

**GEO-ENVIRONMENTAL REPORT
TESCO CAR PARK
READING
BERKSHIRE
RG30 1AW**

Report Prepared For:

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APPENDIX E

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1.0 EXECUTIVE SUMMARY

Site Address	Tesco Car Park, Reading, Berkshire, RG30 1AW
Site Location	The site is located off Portman Road, Reading at postcode RG30 1AW and National Grid Reference 469660, 173961. The site can be found in an area of mixed residential and commercial land use.
Site Description	The site is roughly square in shape, measuring approximately 0.69ha with maximum dimensions of ~90m north to south by ~65m east to west. Access to the site is via Portman Road on the eastern boundary and then into Tesco car park. The site is currently comprised primarily of hardstanding being utilised as a car park. There is a raised mound with open grassland in the northern portion with associated trees on the northern boundary.
Proposed Use	It is understood that the proposed redevelopment of the site will comprise change of use for a residential development
History	Historical maps indicate that the site was open land from 1878. A small building was constructed on the SE border in 1933. In 1959 the small building was no longer present. In 1973 the Southern section of the site was converted into a car park with raised verges. The Tesco Superstore is present from 2002 and comprises the current site configuration.
Geology and Hydrology	- Bedrock geology: Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated) deemed a Principal Aquifer. - Superficial deposits: Alluvium formations (Clay, Silt, Sand and Gravel). Deemed a Secondary (A) Aquifer - The site does not lie within an Environment Agency source protection zone. However, there is a Potable Water Abstraction License within 250m of the site. - There is no surface water features recorded within 250m of the site. - The site lies within an Environment Agency Zone 2 Floodplain and has a Low Risk of Flooding.
Intrusive Field Results	- Tarmac: 0.00 – 0.10m bgl, Topsoil: 0.00 – 0.50m bgl, Made Ground: 0.10 – 2.60m bgl - Silt/Clay: 2.60 – 4.40m bgl - Sand & Gravel: 3.00 – 5.00m bgl - Groundwater was encountered between 2.20m to 3.10m of the soil strata.
Field Observations	No grossly contaminative, visual or olfactory evidence of contamination was encountered during the intrusive investigation.
Permeability	Borehole permeability testing returned a value of $>10^{-4}$ m/sec indicating good permeability within the encountered materials.
Ground gas	- Methane Gas Screening Value is characterised as Low (Max CH₄ = 69.6%). - Carbon dioxide Gas Screening Value is characterised as Low (Max CO₂ = 27.6%). - Special enhancements are likely to be required for the protection of future receptors from ground gas/vapours at this site.
Contamination Testing	Soil Exceedances: Asbestos (0.25%), PAHs and heavy metals (lead 5,600mg/kg) Groundwater Exceedances: Boron (3mg/l), Zinc (0.038mg/l), TPH: Aliphatic C8-10 (0.024mg/l), TPH: Aromatic C8-12 (0.025mg/l) - Unlikely to require large scale remedial works - Made ground likely to be classified as hazardous for offsite disposal.
Geotechnical Testing	- SPT N-values of 1 to 5 were observed within the silt and clay materials - The clay returned an extremely high plasticity with a modified plasticity index of 39% indicating a medium volume change potential (shrink/swell). - The clay returned 6 – 33 kPa undrained shear strength indicating Very Soft to Soft materials
Comment of Foundations and Drainage	- It is likely that a piled foundation solution will be most appropriate for this site, due to the shallow ground water and very soft to soft materials. - It is recommended that a specialist structural engineer be consulted for the final design of foundations. - Soakages to ground onsite are likely to be feasible within the encountered materials
Recommendations	- Further ground gas and groundwater monitoring - Installation of deep boreholes for pile design parameters - Preparation of a Remedial Strategy including a DQRA to manage the observed contamination

2.0 INTRODUCTION

WDE Consulting Limited (WDE) was appointed by Ridgepoint Homes Ltd (the Client) to conduct a Geo-Environmental Report at Tesco Car Park, Reading (Figure 1) to determine the ground conditions prior to the proposed redevelopment of the site for residential land use.

The works described in this report are subject to the WDE Service Constraints presented in Appendix A. This report was finalised in August 2019 and should be read in light of any subsequent changes in legislation, statutory requirements, statutory guidance, non-statutory guidance, relevant research and industry practices. This report is currently assigned only to the Client for their sole reliance.

2.1 RELEVANT GUIDANCE

WDE Consulting has duly taken account of the recommendation contained within relevant guidance documents and legislation during the preparation of this report, details of which are presented in Appendix B.

2.2 PROPOSED REDEVELOPMENT

It is understood that the proposed redevelopment of the site will comprise a residential development.

2.3 AIMS AND OBJECTIVES

2.3.1 Aims

The aims of this report are as follows:

1. To identify whether there is any contamination onsite which is likely to cause significant harm to human health, the environment or other sensitive receptors.
2. To identify the geotechnical properties of the ground to determine outline design parameters for foundations and drainage.

2.3.2 Objectives

In order to achieve the aims set out in Section 2.3.1 WDE proposes the following objectives:

1. Complete a Phase 1 desk based study of the site to ascertain information on the site geology, hydrology and surrounding land uses.
2. Complete walkover survey to identify any areas of potential contamination.
3. Investigate the nature of material that is present onsite through field investigations.
4. Investigate the nature and extent of any contamination onsite through field investigations.
5. Compare onsite soil and water concentrations with generic UK based assessment criteria.

6. Investigate the soakage capacity of the underlying geology.

2.4 WORK AND PROGRAMME

WDE Consulting's scope of work includes the following:

- Site walkover
- Intrusive site investigation
- Groundwater and ground gas monitoring
- Borehole permeability testing
- Laboratory analyses (contamination and geotechnical)
- Geo-Environmental Report

The programme of work that was undertaken comprises the following elements presented in Table 1.

Table 1 – Programme of Works

Item	Description	Start Date	Completion Date
1	Site Walkover	06/08/2019	06/08/2019
2	Intrusive investigation	06/08/2019	06/08/2019
3	Monitoring visits	09/08/2019	09/08/2019
4	Analytical Laboratory analysis	07/08/2019	19/08/2019
5	Geotechnical Laboratory analysis	07/08/2019	23/08/2019
6	Geo-Environmental Report	05/08/2019	27/08/2019

3.0 PHASE 1 DESK STUDY AND SITE WALKOVER

3.1 SOURCES OF INFORMATION

The sources of information that were used during the desk study included the following items:

- Site walkover (Photos presented in Appendix C)
- Environmental database information (Appendix D)

3.2 SITE LOCATION

The site is located off Portman Road, Reading at postcode RG30 1AW and National Grid Reference 469660, 173961 (Figure 1). The site can be found in an area of mixed residential and commercial land use. A summary of the site surroundings are as follows:

- Northern Boundary – Portman Road with commercial properties beyond
- Eastern Boundary – Commercial properties with Petrol Filling Station
- Southern Boundary – Car park with Tesco Superstore beyond
- Western Boundary – Mix of commercial and residential properties

3.3 SITE DESCRIPTION AND WALKOVER

The site is roughly square in shape, measuring approximately 0.69ha with maximum dimensions of ~90m north to south by ~65m east to west. Access to the site is via Portman Road on the eastern boundary and then into Tesco car park.

The site currently comprises of a raised mound with open grassland in the northern portion with associated trees on the northern boundary. The remainder of the site is comprised primarily of hard standing in good condition, which is currently being utilised as a car park for Tesco's customers. Additionally, there was a recycling area to the south of the raised mound on the hard standing.

Topography on site is level within the car park with a raised mound of 1.5m height in the northern section.

There was no evidence of any bulk tanks, surface staining or invasive plant species on site.

3.4 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

Published geological information indicates that the bedrock geology on site comprises the Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated) deemed a Principal Aquifer with superficial deposits of the Alluvium formations (Clay, Silt, Sand and Gravel).

The bedrock has been classified as a Principal Aquifer, while the superficial deposits are classified as Secondary (A) Aquifer. The site does not lie within a source protection zone.

The site lies within an Environment Agency Zone 2 Floodplain and has a Low Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating. There is no surface water features recorded within 250m of the site; however there is a Potable Water Abstraction within 250m of the site.

3.5 GEOLOGICAL HAZARD

3.5.1 Natural Hazards

The environmental database search has identified a number of potential hazards which are summarised in Table 2 below.

Table 2 – Natural Hazard Findings

Natural Hazard	Risk Rating
Shrink Swell	Very Low
Landslides	Very Low
Soluble Rocks	Very Low
Compressible Ground	Moderate
Collapsible Rocks	Very Low
Running Sand	Low

3.5.2 Radon

The property is not in a Radon Affected Area (less than 1% of properties are estimated to be at or above the Action Level). No radon protective measures are likely to be necessary as a result.

3.6 LAND USES ADJACENT TO SITE

3.6.1 Current Industrial Data

There are various current industrial land uses within 250m of the site boundaries, details of which are summarised below:

- Tesco Filling station (Fuel station) – 31m E
- Works (Unspecified) – 39m N
- Pumping station (Water) – 50m NW
- Elite interface LTD (Mechanical engineers) – 51m N
- Redland Healthcare (Mobility equipment) – 58m N
- Rodmatic LTD (Precision engineers) – 61m NW
- Cleaver Cars LTD (Vehicle repairs) – 83m NE

- Koltrane Lighting (Lighting) – 83 m NE
- Jaystock (Vehicle parts) – 90m NE
- Parsons Peebles (Electrical equipment) – 96m N
- Warehouse (storage) – 98m N
- Depot (storage) – 99m N
- Warehouse (storage) – 101m N
- Calcot Cars (Vehicle repairs) – 109m E
- Depot (Storage) – 113m N
- Car Bar Service Centre (Vehicle repair) – 124m E
- Motorrific (Vehicle repair) – 127m E
- V-Speed LTD (Vehicle repair) – 128m NE
- Pirtek LTD (Industrial repairs) – 151m NE
- Chimney - 153m E
- Self-Adhesive Supplies (Adhesives) – 179m E
- Works (Unspecified) – 191m NW
- NC Auto Services LTD (Vehicle repair) – 191m E
- C K the garage (Vehicle repair) - 200m E
- Eden Vauxhall Reading (New Vehicles) – 201m NW
- FDS (Industrial coatings) – 206m E
- Paul's Floors LTD (Construction services) – 213m E
- Thames Valley MOT's (Vehicle repairs) – 227m E
- TW flooring (Construction services) – 223m E

3.6.2 Current Electrical Features

There are eight recorded energy features within 250m of the site boundaries, details of which are summarised below:

- Electricity Substation – 17m W
- Electricity Substation – 76m NW
- Electricity Substation - 84m N
- Electricity Substation – 167m E
- Electricity Substation – 179m S
- Electricity Substation - 188m W
- Electricity Substation (2) – 208m S
- Electricity Substation – 240m S

3.6.3 Current Tank Database

There are three existing tanks recorded within 250m of the site boundaries.

- Tank (Generic) -154m E
- Tank (Generic) -155m E
- Tank (Generic) -160m E

3.6.4 Petrol and Fuel Site Database

There is one recorded petrol and fuel site operating within 250m of the site boundaries.

- Tesco Extra – 31m E

3.6.5 Historical Industrial Land Use

There are various potentially contaminative historical industrial sites recorded within 250m of the site boundaries, details of which are summarised below:

- Hospital (1974, 1982, 1991) – On site
- Unspecified works (1974, 1982, 1991) – 20m N
- Hospital (1898, 1920, 1932, 1938) – 91m S
- Railway sidings (1878, 1900, 1910, 1932, 1938, 1960) – 136m N
- Infectious diseases hospital (1898) – 146m SE
- Unspecified works (1974, 1982, 1991) – 155m W
- Railway sidings (1901, 1974, 1982, 1991) – 159m N
- Hospital (1898, 1910) – 181m S
- Unspecified workhouse (1898, 1910) – 192m W
- Railway building (1900, 1910, 1932, 1938, 1960, 1974, 1982, 1991) – 211m N

3.6.6 Historical Tank Database

There are two historical tanks recorded within 250m of the site boundaries, details of which are summarised below:

- Tanks (1973, 1993, 1996) – 145m E
- Unspecified Tanks (1976, 1990) – 158m E

3.6.7 Historical Energy Features

There are six recorded historical energy features within 250m of the site boundaries, details of which are summarised below:

- Electricity Substation (1973, 1990, 1996) – 20m W
- Electricity Substation (1973, 1993, 1996) – 32m S
- Electricity Substation (1976, 1993) – 82m N
- Electricity Substation (1968, 1971, 1973, 1976, 1993) – 152m E
- Electricity Substation (1986, 1988, 1990, 1993) – 186m W
- Electricity Substation (1973, 1976, 1993) – 250m SE

3.6.8 Historical Petrol and Fuel Site Database

There are no recorded historical petrol and fuel sites within 250m of the site boundaries.

3.6.9 Historical Garage and Motor Vehicle Repair Database

There is one recorded historical garages and motor vehicle repairs within 250m of the site boundaries, details of which are summarised below:

- Garage (1976) - 156m NW

3.6.10 Historical Military Sites

There are no recorded historical military sites within 250m of the site boundaries.

3.6.11 Potentially Infilled Land

There are no recorded areas of potentially infilled land within 250m of the site boundaries.

3.6.12 Records of Part A(2) and Part B Activities and Enforcements

There is one recorded Part A(2) and Part B Activities and Enforcements within 250m of the site boundaries, details of which are summarised in Table 3 below.

Table 3 – Records of Part A(2) and Part B Activities and Enforcements

Address	Process	Status	Permit Type	Distance & Direction
Tesco Stores LTD, Portman Road, Reading, Berkshire, RG30 1AH	Unloading of petrol at service station	Current Permit	Part B	31m E

3.6.13 Records of Licensed Discharge Consents

There are no recorded licensed discharge consents within 500m of the site boundaries.

3.6.14 Records of Radioactive substances

There is one recorded use of radioactive substances within 500m of the site, details of which are summarised in Table 4 below.

Table 4 - Records of Category 3 or 4 Radioactive Substances Authorisations

Address	Type	Status	Distance & Direction
Royal Berkshire NHS Foundation Trust, Battle Hospital, Oxford Road Reading, Berkshire	Keeping and use of radioactive materials	Revoked/Cancelled	328m S

3.6.15 Records of Planning Hazardous Substance Consents and Enforcements

There are no records of planning hazardous substance consents and enforcements within 250m of the site boundaries.

3.6.16 Environment Agency Recorded Pollution Incidents

There are two recorded pollution incidents within 250m of the site boundaries details of which are summarised in Table 5 below.

Table 5 - Records of Environment Agency Pollution Incidents

Date	Pollutant	Water Impact	Land Impact	Air Impact	Location
15.11.2002	Oils and Fuel	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	53m SE
29.01.2002	Household waste	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	159m E

3.6.17 Records of Hazardous Substance Consents and Enforcements

There is one record of Hazardous Substance Consents that has been identified within 500m of the site boundaries, details of which are summarised in Table 6 below:

Table 6 - Records of Planning Hazardous Substance Consents and Enforcements

Application date	Site	Status	Details	Location
30.08.2007	Oxhem Limited, 117 Loverock Road	Approved	Storage of up to 18 tonnes of chromic acid	448m NW

3.6.18 Historical/Current Landfill/Waste Sites

There are two recorded waste treatment, transfer or disposal sites that have been identified as operating within 500m of the site boundaries, details of which are summarised in Table 7 below:

Table 7 - Records of waste treatment, transfer or disposal sites

Site	NGR	Type of site	Location
Tesco Superstore, Portman Road	469653 173762	Recycling Centre	125m S
B, 75 Loverock Road	469254 174199	Waste Transfer Facility	398m NW

Additionally, there are two recorded Environment Agency licensed waste sites that have been identified as operating within 500m of the site boundaries, details of which are summarised in Table 8 below:

Table 8 - Records of Environment Agency/Natural Resources Wales licensed waste sites

Operator	Site	NGR	Type of site	Status	Location
Oakford UK Ltd	Part A, Unit B, 75, Loverock Road, Tilehurst	469718 174096	75kte HCl Waste TS + treatment	Expired	101m N
1 st Reynolds Skip Hire Ltd	Unit 3, 40 Wigmore Lane, Reading	469251 174315	Household, Commercial and Industrial waste	Issued	492m NW

3.6.19 Water Abstractions

There is two licensed potable water or surface water abstraction licences recorded within 250m of the site boundaries, details of which are summarised in Table 9 below:

Table 9 - Record of Abstraction Licences.

Point	Licence No:	Type	Details	Status	Location
Battle Hospital, Oxford road	28/39/23/0181	Potable water	Drinking, Cooking, Sanitary, Washing	Historical	103m E
Little John's Farm, Reading	28/39/23/0070	Groundwater	General Farming and Domestic	Active	249m NW

3.7 HISTORICAL LAND USE ON SITE AND IN SURROUNDING AREA

The historical ordnance survey maps indicate the following historical land uses on site and in the surrounding area and are summarised in Table 10.

Table 10 – Summary of Historical Land Use

Date	On Site	Off Site
1878- 1881	Site comprises open land marked 'Liable to floods'	Marshland present from 50m to 250m E. Battle House Hospital 25m SE with Fever hospital and infirmary labelled. Plant nursery labelled 250m SW. Railway track 200m N Little Johns Farm labelled ~ 450m N. 49 th Regimental District Barrack ~ 480m SW. Old gravel pit ~ 500m E
1897-1900	No significant change	Residential properties constructed ~ 250m SW
1913-1914	Road running through site from S to N.	Further residential properties constructed ~100m SW. Allotment gardens ~ 100m W. Workhouse labelled ~ 250m S. Battle House Hospital changes name to Battle Hospital.
1933-1934	Small building constructed on south east border possibly part of battle hospital.	Further residential construction ~ 90m SW. Tin works labelled ~ 450m E
1936-1938	Map incomplete	Residential properties constructed ~ 450m W
1959-1960	No significant change	Map Incomplete
1962	No significant change	Buildings constructed ~ 20m W. Battle hospital expansion ~ 100m SE
1968-1969	Small buildings no longer present.	Buildings 20m W gone. Builders yard ~ 120m W. Map partially incomplete
1973	Southern section of site converted into car park with raised verges. Northern section open land with trees. Road on longer marked.	Residential construction ~ 50m W. Commercial/industrial buildings ~ 50 S and SW. Electrical substation labelled ~ 10m SW and 20m SW. Map incomplete
1976-1979	No significant change	Works and depot labelled ~ 450m NW
1983	No significant change	Depot replaced by warehouse ~ 450m NW
1990-1991	No significant change	Works labelled ~ 200m N. Map incomplete.
1993-1994	No significant change	Series of warehouses, works and depots labelled ~ 50m N
2002 - 2014	The Tesco Superstore is present from 2002 and comprises the current site configuration.	Series of warehouses, works and depots no longer labelled ~ 50m N Battle Hospital replaced by superstore.

3.8 SENSITIVE LAND USE

The site lies within a Nitrate Vulnerable Zone, details of this are summarised below:

- Nitrate Vulnerable Zone (existing) – Onsite

3.9 POTENTIAL AREAS OF CONCERN

The potential areas of concern identified on the site walkover and desk study are outlined in Table 11 and show in Figure 2.

Table 11 – Summary of Potential Areas of Concern

Ref	Item	Comment	Picture
A	Offsite Tesco Filling station	Fuel station 31m E. Current B permit	Photo 1 (Appendix C)
B	Offsite Pollution incident (oils and fuels)	Category 3 (minor) – 53m SE	-
-	Potential imported made ground	Associated with existing buildings on site	-

4.0 PRELIMINARY RISK ASSESSMENT

4.1 IDENTIFICATION OF CRITICAL RECEPTORS

Based on future residential land use, the potentially sensitive receptors are considered to be:

- Residential Human Health: Future occupants onsite
- Residential Human Health: Current occupants offsite
- Groundwater: Principal Aquifer
- Groundwater: Groundwater Abstraction (Domestic)
- Onsite workers*

*The risks to onsite workers can be minimised by following appropriate health and safety guidance on site (i.e. wearing protective clothing and washing).

4.2 IDENTIFICATION OF CONTAMINANT SOURCES

The list of potential sources of contamination on site and in the surrounding area are summarised in Table 12

Table 12 – Identification of Potential Sources of Contamination

Type of Land Use	Potential Source	Potential Contaminants
Onsite source	Potential Made Ground	Hydrocarbons (TPH, BTEX, PAH), heavy metals, inorganics, ground gas, asbestos
Offsite source	Active and inactive industrial land uses, petrol filling station, electricity substations, historical made ground	Hydrocarbons (TPH, BTEX, PAH), heavy metals, inorganics, ground gas, PCBs

The potential contaminants of PCBs arising from electricity substations located offsite have been discounted as PCBs are not considered to be sufficiently mobile or soluble¹.

4.3 POTENTIAL PATHWAYS

4.3.1 Human Health Pathways

The potential human health exposure pathways, based on the Agency Soil Science Report SR3², for a residential receptor are indicated in Table 13

¹ Department of the Environment, 1996, Industry Profile: Engineering works. P.14 Sect 3.2.1

² Environment Agency, August 2008, Updated technical background to the CLEA model, Science Report - SC050021/SR3

Table 13 – Identification of Potentially Active Human Health Exposure Pathways

Potential Pathway	Active/ Inactive	Notes
Ingestion of fruit/home-grown produce	Active	Qualitative Risk Assessment required
Ingestion of soil and dusts	Active	Qualitative Risk Assessment required
Dermal contact with soils and dust	Active	Qualitative Risk Assessment required
Inhalation of dusts	Active	Qualitative Risk Assessment required
Inhalation of organic vapours (generated by shallow soils) in external areas or inside buildings	Active	Qualitative Risk Assessment required
Inhalation of organic vapours generated by dissolved phase groundwater migrating offsite to neighbouring residential properties	Active	Qualitative Risk Assessment required
Inhalation of organic vapours generated by dissolved phase groundwater migrating onto site from surrounding offsite sources	Active	Qualitative Risk Assessment required
Contaminants from site entering groundwater and migrating into public water abstraction borehole for human consumption	Active	Qualitative Risk Assessment required

4.3.2 Controlled Waters Pathways

The potentially active controlled waters migration pathways are indicated in Table 14

Table 14 – Identification of Potentially Active Controlled Water Pathways

Potential Pathway	Active/ Inactive	Notes
Impacted soils leaching to groundwater within Principal Aquifer	Active	Qualitative Risk Assessment required
Impacted soils leaching to groundwater and migration to surface water	Inactive	No surface water within 250m – no further assessment required
Impacted soils leaching to groundwater abstraction license for domestic use	Active	Qualitative Risk Assessment required

4.3.3 Ground Gas Pathways

The potentially active migration pathways for ground gas are indicated in Table 15

Table 15 – Identification of Potentially Active Ground Gas Pathways

Potential Pathway	Active/ Inactive	Notes
Ground gas generated from current/historical landfills within 250m radius	Inactive	No landfills within 250m – no further assessment required
Ground gas generated from current/historical buried land within 250m radius	Active	Qualitative Risk Assessment required

4.4 QUALITATIVE RISK ASSESSMENT

To assess the potential for risk, the Source → Pathway → Receptor relationships have been evaluated to determine whether there are potentially active pollutant linkages between sources and receptors. It is only when there is an active pollutant linkage, can there be a potential risk to a receptor from a source via a particular pathway. Each active pathway has been assigned a qualitative assessment as to the level of risk as explained in Table 16 as per R&D 6613 . A summary of the relevant pollutant linkages based on a source-pathway-receptors analysis is provided in

Table 17.

Table 16 – Qualitative Risk Classification Scheme

		CONSEQUENCE			
		Severe	Medium	Mild	Minor
PROBABILITY (Likelihood)	High likelihood	Very High Risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Table 17 – Summary of Potentially Active Source-Pathway-Target Assessment

Sources	Potential Pathway	Potential Receptor	Risk Classification
Onsite Sources	Dermal contact, ingestion, outdoor inhalation and indoor inhalation, home grown produce	Human Health (Onsite Residential)	Moderate Risk
Onsite Sources	Vapour inhalation from dissolved phase groundwater migrating from site to neighbouring properties	Human Health (Offsite Residential)	Low Risk
Onsite Sources	Impacted soil leaching to groundwater within Principal Aquifer	Controlled Waters (Groundwater)	Low Risk
Onsite Sources	Impacted soils leaching to groundwater and into licensed abstraction	Human Health (Offsite Residential)	Low Risk
Offsite Sources	Vapour inhalation from dissolved phase migration from offsite sources	Human Health (Onsite Residential)	Moderate Risk
Ground gas generation from offsite landfill/infilled land	Inhalation of organic vapours and ground gas	Human Health (Onsite Residential)	Moderate Risk

5.0 INVESTIGATION WORKS

5.1 FIELD METHODS USED

The locations of the intrusive investigation are presented on Figure 3 and comprised the following:

- 5no. boreholes (BH1 to BH5) were drilled using mechanically driven window sampling techniques (Photo 2) to a maximum depth of 5.00m bgl
- 5no. dynamic probes (DP1 to DP5) were drilled to a maximum depth of 5.00m bgl
- 3no. 50mm diameter monitoring wells (BH1, BH2 & BH3) were installed to a maximum depth of 5.00m bgl

All of the fieldwork was completed under the supervision of a WDE site engineer. Soil samples were transported in a cooler box to a UKAS accredited laboratory under chain of custody conditions. Logs for each of the intrusive locations are presented in Appendix E. Organic Vapour Concentrations (OVCs) were measured during fieldwork on recovered soil samples using a Photo-Ionisation Detector (PID).

The monitoring wells were installed for groundwater and ground gas monitoring using 50mm diameter well material, gas valves and lockable covers and were subsequently monitored for levels of oxygen, carbon dioxide and methane. The monitoring wells were then dipped with an interface meter to determine depth to product and water before groundwater samples were taken.

5.2 SPECIFICATION AND RATIONALE ADOPTED FOR INTRUSIVE LOCATIONS

The intrusive locations were positioned in accordance with the client and are indicated on Figure 2. Rationale used for the selection of locations is presented in Table 18.

Table 18 – Rationale for Exploratory Hole Locations

Area of Concern	Sample Location	Rationale	Use
A & B	BH1, BH2	Adjacent to eastern boundary with potential offsite sources	Contamination, Geotechnical, Groundwater and Ground Gas
-	BH3 (Photo 3)	Site coverage	Contamination, Geotechnical, Groundwater and Ground Gas
-	BH4, BH5	Site coverage	Contamination, Geotechnical
-	DP1 – DP5	Site coverage	Geotechnical

5.3 CONSTRAINTS OF THE INVESTIGATION

There were no constraints of the Intrusive locations during the site investigation.

5.4 FIELD RESULTS

5.4.1 Geology

A summary of the geology encountered during the intrusive investigation is summarised in Table 19 and is presented in full in logs for the boreholes within Appendix E.

Table 19 – Summary of Geology Proved Onsite

Description	Min – Max Depth (m bgl)	Average Depth (m bgl)
Tarmac	0.00 – 0.10	0.00 – 0.10
Topsoil	0.00 – 0.50	0.00 – 0.50
Made Ground	0.10 – 2.60	0.20 – 2.50
Organic clay*	2.50 – 3.40	2.50 – 3.40
Silt/Clay	2.60 – 4.40	2.60 – 3.60
Sand & Gravel	3.00 – 5.00	3.60 – 5.00+

*BH2 only.

Topsoil: Brown sandy, gravelly clay with rootlets was encountered in BH4 and BH5 and proved to a maximum depth of 0.50m bgl.

Made Ground: Dark brown gravelly clayey fill with red brick and glass fragments was encountered in all intrusive locations and proved to a maximum depth of 2.60m bgl.

Organic Clay: Soft black/brown sandy silty organic clay (Photo 4) was encountered at 2.50m to 3.40m in BH2 which had a slight organic smell.

Silt/Clay: Soft to firm brown silt and clay was encountered in BH1, BH2 and BH3 to a maximum depth of 4.40m bgl.

Sand & Gravel: Loose to dense yellow/brown fine to medium sand and gravel was encountered in BH1 to BH3. The gravels were medium to coarse subangular to subrounded at BH1 and were fine to medium, subangular to subrounded in BH3. The sand & gravel was proved to a maximum depth of 5.00m bgl.

5.4.2 Dynamic Probing Results

Dynamic probe testing was carried out in five locations (DP1 to DP5) to a maximum depth of 5.00m bgl. A copy of the dynamic probe logs are provided in Appendix E and are summarised in Table 20.

Table 20 – Summary of Dynamic Probe Results

DP Depth (m)	DP1 Calculated N Value	DP2 Calculated N Value	DP3 Calculated N Value	DP4 Calculated N Value	DP5 Calculated N Value
0.0-0.3	-	-	93	-	-
0.3-0.6	16	2	70	18	13
0.6-0.9	25	7	28	20	16
0.9-1.2	9	4	22	17	13
1.2-1.5	4	4	14	8	16
1.5-1.8	1	9	9	11	4
1.8-2.1	1	13	5	11	1
2.1-2.4	0	5	3	12	1
2.4-2.7	3	5	2	9	4
2.7-3.0	1	2	3	4	2
3.0-3.3	3	2	2	4	2
3.3-3.6	5	2	11	4	18
3.6-3.9	5	2	20	1	2
3.9-4.2	3	4	20	3	3
4.2-4.5	4	2	27	5	4
4.5-4.8	57	3	20	37	8
4.8-5.1	50	3	19	30	9

5.4.3 Groundwater Observations

Groundwater was encountered during the intrusive investigation between 2.20m to 3.10m of the soil strata.

5.4.4 Contamination Observations

No grossly contaminative, visual or olfactory evidence of contamination was encountered during the intrusive investigation, with all PID readings <2ppm(v).

5.4.5 Groundwater Monitoring Results

A summary of the groundwater monitoring data obtained during the monitoring visit on 9th August 2019 is presented in Table 21 and the locations of the monitoring wells are indicated on Figure 3.

Table 21 – Groundwater Field Monitoring Results

Location	Depth to Product (m bgl)	Depth to Water (m bgl)	Depth to Base (m bgl)	Comment
BH1	-	1.913	3.87	Dark black organic colour
BH2	-	2.516	4.67	Dark black organic colour
BH3	-	2.700	2.90	Dark black organic colour

5.4.6 Ground Gas Monitoring Results

A summary of the ground gas monitoring results obtained on 9th August 2019 is presented in Table 22 and presented in full in Appendix F.

Table 22 – Ground Gas Field Monitoring Results

Location	Date	O ₂ (%)	CO ₂ (%)	CH ₄ (%)	Atm (mbar)	Flow (l/hr)	CO (ppm)	H ₂ S (ppm)
BH1	09/08/19	10.9	11.2	0	997	0.0	1	0
BH2	09/08/19	0.0	27.6	69.6	997	+0.1	18	0
BH3	09/08/19	0.5	23.1	0	997	0.0	7	0

5.4.7 Groundwater Flow Direction

A site survey of three monitoring wells (BH1 to BH3) using a laser level combined with measured depth to water was used to calculate the groundwater flow direction (Figure 3), the results of which are presented in Table 23 and Table 24.

Table 23 – Groundwater Surveying Results

Monitoring Well	Temp Benchmark (mRTB)	TOC (mAOD)	DTW	GW Elevation (mRTB)
BH1	10.00	10.296	1.913	8.383
BH2	10.00	10.206	2.516	7.690
BH3	10.00	10.032	2.700	7.332

TOC – Top of casing. mRTB – meters relative to temporary benchmark

Table 24 – Groundwater Hydraulic Gradient and Flow Direction

Hydraulic Gradient	Flow Direction (degrees from N)	Groundwater Flow Direction
0.013	189.4	S/SW

5.4.8 Permeability Results

A summary of the borehole permeability testing undertaken on 9th August 2019 is presented in Table 25 and is presented in full in Appendix F.

Table 25 – Permeability Field Results

Location Reference	Water Added (Litres)	Drainage (m/sec)	Comments
BH2	~20	$>10^{-4}$	Good permeability

6.0 GROUNDGAS ASSESSMENT

6.1 PUBLISHED GUIDANCE

A ground gas assessment has been undertaken to assess risks associated with carbon dioxide and methane to new buildings and their users. The relevant guidance has been used to assess the risks posed by ground gas (Appendix B).

6.2 COMPARISON WITH SITE DATA

Taking a conservative viewpoint, the highest readings from the monitoring wells have been selected for the determination of the relevant gas screening values. If the readings were <0.01 a value of 0.01 is used in line with CIRIA 2007 guidelines. A summary of gas screening calculations and the associated characterisation of the site are identified below in Table 26.

Table 26 – Summary of Gas Screening Values

Gas	Screening Value	Characterisation Situation	Comment
Methane	$((69.6/100) \times 0.1) = 0.0696$	2 (Low)	Methane >1%
Carbon Dioxide	$((27.6/100) \times 0.1) = 0.0276$	2 (Low)	Carbon Dioxide >5%

Source materials for the generation of ground gas have been identified (Peaty Clay) during the ground investigation and a maximum characterisation value of 2 (Low) has been returned from the monitoring visit. It is therefore considered likely that there is requirement for additional ground gas monitoring prior to finalising the protective measures required.

7.0 CONTAMINATION ASSESSMENT

7.1 SOIL ANALYTICAL TEST RESULTS

The Generic Assessment Criteria (GACs) that have been adopted include published Land Quality Management (LQM) Suitable for Use Levels (S4UL) guideline values. As there is no current UK GAC for lead or cyanide, the Dutch Intervention Level (DIV) and Category 4 Screening Level (C4SL) will be adopted. In the absence of any UK published value, the detection limits have been adopted. The residential with home-grown produce GACs have been adopted based on the proposed land use. Table 27 is a comparison with the adopted GACs compared against the minimum and maximum site concentrations, with the full results presented in Appendix G.

Table 27 – Comparison of Soil Laboratory Results with Adopted Residential GACs (mg/kg)

Contaminant of Concern	No. of Samples	GAC with HG	GAC w/o HG	Source	Min	Max	Samples Exceeded with HG	Samples Exceeded w/o HG
Asbestos	5	DL	DL	WDE	No	Yes	BH2.1	BH2.1
Asbestos quantification	1	0.1%	0.1%	WDE	0.25	0.25	BH2.1	BH2.1
Total Phenols	5	280	750	LQM	BDL	BDL	0	0
Cyanide	5	50	50	DIV	0.50	9.3	0	0
Naphthalene	5	2.3	2.3	LQM	BDL	1.9	0	0
Acenaphthylene	5	170	2900	LQM	BDL	0.57	0	0
Acenaphthene	5	210	3000	LQM	BDL	1.0	0	0
Fluorene	5	170	2800	LQM	BDL	1.7	0	0
Phenanthrene	5	95	1300	LQM	BDL	3.1	0	0
Anthracene	5	2400	31000	LQM	BDL	0.89	0	0
Fluoranthene	5	280	1500	LQM	0.11	4.2	0	0
Pyrene	5	620	3700	LQM	0.17	4.3	0	0
Benzo(a)anthracene	5	7.2	11	LQM	BDL	2.6	0	0
Chrysene	5	15	30	LQM	BDL	4.5	0	0
Benzo(b)fluoranthene	5	2.6	3.8	LQM	BDL	2.8	BH5	0
Benzo(k)fluoranthene	5	77	110	LQM	BDL	1.1	0	0
Benzo(a)pyrene	5	2.2	3.2	LQM	BDL	2.2	0	0
Indeno(1,2,3-cd)pyrene	5	27	45	LQM	BDL	1.5	0	0
Dibenz(a,h)anthracene	5	0.24	0.31	LQM	BDL	0.59	BH5.1, BH2.1	BH2.1
Benzo(ghi)pyrene	5	320	360	LQM	BDL	1.6	0	0
Arsenic	5	37	40	LQM	19	110	BH1.2, BH2.1, BH3.1	BH1.2, BH2.1, BH3.1
Boron	5	290	11000	LQM	0.68	4.7	0	0
Cadmium	5	11	85	LQM	BDL	1.1	0	0
Chromium	5	910	910	LQM	22	36	0	0
Copper	5	2400	7100	LQM	25	260	0	0
Lead	5	210	330	C4SL	120	5600	BH1.2, BH2.1, BH3.1	BH1, BH2.1, BH3
Mercury	5	40	56	LQM	0.26	4.9	0	0
Nickel	5	180	180	LQM	20	130	0	0
Selenium	5	250	430	LQM	BDL	1.8	0	0
Zinc	5	3700	40000	LQM	100	1100	0	0
Benzene	5	0.087	0.38	LQM	BDL	BDL	0	0
Toluene	5	130	880	LQM	BDL	BDL	0	0
Ethylbenzene	5	47	83	LQM	BDL	BDL	0	0
Xylenes (sum)	5	56	79	LQM	BDL	BDL	0	0

MTBE	5	DL	0.001	WDE	BDL	BDL	0	0
TPH - Aliphatic >C5 - C6	5	42	42	LQM	BDL	BDL	0	0
TPH - Aliphatic >C6 - C8	5	100	100	LQM	BDL	BDL	0	0
TPH - Aliphatic >C8 - C10	5	27	27	LQM	BDL	BDL	0	0
TPH - Aliphatic >C10 - C12	5	130	130	LQM	BDL	BDL	0	0
TPH - Aliphatic >C12 - C16	5	1100	1100	LQM	BDL	2.2	0	0
TPH - Aliphatic >C16 - C21	5	65000	65000	LQM	BDL	44	0	0
TPH - Aliphatic >C21 - C35	5	65000	65000	LQM	BDL	210	0	0
TPH - Aromatic >C5 - C7	5	70	70	LQM	BDL	BDL	0	0
TPH - Aromatic >C7 - C8	5	130	130	LQM	BDL	BDL	0	0
TPH - Aromatic >C8 - C10	5	34	34	LQM	BDL	BDL	0	0
TPH - Aromatic >C10 - C12	5	74	74	LQM	BDL	BDL	0	0
TPH - Aromatic >C12 - C16	5	140	140	LQM	BDL	3.6	0	0
TPH - Aromatic >C16 - C21	5	260	260	LQM	BDL	46	0	0
TPH - Aromatic >C21 - C35	5	1100	1100	LQM	BDL	340	0	0
Sum VOCs	5	DL	DL	WDE	BDL	BDL	0	0

7.2 GROUNDWATER ANALYTICAL TEST RESULTS

In the UK there are two published Environmental Assessment Levels (EALs) available for comparison with groundwater, the Water Framework Directive³ and the Water Supply Regulations⁴, apart from TPH fractions, Ethylbenzene and Xylenes where the DWS and EQS values has been adopted respectively. Detection Limit (DL) is used where a standard has not been derived. A comparison of the site concentrations with the appropriate target value is presented in Table 28 below.

Table 28 – Comparison of Groundwater Results with Adopted Target Values (mg/l)

Contaminant of Concern	No. of Samples	EAL	Source	Min	Max	No. Samples > EAL	Samples Exceeded
Total Phenols	3	0.0077	UK WFD	BDL	BDL	0	-
Total Cyanide	3	0.05	UK WSR	BDL	BDL	0	-
Naphthalene	3	0.002	UK WFD	BDL	BDL	0	-
Acenaphthylene	3	0.0001	UK WSR	BDL	BDL	0	-
Acenaphthene	3	0.0001	UK WSR	BDL	BDL	0	-
Fluorene	3	0.0001	UK WSR	BDL	BDL	0	-
Phenanthrene	3	0.0001	UK WSR	BDL	BDL	0	-
Anthracene	3	0.0001	UK WSR	BDL	BDL	0	-
Fluoranthene	3	0.0001	UK WSR	BDL	BDL	0	-
Pyrene	3	0.0001	UK WSR	BDL	BDL	0	-
Benzo(a)anthracene	3	0.0001	UK WSR	BDL	BDL	0	-
Chrysene	3	0.0001	UK WSR	BDL	BDL	0	-
Benzo(b)fluoranthene	3	0.0001	UK WSR	BDL	BDL	0	-
Benzo(k)fluoranthene	3	0.0001	UK WSR	BDL	BDL	0	-
Benzo(a)pyrene	3	0.00001	UK WSR	BDL	BDL	0	-
Indeno(1,2,3-cd)pyrene	3	0.0001	UK WSR	BDL	BDL	0	-
Dibenz(a,h)anthracene	3	0.0001	UK WSR	BDL	BDL	0	-
Benzo(ghi)perylene	3	0.0001	UK WSR	BDL	BDL	0	-

³ The Water Framework Directive (Standards and Classifications) Directions (England and Wales) 2015

⁴ The Water Supply (Water Quality) Regulations 2018

Arsenic	3	0.01	UK WSR	0.0034	0.022	0	-
Boron	3	1	UK WSR	0.61	3	2	BH2 & BH3
Cadmium	3	0.005	UK WSR	BDL	BDL	0	-
Chromium	3	0.05	UK WSR	0.0016	0.0057	0	-
Copper	3	2	UK WSR	BDL	BDL	0	-
Lead	3	0.01	UK WSR	BDL	BDL	0	-
Mercury	3	0.001	UK WSR	BDL	BDL	0	-
Nickel	3	0.02	UK WSR	BDL	0.0036	0	-
Selenium	3	0.01	UK WSR	BDL	0.0046	0	-
Zinc*	3	0.0123	UK WFD	0.0022	0.038	1	BH3
Benzene	3	0.001	UK WSR	BDL	BDL	0	-
Toluene	3	0.074	UK WFD	BDL	BDL	0	-
Ethylbenzene	3	0.02	UK EQS	BDL	BDL	0	-
Xylenes (sum)	3	0.03	UK EQS	BDL	BDL	0	-
MTBE	3	DL	WDE	BDL	BDL	0	-
TPH - Aliphatic (>C5- C6)	3	0.01	UK DWS	BDL	BDL	0	-
TPH - Aliphatic (>C6- C8)	3	0.01	UK DWS	BDL	BDL	0	-
TPH - Aliphatic (>C8- C10)	3	0.01	UK DWS	BDL	0.024	0	BH2
TPH - Aliphatic (>C10 - C12)	3	0.01	UK DWS	BDL	0.0047	0	-
TPH - Aliphatic (>C12 - C16)	3	0.01	UK DWS	BDL	BDL	0	-
TPH - Aliphatic (>C16 - C21)	3	0.01	UK DWS	BDL	BDL	0	-
TPH - Aliphatic (>C21 - C34)	3	0.01	UK DWS	BDL	BDL	0	-
TPH - Aromatic (>C5 - C7)	3	0.01	UK DWS	BDL	BDL	0	-
TPH - Aromatic (>C7 - C8)	3	0.01	UK DWS	BDL	BDL	0	-
TPH - Aromatic (>C8 -10)	3	0.01	UK DWS	BDL	0.014	0	BH2
TPH - Aromatic (>C10 - C12)	3	0.01	UK DWS	BDL	0.011	0	BH2
TPH - Aromatic (>C12 - C16)	3	0.01	UK DWS	BDL	BDL	0	-
TPH - Aromatic (>C16 - C21)	3	0.01	UK DWS	BDL	BDL	0	-
TPH - Aromatic (>C21 - C35)	3	0.01	UK DWS	BDL	BDL	0	-
Sum VOCs	3	0.01	WDE	BDL	BDL	0	-

*includes ambient background concentration

7.3 COMPARISON WITH VAPOUR INHALATION RISKS FROM GROUNDWATER SOBRA VALUES

The GACs that have been adopted are based on the methodology developed by SoBRA⁵ for assessing chronic risk to human health via inhalation of groundwater derived hydrocarbon vapours in a manner compliant with current UK guidance. These published values are available for residential and commercial land use scenarios. As it is proposed to reuse the subject site for residential purposes, residential GACs have been adopted for assessment. A comparison of the site concentrations with the appropriate vapour inhalation GACs for a residential receptor is presented in Table 29.

⁵SoBRA. Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater, V1.0. February 2017.

Table 29 - Comparison of Groundwater Laboratory Results with Vapour Inhalation GACs (mg/l)

Contaminant of Concern	No. of Samples	GAC	Source	Min	Max	No. Samples >GAC	Samples Exceeded
Naphthalene	3	0.22	SoBRA	BDL	BDL	0	
Benzene	3	0.21	SoBRA	BDL	BDL	0	
Toluene	3	230	SoBRA	BDL	BDL	0	
Ethylbenzene	3	10	SoBRA	BDL	BDL	0	
Xylenes (sum)	3	30.4	SoBRA	BDL	BDL	0	
TPH - Aliphatic (>C5- C6)	3	1.9	SoBRA	BDL	BDL	0	
TPH - Aliphatic (>C6- C8)	3	1.5	SoBRA	BDL	BDL	0	
TPH - Aliphatic (>C8- C10)	3	0.057	SoBRA	BDL	0.024	0	
TPH - Aliphatic (>C10 - C12)	3	0.037	SoBRA	BDL	0.0047	0	
TPH - Aromatic (>C5 – C7)	3	210	SoBRA	BDL	BDL	0	
TPH - Aromatic (>C7 – C8)	3	220	SoBRA	BDL	BDL	0	
TPH - Aromatic (>C8 –10)	3	1.9	SoBRA	BDL	0.014	0	
TPH - Aromatic (>C10 – C12)	3	6.8	SoBRA	BDL	0.011	0	
TPH - Aromatic (>C12 – C16)	3	39	SoBRA	BDL	BDL	0	

7.4 COMPARISON WITH WATER UK THRESHOLD CONCENTRATION VALUES

The soil laboratory results from the upper 1.35m have been compared to the UKWIR thresholds^{22 23} for the selection of water supply pipes in Table 30 with full results presented in Appendix G.

Table 30 – Comparison of Soil Laboratory Results from the upper 1.35m with UKWIR (mg/kg)

Contaminant of Concern	No. of Samples	Threshold	Source	Min	Max	No. Samples > GAC	Samples Exceeded
Total VOCs	3	0.5	UKWIR	BDL	BDL	-	
Total BTEX & MTBE	3	0.1	UKWIR	BDL	BDL	-	
Total SVOCs	-	2	UKWIR	-	-	-	
EC5-EC10 Aliphatics	3	2	UKWIR	BDL	BDL	-	
EC10-EC16 Aliphatics	3	10	UKWIR	BDL	2.2	-	
EC16-EC40 Aliphatics	3	500	UKWIR	BDL	254	-	
EC5-EC10 Aromatics	3	2	UKWIR	BDL	BDL	-	
EC10-EC16 Aromatics	3	10	UKWIR	BDL	1.6	-	
EC16-EC40 Aromatics	3	500	UKWIR	BDL	380	-	
Phenols	3	2	UKWIR	BDL	BDL	-	
Cresols chlorinated phenols	-	2	UKWIR	-	-	-	
Corrosive	3	Various	UKWIR	7.4	10.4	-	

There have been no exceedances of the UKWIR threshold values and therefore it is unlikely that additional mitigation measures in the form of protective pipe will be necessary. Further consultation should be sought with the water supply company.

7.5 WASTE CLASSIFICATION

A Waste Checker and WAC testing has been performed on the encountered materials with the full results presented in Appendix G. Table 31 provides an overview of the likely waste classification and WAC designation for onsite materials.

Table 31 – Likely Waste Classification of Onsite Materials

Material	Likely Waste Classification	Likely WAC Landfill Type
Made ground (northern mound)	Non-hazardous	Inert
Made ground	Hazardous	Hazardous
Natural Materials	Inert	-

7.6 CONCLUSIONS ON CONTAMINATION

The site investigation has revealed some exceedances within the soil and groundwater samples including:

- **Soils:** Asbestos (0.25%), PAHs and heavy metals (lead 5,600mg/kg)
- **Groundwater:** Boron (3mg/l), Zinc (0.038mg/l), TPH: Aliphatic C8-10 (0.024mg/l), TPH: Aromatic C8-12 (0.025mg/l)

The exceedances within the soil are non-volatile and can likely be managed via pathway control measures. The exceedances within the groundwater are moderate and will require further assessment via a DQRA, with remedial action unlikely to be required. It is therefore recommended that a Remedial Strategy is completed that will include a DQRA for the groundwater and details of the pathway control measures.

A revised *source-pathway-receptor* assessment is presented in Table 32.

Table 32 – Summary of Revised Source-Pathway-Receptor Assessment

Sources	Potential Pathway	Potential Receptor	Risk Classification
Onsite Sources	Dermal contact, ingestion, outdoor inhalation and indoor inhalation, home grown produce	Human Health (Onsite Residential)	Moderate Risk
Onsite Sources	Vapour inhalation from dissolved phase groundwater migrating from site to neighbouring properties	Human Health (Offsite Residential)	Low Risk
Onsite Sources	Impacted soil leaching to groundwater within Principal Aquifer	Controlled Waters (Groundwater)	Low/Moderate Risk
Onsite Sources	Impacted soils leaching to groundwater and into licensed abstraction	Human Health (Offsite Residential)	Low Risk
Offsite Sources	Vapour inhalation from dissolved phase migration from offsite sources	Human Health (Onsite Residential)	Low Risk
Ground gas generation from offsite landfill/infilled land	Inhalation of organic vapours and ground gas	Human Health (Onsite Residential)	Moderate Risk

8.0 GEOTECHNICAL ASSESSMENT

8.1 GEOTECHNICAL FIELD TESTING

An appraisal of the geotechnical field parameters of the encountered strata are summarised below in Table 33 and are presented in full in Appendix H.

Table 33 – Geotechnical Field Parameters

Description	Av Depth (m)	SPT N Value	Calculated CBR %	Cu (kPa)	Q alt (kPa)	Inferred Strength of Material
Organic Clay*	2.50 – 3.40	2 – 5	0 – 1	10.3 – 25.7	12.9 – 37.8	Soft to firm
Silt/Clay	2.60 – 3.60	1 – 5	0 – 3	5.1 – 25.7	4.5 – 37.8	Soft to firm
Sand & Gravel	3.60 – 5.00	2 – 57	0 – 76	10.3 – 293	12.9 – 358.6	Very Loose to Very Dense

*BH2 only.

The silt and clay materials were found to be soft to firm whilst the sand & gravels were found to very loose to very dense and generally became stiffer with depth.

8.2 GEOTECHNICAL TESTING

Moisture content, Atterberg Limits, PSD and Triaxial testing was carried out on representative soil samples collected during the intrusive investigation. A copy of the test results are presented in Appendix H and are summarised in Table 34.

Table 34 – Summary of Geotechnical Properties

Description	Av Depth (m)	Moisture Content (%)	Modified Plasticity Index (%)	Undrained Shear Strength, cu (kPa)	PSDs (% dry mass)			
					Gravel	Sand	Silt	Clay
Organic Clay*	2.50 – 3.40	114	39.7	-	12	45	30	12
Silt/Clay	2.60 – 3.60	18 – 54	8 – 10	6 – 33	-	-	-	-
Sand & Gravel	3.60 – 5.00	15	-	-	25	62	8	5

Results from the testing of the clay materials indicate that there is Extremely High plasticity present. The modified plasticity index of the organic clay in BH2 (39.7%) indicates that there is Medium Volume Change Potential (shrink/swell). Elsewhere the modified plasticity index (8 – 10%) of the silt and clay materials indicates that there is a Low Volume Change Potential (shrink/swell).

The triaxial testing indicates that the clay materials are Very Soft to Soft between 2.50m and 4.30m bgl.

8.3 PRELIMINARY CBR FOR ROAD/PAVING DESIGN

CBR values obtained from the dynamic probes within the upper 2m of the proposed development can be calculated using the following equation:

$$\text{Log CBR} = 2.628 - 1.273 \log (\text{DCP})^{11}$$

Table 35 shows a summary of the CBR values. Further details are presented in Appendix H.

Table 35 – Summary of CBR Values (%) within upper 2m

Sample Ref	CBR Value (%)
DP1	0 – 29
DP2	0 – 7
DP3	3 – 112
DP4	3 – 17
DP5	0 – 14

A CBR value of <2% is recommended for initial design of pavements founded into the upper 2m of materials encountered onsite. Enhanced values are likely to be achievable following suitable compaction.

8.4 CONCRETE DESIGN PARAMETERS

A summary of the sulphate, pH and corresponding BRE concrete in aggressive ground parameters⁶ for concrete design are presented in Table 36.

Table 36 – Summary of BRE Concrete in Aggressive Ground Parameters

Location	Concrete Parameters
pH (pH Units)	7.4 – 10.4
Water Soluble Sulphate as (2:1 Leachate Equivalent) (mg/l)	1100
ACEC Classification	AC-2
Design Sulphate Class	DS-2

Concentrations have been analysed in line with BRE Special Digest 1: 2005⁷

8.5 EXCAVATIONS, GROUNDWATER CONTROL AND SERVICES

Groundwater was encountered within the upper 2m during the intrusive investigation. Therefore, there is potential for special requirements needed for dewatering and excavation walls are likely to need additional support.

⁶ BRE 2005. Concrete in Aggressive Ground. Special Digest 1.

⁷ Building Research Establishment (BRE) Special Digest 1: 2005 Third Edition, Concrete in aggressive Ground"

8.6 PRELIMINARY FLOOR DESIGN

The ground gas risk for the site has been characterised as a Low Risk. There is currently likely to be a requirement for the enhancement of the membrane to 2,000g specification. It is recommended that a block and beam suspended floor construction is adopted to accommodate potential heave within the clay materials.

8.7 SOAKAGE POTENTIAL

Indicative borehole permeability tests ($>10^{-4}$) suggest soakages to ground onsite are likely to be feasible within the encountered materials: This is likely to require BRE365 soakage testing prior to finalising the drainage design parameters.

8.8 PRELIMINARY FOUNDATION DESIGN

It is understood that the proposed redevelopment consists of construction of residential units. Due to the encountered strength of the natural silt and clay materials within the upper 3m (very soft to soft) and the relatively high water table, a piled foundation solution is likely to be most appropriate. Further investigation is required to determine the piled foundation design criteria.

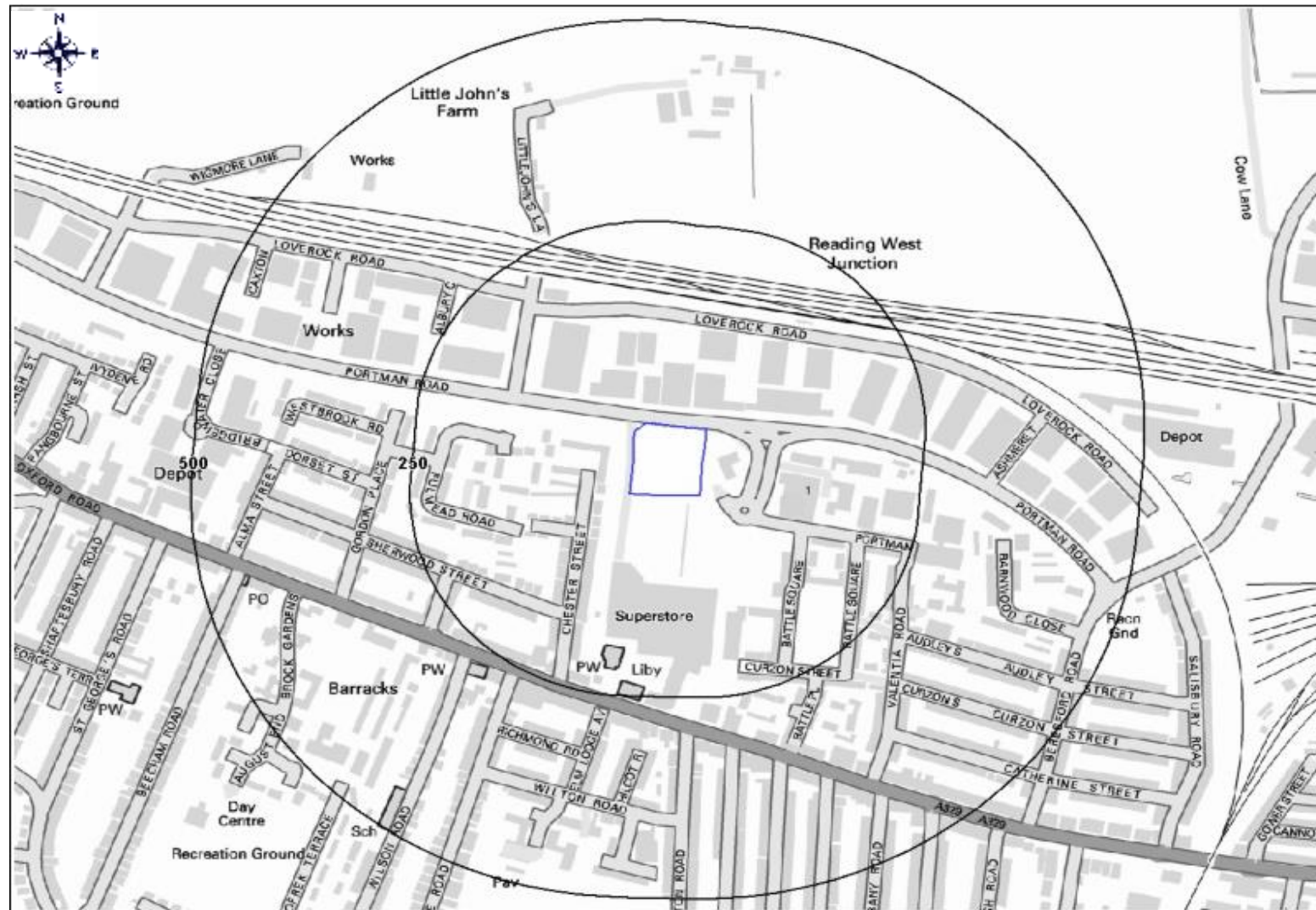
It is recommended that a structural engineer is consulted for the final design of the foundations.

9.0 RECOMMENDATIONS

WDE recommends that the following actions are undertaken as part of the redevelopment programme:

- Further ground gas and groundwater monitoring
- Installation of deep boreholes to inform the pile design criteria
- Preparation of a Remedial Strategy including a DQRA to manage the observed contamination onsite

FIGURES



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Plan Provided by Client. Locations approximate



Borehole with monitoring well



Borehole

Plan Provided by Client. Locations approximate

APPENDIX A

Limitations and exceptions of assessment

LIMITATIONS AND EXCEPTIONS OF ASSESSMENT

Ridgepoint Homes Ltd (the client) has requested that a Geo-Environmental Report be performed for Tesco Car Park
Reading
Berkshire

RG30 1AW to provide information to permit formulation of an opinion as to the potential for risks to human health & controlled waters posed by identified substances of concern.

The Geo Environmental Assessment was conducted and this report has been prepared for the sole use and reliance of the Client. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WDE Consulting Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill.

The findings and opinions conveyed via this Geo-Environmental Report are based on information obtained from a variety of sources as detailed within this report, and which WDE Consulting Limited believes are reliable. Nevertheless, WDE Consulting limited cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

The report represents the findings and opinions of experienced geo-environmental consultants. WDE Consulting Limited does not provide legal advice and the advice of lawyers may also be required.

The Client is advised that the conditions stated within reports supplied to WDE Consulting limited are subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance and may subsequently have become observable.

It is possible that WDE Consulting's research, while fully appropriate for an Geo-Environmental Report, failed to indicate the existence of important information sources. Assuming such sources actually exist, their information could not have been considered in the formulation of WDE Consulting's findings and opinions.

Certain indicators or evidence of hazardous substances may have been outside the very limited portion of the subsurface investigated or monitored, latent at the time of this work or only partially intercepted by the works and thus their full significance could not have been appreciated. Groundwater levels are particularly susceptible to variations due to seasonal or other effects. Any comments on groundwater conditions are based on observations and analyses made by third parties at the time the site work was carried out. Accordingly, it is possible that WDE Consulting's work, whilst fully appropriate for an Geo-Environmental Report failed to indicate the presence or significance of hazardous substances. Assuming such materials present a hazard, their presence could not have been considered in the formulation of WDE Consulting's findings and opinions. The subsurface geological profiles and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

Any interpretation of the results of the Geo-Environmental Report have been based on the proposed site usage and the findings are not valid should the proposed land use and/or the regulatory regime/guidance change. Where interpretation is based on public domain guidance/protocols/models/software/code, WDE Consulting Limited is not liable for errors in the guidance/protocols/models/software/code.

WDE Consulting Limited believes that providing information about limitations is essential to help the client identify and thereby manage their risks. These risks can be mitigated, but they cannot be eliminated, through additional research. WDE Consulting Limited will on request, advise the client of the additional research opportunities available, their impact on risk, and their cost.

In preparing this report, it has been assumed that all past and present occupants have provided all relevant and other information, especially relating to known or potential hazards. This report is not required to identify insufficiencies or mistakes in the information provided by the user/owner or from any other source, but has sought to compensate for these where obvious in the light of other information.

The work is also subject to WDE Consulting's standard terms and conditions.

APPENDIX B

Relevant Guidance and Legislation

WDE Consulting has duly taken account of the recommendation contained within relevant guidance documents and legislation during the preparation of this report.

CONTAMINATION

Part IIa of the Environmental Protection Act 1990 defined contamination in relation to continued land use and introduced the “polluter pays” principal. The Groundwater Regulations 1998 defined List 1 and List 2 substances and the procedures for preventing them from entering groundwater. The Water Resources Act of 1991 introduced the term “controlled waters” and gave powers to the Environment Agency to require remediation where there was pollution of controlled waters.

The National Planning Policy Framework⁸ requires the following:

- The site is made suitable for its intended use, taking account of all ground conditions arising from natural and former activities, pollution arising from previous uses and proposals for mitigation including land remediation.
- After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.
- Adequate site information, prepared by a competent person, is presented.

The methodology adopted for this report follows the Model Procedures for the Management of Land Contamination CLR-11 produced by DEFRA and the Agency⁹. The CLR-11 process provides a reasoned and structured process to identify potential risk issues and, where necessary, provide a way forward to develop a robust risk management strategy to address potentially unacceptable risks in an appropriate manner. Contained within the CLR-11 Framework are the following stages:

1. Stage 1 Preliminary Risk Assessment (Conceptual Model)
2. Collection of appropriate Site Information
3. Stage 2 Comparison with Generic Criteria
4. Stage 3 Detailed Quantitative Risk Assessment
5. Preparation of Remedial Options Appraisal
6. Verification Plan

British Standards has issued guidance for the Investigation of Potentially Contaminated Sites¹⁰ and for undertaking Site Investigations¹¹ which have duly been considered. An update to the potential human health exposure pathways is provided in the Environment Agency Soil Science Report SR3¹².

⁸ Department of Communities and Local Government. March 2012

⁹ Environment Agency. 2004. Model Procedures for the Management of Land Contamination. Contaminated Land Report 11

¹⁰ British Standards 2011. Investigation of Potentially Contaminated Sites-Codes of Practice. BS10175:2011

¹¹ British Standards. 2015. Code of Practice for Site Investigations. BS5930

¹² Environment Agency, August 2008, Updated technical background to the CLEA model, Science Report - SC050021/SR3

In 2008 the Environment Agency and the National House-Building Council (NHBC), Chartered Institute of Environmental Health (CIEH) released a joint publication for the Safe Development of Housing on Land Affected by Contamination¹³. Guidance is provided in the CLR Report No 4 on sampling strategies for contaminated land¹⁴.

WASTE MANAGEMENT

The EU Waste Framework Directive 2008 presents the legislative framework for the collection, transport, recovery and disposal of waste. This framework provides a five step hierarchical plan for managing waste comprising prevention, preparing for re-use, recycling, recovery and disposal, which have been made into UK law via the UK Waste Regulations 2011. This requires all businesses/organisations that either produces or handles waste to either prevent waste or to apply the waste hierarchy for the transfer of waste. The Environment Protection (Duty of Care) Regulations 1991 require that transfer notes are used to identify the type of waste, volume, source and intended destination along with the details of the licensed carrier.

The Agency have published guidance on the classification of Hazardous Waste¹⁵, which defines how man-made materials are classified as being hazardous by exceeding at least one of the fifteen hazardous properties (H1 to H15). Man Made materials can either be absolute hazardous, absolute non-hazardous or mirror and if mirror then an assessment needs to be made as to whether the materials poses any of the hazardous properties before classifying the materials as being either hazardous or non-hazardous. The Agency have also published guidance on the Waste Acceptance at Landfills¹⁶. Landfills are classified as to whether they can accept hazardous, non-hazardous or inert materials. Waste Acceptance Criteria (WAC) thresholds have been set to determine the class of landfill that can accept the materials. Disposal of hazardous materials requires pre-treatment. WAC limits are not to be used for determining whether waste is hazardous.

The CL:AIRE CoP of the Definition of Waste¹⁷ was developed to provide clarity on when the reuse of site won materials will cease to be the waste. It requires the development of Material Management Plan (MMP) that is specific to the site and the intended reuse of materials. The MMP will need to be based on a site specific Remedial Strategy/Design Statement that will demonstrate that the reuse of the site won materials will not pose an unacceptable risk to sensitive receptors. There will then need to be a requirement for verification that the proposed reuse has been carried out as was planned.

¹³ Environment Agency. 2008. Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D 66

¹⁴ DOE. 1994. Sampling Strategies for Contaminated Land. CLR Report No 4

¹⁵ Environment Agency. 2013. Interpretation of the Definition and Classification of Hazardous Waste. Technical Guidance WM2

¹⁶ Environment Agency. 2010 Waste Acceptance at Landfills. Version 1.

¹⁷ CL:AIRE 2001. The Definition of Waste: Development Industry Code of Practice. Version 2.

GROUND GAS

The following relevant guidance will be used to assess the risks posed by ground gas:

- CIRIA Assessing risks posed by hazardous ground gases to buildings¹⁸
- NHBC, Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present¹⁹
- The Building Regulations Site Preparation and resistance to contaminants and moisture. ²⁰
- British Standard. Guidance on Investigations for Ground Gas²¹

The 2007 CIRIA guidance calculates a gas screening value to identify the protective measures required, as shown in Table 37

Table 37 – Summary of CIRIA 2007 Guidance

Characterisation Situation	Risk Classification	Gas Screening Value	Typical Factors	Protective Measure
1	Very Low	<0.07	Methane <1% or carbon dioxide <5%; otherwise increase to Situation 2	No special precautions (see recommendation)
2	Low	<0.7	Air Flow rate <70l/hr; otherwise increase to Situation 3	Block and beam with 2,000g, Cast in situ with 1,200g. All joints and penetrations sealed
3	Moderate	<3.5	-	As above but with gas resistant membranes and passively ventilated or positive pressured sub-floor void
4	Moderate to High	<15	QRA recommended	As above but with oversite capping, in-ground venting layer and in ground wells or barriers
5 – 6	High to Very High	<70		Not suitable unless gas regime is reduced first and QRA completed

UK WATER SUPPLY PIPES

The following guidance has been followed for the selection of water supply pipes:

- UKWIR Guidance for the selection of Water Supply Pipes²²
- Water UK Contaminated Land Assessment Guidance²³

These mainly apply to brownfield sites, although may apply to greenfield sites should the preliminary risk assessment identify there is a potential for contamination to be present.

¹⁸ CIRIA 2007. Assessing Risks Posed by Hazardous Ground Gases to Buildings. C665

¹⁹ NHBC 2007. Guidance on Evaluation of Development Proposals on Sites where methane and carbon dioxide are present

²⁰ Building Regulations 2004. Approved Document C, Site Preparation and resistance to contaminants and moisture.

²¹ British Standards 2013. Guidance on Investigation for Ground Gas. BS8576. 2013

²² UK Water Industry Research 2011. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. 10/WM/03/21

²³ Water UK 2014. Contaminated Land Assessment Guidance.

SOAKAGE TESTING AND DESIGN

The following guidance has been followed during the soakage testing:

- Falling Head Tests in boreholes – BS593011

APPENDIX C

Site Photos

Photo 1: Looking east from site at adjacent petrol filling station highlighted in areas of concern.



Photo 2: BH1 on site with window sampling rig



Photo 3: BH3 towards the SW boundary of the site.



Photo 4: Showing the soft black/brown organic clay.



APPENDIX D

Environmental Database Information



WDE Consulting Ltd
62a, WESTERN ROAD,
TRING, HP23 4BB

Groundsure Reference: WDE-6213640

Your Reference: 19-335

Report Date 1 Aug 2019

Report Delivery Method: Email - pdf

Enviro Insight

Address: TESCO CARPARK, TESCO SUPERSTORE, PORTMAN ROAD, READING, RG30 1AW

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on (T) 08444 159 000 quoting the above report reference number.

Yours faithfully,

WDE Consulting

Enc.
Groundsure Enviroinsight

Address: TESCO CARPARK, TESCO SUPERSTORE, PORTMAN ROAD, READING, RG30 1AW

Date: 1 Aug 2019

Reference: WDE-6213640

Client: WDE Consulting Ltd



Aerial Photograph Capture date: 20-Apr-2015

Grid Reference: 469660,173961

Site Size: 0.6886ha

Report Reference: WDE-6213640

Client Reference: 19-335

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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	3	3	42	47
1.2 Additional Information – Historical Tank Database	0	0	6	14
1.3 Additional Information – Historical Energy Features Database	0	7	14	46
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	1	0
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	0	0	0	18
Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	3
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	5
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	1	0	3
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	1
2.1.8 Records of Licensed Discharge Consents	0	0	0	0
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	1
2.2 Records of COMAH and NIHHS sites	0	0	0	1
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	2	0
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	2	0
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	1	1	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	1	1	9	1

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	4	46	Not searched
4.2 Records of Petrol and Fuel Sites	0	1	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Records of Artificial Ground and Made Ground present beneath the study site	None identified
5.2 Records of Superficial Ground and Drift Geology present beneath the study site	Identified
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology				0-500m		
6.1 Records of Strata Classification in the Superficial Geology within 500m of the study site				Identified		
6.2 Records of Strata Classification in the Bedrock Geology within 500m of the study site				Identified		
	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	2	3	7	9
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	3
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	1	0	1	4
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	1	2	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

0-500m

	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site	No	No	No	No	No	No
6.10 Ordnance Survey MasterMap Water Network entries within 500m of the site	0	0	0	0	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	No	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Environment Agency Zone 2 floodplains within 250m of the study site	Identified					
7.2 Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Identified					
7.3 Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site	Low					
7.4 Flood Defences within 250m of the study site	None identified					
7.5 Areas benefiting from Flood Defences within 250m of the study site	None identified					
7.6 Areas used for Flood Storage within 250m of the study site	None identified					
7.7 Maximum BGS Groundwater Flooding susceptibility within 50m of the study site	Potential at Surface					
7.8 BGS confidence rating for the Groundwater Flooding susceptibility areas	High					

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	2
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	5
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	1
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	1	0	0	1	0	0
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 Maximum risk of natural ground subsidence

Moderate

9.1.1 Maximum Shrink-Swell hazard rating identified on the study site

Very Low

9.1.2 Maximum Landslides hazard rating identified on the study site

Very Low

9.1.3 Maximum Soluble Rocks hazard rating identified on the study site

Very Low

9.1.4 Maximum Compressible Ground hazard rating identified on the study site

Moderate

9.1.5 Maximum Collapsible Rocks hazard rating identified on the study site

Very Low

9.1.6 Maximum Running Sand hazard rating identified on the study site

Low

9.2 Radon

9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?

No radon protective measures are necessary.

Section 10: Mining

10.1 Coal mining areas within 75m of the study site

None identified

10.2 Non-Coal Mining areas within 50m of the study site boundary

None identified

10.3 Brine affected areas within 75m of the study site

None identified

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licences, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use



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1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 95

ID	Distance [m]	Direction	Use	Date
1A	0	On Site	Hospital	1982
2A	0	On Site	Hospital	1974
3A	0	On Site	Hospital	1991
4B	20	N	Unspecified Works	1991
5B	20	N	Unspecified Commercial/Industrial	1982
6AC	25	N	Unspecified Commercial/Industrial	1974
7D	64	W	Nursery	1910
8C	91	S	Hospital	1960
9C	91	S	Hospital	1932
10C	92	S	Hospital	1938
11D	92	W	Nursery	1898
12D	94	W	Nursery	1898
13E	98	S	Isolation Hospital	1910
14E	98	S	Infectious Hospital	1898
15F	136	N	Railway Sidings	1932
16F	136	N	Railway Sidings	1938
17F	136	N	Railway Sidings	1910
18	136	N	Railway Sidings	1960
19	136	N	Railway Sidings	1900
20AD	146	N	Railway Sidings	1878
21	146	SE	Infectious Diseases Hospital	1898
22G	155	W	Unspecified Works	1974
23G	155	W	Unspecified Commercial/Industrial	1982
24G	155	W	Unspecified Commercial/Industrial	1991
25H	159	N	Railway Sidings	1974
26H	159	N	Railway Sidings	1991
27H	159	N	Railway Sidings	1982
28	171	N	Railway Sidings	1901
29I	181	S	Hospital	1898
30I	181	S	Hospital	1910
31I	185	S	Hospital	1898

32J	192	W	Nursery	1898
33J	194	W	Nursery	1898
34K	194	SE	Unspecified Workhouse	1910
35K	194	SE	Unspecified Workhouse	1898
36K	195	SE	Workhouse	1898
37	211	N	Railway Sidings	1900
38L	231	N	Railway Building	1900
39L	231	N	Railway Building	1960
40L	231	N	Railway Building	1932
41L	231	N	Railway Building	1938
42L	231	N	Railway Building	1910
43L	237	N	Railway Buildings	1974
44M	242	NE	Railway Building	1991
45M	242	NE	Railway Building	1982
46M	242	NE	Railway Building	1974
47L	249	NW	Railway Building	1991
48L	249	NW	Railway Building	1982
49P	263	SE	Unspecified Works	1960
50N	276	SW	Barracks	1974
51N	276	SW	Barracks	1991
52N	288	SW	Barracks	1932
53N	289	SW	Barracks	1960
54O	294	SW	Barracks	1938
55O	294	SW	Barracks	1898
56O	294	SW	Barracks	1910
57N	295	SW	Barracks	1898
58P	299	SE	Tin Works	1932
59	304	E	Railway Sidings	1962
60R	307	E	Railway Sidings	1989
61Q	307	E	Railway Sidings	1977
62Q	307	E	Railway Sidings	1971
63R	307	E	Railway Sidings	1994
64S	309	W	Unspecified Works	1991
65S	309	W	Unspecified Depots	1974
66S	309	W	Unspecified Works	1982
67T	343	SE	Tin Works	1910
68T	343	SE	Tin Works	1938
69	345	E	Unspecified Tank	1878
70U	403	E	Railway Sidings	1932
71	410	E	Unspecified Depot	1971
72U	426	E	Railway Sidings	1938
73V	429	SW	Hospital	1932
74V	435	SW	Hospital	1938
75V	435	SW	Hospital	1910
76V	435	SW	Hospital	1898
77V	437	SW	Hospital	1898

78W	442	E	Unspecified Pit	1938
79W	444	E	Unspecified Pit	1962
80W	446	E	Unspecified Pit	1932
81W	446	E	Unspecified Pit	1932
82W	454	E	Gravel Pit	1898
83W	457	E	Gravel Pit	1898
84X	463	W	Unspecified Warehouses	1982
85X	463	W	Unspecified Depot	1974
86X	463	W	Unspecified Warehouses	1991
87Y	468	W	Unspecified Depot	1982
88Y	468	W	Unspecified Depot	1991
89Z	475	SE	Unspecified Pit	1971
90Z	475	SE	Unspecified Pit	1977
91Z	475	SE	Unspecified Pit	1989
92Z	475	SE	Unspecified Pit	1994
93Z	481	SE	Unspecified Ground Workings	1910
94AA	497	E	Pumping Station	1994
95AA	497	E	Pumping Station	1989

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary:

20

ID	Distance (m)	Direction	Use	Date
96AB	145	E	Tanks	1996
97AB	145	E	Tanks	1993
98AB	145	E	Tanks	1973
99AB	156	E	Tanks	1990
100AC	158	E	Unspecified Tank	1976
101AC	159	E	Unspecified Tank	1990
102K	299	SE	Tanks	1993
103K	300	SE	Tanks	1881
104AD	341	E	Unspecified Tank	1959
105AE	380	E	Unspecified Tank	1959
106AE	381	E	Unspecified Tank	1936
107AE	383	E	Unspecified Tank	1913
108AE	384	E	Unspecified Tank	1960
109AF	417	S	Unspecified Tank	1989
110AF	418	S	Unspecified Tank	1959
111AF	418	S	Unspecified Tank	1974

112AF	418	S	Unspecified Tank	1960
113AF	426	S	Unspecified Tank	1959
114AF	427	S	Unspecified Tank	1989
115	458	S	Unspecified Tank	

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary:

67

ID	Distance (m)	Direction	Use	Date
116AG	20	W	Electricity Substation	1973
117AG	20	W	Electricity Substation	1990
118AG	20	W	Electricity Substation	1996
119AG	21	W	Electricity Substation	1993
120AH	32	S	Electricity Substation	1996
121AH	32	S	Electricity Substation	1993
122AH	32	S	Electricity Substation	1973
123AI	82	N	Electricity Substation	1976
124AI	82	N	Electricity Substation	1993
125AJ	152	E	Electricity Substation	1996
126AJ	152	E	Electricity Substation	1973
127AJ	153	E	Electricity Substation	1976
128AC	160	E	Electricity Substation	1971
129AC	160	E	Electricity Substation	1968
130AK	186	W	Electricity Substation	1993
131AK	186	W	Electricity Substation	1986
132AK	187	W	Electricity Substation	1988
133AK	187	W	Electricity Substation	1988
134AK	187	W	Electricity Substation	1990
135AK	187	W	Electricity Substation	1993
136AL	250	SE	Electricity Substation	1996
137AL	255	SE	Electricity Substation	1973
138AL	255	SE	Electricity Substation	1976
139AL	255	SE	Electricity Substation	1993
140G	274	NW	Electricity Substation	1968
141AM	305	SW	Electricity Substation	1971
142AM	306	SW	Electricity Substation	1986
143AM	306	SW	Electricity Substation	1988
144AM	306	SW	Electricity Substation	1988
145AM	306	SW	Electricity Substation	1971
146AM	306	SW	Electricity Substation	1971

147	341	E	Electricity Substation	1988
148AN	346	SE	Electricity Substation	1993
149AN	346	SE	Electricity Substation	1996
150AN	347	SE	Electricity Substation	1990
151AO	360	S	Electricity Substation	1993
152AO	371	S	Electricity Substation	1976
153AO	371	S	Electricity Substation	1960
154S	396	NW	Electricity Substation	1968
155AP	401	W	Electricity Substation	1973
156AP	401	W	Electricity Substation	1990
157AQ	403	S	Electricity Substation	1996
158AQ	404	S	Electricity Substation	1993
159AQ	404	S	Electricity Substation	1990
160AQ	404	S	Electricity Substation	1969
161AF	409	S	Electricity Substation	1993
162AF	413	S	Electricity Substation	1996
163AF	413	S	Electricity Substation	1973
164AF	413	S	Electricity Substation	1976
165AF	413	S	Electricity Substation	1988
166AP	416	W	Electricity Substation	1993
167AR	446	E	Electricity Substation	1971
168AR	446	E	Electricity Substation	1988
169AS	470	SE	Electricity Substation	1993
170AS	470	SE	Electricity Substation	1993
171AS	470	SE	Electricity Substation	1988
172AT	473	SW	Electricity Substation	1971
173AT	474	SW	Electricity Substation	1993
174AU	483	W	Electricity Substation	1986
175AU	483	W	Electricity Substation	1988
176AU	484	W	Electricity Substation	1988
177AU	484	W	Electricity Substation	1968
178AU	484	W	Electricity Substation	1993
179AU	484	W	Electricity Substation	1976
180AU	485	W	Electricity Substation	1976
181AV	486	W	Electricity Substation	
182AV	492	W	Gas Governor	

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary:

0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 1

ID	Distance (m)	Direction	Use	Date
183	156	NW	Garage	1976

1.6 Historical military sites

Certain military installations were not noted on historic mapping for security reasons. Whilst not all military land is necessarily of concern, Groundsure has researched and digitised a number of Ordnance Factories and other military industrial features (e.g. Ordnance Depots, Munitions Testing Grounds) which may be of contaminative concern. This research was drawn from a number of different sources, and should not be regarded as a definitive or exhaustive database of potentially contaminative military installations. The boundaries of sites within this database have been estimated from the best evidence available to Groundsure at the time of compilation.

Records of historical military sites within 500m of the search boundary: 0

Database searched and no data found.

1.7 Potentially Infilled Land

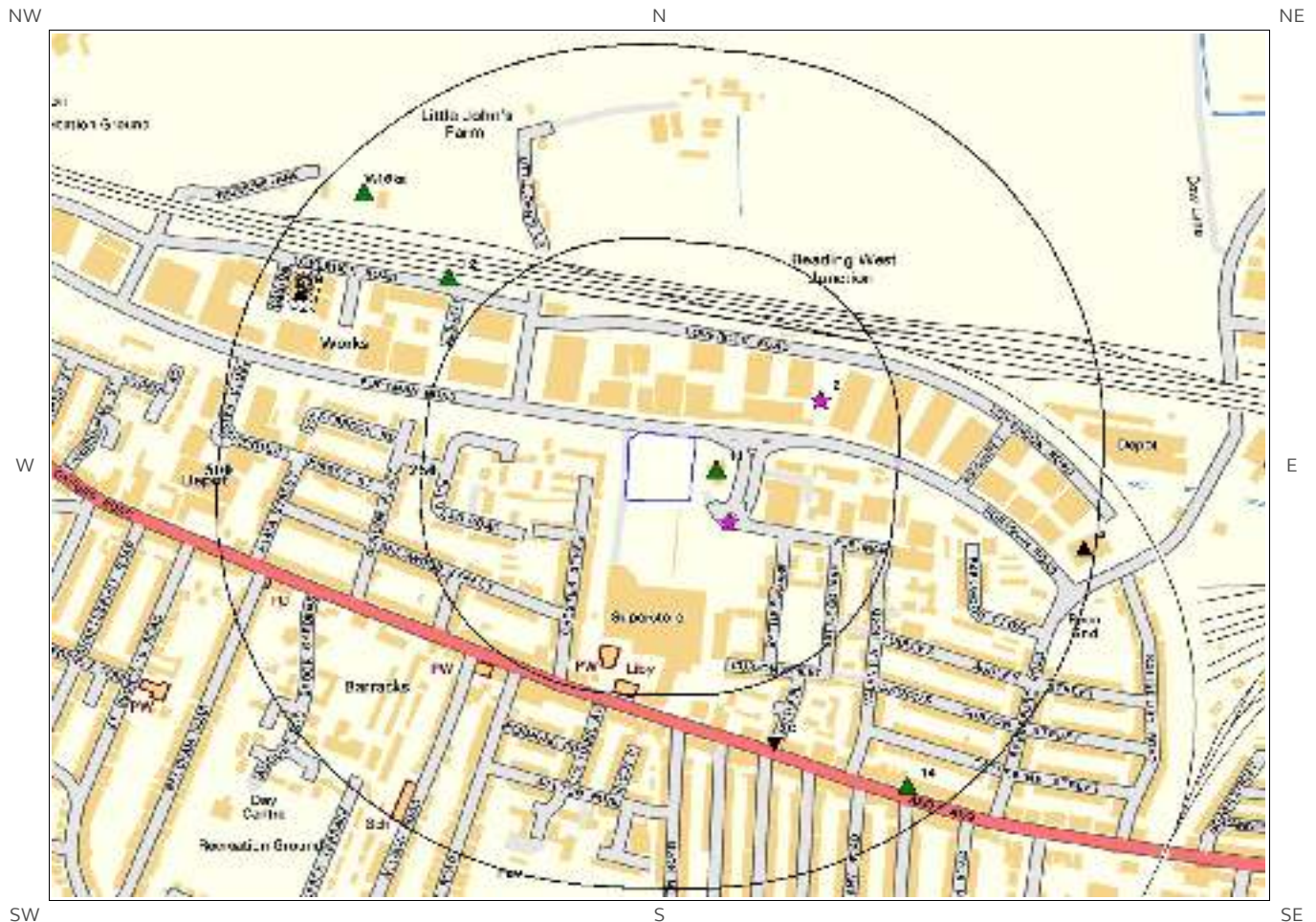
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 18

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
184	292	NW	Pond	1901
185AW	361	E	Pond	1910
186AW	361	E	Pond	1898
187AW	361	E	Pond	1938
188AW	363	E	Pond	1898
189AW	363	E	Pond	1962
190W	442	E	Unspecified Pit	1938
191W	444	E	Unspecified Pit	1962
192W	446	E	Unspecified Pit	1932
193W	446	E	Unspecified Pit	1932
194W	454	E	Gravel Pit	1898
195W	457	E	Gravel Pit	1898
196	470	NW	Pond	1878
197Z	475	SE	Unspecified Pit	1977
198Z	475	SE	Unspecified Pit	1971

199Z	475	SE	Unspecified Pit	1989
200Z	475	SE	Unspecified Pit	1994
201Z	481	SE	Unspecified Ground Workings	1910

2. Environmental Permits, Incidents and Registers Map



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- | | | |
|-------------------------------|---------------------------------------|---|
| Site Outline | Reported Pollution Incident | Part A1, A2, and A3 Authorised Processes and Isolated PC Authorisations |
| Search Buffers (m) | Dangerous Substances (List 1) | Part A2 and Part 3 Authorised Processes |
| Dangerous Substances (List 2) | Water Industry Referrals | COMAH / HHHS Sites |
| Licensed Discharge Consents | Sites Determined as Contaminated Land | Hazardous Substance Consents and Enforcement |
| Risk for Discharge Consents | | |

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

3

The following IPC Authorisations are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
23A	486	E	470180 173850	Operator: Oxkem Ltd Address: 1 Loverock Road, Reading, Berkshire, RG30 1DZ Process: Inorganic Chemical Processes Permit Number: AW0784 Original Permit Number: IPCMINVAR Date Approved: 9-8-1996 Effective Date: 9-8-1996 Status: Superseded By Variation
24A	486	E	470180 173850	Operator: Oxkem Ltd Address: 1 Loverock Road, Reading, Berkshire, RG30 1DZ Process: Inorganic Chemical Processes Permit Number: AO1128 Original Permit Number: IPCAIRAPP Date Approved: 28-11-1994 Effective Date: 5-12-1994 Status: Superseded By Variation
25A	486	E	470180 173850	Operator: Oxkem Ltd Address: 1 Loverock Road, Reading, Berkshire, RG30 1DZ Process: Inorganic Chemical Processes Permit Number: BD6441 Original Permit Number: IPCMINVAR Date Approved: 24-11-1998 Effective Date: 30-11-1998 Status: Revoked - Now Ippc

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

5

The following Part A(1) and IPPC Authorised Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
18B	445	NW	469220 174180	Operator: OXKEM LTD Installation Name: READING INORGANIC CHEMICAL PLANT Process: INORGANIC CHEMICALS; SALTS EG AMMONIUM CHLORIDE Permit Number: QP3232VU Original Permit Number: BP3734SB EPR Reference: - Issue Date: 12/08/2014 Effective Date: 12/08/2014 Last date noted as effective: 2019-04-30

ID	Distance (m)	Direction	NGR	Details
Status: SUPERCEDED				
19B	445	NW	469220 174180	Operator: OXKEM LTD Installation Name: READING INORGANIC CHEMICAL PLANT Process: INORGANIC CHEMICALS; SALTS EG AMMONIUM CHLORIDE Permit Number: JP3030TC Original Permit Number: BP3734SB EPR Reference: - Issue Date: 29/04/2010 Effective Date: 29/04/2010 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
20B	445	NW	469220 174180	Operator: OXKEM LTD Installation Name: READING INORGANIC CHEMICAL PLANT Process: INORGANIC CHEMICALS; SALTS EG AMMONIUM CHLORIDE Permit Number: BP3734SB Original Permit Number: BP3734SB EPR Reference: - Issue Date: 31/03/2006 Effective Date: 31/03/2006 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
21B	445	NW	469220 174180	Operator: OXKEM LIMITED Installation Name: READING INORGANIC CHEMICAL PLANT - EPR/BP3734SB Process: INORGANIC CHEMICALS; SALTS EG AMMONIUM CHLORIDE Permit Number: HP3834QG Original Permit Number: BP3734SB EPR Reference: - Issue Date: 17/01/2019 Effective Date: 17/01/2019 Last date noted as effective: 2019-04-30 Status: EFFECTIVE
22B	445	NW	469220 174180	Operator: OXKEM LTD Installation Name: READING INORGANIC CHEMICAL PLANT Process: INORGANIC CHEMICALS; SALTS EG AMMONIUM CHLORIDE Permit Number: CP3733RQ Original Permit Number: BP3734SB EPR Reference: - Issue Date: 14/10/2015 Effective Date: 14/10/2015 Last date noted as effective: 2019-04-30 Status: SUPERCEDED

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

4

The following Part A(2) and Part B Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
11	30	E	469730 173951	Address: Tesco Stores Ltd, Portman Road, Reading, Berkshire, RG30 1AH Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
12	303	NW	469401 174199	Address: Nationwide Crash Repair Centres Ltd, Loverock Road, RG3 1DZ Process: Respraying of Road Vehicles Status: Historical Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
13	454	NW	469298 174310	Address: Berkshire Macadams Limited, Wigmore Lane, Reading, Berkshire, RG30 1NP Process: Roadstone Coating Processes Status: Current Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
14	455	SE	469964 173543	Address: Bobbys 2Hr Dry Cleaning, 296 Oxford Road, Reading, RG30 1AD Process: Dry Cleaning Status: Current Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

1

The following RAS Licence (3 or 4) records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Address	Operator	Type	Permission Number	Dates	Status
26C	328	S	469800 173600	Royal Berkshire Nhs Foundation Trust, Battle Hospital, Oxford Road, Reading, Berkshire, RG30 1AG	Royal Berkshire Nhs Foundation Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AI9176	Date of Approval: 27/7/1993 Effective from: 27/7/1993 Last date of update: 2015-01-01	Revoked/cancelled

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

0

Database searched and no data found.

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

1

The following records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
27D	448	NW	07/011170/H AZARD	469224 174195	Approved	30/08/2007	Oxkem Limited, 117, Loverock Road, Reading, Berkshire, England, RG30 1DZ	Storage of up to 18 tonnes of chromic acid	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site:

1

The following COMAH & NIHHS Authorisation records provided by the Health and Safety Executive are represented as polygons or buffered points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Company	Address	Operational Status	Tier
16D	421	NW	Oxkem Limited	Oxkem Limited, Reading, 117 Loverock Road, Reading, Berkshire, RG30 1DZ	Current COMAH Site	COMAH Upper Tier Operator

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

2

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
1	53	SE	469744.0 173886.0	Incident Date: 15-Nov-2002 Incident Identification: 121032.0 Pollutant: Oils and Fuel Pollutant Description: Gas and Fuel Oils Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
2	159	E	469856.0 174043.0	Incident Date: 29-Jan-2002 Incident Identification: 55194.0 Pollutant: Specific Waste Materials Pollutant Description: Household Waste Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

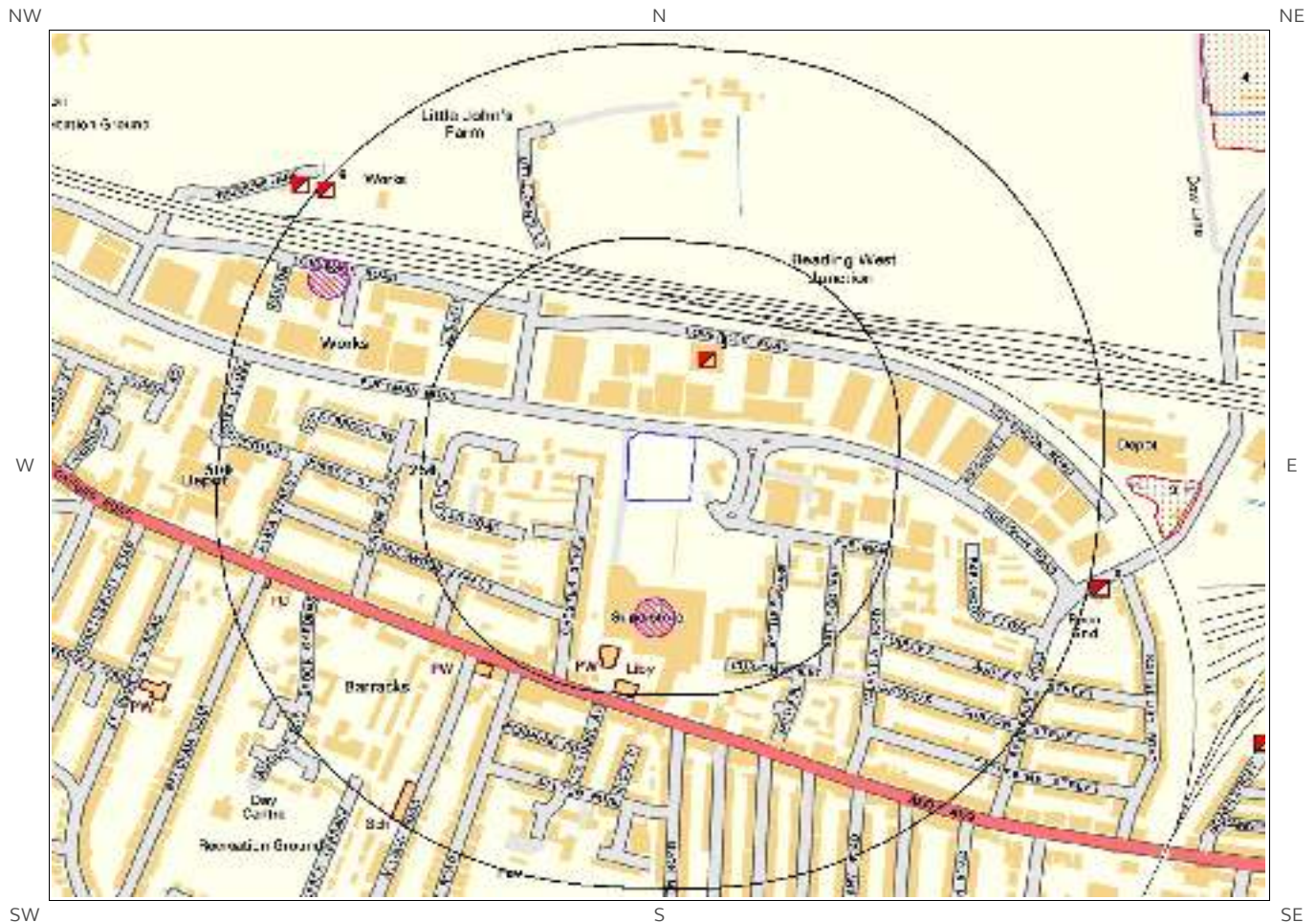
Database searched and no data found.

2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

Records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site

0

Database searched and no data found.



Site Outline

Search Buffer (mi)

250

500

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS/ DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste site

Local Authority/ Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

2

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details
3	532	E		Site Address: Cow Lane, Reading, Berkshire Waste Licence: - Site Reference: TP0340, RDG4 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: 31-Dec-1950 Last Recorded: 31-Dec-1959
4	738	NE		Site Address: Richfield Avenue, Reading, Berkshire Waste Licence: - Site Reference: RDG11, TP0122 Waste Type: Commercial, Household, Liquid sludge Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: 31-Dec-1970 Last Recorded: 31-Dec-1979

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

0

Database searched and no data found.

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

2

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details		
1	125	S	469653 173762	Type of Site: Recycling Centre Site Address: Tesco Superstore, Portman Road, READING, Berkshire, RG30 1AW	Planning Application Reference: 09/01913/FUL Date: 06/05/2010	Further Details: Scheme comprises replacement of recycling facilities with new TOMRA automated recycling centre in new location in car parking area, involving net loss of 3 car parking spaces. An application (ref: 09/01913/FUL) for detailed planning permission was granted by Reading B.C. A detailed planning application has been granted. Data Source: Historic Planning Application Data Type: Point
2	398	NW	469254 174199	Type of Site: Waste Transfer Facility Site Address: B, 75 Loverock Road, READING, Berkshire, RG30 1DZ	Planning Application Reference: 09/00909/FUL Date: 05/02/2010	Further Details: Scheme comprises change of use of land and building to waste transfer facility. An application (ref: 09/00909/FUL) for detailed planning permission was granted by Reading B.C. A detailed planning application has been granted. Data Source: Historic Planning Application Data Type: Point

3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

12

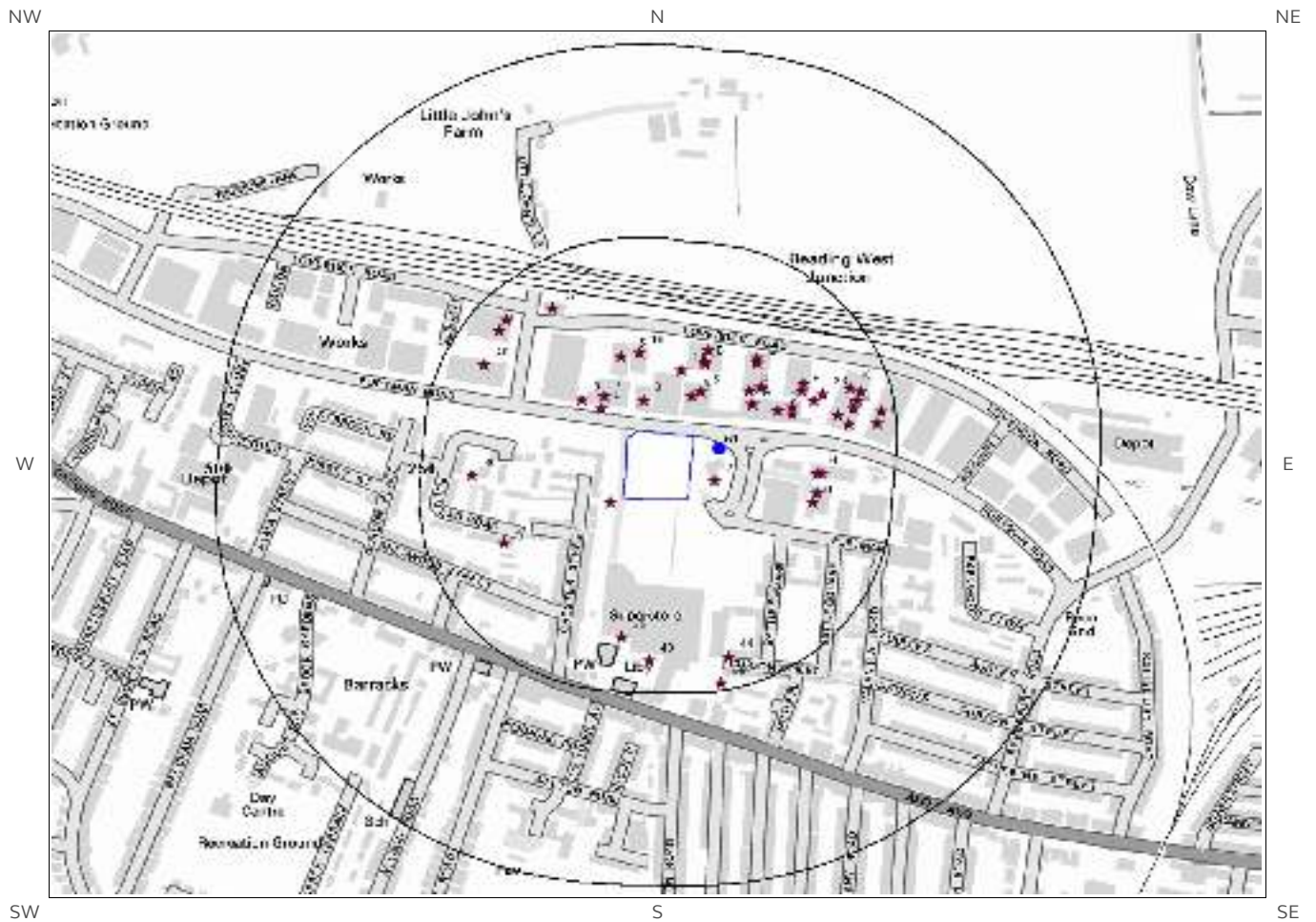
The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details
5	101	N	469718 174096	Site Address: Part A, Unit B, 75, Loverock Road, Tilehurst, Reading, Berkshire, RG30 1DZ Type: 75kte HCI Waste TS + treatment Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: OAK056 EPR reference: EA/EPR/EP3993VE/A001 Operator: Oakford U K Ltd Waste Management licence No: 101222 Annual Tonnage: 74999.0 Issue Date: 18/11/2009 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired Site Name: Loverock Road Waste Transfer Station Correspondence Address: -
6	492	NW	469251 174315	Site Address: Unit 3, 40, Wigmore Lane, Reading, Berkshire, RG30 1NP Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: REY002 EPR reference: EA/EPR/MP3195EA/A001 Operator: 1st Reynolds Skip Hire Ltd Waste Management licence No: 86373 Annual Tonnage: 4999.0 Issue Date: 11/08/2005 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Reynolds Skip Hire Correspondence Address: -
7A	515	E	470200 173800	Site Address: Elliot Metal Company Ltd, 3, Loverock Road, Battle Farm Indus Est, Reading, RG3 1NL Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIM001 EPR reference: - Operator: Simsmetal Uk Limited Waste Management licence No: 86002 Annual Tonnage: 4999.0 Issue Date: 06/04/1993 Effective Date: 27/04/2002 Modified: 26/04/2002 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Simsmetal U K Limited Correspondence Address: 4, The Uplands, Nailsea, Somerset, BS48 4RR
8A	515	E	470200 173800	Site Address: Elliot Metal Company Ltd, 3, Loverock Road, Battle Farm Indus Est, Reading, Berkshire, RG3 1NL Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: PAR197 EPR reference: EA/EPR/CB3909KB/S002 Operator: Parsons Metal Recycling Limited Waste Management licence No: 86002 Annual Tonnage: 0.0 Issue Date: 06/04/1993 Effective Date: 26/06/2015 Modified: 27/08/2014 Surrendered Date: Mar 8 2016 12:00AM Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Parsons Metal Recycling Limited Correspondence Address: -
9A	515	E	470200 173800	Site Address: Elliot Metal Company Ltd, 3, Loverock Road, Battle Farm Indus Est, Reading, Berkshire, RG3 1NL Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIM001 EPR reference: EA/EPR/LP3199EB/V006 Operator: Sims Group U K Ltd Waste Management licence No: 86002 Annual Tonnage: 74999.0 Issue Date: 06/04/1993 Effective Date: 27/04/2002 Modified: 27/08/2014 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Sims Group U K Ltd Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details
10A	515	E	470200 173800	Site Address: Elliot Metal Company Ltd, 3, Loverock Road, Battle Farm Indus Est, Reading, Berkshire, RG3 1NL Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIM001 EPR reference: EA/EPR/LP3199EB/V005 Operator: Sims Group Uk Limited Waste Management licence No: 86002 Annual Tonnage: 74999.0 Issue Date: 06/04/1993 Effective Date: 27/04/2002 Modified: 20/04/2010 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Sims Group U K Ltd Correspondence Address: -
11	522	NW	469219 174322	Site Address: Fleetwood Grab Services Ltd, 1& 1a 40, Wigmore Lane, Reading, Berkshire, RG30 1NP Type: Treatment of waste to produce soil <75,000 tpy Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: FLE026 EPR reference: EA/EPR/JB3534RP/A001 Operator: Fleetwood Grab Services Ltd Waste Management licence No: 104488 Annual Tonnage: 74999.0 Issue Date: 03/12/2012 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Fleetwood Grab Services Ltd Correspondence Address: -
12	769	SE	470400 173600	Site Address: E.G.W Carter, 54, Gower Street, Reading, Berkshire, RG1 7PE Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: CAR001 EPR reference: EA/EPR/LP3699EF/S004 Operator: E G W Carter Waste Management licence No: 86001 Annual Tonnage: 9322.0 Issue Date: 19/03/1996 Effective Date: - Modified: - Surrendered Date: Jul 23 1999 12:00AM Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: E G W Carter Correspondence Address: -
Not shown	811	E	470497 174166	Site Address: 128, Cardiff Road, Reading, Berkshire, RG1 8PQ Type: 75kte Materials Recycling Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MCO003 EPR reference: EP3893VZ/A001 Operator: M Collard Waste Management Services Ltd Waste Management licence No: 101199 Annual Tonnage: 0.0 Issue Date: 11/02/2010 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: M Collard Waste Management Services Ltd Correspondence Address: -
Not shown	815	E	470500 174174	Site Address: 128, Cardiff Road, Reading, Berkshire, RG1 8PQ Type: 75kte HCI Waste TS + treatment Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MCO003 EPR reference: EA/EPR/EP3893VZ/V002 Operator: M Collard Waste Management Services Ltd Waste Management licence No: 101199 Annual Tonnage: 74999.0 Issue Date: 11/02/2010 Effective Date: - Modified: 09/07/2010 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: M Collard Waste Management Services Ltd Correspondence Address: -
Not shown	815	E	470500 174174	Site Address: 128, Cardiff Road, Reading, Berkshire, RG1 8PQ Type: 75kte HCI Waste TS + treatment Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: RCO001 EPR reference: EA/EPR/EB3500KB/V002 Operator: R Collard Limited Waste Management licence No: 101199 Annual Tonnage: 74999.0 Issue Date: 11/02/2010 Effective Date: 11/10/2016 Modified: 16/10/2018 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: R Collard Limited Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details
Not shown	1060	W	468638 174382	Site Address: I T P, Unit 1, Stadium Way, Tilehurst, Reading, Berkshire, RG30 6BX Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ITP002 EPR reference: EA/EPR/BB3302TG/A001 Operator: International Technology Products (U K) Limited Waste Management licence No: 401209 Annual Tonnage: 760.0 Issue Date: 02/05/2014 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: I T P Correspondence Address: -

4. Current Land Use Map



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4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site:

50

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	17	W	Electricity Sub Station	469601 173910	Berkshire, RG30	Electrical Features	Infrastructure and Facilities
2	31	E	Tesco Filling Station	469730 173938	Tesco Extra Petrol Station Tesco Superstore, Portman Road, Reading, Berkshire, RG30 1AW	Petrol and Fuel Stations	Road and Rail
3	39	N	Works	469642 174042	Berkshire, RG30	Unspecified Works Or Factories	Industrial Features
4	50	NW	Pumping Station	469591 174031	Berkshire, RG30	Water Pumping Stations	Industrial Features
5	51	N	Elite Interfaces Ltd	469701 174047	24b, Portman Road, Reading, Berkshire, RG30 1EA	Mechanical Engineers	Engineering Services
6	58	N	Redland Healthcare	469713 174052	24a, Portman Road, Reading, Berkshire, RG30 1EA	Disability and Mobility Equipment	Consumer Products
7	61	NW	Rodmatic Ltd	469594 174048	Battle Farm Trading Estate 30, Portman Road, Reading, Berkshire, RG30 1PD	Precision Engineers	Engineering Services
8	76	NW	Electricity Sub Station	469567 174043	Berkshire, RG30	Electrical Features	Infrastructure and Facilities
9A	83	NE	Cleaver Cars Ltd	469776 174036	67, Loverock Road, Reading, Berkshire, RG30 1DZ	Vehicle Repair, Testing and Servicing	Repair and Servicing
10A	83	NE	Koltrane Lighting	469776 174036	20, Portman Road, Reading, Berkshire, RG30 1EA	Lampshades and Lighting	Consumer Products
11	84	N	Electricity Sub Station	469689 174081	Berkshire, RG30	Electrical Features	Infrastructure and Facilities
12C	90	NE	Jaystock	469772 174054	69-71, Loverock Road, Reading, Berkshire, RG30 1DZ	Vehicle Parts and Accessories	Motoring
13B	96	N	Parsons Peebles	469718 174090	75a, Loverock Road, Reading, Berkshire, RG30 1DZ	Electrical Equipment Repair and Servicing	Repair and Servicing
14B	98	N	Warehouse	469718 174092	Berkshire, RG30	Container and Storage	Transport, Storage and Delivery
15	99	N	Depot	469614 174099	Berkshire, RG30	Container and Storage	Transport, Storage and Delivery
16	101	N	Warehouse	469638	Berkshire, RG30	Container and Storage	Transport, Storage and

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
				174104			Delivery
17C	103	NE	Letter Works	469786 174059	65, Loverock Road, Reading, Berkshire, RG30 1DZ	Published Goods	Industrial Products
18C	103	NE	Thake Signs & Print	469786 174059	65, Loverock Road, Reading, Berkshire, RG30 1DZ	Signs	Industrial Products
19D	109	E	Calcot Cars	469808 174029	18, Portman Road, Reading, Berkshire, RG30 1EA	Vehicle Repair, Testing and Servicing	Repair and Servicing
20	113	N	Depot	469722 174107	Berkshire, RG30	Container and Storage	Transport, Storage and Delivery
21E	123	NE	Berkshire Food Products Ltd	469782 174090	61-63, Loverock Road, Reading, Berkshire, RG30 1DZ	Dairy Products	Foodstuffs
22D	124	E	Car Bar Service Centre	469824 174023	16, Portman Road, Reading, Berkshire, RG30 1EA	Vehicle Repair, Testing and Servicing	Repair and Servicing
23D	127	E	Motorrific	469825 174034	53, Loverock Road, Reading, Berkshire, RG30 1DZ	Vehicle Repair, Testing and Servicing	Repair and Servicing
24E	128	NE	V-speed Ltd	469782 174097	61-63, Loverock Road, Reading, Berkshire, RG30 1DZ	Vehicle Repair, Testing and Servicing	Repair and Servicing
25F	145	NE	Howson Wood Ltd	469837 174054	51, Loverock Road, Reading, Berkshire, RG30 1DZ	Catering and Non Specific Food Products	Foodstuffs
26F	151	NE	Pirtek Ltd	469839 174063	49, Loverock Road, Reading, Berkshire, RG30 1DZ	Industrial Repairs and Servicing	Repair and Servicing
27G	153	E	Chimney	469851 173910	Berkshire, RG30	Chimneys	Industrial Features
28H	154	E	Tank	469855 173948	Berkshire, RG30	Tanks (Generic)	Industrial Features
29F	155	E	Tank	469852 174042	Berkshire, RG30	Tanks (Generic)	Industrial Features
30G	157	E	Electricity Sub Station	469855 173922	Berkshire, RG30	Electrical Features	Infrastructure and Facilities
31	157	W	J P J Computers	469470 173857	46, Fulmead Road, Reading, Berkshire, RG30 1JX	Electrical Equipment Repair and Servicing	Repair and Servicing
32H	160	E	Tank	469861 173947	Berkshire, RG30	Tanks (Generic)	Industrial Features
33	167	E	Electricity Sub Station	469862 174050	Berkshire, RG30	Electrical Features	Infrastructure and Facilities
34I	179	E	Self Adhesive Supplies	469881 174023	7-9, The Portman Centre, Reading, Berkshire, RG30 1DZ	Adhesives and Sealants	Industrial Products
35	179	S	Electricity Sub Station	469616 173735	Berkshire, RG30	Electrical Features	Infrastructure and Facilities
36	188	W	Electricity Sub Station	469431 173945	Berkshire, RG30	Electrical Features	Infrastructure and Facilities
37	191	NW	Works	469531 174162	Berkshire, RG30	Unspecified Works Or Factories	Industrial Features
38I	191	E	N C Auto Services Ltd	469895 174011	Unit 10 The Portman Centre 37-45, Loverock	Vehicle Repair, Testing and Servicing	Repair and Servicing

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
					Road, Reading, Berkshire, RG30 1DZ		
39J	200	E	C K the Garage	469901 174031	Unit 8 The Portman Centre 37-45, Loverock Road, Reading, Berkshire, RG30 1DZ	Vehicle Repair, Testing and Servicing	Repair and Servicing
40	201	NW	Eden Vauxhall Reading	469446 174088	38-40, Portman Road, Reading, Berkshire, RG30 1JG	New Vehicles	Motoring
41K	201	E	King Catch	469895 174058	Unit 3 The Portman Centre 37-45, Loverock Road, Reading, Berkshire, RG30 1DZ	Fish, Meat and Poultry Products	Foodstuffs
42J	206	E	F D S	469905 174041	Unit 6 The Portman Centre 37-45, Loverock Road, Reading, Berkshire, RG30 1DZ	Industrial Coatings and Finishings	Industrial Products
43	208	S	Electricity Sub Station	469649 173705	Berkshire, RG30	Electrical Features	Infrastructure and Facilities
44	208	S	Electricity Sub Station	469747 173710	Berkshire, RG30	Electrical Features	Infrastructure and Facilities
45L	211	NW	Warehouse	469465 174132	Berkshire, RG30	Container and Storage	Transport, Storage and Delivery
46K	213	E	Paul's Floors Ltd	469909 174053	Unit 4 The Portman Centre 37-45, Loverock Road, Reading, Berkshire, RG30 1DZ	Construction Completion Services	Construction Services
47L	214	NW	Depot	469473 174146	Berkshire, RG30	Container and Storage	Transport, Storage and Delivery
48M	227	E	Thames Valley M O T's	469930 174012	33, Loverock Road, Reading, Berkshire, RG30 1DZ	Vehicle Repair, Testing and Servicing	Repair and Servicing
49M	233	E	T W Flooring	469935 174027	31, Loverock Road, Reading, Berkshire, RG30 1DZ	Construction Completion Services	Construction Services
50	240	S	Electricity Sub Station	469738 173676	Berkshire, RG30	Electrical Features	Infrastructure and Facilities

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site:

1

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
51	31	E	469735 173979	TESCO EXTRA	Portman Road, Reading, Reading, RG30 1AW	No	Open

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site:

0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site:

0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
TPGR-XSV	TAPLOW GRAVEL MEMBER	SAND AND GRAVEL
KPGR-XSV	KEMPTON PARK GRAVEL MEMBER	SAND AND GRAVEL

5.3 Bedrock and Solid Geology

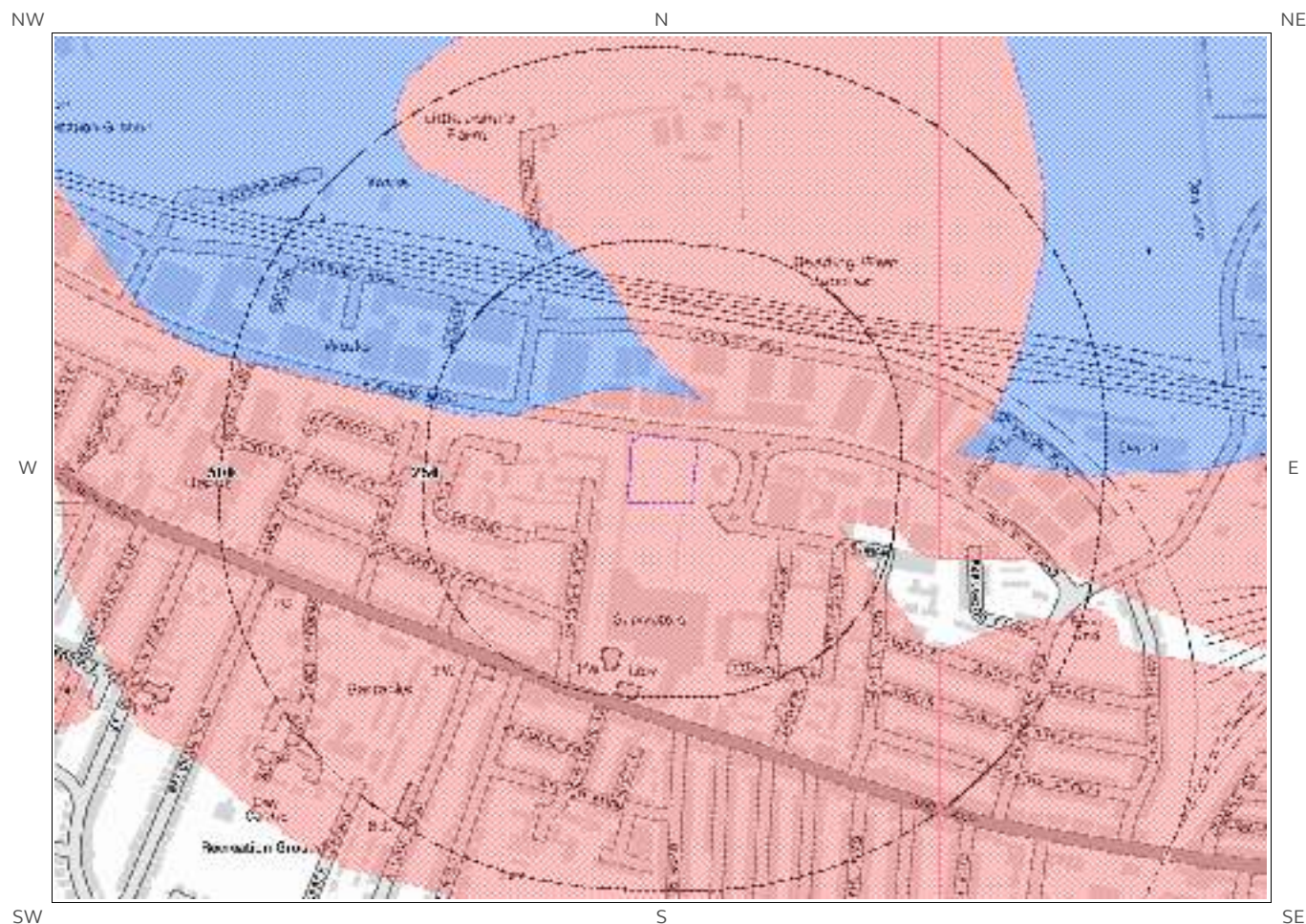
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
SNCK-CHLK	SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)	CHALK

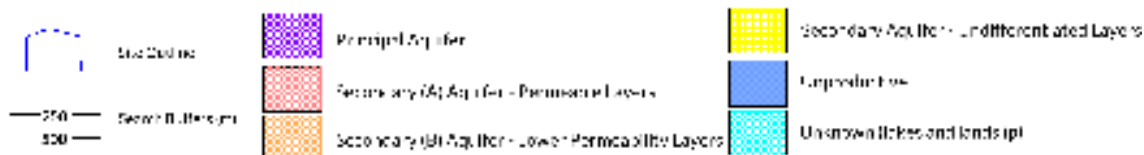
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



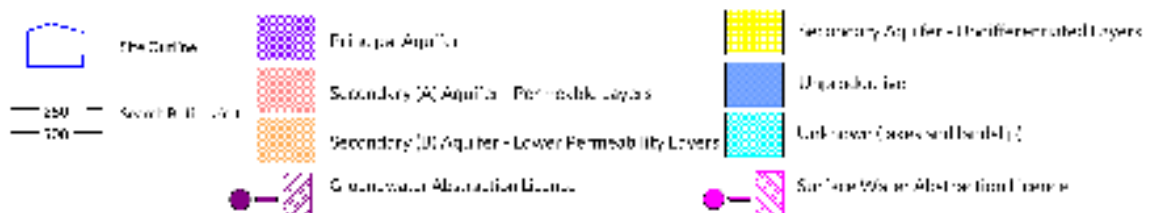
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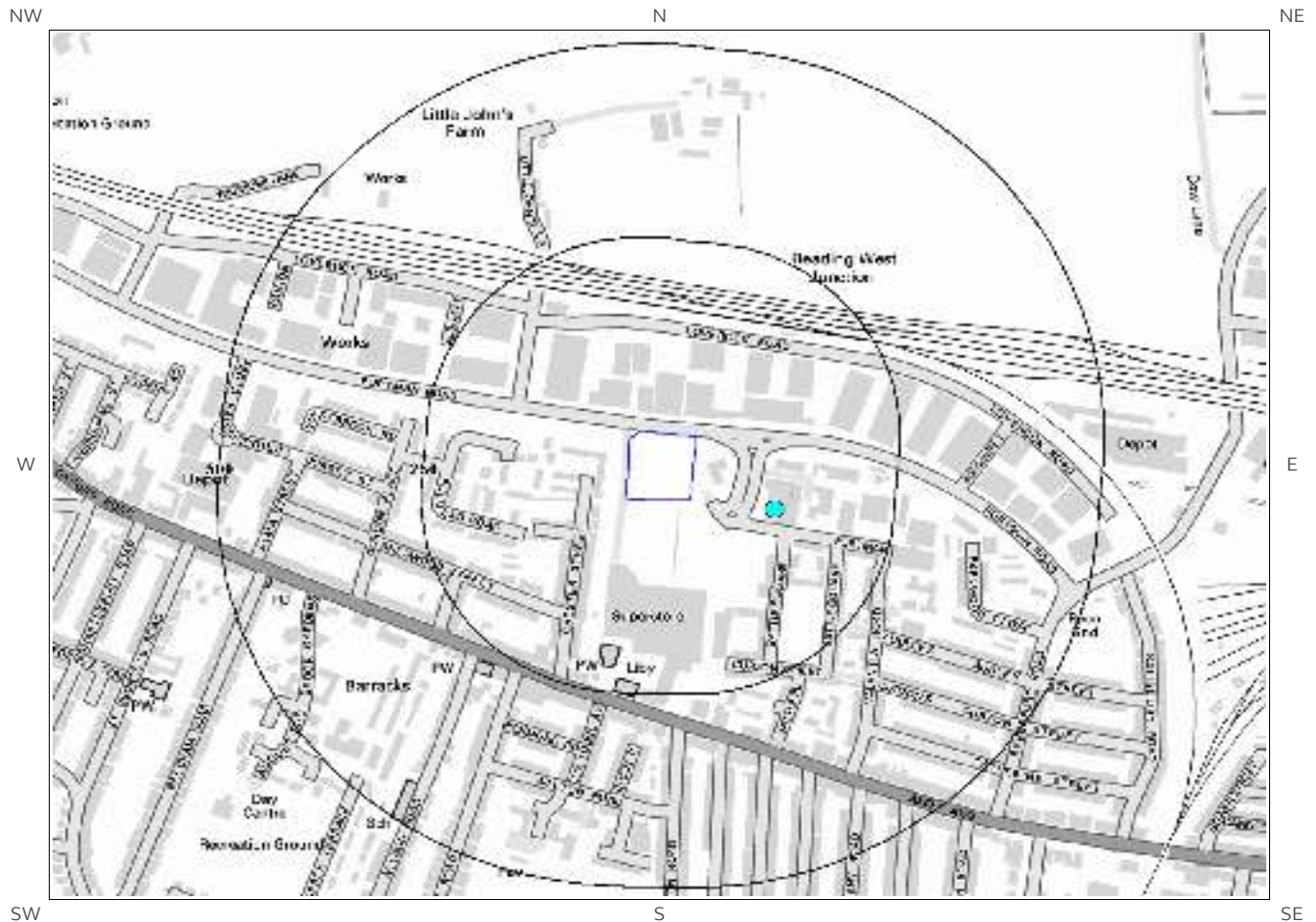
6b. Aquifer Within Bedrock Geology and Abstraction Licences



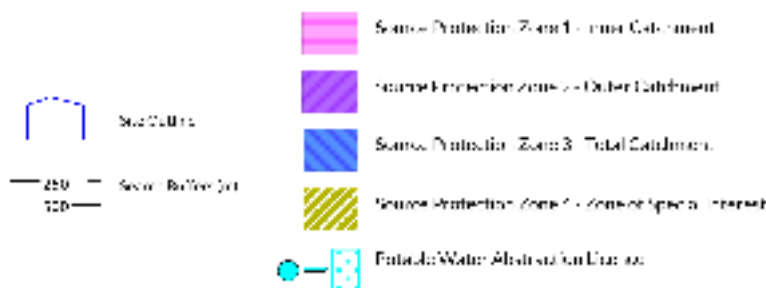
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6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences



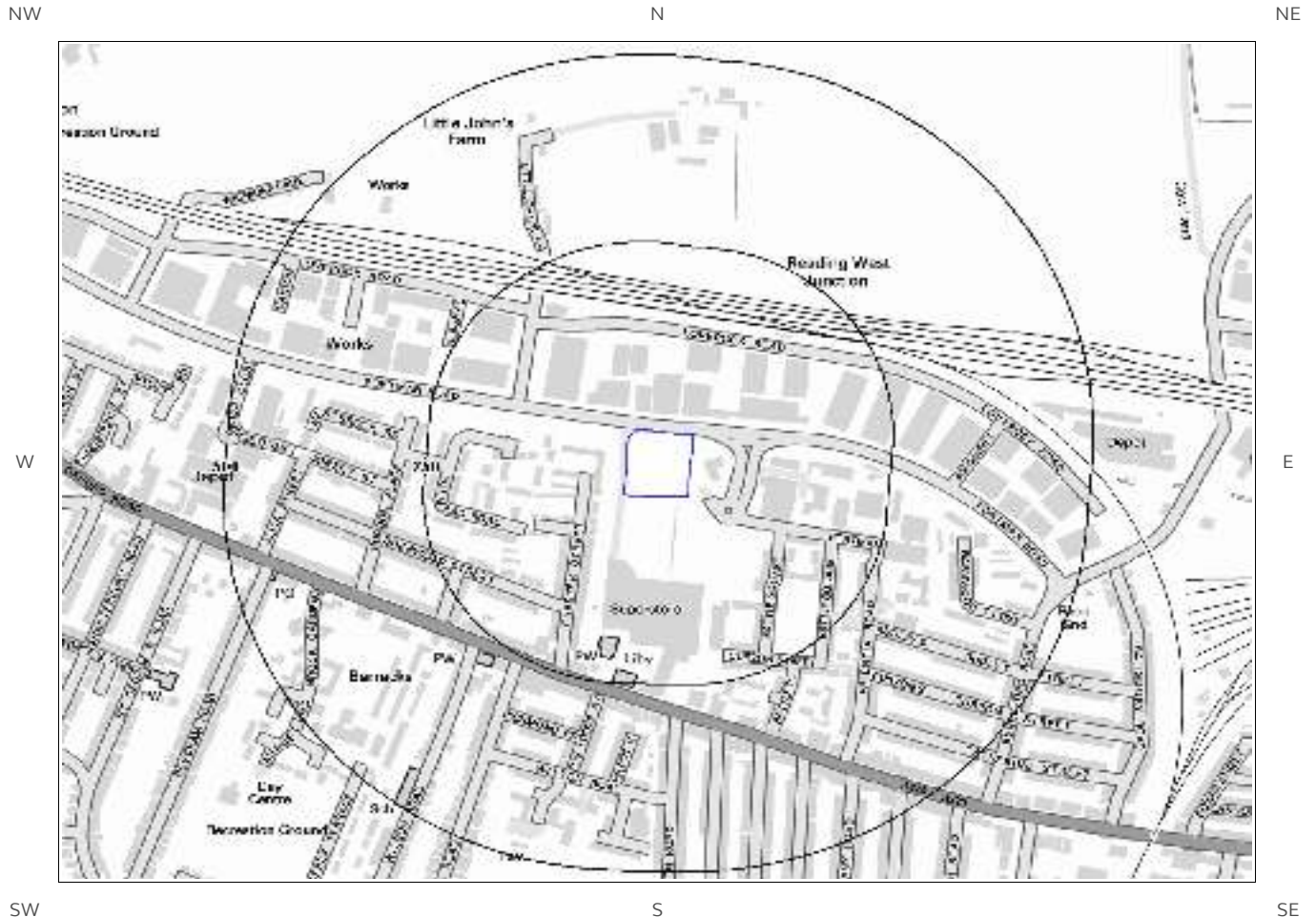
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The map shows the Fort Mifflin area in Philadelphia. Key landmarks include Little John's Farm, Barracks, Day Centre, Recreation Ground, and the central building complex. A large circle is drawn around the central area, and a smaller circle is drawn around the central building. A blue square highlights a specific building, and a red dot is placed near it. The map is oriented with North at the top.

Figure 1: Schematic diagram of the study area showing the location of the proposed water abstraction license. The diagram includes a map of the study area with a dashed line indicating the 'Study Boundary'. A legend identifies four zones: Source Protection Zone 1C - Inner Catchment (dark blue), Source Protection Zone 2C - Outer Catchment within Confined Aquifer (medium blue), Source Protection Zone 3C - Total Catchment within a Confined Aquifer (light blue), and Potential Water Abstraction License (red dot). A scale bar shows distances of 0, 500, and 1000 meters.

6e. Hydrology – Watercourse Network and River Quality



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6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Records of strata classification within the superficial geology at or in proximity to the property Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
8	52	N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	296	E	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
9	317	E	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.2 Aquifer within Bedrock Deposits

Records of strata classification within the bedrock geology at or in proximity to the property Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
2	296	E	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

6.3 Groundwater Abstraction Licences

Groundwater Abstraction Licences within 2000m of the study site

Identified

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details
6	103	E	469800 173900	Status: Historical Licence No: 28/39/23/0181 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: BATTLE HOSPITAL, OXFORD ROAD, READING Data Type: Point Name: WEST BERKSHIRE HEALTH AUTHORITY Annual Volume (m³): 136875 Max Daily Volume (m³): 400 Original Application No: - Original Start Date: 17/01/1992 Expiry Date: - Issue No: 100 Version Start Date: 07/01/1999 Version End Date:
7	240	NW	469500 174200	Status: Active Licence No: 28/39/23/0070 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LITTLE JOHN'S FARM, READING (A) Data Type: Point Name: DRAYTON Annual Volume (m³): 9819 Max Daily Volume (m³): 26.82 Original Application No: - Original Start Date: 09/01/1967 Expiry Date: - Issue No: 100 Version Start Date: 09/01/1967 Version End Date:
8A	401	N	469700 174400	Status: Active Licence No: 28/39/23/0070 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LITTLE JOHN'S FARM, READING (B) Data Type: Point Name: DRAYTON Annual Volume (m³): 9819 Max Daily Volume (m³): 26.82 Original Application No: - Original Start Date: 09/01/1967 Expiry Date: - Issue No: 100 Version Start Date: 09/01/1967 Version End Date:
9A	401	N	469700 174400	Status: Active Licence No: 28/39/23/0070 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LITTLE JOHN'S FARM, READING (C) Data Type: Point Name: DRAYTON Annual Volume (m³): 9819 Max Daily Volume (m³): 26.82 Original Application No: - Original Start Date: 09/01/1967 Expiry Date: - Issue No: 100 Version Start Date: 09/01/1967 Version End Date:
10	499	NE	470100 174300	Status: Active Licence No: 28/39/23/0070 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LITTLE JOHN'S FARM, READING (E) Data Type: Point Name: DRAYTON Annual Volume (m³): 9819 Max Daily Volume (m³): 26.82 Original Application No: - Original Start Date: 09/01/1967 Expiry Date: - Issue No: 100 Version Start Date: 09/01/1967 Version End Date:
11	649	E	470359 174009	Status: Active Licence No: TH/039/0023/032 Details: Transfer Between Sources (Post Water Act 2003) Direct Source: THAMES GROUNDWATER Point: BERKSHIRE DOWNS CHALK AT COW LANE, READING, BERKSHIRE Data Type: Poly4 Name: Network Rail Infrastructure Limited Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 28/01/2019 Expiry Date: 30/06/2019 Issue No: 1 Version Start Date: 28/01/2019 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
12	703	E	470400 174100	Status: Active Licence No: 28/39/23/0128 Details: Process Water Direct Source: THAMES GROUNDWATER Point: CARDIFF ROAD, READING POINT A Data Type: Point Name: HILLIER GROUP OF COMPANIES	Annual Volume (m³): 6682 Max Daily Volume (m³): 27.28 Original Application No: - Original Start Date: 22/01/1975 Expiry Date: - Issue No: 100 Version Start Date: 01/04/2008 Version End Date:
Not shown	722	NE	470100 174600	Status: Active Licence No: 28/39/23/0070 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LITTLE JOHN'S FARM, READING (D) Data Type: Point Name: DRAYTON	Annual Volume (m³): 9819 Max Daily Volume (m³): 26.82 Original Application No: - Original Start Date: 09/01/1967 Expiry Date: - Issue No: 100 Version Start Date: 09/01/1967 Version End Date:
Not shown	801	NW	469100 174600	Status: Historical Licence No: 28/39/23/0137 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: SCOURS LANE, READING (A - R) Data Type: Point Name: READING BOROUGH COUNCIL	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 17/11/1976 Expiry Date: - Issue No: 100 Version Start Date: 17/11/1976 Version End Date:
Not shown	884	NW	468900 174500	Status: Historical Licence No: 28/39/23/0131 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: SCOURS LANE, READING Data Type: Point Name: PRUDENTIAL IBIS CLUB	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 14/01/1967 Expiry Date: - Issue No: 100 Version Start Date: 01/05/1992 Version End Date:
Not shown	884	NW	468900 174500	Status: Historical Licence No: 28/39/23/0131 Details: Spray Irrigation - Direct Direct Source: THAMES GROUNDWATER Point: SCOURS LANE, READING Data Type: Point Name: PRUDENTIAL IBIS CLUB	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 14/01/1967 Expiry Date: - Issue No: 100 Version Start Date: 01/05/1992 Version End Date:
Not shown	896	E	470600 174000	Status: Active Licence No: 28/39/23/0128 Details: Process Water Direct Source: THAMES GROUNDWATER Point: CARDIFF ROAD, READING POINT B Data Type: Point Name: HILLIER GROUP OF COMPANIES	Annual Volume (m³): 6682 Max Daily Volume (m³): 27.28 Original Application No: - Original Start Date: 22/01/1975 Expiry Date: - Issue No: 100 Version Start Date: 01/04/2008 Version End Date:
Not shown	1054	NW	468700 174500	Status: Historical Licence No: 28/39/23/0176 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: SCOURS LANE, READING TOWN F.C., READING Data Type: Point Name: READING TOWN FOOTBALL CLUB	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 30/09/1994 Expiry Date: - Issue No: 100 Version Start Date: 30/09/1994 Version End Date:

ID	Distance (m)	Direction	NGR	Details		
Not shown	1054	NW	468700 174500	Status: Historical Licence No: 28/39/23/0176 Details: Spray Irrigation - Direct Direct Source: THAMES GROUNDWATER Point: SCOURS LANE, READING TOWN F.C., READING Data Type: Point Name: READING TOWN FOOTBALL CLUB	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 30/09/1994 Expiry Date: - Issue No: 100 Version Start Date: 30/09/1994 Version End Date:	
Not shown	1200	E	470900 174100	Status: Historical Licence No: 28/39/23/0041 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: CARDIFF ROAD, READING, BERKSHIRE Data Type: Point Name: COX & WYMAN LTD	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 11/07/1966 Expiry Date: - Issue No: 100 Version Start Date: 11/07/1966 Version End Date:	
Not shown	1200	E	470900 174100	Status: Historical Licence No: 28/39/23/0041 Details: Non-Evaporative Cooling Direct Source: THAMES GROUNDWATER Point: CARDIFF ROAD, READING, BERKSHIRE Data Type: Point Name: COX & WYMAN LTD	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 11/07/1966 Expiry Date: - Issue No: 100 Version Start Date: 11/07/1966 Version End Date:	
Not shown	1200	E	470900 174100	Status: Active Licence No: 28/39/23/0167 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: MEADOW ROAD, READING, BERKSHIRE Data Type: Point Name: MANROSE MANUFACTURING LTD	Annual Volume (m³): 90920 Max Daily Volume (m³): 727.4 Original Application No: - Original Start Date: 23/01/1990 Expiry Date: - Issue No: 101 Version Start Date: 30/06/2006 Version End Date:	
Not shown	1200	E	470900 174100	Status: Active Licence No: 28/39/23/0167 Details: Non-Evaporative Cooling Direct Source: THAMES GROUNDWATER Point: MEADOW ROAD, READING, BERKSHIRE Data Type: Point Name: MANROSE MANUFACTURING LTD	Annual Volume (m³): 90920 Max Daily Volume (m³): 727.4 Original Application No: - Original Start Date: 23/01/1990 Expiry Date: - Issue No: 101 Version Start Date: 30/06/2006 Version End Date:	
Not shown	1296	N	469140 175200	Status: Historical Licence No: 28/39/23/0139 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: CHAZEY COURT FARM, MAPLEDURHAM Data Type: Point Name: EYSTON	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 23/03/1977 Expiry Date: - Issue No: 101 Version Start Date: 09/09/1999 Version End Date:	
Not shown	1308	NW	469110 175200	Status: Historical Licence No: 28/39/23/0139 Details: General use relating to Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: CHAZEY COURT FARM, MAPLEDURHAM, - TUBEWELL 'A' Data Type: Point Name: EYSTON	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 23/03/1977 Expiry Date: - Issue No: 101 Version Start Date: 09/09/1999 Version End Date:	

ID	Distance (m)	Direction	NGR	Details
Not shown	1558	E	471200 173500	Status: Active Licence No: 28/39/23/0042 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: CHEAPSIDE, READING, BERKSHIRE Data Type: Point Name: PRIMARK STORES LIMITED Annual Volume (m³): 14933 Max Daily Volume (m³): 40.91 Original Application No: - Original Start Date: 11/07/1966 Expiry Date: - Issue No: 101 Version Start Date: 01/04/2008 Version End Date: -

6.4 Surface Water Abstraction Licences

Surface Water Abstraction Licences within 2000m of the study site

Identified

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details
Not shown	1794	E	471440 174450	Status: Historical Licence No: 28/39/23/0196 Details: Transfer between sources Direct Source: THAMES SURFACE WATER - NON TIDAL Point: THAMES AT CHRISTCHURCH MEADOW Data Type: Point Name: READING BOROUGH COUNCIL Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 12/05/2003 Expiry Date: 31/03/2016 Issue No: 1 Version Start Date: 12/05/2003 Version End Date: -
Not shown	1794	E	471440 174450	Status: Historical Licence No: 28/39/23/0196 Details: Lake & Pond Throughflow Direct Source: THAMES SURFACE WATER - NON TIDAL Point: THAMES AT CHRISTCHURCH MEADOW Data Type: Point Name: READING BOROUGH COUNCIL Annual Volume (m³): 31536 Max Daily Volume (m³): 86.4 Application No: - Original Start Date: 12/05/2003 Expiry Date: 31/03/2016 Issue No: 1 Version Start Date: 01/04/2006 Version End Date: -
Not shown	1794	E	471440 174450	Status: Historical Licence No: 28/39/23/0199/TR Details: Transfer Between Sources (Post Water Act 2003) Direct Source: THAMES SURFACE WATER - NON TIDAL Point: RIVER THAMES - CHRISTCHURCH MEADOWS Data Type: Point Name: READING BOROUGH COUNCIL Annual Volume (m³): 1.752 Max Daily Volume (m³): 4800 Application No: - Original Start Date: 10/09/2008 Expiry Date: 31/03/2016 Issue No: 1 Version Start Date: 10/09/2008 Version End Date: -

6.5 Potable Water Abstraction Licences

Potable Water Abstraction Licences within 2000m of the study site

Identified

The following Potable Water Abstraction Licences records are represented as points, lines and regions on the SPZ and Potable Water Abstraction Licences Map (6c):

ID	Distance (m)	Direction	NGR	Details
1	103	E	469800	Status: Historical Annual Volume (m³): 136875

ID	Distance (m)	Direction	NGR	Details	
			173900	Licence No: 28/39/23/0181 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: BATTLE HOSPITAL, OXFORD ROAD, READING Data Type: Point Name: WEST BERKSHIRE HEALTH AUTHORITY	Max Daily Volume (m³): 400 Original Application No: - Original Start Date: 17/01/1992 Expiry Date: - Issue No: 100 Version Start Date: Version End Date:
Not shown	884	NW	468900 174500	Status: Historical Licence No: 28/39/23/0131 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: SCOURS LANE, READING Data Type: Point Name: PRUDENTIAL IBIS CLUB	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 14/01/1967 Expiry Date: - Issue No: 100 Version Start Date: Version End Date:
Not shown	1054	NW	468700 174500	Status: Historical Licence No: 28/39/23/0176 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: SCOURS LANE, READING TOWN F.C, READING Data Type: Point Name: READING TOWN FOOTBALL CLUB	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 30/09/1994 Expiry Date: - Issue No: 100 Version Start Date: Version End Date:
Not shown	1200	E	470900 174100	Status: Historical Licence No: 28/39/23/0041 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: CARDIFF ROAD, READING, BERKSHIRE Data Type: Point Name: COX & WYMAN LTD	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 11/07/1966 Expiry Date: - Issue No: 100 Version Start Date: Version End Date:
Not shown	1200	E	470900 174100	Status: Active Licence No: 28/39/23/0167 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: MEADOW ROAD, READING, BERKSHIRE Data Type: Point Name: MANROSE MANUFACTURING LTD	Annual Volume (m³): 90920 Max Daily Volume (m³): 727.4 Original Application No: - Original Start Date: 23/01/1990 Expiry Date: - Issue No: 101 Version Start Date: Version End Date:
Not shown	1558	E	471200 173500	Status: Active Licence No: 28/39/23/0042 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: THAMES GROUNDWATER Point: CHEAPSIDE, READING, BERKSHIRE Data Type: Point Name: PRIMARK STORES LIMITED	Annual Volume (m³): 14933 Max Daily Volume (m³): 40.91 Original Application No: - Original Start Date: 11/07/1966 Expiry Date: - Issue No: 101 Version Start Date: Version End Date:

6.6 Source Protection Zones

Source Protection Zones within 500m of the study site

None identified

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Source Protection Zones within the Confined Aquifer within 500m of the study site

None identified

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site

Identified

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Major Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.
208	N	Major Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.
296	E	Major Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.
322	NE	Major Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.

6.9 River Quality

Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site

None identified

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Ordnance Survey MasterMap Water Network

Ordnance Survey MasterMap Water Network entries within 500m of the study site

Database searched and no data found.

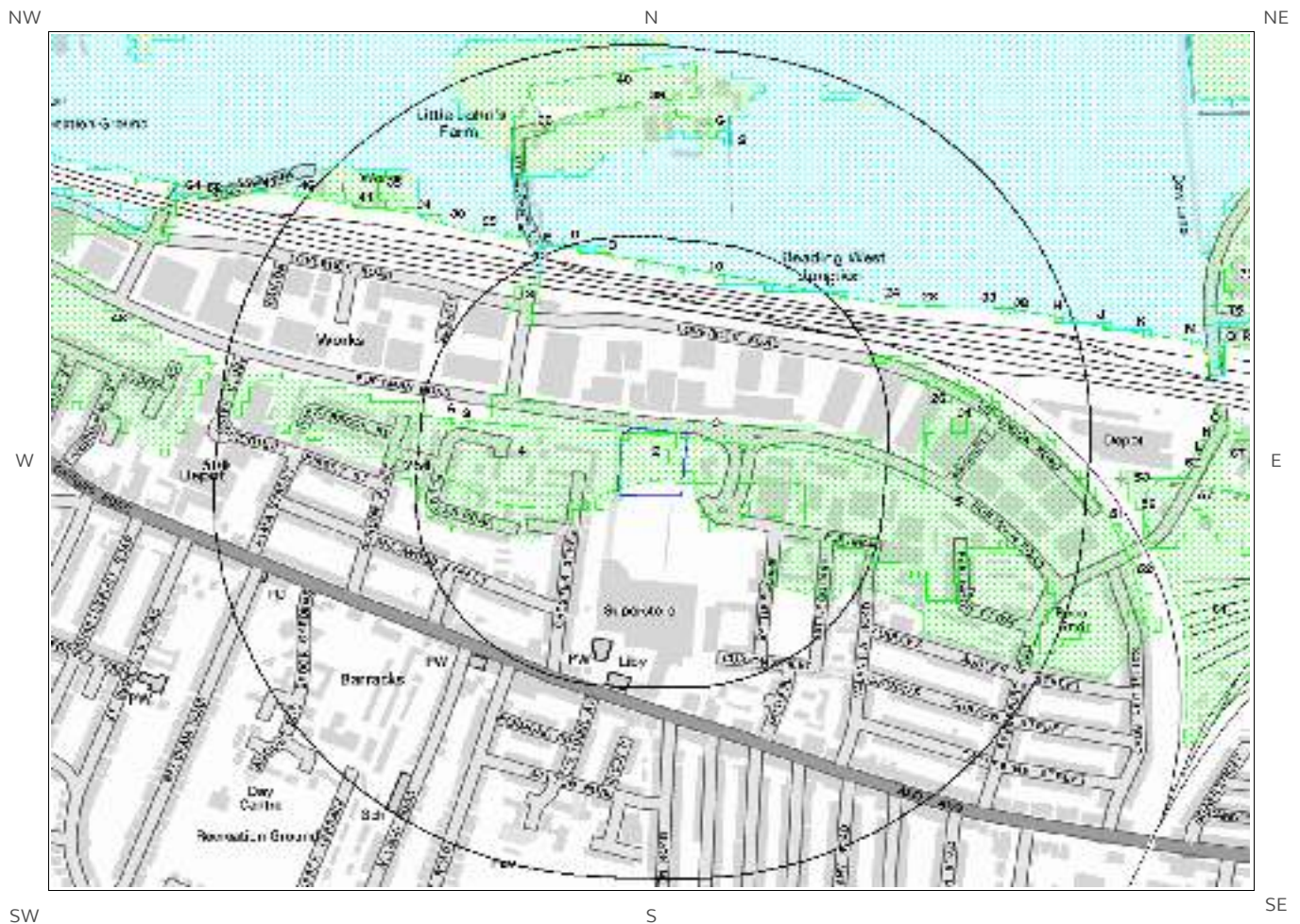
6.11 Surface Water Features

Surface water features within 250m of the study site

None identified

Database searched and no data found.

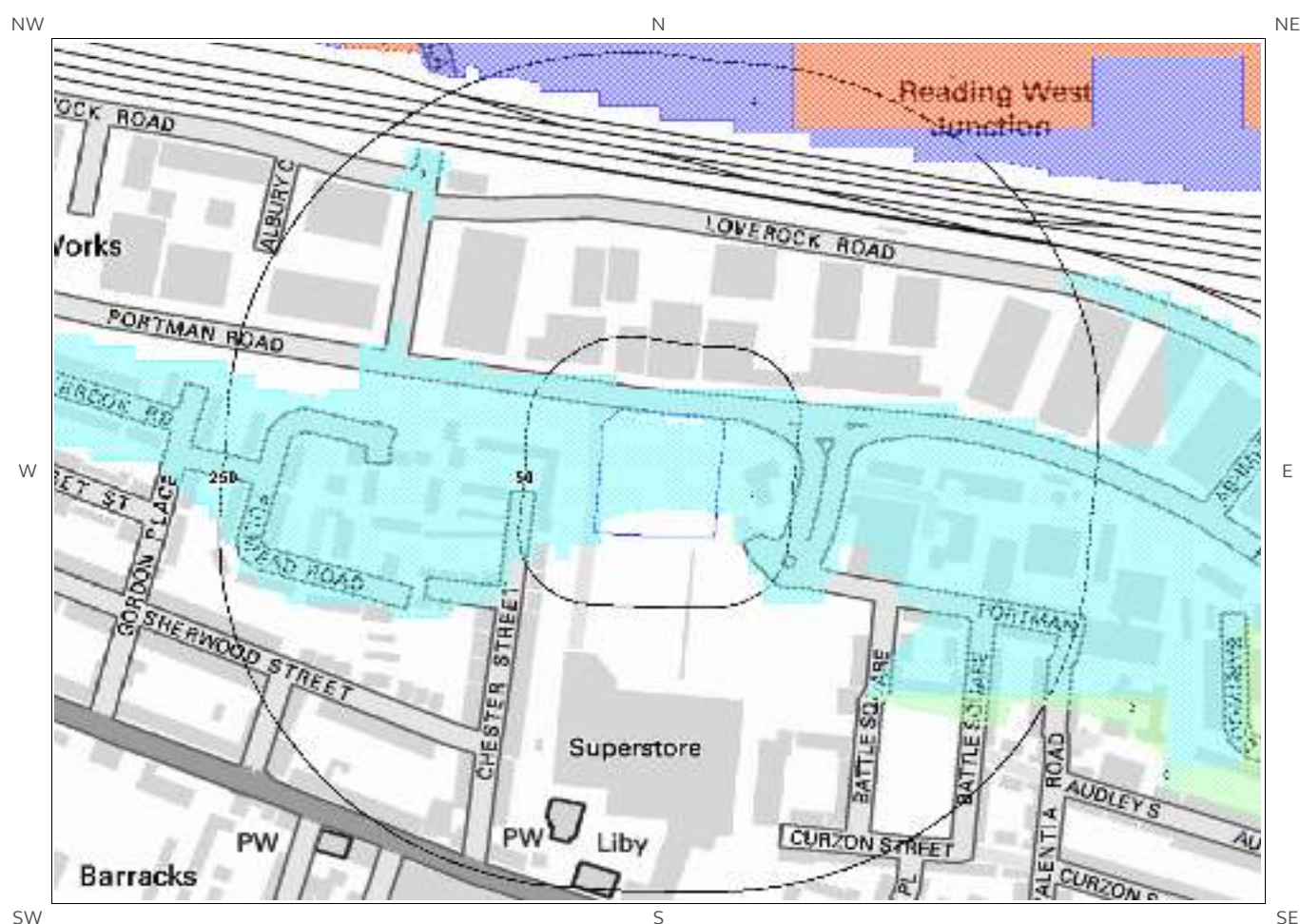
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



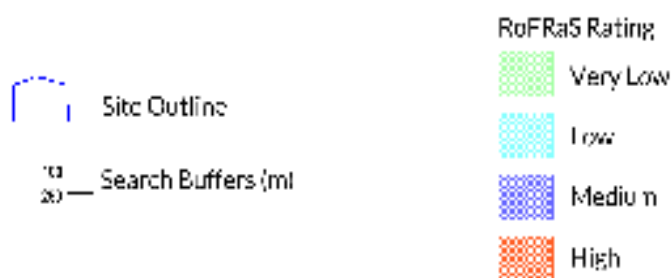
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7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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7 Flooding

7.1 River and Coastal Zone 2 Flooding

Environment Agency/Natural Resources Wales Zone 2 floodplain within 250m

Identified

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1	0	On Site	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
2	0	On Site	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
3	0	On Site	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
4	0	On Site	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
5	0	On Site	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
6	12	E	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
7	145	SE	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
8	181	NW	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
9	182	W	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
10	198	N	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
11S	211	N	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
12A	213	W	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
13	220	NW	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
14B	226	N	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
15A	230	W	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
16B	232	N	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
17D	241	N	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
18	244	E	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)
19C	246	NE	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Environment Agency/Natural Resources Wales Zone 3 floodplain within 250m Identified

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1	200	N	20-Jun-2019	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

Highest risk of flooding onsite Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Low (greater than 1 in 1000 but less than 1 in 100) chance of flooding in any given year.

Any relevant data within 250m is represented on the RoFRaS Flood map. Data to 50m is reported in the table below.

ID	Distance (m)	Direction	RoFRaS flood Risk
1	0.0	On Site	Low

7.4 Flood Defences

Flood Defences within 250m of the study site None identified
Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Areas benefiting from Flood Defences within 250m of the study site None identified

7.6 Areas benefiting from Flood Storage

Areas used for Flood Storage within 250m of the study site None identified

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site Identified

Clearwater Flooding or Superficial Deposits Flooding Clearwater Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 Highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

7.8 Groundwater Flooding Confidence Areas

British Geological Survey confidence rating in this result High

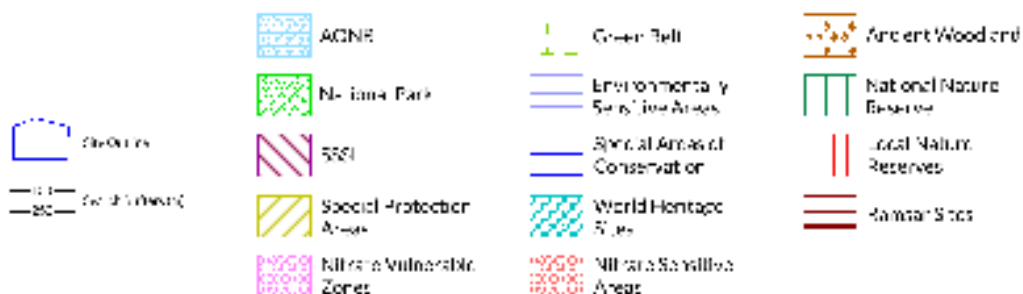
Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



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8. Designated Environmentally Sensitive Sites

Designated Environmentally Sensitive Sites within 2000m of the study site

Identified

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

0

Database searched and no data found.

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

2

The following records of Designated Ancient Woodland provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
Not shown	1767	NW	CHAZEY WOOD	Ancient Replanted Woodland
Not shown	1969	W	KENTWOOD GROVE	Ancient and Semi-Natural Woodland

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

5

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
1	1362	SW	Lousehill Copse	Natural England
2	1416	SW	Lousehill Copse	Natural England
Not shown	1554	W	McIlroy Park	Natural England
Not shown	1690	W	Round Copse	Natural England
Not shown	1725	W	Lousehill Copse	Natural England

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

1

The following Area of Outstanding Natural Beauty (AONB) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	AONB/NSA Name	Data Source
Not shown	1440	N	Chilterns	Natural England

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

2

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
6	0	On Site	Existing	DEFRA
7	296	E	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a **Groundsure Geo Insight**, available from our **website**. The following information has been found:

9.1.1 Shrink Swell

Maximum Shrink-Swell** hazard rating identified on the study site Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

9.1.2 Landslides

Maximum Landslide* hazard rating identified on the study site Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

Maximum Soluble Rocks* hazard rating identified on the study site Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant soluble rocks are present. Problems unlikely except with considerable surface or subsurface water flow. No special actions required to avoid problems due to soluble rocks. No special ground investigation required or increased construction costs are likely. An increase in financial risk due to potential problems with soluble rocks is unlikely.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

Maximum Compressible Ground* hazard rating identified on the study site

Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

Maximum Collapsible Rocks* hazard rating identified on the study site

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

Maximum Running Sand** hazard rating identified on the study site

Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property no significant increase in insurance risk due to running sand problems is likely.

* This indicates an automatically generated 50m buffer and site.

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Coal mining areas within 75m of the study site

None identified

Database searched and no data found.

10.2 Non-Coal Mining

Non-Coal Mining areas within 50m of the study site boundary

None identified

Database searched and no data found.

10.3 Brine Affected Areas

Brine affected areas within 75m of the study site

None identified

Guidance: No Guidance Required.

Contact Details

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general@wdeconsulting.co.uk



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**The Coal
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WDE Consulting Ltd

62a, WESTERN ROAD,
TRING, HP23 4BB

Report Reference: WDE-6213641

Your Reference: 19-335

Report Date 1 Aug 2019

Report Delivery Email - pdf
Method:

Geo Insight

Address: TESCO CARPARK, TESCO SUPERSTORE, PORTMAN ROAD, READING, RG30 1AW

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on (T) 08444 159 000 quoting the above report reference number.

Yours faithfully,

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Date: 1 Aug 2019

Reference: WDE-6213641

Client: WDE Consulting Ltd

NW N NE



SW S SE

Aerial Photograph Capture date: 20-Apr-2015
Grid Reference: 469660,173961
Site Size: 0.6886ha

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Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale

1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	Yes
	1.2.2 Are there any records of landslide within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and linear features	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale?	No

Section 2: Geology 1:50,000 Scale

2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslide within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and linear features

2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.

2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?

Yes

2.3.3 Are there any records of linear features within 500m of the study site boundary?

No

Section 3: Radon

3. Radon

3.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

3.2 Radon Protection

No radon protective measures are necessary.

Section 4: Ground Workings

	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	0	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	1	16

Section 5: Mining, Extraction & Natural Cavities

	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	2	1
5.4 Non-Coal Mining*	0	0	4	2	0
5.5 Non-Coal Mining Cavities	0	0	0	0	3
5.5 Natural Cavities	0	0	0	0	6

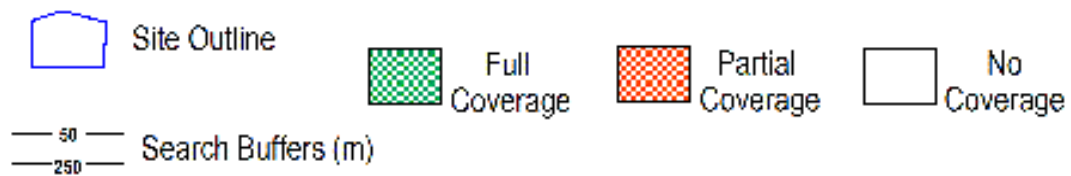
Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Cornwall and Devon Metalliferous Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Very Low				
6.2 Landslides	Very Low				
6.3 Ground Dissolution of Soluble Rocks	Very Low				
6.4 Compressible Deposits	Moderate				
6.5 Collapsible Deposits	Very Low				
6.5 Running Sand	Low				
Section 7: Borehole Records	On-site	0-50m	51-250		
7 BGS Recorded Boreholes	0	2	15		
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250		
8 Records of Background Soil Chemistry	2	2	0		
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500	
9.1 Tunnels	0	0	0	Not Searched	
9.2 Historical Railway and Tunnel Features	0	0	30	Not Searched	
9.3 Historical Railways	0	0	0	Not Searched	
9.4 Active Railways	0	0	82	Not Searched	
9.5 Railway Projects	0	0	0	0	

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	No coverage
2	296.0	Some deposits are mapped	Full	Full	No coverage
3	997.0	Some deposits are mapped	Full	Full	No coverage
4	1047.0	Some deposits are mapped	Full	Full	No coverage

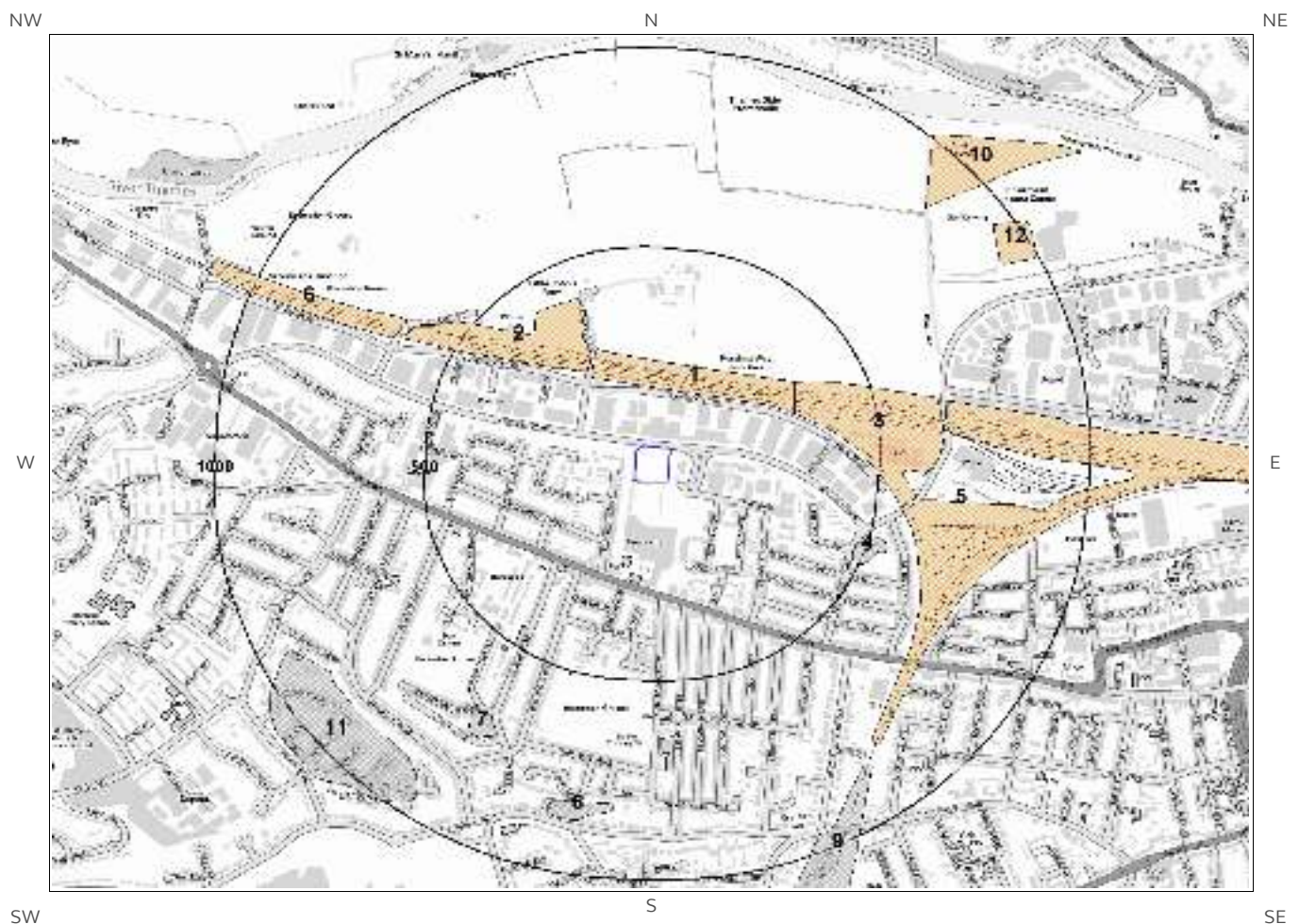
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

1 Geology (1:10,000 scale).

1.1 Artificial Ground map (1:10,000 scale)



Artificial Ground Legend

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1. Geology 1:10,000 scale

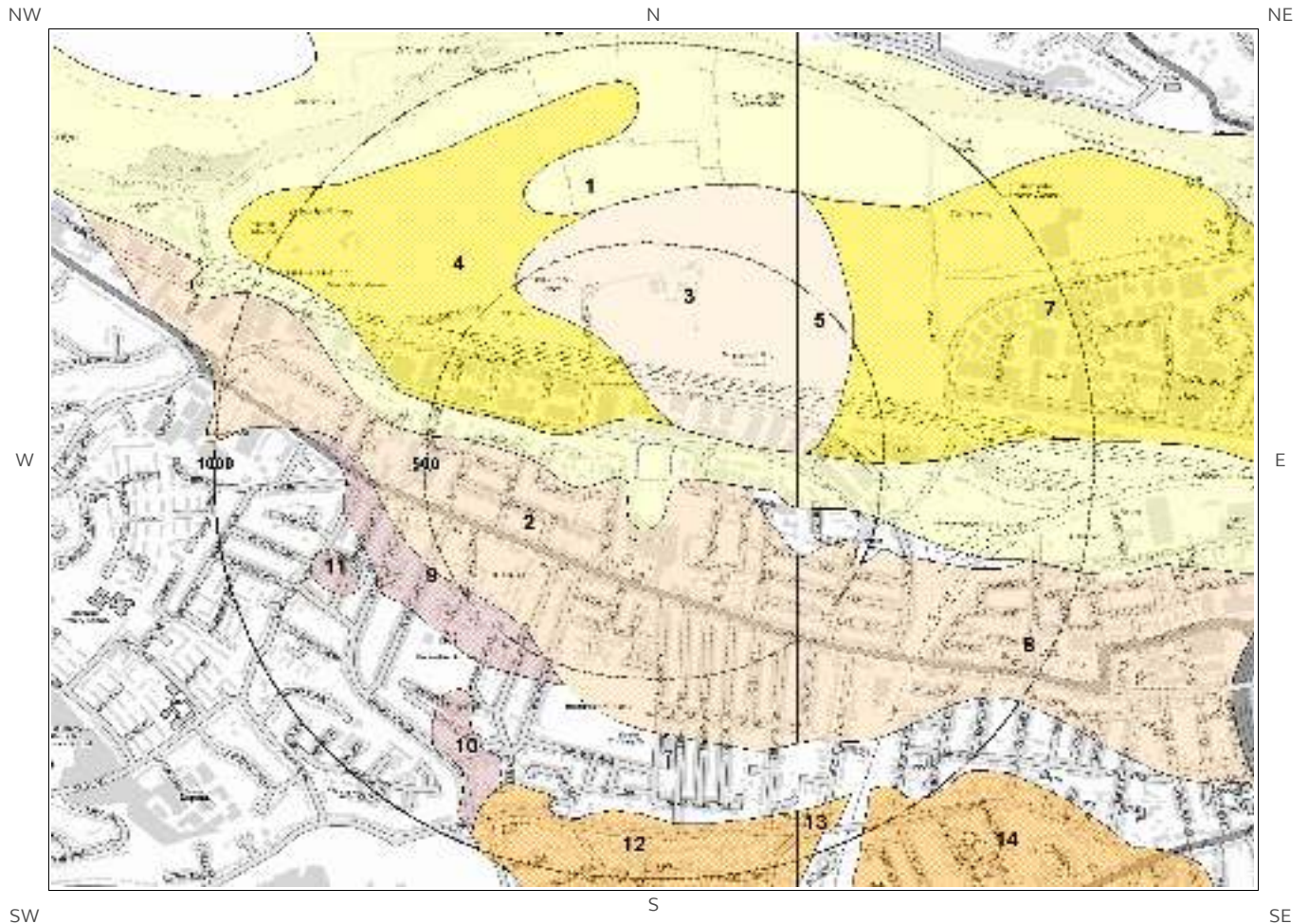
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? Yes

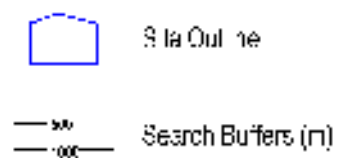
ID	Distance	Direction	LEX Code	Description	Rock Description
1	145.0	N	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
2	228.0	NW	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
3	309.0	E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
4	473.0	E	WGR-VOID	Worked Ground (Undivided)	Void

1.2 Superficial Deposits and Landslips map (1:10,000 scale)



Artificial Ground Legend

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1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	ALV-Z	Alluvium - Silt (unlithified Deposits Coding Scheme)	Silt
2	20.0	SE	TPGR-XSV	Taplow Gravel Formation - Sand And Gravel	Sand And Gravel
3	48.0	NE	KPGR-XSV	Kempton Park Gravel Formation - Sand And Gravel	Sand And Gravel
4	50.0	N	LASI-XCZ	Langley Silt Member - Clay And Silt	Clay And Silt
5	296.0	E	KPGR-XSV	Kempton Park Gravel Formation - Sand And Gravel	Sand And Gravel
6	296.0	E	ALV-Z	Alluvium - Silt (unlithified Deposits Coding Scheme)	Silt
7	305.0	E	LASI-XCZ	Langley Silt Member - Clay And Silt	Clay And Silt
8	357.0	SE	TPGR-XSV	Taplow Gravel Formation - Sand And Gravel	Sand And Gravel
9	455.0	SW	HEAD-XVSZC	Head - Gravel, Sand, Silt And Clay	Gravel, Sand, Silt And Clay

1.2.2 Landslip

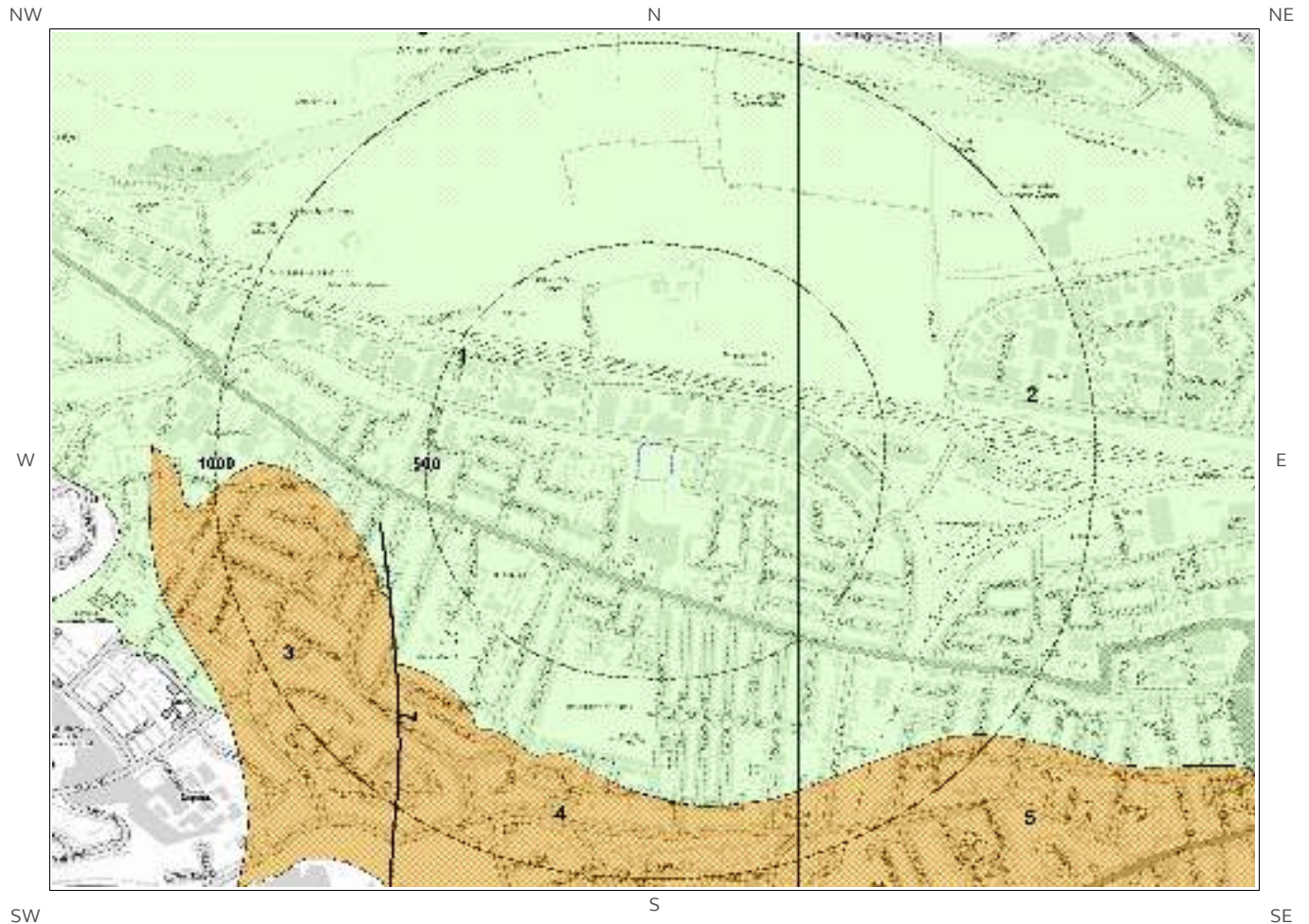
Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

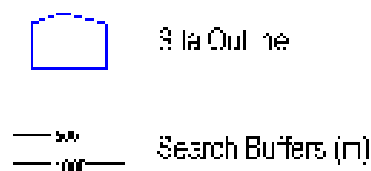
This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and linear features map (1:10,000 scale)



Bedrock and linear features Legend

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1.3 Bedrock and linear features

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	LSNCK-CHLK	Lewes Nodular Chalk Formation, Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated) - Chalk	Campanian Age - Turonian Age
2	296.0	E	LSNCK-CHLK	Lewes Nodular Chalk Formation, Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated) - Chalk	Campanian Age - Turonian Age

1.3.2 Linear features

Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale? No

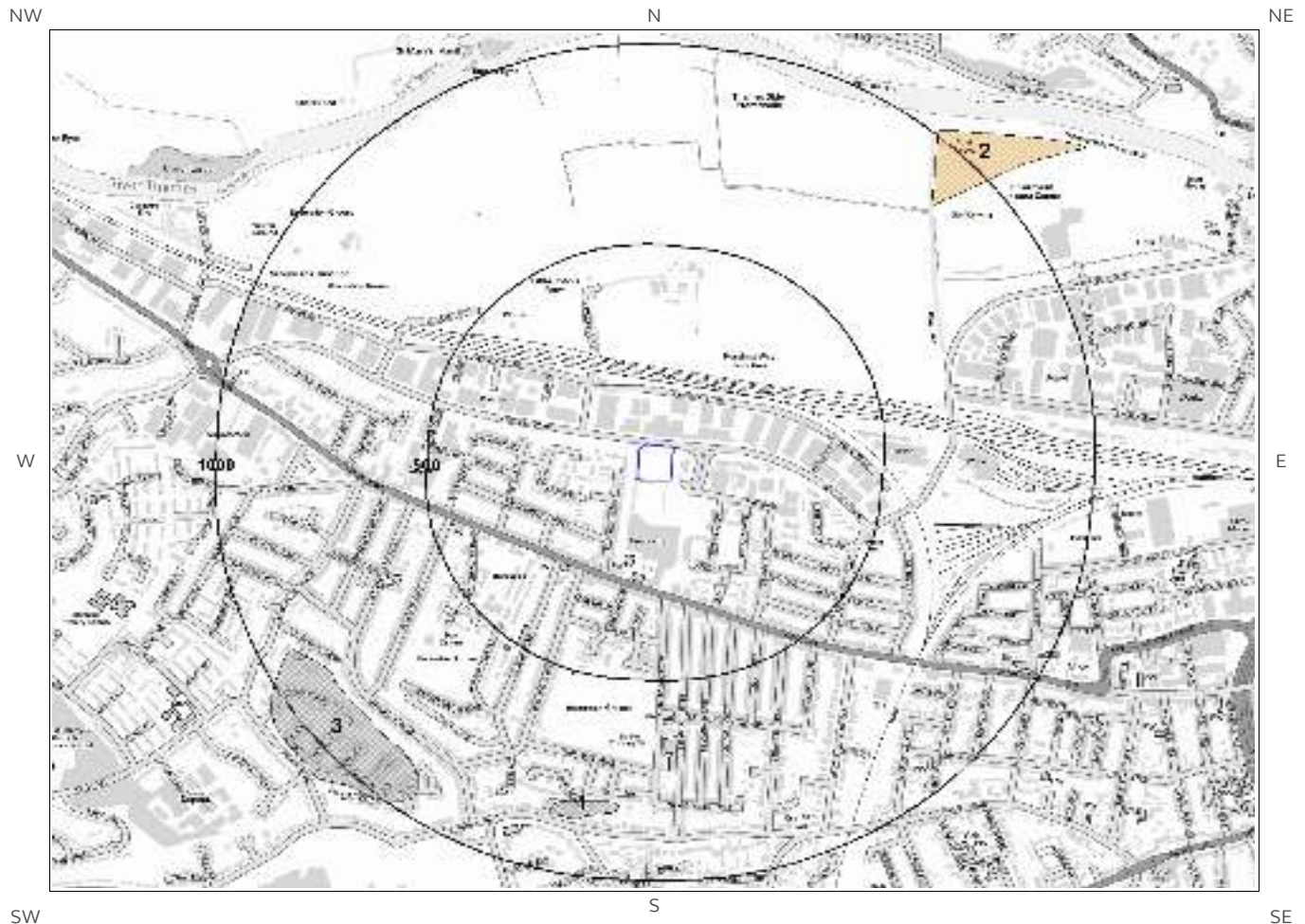
Database searched and no data found at this scale.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

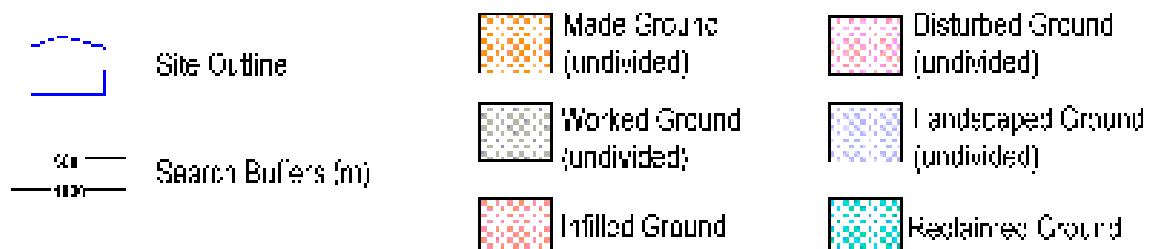
This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground map



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2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 268

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? No

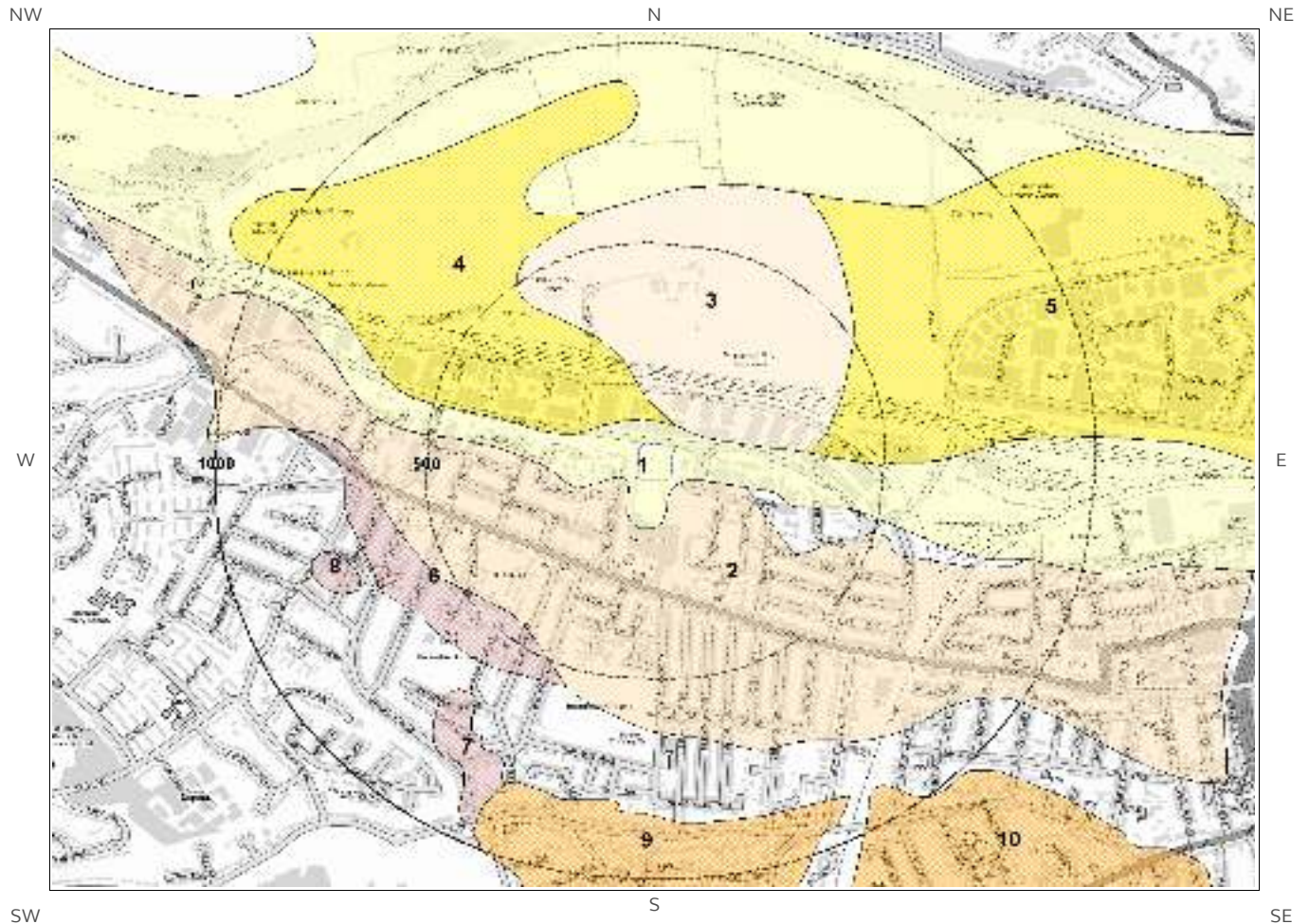
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

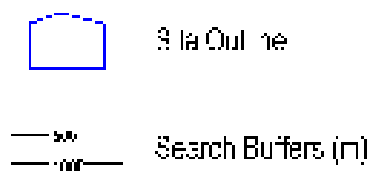
Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

2.2 Superficial Deposits and Landslips map (1:50,000 scale)



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2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
2	20.0	SE	TPGR-XSV	TAPLOW GRAVEL MEMBER	SAND AND GRAVEL
3	47.0	NE	KPGR-XSV	KEMPTON PARK GRAVEL MEMBER	SAND AND GRAVEL
4	52.0	N	LASI-XCZ	LANGLEY SILT MEMBER	CLAY AND SILT
5	317.0	E	LASI-XCZ	LANGLEY SILT MEMBER	CLAY AND SILT
6	453.0	SW	HEAD-XVSZC	HEAD	GRAVEL, SAND, SILT AND CLAY

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	High	Very Low
20.0	SE	Intergranular	Very High	High
47.0	NE	Intergranular	Very High	High

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

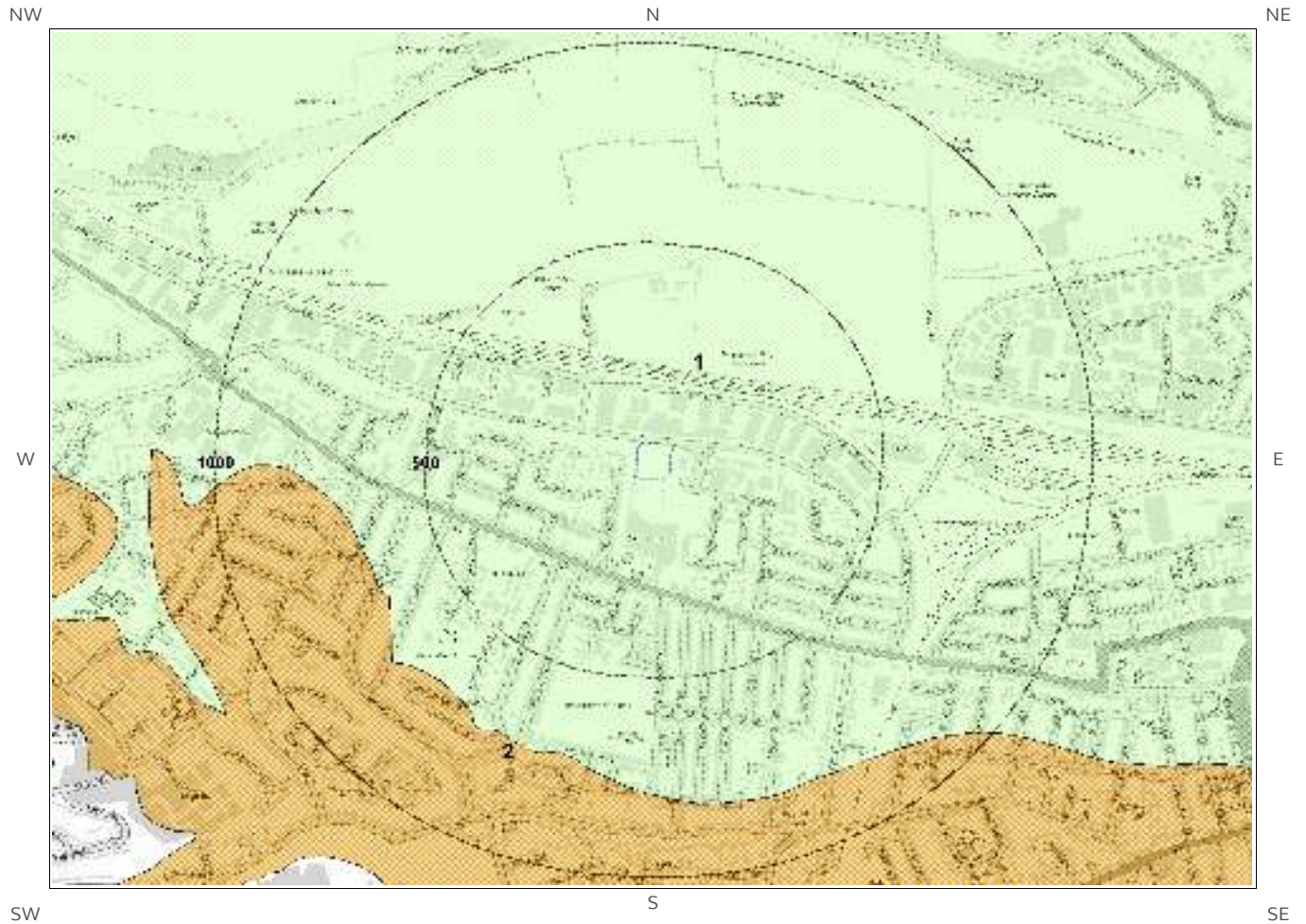
2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary?

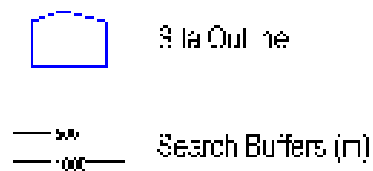
No

Database searched and no data found.

2.3 Bedrock and linear features map (1:50,000 scale)



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2.3 Bedrock, Solid Geology & linear features

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 268

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	SNCK-CHLK	SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) - CHALK	CONIACIAN

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Very High	Very High

2.3.3 Linear features

Are there any records of linear features within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

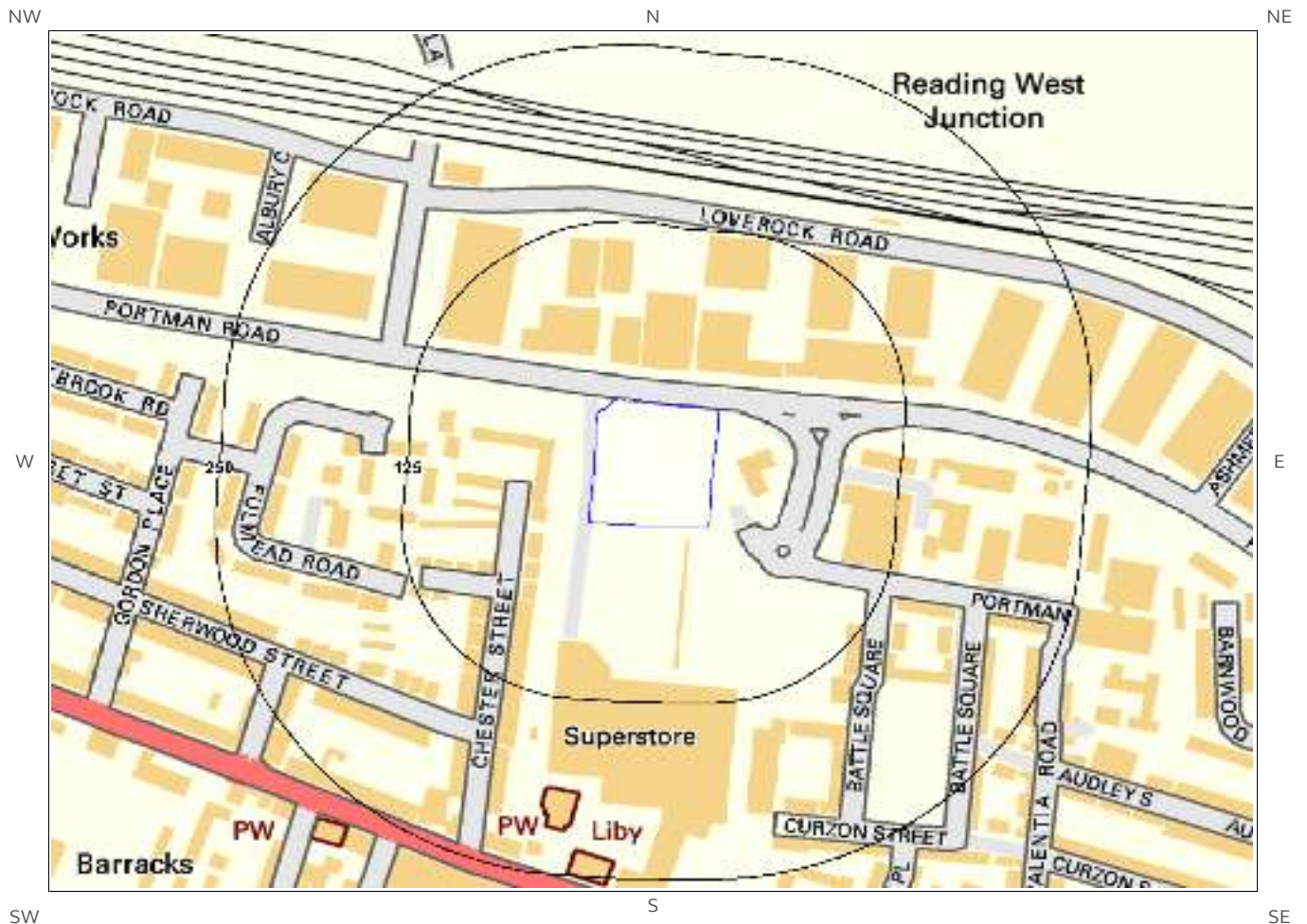
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

3.2 Radon Protection

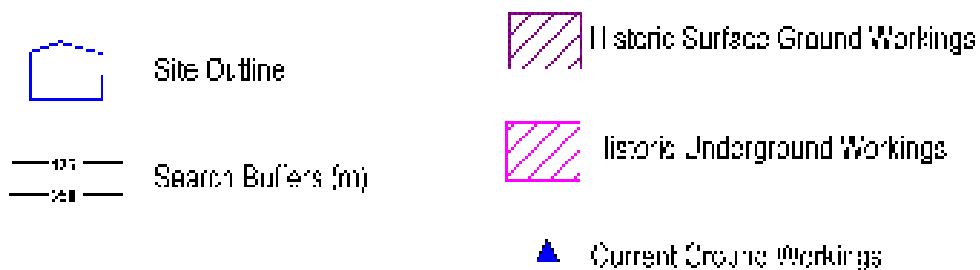
Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

4 Ground Workings map



Ground Workings Legend

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4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? No

Database searched and no data found.

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

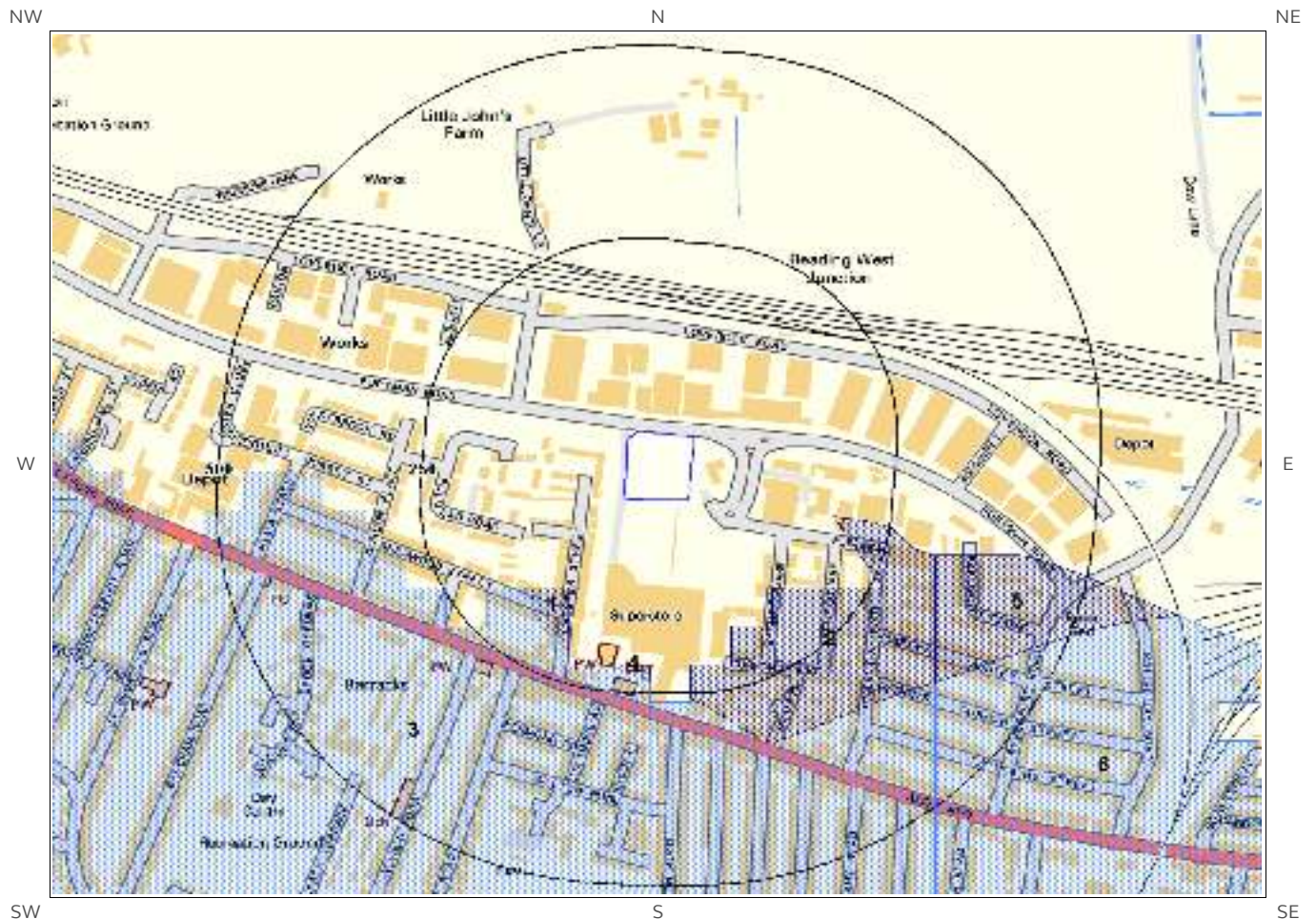
Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	500.0	E	470178 173774	Sand & Gravel	Battle Farm Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	710.0	SW	469254 173304	Chalk	Grovelands Chalk Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	753.0	SW	469230 173269	Sand & Gravel	Prospect Park Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	781.0	S	469570 173135	Clay & Shale	Prospect Park Brick Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	804.0	S	469402 173140	Sand & Gravel	Prospect Park Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	806.0	S	469458 173124	Sand & Gravel	Prospect Park Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	821.0	S	469545 173097	Sand & Gravel	Prospect Park Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	837.0	S	469461 173092	Sand & Gravel	Prospect Park Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	845.0	S	469864 173084	Sand	Tilehurst Road Sand Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	861.0	SW	469248 173137	Sand & Gravel	Prospect Park Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	898.0	SW	468932 173334	Clay & Shale	Grovelands Brick Tile & Pottery Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	917.0	SW	469199 173098	Sand & Gravel	Prospect Park Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	922.0	SW	468975 173253	Clay & Shale	Grovelands Brick Tile & Pottery Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	949.0	SW	469097 173121	Clay & Shale	Prospect Park Brick Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	956.0	SW	469021 173167	Clay & Shale	Grovelands Brick Tile & Pottery Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	977.0	SW	468849 173311	Clay & Shale	Grovelands Brick, Tile & Pottery Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	992.0	SW	468778 173386	Clay & Shale	Grovelands Brick Tile & Pottery Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities map



Mining, Extraction and Natural Cavities Legend

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5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? Yes

The following information provided by JPB is not represented on mapping: Whilst outside of an area where The Coal Authority have information on coal mining activities, Johnson Poole & Bloomer (JPB) have information such as mining plans and maps held within their archive of mining activities that have occurred within 1km of this property. Further details and a quote for services can be obtained by emailing this report to enquiries.gs@jpb.co.uk.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	133.0	SW	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
2	152.0	SE	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
3	167.0	SW	Not available	Chalk	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
4	213.0	S	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
5	311.0	E	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
6	383.0	SE	Not available	Chalk	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled “Review of mining instability in Great Britain, 1990” PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? Yes

The following Non-Coal Mining Cavities information provided by Peter Brett Associates:

ID	Distance (m)	Direction	NGR	Address	Superficial Deposits	Bedrock Deposits	Extracted Mineral
Not shown	843.0	S	469400 173100	Elm Lodge/Jesses Brick Field, Tilehurst, Berkshire	Lynch Hill Gravels	Lambeth Group, Upper Chalk Formation	Chalk
Not shown	933.0	SE	470300 173200	Coopers Brick & Lime Manufactory, Reading (West), Berkshire	Lynch Hill Gravel	Lambeth Group, Upper Chalk Formation	Chalk
Not shown	944.0	SW	468900 173300	Grovelands-Works Complex, Tilehurst, Berkshire	Worked Ground	Lambeth Group, Upper Chalk Formation	Chalk

5.6 Natural Cavities

This dataset provides information based on the Peter Brett Associates natural cavities database. The dataset is made up of points and polygons. Where polygons are used these represent an area in which it is expected the cavities could be found. It does not indicate that cavities are present everywhere within the polygon, and caution should be used in the interpretation of this data.

Are there any Natural Cavities within 1000m of the study site boundary?

Yes

The following Natural Cavities information provided by Peter Brett Associates:

ID	Distance (m)	Direction	NGR	Superficial Deposits	Bedrock Deposits	Cavity Type and Number
Not shown	927.0	SE	470240 173160	Lynch Hill Gravel	Chalk Group, Lambeth Group	Solution Pipe x 1
Not shown	933.0	SE	470250 173160	-	Chalk Group, Lambeth Group	Solution Pipe x 1
Not shown	935.0	SE	470240 173150	Lynch Hill Gravel	Chalk Group, Lambeth Group	Solution Pipe x 1
Not shown	940.0	SW	468800 173450	Worked Ground	Chalk Group, Lambeth Group	Sinkhole x 1, Solution Pipe x 1
Not shown	951.0	S	470000 173010	-	Chalk Group, Lambeth Group	Solution Widened Joint or Fissure x 1
Not shown	965.0	SW	469100 173100	-	Chalk Group, Lambeth Group	Solution Pipe x 10

5.7 Brine Extraction

This data provides information from the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary?

No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary?

No

Database searched and no data found.

5.9 Cornwall and Devon Metalliferous Mining

This dataset provides information on metalliferous mining areas in Cornwall/Devon and is derived from records held by Mining Searches UK.

Are there any Cornwall and Devon Metalliferous Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

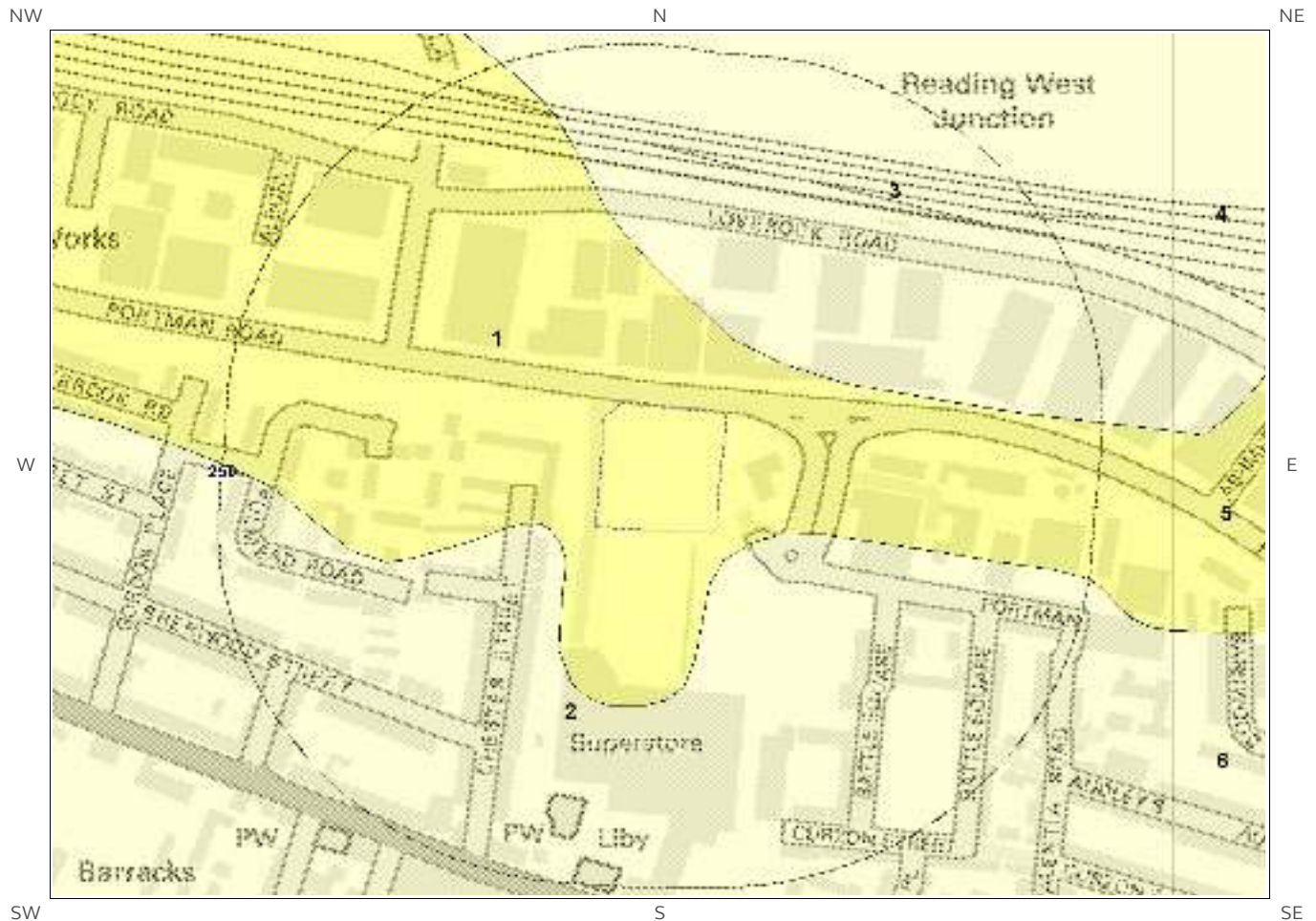
This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay map



Shrink Swell Clay Legend

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6.2 Landslides map



Landslides Legend

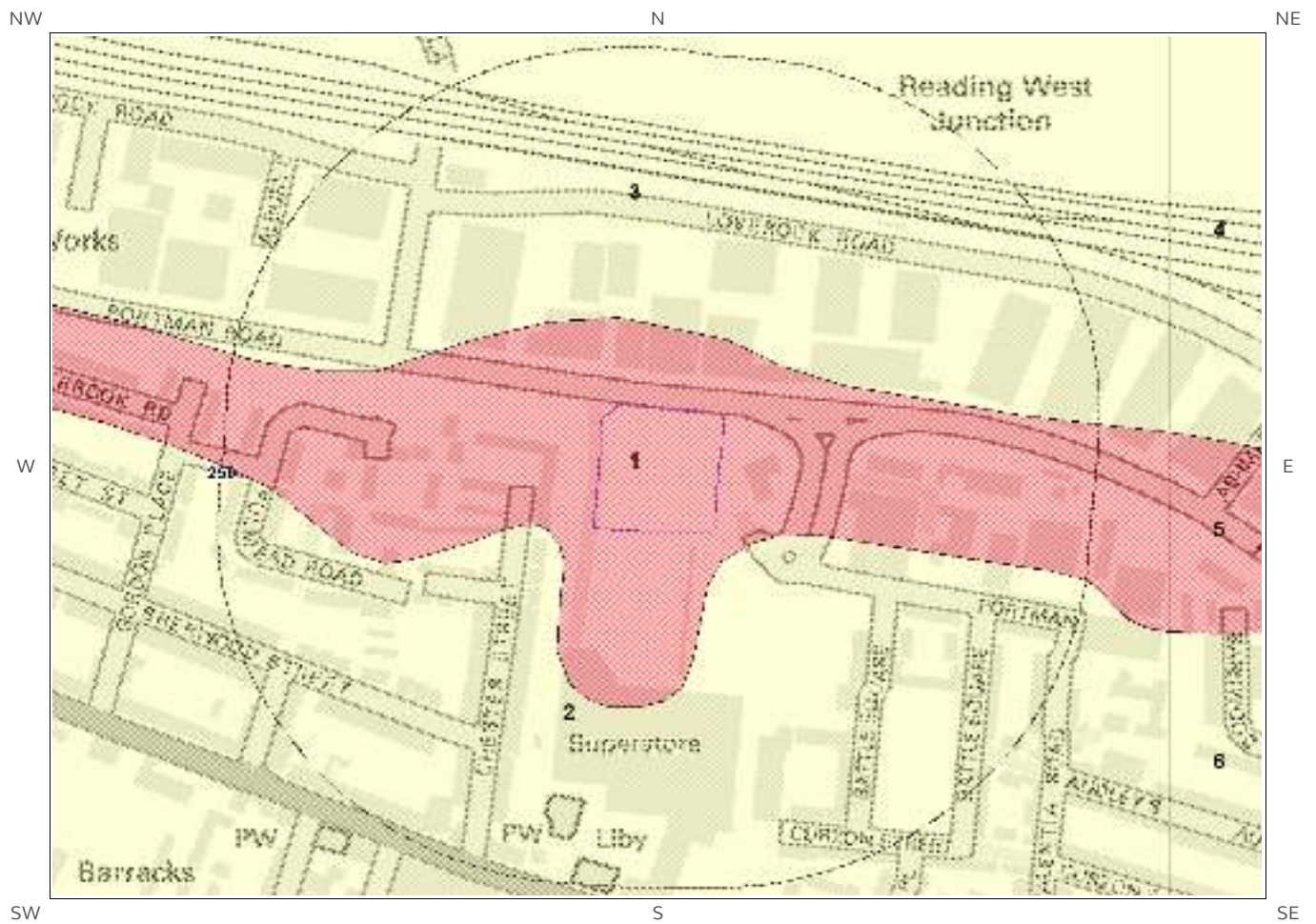
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6.3 Ground Dissolution of Soluble Rocks map



6.4 Compressible Deposits map

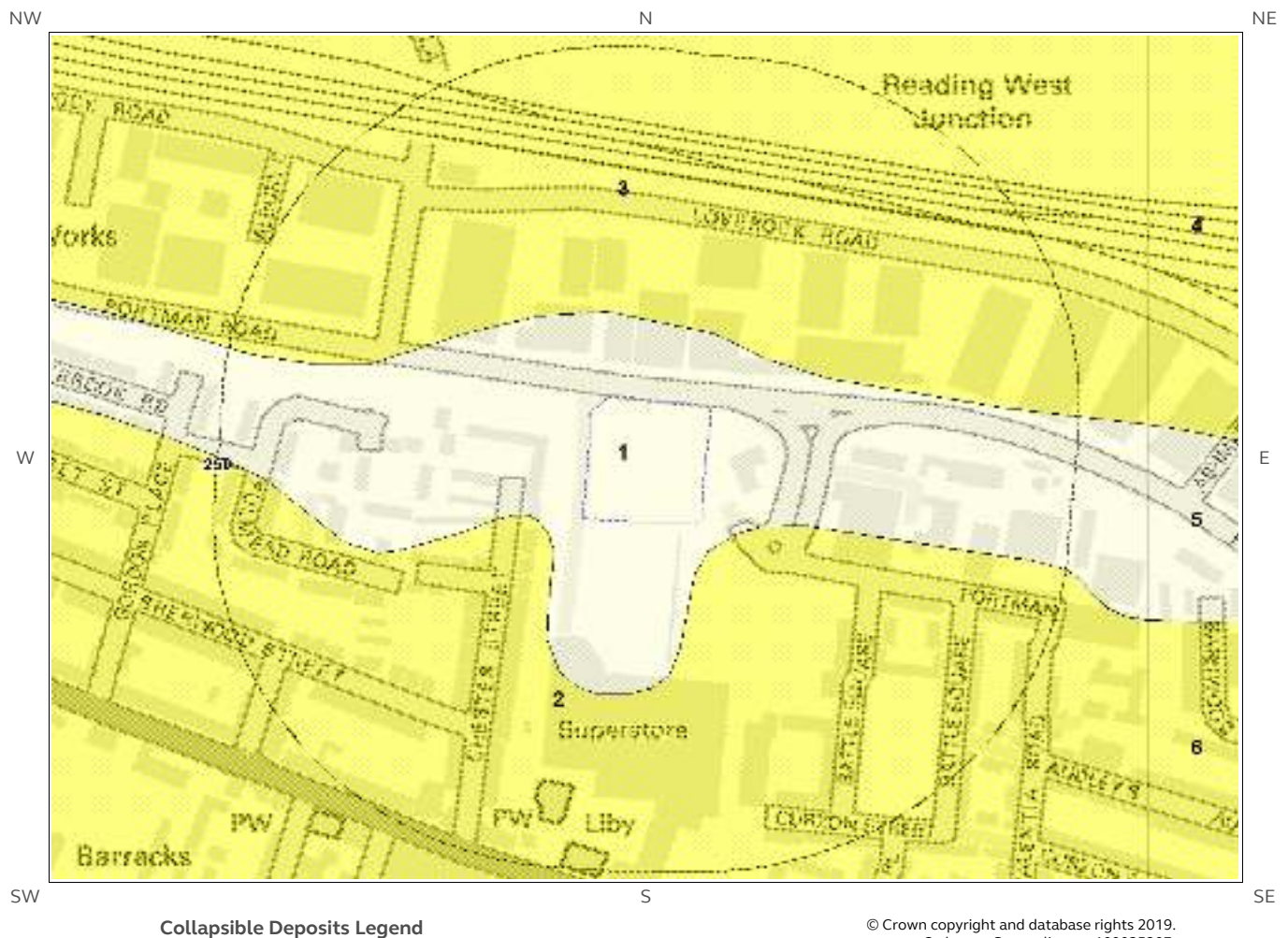


Compressible Deposits Legend

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6.5 Collapsible Deposits map

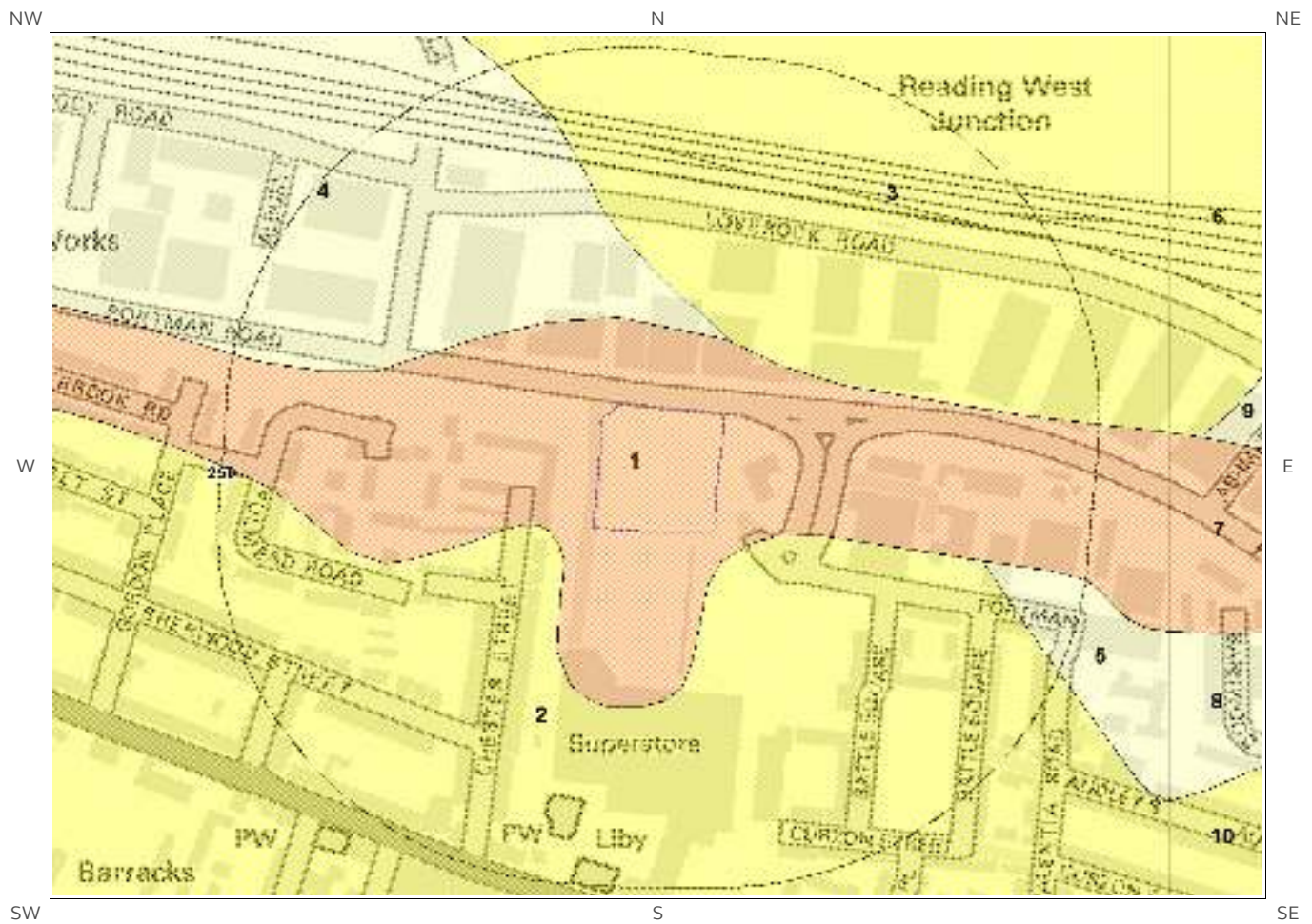


Collapsible Deposits Legend

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6.6 Running Sand map



Running Sand Legend

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6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site* boundary? Moderate

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
2	20.0	SE	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
3	47.0	NE	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

* This includes an automatically generated 50m buffer zone around the site

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Significant soluble rocks are present. Problems unlikely except with considerable surface or subsurface water flow. No special actions required to avoid problems due to soluble rocks. No special ground investigation required or increased construction costs are likely. An increase in financial risk due to potential problems with soluble rocks is unlikely.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Moderate	Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property - possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.
2	20.0	SE	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
3	47.0	NE	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 Collapsible Deposits

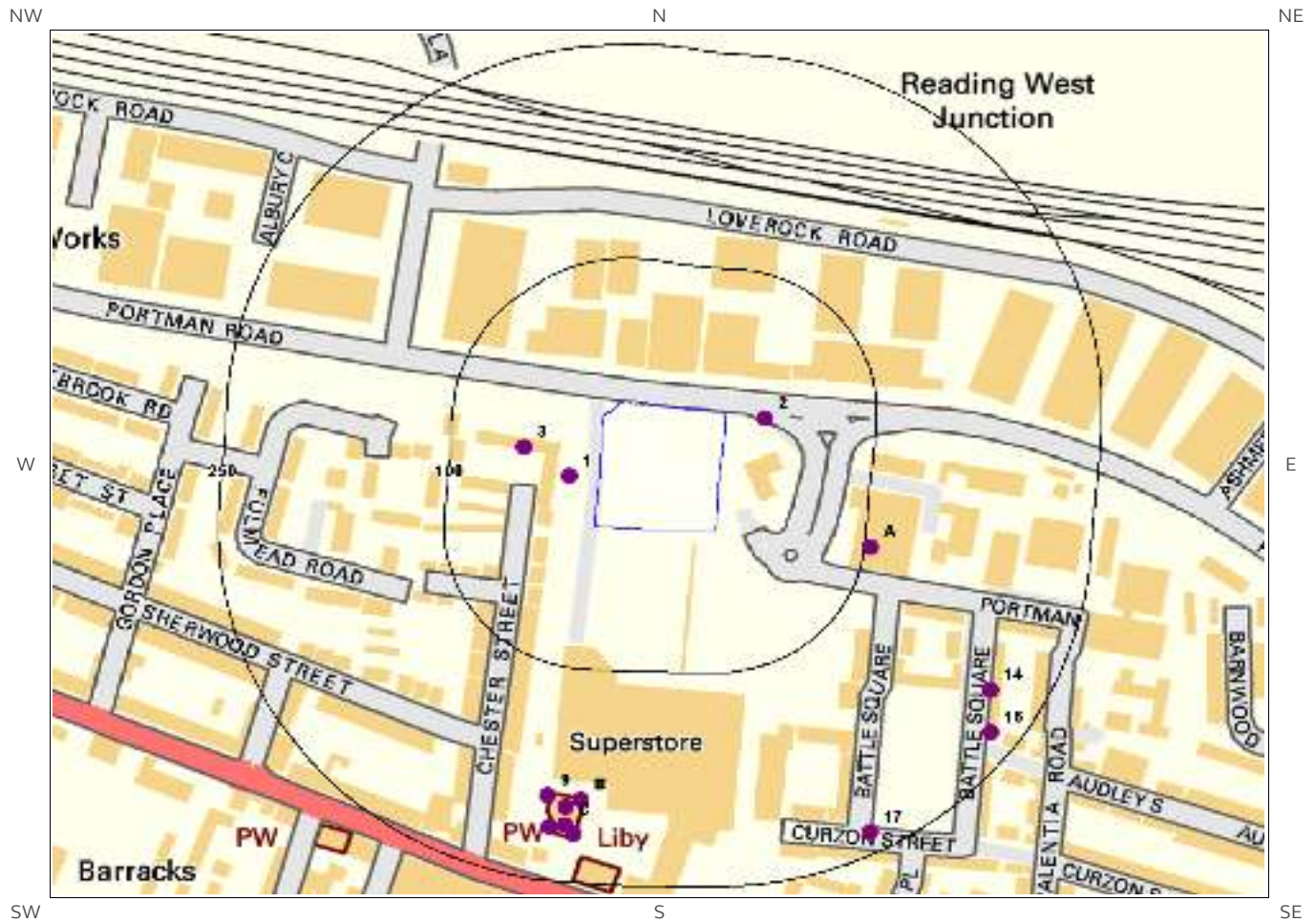
The following Collapsible Rocks information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
2	20.0	SE	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
3	47.0	NE	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

The following Running Sands information provided by the British Geological Survey:

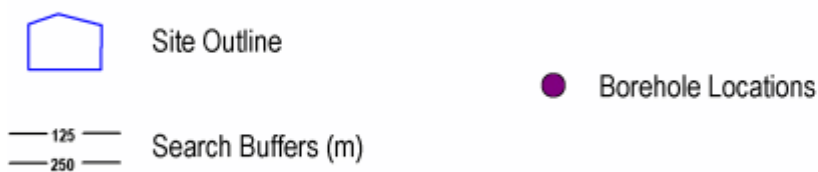
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.
2	20.0	SE	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
3	47.0	NE	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

7 Borehole Records map



Borehole Records Legend

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7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary:

17

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	20.0	W	469600 173950	SU67SE428	-9999	CHESTER ST READING
2	26.0	E	469730 173990	SU67SE429	-9999	CHESTER ST READING
3	52.0	W	469570 173970	SU67SE427	-9999	CHESTER ST READING
4A	103.0	E	469800 173900	SU67SE122	12	BATTLE HOSPITAL READING 1
5A	103.0	E	469800 173900	SU67SE125	12	BATTLE HOSPITAL READING 4
6A	103.0	E	469800 173900	SU67SE124	15	BATTLE HOSPITAL READING 3
7A	103.0	E	469800 173900	SU67SE126	7	BATTLE HOSPITAL READING 5
8A	103.0	E	469800 173900	SU67SE123	15	BATTLE HOSPITAL READING 2
9	191.0	S	469586 173726	SU67SE663	2.1	EMMANUEL METHODIST CHURCH READING TP 4
10B	192.0	S	469608 173723	SU67SE664	2.2	EMMANUEL METHODIST CHURCH READING TP 5
11B	197.0	S	469598 173718	SU67SE660	15	EMMANUEL METHODIST CHURCH READING 1
12C	210.0	S	469597 173705	SU67SE661	15	EMMANUEL METHODIST CHURCH READING 2
13C	213.0	S	469587 173704	SU67SE662	2.1	EMMANUEL METHODIST CHURCH READING TP 3
14	214.0	SE	469880 173800	SU67SE916	-9999	BATTLE HOSPITAL READING TP7
15C	216.0	S	469603 173699	SU67SE665	2.2	EMMANUEL METHODIST CHURCH READING TP 6
16	231.0	SE	469880 173770	SU67SE915	-9999	BATTLE HOSPITAL READING TP6
17	236.0	SE	469800 173700	SU67SE101	45.72	BATTLE HOSPITAL READING

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/423845
#2: scans.bgs.ac.uk/sobi_scans/boreholes/423846
#3: scans.bgs.ac.uk/sobi_scans/boreholes/423844
#4A: scans.bgs.ac.uk/sobi_scans/boreholes/423539
#5A: scans.bgs.ac.uk/sobi_scans/boreholes/423542
#6A: scans.bgs.ac.uk/sobi_scans/boreholes/423541
#7A: scans.bgs.ac.uk/sobi_scans/boreholes/423543
#8A: scans.bgs.ac.uk/sobi_scans/boreholes/423540
#9: scans.bgs.ac.uk/sobi_scans/boreholes/15637511
#10B: scans.bgs.ac.uk/sobi_scans/boreholes/15637512
#11B: scans.bgs.ac.uk/sobi_scans/boreholes/15637506
#12C: scans.bgs.ac.uk/sobi_scans/boreholes/15637509
#13C: scans.bgs.ac.uk/sobi_scans/boreholes/15637510
#15C: scans.bgs.ac.uk/sobi_scans/boreholes/15637513
#17: scans.bgs.ac.uk/sobi_scans/boreholes/423518

8 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary:

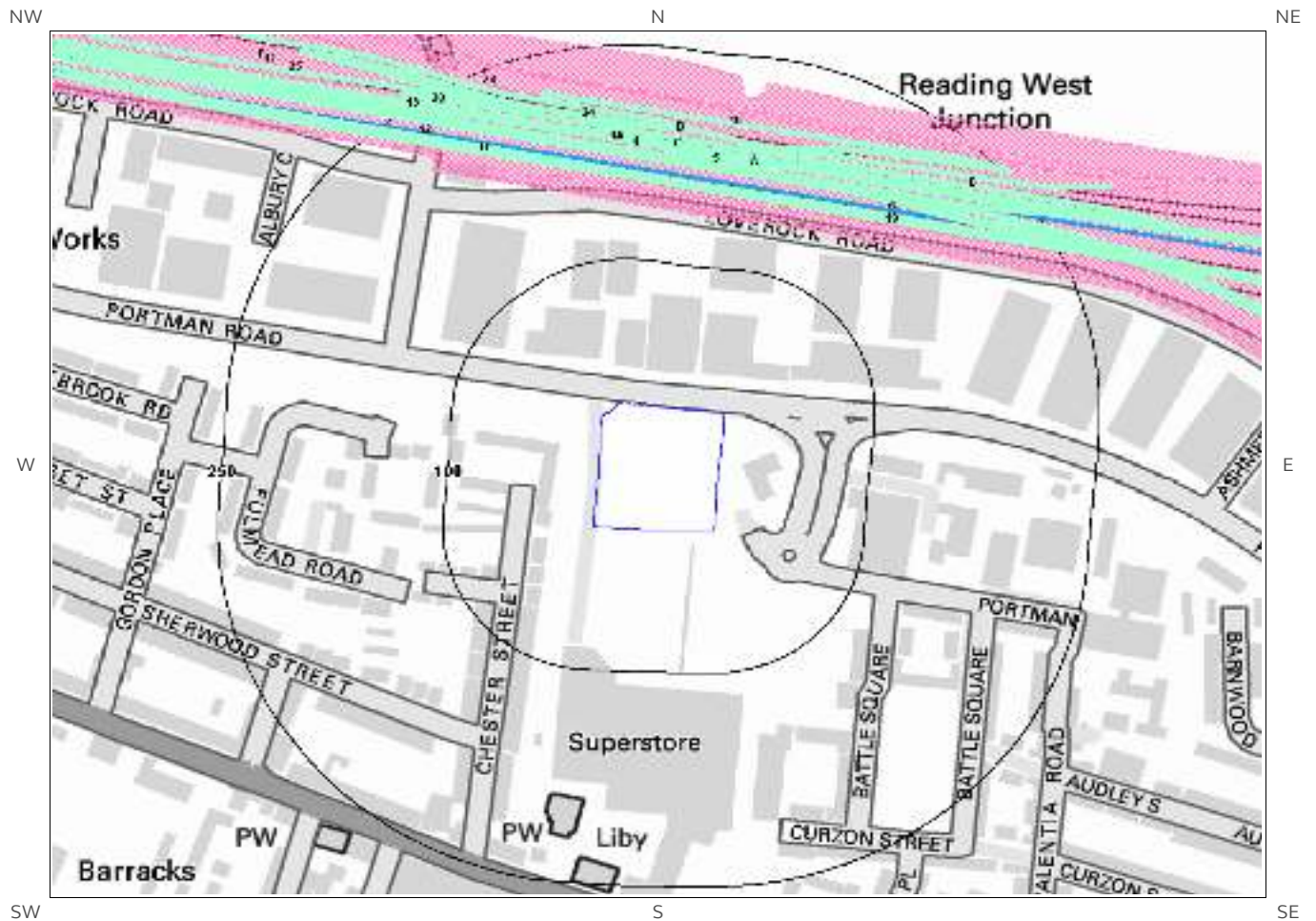
4

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
20.0	SE	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
47.0	NE	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg

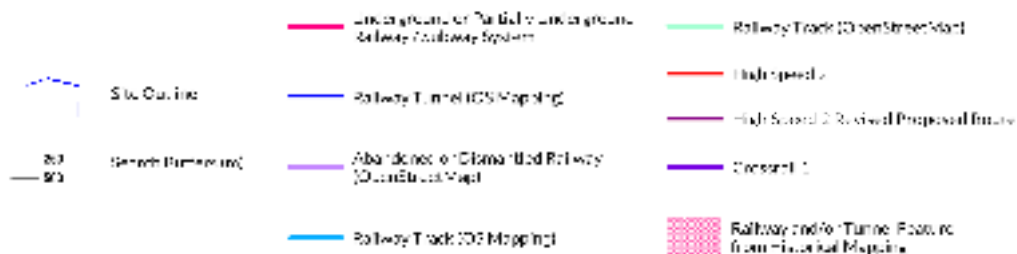
*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels map



Railways and Tunnels Legend

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9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
12	133	N	n/a	Railway	1877
1A	136	N	469658 174171	Railway Sidings	1910
2A	136	N	469658 174171	Railway Sidings	1938
3A	136	N	469658 174171	Railway Sidings	1932
4	136	N	469317 174238	Railway Sidings	1960
5	136	N	469670 174167	Railway Sidings	1900
13	138	N	n/a	Railway	1932

ID	Distance (m)	Direction	NGR	Details	Date
6	146	N	469979 174110	Railway Sidings	1878
14	148	N	468357 174448	Railway Sidings	1960
15	149	N	469358 174251	Railway Sidings	1960
7B	159	N	469700 174193	Railway Sidings	1991
8B	159	N	469700 174193	Railway Sidings	1982
9B	159	N	469700 174193	Railway Sidings	1974
16C	160	N	469405 174251	Railway Sidings	1936
17C	160	N	469405 174251	Railway Sidings	1913
18C	160	N	469405 174251	Railway Sidings	1934
19	168	NE	469816 174129	Railway Sidings	1993
10	171	N	470053 174155	Railway Sidings	1901
20	175	N	469515 174219	Railway Sidings	1897
21D	183	N	469544 174179	Railway Sidings	1976
22D	183	N	469544 174179	Railway Sidings	1959
23D	184	N	469545 174179	Railway Sidings	1993
24	191	N	469615 174203	Railway Sidings	1959
25	196	N	469363 174248	Railway Sidings	1897
26E	210	NE	469871 174154	Railway Sidings	1897
11	211	N	469357 174251	Railway Sidings	1900
27E	215	NE	469873 174156	Railway Sidings	1959
28	234	N	469548 174226	Railway Sidings	1959
29F	250	NW	469315 174258	Railway Sidings	1993
30F	250	NW	469315 174258	Railway Sidings	1959

Any records that have been identified are represented on the Railways and Tunnels map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Name	Type
151	N	Great Western Main Line	rail
151	N	Great Western Main Line	rail
155	N	Great Western Main Line	rail
155	N	Great Western Main Line	rail
156	NE	Great Western Main Line	rail
156	NE	Great Western Main Line	rail
159	N	Not given	Multi Track
159	N	Not given	Multi Track
160	NE	Great Western Main Line	rail
160	NE	Great Western Main Line	rail
167	N	Not given	rail
167	N	Not given	rail
167	N	Not given	rail
167	N	Not given	rail
167	N	Not given	rail
167	N	Not given	rail
169	N	Not given	Multi Track
169	N	Not given	Multi Track
170	N	Great Western Main Line	rail
170	N	Great Western Main Line	rail
171	N	Not given	rail
171	N	Not given	rail
171	N	Not given	rail
171	N	Not given	rail
171	N	Not given	rail
171	N	Not given	rail
172	N	Not given	Multi Track
172	N	Not given	Multi Track
172	N	Not given	Multi Track
172	N	Not given	Multi Track
174	N	Great Western Main Line	rail

Distance (m)	Direction	Name	Type
174	N	Great Western Main Line	rail
176	NE	Not given	rail
176	NE	Not given	rail
176	N	Great Western Main Line	rail
176	NE	Not given	rail
176	NE	Not given	rail
176	N	Great Western Main Line	rail
179	N	Great Western Main Line	rail
179	N	Great Western Main Line	rail
179	N	Great Western Main Line	rail
179	N	Great Western Main Line	rail
180	NE	Not given	rail
180	NE	Not given	rail
180	NE	Not given	rail
180	NE	Not given	rail
183	N	Great Western Main Line	rail
183	N	Great Western Main Line	rail
184	N	Not given	rail
184	N	Not given	rail
184	N	Not given	rail
184	N	Not given	rail
188	N	Not given	rail
188	N	Not given	rail
188	N	Not given	rail
188	N	Not given	rail
188	N	Not given	rail
188	N	Not given	rail
194	N	Not given	rail
194	N	Not given	rail
194	N	Not given	rail
194	N	Not given	rail
197	N	Not given	rail
197	N	Not given	rail
201	N	Not given	rail
201	N	Not given	rail
206	N	Not given	rail
206	N	Not given	rail
215	NE	Not given	rail
215	NE	Not given	rail
221	NE	Great Western Main Line	rail
221	NE	Great Western Main Line	rail
223	NE	Not given	Multi Track
223	NE	Not given	Multi Track
223	NE	Not given	Multi Track
223	NE	Not given	Multi Track
224	NE	Not given	rail
224	NE	Not given	rail
235	NE	Not given	rail
235	NW	Not given	rail
235	NE	Not given	rail
235	NW	Not given	rail

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a Groundsure HS2 and Crossrail 1 Report.

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

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Map Name: County Series

Map date: 1881

Scale: 1:2,500

Printed at: 1:2,500



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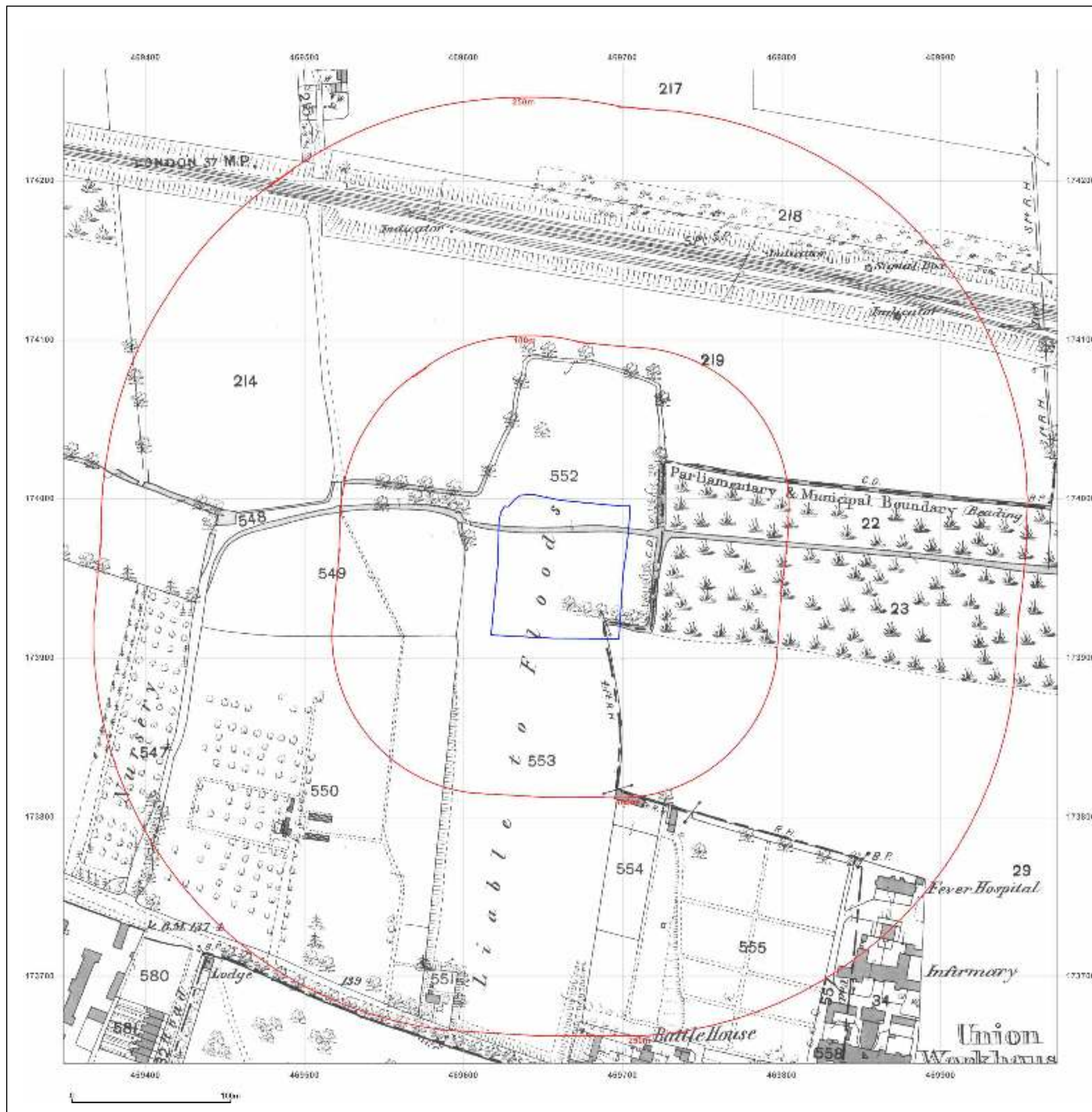


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Map Name: County Series

Map date: 1897

Scale: 1:2,500

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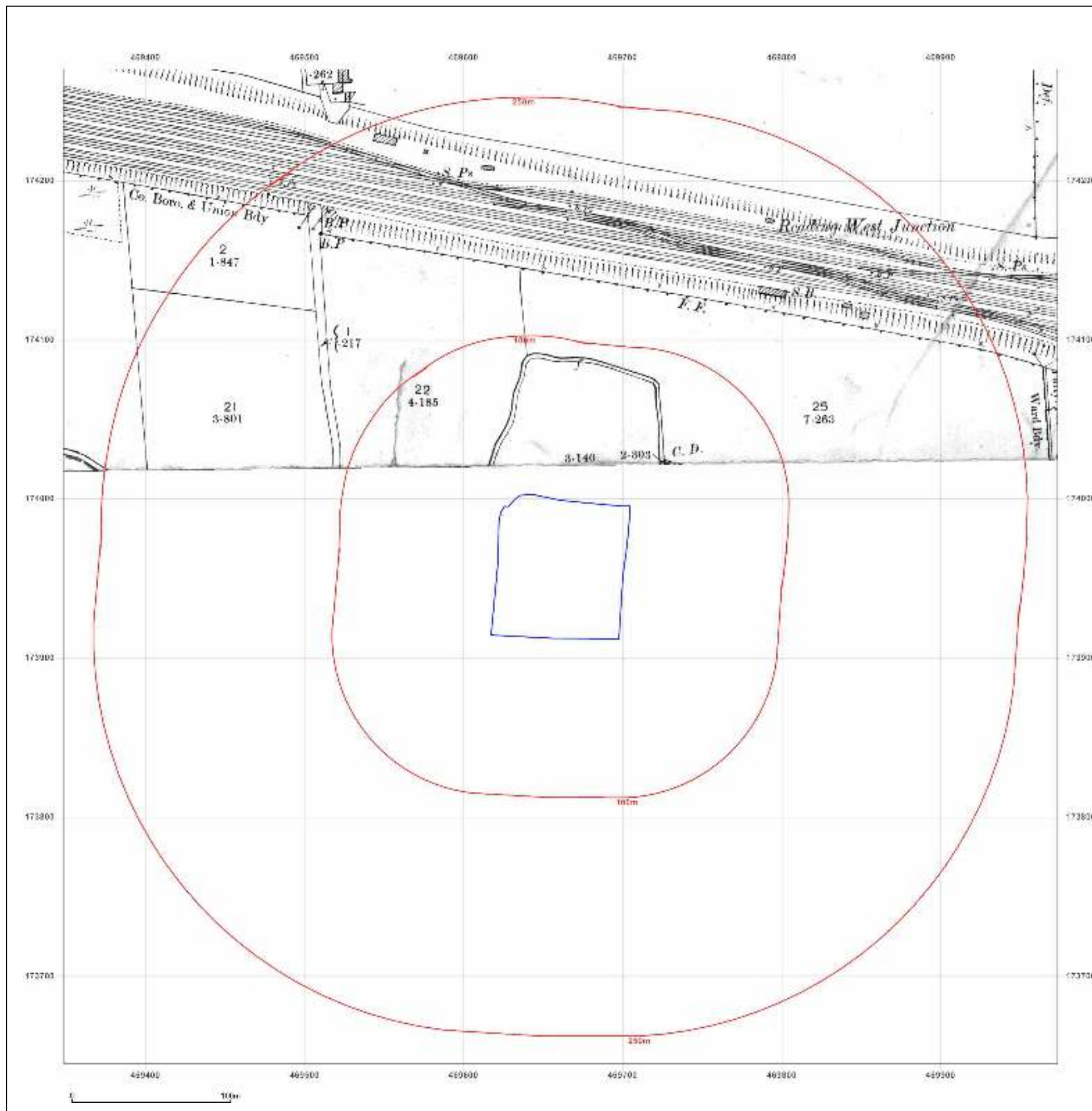


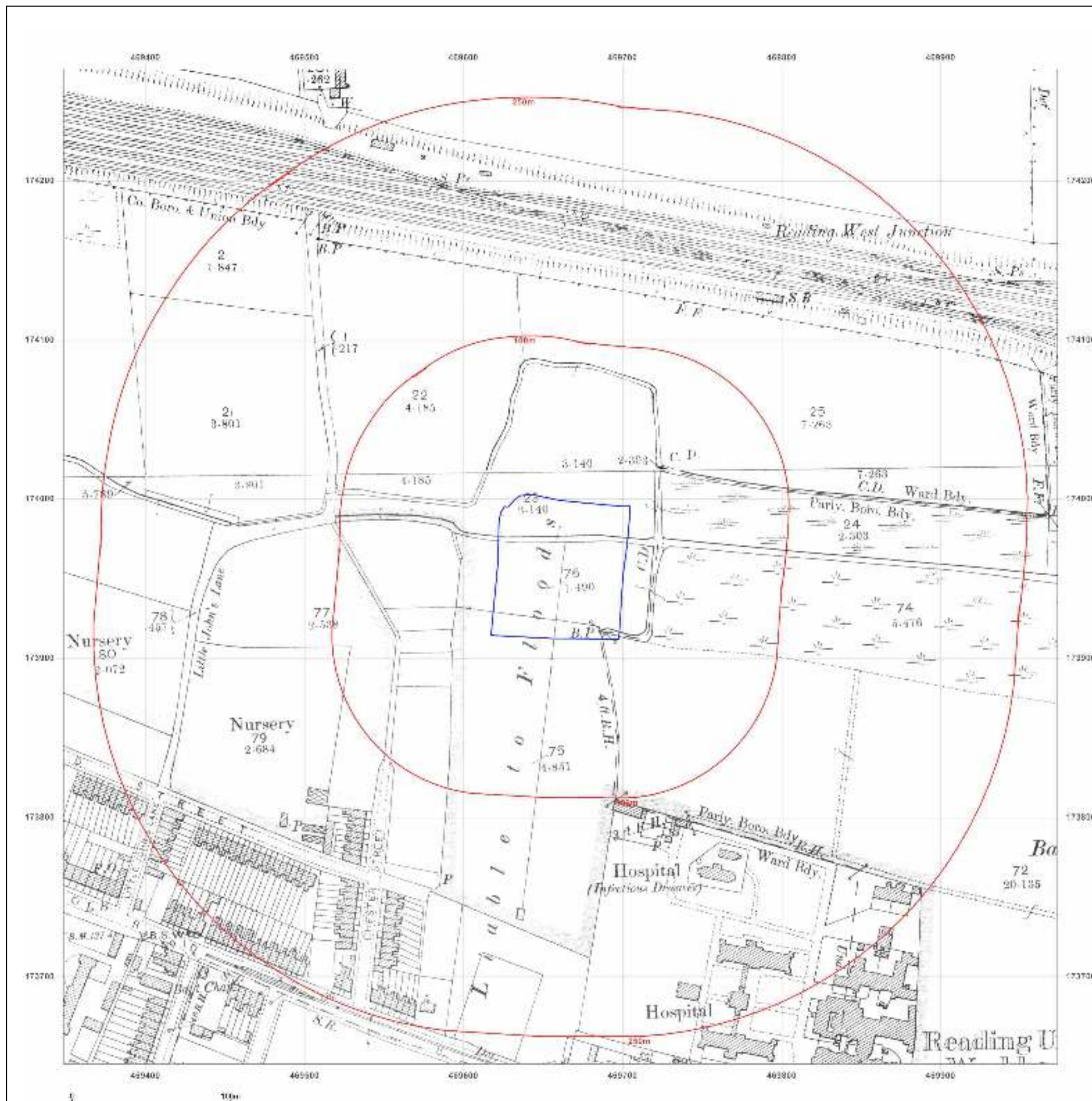
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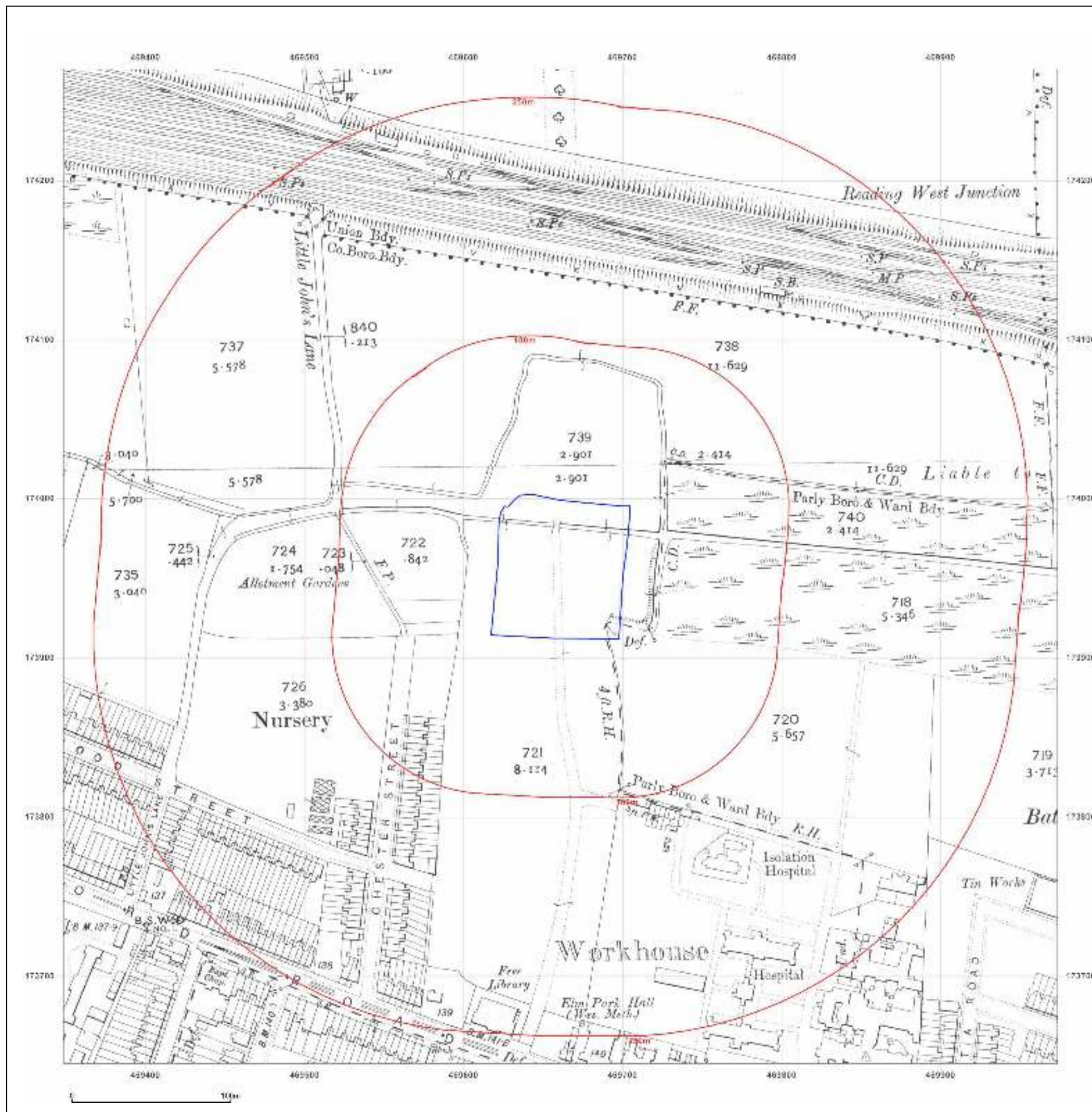
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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1932-1934

Scale: 1:2,500

Printed at: 1:2,500



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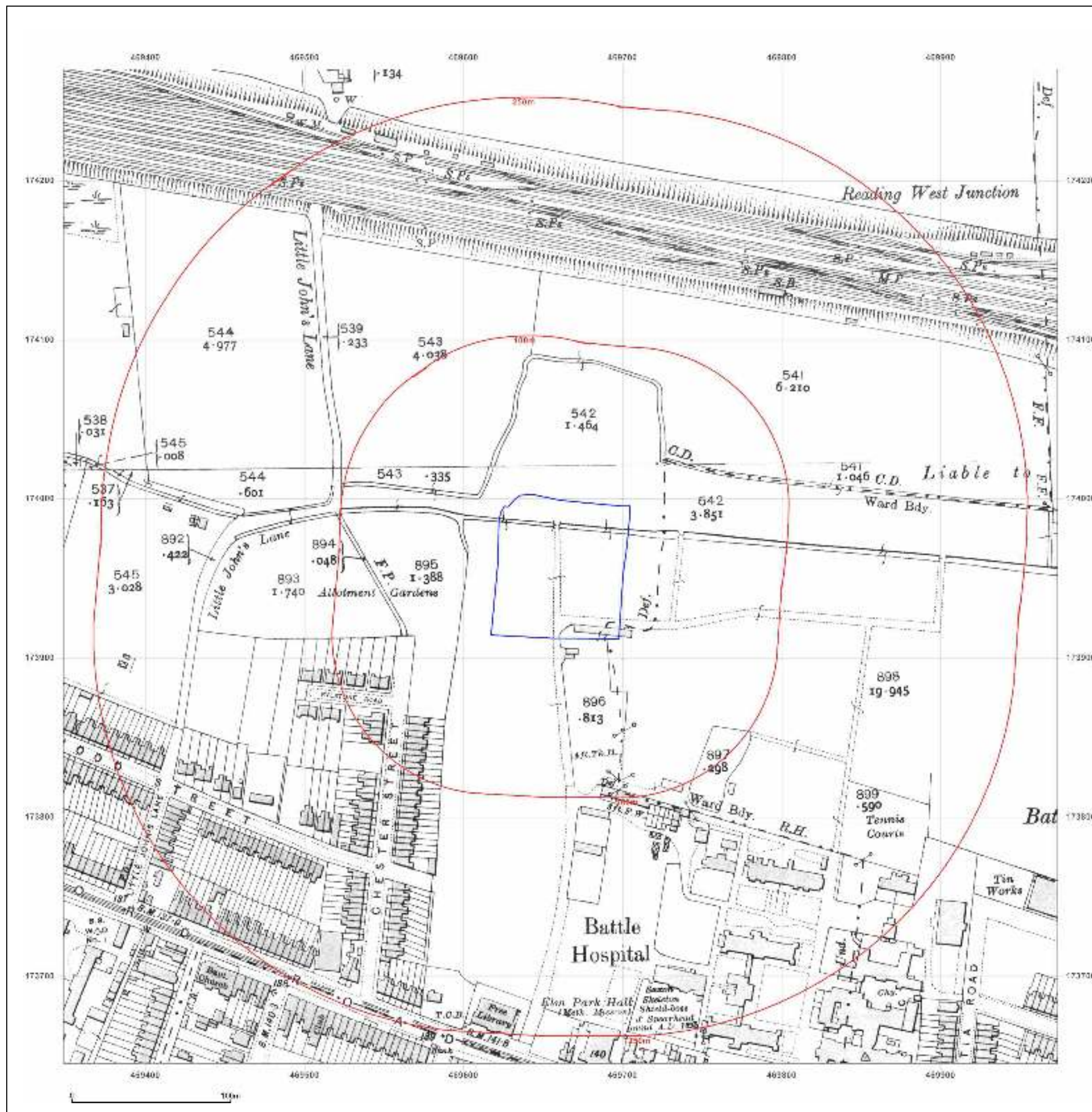


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Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1936

Scale: 1:2,500

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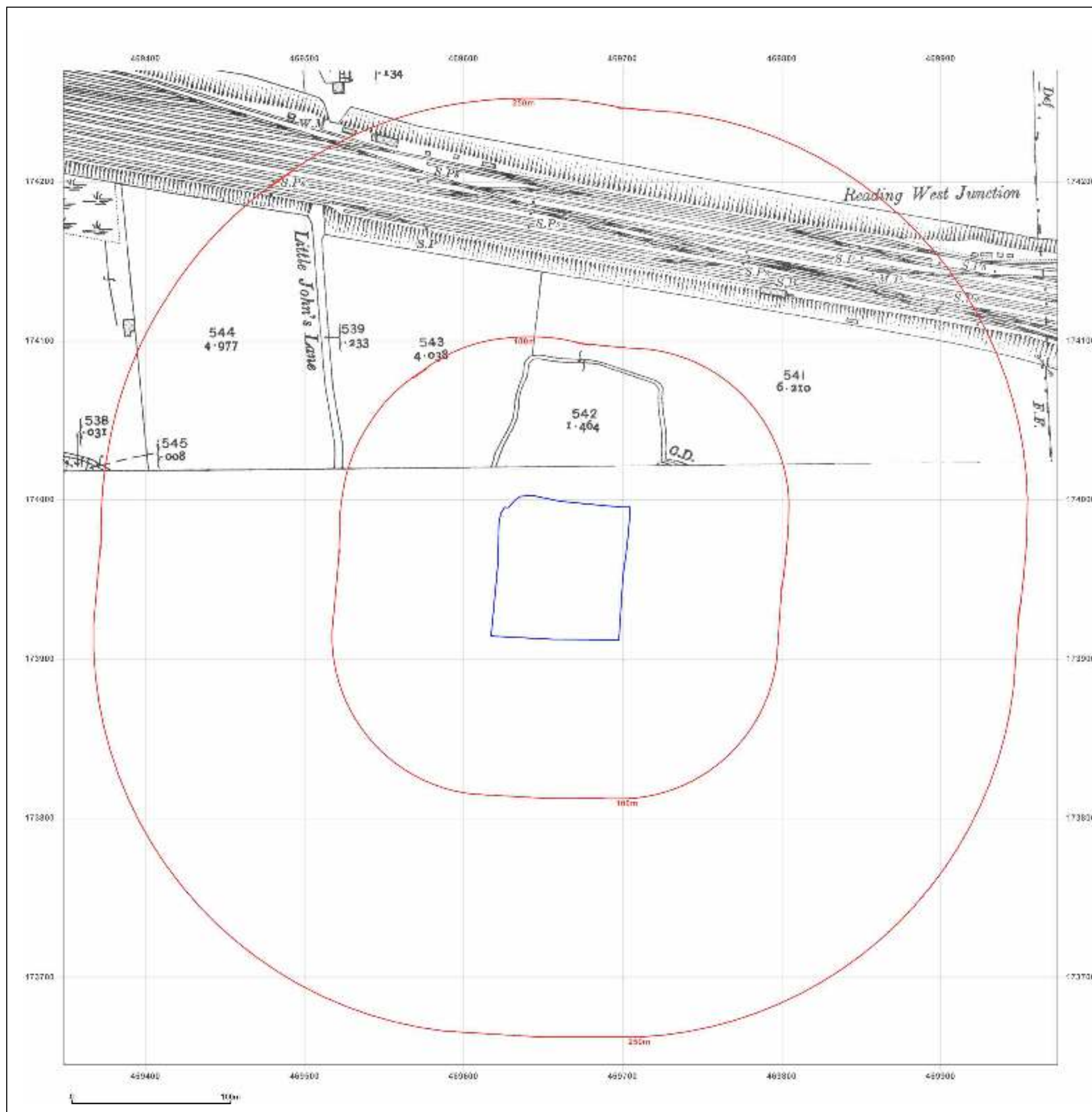


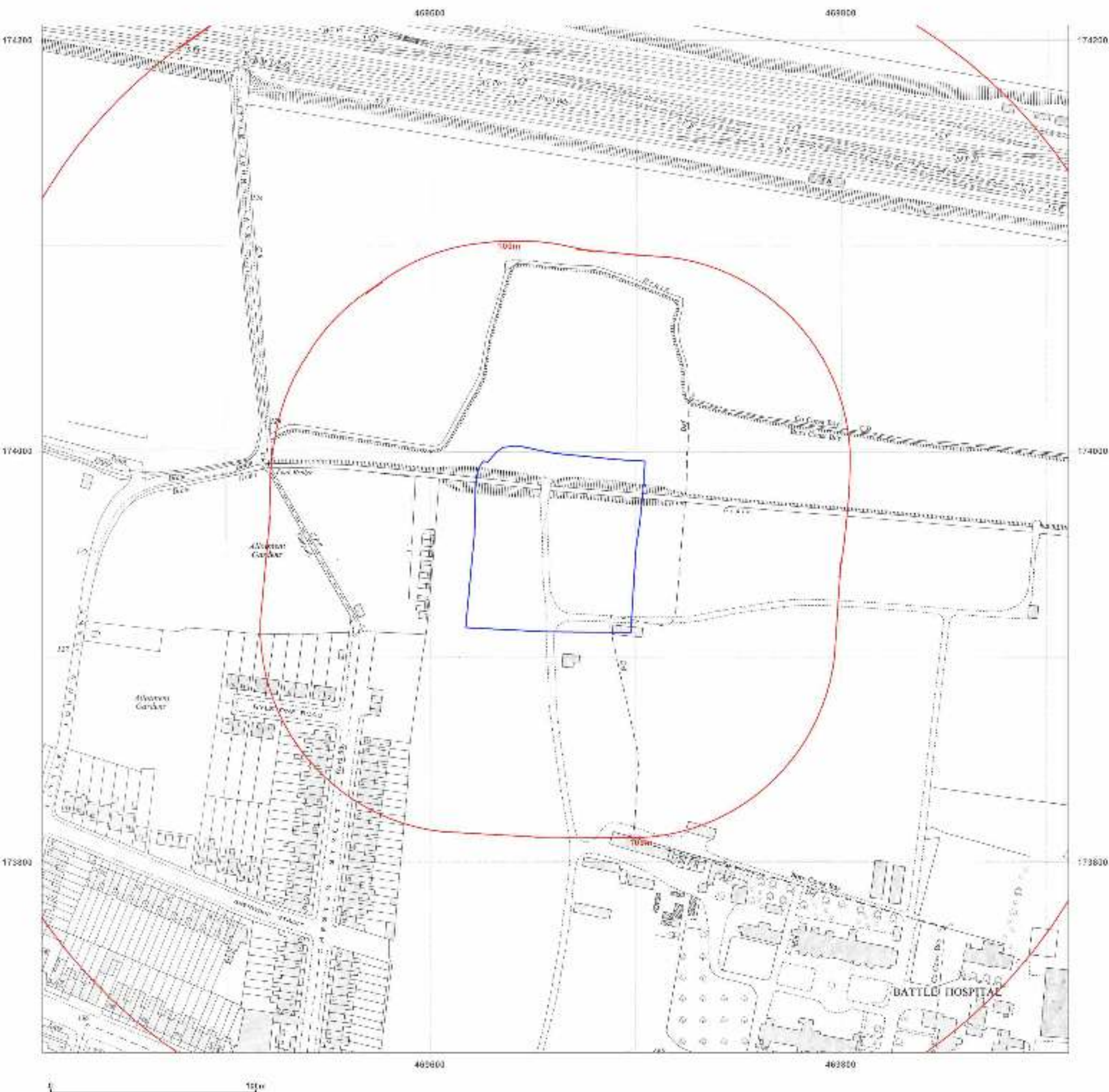
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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1960

Scale: 1:2,500

Printed at: 1:2,500



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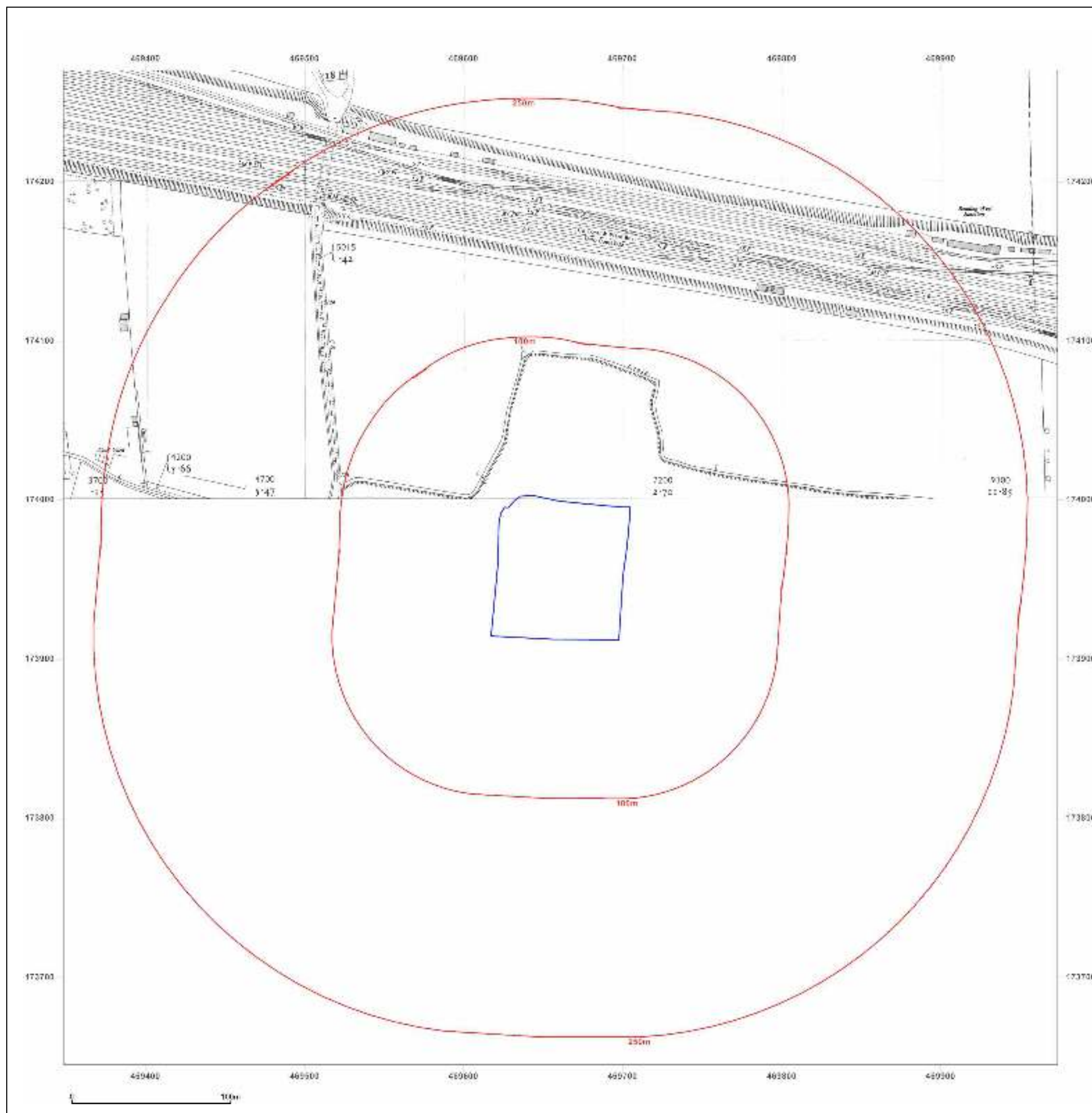


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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1960-1962

Scale: 1:2,500

Printed at: 1:2,500



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Edition 1962
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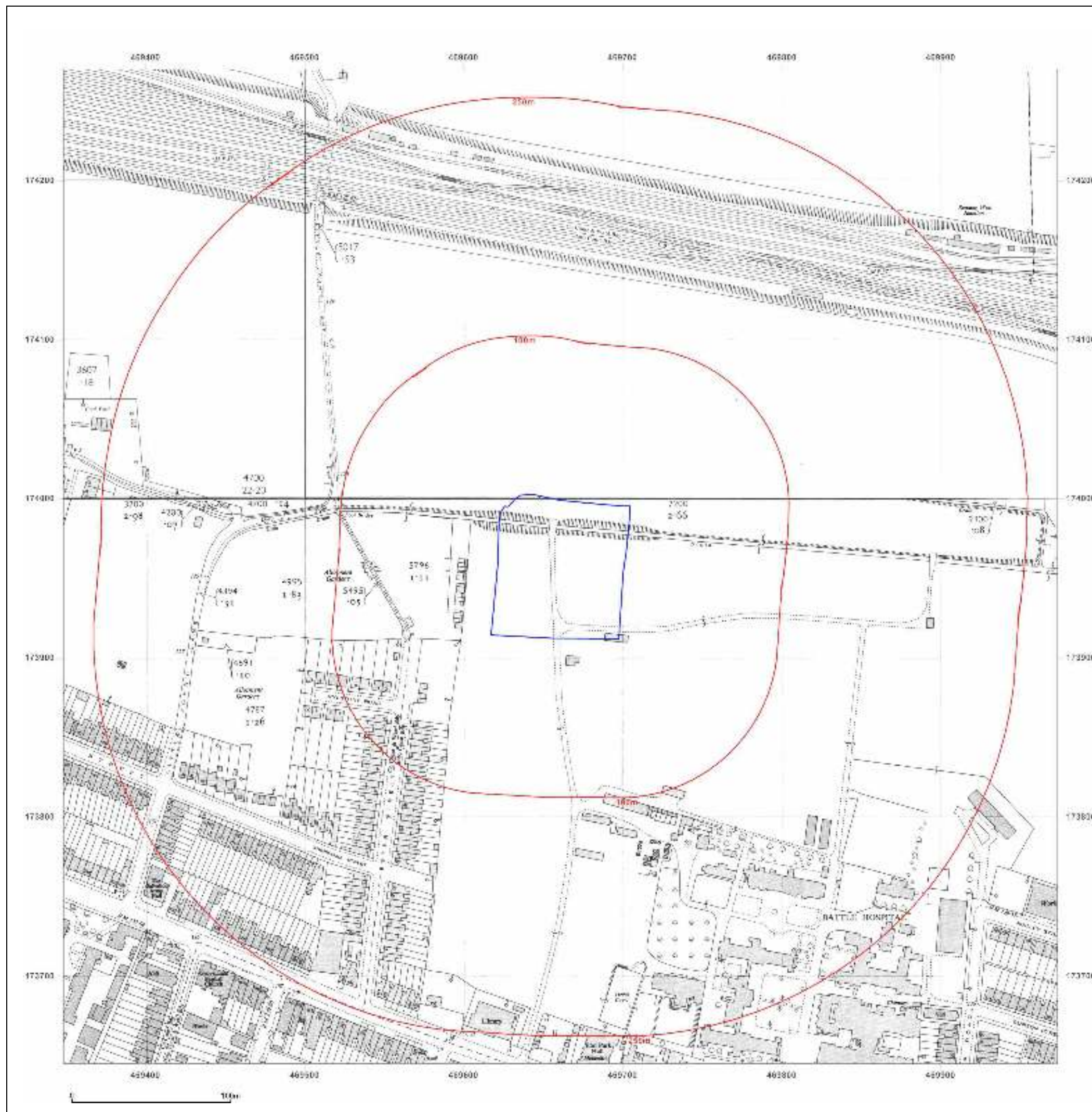


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Client Ref: 19-335
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Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1968-1969

Scale: 1:1,250

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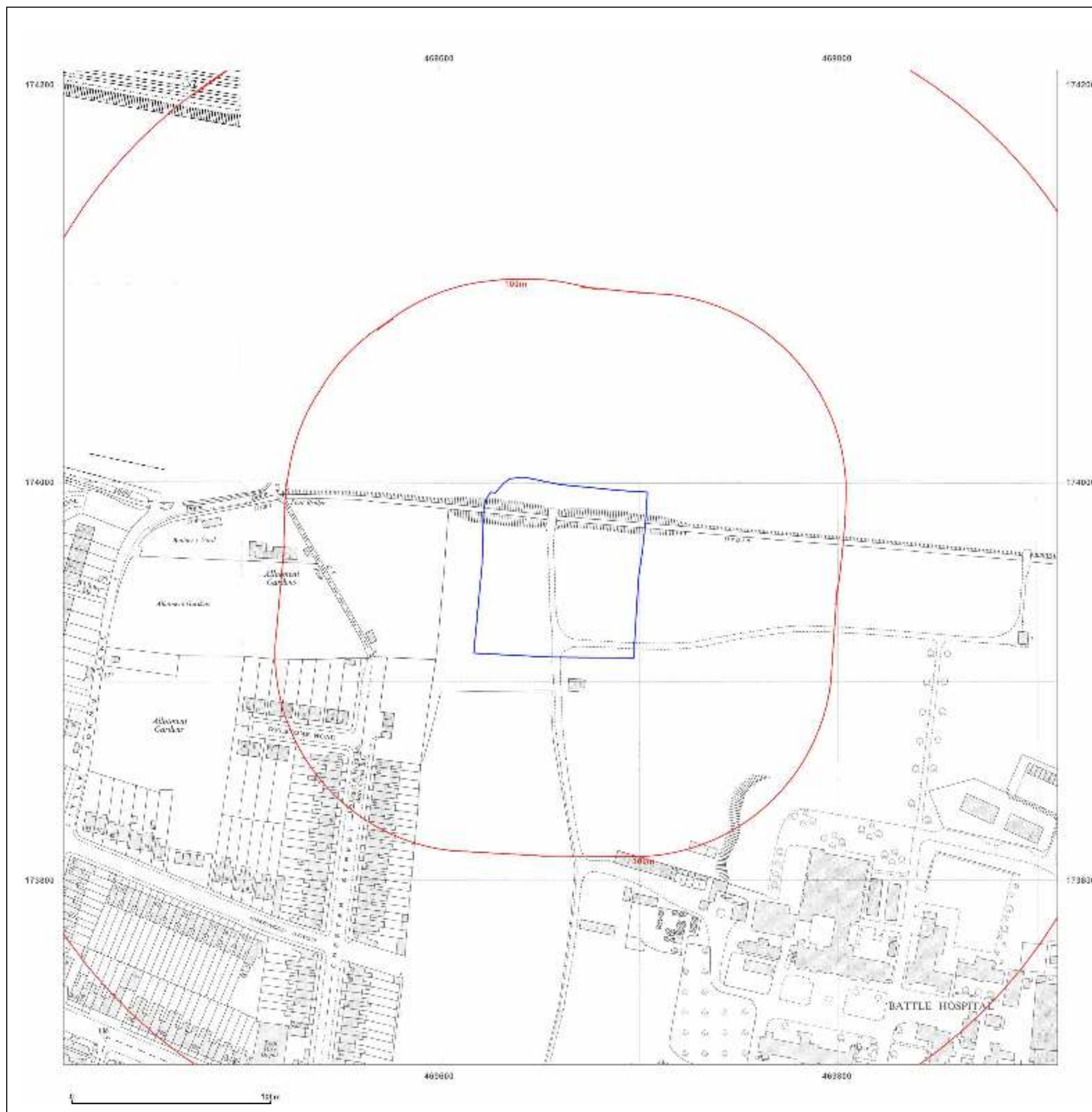


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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1968-1973

Scale: 1:1,250

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Surveyed 1959
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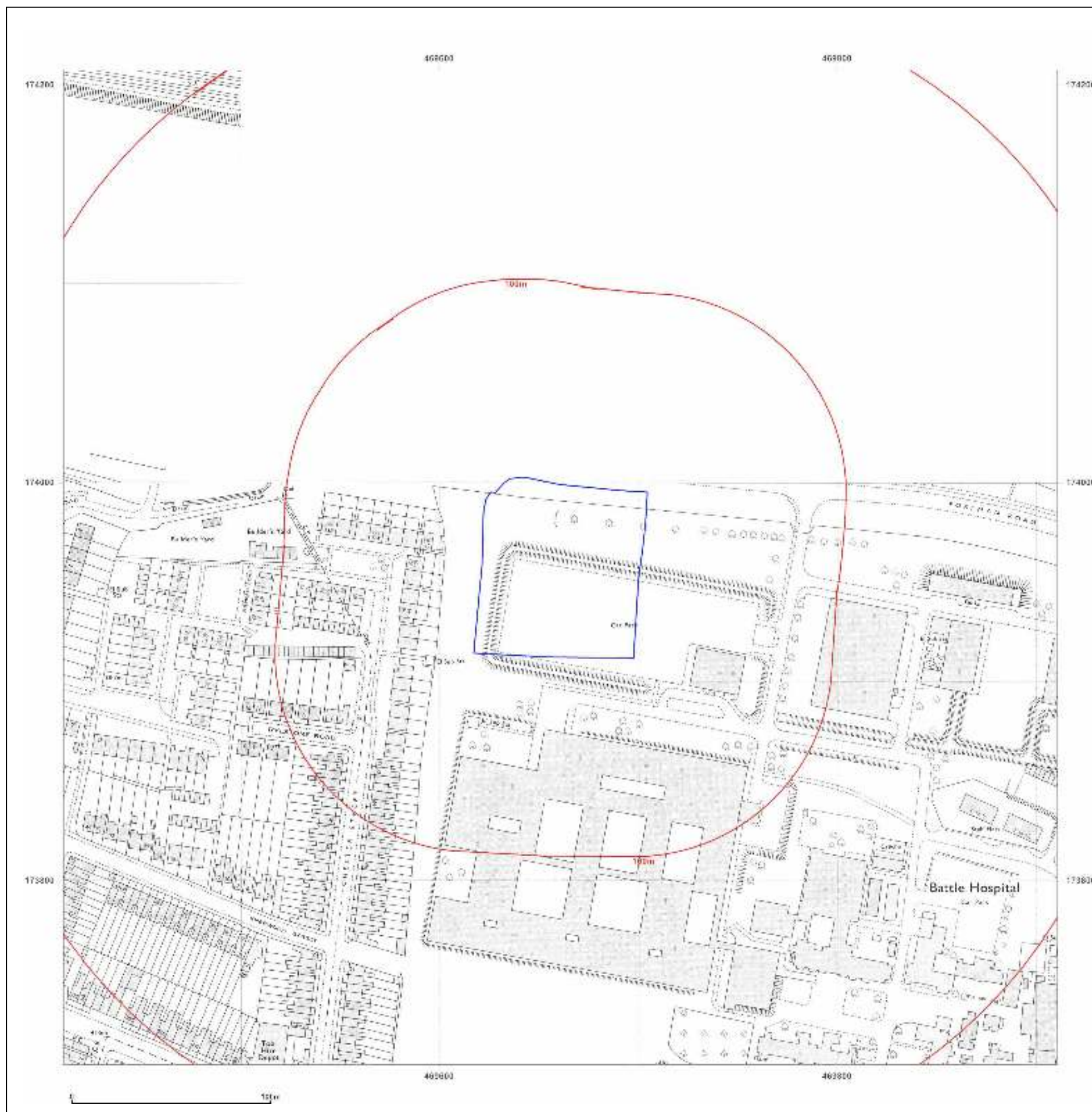


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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1974-1976

Scale: 1:1,250

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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1976

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1959
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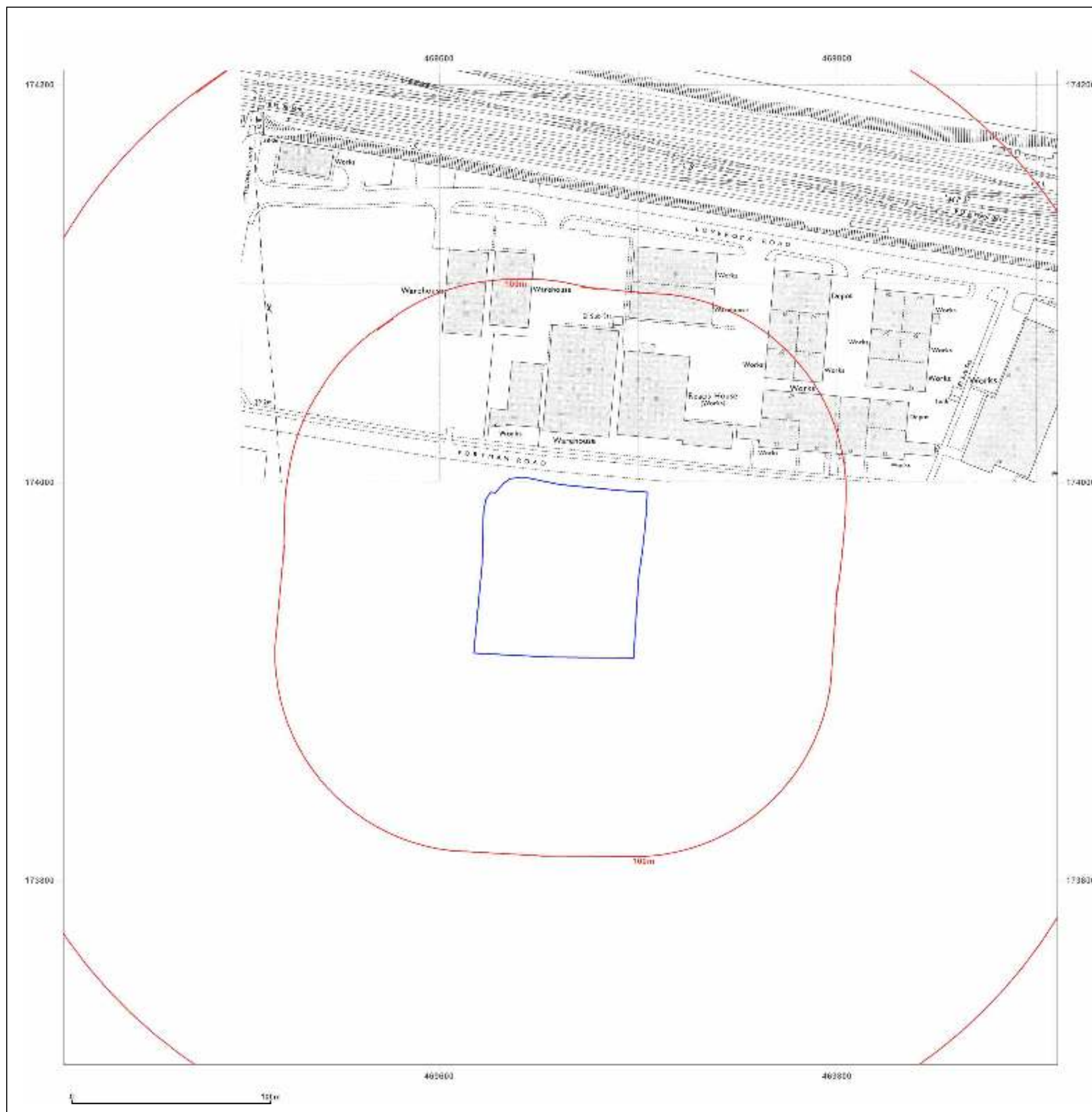


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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1986-1990

Scale: 1:1,250

Printed at: 1:2,000



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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1988-1993

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1993
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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1878

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1878
Revised 1878
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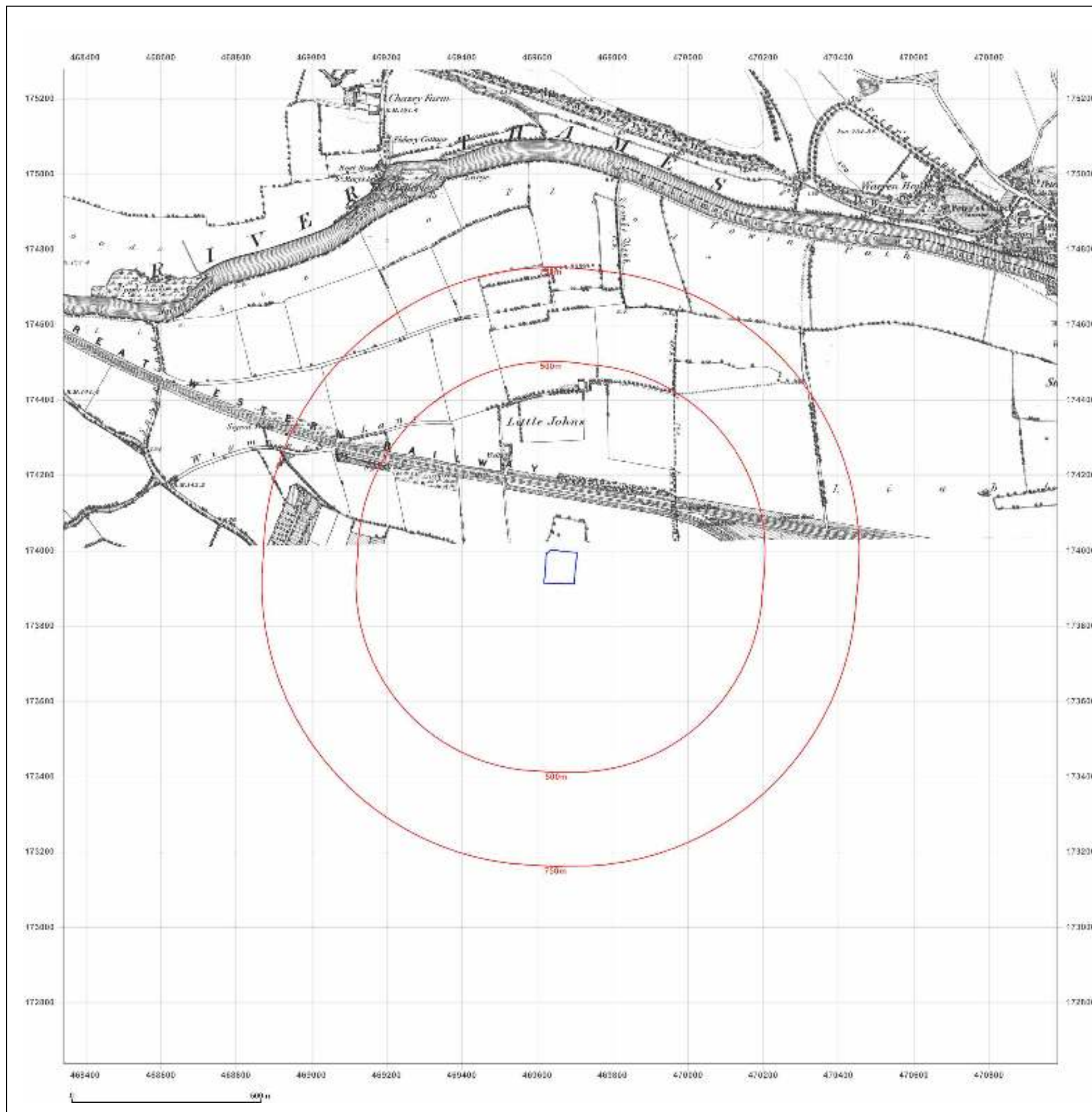


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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1897-1900

Scale: 1:10,560

Printed at: 1:10,560



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Edition 1900
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Surveyed 1877
Revised 1898
Edition 1900
Copyright N/A
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Revised 1898
Edition N/A
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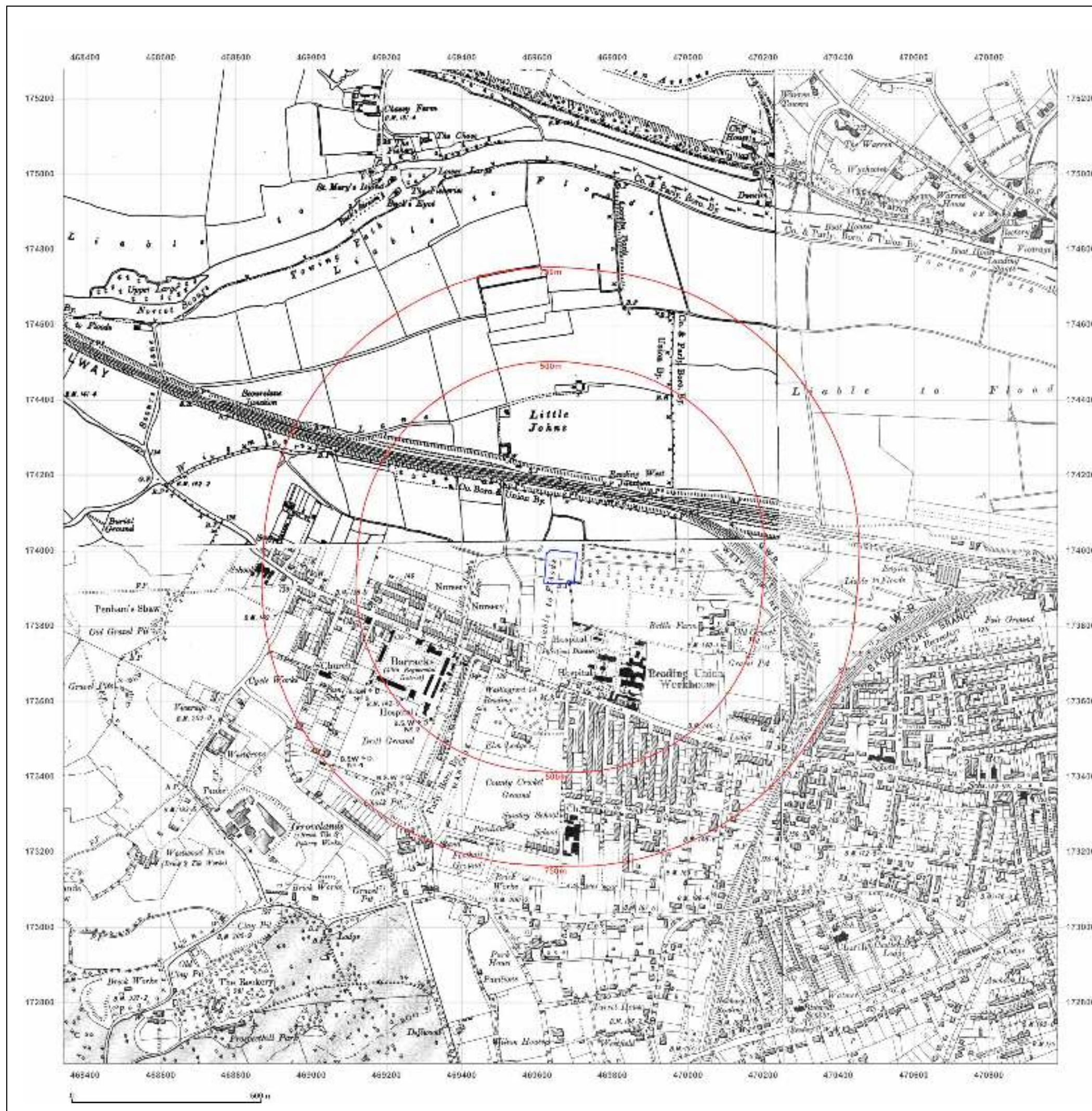


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ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1900

Scale: 1:10,560

Printed at: 1:10,560



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Edition 1900
Copyright N/A
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1888
Edition 1900
Copyright N/A
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
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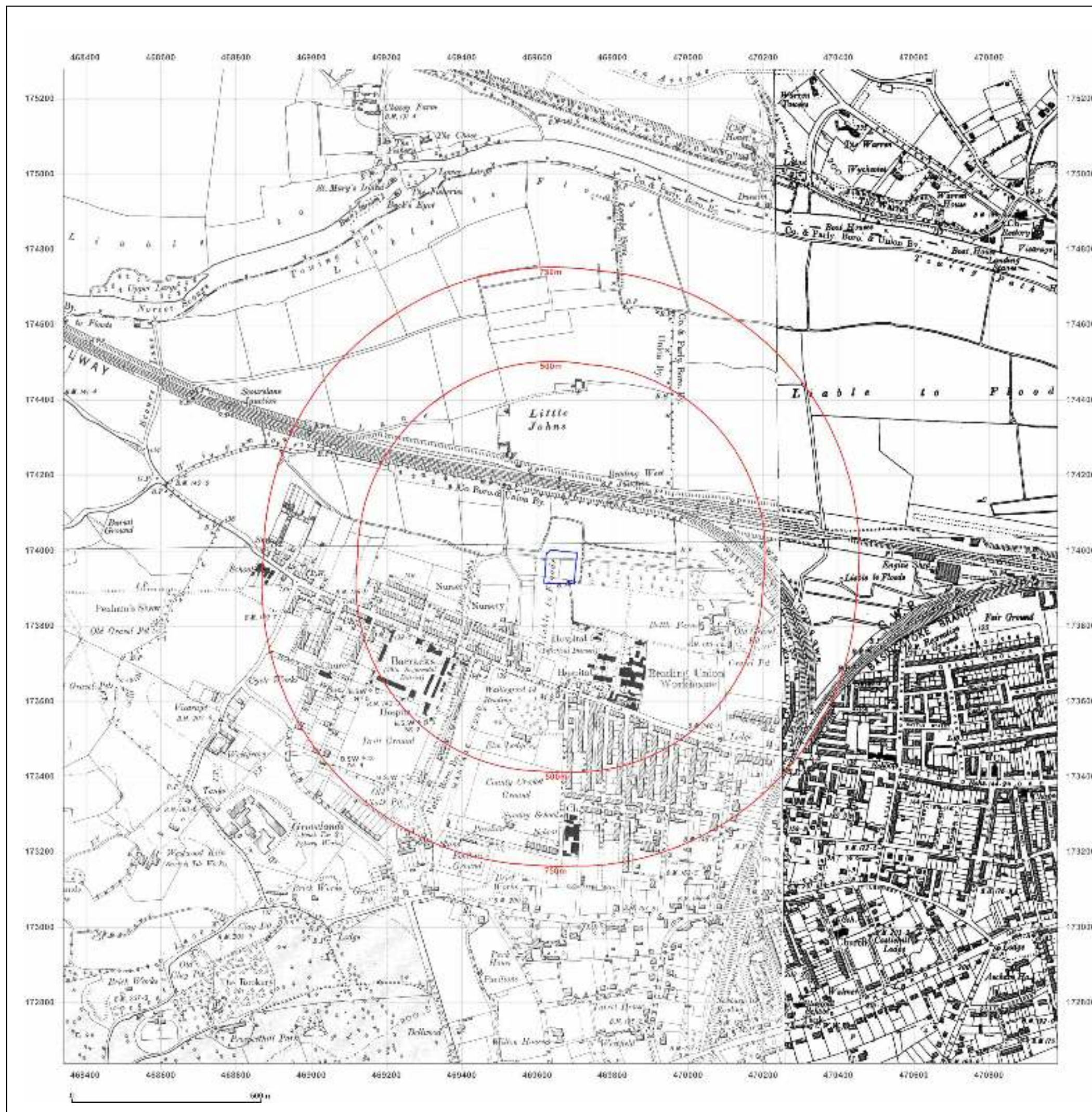


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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1910-1913

Scale: 1:10,560

Printed at: 1:10,560



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Surveyed 1877
Revised 1910
Edition N/A
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Surveyed 1877
Revised 1910
Edition N/A
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Surveyed 1877
Revised 1910
Edition 1913
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Levelled N/A



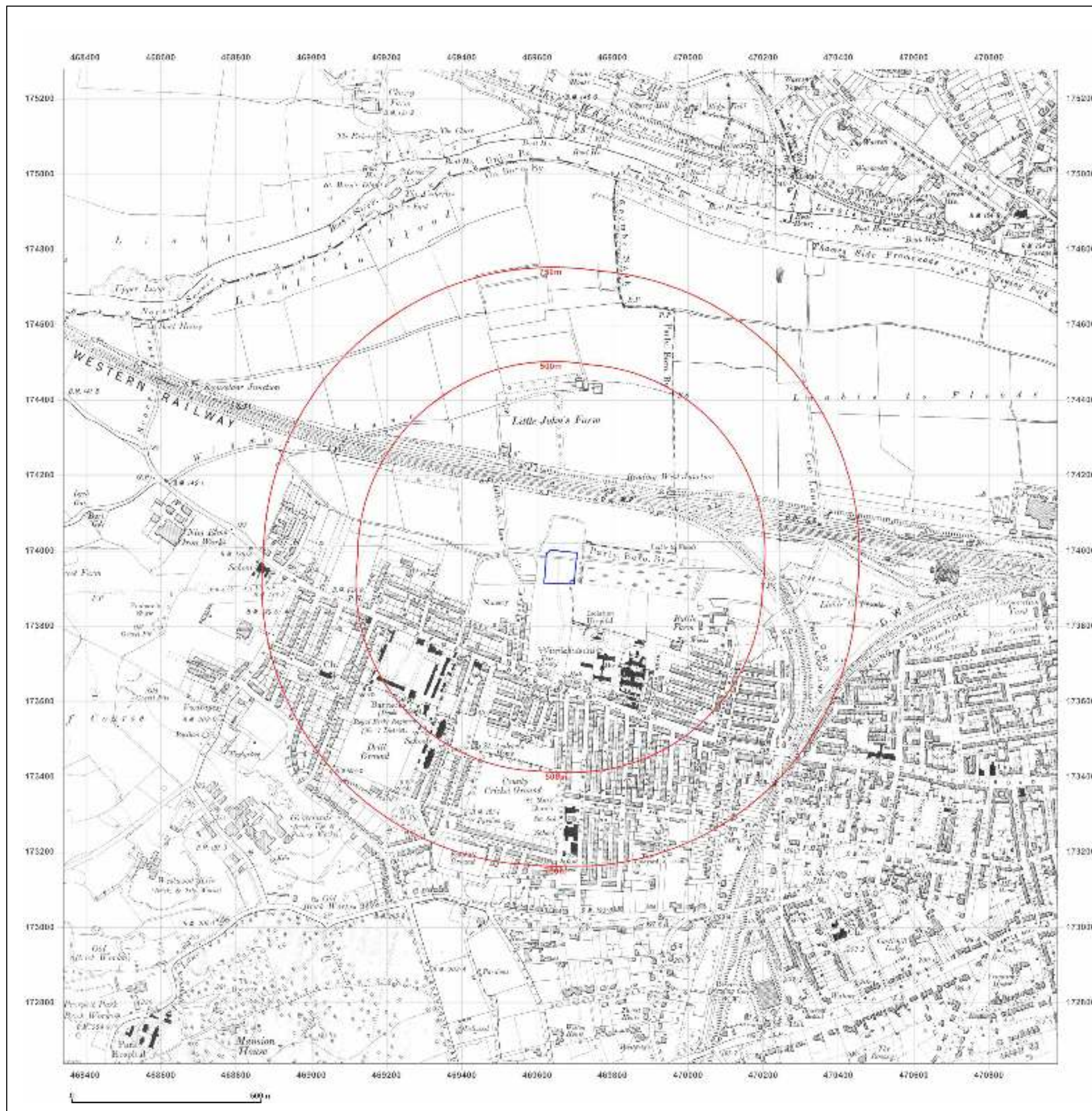
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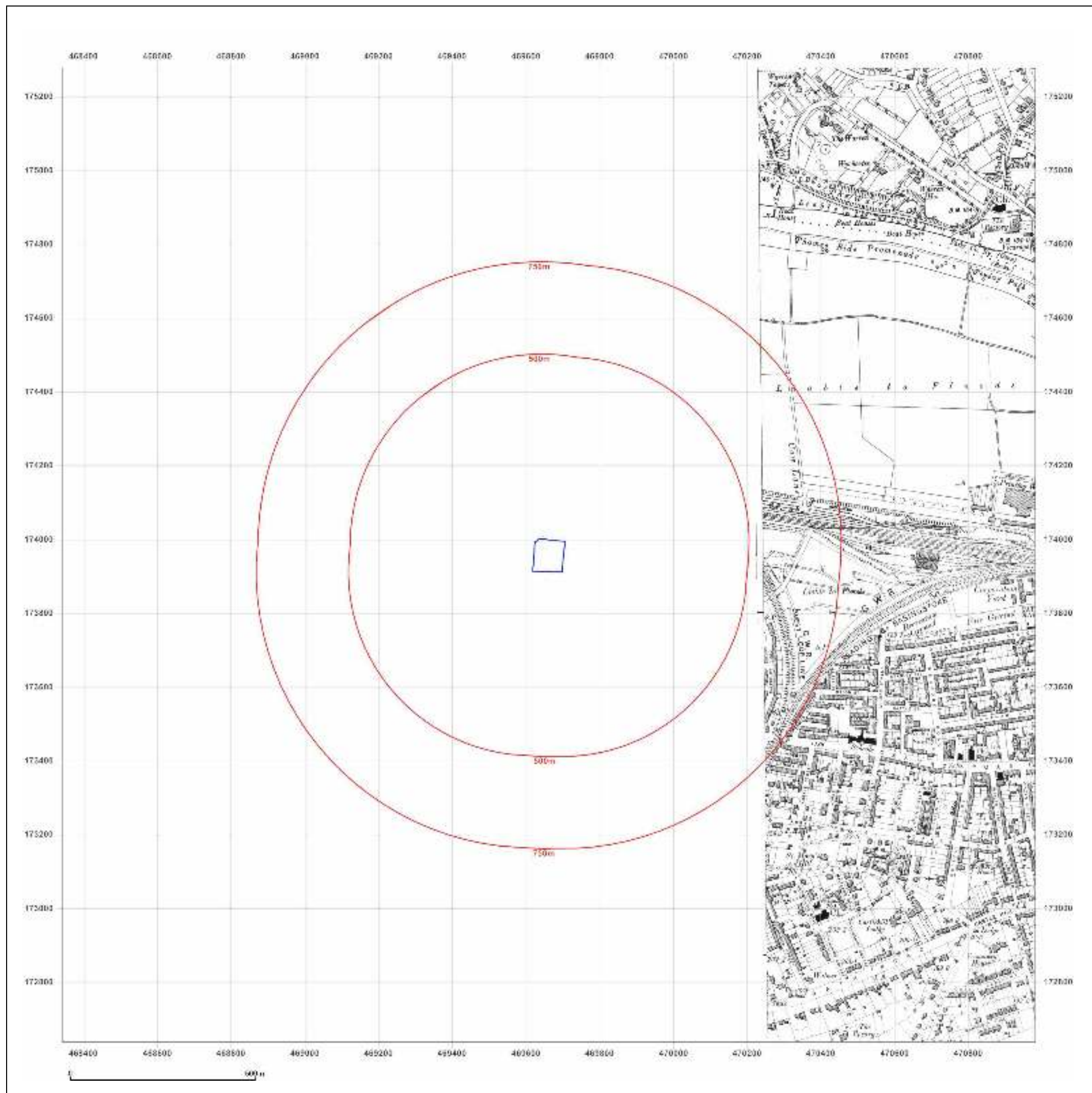
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Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1914

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1877
Revised 1910
Edition 1914
Copyright N/A
Lavalas N/A

Surveyed N/A
Revised 1914
Edition 1913
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Lavalas N/A



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Production date: 01 August 2019

Map legend available at:
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Site Details:

TESCO CARPARK, TESCO
SUPERSTORE, PORTMAN
ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1932-1933

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1877
Revised 1932
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1932
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1932
Edition N/A
Copyright N/A
Levelled N/A



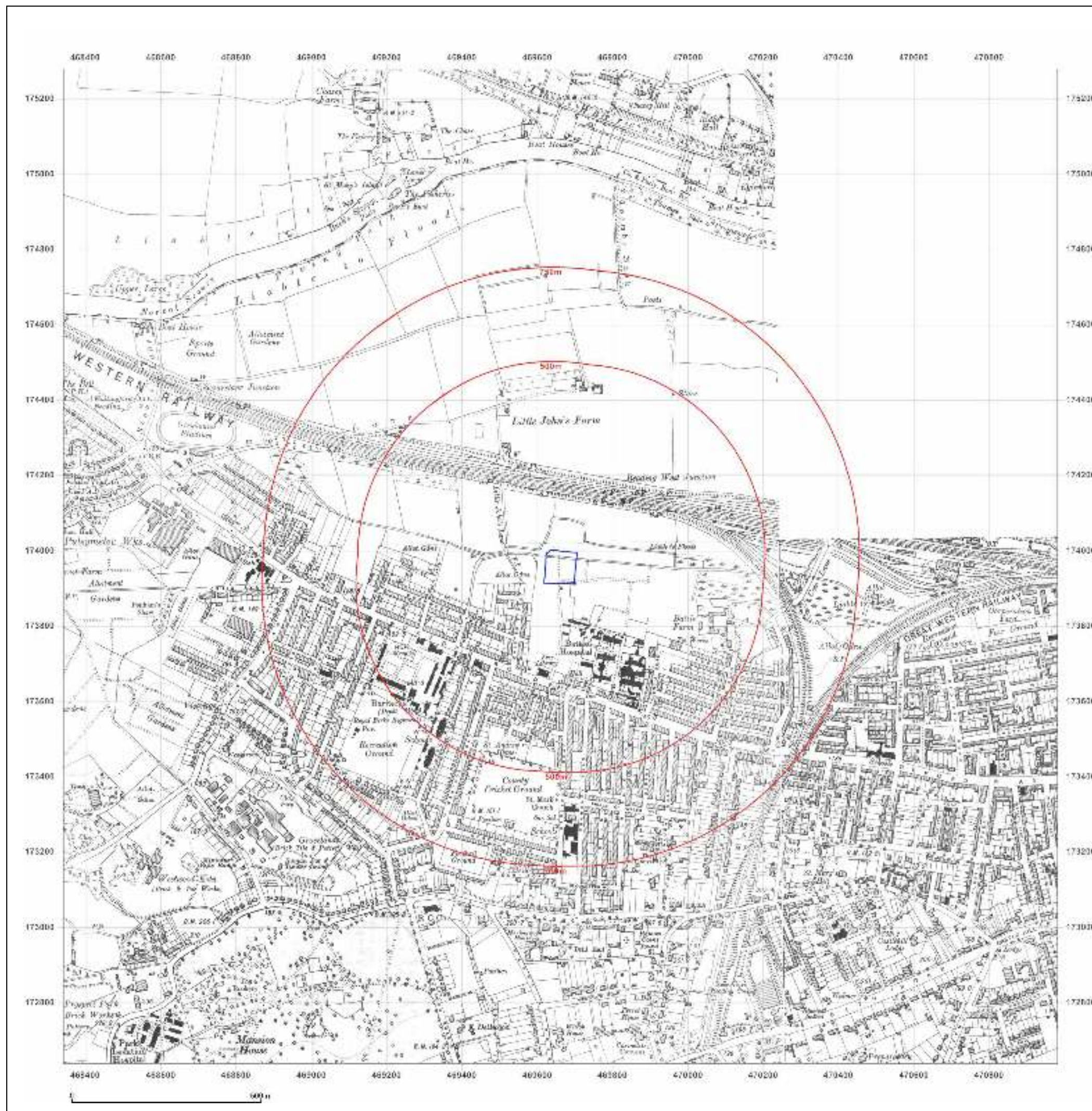
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Site Details:

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SUPERSTORE, PORTMAN
ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed N/A
Revised N/A
Edition 1938
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1938
Edition 1938
Copyright N/A
Levelled N/A



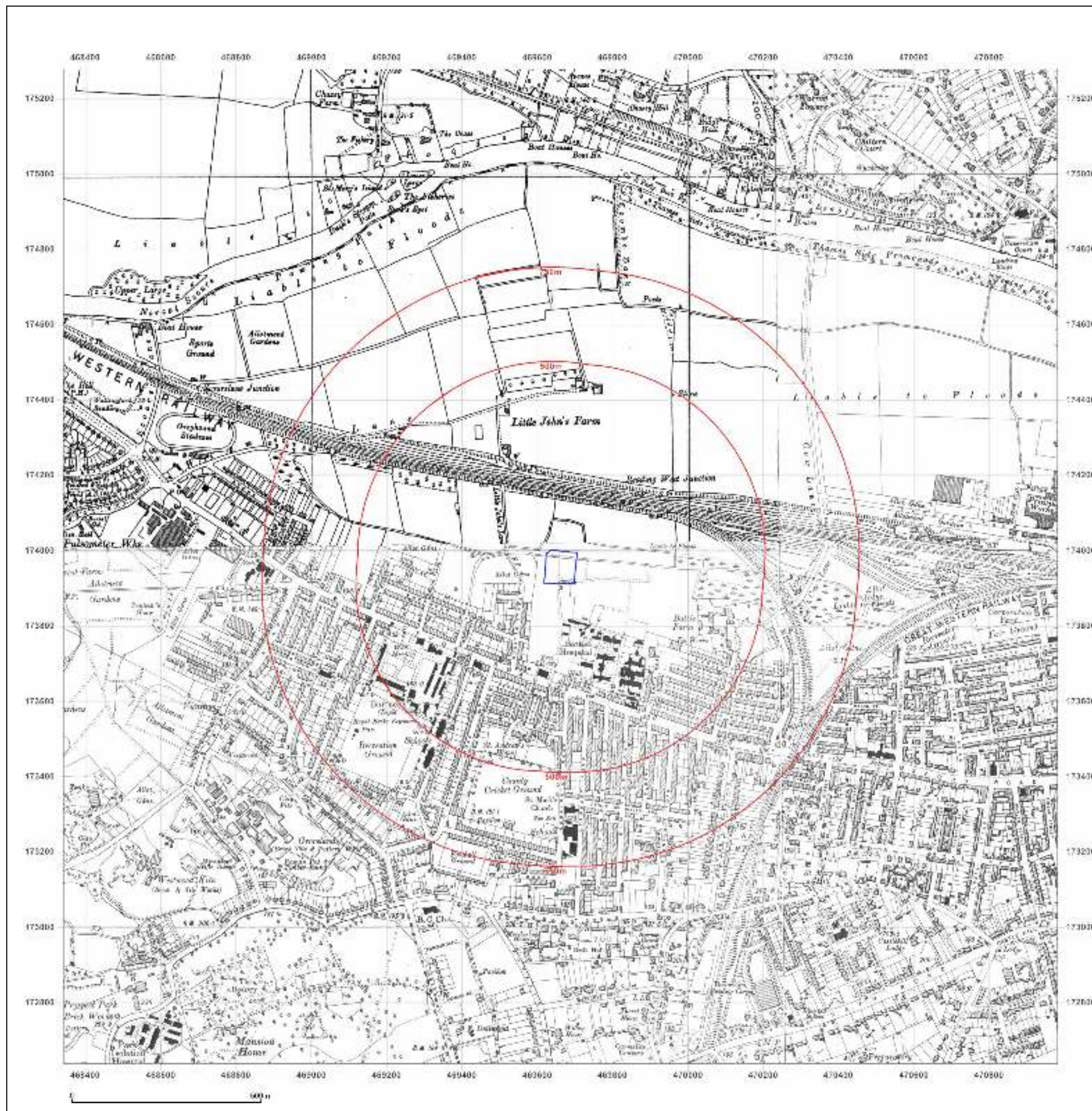
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Site Details:

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ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1877
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

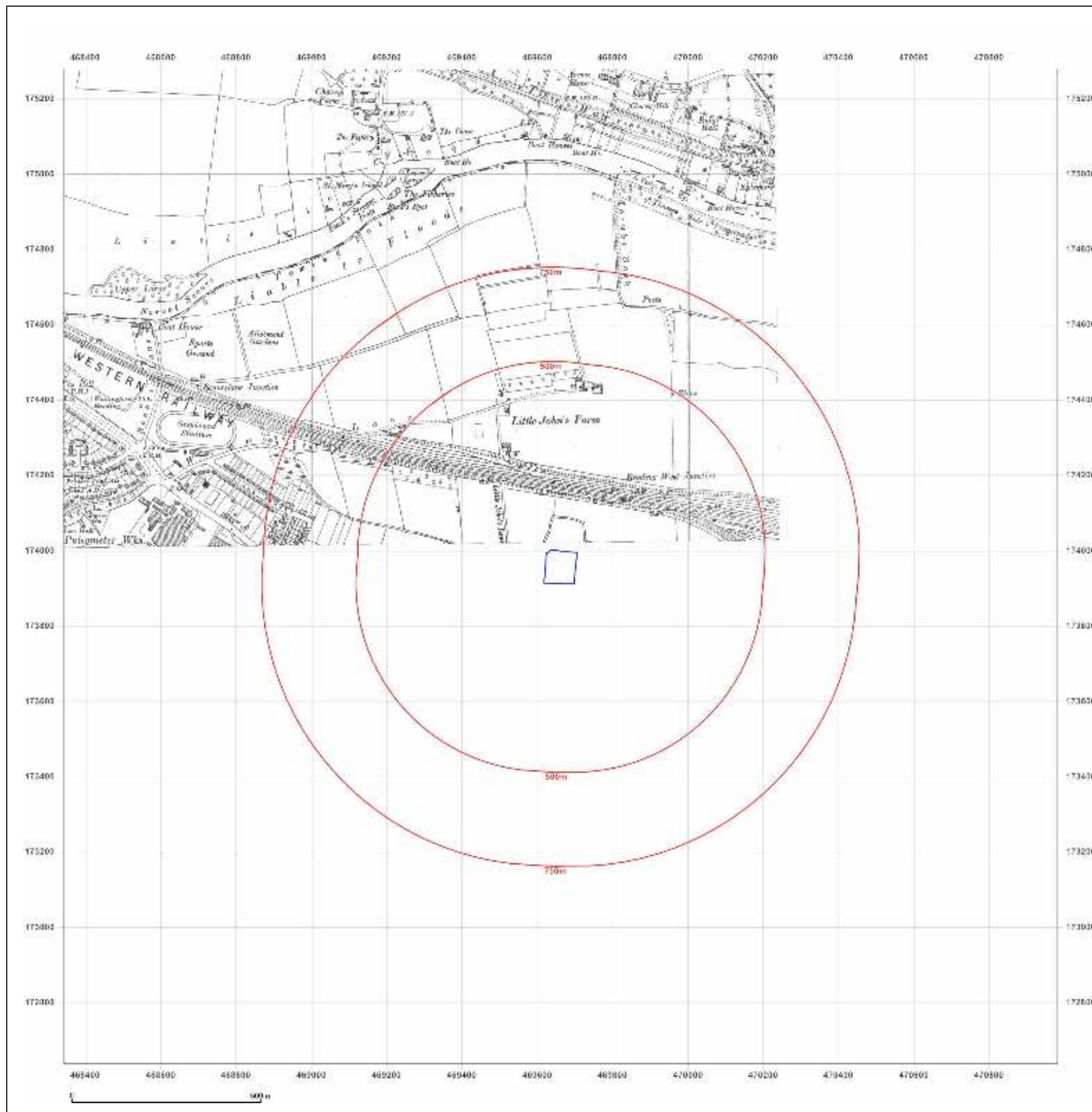


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Site Details:

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SUPERSTORE, PORTMAN
ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: Provisional

Map date: 1960-1962

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1961
Revised 1961
Edition N/A
Copyright 1961
Levelled N/A

Surveyed 1877
Revised 1961
Edition N/A
Copyright 1961
Levelled N/A

Surveyed N/A
Revised 1961
Edition 1961
Copyright 1961
Levelled N/A

Surveyed 1961
Revised 1961
Edition N/A
Copyright 1961
Levelled N/A

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Site Details:

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ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: Provisional

Map date: 1968

Scale: 1:10,560

Printed at: 1:10,560



Surveyed N/A
Revised 1968
Edition N/A
Copyright 1961
Levelled N/A



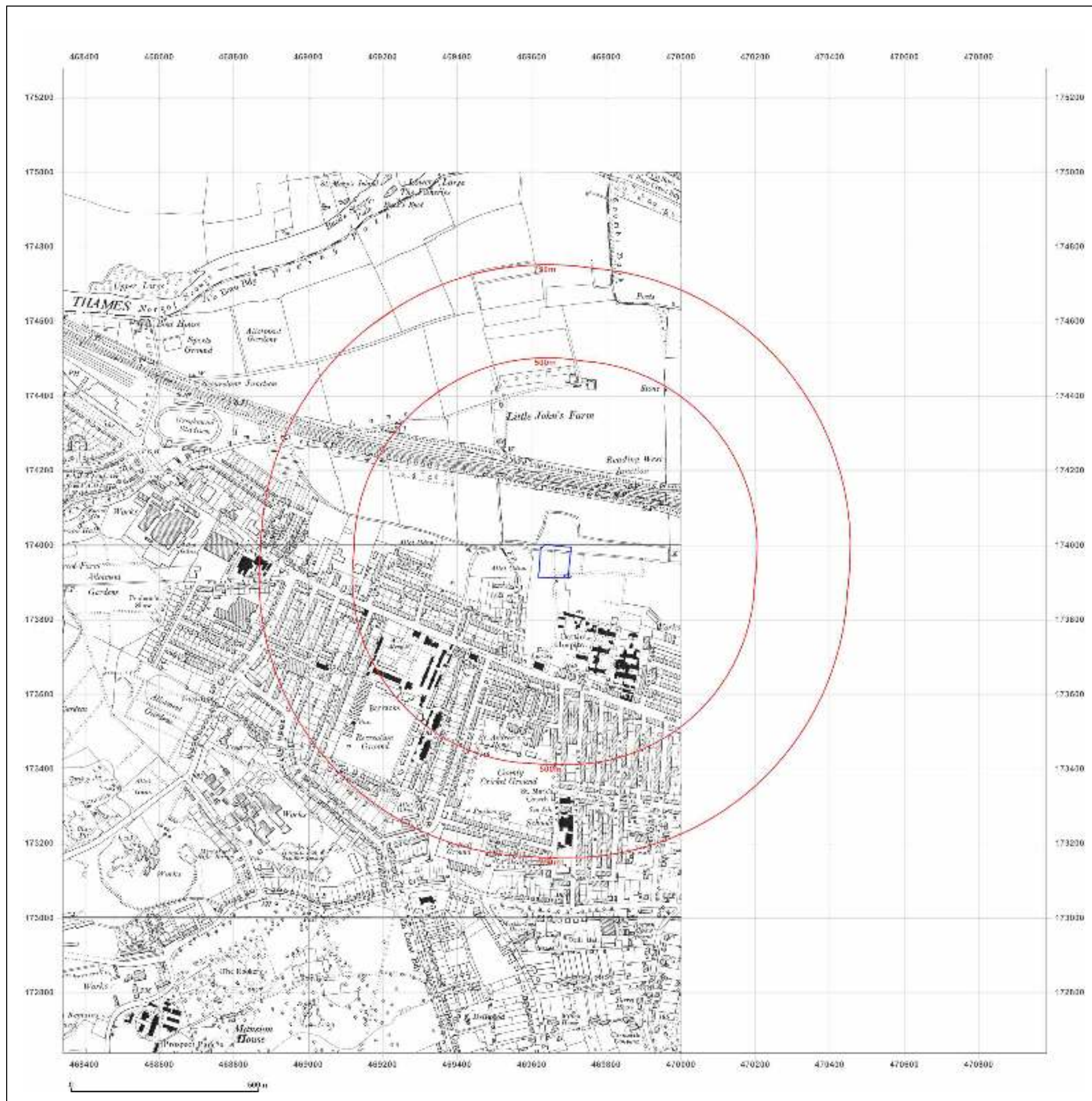
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Site Details:

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ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1970-1973

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1968
Revised 1970
Edition N/A
Copyright 1973
Levelled 1969

Surveyed 1971
Revised 1973
Edition N/A
Copyright 1973
Levelled 1969

Surveyed 1970
Revised 1973
Edition N/A
Copyright 1973
Levelled N/A

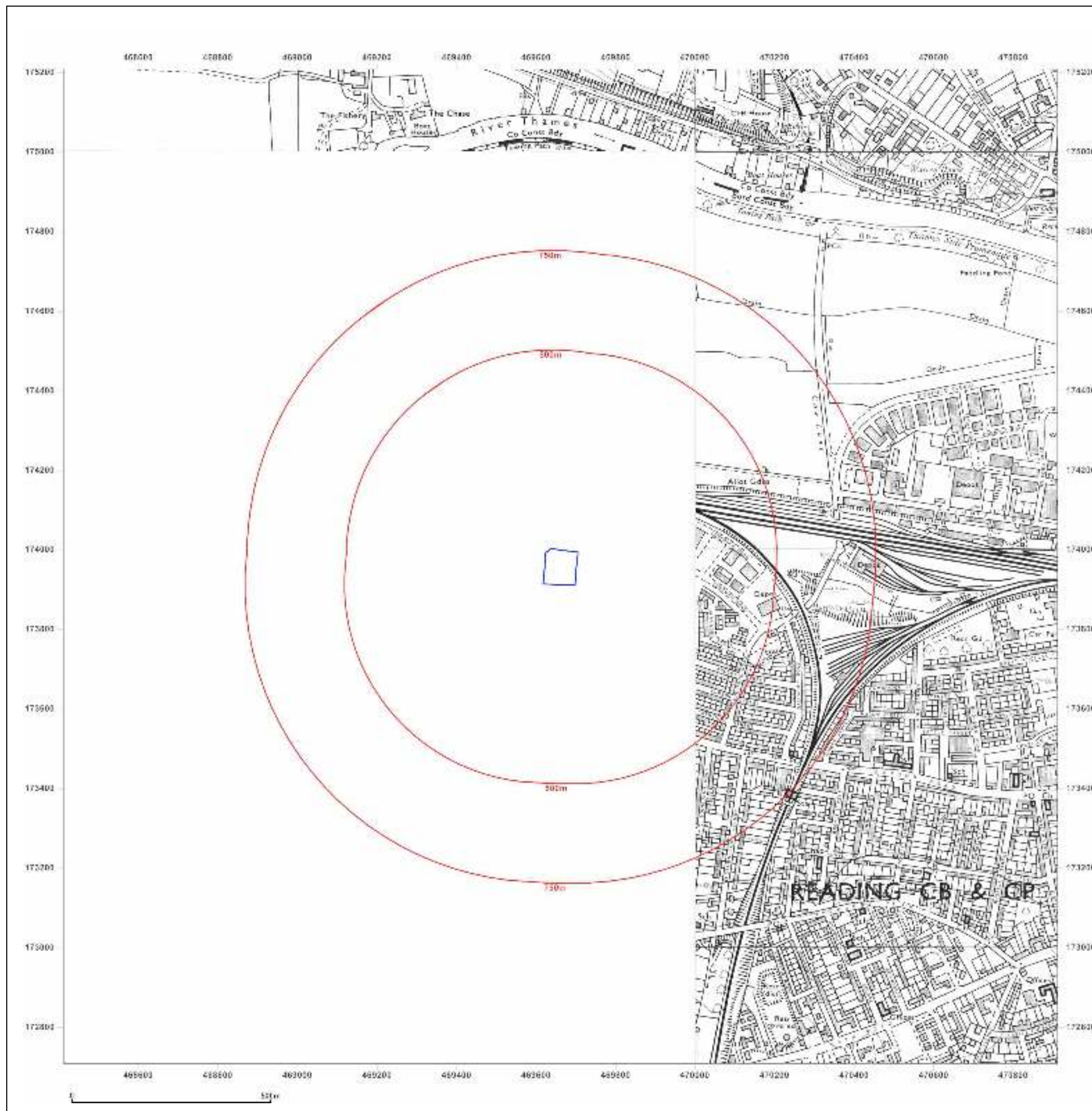


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Site Details:

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ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1976-1979

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1973
Revised 1975
Edition N/A
Copyright 1976
Levelled 1969

Surveyed 1977
Revised 1979
Edition N/A
Copyright 1979
Levelled 1969

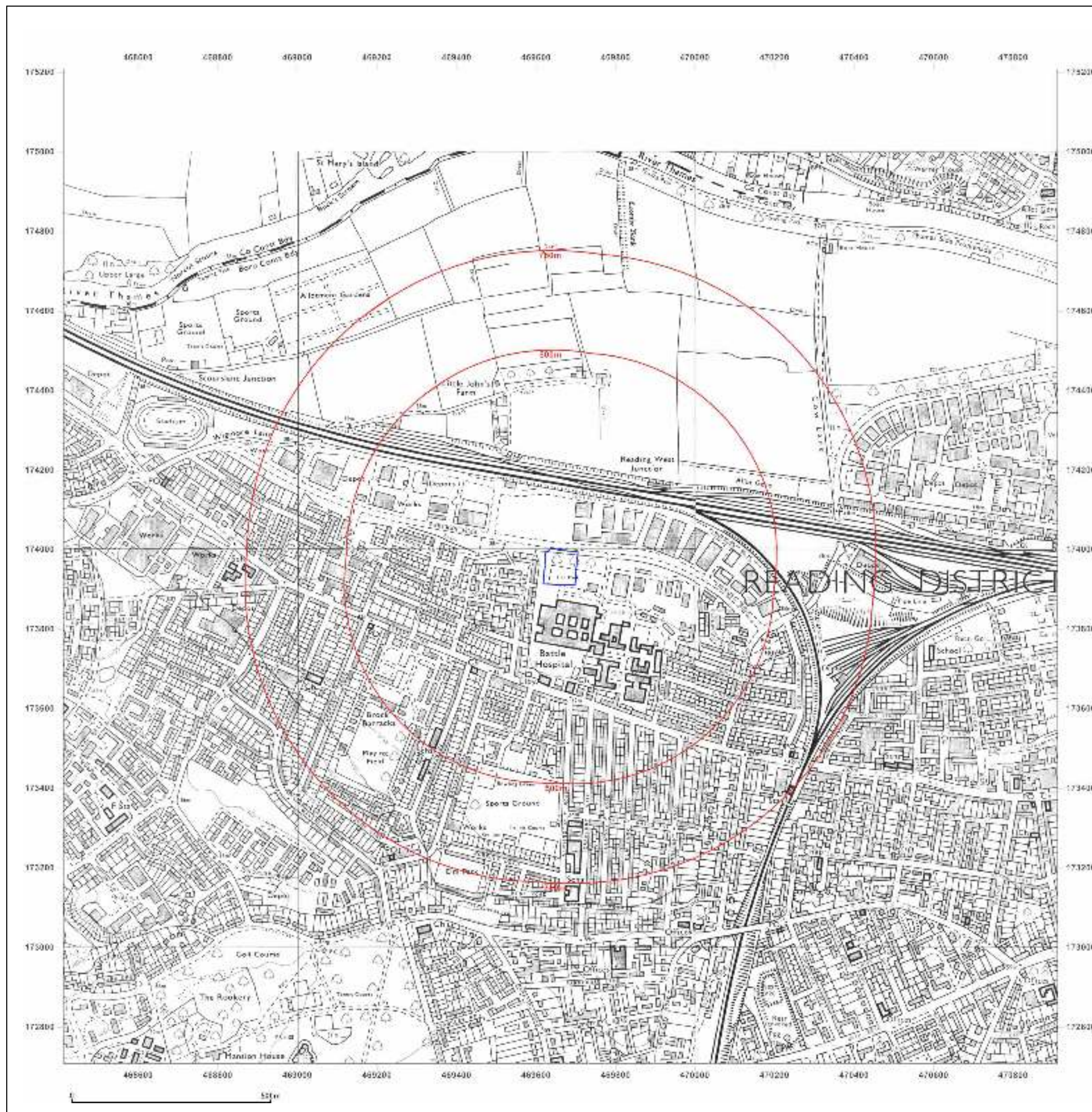


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Site Details:

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ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1982-1983

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1981
Revised 1983
Edmon N/A
Copyright N/A
Levelled N/A

Surveyed 1981
Revised 1982
Edmon N/A
Copyright N/A
Levelled N/A

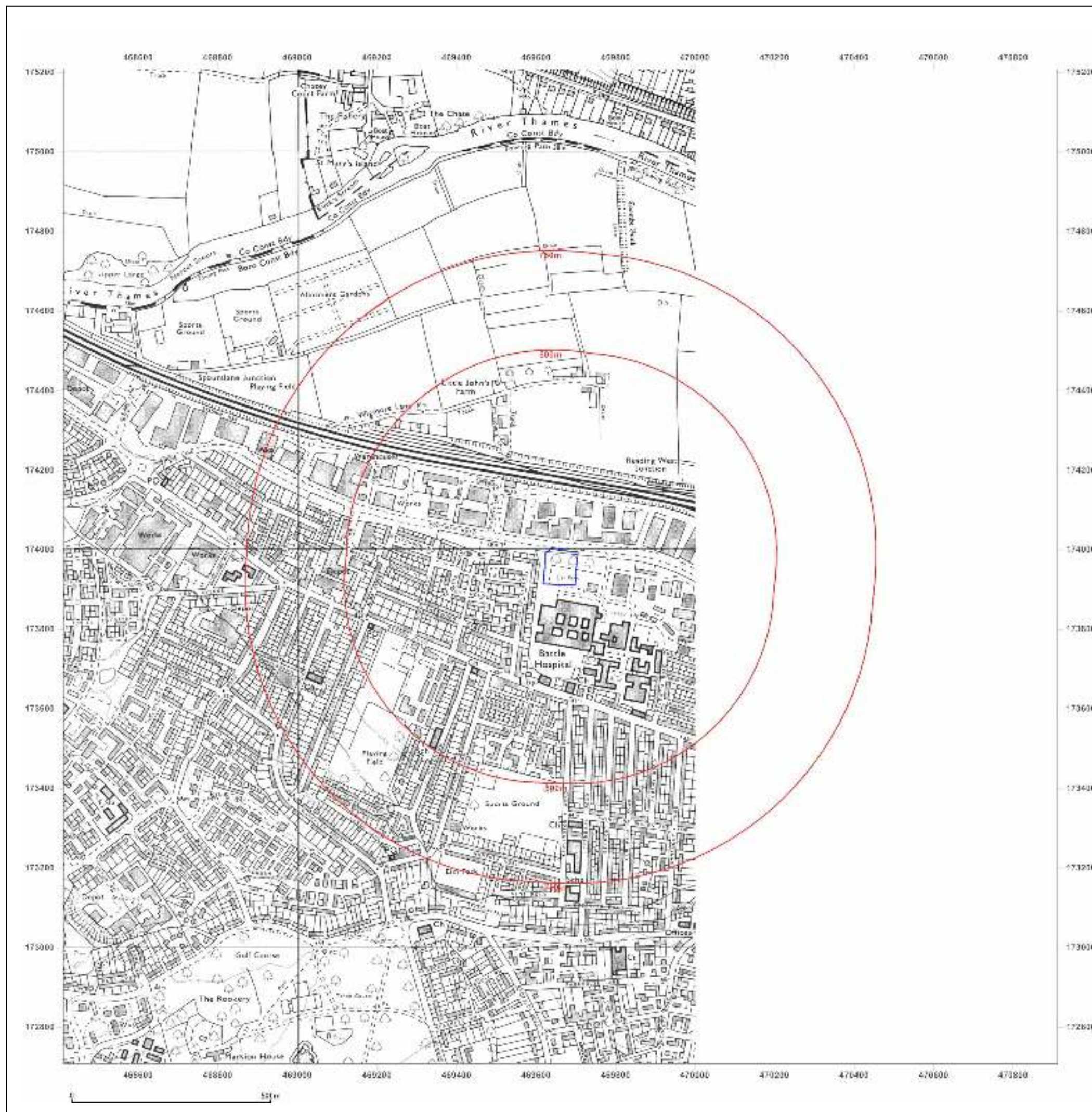


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Site Details:

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ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1989-1991

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1989
Revised 1990
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1990
Revised 1991
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1991
Revised 1999
Edition N/A
Copyright N/A
Levelled N/A

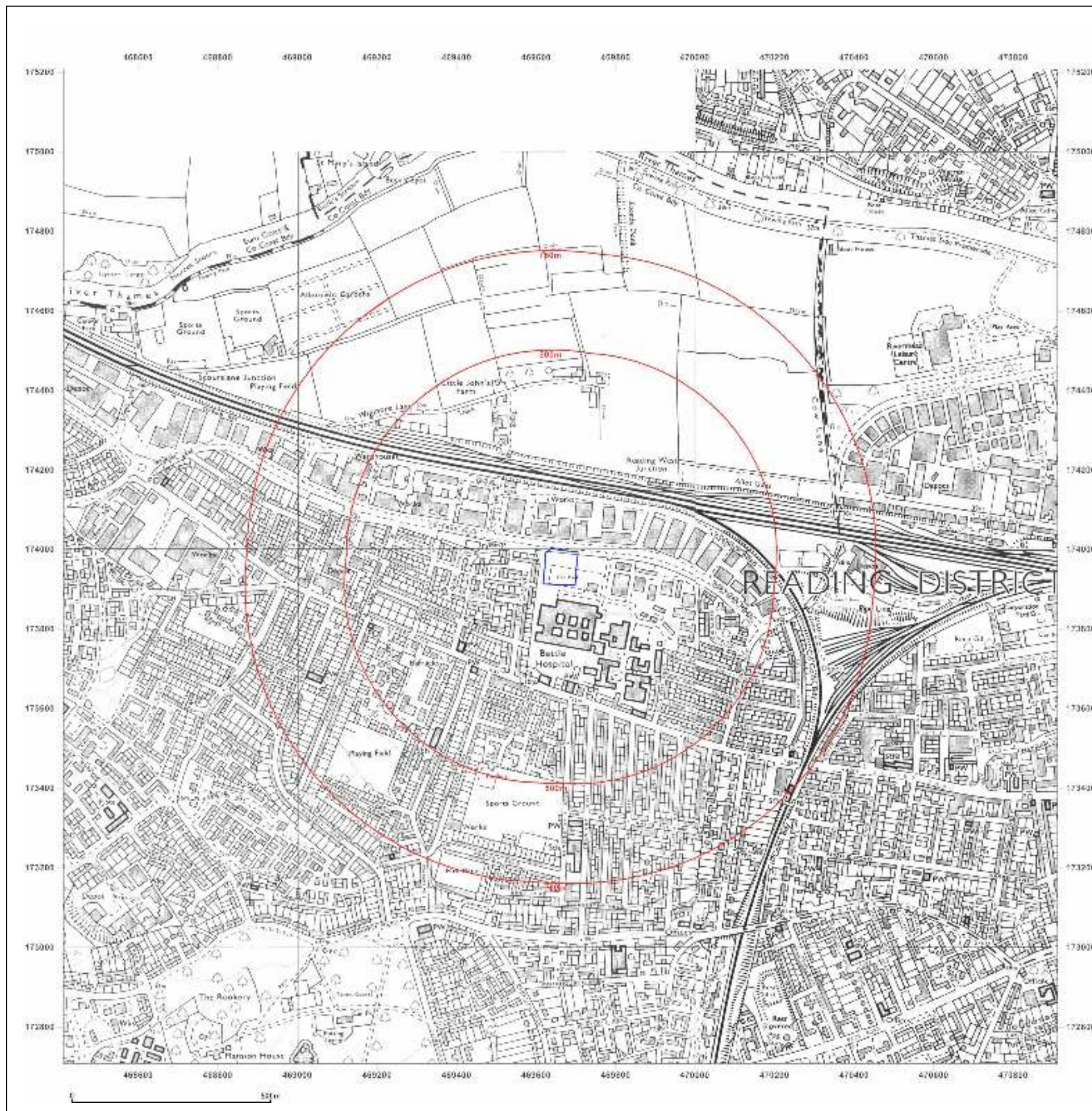


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SUPERSTORE, PORTMAN
ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 1994

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1987
Revised 1994
Edition N/A
Copyright N/A
Landed N/A

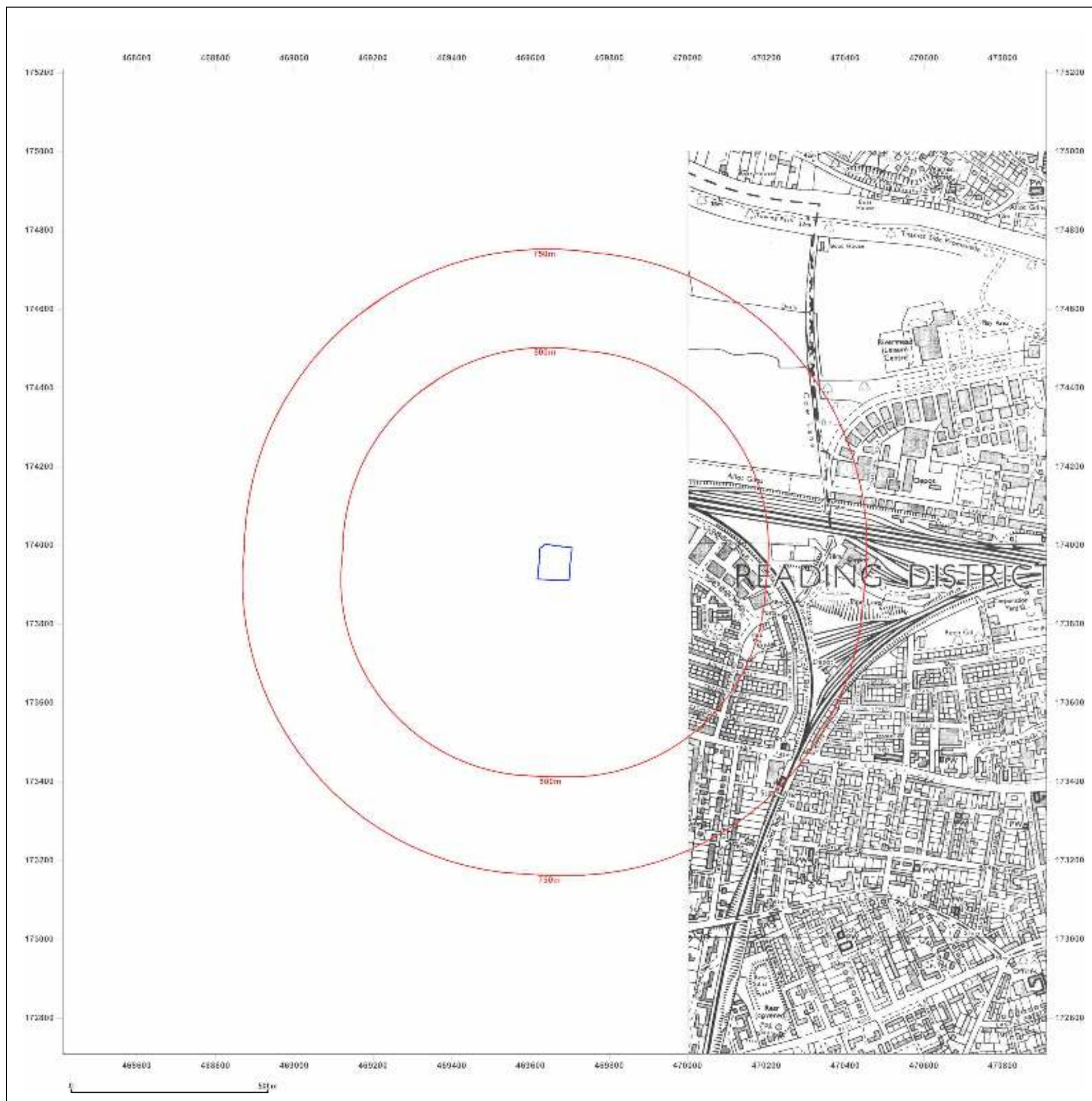


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Site Details:

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ROAD, READING, RG30 1AW

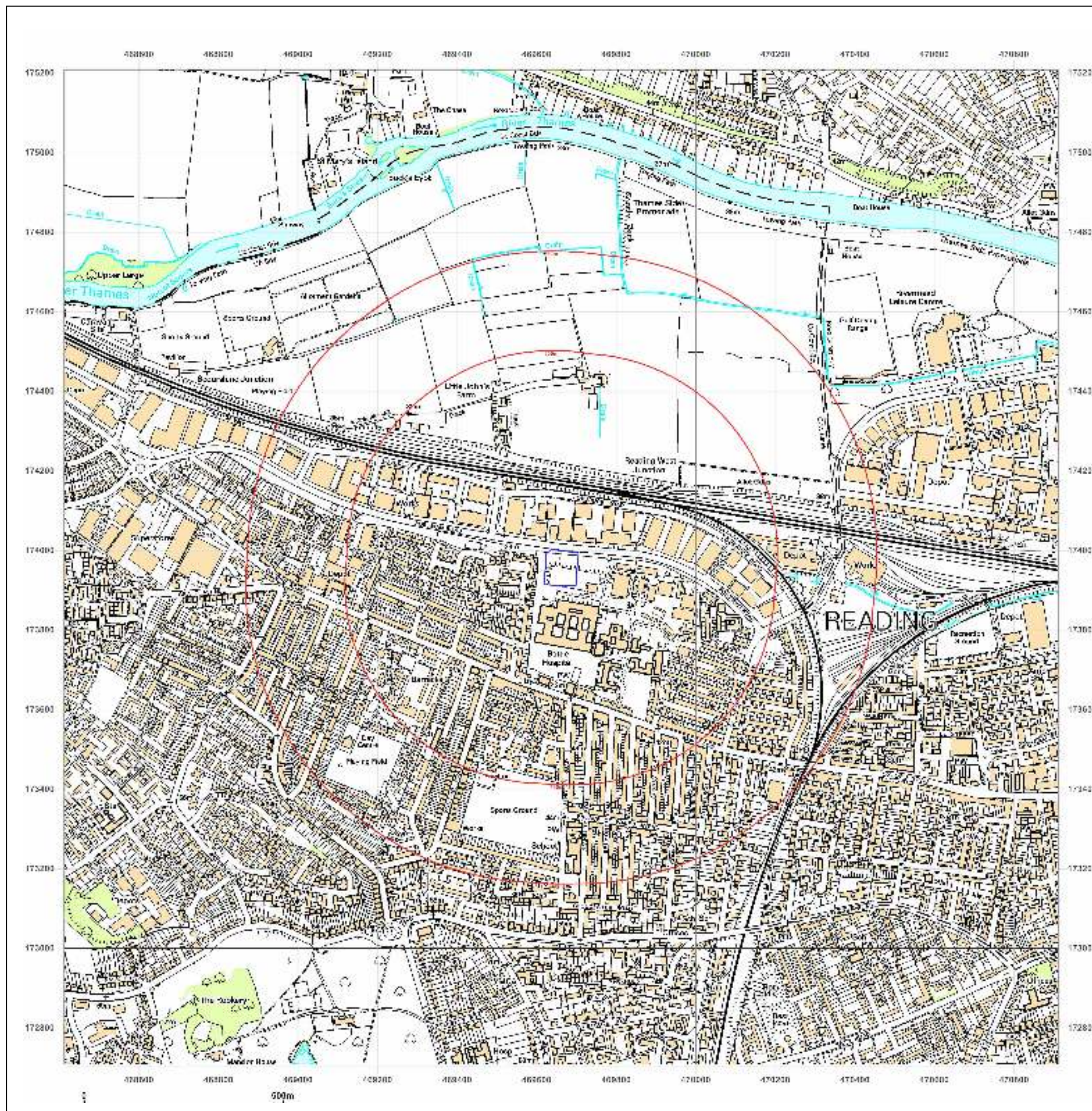
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Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: 1:10,000 Raster

Map date: 2002

Scale: 1:10,000

Printed at: 1:10,000



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Site Details:

TESCO CARPARK, TESCO
SUPERSTORE, PORTMAN
ROAD, READING, RG30 1AW

Client Ref: 19-335
Report Ref: WDE-6213642
Grid Ref: 469661, 173957

Map Name: National Grid

Map date: 2014

Scale: 1:10,000

Printed at: 1:10,000



2014

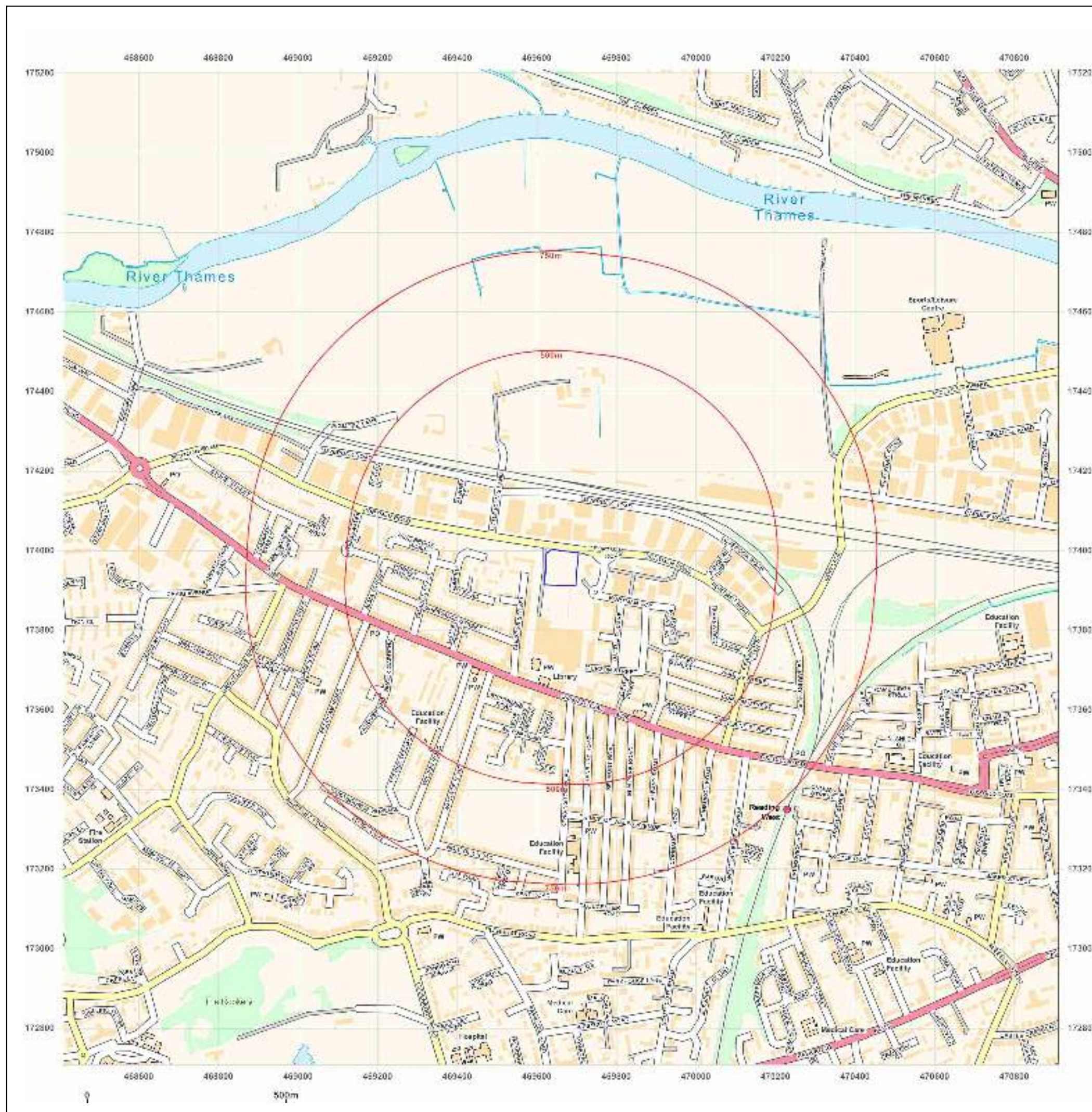


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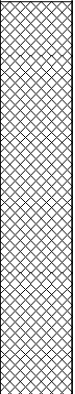
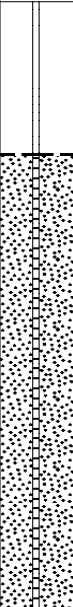
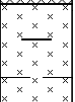
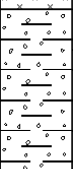
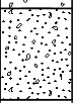
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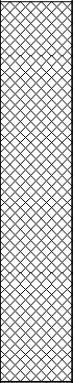
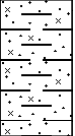
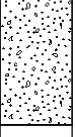


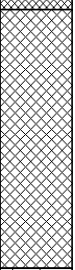
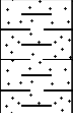
APPENDIX E

Borehole Logs

Dynamic Probe Logs

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Tesco Car Park, Reading		Number BH1	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Ridgepoint Homes LTD		Job Number 20931	
		Location		Dates 07/08/2019		Engineer David Bryan		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
1.00-1.00	J1		(1.6ppm)		(2.60)	MADE GROUND: Brown/black gravelly clayey fill with red brick fragments coal ash and glass			
1.50-1.50	J2		(0ppm)						
			Water strike(1) at 2.20m. (0.8ppm)						
					2.60 (0.70)	Soft brown clayey SILT			
					3.30 (1.10)	Soft grey sandy slightly gravelly very silty CLAY. Gravels are medium to coarse subangular to subrounded			
					4.40 (0.60)	Loose to very dense yellow/brown clayey sandy medium to coarse subangular to subrounded SAND & GRAVEL			
					5.00	Complete at 5.00m			
Remarks							Scale (approx) 1:50	Logged By DB	
							Figure No. 20931.BH1		

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Tesco Car Park, Reading		Number BH2	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Ridgepoint Homes LTD		Job Number 20931	
		Location		Dates 07/08/2019		Engineer David Bryan		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.60	J1		(0ppm)			MADE GROUND: Brown/black sandy clayey fill with red brick fragments and glass			
2.50	J2		(0.1ppm)		2.50	Soft black/brown sandy very silty organic CLAY			
			Water strike(1) at 3.10m.		(0.90)				
			(0.4ppm)		3.40	Very loose grey/brown clayey fine to medium subangular to subrounded SAND & GRAVEL			
					(1.10)				
					4.50				
						Complete at 5.00m			
Remarks							Scale (approx) 1:50	Logged By DB	Figure No. 20931.BH2

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Tesco Car Park, Reading		Number BH3	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Ridgepoint Homes LTD		Job Number 20931	
		Location		Dates 06/08/2019		Engineer David Bryan		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
1.50	J1		(0ppm)		0.10 (0.40)	TARMAC			
					0.50	MADE GROUND: Granular type 1 fill			
					(1.70)	MADE GROUND: Brown sandy clayey fill with red brick fragments			
2.00	J2		(0.6ppm)		2.20	Soft to firm grey sandy CLAY			
2.20	J3		(0.1ppm)		(0.80)				
			Water strike(1) at 2.60m.		3.00	Very loose to medium dense yellow clayey sandy fine to medium subangular to subrounded SAND & GRAVEL			
					(1.00)				
					4.00	Complete at 4.00m			
Remarks							Scale (approx) 1:50	Logged By DB	Figure No. 20931.BH3

Site

Tesco Car Park, Reading

Number
BH4

Excavation Method

Drive-in Window Sampler

Dimensions

Location

Ground Level (mOD)

Dates

06/08/2019

Client

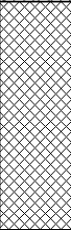
Ridgepoint Homes LTD

Job
Number
20931

Engineer

David Bryan

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
1.00	J1		(0ppm)			TOPSOIL: Brown sandy gravelly clay with rootlets MADE GROUND: Brown sandy clayey fill with red brick fragments Complete at 2.00m	 	

Remarks

Scale
(approx)

1:50

Logged
By

DB

Figure No.

20931.BH4

Site

Tesco Car Park, Reading

Number
BH5

Excavation Method

Drive-in Window Sampler

Dimensions

Location

Ground Level (mOD)

Dates

06/08/2019

Client

Ridgepoint Homes LTD

Job
Number
20931

Engineer

David Bryan

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
1.00	J1		(0ppm)		(0.30) 0.30 (1.70) 2.00	TOPSOIL: Brown sandy gravelly clay with rootlets MADE GROUND: Brown sandy clayey fill with red brick fragments Complete at 2.00m		

Remarks

Scale
(approx)

1:50

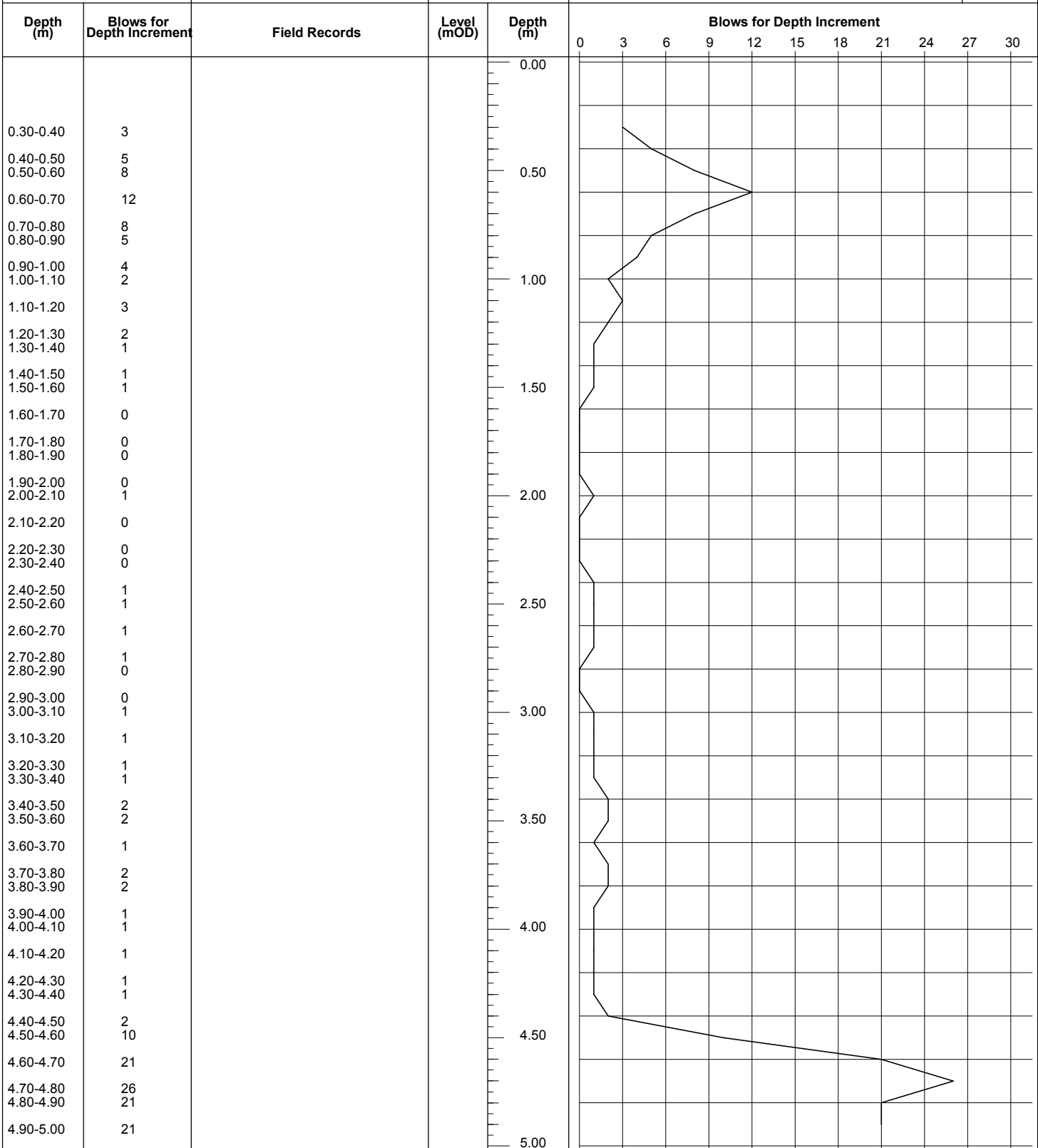
Logged
By

DB

Figure No.

20931.BH5

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Ridgepoint Homes LTD	Job Number 20931
	Location	Dates 07/08/2019	Engineer David Bryan	Sheet 1/1



Remarks

Scale (approx)
1:25

Logged By
DB

Figure No.
20931.DP1

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Ridgepoint Homes LTD	Job Number 20931
	Location	Dates 06/08/2019	Engineer David Bryan	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
					0 1 2 3 4 5 6 7 8 9 10
0.30-0.40	1			0.00	
0.40-0.50	1				
0.50-0.60	0			0.50	
0.60-0.70	1				
0.70-0.80	4				
0.80-0.90	2				
0.90-1.00	1			1.00	
1.00-1.10	1				
1.10-1.20	2				
1.20-1.30	1				
1.30-1.40	1				
1.40-1.50	2			1.50	
1.50-1.60	3				
1.60-1.70	3				
1.70-1.80	3				
1.80-1.90	6				
1.90-2.00	4			2.00	
2.00-2.10	3				
2.10-2.20	2				
2.20-2.30	1				
2.30-2.40	2				
2.40-2.50	1			2.50	
2.50-2.60	2				
2.60-2.70	2				
2.70-2.80	1				
2.80-2.90	0				
2.90-3.00	1			3.00	
3.00-3.10	1				
3.10-3.20	0				
3.20-3.30	1				
3.30-3.40	0				
3.40-3.50	1			3.50	
3.50-3.60	1				
3.60-3.70	1				
3.70-3.80	1				
3.80-3.90	0				
3.90-4.00	2			4.00	
4.00-4.10	1				
4.10-4.20	1				
4.20-4.30	1				
4.30-4.40	0				
4.40-4.50	1			4.50	
4.50-4.60	0				
4.60-4.70	2				
4.70-4.80	1				
4.80-4.90	2				
4.90-5.00	1			5.00	

Remarks

Scale
(approx) 1:25

**Logged
By**
DB

Figure No.
20931.DP2

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Ridgepoint Homes LTD	Job Number 20931
	Location	Dates 06/08/2019	Engineer David Bryan	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
0.00-0.10	30			0.00	
0.10-0.20	33				
0.20-0.30	30				
0.30-0.40	35				
0.40-0.50	23			0.50	
0.50-0.60	12				
0.60-0.70	8				
0.70-0.80	10				
0.80-0.90	10				
0.90-1.00	9			1.00	
1.00-1.10	7				
1.10-1.20	6				
1.20-1.30	5				
1.30-1.40	4				
1.40-1.50	5			1.50	
1.50-1.60	5				
1.60-1.70	2				
1.70-1.80	2				
1.80-1.90	2				
1.90-2.00	2			2.00	
2.00-2.10	1				
2.10-2.20	1				
2.20-2.30	1				
2.30-2.40	1				
2.40-2.50	1			2.50	
2.50-2.60	1				
2.60-2.70	0				
2.70-2.80	1				
2.80-2.90	1				
2.90-3.00	1			3.00	
3.00-3.10	1				
3.10-3.20	0				
3.20-3.30	1				
3.30-3.40	1				
3.40-3.50	4			3.50	
3.50-3.60	6				
3.60-3.70	7				
3.70-3.80	6				
3.80-3.90	7				
3.90-4.00	7			4.00	
4.00-4.10	6				
4.10-4.20	7				
4.20-4.30	9				
4.30-4.40	10				
4.40-4.50	8			4.50	
4.50-4.60	7				
4.60-4.70	6				
4.70-4.80	7				
4.80-4.90	5				
4.90-5.00	7			5.00	

Remarks

Scale (approx)	Logged By
1:25	DB
Figure No.	
20931.DP3	

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Ridgepoint Homes LTD	Job Number 20931
	Location	Dates 06/08/2019	Engineer David Bryan	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
				0.00	0 2 4 6 8 10 12 14 16 18 20
0.30-0.40	4				
0.40-0.50	6				
0.50-0.60	8			0.50	
0.60-0.70	8				
0.70-0.80	6				
0.80-0.90	6				
0.90-1.00	6				
1.00-1.10	5			1.00	
1.10-1.20	6				
1.20-1.30	4				
1.30-1.40	2				
1.40-1.50	2				
1.50-1.60	3			1.50	
1.60-1.70	4				
1.70-1.80	4				
1.80-1.90	3				
1.90-2.00	4				
2.00-2.10	4			2.00	
2.10-2.20	3				
2.20-2.30	5				
2.30-2.40	4				
2.40-2.50	4				
2.50-2.60	3			2.50	
2.60-2.70	2				
2.70-2.80	1				
2.80-2.90	2				
2.90-3.00	1				
3.00-3.10	1			3.00	
3.10-3.20	2				
3.20-3.30	1				
3.30-3.40	1				
3.40-3.50	2				
3.50-3.60	1			3.50	
3.60-3.70	0				
3.70-3.80	1				
3.80-3.90	0				
3.90-4.00	2				
4.00-4.10	1			4.00	
4.10-4.20	0				
4.20-4.30	1				
4.30-4.40	1				
4.40-4.50	3				
4.50-4.60	8			4.50	
4.60-4.70	13				
4.70-4.80	16				
4.80-4.90	14				
4.90-5.00	16			5.00	

Remarks

Scale (approx)	Logged By
1:25	DB
Figure No.	
20931.DP4	

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Ridgepoint Homes LTD	Job Number 20931
	Location	Dates 06/08/2019	Engineer David Bryan	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
					0 2 4 6 8 10 12 14 16 18 20
0.30-0.40	4			0.00	
0.40-0.50	5				
0.50-0.60	4			0.50	
0.60-0.70	5				
0.70-0.80	6				
0.80-0.90	5				
0.90-1.00	6			1.00	
1.00-1.10	3				
1.10-1.20	4				
1.20-1.30	7				
1.30-1.40	6				
1.40-1.50	3			1.50	
1.50-1.60	2				
1.60-1.70	2				
1.70-1.80	0				
1.80-1.90	0				
1.90-2.00	0			2.00	
2.00-2.10	1				
2.10-2.20	0				
2.20-2.30	1				
2.30-2.40	0				
2.40-2.50	1			2.50	
2.50-2.60	0				
2.60-2.70	3				
2.70-2.80	1				
2.80-2.90	0				
2.90-3.00	1			3.00	
3.00-3.10	1				
3.10-3.20	0				
3.20-3.30	1				
3.30-3.40	11				
3.40-3.50	5			3.50	
3.50-3.60	2				
3.60-3.70	1				
3.70-3.80	0				
3.80-3.90	1				
3.90-4.00	1			4.00	
4.00-4.10	1				
4.10-4.20	1				
4.20-4.30	1				
4.30-4.40	1				
4.40-4.50	2			4.50	
4.50-4.60	1				
4.60-4.70	3				
4.70-4.80	4				
4.80-4.90	3				
4.90-5.00	2			5.00	

Remarks

Scale (approx) 1:25
Logged By DB
Figure No. 20931.DP5

APPENDIX F

Ground Gas Sheets

Permeability Sheets

Visit Date: 09/08/2019

Visit Number: 1

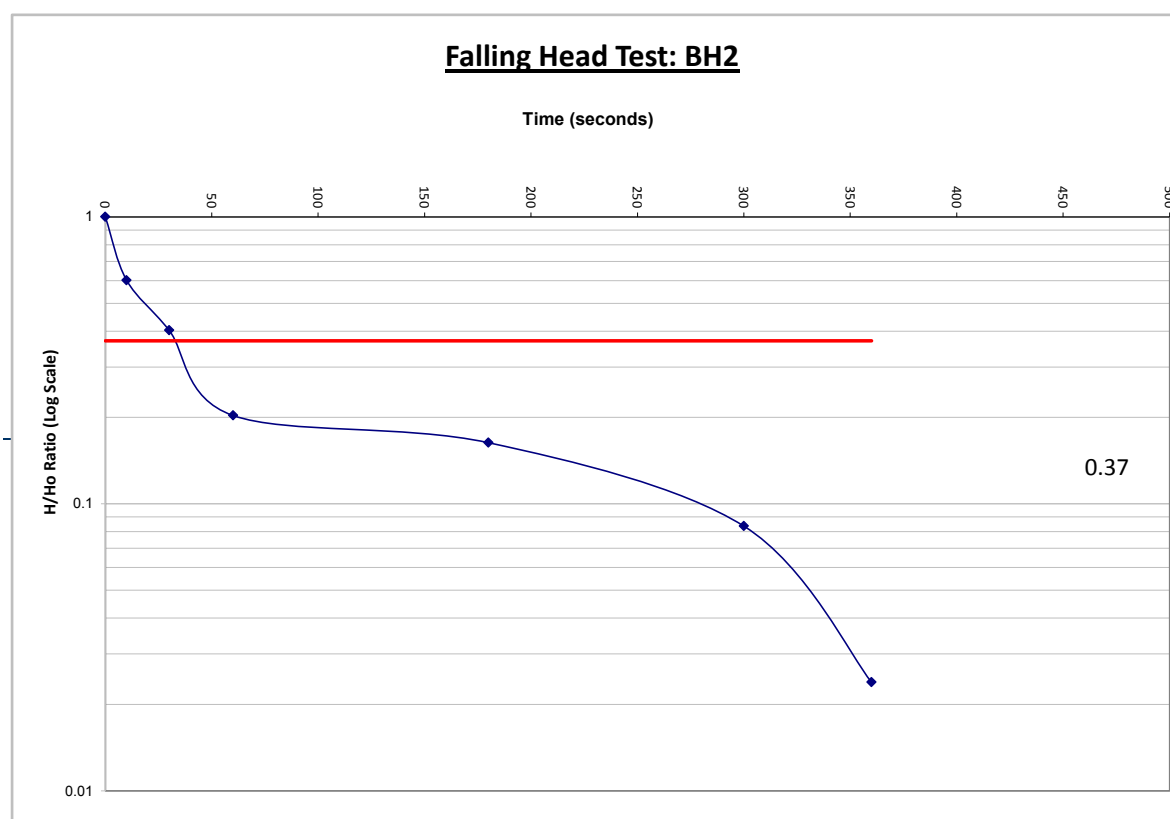
Air Temperature: 20 °C

Borehole Number	BH1			BH2		
	0 mins	5 mins	10 mins	0 mins	5 mins	10 mins
Combustible gas (CH4) %LEL	0	0	0	^	>>>	>>>
Combustible gas (CH4) % vol	0	0	0	69.5	69.5	69.6
Combustible gas (CH4) Peak	0	0	0	69.5	69.5	69.6
Carbon dioxide % vol	10.8	11.1	11.2	27.5	27.6	27.5
Oxygen % vol	12.1	10.9	10.9	0.1	0	0
Carbon monoxide ppm	1	1	1	17	17	18
Hydrogen sulfide ppm	0	0	0	0	0	0
Flow Rate (l/hr)	0			0.1		
Barometric Pressure (mB)	997			997		
Relative Downhole Pressure (mB)	0			0.15		
Depth to Groundwater (m)	1.913			2.516		
Depth to Base of Borehole (m)	3.87			4.67		
Condition of Standpipe	Good			Good		

Borehole Number	BH3					
	0 mins	5 mins	10 mins	0 mins	5 mins	10 mins
Combustible gas (CH4) %LEL	0	0	0			
Combustible gas (CH4) % vol	0	0	0			
Combustible gas (CH4) Peak	0	0	0			
Carbon dioxide % vol	14.1	14.4	23.1			
Oxygen % vol	7.3	6.7	0.5			
Carbon monoxide ppm	7	7	7			
Hydrogen sulfide ppm	0	0	0			
Flow Rate (l/hr)	0					
Barometric Pressure (mB)	997					
Relative Downhole Pressure (mB)	-0.02					
Depth to Groundwater (m)	2.7					
Depth to Base of Borehole (m)	2.9					
Condition of Standpipe	Good					

Comments:

$>10^{-4}$ = Good Permeability

[illegible]

APPENDIX G

Laboratory Test Results

Waste Checker Sheet



Final Report

Report No.: 19-26599-1

Initial Date of Issue: 14-Aug-2019

Client WDE Consulting Ltd

Client Address: 62a Western Road □
Tring □
Herts □
HP23 4BB

Contact(s): Results

Project 20931 Tesco Car Park

Quotation No.: Q19-16589 **Date Received:** 08-Aug-2019

Order No.: 19-351 **Date Instructed:** 08-Aug-2019

No. of Samples: 7

Turnaround (Wkdays): 5 **Results Due:** 14-Aug-2019

Date Approved: 14-Aug-2019

Approved By:



Details: Robert Monk, Technical Manager □

Results - Soil

Project: 20931 Tesco Car Park

Client: WDE Consulting Ltd	Chemtest Job No.:				19-26599	19-26599	19-26599	19-26599	19-26599
Quotation No.: Q19-16589	Chemtest Sample ID.:				870084	870085	870086	870087	870088
Order No.: 19-351	Client Sample Ref.:				2	1	2	1	1
	Sample Location:				BH1	BH2	BH2	BH3	BH5
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.5	0.6	2.5	1.5	1.0
	Date Sampled:				06-Aug-2019	06-Aug-2019	06-Aug-2019	06-Aug-2019	06-Aug-2019
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD					
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	Chrysotile	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Type	U	2192		N/A	-	Bitumen	-	-	-
ACM Detection Stage	U	2192		N/A	-	Stereo Microscopy	-	-	-
pH	U	2010		N/A	7.9	7.6	7.6	7.4	10.4
Cyanide (Total)	U	2300	mg/kg	0.50	2.5	2.1	0.70	9.3	0.50
Sulphate (Total)	U	2430	%	0.010	0.97	1.3	0.90	2.2	0.66
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.010	0.24	0.50	0.41	1.1	0.55
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	9.2	43	12	11	11
Total Organic Carbon	U	2625	%	0.20	45	30	14	12	1.3
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Naphthalene	U	2700	mg/kg	0.10	1.9	1.9	< 0.10	0.47	0.18
Acenaphthylene	U	2700	mg/kg	0.10	0.50	0.57	< 0.10	0.32	0.31
Acenaphthene	U	2700	mg/kg	0.10	1.0	0.32	< 0.10	0.12	0.16
Fluorene	U	2700	mg/kg	0.10	1.7	0.88	< 0.10	0.19	0.25
Phenanthrene	U	2700	mg/kg	0.10	3.1	1.9	< 0.10	1.5	2.6
Anthracene	U	2700	mg/kg	0.10	0.32	0.41	< 0.10	0.22	0.89
Fluoranthene	U	2700	mg/kg	0.10	1.5	3.8	0.11	1.6	4.2
Pyrene	U	2700	mg/kg	0.10	1.6	3.7	0.17	1.5	4.3
Benzo[a]anthracene	U	2700	mg/kg	0.10	1.8	2.1	< 0.10	1.2	2.6
Chrysene	U	2700	mg/kg	0.10	3.6	4.5	< 0.10	1.0	2.3
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	0.93	1.4	< 0.10	1.6	2.8
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	0.92	0.62	< 0.10	0.51	1.1
Benzo[a]pyrene	U	2700	mg/kg	0.10	1.3	1.5	< 0.10	0.69	2.2
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	1.2	< 0.10	0.81	1.5
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	0.59	< 0.10	0.15	0.28
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	1.4	< 0.10	0.82	1.6
Total Of 16 PAH's	U	2700	mg/kg	2.0	20	27	< 2.0	13	27
Arsenic	U	2450	mg/kg	1.0	110	63	30	57	19
Beryllium	U	2450	mg/kg	1.0	5.2	7.3	< 1.0	11	< 1.0
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	4.7	3.6	2.3	4.0	0.68
Cadmium	U	2450	mg/kg	0.10	0.51	1.1	0.30	< 0.10	< 0.10
Chromium	U	2450	mg/kg	1.0	26	29	22	36	27
Copper	U	2450	mg/kg	0.50	130	150	53	260	25
Lead	U	2450	mg/kg	0.50	2300	600	120	5600	200
Mercury	U	2450	mg/kg	0.10	1.1	2.7	0.44	4.9	0.26
Nickel	U	2450	mg/kg	0.50	84	78	20	130	22

Results - Soil

Project: 20931 Tesco Car Park

Client: WDE Consulting Ltd	Chemtest Job No.:				19-26599	19-26599	19-26599	19-26599	19-26599
Quotation No.: Q19-16589	Chemtest Sample ID.:				870084	870085	870086	870087	870088
Order No.: 19-351	Client Sample Ref.:				2	1	2	1	1
	Sample Location:				BH1	BH2	BH2	BH3	BH5
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.5	0.6	2.5	1.5	1.0
	Date Sampled:				06-Aug-2019	06-Aug-2019	06-Aug-2019	06-Aug-2019	06-Aug-2019
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD					
Selenium	U	2450	mg/kg	0.20	1.8	1.4	0.97	1.1	< 0.20
Vanadium	U	2450	mg/kg	5.0	46	66	28	76	35
Zinc	U	2450	mg/kg	0.50	750	760	110	1100	100
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	490	640	< 10	300	250
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	1.3	2.2	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	17	44	< 1.0	20	14
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	86	210	< 1.0	150	72
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	100	250	< 5.0	170	86
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	3.6	1.6	< 1.0	1.4	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	46	39	< 1.0	5.8	5.3
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	340	340	< 1.0	120	160
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	12	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	390	390	< 5.0	130	160
Asbestos by Gravimetry	U	2192	%	0.001		0.25			
Total Asbestos	N	2192	%	0.001		0.25			
Moisture	N	2030	%	0.020	39	19	45	31	6.4
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Project: 20931 Tesco Car Park

Client: WDE Consulting Ltd	Chemtest Job No.:					19-26599	19-26599	19-26599	19-26599	19-26599
Quotation No.: Q19-16589	Chemtest Sample ID.:					870084	870085	870086	870087	870088
Order No.: 19-351	Client Sample Ref.:					2	1	2	1	1
	Sample Location:					BH1	BH2	BH2	BH3	BH5
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					1.5	0.6	2.5	1.5	1.0
	Date Sampled:					06-Aug-2019	06-Aug-2019	06-Aug-2019	06-Aug-2019	06-Aug-2019
	Asbestos Lab:					DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD						
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: 20931 Tesco Car Park

Client: WDE Consulting Ltd	Chemtest Job No.:					19-26599	19-26599	19-26599	19-26599	19-26599
Quotation No.: Q19-16589	Chemtest Sample ID.:					870084	870085	870086	870087	870088
Order No.: 19-351	Client Sample Ref.:					2	1	2	1	1
	Sample Location:					BH1	BH2	BH2	BH3	BH5
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					1.5	0.6	2.5	1.5	1.0
	Date Sampled:					06-Aug-2019	06-Aug-2019	06-Aug-2019	06-Aug-2019	06-Aug-2019
	Asbestos Lab:					DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD						
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Results - Single Stage WAC

Project: 20931 Tesco Car Park

Chemtest Job No: 19-26599					Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 870089					Limits		
Sample Ref: 1					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:							
Sample Location: BH1							
Top Depth(m): 1.0							
Bottom Depth(m):							
Sampling Date: 06-Aug-2019							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	4.8	3	5	6
Loss On Ignition	2610	U	%	7.8	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	120	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	38	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.059	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	0.0063	0.063	0.5	2	25
Barium	1450	U	0.016	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0069	0.069	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.017	0.17	0.5	10	30
Nickel	1450	U	0.0021	< 0.050	0.4	10	40
Lead	1450	U	0.0032	0.032	0.5	10	50
Antimony	1450	U	0.095	0.95	0.06	0.7	5
Selenium	1450	U	0.0014	0.014	0.1	0.5	7
Zinc	1450	U	0.0010	< 0.50	4	50	200
Chloride	1220	U	3.7	37	800	15000	25000
Fluoride	1220	U	0.67	6.7	10	150	500
Sulphate	1220	U	64	640	1000	20000	50000
Total Dissolved Solids	1020	N	160	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	14	140	500	800	1000

Solid Information

Dry mass of test portion/kg	0.090
Moisture (%)	6.3

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 20931 Tesco Car Park

Chemtest Job No: 19-26599					Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 870090					Limits		
Sample Ref: 1					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:							
Sample Location: BH4							
Top Depth(m): 1.0							
Bottom Depth(m):							
Sampling Date: 06-Aug-2019							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	1.1	3	5	6
Loss On Ignition	2610	U	%	3.5	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	77	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	92	100	--	--
pH	2010	U		9.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.21	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	0.0066	0.066	0.5	2	25
Barium	1450	U	0.012	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0035	< 0.050	0.5	10	70
Copper	1450	U	0.0035	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0063	0.063	0.5	10	30
Nickel	1450	U	0.0019	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0045	0.045	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0010	< 0.50	4	50	200
Chloride	1220	U	3.0	30	800	15000	25000
Fluoride	1220	U	0.28	2.8	10	150	500
Sulphate	1220	U	96	960	1000	20000	50000
Total Dissolved Solids	1020	N	200	1900	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	12	120	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	13

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils (Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44 Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



Final Report

Report No.: 19-27066-1

Initial Date of Issue: 20-Aug-2019

Client WDE Consulting Ltd

Client Address: 62a Western Road □
Tring □
Herts □
HP23 4BB

Contact(s): Results □
Jason Fitzgerald

Project 20931 Tesco's Car Park, Reading

Quotation No.: Q19-16589 **Date Received:** 13-Aug-2019

Order No.: 19-357 **Date Instructed:** 13-Aug-2019

No. of Samples: 3

Turnaround (Wkdays): 5 **Results Due:** 19-Aug-2019

Date Approved: 20-Aug-2019

Approved By:



Details: Robert Monk, Technical Manager □

Results - Water

Client: WDE Consulting Ltd	Chemtest Job No.:				19-27066	19-27066	19-27066
Quotation No.: Q19-16589	Chemtest Sample ID.:				872133	872134	872135
	Sample Location:				BH1	BH2	BH3
	Sample Type:				WATER	WATER	WATER
	Date Sampled:				09-Aug-2019	09-Aug-2019	09-Aug-2019
Determinand	Accred.	SOP	Units	LOD			
pH	U	1010		N/A	7.3	7.2	7.0
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050
Sulphide	U	1325	mg/l	0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050
Total Organic Carbon	U	1610	mg/l	2.0	7.5	14	7.8
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Chrysene	N	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0	< 2.0	< 2.0	< 2.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	53	< 10
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	24	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	4.7	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	29	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	14	< 0.10

Project: 20931 Tesco's Car Park, Reading

Client: WDE Consulting Ltd	Chemtest Job No.:				19-27066	19-27066	19-27066
Quotation No.: Q19-16589	Chemtest Sample ID.:				872133	872134	872135
	Sample Location:				BH1	BH2	BH3
	Sample Type:				WATER	WATER	WATER
	Date Sampled:				09-Aug-2019	09-Aug-2019	09-Aug-2019
Determinand	Accred.	SOP	Units	LOD			
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	11	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	25	< 5.0
Sulphate	U	1220	mg/l	1.0	16	25	920
Arsenic (Dissolved)	U	1450	µg/l	1.0	6.0	22	3.4
Boron (Dissolved)	U	1450	µg/l	20	610	3000	2000
Beryllium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080	< 0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1.0	1.6	5.7	2.3
Copper (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0
Mercury (Dissolved)	U	1450	µg/l	0.50	< 0.50	< 0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0	3.6	2.9	< 1.0
Lead (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0	< 1.0	4.6	1.3
Vanadium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0
Zinc (Dissolved)	U	1450	µg/l	1.0	8.2	2.2	38
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10

Project: 20931 Tesco's Car Park, Reading

Client: WDE Consulting Ltd	Chemtest Job No.:				19-27066	19-27066	19-27066
Quotation No.: Q19-16589	Chemtest Sample ID.:				872133	872134	872135
	Sample Location:				BH1	BH2	BH3
	Sample Type:				WATER	WATER	WATER
	Date Sampled:				09-Aug-2019	09-Aug-2019	09-Aug-2019
Determinand	Accred.	SOP	Units	LOD			
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	2.4
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
872133			BH1	09-Aug-2019	B	Coloured Winchester 1000ml
872133			BH1	09-Aug-2019	B	EPA Vial 40ml
872133			BH1	09-Aug-2019	B	Plastic Bottle 1000ml
872134			BH2	09-Aug-2019	B	Coloured Winchester 1000ml
872134			BH2	09-Aug-2019	B	EPA Vial 40ml
872134			BH2	09-Aug-2019	B	Plastic Bottle 1000ml
872135			BH3	09-Aug-2019	B	Coloured Winchester 1000ml
872135			BH3	09-Aug-2019	B	EPA Vial 40ml
872135			BH3	09-Aug-2019	B	Plastic Bottle 1000ml

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N-dimethyl-p-phenylenediamine.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44 Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

Results - Single Stage WAC

Chemtest Job No: 19-26599					Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 870089					Limits		
Sample Ref: 1					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:							
Sample Location: BH1							
Top Depth(m): 1.0							
Bottom Depth(m):							
Sampling Date: 06-Aug-2019							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	4.8	3	5	6
Loss On Ignition	2610	U	%	7.8	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	120	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	38	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.059	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	0.0063	0.063	0.5	2	25
Barium	1450	U	0.016	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0069	0.069	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.017	0.17	0.5	10	30
Nickel	1450	U	0.0021	< 0.050	0.4	10	40
Lead	1450	U	0.0032	0.032	0.5	10	50
Antimony	1450	U	0.095	0.95	0.06	0.7	5
Selenium	1450	U	0.0014	0.014	0.1	0.5	7
Zinc	1450	U	0.0010	< 0.50	4	50	200
Chloride	1220	U	3.7	37	800	15000	25000
Fluoride	1220	U	0.67	6.7	10	150	500
Sulphate	1220	U	64	640	1000	20000	50000
Total Dissolved Solids	1020	N	160	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	14	140	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.3

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Chemtest Job No: 19-26599					Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 870090					Limits		
Sample Ref: 1					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID: BH4							
Sample Location: 1.0							
Top Depth(m):							
Bottom Depth(m):							
Sampling Date: 06-Aug-2019							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	1.1	3	5	6
Loss On Ignition	2610	U	%	3.5	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	77	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	92	100	--	--
pH	2010	U		9.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.21	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	0.0066	0.066	0.5	2	25
Barium	1450	U	0.012	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0035	< 0.050	0.5	10	70
Copper	1450	U	0.0035	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0063	0.063	0.5	10	30
Nickel	1450	U	0.0019	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0045	0.045	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0010	< 0.50	4	50	200
Chloride	1220	U	3.0	30	800	15000	25000
Fluoride	1220	U	0.28	2.8	10	150	500
Sulphate	1220	U	96	960	1000	20000	50000
Total Dissolved Solids	1020	N	200	1900	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	12	120	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	13

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Naphthalene				0.00019					0.00019					0.00019	0.00019
Acenaphthylene	0.000057			0.000057											
Acenaphthene	0.0001														
Fluorene															
Phenanthrene	0.00031			0.00031					0.00031						
Anthracene	0.000089													0.000089	0.000089
Fluoranthene	0.00042			0.00042					0.00042						
Pyrene	0.00043			0.00043											
Benzo(a)anthracene															
Chrysene				0.00045			0.00045						0.00045		
Benzo(b)fluoranthene							0.00028							0.00028	0.00028
Benzo(k)fluoranthene				0.00011			0.00011								
Benzo(a)pyrene							0.00022				0.00022		0.00022	0.00022	0.00022
Indeno[1,2,3-cd]pyrene															
Dibenz(a,h)anthracene							0.000059							0.000059	0.000059
Benzo(ghi)perylene														0.00016	0.00016
Arsenic			0.011		0.011									0.011	0.011
Boron	0.00047			0.00047											
Cadmium	0.00011	0.00011	0.00011		0.00011	0.00011	0.00011								
Chromium										0.0036			0.0036		
Copper				0.026										0.026	0.026
Lead				0.56					0.56		0.56	0.56		0.56	0.56
Mercury		0.00049				0.00049								0.00049	0.00049
Nickel							0.013	0.013	0.013						
Selenium			0.00018		0.00018										0.00018
Zinc	0.11			0.11											
Benzene	0.0001		0.0001	0.0001			0.0001								
Toluene				0.0001								0.0001			
Ethylbenzene				0.0001	0.0001							0.0001			
p & m-xylene	0.0001			0.0001											
o-xylene	0.0001			0.0001											
MTBE (Methyl Tertiary Butyl Eth)	0.0001														
PRO C6-C10				0.0006			0.0006							0.0006	0.0006
DRO C10-C25				0.06478					0.06478					0.06478	0.06478
Total (or greatest)	0.1124	0.0006	0.0114	0.7643	0.0114	0.0006	0.0130	0.0130	0.5600	0.0036	0.5600	0.5600	0.0036	0.6639	0.6640
Threshold (%)	20.0	0.1	3	25.0	3.0	0.1	0.1	0.1	1.0	1.0	0.5	5.0	0.1	25.00	25.00
Exceeded? (y/n)	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Benzo(a)pyrene							0.00022						0.00022		
BaP Concentration in TPH							1.408E-07						1.408E-07		
BaP Exceeded (y/n)							N						N		
TPH (EC5 - EC35)				0.064			0.064				0.064		0.064	0.064	0.064
Threshold (%)				25.0			0.1				5.0		0.1	2.50	2.50
Hazardous Properties				N			N				N		N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	Car. Cat 1a	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic				Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	RE1	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H350	H10		H11	H14	H14
Asbestos										0.25					
Threshold (%)										0.1					
Hazardous Properties										Y					

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Naphthalene				0.000018					0.000018					0.000018	0.000018
Acenaphthylene	0.000031			0.000031											
Acenaphthene	0.000016														
Fluorene															
Phenanthrene	0.00026			0.00026					0.00026						
Anthracene	0.000089													0.000089	0.000089
Fluoranthene	0.00042			0.00042					0.00042						
Pyrene	0.00043			0.00043											
Benzo(a)anthracene															
Chrysene				0.00023			0.00023						0.00023		
Benzo(b)fluoranthene							0.00028							0.00028	0.00028
Benzo(k)fluoranthene				0.00011			0.00011								
Benzo(a)pyrene							0.00022				0.00022		0.00022	0.00022	0.00022
Indeno(1,2,3-cd)pyrene															
Dibenz(a,h)anthracene							0.000028							0.000028	0.000028
Benzo(ghi)perylene														0.00016	0.00016
Arsenic			0.0019		0.0019									0.0019	0.0019
Boron	0.000068			0.000068											
Cadmium	0.00001	0.00001	0.00001		0.00001	0.00001	0.00001								
Chromium										0.0027			0.0027		
Copper				0.0025										0.0025	0.0025
Lead				0.02					0.02		0.02	0.02		0.02	0.02
Mercury		0.000026				0.000026								0.000026	0.000026
Nickel							0.0022	0.0022	0.0022						
Selenium			0.00002		0.00002										0.00002
Zinc	0.01			0.01											
Benzene	0.0001		0.0001	0.0001			0.0001								
Toluene				0.0001								0.0001			
Ethylbenzene				0.0001	0.0001							0.0001			
p & m-xylene	0.0001			0.0001											
o-xylene	0.0001			0.0001											
MTBE (Methyl Tertiary Butyl Eth)	0.0001														
PRO C6-C10				0.0006			0.0006							0.0006	0.0006
DRO C10-C25				0.02553					0.02553					0.02553	0.02553
Total (or greatest)	0.0117	0.000036	0.0020	0.0607	0.0020	0.000036	0.0022	0.0022	0.0255	0.0027	0.0200	0.0200	0.0027	0.0514	0.0514
Threshold (%)	20.0	0.1	3	25.0	3.0	0.1	0.1	0.1	1.0	1.0	0.5	5.0	0.1	25.00	25.00
Exceeded? (y/n)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Benzo(a)pyrene							0.00022						0.00022		
BaP Concentration in TPH							5.412E-08						5.412E-08		
BaP Exceeded (y/n)							N						N		
TPH (EC5 - EC35)				0.0246			0.0246				0.0246		0.0246	0.0246	0.0246
Threshold (%)				25.0			0.1				5.0		0.1	2.50	2.50
Hazardous Properties				N			N				N		N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	Car. Cat 1a	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic				Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	RE1	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H350	H10		H11	H14	H14
Asbestos										0					
Threshold (%)										0.1					
Hazardous Properties										N					

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Naphthalene				0.00001					0.00001					0.00001	0.00001
Acenaphthylene	0.00001			0.00001											
Acenaphthene	0.00001														
Fluorene															
Phenanthrene	0.00001			0.00001					0.00001						
Anthracene	0.00001													0.00001	0.00001
Fluoranthene	0.000011			0.000011					0.000011						
Pyrene	0.000017			0.000017											
Benzo(a)anthracene															
Chrysene				0.00001			0.00001						0.00001		
Benzo(b)fluoranthene							0.00001							0.00001	0.00001
Benzo(k)fluoranthene				0.00001			0.00001								
Benzo(a)pyrene							0.00001				0.00001		0.00001	0.00001	0.00001
Indeno(1,2,3-cd)pyrene															
Dibenz(a,h)anthracene							0.00001							0.00001	0.00001
Benzo(ghi)perylene														0.00001	0.00001
Arsenic			0.003		0.003									0.003	0.003
Boron	0.00023			0.00023											
Cadmium	0.00003	0.00003	0.00003		0.00003	0.00003	0.00003								
Chromium										0.0022			0.0022		
Copper				0.0053										0.0053	0.0053
Lead				0.012						0.012		0.012		0.012	0.012
Mercury		0.000044				0.000044								0.000044	0.000044
Nickel							0.002	0.002	0.002						
Selenium			0.000097		0.000097										0.000097
Zinc	0.011			0.011											
Benzene	0.0001		0.0001		0.0001		0.0001								
Toluene				0.0001								0.0001			
Ethylbenzene				0.0001	0.0001							0.0001			
p & m-xylene	0.0001			0.0001											
o-xylene	0.0001			0.0001											
MTBE (Methyl Tertiary Butyl Eth)	0.0001														
PRO C6-C10				0.0006			0.0006							0.0006	0.0006
DRO C10-C25				0.0008					0.0008					0.0008	0.0008
Total (or greatest)	0.0117	0.000074	0.0032	0.0305	0.0032	0.000074	0.0020	0.0020	0.0120	0.0022	0.0120	0.0120	0.0022	0.0218	0.0219
Threshold (%)	20.0	0.1	3	25.0	3.0	0.1	0.1	0.1	1.0	1.0	0.5	5.0	0.1	25.00	25.00
Exceeded? (y/n)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Benzo(a)pyrene							0.00001						0.00001		
BaP Concentration in TPH							1E-10								
BaP Exceeded (y/n)							N						N		
TPH (EC5 - EC35)				0.001			0.001				0.001		0.001	0.001	0.001
Threshold (%)				25.0			0.1				5.0		0.1	2.50	2.50
Hazardous Properties				N			N				N		N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	Car. Cat 1a	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic				Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	RE1	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H350	H10		H11	H14	H14
Asbestos										0					
Threshold (%)										0.1					
Hazardous Properties										N					

APPENDIX H

Geotechnical Laboratory Results

SPT Variation Graphs

CBR Variation Graphs



TEST CERTIFICATE

Liquid and Plastic Limits

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



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: David Hastings
Site Name: Tesco Car Park, Reading
Site Address: Not Given

Client Reference: 20931
Job Number: 19-53830
Date Sampled: 18/06/2019
Date Received: 08/08/2019
Date Tested: 13/08/2019
Sampled By: DH

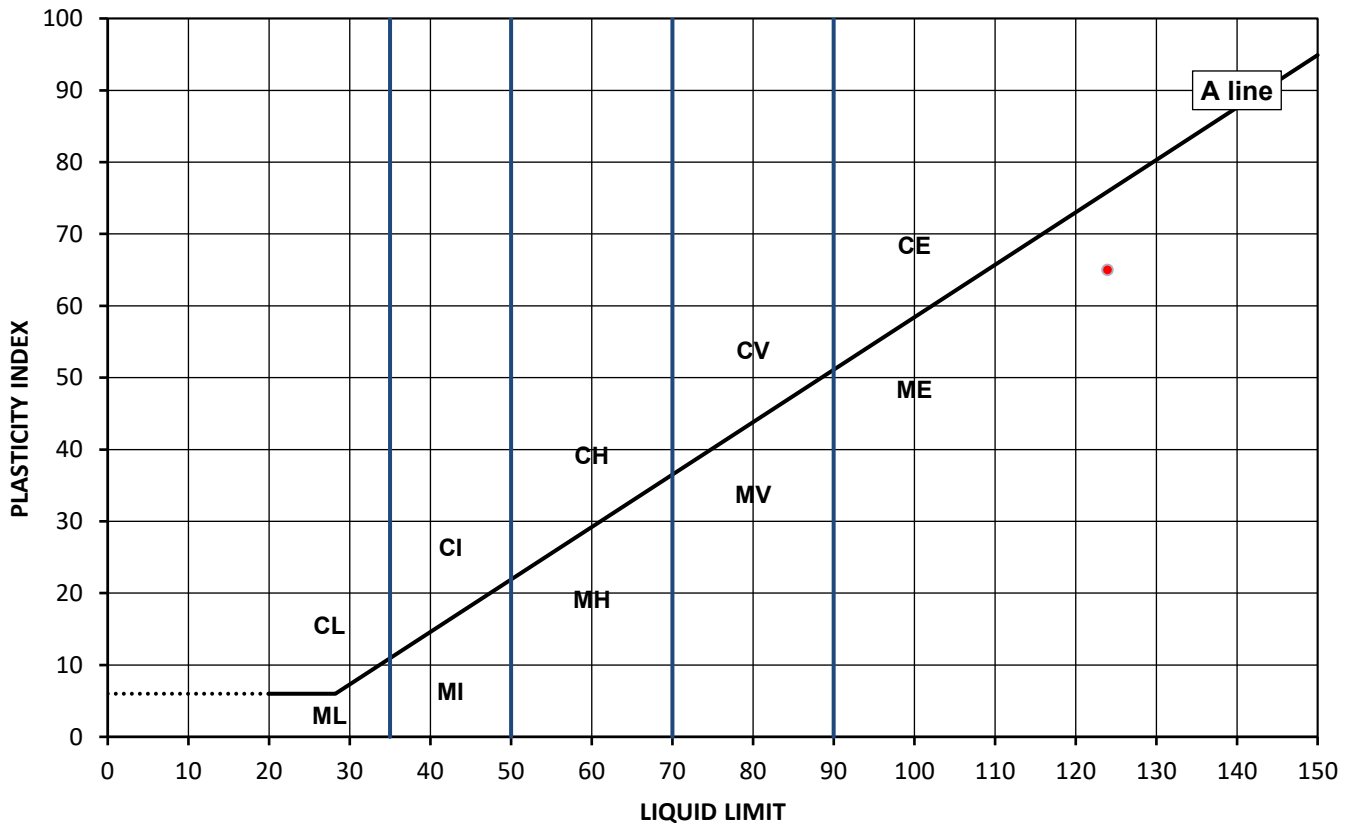
Test Results:

Laboratory Reference: 1287612
Hole No.: BH1
Sample Reference: Not Given
Soil Description: Brown slightly gravelly sandy CLAY with flintstones

Depth Top [m]: 3.50
Depth Base [m]: 4.00
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425um BS Test Sieve
54*	124	59	65	61



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	L	Low	Liquid Limit	below 35
M	Silt		I	Medium		35 to 50
			H	High		50 to 70
			V	Very high		70 to 90
			E	Extremely high		exceeding 90
	Organic		O	append to classification for organic material (eg CHO)		

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks: *Sample is wet
Re-issue 1: Depth for sample 1287614 amended

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager

Signed: Darren Berrill
Geotechnical General Manager

Date Reported: 27/08/2019

for and on behalf of i2 Analytical Ltd GF 232.5

*Opinions and interpretations expressed here in are outside of the scope of the UKAS Accreditation.
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.
The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.*

Any assessment of compliance with specifications based the analytical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.



TEST CERTIFICATE

Liquid and Plastic Limits

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



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: David Hastings
Site Name: Tesco Car Park, Reading
Site Address: Not Given

Client Reference: 20931
Job Number: 19-53830
Date Sampled: 18/06/2019
Date Received: 08/08/2019
Date Tested: 13/08/2019
Sampled By: DH

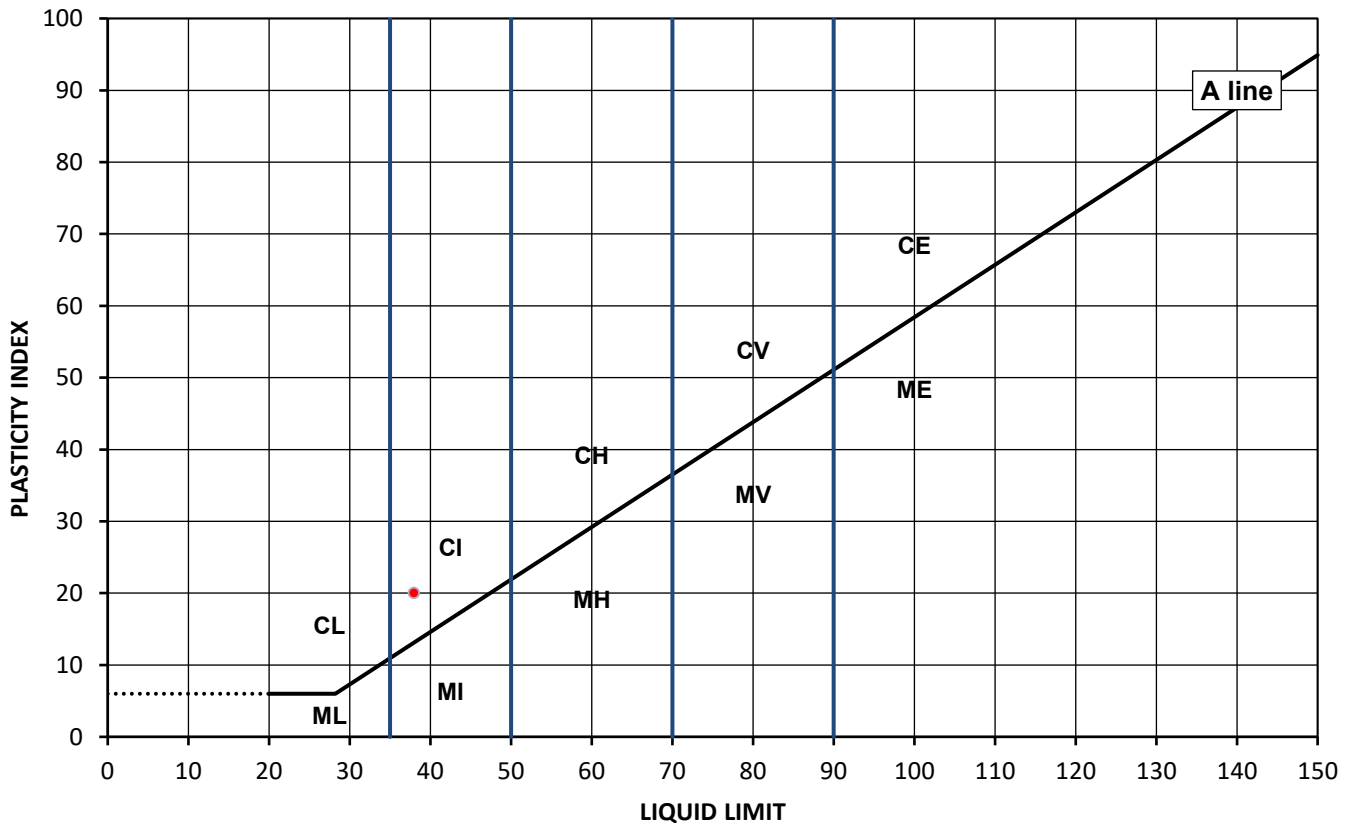
Test Results:

Laboratory Reference: 1287613
Hole No.: BH1
Sample Reference: Not Given
Soil Description: Mottled brown very gravelly sandy CLAY with flintstones

Depth Top [m]: 4.00
Depth Base [m]: 4.30
Sample Type: C

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425um BS Test Sieve
18	38	18	20	38



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	below 35
		I	35 to 50
		H	50 to 70
		V	70 to 90
		E	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks: Re-issue 1: Depth for sample 1287614 amended

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 27/08/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 232.5

*Opinions and interpretations expressed here in are outside of the scope of the UKAS Accreditation.
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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.*

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TEST CERTIFICATE

Liquid and Plastic Limits

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



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: David Hastings
Site Name: Tesco Car Park, Reading
Site Address: Not Given

Client Reference: 20931
Job Number: 19-53830
Date Sampled: 18/06/2019
Date Received: 08/08/2019
Date Tested: 13/08/2019
Sampled By: DH

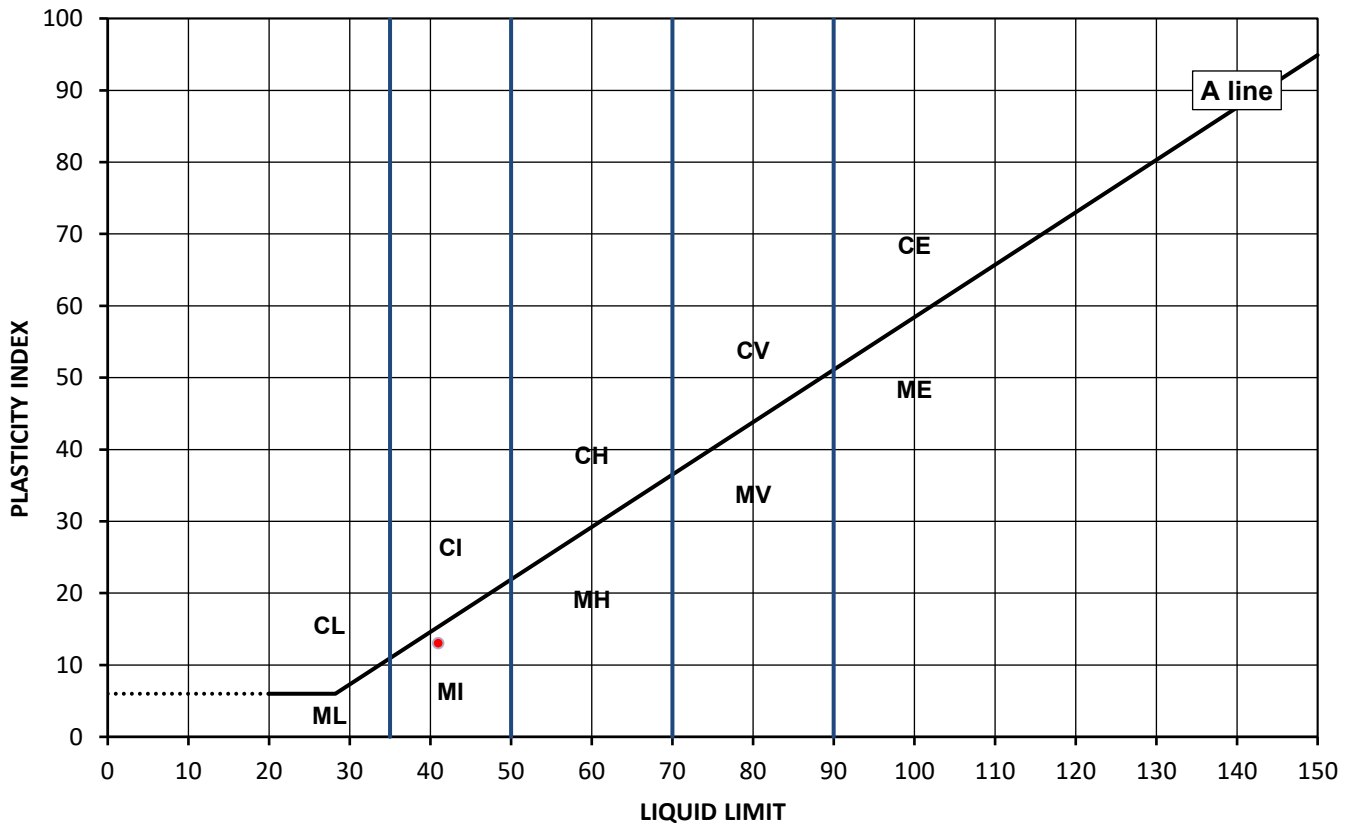
Test Results:

Laboratory Reference: 1287615
Hole No.: BH3
Sample Reference: Not Given
Soil Description: Brown mottled black slightly gravelly sandy CLAY

Depth Top [m]: 2.50
Depth Base [m]: 3.00
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
25	41	28	13	73



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	L	Low	Liquid Limit	below 35
M	Silt		I	Medium		35 to 50
			H	High		50 to 70
			V	Very high		70 to 90
			E	Extremely high		exceeding 90
	Organic		O	append to classification for organic material (eg CHO)		

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks: Re-issue 1: Depth for sample 1287614 amended

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 27/08/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 232.5

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The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

"Any assessment of compliance with specifications based the analytical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request."



SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshole Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with:

Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB

Contact: David Hastings
Site Name: Tesco Car Park, Reading
Site Address: Not Given

MC by BS 1377-2: 1990: Clause 3.2; WC by BS EN 17892-1: 2014; Atterberg
by BS 1377-2: 1990: Clause 4.3, Clause 4.4 and 5; PD by BS 1377-2: 1990:
Clause 8.2

Client Reference: 20931
Job Number: 19-53830
Date Sampled: 18/06/2019
Date Received: 08/08/2019
Date Tested: 13/08/2019
Sampled By: DH

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	MC	WC	Atterberg				Density			Total Porosity#		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um	LL	PL	PI	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
1287612	BH1	Not Given	3.50	4.00	B	Brown slightly gravelly sandy CLAY with flintstones	Atterberg 1 Point	54*		61	124	59	65						
1287613	BH1	Not Given	4.00	4.30	C	Mottled brown very gravelly sandy CLAY with flintstones	Atterberg 1 Point	18		38	38	18	20						
1287614	BH2	Not Given	3.00	3.40	B	Brown organic CLAY		114											
1287615	BH3	Not Given	2.50	3.00	B	Brown mottled black slightly gravelly sandy CLAY	Atterberg 1 Point	25		73	41	28	13						
1287616	BH3	Not Given	3.40	4.00	B	Yellowish brown gravelly clayey SAND		15											

Note: # Non accredited; NP - Non plastic

Comments: *Sample is wet
Re-issue 1: Depth for sample 1287614 amended

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 27/08/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 234.7



TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
7 Woodshots Meadow
Coxley Green Business Park
Watford Herts WD18 8YS



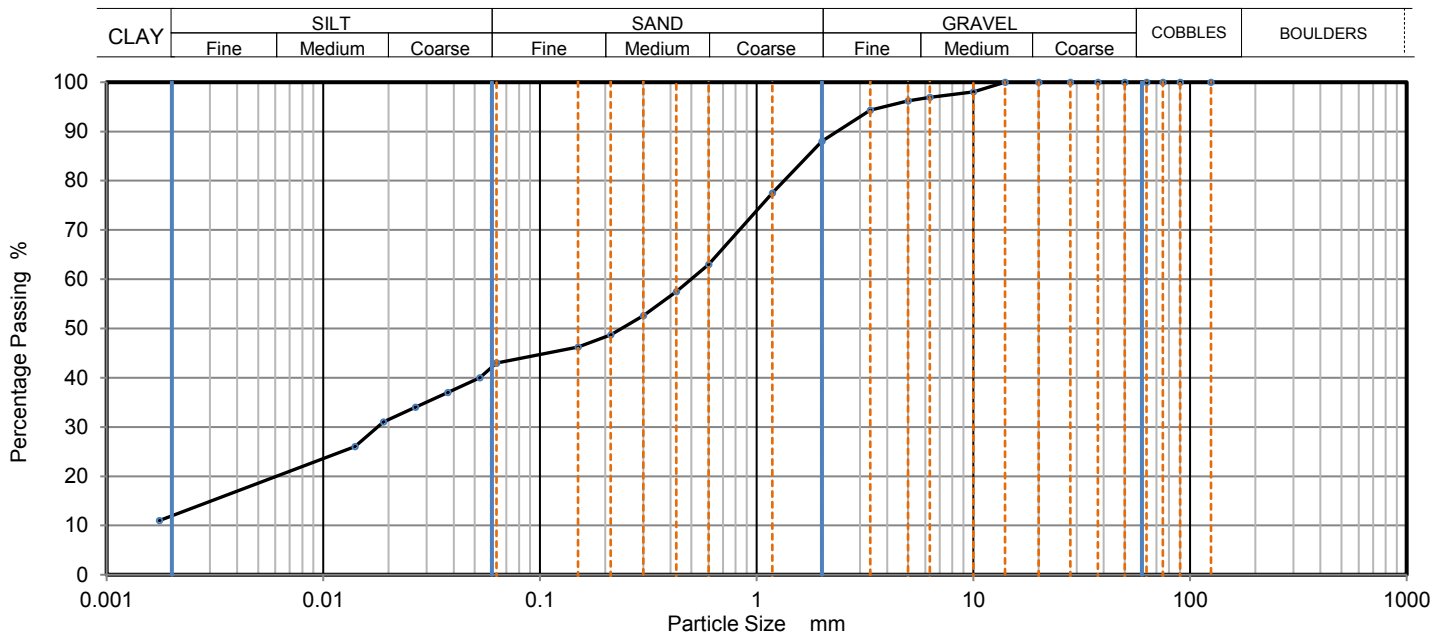
Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: David Hastings
Site Name: Tesco Car Park, Reading
Site Address: Not Given

Client Reference: 20931
Job Number: 19-53830
Date Sampled: 18/06/2019
Date Received: 08/08/2019
Date Tested: 12/08/2019
Sampled By: DH

Test Results:

Laboratory Reference: 1287614
Hole No.: BH2
Sample Reference: Not Given
Sample Description: Brown organic CLAY

Depth Top [m]: 3.00
Depth Base [m]: 3.40
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	43
90	100	0.0527	40
75	100	0.0375	37
63	100	0.0266	34
50	100	0.0189	31
37.5	100	0.0140	26
28	100	0.0018	11
20	100		
14	100		
10	98		
6.3	97		
5	96		
3.35	94		
2	88		
1.18	78		
0.6	63		
0.425	58	Particle density (assumed) 2.65 Mg/m3	
0.3	53		
0.212	49		
0.15	46		
0.063	43		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	12.00
Sand	45.30
Silt	30.40
Clay	12.30

Grading Analysis		
D100	mm	14
D60	mm	0.498
D30	mm	0.0177
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks: Re-issue 1: Depth for sample 1287614 amended

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 27/08/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 100.12



TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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



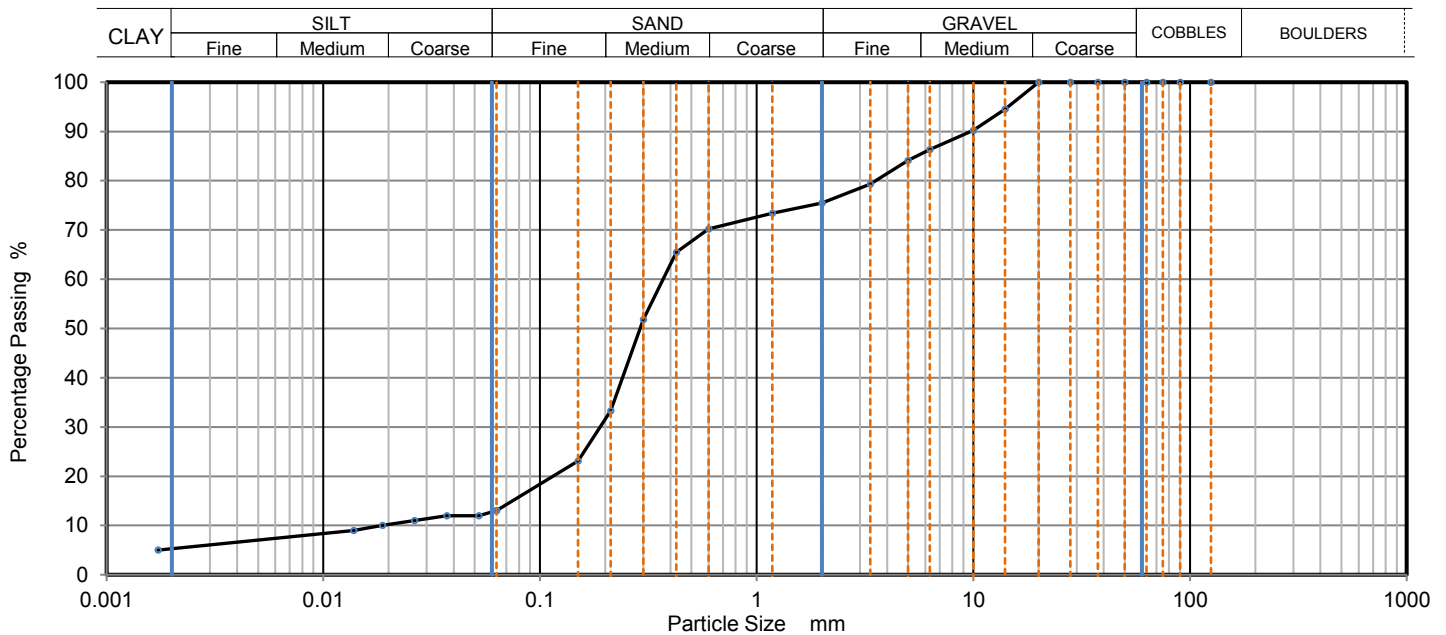
Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: David Hastings
Site Name: Tesco Car Park, Reading
Site Address: Not Given

Client Reference: 20931
Job Number: 19-53830
Date Sampled: 18/06/2019
Date Received: 08/08/2019
Date Tested: 12/08/2019
Sampled By: DH

Test Results:

Laboratory Reference: 1287616
Hole No.: BH3
Sample Reference: Not Given
Sample Description: Yellowish brown gravelly clayey SAND

Depth Top [m]: 3.40
Depth Base [m]: 4.00
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	13
90	100	0.0522	12
75	100	0.0371	12
63	100	0.0264	11
50	100	0.0188	10
37.5	100	0.0138	9
28	100	0.0017	5
20	100		
14	95		
10	90		
6.3	86		
5	84		
3.35	79		
2	76		
1.18	73		
0.6	70	Particle density (assumed) 2.65 Mg/m3	
0.425	66		
0.3	52		
0.212	33		
0.15	23		
0.063	13		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	24.50
Sand	62.30
Silt	7.90
Clay	5.30

Grading Analysis		
D100	mm	20
D60	mm	0.37
D30	mm	0.19
D10	mm	0.019
Uniformity Coefficient		20
Curvature Coefficient		5.1

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks: Re-issue 1: Depth for sample 1287614 amended

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 27/08/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 100.12



4041

Client: WDE Consulting Ltd
 Client Address: 62a Western Road, Tring,
 Hertfordshire, HP23 4BB
 Contact: David Hastings
 Site Name: Tesco Car Park, Reading
 Site Address: Not Given

TEST CERTIFICATE
Unconsolidated Undrained
Triaxial Compression
 Tested in Accordance with:
 BS 1377-7: 1990: Clause 8

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



Client Reference: 20931
 Job Number: 19-53830
 Date Sampled: 18/06/2019
 Date Received: 08/08/2019
 Date Tested: 14/08/2019
 Sampled By: DH

Test Results:

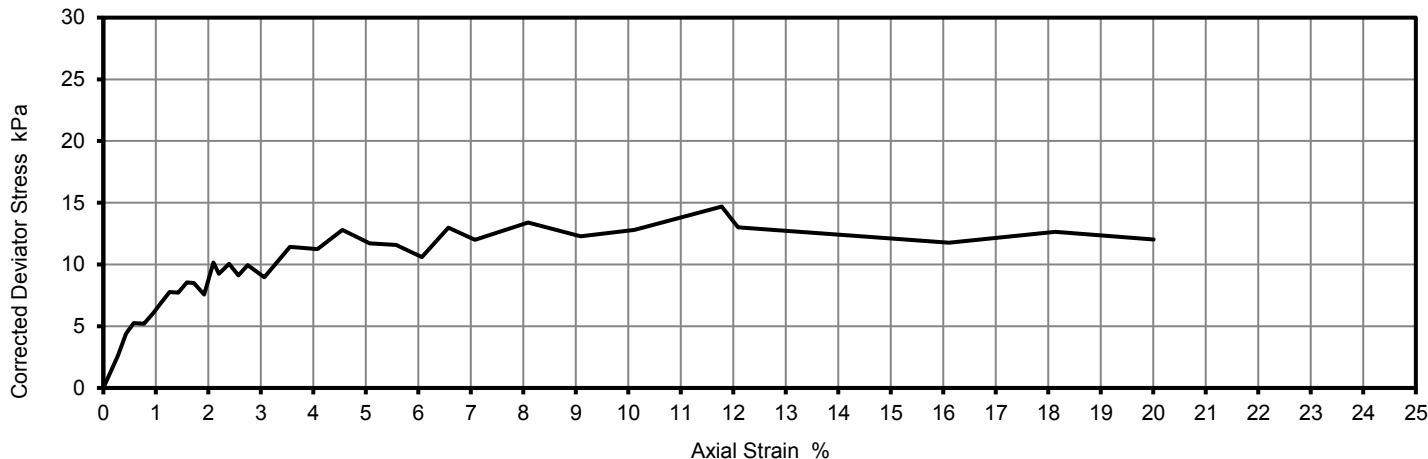
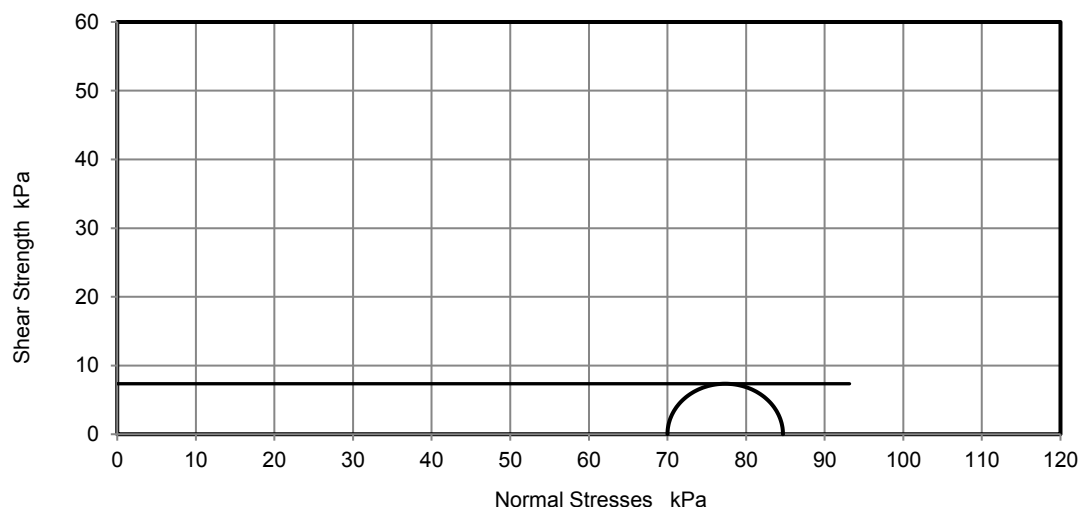
Laboratory Reference: 1287612
 Hole No.: BH1
 Sample Reference: Not Given
 Sample Description: Brown slightly gravelly sandy CLAY with flintstones

Depth Top [m]: 3.50
 Depth Base [m]: 4.00
 Sample Type: B

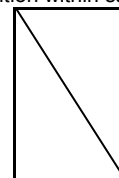
Test Number	1
Length	67.23 mm
Diameter	37.50 mm
Bulk Density	1.61 Mg/m ³
Moisture Content	54 %
Dry Density	1.04 Mg/m ³
Membrane Correction	2.08 kPa

Rate of Strain
 Cell Pressure
 Axial Strain at failure
 Deviator Stress, ($\sigma_1 - \sigma_3$)_f
 Undrained Shear Strength, c_u
 Mode of Failure
 Membrane thickness

2.00	%/min
70	kPa
11.8	%
15	kPa
7	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Plastic	
0.31	mm

Deviator Stress v Axial Strain**Mohr Circles**

Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
 This is provided for information only.

Remarks: Unable to determine orientation
 Re-issue 1: Depth for sample 1287614 amended

Approved: Dariusz Piotrowski
 PL Geotechnical Laboratory Manager
 Date Reported: 27/08/2019

Signed: Darren Berrill
 Geotechnical General Manager

for and on behalf of i2 Analytical Ltd GF 184.7



TEST CERTIFICATE
Unconsolidated Undrained
Triaxial Compression
 Tested in Accordance with:
 BS 1377-7: 1990: Clause 8

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



Client: WDE Consulting Ltd
 Client Address: 62a Western Road, Tring,
 Hertfordshire, HP23 4BB
 Contact: David Hastings
 Site Name: Tesco Car Park, Reading
 Site Address: Not Given

Client Reference: 20931
 Job Number: 19-53830
 Date Sampled: 18/06/2019
 Date Received: 08/08/2019
 Date Tested: 14/08/2019
 Sampled By: DH

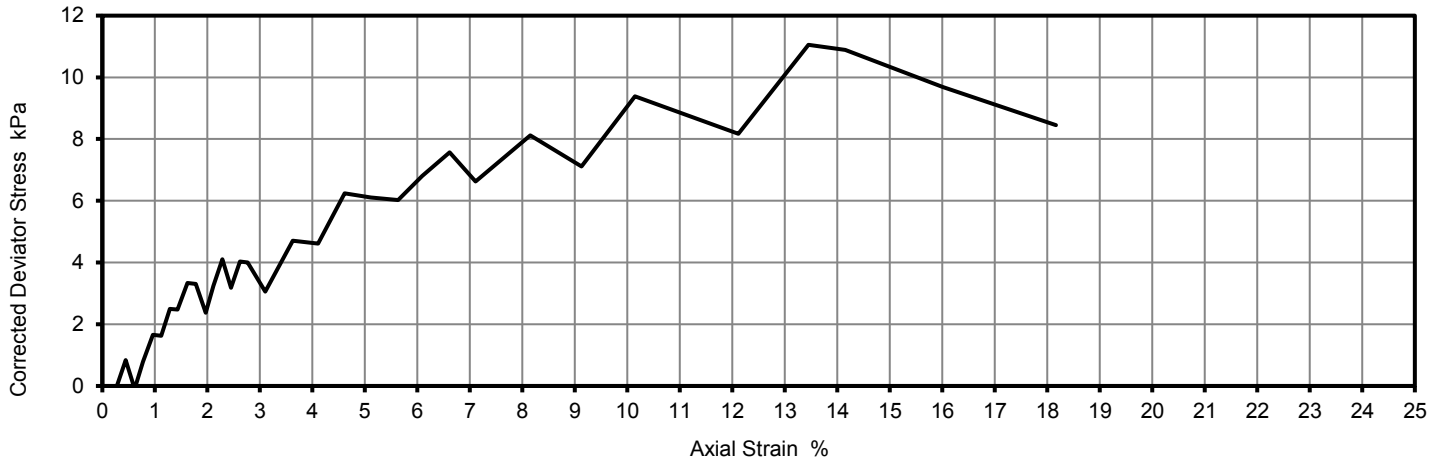
Test Results:

Laboratory Reference: 1287613
 Hole No.: BH1
 Sample Reference: Not Given
 Sample Description: Mottled brown very gravelly sandy CLAY with flintstones

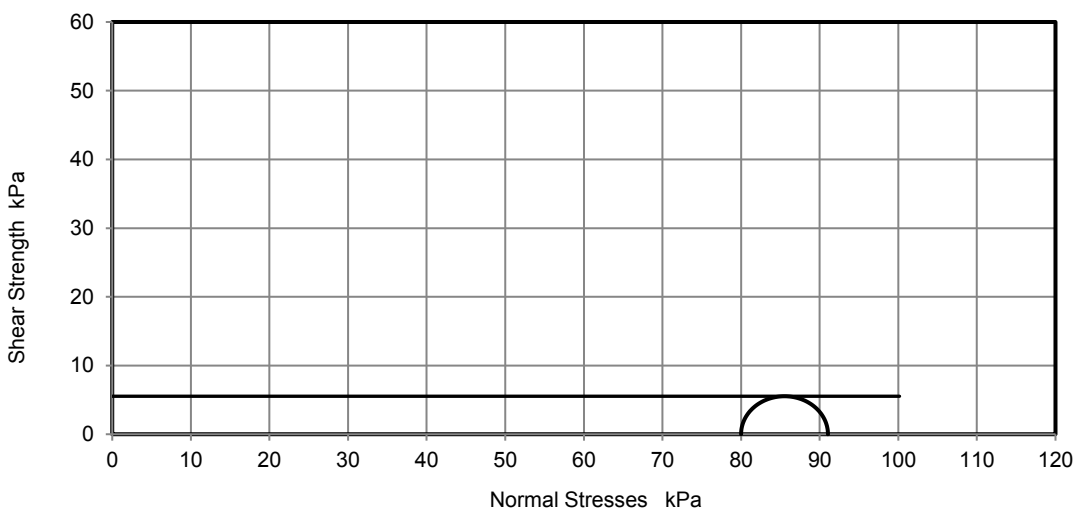
Depth Top [m]: 4.00
 Depth Base [m]: 4.30
 Sample Type: C

Test Number	1	Rate of Strain	2.00	%/min
Length	74.71	Cell Pressure	80	kPa
Diameter	37.38	Axial Strain at failure	13.5	%
Bulk Density	1.65	Deviator Stress, $(\sigma_1 - \sigma_3)_f$	11	kPa
Moisture Content	18	Undrained Shear Strength, c_u	6	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Dry Density	1.39	Mode of Failure	Compound	
Membrane Correction	1.56	Membrane thickness	0.21	mm

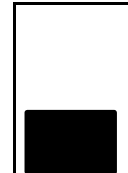
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
 This is provided for information only.

Remarks: Re-issue 1: Depth for sample 1287614 amended

Approved: Dariusz Piotrowski
 PL Geotechnical Laboratory Manager
 Date Reported: 27/08/2019

Signed: Darren Berrill
 Geotechnical General Manager

for and on behalf of i2 Analytical Ltd GF 184.7



TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: David Hastings
Site Name: Tesco Car Park, Reading
Site Address: Not Given

Client Reference: 20931
Job Number: 19-53830
Date Sampled: 18/06/2019
Date Received: 08/08/2019
Date Tested: 13/08/2019
Sampled By: DH

Test Results:

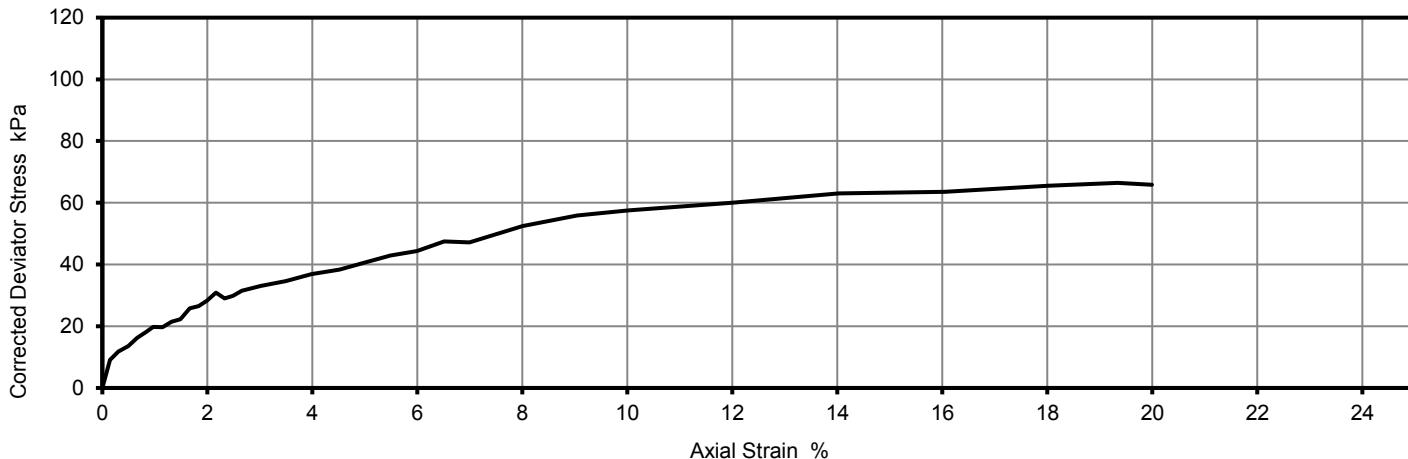
Laboratory Reference: 1287615
Hole No.: BH3
Sample Reference: Not Given
Sample Description: Brown mottled black slightly gravelly sandy CLAY

Depth Top [m]: 2.50
Depth Base [m]: 3.00
Sample Type: B

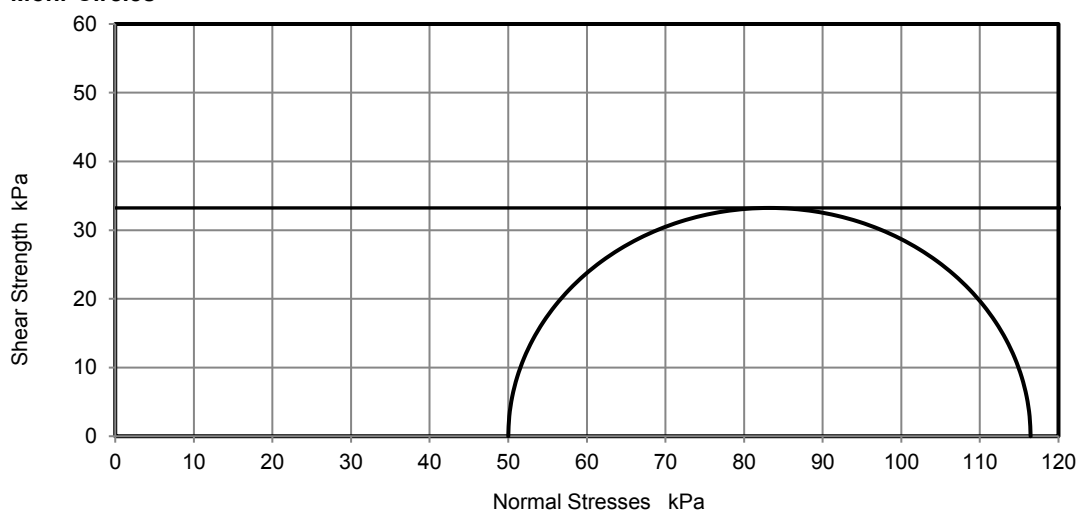
Test Number	1
Length	75.23 mm
Diameter	37.28 mm
Bulk Density	2.03 Mg/m ³
Moisture Content	25 %
Dry Density	1.62 Mg/m ³
Membrane Correction	3.01 kPa

Rate of Strain	2.00 %/min
Cell Pressure	50 kPa
Axial Strain at failure	19.3 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	66 kPa
Undrained Shear Strength, c_u	33 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound
Membrane thickness	0.30 mm

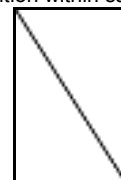
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks: Unable to determine orientation
Re-issue 1: Depth for sample 1287614 amended

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 27/08/2019

Signed: Darren Berrill
Geotechnical General Manager

for and on behalf of i2 Analytical Ltd GF 184.7

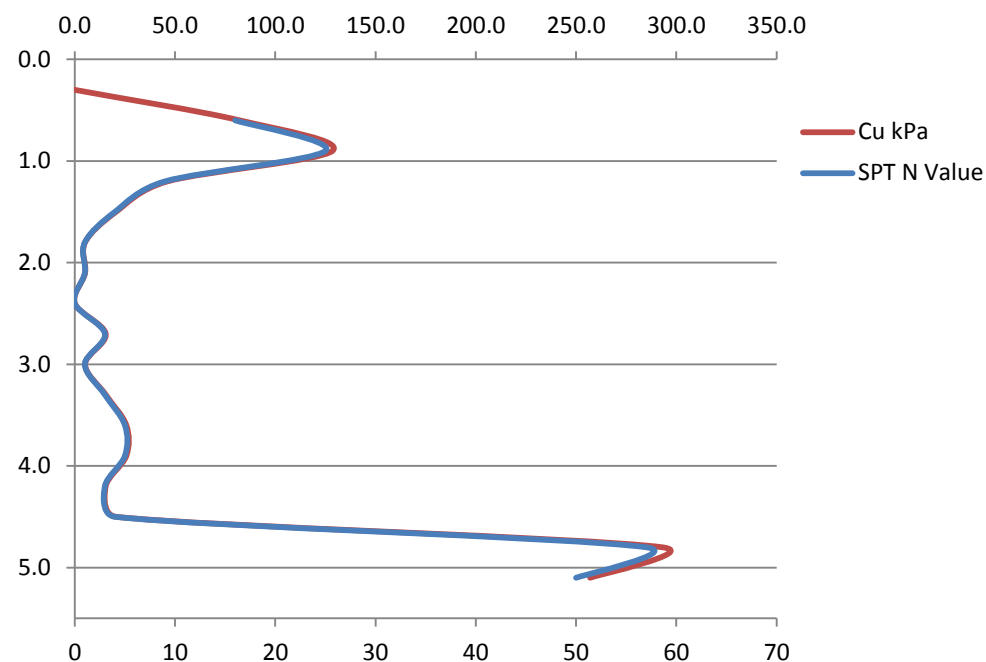
Date of Test	06/08/2019
Completed by	DB
Site Name	Tesco Car Park
Hole number	DP1

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPA
0.3		0.0	-3.9
0.6	16	82.2	125.2
0.9	25	128.5	192.4
1.2	9	46.3	70.2
1.5	4	20.6	29.5
1.8	1	5.1	4.5
2.1	1	5.1	4.5
2.4	0	0.0	-3.9
2.7	3	15.4	21.3
3.0	1	5.1	4.5
3.3	3	15.4	21.3
3.6	5	25.7	37.8
3.9	5	25.7	37.8
4.2	3	15.4	21.3
4.5	4	20.6	29.5
4.8	57	293.0	399.8
5.1	50	257.0	358.6

Change in SPT n value and Cu kPa with depth (m)



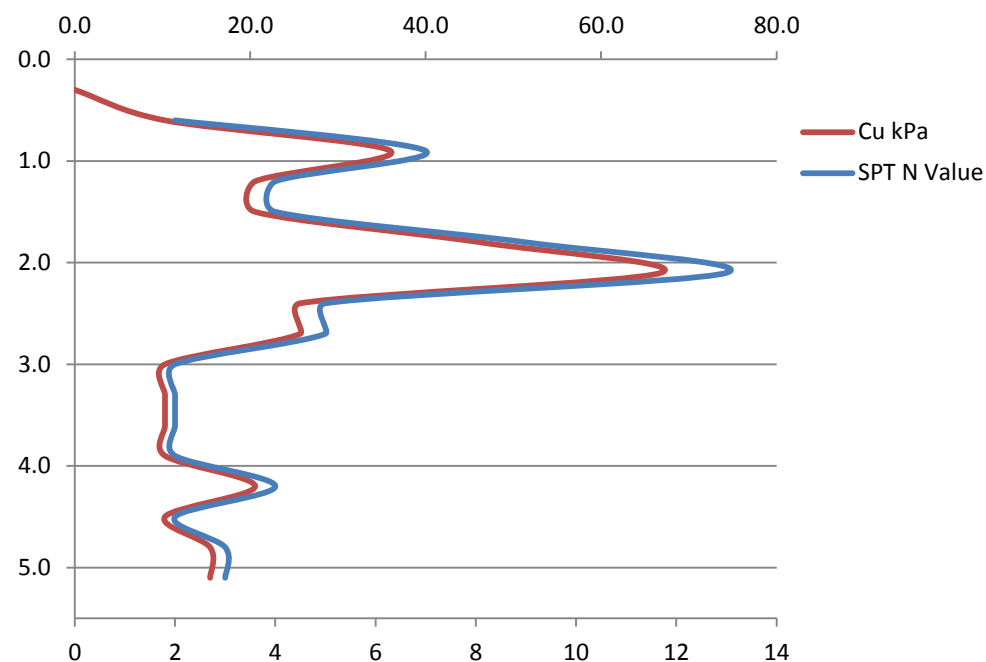
Date of Test 06/08/2019
Completed by DB
Site Name Tesco Car Park
Hole number DP2

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPA
0.3		0.0	-3.9
0.6	2	10.3	12.9
0.9	7	36.0	54.1
1.2	4	20.6	29.5
1.5	4	20.6	29.5
1.8	9	46.3	70.2
2.1	13	66.8	101.9
2.4	5	25.7	37.8
2.7	5	25.7	37.8
3.0	2	10.3	12.9
3.3	2	10.3	12.9
3.6	2	10.3	12.9
3.9	2	10.3	12.9
4.2	4	20.6	29.5
4.5	2	10.3	12.9
4.8	3	15.4	21.3
5.1	3	15.4	21.3

Change in SPT n value and Cu kPa with depth (m)



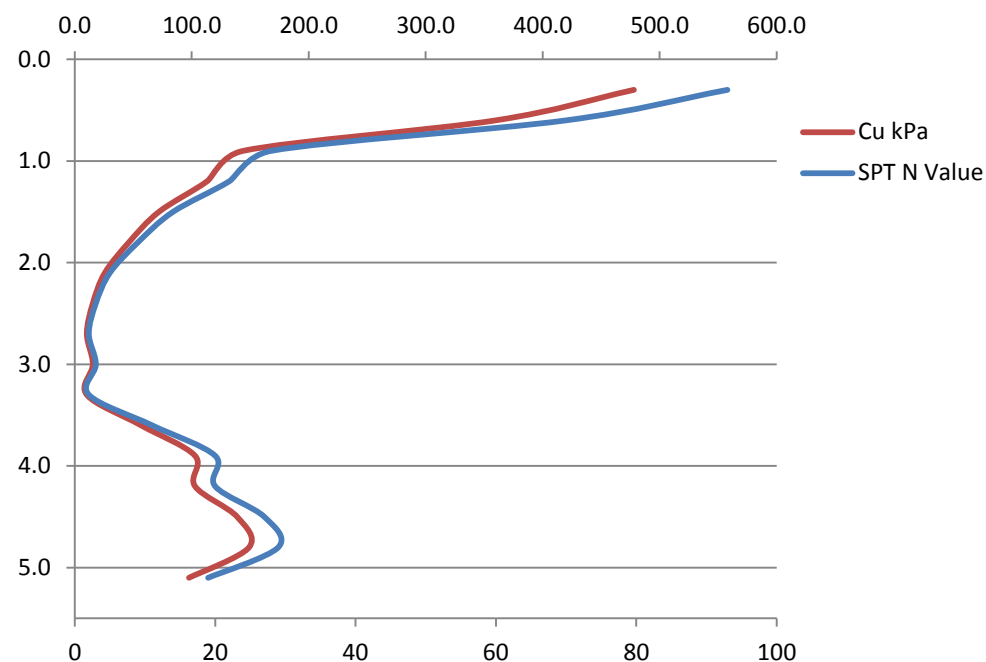
Date of Test 06/08/2019
Completed by DB
Site Name Tesco Car Park
Hole number DP3

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPa
0.3	93	478.0	574.4
0.6	70	359.8	470.0
0.9	28	143.9	213.9
1.2	22	113.1	170.4
1.5	14	72.0	109.7
1.8	9	46.3	70.2
2.1	5	25.7	37.8
2.4	3	15.4	21.3
2.7	2	10.3	12.9
3.0	3	15.4	21.3
3.3	2	10.3	12.9
3.6	11	56.5	86.2
3.9	20	102.8	155.5
4.2	20	102.8	155.5
4.5	27	138.8	206.8
4.8	29	149.1	221.0
5.1	19	97.7	148.0

Change in SPT n value and Cu kPa with depth (m)



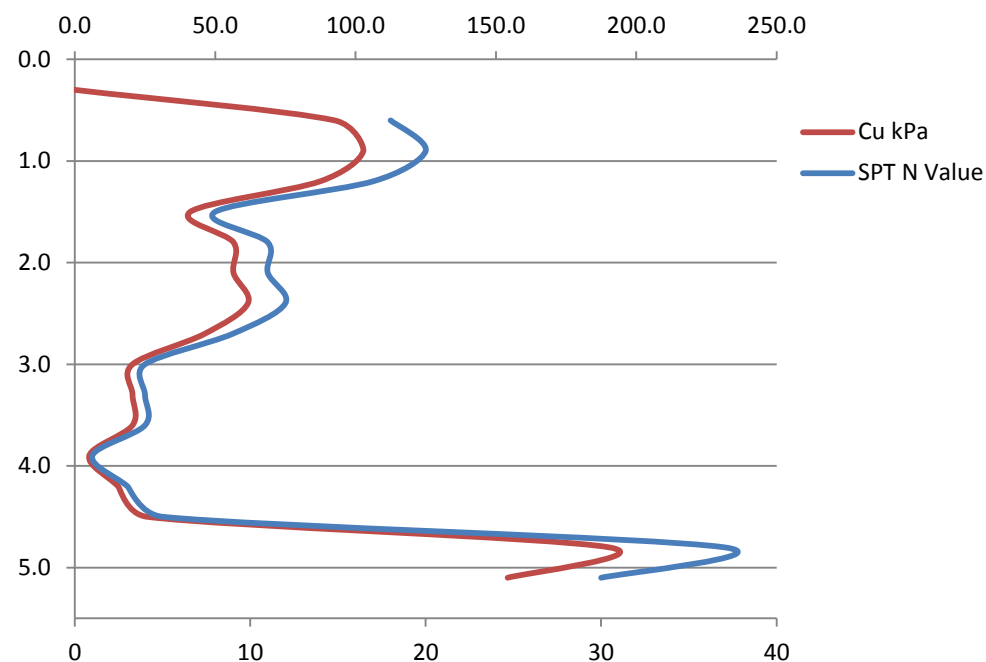
Date of Test	06/08/2019
Completed by	DB
Site Name	Tesco Car Park
Hole number	DP4

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPA
0.3		0.0	-3.9
0.6	18	92.5	140.4
0.9	20	102.8	155.5
1.2	17	87.4	132.8
1.5	8	41.1	62.2
1.8	11	56.5	86.2
2.1	11	56.5	86.2
2.4	12	61.7	94.1
2.7	9	46.3	70.2
3.0	4	20.6	29.5
3.3	4	20.6	29.5
3.6	4	20.6	29.5
3.9	1	5.1	4.5
4.2	3	15.4	21.3
4.5	5	25.7	37.8
4.8	37	190.2	275.9
5.1	30	154.2	228.0

Change in SPT n value and Cu kPa with depth (m)



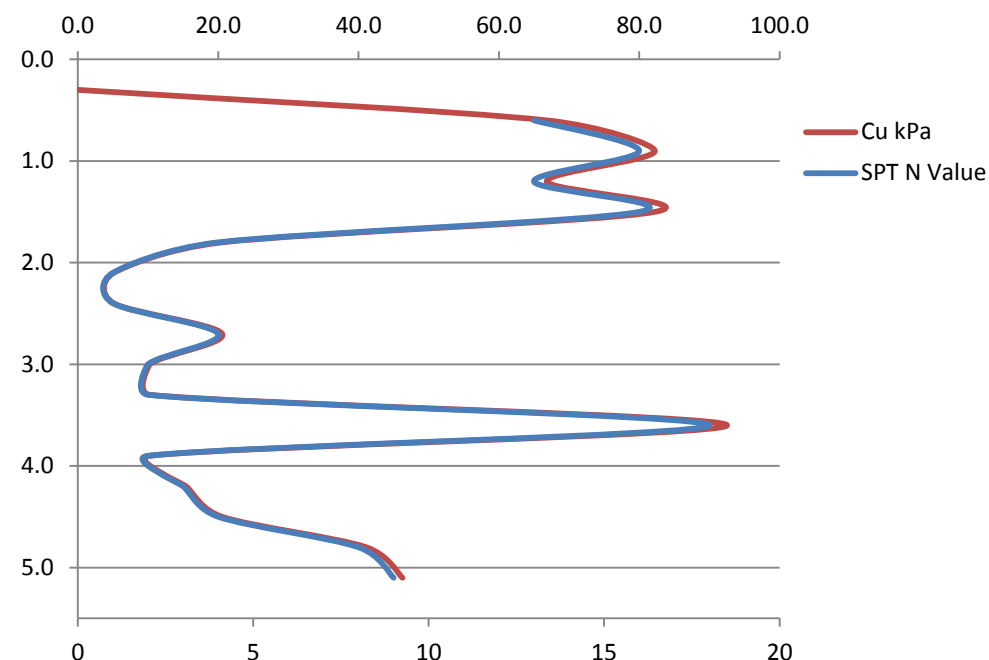
Date of Test	06/08/2019
Completed by	DB
Site Name	Tesco Car Park
Hole number	DP5

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPA
0.3		0.0	-3.9
0.6	13	66.8	101.9
0.9	16	82.2	125.2
1.2	13	66.8	101.9
1.5	16	82.2	125.2
1.8	4	20.6	29.5
2.1	1	5.1	4.5
2.4	1	5.1	4.5
2.7	4	20.6	29.5
3.0	2	10.3	12.9
3.3	2	10.3	12.9
3.6	18	92.5	140.4
3.9	2	10.3	12.9
4.2	3	15.4	21.3
4.5	4	20.6	29.5
4.8	8	41.1	62.2
5.1	9	46.3	70.2

Change in SPT n value and Cu kPa with depth (m)



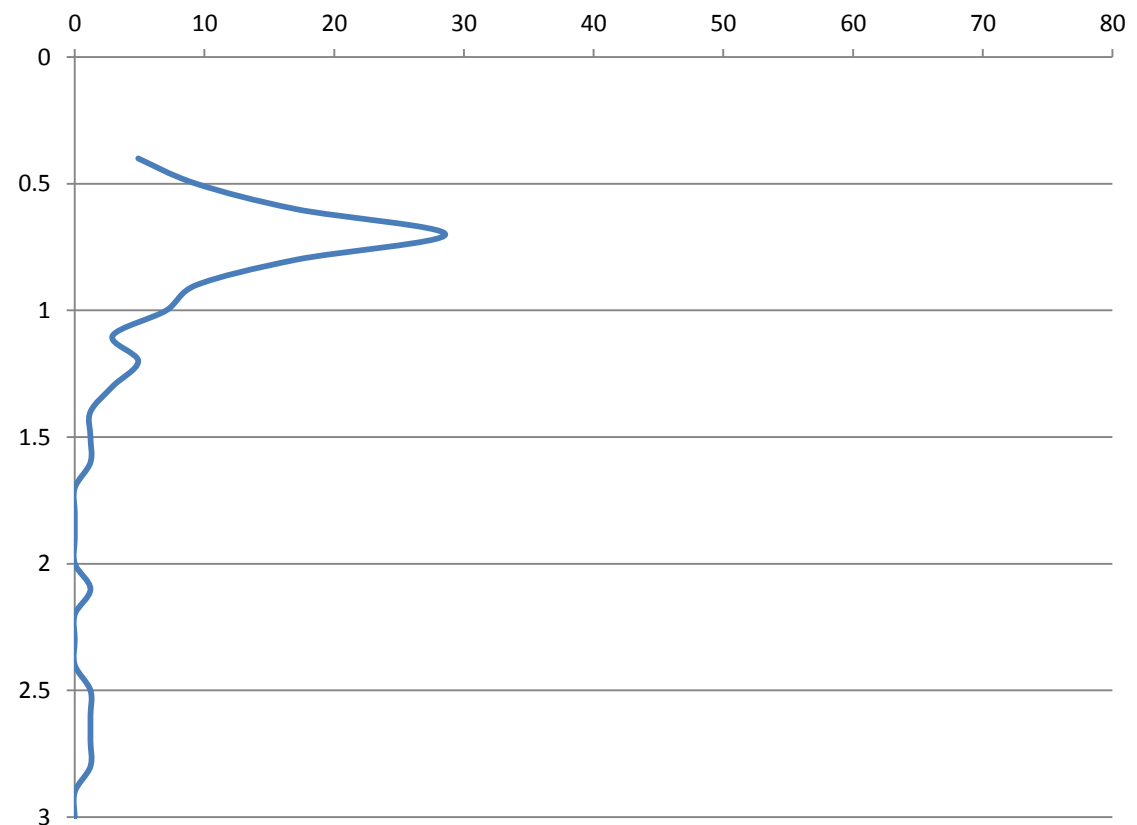
Date of Test 06/08/2019
Completed by DB
Site Name Tesco Car Park
Hole number DP1

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	
0.2	
0.3	
0.4	5
0.5	9
0.6	17
0.7	29
0.8	17
0.9	9
1.0	7
1.1	3
1.2	5
1.3	3
1.4	1
1.5	1
1.6	1
1.7	0
1.8	0
1.9	0
2.0	0
2.1	1
2.2	0
2.3	0
2.4	0
2.5	1
2.6	1
2.7	1
2.8	1
2.9	0
3.0	0

Change in CBR values with depth

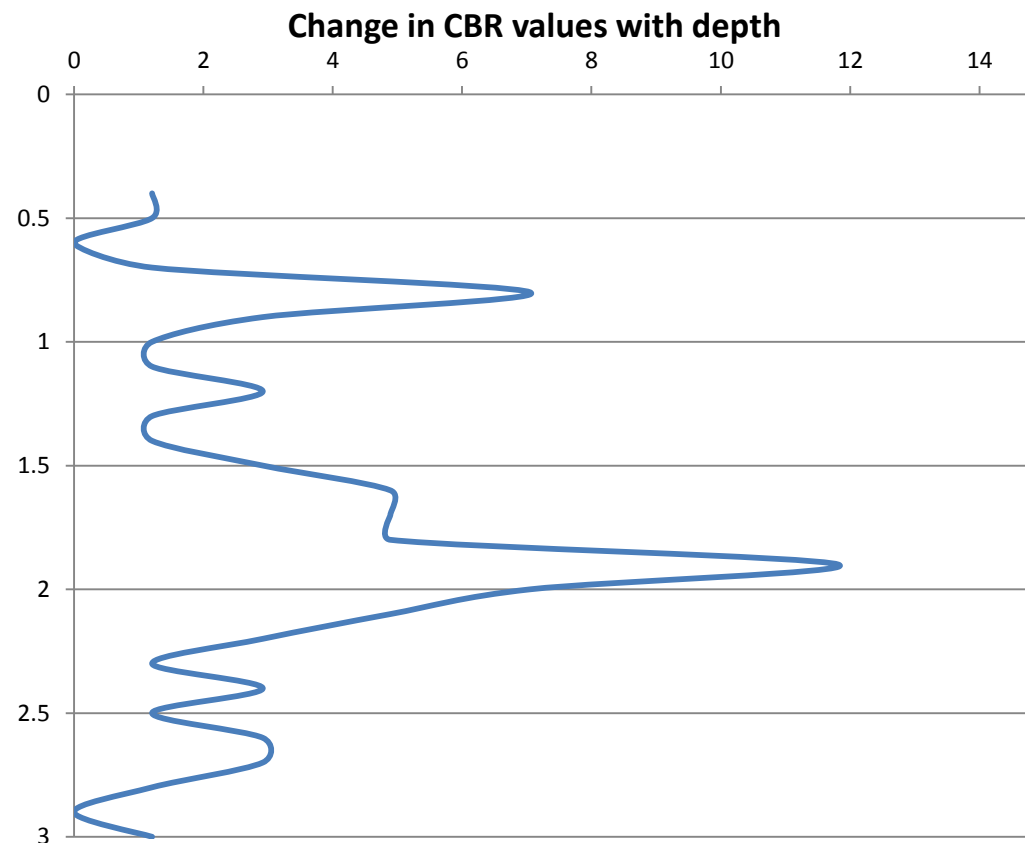


Date of Test 06/08/2019
Completed by DB
Site Name Tesco Car Park
Hole number DP2

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	
0.2	
0.3	
0.4	1
0.5	1
0.6	0
0.7	1
0.8	7
0.9	3
1.0	1
1.1	1
1.2	3
1.3	1
1.4	1
1.5	3
1.6	5
1.7	5
1.8	5
1.9	12
2.0	7
2.1	5
2.2	3
2.3	1
2.4	3
2.5	1
2.6	3
2.7	3
2.8	1
2.9	0
3.0	1

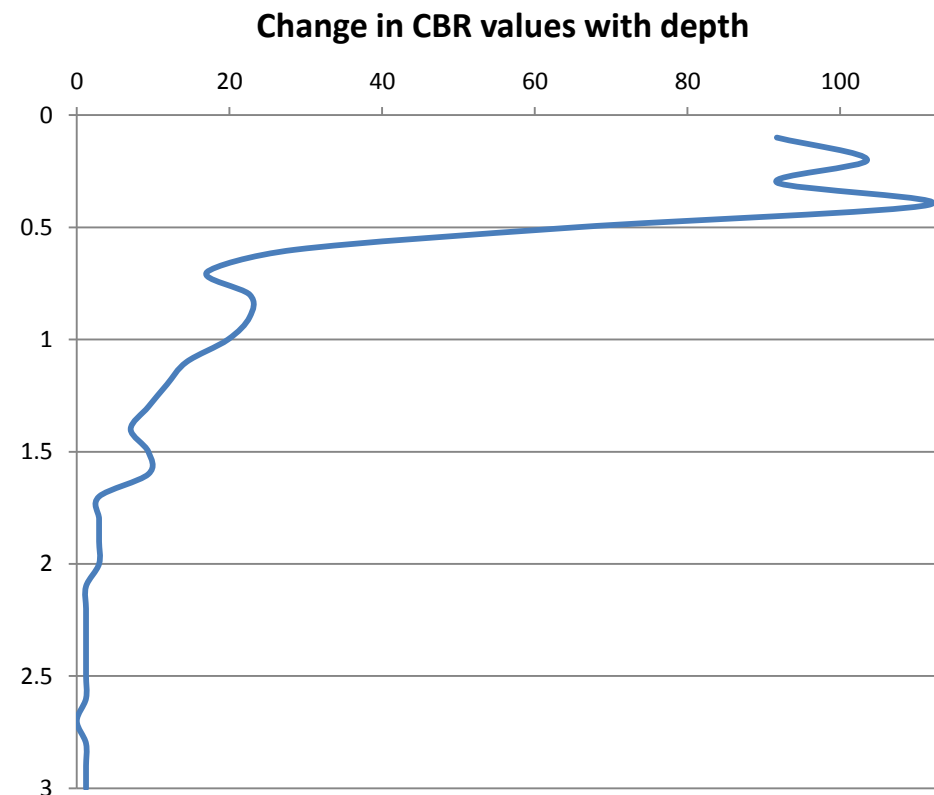


Date of Test 06/08/2019
Completed by DB
Site Name Tesco Car Park
Hole number DP3

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	92
0.2	104
0.3	92
0.4	112
0.5	65
0.6	29
0.7	17
0.8	23
0.9	23
1.0	20
1.1	14
1.2	12
1.3	9
1.4	7
1.5	9
1.6	9
1.7	3
1.8	3
1.9	3
2.0	3
2.1	1
2.2	1
2.3	1
2.4	1
2.5	1
2.6	1
2.7	0
2.8	1
2.9	1
3.0	1

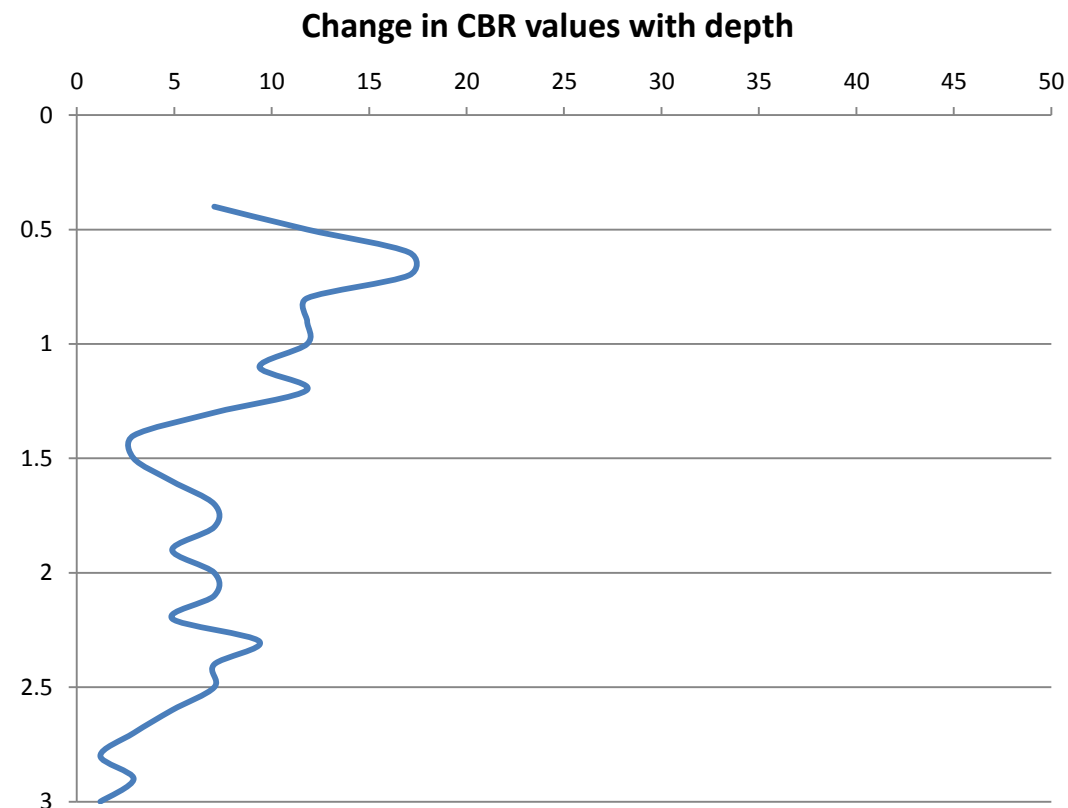


Date of Test 06/08/2019
Completed by DB
Site Name Tesco Car Park
Hole number DP4

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	
0.2	
0.3	
0.4	7
0.5	12
0.6	17
0.7	17
0.8	12
0.9	12
1.0	12
1.1	9
1.2	12
1.3	7
1.4	3
1.5	3
1.6	5
1.7	7
1.8	7
1.9	5
2.0	7
2.1	7
2.2	5
2.3	9
2.4	7
2.5	7
2.6	5
2.7	3
2.8	1
2.9	3
3.0	1



Date of Test 06/08/2019
Completed by DB
Site Name Tesco Car Park
Hole number DP5

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	
0.2	
0.3	
0.4	7
0.5	9
0.6	7
0.7	9
0.8	12
0.9	9
1.0	12
1.1	5
1.2	7
1.3	14
1.4	12
1.5	5
1.6	3
1.7	3
1.8	0
1.9	0
2.0	0
2.1	1
2.2	0
2.3	1
2.4	0
2.5	1
2.6	0
2.7	5
2.8	1
2.9	0
3.0	1

Change in CBR values with depth

