Phase I & II Geo-Environmental Assessment

Land to the Rear of 17 Newcastle Road
Reading
RG2 7TN

Prepared for:

Brett Property Group
c/o PSD Architectural Services
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LAND TO THE REAR OF 17 NEWCASTLE ROAD, READING

NON-TECHNICAL CLIENT SUMMARY

This report presents the findings of a combined Phase I Desk Study and Phase II Geo-Environmental assessment undertaken to determine ground conditions, establish if there are any geo-environmental risks associated with the site and its proposed development and to provide a geotechnical appraisal. Pertinent findings and conclusions may be summarised as follows:

- The site is currently an undeveloped area that is largely overgrown with mature trees boarding the site on the northern, eastern and western boundaries with residential properties to the south. Proposed plans are understood to comprise the construction of 9 new residential dwellings with associated infrastructure works inclusion areas of private gardens.
- Historically the site remained undeveloped until the 1910s when it was mapped as allotment gardens until the 1930's. Since then, it has formed the residential gardens of the adjacent properties until recently when the site was sold. The site is not located in a particularly environmentally sensitive area (due to the underlying clay soils and therefore limited groundwater resource potential). Some limited commercial/industrial sites were noted within the surrounding area including a nearby car engine tuners and farm, but are not considered to pose a significant risk to the site and its development.
- To assess the nature and quality of soils beneath the site, five boreholes were drilled to a maximum depth of 4.0m. Ground conditions comprised a variable thickness (up to 0.8m) of made ground with brick/glass; overlying superficial clay deposits, although in some areas, a layer of gravel in a sandy clay matrix was encountered. Groundwater generally wasn't encountered throughout the boreholes.
- The Laboratory analysis of shallow soil samples has established that the made ground materials do not meet environmental quality standards for use within residential gardens or soft landscaping due to the presence of contamination, including the presence of lead and benzo(a)pyrene.
- In order for the development to meet the required standards, the recommendation has been made for the installation of a 600mm cover system proposed garden and soft landscaping areas. This removal should be appropriately verified and associated documentation provided to the local authority to support discharge of relevant planning conditions.

ENGINEERING SUMMARY

- The ground conditions may be suitable for conventional spread foundations but due to the thickness of made ground. An allowable bearing capacity of 140kN/m^2 at 1.0m is considered appropriate, although this can increase with depth.
- Suspended ground floor slabs are recommended for any new buildings.
- Falling head infiltration testing indicated that soakaways are unlikely to be suitable for use at the site due to the cohesive geology.
- A design sulphate class of DS- and an aggressive chemical environment for concrete (ACEC) of AC-1s is considered suitable for shallow buried concrete.

The above points represent a simplified summary of the findings of this assessment and **must not** form the basis for key decisions for the proposed development. A thorough review of the details is contained within the following report, or alternatively get in touch and we'll talk you through it.

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Status:	Issue 3 (further revisions to development plan)	

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If third parties have been contracted / consulted during compilation of this report, the validity of any data they may have supplied, and which are included in the report, have been assessed as far as possible by EPS however, EPS cannot guarantee the validity of these data.

Where ground investigations have been conducted, these have been limited to the level of detail required for the site in order to achieve the objectives of the investigation.

No part of this report, or references to it, may be included in published documents of any kind without approval from EPS. This report and its contents, together with any supporting correspondence or other documentation, remain the property of Environmental Protection Strategies Ltd until paid for in full.

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance, with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.

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1 INTRODUCTION

In June 2022, EPS Ltd was commissioned by Brett Property Group to complete a Phase I & II Geo-Environmental Assessment for Land to the rear of 17 Newcastle Road, Reading RG2 7TN ('the site'); see Figure 1.

The work was commissioned in order to support planning requirements relating to contamination for the erection of 9 residential dwellings, including associated infrastructure and areas of private gardens.

This report presents the findings, conclusions, and recommendations of the Phase I Desk Study and subsequent Phase II Intrusive Investigation undertaken.

1.1 Objectives

The objectives of this investigation were as follows:

a) Compile a Phase I desk study and Conceptual Site Model (CSM) to evaluate the potential risks the site may pose to human and environmental receptors, both currently and in future.
b) Assess potential contaminant linkages identified through the CSM by means of investigating shallow soils.
c) Determine the potential risks posed by the site and make recommendations for further work that may be required, to ensure safe development in accordance with the Environment Agency's *Land Contamination: Risk Management* (2020) and the *National Planning Policy Framework.*
d) Collect information on ground conditions and strength in order to make appropriate recommendations for geotechnical design.

1.2 Scope of Work

The scope of works was to perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRAs '*Contaminated Land Statutory Guidance'* (2012), BS10175 (2011) – '*Investigation of Potentially Contaminated Sites'*, BS5930:2015 '*Code of Practice for Ground Investigation*' and BS EN 1997:2007 *'Geotechnical Design',* and therefore, the following tasks were undertaken:

<u>Desk Study:</u>

- Collection of site records.
- Study of existing geological, hydrogeological and historic maps of the area.
- Consultation of environmental databases, including records held by the local authority (where available).
- Review of proposed development plans.
- Development of a Conceptual Site Model (CSM) and Preliminary Risk Assessment.

Intrusive Investigation:

- Site walkover, inspection of any visual evidence of contamination, obtaining photographic records.
- Health and safety briefing/ site supervision.
- Drilling of five window sample boreholes to a maximum depth of 4.0m below ground level (bgl), using a track-mounted, percussive drilling rig.
- In-situ testing, to assist with geotechnical design, including a falling head infiltration test in one of the boreholes to assess the permeability of shallow soils.
- Continual logging of ground conditions including inspection of samples for visual and olfactory contamination, and laboratory analysis of selected soil samples.

Reporting:

- Data collection
- Interpretation of data including completion of Generic Quantitative Risk Assessment
- Reporting

The findings of these investigations and their conclusions are presented in the following sections.

1.3 Project Limitations and Constraints

The purpose of this report is to present the findings of a soil sampling investigation conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, EPS makes the following statements:

No investigation method is capable of completely identifying all ground conditions that might be present in the soil or groundwater under a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of boreholes and / or trial pits to recover soil and / or groundwater samples. The locations of these excavations and sampling points are considered to be representative of the condition of the whole site subsurface however, ground conditions are naturally variable and it may be possible that the ground conditions encountered may differ to those encountered during the investigation.

No visible evidence of Japanese Knotweed was identified during the site walkover. However, this plant can be difficult to identify in the early stages of growth and therefore it is not always possible to identify its presence at certain times of the year. For this reason, EPS cannot confirm that Japanese Knotweed rhizomes do not exist and it is recommended that if it is suspected that this species, or other similarly invasive plants are present at the site, a specialist contractor should be commissioned to make a detailed assessment.

The investigation was carried out to assess the significance of contamination resulting from the use of the site as identified in this report. Unless EPS has otherwise indicated, no assessment of potential impact of any other previous uses has been made.

2 SITE CHARACTERISATION

The following section provides a summary of the information collected in relation to the site location and history.

2.1 Site Location and Description

Detail	Description
Location	The site is located to the north of Newcastle Road, located approximately 2.1km south east from Reading town centre.
National Grid Reference	472320, 171720
Topography	Site levels fall towards the south with a steeper bank noted in the south which leads to the rear gardens of the adjacent residential properties. The main site area lies approximately 65m above ordnance datum (AOD) although the base of the bank is a couple of metres lower.
Description of Site	A walkover survey was completed by EPS on the 28th July 2022 and the site was found to comprise a regular shaped parcel of land, covering approximately 0.24ha. Access was gained from the garden area of 19 Newcastle Road in the south. Immediately from the site boundary in the south there was a bank leading up to the main site area. Waste material was dumped along the southern boundary including, bikes, sofas and wood. At the time of the walkover the area was heavily overgrown with varying grass species and brambles and a contractor was on-site clearing the vegetation at the time of the walkover. Mature and semi mature trees were present along the northern, eastern and western boundaries which did include oak. Due to the overgrown of the site no utilities were immediately obvious but due to the history were unlikely to be present.
Surrounding Land Use	The land is immediately surrounded by Cintra Park to the north, allotment gardens to the east, and residential properties to the south and west. In the wider area it is a mixture of residential properties and schools.

A plan showing the site location is provided as Figure 1, the current site layout is detailed on Figure 2 and an aerial photograph is included as Figure 3. Selected site photographs are included as Appendix A, an indicative proposed development plan is included as Appendix B and relevant extracts of the Envirocheck Report are included as Appendix C.

2.2 Geo-Environmental Setting

<table>
<tr><th>Detail</th><th colspan="2">Description</th></tr>
<tr><td>Geology</td><td colspan="2">Geological mapping suggests the site to be directly underlain by bedrock of the London Clay Formation. Although superficial deposits of the Boyn Hill Gravel Member are mapped to the north. Information on the site's geological context is included as Appendix D.</td></tr>
<tr><td>British Geological Survey (BGS)</td><td colspan="2">A historical trial hole log has been reviewed for a location around 170m south west at the Palmer Academy, to give a further indication of the ground conditions that may be anticipated beneath the study area. The log reports topsoil to 0.6m below ground level (bgl), overlying a medium dense brown clayey gravelly sand to 1.1m underlain by a firm brown/grey mottled very silty sandy clay to 2.5m overlying a soft very silty sandy clay to 3.1m where the trial pit was terminated. Groundwater was not encountered during the excavation process and the historical log is also included in Appendix D.</td></tr>
<tr><td rowspan="8">Geological Hazards</td><td>Hazard</td><td>On Site Risk</td></tr>
<tr><td>Mining Activities</td><td>Unlikely</td></tr>
<tr><td>Collapsible Ground</td><td>Very Low</td></tr>
<tr><td>Compressible Ground</td><td>No Hazard</td></tr>
<tr><td>Ground Dissolution</td><td>No Hazard</td></tr>
<tr><td>Running Sand</td><td>Very Low</td></tr>
<tr><td>Landslide</td><td>Very Low</td></tr>
<tr><td>Shrinking/ Swelling Clay</td><td>Low</td></tr>
<tr><td colspan="2">Seventeen BGS recorded mineral sites are present within 1km, the closest was located 517m north west named 'Whitley Grove Gravel Pit' which was an opencast pit extracting gravels of the Boyn Hill Gravel Member.

Six man-made mining cavities are reported within 1km with the closest 616m west. The mine extracted chalk and the possible adit entrance was depicted on an ordnance survey map.</td></tr>
<tr><td>Radon</td><td colspan="2">The Envirocheck report indicates the site to lie in a location where the percentage of homes above the radon action level is less than 1%. It further reports that the site does not require any radon protection measures in the construction of new buildings or extensions.</td></tr>
<tr><td>Hydrogeology</td><td colspan="2">Groundwater vulnerability maps for the area show that the underlying bedrock of the London Clay Formation is defined as Unproductive Strata and does not lie within a Source Protection Zone (SPZ) for local groundwater abstraction although a SPZ Zone I is located 754m to the east.

Three groundwater abstractions have been identified within 1km of the site; the closest is 656m east at University of Reading for 'Schools and Colleges:</td></tr>
</table>

	General Use (Medium Loss). mineral products: Groundwater vulnerability maps are included as Appendix E.
Hydrology	The nearest surface water feature has been identified as a drainage ditch 3m north in Cintra Park. One discharge consent is listed within 500m at approximately 300m operated by Bewley Homes Plc for the discharge of trade effluent to the land through a soakaway. There are no surface water abstractions listed within 1km.
Flood Risk	Review of the EA flood zone map for the area indicates that the site lies within Flood Zone 1, which is defined within Table 1 of the technical guidance to the National Planning Policy Framework (NPPF) as '*the area with a low probability of flooding from rivers or the sea*'. It should be noted that the EA maps do not take into account flooding from other potential sources of floodwater, such as from poor drainage, or groundwater. An indicative flood zone map is included in Appendix E.
Landfill & Waste	Five historic/local authority recorded landfill sites are recorded within 1km of the site. The closest was 637m west named 'Craddock Road' with deposited waste including inert and industrial waste. One licensed waste management facility is located within 1km approximately 723m west. The facility was operated by Rentokil Initial Services Ltd and was categorised as a special waste transfer station, but the licence appears to have been surrendered. Six area of potentially infilled land are present within 1km. The closest is 526m north west relating to an unknown pit/quarry.
Licensed Industrial Activity	Two sites are licensed by the local authority for industrial activity within 500m with the closest 428m north east related to the respraying of road vehicles but the authorisation has been revoked.
Industrial Land Use	The Envirocheck report lists 11 industrial land uses within 500m (3 of which are present within 250m); the most pertinent are summarised below.

Land Use	Distance (Direction)	Status
A D S Berkshire Holdings Ltd (Freight Forwarders)	20m (SW)	Active
Digital Auto Dash (Car Engine Tuning & Diagnostic Services)	138m (SE)	Inactive
Equazion Ltd (Air Conditioning & Refrigeration Contractors)	143m (SW)	Inactive
Wrap Wire Service Ltd (Electronic Engineers)	375m (SW)	Inactive
Hi Lo (Carpet Curtain & Upholstery Cleaners)	384m (W)	Inactive
Top Gear Tyres Ltd (Tyre Dealers)	414m (NE)	Active

One petrol station entry is recorded within 500m at 405m north east but the Reading Garage is now listed as obsolete.

Pollution Incidents	Two pollution incidents to controlled waters are reported within 500m, the closest of which is located around 389m north east. This event was recorded as a 'Category 3 - Minor Incident 'and occurred in July 1993, involving the release of an unknown pollutant, with the cause of the incident and receiving water not reported.
Sensitive Land Use	No sensitive land uses are recorded within 500m
Previous Investigation or Remediation	EPS are not aware of any previous ground investigations or remedial works undertaken at the site.

2.3 Site History

A summary of historical map data from 1879 to 2022 is summarised below. Key points are highlighted, and copies of relevant historic maps and any others examined during the investigation are included in this report as Appendix F.

- Mapping from the late 1800s shows the site to be undeveloped forming part of a wider field network. This remained as such until 1912 by when the site was mapped as allotment gardens. By 1932, residential properties had been built to the south of the site and the site formed the garden areas (long and narrow) for the six properties. The aerial mapping from 1999 showed the gardens present which were predominantly grass covered with trees present throughout. No obvious structures were present within the garden areas.
- With regards to the surrounding area, there was limited development in the late 1800s, although a couple of farms (Whitleypark Farm and Gully Farm) were present in the area 180m north east and 340m south west respectively. A pond was located 210m west that was later infilled around 1899.
- By 1899, allotments were mapped 100m west and remained present until 1932 when they were cleared for residential properties.
- From 1966, allotments were mapped to the east of the site and are still present in 2022.

3 PRELIMINARY RISK ASSESSMENT AND CONCEPTUAL SITE MODEL

In accordance with the Environment Agency's *Land Contamination: Risk Management* (LC:RM, 2020) guidance, there are three stages to managing contaminated land (Risk Assessment, Remedial Options Appraisal / Remediation and Verification). This section outlines the first tier of Stage 1, the Preliminary Risk Assessment.

The following section provides a review of the contaminant linkages that may be active at the site through examination of the potential sources that may be present as a result of historic and / or current site activities and where potential interaction between these sources and the identified human / environmental receptors may occur.

3.1 Background

A preliminary risk assessment comprises the first stage of any geo-environmental assessment, the purpose of which is to determine what potentially contaminative activities may have occurred at the property or the surrounding area which may pose an environmental or geological risk to site users, the surrounding environment or proposed development, either at present or in the future.

The method used in this investigation to assess the environmental risk posed is based on the concept of 'contaminant linkage', which considers the following three factors:

Source	The location from which an environmentally hazardous / contaminative substance is, (or was,) derived.
Pathway	A route or mechanism via which a source could come into contact with a receptor to cause significant harm.
Receptor	An environmentally sensitive object or condition e.g. person, property, controlled water, or ecological system, which may be present now or in future.

If all three factors are identified, there is the potential for a 'contaminant linkage' to be active, which could result in significant harm being caused to the environment or human health.

3.2 Source Characterisation

The following potential contaminant sources have been identified at the site and in the surrounding area:

Potential Source	Source Description	Principal Contaminants of Concern
Current and Historic Site Use	In-fill material of unknown origin (made ground) used to level areas.	PAH, ACM & Metals

Potential Source	Source Description	Principal Contaminants of Concern
Current and Historic Site Use (cont.)	Former allotment gardens present on-site.	Metals, Herbicides & Pesticides
Current and Historic Surrounding Land Use	Current / former allotment gardens in the surrounding area, closest located directly to the east.	Metals, Herbicides & Pesticides
	Historic pond infilled by 1899.	Ground Gas (CH_4, CO_2)
	Current and historic commercial and industrial land use within the surrounding area, such as car engine tuners and farms within 250m.	TPH, PAH, Metals & ACM

Notes:

PAH	Polycyclic Aromatic Hydrocarbons	ACM	Asbestos Containing Materials
TPH	Total Petroleum Hydrocarbons	VOC	Volatile Organic Compounds
CH_4	Methane	CO_2	Carbon Dioxide

3.3 Potential Receptors

A framework for the assessment of risks arising from the presence of contamination in soils has been produced by the Environment Agency and the Department for the Environment, Food and Rural Affairs (DEFRA) and is presented with the report: '*Using Science to Create A Better Place: Updated Technical Background to the CLEA Model* – Science Report SC050021/SR3'. This guidance document defines a series of standard land-uses which have been further developed into six generic land uses in the Category 4 Screening Levels project for Land Affected by Contamination (DEFRA/Contaminated Land: Applications in Real Environments (CL:AIRE) Project Report SP1010, 2014) which form a basis for the development of the Conceptual Site Model.

Risks posed to controlled waters have been considered in line with the Environment Agency's approach to groundwater protection (v1.2, 2018) and associated position statements.

The development is currently understood to include the construction of nine residential dwellings with associated works and areas of private gardens and therefore the proposed land use has been considered as:

- Residential (with home grown produce)

In view of the environmental setting, current and potential future land use of the study area and surrounding sites, the potential receptors for any contaminant impact are discussed below:

Receptor	Site Specific Description
Human	Future site users, site workers involved in the site redevelopment, and those working and living in the surrounding area have the potential to be at risk from exposure to potential contaminants of concern (CoCs).
Groundwater	The geology beneath the site is anticipated to comprise bedrock of the London Clay Formation which is classed as Unproductive Strata and does not within an SPZ for nearby groundwater abstraction with no licences held within 500m. On this basis, groundwater should not be considered as a sensitive receptor to site derived contaminants at this stage.
Surface Water	The nearest surface watercourse is a small drainage ditch, 3m to the north. It is possible that site-derived contaminants of concern may enter these watercourses either directly through surface runoff or shallow drainage systems, or via lateral migration through unsaturated soils. Therefore, surface waters must also be considered as a sensitive receptor within the conceptual site model.
Flora and Fauna	The proposed development includes the provision of private gardens. Some of the identified contaminants of concern are known to be phytotoxic and as such, the potential for this impact should be considered.
Buildings & Infrastructure	Subsurface structures are likely to be present at the site which may be adversely affected by the potential presence of the identified contaminants of concern. These include concrete used in building foundations, buried potable water supply pipes and other service lines and pipes.
Adjacent Land	Adjacent properties including private residential dwellings could also be at risk from potential contaminants found at the site.

3.4 Potential Pathways

Where contaminants may be present in soil, there are a number of potential pathways that enable human receptors to come into contact with or be exposed to them. The most direct pathways, considered under current UK legislation, can be summarised as follows:

- Direct ingestion of contaminated soil
- Ingestion of household dust
- Ingestion of contaminated vegetables
- Ingestion of soil attached to vegetables
- Dermal contact with contaminated soil
- Dermal contact with household dust
- Inhalation of fugitive soil dust
- Inhalation of fugitive household dust
- Inhalation of vapours outdoors
- Inhalation of vapours indoors

Clearly, not all of these potential pathways apply for every standard land-use. For example, ingestion of contaminated vegetables will not apply to land uses other than residential with plant uptake and allotments.

However, in addition to direct exposure pathways, a number of physical transport mechanisms / pathways may also exist at a site that allow remote or less accessible contaminants in soil or groundwater to reach human or environmental receptors both at a site and beyond the site boundary. These include the following:

- Downward and lateral movement of contaminants in soil either by gravity or through being 'leached' by percolating rainwater.
- Lateral migration of contaminants dissolved in groundwater.
- Direct seepage or leaching of contaminants from soil into subsurface drains or supply pipework.
- Volatilisation of contaminants from groundwater or unsaturated soils into buildings or outdoor air.

Through examination of the standard land use and environmental setting at each site, the presence of pathways and transport mechanisms described above must be considered when assessing whether a contaminant linkage may plausibly be active, and therefore be included in the conceptual site model.

3.5 Summary of Site-Specific Contaminant Linkages

Considering the site use and environmental setting, and the proposed land use; the plausible contaminant linkages that require further investigation are summarised in the following table:

Source	Pathway	Receptor
Contaminated Soil	Direct contact and inadvertent ingestion by eating or smoking with dirty hands	Construction workers during redevelopment & site users
	Inhalation of fugitive dusts	
	Direct uptake and/or adherence to homegrown produce and subsequent ingestion	Site users
	Direct uptake via root systems	Plants

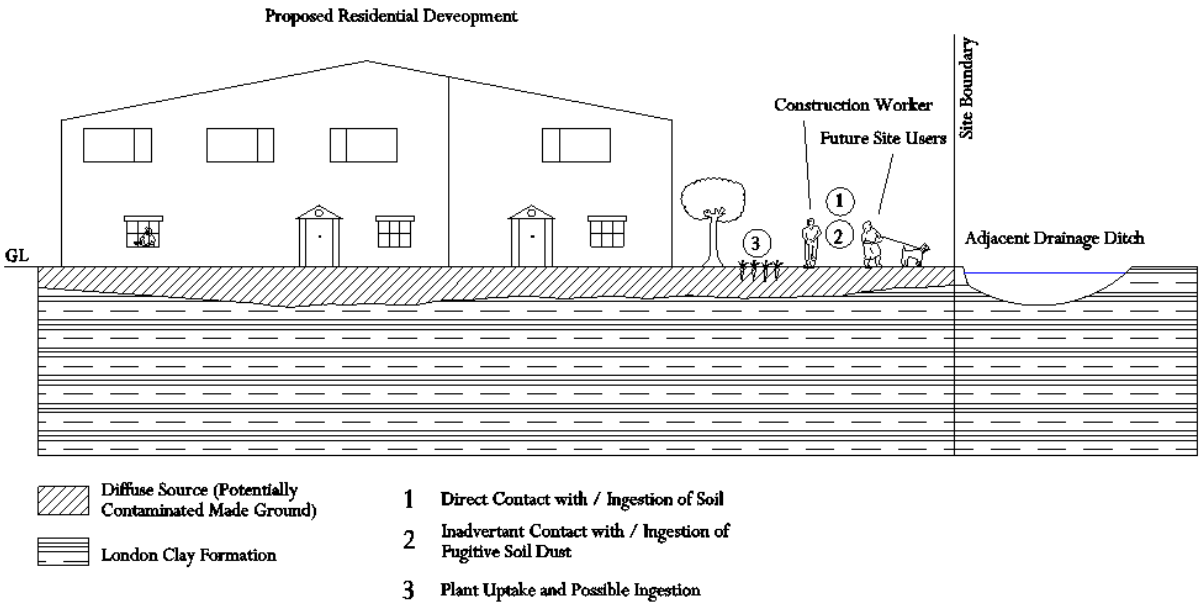
The following comments are made with respect to contaminant linkages which have been considered through development of the conceptual model, but have not been concluded as 'plausible' – i.e., through which a significant possibility of significant harm could occur to an identified receptor:

- PAHs and metals have been identified as contaminants of concern associated with the historic onsite infill, however these contaminants are considered to be relatively immobile in the environment by virtue of their very low solubility and volatility. On this basis, plausible pathways by which these potential contaminants could pose a significant risk to the underlying groundwater or nearby surface watercourses are not considered to be active.
- Agri-chemicals possibly utilised for on-site and surrounding historical horticultural activities, including the allotment gardens have been identified as potential sources of contamination. However, given the quantities in which they are likely to have been applied, it is considered highly unlikely that significant pesticide contamination or any semi-volatile organic contaminants associated with this off-site source would still be present in shallow soils within concentrations capable of posing a risk to future site users. Metals have still been considered as part of this assessment.

- A historic infilled pond located 210m west. Considering the cohesive nature of the mapped soils, the time that has passed since the site was levelled (100+years) and the nature of the fill that is likely to have a low gas generating potential when compared to a municipal landfill. Therefore, considering these points a risk to future site users from ground gases is not considered plausible.
- A limited number of former/ active commercial/industrial sites have been noted nearby including a car tuning tuners and farms. However, due to the nature, location, underlying geology and size of these services, these are not considered to pose a significant risk to the proposed development.

The following diagram provides an illustration of the plausible contaminant linkages that may be active at the site and which may need further investigation or control to ensure safe development:

Land to the rear of 17 Newcastle Road, Reading – Illustrative Conceptual Site Model



4 SUMMARY OF INTRUSIVE INVESTIGATIONS

The intrusive ground investigation was undertaken on the 28th July 2022, in accordance with EPS standard operating procedures, copies of which will be made available on request. A summary of the site activities is presented in the following sections:

4.1 Exploratory Hole Locations

Exploratory hole locations were selected through consideration of the proposed development layout, the findings of the conceptual site model, the location of below ground utilities as well as operational and health & safety considerations.

Five window sample boreholes (WS01-WS05) were drilled to a maximum depth of 4.0m.

The overall objective, in terms of exploratory hole locations, was to deliver an appropriate lateral and vertical coverage of the site in order to offer information relating to the nature, quality and strength of the underlying soils. Further rationale for each sampling location is provided in the table below:

Location	Rationale
WS01-WS05	Assess the nature and quality of shallow soils across the site, providing detailed lateral coverage for the contamination risk assessment and to assist with geotechnical design.
WS01	To facilitate the completion of a falling head infiltration test.

The exploratory holes were formed in accordance with standard EPS methodologies, and all sub-contractors were supervised by an EPS engineer throughout the works.

All borehole positions were backfilled with soil arising's upon completion.

An intrusive investigation location plan is presented as Figure 4.

4.2 In-Situ Testing & Soil Sampling

Each borehole was logged for ground conditions encountered and inspected for any physical evidence of contamination, such as soil staining, odour and the presence of separate phase liquids, on a precautionary basis.

Soil samples were recovered from each location at regular intervals for record purposes and future laboratory testing. Selection of samples from the boreholes focused on providing an assessment of the geotechnical properties of the soils encountered, as well as the quality of sub-surface materials present across the site (including any impacts from previous or adjacent land uses, as identified within the Phase I section of this report).

Standard or cone penetration tests (SPT / CPT) were carried out in all of the boreholes (where appropriate) using an automatic trip hammer. The number of blows required to advance a standard split spoon, (or solid 60° nose cone for the CPT test) over the final 300mm of a 450mm total drive was recorded and is shown on the borehole records at the penetration resistance ("N" value).

Hand shear vane tests, indicated as HVP on the borehole records, were undertaken throughout the clay soils recovered from the window sampler boreholes and the peak undrained shear strength for each test is presented in kPa.

A falling head infiltration test was also attempted in one of the window sample locations (WS01), to provide a preliminary assessment of the permeability of shallow soils.

4.3 Laboratory Testing

Soil samples were obtained for analysis of selected contaminants of concern in order to identify the presence of any contamination and confirm their suitability for future use. Samples were submitted to Element Materials Technology of Flintshire, who hold appropriate UKAS/ MCERT accreditation for the required testing. Samples were transported in laboratory supplied containers and delivered by an approved courier.

Geotechnical testing was undertaken by Soil Property Testing, Huntingdon, a UKAS accredited laboratory.

Copies of the chain of custody documentation are held by EPS and will be made available on request. Furthermore, laboratory testing schedules detailing all samples submitted for environmental and geotechnical laboratory analysis are included within Table 1 and Table 2 respectively.

5 FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the findings of the intrusive investigations undertaken.

5.1 Ground Conditions

A total of five boreholes were formed across the site and the ground conditions encountered, from surface level, have been interpreted to differ to those inferred from geological mapping and comprise:

- Made Ground
- Superficial Deposits

Site specific borehole logs are included as Appendix G and give full descriptions and depths of strata encountered. A summary of the general ground profile beneath the plot is provided in the table below, with more detailed description given in the following sub-sections.

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Strata Thickness (m)
Made Ground	0.8	0.55-0.8
Superficial Deposits	>4.0	>3.2 - >3.45 (not proven)

5.1.1 Made Ground

Made ground was encountered at each borehole location and was reasonably consistent in nature and thickness. The material was generally described as a dark brown slightly clayey silty sand with brick fragments and rare chert gravel and dark brown slightly silty sandy clay with brick fragments. Fragments of glass were also present in the made ground material at WS03. The made ground was proven to a maximum depth of 0.8m at WS03.

5.1.2 Superficial Deposits

Directly beneath the made ground were soils interpreted to be representative of superficial deposits that were proven to a maximum depth of 4.0m.

At WS01 and WS02, the material underlying the made ground was initially described as a stiff yellowish brown slightly gravelly slightly sandy clay with occasional light orangish brown and light grey mottling with decayed roots. The gravel in this stratum was fine to coarse angular to subrounded chert. This material extended to 1.4m in WS01 where it transitioned into a medium dense black brown and white angular to rounded clayey very sandy gravel in WS01 proven to 2.1m. The gravel layer in WS02 was predominantly in a slight sandy clay matrix. This granular material transitioned to a stiff, very stiff in places, yellowish brown clay with occasional light orangish brown mottling and grey mottling and rare calcareous aggregations

Underlying the made ground in boreholes WS03 – WS05 the material was generally found to comprise a stiff, very stiff in places, yellowish brown clay with occasional light orangish brown mottling and grey mottling and rare calcareous aggregations. At WS04 and WS05 around 1.5 to 2.0m fine to cobbled size flint gravel was encountered.

5.2 Groundwater

Groundwater strikes were not encountered in any of the boreholes formed during the investigation.

5.3 Physical Evidence of Contamination

Despite the presence of the made ground with construction debris such as brick and glass fragments at all locations, there was no palpable evidence of contamination, waste or putrefiable material encountered in any of the sampling locations during the investigation, including any visual or olfactory evidence of hydrocarbon impact.

5.4 Laboratory Analysis – Soil

An environmental laboratory analysis testing schedule is presented as Table 1 and all environmental soil analysis results obtained from the laboratory are included as Appendix H.

The key results of laboratory testing on environmental soil samples are summarised below.

Contaminant	No. of Samples	No of Detections	Range of Detections (mg/kg)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	5	5	18.9	28.9	WS02 (0.1-0.4)
Cadmium	5	0	-		
Chromium III	5	5	58.6	80.3	WS05 (0.1-0.4)
Chromium VI	5	0	-		
Copper	5	5	34	131	WS01 (0.1-0.4)
Lead	5	5	106	1364	WS03 (0.1-0.5)
Mercury	5	5	0.4	1.1	WS04 (0.1-0.5)
Nickel	5	5	22.3	39.9	WS05 (0.1-0.4)
Selenium	5	1	2		WS02 (0.1-0.4)
Zinc	5	5	146	384	WS05 (0.1-0.5)
Benzo(a)pyrene	5	5	0.38	17.53	WS01 (0.1-0.4)
Dibenzo(ah)anthracene	5	5	0.06	1.71	WS01 (0.1-0.4)
Naphthalene	5	4	0.09	1.77	WS01 (0.1-0.4)
PAH (Total of 16)	5	5	3.4	285	WS01 (0.1-0.4)
Total Cyanide	5	1	0.6	2817	WS01 (2.2-2.4)
ACM (mass %)	5	0	-		

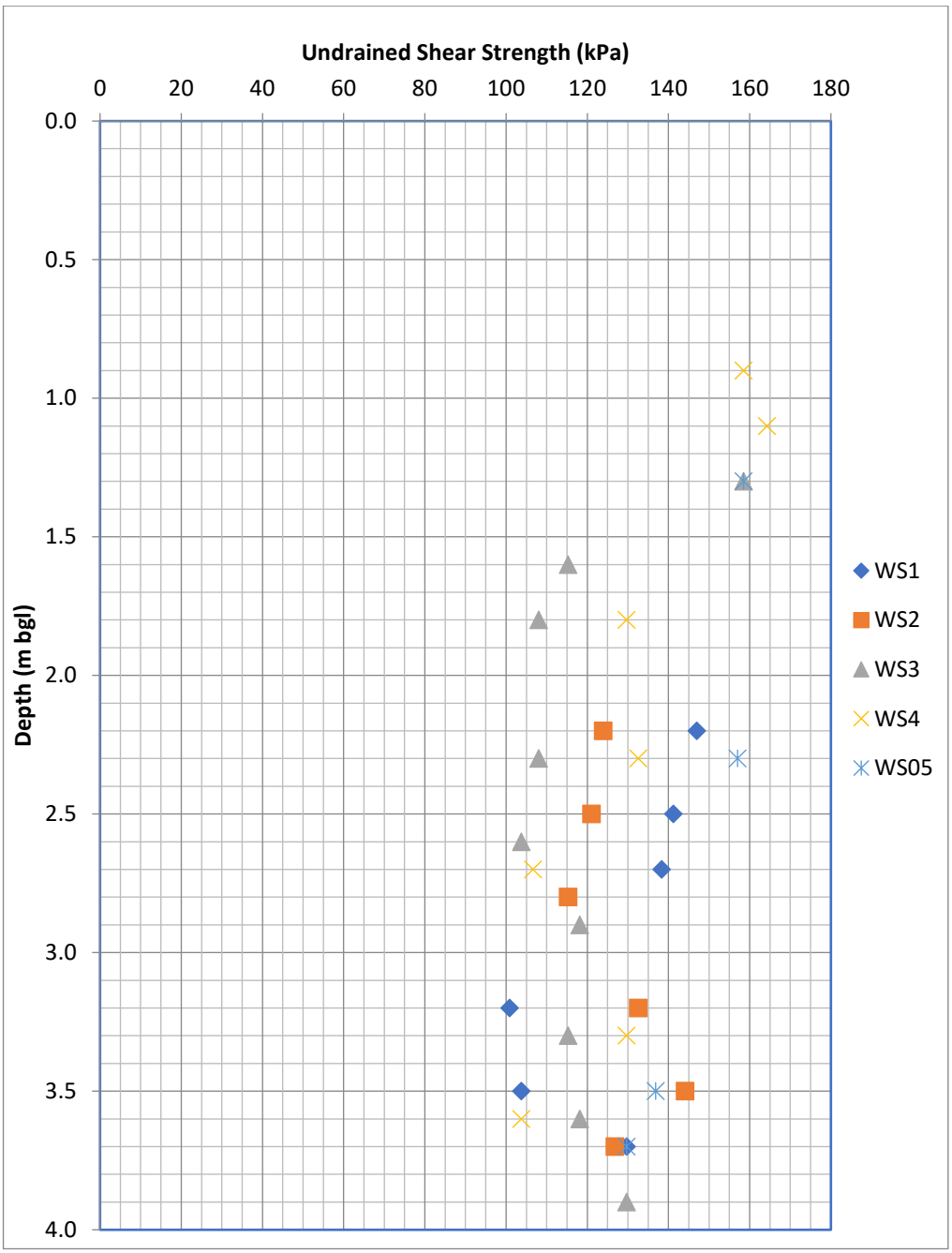
Notes: - Contaminant not identified above MDL PAH Polycyclic Aromatic Hydrocarbons
ACM Asbestos Containing Material

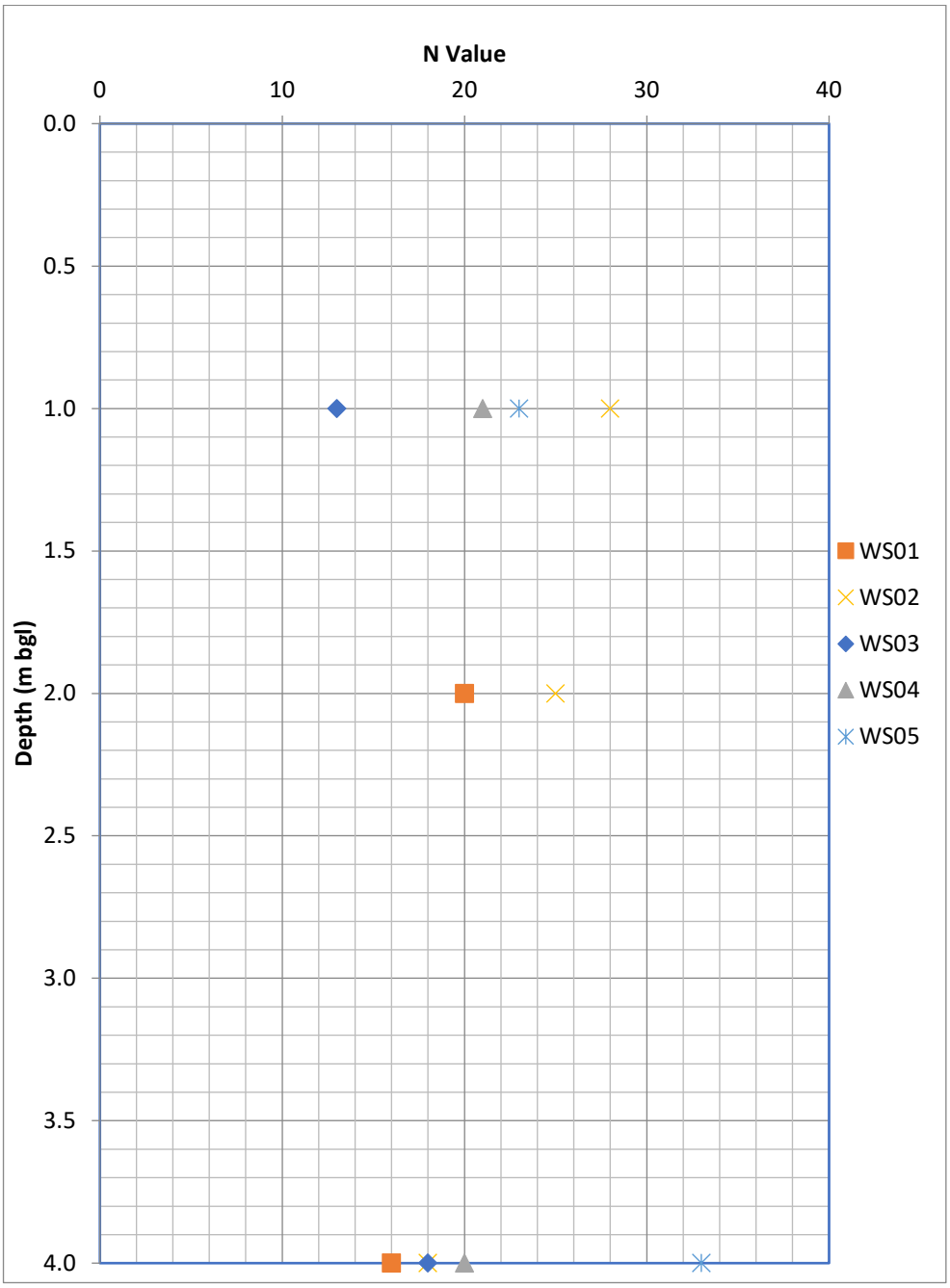
- ACM was not detected in any sample analysed.

5.5 Geotechnical Testing

5.5.1 In-Situ Geotechnical Testing

The results of in-situ geotechnical strength testing comprising the hand shear vanes and SPTs undertaken in the window sample boreholes, are summarised on the graphs below.





As can be seen from the above summary, the encountered soils are of competent strength throughout with the shear vane values all over 100kPa and likewise the N values recorded are all >10.

5.5.2 Laboratory Geotechnical Testing

The results of geotechnical laboratory testing are summarised in the table below.

Strata	Range of Parameters			
	Moisture Content (%)		Plasticity Index (%)	
	Min	Max	Min	Max
Superficial Deposits	20.5	26.5	38	41

Strata	Particle Size Distribution					
	Fines		Sand		Gravel	
	Min	Max	Min	Max	Min	Max
Superficial Deposits	8		35		57	

The water content, liquid and plastic limits and plasticity and liquidity indexes were established for 4 samples of predominantly cohesive soils, tested in line with BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3 and 5.4.

Particle Size Distributions were undertaken on one sample of granular material in accordance with BS1377: Part 2: 1990: 9.2.

Sulphate contents and pH values determinations were carried out by the environmental laboratory for natural soils, the results of which are summarised in Section 6.6.

A geotechnical laboratory analysis testing schedule is presented as Table 2 and all geotechnical sample results obtained from the laboratory are included as Appendix I.

6 GEOTECHNICAL APPRAISAL

The ground conditions have been found to comprise made ground to a maximum depth of 0.8m overlying predominantly stiff clay, proven to at least 4.0m below existing surface levels. Although in WS01 and WS02 from around 1.2m to 2.1m a layer of granular material was encountered.

6.1 Geotechnical Category

Geotechnical Category (BS EN 1997-1:2004)	Definition
GC1	Geotechnical Category 1 (GC1) should only include small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations with negligible risk in terms of overall stability or ground movements and in ground conditions which are known.
GC2	Geotechnical Category 2 (GC2) should include conventional types of structure and foundation with no exceptional risk or difficult or loading conditions. Designs for structures in Geotechnical Category 2 should normally include quantitative geotechnical data and analysis.
GC3	Geotechnical Category 3 (GC3) should include structures or parts of structures, which fall outside the limits of Geotechnical Categories 1 and 2. This may include very large or unusual structures, structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions, or structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.

At the time of writing, outline development proposals are understood to comprise construction of nine residential dwellings with associated infrastructure. Therefore, the below assessment has been undertaken in accordance with Geotechnical Category 2 (GC2), including conventional types of structure and foundation with no exceptional risk or difficult ground or loading conditions, as defined by BS EN 1997-1:2004.

6.2 Structural Foundations

As detailed above, the development is anticipated to comprise the construction of a limited number of residential dwellings with external works. The foundation assessment has therefore been undertaken in accordance with BS EN 1997-1:2004, to take in to account;

- Bearing Pressure (Ultimate Limit State)
- Settlement (Serviceability Limit State)

6.2.1 Spread Foundations

The ground conditions are considered suitable for the use of conventional spread foundations, either strip footings or pad foundations, bearing upon the predominantly cohesive superficial deposits. Allowable bearing capacities have been calculated and are summarised in the table below.

Foundation Depth (m bgl)	Allowable Bearing Capacity (kN/m^2)
1.0	140
1.5	150

The allowable bearing capacity is the permissible increase in vertical stress at the level of the underside of the foundation, above existing overburden pressure, which may be calculated on the basis of a soil density of $19kN/m^3$.

At the above allowable bearing capacities, total settlements are considered unlikely to exceed roughly 20-25mm. Settlements in cohesive soils will likely comprise a small amount of immediate settlement and a larger proportion of consolidation settlement, which will occur over a long period of time, whilst settlements in granular soils will occur rapidly as loadings increase.

A minimum foundation depth of 1.0m, below existing or proposed ground level is considered suitable for any new buildings, subject to the following provisos:

a) All foundations should fully penetrate any made ground or disturbed ground and extend a minimum of 150mm into undisturbed natural strata. The made ground at the site has been proven to 0.8m.

b) The cohesive soil (clays) will be subject to volume change, (subsidence and / or heave) due to the presence of trees. Foundation design will therefore need to take into account the presence of trees, both those to remain (on-site and adjacent to it) and those to be planted as well as to be removed. The natural clay soils of the superficial deposits should be considered as having a 'high volume change potential' in accordance with NHBC Standards Chapter 4.2 *'Building Near Trees'*.

6.3 Ground Floor Construction

Given that made ground is present across the site and the near surface soils being likely to be susceptible to volume change, suspended ground floor slabs are recommended for any new buildings, incorporating a suitable sub-floor void.

The floor slab design will also need to take in to account the presence of trees/ vegetation and should be designed to accommodate any heave/ shrinkage that will be generated.

6.4 External Works

6.4.1 Drainage

Falling head infiltration testing was completed in WS01 with an indicative infiltration rate provided in the table below:

Trial Pit Location	Test Depth (m bgl)	Indicative Infiltration Rate (m/s)	Comments
WS01	4.0	7.12×10^{-8}	Test duration of approximately 3.5 hours.

The results of the infiltration testing indicate that the predominantly clay based soils beneath the site are not suitable for the adoption of infiltration drainage, which was expected based on the nature of the shallow ground conditions. Therefore, it is recommended that alternative methods of surface water disposal are explored in support of the scheme.

6.5 Groundworks

Whilst excavations in the cohesive soils may remain stable for short periods during construction, the stability of infilled soils and/ or granular materials should not be relied upon.

Excavations must not be carried out in close proximity of any existing neighbouring structures/ retaining features without permanent support measures in place. Care should also be taken to ensure excavations do not destabilise any slopes.

Heavy plant and stockpiles of materials should not be permitted close to the edges of unsupported excavations. Further reference may be made to CIRIA Report No. 97 *'Trenching Practice'* 1992.

6.6 Concrete Grade

Sulphate contents and pH value determinations were carried out by the environmental laboratory and the results of this testing are summarised in the below table as well as being presented within Appendix H.

Strata	Water Soluble Sulphate 2:1 SO_4 (mg/l)		Total Sulphur (%)		Total Potential Sulphate (%)		pH	
	Min	Max	Min	Max	Min	Max	Min	Max
Made Ground	1.9	157.2	-		-		7.12	7.89
Superficial Deposits	30.5	422.9	<0.01	0.06	<0.03	0.18	4.74	7.88

In accordance with Part 1 of the BRE Special Digest 1 '*Concrete in Aggressive Ground'* 2005, the mean of the highest two water soluble sulphate values has been used. For the made ground and the superficial deposits, this gives a Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1s.

7 ENVIRONMENTAL APPRAISAL

The following section outlines the approach applied to assessing the risks posed to human health through a Generic Quantitative Risk Assessment, then identifies sample results found by this investigation which warrant further consideration. Risks to controlled waters were discounted as part of the Phase I Desk Study.

7.1 Human Health

7.1.1 Land Use Setting & Generic Screening Criteria

It is understood that the development is to comprise the construction of 9 residential dwellings with associated infrastructure and areas of private gardens. In order to screen laboratory data for concentrations of contaminants in soil with potential to cause harm to human health in these soft landscaped areas, relevant generic screening values most applicable to this land use have been utilised. A land use setting of Residential (with Homegrown Produce) has been adopted as it is considered the most representative.

The technical framework used to derive the screening values and the documents in which they are published are summarised as follows:

- *EA Science Reports* (SC050021/SR2, SC050021/SR3, and SC050021/SR7)
- *EA Soil Guideline Value Science Reports*
- *Suitable for Use Levels (S4ULs) for Human Health Risk Assessment* – LQM and CIEH (2015)
- *Soil Generic Assessment Criteria for Human Health Risk Assessment* - EIC/AGS/CL: AIRE (2010)
- *Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010* – DEFRA (2013)

Category 4 Screening Levels (C4SLs) provide generic suitable for use screening values for common contaminants in a variety of land uses and are also utilised as appropriate generic screening criteria.

Where assessment of the risk to human health from asbestos in soil is concerned there is no nationally recognised suitable for use /generic screening value commonly referred to through the planning system. Due to this, it is necessary to take a more qualitative approach to the risks posed to future site users from asbestos on a site-specific basis.

For assessing concentrations of free and complex cyanide in soil, in the absence of any commonly accepted national criteria, reference has been made to the Dutch Intervention Values (DIV). It is acknowledged that there are significant limitations in the derivation of these figures and they are not based on UK exposure modelling, so they have only been used to further inform the initial screening of the dataset.

A summary of the screening criteria and the methodology used to derive them is included in Appendix J.

7.1.2 Assessment of Soil Results – Human Health

The results of the screening process for on-site human receptors showed that generic screening criteria representative of risks to future site users were exceeded for a few contaminants, these included lead and selected PAH compounds.

Contaminant	Screening Criteria (mg/kg)	Number of Exceedances	Max Exceedance (mg/kg) & Sampling Location
Lead	200	4	1,364 (WS03, 0.1m-0.5m)
Benzo(a)pyrene	5	2	17.53 (WS01, 0.1m – 0.4m)
Dibenzo(ah)anthracene	0.24	3	1.71 (WS01, 0.1m – 0.4m)

Where C4SLs have been used as specified in the table, these screening values represent a level of risk to human health considered to be low and acceptable, whereas the generic criteria used for other contaminants where a C4SL is not available are designed to represent the level below which the risk is negligible. Therefore, a widely recognised approach for assessing human health risks posed from genotoxic PAH compounds for example, is that of utilising benzo(a)pyrene as a risk driver or marker of the other compounds. This is because benzo(a)pyrene has similar properties to other genotoxic PAHS (e.g. dibenzo(ah)anthracene), but is considered to be one of the most harmful yet most well-understood PAH compounds. In this case, the maximum measured concentration of benzo(a)pyrene was 17.53mg/kg which does exceed the relevant C4SL screening value, suggesting there may be an unacceptable level of risk to human health from PAH compounds.

Due to the absence of a formal sampling pattern, the use of a three-dimensional dataset (i.e. samples at varying depths) and targeted nature of the investigation, it is unlikely that any statistical analysis can be applied to the soil dataset in accordance with CL:AIRE's 2020 guidance (*Comparing Soil Contamination Data with a Critical Concentration*). EPS has therefore taken the most significant sampling result for each source to drive the risk assessment and design of remedial measures.

At the concentrations present, it is considered that there would be an unacceptable risk posed to future site users and construction workers from exposure to contamination in the underlying shallow soils, if development work went ahead with the site in its current condition. Remedial control measures to reduce this risk will therefore be required as is detailed in Section 7.3.

7.2 Summary of Findings

Through consideration of the study area's history and environmental setting, the Phase I Desk Study established that a number of plausible contaminant linkages have the potential either to be currently active, or to become active as a result of the proposed development.

These contaminant linkages primarily comprise of human health risks associated with exposure of future site users and construction workers to contaminated shallow soils associated with the former use as an allotment garden and the potential for isolated areas of made ground. No off-site sources of potential contamination were established, and risks to controlled waters were also discounted as part of the initial Phase I risk assessment.

Therefore, to target the area's most vulnerable to contamination and to provide a more detailed assessment of shallow soil quality across the study area, five boreholes were drilled to a maximum depth of 5.0m bgl. The ground conditions were found to comprise a variable thickness of made ground (infilled soils) up to 0.8m bgl, comprising predominantly granular based materials with brick and glass overlying London Clay Formation bedrock.

The results of the investigation, laboratory analysis, and subsequent risk assessment undertaken have identified that the adopted screening criteria protective of future site users (including residents) have been exceeded by lead and benzo(a)pyrene. Therefore, risks to human health from ground contamination are recognised, which will require remedial measures.

7.3 Environmental Conclusions & Recommendations

In the context of potentially unacceptable or acceptable risks as outlined within the Environment Agency's *Land Contamination: Risk Management guidance* (LC:RM, 2020), unacceptable risks have been identified which will warrant further assessment and / or remedial measures to reduce them to an acceptable level.

a) It is recommended that the made ground soils are stripped / removed from any areas of proposed gardens or soft landscaping associated with the redevelopment. The made ground soils should be excavated down to the natural soils or to a maximum depth of 600mm (whichever comes first) and certified clean, imported soil should be installed in areas of private garden and soft landscaping to achieve the desired level and to provide a suitable growing medium. However, if levels for the site can be raised then it is possible to incorporate the cover system into this and avoid the need to remove 600mm of material. For example, if site levels are to raise by 300mm then 30omm of made ground could be removed from the garden areas and replaced with 600mm of clean import material.

   Good records of the removal of the made ground soils should be kept and retained by the client / developer, such records should, as a minimum include photographs showing the excavation of the made ground soils, waste haulier notes / transfer details showing the removal of the made ground from site and delivery to an appropriately licensed waste facility and certification of any imported soil used in areas of gardens and soft landscaping / planting. All imported material should be accompanied by appropriate chemical analysis including metals, TPH and

PAH compounds. A cover soils checklist outlining the requirements for imported soils is presented as Appendix K.

This recommendation is only made for proposed soft landscaping areas, such action is not required for areas which will be effectively 'capped' by hardstanding or building footprint.

These remedial works must be verified and EPS can assist in this process. All waste transfer documentation must be retained, with photographs of the excavations including any exposed clean natural soils and compiling the information outlined in the Cover Soils Checklist. If an established supplier such as British Sugar was used, then the soil is tested at source and no further analysis would typically be needed.

Where the proposed cover system coincides with the root protection area it is unlikely to be possible to remove the initial 600mm of soil due to the potential damage this could cause to the trees. Therefore, it may be possible, subject to agreement between the environmental Health and Tree Officers, to reduce the thickness of the soils to be removed/replaced to around 100mm to 150mm.

The following recommendations are also made in regards to safe development and to protect construction workers during the redevelopment works:

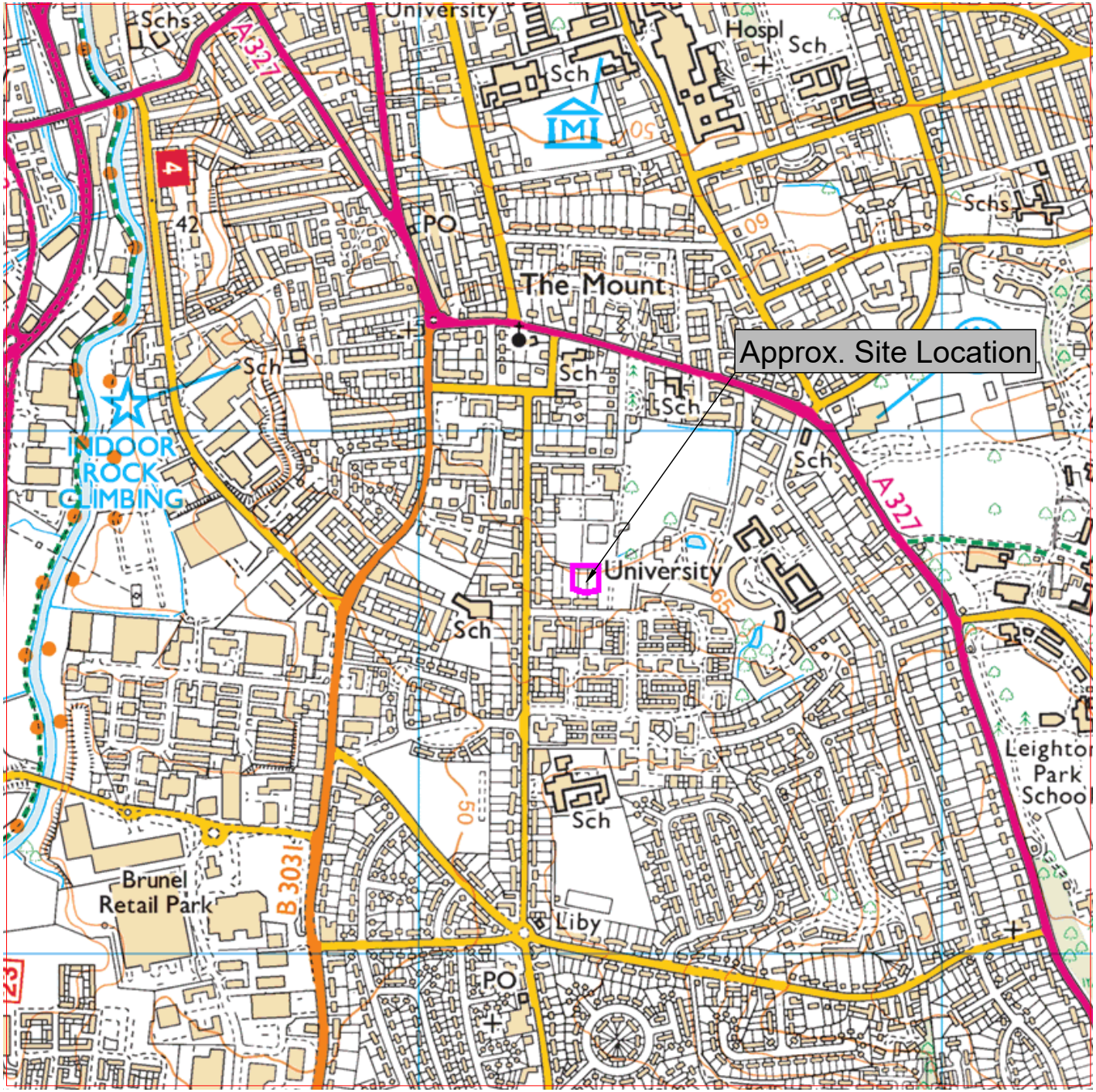
b) All construction workers operating at the site should be advised of the potential for contact with made ground material within shallow soils. Appropriate health and safety precautions should be adopted during any excavation works to avoid exposure to soils. Reference should be made to relevant health & safety guidance including the following CIRIA document: *R132 Guide to Safe Working on Contaminated Sites*. Consideration should also be given to the potential for dust generation during excavation of the made ground materials and the need for damping down / dust suppression measures.

c) Although the findings of the investigation would suggest that significant quantities of asbestos are unlikely to be encountered, the possibility of discrete pockets of this material existing within the made ground remains. If any evidence of visually identifiable ACM is suspected and is to be disturbed during the site development it is recommended that all works are postponed until suitable assessment and control measures (including a Working Method Statement (WMS)) are created. This WMS should be in accordance with guidance from CIRIA as well as the CL:AIRE /Joint Industry Working Group industry guidance on Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials (2016).

d) Should any palpable evidence of unexpected contamination be encountered during the redevelopment work, which significantly varies from the conditions described above, it should be reported to EPS so that an inspection can be made and appropriate sampling and assessment work carried out. A method statement for encountering any unexpected contamination is included as Appendix L of this report.

It is also recommended that a copy of this report be provided to the Environmental Health Department of Reading Borough Council in support of any future planning application and for inclusion in their land quality records.

FIGURES



N

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www.epstrategies.co.uk

Site
Land to the rear of 17 Newcastle Road, Reading, RG2 7TN

Client
Brett Property Group

Title
Site Location Plan

Figure No.	1	Drawn by:	JB
Checked by:	SB	Date:	August 2022
Scale [A4 Sheet]	NTS	Drawing Reference	Reading/0822/01
Job No	UK22.5978	Rev	1

PREVIEW ONLY
Envirocheck
LANDMARK INFORMATION GROUP

N

KEY:

SITE BOUNDARY

eps

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Site
Land to the rear of 17 Newcastle Road, Reading, RG2 7TN

Client
Brett Property Group

Title
Current Site Layout Plan

Figure No.	2	Drawn by:	JB
Checked by:	SB	Date:	August 2022
Scale [A4 Sheet]	NTS	Drawing Reference	Reading/0822/02
Job No	UK22.5978	Rev	1

N

KEY:

SITE BOUNDARY

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Site

Land to the rear of 17 Newcastle Road, Reading, RG2 7TN

Client

Brett Property Group

Title

Aerial Photograph

Figure No.	3	Drawn by:	JB
Checked by:	SB	Date:	August 2022
Scale [A4 Sheet]	NTS	Drawing Reference	Reading/0822/03
Job No	UK22.5978	Rev	1

N

KEY:

SITE BOUNDARY

EPS BOREHOLE LOCATION

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Site
Land to the rear of 17 Newcastle Road, Reading, RG2 7TN

Client
Brett Property Group

Title
Borehole Location Plan

Figure No.	4	Drawn by:	JB
Checked by:	SB	Date:	August 2022
Scale [A4 Sheet]	NTS	Drawing Reference	Reading/0822/04
Job No	UK22.5978	Rev	1

TABLES

Table 1 – Environmental Laboratory Testing Schedule

Sample ID	Sample Depth (m bgl)	EPS Mini Suite	pH & Sulphates
WS01	0.1-0.4	1	-
WS01	2.4-2.6	-	1
WS02	0.1-0.4	1	-
WS02	1.3-1.5	-	1
WS03	0.1-0.5	1	-
WS03	3.7-3.8	-	1
WS04	0.1-0.5	1	-
WS04	0.8-1.0	-	1
WS04	2.2-2.5	-	1
WS05	0.1-0.5	1	-
WS05	1.5-1.6	-	1

Notes:

m bgl	meters below ground level	EPS Mini Suite	Organic Matter, Cyanide, Metals, PAH's, Phenols and Asbestos Screen
1	Sample Taken	-	Sample Not Analysed

Table 2 – Geotechnical Laboratory Testing Schedule

Sample ID	Sample Depth (m bgl)	Atterberg Limits	Moisture Content	Particle Size Distribution
WS01	0.8-1.0	1	1	-
WS01	1.8-2.0	-	-	1
WS02	3.4-3.6	1	1	-
WS03	2.2-2.5	1	1	-
WS05	3.4-3.6	1	1	-

Notes:

m bgl	meters below ground level
1	Sample Taken
-	Sample Not Analysed

APPENDICES

APPENDIX A

Selected Site Photographs

Photo 1: Image showing the location of WS01, facing north.

Photo 2: WS01 core material recovered.

Photo 3: WS02 core material recovered.

Photo 4: Image showing the location of WS03 with the trees on the boundary.

Photo 5: Image from the rear of the site looking south towards the residential properties.

Photo 6: Access point to the site to the rear of N0. 19.

APPENDIX B

Proposed Development Plan

PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE BUILDER IS TO CHECK AND/OR DETERMINE ALL CONSTRUCTION DETAILS, INCLUDING CHECKING EXISTING SITE LEVELS AND DIMENSIONS.

Rev.	Date	Details	Drawn

Existing group of offsite trees to be retained and protected during build. Refer to TPP.

Existing group of trees to be retained and protected during build.

No soakaway to be used within the tree root zone. All drainage to site to connect to drainage in road, in line with drainage engineer design.

Minimum 1.8m high close boarded fence between plots and boundary.

Minimum 1.8m high close boarded fence to all site boundarys.

All paths Part M compliant.

All parking spaces on site to be min. 2.5m x 5.0m in line with parking and transport consultant report.

Bin storage and Collection points for Plot 1,2 and 3. (Durable Bin store style used to whole site)

Natural wild flowers / Planting in line with Landscaping scheme and biodiversity report.

Retained Garden area to No.17 Newcastle Road.

Denotes Single storey structure.

Red dashed outline denotes existing dwelling at 19 Newcastle Road to make way for new access road into development.

Cycle Storage.

Cycle Storage.

Existing group of offsite trees to be retained and protected during build. Refer to TPP.

Existing group of offsite trees to be retained and protected during build. Refer to TPP.

Plot 9 Built outside of root protection zone.

Bin storage Area for Plot 9.

Denotes min 1 EV car charging point to each house.

Bin storage and Collection points for Plot 8,7 and 6 as indicated for other bin stores.

Denotes position of existing boundary fences. New fence provides larger gardens for 23, 25, 27 and 29 Newcastle Road.

Denotes Single storey structure.

Block Plan

Scale 1:200

KEY:

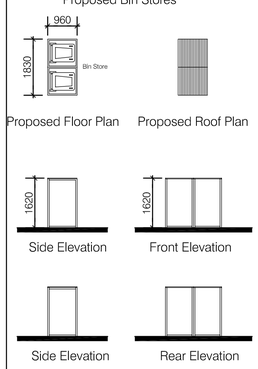
Denotes Boundary of site.

0 2 4 6 8 10 Metres

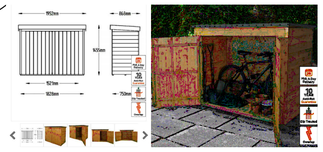
Scale Bar - 1:200

4m dia radius curves to new access road. All works to new access road to be in accordance with Highways consents and in line with Transport Report enclosed within submission. Tactile paving and drop kerbs to radius curves and road all in accordance with detailed design / planning condition. 2.4m x 32.4m visibility splays provided from centre of new carriageway all in accordance with further details provided within transport report.

Proposed Bin Stores



SECURE CYCLE STORAGE



Legend

Existing building to be removed	Root protection area
Existing trees and vegetation to be retained and protected	Tarmac and associated pathway In line with highways design
Proposed planting (refer to landscaping plan)	Block paving - Autumn gold. In line with external material schedule
Proposed native hedgerow around boundaries (refer to landscaping plan)	Path - in line with external material schedule All paths Part M compliant
Proposed native grassland and wildflower planting area. In line with LP	Site Area = 2465 Sqm
Proposed grass area	Cycle storage to be located within lockable shed in rear garden of house. Exact position to be confirmed.

Accommodation Schedule

Plot	Plot	Description	Housetype
Plot 1	132.72sqm / 1429sqft	4 bedroom end terrace house	House Type A
Plot 2	132.72sqm / 1429sqft	4 bedroom end terrace house	House Type A
Plot 3	132.72sqm / 1429sqft	4 bedroom mid terrace house	House Type A
Plot 4	78.4sqm / 842sqft	2 bedroom end terrace house	House Type B
Plot 5	78.4sqm / 842sqft	2 bedroom end terrace house	House Type B
Plot 6	78.4sqm / 842sqft	2 bedroom mid terrace house	House Type B
Plot 7	78.4sqm / 842sqft	2 bedroom mid terrace house	House Type B
Plot 8	132.72sqm / 1429sqft	4 bedroom mid terrace house	House Type A
Plot 9	132.72sqm / 1429sqft	4 bedroom end terrace house	House Type A
Total	977.20sqm / 10,513 sqft		

Housetype Schedule

Type	Floor	sqm	sqft
A	Ground Floor	60.9sqm	652sqft
A	First Floor	50.sqm	545sqft
A	Second Floor	21.54sqm	232sqft
Total		132.72sqm	1429sqft
B	Ground Floor	39.2sqm	421sqft
B	First Floor	39.2sqm	421sqft
Total		78.4sqm	842sqft

Front Garden Sizes		Rear Garden Sizes	
Plot 1	22sqm	Plot 1	100sqm
Plot 2	25sqm	Plot 2	71sqm
Plot 3	21sqm	Plot 3	63sqm
Plot 4	12sqm	Plot 4	60sqm
Plot 5	11sqm	Plot 5	53sqm
Plot 6	11sqm	Plot 6	62sqm
Plot 7	11sqm	Plot 7	60sqm
Plot 8	17sqm	Plot 8	61sqm
Plot 9	40sqm	Plot 9	132sqm
Total	170sqm	Total	662sqm

Arboricultural Report: - Refer to report produced by Harrison Arboriculture enclosed within submission documents.

Drainage Report: - Refer to drawings and details produced by Spillways consultants enclosed within application submission.

Ecology Report: Refer to seperate drawings and details produced by ECUS Ltd.

Achaeology Report: Refer to seperate drawings and details produced by ECUS Ltd.

Highways and Transport Report: Refer to report produced by RGP Consultants enclosed within submission documents.

Topographical Survey: Refer to separate drawing produced by Marvin and Partners Ltd.

Soft and Hard Landscaping Design: Refer to seperate drawings and details produced by ECUS Ltd.

All other specialist reports refer to Planning Statement produced by Union4 Planning

Existing Window Schedule

W1	Bedroom
W2	Bedroom
W3	Bedroom
W4	Bathroom
W5	Bedroom
W6	Bedroom
W7	Bedroom
W8	Bedroom
W9	Bedroom
W10	Walk in wardrobe
W11	Bedroom

Existing Street Scene Photograph showing 17, 19 and 23 Newcastle Road

Proposed CGI Visual Street Scene

Southern view showing Demolished Bungalow (No.19 Newcastle Road and Plots 2,3,4,5,6 and 9 in the distance.

Client: Brett Property Developments Ltd

Site Address:	Description:
Land to Rear of 17 - 29 Newcastle Road Reading	Site Plan

Drawing Number: 22-Newcastlerd-002 Revised v1

Date: Jan 2023 | Scale: As shown @A1

Status: PLANNING APPLICATION

AutoCAD Reference: 000

PSD Architectural Services

189 Lynchford Road, Farnborough
Hampshire, GU14 9RF
Tel / Fax 01252 372 100
E-mail: admin@psd-arch.co.uk

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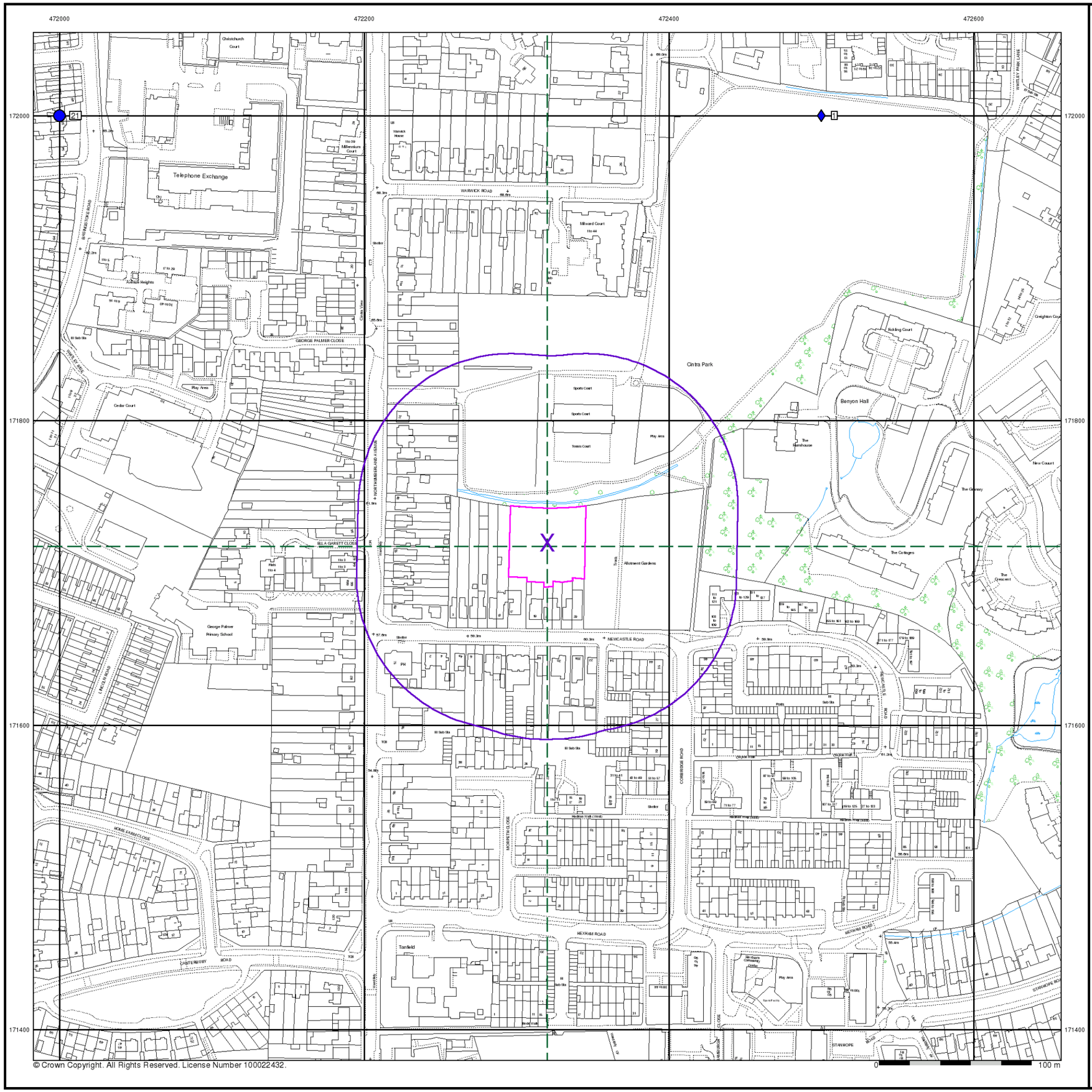
APPENDIX C

Surrounding Land Use



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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location
- Pylon
- Overhead Transmission Line

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

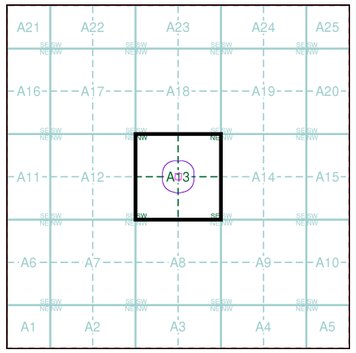
Geological

- BGS Recorded Mineral Site

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Site Sensitivity Map - Segment A13



Order Details

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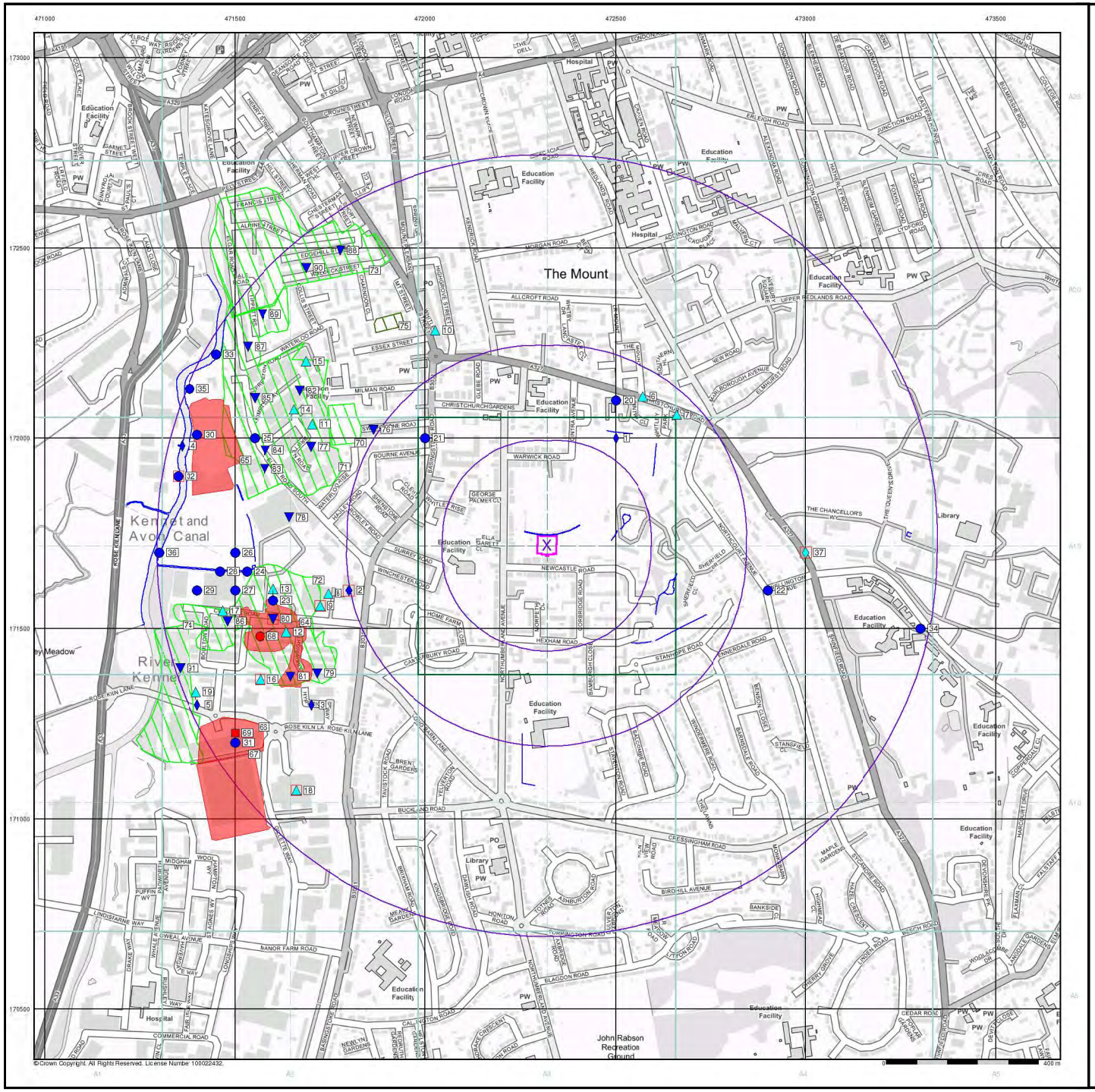
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Plot Buffer (m):	100

Site Details

Site at 472320, 171720

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


The Mount
Kennet and Avon Canal
River Kennet
Education Facility
Hospital
Library
John Rabson Recreation Ground
ROSE KILN LANE
NEWCASTLE ROAD
WARWICK ROAD
HEXHAM ROAD
ALLCROFT ROAD
UPPER REDLANDS ROAD
MORGAN ROAD
ESSEX STREET
MILMAN ROAD
CHRISTCHURCH GARDENS
BOURNE AVENUE
SURREY ROAD
WINCHESTER ROAD
HOME FARM CLOSE
CANTERBURY ROAD
STANHOPE ROAD
DINNERDALE ROAD
BUCKLAND ROAD
CRESSINGHAM ROAD
BIRCH HILL AVENUE
BANKSIDE
MANOR FARM ROAD
BLAGDON ROAD
CALVERTON ROAD
COMMERCIAL ROAD
CEDAR ROAD
THE CHANCELLORS WAY
ROSE KILN LANE
A329
A327
A33
A32
A3
A4
A5
A6
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A9
A10
A11
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A40
A41
A42

APPENDIX D

Geological Context

Geology 1:50,000 Maps Legends

Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	WGR	Worked Ground (Undivided)	Void	Not Supplied - Holocene
	MGR	Made Ground (Undivided)	Artificial Deposit	Not Supplied - Holocene
	WMGR	Infilled Ground	Artificial Deposit	Not Supplied - Holocene

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay, Silt, Sand and Gravel	Not Supplied - Holocene
	KPGR	KEMPTON PARK GRAVEL MEMBER	Sand and Gravel	Not Supplied - Devensian
	BGGR	Beenham Grange Gravel Member	Sand and Gravel	Not Supplied - Devensian
	TPGR	TAPLOW GRAVEL MEMBER	Sand and Gravel	Not Supplied - Wolstonian
	LHGR	Lynch Hill Gravel Member	Sand and Gravel	Not Supplied - Wolstonian
	BHT	Boyn Hill Gravel Member	Sand and Gravel	Not Supplied - Hoxnian
	RTD6	River Terrace Deposits, 6	Sand and Gravel	Not Supplied - Quaternary
	HEAD	Head	Clay, Silt, Sand and Gravel	Not Supplied - Quaternary
	RTD2	River Terrace Deposits, 2	Sand and Gravel	Not Supplied - Quaternary
	RTD1	River Terrace Deposits, 1	Sand and Gravel	Not Supplied - Quaternary

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	LC	London Clay Formation	Clay, Silt and Sand	Not Supplied - Ypresian
	LMBE	Lambeth Group	Clay, Silt and Sand	Not Supplied - Thanetian
	SNCK	Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated)	Chalk	Not Supplied - Coniacian

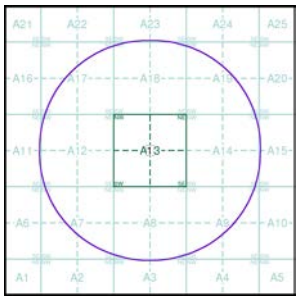
Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the 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. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

Map ID:	**1**
Map Sheet No:	**268**
Map Name:	**Reading**
Map Date:	**2000**
Bedrock Geology:	**Available**
Superficial Geology:	**Available**
Artificial Geology:	**Available**
Faults:	**Not Supplied**
Landslip:	**Not Available**
Rock Segments:	**Not Supplied**

Geology 1:50,000 Maps - Slice A



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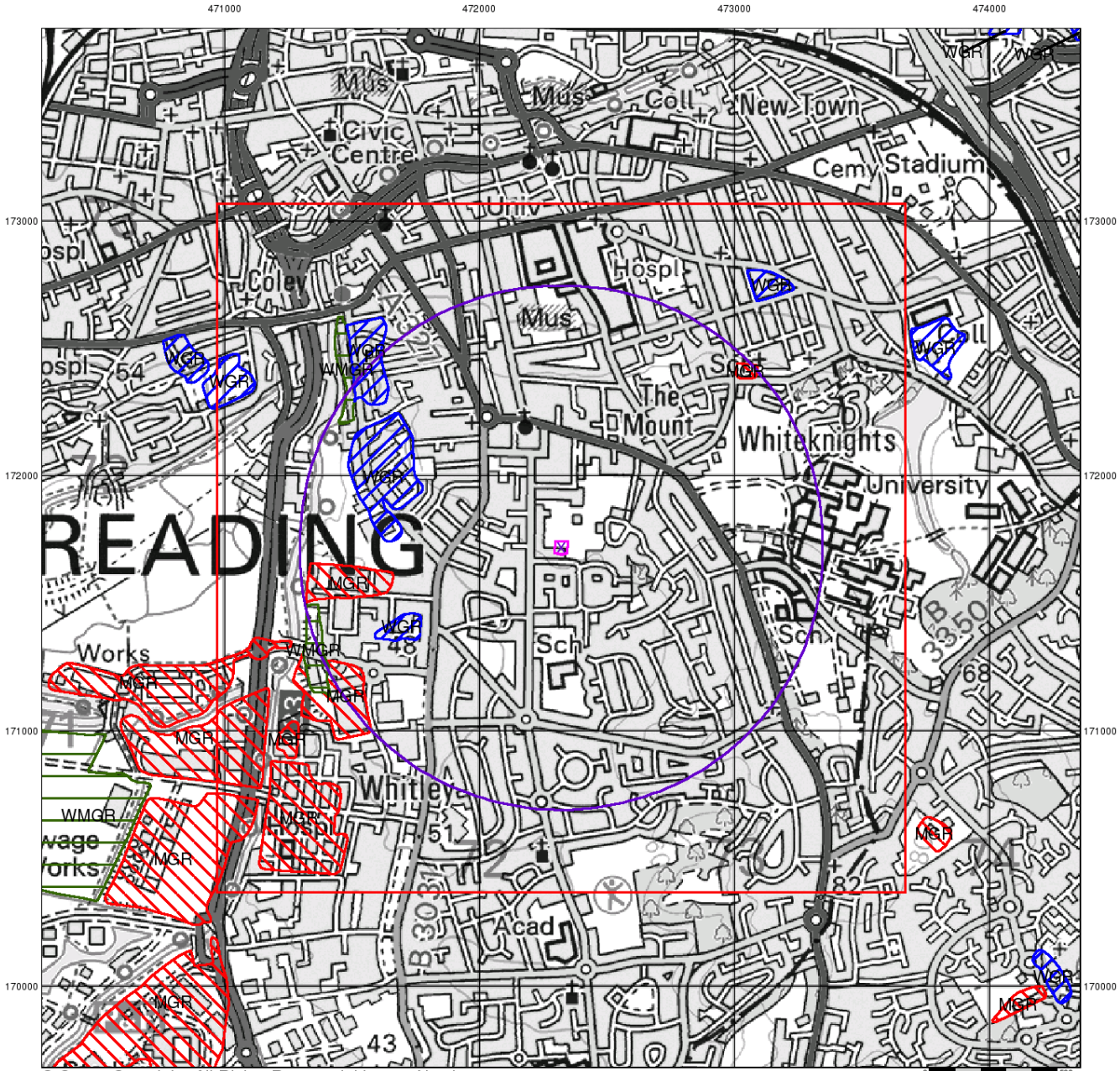
Customer Reference:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details:

Site at 472320, 171720

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



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Artificial Ground and Landslip

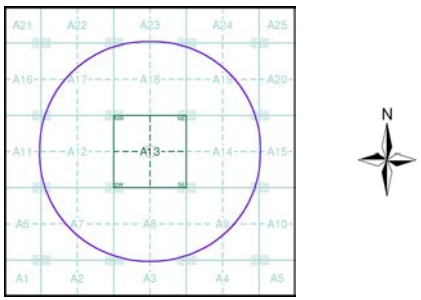
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions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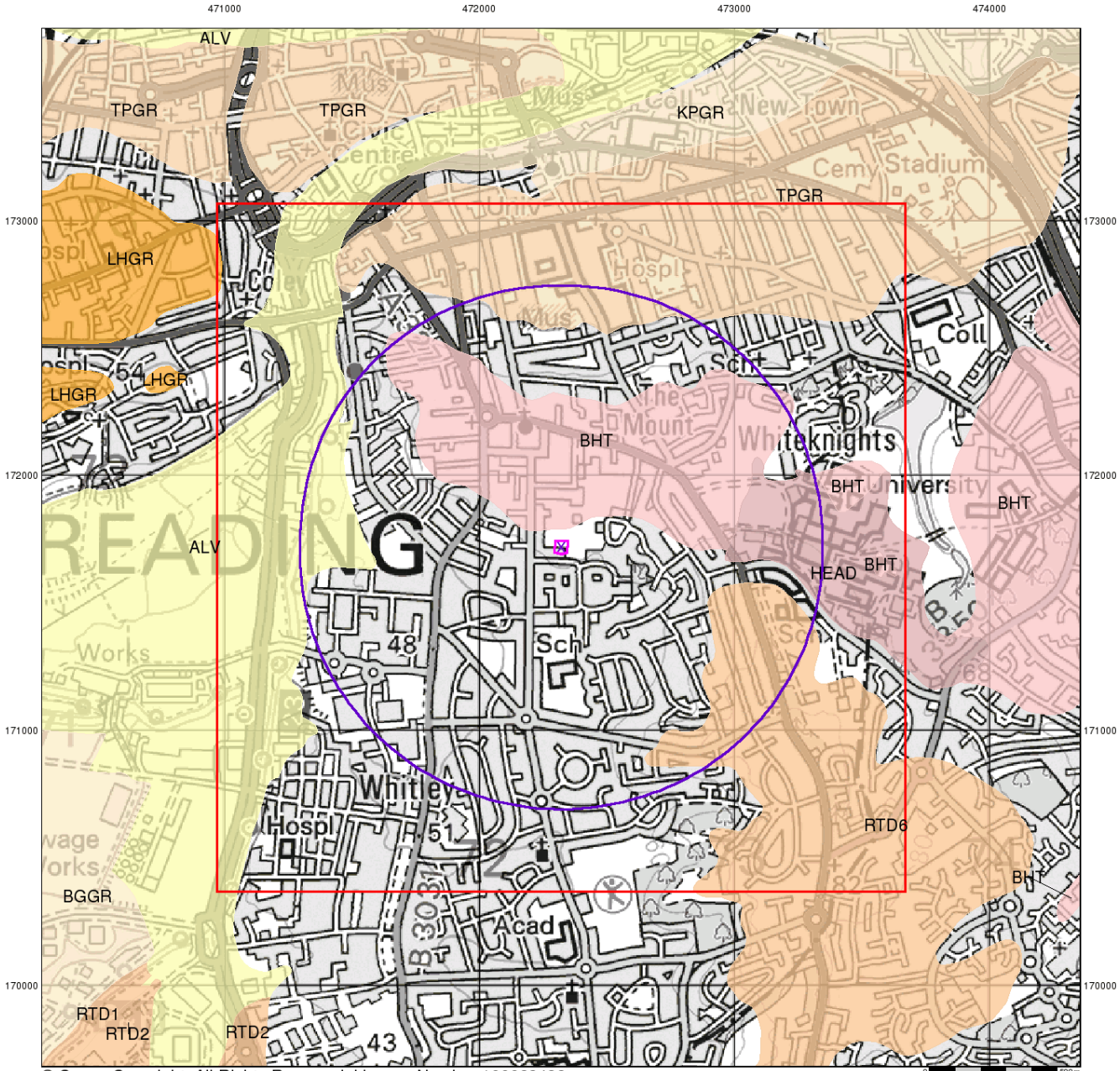

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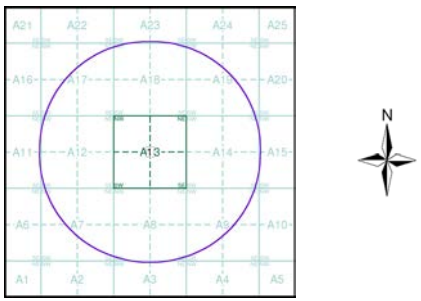
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, 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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National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details:

Site at 472320, 171720

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Bedrock and Faults

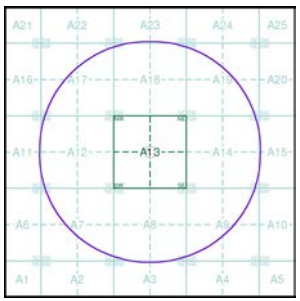
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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 (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A



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Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details:

Site at 472320, 171720

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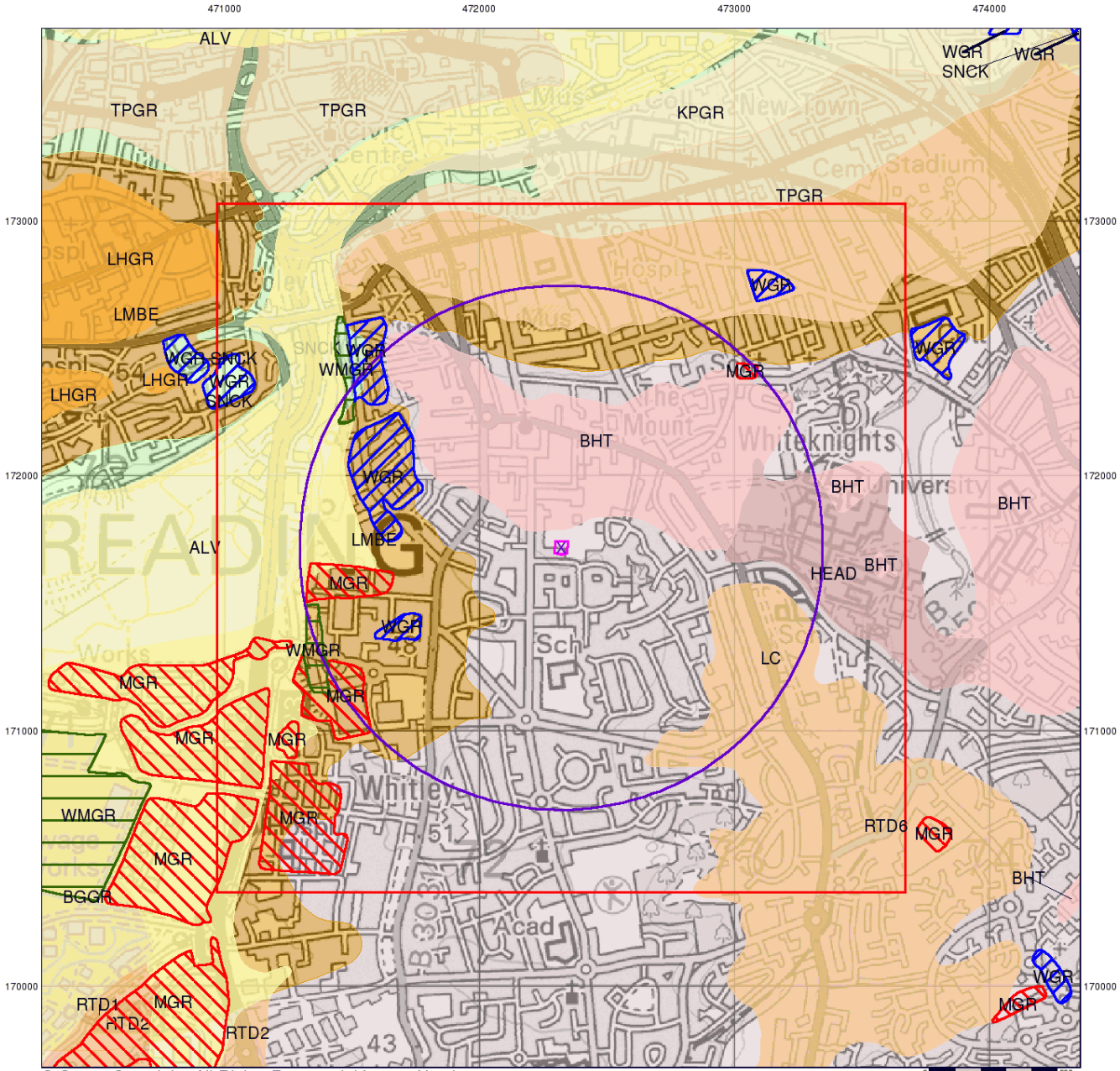
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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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.

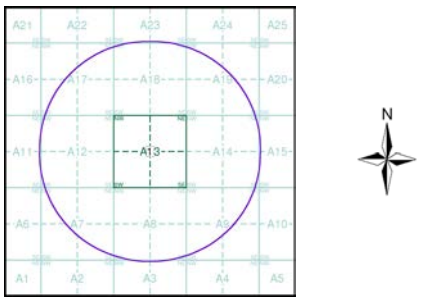
Additional Information

More information on 1:50,000 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



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Customer Reference:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details:

Site at 472320, 171720

PAGE: 6	JOB 1912	TRIALPIT 5
DATE: 24.01.02	GEORGE PALMER SCHOOL - READING	

DESCRIPTION	REDUCED LEVEL m	DEPTH m	LEGEND	SAMPLE TYPE	SAMPLE DEPTH	THICKNESS m	SPT N	REMARKS 472151 171672.
TOPSOIL		0.00						
				B	0.30	0.60		--1912 /5 / 0.3B
Medium dense brown clayey gravelly SAND...		0.60				0.50		Roots found down to 600mm
				U38	1.00			--1912 /5 / 1.0U
Firm brown/grey mottled very silty sandy.. CLAY		1.10						
				U38	1.80	1.40		--1912 /5 / 1.8U
Soft very silty sandy CLAY.....		2.50				0.60		
				B	2.90			--1912 /5 / 2.9B
		3.10						-Trialpit remained dry

TERRAMECH INVESTIGATIONS LIMITED
183 LONG LANE TILEHURST READING

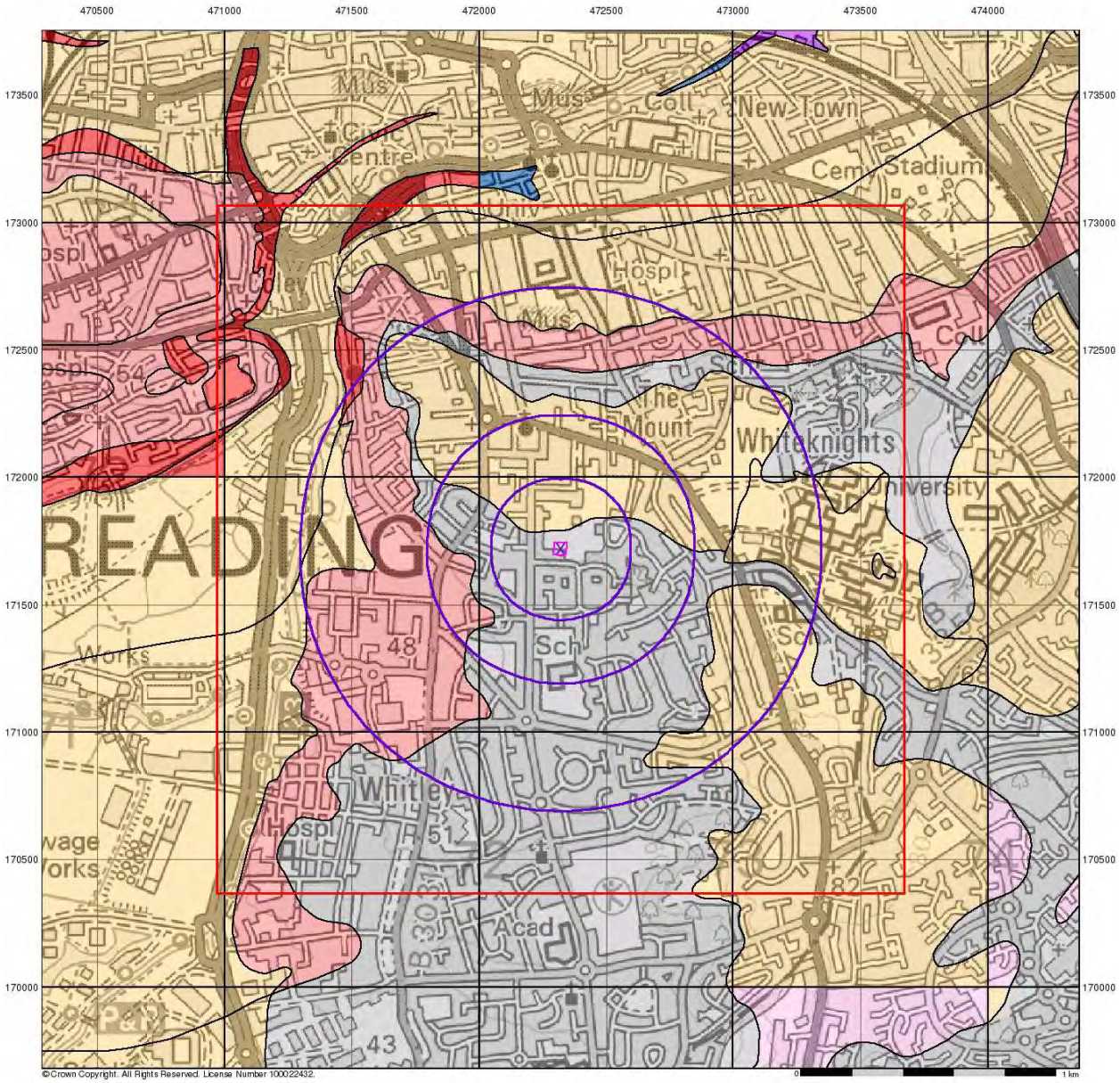
REMARKS:

U100=100mm dia. UNDISTURBED SAMPLE U38=38mm dia. UNDISTURBED SAMPLE D=SMALL DISTURBED SAMPLE
B=BULK SAMPLE W=WATER SAMPLE SPT=STANDARD PENETRATION TEST CPT=CONE PENETRATION TEST

British Geological Survey

APPENDIX E

Groundwater Vulnerability and Flood Maps



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Groundwater Vulnerability

General

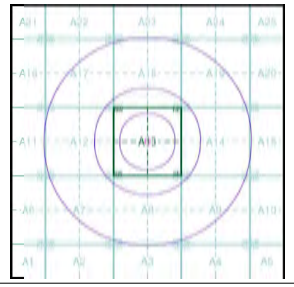
Specified Site
Specified Buffer(s)
Bearing Reference Point
Slice
Map ID

Agency and Hydrological

Bedrock Aquifers	Superficial Aquifers
High Vulnerability, Principal Aquifer	High Vulnerability, Principal Aquifer
High Vulnerability, Secondary Aquifer	High Vulnerability, Secondary Aquifer
Medium Vulnerability, Principal Aquifer	Medium Vulnerability, Principal Aquifer
Medium Vulnerability, Secondary Aquifer	Medium Vulnerability, Secondary Aquifer
Low Vulnerability, Principal Aquifer	Low Vulnerability, Principal Aquifer
Low Vulnerability, Secondary Aquifer	Low Vulnerability, Secondary Aquifer

Unproductive Aquifer
Soluble Rock

Site Sensitivity Context Map - Slice A



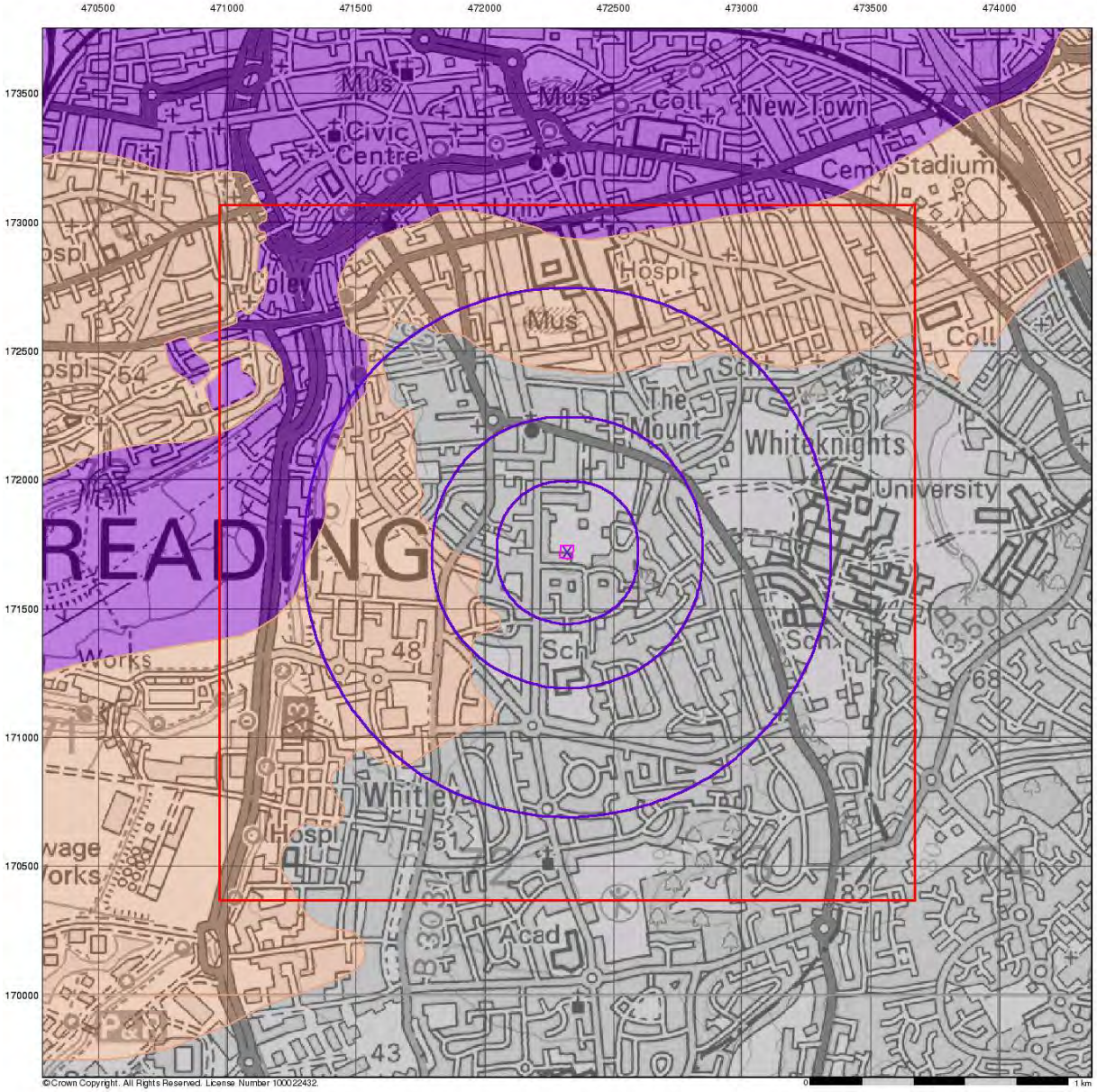
Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details

Site at 472320, 171720

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



Bedrock Aquifer Designation

General

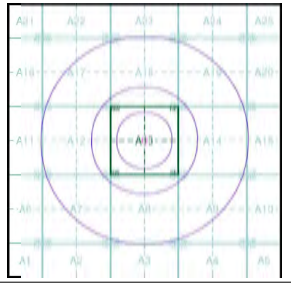
Specified Site
Specified Buffer(s)
Bearing Reference Point
Slice
Map ID

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:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details

Site at 472320, 171720

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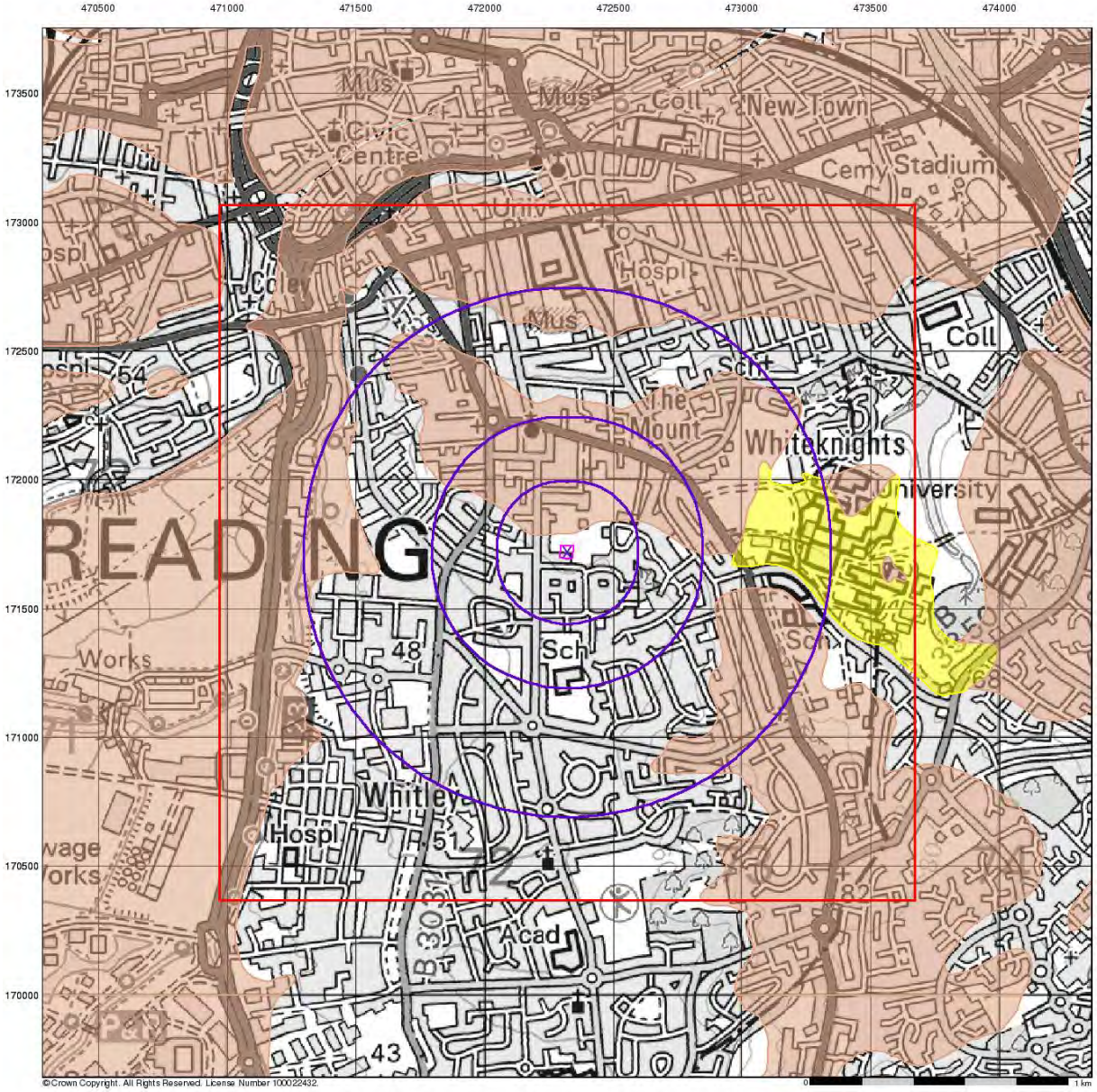
Web: www.envirocheck.co.uk



Superficial Aquifer Designation

General

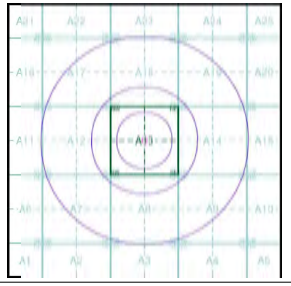
Specified Site
Specified Buffer(s)
Bearing Reference Point
Slice
Map ID

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



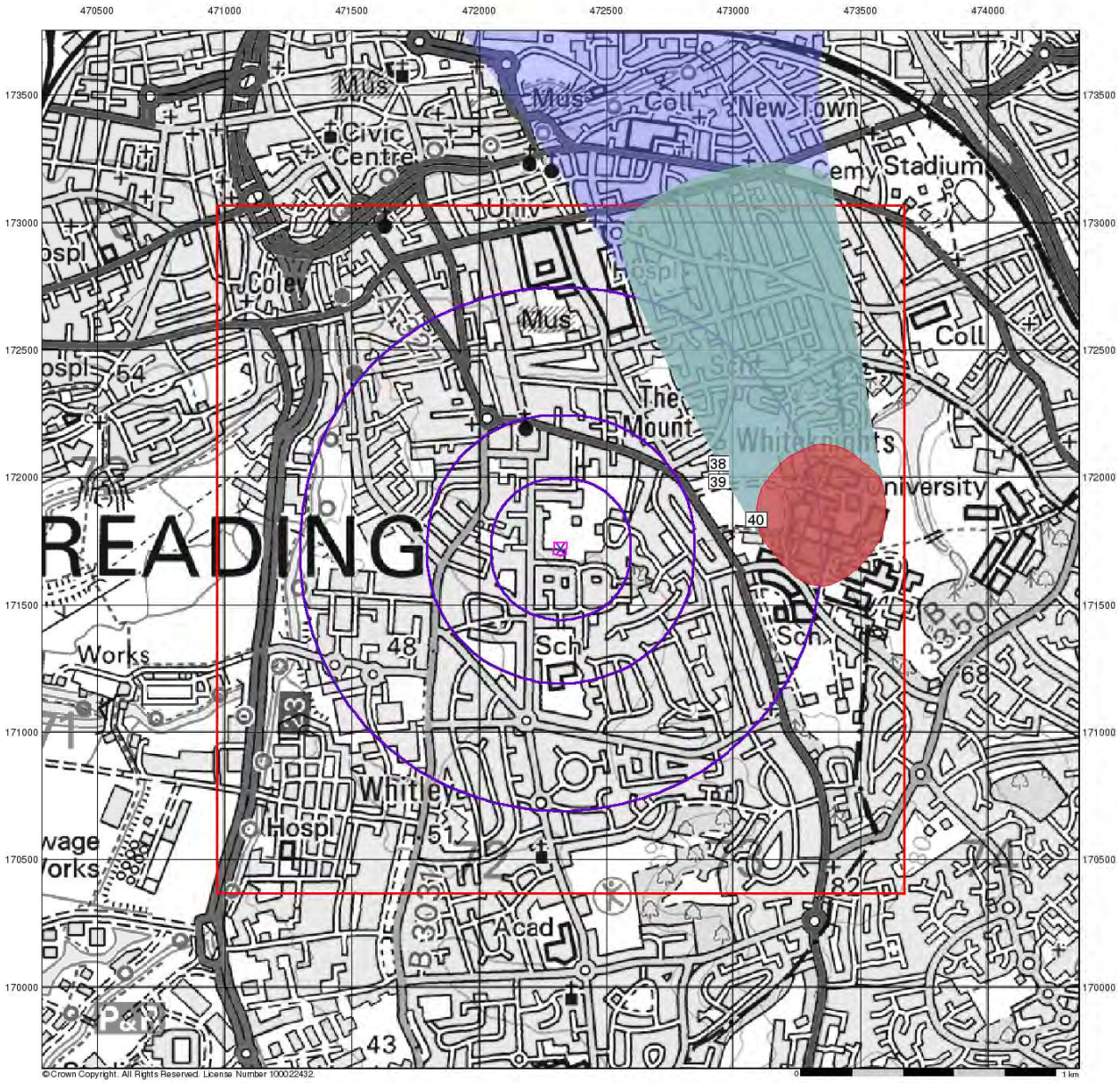
Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details

Site at 472320, 171720

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



Source Protection Zones

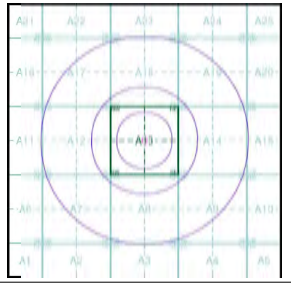
General

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



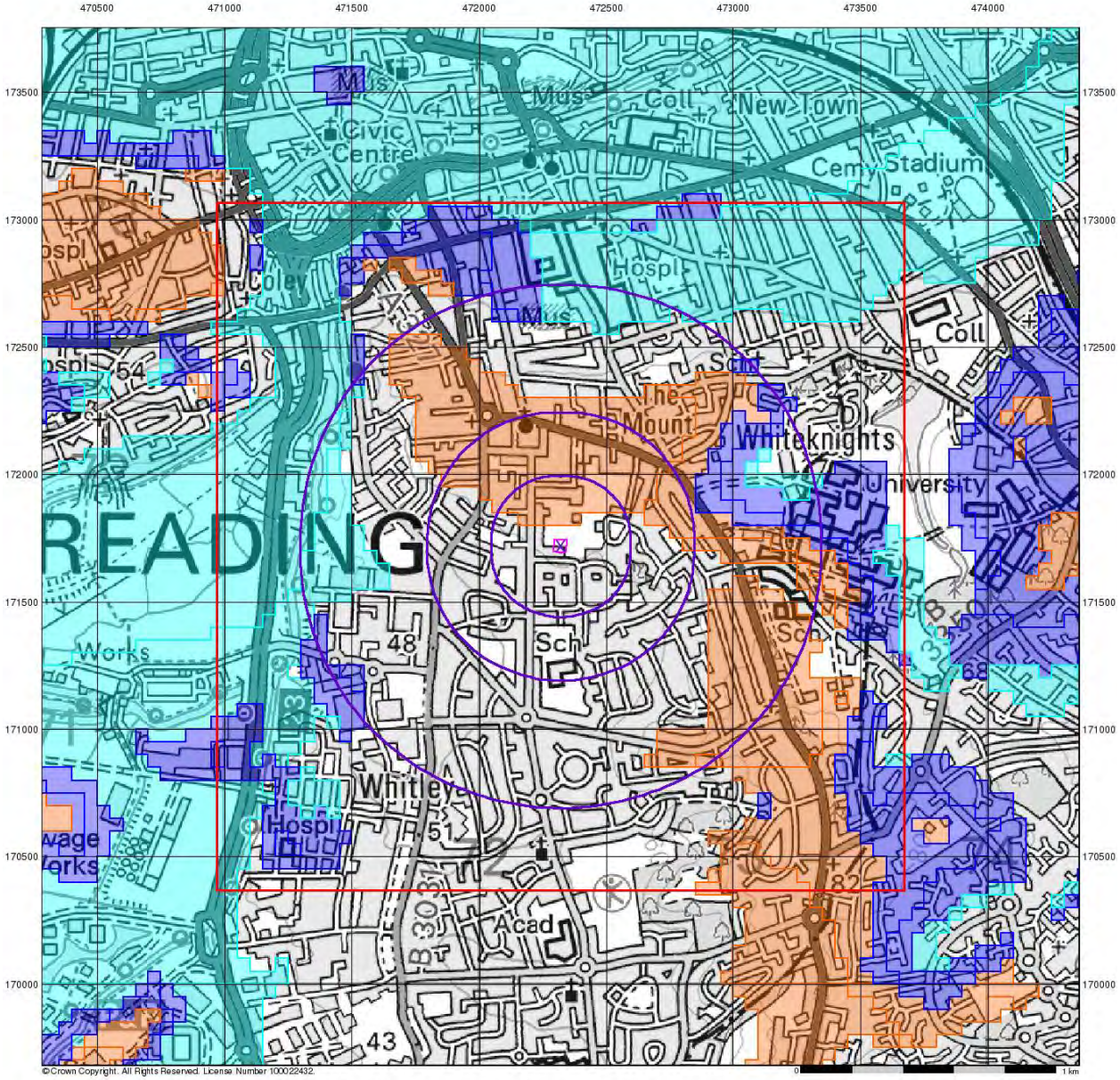
Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details

Site at 472320, 171720

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



BGS Flood GFS Data

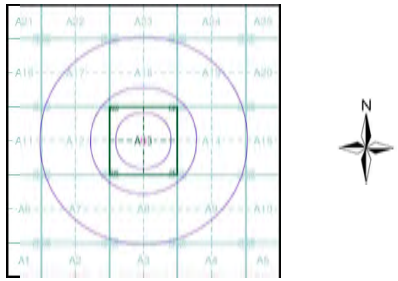
General

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:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details

Site at 472320, 171720

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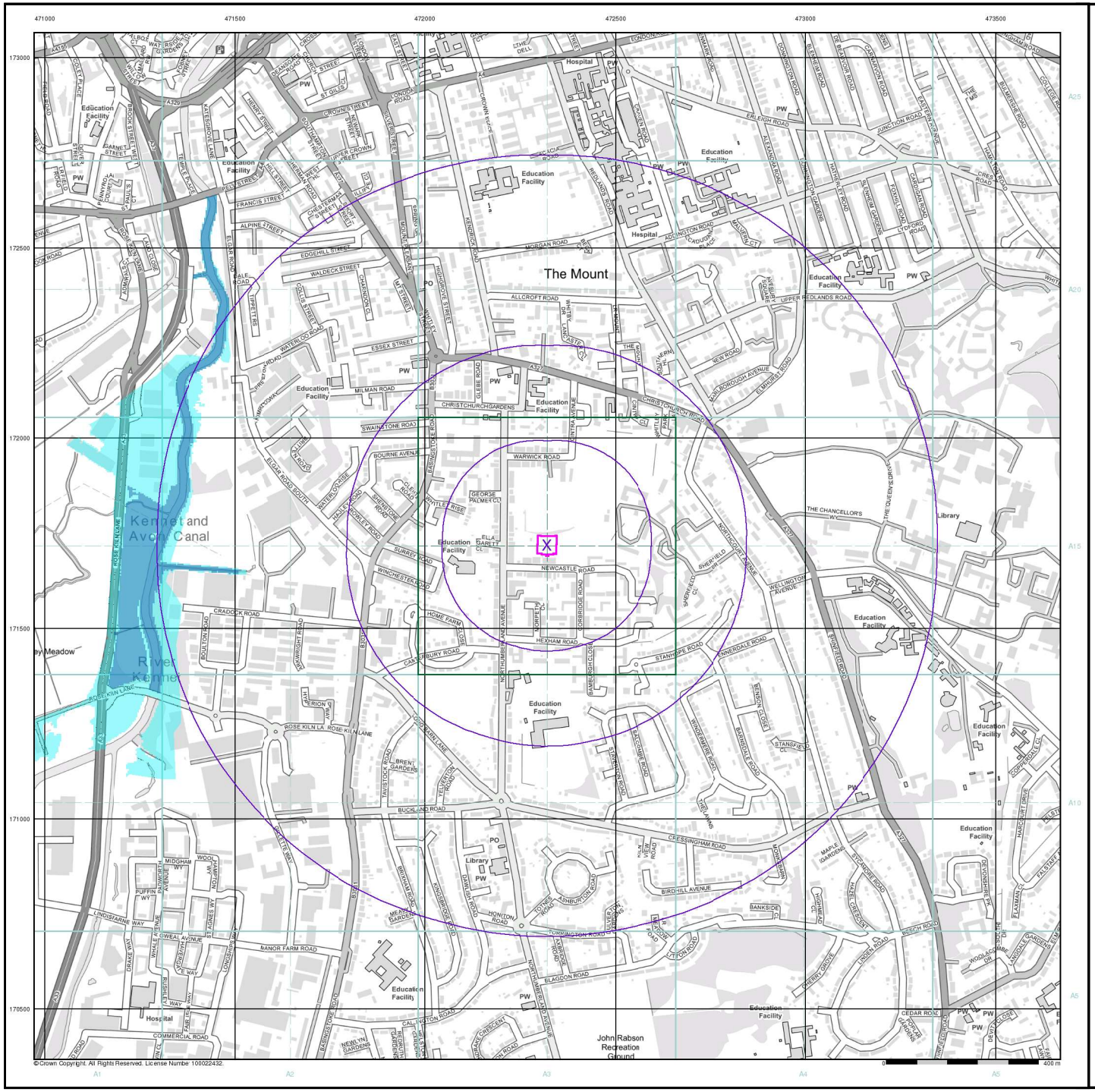
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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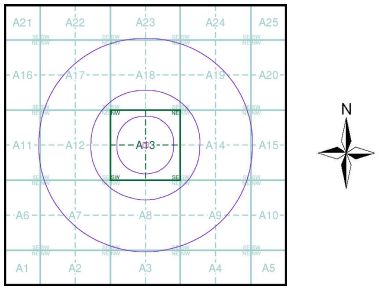
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	1000

Site Details

Site at 472320, 171720

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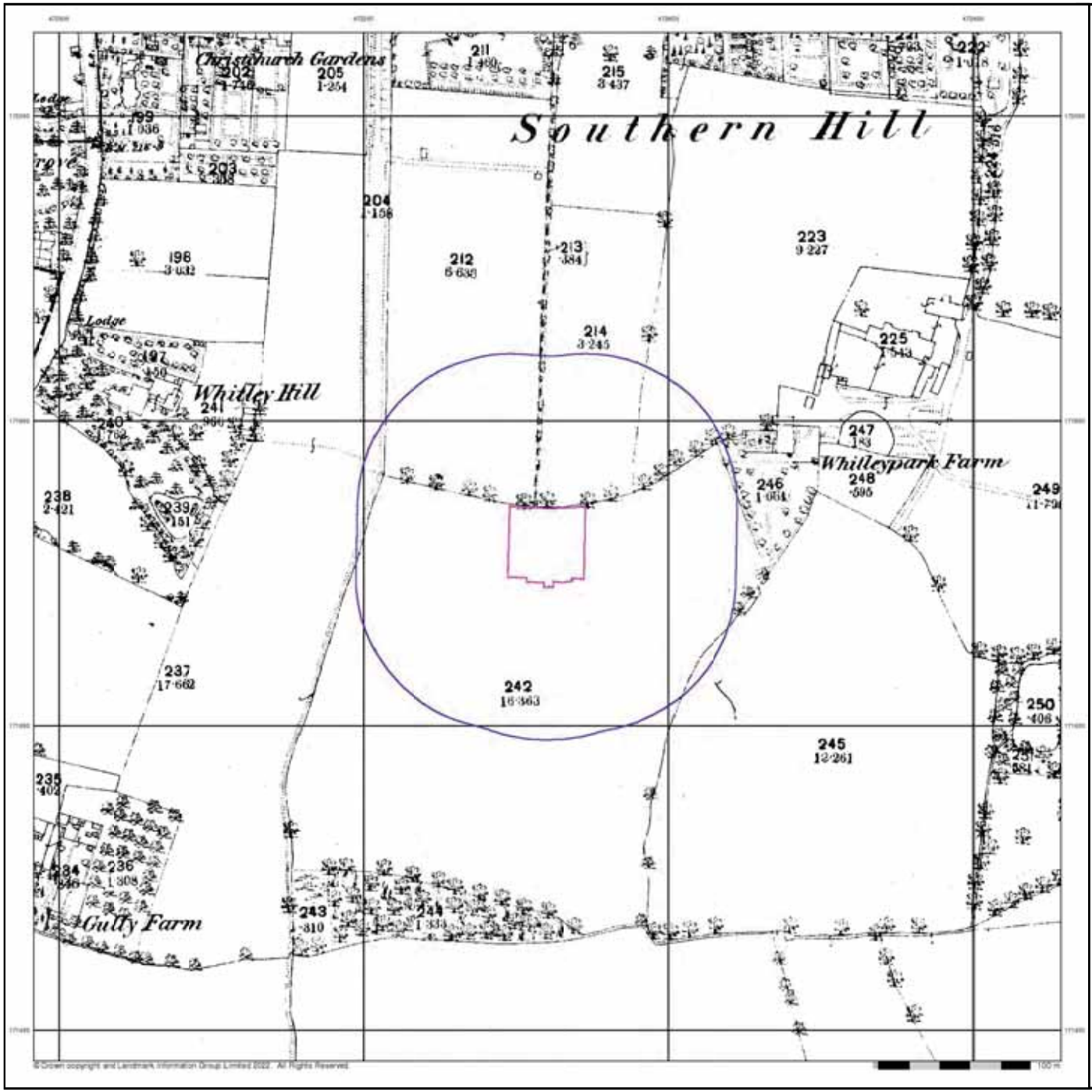
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

APPENDIX F

A Selection of Historic Maps



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Berkshire

Published 1879

Source map scale - 1:2,500

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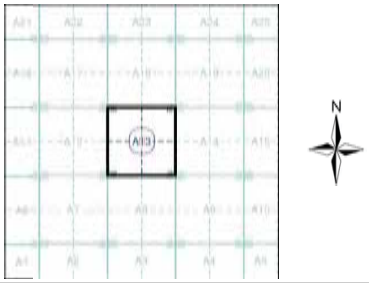
Map Name(s) and Date(s)

Historical Map - Segment A13



Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	100

Site Details

Site at 472320, 171720

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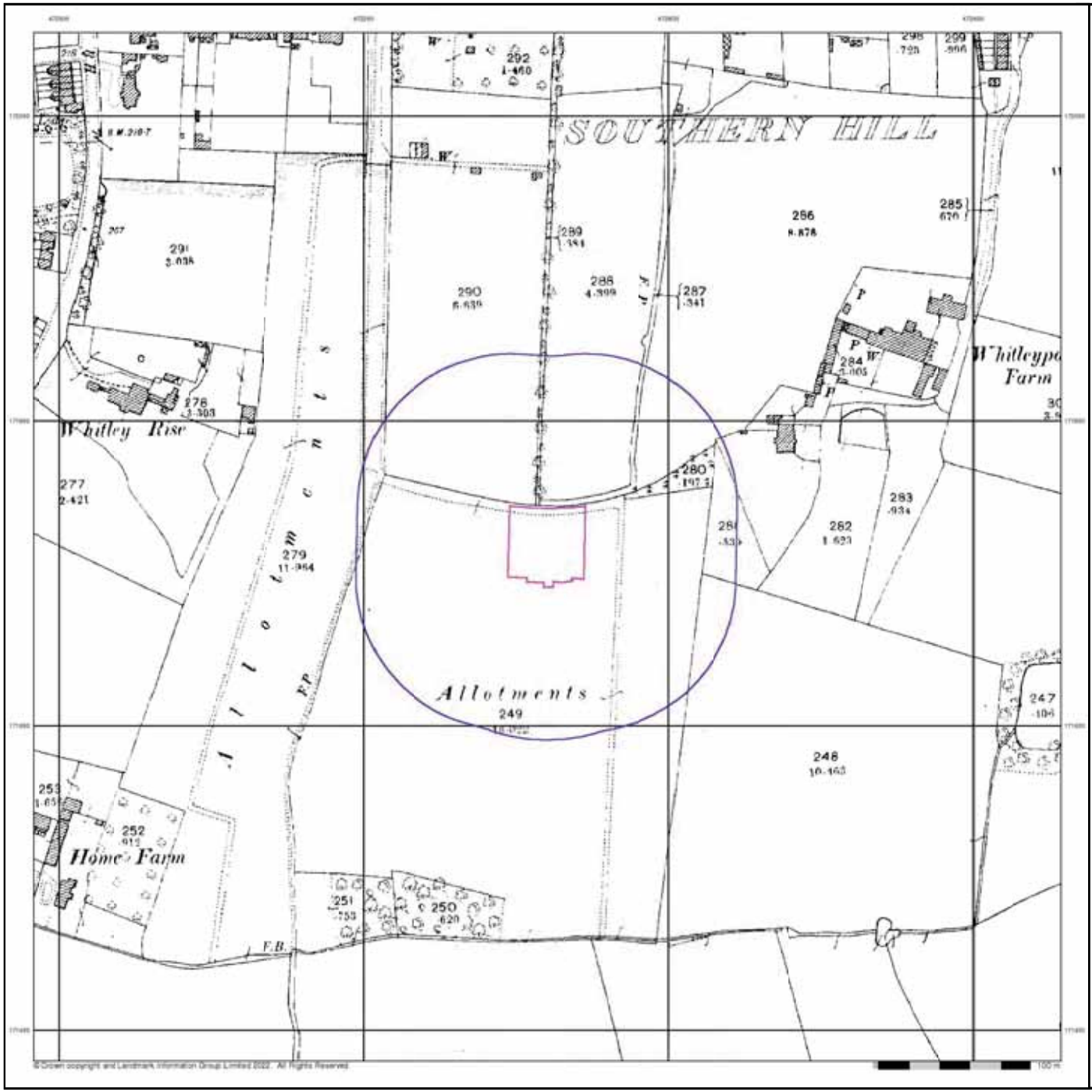
Fax 0844 844 9951
Web www.envirocheck.co.uk



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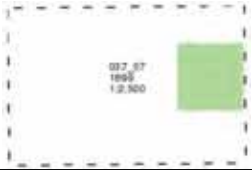
Berkshire

Published 1899

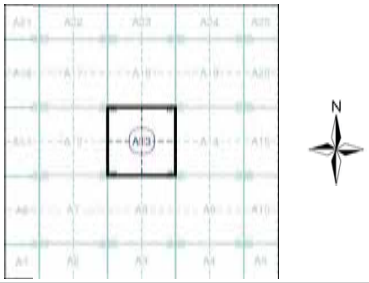
Source map scale - 1:2,500

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 and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below 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.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	100

Site Details

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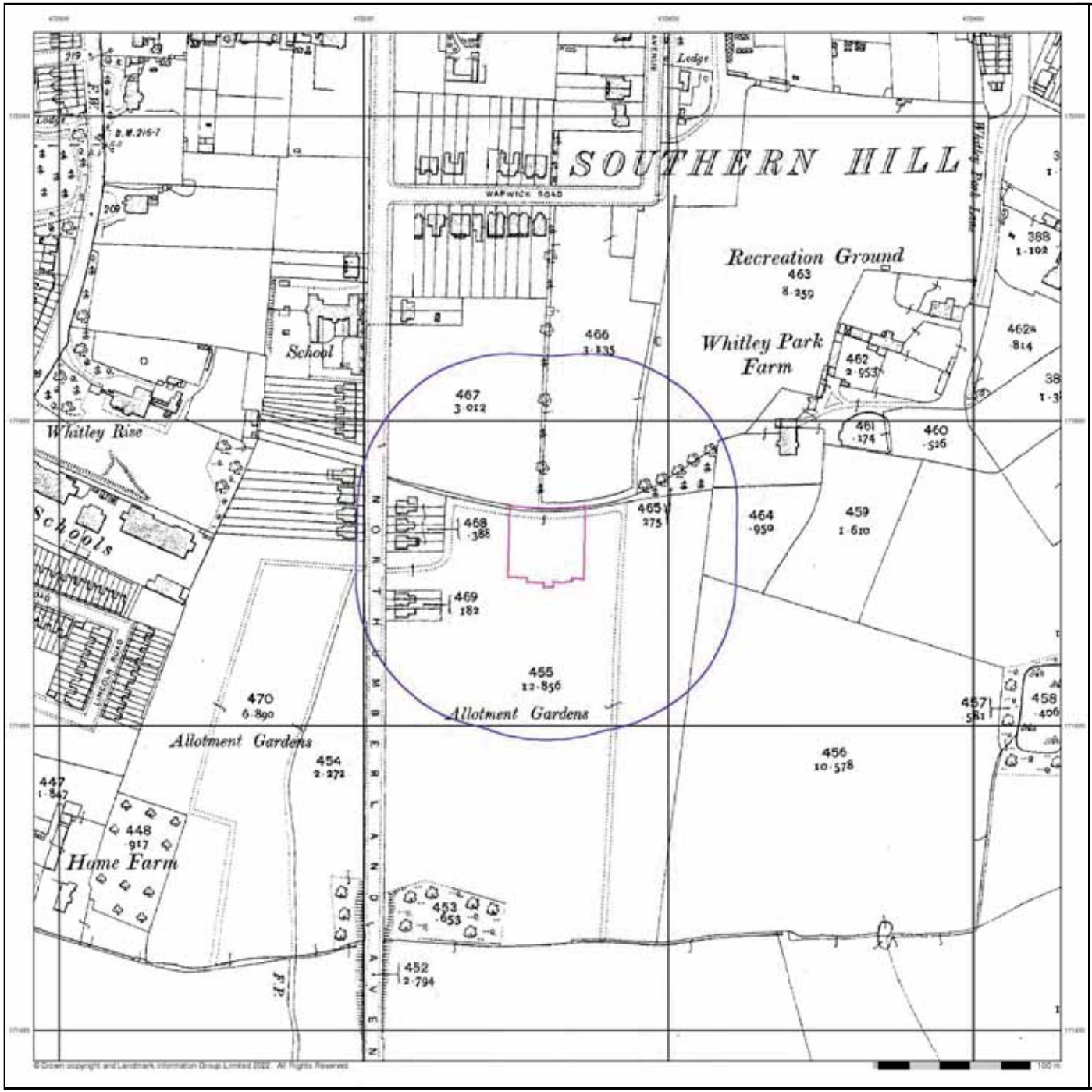

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Berkshire

Published 1912

Source map scale - 1:2,500

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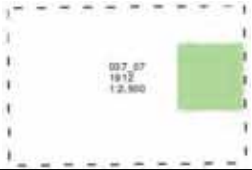
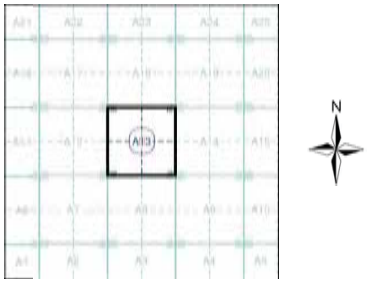
Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	100

Site Details

Site at 472320, 171720

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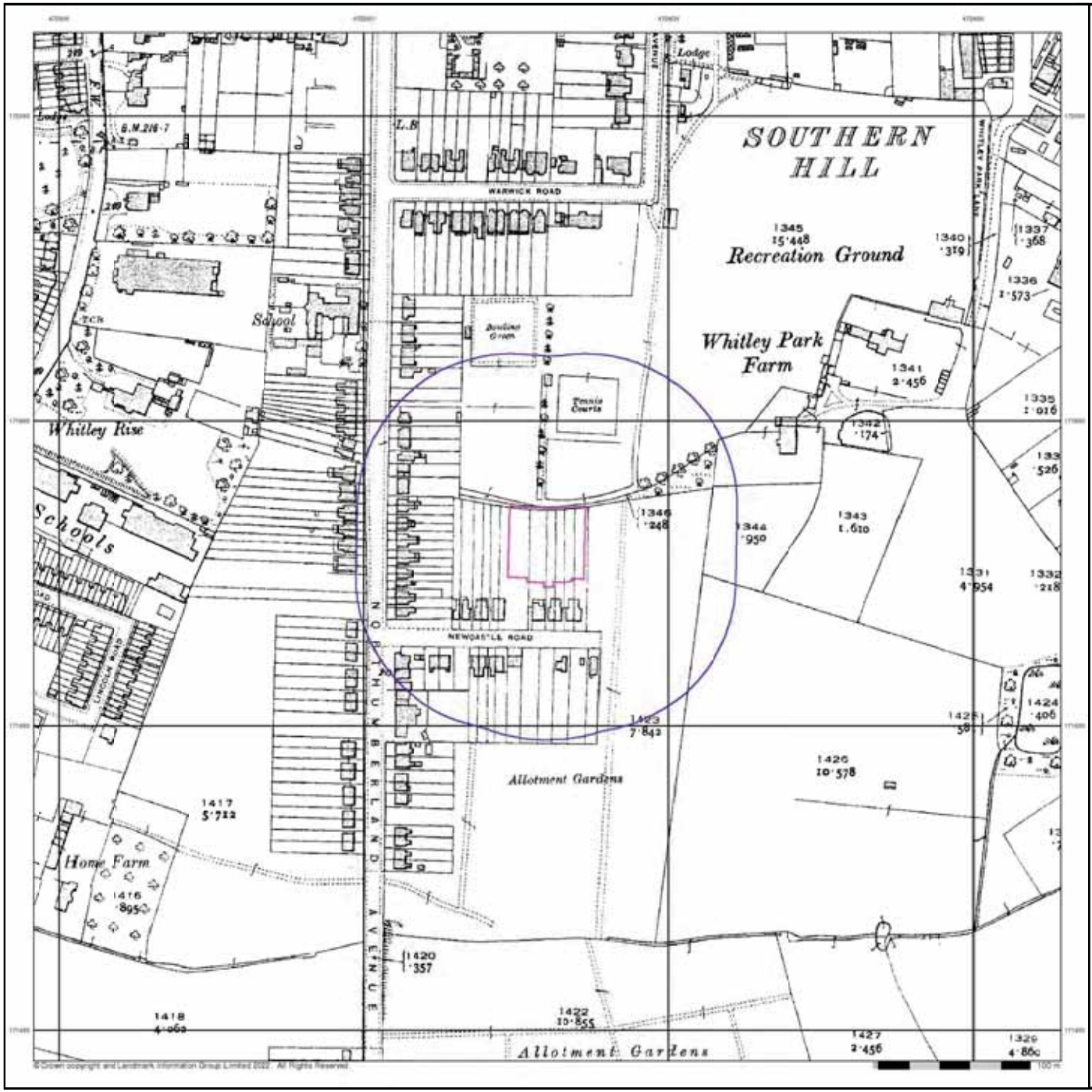
Web www.envirocheck.co.uk



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Berkshire

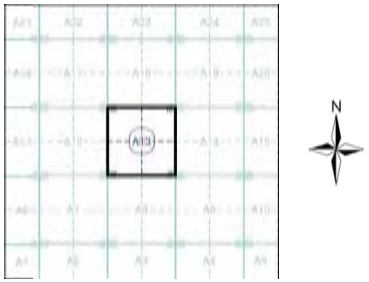
Published 1932

Source map scale - 1:2,500

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 and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below 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.

Map Name(s) and Date(s)

Historical Map - Segment A13



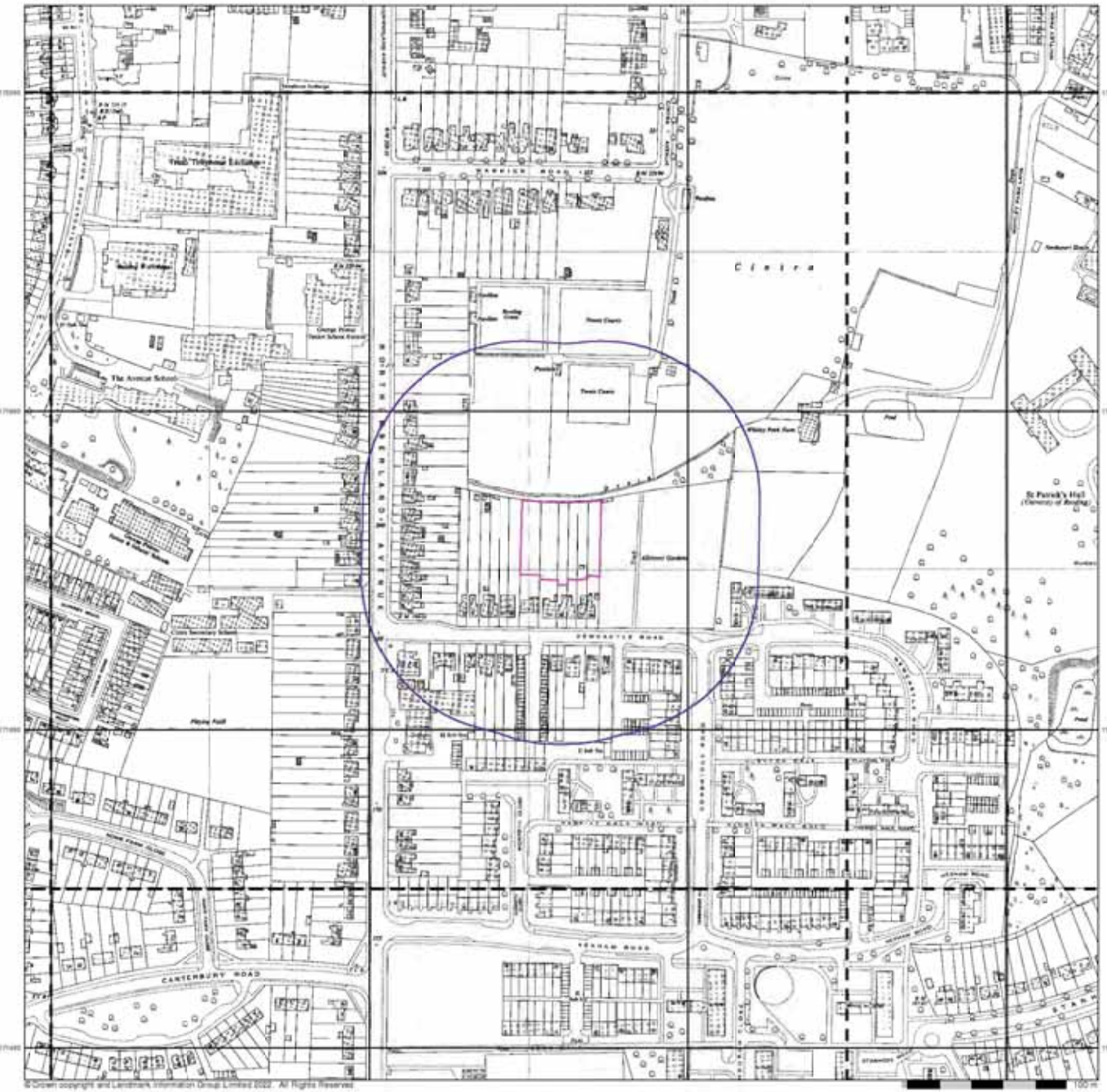
Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	100

Site Details

Site at 472320, 171720

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



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Ordnance Survey Plan

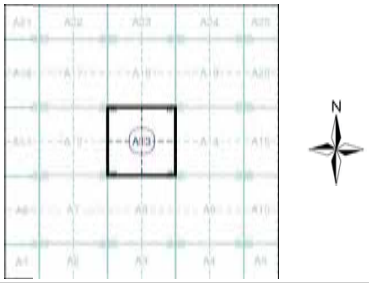
Published 1966 - 1972

Source map scale - 1:1,250

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 and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below 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.

Map Name(s) and Date(s)

Historical Map - Segment A13



Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	100

Site Details

Site at 472320, 171720

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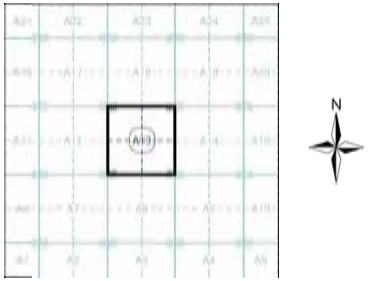
Web: www.envirocheck.co.uk

Historical Aerial Photography

Published 1999

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

Order Number:	297521748_1_1
Customer Ref:	UK22.5978
National Grid Reference:	472320, 171720
Slice:	A
Site Area (Ha):	0.24
Search Buffer (m):	100

Site Details

Site at 472320, 171720

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

APPENDIX G

Site Specific Borehole Logs

Borehole Log

Borehole No. **WS01** Sheet 1 of 1			
Project Name: Land to the rear of 17 Newcastle Road	Project No. UK22.5978	Co-ords: -106973E - 6699472N	Hole Type WLS
Location: Reading, RG2 7TN		Level:	Scale 1:20
Client: Brett Property Group		Dates: 28/07/2022	Logged By JB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	In Situ Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.10 - 0.40	ES					Made Ground: Dark brown slightly clayey slightly gravelly silty SAND with brick and chert.	
					0.55			Stiff yellowish brown slightly gravelly slightly sandy CLAY with occasional light orangish brown and light grey mottling and rare decayed roots. Gravel is fine to coarse angular to subangular chert.	
		0.80 - 1.00	D						1
					1.40			Medium dense black brown and white angular to rounded clayey very sandy chert GRAVEL. Sand is orangish brown.	
		1.80 - 2.00	D						
		2.00	SPT	N=20 (2,3/3,5,5,7)					2
					2.10			Stiff yellowish brown CLAY with occasional greyish brown and grey mottling and rare calcareous aggregations. (London Clay Formation)	
		2.20		HVP=147					
		2.40 - 2.60	D						
		2.50		HVP=141					
		2.70		HVP=138					3
		3.20		HVP=101					
		3.50 - 3.70	D						
		3.50		HVP=104					
		3.70		HVP=130					
		4.00	SPT	N=16 (3,3/3,4,5,4)	4.00			End of Borehole at 4.000m	4

Remarks

No groundwater encountered

Borehole Log

Borehole No. **WS02** Sheet 1 of 1			
Project Name: Land to the rear of 17 Newcastle Road	Project No. UK22.5978	Co-ords: -106942E - 6699457N	Hole Type WLS
Location: Reading, RG2 7TN		Level:	Scale 1:20
Client: Brett Property Group		Dates: 28/07/2022	Logged By JB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	In Situ Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.10 - 0.40	ES					Made Ground: Dark brown slightly silty sandy CLAY with brick and rare chert gravel.	
					0.45			Made Ground: Light brown clayey SAND.	
					0.55			Stiff yellowish brown slightly gravelly slightly sandy CLAY with occasional light orangish brown and light grey mottling and rare decayed roots. Gravel is fine to coarse angular to subrounded chert.	
		1.00	SPT	N=28 (3,3/4,7,8,9)					1
					1.20			Medium dense black brown and white angular to subangular chert and flint GRAVEL in an orangish brown slightly sandy clay matrix.	
		1.30 - 1.50	D						
		2.00	SPT	N=25 (6,8/6,5,7,7)	2.00			Stiff yellowish brown CLAY with occasional light orangish brown and grey mottling and rare calcareous aggregations. (London Clay Formation)	2
		2.20		HVP=124					
		2.50 - 2.70	D						
		2.50		HVP=121					
		2.80		HVP=115					3
		3.20		HVP=133					
		3.40 - 3.60	D						
		3.50		HVP=144					
		3.70		HVP=127					
		4.00	SPT	N=18 (3,3/4,4,5,5)	4.00			End of Borehole at 4.000m	4

Remarks

No groundwater encountered

Borehole Log

Borehole No. **WS03** Sheet 1 of 1			
Project Name: Land to the rear of 17 Newcastle Road	Project No. UK22.5978	Co-ords: -106989E - 6699453N	Hole Type WLS
Location: Reading, RG2 7TN		Level:	Scale 1:20
Client: Brett Property Group		Dates: 28/07/2022	Logged By JB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	In Situ Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.10 - 0.50	ES					Made Ground: Dark brown slightly clayey slightly gravelly silty SAND with brick, galss and chert.	
					0.80			Stiff yellowish brown CLAY with occasional light orangish brown and grey mottling and rare calcareous aggregations. (London Clay Formation)	
		1.00	SPT	N=13 (4,4/3,3,4,3)					1
		1.10 - 1.30	D						
		1.30		HVP=159					
		1.60		HVP=115					
		1.80		HVP=108					
		1.90 - 2.00	D						2
		2.20 - 2.50	D						
		2.30		HVP=108					
		2.60		HVP=104					
		2.90		HVP=118					3
		3.30		HVP=115					
		3.60		HVP=118					
		3.70 - 3.80	D						
		3.90		HVP=130					
		4.00	SPT	N=18 (3,3/3,4,5,6)	4.00			End of Borehole at 4.000m	4

Remarks

No groundwater encountered

Borehole Log

Borehole No. **WS04** Sheet 1 of 1			
Project Name: Land to the rear of 17 Newcastle Road	Project No. UK22.5978	Co-ords: -106940E - 6699489N	Hole Type WLS
Location: Reading, RG2 7TN		Level:	Scale 1:20
Client: Brett Property Group		Dates: 28/07/2022	Logged By JB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	In Situ Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.10 - 0.50	ES					Made Ground: Dark brown to greyish brown slightly silty slightly gravelly clayey SAND with brick and rare cobbles.	
					0.75			Stiff yellowish brown CLAY with occasional light orangish brown and grey mottling and rare calcareous aggregations. (London Clay Formation)	
		0.80 - 1.00	D						
		0.90		HVP=159					
		1.00	SPT	N=21 (4,4/4,5,5,7)					1
		1.10		HVP=164					
								Subangular flint cobbles	
		1.80		HVP=130					
									2
		2.20 - 2.50	D						
		2.30		HVP=133					
		2.70		HVP=107					
									3
		3.30		HVP=130					
		3.50 - 3.70	D						
		3.60		HVP=104					
		4.00	SPT	N=20 (3,4/4,4,5,7)	4.00			End of Borehole at 4.000m	4

Remarks

No groundwater encountered

Borehole Log

Borehole No. **WS05**

Sheet 1 of 1

Project Name:	Land to the rear of 17 Newcastle Road	Project No. UK22.5978	Co-ords: -106984E - 6699497N
Hole Type	WLS		
Location:	Reading, RG2 7TN	Level:	
Scale	1:20		
Client:	Brett Property Group	Dates: 28/07/2022	
Logged By	JB		

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	In Situ Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.10 - 0.40	ES					Made Ground: Dark brown slightly clayey silty SAND with brick and rare chert gravel.	
					0.65			Stiff yellowish brown CLAY with occasional greyish brown and grey mottling and rare calcareous aggregations. (London Clay Formation)	
		1.00	SPT	N=23 (4,6/6,5,6,6)					1
		1.30		HVP=159					
		1.50 - 1.60	D					*Fine to coarse subangular flint gravel*	
									2
		2.30		HVP=157					
									3
		3.40 - 3.60	D						
		3.50		HVP=137					
		3.70		HVP=130					
		4.00	SPT	N=33 (4,7/7,7,9,10)	4.00			End of Borehole at 4.000m	4

Remarks

No groundwater encountered

APPENDIX H

Laboratory Results – Environmental

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

EPS Ltd
7B Caxton House
Broad Street
Cambourne
Cambridgeshire
CB23 6JN

Attention :	James Bowley
Date :	9th August, 2022
Your reference :	UK22.5978
Our reference :	Test Report 22/12415 Batch 1
Location :	Land To The Rear Of 17 Newcastle Rd Reading
Date samples received :	30th July, 2022
Status :	Final Report
Issue :	1

Eleven samples were received for analysis on 30th July, 2022 of which eleven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 3rd Floor Davidson Building, 5 Southampton Street, London WC2E 7HA
Company Registration No: 11371415

Element Materials Technology

Client Name: EPS Ltd
Reference: UK22.5978
Location: Land To The Rear Of 17 Newcastle Rd Reading
Contact: James Bowley
EMT Job No: 22/12415

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21	22	23	24	25			
Sample ID	WS01	WS02	WS03	WS04	WS05	WS01	WS02	WS03	WS04	WS004			
Depth	0.1-0.4	0.1-0.4	0.1-0.5	0.1-0.5	0.1-0.4	2.40-2.60	1.30-1.50	3.70-3.80	0.80-1.00	2.20-2.50	Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	B	B	B	B	B			
Sample Date	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022			
Sample Type	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam	Clay	Clayey Sand	Clay	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022			
Arsenic #M	18.9	28.9	26.5	22.1	28.0	-	-	-	-	-	<0.5	mg/kg	TM30/PM15
Cadmium #M	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	<0.1	mg/kg	TM30/PM15
Chromium #M	58.6	63.7	75.7	62.8	80.3	-	-	-	-	-	<0.5	mg/kg	TM30/PM15
Copper #M	131	34	42	46	71	-	-	-	-	-	<1	mg/kg	TM30/PM15
Lead #M	269	106	1364	205	251	-	-	-	-	-	<5	mg/kg	TM30/PM15
Mercury #M	0.7	0.4	0.4	1.1	1.0	-	-	-	-	-	<0.1	mg/kg	TM30/PM15
Nickel #M	22.7	27.8	22.3	27.3	39.9	-	-	-	-	-	<0.7	mg/kg	TM30/PM15
Selenium #M	<1	2	<1	<1	<1	-	-	-	-	-	<1	mg/kg	TM30/PM15
Sulphur as S	-	-	-	-	-	<0.01	0.02	0.02	0.01	0.01	<0.01	%	TM30/PM15
Total Sulphate as SO4 #M	765	297	469	440	525	109	419	255	119	193	<50	mg/kg	TM50/PM29
Zinc #M	356	146	291	301	384	-	-	-	-	-	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #M	1.77	<0.04	0.12	<0.04	0.09	-	-	-	-	-	<0.04	mg/kg	TM4/PM8
Acenaphthylene	2.97	0.06	0.50	0.11	0.34	-	-	-	-	-	<0.03	mg/kg	TM4/PM8
Acenaphthene #M	0.56	<0.05	0.09	<0.05	0.05	-	-	-	-	-	<0.05	mg/kg	TM4/PM8
Fluorene #M	2.85	<0.04	0.07	<0.04	0.10	-	-	-	-	-	<0.04	mg/kg	TM4/PM8
Phenanthrene #M	52.36	0.16	1.23	0.45	2.19	-	-	-	-	-	<0.03	mg/kg	TM4/PM8
Anthracene #	7.15	0.09	0.94	0.14	0.79	-	-	-	-	-	<0.04	mg/kg	TM4/PM8
Fluoranthene #M	57.86	0.45	6.97	1.13	6.20	-	-	-	-	-	<0.03	mg/kg	TM4/PM8
Pyrene #	42.87	0.43	6.14	1.00	5.26	-	-	-	-	-	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	17.70	0.27	4.27	0.59	2.65	-	-	-	-	-	<0.06	mg/kg	TM4/PM8
Chrysene #M	22.11	0.31	4.66	0.70	3.15	-	-	-	-	-	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #M	34.50	0.61	10.30	1.39	5.58	-	-	-	-	-	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	17.53	0.38	5.86	0.76	3.19	-	-	-	-	-	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #M	12.76	0.27	4.95	0.62	2.49	-	-	-	-	-	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	1.71	0.06	1.04	0.15	0.54	-	-	-	-	-	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	10.34	0.32	4.75	0.60	2.30	-	-	-	-	-	<0.04	mg/kg	TM4/PM8
PAH 16 Total	285.0	3.4	51.9	7.6	34.9	-	-	-	-	-	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	24.84	0.44	7.42	1.00	4.02	-	-	-	-	-	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	9.66	0.17	2.88	0.39	1.56	-	-	-	-	-	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	88	89	93	85	92	-	-	-	-	-	<0	%	TM4/PM8
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	-	-	-	-	-	<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	8.4	6.3	5.4	7.4	6.4	-	-	-	-	-	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	-	-	-	-	-	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #M	0.1572	0.0068	0.0277	0.0026	0.0019	0.0387	0.0995	0.1028	0.0305	0.0925	<0.0015	g/l	TM38/PM20
Chromium III	58.6	63.7	75.7	62.8	80.3	-	-	-	-	-	<0.5	mg/kg	NONE/NONE
Total Cyanide #M	<0.5	<0.5	0.6	<0.5	<0.5	-	-	-	-	-	<0.5	mg/kg	TM89/PM45
Organic Matter	7.3	4.3	12.1	8.0	8.4	-	-	-	-	-	<0.2	%	TM21/PM24

Element Materials Technology

Client Name: EPS Ltd
Reference: UK22.5978
Location: Land To The Rear Of 17 Newcastle Rd Reading
Contact: James Bowley
EMT Job No: 22/12415

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21	22	23	24	25			
Sample ID	WS01	WS02	WS03	WS04	WS05	WS01	WS02	WS03	WS04	WS004			
Depth	0.1-0.4	0.1-0.4	0.1-0.5	0.1-0.5	0.1-0.4	2.40-2.60	1.30-1.50	3.70-3.80	0.80-1.00	2.20-2.50	Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	B	B	B	B	B			
Sample Date	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022			
Sample Type	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam	Clay	Clayey Sand	Clay	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022	30/07/2022			
pH #M	7.12	7.87	7.89	7.43	7.21	7.58	5.18	7.76	7.88	6.84	<0.01	pH units	TM73/PM11
Sample Type	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam	Clay	Clayey Sand	Clay	Clay	Clay		None	PM13/PM0
Sample Colour	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown		None	PM13/PM0
Other Items	stones, roots	stones, roots	roots, stones, glass	stones, roots	stones, roots	stones	stones	stones	stones	stones		None	PM13/PM0

Element Materials Technology

Client Name: EPS Ltd
Reference: UK22.5978
Location: Land To The Rear Of 17 Newcastle Rd Reading
Contact: James Bowley
EMT Job No: 22/12415

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	26										LOD/LOR	Units	Method No.
Sample ID	WS005												
Depth	1.50-1.60												
COC No / misc													
Containers	B												
Sample Date	28/07/2022												
Sample Type	Clay												
Batch Number	1												
Date of Receipt	30/07/2022												
Arsenic #M	-										<0.5	mg/kg	TM30/PM15
Cadmium #M	-										<0.1	mg/kg	TM30/PM15
Chromium #M	-										<0.5	mg/kg	TM30/PM15
Copper #M	-										<1	mg/kg	TM30/PM15
Lead #M	-										<5	mg/kg	TM30/PM15
Mercury #M	-										<0.1	mg/kg	TM30/PM15
Nickel #M	-										<0.7	mg/kg	TM30/PM15
Selenium #M	-										<1	mg/kg	TM30/PM15
Sulphur as S	0.06										<0.01	%	TM30/PM15
Total Sulphate as SO4 #M	1260										<50	mg/kg	TM50/PM29
Zinc #M	-										<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #M	-										<0.04	mg/kg	TM4/PM8
Acenaphthylene	-										<0.03	mg/kg	TM4/PM8
Acenaphthene #M	-										<0.05	mg/kg	TM4/PM8
Fluorene #M	-										<0.04	mg/kg	TM4/PM8
Phenanthrene #M	-										<0.03	mg/kg	TM4/PM8
Anthracene #	-										<0.04	mg/kg	TM4/PM8
Fluoranthene #M	-										<0.03	mg/kg	TM4/PM8
Pyrene #	-										<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-										<0.06	mg/kg	TM4/PM8
Chrysene #M	-										<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #M	-										<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	-										<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #M	-										<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	-										<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	-										<0.04	mg/kg	TM4/PM8
PAH 16 Total	-										<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-										<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-										<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-										<0	%	TM4/PM8
Total Phenols HPLC	-										<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	-										<0.1	%	PM4/PM0
Hexavalent Chromium #	-										<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #M	0.4229										<0.0015	g/l	TM38/PM20
Chromium III	-										<0.5	mg/kg	NONE/NONE
Total Cyanide #M	-										<0.5	mg/kg	TM89/PM45
Organic Matter	-										<0.2	%	TM21/PM24

Element Materials Technology

Client Name: EPS Ltd
Reference: UK22.5978
Location: Land To The Rear Of 17 Newcastle Rd Reading
Contact: James Bowley
EMT Job No: 22/12415

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	26												
Sample ID	WS005												
Depth	1.50-1.60										Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	B												
Sample Date	28/07/2022												
Sample Type	Clay												
Batch Number	1										LOD/LOR	Units	Method No.
Date of Receipt	30/07/2022												
pH #M	4.74										<0.01	pH units	TM73/PM11
Sample Type	Clay											None	PM13/PM0
Sample Colour	Medium Brown											None	PM13/PM0
Other Items	stones											None	PM13/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: EPS Ltd
Reference: UK22.5978
Location: Land To The Rear Of 17 Newcastle Rd Reading
Contact: James Bowley

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
22/12415	1	WS01	0.1-0.4	3	Simon Postlewhite	08/08/2022	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	08/08/2022	**Asbestos Fibres**	NAD
					Simon Postlewhite	08/08/2022	**Asbestos ACM**	NAD
					Simon Postlewhite	08/08/2022	**Asbestos Type**	NAD
22/12415	1	WS02	0.1-0.4	7	Simon Postlewhite	08/08/2022	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	08/08/2022	**Asbestos Fibres**	NAD
					Simon Postlewhite	08/08/2022	**Asbestos ACM**	NAD
					Simon Postlewhite	08/08/2022	**Asbestos Type**	NAD
22/12415	1	WS03	0.1-0.5	11	Andrew Alker	08/08/2022	**General Description (Bulk Analysis)**	brown soil and stone
					Andrew Alker	08/08/2022	**Asbestos Fibres**	NAD
					Andrew Alker	08/08/2022	**Asbestos ACM**	NAD
					Andrew Alker	08/08/2022	**Asbestos Type**	NAD
22/12415	1	WS04	0.1-0.5	15	Andrew Alker	08/08/2022	**General Description (Bulk Analysis)**	brown soil and stone
					Andrew Alker	08/08/2022	**Asbestos Fibres**	NAD
					Andrew Alker	08/08/2022	**Asbestos ACM**	NAD
					Andrew Alker	08/08/2022	**Asbestos Type**	NAD
22/12415	1	WS05	0.1-0.4	19	Rebecca Collins	08/08/2022	**General Description (Bulk Analysis)**	brown soil and syone
					Rebecca Collins	08/08/2022	**Asbestos Fibres**	NAD
					Rebecca Collins	08/08/2022	**Asbestos ACM**	NAD
					Rebecca Collins	08/08/2022	**Asbestos Type**	NAD

Client Name: EPS Ltd
Reference: UK22.5978
Location: Land To The Rear Of 17 Newcastle Rd Reading
Contact: James Bowley

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 22/12415						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/12415

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 22/12415

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	No
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes

EMT Job No: 22/12415

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes	Yes	AD	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes	Yes	AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

APPENDIX I

Laboratory Results - Geotechnical

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 15/08/2022

0998

Contract	**UK22.5978 - Land to the rear of 17 Newcastle Road, Reading**
Serial No.	**41171_1**

Client:

Environmental Protection Strategies Ltd
Unit 7
Caxton House
Broad Street
Great Cambourne
Cambridge
CB23 6JN

Soil Property Testing Ltd

15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG

Tel: 01480 455579
Email: enquiries@soilpropertytesting.com
Website: www.soilpropertytesting.com

Samples Submitted By:

Environmental Protection Strategies Ltd

Samples Labelled:

UK22.5978 - Land to the rear of 17 Newcastle Road, Reading

Approved Signatories:

☑ **J.C. Garner B.Eng (Hons) FGS**
Technical Director & Quality Manager

☐ **W. Johnstone**
Materials Lab Manager

Date Received: 01/08/2022 **Samples Tested Between:** 01/08/2022 **and** 15/08/2022

Remarks:

For the attention of James Bowley
Your Reference No: UK22.5978
Your Order No: 29884

Notes:

1. All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.
2. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
3. Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.
4. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.
5. The results within this report only relate to the items tested or sampled.

TEST REPORT

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DATE ISSUED: 15/08/2022

0998

Contract	**UK22.5978 - Land to the rear of 17 Newcastle Road, Reading**		
Serial No.	**41171_1**	**Target Date**	15/08/2022
Scheduled By	Environmental Protection Strategies Ltd		

Schedule Remarks

Bore Hole No.	Type	Sample Ref.	Top Depth	Water Content (BSEN)	Liquid/Plastic Limits	Wet Sieve Preparation	Particle Size Distribution (BS1377)																Sample Remarks
WS01	D	1	0.80	1	1	1																	
WS01	D	2	1.80				1																
WS02	D	3	3.40	1	1																		
WS03	D	3	2.20	1	1																		
WS05	D	2	3.40	1	1																		
Totals				**4**	**4**	**1**	**1**																**End of Schedule**

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 15/08/2022

0998

Contract	**UK22.5978 - Land to the rear of 17 Newcastle Road, Reading**
Serial No.	**41171_1**

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasti-city Index (%)	Liquid-ity Index	Sample Preparation				Description	Class
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
WS01	0.80 - 1.00	D	1	**20.5**	63	23	40	-0.06	Wet Sieved	13 (M)	23.6*	27	Very stiff yellowish brown slightly gravelly slightly sandy CLAY with occasional light orangish brown and light grey mottling and rare decayed roots. Gravel is white and grey fine and medium angular and subangular chert	CH
WS02	3.40 - 3.60	D	3	**26.5**	63	25	38	0.04	From Natural	0 (A)		24	Stiff yellowish brown CLAY with occasional light orangish brown and grey mottling and rare calcareous aggregations	CH
WS03	2.20 - 2.50	D	3	**24.5**	64	25	39	-0.01	From Natural	0 (A)		24	Stiff yellowish brown CLAY with occasional light orangish brown and grey mottling and rare calcareous aggregations	CH
WS05	3.40 - 3.60	D	2	**20.5**	65	24	41	-0.09	From Natural	0 (A)		24	Very stiff yellowish brown CLAY with occasional greyish brown and grey mottling and rare calcareous aggregations	CH

Method Of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	*Corrected water content assume material greater than 0.425mm is non-porous. See BS1377: Part 2: 1990 Clause 3 Note 1.
Table Notation:	Ret'd 0.425mm: (A) = Assumed, (M) = Measured

TEST REPORT

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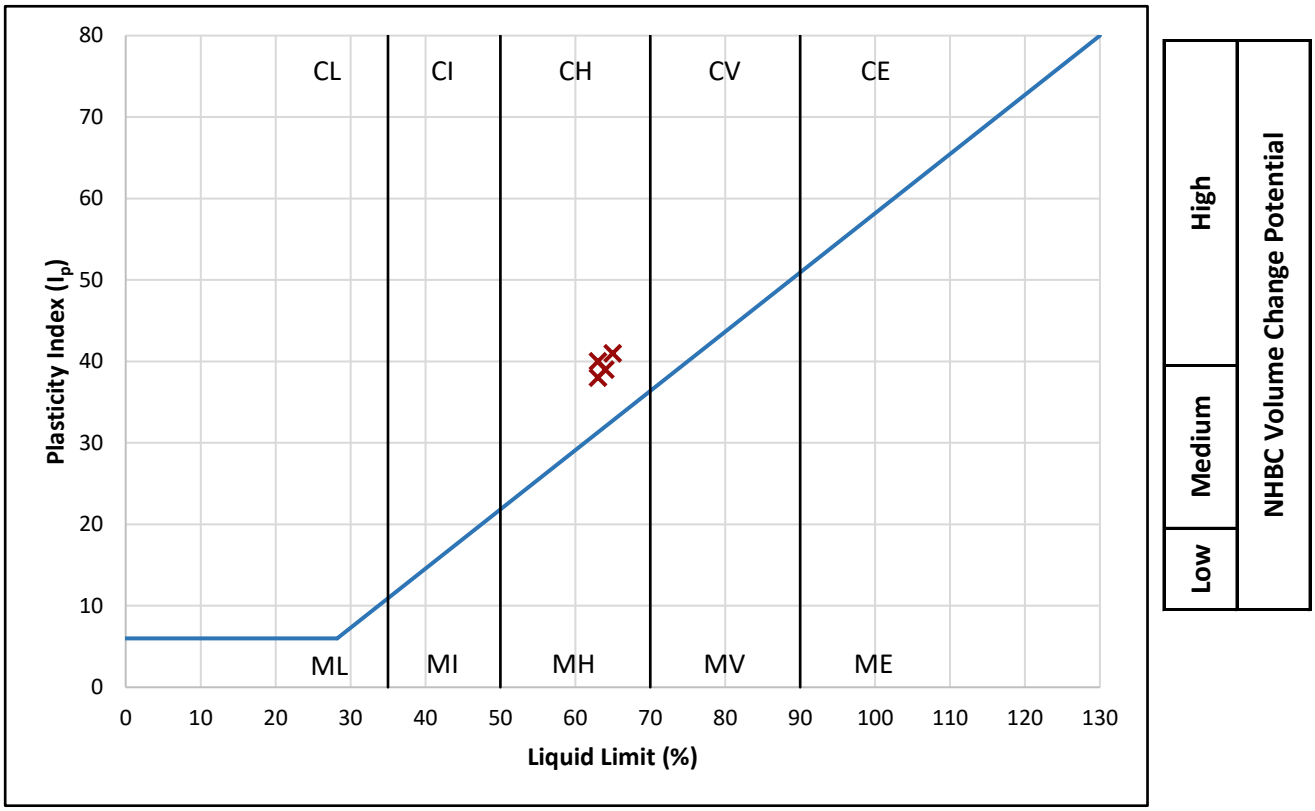
DATE ISSUED: 15/08/2022

0998

Contract	**UK22.5978 - Land to the rear of 17 Newcastle Road, Reading**
Serial No.	**41171_1**

PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

Plasticity				
Low	Medium	High	Very High	Extremely High



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS 1377: Part 2: 1990: 4.2
Method of Test:	BS1377: Part 2: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index

TEST REPORT

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DATE ISSUED: 15/08/2022

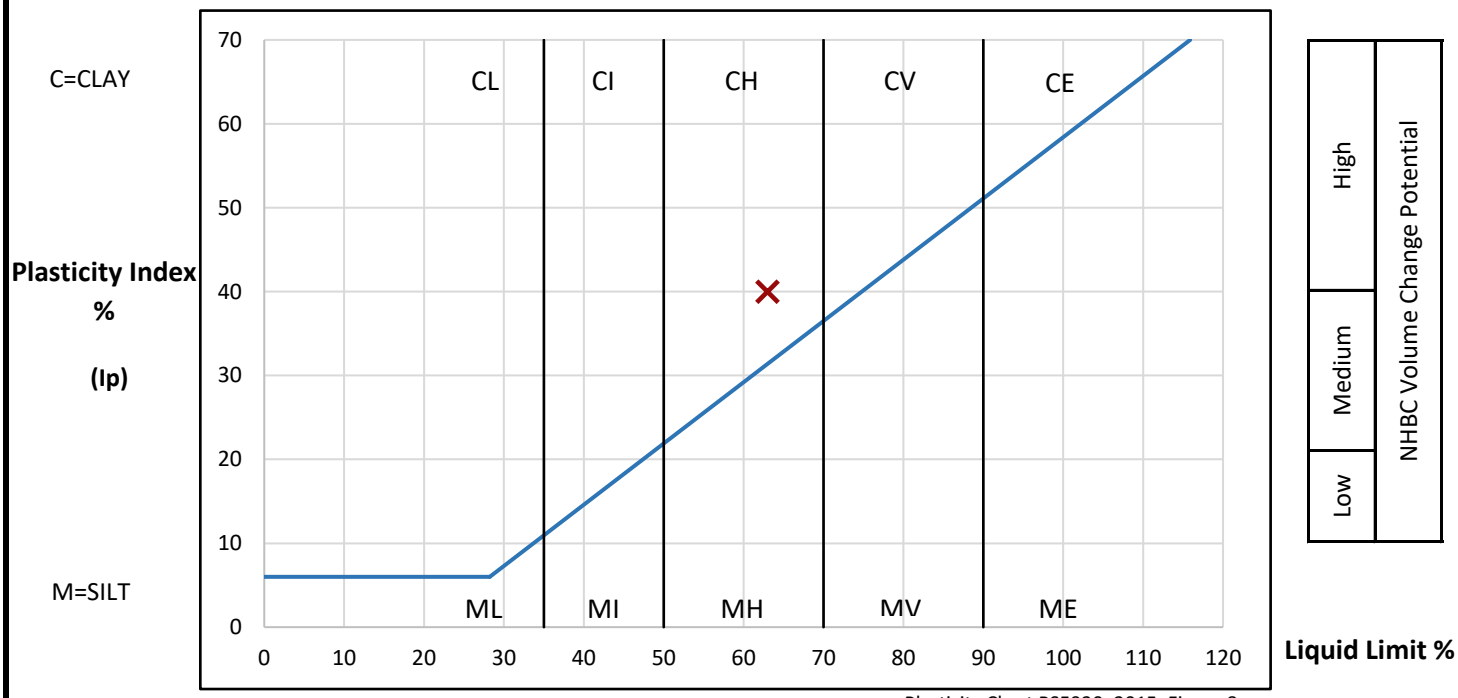
0998

Contract	**UK22.5978 - Land to the rear of 17 Newcastle Road, Reading**
Serial No.	**41171_1**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS01	0.80 - 1.00	D	1	20.5	Very stiff yellowish brown slightly gravelly slightly sandy CLAY with occasional light orangish brown and light grey mottling and rare decayed roots. Gravel is white and grey fine and medium angular and subangular chert	

PREPARATION					
				Liquid Limit	63 %
Method of preparation		Wet sieved over 0.425mm sieve		Plastic Limit	23 %
Sample retained 0.425mm sieve	(Measured)	13 %		Plasticity Index	40 %
Corrected water content for material passing 0.425mm		23.6 %		Liquidity Index	-0.06
Sample retained 2mm sieve	(Measured)	7 %		NHBC Modified (I'p)	35 %
Curing time	27 hrs		Clay Content Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

TEST REPORT

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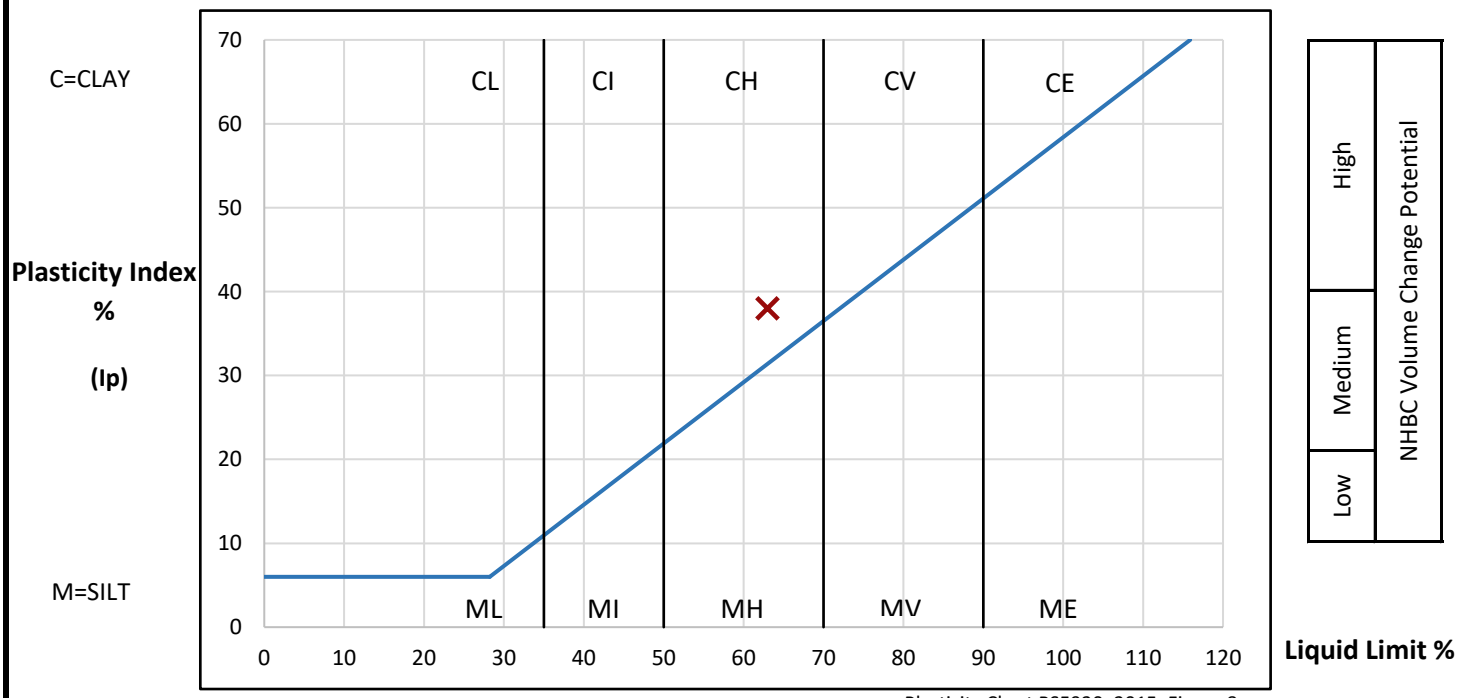
0998

Contract	**UK22.5978 - Land to the rear of 17 Newcastle Road, Reading**
Serial No.	**41171_1**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS02	3.40 - 3.60	D	3	26.5	Stiff yellowish brown CLAY with occasional light orangish brown and grey mottling and rare calcareous aggregations	

PREPARATION					
				Liquid Limit	63 %
Method of preparation			From natural	Plastic Limit	25 %
Sample retained 0.425mm sieve	(Assumed)		0 %	Plasticity Index	38 %
Corrected water content for material passing 0.425mm				Liquidity Index	0.04
Sample retained 2mm sieve	(Assumed)		0 %	NHBC Modified (I'p)	n/a
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 15/08/2022

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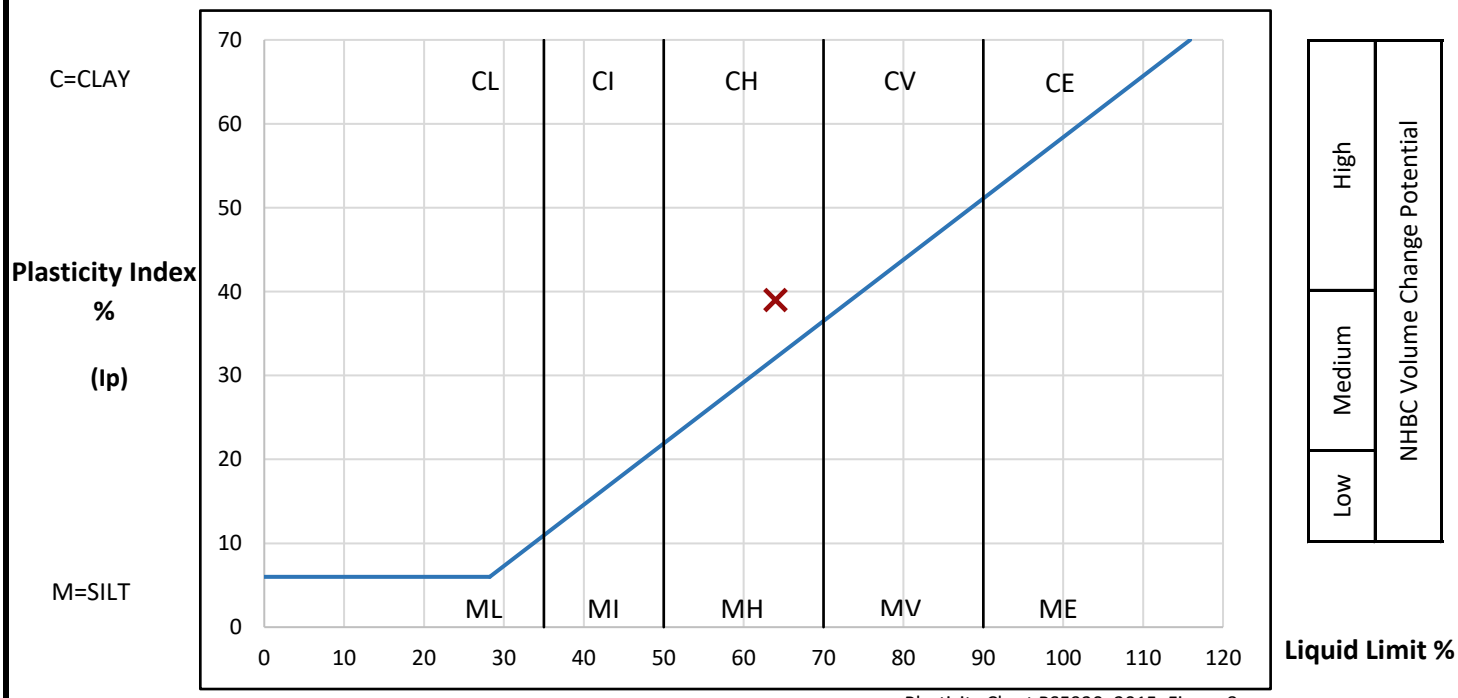
Contract	**UK22.5978 - Land to the rear of 17 Newcastle Road, Reading**
Serial No.	**41171_1**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS03	2.20 - 2.50	D	3	24.5	Stiff yellowish brown CLAY with occasional light orangish brown and grey mottling and rare calcareous aggregations	

PREPARATION					
				Liquid Limit	64 %
Method of preparation			From natural	Plastic Limit	25 %
Sample retained 0.425mm sieve	(Assumed)		0 %	Plasticity Index	39 %
Corrected water content for material passing 0.425mm				Liquidity Index	-0.01
Sample retained 2mm sieve	(Assumed)		0 %	NHBC Modified (I'p)	n/a
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 15/08/2022

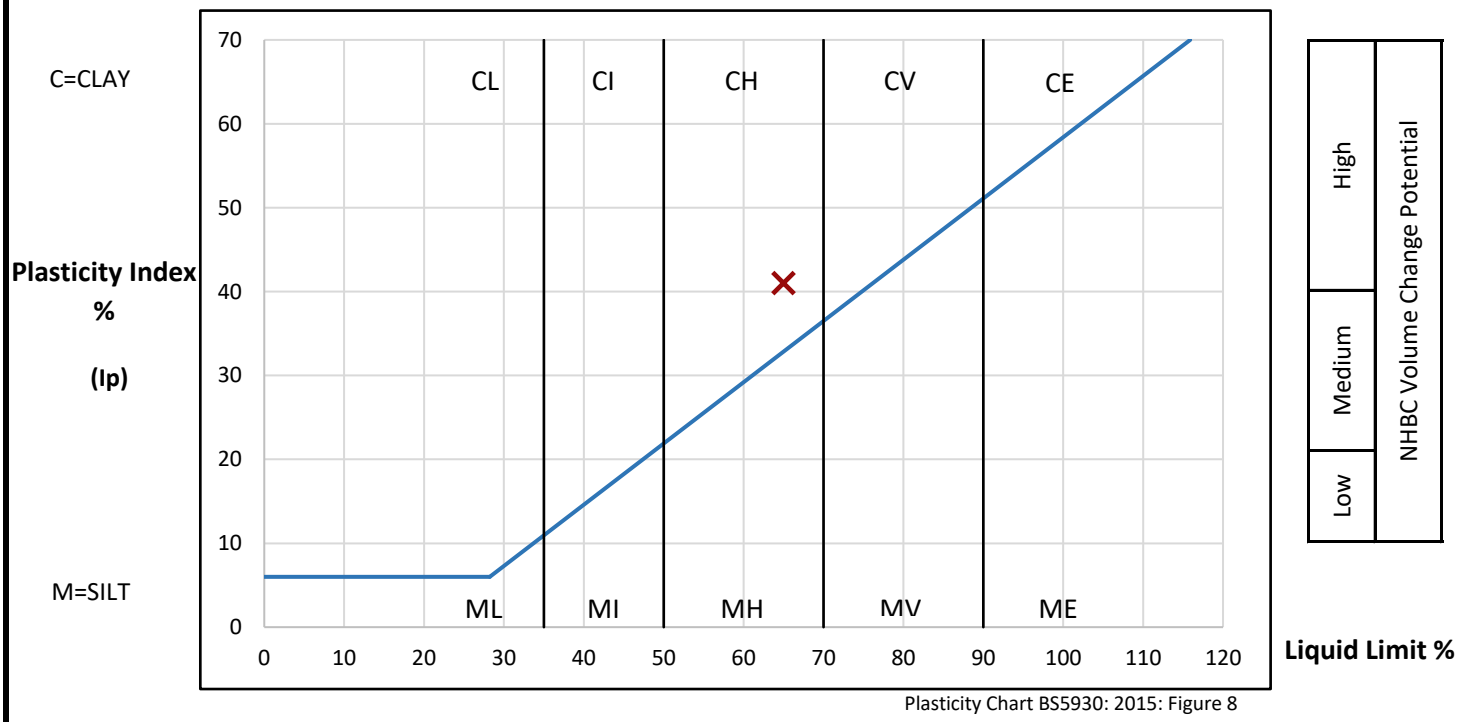
0998

Contract	**UK22.5978 - Land to the rear of 17 Newcastle Road, Reading**
Serial No.	**41171_1**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS05	3.40 - 3.60	D	2	20.5	Very stiff yellowish brown CLAY with occasional greyish brown and grey mottling and rare calcareous aggregations	

PREPARATION			
		Liquid Limit	65 %
Method of preparation	From natural	Plastic Limit	24 %
Sample retained 0.425mm sieve (Assumed)	0 %	Plasticity Index	41 %
Corrected water content for material passing 0.425mm		Liquidity Index	-0.09
Sample retained 2mm sieve (Assumed)	0 %	NHBC Modified (I'p)	n/a
Curing time 24 hrs	Clay Content Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 15/08/2022

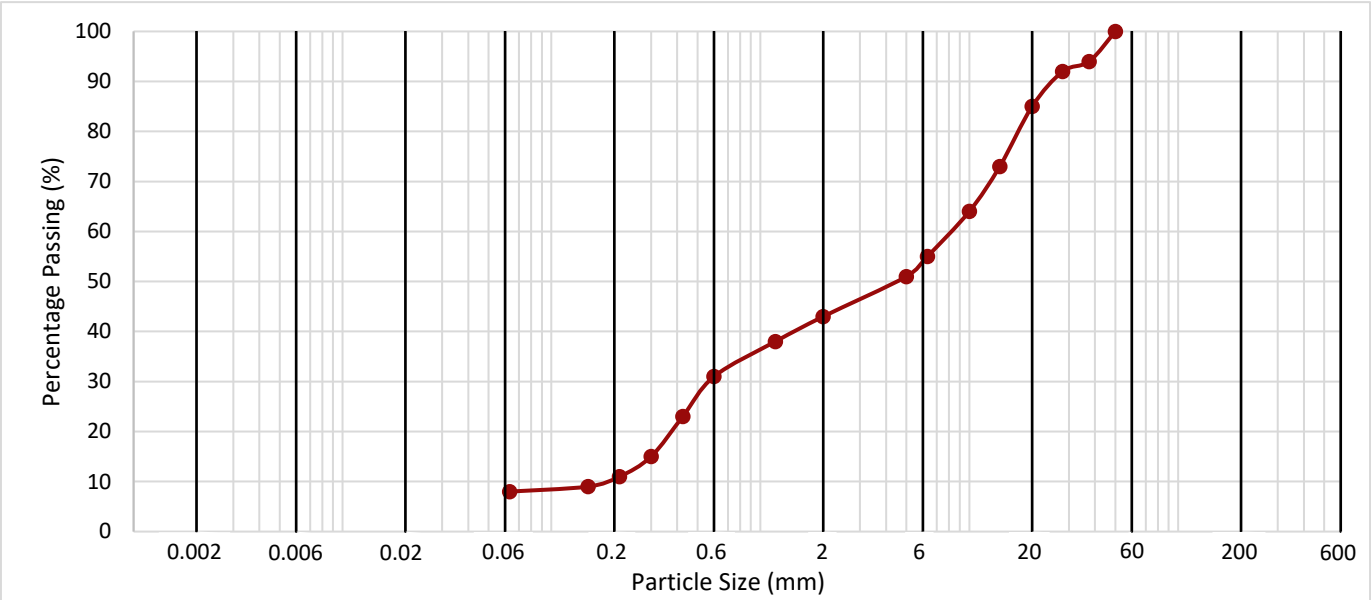
UKAS TESTING 0998

Contract	**UK22.5978 - Land to the rear of 17 Newcastle Road, Reading**
Serial No.	**41171_1**

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
WS01	1.80 - 2.00	D	2	Brown, black and white angular to rounded clayey very sandy chert GRVAEL. Sand is orangish brown	Dry mass of sample required 2kg. Mass of sample submitted 1.452kg. Sample Unrepresentative BS1377:Part 2:1990 Table 3.

Method of Test:	Wet Sieve	Method of Pretreatment:	Not required



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
			Clay by Dry Mass (%)

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	43	35
1.18	38	
0.600	31	
0.425	23	
0.300	15	
0.212	11	
0.150	9	
0.063	8	

Fines By Dry Mass (%)	
<0.063mm	8

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		57
125		
90		
63		
50	100	
37.5	94	
28	92	
20	85	
14	73	
10	64	
6.3	55	
5	51	

Method of Preparation:	BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test:	BS1377: Part 2: 1990: 9.2
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

APPENDIX J

Summary of Screening Criteria

EPS Generic Quantitative Risk Assessment

Generic Screening Criteria (C4SLs) - All Land Uses

Contaminant	Soil Targets					
	Residential		Allotments	Commercial	Public Open Spaces	
	With Home Grown Produce	Without Home Grown Produce			Residential	Parks
Unit	mg/kg					
Arsenic	37	40	49	640	79	168
Benzene	0.87	3.3	0.18	98	140	230
Benzo(a)pyrene	5	5.3	5.7	76	10	21
Cadmium	26	149	4.9	410	220	880
Chromium (VI)	21	21	170	49	23	250
Lead	200	310	80	2330	630	1300
Chloroethene (Vinyl Chloride)	0.017	0.029	0.0058	2.2	7.8	19
Trichloroethene (TCE)	0.043	0.045	0.16	3.4	79	69
Tetrachloroethene (PCE)	1.6	1.6	11	130	3400	2500

Notes:

Targets for Human Health have been taken from the publicly available Category 4 Screening Levels (C4SLs) for assessment of land affected by contamination issued by DEFRA/CL:AIRE in December 2013 and May 2021.

Within the modelling for C4SLs, a Soil Organic Matter content of 6% has been used. Reference to site-specific data should be made where possible.

The C4SLs for the contaminant benzene along with the three chlorinated solvents are the most susceptable to changes in SOM.

May-22

EPS Generic Quantitative Risk Assessment - Residential Land Use

Contaminant	Soil Targets			Groundwater Targets		
	Human Health	Controlled Waters		Human Health	Controlled Waters	
		Surface Water	Groundwater		Surface Water	Groundwater
Unit	mg/kg			µg/l		
Arsenic	See C4SL	n/c	n/c	n/c	50	10
Cadmium	See C4SL	n/c	n/c	n/c	2.5#	5
Chromium III	910	n/c	n/c	n/c	4.7	50
Chromium VI	See C4SL	n/c	n/c	n/c	3.4	
Copper	2400	n/c	n/c	n/c	93.1#	2000
Mercury (elemental)	1.2	0.085	1.22	1.1	1	1
Nickel	180	n/c	n/c	n/c	14.8#	20
Lead	See C4SL	n/c	n/c	n/c	27.7#	10
Selenium	250	n/c	n/c	n/c	10	10
Zinc	3700	n/c	n/c	n/c	373#	3000
Benzene	See C4SL	0.064	0.0064	210	10	1
Toluene	130	1.33	12.6	230,000	74	700
Ethylbenzene	47	0.77	11.5	10,000	20	300
Xylene (para)	56	1.18	19.6	9,900	30	500
MTBE#	49	4.41	0.026	83,000	2600	15
Benzo(a)Pyrene	See C4SL	n/c	n/c	n/c	0.005 (0.00017)	0.01
Naphthalene	2.3	0.11	0.11	220	2	2
Aliphatic C5-C6	42	4.06	0.81	1,900	50	10
Aliphatic C6-C8	100	17.8	3.57	1,500	50	10
Aliphatic C8-C10	27	n/c	n/c	57	50	10
Aliphatic C10-C12	130(48)*	n/c	n/c	37	50	10
Aliphatic C12-C16	1100(8.48)**	n/c	n/c	n/c	50	10
Aliphatic C16-C35	65000 (8.48)**	n/c	n/c	n/c	50	10
Aromatic C8-C10	34	6.71	1.34	1,900	50	10
Aromatic C10-C12	74	10.6	2.13	6,800	50	10
Aromatic C12-C16	140	21.2	4.23	39,000	50	10
Aromatic C16-C21	260	n/c	n/c	n/c	50	10
Aromatic C21-C35	1100	n/c	n/c	n/c	50	10
Tetrachloroethene	See C4SL	0.24	0.24	34	10	10
Trichloroethene	See C4SL	0.13	0.13	5.7	10	10
cis-1,2 Dichloroethene		0.21	0.21	130	50	50
Vinyl Chloride	See C4SL	0.0012	0.0012	0.62	0.5	0.5

Notes:
f = Oral, dermal and inhalation exposure compared with oral HCV N/C = Not Calculated
* = S4UL exceeds vapour saturation limit (in brackets) ** = S4UL exceeds solubility saturation limit (in brackets)
n/c = not calculated. Under normal conditions contaminant exhibits low solubility /volatility, therefore risks from leaching and or vapour pathways are considered low.

To establish suitable compliance criteria for Surface Water review of basline groundwater quality in England and Wales was completed following research reported in Shand, P, Edmunds, W M, Lawrence, A R, Smedle y, P L, and Burke, S. 2007. The natural (baseline) quality of groundwater in England and Wales. British Geological Survey Research Report No. RR/07/06. Where compliance criteria was found below the 97.7 percentile of baseline value, the latter was adopted as GAC.

Soil Targets

Targets for Human Health have been taken from *S4ULs 'Suitable For Use Levels for Human Health Risk Assessment' – LQM and CIEH (2014)* derived using standard sandy loam soil with 1% SOM, except (#) = *EIC/AGS/CL:AIRE GAC 'Soil Generic Assessment Criteria' (2010)* . For sites where ground conditions differ significantly from sandy loam or site-specific SOM and pH are available, the generic human health targets may be revised.

Targets for Controlled waters have been derived using EA Remedial Targets Worksheet (v3.1) - using standard Sandy Loam ground conditions as described in Science Report SC050021/SR3, assuming no degradation for a 10m compliance distance with criteria of EQS or UKDWS for Surface Water and Groundwater respectively (see notes for GW targets).

Groundwater Targets
For Surface Water, targets have been taken as Freshwater EQS where available. For MTBE Predicted No Effect Concentration (European Risk Assessment Report, 2002) was used. For individual TPH fractions, in absence of UK EQS, a 5 times multiplier of UKDWS has been taken.

For Groundwater, targets have been taken as UKDWS where available. In the absence of UK targets internationally recognised criteria were adopted. For MTBE, WHO taste threshold has been adopted.

Targets for Human Health have been taken from *Society of Brownfield Risk Assessment (SoBRA) 'Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater' - Version 1.0, February 2017,* derived using sandy soil and 1%SOM. GAC were set up assuming source at 50cm below typical ground bearing slab of 15cm thickness. GAC were derived for vapour pathways only. For sites where ground conditions, or differ significantly from described above, the generic human health targets may be revised.

May-22

APPENDIX K

Cover Soils Checklist

ADVISORY NOTE

SOILS FOR USE IN COVER SYSTEMS

This note applies where there is a need for a control measure in the form of a defined thickness of clean soil to be used in gardens and soft landscaped areas in order to reduce risks from underlying contamination (a 'cover system'). Where a specific thickness has been presented, it is what EPS consider sufficient provided the soil forming the cover system is good quality, as it is assumed that over time this soil will become intermixed with the underlying soils and therefore needs to have the necessary 'dilution' effect. The aim being that an acceptable reduction in exposure to contamination is achieved, rather than absolute prevention.

These simple cover systems are designed in general accordance with the BRE 2004 guidance *'Cover Systems for Land Regeneration, Thickness of Cover Systems for Contaminated Land'*. In many cases guidance from a Local Planning Authority or NHBC/Approved Inspector may also apply and need to be taken into account. In most cases, to design the cover system EPS have to assume a certain quality of cover soils in advance. In these circumstances, we utilise what we consider to represent 'good quality soil' in that the soil could never be considered 'contaminated' but is also pragmatic and does not represent an unrealistic or unsustainable objective for much of the soils in the UK. In numerical terms, this standard typically equates to soil containing contaminants at around 25% of their adopted screening values in the risk assessment.

For the cover system itself, EPS would usually carry out a verification process of your site to demonstrate the control measure has been implemented as intended to satisfy all interested parties such as planning authorities, the NHBC and the future property owner. To document this process, EPS will prepare a Verification Report. If you wish for EPS to do this, we will need the following points confirmed relating to the soils preferably before they are installed in gardens.

If there are any queries, please contact EPS before purchasing any soil.

EPS Contact Details:

Tel: 01954 710666

Email: info@epstrategies.co.uk

Pre-Verification Cover System Checklist		Yes?
Soil Source	The soil must not be a waste. Has it been confirmed that the soil is not a waste and has never been deemed as such in the past?	
	Has the source of the soil been provided?	
	Have all the delivery notes confirming the source, volume and type of soil been provided for all that is to be used? Where suppliers such as British Sugar are used, the soils should be delivered direct to site (not via an intermediary depot).	
Soil Quality	The soils are free of invasive plant species such as Japanese Knotweed, and have not been sourced from an affected area?	
	Do the soils look clean and of a high quality? I.e. the soil must not have an odour or contain any visual evidence of contamination, including oils, asbestos, glass, plastic, rubble, metal, ash, sharp objects or tarmac/bitumen?	
	Testing to 'BS 3882:2015 *Specification for topsoil and requirements for use*' is preferable but generally not essential for public health regulation, provided you can confirm the soils comply with the above points, are suitable for their intended purpose and will provide an adequate growing medium?	
	Has the soil been chemically tested prior to it arriving at site? Any soil test results presented to EPS by a third party must be current and clearly relate to the soil used, i.e. the testing must generally be dated within 6 weeks of delivery. The quantity of testing will be dependent on how much confidence is generated in the quality of the material, as well any specific local regulatory requirements. If the soil is clean soil from an established source such as British Sugar, the testing they provide at source may be sufficient alone without further testing (by EPS). For other soils, EPS can advise on the likely testing frequencies but as a rule of thumb, anticipate at least one sample per average-sized plot. The testing would usually comprise the following: Heavy Metals, Poly Aromatic Hydrocarbons, Asbestos and Total Petroleum Hydrocarbons at an accredited lab. If adequate testing has not been completed, then EPS will need to test it from stockpiles prior to installation. Installing the soils into gardens without any testing data is not advised, as it may need to all be removed later.	
Cover Thickness	Are all excavations ready which will allow the necessary thickness of cover soils to be installed?	
	If yes, can you provide waste transfer documentation for any excavated soils?	

APPENDIX L

Method Statement for Encountering Unexpected Contamination

METHOD STATEMENT

ACTIONS TO BE TAKEN IN THE EVENT OF DISCOVERING UNEXPECTED CONTAMINATION DURING INTRUSIVE GROUNDWORKS

If at any point during intrusive groundworks at a site, evidence of unforeseen contamination is encountered in the form of significant noxious odours, discolouration, or instability within soils or sheen/ discolouration in groundwater, the following actions will be taken:

- Intrusive works in the immediate area of the impacted ground will be suspended and the continuation of work in other areas of the site will be considered within the context of the site specific health & safety plan.
- Environmental Protection Strategies Ltd (EPS) will be contacted and appraised of the situation so that arrangements can be made to characterise the impact and determine what action may be necessary in addition to the scheduled site works. Where possible / health & safety plan permits, digital photographs of the impacted ground will be taken and emailed to EPS at the address below to assist in the initial assessment
- It may well be necessary for EPS to attend site to undertake visual inspection and obtain samples for field and/or laboratory analysis, although the actions taken will be dependent on the nature of what is encountered
- In cases where EPS consider the unforeseen contamination likely to pose a significant risk of significant harm to adjacent site users or local environmental receptors, the local authority and the Environment Agency will be informed of the situation and the actions being taken
- Once appropriate action has been agreed and undertaken, a written summary will be produced by EPS for submission to the Local Authority, (and where relevant, the Environment Agency) in accordance with planning requirements. The submission will include details of work undertaken, analytical results of investigative and validation samples obtained and conclusions and recommendations for any further actions considered necessary
- Where regulatory bodies have been involved, site works should only recommence following their agreement and in all cases should only recommence when the site manager considers it safe to do so within the context of the site specific health & safety plan.

EPS Contact Details:

Marcus Bell	Associate Director	Tel: 0787 206 9979
Will Evans	Director	Tel: 0781 253 9655
Steve Bullock	Director	Tel: 0786 694 9221

Email: info@epstrategies.co.uk (Automatically forwarded to the above and office-based personnel)

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