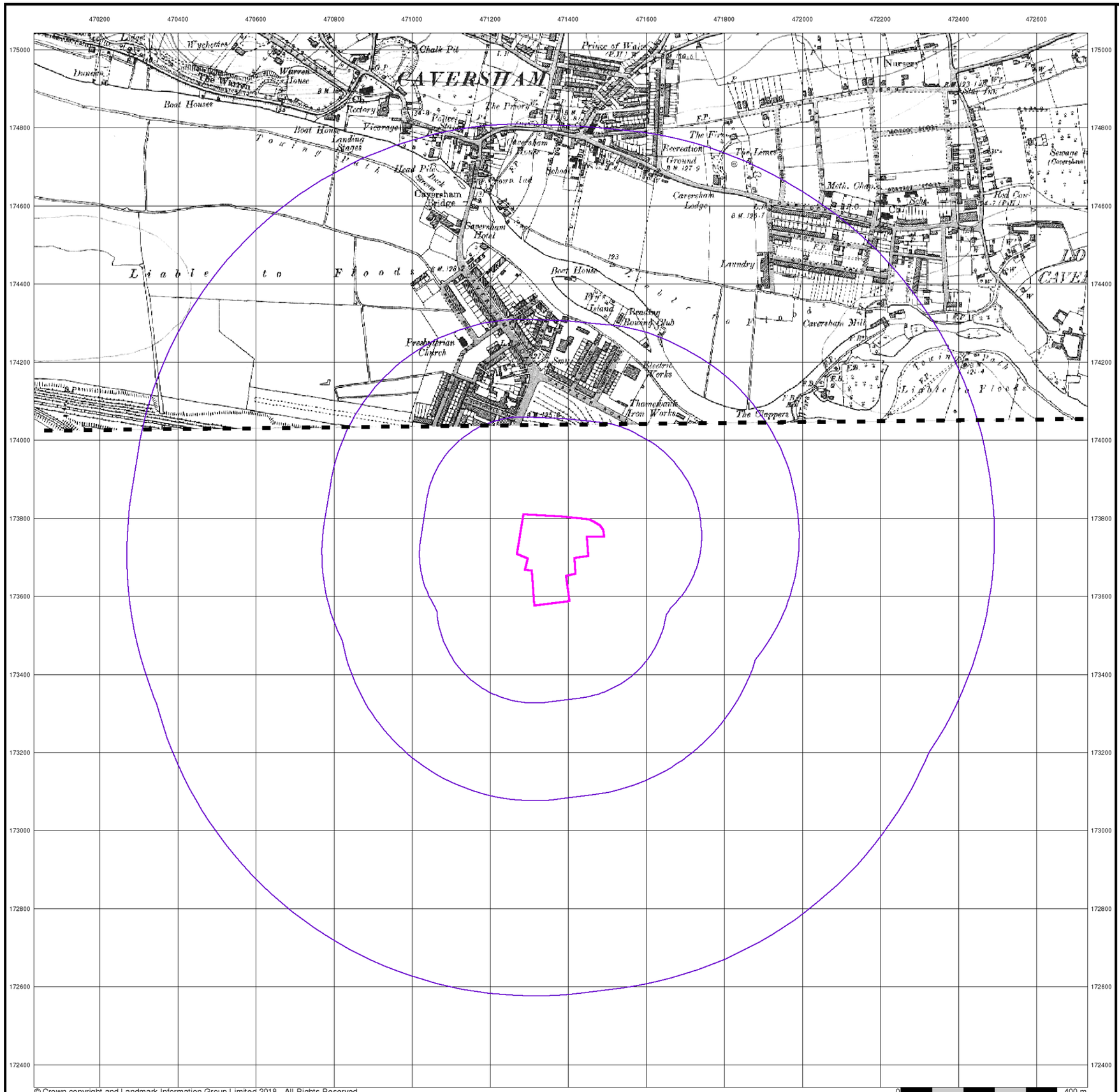

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0 400 m

RAMBOLL

Oxfordshire

Published 1901

Source map scale - 1:10,560

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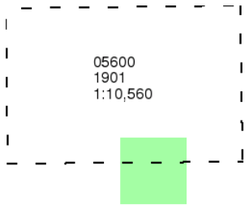
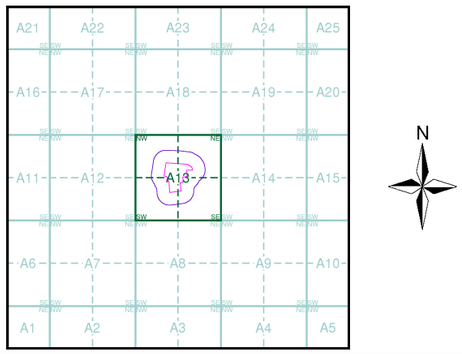
Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

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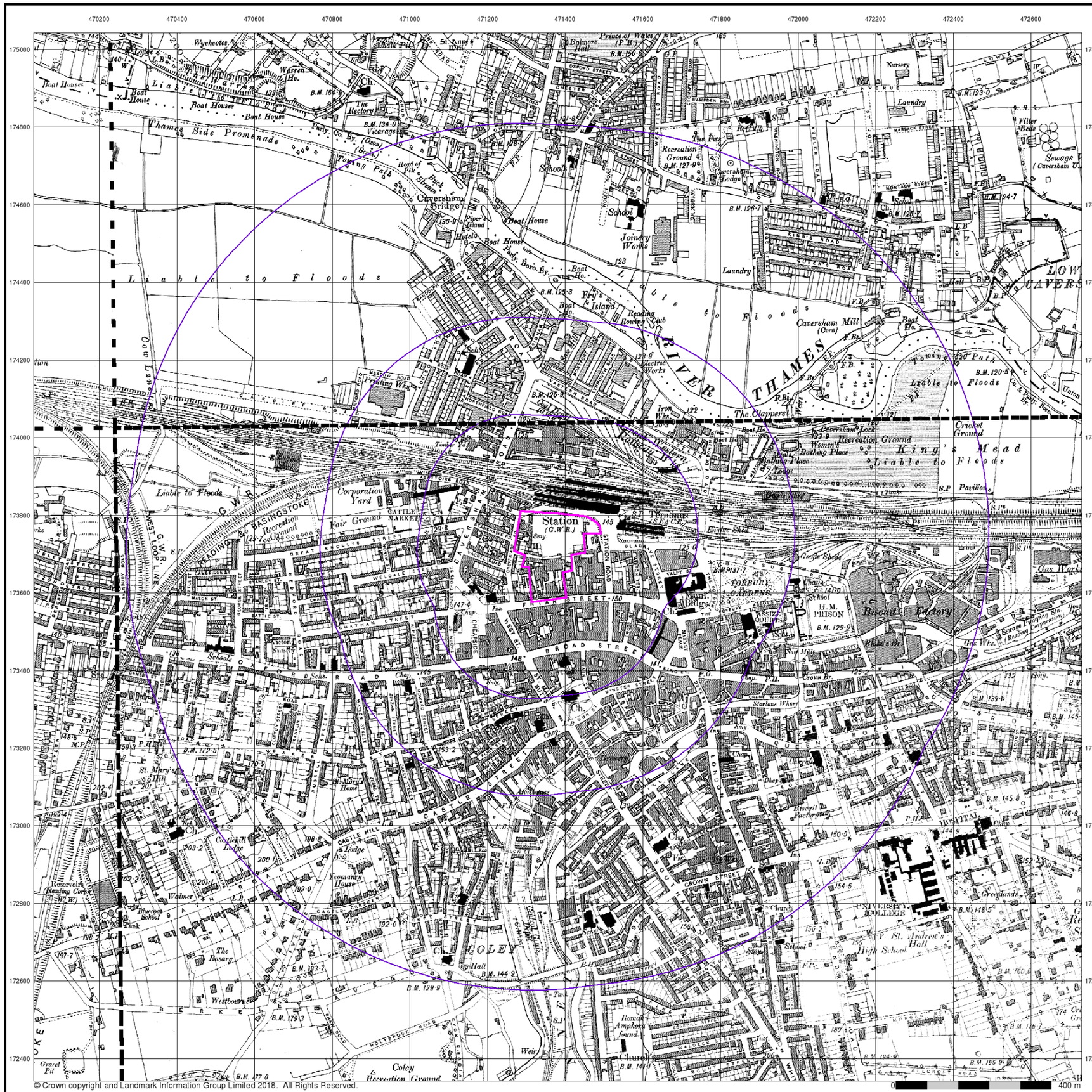

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RAMBOLL

Berkshire

Published 1913 - 1914

Source map scale - 1:10,560

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Map Name(s) and Date(s)

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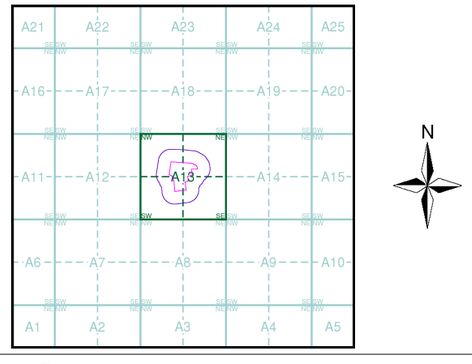
037NW 1914 1:10,560	037NE 1913 1:10,560

Historical Map - Slice A



Order Details

Order Number:	179269911_1_1
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
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Site Details

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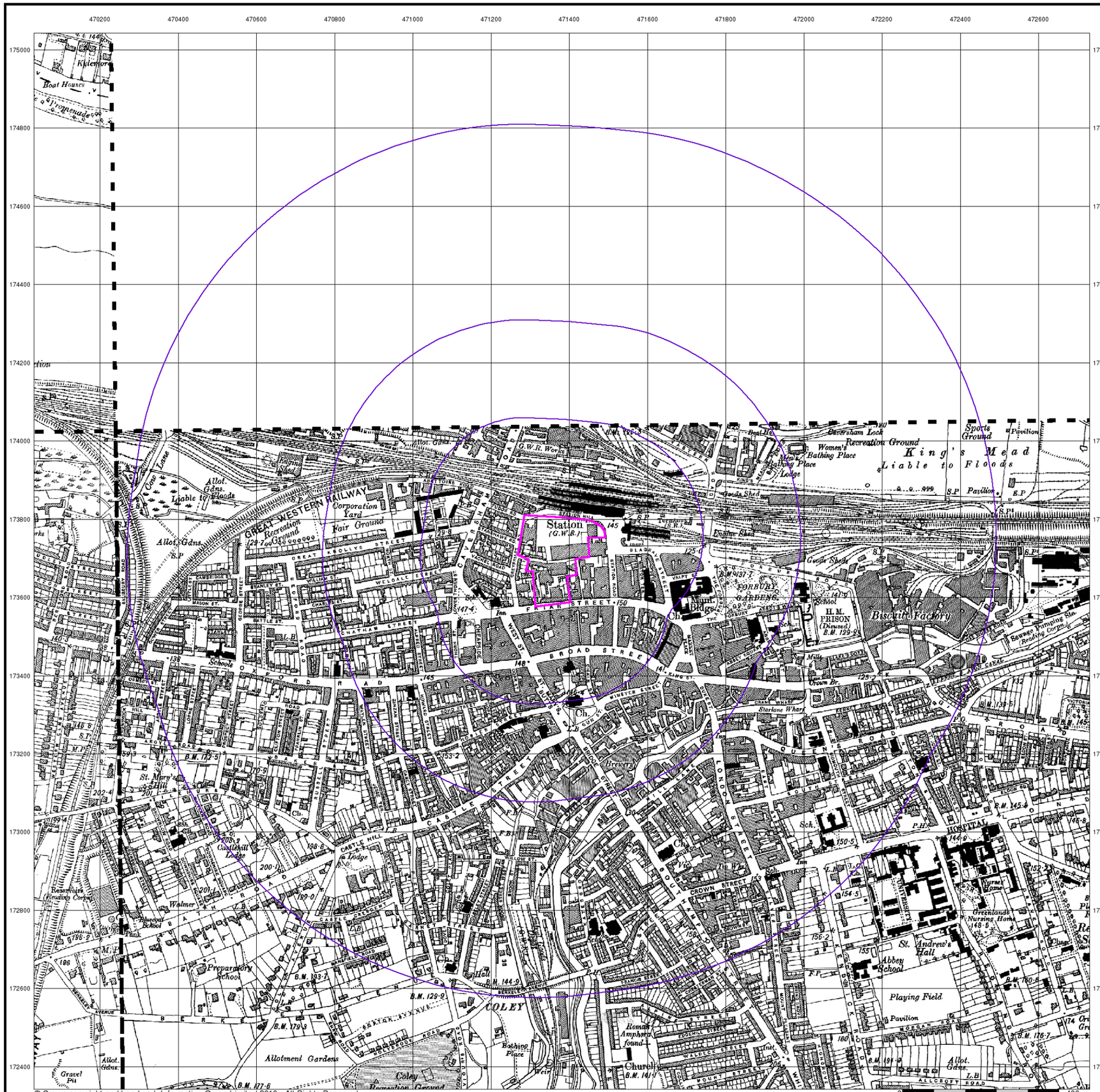
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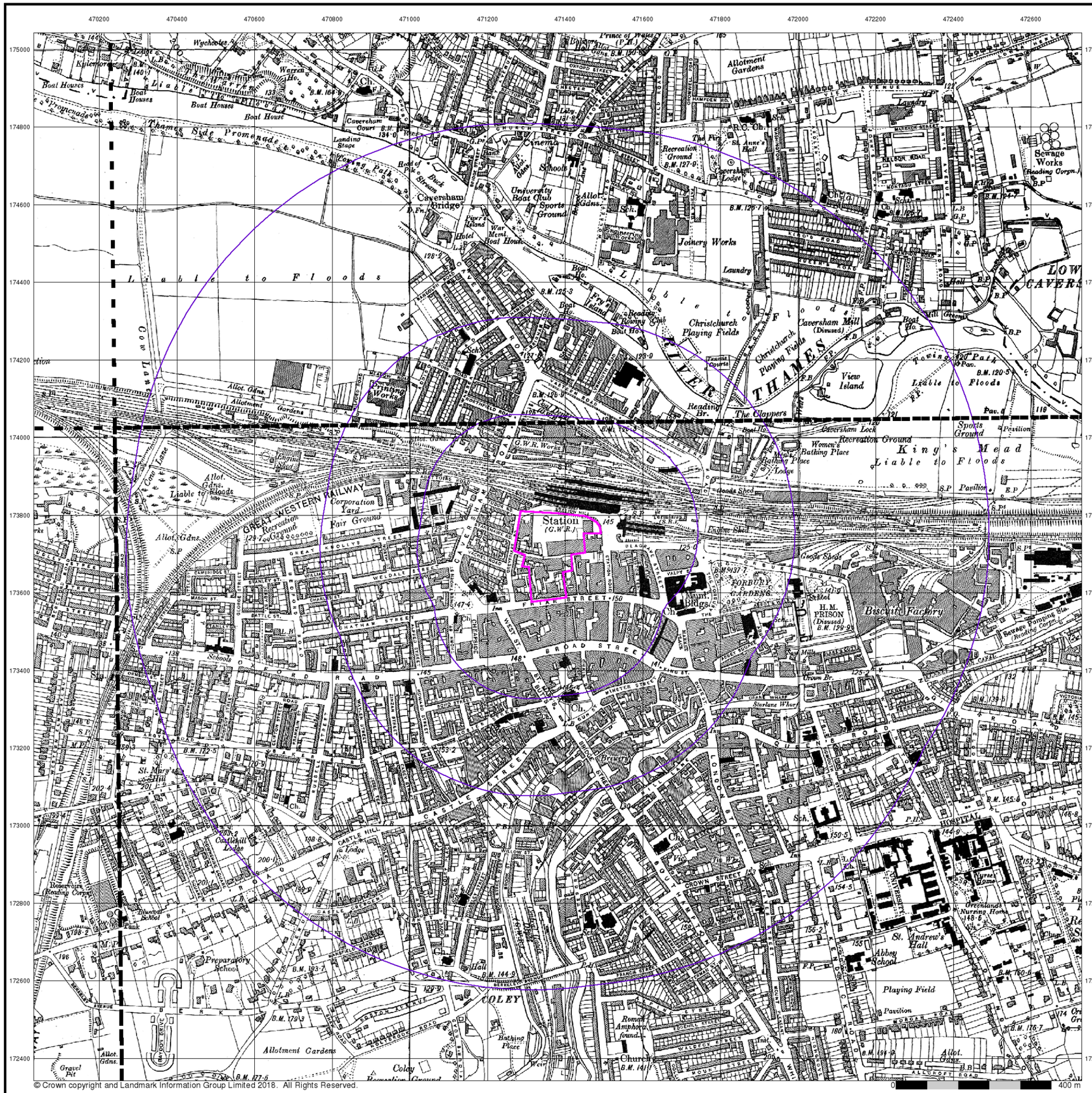
174400
174200
174000
173800
173600
173400
173200
173000
172800
172600
172400
Station (G.W.R.)
GREAT WESTERN RAILWAY
Corporation Yard
Fair Ground
Recreation Ground
Allot. Gdns.
Liable to Floods
King's Mead
Recreation Ground
Sports Ground
Bathing Place
Women's Bathing Place
Caversham Lock
Boat Houses
Promenade
Kiosk
Engine Shed
Goods Shed
Biscuit Factory
FORBURY GARDENS
H.M. PRISON (Disused)
Abbey School
St. Andrew's Hall
Playing Field
Pavilion
Allotment Gardens
Gravel Pit
Coley
Reservoir
Reading Corpn.
Waterworks
Preparatory School
Castle Hill Lodge
Roman Amphora found
Bathing Place
Church
Sch.
Inn
P.H.
HOSPITAL
Greenlands Nursing Home
Sewage Pumping Sta.
Reading Corpn.
Mill
Crown Br.
Crane Wharf
Starlane Wharf
Brewery
Ch.
Vic.
Pav.
Mkt.
Sta.
Yd.
Gdns.
Rec. Ground
Allot. Gdns.
Liable to Floods



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RAMBOLL

Berkshire

Published 1938

Source map scale - 1:10,560

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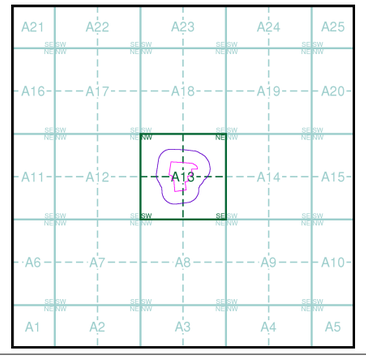
Map Name(s) and Date(s)

029SW 1938 1:10,560	029SE 1938 1:10,560
037NW 1938 1:10,560	037NE 1938 1:10,560

Historical Map - Slice A



Order Details

Order Number:	179269911_1_1
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

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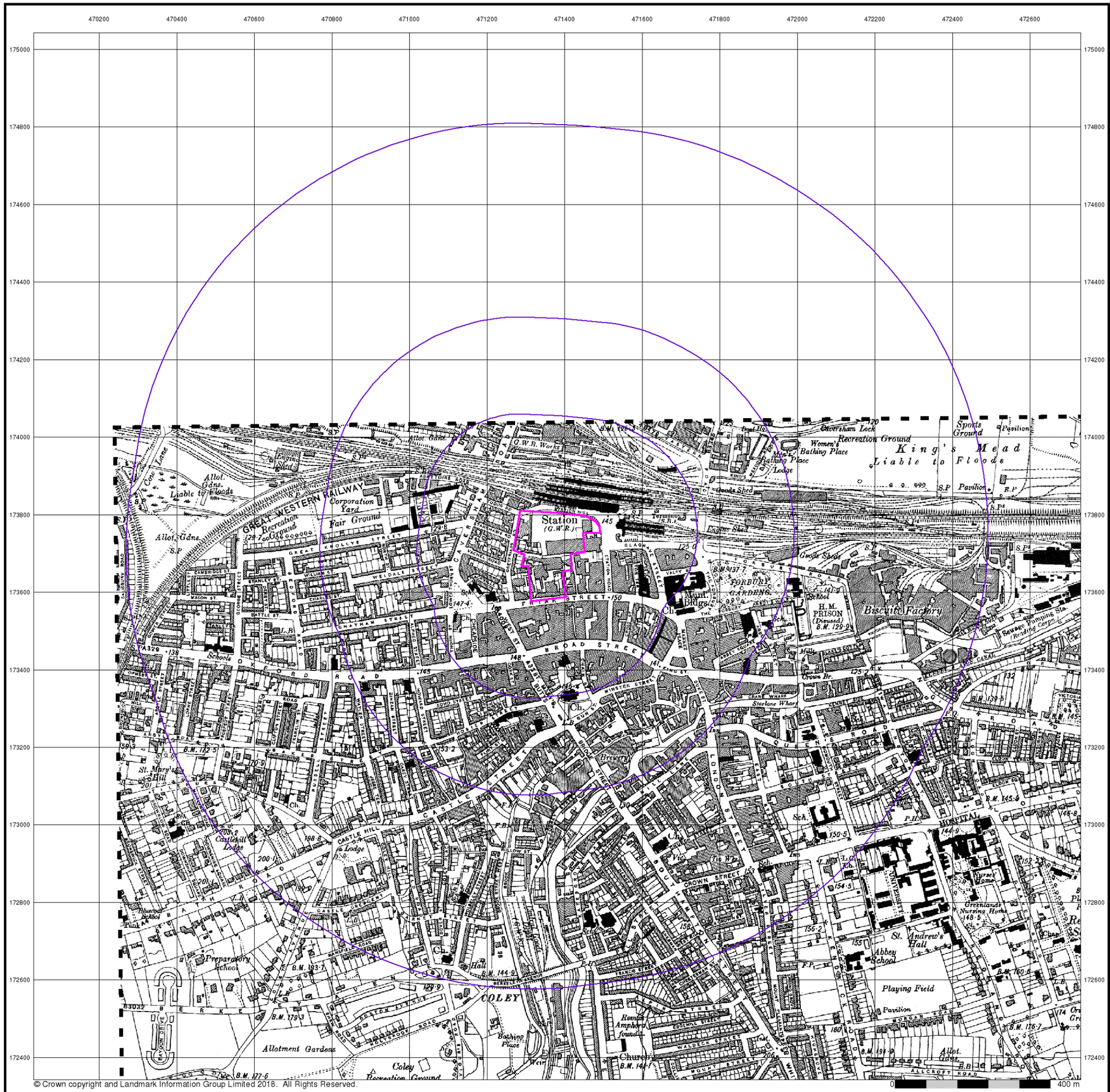

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RAMBOLL

Berkshire

Published 1938

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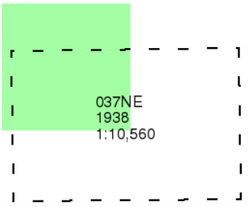
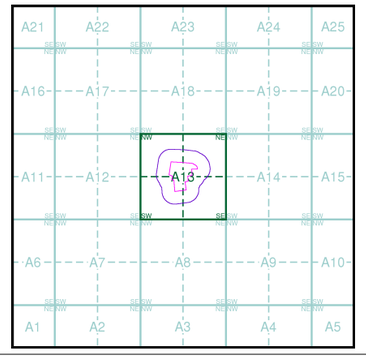
Map Name(s) and Date(s)



Historical Map - Slice A



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RAMBOLL

Historical Aerial Photography

Published 1947 - 1948

Source map scale - 1:10,560

The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

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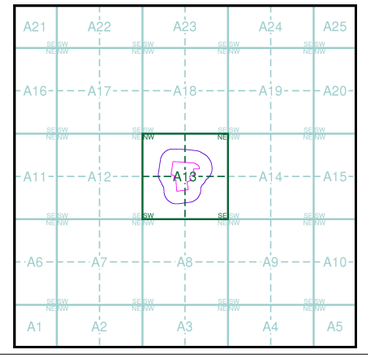
Map Name(s) and Date(s)

SU 77 NW
1947
1:10,560

SU 77 SW
1948
1:10,560

Historical Aerial Photography - Slice A



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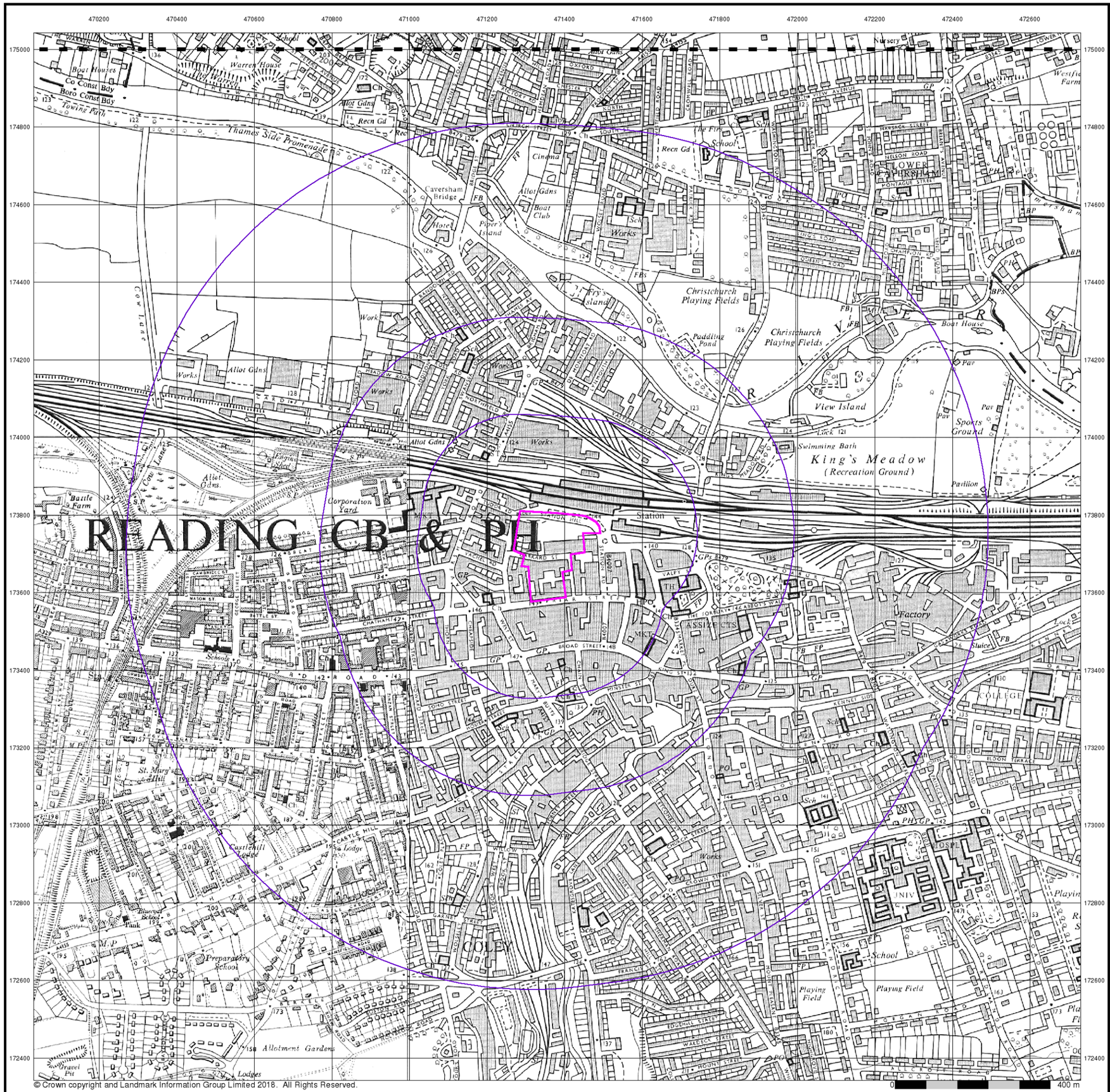

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RAMBOLL

Ordnance Survey Plan

Published 1961 - 1962

Source map scale - 1:10,000

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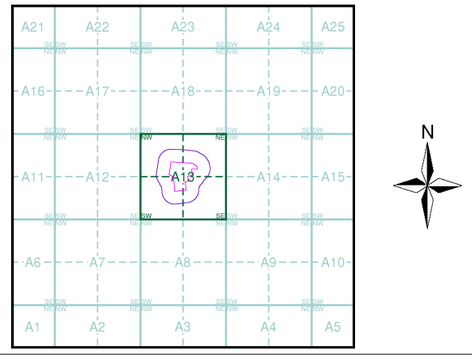
Map Name(s) and Date(s)

SU77NW
1961
1:10,560

SU77SW
1962
1:10,560

Historical Map - Slice A



Order Details

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Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR

Landmark INFORMATION GROUP

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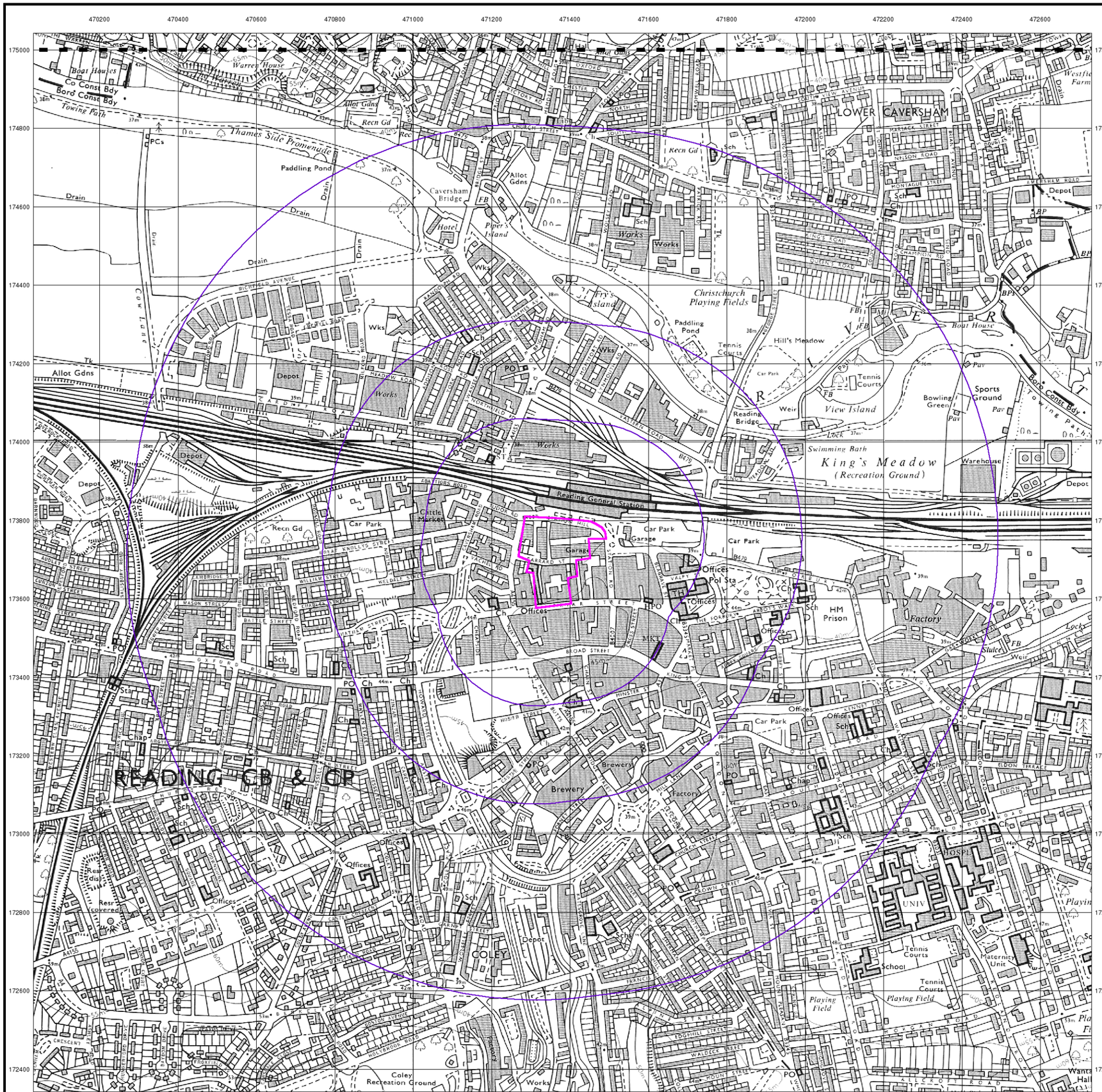
Web: www.envirocheck.co.uk



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RAMBOLL

Ordnance Survey Plan

Published 1973

Source map scale - 1:10,000

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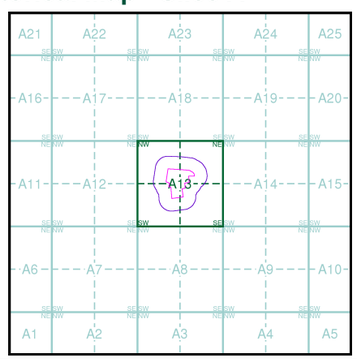
Map Name(s) and Date(s)

SU77NW
1973
1:10,000

SU77SW
1973
1:10,000

Historical Map - Slice A



Order Details

Order Number:	179269911_1_1
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Ordnance Survey Plan

Published 1979

Source map scale - 1:10,000

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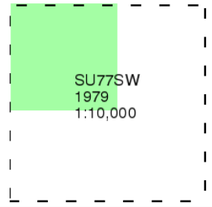
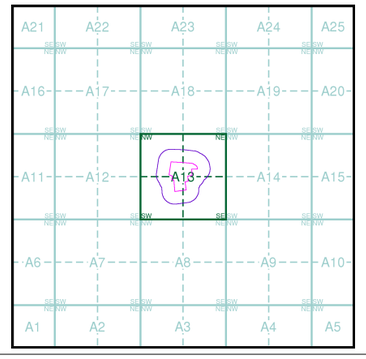
Map Name(s) and Date(s)



Historical Map - Slice A



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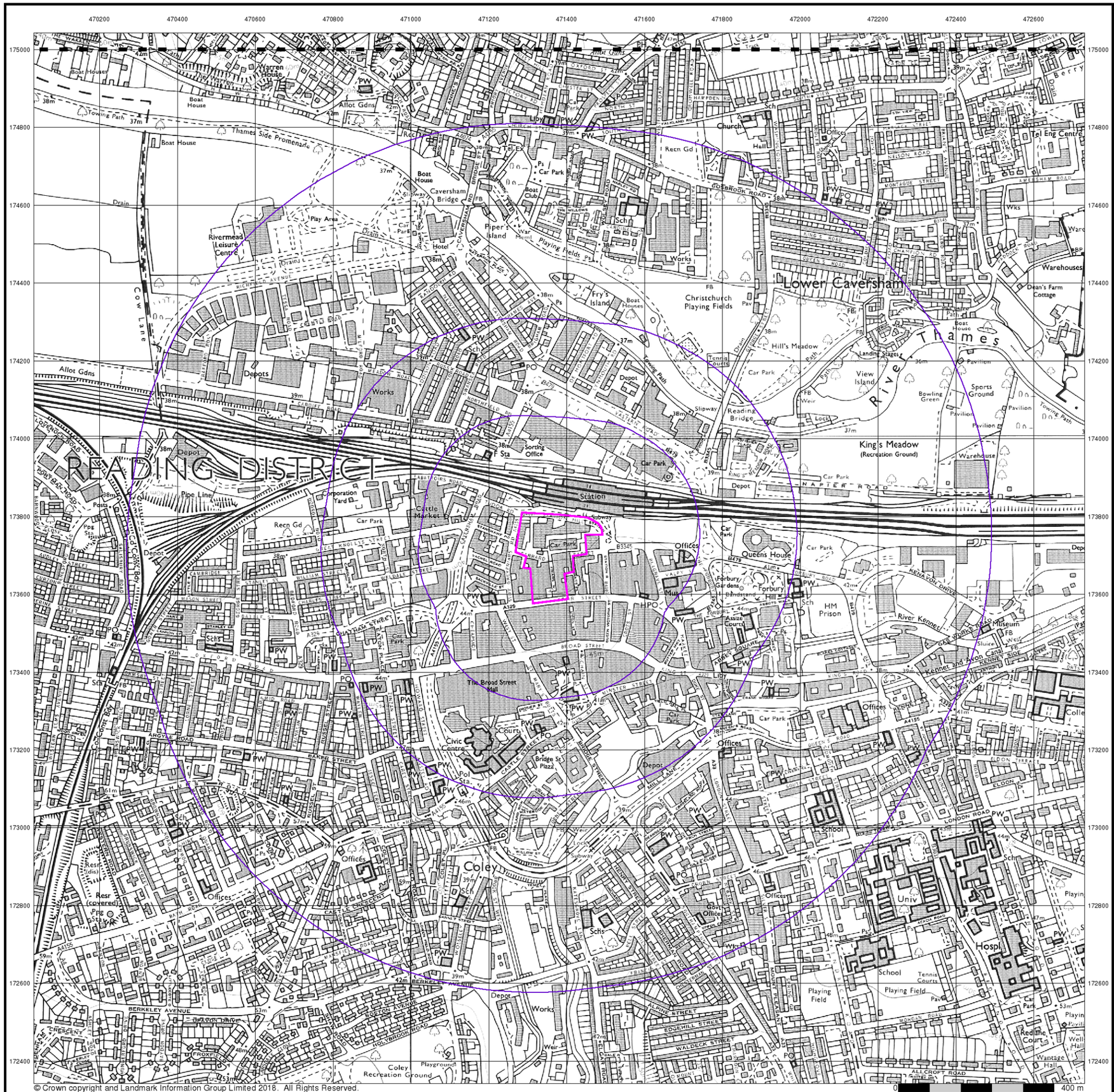

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Ordnance Survey Plan

Published 1990 - 1991

Source map scale - 1:10,000

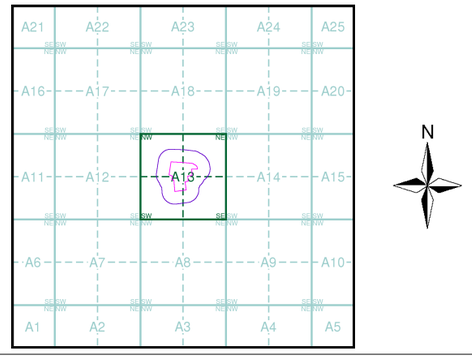
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SU77NW
1991
1:10,000

SU77SW
1990
1:10,000

Historical Map - Slice A



Order Details

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470200
470400
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172800
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172400
Темза
место для прогулок Темс-Сайд
мост Кавершем
группа заводов
депо
ст. Рединг (Уэст)
ул. Кавершем-Роад
ул. Бат-Роад
ул. Барнли-авеню
ул. Холмер-Роад
ул. Бостон-авеню
ул. Апавон-Драйв
ул. Тайлхерст-Род
ул. Насс-Хилл
ул. Брод-стрит
ул. Минстер-стрит
ул. Кингс-Род
ул. Лондон-Род
ул. Форбери-Род
ул. Эллдон-Террас
ул. Саут-Вью-авеню
ул. Нельсон-Род
ул. Монтагью-стрит
ул. Госбрук-Род
ул. Амершем-Род
ул. Оксфорд-Род
ул. Кингсмид-Род
ул. Хенли-Роад
ул. Уотлинг-стрит
ул. Кингсуэй
ул. Уэллсли-Роад
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ул. Уиндзор-Роад
ул. Кенилворт-Роад
ул. Уэйкфилд-авеню
ул. Кремилл-Род
ул. Нарлиф-Род
ул. Тесфорд-Род
ул. Бакингем-Роад
ул. Бристоль-Роад
ул. Бедфорд-Роад
ул. Кембридж-Роад
ул. Оксфорд-стрит
ул. Честер-стрит
ул. Йорк-стрит
ул. Дорчестер-стрит
ул. Ливерпул-стрит
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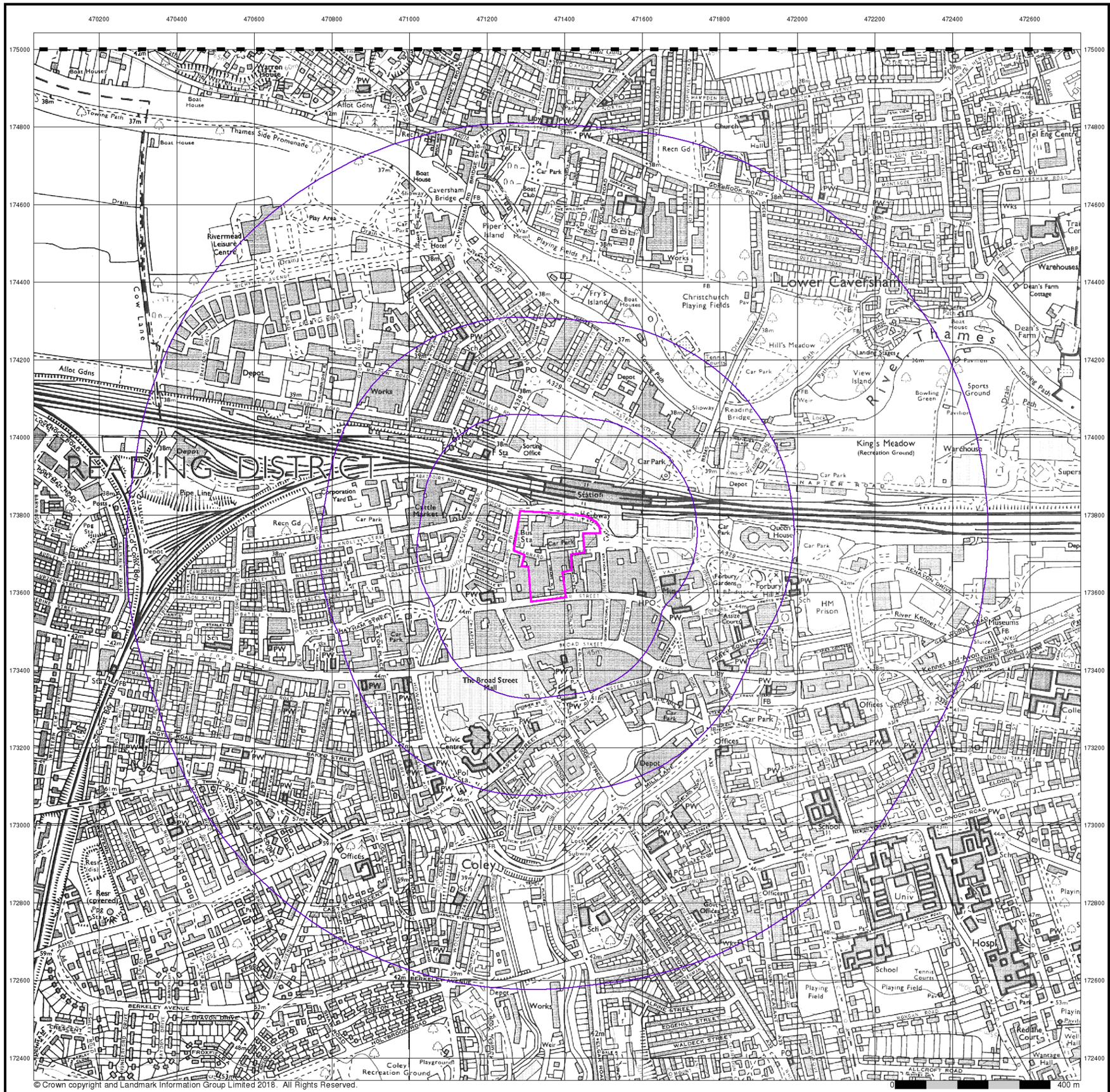
ул. Ноттингем



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RAMBOLL

Ordnance Survey Plan

Published 1995

Source map scale - 1:10,000

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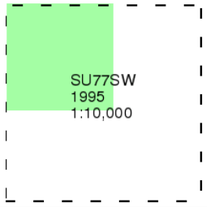
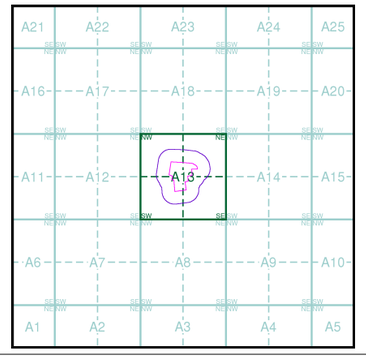
Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	179269911_1_1
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR

Landmark INFORMATION GROUP

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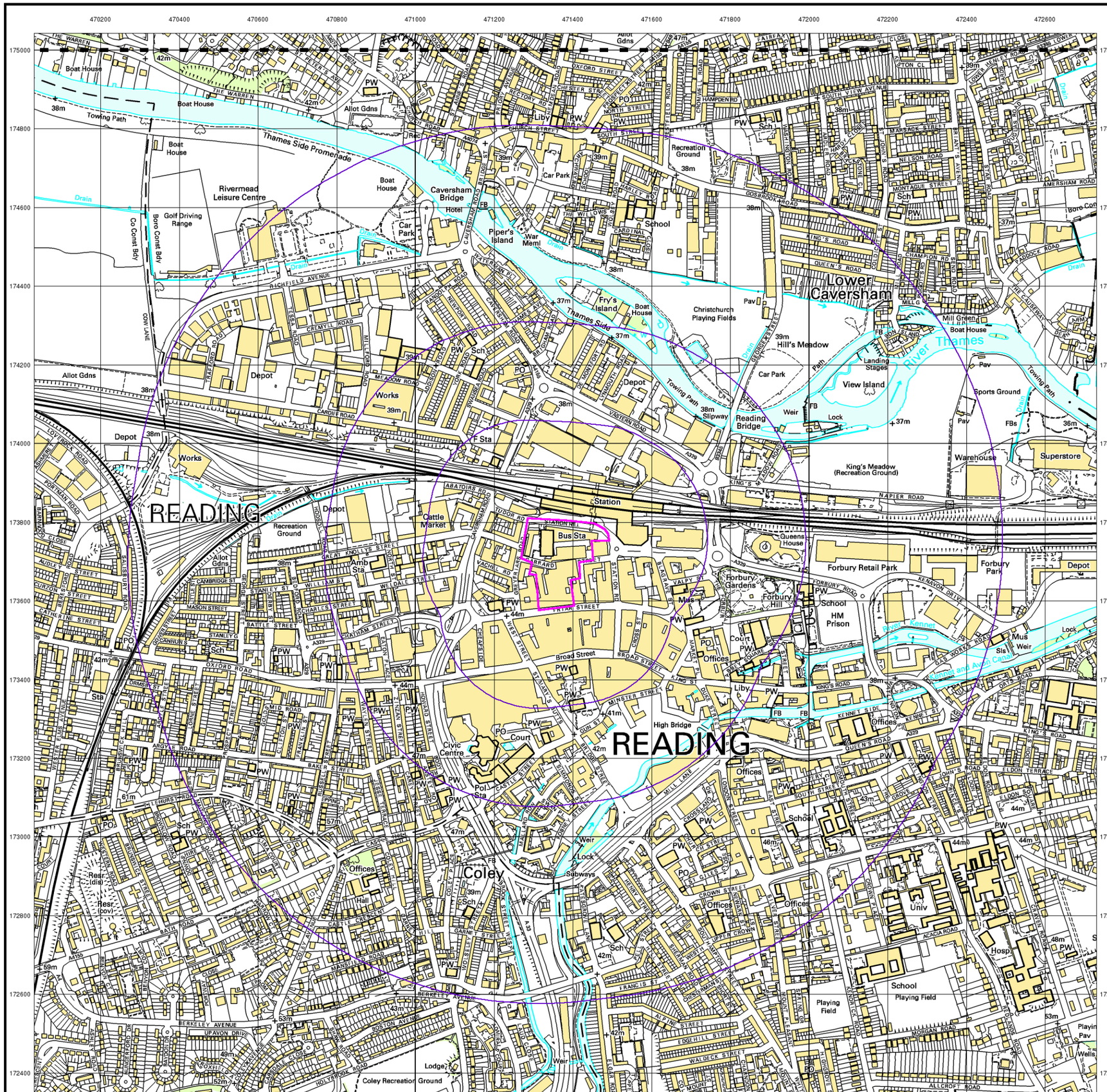
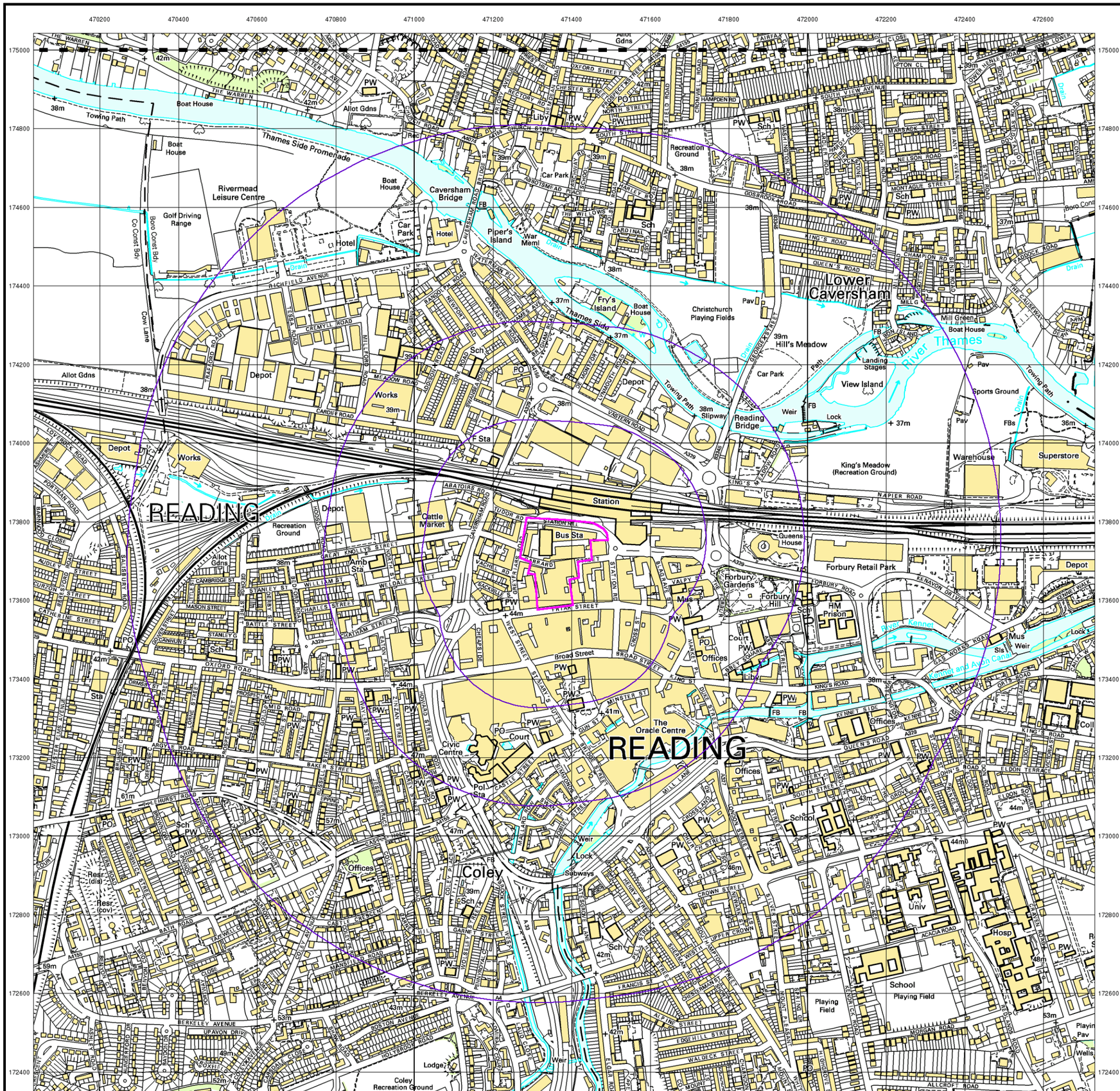

READING
READING
Coley
Thames Side Promenade
Towing Path
River Thames
Rivermead Leisure Centre
Lower Caversham
Caversham Bridge
Reading Bridge
Christchurch Playing Fields
Hill's Meadow
View Island
King's Meadow (Recreation Ground)
Fry's Island
Piper's Island
Forbury Gardens
Forbury Hill
Forbury Retail Park
Queens House
Cattle Market
Recreation Ground
Bus Sta
Station
F Sta
Amb Sta
Civic Centre
High Bridge
Broad Street
Forbury Road
Kennet and Avon Canal
Coley Recreation Ground
Sports Ground
Superstore
Warehouse
Landing Stages
Mill Green
Boat House
Golf Driving Range
Car Park
Depot
Works
Allot Gdns
Playing Field
School
Offices
Hosp
Univ
Lock
Weir
Drain
Pav
Path
Slipway
Subways
Resr (dis)
Resr (cov)
Hall
Sch
Lodge
Wells
Mus
Sta
Liby
PO
Court
Pol Sta
Rec
Ground
Hotel
Boat House
Car Park
War Mem
Playing Field
Playing Pav
Queen's House
Forbury Park
Forbury Depot
Forbury Hill
Forbury Gardens
Mill Green
Boat House
Landing Stages
Sports Ground
Pav
FBs
Weir
Lock


READING
Thames Side Promenade
Towing Path
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Rivermead Leisure Centre
Golf Driving Range
Caversham Bridge
Piper's Island
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Recreation Ground
Cattle Market
Bus Sta
Station
Queens House
Forbury Retail Park
Forbury Gardens
Forbury Hill
HM Prison
Offices
The Oracle Centre
Civic Centre
Pol Sta
Court
Coley
Coley Recreation Ground
Lodge
School
Playing Field
Univ
Hosp
Resr (dis)
Resr (cov)
Amb Sta
Sch
Pav
Mus
Lib
PO
Rec
Col
Boro Const Bdy
Cow Lane
Drain
Weir
Lock
Subways
Queen's Road
Broad Street
Oxford Road
Castle Street
Caversham Road
Kennet and Avon Canal
River Kennet
A329
A33
A4
A3290
A3083
A3200
A3200
A3200

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VectorMap Local

Published 2018

Source map scale - 1:10,000

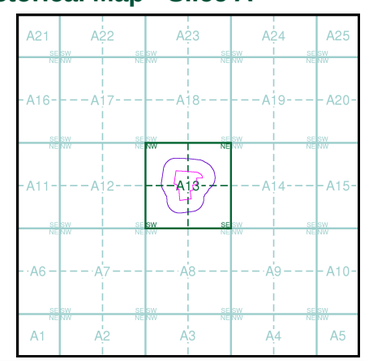
VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

SU77NW
2018
Variable

SU77SW
2018
Variable

Historical Map - Slice A



Order Details

Order Number:	179269911_1_1
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Site Details

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Geology 1:10,000 Maps Legends

Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	MGR	Made Ground (Undivided)	Artificial Deposit	Holocene - Holocene
	WGR	Worked Ground (Undivided)	Void	Holocene - Holocene
	WMGR	Infilled Ground	Artificial Deposit	Holocene - Holocene

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Silt	Flandrian - Pleistocene
	LASI	Langley Silt Member	Clay and Silt	Devensian - Ipswichian
	KPGR	Kempton Park Gravel Formation	Sand and Gravel	Devensian - Ipswichian
	TPGR	Taplow Gravel Formation	Sand and Gravel	Wolstonian - Chokierian
	LHGR	Lynch Hill Gravel Member	Sand and Gravel	Wolstonian - Chokierian
	BHT	Boyn Hill Gravel Member	Sand and Gravel	Wolstonian - Wolstonian
	HEAD	Head	Clay, Silt, Sand and Gravel	Quaternary - Ryazanian

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	LC	London Clay Formation	Clay, Silt and Sand	Eocene - Eocene
	LMBE	Lambeth Group	Clay, Silt and Sand	Paleocene - Paleocene
	LSNCK	Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated)	Chalk	Campanian - Turonian

RAMBOLL

Geology 1:10,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:10,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around a site. This mapping may be more up to date than previously published paper maps.

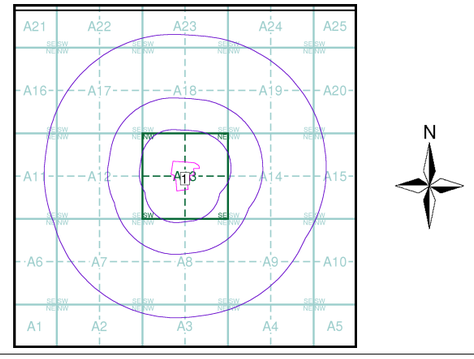
The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page.

Please Note: Not all of the layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:10,000 Maps Coverage

Map ID:		**Map ID:**	1
Map Name:	SU77NW	**Map Name:**	SU77SW
Map Date:	2011	**Map Date:**	2011
Bedrock Geology:	Available	**Bedrock Geology:**	Available
Superficial Geology:	Available	**Superficial Geology:**	Available
Artificial Geology:	Available	**Artificial Geology:**	Available
Faults:	Not Supplied	**Faults:**	Not Supplied
Landslip:	Not Available	**Landslip:**	Not Available
Rock Segments:	Not Supplied	**Rock Segments:**	Not Supplied

Geology 1:10,000 Maps - Slice A



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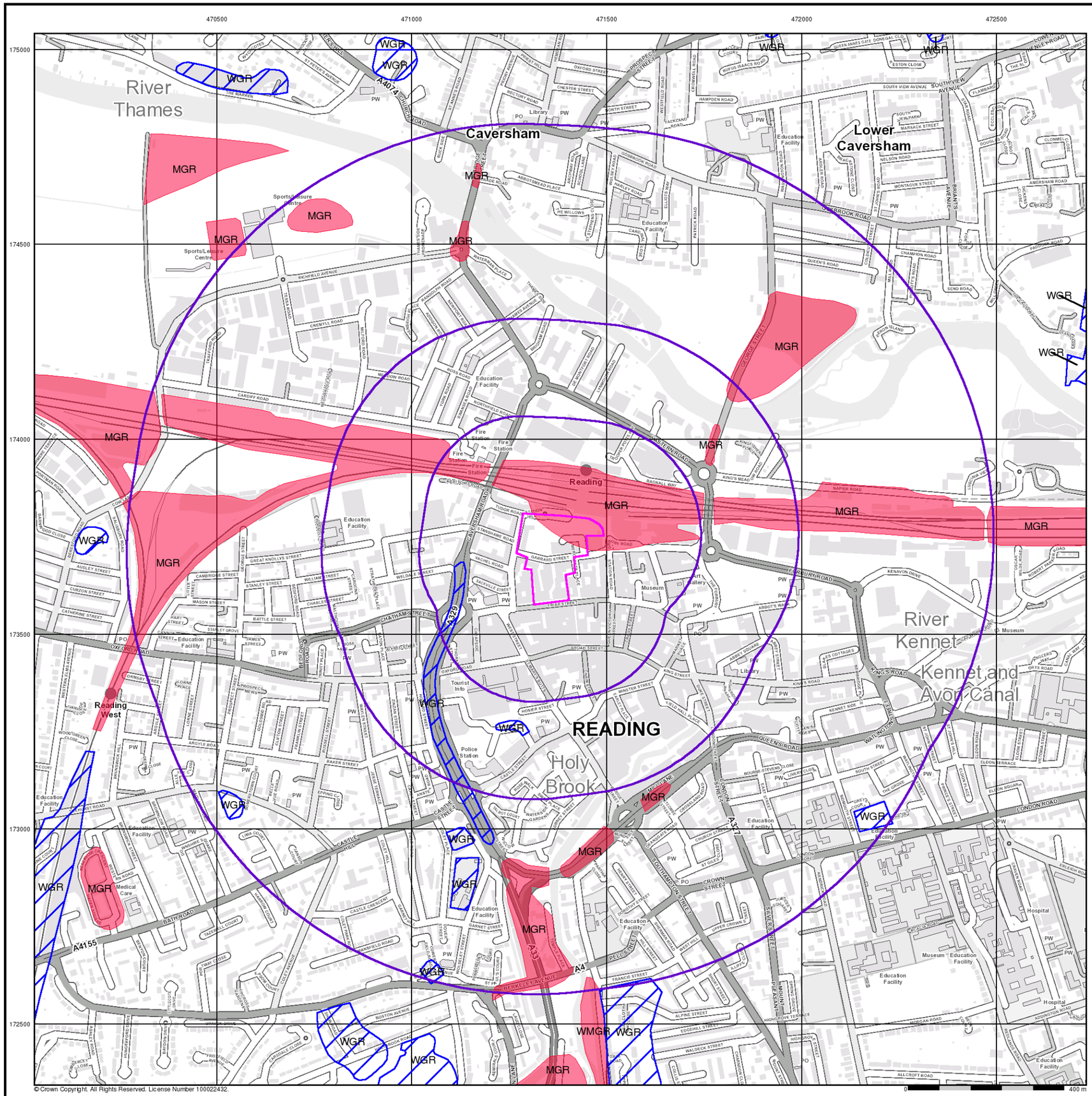

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RAMBOLL

Artificial Ground and Landslip

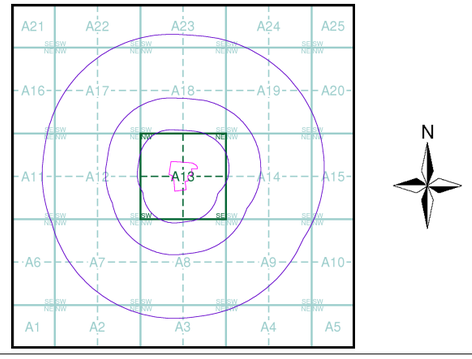
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A



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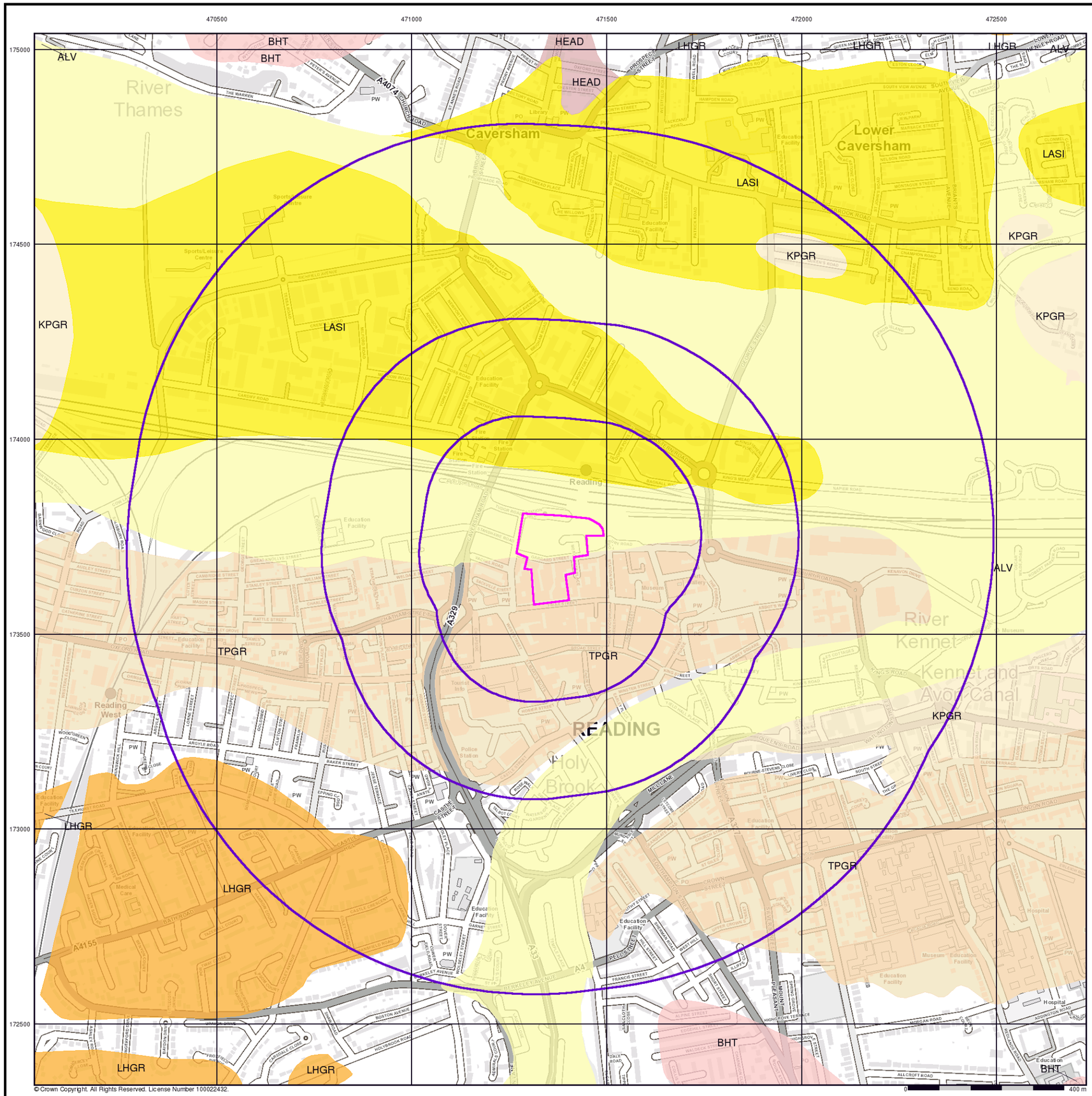

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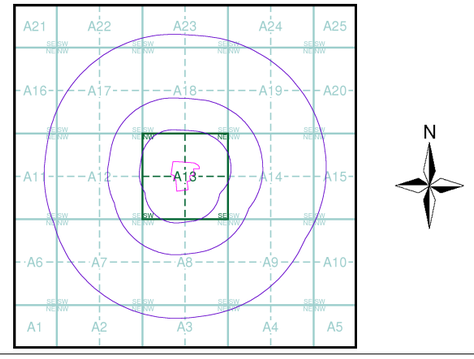
Superficial Geology

BGS 1:10,000 Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



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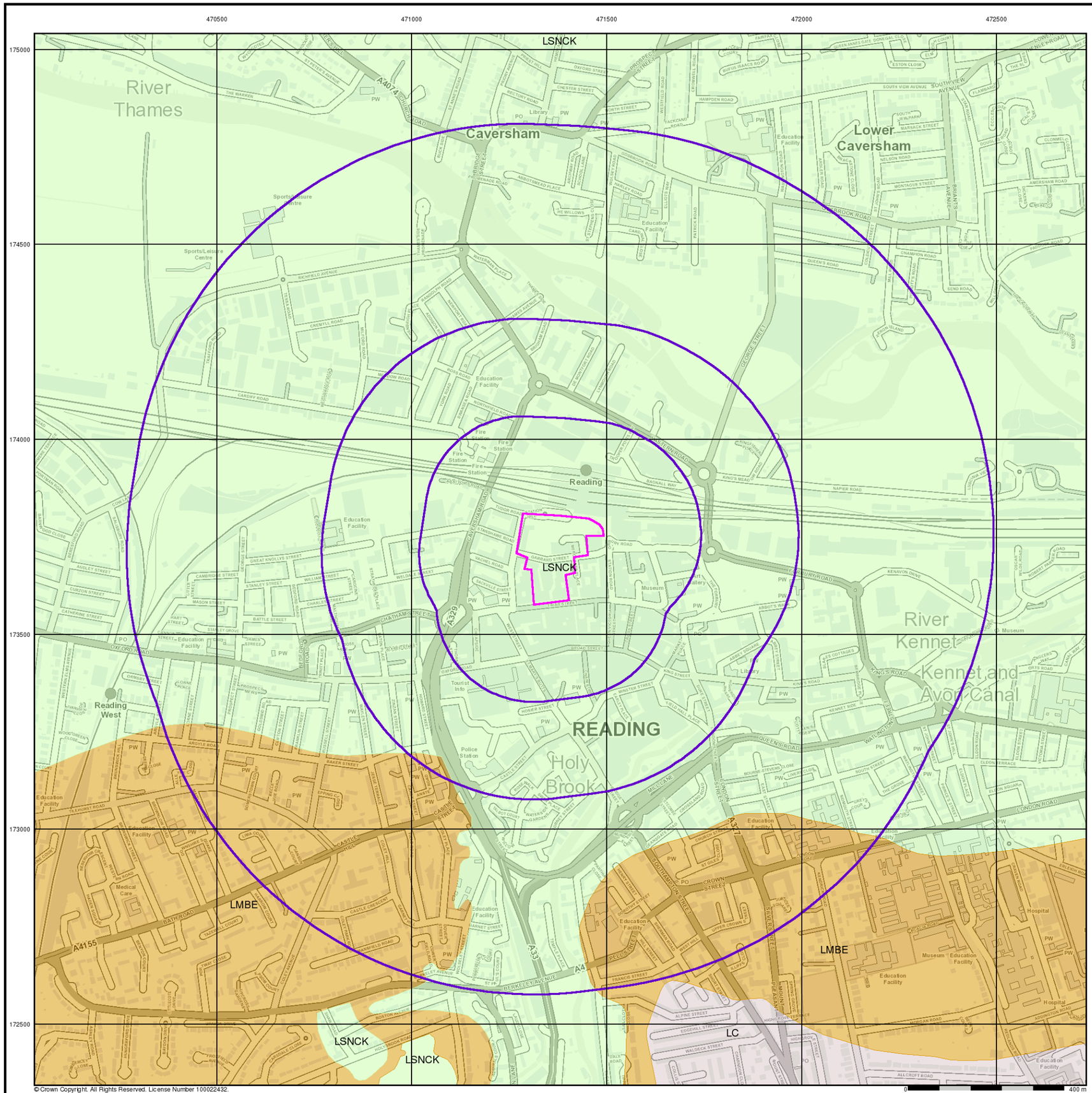

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RAMBOLL

Bedrock and Faults

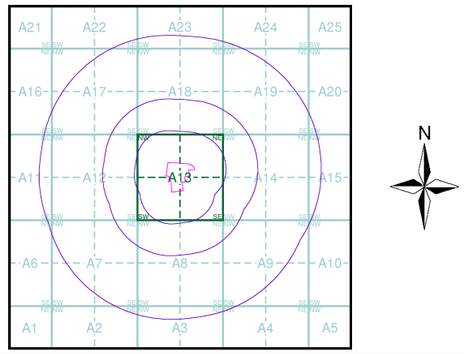
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults and thin beds mapped as lines such as coal seams and mineral veins. These are not restricted by age and could relate to features of any of the 1:10,000 geology datasets.

Bedrock and Faults Map - Slice A

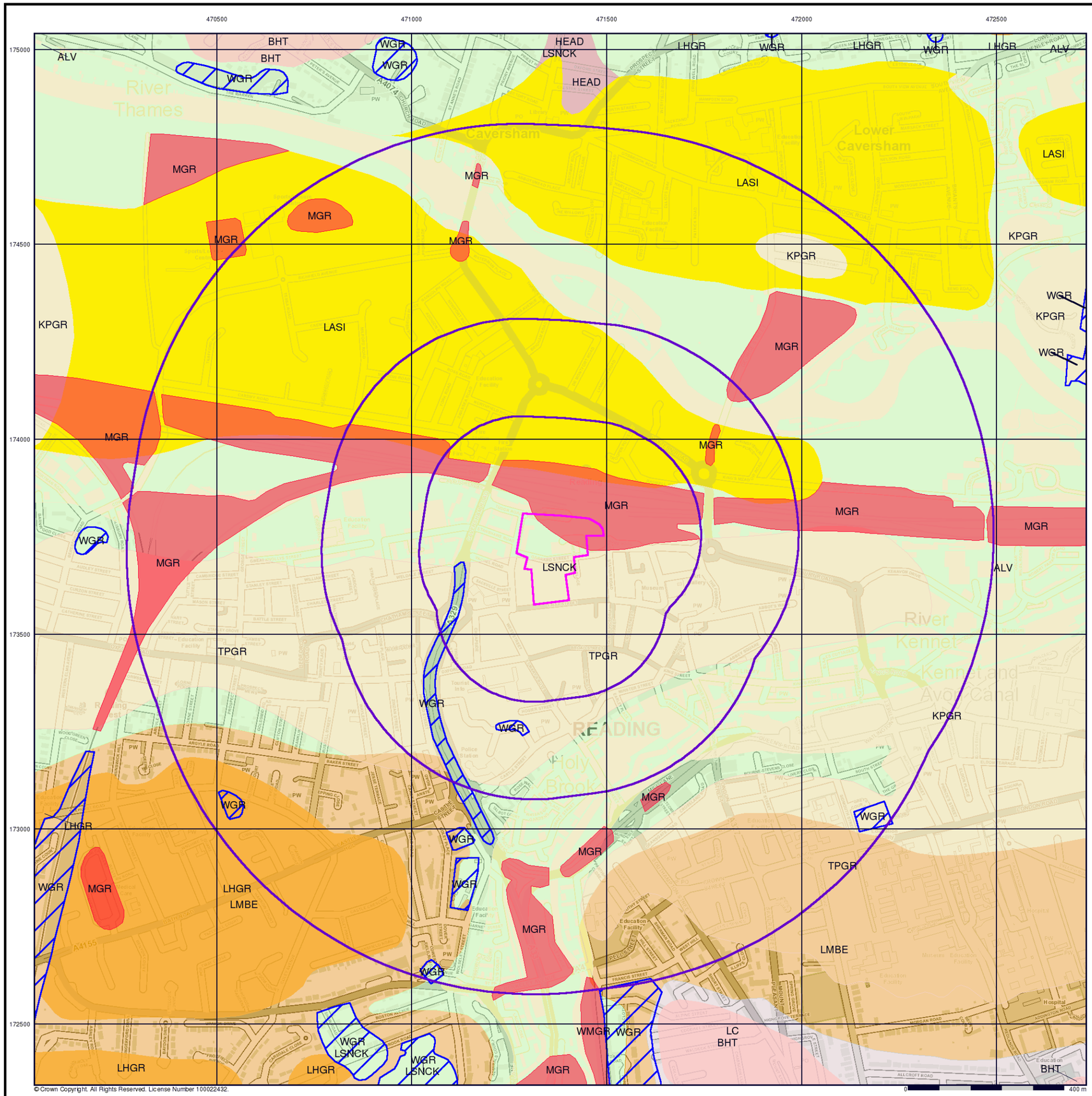


Order Details

Order Number:	179269911_1_1
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR



RAMBOLL

Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

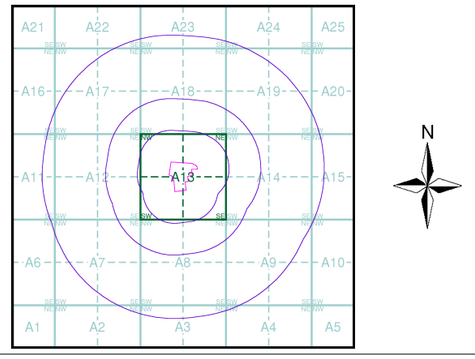
Additional Information

More information on 1:10,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



Order Details

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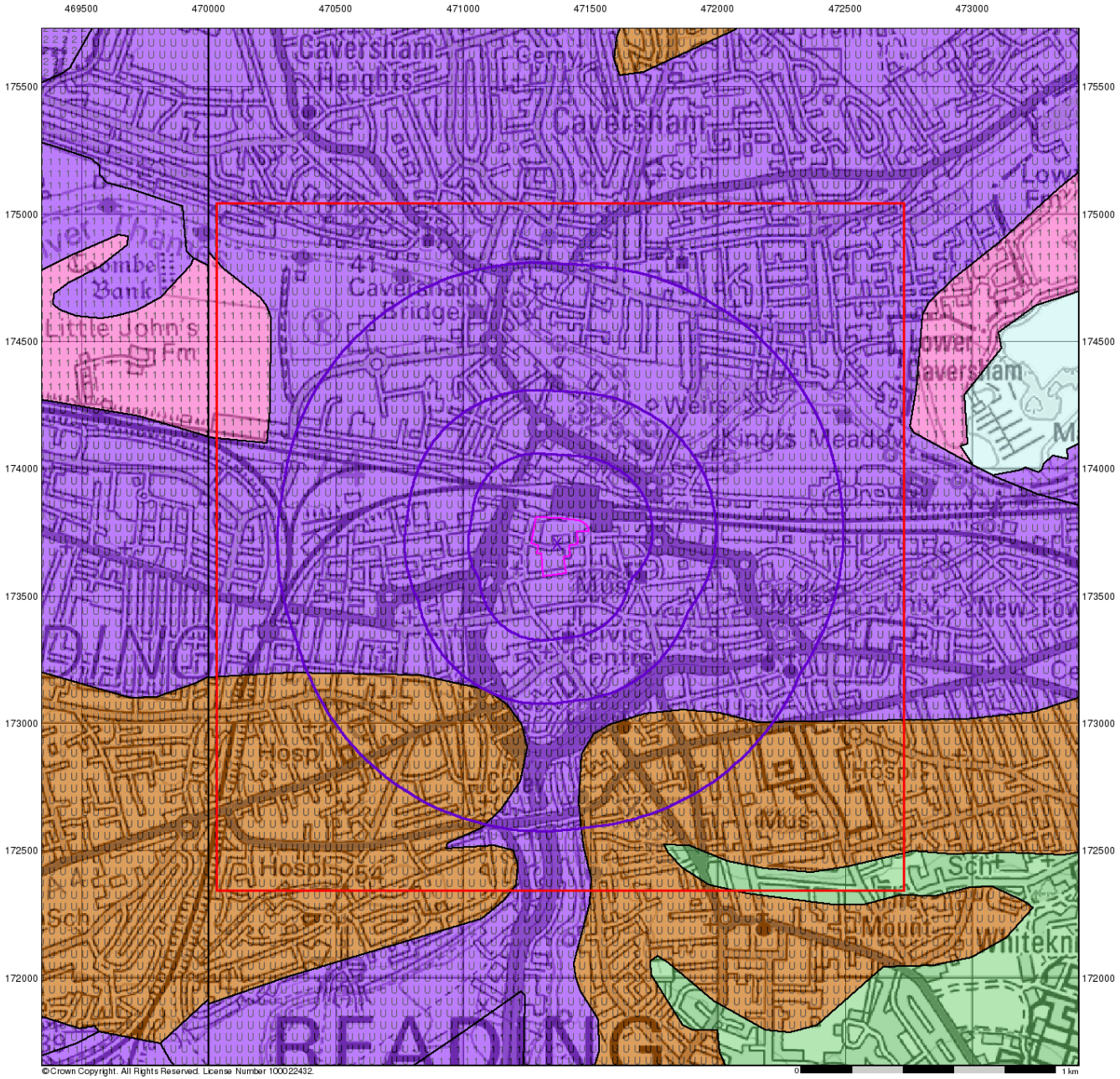
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR



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RAMBOLL

Groundwater Vulnerability

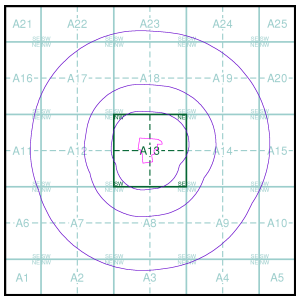
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes	Soil Classes
Major Aquifer (Highly Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Minor Aquifer (Variably Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Non Aquifer (Negligibly Permeable)	
Water or Sea	
Drift Deposit	

Site Sensitivity Context Map - Slice A



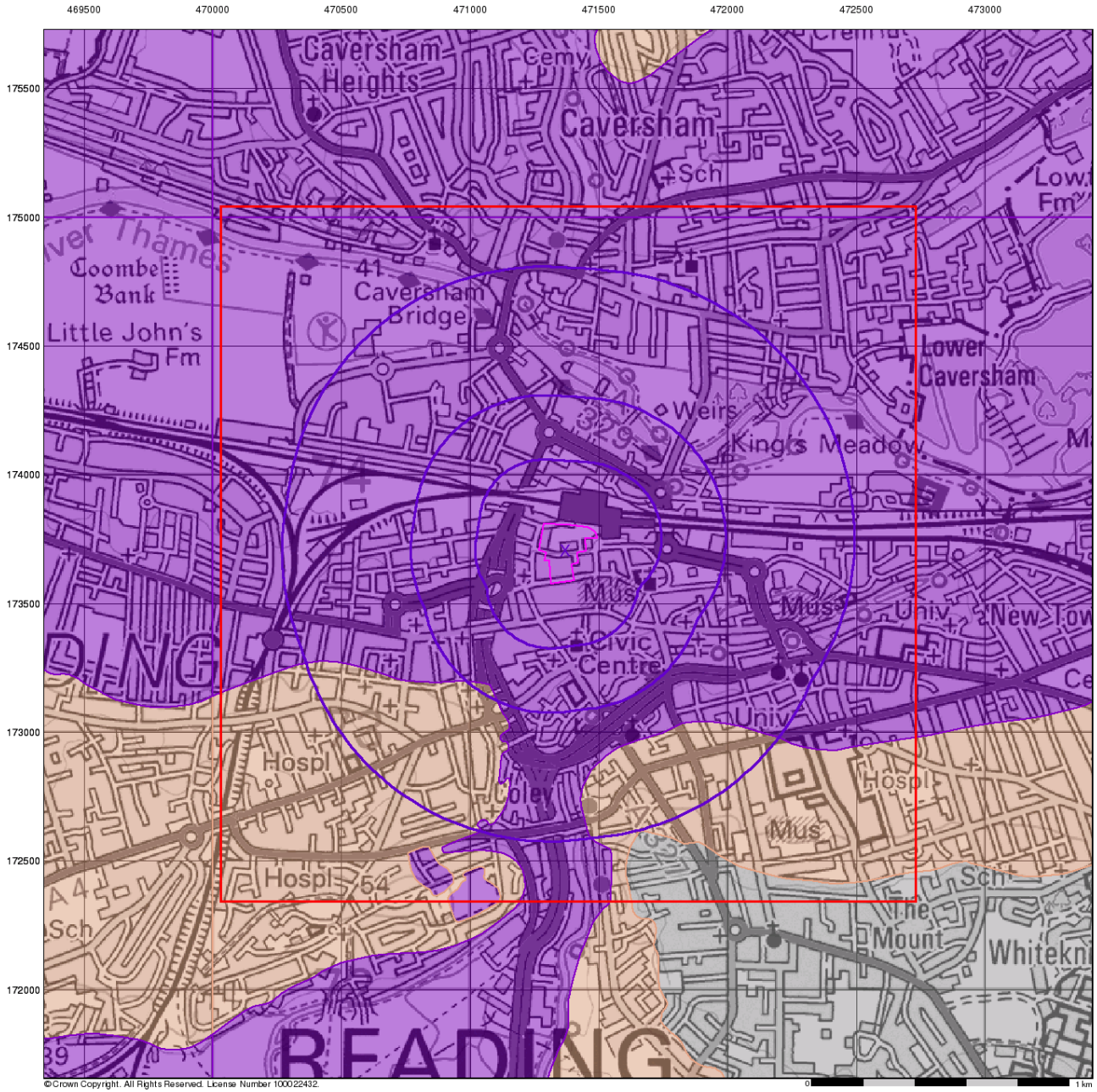
Order Details

Order Number:	179269911_1_1
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



RAMBOLL

Bedrock Aquifer Designation

General

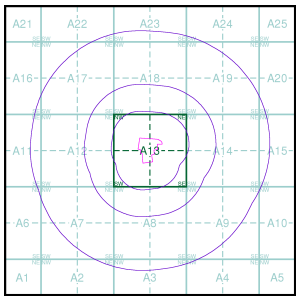
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A

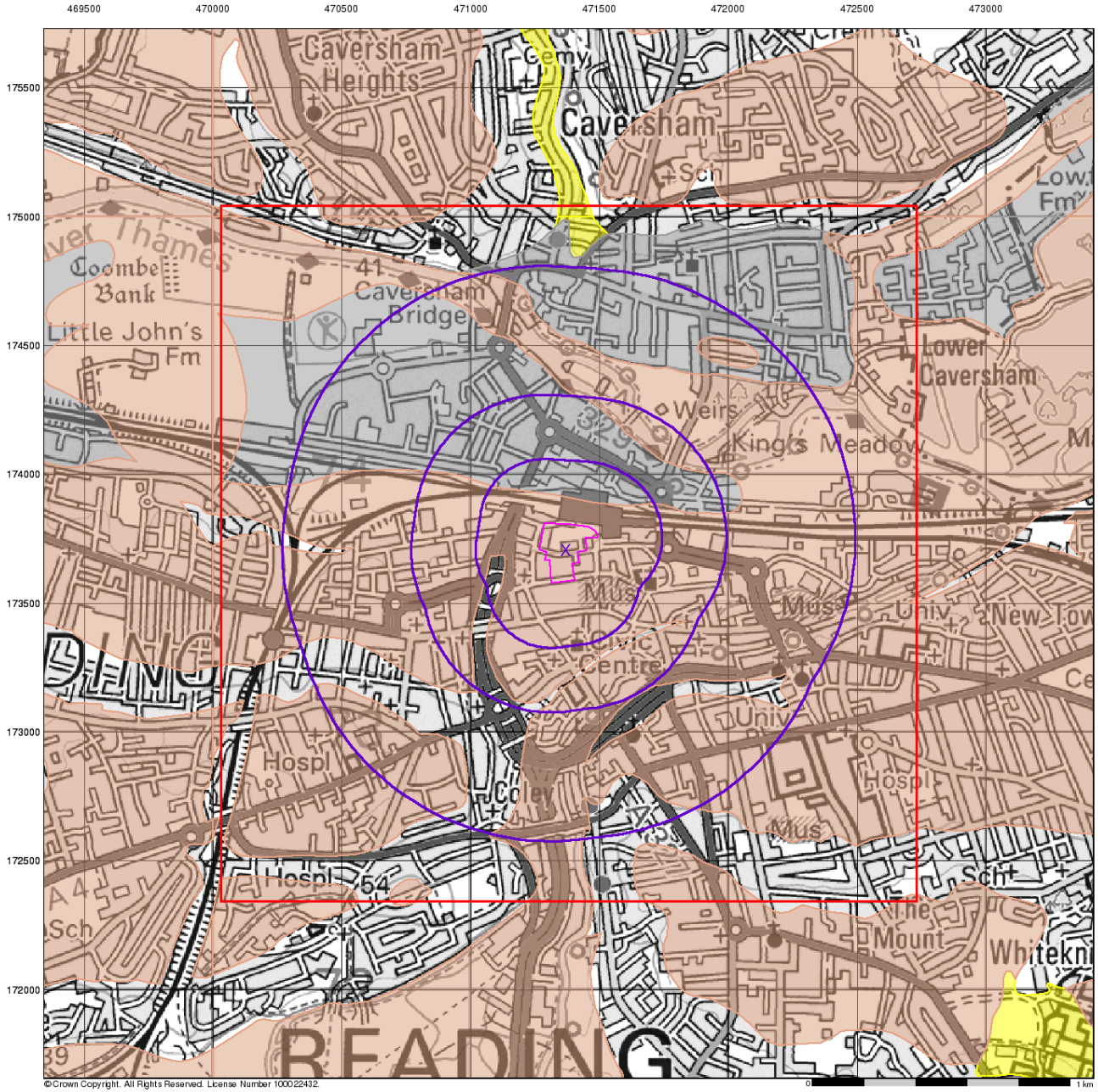


Order Details

Order Number:	179269911_1_1
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR



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RAMBOLL

Superficial Aquifer Designation

General

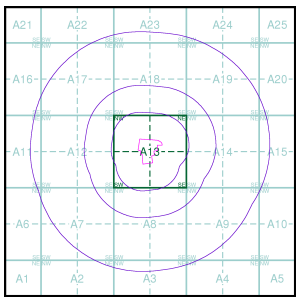
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A

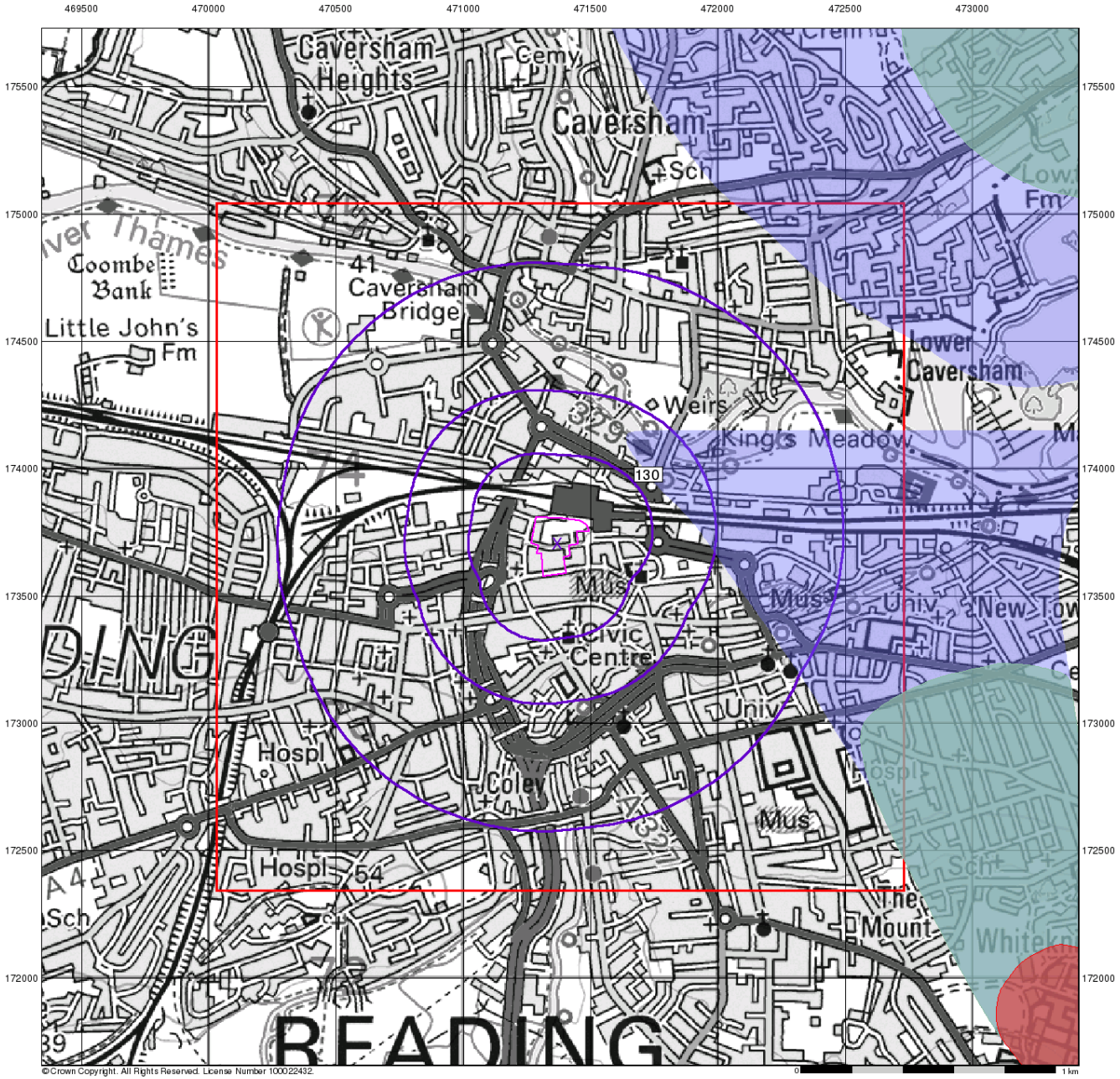


Order Details

Order Number:	179269911_1_1
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR



RAMBOLL

Source Protection Zones

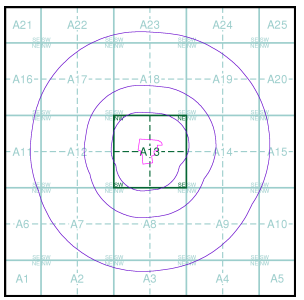
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1c)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2c)
- Total catchment (Zone 3)
- Total catchment - subsurface activity only (Zone 3c)
- Special interest (Zone 4)

Site Sensitivity Context Map - Slice A



Order Details

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National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
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Site Details

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Landmark INFORMATION GROUP
Tel: 0844 844 9952
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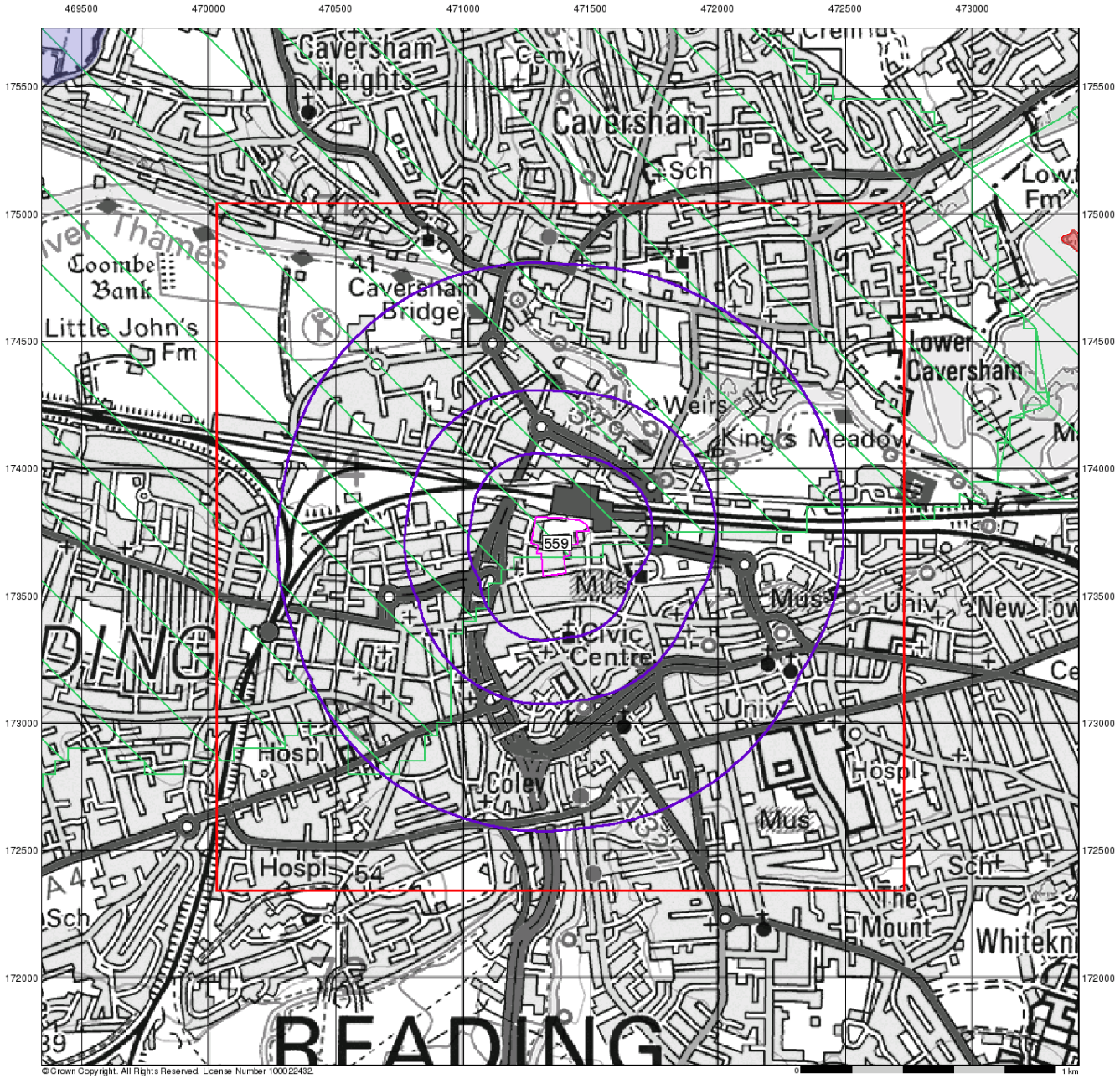


RAMBOLL

Sensitive Land Uses

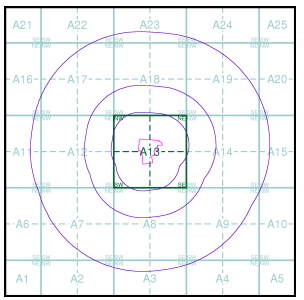
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Sensitive Land Uses

- Ancient Woodland
- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- National Park
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area
- World Heritage Sites

Site Sensitivity Context Map - Slice A



Order Details

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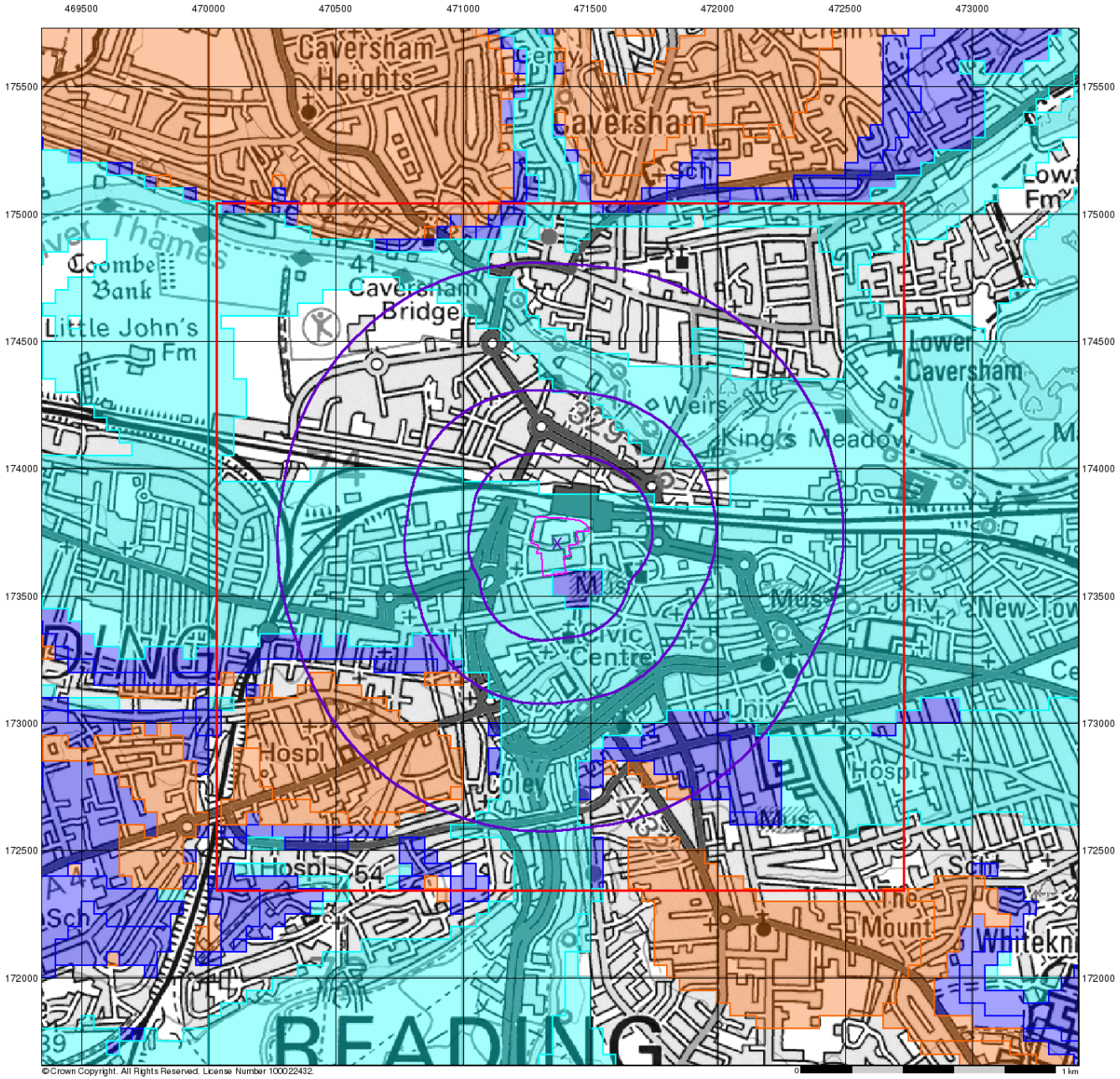
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR



RAMBOLL

BGS Flood GFS Data

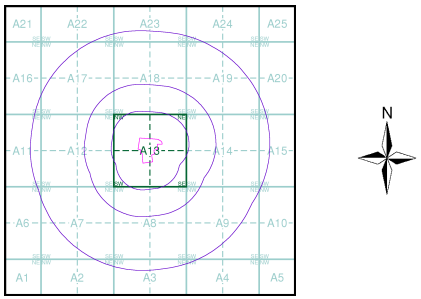
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



Order Details

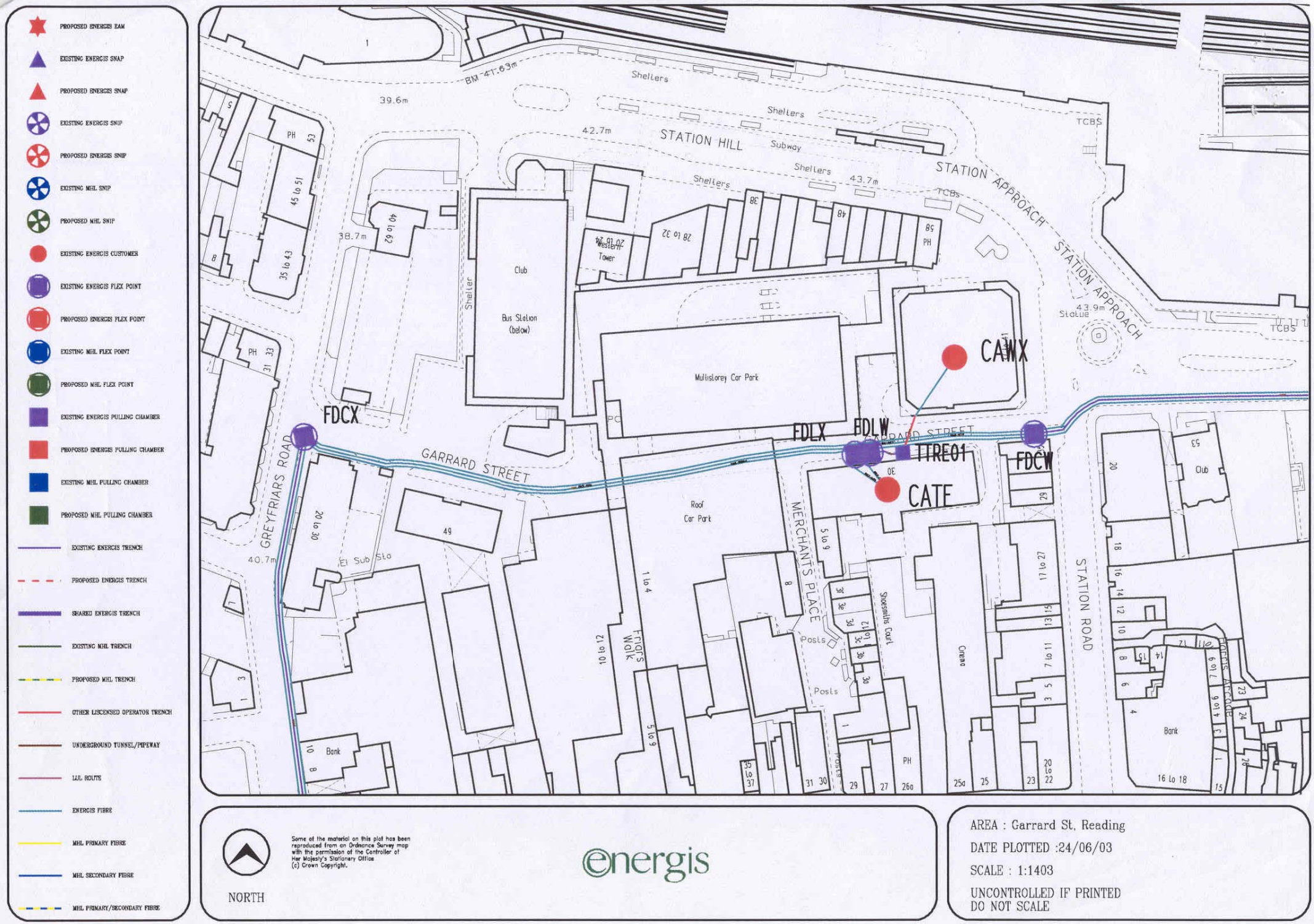
Order Number:	179269911_1_1
Customer Ref:	1620004716
National Grid Reference:	471370, 173710
Slice:	A
Site Area (Ha):	3.15
Search Buffer (m):	1000

Site Details

Flat 2, Garrard House, 30, Garrard Street, READING, RG1 1NR

APPENDIX C

CONSULTATIONS



NORTH

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energis

AREA : Garrard St, Reading

DATE PLOTTED :24/06/03

SCALE : 1:1403

UNCONTROLLED IF PRINTED
DO NOT SCALE

FIBERNET
Rosalind House
Jays Close
Viables
Basingstoke
RG22 4BS
Tel: 01256 858685
Fax 01256 858601

PROJECT:

CIVILS READING

NOTES:

Station Hill

Map legend

As Laid Duct

Duct

As Laid Chamber

Chamber Ab Text

NO:	DRAWN:	DATE:	AMENDMENTS:

BASED ON THE ORDNANCE SURVEYS LARGE SCALE DATA WITH THE PERMISSION OF THE CONTROLLER OF HER MAJE STATIONERY OFFI CE. CROWN COPY RIGHT RESERVED

PREPARED BY: FIBERNET	SCALE: 0 5 10 15 20m
PLANNED BY: T. FULLBROOK.	1/1,500
DRAWN BY: H.BOYD.	DATE: 18-Jun-03
APPROVED BY:	DATE:
DRAWING NUMBER:	

KEY TO BT PLANT

- UNDERGROUND PLANT
- A/C, D/W or W — OVERHEAD PLANT
- 1738 — DISTRIBUTION POINT
- JOINT BOX
- MANHOLE
- POLE
- 1737 — CABINET
- BURIED JOINT
- J — JOINTING POST
- PROPOSED U/G
- A/C, D/W or W — PROPOSED O/H
- PROPOSED BOX

Other proposed plant is shown using dashed lines.

BT symbols not listed above may be disregarded.

Existing BT plant may not be recorded.

Information valid at the time of preparation.

FOR FREE ON SITE LOCATION & MARKING SERVICE CALL THE EXCHANGE OPERATOR AND ASK FOR:-

FREEPHONE
0800 9173993

IMPORTANT WARNING:
Information regarding the location of BT apparatus is given for your assistance and is intended for general guidance only. No guarantee is given of its accuracy. It should not be relied upon in the event of excavations or other works being made near to BT apparatus which may exist at various depths and may deviate from the marked route.

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PLANT INFORMATION REPLY

British Telecommunications plc.

Notes: STATION HILL
GRID REF SU7173

If more detailed information is required please submit larger scale plans

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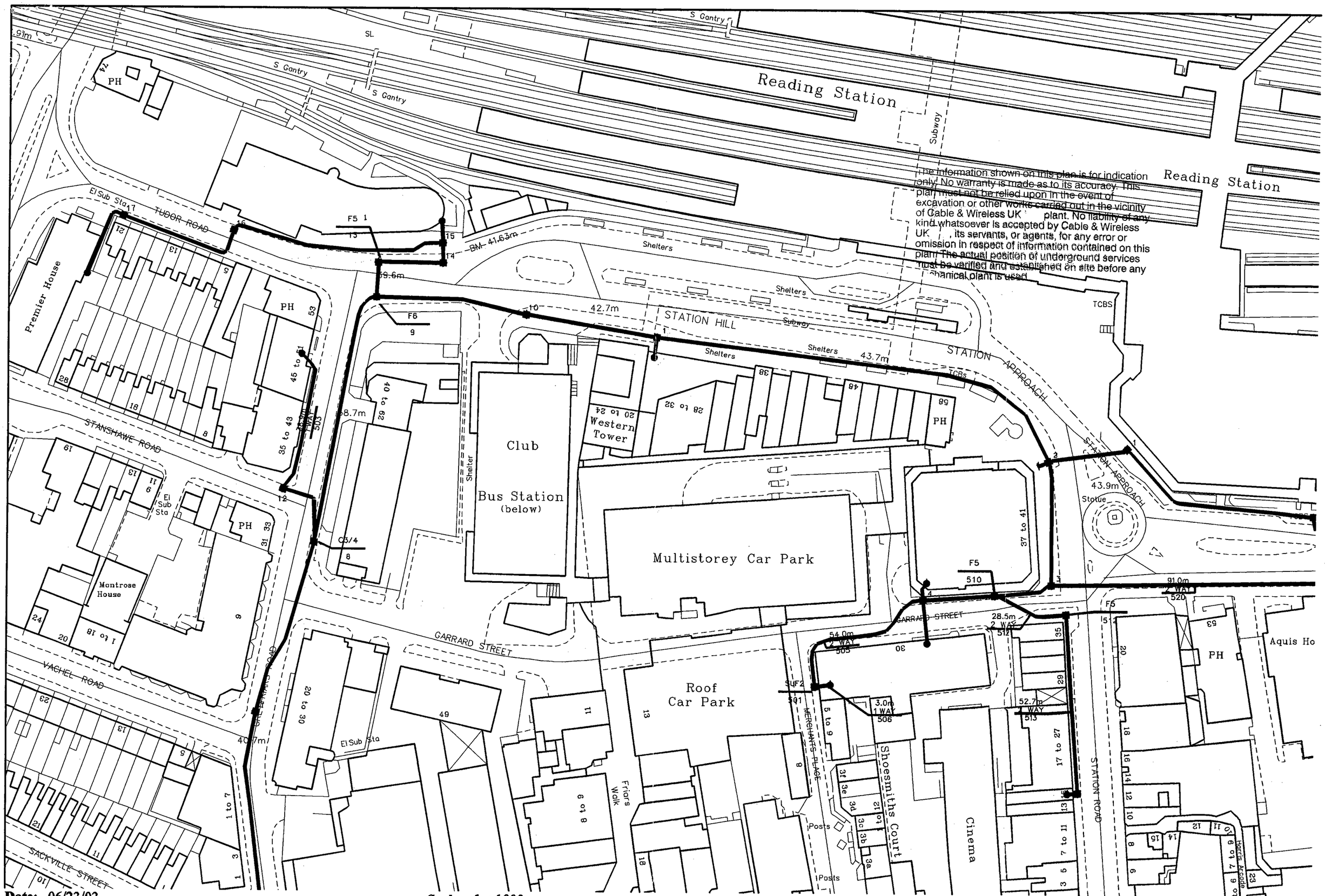
wmjks29 06/09/2003



Date: 06/23/03

FRAMME Web View

Scale: 1 : 1000

ATKINS TELECOMS.

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REVISION

XYZ LAND SURVEYS

LAND & BUILDING SURVEYORS

DATUM HOUSE, 110 ROEBUCK ROAD,
CHESSINGTON, SURREY. KT9 1EU
TEL 020 8935 4500 – FAX 020 8935 4501
E-Mail – surveyors@xyzsurveys.co.uk

LEVELS RELATE TO :- BENCHMARK LOCATED AT CORNER OF STATION BUILDING WITH A VALUE OF 44.83m

SITE

STATION HILL
READING

DRAWING

SITE SURVEY –
LOWER GROUND

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SCALE	DATE	JOB NO
1:200	JUNE 2003	20032/065
SURVEYED BY	DRAWN BY	DRAWING NO
MS/ MEL	CAD	01
READY BY	APPROVED	
MEL	× ×	

FOR

SCOTT BROWNRIG
& TURNER

ON DETAIL SURVEY

AB	AIR BRICK	JB	JUNCTION BOX
AC	AIR CONDITIONING UNIT	LC	LAMP COLUMN
AL	ALUMINIUM	LP	LAMP POST
Apx	APPROX	MH	MANHOLE
AP	ASP & STONE PAVING	MKD	MARKED (SERVICES)
AT	AIR TANK	MP	METAL POST
BS	BELISHA BEACON	MT	MOORING POST
BH	BOREHOLE	NP	NEWSPAPER
Bk	BRICK	OP	OVERFLOW PIPE
BW	BOX VOLE	OS	OPEN SPACE
BP	BRITISH PHOTOPHIS	OST	OIL STORAGE TANK
BT	BRITISH TELECOM	PC	PETROL CAP
BU	BRITISH TELECOM UP	PB	PATH BOLLARD
CAB	CABLE	PH	PATH HANDRAIL
CBK	COAL BUNKER	PO	PICKING POINT
CD	CONCRETE DUCT	PS	PUMP SET
CG	CONCRETE GAUGES	RE	RODDING EYE
CL	CHAIN LINK	RS	ROAD SIGN
CP	CONCRETE POST	RL	ROAD LINE
CT	COAL TELEVISION	SB	STREET BIN
Dr	DEPTH UNDER WATER	SNP	STREET NAME PLATE
E	ELECTRICITY LINE	SYL	STREET YELLOW LINE
EL	ELECTRICITY	TBL	TELEPHONE BOX, SMALL
FH	FIRE HYDRANT	TC	TELE CAB
FB	FLOWER BED	TP	TELE POST
FL	FLOOD LIGHT	TLCB	TRAFFIC LIGHT CONTROL BOX
FLT	FLOOD LIGHT TOWER	TS	TRAFFIC SIGN
FT	FENCE TRIP	TRL	TRAFFIC LIGHT
G	FENCE TREE	TT	TOP OF TANK
GI	GRID INLET	TW	TOP OF WALL
GV	GAS GOVERNOR	TF	TOP OF FENCE
HV	GAS VALVE	VTL	VARIABLE TO LEFT
HC	HEDGE	VTR	VARIABLE TO RIGHT
IC	INSPECTION COVER	VC	VEHICLE CROSSOVER
IL	INVERT LEVEL	WV	WATER VALVE
ILL	ILLUMINATED	WB	WINDOW BROADWAY
IP	INFORMATION PLATE	WC	WATER COURSE
		WT	WATER TAP/VALVE

ON PERIPHERAL FEATURES

CPU	CONCRETE POST	HSB	HORIZONTAL BOARD
MP	METAL POST	HSP	HORIZONTAL PANEL
WP	WOOD POST	PCB	PCB
PCB	CLOSE BOARDED	PL	PLASTIC
PCB	CLOSE BOARDED	PRB	PLASTIC RAIL
CL	CHAIN LINK	RB	RAILWAY
CL	CHAIN LINK	TB	VERTICAL BOARD
CCP	CONCRETE PALING	PW	WIRE
CCP	CONCRETE PALING	WR	WIRE RAIL
		CSW	CONC SECTION WALL

ON BUILDINGS

ASB	ASBESTOS	RWC	RAIN CHANNEL
B	BRICK	RWP	RAIN WATER PIPE
Clad	CLAD STEEL	SH	SPRING OF ARCH
CH	CEILING HEIGHT	TCH	TEMPORARY CEILING HEIGHT
CH	CEILING HEIGHT	TCH	SUSPENDED CEILING HEIGHT
Dr	DOOR OPENING	TH	TOP OF HEDGE
Dr	DOOR HEIGHT	TS	TOP OF SIGN
Dr	DOOR HEIGHT (WITH PANEL	UGS	UP & DOWN SIGN
F	FRAME HEIGHT	UGS	UP & DOWN SIGN
GL	GLAZED HEIGHT	WT	WATER TANK
GL	GLAZED HEIGHT	WT	WATER TROUGH
PMH	PAT MOTOR HEIGHT	WT	WATER TOP
PMH	PAT MOTOR HEIGHT	WT	WATER STORAGE TANK
RSD	ROLLER SHUTTER DOOR	WSH	WEAR LEVEL

N

FIT POINT

STATION HILL

BLDG

GARRARD HILL

UNDERGROUND CAR PARK

LOWER LEVEL

UPPER LEVEL

MULTI-STOREY CAR PARK

SITE COMPOUND

BLDG

GARRARD HILL

BLDG

FIT POINT

GARRARD HILL

BLDG

960.000 1000.000 1040.000 1080.000 1120.000

600.000 560.000 520.000 480.000

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TEL. 020 8925 4656 – FAX. 020 8925 4651
E-MAIL – SURVEYOR@XYZSURVEYS.CO.UK

SITE
STATION HILL
READING

DRAWING
SITE SURVEY–GROUND

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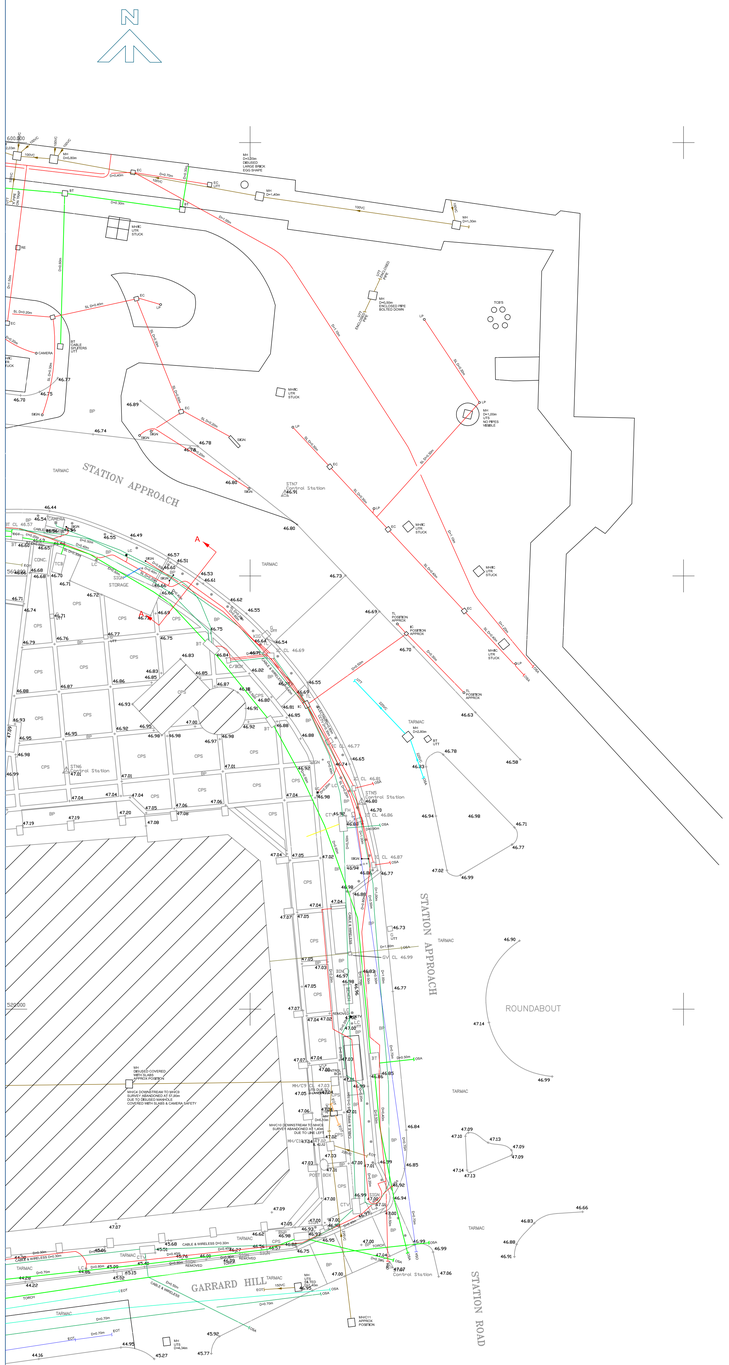
SCALE	1:200	DATE	JUNE 2003
JOB NO	3003/2/065		
DRAWING BY	CAD	CHECKED BY	
DRAWING NO		REVISION	02
CHECKED BY	MJE		

SCOTT BROWNRIG & TURNER

REVISION

LEVELS SHOWN TO :– BENCHMARK LOCATED AT CORNER OF STATION BUILDING WITH A VALUE OF 44.83m

01	1	1	1
02	2	2	2
03	3	3	3
04	4	4	4



REVISION

LEVELS RELATE TO -- BENCHMARK LOCATED AT CORNER OF STATION BUILDING WITH A VALUE OF 44.63m

ON DETAIL SURVEY

AB	AIR BRICK	JB	JUNCTION BOX
ACU	AIR CONDITIONING UNIT	LC	LAMP COLUMN
ACV	AIR CONNECTION	LL	LAMP PILLOW
AP	AIR LINE	MH	MANHOLE
APS	AIR LINE STONE PAVING	MKR	MARKER (SERVICE)
AV	AIR VENT	MP	METAL POST
BH	BOAT HOOK	MS	METAL SHED
BOL	BOLLARD	MT	METER, GAS
BRT	BRANDRY	NB	NOTICE BOARD
BS	BUS STOP	OB	OBSERVATION
BL	BUS LEVEL	OHP	OFFSET/TILL
BT	BUS TURNING	PBX	POLE TERMS TWR
BT	BUS STATION	PCL	POLE, CABLE
CB	CABLE TELEVISION	PH	PHONE
CH	CHIMNEY	PL	PAVEMENT LIGHT
CM	COAL BUNKER	PT	PETROL TANK
CMP	COAL MERCHANTS	PV	PETROL VENT
CS	CONTROL STATION	RE	RODDING EYE
CL	CROSS LEVEL	RG	ROAD GRID
CL	CROWN LEVEL	RS	ROAD SIGN
D	DRAIN, GULLY	SA	SERVICE ATTN
E	EARTH STATION	SP	STREET NAME PLATE
EL	ELECTRIC LINE	TCB	TELEPHONE CAB, BT
DYL	DOUBLE YELLOW LINE	TCS	TELEPHONE CAB, S/W
EP	ELECTRIC POLE	TL	TOP OF LEVEL
FA	FIXED AID TILLET	TL	TOP LIGHT
FB	FLOWER BED	TL	TRAFFIC LIGHT CONTROL BOX
FC	FLOWER CONTAINER	TP	TRAFFIC POST
FT	FLOWER POT TOWER	TS	TRAFFIC SIGNAL
FH	FLUSH HYDRANT	TT	TRAFFIC LIGHT
GT	GRILLY TREE	TT	TOP OF TANK
GP	GUARD	TW	TOP OF WALL
GR	GUY RESPONSE	TW	TOP OF STREET
HC	HEDGE	UL	UNABLE TO LOCATE
HC	HEDGE CUTTER COVER	UT	UNABLE TO TRACE
IL	INVERT LEVEL	WL	WATER LEVEL
IP	INSPECTION PLATE	WR	WATER RECOVERY
ON PERMS/OTHERS		WP	WOOD POST
AP	ASPHALT POST	WV	WATER VALVE
BW	BRICK WALL	HB	HORIZONTAL BOARD
CP	CONCRETE POST	HR	HORIZONTAL RAIL
CW	CRIBBLE WORK	MW	METAL WALL
FW	FENCE WIRE	PB	PLASTIC BOLL
GW	GLOSE BOARDS	VB	VERTICAL BOARD
GW	GRASS CRETE RING	VR	VERTICAL RAIL
PC	PRECAST CONC	WW	WIRE WALL
RW	RENDERED PILING	WW	WOOD WALL
ON BOUNDARY		CSW	CONC SECTION WALL
BCB	BRICK CUB	RWG	RAIN CHANNEL
BP	BRICK PIER	RWP	RAIN WATER PIPE
CS	CLOSE SP MESH	SB	SPRING OF BOW
CW	CLOSE SP WOOD	SC	SPRING OF ARCH/RW HEIGHT
DCP	DILLING HE POST	SL	SLOPING SIDE
DW	DILLING HE WIRE	SP	SPRING POINT
EP	ELECTRIC METER PANEL	SW	STEEL MESH WORK
FP	FENCE HE POST	TB	TOP OF BOW
FW	FENCE HE WIRE	UB	UNDERSIDE OF BOW
LP	LAMP POST	UC	UNDERSIDE OF CURB
LP	LAMP POST/FLOOD LIGHT	WH	WATER HEATER
PWP	PARTITION WALL PLAN	WST	WATER STORAGE TANK
PWT	PARTITIONING	WT	WATER TANK
RSD	ROLLER SHUTTER DOOR	WLE	WORK LEVEL

NOTE: THIS DRAWING REMAINS THE PROPERTY OF XYZ LAND SURVEYS UNTIL FULL AND FINAL PAYMENT HAS BEEN RECEIVED.

XYZ LAND SURVEYS
LAND & BUILDING SURVEYORS
DATUM HOUSE, 115 ROEBUCK ROAD, CHESSINGTON, SURREY, KT9 1EU
TEL 020 8255 4550 -- FAX 020 8255 4551
E-Mail - surveyors@xyzsurveys.co.uk

SITE

STATION HILL
READING

DRAWING

SITE SURVEY-GROUND

© Copyright 2002 TENDSEIS Ltd. T/A XYZ Land Surveys

SCALE	1:200	DATE	JUNE 2003
JOB NO	20032/065	DRAWING BY	ME/MEL
TRACED BY	CAD	CHECKED BY	MEL
APPROVED	×	DRAWING NO	03

FOR

SCOTT BROWNRIG & TURNER

PREVIOUS SURVEY IN GREY

PREVIOUS SURVEY IN GREY

UTGA
Locked Gate

UTGA
Locked Gate

UTGA
Locked Gate

GARRARD STREET

National Probation Service

car park

open at ground level

Entrance boarded up

Hoarding

Roller Shutter

tarmac

concrete

no access as area is private property

Kingston Tfe

Torch

Unknown Fibre Optic

Unknown Scar

Unknown Duct

Energis

Water

Gas

Vtx

Bt

Cv

Wv

Ev

Ele

Ftn

Sw

Ssw

Mh

Pp

Lc

Ec

Gv

Utt

Pedestal

Post

Bollard

Flood Light

Traffic Light

Sign

Fence

Wall

Kerb

Edge

Step

Ramp

Hedge

Tree

Manhole

Chamber

Cover

Level

Invert

Pipe

Duct

Cable

Fibre

Scar

Trench

Boundary

Building

Road

Path

Kerb Line

Edge Line

Centre Line

Footway

Verge

Island

Junction

Crossing

Zebra

Pelican

Puffin

Toucan

Pegasus

Refuge

Island

Roundabout

Mini Roundabout

Give Way

Stop

Yield

Keep Clear

Box

Hatching

Chevron

Arrow

Lane

Bus Lane

Cycle Lane

Cycle Track

Shared Use

Footpath

Bridleway

Restricted Byway

Byway Open to All Traffic

Unclassified

Classified

Trunk

Motorway

Slip Road

Roundabout

PREVIOUS SURVEY IN GREY

PREVIOUS SURVEY IN GREY

PREVIOUS SURVEY IN GREY

UTGA

UTGA

UTGA

Hoarding

Hoarding

Hoarding

Roller Shutter

Ruby Reds

Steps

Boarded Up

Boarded Up

Sof 44.64

Sof44.62

Sof44.63

Sof45.21

Sof42.95

Sof43.65

Sof42.96

Sof44.23

Sof44.26

Sof44.00

Sof44.82

Sof45.23

Sof44.60

Sof44.65

Sof44.67

Sof44.69

Sof44.71

Sof44.73

Sof44.75

Sof44.77

Sof44.79

Sof44.81

Sof44.83

Sof44.85

Sof44.87

Sof44.89

Sof44.91

Sof44.93

Sof44.95

Sof44.97

Sof44.99

Sof45.01

Sof45.03

Sof45.05

Sof45.07

Sof45.09

Sof45.11

Sof45.13

Sof45.15

Sof45.17

Sof45.19

Sof45.21

Sof45.23

Sof45.25

Sof45.27

Sof45.29

Sof45.31

Sof45.33

Sof45.35

Sof45.37

Sof45.39

Sof45.41

Sof45.43

UTGA
Locked Gate

private property, limted access

FRIAR STREET

Bon Marche

Sainsburys

Coast To Coast

More Than Pine

Vacant Retail Unit

Vacant Retail Units

Savers

Boiler Shutter

Sub 89

Highlight

FURAMA
Chinese Restaurant

Optimax

Coral

East & West

Advance Gym

First Choice

The Hope Top
(Freehouse)

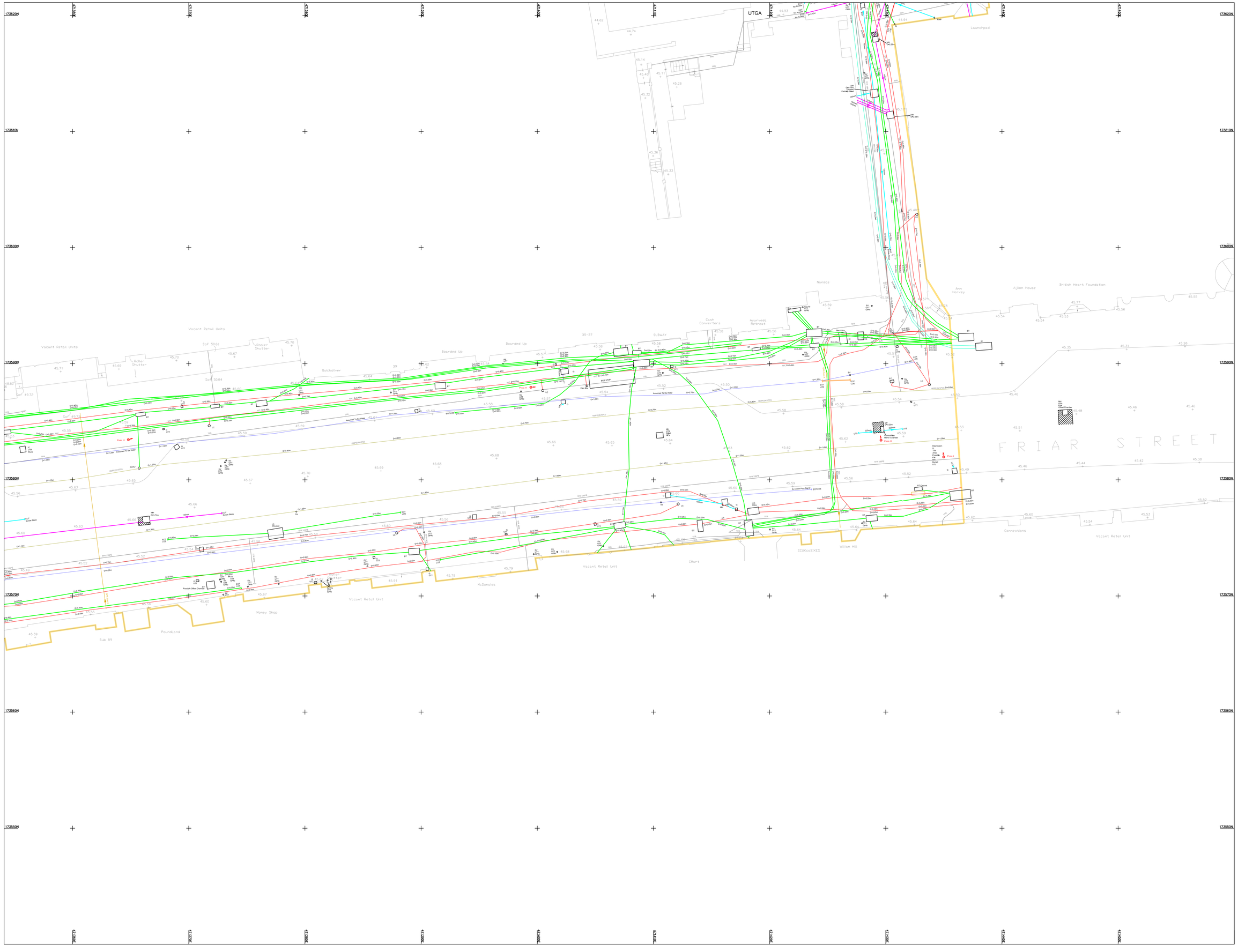
Silvers Amusements

BUS STOP

Assumed To Be Water

Flexible Offset Chamber

173620N
173610N
173600N
173590N
173580N
173570N
173560N
173550N
432600E
432700E
432800E
432900E
433000E
433100E
433200E
433300E
433400E
433500E
433600E


UTGA
Launchpad
Nandos
Ann Harvey
A Jilon House
British Heart Foundation
Ayurveda Retreat
Cash Converters
SUBWAY
Vacant Retail Units
Roller Shutter
Quicksilver
Boarded Up
35-37
39
FRIAR STREET
Connexions
Vacant Retail Unit
SCUKcoBIKES
William Hill
CMart
McDonalds
Money Shop
Poundland
Sub 89
173620N
173610N
173600N
173590N
173580N
173570N
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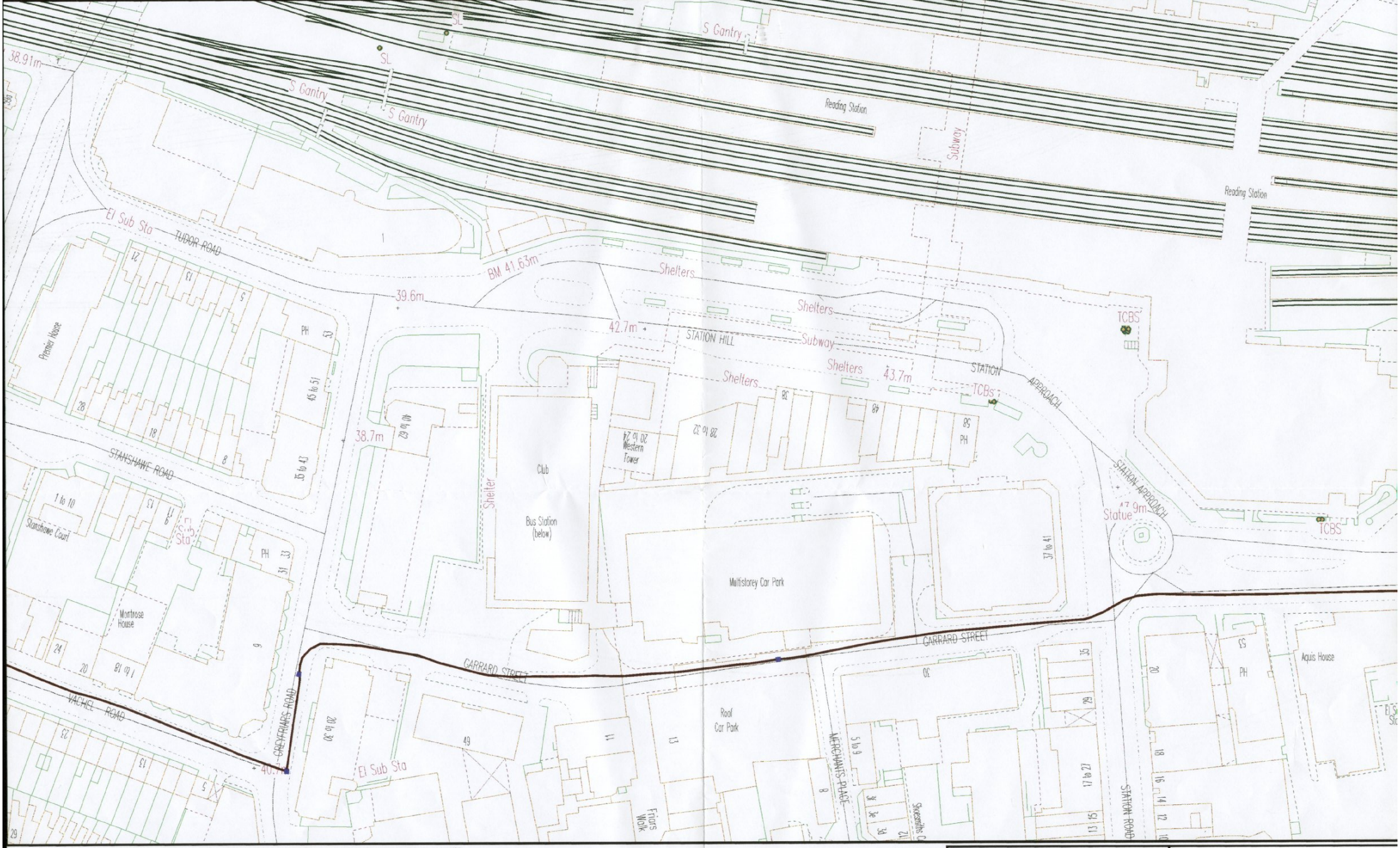
432000E
432100E
432200E



0 100 metres

Duct laid at nominal 350 mm. cover in footway 600 mm. cover in carriageway

Subject to variation due to site conditions.

LEGEND

EXISTING DUCT ROUTE
EXISTING CHAMBER
PROPOSED DUCT ROUTE
PROPOSED CHAMBER

The position of KINGSTON Infrastructures plant is shown as accurately as possible, but the position must be regarded as approximate only, and should be verified on site before excavation.
These plans are valid for three months from the date of issue.

If in doubt contact 0800 138 0292

FIBRE OPTIC CABLES EXIST

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(c) Crown Copyright - ALD50363A

Added data copyright Kingston Communication

let-053062-2a-lgj-130603-rls-1

Station Hill, Reading

SHEET **ISSUE DATE:**
Drawing Reference :-
Scale :- 1:1000
Grid Reference :-

KINGSTON INFRASTRUCTURE
Melbourne House,
Brandy Carr Road,
Wrenthorp,
WAKEFIELD, WF2 0UG
Tel:- 01924 868668
Fax:- 01924 882779

Whitefield Road
Wokingham
Berkshire
RG41 5PZ

www.ntl.com

Your Ref: 05101942ALGJ 080903-1/MLS
Our Ref: RG712D09

16th September, 2003

FAO: Hoare Lea
Hoare Lea Consulting Engineers
140 Aztec West Business Park
Almondsbury
Bristol
BS32 4TX

Dear Hoare

RE: Station Approach, Reading City Centre

In response to your notice of the above reference dated 8th September 2003, I can advise you that we do have ***Regional*** plant in this area.

Please find enclosed a copy of our plans with the location of our existing network marked on it. This information is intended as a general guide only in relation to any proposed works. Individual services to premises may not be shown but it should be assumed that they will be present.

Should any excavations occur within 600mm of our plant a safe digging practice is required. Trial excavations should be used to establish the exact location. If you suspect that you have damaged NTL plant call the NTL damage hotline 0870 0133630. Safe digging practice should be used at all times in accordance with Heath & Safety series booklet HS(G)47 "Avoiding danger from underground services".

It should be noted that our plant contains fibre optic cables, which, if damaged, may cause eye injury and can also be very expensive to repair. The responsibility for damage to our plant will remain with yourselves.

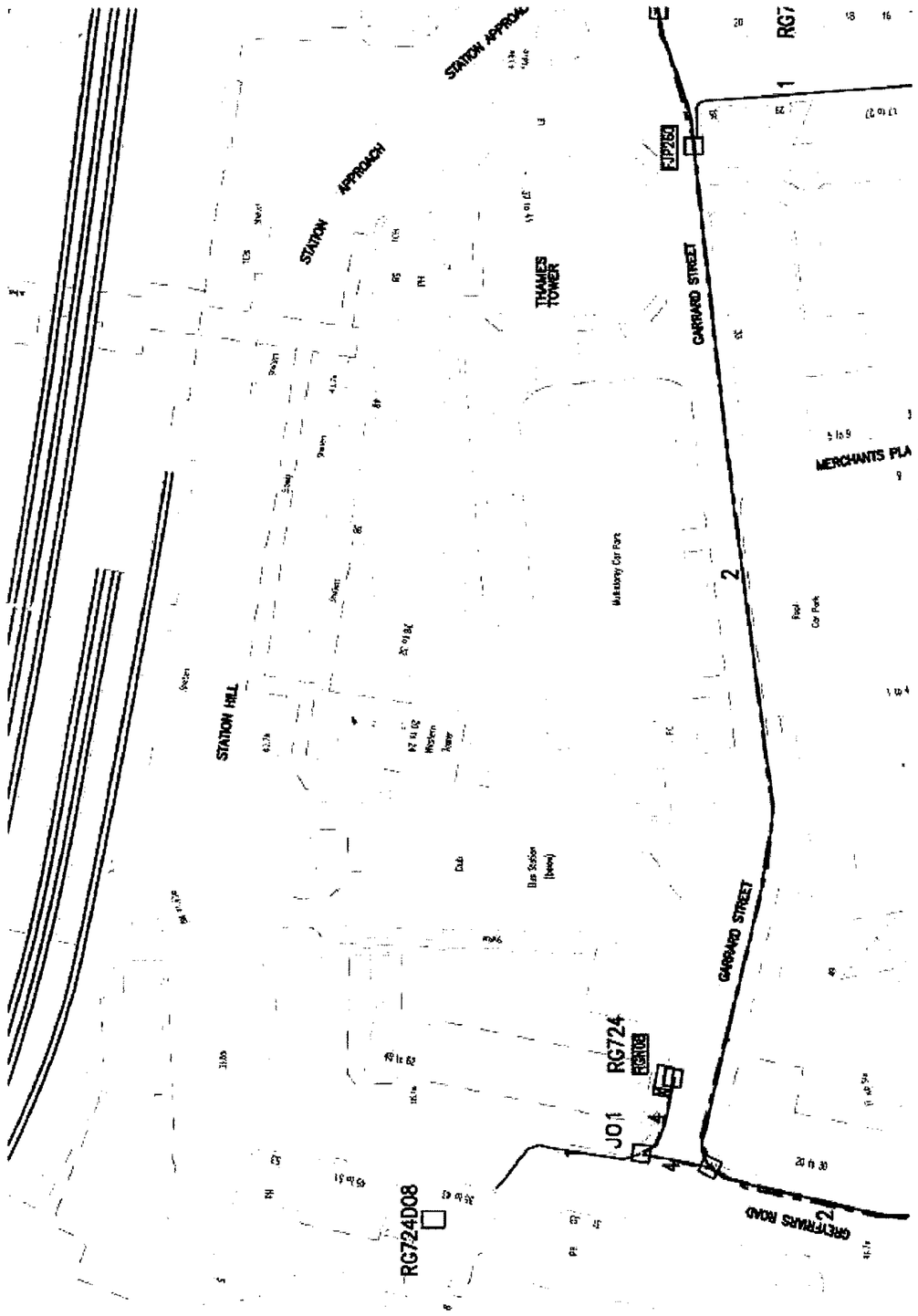
You are also advised that your enquiry was received from Emley Moor Huddersfield on 10th September 2003.

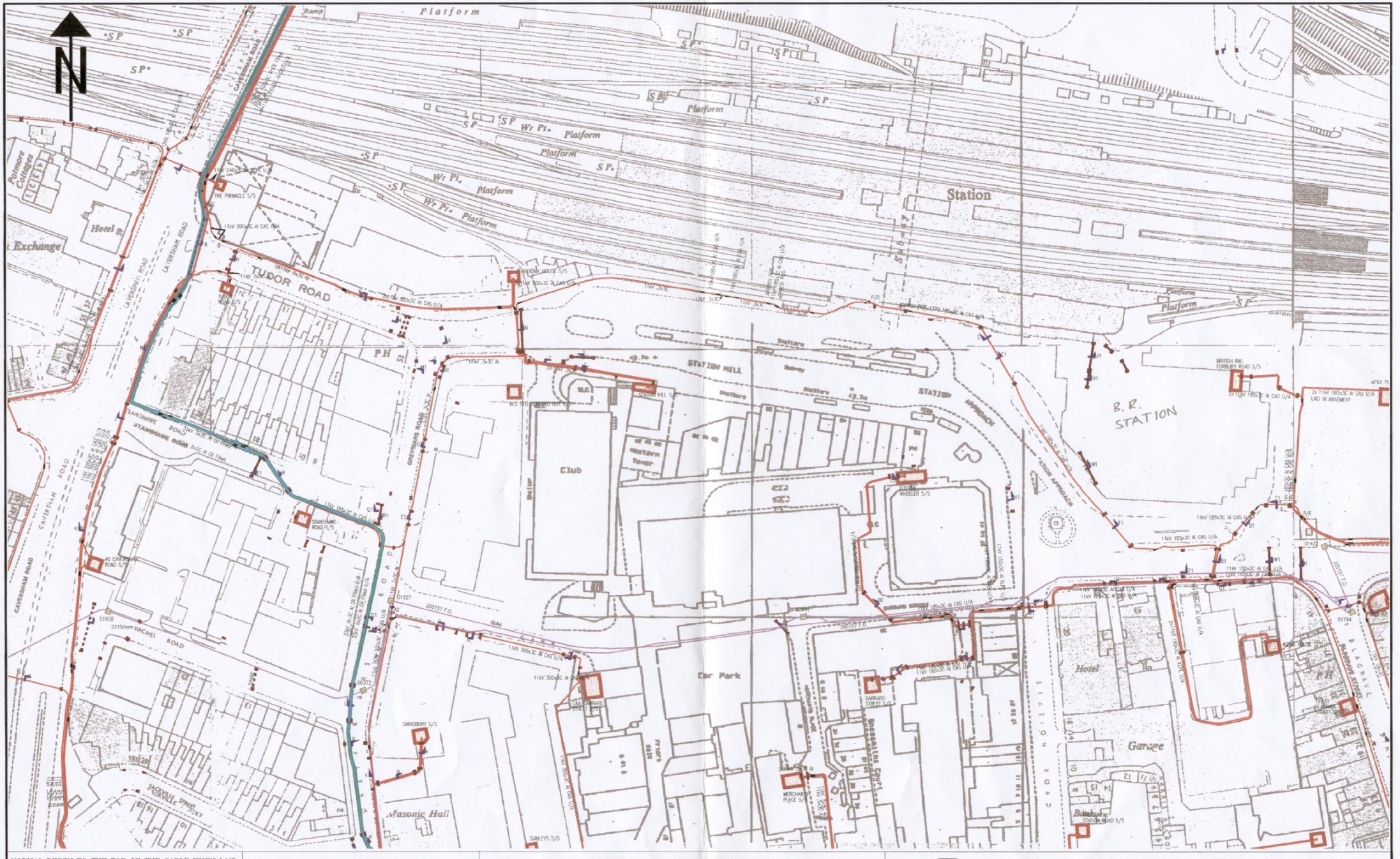
Please do not hesitate to contact me directly on 0118 954 4577 should you have any further queries relating to this matter.

Kind Regards

Stacey Carter

Stacey Carter
Civils, Administrator





NORMAL DEPTH TO THE TOP OF THE CABLE WHEN LAID				
	services	l.v.	h.v.	e.h.v.
FOOTPATH	0.40m	0.45m	0.60m	0.75m
ROAD CROSSING	0.60m	0.60m	0.75m	0.90m

l.v./services – up to 1000V.
h.v. – over 1000V. to 11,000V.

WARNING

There may have been subsequent alterations to the surface levels. Trial holes must be taken to determine positions and depth of cables. HS (G) 47 Booklet from the Health and Safety Executive – Avoiding Danger from Buried Cables – should be consulted before commencing excavation work. (available from HMSO)

WHEN WORKING IN THE VICINITY OF OVERHEAD LINES THE HEALTH AND SAFETY GUIDANCE NOTE GS6 SHOULD BE CONSULTED. (AVAILABLE FROM HMSO)

BASED UPON THE ORDNANCE SURVEY MAP WITH THE SANCTION OF THE CONTROLLER OF H.M. STATIONERY OFFICE. CROWN COPYRIGHT RESERVED.

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Scottish and Southern Energy plc.
Registered in Scotland No 117119.
Registered Office: Inveralmond House
200 Dunkeld Road,
Perth, PH1 3AQ.

READING 01189-465500

UNCONTROLLED COPY

Scottish and Southern Energy plc

H.V. MAINS RECORD

Station Hill,Reading City Centre

Grid Ref: SU71387376
Scale: 1:1250
Date: 27/06/2003

NORMAL DEPTH TO THE TOP OF THE CABLE WHEN LAID				
	services	l.v.	h.v.	e.h.v.
FOOTPATH	0.40m	0.45m	0.60m	0.75m
ROAD CROSSING	0.60m	0.60m	0.75m	0.90m

l.v./services – up to 1000V.
h.v. – over 1000V. to 11,000V.

WARNING

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Scottish and Southern Energy plc

L.V. MAINS RECORD

Station Hill,Reading City Centre

Grid Ref: SU71387376
Scale: 1:1250
Date: 27/06/2003

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Thames Water: water mains als 174070

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

100 metre intervals

EAGLE hardcopy facility - Normal Map.
The plot is centred on (471394 , 173747), which is in SU7173NW. Printed on 25 June 2003 at 9:44:38 by MBETON.

Comments:

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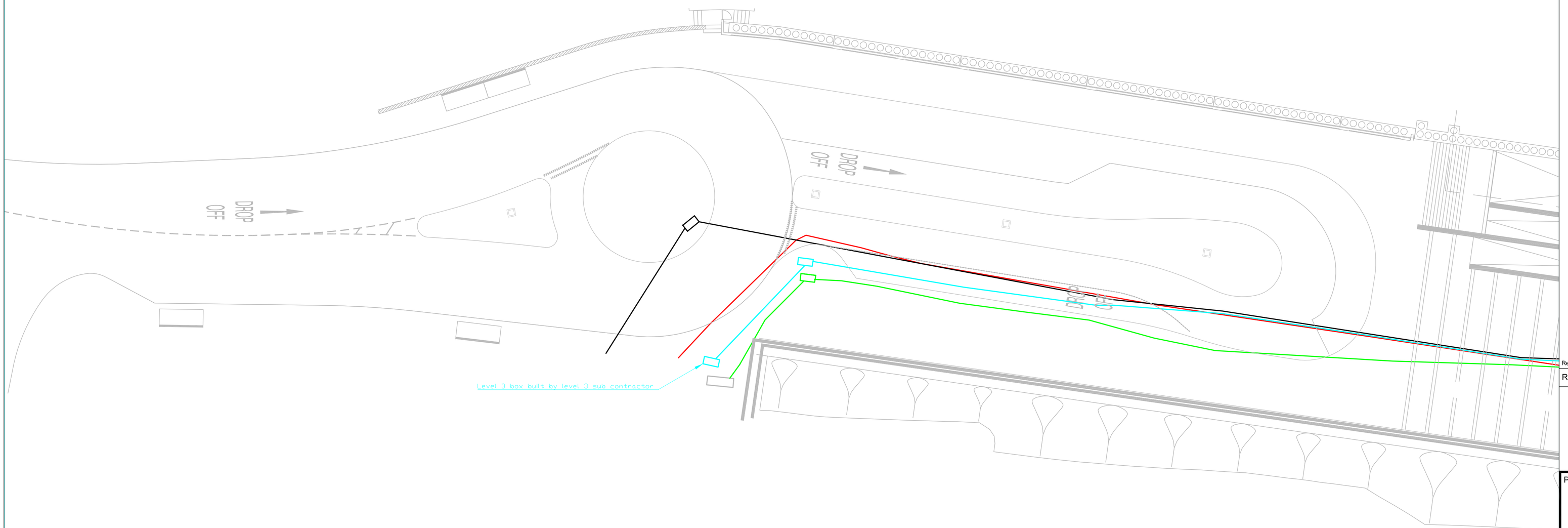
Thames Water: sewers als 174070

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

100 metre intervals

EAGLE hardcopy facility - Normal Map.
The plot is centred on (471394 , 173747), which is in SU7173NW. Printed on 25 June 2003 at 9:46:03 by MBETON.

Comments:



GallifordTry

NOTES

KEY:

- Level 3 (2 No green ducts)
- Virgin Media (4 No white ducts)
- BT (2 No grey ducts)
- HV (1 No 150dia black duct)
- BT installed by Options (2 No grey ducts)

Rev.	Date	Description	By	App

Revisions

Project

READING STATION AREA
SOUTH WEST INTERCHANGE
(SHEET 1 OF 2)

Drawing Title

SERVICE DIVERSIONS
AS BUILT

Drawn	Checked	Approved
KS	-	-

Scales	Date
1:200	09/06/2014

Drawing No.	Revision
362007/SWISTATS/001	00

GallifordTry

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Revisions

Project

READING STATION AREA
SOUTH WEST INTERCHANGE
(SHEET 2 OF 2)

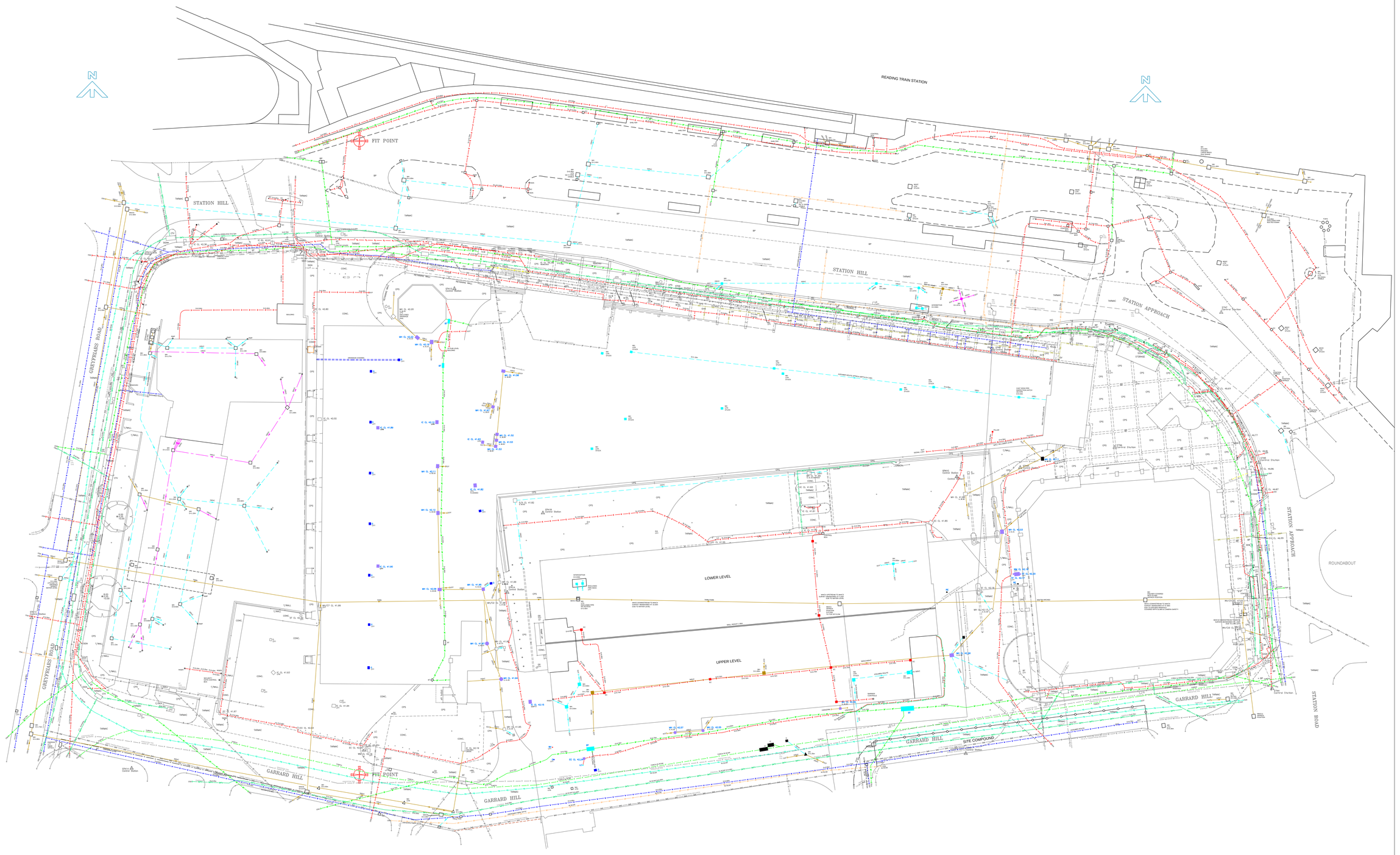
Drawing Title

SERVICE DIVERSIONS
AS BUILT

Drawn	Checked	Approved
KS	-	-

Scales	Date
1:200	09/06/2014

Drawing No.	Revision
362007/SWISTATS/001	00



LEGEND

- Foul Drainage
- Surface Drainage
- Combined Drainage
- Electricity
- Gas
- Water
- Telecommunications
- Cable Television
- Close Circuit Television
- British Telecom
- Fibre Optics
- Unknown
- Ducting

ABBREVIATIONS

AD	Assumed Direction	MS	Mile Post/pole
ACC	Access	MT	Marker Tape
ACU	Air Conditioning Unit	NFI	No Further Information
AR	Assumed Route	NP	Name Plate
BAS	Bell Alarm Service	OH	Overhead Cable
BB	Belisha Beacon	OH	Overhead Cable
BD	Back Drop	OSA	Off Survey Area
BH	Bore Hole	PB	Push Button
Bkt	Brackets	PBM	Permanent Bench Mark
Bk	Brick	PGM	Permanent Ground Marker
BW	Brick Wall	PR	Pipe Riser
BTB	British Telecom Box	Post	Post
BTC	British Telecom Cover	PRF	Post and Rail Fence
BS	Box Stop	PW	Post and Wire Fence
CR	Cable Riser	PU	Pump
CP	Catch Pit	PWP	Pump Water Pipe
CP	Catch Pit	RP	Reflector Post
CL	Chain Link Fence	RW	Retaining Wall
CH	Change Head	RE	Rodding Eye
CB	Close Bonded Fence	RE	Rodding Eye
Co	Concrete	SJF	Safety Fence
CK	Concrete Kerbset	SP	Service Pipe
CF	Corrugated Iron Fence	SL	Soffit Level
CL	Cover Level	SC	Speed Camera
D	Ditch	SP	Spot Point
dil	Dilapidated	ST	Stop Tap
dis	Disused	SV	Sluice Valve
DP	Down Pipe	S	Stump
EP	Earth Rod	TS	Stump
EB	Electricity Box	SW	Survey Station
EC	Electricity Cover	TBC	To Be Confirmed
EP	Electricity Pole	TFR	Taken From Records
EP	Electricity Pole	TP	Telegraph Pole
FC	Fuel Cover	TCB	Telephone Call Box
FFL	Finished floor Level	TBM	Temporary Bench Mark
FH	Fire Hydrant	TP	Traffic Post
FS	Flag Staff	TH	Trial Hole / Pit
GV	Gas Valve	UTL	Unable to Locate
GP	Guide Post	UTL	Unable to Survey
G	Gully	UTS	Unable to Survey
IC	Inspection Cover	UTT	Unable to Trace
IL	Invert Level	VP	Vehicle Barrier
IR	Iron Rail Fence	VDP	Vehicle Detector Pads
KO	Kerb Outlet	VP	Vent Pipe
LP	Lamp Post	WP	Water Hydrant Pipe
LB	Letter Box	WO	Wash Out
LC	Lighting Column	W	Water Cover
MH	Manhole Cover	WI	Water Level
Mkr	Marker	WM	Water Meter
MB	Meter	WV	Water Valve

DISCLAIMER

Unless otherwise stated all services shown on this plan have been surveyed using approved detectors and the connections between manholes are assumed to be direct. Location accuracy is determined by referring to manufacturers guidelines for the detector used.

*Electronic tracing is a reliable method of locating buried services. On heavy built up sites 85% completeness is probably all that can be expected.

*Plan accuracies of the order of + or - 150mm may be achieved but this figure will increase with depth. Where services are running parallel and are in close proximity, separation may be impossible. Successful tracing of non-metallic pipes may be limited.

Some above ground features may have been obscured at the time of survey. No guarantee can be given that all services have been shown.

Underground service information supplied by statutory bodies is often incomplete and of doubtful accuracy. It should be regarded only as an indication and cannot be guaranteed.

Reference should be made to the latest version of 40Seven's Documented Site Procedures for Utility Location Surveys.

Underground services in the vicinity of services shown should be carried out with due diligence (Ref: HS (G) 47).

BT information has been provided by BT.

*Extracts taken from - Surveys of Land, Buildings and Utility Surveys at Scales of 1:500 and Greater
Issued by The Royal Institution of Chartered Surveyors February 1996.

NOTES

Read in conjunction with existing records.
Utility routes shown in grey are from existing records.
Sub level utility covers are shown solid.
Kingston Infrastructure shown from records possibly runs in same trench as Torch along Station Hill.
Atkins telecoms existing records coincide with Cable & Wireless routes traced, possibly run in same trench.
Virgin and NTL on Garrard Hill, Records coincide with CATV route traced, possibly run in same trench.
The Station Approach base plan has been digitised from an existing plan provided by the client, therefore accuracy's cannot be fully guaranteed.

REV.	DETAILS	BY	DATE
4.0	Invert Level removed from MH/CS due to being UTS two landings.	TR	21/10/05
3.0	Site re-visit for the Utility survey in the car park areas & added to the AutoCAD drawing.	AW	19/10/05
2.1	Site re-visit for the Utility survey at the Station approach & added to the AutoCAD drawing.	TR	28/09/05
2.0	Hatched areas added to drawing to indicate areas not surveyed.	LP	14/09/05

40SEVEN
Cross Green Way
Leeds, LS9 0SE.
Tel: 0700 4 474747
Email: info@40seven.com

CLIENT:
Hoare Lea Consulting Engineers
Glen House,
200-208 Tottenham Court Road,
London

DRAWING TITLE:
Utility Mapping Survey
At
Station Hill,
Reading

SURVEYED BY:	DRAWN BY:	APPROVED BY:
AF/GL	LP	DH

SCALE:	SURVEY DATE:
1:250	19/08/2005

DRAWING NUMBER:	SHEET NUMBER:
FS270-R4	1 of 1

DRAWING STATUS: Final
REV: 4.0

APPENDIX D

TOPOGRAPHIC SURVEY

A0 1:100

STANDARD ABBREVIATIONS

B	BOLLARD	MW	MARKER
BB	BELISHA BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTC	BRITISH TELECOM IC	PFC	PANEL FENCE-CONC
C	CENTRE LINE OF ROAD	PFW	PANEL FENCE-WOOD
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	(R)	FROM RECORDS
CO	CLEAN OUT	RE	RAILINGS
CONC	CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SC	SCAFFOLDING
CTV	CABLE TV IC	SD	SLOPING DOWN
	(Dig)=DILAPIDATED	Sk(1)	Skylight
DRN	DRUGEON	SL	SUMP LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
EB	ELECTRICITY BOX	SP	SPOT LEVEL
EJB	ELEC JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
F	FENCE LINE	TB	TELEPHONE BOX
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
FL	FLOOR LEVEL	TP	TELEPHONE POLE
FP	FLAG POLE	TPV	TACTILE PAVING
G	GRATE	TR	TREE/BUSH
GV	GAS VALVE	(UU)	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
I	ILLUMINATED BOLLARD	W	WELL
IC	INSPECTION COVER	WA	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
L	LAMP COLUMN		
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (Bottom-Top)

GLASS SYMBOL (Elevations)

STN 2 SURVEY STATION

+ 28.34 SPOT LEVEL

CL 2.10 CLEARANCE HEIGHT & TAG

FS 1.00 FLOOR TO SILL HIDGHT

SH 1.50 SILL TO HEAD HEIGHT

BA 1.50 FLOOR TO BOTTOM OF ARCH

TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction

WATER

GAS

Caution: Tracing of uPVC Gas Pipes Not possible, Can Lines May Have Also Been Shown From Utility Records ONLY.

ELECTRICITY

TELECOM

CABLE TV

UNDERGROUND CHAMBER

Note:
All Pipe sizes in millimeters unless stated otherwise

CAUTIONARY NOTES

ELECTRO-DETECTION TECHNIQUES HAVE BEEN USED TO OBTAIN THE LOCATION OF UNDERGROUND SERVICES. THE RESULTS ARE NOT INFALLIBLE AND TRIAL EXCAVATIONS MUST BE CARRIED OUT TO ESTABLISH THE EXACT POSITION OF SERVICES AND, IN PARTICULARLY, DEPTHS. ALTHOUGH ALL REASONABLE EFFORT HAS BEEN MADE IN SEARCHING AVAILABLE RECORD DRAWINGS, THE COMPLETENESS OF THE UNDERGROUND SERVICE INFORMATION CANNOT BE GUARANTEED.

General Notes

S1	S2	S3
S4	S5	S6
S7	S8	
S9	S10	

Co-ordinate System
This survey is produced on:
scaled version of Ordnance Survey grid

Survey Accuracy

Bench Mark Details
Levels are related to:
Levels are generated from GPS measurements & verified to 2 local benchmarks.
1st on No.29 Friar St June Merchants Place W face S end
2nd on projecting bracket Greyfriars Ch SE face S end

Date	By	Revision Details

Client
Stanhope PLC
Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title

STATION HILL
READING
RG1 1LX

Footprint

Scale	1:100	Date	31/01/14
File	3868-T	Checked	RD / AD
Sheet Number	1 OF 10	Job No.	3868

msa
Pandora House
41-45 Lind Road
Sutton
Surrey
SM1 4PP

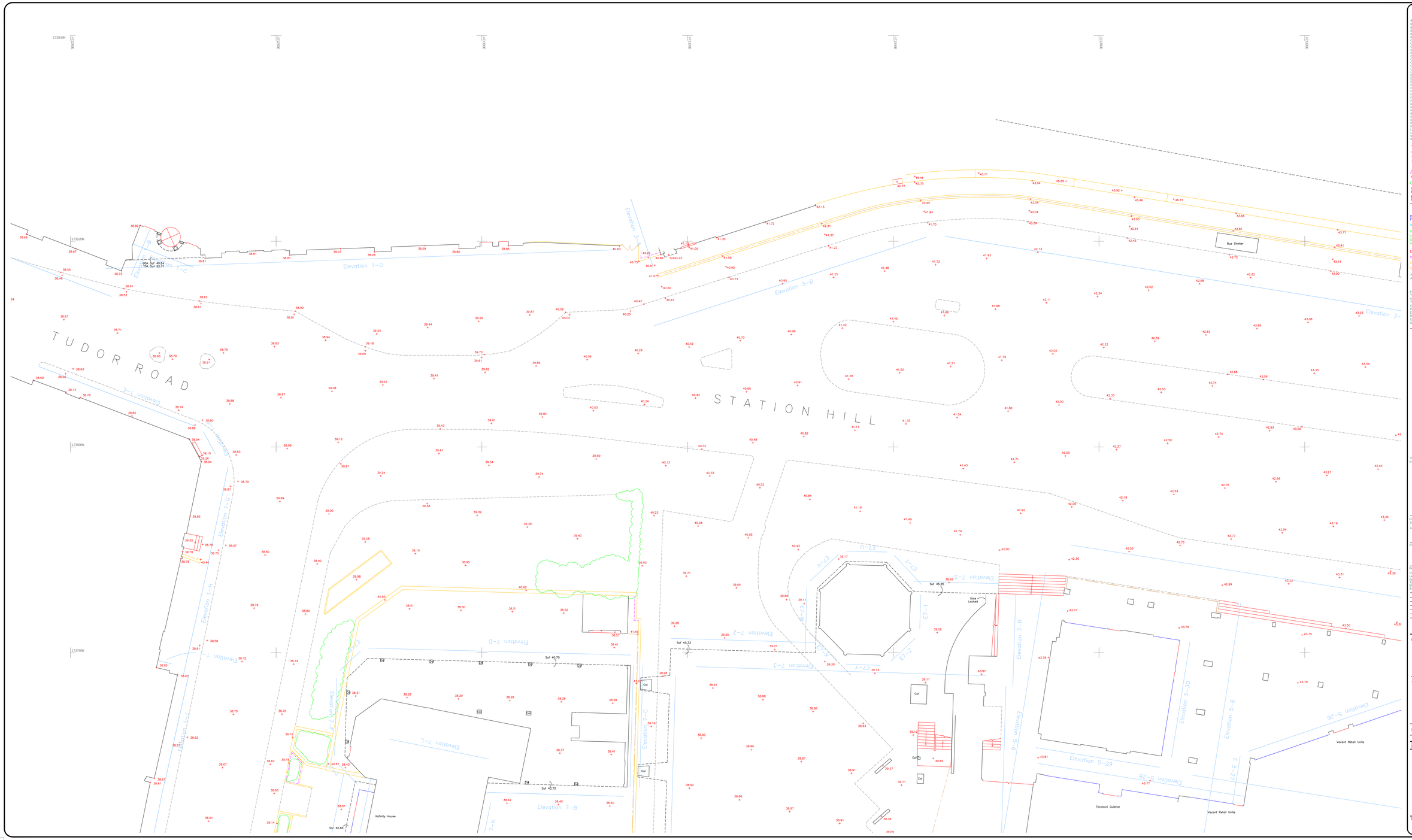
T 020 8770 3390
F 020 8770 3391

msa@msasurvey.com
www.msasurvey.com

Drawing No. 3868-T

Rev. -

A0 1:1



STANDARD ABBREVIATIONS

B	BOLLARD	MM	MARKER
BB	BELISHA BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTC	BRITISH TELECOM IC	PFC	PANEL FENCE–CONC
CB	CABLE MARKER	PFT	PANEL FENCE–TIMBER
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	(R)	FROM RECORDS
CP	CONC POST	RE	RAILINGS
CONC	CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SB	SOFT BOARD
CRTV	CABLE TV IC	SD	SLOPING CEILING
	(dsg)DILAPIDATED	Sk(+)	Skylight
DRN	DRUGED	SL	SUMP LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
EC	ELECTRICITY CONN	SP	SIGN POST
EJB	ELEC JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
F	FENCE LINE	TC	TELEPHONE CABLE
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
FL	FLOOR LEVEL	TP	TELEPHONE POLE
FP	FLAG POLE	TPV	TACTILE PAVING
G	GRATE	UC	UNDER CUT
GV	GAS VALVE	(UTL)	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
IB	ILLUMINATED BOLLARD	W	WELL
IC	INSPECTION COVER	WA	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
LC	LAMP COLUMN		
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (Bottom–Top)

GLASS SYMBOL (Elevations)

STN 2 SURVEY STATION

28.34 SPOT LEVEL

CLEARANCE HEIGHT & TAG

FS 1.00 FLOOR TO SILL HIGHT
SH 1.50 SILL TO HEAD HEIGHT

BA 1.50 FLOOR TO BOTTOM OF ARCH
TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction

WATER

GAS

Caution: Tracing of uPVC Gas Pipes Not possible, Gas Lines May Not Also Been Shown In Utility Records ONLY.

ELECTRICITY

TELECOM

CABLE TV

UNDERGROUND CHAMBER

Note:
All Pipe sizes in millimeters unless stated otherwise

CAUTIONARY NOTES

ELECTRO–DETECTION TECHNIQUES HAVE BEEN USED TO OBTAIN THE LOCATION OF UNDERGROUND SERVICES. THE RESULTS ARE NOT INFALLIBLE AND TRIAL EXCAVATIONS MUST BE CARRIED OUT TO CONFIRM THE EXACT POSITION OF ANY SERVICE. DESPITE PARTICULARLY DEPTHS, ALTHOUGH ALL REASONABLE EFFORT HAS BEEN MADE IN SEARCHING AVAILABLE RECORD DRAWINGS, THE COMPLETENESS OF THE UNDERGROUND SERVICE INFORMATION CANNOT BE GUARANTEED.

General Notes

S1	S2	S3
S4	S5	S6
S7	S8	
S9	S10	

Co-ordinate System
This survey is produced on:
Localised version of Ordnance Survey grid

Survey Accuracy

Bench Mark Details
Levels are related to:
Temporary Benchmarks from GPS measurements & verified to 2 local benchmarks.
1st on No.29 Friar St June Merchants Place W face OS mrk
2nd on projecting bracket Greyfriars Ch SE face S orig

Date	By	Revision Details

Client
Stanhope PLC
Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title

STATION HILL
READING
RG1 1LX

Footprint

Scale	1:100	Date	31/01/14
File	3868-T	Checked	AU
Sheet Number	2 OF 10	Job No.	3868

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Rev. -

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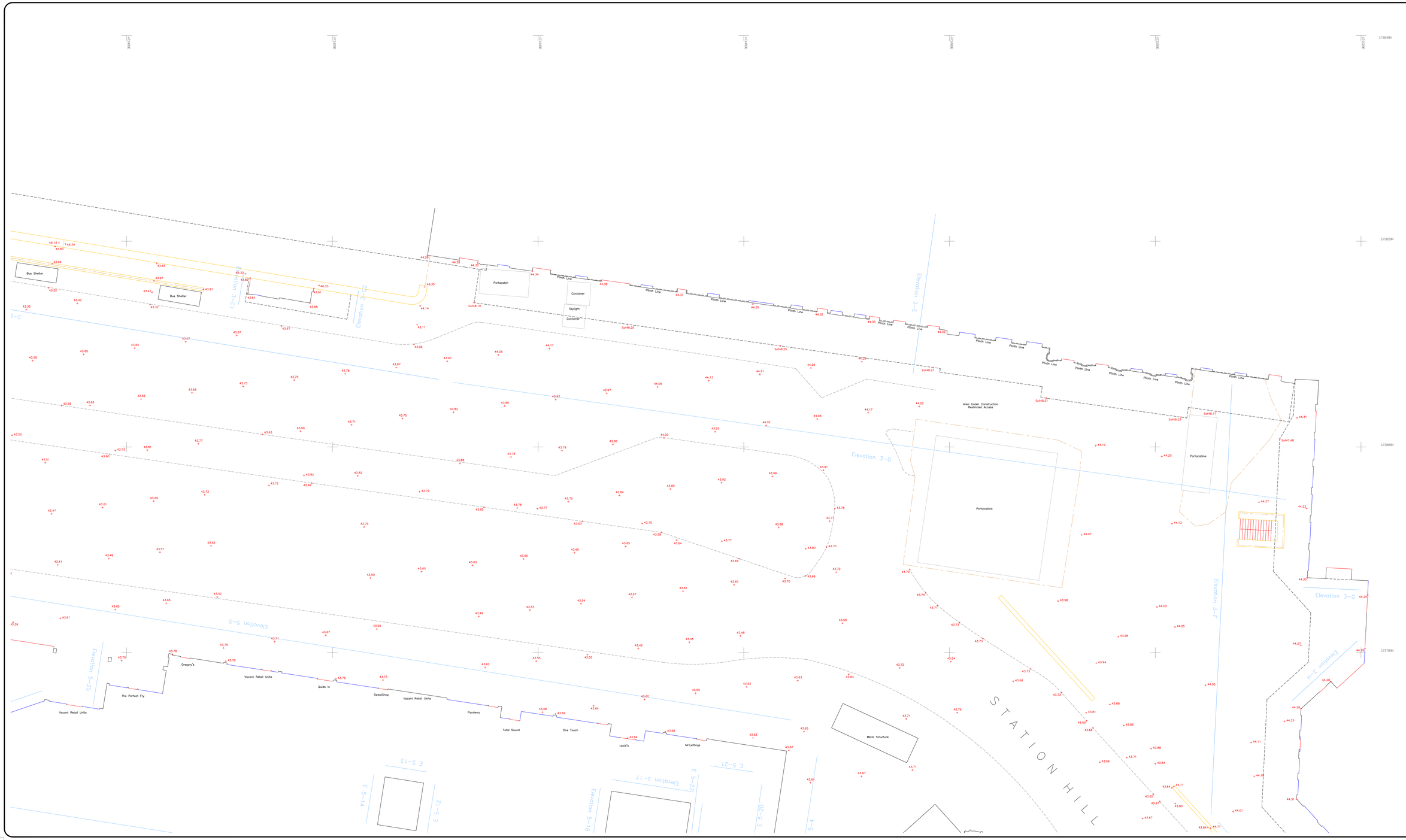

STANDARD ABBREVIATIONS

B	BOLLARD	MM	MARKER
BB	BELISHA BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTC	BRITISH TELECOM IC	PFC	PANEL FENCE-CONC
C	CENTRE LINE OF ROAD	PFT	PANEL FENCE-TIMBER
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	(R)	FROM RECORDS
CO	CLEAN OUT	RE	RAILINGS
CONC	CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SB	SOIL BOARD
CRTV	CABLE TV IC	SD	SLOPING CEILING
	(dsg)=DILAPIDATED	Sk(+)	Skylight
DRN	DRUSEN	SL	SLIMP LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
EB	ELEC. BOX/TRANSFORM	SP	SIGN POST
EJB	ELEC. JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
F	FENCE LINE	TB	TELEPHONE BOX
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
FL	FLOOR LEVEL	TP	TELEPHONE POLE
FP	FLAG POLE	TPV	TACTILE PAVING
G	GRATE	TR	TRENCH
GV	GAS VALVE	(UTL)	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
IB	ILLUMINATED BOLLARD	W	WELL
IC	INSPECTION COVER	WA	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
LP	LAMP POST		
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (Bottom-Top)

GLASS SYMBOL (Elevations)

STN 2 SURVEY STATION

+ 28.34 SPOT LEVEL

2500 CLEARANCE HEIGHT & TAG

FS 1.00 FLOOR TO SILL HIGHT
SH 1.50 SILL TO HEAD HEIGHT

BA 1.50 FLOOR TO BOTTOM OF ARCH
TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction

WATER

GAS

Caution: Tracing of uPVC Gas Pipes Not possible, Can Lines May Have Also Been Shown From Utility Records ONLY.

ELECTRICITY

TELECOM

CABLE TV

UNDERGROUND CHAMBER

Note:
All Pipe sizes in millimeters unless stated otherwise

CAUTIONARY NOTES

ELECTRO-DETECTION TECHNIQUES HAVE BEEN USED TO OBTAIN THE LOCATION OF UNDERGROUND SERVICES. THE RESULTS ARE NOT INFALLIBLE AND TRIAL EXCAVATIONS MUST BE CARRIED OUT TO CONFIRM THE POSITION AND DEPTH OF SERVICES. IN PARTICULARLY DEPTHS, ALTHOUGH ALL REASONABLE EFFORT HAS BEEN MADE IN SEARCHING AVAILABLE RECORD DRAWINGS, THE COMPLETENESS OF THE UNDERGROUND SERVICE INFORMATION CANNOT BE GUARANTEED.

N

General Notes

S1	S2	S3	
	S4	S5	S6
	S7	S8	
	S9	S10	

Co-ordinate System
This survey is produced on;
Localised version of Ordnance Survey grid

Survey Accuracy

Bench Mark Details
Levels are related to:
Temporary Benchmarks from GPS measurements & verified to 2 local benchmarks.
1st on No.29 Friar St June Merchants Place W face SW corn
2nd on projecting bracket Greyfriars Ch SE face S ang.

Date	By	Revision Details

Client
Stanhope PLC
Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title

STATION HILL
READING
RG1 1LX

Footprint

Scale	1:100	Date	31/01/14
File	3868-T	Checked by	AU
Sheet Number	3 OF 10	Job No.	3868

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Drawing No.	Rev.
3868-T	-

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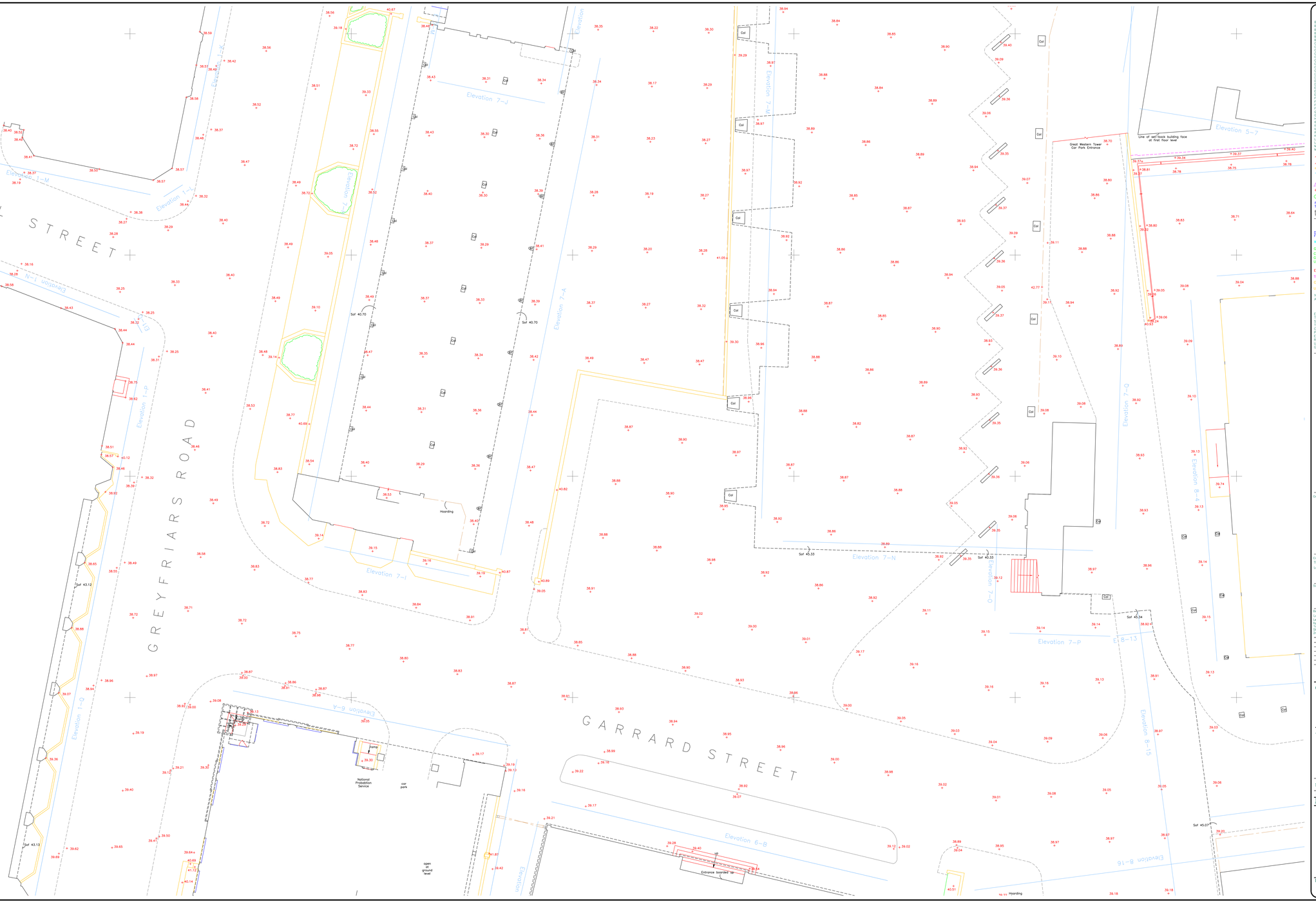

STANDARD ABBREVIATIONS

B	BOLLARD	MM	MARKER
BB	BELOW/4 BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTC	BRITISH TELECOM IC	PFC	PANEL FENCE–CONC
CB	CONCRETE BOLLARD	PFT	PANEL FENCE–TIMB
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	RD	FROM RECORDS
CP	CONC POST	RE	RAILINGS
CPC	CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SD	STORM DRAIN
CTV	CABLE TV IC	SG	SLOPING/G CEILING
	(dsg)DILAPIDATED	Sk(.)	SKylight
DIS	DISUSED	SL	SUMP LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
EB	ELEC BOX/CONSTRUCTION	ST	STEPS
EJB	ELEC JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
F	FENCE LINE	TC	TOP OF CURB
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
FL	FLOOR LEVEL	TP	TELEPHONE POLE
FP	FLAG POLE	TPV	TACTILE PAVING
G	GRATE	TR	TREE/SHRUB
GV	GAS VALVE	U/(L)	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
IB	ILLUMINATED BOLLARD	W	WELL
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
LP	LAMP POST		
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

- SINGLE DOOR
- DOUBLE DOORS
- GATE
- SLOPE SYMBOL (Bottom–Top)
- GLASS SYMBOL (Elevations)
- STN 2 SURVEY STATION
- + 28.34 SPOT LEVEL
- CLEARANCE HEIGHT & TAG
- FS 1.00 FLOOR TO SILL HEIGHT
- SH 1.50 SILL TO HEAD HEIGHT
- BA 1.50 FLOOR TO BOTTOM OF ARCH
- TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction
WATER
GAS
Caution: Tracing of uPVC Gas Pipes Not possible, Can Lines May Have Also Been Shown From Utility Records ONLY.
ELECTRICITY
TELECOM
CABLE TV
UNDERGROUND CHAMBER

Note:
All Pipe sizes in millimeters unless stated otherwise

CAUTIONARY NOTES

ELECTRO–DETECTION TECHNIQUES HAVE BEEN USED TO OBTAIN THE LOCATION OF UNDERGROUND SERVICES. THE RESULTS ARE NOT INFALLIBLE AND TRIAL EXCAVATIONS MUST BE CARRIED OUT TO CONFIRM THE POSITION AND DEPTH OF SERVICES, PARTICULARLY DEPTHS. ALTHOUGH ALL REASONABLE EFFORT HAS BEEN MADE IN SEARCHING AVAILABLE RECORD DRAWINGS, THE COMPLETENESS OF THE UNDERGROUND SERVICE INFORMATION CANNOT BE GUARANTEED.

General Notes

S1	S2	S3
S4	S5	S6
S7	S8	
S9	S10	

Co-ordinate System
This survey is produced on: Localised version of Ordnance Survey grid

Survey Accuracy

Bench Mark Details
Levels are related to: Temporary Bench Mark from GPS measurements & verified to 2 local benchmarks. 1st on No.29 Friar St.June Merchants Place W face OS mrk. 2nd on projecting bracket Greyfriars Ch SE face S orng.

Date	By	Revision Details

Client
Stanhope PLC
Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title
STATION HILL
READING
RG1 1LX

Footprint

Scale	1:100	Date	31/01/14
File	3868-T	Checked eg	A0 +
Sheet Number	4 OF 10	Job No.	3868

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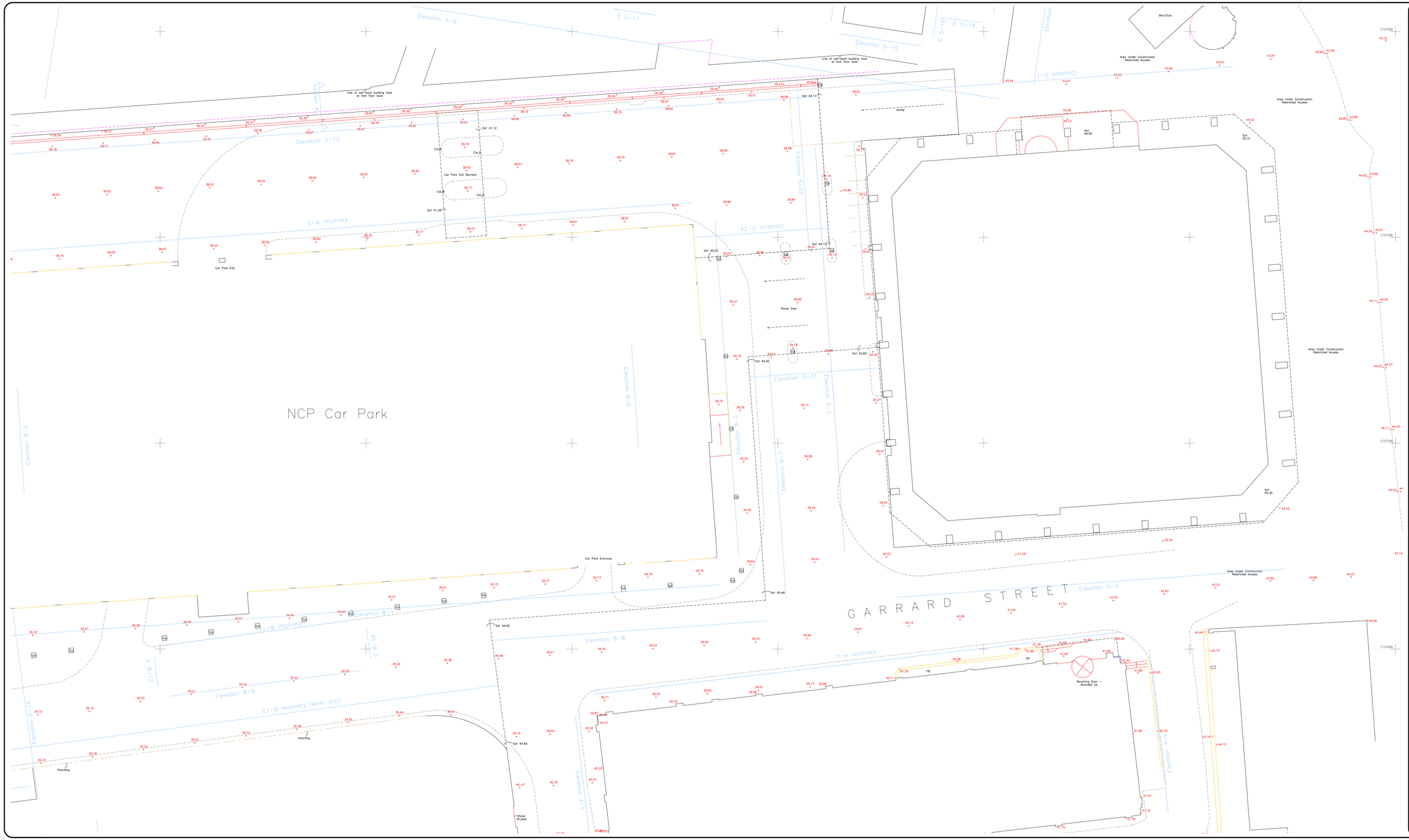
Drawing No. 3868-T
Rev. -

A0 +1



STANDARD ABBREVIATIONS

B	BOLLARD	MM	MARKER
BB	BELISHA BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTC	BRITISH TELECOM IC	PFC	PANEL FENCE-CONC
BW	BRICK/BLOCK WALL	PFW	PANEL FENCE-WOOD
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	(R)	FROM RECORDS
CO	CLEAN OUT	RE	RAILINGS
CONC	CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SA	SOIL VENT PIPE
CTV	CABLE TV IC	SD	SUSPENDED CEILING
	(dbg)(DILAPIDATED	Sk(+)	SKylight
DRN	DRAIN	TL	TUMP LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
EB	ELECTRICITY BOX	ST	STEPS
EJB	ELEC JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
FB	FLOWER BED	TC	TOP OF CURB
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
FL	FLOOR LEVEL	TP	TELEPHONE POLE
FP	FLAG POLE	TPV	TACTILE PAVING
G	GRATE	U	UNDERSIDE
GV	GAS VALVE	(UL)	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
IB	ILLUMINATED BOLLARD	W	WINDOW
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
LP	LAMP POST		
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (Bottom-Top)

GLASS SYMBOL (Elevations)

STN 2 SURVEY STATION

+ 28.34 SPOT LEVEL

2.50 CLEARANCE HEIGHT & TAG

FS 1.00 FLOOR TO SILL HIDGHT
SH 1.50 SILL TO HEAD HEIGHT

BA 1.50 FLOOR TO BOTTOM OF ARCH
TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction

WATER

GAS

Caution: Tracing of uPVC Gas Pipes Not possible, Can Lines May Have Also Been Shown From Utility Records ONLY.

ELECTRICITY

TELECOM

CABLE TV

UNDERGROUND CHAMBER

Note:
All Pipe sizes in millimeters unless stated otherwise

CAUTIONARY NOTES

ELECTRO-DETECTION TECHNIQUES HAVE BEEN USED TO OBTAIN THE LOCATION OF UNDERGROUND SERVICES. THE RESULTS ARE NOT INFALLIBLE AND TRIAL EXCAVATIONS MUST BE CARRIED OUT TO CONFIRM THE POSITION OF ANY SERVICE BEFORE ANY PARTICULARLY DEPTHS. ALTHOUGH ALL REASONABLE EFFORT HAS BEEN MADE IN SEARCHING AVAILABLE RECORD DRAWINGS, THE COMPLETENESS OF THE UNDERGROUND SERVICE INFORMATION CANNOT BE GUARANTEED.

General Notes

S1	S2	S3
S4	S5	S6
S7	S8	
S9	S10	

Co-ordinate System
This survey is produced on:
Localised version of Ordnance Survey grid

Survey Accuracy

Bench Mark Details
Levels are related to:
Levels are generated from GPS measurements & verified by 2 local benchmarks,
1st on No.29 Friar St June Merchants Place W face SW arris
2nd on projecting bracket Greyfriars Ch SE face S arris

Date	By	Revision Details

Client
Stanhope PLC
Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title
STATION HILL
READING
RG1 1LX

Footprint

Scale	1:100	Date	31/01/14
File	3868-T	Checked	KD AD **
Sheet Number	5 OF 10	Job No.	3868

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Drawing No. 3868-T
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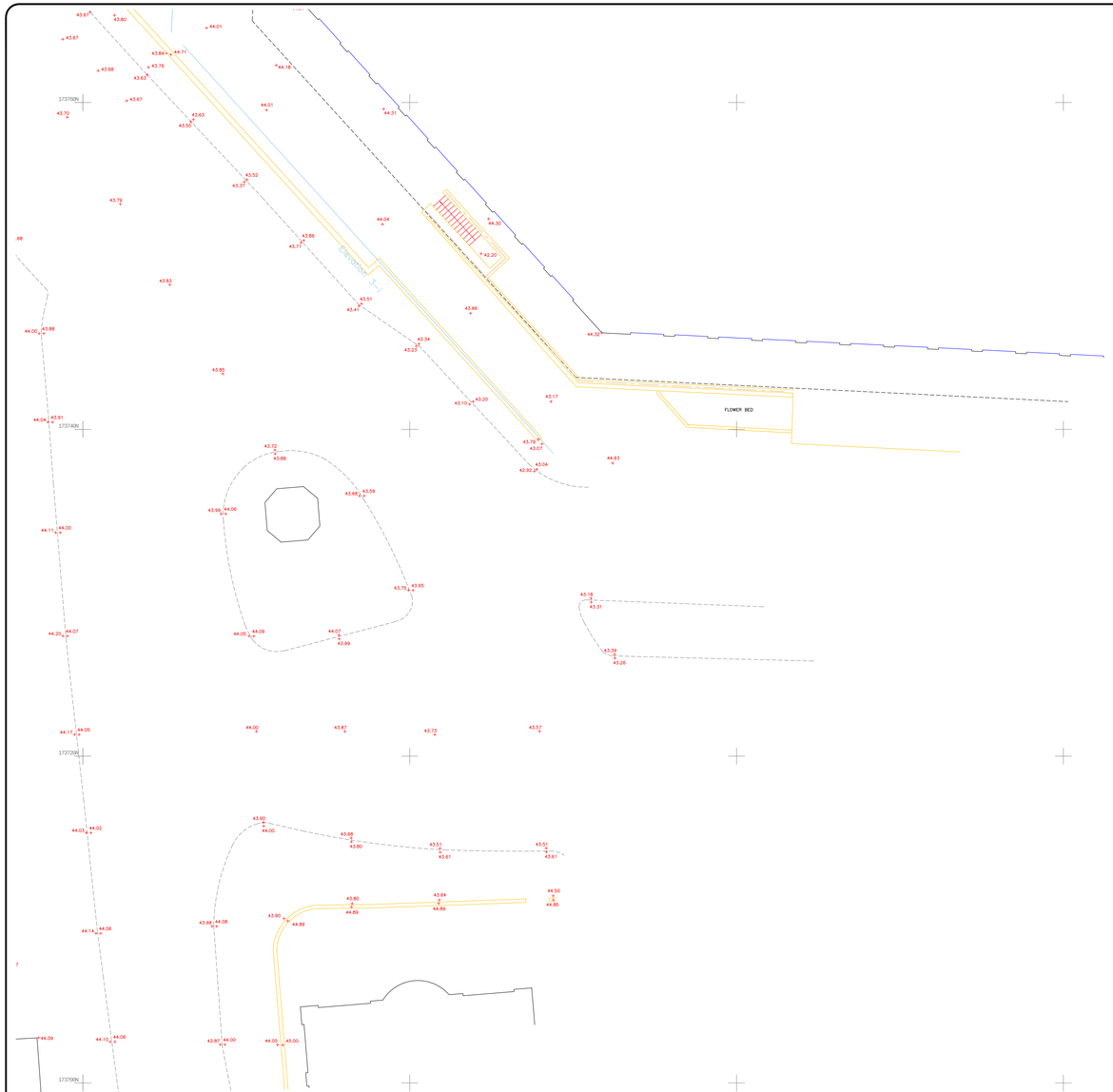

STANDARD ABBREVIATIONS

B	BOLLARD	MM	MARKER
BB	BELISHA BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTIC	BRITISH TELECOM IC	PFC	PANEL FENCE-CONC
C	CONCRETE PAVING	PFT	PANEL FENCE-TIMBER
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	RO	FROM RECORDS
CO	CLEAN OUT	RP	ROOF PIPE
CONC	CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SB	SOIL BOARD
CATV	CABLE TV IC	SD	SLOPING CEILING
	(Vdig=DISLAPIDATED	Sk(),	Skylight
DRN	DRIVEWAY	SL	SUMP LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
EBF	ESTATE BOARD FENCE	ST	STREET
EJB	ELEC JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
F	FENCE LINE	TB	TELEPHONE BOX
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
FL	FLOOR LEVEL	TP	TELEPHONE POLE
FP	FLAG POLE	TPV	TACTILE PAVING
G	GULLY	UC	UNDER CUT
GV	GAS VALVE	(UTL)	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
IB	ILLUMINATED BOLLARD	W	WELL
IC	INSPECTION COVER	WA	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

- SINGLE DOOR
- DOUBLE DOORS
- GATE
- SLOPE SYMBOL (Bottom-Top)
- GLASS SYMBOL (Elevations)
- STN 2 SURVEY STATION
- 28.34 SPOT LEVEL
- CL CLEARANCE HEIGHT & TAG
- FS 1.00 FLOOR TO SILL HIGHT
- SH 1.50 SILL TO HEAD HEIGHT
- BA 1.50 FLOOR TO BOTTOM OF ARCH
- TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction

WATER

GAS

Caution: Tracing of uPVC Gas Pipes Not possible, Gas Lines May Have Also Been Shown From Utility Records ONLY.

ELECTRICITY

TELECOM

CABLE TV

UNDERGROUND CHAMBER

Note:
All Pipe sizes in millimeters unless stated otherwise

CAUTIONARY NOTES

ELECTRO-DETECTION TECHNIQUES HAVE BEEN USED TO OBTAIN THE LOCATION OF UNDERGROUND SERVICES. THE RESULTS ARE NOT INFALLIBLE AND TRIAL EXCAVATIONS MUST BE CARRIED OUT TO CONFIRM THE ACCURACY OF THE SURVEY DATA. PARTICULARLY DEPTHS. ALTHOUGH ALL REASONABLE EFFORT HAS BEEN MADE IN SEARCHING AVAILABLE RECORD DRAWINGS, THE COMPLETENESS OF THE UNDERGROUND SERVICE INFORMATION CANNOT BE GUARANTEED.

N

General Notes

S1	S2	S3	
	S4	S5	S6
	S7	S8	
	S9	S10	

Co-ordinate System
This survey is produced on:
Localised version of Ordnance Survey grid

Survey Accuracy

Bench Mark Details
Levels are related to:
Levels are generated from GPS measurements & verified by 2 local benchmarks,
1st on No.29 Friar St June Merchants Place W face . Stn only
and on projecting bracket Greyfriars Ch SE face S ang.

Date	By	Revision Details

Client
Stanhope PLC
Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title
STATION HILL
READING
RG1 1LX

Footprint

Scale	1:100	Date	31/01/14
File	3868-T	Checked	AD
Sheet Number	6 OF 10	Job No.	3868

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Drawing No. 3868-T
Rev. -

A0 1:100

PricewaterhouseCoopers

STANSHAWE ROAD

open at ground level

car park

tarmac

concrete

no access as area is private property

Hoarding

Roller Shutter

Disabled doorways

Duct

private property, no access

Elevation 6-C

Elevation 6-D

Elevation 6-E

Elevation 6-R

Elevation 6-I

Elevation 6-J

Elevation 6-K

Elevation 6-L

Elevation 6-M

Elevation 6-N

Elevation 6-S

Elevation 6-T

Elevation 6-U

Elevation 8-C

Elevation 8-18

Elevation 8-19

Elevation 8-21

Elevation 8-24

Elevation 8-25

Elevation 8-26

Elevation 8-27

Elevation 8-29

Elevation 8-46

173600N

173620N

173640N

STANDARD ABBREVIATIONS

B	BOLLARD	MM	MARKER
BB	BELISHA BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTC	BRITISH TELECOM IC	PFC	PANEL FENCE-CONC
CB	CONCRETE BOLLARD	PFT	PANEL FENCE-TIMB
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	RO	FROM RECORDS
CP	CATCH PIT	RT	RETAINING
CONC	CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SB	SOIL BOARD
CATV	CABLE TV IC	SD	SUSPENDED CEILING
	(4Sqp)DILAPIDATED	Sk(.)	SKylight
D	DRAIN	SL	SUMP LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
DP	DOWN PIPE/DRAIN	ST	STEPS
EJB	ELEC JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
F	FENCE LINE	TB	TELEPHONE BOX
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
FL	FLOOR LEVEL	TP	TELEPHONE POLE
FP	FLAG POLE	TPV	TACTILE PAVING
G	GRATE	TR	TRANSFORMER
GV	GAS VALVE	(UTL)	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
IB	ILLUMINATED BOLLARD	W	WELL
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
LP	LAMP POST		
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (Bottom-Top)

GLASS SYMBOL (Elevations)

STN 2 SURVEY STATION

+ 28.34 SPOT LEVEL

CLEARANCE HEIGHT & TAG

FS 1.00 FLOOR TO SILL HIGHT

SH 1.50 SILL TO HEAD HEIGHT

BA 1.50 FLOOR TO BOTTOM OF ARCH

TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction

WATER

GAS

Caution: Tracing of uPVC Gas Pipes Not possible, Cast Lines May Have Also Been Shown From Utility Records ONLY.

ELECTRICITY

TELECOM

CABLE TV

UNDERGROUND CHAMBER

Note:
All Pipe sizes in millimeters unless stated otherwise

CAUTIONARY NOTES

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General Notes

S1	S2	S3	
S4	S5	S6	
S7	S8		
S9	S10		

Co-ordinate System
This survey is produced on:
Localised version of Ordnance Survey grid

Survey Accuracy

Bench Mark Details
Levels are related to:
Levels are generated from GPS measurements & verified by 2 local benchmarks.
1st on No.29 Friar St June Merchants Place W face 1.68 up
2nd on projecting bracket Greyfriars Ch SE face S orig.

Date	By	Revision Details

Client
Stanhope PLC
Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title
STATION HILL
READING
RG1 1LX

Footprint

Scale	1:100	Date	31/01/14
File	3868-T	Checked	KG
Sheet Number	7 OF 10	Job No.	3868

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Drawing No. 3868-T
Rev. -

A0 1:1

STANDARD ABBREVIATIONS

B	BOLLARD	MM	MARKER
BB	BELISHA BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTC	BRITISH TELECOM IC	PFC	PANEL FENCE–CONC
BW	BRICK/BLOCK WALL	PFW	PANEL FENCE–WOOD
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	(R)	FROM RECORDS
CP	CAT POST	RE	RAILINGS
CON	CONC CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SA	SOIL & VENT
CTV	CABLE TV IC (VS)(g)(DS)LAP/DATED	SD	SLOPING CEILING
DRN	DRAIN	Sk(), Sk1	SKYLIGHT
DRN	DRY/SEWER	SL	SLOPE LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
EB	ELEC. BOX/TRANSFORM	ST	STEPS
EJB	ELEC. JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
FB	FLOWER BED	TC	TELEPHONE CABLE
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
FL	FLOOR LEVEL	TP	TELEPHONE POLE
FP	FLAG POLE	TPV	TACTILE PAVING
G	GRATE	TS	TRAFFIC SIGN
GV	GAS VALVE	U/S()	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
IB	ILLUMINATED BOLLARD	WC	WATER CLOSET
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
LP	LAMP POST		
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (Bottom–Top)

GLASS SYMBOL (Elevations)

STN 2 SURVEY STATION

+ 28.34 SPOT LEVEL

CLEARANCE HEIGHT & TAG

FS 1.00 FLOOR TO SILL HIGHT
SH 1.50 SILL TO HEAD HEIGHT

BA 1.50 FLOOR TO BOTTOM OF ARCH
TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction

WATER

GAS

Caution: Tracing of uPVC Gas Pipes Not possible, Can Lines May Have Also Been Shown From Utility Records ONLY.

ELECTRICITY

TELECOM

CABLE TV

UNDERGROUND CHAMBER

Note:
All Pipe sizes in millimeters unless stated otherwise

CAUTIONARY NOTES

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General Notes

S1	S2	S3
S4	S5	S6
S7	S8	
S9	S10	

Co-ordinate System
This survey is produced on:
Localised version of Ordnance Survey grid

Survey Accuracy

Bench Mark Details
Levels are related to:
Levels are generated from GPS measurements & verified by 2 local benchmarks,
1st on No.29 Friar St June Merchants Place W face SW end
2nd on projecting bracket Greyfriars Ch SE face S eng.

Date	By	Revision Details

Client
Stanhope PLC
Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title
STATION HILL
READING
RG1 1LX

Footprint

Scale	1:100	Date	31/01/14
File	3868-T	Checked	PD
Sheet Number	8 OF 10	Job No.	3868

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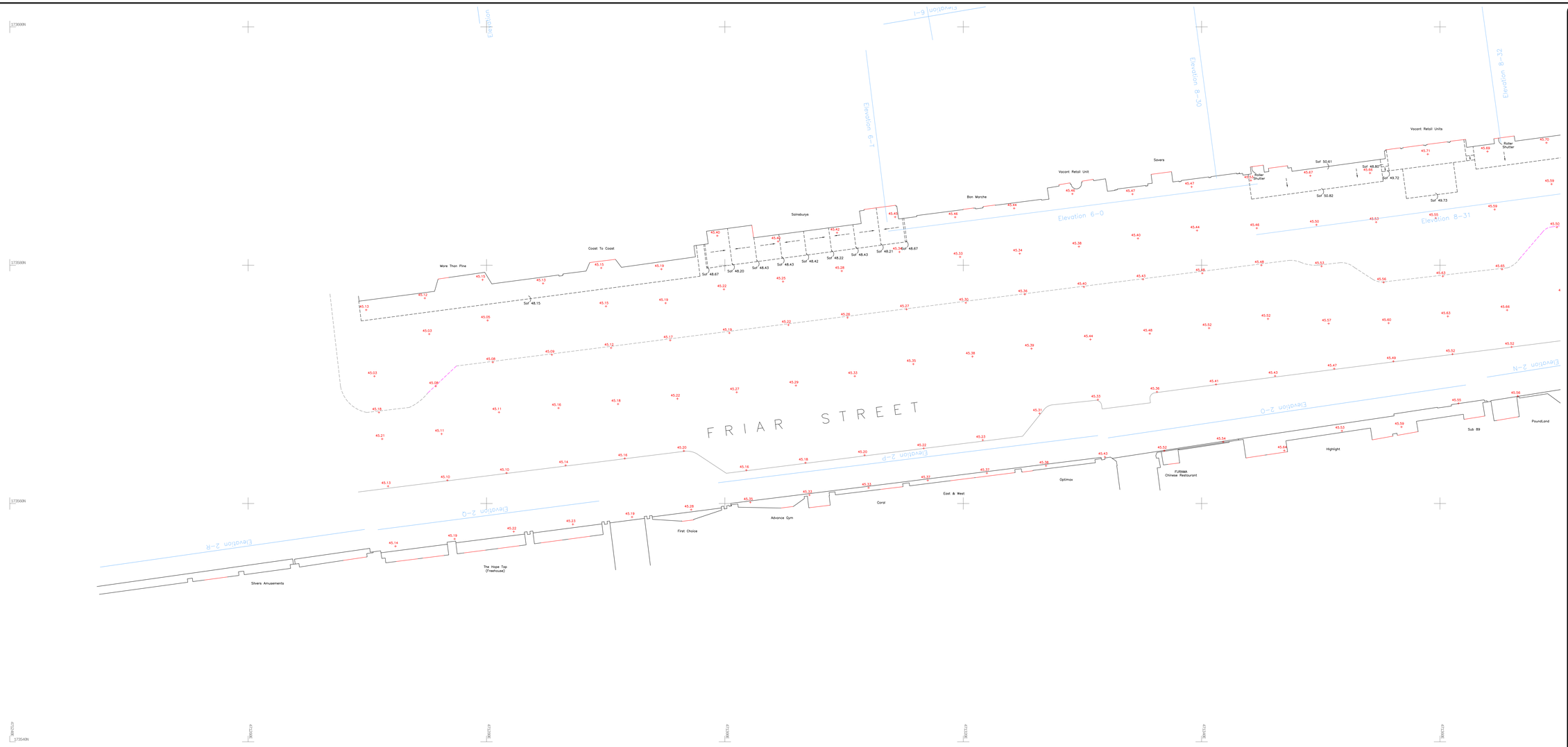
Rev. -

A0 +1



STANDARD ABBREVIATIONS

B	BOLLARD	MM	MARKER
BB	BELISHA BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTC	BRITISH TELECOM IC	PFC	PANEL FENCE-CONC
CBF	CLOSE BOARD FENCE	PFW	PANEL FENCE-WOOD
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	(R)	FROM RECORDS
CO	CLEAN OUT	RE	RAILINGS
CONC	CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SB	SOIL BOARD
CRTV	CABLE TV IC	SD	SLOPING CEILING
	(Vdg/2ØLAPDATED	Sk(),	Skylight
DRN	DRUSEDI	SL	SUMP LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
EB	ELEC.-BOLLARD	SP	SPOT
EJB	ELEC.-JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
F	FENCE LINE	TB	TELEPHONE BOX
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
FL	FLOOR LEVEL	TP	TELEPHONE POLE
FP	FLAG POLE	TPV	TACTILE PAVING
G	GULLY	TR	TREE/BUSH
GV	GAS VALVE	(UL)	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
IB	ILLUMINATED BOLLARD	W	WELL
IC	ILLUMINATION COVER	WA	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
LP	LAMP POST		
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (Bottom-Top)

GLASS SYMBOL (Elevations)

STN 2 SURVEY STATION

+ 28.34 SPOT LEVEL

CL CLEARANCE HEIGHT & TAG

FS 1.00 FLOOR TO SILL HIGHT
SH 1.50 SILL TO HEAD HEIGHT

BA 1.90 FLOOR TO BOTTOM OF ARCH
TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction

WATER

GAS

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ELECTRICITY

TELECOM

CABLE TV

UNDERGROUND CHAMBER

Note:
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General Notes

S1	S2	S3
S4	S5	S6
S7	S8	
S9	S10	

Co-ordinate System
This survey is produced on:
Localised version of Ordnance Survey grid

Survey Accuracy

Bench Mark Details
Levels are related to:
Levels are generated from GPS measurements & verified to OS BM 2nd on No.29 Friar St. corner Merchants Place W face DR. orng.
2nd on projecting bracket Greyfriars Ch SE face S orng.

Date	By	Revision Details

Client
Stanhope PLC
Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title
STATION HILL
READING
RG1 1LX

Footprint

Scale	1:100	Date	31/01/14
File	3868-T	Checked	AG
To Sheet Number	9 OF 10	Job No.	3868

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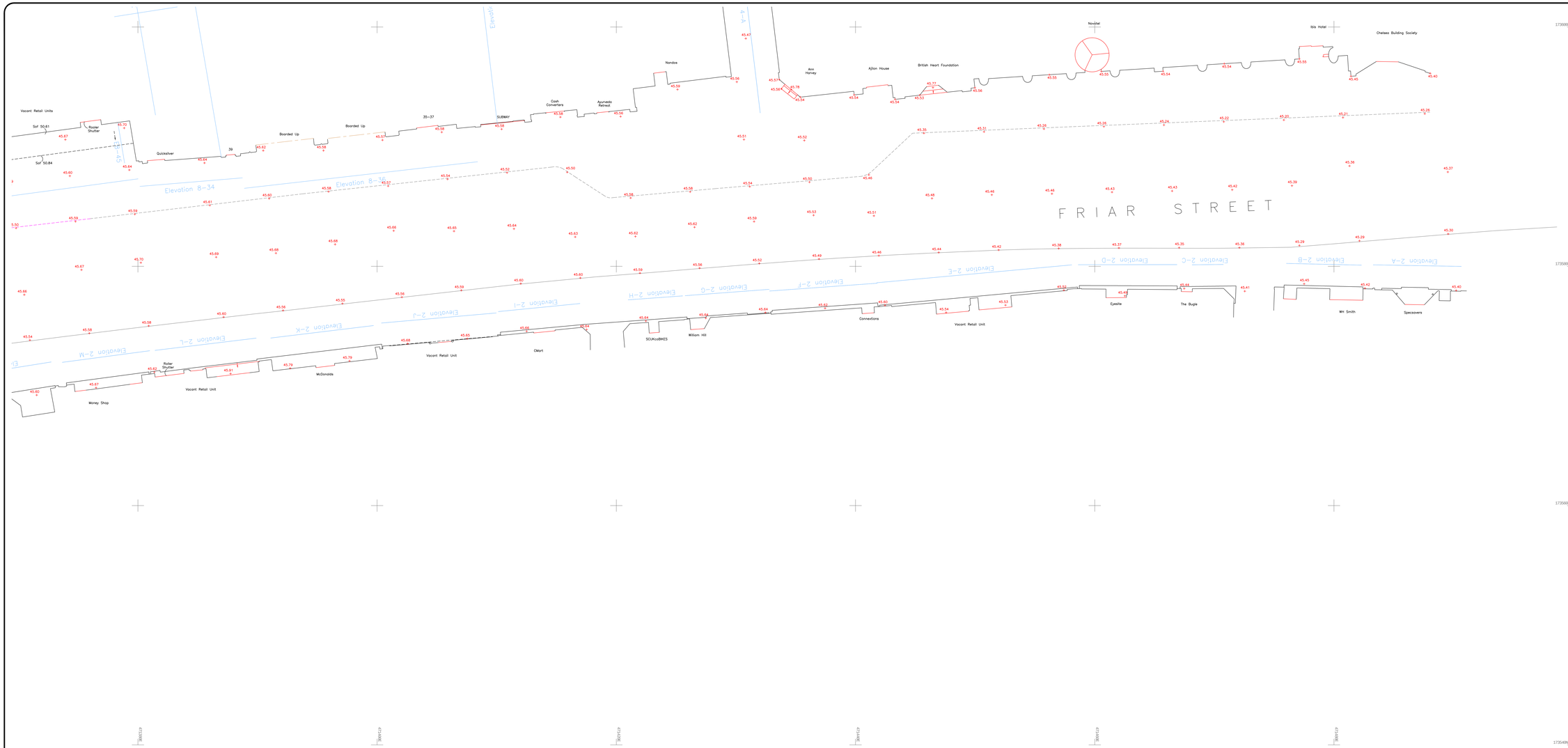

STANDARD ABBREVIATIONS

B	BOLLARD	MM	MARKER
BB	BELISHA BEACON	OBF	OPEN BOARDED FENCE
BP	BRICK PAVING	OH	OVERHANG
BS	BUS STOP	P	POST/POLE
BTC	BRITISH TELECOM IC	PFC	PANEL FENCE-CONC
BW	BRICK/BLOCK WALL	PFT	PANEL FENCE-TIMB
CBF	CLOSE BOARD FENCE	PL	PAVEMENT LIGHT
CL	COVER LEVEL	PRF	POST & RAIL FENCE
CLF	CHAIN LINK FENCE	PWF	POST & WIRE FENCE
CM	CABLE MARKER	(R)	FROM RECORDS
CP	CAT POST	RE	RAIL END
CONC	CONCRETE	RTW	RETAINING WALL
CP	CATCH PIT	RWP	RAIN WATER PIPE
CPS	CONCRETE PAVING SLAB	SC	SCRIBED
CATV	CABLE TV IC	SD	SUSPENDED CEILING
(dup)2SLAPDATED		Sk(),	SkylIght
DRN	DRILLHEAD	SL	SLOPE LEVEL
DK	DROPPED KERB	SO	SMOKE OUTLET
DW	DOUBLE WIDE DOOR	ST	STEPS
EJB	ELEC JUNCTION BOX	SV	STOP VALVE
EP	ELECTRICITY POLE	SVP	SOIL VENT PIPE
FB	FLOWER BED	TC	TELEPHONE CABLE
FB	FLOWER BED	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TL	TRAFFIC LIGHT
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G	GULLY	TR	TREE/SHRUB
GV	GAS VALVE	(UL)	UNABLE TO LIFT
HT	HEIGHT	VP	VENT PIPE
IB	ILLUMINATED BOLLARD	W	WINDOW
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASH OUT
IRF	IRON RAILING FENCE	WV	WATER VALVE
KO	KERB OUTLET	Susp	SUSPENDED CEILING
LP	LAMP POST		
LP	LAMP POST		
M	MERCURY IC		
MH	MAN HOLE		

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (Bottom-Top)

GLASS SYMBOL (Elevations)

STN 2 SURVEY STATION

28.34 SPOT LEVEL

CLEARANCE HEIGHT & TAG

FS 1.00 FLOOR TO SILL HIGHT
SH 1.50 SILL TO HEAD HEIGHT

BA 1.50 FLOOR TO BOTTOM OF ARCH
TA 2.50 FLOOR TO TOP OF ARCH

SERVICE TRACING LEGEND AND NOTES

DRAINAGE & Flow Direction

WATER

GAS

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ELECTRICITY

TELECOM

CABLE TV

UNDERGROUND CHAMBER

Note:
All Pipe sizes in millimeters unless stated otherwise

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1st on No.29 Friar St June Merchants Place W face S/W arrow
and on projecting bracket Greyfriars Ch SE face S arrow

Date	By	Revision Details

Client
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Norfolk House
31 St James Square
LONDON
SW1Y 4JJ

Title
STATION HILL
READING
RG1 1LX

Footprint

Scale 1:100	Date 31/01/14
File 3868-T	Checked KD AO **
Sheet Number 10 OF 10	Job No. 3868

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APPENDIX E

LEGISLATIVE CONTEXT

Intended for

Project no.

Date
01 May 2016

LEGISLATIVE CONTEXT AND METHODOLOGIES

GROUND CONTAMINATION

1. LEGISLATIVE CONTEXT

1.1.1. England

The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the Environmental Protection Act 1990 (EPA), as inserted by S.57 of The Environment Act 1995 and came into effect in England on 1st April 2000 as The Contaminated Land (England) Regulations 2000 (SI 2000/227). These regulations were subsequently revoked with the provision of The Contaminated Land (England) Regulations 2006 (SI 2006/1380) (as amended), which came into force in August 2006, and consolidated the previous regulations and amendments. Revised statutory guidance ("the Guidance") for local authorities on how to implement the regime, including the decision-making process on whether land is contaminated land in the legal sense, has been published by Defra and entered into force in April 2012.

Under Part 2A of the EPA Section 78A(2), "contaminated land" is defined as "land which appears… 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 waters is being caused, or there is a significant possibility of such pollution being caused".

1.1.2. Wales

The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the Environmental Protection Act 1990 (EPA), as inserted by S.57 of The Environment Act 1995 and came into effect in Wales on 1st July 2001 as The Contaminated Land (Wales) Regulations 2001 (WSI 2001/2197, W.157). These regulations were subsequently revoked with the provision of The Contaminated Land (Wales) Regulations 2006 (SI 2006/2989 W.278), which consolidated the previous regulations and amendments and added in provisions regarding radioactive contaminated land. These regulations came into force on 10th December 2006 and were accompanied by statutory guidance published by the Welsh Assembly Government in December 2006 ('the Guidance') for local authorities on how to implement the regime. The 2006 statutory guidance was replaced by the Contaminated Land Statutory Guidance - 2012 (WG19243), issued by the Welsh Government.

Under Part 2A of the EPA Section 78A(2), "contaminated land" is defined as "land which appears… 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) pollution of controlled waters is being, or is likely to be caused" (Section 86 of the Water Act 2003 remains only partially implemented in Wales).

1.1.3. Scotland

The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the Environmental Protection Act 1990 (EPA), as inserted by S.57 of The Environment Act 1995 and came into effect in Scotland on 14th July 2000 as The Contaminated Land (Scotland) Regulations 2000 (SSI 2000/ 178). These regulations were subsequently revoked with the provision of The Contaminated Land (Scotland) Regulations 2005 (SSI 2005 /658), which came into force in April 2006 and consolidated the previous regulations and amendments and were accompanied by statutory guidance published by

the Scottish Government in May 2006 ('the Guidance') for local authorities on how to implement the regime.

Under Part 2A of the Environmental Protection Act 1990, "contaminated land" is defined in the Contaminated Land (Scotland) Regulations 2005 (as amended) as land which appears to the local authority to be in such a condition, by reason of substances in, on or under the land, that:

a) significant harm is being caused, or there is a significant possibility of such harm being caused; or

b) significant pollution of the water environment is being caused or there is a significant possibility of such pollution being caused.

1.1.4. Northern Ireland

The regime for Contaminated Land in Northern Ireland was set out in the Waste and Contaminated Land (Northern Ireland) Order 1997 (as amended). Part 3 of the Waste and Contaminated Land (Northern Ireland) Order 1997 contains the main legal provisions for the introduction of a contaminated land regime in Northern Ireland, but the regime is not yet in operation. It is noted that the Contaminated Land (Northern Ireland) Regulations 2006 and associated statutory guidance were published in draft for consultation in 2006, but have yet to be finalised. Under Part 3 of the 1997 Order, contaminated land is defined as,

"any land which appears to a district council in whose district it is situated to be in such a condition, by reason of substances in, on or under the land, that -

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) pollution of waterways or underground strata is being, or is likely to be, caused.

"Significant harm" is defined in the draft guidance on risk based criteria and must be the result of a "pollutant linkage", which may be assessed using qualitative risk assessment models. The presence of a pollutant linkage relies on the Source-Pathway-Receptor concept, where all three factors must be present and potentially or actually linked for a potential risk to exist.

1.1.5. The Channel Islands

There is no formal contaminated land regime in the Channel Islands, as they are not part of the UK, and as such they usually adopt either the English or French legislation or create their own.

1.1.6. Isle of Man

There is no formal contaminated land regime in the Isle of Man, and they usually adopt a best 'practice approach' from a European country of choice on this basis.

1.1.7. Risk assessment Framework

"Significant harm" or "significant pollution of controlled waters" is defined in the Guidance on risk based criteria and must be the result of one or more relevant 'contaminant linkages' relating to the land.

The presence of a contaminant linkage relies on the Source-Pathway-Receptor concept, where all three factors must be present and potentially or actually linked for a potential risk to exist. For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- A source - a substance that is capable of causing pollution or harm;
- A receptor - something which could be adversely affected by the contaminant; and

- A pathway - a route by which the contaminant can reach the receptor.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

The Environment Agency Contaminated Land Report CLR 11 Model Procedures for the Management of Land Contamination provides the technical framework for structured decision making about land contamination. CLR 11 advocates a phased approach to risk assessment comprising:

- Preliminary Risk Assessment (PRA) – desk study and qualitative assessment
- Generic Quantitative Risk Assessment (GQRA) – assessment of contaminant concentrations against generic assessment criteria.
- Detailed Quantitative Risk Assessment (DQRA) – detailed site specific risk assessment and development of site-specific assessment criteria.

Each of these phases follows the same basic steps buts adds site specific details and further certainty into the assessment as the stages progress. The basic steps are:

- Hazard identification and hazard assessment – development or refinement of the source-pathway-receptor conceptual model, and identification of potential pollutant linkages.
- Risk Estimation – qualitative risk estimation predicting magnitude and probability of potential consequences that may arise as a result of a hazard.
- Risk Evaluation – deciding whether a risk is unacceptable.

2. RISK ESTIMATION

An assessment of environmental risks is made for each potential pollutant linkage identified.

Risk estimation has been completed in accordance with the guidance provided in:

- NHBC and Environment Agency 2008. Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D Publication 66: 2008.

The following is taken directly from NHBC/EA 2008. The key to the classification is that the designation of risk is based upon the consideration of both:

a) the magnitude of the potential consequence (*i.e.*, severity) [takes into account both the potential severity of the hazard and the sensitivity of the receptor];

b) the magnitude of probability (*i.e.*, likelihood) [takes into account both the presence of the hazard and receptor and the integrity of the pathway].

Table 1: Classification of Consequence (after NHBC/EA 2008)

Category	Definition
Severe	Highly elevated concentrations **likely** to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to EA **Category 1** pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to **EA Category 2** pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.
Mild	Exposure to human health **unlikely** to lead to "significant harm". Equivalent to **EA Category 3** pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population. Minor damage to crops, buildings or property.
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.

* For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned.

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given below.

Table 2: Classification of Probability (after NHBC/EA 2008)

Category	Definition
High Likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low Likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix in order to give a level of risk for each potential hazard.

Table 3: The Classification of Risk (after NHBC/EA 2008)

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**	**Very high**	High	Moderate	Low
	Likely	High	Moderate	Moderate/ Low	Low
	Low Likelihood	Moderate	Moderate/ Low	Low	Very low
	Unlikely	Moderate/ Low	Low	Very low	Very low

Very high risk

There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.

High risk

Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.

Moderate risk

It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.

Low risk

It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.

Very low risk

It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.

No potential risk

There is no potential risk if no pollution linkage has been established.

3. GQRA METHODOLOGIES

In order to assess the significance of the chemical concentrations recorded, generic assessment criteria (GAC) must be selected. The GAC are screening concentrations which are used initially for direct comparison to the measured site concentrations.

The GAC are defined based on the critical receptors identified at the site. Receptors are considered in relation to:

- Human health receptors (*e.g.*, site users);
- The water environment (*e.g.*, groundwater and surface water).

Potential risks to human health are considered primarily using measured concentrations of chemicals in soil. Potential risks to the water environment are considered primarily using soil leachate and groundwater concentrations as indicative of the potentially mobile fraction of any soil impact.

Additional receptors may be relevant dependent on the site *e.g.*, flora/fauna, water supply pipes, buried concrete.

3.1. Human Health Assessment

3.1.1. Initial Screening Assessment

In accordance with current UK guidance on legislation including Part 2A of the Environmental Protection Act 1990 and based on the principles of risk assessment, Ramboll Environ (REH) has derived generic assessment criteria (GAC) for interpretation of soil and groundwater chemical analysis. The Ramboll Environ GAC are considered to be threshold based screening concentrations, at which a significant risk is not considered to be present to the relevant receptors.

The Ramboll Environ REH GAC for soil assessment are based on the generic scenarios outlined in the Contaminated Land Exposure Assessment (CLEA) methodology and guidance documents (incorporating Science Reports SC050021/SR2 (January 2009), SR3 (January 2009), SR4 (September 2009) and the SGV reports (2009)). The generic scenarios include inhalation, ingestion, dermal contact of soil and dust as pathways for commercial and residential scenarios; as well as ingestion of homegrown produce for residential with gardens scenario. In addition, REH GAC have also been derived for the two Public Open Space land uses defined in C4SL guidance (outlined below).

The GAC have been calculated by use of two proprietary risk assessment models (CLEA Version 1.071 and the American Society for Testing Materials Risk Based Corrective Action RBCA Tool Kit Version 2.6 for Chemical Releases) which have been altered, where necessary, to reflect the current UK approach to human health risk assessment as set out in the Contaminated Land Report (CLR) 11 and the CLEA guidance documents. The physiochemical data has been taken from or derived using the methodology detailed in SR7 (November 2008) and SGV reports (2009), where feasible. The toxicology data has been taken from the current published EA toxicology documents. We have referred to all current publications and guidance issued up until 1st May 2016.

Reference has been made to the Defra-funded research project (SP1010), which developed a methodology to derive Category 4 Screening Levels (C4SLs) for six contaminants (benzo-a-pyrene, cadmium, arsenic, benzene, hexavalent chromium and lead). SP1010 provides technical tools and advice to be developed to help regulators and others to conform to the requirements of revised Part 2A Statutory Guidance. The C4SLs are therefore less conservative than GAC developed in accordance with published CLEA guidance as they describe a low risk as opposed to minimal risk scenario. However,

consistent with the developed GAC, sites below the C4SLs are within Category 4 (lowest risk category) and therefore considered suitable for use.

Defra's SP1010 Policy Companion document (DEFRA, Dec 2014) states that where a C4SL value has been derived for a contaminant where a Soil Guideline Value (as published by the EA 2009) exists, it is anticipated that risk assessors will use the C4SL value in line with Part 2A Statutory Guidance. In the absence of a suitable C4SL, risk assessors should identify and select appropriate GAC in accordance with established good practice. On this basis, Ramboll Environ has adopted the use of C4SLs however minimal risk assumptions have been applied in-house REH GAC for other contaminants of concern within our screening assessments.

The C4SLs for the six compounds published, are based on a sandy loam soil with 6% soil organic matter (SOM). The 6% SOM and sandy loam soil type is not considered by Ramboll Environ to be realistic of 'typical' UK soil conditions, and EA guidance ('Using Soil Guideline Values' EA, 2009) states that at 6% SOM, GAC may not be sufficiently protective (i.e. the values are too high to be sufficiently certain that they describe land where there is no risk to human health or the risk is negligible). For the Ramboll Environ GAC, all the C4SL inputs have been used apart from the SOM and soil type, which were amended to 1% and sand; thereby ensuring a suitably conservative Ramboll Environ GAC appropriate for most soils and Made Ground encountered in the UK. It is noted that none of the screening criteria used in the UK, including the C4SLs, have a statutory basis.

Ramboll Environ also attended the Land Quality Management and Chartered Institute of Environmental Health workshop for the collaborative development of 'Suitable 4 Use Levels' (S4ULs) and reference has been made to their publication 'The LQM/CIEH S4ULs for Human Health Risk Assessment, 2015'.

Review of additional UK organisation guidance including Contaminated Land: Applications in Real Environments (CL:AIRE) and partners GAC, including addendums up until 10 April 2012 has also been made. Soil Guideline Values (EA/DEFRA, 2009) may also be referred to if relevant. Finally, where necessary, other published sources of (non-UK) information, such as the RBCA V2.6 database has also been reviewed.

Contaminant concentrations below the adopted GAC are not considered to present a significant risk to identified receptors and therefore are not considered to warrant further study. Contaminants which are recorded at concentrations above their respective GAC are considered to present a potential risk to identified receptors and resultantly these determinants are subject to further assessment.

3.1.2. Contaminant Distribution Assessment

Concentrations above the GAC are considered further in relation to vertical and lateral distribution across the site and through statistical analysis, where appropriate. This analysis is used to define 'averaging areas' within which contamination concentrations and distribution are considered likely to be similar.

For each averaging area, where appropriate, statistical analysis is then used to calculate a 'representative' concentration for each contaminant within that area and identify possible outliers of the underlying distribution of contaminant concentrations. This analysis is completed in accordance with CIEH 2008 guidance.

The initial statistical tests are used to calculate the 95% probability that the true population mean falls below the critical concentration (GAC). In practise, this involves comparing the 95th Upper Confidence Limit of the true population mean with the GAC. The Maximum Value test is then used to identify whether the maximum concentration is likely to lie outside of the assumed distribution trend and as such would represent an outlier of the general population of data across the site. Outliers above the GAC may represent localised contaminant hotspots and require further consideration.

Constituent non-detects are conservatively assigned a value equal to the reported analytical laboratory limit of detection. Any identified true outliers are excluded from the datasets used in calculation of the 95%UCL value.

3.2. Assessment for the Water Environment

Assessment of risks to water resources is completed in general accordance with guidance provided in the Environment Agency 2013, Groundwater Protection Principles and Practice (GP3) for England and Wales and with reference to SEPA guidance WAT–PS-10-01 in Scotland.

Generic assessment criteria for waters must be selected to assess potential risks to the identified environmental receptors.

In the absence of relevant published water assessment criteria, the potential risk to human health from contaminated surface and groundwater and the potential risk to the aquatic environment from entry of pollutants (either directly or via a groundwater pathway) has been assessed using commonly accepted UK guidelines including the Water Supply (Water Quality) (England) Regulations 2000 (known as the Drinking Water Standards, or DWS) and the Environmental Quality Standards (EQS) defined in European legislation such as the Water Framework Directive (WFD) (2000/60/EC).

Minimum reporting values are also considered for hazardous substances for assessment of risks to groundwater resources in order to comply with the requirements of the guidance to 'prevent' input of hazardous substances to groundwater.

4. GROUND GAS RISK ASSESSMENT

Ground gas risk is characterised using guidance provided in the following:

- CIRIA C665, 2007. Assessing risks posed by hazardous ground gases to buildings. (Supersedes CIRIA 659).
- NHBC / RSK, 2007. Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present. Report Ed 4.
- BS8485: 2015 Code of practice for the characterization and remediation from ground gas in affected developments.
- BS8576:2013. Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)

The risk posed by a gas regime is assessed initially by calculating a Gas Screening Value using a combination of the gas flow rate and recorded concentrations of carbon dioxide and methane. This Gas Screening Value is then used in combination with the maximum recorded gas concentrations to determine the site's Characteristic Situation (CIRIA 665 – all site uses except low rise residential) or Traffic Light Classification (NHBC/RSK 2007 low rise residential sites only). Table A below outlines the method for defining the Characteristic Situation as detailed in CIRIA 665 and Table B outlines the method for defining the Traffic Light classification as detailed in NHBC/RSK 2007.

Table A: Proposed method for classifying gassing sites (after CIRIA C665 2007)

Characteristic Situation	Risk classification	Gas screening value of CH_4 or CO_2 (l/hr)[a]	Additional limiting factors	Typical source of generation
1	Very low risk	<0.07	Typically methane ≤ 1% and/or carbon dioxide ≤ 5%. Otherwise consider increase to Situation 2	Natural soils with low organic content. "Typical" Made Ground
2	Low risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to Characteristic Situation 3	Natural soil, high peat/organic content. "Typical" Made Ground
3	Moderate risk	<3.5	-	Old landfill, inert waste, mineworking flooded
4	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures	Mineworking -susceptible to flooding, completed landfill, inert waste (WMP 26B criteria)
5	High risk	<70	-	Mineworking unflooded inactive with shallow workings near surface
6	Very high risk	>70	-	Recent landfill site

[a] Gas screening value = gas concentration (%) x measured borehole flow rate (l/hr)

Table B: Proposed method for classifying gassing sites (after NHBC/RSK 2007)

Traffic Light	Methane1		Carbon Dioxide1	
	Typical Maximum Concentration5 (%v/v)	Gas Screening Value (GSV)2,4,6 litres per hour	Typical Maximum Concentration5	Gas Screening Value (GSV)2,3,4,5

			(%v/v)	litres per hour
Green				
Amber 1	1	0.16	5	0.78
Amber 2	5	0.63	10	1.56
Red	20	1.56	30	3.13

The CIRIA, NHBC and BS8485 guidance documents are then used to determine requirements for gas protection measures based on the site classification.

5. WATER SUPPLY PIPES

The assessment has been completed in accordance with the current UK guidance:

- Water UK. Jan 2014. Contaminated Land Assessment Guidance.
- UKWIR UK Water Industry Research Ltd, 2010. Guidance for Selection of Water Supply Pipes to be used in Brownfield Sites.

This guidance provides threshold concentrations for different pipe material for various chemical groups.

The pipeline materials considered by the guidance are PE, PVC, wrapped steel, wrapped ductile iron or copper pipe and barrier pipe. PE and PVC are assessed using threshold concentrations for various chemical groups including volatile organic compounds (VOC) with tentatively identified compounds (TICs), semi-volatile organic compounds (SVOC) with TICs, and mineral oils. Wrapped steel, wrapped ductile iron and copper pipe are assessed using corrosive properties.

Regional water companies may have adopted additional more stringent thresholds which they apply locally, thus consultation with the water authority must always be completed prior to final determination of water supply pipe materials.

6. WASTE CLASSIFICATION

The main steps in classifying waste are:

1. Is it really a waste or can it be reused, recycled or recovered?
2. If the material is not to be utilised in some way and it is waste then classify to ascertain if hazardous or non-hazardous. In order to do this, guidance regarding the definition and classification of hazardous waste is utilised, the two main documents being EA, 2015 'Technical Guidance WM3: Waste Classification - Guidance on the classification and assessment of waste' and the European Waste Catalogue (EWC 2002).
3. Use the results of this initial waste classification to follow one of the following routes:

<table>
<tr><th colspan="3">Hazardous</th><th colspan="2">Non-Hazardous</th><th></th></tr>
<tr><td colspan="3">Pre-treat the waste.</td><td colspan="2">Thought likely to be inert:
(e.g. insoluble and inorganic in nature)</td><td>Thought unlikely to be inert:
(e.g. may contain peat or other high organic content material)</td></tr>
<tr><td colspan="3">Complete WAC (Waste Acceptance Criteria) testing to determine class of landfill it can go to or any requirement for further pre-treatment if WAC fails.</td><td colspan="2">Complete WAC test to determine class of landfill it can be disposed to</td><td>-</td></tr>
<tr><td>Pass stable non-reactive hazardous WAC: dispose of at SNRHW landfill.</td><td>Pass hazardous WAC: dispose of at hazardous landfill.</td><td>Fail: further remedial action required</td><td>Pass: dispose of at inert landfill</td><td>Fail: dispose of at non-hazardous landfill</td><td>Dispose to non-hazardous landfill (no WAC testing required by WM3).</td></tr>
</table>

The landfill regulations (Environment Agency, 2011 Treatment of Waste for Landfill) prescribe that hazardous waste requires pre-treatment prior to disposal to landfill. This may include physical sorting at the point of production on site, by sorting of waste soils into separate stockpiles of eg topsoil, made ground and natural gravels.

6.1. Methodology

In terms of the EWC, the soil to be excavated from this site for disposal is classed as 'Soil and Stones containing Dangerous Substances' (EWC Code 170503) or 'Soil and Stones other than those mentioned in EWC Code 170503' (EWC Code 170504). As such it is what is known as a 'Mirror Entry waste' and needs to be assessed against Threshold Levels for certain dangerous substances in order to confirm whether it needs to be classified as hazardous (170503) or non-hazardous (170504).

Data from site soil chemical testing have been assessed to classify the site soils. The assessment has been undertaken using HazWasteOnline ™, a web-based tool for classifying waste. The software utilises Environment Agency guidance and European regulations to classify samples in line with current requirements.

The assessment provided in this report fulfils the requirement of step 2 above, and allows classification of the site soils and hazardous or non-hazardous.

Asbestos: The Hazardous Waste (England and Wales) Regulations 2005 requires that any waste having an asbestos content greater than 0.1% weight/weight (w/w) be classified as Hazardous Waste. Any waste with an asbestos content of less than 0.1% w/w can be classified as non-hazardous waste, unless there are other contaminants present which would make the waste hazardous.

Where fibrous asbestos is present at concentrations greater than 0.001%, these can be considered to pose a risk to human health and must be dealt with as hazardous soils for disposal purposes.

Where the asbestos is deemed to be of a fibrous nature the Health and Safety Executive (HSE) require that the handling of the material is undertaken by a suitably licensed company. The Carriage of Dangerous Goods (etc.) Regulations 2009 (CDG2009) applies in this instance.

APPENDIX 2
GROUND INVESTIGATION REPORT

Intended for
Lincoln MGT

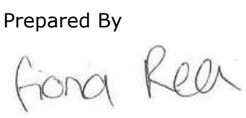
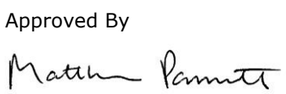
Project no.
1620004716

Date
July 2020

STATION HILL, NORTH SITE, READING

GROUND INVESTIGATION REPORT

Revision	Date	Status	Document Ref.	Comments
I01	19/08/2019	Draft	SHR-RAM-NB-XX-RP-G-000022	Awaiting Final Gas and Groundwater Monitoring Results
I02	30/08/2019	Issue	SHR-RAM-NB-XX-RP-G-000022	First Issue
I03	12/12/2019	Issue	SHR-RAM-NB-XX-RP-G-000022	Development description amended
I04	15/07/2020	Issue	SHR-RAM-NB-XX-RP-G-000022	Additional groundwater sampling results included

Prepared By	Reviewed By	Approved By
		
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APPENDIX

Appendix 1 – Data Plots from SI
Appendix 2 – GEL Factual Report, Ref: 35248

Scope	
Brief	Ramboll was instructed to produce a combined Geotechnical and Geo-Environmental Ground Investigation Report (GIR) for Lincoln MGT (the Client) to support the proposed development at Station Hill, Reading. The Station Hill project is a combined office and residential development, located directly opposite Reading train station, occupying approximately 2.6 hectares. The development site has been split into two; the North Site and the South Site, separated by Garrard Street. This report covers the North Site only. The GIR for the South Site was issued in April 2019. This report contains: a contaminated land risk assessment for the proposed mixed commercial and residential end use; and geotechnical interpretation of the factual data obtained during the recent ground investigation to inform the design and provide Geotechnical Design Parameters required for the proposed foundation design solutions.
Proposed Development	The planning application for the site includes for the demolition of all previous buildings to allow for the construction of a mixed-use, sustainable development, offering new homes, a hotel, flexible high-tech office space, along with central open community space. The North Site master plan currently comprises a site wide podium and five building plots, split into two development phases: • Phase 3 comprises Block A, B and D (residential) and Block C (commercial) in the western part of the site. • Phase 2 comprises Block G in the eastern part of the site (commercial). • Phase 1 of the development is classed as Station Hill South Site and is discussed in a separate report.

Site Information	
Grid Ref	Approximately centred on 471370, 173710.
Current Site Description	The site is located in central Reading, bound by Station Hill and Reading train station to the north and east, Garrard Street and the Station Hill South Site to the south and Greyfriars Road to the west. The site formerly comprised four main buildings: an office building in the west (Xafinity House), a ballroom turned bingo hall and bus station in the centre, Western Tower in the north east, and a multi-storey carpark in the south east. The former ballroom/bingo hall, bus station and Western Tower buildings were demolished prior to the ground investigation. Crushed demolition material from these buildings has been used as ground cover across the former building footprints. The office building, Xafinity House, in the west and the multi-storey carpark are still in situ and are set to be demolished at a later stage. Several services run beneath the site including a Thames Water foul sewer that runs east to west across the centre of the North Site. Substations are present in the north west corner of the site and a substation and a radio mast are located along the southern boundary of the site, adjacent to Garrard Street.
Site History	Historical maps date back to 1879, when the north site was predominantly fields, with a timber yard in the north west corner and terraced housing to the south of this. Livery stables were located in the far north-east of the site and extended further off-site to the east. Railway lines and Reading train station were shown to the north, with an embankment along the northern boundary indicating that the site level was lower than that of the rail land to the north. Mapping from 1900 to 1913 showed a large circular feature potentially a pond or lake covering the majority of the Station Hill North Site, with some buildings in the west along Greyfriars Road. By 1957, a large garage was located in the south east of the North Site. The terraced housing was still present in the south west and a factory in the north west. By 1962, the north of the site was shown to be used for car parking. By 1968, a ballroom had been constructed in the centre of the site, and western tower and associated retail parade in the north east. A bus station was shown in the south west and a furniture factory in the north west. A tank was shown to be present on the north western corner of the garage at this time. By 1973, the garage had been demolished and by 1979, the multi-storey car park had been constructed in its current layout. The terraced housing in the west was also demolished around this time. During the 1990s, the ballroom was classed as a Club and an office building (Xafinity House) was constructed in the west, which is still present today. A site visit undertaken by Watermans in 2013 described the former ballroom / Club as a Mecca Bingo Hall at that time, which Watermans reported contained two tanks and a switch room. By 2019, the former ballroom/bingo hall, Western Tower and the retail parade had been demolished. Xafinity House in the west and the multi-storey carpark in the south east are still present and are set to be demolished at a later stage.

Ground Investigation	
Contract Details	Geotechnical Engineering Limited (GEL) were appointed to undertake a ground investigation on the North Site. The ground investigation was designed and specified by Ramboll and was undertaken between 8th May and 18th June 2019, with part-time supervision by Ramboll. The specification was designed to assess the contamination status of the site, determine and confirm the geological and hydrological regime at site, undertake in situ and laboratory based geotechnical testing of soils to determine Geotechnical Design Parameters for foundation and retaining wall design, and address uncertainty for the mitigation and management of the ground-based risks at the site.
Scope of Works	The ground investigation comprised five deep boreholes, five window sample holes and seven trial pits. In situ testing (SPTs) was carried out and samples were taken from the exploratory holes for subsequent chemical and geotechnical testing. Chemical analysis of soil and groundwater samples were undertaken along with six groundwater and ground gas monitoring visits.
Additional Scope of Works	Two additional groundwater sampling rounds were undertaken on 26th September and 22nd October 2019 by Ramboll to further assess hydrocarbons detected in the groundwater sample taken from BH204 in the southeast corner of the site (adjacent to the NCP carpark). Groundwater samples were taken from BH204, and WS203, which is located to the north west of the NCP carpark (where a former tank was labelled on historical maps) on two additional occasions to assess whether the groundwater contamination was localised and not a wider issue. Hydrocarbons were found to be elevated in BH204 on the subsequent visits but not in WS203 and are therefore considered to be localised.

Ground Conditions	
Geology	The geology comprises Made Ground overlying Alluvium and Taplow Gravels of varying extents, overlying the Upper Chalk formation which comprised Structureless Chalk over Structured Chalk.
Ground Aggressivity	Soil samples were scheduled for chemical analyses to establish the ground aggressivity. Sulphate and pH tests were carried out on soil and groundwater samples. An assessment of the soil data, in accordance with BRE Special Digest 1 (BRE, 2005) suggests a Design Sulphate Class of DS-2 and the Aggressive Chemical Environment for Concrete (ACEC) Classification is AC-2.
Hydrogeology	The Environment Agency classifies the Made Ground as Unproductive Strata, the Alluvium and Taplow Gravel as Secondary 'A' Aquifers and the Upper Chalk Formation is classified as a Principal Aquifer. Groundwater level data collected during groundwater monitoring visits indicates a groundwater level at approximately to 36.2 m AOD. Ground level varies between 38 and 40m AOD.
Hydrology	The nearest surface water feature is a drainage network approximately 315 m north west of the site, associated with the railway line. Followed by the east flowing River Thames which, at its closest point,

	lies 420 m north east of the site. The River Kennet is located approximately 500 m south of the site and flows in an easterly direction.
Generic Quantitive Risk Assessment	
Asbestos	Four samples identified positive results for asbestos in three out of twenty-two Made Ground samples analysed. Two identifications were reported by the laboratory as chrysotile and three amosite (one sample contained both chrysotile and amosite). These were a mixture of loose fibres and loose fibrous debris. The quantifications ranged between <0.001% and 0.024% w/w, which is not unusual for Made Ground and urban areas. All detections are within the top 0.75 m of Made Ground. Due to the shallow identifications of asbestos, it is anticipated that the majority of this material will be removed from site as part of either the earthworks, foundation excavations and local to Phase 3, the basement excavations. Management of the risk from asbestos to construction workers and the local community during the development works must be considered and managed appropriately. This is beyond the scope of this report.
Soils	Chemical analysis of soil samples was undertaken and screened against Ramboll's Generic Assessment Criteria (GAC) for residential use without plant uptake and for commercial use. Elevated concentrations of lead, PAH and hydrocarbons were identified. These elevated concentrations were further considered by Ramboll's risk assessment. The location of the contaminants are predominantly within areas of the site proposed to be excavated for the basement, or in the areas with a proposed commercial use such that risks would be expected to be mitigated. This is because there is not a complete contaminant – pathway – receptor linkage as explained in this report.
Groundwaters	Seven groundwater samples were obtained and scheduled for analysis complimentary to the soil analytical suite. One location, BH204 (south-east corner of the site by the NCP carpark), detected elevated hydrocarbons above relevant criteria. Two additional rounds of groundwater sampling were undertaken in BH204 and WS203 to further characterise hydrocarbon concentrations in groundwater in this area. The results of the sampling recorded consistently elevated concentrations of hydrocarbons in BH204 across all three monitoring rounds. No detectable hydrocarbons were recorded in WS203. Based on the results of this investigation, the hydrocarbons in BH204 are considered to be localised and not indicative of site wide groundwater contamination. Further assessment of the groundwater in this localised area is recommended following the demolition of the multi-storey car park, during the earthworks stage. i.e. When the ground is accessible.
Ground Gas	Six ground gas monitoring visits were undertaken, and the results of the ground gas assessment classify the site as CIRIA Characteristic Situation 2. CS2 requires passive, development led basic gas protection measures to be incorporated into the building design.
Hydrocarbon Vapours	The photo ionisation detector (PID) readings recorded during the ground investigation and subsequent six monitoring visits identified elevated volatile organic compounds (VOCs). The source of the VOCs is considered to be within the soils, predominantly located in the south-east of the site. Potential risks to site users via inhalation of volatiles may be present in the location of BH204, where the contamination is deeper and will not be excavated (up to 4.50 m depth in the top of the structureless chalk). This depth of impact may mitigate the risks, but further assessment should be undertaken post-demolition, during the excavation works in this area.
Conclusions and Recommendations	

- Further geotechnical investigation is recommended in previously inaccessible areas to confirm the level and composition of the Structured Chalk. Cone penetration testing is likely to be the most efficient method of investigation.
- A number of obstructions were encountered during the Ground Investigation. Further investigation into the location and nature of the existing foundations is recommended in order to reduce the risk of encountering obstructions during the construction phase. It is recommended that preliminary pile testing is undertaken to supplement the Ground Investigation in order to provide an improved understanding of the anticipated pile load performance at the site. This will enable refinement of the pile design, and potential cost savings to the substructure.
- Ramboll recommends that a Materials Management Plan (MMP) is prepared prior to the construction works to manage material being removed from site and/or being reused as part of the pile mat and under hardstanding. Careful management of materials should also be considered with possible remedial actions for efficiency. The results of this investigation will need to be considered, including the contaminants detected.
- Further environmental assessment is recommended in previously inaccessible areas to provide further delineation of hydrocarbon contamination, particularly in the area of the multi-storey car park. This can only be undertaken post demolition. It is likely that this can be dealt with during the environmental watching brief, with additional sampling taken where any visual or olfactory evidence of contamination is encountered.
- During the removal of the concrete slabs, earthworks and enabling works, an environmental watching brief should be implemented with a view to confirming the final site condition and assessing unforeseen ground contamination or structures such as underground tanks. If previously unforeseen contamination is identified the risk assessment should be updated accordingly.
- An Environmental Management Plan (EMP) report is recommended to provide protocols for dealing with unforeseen contamination.

1. INTRODUCTION

1.1. Background

Ramboll was instructed to produce a Geotechnical and Geo-Environmental Ground Investigation Report (GIR) for the proposed development at the Station Hill Site in Reading. The site was subsequently split into two phases, the north and south. This report covers the North Site only. The GIR for the South Site was issued in April 2019 and updated in February 2020 (ref. SHR-RAM-SB-XX-RP-G-000016). The report includes a contaminated land risk assessment and recommendations for the Geotechnical Design Parameters that will be adopted for the substructure design for the proposed development.

1.2. Objectives

The objectives of the Ground Investigation were to assess the ground conditions, geological and hydrogeological conditions, and the potential for soil and/or groundwater contamination that could have resulted from current and historical contaminant sources identified within the Phase 1 Desk Study Report (ref. 1620004716-SHR-RAM-GE-002-Desk Study, 2018).

1.3. Scope of Works

The scope of work, undertaken between 8th May and 18th June 2019, for the North Site investigation comprised:

- seven trial pits to maximum depth 4.5m bgl;
- five window sample holes to a maximum depth of 6m bgl;
- five rotary boreholes;
- gas and groundwater monitoring of all exploratory hole locations installed with monitoring wells on six occasions for ground gas and rest groundwater levels;
- groundwater sampling from all installed boreholes;
- geotechnical laboratory testing of soil samples; and,
  submission of selected soil and groundwater samples to a Ramboll approved MCERTs and UKAS accredited laboratory for analysis for a relevant range of determinands.

In the preparation of this report Ramboll has referred to UK regulatory guidance and methodologies, including, but not limited to: CLR 11 Model Procedures for the Management of Land Contamination; BS 5930:2015 Code of Practice for Site Investigation; and BS 10175:2011 + A2:2017 Code of Practice for the Investigation of Potentially Contaminated Sites.

1.4. Additional Scope of Works

The additional scope of works comprised the groundwater monitoring and sampling of WS203 and BH204 on two occasions on the 26th September and 22nd October 2019.

The additional work was carried out following the results of the first groundwater monitoring round which was undertaken in July 2019 by Ground Engineering Limited (GEL). The monitoring identified elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons (TPHs). As such, additional groundwater sampling was undertaken by Ramboll in September and October 2019 to further characterise the groundwater contamination in this area.

1.5. Previous Relevant Reports

This report should be read in conjunction with the following documentation:

- Ramboll, October 2018, *Geotechnical and Geoenvironmental Desk Study, Station Hill, Reading*, Ref: 1620004761-SHR-RAM-GEB-001-Desk Study;
- *Geotechnical Engineering Limited, February 2019, Factual Report on Ground Investigation, Station Hill, Reading, South Site,* Ref: 34769;
- Ramboll, April 2019, *Ground Investigation Report, Station Hill, Reading, South Site,* Ref: 1620004761-SHR-RAM-SB-XX-RP-G-000016;
- Ramboll, July 2019, *Foundation Works Risk Assessment, Station Hill, Reading, South Site*, Ref: 1620004761-SHR-RAM-SB-XX-RP-ENV-FWRA;
- Ramboll, July 2019, *Environmental Specification, Station Hill, Reading, South Site*, Ref: SHR-RAM-SB-XX-SP-G-000004;
- *Geotechnical Engineering Limited, August 2019, Factual Report on Ground Investigation, Station Hill, Reading*, Ref: 35248;
- Concept, July 2012, *Site Investigation Report, Thames Tower*, Ref: 122460/FR-02; and,
- Waterman, September 2014, *Geo-Environmental and Geotechnical Assessment, Station Hill, Reading,* Ref: EED12350-110-R-3.1.1-RM.

1.6. General Limitations and Reliance

This report has been prepared by Ramboll exclusively for the intended use by the client in accordance with the agreement between Ramboll and the client defining, among others, the purpose, the scope and the terms and conditions for the services. No other warranty, expressed or implied, is made as to the professional advice included in this report or in respect of any matters outside the agreed scope of the services or the purpose for which the report and the associated agreed scope were intended or any other services provided by Ramboll.

In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate, complete and available to Ramboll within the reporting schedule.

Ramboll's services are not intended as legal advice, nor an exhaustive review of site conditions and/or compliance. This report and accompanying documents are initial and intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party, unless formally agreed by Ramboll through that party entering into, at Ramboll's sole discretion, a written reliance agreement.

The site investigation works were undertaken during a discrete period of time. The findings and conclusions presented in this report are accordingly factually limited by these circumstances and, unless stated otherwise in the report, are preliminary. The field investigations were restricted to a level of detail necessary to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant period of time has elapsed since the sampling took place. The interpretation of the geological and environmental quality conditions is based on extrapolation from point-source data in a heterogeneous environment. Accordingly, more detailed investigation may be appropriate dependent upon the client objectives.

2. SITE DESCRIPTION

2.1. Site Description

The site is located in central Reading, bound by Station Hill road and Reading train station to the north and east, Garrard Street and the Station Hill South Site to the south and Greyfriars Road to the west. The site is approximately centred around National Grid Reference 471370, 173710. The site formerly comprised four main buildings; an office building in the west, a bingo hall and adjacent bus station in the centre, Western Tower in the north east and a multi-storey carpark in the south east. The former bingo hall, bus station and Western Tower were demolished prior to the investigation and the crushed demolition material covers the site together with a stockpile in its centre. Ramboll understands that McGees, the demolition Contractor, arranged for the removal of the stockpile of building crush shortly after the ground investigation.

The office building in the west (Xafinity House) is vacant but currently being used as McGees temporary site offices and welfare whilst demolition of the buildings on the Station Hill South Site is undertaken. The multi-storey car park in the south east of the site is currently in use and is set to be demolished at a later stage.

Substations are present in the north west corner of the site, to the north of Xafinity House. A substation is also present in the south of the site adjacent to Garrard Street. A temporary radio mast is also present.

A Thames Water 1250 mm diameter brick foul sewer runs west to east beneath the northern section of the site, at a depth of approximately 4 mbgl, with three 225 mm diameter sewers branching off. Several other services are present, as shown on Figure 1 below.

A high density of services are known to exist in and around the site beneath Greyfriars Road, Garrard Street and Friar Street. An unexpected service was encountered running east to west across the centre of the site during the ground investigation, to the north of the foul sewer, at an approximate depth of 2.20 m bgl.

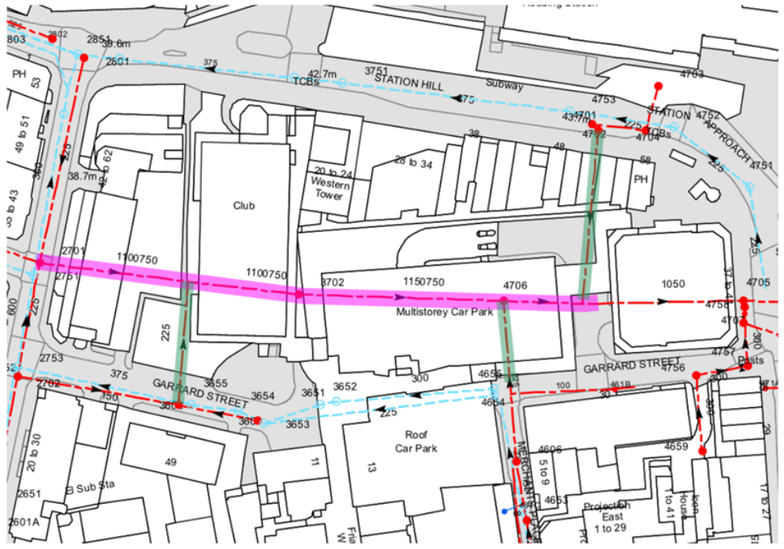

Figure 1 : Map of Thames Water Sewer, Hoare Lea Thames Water Note

2.2. Site History

Historical Ordnance Survey maps were reviewed as part of Ramboll's Phase I Desk Study Report (ref. 1620004716-SHR-RAM-GE-002-Desk Study, 2018) and have been summarised below. An aerial view of the site prior to demolition is shown in Figure 2 below.

Historical maps date back to 1879, when the north site was predominantly fields, with a timber yard in the north west corner and terraced housing to the south of this. Livery stables were located in the far north-east of the site and extending off-site further east. Railway lines and Reading train station were shown to the north, with an embankment along the northern boundary indicating that the site level was lower than that of the rail land to the north.

The 1900 map showed a circular feature potentially a pond or lake covering the centre and majority of the Station Hill north site.

By 1957, a garage was located in the south east of the North Site. The terraced housing was still present in the south west and a factory in the north west. On the 1962 map, the north of the site was shown to be used for car parking. By 1968, a ballroom had been constructed in the centre of the site and western tower and associated retail parade in the north east of the site. A bus station was shown in the south west of the site and a furniture factory in the north west. By 1973, the garage had been demolished and by 1979, the multi-storey car park had been constructed in its place. The terraced housing in the west was also demolished around this time.

During the 1990s, the ballroom was classed as a Club and an office building (Xafinity House) was constructed in the west of the site, which is still present today.

A site visit undertaken by Watermans in 2013 described the former ballroom / Club as a Mecca Bingo Hall at this time, which contained two tanks and a switch room.

By 2019, the former ballroom/bingo hall, Western Tower and the retail parade had been demolished. Xafinity House in the west and the NCP multi-storey car park in the south east are still present on site and are set to be demolished at a later stage.

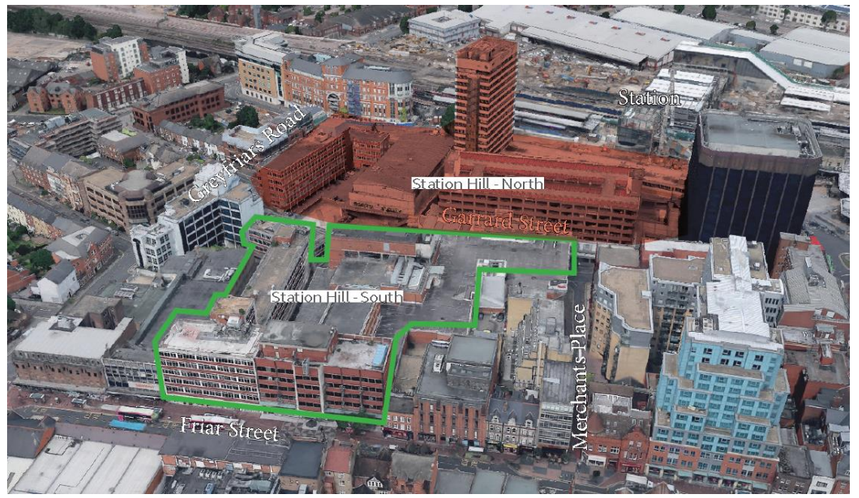

Figure 2 : An aerial view of the North Site (shaded red) prior to demolition (Source: Google)

2.3. Proposed Development

The Station Hill North Site is located directly opposite Reading train station and occupies approximately 2.6 hectares (six and a half acres).

The planning application for the site includes for the demolition of all previous buildings to allow for the construction of a mixed-use, sustainable development, offering new homes, a hotel, flexible high-tech office space, along with central open community space.

The North Site master plan currently comprises a site wide podium and five building plots, split into two development phases:

- Phase 3 comprises Block A, B and D (residential) and Block C (commercial) in the west.
- Phase 2 comprises Block G in the east (commercial).
- Phase 1 of the development is classed as Station Hill South Site and is discussed in a separate report.

Car parking will be provided within the podium with a maximum of 835 spaces provided. The buildings range in height from a minimum of 62m AOD to a maximum of 163m AOD and would rise up from the Plaza level. The Plaza level is the principal area of public realm across the North Site providing level access from Reading train station through to Friar Street. The Plaza level would sit on top of the underlying podium.

A basement for car parking and plant rooms is currently proposed to the north of the Thames Water Main in Phase 3 of the development (the west of the site). The exact design details of the basement are still to be finalised but there are no proposals for basement to be constructed beneath Phase 2 of the development (the east of the site).

The proposed substructure is anticipated to comprise piled foundations and a retaining wall. The retaining wall type is still to be finalised.

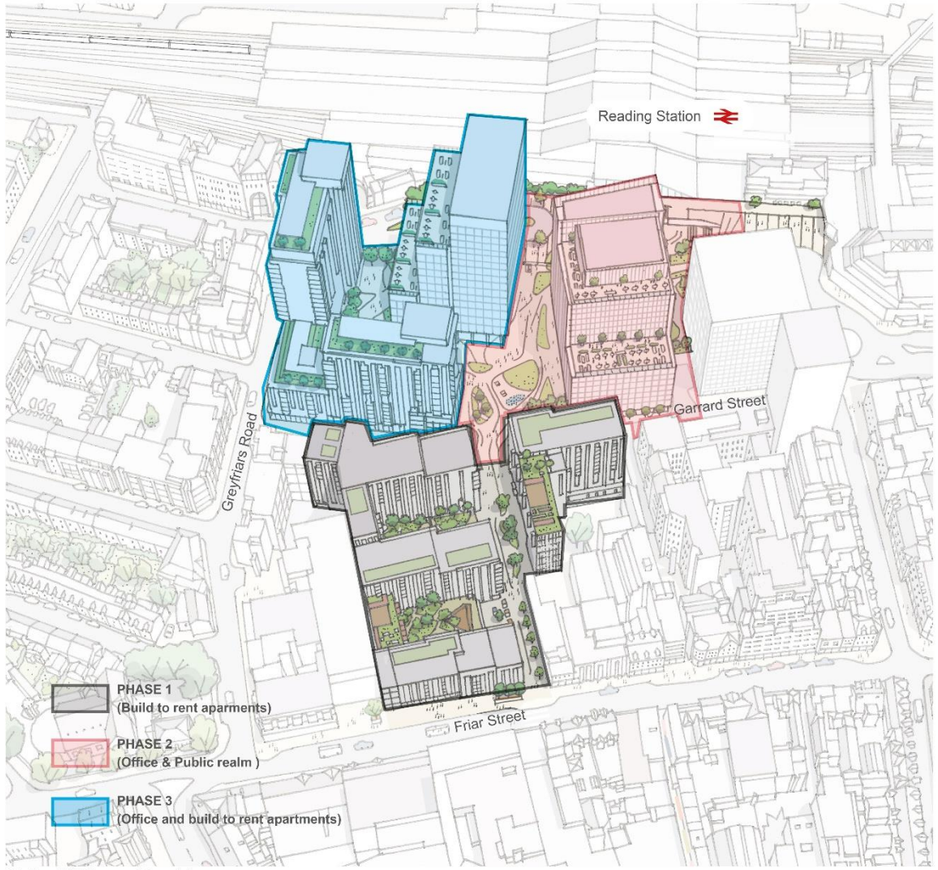

Figure 3*: A Drawing of the Proposed Development (Source: MGT)*

3. PRELIMINARY CONCEPTUAL SITE MODEL

The preliminary Conceptual Site Model (CSM) is a simplified representation of the environmental conditions at the site, and in the vicinity of the site, and is used to identify potentially sensitive receptors and potential pollutant linkages. Information obtained during the ground investigation, described in the following sections of this report, is then used to refine and update this preliminary CSM. The information provided in the preliminary Conceptual Site Model is based on Ramboll's Phase I Desk Study and is summarised in Table 3.1.

Table 3.1: Preliminary Conceptual Site Model

Potential Sources of Contamination

On Site

The desk study report identified a number of sources of potential contamination, including current and former land uses at the site and in the surrounding area.

Historical sources include the former garage in the location of the present-day multi-storey car park, with a tank shown adjacent to the north west corner of the garage on 1968 mapping. The historical data report from Envirocheck identified potentially fuel related tanks on site, in close proximity to the former garage. Underground tanks may also have been present. A timber yard is shown to be present in the north west corner of the site on 1879 mapping. A bus station was constructed in the early 1960s in the centre of the North Site and a furniture factory in the north west.

A site visit undertaken by Watermans in 2013 described the former ballroom / Club as a Mecca Bingo Hall at this time, which reportedly contained two tanks and a switch room.

Three electrical sub-stations were noted during the site walkover, in the north west of the site and one in the south of the site and asbestos is known to be present within the Made Ground on site (from results of a previous ground investigation). Demolition rubble from the recently demolished buildings has been spread across the site and the excess stockpiled in the centre.

Surrounding Area

A review of the surrounding area's history highlighted industrial land use within 100m of the site.

The Great Western Railway runs parallel to the wider site boundary approximately 60m north, since the late 1870s. On the 1879 mapping, a coal yard was present to the south of Garrard Street, within the south site boundary. Garages were situated approximately 90m southwest and 50m southeast of the site by 1957. Engineering works were identified on the historical maps to the northwest and north of the site. Four electrical sub-stations were also identified within approximately 80m of the site.

Historical Building Plans Information identified three underground fuel tanks and oil storage within 100m south of the site.

Geology

The geology comprises Made Ground of varying thicknesses over superficial deposits of Alluvium and the Taplow Gravel Formation, underlain by the Upper Chalk Formation. The upper layers of the Chalk comprise variable and significant thicknesses of Structureless Chalk.

Hydrogeology

Shallow groundwater is anticipated within the Alluvium, Taplow Gravel Formation, and Upper Chalk Formation. Isolated perched groundwater may also be present within the Made Ground.

The Made Ground is classified as an Unproductive Strata, with the Environment Agency classifying the Alluvium and Taplow Gravel Formation as Secondary A Aquifers and the Upper Chalk Formation as a Principal Aquifer. The site is not located within a Source Protection Zone (I, II, III). Groundwater is expected to be in hydraulic continuity with the River Thames and flow direction could be expected broadly to the north-east or east.

There is one groundwater abstraction recorded within 250 m of the site, at approximately 140m south west, associated with Primark and used for drinking, cleaning and washing.

Hydrology

Table 3.1: Preliminary Conceptual Site Model

The nearest surface water feature is a drain approximately 320 m northwest of the site, associated with the railway line. Followed by the easterly flowing River Thames which, at its closest point, lies approximately 420 m northeast of the site. The River Kennet is located approximately 500 m southeast of the site and also flows in an easterly direction.

Potential Receptors to Contamination			**Receptor Present?**
Human Health	On-site	Future site users in a mixed residential and commercial setting.	Yes
	Off-site	The site is surrounded by predominantly commercial properties and railway land.	Yes
Water Environment	On-site	The site is underlain by alluvium and gravels which are classified as Secondary A Aquifers and the underlying Chalk which is a Principal Aquifer.	Yes
	Off-site	The surrounding area is underlain by alluvium and gravels which are classified as Secondary A Aquifers and the underlying Chalk which is a Principal Aquifer.	Yes
		Surface Water: The nearest surface water feature is reportedly a drain approximately 320m northwest of the site, followed by the River Thames at 420 m north east.	Yes
Ecological Receptors	On-site	There are no statutory designated ecologically sensitive sites present on-site.	No
	Off-site	There are no statutory designated ecologically sensitive sites present within 250m of the site.	No
Built Environment	On-site	The intended end-use of the site is mixed commercial and residential.	Yes

Potential Sources	**Pathways**
Made Ground relating to historical development (For example, heavy metals and hydrocarbons relating to the former garage)	• Direct contact, ingestion or inhalation of soil bound contaminants / dust or contaminated groundwater. • Leaching of contaminants. • Migration of impacted perched groundwater.
Potential asbestos in Made Ground	• Inhalation of fibres.
Potential ground gases and vapours	• Inhalation of ground gases. • Migration of ground gases through the ground or service routes. • Build-up of explosive and / or asphyxiating gases / depleted oxygen.
Substations	• Direct contact with soils and groundwater containing PCBs.

The site investigation strategy was designed to assess the geotechnical setting of the site and identify key potential contamination sources identified in the preliminary Conceptual Site Model. The following sections describe the site investigation strategy, the results of laboratory chemical analysis and a qualitative source-pathway-receptor risk assessment; the revised conceptual model is then presented in Section 10 which discusses the identified sources, receptors and any remaining pathway linkages.

4. GROUND INVESTIGATION

4.1. Rationale and Design Philosophy

A ground investigation was designed and specified by Ramboll UK based on the Geotechnical and Geoenvironmental Desk Study (2018). The ground investigation was designed to assess ground conditions, Geotechnical Design Parameters for substructure design and uncertainty with respect to ground based geotechnical risks, and soil and groundwater contamination.

Due to the ground investigation being undertaken prior to demolition of all buildings, the investigation was limited by access restrictions where the multi-storey car park is located on the footprint of the former garage and in the west where Xafinity House is situated. However, Ramboll considers appropriate assessment of these areas has been undertaken to provide a broad understanding of potential significant land contamination risks. As is standard, further assessment is recommended in these areas when access permits. This is likely to be during demolition and when a watching brief can be undertaken.

The locations of the exploratory holes were chosen to provide both representative coverage of the site as far as possible, target potential sources of contamination and assess the ground conditions beneath each of the proposed new buildings.

The ground investigation was undertaken in general accordance with the following codes and standards:

- BS EN 1997-1:2004 Eurocode 7: Geotechnical Design – Part 1: General Rules (BSI, 2004);
- BS EN 1997-2:2007 Eurocode 7: Geotechnical Design – Part 2: Ground Investigation and Testing (BSI, 2007);
- BS 1377-1:2016 Methods of Test for Soils for Civil Engineering Purposes (BSI, 2016)
- BS EN ISO 22475-1:2006 Geotechnical investigation and testing – Sampling methods and groundwater measurements – Part 1 Technical principles for execution (BSI, 2006); and,
- BS 5930:2015 + Amendment A1: 2015 Code of Practice for Site Investigation (BSI, 2015).

4.2. Summary of Ground Investigation Works

The fieldwork was undertaken between 8th May and 18th June 2019. The fieldwork was completed by Geotechnical Engineering Limited (GEL) and Ramboll carried out regular site visits throughout the works. The exploratory holes were logged and sampled for geotechnical and chemical testing by GEL.

The ground investigation comprised the following scope of works:

- prior to intrusive works, GEL undertook below ground utility service clearance at all exploratory hole locations. Service plans including plans for the Thames Water sewer running beneath the site were provided. A preliminary UXO risk assessment undertaken by 1st Line Defence classified the risk level as 'minimal' therefore no further actions were undertaken with regards with UXO;
- where possible, all exploratory locations were hand-dug to approximately 1.2 m bgl in advance of drilling;
- five rotary boreholes extending into the chalk (BH201-BH205);
- five windowless sample boreholes were undertaken (WS201-WS204, and WS211 which was undertaken in place of trial pit TP211 due to access restrictions);
- seven trial pits were excavated to a maximum depth of 4 m bgl;
- nine 50 mm ground gas and groundwater monitoring standpipes were installed in boreholes and window sample boreholes;
- in situ geotechnical testing within the exploratory holes;
- targeted soil samples were taken from each exploratory hole location and screened on-site using a hand-held PID for the presence of VOCs;
- selected soil samples were analysed for a predetermined suite of contaminants, designed to be reflective of the site's historic uses; and
- six rounds of ground gas monitoring were undertaken on the 28th June, 3rd July, 10th July, 18th/19th July, 26th July and 22nd August using a portable gas analyser from nine locations. These were taken over an approximately three-month period in accordance CIRIA C665. A hand-held PID was also used to measure VOCs in the monitoring wells during the monitoring round.

4.2.1. Exploratory Holes

The five rotary boreholes were excavated to a maximum depth of 40.5 m, as detailed in the Factual Report on Ground Investigation compiled by GEL.

During the ground investigation concrete, at times reinforced, was encountered in various locations, and in particular within areas subjected to previously demolition works. The depth of the concrete obstructions was not proven. Borehole locations were relocated numerous times due to such obstructions.

The borehole and window sample positions and coordinates are shown on the exploratory hole location plan in Drawing SHRN-RAM-SW-ZZ-DR-S-0070. Exploratory hole details are summarised in Table 4.1, specifying the type of boreholes, scheduled depths and achieved depths. Further information regarding the descriptions of strata encountered and comments on the groundwater conditions are given in the borehole records in the GEL Final Factual Report, August 2019.

Table 4.1: Summary of Exploratory Boreholes

Hole ID	Type	Scheduled Depth (m bgl)	Achieved Depth (m bgl)
BH201	RC	35.00	35.50
BH202D	RC	40.00	40.50
BH203	RC	30.00	40.50
BH204	RC	40.00	40.00
BH205C	RC	37.00	38.00
WS201	WS	6.00	1.10
WS202	WS	6.00	6.45
WS203	WS	6.00	5.45
WS204	WS	6.00	0.35
WS211	WS	6.00	1.07
TP202	TP	4.00	1.50
TP203	TP	4.00	4.30
TP204	TP	4.00	0.65
TP205	TP	4.00	3.00
TP206	TP	4.00	2.50
TP208	TP	4.00	2.20
TP209	TP	4.00	2.90

4.2.2. Monitoring Well Installation

Five boreholes and three of the window samples (WS201, WS202 and WS203) were completed as gas and groundwater monitoring wells with 50mm ID diameter HDPE slotted pipe set in a gravel

filter pack with a plain pipe bentonite pellet seal above and below. Table 4.2: Summary of Monitoring Installations

Table 4.2: Summary of Monitoring Installations

Borehole ID	Installation Type	Response Zone (m bgl)	Ground Level (m AOD)	Response Zone (m OD)	Stratum at Response Zone
BH201	50mm Gas/Groundwater Monitoring Standpipe	11.00 - 12.00	38.30	+27.30 – +26.30	Structured Chalk
BH202D	50mm Gas/Groundwater Monitoring Standpipe	6.00 – 7.00	39.20	+33.20 - +32.20	Taplow Gravels
BH203	50mm Gas/Groundwater Monitoring Standpipe	11.00 – 12.00	38.75	+27.75 - +26.75	Structureless Chalk
BH204	50mm Gas/Groundwater Monitoring Standpipe	3.00 - 4.00	39.50	+43.35 - +42.35	Made Ground
BH205C	50mm Gas/Groundwater Monitoring Standpipe	8.10 - 9.10	38.35	+30.25 - +29.25	Taplow Gravels/ Structureless Chalk
WS201	50mm Gas/Groundwater Monitoring Standpipe	0.25 - 1.10	40.80	+40.55 – +39.70	Made Ground
WS202	50mm Gas/Groundwater Monitoring Standpipe	1.80 - 6.45	38.65	+36.85 – +32.20	Alluvium and Taplow Gravels
WS203	50mm Gas/Groundwater Monitoring Standpipe	2.30 - 5.45	39.05	+36.75 - +33.60	Made Ground / Taplow Gravels

4.3. Sampling and in situ Testing

Representative soil samples were recovered from all strata encountered in rotary boreholes for laboratory geotechnical and contamination testing to enable preliminary classification and assessment of the engineering properties of the strata beneath the site.

Standard penetration tests (SPTs) were carried out in accordance with BS EN ISO 22476-3 (2005) at regular intervals through the depth of all boreholes.

4.4. Geotechnical Laboratory Testing

The samples collected from the exploratory holes were scheduled by Ramboll for geotechnical and chemical testing. The testing was carried out in accordance with BS 1377 (1990/2018) unless otherwise stated and is summarised in Table 4.3.

Table 4.3: Geotechnical Lab Tests Completed

Test Method	Quantity	Accredited Test
Water Content	34	Yes
Liquid & Plastic Limits	16	Yes
Liquid (Casagrande Method) & Plastic Limits	1	No
Saturation Moisture Content	16	Yes
Linear Shrinkage	4	No
Particle Density - Pycnometer	17	Yes
Particle Size Distribution -Wet Sieve	15	Yes
Particle Size Distribution -Pipette	6	Yes
Water Content of Rock (Subcontracted)	18	Yes
Uniaxial Compressive Strength of Rock	2	Yes
Point Load Strength Test	115	Yes
pH (Subcontracted)	21	Yes
Organic Matter Content (Subcontracted)	16	Yes

4.5. Geo-Environmental Sampling and Monitoring

4.5.1. Soil Samples

Soil samples were taken from each of the exploratory locations, across all strata in general accordance with BS 10175:2011+A1:2013 and were stored within appropriate sample containers and forwarded to an independent MCERTS accredited analytical laboratory by GEL. Selected soil samples were tested on-site for the presence of volatile organic compounds (VOCs) using a photo-ionisation detector (PID). The PID screens for a wide range of VOCs but does not indicate a specific compound; therefore, the results of the PID screening provide a semi-quantitative indication of the concentration of VOCs present in soil pore spaces.

4.5.2. Groundwater Monitoring and Sampling

Six groundwater samples (BH201, BH202D, BH203, BH204, BH205C and WS203) were taken on 4th July 2019 and an additional sample (WS202) was taken on 10th July. All groundwater samples were scheduled for chemical analysis to compliment the soils suite.

Following the first groundwater sampling round, two additional rounds were undertaken in September and October 2019 at WS203 and BH204 only. The sampling was undertaken to further characterise the groundwater regime at these locations and is discussed in Section 8. The samples were scheduled for Total Petroleum Hydrocarbon (TPH) and Polycyclic Aromatic Hydrocarbons (PAHs) analysis only, as detailed in Table 4.4 below.

4.5.3. Ground Gas Monitoring

Ground gas monitoring was completed using a calibrated GFM 435 instrument with reference to CIRIA C665 and BS 8576:2013 Guidance on Investigations for Ground Gas. The following parameters were monitored:

- Methane (% by volume)
- Carbon dioxide (% by volume)
- Oxygen (% by volume)
- Flow rate (litres/hour)

A PID was also used to measure VOCs (in parts per million by volume) in the installed monitoring wells. The results of the ground gas monitoring are discussed in further detail in Section 9.

4.6. Geo-Environmental Laboratory Analysis

4.6.1. Analytical Rationale

Table 4.4 summarises the analytical schedule for soil and groundwater samples together with the rationale for analysis.

Table 4.4: Summary of Analytical Strategy

Analytical Suite	Rationale	No. of soil samples scheduled	No. groundwater samples scheduled	No. additional groundwater samples[1]
Metals (arsenic, boron, cadmium, trivalent chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, zinc)	Typically associated with brownfield sites historically used for industrial purposes.	50	7	-
Phenols	Typically associated with industrial site uses.	50	7	-
Cyanide	Typically associated with historical industrial sites and brownfield land.	50	7	-
Polycyclic Aromatic Hydrocarbons (PAHs)	Typically associated with fuels and oils, combustion products and heavy end hydrocarbons such as tars.	50	7	4
Total Petroleum Hydrocarbons Carbon Working Group (TPH CWG) including MTBE and BTEX	Typically associated with fuels and oils.	50	7	4
Volatile Organic Compounds (VOCs)	Typically associated with solvents and	14	2	-
Semi-Volatile Organic Compounds (SVOCs)	sometimes with fuels and oils.	14	2	-
Polychlorinated biphenyls (PCBs)	Typically associated with older electrical equipment.	13	2	-
Asbestos	Typically associated with brownfield sites / Made Ground.	24	-	-

Notes:

[1] Samples obtained during additional scope of works in September and October 2019.

4.6.2. Data Quality Assurance

The laboratory selected by GEL to perform the analysis is accredited by UKAS to ISO 17025 and MCerts standards. Internal quality assurance checks are carried out by the laboratory data prior to the laboratory certificates being issued.

5. GROUND CONDITIONS

5.1. General

The ground conditions encountered beneath the site based on the previous Ground Investigations and the exploratory holes undertaken during the 2019 GEL Ground Investigation is presented in this chapter. A summary of the previous investigations that have been undertaken on or surrounding the site are listed in Table 5.1.

Table 5.1: Summary of Previous Ground Investigation Reports

Project	Site Investigation Contractor	Date
Station Hill, South Site	Geotechnical Engineering Limited	February 2019
Station Hill, Reading	ST Consult	May 2014
Thames Tower	Concept	July 2012

The relevant information from these reports was reviewed as part of the Geotechnical and Geoenvironmental Desk Study and has been used to supplement the information obtained from the recent Ground Investigation to inform this report.

Ground levels vary between approximately 38 m AOD at Garrard Street in the south and generally 40 m AOD at Station Hill in the north. The stratigraphic succession identified during the recent investigation confirms the general ground profile indicated from the previous borehole records.

A summary of the general succession of strata encountered during the investigation is presented in Table 5.2.

Table 5.2: Summary of Ground Conditions

Stratum	Level at Top of Stratum (m OD)		Thickness (m)		Exploratory Holes where Stratum Encountered
	Range	Average	Range	Average	
Made Ground	+38.05 - +40.6	+39.55	1 – 5.6	3.3	ALL
Alluvium	+32.75 - +36.9	+34.825	0.6 – 1.9	1.25	BH201, BH202D, BH203, WS202
Taplow Gravels	+32.15 - +36.20	+34.175	0.4 – 4.9	2.65	BH201, BH202D, BH203, BH205C, WS202 and WS203
Upper Chalk (Structureless)	+30.20 - +35.2	+32.7	0.35 – 11.2	9.26	BH201, BH202, BH203, BH204 and BH205
Upper Chalk (Structured)	+21.2 - +30.95	+26.075	>21.2 (Unproven)	(Unproven)	BH201, BH202, BH203, BH204 and BH205

An exploratory hole location plan and geological cross-sections are provided in Drawings SHRN-RAM-SW-ZZ-DR-S-0070 to SHRN-RAM-SW-ZZ-DR-S-0072.

5.2. Surfacing

The surfacing across the site comprises predominantly asphalt around the multi-storey car park and Xafinity House in the west. The maximum thickness of asphalt is recorded as 0.2m in several locations.

A layer of "crush" from the previously demolished buildings covered the majority of the centre of the site. A 4m high stockpile of this crushed material was also present in the centre of the site at the time of the ground investigation.

5.3. Made Ground

Made Ground was encountered within all exploratory holes across the north site. The Made Ground was found to be highly variable in nature, reference should be made to the fieldwork records for detailed descriptions of the materials encountered.

The Made Ground generally comprises 'crushed material' from the demolished ballroom/bingo hall, described as light grey slightly sandy silty subangular and subrounded fine to coarse brick, concrete and sandstone gravel. Concrete slabs were encountered beneath the crushed material in several locations. The maximum thickness of concrete is recorded as 0.3m in BH205C, within BH204 a concrete slab 50mm thick below a tarmacadam layer was encountered. A 50mm concrete slab was also encountered below a tarmacadam layer within BH204, and an additional 200mm layer of concrete at 0.4m depth.

WS203 was excavated in the location of the former tank shown on historical mapping. It is not known whether this was a below or above ground storage tank (associated with the former garage). No evidence of a UST (underground storage tank) was encountered and no significant visual or olfactory evidence of contamination was noted.

5.3.1. Classification

8no. particle size distribution tests were carried out on Made Ground samples, as given in Data Plot A1.1. The results indicate that the samples contained quite uniform composition of particles, with generally a large portion attributed to gravel (32-80%), a smaller portion of sand (16-47%) and little silt / clay content (2-17%).

Atterberg limit tests were conducted on 5no. samples taken from cohesive portions of the Made Ground in BH201, BH203, BH205C and WS203 and revealed an average plastic limit of 23%, a liquid limit of 40.6% and the plasticity index is 14%. As illustrated in Data Plot A1.2, the result indicates that the material comprises clay of low plasticity. The variation in plasticity index and liquid limit suggest a low volume change potential in accordance with the NHBC Standards.

The bulk density has been assumed on the basis of the material types encountered, typical published values for such materials provided in guidance BS8002:2015 and based on Ramboll's experience of similar materials. A value of 19kN/m^3 is recommended for design.

5.3.2. *In situ* Testing

20no. Standard Penetration Tests (SPTs) were carried out within the Made Ground, with the uncorrected SPT N values obtained ranging between 3 and 56. The results of the SPTs are plotted in Data Plot A1.3, where the uncorrected N values greater than 50 were extrapolated using the technique recommended in CIRIA Report 143. Two tests were excluded which were influenced by encountering concrete giving a very high extrapolated value. The corrected N60 values, taking account of the hammer energy ratio, range between 3 and 58 with an average of 20. The (N1)60 values range between 3 and 71, with an average of 23. The corrected SPT values are plotted in Data Plot A1.4. A conservative characteristic value of 10 is recommended.

5.3.3. Drained Shear Strength Parameters

The SPT $(N_1)_{60}$ results can be used to estimate the internal angle of shearing resistance and the stiffness of the Made Ground. Subject to empirical relationships between the corrected SPT N value and angle of shearing resistance for granular material (Wolff, 1989), the angle of shearing resistance, Ø', using a conservative characteristic SPT $(N_1)_{60}$ value of 10 for granular material is approximately 30°. However, the variability and inconsistency of the Made Ground, means that this should not be relied upon to provide significant support to foundations without benefit of prior improvement. Due to this it is recommended that the Made Ground be removed or improved if it is to be used as a founding material.

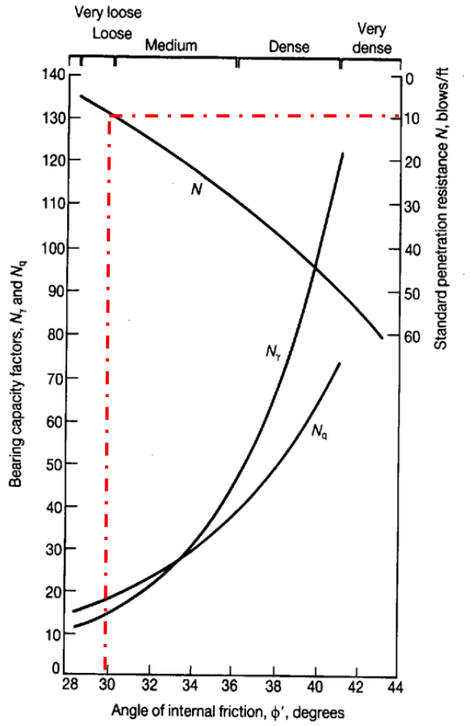

Figure 4: Relationship between NSPT value and Angle of internal friction. Taken from CIRIA 143

5.3.4. Stiffness

The stiffness properties of the Made Ground have been estimated according to Stroud (1989) (as reported in CIRIA 143). Stroud (1989) suggests that for normally consolidated granular deposits a reasonable approximation can be made to estimate the vertical drained stiffness E' from *in situ* SPT N tests using the relationship E'/N=1MN/m^2. Therefore, for a corrected SPT N=10, it is recommended that;

$$E' \text{ (MPa)} = 10\text{MN/m}^2$$

5.3.5. Summary of Parameters for Made Ground

The range of measured and characteristic soil parameters for the Made Ground are summarised in Table 5.3.

Table 5.3: Summary of Geotechnical Parameters for Made Ground

Soil Parameters	Unit	Range	Characteristic Value	Reference
Level at Top of Stratum	m AOD	+38.05 – +40.6	+38.5	Exploratory hole logs from all GIs
Thickness	m	1 – 5.6	2.5	Exploratory hole logs from all GIs
Bulk Density	kN/m^3	-	19	Assumed
SPT $(N_1)_{60}$ value	-	3 - 71	10	Corrected *in situ* tests
Angle of Shearing Resistance	degrees	-	25	Based on Ramboll's experience and considering inherent variability of this stratum
Drained Stiffness	MN/m^2	2 – 60+	10	Correlation with CIRIA C143 and considering inherent variability of this stratum

5.4. Alluvium and Taplow Gravels

The Alluvium and Taplow Gravels are discontinuous across the north site with the Alluvium as shown in Table 5.2.

The Alluvium is generally described as stiff light greenish grey slightly sandy silty clay, with the gravel being subangular and subrounded with fine and medium chalk and flint gravel.

The Taplow Gravel is described as orangish brown clayey gravelly sand or sandy gravel. Gravel comprises subangular and subrounded fine to coarse flint and chalk gravel.

Photograph 1: Alluvium and Taplow Gravel in BH202D (Source: GEL Factual Report 35248)

5.4.1. Classification

4no. particle size distribution tests were carried out on the Taplow Gravel as given in Data Plot A1.5. The results indicate that the samples contained predominately gravel (65-82%), a smaller portion of sand (10-30%) and a minor portion of silt/ clay (1 to 5%).

The average Natural Moisture Content measured of 5no. Alluvium and Taplow Gravels was 19.5% and 17% for the Alluvium and Taplow Gravel respectively.

The Atterberg limit tests on the Alluvium recorded an average plastic limit of 18%, and an average liquid limit of 39%, resulting in an average plasticity index of 21%. As illustrated in Data Plot A1.6, the results indicate that the sample comprises clay of low plasticity. As can be seen, the moisture content and plastic limit are recorded to be very similar and so the Alluvium may be seen occasionally to be at or near the limit of its plasticity.

The Atterberg limit tests on the more cohesive layers of the Taplow Gravel recorded an average plastic limit of 18.5%, and a liquid limit ranging between 23% and 30%. Resulting in a plasticity index of 8%. As illustrated in Data Plot A1.6, the results indicate that the sample comprises material of very low plasticity.

Organic matter tests were undertaken on 1no. sample from the Alluvium Strata, indicating 0.55% organic matter.

No density tests were undertaken on this stratum, typical published values for such materials provided in guidance BS8002:1994 and based on Ramboll's experience of similar materials have been considered. A value of 20kN/m^3 is recommended for design.

5.4.2. *In situ* Testing

3no. SPTs were carried out within the Alluvium, with the uncorrected SPT N values obtained ranging between 5 and 27. The results of the SPTs are plotted in Data Plot A1.7. The corrected N60 values taking account of the hammer energy ratio range between 5.3 and 27.5 and are plotted in Data Plot A1.8. A design N60 value of 18 is recommended.

17no SPTs were carried out in the Taplow Gravels with uncorrected N values ranging between 4 and 116. The corrected $(N_1)_{60\ values}$ range between 7 and 146. Taking account of the variability of the results a conservative design value of 26 is recommended.

5.4.3. Shear Strength Parameters

Alluvium

The undrained shear strength of the Alluvium can be estimated from the *in situ* SPT testing carried out. The shear strength can be calculated from uncorrected SPT N results using the relationship suggested by Stroud (1989) (as reported in CIRIA 143, 1995) as follows;

$Cu = f_1 \times N$ (kN/m^2)

Where f_1 is a correlation factor that depends on the plasticity of the material, and N is the number of total blows from the *in situ* SPT test. For an average Plasticity Index of 21%, the correlation factor f_1 can be taken to be 5.0 (CIRIA 143, 1995). However, in Ramboll's experience the plasticity index of Alluvium is significantly higher as such an f_1 factor of 4 has been used.

For design purposes the following undrained shear strength profile can therefore be estimated as:

Cu = 72 kN/m^2 (over depth of Alluvium)

Taplow Gravels

The SPT $(N_1)_{60}$ results can be used to estimate the internal angle of shearing resistance and the stiffness of the Taplow Gravels. Subject to empirical relationships between the corrected SPT N value and angle of shearing resistance for granular material (Peck & Stroud, 1989) as seen in Figure 4, the angle of shearing resistance, Ø', using a conservative characteristic SPT $(N_1)_{60}$ value of 26 for granular material is approximately 35°. However, the limited number of tests and the large variability of the results means that this should not be relied upon to provide significant support to foundations without benefit of prior improvement, if it is to be considered as a material to be founded upon/ potential backfill material.

5.4.4. Stiffness

Alluvium

The stiffness response of Alluvium varies according to the direction of stress changes (vertical or horizontal); the period of response (short term - undrained or long term - drained) and the strain level.

Based on literature, case studies and experience of the response of foundations on Alluvium, the following relationships between Young's modulus and undrained shear strength are recommended for foundation design. These factors can be applied to the undrained shear strength design profile detailed in Section 5.4.3.

Table 5.4: Stiffness Parameters for Alluvium

Stiffness	
$E_u = 400C_u$	E_u = 29 MPa
$E' = 0.75E_u$	E' = 22 MPa

Taplow Gravels

Using the relationship described in Section 0 and an $(N_1)_{60\ value}$ of 26 an E' value of 26 MPa is recommended for foundation design.

5.4.5. Summary of parameters for Alluvium and Taplow Gravel

The range of measured and characteristic soil parameters for the soil stratum are summarised in Table 5.5.

Table 5.5: Summary of Geotechnical Parameters for Alluvium

Soil Parameters	Unit	Range	Characteristic Value	Reference
Level at Top of Stratum	m OD	+32.75 - +36.9	+36.0	Exploratory hole logs from all GIs
Thickness	m	0.6 – 1.9	1.0	Exploratory hole logs from all GIs
Bulk Density	kN/m^3	-	20	Assumed
SPT N60 Value	-	5.3 – 27.5	18	*In situ* tests
Undrained Shear Strength	kN/m^2	-	72	*In situ* test results and correlation with CIRIA C143
Stiffness (Foundations)	MN/m^2	-	E_u = 29	Correlations recommended in Foundation Design and construction, *Tomlinson* 2001
		-	E' = 22	

Table 5.6: Summary of Geotechnical Parameters for Taplow Gravels

Soil Parameters	Unit	Range	Characteristic Value	Reference
Level at Top of Stratum	m OD	+32.15 - +36.20	+35.0	Exploratory hole logs from all GIs
Thickness	m	0.4 – 4.9	4.0	Exploratory hole logs from all GIs
Bulk Density	kN/m^3	-	20	Assumed
SPT $(N_1)_{60}$ Value	-	7 – 146	26	*In situ* tests
Angle of shearing Resistance	°	-	35	*In situ* test results and correlation with CIRIA C143
Drained Stiffness	MN/m^2	-	26	Assumed as a linear relationship

5.5. Structureless Chalk

The Structureless Chalk was encountered across the north site in all completed exploratory holes at levels ranging between +30.2m AOD to +35.2m mOD. The Structureless Chalk was encountered at the shallowest level within BH201 and BH202D. The thickness of the unit varied significantly between 0.35 (BH201) and 11.2m (BH204).

The Structureless Chalk has a CIRIA grade of Dm or Dc. The typical description comprises Structureless Chalk composed of white slightly gravelly silt. Gravel is subangular and rounded fine to coarse very weak low to medium density white with frequent black specks chalk, rarely angular fine to coarse flint.

Photograph 2: Structureless Chalk in BH204 (Source: GEL Factual Report 35248)

A contour map of the top of stratum level for the Structureless Chalk is shown in **Figure 5**. In this contour map, both north and south sites are presented, A number of other boreholes are presented in the map including boreholes and window samples from previous ground investigations conducted by GEL in 2018, SI Consult in 2014, and Concept in 2012. These boreholes support the findings of the recent investigation, and as shown, the top of level for the Structureless Chalk varies between +28.9m AOD and +44.92m AOD across the entire Station Hill site.

The Thames Tower boreholes BH01, BH02 and BH03 (undertaken by Concept in 2012) present significant uncertainties regarding the thickness of the layer and the transition towards the more competent Structured Chalk. The descriptions in the borehole logs show layers of Structureless Chalk interbedded with Structured Chalk, as shown in Drawing SHRN-RAM-SW-ZZ-DR-S-0072. The discontinuities encountered may indicate the presence of a dissolution feature; however, the boreholes also show low RQD and generally poor recovery, therefore it may be a function of the drilling.

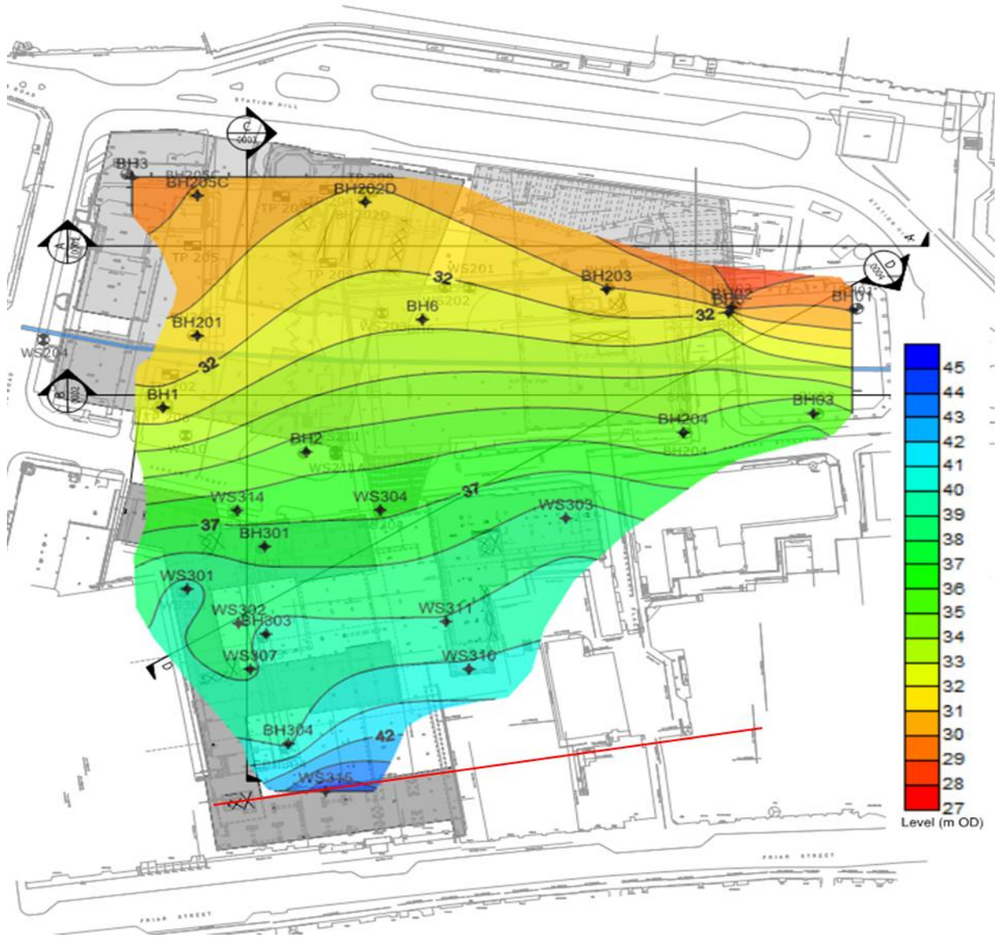

Figure 5: Contour Map showing the level of the Structureless Chalk across the site

5.5.1. Classification

Only 1no. particle size distribution tests was carried out across the Station Hill North site on a sample from the Structureless Chalk as shown in Data Plot A1.9. The results indicate a composition of 48% gravel and sand, and the remaining silt and clay. This has been compared to the PSDs results obtained across the Station Hill South site, and they were found to be similar.

The Natural Moisture Content of the Structureless Chalk was measured 13no. times in a combination of Atterberg Limits tests (8), Saturation Moisture Content tests (4), Water content of Rock (1). The results of which range between 21.7% and 38% with an average value of 27.2%. The results are shown in Data Plot A1.10.

The results of Atterberg limit tests revealed a plastic limit ranging between 22% to 26%, and the liquid limit from 29% to 33%. The plasticity index ranged from 7% to 8%. As illustrated in Data Plot A1.11, the results indicate that the sample comprises, material of very low plasticity. As can be seen, the moisture contents and plastic limits are recorded to be similar and so the Structureless Chalk may be seen occasionally to be at the, or near the, limit of its plasticity.

The bulk density was measured using the Caliper / Buoyancy method and the Saturation Moisture Content tests on 5 no. samples of Structureless Chalk. The results of these tests range between 1.53Mg/m^3 and 2Mg/m^3 with an average of 1.91 Mg/m^3, this can be seen in Data Plot A1.12. 5 No. dry density tests were undertaken between same samples on the Structureless Chalk resulting in a maximum value of 1.62Mg/m^3 and minimum value of 1.52 Mg/m^3 with an average of 1.57 Mg/m^3.

Organic matter tests were undertaken on 1 No. samples from the Structureless Chalk, with result indicating an organic content of 2.9%.

5.5.2. *In situ* Testing

14no. SPTs were carried out within the Structureless Chalk, with the uncorrected SPT N values obtained generally ranging between 13 and 37. The results of the SPTs are plotted in Data Plot A1.13. The corrected N60 values taking account of the hammer energy ratio generally range between 14 and 39 with an average of 26 as shown in Data Plot A1.14. A design N60 value of 25 is recommended.

5.5.3. Unconfined Compressive Strength

Stroud (1989) (as reported in CIRIA 143) suggests that for chalk the unconfined compressive strength can be estimated using the following relationship:

$$\sigma_c = 50\ N_{60.}$$

Using an N60 value of 25 this would equate to an σ_c value of 1.25 Mpa.

Matthews and Clayton (1993) (as reported in CIRIA 574) suggested the relationship proposed in Figure 6 relating dry density and porosity to the unconfined compressive strength.

Using an average dry density value of 1.57 Mg/m3 a Uniaxial Compressive Strength Tests (UCS) of approximately 3 MPa can be observed. This correlates well with the results obtained from the 2no. UCS tests undertaken.

2 No. point load tests were undertaken on samples from the Structureless Chalk strata, applying a correlation factor of 24 as described in Bieniawski (1975) to the point load index value a UCS value can be obtained. This results in a range between 1.92 MPa and 2.64 MPa with an average value of 2.28 MPa.

2no UCS Tests were completed on samples from the Structureless Chalk. These gave UCS values of 3.14MPa and 3.09MPa.

Considering the methods described plotted in Data Plot A1.15 a design UCS value of 2.0 MPa is considered suitable for the chalk fragments which make up the structureless chalk. For the structureless chalk rock mass CIRIA 574 recommends using the following strength parameters:

C′ = 0

Φ′ = 32°

5.5.4. Stiffness

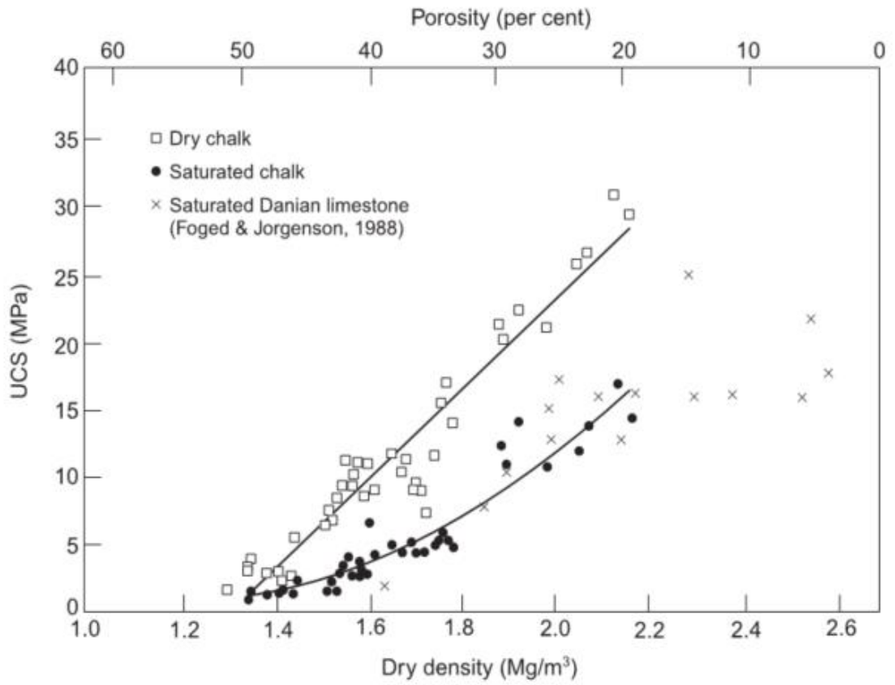

Figure 6: Relationship between unconfined compressive strength and intact dry density

Stroud (1989) (as reported in CIRIA 143) suggests that for chalk deposits a conservative approximation can be made to estimate the drained stiffness E′ for settlement calculations from *in situ* SPT N tests using the relationship E′/N_{60} =5MPa. The results are plotted in Data Plot A1.15, for a corrected SPT N=25 it is recommended that;

$$E' = 125 MN/m^2$$

5.5.5. Summary of Parameters for Structureless Chalk

The range of measured and characteristic soil parameters for the soil stratum are summarised in Table 5.7.

Table 5.7: Summary of Geotechnical Parameters for Structureless Chalk

Soil Parameters	Unit	Range	Characteristic Value	Reference
Level at Top of Stratum	m OD	+30.20 - +35.2	+31.0	Exploratory hole logs from all GIs
Thickness	m	0.35 – 11.2	7.0	Exploratory hole logs from all GIs
Bulk Density	kN/m^3	18.6 – 20.2	18.5	Lab test results
SPT N_{60} value	-	14 – 39	26	Corrected in situ tests
C′	kN/m^2	-	0	CIRIA 574

Soil Parameters	Unit	Range	Characteristic Value	Reference
Effective angle of friction	°	-	32	CIRIA 574
E'	MN/m^2	27 – 471	125	Correlation with CIRIA C143

5.6. Structured Chalk

The Structured Chalk was encountered within all the boreholes, with a top of stratum level ranging between 30.95m mOD and 21.2m mOD. The thickness was unproven. The CIRIA grade present in the structured chalk which comes from a grading scheme based on typical discontinuity spacing is B5, B4, B3, C4, C3, A5. Two fracture sets are present with one predominantly subhorizontal to 20°, and the second set predominately between 45° and 70°. Medium to widely space bands of cobbled sized black nodular flint were encountered.

The typical description consists of very weak medium density white CHALK with frequent black specks and yellowish orange staining.

Photograph 3: Structured Chalk in BH201 (Source: GEL Factual Report 35248)

A contour map of the top of stratum level for the Structured Chalk is shown in **Figure 7**. In this contour map, both north and south sites are presented. A number of other exploratory holes are presented in the map including boreholes and window samples from the previous ground investigations conducted by GEL in 2018, SI Consult in 2014, and Concept in 2012.

The map shows that limited information is available across the site regarding the level of the Structured Chalk. This is due to the ground investigation being undertaken prior to and/or during demolition of the existing buildings, and hence access was therefore limited to certain areas of the site. In particular, the centre of the north site was inaccessible due to the presence of the NCP car park and large stockpile up to approximately 4m in height (and approximately 50m by 20m in plan). Further site investigation is recommended within the centre of the North site and in the South site across Block F to provide further coverage and confirm the level and composition of the Structured Chalk.

As described in Section 5.5, the Thames Tower boreholes (BH01 to BH03 to the east of the North site) show poor recovery resulting in uncertainty regarding the transition between the Structureless and Structured Chalk in this area. The levels of the top of stratum have been interpreted from the SPT values and also from the core photographs and the borehole descriptions, comparing to the neighbouring boreholes from the recent investigation where appropriate. For BH01, the core recovery is generally between 70 - 100%; however, some cores comprise as little as 20% recovery or no recovery. SPT values above 25 are reported from 16m bgl and values greater than 45 from 25m bgl. Recovery in BH02 is reported to be generally above 70%, but this is not consistent with the visual photographs where evidence of poor drilling is apparent. SPT values above 25 are noted below 14.60m bgl and SPT refusals below 22m bgl. The recovery is reported to be between 75-100% in BH03, with a few core runs with lower recovery. SPT's are above 25 below 18m bgl with some refusals below 22.30m bgl. Based on this information and the neighbouring boreholes, interpreted levels have been presented in the contour map. The discontinuities encountered in these boreholes may indicate the presence of a dissolution feature; however, the boreholes show low RQD and generally poor recovery, therefore it may be a function of the drilling.

There is significant uncertainty in the level of the Structured Chalk in this area and the validity of the logs. It is therefore recommended that further investigation is carried out to assess the Chalk at the eastern end of the North site and evaluate the risk of the presence of any potential solution features or variation in geology.

As stated, in the centre of the North site, and on the South site where Block F is planned to be constructed, no boreholes were able to be undertaken due to site constraints. Further site investigation is therefore recommended to confirm the stratigraphy and level of the top of Structured Chalk. Cone penetration testing is likely to be the most efficient method of investigation.

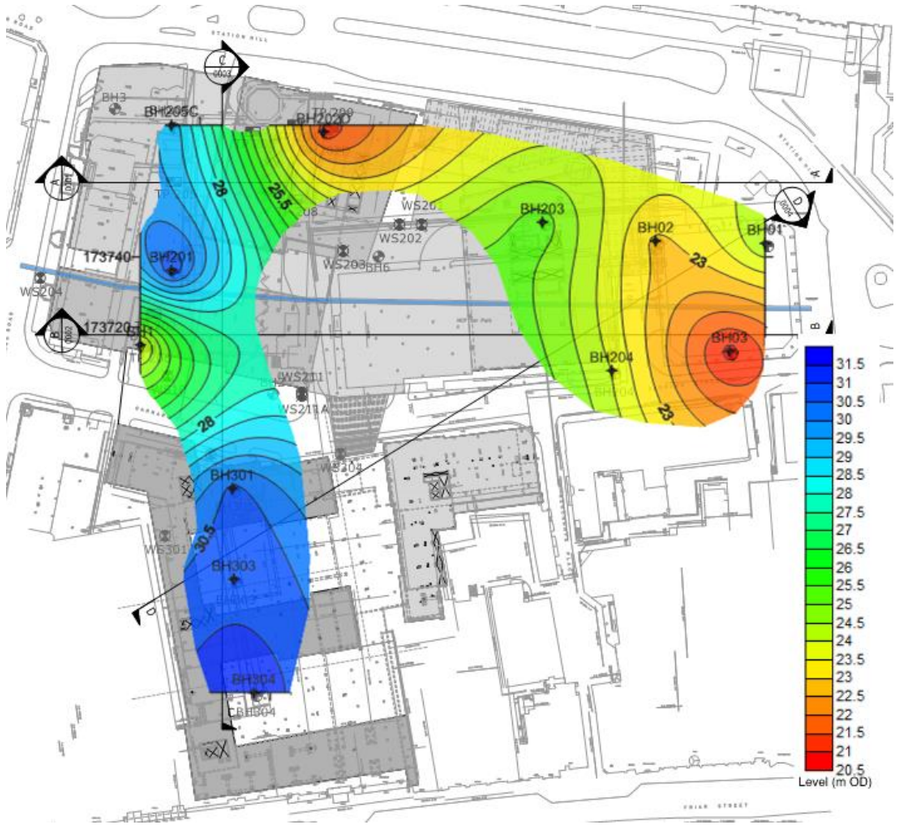

Figure 7: Contour Map showing the level of the Structured Chalk across the site

5.6.1. Classification

No Particle Size distribution tests were undertaken on samples from Structured Chalk; however, 1 no. PSD test was conducted during the south site investigation carried out by GEL in 2018. The results indicated that the sample comprised predominantly gravel (84%) with a 7% sand fraction and 9% silt sized fraction.

The moisture content of the Structured Chalk was measured 57 times in a combination of Atterberg limit tests (4), Saturation Moisture Content tests (15), Rock Water Content tests (18), Caliper / Buoyancy techniques (18) and UCS (2) tests. The results of which ranged from 18% to 29% with an average value of 23.5%, the results are plotted in Data Plot A1.17. The low plasticity of the samples are shown in Data Plot A1.18, with the liquid limit ranging between 28% to 32% and the plastic limit between 21% and 23% leading to a plastic index of 8%.

The bulk density was measured as part of the Uniaxial Compressive Strength test on 2 no. samples of Structured Chalk. It was also measured as part of measuring the saturation moisture content of 15 No. samples. The results of these tests range between 19kN/m^3 and 20.2kN/m^3 with an average of 19.6 kN/m^3, this can be seen in Data Plot A1.19. 17 No. dry density tests were undertaken on the structured chalk resulting in a maximum value of 1.79Mg/m^3 and minimum value of 1.46 Mg/m^3 with an average of 1.63 Mg/m^3.

11no. Loss on ignition tests were undertaken on the Structured Chalk strata and the resultant organic matter ranges between 7 and 22%.

5.6.2. In situ Testing

85 No. SPT's were carried out in the Structured Chalk with the uncorrected SPT N values obtained ranging between 13 and 375 when extrapolated. The results of the SPTs are plotted in Data Plot A1.20. The corrected N60 values taking account of the hammer energy ratio range between 20 and 413 and are plotted in Data Plot A1.20. The following N60 design line is recommended:

N = 45+8z (where z is depth below +24 mOD)

N = 200 (below +4 mOD)

5.6.3. Strength Parameters

Using the NSPT relationship from Stroud (1989) the unconfined compressive strength for the Structured Chalk can be estimated to be:

UCS (MPa) = 2.25 +0.4z (where z is depth below +24 mOD)

UCS (MPa) = 10 (below +4 mOD)

Using the relationship proposed by Matthews and Clayton (1993) using an average dry density of 1.57 kN/m^3 a UCS of approximately 3 MPa can be assessed.

85 No. point load tests were undertaken on samples from the Structured Chalk strata applying a correlation factor of 24 as described in Bieniawski (1975) to the point load index value. A UCS value can be obtained. This results range between 0.48 MPa and 11.04 MPa with an average value of 5.7 MPa. There is no observable trend with depth for the point load tests.

2no Uniaxial Compressive Strength Tests were completed on samples from the Structured Chalk. These gave UCS values of 2.1MPa and 2.85 MPa.

The UCS test results and derived UCS values using different methodologies are plotted in Data Plot A1.21. Considering the methods described a design UCS value of 2.5 MPa is considered suitable.

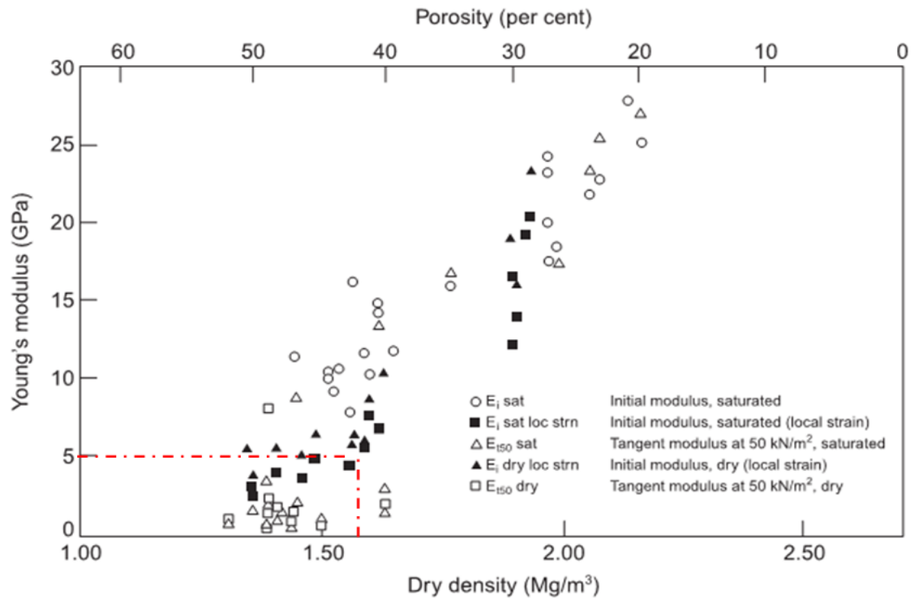

Figure 8: Relationship between dry density and porosity to Intact Youngs Modulus (Matthews and Clayton 1993). CIRIA 574.

5.6.4. Stiffness

Stroud (1989) suggests that for chalk deposits a conservative approximation can be made to estimate the drained stiffness (E') for settlement calculations from in situ SPT N tests using the relationship.

E'/N60 =5MPa.

Therefore, using the design line suggested in Section 5.6.2 it is recommended that;

E' (MPa) = 225+40z (where z is depth below +24 mOD).

E' (MPa) = 1000 (below +4 mOD).

A relationship relating porosity and dry density to the intact Youngs Modulus is detailed in Matthews and Clayton (1993) and replicated in Figure 8. Using an average dry density of 1.63Mg/m^3 an intact Youngs Modulus of approximately 5 GPa can be observed.

CIRIA 574 recommends the following parameters for structured chalk depending on the type of the analysis to be conducted:

Moderately conservative

C' =20 kN/m^2

Φ' = 39^o

Worst Credible

C' =0 kN/m^2

Φ' = 34^o

5.6.5. Summary of Parameters for Structured Chalk

The range of measured and characteristic soil parameters for the soil stratum are summarised in Table 5.8 below.

Table 5.8: Summary of Geotechnical Parameters for Structured Chalk

Soil Parameters	Unit	Range	Characteristic Value	Reference
Level at Top of Stratum	m OD	+21.2 - +30.95	+24.0	Exploratory hole logs from all GIs
Thickness	m	>21.2	Unproven	Exploratory hole logs from all GIs
Bulk Density	kN/m^3	19 – 20.2	19.6	Lab test results
SPT N60 value	-	13 – 375	45+8z (from +24 mOD) 200 (below +4mOD)	In situ tests
Undrained compressive strength	MN/m^2	-	2.5	Lab test results and correlation with CIRIA C143
C′	kN/m^2	-	20 (mod conservative) 0 (worst credible)	CIRIA 574
Effective angle of friction	°	-	39 (mod conservative) 34 (worst credible)	CIRIA 574
Drained Stiffness	MN/m^2	-	225+40z (from +24 mOD) 1000 (below +4mOD)	Assumed as a linear relationship
Intact Stiffness	GPa		5	Correlation with CIRIA C574

5.7. Groundwater

The Environment Agency classification reports the Made Ground as an Unproductive Strata, the Alluvium and Taplow Gravel as a Secondary A aquifer, and the Upper chalk formation as a Principal Aquifer.

Water strikes were encountered in 2no. exploratory holes summarised in Table 5.9 below.

Table 5.9: Ground Investigation Water Strikes

Exploratory Hole	Strike Level (mAOD)	Rise (mAOD)	Time to Rise (Minutes)	Stratum
WS202	34.41	35.81	20	Structureless Chalk
WS203	34.84	35.74	20	Structureless Chalk

A summary of the ground water monitoring installations is provided in Table 4.2. Six rounds of groundwater monitoring were undertaken on the 28thJune, 3rd/4th July, 10th July, 18th/19th July, 26th July and 22nd August. The final round of monitoring was undertaken out of sequence with the original monitoring schedule due to events on site in early August 2019. The highest water level measured was +36.2m AOD and the lowest water level measured was +36.0 m AOD. Based on this a design water level of +36.2m AOD is recommended.

A water level of +39.73m AOD was recorded in WS201; however, this is interpreted to be perched groundwater within the Made Ground.

It is important to note that with respect to water strikes and groundwater level observations made during drilling, that levels given in the borehole records may not reflect true equilibrium conditions for a number of reasons. For example, water has been added to assist drilling, and where strikes were encountered, the water may not have reached an equilibrium level within the duration of the test observations, typically 20mins. Additionally, groundwater levels and pressures can increase from those recorded during the monitoring period subject to seasonal change. It is recommended that further monitoring is undertaken during the winter months to capture any variations in the groundwater level.

Table 5.10: Ground Water Monitoring Results

Ground Water Monitoring Results	Ground Water Level (mAOD)					
	28/06/19	*3-4/07/19*	*10/07/19*	*18-19/07/19*	*26/07/2019*	*22/08/2019*
BH201	36.13	36.06	36.07	36.05	36.07	36.08
BH202D	36.14	36.1	36.1	36.06	36.07	36.10
BH203	36.2	36.06	36.07	36.02	36.05	35.05
BH204	36.1	36.06	36.01	35.91	36.0	36.0
BH205C	36.15	36.1	36.11	36.11	36.08	36.06
WS201	-	Dry	Dry	Dry	39.73	39.84
WS202	-	36.07	36.01	35.98	35.99	36.01
WS203	-	36.08	36.07	36.03	36.05	36.04

5.8. Ground Aggressivity

Sulphates and acids which occur naturally in the ground can be destructive to concrete through expansion and softening of the latter (BRE, 2005). Therefore, as part of the chemical testing programme, soil samples were tested for water soluble sulphate and pH to assess the potential chemical attack on the concrete structures. Water soluble sulphate and pH tests were carried out on 21 No. sample within the Made Ground, 3 No. sample within the Alluvium, 6 No. sample within the Taplow Gravels, and 3 No. within the Structureless Chalk. 12 No. groundwater samples were also taken. The data was assessed, with reference to the BRE Special Digest 1 – Concrete Aggressive Ground (BRE, 2005) to determine the appropriate concrete classification.

The assessment for the proposed works has considered ‘brownfield location’ and ‘mobile groundwater’ (conservative) conditions. A summary of the test results for the assessment of the Design Sulphate class and Aggressive Chemical Environment for Concrete (ACEC) classification is presented in Table 5.11.

Table 5.11: Results from testing for Aggressive Ground Conditions

	Made Ground	Alluvium	Taplow Gravels	Chalk	Groundwater
Water-soluble Sulphate (SO_4 mg/kg)	580	524	20	29	445
pH in 2.5:1 water/soil extract	7.7	7.1	8.5	8.7	7.4
Design Sulphate Class	DS-2	DS-2	DS-1	DS-1	DS-2
ACEC Class	AC-2	AC-2	AC-1	AC-1	AC-2

Therefore, in accordance with the BRE guidance, the Design Sulphate Class for the site can be classified as DS-2; the Aggressive Chemical Environment for Concrete (ACEC) can be inferred to be AC-2 to depth across the site.

6. SUMMARY OF GEOTECHNICAL PARAMETERS

Section 5 of the report presented a review of the Ground Investigation Factual Report for Station Hill North Site and interpretation of the Geotechnical Design Parameters. For each stratum, the geotechnical parameters recommended for foundation design are summarised in Table 6.1.

The stratigraphy varies significantly across the site and therefore it is recommended that the ground model adopted in design is assessed for each individual building.

Table 6.1: Summary of Geotechnical Parameters

Parameter	Unit	Range	Characteristic Value
Made Ground			
Level at Top of Stratum	m AOD	+38.05 to +40.6	+38.5
Thickness	m	1 to 5.6	2.5
Bulk Density	kN/m3	-	19
SPT (N1)60 value	-	3 - 85	10
Angle of Shearing Resistance	degrees	-	25
Drained Stiffness	MN/m2	2 – 60+	10
Alluvium			
Level at Top of Stratum	m OD	+32.75 to +36.9	+36
Thickness	m	0.6 – 1.9	1
Bulk Density	kN/m^3	-	20
SPT N60 Value	-	5.3 – 27.5	18
Undrained Shear Strength	kN/m^2	-	72
Stiffness (Foundations)	MN/m^2	-	E_u = 29
		-	E′ = 22
Taplow Gravels			
Level at Top of Stratum	m OD	+32.15 to +36.20	+35
Thickness	m	0.4 – 4.9	4
Bulk Density	kN/m^3	-	20
SPT $(N_1)_{60}$ Value	-	7 – 146	26
Angle of shearing Resistance	°	-	35
Drained Stiffness	MN/m^2	-	26
Structureless Chalk			
Level at Top of Stratum	m OD	+30.20 to +35.2	+31
Thickness	m	0.35 – 11.2	7
Bulk Density	kN/m^3	18.6 – 20.2	18.5
SPT N_{60} value	-	14 – 39	26
C′	kN/m^2	-	0
Effective angle of friction	°	-	32
E'	MN/m^2	27 –471	125
Structured Chalk			
Level at Top of Stratum	m OD	+21.2 - +30.95	+24
Thickness	m	>21.2	Unproven
Bulk Density	kN/m^3	19 – 20.2	19.6
SPT N60 value	-	13 – 375	45+8z (from +24mOD) 200 (below +4mOD)
Undrained compressive strength	MN/m^2	-	2.5
C′	kN/m^2	-	20 (mod conservative) 0 (worst credible)
Effective angle of friction	°	-	39 (mod conservative) 34 (worst credible)
Drained Stiffness	MN/m^2	-	225+40z (from +24 mOD) 1000 (below +4mOD)
Intact Stiffness	GPa		5

7. GENERIC QUANTITATIVE RISK ASSESMENT

7.1. Assessment Approach

The main environmental legislation relating to contaminated land in the UK is Part 2A of the Environmental Protection Act 1990. The philosophy behind Part 2A is the contaminant-pathway-receptor linkage; for land to be contaminated all three aspects of this linkage must be present (i.e. a contaminant must be present and able to move along a pathway and impact a receptor).

Ramboll has derived generic assessment criteria (GAC) for the interpretation of soil and groundwater chemical analyses. The GAC are threshold-based screening criteria, below which a significant risk is not considered to be present.

It should be noted that contaminants at concentrations that exceed the Ramboll GAC do not infer that an unacceptable risk is present; rather that further assessment is required to more fully understand potential contamination risks. The outcome of the screening is assessed further in the context of a qualitative contaminant-pathway-receptor risk assessment presented in the revised conceptual site model in Section 10.

The analytical results of the soil samples have been screened against the Ramboll GACs for a residential without plant uptake scenario and also against the commercial GACs. The east of the site has a proposed commercial end use. The south and west of the site are proposed for residential buildings. The majority of the ground floor level of the residential buildings is proposed to be a combination of retail, amenity space, bicycle parking, with limited residential apartments at ground level. A basement carpark is also proposed in the north of the site (north of the Thames Water Foul Sewer) in the west as part of Phase 3.

Construction Workers

This report and the generic assessment criteria (GAC) consider long term and chronic risk to humans based on defined exposure scenarios set out in the Contaminated Land Exposure Assessment (CLEA) model. In some cases, contaminants may also pose acute hazards to workers at a site, or a worker's exposure scenario may differ from the scenarios considered when deriving the GAC.

As exposure times for construction workers are generally short term, risks from site contamination are generally addressed through the use of appropriate working procedures and the use of personal protective equipment (PPE) in line with the Management of Health and Safety at Work Regulations (1999), Construction (Design and Management) Regulations (2015) for some sites and the Control of Substances Hazardous to Health Regulations (2002). This potential source-pathway-receptor linkage is considered further in Section 10. Field Evidence of Contamination

Potentially Natural Organic Odours

A strong (natural, plant based) organic odour was noted in several locations, predominantly in the north/centre of the site and typically associated with a soft clay strata with occasional gravel and relict rootlets at the base of the Made Ground and Alluvium.

A strong organic (natural, plant based) odour was noted in BH202D between 2.30m and 2.40m in a greyish green mottled dark brown clay with flint gravel and rare relict rootlets. TP205 also recorded a similar soft black and dark green gravelly clay with strong organic odour and frequent decomposing wood from 2.30m with the base of the trial pit at 3m. TP203 recorded a similar strong (plant based) organic odour associated with a very soft dark green speckled black slightly gravelly clay with relict rootlets at 2.50 m bgl to 2.90 m bgl. WS202 recorded a similar strata as soft greyish green mottled brown clay with faint organic odour at 2.20 m bgl to 3.30m bgl. BH205C had a faint organic odour at 4.00 to 4.20 m in the Taplow Gravels.

Former Tank Location / Former Garage Location (Hydrocarbons)

Hydrocarbon odours and visible contamination were noted in BH204 (south-east corner of the site) as a strong hydrocarbon odour between 2.80 m in the Made Ground to 4.50 m bgl at the top of the structureless chalk. Between 4.30 m bgl and 4.50 m bgl, at the top of the structureless chalk, a light grey discoloration was also noted along with the strong hydrocarbon odour. Elevated PID readings were also detected in BH204 during the monitoring with an elevated PID reading of 405.5ppm (refer to Section 9). BH204 coincides with the south-eastern edge of the historic garage.

The maximum reading recorded on site during the monitoring was 412.8ppm in WS203, which was drilled to the north west corner of the car park and was concurrent with a slight hydrocarbon odour. WS203 is broadly located in the location of the former tank shown on historical mapping. It is not known whether the former tank was a below or above ground storage tank (associated with the former garage). No evidence of a UST (underground storage tank) was encountered.

7.2. Asbestos

Twenty-four samples taken from the Made Ground were submitted for asbestos screening. Asbestos was detected in four samples and 'quantification' was scheduled for all positive asbestos identifications. The asbestos results are summarised in Table 7.1.

Table 7.1: Asbestos Detected

Exploratory Hole Location	Depth (m bgl)	Asbestos Type	Form	Quantification (%)
WS202	0.1-0.3	Chrysotile	Loose fibrous debris	0.002
		Amosite	Loose fibres	0.002
WS202	0.5-0.7	Amosite	Loose fibrous debris	0.024
WS203	0.55-0.75	Chrysotile	Loose fibres	<0.001
TP208	0.5-0.7	Amosite	Loose fibres	<0.001

All asbestos detections are within the top 0.75 m bgl of Made Ground. It is likely that the material containing the asbestos will be excavated as part of the basement excavation in the west, which will exceed depths of 0.75 m bgl where the asbestos has been identified and otherwise from shallow groundworks and foundation excavations in the east. Risks from asbestos to construction workers and the local community will need to be considered by the Principal Contractor as part of the development and a watching brief is recommended. Management of asbestos during the development works is beyond the remit of this report.

Future potential exposure pathways in relation to remaining soil containing asbestos can be expected to be 'broken' where asbestos is capped by buildings, hardstanding or an engineered landscaped layer. This is a standard remedial technique.

In Ramboll's experience, the asbestos found is not uncommon for urban areas or Made Ground and additional asbestos can be expected to be present in the soil elsewhere. Typically, a competent contractor should be able to manage the asbestos identified.

7.3. Soil Chemical Analysis Results

7.3.1. Heavy Metals

Arsenic concentrations exceeded the residential without plant uptake GAC of 40 mg/kg at 2 m bgl in TP203, recording a concentration of 44 mg/kg. Ramboll considers this to be a marginal exceedance and has not assessed this further.

Lead exceeded the residential without plant uptake GAC in WS203 (0.55 m), WS211 (0.5 and 0.95 m), BH204 (1.5 m) and TP203 (2 m). The highest concentration detected was 1,100 mg/kg at WS203 (0.55m); however, the elevated results are located in proximity to proposed Block C (commercial end use) or Block G (Phase 2 commercial use) and do not exceed the commercial end use GAC (2,300 mg/kg). As such the lead encountered is not considered to be a significant risk or warrant further action in terms of the proposed end development.

No other heavy metal results exceed the relevant GAC for residential or commercial end use.

7.3.2. Polycyclic Aromatic Hydrocarbons (PAHs)

Elevated PAHs were detected in several locations across the site; WS202, WS203, WS211, BH201, BH203, TP203, TP208 and TP209 when compared to residential without plant uptake screening criteria.

Naphthalene was elevated in WS203 (1.1 m) at 7.3 mg/kg and TP208 (1.5 m) at 2.4 mg/kg in the centre of the site when compared to residential screening criteria. These elevated readings are located in an area with a proposed commercial end use and do not exceed the commercial GAC of 110 mg/kg. Therefore, a risk is not considered to be present.

Using benzo(a)pyrene as a surrogate marker compound for PAHs, there are two locations which exceed the commercial C4SL GAC of 76 mg/kg; WS203 at 1.1 m bgl at 270 mg/kg, and TP208 at 1.5 m bgl at 120 mg/kg. TP208 will likely fall within the proposed basement area in Phase 3, and as such, the material containing the elevated PAHs can be expected to be excavated as part of the earthworks.

7.3.3. Total Petroleum Hydrocarbons (TPHs)

Elevated heavy end aromatic hydrocarbons (Aromatic C21-C35) were identified in soils in two locations; WS203 (1.1m) at 2,600 mg/kg and TP208 (0.5m) at 2,900 mg/kg when compared to residential without plant uptake assessment criteria.

Both of these exploratory locations are central to the site where either commercial buildings are proposed in the master plan or will coincide with areas expected to be excavated for basement construction in Phase 3.

No TPH results exceeded the GAC for commercial end use of 29,000 mg/kg, and therefore remediation is not considered necessary.

A watching brief should be undertaken when excavating the basement and other footings particularly in the areas where elevated hydrocarbons have been detected.

7.3.4. VOCs and SVOCs (Volatiles)

No VOCs were detected above Ramboll GACs. PAHs were identified above the GAC within the analytical methods for the SVOC but are not discussed further here; reference should instead be made to Section 7.4.2.

7.4. Human Health Risks from Soils Discussion

A small number of contaminants exceeded the relevant soil GACs in a limited number of samples.

The highest exceedances are predominantly located in centre of the site in TP208 and WS203, these are in areas of commercial development or hardcover and particularly in the case of TP208 are expected to coincide with the Phase 3 basement area such that they would likely be removed. On this basis the soil results are therefore not considered to represent a risk to the future site use or warrant further action, except for a watching brief during earthworks and the basement excavations.

Assessment within the footprint of the multi-storey car park would be prudent following demolition. As explained later, this would most effectively take the form of a watching brief and trial pitting during demolition.

Limited exploratory holes have been undertaken in the area of the proposed residential buildings due to Xafinity House and walls still being present on site. The proposed development comprises predominantly hardstanding with limited soft landscaping and limited residential use at ground level, however additional assessment and a watching brief is recommended in the west of the site following the demolition of Xafinity House and related infrastructure to confirm the final site condition.

8. CONTROLLED WATERS RISK ASSESMENT

Assessment Approach

Seven groundwater samples were obtained in total; six groundwater samples (BH201, BH202D, BH203, BH204, BH205C and WS203) were taken on 4th July and an additional sample (WS202) was taken on 10th July 2019. All groundwater samples were scheduled for chemical analysis to compliment the soils suite.

8.1. Analytical Results

The groundwater exceedances are summarised in Table 8.1 below. Analytical certificates for groundwater are presented in Appendix 2. Exceedance of screening criteria does not infer that an unacceptable risk is present; the outcome of the screening is assessed further in the context of a qualitative source-pathway-receptor risk assessment presented in Section 10.

Table 8.1: Groundwater Exceedances

Determinand	Ramboll GAC (ug/l)	Maximum Concentration (ug/l)	Locations of Exceedance
Sulphate	400,000	445,000	BH204
BaP (and associated PAH compounds)	0.01	3.25	BH204
Fluoranthene (most elevated PAH)	0.1	7.16	BH204
TPH CWG – Aliphatic >C10 - C12	300	390	BH204
TPH CWG – Aromatic >C10 - C12	90	330	BH204
TPH CWG – Aromatic >C12 - C16	90	660	BH204
TPH CWG – Aromatic >C12 - C16	90	190	BH204
Nickel	20	29	BH205C
Tetrachloroethene (PCE)	10	11.1	BH203

The exceedances of nickel in BH205C and tetrachloroethene (PCE) in BH203 are considered to represent a low risk given that the marginal exceedance above conservative guidelines, the isolated occurrence and proposed future site use.

Solvents, such as PCE, may be present at the site given the former garage use; however, none have been identified at significantly elevated concentration in soils and the groundwater exceedance is only one marginal result. The concentration detected in not uncommon for brownfield or urban sites. There is no plausible source of nickel in groundwater (based on the historic uses of the site). No further consideration of these particular results is therefore considered to be warranted.

The hydrocarbon exceedances identified in BH204 likely relate to the historical uses of this area of the site as a garage, however significantly elevated hydrocarbon concentrations were not detected within the soils at this location.

8.2. Additional Scope of Works – Groundwater Monitoring

Two additional rounds of groundwater monitoring were undertaken on 26th September and 22nd October 2019 to further assess the TPH and PAHs in BH204 and WS203.

The groundwater analytical results from the three monitoring rounds are summarised in Table 8.2 below.

	Round 1 (04/07/2019)		Round 2 (26/09/2019)		Round 3 (22/10/2019)	
Contaminant	**WS203**	**BH204**	**WS203**	**BH204**	**WS203**	**BH204**
Polycyclic Aromatic Hydrocarbons						
Naphthalene	<0.01	1.94	<0.01	5.61	<0.01	0.67
Acenaphthylene	<0.01	0.64	<0.01	<0.01	<0.01	0.39
Acenaphthene	<0.01	0.34	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.01	0.68	<0.01	<0.01	<0.01	0.27
Phenanthrene	<0.01	3.33	<0.01	0.33	<0.01	0.74
Anthracene	<0.01	0.69	<0.01	<0.01	<0.01	0.37
Fluoranthene	<0.01	7.16	<0.01	0.4	<0.01	2.62
Pyrene	<0.01	6.12	<0.01	0.38	<0.01	2.40
Benzo(a)anthracene	<0.01	2.90	<0.01	<0.01	<0.01	1.21
Chrysene	<0.01	3.12	<0.01	<0.01	<0.01	1.13
Benzo(b)fluoranthene	<0.01	3.69	<0.01	<0.01	<0.01	1.39
Benzo(k)fluoranthene	<0.01	1.55	<0.01	<0.01	<0.01	0.73
Benzo(a)pyrene	<0.01	3.25	<0.01	<0.01	<0.01	1.11
Indeno(1,2,3-cd)pyrene	<0.01	2.01	<0.01	<0.01	<0.01	0.58
Dibenz(ah)anthracene	<0.01	0.58	<0.01	<0.01	<0.01	<0.01
Benzo(ghi)perylene	<0.01	2.33	<0.01	<0.01	<0.01	0.79
Total PAHs	<0.16	40.3	<0.16	6.72	<0.16	14.4
Total Petroleum Hydrocarbons						
Aliphatic C10-C12	<10	390	<10	<10	<10	260
Aliphatic C12-C16	<10	200	<10	<10	<10	1700
Aliphatic C16-C21	<10	350	<10	<10	<10	970
Aliphatic C21-C35	<10	3000	<10	<10	<10	4000
Aromatic C10-C12	<10	330	<10	290	<10	340
Aromatic C12-C16	<10	660	<10	61	<10	330
Aromatic C16-C21	<10	190	<10	<10	<10	100

	Round 1 (04/07/2019)		Round 2 (26/09/2019)		Round 3 (22/10/2019)	
Total TPH Aliphatic (C5-C35)	<10	**3900**	<10	**420**	<10	**6900**
Total TPH Aromatic (C5-C35)	<10	**1200**	<10	**530**	<10	**780**

8.3. Additional Scope of Works – Discussion of Results

Elevated concentrations of PAHs and TPHs were detected within BH204 during the first and third monitoring rounds. All concentrations of contaminants were recorded at significantly lower levels or fell below the laboratory limit of detection with the exception of Naphthalene which increased in concentration from 1.94 µg/l to 5.61 µg/l during the second monitoring round.

In summary, elevated hydrocarbon concentrations have been consistently identified in groundwater at BH204 in the south-east area of the site. This well is installed within the Made Ground and therefore are likely to contain perched, localised groundwater and not relate to the deeper aquifers of the Taplow Gravels or underlying Chalk. The data from WS203 provides confidence that the groundwater contamination in BH204 can be expected to be localised and not indicative of a site wide groundwater contamination plume, and it is understood to be perched within the Made Ground deposits on site.

TPH concentrations were not detected above the laboratory limit of detection in WS203 during the three monitoring rounds. This provides evidence that the TPH detected in BH204 is limited in extent and static.

8.4. Discussion

Significant or widespread groundwater contamination was not identified. A localised hotspot of TPH was found close to a former garage use which was further assessed by undertaking repeat sampling. Given the isolated nature and location of this sample, the TPH and also PAHs detected are not considered to represent a significant risk of pollution or require remediation.

During demolition and earthworks, it is recommended that a watching brief is undertaken to further assess TPH in this area and beneath the current buildings. This could take the form of additional trial pits excavated to the water table, soil and groundwater testing.

9. BUILT ENVIRONMENT RISK ASSESSMENT

9.1. Ground Gas Risk Assessment

Six ground gas monitoring visits were undertaken over a three-month period on; 14th/18th June, 28th June, 3rd/4th July, 10th July, 26th July and 22nd August 2019. The ground gas monitoring results are presented in full in the GEL Factual Report and are summarised as follows:

- Atmospheric pressure recorded during the monitoring visits ranged from 1004 and 1026 millibar (mb).
- The maximum positive flow rate recorded was 3.7 litres per hour (l/h) in BH201, subsequently dropping to 0.0 l/hr after 2 minutes.
- Significant negative flow rates were recorded, with the maximum being -17.3 in BH201 on the final visit, which subsequently rose to 0.0 l/hr after 1 minute.
- The maximum recorded concentration of carbon dioxide recorded was 10 % v/v in WS203 on the final gas monitoring visit.
- No methane was recorded in any location during any of the monitoring rounds.
- The maximum concentration of carbon monoxide detected was 10 ppm in BH201 on one occasion.

Readings from the monitoring have been used to generate a worst-case gas screening value (GSV) for the site based on CIRIA C665 guidance. The GSV (gas screening value) was then calculated using the maximum volume of methane or carbon dioxide gas that could be produced each hour. The GSV for the site has been calculated as 0.37 l/hr, using the maximum positive flow rate of 3.7 and highest carbon dioxide reading of 10% v/v.

Th GSV classifies the site as Characteristic Situation 2 (Low Risk). Characteristic Situation 2 states that basic gas protection measures are required. A typical scope of these protective measures should comprise "a) Reinforced concrete cast *in situ* floor slab (suspended, nonsuspensed or raft) with at least 1200 g DPM2 and underfloor venting. B) Beam and block or pre-cast concrete and 2000 g DPM/reinforced gas membrane and underfloor venting. All joints and penetrations sealed." Where a basement is present for car parking it can be expected that the structure of the basement would require 'tanking' to prevent groundwater ingress where this is shallower than the floor of the basement, similarly the basement could be expected to be vented if used for car parking such that the potential risks from gas ingress could be reduced. Where basements are not planned (such as the Phase 2 area), gas protection measures will be required.

9.2. Vapours Risk Assessment

VOCs were recorded during the monitoring period at a maximum concentration of 72.4 ppm (parts per million by volume) in BH204 on the first four rounds. Possible groundwater contamination and a hydrocarbon odour were noted in the borehole at this location. The fifth monitoring round was undertaken on 26th July after an extended period of hot weather. The monitoring round recorded high VOC readings in most locations. The maximum concentrations being; 412.8ppmv in WS203, 405.5ppmv in BH204, 389.2ppmv in BH205C, 313.8ppmv in WS201, 258ppmv in BH202D, 247.9ppmv in WS202 and 246.6 ppmv in BH201.

Further investigation and consideration of the vapours risk should be undertaken following demolition of Xafinity House in the area of proposed residential development, which currently lacks significant site investigation, and in the area of the multi-storey car park where hydrocarbons were encountered in soils and groundwater.

9.3. Water Supply Pipes

Buried water supply pipes can be at risk from permeation and accelerated deterioration from certain contaminants. A detailed assessment of existing and future pipe materials is outside of the scope of this investigation; however, architects and designers should liaise with the local water supply company and are directed to the following document for guidance:

- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites; UK Water Industry Research (UK WIR), 2010 (Ref. 10/WM/03/21).

10. REVISED CONCEPTUAL SITE MODEL

10.1. Revised Conceptual Site Model

Using information obtained during this site investigation, the preliminary conceptual site model presented in Section 6 has been refined and is described in Table 10.1 below:

Table 10.1: Revised Conceptual Site Model

Sources of Contamination

Soil:

- Asbestos (Chrysotile and Amosite) was detected in four samples with a maximum depth of 0.75 m bgl and with quantifications between <0.001% and 0.024% w/w.
- Lead exceeded the residential without plant uptake GAC in four locations. None exceed the commercial GAC and it is likely these exceedances will either be excavated as part of the earthworks or be at a suitable depth beneath concrete foundations and hardstanding.
- Hydrocarbons (PAHs and TPH) were detected above the relevant GACs. It is likely that some of these exceedances will be removed as part of the earthworks and basement excavation but that some risks will remain in BH204 and the area in the south east of the site. Further assessment and delineation of hydrocarbons is recommended.
- Visual and olfactory evidence of contamination was noted in BH204 during the ground investigation between 3.8m and 4.5m bgl at the base of the Made Ground and the top of the structureless chalk, as light grey discolouration in the chalk with a strong hydrocarbon odour.
- A strong, natural, organic odour was noted in several locations, predominantly in the north/centre of the site, typically associated with a soft clay strata with occasional gravel and relict rootlets at the base of the Made Ground and Alluvium.

Groundwater:

- Six groundwater samples were taken from all five boreholes and one window sample.
- Elevated TPHs and PAHs were identified in BH204 above the screening criteria for controlled waters.
- Two additional rounds of groundwater sampling were undertaken in BH204 and WS203 and elevated concentrations of TPHs and PAHs were recorded in BH204 on all three occasions.
- Further assessment of hydrocarbons in groundwater in BH204 is recommended following the demolition of the NCP car park which impeded investigation of this area.

Ground Gas:

- The maximum recorded concentration of carbon dioxide was 10 % v/v in WS203
- No methane was detected in any locations during the monitoring.
- The maximum positive flow rate was recorded as 3.7 litres per hour (l/h) in BH202D.
- The maximum negative flow rate recorded was -17.3 in BH201.
- A GSV for the site has been calculated as 0.37 l/h, which lies within CIRIA C665 Characteristic Situation 2.

Vapours

- VOCs were recorded in all locations during the gas monitoring visits. The maximum VOC recorded was 412.8ppm in WS203 and 405.5ppm in BH204. Both of these locations are located adjacent to the former garage and now multi-storey car park and appear related to the presence of hydrocarbon odours identified in soil and groundwater.
- No VOCs exceeded in the soil samples, however SVOCs exceeded in WS202, WS203 and BH204. These locations are in the south east of the site surrounding the former garage and location and correspond to the VOCs detected during monitoring.

Table 10.1: Revised Conceptual Site Model

Geology

The investigation confirmed the anticipated geological sequence at the site. Made Ground was encountered across the site. Beneath this, further superficial deposits of occasional Alluvium and Taplow Gravels were encountered. These in turn were found to overly the solid geology of the Upper Chalk Formation.

Hydrogeology

- The Made Ground is classed as unproductive strata.
- The Alluvium and Taplow Gravel Formation are Secondary A Aquifers.
- The Chalk is a Principal Aquifer.

Hydrology

- The nearest surface water feature is a drainage network 320m northwest of the site, associated with the railway line.
- The River Thames, at its closest point, lies 420m northeast of the site and flows to the east.
- The River Kennet is located approximately 500m southeast of the Site and also flows in an easterly direction.
- Overall the site is considered by Ramboll to be located in an area of low to moderate environmental sensitivity in terms of surface water receptors. The nearest receptors are some distance but groundwater at the site would be expected to be in hydraulic continuity with the surrounding hydrological features.

Potential Contaminant Linkages The following potential pollutant linkages have been identified at the Site and are considered further in the qualitative risk assessment:			**Potential Contaminant Linkage**
Human Health **(Future construction workers and site users)**	On-site	• Dermal contact, ingestion of soil and soil derived dust, principally asbestos • Ingestion and inhalation of soil derived particulates and dust.	PCL1
	On-site	• Inhalation of vapours	PCL2
Water Environment	Off-site	• Migration of contaminants off-site within groundwater, onto third party land and towards off-site abstraction wells or surface water features.	PCL3
Built Environment	On-site	• Migration of ground gases in buildings and structures.	PCL4

10.2. Qualitative Risk Assessment

The principal sources of contamination, receptors and potential pollutant linkages have been assessed using a qualitative source-pathway-receptor approach and are summarised in Table 10.2.

Table 10.2: Qualitative Source-Pathway-Receptor Risk Assessment

Potential Contaminant Linkage	Contaminants	Pathways	Receptors	Discussion	Risk Rating
PCL1	Contaminants in soils	Dermal contact. Ingestion and inhalation of soil derived particulates and dust and asbestos. Inhalation of vapours.	Future site users.	**Current/Future Site Users** The investigation identified elevated lead, PAHs and TPH for a residential without plant uptake end use in several locations, predominately in the central area of the site. Asbestos was detected in three exploratory hole locations, in four samples out of twenty-two Made Ground samples screened. Chrysotile and Amosite were detected. Quantifications were between <0.001% and 0.024% w/w. The proposed development plans include commercial in the north and east of the site, together with the basement located under Phase 3, therefore, risks to end users from soil concentrations measured to date are currently considered to be low and mitigated by the development scheme.	**Low to Moderate**
				Construction Workers There is potential for site maintenance workers to come into contact with contaminated soils, including asbestos during earthworks. The use of appropriate risk assessment and working procedures, such as hygiene measures and PPE, should mitigate risks to workers.	**Low to Moderate**
PLC2	Vapours (VOCs)	Lateral and vertical migration	Future site users. Built environment	Elevated VOCs were detected in most locations during the ground gas monitoring, in particular in WS203 and BH204, the two locations in the south east of the site, closest to the former garage and current multi-storey car park. Protection from vapour risks need to be considered going forwards.	**Moderate**
PCL3	Contaminants in groundwater	Lateral migration of groundwater	Off-site third-party land and its users. Off-site potable abstraction and surface water features.	A hotspot of hydrocarbon contamination in groundwater was identified in BH204 in the area of the former garage (and present-day multi-storey car park). The risks from contamination in groundwater to migrate onto third party land, towards the potable abstraction and towards off-site surface water features is considered low to moderate as the groundwater is known to be perched in BH204. Further assessment will be possible following the demolition of the multi-storey car park in this area, to assess the risks to controlled waters and take remedial action if necessary.	**Low to Moderate**
PCL4	Ground Gas	Lateral and vertical migration	Future site users. Built environment.	The results of the preliminary ground gas risk assessment suggest that the site may be classified as CIRIA Characteristic Situation 2 (CS2, Low Risk). This is a worst-case scenario calculated using the highest flow rate and the highest carbon dioxide reading throughout the monitoring period. Ground gas protection measures are required to be considered as part of the proposed development.	**Low to Moderate**

11. CONCLUSIONS AND RECOMMENDATIONS

11.1. Conclusions

This ground investigation report has been prepared for the proposed development of the Station Hill North Site based on the findings of the ground investigation undertaken by Ground Engineering Ltd during the period 8th May and 18th June 2019. The investigation comprised five deep boreholes, five window sample holes and seven trial pits. The investigation was limited to areas of the site where buildings had already been demolished and several obstructions were encountered in exploratory hole locations across the site. The multi-storey car park and Xafinity House are still present and will be demolished in due course.

In general, only modest soil and groundwater contamination was identified with a hotspot of hydrocarbons detected in groundwater in one location. Based on the investigation results, a significant risk has not been identified to future site users or Controlled Waters. Remediation is not considered necessary; however, a number of best practice measures should be implemented, and an unexpected contamination procedure prepared and validated.

During the investigations concrete was encountered at the top of the Made Ground in all of the exploratory holes varying in thickness. The average confirmed thickness of the concrete was 0.31m. In several locations, the full extent of the concrete was not determined, with second a layer of concrete below the first being encountered, separated by Made Ground. This Made Ground was underlain by Alluvium in three locations and by Taplow Gravels in four locations. The Chalk was encountered in the five boreholes undertaken.

Groundwater was encountered at a depth of between +36.2m AOD and +36m AOD (compared to a site level of between 38m AOD and 40m AOD).

Environmental Conclusions

Four samples identified positive results for asbestos (both chrysotile and amosite). These were a mixture of loose fibres and loose fibrous debris. The quantifications ranged between <0.001% and 0.024% w/w. All detections were reported within the top 0.75 m of Made Ground. Due to the shallow identifications of asbestos, Ramboll expects that the majority of this material will be removed from site as part of the earthworks and basement excavations. Further asbestos is likely to be present as is typical for other brownfield sites.

Analysis of soils samples identified contaminants in excess of Ramboll's generic assessment criteria (GAC) for a residential without plant uptake end use. These were predominately located in the centre of the site (TP208 and WS203) and are at a maximum depth of 1.5 m bgl. Only one benzo(a)pyrene result (in WS203) was found to exceed the commercial GAC. However, this area will be capped and therefore the risk should be mitigated.

Hydrocarbon odours and visible contamination was noted in BH204 log, as a strong hydrocarbon odour between 2.80 m in the Made Ground down to 4.50 m bgl at the top of the structureless chalk and this coincides with the detection of elevated hydrocarbon concentration in groundwater at this same location.

Two additional rounds of groundwater sampling were undertaken in September and October 2019 to further investigate the elevated hydrocarbon concentrations at BH204. Sampling was undertaken in BH204 and WS203 and the results indicate that elevated hydrocarbon concentrations have been consistently identified in groundwater at BH204 in the south east area of the site. The data from WS203 (no detectable hydrocarbon concentrations) provides confidence that the groundwater contamination in BH204 can be expected to be localised and not indicative of a site wide groundwater contamination plume. Analysis of the groundwater samples against human health volatilisation risk did not identify any contaminants above the relevant GAC for the site.

The results of the preliminary ground gas risk assessment suggest that the site may be classified as CIRIA Characteristic Situation 2 (Low Risk). Characteristic Situation 2 requires passive, development led basic gas protection measures to be incorporated into the building design.

11.2. Recommendations

Due to the ground investigation being undertaken prior to and/or during demolition of the existing buildings, access for carrying out exploratory holes was limited to certain areas of the site. As such, further investigation is recommended in the following areas:

Geotechnical Recommendations

- In the area proposed as Block F (South site) to provide further coverage and confirm the level and composition of the Structured Chalk.
- Additional geotechnical investigation is recommended towards the east of the north site (across the NCP car park, and at the interface with Thames Tower) to confirm the level of the Structured Chalk and to assess the potential risk of variation in geology and/or solution features in this area of the site. Cone penetration testing is likely to be the most efficient method of investigation.
- It is recommended that preliminary pile testing is undertaken to supplement the Ground Investigation in order to provide an improved understanding of the anticipated pile load performance at the site. This will enable refinement of the pile design, and potential cost savings to the substructure.
- A number of obstructions were encountered during the Ground Investigation. Further investigation into the location and nature of the existing foundations is recommended in order to reduce the risk of encountering obstructions during the construction phase.

Environmental Recommendations

- Further assessment and consideration of the vapours risk should be undertaken following demolition of Xafinity House in the area of proposed residential development and in the area of the multi-storey car park during earthworks stage where hydrocarbons were encountered in soils and groundwater.
- An environmental watching brief is recommended during the earthworks to assess unexpected contamination. A Validation Report should be produced when the watching brief is completed. The watching brief visits should focus on the areas of identified contamination, and in particular beneath the foundations of the multi-storey car park to further assess potential contamination in this area.
- Future soft landscaped areas and/or planters should be required to use a 600mm cap of imported material (topsoil) that is deemed suitable for use from a contamination perspective. Site-won materials are deemed unsuitable for reuse as subsoil or topsoil in soft landscaped areas. Validation of the soft landscaped areas will be undertaken by the environmental consultant at the end of the build and an addendum to the Validation Report will be issued to sign off the associated Planning Condition.

Based on the current site investigation, assuming that no previously unidentified contamination is encountered during further works, then the following best practice measures are recommended in Table 11.1.

Table 11.1: Mitigation Measures

Category	Description of Recommended Mitigation Measures
Environmental Management Plan	An Environmental Management Plan (EMP) should be prepared and implemented in order to prevent construction work and future operations from giving rise to land contamination. The EMP should include the site specific risk management measures recommended above as well as the following measures: • overview of legislative compliance; • noise and vibration management requirements; • imported soils control and verification requirements; • site welfare; • controls for excavation works; • waste management and materials management requirements; • air quality and dust control provisions; • methods for dealing with unexpected contamination finds and asbestos finds; and • procedures for environmental acidents and emergency situations.
Protective measures during construction	Many of the potentially significant effects on the construction work force can be expected to be mitigated as part of the health and safety precautions required of the Contractor. Risk to construction workers should be dealt with by the Contractor based on the identified hazards. These should also be revised based on the ground conditions encountered during on-site activities. The Contractor will be responsible for site health and safety and will manage the risk through control of suitable Health and Safety measures for example including provision of PPE, education of the workforce and inductions for all site staff and visitors. Asbestos has been detected on site and therefore appropriate RPE and protective measures should be put in place to protect construction workers from being exposed to asbestos. The proposed development is subject to CDM Regulations.
Site Enabling and Clearance works	Obstructions and existing foundations should be considered prior to the enabling and clearnace works. For excavated materials, best practice approaches including bunding of materials should be implemented in order to minimise cross contamination of excavation materials and/or perched water, if encountered in any excavations during the site works. An environmental watching brief is recommended during the earthworks and basement excavation. If any previously unidentified contamination is encountered, validation sampling should be undertaken.
Underground Services	The Thames Water Foul Sewer beneath the site will need to be considered during design stages and managed throughout the earthworks, piling and construction stages. Laying underground services in potentially contaminated Made Ground materials has the potential to establish preferential flow pathways. In addition, certain contaminants e.g. hydrocarbons may penetrate and impact on water supply. Therefore, materials should be used appropriate to the level of contamination identified on site, particularly with regard to underground mains water supply. Heavily contaminated areas of the site have not yet been identified but additional investigation is still required in uninvestigated areas and groundwater is typically deeper than the levels at which services might be installed, however further consideration to service routes should be given once all investigations have been completed.
Waste Management and MMP	Waste disposal should be undertaken in accordance with current legislative requirements. A materials management plan (MMP) is likely to be required to track material movements for the development if material is intended to be re-used on-site.
Soft Landscaping	For any soft landscaped areas, Made Ground soils are not considered suitable for the use in soft landscaped areas. Any topsoil/subsoil imported for use within any soft landscaped areas should be tested and verified against a suitable for use criteria.
Asbestos Management Protocol (can be incorporated into EMP)	Asbestos has been encountered in the shallow Made Ground soils. The Client should therefore ensure that this risk is addressed and mitigated through the preparation and adoption of health and safety risk assessments and method statements, which should be prepared at least in accordance with the Control of Asbestos Regulations 2012, to ensure the health and safety of all construction workers during the excavation of Made Ground. Details of on-site procedures to be adopted in the event that asbestos containing material is suspected and or encountered will be required. Details may include but are not limited to: • monitoring; • watching briefs; • competency of personnel; • licenced contractors; and • HSE notification (if required).
Previously Unidentified Contamination	Due to the potential for previously unidentified contamination to be present in areas which were inaccessible at the time of this investigation, an allowance for additional investigaiton of uninvestigate should be made. Nothwithstanding, an enviornmental watching brief during the earthworks and basement excavation should be implemented. Watching brief visits should focus on areas of identified contamination, where former tanks are noted on historical maps and in areas less well investigated. During the watching brief, if unforeseen contamination is identified, contaminated materials will be segregated and dealt with appropriately and the Local Authority notified if appropriate. An allowance for validation samples should also be made in the event that unidentified contamination is encountered.
Verification Report	In accordance with EA guidance, a Verification and Remediation of Land Contamination Report will need to be produced in order to verify the completion of works and any previously unforeseen contamination encountered during the construction phase of works. The Verification Report is to include the details of the watching brief visit conducted throughout the earthworks to ensure no unacceptable risk remains and if relevant, will determine whether the remedial objectives have been met. The report may include: • summary verification works; • details of watching briefs completed (site works diary); • photographic log; • plan denoting sample locations; • plan showing the location of re-use of site derived materials; • quantities of re-used, imported and disposed material; • Waste Transfer Notes and carrier / receiving facility Licences; • sources, type of import and placement location; details and demonstration of any relevant permits or exemptions required by the Environment Agency for re-using material or importing material, particularly where there is the potential for material being considered waste; • areas of unexpected contamination and subsequent works conducted; • details of any water discharges / off-site removal of groundwater; • laboratory chemical testing results of validation samples, imported material, waste material; and, • details of any liaison and agreements with Regulators.

12. REFERENCES

- Ramboll UK Ltd, October 2018, *Geotechnical and Geoenvironmental Desk Study,* Ref: 1620004716-SHR-RAM-GE-002-Desk Study;
- Ramboll UK Ltd, September 2018, *Site Investigation Specification South Site*, Ref: 1620004761-SHR-RAM-GE-002-Ground Investigation Specification;
- Geotechnical Engineering Limited, February 2019, *Factual Report on Ground Investigation,* Ref: 34769;
- Ramboll UK Ltd, March 2019, *Ground Investigation Report, Station Hill South Site*, report ref: 1620004716);
- Ramboll UK Ltd, March 2019, *Site Investigation Specification North Site*, Ref: 1620004761-SHR-RAM-GE-003-Ground Investigation Specification North Site; and,
- Geotechnical Engineering Limited, August 2019, *Factual Report on Ground Investigation,* Ref: 35248.
- CIRIA (2002). *Engineering in chalk* (C574).
- CIRIA (1995). *The Standard Penetration Test (SPT): Methods and Use (C143)*.
- CIRIA C665 (2007). *Assessing risks posed by hazardous ground gases to buildings.*
- CLR11: *Model Procedures for the Management of Land Contamination* (2004).
- BS 5930:2015 *Code of Practice for Ground Investigations.*
- BS 10175:2011 + A1:2013 *Code of Practice for the Investigation of Potentially Contaminated Sites*.
- Concept (2012), *Site Investigation Report, Thames Tower,* Ref: 122460/FR-02.
- Waterman (2014), *Geo-Environmental and Geotechnical Assessment,* Ref: EED12350-110-R-3.1.1-RM

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LOCATION PLAN KEY:

- BH204 — EXPLORATORY BOREHOLE (GEL 2019)
- WS201 — WINDOWLESS SAMPLE (GEL 2019)
- TP 209 — TRIAL PIT (GEL 2019)
- BH303 — EXPLORATORY BOREHOLE (GEL 2018)
- WS304 — WINDOWLESS SAMPLE (GEL 2018)
- BH1 — EXPLORATORY BOREHOLE (ST CONSULT 2014)
- WS10 — WINDOWLESS SAMPLE (ST CONSULT 2014)
- BH03 — EXPLORATORY BOREHOLE (CONCEPT 2012)
- SECTION MARK
- THAMES WATER SEWER

DEVELOPMENT KEY

- BLOCK A
- BLOCK B-D
- BLOCK C
- BLOCK E
- BLOCK F
- BLOCK G
- PODIUM

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EXPLORATORY HOLE LOCATION PLAN

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1620004716	1.500	DH	AUG.2019

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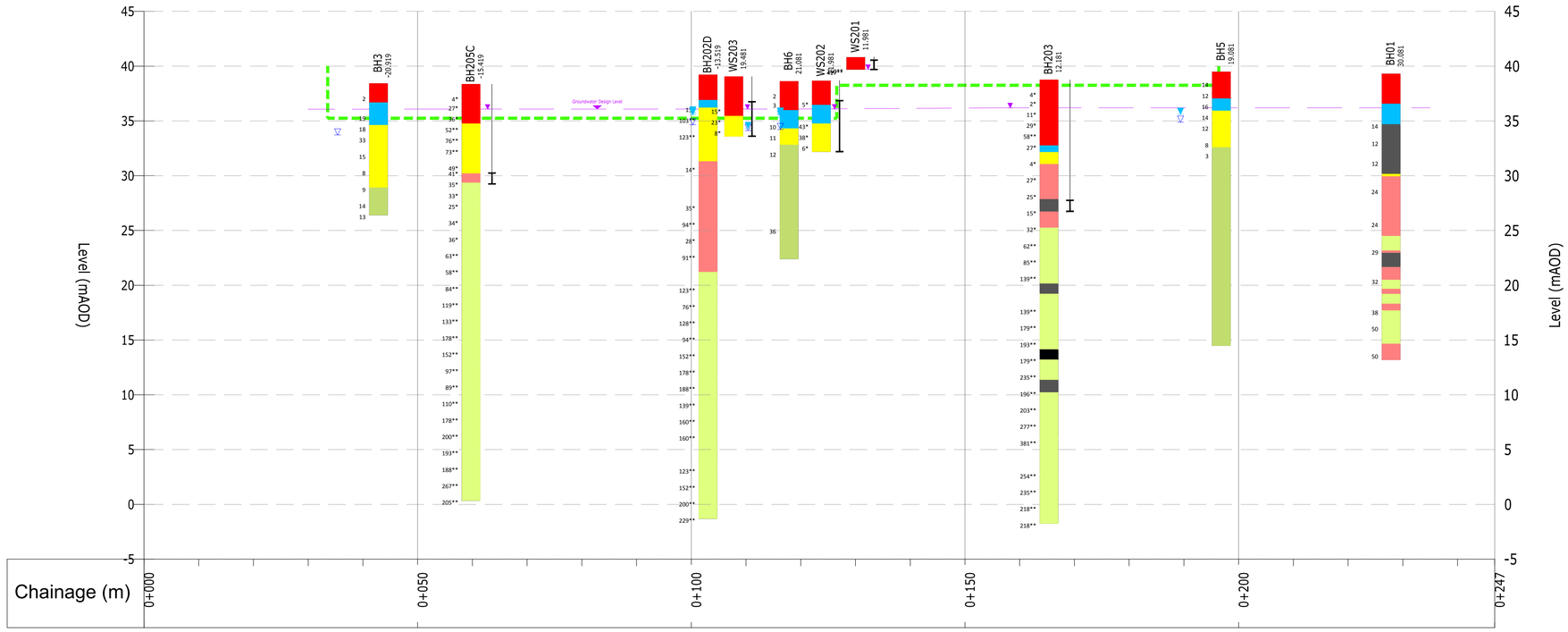

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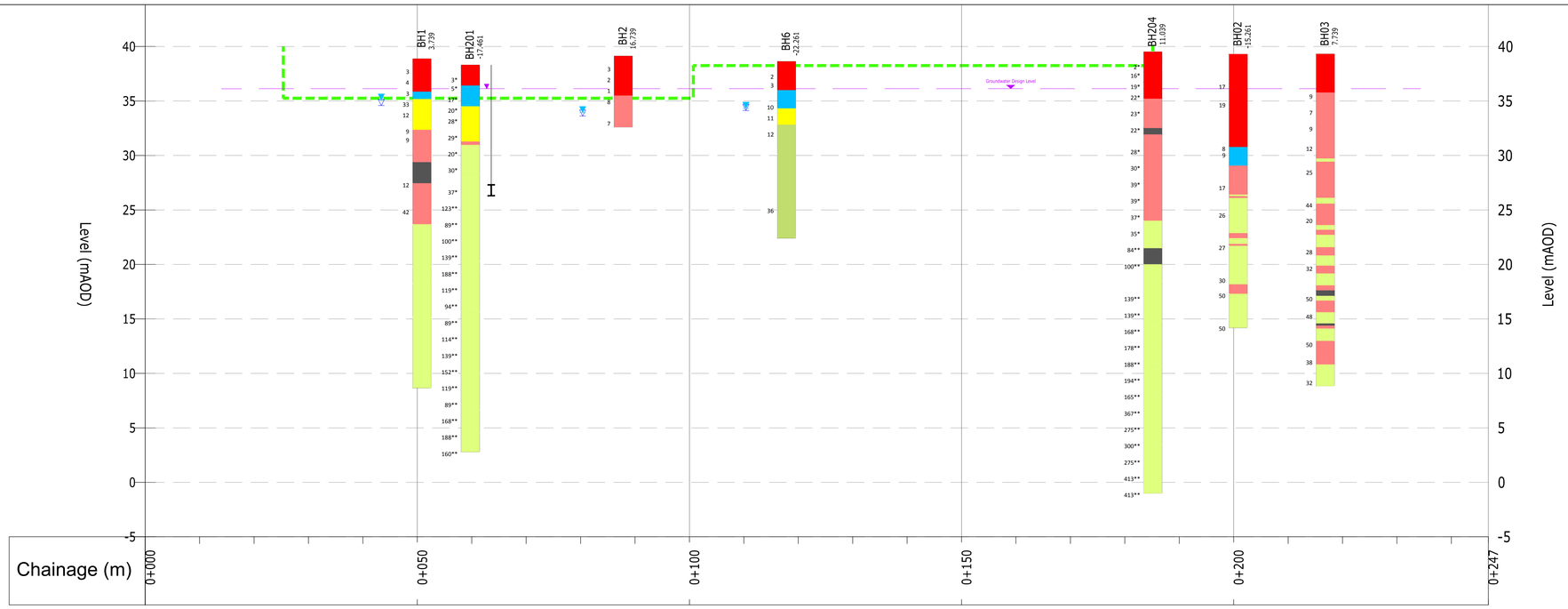

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KEY:

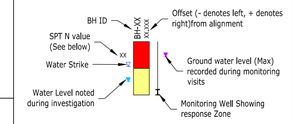
APPROXIMATE BASEMENT SSL LEVEL

GROUNDWATER DESIGN LEVEL

GEOLOGY KEY:

Legend	
	MADE GROUND
	ALLUVIUM
	TAPLOW GRAVEL
	STRUCTURELESS CHALK
	STRUCTURED CHALK
	UNDIFFERENTIAITED CHALK
	NO RECOVERY

BOREHOLE LEGEND:



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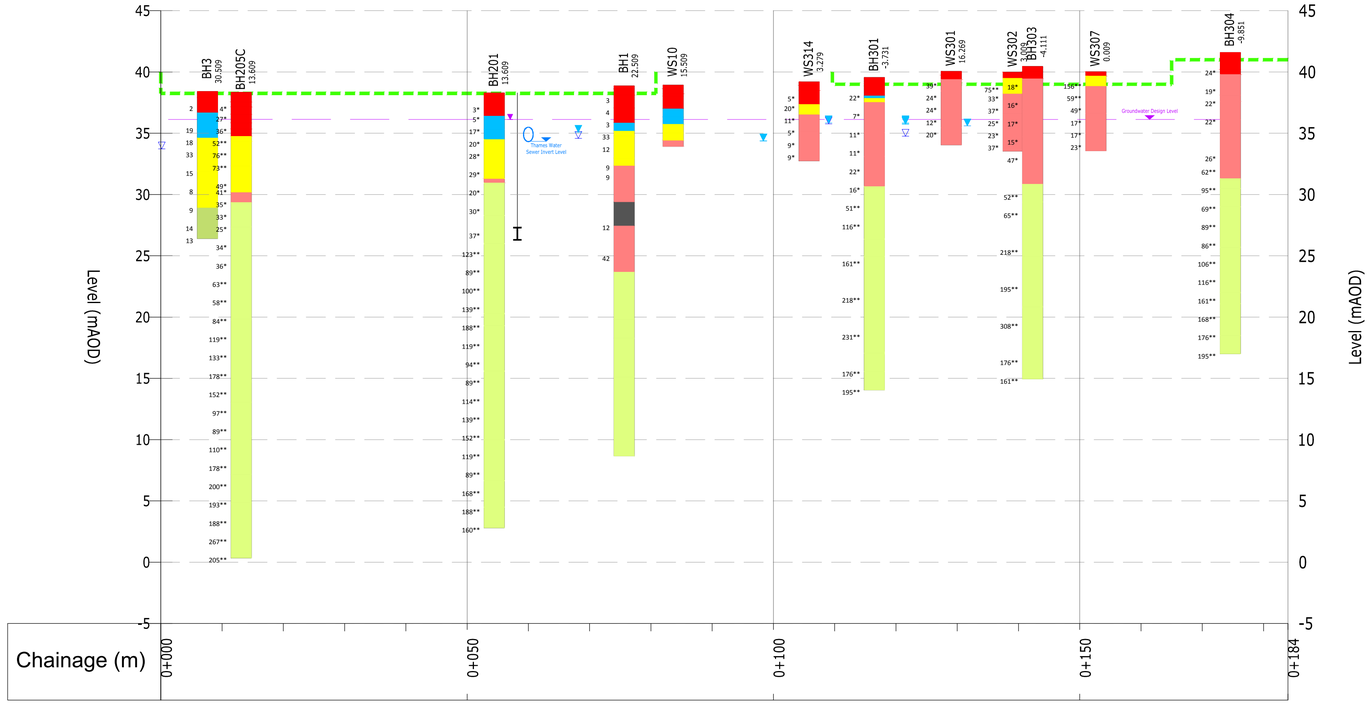

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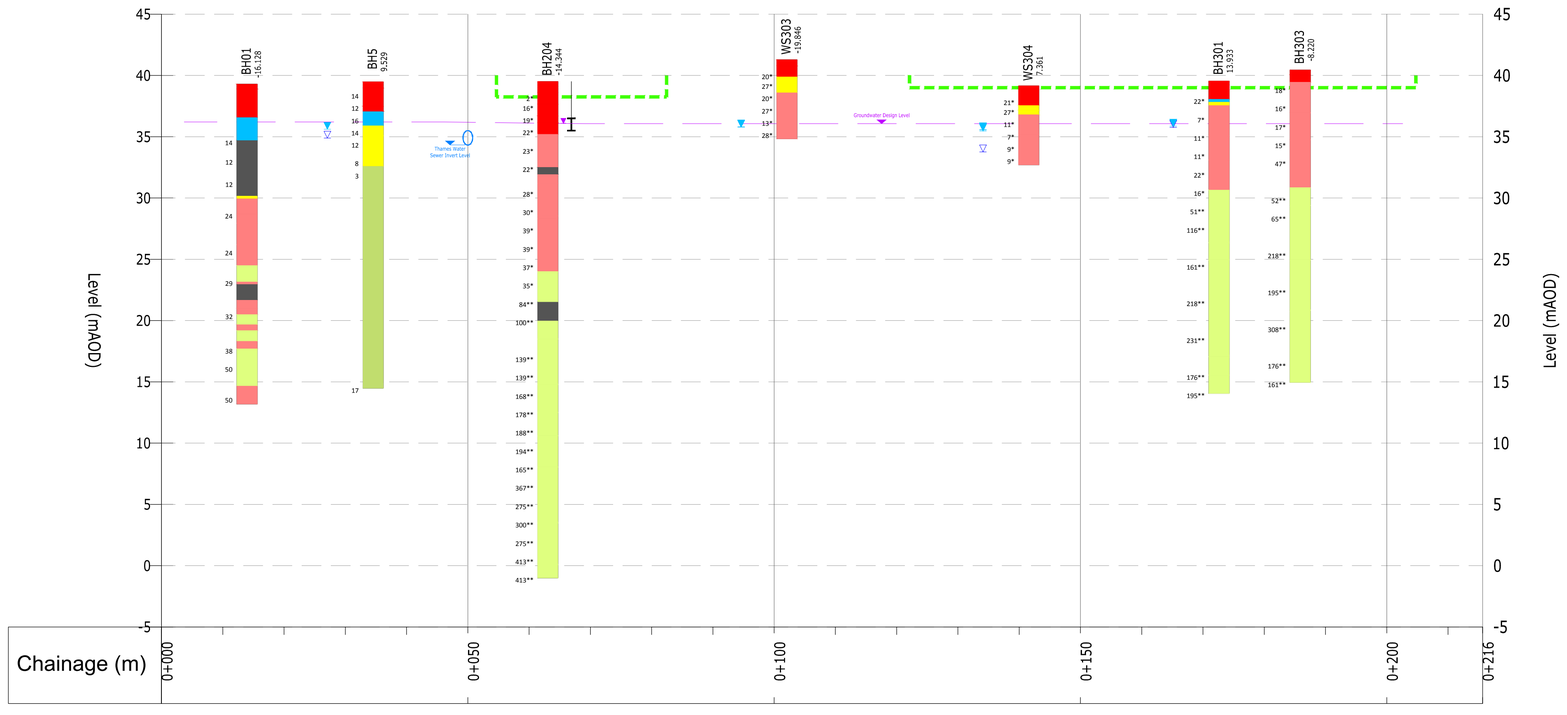

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KEY:

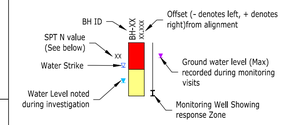
APPROXIMATE BASEMENT SSL LEVEL

GROUNDWATER DESIGN LEVEL

GEOLOGY KEY:

Legend
MADE GROUND
ALLUVIUM
TAPLOW GRAVEL
STRUCTURELESS CHALK
STRUCTURED CHALK
UNDIFFERENTIAITED CHALK
NO RECOVERY

BOREHOLE LEGEND:



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APPENDIX 1

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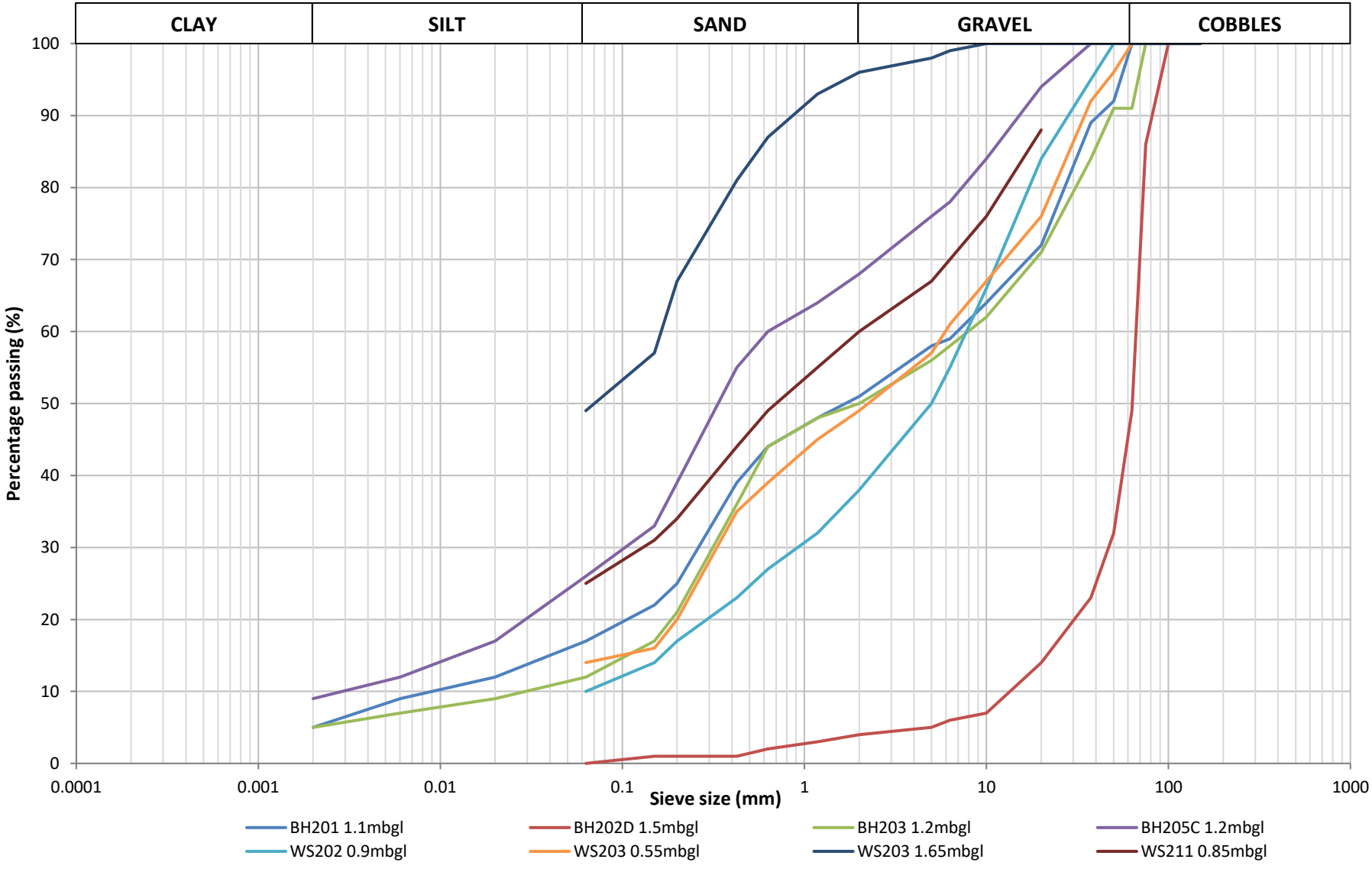
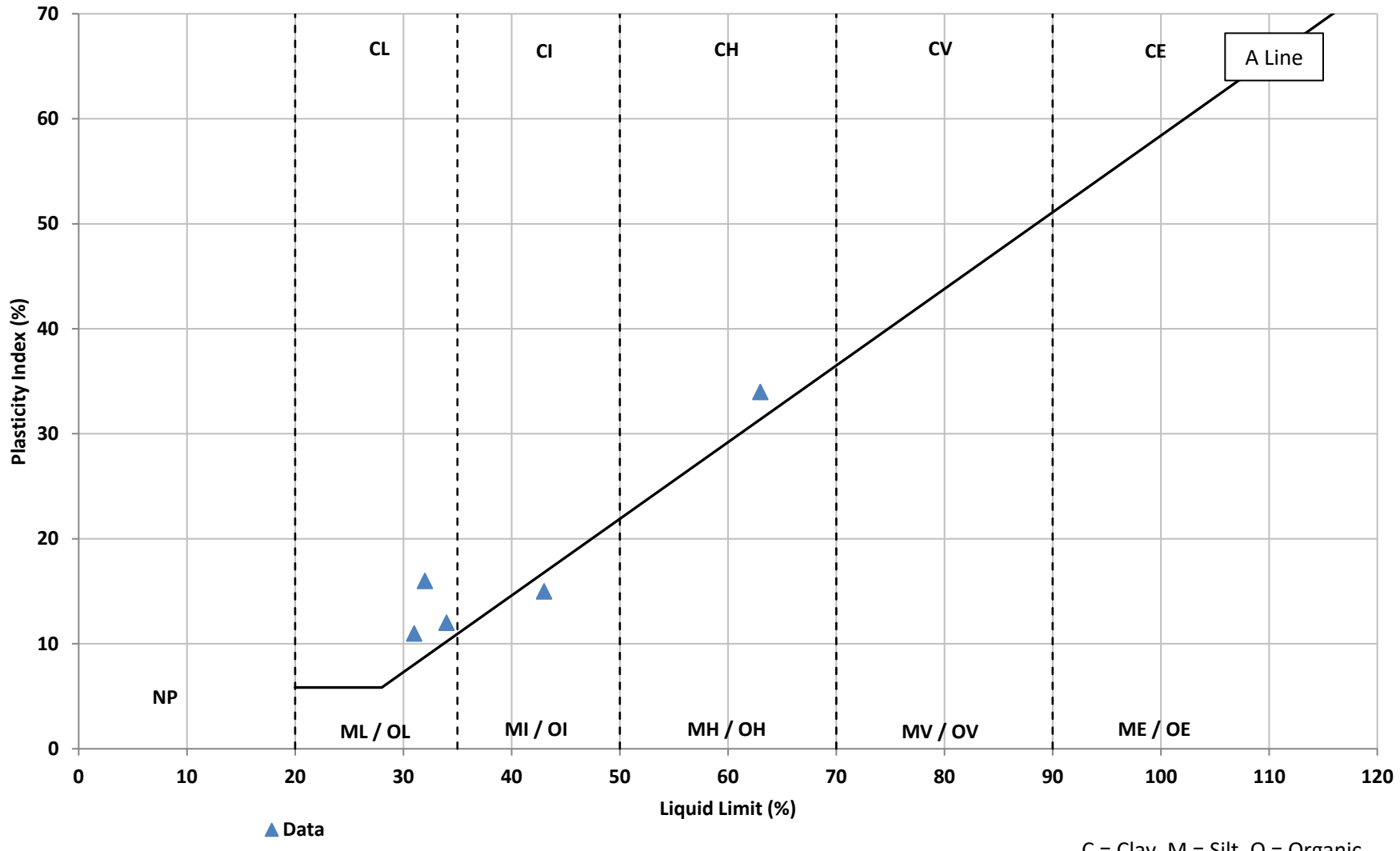
	Location: STATION HILL, READING	**Client:** Lincoln	



Title: Particle size distribution (PSD) by Sample for Made Ground	**Data Plot:** A1.1	**Status:**	**Drawn:** FCAPA	**Date:** 13/08/2019
			Checked: KS	**Date:** 16/08/2019

RAMBOLL	**Project:** STATION HILL, READING	**Job No:** 1620004716	
	Location: Station Hill Road, Reading	**Client:** Lincoln	



C = Clay, M = Silt, O = Organic

Title: Plasticity Chart for MADE GROUND	**Data Plot:** A1.2	**Status:**	**Drawn:** FCAPA	**Date:** 05/08/2019
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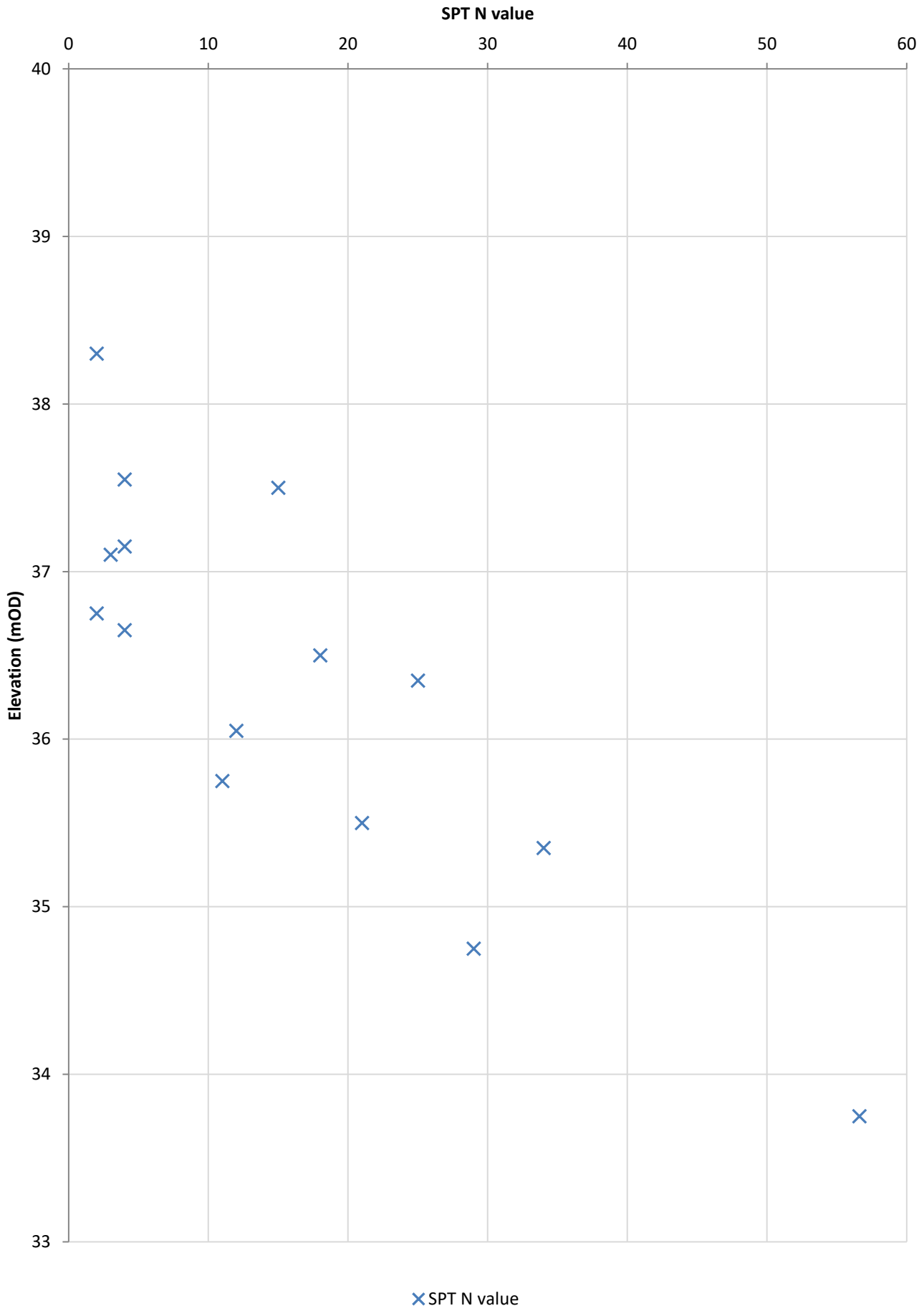
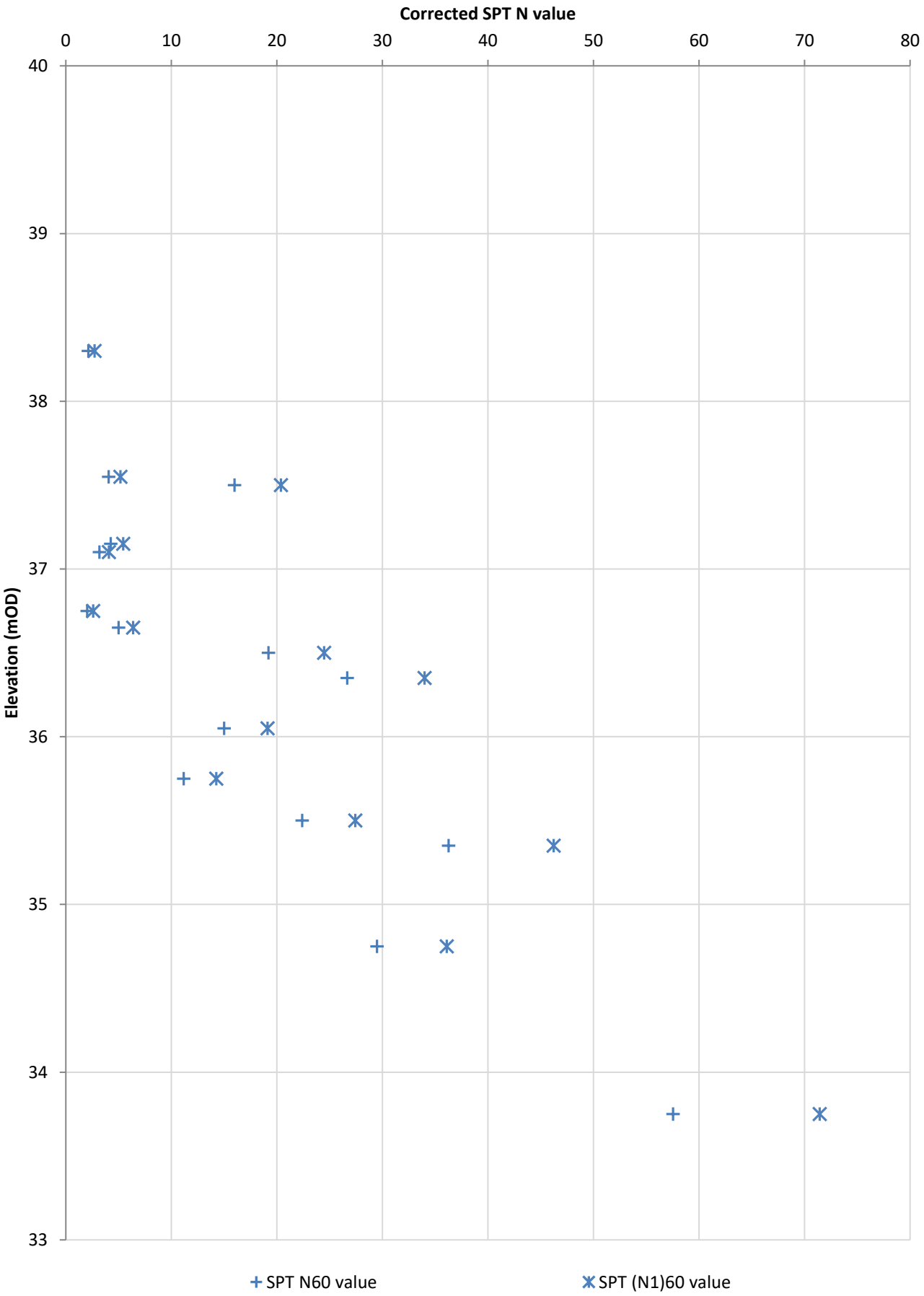
	Location:	STATION HILL, READING	Client:	Lincoln



Title:	Uncorrected SPT N value by Elevation for MADE GROUND	Data Plot: A1.3	Drawn: FCAPA	Date: 02/08/2019
		Status:	Checked: KS	Date: 16/08/2019

RAMBOLL	Project:	STATION HILL, READING	Job No:	1620004716
	Location:	STATION HILL, READING	Client:	Lincoln



Title:	Corrected SPT N value by Elevation for MADE GROUND	Data Plot: A1.4	Drawn: FCAPA	Date: 02/08/2019
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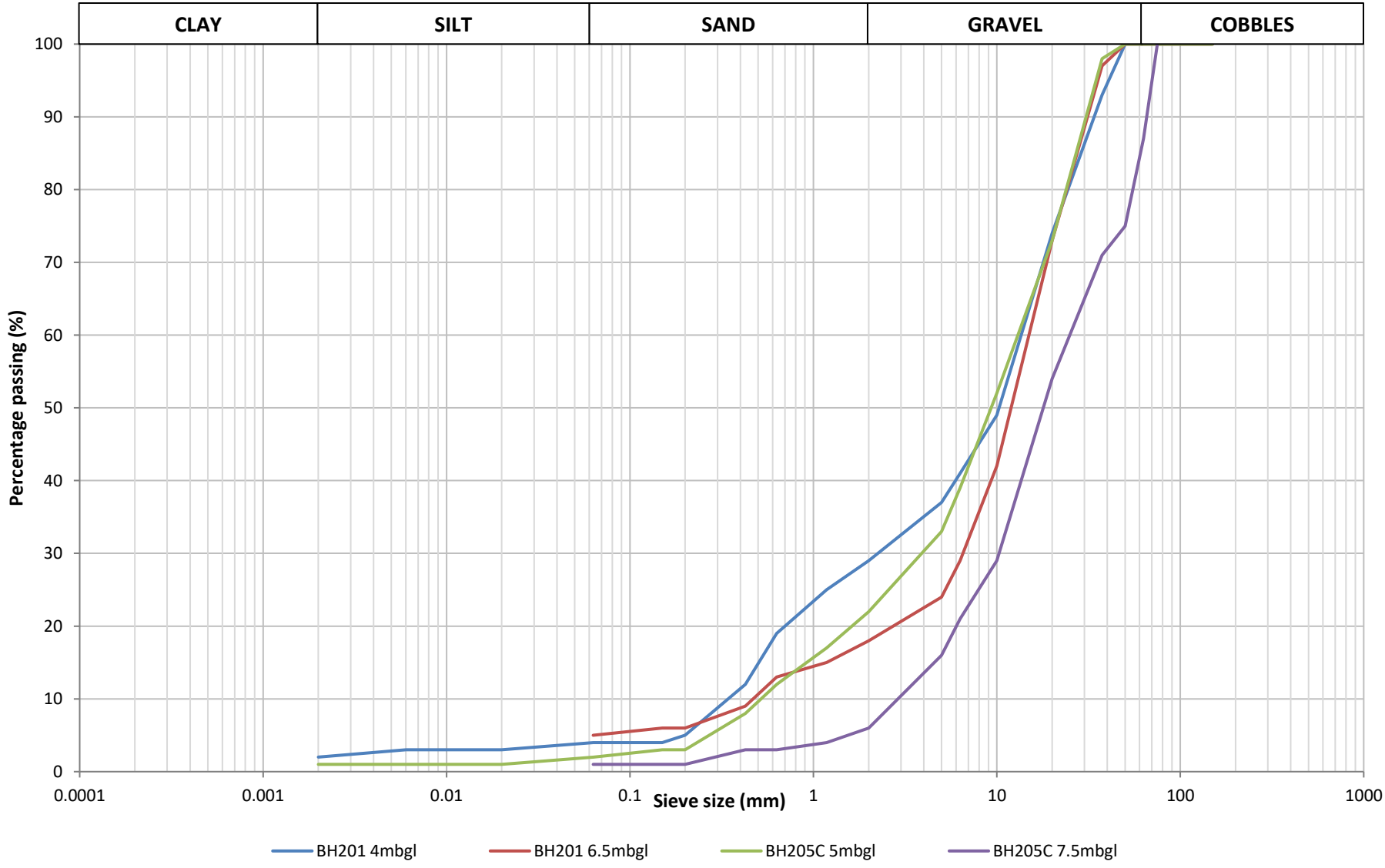

Title: Particle size distribution (PSD) by Sample for Taplow Gravel	**Data Plot:** A1.5	**Status:**	**Drawn:** FCAPA	**Date:** 13/08/2019
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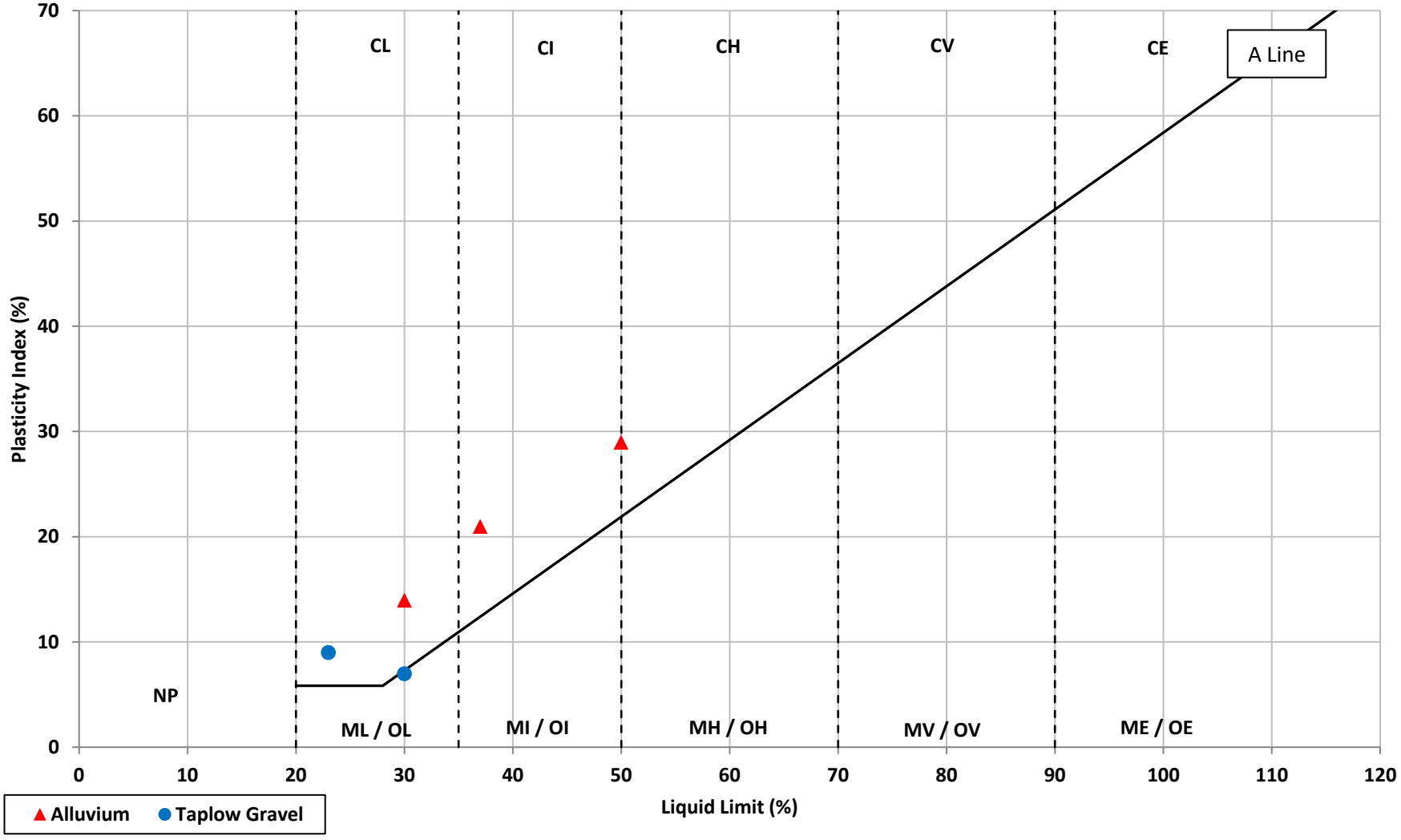

C = Clay, M = Silt, O = Organic

Title: Plasticity Chart for Alluvium and Taplow Gravel	**Data Plot:** A1.6	**Status:**	**Drawn:** FCAPA	**Date:** 05/08/2019
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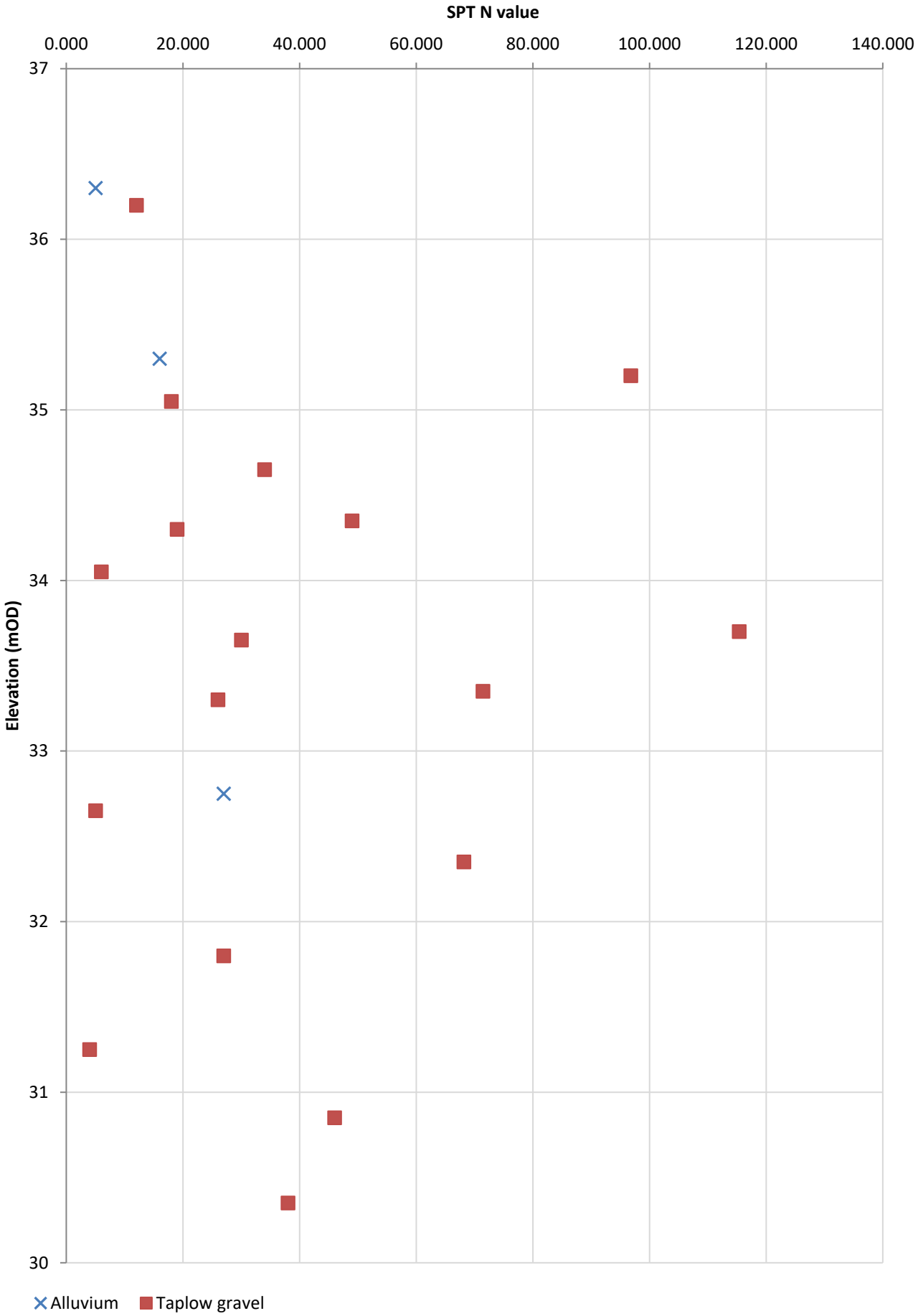

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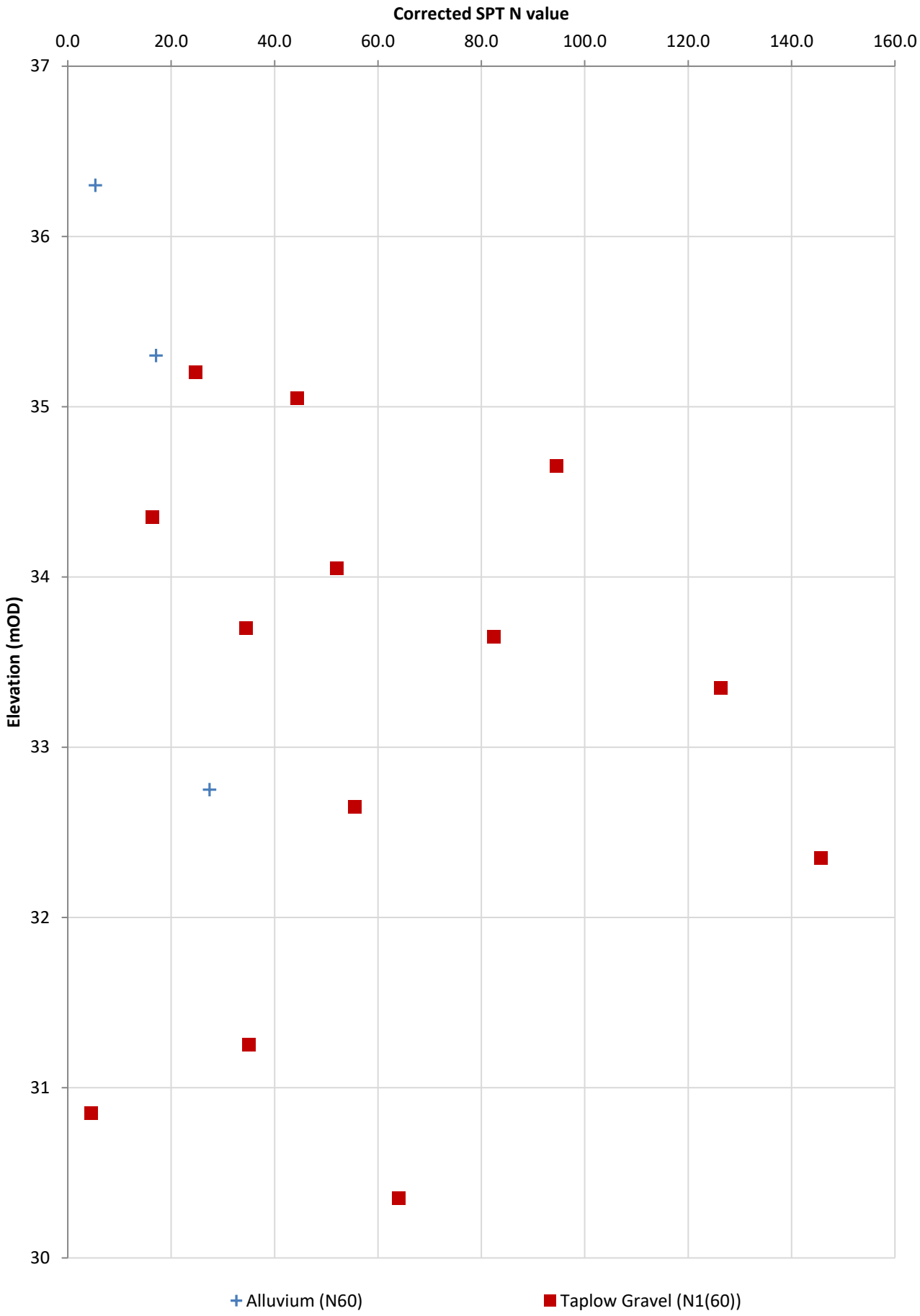

Title:	Corrected SPT N value by Elevation for Alluvium and Taplow Gravel	Data Plot:	A1.8	Drawn:	FCAPA	Date:	02/08/2019
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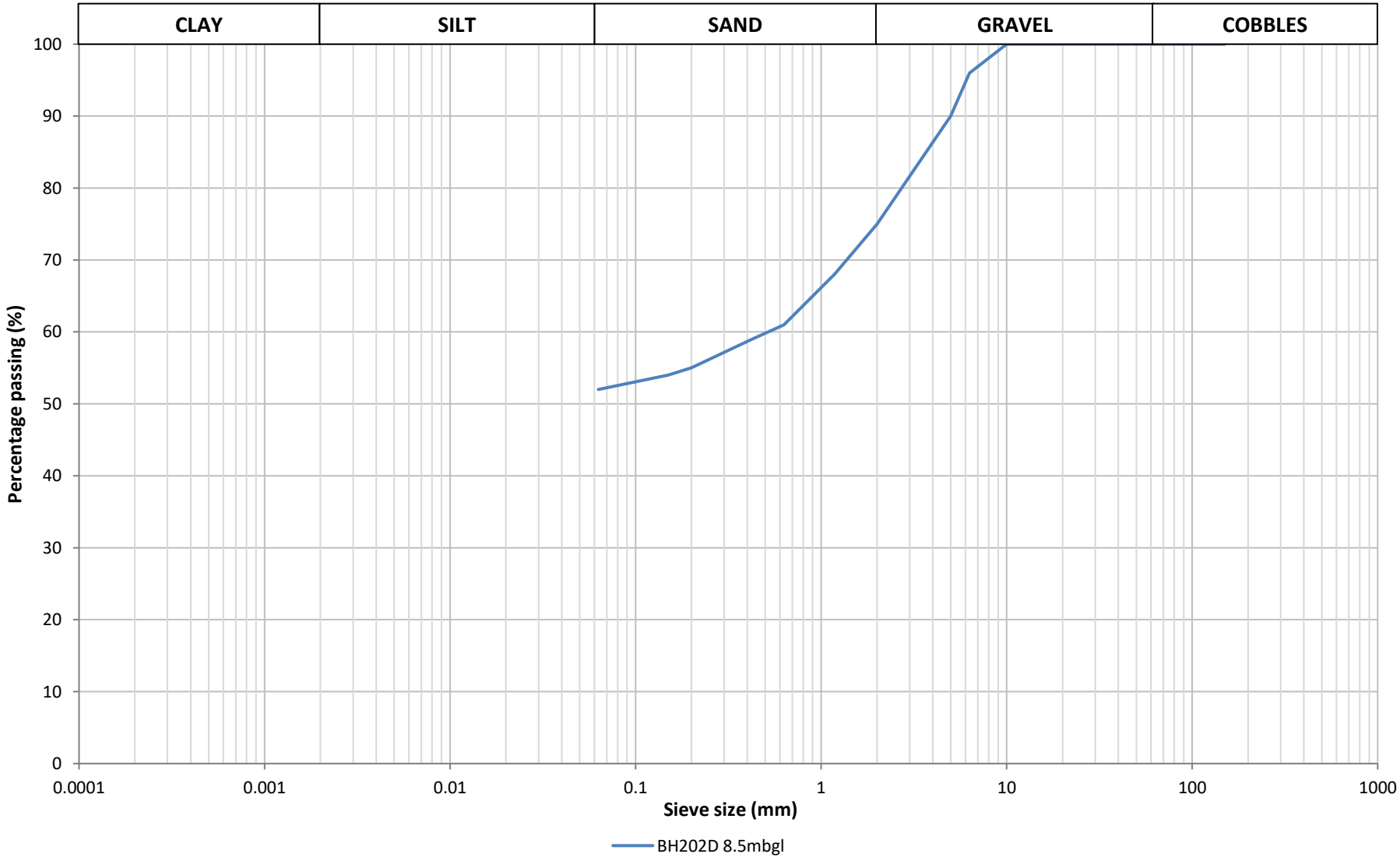

Title:	Particle size distribution (PSD) by Sample for STRUCTURELESS CHALK	**Data Plot:** A1.9	**Status:**	**Drawn:** FCAPA	**Date:** 13/08/2019
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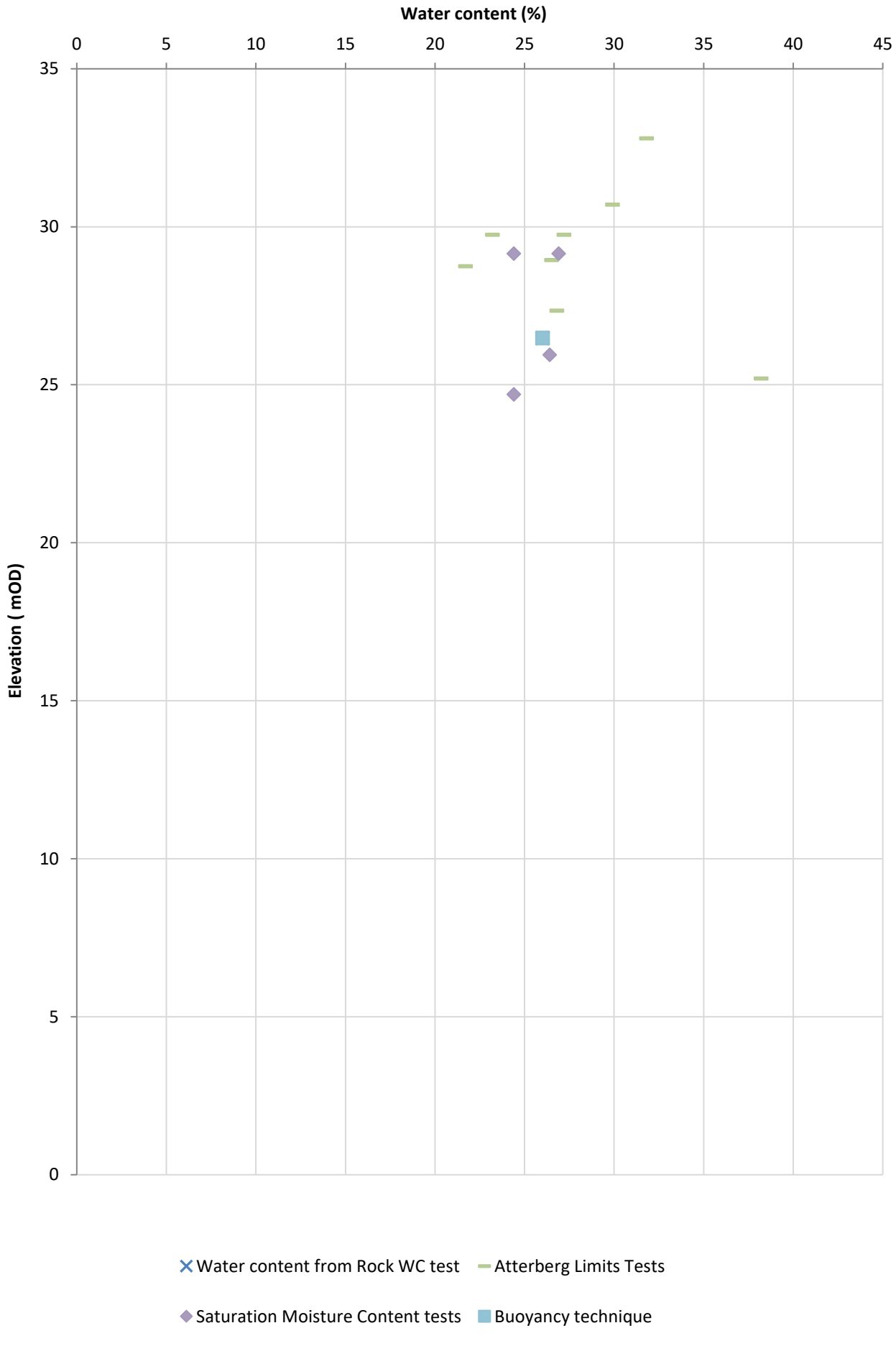
RAMBOLL	Project: STATION HILL, READING	Job No: 1620004716
	Location: STATION HILL, READING	Client: Lincoln



Title:	Dry and bulk density by Elevation for Structureless Chalk	Data Plot: A1.10	Drawn: FCAPA	Date: 05/08/2019
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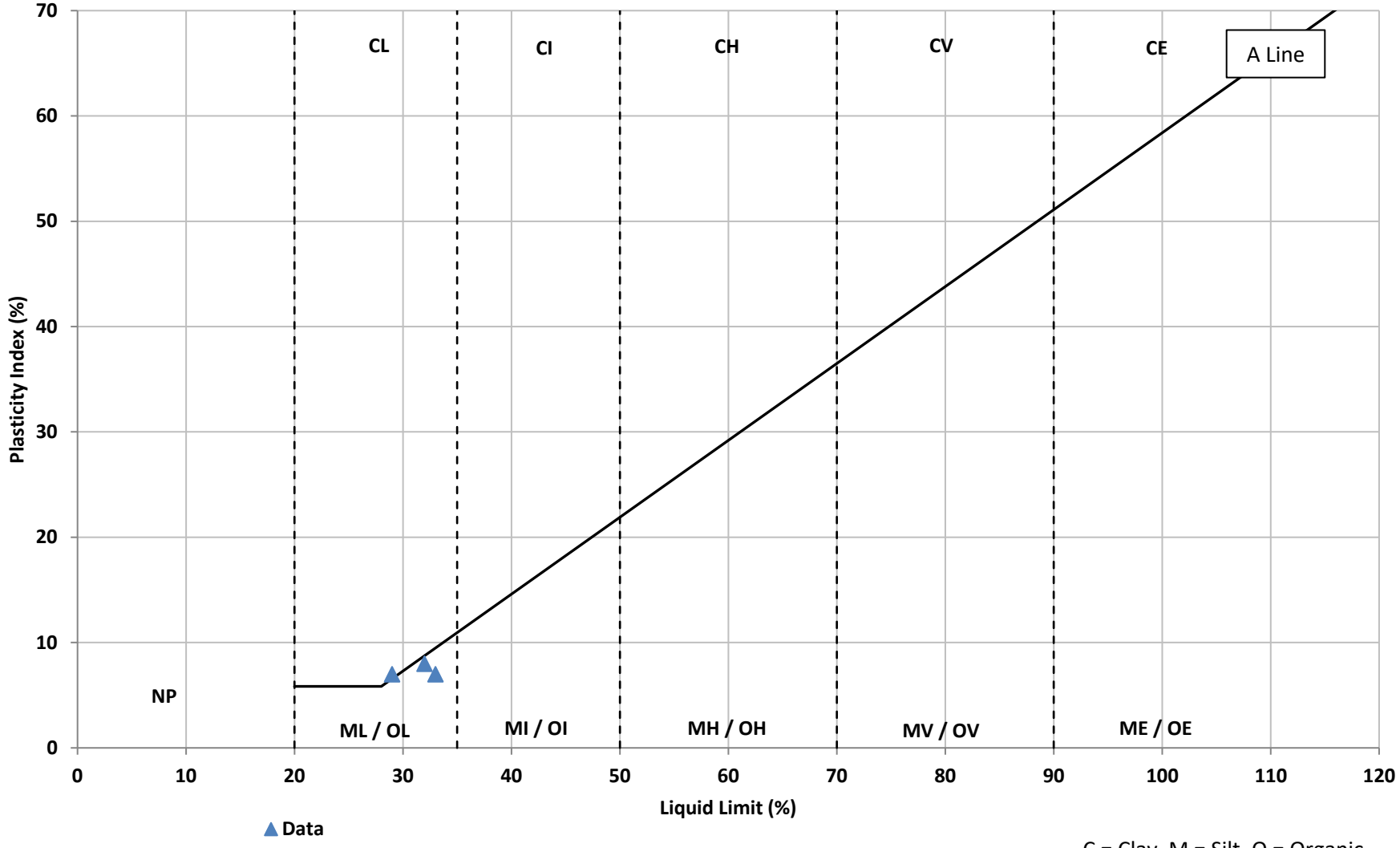
RAMBOLL	**Project:** STATION HILL, READING	**Job No:** 1620004716	
	Location: Station Hill Road, Reading	**Client:** Lincoln	



C = Clay, M = Silt, O = Organic

Title: Plasticity Chart for STRUCTURELESS CHALK	**Data Plot:** A1.11	**Status:**	**Drawn:** FCAPA	**Date:** 05/08/2019
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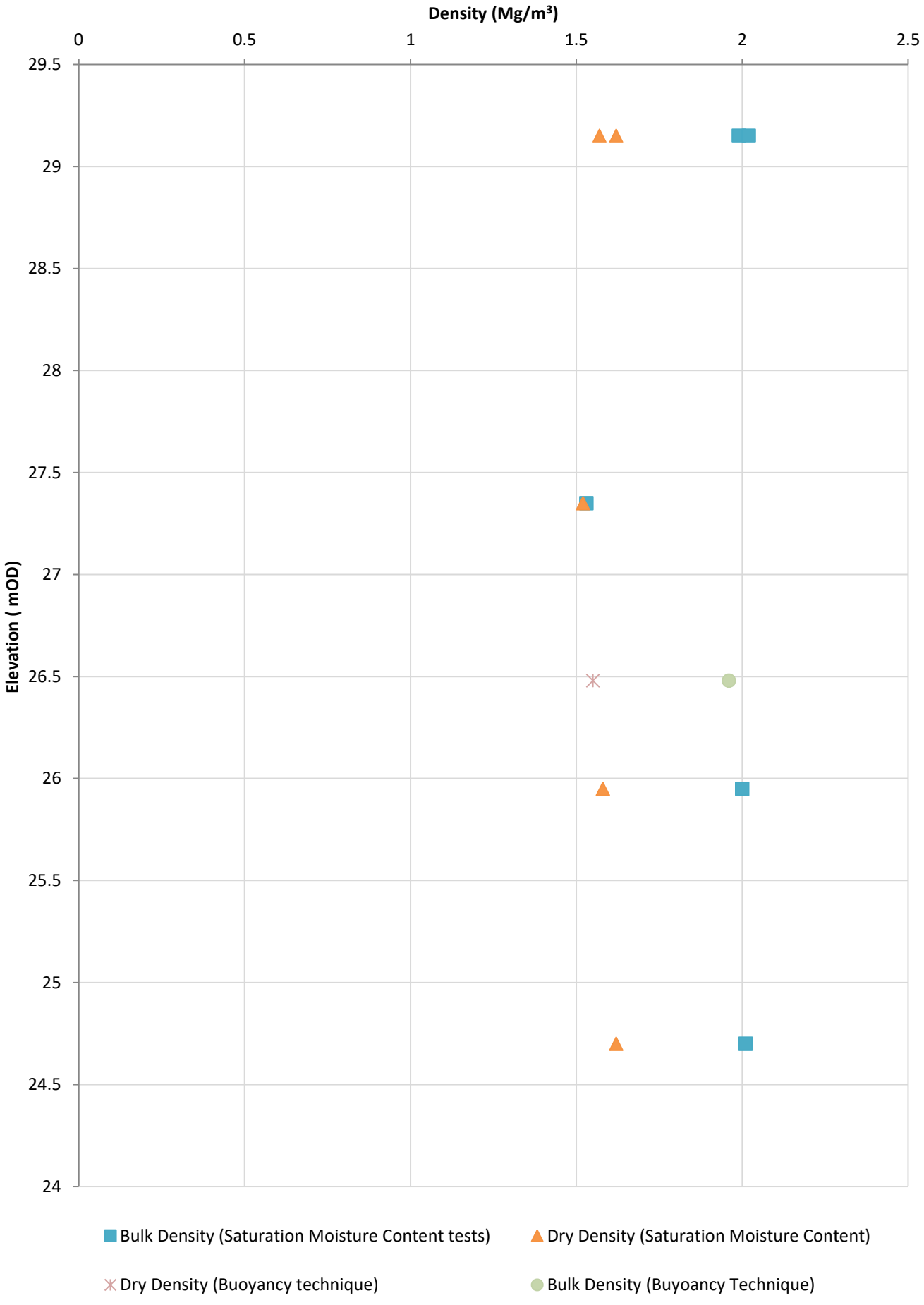
RAMBOLL	Project: STATION HILL, READING	Job No: 1620004716
	Location: STATION HILL, READING	Client: Lincoln



Title:	Dry and bulk density by Elevation for Structureless Chalk	Data Plot: A1.12	Drawn: FCAPA	Date: 05/08/2019
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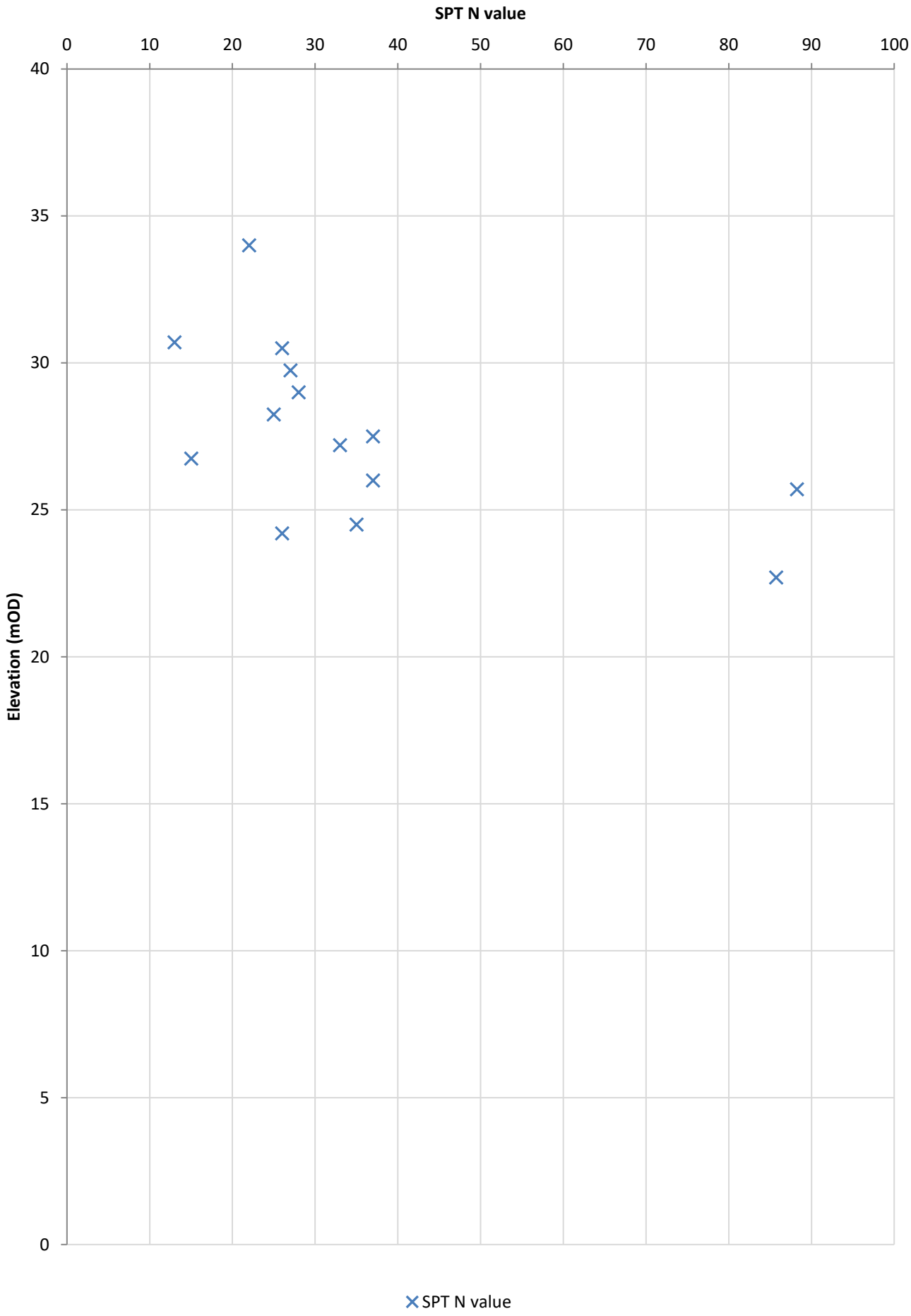
	Location: STATION HILL, READING	**Client:**	SH READING MASTER LLP



Title:	Uncorrected SPT N value by Elevation for STRUCTURELESS CHALK	**Data Plot:**	A1.13	**Drawn:**	FCAPA	**Date:**	05/08/2019
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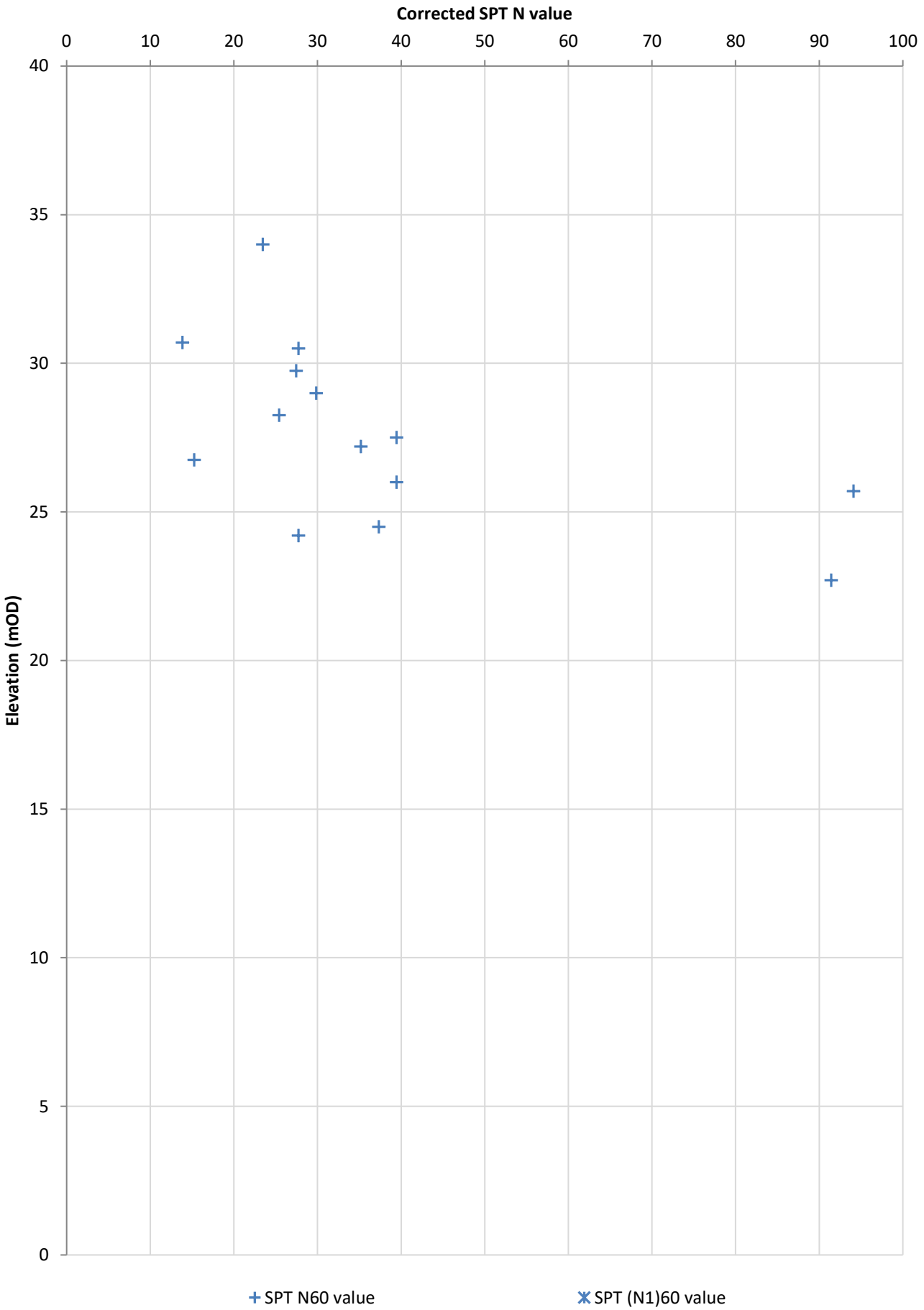
RAMBOLL	**Project:** STATION HILL, READING	**Job No:**	1620004716
	Location: STATION HILL, READING	**Client:**	SH READING MASTER LLP



Title:	Corrected SPT N value by Elevation for STRUCTURELESS CHALK	**Data Plot:**	A1.14	**Drawn:**	FCAPA	**Date:**	05/08/2019
		Status:		**Checked:**	KS	**Date:**	16/08/2019

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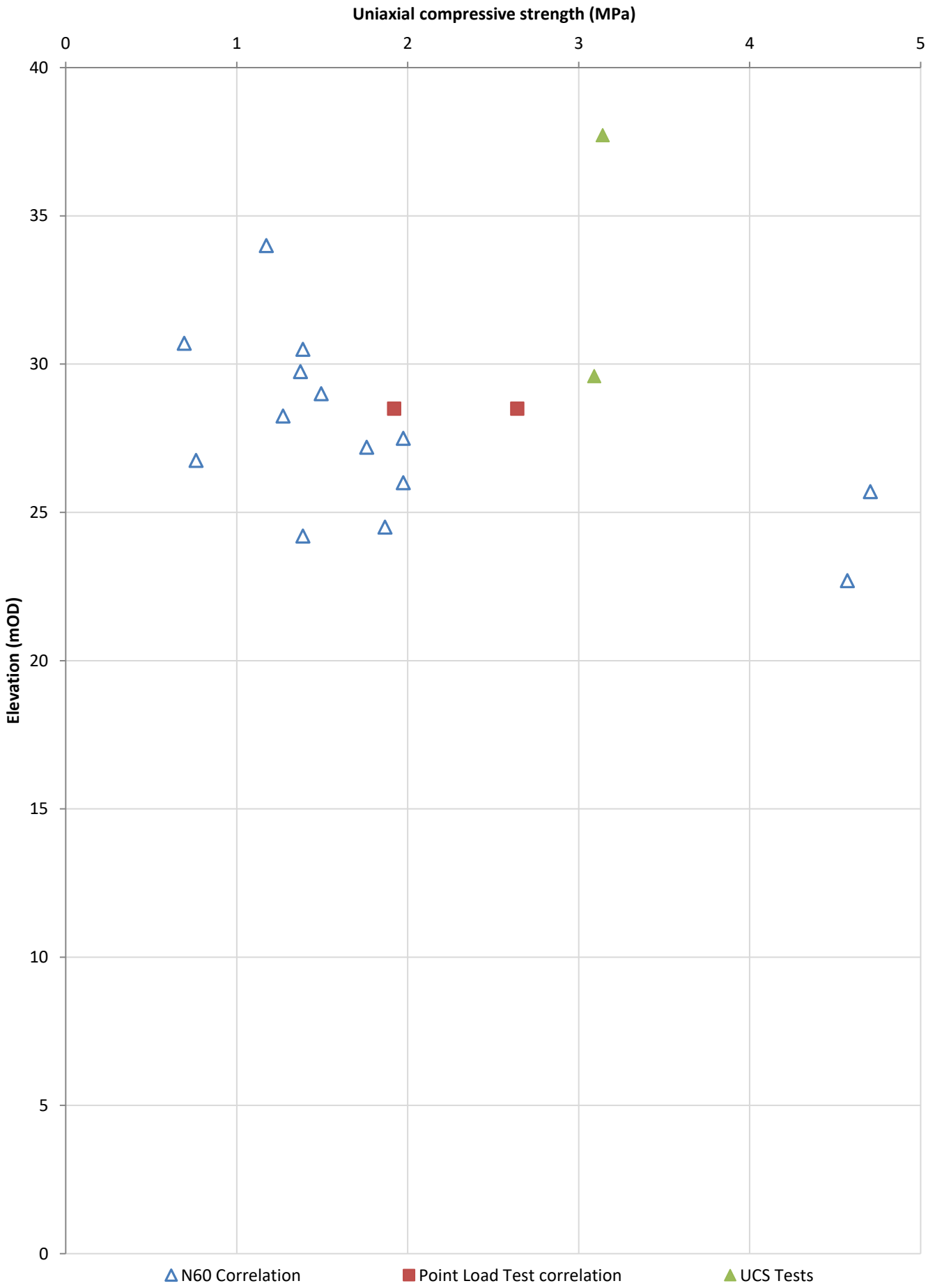
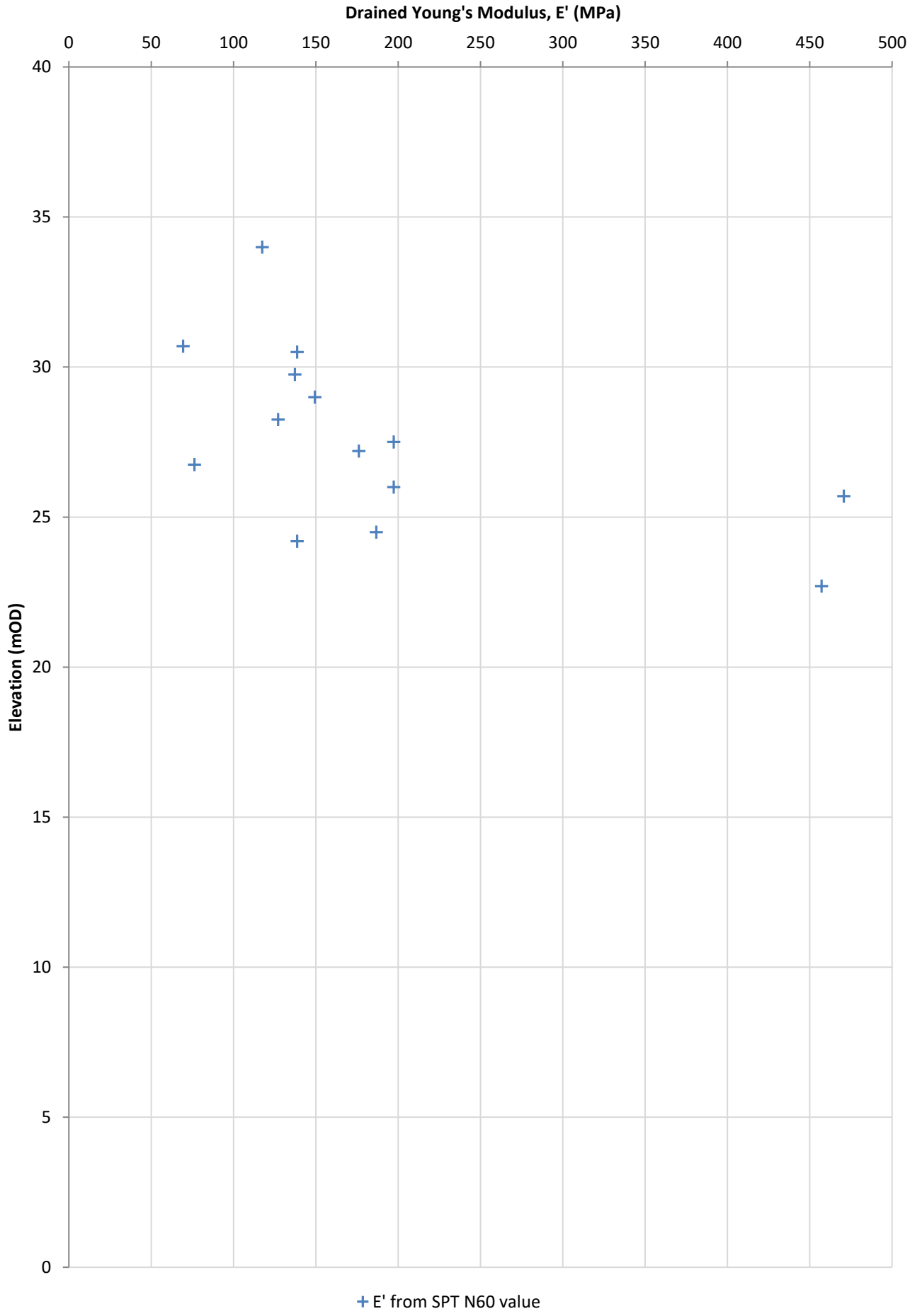
	Location: STATION HILL, READING	**Client:**	SH READING MASTER LLP



Title:	Uniaxial Comrpessive Strength results for Structureless Chalk	**Data Plot:**	A1.15	**Drawn:**	FCAPA	**Date:**	05/08/2019
		Status:		**Checked:**	KS	**Date:**	16/08/2019

RAMBOLL	Project:	STATION HILL, READING	Job No:	1620004716
	Location:	STATION HILL, READING	Client:	SH READING MASTER LLP



Title:	Uncorrected SPT N value by Elevation for STRUCTURELESS CHALK	Data Plot:	A1.16	Drawn:	FCAPA	Date:	05/08/2019
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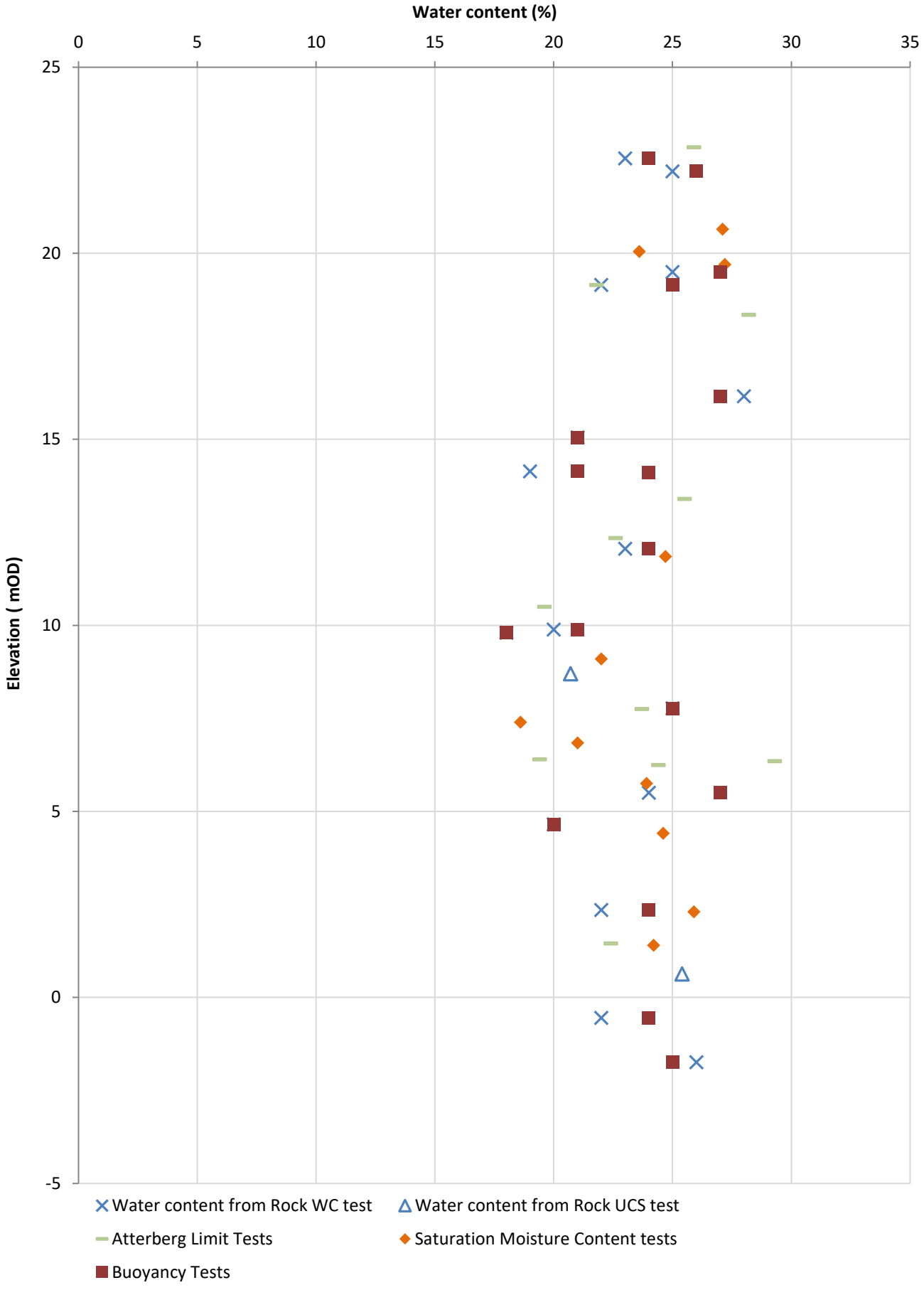
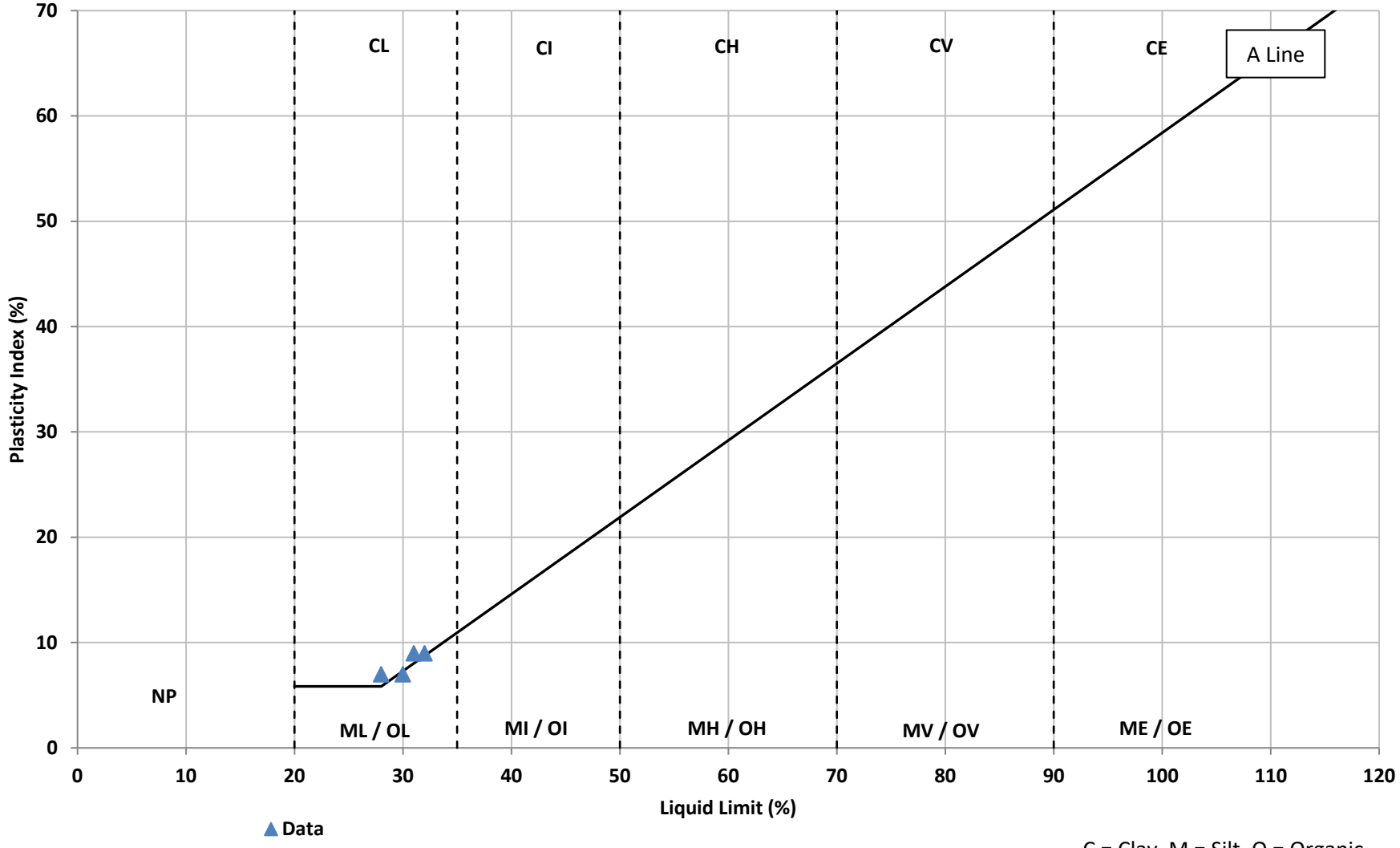
RAMBOLL	Project: STATION HILL, READING	Job No: 1620004716
	Location: STATION HILL, READING	Client: Lincoln



Title:	Moisture content by Elevation for STRUCTURED CHALK	Data Plot: A1.17	Drawn: FCAPA	Date: 05/08/2019
		Revision:	Checked:	Date:

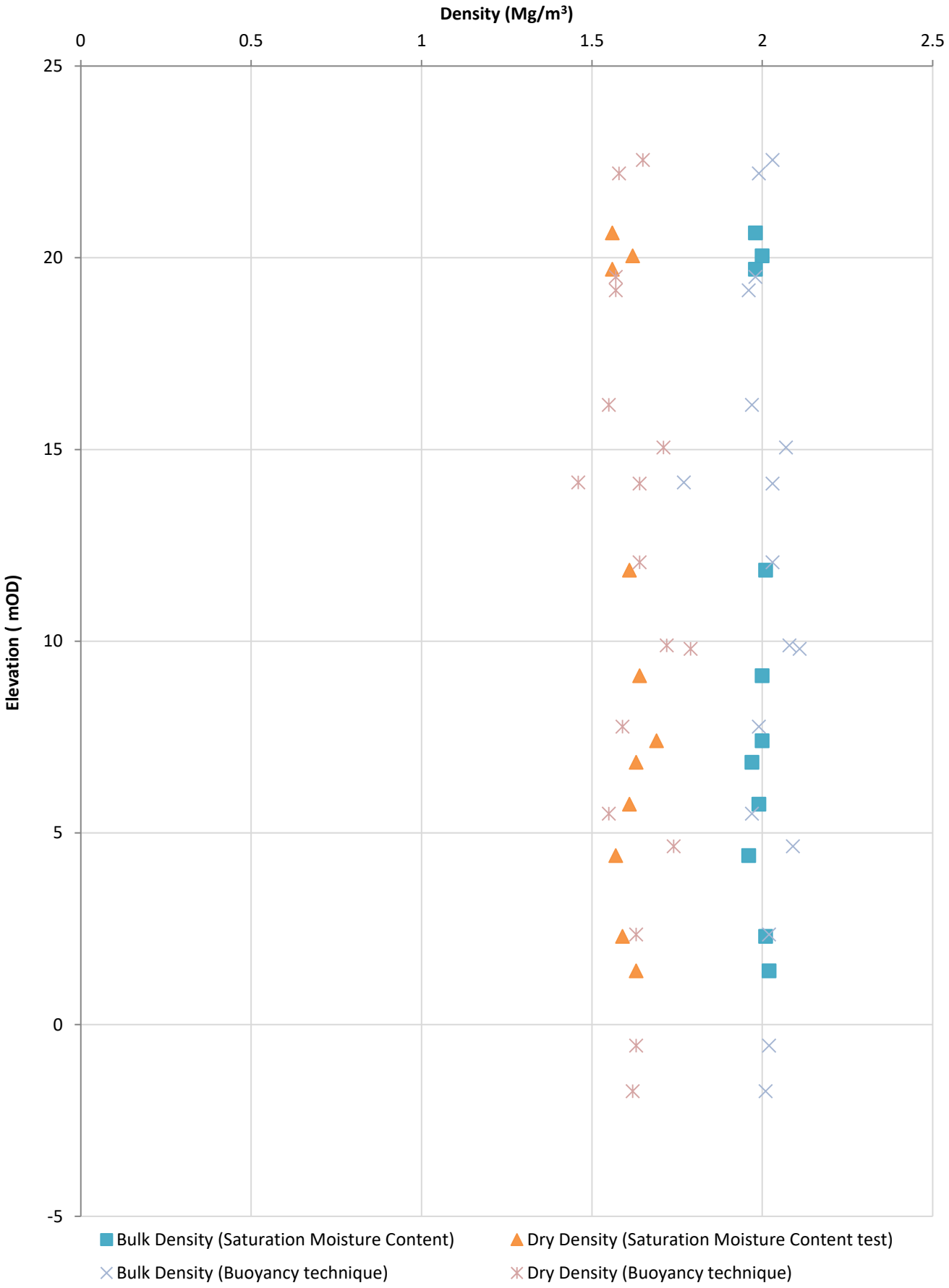
RAMBOLL	**Project:** STATION HILL, READING	**Job No:** 1620004716	
	Location: Station Hill Road, Reading	**Client:** Lincoln	



C = Clay, M = Silt, O = Organic

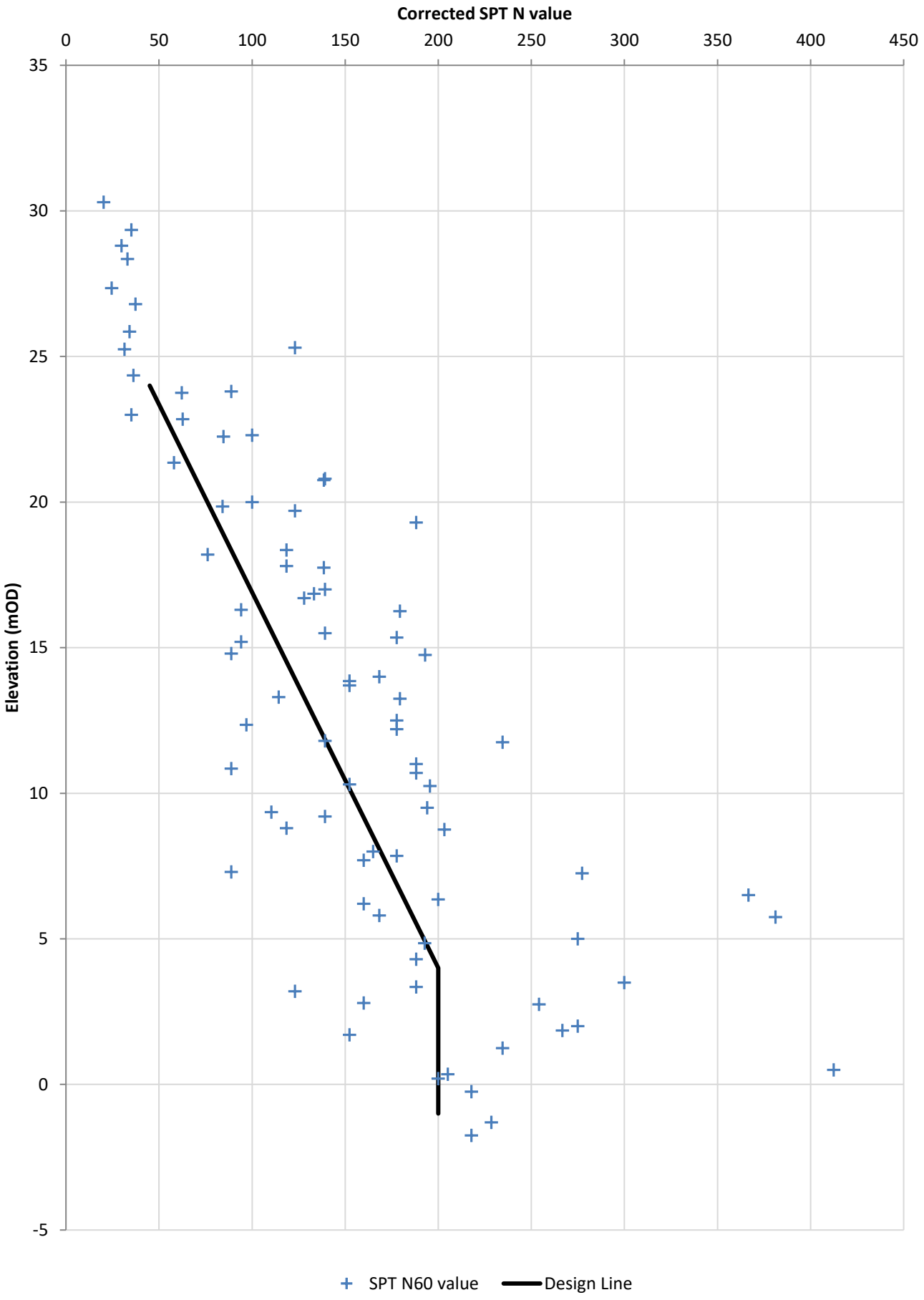
Title: Plasticity Chart for STRUCTURED CHALK	**Data Plot:** A1.18	**Status:**	**Drawn:** FCAPA	**Date:** 05/08/2019
			Checked: KS	**Date:** 16/08/2019

RAMBOLL	**Project:** STATION HILL, READING	**Job No:** 1620004716	
	Location: STATION HILL, READING	**Client:** Lincoln	



Title:	Dry and bulk density by Elevation for STRUCTURED CHALK	**Data Plot:** A1.19	**Drawn:** FCAPA	**Date:**	05/08/2019
		Revision:	**Checked:**	**Date:**	

RAMBOLL	**Project:** STATION HILL, READING	**Job No:**	1620004716
	Location: STATION HILL, READING	**Client:**	SH READING MASTER LLP



Title:	Corrected SPT N value by Elevation for STRUCTURED CHALK	**Data Plot:**	A1.20	**Drawn:**	FCAPA	**Date:**	05/08/2019
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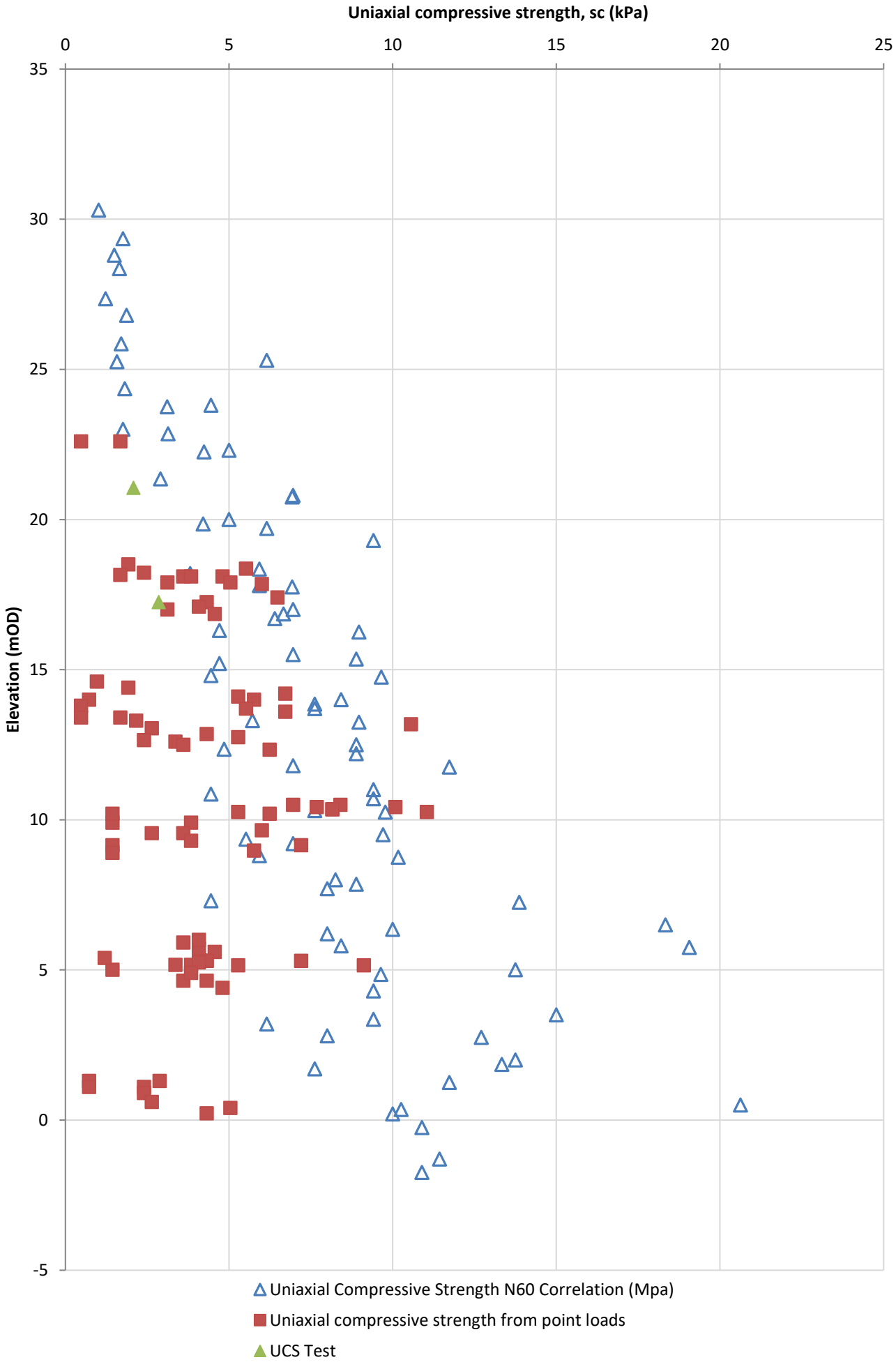
RAMBOLL	Project:	STATION HILL, READING	Job No:	1620004716
	Location:	STATION HILL, READING	Client:	SH READING MASTER LLP



Title:	Uniaxial Compressive Strength for Structured Chalk	Data Plot: A1.21	Drawn: FCAPA	Date: 05/08/2019
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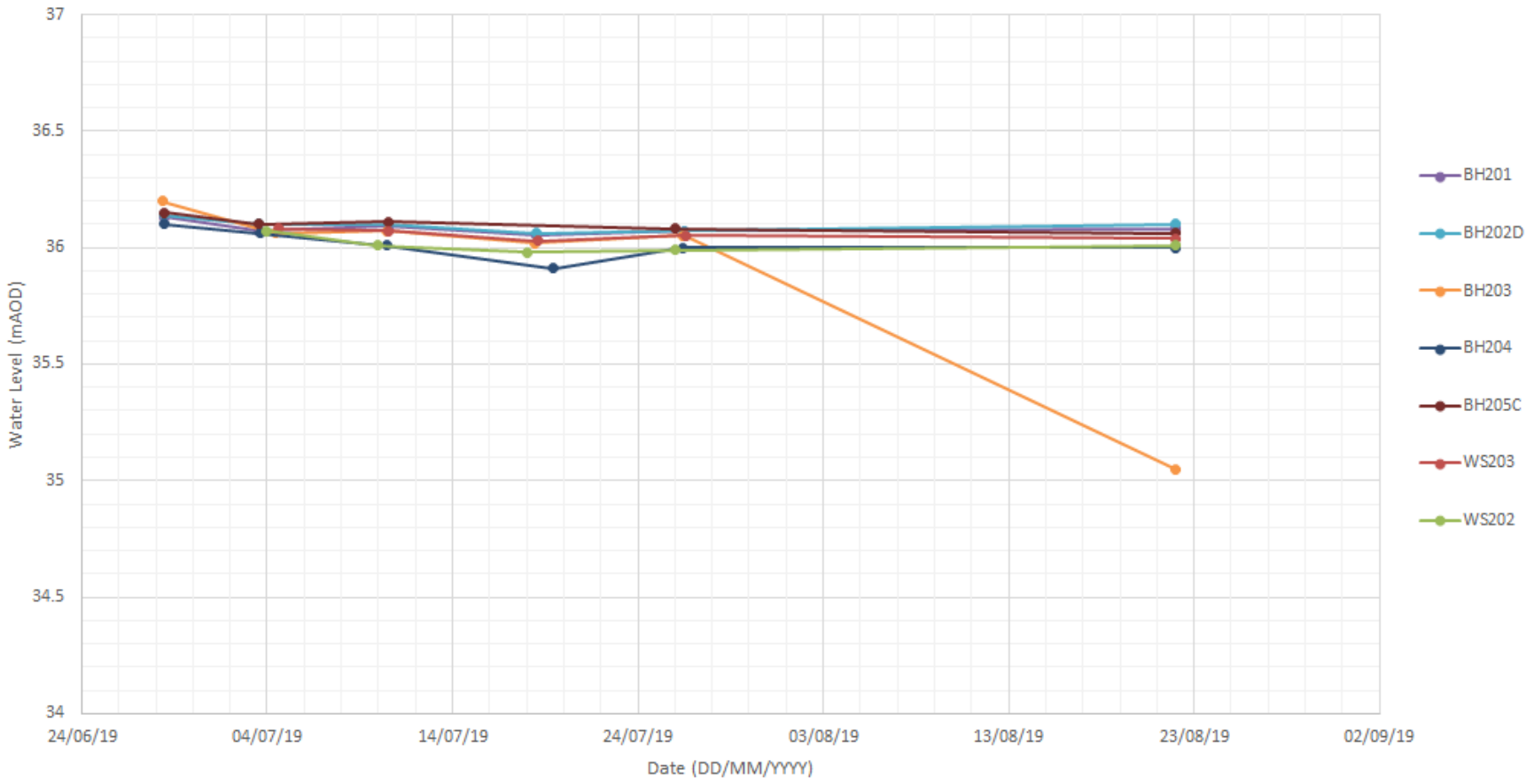
RAMBOLL	**Project:** STATION HILL, READING	**Job No:**	1620004716
	Location: Station Hill Road, Reading	**Client:**	Lincoln



Title: Ground Water Levels	**Data Plot:** A1.22	**Status:**	**Drawn:** FCAPA	**Date:**	28/08/2019
			Checked:	**Date:**	28/08/2019

APPENDIX 2

STATION HILL, READING

FACTUAL REPORT ON GROUND INVESTIGATION

Prepared for SH READING MASTER LLP

Report Ref: 35248

Geotechnical Engineering Ltd
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STATION HILL, READING

FACTUAL REPORT ON GROUND INVESTIGATION

Prepared for SH READING MASTER LLP

Report Ref: 35248

PROJECT: Redevelopment of Old Shopping Centre

CONSULTANT: Ramboll UK Ltd

VOLUME - VERSION	STATUS	ORIGINATOR	CHECKER	APPROVED	DATE
1 of 1 – A	DRAFT	AT/JS	CT	-	23/07/19
1 of 1 – A	FINAL	JS	CT	CT	06/08/19
1 of 1 – B	FINAL	JS	CT	CT	23/08/19

ORIGINATOR	APPROVER
J SURMAN Senior Engineering Geologist	C THOMAS Geotechnical Consultant

The report is not to be used for contractual or engineering purposes unless this sheet is signed and the report designated "Final".
The report has been prepared for the sole use and reliance by SH Reading Master LLP. GEL accepts no liability as a result of the use or reliance of this report by any other parties.

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EXPLORATORY HOLE LOCATION PLAN 1

APPENDICES

APPENDIX A FIELDWORK DATA

APPENDIX B LABORATORY TESTING

APPENDIX C CHEMICAL ANALYSES

APPENDIX C PHOTOGRAPHS

1. INTRODUCTION

It is proposed to redevelop a former shopping centre at Station Hill, Reading. Geotechnical Engineering Limited (GEL) was instructed by Ramboll Uk Ltd (the Consultant) acting on behalf of SH Reading Master LLP (the Client) to carry out an investigation to determine the ground conditions. This report covers the northern half of the site. Geotechnical Engineering Report reference 34769 covers the southern half of the site and should be read in conjunction.

The scope of works and terms and conditions of appointment were specified by the Consultant and GEL correspondence reference T28836_02 dated 8th April 2018. The investigation was carried out under direction and part-time supervision of the Consultant.

This report describes the investigation and presents the findings.

2. SITE LOCATION AND GEOLOGY

The site is situated directly north of Garrard Street (west of the NCP car park), Reading and may be located by its National Grid co-ordinates SU 713 737.

British Geological Survey (BGS) England and Wales (Sheet No. 268, 1:50,000, 2000) and the BGS online geology (1:50,000) indicate the site is underlain by superficial deposits of Alluvium (clay, silt, sand and gravel). The Taplow Gravel Member is recorded to the south of Garrard Street, Bedrock geology comprises the Seaford Chalk Formation and the Newhaven Chalk Formation. Made Ground was anticipated associated with road and building construction.

3. GROUND INVESTIGATION

3.1 Fieldwork

The fieldwork was carried out in general accordance with BS5930:2015 during the period 8th May to the 18th June 2019 and comprised five boreholes, two dynamic sample boreholes, eleven terminated hand dug inspection pits and seven machine excavated trial pits.

The exploratory hole locations were selected by the Consultant and set out by this Company and are shown as approximate locations on Figure 1. The ground level and co-ordinates at exploratory holes BH201, BH202D, BH203, BH204, BH205C, TP202 to TP206, TP208 and TP209, WS201 to WS204, WS211 and WS211A were established by this Company using GPS techniques. Survey data for the remaining terminated pits was not established.

The boreholes, referenced BH201, BH202D, BH203, BH204 and BH205C (Appendix A), were formed using a track-mounted Geotechnical Pioneer Rig. In BH201, BH203 and BH205C the surface was rotary cored drilled (300mm), in BH204 the surface was broken out with a hydraulic breaker. An inspection pit was then hand excavated to a maximum depth of 1.20m to check for buried services. BH202D was machine excavated from surface to a depth of 1.85m. Disturbed samples were taken and retained in a combination of plastic tubs, bags and glass jars. Heavy duty dynamic sampling techniques were then employed at each location to produce a continuous disturbed sample of 112mm nominal diameter. The samples were recovered in semi-rigid plastic liner.

On refusal to dynamic sampling the boreholes were continued by Geobor S wireline, rotary drilling techniques utilising a water or polymer flush. An inner barrel assembly, incorporating a semi-rigid plastic liner, is deployed down the borehole and is latched onto the outer barrel/casing to recover continuous cores of 102mm diameter. The outer barrel acts as the casing ensuring the hole is fully cased at all times.

The dynamic samples and rotary core were extracted horizontally from the sampler and core barrel respectively, the semi-rigid liner was cut to length and sealed at each end to retain moisture content. All samples and core were retained in sequence in labelled, wooden coreboxes.

The boreholes, referenced WS202 and WS203, (Appendix A), were formed using a Terrier 2000 rig. In WS202 the surface was rotary cored drilled (300mm diameter), in WS203 surface was broken out with a hydraulic breaker. An inspection pit was then hand excavated at each borehole location to a maximum depth of 1.20m to check for buried services. Disturbed samples were taken and retained in a combination of plastic tubs, bags and glass jars. Dynamic sampling techniques were then employed to produce a continuous disturbed sample of 97mm diameter. The samples were recovered in semi-rigid plastic liner.

The samples were extracted horizontally from the sampler, labelled and sealed at each end to retain moisture.

Standard penetration tests (SPT) were carried out in general accordance with BS EN ISO 22476-3:2005+A1:2011. A split barrel or a solid cone was used depending upon the materials encountered and the split barrel samples retained in airtight jars. The SPT N value was taken as the number of blows to penetrate the 300mm test drive following a 150mm seating drive. Where low penetration was recorded the seating drive was terminated at 25 blows and the test drive completed after a further 50 blows. Detailed SPT results, together with the energy ratio (E_r), are presented in Appendix A and summarised as uncorrected N values on the borehole logs.

Boreholes were monitored for groundwater ingress as sampling proceeded. Upon encountering water in WS202 and WS203, sampling was temporarily stopped to allow the level to stabilise. Water levels were also recorded at the start and finish of each day's work and on completion of the borehole and are presented on the relevant log.

On completion gas/water monitoring standpipes were installed in BH201, BH202D, BH203, BH204, BH205C, WS201, WS202and WS203. Each installation consisted of a 50mm ID HDPE slotted tube set in a filter response zone of non-calcareous pea gravel. The installation was sealed above with a bentonite plug and accessed via a valve assembly. The installations in BH201, BH202D, BH203, BH204 and BH205C, were also sealed below the response zone with bentonite pellets. The installations were protected at the surface by a lockable stopcock cover set in concrete. Installation details are given on the relevant borehole log and in Table 3.1 in Section 3.3. Subsequent water level readings are tabulated in Appendix A.

A number of exploratory hole locations were terminated in the pit due to obstructions or services. A summary of excavation techniques or the terminated pits is presented below:

Hand dug pit followed by mechanical excavator (JCB 3CX)	BH202
Hand dug pit	BH202A, WS204
Machine excavated (JCB 3CX)	BH202B, BH202C
Rotary core drilled (300mm) followed by hand dug pit	BH205, BH205A, WS201, WS211, WS211A
Hand dug pit followed by rotary core drilling (300mm)	BH205B

On completion, BH202, BH202A, BH202B, BH202C and BH205B were backfilled with arisings, BH205 and BH205A were backfilled with arisings and sand, WS204 was backfilled with arisings and concrete paving slab replaced, WS211 and WS211A were backfilled with arisings and the surface reinstated with concrete.

The trial pits, referenced TP202 to TP206, TP208 and TP209 (Appendix A), were formed by a wheeled excavator with a 0.60m wide backactor bucket.

Representative disturbed samples were taken and retained in sealed plastic bags and airtight containers to retain moisture content.

Photographs of the trial pit profile and spoil heap were taken and are presented in Appendix D.

On completion all trial pits were backfilled with arisings compacted in suitable layers by the excavator bucket. The ground surface was left slightly proud to accommodate the future inevitable settlement of the backfill.

Samples for chemical analyses were dispatched from site directly to i2 Analytical Ltd under a Chain of Custody. The headspace of these environmental samples was monitored for Volatile Organic Compounds (VOC's) using a MiniRAE 3000 Portable Photo-Ionisation Detector (PID) with a 10.6eV gas discharge lamp. The detector uses an ultra violet light source to break down the chemicals into positive and negative ions (ionisation). The detector measures the charge of the ionised gas and converts the signal into current. The current is then amplified and displayed as "ppm"; the readings are presented on the relevant exploratory hole logs in Appendix A.

The remaining samples were brought to this Company's laboratory for testing and storage.

3.2 Logging

The logging of soils and rocks was carried out by an Engineering Geologist in general accordance with BS5930:2015 and CIRIA C574. A key to the exploratory hole logs is presented in Appendix A.

Detailed descriptions of the core and samples are given in the borehole logs, Appendix A, along with details of sampling, in situ testing, groundwater ingress, installations and relevant comments on drilling techniques.

Prior to logging, photographs of the core were taken and are presented in Appendix D. The trial pits were logged in situ to a depth of approximately 1.20m and thereafter from the surface. Detailed descriptions are given in the trial pit logs, Appendix A, along with details of sampling and in situ testing, groundwater ingress and relevant comments on stability and excavatability.

3.3 Post Fieldwork Monitoring

Following the main fieldwork, a period of monitoring was undertaken from 28th June to 22nd August 2019. The response zone of each installation is presented in Table 3.1 below.

Borehole	Standpipe (50mm) Response Zone (m bgl)
BH201	11.00 - 12.00
BH202D	6.00 - 7.00
BH203	11.00 - 12.00
BH204	3.00 - 4.00
BH205C	8.10 - 9.10
WS201	0.25 - 1.10
WS202	1.80 – 6.45
WS203	2.30 – 5.45

Table 3.1: Summary of installation response zones

The gas/water installations (50mm standpipes) were monitored for gas flow and then tested for methane, carbon dioxide, oxygen, hydrogen sulphide, and carbon monoxide using a Gas Data GFM 435 gas analyser. The installations were also monitored for Volatile Organic Compounds (VOC's) using a MiniRAE 2000 Portable Photo-Ionisation Detector (PID) with a

10.6eV gas discharge lamp. Subsequent readings, along with water level records from all standpipes, are tabulated in Appendix A.

3.4 Laboratory Testing

Two schedules of laboratory tests were prepared by the Consultant the following tests being carried out in accordance with BS1377:1990, unless stated otherwise. The number in brackets refers to the test number given in that standard. The results are presented in Appendix B.

The natural water content was determined on thirty-four selected samples in accordance with BS EN ISO 17892-1:2014.

Liquid limit, plastic limit and plasticity index tests [Part 2:4.2-4.6 & 5.2-5.4] were carried out on seventeen selected samples. Atterberg line plots have also been presented.

The saturated moisture content [Part 2:3.3] was determined on sixteen selected samples.

The linear shrinkage tests [Part 2:6.5] was carried out on four selected cohesive samples.

Particle densities were determined for seventeen samples using the fluid pycnometer method in accordance with BS EN ISO 17892-3:2015.

Particle size distributions were determined in accordance with BS EN ISO 17892-4:2016 for fifteen samples by wet sieving [5.2]. The fine fractions of six of these samples were further analysed by sedimentation using the pipette method [5.4]. The results are presented as grading curves.

The following tests on rock samples were carried out in accordance with ISRM (2007) unless stated otherwise. Test results are presented in Appendix B.

The natural moisture content of rock was determined on eighteen selected cores.

The porosity and density of rock was determined on one hundred and forty-three selected cores.

Two rock cores were tested for their unconfined compressive strength.

Point load index tests were carried out on one hundred and fifteen selected lengths of core.

The BRE SD1 (2005) suite of tests was carried out on thirteen samples by Chemtest Ltd using in-house methods.

The organic matter content was determined for sixteen selected samples by Chemtest Ltd using in-house methods.

The pH was determined for twenty-one selected samples by Chemtest Ltd using in-house methods.

Selected samples were despatched to i2 Analytical Ltd, where chemical analyses were carried out to in-house methods for a suite of contaminants. The results are presented in Appendix C.

GEOTECHNICAL ENGINEERING LIMITED

4. REFERENCES

British Standards Institution (2015): Code of practice for ground investigations. BS 5930:2015.

British Standards Institution (2016): Methods of test for soils for civil engineering purposes – Part 1: General requirements and sample preparation. BS1377-1:2016.

British Standards Institution (1990): Methods of tests for soils for civil engineering purposes. BS 1377 Parts 2-9.

British Standards Institution (2014): Geotechnical investigation and testing – Laboratory testing of soil. Part 1: Determination of water content. BS EN ISO 17892-1:2014.

British Standards Institution (2016): Geotechnical investigation and testing – Laboratory testing of soil. Part 3: Determination of particle density. BS EN ISO 17892-3:2015.

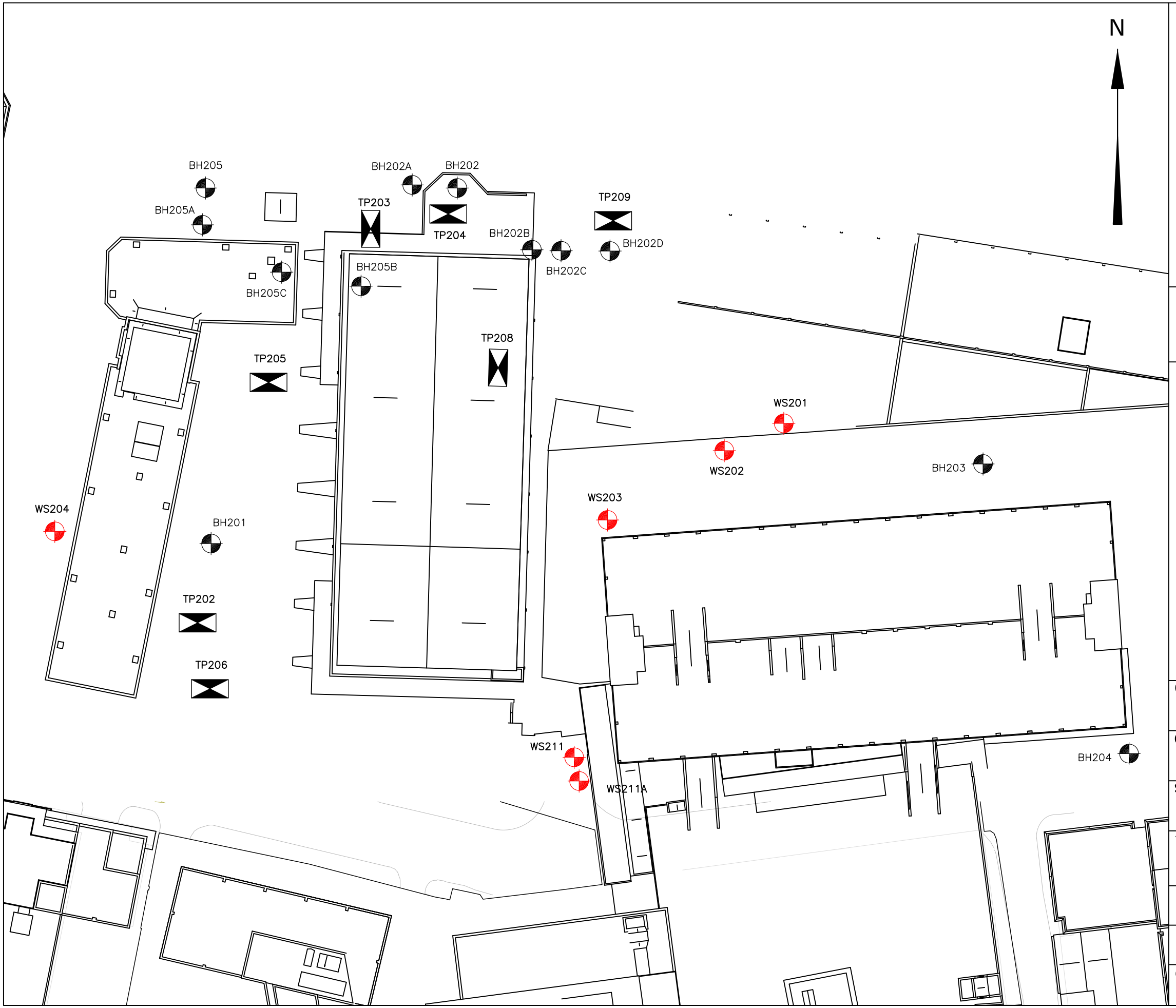
British Standards Institution (2016): Geotechnical investigation and testing – Laboratory testing of soil. Part 4: Determination of particle size distribution. BS EN ISO 17892-4:2016.

British Standards Institution (2012): Geotechnical investigation and testing. Field testing. Standard penetration test. BS EN ISO 22476-3:2005+A1:2011.

Lord J A, Clayton C R I and Mortimore R N (2002): Engineering in Chalk. CIRIA Report No. C574.

Building Research Establishment (2005): Concrete in aggressive ground. BRE Special Digest 1. Third Edition.

International Society for Rock Mechanics (2007). The complete ISRM suggested methods for rock characterization, testing and monitoring: 1974-2006, edited by R Ulusay & J A Hudson. Ankara, Turkey: Turkish National Group of the International Society for Rock Mechanics.

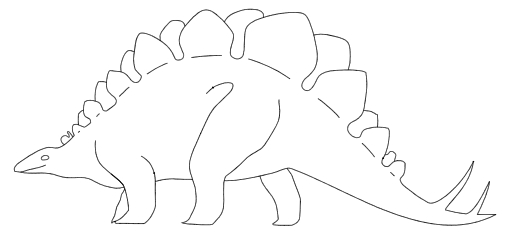


Key.

- Approximate Borehole Location
- Approximate Dynamic Sample Location
- Approximate Trial Pit Location

Notes:

Drawing supplied by the Consultant



geotechnical

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Client: SH READING MASTER LLP		
Consultants: RAMBOLL UK LTD		
Site: STATION HILL, READING		
Title: EXPLORATORY HOLE LOCATION PLAN		
Drawn By: JB	**Checked By:** CT	**Paper Size:** A3
Scale: Not to scale	**Date:** July 2019	
Contract: 35248	**Figure:** 1	

APPENDIX A

FIELDWORK DATA

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KEY TO EXPLORATORY HOLE LOGS

Sample type

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

Test type

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

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

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

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

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

Mx Mexe cone - average reading of equivalent CBR value in %

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

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

Sample/core range/I_f

Dynamic sample

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

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

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

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

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

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

Instrumentation

Porous tip | Perforated standpipe | Granular response zone | Bentonite seal | Cement/ bentonite grout | Soil Backfill | Concrete

Stratum boundaries

Estimated boundary

Grading boundary

Logging

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

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

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

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

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

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

General Comments

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

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

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

Where provided, the stratigraphic names/geological rock units are for guidance only and may not be wholly accurate.

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BOREHOLE LOG

BH201

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 4

Start Date 20 May 2019 — Easting 471311.90 — Scale 1 : 50

End Date 24 May 2019 — Northing 173736.20 — Ground level 38.30mOD — Depth 35.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
20/05/19 0930hrs	C	0.00 - 0.30			67			MADE GROUND composed light grey CONCRETE.	0.20	38.10	
	1B	0.30 - 0.50						0.20m: Black plastic mesh.	0.30	38.00	
	1ES	0.30 - 0.50		Vo 0.0				Brown slightly clayey sandy angular to rounded fine to coarse limestone and flint rarely chalk and sandstone GRAVEL. (MADE GROUND)			
	2B	0.70 - 0.90									
	2ES	0.70 - 0.90		Vo 0.0							
	3B	1.10 - 1.30									
	3ES	1.10 - 1.30		Vo 0.0							
	4D	1.20 - 1.65	Nil	S 3				Very soft brown mottled dark brown slightly sandy slightly gravelly silty CLAY with frequent fragments (up to 30x50mm) of slate roofing tiles. Gravel is subangular to rounded fine to coarse brick and flint rarely clinker and chalk. (MADE GROUND)			
	5L	1.20 - 2.00									
	4ES	1.60 - 1.80		Vo 0.0							
	6D	2.00 - 2.45	Nil	S 5					1.90	36.40	
	7L	2.00 - 3.00	2.00					Soft greyish green mottled brown slightly sandy becoming sandy slightly gravelly CLAY. Gravel is angular fine and medium flint. (ALLUVIUM)			
	5ES	2.20 - 2.40		Vo 0.0							
	6ES	2.80 - 3.00		Vo 0.0							
	8D	3.00 - 3.45	3.00	S 16					3.00	35.30	
	9L	3.00 - 4.00						Stiff yellowish brown slightly gravelly slightly sandy CLAY. Gravel is subangular to subrounded fine and medium rarely coarse flint and chalk. (ALLUVIUM)			
	7ES	3.60 - 3.80		Vo 0.0							
	8ES	4.00 - 4.20		Vo 0.0					3.80	34.50	
	10D	4.00 - 4.45	4.00	S 19				Medium dense yellowish brown gravelly fine to coarse SAND. Gravel is subangular and subrounded fine and medium rarely coarse flint and chalk rarely quartzite. (TAPLOW GRAVEL) 3.80 - 3.95m: Orangish brown.			
	11L	4.00 - 5.00									
	12D	5.00 - 5.45	5.00	S 26							
	13L	5.00 - 6.50									
	9ES	6.00 - 6.20		Vo 0.0							
		6.50 - 6.95	6.50	C 27							
	14L	6.50 - 8.00							7.00	31.30	
								Structureless CHALK composed of slightly sandy silty subangular to rounded fine rarely medium chalk rarely flint GRAVEL. Matrix is white. (Probably CIRIA Grade Dc) (STRUCTURELESS CHALK)	7.35	30.95	
20/05/19 1715hrs 2.40m		8.00 - 8.45	8.00	C 19				Extremely weak low density white rarely stained orangish brown with rare black specks CHALK. Fractures are			
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Rotary core drilled (300mm) 0.00-0.30m. Hand dug inspection pit 0.30-1.20m. Dynamic sampled (128mm) 1.20-9.50m. Waterflush rotary core drilled (146mm wireline) 9.50-35.50m.

CASING: 200mm diam to 10.00m, 168mm diam to 10.00mm and 140mm diam to 35.50m.

BACKFILL: On completion, hole backfilled with bentonite pellets 35.50-12.00m. A slotted standpipe (50mm) with geosock was installed to 12.00m, granular response zone 12.00-11.00m, bentonite seal 11.00-0.30m, concrete and stopcock cover 0.30- 0.00m.

REMARKS: Bentonite seal for aquifer protection installed 8.50-9.50m. Seal cured for 3hrs prior to progressing hole through seal at reduced casing diameter. 200mm and 168mm casing dropped to 10.00m as hole advanced. Driller notes reduced flush returns 9.50-35.50m (approx. 50-75% returned). Chalk grade based on CIRIA C574 (2002).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

AGS

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BOREHOLE LOG

BH201

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 2 of 4

Start Date 20 May 2019 — Easting 471311.90 — Scale 1 : 50

End Date 24 May 2019 — Northing 173736.20 — Ground level 38.30mOD — Depth 35.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
21/05/19 0830hrs 3.00m	15L	8.00 - 9.50						randomly orientated extremely closely spaced planar rough stained light yellowish brown with frequent black specks. (Probably CIRIA Grade B5) (STRUCTURED CHALK) 8.00 - 10.00m: Drilling disturbed. 8.75m: Coarse gravel sized rinded black nodular flint.			
	16D	9.50 - 9.95	9.50	S 28							
	17C	9.50 - 10.00			100 0 0	NI					
									10.00	28.30	
	18C	10.00 - 11.50	10.00		73 0 0	NI NI 55		Extremely weak low density white with rare black specks CHALK. Fractures are randomly orientated extremely closely and very closely spaced planar and stepped rough infilled (up to 2mm) with white silt. (CIRIA Grade B5) (STRUCTURED CHALK) 10.00m: Cobble sized rinded black nodular flint recovered non intact.			
		11.50 - 11.95	11.50	C 35							
	19C	11.50 - 13.00			87 0 0						
						NI 50 120			12.30	26.00	
		13.00 - 13.27	13.00	C*115				Extremely weak low density white with rare black specks CHALK. Fractures are subhorizontal to 10° and 80° to subvertical very closely and closely spaced planar rough infilled (up to 3mm) with white silt locally stained orangish brown. Widely spaced bands of medium and coarse gravel sized rinded black nodular flint (possible cobbles recovered non-intact. (CIRIA Grade B4) (STRUCTURED CHALK) 13.45 - 15.55m: 45° planar rough fracture.			
	20C	13.00 - 14.50			60 0 0						
21/05/19 1730hrs 2.50m											
		14.50 - 14.83	14.50	C*83							
22/05/19 0800hrs 4.00m	21C	14.50 - 16.00			93 7 7						
		16.00 - 16.31	16.00	C*94							
	22C	16.00 - 17.50			60 10 7						
		17.50 - 17.74	17.50	C*130							
	23C	17.50 - 19.00			93 17 12						
									18.00	20.30	
								Continued Next Page	{18.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING — Sheet 3 of 4

Start Date 20 May 2019 — Easting 471311.90 — Scale 1 : 50

End Date 24 May 2019 — Northing 173736.20 — Ground level 38.30mOD — Depth 35.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
						NI 50 160		Very weak medium density white with rare black specks CHALK with rare wisps of light grey marl. Fractures are subhorizontal and 70° very closely and closely spaced planar rough infilled (up to 4mm) with white silt. (CIRIA Grade C4) (STRUCTURED CHALK)			
		19.00 - 19.24	19.00	C*176				18.10 - 18.15m: 60° planar rough fracture stained orangish brown.	19.00	19.30	
	24C	19.00 - 20.50			60 20 20	20 115 190		18.10 - 18.50m: Subvertical planar rough fracture.			
								Very weak medium density white rarely stained orangish brown CHALK with rare wisps of light grey marl. Fractures are subhorizontal to 20° very closely and closely spaced planar rough infilled (up to 2mm) with light grey silt. Medium spaced bands of cobble sized rinded black nodular flint recovered non intact. (CIRIA Grade B3/4) (STRUCTURED CHALK)			
		20.50 - 20.79	20.50	C*111				19.25 - 19.65m: Subvertical planar rough fracture.			
	25C	20.50 - 22.00			53 7 7						
		22.00 - 22.32	22.00	C*88							
	26C	22.00 - 23.50			80 27 13						
						NI 90 180			22.70	15.60	
		23.50 - 23.81	23.50	C*83				Very weak and weak high density light yellowish brown CHALK with rare wisps of light grey marl. Fractures are subhorizontal to 15° closely spaced planar rough infilled (up to 2mm) with white silt, frequently stained with black specks and rarely stained orangish brown with a veneer of grey clay. (CIRIA Grade B3) (STRUCTURED CHALK)			
	27C	23.50 - 25.00			93 37 27						
								24.35m: 50mm rinded black finger flint.			
		25.00 - 25.29	25.00	C*107							
	28C	25.00 - 26.50			100 63 63						
		26.50 - 26.75	26.50	C*130							
	29C	26.50 - 28.00			97 53 27			26.70 - 27.10m: Subvertical planar rough fracture. 26.80m: Cobble sized rinded black nodular flint.			
22/05/19 1700hrs 2.90m								27.65m: Cobble sized rinded black nodular flint.			
		28.00 - 28.26	28.00	C*143							
								Continued Next Page	{28.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING — Sheet 4 of 4

Start Date 20 May 2019 — Easting 471311.90 — Scale 1 : 50

End Date 24 May 2019 — Northing 173736.20 — Ground level 38.30mOD — Depth 35.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
23/05/19 0800hrs 1.50m	30C	28.00 - 29.50			87 30 20	NI 170 230			28.30	10.00	
		29.50 - 29.79	29.50	C*111				Very weak medium locally high density light grey CHALK with abundant bands (up to 4mm) and wisps of light grey marl. Fractures are 20-40° closely and medium spaced planar rough infilled (up to 2mm) with white silt and frequent brown staining, a veneer of greenish grey clay and rare striations. (CIRIA Grade B3) (STRUCTURED CHALK)			
	31C	29.50 - 31.00			80 60 60			29.45m: Shell fragment (4x5mm)			
		31.00 - 31.33	31.00	C*83							
	32C	31.00 - 32.50			87 40 20				31.65	6.65	
		32.50 - 32.75	32.50	C*158		NI 90 170		Weak high density white CHALK with frequent bands (up to 20mm) and wisps of light grey marl. Fractures are 10º and 60-80° closely spaced planar rough infilled (up to 2mm) with white silt frequently stained greyish brown rarely stained orangish brown. (CIRIA Grade B3) (STRUCTURED CHALK)			
	33C	32.50 - 34.00			87 30 27			32.70 - 33.80m: Medium spaced bands of coarse gravel sized rinded black nodular flint recovered non intact.			
		34.00 - 34.24	34.00	C*176					33.80	4.50	
	34C	34.00 - 35.50			83 27 20	NI 55 100		Very weak medium density white rarely stained orangish brown CHALK. Fractures are subhorizontal to 10° very closely and closely spaced planar rough infilled (up to 2mm) with white silt. (CIRIA Grade B4) (STRUCTURED CHALK)			
23/05/19 1300hrs 2.90m		35.50 - 35.75	35.50	C*150					35.50	2.80	
								Borehole completed at 35.50m.	{38.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING

Start Date 17 May 2019

End Date 20 May 2019

Sheet 1 of 1

Scale 1 : 50

Depth 1.60 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
17/05/19 0930hrs	1B	0.20 - 0.40						Grey angular concrete, flint and brick COBBLES with some slightly sandy angular and subangular flint, limestone, chalk and mudstone gravel. (MADE GROUND)	0.20		
	1ES	0.20 - 0.40		Vo 0.0							
	2B	0.80 - 1.00						Brown silty sandy angular to rounded fine to coarse flint, mudstone, sandstone, concrete and brick GRAVEL with a medium angular concrete, flint and brick cobble content and rare fragments of metal wire (up to 60mm) and plastic sheeting (up to 20x80mm). (MADE GROUND)	1.30		
	2ES	0.80 - 1.00		Vo 0.0							
20/05/19 1140hrs Dry								MADE GROUND comprising CONCRETE.	1.60		
								1.60m: Copper wiring (60x5mm) underlying base of concrete.			
								Borehole completed at 1.60m.	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig and JCB 3CX Mechanical Excavator.

METHOD: Hand dug inspection pit 0.00-1.30m. Machine excavated 1.30-1.60m

CASING: None used.

BACKFILL: On completion, hole backfilled with arisings.

REMARKS: Hole terminated at 1.60m due to encountering copper wiring beneath concrete slab.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered.

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BOREHOLE LOG

BH202A

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

Start Date 17 May 2019

End Date 17 May 2019

Sheet 1 of 1

Scale 1 : 50

Depth 0.65 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
17/05/19 1310hrs	1B 1ES	0.10 - 0.30 0.10 - 0.30		Vo 0.0				Greyish brown silty sandy angular to rounded fine to coarse flint, mudstone, sandstone, concrete, brick and slag GRAVEL with a medium angular concrete, brick and flint cobble content and rare fragments of metal wiring (up to 60mm) and plastic sheeting (up to 20x80mm). (MADE GROUND)	0.65		
17/05/19 1500hrs Dry								0.65m: Grey concrete across pit. Borehole completed at 0.65m.	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-0.65m.

CASING: None used.

BACKFILL: On completion, hole backfilled with arisings.

REMARKS: Hole terminated at 0.65m due to encountering concrete across pit.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

AGS

CONTRACT	CHECKED
35248	**CT**

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BOREHOLE LOG

BH202B

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

Start Date 22 May 2019

End Date 22 May 2019

Sheet 1 of 1

Scale 1 : 50

Depth 0.60 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
22/05/19 1120hrs								Light grey slightly sandy silty subangular and subrounded fine to coarse brick, concrete and sandstone GRAVEL with a medium subangular and subrounded brick and concrete cobble content, frequent fragments of metal (up to 40mm) and plastic (up to 80mm) and rare fragments of wood (up to 60mm) and steel reinforcement bar (up to 15mm diam). (MADE GROUND)			
22/05/19 1135hrs Dry								0.60m: Concrete obstruction across pit.	0.60		
								Borehole completed at 0.60m.	{8.00}		

EQUIPMENT: JCB 3CX Mechanical Excavator and Geotechnical Pioneer rig.

METHOD: Machine excavated 0.00-0.60m.

CASING: None used.

BACKFILL: On completion, hole backfilled with arisings.

REMARKS: Hole terminated at 0.60m due to encountering concrete obstruction across pit.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

AGS

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BOREHOLE LOG

BH202C

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

Start Date 22 May 2019

End Date 22 May 2019

Sheet 1 of 1

Scale 1 : 50

Depth 0.10 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
22/05/19 1150hrs Dry									Light grey slightly sandy silty subangular and subrounded fine to coarse brick, concrete and sandstone GRAVEL with a medium subangular and subrounded concrete cobble content and rare fragments of metal (up to 15mm), plastic (up to 10mm), wood (up to 30mm) and steel reinforcement bar (up to 15mm diam). (MADE GROUND) 0.10m: Concrete obstruction across pit. Borehole completed at 0.10m.	0.10 {8.00}		

EQUIPMENT: JCB 3CX Mechanical Excavator and Geotechnical Pioneer rig.

METHOD: Machine excavated 0.00-0.10m.

CASING: None used.

BACKFILL: On completion, hole backfilled with arisings.

REMARKS: Hole terminated at 0.10m due to encountering concrete obstruction across pit.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

AGS

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Geotechnical Engineering Limited

BOREHOLE LOG

BH202D

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 5

Start Date 22 May 2019 — Easting 471355.20 — Scale 1 : 50

End Date 31 May 2019 — Northing 173775.60 — Ground level 39.20mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
22/05/19 1155hrs	1B	0.80 - 1.00						Light grey slightly sandy silty subangular and subrounded fine to coarse brick, concrete and sandstone GRAVEL with a medium subangular and subrounded brick and concrete cobble content and rare fragments of metal (up to 150mm), plastic (up to 200mm), wood (up to 30mm) and steel reinforcement bar (up to 30mm diam). (MADE GROUND)			
22/05/19 1210hrs Dry	2B	1.50 - 1.80									
24/05/19 1100hrs Dry	3L	1.85 - 2.00	Nil						2.00	37.20	
	4L	2.00 - 3.00	2.00					Black and dark brown clayey sandy angular to subrounded fine and medium flint, chalk, mudstone and brick GRAVEL. (MADE GROUND)	2.30	36.90	
	1ES	2.30 - 2.40		Vo 0.0				2.00 - 3.00m: Limited recovery (70%).			
	2ES	2.50 - 2.60		Vo 0.0							
	5D	3.00 - 3.45	3.00	S 12				Firm greyish green mottled dark brown slightly sandy silty CLAY with rare angular fine flint gravel and rare decomposed rootlets. (ALLUVIUM)	3.00	36.20	
	6L	3.00 - 4.00						2.30 - 2.40m: Strong organic odour.			
	3ES	3.00 - 3.20		Vo 0.0							
	4ES	3.80 - 4.00		Vo 0.0				Medium dense orangish brown clayey fine and medium SAND. (TAPLOW GRAVEL)			
	7D	4.00 - 4.31	4.00	S*97				3.00 - 3.60m: Locally light grey.			
	8L	4.00 - 5.50						4.00m: Very dense.	4.35	34.85	
	5ES	4.50 - 4.70		Vo 0.0				Very dense orangish brown silty sandy subangular and subrounded fine and medium rarely coarse flint, chalk and mudstone GRAVEL. (TAPLOW GRAVEL)			
								5.10 - 5.50m: No recovery.			
	9D	5.50 - 5.78	5.50	S*115							
	10L	5.50 - 7.00									
	6ES	6.00 - 6.20		Vo 0.0							
24/05/19 1530hrs 4.00m											
28/05/19 0750hrs 3.00m	11L	7.00 - 8.50	7.00					7.30 - 7.90m: Very sandy.	7.90	31.30	
								Continued Next Page	{8.00}		

EQUIPMENT: JCB 3CX Mechanical Excavator and Geotechnical Pioneer rig.

METHOD: Machine excavated 0.00-1.85m. Dynamic sampled (128mm) 1.85-10.00m. Rotary core drilled using a polymer flush (146mm wireline) 10.00-40.50m.

CASING: 200mm diam to 2.00m, 168mm diam to 10.00m and 140mm diam to 40.50m.

BACKFILL: On completion, hole backfilled with bentonite pellets 40.50-7.00m. A slotted standpipe (50mm) with geosock was installed to 7.00m, granular response zone 7.00-6.00m, bentonite seal 6.00-0.30m concrete and stopcock cover 0.30-0.00m.

REMARKS: Driller notes reduced flush returns 10.00-40.50m (approx. 65-80% returned). Chalk grade based on CIRIA C574 (2002).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

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BOREHOLE LOG

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SITE STATION HILL, READING

Sheet 2 of 5

Start Date 22 May 2019 Easting 471355.20

Scale 1 : 50

End Date 31 May 2019 Northing 173775.60 Ground level 39.20mOD

Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	7ES 12D 13L	8.20 - 8.40 8.50 - 8.95 8.50 - 10.00	8.50	Vo 0.0 S 13				Structureless CHALK composed of slightly sandy silty subangular to rounded fine and medium rarely coarse GRAVEL. Clasts are extremely weak low density. Matrix is white with rare black specks. (Probably CIRIA Grade Dc) (STRUCTURELESS CHALK)	9.30	29.90	
	C	10.00 - 10.50	10.00		0	NA		Structureless CHALK composed of white locally stained brownish yellow slightly sandy slightly gravelly locally gravelly SILT. Gravel is subrounded and rounded fine and medium rarely coarse extremely weak low density chalk, rarely angular fine to coarse flint. (CIRIA Grade Dm) (STRUCTURELESS CHALK) 9.50 - 10.00m: No recovery. 10.00 - 10.50m: No recovery.			
	14C	10.50 - 12.00	10.50		93						
		12.00 - 12.45	12.00	C 33							
	C	12.00 - 13.50			0			12.00 - 13.50m: No recovery.			
		13.50 - 13.82	13.50	C*88							
	15C	13.50 - 15.00			87			13.50m: Cobble sized rinded black nodular flint recovered non intact. 14.50m: Medium density. 14.60m: Cobble sized rinded black nodular flint recovered non intact.			
		15.00 - 15.45	15.00	C 26							
	16C	15.00 - 16.50			97			15.90m: Yellow silt lens (2x15mm). 16.10m: Coarse gravel sized rinded black and grey nodular flint recovered non intact.			
		16.50 - 16.83	16.50	C*86							
	17C	16.50 - 18.00			73			17.30m: Coarse gravel sized rinded black and grey nodular flint recovered non intact. 17.60 - 18.00m: Assessed zone of core loss.			
						NR			18.00	21.20	
								Continued Next Page	{18.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING — Sheet 3 of 5

Start Date 22 May 2019 — Easting 471355.20 — Scale 1 : 50

End Date 31 May 2019 — Northing 173775.60 — Ground level 39.20mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	18C	18.00 - 19.50	18.00		93 13 0	NI 20 80		Very weak medium density white with frequent black specks and rare orangish brown staining CHALK. Fractures are randomly orientated very closely rarely closely spaced planar rough with frequent black specks and with a rare veneer of grey clay. (CIRIA Grade B4) (STRUCTURED CHALK)			
28/05/19 1700hrs 3.00m		19.50 - 19.78	19.50	C*115		NI 60 150			19.35	19.85	
29/05/19 0750hrs 3.20m	19C	19.50 - 21.00			87 23 10			Very weak medium density white with rare black specks and orangish brown staining CHALK. Fractures are subhorizontal to 15° and randomly orientated very closely and closely spaced planar rough with frequent black specks and greyish brown staining. Widely spaced bands of cobble and coarse gravel sized rinded black nodular flint recovered non intact. (CIRIA Grade B4) (STRUCTURED CHALK)			
		21.00 - 21.36	21.00	C*71							
	20C	21.00 - 22.50			93 3 0			21.10 - 21.30m: 70° planar rough fracture stained light grey.	21.50	17.70	
		22.50 - 22.74	22.50	C*120		NI NI 40		Extremely weak low density white with frequent black specks and rare orangish brown staining CHALK. Fractures are randomly orientated extremely closely rarely very closely spaced planar rough frequently stained stained greyish brown and brown with rare grey clay veneer. (CIRIA Grade B5) (STRUCTURED CHALK)			
	21C	22.50 - 24.00			80 7 0				23.50	15.70	
		24.00 - 24.32	24.00	C*88		NI 80 200		Weak high density white CHALK with rare bands (up to 1mm) and wisps (up to 3x5mm) of light grey marl. Fractures are subhorizontal to 15° closely and medium spaced planar and undulating rough rarely stained greyish brown and brown. (CIRIA Grade B4) (STRUCTURED CHALK) 24.40 - 25.70m: Cobble sized rinded black nodular flint recovered non intact.			
	22C	24.00 - 25.50			93 53 23						
		25.50 - 25.71	25.50	C*143							
	23C	25.50 - 27.00			97 47 37			25.90 - 26.00m: Intersecting 60° to subvertical planar rough fractures stained orangish brown. 26.30 - 26.40m: 60° planar rough fracture.			
		27.00 - 27.23	27.00	C*167							
	24C	27.00 - 28.50			87 50 40			27.10 - 27.20m: 60° planar rough fracture.			
						20 110 350		Very weak medium density white with frequent dark orangish brown staining CHALK with frequent bands (up	27.60	11.60	
								Continued Next Page	{28.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING — Sheet 4 of 5

Start Date 22 May 2019 — Easting 471355.20 — Scale 1 : 50

End Date 31 May 2019 — Northing 173775.60 — Ground level 39.20mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
		28.50 - 28.66	28.50	C*176	75			to 6mm) and rare wisps of light grey and grey marl. Fractures are subhorizontal and 15-25° closely and medium spaced planar and undulating rough with frequent greyish brown staining and grey clay veneer. (CIRIA Grade B3) (STRUCTURED CHALK)			
	25C	28.50 - 30.00			50						
	26Cs	28.70 - 29.05			47						
		30.00 - 30.20	30.00	C*130	100	NI			30.00	9.20	
	27C	30.00 - 31.50			40	60		Weak high density locally medium density white with rare orangish brown staining CHALK with rare bands (up to 1mm) and wisps of light grey marl. Fractures are 45-60° very closely and closely spaced planar rough with frequent black specks and orangish brown and brown staining. (CIRIA Grade B3) (STRUCTURED CHALK)			
					26	190		30.55 - 30.80m: Subvertical planar rough fracture stained light greyish brown.			
		31.50 - 31.67	31.50	C*150				30.80m: Cobble sized rinded black nodular flint recovered non intact.			
	28C	31.50 - 33.00			40						
					7						
					0			31.80m: Cobble sized rinded black nodular flint recovered non intact.			
						NR		32.10 - 33.00m: Assessed zone of core loss.			
		33.00 - 33.21	33.00	C*150					33.00	6.20	
	29C	33.00 - 34.50			80	NI		Weak high locally medium density white with rare orangish brown staining CHALK with rare wisps of light grey marl. Fractures are subhorizontal to 15° very closely and closely spaced planar rough frequently stained greyish brown and brown with a rare veneer of grey clay and rare black specks. (CIRIA Grade B3) (STRUCTURED CHALK)			
					27	90					
					23	150					
						NI		33.55m: Coarse gravel sized rinded black nodular flint.			
						NR		33.80 - 34.20m: Randomly orientated extremely closely spaced planar rough fractures with rare black specks.			
	30C	34.50 - 36.00	34.50		93	30		34.20 - 34.50m: Assessed zone of core loss.			
					30	60					
					30	130					
						NI		35.20 - 36.00m: Drilling disturbed.			
29/05/19 1630hrs 3.00m		36.00 - 36.21	36.00	C*115					36.00	3.20	
31/05/19 0815hrs 3.00m	31C	36.00 - 37.50			100	40		Weak medium density white with rare orangish brown staining CHALK with frequent bands (up to 2mm) and wisps of light grey and grey marl. Fractures are subhorizontal and 20-40° very closely to medium spaced planar and undulating rough with frequent greyish brown and orangish brown staining, rare black specks and a rare veneer of grey clay. (CIRIA Grade B3) (STRUCTURED CHALK)			
					47	180					
					47	250					
		37.50 - 37.67	37.50	C*143							
	32C	37.50 - 39.00			93						
					30						
					23						
								Continued Next Page	{38.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING

Sheet 5 of 5

Start Date 22 May 2019 Easting 471355.20 Scale 1 : 50

End Date 31 May 2019 Northing 173775.60 Ground level 39.20mOD Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
							NI					
	33C	39.00	39.12	39.00	C*188	93	50					
		39.00	40.50			40	180					
31/05/19 1140hrs 2.80m						33	210					
		40.50	40.70	40.50	C*214				Borehole completed at 40.50m.	40.50	-1.30	
										{48.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING — Sheet 1 of 5

Start Date 3 June 2019 — Easting 471417.50 — Scale 1 : 50

End Date 6 June 2019 — Northing 173749.90 — Ground level 38.75mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
03/06/19 1430hrs	C	0.00 - 0.40			100			MADE GROUND comprising black TARMACADAM.	0.20	38.55	
								MADE GROUND comprising grey CONCRETE.	0.40	38.35	
	1ES	0.40 - 0.60		Vo 0.0				Very loose clayey very sandy angular to rounded fine to coarse flint, brick, chalk, mudstone and quartzite GRAVEL with a low angular and subangular brick rarely flint cobble content and frequent greyish brown silty clay pockets (up to 30x40mm). (MADE GROUND)			
	2ES	0.70 - 0.90		Vo 0.0							
	1D	1.20 - 1.65	Nil	S 4							
	2L	1.20 - 2.00									
	3ES	1.30 - 1.50		Vo 0.0							
	4ES	1.70 - 1.90		Vo 0.0							
	3D	2.00 - 2.45	Nil	S 2					2.00	36.75	
	4L	2.00 - 3.00						Firm greyish green mottled dark brown and black slightly sandy becoming sandy silty CLAY with rare angular fine flint gravel and rare decomposed rootlets. (MADE GROUND) 2.00 - 2.45m: Very soft.			
	5ES	2.40 - 2.60		Vo 0.0							
03/06/19 1800hrs 2.80m	5D	3.00 - 3.45	3.00	S 11							
04/06/19 0845hrs Dry	6L	3.00 - 4.00						3.00 - 4.00m: Limited recovery (30%)			
	6ES	3.20 - 3.40		Vo 0.0							
	7D	4.00 - 4.45	4.00	S 29					4.00	34.75	
	8L	4.00 - 5.00						Soft black slightly gravelly silty CLAY. Gravel is angular and subangular fine and medium flint. (MADE GROUND)	4.20	34.55	
	7ES	4.00 - 4.10		Vo 0.0				4.00 - 5.00m: Limited recovery (10%)			
	9D	5.00 - 5.39	5.00	S*57				Medium dense becoming very dense grey, white and red sandy angular to subrounded medium flint, brick and chalk GRAVEL. (MADE GROUND)			
	10L	5.00 - 6.00						5.00 - 6.00m: Limited recovery (10%)			
	11D	6.00 - 6.45	6.00	S 27					6.00	32.75	
	12L	6.00 - 7.50						Stiff light greenish grey mottled bluish grey slightly sandy silty CLAY with rare subangular and subrounded fine and medium chalk and flint gravel. (ALLUVIUM)			
	8ES	6.20 - 6.40		Vo 0.0					6.60	32.15	
	9ES	7.00 - 7.20		Vo 0.0				Yellowish brown clayey gravelly fine to coarse SAND. Gravel is angular to subrounded fine and medium rarely coarse flint, chalk and mudstone. (TAPLOW GRAVEL) 7.10 - 7.25m: Slightly sandy gravelly silty clay. Gravel is angular and subangular fine and medium chalk.			
	13D	7.50 - 7.95	7.50	S 4							
	14L	7.50 - 9.00						7.50 - 9.00m: Limited recovery (60%)	7.70	31.05	
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Rotary core drilled (300mm) 0.00-0.40m. Hand dug inspection pit 0.40-1.20m. Dynamic sampled (128mm) 1.20-12.00m. Waterflush rotary core drilled (146mm wireline) 12.00-40.50m.

CASING: 200mm diam to 10.50m, 168mm diam to 10.50m and 140mm diam to 40.50m.

BACKFILL: On 07/06/19, hole backfilled with bentonite pellets 40.50-12.00m. A slotted standpipe (50mm) with geosock was installed to 12.00m, granular response zone 12.00-11.00m, bentonite seal 11.00-0.50m, gravel drain 0.50-0.30m, concrete and stopcock cover 0.30-0.00m.

REMARKS: Bentonite seal for aquifer protection installed 9.50-10.50m. Seal cured for 3hr prior to progressing hole through seal at reduced casing diameter. Driller notes reduced flush returns 12.00-40.50m (approx 20-80% returned) and loss of flush returns 31.50-40.50m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

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BOREHOLE LOG

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SITE STATION HILL, READING — Sheet 2 of 5

Start Date 3 June 2019 — Easting 471417.50 — Scale 1 : 50

End Date 6 June 2019 — Northing 173749.90 — Ground level 38.75mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	10ES	8.20 - 8.40		Vo 0.0				Structureless CHALK composed of slightly sandy subangular to rounded fine to coarse GRAVEL. Clasts are very weak and weak medium density white frequently stained orangish brown. Matrix is white and light orangish brown (Probably CIRIA Grade Dc). (STRUCTURELESS CHALK)			
	15D 16L	9.00 - 9.45 9.00 - 10.50	9.00	S 27				8.30m: Cobble sized rinded black nodular flint recovered non intact.			
	17D 18L	10.50 - 10.95 10.50 - 12.00	10.50	S 25							
								Assessed zone of core loss.	10.90	27.85	
	19D 20C	12.00 - 12.45 12.00 - 13.50	12.00	S 15	90	NA		Structureless CHALK composed of slightly sandy subangular to rounded fine to coarse GRAVEL. Clasts are very weak and weak medium density white frequently stained orangish brown. Matrix is white and light orangish brown (CIRIA Grade Dc). (STRUCTURELESS CHALK)	12.00	26.75	
04/06/19 1745hrs 2.90m		13.50 - 13.95	13.50	C 31					13.50	25.25	
05/06/19 0855hrs 2.80m	21C	13.50 - 15.00			53 0 0	NI NI 20		Very weak medium density white CHALK rarely stained orangish brown with rare black specks. Fractures are subhorizontal to 20°, 30-50° and subvertical extremely closely and very closely spaced planar smooth stained orangish brown. Medium rarely widely spaced bands of cobble and coarse gravel sized rinded black nodular flint frequently recovered non intact. (CIRIA Grade B5). (STRUCTURED CHALK) 13.50m: Cobble sized rinded black nodular flint recovered non intact.			
		15.00 - 15.40	15.00	C*61							
	22C	15.00 - 16.50			93 15 9			14.25 - 15.00m: Assessed zone of core loss.			
						140			15.60	23.15	
						NI 10 50		Very weak medium density white CHALK rarely stained orangish brown with rare black specks. Fractures are subhorizontal to 15°, 30° to 50° and subvertical extremely closely and very closely spaced planar smooth rarely stained brownish grey. Medium rarely widely spaced cobble and coarse gravel sized rinded black nodular flint frequently recovered non intact. (CIRIA Grade B5). (STRUCTURED CHALK) 15.60 - 17.75m: Closely spaced fractures. 15.90 - 16.30m: Subvertical stepped rough fracture. 16.50m: Cobble sized rinded black nodular flint recovered non intact.			
		16.50 - 16.83	16.50	C*83							
	23C	16.50 - 18.00			66 10 0			17.50 - 18.00m: Assessed zone of core loss. 17.50m: Cobble sized rinded black nodular flint recovered non intact.			
		18.00 - 18.22	18.00	C*136							
								Continued Next Page	{18.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING — Sheet 3 of 5

Start Date 3 June 2019 — Easting 471417.50 — Scale 1 : 50

End Date 6 June 2019 — Northing 173749.90 — Ground level 38.75mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	24C	18.00 - 19.50			40 0 0			18.00 - 18.20m: Cobble sized rinded black nodular flint recovered non intact.			
						NR		Assessed zone of core loss.	18.60	20.15	
	25C	19.50 - 21.00			80 44 29	NI 30 100		Very weak medium density white CHALK with frequent wisps (up to 3x20mm) and bands (up to 4mm) of light grey marl and rare orangish brown staining. Fractures are 10° to 20° very closely and closely spaced planar rough with rare black specks and orangish brown staining (CIRIA Grade B4). (STRUCTURED CHALK) 19.90m: Coarse gravel sized rinded black nodular flint recovered non intact. 20.10m: 70° undulating rough fracture.	19.50	19.25	
		21.00 - 21.26	21.00	C*136							
	26C	21.00 - 22.50			100 20 13	NI					
						NI 30 100					
		22.50 - 22.65	22.50	C*176							
	27C	22.50 - 24.00			97 10 7						
		24.00 - 24.16	24.00	C*190							
	28C	24.00 - 25.50			40 24 7	NI 60 130					
						NR		Assessed zone of core loss.	24.65	14.10	
		25.50 - 25.63	25.50	C*176					25.50	13.25	
	29C	25.50 - 27.00			97 40 19	NI 90 180		Very weak medium density white CHALK with frequent wisps (up to 3x20mm) and bands (up to 4mm) of light grey marl and rare orangish brown staining. Fractures are 10° to 20° mainly closely spaced planar rough with rare black specks and orangish brown staining (CIRIA Grade B3). (STRUCTURED CHALK) 25.70 - 27.15m: Cobble sized rinded black nodular flint recovered non intact. 26.30 - 26.80m: Subvertical stepped rough fracture with frequent black specks. 27.00 - 27.40m: Cobble sized rinded black nodular flint recovered non intact.			
		27.00 - 27.13	27.00	C*231							
	30C	27.00 - 28.50			27 0 0						
						NR		Assessed zone of core loss.	27.40	11.35	
								Continued Next Page	{28.00}		

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

Groundwater not encountered prior to use of water flush.

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SITE STATION HILL, READING — Sheet 4 of 5

Start Date 3 June 2019 — Easting 471417.50 — Scale 1 : 50

End Date 6 June 2019 — Northing 173749.90 — Ground level 38.75mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
05/06/19 1730hrs 2.90m												
		28.50	28.63	28.50	C*192					28.50	10.25	
06/06/19 0830hrs 3.20m	31C	28.50	30.00			100 60 33	NI 95 210		Very weak medium locally high density light grey CHALK with abundant wisps (up to 3x15mm) and frequent bands (up to 2mm) of light grey marl. Fractures are subhorizontal closely and medium spaced planar rough with frequent grey clay veneer. (CIRIA Grade B3). (STRUCTURED CHALK) 28.70 - 28.75m: 50° undulating rough fracture. 28.80 - 28.85m: 45° undulating rough fracture.			
		30.00	30.15	30.00	C*200							
	32C	30.00	31.50			97 40 63						
		31.50	31.68	31.50	C*273							
	33C	31.50	33.00			90 63 47						
		33.00	33.12	33.00	C*375		NI 60 120			32.80	5.95	
	34C	33.00	34.50			87 57 23			Weak high density white CHALK with rare wisps (up to 3x15mm) of light grey marl and orangish brown staining. Fractures are 20° rarely randomly orientated closely rarely extremely closely spaced planar and undulating rough with rare black specks and brown staining. Medium spaced cobble and coarse gravel sized rinded black nodular flint frequently recovered non intact. (CIRIA Grade B4). (STRUCTURED CHALK)			
	35C	34.50	36.00	34.50		97 27 23						
		36.00	36.17	36.00	C*250					36.00	2.75	
	36C	36.00	37.50			93 60 50	NI 115 240		Very weak medium density white CHALK with frequent wisps (up to 5x10mm) and bands (up to 5mm) of light grey marl. Fractures are subhorizontal to 15° closely and medium spaced planar rarely undulating rough. Medium spaced cobble sized rinded black nodular flint. (CIRIA Grade B3). (STRUCTURED CHALK)			
		37.50	37.66	37.50	C*231							
	37C	37.50	39.00			97 40 40						
									Continued Next Page	{38.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

BH203

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SITE STATION HILL, READING

Sheet 5 of 5

Start Date 3 June 2019 Easting 471417.50 Scale 1 : 50

End Date 6 June 2019 Northing 173749.90 Ground level 38.75mOD Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	38C	39.00	39.15	39.00	C*214	93						
		39.00	40.50			57 33						
06/06/19 1330hrs 3.00m		40.50	40.65	40.50	C*214				Borehole completed at 40.50m.	40.50	-1.75	
										{48.00}		

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

Groundwater not encountered prior to use of water flush.

AGS

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BOREHOLE LOG

BH204

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 5

Start Date 10 June 2019 — Easting 471437.30 — Scale 1 : 50

End Date 18 June 2019 — Northing 173707.70 — Ground level 39.50mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
10/06/19 1600hrs	1ES	0.15	0.25		Vo 0.0				MADE GROUND comprising black TARMACADAM (100mm) over grey CONCRETE (50mm).	0.15	39.35	
										0.40	39.10	
11/06/19 0900hrs Dry	C	0.40	0.60			100			Brown silty sandy angular to rounded fine to coarse flint, brick, concrete, tarmac, slag, quartzite and mudstone GRAVEL with frequent fragments (up to 60mm) of glass. (MADE GROUND)	0.60	38.90	
	2ES	0.60	0.70		Vo 0.0					0.90	38.60	
11/06/19 1700hrs Dry	3ES	0.90	1.10		Vo 0.0							
	1D	1.20	1.65	Nil	S 2				MADE GROUND comprisng grey CONCRETE.			
12/06/19 0800hrs Dry	2L	1.20	2.00									
	4ES	1.30	1.50		Vo 0.0				Brown sandy gravelly SILT with a low angular and subangular flint and brick cobble content and rare pockets (up to 40mm) of dark brown clay. Gravel is angular to rounded fine to coarse flint, brick, mudstone, quartz, glass and concrete. (MADE GROUND)			
	5ES	1.80	2.00		Vo 0.0					1.85	37.65	
		2.00	2.45	Nil	S 15							
	3L	2.00	3.00									
	6ES	2.20	2.40		Vo 0.0				Very soft black mottled dark brown slightly sandy slightly gravelly silty CLAY. Gravel is angular to subrounded fine and medium rarely coarse slag, brick, flint, mudstone and quartzite. (MADE GROUND)			
	7ES	2.90	3.00		Vo					2.80	36.70	
	4D	3.00	3.45	3.00	129.6 S 18				Firm brown slightly gravelly sandy silty CLAY. Gravel is subangular and subrounded fine chalk and rare brick. Strong hydrocarbon odour. (MADE GROUND)			
	5L	3.00	4.00							3.35	36.15	
	8ES	3.35	3.55		Vo 49.6				Stiff bluish grey mottled grey gravelly CLAY with frequent pockets (up to 30mm) of light yellow sand. Gravel is angular to subrounded fine and medium chalk and flint. Strong hydrocarbon odour. (MADE GROUND) 3.00 - 4.00m: Limited recovery (50%).			
		4.00	4.45	4.00	S 21							
	6L	4.00	5.50									
	9ES	4.10	4.30		44.8				Medium dense brownish grey mottled dark grey and orangish brown gravelly clayey fine to coarse SAND. Gravel is subangular and subrounded fine to coarse chalk rarely flint. Strong hydrocarbon odour. (MADE GROUND) 4.00 - 5.50m: Limited recovery (53%).	4.30	35.20	
	10ES	4.30	4.50		Vo 6.2							
		5.50	5.95	5.50	S 22				Structureless CHALK composed of light pink gravelly sandy SILT. Clasts are subangular to rounded fine to coarse extremely weak low density white chalk. (Probably CIRIA Grade Dm). (STRUCTURELESS CHALK) 4.30 - 4.50m: Light grey discolouration with a strong hydrocarbon odour. 5.50 - 7.00m: Limited recovery (40%).			
	7L	5.50	7.00									
	11ES	5.60	5.80		Vo 1.8							
12/06/19 1430hrs 3.00m		7.00	7.45	7.00	S 21					7.00	32.50	
13/06/19 0800hrs 2.10m	C	7.00	7.50			0			NO RECOVERY.			
										7.55	31.95	
	8C	7.50	9.00	7.50		63			Structureless CHALK composed of off white slightly gravelly sandy SILT. Gravel is angular to subrounded fine			
									Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hydraulic breaker 0.00-0.15m and 0.40-0.60m. Hand dug inspection pit 0.15-0.40m and 0.60-1.20m. Dynamic sampled (128mm) 1.20-7.00m. Waterflush rotary core drilled (146mm wireline) 7.00-40.50m.

CASING: 200mm diam to 7.00m, 168mm diam to 7.00m and 140mm diam to 40.50m.

BACKFILL: On completion, hole backfilled with bentonite pellets 40.50-4.00m. A slotted standpipe (50mm) was installed to 4.00m, granular response zone 4.00-3.00m, bentonite seal 3.00-0.50m, concrete and raised helmtet cover 0.50-0.00m.

REMARKS: Bentonite seal for aquifer protection installed 6.00-7.00m. Seal cured for 3hrs prior to progressing hole through seal at reduced casing diameter.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

AGS

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BOREHOLE LOG

BH204

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 2 of 5

Start Date 10 June 2019 — Easting 471437.30 — Scale 1 : 50

End Date 18 June 2019 — Northing 173707.70 — Ground level 39.50mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								to coarse flint and rarely subangular and subrounded extremely weak medium density off-white chalk (probably CIRIA Grade Dm). (STRUCTURELESS CHALK)	8.30	31.20	
	9D	9.00 - 9.45	9.00	S 26				Structureless CHALK composed of slightly sandy silty angular to subrounded fine to coarse GRAVEL. Clasts are weak and very weak low density white with rare black specks and orange staining. Matrix is white (probably CIRIA Grade Dc). (STRUCTURELESS CHALK)			
	10C	9.00 - 10.50			100			8.30 - 9.70m: Medium spaced bands of fine to coarse rinded flint.			
		10.50 - 10.95	10.50	C 28							
	11C	10.50 - 12.00			87				10.95	28.55	
								Structureless CHALK composed of white slightly gravelly sandy SILT. Gravel is subangular and subrounded fine and medium low density off-white chalk and angular to subrounded flint (probably CIRIA Grade DM). (STRUCTURELESS CHALK)	11.15	28.35	
		12.00 - 12.45	12.00	C 37				Structureless CHALK composed of slightly sandy silty angular to subrounded fine to coarse GRAVEL. Clasts are extremely weak and very weak low and medium density white with rare black specks and orange staining chalk rarely subangular flint. Matrix is white. (CIRIA Grade Dc) (STRUCTURELESS CHALK)			
	12C	12.00 - 13.50			87			11.50 - 11.75m: Frequent subangular fine to coarse flint.			
								13.00m: Thin bed of extremely weak low density white chalk.			
		13.50 - 13.95	13.50	C 37							
	13C	13.50 - 15.00			77						
		15.00 - 15.45	15.00	C 35							
	14C	15.00 - 16.50			100 32 32						
						NI 130 380			15.50	24.00	
								Extremely weak low locally medium density white with rare black specks and locally frequent orangish brown and dark orangish brown staining CHALK. Fractures are subhorizontal closely and medium spaced undulating smooth rarely infilled (up to 30mm) with white silt (CIRIA Grade C3). (STRUCTURED CHALK)			
		16.50 - 16.95	16.50	C 33				16.25 - 16.50m: Band of rinded dark grey nodular flint revovered non intact.			
	15C	16.50 - 18.00			87 41 32						
								17.10 - 17.20m: Fracture infilled with gravelly silt. Gravel is angular to subangular flint.			
						NI		17.60 - 18.00m: Recovered non intact.			
		18.00 - 18.32	18.00	C*79					18.00	21.50	
								Continued Next Page	{18.00}		

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

Groundwater not encountered prior to use of water flush.

AGS

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BOREHOLE LOG

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SITE STATION HILL, READING — Sheet 3 of 5

Start Date 10 June 2019 — Easting 471437.30 — Scale 1 : 50

End Date 18 June 2019 — Northing 173707.70 — Ground level 39.50mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	C	18.00 - 19.50			0	NR		NO RECOVERY.			
		19.50 - 19.77	19.50	C*94					19.50	20.00	
	16C	19.50 - 21.00			87 32 27	NI 20 100		Extremely weak and very weak low density white with rare black specks CHALK. Fractures are subhorizontal white, 50° and subvertical extremely closely to closely spaced planar and undulating smooth and rough stained orangish brown (CIRIA Grade B5). (STRUCTURED CHALK)			
	17C	21.00 - 22.50	21.00		93 60 46	NI 120 195		Very weak low and medium density white with frequent black specks and rare orange staining CHALK. Fractures are subhorizontal to 10° and subvertical mainly closely spaced planar smooth frequently infilled (up to 10mm) with gravelly silt (CIRIA Grade C4). (STRUCTURED CHALK)	21.00	18.50	
13/06/19 1730hrs 3.20m		22.50 - 22.71	22.50	C*130							
14/06/19 0800hrs 3.00m	18C	22.50 - 24.00			89 72 72						
		24.00 - 24.27	24.00	C*130							
	19C	24.00 - 25.50			100 36 32						
						NI 160 200		Very weak low and medium density white CHALK with frequent wisps (up to 40mm) of light grey marl and rare orangish brown staining. Fractures are subhorizontal to 20° very closely and closely spaced planar smooth stained orange. Closely to medium spaced bands of coarse gravel sized flint (CIRIA Grade B4). (STRUCTURED CHALK)	24.70	14.80	
		25.50 - 25.69	25.50	C*158							
	20C	25.50 - 27.00			92 56 41						
		27.00 - 27.24	27.00	C*167					27.00	12.50	
	21C	27.00 - 28.50			97 70 46	NI 90 150		Weak medium density white CHALK with rare orangish brown staining. Fractures are subhorizontal to 25° very closely and closely spaced planar rough locally infilled (up to 10mm) with white silt (CIRIA Grade C3). (STRUCTURED CHALK)			
								Continued Next Page	{28.00}		

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

Groundwater not encountered prior to use of water flush.

AGS

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BOREHOLE LOG

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CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 4 of 5

Start Date 10 June 2019 — Easting 471437.30 — Scale 1 : 50

End Date 18 June 2019 — Northing 173707.70 — Ground level 39.50mOD — Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								27.30 - 27.40m: Frequent wisps (up to 40mm) of light grey marl. 28.05m: 15° light grey marl (4mm thick). 28.40 - 28.45m: 65° intersecting planar smooth fractures.			
	22C	28.50 - 28.67 28.50 - 30.00	28.50	C*176	97 67 57	NI 70 180			28.90	10.60	
14/06/19 1300hrs 3.20m								Very weak and weak low and medium density light yellowish grey with black specks CHALK. Fractures are subhorizontal to 30° very closely and closely spaced undulating smooth locally infilled (up to 3mm) with white silt (CIRIA Grade B3). (STRUCTURED CHALK) 28.90m: Cobble sized black nodular flint. 29.50m: 15° band (30mm thick) of black nodular flint.			
17/06/19 0800hrs 3.00m	23C	30.00 - 30.15 30.00 - 31.50	30.00	C*176	95 73 42						
								31.05 - 31.10m: Dark grey coarse gravel sized nodular flint.			
	24C	31.50 - 31.75 31.50 - 33.00	31.50	C*150	90 59 50	NI 110 290		31.10m: Cobble sized black nodular flint.	31.45	8.05	
								Weak medium density white locally light grey CHALK with medium spaced cobble sized bands of black coarse gravel sized nodular flint. Fractures are subhorizontal to 20° closely and medium spaced planar smooth locally infilled (up to 1mm) with white silt. (CIRIA Grade B3). (STRUCTURED CHALK) 31.75 - 31.80m: Locally stained orangish brown.			
	25C	33.00 - 33.18 33.00 - 34.50	33.00	C*333	98 60 47			32.75 - 32.80m: 60° undulating smooth fracture locally stained orangish brown. 33.20m: Locally stained orangish brown. 33.60 - 33.90m: Recovered non intact. Fractures probably very closely spaced. 34.00 - 34.10m: Frequent thin laminae of light grey marl.			
	26C	34.50 - 34.65 34.50 - 36.00	34.50	C*250	93 55 35						
								35.40 - 35.65m: Very weak and weak low and medium density.			
	27C	36.00 - 36.16 36.00 - 37.50	36.00	C*273	100 50 27	NI 70 180		Weak medium density white locally grey CHALK with frequent wisps (up to 3x15mm) and rare bands (up to 12mm) of light grey and grey marl. Medium spaced coarse gravel and cobble sized rinded black nodular flint frequently recovered non intact. Fractures are subhorizontal to 20° very closely and closely spaced planar rough with rare brownish grey staining (CIRIA Grade B3). (STRUCTURED CHALK) 36.85 - 36.95m: 40° planar rough fracture. 37.20m: Shell fragment (15x20mm).	36.00	3.50	
	28C	37.50 - 37.59 37.50 - 39.00	37.50	C*250	100 38 21						
								Continued Next Page	{38.00}		

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

Groundwater not encountered prior to use of water flush.

AGS

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BOREHOLE LOG

BH204

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SITE STATION HILL, READING

Sheet 5 of 5

Start Date 10 June 2019 Easting 471437.30 Scale 1 : 50

End Date 18 June 2019 Northing 173707.70 Ground level 39.50mOD Depth 40.50 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
17/06/19 1700hrs 3.00m		39.00	39.14	39.00	C*375							
18/06/19 0900hrs 3.00m	29C	39.00	40.50			96 94 56	NI 90 200		Weak medium densiry white locally grey CHALK. Fractures are subhorizontal closely spaced planar smooth locally stained orangish brown (CIRIA Grade B3). (STRUCTURED CHALK)	39.40	0.10	
18/06/19 0945hrs 3.00m		40.50	40.59	40.50	C*375					40.50	-1.00	
									Borehole completed at 40.50m.	{48.00}		

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

Groundwater not encountered prior to use of water flush.

AGS

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BOREHOLE LOG

BH205

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

Start Date 8 May 2019

End Date 8 May 2019

Sheet 1 of 1

Scale 1 : 50

Depth 0.65 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
08/05/19 1530hrs	C	0.00 - 0.20			100			MADE GROUND comprising black TARMACADAM (20mm) over grey CONCRETE. 0.20m: Sheet of black plastic mesh.	0.20		
	1B	0.20 - 0.40									
	2D	0.20 - 0.40									
	1ES	0.20 - 0.40		Vo 0.0				Light brown slightly clayey sandy angular to rounded fine to coarse limestone, mudstone, flint and rare brick GRAVEL. (MADE GROUND) 0.65m: Concrete slab across pit. Borehole completed at 0.65m.	0.65		
08/05/19 1615hrs Dry									{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Rotary core drilled (300mm) 0.00-0.20m. Hand dug inspection pit 0.20-0.65m.

CASING: None used.

BACKFILL: On completion, hole backfilled with materials arisings 0.65-0.10m and sand 0.10-0.00m.

REMARKS: Hole terminated at 0.65m due to encountering concrete slab obstruction across pit.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH205A

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

Start Date 9 May 2019

End Date 9 May 2019

Sheet 1 of 1

Scale 1 : 50

Depth 1.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
09/05/19 0845hrs	C	0.00 - 0.20			100			MADE GROUND comprising black TARMACADAM (20mm) over grey CONCRETE.	0.20		
	1B	0.20 - 0.40						Brown and pinkish brown clayey sandy angular to rounded fine to coarse limestone, mudstone, flint, brick and rare chalk GRAVEL. (MADE GROUND)			
	2D	0.20 - 0.40						0.60 - 0.80m: Frequent pockets (up to 30mm) of soft black slightly gravelly sandy clay.	0.80		
09/05/19 1130hrs Dry	1ES	0.20 - 0.40		Vo 0.0				Soft black slightly sandy slightly gravelly silty CLAY with frequent fragments (up to 20mm) of wood. Gravel is angular to subrounded fine to coarse limestone, mudstone, flint, brick and rare chalk. (MADE GROUND)	1.00		
	3B	0.80 - 0.95						Borehole completed at 1.00m.			
	4D	0.80 - 0.95									
	2ES	0.80 - 0.95		Vo 0.0					{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Rotary core drilled (300mm) 0.00-0.20m. Hand dug inspection pit 0.20-1.00m.

CASING: None used.

BACKFILL: On completion, hole backfilled with materials arising 1.00-0.10m and sand 0.10-0.00m.

REMARKS: Hole terminated at 1.00m due to positive power signal from Cable Avoidance Tool (CAT).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered.

AGS

CONTRACT	CHECKED
35248	**CT**

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BOREHOLE LOG

BH205B

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

Start Date 9 May 2019

End Date 9 May 2019

Sheet 1 of 1

Scale 1 : 50

Depth 0.40 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
09/05/19 1215hrs	C	0.20 - 0.40			100			Brown clayey sandy angular to subrounded fine to coarse limestone, mudstone, flint, chalk, brick and concrete GRAVEL with a low angular and subangular flint and limestone cobble content. Rare fragments of wood (up to 10mm) and metal (up to 30mm). (MADE GROUND)	0.40		
09/05/19 1400hrs Dry	1B	0.20 - 0.40		Vo 0.0				Borehole completed at 0.40m.	{8.00}		
	2D	0.20 - 0.40									
	1ES	0.20 - 0.40									

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-0.20m. Rotary core drilled 0.20-0.40m.

BACKFILL: On completion, hole backfilled with materials arising.

REMARKS: Hole terminated at 0.40m due to concrete obstruction across pit.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered.

AGS

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Geotechnical Engineering Limited

BOREHOLE LOG

BH205C

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 4

Start Date 9 May 2019 — Easting 471311.90 — Scale 1 : 50

End Date 16 May 2019 — Northing 173777.50 — Ground level 38.35mOD — Depth 38.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
09/05/19 1500hrs	C	0.00 - 0.30			100			MADE GROUND comprising light grey CONCRETE.	0.30	38.05	
	1B	0.20 - 0.30									
	2D	0.20 - 0.30						Brown clayey sandy angular to rounded fine to coarse limestone, flint, chalk, mudstone, brick, clinker and rare sandstone GRAVEL. Rare wood fragments (up to 15mm). (MADE GROUND)			
	1ES	0.20 - 0.30		Vo 0.0							
	3B	0.30 - 0.50							0.80	37.55	
09/05/19 1630hrs Dry	4D	0.30 - 0.50									
	2ES	0.30 - 0.50		Vo 0.0				0.70 - 0.80m: Abundant brick fragments (up to 80mm).			
	5B	0.90 - 1.00							1.20	37.15	
10/05/19 0750hrs Dry	6D	0.90 - 1.00						Dark brown sandy clayey angular to subrounded fine to coarse chalk, limestone, mudstone, sandstone, brick and rare clinker GRAVEL with a low subangular brick cobble content and rare pockets (up to 60mm) of soft yellowish brown sandy clay. Frequent wood fragments (up to 15mm). (MADE GROUND)			
	3ES	0.90 - 1.00		Vo 0.0							
	7D	1.20 - 1.65	Nil	S 4					1.80	36.55	
	8L	1.20 - 2.00									
	4ES	1.40 - 1.60		Vo 0.0							
	5ES	1.80 - 2.00		Vo 0.1							
	9D	2.00 - 2.45	Nil	S 25				Soft brown mottled black sandy gravelly silty CLAY with rare black wood fragments (up to 20mm). Gravel is angular to subrounded fine to coarse chalk, flint, limestone, mudstone and brick. (MADE GROUND)			
	10L	2.00 - 3.00	2.00						2.50	35.85	
	6ES	2.55 - 2.70		Vo 0.0							
	11D	3.00 - 3.45	3.00	S 34				Firm brownish grey sightly gravelly sandy silty CLAY. Gravel is angular to subrounded fine to coarse flint, mudstone, sandstone and chalk. (MADE GROUND)	3.00	35.35	
	12L	3.00 - 4.00									
	7ES	3.20 - 3.40		Vo 0.0							
								Soft thinly laminated black and greenish grey slightly sandy slightly gravelly silty CLAY. Gravel is angular and subangular fine and medium flint and rare brick. (MADE GROUND)	3.60	34.75	
	13D	4.00 - 4.45	4.00	S 49				2.55m: Subangular coarse gravel sized brick fragment.	4.00	34.35	
	14L	4.00 - 5.00									
	8ES	4.00 - 4.20		Vo 0.0				Dense dark brown becoming brown clayey sandy angular to subrounded fine to coarse flint, mudstone, chalk and brick GRAVEL. (MADE GROUND)			
	15D	5.00 - 5.34	5.00	S*71				Yellowish brown slightly clayey sandy subangular to rounded fine to coarse flint, mudstone, limestone and chalk GRAVEL. (TAPLOW GRAVEL)			
	16L	5.00 - 6.00									
10/05/19 1430hrs 4.00m								Very dense yellowish brown clayey gravelly fine to coarse SAND locally slightly clayey very sandy gravel. Gravel is subangular to rounded fine to coarse flint, mudstone and chalk. (TAPLOW GRAVEL)			
	17D	6.00 - 6.33	6.00	S*68				4.00 - 4.20m: Faint organic odour.	6.00	32.35	
13/05/19 1045hrs 5.00m	18L	6.00 - 7.50						5.30m: Angular flint cobble.			
	9ES	6.40 - 6.60		Vo 0.0				Very dense becoming dense light grey, orangish brown and black slightly sandy angular to rounded fine to coarse flint, chalk, quartzite and rare sandstone GRAVEL. (TAPLOW GRAVEL)			
								6.00 - 7.50m: Limited recovery (53%).			
	19D	7.50 - 7.95	7.50	S 46							
	20L	7.50 - 8.00						7.50 - 8.00m: With a low cobble content.			
								7.70 - 8.00m: Rare pockets (up to 10mm) of chalk.			
	21D	8.00 - 8.45	8.00	S 38							
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Rotary core drilled (300mm) 0.00-0.30m. Hand dug inspection pit 0.30-1.20m. Dynamic sampled (128mm) 1.20-10.00m. Waterflush rotary core drilled (146mm wireline) 10.00-38.00m.

CASING: 200mm diam to 12.00m, 168mm diam to 12.00m and 140mm to 38.00m.

BACKFILL: On completion, hole backfilled with bentonite pellets 38.00-9.10m. A slotted standpipe (50mm) with geosock was installed to 9.10m, granular response zone 9.10-8.10m, bentonite seal 8.10-0.50m, concrete and stopcock cover 0.50-0.00m.

REMARKS: Bentonite seal for aquifer protection installed 8.00-9.00m. Seal cured for 3hrs prior to progressing hole through seal at reduced casing diameter. 200mm diam and 168mm diam casing dropped to 12.00m as hole advanced. Driller notes flush returns reduced 10.00-38.00m (approx. 40-75% returned). Chalk grade based on CIRIA C574 (2002).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

AGS

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BOREHOLE LOG

BH205C

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 2 of 4

Start Date 9 May 2019 — Easting 471311.90 — Scale 1 : 50

End Date 16 May 2019 — Northing 173777.50 — Ground level 38.35mOD — Depth 38.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp./core range	I_f	instru-ment	description	depth (m)	reduced level (m)	legend
	22L	8.00 - 9.00							8.15	30.20	
13/05/19 1500hrs 6.00m	23D	9.00 - 9.45	9.00	S 33				Structureless CHALK composed of slightly sandy silty subangular and subrounded fine and medium GRAVEL. Clasts are white chalk. Matrix is white. (Probably CIRIA Grade Dc) (STRUCTURELESS CHALK) 8.80m: Cobble sized rinded nodular flint recovered non intact.	9.00	29.35	
14/05/19 0720hrs 4.50m	24L	9.00 - 10.00									
	10ES	9.20 - 9.40		Vo 0.0				Extremely weak medium density white locally stained orangish brown CHALK. Fractures are randomly orientated extremely closely to very closely spaced planar rough locally stained orangish brown. Medium spaced bands of cobble sized rinded nodular flint. (CIRIA Grade A5) (STRUCTURED CHALK)			
	25D	10.00 - 10.45	10.00	S 31							
	26C	10.00 - 11.00			10 0 0	NI		10.00 - 11.00m: Limited recovery (10%). Rinded nodular flint recovered non intact. Core loss suspected to be chalk, not recovered due to flint jamming in the barrel.			
	27D	11.00 - 11.45	11.00	S 23					11.00	27.35	
	28C	11.00 - 12.50			40 0 0	NI NI 100		Very weak medium density white with frequent black specks and rare orangish brown staining CHALK. Fractures are randomly orientated extremely closely and closely spaced planar rough. (CIRIA Grade A5) (STRUCTURED CHALK)			
	29D	12.50 - 12.95	12.50	S 32							
	30C	12.50 - 14.00			47 7 0			12.40 - 14.60m: Drilling disturbed.			
	31D	14.00 - 14.45	14.00	S 34							
	32C	14.00 - 15.50			73 10 0			14.00 - 14.40m: Assessed zone of core loss.			
	33D	15.50 - 15.91	15.50	S*59							
	34C	15.50 - 17.00			100 0 0			16.00 - 16.70m: Rare subrounded medium gravel sized flint.			
14/05/19 1630hrs 3.00m	35D	17.00 - 17.42	17.00	S*54							
15/05/19 0930hrs 3.00m	36C	17.00 - 18.50			97 20 13			17.40 - 17.90m: Fractures are extremely closely to closely spaced.			
								Continued Next Page	{18.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING

Sheet 3 of 4

Start Date 9 May 2019 Easting 471311.90 Scale 1 : 50

End Date 16 May 2019 Northing 173777.50 Ground level 38.35mOD Depth 38.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	37D	18.50 - 18.84	18.50	S*79					18.50	19.85	
	38C	18.50 - 20.00			93 20 7	NI 60 120		Very weak low and medium density white with rare black specks and orangish brown staining CHALK. Fractures are subhorizontal to 25° and 45-60° very closely and closely spaced planar and undulating rough with frequent black specks stained greyish brown. (CIRIA Grade B4) (STRUCTURED CHALK) 19.30 - 19.40m: Stained orangish brown.			
	39D	20.00 - 20.26	20.00	S*111							
	40C	20.00 - 21.50			80 13 0			20.00 - 20.50m: Subangular fine to coarse gravel and cobble sized flint. 20.65 - 20.75m: Stained yellowish brown.			
	41D	21.50 - 21.69	21.50	S*125							
	42C	21.50 - 23.00			87 20 13			22.30 - 22.60m: 60° planar rough fracture with black specks stained orangish brown with a veneer of greenish grey clay.			
	43D	23.00 - 23.24	23.00	S*167							
	44C	23.00 - 24.50			97 23 7			23.30m: High density.	23.60	14.75	
						NI 50 110		Very weak low and medium density white with rare black specks and rare orangish brown staining CHALK with frequent bands (up to 20mm) and wisps of light grey marl. Fractures are subhorizontal and 45° very closely and closely spaced planar and undulating rough rarely stained light brown. Rare coarse gravel sized rinded nodular flint. (CIRIA Grade B4) (STRUCTURED CHALK) 24.20m: Shell fragment (15mm). 24.50 - 25.30m: Drilling disturbed.			
	45D	24.50 - 24.72	24.50	S*143							
	46C	24.50 - 26.00			93 33 17				25.30	13.05	
						20 45 125		Very weak medium density white CHALK with rare light yellowish brown staining and rare bands (up to 15mm) and wisps of light grey marl. Fractures are subhorizontal to 20° and 40-60° very closely and closely spaced planar and undulating rough locally with a veneer of greenish grey clay. (CIRIA Grade B4) (STRUCTURED CHALK) 25.30m: Cobble sized rinded nodular flint. 25.55 - 25.70m: Subvertical planar rough fracture infilled (3mm) with reddish brown clay. 26.60 - 27.10m: Fractures are randomly orientated extremely closely spaced planar rough.			
	47D	26.00 - 26.31	26.00	S*91							
	48C	26.00 - 27.50			87 30 13						
						NI					
						20 45 110					
		27.50 - 27.81	27.50	C*83							
	49C	27.50 - 29.00			87 27 10						
								Continued Next Page	{28.00}		

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

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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SITE STATION HILL, READING — Sheet 4 of 4

Start Date 9 May 2019 — Easting 471311.90 — Scale 1 : 50

End Date 16 May 2019 — Northing 173777.50 — Ground level 38.35mOD — Depth 38.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
						NI		Very weak medium density white CHALK with frequent bands (up to 15mm) and wisps of light grey marl and rare styolites. Fractures are subhorizontal to 15° very closely and closely spaced planar rough locally with a veneer of grey clay. Medium spaced bands of rinded black nodular flint cobbles, recovered non intact. (CIRIA Grade B3) (STRUCTURED CHALK)	28.10	10.25	
						NI 105 140					
		29.00 - 29.26	29.00	C*103							
	50C	29.00 - 30.50			87 33 23			28.10 - 28.40m: Fractures are randomly orientated extremely closely spaced planar rough.			
								29.50 - 29.60m: Subvertical planar rough fracture with frequent black specks.			
15/05/19 1630hrs 2.00m		30.50 - 30.68	30.50	C*167							
16/05/19 0750hrs 2.50m	51C	30.50 - 32.00			80 60 47						
						NI 120 160			31.20	7.15	
	52D	32.00 - 32.14	32.00	S*188				Very weak low and medium density white CHALK with rare orangish brown staining frequent bands (up to 20mm) and wisps of light grey marl. Fractures are subhorizontal to 15° and 45-60° very closely and closely spaced planar and undulating rough locally with a veneer of grey clay. (CIRIA Grade B3) (STRUCTURED CHALK)			
	53C	32.00 - 33.50			93 40 40						
		33.50 - 33.66	33.50	C*181					33.50	4.85	
	54C	33.50 - 35.00			93 80 63	60 95 280		Very weak locally weak medium density white CHALK with frequent bands (up to 35mm) and wisps of light grey marl. Fractures are 15-30° very closely to medium spaced planar rough frequently stained brown locally with a veneer of grey clay. (CIRIA Grade B3) (STRUCTURED CHALK) 33.50 - 35.30m: Closely and medium spaced bands of medium gravel sized rinded nodular flint.			
		35.00 - 35.15	35.00	C*176							
	55C	35.00 - 36.50			60 27 20			35.00 - 36.50m: Limited recovery (67%). Recovered as rinded nodular flint. Core loss presumed to be chalk, not recovered due to flint jamming in the barrel.			
						NI 50 250					
		36.50 - 36.60	36.50	C*250							
	56C	36.50 - 38.00			97 43 43			36.80 - 37.10m: Drilling disturbed. 37.05m: Cobble sized rinded nodular flint.			
16/05/19 1300hrs 2.00m		38.00 - 38.14	38.00	C*192					38.00	0.35	
								Borehole completed at 38.00m.	{38.00}		

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

Groundwater not encountered prior to use of water flush.

AGS

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BOREHOLE LOG

WS201

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 1

Start Date 16 May 2019 — Easting 471382.20 — Scale 1 : 50

End Date 16 May 2019 — Northing 173750.10 — Ground level 40.80mOD — Depth 1.10 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
16/05/19 1010hrs	1C	0.00 - 0.20			100		MADE GROUND comprising orangish brown tarmacadam (50mm) over black TARMACADAM.	0.20	40.60	
	2B	0.50 - 0.60		Vo 0.0			Brownish grey silty gravelly fine to coarse SAND with a low subangular concrete and brick cobble content and frequent fragments of plastic (up to 70mm) and wood (up to 40mm). Gravel is angular to subrounded fine to coarse brick, flint and quartzite. (MADE GROUND)			
	1ES	0.50 - 0.60		Vo 0.0						
16/05/19 1240hrs Dry	2ES	1.00 - 1.10		Vo 0.0						
		1.10 - 1.24	Nil	C*200				1.10	39.70	
		1.24 - 1.29	Nil	C*333			1.10m: Suspected concrete cobble. Borehole completed at 1.10m.	{8.00}		

EQUIPMENT: Geotechnical Terrier 2000 rig.

METHOD: Rotary core drilled (300mm) 0.00-0.20m. Hand dug inspection pit 0.20-1.10m.

CASING: None used.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 1.10m, granular response zone 1.10-0.25m, bentonite seal 0.25-0.15m, gravel drain 0.15-0.10, concrete and a stopcock cover 0.10-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

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Geotechnical Engineering Limited

BOREHOLE LOG

WS202

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 1

Start Date 20 May 2019 — Easting 471375.90 — Scale 1 : 50

End Date 20 May 2019 — Northing 173750.10 — Ground level 38.65mOD — Depth 6.45 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
20/05/19 0900hrs	C	0.00 - 0.10			100		MADE GROUND comprising black TARMACADAM.	0.10	38.55	
	1B	0.10 - 0.30					Dark brown clayey very sandy angular to subrounded fine to coarse flint, brick and slag GRAVEL with rare fragments of ceramic (up to 30x40mm) and glass (up to 20x30mm). (MADE GROUND)			
	1ES	0.10 - 0.30		Vo 0.0						
	2B	0.50 - 0.70								
	2ES	0.50 - 0.70		Vo 0.0						
	3B	0.90 - 1.10		Vo 0.0						
	3ES	1.20 - 1.76	Nil	S<1						
	4D	1.20 - 2.00	1.20					1.40	37.25	
	5L						Very soft dark brown slightly sandy slightly gravelly silty CLAY with rare fragments of brick (up to 15x30mm) and slate roofing tile (up to 70x80mm). (MADE GROUND)			
	4ES	1.70 - 1.90		Vo 0.0			1.70 - 1.75m: Angular to subrounded fine and medium sandstone gravel.			
	6D	2.00 - 2.45	2.00	S 4				2.20	36.45	
	7L	2.00 - 3.00					Very soft greyish green mottled brown slightly sandy becoming sandy CLAY with rare angular fine and medium flint gravel and a faint organic odour. (ALLUVIUM)			
	5ES	2.20 - 2.40		Vo 0.0						
	6ES	2.80 - 3.00		Vo 0.0						
	8D	3.00 - 3.78	3.00	S<1						
	9L	3.00 - 4.00								
	7ES	3.20 - 3.40		Vo 0.0			3.30 - 3.90m: Frequent pockets (up to 10x20mm) orangish brown sand and subangular and subrounded fine chalk gravel.			
	8ES	3.70 - 3.90		Vo 0.0			3.50m: Rounded flint cobble.	3.90	34.75	
	10D	4.00 - 4.45	4.00	S 34			Dense brown gravelly silty fine to coarse SAND. Gravel is angular to subrounded fine and medium rarely coarse flint, mudstone and chalk. (TAPLOW GRAVEL)			
	11L	4.00 - 5.00					4.00 - 5.00m: Limited recovery (65%).			
	9ES	4.40 - 4.60		Vo 0.0						
	12D	5.00 - 5.45	5.00	S 30						
	13L	5.00 - 6.00					5.00 - 6.00m: Limited recovery (50%).			
	10ES	5.20 - 5.40		Vo 0.0						
20/05/19 1215hrs 3.10m	14D	6.00 - 6.45	6.00	S 5			6.00m: Loose.	6.45	32.20	
							Borehole completed at 6.45m.	{8.00}		

EQUIPMENT: Geotechnical Terrier 2000 rig.

METHOD: Rotary core drilled (300mm) 0.00-0.10m. Hand dug inspection pit 0.10-1.20m. Dynamic sampled (113mm) 1.20-6.00m.

CASING: 128mm diam to 6.00nm.

BACKFILL: On completion, a slotted standpipe (50mm) with geosock was installed to 6.00m, granular response zone 6.45-1.80m, bentonite seal 1.80-0.15m, gravel drain 0.15-0.10m, concrete and stopcock cover 0.15-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
4.24	4.00	2.84	20	Encountered during SPT 4.00-4.45m.

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BOREHOLE LOG

WS203

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 1

Start Date 17 May 2019 — Easting 471359.90 — Scale 1 : 50

End Date 17 May 2019 — Northing 173742.60 — Ground level 39.05mOD — Depth 5.45 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
17/05/19 1125hrs	1B	0.10 - 0.20					MADE GROUND comprising light grey CONCRETE.	0.05	39.00	
	1ES	0.10 - 0.20		Vo 0.0			Yellowish brown gravelly clayey SAND. Gravel is subangular and subrounded fine to coarse flint, sandstone, quartzite and crystalline. (MADE GROUND)	0.25	38.80	
	2B	0.55 - 0.70								
	2ES	0.55 - 0.70		Vo 0.0						
	3ES	1.10 - 1.20		Vo 0.0			Dark brown clayey very sandy angular to subrounded fine to coarse slate, brick, clinker and flint GRAVEL with a low subangular brick and slate cobble content. (MADE GROUND)	1.10	37.95	
	3D	1.20 - 1.80	Nil	S<1						
	4L	1.20 - 2.00	1.20							
	4ES	1.65 - 1.85		Vo 0.0			Very soft dark brown slightly sandy slightly gravelly silty CLAY with rare fragments of glass (up to 40mm) and shell debris (up to 8mm). Gravel is subangular and subrounded fine and medium brick and chalk. (MADE GROUND)			
	5B	1.65 - 1.85					1.65 - 1.80m: Band of yellowish brown slightly sandy gravelly silty clay with rare relict rootlets. Gravel is subangular and subrounded fine and medium chalk and brick.	2.20	36.85	
	6D	2.00 - 2.75	2.00	S<1			2.00 - 2.20m: Subangular brick cobbles.			
	7L	2.00 - 3.00								
	5ES	2.35 - 2.45		Vo 0.0						
	8D	3.00 - 3.70	3.00	S 12			Very soft dark green speckled black slightly gravelly CLAY with rare becoming frequent stained white relict rootlets. Gravel is fine and medium angular and subrounded flint. (MADE GROUND)	2.95	36.10	
	9L	3.00 - 4.00					2.20 - 2.40m: Black.			
	6ES	3.10 - 3.30		Vo 0.0			2.20 - 2.50m: Rare brick fragments (up to 5mm).	3.60	35.45	
							2.25 - 2.30m: Rare orangish brown staining.			
	10D	4.00 - 4.45	4.00	S 18			Firm bluish grey mottled orangish brown slightly sandy slightly gravelly CLAY with rare pockets (up to 5mm) of black organic material. Gravel is subangular and subrounded fine and medium brick and flint. (MADE GROUND)			
	11L	4.00 - 5.00								
	7ES	4.50 - 4.70		Vo 0.0						
17/05/19 1440hrs 3.20m	12D	5.00 - 5.45	5.00	S 6			Medium dense becoming loose dark orangish brown very gravelly fine to coarse fining upwards SAND. Gravel is sandstone, flint, chalk and limestone. (TAPLOW GRAVEL)	5.45	33.60	
							5.00m: Loose.			
							Borehole completed at 5.45m.	{8.00}		

EQUIPMENT: Geotechnical Terrier 2000 rig.

METHOD: Hydraulic breaker 0.00-0.06m. Hand dug inspection pit 0.06-1.20m. Dynamic sampled (113mm) 1.20-5.00m

CASING: 128mm diam to 5.00m.

BACKFILL: On completion, a slotted standpipe (50mm) with geosock was installed to 5.00m, granular response zone 5.45-2.30m, bentonite seal 2.30-0.15m, gravel drain 0.15-0.10m, concrete and stopcock cover 0.10-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
4.21	4.00	3.12	20	Encountered during SPT 4.00-4.45m.

AGS

CONTRACT **35248**

CHECKED **CT**

Geotechnical Engineering Limited

BOREHOLE LOG

WS204

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 1

Start Date 20 May 2019 — Easting 471273.70 — Scale 1 : 50

End Date 20 May 2019 — Northing 173734.90 — Ground level 38.35mOD — Depth 0.35 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
20/05/19 1400hrs	1B 1ES	0.10 - 0.30 0.10 - 0.30		Vo 0.0				MADE GROUND comprising grey concrete paving slab (50mm) over yellowish brown gravelly silty fine to coarse SAND. Gravel is angular and subangular fine and medium flint, brick and slag rarely mudstone. (MADE GROUND)	0.35	38.00	
20/05/19 1500hrs Dry								0.35m: Grey concrete across pit. Borehole completed at 0.35m.	{8.00}		

EQUIPMENT: Geotechnical Terrier 2000 rig.

METHOD: Hand dug inspection pit 0.00-0.35m.

CASING: None used.

BACKFILL: On completion, hole backfilled with arisings 0.35-0.05m and concrete paving slab reinstated 0.05-0.00m.

REMARKS: Hole terminated at 0.35m due to encountering concrete across pit.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered.

AGS

CONTRACT	CHECKED
35248	CT

Geotechnical Engineering Ltd, Tel. 01452 527743 35248-STATION HILL MASTER.GPJ TRIALJH.GPJ GEOTECH2.GLB 23/08/2019 14:23:57 JT EL

Geotechnical Engineering Limited

BOREHOLE LOG

WS211

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 1

Start Date 16 May 2019 — Easting 471348.10 — Scale 1 : 50

End Date 16 May 2019 — Northing 173702.30 — Ground level 39.20mOD — Depth 1.07 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
16/05/19 1430hrs	C	0.00 - 0.10			100			MADE GROUND comprising light grey CONCRETE.	0.10	39.10	
	1B	0.50 - 0.70						Soft dark greyish brown slightly sandy gravelly silty CLAY with a low subangular brick cobble content. Gravel is angular to subrounded fine to coarse flint, brick, chalk, quartzite and clinker. (MADE GROUND)			
	1ES	0.50 - 0.70		Vo 0.0							
16/05/19 1530hrs Dry	2B	0.85 - 1.00							0.85	38.35	
	2ES	0.85 - 1.00		Vo 0.0					1.00	38.20	
								Soft dark greyish brown slightly sandy slightly gravelly silty CLAY with a low subangular brick cobble content. Gravel is angular to subrounded fine to coarse flint, brick and chalk. (MADE GROUND)	1.07	38.13	
								Yellowish brown sandy subangular and subrounded fine and medium sandstone and quartzite GRAVEL. (MADE GROUND) 1.05m: Clay drainage duct (approx.100mm diam.)			
								Borehole completed at 1.07m.	{8.00}		

EQUIPMENT: Geotechnical Terrier 2000 rig.

METHOD: Rotary core drilled (300mm) 0.00-0.10m. Hand dug inspection pit 0.10-1.07m.

CASING: None used.

BACKFILL: On completion, hole backfilled with arisings 1.07-0.10m and concrete 0.10-0.00m.

REMARKS: Hole terminated at 1.07m due to encountering clay drainage duct.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered.

AGS

CONTRACT	CHECKED
35248	**CT**

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Geotechnical Engineering Limited

BOREHOLE LOG

WS211A

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING — Sheet 1 of 1

Start Date 16 May 2019 — Easting 471348.20 — Scale 1 : 50

End Date 16 May 2019 — Northing 173701.50 — Ground level 39.10mOD — Depth 1.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
16/05/19 1530hrs	C	0.00 - 0.10			100			MADE GROUND comprising light grey CONCRETE.	0.10	39.00	
	1B	0.50 - 0.60						Soft dark greyish brown slightly sandy gravelly silty CLAY with a low subangular brick cobble content. Gravel is angular to subrounded fine to coarse flint, brick, chalk, quartzite and clinker. (MADE GROUND)	0.75	38.35	
16/05/19 1700hrs Dry	1ES	0.50 - 0.60		Vo 0.0					0.95	38.15	
	2ES	0.95 - 1.00		Vo 0.0				Yellowish brown sandy subangular and subrounded fine and medium sandstone and quartzite GRAVEL. (MADE GROUND)	1.00	38.10	
								Soft black slightly sandy slightly gravelly clayey SILT with rare fragments (up to 50mm) of glass. Gravel is angular to subrounded fine to coarse clinker with rare brick. (MADE GROUND)			
								1.00m: Clay drainage duct (100mm diam. approx.)			
								Borehole completed at 1.00m.	{8.00}		

EQUIPMENT: Geotechnical Terrier 2000 rig.

METHOD: Rotary core drilled (300mm) 0.00-0.10m. Hand dug inspection pit 0.10-1.00m.

CASING: None used.

BACKFILL: On completion, hole backfilled with arisings 1.00-0.10m and concrete 0.10-0.00m.

REMARKS: Hole terminated at 1.00m due to encountering clay drainage duct.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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

Groundwater not encountered.

AGS

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Ltd, Tel. 01452 527743 35248-STATION HILL MASTER.GPJ TRIALJH.GPJ GEOTECH2.GLB 23/08/2019 14:23:58 MC AT

Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole no.	borehole depth (m)	s.w.p (m)	bottom depth (m)	casing depth (m)	water level (m)	seating drive blows	seating drive pen (mm)	test drive blows	test drive pen (mm)	test type	N	energy ratio (%)
BH201	1.20		1.65	Nil	Dry	1 1	75 75	1 0 1 1	75 75 75 75	S	3	64
BH201	2.00		2.45	Nil	Dry	1 1	75 75	1 2 1 1	75 75 75 75	S	5	64
BH201	3.00		3.45	3.00	2.00	1 1	75 75	2 2 5 7	75 75 75 75	S	16	64
BH201	4.00		4.45	4.00	2.50	2 3	75 75	3 4 4 8	75 75 75 75	S	19	64
BH201	5.00		5.45	5.00	2.00	4 8	75 75	6 6 7 7	75 75 75 75	S	26	64
BH201	6.50		6.95	6.50	2.30	4 6	75 75	6 8 7 6	75 75 75 75	C	27	64
BH201	8.00		8.45	8.00	2.00	3 2	75 75	4 4 5 6	75 75 75 75	C	19	64
BH201	9.50		9.95	9.50	2.00	4 8	75 75	8 7 7 6	75 75 75 75	S	28	64
BH201	11.50		11.95	11.50	2.20	2 7	75 75	7 10 9 9	75 75 75 75	C	35	64
BH201	13.00		13.27	13.00	3.00	6 19	75 60	23 27	75 55	C	115	64
BH201	14.50		14.83	14.50	2.70	5 11	75 75	18 23 9	75 75 30	C	83	64
BH201	16.00		16.31	16.00	2.50	4 13	75 75	20 24 6	75 75 10	C	94	64
BH201	17.50		17.74	17.50	2.40	8 17	75 50	32 18	75 40	C	130	64
BH201	19.00		19.24	19.00	2.90	8 13	75 75	42 8	75 10	C	176	64
BH201	20.50		20.79	20.50	3.20	5 13	75 75	22 28	75 60	C	111	64
BH201	22.00		22.32	22.00	2.50	6 17	75 75	18 20 12	75 75 20	C	88	64
BH201	23.50		23.81	23.50	2.70	10 15	75 50	20 22 8	75 75 30	C	83	64
BH201	25.00		25.29	25.00	2.50	10 12	75 75	33 17	75 65	C	107	64
BH201	26.50		26.75	26.50	2.60	5 20	75 60	26 24	75 40	C	130	64
BH201	28.00		28.26	28.00	4.00	9 11	75 75	20 30	75 30	C	143	64
BH201	29.50		29.79	29.50	2.50	7 10	75 75	26 24	75 60	C	111	64
BH201	31.00		31.33	31.00	2.50	9 14	75 75	20 21 9	75 75 30	C	83	64
BH201	32.50		32.75	32.50	2.50	10 12	75 75	34 16	75 20	C	158	64
BH201	34.00		34.24	34.00	2.70	6 17	75 75	41 9	75 10	C	176	64

notes:

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

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole no.	borehole depth (m)	s.w.p (m)	bottom depth (m)	casing depth (m)	water level (m)	seating drive blows	seating drive pen (mm)	test drive blows	test drive pen (mm)	test type	N	energy ratio (%)
BH201	35.50		35.75	35.50	2.90	8 13	75 75	33 17	75 25	C	150	64
BH202D	3.00		3.45	3.00	Dry	1 1	75 75	2 2 3 5	75 75 75 75	S	12	64
BH202D	4.00		4.31	4.00	Dry	7 14	75 75	21 25 4	75 75 5	S	97	64
BH202D	5.50		5.78	5.50	4.00	2 12	75 75	20 30	75 55	S	115	64
BH202D	8.50		8.95	8.50	2.90	2 2	75 75	2 3 3 5	75 75 75 75	S	13	64
BH202D	12.00		12.45	12.00	2.80	4 8	75 75	8 8 9 8	75 75 75 75	C	33	64
BH202D	13.50		13.82	13.50	2.90	4 5	75 75	19 22 9	75 75 20	C	88	64
BH202D	15.00		15.45	15.00	3.10	1 3	75 75	5 6 5 10	75 75 75 75	C	26	64
BH202D	16.50		16.83	16.50	2.60	6 15	75 75	20 21 9	75 75 25	C	86	64
BH202D	19.50		19.78	19.50	3.00	3 18	75 75	25 25	75 55	C	115	64
BH202D	21.00		21.36	21.00	2.80	6 10	75 75	12 24 14	75 75 60	C	71	64
BH202D	22.50		22.74	22.50	2.50	10 15	75 40	22 28	75 50	C	120	64
BH202D	24.00		24.32	24.00	2.70	12 10	75 75	18 20 12	75 75 20	C	88	64
BH202D	25.50		25.71	25.50	3.30	10 15	75 25	32 18	75 30	C	143	64
BH202D	27.00		27.23	27.00	3.00	12 13	75 65	35 15	75 15	C	167	64
BH202D	28.50		28.66	28.50	3.00	25	70	39 11	75 10	C	176	64
BH202D	30.00		30.20	30.00	2.70	20 5	75 5	29 21	75 40	C	130	64
BH202D	31.50		31.67	31.50	3.00	25	65	31 19	75 25	C	150	64
BH202D	33.00		33.21	33.00	3.20	15 10	75 30	34 16	75 25	C	150	64
BH202D	36.00		36.21	36.00	2.80	21 4	75 5	28 22	75 55	C	115	64
BH202D	37.50		37.67	37.50	2.70	25	60	32 18	75 30	C	143	64
BH202D	39.00		39.12	39.00	3.20	25	40	43 7	75 5	C	188	64
BH202D	40.50		40.70	40.50	2.80	5 20	75 50	50	70	C	214	64
BH203	1.20		1.65	Nil	Dry	1 1	75 75	1 1 1 1	75 75 75 75	S	4	61

notes:

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

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole no.	borehole depth (m)	s.w.p (m)	bottom depth (m)	casing depth (m)	water level (m)	seating drive blows	seating drive pen (mm)	test drive blows	test drive pen (mm)	test type	N	energy ratio (%)
BH203	2.00		2.45	Nil	Dry	1 0	75 75	1 0 1 0	75 75 75 75	S	2	61
BH203	3.00		3.45	3.00	Dry	1 2	75 75	2 2 4 3	75 75 75 75	S	11	61
BH203	4.00		4.45	4.00	3.10	4 6	75 75	7 8 7 7	75 75 75 75	S	29	61
BH203	5.00		5.39	5.00	2.40	10 15	75 50	13 15 15 7	75 75 75 40	S	57	61
BH203	6.00		6.45	6.00	2.50	3 5	75 75	6 6 7 8	75 75 75 75	S	27	61
BH203	7.50		7.95	7.50	2.40	1 1	75 75	1 1 1 1	75 75 75 75	S	4	61
BH203	9.00		9.45	9.00	2.40	1 5	75 75	6 6 7 8	75 75 75 75	S	27	61
BH203	10.50		10.95	10.50	3.40	4 6	75 75	6 6 6 7	75 75 75 75	S	25	61
BH203	12.00		12.45	12.00	2.80	1 2	75 75	3 3 4 5	75 75 75 75	S	15	61
BH203	13.50		13.95	13.50	3.20	5 7	75 75	7 8 8 8	75 75 75 75	C	31	61
BH203	15.00		15.40	15.00	1.80	4 5	75 75	5 18 20 7	75 75 75 20	C	61	61
BH203	16.50		16.83	16.50	2.40	10 13	75 75	22 20 8	75 75 30	C	83	61
BH203	18.00		18.22	18.00	2.80	11 14	75 30	32 18	75 35	C	136	61
BH203	21.00		21.26	21.00	2.70	4 21	75 70	37 13	75 35	C	136	61
BH203	22.50		22.65	22.50	2.80	25	60	42 8	75 10	C	176	61
BH203	24.00		24.16	24.00	2.80	20 5	75 5	46 4	75 4	C	190	61
BH203	25.50		25.63	25.50	2.80	25	40	39 11	75 10	C	176	61
BH203	27.00		27.13	27.00	2.80	25	60	50	65	C	231	61
BH203	28.50		28.63	28.50	2.60	25	55	42 8	75 3	C	192	61
BH203	30.00		30.15	30.00	3.20	18 7	75	50	75	C	200	61
BH203	31.50		31.68	31.50	3.20	10 15	75 45	50	55	C	273	61
BH203	33.00		33.12	33.00	3.00	25	75	50	40	C	375	61
BH203	36.00		36.17	36.00	3.00	15 10	75 35	50	60	C	250	61
BH203	37.50		37.66	37.50	3.00	18 7	75 20	50	65	C	231	61

notes:

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

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole no.	borehole depth (m)	s.w.p (m)	bottom depth (m)	casing depth (m)	water level (m)	seating drive blows	seating drive pen (mm)	test drive blows	test drive pen (mm)	test type	N	energy ratio (%)
BH203	39.00		39.15	39.00	3.00	20 5	75 0	50	70	C	214	61
BH203	40.50		40.65	40.50	3.00	25	75	50	70	C	214	61
BH204	1.20		1.65	Nil	Dry	1 0	75 75	1 1 0 0	75 75 75 75	S	2	64
BH204	2.00		2.45	Nil	Dry	5 3	75 75	3 4 3 5	75 75 75 75	S	15	64
BH204	3.00		3.45	3.00	Dry	3 5	75 75	4 5 5 4	75 75 75 75	S	18	64
BH204	4.00		4.45	4.00	3.20	4 5	75 75	6 5 5 5	75 75 75 75	S	21	64
BH204	5.50		5.95	5.50	3.20	6 5	75 75	7 4 5 6	75 75 75 75	S	22	64
BH204	7.00		7.45	7.00	3.20	6 7	75 75	6 5 5 5	75 75 75 75	S	21	64
BH204	9.00		9.45	9.00	2.40	1 3	75 75	4 5 8 9	75 75 75 75	S	26	64
BH204	10.50		10.95	10.50	2.80	5 7	75 75	7 8 7 6	75 75 75 75	C	28	64
BH204	12.00		12.45	12.00	3.00	6 8	75 75	9 9 10 9	75 75 75 75	C	37	64
BH204	13.50		13.95	13.50	3.10	4 8	75 75	10 9 10 8	75 75 75 75	C	37	64
BH204	15.00		15.45	15.00	3.10	5 6	75 75	8 9 9 9	75 75 75 75	C	35	64
BH204	16.50		16.95	16.50	3.20	5 6	75 75	8 8 8 9	75 75 75 75	C	33	64
BH204	18.00		18.32	18.00	3.10	12 13	75 50	18 20 12	75 75 40	C	79	64
BH204	19.50		19.77	19.50	3.40	17 8	75 30	20 22 8	75 75 10	C	94	64
BH204	22.50		22.71	22.50	3.20	19 6	75 20	26 24	75 40	C	130	64
BH204	24.00		24.27	24.00	3.10	4 10	75 75	24 26	75 40	C	130	64
BH204	25.50		25.69	25.50	3.10	20 5	75 20	32 18	75 20	C	158	64
BH204	27.00		27.24	27.00	3.20	4 10	75 75	31 19	75 15	C	167	64
BH204	28.50		28.67	28.50	3.10	21 4	75 5	34 16	75 10	C	176	64
BH204	30.00		30.15	30.00	3.20	25	60	35 15	75 10	C	176	66
BH204	31.50		31.75	31.50	3.20	2 12	75 75	21 29	75 25	C	150	66
BH204	33.00		33.18	33.00	3.10	4 21	75 60	50	45	C	333	66

notes:

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

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole no.	borehole depth (m)	s.w.p (m)	bottom depth (m)	casing depth (m)	water level (m)	seating drive blows	seating drive pen (mm)	test drive blows	test drive pen (mm)	test type	N	energy ratio (%)
BH204	34.50		34.65	34.50	2.70	15 10	75 10	50	60	C	250	66
BH204	36.00		36.16	36.00	2.90	14 11	75 30	50	55	C	273	66
BH204	37.50		37.59	37.50	2.80	25	30	50	60	C	250	66
BH204	39.00		39.14	39.00	3.00	15 10	75 20	50	40	C	375	66
BH204	40.50		40.59	40.50	3.00	25	50	50	40	C	375	66
BH205C	1.20		1.65	Nil	Dry	1 1	75 75	1 1 1 1	75 75 75 75	S	4	64
BH205C	2.00		2.45	Nil	Dry	5 7	75 75	6 6 7 6	75 75 75 75	S	25	64
BH205C	3.00		3.45	3.00	Dry	6 9	75 75	8 8 9 9	75 75 75 75	S	34	64
BH205C	4.00		4.45	4.00	3.00	7 12	75 75	12 12 14 11	75 75 75 75	S	49	64
BH205C	5.00		5.34	5.00	4.00	12 13	75 55	14 20 16	75 75 60	S	71	64
BH205C	6.00		6.33	6.00	5.00	12 13	75 35	15 17 18	75 75 70	S	68	64
BH205C	7.50		7.95	7.50	5.00	8 12	75 75	13 12 10 11	75 75 75 75	S	46	64
BH205C	8.00		8.45	8.00	5.00	8 9	75 75	8 10 12 8	75 75 75 75	S	38	64
BH205C	9.00		9.45	9.00	6.00	7 9	75 75	8 8 8 9	75 75 75 75	S	33	64
BH205C	10.00		10.45	10.00	4.00	4 5	75 75	7 8 8 8	75 75 75 75	S	31	64
BH205C	11.00		11.45	11.00	4.00	2 4	75 75	5 6 5 7	75 75 75 75	S	23	64
BH205C	12.50		12.95	11.00	2.00	4 6	75 75	7 8 8 9	75 75 75 75	S	32	64
BH205C	14.00		14.45	14.00	3.00	4 7	75 75	7 8 10 9	75 75 75 75	S	34	64
BH205C	15.50		15.91	15.50	2.00	1 4	75 75	13 14 16 7	75 75 75 30	S	59	64
BH205C	17.00		17.42	17.00	2.00	4 7	75 75	12 15 14 8	75 75 75 45	S	54	64
BH205C	18.50		18.84	18.50	2.00	4 8	75 75	14 22 14	75 75 40	S	79	64
BH205C	20.00		20.26	20.00	3.00	7 18	75 50	22 28	75 60	S	111	64
BH205C	21.50		21.69	21.50	2.50	25	70	26 24	75 45	S	125	64
BH205C	23.00		23.24	23.00	2.00	1 7	75 75	35 15	75 15	S	167	64

notes:

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

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

STANDARD PENETRATION TEST

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole no.	borehole depth (m)	s.w.p (m)	bottom depth (m)	casing depth (m)	water level (m)	seating drive blows	seating drive pen (mm)	test drive blows	test drive pen (mm)	test type	N	energy ratio (%)
BH205C	24.50		24.72	24.50	3.00	4 21	75 40	33 17	75 30	S	143	64
BH205C	26.00		26.31	26.00	2.60	6 19	75 65	21 24 5	75 75 15	S	91	64
BH205C	27.50		27.81	27.50	3.00	8 17	75 50	20 23 7	75 75 30	C	83	64
BH205C	29.00		29.26	29.00	2.80	10 15	75 40	21 29	75 70	C	103	64
BH205C	30.50		30.68	30.50	2.50	20 5	75 10	32 18	75 15	C	167	64
BH205C	32.00		32.14	32.00	1.50	25	60	45 5	75 5	S	188	64
BH205C	33.50		33.66	33.50	2.00	23 2	75 2	40 10	75 8	C	181	64
BH205C	35.00		35.15	35.00	2.50	25	60	43 7	75 10	C	176	64
BH205C	36.50		36.60	36.50	2.60	25	40	50	60	C	250	64
BH205C	38.00		38.14	38.00	2.00	25	60	45 5	75 3	C	192	64
WS201	1.10		1.24	Nil	Dry	25	65	50	75	C	200	75
WS201	1.24		1.29	Nil	Dry	25	5	50	45	C	333	75
WS202	1.20		1.76	Nil	Dry	1 0	75 75	0 0 0 0	75 75 75 185	S	<1	75
WS202	2.00		2.45	2.00	Dry	1 1	75 75	1 1 1 1	75 75 75 75	S	4	75
WS202	3.00	0.78	3.78	3.00	Dry					S		75
WS202	4.00		4.45	4.00	Dry	2 4	75 75	7 7 8 12	75 75 75 75	S	34	75
WS202	5.00		5.45	5.00	4.24	4 10	75 75	9 7 6 8	75 75 75 75	S	30	75
WS202	6.00		6.45	6.00	3.10	1 4	75 75	2 1 1 1	75 75 75 75	S	5	75
WS203	1.20	0.60	1.80	Nil	Dry					S	<1	75
WS203	2.00		2.75	2.00	Dry	1 0	75 75	0 0 0 0	75 75 75 375	S	<1	75
WS203	3.00	0.25	3.70	3.00	Dry	3 3	75 75	2 3 2 5	75 75 75 75	S	12	75
WS203	4.00		4.45	4.00	Dry	3 6	75 75	5 5 4 4	75 75 75 75	S	18	75
WS203	5.00		5.45	5.00	3.20	2 3	75 75	2 2 1 1	75 75 75 75	S	6	75

notes:

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

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

TRIAL PIT LOG

TP202

CLIENT	SH READING MASTER LLP						
SITE	STATION HILL, READING					Sheet	1 of 1
Start Date	22 May 2019	Easting	471306			Scale	1 : 25
End Date	22 May 2019	Northing	173725	Ground level	38.85mOD	Depth	1.50 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
	1B		0.30- 0.40	Light grey slightly sandy silty angular to subrounded fine to coarse concrete and brick GRAVEL with a high angular and subangular concrete cobble content. Frequent steel reinforcement bar (up to 20mm diam) and fragments of plastic (up to 50mm) and metal (up to 70mm). (MADE GROUND)			
	1ES	Vo 0.0	0.30- 0.40				
	2D		0.30- 0.40				
					0.60	38.25	
	3B		0.65- 0.75	Soft dark brown slightly gravelly silty CLAY with a high angular to subrounded brick and concrete cobble content. Frequent fragments of porcelain (up to 20mm), plastic (up to 80mm) and metal (up to 90mm). Gravel is angular to subrounded fine to coarse clinker, flint, brick, sandstone, slate and rare chalk. (MADE GROUND)			
	2ES	Vo 0.0	0.65- 0.75				
	4D		0.65- 0.75				
	5B		1.35- 1.50				
	3ES	Vo 0.0	1.35- 1.50	1.40m: Brick structure in the east and west of the pit.			
Dry				1.50m: Brick structure across the base of the pit.	1.50	37.35	
				Trial pit completed at 1.50m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 3.00x1.00x1.50m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 1.50m due to presence of a brick structure.

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

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

AGS

CONTRACT	CHECKED
35248	CT

Geotechnical Engineering Ltd, Tel. 01452 527743 35248-STATION HILL MASTER.GPJ TRIALJH.GPJ GEOTECH2.GLB 06/08/2019 13:47:27 MC EL

Geotechnical Engineering Limited

TRIAL PIT LOG

TP203

CLIENT	SH READING MASTER LLP					Sheet	1 of 2
SITE	STATION HILL, READING					Scale	1 : 25
Start Date	20 May 2019	Easting	471334				
End Date	20 May 2019	Northing	173777	Ground level	39.10mOD	Depth	4.30 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
				Light grey silty sandy subangular and subrounded fine to coarse brick, concrete and sandstone GRAVEL with a medium subangular and subrounded brick and concrete cobble content. (MADE GROUND)	0.50	38.60	
	1B		0.50- 0.60	Reddish brown silty sandy subangular and subrounded fine to coarse brick GRAVEL with a high subangular and subrounded brick cobble content. Frequent steel reinforcement bar (up to 30mm diam), rare metal fragments (up to 500mm) and pockets (up to 70mm) of grey gravelly clay. (MADE GROUND)			
	2D		0.50- 0.60				
	1ES	Vo 0.0	0.50- 0.60		0.90	38.20	
	3B		1.00- 1.20	Dark brown and black slightly sandy gravelly SILT with frequent fragments of glass (up to 10mm), wood (up to 40mm) and metal (up to 70mm). Gravel is angular to subrounded fine to coarse clinker, flint, brick, sandstone, rare chalk and slate. (MADE GROUND)			
	2ES	Vo 0.0	1.00- 1.20				
	4D		1.00- 1.20				
	5B		2.00- 2.10				
	3ES	Vo 0.0	2.00- 2.10				
	6D		2.00- 2.10		2.30	36.80	
	7B		2.50- 2.60	Very soft dark green speckled black slightly gravelly CLAY with a strong organic odour and rare fragments of metal (up to 100mm). Gravel is angular to subrounded fine to coarse flint, clinker, wood, ceramic and glass. Frequent relict rootlets. (MADE GROUND)			
	4ES	Vo 0.0	2.50- 2.60				
2.60m: Flow	8D		2.50- 2.60	2.40m: Ceramic bowl (200mm diam).	2.90	36.20	
	9B		3.00- 3.10	Soft yellowish brown slightly gravelly sandy CLAY with frequent pockets (up to 200mm) of dark grey organic clay. Gravel is angular to subrounded fine to coarse flint. Frequent relict roots (up to 4mm diam) and rootlets. (MADE GROUND)			
	5ES	Vo 0.0	3.00- 3.10				
	10D		3.00- 3.10		3.90	35.20	
				Yellowish brown sandy clayey subangular and subrounded fine to coarse flint and			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 2.60m.
Trial pit sides collapsed between 3.90-4.30m.
Trial pit dimensions 3.00x0.90x4.30m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated due to water in the base of the pit.

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

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

CONTRACT	CHECKED
35248	CT

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Geotechnical Engineering Limited

TRIAL PIT LOG

TP203

CLIENT	SH READING MASTER LLP					Sheet	2 of 2
SITE	STATION HILL, READING					Scale	1 : 25
Start Date	20 May 2019	Easting	471334				
End Date	20 May 2019	Northing	173777	Ground level	39.10mOD	Depth	4.30 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
	11B		4.00- 4.10	sandstone GRAVEL. (TAPLOW GRAVEL)			
	12D		4.00- 4.10				
4.20m	6ES	Vo 0.0	4.00- 4.10		4.30	34.80	
				Trial pit completed at 4.30m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 2.60m.
Trial pit sides collapsed between 3.90-4.30m.
Trial pit dimensions 3.00x0.90x4.30m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated due to water in the base of the pit.

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

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP204

CLIENT	SH READING MASTER LLP						
SITE	STATION HILL, READING					Sheet	1 of 1
Start Date	20 May 2019	Easting	471346			Scale	1 : 25
End Date	20 May 2019	Northing	173779	Ground level	39.15mOD	Depth	0.65 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
				Light grey slightly sandy silty subangular and subrounded fine to coarse brick concrete and sandstone GRAVEL with a medium subangular and subrounded brick and concrete cobble content. (MADE GROUND)	0.40	38.75	
Dry	1ES	Vo 0.0	0.55- 0.65	Yellowish brown slightly clayey sandy angular to subrounded fine to coarse flint and sandstone GRAVEL. (MADE GROUND) 0.60 - 0.65m: Brick structure and concrete foundation.	0.65	38.50	
				Trial pit completed at 0.65m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 3.00x1.80x0.65 expanded to 3.50x1.80x0.65m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 0.65m due to encountering a brick structure and a foundation across the north of the pit and possible yellow marker tape in the south.

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

CONTRACT	CHECKED
35248	CT

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP205

CLIENT	SH READING MASTER LLP						
SITE	STATION HILL, READING					Sheet	1 of 1
Start Date	21 May 2019	Easting	471312			Scale	1 : 25
End Date	21 May 2019	Northing	173762	Ground level	38.35mOD	Depth	3.00 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
				Light grey slightly sandy silty subangular and subrounded fine to coarse concrete and sandstone GRAVEL with a medium subangular and subrounded brick and concrete cobble content and frequent fragments of metal (up to 100mm), plastic (up to 150mm), wood (up to 30mm) and rare steel reinforcement bar (up to 15mm diam). (MADE GROUND)	0.25	38.10	
				Dark brown slightly sandy clayey subrounded to subangular fine to coarse brick and sandstone GRAVEL with a high subangular cobble content and rare fragments of plastic (up to 40mm), metal (up to 20mm) and glass (up to 10mm). (MADE GROUND)	0.50	37.85	
	1B		0.70- 1.00	Soft dark brown slightly sandy gravelly CLAY with a medium subangular brick cobble content, frequent pockets (up to 400mm) of black organic silt and yellow brown fine and medium sand and frequent fragments of wood (up to 40mm) and plastic (up to 60mm). Gravel is subangular to subrounded fine to coarse brick, flint and chalk. (MADE GROUND)			
	1ES	Vo 0.0	0.70- 1.00				
	2D		0.70- 1.00				
	3B		1.50- 1.70				
	2ES	Vo 0.0	1.50- 1.70				
	4D		1.50- 1.70				
	5B		2.30- 2.50	Soft black and dark green slightly sandy slightly gravelly silty CLAY with a strong organic odour. Frequent decomposing wood fragments (up to 70mm) and rare pockets (up to 300mm) of dark yellowish brown fine and medium sand. Gravel is subangular and subrounded fine to coarse brick, porcelain, rare chalk and sandstone. (MADE GROUND)	2.30	36.05	
	6D		2.30- 2.50				
	3ES	Vo 0.0	2.30- 2.50				
	7B		2.80- 3.00				
3.00m: Seepage 2.80m	8D		2.80- 3.00				
	4ES	Vo 0.3	2.80- 3.00				
				Trial pit completed at 3.00m.	3.00	35.35	

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater seepage encountered at 3.00m rising to 2.80m after 20minutes.
Trial pit sides remained stable and vertical.
Trial pit dimensions 3.00x1.00x3.00m.
On completion, the trial pit was backfilled with materials arising.

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

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

CONTRACT	CHECKED
35248	CT

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TRIAL PIT LOG

TP206

CLIENT	SH READING MASTER LLP						
SITE	STATION HILL, READING					Sheet	1 of 1
Start Date	22 May 2019	Easting	471304			Scale	1 : 25
End Date	22 May 2019	Northing	173716	Ground level	38.90mOD	Depth	2.50 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
	1B		0.50- 0.60	MADE GROUND comprising black TARMACADAM (15mm) over brownish grey silty angular to subrounded fine to coarse concrete and brick GRAVEL with a low subangular concrete and brick cobble content. (MADE GROUND)			
	1ES	Vo 0.0	0.50- 0.60				
	2D		0.50- 0.60				
					0.75	38.15	
	3B		1.30- 1.60	Soft dark brown slightly sandy gravelly silty CLAY with a high angular and subangular brick and concrete cobble content. Rare fragments of plastic (up to 20mm) and metal (up to 30mm). Gravel is angular to subrounded fine to coarse concrete and brick. (MADE GROUND)			
	2ES	Vo 0.0	1.30- 1.60				
	4D		1.30- 1.60				
	5B		2.10- 2.20				
	3ES	Vo 0.0	2.10- 2.20				
	6D		2.10- 2.20				
					2.50	36.40	
Dry				Trial pit completed at 2.50m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 2.30x1.10x2.50m.
On completion, the trial pit was backfilled with materials arising.

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

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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35248	CT

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Geotechnical Engineering Limited

TRIAL PIT LOG

TP208

CLIENT	SH READING MASTER LLP					Sheet	1 of 1
SITE	STATION HILL, READING					Scale	1 : 25
Start Date	21 May 2019	Easting	471346				
End Date	21 May 2019	Northing	173757	Ground level	39.00mOD	Depth	2.20 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
	1B		0.50- 0.60	Light grey slightly sandy silty subangular and subrounded fine to coarse brick, concrete and sandstone GRAVEL with a medium subangular and subrounded brick and concrete cobble content and frequent fragments of metal (up to 150mm), plastic (up to 200mm), wood (up to 30mm) and steel reinforcement bar (up to 15mm diam). (MADE GROUND)			
	1ES	Vo 0.0	0.50- 0.60				
	2D		0.50- 0.60		0.60	38.40	
	3B		1.00- 1.20	Dark brown slightly sandy silty subangular and subrounded fine to coarse brick and sandstone GRAVEL with a high subangular cobble content and a low subangular boulder content. (MADE GROUND)			
	2ES	Vo 0.0	1.00- 1.20				
	4D		1.00- 1.20				
	5B		1.50- 1.70				
	3ES	Vo 0.0	1.50- 1.70				
	6D		1.50- 1.70				
Dry				2.20m: North section: Dark brown duct (200mm diam. approx.) covered by 300mm concrete orientated east-west. Trial pit completed at 2.20m.	2.20	36.80	

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 2.90x1.20x2.20m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated on the Client's instruction due to encountering duct (200mm diam. approx.) at 2.20m.

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

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

CONTRACT	CHECKED
35248	CT

Geotechnical Engineering Ltd, Tel. 01452 527743 35248-STATION HILL MASTER.GPJ TRIALJH.GPJ GEOTECH2.GLB 06/08/2019 13:47:31 MC EL

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TRIAL PIT LOG

TP209

CLIENT	SH READING MASTER LLP					Sheet	1 of 1
SITE	STATION HILL, READING					Scale	1 : 25
Start Date	20 May 2019	Easting	471356				
End Date	20 May 2019	Northing	173778	Ground level	39.25mOD	Depth	2.90 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
	1B		0.50- 0.70	Light grey slightly sandy silty subangular and subrounded fine to coarse brick, concrete and sandstone GRAVEL with a medium subangular and subrounded brick and concrete cobble content and frequent fragments of metal (up to 150mm), plastic (up to 200mm), wood (up to 30mm), rubber (200mm) and steel reinforcement bar (up to 30mm diam). (MADE GROUND)			
	1ES	Vo 0.0	0.50- 0.70				
	2D		0.50- 0.70				
	3B		1.50- 2.00				
	2ES	Vo 0.0	1.50- 2.00				
	4D		1.50- 2.00				
	5B		2.50- 2.60				
	6D		2.50- 2.60				
	3ES	Vo 0.0	2.50- 2.60				
2.80m: Seepage 2.50m	7B		2.70- 2.90				
	8D		2.70- 2.90	Soft dark green speckled black slightly gravelly CLAY. Gravel is angular to subrounded fine and medium flint. Frequent relict rootlets stained white. (MADE GROUND)	2.70	36.55	
	4ES	Vo 0.0	2.70- 2.90		2.90	36.35	
				Trial pit completed at 2.90m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 2.80m rising to 2.50m after 20 minutes.
Trial pit sides remained stable and vertical.
Trial pit dimensions 1.70x2.90x2.90m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated due to the groundwater covering the base of the pit.

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

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

AGS

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35248	CT

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH201	18/06/19 14:10:00												2.18	
BH201	28/06/19 10:41:00	1024	0								0.0	21		
BH201	28/06/19 10:42:00	1024	0								0.0			
BH201	28/06/19 10:43:00	1024	0								0.0			
BH201	28/06/19 10:44:00	1024	0								0.0			
BH201	28/06/19 10:45:00	1024	0								0.0			
BH201	28/06/19 10:46:00	1024	0								0.0			
BH201	28/06/19 10:47:00			0.0	0.0	20.9	0.0	0	0	0.7				
BH201	28/06/19 10:48:00			0.4	0.0	20.4	0.0	0	0	19.8				
BH201	28/06/19 10:49:00			0.4	0.0	20.4	0.0	0	10	21.0				
BH201	28/06/19 10:50:00			0.3	0.0	20.4	0.0	0	10	21.5				
BH201	28/06/19 10:51:00			0.3	0.0	20.4	0.0	0	10	21.4				
BH201	28/06/19 10:52:00			0.3	0.0	20.4	0.0	0	10	21.2				
BH201	28/06/19 10:53:00												2.17	
BH201	03/07/19 12:24:00	1026	0								0.0	21		
BH201	03/07/19 12:25:00	1026	0								0.0			
BH201	03/07/19 12:26:00	1026	0								0.0			
BH201	03/07/19 12:27:00	1026	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH201	03/07/19 12:28:00	1026	0								0.0			
BH201	03/07/19 12:29:00	1026	0								0.0			
BH201	03/07/19 12:34:00			0.3	0.0	20.6	0.0	0	0	2.2				
BH201	03/07/19 12:35:00			0.3	0.0	20.5	0.0	0	0	14.0				
BH201	03/07/19 12:36:00			0.3	0.0	20.6	0.0	0	0	14.8				
BH201	03/07/19 12:37:00			0.3	0.0	20.5	0.0	0	0	15.3				
BH201	03/07/19 12:38:00			0.3	0.0	20.6	0.0	0	0	15.4				
BH201	03/07/19 12:39:00			0.3	0.0	20.6	0.0	0	0	15.4			2.23	Groundwater sample taken.
BH201	10/07/19 12:43:00	1016	15								3.7			
BH201	10/07/19 12:44:00	1016	5								1.6			
BH201	10/07/19 12:45:00	1015	1								0.3			
BH201	10/07/19 12:46:00	1015	0								0.0			
BH201	10/07/19 12:47:00	1016	0								0.0			
BH201	10/07/19 12:48:00	1016	0								0.0			
BH201	10/07/19 12:49:00			0.0	0.0	19.8	0.0	0	0	14.9				
BH201	10/07/19 12:50:00			0.0	0.0	19.8	0.0	0	0	13.0				
BH201	10/07/19 12:51:00			0.0	0.0	19.9	0.0	0	0	9.1				
BH201	10/07/19 12:52:00			0.0	0.0	19.9	0.0	0	0	7.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH201	10/07/19 12:53:00			0.0	0.0	19.9	0.0	0	0	4.4				
BH201	10/07/19 12:54:00			0.0	0.0	19.9	0.0	0	0	3.0				
BH201	10/07/19 12:56:00												2.21	
BH201	18/07/19 14:39:00	1005	0								0.0			
BH201	18/07/19 14:40:00	1006	0								0.0			
BH201	18/07/19 14:41:00	1006	0								0.0			
BH201	18/07/19 14:42:00	1006	0								0.0			
BH201	18/07/19 14:43:00	1006	0								0.0			
BH201	18/07/19 14:44:00	1006	0								0.0			
BH201	18/07/19 14:46:00			0.4	0.0	20.5	0.0	0	0	0.0				
BH201	18/07/19 14:47:00			0.4	0.0	20.5	0.0	0	0	0.0				
BH201	18/07/19 14:48:00			0.4	0.0	20.5	0.0	0	0	0.0				
BH201	18/07/19 14:49:00			0.4	0.0	20.5	0.0	0	0	0.0				
BH201	18/07/19 14:50:00			0.4	0.0	20.5	0.0	0	0	0.0				
BH201	18/07/19 14:51:00			0.4	0.0	20.5	0.0	0	0	0.0				
BH201	18/07/19 14:52:00												2.25	
BH201	26/07/19 10:17:00	1009	0								0.0			
BH201	26/07/19 10:18:00	1010	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH201	26/07/19 10:19:00	1010	0								0.0			
BH201	26/07/19 10:20:00	1010	0								0.0			
BH201	26/07/19 10:21:00	1010	0								0.0			
BH201	26/07/19 10:22:00	1010	0								0.0			
BH201	26/07/19 10:23:00			0.1	0.0	20.7	0.0	0	0	76.1				
BH201	26/07/19 10:24:00			0.4	0.0	20.5	0.0	0	0	246.6				
BH201	26/07/19 10:25:00			0.4	0.0	20.4	0.0	0	0	372.1				
BH201	26/07/19 10:26:00			0.4	0.0	20.4	0.0	0	0	291.0				
BH201	26/07/19 10:27:00			0.4	0.0	20.4	0.0	0	0	259.1				
BH201	26/07/19 10:28:00			0.4	0.0	20.5	0.0	0	0	207.3				
BH201	26/07/19 10:29:00												2.23	
BH201	22/08/19 08:57:00	1024	-72								-17.3			
BH201	22/08/19 08:58:00	1024	-3								0.0			
BH201	22/08/19 08:59:00	1024	0								0.0			
BH201	22/08/19 09:00:00	1024	0								0.0			
BH201	22/08/19 09:01:00	1024	0								0.0			
BH201	22/08/19 09:05:00			0.5	0.0	20.1	0.0	0	0	9.1				
BH201	22/08/19 09:06:00			0.6	0.0	20.0	0.0	0	0	10.7				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH201	22/08/19 09:07:00			0.0	0.0	19.9	0.0	0	0	11.6				
BH201	22/08/19 09:08:00			0.5	0.0	20.0	0.0	0	0	12.3				
BH201	22/08/19 09:09:00			0.5	0.0	20.0	0.0	0	0	12.4				
BH201	22/08/19 09:10:00			0.5	0.0	20.0	0.0	0	0	12.4				
BH201	22/08/19 09:12:00												2.22	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH202D	18/06/19 13:50:00												2.63	
BH202D	28/06/19 10:00:00	1024	0								0.0	19		
BH202D	28/06/19 10:01:00	1024	0								0.0			
BH202D	28/06/19 10:02:00	1024	0								0.0			
BH202D	28/06/19 10:03:00	1024	0								0.0			
BH202D	28/06/19 10:04:00	1024	0								0.0			
BH202D	28/06/19 10:05:00	1024	0								0.0			
BH202D	28/06/19 10:06:00			0.0	0.0	20.9	0.0	0	0	0.6				
BH202D	28/06/19 10:07:00			0.0	0.0	20.6	0.0	0	0	7.9				
BH202D	28/06/19 10:08:00			0.0	0.0	20.7	0.0	0	0	7.0				
BH202D	28/06/19 10:09:00			0.0	0.0	20.7	0.0	0	0	5.3				
BH202D	28/06/19 10:10:00			0.0	0.0	20.7	0.0	0	0	3.8				
BH202D	28/06/19 10:11:00			0.0	0.0	20.8	0.0	0	0	2.8				
BH202D	28/06/19 10:12:00												3.06	
BH202D	03/07/19 13:24:00	1024	0								-4.0	21		
BH202D	03/07/19 13:25:00	1024	0								0.0			
BH202D	03/07/19 13:26:00	1024	0								0.0			
BH202D	03/07/19 13:27:00	1024	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

CHECKED **CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH202D	03/07/19 13:28:00	1024	0								0.0			
BH202D	03/07/19 13:29:00	1024	0								0.0			
BH202D	03/07/19 13:31:00			0.0	0.0	21.6	0.0	0	0	1.4				
BH202D	03/07/19 13:32:00			0.1	0.0	21.0	0.0	0	0	10.2				
BH202D	03/07/19 13:33:00			0.1	0.0	21.0	0.0	0	0	10.5				
BH202D	03/07/19 13:34:00			0.1	0.0	21.0	0.0	0	0	10.7				
BH202D	03/07/19 13:35:00			0.1	0.0	21.0	0.0	0	0	10.8				
BH202D	03/07/19 13:36:00			0.1	0.0	21.1	0.0	0	0	10.8				
BH202D	03/07/19 13:37:00												3.10	Groundwater sample taken.
BH202D	10/07/19 12:13:00	1013	0								0.0			
BH202D	10/07/19 12:14:00	1013	0								0.0			
BH202D	10/07/19 12:15:00	1013	0								0.0			
BH202D	10/07/19 12:16:00	1013	0								0.0			
BH202D	10/07/19 12:17:00	1013	0								0.0			
BH202D	10/07/19 12:18:00	1013	0								0.0			
BH202D	10/07/19 12:19:00			0.0	0.0	18.8	0.0	0	0	13.9				
BH202D	10/07/19 12:20:00			0.1	0.0	19.2	0.0	0	0	13.5				
BH202D	10/07/19 12:21:00			0.1	0.0	19.2	0.0	0	0	12.1				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH202D	10/07/19 12:22:00			0.1	0.0	19.2	0.0	0	0	11.6				
BH202D	10/07/19 12:23:00			0.1	0.0	19.2	0.0	0	0	11.2				
BH202D	10/07/19 12:24:00			0.1	0.0	19.3	0.0	0	0	10.9				
BH202D	10/07/19 12:26:00												3.10	
BH202D	18/07/19 15:30:00	1004	0								0.0			
BH202D	18/07/19 15:31:00	1004	0								0.0			
BH202D	18/07/19 15:32:00	1004	0								0.0			
BH202D	18/07/19 15:33:00	1004	0								0.0			
BH202D	18/07/19 15:34:00	1004	0								0.0			
BH202D	18/07/19 15:35:00	1004	0								0.0			
BH202D	18/07/19 15:36:00			0.1	0.0	21.0	0.0	0	0	0.0				
BH202D	18/07/19 15:37:00			0.2	0.0	20.6	0.0	0	0	0.0				
BH202D	18/07/19 15:38:00			0.1	0.0	20.7	0.0	0	0	0.0				
BH202D	18/07/19 15:39:00			0.1	0.0	20.8	0.0	0	0	0.0				
BH202D	18/07/19 15:40:00			0.1	0.0	20.9	0.0	0	0	0.0				
BH202D	18/07/19 15:41:00			0.0	0.0	20.9	0.0	0	0	0.0				
BH202D	18/07/19 15:42:00												3.14	
BH202D	26/07/19 09:35:00	1010	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH202D	26/07/19 09:36:00	1010	0								0.0			
BH202D	26/07/19 09:37:00	1010	0								0.0			
BH202D	26/07/19 09:38:00	1010	0								0.0			
BH202D	26/07/19 09:39:00	1010	0								0.0			
BH202D	26/07/19 09:40:00	1010	0								0.0			
BH202D	26/07/19 09:41:00			0.1	0.0	19.8	0.0	0	0	258.0				
BH202D	26/07/19 09:42:00			0.1	0.0	20.6	0.0	0	0	60.7				
BH202D	26/07/19 09:43:00			0.1	0.0	20.8	0.0	0	0	8.9				
BH202D	26/07/19 09:44:00			0.1	0.0	20.9	0.0	0	0	0.0				
BH202D	26/07/19 09:45:00			0.0	0.0	20.9	0.0	0	0	0.0				
BH202D	26/07/19 09:46:00			0.0	0.0	20.9	0.0	0	0	0.0				
BH202D	26/07/19 09:47:00												3.13	
BH202D	22/08/19 08:57:00	1022	-30								0.0			
BH202D	22/08/19 08:58:00	1022	0								0.0			
BH202D	22/08/19 08:59:00	1022	0								0.0			
BH202D	22/08/19 09:00:00	1022	0								0.0			
BH202D	22/08/19 09:01:00	1022	0								0.0			
BH202D	22/08/19 09:05:00			0.3	0.0	20.6	0.0	0	0	9.8				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH202D	22/08/19 09:06:00			0.4	0.0	20.1	0.0	0	0	13.4				
BH202D	22/08/19 09:07:00			0.4	0.0	20.1	0.0	0	0	13.3				
BH202D	22/08/19 09:08:00			0.4	0.0	20.1	0.0	0	0	13.5				
BH202D	22/08/19 09:09:00			0.4	0.0	20.1	0.0	0	0	13.3				
BH202D	22/08/19 09:10:00			0.4	0.0	20.2	0.0	0	0	13.3				
BH202D	22/08/19 09:12:00												3.10	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH203	14/06/19 13:35:00												2.72	
BH203	28/06/19 08:32:00	1025	0								0.0	17		
BH203	28/06/19 08:33:00	1025	0								0.0			
BH203	28/06/19 08:34:00	1025	0								0.0			
BH203	28/06/19 08:35:00	1025	0								0.0			
BH203	28/06/19 08:36:00	1025	0								0.0			
BH203	28/06/19 08:37:00	1025	0								0.0			
BH203	28/06/19 08:38:00			0.0	0.0	20.6	0.0	0	0	0.6				
BH203	28/06/19 08:39:00			0.1	0.0	20.5	0.0	0	0	8.4				
BH203	28/06/19 08:40:00			0.0	0.0	20.6	0.0	0	0	7.5				
BH203	28/06/19 08:41:00			0.0	0.0	20.6	0.0	0	0	6.4				
BH203	28/06/19 08:42:00			0.0	0.0	20.6	0.0	0	0	5.3				
BH203	28/06/19 08:43:00			0.0	0.0	20.7	0.0	0	0	4.2				
BH203	28/06/19 08:44:00												2.55	
BH203	04/07/19 11:20:00												2.69	Groundwater sample taken. No gas tap present.
BH203	10/07/19 10:20:00	1014	0								0.0	15		
BH203	10/07/19 10:21:00	1014	0								0.0			
BH203	10/07/19 10:22:00	1014	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

CHECKED **CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH203	10/07/19 10:23:00	1014	0								0.0			
BH203	10/07/19 10:24:00	1014	0								0.0			
BH203	10/07/19 10:25:00	1014	0								0.0			
BH203	10/07/19 10:26:00			0.2	0.0	18.1	0.0	0	0	12.7				
BH203	10/07/19 10:27:00			0.2	0.0	19.0	0.0	0	0	13.4				
BH203	10/07/19 10:28:00			0.2	0.0	19.2	0.0	0	0	13.3				
BH203	10/07/19 10:29:00			0.2	0.0	19.2	0.0	0	0	12.7				
BH203	10/07/19 10:30:00			0.2	0.0	19.2	0.0	0	0	12.1				
BH203	10/07/19 10:31:00			0.1	0.0	19.3	0.0	0	0	11.6				
BH203	10/07/19 10:33:00												2.68	
BH203	18/07/19 16:32:00	1004	0								0.0			
BH203	18/07/19 16:33:00	1004	0								0.0			
BH203	18/07/19 16:34:00	1004	0								0.0			
BH203	18/07/19 16:35:00	1004	0								0.0			
BH203	18/07/19 16:36:00	1004	0								0.0			
BH203	18/07/19 16:37:00	1004	0								0.0			
BH203	18/07/19 16:38:00			0.5	0.0	19.6	0.0	0	0	0.0				
BH203	18/07/19 16:39:00			0.2	0.0	20.8	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH203	18/07/19 16:40:00			0.2	0.0	20.9	0.0	0	0	0.0				
BH203	18/07/19 16:41:00			0.2	0.0	20.9	0.0	0	0	0.0				
BH203	18/07/19 16:42:00			0.1	0.0	21.0	0.0	0	0	0.0				
BH203	18/07/19 16:43:00			0.1	0.0	21.0	0.0	0	0	0.0				
BH203	18/07/19 16:44:00												2.73	
BH203	26/07/19 08:11:00	1010	0								0.0			
BH203	26/07/19 08:12:00	1010	0								0.0			
BH203	26/07/19 08:13:00	1010	0								0.0			
BH203	26/07/19 08:14:00	1010	0								0.0			
BH203	26/07/19 08:15:00	1010	0								0.0			
BH203	26/07/19 08:16:00	1010	0								0.0			
BH203	26/07/19 08:17:00			0.0	0.0	20.7	0.0	0	0	5.8				
BH203	26/07/19 08:18:00			0.3	0.0	20.5	0.0	0	0	95.7				
BH203	26/07/19 08:19:00			0.3	0.0	20.5	0.0	0	0	90.5				
BH203	26/07/19 08:20:00			0.2	0.0	20.6	0.0	0	0	72.3				
BH203	26/07/19 08:21:00			0.2	0.0	20.6	0.0	0	0	47.5				
BH203	26/07/19 08:22:00			0.2	0.0	20.6	0.0	0	0	37.5				
BH203	26/07/19 08:23:00												2.70	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

CHECKED **CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH203	22/08/19 10:33:00	1023	-104								-17.2			
BH203	22/08/19 10:34:00	1023	0								0.0			
BH203	22/08/19 10:35:00	1023	0								0.0			
BH203	22/08/19 10:36:00	1023	0								0.0			
BH203	22/08/19 10:37:00	1023	0								0.0			
BH203	22/08/19 10:39:00			0.4	0.0	20.7	0.0	0	0	98.1				
BH203	22/08/19 10:40:00			0.6	0.0	20.0	0.0	0	0	51.6				
BH203	22/08/19 10:41:00			0.6	0.0	19.9	0.0	0	0	36.2				
BH203	22/08/19 10:42:00			0.6	0.0	19.9	0.0	0	0	29.7				
BH203	22/08/19 10:43:00			0.6	0.0	20.0	0.0	0	0	24.4				
BH203	22/08/19 10:44:00			0.5	0.0	120.1	0.0	0	0	22.3				
BH203	22/08/19 10:46:00												3.70	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH204	28/06/19 11:25:00												3.40	Unable to gas monitor due to no gas tap.
BH204	03/07/19 14:45:00	1021	0								0.0	21		
BH204	03/07/19 14:46:00	1021	0								0.0			
BH204	03/07/19 14:47:00	1021	0								0.0			
BH204	03/07/19 14:48:00	1021	0								0.0			
BH204	03/07/19 14:49:00	1021	0								0.0			
BH204	03/07/19 14:50:00	1021	0								0.0			
BH204	03/07/19 14:55:00			3.6	0.0	18.9	0.0	0	0	3.4				
BH204	03/07/19 14:56:00			0.1	0.0	20.5	0.0	0	0	10.6				
BH204	03/07/19 14:57:00			0.1	0.0	20.6	0.0	0	0	8.3				
BH204	03/07/19 14:58:00			0.1	0.0	20.8	0.0	0	0	5.6				
BH204	03/07/19 14:59:00			0.0	0.0	20.9	0.0	0	0	4.6				
BH204	03/07/19 15:00:00			0.0	0.0	21.0	0.0	0	0	3.7				
BH204	03/07/19 15:01:00												3.44	Groundwater sample taken.
BH204	10/07/19 10:37:00	1013	0								0.0	15		
BH204	10/07/19 10:38:00	1013	0								0.0			
BH204	10/07/19 10:39:00	1013	0								0.0			
BH204	10/07/19 10:40:00	1013	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

CHECKED **CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH204	10/07/19 10:41:00	1013	0								0.0			
BH204	10/07/19 10:42:00	1013	0								0.0			
BH204	10/07/19 10:43:00			0.6	0.0	18.1	0.0	0	0	72.4				VOC peaked at 76.2ppm.
BH204	10/07/19 10:44:00			0.5	0.0	18.3	0.0	0	0	32.5				
BH204	10/07/19 10:45:00			0.5	0.0	18.5	0.0	0	0	34.6				
BH204	10/07/19 10:46:00			0.4	0.0	18.7	0.0	0	0	20.4				
BH204	10/07/19 10:47:00			0.2	0.0	19.0	0.0	0	0	13.3				
BH204	10/07/19 10:48:00			0.2	0.0	19.1	0.0	0	0	11.2				
BH204	10/07/19 10:50:00												3.49	
BH204	19/07/19 09:55:00	1007	0								0.0			
BH204	19/07/19 09:56:00	1006	0								0.0			
BH204	19/07/19 09:57:00	1007	0								0.0			
BH204	19/07/19 09:58:00	1007	0								0.0			
BH204	19/07/19 09:59:00	1006	0								0.0			
BH204	19/07/19 10:00:00	1006	0								0.0			
BH204	19/07/19 10:01:00			1.2	0.0	18.5	0.0	0	0	8.5				
BH204	19/07/19 10:02:00			1.2	0.0	17.9	0.0	0	0	8.8				Test paused: blocked flow messgae on PID connection.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH204	19/07/19 10:04:00			0.7	0.0	19.5	0.0	0	0	8.6				Test paused: blocked flow messgae on PID connection.
BH204	19/07/19 10:49:00			0.7	0.0	20.0	0.0	0	0	8.3				
BH204	19/07/19 10:50:00			0.7	0.0	19.4	0.0	0	0	8.9				Test stopped: blocked flow messgae on PID connection.
BH204	19/07/19 10:51:00												3.59	
BH204	26/07/19 10:49:00	1009	0								0.0			
BH204	26/07/19 10:50:00	1009	0								0.0			
BH204	26/07/19 10:51:00	1008	0								0.0			
BH204	26/07/19 10:52:00	1008	0								0.0			
BH204	26/07/19 10:53:00	1008	0								0.0			
BH204	26/07/19 10:54:00	1008	0								0.0			
BH204	26/07/19 10:55:00			0.4	0.0	20.5	0.0	0	0	56.3				
BH204	26/07/19 10:56:00			0.7	0.0	19.6	0.0	0	0	405.5				
BH204	26/07/19 10:57:00			0.6	0.0	19.9	0.0	0	0	279.3				
BH204	26/07/19 10:58:00			0.5	0.0	20.1	0.0	0	0	194.8				
BH204	26/07/19 10:59:00			0.5	0.0	20.3	0.0	0	0	150.4				
BH204	26/07/19 11:00:00			0.4	0.0	20.4	0.0	0	0	117.9				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH204	26/07/19 11:01:00												3.50	
BH204	22/08/19 10:55:00	1022	0								-3.6			
BH204	22/08/19 10:56:00	1022	0								0.0			
BH204	22/08/19 10:57:00	1022	0								0.0			
BH204	22/08/19 10:58:00	1022	0								0.0			
BH204	22/08/19 10:59:00	1022	0								0.0			
BH204	22/08/19 11:01:00			0.9	0.0	19.4	0.0	0	0	125.5				
BH204	22/08/19 11:02:00			0.6	0.0	19.9	0.0	0	0	117.4				
BH204	22/08/19 11:03:00			0.5	0.0	20.2	0.0	0	0	116.4				
BH204	22/08/19 11:04:00			0.3	0.0	20.5	0.0	0	0	99.6				
BH204	22/08/19 11:05:00			0.2	0.0	20.7	0.0	0	0	78.8				
BH204	22/08/19 11:06:00			0.1	0.0	20.8	0.0	0	0	72.2				
BH204	22/08/19 11:08:00												3.50	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH205C	18/06/19 14:00:00												2.20	
BH205C	28/06/19 11:01:00	1022	0								0.0	21		
BH205C	28/06/19 11:02:00	1022	0								0.0			
BH205C	28/06/19 11:03:00	1022	0								0.0			
BH205C	28/06/19 11:04:00	1022	0								0.0			
BH205C	28/06/19 11:05:00	1022	0								0.0			
BH205C	28/06/19 11:06:00	1022	0								0.0			
BH205C	28/06/19 11:07:00			0.0	0.0	21.0	0.0	0	0	7.6				
BH205C	28/06/19 11:08:00			0.0	0.0	20.6	0.0	0	0	5.0				
BH205C	28/06/19 11:09:00			0.0	0.0	20.9	0.0	0	0	3.4				
BH205C	28/06/19 11:10:00			0.0	0.0	21.0	0.0	0	0	2.6				
BH205C	28/06/19 11:11:00			0.0	0.0	21.0	0.0	0	0	1.9				
BH205C	28/06/19 11:12:00			0.0	0.0	21.0	0.0	0	0	1.5				
BH205C	28/06/19 11:13:00												2.20	
BH205C	03/07/19 13:00:00	1025	0								0.0	21		
BH205C	03/07/19 13:01:00	1025	0								0.0			
BH205C	03/07/19 13:02:00	1025	0								0.0			
BH205C	03/07/19 13:03:00	1025	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH205C	03/07/19 13:04:00	1025	0								0.0			
BH205C	03/07/19 13:05:00	1025	0								0.0			
BH205C	03/07/19 13:09:00			0.3	0.0	20.1	0.0	0	0	3.5				
BH205C	03/07/19 13:10:00			0.1	0.0	20.7	0.0	0	0	3.6				
BH205C	03/07/19 13:11:00			0.0	0.0	21.0	0.0	0	0	2.2				
BH205C	03/07/19 13:12:00			0.0	0.0	21.1	0.0	0	0	1.8				
BH205C	03/07/19 13:13:00			0.0	0.0	21.2	0.0	0	0	1.4				
BH205C	03/07/19 13:14:00			0.0	0.0	21.2	0.0	0	0	1.2				
BH205C	03/07/19 13:15:00												2.25	Groundwater sample taken.
BH205C	10/07/19 12:28:00	1015	0								0.0			
BH205C	10/07/19 12:29:00	1016	0								0.0			
BH205C	10/07/19 12:30:00	1016	0								0.0			
BH205C	10/07/19 12:31:00	1015	0								0.0			
BH205C	10/07/19 12:32:00	1015	0								0.0			
BH205C	10/07/19 12:33:00	1016	0								0.0			
BH205C	10/07/19 12:34:00			0.3	0.0	19.2	0.0	0	0	8.1				
BH205C	10/07/19 12:35:00			0.0	0.0	19.4	0.0	0	0	1.2				
BH205C	10/07/19 12:36:00			0.0	0.0	19.5	0.0	0	0	0.8				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH205C	10/07/19 12:37:00			0.0	0.0	19.5	0.0	0	0	0.5				
BH205C	10/07/19 12:38:00			0.0	0.0	19.6	0.0	0	0	0.4				
BH205C	10/07/19 12:39:00			0.0	0.0	19.5	0.0	0	0	0.3				
BH205C	10/07/19 12:41:00												2.24	
BH205C	18/07/19 15:06:00	1006	0								0.0			
BH205C	18/07/19 15:07:00	1005	0								0.0			
BH205C	18/07/19 15:08:00	1005	0								0.0			
BH205C	18/07/19 15:09:00	1005	0								0.0			
BH205C	18/07/19 15:10:00	1005	0								0.0			
BH205C	18/07/19 15:11:00	1005	0								0.0			
BH205C	18/07/19 15:13:00			0.2	0.0	20.6	0.0	0	0	0.0				
BH205C	18/07/19 15:14:00			0.1	0.0	20.9	0.0	0	0	0.0				
BH205C	18/07/19 15:15:00			0.0	0.0	21.0	0.0	0	0	0.0				
BH205C	18/07/19 15:16:00			0.0	0.0	21.1	0.0	0	0	0.0				
BH205C	18/07/19 15:17:00			0.0	0.0	21.1	0.0	0	0	0.0				
BH205C	18/07/19 15:18:00			0.0	0.0	21.1	0.0	0	0	0.0				
BH205C	18/07/19 15:19:00												Dry	
BH205C	26/07/19 09:59:00	1010	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

CHECKED **CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH205C	26/07/19 10:00:00	1010	0								0.0			
BH205C	26/07/19 10:01:00	1010	0								0.0			
BH205C	26/07/19 10:02:00	1010	0								0.0			
BH205C	26/07/19 10:03:00	1010	0								0.0			
BH205C	26/07/19 10:04:00	1010	0								0.0			
BH205C	26/07/19 10:05:00			0.5	0.0	20.6	0.0	0	0	0.0				
BH205C	26/07/19 10:06:00			0.5	0.0	19.7	0.0	0	0	94.2				
BH205C	26/07/19 10:07:00			0.2	0.0	20.6	0.0	0	0	389.2				
BH205C	26/07/19 10:08:00			0.1	0.0	20.8	0.0	0	0	255.7				
BH205C	26/07/19 10:09:00			0.1	0.0	20.9	0.0	0	0	199.8				
BH205C	26/07/19 10:10:00			0.1	0.0	20.9	0.0	0	0	167.9				
BH205C	26/07/19 10:11:00												2.27	
BH205C	22/08/19 12:06:00	1025	0								0.0			
BH205C	22/08/19 12:07:00	1025	0								0.0			
BH205C	22/08/19 12:08:00	1025	0								0.0			
BH205C	22/08/19 12:09:00	1025	0								0.0			
BH205C	22/08/19 12:10:00	1025	0								0.0			
BH205C	22/08/19 12:12:00			0.7	0.0	19.7	0.0	0	0	13.1				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH205C	22/08/19 12:13:00			0.2	0.0	20.6	0.0	0	0	60.5				
BH205C	22/08/19 12:14:00			0.1	0.0	20.8	0.0	0	0	517.1				
BH205C	22/08/19 12:15:00			0.1	0.0	20.9	0.0	0	0	462.3				
BH205C	22/08/19 12:16:00			0.1	0.0	20.9	0.0	0	0	429.9				
BH205C	22/08/19 12:17:00			0.1	0.0	21.0	0.0	0	0	420.6				
BH205C	22/08/19 12:19:00												2.29	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS201	18/06/19 14:30:00												Damp	
WS201	04/07/19 13:30:00	1025	0								0.0	24		
WS201	04/07/19 13:31:00	1025	0								0.0			
WS201	04/07/19 13:32:00	1025	0								0.0			
WS201	04/07/19 13:33:00	1025	0								0.0			
WS201	04/07/19 13:34:00	1025	0								0.0			
WS201	04/07/19 13:35:00	1025	0								0.0			
WS201	04/07/19 13:40:00												Dry	Gas tap blocked.
WS201	10/07/19 11:18:00	1016	0								0.0			
WS201	10/07/19 11:19:00	1016	0								0.0			
WS201	10/07/19 11:20:00	1016	0								0.0			
WS201	10/07/19 11:21:00	1016	0								0.0			
WS201	10/07/19 11:22:00	1016	0								0.0			
WS201	10/07/19 11:23:00	1016	0								0.0			
WS201	10/07/19 11:24:00			0.0	0.0	19.2	0.0	0	0	1.8				
WS201	10/07/19 11:25:00			0.0	0.0	17.2	0.0	0	0	2.5				
WS201	10/07/19 11:26:00			0.0	0.0	17.0	0.0	0	0	2.5				
WS201	10/07/19 11:27:00			0.0	0.0	17.0	0.0	0	0	2.6				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS201	10/07/19 11:28:00			0.0	0.0	16.9	0.0	0	0	2.6				
WS201	10/07/19 11:29:00			0.0	0.0	16.9	0.0	0	0	2.6				
WS201	10/07/19 11:31:00												Dry	
WS201	19/07/19 11:08:00	1005	0								0.0			
WS201	19/07/19 11:09:00	1005	0								0.0			
WS201	19/07/19 11:10:00	1005	0								0.0			
WS201	19/07/19 11:11:00	1005	0								0.0			
WS201	19/07/19 11:12:00	1005	0								0.0			
WS201	19/07/19 11:13:00	1005	0								0.0			
WS201	19/07/19 12:23:00			0.0	0.0	20.7	0.0	0	0	7.2				
WS201	19/07/19 12:24:00			0.0	0.0	17.3	0.0	0	0	6.0				
WS201	19/07/19 12:25:00			0.0	0.0	17.3	0.0	0	0	5.8				
WS201	19/07/19 12:26:00			0.0	0.0	17.2	0.0	0	0	5.2				
WS201	19/07/19 12:27:00			0.0	0.0	17.2	0.0	0	0	3.8				
WS201	19/07/19 12:28:00			0.0	0.0	17.2	0.0	0	0	3.7				
WS201	19/07/19 12:29:00												Dry	
WS201	26/07/19 09:09:00	1009	0								0.0			
WS201	26/07/19 09:10:00	1009	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS201	26/07/19 09:11:00	1009	0								0.0			
WS201	26/07/19 09:12:00	1009	0								0.0			
WS201	26/07/19 09:13:00	1009	0								0.0			
WS201	26/07/19 09:14:00	1009	0								0.0			
WS201	26/07/19 09:15:00			0.6	0.0	19.7	0.0	0	0	75.3				
WS201	26/07/19 09:16:00			0.0	0.0	16.2	0.0	0	0	290.2				
WS201	26/07/19 09:17:00			0.0	0.0	16.2	0.0	0	0	7.7				
WS201	26/07/19 09:18:00			0.0	0.0	16.1	0.0	0	0	313.8				
WS201	26/07/19 09:19:00			0.0	0.0	16.1	0.0	0	0	234.9				
WS201	26/07/19 09:20:00			0.0	0.0	16.1	0.0	0	0	176.2				
WS201	26/07/19 09:21:00												1.07	
WS201	22/08/19 11:25:00	1023	0								0.0			
WS201	22/08/19 11:25:00	1023	0								0.0			
WS201	22/08/19 11:25:00	1023	0								0.0			
WS201	22/08/19 11:25:00	1023	0								0.0			
WS201	22/08/19 11:25:00	1023	0								0.0			
WS201	22/08/19 11:25:00			0.0	0.0	17.5	0.0	0	0	36.4				
WS201	22/08/19 11:25:00			0.0	0.0	17.5	0.0	0	0	19.8				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

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35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS201	22/08/19 11:25:00			0.0	0.0	16.9	0.0	0	0	16.7				
WS201	22/08/19 11:25:00			0.0	0.0	16.9	0.0	0	0	15.7				
WS201	22/08/19 11:25:00			0.0	0.0	16.8	0.0	0	0	16.1				
WS201	22/08/19 11:25:00			0.0	0.0	16.8	0.0	0	0	11.6				
WS201	22/08/19 11:25:00												0.96	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS202	14/06/19 13:40:00												2.63	
WS202	04/07/19 14:20:00	1020	0								0.0	20		
WS202	04/07/19 14:21:00	1020	0								0.0			
WS202	04/07/19 14:22:00	1020	0								0.0			
WS202	04/07/19 14:23:00	1020	0								0.0			
WS202	04/07/19 14:24:00	1020	0								0.0			
WS202	04/07/19 14:25:00	1020	0								0.0			
WS202	04/07/19 14:29:00			2.3	0.0	15.4	0.0	0	0	0.9				
WS202	04/07/19 14:30:00			4.6	0.0	11.5	0.0	0	0	7.5				
WS202	04/07/19 14:31:00			4.5	0.0	11.6	0.0	0	0	7.9				
WS202	04/07/19 14:32:00			4.4	0.0	11.9	0.0	0	0	8.1				
WS202	04/07/19 14:33:00			4.4	0.0	12.1	0.0	0	0	8.2				
WS202	04/07/19 14:34:00			4.4	0.0	12.3	0.0	0	0	8.1				
WS202	04/07/19 14:35:00												2.58	
WS202	10/07/19 08:58:00	1014	0								0.0	13		
WS202	10/07/19 08:59:00	1014	0								0.0			
WS202	10/07/19 09:00:00	1014	0								0.0			
WS202	10/07/19 09:01:00	1014	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS202	10/07/19 09:02:00	1014	0								0.0			
WS202	10/07/19 09:03:00	1014	0								0.0			
WS202	10/07/19 09:04:00			3.8	0.0	16.3	0.0	0	0	7.3				
WS202	10/07/19 09:05:00			4.4	0.0	13.6	0.0	0	0	9.1				
WS202	10/07/19 09:06:00			4.2	0.0	12.5	0.0	0	0	9.5				
WS202	10/07/19 09:07:00			4.1	0.0	12.7	0.0	0	0	9.3				
WS202	10/07/19 09:08:00			3.9	0.0	12.9	0.0	0	0	9.2				
WS202	10/07/19 09:09:00			3.9	0.0	13.0	0.0	0	0	8.9				
WS202	10/07/19 09:11:00												2.64	Groundwater sample taken.
WS202	18/07/19 16:14:00	1004	0								0.0			
WS202	18/07/19 16:15:00	1004	0								0.0			
WS202	18/07/19 16:16:00	1004	0								0.0			
WS202	18/07/19 16:17:00	1004	0								0.0			
WS202	18/07/19 16:18:00	1004	0								0.0			
WS202	18/07/19 16:19:00	1004	0								0.0			
WS202	18/07/19 16:20:00			2.4	0.0	16.7	0.0	0	0	0.0				
WS202	18/07/19 16:21:00			2.5	0.0	15.9	0.0	0	0	0.0				
WS202	18/07/19 16:22:00			2.5	0.0	15.9	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS202	18/07/19 16:23:00			2.4	0.0	16.0	0.0	0	0	0.0				
WS202	18/07/19 16:24:00			2.4	0.0	16.0	0.0	0	0	0.0				
WS202	18/07/19 16:25:00			2.5	0.0	15.9	0.0	0	0	0.0				
WS202	18/07/19 16:26:00												2.67	
WS202	26/07/19 08:45:00	1010	0								0.0			
WS202	26/07/19 08:46:00	1010	0								0.0			
WS202	26/07/19 08:47:00	1010	0								0.0			
WS202	26/07/19 08:48:00	1009	0								0.0			
WS202	26/07/19 08:49:00	1009	0								0.0			
WS202	26/07/19 08:50:00	1009	0								0.0			
WS202	26/07/19 08:51:00			8.2	0.0	11.4	0.0	0	0	45.5				
WS202	26/07/19 08:52:00			4.2	0.0	12.6	0.0	0	0	148.1				
WS202	26/07/19 08:53:00			4.1	0.0	12.7	0.0	0	0	247.9				
WS202	26/07/19 08:54:00			4.1	0.0	12.9	0.0	0	0	140.1				
WS202	26/07/19 08:55:00			4.0	0.0	13.0	0.0	0	0	95.2				
WS202	26/07/19 08:56:00			4.0	0.0	13.0	0.0	0	0	82.2				
WS202	26/07/19 08:57:00												2.66	
WS202	22/08/19 10:12:00	1023	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS202	22/08/19 10:13:00	1023	0								0.0			
WS202	22/08/19 10:14:00	1023	0								0.0			
WS202	22/08/19 10:15:00	1023	0								0.0			
WS202	22/08/19 10:16:00	1023	0								0.0			
WS202	22/08/19 10:18:00			0.7	0.0	19.6	0.0	0	0	227.6				
WS202	22/08/19 10:19:00			0.0	0.0	26.7	0.0	0	0	195.7				
WS202	22/08/19 10:20:00			0.0	0.0	20.7	0.0	0	0	96.5				
WS202	22/08/19 10:21:00			0.0	0.0	20.7	0.0	0	0	89.5				
WS202	22/08/19 10:22:00			0.0	0.0	20.7	0.0	0	0	65.7				
WS202	22/08/19 10:23:00			0.0	0.0	20.7	0.0	0	0	48.3				
WS202	22/08/19 10:25:00												2.64	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS203	18/06/19 14:45:00													Unable to access, car parked over position throughout visit.
WS203	04/07/19 11:24:00	1024	0								0.0	21		
WS203	04/07/19 11:25:00	1024	0								0.0			
WS203	04/07/19 11:26:00	1024	0								0.0			
WS203	04/07/19 11:27:00	1024	0								0.0			
WS203	04/07/19 11:28:00	1024	0								0.0			
WS203	04/07/19 11:29:00	1024	0								0.0			
WS203	04/07/19 11:31:00			0.1	0.0	21.2	0.0	0	0	1.3				
WS203	04/07/19 11:32:00			4.6	0.0	16.0	0.0	0	0	8.2				
WS203	04/07/19 11:33:00			4.6	0.0	15.9	0.0	0	0	8.9				
WS203	04/07/19 11:34:00			4.6	0.0	15.9	0.0	0	0	8.9				
WS203	04/07/19 11:35:00			4.6	0.0	15.9	0.0	0	0	8.8				
WS203	04/07/19 11:36:00			4.6	0.0	15.9	0.0	0	0	8.5				
WS203	04/07/19 11:38:00												2.97	Groundwater sample taken.
WS203	10/07/19 09:32:00	1013	0								0.0	13		
WS203	10/07/19 09:33:00	1014	0								0.0			
WS203	10/07/19 09:34:00	1014	0								0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS203	10/07/19 09:35:00	1013	0								0.0			
WS203	10/07/19 09:36:00	1013	0								0.0			
WS203	10/07/19 09:37:00	1014	0								0.0			
WS203	10/07/19 09:38:00			3.7	0.0	14.7	0.0	0	0	12.6				
WS203	10/07/19 09:39:00			4.3	0.0	13.6	0.0	0	0	14.8				
WS203	10/07/19 09:40:00			4.4	0.0	13.3	0.0	0	0	14.5				
WS203	10/07/19 09:41:00			4.4	0.0	13.2	0.0	0	0	14.1				
WS203	10/07/19 09:42:00			4.5	0.0	13.1	0.0	0	0	13.2				
WS203	10/07/19 09:43:00			4.5	0.0	13.0	0.0	0	0	12.2				
WS203	10/07/19 09:45:00												2.98	
WS203	18/07/19 15:55:00	1004	0								0.0			
WS203	18/07/19 15:56:00	1004	0								0.0			
WS203	18/07/19 15:57:00	1004	0								0.0			
WS203	18/07/19 15:58:00	1004	0								0.0			
WS203	18/07/19 15:59:00	1004	0								0.0			
WS203	18/07/19 16:00:00	1004	0								0.0			
WS203	18/07/19 16:01:00			0.0	0.0	21.3	0.0	0	0	0.0				
WS203	18/07/19 16:02:00			0.0	0.0	21.4	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT **35248**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS203	18/07/19 16:03:00			0.0	0.0	21.4	0.0	0	0	0.0				
WS203	18/07/19 16:04:00			0.0	0.0	21.4	0.0	0	0	0.0				
WS203	18/07/19 16:05:00			0.0	0.0	21.4	0.0	0	0	0.0				
WS203	18/07/19 16:06:00			0.0	0.0	21.4	0.0	0	0	0.0				
WS203	18/07/19 16:07:00												3.02	
WS203	26/07/19 08:30:00	1010	0								0.0			
WS203	26/07/19 08:31:00	1010	0								0.0			
WS203	26/07/19 08:32:00	1010	0								0.0			
WS203	26/07/19 08:33:00	1010	0								0.0			
WS203	26/07/19 08:34:00	1010	0								0.0			
WS203	26/07/19 08:35:00	1010	0								0.0			
WS203	26/07/19 08:36:00			0.1	0.0	21.0	0.0	0	0	19.5				
WS203	26/07/19 08:37:00			8.3	0.0	8.4	0.0	0	0	412.8				
WS203	26/07/19 08:38:00			8.4	0.0	8.2	0.0	0	0	128.2				
WS203	26/07/19 08:39:00			8.4	0.0	8.1	0.0	0	0	86.0				
WS203	26/07/19 08:40:00			8.5	0.0	8.0	0.0	0	0	81.7				
WS203	26/07/19 08:41:00			8.5	0.0	7.9	0.0	0	0	52.9				
WS203	26/07/19 08:42:00												3.00	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: SH READING MASTER LLP

SITE: STATION HILL, READING

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
WS203	22/08/19 09:50:00	1024	0								0.0			
WS203	22/08/19 09:51:00	1024	0								0.0			
WS203	22/08/19 09:52:00	1024	0								0.0			
WS203	22/08/19 09:53:00	1024	0								0.0			
WS203	22/08/19 09:54:00	1024	0								0.0			
WS203	22/08/19 09:56:00			8.9	0.0	10.1	0.0	0	0	260.8				
WS203	22/08/19 09:57:00			9.8	0.0	9.2	0.0	0	0	217.1				
WS203	22/08/19 09:58:00			9.9	0.0	9.1	0.0	0	0	120.7				
WS203	22/08/19 09:59:00			9.9	0.0	8.9	0.0	0	0	79.1				
WS203	22/08/19 10:00:00			10.0	0.0	8.9	0.0	0	0	62.2				
WS203	22/08/19 10:01:00			10.0	0.0	8.8	0.0	0	0	50.0				
WS203	22/08/19 10:02:00												3.01	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Single

CONTRACT	CHECKED
35248	**CT**

APPENDIX B

LABORATORY TESTING

2718

Geotecnical Engineering Limited

Version No.	3
For the attention of David Owen/Andrew Tatnell	Page No. 1 of 50
	Date of Issue 23/07/2019

TEST REPORT

PROJECT/SITE	Station Hill, Reading	Samples received	13/06/2019
GEL REPORT NUMBER	35248	Schedule received	13/06/2019
Your ref/PO:		Testing commenced	14/06/2019
Test report refers to	Combined Schedules	Status	Final

SUMMARY OF RESULTS ATTACHED

TEST METHOD & DESCRIPTION	QUANTITY	ACCREDITED TEST
BS EN ISO 17892-1: 2014:5. Water Content	34	YES
BS1377: Part 2: 1990:4.2-4.4&5.2-5.4, Liquid & Plastic Limits	16	YES
BS1377: Part 2: 1990:4.5-4.6&5.2-5.4, Liquid (Casagrande Method) & Plastic Limits	1	NO
BS1377: Part 2: 1990:3.3, Saturation Moisture Content	16	YES
BS1377: Part 2: 1990:6.5, Linear Shrinkage	4	NO
BS EN ISO 17892-3: 2015:5, Particle Density - Pycnometer	17	YES
BS EN ISO 17892-4: 2016: 5.2, Particle Size Distribution - Wet Sieve	15	YES
BS EN ISO 17892-4: 2016: 5.4, Particle Size Distribution - Pipette	6	YES
ISRM: Suggested Methods: 1974 - 2006: Water Content of Rock (Subcontracted)	18	YES
ISRM: Suggested Methods: 1974 - 2006: Porosity/Density of Rock (Subcontracted)	18	YES
ISRM: Suggested Methods: 2007: Uniaxial Compressive Strength of Rock	2	YES
ISRM: 2007: Point Load Strength Test	115	YES
pH (Subcontracted)	21	YES
Organic Matter Content Subcontracted)	16	YES

Remarks

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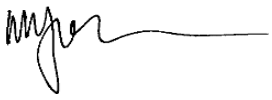
Approved Signatories:

W Jones (Laboratory Manager) E Crimp (Senior Engineer)

J Hanson (Director) N Parry (Director)



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Geotecnical Engineering Limited

Version No.	3
For the attention of David Owen/Andrew Tatnell	Page No. 2 of 50
Date of Issue	23/07/2019

TEST REPORT

PROJECT/SITE	Station Hill, Reading	Samples received	13/06/2019
GEL REPORT NUMBER	35248	Schedule received	13/06/2019
Your ref/PO:		Testing commenced	14/06/2019
Test report refers to	Combined Schedules	Status	Final

SUMMARY OF RESULTS ATTACHED

TEST METHOD & DESCRIPTION	QUANTITY	ACCREDITED TEST
BRE SD1 Suite (Subcontracted)	13	YES/NO

Remarks

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Approved Signatories:

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LIQUID AND PLASTIC LIMITS

BS.1377 : PART 2 : 1990 : 4 and 5

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole /trial pit no.	sample no./type	sample depth (m)	specimen depth (m)	natural water content (%)	specimen preparation and test method	fraction >0.425 mm (%)	liquid limit (%)	plastic limit (%)	plasticity index (%)	description and remarks
BH201	3B	1.10	1.10	16.5	BXE	58	31	20	11	Brown clayey very sandy GRAVEL
BH201	7L	2.00	2.70	7	BXE	46	30	16	14	Yellowish brown slightly gravelly sandy CLAY
BH201	8D	3.00	3.00	15.6	E					Yellowish brown slightly gravelly slightly sandy CLAY
BH201	16D	9.50	9.50	18.5	E					Off white slightly sandy gravelly SILT (chalk)
BH201	17C	9.50	9.85	21.7	BYE	64	30	23	7	Off white sandy very silty GRAVEL (chalk)
BH201	24C	19.00	19.15	21.8	BYE	8	28	21	7	Off white slightly gravelly slightly sandy SILT (chalk)
BH201	32C	31.00	31.90	19.4	E					Off white slightly sandy slightly gravelly SILT (chalk)
BH202D	2B	1.50	1.50	0.8	E					Brown slightly sandy very gravelly COBBLES
BH202D	12D	8.50	8.50	29.9	E					Off white slightly sandy slightly gravelly SILT (chalk)
BH202D	15C	13.50	14.00	38.2	BXE	35	29	22	7	Off white slightly sandy slightly gravelly SILT (chalk)
BH202D	26Cs	28.70	28.70	19.6	E					White CHALK
BH202D	27C	30.00	31.45	23.7	BZE	52	32	23	9	Off white slightly sandy gravelly SILT (chalk)
BH202D	32C	37.50	37.75	22.4	BXE	3	31	22	9	Off white slightly gravelly slightly sandy SILT (chalk)
BH203	6L	3.00	3.50	35.3	BXE	19	63	29	34	Brownish grey slightly gravelly slightly sandy silty CLAY
BH203	7D	4.00	4.00	25	E					Yellowish brown clayey sandy GRAVEL
BH203	9D	5.00	5.00	11.3	E					Yellowish brown slightly sandy slightly gravelly silty CLAY
BH203	12L	6.00	6.55	25.1	BXE	18	37	16	21	Greyish brown slightly sandy slightly gravelly silty CLAY
BH203	15D	9.00	9.00	27.2	E					Off white slightly sandy gravelly SILT (chalk)
BH203	16L	9.00	9.80	26.5	BYE	25	32	24	8	Off white and yellow slightly sandy slightly gravelly SILT (chalk)

general remarks

natural water content determined in accordance with BS EN ISO 17892 - 1 : 2014 (unless specified)

NP denotes non plastic

# denotes sample tested is smaller than that which is recommended in accordance with BS1377 or BS EN ISO 17892

specimen preparation		test method	CONTRACT	CHECKED
A - as received	D - oven dried (60oC)	X - cone penetrometer (test 4.3)		
B - washed on 0.425mm sieve	E - oven dried (105oC)	Y - cone penetrometer (test 4.4)	**35248**	**TB**
C - air dried	F - not known	Z - casagrande apparatus (test 4.5)		

Geotechnical Engineering Limited

LIQUID AND PLASTIC LIMITS

BS.1377 : PART 2 : 1990 : 4 and 5

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole /trial pit no.	sample no./type	sample depth (m)	specimen depth (m)	natural water content (%)	specimen preparation and test method	fraction >0.425 mm (%)	liquid limit (%)	plastic limit (%)	plasticity index (%)	description and remarks
BH204	7L	5.50	6.70	31.8	BXE	18	33	26	7	Off white slightly sandy slightly gravelly SILT (chalk)
BH204	20C	25.50	26.10	25.5	E					Off white slightly sandy gravelly SILT (chalk)
BH204	25C	33.00	33.25	24.4	E					Off white slightly sandy gravelly SILT (chalk)
BH205C	8L	1.20	1.20	21.1	E					Brown very clayey very gravelly SAND
BH205C	9D	2.00	2.00	33.6	BYE	54	43	28	15	Brown mottled orange slightly sandy gravelly clayey SILT
BH205C	12L	3.00	3.15	15.3	BYE	58	34	22	12	Brown slightly sandy gravelly silty CLAY
BH205C	22L	8.00	8.60	23.2	BYE	59	30	23	7	Off white slightly sandy gravelly SILT (chalk)
BH205C	27D	11.00	11.00	26.8	E					Off white slightly sandy slightly gravelly SILT (chalk)
BH205C	33D	15.50	15.50	25.9	E					Off white slightly sandy slightly gravelly SILT (chalk)
BH205C	39D	20.00	20.00	28.2	E					Off white slightly sandy slightly gravelly SILT (chalk)
BH205C	47D	26.00	26.00	22.6	E					Off white mottled brown slightly sandy slightly gravelly SILT (chalk)
BH205C	52D	32.00	32.00	29.3	E					Off white slightly sandy slightly gravelly SILT (chalk)
WS202	8D	3.00	3.00	29.5	BXE	6	50	21	29	Brown mottled grey slightly gravelly slightly sandy CLAY
WS202	13L	5.00	5.00	10.8	BXE	51	23	14	9	Yellowish brown slightly sandy gravelly CLAY
WS203	8D	3.00	3.00	21.1	BXE	21	32	16	16	Yellowish brown slightly gravelly slightly sandy CLAY

general remarks

natural water content determined in accordance with BS EN ISO 17892 - 1 : 2014 (unless specified)

NP denotes non plastic

# denotes sample tested is smaller than that which is recommended in accordance with BS1377 or BS EN ISO 17892

specimen preparation		test method	CONTRACT	CHECKED
A - as received	D - oven dried (60oC)	X - cone penetrometer (test 4.3)		
B - washed on 0.425mm sieve	E - oven dried (105oC)	Y - cone penetrometer (test 4.4)	**35248**	**TB**
C - air dried	F - not known	Z - casagrande apparatus (test 4.5)		

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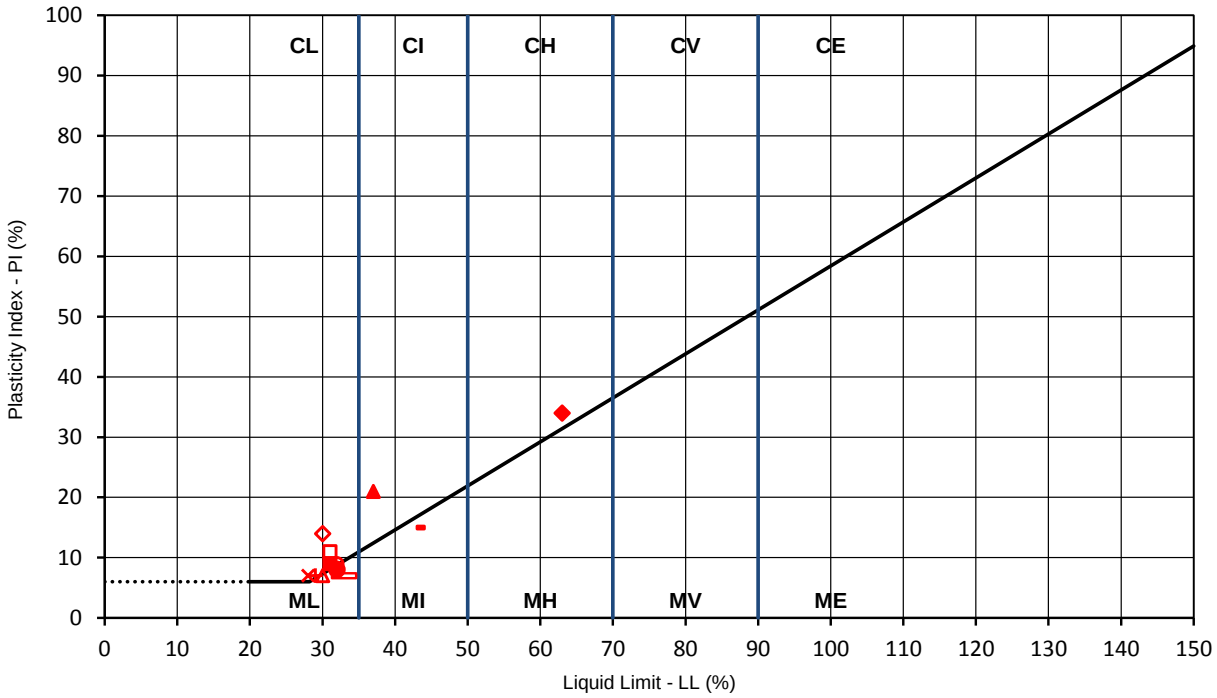
ATTERBERG LINE PLOT

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING



	BH/TP No.	depth (m)	LL	PL	PI	remarks
□	BH201	1.10	31	20	11	
◇	BH201	2.70	30	16	14	
△	BH201	9.85	30	23	7	
×	BH201	19.15	28	21	7	
+	BH202D	14.00	29	22	7	
○	BH202D	31.45	32	23	9	
■	BH202D	37.75	31	22	9	
◆	BH203	3.50	63	29	34	
▲	BH203	6.55	37	16	21	
●	BH203	9.80	32	24	8	
▭	BH204	6.70	33	26	7	
▪	BH205C	2.00	43	28	15	

CONTRACT	CHECKED
35248	**TB**

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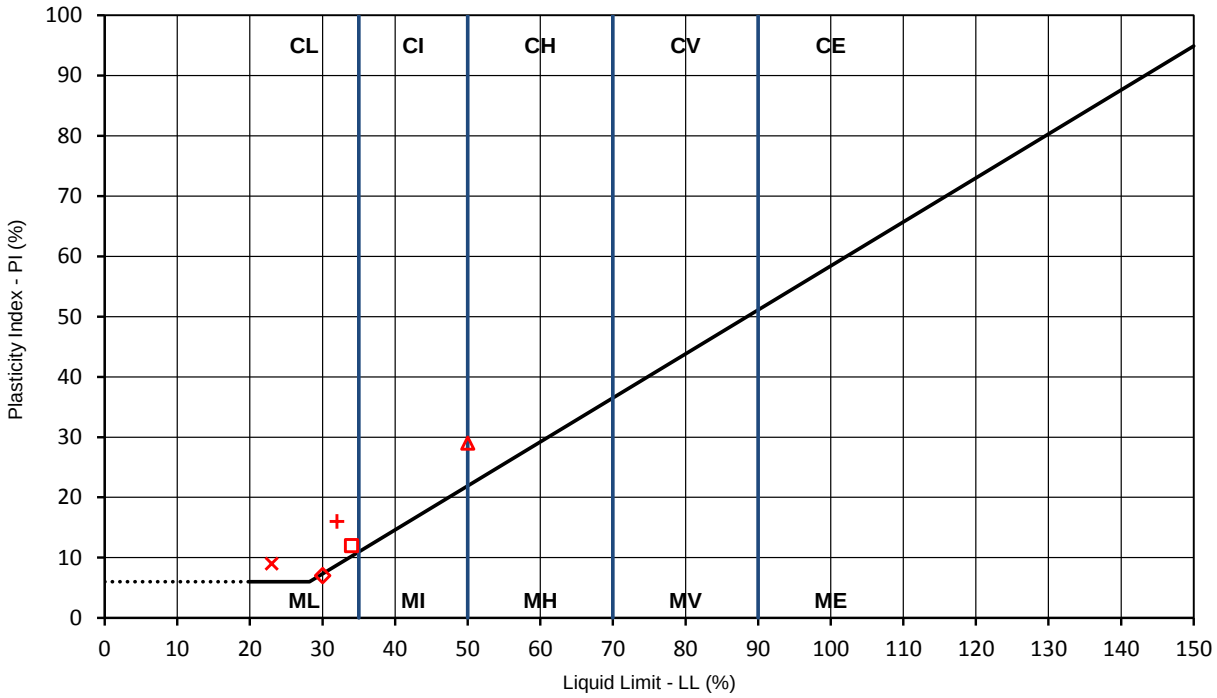
ATTERBERG LINE PLOT

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING



	BH/TP No.	depth (m)	LL	PL	PI	remarks
□	BH205C	3.15	34	22	12	
◇	BH205C	8.60	30	23	7	
△	WS202	3.00	50	21	29	
×	WS202	5.00	23	14	9	
+	WS203	3.00	32	16	16	

CONTRACT	CHECKED
35248	**TB**

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SATURATION MOISTURE CONTENT OF CHALK

BS.1377 : PART 2 : 1990 : 3.3

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole /trial pit no.	sample		specimen depth (m)	natural moisture content (%)	bulk density (Mg/m3)	dry density (Mg/m3)	saturation moisture content (%)	porosity (%)	description and remarks
	no./type	depth (m)							
BH201	23C	17.50	18.25	23.60	2.00	1.62	25	40	White CHALK
BH201	31C	29.50	30.90	18.60	2.00	1.69	22	37	White CHALK
BH201	32C	31.00	31.46	21.00	1.97	1.63	24	40	White CHALK
BH202D	15C	13.50	14.50	24.40	2.01	1.62	25	40	White CHALK #
BH202D	19C	19.50	20.52	27.20	1.98	1.56	27	42	White CHALK
BH202D	27C	30.00	30.10	22.00	2.00	1.64	24	39	White CHALK
BH202D	31C	36.00	36.90	25.90	2.01	1.59	26	41	White CHALK
BH202D	32C	37.50	37.80	24.20	2.02	1.63	24	40	White CHALK
BH203	16L	9.00	9.60	26.90	1.99	1.57	27	42	White CHALK #
BH203	16L	9.00	9.60	24.40	2.02	1.62	25	40	White CHALK #
BH203	20C	12.00	12.80	26.40	2.00	1.58	26	41	White CHALK #
BH203	29C	25.50	26.90	24.70	2.01	1.61	25	40	White CHALK
BH205C	28C	11.00	12.40	0.70	1.53	1.52	29	44	White CHALK #
BH205C	36C	17.00	17.70	27.10	1.98	1.56	27	42	White CHALK
BH205C	53C	32.00	32.60	23.90	1.99	1.61	25	40	White CHALK
BH205C	54C	33.50	33.94	24.60	1.96	1.57	26	42	White CHALK

general remarks

natural moisture content determined in accordance with BS1377 : Part 2 : 1990 : 3.2 (unless specified)

# denotes sample tested is smaller than that which is recommended in accordance with BS1377

test method

immersion in water (test 3.3)

CONTRACT	CHECKED
35248	**TB**

Geotechnical Engineering Limited

LINEAR SHRINKAGE

BS.1377 : PART 2 : 1990 : 6.5

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole /trial pit no.	sample no./type	sample depth (m)	specimen depth (m)	specimen preparation	fraction > 0.425 mm (%)	linear shrinkage (%)	description and remarks
BH201	17C	9.50	9.85	BD	64	3	Off white sandy very silty GRAVEL (chalk)
BH201	24C	19.00	19.15	BD	8	5	Off white slightly gravelly slightly sandy SILT (chalk)
BH203	16L	9.00	9.80	BD	25	3	Off white and yellow slightly sandy gravelly SILT (chalk)
BH205C	22L	8.00	8.60	BD	59	2	Off white slightly sandy gravelly SILT (chalk)

general remarks

specimen preparation

A - as received
B - washed on 0.425mm seive
C - air dried
D - oven dried (50o)
E - unknown

CONTRACT	CHECKED
35248	**TB**

Geotechnical Engineering Limited

PARTICLE DENSITY - PYCNOMETER METHOD

BS EN ISO 17892 - 3 : 2015 : 5

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole /trial pit no.	sample no./type	sample depth (m)	specimen depth (m)	test method	mean particle density Mg/m3	description and remarks
BH201	7L	2.00	2.70	SP	2.66	Yellowish brown slightly gravelly sandy CLAY
BH201	11L	4.00	4.50	SP	2.64	Light brown slightly clayey sandy GRAVEL
BH201	16D	9.50	9.50	SP	2.70	Off white sandy very silty GRAVEL (chalk)
BH201	22C	16.00	16.00	SP	2.69	Off white slightly sandy slightly gravelly SILT (chalk)
BH201	31C	29.50	31.90	SP	2.70	Off white slightly sandy slight gravelly SILT (chalk)
BH202D	10L	5.50	5.90	SP	2.75	Yellowish brown slightly clayey gravelly SAND
BH202D	15C	13.50	14.00	SP	2.70	Off white slightly sandy slightly gravelly SILT (chalk)
BH202D	19C	19.50	19.75	SP	2.70	Off white slightly sandy slightly gravelly SILT (chalk)
BH202D	27C	30.00	31.45	SP	2.66	Off white slightly sandy gravelly SILT (chalk)
BH202D	32C	37.50	37.75	SP	2.69	Off white slightly gravelly slightly sandy SILT (chalk)
BH203	4L	2.00	2.25	SP	2.63	Brown slightly sandy CLAY
BH203	12L	6.00	6.55	SP	2.66	Greyish brown slightly sandy slightly gravelly CLAY
BH204	11C	10.50	11.20	SP	2.70	Off white slightly sandy gravelly SILT (chalk)
BH205C	8L	1.20	1.20	SP	2.60	Brown slightly sandy slightly gravelly CLAY
BH205C	10L	2.00	2.50	SP	2.60	Brown slightly sandy gravelly CLAY
BH205C	27D	11.00	11.00	SP	2.71	Off white slightly sandy slightly gravelly SILT (chalk)
BH205C	53C	32.00	32.57	SP	2.67	Off white slightly sandy slightly gravelly SILT (chalk)

general remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN ISO 17892

test method
SP - small pycnometer ~ 50ml (test 5.1)
LP - large pycnometer ~ 100ml (test 5.1)

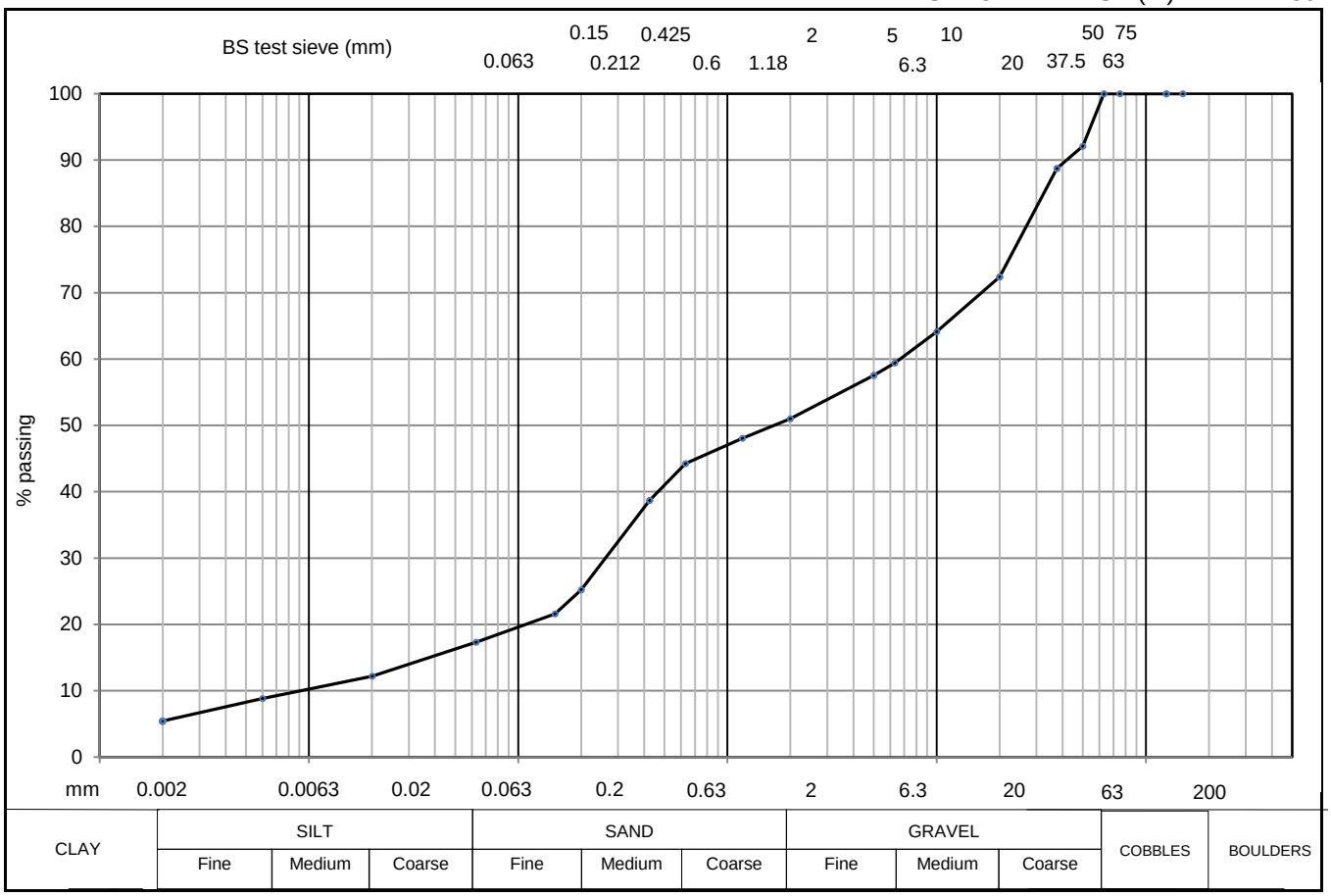
CONTRACT	CHECKED
35248	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	BH201
SITE	STATION HILL, READING	SAMPLE No./TYPE	3B
		SAMPLE DEPTH (m)	1.10
DESCRIPTION	Brown clayey very sandy GRAVEL	SPECIMEN TOP (m)	1.10
		SPECIMEN BASE (m)	1.30



soil type	% fraction
CLAY	5
SILT	12
SILT & CLAY	17
SAND	34
GRAVEL	49
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	
63	100
50	92
37.5	89
20	72
10	64
6.3	59

BS test sieve (mm)	% passing
5	58
2	51
1.18	48
0.63	44
0.425	39
0.2	25
0.15	22
0.063	17

BS test sieve (µm)	% finer
20	12
6	9
2	5

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

CONTRACT	CHECKED
35248	**TB**

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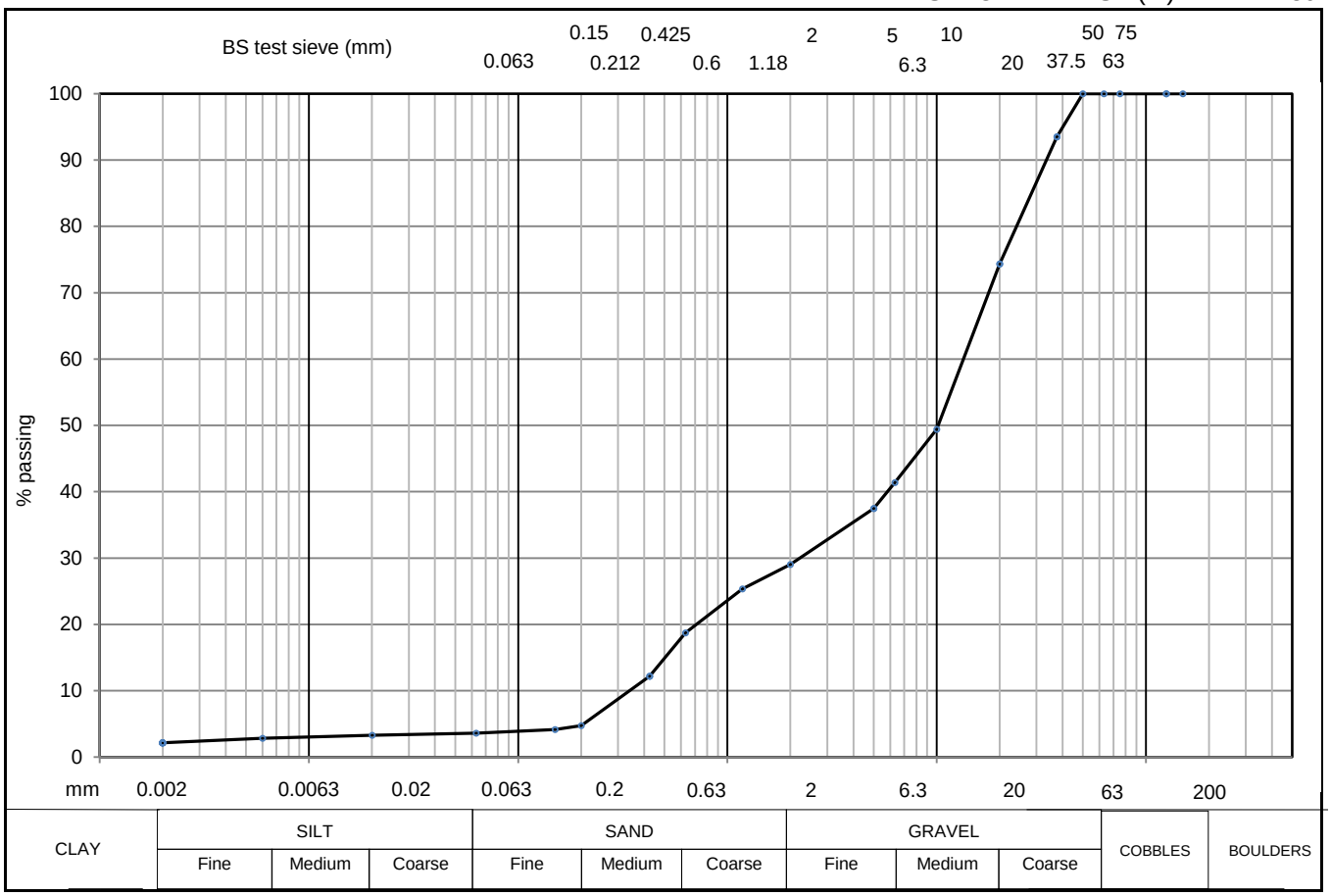
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	BH201
SITE	STATION HILL, READING	SAMPLE No./TYPE	11L
		SAMPLE DEPTH (m)	4.00
DESCRIPTION	Light brown slightly clayey sandy GRAVEL	SPECIMEN TOP (m)	4.50
		SPECIMEN BASE (m)	4.80



soil type	% fraction
CLAY	2
SILT	1
SILT & CLAY	4
SAND	25
GRAVEL	71
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	
63	
50	100
37.5	93
20	74
10	49
6.3	41

BS test sieve (mm)	% passing
5	37
2	29
1.18	25
0.63	19
0.425	12
0.2	5
0.15	4
0.063	4

BS test sieve (µm)	% finer
20	3
6	3
2	2

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

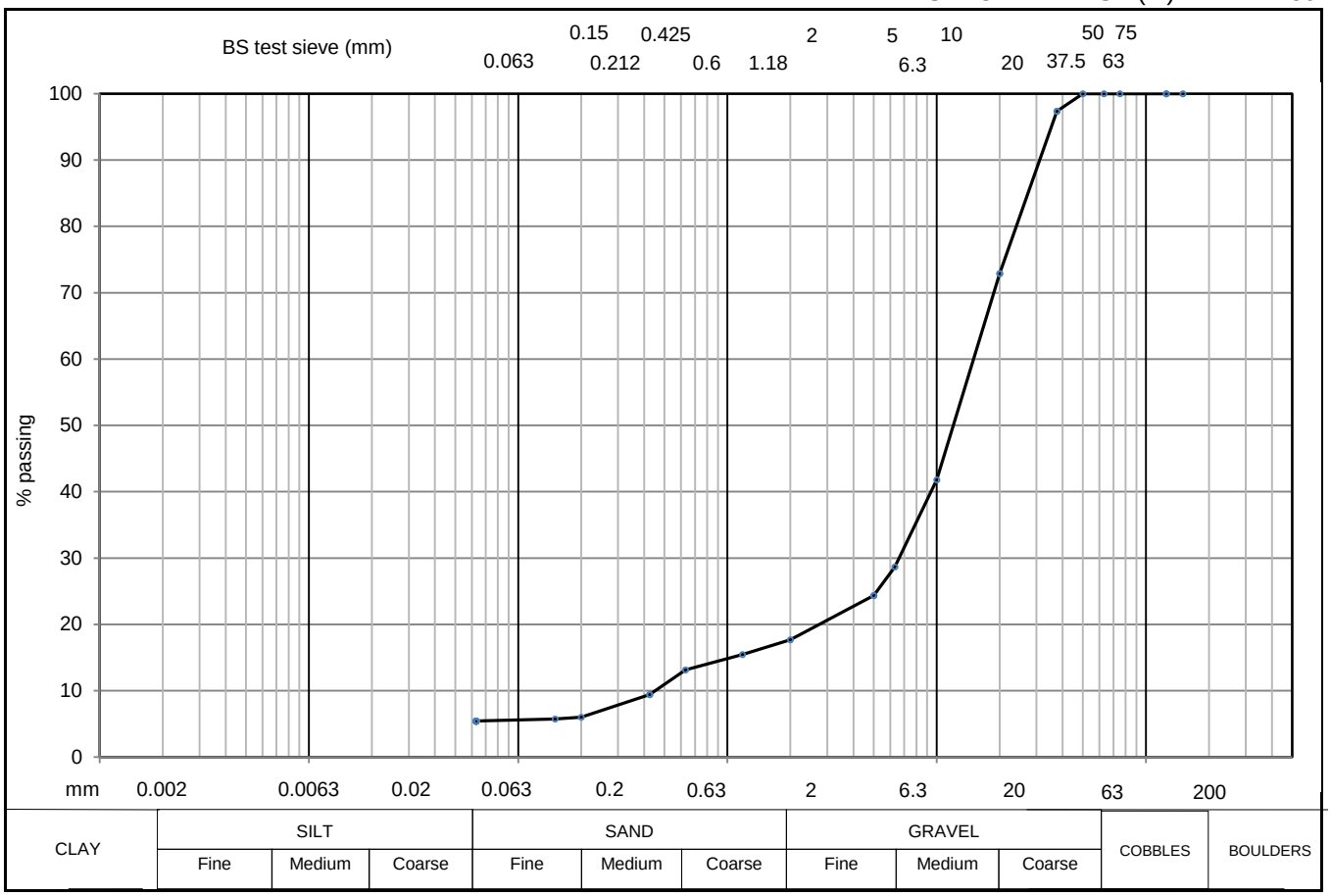
CONTRACT	CHECKED
35248	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	BH201
SITE	STATION HILL, READING	SAMPLE No./TYPE	14L
		SAMPLE DEPTH (m)	6.50
DESCRIPTION	Off white and brown silty sandy GRAVEL (chalk)	SPECIMEN TOP (m)	6.50
		SPECIMEN BASE (m)	7.50



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	5
SAND	12
GRAVEL	82
COBBLE & BOULDER	0
test method(s)	5.2
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	BS test sieve (µm)	% finer
150		5	24	20	
75		2	18	6	
63		1.18	15	2	
50	100	0.63	13		
37.5	97	0.425	9		
20	73	0.2	6		
10	42	0.15	6		
6.3	29	0.063	5		

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

CONTRACT	CHECKED
35248	**TB**

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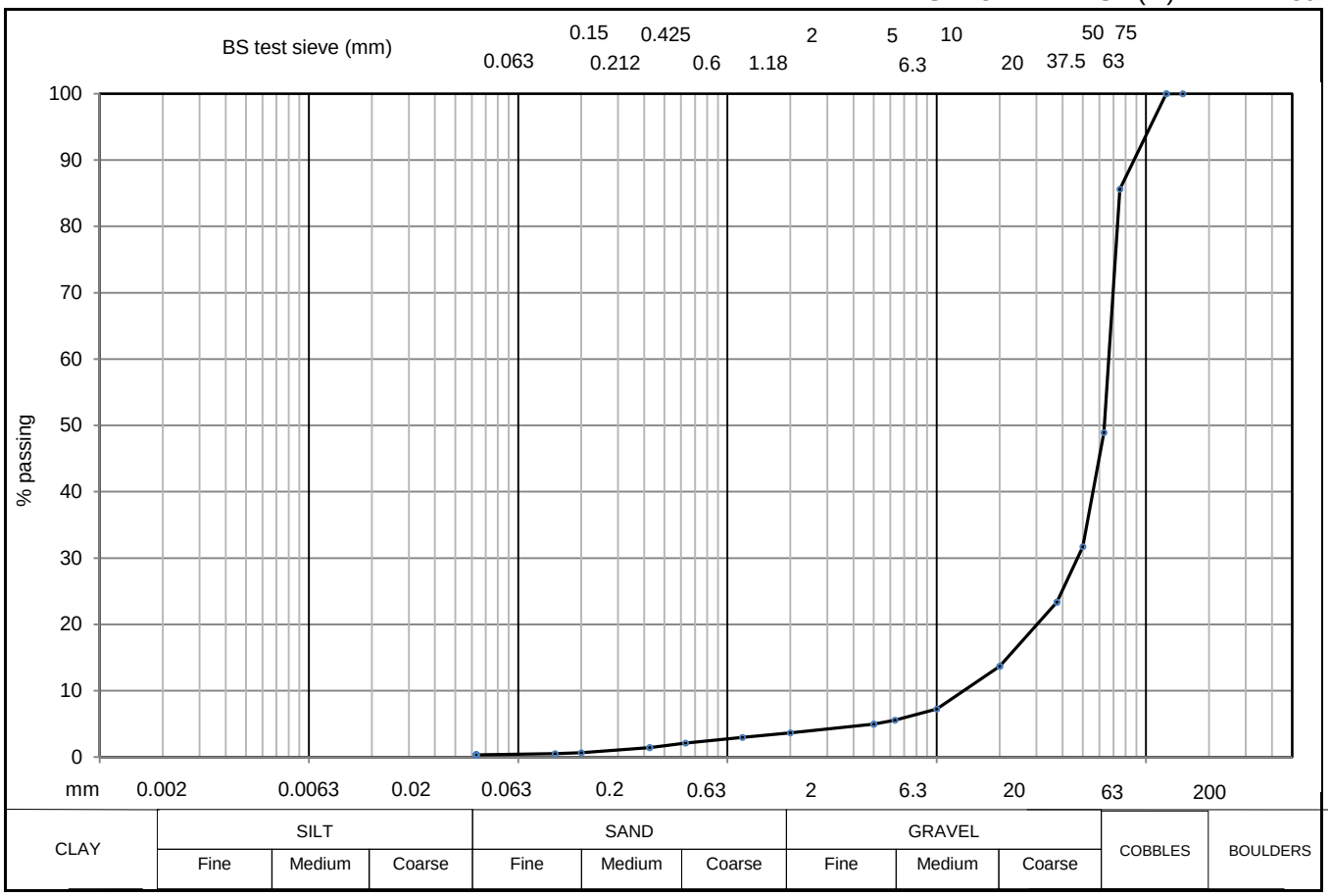
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	BH202D
SITE	STATION HILL, READING	SAMPLE No./TYPE	2B
		SAMPLE DEPTH (m)	1.50
DESCRIPTION	Brown slightly sandy very gravelly COBBLES	SPECIMEN TOP (m)	1.50
		SPECIMEN BASE (m)	1.80



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	0
SAND	3
GRAVEL	45
COBBLE & BOULDER	51
test method(s)	5.2#

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	BS test sieve (µm)	% finer
150	100	5	5	20	
75	86	2	4	6	
63	49	1.18	3	2	
50	32	0.63	2		
37.5	23	0.425	1		
20	14	0.2	1		
10	7	0.15	1		
6.3	6	0.063	0		

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

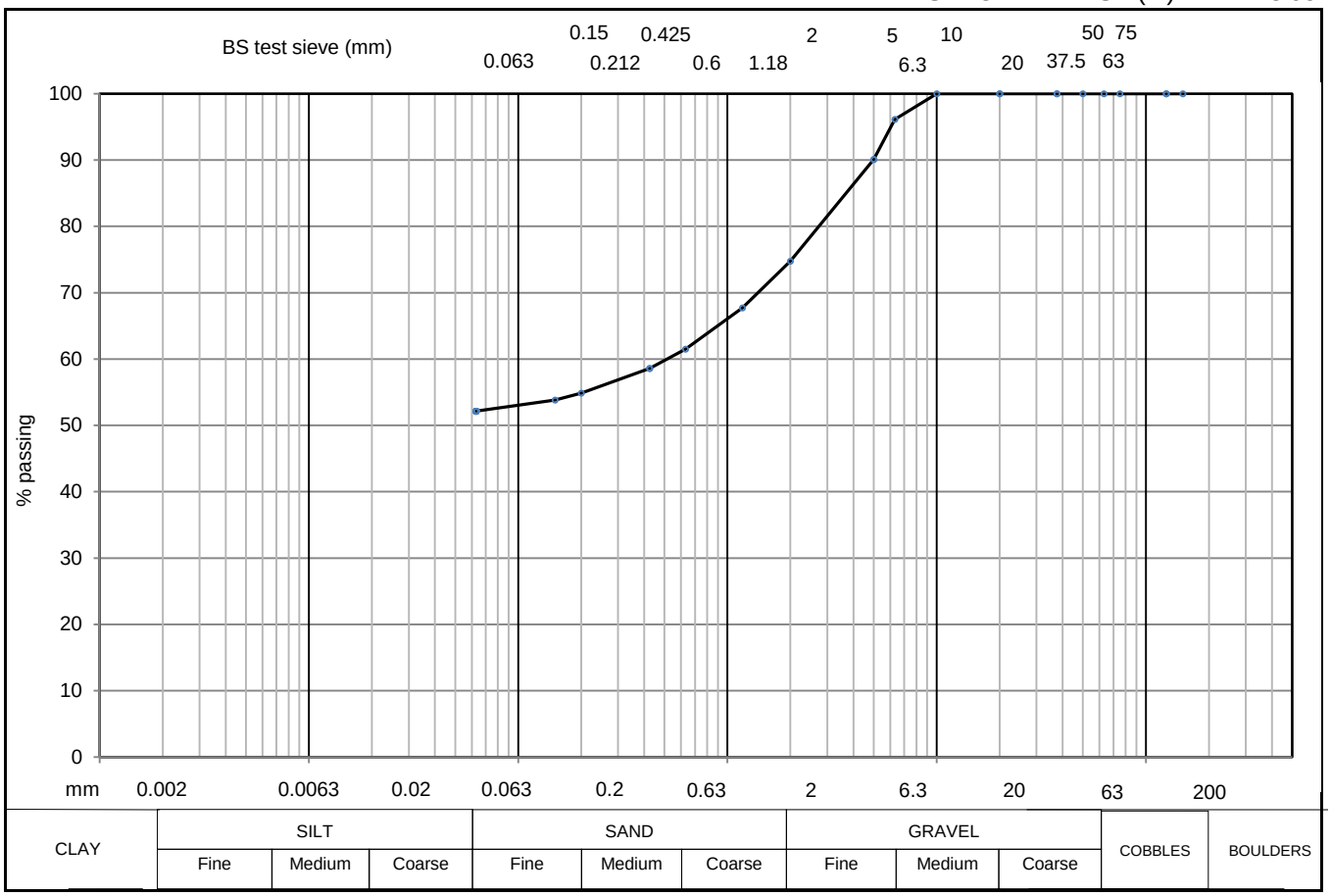
CONTRACT	CHECKED
35248	**TB**

Geotechnical Engineering Limited

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	BH202D
SITE	STATION HILL, READING	SAMPLE No./TYPE	12D
		SAMPLE DEPTH (m)	8.50
DESCRIPTION	Off white slightly sandy slightly gravelly SILT (chalk)	SPECIMEN TOP (m)	8.50
		SPECIMEN BASE (m)	8.95



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	52
SAND	23
GRAVEL	25
COBBLE & BOULDER	0
test method(s)	5.2
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	
63	
50	
37.5	
20	
10	100
6.3	96

BS test sieve (mm)	% passing
5	90
2	75
1.18	68
0.63	61
0.425	59
0.2	55
0.15	54
0.063	52

BS test sieve (µm)	% finer
20	
6	
2	

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

CONTRACT	CHECKED
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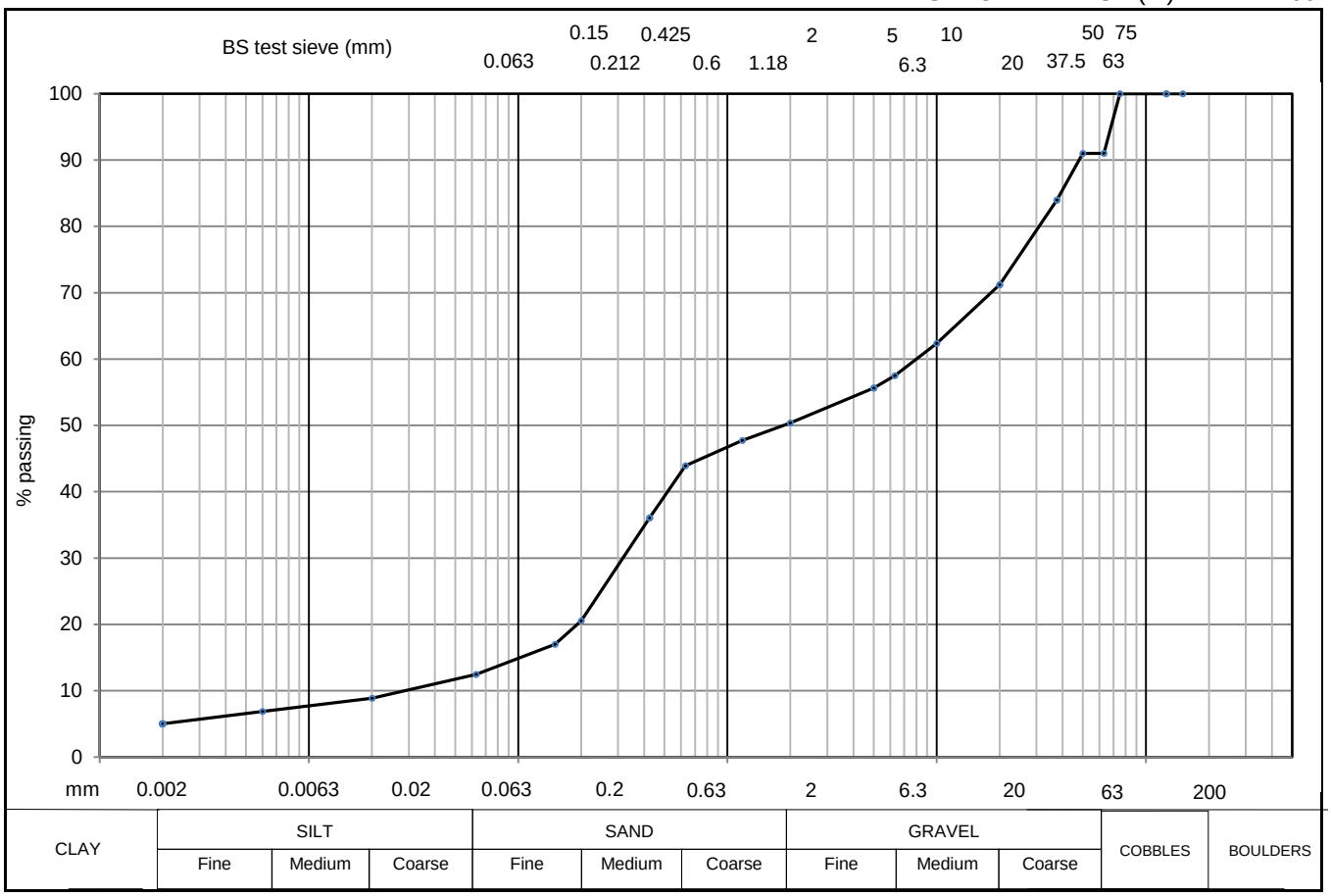
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	BH203
SITE	STATION HILL, READING	SAMPLE No./TYPE	2L
		SAMPLE DEPTH (m)	1.20
DESCRIPTION	Brown clayey very sandy GRAVEL with medium cobble content	SPECIMEN TOP (m)	1.20
		SPECIMEN BASE (m)	2.00



soil type	% fraction
CLAY	5
SILT	7
SILT & CLAY	12
SAND	38
GRAVEL	41
COBBLE & BOULDER	9
test method(s)	5.2 & 5.4
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	100
63	91
50	91
37.5	84
20	71
10	62
6.3	58

BS test sieve (mm)	% passing
5	56
2	50
1.18	48
0.63	44
0.425	36
0.2	21
0.15	17
0.063	12

BS test sieve (µm)	% finer
20	9
6	7
2	5

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

CONTRACT	CHECKED
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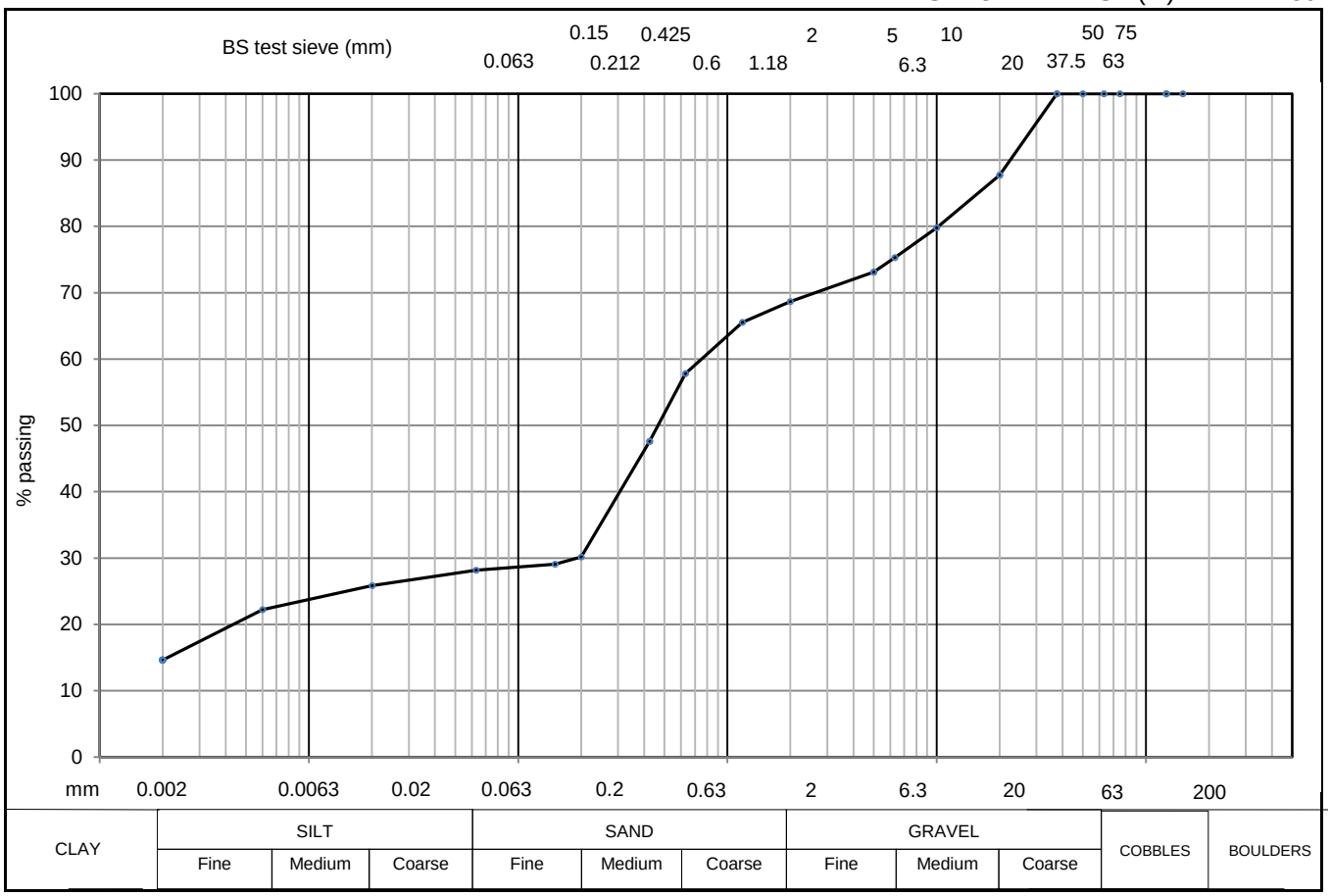
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	BH203
SITE	STATION HILL, READING	SAMPLE No./TYPE	12L
		SAMPLE DEPTH (m)	6.00
DESCRIPTION	Orangish brown very clayey very gravelly SAND	SPECIMEN TOP (m)	6.83
		SPECIMEN BASE (m)	7.36



soil type	% fraction
CLAY	15
SILT	14
SILT & CLAY	28
SAND	41
GRAVEL	31
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	
63	
50	
37.5	100
20	88
10	80
6.3	75

BS test sieve (mm)	% passing
5	73
2	69
1.18	66
0.63	58
0.425	48
0.2	30
0.15	29
0.063	28

BS test sieve (µm)	% finer
20	26
6	22
2	15

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

CONTRACT	CHECKED
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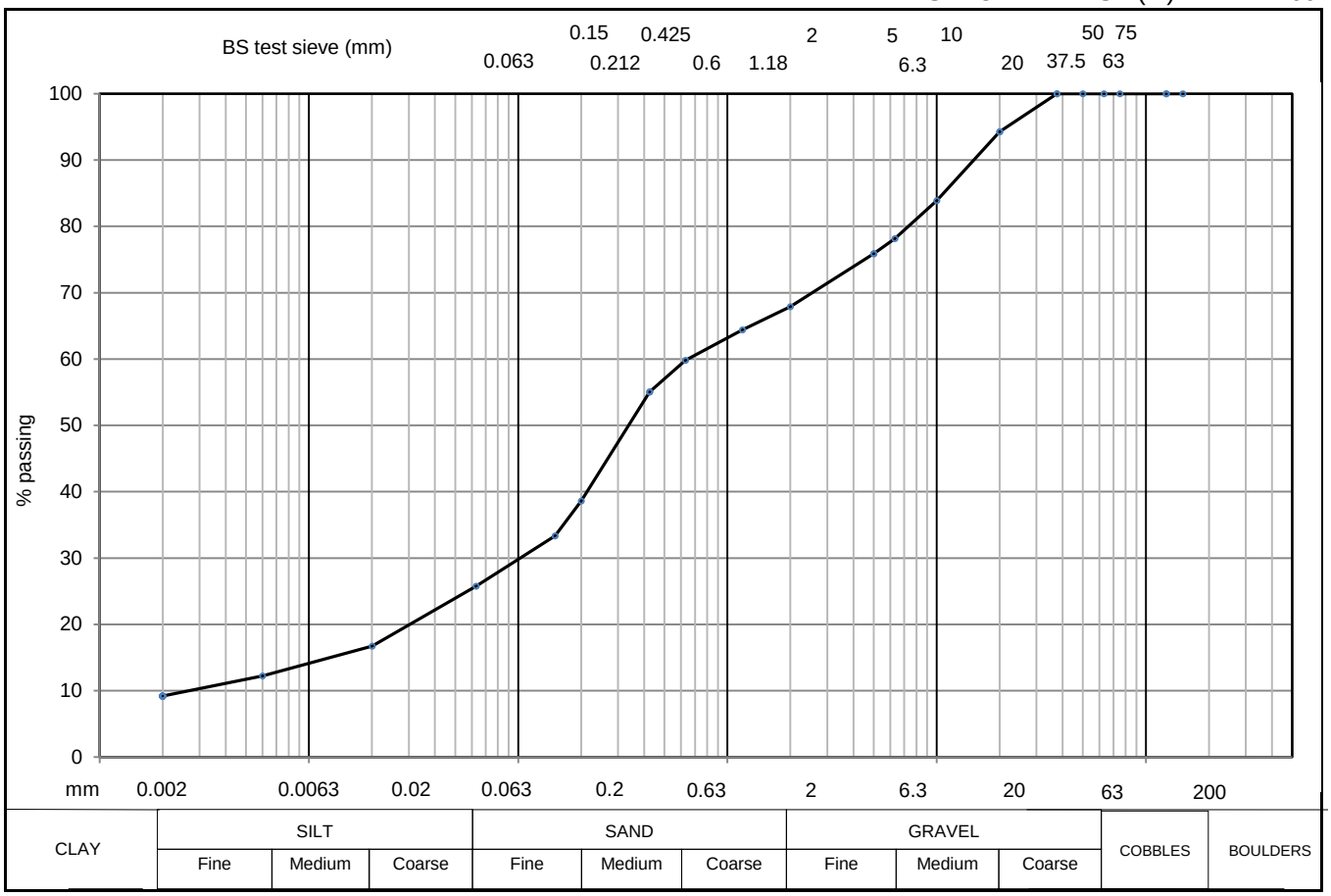
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	BH205C
SITE	STATION HILL, READING	SAMPLE No./TYPE	8L
		SAMPLE DEPTH (m)	1.20
DESCRIPTION	Brown slightly gravelly sandy CLAY	SPECIMEN TOP (m)	1.20
		SPECIMEN BASE (m)	2.00



soil type	% fraction
CLAY	9
SILT	17
SILT & CLAY	26
SAND	42
GRAVEL	32
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	
63	
50	
37.5	100
20	94
10	84
6.3	78

BS test sieve (mm)	% passing
5	76
2	68
1.18	64
0.63	60
0.425	55
0.2	39
0.15	33
0.063	26

BS test sieve (µm)	% finer
20	17
6	12
2	9

remarks

# denotes sample tested is smaller than that which is recommended in accordance with BS EN 17892

Particle density assigned an assumed value of 2.70 Mg/m3

CONTRACT	CHECKED
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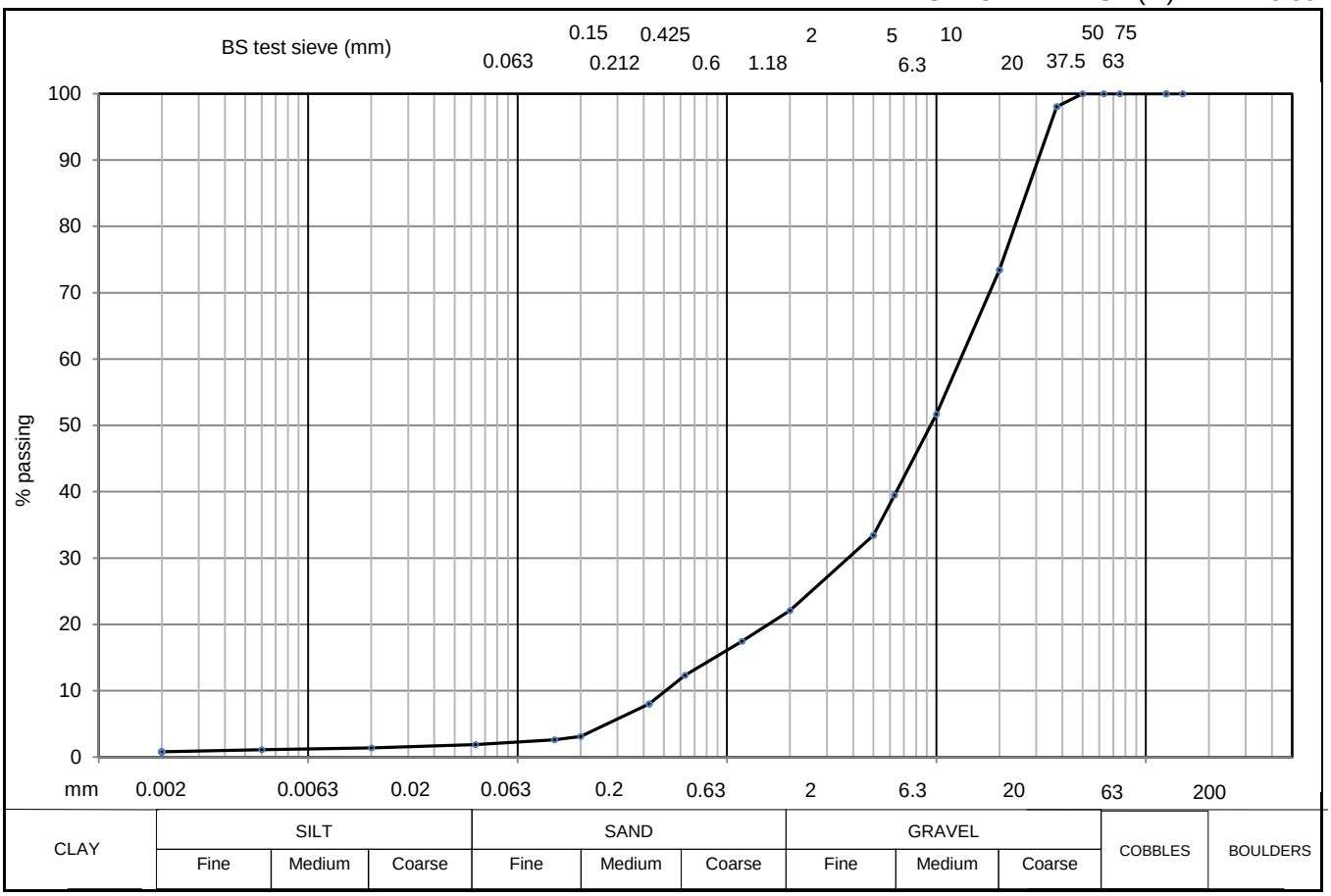
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	BH205C
SITE	STATION HILL, READING	SAMPLE No./TYPE	16L
		SAMPLE DEPTH (m)	5.00
DESCRIPTION	Brown slightly clayey very sandy GRAVEL	SPECIMEN TOP (m)	5.00
		SPECIMEN BASE (m)	5.50



soil type	% fraction
CLAY	1
SILT	1
SILT & CLAY	2
SAND	20
GRAVEL	78
COBBLE & BOULDER	0
test method(s)	5.2 & 5.4
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	
63	
50	100
37.5	98
20	73
10	52
6.3	39

BS test sieve (mm)	% passing
5	33
2	22
1.18	17
0.63	12
0.425	8
0.2	3
0.15	3
0.063	2

BS test sieve (µm)	% finer
20	1
6	1
2	1

remarks

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Particle density assigned an assumed value of 2.70 Mg/m3

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PARTICLE SIZE DISTRIBUTION

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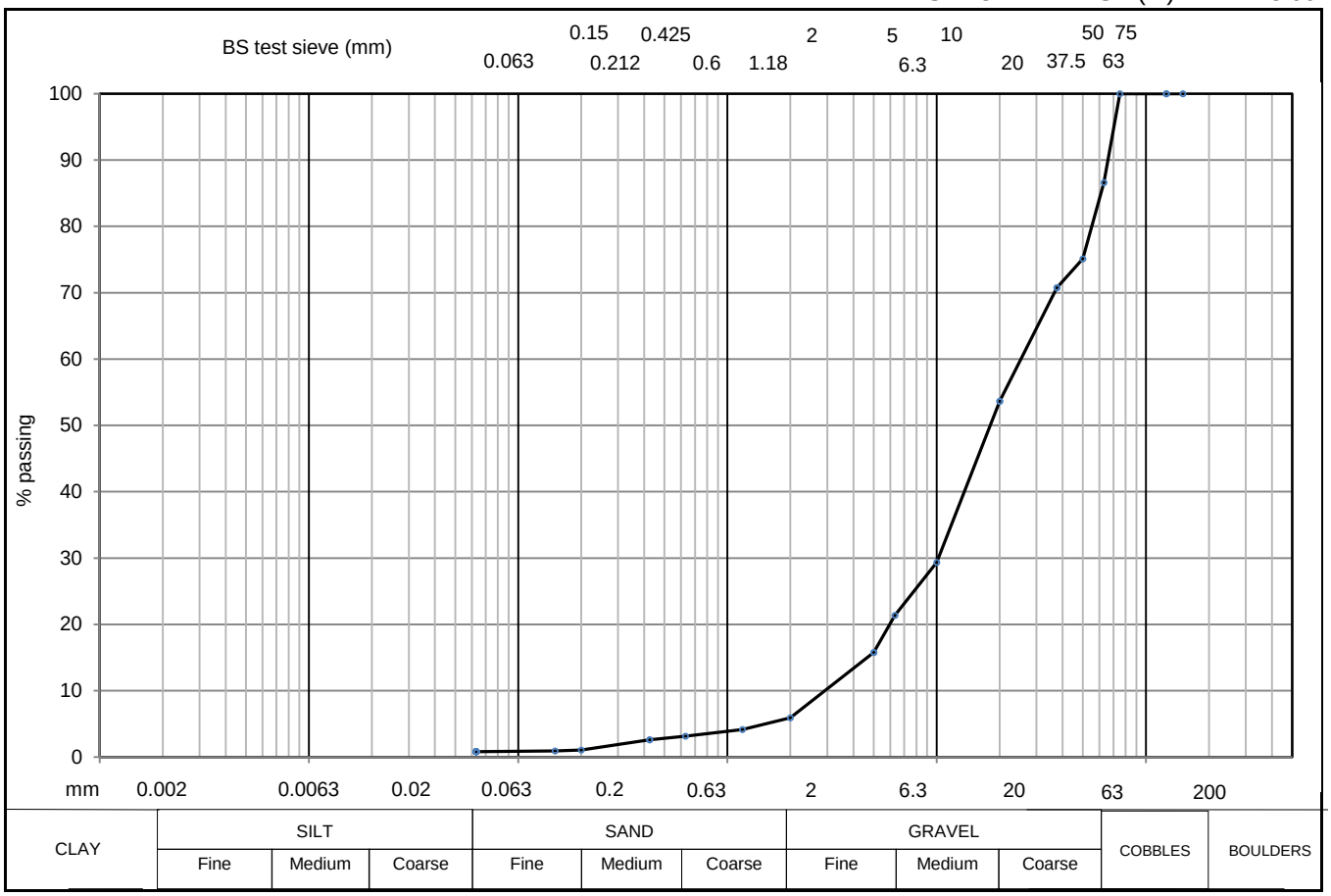
CLIENT	SH READING MASTER LLP	BH/TP No.	BH205C
SITE	STATION HILL, READING	SAMPLE No./TYPE	20L
		SAMPLE DEPTH (m)	7.50
DESCRIPTION	Light brown slightly silty sandy GRAVEL with medium cobble content	SPECIMEN TOP (m)	7.50
		SPECIMEN BASE (m)	8.00



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	1
SAND	5
GRAVEL	81
COBBLE & BOULDER	13
test method(s)	5.2
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	100
63	87
50	75
37.5	71
20	54
10	29
6.3	21

BS test sieve (mm)	% passing
5	16
2	6
1.18	4
0.63	3
0.425	3
0.2	1
0.15	1
0.063	1

BS test sieve (µm)	% finer
20	
6	
2	

remarks

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Particle density assigned an assumed value of 2.70 Mg/m3

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PARTICLE SIZE DISTRIBUTION

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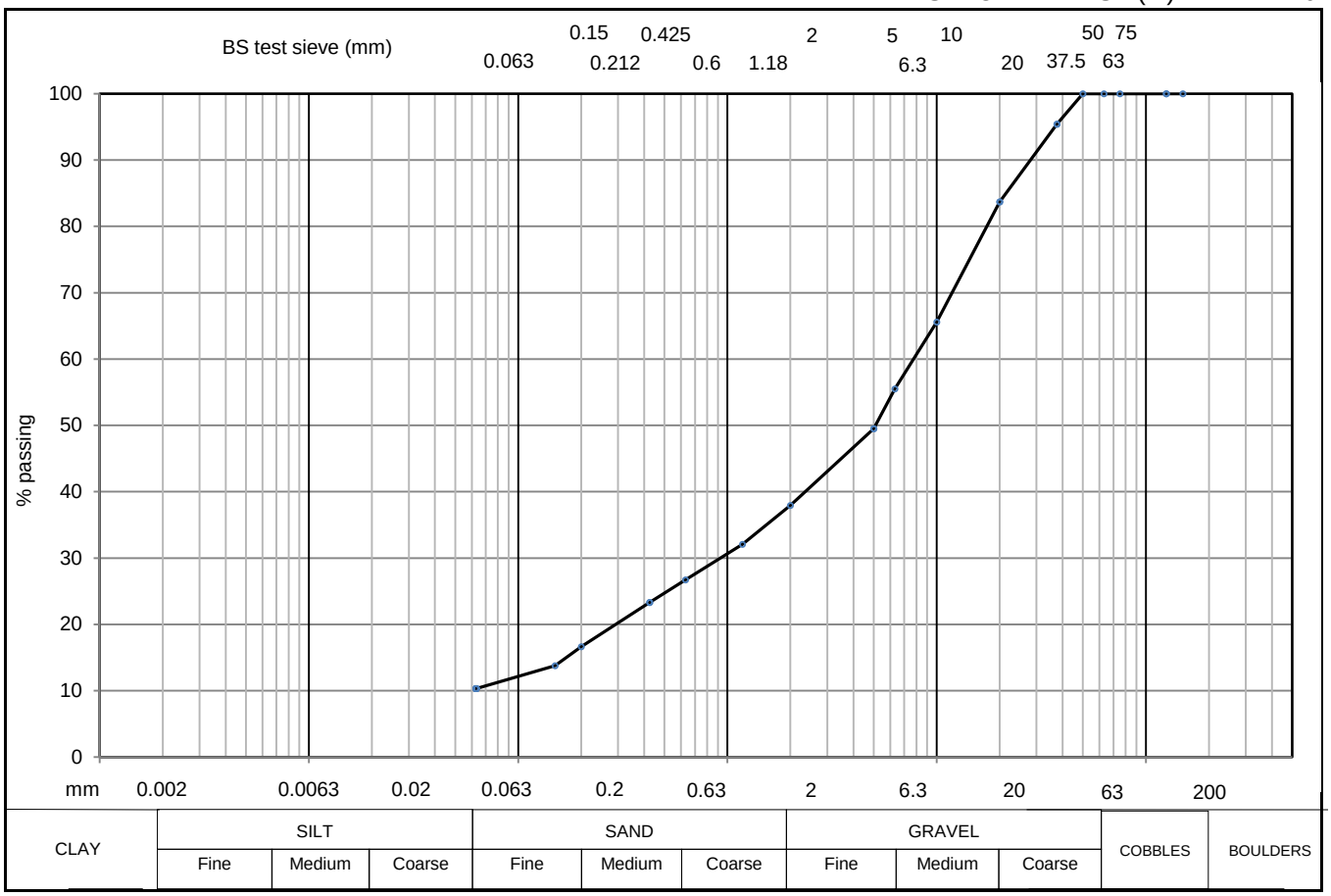
CLIENT	SH READING MASTER LLP	BH/TP No.	WS202
SITE	STATION HILL, READING	SAMPLE No./TYPE	3B
		SAMPLE DEPTH (m)	0.90
DESCRIPTION	Dark brown clayey very sandy GRAVEL	SPECIMEN TOP (m)	0.90
		SPECIMEN BASE (m)	1.10



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	10
SAND	28
GRAVEL	62
COBBLE & BOULDER	0
test method(s)	5.2
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	
63	
50	100
37.5	95
20	84
10	66
6.3	55

BS test sieve (mm)	% passing
5	50
2	38
1.18	32
0.63	27
0.425	23
0.2	17
0.15	14
0.063	10

BS test sieve (µm)	% finer
20	
6	
2	

remarks

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Particle density assigned an assumed value of 2.70 Mg/m3

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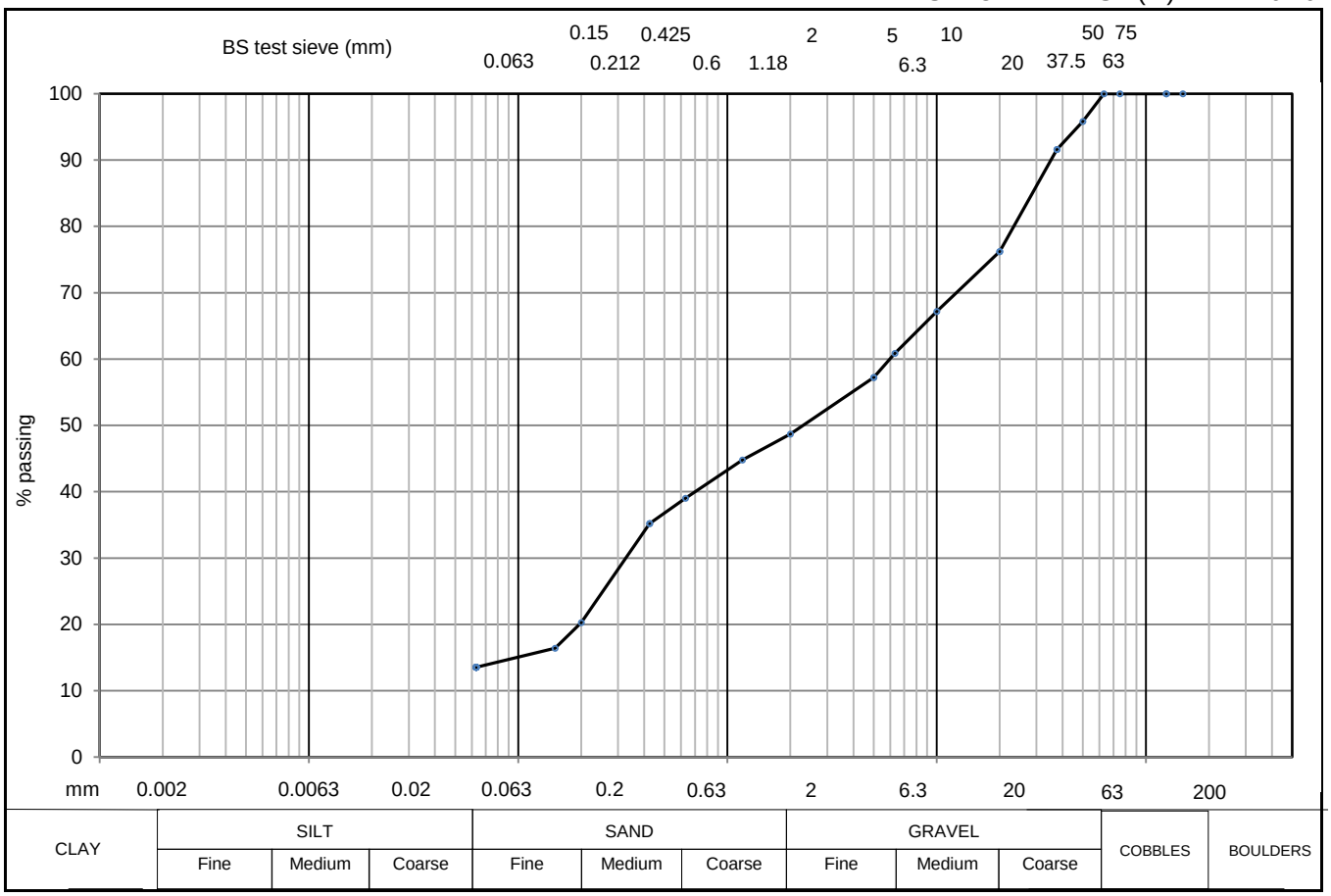
CLIENT	SH READING MASTER LLP	BH/TP No.	WS203
SITE	STATION HILL, READING	SAMPLE No./TYPE	2B
		SAMPLE DEPTH (m)	0.55
DESCRIPTION	Brown clayey very sandy GRAVEL	SPECIMEN TOP (m)	0.55
		SPECIMEN BASE (m)	0.70



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	14
SAND	35
GRAVEL	51
COBBLE & BOULDER	0
test method(s)	5.2
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	
63	100
50	96
37.5	92
20	76
10	67
6.3	61

BS test sieve (mm)	% passing
5	57
2	49
1.18	45
0.63	39
0.425	35
0.2	20
0.15	16
0.063	14

BS test sieve (µm)	% finer
20	
6	
2	

remarks

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Particle density assigned an assumed value of 2.70 Mg/m3

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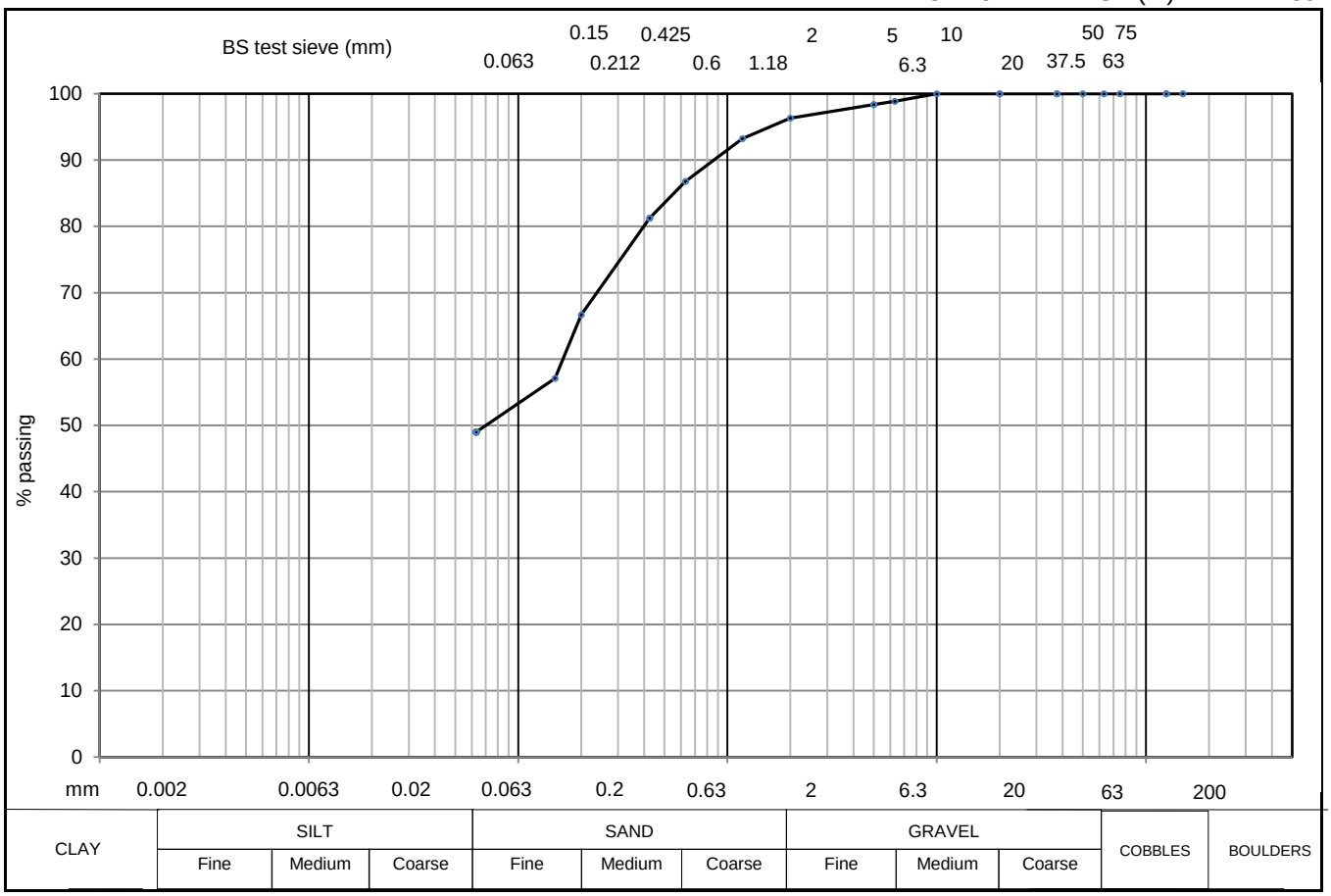
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	WS203
SITE	STATION HILL, READING	SAMPLE No./TYPE	5B
		SAMPLE DEPTH (m)	1.65
DESCRIPTION	Dark brown slightly gravelly sandy CLAY	SPECIMEN TOP (m)	1.65
		SPECIMEN BASE (m)	1.85



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	49
SAND	47
GRAVEL	4
COBBLE & BOULDER	0
test method(s)	5.2

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	BS test sieve (µm)	% finer
150		5	98	20	
75		2	96	6	
63		1.18	93	2	
50		0.63	87		
37.5		0.425	81		
20		0.2	67		
10	100	0.15	57		
6.3	99	0.063	49		

remarks

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Particle density assigned an assumed value of 2.70 Mg/m3

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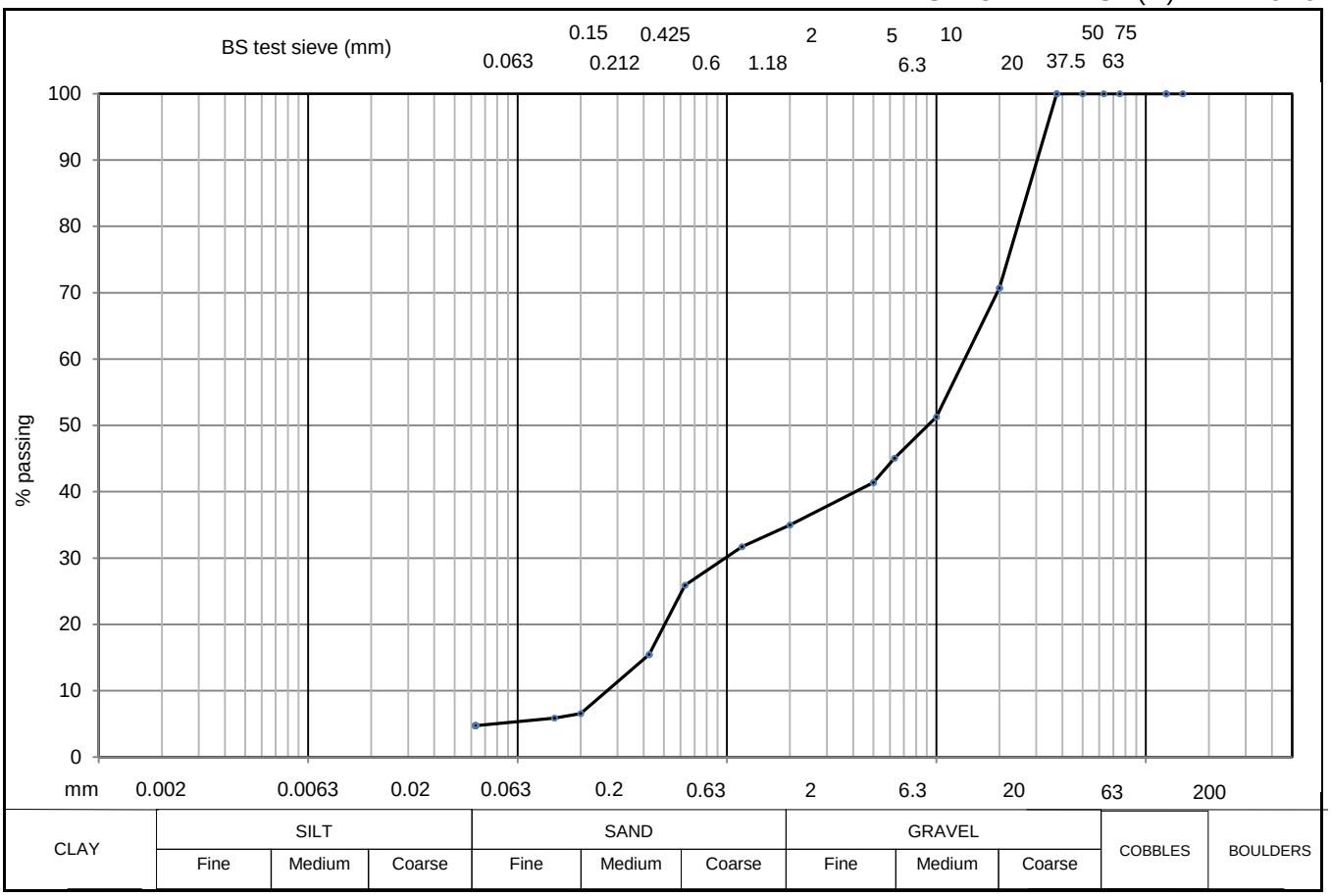
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	WS203
SITE	STATION HILL, READING	SAMPLE No./TYPE	12D
		SAMPLE DEPTH (m)	5.00
DESCRIPTION	Orangish brown slightly clayey very sandy GRAVEL	SPECIMEN TOP (m)	5.00
		SPECIMEN BASE (m)	5.45



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	5
SAND	30
GRAVEL	65
COBBLE & BOULDER	0
test method(s)	5.2#

test method

5.2 - sieving

5.3 - sedimentation by hydrometer

5.4 - sedimentation by pipette

BS test sieve (mm)	% passing	BS test sieve (mm)	% passing	BS test sieve (µm)	% finer
150		5	41	20	
75		2	35	6	
63		1.18	32	2	
50		0.63	26		
37.5	100	0.425	15		
20	71	0.2	7		
10	51	0.15	6		
6.3	45	0.063	5		

remarks

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Particle density assigned an assumed value of 2.70 Mg/m3

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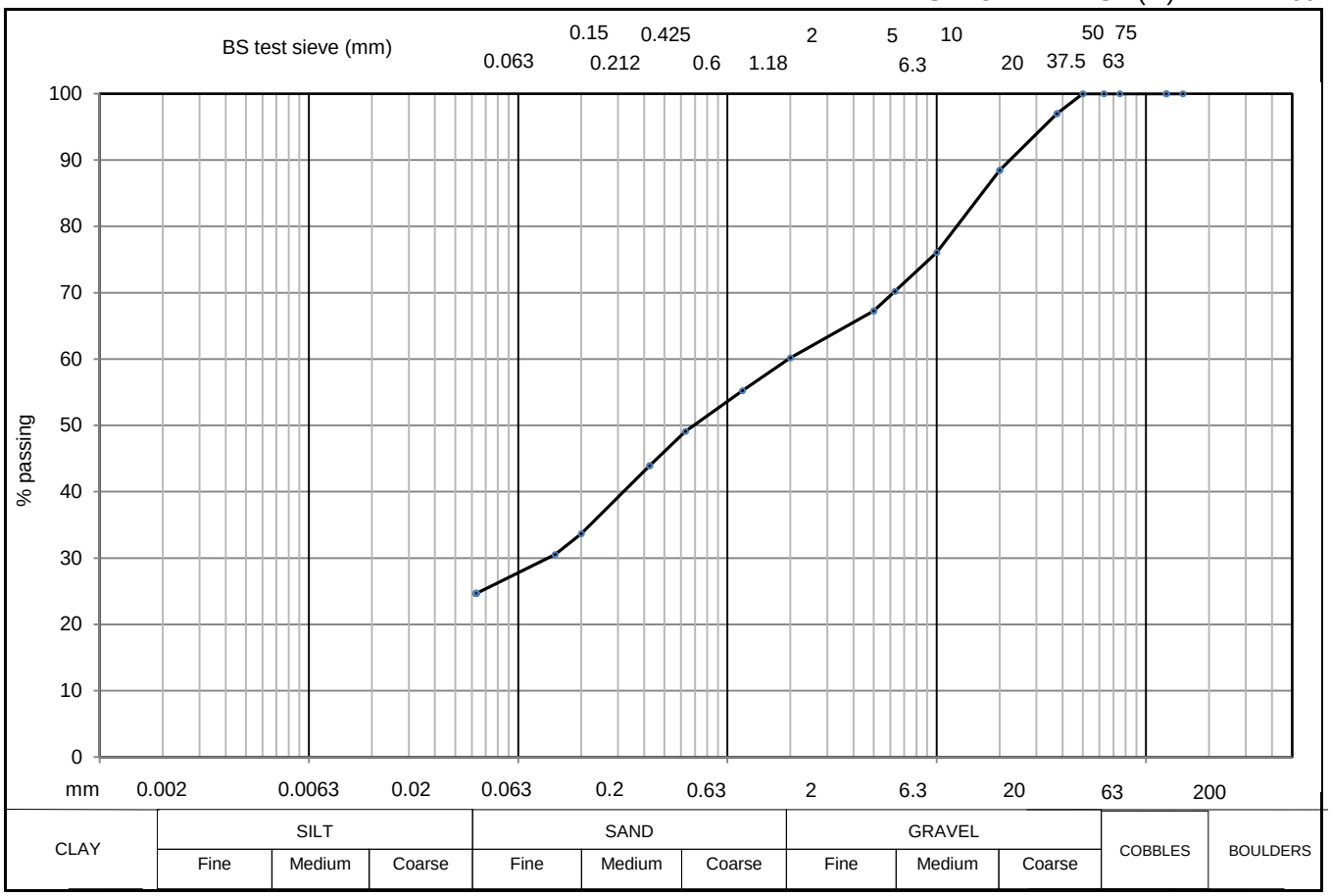
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892 - 4 : 2016 : 5

CLIENT	SH READING MASTER LLP	BH/TP No.	WS211
SITE	STATION HILL, READING	SAMPLE No./TYPE	2B
		SAMPLE DEPTH (m)	0.85
DESCRIPTION	Dark brown very clayey very sandy GRAVEL	SPECIMEN TOP (m)	0.85
		SPECIMEN BASE (m)	1.00



soil type	% fraction
CLAY	
SILT	
SILT & CLAY	25
SAND	36
GRAVEL	40
COBBLE & BOULDER	0
test method(s)	5.2
test method	
5.2 - sieving	
5.3 - sedimentation by hydrometer	
5.4 - sedimentation by pipette	

BS test sieve (mm)	% passing
150	
75	
63	
50	100
37.5	97
20	88
10	76
6.3	70

BS test sieve (mm)	% passing
5	67
2	60
1.18	55
0.63	49
0.425	44
0.2	34
0.15	31
0.063	25

BS test sieve (µm)	% finer
20	
6	
2	

remarks

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Particle density assigned an assumed value of 2.70 Mg/m3

CONTRACT	CHECKED
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ISRM Suggested Methods – Rock Characterization Testing and Monitoring 1974 - 2006

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

Sample details				Test results		
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (ºC)	Remarks
BH201	23C	18.80	White CHALK	25.0	105º	
BH201	30C	28.50	White CHALK	18.4	105º	
BH202D	22C	25.06	White CHALK	19.3	105º	
BH202D	29C	33.70	White CHALK	23.6	105º	
BH205C	44C	23.30	White CHALK	20.7	105º	

Note: Water Content in a rock sample as received

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 18/07/2019

Project Number:

GEO / 29536

Project Name:

STATION HILL, READING
35248

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UKAS TESTING 1982

ISRM Suggested Methods – Rock Characterization Testing and Monitoring 1974 - 2006

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

Sample details				Test results		
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (ºC)	Remarks
BH203	22C	16.20	White CHALK	23.3	105º	
BH203	25C	19.60	White CHALK	21.8	105º	
BH203	28C	24.64	White CHALK	23.0	105º	
BH203	31C	28.86	White CHALK	20.4	105º	
BH203	34C	34.10	White CHALK	19.9	105º	
BH203	38C	39.30	White CHALK	22.0	105º	
BH204	12C	13.02	White CHALK	25.5	105º	
BH204	15C	17.30	White CHALK	25.4	105º	
BH204	18C	23.34	White CHALK	27.5	105º	
BH204	21C	27.44	White CHALK	23.1	105º	

Note: Water Content in a rock sample as received

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 18/07/2019

Project Number:

GEO / 29537

Project Name:

STATION HILL, READING
35248

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UKAS TESTING 1982

ISRM Suggested Methods – Rock Characterization Testing and Monitoring 1974 - 2006

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

Sample details				Test results		
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (ºC)	Remarks
BH204	24C	31.73	White CHALK	24.5	105º	
BH204	27C	37.15	White CHALK	22.1	105º	
BH204	29C	40.04	White CHALK	25.8	105º	

Note: Water Content in a rock sample as received

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 18/07/2019

Project Number:

GEO / 29537

Project Name:

STATION HILL, READING
35248

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UKAS TESTING 1982

ISRM Suggested Methods – Rock Characterization Testing and Monitoring 1974 - 2006

POROSITY/DENSITY DETERMINATION USING SATURATION AND CALIPER/BUOYANCY TECHNIQUES

Sample details				Test results							
Borehole Ref.	Sample Ref.	Depth (m)	Description	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Water Content (%)	Volume (cm³)	Method of volume calculation	D. Tested	(*) Pore Volume (cm³)	Porosity (%)
BH201	23C	18.80	White CHALK	1.98	1.57	27	42.48	Buoyancy technique	16/07/19	17.73	41.75
BH201	30C	28.50	White CHALK	2.11	1.79	18	66.12	Buoyancy technique	16/07/19	21.64	32.73
BH202D	22C	25.06	White CHALK	1.77	1.46	21	95.87	Buoyancy technique	16/07/19	29.25	30.51
BH202D	29C	33.70	White CHALK	1.97	1.55	27	59.31	Buoyancy technique	16/07/19	24.74	41.72
BH205C	44C	23.30	White CHALK	2.07	1.71	21	64.72	Buoyancy technique	16/07/19	23.34	36.07

(*) Pore volume obtained by water saturation at 20°.

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C Clergeaud (Snr. Geologist)

Date: 18/07/2019

Project Number:

GEO / 29536

Project Name:

STATION HILL, READING
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ISRM Suggested Methods – Rock Characterization Testing and Monitoring 1974 - 2006

POROSITY/DENSITY DETERMINATION USING SATURATION AND CALIPER/BUOYANCY TECHNIQUES

Sample details				Test results							
Borehole Ref.	Sample Ref.	Depth (m)	Description	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Water Content (%)	Volume (cm³)	Method of volume calculation	D. Tested	(*) Pore Volume (cm³)	Porosity (%)
BH203	22C	16.20	White CHALK	2.03	1.65	24	48.69	Buoyancy technique	16/07/19	18.93	38.89
BH203	25C	19.60	White CHALK	1.96	1.57	25	32.96	Buoyancy technique	16/07/19	13.02	39.51
BH203	28C	24.64	White CHALK	2.03	1.64	24	51.59	Buoyancy technique	16/07/19	19.94	38.64
BH203	31C	28.86	White CHALK	2.08	1.72	21	54.10	Buoyancy technique	16/07/19	19.43	35.93
BH203	34C	34.10	White CHALK	2.09	1.74	20	54.70	Buoyancy technique	16/07/19	19.33	35.35
BH203	38C	39.30	White CHALK	2.02	1.63	24	70.03	Buoyancy technique	16/07/19	27.55	39.34
BH204	12C	13.02	White CHALK	1.96	1.55	26	62.51	Buoyancy technique	16/07/19	25.65	41.03
BH204	15C	17.30	White CHALK	1.99	1.58	26	62.31	Buoyancy technique	16/07/19	25.65	41.16
BH204	18C	23.34	White CHALK	1.97	1.55	27	33.46	Buoyancy technique	16/07/19	14.23	42.51
BH204	21C	27.44	White CHALK	2.03	1.64	24	65.82	Buoyancy technique	16/07/19	25.55	38.81

(*) Pore volume obtained by water saturation at 20º.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 18/07/2019

Project Number:

GEO / 29537

Project Name:

STATION HILL, READING

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ISRM Suggested Methods – Rock Characterization Testing and Monitoring 1974 - 2006

POROSITY/DENSITY DETERMINATION USING SATURATION AND CALIPER/BUOYANCY TECHNIQUES

Sample details				Test results							
Borehole Ref.	Sample Ref.	Depth (m)	Description	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Water Content (%)	Volume (cm³)	Method of volume calculation	D. Tested	(*) Pore Volume (cm³)	Porosity (%)
BH204	24C	31.73	White CHALK	1.99	1.59	25	46.48	Buoyancy technique	16/07/19	18.73	40.30
BH204	27C	37.15	White CHALK	2.02	1.63	24	58.30	Buoyancy technique	16/07/19	22.64	38.83
BH204	29C	40.04	White CHALK	2.01	1.62	25	49.39	Buoyancy technique	16/07/19	19.74	39.96

(*) Pore volume obtained by water saturation at 20º.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 18/07/2019

Project Number:

GEO / 29537

Project Name:

STATION HILL, READING
35248

GEOLABS®

UKAS TESTING 1982

Geotechnical Engineering Limited

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

I.S.R.M. Suggested Methods : 2007 Edition

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole /trial pit no.	sample no./type	sample depth (m)	specimen depth (m)	diameter D (mm)	height H (mm)	H/D	moisture content (%)	bulk density (Mg/m3)	loading rate (kN/min)	time to failure (min:sec)	UCS (MPa)	description, codes and remarks
BH201	31C	29.50	29.60	91.5	204.2	2.23	20.7	1.55	3	06:48	3.09	White CHALK, P, AxCa. H/D ratio falls outside ISRM specification
BH205C	56C	36.50	37.72	98.1	238.8	2.44	25.4	1.96	3	07:46	3.14	White CHALK, P, AxCa. H/D ratio falls outside ISRM specification

general remarks

sample obtained from vertically drilled core (unless specified), test machine - VJT6000

coding:

moisture condition	sample storage	failure mode
N - natural moisture content	U - not wrapped	Ax - axial cleavage
F - fully saturated	F - wrapped in cling film/foil	Ca - cataclasis
S - soaked	W - waxed	Sh - shear
P - air/partially dried	G - contained in sealed Geoline	Ex - explosive
		Ot - other

CONTRACT	CHECKED
35248	**TB**

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POINT LOAD STRENGTH TEST

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SITE STATION HILL, READING

borehole /trial pit no.	sample depth (m)	test type	test orien-tation	moisture condition	width W (mm)	length L (mm)	platen sep. D (mm)	failure load P (kN)	equiv. diam. De (mm)	Is (MPa)	size factor	Is(50) (MPa)	description and remarks
BH201	12.10	I	U	P	40	70	40	0.16	45.14	0.08	0.95	0.08	White CHALK
BH201	12.80	I	U	P	70	70	60	0.36	73.13	0.07	1.19	0.08	White CHALK
BH201	15.70	D	Y	P		30	90	0.14	90.00	0.02	1.30	0.02	White CHALK
BH201	15.70	A	X	P	90		30	0.21	58.63	0.06	1.07	0.07	White CHALK
BH201	19.80	D	Y	P		40	50	0.19	50.00	0.08	1.00	0.08	White CHALK
BH201	19.94	D	Y	P		30	30	0.26	30.00	0.29	0.79	0.23	White CHALK
BH201	20.07	A	X	P	90		60	0.53	82.92	0.08	1.26	0.10	White CHALK
BH201	20.15	A	X	P	90		60	0.36	82.92	0.05	1.26	0.07	White CHALK
BH201	20.20	D	Y	P		60	90	0.96	90.00	0.12	1.30	0.15	White CHALK
BH201	20.20	A	X	P	90		65	0.91	86.30	0.12	1.28	0.16	White CHALK
BH201	20.40	I	U	P	50	50	55	0.42	59.17	0.12	1.08	0.13	White CHALK
BH201	20.45	I	U	P	50	35	30	0.51	43.70	0.27	0.94	0.25	White CHALK
BH201	23.70	I	U	P	85	100	75	0.26	90.09	0.03	1.30	0.04	White CHALK
BH201	23.90	I	U	P	85	80	70	0.47	87.04	0.06	1.28	0.08	White CHALK
BH201	24.10	D	Y	P		40	80	1.47	80.00	0.23	1.24	0.28	White CHALK
BH201	24.20	D	Y	P		30	90	1.36	90.00	0.17	1.30	0.22	White CHALK
BH201	24.30	D	Y	P		80	90	0.21	90.00	0.03	1.30	0.03	White CHALK
BH201	24.30	A	X	P	90		80	1.63	95.75	0.18	1.34	0.24	White CHALK
BH201	24.50	I	U	P	70	110	60	0.11	73.13	0.02	1.19	0.02	White CHALK

general remarks

tests carried out in accordance with I.S.R.M.(2007): Suggested Methods for Determining Point Load Strength

test machine PLM02

test type	test orientation relative to discontinuities		moisture condition	CONTRACT	CHECKED
A - axial	X - perpendicular	U - unknown	N - natural moisture content		
D - diametral	Y - parallel		P - partially air dried	**35248**	**TB**
I - irregular lump	Z - oblique		S - soaked		

Geotechnical Engineering Limited

POINT LOAD STRENGTH TEST

I.S.R.M. Suggested Methods : 2007 Edition

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SITE STATION HILL, READING

borehole /trial pit no.	sample depth (m)	test type	test orien-tation	moisture condition	width W (mm)	length L (mm)	platen sep. D (mm)	failure load P (kN)	equiv. diam. De (mm)	Is (MPa)	size factor	Is(50) (MPa)	description and remarks
BH201	24.60	D	Y	P		20	75	1.06	75.00	0.19	1.20	0.23	White CHALK
BH201	24.70	D	Y	P		30	75	1.29	75.00	0.23	1.20	0.28	White CHALK
BH201	24.90	D	Y	P		40	90	0.10	90.00	0.01	1.30	0.02	White CHALK
BH201	28.40	D	Y	P		40	90	0.38	90.00	0.05	1.30	0.06	White CHALK
BH201	28.40	A	X	P	90		40	0.65	67.70	0.14	1.15	0.16	White CHALK
BH201	28.65	A	X	P	90		50	1.19	75.69	0.21	1.21	0.25	White CHALK
BH201	28.75	D	Y	P		80	90	0.93	90.00	0.11	1.30	0.15	White CHALK
BH201	28.75	A	X	P	90		80	0.76	95.75	0.08	1.34	0.11	White CHALK
BH201	29.00	D	Y	P		30	70	0.69	70.00	0.14	1.16	0.16	White CHALK
BH201	29.15	D	Y	P		50	90	0.36	90.00	0.04	1.30	0.06	White CHALK
BH201	29.15	A	X	P	90		50	1.41	75.69	0.25	1.21	0.30	White CHALK
BH201	29.33	A	X	P	90		30	0.76	58.63	0.22	1.07	0.24	White CHALK
BH201	29.40	D	Y	P		50	90	0.39	90.00	0.05	1.30	0.06	White CHALK
BH201	32.60	I	U	P	90	90	55	0.86	79.39	0.14	1.23	0.17	White CHALK
BH201	32.70	D	Y	P		30	60	0.62	60.00	0.17	1.09	0.19	White CHALK
BH201	33.00	D	Y	P		80	90	1.14	90.00	0.14	1.30	0.18	White CHALK
BH201	33.00	A	X	P	90		80	2.06	95.75	0.22	1.34	0.30	White CHALK
BH201	33.13	D	Y	P		80	90	0.89	90.00	0.11	1.30	0.14	White CHALK
BH201	33.13	A	X	P	90		80	1.10	95.75	0.12	1.34	0.16	White CHALK

general remarks

tests carried out in accordance with I.S.R.M.(2007): Suggested Methods for Determining Point Load Strength

test machine PLM02

test type	test orientation relative to discontinuities		moisture condition	CONTRACT	CHECKED
A - axial	X - perpendicular	U - unknown	N - natural moisture content		
D - diametral	Y - parallel		P - partially air dried	**35248**	**TB**
I - irregular lump	Z - oblique		S - soaked		

Geotechnical Engineering Limited

POINT LOAD STRENGTH TEST

I.S.R.M. Suggested Methods : 2007 Edition

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SITE STATION HILL, READING

borehole /trial pit no.	sample depth (m)	test type	test orien-tation	moisture condition	width W (mm)	length L (mm)	platen sep. D (mm)	failure load P (kN)	equiv. diam. De (mm)	Is (MPa)	size factor	Is(50) (MPa)	description and remarks
BH201	33.30	D	Y	P		30	90	0.39	90.00	0.05	1.30	0.06	White CHALK
BH201	33.66	D	Y	P		80	90	0.96	90.00	0.12	1.30	0.15	White CHALK
BH201	33.66	A	X	P	90		80	1.23	95.75	0.13	1.34	0.18	White CHALK
BH201	33.90	D	Y	P		50	60	0.67	60.00	0.19	1.09	0.20	White CHALK
BH202D	21.10	I	U	P	50	60	40	0.51	50.46	0.20	1.00	0.20	White CHALK
BH202D	21.30	I	U	P	40	40	55	0.56	52.93	0.20	1.03	0.21	White CHALK
BH202D	21.80	I	U	P	50	60	40	0.69	50.46	0.27	1.00	0.27	White CHALK
BH202D	21.95	A	X	P	90		40	0.71	67.70	0.15	1.15	0.18	White CHALK
BH202D	22.10	I	U	P	60	60	50	0.59	61.80	0.15	1.10	0.17	White CHALK
BH202D	22.20	I	U	P	40	70	30	0.23	39.09	0.15	0.90	0.13	White CHALK
BH202D	22.35	I	U	P	40	80	35	0.36	42.22	0.20	0.93	0.19	White CHALK
BH202D	25.80	D	Y	P		35	90	0.46	90.00	0.06	1.30	0.07	White CHALK
BH202D	25.90	D	Y	P		30	70	0.39	70.00	0.08	1.16	0.09	White CHALK
BH202D	26.02	D	Y	P		45	90	2.74	90.00	0.34	1.30	0.44	White CHALK
BH202D	26.15	D	Y	P		40	90	0.71	90.00	0.09	1.30	0.11	White CHALK
BH202D	26.35	D	Y	P		40	90	1.10	90.00	0.14	1.30	0.18	White CHALK
BH202D	26.45	I	U	P	50	60	50	0.66	56.42	0.21	1.06	0.22	White CHALK
BH202D	26.55	A	X	P	90		40	0.38	67.70	0.08	1.15	0.10	White CHALK
BH202D	26.60	D	Y	P		60	90	0.89	90.00	0.11	1.30	0.14	White CHALK

general remarks

tests carried out in accordance with I.S.R.M.(2007): Suggested Methods for Determining Point Load Strength

test machine PLM02

test type	test orientation relative to discontinuities		moisture condition	CONTRACT	CHECKED
A - axial	X - perpendicular	U - unknown	N - natural moisture content		
D - diametral	Y - parallel		P - partially air dried	**35248**	**TB**
I - irregular lump	Z - oblique		S - soaked		

Geotechnical Engineering Limited

POINT LOAD STRENGTH TEST

I.S.R.M. Suggested Methods : 2007 Edition

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SITE STATION HILL, READING

borehole /trial pit no.	sample depth (m)	test type	test orien-tation	moisture condition	width W (mm)	length L (mm)	platen sep. D (mm)	failure load P (kN)	equiv. diam. De (mm)	Is (MPa)	size factor	Is(50) (MPa)	description and remarks
BH202D	26.70	D	Y	P		40	90	0.96	90.00	0.12	1.30	0.15	White CHALK
BH202D	26.87	A	X	P	90		50	1.24	75.69	0.22	1.21	0.26	White CHALK
BH202D	28.70	D	Y	N		80	90	1.81	90.00	0.22	1.30	0.29	White CHALK
BH202D	28.70	A	X	N	90		80	2.41	95.75	0.26	1.34	0.35	White CHALK
BH202D	28.78	D	Y	N		70	90	1.97	90.00	0.24	1.30	0.32	White CHALK
BH202D	28.78	A	X	N	90		70	2.61	89.56	0.33	1.30	0.42	White CHALK
BH202D	28.85	D	Y	N		90	90	2.13	90.00	0.26	1.30	0.34	White CHALK
BH202D	28.85	A	X	N	90		90	2.53	101.55	0.25	1.38	0.34	White CHALK
BH202D	28.94	D	Y	N		65	90	1.34	90.00	0.17	1.30	0.22	White CHALK
BH202D	28.94	A	X	N	90		60	2.51	82.92	0.37	1.26	0.46	White CHALK
BH202D	29.00	D	Y	N		20	90	0.40	90.00	0.05	1.30	0.06	White CHALK
BH202D	29.00	A	X	N	90		20	0.61	47.87	0.27	0.98	0.26	White CHALK
BH202D	33.20	A	X	P	90		40	0.66	67.70	0.14	1.15	0.17	White CHALK
BH202D	33.29	A	X	P	90		45	0.64	71.81	0.12	1.18	0.15	White CHALK
BH202D	33.80	I	U	P	40	40	60	0.14	55.28	0.05	1.05	0.05	White CHALK
BH202D	33.89	A	X	P	90		65	1.02	86.30	0.14	1.28	0.18	White CHALK
BH202D	33.95	A	X	P	90		50	0.82	75.69	0.14	1.21	0.17	White CHALK
BH202D	34.05	D	Y	P		60	90	1.34	90.00	0.17	1.30	0.22	White CHALK
BH202D	34.05	A	X	P	90		60	2.07	82.92	0.30	1.26	0.38	White CHALK

general remarks

tests carried out in accordance with I.S.R.M.(2007): Suggested Methods for Determining Point Load Strength

test machine PLM02

test type	test orientation relative to discontinuities		moisture condition	CONTRACT	CHECKED
A - axial	X - perpendicular	U - unknown	N - natural moisture content		
D - diametral	Y - parallel		P - partially air dried	**35248**	**TB**
I - irregular lump	Z - oblique		S - soaked		

Geotechnical Engineering Limited

POINT LOAD STRENGTH TEST

I.S.R.M. Suggested Methods : 2007 Edition

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole /trial pit no.	sample depth (m)	test type	test orien-tation	moisture condition	width W (mm)	length L (mm)	platen sep. D (mm)	failure load P (kN)	equiv. diam. De (mm)	Is (MPa)	size factor	Is(50) (MPa)	description and remarks
BH202D	34.30	I	U	P	60	100	40	0.46	55.28	0.15	1.05	0.16	White CHALK
BH202D	37.90	D	Y	P		50	90	0.19	90.00	0.02	1.30	0.03	White CHALK
BH202D	37.90	A	X	P	90		50	0.56	75.69	0.10	1.21	0.12	White CHALK
BH202D	38.10	D	Y	P		100	95	0.22	95.00	0.02	1.33	0.03	White CHALK
BH202D	38.10	A	X	P	95		110	0.90	115.35	0.07	1.46	0.10	White CHALK
BH202D	38.30	A	X	P	90		35	0.36	63.33	0.09	1.11	0.10	White CHALK
BH202D	38.60	I	U	P	60	90	70	0.49	73.13	0.09	1.19	0.11	White CHALK
BH202D	38.80	I	U	P	70	65	50	0.81	66.76	0.18	1.14	0.21	White CHALK
BH202D	38.98	I	U	P	60	90	60	0.71	67.70	0.15	1.15	0.18	White CHALK
BH204	5.35	I	U	P	70	80	40	0.26	59.71	0.07	1.08	0.08	White CHALK
BH204	5.35	I	U	P	45	70	30	0.21	41.46	0.12	0.92	0.11	White CHALK
BH204	15.40	A	X	P	95		60	0.11	85.19	0.02	1.27	0.02	White CHALK
BH204	15.62	I	U	P	95	100	30	0.09	60.24	0.02	1.09	0.03	White CHALK
BH204	15.78	D	Y	P		20	95	0.17	95.00	0.02	1.33	0.03	White CHALK
BH204	16.00	I	U	P	40	40	30	0.08	39.09	0.05	0.90	0.05	White CHALK
BH204	16.17	I	U	P	70	50	50	0.36	66.76	0.08	1.14	0.09	White CHALK
BH204	16.25	I	U	P	55	90	40	0.19	52.93	0.07	1.03	0.07	White CHALK
BH204	16.30	A	X	P	95		75	1.46	95.25	0.16	1.34	0.22	White CHALK
BH204	16.45	I	U	P	95	110	45	0.79	73.78	0.15	1.19	0.17	White CHALK

general remarks

tests carried out in accordance with I.S.R.M.(2007): Suggested Methods for Determining Point Load Strength

test machine PLM02

test type	test orientation relative to discontinuities		moisture condition	CONTRACT	CHECKED
A - axial	X - perpendicular	U - unknown	N - natural moisture content		
D - diametral	Y - parallel		P - partially air dried	**35248**	**TB**
I - irregular lump	Z - oblique		S - soaked		

Geotechnical Engineering Limited

POINT LOAD STRENGTH TEST

I.S.R.M. Suggested Methods : 2007 Edition

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SITE STATION HILL, READING

borehole /trial pit no.	sample depth (m)	test type	test orien-tation	moisture condition	width W (mm)	length L (mm)	platen sep. D (mm)	failure load P (kN)	equiv. diam. De (mm)	Is (MPa)	size factor	Is(50) (MPa)	description and remarks
BH204	28.53	D	Y	P		30	95	0.49	95.00	0.05	1.33	0.07	White CHALK
BH204	28.65	D	Y	P		40	95	0.71	95.00	0.08	1.33	0.11	White CHALK
BH204	28.80	A	X	P	95		70	0.93	92.02	0.11	1.32	0.14	White CHALK
BH204	28.95	I	U	P	70	95	50	0.06	66.76	0.01	1.14	0.02	White CHALK
BH204	29.10	D	Y	P		30	95	0.29	95.00	0.03	1.33	0.04	White CHALK
BH204	29.25	D	Y	P		40	95	1.03	95.00	0.11	1.33	0.15	White CHALK
BH204	29.41	D	Y	P		50	95	0.84	95.00	0.09	1.33	0.12	White CHALK
BH204	29.70	I	U	P	50	50	35	0.19	47.20	0.09	0.97	0.08	White CHALK
BH204	29.90	D	Y	P		30	95	0.36	95.00	0.04	1.33	0.05	White CHALK
BH204	36.25	A	X	P	95		60	0.29	85.19	0.04	1.27	0.05	White CHALK
BH204	36.35	D	Y	P		20	95	0.40	95.00	0.04	1.33	0.06	White CHALK
BH204	36.70	A	X	P	95		50	0.26	77.77	0.04	1.22	0.05	White CHALK
BH204	36.83	D	Y	P		20	95	0.49	95.00	0.05	1.33	0.07	White CHALK
BH204	36.94	D	Y	P		30	95	0.57	95.00	0.06	1.33	0.08	White CHALK
BH205C	10.00	I	U	P	90	110	60	0.81	82.92	0.12	1.26	0.15	White CHALK
BH205C	15.10	I	U	P	60	80	40	0.63	55.28	0.21	1.05	0.22	White CHALK
BH205C	15.20	D	Y	P		40	90	0.69	90.00	0.09	1.30	0.11	White CHALK
BH205C	15.20	A	X	P	90		35	0.52	63.33	0.13	1.11	0.14	White CHALK
BH205C	15.30	D	Y	P		30	90	0.36	90.00	0.04	1.30	0.06	White CHALK

general remarks

tests carried out in accordance with I.S.R.M.(2007): Suggested Methods for Determining Point Load Strength

test machine PLM02

test type	test orientation relative to discontinuities		moisture condition	CONTRACT	CHECKED
A - axial	X - perpendicular	U - unknown	N - natural moisture content		
D - diametral	Y - parallel		P - partially air dried	**35248**	**TB**
I - irregular lump	Z - oblique		S - soaked		

Geotechnical Engineering Limited

POINT LOAD STRENGTH TEST

I.S.R.M. Suggested Methods : 2007 Edition

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole /trial pit no.	sample depth (m)	test type	test orien-tation	moisture condition	width W (mm)	length L (mm)	platen sep. D (mm)	failure load P (kN)	equiv. diam. De (mm)	Is (MPa)	size factor	Is(50) (MPa)	description and remarks
BH205C	15.30	A	X	P	90		30	0.54	58.63	0.16	1.07	0.17	White CHALK
BH205C	15.45	I	U	P	25	60	40	0.81	35.68	0.64	0.86	0.55	White CHALK
BH205C	20.70	I	U	P	60	90	60	0.22	67.70	0.05	1.15	0.06	White CHALK
BH205C	20.80	I	U	P	40	90	60	0.09	55.28	0.03	1.05	0.03	White CHALK
BH205C	21.00	D	Y	P		30	70	0.14	70.00	0.03	1.16	0.03	White CHALK
BH205C	21.25	D	Y	P		30	90	0.23	90.00	0.03	1.30	0.04	White CHALK
BH205C	21.25	A	X	P	90		25	0.41	53.52	0.14	1.03	0.15	White CHALK
BH205C	21.35	D	Y	P		40	90	0.66	90.00	0.08	1.30	0.11	White CHALK
BH205C	21.35	A	X	P	90		30	0.59	58.63	0.17	1.07	0.18	White CHALK
BH205C	21.43	D	Y	P		30	90	0.71	90.00	0.09	1.30	0.11	White CHALK
BH205C	21.43	A	X	P	90		25	0.96	53.52	0.34	1.03	0.35	White CHALK
BH205C	26.50	I	U	P	40	90	50	1.43	50.46	0.56	1.00	0.56	White CHALK
BH205C	26.65	I	U	P	30	90	60	0.19	47.87	0.08	0.98	0.08	White CHALK
BH205C	26.80	A	X	P	90		50	1.60	75.69	0.28	1.21	0.34	White CHALK
BH205C	26.97	A	X	P	90		45	1.65	71.81	0.32	1.18	0.38	White CHALK
BH205C	27.10	A	X	P	90		60	1.51	82.92	0.22	1.26	0.28	White CHALK
BH205C	27.20	A	X	P	90		60	1.81	82.92	0.26	1.26	0.33	White CHALK
BH205C	27.28	D	Y	P		30	90	0.64	90.00	0.08	1.30	0.10	White CHALK
BH205C	27.40	D	Y	P		20	90	0.31	90.00	0.04	1.30	0.05	White CHALK

general remarks

tests carried out in accordance with I.S.R.M.(2007): Suggested Methods for Determining Point Load Strength

test machine PLM02

test type	test orientation relative to discontinuities		moisture condition	CONTRACT	CHECKED
A - axial	X - perpendicular	U - unknown	N - natural moisture content		
D - diametral	Y - parallel		P - partially air dried	**35248**	**TB**
I - irregular lump	Z - oblique		S - soaked		

Geotechnical Engineering Limited

POINT LOAD STRENGTH TEST

I.S.R.M. Suggested Methods : 2007 Edition

CLIENT SH READING MASTER LLP

SITE STATION HILL, READING

borehole /trial pit no.	sample depth (m)	test type	test orien-tation	moisture condition	width W (mm)	length L (mm)	platen sep. D (mm)	failure load P (kN)	equiv. diam. De (mm)	Is (MPa)	size factor	Is(50) (MPa)	description and remarks
BH205C	27.40	A	X	P	90		25	0.59	53.52	0.21	1.03	0.21	White CHALK
BH205C	27.46	A	X	P	90		45	1.39	71.81	0.27	1.18	0.32	White CHALK
BH205C	35.27	D	Y	P		40	90	0.61	90.00	0.08	1.30	0.10	White CHALK
BH205C	35.27	A	X	P	90		45	0.91	71.81	0.18	1.18	0.21	White CHALK
BH205C	35.45	D	Y	P		70	90	1.30	90.00	0.16	1.30	0.21	White CHALK
BH205C	35.45	A	X	P	90		70	1.90	89.56	0.24	1.30	0.31	White CHALK
BH205C	35.60	D	Y	P		20	90	0.66	90.00	0.08	1.30	0.11	White CHALK
BH205C	35.60	A	X	P	90		20	1.01	47.87	0.44	0.98	0.43	White CHALK
BH205C	36.03	D	Y	P		50	90	1.06	90.00	0.13	1.30	0.17	White CHALK
BH205C	36.03	A	X	P	90		50	1.64	75.69	0.29	1.21	0.34	White CHALK

general remarks

tests carried out in accordance with I.S.R.M.(2007): Suggested Methods for Determining Point Load Strength

test machine PLM02

test type	test orientation relative to discontinuities		moisture condition	CONTRACT	CHECKED
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I - irregular lump	Z - oblique		S - soaked		

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	19-20348-1
Initial Date of Issue:	24-Jun-2019
Client	Geotechnical Engineering Ltd
Client Address:	Centurion House Olympus Park Quedgeley Gloucester Gloucestershire GL2 4NF
Contact(s):	GEL Wendy Jones
Project	35248 Station Hill, Reading

Quotation No.:		**Date Received:**	18-Jun-2019
Order No.:	35248/WJ	**Date Instructed:**	18-Jun-2019
No. of Samples:	26		
Turnaround (Wkdays):	5	**Results Due:**	24-Jun-2019
Date Approved:	24-Jun-2019		

Approved By:

Details: Robert Monk, Technical Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 35248 Station Hill, Reading

Client: Geotechnical Engineering Ltd					**Chemtest Job No.:**	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348
Quotation No.:					**Chemtest Sample ID.:**	843999	844000	844001	844002	844003	844004	844005	844006	844007
					Client Sample ID.:	5L	6D	7L	11L	13L	14L	18C	19C	3L
					Sample Location:	BH201	BH201	BH201	BH201	BH201	BH201	BH201	BH201	BH202D
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.20	2.00	2.00	4.00	5.00	6.50	10.00	11.50	1.85
					Bottom Depth (m):	2.00	2.45	3.00			8.00	11.50	13.00	2.00
					Date Sampled:	14-Jun-2019	14-Jun-2019	14-Jun-2019	14-Jun-2019	14-Jun-2019	14-Jun-2019	14-Jun-2019	14-Jun-2019	17-Jun-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Moisture	N	2030	%	0.020		9.7	21	13	4.1	9.7	1.9	12	17	3.1
pH	U	2010		N/A		8.6		7.8			8.9	8.8		
pH (2.5:1)	N	2010		N/A			7.9			8.8			9.0	11.1
Magnesium (Water Soluble)	N	2120	g/l	0.010			< 0.010			< 0.010			< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			0.56			0.028			< 0.010	1.1
Total Sulphur	U	2175	%	0.010			0.092			0.016			< 0.010	0.36
Chloride (Water Soluble)	U	2220	g/l	0.010			0.013			< 0.010			< 0.010	0.015
Nitrate (Water Soluble)	N	2220	g/l	0.010			< 0.010			< 0.010			< 0.010	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010			0.16			0.016			< 0.010	0.58
Organic Matter	U	2625	%	0.40		0.83			< 0.40					

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 35248 Station Hill, Reading

Client: Geotechnical Engineering Ltd					**Chemtest Job No.:**	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348
Quotation No.:					**Chemtest Sample ID.:**	844008	844009	844010	844011	844012	844013	844014	844015	844016
					Client Sample ID.:	4L	6L	10L	11L	15C	22C	28C	10L	11D
					Sample Location:	BH202D	BH202D	BH202D	BH202D	BH202D	BH202D	BH202D	BH205C	BH205C
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	2.00	3.00	5.50	7.00	13.50	24.00	31.50	2.00	3.00
					Bottom Depth (m):	3.00	4.00	7.00	8.50	15.00	25.50	33.00	3.00	3.45
					Date Sampled:	17-Jun-2019	17-Jun-2019	17-Jun-2019	17-Jun-2019	17-Jun-2019	17-Jun-2019	17-Jun-2019	14-Jun-2019	14-Jun-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Moisture	N	2030	%	0.020		16	10	2.4	5.1	19	7.4	15	15	9.2
pH	U	2010		N/A		8.2		9.3		9.2	9.2	9.0	8.0	
pH (2.5:1)	N	2010		N/A			9.1		9.3					8.6
Magnesium (Water Soluble)	N	2120	g/l	0.010			< 0.010		< 0.010					< 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			0.022		< 0.010					0.23
Total Sulphur	U	2175	%	0.010			0.014		0.022					0.055
Chloride (Water Soluble)	U	2220	g/l	0.010			< 0.010		< 0.010					< 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010			< 0.010		< 0.010					< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010			0.024		0.011					0.081
Organic Matter	U	2625	%	0.40		6.7		< 0.40		2.9	< 0.40	< 0.40	3.1	

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 35248 Station Hill, Reading

Client: Geotechnical Engineering Ltd					**Chemtest Job No.:**	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348	19-20348
Quotation No.:					**Chemtest Sample ID.:**	844017	844018	844019	844020	844021	844022	844023	844024
					Client Sample ID.:	12L	15D	18L	20L	24L	8D	13L	8D
					Sample Location:	BH205C	BH205C	BH205C	BH205C	BH205C	WS202	WS202	WS203
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	3.00	5.00	6.00	7.50	9.00	3.00	5.00	3.00
					Bottom Depth (m):	4.00	5.34			10.00	3.78	6.00	3.70
					Date Sampled:	14-Jun-2019	14-Jun-2019	17-Jun-2019	17-Jun-2019	17-Jun-2019	14-Jun-2019	14-Jun-2019	14-Jun-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Moisture	N	2030	%	0.020		6.5	8.4	5.1	0.34	22	26	2.5	19
pH	U	2010		N/A		8.3			8.9	9.0			
pH (2.5:1)	N	2010		N/A				9.1		9.2			
Magnesium (Water Soluble)	N	2120	g/l	0.010				< 0.010		< 0.010			
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010				< 0.010		0.035			
Total Sulphur	U	2175	%	0.010				0.029		0.013			
Chloride (Water Soluble)	U	2220	g/l	0.010				< 0.010		< 0.010			
Nitrate (Water Soluble)	N	2220	g/l	0.010				< 0.010		< 0.010			
Sulphate (Acid Soluble)	U	2430	%	0.010				0.015		< 0.010			
Organic Matter	U	2625	%	0.40			< 0.40				0.55	< 0.40	< 0.40

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	19-22076-1
Initial Date of Issue:	05-Jul-2019
Client	Geotechnical Engineering Ltd
Client Address:	Centurion House Olympus Park Quedgeley Gloucester Gloucestershire GL2 4NF
Contact(s):	GEL Wendy Jones
Project	35248 B Station Hill, Reading

Quotation No.:		**Date Received:**	01-Jul-2019
Order No.:	35248/WJ	**Date Instructed:**	01-Jul-2019
No. of Samples:	14		
Turnaround (Wkdays):	5	**Results Due:**	05-Jul-2019
Date Approved:	05-Jul-2019		

Approved By:

Details: Robert Monk, Technical Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 35248 B Station Hill, Reading

Client: Geotechnical Engineering Ltd					**Chemtest Job No.:**	19-22076	19-22076	19-22076	19-22076	19-22076	19-22076	19-22076	19-22076
Quotation No.:					**Chemtest Sample ID.:**	851242	851243	851244	851245	851246	851247	851248	851249	851250
					Client Sample ID.:	4L	5D	7D	11D	17D	34C	7L	8C	14C
					Sample Location:	BH203	BH203	BH203	BH203	BH203	BH203	BH204	BH204	BH204
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	2.00	3.00	4.00	6.00	10.50	33.00	5.50	7.50	15.00
					Bottom Depth (m):	3.00	3.45	4.45	6.45	10.95	34.50	7.00	9.00	16.50
					Date Sampled:	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Moisture	N	2030	%	0.020		26	15	7.6	11	23	21	15	30	22
pH	U	2010		N/A		8.0		8.4		8.8	8.8	8.5		
pH (2.5:1)	N	2010		N/A			8.3		8.4					8.8
Magnesium (Water Soluble)	N	2120	g/l	0.010			< 0.010		< 0.010					< 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			0.053		< 0.010					< 0.010
Total Sulphur	U	2175	%	0.010			0.055		0.070					0.076
Chloride (Water Soluble)	U	2220	g/l	0.010			0.011		< 0.010					< 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010			< 0.010		< 0.010					< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010			0.038		0.026					< 0.010
Organic Matter	U	2625	%	0.40		0.97			< 0.40				5.0	

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 35248 B Station Hill, Reading

Client: Geotechnical Engineering Ltd			**Chemtest Job No.:**		19-22076	19-22076	19-22076	19-22076	19-22076
Quotation No.:			**Chemtest Sample ID.:**		851251	851252	851253	851254	851255
			Client Sample ID.:		16C	18C	20C	22C	26C
			Sample Location:		BH204	BH204	BH204	BH204	BH204
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		19.50	22.50	25.50	28.50	34.50
			Bottom Depth (m):		21.00	24.00	27.00	30.00	36.00
			Date Sampled:		28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Moisture	N	2030	%	0.020	19	19	21	17	16
pH	U	2010		N/A	8.6			8.8	8.8
pH (2.5:1)	N	2010		N/A			8.9		
Magnesium (Water Soluble)	N	2120	g/l	0.010			< 0.010		
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			< 0.010		
Total Sulphur	U	2175	%	0.010			0.015		
Chloride (Water Soluble)	U	2220	g/l	0.010			< 0.010		
Nitrate (Water Soluble)	N	2220	g/l	0.010			< 0.010		
Sulphate (Acid Soluble)	U	2430	%	0.010			< 0.010		
Organic Matter	U	2625	%	0.40		< 0.40			

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Report Information

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I/S	Insufficient Sample
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Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

APPENDIX C

CHEMICAL ANALYSES

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

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f: 01452 729 314
e: andrew.tatnell@geoeng.co.uk

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

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

Analytical Report Number : 19-41032

Project / Site name:	Station Hill, Reading	**Samples received on:**	10/05/2019
Your job number:	35248	**Samples instructed on:**	14/05/2019
Your order number:		**Analysis completed by:**	20/05/2019
Report Issue Number:	1	**Report issued on:**	20/05/2019
Samples Analysed:	3 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 19-41032

Project / Site name: Station Hill, Reading

Lab Sample Number				1220390	1220391	1220392		
Sample Reference				BH205	BH205A	BH205C		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.20-0.40	0.80-0.95	1.80-2.00		
Date Sampled				08/05/2019	09/05/2019	10/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	63	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	2.4	17	17		
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.1	8.4	-		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	-		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.046	0.50	-		
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	-		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.25	-		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.14	-		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.43	-		
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	1.4	-		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.95	-		
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	4.0	-		
Pyrene	mg/kg	0.05	MCERTS	< 0.05	3.4	-		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	2.3	-		
Chrysene	mg/kg	0.05	MCERTS	< 0.05	2.1	-		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	2.4	-		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.92	-		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.9	-		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.89	-		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.24	-		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.91	-		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	22.3	-		
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.2	36	-		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	< 0.06	0.40	-		
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	6.8	-		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8	< 0.2	-		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	-		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	3.8	9.4	-		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	9.2	33	-		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	270	180	-		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.7	-		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	2.0	13	-		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	2.5	18	-		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	60	110	-		

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Analytical Report Number: 19-41032

Project / Site name: Station Hill, Reading

Lab Sample Number				1220390	1220391	1220392		
Sample Reference				BH205	BH205A	BH205C		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.20-0.40	0.80-0.95	1.80-2.00		
Date Sampled				08/05/2019	09/05/2019	10/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.8	2.1	-		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	5.1	7.0	-		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	13	26	-		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	25	43	-		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	45	79	-		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	5.1	-		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	8.7	-		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	45	-		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	100	-		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	160	-		

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Analytical Report Number: 19-41032

Project / Site name: Station Hill, Reading

Lab Sample Number				1220390	1220391	1220392		
Sample Reference				BH205	BH205A	BH205C		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.20-0.40	0.80-0.95	1.80-2.00		
Date Sampled				08/05/2019	09/05/2019	10/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
Chloroethane	µg/kg	1	NONE	-	< 1.0	< 1.0		
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	< 1.0		
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	< 1.0		
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0		
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0		
Benzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0		
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Styrene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Tribromomethane	µg/kg	1	NONE	-	< 1.0	< 1.0		
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	< 1.0		
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0		

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Analytical Report Number: 19-41032

Project / Site name: Station Hill, Reading

Lab Sample Number				1220390	1220391	1220392		
Sample Reference				BH205	BH205A	BH205C		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.20-0.40	0.80-0.95	1.80-2.00		
Date Sampled				08/05/2019	09/05/2019	10/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	< 0.1	< 0.1		
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	< 0.2		
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1		
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1		
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1		
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05		
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	< 0.2		
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
Naphthalene	mg/kg	0.05	MCERTS	-	0.25	< 0.05		
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	< 0.1		
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1		
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	< 0.1		
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1		
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	< 0.1		
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1		
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1		
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1		
Acenaphthylene	mg/kg	0.05	MCERTS	-	0.14	0.11		
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	0.23		
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	< 0.3		
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
Fluorene	mg/kg	0.05	MCERTS	-	0.43	0.22		
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
Phenanthrene	mg/kg	0.05	MCERTS	-	1.4	0.77		
Anthracene	mg/kg	0.05	MCERTS	-	0.95	0.71		
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2		
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3		
Fluoranthene	mg/kg	0.05	MCERTS	-	4.0	3.9		
Pyrene	mg/kg	0.05	MCERTS	-	3.4	3.7		
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	< 0.3		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	2.3	2.3		
Chrysene	mg/kg	0.05	MCERTS	-	2.1	2.3		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	2.4	1.9		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.92	0.92		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	1.9	2.1		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.89	0.83		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	0.24	0.18		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.91	0.94		

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Analytical Report Number : 19-41032

Project / Site name: Station Hill, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1220390	BH205	None Supplied	0.20-0.40	Brown gravel with stones.**
1220391	BH205A	None Supplied	0.80-0.95	Brown sandy gravel with brick.**
1220392	BH205C	None Supplied	1.80-2.00	Brown clay.

** NON MCERTS MATRIX

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Analytical Report Number : 19-41032

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-42156

Project / Site name:	Station Hill, Reading	**Samples received on:**	17/05/2019
Your job number:	35248	**Samples instructed on:**	21/05/2019
Your order number:	35248-DO	**Analysis completed by:**	29/05/2019
Report Issue Number:	1	**Report issued on:**	29/05/2019
Samples Analysed:	3 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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Analytical Report Number: 19-42156

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1226674	1226675	1226676		
Sample Reference				WS201	WS211	WS211A		
Sample Number				2	1	2		
Depth (m)				1.00-1.20	0.50-0.70	0.95-1.00		
Date Sampled				16/05/2019	16/05/2019	16/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	6.1	9.9	15		
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	12.0	8.5	7.9		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	77	550	780		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.039	0.27	0.39		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	38.7	274	388		
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.35	0.77		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.19	0.27		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.34		
Phenanthrene	mg/kg	0.05	MCERTS	1.7	3.9	5.2		
Anthracene	mg/kg	0.05	MCERTS	0.48	1.4	2.0		
Fluoranthene	mg/kg	0.05	MCERTS	4.8	12	18		
Pyrene	mg/kg	0.05	MCERTS	4.1	12	18		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.7	5.6	12		
Chrysene	mg/kg	0.05	MCERTS	2.0	6.2	8.9		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.8	8.6	17		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.4	3.5	5.2		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.6	7.0	14		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.82	4.0	7.7		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.99	2.0		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.1	4.8	10		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	21.4	70.7	122		

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

Analytical Report Number: 19-42156

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1226674	1226675	1226676		
Sample Reference				WS201	WS211	WS211A		
Sample Number				2	1	2		
Depth (m)				1.00-1.20	0.50-0.70	0.95-1.00		
Date Sampled				16/05/2019	16/05/2019	16/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	21	20		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.81	1.1	1.0		
Boron (water soluble)	mg/kg	0.2	MCERTS	3.3	2.7	4.1		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	21	18		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	28	70	170		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	120	440	690		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6	1.2	0.7		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	27	20		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	33	42	39		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	70	140	130		
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	3.0	< 1.0	8.3		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	4.9	< 2.0	7.1		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	26	< 8.0	15		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	140	< 8.0	80		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	180	< 10	110		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	5.7	7.9	6.9		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	34	78	100		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	120	210	290		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	160	300	400		
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001		
PCB Congener 52	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001		
PCB Congener 101	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001		
PCB Congener 118	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001		
PCB Congener 138	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001		
PCB Congener 153	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001		
PCB Congener 180	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001		
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	< 0.007	< 0.007		

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Analytical Report Number : 19-42156

Project / Site name: Station Hill, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1226674	WS201	2	1.00-1.20	Light grey gravelly sand with rubble and vegetation.
1226675	WS211	1	0.50-0.70	Brown loam and clay with gravel and rubble.
1226676	WS211A	2	0.95-1.00	Grey gravelly loam with rubble.

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Analytical Report Number : 19-42156

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-42229

Replaces Analytical Report Number : 19-42229, issue no. 1

Project / Site name:	Station Hill North Site	**Samples received on:**	21/05/2019
Your job number:	35248	**Samples instructed on:**	21/05/2019
Your order number:	35067	**Analysis completed by:**	17/06/2019
Report Issue Number:	2	**Report issued on:**	17/06/2019
Samples Analysed:	6 soil samples		

Signed:

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

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site
Your Order No: 35067

Lab Sample Number				1227035	1227036	1227037	1227038	1227039
Sample Reference				WS202	WS202	WS202	WS202	WS202
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.30	0.50-0.70	2.20-2.40	3.70-3.90	5.20-5.40
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	39
Moisture Content	%	N/A	NONE	9.2	7.9	24	13	9.3
Total mass of sample received	kg	0.001	NONE	2.0	1.8	2.0	1.9	2.0
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile & Amosite	Amosite	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Not-detected	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	0.002	0.024	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	0.002	0.024	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	11.7	10.5	7.9	8.4	8.7
Total Cyanide	mg/kg	1	MCERTS	< 1	1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.035	0.17	0.22	0.025	0.028
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.21	0.33	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.47	0.76	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.23	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.31	0.22	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	4.4	3.7	0.51	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	1.5	1.1	0.17	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	10	12	2.3	< 0.05	0.36
Pyrene	mg/kg	0.05	MCERTS	9.0	11	2.2	< 0.05	0.33
Benzo(a)anthracene	mg/kg	0.05	MCERTS	5.5	7.7	0.96	< 0.05	0.18
Chrysene	mg/kg	0.05	MCERTS	5.2	5.1	1.1	< 0.05	0.15
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	6.1	7.8	1.4	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.4	4.8	0.50	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.6	7.4	1.0	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.2	4.7	0.47	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.82	1.1	0.17	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	4.0	5.7	0.67	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	60.0	72.4	11.4	< 0.80	1.02
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	12	15	15	3.7
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.77	0.83	1.0	0.48	0.21
Boron (water soluble)	mg/kg	0.2	MCERTS	2.7	0.9	2.2	0.6	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	22	21	37	18	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	63	120	16	11	5.7
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	240	22	6.5	4.1
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	0.9	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	19	19	19	7.4
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	31	27	52	42	18
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	82	110	55	28	15

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Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site
Your Order No: 35067

Lab Sample Number				1227035	1227036	1227037	1227038	1227039
Sample Reference				WS202	WS202	WS202	WS202	WS202
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.30	0.50-0.70	2.20-2.40	3.70-3.90	5.20-5.40
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	5.7	1.5	< 1.0	< 1.0	4.4
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	18	8.3	< 2.0	< 2.0	6.4
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	48	16	< 8.0	< 8.0	12
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	160	62	< 8.0	< 8.0	55
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	240	88	< 10	< 10	79
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	11	11	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	6.5	29	18	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	62	76	26	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	190	190	53	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	260	310	110	< 10	< 10

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Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site
Your Order No: 35067

Lab Sample Number				1227035	1227036	1227037	1227038	1227039
Sample Reference				WS202	WS202	WS202	WS202	WS202
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.30	0.50-0.70	2.20-2.40	3.70-3.90	5.20-5.40
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-

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Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site

Your Order No: 35067

Lab Sample Number				1227035	1227036	1227037	1227038	1227039
Sample Reference				WS202	WS202	WS202	WS202	WS202
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.30	0.50-0.70	2.20-2.40	3.70-3.90	5.20-5.40
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	< 0.1	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	0.33	< 0.05	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	0.76	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	-	0.22	< 0.05	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	3.7	0.51	-	-
Anthracene	mg/kg	0.05	MCERTS	-	1.1	0.17	-	-
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	12	2.3	-	-
Pyrene	mg/kg	0.05	MCERTS	-	11	2.2	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	7.7	0.96	-	-
Chrysene	mg/kg	0.05	MCERTS	-	5.1	1.1	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	7.8	1.4	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	4.8	0.50	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	7.4	1.0	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	4.7	0.47	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	1.1	0.17	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	5.7	0.67	-	-

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Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site
Your Order No: 35067

Lab Sample Number				1227035	1227036	1227037	1227038	1227039
Sample Reference				WS202	WS202	WS202	WS202	WS202
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.30	0.50-0.70	2.20-2.40	3.70-3.90	5.20-5.40
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	< 0.007	-	-

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Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site

Your Order No: 35067

Lab Sample Number				1227040				
Sample Reference				WS204				
Sample Number				None Supplied				
Depth (m)				0.10-0.30				
Date Sampled				20/05/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	8.8				
Total mass of sample received	kg	0.001	NONE	1.9				
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-				
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-				
Asbestos Quantification Total	%	0.001	ISO 17025	-				
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.5				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.091				
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	1.3				
Pyrene	mg/kg	0.05	MCERTS	1.6				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.97				
Chrysene	mg/kg	0.05	MCERTS	0.94				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.1				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.75				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.1				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.49				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.67				
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	8.90				
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.4				
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.31				
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	37				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	18				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	28				

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Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site
Your Order No: 35067

Lab Sample Number				1227040				
Sample Reference				WS204				
Sample Number				None Supplied				
Depth (m)				0.10-0.30				
Date Sampled				20/05/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-xylene	µg/kg	1	MCERTS	< 1.0				
o-xylene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	16				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	48				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	25				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	89				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	24				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	52				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	88				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	160				

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Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site

Your Order No: 35067

Lab Sample Number				1227040				
Sample Reference				WS204				
Sample Number				None Supplied				
Depth (m)				0.10-0.30				
Date Sampled				20/05/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0				
Chloroethane	µg/kg	1	NONE	< 1.0				
Bromomethane	µg/kg	1	ISO 17025	< 1.0				
Vinyl Chloride	µg/kg	1	NONE	< 1.0				
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0				
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0				
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0				
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloromethane	µg/kg	1	MCERTS	< 1.0				
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0				
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0				
Benzene	µg/kg	1	MCERTS	< 1.0				
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloroethene	µg/kg	1	MCERTS	< 1.0				
Dibromomethane	µg/kg	1	MCERTS	< 1.0				
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0				
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0				
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0				
Tetrachloroethene	µg/kg	1	NONE	< 1.0				
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0				
Chlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-Xylene	µg/kg	1	MCERTS	< 1.0				
Styrene	µg/kg	1	MCERTS	< 1.0				
Tribromomethane	µg/kg	1	NONE	< 1.0				
o-Xylene	µg/kg	1	MCERTS	< 1.0				
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0				
Bromobenzene	µg/kg	1	MCERTS	< 1.0				
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0				
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0				
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0				
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0				
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0				
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0				

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Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site

Your Order No: 35067

Lab Sample Number				1227040				
Sample Reference				WS204				
Sample Number				None Supplied				
Depth (m)				0.10-0.30				
Date Sampled				20/05/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1				
Phenol	mg/kg	0.2	ISO 17025	< 0.2				
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1				
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2				
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2				
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1				
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2				
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1				
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3				
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05				
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3				
4-Methylphenol	mg/kg	0.2	NONE	< 0.2				
Isophorone	mg/kg	0.2	MCERTS	< 0.2				
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3				
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3				
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3				
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3				
Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3				
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1				
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1				
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1				
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1				
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2				
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1				
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1				
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1				
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2				
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2				
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3				
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2				
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Azobenzene	mg/kg	0.3	MCERTS	< 0.3				
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2				
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3				
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Carbazole	mg/kg	0.3	MCERTS	< 0.3				
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2				
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3				
Fluoranthene	mg/kg	0.05	MCERTS	1.3				
Pyrene	mg/kg	0.05	MCERTS	1.6				
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.97				
Chrysene	mg/kg	0.05	MCERTS	0.94				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.1				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.75				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.1				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.49				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.67				

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

Analytical Report Number: 19-42229

Project / Site name: Station Hill North Site
Your Order No: 35067

Lab Sample Number				1227040				
Sample Reference				WS204				
Sample Number				None Supplied				
Depth (m)				0.10-0.30				
Date Sampled				20/05/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001				
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	< 0.007				

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Analytical Report Number: 19-42229
Project / Site name: Station Hill North Site
Your Order No: 35067

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1227035	WS202	0.10-0.30	141	Loose Fibrous Debris & Loose Fibres	**Chrysotile & Amosite**	0.002	**0.002**
1227036	WS202	0.50-0.70	148	Sheeting/Board Debris	**Amosite**	0.024	**0.024**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

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Analytical Report Number : 19-42229

Project / Site name: Station Hill North Site

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1227035	WS202	None Supplied	0.10-0.30	Brown sand with gravel and vegetation.
1227036	WS202	None Supplied	0.50-0.70	Brown clay and sand with rubble.
1227037	WS202	None Supplied	2.20-2.40	Grey clay.
1227038	WS202	None Supplied	3.70-3.90	Grey clay and sand with gravel.
1227039	WS202	None Supplied	5.20-5.40	Brown sand with gravel and stones.
1227040	WS204	None Supplied	0.10-0.30	Brown clay and sand with rubble and brick.

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Analytical Report Number : 19-42229

Project / Site name: Station Hill North Site

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

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Analytical Report Number : 19-42229

Project / Site name: Station Hill North Site

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-42284

Project / Site name:	Station Hill North Site	**Samples received on:**	21/05/2019
Your job number:	35248	**Samples instructed on:**	21/05/2019
Your order number:	35067-TW	**Analysis completed by:**	29/05/2019
Report Issue Number:	1	**Report issued on:**	29/05/2019
Samples Analysed:	4 soil samples		

Signed: Karolina Marek

Karolina Marek
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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Analytical Report Number: 19-42284

Project / Site name: Station Hill North Site
Your Order No: 35067-TW

Lab Sample Number				1227311	1227312	1227313	1227314
Sample Reference				BH201	BH201	BH201	BH201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.50	1.10-1.30	3.60-3.80	6.00-6.20
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	16	13	6.7
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0	2.0
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	-
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	8.5	8.6	8.8	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.035	0.026	0.011	0.011
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.47	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.24	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.24	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	5.5	0.92	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	1.4	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	14	2.1	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	12	1.8	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	5.8	0.68	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	5.9	1.2	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	8.1	1.1	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	4.5	0.54	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	6.9	0.87	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	4.3	0.61	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.80	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	5.1	0.63	< 0.05	< 0.05
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	75.0	10.4	< 0.80	< 0.80

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Analytical Report Number: 19-42284

Project / Site name: Station Hill North Site
Your Order No: 35067-TW

Lab Sample Number				1227311	1227312	1227313	1227314
Sample Reference				BH201	BH201	BH201	BH201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.50	1.10-1.30	3.60-3.80	6.00-6.20
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	12	17	22
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.65	0.48	0.44	0.49
Boron (water soluble)	mg/kg	0.2	MCERTS	2.3	1.6	0.4	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.4	0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	14	14	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	63	31	6.6	9.9
Lead (aqua regia extractable)	mg/kg	1	MCERTS	630	200	5.2	6.8
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	2.3	1.0	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	15	14	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	32	28	33	33
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	420	92	24	31
Monoaromatics & Oxygenates							
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons							
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	6.2	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	18	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	75	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	99	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	6.7	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	64	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	190	22	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	260	30	< 10	< 10

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Analytical Report Number: 19-42284

Project / Site name: Station Hill North Site
Your Order No: 35067-TW

Lab Sample Number				1227311	1227312	1227313	1227314
Sample Reference				BH201	BH201	BH201	BH201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.50	1.10-1.30	3.60-3.80	6.00-6.20
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
VOCs							
Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-

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Analytical Report Number: 19-42284

Project / Site name: Station Hill North Site
Your Order No: 35067-TW

Lab Sample Number				1227311	1227312	1227313	1227314
Sample Reference				BH201	BH201	BH201	BH201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.50	1.10-1.30	3.60-3.80	6.00-6.20
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
SVOCs							
Aniline	mg/kg	0.1	NONE	< 0.1	-	-	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	-	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	0.47	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	0.24	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Fluorene	mg/kg	0.05	MCERTS	0.24	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	5.5	-	-	-
Anthracene	mg/kg	0.05	MCERTS	1.4	-	-	-
Carbazole	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	14	-	-	-
Pyrene	mg/kg	0.05	MCERTS	12	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	5.8	-	-	-
Chrysene	mg/kg	0.05	MCERTS	5.9	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	8.1	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	4.5	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	6.9	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	4.3	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.80	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	5.1	-	-	-

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Analytical Report Number: 19-42284

Project / Site name: Station Hill North Site
Your Order No: 35067-TW

Lab Sample Number				1227311	1227312	1227313	1227314
Sample Reference				BH201	BH201	BH201	BH201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.50	1.10-1.30	3.60-3.80	6.00-6.20
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
PCBs by GC-MS							
PCB Congener 28	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	< 0.001	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	< 0.001	-	-
Total PCBs by GC-MS							
Total PCBs	mg/kg	0.007	MCERTS	-	< 0.007	-	-

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Analytical Report Number : 19-42284

Project / Site name: Station Hill North Site

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1227311	BH201	None Supplied	0.30-0.50	Brown clay and sand with rubble and brick.
1227312	BH201	None Supplied	1.10-1.30	Brown clay and sand with brick.
1227313	BH201	None Supplied	3.60-3.80	Brown sand.
1227314	BH201	None Supplied	6.00-6.20	Brown sand with gravel.

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Analytical Report Number : 19-42284

Project / Site name: Station Hill North Site

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-42770

Replaces Analytical Report Number : 19-42770, issue no. 1

Project / Site name:	Station Hill Reading	**Samples received on:**	23/05/2019
Your job number:	35248-DO	**Samples instructed on:**	24/05/2019
Your order number:		**Analysis completed by:**	18/06/2019
Report Issue Number:	2	**Report issued on:**	18/06/2019
Samples Analysed:	7 soil samples		

Signed: K. Lewicka

Katarzyna Lewicka
Head of Reporting Section
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230000	1230001	1230002	1230003	1230004
Sample Reference				TP206	TP206	TP208	TP208	TP205
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.60	2.10-2.20	0.50-0.70	1.50-1.70	0.70-1.00
Date Sampled				22/05/2019	22/05/2019	22/05/2019	22/05/2019	22/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	4.5	14	5.2	15	17
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0	2.0	2.0
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Amosite	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	< 0.001	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	< 0.001	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	11.6	8.7	11.7	9.0	8.4
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.021	0.18	0.020	0.090	0.25
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.40	4.4	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.3	16	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.44	3.0	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.45	4.7	0.24
Phenanthrene	mg/kg	0.05	MCERTS	0.32	0.22	6.5	37	1.4
Anthracene	mg/kg	0.05	MCERTS	0.10	< 0.05	1.7	17	0.57
Fluoranthene	mg/kg	0.05	MCERTS	0.86	0.68	19	140	2.0
Pyrene	mg/kg	0.05	MCERTS	0.82	0.64	19	160	1.8
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.46	0.41	10	88	1.3
Chrysene	mg/kg	0.05	MCERTS	0.49	0.43	9.5	73	1.2
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.49	0.57	13	100	0.84
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.29	0.34	5.1	67	0.66
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.48	0.53	12	120	0.96
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.26	0.35	6.7	74	0.40
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.7	18	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.29	0.40	7.7	89	0.43
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	4.86	4.57	114	1020	11.8
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	16	12	9.4	16
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.60	1.4	0.57	1.3	0.92
Boron (water soluble)	mg/kg	0.2	MCERTS	1.9	2.3	1.2	1.3	2.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.6	0.2	0.3	0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	21	15	22	28
Copper (aqua regia extractable)	mg/kg	1	MCERTS	140	48	57	120	39
Lead (aqua regia extractable)	mg/kg	1	MCERTS	52	280	97	160	140
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	1.5	< 0.3	< 0.3	0.7
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	21	17	37	23
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	28	30	32	75	38
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	200	130	110	170	61

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Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230000	1230001	1230002	1230003	1230004
Sample Reference				TP206	TP206	TP208	TP208	TP205
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.60	2.10-2.20	0.50-0.70	1.50-1.70	0.70-1.00
Date Sampled				22/05/2019	22/05/2019	22/05/2019	22/05/2019	22/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	2.4	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	12	< 8.0	22	18	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	130	< 8.0	150	120	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	140	< 10	170	140	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	7.5	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	5.4	41	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	17	12	60	690	21
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	84	37	230	2900	64
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	100	49	300	3600	85

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Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230000	1230001	1230002	1230003	1230004
Sample Reference				TP206	TP206	TP208	TP208	TP205
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.60	2.10-2.20	0.50-0.70	1.50-1.70	0.70-1.00
Date Sampled				22/05/2019	22/05/2019	22/05/2019	22/05/2019	22/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	NONE	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-	-
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	NONE	-	-	-	-	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	-

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Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230000	1230001	1230002	1230003	1230004
Sample Reference				TP206	TP206	TP208	TP208	TP205
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.60	2.10-2.20	0.50-0.70	1.50-1.70	0.70-1.00
Date Sampled				22/05/2019	22/05/2019	22/05/2019	22/05/2019	22/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

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Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230000	1230001	1230002	1230003	1230004
Sample Reference				TP206	TP206	TP208	TP208	TP205
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.60	2.10-2.20	0.50-0.70	1.50-1.70	0.70-1.00
Date Sampled				22/05/2019	22/05/2019	22/05/2019	22/05/2019	22/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	0.001	< 0.001	-	-	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	0.002	< 0.001	-	-	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	0.002	< 0.001	-	-	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	0.002	< 0.001	-	-	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	0.002	< 0.001	-	-	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	0.002	< 0.001	-	-	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	0.003	< 0.001	-	-	< 0.001
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	0.015	< 0.007	-	-	< 0.007

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Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230005	1230006			
Sample Reference				TP205	TP205			
Sample Number				None Supplied	None Supplied			
Depth (m)				2.30-2.50	2.80-3.00			
Date Sampled				22/05/2019	22/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	13	38			
Total mass of sample received	kg	0.001	NONE	2.0	2.0			
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-			
Asbestos in Soil	Type	N/A	ISO 17025	-	-			
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-			
Asbestos Quantification Total	%	0.001	ISO 17025	-	-			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.5	7.7			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.055	1.5			
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.68			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.45			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.30			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.75			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	1.9			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.71			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.57			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.28			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.29			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	5.89			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	17	16			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.0	0.80			
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	5.6			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	32	23			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	68			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	21	150			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	1.6			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	26	23			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	53	44			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	41	100			

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Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230005	1230006			
Sample Reference				TP205	TP205			
Sample Number				None Supplied	None Supplied			
Depth (m)				2.30-2.50	2.80-3.00			
Date Sampled				22/05/2019	22/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	24			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	24			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	31			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	31			

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Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230005	1230006			
Sample Reference				TP205	TP205			
Sample Number				None Supplied	None Supplied			
Depth (m)				2.30-2.50	2.80-3.00			
Date Sampled				22/05/2019	22/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0			
Chloroethane	µg/kg	1	NONE	-	< 1.0			
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0			
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0			
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0			
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0			
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0			
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0			
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0			
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0			
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0			
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0			
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0			
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0			
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0			
Benzene	µg/kg	1	MCERTS	-	< 1.0			
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0			
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0			
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0			
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0			
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0			
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0			
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0			
Toluene	µg/kg	1	MCERTS	-	< 1.0			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0			
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0			
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0			
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0			
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0			
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0			
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0			
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0			
Styrene	µg/kg	1	MCERTS	-	< 1.0			
Tribromomethane	µg/kg	1	NONE	-	< 1.0			
o-Xylene	µg/kg	1	MCERTS	-	< 1.0			
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0			
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0			
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0			
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0			
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0			
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0			
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0			
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0			
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0			
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0			
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0			
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0			
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0			
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0			
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0			
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0			
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0			
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0			

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

Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230005	1230006			
Sample Reference				TP205	TP205			
Sample Number				None Supplied	None Supplied			
Depth (m)				2.30-2.50	2.80-3.00			
Date Sampled				22/05/2019	22/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	< 0.1			
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2			
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1			
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2			
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2			
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1			
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2			
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1			
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3			
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05			
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3			
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2			
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2			
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3			
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3			
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3			
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3			
Naphthalene	mg/kg	0.05	MCERTS	-	0.68			
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3			
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1			
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1			
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1			
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1			
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2			
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1			
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1			
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1			
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1			
Acenaphthylene	mg/kg	0.05	MCERTS	-	0.45			
Acenaphthene	mg/kg	0.05	MCERTS	-	0.30			
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2			
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2			
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3			
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2			
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2			
Fluorene	mg/kg	0.05	MCERTS	-	0.75			
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3			
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2			
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3			
Phenanthrene	mg/kg	0.05	MCERTS	-	1.9			
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05			
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3			
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2			
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3			
Fluoranthene	mg/kg	0.05	MCERTS	-	0.71			
Pyrene	mg/kg	0.05	MCERTS	-	0.57			
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.28			
Chrysene	mg/kg	0.05	MCERTS	-	0.29			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05			

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Analytical Report Number: 19-42770

Project / Site name: Station Hill Reading

Lab Sample Number				1230005	1230006			
Sample Reference				TP205	TP205			
Sample Number				None Supplied	None Supplied			
Depth (m)				2.30-2.50	2.80-3.00			
Date Sampled				22/05/2019	22/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-			
PCB Congener 52	mg/kg	0.001	MCERTS	-	-			
PCB Congener 101	mg/kg	0.001	MCERTS	-	-			
PCB Congener 118	mg/kg	0.001	MCERTS	-	-			
PCB Congener 138	mg/kg	0.001	MCERTS	-	-			
PCB Congener 153	mg/kg	0.001	MCERTS	-	-			
PCB Congener 180	mg/kg	0.001	MCERTS	-	-			
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-			

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Analytical Report Number: 19-42770
Project / Site name: Station Hill Reading
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1230002	TP208	0.50-0.70	107	Loose Fibres	**Amosite**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

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Analytical Report Number : 19-42770

Project / Site name: Station Hill Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1230000	TP206	None Supplied	0.50-0.60	Beige rubble.
1230001	TP206	None Supplied	2.10-2.20	Brown clay and sand with brick and rubble.
1230002	TP208	None Supplied	0.50-0.70	Brown gravelly sand with rubble.
1230003	TP208	None Supplied	1.50-1.70	Brown loam and clay with gravel.
1230004	TP205	None Supplied	0.70-1.00	Brown clay and sand with gravel.
1230005	TP205	None Supplied	2.30-2.50	Brown clay and sand.
1230006	TP205	None Supplied	2.80-3.00	Brown clay.

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Analytical Report Number : 19-42770

Project / Site name: Station Hill Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

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Analytical Report Number : 19-42770

Project / Site name: Station Hill Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-43154

Project / Site name:	Station Hill, Reading	**Samples received on:**	28/05/2019
Your job number:	35248	**Samples instructed on:**	29/05/2019
Your order number:		**Analysis completed by:**	04/06/2019
Report Issue Number:	1	**Report issued on:**	04/06/2019
Samples Analysed:	3 soil samples		

Signed:

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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Analytical Report Number: 19-43154

Project / Site name: Station Hill, Reading

Lab Sample Number				1231886	1231887	1231888		
Sample Reference				BH202D	BH202D	BH202D		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.30-2.040	3.00-3.20	6.00-6.20		
Date Sampled				23/05/2019	23/05/2019	23/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	27		
Moisture Content	%	N/A	NONE	32	16	3.6		
Total mass of sample received	kg	0.001	NONE	1.6	2.0	2.0		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.1	8.5	8.7		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1000	26	39		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.52	0.013	0.019		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	524	13.1	19.3		
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	1.3	< 1.0	< 1.0		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	0.99	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	0.58	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	3.3	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	17	< 0.05	< 0.05		
Anthracene	mg/kg	0.05	MCERTS	5.2	< 0.05	< 0.05		
Fluoranthene	mg/kg	0.05	MCERTS	19	< 0.05	< 0.05		
Pyrene	mg/kg	0.05	MCERTS	15	< 0.05	< 0.05		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	9.3	< 0.05	< 0.05		
Chrysene	mg/kg	0.05	MCERTS	5.6	< 0.05	< 0.05		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	7.5	< 0.05	< 0.05		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.3	< 0.05	< 0.05		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.8	< 0.05	< 0.05		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.7	< 0.05	< 0.05		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.98	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	4.5	< 0.05	< 0.05		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	101	< 0.80	< 0.80		
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	32	10	39		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.3	0.57	0.75		
Boron (water soluble)	mg/kg	0.2	MCERTS	9.6	1.3	0.4		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	3.9	< 0.2	< 0.2		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (III)	mg/kg	1	NONE	22	19	43		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	22	19	43		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	6900	20	9.1		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	410	6.1	8.8		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	2.3	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	160	15	38		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.7	< 1.0	< 1.0		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	38	25	61		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	3800	25	45		

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Analytical Report Number: 19-43154

Project / Site name: Station Hill, Reading

Lab Sample Number				1231886	1231887	1231888		
Sample Reference				BH202D	BH202D	BH202D		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.30-2.040	3.00-3.20	6.00-6.20		
Date Sampled				23/05/2019	23/05/2019	23/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	6.4	< 2.0	< 2.0		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	38	< 8.0	< 8.0		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	160	< 8.0	< 8.0		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	210	< 10	< 10		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	4.3	< 1.0	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	45	< 2.0	< 2.0		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	250	< 10	< 10		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	360	< 10	< 10		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	670	< 10	< 10		

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Analytical Report Number: 19-43154

Project / Site name: Station Hill, Reading

Lab Sample Number				1231886	1231887	1231888		
Sample Reference				BH202D	BH202D	BH202D		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.30-2.040	3.00-3.20	6.00-6.20		
Date Sampled				23/05/2019	23/05/2019	23/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	-		
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	-		
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	-		
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	-		
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	-		
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	-		
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	-		
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		

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Analytical Report Number: 19-43154

Project / Site name: Station Hill, Reading

Lab Sample Number				1231886	1231887	1231888		
Sample Reference				BH202D	BH202D	BH202D		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.30-2.040	3.00-3.20	6.00-6.20		
Date Sampled				23/05/2019	23/05/2019	23/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	-		
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	-		
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-		
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	-		
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-		
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	-		
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	-		
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	-		
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
Acenaphthylene	mg/kg	0.05	MCERTS	0.99	< 0.05	-		
Acenaphthene	mg/kg	0.05	MCERTS	0.58	< 0.05	-		
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Dibenzofuran	mg/kg	0.2	MCERTS	1.0	< 0.2	-		
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	-		
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Fluorene	mg/kg	0.05	MCERTS	3.3	< 0.05	-		
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Phenanthrene	mg/kg	0.05	MCERTS	17	< 0.05	-		
Anthracene	mg/kg	0.05	MCERTS	5.2	< 0.05	-		
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Fluoranthene	mg/kg	0.05	MCERTS	19	< 0.05	-		
Pyrene	mg/kg	0.05	MCERTS	15	< 0.05	-		
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	-		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	9.3	< 0.05	-		
Chrysene	mg/kg	0.05	MCERTS	5.6	< 0.05	-		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	7.5	< 0.05	-		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.3	< 0.05	-		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.8	< 0.05	-		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.7	< 0.05	-		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.98	< 0.05	-		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	4.5	< 0.05	-		

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Analytical Report Number : 19-43154

Project / Site name: Station Hill, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1231886	BH202D	None Supplied	2.30-2.040	Brown clay and sand with gravel.
1231887	BH202D	None Supplied	3.00-3.20	Light brown clay.
1231888	BH202D	None Supplied	6.00-6.20	Brown sand with gravel and stones.

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Analytical Report Number : 19-43154

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-43154

Project / Site name:	Station Hill, Reading	**Samples received on:**	28/05/2019
Your job number:	35248	**Samples instructed on:**	29/05/2019
Your order number:		**Analysis completed by:**	04/06/2019
Report Issue Number:	1	**Report issued on:**	04/06/2019
Samples Analysed:	3 soil samples		

Signed:

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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

Analytical Report Number: 19-43154

Project / Site name: Station Hill, Reading

Lab Sample Number				1231886	1231887	1231888		
Sample Reference				BH202D	BH202D	BH202D		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.30-2.040	3.00-3.20	6.00-6.20		
Date Sampled				23/05/2019	23/05/2019	23/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	27		
Moisture Content	%	N/A	NONE	32	16	3.6		
Total mass of sample received	kg	0.001	NONE	1.6	2.0	2.0		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.1	8.5	8.7		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1000	26	39		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.52	0.013	0.019		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	524	13.1	19.3		
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	1.3	< 1.0	< 1.0		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	0.99	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	0.58	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	3.3	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	17	< 0.05	< 0.05		
Anthracene	mg/kg	0.05	MCERTS	5.2	< 0.05	< 0.05		
Fluoranthene	mg/kg	0.05	MCERTS	19	< 0.05	< 0.05		
Pyrene	mg/kg	0.05	MCERTS	15	< 0.05	< 0.05		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	9.3	< 0.05	< 0.05		
Chrysene	mg/kg	0.05	MCERTS	5.6	< 0.05	< 0.05		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	7.5	< 0.05	< 0.05		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.3	< 0.05	< 0.05		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.8	< 0.05	< 0.05		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.7	< 0.05	< 0.05		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.98	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	4.5	< 0.05	< 0.05		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	101	< 0.80	< 0.80		
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	32	10	39		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.3	0.57	0.75		
Boron (water soluble)	mg/kg	0.2	MCERTS	9.6	1.3	0.4		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	3.9	< 0.2	< 0.2		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (III)	mg/kg	1	NONE	22	19	43		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	22	19	43		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	6900	20	9.1		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	410	6.1	8.8		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	2.3	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	160	15	38		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.7	< 1.0	< 1.0		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	38	25	61		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	3800	25	45		

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Analytical Report Number: 19-43154

Project / Site name: Station Hill, Reading

Lab Sample Number				1231886	1231887	1231888		
Sample Reference				BH202D	BH202D	BH202D		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.30-2.040	3.00-3.20	6.00-6.20		
Date Sampled				23/05/2019	23/05/2019	23/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	6.4	< 2.0	< 2.0		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	38	< 8.0	< 8.0		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	160	< 8.0	< 8.0		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	210	< 10	< 10		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	4.3	< 1.0	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	45	< 2.0	< 2.0		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	250	< 10	< 10		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	360	< 10	< 10		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	670	< 10	< 10		

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Analytical Report Number: 19-43154

Project / Site name: Station Hill, Reading

Lab Sample Number				1231886	1231887	1231888		
Sample Reference				BH202D	BH202D	BH202D		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.30-2.040	3.00-3.20	6.00-6.20		
Date Sampled				23/05/2019	23/05/2019	23/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	-		
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	-		
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	-		
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	-		
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	-		
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	-		
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	-		
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	-		
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-		

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Analytical Report Number: 19-43154

Project / Site name: Station Hill, Reading

Lab Sample Number				1231886	1231887	1231888		
Sample Reference				BH202D	BH202D	BH202D		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				2.30-2.040	3.00-3.20	6.00-6.20		
Date Sampled				23/05/2019	23/05/2019	23/05/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1	-		
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2	-		
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-		
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2	-		
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-		
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1	-		
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1	-		
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1	-		
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-		
Acenaphthylene	mg/kg	0.05	MCERTS	0.99	< 0.05	-		
Acenaphthene	mg/kg	0.05	MCERTS	0.58	< 0.05	-		
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Dibenzofuran	mg/kg	0.2	MCERTS	1.0	< 0.2	-		
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	-		
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Fluorene	mg/kg	0.05	MCERTS	3.3	< 0.05	-		
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Phenanthrene	mg/kg	0.05	MCERTS	17	< 0.05	-		
Anthracene	mg/kg	0.05	MCERTS	5.2	< 0.05	-		
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-		
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-		
Fluoranthene	mg/kg	0.05	MCERTS	19	< 0.05	-		
Pyrene	mg/kg	0.05	MCERTS	15	< 0.05	-		
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	< 0.3	-		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	9.3	< 0.05	-		
Chrysene	mg/kg	0.05	MCERTS	5.6	< 0.05	-		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	7.5	< 0.05	-		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.3	< 0.05	-		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.8	< 0.05	-		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.7	< 0.05	-		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.98	< 0.05	-		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	4.5	< 0.05	-		

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Analytical Report Number : 19-43154

Project / Site name: Station Hill, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1231886	BH202D	None Supplied	2.30-2.040	Brown clay and sand with gravel.
1231887	BH202D	None Supplied	3.00-3.20	Light brown clay.
1231888	BH202D	None Supplied	6.00-6.20	Brown sand with gravel and stones.

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Analytical Report Number : 19-43154

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-43168

Project / Site name:	Station Hill, Reading	**Samples received on:**	21/05/2019
Your job number:	35248	**Samples instructed on:**	28/05/2019
Your order number:		**Analysis completed by:**	04/06/2019
Report Issue Number:	1	**Report issued on:**	04/06/2019
Samples Analysed:	4 soil samples		

Signed: Karoline Marek

Karolina Marek
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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Analytical Report Number: 19-43168

Project / Site name: Station Hill, Reading

Lab Sample Number				1231926	1231927	1231928	1231929	
Sample Reference				TP 209	TP 209	TP 209	TP 205	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.50-0.70	1.50-2.00	2.70-2.90	1.50-1.70	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	21/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	29	33	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	3.9	5.8	29	15	
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0	2.0	
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Not-detected	
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	11.7	12.0	7.7	8.3	
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.027	0.0063	0.27	0.037	
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.48	< 0.05	< 0.05	
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.17	< 0.05	< 0.05	
Phenanthrene	mg/kg	0.05	MCERTS	1.4	2.0	0.64	0.55	
Anthracene	mg/kg	0.05	MCERTS	0.39	0.61	< 0.05	< 0.05	
Fluoranthene	mg/kg	0.05	MCERTS	4.0	5.2	0.76	0.59	
Pyrene	mg/kg	0.05	MCERTS	3.9	5.0	0.72	0.50	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.2	3.5	0.45	0.31	
Chrysene	mg/kg	0.05	MCERTS	1.7	2.8	0.41	0.23	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.2	4.4	0.54	< 0.05	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.4	1.5	0.19	< 0.05	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.8	3.6	0.45	< 0.05	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.9	2.7	0.34	< 0.05	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.44	0.60	< 0.05	< 0.05	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.3	3.2	0.39	< 0.05	
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	26.6	35.6	4.89	2.18	

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Analytical Report Number: 19-43168

Project / Site name: Station Hill, Reading

Lab Sample Number				1231926	1231927	1231928	1231929	
Sample Reference				TP 209	TP 209	TP 209	TP 205	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.50-0.70	1.50-2.00	2.70-2.90	1.50-1.70	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	21/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	13	15	17	
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.60	0.60	1.1	0.87	
Boron (water soluble)	mg/kg	0.2	MCERTS	1.0	1.4	7.1	0.8	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	0.4	< 0.2	
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	18	28	25	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	53	56	230	16	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	61	79	95	25	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	15	24	27	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	31	29	53	50	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	67	100	180	54	
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	2.6	< 1.0	< 1.0	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	3.1	7.5	< 2.0	< 2.0	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	21	19	< 8.0	< 8.0	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	67	69	< 8.0	< 8.0	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	90	99	< 10	< 10	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	15	< 10	< 10	< 10	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	34	13	< 10	< 10	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	49	22	< 10	< 10	

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Analytical Report Number: 19-43168

Project / Site name: Station Hill, Reading

Lab Sample Number				1231926	1231927	1231928	1231929	
Sample Reference				TP 209	TP 209	TP 209	TP 205	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.50-0.70	1.50-2.00	2.70-2.90	1.50-1.70	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	21/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	
Chloroethane	µg/kg	1	NONE	-	-	< 1.0	-	
Bromomethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	
Vinyl Chloride	µg/kg	1	NONE	-	-	< 1.0	-	
Trichlorofluoromethane	µg/kg	1	NONE	-	-	< 1.0	-	
1,1-Dichloroethene	µg/kg	1	NONE	-	-	< 1.0	-	
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	< 1.0	-	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	< 1.0	-	
Trichloromethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	< 1.0	-	
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	< 1.0	-	
Benzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
Tetrachloromethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	< 1.0	-	
Trichloroethene	µg/kg	1	MCERTS	-	-	< 1.0	-	
Dibromomethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
Bromodichloromethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	< 1.0	-	
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	< 1.0	-	
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	< 1.0	-	
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	
Tetrachloroethene	µg/kg	1	NONE	-	-	< 1.0	-	
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	
Chlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
p & m-Xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	
Styrene	µg/kg	1	MCERTS	-	-	< 1.0	-	
Tribromomethane	µg/kg	1	NONE	-	-	< 1.0	-	
o-Xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	
Isopropylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
Bromobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	< 1.0	-	
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	< 1.0	-	
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	< 1.0	-	
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	< 1.0	-	
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	

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Analytical Report Number: 19-43168

Project / Site name: Station Hill, Reading

Lab Sample Number				1231926	1231927	1231928	1231929	
Sample Reference				TP 209	TP 209	TP 209	TP 205	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.50-0.70	1.50-2.00	2.70-2.90	1.50-1.70	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	21/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-	< 0.1	-	
Phenol	mg/kg	0.2	ISO 17025	-	-	< 0.2	-	
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-	
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	< 0.1	-	
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	< 0.05	-	
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
4-Methylphenol	mg/kg	0.2	NONE	-	-	< 0.2	-	
Isophorone	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
4-Chloroaniline	mg/kg	0.1	NONE	-	-	< 0.1	-	
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	< 0.1	-	
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-	
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	< 0.1	-	
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	< 0.1	-	
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	
Acenaphthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	< 0.3	-	
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
Fluorene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	
Azobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
Phenanthrene	mg/kg	0.05	MCERTS	-	-	0.64	-	
Anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	
Carbazole	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-	
Anthraquinone	mg/kg	0.3	MCERTS	-	-	< 0.3	-	
Fluoranthene	mg/kg	0.05	MCERTS	-	-	0.76	-	
Pyrene	mg/kg	0.05	MCERTS	-	-	0.72	-	
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	< 0.3	-	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	0.45	-	
Chrysene	mg/kg	0.05	MCERTS	-	-	0.41	-	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	0.54	-	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	0.19	-	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	0.45	-	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	0.34	-	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	0.39	-	

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Analytical Report Number: 19-43168

Project / Site name: Station Hill, Reading

Lab Sample Number				1231926	1231927	1231928	1231929	
Sample Reference				TP 209	TP 209	TP 209	TP 205	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.50-0.70	1.50-2.00	2.70-2.90	1.50-1.70	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	21/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-	-	-	

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Analytical Report Number : 19-43168

Project / Site name: Station Hill, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1231926	TP 209	None Supplied	0.50-0.70	Grey gravel with stones.
1231927	TP 209	None Supplied	1.50-2.00	Grey sand with stones and gravel.
1231928	TP 209	None Supplied	2.70-2.90	Grey clay.
1231929	TP 205	None Supplied	1.50-1.70	Brown clay.

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Analytical Report Number : 19-43168

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
TP 205		S	19-43168	1231929	c	Total cyanide in soil	L080-PL	c
TP 209		S	19-43168	1231926	c	Total cyanide in soil	L080-PL	c
TP 209		S	19-43168	1231927	c	Total cyanide in soil	L080-PL	c
TP 209		S	19-43168	1231928	c	Total cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 19-43214

Replaces Analytical Report Number : 19-43214, issue no. 1

Project / Site name:	Station Hill, Reading	**Samples received on:**	21/05/2019
Your job number:	35248	**Samples instructed on:**	28/05/2019
Your order number:		**Analysis completed by:**	18/06/2019
Report Issue Number:	2	**Report issued on:**	18/06/2019
Samples Analysed:	9 soil samples		

Signed: K. Lewicka

Katarzyna Lewicka
Head of Reporting Section
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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

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

Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232398	1232399	1232400	1232401	1232402
Sample Reference				WS203	WS203	WS203	WS203	WS203
Sample Number				1	2	3	5	7
Depth (m)				0.10-0.20	0.55-0.75	1.10-1.20	2.35-2.45	4.50-4.70
Date Sampled				17/05/2019	17/05/2019	17/05/2019	17/05/2019	17/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	40	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	8.3	9.5	16	18	8.3
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0	2.0	2.0
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Detected	-	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	10.3	8.0	8.3	7.5	8.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	120	530	94	1900	57
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.060	0.26	0.047	0.97	0.028
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	60.4	263	47.0	972	28.3
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.95	7.3	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.54	1.0	34	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	1.5	4.8	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.28	1.4	4.9	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	2.8	15	56	0.46	0.22
Anthracene	mg/kg	0.05	MCERTS	0.68	3.7	30	0.12	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	5.5	28	250	0.73	0.73
Pyrene	mg/kg	0.05	MCERTS	5.1	26	250	0.79	0.79
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.1	15	190	0.28	0.72
Chrysene	mg/kg	0.05	MCERTS	2.6	15	160	0.80	0.43
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.7	19	240	0.71	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.7	8.4	120	0.43	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	3.0	16	270	0.58	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.5	11	170	0.39	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.50	3.0	44	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.8	13	210	0.55	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	34.7	178	2050	5.84	2.89

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Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232398	1232399	1232400	1232401	1232402
Sample Reference				WS203	WS203	WS203	WS203	WS203
Sample Number				1	2	3	5	7
Depth (m)				0.10-0.20	0.55-0.75	1.10-1.20	2.35-2.45	4.50-4.70
Date Sampled				17/05/2019	17/05/2019	17/05/2019	17/05/2019	17/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.5	19	12	18	9.7
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.44	1.1	1.0	0.95	0.55
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	0.9	1.2	6.9	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	0.5	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	20	15	28	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	35	230	90	130	8.1
Lead (aqua regia extractable)	mg/kg	1	MCERTS	34	1100	170	170	6.1
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.3	3.6	1.0	0.9	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	27	33	21	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	1.1	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	22	30	61	37	34
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	72	330	180	170	26
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	8.4	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	27	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	17	95	13	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	17	130	13	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	69	210	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	66	230	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	15	91	680	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	31	220	2600	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	46	450	3700	12	< 10

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Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232398	1232399	1232400	1232401	1232402
Sample Reference				WS203	WS203	WS203	WS203	WS203
Sample Number				1	2	3	5	7
Depth (m)				0.10-0.20	0.55-0.75	1.10-1.20	2.35-2.45	4.50-4.70
Date Sampled				17/05/2019	17/05/2019	17/05/2019	17/05/2019	17/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-

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Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232398	1232399	1232400	1232401	1232402
Sample Reference				WS203	WS203	WS203	WS203	WS203
Sample Number				1	2	3	5	7
Depth (m)				0.10-0.20	0.55-0.75	1.10-1.20	2.35-2.45	4.50-4.70
Date Sampled				17/05/2019	17/05/2019	17/05/2019	17/05/2019	17/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-	< 0.2	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-	< 0.2	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Naphthalene	mg/kg	0.05	MCERTS	-	0.95	-	< 0.05	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	1.0	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	-	1.5	-	< 0.05	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	0.4	-	< 0.2	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	< 0.3	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Fluorene	mg/kg	0.05	MCERTS	-	1.4	-	< 0.05	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Phenanthrene	mg/kg	0.05	MCERTS	-	15	-	0.46	-
Anthracene	mg/kg	0.05	MCERTS	-	3.7	-	0.12	-
Carbazole	mg/kg	0.3	MCERTS	-	0.7	-	< 0.3	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Fluoranthene	mg/kg	0.05	MCERTS	-	28	-	0.73	-
Pyrene	mg/kg	0.05	MCERTS	-	26	-	0.79	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	15	-	0.28	-
Chrysene	mg/kg	0.05	MCERTS	-	15	-	0.80	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	19	-	0.71	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	8.4	-	0.43	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	16	-	0.58	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	11	-	0.39	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	3.0	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	13	-	0.55	-

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Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232398	1232399	1232400	1232401	1232402
Sample Reference				WS203	WS203	WS203	WS203	WS203
Sample Number				1	2	3	5	7
Depth (m)				0.10-0.20	0.55-0.75	1.10-1.20	2.35-2.45	4.50-4.70
Date Sampled				17/05/2019	17/05/2019	17/05/2019	17/05/2019	17/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	< 0.007	-	-

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Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232403	1232404	1232405	1232406	
Sample Reference				TP203	TP203	TP203	TP204	
Sample Number				1	3	6	1	
Depth (m)				0.50-0.60	2.00-2.10	3.50-3.60	0.60-0.65	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	11	17	14	4.8	
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0	2.0	
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	Not-detected	
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.2	8.5	8.6	9.9	
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	220	330	130	340	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.11	0.17	0.067	0.17	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	111	167	67.3	168	
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	2.4	< 0.05	< 0.05	
Acenaphthylene	mg/kg	0.05	MCERTS	0.56	7.0	0.62	< 0.05	
Acenaphthene	mg/kg	0.05	MCERTS	1.2	0.87	< 0.05	< 0.05	
Fluorene	mg/kg	0.05	MCERTS	0.85	1.4	< 0.05	< 0.05	
Phenanthrene	mg/kg	0.05	MCERTS	11	23	2.5	< 0.05	
Anthracene	mg/kg	0.05	MCERTS	4.0	7.5	0.74	< 0.05	
Fluoranthene	mg/kg	0.05	MCERTS	43	70	6.9	0.40	
Pyrene	mg/kg	0.05	MCERTS	46	69	6.6	0.46	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	33	42	3.8	0.34	
Chrysene	mg/kg	0.05	MCERTS	23	35	2.8	0.25	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	43	57	4.0	< 0.05	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	13	18	1.9	< 0.05	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	33	45	3.7	< 0.05	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	19	32	2.4	< 0.05	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	4.6	8.0	0.53	< 0.05	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	21	36	2.8	< 0.05	
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	295	454	39.2	1.45	

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Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232403	1232404	1232405	1232406	
Sample Reference				TP203	TP203	TP203	TP204	
Sample Number				1	3	6	1	
Depth (m)				0.50-0.60	2.00-2.10	3.50-3.60	0.60-0.65	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.1	44	17	4.6	
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.51	3.0	0.51	0.29	
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	1.3	1.0	0.6	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	3.1	
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	20	17	21	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17	520	9.5	16	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	210	730	13	28	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.7	0.9	< 0.3	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12	57	16	14	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.8	< 1.0	< 1.0	
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	21	55	39	22	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	78	260	39	17	
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	3.6	< 1.0	< 1.0	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	7.1	< 2.0	< 2.0	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	74	< 8.0	< 8.0	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	290	< 8.0	< 8.0	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	380	< 10	< 10	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	110	< 1.0	< 1.0	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	3.6	110	< 2.0	< 2.0	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	110	190	23	< 10	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	410	640	46	< 10	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	520	1100	69	< 10	

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Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232403	1232404	1232405	1232406	
Sample Reference				TP203	TP203	TP203	TP204	
Sample Number				1	3	6	1	
Depth (m)				0.50-0.60	2.00-2.10	3.50-3.60	0.60-0.65	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	
Chloroethane	µg/kg	1	NONE	-	-	-	-	
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-	
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-	
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-	
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-	
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-	
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-	
Benzene	µg/kg	1	MCERTS	-	-	-	-	
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-	
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-	
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-	
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-	
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	
Toluene	µg/kg	1	MCERTS	-	-	-	-	
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-	
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-	
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-	
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-	
Styrene	µg/kg	1	MCERTS	-	-	-	-	
Tribromomethane	µg/kg	1	NONE	-	-	-	-	
o-Xylene	µg/kg	1	MCERTS	-	-	-	-	
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-	
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-	
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-	
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	

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Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232403	1232404	1232405	1232406	
Sample Reference				TP203	TP203	TP203	TP204	
Sample Number				1	3	6	1	
Depth (m)				0.50-0.60	2.00-2.10	3.50-3.60	0.60-0.65	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-	-	-	
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-	
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-	
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-	
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-	
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-	
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-	
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-	
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-	
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-	
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-	
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-	
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-	
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-	
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-	
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-	
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-	
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-	
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-	
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-	
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-	
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-	
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-	
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-	
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-	
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-	
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	

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Analytical Report Number: 19-43214

Project / Site name: Station Hill, Reading

Lab Sample Number				1232403	1232404	1232405	1232406	
Sample Reference				TP203	TP203	TP203	TP204	
Sample Number				1	3	6	1	
Depth (m)				0.50-0.60	2.00-2.10	3.50-3.60	0.60-0.65	
Date Sampled				20/05/2019	20/05/2019	20/05/2019	20/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007	-	-	

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Analytical Report Number: 19-43214
Project / Site name: Station Hill, Reading
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1232399	WS203	0.55-0.75	116	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

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

Analytical Report Number : 19-43214

Project / Site name: Station Hill, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1232398	WS203	1	0.10-0.20	Brown clay and sand with gravel.
1232399	WS203	2	0.55-0.75	Brown loam and sand with stones and brick.
1232400	WS203	3	1.10-1.20	Brown loam and sand with gravel.
1232401	WS203	5	2.35-2.45	Brown clay and sand with gravel.
1232402	WS203	7	4.50-4.70	Light brown sand with gravel.
1232403	TP203	1	0.50-0.60	Brown sand with brick and rubble.
1232404	TP203	3	2.00-2.10	Brown gravelly sand.
1232405	TP203	6	3.50-3.60	Brown sand with gravel.
1232406	TP204	1	0.60-0.65	Brown clay and sand with gravel.

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Analytical Report Number : 19-43214

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

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Analytical Report Number : 19-43214

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
TP203	1	S	19-43214	1232403	c	Total cyanide in soil	L080-PL	c
TP203	3	S	19-43214	1232404	c	Total cyanide in soil	L080-PL	c
TP203	6	S	19-43214	1232405	c	Total cyanide in soil	L080-PL	c
TP204	1	S	19-43214	1232406	c	Total cyanide in soil	L080-PL	c
WS203	1	S	19-43214	1232398	c	Total cyanide in soil	L080-PL	c
WS203	2	S	19-43214	1232399	c	Total cyanide in soil	L080-PL	c
WS203	3	S	19-43214	1232400	c	Total cyanide in soil	L080-PL	c
WS203	5	S	19-43214	1232401	c	Total cyanide in soil	L080-PL	c
WS203	7	S	19-43214	1232402	c	Total cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 19-43322

Project / Site name:	Station Hill, Reading	**Samples received on:**	29/05/2019
Your job number:	35248	**Samples instructed on:**	29/05/2019
Your order number:	35248-DO	**Analysis completed by:**	05/06/2019
Report Issue Number:	1	**Report issued on:**	05/06/2019
Samples Analysed:	1 soil sample		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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

Analytical Report Number: 19-43322

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1232937				
Sample Reference				BH202D				
Sample Number				None Supplied				
Depth (m)				8.20-8.40				
Date Sampled				28/05/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	21				
Total mass of sample received	kg	0.001	NONE	2.0				
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.8				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.029				
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Pyrene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80				
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	< 0.06				
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	1.1				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	3.3				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	1.4				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	2.2				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	6.1				

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Analytical Report Number: 19-43322

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1232937				
Sample Reference				BH202D				
Sample Number				None Supplied				
Depth (m)				8.20-8.40				
Date Sampled				28/05/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-xylene	µg/kg	1	MCERTS	< 1.0				
o-xylene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				

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Analytical Report Number : 19-43322

Project / Site name: Station Hill, Reading

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1232937	BH202D	None Supplied	8.20-8.40	White clay with chalk and gravel.

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Analytical Report Number : 19-43322

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-44384

Project / Site name:	Station Hill, Reading	**Samples received on:**	05/06/2019
Your job number:	35248	**Samples instructed on:**	05/06/2019
Your order number:	35248-DO	**Analysis completed by:**	12/06/2019
Report Issue Number:	1	**Report issued on:**	12/06/2019
Samples Analysed:	5 soil samples		

Signed:

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

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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Analytical Report Number: 19-44384

Project / Site name: Station Hill, Reading
Your Order No: 35248-DO

Lab Sample Number				1238604	1238605	1238606	1238607	1238608
Sample Reference				BH203	BH203	BH203	BH203	BH203
Sample Number				1	3	5	7	8
Depth (m)				1.30-1.50	2.40-2.60	4.00-4.10	7.00-7.20	8.20-8.40
Date Sampled				04/06/2019	04/06/2019	04/06/2019	04/06/2019	04/06/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	18	31	17	22
Total mass of sample received	kg	0.001	NONE	2.0	2.0	0.47	2.0	2.0
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.0	7.6	7.6	8.5	8.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.051	0.097	0.49	0.022	0.024
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.33	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.65	< 0.05	0.51	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.27	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	4.3	< 0.05	0.49	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	2.0	< 0.05	0.46	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	16	< 0.05	4.9	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	16	< 0.05	4.6	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	8.3	< 0.05	3.7	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	5.6	< 0.05	2.8	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	7.8	< 0.05	5.1	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	4.5	< 0.05	3.2	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	9.3	< 0.05	6.7	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	4.5	< 0.05	4.1	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.98	< 0.05	0.89	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	5.4	< 0.05	4.4	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	86.6	< 0.80	41.8	< 0.80	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	20	12	9.5	1.2
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.73	0.77	1.1	0.36	< 0.06
Boron (water soluble)	mg/kg	0.2	MCERTS	1.6	1.6	6.2	0.4	0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.2	< 0.2	0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	25	31	12	1.4
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	15	100	8.4	3.3
Lead (aqua regia extractable)	mg/kg	1	MCERTS	92	11	200	4.9	< 1.0
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	1.8	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	27	20	12	1.1
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.0	1.3	1.2	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	29	43	43	23	2.1
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47	41	390	26	6.6

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

Analytical Report Number: 19-44384

Project / Site name: Station Hill, Reading
Your Order No: 35248-DO

Lab Sample Number				1238604	1238605	1238606	1238607	1238608
Sample Reference				BH203	BH203	BH203	BH203	BH203
Sample Number				1	3	5	7	8
Depth (m)				1.30-1.50	2.40-2.60	4.00-4.10	7.00-7.20	8.20-8.40
Date Sampled				04/06/2019	04/06/2019	04/06/2019	04/06/2019	04/06/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	4.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	8.7	< 2.0	8.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	38	< 8.0	30	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	170	< 8.0	210	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	220	< 10	250	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	12	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	17	< 2.0	2.7	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	86	< 10	28	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	330	< 10	210	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	450	< 10	240	< 10	< 10

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Analytical Report Number : 19-44384

Project / Site name: Station Hill, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1238604	BH203	1	1.30-1.50	Brown clay and sand with gravel.
1238605	BH203	3	2.40-2.60	Grey clay.
1238606	BH203	5	4.00-4.10	Black clay and sand with gravel.
1238607	BH203	7	7.00-7.20	Brown sandy clay.
1238608	BH203	8	8.20-8.40	White clay with chalk.

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Analytical Report Number : 19-44384

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-45566

Project / Site name:	Station Hill Reading	**Samples received on:**	13/06/2019
Your job number:	35248	**Samples instructed on:**	13/06/2019
Your order number:	35248-DO	**Analysis completed by:**	20/06/2019
Report Issue Number:	1	**Report issued on:**	20/06/2019
Samples Analysed:	5 soil samples		

Signed:

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

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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

Analytical Report Number: 19-45566

Project / Site name: Station Hill Reading
Your Order No: 35248-DO

Lab Sample Number				1244909	1244910	1244911	1244912	1244913
Sample Reference				BH204	BH204	BH204	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60-0.70	1.30-1.50	2.90-3.00	4.10-4.30	5.60-5.80
Date Sampled				11/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	12	17	14	11	24
Total mass of sample received	kg	0.001	NONE	2.0	1.6	1.9	2.0	2.0
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.8	8.0	8.0	8.5	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1	2	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.32	0.14	0.42	0.023	0.018
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	1.0	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.55	1.6	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.64	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.34	0.95	0.35	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	4.6	11	0.41	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	1.7	2.9	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	10	29	1.0	< 0.05	0.41
Pyrene	mg/kg	0.05	MCERTS	9.0	27	0.94	< 0.05	0.47
Benzo(a)anthracene	mg/kg	0.05	MCERTS	6.7	17	0.45	< 0.05	0.27
Chrysene	mg/kg	0.05	MCERTS	4.8	15	0.52	< 0.05	0.29
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	4.1	15	0.35	< 0.05	0.24
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.6	10	0.27	< 0.05	0.24
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4.8	16	0.34	< 0.05	0.28
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.7	10	< 0.05	< 0.05	0.20
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.80	2.6	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.7	12	< 0.05	< 0.05	0.26
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	56.5	172	4.65	< 0.80	2.66
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	22	5.1	7.6	3.2
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.60	0.83	0.23	0.26	< 0.06
Boron (water soluble)	mg/kg	0.2	MCERTS	2.1	4.5	1.3	0.3	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	24	10	10	1.5
Copper (aqua regia extractable)	mg/kg	1	MCERTS	70	71	7.4	8.2	2.4
Lead (aqua regia extractable)	mg/kg	1	MCERTS	150	760	10	3.4	1.6
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	38	10	9.3	2.8
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	22	37	16	17	1.7
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	270	27	20	11

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Analytical Report Number: 19-45566

Project / Site name: Station Hill Reading
Your Order No: 35248-DO

Lab Sample Number				1244909	1244910	1244911	1244912	1244913
Sample Reference				BH204	BH204	BH204	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60-0.70	1.30-1.50	2.90-3.00	4.10-4.30	5.60-5.80
Date Sampled				11/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	1.2	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.2	3.1	9.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	10	50	130	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	29	65	140	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	74	45	46	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	110	160	330	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	5.7	1.7	9.1	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	11	5.3	100	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	88	72	150	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	210	110	68	< 10	16
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	310	190	320	< 10	22

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Analytical Report Number: 19-45566

Project / Site name: Station Hill Reading
Your Order No: 35248-DO

Lab Sample Number				1244909	1244910	1244911	1244912	1244913
Sample Reference				BH204	BH204	BH204	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60-0.70	1.30-1.50	2.90-3.00	4.10-4.30	5.60-5.80
Date Sampled				11/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	-	< 1.0	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0	-	-

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

Analytical Report Number: 19-45566

Project / Site name: Station Hill Reading
Your Order No: 35248-DO

Lab Sample Number				1244909	1244910	1244911	1244912	1244913
Sample Reference				BH204	BH204	BH204	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60-0.70	1.30-1.50	2.90-3.00	4.10-4.30	5.60-5.80
Date Sampled				11/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	< 0.1	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	1.0	< 0.05	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	1.6	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	0.64	< 0.05	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	0.4	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	-	0.95	0.35	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	11	0.41	-	-
Anthracene	mg/kg	0.05	MCERTS	-	2.9	< 0.05	-	-
Carbazole	mg/kg	0.3	MCERTS	-	1.3	< 0.3	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	1.0	< 0.3	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	29	1.0	-	-
Pyrene	mg/kg	0.05	MCERTS	-	27	0.94	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	17	0.45	-	-
Chrysene	mg/kg	0.05	MCERTS	-	15	0.52	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	15	0.35	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	10	0.27	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	16	0.34	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	10	< 0.05	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	2.6	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	12	< 0.05	-	-

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Analytical Report Number: 19-45566

Project / Site name: Station Hill Reading
Your Order No: 35248-DO

Lab Sample Number				1244909	1244910	1244911	1244912	1244913
Sample Reference				BH204	BH204	BH204	BH204	BH204
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60-0.70	1.30-1.50	2.90-3.00	4.10-4.30	5.60-5.80
Date Sampled				11/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	< 0.007	-	-	-

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Analytical Report Number : 19-45566

Project / Site name: Station Hill Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1244909	BH204	None Supplied	0.60-0.70	Light brown clay and sand with gravel.
1244910	BH204	None Supplied	1.30-1.50	Brown clay and sand with gravel and clinker.
1244911	BH204	None Supplied	2.90-3.00	Light brown clay and sand with gravel.
1244912	BH204	None Supplied	4.10-4.30	Light brown clay and sand with gravel and chalk.
1244913	BH204	None Supplied	5.60-5.80	Beige clay and sand with gravel and chalk.

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Analytical Report Number : 19-45566

Project / Site name: Station Hill Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-45728

Project / Site name:	Station Hill, Reading	**Samples received on:**	14/06/2019
Your job number:	35248	**Samples instructed on:**	14/06/2019
Your order number:	3548-DO	**Analysis completed by:**	21/06/2019
Report Issue Number:	1	**Report issued on:**	21/06/2019
Samples Analysed:	1 soil sample		

Signed: K. Lewicka

Katarzyna Lewicka
Head of Reporting Section
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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Analytical Report Number: 19-45728

Project / Site name: Station Hill, Reading
Your Order No: 3548-DO

Lab Sample Number				1245918				
Sample Reference				BH204				
Sample Number				None Supplied				
Depth (m)				8.40-8.70				
Date Sampled				14/06/2019				
Time Taken				1700				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	20				
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0				
Chloroethane	µg/kg	1	NONE	< 1.0				
Bromomethane	µg/kg	1	ISO 17025	< 1.0				
Vinyl Chloride	µg/kg	1	NONE	< 1.0				
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0				
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0				
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0				
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloromethane	µg/kg	1	MCERTS	< 1.0				
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0				
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0				
Benzene	µg/kg	1	MCERTS	< 1.0				
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloroethene	µg/kg	1	MCERTS	< 1.0				
Dibromomethane	µg/kg	1	MCERTS	< 1.0				
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0				
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0				
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0				
Tetrachloroethene	µg/kg	1	NONE	< 1.0				
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0				
Chlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-Xylene	µg/kg	1	MCERTS	< 1.0				
Styrene	µg/kg	1	MCERTS	< 1.0				
Tribromomethane	µg/kg	1	NONE	< 1.0				
o-Xylene	µg/kg	1	MCERTS	< 1.0				
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0				
Bromobenzene	µg/kg	1	MCERTS	< 1.0				
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0				
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0				
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0				
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0				
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0				
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0				

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Analytical Report Number: 19-45728

Project / Site name: Station Hill, Reading
Your Order No: 3548-DO

Lab Sample Number				1245918				
Sample Reference				BH204				
Sample Number				None Supplied				
Depth (m)				8.40-8.70				
Date Sampled				14/06/2019				
Time Taken				1700				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					

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Analytical Report Number : 19-45728

Project / Site name: Station Hill, Reading

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1245918	BH204	None Supplied	8.40-8.70	White clay and gravel with chalk.

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Analytical Report Number : 19-45728

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-48596

Replaces Analytical Report Number : 19-48596, issue no. 1

Project / Site name:	Station Hill, Reading	**Samples received on:**	05/07/2019
Your job number:	35248	**Samples instructed on:**	05/07/2019
Your order number:	35248-DO	**Analysis completed by:**	25/07/2019
Report Issue Number:	2	**Report issued on:**	25/07/2019
Samples Analysed:	6 water samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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

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

Analytical Report Number: 19-48596

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260151	1260152	1260153	1260154	1260155
Sample Reference				BH201	BH202D	BH203	BH204	BH205C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.23M	3.10M	2.69M	3,44M	2.25M
Date Sampled				04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Time Taken				1045	1105	1130	1300	1020
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.8	7.7	7.8	7.6	7.4
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO_4	µg/l	45	ISO 17025	49300	50400	45200	445000	110000
Sulphate as SO_4	mg/l	0.045	ISO 17025	49.3	50.4	45.2	445	110
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	20	660	49	1200	130
Hardness - Total	mgCaCO3/l	1	ISO 17025	361	348	344	293	405
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	1.94	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	0.64	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	0.34	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	0.68	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	3.33	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	0.69	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	7.16	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	6.12	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	2.90	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	3.12	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	3.69	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	1.55	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	3.25	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	2.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	0.58	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	2.33	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	40.3	< 0.16

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Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260151	1260152	1260153	1260154	1260155
Sample Reference				BH201	BH202D	BH203	BH204	BH205C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.23M	3.10M	2.69M	3,44M	2.25M
Date Sampled				04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Time Taken				1045	1105	1130	1300	1020
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.48	0.31	0.51	1.91	1.19
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	0.2	< 0.1
Boron (dissolved)	µg/l	10	ISO 17025	63	140	59	89	170
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02	0.06	< 0.02
Calcium (dissolved)	mg/l	0.012	ISO 17025	130	130	130	86	150
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	U/S	< 5.0
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	U/S	6.7
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.6	< 0.2	0.7	1.1	6.7
Copper (dissolved)	µg/l	0.5	ISO 17025	3.1	3.3	1.5	0.8	6.1
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	0.9	< 0.2
Magnesium (dissolved)	mg/l	0.005	ISO 17025	6.2	8.4	6.3	19	8.7
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	0.15	0.32	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	4.3	15	4.9	13	29
Selenium (dissolved)	µg/l	0.6	ISO 17025	4.1	1.8	3.4	8.8	3.5
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.6	0.3	1.2	1.6	0.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.9	3.2	1.2	9.4	4.4
Monoaromatics & Oxygenates								
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	7.6	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	13.4	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	3.6	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	390	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	200	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	350	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	3000	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	3900	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	34	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	330	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	660	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	190	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	1200	< 10

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Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260151	1260152	1260153	1260154	1260155
Sample Reference				BH201	BH202D	BH203	BH204	BH205C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.23M	3.10M	2.69M	3,44M	2.25M
Date Sampled				04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Time Taken				1045	1105	1130	1300	1020
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Chloroethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Bromomethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Vinyl Chloride	µg/l	1	NONE	-	-	< 1.0	< 1.0	-
Trichlorofluoromethane	µg/l	1	NONE	-	-	< 1.0	< 1.0	-
1,1-Dichloroethene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,1-Dichloroethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
2,2-Dichloropropane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Trichloromethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,1,1-Trichloroethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,2-Dichloroethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,1-Dichloropropene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Benzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Tetrachloromethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,2-Dichloropropane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Trichloroethene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Dibromomethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Bromodichloromethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Toluene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,1,2-Trichloroethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,3-Dichloropropane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Dibromochloromethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Tetrachloroethene	µg/l	1	ISO 17025	-	-	11.1	< 1.0	-
1,2-Dibromoethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Chlorobenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Ethylbenzene	µg/l	1	ISO 17025	-	-	< 1.0	7.6	-
p & m-Xylene	µg/l	1	ISO 17025	-	-	< 1.0	13.4	-
Styrene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Tribromomethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
o-Xylene	µg/l	1	ISO 17025	-	-	< 1.0	3.6	-
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Isopropylbenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Bromobenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
n-Propylbenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
2-Chlorotoluene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
4-Chlorotoluene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	-	-	< 1.0	5.6	-
tert-Butylbenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	-	-	< 1.0	4.0	-
sec-Butylbenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,3-Dichlorobenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
p-Isopropyltoluene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,2-Dichlorobenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,4-Dichlorobenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Butylbenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
Hexachlorobutadiene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	-	-	< 1.0	< 1.0	-

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Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260151	1260152	1260153	1260154	1260155
Sample Reference				BH201	BH202D	BH203	BH204	BH205C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.23M	3.10M	2.69M	3,44M	2.25M
Date Sampled				04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Time Taken				1045	1105	1130	1300	1020
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Phenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
2-Chlorophenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
1,3-Dichlorobenzene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
1,2-Dichlorobenzene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
1,4-Dichlorobenzene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
2-Methylphenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Hexachloroethane	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Nitrobenzene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
4-Methylphenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Isophorone	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
2-Nitrophenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
2,4-Dimethylphenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Naphthalene	µg/l	0.01	ISO 17025	-	-	< 0.01	1.9	-
2,4-Dichlorophenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
4-Chloroaniline	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Hexachlorobutadiene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
4-Chloro-3-methylphenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
2,4,6-Trichlorophenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
2,4,5-Trichlorophenol	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
2-Methylnaphthalene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
2-Chloronaphthalene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Dimethylphthalate	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
2,6-Dinitrotoluene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Acenaphthylene	µg/l	0.01	ISO 17025	-	-	< 0.01	0.64	-
Acenaphthene	µg/l	0.01	ISO 17025	-	-	< 0.01	0.34	-
2,4-Dinitrotoluene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Dibenzofuran	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Diethyl phthalate	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
4-Nitroaniline	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Fluorene	µg/l	0.01	ISO 17025	-	-	< 0.01	0.68	-
Azobenzene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Bromophenyl phenyl ether	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Hexachlorobenzene	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Phenanthrene	µg/l	0.01	ISO 17025	-	-	< 0.01	3.3	-
Anthracene	µg/l	0.01	ISO 17025	-	-	< 0.01	0.69	-
Carbazole	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Dibutyl phthalate	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Anthraquinone	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Fluoranthene	µg/l	0.01	ISO 17025	-	-	< 0.01	7.2	-
Pyrene	µg/l	0.01	ISO 17025	-	-	< 0.01	6.1	-
Butyl benzyl phthalate	µg/l	0.05	NONE	-	-	< 0.05	< 0.05	-
Benzo(a)anthracene	µg/l	0.01	ISO 17025	-	-	< 0.01	2.9	-
Chrysene	µg/l	0.01	ISO 17025	-	-	< 0.01	3.1	-
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	-	-	< 0.01	3.7	-
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	-	-	< 0.01	1.6	-
Benzo(a)pyrene	µg/l	0.01	ISO 17025	-	-	< 0.01	3.3	-
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	-	-	< 0.01	2.0	-
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	-	-	< 0.01	0.58	-
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	-	-	< 0.01	2.3	-
PCBs by GC-MS								
PCB Congener 28	µg/l	0.02	NONE	-	-	-	< 0.02	< 0.02
PCB Congener 52	µg/l	0.02	NONE	-	-	-	< 0.02	< 0.02

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Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260151	1260152	1260153	1260154	1260155
Sample Reference				BH201	BH202D	BH203	BH204	BH205C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.23M	3.10M	2.69M	3,44M	2.25M
Date Sampled				04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Time Taken				1045	1105	1130	1300	1020
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCB Congener 101	µg/l	0.02	NONE	-	-	-	< 0.02	< 0.02
PCB Congener 118	µg/l	0.02	NONE	-	-	-	< 0.02	< 0.02
PCB Congener 138	µg/l	0.02	NONE	-	-	-	< 0.02	< 0.02
PCB Congener 153	µg/l	0.02	NONE	-	-	-	< 0.02	< 0.02
PCB Congener 180	µg/l	0.02	NONE	-	-	-	< 0.02	< 0.02
PCBs by GC-MS								
Total PCBs	µg/l	0.14	NONE	-	-	-	< 0.14	< 0.14

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number: 19-48596

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260156				
Sample Reference				WS203				
Sample Number				None Supplied				
Depth (m)				2.97M				
Date Sampled				04/07/2019				
Time Taken				1145				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.3				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Sulphate as SO_4	µg/l	45	ISO 17025	121000				
Sulphate as SO_4	mg/l	0.045	ISO 17025	121				
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	940				
Hardness - Total	mgCaCO3/l	1	ISO 17025	567				
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10				
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16				

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Analytical Report Number: 19-48596

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260156				
Sample Reference				WS203				
Sample Number				None Supplied				
Depth (m)				2.97M				
Date Sampled				04/07/2019				
Time Taken				1145				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.57				
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1				
Boron (dissolved)	µg/l	10	ISO 17025	270				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.04				
Calcium (dissolved)	mg/l	0.012	ISO 17025	200				
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0				
Chromium (III)	µg/l	1	NONE	< 1.0				
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.3				
Copper (dissolved)	µg/l	0.5	ISO 17025	2.8				
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2				
Magnesium (dissolved)	mg/l	0.005	ISO 17025	16				
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05				
Nickel (dissolved)	µg/l	0.5	ISO 17025	3.6				
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.4				
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.6				
Zinc (dissolved)	µg/l	0.5	ISO 17025	57				
Monoaromatics & Oxygenates								
Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				

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Analytical Report Number: 19-48596

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260156				
Sample Reference				WS203				
Sample Number				None Supplied				
Depth (m)				2.97M				
Date Sampled				04/07/2019				
Time Taken				1145				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/l	1	ISO 17025	< 1.0				
Chloroethane	µg/l	1	ISO 17025	< 1.0				
Bromomethane	µg/l	1	ISO 17025	< 1.0				
Vinyl Chloride	µg/l	1	NONE	< 1.0				
Trichlorofluoromethane	µg/l	1	NONE	< 1.0				
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0				
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0				
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0				
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0				
Trichloromethane	µg/l	1	ISO 17025	< 1.0				
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0				
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0				
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0				
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0				
Benzene	µg/l	1	ISO 17025	< 1.0				
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0				
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0				
Trichloroethene	µg/l	1	ISO 17025	< 1.0				
Dibromomethane	µg/l	1	ISO 17025	< 1.0				
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0				
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0				
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0				
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0				
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0				
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0				
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0				
Chlorobenzene	µg/l	1	ISO 17025	< 1.0				
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-Xylene	µg/l	1	ISO 17025	< 1.0				
Styrene	µg/l	1	ISO 17025	< 1.0				
Tribromomethane	µg/l	1	ISO 17025	< 1.0				
o-Xylene	µg/l	1	ISO 17025	< 1.0				
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0				
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0				
Bromobenzene	µg/l	1	ISO 17025	< 1.0				
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0				
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0				
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0				
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0				
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0				
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0				
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0				
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0				
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0				
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0				
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0				
Butylbenzene	µg/l	1	ISO 17025	< 1.0				
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0				
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0				
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0				
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0				

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Analytical Report Number: 19-48596

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260156				
Sample Reference				WS203				
Sample Number				None Supplied				
Depth (m)				2.97M				
Date Sampled				04/07/2019				
Time Taken				1145				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	µg/l	0.05	NONE	< 0.05				
Phenol	µg/l	0.05	NONE	< 0.05				
2-Chlorophenol	µg/l	0.05	NONE	< 0.05				
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05				
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05				
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05				
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05				
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05				
2-Methylphenol	µg/l	0.05	NONE	< 0.05				
Hexachloroethane	µg/l	0.05	NONE	< 0.05				
Nitrobenzene	µg/l	0.05	NONE	< 0.05				
4-Methylphenol	µg/l	0.05	NONE	< 0.05				
Isophorone	µg/l	0.05	NONE	< 0.05				
2-Nitrophenol	µg/l	0.05	NONE	< 0.05				
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05				
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05				
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05				
4-Chloroaniline	µg/l	0.05	NONE	< 0.05				
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05				
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05				
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05				
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05				
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05				
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05				
Dimethylphthalate	µg/l	0.05	NONE	< 0.05				
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05				
Dibenzofuran	µg/l	0.05	NONE	< 0.05				
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05				
Diethyl phthalate	µg/l	0.05	NONE	< 0.05				
4-Nitroaniline	µg/l	0.05	NONE	< 0.05				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Azobenzene	µg/l	0.05	NONE	< 0.05				
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05				
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Carbazole	µg/l	0.05	NONE	< 0.05				
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05				
Anthraquinone	µg/l	0.05	NONE	< 0.05				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				
PCBs by GC-MS								
PCB Congener 28	µg/l	0.02	NONE	-				
PCB Congener 52	µg/l	0.02	NONE	-				

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Analytical Report Number: 19-48596

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1260156				
Sample Reference				WS203				
Sample Number				None Supplied				
Depth (m)				2.97M				
Date Sampled				04/07/2019				
Time Taken				1145				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
PCB Congener 101	µg/l	0.02	NONE	-				
PCB Congener 118	µg/l	0.02	NONE	-				
PCB Congener 138	µg/l	0.02	NONE	-				
PCB Congener 153	µg/l	0.02	NONE	-				
PCB Congener 180	µg/l	0.02	NONE	-				
PCBs by GC-MS								
Total PCBs	µg/l	0.14	NONE	-				

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 19-48596

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
PCB's By GC-MS in water	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-PL	W	NONE
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025

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Analytical Report Number : 19-48596

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-49450

Project / Site name:	Station Hill, Reading	**Samples received on:**	11/07/2019
Your job number:	35248	**Samples instructed on:**	11/07/2019
Your order number:	35248-DO	**Analysis completed by:**	17/07/2019
Report Issue Number:	1	**Report issued on:**	24/07/2019
Samples Analysed:	1 water sample		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

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Analytical Report Number: 19-49450

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1264900				
Sample Reference				WS202				
Sample Number				None Supplied				
Depth (m)				2.64				
Date Sampled				10/07/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.3				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Sulphate as SO_4	µg/l	45	ISO 17025	34500				
Sulphate as SO_4	mg/l	0.045	ISO 17025	34.5				
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	810				
Hardness - Total	mgCaCO3/l	1	ISO 17025	435				
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10				
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16				
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.65				
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1				
Boron (dissolved)	µg/l	10	ISO 17025	71				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.06				
Calcium (dissolved)	mg/l	0.012	ISO 17025	160				
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0				
Chromium (III)	µg/l	1	NONE	2.0				
Chromium (dissolved)	µg/l	0.2	ISO 17025	2.0				
Copper (dissolved)	µg/l	0.5	ISO 17025	17				
Lead (dissolved)	µg/l	0.2	ISO 17025	0.2				
Magnesium (dissolved)	mg/l	0.005	ISO 17025	8.8				
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05				
Nickel (dissolved)	µg/l	0.5	ISO 17025	7.7				
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.5				
Vanadium (dissolved)	µg/l	0.2	ISO 17025	< 0.2				
Zinc (dissolved)	µg/l	0.5	ISO 17025	34				

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

Analytical Report Number: 19-49450

Project / Site name: Station Hill, Reading

Your Order No: 35248-DO

Lab Sample Number				1264900				
Sample Reference				WS202				
Sample Number				None Supplied				
Depth (m)				2.64				
Date Sampled				10/07/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 19-49450

Project / Site name: Station Hill, Reading

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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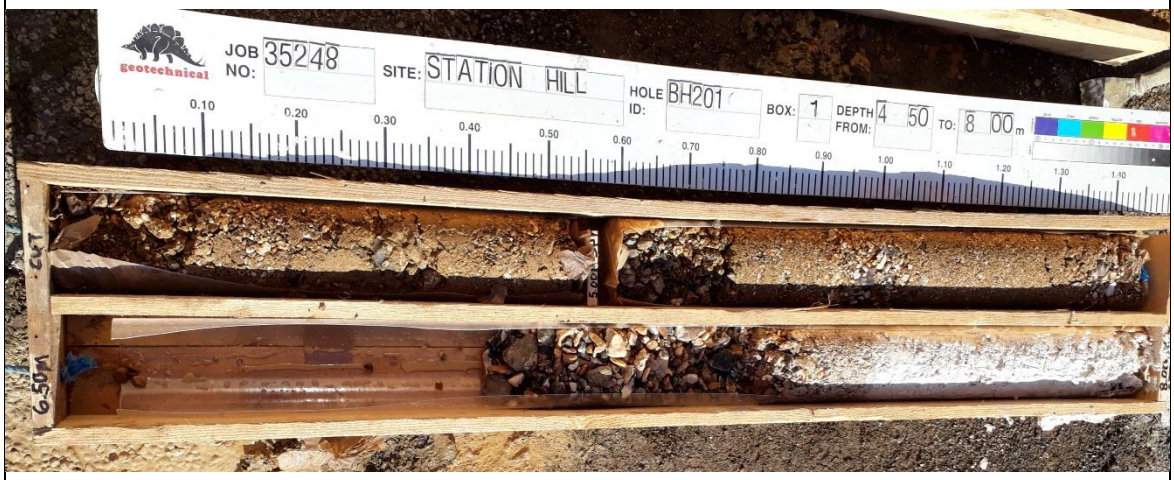
APPENDIX D

PHOTOGRAPHS

Borehole: BH201 Box 1: 1.30-4.50m



Borehole: BH201 Box 2: 4.50-8.00m

Borehole: BH201 Box 3: 8.00-10.00m

Borehole: BH201 Box 4: 10.00-13.00m

Borehole: BH201 Box 5: 13.00-16.00m

Borehole: BH201 Box 6: 16.00-19.00m

Not Available.

Borehole: BH201 Box 7: 19.00-22.00m

Borehole: BH201 Box 8: 22.00-25.00m

Borehole: BH201 Box 9: 25.00-28.00m

Borehole: BH201 Box 10: 28.00-31.00m

Borehole: BH201 Box 11: 31.00-34.00m

Borehole: BH201 Box 12: 34.00-35.50m

Borehole: BH202D Box 1: 1.20-4.00m

Borehole: BH202D Box 2: 4.00-7.00m

Borehole: BH202D Box 3: 7.00-8.50m

Borehole: BH202D Box 4: 8.50-10.00m

Borehole: BH202D Box 5: 10.00-15.00m

Borehole: BH202D Box 6: 15.00-18.00m

Borehole: BH202D Box 7: 18.00-21.00m

Borehole: BH202D Box 8: 21.00-24.00m

Borehole: BH202D Box 9: 24.00-27.00m

Borehole: BH202D Box 10: 27.00-30.00m

Borehole: BH202D Box 11: 30.00-33.00m

Borehole: BH202D Box 12: 33.00-36.00m

Borehole: BH202D Box 13: 36.00-39.00m

Borehole: BH202D Box 14: 39.00-40.50m

Borehole: BH203 Box 1: 1.20-5.00m

Borehole: BH203 Box 2: 5.00-7.50m

Borehole: BH203 Box 3: 7.50-10.50m

Borehole: BH203 Box 4: 10.50-13.00m

Borehole: BH203 Box 5: 13.50-16.50m

Borehole: BH203 Box 6: 16.50-19.50m

Borehole: BH203 Box 7: 19.50-22.50m

Borehole: BH203 Box 8: 22.50-25.50m

Borehole: BH203 Box 9: 25.50-28.50m

Borehole: BH203 Box 10: 28.50-31.50m

Borehole: BH203 Box 11: 31.50-34.50m

Borehole: BH203 Box 12: 34.50-37.50m

Borehole: BH203 Box 13: 37.50-40.50m

Borehole: BH204 Box 1: 1.20-4.00m

Borehole: BH204 Box 2: 4.00-7.00m

Borehole: BH204 Box 3: 7.00-10.50m

Borehole: BH204 Box 4: 10.50-13.00m

Borehole: BH204 Box 5: 13.50-16.50m

Borehole: BH204 Box 6: 16.50-21.00m

Borehole: BH204 Box 7: 21.00-24.00m

Borehole: BH204 Box 8: 24.00-27.00m

Borehole: BH204 Box 9: 27.00-30.00m

Borehole: BH204 Box 10: 30.00-33.00m

Borehole: BH204 Box 11: 33.00-36.00m

Borehole: BH204 Box 12: 36.00-39.00m

Borehole: BH204 Box 13: 39.00-40.50m

Borehole: BH205C Box 1: 1.20-4.00m

Borehole: BH205C Box 2: 4.00-6.00m

Borehole: BH205C Box 3: 6.00-9.00m

Borehole: BH205C Box 4: 9.0-12.50m

Borehole: BH205C Box 5: 12.50-15.50m

Borehole: BH205C Box 6: 15.50-17.00m

Borehole: BH205C Box 7: 17.00-18.50m

Borehole: BH205C Box 8: 18.50-21.50m

Borehole: BH205C Box 9: 21.50-24.50m

Borehole: BH205C Box 10: 24.50-27.50m

Borehole: BH205C Box 11: 27.50-30.50m

Borehole: BH205C Box 12: 30.50-33.50m

Borehole: BH205C Box 10: 33.50-36.50m

Borehole: BH205C Box 11: 36.50-38.00m

Trial Pit: TP202 1.50m

Trial Pit: TP202 1.50m

Trial Pit: TP202 1.50m

Trial Pit: TP202 Backfilled

Trial Pit: TP203 4.30m

Trial Pit: TP203 Spoil

Trial Pit: TP203 Backfill

Trial Pit: TP204 0.65m

Trial Pit: TP204 Backfill

Trial Pit: TP205 3.00m

Trial Pit: TP205 3.00m

Trial Pit: TP205 Spoil

Trial Pit: TP205 Backfill

Trial Pit: TP206 2.50m

Trial Pit: TP206 Backfill

Trial Pit: TP208 2.20m

Trial Pit: TP209 Backfill

APPENDIX 3
REMEDIATION STRATEGY

Intended for
Lincoln MGT

Date
August 2021

Project Number
1620004716

STATION HILL, NORTH SITE, READING
REMEDIATION STRATEGY

RAMBOLL

STATION HILL, NORTH SITE, READING
REMEDIATION STRATEGY

Project Ref.	**1620004716**
Issue No.	**01**
Date	**18/08/2021**
Made by	**Catherine Cooper**
Checked by	**Siobhán McGeever**
Approved by	**Matthew Pannett**

Made by:

Checked/Approved by:

Version Control Log

Revision	Date	Made by	Checked by	Approved by	Description
01	18/08/2021	CGC	SM	MP	First Issue

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APPENDICES

Appendix 1
Figures

Appendix 2
Chemical Criteria For Reuse and Import Material

1. INTRODUCTION

1.1 Brief

Ramboll UK Limited (herein referred to as "Ramboll") was commissioned by Lincoln MGT (the "Client") to produce an outline remediation strategy for the development of Station Hill North site, Reading, RG1 1NR (the "site").

The remediation strategy follows a number of assessments that are typically undertaken to evaluate the contamination status of a site. Past assessments have included Desk Study Assessments, Ground Investigation Interpretive Reports including a conceptual site model and associated human health and controlled waters risk assessments, followed by a Foundation Works Risk Assessment (FWRA) and Environmental Specification. These assessments provide the basis for the remediation required and are summarised in this report.

This remediation strategy covers the Station Hill North Site only, which includes Phase 2 (in the east) and Phase 3 (in the west). Phase 2 is split into the NCP multi-storey car park in the south and former Temporary Events Area in the north. In summer 2021, the site boundary was extended to include an additional strip of land to the north of the Temporary Events Area, utilised as public realm, to allow for obstructions to be removed prior to piling works commencing.

The remediation strategy for the South Site (Phase 1) is discussed in a separate report.

1.2 Planning

1.2.1 Outline Planning Permission

Outline planning permission for the Station Hill development was granted by Reading Borough Council subject to conditions outlined in Planning Application Number 130436, dated 9th January 2015.

1.2.2 Hybrid Planning Permission – Station Hill North

Full planning permission has been granted for Phase 2 and outline permission has been granted for Phase 3 of the Station Hill North site, as outlined in Hybrid Planning Application Number 192032.

Land contamination matters for Phases 2 and 3 are dealt with under Conditions 10 and 72, respectively. This report is to satisfy section c) of the conditions, which states:

"(c) The results of the site investigation and detailed risk assessment referred to in (b) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken. The strategy shall include all works to be undertaken, proposed remediation objectives and remediation criteria, an appraisal of remedial options, and proposal of the preferred option(s), and a timetable of works and site management procedures. The strategy shall ensure that the site will not qualify as contaminated land under Part 2A of the Environmental Protection Act 1990 and shall be suitable for its intended use after remediation."

1.2.3 Temporary Events Area

A separate planning application (ref: 130440) was granted in full in January 2014 for the Temporary Events Area, which included the demolition of the former Station Hill Retail Parade. Land contamination matters are dealt with under Condition 9 of the Planning Consent as follows:

"Following demolition, no works to construct the events space beyond the cleared site state shall commence and no public use shall be permitted until a scheme which includes the following

components to deal with the risks associated with contamination of the site has been submitted to and approved in writing by the Local Planning Authority:

a) A site investigation scheme, based on the existing desk study (Waterman, dated March 2013) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off-site; and

b) The results of the site investigation and detailed risk assessment referred to in a) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken; and

c) A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in b) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action."

In 2021, the site boundary was extended to include an additional strip of land located along the northern boundary of the Temporary Events Space, which is being dealt with under a separate planning condition.

1.3 Station Hill North Site Proposed Development

The proposed development consists of the demolition of the existing buildings on the Station Hill North Site. The remaining buildings comprise an office building in the west (currently being used as the current Principal Contractors site office), and the NCP carpark in the south east of the site, which was closed in July 2021 and, at the time of writing, was being prepared for demolition.

The site will be constructed into mixed residential and commercial town quarter realm that will include approximately 538 new homes and approximately 25,000 sq. ft of commercial and leisure space.

The development site has been split into the following phases:

- Phase 1 is classed as Station Hill South Site and is discussed in a separate report;
- Phase 2 comprises Block G in the eastern part of the site (commercial); and
- Phase 3 comprises Blocks A, B and D (residential) and Block C (commercial) in the western part of the site.

A drawing of the proposed development is shown below as:

Figure 1: A Drawing of the Proposed Development (Source: MGT)

Phase 2 Proposed Development

Phase 2 comprises Plot G and public realm, including demolition of existing structures, erection of an eighteen-storey building containing office use and flexible retail, non-residential institution and assembly and leisure uses. Provision of podium deck, vehicular access and parking. New public open space and landscaping and a bridge link over Garrard Street.

No basement excavations are proposed within Phase 2 of the development as the proposed building aligns with existing ground level along the majority of peripheries across the site.

The former Temporary Events Area in the north of Phase 2 has a proposed formation level of approximately 2.5m below existing ground level. The Temporary Events Area will be mostly covered with hardstanding and used as public realm with part of the commercial building (Block G) encroaching onto the southern site boundary.

In 2021, the site boundary was extended to include an additional strip of land to the north of the Temporary Events Area, utilised as public realm, to allow for obstructions to be removed prior to piling works commencing.

Phase 3 Proposed Development

Phase 3 comprises four building plots (A to D), including demolition of existing buildings and structures and erection of a mixed-use redevelopment comprising residential dwellings, hotel, residential institutions, office use, flexible retail, financial and professional services, restaurants and cafes, drinking establishments, hot food takeaways, non-residential institutions and assembly and leisure. Provision of a podium deck and basement storey running beneath Phase 3 and formation of pedestrian and vehicular access. Means of access and circulation and car parking within the site and provision of new public open space and landscaping. The proposed substructures are anticipated to comprise piled foundations and a sheet piled retaining wall.

1.4 Constraints and Limitations

This report has been prepared for the exclusive use of Lincoln MGT and should not be used in whole or in part by any third parties without the express permission of Ramboll in writing.

The remediation strategy is designed to support the proposed mixed residential and commercial development of the site. This remediation strategy has been produced based upon the findings of Ramboll's 2019 Ground Contamination Investigation Report (GCIR) and other previous third-party site assessment and intrusive investigation information.

2. SITE DESCRIPTION

2.1 Site Location

The Station Hill North Site is located to the north of Garrard Street in central Reading, RG1 1NR, immediately southwest of Reading train station. The site is bounded by Station Hill to the north and east, Garrard Street and Station Hill South site to the south, and Greyfriars Road to the west. The site is part of the larger Station Hill Site, which includes the area directly south of Garrard Street and bound by Friars Street to the south. The Station Hill development is centred on National Grid Reference 471370, 173710.

In 2021 the site boundary was extended to include an additional strip of land to the north of the Temporary Events Area in the northeast of the site. The additional red line boundary is provided in Appendix 1.

2.2 Site Description

The site formerly comprised four main buildings; an office building in the west, a bingo hall and adjacent bus station in the centre, Western Tower in the north east and an NCP multi-storey car park in the south east. The former bingo hall, bus station and Western Tower were demolished prior to Ramboll's 2019 ground investigation. At the time of writing, the NCP car park was closed to the public and was being prepared for demolition.

Substations are present in the north west corner of the site, to the north of Xafinity House, and in the south adjacent to Garrard Street. A temporary radio mast is also present.

For the purpose of the remediation and development, the North Site has been split into two phases. Phase 2 comprises Plot G (in the east) and Phase 3 comprises Plots A-D (in the west). Phase 2 is being developed first, with Phase 3 to follow on from this. A red line boundary for the site is shown below as Figure 2.

Figure 2: Station Hill Site (North and South) Red Line Boundary

2.3 Site History

A detailed site history based on historical Ordnance Survey maps of the Temporary Events Area in the northeast of the site is provided in Ramboll's Phase 2 Enabling Works Environmental Site Assessment Report (ref: 1620004716, dated March 2020). The site history for the rest of the Station Hill North Site is presented in Ramboll's Geotechnical and Geo-environmental Desk Study (ref: 1620004716-SHR-RAM-GE-001, dated October 2018). A summary is provided below.

Historical maps date back to 1879, when the north site was predominantly fields, with a timber yard in the north west corner and terraced housing to the south of this. Livery stables were located in the far north-east of the site and extending off-site. Railway lines and Reading train station were shown to the north, with an embankment along the northern boundary indicating that the site level was lower than that of the rail land to the north.

The 1900 map showed a circular feature, potentially a pond or lake, covering the centre and majority of the Station Hill north site.

By 1957, a garage was located in the south east of the North Site. The terraced housing was still present in the south west and a factory in the north west. On the 1962 map, the north of the site was shown to be used for car parking. By 1968, a ballroom had been constructed in the centre of the site and western tower and associated retail parade in the north east of the site. A bus station was shown in the south west of the site and a furniture factory in the north west. By 1973, the garage had been demolished and by 1979, the multi-storey car park had been constructed in its place. The terraced housing in the west was also demolished around this time.

During the 1990s, the ballroom was classed as a Club and an office building (Xafinity House) was constructed in the west of the site, which is still present today.

A site visit undertaken by Watermans in 2013 described the former ballroom/ Club as a Mecca Bingo Hall at this time, which contained two tanks and a switch room.

By 2019, the former ballroom/ bingo hall, Western Tower and the retail parade had been demolished.

The NCP multi-storey car park in the south east was closed and secured in July 2021 and was being prepared for demolition at the time of writing. Xafinity House in the west is still present on-site and will be demolished at a later date.

2.4 Underground Services

A high density of services are known to exist in and around the site beneath Greyfriars Road, Garrard Street, and Friar Street. Local service connections and other local services such as CCTV and fibre-optic also exist surrounding the site. Services into the site will need to be disconnected as the phased development takes place.

There is a 1250mm diameter brick foul sewer running west to east beneath the northern section of the site, at a depth of approximately 4m below ground level (bgl), with three 225mm diameter sewers branching off, as seen in Figure 3 below. Further liaison with Thames Water including the provision of as-built drawings and sections will provide more conclusive certainty of the location details of their tunnel. Protection zones associated with Thames Water tunnel asset may limit the location, proximity and construction methods of foundation and retaining wall structures. Pre- and post-construction condition surveys may be required, along with monitoring and inspections during the course of the site development. Impact Assessments may also be required by Thames Water to demonstrate the effect of demolition and construction activities associated with the proposed development.

An unknown buried service was encountered in the centre of the site during the ground investigation (in TP208) running east to west, to the north of the foul sewer, at an approximate depth of 2.20m bgl. Further unknown buried services beneath the site could present an obstruction to foundation excavations while also presenting a health and safety risk to site workers.

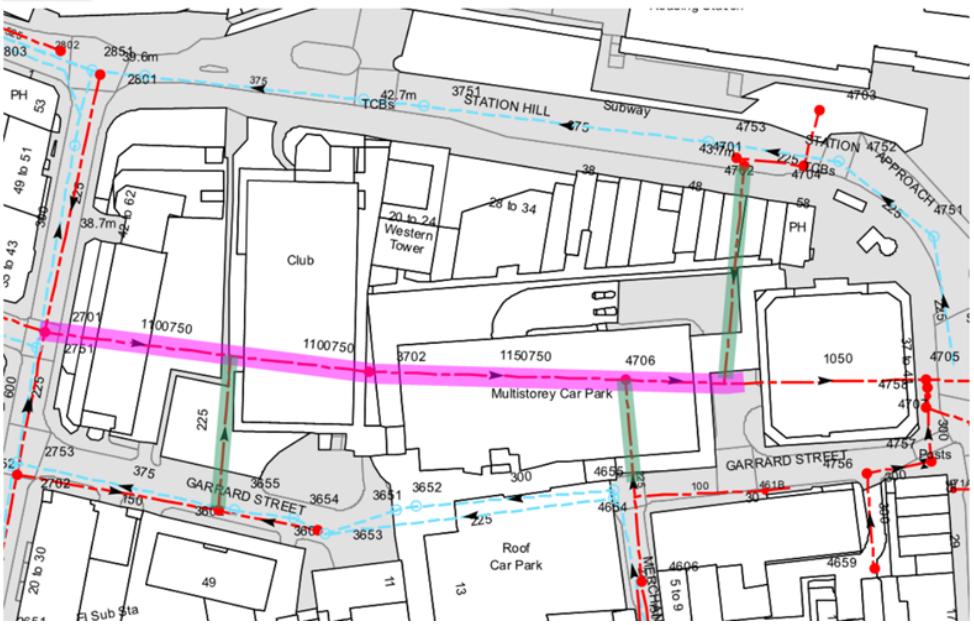


Figure 3: Map of Thames Water Sewer, Hoare Lea *Thames Water*

2.5 Environmental Setting

2.5.1 Geology

Details of the geology encountered during Ramboll's 2019 ground investigation is summarised in Table 2-1 below.

Table 2-1: Sequence of Strata Encountered on Site

Stratum	Level at Top of Stratum (m AOD)	Thickness Range (m)	Typical Description
Made Ground	+38.35 - +46.35	0.0 – 6.0	Concrete hardstanding and/ or tarmacadam is located at all exploratory locations across the site, with the exception of BH202D. This is underlain by Made Ground which is variable but generally comprises 6F2 building crush from the demolished bingo hall, which is described as light grey, slightly silty sandy silty subangular and subrounded fine to coarse brick, concentrate and sandstone GRAVEL. Fragments of limestone, clinker, metal, plastic, glass and wood are noted throughout the Made Ground. A stockpile of the 6F2 crush is located to the west of the NCP carpark and is to be removed from site by the Principal Contractor.

Table 2-1: Sequence of Strata Encountered on Site			
Stratum	**Level at Top of Stratum (m AOD)**	**Thickness Range (m)**	**Typical Description**
			Very soft brown, occasionally mottled black, slightly gravelly silty CLAY layer was encountered in all boreholes and window samples with the exception of BH202D and WS201. This is likely a lacustrine deposit from the base of a former pond located in the centre of the site noted in historical maps dated 1899. A secondary concrete slab was encountered at between depths of 0.4 and 1.6m bgl in BH202, BH205, WS201 and WS204, located predominantly in the northern and western extents of the site.
Alluvium	+32.75 - +36.90	0.9 – 1.9	The Alluvium is discontinuous across the site with the Alluvium only being encountered in 4no. exploratory holes with an average thickness of 1.06m located in the northern extent of the site. The Alluvium is generally described as soft becoming stiff greyish green mottled brown slightly sand silty CLAY gravel being subangular to rounded fine to coarse flint and chalk.
Taplow Gravels	+32.15 - +36.20	1.1 – 4.9	The Taplow Gravels are encountered in 6no. window samples and have an average thickness of 2.95m. They are generally described as orangish brown sandy subangular and subrounded fine and medium SAND with rare coarse flint, chalk and mudstone GRAVEL. One borehole encountered a layer of silty gravelly chalk which due to the destructive nature of using shell and auger drilling techniques at this depth, could have included a layer of gravel which has been subsumed by the chalk.
Upper Chalk (Structureless)	+30.20 - +42.05	0.35 – 11.20	The structureless chalk was only encountered in the boreholes and has a CIRIA probably grade Dm or Dc. With a typical description consisting of; structureless CHALK composed of white slightly silty GRAVEL or white slightly gravelly sandy SILT. Gravel subangular to subrounded fine and medium, with rare coarse, gravels of extremely weak low density, flint. Matrix is white with rare black specks.
Upper Chalk (Structured)	+21.2 - +30.95	>20.65 (Unproven)	The structured chalk was only encountered in the boreholes (thickness unproven). The CIRIA grade of the chalk included B5, B4, B3, A5, C3 and C4.

Table 2-1: Sequence of Strata Encountered on Site			
Stratum	**Level at Top of Stratum (m AOD)**	**Thickness Range (m)**	**Typical Description**
			The typical description consists of weak medium density white CHALK with rare black specks and bands of marl.

2.5.2 Hydrogeology

According to the Environment Agency (EA), the Alluvium and Taplow Gravel formations beneath the site are classified as Secondary 'A' Aquifers and the Upper Chalk Formation is classified as a Principal Aquifer (identified as a layer of rock or drift deposits which have a high intergranular permeability, and as such they usually provide a high level of water storage).

The site is not located within an EA designated Source Protection Zone. There are six licensed groundwater abstractions within 1km of the site, the closest of which is located 0.14km to the southwest which is in use for drinking, cooking, sanitary and washing (small garden) purposes. There are no abstractions for sensitive use, such as potable drinking water supply, within 2km of the site.

Overall, the site is considered to be located within a low-moderate sensitivity setting in terms of groundwater receptors.

During the Ground Investigation, two groundwater strikes were recorded in the Taplow Gravels at 34.41m AOD (metres above Ordnance Datum) and 34.84m AOD in WS202 and WS203 respectively.

2.5.3 Hydrology

The nearest surface water feature is a drainage network 320m north west of the site, associated with the railway line. The River Thames is located approximately 370m north east of the site at its nearest point. The River Kennet is located approximately 500m south east of the site which flows in an easterly direction and connects to the River Thames approximately 1km to the east of the site.

There are three surface water abstractions within 1km of the site, the closet of which is located 476m south of the site for amenity: lake and pond throughflow. There are no surface water abstractions for sensitive use such as public drinking water supply.

Overall, the site is considered to be of low environmental sensitivity in terms of surface water receptors.

3. PREVIOUS GROUND INVESTIGATION

The following intrusive ground investigation reports have been prepared for the Station Hill North site:

- Waterman, Geo-Environmental and Geotechnical Assessment, Station Hill Reading (ref: EED12350-110-R-3.1.1-RM, dated September 2014);
- Geotechnical Engineering Ltd (GEL), Factual Report on Ground Investigation, Station Hill, Reading (ref: 35248, dated August 2019); and
- Ramboll UK Limited, Ground Investigation Report (ref: SHR-RAM-NB-XX-RP-G-000022, dated July 2020).

Ramboll's Ground Investigation Report was based on the findings of GEL's 2019 intrusive investigation supervised by Ramboll. This investigation did not include the temporary events area in the northeast of the site. Previous investigation undertaken by Waterman in 2014 included the entire Station Hill site including the temporary events area.

Full details of the site investigations and contamination identified at the site are provided within the reports listed above. A summary of the ground investigations is presented below.

3.1 Waterman (2014) Geo-Environmental and Geotechnical Assessment

This summary is based on the findings of Waterman's investigation within the temporary events area only. A summary of contamination identified across the rest of the Station Hill North Site is provided within the Ramboll (2020) Ground Investigation Report review.

The scope of works that falls within the temporary events area site boundary comprised:

- the drilling of six windowless sample boreholes (WS14, WS15, WS16, WS18, WS19 and WS20) to a maximum depth of 5.0m bgl (below ground level) (and extract of the Waterman exploratory plan is provided as Figure 4, Appendix 1);
- the excavation of one trial pit (TP7) to a maximum depth of 1.3m bgl; and
- the installation of one windowless sample borehole (WS20), located at the far eastern end of the site) for the purposes of gas and groundwater monitoring.

Ground Conditions

The ground conditions encountered at the site comprised the following strata:

- concrete hardstanding at an average thickness of 0.35m;
- made Ground comprising sandy CLAY or gravelly SAND with frequent flint, brick and concrete with occasional ashy material, ceramic, slate and rare glass, encountered at an average thickness of 1.5m; underlain by,
- alluvium comprising greenish grey silty CLAY at an average thickness of 1.8m; underlain by,
- river terrace deposits comprising orange-brown sand and gravel, encountered at depths between 3.0m and 4.3m bgl to >5.0 m bgl (depth unproven).

No visual or olfactory evidence of contamination was noted in any of the exploratory locations undertaken within the boundary of the Phase 2 Enabling Works footprint.

Chemical Analysis

Chemical analysis of soil samples was undertaken and tested for a range of contaminants including heavy metals, inorganics, total petroleum hydrocarbons (TPHs), polycyclic aromatic hydrocarbons

(PAHs), BTEX compounds, phenols, volatile organic compounds (VOCs) and polychlorinated biphenyls (PCBs).

The results were screened against commercial end use screening criteria. Only lead and asbestos was recorded above the screening criteria. Lead was recorded at a concentration of 1,250mg/kg in WS19 (0.5m to 1.2m) and asbestos was recorded in WS14 and WS19. Subsequent asbestos quantification identified chrysotile free fibres and chrysotile type cement at concentrations of <0.001% w/w (weight by weight) and 0.12% w/w in WS14 and WS19 respectively.

All other analytical results were reported to fall below the screening criteria.

Gas and Groundwater Monitoring

One groundwater sample was obtained from WS20 (located at the far eastern end of the site) and was tested for a range of contaminants similar to that of the soil analytical suite. Comparison of results against the GAC for controlled waters showed that only ammoniacal nitrogen was recorded above the screening criteria.

Six rounds of ground gas monitoring undertaken recorded a maximum methane concentration of 0.2% by volume; a maximum carbon dioxide concentration of 4.3% by volume; a minimum oxygen concentration of 17.6% by volume and a maximum flow rate of 0.1l/hr.

Waterman's Conclusions

Waterman concluded that no significant or widespread contamination of soils or groundwater was identified at the site (which included the Phase 2 Enabling Works area). Isolated exceedances of asbestos and lead were encountered within the Made Ground deposits.

Waterman concluded that in the context of the overall proposed development the presence of contaminants in soil was not considered to pose a significant risk to end users as the development will predominantly comprise buildings and hardstanding.

No specific remedial measures were recommended for the Phase 2 enabling works site area.

3.2 Ramboll (2020), Ground Investigation Report

The exploratory site plan is provided as Figure 5, Appendix 1.

Visual and Olfactory Evidence of Contamination

Visual and olfactory contamination was noted during the ground investigation in BH204 between 2.8 and 4.5m bgl at the base of the Made Ground and at the top of the structureless chalk. This comprised a strong hydrocarbon odour within the Made Ground deposits and a light grey discolouration with a strong hydrocarbon odour at the top of the structureless chalk.

During the site investigation, selected soil samples were tested on-site for the presence of VOCs using a PID (photo-ionisation detector). PID concentrations were recorded between 0.1 and 129.6 parts per million (ppm). The highest PID reading was recorded in BH204 at 2.8m bgl.

During the subsequent monitoring, elevated PID readings were also recorded. The maximum recorded PID reading at BH204 was 405.5ppm, and the maximum recorded reading for the entire site was recorded at 412.8ppm in WS203.

Soil Contamination Assessment

As part of the Ground Investigation undertaken in 2019, fifty soil samples were tested for a wide range of typical industrial contaminants (including metals, hydrocarbons, volatile organic compounds

(VOCs), semi-volatile organic compounds (SVOCs) and polychlorinated biphenyls (PCBs)). Twenty-four Made Ground samples were also tested for asbestos screen and identification.

During the ground investigation a layer of very soft brown mottled black silty clay with occasional rootlets was observed in all window samples and boreholes, with the exception of BH202D and WS201. A faint to strong organic odour was identified in these locations and is likely to be a lacustrine deposit from the base of a former pond located in the centre of the site in 1899.

The soil samples were screened against Ramboll's generic assessment criteria (GAC) for a residential without plant uptake end use. Arguably the conceptual site model is more akin to a commercial use with near complete building cover and hardstanding with only localised soft landscaping areas, that are likely to have been constructed in raised planters with imported topsoil materials. A review of the data was also therefore undertaken against commercial screening GAC. The exceedances of the chemical analysis are discussed below.

Exceedances of heavy end aromatic TPHs, speciated PAHs including benzo(a)pyrene and heavy metals were recorded within shallow Made Ground. Heavy end TPH concentrations were detected above the residential GAC at two locations (TP208 at 0.5m and WS203 at 1.1m); PAHs were detected above the GAC at ten locations up to 4.10m bgl; lead was detected above the GAC at seven locations up to 2.3m bgl; and arsenic was detected above the GAC in one location (BH202D) at 6.0m bgl.

No TPH, lead or arsenic concentrations exceeded the Ramboll GAC for commercial end use; however, some PAH concentrations (Naphthalene, Benzo(a)anthracene, Benzo(k)fluoranthene, Benzo(a)pyrene and Dibenz (a, h) anthracene) did exceed the GAC for commercial end use. The highest PAH concentrations recorded only marginally exceeded the GAC for commercial end use and were generally recorded within one order of magnitude of the GAC. The locations of the exceedances of the commercial GAC (WS203 and TP208) are likely situated within the proposed basement area in Phase 3, and as such would be excavated as part of the earthworks and basement excavations.

There were no visual observations of possible asbestos containing material (ACM) as (ACM product) observed in soil during the site investigation. Asbestos screening of Made Ground samples identified asbestos in four Made Ground samples from three exploratory locations across the site. The highest asbestos concentration was recorded at a weight/ weight concentration of 0.024% in WS202 at 0.5-0.7m bgl, this was detected as amosite.

Controlled Waters Contamination Assessment

Seven groundwater samples were obtained from all five boreholes and two installed window samples (BH201, BH202D, BH203, BH204, BH205C, WS202 and WS203), which were analysed for a wide range of industrial contaminants to compliment the soil analysis.

No groundwater concentrations were detected in excess of the human health GAC for groundwater volatilisation for a residential end use.

The groundwater results were screened against the GAC for controlled waters. Concentrations above the relevant screening criteria were predominantly recorded in one location, BH204, with the exception of one nickel concentration recorded in BH205C.

BH204 recorded concentrations in excess of the relevant GAC for some speciated PAHs, including BaP and its associated compounds, and TPHs. TPHs detected were limited to heavy-end aromatic hydrocarbons and aliphatic fraction C10-C12. The highest concentration detected was recorded at 660 mg/kg for aromatic fraction C12-C16, which exceeded the GAC of 90mg/kg.

BH205C recorded one concentration of nickel at 29 mg/kg (GAC is 20mg/kg); and BH203 recorded an exceedance of tetrachloroethene of 11.1mg/kg (GAC is 10mg/kg). These exceedances are considered to represent a low risk given that the actual concentrations are the same order of magnitude as the GAC. No other groundwater samples recorded concentrations in excess of the GACs.

Ground Gas Risk Assessment Summary

Six rounds of ground gas monitoring were undertaken following the 2019 ground investigation. The results of the ground gas assessment classify the site as CIRIA Characteristic Situation 2. For reference, CS2 requires passive, development led basic gas protection measures to be incorporated into the building design.

Obstructions

Numerous below ground obstructions were encountered during the Ramboll 2019 Ground Investigation. Obstructions were largely found to comprise a second layer of concrete slab(s) at four exploratory holes (BH202, BH205, WS201 and WS204). This slab was encountered between depths of 0.4 to 1.9m bgl. This second layer may represent existing foundations, or historic structures present on site.

Contamination Summary

Ramboll's ground investigation and assessment identified minor residual impacts via potential complete pollutant linkages between contamination sources and sensitive receptors, which are summarised along with a summary of additional actions in Table 3-1 below. It should be noted that this ground investigation was limited due to access restrictions, buildings and concrete slabs being in situ at the time of drilling.

Table 3-1: Significant Pollutant Linkages Identified

Pollutant	Additional Actions Required
Asbestos	Asbestos was detected in three exploratory hole locations, in four samples out of twenty-two Made Ground samples screened. Chrysotile and Amosite were detected. Quantifications were between <0.001% and 0.024%. Due to the nature of asbestos, previously unidentified asbestos cannot be discounted. Risk management measures are therefore required to address potential risks to human health during construction including both worker health and safety aspects and public protection aspects. An asbestos management plan may be required.
Heavy Metals	Lead was detected in seven locations and arsenic was detected in one location. The concentrations recorded were only marginally above the screening criteria and were detected below the GAC for commercial end use. Risks to construction workers and future site users should be managed as per the risk assessment recommendations but principally in accordance with health and safety legislation.
Hydrocarbons	Exceedances of heavy end aromatic total petroleum hydrocarbons and PAHs such as benzo(a)pyrene were identified. Risks to construction workers and future site users should be managed as per the risk assessment recommendations but principally in accordance with health and safety legislation. Precautions against underground services i.e., barrier pipe should also be considered for buried plastic water pipes. The development will comprise

Table 3-1: Significant Pollutant Linkages Identified	
Pollutant	**Additional Actions Required**
	impermeable hard standing over the majority of the site thus reducing leaching potential further from the unsaturated soils. An assessment of water supply pipes suitable for ground contamination may be required by the Mains Water supplier in accordance with UKWIR report 10/WM/03/21 Guidance for the Selection of Water Supply Pipes to be used in brownfield sites, 2010.

The Conceptual Site Model and Remedial Measures are detailed in the following section.

4. CONCEPTUAL SITE MODEL AND REMEDIAL OPTIONS

4.1 Pollutant Linkages

A full risk assessment and conceptual site model is presented in Ramboll's Ground Investigation Report (2020). Due to the ground investigation being undertaken prior to demolition of all buildings, the investigation was limited by access restrictions where the multi-storey car park is located on the footprint of the former garage and in the west where Xafinity House is situated. However, Ramboll considers appropriate assessment of these areas has been undertaken to provide a broad understanding of potential significant land contamination risks in the context of the newly proposed development. Further assessment within these areas can be undertaken though watching brief visits following demolition.

A summary of the pollutant linkages that are considered 'active' for the site and require remedial measure are presented below. A remediation options appraisal has not been undertaken for this strategy as the majority of pollutant linkages will be removed through the design of the future development.

Table 4-1: Qualitative Source-Pathway-Receptor Risk Assessment

Potential Contaminant Linkage	Contaminants	Pathways	Receptors	Discussion	Risk Rating
PCL1	Contaminants in soils	Dermal contact. Ingestion and inhalation of soil derived particulates and dust and asbestos. Inhalation of vapours.	Future site users.	**Current/ Future Site Users** The investigation identified elevated lead, PAHs and TPH for a residential without plant uptake end use in several locations, predominately in the central area of the site. Asbestos was detected in three exploratory hole locations, in four samples out of twenty-two Made Ground samples screened. Chrysotile and Amosite were detected. Quantifications were between <0.001% and 0.024% w/w. The proposed development plans include commercial in the north and east of the site, together with the basement located under Phase 3, therefore, risks to end users from soil concentrations measured to date are currently considered to be low and mitigated by the development scheme.	**Low to Moderate**

Table 4-1: Qualitative Source-Pathway-Receptor Risk Assessment					
Potential Contaminant Linkage	**Contaminants**	**Pathways**	**Receptors**	**Discussion**	**Risk Rating**
				Construction Workers There is potential for site maintenance workers to come into contact with contaminated soils, including asbestos during earthworks. The use of appropriate risk assessment and working procedures, such as hygiene measures and PPE, should mitigate risks to workers.	**Low to Moderate**
PLC2	Vapours (VOCs)	Lateral and vertical migration	Future site users. Built environment	Elevated VOCs were detected in most locations during the ground gas monitoring, in particular in WS203 and BH204, the two locations in the south east of the site, closest to the former garage and current multi-storey car park. Protection from vapour risks need to be considered going forwards.	**Moderate**
PCL3	Contaminants in groundwater	Lateral migration of groundwater	Off-site third-party land and its users. Off-site potable abstraction and surface water features.	A hotspot of hydrocarbon contamination in groundwater was identified in BH204 in the area of the former garage (and present-day multi-storey car park). The risks from contamination in groundwater to migrate onto third party land, towards the potable abstraction and towards off-site surface water features is considered low to moderate as the groundwater is known to be perched in BH204. Further assessment will be possible following the demolition of the multi-storey car park in this area, to assess the risks to controlled waters and take remedial action if necessary.	**Low to Moderate**
PCL4	Ground Gas	Lateral and vertical migration	Future site users. Built environment.	The results of the preliminary ground gas risk assessment suggest that the site may be classified as CIRIA Characteristic Situation 2 (CS2, Low Risk). This is a worst-case scenario calculated using the highest flow rate and the highest carbon dioxide reading throughout the monitoring period. Until further assessment has been made, ground gas protection measures are required to be considered as part of the proposed development.	**Low to Moderate**

5. SPECIFIC REMEDIATION ACTIVITIES

The key elements of the remediation strategy are presented below. The vast majority of pollutant linkages that have been identified can be mitigated by a development led approach of mitigation applied or established as part of the construction of the development.

The development has been split into two separate phases: Phase 2 (in the east) and Phase 3 (in the west). Phase 2 has been further divided into two areas: The Temporary Events Area to the north and the multi-storey NCP car park to the south. This remediation strategy discusses the remediation works required for the entire Station Hill North Site.

Based on the risk assessment previously undertaken for the development, the plausible pollutant linkages relate predominantly to direct contact pathways with the shallow soils (i.e., ingestion, dermal and inhalation of dust). Elevated contaminant concentrations (including lead, PAHs, TPH and asbestos) were identified in shallow soils across the site, the majority of which are located within the proposed basement areas, and as such will be removed from the site.

The following pre-development remedial works and development led mitigation works have been identified for the site.

5.1 Pre-development remedial works:

- Excavation and off-site disposal of potentially contaminated Made Ground within the temporary events area (north of Phase 2).
- Further assessment of the previously identified hydrocarbon hotspot in groundwater (and associated soil impacts, if encountered) in the vicinity of BH204 (southeast of Phase 2).
- Excavation of basement and concurrent removal of contamination in shallow soils (south of Phase 2 and within Phase 3).
- Removal of substation (northwest of Phase 3).

5.2 Development led mitigation works:

- Excavation and removal of shallow Made Ground during enabling works.
- Capping System.
- Potential Ground Gas Protection Measures.
- Water Supply Pipe / Service Corridors.
- Piling Risk Assessment / Foundation Works Risk Assessment.
- Borehole Decommissioning.

5.3 Timescales

Remedial works for the North Site have been split into two separate phases; Phase 2 (the east of the site) and Phase 3 (the west of the site) and will be undertaken at different stages.

The Phase 2 enabling works within the Temporary Events Area was the first phase to be undertaken and works commenced on Monday 15th February. The enabling works involved a bulk excavation to formation level (approximately 2.5m bgl), which was complete in May 2021.

In July 2021, an additional strip of land along the northern boundary of the Temporary Events Area was added to the development site. It is understood that this area will be excavated to formation level, in line with the Temporary Events Area, at a later date.

The NCP multi-storey car park was closed and secured in July 2021 and was being demolished at the time of writing. Demolition is due to be complete later summer 2021, followed by earthworks and remediation within this part of the site.

The Phase 3 enabling works including demolition of Xafinity House will be undertaken at a later date (date to be confirmed).

5.4 Excavations and Enabling Works

5.4.1 North of Phase 2 / Temporary Events Area

As part of the initial Phase 2 enabling works, bulk excavation will be undertaken across the temporary events area to an approximate depth of 2.5m bgl (slightly higher in the west due to a sloping topography). This will involve the excavation of Made Ground comprising demolition crush from previous buildings, previous foundations and pre-existing Made Ground, and as a result the removal of contamination previously identified in shallow soils across this area of the site.

At the time of writing, the Temporary Events Area had been excavated to formation level and validation soil samples were collected by Ramboll from the in situ Made Ground to assess the risk of residual contamination. The chemical analytical results did not identify a risk to future users.

Enabling works occurring where asbestos containing materials have previously been identified (albeit to date very limited in detection based on the ground investigation data) should be undertaken in accordance with relevant guidance and legal requirements. There is also a potential for similarly impacted materials in areas not investigated across the site. All materials that are to be disposed off-site will require waste classification and should be managed under the appropriate waste management regulations and duty of care or under a Materials Management Plan where materials are intended to be reused.

The Contractor shall take all practicable measures to ensure water does not enter excavations. In the event of water entering excavations the Contractor shall take suitable measures to ensure it does not become contaminated. Any water entering excavations shall be disposed of in a suitable manner, with appropriate permissions and record keeping.

Should excavations reveal soils which are identified as potentially contaminated through visual or olfactory indicators such as black staining or hydrocarbon odours, the materials will be stockpiled separately. Refer to Section 7 Unexpected Contamination.

5.4.2 South of Phase 2 / NCP Car Park

Previous ground investigation identified two areas of contamination within the vicinity of the NCP car park in the south of Phase 2.

A hotspot of hydrocarbon contamination was identified within groundwater at BH204, located in the southeast corner of the site within the area of the former garage. Based on the geology encountered at BH204, the contaminated groundwater is considered to be perched and localised within the Made Ground. Impacted soils were also identified at BH204 to 4.5m bgl (top of chalk).

Elevated VOCs were also recorded during ground gas monitoring at WS203 within a former tank area (to the north west of the car park), as well as at BH204.

As Ramboll's ground investigation was undertaken prior to the demolition of the NCP car park, ground conditions directly beneath the building foundations are unknown. Therefore, further assessment and delineation of the ground conditions within this area are to be undertaken. It is understood that Sir Robert McAlpine, appointed demolition Contractor for the NCP car park, is undertaking additional ground investigation beneath the car park in July 2021, during which Ramboll will implement a part time watching brief to assess the ground conditions, particularly in relation to the previously identified contamination in the south east.

Depending on site observations by the contractor and during watching brief visits, further targeted and non-targeted trial pitting or surface soil sampling may be required to be undertaken across the site once excavations are complete.

A regular watching brief will be undertaken by Ramboll during the excavation works. Verification requirements are discussed in Section 8.

Free phase product was not identified during previous investigation, however, should free phase product be encountered during excavations, it will require removal and disposal at a licensed waste management facility.

5.4.3 Phase 3

As part of the development and site enabling works, basement excavations are proposed across the footprint of buildings in Phase 3. This will involve the excavation of Made Ground, possible Alluvium and Taplow Gravels, and as a result the removal of contamination previously identified in shallow soils across the site.

As the ground investigation was undertaken prior to the demolition of Xafinity House in the west of Phase 3, the ground conditions underlying the building are unknown. A watching brief will be undertaken during the excavations of the building foundations to assess the ground conditions. Verification requirements are discussed in Section 8.

5.4.4 Unforeseen Contamination

Should previously unidentified contamination be encountered during excavation works across the site then the contractor should refer to Section 7 (Unforeseen Contamination Protocol).

5.4.5 Removal of Groundwater

Should perched groundwater be encountered in any excavations across the site, then the water should be observed for signs of obvious contamination such as sheens or free product ('neat' oil on the surface of the water). If contamination is suspected, then an investigation of the potentially contaminated material will be required to determine management options. It is not envisaged that water will affect the excavations as there are no water sourced on-site (e.g., no shallow groundwater) and rainwater is not considered likely to 'pool' within excavations.

The remediation contractor will submit a Method Statement detailing the appropriate method for groundwater treatment (for example pumping from open excavations, or from installed sumps or wells within or around the perimeter of the excavation). For example, perched groundwater containing dissolved phase hydrocarbons could be disposed of off-site by tanker or treated on-site using a temporary on-site treatment unit. The Contractor will determine an appropriate disposal solution, taking into account the likely volume of perched groundwater, the dissolved phase concentrations and the ability of the Contractor to obtain appropriate consents for the discharge of treated groundwater (e.g., to foul sewer).

The perched water will be sampled and analysed by the Contractor prior to disposal to ensure that the perched water meets relevant requirements (e.g., discharge consent/ permit limits for disposal to foul sewer). The Contractor will be responsible for obtaining all necessary permits and consents for water disposal or discharge. A Thames Water Discharge Consent will be required if significant groundwater is encountered in excavations and if contaminated groundwater is to be remediated prior to discharge.

5.4.6 Removal of Obstructions and Existing Foundations

Concrete slabs and obstructions were encountered within many of the exploratory hole locations during the ground investigation. Excavation and removal of in situ obstructions has the potential to expose previously unidentified contamination in the ground and mobilise contaminants within the soil e.g., although not anticipated, underground storage tanks or asbestos containing material (ACM) cannot be ruled out.

The redevelopment works include excavation of existing basement foundations where there has been limited previous investigation. Therefore, regular watching brief visits will be undertaken during the excavations following demolition of the buildings. Watching brief and verification requirements are discussed in Section 8.

5.5 Removal of Substation

Two substations are present on the North site within the Phase 3 boundary. One is located in the north west corner, to the north of Xafinity House, and the other is located in the centre south of the site, adjacent to Garrard Street. A temporary radio mast is also present in this location. The substation in the north west corner requires appropriate removal to enable the Phase 3 development works.

PCBs were detected marginally above the laboratory limit of detection during the ground investigation, the highest was recorded in TP206 at 0.003mg/kg.

5.6 Capping System

Based on the elevated concentrations of contaminants encountered during the ground investigation, a clean capping system will be required as part of the development. The external areas of the development are understood to vary in terms of layout and the nature of the surfacing that will be present. The following provides general rules for each common type of capping that will need to be tailored to the specific layout and features in each phase of development. The two main types are:

- Hard capping (buildings, paving); and,
- Soft Landscaped Areas (no food growing is proposed within soft landscaped areas).

5.6.1 Hard Capping Layers

Future buildings and other areas of hardstanding (walkways, external paved areas, access roads, and hard landscaping) will provide a physical barrier to prevent site users coming into contact with the soil. No further remedial action is considered necessary in these areas in terms of human health risks. The hard-capping system for the site will principally rely on a barrier being created by the development preventing site users being exposed to soil beneath the site.

5.6.2 Soft Landscaped Areas

Within soft landscaped areas, a "clean cap" of a minimum of 600 mm is typically required which will incorporate a hard "no dig" demarcation layer to separate the clean cap from the residual Made Ground (subject to landscaping and planting requirements).

Soft landscaping is understood to predominantly comprise raised planters which will be filled with imported topsoil, as site won materials are not deemed suitable. Import testing requirements are described in Section 5.6.4.

5.6.3 General Requirements

The clean cap thicknesses above require agreement with the Local Authority and should be treated as draft until such time as they are agreed in writing.

Where excavation into the existing ground level takes place, the contractor will be required to have in place a watching brief presence to ensure unforeseen contamination is dealt with appropriately if encountered. A typical watching brief procedure is provided in Section 8.

Imported materials used within the clean cap construction of communal soft landscaped areas (including that for the cover system) shall be analysed chemically to ensure it is suitable for use. This should be undertaken prior to importing any such material onto the site.

Whilst not strictly part of the capping system material imported for use in service corridors or as general fill (if required) should also be sampled and verified as suitable for use.

Documentation on the source, quantity, and testing results of imported clean topsoil shall be retained onsite for inspection and subsequent inclusion in the verification report. The contractor shall retain records on the location, depth of excavations and how/ where any imported material is placed.

Furthermore, any water features included within the external spaces and that are to be sunk into the existing ground will need to be appropriately sealed and documentation provided of such sealing.

5.6.4 Import Testing Requirements

Where it is necessary to import materials, for example recycled aggregates or clean soil for landscaping/ green roof, the materials will be tested and where applicable follow appropriate protocols such as the Waste Protocols project or WRAP. In addition, all imported material will be inspected by the development contractor for any visible signs of contamination including, but not limited to, unusual discolouration, non-specified anthropogenic material, hydrocarbon staining or odours.

Imported materials will also require testing prior to import to site and once emplaced in the ground for contaminants to ensure that they are appropriate for the intended use (e.g., soil to be used in soft landscaping). The risk-based import soil verification criteria are presented in Appendix 2.

Sampling of imported material will be undertaken at the following frequency with testing both prior to import and once emplaced in the ground:

- One sample per 750m^3 of soil to be used in soft landscaped areas.

All samples will be analysed at an MCERTS accredited laboratory.

5.7 Ground Gas/ Vapour Mitigation

The site has currently been classified as being of CS2 characterisation based on six rounds of gas monitoring undertaken on the North site, requiring the installation of basic ground gas protection measures. This is a worst-case scenario and further assessment can be undertaken to potentially zone the North Site with regards to ground gas issues.

For a CS2 site two levels of protection are required for residential developments usually in the form of:

- a. Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200g DPM2 and underfloor venting; or

- b. Beam and block or pre-cast concrete and 2000g DPM/ reinforced gas membrane and underfloor venting; and
- All joints and penetrations sealed.

The proposed development comprises both residential and commercial buildings with residential buildings only within Phase 3 (in the west).

If a vapour risk is identified in certain areas that are intended to be developed with buildings, the most likely solution for vapour protection would be to install an upgraded damp proof membrane that also provides vapour protection for the identified contaminants of concern.

The final performance requirements of the ground gas/ vapour protection measures should be confirmed as part of detailed design in consultation with a specialist contractor and the agreement of the EHO.

All ground gas/ vapour protection measures incorporated into the design of the buildings will need to be documented on-site. Photographic evidence of the general installation, taping and sealing of a membrane would be required to be able to provide sufficient information to complete a Verification Report for each building upon completion of the construction works in each phase.

Future Gas Monitoring

It is expected that the enabling works will remove a significant amount of Made Ground, considered the source of ground gas on site and therefore once the verification works have been undertaken, there is the opportunity to consider the new CSM and potentially reclassify the site as CS1.

If required, any proposals for future gas monitoring will be submitted to Reading Council, which could include the installation of a series of gas monitoring wells following the demolition works.

5.8 Water Supply Pipes

Elevated concentrations of contaminants were identified in the Made Ground that are likely to preclude the use of polyethylene pipes on-site. As such the contractor should consult with the local water supply authority regarding the final selection of water pipe materials.

5.9 Foundation Works Risk Assessment

Ramboll's FWRA report (2019) provides details of the risks that need to be addressed relating to the foundation works and piling at the site with regard to the proposed development. The proposed foundation scheme comprises deep piled foundations with piles spaced at a minimum of three times the pile diameter to fully attain the base resistance of the structured upper chalk. The current proposal is to use CFA piles as these are financially more effective than bored piles, produce the least amount of vibration and noise and limit the possible spread of contamination, if present, from the shallow strata to the chalk aquifer. Piling works will be subject to liaison with the Environment Agency. A specialist piling contractor has been consulted with regards to the types of piles that are suitable for the site conditions and for the detailed design of the piles. The pile design will need to take into account the concrete Thames Water Foul Sewer running from east to west across the centre of the North Site.

During piling works arisings will be stored in discrete stockpiles dependant on the nature of the material. Prior to offsite disposal, the arisings should be further chemically analysed to ascertain their suitability for reuse or disposal.

5.10 Borehole Decommissioning

Decommissioning of existing boreholes on site to protect the underlying aquifer is recommended in accordance with Environment Agency Guidance and is a requirement of the original permission for drilling boreholes into the chalk for investigative purposes.

All boreholes installed in the Taplow Gravels or Chalk aquifers will be decommissioned before the earthworks and piling commences. The relevant boreholes are listed below:

- BH201 – Installed in the Chalk, (Phase 3).
- BH202D – Installed in Taplow Gravels, (Phase 2/ Phase 3 boundary).
- BH203 – Installed in the Chalk, (Phase 2).
- BH204 – Installed in the Made Ground, targeting hydrocarbon contamination, (Phase 2).
- ***BH205C – Installed in the Chalk, (Phase 3).***

Borehole	Standpipe (50mm) Response Zone (m bgl)
BH201	11.00 - 12.00
BH202D	6.00 - 7.00
BH203	11.00 - 12.00
BH204	3.00 - 4.00
BH205C	8.10 - 9.10
WS201	0.25 - 1.10
WS202	1.80 – 6.45
WS203	2.30 – 5.45

Figure 4: Boreholes installed during Ramboll's 2019 ground investigation

The EA guidance document Decommissioning Redundant Boreholes and Wells stipulates that the head works will need to be removed. This is usually done by digging out the top 1m of the well, cutting the pipe off and removing the cover and protruding section of pipe.

The wells will then be backfilled as per the EA guidance which states that:

"The ground should be restored as closely as possible to its pre-drilled condition. The borehole or well should be backfilled with clean (washed), uncontaminated, excavated materials such that the permeability of the selected materials are similar to the properties of the geological strata against which they are placed. The backfilled hole will then mimic the surrounding natural strata and groundwater flow and quality will be protected".

"…alternatively, the entire borehole can be backfilled with a low permeability material that will prevent significant vertical or horizontal movement of groundwater through or along the borehole".

The Contractor shall prepare a Method Statement for decommissioning boreholes that have been installed into the Upper Chalk. The Method Statement may need to be agreed with the

Environment Agency prior to proceeding with the works and this will be managed by the Project Environmental Consultant.

The contractors shall submit all details to Ramboll relating to the decommissioning works for inclusion in the Verification Report (including photographic evidence of the works being undertaken).

6. GENERAL SITE ENVIRONMENTAL CONTROLS

The following provides a summary of the expected general controls that will be in place during works on the site. As the works will largely be undertaken by contractors on behalf of JRL Group (Principal Contractor) the requirements are provided on the basis that contractors working on the project will adhere to these requirements (where relevant to the works being undertaken).

6.1 Permits and Licences

The contractors involved in the remedial works will be required to obtain and provide as evidence to the Client all relevant licences, exemptions, consents and deployment forms relevant to the remediation works being completed prior to works commencing. If necessary, the contractor shall comply with and give all notices required by any regulation or by-law applicable to the works, including the reuse of material on-site.

If required, the contractor will obtain the necessary permits for all equipment in terms of potential nuisance (e.g., noise and odour) and agree these with the relevant regulatory authorities (e.g., Environment Agency, Local Authority).

6.2 Environmental Management

Environmental management issues throughout the life of the works are to be governed or guided by a number of 'standards' including:

- those contained in legislation;
- those established by industry codes of practice; and
- those that are specific to commitments made in surveys, commitments made during regulatory consultation and measures as may be set out in conditions/ contract or in other licences and consents.

During the site works, the appointed contractors will implement procedures from published guidance documents for working on contaminated sites, in accordance with relevant construction industry practices, EA guidance, industry-accepted standards of 'good working practice' and relevant legislation.

Specifically, in relation to environmental management the contractor will implement procedures in accordance with the Control of Water Pollution from Construction Sites CIRIA C532 guidelines (CIRIA 2001) and the CIRIA Guide to Good Practice on Site during the developments of Contaminated Land, as well as relevant Environment Agency Pollution Prevention Guidelines.

6.3 Environmental Monitoring

6.3.1 Dust, Odour and Vapour

The contractors will be required to consider the need for dust, odour, hydrocarbon vapour, and asphyxiant gas controls and to provide details of any appropriate environmental controls and monitoring to prove its effectiveness during the works. This will include agreeing monitoring criteria with the regulatory authorities (if considered necessary).

6.3.2 Noise

Good practice will apply to potentially noisy operations. In particular:

- Plant and equipment used for the works will be properly maintained, silenced where appropriate, and operated to prevent excessive noise. Plant should be certified to meet any relevant EC Directives/UK/BS5228 standards.

- Guidance in relevant British Standards will be applied.
- Static construction plant (e.g., compressors and generators, if required) will be installed and appropriately enclosed or screened unless the location can be shown not to require it.
- Items of plant operating on the site in intermittent use will be shut down in the intervening periods between uses.

6.3.3 Vehicle Cleanliness

The contractors will take all reasonable measures to prevent, as far as is practically possible, the deposit or tracking of mud or debris arising from the remediation areas onto other areas of the site and onto public areas outside of the site (this will include public highways and areas of public access).

The following procedures will be put in place by the contractors working on the site:

- all vehicles shall be inspected prior to departure and where necessary loose material removed and wheels washed;
- drivers will inspect their vehicles prior to leaving the site and ensure that their loads are secure; and
- any loads of spoil or fill shall be adequately sheeted to prevent spillage on public roads or on the site premises.

6.3.4 Fuel and Hazardous Substances Storage

All liquids and solids of a potentially hazardous nature (e.g., diesel fuel, oils, solvents) will be stored in dedicated hard surfaced areas agreed with the client, including secondary containment (e.g., bunding) in accordance with current guidance and statutory requirements.

The contractor will establish within the site an area for the refuelling of plant and vehicles away from any water courses or site drainage. The fuelling area shall be kept clean at all times. Any spillages or leaks of fuel or other hazardous substances will be cleaned up immediately by the contractor. No refuelling will be carried out outside the refuelling area and the contractor will have in place contingency arrangements for dealing with spillages.

All equipment containing fuel/ oils (e.g., pumps and generators) will be placed on drip trays and these will be maintained by the contractor to remove standing water as appropriate to their correct operation and containment of the plant in question.

6.4 Soil Stockpiling

The contractor will stockpile excavated 'uncontaminated' soils and excavated 'impacted soils' separately. If required, imported 'uncontaminated' soils will also be stockpiled separately. The contractor is required to prevent mixing of 'uncontaminated' soils from soils excavated in other areas of the site to ensure that 'uncontaminated' soils are available to backfill the excavations which they were derived from.

Stockpiled materials will be stored and handled by the contractor in consideration of the nature of the materials and the potential to impact the surrounding environment (e.g., the control of surface water run-off, leachate, and dusts). This will include stockpiling excavated soils in designated areas of hardstanding (to be identified by the contractor on a plan). In addition, 'contaminated' stockpiles will be required to be placed on impermeable sheeting. The contractor should also make arrangements to suitably cover the stockpiles to minimise rainwater water ingress. Arrangements will also be required to handle and appropriately dispose of rainwater and

contaminated water run-off from stockpiles and remediation areas. Stockpile design and management will be the responsibility of the contractor.

6.5 Waste Disposal

6.5.1 Solid Waste

All material removed and disposed of off-site will be undertaken in accordance with the Duty of Care requirements of the Environmental Protection Act 1990, including the Waste (England and Wales) Regulations 2011. This includes any general waste (e.g., timber pallets, impermeable sheeting, office waste, absorbent pads) arising from the remedial works.

If impacted soils require off-site disposal the contractor will be responsible for sorting and segregating the waste soil into appropriate waste classification streams, supported by relevant chemical testing and Duty of Care documentation. The contractor will classify the waste and ensure it is disposed to a landfill or treatment facility licensed to accept that waste. The contractor will be required to segregate material in order that 'uncontaminated' overburden may be disposed of under a lesser waste classification if off-site disposal is required.

The contractor will provide a valid copy of the waste transfer certificate/ consignment note for each load of material which exits the site for off-site disposal during the works, including proof of receipt of the material at the landfill or other disposal site.

Loading of vehicles by the contractor shall be performed in an organised manner so as to prevent the escape of contaminants and materials. All vehicles will be appropriately designed to hold the waste without release during transit, sheeted, and cleaned externally, prior to leaving site. The contractor will take all reasonable and applicable measures to prevent the escape of material during loading and transportation. The contractor will be responsible for determining the need for and implementing compliance with transportation regulations for hazardous wastes, as applicable.

Identification of hazardous materials including for example asbestos containing materials (if encountered), will be subject to site contingency plans, health & safety and risk assessment/ method statement procedures for their identification, handling, removal and disposal.

6.5.2 Liquid Waste

Although not expected, free phase hydrocarbons, if encountered, will require disposal off-site in accordance with the Duty of Care requirements and handling requirements detailed above.

If the contractor proposes to remove groundwater this will also need to be disposed of appropriately. Should it be required, Ramboll will work with the project design team and contractor to manage wastewater appropriately. The contractor would be required to manage wastewater, if any, in compliance with appropriate regulations and consents (e.g., relevant discharge consents and treatment).

6.6 Materials Management and Re-use of Materials

The re-use of materials on-site should be undertaken under the CL: AIRE Development Industry Code of Practice (CoP) and will include the preparation of a Materials Management Plan (MMP). The MMP will provide a robust and auditable trail to monitor where the materials originate from through to their final destination, including temporary storage or stockpiling as necessary. The contractor will be required to prepare an MMP that can be novated to the Client for use in future works (if required).

Site won materials should only be used in areas of proposed hard standing or below 600mm in landscaped areas (unless proven otherwise by detailed sampling and verification by the contractor and approved by the Environmental Consultant and Council).

Materials with significant visual/ olfactory evidence of contamination should be managed in accordance with the procedures for unforeseen contamination (detailed in Section 7) and depending on their suitability may either conclude to be appropriate for re-use on-site subject to the requirements of the MMP or otherwise disposed of, off-site to an appropriately licensed facility.

If re-use of materials is required, an MMP should be produces and should include the following:

- roles and responsibilities of construction parties, regulators and consultants;
- description of the construction work including a site plan indicating areas of excavation and subsequent re-use;
- classification of waste types involved (inert, hazardous or non-hazardous, EWC codes);
- estimated quantity of materials for re-use (cubic metres or tonnes);
- management methods to be employed, documenting amounts re-used on or off site, treated on- or off-site, sent for another form of recovery, sent to landfill, or otherwise disposed of; and
- both the client and the Principal Contractor must declare that all waste will be dealt with in accordance with waste legislation, the Duty of Care Regulations and that materials will be handled efficiently, and waste managed appropriately.

The chemical criteria for re-use materials are shown in Appendix 2.

6.7 Health and Safety

The contractor will be responsible for ensuring the works are undertaken in accordance with applicable Health and Safety legislation and for ensuring that all necessary measures are put in place during the works, including:

- access and egress;
- site accommodation and welfare;
- site working hours;
- utility services and buried services (including drawings of underground services);
- site security;
- contractor induction requirements;
- CDM 2015 roles and requirements;
- Health and Safety document provision, including the provision of with method statements and risk assessments for the various activities associated with the works; and
- site security arrangements.

6.7.1 Utilities

The contractor will be required to make its own arrangements for a self-sufficient operation (for example its own provision of mobile generators and bowser water supplies).

Particular care shall be exercised for any work close to drainage (including surface water, trade effluent and foul) water systems and measures shall be put in place by the contractor to intercept contaminated run-off (if generated) during the remediation works.

The contractor will be responsible for locating, marking out and avoiding all underground and above ground services within the remediation areas. The integrity of the services (with the exception of the strip drain and sump, which will require removal) is required to be maintained during the works or reinstated following the works.

6.7.2 Remediation Contractor's Method Statements

Prior to undertaking any of the elements of the remedial strategy the contractor undertaking the works shall supply to the Client/ Ramboll Method Statement(s) and associated Risk Assessments for each activity of the works. This shall include, but not be limited to, removal of hardstanding, associated concrete obstructions in the ground, soil excavation, soil disposal routes, free phase product removal, groundwater disposal, details of all temporary works, specialist contractors, including waste operators and landfill operators, sourcing backfill material, backfilling excavations, sampling and chemical analysis and any other supporting documentation required to undertake the ground remediation works.

7. UNFORESEEN CONTAMINATION PROTOCOL

Potentially contaminated materials may be encountered during earthworks on-site that through visual or olfactory evidence may be suspected to be contaminated (i.e., the presence of staining, odours or deleterious materials).

For contractors undertaking works on-site that will create excavations into the ground each will be required to have in place a method statement that documents their own unforeseen contamination protocol based around the specific activities that each contractor will be performing. Should a source of contamination be found during the development works, such as free phase product, 'blue billy' or other similar contamination sources, a contractor would be expected to remediate the source. The environmental consultant will advise on the assessment of such contamination and the remediation measures needed.

The unforeseen contamination protocols are likely to include:

- The contractor stopping work in that area and immediately informing the Client or their representative and Ramboll to discuss the proposed action;
- The contractor liaising with the statutory authorities including the Environment Agency and Reading Borough Council to agree proposals for dealing with this material;
- If required based on consultation with the Client/ Ramboll the implementation of measures to remove grossly contaminated materials (where feasible) for segregation, storage or stockpiling (of soils) within a bunded and polythene covered area whilst testing is undertaken. Contaminated liquids should be stored in suitable containers;
- A record should be made of the volume of material removed and the extent of any required excavation;
- The full extent of the contaminated material must be excavated and furthermore validated by a suitably qualified engineer;
- Undertake laboratory testing of representative samples from the base and sides of the excavation (minimum of 1 sample per 10m length of sides and 1 per 100m^2 base) and testing of the material for a suitable suite of contaminants. The suite and chemical criteria for verification are to be defined in consultation with Ramboll and the regulatory authorities based on the nature of the contamination encountered;
- If the material fails comparison against the re-use thresholds this material should be excluded from the re-use strategy and alternative scenarios should be sought for re-use. The last option should be disposal off-site in accordance with current waste regulations. Records including laboratory analytical certificates, waste transfer notes, consignment notes and volumes requiring removal should be retained by the contractor; and
- If the material passes comparison with re-use thresholds (and is geo-technically suitable), the contactor should determine and record the location for placement of the material.

It will be necessary to retain all records relating to testing, quantity, depth and location of the material identified. Where such material is re-used, it will be necessary to demonstrate suitability through appropriate chemical testing and to retain records on where this material was placed.

If this material is removed off-site, then in addition to records on the source area outlined above, it will also be necessary to retain duty of care records relating to waste transfer notes, quantities and the receiving site.

8. VERIFICATION AND DOCUMENTATION

The following sets out the expected verification data that will be generated by the contractors to confirm that the works have been completed successfully.

8.1 Verification Report

A verification report will be produced upon completion of the earthworks. Information contained within the verification report shall include, but not be limited to:

- photographic evidence of reuse of soil with associated as built drawing showing where material came from and where it was ultimately used e.g., any re-use of building crush from Xafinity House and NCP car park following demolition;
- a material tracking sheet to document where materials have been sourced from on-site and their final destination;
- details of any material taken off-site, together with waste transfer notes or consignment notes, including the removal of the pile of 6F2 crush material currently located within Phase 3 and results of WAC testing for material classified as either hazardous or inert;
- details of any materials imported onto site, including as-built drawings showing where the material was used and the results of soil analysis showing its suitability for use on-site; and
- details of how previously unidentified contaminated material, if encountered, was addressed on-site. Site records and photographic evidence of excavation works in areas of unanticipated contamination with watching brief by an appropriately qualified Environmental Consultant.

A regular watching brief will be implemented by Ramboll during the remediation and earthworks with more frequents visits focussed on previously identified contamination and in areas with limited investigation to date. The following verification watching brief visits are recommended as a minimum:

- during the removal of the substations, and associated shallow soils, located in the north western corner of the site and along Garrard Street;
- during the excavation of material assumed to relate to the former pond shown on historical mapping if excavations reach this depth (approximately +36.9 – 34.75m AOD);
- during excavation in the areas of the former tank and garage, in the vicinity of WS203 and BH204, where contamination was identified during the site investigation and the area between which has currently not been investigated due to the multi-storey carpark;
- during excavations in the west of the site where limited investigation has been undertaken to date due to the presence of Xafinity House; and
- in the location of TP208 where the unexpected service was identified and exceedances in the soil.

During the site works the Contractor will be responsible for obtaining and maintaining a record of information required for the Verification Report. These records will be checked during part-time Environmental Watching Brief visits carried out by Ramboll. The Contractor is required to liaise directly with Ramboll to ensure that the visits to be undertaken by Ramboll are programmed in when most suitable. The Contractor will need to provide a copy of waste transfer notes and relevant paperwork on completion of the ground works to the Project Environmental Consultant and address with any queries arising from the verification process.

8.2 Record Keeping

The Contractor will provide Ramboll with the following information, for use within Ramboll's verification report:

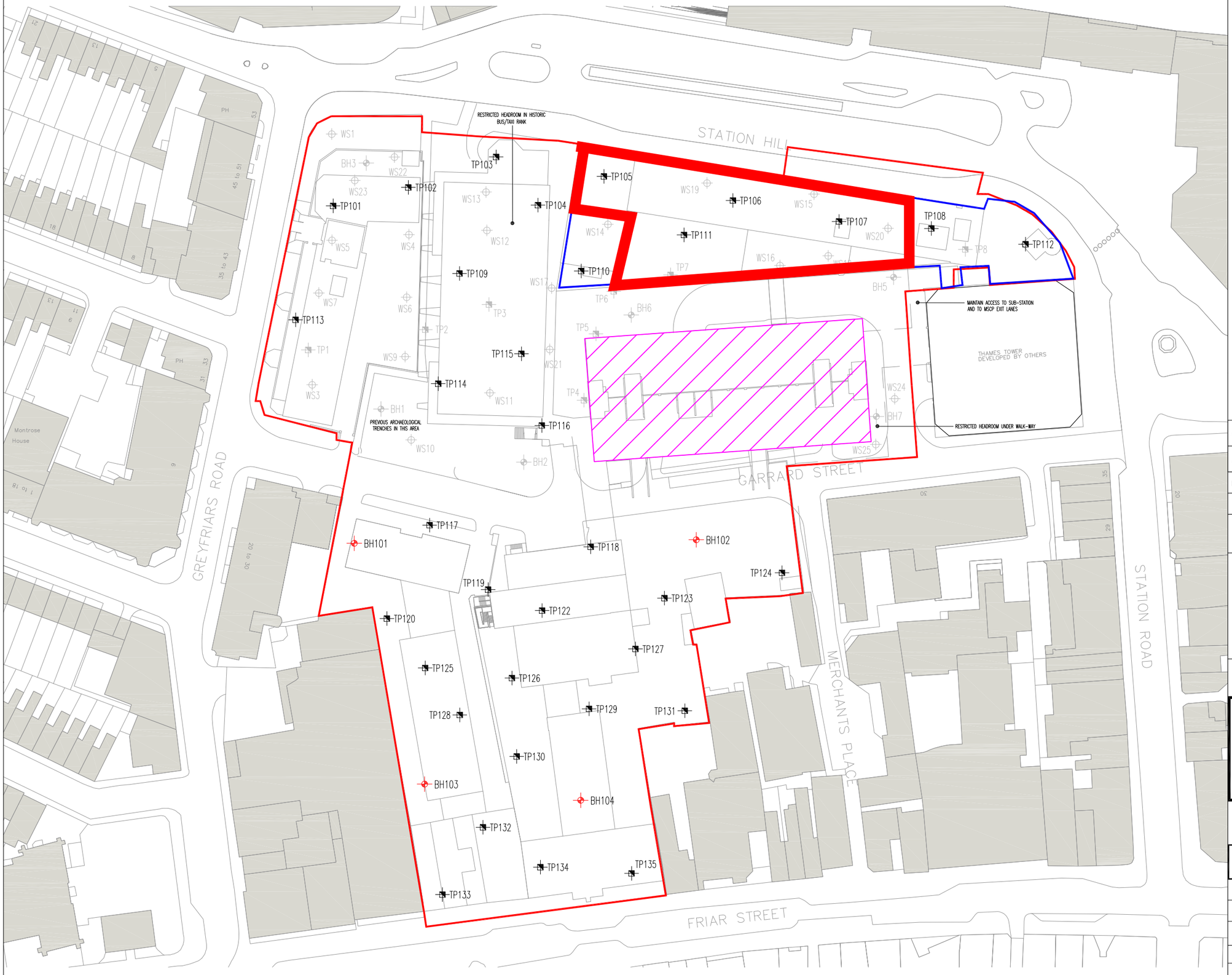
- a report on any environmental controls required during excavation works (e.g., dust monitoring and noise monitoring);
- plans showing the location and depth of excavations and verification samples, sub-surface voids and obstructions (if encountered), location and description of unexpected contamination (if encountered);
- 'as-dug' plans of where backfill materials have been placed at the site, including the thicknesses and types of backfill and the final site levels;
- results of laboratory analysis (laboratory analytical certificates in PDF format and compiled laboratory results in Excel format);
- details of consents, exemptions and permits for the works;
- waste duty of care information (including the types and amounts of waste disposed of, waste classification and WAC analysis, waste transfer and consignment notes and applicable site and carriers' licenses;
- documentation obtained from the producer of any imported recycled aggregate and topsoil;
- delivery notes for imported materials (where applicable); and
- the completed MMP for the works.

8.3 Ramboll Verification Report

On completion of the remediation, Ramboll will prepare a remediation Verification Report, which will include the following information, in accordance with current guidance on verification:

- the details and roles of Contractor/ sub-contractors involved in the remediation work;
- a summary of the original site conditions, with reference to the original site investigations and assessments;
- the remediation objectives and criteria, together with the basis on which the criteria were to be achieved (i.e., by reference to the remediation strategy);
- the Conceptual Site Model for the remediation and reference to the lines of evidence which demonstrate that the pollutant linkages have been broken;
- a description of the remedial activities with reference to relevant design reports including the remediation method statement, detailed designs, permits, phasing etc.;
- a photographic record of the remediation works, together with plans indicating the dates and locations of remediation activities;
- a clear description of the verification plan, including the methods used for data collection and interpretation;
- a summary of progress data such as excavation records and groundwater monitoring data, waste consignment notes, imported fill records, any variations;
- details of communications held with regulators during the remediation works;
- reference to the Health and Safety file;
- a clear statement that the remedial objectives have been completed; and
- supporting documents, to include where appropriate analytical results, monitoring data, health and safety documentation and quality management documentation.

APPENDIX 1
FIGURES



KEY:

- OUTLINE APPLICATION AREA
- TEMPORARY EVENTS AREA
- PREVIOUS SI LOCATIONS
- PROPOSED TRIAL PIT LOCATIONS
- PROPOSED BOREHOLE LOCATIONS
- INACCESSIBLE AREA

Rev	Date	Description	By
A02	02.06.15	UPDATE BOUNDARY AND ADD NEW SI LOCATIONS	DC
A01	24.06.14	PRELIMINARY ISSUE	MC

Amendments

Project
STATION HILL READING

Title
PROPOSED EXPLORATORY HOLE LOCATION PLAN (FIGURE A6)

Client
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Waterman

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Drawing Status
PRELIMINARY

Designed by	NS	Checked by	RM
Drawn by	DC	Date	JUNE 2015
Scales @ A3 work to figured dimensions only	1:750 @ a3		
Project No	EED12350-110		
Computer File No	EED12350-110-ESA80001		

Publisher	Zone	Category	Number	Revision
EED	80	SA	001	A02

A3-Waterman-S, EED12350-100-SA-80-SU, EXISTING_SI

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Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. BH01,BH02,AND BH03 CO-ORDINATES HAVE BEEN INFERRED FROM CONCEPT 2012 GROUND INVESTIGATION REPORTING. THEREFORE THEIR RELEVANT POSITIONS SHOULD BE CONSIDERED INDICATIVE ONLY.
6. WS302 - WS303, WS305, WS305A, WS306 - WS3013, WS3015 &WS3016 FROM GEL 2018 GI LOCATIONS ARE ALSO INDICATIVE ONLY.
7. THAMES WATER SEWER LEVELS ARE SHOWN INDICATIVELY, BASED ON HISTORIC CCTV SURVEY REPORTING NOTES.
8. GROUND WATER DESIGN LEVELS ARE INFERRED BASED ON MAXIMUM RECORDED GROUND WATER LEVELS RECORDED DURING MONITORING VISITS UNDERTAKEN BETWEEN 28TH JUNE & 26TH JULY 2019.

LOCATION PLAN KEY:

- BH204 — EXPLORATORY BOREHOLE (GEL 2019)
- WS201 — WINDOWLESS SAMPLE (GEL 2019)
- TP 209 — TRIAL PIT (GEL 2019)
- BH303 — EXPLORATORY BOREHOLE (GEL 2018)
- WS304 — WINDOWLESS SAMPLE (GEL 2018)
- BH1 — EXPLORATORY BOREHOLE (ST CONSULT 2014)
- WS10 — WINDOWLESS SAMPLE (ST CONSULT 2014)
- BH03 — EXPLORATORY BOREHOLE (CONCEPT 2012)
- SECTION MARK
- THAMES WATER SEWER

DEVELOPMENT KEY

- BLOCK A
- BLOCK B-D
- BLOCK C
- BLOCK E
- BLOCK F
- BLOCK G
- PODIUM

Rev	Description	Date	By	Chk	App
I01	FOR INFORMATION	06/08/19	DH	SM	SP

FOR INFORMATION

STATION HILL READING

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EXPLORATORY HOLE LOCATION PLAN

Project No:	Scale (@A1):	Drawn:	Date:
1620004716	1.500	DH	AUG.2019

Drawing No: SHRN-RAM-SW-ZZ-DR-S-0070 Rev: I01

16/08/2019 10:55:55

APPENDIX 2
CHEMICAL CRITERIA FOR REUSE AND IMPORT MATERIA

Determinand	Chemical Criteria for imported material to be used below hardstanding	Chemical Criteria for imported material to be used within the brown/green roof area
Inorganics		
Arsenic	640	40
Cadmium	410	150
Chromium (III)	8600	910
Chromium (VI)	49	21
Copper	68000	7100
Lead	2300	310
Mercury	1100	56
Nickel	980	180
Selenium	12000	430
Vanadium	9000	1200
Zinc	73000	40000
Free Cyanide	49	49
PAHs		
Acenaphthene	75000	2000
Acenaphthylene	76000	2000
Anthracene	520000	30000
Benzo(a)anthracene	170	12
Benzo(a)pyrene	76	5.3
Benzo(b)fluoranthene	45	4
Benzo(ghi)perylene	3900	360
Benzo(k)fluoranthene	1200	110
Chrysene	350	30
Dibenzo(a,h)anthracene	3.5	0.31
Fluoranthene	23000	1500
Fluorene	60000	2200
Indeno(123-cd)pyrene	510	45
Naphthalene	110	0.99
Phenanthrene	22000	1300
Pyrene	54000	3700
BTEX		
Benzene	15	0.37
Ethylbenzene	3200	34
Toluene	33000	370
Xylene –m	3400	34
Xylene –o	3700	37

Determinand	Chemical Criteria for imported material to be used below hardstanding	Chemical Criteria for imported material to be used within the brown/green roof area
Xylene -p	3300	33
TPHs		
TPH Aliphatic C5-6	2400	24
TPH Aliphatic C6-8	5300	53
TPH Aliphatic C8-10	1300	13
TPH Aliphatic C10-12	6100	62
TPH Aliphatic C12-16	43000	510
TPH Aliphatic C16-35	1000000	42000
TPH Aliphatic C35-44	1000000	42000
TPH Aromatic EC5-7 (benzene)	26000	370
TPH Aromatic EC7-8 (toluene)	56000	860
TPH Aromatic EC8-10	2200	22
TPH Aromatic EC10-12	11000	120
TPH Aromatic EC12-16	35000	1100
TPH Aromatic EC16-21	29000	1900
TPH Aromatic EC21-35	29000	1900
TPH Aromatic EC35-44	29000	1900
TPH Aliphatic and Aromatic EC44-70	28000	1900
Other		
Asbestos	Absent	Absent