

**PHASE 1
CONTAMINATED LAND &
GEOTECHNICAL
DESK STUDY REPORT**
Proposed Secondary School Development
Land off Richfield Avenue, Reading

Prepared for: Hampshire County Council

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Desk Study Report:

Proposed Secondary School Development

Land off Richfield Avenue, Reading

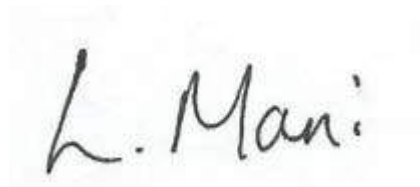
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Executive Summary

Proposals		Hampshire County Council is proposing the construction of a new secondary school within land at Land off Richfield Avenue, Reading. The proposed development will consist of a 3-storey 'superblock' with separate sports block and associated infrastructure.
Geology		The Geological Map of the area shows the site to be underlain by the Seaford Chalk Formation and Newhaven Chalk Formation of Cretaceous Age. The Seaford Chalk Formation and Newhaven Chalk Formation typically comprise chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout. Superficial deposits in the form of Alluvium are shown to overlie the solid geology to the north of the site, typically comprise clay, silt, sand and gravel. The south of the site is shown to comprise the Langley Silt Member which typically comprises silt to clay, commonly yellow-brown and massively bedded.
Mining		In summary, the risk from underground and/or surface mining activity is likely to be Low .
Preliminary Geotechnical Risk Assessment		The preliminary geotechnical risk assessment has revealed that a Low to Moderate risk is present from various geotechnical aspects including moderate risks for underground voids, foundations and sub-structures, floor slabs and road pavements, drainage & flooding and temporary works and construction issues.
Recommendations		In order to confirm the above preliminary geotechnical risk assessment it is recommended that a Phase 2 Intrusive Site Investigation is undertaken in order to determine the ground conditions and confirm relevant geotechnical aspects.
Potential Sources of Contamination	On-site	Historically, the site has typically comprised open undeveloped land since the 1800s. The site was then known to have operated as a household and commercial landfill site between 1970 and 1979. By 2002, the site was redeveloped as a golf driving range, comprising a single-storey elongated open-sided building to the north of the site. The southern part of the site has remained open and undeveloped land. Today, the site now operates as a children's activity centre and laser clay pigeon shooting range. Previous site investigation reports have identified sources of contamination within the Made Ground of the former landfill including elevated levels of Cyanides and PCBs, which could pose a risk to human health and the aquatic environment. However, to-date ground investigations at the site have remained confined to a small section and do not represent the ground conditions of the wider site. Due to the historical uses of the site as a landfill site, there is considered a significant potential source of contamination beneath the site. In addition, a stockpile of material is currently present within the Children's activity centre area and also a bund along the eastern boundary of which the nature and history is not known.
	Off-site	Historically, the surrounding area (<250m) has typically comprised open undeveloped farm land, with the River Thames 120m north. The area was developed for both commercial and residential purposes to the south, with land to the west remaining open. Potentially contaminative sources have included an engine house and railway, allotment gardens, a boat house, printing works and the current industrial estate comprising depots, factories and workshops. However, based on their locations (>100 m from site), periods of use and nature of associated contaminants; it is considered unlikely that any identified off-site sources would have an influencing factor on the site. Therefore, significant contamination is not expected from off-site sources.
	Gas Migration	Due to the presence of a significant level of historic landfill material and Made Ground, the presence of landfill and ground gas at the site could not be discounted. Further, previous ground investigations at the site revealed elevated concentrations of Methane, Carbon Dioxide and depleted Oxygen.
Preliminary Human Health & Environmental Risk Assessment		The preliminary human health and environmental risk assessment has revealed that due to the sites and surrounding areas current and past land uses that a Moderate risk is present from contamination present beneath the site, with particular risk specifically associated with the sites former use as a landfill. In addition, a Low risk is present from the migration of radon gas, a High risk from the migration of landfill gas and a Low to Moderate risk from the migration of ground gas.
Recommendations		Based on a Low to High overall risk rating, in order to confirm the above preliminary human health and environmental risk assessment it is recommended that a Phase 2 Ground Investigation is undertaken comprising site specific soil chemical testing in order to determine the ground conditions, soil chemistry and any environmental liability associated with the site.

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Drawing 1.1: Site Location Plan
Drawing 3.1: Preliminary Conceptual Site Model

SECTION 1 Introduction and Proposed Development

Hampshire County Council is proposing the construction of a new secondary school within Land off Richfield Avenue, Reading. The proposed development will consist of a 3-storey 'superblock' with separate sports block and associated infrastructure.

Terra Firma (South) have been commissioned as Geotechnical and Geo-Environmental Engineers to carry out a Phase 1 Contaminated Land & Geotechnical Desk Study of the site.

The main objectives of the desk study were to:

- Undertake a walk over survey of the site in order to identify relevant features.
- Investigate the history of the site by referring to old Ordnance Survey Maps.
- Determine the likely geological conditions beneath the site including soil/rock types, groundwater and if made ground is likely to be present beneath the site.
- Identify any potential risks associated with past uses of the site.

Based on the desk study information, the following assessment is to be made:

- Identify the likely potential environmental liabilities at the site associated with any soil and groundwater contamination from past site uses.
- Identify if ground gas emissions either from the site or surrounding areas is likely to be present.
- Identify the likely potential geo-technical liabilities at the site associated with any ground stability issues.

The desk study has been undertaken in accordance with the following advisory guidance:

- Model Procedures for the Management of Contaminated Land (CLR11): 2004
- Investigation of Potentially Contaminated Sites – CoP (BS 10175): 2011
- Guidance for the Safe Development of Housing on Land Affected by Contaminated Land – NHBC (R&D Publication 66): 2008
- Code of Practice for Ground Investigations (BS5930): 2015

1.1 Limitations and Exceptions of Investigation

Hampshire County Council has requested that a Phase 1 Contaminated Land & Geotechnical Desk Study be performed in order to determine the past history, likely ground conditions and possibility of contamination and ground gasses beneath the site.

The Phase 1 Contaminated Land & Geotechnical Desk Study was conducted and this report has been prepared for the sole internal reliance of Hampshire County Council and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (South). 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.

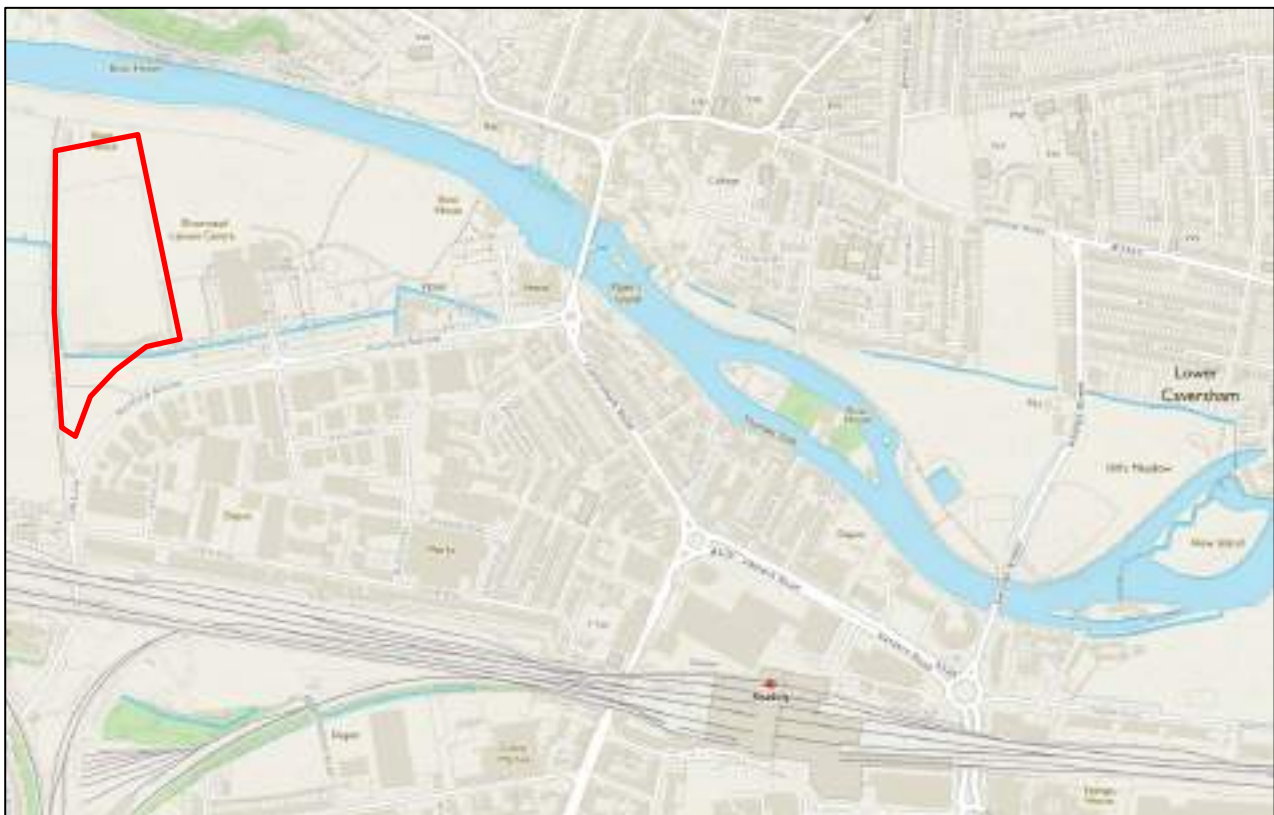
The report represents the findings and opinions of experienced geo-environmental and geo-technical consultants. Terra Firma (South) does not provide legal advice and the advice of lawyers may also be required.

SECTION 2 Review of Existing Data

2.1 Physical Setting

The proposed development is to be located on Land off Richfield Avenue, Reading, RG1 8EQ.

The site is centred approximately on National Grid Reference (NGR) 470413 174483. The site location is presented in **Drawing 1.1** below.



Drawings 1.1: Site Location Plan

The site is irregular in shape with a plan area of approximately 5.1 hectares and sits at approximately 37 m above ordnance datum (aod).

The topography of the site is typically flat, and the topography of the surrounding area is also typically flat.

The site boundaries comprise the following:

- North – The northern boundary comprises open land with the River Thames beyond,
- East – The eastern boundary comprises the Rivermead Leisure complex,
- South – The southern boundary comprises Richfield Avenue and a industrial/buisness estate beyond, and
- West – The western boundary comprises open land which is also used to host Reading Festival.

2.1.1 Current Use and Site Conditions

A walk-over survey was undertaken on the 18th April 2018 by a Terra Firma (South) Engineer. The site is accessed via a private road through the Rivermead Leisure complex. At the time of the walk-over survey the site comprised a large open field to the north of the site with a single storey open fronted building used as a laser clay pigeon shooting ground and a children's activity centre. The southern section of the site comprised open car parking areas with access from Cow Lane. In addition, the following site attributes were noted:

Table 2.1: Walk-over Survey Details

Class	Attributes	Details
Topography	Localised Sloping	Site generally flat
	Cut/Fill	A bund is present along the eastern site boundary to Rivermead Leisure Complex.
	Slope Instability	-
	Spoil Heaps	A stockpile is present in the south east of the children's activity centre area.
	Ground Subsidence	Ground is hummocky and uneven across the site.
Geology	Exposures	-
Surface Water & Groundwater	Streams/Rivers	Drainage ditch present to the south of the activity centre and the car parking areas to the south.
	Springs	-
	Past Flooding	-
	Water Logging	-
	Discharges/Abstracts	-
Surface Contamination	Visual/Olfactory	-
	Storage Tanks	-
	Off-site (<50m)	-
Vegetation	Die-back/restricted	-
	Protected Species	-
	Invasive Species	-
	Trees (Shrinkage)	Some large trees present along northern site boundary and to the west of the site to Cow Lane.
Ecology	Protected Species	-
Structures	Settlement	As ground subsidence above.
	Asbestos	-
	Archaeology	-
Local Knowledge	Owners/Occupiers	Currently used by Reading Borough Council as a Children's Activity centre and privately as a laser clay shooting range. Site also forms part of the Reading Festival during August as camping and storage areas. Site known to have been a landfill site.
	Local Residents	N/A
Services	Buried	Numerous manholes noted across the site but could not be lifted during the survey.
	Overhead	-
	Sub-stations	-
Access	Restrictions	A locked gate is used to access the site from the Rivermead Leisure Complex. Access to the southern section of the site is via a locked gate from Richfield Avenue.

During the walk-over survey the following photographs were taken:

Table 2.2: Walk-over Survey Photographs	
	
Photo 1: Open land to the north of the site used as a children's activity centre. Photo taken looking north.	Photo 2: Single-storey open-fronted building currently present onsite forming part of the Reload shooting range and Children's activity centre. Photo taken looking west.
	
Photo 3: Building currently present on-site. Photo taken looking north-west.	Photo 4: Stockpile present along the eastern site boundary.
	
Photo 5: Southern section of the site comprising an open car parking area. Photo taken looking east.	Photo 6: Secondary area to south of site comprising open car parking area. Photo taken looking east.

2.1.2 Current Land Uses

The following potentially current contaminative land uses are within 100m of the site:

Table 2.3: Potentially Contaminative Land Uses (Current)			
Land Use	Activity	Distance from Site (m)	Direction
Transport, storage and delivery	Container and Storage - Depot	36	SE
Transport, storage and delivery	Container and Storage - Depot	41	SE
Industrial Feature	Unspecified works or factories	44	SE
Repair and Servicing	Vehicle repair, testing and servicing – Grosvenor Motor Company Ltd.	46	SE
Industrial Products	Lifting and handling equipment – Indespension Ltd.	48	SE
Industrial features	Tank (Generic)	49	SE
Industrial Products	Special purpose machinery and equipment – Phoenix Survey and safety equipment hire	54	SE
Hire Services	Construction and tool hire – Brandon hire	54	SE
Industrial products	Electronic equipment – 21 st Century AV	57	SE
Industrial features	Tanks (Generic)	71	SE
Infrastructure and facilities	Electrical Feature – electricity substation	72	SE
Industrial features	Unspecified works or factories	75	SE
Engineering Services	Civil Engineers – Water Scientific	80	SE
Industrial products	Aeroplanes – Precision Aircraft Ltd.	80	SE
Foodstuffs	Cater and non-specific food products – Valentine	83	SE
Industrial features	Unspecified works or factories	89-91	SE

There are no Petrol & Fuel Sites are located within 250m of the site:

There are no National Grid High Voltage Underground Electricity Transmission Cables of High Pressure Gas Transmission Pipelines within 250m of the site.

2.2 Historical Setting

The history of the site has been traced using historic maps from a GroundSure MapInsight Report. The relevant maps are presented in **Annex A**, with key years being discussed below:

Table 2.4: Site History

Map - Edition	Scale	Key Features On-site	Key Features Off-site (<250m)
1877-1881 & 1878	1:2,500 1:10,560	Site comprises open land with a ditch crossing E-W towards the north of the site. A ditch is also present in a N-S direction to the south-west of the site. The area is labelled 'liable to flood'.	Surrounding area comprises open undeveloped land, with land to the west called 'Little Johns'. Railway line shown 200 m south of the site.
1897-1900	1:10,560	No change to site condition from previous map edition	Residential and industrial infilling in the general surrounding area. Engine shed now present 250m south east of site.
1910-1913 & 1913	1:10,560 1:2,500	The southern section of the site is now within a different land boundary. Site remains open undeveloped land.	Road adjacent to the west site boundary now called 'Cow Lane'. Numerous boat houses now constructed 250m north of the site on the northern banks of the River Thames. A building (thought to be a pump house) now present 50m north of the site.
1932-1934	1:2,500	No change to site condition from previous map edition.	Little or no change to surrounding area from previous map edition.
1936	1:2,500	No change to site condition from previous map edition.	Little or no change to surrounding area from previous map edition.
1938	1:10,560	No change to site condition from previous map edition	Allotment gardens present 200m south of the site boundary adjacent to the railway line.
1959	1:1,250	Pit now present in the southern point of the site and extending off-site. Ditch in the southern section of the site crossing E-W now labelled as a drain.	Bridge now present adjacent to the western site boundary for Cow Lane. Buildings now constructed within the pit area to the south of the site boundary comprising a warehouse and a works. Allotment gardens are now adjacent to the works (120m SW) and a Depot is present 200 m SW.
1960-1962	1:10,560	No change to site condition from previous map edition.	Area to the south of the site now comprises numerous works and commercial buildings along Cardiff Road.
1970-1972 & 1970-1973	1:1,250 & 1:10,000	Southern section of the site shown as rough pasture and bushes.	Road now present along southern site boundary comprising Richfield Avenue. Numerous works and depots present including the Post Office Depot and a printing works. Allotments now present 100m south-west of the site.
1976-1979	1:10,000	No change to site condition from previous map edition.	Building 250m north of the site shown as a boat house. Further commercial infilling to the south east of the site.
1989-1991 & 1988-1993	1:10,000 1:1,250	No change to site condition from previous map edition.	Rivermead Leisure Complex now present adjacent to the eastern site boundary.
1994	1:10,000	No change to site condition from previous map edition.	Little or no change to surrounding area from previous map edition.

2002	1:10,000	Site now comprises an elongate building along the drainage ditch to the south of the site and is now labelled as a Golf Driving Range.	Rivermead Leisure Complex has been extended.
2010	1:10,000	No change to site condition from previous map edition.	Little or no change to surrounding area from previous map edition.

The following specific historic contaminative land uses are within 200m of the site:

Table 2.5: Potentially Contaminative Land Uses (Historic)			
Land Use	Date	Distance from Site (m)	Direction
Unspecified works	1961	23	SE
Boat House	1977-1994	66	N
Unspecified Depot	1977-1994	93-96	SE
Railway sidings	1897-1994	126-129	S
Railway sidings	1900-1938	151-156	SW
Boat Houses	1900-1994	174-178	N
Railway siding	1878	179	S
Boat Houses	1897-1938	179-181	N
Boat Houses	1910-1938	197	NE
Unspecified ground workings	1910-1938	206	N
Railway sidings	1933	208	S
Unspecified pits	1962-1994	208	N
Railway Sidings	1900-1938	212-219	S
Refuse Heap	1913	216	S
Boat House	1910-1938	222	N
Unspecified Depot	1971-1977	222	S
Railway Building	1962-1971	226	SE
Boat Houses	1994	228	N
Unspecified Depot	1971-1977	228-230	SE
Railway Building	1977-1994	230	SE
Boat Houses	1938	231	N
Unspecified Depot	1989-1994	232	S
Railway Sidings	1938-1938	236-237	SW
Railway Sidings	1898	240	SE
Unspecified ground workings	1962	242	S
Boat houses	1938	250	N

2.2.1 Preliminary UXO Risk Assessment

Based on the historical setting of the site and UXB Risk Maps, little or no military activity has been recorded within the area. Therefore, the risk from Unexploded Ordnance (UXO) is considered to be low.

2.3 Geological Setting

2.3.1 Geology

The 1:50,000-scale Geological Map of the area shows the site to be underlain by the Seaford Chalk Formation and Newhaven Chalk Formation of Cretaceous Age. The Seaford Chalk Formation and Newhaven Chalk Formation typically comprise chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout.

Superficial deposits in the form of Alluvium are shown to overlie the solid geology to the north of the site, typically comprise clay, silt, sand and gravel. The south of the site is shown to comprise the Langley Silt Member which typically comprises silt to clay, commonly yellow-brown and massively bedded.

Due to the nature and the known history of the site as a former landfill the presence of significant Made Ground is expected.

The British Geological Survey (BGS) online database has been consulted and there are 2 no. boreholes in proximity to the site:

1. SU77SW9 – Cow Lane Reading (8.6m) (470370, 174310) – On site
2. SU77SW8 – Thames Side Promenade Reading (11.2 m) (471440, 174750) – 50 m North

The boreholes reveal a sequence of Topsoil or Made Ground over a silty/sandy clay, underlain by superficial deposits of gravel and sand. Both boreholes also encountered chalk at depths of 8.6m and 11.20m.

BGS borehole logs for both locations are included as **Annex B**.

2.3.2 Aggressive Ground Conditions

Natural Ground

In natural ground, sulphates most commonly occur in the form of hydrated calcium sulphate (gypsum). The likelihood of sulphates being present in natural ground depends on the geological strata, weathering and groundwater flow. With reference to Figure C2 of BRE SD1: 2005 'Concrete in aggressive ground, the geological strata most likely to have substantial sulphate concentrations are ancient sedimentary clays, including Mercia Mudstone, Lower Lias Clay, Kimmeridge Clay, Oxford Clay, Wealden Clays, Gault Clay and London Clay.

The Geological Formation beneath the site comprises the Seaford Chalk Formation and Newhaven Chalk Formation, therefore combined with the inspection of any exposures, the presence of sulphates is unlikely.

Brownfield

Fill materials found on site, or brought in during construction, may contain substantial quantities of sulphates. In addition, colliery spoil, slag, clinker and demolition waste often contains variable amounts of common sulphates.

Due to the nature and history of the site the presence of significant Made Ground is expected, therefore the presence of sulphates is likely.

2.3.3 Radon

Radon is a naturally occurring radioactive gas which is produced by the radioactive decay of radium, which in turn is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks. Radon released from rocks and soils is quickly diluted in the atmosphere. However, radon that enters enclosed spaces such as buildings can reach high concentrations and pose a hazard to human health. The Government has adopted an Action Level for radon in homes of 200 Becquerel's per cubic metre (Bq/m³). Where the radon levels exceed the Action Level, remedial measures are required to reduce the concentration.

The property is in a Radon Affected Area as defined by the Health Protection Agency (HPA), less than 1% of properties are above the Action Level.

BR211 by the Building Research Establishment (BRE) indicates that new buildings and extensions within the sites boundaries require No Radon Protection measures under the current Building Regulations.

2.3.4 Karstic Features

All chalk formations are susceptible to the formation of karstic or solution features.

Based on the Geological Map of the area, the site is underlain by chalk formations and so, it is concluded that the risk is **Moderate**.

2.3.5 Mining

Coal Mining

There are no coal mining areas within 75m of the site.

Non-Coal Mining

There are no non-coal mining areas within 50m of the site.

Brine Affected Areas

There are no brine affected areas within 75m of the site.

In summary, the risk from underground and/or surface mining activity is likely to be **Low**.

2.3.6 Ground Stability Hazards

Based upon BGS GeoSure data the risk from various ground stability hazards has been assessed below:

Table 2.6: Ground Stability Hazards	
Potential Hazard	Maximum Hazard Rating
Shrink-Swell	Very low Risk – 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.
Landslides	Very low Risk – 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.
Soluble Rocks	Very low Risk – 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.
Compressible Ground	Moderate Risk – 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.
Collapsible Rocks	Very low Risk – 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.
Running Sand	Low Risk – 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.

2.4 Environmental Setting

A GroundSure EnviroInsight Report has been obtained for the site and is presented in **Annex A**, with key information being discussed below:

In addition, The Environment Agency (EA) 'What's in your backyard' database was searched. Information from both the Groundsure report and EA database is summarised in the following sub-sections.

2.4.1 Hydrology and Flooding

As mentioned in Section 2.1, the topography of the site is typically flat. A drainage ditch is present to the south of the shooting range, cutting in an E-W direction across the site however, The River Thames is located approximately 120 m north of the site boundary. Therefore, the inferred direction of surface and groundwater flow is likely to be in this direction, following the natural topography of the area.

Environment Agency records show the site to lie within a Flood Zone 2 and 3 for nearby surface water bodies.

Environment Agency 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.

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.

The Environmental Agency (EA) Risk of Flooding from Rivers and the Sea (RoFRas) data indicates the site is in an area with a Low to High chance of flooding in any given year.

There are no flood defences, areas benefiting from flood defences or flood storage areas within 250m of the site.

The site is considered to have potential for clearwater groundwater flooding based on the underlying geological conditions, of which the BGS has a High confidence rating.

It is recommended that a Flood Risk Assessment (FRA) is undertaken at the site to assess the potential susceptibility to flooding.

2.4.2 Hydrogeology

The Aquifer Designation Map for the area shows the underlying Superficial Deposits to comprise an Unproductive and a Secondary aquifer and the Bedrock Geology to comprise a Principal Aquifer.

Principal Aquifers consist of layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary Aquifers include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into three types and beneath the site the aquifer is classed as a 'Secondary A'. These aquifers consist of 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.

Unproductive Strata consist of rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.

There are 2 no. abstraction licences are located within 250m of the site:

1. Thames Groundwater, process water – Hillier Group of Companies – 144m South. Status: active since 2008.
2. Thames Groundwater, general farming and domestic – Little John's Farm – 222m West. Status: Active since 1967.

Source Protection Zones (SPZs) have been defined for a number of groundwater sources such as wells, boreholes and springs which are used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area, the closer the activity, the greater the risk. SPZs are typically defined as three main zones (inner, outer and total catchment).

The site does not lie within 1km of a Source Protection Zone (SPZ) or a zone of special interest resulting in no restrictions by the EA on activities that may pollute water supplies.

The following information on groundwater vulnerability and soil leaching potential is present within 250m of the site:

1. Classification: High Leaching Potential, On site, Soil Vulnerability Category: H1
2. Classification: Intermediate Leaching Potential, 77m W, Soil Vulnerability Category: I1

2.4.3 Environmental Permits, Incidents and Registers

There are 6 no. industrial site holding environmental permits and/or authorisations within 250m of the site:

1. Part A(1) and IPCC: Organic chemicals, hydrocarbons e.g. aromatics, 182m, SE.
2. List 1 Dangerous Substance Inventory: Quick Circuits – authorised substances Mercury (other) and Cadmium, 9m E.
3. List 1 Dangerous Substance Inventory: Unimet Enamellers Ltd. – authorised substances Chromium, 202m SE.
4. Part B: Grosvenor Motor Company - Waste oil and recovered oil, 30m SE.
5. Part B: Wadham Kenning – Respraying of Road Vehicles, 60m SW.
6. Part B: E. Hilier and Son Ltd. – Metal Processes, 119m S.

There is one licenced discharge consent located within 250m of the site:

1. Miscellaneous – Surface water: Riverside Leisure Centre 107m E – Status: Active

There is one record of COMAH and NIHS sites within 250m of the site:

1. Calor Gas Ltd., Historical NIHHS Site: 196m S

There are 3 no. Environment Agency recorded List 1 or 2 pollution incidents within 250m of the site:

Table 2.7: Pollution incidents			
Pollutant type	Impact category	Distance	Direction
Waste Materials – Metal Wastes	Land Impact - Minor	97	S
Oils and Fuel – Unidentified oil	Land impact – Minor	146	E
Oils and Fuel – Mixed/waste oils	Land Impact – Minor	228	E

There are no sites determined as Contaminated Land under Part IIA EPA within 250m of the site.

2.4.4 Landfill Sites

There is one record for active or historic landfill sites within 250m of the site:

1. Richfield Avenue, Onsite: Commercial, household and liquid sludge, 1970-1979

There are 2 no. licensed waste management facilities or registered waste transfer sites are located within 250m of the site:

1. Waste Transfer Building, 124m SE: Waste transfer, sorting and recycling centre.
2. Licenced waste site, 154m SE: 75kte HCl Waste TS and treatment (<25000 tonnes).

2.4.5 Sensitive Land Use

There are no designated environmentally sensitive sites within 250m of the site.

2.4.6 Anticipated Soil Chemistry

The BGS has been commissioned by Defra to provide guidance on what are 'normal' levels of contaminant concentrations in English soils in support of the revision of the Part 2A Contaminated Land Statutory Guidance.

Anticipated soil concentrations for a number of common contaminants have been published. Concentrations relevant to the site location have been detailed below:

Table 2.8: Anticipated Soil Chemistry				
Contaminant	Anticipated Soil Concentration (mg/kg)	Soil Guideline Value (mg/kg)		
		Residential	Commercial	Source
Arsenic	33.4-74.4	37	640	C4SL
Cadmium	0.85-1.2	22	410	C4SL
Copper	97.6-248	2400	68000	S4UL
Nickel	46.9-74.7	180	980	S4UL
Lead	242-986	200	2330	C4SL

Table 2.8 Notes:

- C4SL –Category 4 Screening Levels (with consumption of home-grown produce)
- S4UL – Suitable 4 Use Levels (with consumption of home-grown produce)

All of the given determinants, with the exception of Lead and Arsenic, have anticipated concentrations on the site that are below the recognised levels for the relevant both residential and commercial use. Lead and Arsenic both exceeds the soil guidance value for Lead for a residential end-use.

2.4.7 Previous Site Investigations

A previous site investigation was conducted at the site by Terramech Investigations Ltd. in July 2017 and a short Geotechnical Report produced (Report No: 3937). The site investigation was conducted in the south-east corner of the current Reload Shooting Range and Children's Activity Centre in the northern part of the site.

The site investigation comprised 3 no. cable percussion boreholes (1 to 15m and 2 to 8m), chemical and geotechnical lab testing on soils samples, gas and groundwater monitoring, Waste Acceptance Protocol assessment and a hand-dug pit to establish foundation conditions of a building onsite.

The site investigation revealed the following:

- A sequence of substantial Made Ground comprising anthropogenic waste overlain by a cohesive capping layer of clay and topsoil.
- Beneath the Made Ground a sandy silty clay considered to comprise the Langley Silt Formation was encountered which itself was underlain by gravel/sandy gravel or sand and gravel comprising the Kempton Park Gravel. Finally, the Seaford Chalk Formation was encountered at depths of between 7.20-7.70 m.
- Groundwater was encountered during drilling at depths between 2.60-2.70m.
- Gas Monitoring identified elevated levels of Carbon Dioxide (maximum 13.8%) and depleted Oxygen (3.2%). The maximum flow rate recorded was 0.3l/h categorising the site as a Characteristic Situation 2 site requiring gas protection membranes.
- Contamination testing of soils samples obtained during the SI revealed elevated levels of PCBs and Thiocyanates above acceptance criteria for a public open space (POS) site end-use.

Finally, the report recommended that further sampling should be conducted of the Made Ground where PCBs were identified to establish the extent.

The full report is included in **Annex C**.

2.4.8 Relevant Planning Applications

A search was completed to explore previous planning application that may be of relevance to establishing the sites history. Although only minor amendment applications existed for the site, a planning application of the adjacent site – Rivermead Leisure complex. The site of the Rivermead Leisure Complex formally comprised part of the landfill site covering the current site boundary, therefore information relating to ground conditions at Rivermead Leisure Complex may reflect that of the current site.

The Planning Application (Ref: 162323) submitted in December 2016 sought an extension to existing facilities to Rivermead Leisure Complex. A ground investigation was completed at the site by Soils Ltd. in November 2015 and a Phase II Ground Investigation Report compiled (Report No: 15225/GIR).

The SI comprised 8 no. window sample boreholes, 2 no. cable percussive boreholes, installation of gas and groundwater monitoring boreholes and Geotechnical and Chemical testing of soil samples.

The boreholes revealed ground conditions of Topsoil/Made Ground over Kempton Park Gravel over Seaford and Newhaven Chalk Formation.

Chemical testing revealed no contaminant concentrations above a commercial end-use scenario at the site.

Gas monitoring revealed elevated levels of Methane, Carbon Dioxide and depleted Oxygen across the site, with a maximum flow rate of 0.1l/h. Soils Ltd. recommended that based on the levels of elevated methane and Carbon Dioxide that a Characteristic Gas Situation 2 be adopted for the site.

2.5 Preliminary Geotechnical Risk Assessment

A preliminary geotechnical risk assessment is presented below, based upon desk study information and existing site data.

Table 2.9: Preliminary Geotechnical Risk Assessment					
Geotechnical Aspect	Ground Conditions	Hazard	Potential Impact		Preliminary Risk Assessment
Underground Voids	Mining, Natural Cavities, Other Voids	Collapse, Subsidence and Ground Instability	Surface deformation & Structural Damage	Slowdown of construction, design changes, project delays, time/cost implications	Low to Moderate Risk – Based on BGS GeoSure Soluble & Collapsible Rocks Hazard Rating and above Mining and Karst Assessment
Slopes & Earthworks	Steep Slopes, Embankment/Cutting Stability	Slope Failure and Ground Instability	Site Stability, Surface Deformation & Structural Damage		Low Risk – Based on BGS GeoSure Landslides and Running Sand Hazard Rating and topography
Foundations & Sub-structures	Soft/loose and compressible soils, Shrinkable Soils, Aggressive Ground	Unsuitable Strata, Settlement, Attack on Buried Structures and Ground Instability	Excess Settlement, Structural Damage		Moderate Risk – Based on BGS GeoSure Compressible Ground and Shrink-Swell Hazard Rating and geology / aggressive ground conditions – potential for differential settlement due to significant Made Ground.
Floor Slabs & Road Pavements	Soft/loose and Compressible, Frost Susceptible Soils	Unsuitable Strata, Low CBR, Frost Heave	Structural Damage, Alternative Design		Moderate Risk – Based on BGS GeoSure Compressible Ground and Shrink-Swell Hazard Rating, geology and presence of trees - potential for differential settlement due to significant made ground.
Drainage & Flooding	High/Low Permeability, High Groundwater, Watercourse	Ineffective Attenuation/ Soakaways, Buoyancy, Effects Levels, Flooding	Settlement, Flooding		Moderate Risk – Based on geology, geomorphology, hydrology, flooding and hydrogeology

Temporary Works & Construction Issues	Soft/loose or Unstable Strata, Hard Strata or Obstruction, High Groundwater	Excavation Instability, Hard Digging, Water Inundation	Collapse, Increased Costs		Moderate Risk – Based on BGS Running Sand GeoSure Hazard Rating and geology
OVERALL RISK RATING					
The preliminary geotechnical risk assessment has revealed that a Low to Moderate risk is present from various geotechnical aspects including moderate risks for underground voids, foundations and sub-structures, floor slabs and road pavements, drainage & flooding and temporary works and construction issues.					

In order to confirm the above preliminary geotechnical risk assessment it is recommended that a Phase 2 Intrusive Site Investigation is undertaken in order to determine the ground conditions and confirm relevant geotechnical aspects.

SECTION 3 Preliminary Risk Assessment

The following sub-sections detail a Preliminary Risk Assessment (PRA), based upon the desk study information.

3.1 General

Environmental Protection Act

The contaminated land regime is set out in Part IIA of the Environmental Protection Act (EPA) 1990 and was introduced on the 1st April 2000 in England and 1st July 2001 in Wales. A similar regime was introduced in Scotland on 14th July 2000.

Part IIA was introduced to achieve two aims:

- (a) The identification of contaminated land
- (b) The remediation of contaminated land that poses an unacceptable risk to human health and/or the environment

Under Part IIA the statutory definition of 'contaminated land' is:

"any land which appears to the local authority in whose area it is situated, to be in such a condition, by reason of substances in, on, or under the land, that:

- (a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) Pollution of controlled waters is being, or is likely to be, caused."

Planning Policy Framework

The contaminated land regime in Part IIA was introduced specifically to address the historical legacy of land contamination and is not directed to assessing the risks in relation to a future use of the land that would require a specific grant of planning permission. Therefore, Part IIA would not normally apply where land is being managed within the normal cycle of land redevelopment and regeneration. In this case, planning and development control will continue to be the primary means of control.

Land contamination, or the possibility of it, is a material consideration for the purposes of town and country planning (Town and Country Planning Act 1991). Current planning control on contaminated land is set out in The National Planning Policy Framework (NPPF).

The NPPF sets out the Governments planning policies for England and how these should be applied and states that:

- The natural environment should be conserved and enhanced by remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land,
- In preparing to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment. Plans should allocate land with the least environmental or amenity value, and
- Planning policies and decisions should encourage the effective use of land by re-using land that has previously been developed (Brownfield land), provided that it is not of high environmental value.

Where a new development is taking place, it will be the responsibility of the developer to carry out the necessary remediation. In most cases, the enforcement of any remediation requirements would be through planning conditions and building control, rather than through a remediation notice issued under Part IIA.

This report has been written with the precautionary regime of planning and The NPPF in mind.

The Concept of Risk

For land to be classified as 'Contaminated Land' there must be a '**pollutant linkage**'. A pollutant linkage requires three essential elements:

- (1) A **CONTAMINANT** (hazard) – a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of **controlled waters**
- (2) A **RECEPTOR** (target) – something which could be adversely affected by a contaminant
- (3) A **PATHWAY** – a route or means which either allows the contaminant to cause significant harm to that receptor, or that there is a significant possibility of such harm being caused to the receptor, or that pollution of controlled waters is being or likely to be caused.

The term 'Risk' is widely used in different contexts and situations, but a prescriptive definition is given by the Guidelines for Environmental Risk Assessment and Management (DEFRA *et al*, 2000):

'Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence'.

A 'Hazard' is defined as '*a property or situation that in particular circumstances could lead to harm*'.

The classification of consequences and probability and determining the risk category are defined in the following sections.

3.1.1 Classification of Consequence

Table 3.1: Classification of Consequence	
Classification	Definition
Severe	• Short term (acute) risk to human health likely to result in significant harm • Short term risk to controlled waters • Catastrophic damage to buildings/structures • Short term risk to an ecosystem or organism within the particular ecosystem
Medium	• Chronic damage to human health (long term risk) • Pollution of a sensitive water resource • A significant change in an ecosystem or organism within the ecosystem
Mild	• Pollution of non-sensitive water resources • Significant damage to buildings/structures
Minor	• Harm (not necessarily significant) which may result in financial loss • Non-permanent health effects to humans (easily prevented by PPE for example) • Easily repairable effects of structural (building) damage

3.1.2 Classification of Probability

Table 3.2: Classification of Probability	
Classification	Definition
High	• There is a complete pollution linkage and an event appears very likely to occur in the short term and is inevitable in the long term. • Evidence of harm to the receptor
Medium	• There is a complete pollution linkage which means that it is probable that an event will occur • The event is not inevitable but possible in short term and likely in the long term
Low	• There is a complete pollution linkage and circumstances are possible under which an event could occur • It is not certain that an event will occur in the long term, and it is less likely to occur in the short term
Negligible	• There is a complete pollution linkage but circumstances are such that it is improbable that an event would occur even in the long term

3.1.3 Risk Assessment Matrix

By comparing the consequences of a risk and the probability of the risk of a pollution linkage, the likely risk category can be determined as shown in Table 3.3 below.

Table 3.3: Risk Assessment Matrix					
Increasing acceptability ↘		Consequence			
		Severe	Medium	Mild	Minor
Probability	High	High	High	Medium / Low	Near zero
	Medium	High	Medium	Low	Near zero
	Low	High / medium	Medium / Low	Low	Near zero
	Negligible	High / medium / Low	Medium / Low	Low	Near zero

High Risk

There is a high probability that severe harm could risk a receptor, or there is evidence that a receptor is being harmed. The risk if realised is likely to result in liability, and urgent investigation or remediation will be required.

Medium Risk

It is probable that harm will arise to a receptor. However, it is relatively unlikely that such harm would be severe, or if harm does occur the harm is likely to be relatively mild. Investigation will be required to determine the liability, and some remedial works may be required in the long term.

Low Risk

It is possible that harm may arise to a receptor, but it is likely that the harm would be mild.

Near Zero Risk

There is a very low risk of harm to the receptor. In the event of harm being realised the harm is not likely to be severe.

3.2 Preliminary Site Conceptual Model

The preceding sections enable a preliminary conceptual model of the site to be drawn up, to illustrate the likely ground conditions beneath the site together with a preliminary assessment of the nature of any underlying aquifers and groundwater movement. The preliminary site conceptual model is used as a model for the design and implementation of the site investigation, whereby areas of potential contamination can be targeted as well as investigating the site as a whole.

3.2.1 Potential Sources of Contamination

The potential contamination beneath the site, whether in the matrix of soil or groundwater will be related to the sites past use.

On-site Sources

Currently, the site walkover survey identified the following surface contamination details:

Visual/Olfactory	Stockpile to south-east of Children's activity centre
Storage Tanks	No storage tanks noted

Historically, the site has typically comprised open undeveloped land since the 1800s. The site was then known to have operated as a household and commercial landfill site between 1970 and 1979. By 2002, the site was redeveloped as a golf driving range, comprising a single-storey elongated open-sided building to the north of the site. The southern part of the site has remained open and undeveloped land. Today, the site now operates as a children's activity centre and laser clay pigeon shooting range.

Previous site investigation reports have identified sources of contamination within the Made Ground of the former landfill including elevated levels of Cyanides and PCBs, which could pose a risk to human health and the aquatic environment. However, to-date ground investigations at the site have remained confined to a small section and do not represent the ground conditions of the wider site.

Due to the historical uses of the site as a landfill site, there is considered a significant potential source of contamination beneath the site.

In addition, a stockpile of material is currently present within the Children's activity centre area and also a bund along the eastern boundary of which the nature and history is not known.

It should be noted that the natural bedrock underlying the site may exhibit naturally elevated levels of heavy metals, in this case elevated levels of Lead and Arsenic above residential soil guidance values are anticipated (Section 2).

Off-site Sources

Historically, the surrounding area (<250m) has typically comprised open undeveloped farm land, with the River Thames 120m north. The area was developed for both commercial and residential purposes to the south, with land to the west remaining open. Potentially contaminative sources have included an engine house and railway, allotment gardens, a boat house, printing works and the current industrial estate comprising depots, factories and workshops.

However, based on their locations (>100 m from site), periods of use and nature of associated contaminants, it is considered unlikely that any identified off-site sources would have an influencing factor on the site. Therefore, significant contamination is not expected from off-site sources.

Landfill/Ground Gas

Due to the presence of a significant level of historic landfill material and Made Ground, the presence of landfill and ground gas at the site could not be discounted. Further, previous ground investigations at the site revealed elevated concentrations of Methane, Carbon Dioxide and depleted Oxygen.

3.2.2 Potential Pollution Linkages

The potential pollution linkages relating to human health and the wider environment are as follows:

Human Health

1. Ingestion of soil and soil dust
2. Contaminant permeation of drinking water pipes and ingestion of contaminated water supply
3. Inhalation of soil particles, dust, asbestos and vapours, both indoors and outdoors
4. Dermal contact (Inc. eye uptake) with soil, soil dust and water
5. Inhalation of landfill / ground gas, accumulation and risk of explosion

Aquatic Environment

1. Surface water runoff
2. Migration of surface water into underlying soils and groundwater
3. Leaching of contaminants via groundwater transport into the wider aquatic environment – surface waters and groundwater

Ecology

1. Phytotoxic substances may inhibit healthy plant growth
2. Poisonous, carcinogenic, genotoxic substances may affect wildlife
3. Surface runoff can introduce contamination / allow contamination to migrate

Buildings

1. Chemical attack of buried structures (concrete, steel etc.)

3.2.3 Potential Receptors

The potential receptors of any contamination and ground gas are considered to be:

1. Site end users – Workers and Visitors
2. Construction workers
3. Neighbouring site users and passers-by
4. The aquatic environment - surface waters, perched and deep groundwater
5. Building Materials - sulphates in the ground can damage building materials
6. Flora and Fauna upon the site is potentially at risk from Phytotoxic contaminants

3.3 Preliminary Human Health and Environmental Risk Assessment

A Preliminary Human Health and Environmental Risk Assessment aims to make initial assumptions about potential risks posed towards the human health and to the environment during all stages of the development.

Where it is assumed that a potential pollution pathway exists, there is a potential source, a potential receptor and a likely pathway which links the two. This qualitative risk assessment can then be refined into a quantitative risk assessment once any site investigation and laboratory soil chemical testing/environmental assessment has been undertaken.

Table 3.4: Preliminary Human Health and Environmental Risk Assessment

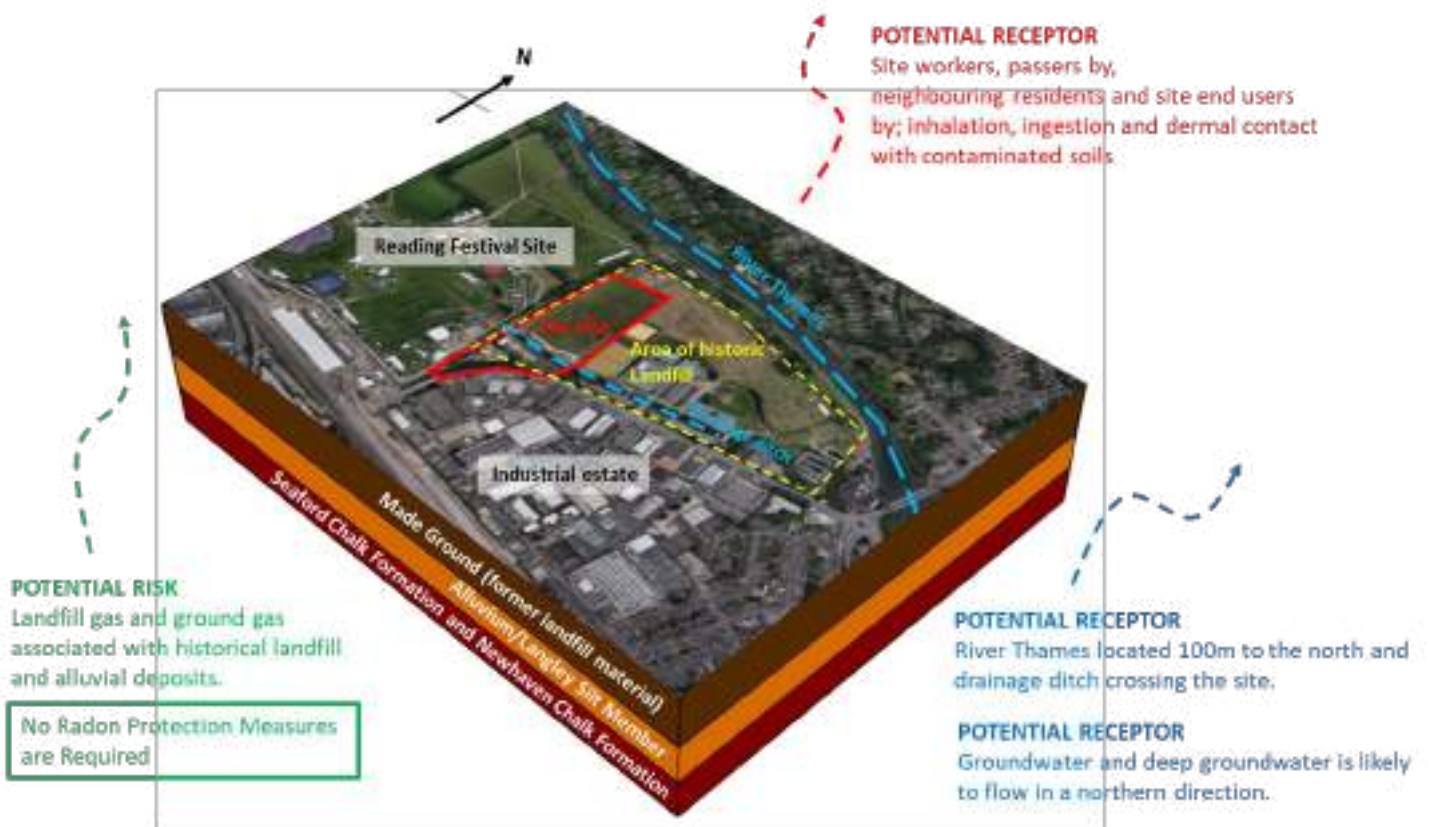
Potential Source	Potential Pathway	Potential Receptor	Preliminary Risk Assessment	
Human Health				
Subsurface Soil	Ingestion of soil and soil dust	Site end users – Workers and Visitors	On-Site Sources	Moderate Risk - Due to the presence of identified on-site sources of contamination including the historic landfill and made ground materials at shallow depth.
	Off-site Sources		Low Risk – Due to the distance, nature and period of use of potential contamination sources.	
	Ingestion of potable water. Permeation of drinking water pipes	Construction workers	Moderate Risk – Based on above contaminative sources details. COSHH assessment, good level of PPE/ hygiene, dust suppression measures and measures to avoid runoff and accidental spillages	
	Inhalation of soil dust and vapours			
Dermal contact with soils	Passers-by and neighbouring site users	Low Risk – Based on above contaminative sources details.		
Radon gas	Inhalation. Migration and accumulation of gas indoors.	Site end users – Workers and Visitors	Low Risk – The BGS indicates that the site lies within an area where No radon protection measures may be required.	
Landfill Gas	Migration into indoor spaces, inhalation and explosive build up	Site end users – Workers and Visitors	High Risk – The site is a former landfill and previous site investigations have detected elevated levels of methane and carbon dioxide.	
Ground gases	Migration into indoor spaces, inhalation and explosive build up	Site end users – Workers and Visitors	Low to Moderate Risk – ground gases may be associated with the presence of alluvium deposits at the site.	

Aquatic Environment			
Subsurface Soil	Surface runoff and leaching into groundwater	Groundwater beneath the site	Moderate Risk – Based on above contaminative sources details and presence of a Principal Aquifer underlying aquifer.
Subsurface Soil	Groundwater transport	Surface Water	Moderate Risk – Based on above contaminative sources details and the proximal distance to the nearest surface water body (River Thames – 120m North and drainage ditch passing through the site).
Subsurface Soil	Groundwater transport	Principal Aquifer	Moderate Risk – Based on above contaminative sources details and presence of a Principal Aquifer underlying aquifer.
Ecology			
Subsurface Soil	Uptake of phytotoxic contaminants Surface Runoff	Vegetation	Moderate Risk – Based on above contaminative sources details.
Subsurface Soil	Ingestion of poisonous substances Surface Runoff	Wildlife	Moderate Risk – Based on above contaminative sources details.
Building Materials			
Subsurface Soil	Aggressive Ground Conditions	Building Materials	Moderate Risk – Correct class of concrete to be chosen based on appropriate testing
OVERALL RISK RATING			
The preliminary human health and environmental risk assessment has revealed that due to the sites and surrounding areas current and past land uses that a Moderate risk is present from contamination present beneath the site, with particular risk specifically associated with the sites former use as a landfill. In addition, a Low risk is present from the migration of radon gas, a High risk from the migration of landfill gas and a Low to Moderate risk from the migration of ground gas.			

Based on a **Low to High** overall risk rating, in order to confirm the above preliminary human health and environmental risk assessment it is recommended that a Phase 2 Ground Investigation is undertaken comprising site specific soil chemical testing in order to determine the ground conditions, soil chemistry and any environmental liability associated with the site.

3.3.1 Preliminary Illustrative Site Conceptual Model

The following illustration represents a theorised model through the site. The drawing is generalised and not to scale.



Drawing 3.1: Preliminary Conceptual Site Model

SECTION 4 Recommended Phase 2 Ground Investigation

As the development proposals and associated infrastructure have yet to be confirmed the recommended Phase 2 Ground Investigation at this stage should be considered indicative only. Once the development proposals have been confirmed the recommended Phase 2 Ground Investigation can then be firmed up.

4.1 Geo-Environmental

Based upon the desk study, potential environmental liabilities were identified on-site associated with its use as a landfill site and Gas Migration.

Therefore, significant levels of contamination could not be ruled out due to the sites historical past use within these areas.

If following confirmation of the development design proposals any development or associated infrastructure are located within or adjacent the above areas then it is therefore recommended that a Phase 2 geo-environmental site investigation be undertaken.

The main objectives of the Phase 2 geo-environmental assessment programme are to:

- Provide a summary of the environmental conditions at the site, together with any necessary remediation works to render the site fit for its intended use.

It is recommended that the Phase 2 site investigations comprise trial pitting and/or boreholes at specific locations targeting the above potential environmental liabilities and potential gas migration.

Standpipes should be installed to a sufficient depth and an appropriate gas monitoring regime implemented:

1. Post-investigation gas monitoring undertaken in line with current best practise guidance such as BS8476: 2013.

Soil samples, should be obtained for chemical testing to include the following contaminant suites based on the previous identified industrial processes on-site or within influencing distance of the site:

1. **Heavy Metals** (As, Cd, Cr, Cu, Pb, Ni, Se, Zn and Mercury)
2. **Inorganics** (Cyanide, Sulphate, Sulphide, Sulphur and pH)
3. **Organics**
 - a. Poly-Aromatic Hydrocarbons (PAH's)
 - b. Petroleum Hydrocarbons (PH's)
 - c. Benzene, Toluene, Ethyl-benzene and Xylene (BTEX)
 - d. Methyl Tert-Butyl Ether (MTBE)
 - e. Poly-Chlorinated Bi-phenyls (PCB's)
 - f. Phenols
 - g. (Semi) Volatile Organic Compounds (VOC's)
4. **Other** (Asbestos Screening/Quantification)

A full utility search should be undertaken before any site works commence.

4.2 Geotechnical

Based upon the desk study, potential geotechnical liabilities were identified. Therefore, it is recommended that a Phase 2 Geotechnical Ground Investigation comprising trial pits and/or boreholes is undertaken.

The main objectives of the geo-technical site investigation are to:

- Determine the type, strength and bearing characteristics of the shallow superficial and underlying solid geology.
- Provide recommendations for a suitable and economic foundation/floor slab solution for the proposed development.
- Provide recommendations with regard to any other geo-technical aspects pertaining to the development, such as soakaway and/or highway design.

Annex A: Groundsure Report



TerraFirma South

THE SLATE BARN, LOWER LOWLEY,
DEVON, EX6 7BP

Groundsure Reference: GS-4904499

Your Reference: 6147

Report Date 20 Apr 2018

Report Delivery Method: Email - pdf

Enviro Insight

Address: RICHFIELD AVENUE, READING, RG1 8EQ

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 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,

Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Address: RICHFIELD AVENUE, READING, RG1 8EQ

Date: 20 Apr 2018

Reference: GS-4904499

Client: TerraFirma South

NW

N

NE

W

E



SW

S

SE

Aerial Photograph Capture date: 20-Apr-2015

Grid Reference: 470397,174508

Site Size: 5.76ha

Report Reference: GS-4904499

Client Reference: 6147

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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	0	1	70	142
1.2 Additional Information – Historical Tank Database	0	1	13	36
1.3 Additional Information – Historical Energy Features Database	0	0	9	18
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	0	3
1.6 Potentially Infilled Land	0	0	9	38
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	1	0
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	4	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	1	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	1	3	3
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	1	4
2.1.9 Records of Water Industry Referrals	0	0	1	1
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	1	0
2.2 Records of COMAH and NIHHS sites	0	0	1	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	3	5
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	1	0	0	1	0	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	3	4	2	2

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	6	38	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	2
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 Are there any records of Artificial Ground and Made Ground present beneath the study site?	Identified
5.2 Are there any 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 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?				Identified		
6.2 Are there any 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	3	5	4	9
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	3	3
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	2	1	3
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	4	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 Is there any 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	2	10	8	34	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding						
7.1 Are there any Environment Agency Zone 2 floodplains within 250m of the study site?	Identified					
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Identified					
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	High					
7.4 Are there any Flood Defences within 250m of the study site?	None identified					
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	None identified					
7.6 Are there any areas used for Flood Storage within 250m of the study site?	None identified					
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface					
7.8 What is the 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	1
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
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 What is the maximum risk of natural ground subsidence?	Moderate
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Very Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Very Low
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Moderate
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the 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 Are there any coal mining areas within 75m of the study site?	None identified
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	None identified
10.3 Are there any 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 licenses, 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.

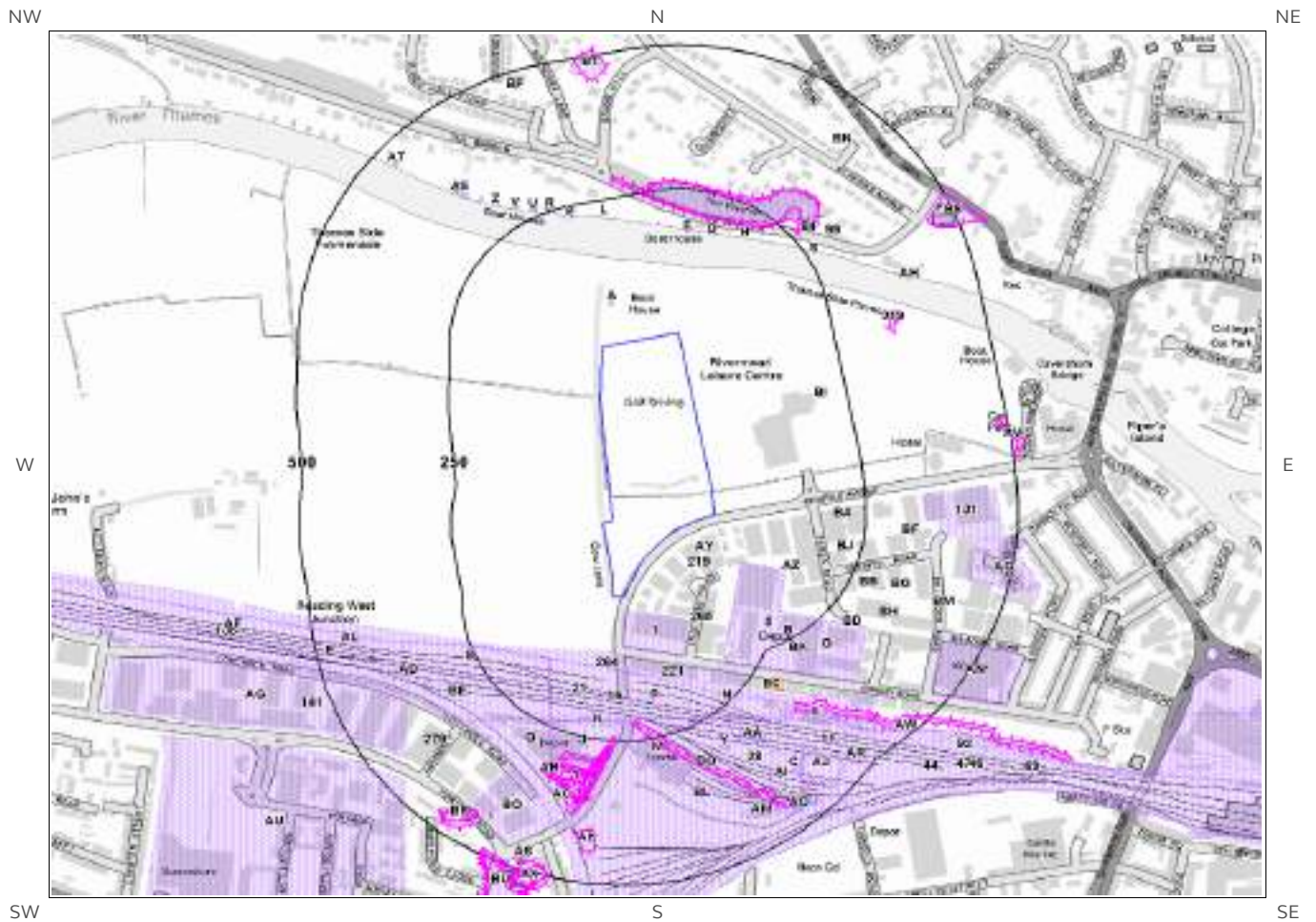
Note: Maps

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).

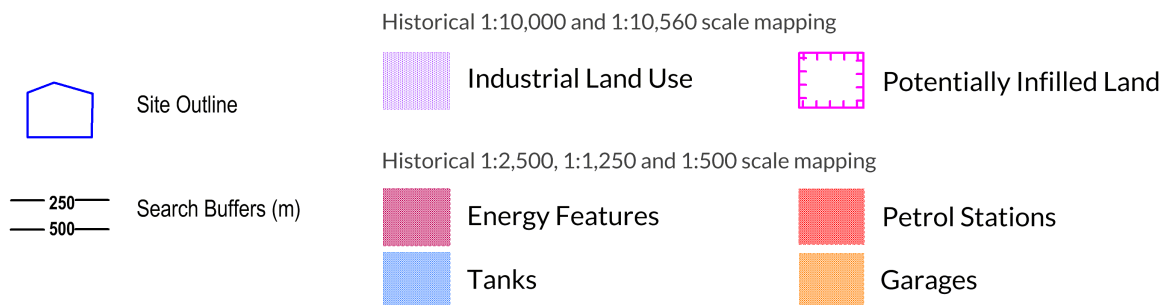
Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

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: 213

ID	Distance [m]	Direction	Use	Date
1	23	S	Unspecified Works	1962
2A	66	N	Boat House	1977
3A	66	N	Boat House	1994
4A	66	N	Boat House	1989
5	93	SE	Unspecified Depot	1994
6B	96	SE	Unspecified Depots	1989
7B	96	SE	Unspecified Depot	1977
8	97	S	Railway Sidings	1901
9C	126	S	Railway Sidings	1994
10C	126	S	Railway Sidings	1989
11	127	S	Railway Sidings	1962
12C	127	S	Railway Sidings	1977
13C	127	S	Railway Sidings	1971
14D	128	S	Railway Sidings	1910
15D	128	S	Railway Sidings	1938
16	129	S	Railway Sidings	1897
17E	151	SW	Railway Sidings	1932
18E	151	SW	Railway Sidings	1938
19E	151	SW	Railway Sidings	1910
20E	156	SW	Railway Sidings	1900
21	162	S	Railway Sidings	1900
22F	174	N	Boat Houses	1900
23G	177	N	Boat Houses	1900
24F	178	N	Boat House	1989
25F	178	N	Boat House	1994
26F	178	N	Boat House	1977
27AD	179	S	Railway Sidings	1878
28F	179	N	Boat Houses	1897
29G	180	N	Boat Houses	1910
30F	180	N	Boat Houses	1938
31G	180	N	Boat Houses	1910
32G	180	N	Boat Houses	1938
33G	181	N	Boat Houses	1897
34H	197	NE	Boat Houses	1938

35H	197	NE	Boat Houses	1910
36I	206	N	Unspecified Ground Workings	1910
37I	206	N	Unspecified Ground Workings	1938
38	208	S	Railway Sidings	1933
39I	208	N	Unspecified Pits	1994
40I	208	N	Unspecified Pits	1977
41I	208	N	Unspecified Pits	1971
42I	208	N	Unspecified Pits	1962
43I	208	N	Unspecified Pits	1989
44	212	S	Railway Sidings	1938
45K	213	S	Railway Sidings	1913
46	213	S	Railway Sidings	1913
47	213	S	Railway Sidings	1938
48J	214	S	Railway Sidings	1938
49J	214	S	Railway Sidings	1938
50BQ	216	S	Refuse Heap	1913
51K	219	S	Railway Sidings	1900
52L	222	N	Boat House	1910
53L	222	N	Boat Houses	1938
54M	222	S	Unspecified Depot	1971
55M	222	S	Unspecified Depot	1977
56N	226	SE	Railway Building	1971
57N	226	SE	Railway Building	1962
58P	228	N	Boat Houses	1994
59O	228	SE	Unspecified Depot	1971
60O	230	SE	Unspecified Depot	1977
61N	230	SE	Railway Building	1977
62N	230	SE	Railway Building	1989
63N	230	SE	Railway Building	1994
64P	231	N	Boat Houses	1938
65M	232	S	Unspecified Depot	1994
66M	232	S	Unspecified Depot	1989
67Q	236	SW	Railway Sidings	1938
68Q	237	SW	Railway Sidings	1932
69	240	SE	Railway Sidings	1898
70W	242	S	Unspecified Ground Workings	1962
71R	250	N	Boat Houses	1938
72R	256	NW	Boat Houses	1994
73S	259	NE	Boat House	1910
74S	259	NE	Boat House	1938
75R	261	NW	Boat Houses	1938
76R	261	NW	Boat Houses	1932
77U	262	NW	Boat Houses	1910
78T	263	S	Unspecified Pit	1971

79T	263	S	Unspecified Pit	1977
80T	263	S	Unspecified Pit	1994
81T	263	S	Unspecified Pit	1989
82T	268	S	Unspecified Ground Workings	1938
83Q	269	SW	Railway Building	1932
84	274	NE	Boat Houses	1901
85U	279	NW	Boat Houses	1910
86V	279	NW	Boat Houses	1938
87V	279	NW	Boat Houses	1932
88W	282	S	Unspecified Ground Workings	1913
89W	283	S	Railway Sidings	1933
90X	285	SE	Railway Buildings	1971
91X	285	SE	Railway Buildings	1962
92	294	SE	Railway Sidings	1933
93Y	296	SE	Railway Building	1933
94Y	300	SE	Railway Building	1962
95Z	301	NW	Boat Houses	1932
96Z	301	NW	Boat Houses	1910
97Z	301	NW	Boat Houses	1938
98Y	301	SE	Railway Building	1938
99	302	NE	Boat Houses	1901
100Y	302	SE	Railway Building	1913
101Y	302	SE	Railway Building	1938
102AA	303	SE	Railway Building	1933
103AA	305	SE	Railway Building	1962
104AA	307	SE	Railway Building	1938
105AA	307	SE	Railway Building	1913
106AA	308	SE	Railway Building	1938
107AB	308	S	Unspecified Pit	1938
108AB	308	S	Unspecified Pit	1910
109T	313	S	Railway Buildings	1971
110T	313	S	Railway Buildings	1962
111T	313	S	Railway Buildings	1977
112AA	314	SE	Railway Building	1898
113X	315	SE	Railway Buildings	1977
114X	315	SE	Railway Buildings	1989
115X	315	SE	Railway Buildings	1994
116Z	322	NW	Boat Houses	1938
117Z	322	NW	Boat Houses	1932
118Z	322	NW	Boat Houses	1910
119AC	334	S	Railway Sidings	1938
120AC	336	S	Railway Sidings	1913
121AC	336	S	Railway Sidings	1938
122AD	336	SW	Unspecified Tank	1878

123AE	339	NW	Boat Houses	1977
124AE	339	NW	Boat Houses	1971
125AE	339	NW	Boat Houses	1962
126AE	339	NW	Boat Houses	1994
127AE	339	NW	Boat Houses	1989
128X	340	SE	Unspecified Ground Workings	1938
129X	340	SE	Unspecified Ground Workings	1910
130BO	340	SW	Unspecified Depot	1971
131	342	E	Unspecified Depot	1977
132AF	354	W	Railway Sidings	1974
133AF	354	W	Railway Sidings	1991
134AF	354	W	Railway Sidings	1982
135	354	W	Railway Sidings	1960
136AG	383	SW	Unspecified Works	1991
137AG	383	SW	Unspecified Commercial/Industrial	1982
138AH	386	E	Boat House	1897
139AH	387	E	Boat House	1900
140AI	390	SE	Railway Building	1962
141	392	SW	Unspecified Commercial/Industrial	1974
142AJ	397	SE	Engine Shed	1933
143AI	399	SE	Railway Building	1913
144AJ	400	SE	Engine Shed	1962
145AJ	402	SE	Engine Shed	1938
146AJ	403	SE	Engine Shed	1938
147AI	405	SE	Railway Building	1962
148AI	408	SE	Railway Building	1938
149AJ	409	SE	Engine Shed	1898
150AJ	409	SE	Engine Shed	1913
151AK	409	S	Cuttings	1989
152AK	409	S	Cuttings	1977
153AK	409	S	Cuttings	1971
154AK	409	S	Cuttings	1994
155AI	412	SE	Railway Building	1898
156AL	414	W	Railway Building	1991
157AL	414	W	Railway Building	1982
158AL	414	W	Railway Building	1974
159AM	422	SE	Railway Building	1994
160AM	422	SE	Railway Building	1989
161AO	426	E	Unspecified Works	1962
162AM	430	SE	Railway Building	1971
163AM	430	SE	Railway Building	1977
164AN	432	SE	Unspecified Works	1971
165AN	432	SE	Unspecified Works	1962

166AN	432	SE	Unspecified Works	1977
167AN	432	SE	Unspecified Works	1989
168AN	432	SE	Unspecified Works	1994
169AO	433	E	Unspecified Works	1971
170AO	433	E	Unspecified Commercial/Industrial	1989
171AO	433	E	Unspecified Works	1977
172AN	433	SE	Printing Works	1910
173AN	435	SE	Printing Works	1938
174AI	436	SE	Railway Building	1962
175AP	436	SE	Unspecified Ground Workings	1938
176AP	436	SE	Unspecified Ground Workings	1913
177AI	437	SE	Railway Building	1913
178AI	437	SE	Railway Building	1938
179AI	438	SE	Railway Building	1938
180AQ	452	SE	Railway Building	1962
181BS	453	NE	Grave Yard	1878
182AQ	456	SE	Railway Building	1913
183BT	456	N	Unspecified Ground Workings	1961
184AR	457	SE	Railway Building	1933
185AR	459	SE	Railway Building	1962
186AS	462	S	Pumping Station	1989
187AS	462	S	Pumping Station	1994
188AR	462	SE	Railway Building	1938
189AT	463	NW	Boat House	1910
190AT	463	NW	Boat House	1932
191AT	463	NW	Boat House	1938
192AR	463	SE	Railway Building	1938
193AQ	464	SE	Railway Building	1977
194AQ	467	SE	Railway Building	1962
195AQ	470	SE	Railway Building	1938
196AQ	470	SE	Railway Building	1913
197AU	471	SW	Hospital	1982
198AU	471	SW	Hospital	1974
199AU	471	SW	Hospital	1991
200AS	474	S	Pumping Station	1977
201AV	478	E	Unspecified Ground Workings	1938
202AV	478	E	Unspecified Ground Workings	1910
203AW	479	SE	Railway Building	1977
204AW	479	SE	Railway Building	1989
205AW	479	SE	Railway Building	1994
206AW	480	SE	Railway Building	1971
207AW	480	SE	Railway Building	1962

208AX	482	S	Old Gravel Pit	1898
209AX	482	S	Old Gravel Pit	1898
210AX	489	SW	Unspecified Pit	1938
211AX	497	SW	Unspecified Pit	1932
212AX	497	SW	Unspecified Pit	1932
213BU	499	SW	Unspecified Pit	1962

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:

50

ID	Distance (m)	Direction	Use	Date
214AY	50	SE	Unspecified Tank	1972
215AY	59	SE	Unspecified Tank	1988
216AY	60	SE	Unspecified Tank	1970
217AY	69	SE	Unspecified Tank	1988
218AY	70	SE	Unspecified Tank	1970
219	70	SE	Unspecified Tank	1972
220AZ	155	SE	Unspecified Tank	1988
221	155	SE	Unspecified Tank	1972
222AZ	155	SE	Unspecified Tank	1970
223BA	210	E	Unspecified Tank	1988
224BA	211	E	Unspecified Tank	1970
225BA	214	E	Unspecified Tank	1988
226BA	215	E	Unspecified Tank	1970
227BJ	220	E	Unspecified Tank	1988
228BB	281	SE	Unspecified Tank	1988
229BB	282	SE	Unspecified Tank	1970
230BC	285	SE	Unspecified Tank	1988
231BC	286	SE	Unspecified Tank	1970
232BD	289	SE	Tanks	1988
233BD	290	SE	Unspecified Tank	1970
234BE	304	SW	Unspecified Tank	1913
235BE	305	SW	Unspecified Tank	1936
236BE	305	SW	Unspecified Tank	1959
237BE	305	SW	Unspecified Tank	1959
238BB	306	SE	Unspecified Tank	1988
239BB	307	SE	Unspecified Tank	1970
240BF	323	E	Unspecified Tank	1988
241BF	324	E	Unspecified Tank	1970
242BG	331	E	Unspecified Tank	1988

243BG	332	E	Unspecified Tank	1970
244BH	334	SE	Tanks	1988
245BH	336	SE	Tanks	1970
246AD	340	SW	Unspecified Tank	1881
247AJ	388	SE	Unspecified Tank	1958
248AJ	388	SE	Unspecified Tank	1959
249AH	414	E	Unspecified Tank	1932
250AH	414	E	Unspecified Tank	1936
251AM	426	SE	Unspecified Tank	1993
252AQ	450	SE	Tanks	1986
253AQ	450	SE	Unspecified Tank	1993
254AQ	450	SE	Tanks	1958
255AQ	451	SE	Tanks	1959
256AQ	456	SE	Tanks	1959
257AQ	460	SE	Unspecified Tank	1900
258AQ	466	SE	Tanks	1986
259AQ	467	SE	Tanks	1971
260AQ	468	SE	Unspecified Tank	1958
261AQ	468	SE	Unspecified Tank	1959
262AQ	469	SE	Unspecified Tank	1912
263AQ	469	SE	Unspecified Tank	1931

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:

27

ID	Distance (m)	Direction	Use	Date
264	120	S	Electricity Substation	1972
265	130	SE	Electricity Substation	1972
266AZ	155	SE	Electricity Substation	1988
267BI	204	E	Electricity Substation	1988
268BI	205	E	Electricity Substation	1993
269BJ	228	E	Electricity Substation	1988
270BJ	230	E	Electricity Substation	1970
271BA	245	E	Electricity Substation	1988
272BA	247	E	Electricity Substation	1970
273BK	270	SE	Electricity Substation	1988
274BK	270	SE	Electricity Substation	1970
275BC	306	SE	Gas Governor	1988
276BC	307	SE	Gas Governor	1970
277BL	364	S	Electricity Substation	1988

278BL	364	S	Electricity Substation	1993
279	386	SW	Electricity Substation	1971
280BM	404	E	Electricity Substation	1988
281BM	406	E	Electricity Substation	1970
282BN	424	NE	Electricity Substation	1993
283BN	425	NE	Electricity Substation	1972
284BO	430	SW	Electricity Substation	1993
285BO	431	SW	Electricity Substation	1988
286BP	469	N	Electricity Substation	1992
287BP	469	N	Electricity Substation	1974
288AS	472	S	Electricity Substation	1971
289AS	480	S	Electricity Substation	1988
290AS	481	S	Electricity Substation	1993

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: 3

ID	Distance (m)	Direction	Use	Date
291BC	280	SE	Garage	1970
292BC	280	SE	Garage	1959
293BC	290	SE	Garage	1959

1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 47

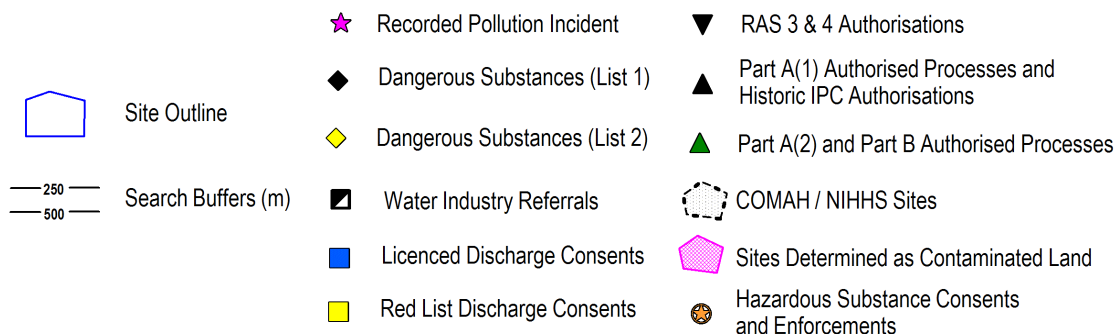
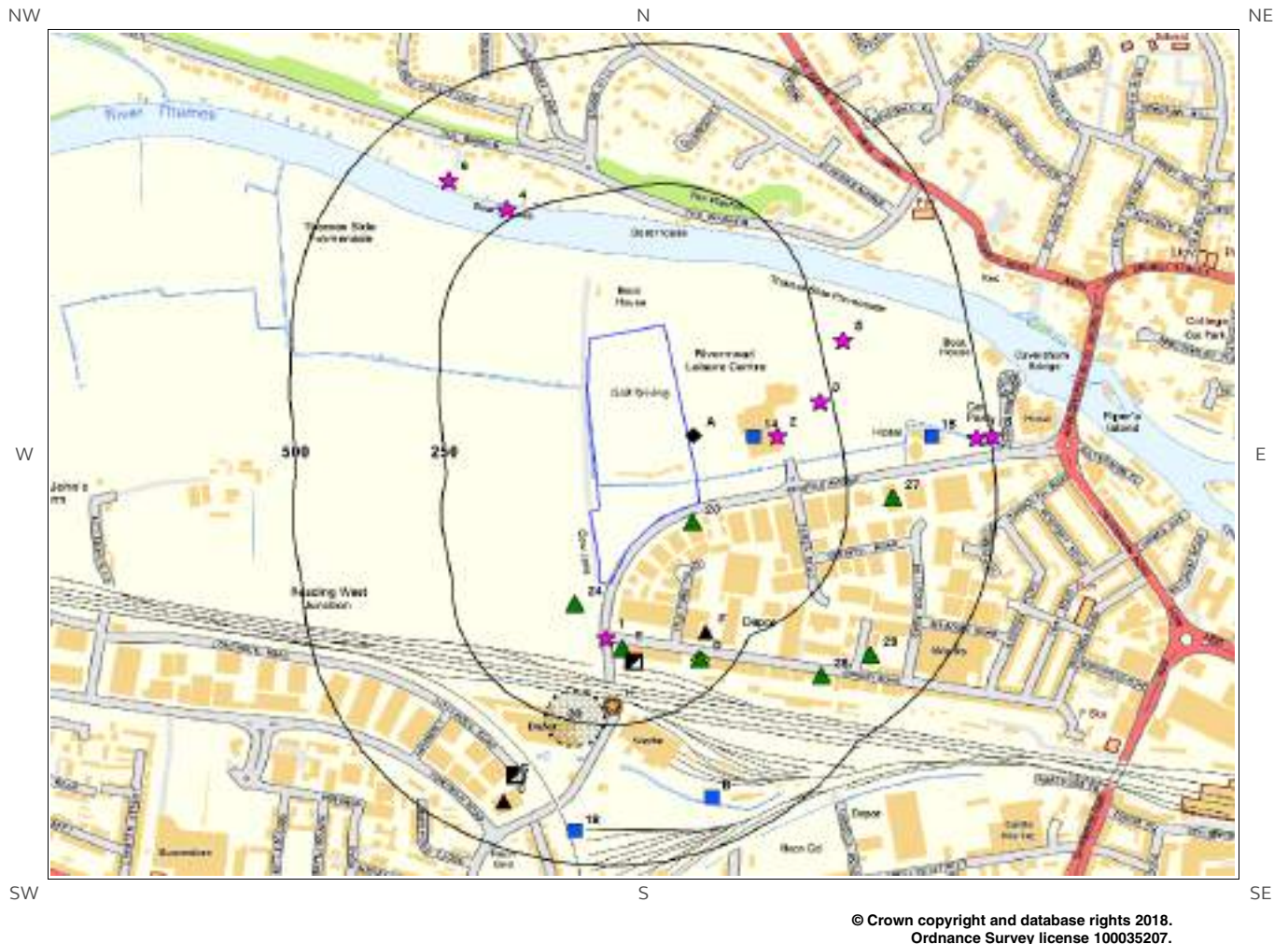
The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
294I	206	N	Unspecified Ground Workings	1910

295I	206	N	Unspecified Ground Workings	1938
296I	208	N	Unspecified Pits	1977
297I	208	N	Unspecified Pits	1971
298I	208	N	Unspecified Pits	1962
299I	208	N	Unspecified Pits	1989
300I	208	N	Unspecified Pits	1994
301BQ	216	S	Refuse Heap	1913
302W	242	S	Unspecified Ground Workings	1962
303AB	263	S	Unspecified Pit	1989
304AB	263	S	Unspecified Pit	1971
305AB	263	S	Unspecified Pit	1977
306AB	263	S	Unspecified Pit	1994
307T	268	S	Unspecified Ground Workings	1938
308AB	282	S	Unspecified Ground Workings	1913
309AB	308	S	Unspecified Pit	1938
310AB	308	S	Unspecified Pit	1910
311AC	310	S	Pond	1913
312AC	314	S	Ponds	1962
313T	315	S	Pond	1938
314AC	327	S	Pond	1913
315AC	327	S	Pond	1938
316AC	330	S	Ponds	1938
317X	340	SE	Unspecified Ground Workings	1938
318X	340	SE	Unspecified Ground Workings	1910
319	340	E	Pond	1971
320AK	409	S	Cuttings	1977
321AK	409	S	Cuttings	1971
322AK	409	S	Cuttings	1994
323AK	409	S	Cuttings	1989
324BR	436	SW	Pond	1962
325AP	436	SE	Unspecified Ground Workings	1938
326AP	436	SE	Unspecified Ground Workings	1913
327BR	442	SW	Pond	1910
328BR	442	SW	Pond	1938
329BR	442	SW	Pond	1898
330BR	448	SW	Pond	1898
331BS	453	NE	Grave Yard	1878
332BT	456	N	Unspecified Ground Workings	1961
333AV	478	E	Unspecified Ground Workings	1938

334AV	478	E	Unspecified Ground Workings	1910
335AX	482	S	Old Gravel Pit	1898
336AX	482	S	Old Gravel Pit	1898
337AX	489	SW	Unspecified Pit	1938
338AX	497	SW	Unspecified Pit	1932
339AX	497	SW	Unspecified Pit	1932
340BU	499	SW	Unspecified Pit	1962

2. Environmental Permits, Incidents and Registers Map



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	
35C	424	SW	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
36C	424	SW	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
37C	424	SW	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:

1

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
34F	182	SE	470520 174150	Operator: Kingfisher Colours Limited Installation Name: Kingfisher Colours Limited Process: ORGANIC CHEMICALS; HYDROCARBONS EG AROMATICS Permit Number: LP3338DD Original Permit Number: LP3338DD EPR Reference: - Issue Date: 12/12/2016 Effective Date: 12/12/2016 00:00:00 Last date noted as effective: 2018-03-01 Status: Effective

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:

4

The following List 1 Dangerous Substance Inventory Site records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
9A	9	E	470500 174500	Name: Quick Circuits, Lovelock Road, Reading Status: Active Receiving Water: Kennet Authorised Substances: Mercury (other)
10A	9	E	470500 174500	Name: Hilliers Engineering, 215 Cardiff Road, Reading Status: Active Receiving Water: Kennet Authorised Substances: Mercury (other), Cadmium
11A	9	E	470500 174500	Name: Quick Circuits Lovelock Rd. Reading Status: Not Active Receiving Water: - Authorised Substances: -
12A	9	E	470500 174500	Name: Hilliers Engineering 215 Cardiff Road Reading Status: Not Active Receiving Water: - Authorised Substances: -

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

1

The following List 2 Dangerous Substance Inventory Site records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
13D	202	SE	470510 174103	Name: Unimet Enamellers Ltd Status: Not Active Receiving Water: Kennet Authorised Substances: Chromium

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

7

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
23	30	SE	470499 174344	Address: Grosvenor Motor Company Ltd, 10 Richfield Avenue, Reading, RG1 8EQ Process: Waste Oil and Recovered Oil less than 0.4MW Status: New Legislation Applies Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
24	60	SW	470299 174199	Address: Wadham Kenning, 38-40 Portman Rd, Reading, 8-40 Portman Rd, RG30 1JG 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
25E	119	S	470378 174120	Address: E Hillier & Son Ltd, Cardiff Road, RG1 8HX Process: Metal Processes Status: Historical Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
26D	203	SE	470512 174102	Address: Unimet Enamellers Limited, 183 Cardiff Road, Reading, Berks, RG1 8HD Process: Coating Processes Status: Historical Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
27	325	E	470833 174389	Address: Snax 24 Limited, Richfield Avenue, Reading, Berkshire, RG1 8EQ 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
28	372	SE	470715 174073	Address: Sprayworks Limited, Unit 5, 151-155 Cardiff Road, Reading, RG1 8ES 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

ID	Distance (m)	Direction	NGR	Details
29	396	SE	470796 174109	Address: Rivermead Accident Repair Centre Limited, 64 Cardiff Road, Reading, Berkshire, RG1 8LL Process: Respraying of Road Vehicles 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:

0

Database searched and no data found.

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

5

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

ID	Distance (m)	Direction	NGR	Details
14	107	E	470600 174500	Address: RIVERSIDE LEISURE CENTRE, READING,, RIVERSIDE LEISURE CENTRE, READIN, G, BERKS, -, - Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: CTWC.2509 Permit Version: 1 Receiving Water: PORTMAN BROOK Status: TRANSFERRED FROM COPA 1974 Issue date: 09/06/1988 Effective Date: 09-Jun-1988 Revocation Date: -
15	401	E	470900 174500	Address: CALENDARS RESTAURANT, RICHFIELD AVE, CALENDARS RESTAURANT, RICHFIELD, AVENUE, CAVERSHAM, READING, BERK, S, - Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: CTWC.2379 Permit Version: 1 Receiving Water: PORTMAN BROOK Status: TRANSFERRED FROM COPA 1974 Issue date: 22/04/1988 Effective Date: 22-Apr-1988 Revocation Date: -
16B	415	SE	470530 173860	Address: PERMANENT WAY STAFF ACCOMMODATION B, PERMANENT WAY STAFF ACCOMMODATIO, N BLOCK, COW LANE, READING,, -, - Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: CTWC.0130 Permit Version: 1 Receiving Water: MADE GROUND OVERLYING ALLUVIUM Status: TRANSFERRED FROM COPA 1974 Issue date: 10/07/1985 Effective Date: 10-Jul-1985 Revocation Date: 12/05/2007
17B	415	SE	470530 173860	Address: PERMANENT WAY STAFF ACCOMMODATION B, PERMANENT WAY STAFF ACCOMMODATIO, N BLOCK, COW LANE, READING,, -, - Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: CTWC.0130 Permit Version: 2 Receiving Water: MADE GROUND OVERLYING ALLUVIUM Status: REVOKED (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 12/05/2007 Effective Date: 12-May-2007 Revocation Date: 24/05/2010

ID	Distance (m)	Direction	NGR	Details	
18	443	S	470300 173800	Address: Reading, Cow Lane, Reading, Cow Lane, -, - Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: TEMP.1771 Permit Version: 1	Receiving Water: VASTERN DITCH Status: REVOKED - UNSPECIFIED Issue date: 02/11/1989 Effective Date: 02-Nov-1989 Revocation Date: 27/01/1997

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

2

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

ID	Distance (m)	Direction	Address	Permission reference	Local Authority	First Date Received	Last Date Received	Status
38E	144	S	E HILLIER AND SON (HOLDINGS) LTD, 215 CARDIFF ROAD, 215 CARDIFF ROAD, READING, BERKSHIRE, RG1 8HX	AF5158	READING BOROUGH COUNCIL	01-Jun-2001	01-Jan-2018	EFFECTIVE
39G	371	SW	QUICK CIRCUITS LTD, 1 LOVEROCK ROAD, 1 LOVEROCK ROAD, READING, BERKSHIRE, RG3 1DZ	AE2269	READING BOROUGH COUNCIL	01-Jun-2001	01-Jan-2018	EFFECTIVE

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
40H	218	S	920460	470362 174021	Approved	17/02/1993	Jewells Calor Gas, formerly J Mould, Cow Lane, Reading, RG1 8NA	The storage, sales and distribution of liquified petroleum gas in cylinders and bulk	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
30	196	S	Calor Gas Ltd	Calor Gas Ltd, Reading Calor Centre, Cow Lane, Reading, RG1 8HE	Historical NIHHS Site	-

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:

8

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	97	S	470352 174142	Incident Date: 18-Apr-2002 Incident Identification: 72625 Pollutant: Specific Waste Materials Pollutant Description: Metal Wastes Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
2	146	E	470640 174500	Incident Date: 26-Feb-2002 Incident Identification: 60718 Pollutant: Oils and Fuel Pollutant Description: Unidentified Oil Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
3	228	E	470711 174562	Incident Date: 27-Feb-2002 Incident Identification: 60853 Pollutant: Oils and Fuel Pollutant Description: Mixed/Waste Oils Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
4	267	NW	470185 174902	Incident Date: 06-Jul-2001 Incident Identification: 14459 Pollutant: Oils and Fuel Pollutant Description: Unidentified Oil Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
5	288	E	470750 174670	Incident Date: 30-Nov-2001 Incident Identification: 45823 Pollutant: Inert Materials and Wastes Pollutant Description: Mineral Materials and Wastes Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
6	368	NW	470086 174954	Incident Date: 23-Aug-2001 Incident Identification: 26223 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)
7	474	E	470974 174497	Incident Date: 13-Aug-2002 Incident Identification: 99851 Pollutant: Oils and Fuel Pollutant Description: Other Oil or Fuel Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
8	500	E	471000 174500	Incident Date: 10-Jul-2001 Incident Identification: 15233 Pollutant: Organic Chemicals/Products Pollutant Description: Other Organic Chemical or Product Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) 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.

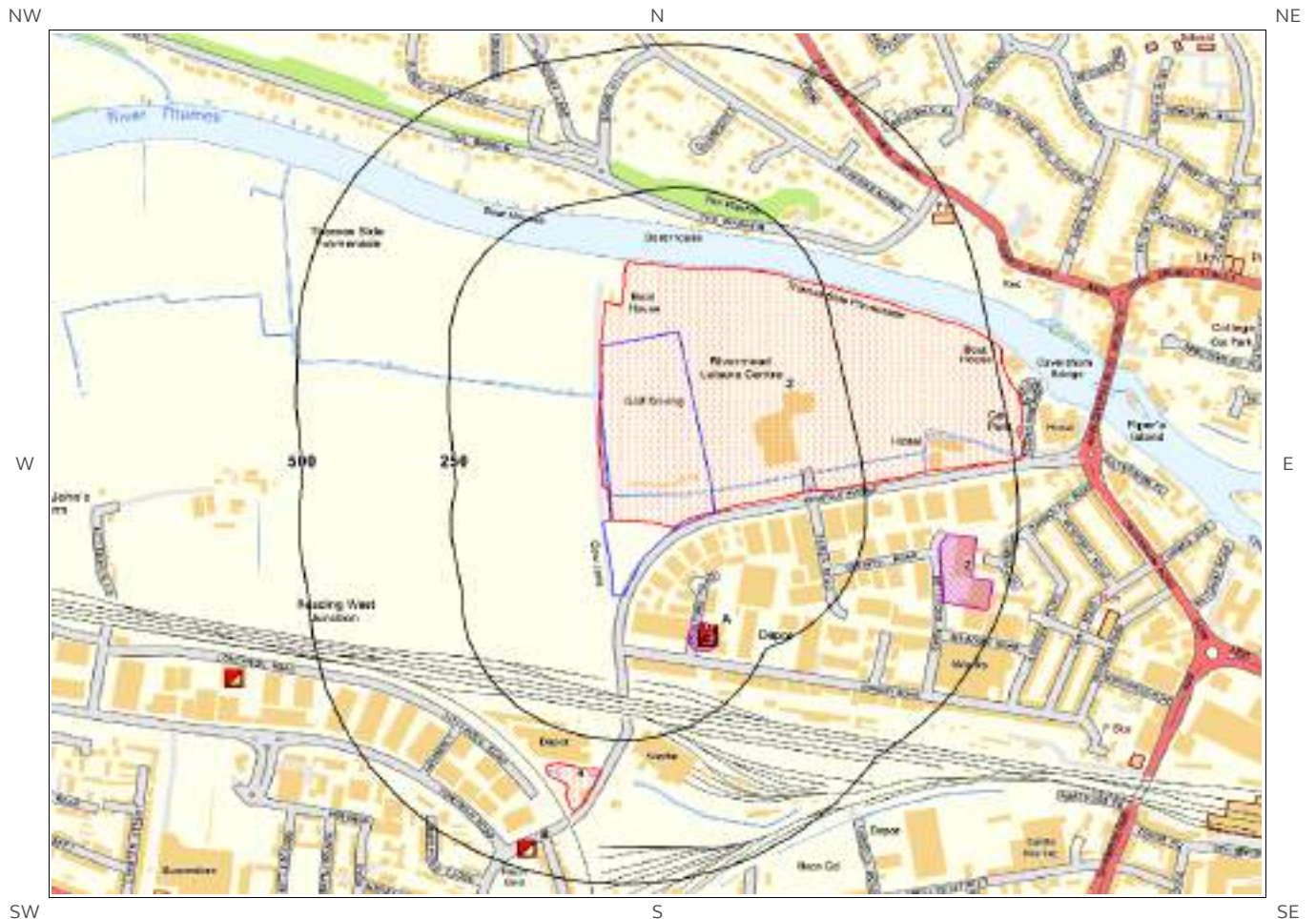
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

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

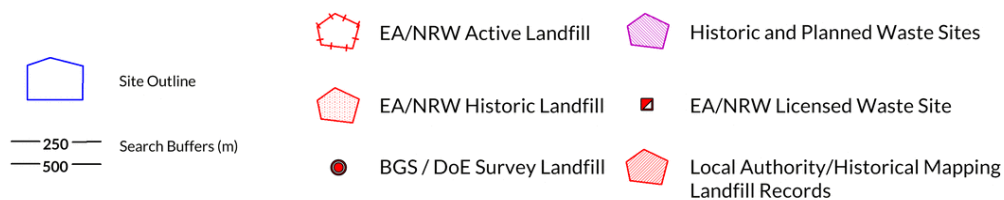
0

Database searched and no data found.

3. Landfill and Other Waste Sites Map



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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	0	On Site	470600 174500	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
4	304	S	470200 173900	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

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	124	SE	470491 174166	Type of Site: Waste Transfer Building Site Address: 128-130 Cardiff Road, READING, Berkshire, RG1 8PQ	Planning Application Reference: 01/316/FUL Date: -	Further Details: Scheme comprises construction of a new steel-framed prefabricated building of 375 sqm, to form waste transfer, sorting and recycling centre. Associated works include landscaping, site services, infrastructure and access. Construction - Goosewing greystic-coated profiled steel cladding, internal partitions walls; insitu concrete floor; Goosewing grey plastic-coated profiled steel cladding roof; aluminium framed, double glazed, rooflight windows; industrial doors (unspecified), timber doors; pad foundations; steel frame; bathroom fittings. An application (ref: 01/316/FUL) for Detailed Planning permission was submitted to Reading Borough Council, no committee date as yet. Contract details to be advised. A building programme remains to be advised. Detailed plans submitted, no committee date as yet. Data Source: Historic Planning Application Data Type: Point
2	374	E	470923 174279	Type of Site: Scrap Metal Yard Site Address: N/A	Planning Application Reference: N/A Date: 1969	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon

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

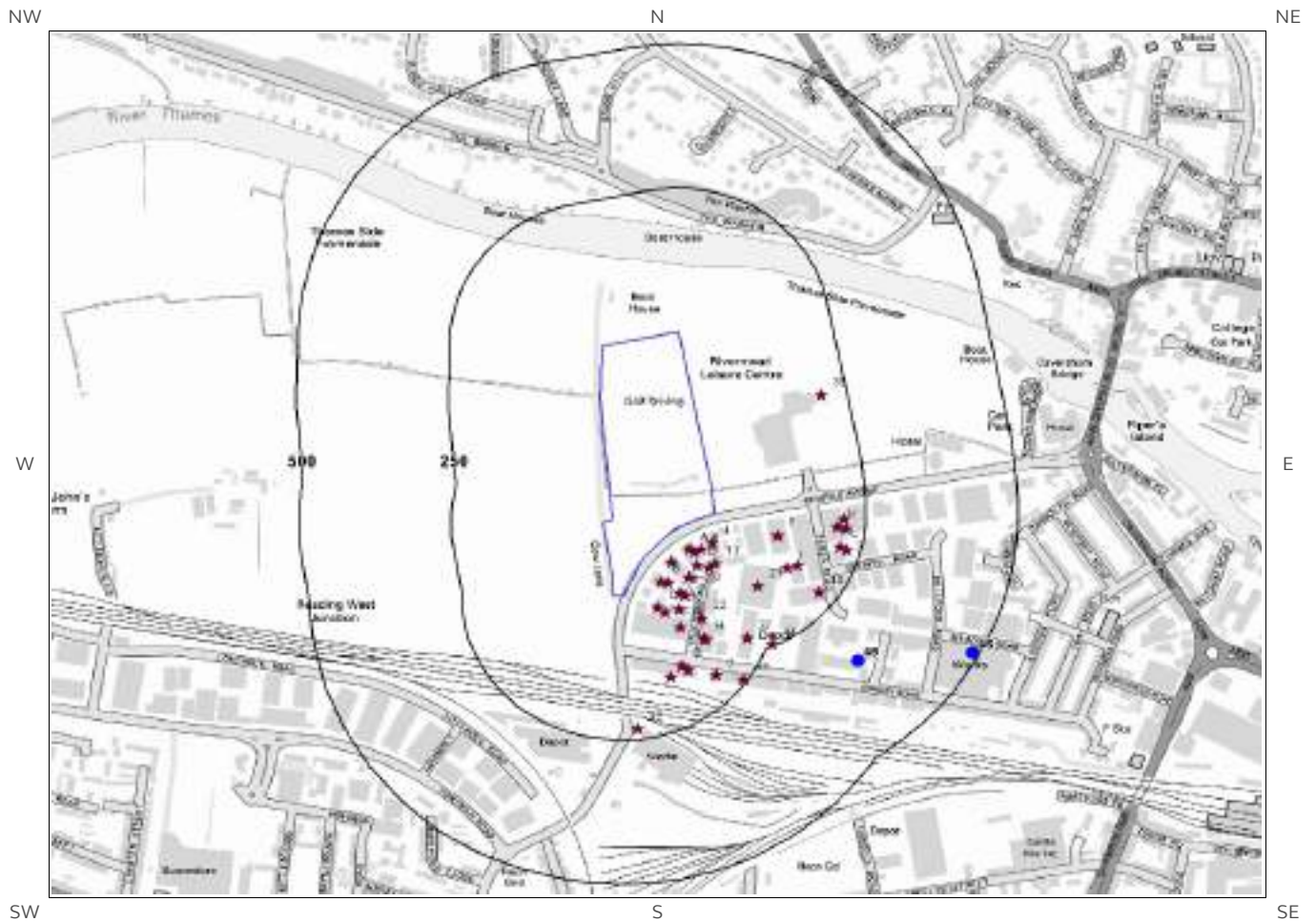
11

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
5A	154	SE	470500 174174	Site Address: 128, Cardiff Road, Reading, Berkshire, RG1 8PQ Type: 75kte HCl 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: -
6A	154	SE	470500 174174	Site Address: 128, Cardiff Road, Reading, Berkshire, RG1 8PQ Type: 75kte HCl Waste TS + treatment Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: RCO001 EPR reference: EA/EPR/EB3500KB/T001 Operator: R Collard Limited Waste Management licence No: 101199 Annual Tonnage: 74999.0 Issue Date: 11/02/2010 Effective Date: 11/10/2016 Modified: 09/07/2010 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: R Collard Limited Correspondence Address: -
7A	154	SE	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: -
8B	464	S	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
9B	464	S	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: 08/03/2016 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Parsons Metal Recycling Limited Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details
10B	464	S	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: -
11B	464	S	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 U K 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: -
Not shown	640	S	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: 23/07/1999 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: E G W Carter Correspondence Address: -
13	642	W	469718 174096	Site Address: Part A, Unit B, 75, Loverock Road, Tilehurst, Reading, Berkshire, RG30 1DZ Type: 75kte HCl 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: -
Not shown	1076	W	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: -
Not shown	1108	W	469219 174322	Site Address: Fleetwood Grab Services Ltd, 1& 1a 40, Wigmore Lane, Reading, Berks, 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: -

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:

44

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	36	SE	Depot	470438 174299	RG1	Container and Storage	Transport, Storage and Delivery
2A	41	SE	Depot	470468 174320	RG1	Container and Storage	Transport, Storage and Delivery
3B	44	SE	Works	470422 174265	RG1	Unspecified Works Or Factories	Industrial Features
4	46	SE	Grosvenor Motor Company Ltd	470505 174331	10, Richfield Avenue, Reading, RG1 8EQ	Vehicle Repair, Testing and Servicing	Repair and Servicing
5A	48	SE	Indespension Ltd	470475 174316	8, Richfield Avenue, Reading, RG1 8EQ	Lifting and Handling Equipment	Industrial Products
6	49	SE	Tank	470487 174320	RG1	Tanks (Generic)	Industrial Features
7B	54	SE	Phoenix Survey & Safety Equipment Hire	470432 174263	4, Richfield Avenue, Reading, RG1 8EQ	Special Purpose Machinery and Equipment	Industrial Products
8B	54	SE	Brandon Hire	470432 174263	4, Richfield Avenue, Reading, RG1 8EQ	Construction and Tool Hire	Hire Services
9C	57	SE	21st Century a V	470415 174219	2, Richfield Avenue, Reading, RG1 8EQ	Electronic Equipment	Industrial Products
10D	71	SE	Tank	470481 174293	RG1	Tanks (Generic)	Industrial Features
11C	72	SE	Electricity Sub Station	470427 174211	RG1	Electrical Features	Infrastructure and Facilities
12D	75	SE	Works	470466 174272	RG1	Unspecified Works Or Factories	Industrial Features
13	80	SE	Water Scientific	470509 174295	9, Trafford Road, Reading, RG1 8JP	Civil Engineers	Engineering Services
14E	80	SE	Precision Aircraft Ltd	470452 174244	3, Trafford Road, Reading, RG1 8JP	Aeroplanes	Industrial Products
15D	83	SE	Valentine	470501 174289	4, Trafford Road, Reading, RG1 8JS	Catering and Non Specific Food Products	Foodstuffs
16E	89	SE	Works	470460 174241	RG1	Unspecified Works Or Factories	Industrial Features
17	91	SE	Works	470451 174216	RG1	Unspecified Works Or Factories	Industrial Features
18	106	SE	T P Link UK	470452 174185	142-144, Cardiff Road, Reading, RG1 8EW	Electronic Equipment	Industrial Products

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
19F	111	E	3D Transmission s Ltd	470613 174344	16b, Richfield Avenue, Reading, RG1 8EQ	Vehicle Components	Industrial Products
20F	111	E	Ace Transmission Parts	470613 174344	16b, Richfield Avenue, Reading, RG1 8EQ	Special Purpose Machinery and Equipment	Industrial Products
21F	111	E	3 D Transmission s	470613 174344	16b, Richfield Avenue, Reading, RG1 8EQ	Vehicle Repair, Testing and Servicing	Repair and Servicing
22	132	SE	Electricity Sub Station	470489 174201	RG1	Electrical Features	Infrastructure and Facilities
23	144	SE	Warehouse	470581 174257	RG1	Container and Storage	Transport, Storage and Delivery
24H	149	SE	R Collard Waste Management Services Ltd	470491 174166	128, Cardiff Road, Reading, RG1 8PQ	Waste Storage, Processing and Disposal	Infrastructure and Facilities
25I	152	SE	Tank	470628 174288	RG1	Tanks (Generic)	Industrial Features
26G	153	SE	Chiltern Auto Repair Services Ltd	470455 174118	191, Cardiff Road, Reading, RG1 8HS	Vehicle Repair, Testing and Servicing	Repair and Servicing
27G	153	SE	Fast Track Auto Services	470455 174118	193-195, Cardiff Road, Reading, RG1 8HS	Vehicle Repair, Testing and Servicing	Repair and Servicing
28H	153	SE	M C Commercial Vehicles Ltd	470494 174163	128, Cardiff Road, Reading, RG1 8PQ	Construction and Tool Hire	Hire Services
29G	159	SE	Tank	470437 174099	RG1	Tanks (Generic)	Industrial Features
30I	163	SE	Electricity Sub Station	470645 174292	RG1	Electrical Features	Infrastructure and Facilities
31G	166	SE	Works	470465 174110	RG1	Unspecified Works Or Factories	Industrial Features
32K	203	E	Kwik-Fit (GB) Limited	470710 174359	Richfield Avenue, Reading, RG1 8EQ	Vehicle Repair, Testing and Servicing	Repair and Servicing
33J	203	SE	Unimet Enamellers	470511 174102	181-183, Cardiff Road, Reading, RG1 8HD	Industrial Coatings and Finishings	Industrial Products
34J	203	SE	C R Services Ltd	470511 174102	181-183, Cardiff Road, Reading, RG1 8HD	New Vehicles	Motoring
35	208	E	Electricity Sub Station	470685 174589	RG1	Electrical Features	Infrastructure and Facilities
36K	213	E	Tank	470722 174374	RG1	Tanks (Generic)	Industrial Features
37	214	SE	Depot	470563 174166	RG1	Container and Storage	Transport, Storage and Delivery
38L	214	E	Electricity Sub Station	470716 174326	RG1	Electrical Features	Infrastructure and Facilities
39K	217	E	Tank	470725 174357	RG1	Tanks (Generic)	Industrial Features
40	220	SE	Cotswold Fayre	470681 174245	Unit 14, Tessa Road, Reading, RG1 8HH	Catering and Non Specific Food Products	Foodstuffs
41L	227	E	Tank	470727 174319	RG1	Tanks (Generic)	Industrial Features
42	231	S	Works	470382 174009	RG1	Unspecified Works Or Factories	Industrial Features

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
43	244	SE	Metal-pro	470557 174094	177, Cardiff Road, Reading, RG1 8HD	Metals Manufacturers, Fabricators and Stockholders	Industrial Products
44	246	SE	Tank	470603 174155	RG1	Tanks (Generic)	Industrial Features

4.2 Petrol and Fuel Sites

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

2

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
45	349	SE	470746 174126	Obsolete	Cardiff Road Service Station, 165-7, Cardiff Road, Cardiff Road, Reading, Reading, RG1 8HY	Not Applicable	Obsolete
46	489	SE	470934 174140	Obsolete	Brs Southern, Cardiff Road, Cardiff Road, Reading, Reading, RG1 8HW	Not Applicable	Obsolete

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

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

Lex Code	Description	Rock Type
MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

5.2 Superficial Ground and Drift Geology

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

Lex Code	Description	Rock Type
LASI-XCZ	LANGLEY SILT MEMBER	CLAY AND SILT
ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

5.3 Bedrock and Solid Geology

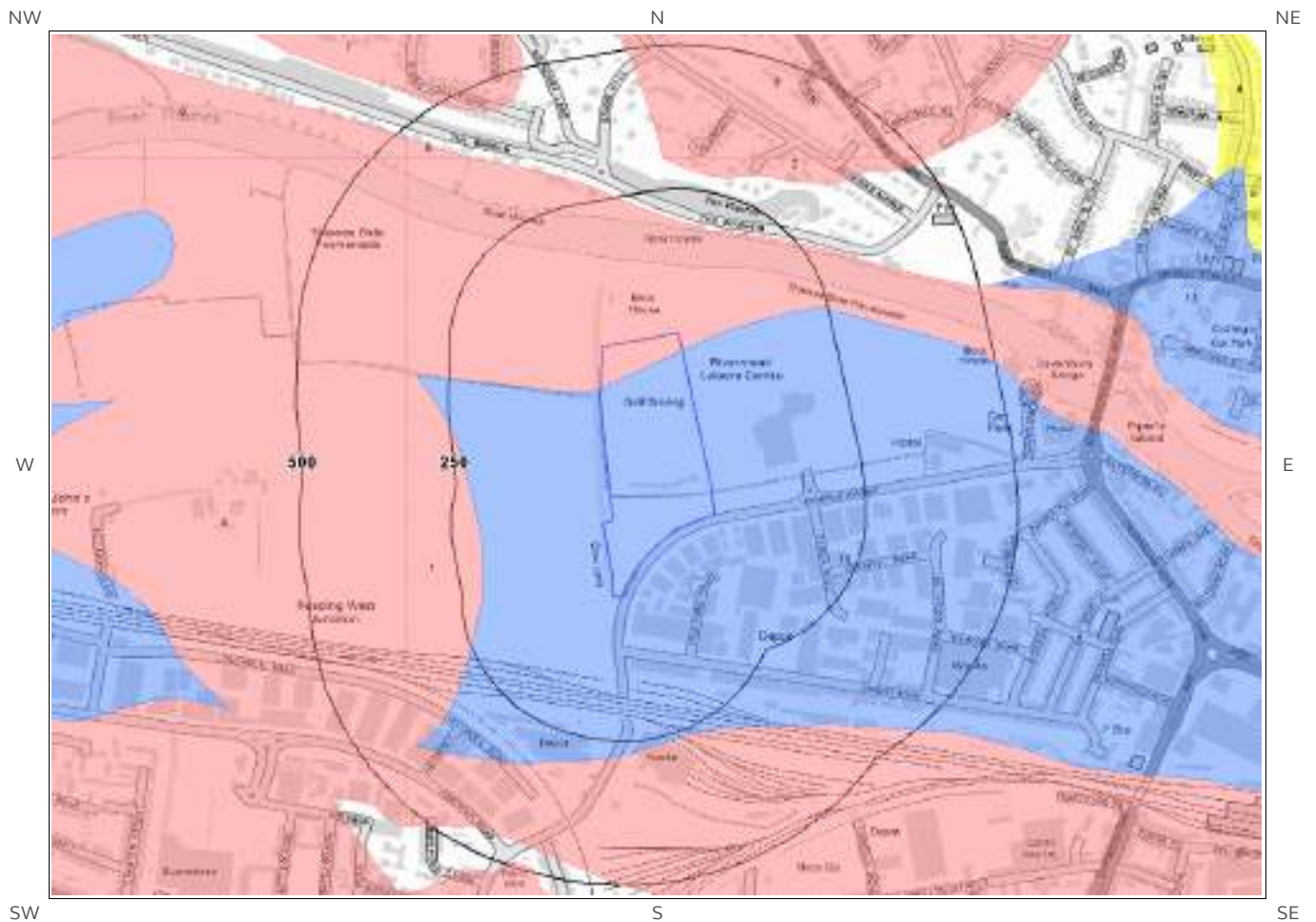
The database has been searched on site, including a 50m buffer.

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

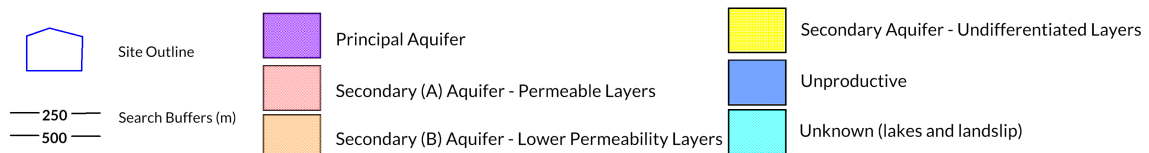
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

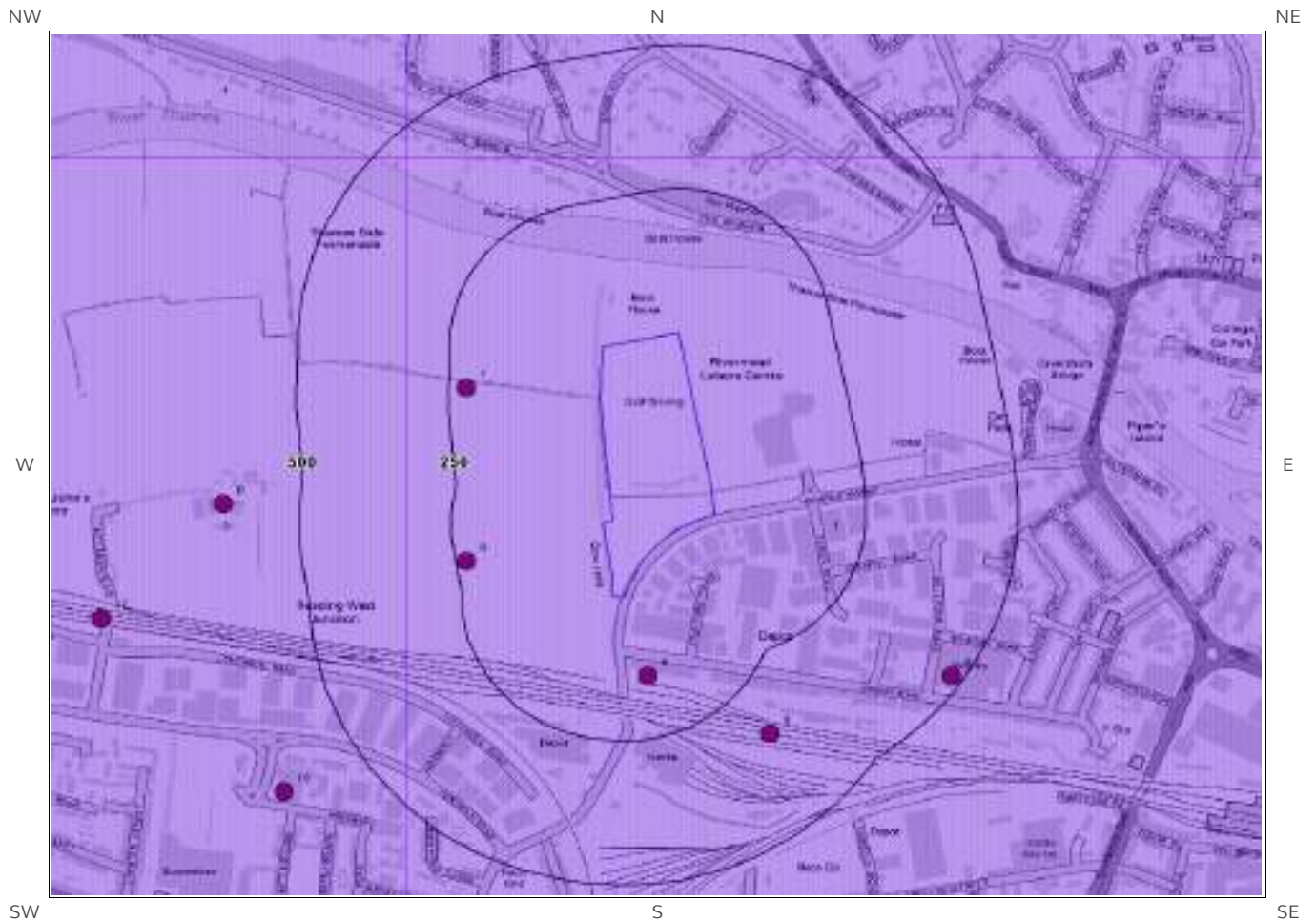
6a. Aquifer Within Superficial Geology



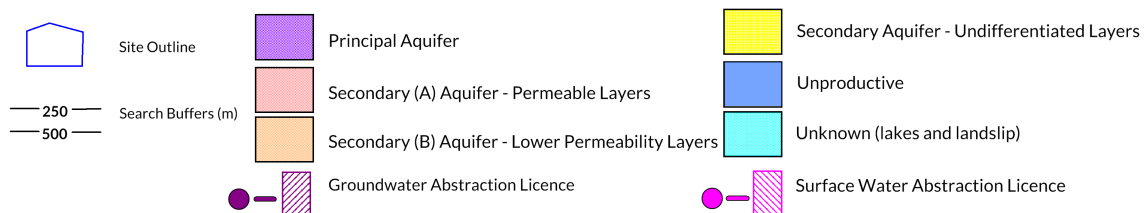
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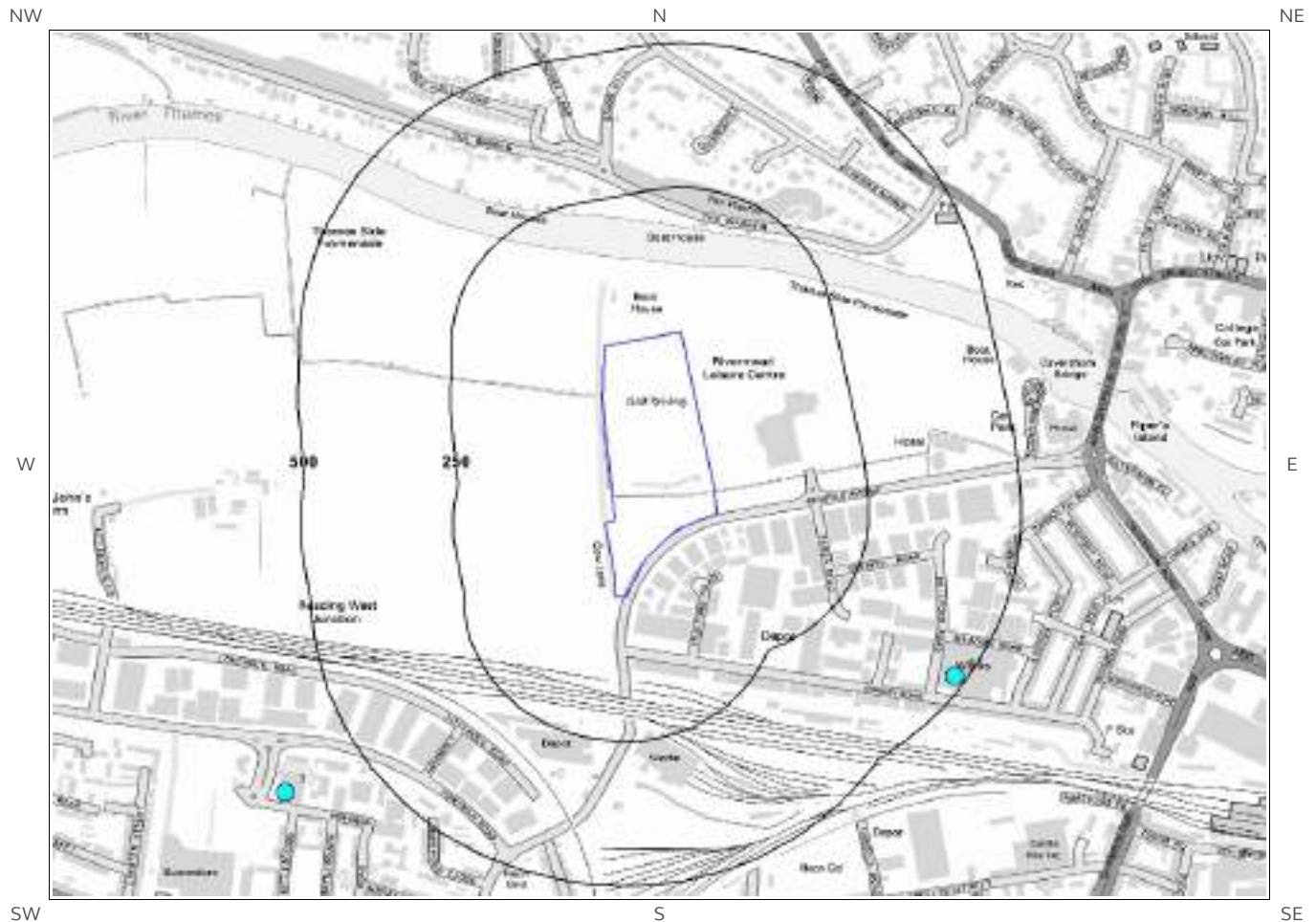
6b. Aquifer Within Bedrock Geology and Abstraction Licenses



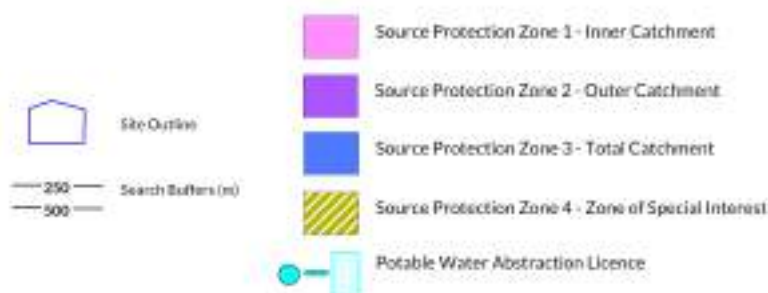
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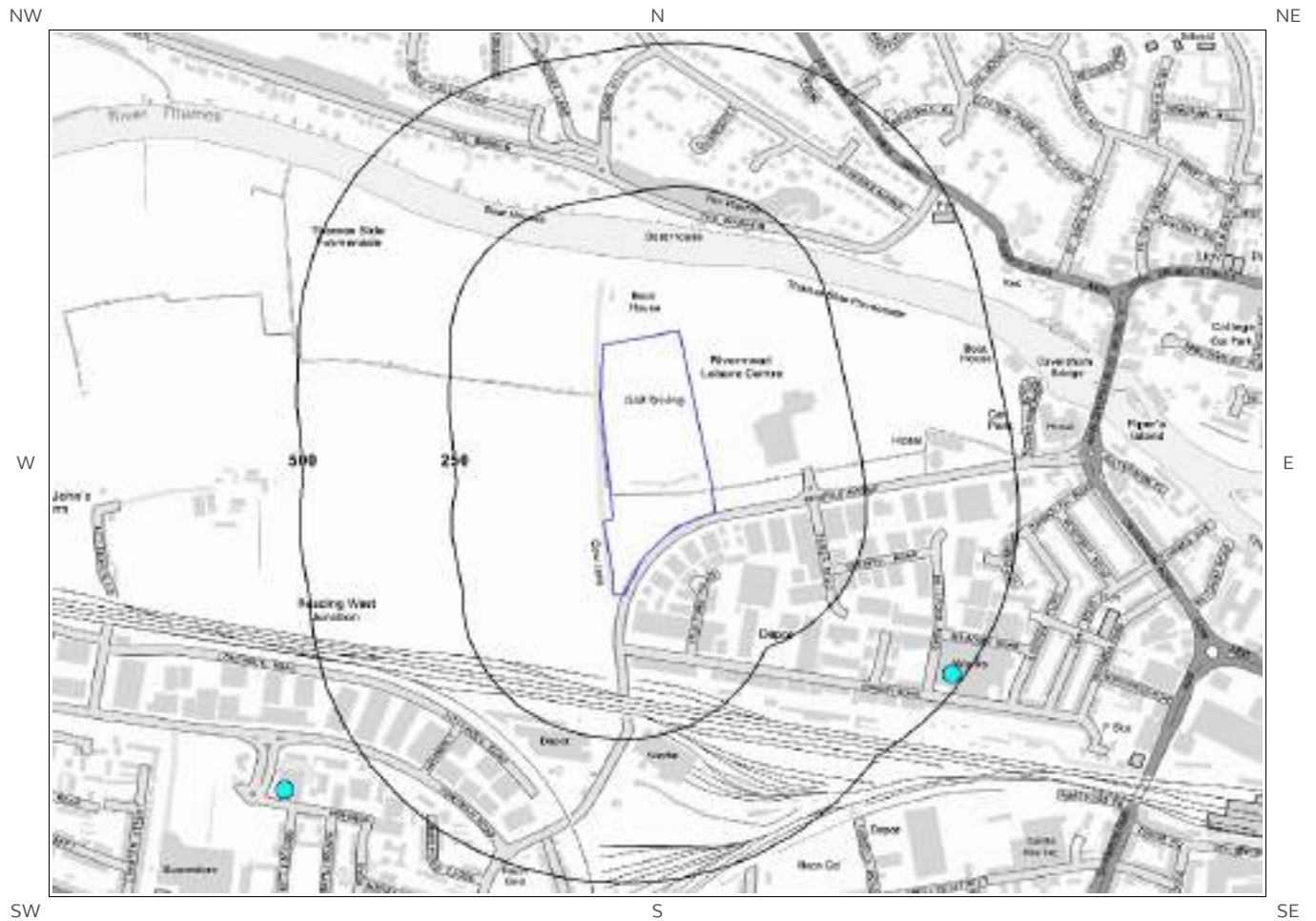
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



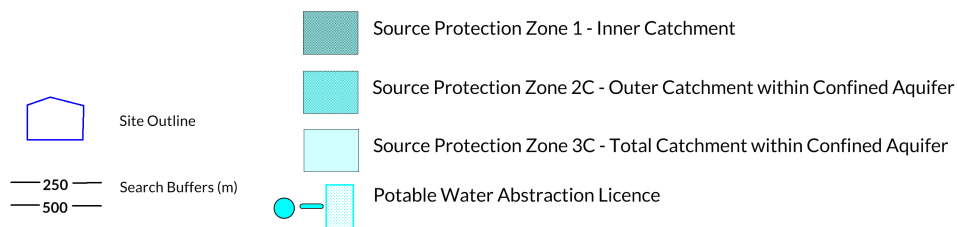
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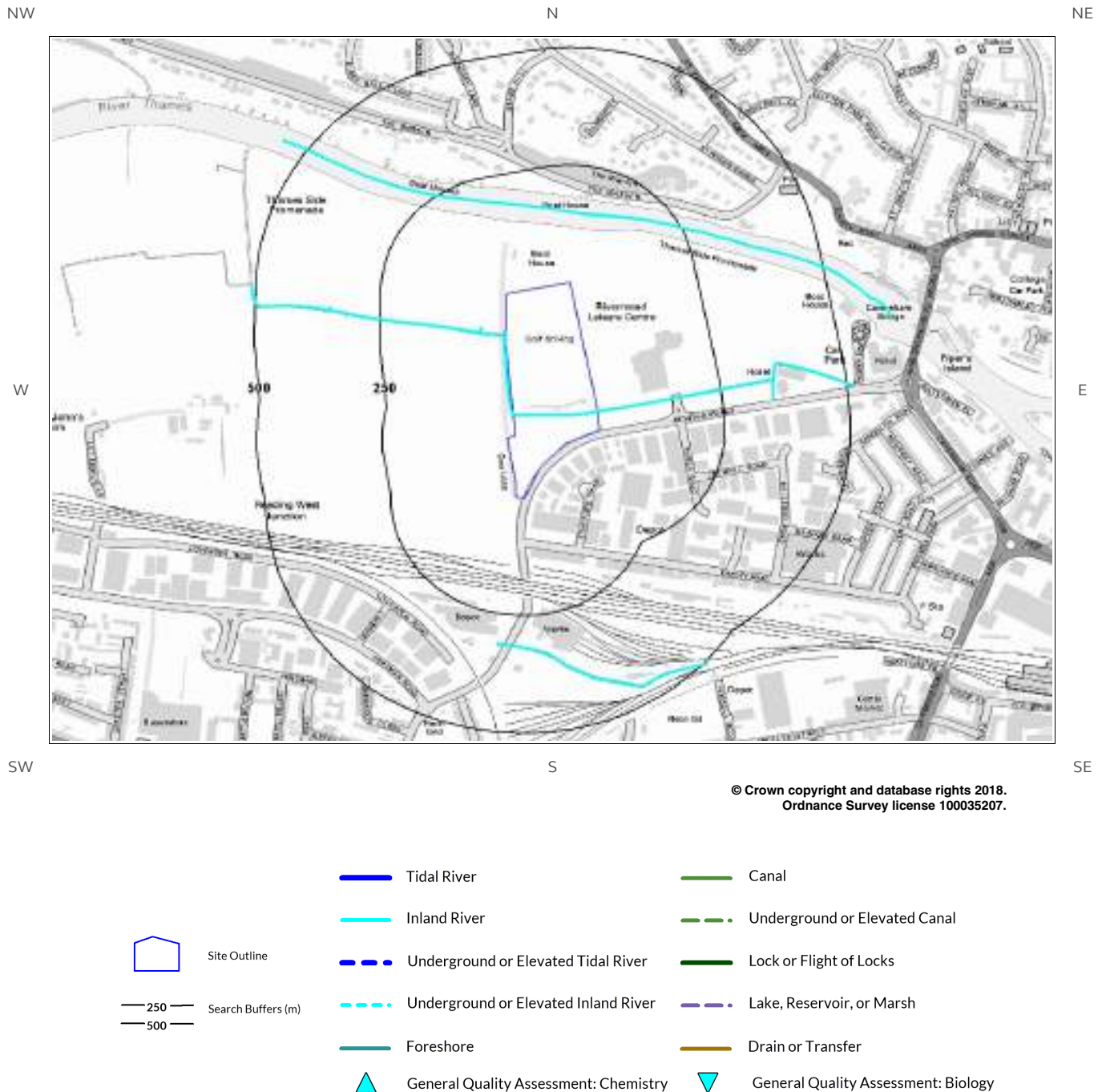
6d. Hydrogeology – Source Protection Zones within confined aquifer



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6e. Hydrology – Watercourse Network and River Quality



6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there 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
10	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	277	N	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
3	303	N	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
4	321	W	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
5	389	NW	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
6	460	NW	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

6.2 Aquifer within Bedrock Deposits

Are there 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

ID	Distance (m)	Direction	Designation	Description
2	303	N	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
3	321	W	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
4	460	NW	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

Are there any 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	144	S	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: WR.A/4547 Original Start Date: 22/1/1975 Expiry Date: - Issue No: 100 Version Start Date: 1/4/2008 Version End Date:
7	222	W	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: WR.A/3088 Original Start Date: 9/1/1967 Expiry Date: - Issue No: 100 Version Start Date: 9/1/1967 Version End Date:
8	234	W	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: WR.A/3088 Original Start Date: 9/1/1967 Expiry Date: - Issue No: 100 Version Start Date: 9/1/1967 Version End Date:
9	338	SE	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: WR.A/4547 Original Start Date: 22/1/1975 Expiry Date: - Issue No: 100 Version Start Date: 1/4/2008 Version End Date:
10A	482	SE	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: 23/1/1990 Expiry Date: - Issue No: 101 Version Start Date: 30/6/2006 Version End Date:

ID	Distance (m)	Direction	NGR	Details
11A	482	SE	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: 23/1/1990 Expiry Date: - Issue No: 101 Version Start Date: 30/6/2006 Version End Date:
12A	482	SE	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: WR.A/1988 Original Start Date: 11/7/1966 Expiry Date: - Issue No: 100 Version Start Date: 11/7/1966 Version End Date:
13A	482	SE	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: WR.A/1988 Original Start Date: 11/7/1966 Expiry Date: - Issue No: 100 Version Start Date: 11/7/1966 Version End Date:
14B	627	W	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: WR.A/3088 Original Start Date: 9/1/1967 Expiry Date: - Issue No: 100 Version Start Date: 9/1/1967 Version End Date:
15B	627	W	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: WR.A/3088 Original Start Date: 9/1/1967 Expiry Date: - Issue No: 100 Version Start Date: 9/1/1967 Version End Date:
16	642	SW	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: WRA/5942 Original Start Date: 17/1/1992 Expiry Date: - Issue No: 100 Version Start Date: 7/1/1999 Version End Date:
17	842	W	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: WR.A/3088 Original Start Date: 9/1/1967 Expiry Date: - Issue No: 100 Version Start Date: 9/1/1967 Version End Date:

ID	Distance (m)	Direction	NGR	Details
Not shown	1118	SE	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: 11/7/1966 Expiry Date: - Issue No: 101 Version Start Date: 1/4/2008 Version End Date:
Not shown	1221	W	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: WR.A/2453/4 Original Start Date: 17/11/1976 Expiry Date: - Issue No: 100 Version Start Date: 17/11/1976 Version End Date:
Not shown	1295	NW	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: 23/3/1977 Expiry Date: - Issue No: 101 Version Start Date: 9/9/1999 Version End Date:
Not shown	1323	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: 23/3/1977 Expiry Date: - Issue No: 101 Version Start Date: 9/9/1999 Version End Date:
Not shown	1391	E	471900 174400	Status: Active Licence No: 28/39/23/0020 Details: Laundry Use Direct Source: Thames Groundwater Point: 72 George Street, Caversham, - Borehole 'a' Data Type: Point Name: Berendsen UK Limited Annual Volume (m³): 68190 Max Daily Volume (m³): 300.04 Original Application No: NPS/WR/021020 Original Start Date: 9/5/1966 Expiry Date: - Issue No: 102 Version Start Date: 12/1/2016 Version End Date:
Not shown	1424	W	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: WR.A/A03/1 Original Start Date: 14/1/1967 Expiry Date: - Issue No: 100 Version Start Date: 1/5/1992 Version End Date:
Not shown	1424	W	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: WR.A/A03/1 Original Start Date: 14/1/1967 Expiry Date: - Issue No: 100 Version Start Date: 1/5/1992 Version End Date:

ID	Distance (m)	Direction	NGR	Details
Not shown	1623	W	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: WR.A/6223 Original Start Date: 30/9/1994 Expiry Date: - Issue No: 100 Version Start Date: 30/9/1994 Version End Date:
Not shown	1623	W	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: WR.A/6223 Original Start Date: 30/9/1994 Expiry Date: - Issue No: 100 Version Start Date: 30/9/1994 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any 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	933	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: WRW/A/1115 Original Start Date: 12/5/2003 Expiry Date: 31/3/2016 Issue No: 1 Version Start Date: 12/5/2003 Version End Date:
Not shown	933	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): 1752000 Max Daily Volume (m³): 4800 Application No: WRW/A/1218 Original Start Date: 10/9/2008 Expiry Date: 31/3/2016 Issue No: 1 Version Start Date: 10/9/2008 Version End Date:
Not shown	933	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: WRW/A/1115 Original Start Date: 12/5/2003 Expiry Date: 31/3/2016 Issue No: 1 Version Start Date: 1/4/2006 Version End Date:
Not shown	1575	E	472072 174185	Status: Active Licence No: TH/039/0023/022 Details: Transfer Between Sources (Post Water Act 2003) Direct Source: Thames Surface Water - Non Tidal Point: River Thames At Caversham Weir Data Type: Point Name: The Reading Sustainability Centre CIC Annual Volume (m³): 0 Max Daily Volume (m³): 0 Application No: NPS/WR/020629 Original Start Date: 19/2/2016 Expiry Date: 31/3/2028 Issue No: 1 Version Start Date: 19/2/2016 Version End Date:

ID	Distance (m)	Direction	NGR	Details
Not shown	1639	SE	471590 173150	Status: Historical Licence No: 28/39/22/0594 Details: Lake & Pond Throughflow Direct Source: Thames Surface Water - Non Tidal Point: The Oracle Centre, Reading Data Type: Point Name: ORACLE SHOPPING CENTRE LTD Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 16/2/2000 Expiry Date: - Issue No: 1 Version Start Date: 16/2/2000 Version End Date:
Not shown	1639	SE	471590 173150	Status: Active Licence No: 28/39/22/0594 Details: Lake & Pond Throughflow Direct Source: Thames Surface Water - Non Tidal Point: St.giles Stream At The Oracle Centre, Reading Data Type: Point Name: ORACLE SHOPPING CENTRE LTD Annual Volume (m³): 737856 Max Daily Volume (m³): 2016 Application No: - Original Start Date: 16/2/2000 Expiry Date: - Issue No: 1 Version Start Date: 16/2/2000 Version End Date:

6.5 Potable Water Abstraction Licences

Are there any 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
1A	482	SE	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: WR.A/1988 Original Start Date: 11/7/1966 Expiry Date: - Issue No: 100 Version Start Date: - Version End Date:
2A	482	SE	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: 23/1/1990 Expiry Date: - Issue No: 101 Version Start Date: - Version End Date:
3	642	SW	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: WRA/5942 Original Start Date: 17/1/1992 Expiry Date: - Issue No: 100 Version Start Date: - Version End Date:

ID	Distance (m)	Direction	NGR	Details
Not shown	1118	SE	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: 11/7/1966 Expiry Date: - Issue No: 101 Version Start Date: - Version End Date: -
Not shown	1424	W	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: WR.A/A03/1 Original Start Date: 14/1/1967 Expiry Date: - Issue No: 100 Version Start Date: - Version End Date: -
Not shown	1623	W	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: WR.A/6223 Original Start Date: 30/9/1994 Expiry Date: - Issue No: 100 Version Start Date: - Version End Date: -

6.6 Source Protection Zones

Are there any 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

Are there any 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

Is there any 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.
77	W	Major Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.
321	W	Major Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.
347	W	Major Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
362	W	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.
412	W	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.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? None identified

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Ordnance Survey MasterMap Water Network

Are there any Ordnance Survey MasterMap Water Network entries within 500m of the study site?

#DRN_Count#

#NDF_DRN_tag#

This watercourse information is provided by Ordnance Survey MasterMap Water Network. The data provides a detailed centre line following the curve of the waterway precisely, so all distances provided in the report should be understood as measurements to the centreline rather than a measurement to the nearest point of the watercourse. Underground watercourses are inferred from entry and exit points so caution is advised in using these to indicate precise locations of underground watercourses when planning site investigation and development.

The following Ordnance Survey MasterMap Water Network records are represented on the Hydrology Map (6e):

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
1	0 On Site	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.2
62	0 On Site	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.2
2	6 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.1
63	6 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.1
3	32 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: Not Provided
64	32 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: Not Provided
4	37 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.6
65	37 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.6
5	47 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.7

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
66	47 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.7
6	49 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 3.6
67	49 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 3.6
7	148 N	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
8	148 N	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
9	148 N	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
68	148 N	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
69	148 N	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
70	148 N	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
10	164 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.6
71	164 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.6
11	314 S	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.2

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
12	314 S	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: Not Provided
Not shown	314 S	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.2
Not shown	314 S	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: Not Provided
13	318 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 3.8
74	318 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 3.8
14	319 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.6
15	319 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.6
75	319 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.6
76	319 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.6
16	322 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.6
17	322 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.6
77	322 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.6

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
78	322 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.6
18	324 S	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: Not Provided
Not shown	324 S	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: Not Provided
19	350 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 3.5
20	350 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.9
21	350 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 3.8
80	350 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 3.5
81	350 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.9
82	350 W	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 3.8
22	354 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.5
83	354 E	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 4.5
23	365 S	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.6

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
Not shown	365 S	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 2.6
24	421 NW	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
25	421 NW	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
26	421 NW	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
85	421 NW	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
86	421 NW	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
87	421 NW	River Thames	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: 57.9
27	469 SE	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: Not Provided
Not shown	469 SE	-	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section: Not Provided

6.11 Surface Water Features

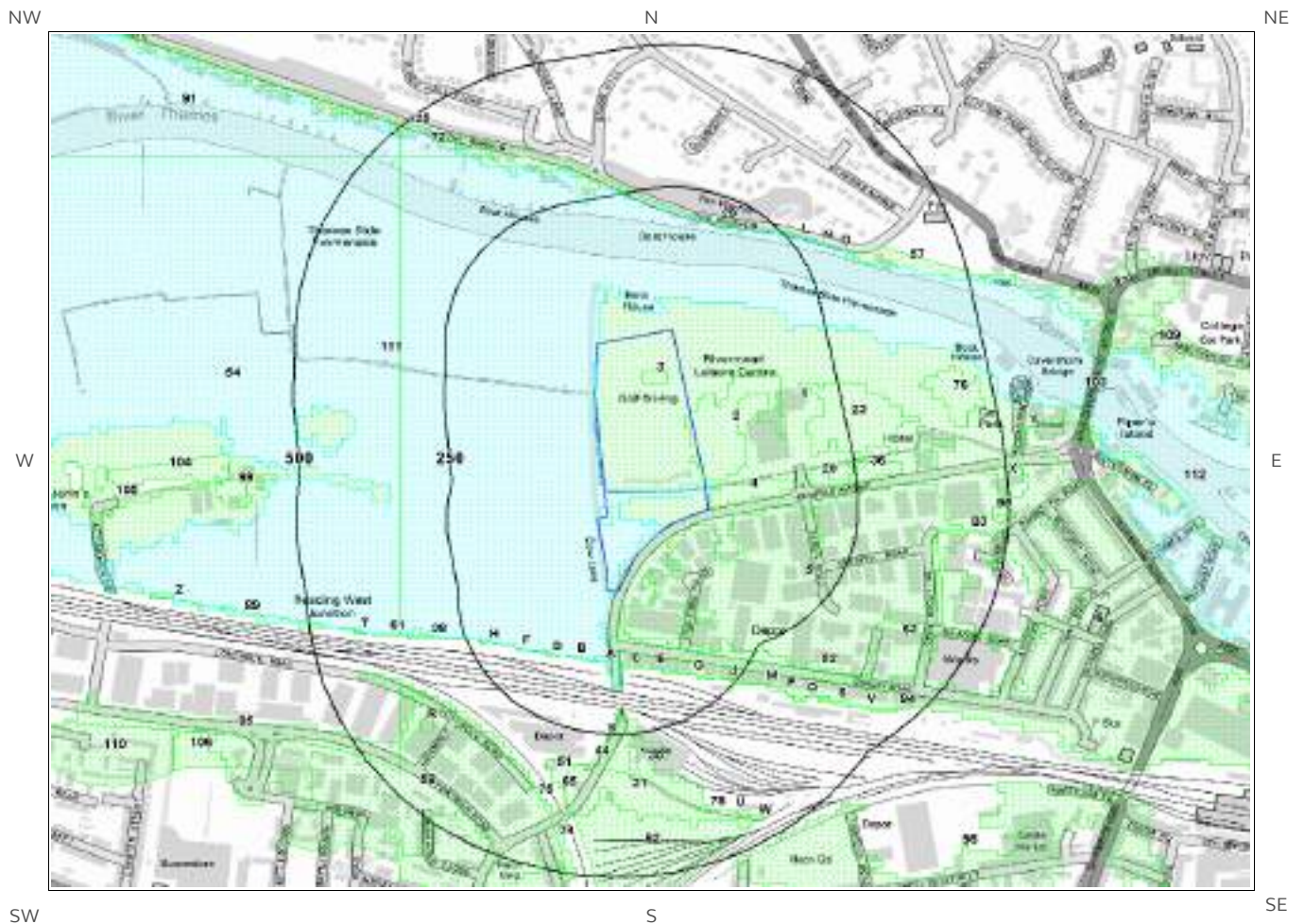
Are there any surface water features within 250m of the study site?

Identified

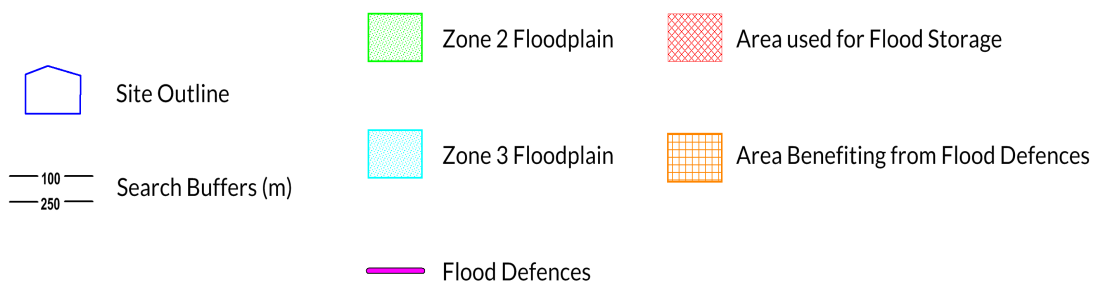
The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
1	W
10	W
37	E
117	N
164	E
223	E

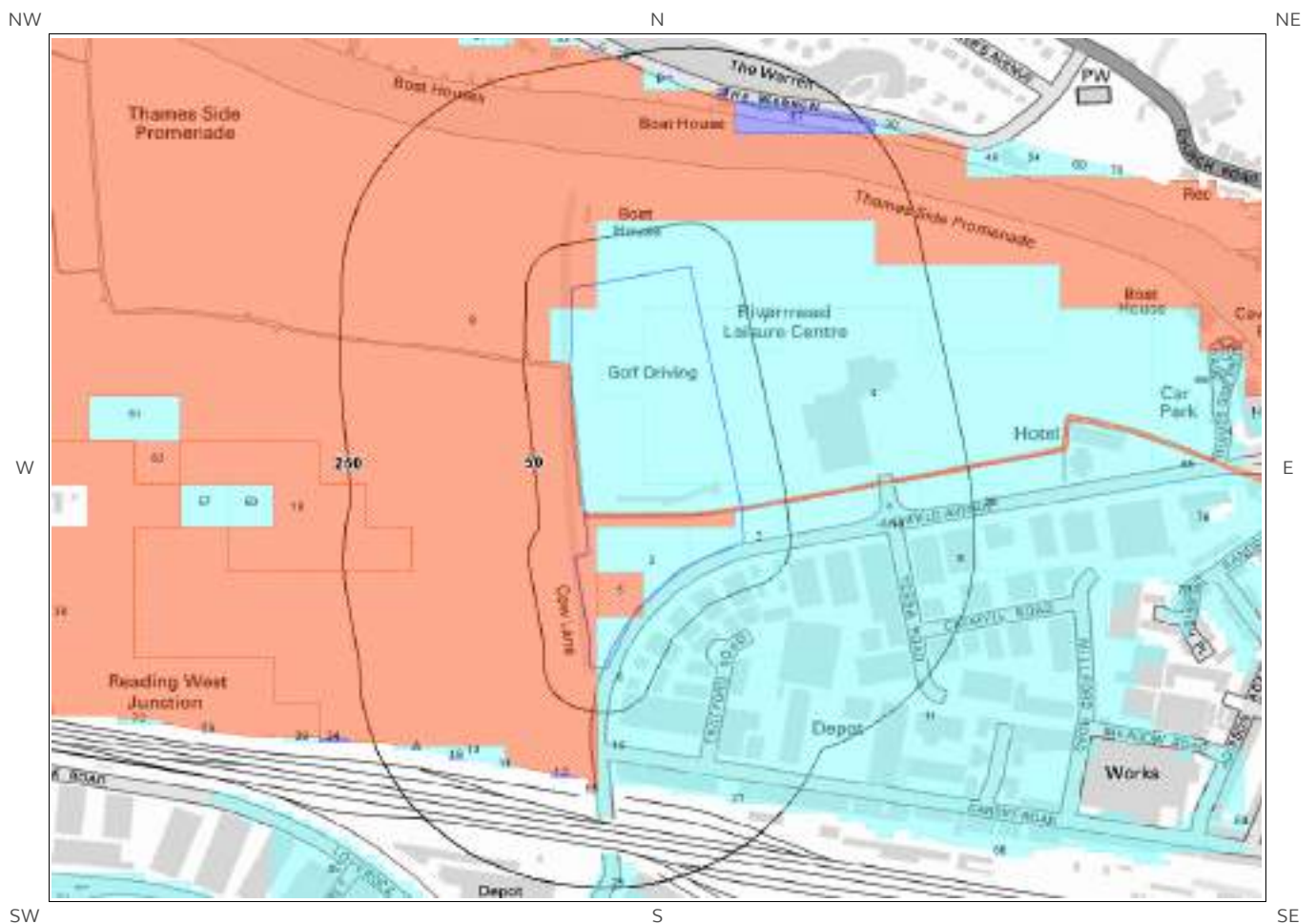
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



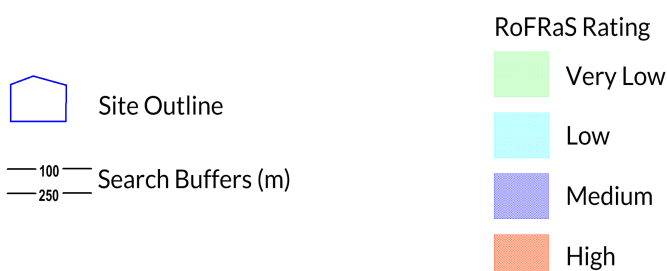
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7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? 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	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
2	0	On Site	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
3	0	On Site	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
4	2	E	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
5	14	SE	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
6	74	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
7	87	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
8B	124	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
9A	124	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
10A	126	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
11B	126	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
12C	129	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
13A	133	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
14D	138	SW	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
15E	140	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
16C	143	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
17D	147	SW	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
18E	154	SE	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
19	158	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)

20	166	E	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
21F	170	SW	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
22G	180	SE	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
23	180	E	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
24F	180	SW	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
25	193	N	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
26G	196	SE	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
27	200	NE	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
28H	200	SW	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
29	203	N	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
30	209	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
31	219	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
32I	220	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
33J	226	SE	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
34H	229	W	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
35I	233	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
36	235	E	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
37I	240	S	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
38	241	W	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)
39J	246	SE	19-Mar-2018	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? 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	0	On Site	19-Mar-2018	Zone 3 - (Fluvial Models)

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

What is the highest risk of flooding onsite?

High

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 High (1 in 30 or greater) 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
2	0.0	On Site	Low
3	0.0	On Site	Low
4	0.0	On Site	Low
5	0.0	On Site	High
6	0.0	On Site	Low
7	0.0	On Site	High
8	0.0	On Site	Low
9	0.0	On Site	High
10	39.0	S	Low

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site?

None identified

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site?

None identified

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site?

None identified

7.7 Groundwater Flooding Susceptibility Areas

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

Does this relate to 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 What is the 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

What is the British Geological Survey confidence rating in this result? High

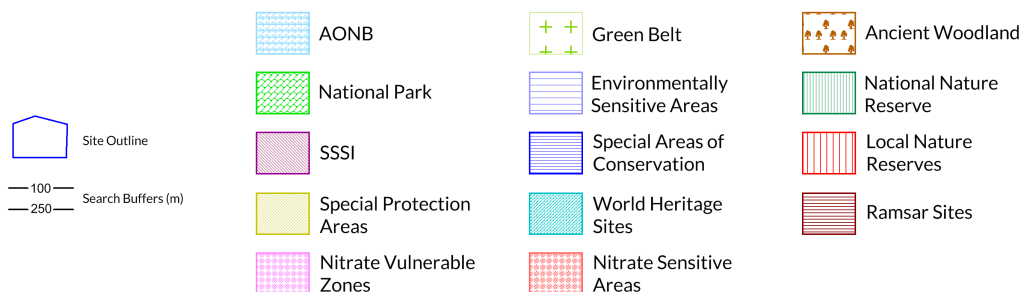
Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

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

Presence of 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:

1

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
4	1705	NW	UNKNOWN	Ancient Replanted Woodland

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

0

Database searched and no data found.

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
3	1203	NW	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
1	0	On Site	Existing	DEFRA
2	321	W	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

What is the 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

What is the 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

What is the 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

What is the 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

What is the 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

What is the 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 Radon

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

Are there any coal mining areas within 75m of the study site? None identified

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? None identified

Database searched and no data found.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? None identified

Guidance: No Guidance Required.

Contact Details

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Map Name: County Series

Map date: 1877-1881

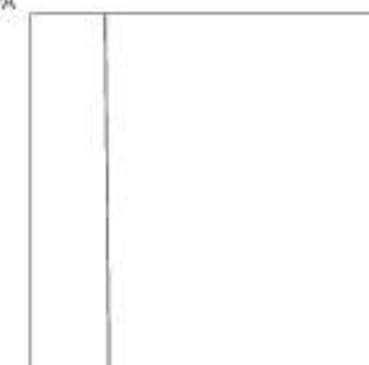
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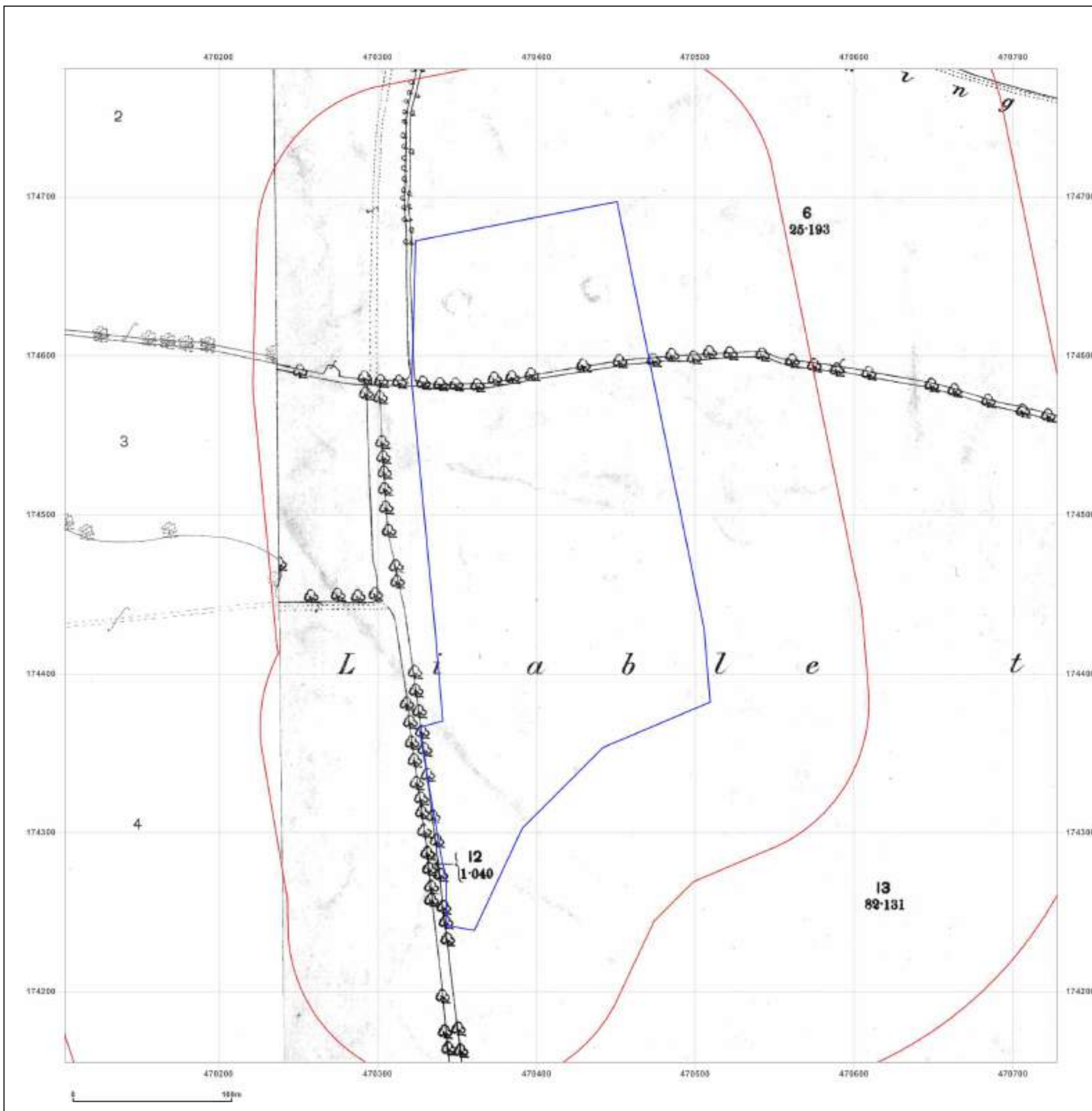


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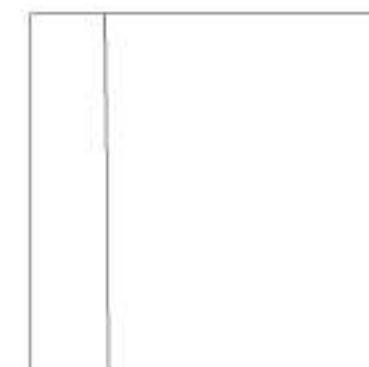
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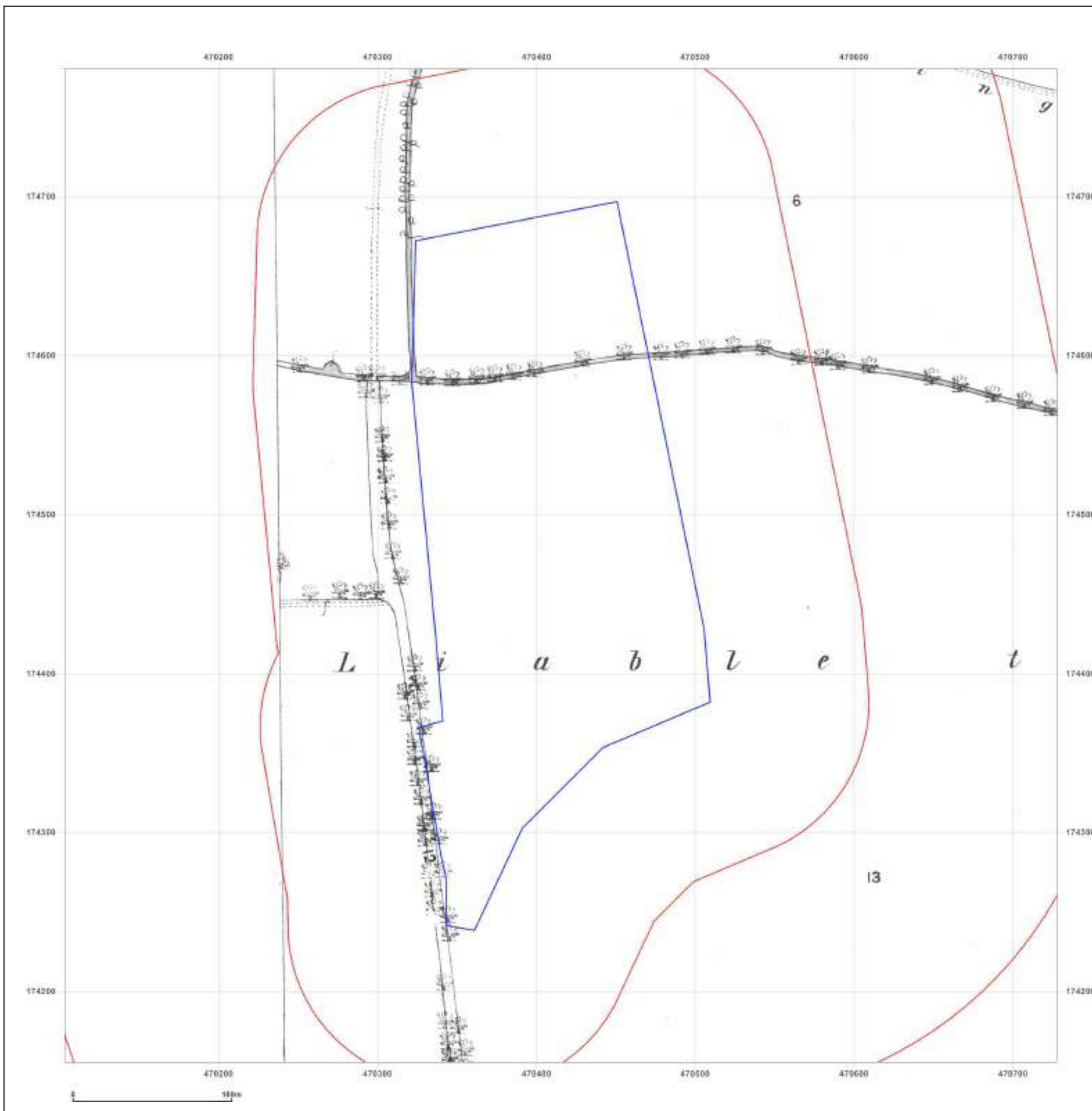


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Map Name: County Series

Map date: 1897-1899

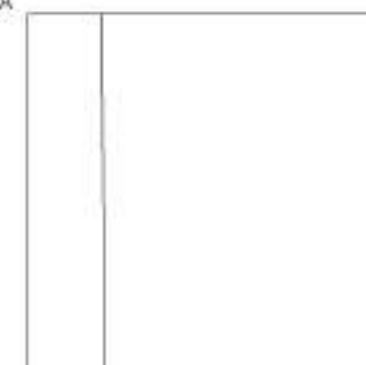
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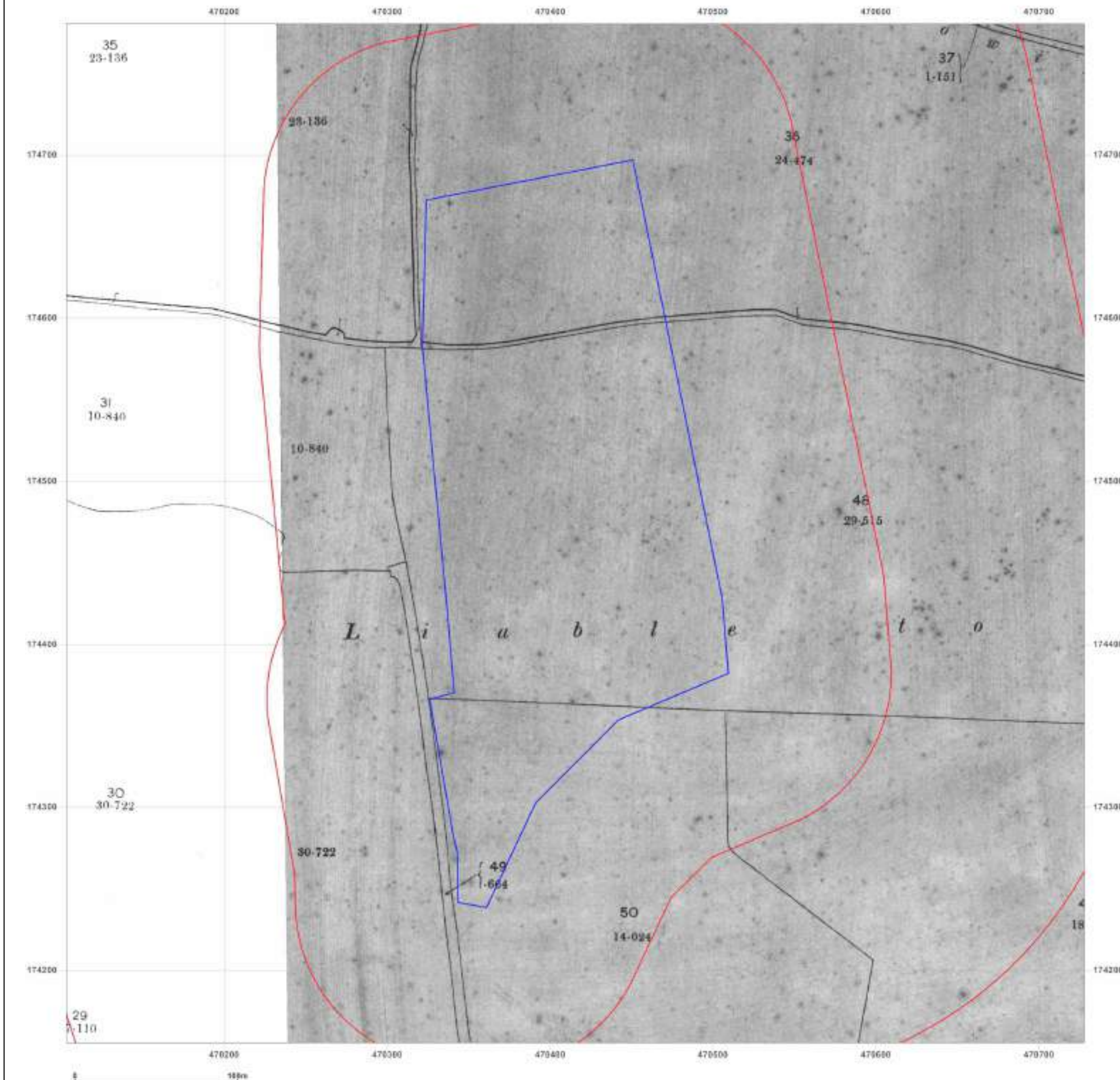


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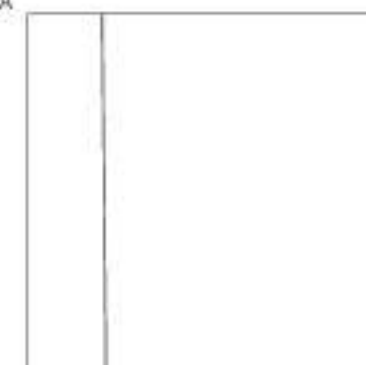
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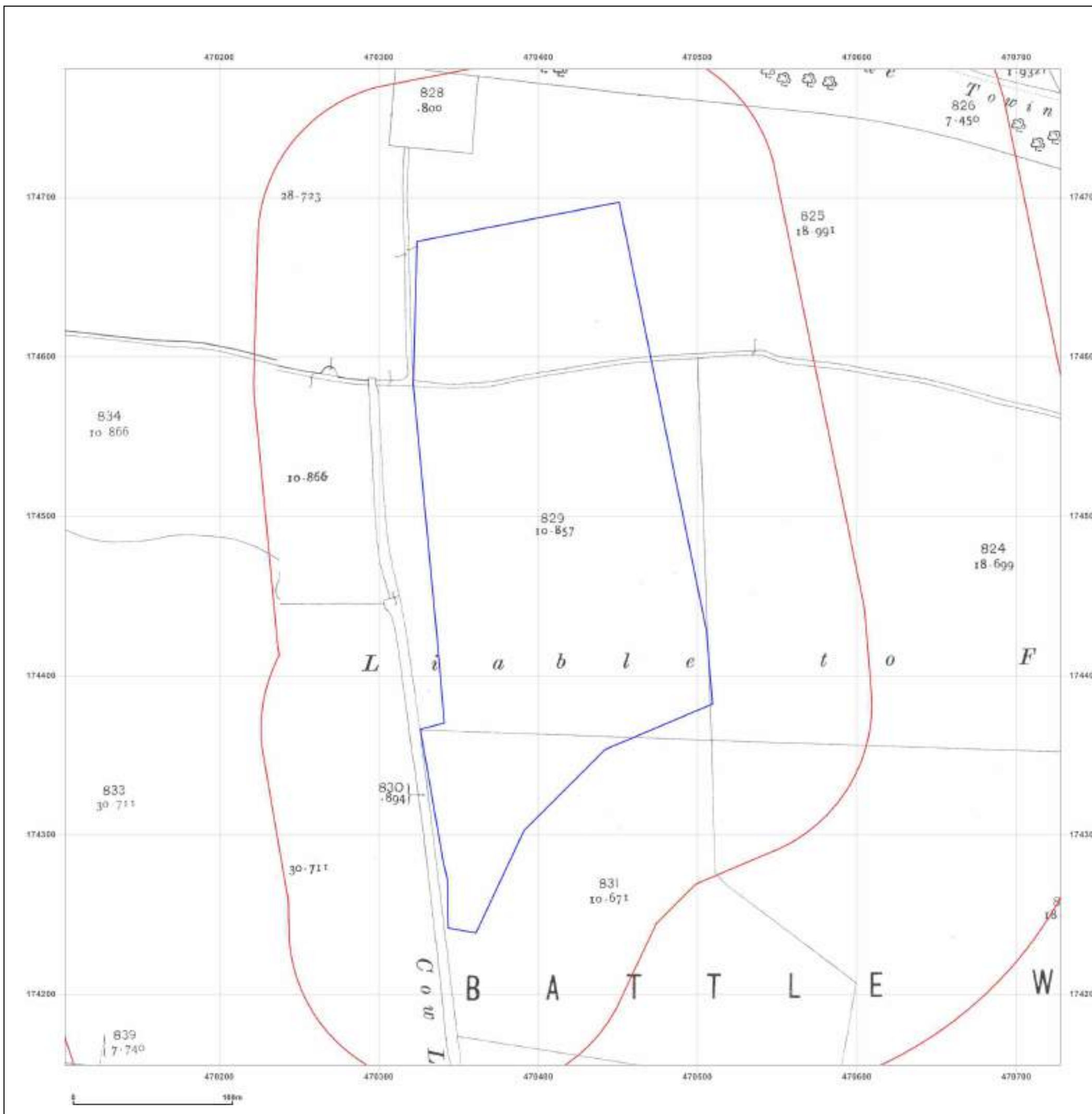


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Map Name: County Series

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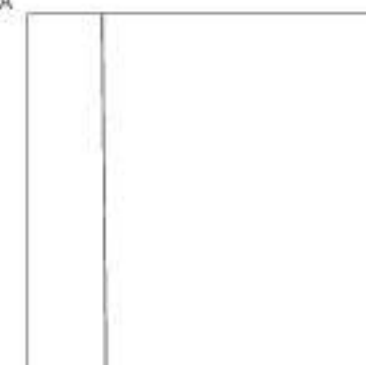
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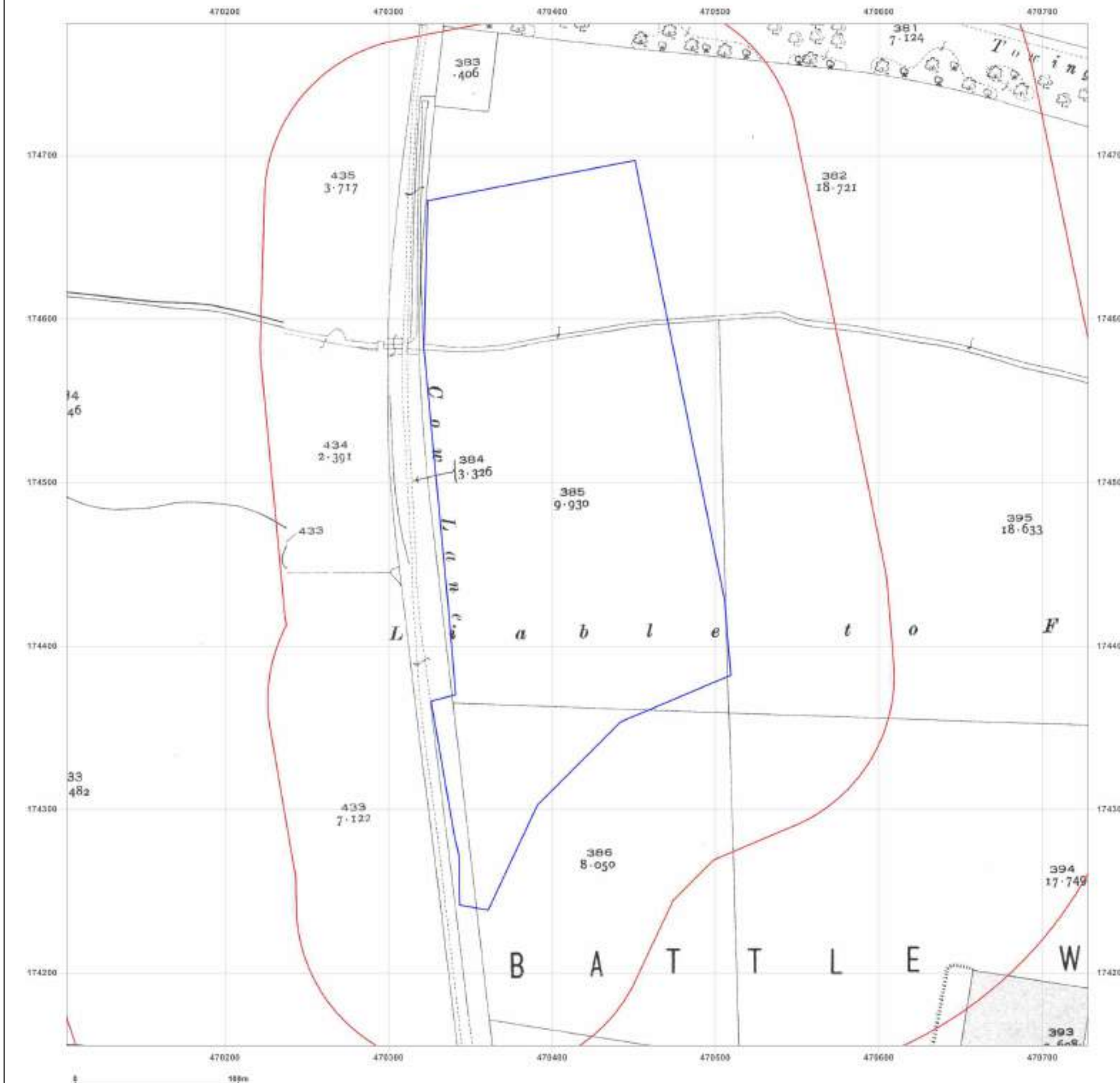


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Map Name: County Series

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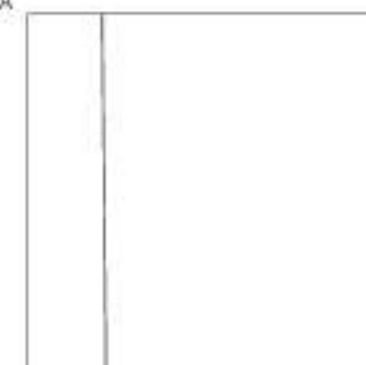
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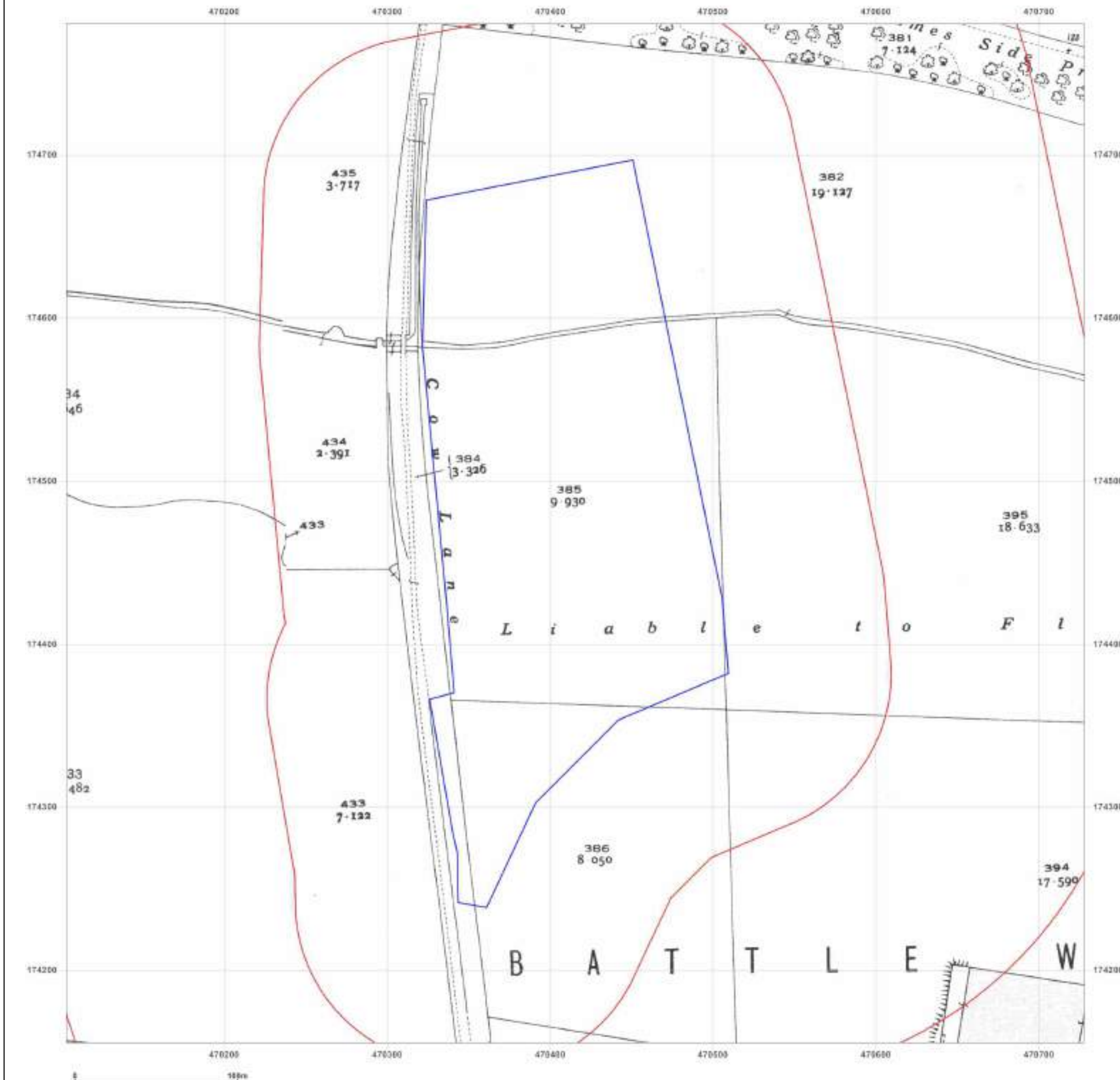


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Map Name: National Grid

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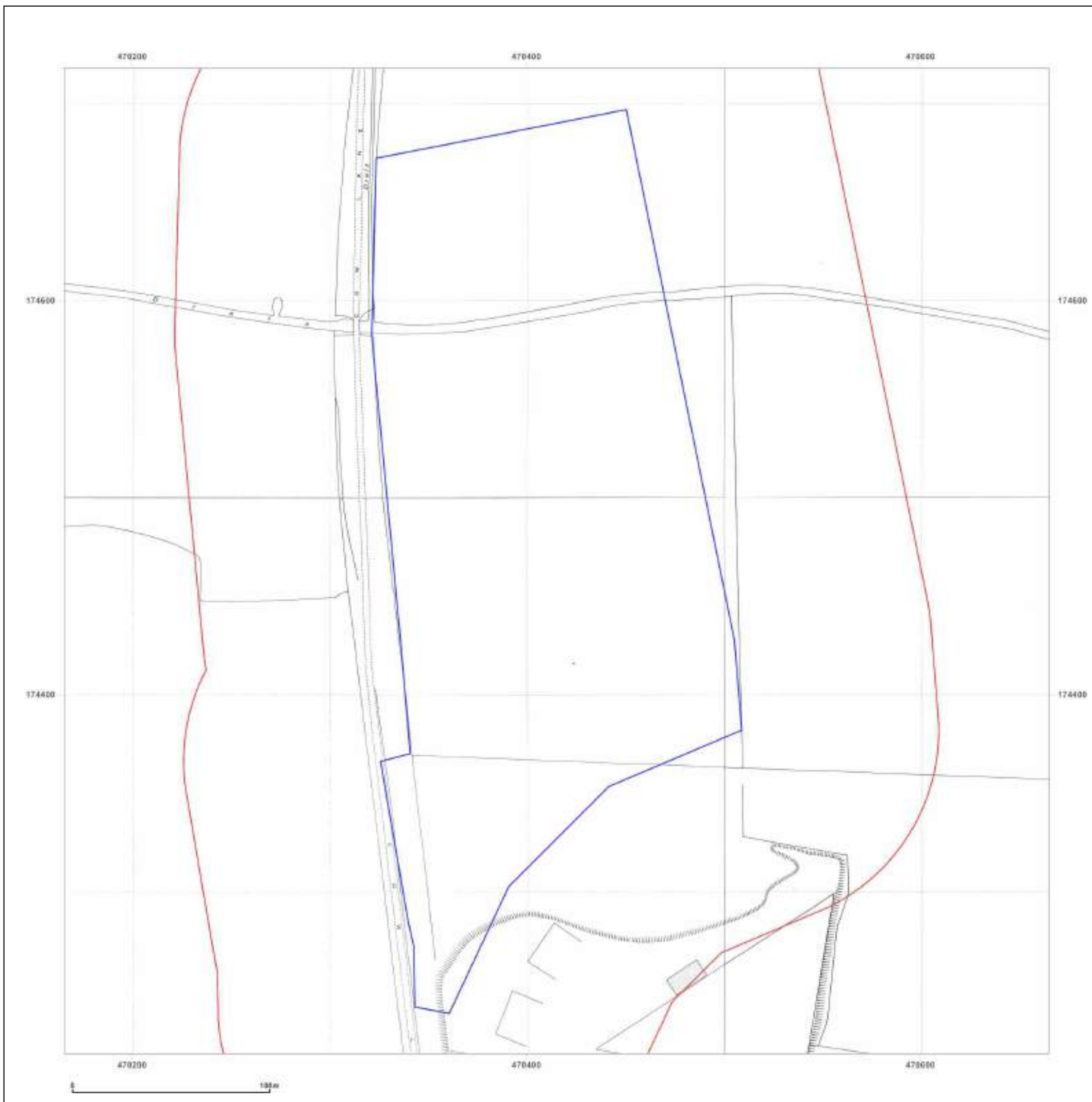


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Map Name: National Grid

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Grid Ref: 470415, 174468

Map Name: National Grid

Map date: 1976

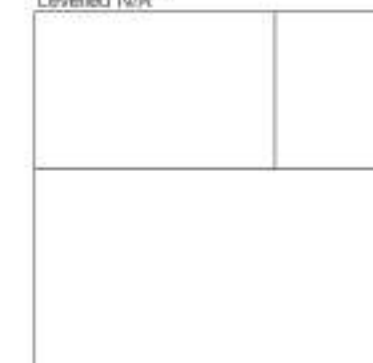
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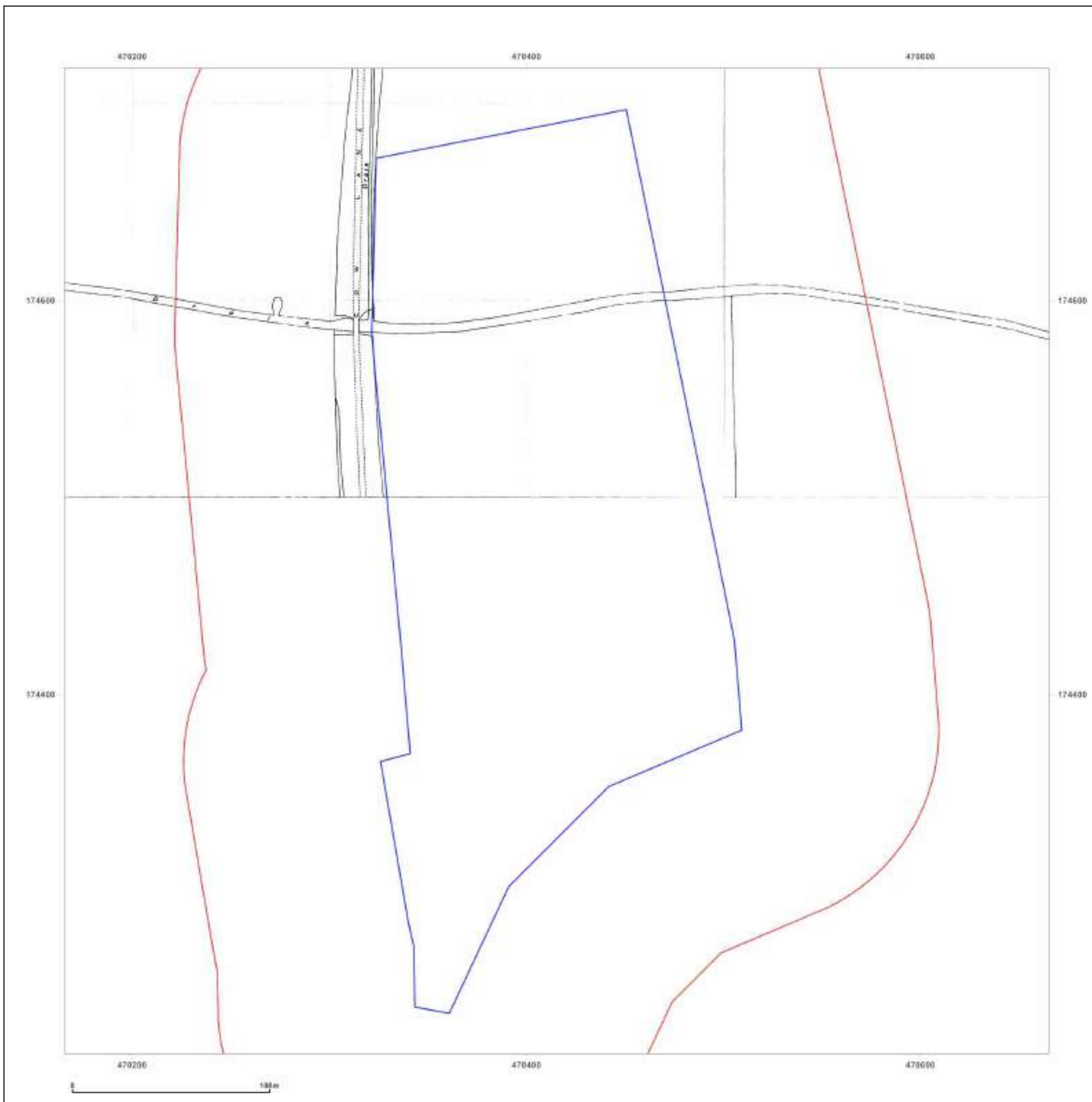


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Map Name: National Grid

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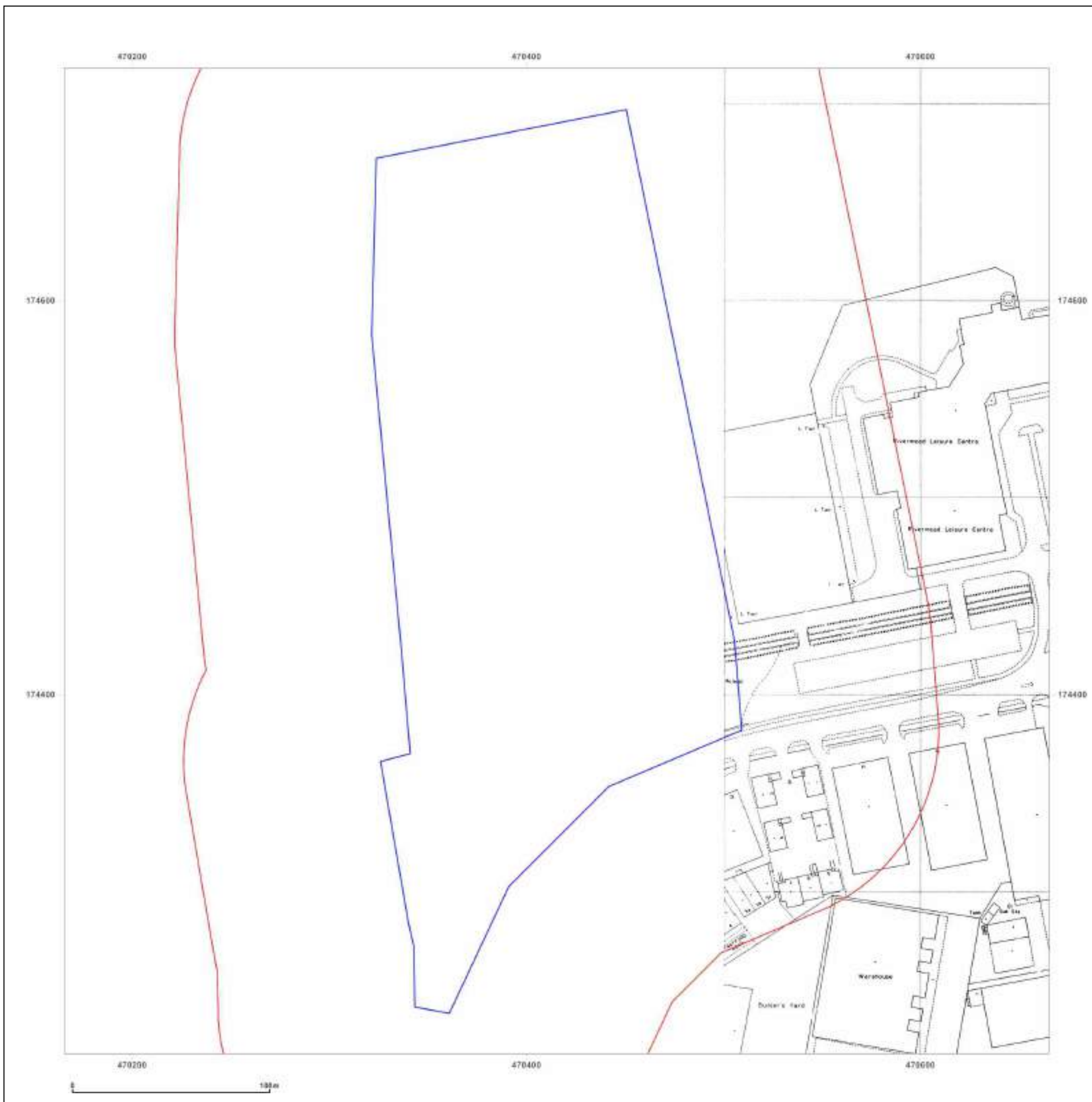


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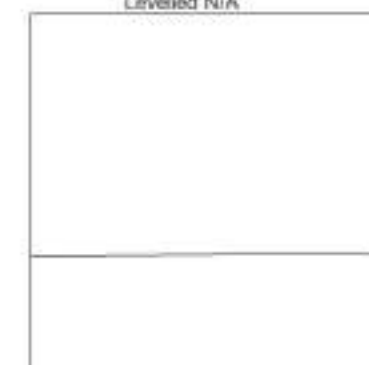
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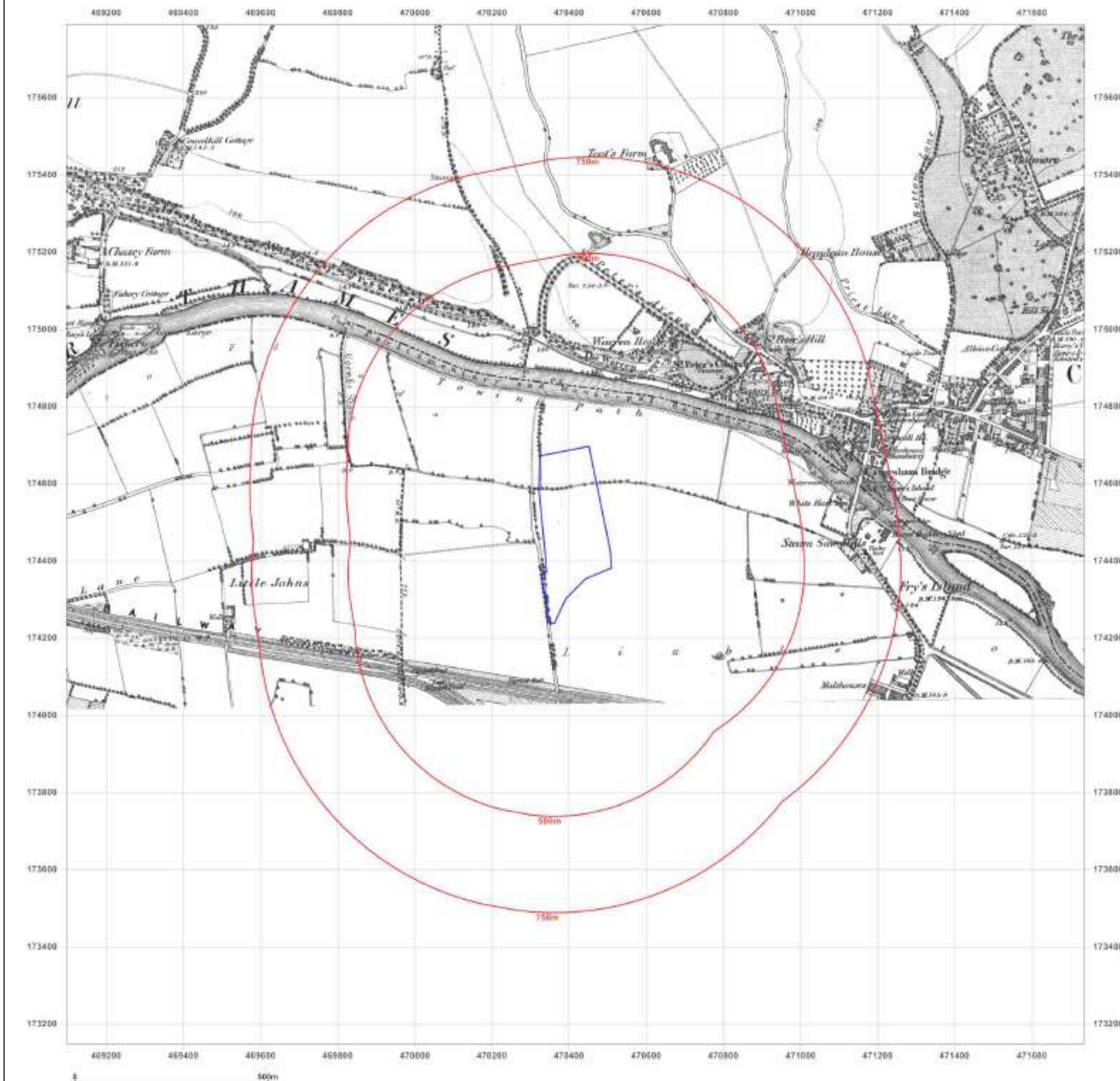


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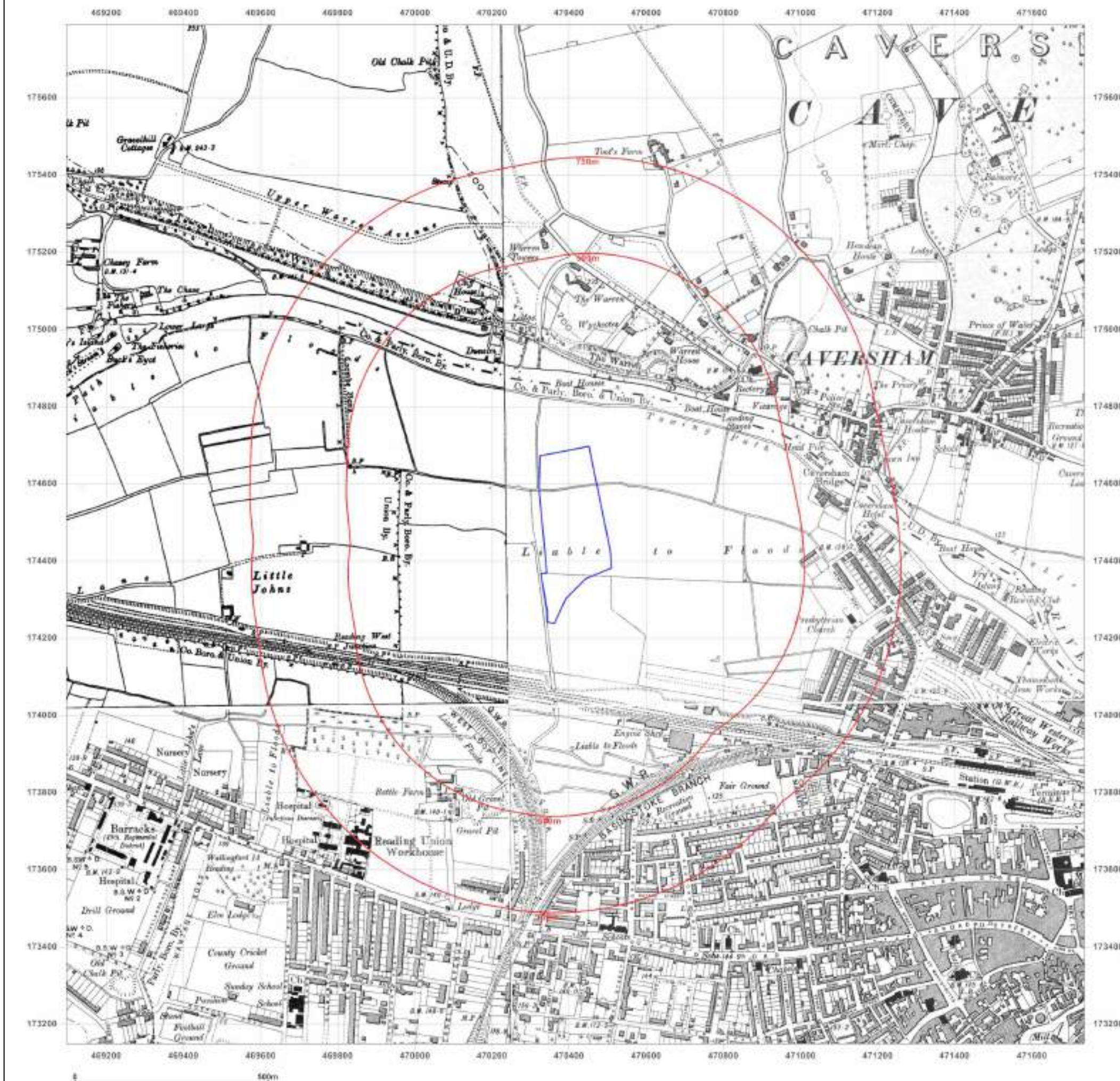


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Site Details:

RICHFIELD AVENUE, READING,
RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: County Series

Map date: 1900

Scale: 1:10,560

Printed at: 1:10,560



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Edition 1900
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Revised N/A
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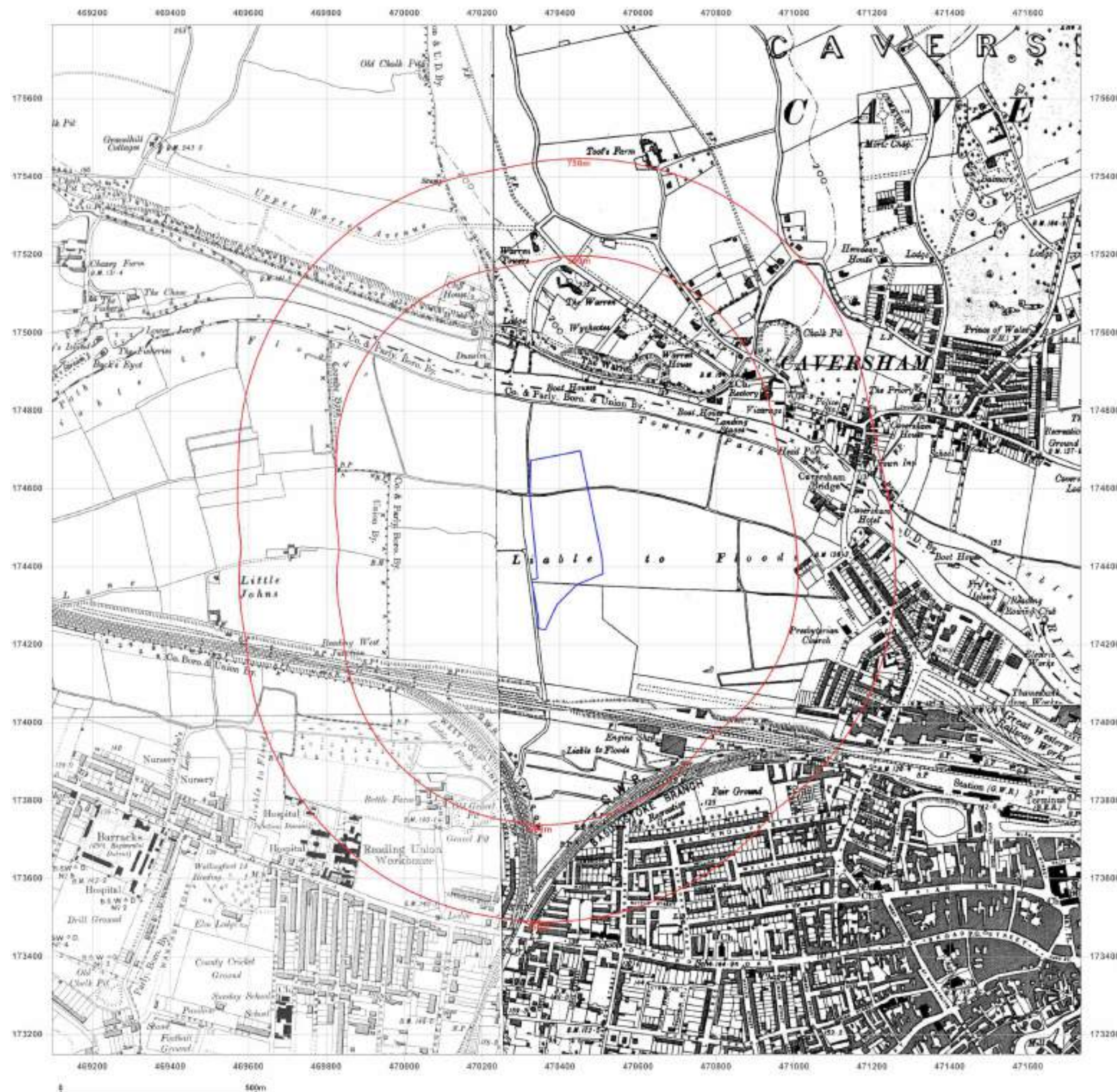


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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: County Series

Map date: 1910-1913

Scale: 1:10,560

Printed at: 1:10,560



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Revised 1910
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Revised 1910
Edition 1913
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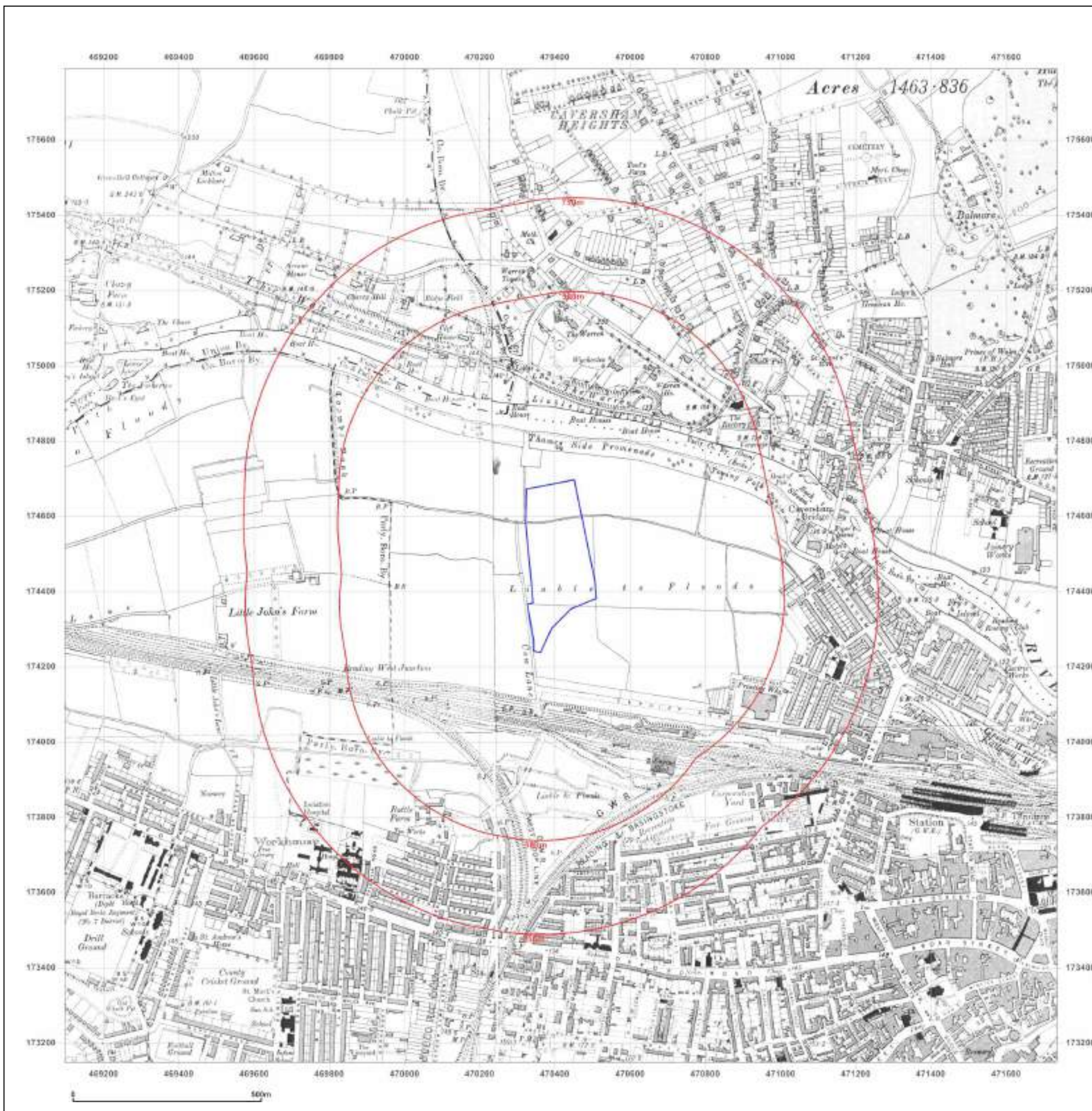


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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: County Series

Map date: 1914

Scale: 1:10,560

Printed at: 1:10,560



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Revised 1910
Edition 1914
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Revised 1914
Edition 1913
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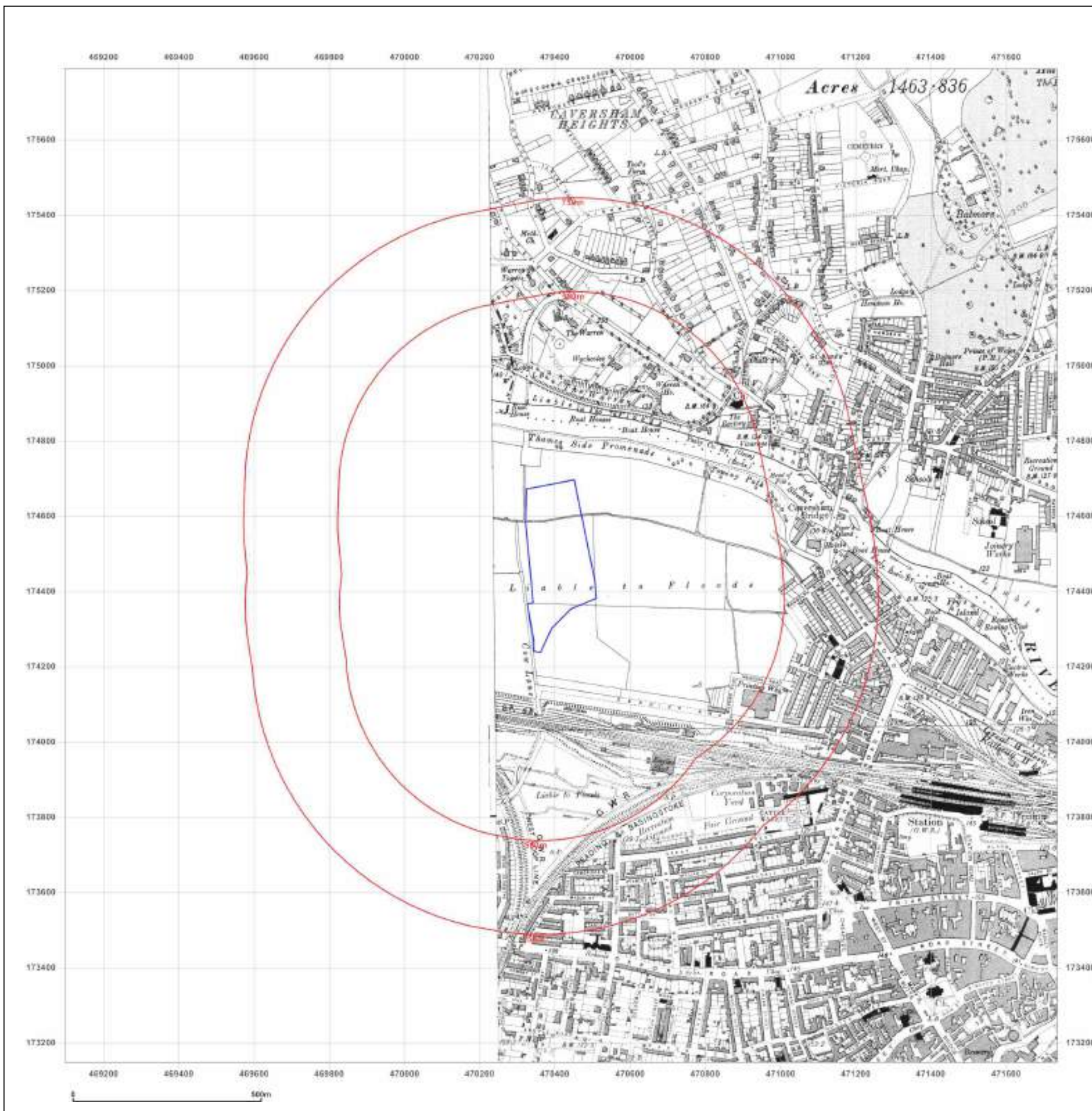


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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: County Series

Map date: 1932-1933

Scale: 1:10,560

Printed at: 1:10,560



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Revised 1932
Edition N/A
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Surveyed 1877
Revised 1932
Edition N/A
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Surveyed 1877
Revised 1933
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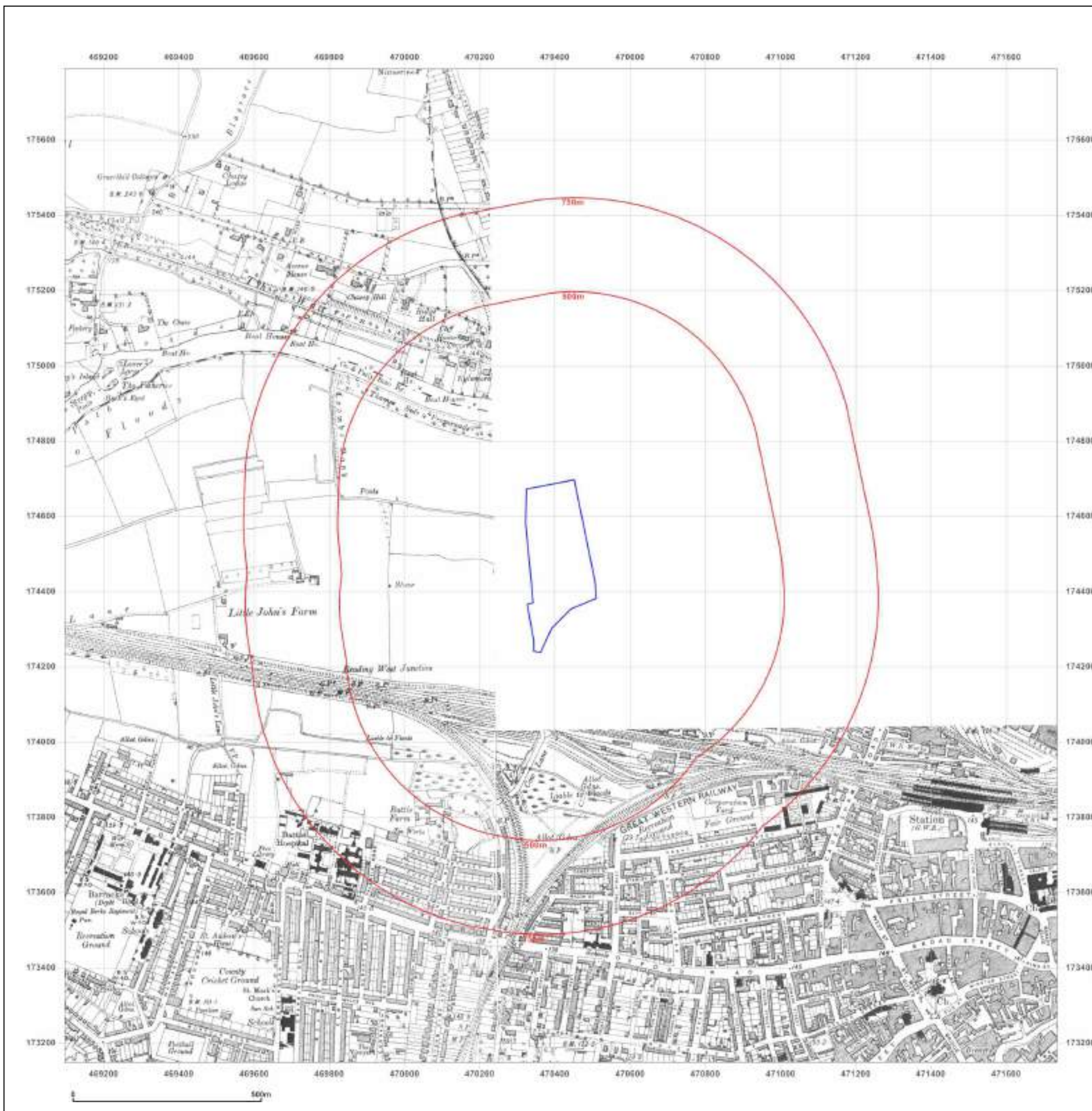


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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



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Revised N/A
Edition 1938
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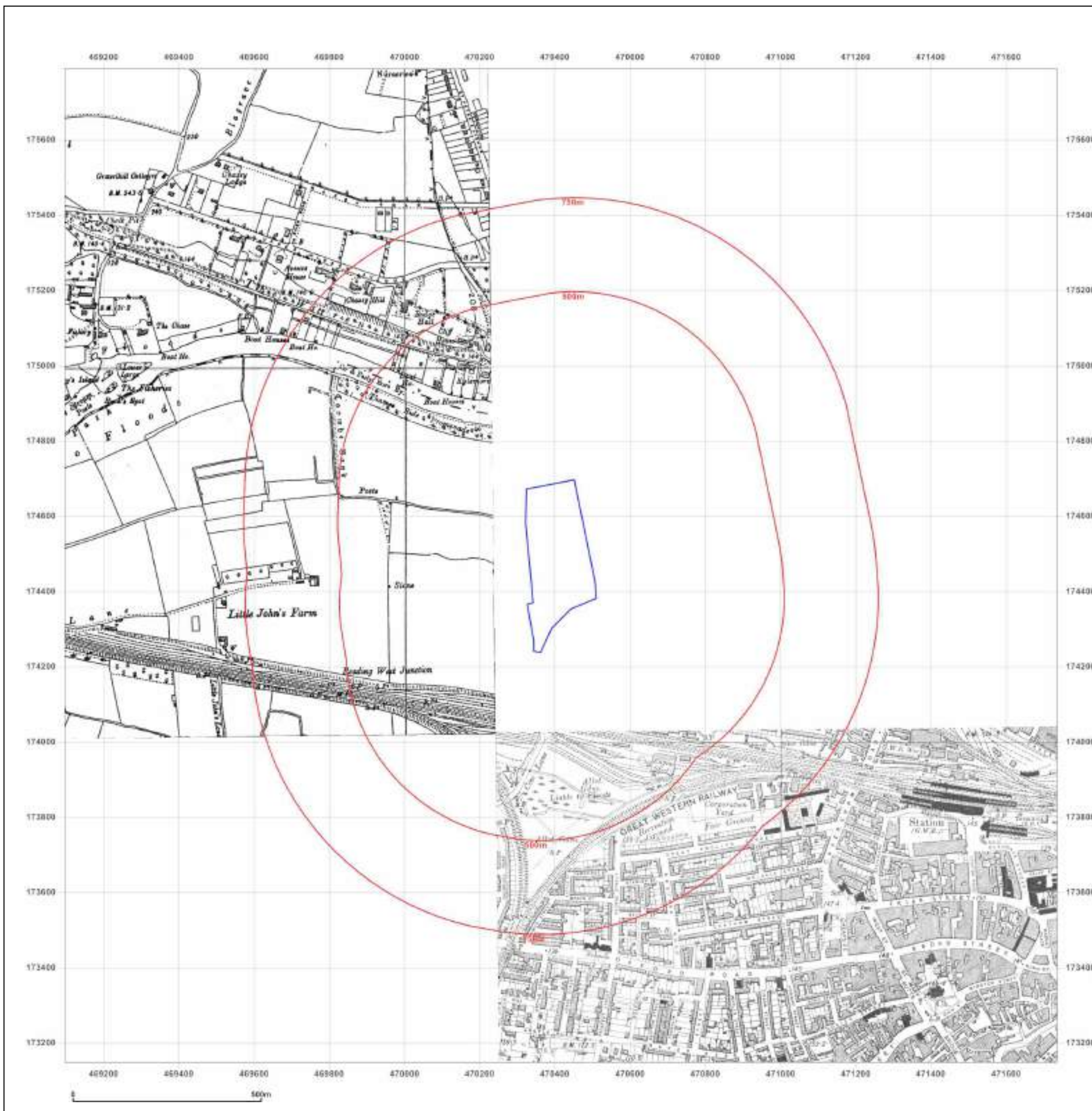


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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
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Map Name: County Series

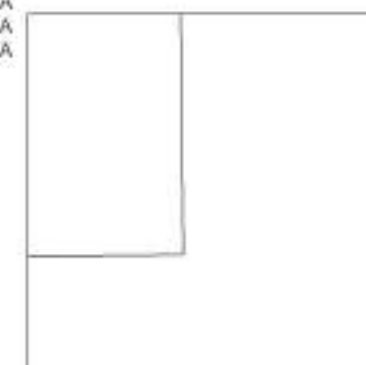
Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1877
Revised 1938
Edition N/A
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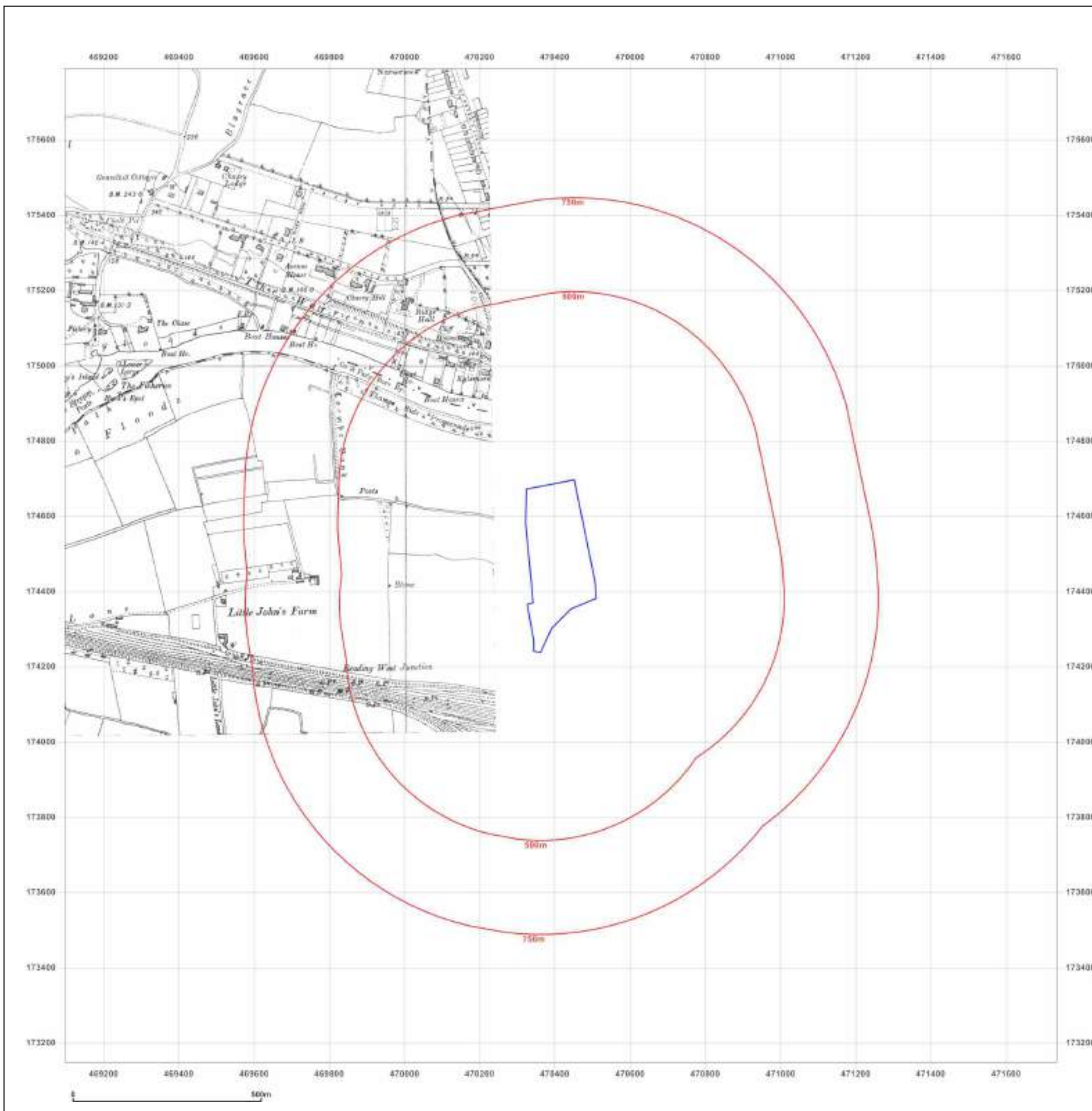


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RICHFIELD AVENUE, READING,
RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: Provisional

Map date: 1960-1962

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1956
Revised 1956
Edition N/A
Copyright 1960
Levelled N/A

Surveyed 1877
Revised 1956
Edition N/A
Copyright 1961
Levelled N/A

Surveyed N/A
Revised 1960
Edition 1961
Copyright 1961
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Surveyed 1959
Revised 1961
Edition N/A
Copyright 1962
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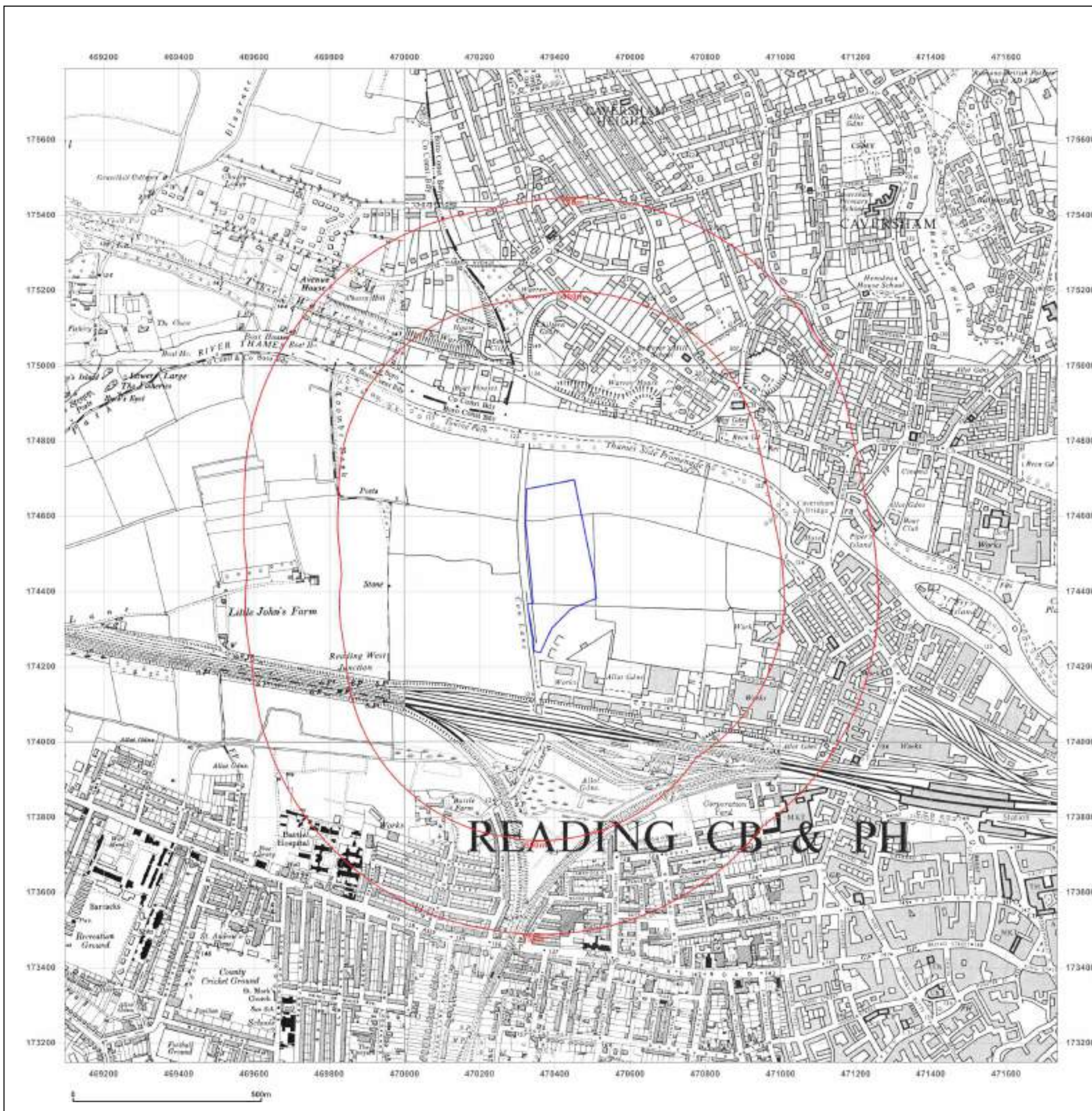


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Site Details:

RICHFIELD AVENUE, READING,
RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: National Grid

Map date: 1970-1973

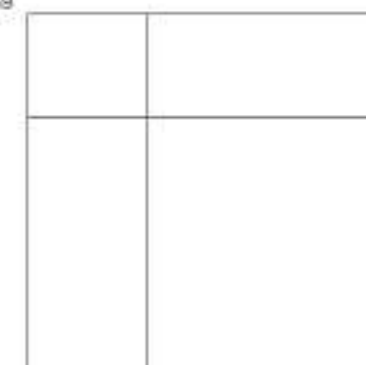
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Levelled 1969

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



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Revised 1973
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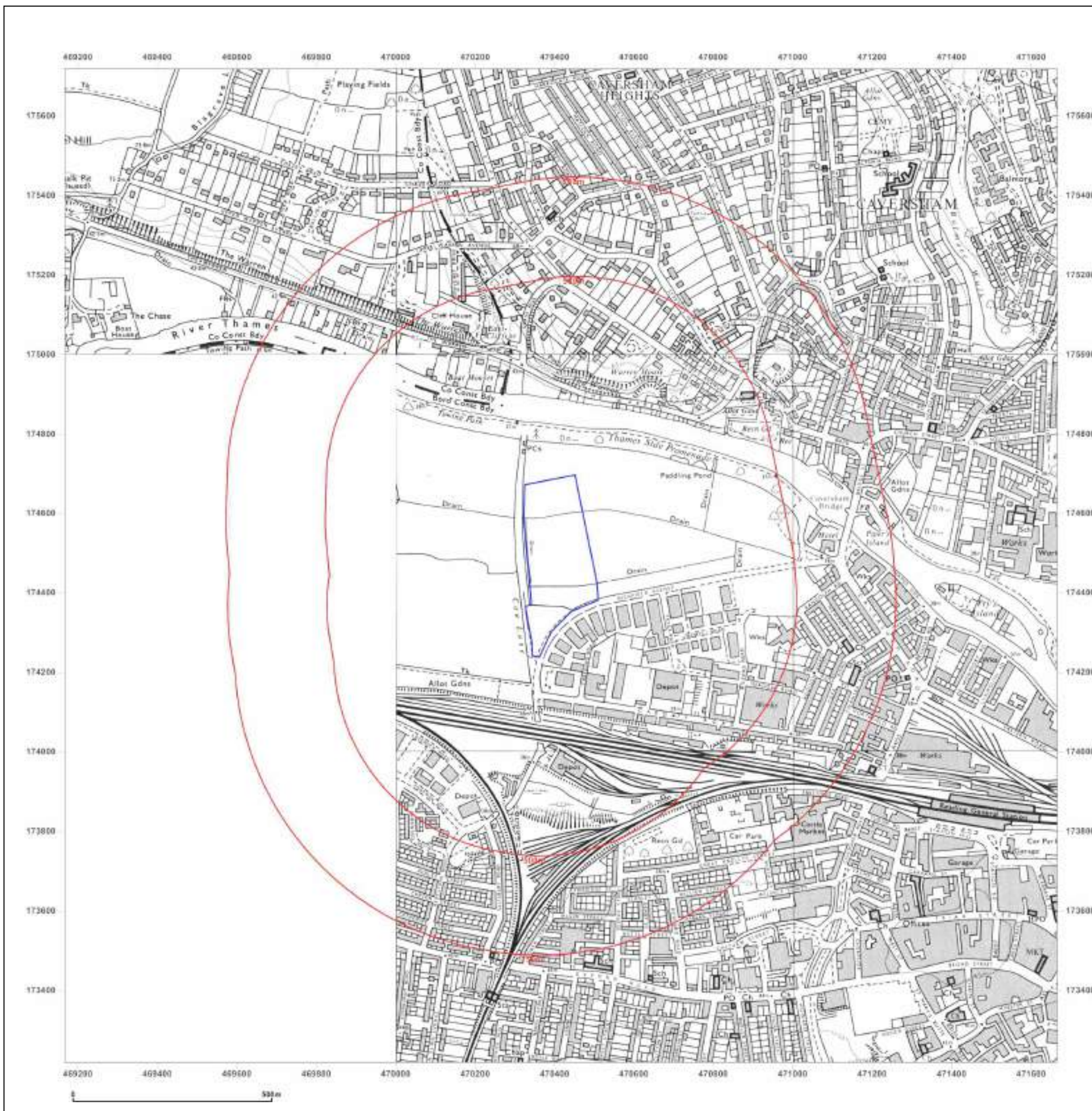


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Site Details:

RICHFIELD AVENUE, READING,
RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: National Grid

Map date: 1976-1979

Scale: 1:10,000

Printed at: 1:10,000



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Edition N/A
Copyright 1976
Levelled 1989

Surveyed 1977
Revised 1979
Edition N/A
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Levelled 1989

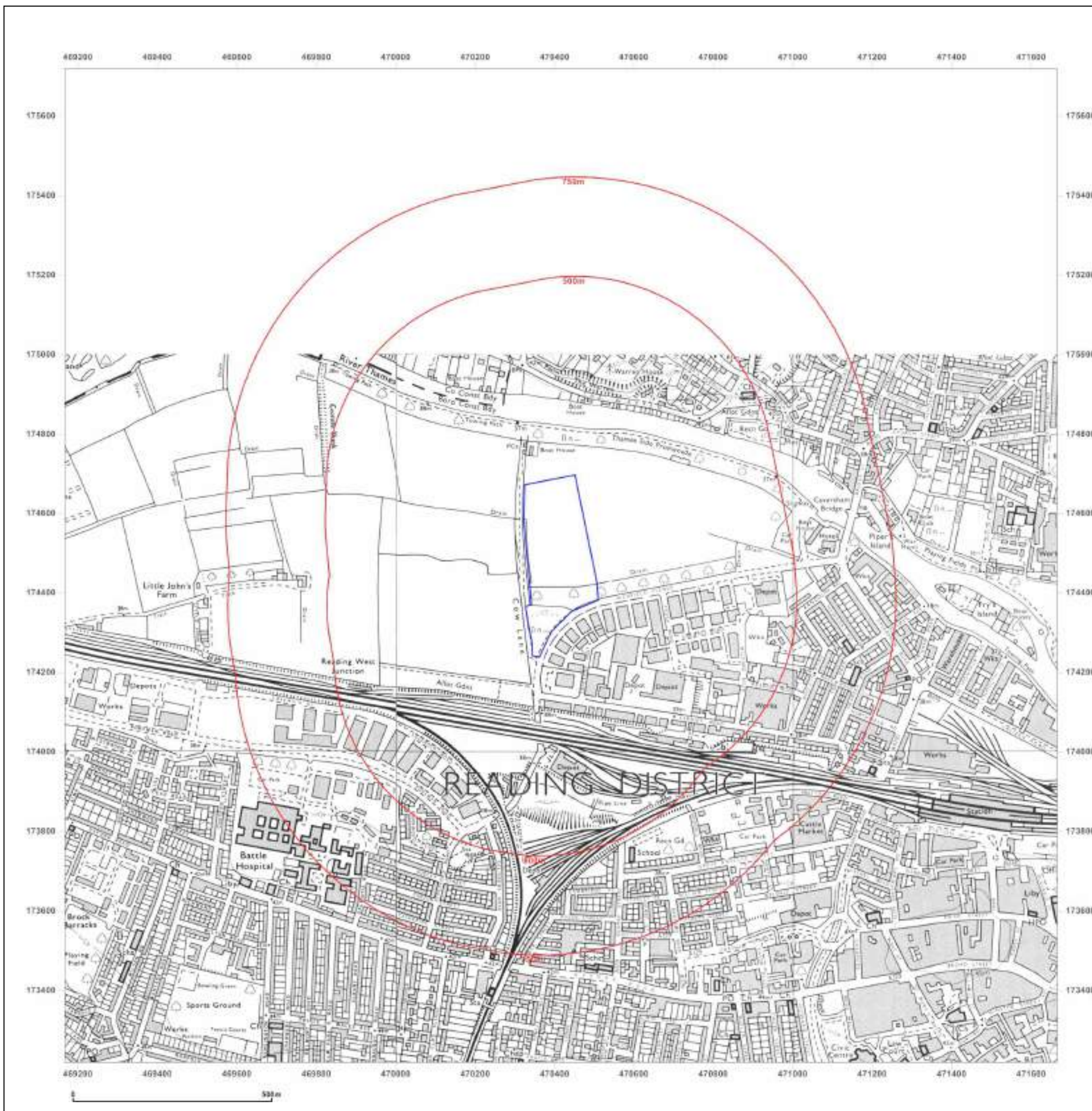


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Site Details:

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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: National Grid

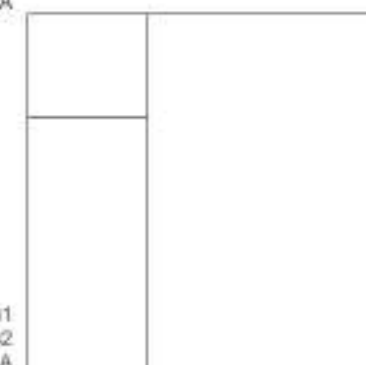
Map date: 1982-1983

Scale: 1:10,000

Printed at: 1:10,000



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Site Details:

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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: National Grid

Map date: 1989-1991

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1985
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Edition N/A
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Surveyed 1990
Revised 1991
Edition N/A
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Levelled N/A

Surveyed 1987
Revised 1989
Edition N/A
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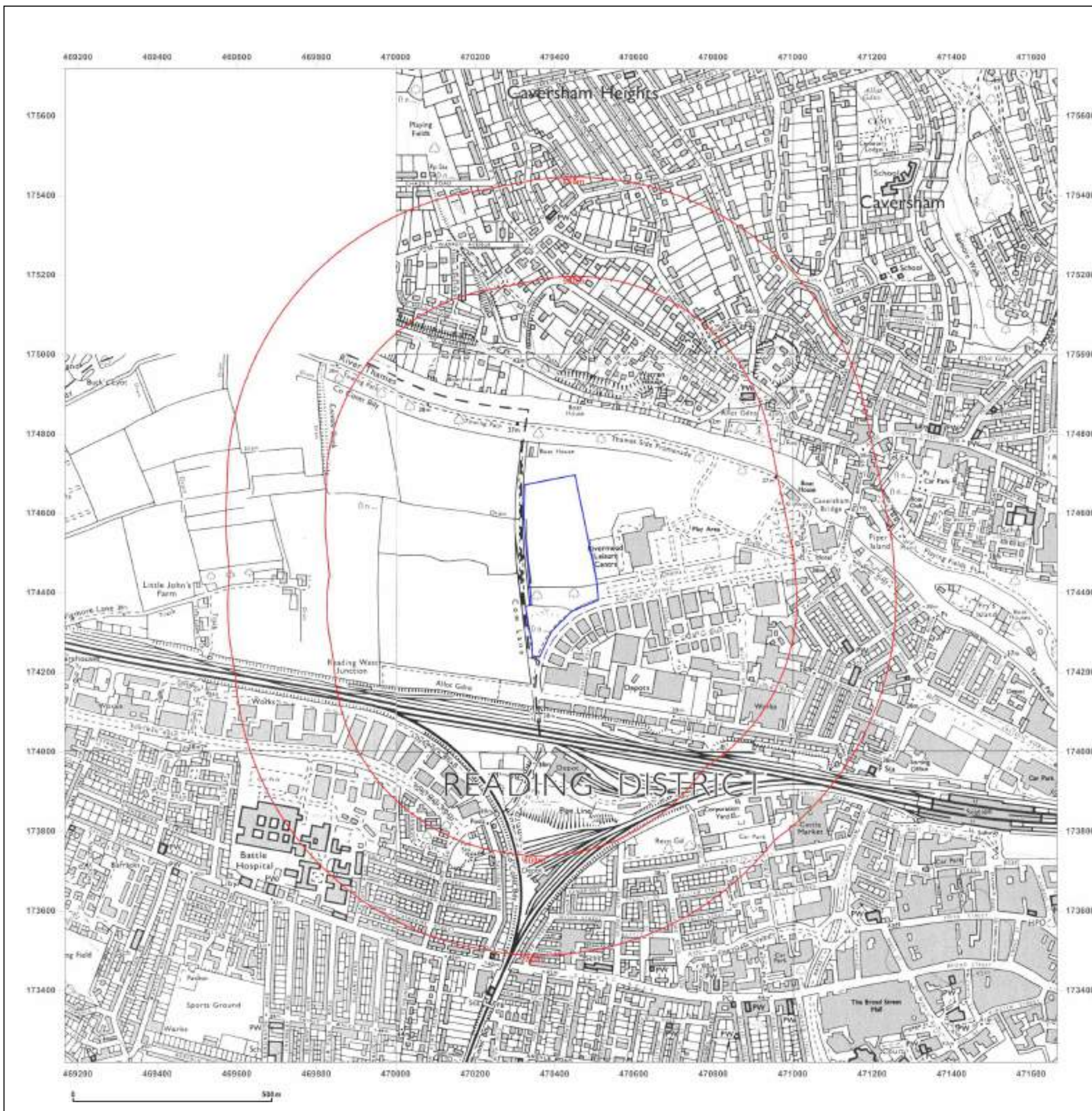


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RG1 8EQ

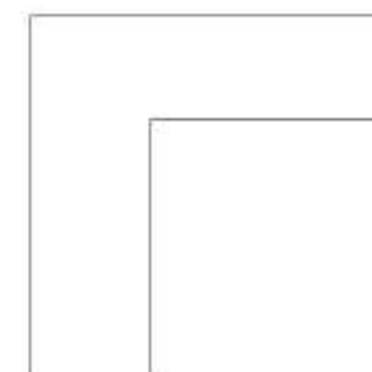
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Grid Ref: 470415, 174468

Map Name: National Grid

Map date: 1994

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1967
Revised 1994
Edition N/A
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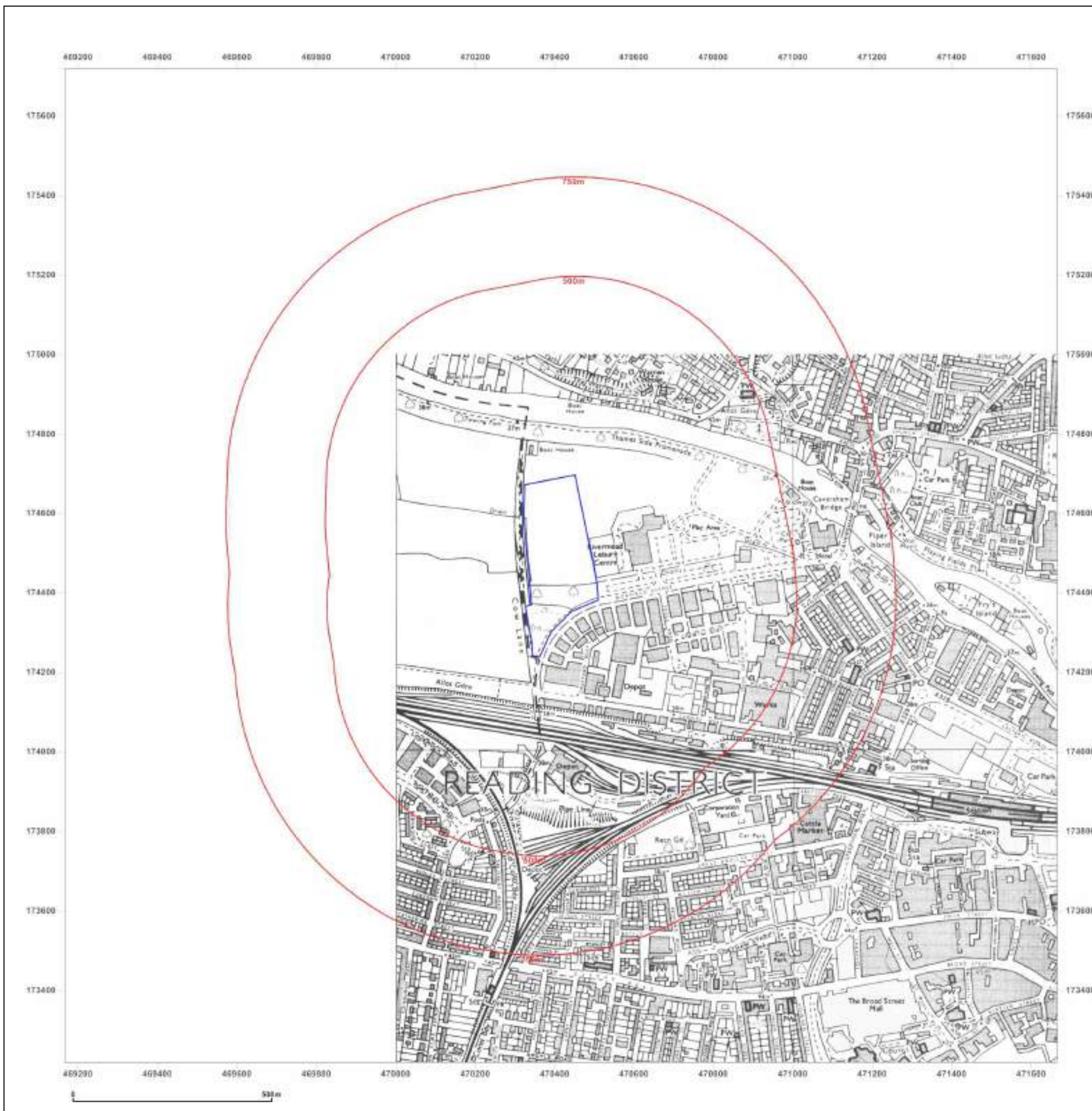


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Site Details:

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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: 1:10,000 Raster

Map date: 2002

Scale: 1:10,000

Printed at: 1:10,000

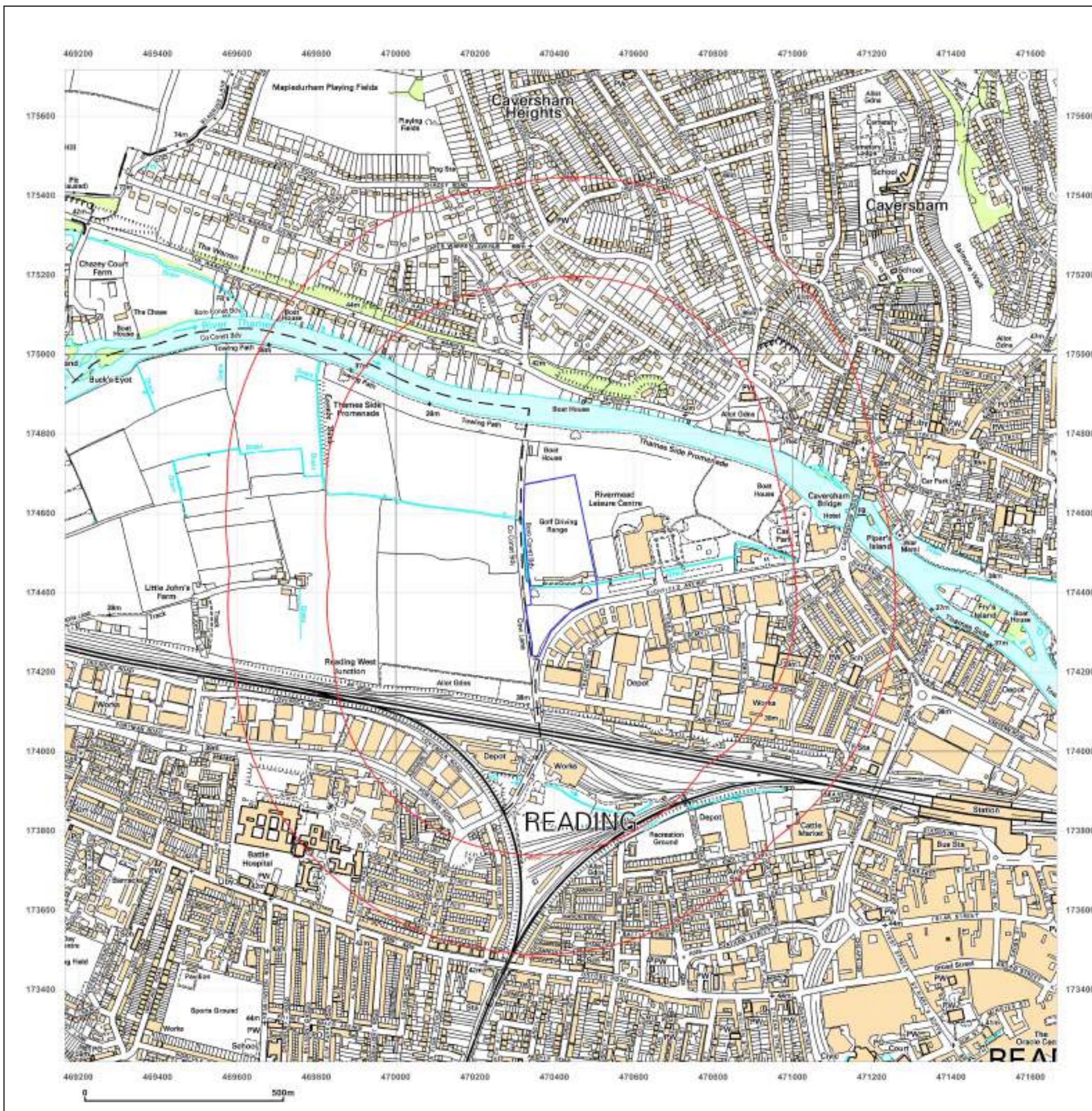


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Site Details:

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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000

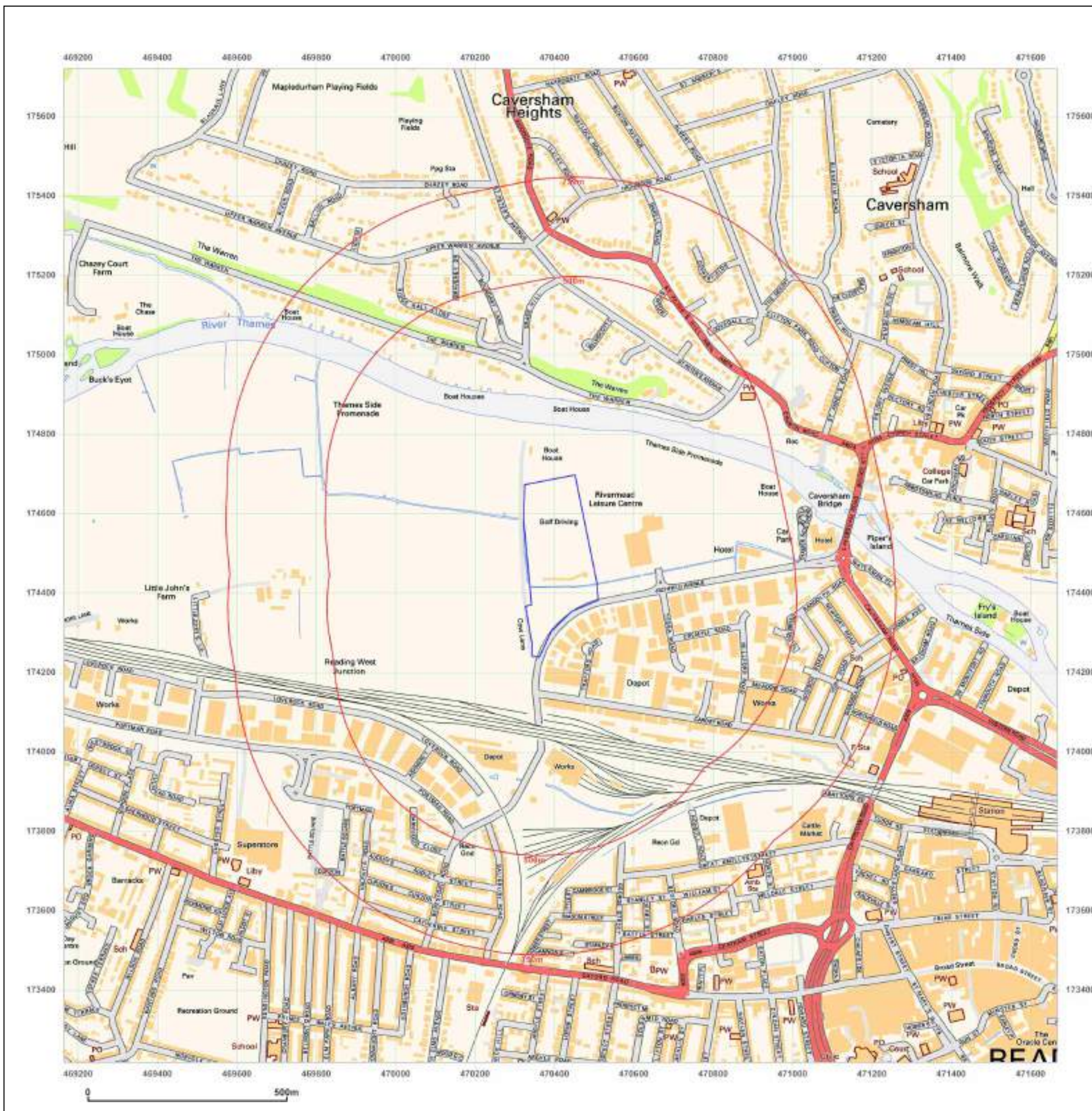


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Site Details:

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RG1 8EQ

Client Ref: 6147
Report Ref: GS-4904500
Grid Ref: 470415, 174468

Map Name: National Grid

Map date: 2014

Scale: 1:10,000

Printed at: 1:10,000

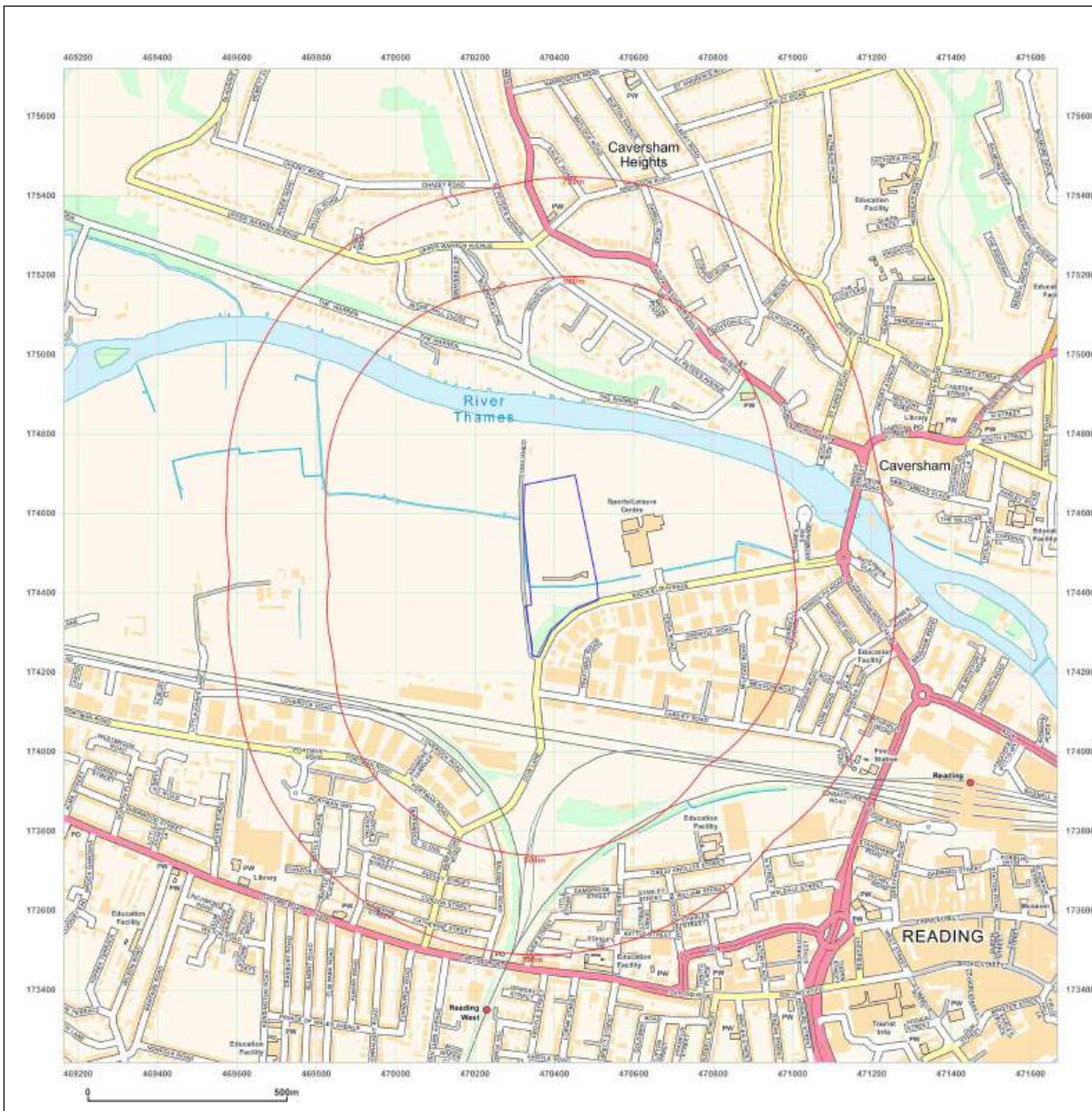


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Annex B: BGS Borehole Logs

Institute of Geological Sciences

MINERAL ASSESSMENT UNIT

Sand and Gravel Survey

BOREHOLE RECORD SHEET

Borehole Reg. No. **SU 77 SW 9**

Nat. Grid Ref. **7037 7431**

Locality **Cow Lane: Reading**

Date started **27-Nov-1972**

Date finished **27-Nov-1972**

Recorded by **C.E. CORSER**

Drilled by **Sondadores**

Drill type **Perussion**

Hole diameter **152 mm.**

Surface level ft. OD

Water struck at **1.3** m below surface

Water struck at ft. OD

Depth(s) bailed

Mean grading percentages

Fines Sand Gravel

Classification of ground

Thickness m

Nature

Overburden

1.3

Silt and clay

Mineral

6.8

Gravel and Sand

Bedrock

0.5 +

Chalk

8.6

Remarks

Description of Strata

Thickness m

Depth to base m

Sample Nos.

Topsoil

0.1

0.1

Sandy clay: brown, trace of gravel

1.2

1.3

More "clayey"

Gravel and Sand

1.0

2.3

MT1261

1.0

3.3

MT1262

1.0

4.3

MT1263

1.0

5.3

MT1264

1.0

6.3

MT1265

1.0

7.3

MT1266

0.8

8.1

MT1267

More "Sandy"

Gravel: Well washed, clean (ie little clay); fine to coarse, but predominantly medium; "assortment" of pebbles: mostly flint W.R. to S.A. black, or brown. Well rounded quartz and quartzite, fine to medium size range, white, light brown or brown. Occasional sandstone and/or limestone. Some cobbles, invariably flint.

cont. over →

Description of Strata (cont.)		Thickness m	Depth to base m	Sample Nos.
<u>Sand</u> : Typically medium and coarse with fine (some of the fines lost by the action of bailing), only milky clayey in parts: faint evidence of clay content decreasing with depth. white-grey in colour, mostly quartz and flint; makes up 50% of the sample in all cases. Scattering of chalk in sample MT1267.				
<u>Chalk</u> . (as mapped)		0.5+	8.6	
Sample Depths		<u>No. Special Samples</u>		
Sample No.	Depth Interval m	Remarks		
MT1261	1.0	} <u>Valley Sand and Gravel.</u> 6.8 m.		
MT1262	1.0			
MT1263	1.0			
MT1264	1.0			
MT1265	1.0			
MT1266	1.0			
MT1267	0.8			

Institute of Geological Sciences
MINERAL ASSESSMENT UNIT

Sand and Gravel Survey
BOREHOLE RECORD SHEET

Borehole Reg. No. **SU 77 SW 8**
Nat. Grid Ref. **7044 7475**
Locality **Thames Side Promenade: Reading**
Date started **28th Nov. 1972**
Date finished **30th Nov. 1972**
Recorded by **C. F. CORSER**

Drilled by **Somclaires**
Drill type **Percussion**
Hole diameter **152 mm**
Surface level ft. OD
Water struck at **3.8** m below surface
Water struck at ft. OD

Depth(s) bailed
Mean grading percentages
Fines Sand Gravel

Classification of ground	Thickness m	Nature
Overburden	3.8	Made-ground clays silt etc
Mineral	6.9	Gravel and Sand.
Bedrock	0.5 + 11.2	chalk

Remarks **Typical River Valley gravel with a mixed gravel composition comprising flint, quartz, quartzite, sandstone and limestones etc. Sand typically medium to coarse with little if any fines.**

Description of Strata	Thickness m	Depth to base m	Sample Nos.
- Overburden - <u>Made-Ground</u> Concrete, soil, rubbish, clay, bricks etc. (Sports and Parking ground)	2.2	2.2	/
<u>Clay</u> : grey-brown, very silty no gravel: suggests alluvial-silt deposit	1.8	3.8	special sample
- Valley Gravel - <u>Gravel and Sand</u>	1.0 1.0 1.0 1.0 1.0 1.0 0.9	4.8 5.8 6.8 7.8 8.8 9.8 10.7	MT1268 MT1269 MT1270 MT1271 MT1272 MT1273 MT1274
Special sample of the various gravel components MT1269/74			

British Geological Survey	Description of Strata (cont.)	Thickness m	Depth to base m	Sample Nos.
	<u>Gravel</u>: unsorted, great variety in pebble shapes and colours. Fine to coarse with cobble size, clean, having little clay Flint: well rounded to subangular, brown, black and white-brown: some cobble size invariably fractured Quartzite: medium to coarse, well rounded occasional cobble size Quartz: well rounded white Sandstone: brown to white brown, fine grained (see special sample) Ironstone: rare; reddish brown Limestone: (?). white, mostly 6m downwards <u>Sand</u>: medium to coarse with fine, clean little clay or fine element (invariably due to 'bailing' action) mostly quartz and flint in composition. Samples very similar throughout. Occ. Flint cobbles throughout. Scattering of chalk MT 1274.			
	Chalk (as mapped)	0.5+	11.20	

Sample Depths			Special Sample
Sample No.	Depth Interval m	Remarks	
MT 1268	1.0	<u>Gravel + Sand.</u> 6.9 m.	1. Various components of the gravel collected for intact Quartz: Quartzite: Sandstone: with particular interest in the white limestone (sandstone)? From 3.8m to 10.7 MT 1268-74.
MT 1269	1.0		
MT 1270	1.0		
MT 1271	1.0		
MT 1272	1.0		
MT 1273	1.0		
MT 1274	0.9		

**Annex C: Terramech Investigations Ltd. –
Short Geotechnical Report (3937)**



Terramech Investigations Ltd
183 Long Lane
Tilehurst
Reading
RG31 6YW

Tel: 0118 943 9910
Fax: 0118 943 9920

Our Ref: 3937 – Short Geotechnical Report

21 July, 2017

SITE: LEADERBOARD GOLF, RICHFIELD AVENUE, READING, RG1 8EQ

This ground investigation was commissioned by KRP Consulting Engineers Ltd of Sandhurst, on behalf of their client Reading Borough Council. The purpose of the ground investigation was to establish the soil conditions in the southeast corner of the former Leaderboard Golf driving range, also to provide preliminary soil parameters for foundation design, although the intended use or proposed construction has not been determined.

The ground investigation scope set out by the consulting engineers comprised of:

- 1) Three cable percussive boreholes, one to 15m and two to 8m,
- 2) Borehole insitu and laboratory geotechnical testing,
- 3) Water level and gas monitoring
- 4) Taking samples to assess the soils human health suitability, also waste category.
- 5) A single hand dug trial pit (to a maximum depth of 1.2m) to establish the depth of the existing foundations.

The geological map for the area shows the expected solid geology to be comprised of the *Seaford Chalk Formation*, overlying the *Lewes Nodular Chalk Formation*. Superficial deposits capping the chalk are expected to comprise *Langley Silt Member* (typically sandy clays), overlying the *Kempton Park Gravel* (typically sands & gravels, sometimes with a variable silt & clay component). *Alluvial* deposits (variable silts, clays, sands, gravels and organics) are shown on the mapping to be closer to the *River Thames* (just to the north of the area under investigation). *Made Ground* is known to be present at locations across the *Rivermead* site, presumable to make up ground levels to protect against flood events.

The ground level of the proposed structure(s) is ~39.0m. It is expected that the bank of the River Thames ~250m to the north would be at a similar height.

Ground Investigation

This ground investigation, comprised of three cable percussive boreholes (BH1-BH3), took place on 7th and 8th June 2017. Return visits to the site were made on the 7th and 17th July to complete water level and gas monitoring.

Light Cable Percussive boreholes (also known as shell and auger boreholes) were drilled at locations specified by the consulting engineers, which are shown on page 2 of the appendices.

This drilling method uses a large (6m high) tripod rig which lifts and drops heavy cutting tools, samplers and bailers to advance the borehole.

The drilling was carried out within steel casing tubes which prevent the sides of the borehole collapsing. These rigs are able to penetrate waterlogged granular soils and clays ranging from soft alluvium to hard clays and mudstones.

As the drilling process in chalk almost completely destroys any structure, undisturbed samples were recovered the chalk in one borehole to aid the chalk description. Insitu Standard Penetration Tests (SPT) were carried out in granular and chalk materials. In addition, samples were also taken for both contamination and geotechnical testing.

Standpipes were installed in each of the boreholes to depths between 8m and 10m for water level and gas monitoring purposes.

A single hand dug trial pit was requested adjacent to the wall of the most easterly *Leaderboard Golf* building to expose the foundations. The trial pit section is included on page 8 of the appendices.

Ground Conditions

The exploratory hole location plan along with the logs are presented in appendix A of this report however, a summary of the strata encountered in the boreholes is summarised below:

Stratum Description	Depth to Top (m bgl)	Depth to Base (m bgl)	Thickness (m)
Topsoil (All three boreholes) Minimal thickness of grass over topsoil encountered in each borehole.	0.00	0.05-0.10	0.05-0.10
Made Ground (All three boreholes) <i>Cohesive Capping – All three boreholes</i> Typically, a firm brown, or dark brown CLAY, sometimes gravelly CLAY, occasionally with some brick gravel.	0.05-0.10	0.40-0.70	0.35-0.60
Made Ground (Boreholes BH1 & BH2 Only) <i>Man-made Dominated Materials</i> Variable components including, ash, brick, flint, wood, metal, plastic & paper.	0.40-0.70	1.40-1.90	1.00-1.20
Langley SILT (Possibly in BH1 & BH3) <u>Probable Langley SILT, could be Made Ground.</u> Typically, a firm brown or dark brown sandy silty CLAY	1.40-1.00	2.10-1.90	0.70-0.90
Kempton Park Gravel (All three boreholes) Typically, medium dense to dense grey, becoming brown, slightly sandy GRAVEL, sandy GRAVEL, or SAND & GRAVEL. Gravels comprised fine to coarse flint.	0.80	1.40	0.60
Seaford Chalk Formation (Boreholes BH1 & BH2 only) Typically, white structureless CHALK, chalk comprised medium density gravelly silt, sub-angular & sub-rounded. Some brown staining, sand pockets, and occasional flints. Estimated to be CIRIA Grade Dm, becoming clast dominated Dc in BH2 at ~13.0m.	7.20-7.70+ (not encountered in BH3 by 8.0m)	8.0+ to 15.0+	0.30-7.80+

Table 1: Summary of ground conditions encountered in the boreholes.

Groundwater

Groundwater was encountered in each of the boreholes. The observations during, on completion, after removal of the casing, also on two return visits to monitor the standpipes has been summarised in the table below:

Borehole	BH1	BH2	BH3
Depth water struck during drilling:	2.7m	2.6m	2.7m
inflow Rate:	Slowly	Fast	Rapidly
depth rose to:	2.2m	2.1m	2.3m
at casing depth:	2.4m	2.0m	2.5m
sealed out by advancing casing at:	Not sealed out	Not sealed out	Not sealed out
Depth at completion of drilling	4.2m	4.0m	3.6m
Depth when casing removed	2.1m	2.1m	2.2m
Standing water levels:			
7 th July 2017	2.53m	2.36m	2.59m
17 th July 2017	2.59m	2.33m	2.53m
Approximate AOD Level	36.4m	36.5m	36.6m

Table 2: Summary of borehole water observations

It should be noted that there may be significant fluctuations in the groundwater level, these may include times when ground investigation area is below flood waters. It is considered that the water level in the standpipes should be similar to those in the River Thames to the north.

It is recommended that these borehole standpipes should be monitored for a longer duration if an assessment of typical standing water levels over the seasons, also during flood events, is required.

The trial pit TP1 located against the wall of the most easterly Leaderboard Golf building found brick to extend to 0.4m below ground level. A 250mm concrete projection was then observed which reduced by 50mm with depth. The concrete was found to be over 850mm deep (total depth in excess of 1.25m below ground level). The soils at 1.25m were comprised of *made ground*, no further progress was possible due to a concrete & metal obstruction at the base of the trial pit.

Geotechnical Testing

- Soil strength was assessed purely on Standard Penetration Tests (SPTs) due to unsuitable material for undisturbed samples/triaxial tests.
- Three liquid and plastic limit tests were carried out, one of the clay capping, with two in the Langley Silts.
- Six wet sieve analysis tests were scheduled from the Kempton Park Gravels
- Five water soluble sulfate tests were carried out, four on representative soils samples and one water sample.
- Two chalk bulk density tests were scheduled.

Volume Change Potential

The following shrinkage recommendations are made using extracts from the current NHBC Standard 'Building near Trees' (2017) Chapter 4.2 which is thought to be the most concise and widely used document on the effects of the moisture demands of the trees on shrinkable soils. This chapter has been used to assess the soils in terms of shrinkage and foundation depth calculations, as well as providing ground floor slab and compressible membrane recommendations. Not all the recommendations in this chapter have been reproduced, therefore this document should be read in conjunction with this chapter 4.2.

The NHBC categories are as follows:

Non-shrinkable

*Grading - less than 35% passing the 63 micron sieve (silt & clay), or
Plasticity index less than 10%*

Low Volume Change Potential

10% to less than 20%

Medium Volume Change Potential

20% to less than 40%

High Volume Change Potential

40% and greater

The liquid & plastic limit testing (Atterberg) carried out on the upper *Clay Capping*, or the lower *Langley Silts / Made Ground* (not confirmed if natural) returned the following results:

Trial Pit Number	Depth	Formation	Percentage Passing 425um sieve	Plasticity Index	Modified Plasticity Index
BH1	1.2m	Langley Silt/Made Ground	60%	11%	7%
BH2	0.5m	Clay Capping	71%	13%	9%
BH3	1.2m	Langley Silt/Made Ground	28%	15%	4%

Although each of the modified plasticity index results were below 10%, due to the limited number of tests carried out, one having a value of 9% (close to low volume change), also a slight reduction in gravel/coarse sand will result in a higher value, it is recommended that the soils above the Kempton Park Gravels should be considered to be of *low volume change potential*.

The gradings of the *Kempton Park* gravels all found less than 10% passing the 63µm sieve (silt & clay), therefore are deemed non-shrinkable according to the NHBC standards.

The chalk at depth can also be considered to be non-shrinkable.

Low volume change potential recommendations

The current NHBC Standard 'Building near Trees' Chapter 4.2 (2017) calls for a minimum foundation depth of 0.75m for *low volume change potential soils*, where foundations are not within the effects of existing trees, proposed planting, or recently removed trees. Where foundations are within the effects of nearby trees, proposed planting or recently removed trees, the depths should be calculated for the tree type and its distance from the foundations.

Where trees have been, or are to be, removed from within 2.0m of the face of the proposed foundation, and where the height on removal is less than 50% of the mature height, it may be assumed that the distance from the foundations (D) = 2.0m when calculating foundation depths.

No trees were observed close to the proposed development area, the closest being ~25m to the south. This will need to be confirmed on site.

Allowances in foundation design would also need to be made for planting of new trees and shrubs, which should comply with the NHBC Standard Chapter 4.2 (2017). Planting schedules should be agreed with the local planning authority.

Compressible membranes

As only non-shrinkable and low volume change potential soils were encountered, there is no NHBC requirement for compressible membranes to the sides of trench fill or pad foundations or the sides of ground beams.

Compressible membranes will be required below ground beams unless it can be confirmed that the soils are not seasonally desiccated at the time of placement.

The following recommended heave precautions for foundations are reproduced by permission of Messrs Cordek Ltd.

Plasticity Index	Shrinkage Potential	Sides of Beams and Foundations		Underside of Ground Beam	
		BRE/NHBC Void Dimension Mm	Equivalent VR Claymaster mm	BRE/NHBC Void Dimension Mm	Equivalent Cellcore (Type CC) thickness Mm
Above 60	Very high*	50*	100	200*	300
40 – 60	High	35	75	150	250
20 – 40	Medium	25	50	100	175
10 – 20	Low	0	Not needed	50	100
Beam Depth mm		Safe Load kN/m ²	Fail Load kN/m ²	Reference	
Up to 350		10	15	10/15CC	
350 – 600		17	24	17/24	
Above 600		Heavier Duty Grade available			
*This category has been recognised by the BRE, but NHBC recommendations have not been published to date					

Soil Strength

The Standard Penetration Test (SPT) carried out in the *made ground* confirmed these materials were soft/loose therefore unsuitable as a bearing medium for buildings, unless a ground improvement technique was employed. These materials may be suitable in terms of shear failure for lightweight structures or frames, however settlement may be excessive and highly variable, where significant differential settlement may occur.

Due to the uncertainties over whether the clays encountered in BH1 and BH3 at 1.4m and 1.0m are part of the natural *Langley Silt* formation or if these are *made ground*, also a poor SPT value in BH1 at 1.2m, it is recommended that proposed foundations also bypass these materials unless further investigation are carried out to confirm their origin and a suitable safe bearing pressure.

The slightly sandy GRAVELs, sandy GRAVELs, or SAND & GRAVEL encountered in BH1 to BH3 at 2.1m, 1.9m and 1.9m respectively initially recorded SPT 'N' values between 23 and 34, averaging over 25. Based on this an allowable bearing value of 250kPa would be appropriate for foundations up to 1.5m wide in 'dry' conditions (water level at least one foundation width below the footing base). However, as the standing water level is currently 0.3-0.5m below the top of the *Kempton Park Gravels*, with water levels likely to be significantly higher during wetter months and river flood events, it is recommended that allowable bearing values should be restricted to 125kPa for foundations up to 1.5m wide. This allowable bearing value does not take account of the practicalities and detrimental effects when water rises above the base of the excavations, such as side instability, 'running sands', also 'piping' where the upward pressure of water reduces the base strength.

It is recommended that water levels should be monitored over a longer period of time to assess if founding at the top of the Kempton Park Gravels (~2.0m) will be practical without the use of a designed dewatering scheme.

Alternatively, a piled solution could be considered such as CFA, driven piles or helical screw piles.

Ground floor slabs

The NHBC Standards recommends that suspended slabs should be used in all situations where heave may occur within the area bounded by foundations, such as where calculated foundation depths are greater than 1.5m, or the soils below the slab at the time of construction being seasonally desiccated (i.e. summer or autumn), unless proved otherwise.

As there is also the potential that soils maybe at or above their natural moisture content at the time of placement of a ground bearing slab, shrinkage may then occur as the low volume change potential soils dry out due to being covered by the proposed building. This shrinkage may cause settlement of the slab relative to the deeper foundation walls.

Ground bearing floor slabs would not be recommended as up to 2.0m of low strength and high compressibility made ground was recorded in the boreholes.

It is therefore recommended that unless this potential differential movement can be tolerated a suspended ground floor slabs should be installed. The NHBC Standards 'Building near Trees' 2016, chapter 4.2 Table 7 calls for a minimum void depth of 200mm for soils of low volume change potential when using pre-cast beam and block or suspended timber construction, or 50mm for suspended cast in-situ concrete ground floor slabs.

Drainage

Chapter 4.2 of the NHBC Standards required allowances to be made for the possibility of heave and /or shrinkage. It is possible greater drainage gradients may be required than given in NHBC Chapter 5.3 'Drainage below ground' as these do not make possible ground movement. Potential ground movement in low volume change potential soils may be in the order of 50mm. Deepening service trenches laying pipework on granular backfill may reduce this risk.

Aggressive Soils

Two samples of the made ground and one of the natural soils were scheduled for BRE SD1 sulfate testing. In addition, two further samples of the made ground, two of the natural soils, also one water sample was scheduled for water soluble sulfate testing.

Of the eleven soil samples tested, only three samples had elevated water soluble sulfates, these were all of the made ground. The others returned low values as SO_4 , with levels of pH sufficiently close to neutral not to require any protection measures for concrete. The elevations returned SO_4 values between of 1,548mg/l and 1,978mg/l. This classifies these materials by BRE SD1:2005 '*Concrete in Aggressive Ground*', as being of Design Sulfate Classes DS-2 and DS-3. DS-3 equates to ACEC Class AC-3, then Design Chemical Class DC-3.

The total potential sulfate testing carried out on seven samples returned elevations on two samples, both again in the made ground containing brick, ash, metal, etc. The total potential sulfates were in Design Sulfate Class DS-3 and DS-4. DS-4 equates to ACEC Class AC-4, then Design Chemical Class DC-4.

The water sample tested from 2.6m in BH2 was classed as DS-1, implying that the sulfates in the soil are not too mobile.

It is recommended that where concrete passes through the made ground containing brick, ash, metal, etc, this should be to Design Chemical Class DC-4.

BRE SD1 does states that where the section thickness is greater than 450mm is used and some surface chemical attack is acceptable, a relaxation of one step in DC class may be applied. For reinforced concrete, the cover should be sufficiently thick to allow for estimated surface degradation during the intended working life.

Conversely, section thicknesses of less than 140mm should be avoided in insitu construction but, where this is not practical the DC class should be increased by one.

Radon

Radon protection measures for this site were derived from the BRE document BR211 (2007) Annex A maps. This source indicates that no radon protection measures are required.

Landfill Gases

Due to the presence of made ground on site which had Total Organic Carbon (TOC) values between 12.68 and 24.99%, also in the wider area, gas monitoring was carried out from each of the three standpipes installed.

To date, only two visits have been carried out, the third is to be timed for a period of low and falling atmospheric pressure. This report will be updated following the third monitoring round.

The gas monitoring results are shown on page 7 of the appendices, but have been summarised below:

- Methane was only recorded in borehole BH1 at 0.2% on both monitoring visits.
- Carbon Dioxide was variably elevated, predominantly in the boreholes closer to the east (BH1 and BH3), with a maximum value of 13.8% logged.
- Depleted oxygen was typically present where there was elevated carbon-dioxide, the lowest value being 3.2%.
- Low levels of carbon monoxide were recorded, typically near detection level 1 or 2ppm, occasionally 3 or 4ppm.
- Hydrogen Sulphide was found to either be at or below detection level (1ppm).
- The maximum flow rate recorded over the two visits was 0.3 l/hr.

Using the Code of practice for the design of protective measures for methane and carbon dioxide gases for new buildings, BS8485:2015, based on the results to date, worst case hazardous gas flow rates of 0.0006 l/hr for methane, and 0.0414 l/hr for carbon-dioxide are calculated. Both of these values are below the Characteristic Situation CS1 gas screening value.

Normally CS1 would not require any gas protection measures, however as only two monitoring visits have been carried out to date, also as there was elevated carbon-dioxide values recorded, it is recommended at this time it would be prudent to use CS2 for design purposes.

Characteristic Situation CS2 will require a score of 3.5 points for private or commercial/public buildings with small to medium sized room, or 2.5 points for commercial/public buildings with small to large sized rooms, or 1.5 for commercial/industrial buildings (retail park style).

According to BS8485:2015, as an example, to obtain a gas protection score of 3.5 both of the following would be required, although other variations/solutions are possible:

- 1) A well-ventilated-passively ventilated slab would provide a score of 1.5 with good performance, or 2.5 with very good performance.
 - a. The volume flow-through rate is governed by the size and number of side vents; for small to medium width buildings (up to 15m wide), the minimum area of side ventilation should be 1,500mm²/m run of wall on at least two opposite sides. For larger width buildings, the side ventilation provisions should be at least 2,000mm²/m run of wall for gas regimes up to and including CS3 and 4,500mm²/m run of wall for gas regime CS4. The minimum depth of the clear void space should be 100mm. Where there are multiple internal obstructions to air flow (caused by beams), there should be four or five times the area of the side vents provided in the internal obstructions.
 - b. To assign a points score of 2.5, all of the recommendations in the paragraph above (a) should be met. If the amount of side ventilation, or internal cross openings, are less than the above recommendations, then the score should be reduced to 2 or 1.5, depending on the additional obstruction to air flow in the layer.
- 2) A gas resistant membrane meeting all of the following criteria will provide a score or 2.0:
 - a. sufficiently impervious to the gases with a methane gas transmission rate <40.0ml/day/m²/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method);
 - b. sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
 - c. sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab);
 - d. sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc);
 - e. capable, after installation, of providing a complete barrier to the entry of the relevant gas; and
 - f. verified in accordance with CIRIA C735 [N1]

These recommendations will be updated after the next gas monitoring round.

Soakaways

BRE365 soakage tests were not carried out as part of the remit for this ground investigation, although the following observations are made:

- It is not recommended for the made ground to be used as a permeable medium due to:
 - The potential for contaminants within the made ground, which may have increased leaching with soakaways present.
 - The potential for large variations in its permeability
- The Kempton Park Gravels at ~2m are likely to have very good permeability, however at the current time the standing water level was 0.3-0.5m below the top of this formation, resulting in reduced storage capacity, with possibly no capacity during flood events.

Contamination Testing

A total of nine representative samples were taken from the three boreholes and single trial pit of these the following testing was scheduled:

- 1) Comprehensive Suite Testing
 - a. One sample from the topsoil from each of the boreholes (3No)
 - b. Three samples of made ground (man-made dominant materials) from BH1, BH2 and TP1
 - c. One sample of the natural ground from BH2
- 2) Waste Acceptance Criteria Testing
 - a. A composite sample was formed from six individual samples of made ground.
 - b. A composite sample was formed from three individual samples of natural ground over a range of depths.

Human Health Assessment

The testing was assessed against the C4SL values published in the DEFRA SP1010 report, or CIEH/LQM S4SL values, based upon a public open space (park) scenario.

The comprehensive suite testing concluded:

- Although there were some elevated metal values returned, including Arsenic and Lead, none exceeded their respective screening values, although some were close to the threshold. Interestingly, the waste acceptance leachate tests on these materials showed that the Arsenic and Lead were of very low solubility.
- All of the Poly-cyclic aromatic hydrocarbons were below the public open space (park) screening values. Assessment of the concentrations present using double ratio plots suggest that the compounds were associated with coal and coal ash. This is consistent with the ash described in the sample logs which probably contained a high proportion of unburnt coal.
- The total petroleum hydrocarbons were analysed using a banded analysis method where concentrations are given for individual hydrocarbon weight bands spanning the gasoline and diesel ranges. The results for each weight band are also divided into two main hydrocarbon groups Aliphatic and Aromatic Hydrocarbons. Only trace concentrations were observed below C10, although high values were recorded in the heavier hydrocarbon ranges, none of the concentrations in any one band exceeded the screening value for that band for public open spaces (parks).
- Phenols (total Monohydric Phenols includes Cresols or Methylphenol and Chlorinated Phenols) were below detection levels in each sample tested.
- Cyanide is a common industrial contaminant and can be used in the case hardening of steel, or it can be present as a combustion by product. Older industries such as town gas works produced Cyanide based waste called Blue Billy (Ferric Cyanide). The analysis returned Free Cyanide values below detection levels in each sample, however Total Cyanides were recorded, the highest value being 16.1mg/kg, with Thiocyanates detected at a concentration of 1.1mg/kg. Thiocyanates are formed by metabolism of other cyanide compounds by plants and animals. The samples with elevated concentrations of these cyanides were all in the ashy made ground layers and we suspect that the compounds are simply combustion residues which lie alongside PAH based combustion residues already detected. The presence of Thiocyanates suggests that the compounds have been in the ground a long time and posing little risk compared with free cyanide, which was not detected.

- Asbestos screening was carried out on all of the samples tested, this showed that there were no fibres detected.
- Poly Chlorinated Biphenyls (PCBs), often used in electrical sub-stations and other electrical installations manufactured before 1981 before the use of PCBs in new equipment was banned in the UK. A single composite sample from *made ground* and another from the *natural ground* was subject to PCB testing. The sample of *natural ground* showed all congeners to be below detectable limits, however the *made ground* sample showed elevated congeners in PCB-101, PCB-118, PCB-138, PCB-153, and PCB-180. This suggests that remnant debris from some electrical equipment or old cables are present, probably in the *made ground* layers. Although screening values for human health assessment are provided in the CLEA model (v1.701), the WAC analysis considers a different set of congeners. However, The CLEA 1.701 values are the same for all congeners, assuming the same generic value for assessment of the WAC PCB results we can see that any value over 2.3mg/kg is of concern for land to be used as parkland. Given that the sample was composited we should be aware that dilution has occurred and the actual values in the ground would be higher than those detected. On this basis, we would highlight the presence of the PCBs as an issue of concern and suggest that some further sampling and analysis is carried out.
- Total Organic Carbon (TOC) values for the *made ground* ranged between 12.68 and 24.99%, with the Soil Organic Matter (SOM) ranging between 21.9% and 43.1%.
- The topsoil and natural ground returned TOC values below 5%, with SOM values below 8%.

Waste Classification

Waste Acceptance Criteria Testing was carried out on a composite sample of the made ground and another of the natural soils to assess the waste classification of this material.

Assessment of soils destined for landfills takes two stages. The first is basic site characterisation, the second stage is compliance testing to assess the leachability or solubility of any contaminants that are present at elevated concentrations as well as to assess organic matter which will generate gases when the materials are buried. Waste Acceptance Criteria (WAC) compliance testing involves a series of leachate or solubility tests for metalloid compounds and total concentrations of hydrocarbon based compounds as well as organic matter content. The purpose of these tests is to assess the risk posed by the material when placed in a landfill. These risks range from the leaching of soluble contaminants out of the material and into groundwater or water courses, to the risk posed by matter which could decay and generate gases such as Methane, Hydrogen Sulphide or Carbon Dioxide. The leachate and total concentrations were then compared to values set out in BS EN 12457-3.

The analysis showed:

- The composite *natural ground* sample was classified as *Inert Waste Landfill*.
- The composite *made ground* sample however had elevations of:
 - a. Mineral oils and sulphates as SO₄ that exceeded the *Inert Waste Landfill* criteria limits, with borderline values for Antimony and Total Dissolved Solids.
 - b. Organics (TOC & LOI) exceeded the *Hazardous Waste Landfill* limits.

It is recommended that if material are to be removed from site to landfill, the made ground and natural soils should be stockpiled separately. The WAC test results should be forwarded to the prospective waste contractor for waste categorisation and pricing purposes.

Contamination Summary

The presence of elevated PCBs is currently of concern. We suggest further samples are obtained of the *made ground* in a number of locations, with further PCB analysis carried to assess if this is a localised hotspot, or widespread across the investigation area (or even across the whole Leaderboard site).

The *natural ground* sample was found to be classified as *Inert Waste Landfill*, whereas the *made ground* exceeded the *Hazardous Waste Landfill limits*. It is recommended that the WAC test results should be forwarded to the prospective waste contractor for waste categorisation and pricing purposes.

Yours sincerely



D. R. DEANE MSc FGS

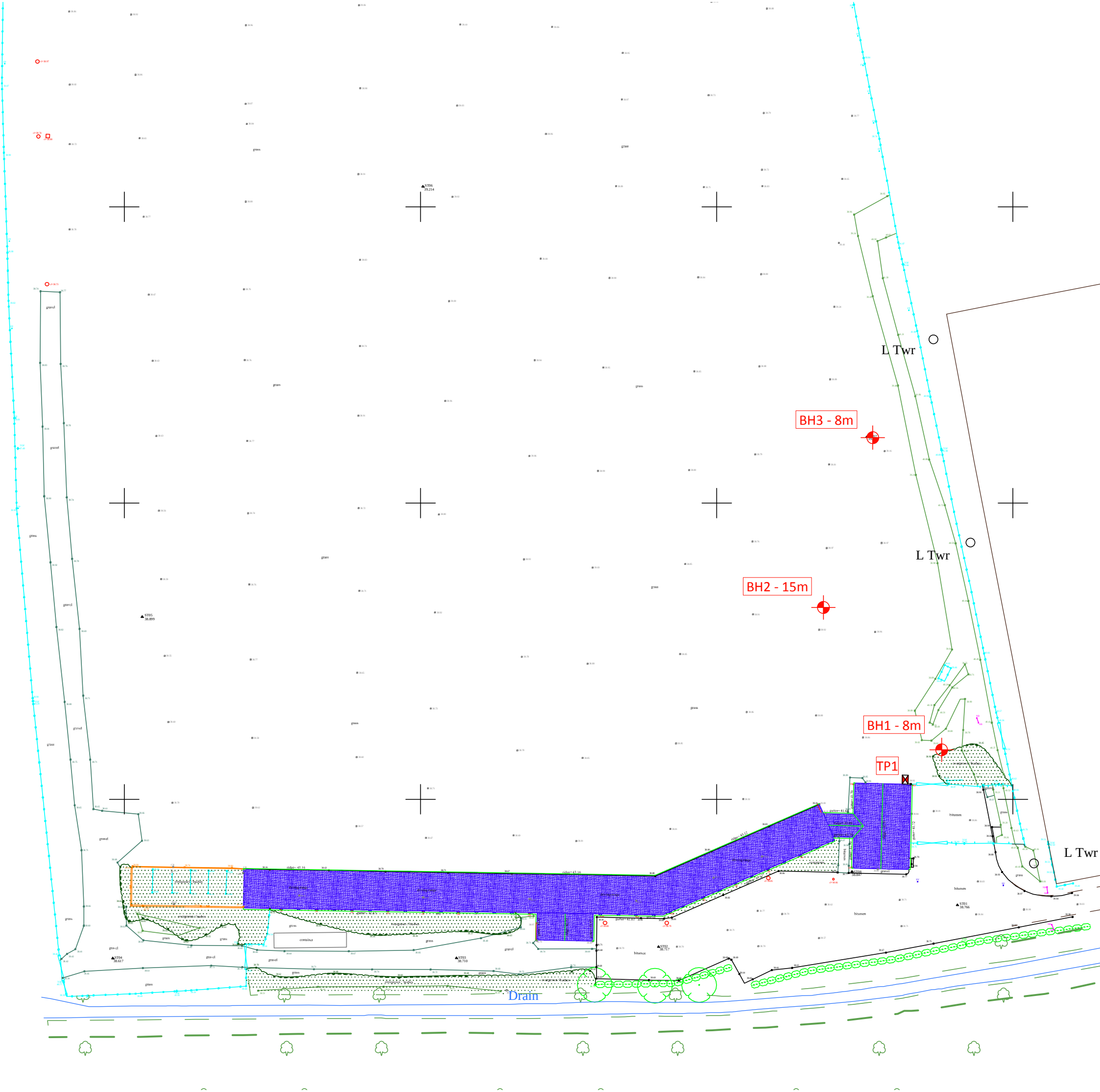
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PAGE: 3		JOB 3937					BOREHOLE		
DATE:21.04.17		LEADERBOARD GOLF, RICHFIELD AV, READING					BH1		
DESCRIPTION	REDUCED	DEPTH	LEGEND	SAMPLE		THICKNESS	SPT	REMARKS	
	LEVEL m				DEPTH	m			
	39.00	0.00		D	0.10	0.05		Hand dug starter pit from ground level to 1.0m	
Grass, over TOPSOIL	38.95	0.05		D	0.50	0.35			
Firm brown CLAY [Made Ground]	38.60	0.40		D	1.00	1.00			
Ash, brick, wood & paper [Made Ground]	37.60	1.40		B	1.20		5	1000 litres of water added between 2.2m and 7.7m	
Firm brown sandy silty CLAY [Langley Silt Member or Made Ground?]	36.90	2.10w		CPT	1.20	0.70	24		
Medium dense sandy GRAVEL, gravel comprised fine to coarse flint [Kempton Park Gravel]		2.10		D	2.10			Water level 2.1m after casing removed	
		2.36w		B	2.10			Standing Water 2.40m on 7th July 17	
		2.40w		W	2.70			Water entered slowly at 2.7m, rising	
		2.70w		B	3.10			Standing Water 2.36m on 17th July 17	
				CPT	3.10	2.70	31	to 2.2m whilst the casing was at 2.4m. The water was not sealed out by advancement of the casing.	
		4.20w		CPT	4.10		30		
				B	4.10			Water level 4.2m on completion of drilling	
Medium dense SAND & GRAVEL, gravel comprised fine to coarse flint [Kempton Park Gravel]	34.20	4.80		CPT	5.10		34		
				B	5.10				
				CPT	6.00	1.80	26		
Medium dense SAND & GRAVEL, with traces of chalk. Gravel comprised fine to coarse flint [Kempton Park Gravel]	32.40	6.60		D	6.45				
				CPT	7.00	1.10	23		
White structureless CHALK [Weathered Seaford Chalk Formation]	31.30	7.70		D	7.45				
	31.00	8.00		D	8.00	0.30		Borehole cased to 8.0m	
								Standpipe installed to 8m (50mm dia pipe, bottom 6m perforated with a gravel surround, top 2m plain pipe with a bentonite surround. Finished with a gas valve and flush cover)	
TERRAMECH INVESTIGATIONS LIMITED 183 LONG LANE TILEHURST READING			REMARKS: Cable Percussive Borehole drilled on 8th June 17 Drillers Descriptions						
U100=100mm dia. UNDISTURBED SAMPLE B=BULK SAMPLE W=WATER SAMPLE			U38=38mm dia. UNDISTURBED SAMPLE SPT=STANDARD PENETRATION TEST			D=SMALL DISTURBED SAMPLE CPT=CONE PENETRATION TEST			

PAGE: 4		JOB 3937					BOREHOLE		
DATE:21.04.17		LEADERBOARD GOLF, RICHFIELD AV, READING					BH2		
DESCRIPTION	REDUCED	DEPTH	LEGEND	SAMPLE		THICKNESS	SPT	REMARKS	
	LEVEL m				DEPTH	m			
	38.90	0.00							
Grass over TOPSOIL	38.80	0.10		D	0.10	0.10	4	Hand dug starter pit from ground level to 1.0m	
Firm brown CLAY [Made Ground]	38.60	0.30		D	0.50	0.20			
Firm brown gravelly CLAY, gravel comprised flint [Made Ground]	38.20	0.70		CPT	1.20	0.40			
Ash, tin, brick, wood [Made Ground]	37.00	1.90		D	1.00				
				B	1.20	1.20			
Medium dense grey sandy clayey GRAVEL, gravel comprised fine to coarse flint [Kempton Park Gravel]	37.00	1.90		B	1.70		30	Water entered fast at 2.6m, rising to 2.1m whilst the casing was at 2.0m. Not sealed out by the advancement of the casing.	
	2.10w			CPT	2.10			Water level 2.1m when casing removed	
	2.33w			W	2.60			Standing Water 2.36m on 7th July 17	
	2.36w			B	3.00			Standing Water 2.33m on 17th July 17	
	2.60w			CPT	3.00	2.80			
		4.00w		CPT	4.10		28	Water level 4.0m on completion of drilling	
				B	4.10				
	Medium dense brown SAND & GRAVEL [Kempton Park Gravel]	34.20	4.70		CPT	5.00		30	
					B	5.00			
					CPT	6.00	2.50	24	
				D	6.45				
				CPT	7.00		21		
White structureless CHALK, chalk comprised gravelly silt, sub-angular & sub-rounded, with some brown staining, also sandy pockets, and occasional flints [Seaford Chalk - CIRIA Grade Dm]	31.70	7.20		D	7.45			20	Standpipe installed to 10m (50mm dia pipe, arisings to 11m, then 1m bentonite seal, then 8m perforated pipe with a gravel surround, with the top 2m plain pipe with a bentonite surround. Finished with a gas valve and flush cover)
				U100	8.00		U100 taken for chalk description		
				D	8.45				
				CPT	9.50	5.80			
				D	9.95				
				CPT	11.00		21	U100 taken for chalk description	
				D	11.45				
				U100	12.00			24	Boundary between matrix and clast dominated chalk is estimated
				D	12.50				
	White structureless CHALK, chalk comprised silty gravel, sub-angular & sub-rounded, with occasional flints [Seaford Chalk - CIRIA Grade Dc]	25.90	13.00		CPT	13.50		2.00	U100 taken for chalk description
				D	13.95				
				U100	14.00				
				D	14.50				
	23.90	15.00		D	14.95		26	Borehole cased to 14m	
				CPT	14.50				
 TERRAMECH INVESTIGATIONS LIMITED 183 LONG LANE TILEHURST READING			REMARKS: Cable Percussive Borehole drilled on 8th June 17 Drillers Descriptions						
U100=100mm dia. UNDISTURBED SAMPLE B=BULK SAMPLE W=WATER SAMPLE			U38=38mm dia. UNDISTURBED SAMPLE SPT=STANDARD PENETRATION TEST			D=SMALL DISTURBED SAMPLE CPT=CONE PENETRATION TEST			

PAGE: 5		JOB 3937					BOREHOLE		
DATE:21.04.17		LEADERBOARD GOLF, RICHFIELD AV, READING					BH3		
DESCRIPTION	REDUCED	DEPTH	LEGEND	SAMPLE		THICKNESS	SPT	REMARKS	
	LEVEL m	m		TYPE	DEPTH	m	N		
	39.20	0.00		D	0.10	0.10		Hand dug starter pit from ground level to 1.0m	
Grass, over TOPSOIL	39.10	0.10		D	0.50	0.30			
Firm dark brown CLAY [Made Ground]	38.80	0.40		D	0.90	0.20			
Firm brown gravelly CLAY with some brick gravel [Made Ground]	38.60	0.60		B	1.20	0.40			
Loose grey flint GRAVEL [Made Ground]	38.20	1.00		CPT	1.20	0.90	10	Water entered rapidly at 2.7m, rising to 2.3m whilst the casing was at 2.5m, not sealed out by the advancing casing.	
Firm dark brown CLAY [Langley Silt Member or Made Ground ?]	37.30	1.90		B	2.10	2.10	28	Water level 2.2m after casing removed	
Medium dense grey sandy GRAVEL, gravel comprised fine to coarse flint [Kempton Park Gravel]		2.20w		CPT	2.10			Standing Water 2.59m on 7th July 17	
		2.53w		W	2.70				
		2.59w		B	3.00			Standing Water 2.53m on 17th July 17	
		2.70w		CPT	3.00	2.50	32		
		3.60w		CPT	4.00		30	Water level 3.6m on completion of drilling	
				B	4.00				
	34.80	4.40		CPT	5.00		34	1000 litres of water added between 1.9m and 8.0m	
				B	5.00				
				CPT	6.00	3.20	30		
				D	6.45				
				CPT	7.50		30		
Medium dense to dense orangey brown SAND & GRAVEL [Kempton Park Gravel]	31.60	7.60		D	7.95	0.40		Borehole cased to 8.0m	
	31.20	8.00						Standpipe installed to 8m (50mm dia pipe, bottom 6m perforated with a gravel surround, top 2m plain pipe with a bentonite surround. Finished with a gas valve and flush cover)	

PAGE: 6	JOB 3937	SPT
DATE:21.04.17	LEADERBOARD GOLF, RICHFIELD AV, READING	RESULTS

STANDARD PENETRATION TEST RESULTS

BORE HOLE	DEPTH m		TEST TYPE	SOIL DESCRIPTION	NUMBER OF BLOWS					'N'
	FROM	TO			150 mm	75 mm	75 mm	75 mm	75 mm	
BH1	1.20	1.65	CPT	Made Ground.....	2	1	2	1	1	5
BH1	2.10	2.55	CPT	Sandy GRAVEL.....	8	6	5	7	6	24
BH1	3.10	3.55	CPT	Sandy GRAVEL.....	9	7	8	8	8	31
BH1	4.10	4.55	CPT	Sandy GRAVEL.....	8	6	7	8	9	30
BH1	5.10	5.55	CPT	SAND & GRAVEL.....	9	7	8	9	10	34
BH1	6.00	6.45	CPT	SAND & GRAVEL.....	7	6	7	6	7	26
BH1	7.00	7.45	CPT	SAND & GRAVEL.....	7	5	6	6	6	23
BH2	1.20	1.65	CPT	Made Ground.....	2	1	1	1	1	4
BH2	2.10	2.55	CPT	Sandy clayey GRAVEL.....	9	7	8	7	8	30
BH2	3.00	3.45	CPT	Sandy clayey GRAVEL.....	10	8	7	8	8	31
BH2	4.10	4.55	CPT	Sandy clayey GRAVEL.....	7	6	7	7	8	28
BH2	5.00	5.45	CPT	SAND & GRAVEL.....	9	7	8	7	8	30
BH2	6.00	6.45	CPT	SAND & GRAVEL.....	8	5	6	7	6	24
BH2	7.00	7.45	CPT	SAND & GRAVEL -> CHALK.....	6	5	5	6	5	21
BH2	9.50	9.95	CPT	CHALK.....	7	6	5	4	5	20
BH2	11.00	11.45	CPT	CHALK.....	6	5	5	5	6	21
BH2	13.50	13.95	CPT	CHALK.....	7	6	5	6	7	24
BH2	14.50	14.95	CPT	CHALK.....	7	6	6	7	7	26
BH3	1.20	1.65	CPT	CLAY (Langley Silt or Made Ground).....	5	4	2	2	2	10
BH3	2.10	2.55	CPT	Sandy GRAVEL.....	8	6	7	7	8	28
BH3	3.00	3.45	CPT	Sandy GRAVEL.....	9	7	8	8	9	32
BH3	4.00	4.45	CPT	Sandy GRAVEL.....	7	6	8	8	8	30
BH3	5.00	5.45	CPT	Slightly sandy GRAVEL.....	9	8	8	9	9	34
BH3	6.00	6.45	CPT	Slightly sandy GRAVEL.....	8	6	7	8	9	30
BH3	7.50	7.95	CPT	SAND & GRAVEL.....	9	7	7	8	8	30

PAGE: 7	JOB 3937 LEADERBOARD GOLD, RICHFIELD AV, READING	GAS MONITORING
DATE: 21.04.17		

Monitoring Date: 7th & 17th July 2017 Monitoring Engineer: DRD

Equipment: GA5000plus

Condition of Well: Intact

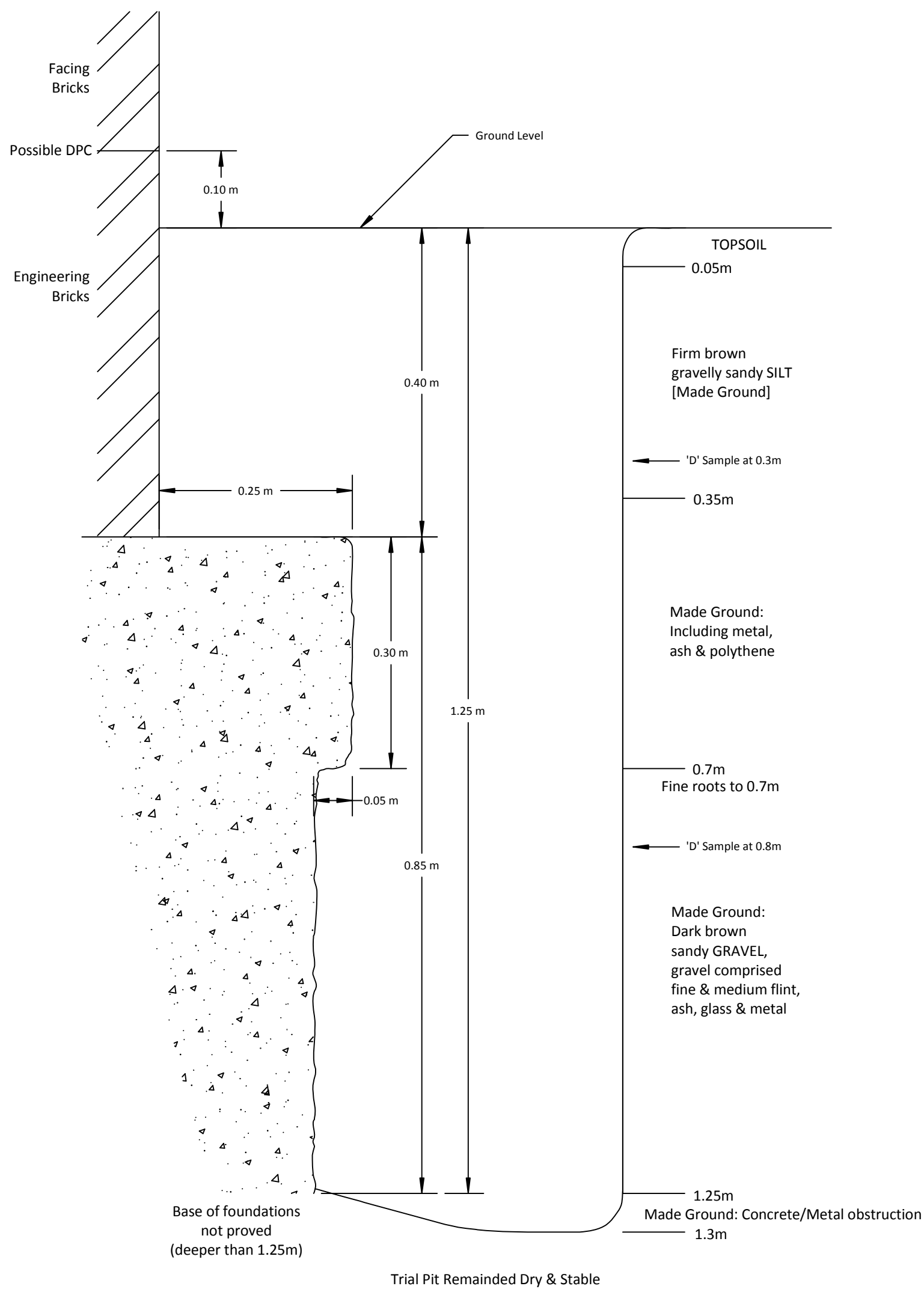
Weather: Dry & Dry/Sunny Weather Trends: 7th Preceding dry weather Atmospheric Pressure Trends: 7th Preceding slight fall
17th Wet 3 days before 17th Static

Remarks:

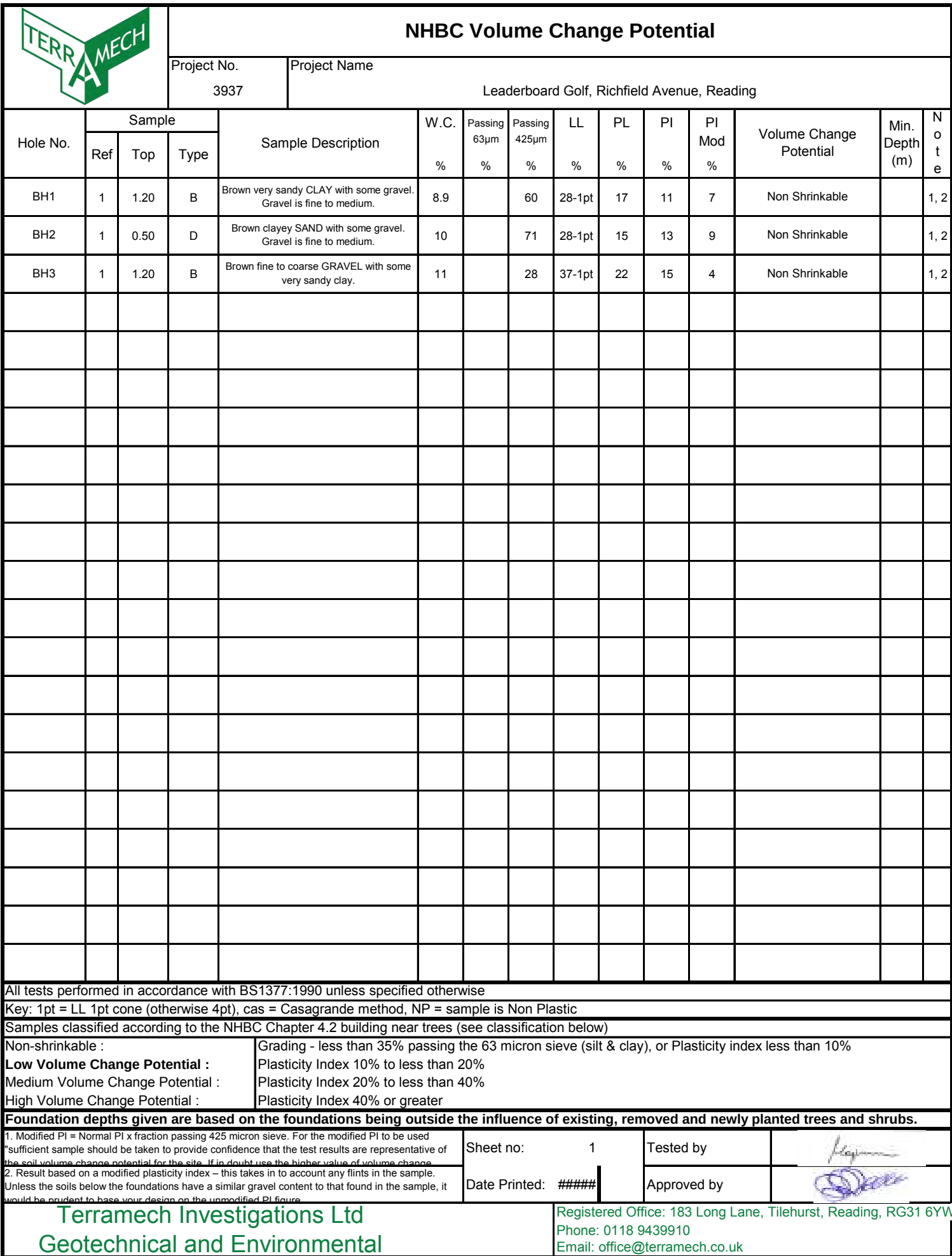
Bore hole ID	Borehole Barometric Pressure (mb)	Atmospheric Barometric Pressure (mb)	Flow (l/hr)	Time (sec)	Methane CH ₄ (%)	Carbon Dioxide CO ₂ (%)	Oxygen O ₂ (%)	Carbon Monoxide Co (ppm)	Hydrogen Sulphide H ₂ S (ppm)	Volatile Organic Compounds VOCs (ppm)	Water Level (m)
7 th July 2017 BH1 (Front)	0.22	1012	Initial 0.2	20	0.2	10.3	9.1	3	0	-	2.40
				40	0.2	9.0	9.9	3	0	-	
			Peak 0.3	60	0.2	8.7	10.0	3	0	-	
				90	0.2	8.6	10.1	2	0	-	
			Av 0.3	120	0.2	9.5	9.1	2	0	-	
				150	0.2	11.5	7.4	2	0	-	
				180	0.2	11.7	7.2	2	0	-	
7 th July 2017 BH2 (Mid)	0.09	1012	Initial -0.3	20	0.0	1.0	18.5	1	0	-	2.36
				40	0.0	0.9	18.5	1	0	-	
			Peak -0.4	60	0.0	0.9	18.5	1	0	-	
				90	0.0	0.9	18.5	1	0	-	
			Av -0.3	120	0.0	0.8	18.6	1	0	-	
				150	0.0	0.7	18.6	1	0	-	
				180	0.0	0.7	18.6	1	0	-	
7 th July 2017 BH3 (Rear)	0.0	1012	Initial 0.3	20	0.0	1.7	18.3	1	0	-	2.59
				40	0.0	1.9	17.9	1	0	-	
			Peak 0.3	60	0.0	2.2	17.5	1	0	-	
				90	0.0	3.0	16.6	1	0	-	
			Av 0.3	120	0.0	3.8	15.8	1	0	-	
				150	0.0	4.9	14.6	1	0	-	
				180	0.0	6.5	13.1	1	0	-	
17 th July 2017 BH1 (Front)	-0.07	1019	Initial -0.1	20	0.2	10.8	4.5	4	1	-	2.36
				40	0.2	11.3	4.4	4	1	-	
			Peak 0.2	60	0.2	11.5	4.4	4	1	-	
				90	0.2	12.1	4.2	4	1	-	
			Av 0.0	120	0.2	12.4	3.7	3	1	-	
				150	0.2	13.1	3.3	3	1	-	
				180	0.2	13.3	3.2	3	1	-	
7 th July 2017 BH2 (Mid)	-5.07	1019	Initial -2.3	20	0.0	1.2	18.8	3	1	-	2.33
				40	0.0	1.2	18.8	3	1	-	
			Peak -1.6	60	0.0	1.2	18.8	3	1	-	
				90	0.0	1.2	18.8	3	1	-	
			Av -1.8	120	0.0	1.2	18.8	3	1	-	
				150	0.0	1.2	18.7	3	1	-	
				180	0.0	1.2	18.7	3	1	-	
7 th July 2017 BH3 (Rear)	0.03	1019	Initial 0.1	20	0.0	12.5	7.1	2	0	-	2.53
				40	0.0	12.6	6.6	2	0	-	
			Peak 0.1	60	0.0	12.8	6.3	2	0	-	
				90	0.0	13.0	6.1	1	0	-	
			Av 0.1	120	0.0	13.3	5.6	1	0	-	
				150	0.0	13.5	5.3	1	0	-	
				180	0.0	13.8	5.0	1	0	-	

Tests undertaken with a Geotechnical Instruments Infra-red gas analyser GA 5000plus

TRIAL PIT TP1 SECTION



Approximate Measurements
(Not to Scale)





PARTICLE SIZE DISTRIBUTION

Job Ref

3937

Borehole/Pit No.

BH1

Site Name

Leaderboard Golf, Richfield Avenue, Reading

Sample No.

1

Soil Description

Brown sandy fine to coarse GRAVEL.

Depth, m

2.10

Specimen
Reference

4

Specimen
Depth

m

Sample Type

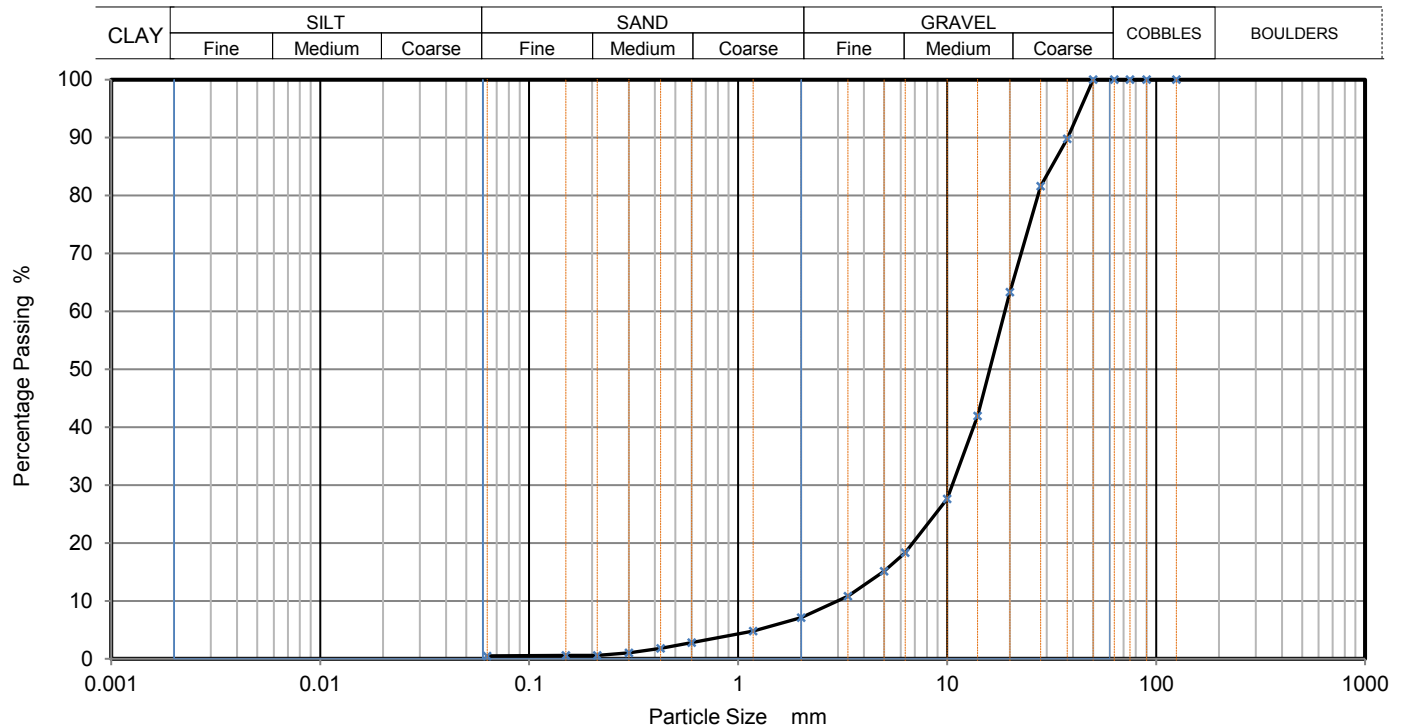
B

Test Method

BS1377:Part 2:1990, clause 9.2

KeyLAB ID

TERR201706193



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	90		
28	82		
20	63		
14	42		
10	28		
6.3	18		
5	15		
3.35	11		
2	7		
1.18	5		
0.6	3		
0.425	2		
0.3	1		
0.212	1		
0.15	1		
0.063	1		

Dry Mass of sample, g

7364

Sample Proportions	% dry mass
Very coarse	0
Gravel	93
Sand	7
Fines <0.063mm	0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator

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Date printed

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PARTICLE SIZE DISTRIBUTION

Job Ref

3937

Borehole/Pit No.

BH1

Site Name

Leaderboard Golf, Richfield Avenue, Reading

Sample No.

1

Soil Description

Grey sandy fine to coarse GRAVEL.

Depth, m

4.10

Specimen
Reference

5

Specimen
Depth

m

Sample Type

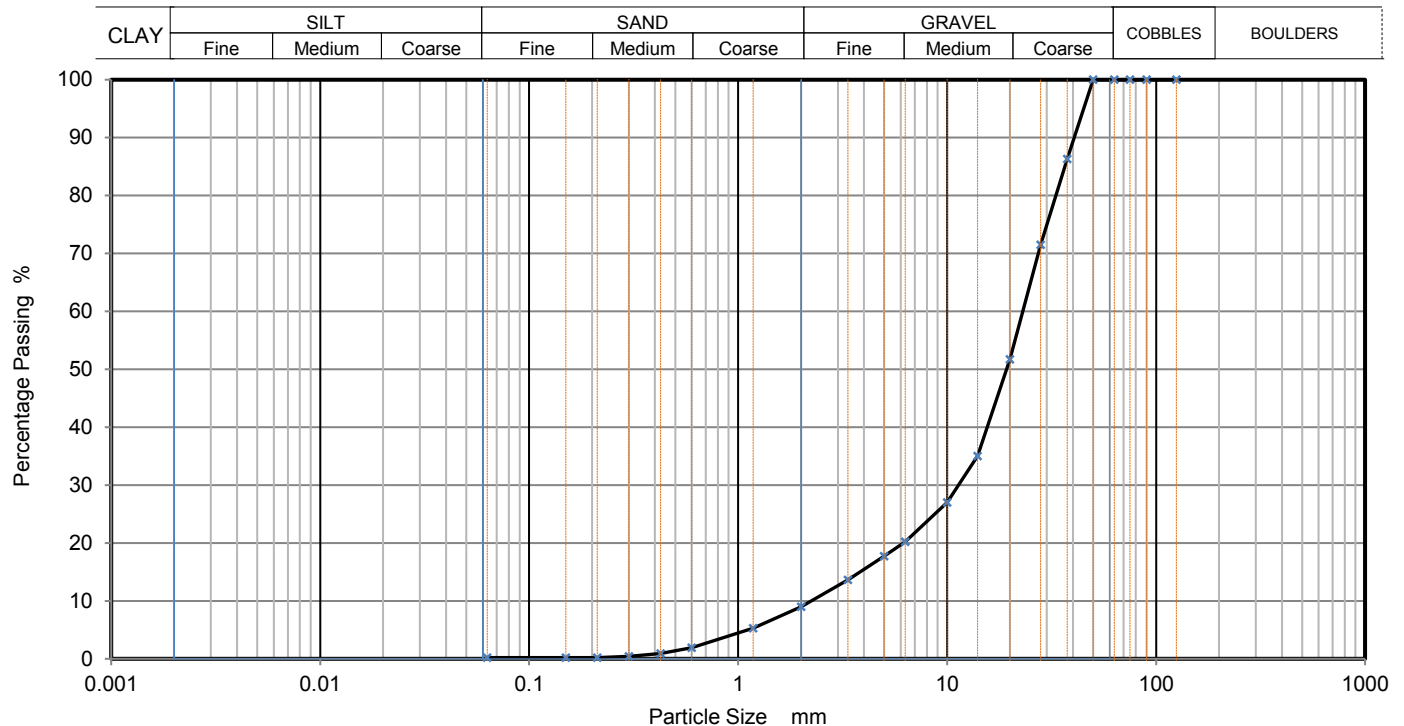
B

Test Method

BS1377:Part 2:1990, clause 9.2

KeyLAB ID

TERR201706194



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	86		
28	72		
20	52		
14	35		
10	27		
6.3	20		
5	18		
3.35	14		
2	9		
1.18	5		
0.6	2		
0.425	1		
0.3	0		
0.212	0		
0.15	0		
0.063	0		

Dry Mass of sample, g

6533

Sample Proportions	% dry mass
Very coarse	0
Gravel	91
Sand	9
Fines <0.063mm	0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	10
Curvature Coefficient	2.5

Remarks

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PARTICLE SIZE DISTRIBUTION

Job Ref

3937

Borehole/Pit No.

BH2

Site Name

Leaderboard Golf, Richfield Avenue, Reading

Sample No.

1

Soil Description

Brown sandy clayey fine to coarse GRAVEL.

Depth, m

1.70

Specimen
Reference

4

Specimen
Depth

m

Sample Type

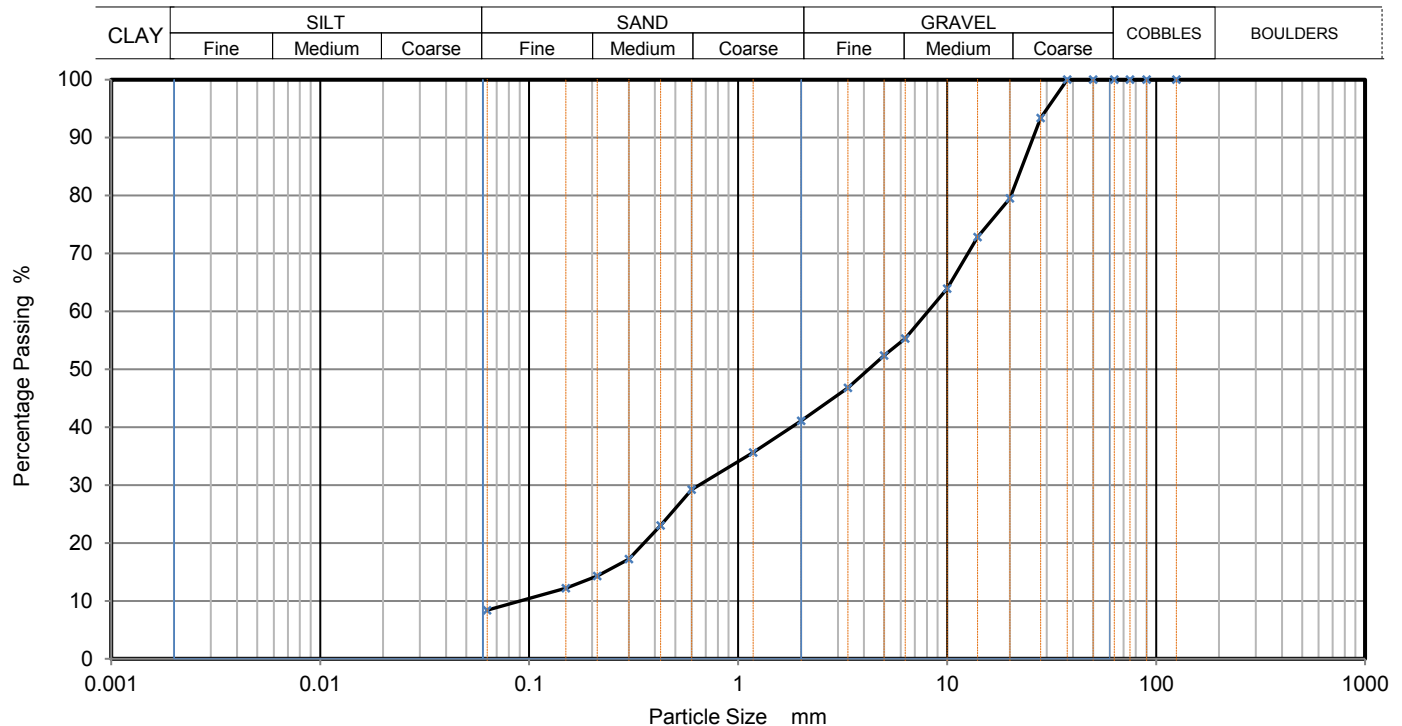
B

Test Method

BS1377:Part 2:1990, clause 9.2

KeyLAB ID

TERR201706197



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	93		
20	80		
14	73		
10	64		
6.3	55		
5	52		
3.35	47		
2	41		
1.18	36		
0.6	29		
0.425	23		
0.3	17		
0.212	14		
0.15	12		
0.063	8		

Dry Mass of sample, g

5443

Sample Proportions	% dry mass
Very coarse	0
Gravel	59
Sand	33
Fines <0.063mm	8

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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PARTICLE SIZE DISTRIBUTION

Job Ref

3937

Borehole/Pit No.

BH2

Site Name

Leaderboard Golf, Richfield Avenue, Reading

Sample No.

1

Soil Description

Brown fine to coarse GRAVEL.

Depth, m

4.10

Specimen
Reference

4

Specimen
Depth

m

Sample Type

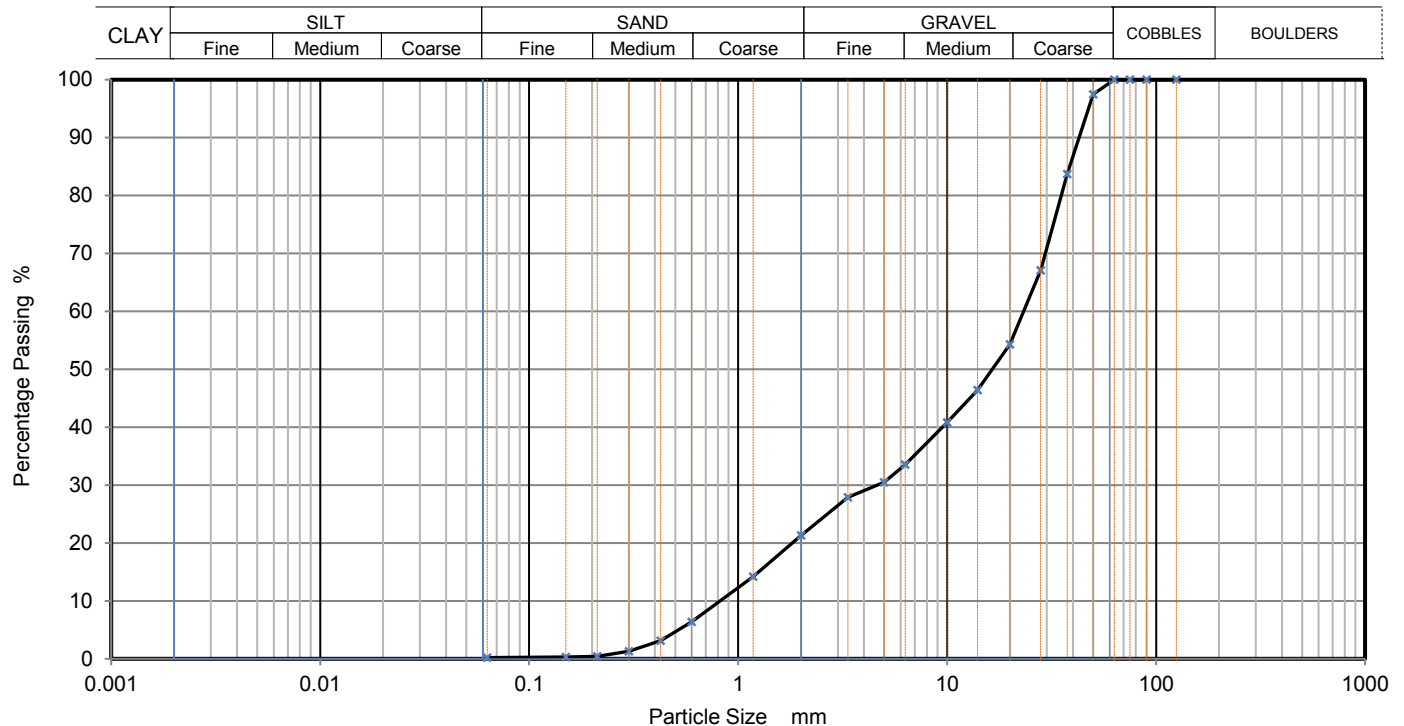
B

Test Method

BS1377:Part 2:1990, clause 9.2

KeyLAB ID

TERR201706199



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	98		
37.5	84		
28	67		
20	54		
14	46		
10	41		
6.3	34		
5	31		
3.35	28		
2	21		
1.18	14		
0.6	6		
0.425	3		
0.3	1		
0.212	0		
0.15	0		
0.063	0		

Dry Mass of sample, g

8526

Sample Proportions	% dry mass
Very coarse	0
Gravel	79
Sand	21
Fines <0.063mm	0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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PARTICLE SIZE DISTRIBUTION

Job Ref

3937

Borehole/Pit No.

BH3

Site Name

Leaderboard Golf, Richfield Avenue, Reading

Sample No.

1

Soil Description

Brown sandy fine to coarse GRAVEL.

Depth, m

2.10

Specimen
Reference

5

Specimen
Depth

m

Sample Type

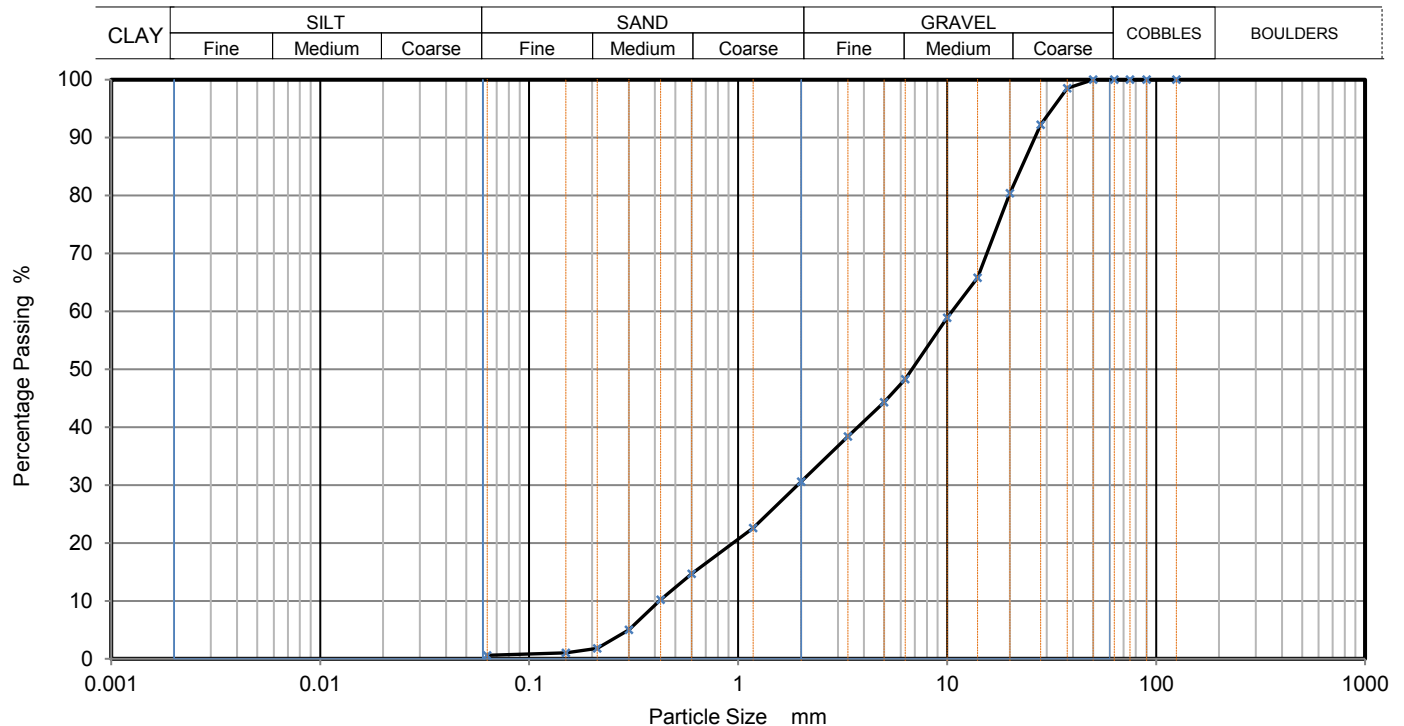
B

Test Method

BS1377:Part 2:1990, clause 9.2

KeyLAB ID

TERR2017061914



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	99		
28	92		
20	80		
14	66		
10	59		
6.3	48		
5	44		
3.35	38		
2	31		
1.18	23		
0.6	15		
0.425	10		
0.3	5		
0.212	2		
0.15	1		
0.063	1		

Dry Mass of sample, g

6432

Sample Proportions	% dry mass
Very coarse	0
Gravel	69
Sand	30
Fines <0.063mm	1

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	25
Curvature Coefficient	0.83

Remarks

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PARTICLE SIZE DISTRIBUTION

Job Ref

3937

Borehole/Pit No.

BH3

Site Name

Leaderboard Golf, Richfield Avenue, Reading

Sample No.

1

Soil Description

Brown sandy fine to coarse GRAVEL.

Depth, m

3.00

Specimen
Reference

4

Specimen
Depth

m

Sample Type

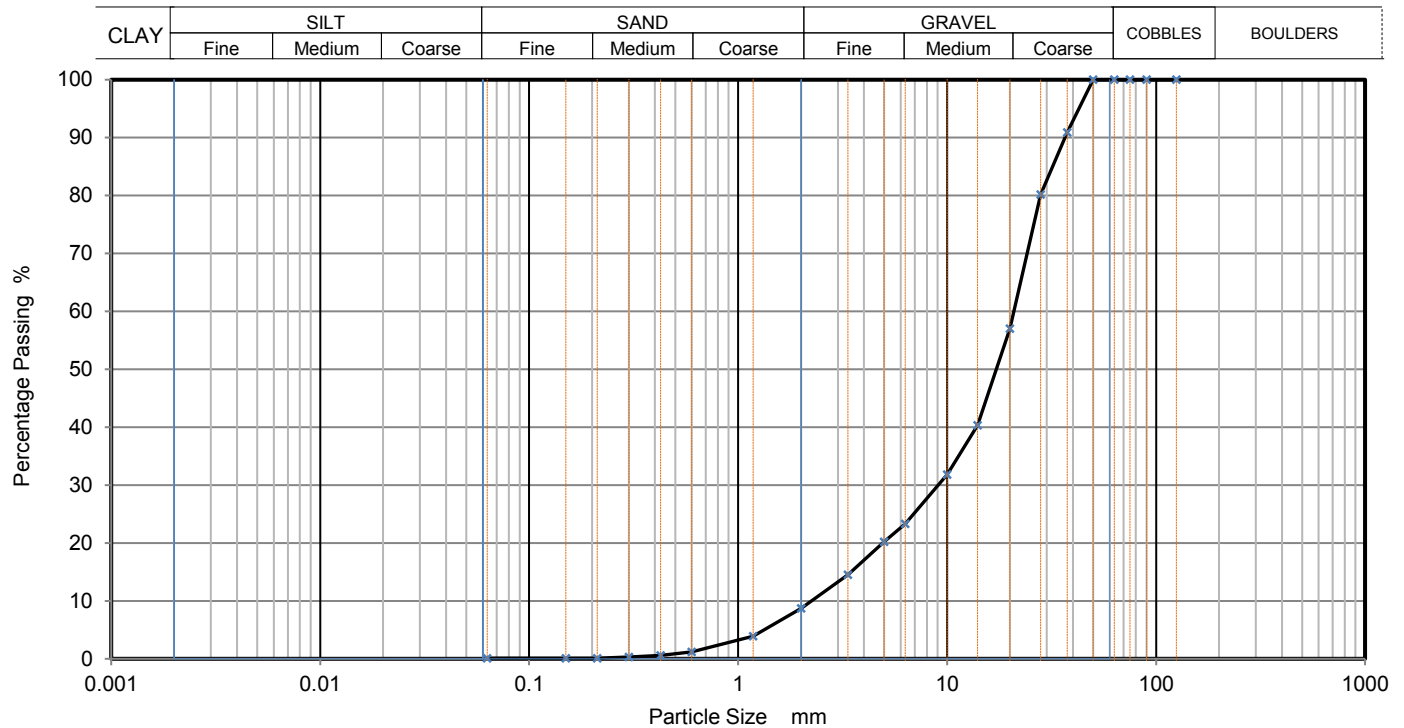
B

Test Method

BS1377:Part 2:1990, clause 9.2

KeyLAB ID

TERR2017061915



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	91		
28	80		
20	57		
14	40		
10	32		
6.3	23		
5	20		
3.35	15		
2	9		
1.18	4		
0.6	1		
0.425	1		
0.3	0		
0.212	0		
0.15	0		
0.063	0		

Dry Mass of sample, g

6891

Sample Proportions	% dry mass
Very coarse	0
Gravel	91
Sand	9
Fines <0.063mm	0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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PARTICLE SIZE DISTRIBUTION

Job Ref

3937

Borehole/Pit No.

BH3

Site Name

Leaderboard Golf, Richfield Avenue, Reading

Sample No.

1

Soil Description

Brown fine to coarse GRAVEL.

Depth, m

5.00

Specimen
Reference

4

Specimen
Depth

m

Sample Type

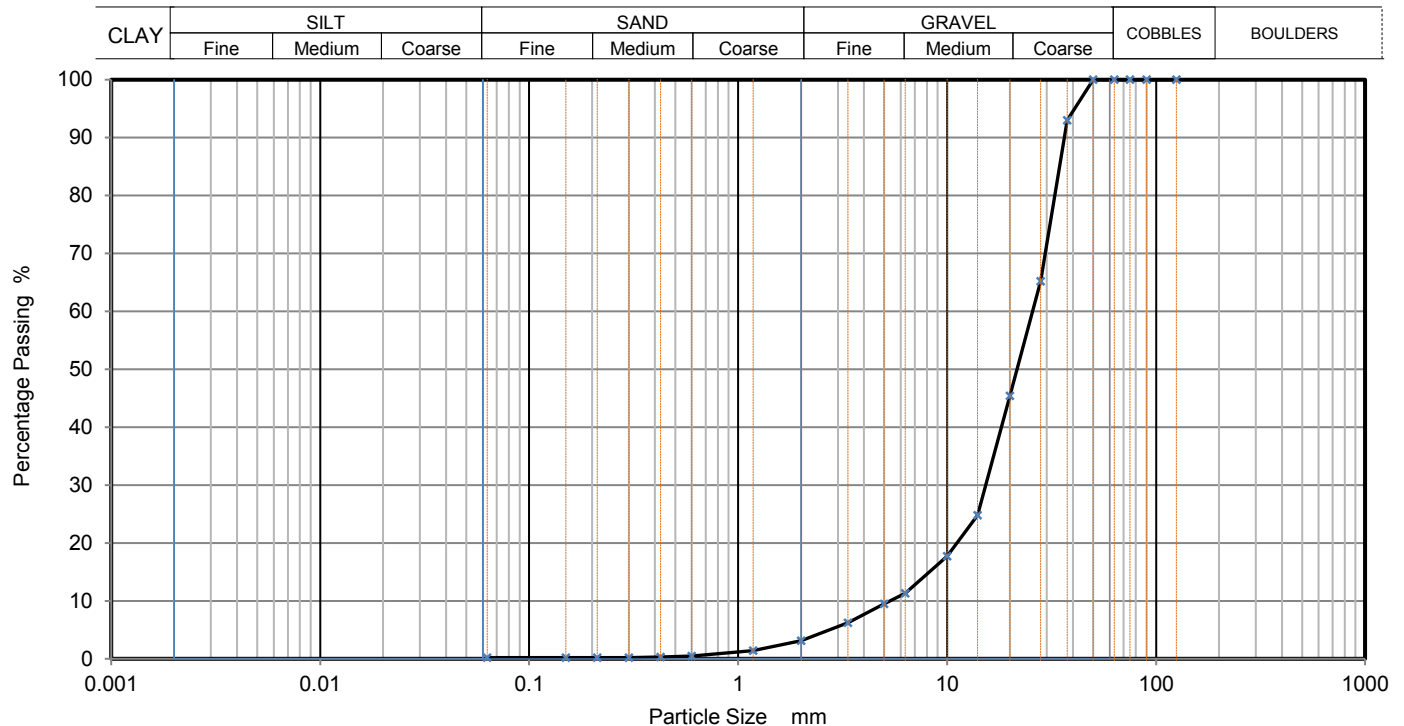
B

Test Method

BS1377:Part 2:1990, clause 9.2

KeyLAB ID

TERR2017061916



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	93		
28	65		
20	45		
14	25		
10	18		
6.3	11		
5	10		
3.35	6		
2	3		
1.18	1		
0.6	1		
0.425	0		
0.3	0		
0.212	0		
0.15	0		
0.063	0		

Dry Mass of sample, g

7050

Sample Proportions	% dry mass
Very coarse	0
Gravel	97
Sand	3
Fines <0.063mm	0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator

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Density Tests - Summary of Results

Project No.

3937

Project Name

Leaderboard Golf, Richfield Avenue, Reading

[illegible]

Legend	w	moisture content of the density test specimen
--------	---	---

Notes

Tests carried out in accordance with
BS1377:Part2:1990 Clause 7.3 unless annotated
otherwise

Date Printed

07/07/2017

Approved By	
-------------	--

Dave

Sheet

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BRE Special Digest 1 Summary from Analytical Test Results

Project No
3937

Leaderboard Golf, Richfield Avenue, Reading

Laboratory Values

Test	(Units)	Sample Number							Exceedance
		BH1 / 0.1	BH1 / 1.0	BH2 / 1.2	BH2 / 2.1	BH3 / 0.1	BH3 / 0.5	TP1 / 0.8	
WWS	g/l	0.0015	1.9782	1.5486	0.0887	0.0476	0.1320	0.0808	DS1>0.5%
AS	%	0.0314	0.0134	0.0106	0.0557	0.0366	0.0302	0.0504	
TS	%	0.02	0.4	0.51	0.04	0.06	0.04	0.09	
OS	%	0.03	1.19	1.52	0.06	0.14	0.09	0.22	>0.3%
TPS	%	0.06	1.2	1.53	0.12	0.18	0.12	0.27	DS1>0.24

Design Sulfate Class for Location

WWS Class	DS-1	DS-3	DS-2	DS-1	DS-1	DS-1	DS-1	
TPS Class	DS-1	DS-3	DS-4	DS-1	DS-1	DS-1	DS-1	
pH	7.37	6.87	6.86	7.94	7.73	7.42	7.75	
Soil	Topsoil	Made Ground	Made Ground	Sandy Clayey Gravel	Topsoil	Gravelly CLAY	Made Ground	
Groundwater	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	

ACEC Class for Location

	AC-1	AC-3	AC-4	AC-1	AC-1	AC-1	AC-1	
--	------	------	------	------	------	------	------	--

Design Chemical Class

Assumed Working Life >50yrs #	DC-1	DC-3	DC-4	DC-1	DC-1	DC-1	DC-1	
Section <150mm *	* Concrete thickness less than 140mm is not recommended, but where not practical DC class increased by 1							
Section >450mm **	** If the concrete thickness is greater than 450mm and some chemical attack is acceptable, DC class reduced by 1							

WWS = Water Soluble Sulfate (SO₄ 2:1 extract) OS = Oxidisable sulfides

TS = Total sulphur (Sulphur %)

AS = Acid-soluble sulfate (Total Sulphate BRE)

TPS = Total potential sulfate

Suffix 's' = Static Water

Suffix 'z' = Need to resist acid conditions

Suffix 'z' = Higher levels of Magnesium

Low rise housing can be taken as having a >50 year life even where longer is expected. For >100 year life see BRE SD1

Structures with >50 year life but have relatively serious consequences of failure should have additional protection measures (see BRE SD1)

Contamination Test Results



Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
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Terramech Investigations Ltd
183 Long Lane
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Berkshire
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Attention :	Dave Deane
Date :	22nd June, 2017
Your reference :	3937
Our reference :	Test Report 17/10339 Batch 1
Location :	Leaderboard Golf Richfield Avenue
Date samples received :	14th June, 2017
Status :	Final report
Issue :	1

Eleven samples were received for analysis on 14th June, 2017 of which nine were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Bruce Leslie
Project Co-ordinator

Please see attached notes for all abbreviations and acronyms

Client Name: Terramech Investigations Ltd
Reference: 3937
Location: Leaderboard Golf Richfield Avenue
Contact: Dave Deane
JE Job No.: 17/10339

Report : Solid

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

J E Sample No.	1-3	4-6	10-12	13-15	16-18	19-21	25-27	28-30	31-33		Please see attached notes for all abbreviations and acronyms		
Sample ID	3937/BH1/0.1 D	3937/BH1/1.0 D	3937/BH2/1.2B	3937/BH2/2.1B	3937/BH3/0.1 D	3937/BH3/0.5 D	3937/TP1/0.8D	MADE GROUND	NATURAL GROUND				
Depth	0.10	1.00	1.20	2.10	0.10	0.50	0.80						
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017		LOD/LOR	Units	Method No.
PAH MS													
Naphthalene ^{#M}	<0.04	<0.04	0.09	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	0.04	0.07	<0.03	0.06	<0.03	0.05	0.10	<0.03		<0.03	mg/kg	TM4/PM8
Acenaphthene ^{#M}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/kg	TM4/PM8
Fluorene ^{#M}	<0.04	<0.04	0.10	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Phenanthrene ^{#M}	0.03	0.18	0.80	<0.03	0.26	0.07	0.14	0.21	<0.03		<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	0.10	0.26	<0.04	0.11	<0.04	0.09	0.15	<0.04		<0.04	mg/kg	TM4/PM8
Fluoranthene ^{#M}	0.11	0.41	1.22	<0.03	0.71	0.18	0.46	0.70	<0.03		<0.03	mg/kg	TM4/PM8
Pyrene [#]	0.11	0.37	1.13	<0.03	0.63	0.18	0.41	0.64	<0.03		<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	0.11	0.43	0.62	<0.06	0.41	0.19	0.38	0.45	<0.06		<0.06	mg/kg	TM4/PM8
Chrysene ^{#M}	0.08	0.33	0.72	<0.02	0.44	0.15	0.27	0.54	<0.02		<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene ^{#M}	0.18	0.63	1.25	<0.07	0.85	0.31	0.64	1.33	<0.07		<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	0.09	0.25	0.62	<0.04	0.49	0.18	0.42	0.69	<0.04		<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene ^{#M}	0.07	0.21	0.42	<0.04	0.39	0.14	0.29	0.51	<0.04		<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	<0.04	<0.04	0.14	<0.04	0.08	<0.04	0.09	0.14	<0.04		<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	0.08	0.23	0.49	<0.04	0.39	0.14	0.38	0.54	<0.04		<0.04	mg/kg	TM4/PM8
Coronene	-	-	-	-	-	-	-	0.14	<0.04		<0.04	mg/kg	TM4/PM8
PAH 16 Total	0.9	3.2	7.9	<0.6	4.8	1.5	3.6	-	-		<0.6	mg/kg	TM4/PM8
PAH 17 Total	-	-	-	-	-	-	-	6.14	<0.64		<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.13	0.45	0.90	<0.05	0.61	0.22	0.46	0.96	<0.05		<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.05	0.18	0.35	<0.02	0.24	0.09	0.18	0.37	<0.02		<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	87	85	91	85	86	92	96	87	86		<0	%	TM4/PM8
Mineral Oil (C10-C40)	-	-	-	-	-	-	-	561	<30		<30	mg/kg	TM5/PM16
TPH CWG													
Aliphatics													
>C5-C6 ^{#M}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	-	-		<0.1	mg/kg	TM36/PM12
>C6-C8 ^{#M}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	-	-		<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1 ^{SV}	0.3 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	-	-		<0.1	mg/kg	TM36/PM12
>C10-C12 ^{#M}	<0.2	7.0	17.9	<0.2	<0.2	<0.2	<0.2	-	-		<0.2	mg/kg	TM5/PM16
>C12-C16 ^{#M}	<4	16	67	<4	<4	<4	<4	-	-		<4	mg/kg	TM5/PM16
>C16-C21 ^{#M}	<7	159	249	<7	<7	<7	<7	-	-		<7	mg/kg	TM5/PM16
>C21-C35 ^{#M}	<7	3195	1874	<7	13	<7	69	-	-		<7	mg/kg	TM5/PM16
>C35-C44	<7	115	368	<7	<7	<7	<7	-	-		<7	mg/kg	TM5/PM16
Total aliphatics C5-44	<26	3492	2576	<26	<26	<26	69	-	-		<26	mg/kg	TM5/PM16

Client Name: Terramech Investigations Ltd
Reference: 3937
Location: Leaderboard Golf Richfield Avenue
Contact: Dave Deane
JE Job No.: 17/10339

Report : Solid

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

J E Sample No.	1-3	4-6	10-12	13-15	16-18	19-21	25-27	28-30	31-33		Please see attached notes for all abbreviations and acronyms		
Sample ID	3937/BH1/0.1 D	3937/BH1/1.0 D	3937/BH2/1.2B	3937/BH2/2.1B	3937/BH3/0.1 D	3937/BH3/0.5 D	3937/TP1/0.8D	MADE GROUND	NATURAL GROUND				
Depth	0.10	1.00	1.20	2.10	0.10	0.50	0.80						
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017	08/06/2017				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017	14/06/2017		LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7 #	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	-	-		<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	-	-		<0.1	mg/kg	TM36/PM12
>EC8-EC10 #M	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	-	-		<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-		<0.2	mg/kg	TM5/PM16
>EC12-EC16 #	<4	<4	17	<4	<4	<4	<4	-	-		<4	mg/kg	TM5/PM16
>EC16-EC21 #	<7	84	310	<7	<7	<7	<7	-	-		<7	mg/kg	TM5/PM16
>EC21-EC35 #	<7	620	1657	<7	64	<7	88	-	-		<7	mg/kg	TM5/PM16
>EC35-EC44	<7	71	351	<7	21	<7	22	-	-		<7	mg/kg	TM5/PM16
Total aromatics C5-44	<26	775	2335	<26	85	<26	110	-	-		<26	mg/kg	TM5/PM16/PM13
Total aliphatics and aromatics(C5-44)	<52	4267	4911	<52	85	<52	179	-	-		<52	mg/kg	TM5/PM16/PM13
MTBE #	<5	<5 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5		<5	ug/kg	TM31/PM12
Benzene #	<5	<5 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5		<5	ug/kg	TM31/PM12
Toluene #	<5	<5 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5		<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5		<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	23 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	6 ^{SV}	<5		<5	ug/kg	TM31/PM12
o-Xylene #	<5	11 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5		<5	ug/kg	TM31/PM12
PCB 28 #	-	-	-	-	-	-	-	<5	<5		<5	ug/kg	TM17/PM8
PCB 52 #	-	-	-	-	-	-	-	<5	<5		<5	ug/kg	TM17/PM8
PCB 101 #	-	-	-	-	-	-	-	10	<5		<5	ug/kg	TM17/PM8
PCB 118 #	-	-	-	-	-	-	-	8	<5		<5	ug/kg	TM17/PM8
PCB 138 #	-	-	-	-	-	-	-	15	<5		<5	ug/kg	TM17/PM8
PCB 153 #	-	-	-	-	-	-	-	16	<5		<5	ug/kg	TM17/PM8
PCB 180 #	-	-	-	-	-	-	-	26	<5		<5	ug/kg	TM17/PM8
Total 7 PCBs #	-	-	-	-	-	-	-	75	<35		<35	ug/kg	TM17/PM8
Phenol #M	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-		<0.01	mg/kg	TM26/PM21
Natural Moisture Content	8.2	12.6	16.8	9.6	16.0	12.3	16.8	25.1	5.1		<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4	-	-	<0.6	8.7	-	-	<0.6	-	-		<0.6	mg/kg	TM38/PM20
Chloride (2:1 Ext BRE) #M	-	-	0.015	0.007	-	-	0.007	-	-		<0.002	g/l	TM38/PM20
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	-		<0.3	mg/kg	TM38/PM20
Nitrate as NO3 (2:1 Ext BRE) #M	-	-	<0.0025	<0.0025	-	-	0.0302	-	-		<0.0025	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #M	<0.0015	1.9782	1.5486	0.0887	0.0476	0.1320	0.0808	-	-		<0.0015	g/l	TM38/PM20
Free Cyanide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-		<0.5	mg/kg	TM89/PM45
Total Cyanide #M	<0.5	16.1	5.2	<0.5	1.0	<0.5	1.7	-	-		<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	0.95	24.99	20.10	0.21	4.24	1.17	12.68	11.59	0.18		<0.02	%	TM21/PM24
Fraction Organic Carbon	0.010	0.250	0.201	0.002	0.042	0.012	0.127	-	-		<0.001	None	TM21/PM24

Please include all sections of this report if it is reproduced

Mass of sample taken (kg)	-	Moisture Content Ratio (%) =	29.0
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	77.5
Particle Size <4mm =	>95%		
JEFL Job No	17/10339	Landfill Waste Acceptance Criteria Limits	
Sample No	30		
Client Sample No	MADE GROUND		
Depth/Other			
Sample Date	08/06/2017		
Batch No	1		
Solid Waste Analysis		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non- Hazardous Landfill
Total Organic Carbon (%)	11.59	3	5
Loss on Ignition (%)	16.0	-	10
Sum of BTEX (mg/kg)	<0.025	6	-
Sum of 7 PCBs (mg/kg)	0.075	1	-
Mineral Oil (mg/kg)	561	500	-
PAH Sum of 17(mg/kg)	6.14	100	-
pH (pH Units)	7.20	-	>6
ANC to pH 7 (mol/kg)	0.26	-	to be evaluated
ANC to pH 4 (mol/kg)	0.36	-	to be evaluated
Eluate Analysis	10:1 conc ⁿ leached		Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg
	C ₁₀ mg/l	A ₁₀ mg/kg	
Arsenic	0.0036	0.036	0.5
Barium	0.117	1.17	20
Cadmium	<0.0005	<0.005	0.04
Chromium	<0.0015	<0.015	0.5
Copper	<0.007	<0.07	2
Mercury	<0.001	<0.01	0.01
Molybdenum	0.012	0.12	0.5
Nickel	0.006	0.06	0.4
Lead	<0.005	<0.05	0.5
Antimony	0.006	0.06	0.06
Selenium	<0.003	<0.03	0.1
Zinc	0.018	0.18	4
Chloride	2.9	29	800
Fluoride	<0.3	<3	10
Sulphate as SO ₄	197.66	1976.8	1000
Total Dissolved Solids	398	3980	4000
Phenol	<0.01	<0.1	1
Dissolved Organic Carbon	5	50	500

Mass of sample taken (kg)	-	Moisture Content Ratio (%) =	9.8
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	91.1
Particle Size <4mm =	>95%		
JEFL Job No	17/10339	Landfill Waste Acceptance Criteria Limits	
Sample No	33		
Client Sample No	NATURAL GROUND		
Depth/Other			
Sample Date	08/06/2017		
Batch No	1		
Solid Waste Analysis		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non- Hazardous Landfill
Total Organic Carbon (%)	0.18	3	5
Loss on Ignition (%)	1.9	-	10
Sum of BTEX (mg/kg)	<0.025	6	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-
Mineral Oil (mg/kg)	<30	500	-
PAH Sum of 17(mg/kg)	<0.64	100	-
pH (pH Units)	7.82	-	>6
ANC to pH 7 (mol/kg)	0.31	-	to be evaluated
ANC to pH 4 (mol/kg)	0.42	-	to be evaluated
Eluate Analysis	10:1 conc ⁿ leached		Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg
	C ₁₀ mg/l	A ₁₀ mg/kg	
Arsenic	0.0064	0.064	0.5
Barium	0.008	0.08	20
Cadmium	<0.0005	<0.005	0.04
Chromium	<0.0015	<0.015	0.5
Copper	<0.007	<0.07	2
Mercury	<0.001	<0.01	0.01
Molybdenum	0.007	0.07	0.5
Nickel	0.003	0.03	0.4
Lead	<0.005	<0.05	0.5
Antimony	<0.002	<0.02	0.06
Selenium	<0.003	<0.03	0.1
Zinc	<0.003	<0.03	4
Chloride	<0.3	<3	800
Fluoride	<0.3	<3	10
Sulphate as SO ₄	13.92	139.2	1000
Total Dissolved Solids	86	860	4000
Phenol	<0.01	<0.1	1
Dissolved Organic Carbon	2	<20	500

Client Name: Terramech Investigations Ltd
Reference: 3937
Location: Leaderboard Golf Richfield Avenue
Contact: Dave Deane

Note:

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

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:



Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/10339	1	3937/BH1/0.1D	0.10	2	16/06/2017	General Description (Bulk Analysis)	soil/stones
					16/06/2017	Asbestos Fibres	NAD
					16/06/2017	Asbestos Fibres (2)	NAD
					16/06/2017	Asbestos ACM	NAD
					16/06/2017	Asbestos ACM (2)	NAD
					16/06/2017	Asbestos Type	NAD
					16/06/2017	Asbestos Type (2)	NAD
					16/06/2017	Asbestos Level Screen	NAD
17/10339	1	3937/BH1/1.0D	1.00	5	16/06/2017	General Description (Bulk Analysis)	soil/stones
					16/06/2017	Asbestos Fibres	NAD
					16/06/2017	Asbestos Fibres (2)	NAD
					16/06/2017	Asbestos ACM	NAD
					16/06/2017	Asbestos ACM (2)	NAD
					16/06/2017	Asbestos Type	NAD
					16/06/2017	Asbestos Type (2)	NAD
					16/06/2017	Asbestos Level Screen	NAD
17/10339	1	3937/BH2/1.2B	1.20	11	16/06/2017	General Description (Bulk Analysis)	soil/stones
					16/06/2017	Asbestos Fibres	NAD
					16/06/2017	Asbestos Fibres (2)	NAD
					16/06/2017	Asbestos ACM	NAD
					16/06/2017	Asbestos ACM (2)	NAD
					16/06/2017	Asbestos Type	NAD
					16/06/2017	Asbestos Type (2)	NAD
					16/06/2017	Asbestos Level Screen	NAD
17/10339	1	3937/BH2/2.1B	2.10	14	16/06/2017	General Description (Bulk Analysis)	soil-stones
					16/06/2017	Asbestos Fibres	NAD
					16/06/2017	Asbestos Fibres (2)	NAD
					16/06/2017	Asbestos ACM	NAD
					16/06/2017	Asbestos ACM (2)	NAD
					16/06/2017	Asbestos Type	NAD
					16/06/2017	Asbestos Type (2)	NAD
					16/06/2017	Asbestos Level Screen	NAD
17/10339	1	3937/BH3/0.1D	0.10	17	16/06/2017	General Description (Bulk Analysis)	soil-stones
					16/06/2017	Asbestos Fibres	NAD
					16/06/2017	Asbestos Fibres (2)	NAD

Client Name: Terramech Investigations Ltd
Reference: 3937
Location: Leaderboard Golf Richfield Avenue
Contact: Dave Deane

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/10339	1	3937/BH3/0.1D	0.10	17	16/06/2017	Asbestos ACM	NAD
					16/06/2017	Asbestos ACM (2)	NAD
					16/06/2017	Asbestos Type	NAD
					16/06/2017	Asbestos Type (2)	NAD
					16/06/2017	Asbestos Level Screen	NAD
17/10339	1	3937/BH3/0.5D	0.50	20	16/06/2017	General Description (Bulk Analysis)	soil/stones
					16/06/2017	Asbestos Fibres	NAD
					16/06/2017	Asbestos Fibres (2)	NAD
					16/06/2017	Asbestos ACM	NAD
					16/06/2017	Asbestos ACM (2)	NAD
					16/06/2017	Asbestos Type	NAD
					16/06/2017	Asbestos Type (2)	NAD
					16/06/2017	Asbestos Level Screen	NAD
17/10339	1	3937/TP1/0.8D	0.80	26	16/06/2017	General Description (Bulk Analysis)	soil/stones
					16/06/2017	Asbestos Fibres	NAD
					16/06/2017	Asbestos Fibres (2)	NAD
					16/06/2017	Asbestos ACM	NAD
					16/06/2017	Asbestos ACM (2)	NAD
					16/06/2017	Asbestos Type	NAD
					16/06/2017	Asbestos Type (2)	NAD
					16/06/2017	Asbestos Level Screen	NAD

Client Name: Terramech Investigations Ltd **Matrix : Solid**

Reference: 3937

Location: Leaderboard Golf Richfield Avenue

Contact: Dave Deane

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/10339

SOILS

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

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

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

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

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

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

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

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

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

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

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

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

WATERS

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

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

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

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

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM12/PM16	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis./Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.			AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified USEPA 160.4. Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (450°C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.	Yes	Yes	AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AD	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.			AD	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes	Yes	AD	Yes
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO ₂ and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes
TM77	Modified DDCE/NTS method 15364:2006. Determination of Acid Neutralization Capacity by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	No
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes	Yes	AR	Yes

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM106	Determination of Sulphide by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes
TM107	Determination of Thiocyanate by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	



Contamination Assessment Criteria

List 1 (Soils Assessment Criteria for Human Health)

- 1A) - Metals
- 1B) - Aliphatic Hydrocarbons
- 1C) - Aromatic Hydrocarbons
- 1D) - BTEX (Monocyclic Aromatic Hydrocarbons)
- 1E) - PAH (Poly-cyclic Aromatic Hydrocarbons)
- 1F) - PCB (Poly Chlorinated Bi-Phenyls)
- 1G) - Chloroalkanes and Alkenes
- 1H) - Explosives
- 1I) - Pesticides
- 1J) - Chlorobenzenes
- 1K) - Phenol and Chlorophenol
- 1L) – Other
- 1M) - Asbestos

At this time SGVs have been published by the Environment Agency for Arsenic, Cadmium, Nickel, Mercury, Selenium, Benzene, Toluene, Ethylbenzene, Xylene and Phenol together with Dioxins Furans and Dioxin Like PCBs. These were calculated using the CLEA model (v1.04) and Environment Agency guidance documents SR2 (Human Health Toxicological Assessment of Contaminants in Soil) and SR3 (Updated Technical Background to the CLEA Model).

Further numbers of contaminants were assessed on this basis using the CLEA Model by CIEH/LQM (The Chartered Institute of Environmental Health and Land Quality Management Ltd) and guideline values were published in their report on Generic Assessment Criteria for Human Health Assessments (2009). This 2009 guidance has now been replaced by new S4UL values (Suitable '4' Use Levels) which are intended by CIEH/LQM to provide a complete and updated replacement for the values published in their 2009 report (see CIEH/LQM S4UL – 1.1). The S4UL values are the copyright of Land Quality Management Ltd and are reproduced with permission; Publication Number S4UL3262 - All rights reserved.

We have also used C4SL values derived in the DEFRA SP1010 report. These values are used with a different assessment methodology (LLTC or Lower Level Of Toxicological Concern) to the HCVs (Health Condition Values) discussed in Environment Agency SR3 report. The SP1010 publication does however give values determined using the original HCV CLEA methodology. The only contaminant we have considered from this list is Lead.

Where there is no Environment Agency SGV or S4UL, Terramech Investigations have derived values using the CLEA Model with old TOX reports as well as the SR2 report and the SR3 report, as suggested by the Environment Agency.

The assessments should be based on a hierarchy where the Environment Agency SGVs and S4UL from the Chartered Institute of Environmental Health are most preferred, followed by values derived by Terramech using the CLEA model.

CIRIA C733 (Asbestos In Soil And Made Ground) shows how respirable fibre exposure estimates can be carried out based on measured soil concentrations. We have used this methodology to derive guideline values for a number of exposure scenarios based on the risk level of 1 in 100,000 used to derive HCVs for other contaminants. We have also used the most conservative values wherever possible. It should be noted that these values are not corroborated by any other organisation and they are also subject to the notes and caveats set out in the wider CIRIA C733 document.



List 2 (Assessment Criteria for Buried Water Supply Pipes)

Our recommendations are based on the Water Regulation Advisory Scheme information and guidance note No 9-04-03' October 2002 'The Selection of Materials for Water Supply Pipes to be Laid in Contaminated Land' however, the water utility companies now assess contaminants on the basis of their own guidances and we cannot comment on compliance with all these individual guidances.

List 3 (Assessment Criteria For Soil Disposal)

Assessment of soils destined for landfills takes two stages. The first is site characterisation, the second stage is compliance testing to assess the leachability or solubility of any contaminants that are present at elevated concentrations.

Characterisation is carried out by comparing the soil results with the SGVs and GACs in List 1 with respect to human health as well as groundwater protection. If the soils are seen to contain unacceptable concentrations of contaminants then leachate tests will be required to fully classify the soils. The leachate results are then compared with thresholds for different waste categories as set out in BS EN 12457-2.

List 4 (Groundwater Assessment Criteria)

Assessment of groundwater analysis is carried out using Water Supply (Water Quality) Regulations 2000 (SI 2000/3184 as amended) or the Environmental Quality Standard (EQS) values for fresh or saltwater depending on which is the most applicable background water quality scenario for compliance. Where the groundwater is not abstracted and not supplying water to springs or rivers, the results from upstream groundwater analysis would be used for comparison.

When investigations highlight the presence of soil contaminants at concentrations exceeding what could be expected naturally, the measured contaminant concentrations in soil would be assessed at tier 1 stage with respect to the risk posed to groundwater using the Environment Agency R&D Publication 20 Remedial Targets Worksheet, Release 2.2a.

Generic values for soil properties and chemical partition coefficients for contaminants were taken from the Environment Agency CLEA Model (v1.06) and supporting documents under the SC050021 reference. Exceedance of these values should not be taken as demonstrating a risk to controlled waters. Tier 2 and Tier 3 assessments would need to be carried out if exceedances are noted at Tier 1.

Assessment Criteria for Ground Gases

Ground gases are assessed on the basis of the CIRIA C665 document (Assessing Risks Posed by Hazardous Ground Gases to Buildings) which dictates the monitoring period and the frequency of visits required. Worst case flow rates and gas concentrations are then used to derive a Gas Screening Value (GSV) from which a characteristic situation and then a level of protection is defined.

List 1A (Metals mg/kg)					
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015	DEFRA SP1010 C4SL using SR3 HCV
Arsenic	Residential with plant uptake	32	32	37	37 _{C4SL}
	Residential without plant uptake	35	Not Assessed	40	40 _{C4SL}
	Allotment		43	43	49 _{C4SL}
	Commercial	635	640	640	640 _{C4SL}
	Public Open Space (Residential)		Not Assessed	79	79 _{C4SL}
	Public Open Space (Park)		Not Assessed	170	170 _{C4SL}
Beryllium	Residential with plant uptake		Not Assessed	1.7	
	Residential without plant uptake		Not Assessed	1.7	
	Allotment		Not Assessed	35	
	Commercial		Not Assessed	12	
	Public Open Space (Residential)		Not Assessed	2.2	
	Public Open Space (Park)		Not Assessed	63	
Boron	Residential with plant uptake		Not Assessed	Not Assessed	
	Residential without plant uptake		Not Assessed	Not Assessed	
	Allotment		Not Assessed	Not Assessed	
	Commercial		Not Assessed	Not Assessed	
	Public Open Space (Residential)		Not Assessed	Not Assessed	
	Public Open Space (Park)		Not Assessed	Not Assessed	
Cadmium	Residential with plant uptake		10	11	22 _{C4SL}
	Residential without plant uptake		Not Assessed	85	150 _{C4SL}
	Allotment		1.8	1.9	3.9 _{C4SL}
	Commercial		230	190	410 _{C4SL}
	Public Open Space (Residential)		Not Assessed	120	220 _{C4SL}
	Public Open Space (Park)		Not Assessed	532	880 _{C4SL}
Chromium III	Residential with plant uptake		Not Assessed	910	
	Residential without plant uptake		Not Assessed	910	
	Allotment		Not Assessed	18000	
	Commercial		Not Assessed	8600	
	Public Open Space (Residential)		Not Assessed	1500	
	Public Open Space (Park)		Not Assessed	3300	
Chromium VI	Residential with plant uptake		Not Assessed	6	21 _{C4SL}
	Residential without plant uptake		Not Assessed	6	21 _{C4SL}
	Allotment		Not Assessed	1.8	170 _{C4SL}
	Commercial		Not Assessed	33	49 _{C4SL}
	Public Open Space (Residential)		Not Assessed	7.7	21 _{C4SL}
	Public Open Space (Park)		Not Assessed	220	250 _{C4SL}
Copper	Residential with plant uptake		Not Assessed	2400	
	Residential without plant uptake		Not Assessed	7100	
	Allotment		Not Assessed	520	
	Commercial		Not Assessed	68000	
	Public Open Space (Residential)		Not Assessed	12000	
	Public Open Space (Park)		Not Assessed	44000	
Lead	Residential with plant uptake	82 ₍₄₎	450 (old SGV) ₍₅₎	Not Assessed	200 _{C4SL}
	Residential without plant uptake	82 ₍₄₎	450 (old SGV) ₍₅₎	Not Assessed	310 _{C4SL}
	Allotment		Not Assessed	Not Assessed	80 _{C4SL}
	Commercial	1100 ₍₄₎	750 (old SGV) ₍₅₎	Not Assessed	2300 _{C4SL}
	Public Open Space (Residential)		Not Assessed	Not Assessed	630 _{C4SL}
	Public Open Space (Park)		Not Assessed	Not Assessed	1300 _{C4SL}
Inorganic Mercury	Residential with plant uptake		170	40	
	Residential without plant uptake		Not Assessed	56	
	Allotment		80	19	
	Commercial		3600	1100	
	Public Open Space (Residential)			120	
	Public Open Space (Park)			240	
Elemental Mercury	Residential with plant uptake		1	1.2	
	Residential without plant uptake		Not Assessed	1.2	
	Allotment		26	21	
	Commercial		26	25.8	
	Public Open Space (Residential)			16	
	Public Open Space (Park)			25.8	
Methyl Mercury	Residential with plant uptake		11	11	
	Residential without plant uptake		Not Assessed	15	
	Allotment		8	6	
	Commercial		410	320	
	Public Open Space (Residential)			40	
	Public Open Space (Park)			68	
Nickel	Residential with plant uptake		130	180	
	Residential without plant uptake		Not Assessed	180	
	Allotment		230	230	
	Commercial		1800	980	
	Public Open Space (Residential)			230	
	Public Open Space (Park)			3400	

List 1A cont. (Metals mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part 2
Selenium	Residential with plant uptake		350	250
	Residential without plant uptake		Not Assessed	430
	Allotment		120	88
	Commercial		13000	12000
	Public Open Space (Residential)			1100
	Public Open Space (Park)			1800
Vanadium	Residential with plant uptake		Not Assessed	410
	Residential without plant uptake		Not Assessed	1200
	Allotment		Not Assessed	91
	Commercial		Not Assessed	9000
	Public Open Space (Residential)		Not Assessed	2000
	Public Open Space (Park)		Not Assessed	5000
Zinc	Residential with plant uptake		Not Assessed	3700
	Residential without plant uptake		Not Assessed	40000
	Allotment		Not Assessed	620
	Commercial		Not Assessed	730000
	Public Open Space (Residential)		Not Assessed	8100
	Public Open Space (Park)		Not Assessed	17000
Free Cyanide	Residential with plant uptake		Not Assessed	Not Assessed
	Residential without plant uptake		Not Assessed	Not Assessed
	Allotment		Not Assessed	Not Assessed
	Commercial		Not Assessed	Not Assessed
	Public Open Space (Residential)		Not Assessed	Not Assessed
	Public Open Space (Park)		Not Assessed	Not Assessed
Complex Cyanide	Residential with plant uptake		Not Assessed	Not Assessed
	Residential without plant uptake		Not Assessed	Not Assessed
	Allotment		Not Assessed	Not Assessed
	Commercial		Not Assessed	Not Assessed
	Public Open Space (Residential)		Not Assessed	Not Assessed
	Public Open Space (Park)		Not Assessed	Not Assessed
Thiocyanate	Residential with plant uptake		Not Assessed	Not Assessed
	Residential without plant uptake		Not Assessed	Not Assessed
	Allotment		Not Assessed	Not Assessed
	Commercial		Not Assessed	Not Assessed
	Public Open Space (Residential)		Not Assessed	Not Assessed
	Public Open Space (Park)		Not Assessed	Not Assessed
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List 1B (Aliphatic Hydrocarbons mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part 3
Aliphatic C5-C6	Residential with plant uptake		Not Assessed	42/78/160 ₍₁₎
	Residential without plant uptake		Not Assessed	42/76/160 ₍₁₎
	Allotment		Not Assessed	730/1700/3900 ₍₁₎
	Commercial		Not Assessed	3200(304 ^{sol})/5900(558 ^{sol})/12000(1150 ^{sol}) _(1&3)
	Public Open Space (Residential)			570000/590000/60000 ₍₁₎
	Public Open Space (Park)			95000(304 ^{sol})/130000(558 ^{sol})/180000(1150 ^{sol}) _(1&3)
Aliphatic C6-C8	Residential with plant uptake		Not Assessed	100/230/530 ₍₁₎
	Residential without plant uptake		Not Assessed	100/230/530 ₍₁₎
	Allotment		Not Assessed	2300/5600/13000 ₍₁₎
	Commercial		Not Assessed	7800(144 ^{sol})/17000(322 ^{sol})/40000(736 ^{sol}) _(1&3)
	Public Open Space (Residential)		Not Assessed	600000/610000/620000 ₍₁₎
	Public Open Space (Park)		Not Assessed	150000(144 ^{sol})/220000(322 ^{sol})/320000(736 ^{sol}) _(1&3)
Aliphatic C8-C10	Residential with plant uptake		Not Assessed	27/65/150 ₍₁₎
	Residential without plant uptake		Not Assessed	27/65/150 ₍₁₎
	Allotment		Not Assessed	320/77/1700 ₍₁₎
	Commercial		Not Assessed	2000(78 ^{sol})/4800(190 ^{vap})/11000(451 ^{vap}) _(1&3)
	Public Open Space (Residential)		Not Assessed	13000/13000/13000 ₍₁₎
	Public Open Space (Park)		Not Assessed	14000(78 ^{sol})/18000(190 ^{vap})/21000(451 ^{vap}) _(1&3)
Aliphatic C10-C12	Residential with plant uptake		Not Assessed	130(48 ^{vap})/330(118 ^{vap})/760(283 ^{vap}) _(1&3)
	Residential without plant uptake		Not Assessed	130(48 ^{vap})/330(118 ^{vap})/760(283 ^{vap}) _(1&3)
	Allotment		Not Assessed	2200/4400/7300 ₍₁₎
	Commercial		Not Assessed	9700(48 ^{sol})/23000(118 ^{vap})/47000(283 ^{vap}) _(1&3)
	Public Open Space (Residential)		Not Assessed	13000/13000/13000 ₍₁₎
	Public Open Space (Park)		Not Assessed	21000(48 ^{sol})/230000(118 ^{vap})/24000(283 ^{vap}) _(1&3)
Aliphatic C12-C16	Residential with plant uptake		Not Assessed	1100(24 ^{sol})/2400(59 ^{sol})/4300(142 ^{sol}) _(1&3)
	Residential without plant uptake		Not Assessed	1100(24 ^{sol})/2400(59 ^{sol})/4300(142 ^{sol}) _(1&3)
	Allotment		Not Assessed	11000/13000/13000 ₍₁₎
	Commercial		Not Assessed	59000(24 ^{sol})/82000(59 ^{sol})/90000(142 ^{sol}) _(1&3)
	Public Open Space (Residential)		Not Assessed	13000/13000/13000 ₍₁₎
	Public Open Space (Park)		Not Assessed	25000(24 ^{sol})/25000(59 ^{sol})/26000(142 ^{sol}) _(1&3)
Aliphatic C16-C35	Residential with plant uptake		Not Assessed	65000(8.48 ^{sol})/92000(21 ^{sol})/110000 _(1&3)
	Residential without plant uptake		Not Assessed	65000(8.48 ^{sol})/92000(21 ^{sol})/110000 _(1&3)
	Allotment		Not Assessed	260000/270000/270000 ₍₁₎
	Commercial		Not Assessed	1600000/1700000/1800000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	3800/3800/3800 ₍₁₎
	Public Open Space (Park)		Not Assessed	3800/3800/3800 ₍₁₎
Aliphatic C35-C44	Residential with plant uptake		Not Assessed	65000(8.48 ^{sol})/92000(21 ^{sol})/110000 _(1&3)
	Residential without plant uptake		Not Assessed	65000(8.48 ^{sol})/92000(21 ^{sol})/110000 _(1&3)
	Allotment		Not Assessed	260000/270000/270000 ₍₁₎
	Commercial		Not Assessed	1600000/1700000/1800000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	3800/3800/3800 ₍₁₎
	Public Open Space (Park)		Not Assessed	3800/3800/3800 ₍₁₎
Aliphatic C44-C70	Residential with plant uptake		Not Assessed	1600/1800/1900
	Residential without plant uptake		Not Assessed	1600/1800/1900
	Allotment		Not Assessed	1200/2100/3000
	Commercial		Not Assessed	28000/28000/28000
	Public Open Space (Residential)		Not Assessed	3800/3800/3800
	Public Open Space (Park)		Not Assessed	7800/7800/7800
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List 1C (Aromatic (Mono-cyclic and Poly-cyclic) Hydrocarbons mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part 3
Aromatic C5-C7	Residential with plant uptake		Not Assessed	70/140/300 ₍₁₎
	Residential without plant uptake		Not Assessed	370/690/1400 ₍₁₎
	Allotment		Not Assessed	13/27/57 ₍₁₎
	Commercial		Not Assessed	26000(1220 ^{soil})/46000(2260 ^{soil})/86000(4710 ^{soil}) _(1&3)
	Public Open Space (Residential)		Not Assessed	56000/56000/56000 ₍₁₎
	Public Open Space (Park)		Not Assessed	76000(1220 ^{soil})/84000(2260 ^{soil})/92000(4710 ^{soil}) _(1&3)
Aromatic C7-C8	Residential with plant uptake		Not Assessed	130/290/660 ₍₁₎
	Residential without plant uptake		Not Assessed	860/1800/3900 ₍₁₎
	Allotment		Not Assessed	22/51/120 ₍₁₎
	Commercial		Not Assessed	56000(869 ^{vap})/110000(1920 ^{soil})/180000(4360 ^{vap}) _(1&3)
	Public Open Space (Residential)		Not Assessed	56000/56000/56000 ₍₁₎
	Public Open Space (Park)		Not Assessed	87000(869 ^{vap})/95000(1920 ^{soil})/100000(4360 ^{vap}) _(1&3)
Aromatic C8-C10	Residential with plant uptake		Not Assessed	34/83/190 ₍₁₎
	Residential without plant uptake		Not Assessed	47/110/270 ₍₁₎
	Allotment		Not Assessed	8.6/21/51 ₍₁₎
	Commercial		Not Assessed	3500(613 ^{vap})/8100(1500 ^{vap})/17000(3580 ^{vap}) _(1&3)
	Public Open Space (Residential)		Not Assessed	5000/5000/5000 ₍₁₎
	Public Open Space (Park)		Not Assessed	7200(613 ^{vap})/8500(1500 ^{vap})/9300(3580 ^{vap}) _(1&3)
Aromatic C10-C12	Residential with plant uptake		Not Assessed	74/180/380 ₍₁₎
	Residential without plant uptake		Not Assessed	250/590/1200 ₍₁₎
	Allotment		Not Assessed	13/31/74 ₍₁₎
	Commercial		Not Assessed	16000(364 ^{soil})/28000(899 ^{soil})/34000(2150 ^{soil}) _(1&3)
	Public Open Space (Residential)		Not Assessed	5000/5000/5000 ₍₁₎
	Public Open Space (Park)		Not Assessed	9200(364 ^{soil})/9700(899 ^{soil})/10000 _(1&3)
Aromatic C12-C16	Residential with plant uptake		Not Assessed	140/330/660 ₍₁₎
	Residential without plant uptake		Not Assessed	1800/2300(419 ^{soil})/2500 _(1&3)
	Allotment		Not Assessed	23/57/130 ₍₁₎
	Commercial		Not Assessed	36000/(169 ^{soil})/37000/38000 _(1&3)
	Public Open Space (Residential)		Not Assessed	5100/5100/5000 ₍₁₎
	Public Open Space (Park)		Not Assessed	10000/10000/10000 ₍₁₎
Aromatic C16-C21	Residential with plant uptake		Not Assessed	260/540/930 ₍₁₎
	Residential without plant uptake		Not Assessed	1900/1900/1900 ₍₁₎
	Allotment		Not Assessed	46/110/260 ₍₁₎
	Commercial		Not Assessed	28000/28000/28000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	3800/3800/3800 ₍₁₎
	Public Open Space (Park)		Not Assessed	7600/7700/7800 ₍₁₎
Aromatic C21-C35	Residential with plant uptake		Not Assessed	1100/1500/1700 ₍₁₎
	Residential without plant uptake		Not Assessed	1900/1900/1900 ₍₁₎
	Allotment		Not Assessed	370/820/1600 ₍₁₎
	Commercial		Not Assessed	28000/28000/28000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	3800/3800/3800 ₍₁₎
	Public Open Space (Park)		Not Assessed	7800/7800/7900 ₍₁₎
Aromatic C35-C44	Residential with plant uptake		Not Assessed	1100/1500/1700 ₍₁₎
	Residential without plant uptake		Not Assessed	1900/1900/1900 ₍₁₎
	Allotment		Not Assessed	370/820/1600 ₍₁₎
	Commercial		Not Assessed	28000/28000/28000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	3800/3800/3800 ₍₁₎
	Public Open Space (Park)		Not Assessed	7800/7800/7900 ₍₁₎
Aromatic C44-C70	Residential with plant uptake		Not Assessed	1600/1800/1900 ₍₁₎
	Residential without plant uptake		Not Assessed	1900/1900/1900 ₍₁₎
	Allotment		Not Assessed	1200/2100/3000 ₍₁₎
	Commercial		Not Assessed	28000/28000/28000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	3800/3800/3800 ₍₁₎
	Public Open Space (Park)		Not Assessed	7800/7800/7900 ₍₁₎
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List 1D (BTEX Mono-cyclic Aromatic Hydrocarbons mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part 3
Benzene	Residential with plant uptake		0.33	0.87/0.17/0.37 ⁽¹⁾
	Residential without plant uptake		Not Assessed	0.38/0.70/1.4 ⁽¹⁾
	Allotment		0.07	0.017/0.034/0.075 ⁽¹⁾
	Commercial		95	27/47/90 ⁽¹⁾
	Public Open Space (Residential)		Not Assessed	72/72/73 ⁽¹⁾
	Public Open Space (Park)		Not Assessed	90/11/110 ⁽¹⁾
Benzene (C4SL values)	Residential with plant uptake			0.87 _{C4SL}
	Residential without plant uptake			3.3 _{C4SL}
	Allotment			0.18 _{C4SL}
	Commercial			98 _{C4SL}
	Public Open Space (Residential)			140 _{C4SL}
	Public Open Space (Park)			230 _{C4SL}
Toluene	Residential with plant uptake		610	130/290/660
	Residential without plant uptake		Not Assessed	880(869 ^{vap})/1900/3900 ^(1&3)
	Allotment		120	22/51/120 ⁽¹⁾
	Commercial		4400	56000(869 ^{vap})/56000(1920 ^{vap})/56000(4360 ^{vap}) ^(1&3)
	Public Open Space (Residential)		Not Assessed	5600/5600/5600 ⁽¹⁾
	Public Open Space (Park)		Not Assessed	87000(869 ^{vap})/95000(1920 ^{vap})/100000(4360 ^{vap}) ^(1&3)
Ethylbenzene	Residential with plant uptake		350	47/110/260 ⁽¹⁾
	Residential without plant uptake		Not Assessed	83/190/440 ⁽¹⁾
	Allotment		90	16/39/91 ⁽¹⁾
	Commercial		2800	5700(518 ^{vap})/13000(1220 ^{vap})/27000(2840 ^{vap}) ^(1&3)
	Public Open Space (Residential)		Not Assessed	24000/24000/25000 ⁽¹⁾
	Public Open Space (Park)		Not Assessed	17000(518 ^{vap})/22000(1220 ^{vap})/27000(2840 ^{vap}) ^(1&3)
o-Xylene	Residential with plant uptake		250	60/140/330 ⁽¹⁾
	Residential without plant uptake		Not Assessed	88/210/480 ⁽¹⁾
	Allotment		160	28/67/160 ⁽¹⁾
	Commercial		2600	6600(478 ^{sol})/15000(1120 ^{sol})/33000(2620 ^{sol}) ^(1&3)
	Public Open Space (Residential)		Not Assessed	41000/42000/43000 ⁽¹⁾
	Public Open Space (Park)		Not Assessed	17000(478 ^{sol})/24000(1120 ^{sol})/33000(2620 ^{sol}) ^(1&3)
m-Xylene	Residential with plant uptake		240	59/140/320 ⁽¹⁾
	Residential without plant uptake		Not Assessed	52/190/450 ⁽¹⁾
	Allotment		180	31/74/170 ⁽¹⁾
	Commercial		3500	6200(625 ^{vap})/14000(1470 ^{vap})/31000(3460 ^{vap}) ^(1&3)
	Public Open Space (Residential)		Not Assessed	41000/42000/43000 ⁽¹⁾
	Public Open Space (Park)		Not Assessed	17000(625 ^{vap})/24000(1470 ^{vap})/32000(3460 ^{vap}) ^(1&3)
p-Xylene	Residential with plant uptake		230	56/130/310 ⁽¹⁾
	Residential without plant uptake		Not Assessed	79/180/430 ⁽¹⁾
	Allotment		160	29/69/160 ⁽¹⁾
	Commercial		3200	59000(576 ^{sol})/14000(1350 ^{sol})/30000(3170 ^{sol}) ^(1&3)
	Public Open Space (Residential)		Not Assessed	41000/42000/43000 ⁽¹⁾
	Public Open Space (Park)		Not Assessed	17000(576 ^{sol})/23000(1350 ^{sol})/31000(3170 ^{sol}) ^(1&3)
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List 1E (Poly-cyclic Aromatic Hydrocarbons or PAH - mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part 4
Acenaphthene	Residential with plant uptake		Not Assessed	210/610/1100 ₍₁₎
	Residential without plant uptake		Not Assessed	3000/(57 ^{sol})/4700(141 ^{sol})/6000(336 ^{sol}) _(1&3)
	Allotment		Not Assessed	34/85/200 ₍₁₎
	Commercial		Not Assessed	8400(57 ^{sol})/97000(141 ^{sol})/100000 _(1&3)
	Public Open Space (Residential)		Not Assessed	15000/15000/15000 ₍₁₎
	Public Open Space (Park)		Not Assessed	29000/30000/30000 ₍₁₎
Acenaphthylene	Residential with plant uptake		Not Assessed	170/420/920 ₍₁₎
	Residential without plant uptake		Not Assessed	2900(86.1 ^{sol})/4600(212 ^{sol})/6000(506 ^{sol}) _(1&3)
	Allotment		Not Assessed	28/69/160 ₍₁₎
	Commercial		Not Assessed	83000(86.1 ^{sol})/97000(212 ^{sol})/100000 _(1&3)
	Public Open Space (Residential)		Not Assessed	15000/15000/15000 ₍₁₎
	Public Open Space (Park)		Not Assessed	29000/30000/30000 ₍₁₎
Anthracene	Residential with plant uptake		Not Assessed	2400/5400/11000 ₍₁₎
	Residential without plant uptake		Not Assessed	31000(1.17 ^{vap})/35000/37000 _(1&3)
	Allotment		Not Assessed	380/950/2200 ₍₁₎
	Commercial		Not Assessed	520000/540000/540000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	74000/74000/74000 ₍₁₎
	Public Open Space (Park)		Not Assessed	150000/150000/150000 ₍₁₎
Benzo (a) Anthracene	Residential with plant uptake		Not Assessed	7.2/11/13 ₍₁₎
	Residential without plant uptake		Not Assessed	11/14/15 ₍₁₎
	Allotment		Not Assessed	2.9/6.5/13 ₍₁₎
	Commercial		Not Assessed	170/170/180 ₍₁₎
	Public Open Space (Residential)		Not Assessed	29/29/29 ₍₁₎
	Public Open Space (Park)		Not Assessed	49/56/62 ₍₁₎
Benzo (a) Pyrene	Residential with plant uptake		Not Assessed	2.2/2.7/3.0 ₍₁₎
	Residential without plant uptake		Not Assessed	3.2/3.2/3.2 ₍₁₎
	Allotment		Not Assessed	0.97/2.0/3.5 ₍₁₎
	Commercial		Not Assessed	35/35/36 ₍₁₎
	Public Open Space (Residential)		Not Assessed	5.7/5.7/5.7 ₍₁₎
	Public Open Space (Park)		Not Assessed	11/12/13 ₍₁₎
Benzo (a) Pyrene (C4SL values)	Residential with plant uptake			5.0 _{C4SL}
	Residential without plant uptake			5.3 _{C4SL}
	Allotment			5.7 _{C4SL}
	Commercial			77 _{C4SL}
	Public Open Space (Residential)			10 _{C4SL}
	Public Open Space (Park)			21 _{C4SL}
Benzo (b) Fluoranthene	Residential with plant uptake		Not Assessed	2.6/3.3/3.7 ₍₁₎
	Residential without plant uptake		Not Assessed	3.9/4.0/4.0 ₍₁₎
	Allotment		Not Assessed	0.99/2.1/3.9 ₍₁₎
	Commercial		Not Assessed	44/44/45 ₍₁₎
	Public Open Space (Residential)		Not Assessed	7.1/7.2/7.2 ₍₁₎
	Public Open Space (Park)		Not Assessed	13/15/16 ₍₁₎
Benzo (ghi) Perylene	Residential with plant uptake		Not Assessed	320/340/350 ₍₁₎
	Residential without plant uptake		Not Assessed	360/360/360 ₍₁₎
	Allotment		Not Assessed	290/470/640 ₍₁₎
	Commercial		Not Assessed	3900/4000/4000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	640/640/640 ₍₁₎
	Public Open Space (Park)		Not Assessed	1400/1500/1600 ₍₁₎
Benzo (k) Fluoranthene	Residential with plant uptake		Not Assessed	77/93/100 ₍₁₎
	Residential without plant uptake		Not Assessed	110/110/110 ₍₁₎
	Allotment		Not Assessed	37/75/130 ₍₁₎
	Commercial		Not Assessed	1200/1200/1200 ₍₁₎
	Public Open Space (Residential)		Not Assessed	190/190/190 ₍₁₎
	Public Open Space (Park)		Not Assessed	370/410/440 ₍₁₎
Chrysene	Residential with plant uptake		Not Assessed	15/22/27 ₍₁₎
	Residential without plant uptake		Not Assessed	30/31/32 ₍₁₎
	Allotment		Not Assessed	4.1/9.4/19 ₍₁₎
	Commercial		Not Assessed	350/350/350 ₍₁₎
	Public Open Space (Residential)		Not Assessed	57/57/57 ₍₁₎
	Public Open Space (Park)		Not Assessed	93/110/120 ₍₁₎
Dibenzo (ah) Anthracene	Residential with plant uptake		Not Assessed	0.24/0.28/0.3 ₍₁₎
	Residential without plant uptake		Not Assessed	0.31/0.32/0.32 ₍₁₎
	Allotment		Not Assessed	0.14/0.27/0.43 ₍₁₎
	Commercial		Not Assessed	3.5/3.6/3.6 ₍₁₎
	Public Open Space (Residential)		Not Assessed	0.57/0.57/0.58 ₍₁₎
	Public Open Space (Park)		Not Assessed	1.1/1.3/1.4 ₍₁₎
Fluoranthene	Residential with plant uptake		Not Assessed	280/560/890 ₍₁₎
	Residential without plant uptake		Not Assessed	1500/1600/1600 ₍₁₎
	Allotment		Not Assessed	52/130/290 ₍₁₎
	Commercial		Not Assessed	23000/23000/23000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	3100/3100/3100 ₍₁₎
	Public Open Space (Park)		Not Assessed	6300/6300/6400 ₍₁₎
Fluorene	Residential with plant uptake		Not Assessed	170/400/860 ₍₁₎
	Residential without plant uptake		Not Assessed	2800(30.9 ^{sol})/3800(76.5 ^{sol})/4500(183 ^{sol}) _(1&3)
	Allotment		Not Assessed	27/67/160 ₍₁₎
	Commercial		Not Assessed	63000(30.9 ^{sol})/68000/71000 _(1&3)
	Public Open Space (Residential)		Not Assessed	9900/9900/9900 ₍₁₎
	Public Open Space (Park)		Not Assessed	20000/20000/20000 ₍₁₎

List 1E cont. (Poly-cyclic Aromatic Hydrocarbons or PAH - mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part 4
Indeno (cd) Pyrene	Residential with plant uptake		Not Assessed	27/36/41 ₍₁₎
	Residential without plant uptake		Not Assessed	45/46/46 ₍₁₎
	Allotment		Not Assessed	9.5/21/39 ₍₁₎
	Commercial		Not Assessed	500/510/510 ₍₁₎
	Public Open Space (Residential)		Not Assessed	82/82/82 ₍₁₎
	Public Open Space (Park)		Not Assessed	150/170/180 ₍₁₎
Naphthalene	Residential with plant uptake		Not Assessed	2.3/5.6/13 ₍₁₎
	Residential without plant uptake		Not Assessed	2.3/5.6/13 ₍₁₎
	Allotment		Not Assessed	4.1/10/24 ₍₁₎
	Commercial		Not Assessed	190(76.4 ^{sol})/460(183 ^{sol})/1100(432 ^{sol}) _(1&3)
	Public Open Space (Residential)		Not Assessed	4900/4900/4900 ₍₁₎
	Public Open Space (Park)		Not Assessed	1200(76.4 ^{sol})/1900(183 ^{sol})/3000 _(1&3)
Phenanthrene	Residential with plant uptake		Not Assessed	95/220/440 ₍₁₎
	Residential without plant uptake		Not Assessed	1300(36 ^{sol})/1500/1500 _(1&3)
	Allotment		Not Assessed	15/38/90 ₍₁₎
	Commercial		Not Assessed	22000/22000/23000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	3100/3100/3100 ₍₁₎
	Public Open Space (Park)		Not Assessed	6200/6200/6300 ₍₁₎
Pyrene	Residential with plant uptake		Not Assessed	620/1200/2000 ₍₁₎
	Residential without plant uptake		Not Assessed	3700/3800/3800 ₍₁₎
	Allotment		Not Assessed	110/270/620 ₍₁₎
	Commercial		Not Assessed	54000/54000/54000 ₍₁₎
	Public Open Space (Residential)		Not Assessed	7400/7400/7400 ₍₁₎
	Public Open Space (Park)		Not Assessed	15000/15000/15000 ₍₁₎
Coal Tar (Benzo (a) Pyrene as surrogate)	Residential with plant uptake		Not Assessed	0.79/0.98/1.1 ₍₁₎
	Residential without plant uptake		Not Assessed	1.2/1.2/1.2 ₍₁₎
	Allotment		Not Assessed	0.32/0.67/1.2 ₍₁₎
	Commercial		Not Assessed	15/15/15 ₍₁₎
	Public Open Space (Residential)		Not Assessed	2.2/2.2/2.2 ₍₁₎
	Public Open Space (Park)		Not Assessed	4.4/4.7/4.8 ₍₁₎
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List 1F (PCBs $\mu\text{g/kg}$)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency New SGV (CLEA v1.04)	CIEH/LQM 2nd Ed 2009 or CIEH/LQM S4UL 2015
Sum of PCDDs, PCDFs and dioxin-like PCBs	Residential with plant uptake		8	Not Assessed
	Residential without plant uptake		8	Not Assessed
	Allotment			Not Assessed
	Commercial		240	Not Assessed
PCB-77	Residential with plant uptake		0.0774	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.233	Not Assessed
	Commercial		2.33	Not Assessed
PCB-81	Residential with plant uptake		0.0774	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.233	Not Assessed
	Commercial		2.33	Not Assessed
PCB-126	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.247	Not Assessed
	Commercial		2.33	Not Assessed
PCB-169	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.251	Not Assessed
	Commercial		2.33	Not Assessed
PCB-105	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.247	Not Assessed
	Commercial		2.33	Not Assessed
PCB-114	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.247	Not Assessed
	Commercial		2.33	Not Assessed
PCB-118	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.247	Not Assessed
	Commercial		2.33	Not Assessed
PCB-123	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.247	Not Assessed
	Commercial		2.33	Not Assessed
PCB-156	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.251	Not Assessed
	Commercial		2.33	Not Assessed
PCB-157	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.251	Not Assessed
	Commercial		2.33	Not Assessed
PCB-156	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.251	Not Assessed
	Commercial		2.33	Not Assessed
PCB-157	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.251	Not Assessed
	Commercial		2.33	Not Assessed
PCB-167	Residential with plant uptake		0.0777	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.251	Not Assessed
	Commercial			Not Assessed
PCB-189	Residential with plant uptake		0.0778	Not Assessed
	Residential without plant uptake		0.0783	Not Assessed
	Allotment		0.252	Not Assessed
	Commercial		2.33	Not Assessed
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List 1G (ChloroAlkanes & Alkenes mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part5
1,2 Dichloroethane (1,2 -DCA)	Residential with plant uptake		Not Assessed	0.0071/0.011/0.019
	Residential without plant uptake		Not Assessed	0.0092/0.013/0.023
	Allotment		Not Assessed	0.0046/0.0083/0.016
	Commercial		Not Assessed	0.67/0.97/1.7
	Public Open Space (Residential)		Not Assessed	29/29/29
	Public Open Space (Park)		Not Assessed	21/24/28
1,1,1 Trichloroethane	Residential with plant uptake		Not Assessed	8.8/18/39
	Residential without plant uptake		Not Assessed	9.0/18/40
	Allotment		Not Assessed	48/110/240
	Commercial		Not Assessed	660/1300/3000
	Public Open Space (Residential)		Not Assessed	14000/14000/14000
	Public Open Space (Park)		Not Assessed	57000(1425 ^{vap})/76000(2915 ^{vap})/100000(6392 ^{vap})
1,1,2,2 Tetrachloroethanes	Residential with plant uptake		Not Assessed	1.6/3.4/7.5
	Residential without plant uptake		Not Assessed	3.9/8.0/17
	Allotment		Not Assessed	0.41/0.89/2.0
	Commercial		Not Assessed	270/550/1100
	Public Open Space (Residential)		Not Assessed	1400/1400/1400
	Public Open Space (Park)		Not Assessed	1800/2100/2300
1,1,1,2 Tetrachloroethanes	Residential with plant uptake		Not Assessed	1.2/2.8/6.4
	Residential without plant uptake		Not Assessed	1.5/3.5/8.2
	Allotment		Not Assessed	0.79/1.9/4.4
	Commercial		Not Assessed	110/250/560
	Public Open Space (Residential)		Not Assessed	1400/1400/1400
	Public Open Space (Park)		Not Assessed	1500/1800/2100
Tetrachloroethene	Residential with plant uptake		Not Assessed	0.18/0.39/0.9
	Residential without plant uptake		Not Assessed	0.18/0.4/0.92
	Allotment		Not Assessed	0.65/1.5/3.6
	Commercial		Not Assessed	19/42/95
	Public Open Space (Residential)		Not Assessed	1400/1400/1400
	Public Open Space (Park)		Not Assessed	820(424 ^{soil})/1100(951 ^{soil})/1500
Tetrachloromethane Aka Carbon Tetrachloride	Residential with plant uptake		Not Assessed	0.026/0.058/0.13
	Residential without plant uptake		Not Assessed	0.026/0.058/0.13
	Allotment		Not Assessed	0.45/1.0/2.4
	Commercial		Not Assessed	2.9/6.3/14
	Public Open Space (Residential)		Not Assessed	890/920/950
	Public Open Space (Park)		Not Assessed	190/270/400
Trichloroethene	Residential with plant uptake		Not Assessed	0.016/0.034/0.075
	Residential without plant uptake		Not Assessed	0.017/0.036/0.08
	Allotment		Not Assessed	0.041/0.091/0.21
	Commercial		Not Assessed	1.2/2.6/6.7
	Public Open Space (Residential)		Not Assessed	120/120/120
	Public Open Space (Park)		Not Assessed	70/91/120
Trichloromethane Aka Chloroform	Residential with plant uptake		Not Assessed	0.91/1.7/3.4
	Residential without plant uptake		Not Assessed	1.2/2.1/4.2
	Allotment		Not Assessed	0.42/0.83/1.7
	Commercial		Not Assessed	99/170/350
	Public Open Space (Residential)		Not Assessed	2500/2500/2500
	Public Open Space (Park)		Not Assessed	2600/2800/3100
Chloroethene Aka Vinyl Chloride	Residential with plant uptake		Not Assessed	0.00064/0.00087/0.0014
	Residential without plant uptake		Not Assessed	0.00077/0.0010/0.0015
	Allotment		Not Assessed	0.000550.0010/0.0018
	Commercial		Not Assessed	0.059/0.077/0.12
	Public Open Space (Residential)		Not Assessed	3.5/3.5/3.5
	Public Open Space (Park)		Not Assessed	4.8/5.0/5.4
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List 1H (Explosives mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part 6
2,4,6 Trinitrotoluene Aka TNT	Residential with plant uptake		Not Assessed	1.6/3.7/8.1
	Residential without plant uptake		Not Assessed	65/66/66
	Allotment		Not Assessed	0.24/0.58/1.4
	Commercial		Not Assessed	1000/1000/1000
	Public Open Space (Residential)		Not Assessed	130/130/130
	Public Open Space (Park)		Not Assessed	260/270/270
RDX	Residential with plant uptake		Not Assessed	120/250/540
	Residential without plant uptake		Not Assessed	13000/13000/13000
	Allotment		Not Assessed	17/38/85
	Commercial		Not Assessed	21000/21000/21000
	Public Open Space (Residential)		Not Assessed	26000/26000/27000
	Public Open Space (Park)		Not Assessed	49000(18.7sol)/51000/53000
HMX	Residential with plant uptake		Not Assessed	5.7/13/26
	Residential without plant uptake		Not Assessed	6700/6700/6700
	Allotment		Not Assessed	0.86/1.9/3.9
	Commercial		Not Assessed	11000/11000/11000
	Public Open Space (Residential)		Not Assessed	13000/13000/13000
	Public Open Space (Park)		Not Assessed	23000(0.36 ^{vap})/23000(0.39 ^{vap})24000(0.48 ^{vap})
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List 11. (Pesticides mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part 7
Aldrin	Residential with plant uptake		Not Assessed	5.7/6.6/7.1 ₍₁₎
	Residential without plant uptake		Not Assessed	7.3/7.4/7.5 ₍₁₎
	Allotment		Not Assessed	3.2/6.1/9.6 ₍₁₎
	Commercial		Not Assessed	170/170/170 ₍₁₎
	Public Open Space (Residential)		Not Assessed	18/18/18 ₍₁₎
	Public Open Space (Park)		Not Assessed	30/30/31 ₍₁₎
Dieldrin	Residential with plant uptake		Not Assessed	0.97/2/3.5 ₍₁₎
	Residential without plant uptake		Not Assessed	7/7.3/7.4 ₍₁₎
	Allotment		Not Assessed	0.17/0.41/0.96 ₍₁₎
	Commercial		Not Assessed	170/170/170 ₍₁₎
	Public Open Space (Residential)		Not Assessed	18/18/18 ₍₁₎
	Public Open Space (Park)		Not Assessed	30/30/30 ₍₁₎
Atrazine	Residential with plant uptake		Not Assessed	3.3/7.6/17.4 ₍₁₎
	Residential without plant uptake		Not Assessed	610/620/620 ₍₁₎
	Allotment		Not Assessed	0.5/1.2/2.7 ₍₁₎
	Commercial		Not Assessed	9300/9300/9400 ₍₁₎
	Public Open Space (Residential)		Not Assessed	1200/1200/1200 ₍₁₎
	Public Open Space (Park)		Not Assessed	2300/2400/2400 ₍₁₎
Dichlorvos	Residential with plant uptake		Not Assessed	0.032/0.066/0.14 ₍₁₎
	Residential without plant uptake		Not Assessed	6.4/6.5/6.6 ₍₁₎
	Allotment		Not Assessed	0.0049/0.010/0.022 ₍₁₎
	Commercial		Not Assessed	140/140/140 ₍₁₎
	Public Open Space (Residential)		Not Assessed	16/16/16 ₍₁₎
	Public Open Space (Park)		Not Assessed	26/26/27 ₍₁₎
Alpha Endosulfan	Residential with plant uptake		Not Assessed	7.4/18/41 ₍₁₎
	Residential without plant uptake		Not Assessed	160(0.003 ^{vap})/280(0.007 ^{vap})/410(0.016 ^{vap}) _(1 & 3)
	Allotment		Not Assessed	1.2/2.9/6.6 ₍₁₎
	Commercial		Not Assessed	5600(0.016 ^{vap})/7400(0.016 ^{vap})/8400(0.016 ^{vap}) _(1 & 3)
	Public Open Space (Residential)		Not Assessed	1200/1200/1200 ₍₁₎
	Public Open Space (Park)		Not Assessed	2400/2400/2500 ₍₁₎
Beta Endosulfan	Residential with plant uptake		Not Assessed	7.0/17/39 ₍₁₎
	Residential without plant uptake		Not Assessed	150(0.00007 ^{vap})/320(0.0002 ^{vap})/440(0.0004 ^{vap}) _(1 & 3)
	Allotment		Not Assessed	1.1/2.7/6.4 ₍₁₎
	Commercial		Not Assessed	6300(0.00007 ^{vap})/7800(0.0002 ^{vap})/8700(0.0004 ^{vap}) _(1 & 3)
	Public Open Space (Residential)		Not Assessed	1200/1200/1200 ₍₁₎
	Public Open Space (Park)		Not Assessed	2400/2400/2500 ₍₁₎
Alpha BHC (Hexachlorocyclohexane) Inc Lindane	Residential with plant uptake		Not Assessed	0.23/0.66/1.2 ₍₁₎
	Residential without plant uptake		Not Assessed	6.9/9.2/11 ₍₁₎
	Allotment		Not Assessed	0.035/0.087/0.21 ₍₁₎
	Commercial		Not Assessed	170/180/180 ₍₁₎
	Public Open Space (Residential)		Not Assessed	24/24/24 ₍₁₎
	Public Open Space (Park)		Not Assessed	47/48/48 ₍₁₎
Beta BHC (Hexachlorocyclohexane) Inc Lindane	Residential with plant uptake		Not Assessed	0.085/0.2/0.46 ₍₁₎
	Residential without plant uptake		Not Assessed	3.7/3.8/3.8 ₍₁₎
	Allotment		Not Assessed	0.013/0.032/0.077 ₍₁₎
	Commercial		Not Assessed	65/65/65 ₍₁₎
	Public Open Space (Residential)		Not Assessed	8.1/8.1/8.1 ₍₁₎
	Public Open Space (Park)		Not Assessed	15/15/16 ₍₁₎
Gamma BHC (Hexachlorocyclohexane) Inc Lindane	Residential with plant uptake		Not Assessed	0.06/0.14/0.33 ₍₁₎
	Residential without plant uptake		Not Assessed	2.9/3.3/3.5 ₍₁₎
	Allotment		Not Assessed	0.0092/0.023/0.054 ₍₁₎
	Commercial		Not Assessed	67/69/70 ₍₁₎
	Public Open Space (Residential)		Not Assessed	8.2/8.2/8.2 ₍₁₎
	Public Open Space (Park)		Not Assessed	14/15/15 ₍₁₎
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List 1J (Chlorobenzenes mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part8
Chlorobenzene	Residential with plant uptake		Not Assessed	0.46/1.0/2.4
	Residential without plant uptake		Not Assessed	0.46/1.0/2.4
	Allotment		Not Assessed	5.9/14/32
	Commercial		Not Assessed	56/130/290
	Public Open Space (Residential)		Not Assessed	11000/13000/14000
	Public Open Space (Park)		Not Assessed	1300(675 ^{sol})/2000(1520 ^{sol})/2900
1,2 Dichlorobenzene	Residential with plant uptake		Not Assessed	23/56/130
	Residential without plant uptake		Not Assessed	24/57/130
	Allotment		Not Assessed	94/230/540
	Commercial		Not Assessed	2000(571 ^{sol})/4800(1370 ^{sol})/11000(3240 ^{sol})
	Public Open Space (Residential)		Not Assessed	90000/95000/98000
	Public Open Space (Park)		Not Assessed	24000(571 ^{sol})/36000(1370 ^{sol})/51000(3240 ^{sol})
1,3 Dichlorobenzene	Residential with plant uptake		Not Assessed	0.4/0.1/2.3
	Residential without plant uptake		Not Assessed	0.44/1.1/2.5
	Allotment		Not Assessed	0.25/0.6/1.5
	Commercial		Not Assessed	30/73/170
	Public Open Space (Residential)		Not Assessed	300/300/300
	Public Open Space (Park)		Not Assessed	390/440/470
1,4 Dichlorobenzene	Residential with plant uptake		Not Assessed	61/150/350
	Residential without plant uptake		Not Assessed	61/150/350
	Allotment		Not Assessed	19/37/88
	Commercial		Not Assessed	4400(224 ^{vap})/10000(540 ^{vap})/25000(1280 ^{vap})
	Public Open Space (Residential)		Not Assessed	17000/17000/17000
	Public Open Space (Park)		Not Assessed	36000(224 ^{vap})/36000(540 ^{vap})/36000(1280 ^{vap})
1,2,3 Trichlorobenzene	Residential with plant uptake		Not Assessed	1.5/3.6/8.6
	Residential without plant uptake		Not Assessed	1.5/3.7/8.8
	Allotment		Not Assessed	4.7/12/28
	Commercial		Not Assessed	102/250/590
	Public Open Space (Residential)		Not Assessed	1800/1800/1800
	Public Open Space (Park)		Not Assessed	770(134 ^{vap})/1100(330 ^{vap})/1600(789 ^{vap})
1,2,4 Trichlorobenzene	Residential with plant uptake		Not Assessed	2.6/6.4/15
	Residential without plant uptake		Not Assessed	2.6/6.4/15
	Allotment		Not Assessed	55/140/320
	Commercial		Not Assessed	220/530/1300
	Public Open Space (Residential)		Not Assessed	15000/17000/19000
	Public Open Space (Park)		Not Assessed	1700(318 ^{vap})/2600(786 ^{vap})/4000(1880 ^{vap})
1,3,5 Trichlorobenzene	Residential with plant uptake		Not Assessed	0.33/0.81/1.9
	Residential without plant uptake		Not Assessed	0.33/0.81/1.9
	Allotment		Not Assessed	4.7/12/28
	Commercial		Not Assessed	23/55/130
	Public Open Space (Residential)		Not Assessed	1700/1700/1800
	Public Open Space (Park)		Not Assessed	380(36.7 ^{vap})/580(90.8 ^{vap})/860(217 ^{vap})
1,2,3,4 Tetrachlorobenzenes	Residential with plant uptake		Not Assessed	15/36/78
	Residential without plant uptake		Not Assessed	24/56/120
	Allotment		Not Assessed	4.4/11/26
	Commercial		Not Assessed	1700(122 ^{vap})/3080(304 ^{vap})/4400(728 ^{vap})
	Public Open Space (Residential)		Not Assessed	830/830/830
	Public Open Space (Park)		Not Assessed	1500(122 ^{vap})/1600/1600
1,2,3,5 Tetrachlorobenzenes	Residential with plant uptake		Not Assessed	0.66/1.6/3.7
	Residential without plant uptake		Not Assessed	0.75/1.9/4.3
	Allotment		Not Assessed	0.38/0.9/2.2
	Commercial		Not Assessed	49(39.4 ^{vap})/120(98.1 ^{vap})/240235 ^{vap})
	Public Open Space (Residential)		Not Assessed	78/79/79
	Public Open Space (Park)		Not Assessed	110(39 ^{vap})/120/130
1,2,4,5 Tetrachlorobenzenes	Residential with plant uptake		Not Assessed	0.33/0.77/1.6
	Residential without plant uptake		Not Assessed	0.73/1.7/3.5
	Allotment		Not Assessed	0.06/0.16/0.37
	Commercial		Not Assessed	42(19.7 ^{sol})/72(49.1 ^{sol})/96
	Public Open Space (Residential)		Not Assessed	13/13/13
	Public Open Space (Park)		Not Assessed	25/26/26
Pentachlorobenzene	Residential with plant uptake		Not Assessed	5.8/12/22
	Residential without plant uptake		Not Assessed	19/30/38
	Allotment		Not Assessed	1.2/3.1/7.0
	Commercial		Not Assessed	640(43.0 ^{sol})/770(107 ^{sol})/830
	Public Open Space (Residential)		Not Assessed	100/100/100
	Public Open Space (Park)		Not Assessed	190/190/190

List 1J (Chlorobenzenes mg/kg) cont				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part8
Hexachlorobenzene	Residential with plant uptake		Not Assessed	1.3(0.2 ^{vap})/3.3(0.5 ^{vap})/4.9
	Residential without plant uptake		Not Assessed	4.1(0.2 ^{vap})/5.7(0.5 ^{vap})/6.7(1.2 ^{vap})
	Allotment		Not Assessed	0.47/1.1/2.5
	Commercial		Not Assessed	110(0.2 ^{vap})/120/120
	Public Open Space (Residential)		Not Assessed	16/16/16
	Public Open Space (Park)		Not Assessed	30/30/30
This table is not a list of potential contaminants at any one site All values are subject to ongoing review CIEH - Chartered Institute for Environmental Health LQM - Land Quality Management (commercial research) (1) xx/yy/zz SOM - Soil Organic Matter dependant at 1%/2.5%/6% (2) xx/yy/zz pH - pH dependant at pH6/pH7/pH8 (3) Internal limits exceeded during calculations. Vapour or solubility saturation limit exceeded (limit presented in brackets) (4) under review by Terramech S4UL values are the copyright of Land Quality Management Ltd and are reproduced with permission; Publication Number S4UL3262 All rights reserved			Terramech Investigations Limited 183 Long Lane Tilehurst Reading RG31 6YW Email - info@terramech.co.uk Tel 01189 439 910 Fax 01189 439 920	



List 1K (Phenols & Chlorophenols mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part9
Phenol	Residential with plant uptake		Not Assessed	280/550/1100
	Residential without plant uptake		Not Assessed	750/1300/2300
	Allotment		Not Assessed	66/140/280
	Commercial		Not Assessed	760/1500/3200
	Public Open Space (Residential)		Not Assessed	760/1500/3200
	Public Open Space (Park)		Not Assessed	760/1500/3200
Chlorophenol	Residential with plant uptake		Not Assessed	0.87/2.0/4.5
	Residential without plant uptake		Not Assessed	94/150/210
	Allotment		Not Assessed	0.13/0.30/0.7
	Commercial		Not Assessed	3500/4000/4300
	Public Open Space (Residential)		Not Assessed	620/620/620
	Public Open Space (Park)		Not Assessed	1100/1100/1100
Pentachlorophenol	Residential with plant uptake		Not Assessed	0.22/0.52/1.2
	Residential without plant uptake		Not Assessed	27(16.4 ^{vap})/29/31
	Allotment		Not Assessed	0.03/0.08/0.19
	Commercial		Not Assessed	400/400/400
	Public Open Space (Residential)		Not Assessed	60/60/60
	Public Open Space (Park)		Not Assessed	110/120/120
This table is not a list of potential contaminants at any one site All values are subject to ongoing review CIEH - Chartered Institute for Environmental Health LQM - Land Quality Management (commercial research) (1) xx/yy/zz SOM - Soil Organic Matter dependant at 1%/2.5%/6% (2) xx/yy/zz pH - pH dependant at pH6/pH7/pH8 (3) Internal limits exceeded during calculations. Vapour or solubility saturation limit exceeded (limit presented in brackets) (4) under review by Terramech S4UL values are the copyright of Land Quality Management Ltd and are reproduced with permission; Publication Number S4UL3262 All rights reserved			Terramech Investigations Limited 183 Long Lane Tilehurst Reading RG31 6YW Email - info@terramech.co.uk Tel 01189 439 910 Fax 01189 439 920	



List 1L (Other mg/kg)				
Contaminant	Generic Exposure Scenario	Terramech (CLEA v1.06 & S4UL methodology)	Environment Agency SGV (CLEA v1.04)	CIEH/LQM S4UL 2015 Part 10
Carbon Disulphide	Residential with plant uptake		Not Assessed	0.14/0.29/0.62
	Residential without plant uptake		Not Assessed	0.14/0.29/0.62
	Allotment		Not Assessed	4.8/10/23
	Commercial		Not Assessed	11/22/47
	Public Open Space (Residential)		Not Assessed	11000/11000/12000
	Public Open Space (Park)		Not Assessed	1300/1900/2700
Hexachlorobutadiene	Residential with plant uptake		Not Assessed	0.29/0.7/1.6
	Residential without plant uptake		Not Assessed	0.32/0.78/1.8
	Allotment		Not Assessed	0.25/0.61/1.4
	Commercial		Not Assessed	31/66/120
	Public Open Space (Residential)		Not Assessed	25/25/25
	Public Open Space (Park)		Not Assessed	48/50/51
This table is not a list of potential contaminants at any one site All values are subject to ongoing review CIEH - Chartered Institute for Environmental Health LQM - Land Quality Management (commercial research) (1) xx/yy/zz SOM - Soil Organic Matter dependant at 1%/2.5%/6% (2) xx/yy/zz pH - pH dependant at pH6/pH7/pH8 (3) Internal limits exceeded during calculations. Vapour or solubility saturation limit exceeded (limit presented in brackets) (4) under review by Terramech S4UL values are the copyright of Land Quality Management Ltd and are reproduced with permission; Publication Number S4UL3262 All rights reserved			Terramech Investigations Limited 183 Long Lane Tilehurst Reading RG31 6YW Email - info@terramech.co.uk Tel 01189 439 910 Fax 01189 439 920	



List 1M (Natural Mineral Fibres quantified % weight in soil)				
Contaminant	Generic Exposure Scenario	Terramech (CIRIA C733 methodology)	Environment Agency SGV	CIEH/LQM
Chrysotile Asbestos	Residential with active gardening Sandy Soil	0.01%		
	Residential with active gardening Int Soil	0.05%		
	Residential with active gardening Clay Soil	0.1%		
	Allotment Sandy Soil	0.002%		
	Allotment Intermediate Soil	0.005%		
	Allotment Clay Soil	0.01%		
	Commercial Sandy Soil	0.05%		
	Commercial Intermediate Soil	0.2%		
	Commercial Clay Soil	0.25%		
	Public Open Space Sandy Soil (Residential)	0.0015%		
	Public Open Space Int Soil (Residential)	0.0025%		
	Public Open Space Clay Soil (Residential)	0.001% (clay overtakes sand)		
Amosite Asbestos	Residential with active gardening Sandy Soil	Any detectable concentration		
	Residential with active gardening Int Soil	Any detectable concentration		
	Residential with active gardening Clay Soil	Any detectable concentration		
	Allotment Sandy Soil	Any detectable concentration		
	Allotment Intermediate Soil	Any detectable concentration		
	Allotment Clay Soil	Any detectable concentration		
	Commercial Sandy Soil	0.001%		
	Commercial Intermediate Soil	0.001%		
	Commercial Clay Soil	0.009%		
	Public Open Space Sandy Soil (Residential)	Any detectable concentration		
	Public Open Space Int Soil (Residential)	Any detectable concentration		
	Public Open Space Clay Soil (Residential)	Any detectable concentration		
Crocidolite Asbestos	Residential with active gardening Sandy Soil	Any detectable concentration		
	Residential with active gardening Int Soil	Any detectable concentration		
	Residential with active gardening Clay Soil	Any detectable concentration		
	Allotment Sandy Soil	Any detectable concentration		
	Allotment Intermediate Soil	Any detectable concentration		
	Allotment Clay Soil	Any detectable concentration		
	Commercial Sandy Soil	Any detectable concentration		
	Commercial Intermediate Soil	Any detectable concentration		
	Commercial Clay Soil	Any detectable concentration		
	Public Open Space Sandy Soil (Residential)	Any detectable concentration		
	Public Open Space Int Soil (Residential)	Any detectable concentration		
	Public Open Space Clay Soil (Residential)	Any detectable concentration		
This table is not a list of potential contaminants at any one site All values are subject to ongoing review CIEH - Chartered Institute for Environmental Health LQM - Land Quality Management (commercial research) C733 - CIRIA - Construction Industry Research & Information Association - Asbestos in Made Ground Dilution of airborne fibre concentrations from the point of origin has not been considered. Residential assume 90 hours per year gardening that results in dust being raised. (Addison et al 1988) Allotment assume 260 hours per year (2.5 hrs per day every weekend) of activities that result in dust being raised. Commercial assume 24 hours per year when service trenches could be excavated that results in dust being raised Public Open space assume not more than four 8hr maintenance days per year (32hrs/yr) that result in dust being raised as well as game playing in summer hols when soil surface is dry and veg layer is compromised (6wks 8hrs/day + maintenance = 368hrs/yr) Limit of detection usually 0.001%			Terramech Investigations Limited 183 Long Lane Tilehurst Reading RG31 6YW Email - info@terramech.co.uk Tel 01189 439 910 Fax 01189 439 920	



List 2 (Waste Acceptance Criteria (WAC) Analysis)			
	Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Solid Waste Analysis - Limit values for compliance			
Total Organic Carbon (%)	3	5	6
Loss on Ignition (%)	-	-	10
Sum of BTEX (mg/kg)	6	-	-
Sum of 7 PCBs (mg/kg)	1	-	-
Mineral Oil (mg/kg)	500	-	-
PAH Sum of 17 (mg/kg)	100	-	-
pH (pH Units)	-	>6	-
Eluate Analysis - Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)			
Arsenic	0.5	2	25
Barium	20	100	300
Cadmium	0.04	1	5
Chromium	0.5	10	70
Copper	2	50	100
Mercury	0.01	0.2	2
Molybdenum	0.5	10	30
Nickel	0.4	10	40
Lead	0.5	10	50
Antimony	0.06	0.7	5
Selenium	0.1	0.5	7
Zinc	4	50	200
Chloride	800	15000	25000
Fluoride	10	150	500
Sulphate as SO ₄	1000	20000	50000
Total Dissolved Solids	4000	60000	100000
Phenol Index	1	-	-
Dissolved Organic Carbon	500	800	1000
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List 3 (Generic Soil Screening Values for the Selection of Appropriate Water Supply Pipe Materials)			
Contaminant (mg/kg dry weight soil)	Threshold levels Water Supply Pipes (mg/kg dried soil)	Guidance reference	
(Corrosion)		WRAS, Water Regulations Advisory Scheme Contaminated Ground Guidance Note 9-04-03	
Sulphate	2000		
Sulphur	5000		
Sulphide	250		
pH			
(Toxicity)			
Antimony	10		
Arsenic	10*		
Cadmium	3		
Chromium (Hexavalent)	25		
Chromium (total)	600		
Cyanide (free)	25*		
Cyanide (complexes)	250*		
Lead	500		
Mercury	1		
Selenium	3		
Thiocyanate	50		
(Organics)			
Coal Tar	50		
Cyclohexane extractable	50		
Phenol	5		
Poly Aromatic Hydrocarbons	50		
Toluene extractable	50		
Petroleum Hydrocarbons	50		
Note 1 * It is not recommended that water pipes should be laid in sites where these substances are identified or suspected.			
Type Of Contaminant	SuitableWater Supply Pipe Material		
None	No special requirements		
Flammable	Metallic – in the absence of corrosive contaminants, Wrapped iron – if corrosive and flammable contaminants are present.		
Toxic	Metallic or plastic – but see Note 1		
Organic	Metallic (iron, copper) or composite Polyethylene/Aluminium/ Polyethylene pipe		
Corrosive	Plastic pipe, plastic coated copper or wrapped iron		
Organic and Corrosive	Wrapped iron or composite Polyethylene/Aluminium/ Polyethylene pipe		
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List 3 (Generic Soil Screening Values for the Selection of Appropriate Water Supply Pipe Materials - Thames Water Utilities Ltd)	
Aliphatic C5 - C12	0.5 mg/kg
Aromatic C5 - C12	0.5 mg/kg
Aliphatic C12 - C21 (not chlorinated)	10 mg/kg
Aromatic C12 - C21 (not BTEX)	10 mg/kg
Aliphatic C21 - C35	500 mg/kg
Aromatic C21 - C35	500 mg/kg
Chlorinated short chain aliphatic hydrocarbons	0.5 mg/kg
Chlorinated short chain aromatic hydrocarbons	2 mg/kg
BTEX compounds	0.1 mg/kg
MTBE compounds	0.1 mg/kg
Naphthalene	5 mg/kg
Phenols (unless present with BTEX)	5 mg/kg
Phenols (in conjunction with BTEX)	2 mg/kg
Phenols (chlorinated)	2 mg/kg
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List 4 (Tier 1 Generic Soil Target Concentrations for Groundwater Protection - EA R&D 20 method)	
Contaminant	Remedial Target (Mg/kg)
Arsenic	5.0 (Natural soils 0 to 35) ⁽³⁾
Cadmium	1.13
Chromium VI	10
Copper	255
Lead	590
Mercury (inorganic)	0.5
Nickel	10 (Average rural soils 21.1mg/kg) ⁽²⁾
Selenium	0.5
Zinc	105
Poly Cyclic Aromatics (Total Aromatics C ₅ to C ₄₄)	4.5 x 10 ⁻⁵ ⁽¹⁾
Total Petroleum Hydrocarbons (Aliphatic and Aromatic C ₅ to C ₄₄)	5.8 x 10 ⁻³ ⁽¹⁾
⁽¹⁾ organic carbon content sensitive, actual values should be used if possible	
⁽²⁾ Nickel in Rural soils 1.16 to 216mg/kg average 21.1 mg/kg (ref - EA SC050021 / Nickel SGV)	
⁽³⁾ Arsenic in Natural Soils 0 to 35mg/kg (ref - BGS Soils Beneath Our Feet website)	
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List 4 (Selected Generic Groundwater Screening Values mg/litre)						
Contaminant Mg/litre	EQS Freshwater	EQS Saltwater	WHO (health)	WHO (ATO)	EU Drinking water	UK Drinking water
Antimony	-	-	0.005	-	0.005	0.005
Arsenic	0.05	0.025	0.01	-	0.01	0.01
Boron	0.002	0.007	0.0003	-	0.001	0.001
Cadmium	0.005	0.0025	0.003	-	0.005	0.005
Chromium	0.005-0.025	0.015	0.05	-	0.05	0.05
Copper	0.001-0.028	0.005	2	1	2	2
Lead	0.004-0.025	0.025	0.01	-	0.01	0.01
Mercury	0.001	0.0003	0.001	-	0.001	0.001
Molybdenum	-	-	0.07	-	-	-
Nickel	0.05-0.2	0.03	0.02	-	0.02	0.02
Selenium	-	-	0.01	-	0.01	0.01
Vanadium	0.02-0.06	0.1	-	-	-	-
Zinc	0.008-0.5	-	-	3	-	5
Hydrocarbons (dissolved/emulsion)	-	-	-	-	-	0.01
Poly-cyclic Aromatic Hydrocarbons	-	-	-	-	0.0001	0.0001
Benzene	0.3	0.3	0.01	-	0.001	0.001
Toluene	0.5	0.5	0.7	24-170	-	-
Ethylbenzene	-	-	0.3	-	-	-
Xylene	0.03	0.03	0.5	20-1800	-	-
Benzo (a) Pyrene	-	-	0.0007	-	0.00001	0.00001
Phenol	0.03	0.03	-	-	0.0005	0.0005
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List 4 Drinking Water Regulations

Contaminant	units	EQS freshwater (1)	EQS saltwater (1)	WHO Health (2)	WHO ATO (2)	EU Drinking Water Standards (3)	UK Drinking Water Standards (4)
Acrylamide	ug/l			0.5		0.1	0.1
Alachlor	ug/l			20		0.1	0.1
Aldicarb	ug/l			10		0.1	0.1
Aldrin	ug/l	0.01	0.01	0.03		0.03	0.03
Aluminium	ug/l				200	200	200
Ammonia (NH ₃ as N)	mg/l	0.015	0.021		1.5		
Ammonium (as NH ₄ ⁺)	mg/l					0.5	0.5
Antimony	ug/l			5		5	5
Arsenic	ug/l	50	25	10		10	10
Atrazine	ug/l	2	2	2		0.1	0.1
Azinphos-methyl	ng/l	10 (40)	10 (40)			100	100
Barium	mg/l			0.7			1
Bentazone	mg/l	0.5	0.5	0.03		0.1	0.1
Benzene	ug/l	30 (300)	30 (300)	10		1	1
Benzo [a] pyrene	ug/l			0.7		0.01	0.01
Biphenyl	ug/l	25	25				
Boron	mg/l	2	7	0.3		1	1
Bromate	ug/l					10	10
Bromoxynil	ug/l	100 (1000)	100 (1000)			0.1	0.1
Cadmium	ug/l	5	2.5	3		5	5
Calcium	mg/l						250
Carbofuran	ug/l			5		0.1	0.1
Chlordane (all isomers)	ug/l			0.2		0.1	0.1
Chlorfenvinphos	ug/l	0.01 (0.1)	0.01 (0.1)			0.1	0.1
Chloride	mg/l	250			250	250	250
Chlorine	ug/l	2	10				
Chloroform	ug/l	12	12	200			
Chloroform extractable substances	ug/l						1000
Chlorophenylid	ug/l	0.05	0.05			0.1	0.1
Chloronitrotoluenes	ug/l	10	10				
Chlorothalonil	ug/l	0.1	0.1			0.1	0.1
Chlorpropham	ug/l	10	10			0.1	0.1
Chlorotoluron	ug/l	2	2	30		0.1	0.1
Chromium	ug/l	5 - 250	15	50		50	50
Copper	ug/l	1 - 28	5	2000	1000	2000	2000
Coumaphos	ug/l	0.01 (0.1)	0.04 (0.4)			0.1	0.1
Cyanide	ug/l			70		50	50
Cyfluthrin	ug/l	0.001	0.001			0.1	0.1

Contaminant	units	EQS freshwater (1)	EQS saltwater (1)	WHO Health (2)	WHO ATO (2)	EU Drinking Water Standards (3)	UK Drinking Water Standards (4)
2,4-dichlorophenoxyacetic acid (2,4-D), (ester form)	ug/l	1	1	30		0.1	0.1
Demeton	ug/l	0.5	0.5			0.1	0.1
Diazinon	ug/l	0.01 (0.1)	0.015 (0.15)			0.1	0.1
Dichlorodiphenyltrichloroethane (all isomers)	ug/l	0.025	0.025				
Para, para-DDT	ug/l	0.01	0.01	2		0.1	0.1
1,2-Dichloroethane (1,2-DCA)	ug/l	10	10	30		3	3
1,1-Dichloroethene (1,1-DCE)	ug/l			30			
1,2-Dichloroethene (1,2-DCE)	ug/l			50			
1,2-dibromo-3-chloropropane	ug/l			1		0.1	0.1
1,2-Dichlorobenzene	ug/l			1000	1 to 10		
1,2-Dichloropropane	ug/l			20		0.1	0.1
1,3-Dichloropropene	ug/l			20		0.1	0.1
1,4-Dichlorobenzene	ug/l			300	0.3 to 30		
Di(2-ethylhexyl)adipate	ug/l			80			
Di(2-ethylhexyl)phthalate	ug/l			8			
Dichloromethane	ug/l			20			
Dichloroprop (DCPP)	ug/l			100		0.1	0.1
Dichlorvos	ng/l	1	40			100	100
Dieldrin	ug/l	0.01	0.01	0.03		0.03	0.03
Dimethoate	ug/l	1	1			0.1	0.1
Drins (total)	ug/l	0.03	0.03			0.1	0.1
Ethetic Acid (EDTA)	ug/l			200			
Endosulfan	ng/l	3	3			100	100
Endrin	ug/l	0.005	0.005			0.1	0.1
Epichlorohydrin	ug/l			0.4		0.1	0.1
Ethylbenzene	ug/l			300	2 to 200		
Fenchlorphos	ug/l	0.01 (0.1)	0.01 (0.1)			0.1	0.1
Fenoprop	ug/l			9		0.1	0.1
Fenitrothion	ng/l	10 (250)	10 (250)			100	100
Flucifuron	ug/l	1				0.1	0.1
Fluoride	ug/l			1500		1500	1500
Formaldehyde	ug/l	5 (50)	n/a	900		0.1	0.1
Heptachlor	ug/l			0.03		0.03	0.03
Hexachlorobenzene	ug/l	0.03	0.03	1		0.1	0.1
Hexachlorobutadiene	ug/l	0.1	0.1	0.6			
Hexachlorocyclohexane (lindane)	ug/l	0.1	0.02	2		0.1	0.1
Hydrocarbons (dissolved/emulsions)	ug/l						10
Hydrogen sulphide (H2S as S)	ug/l	0.25 to 1.0	10				

Contaminant	units	EQS freshwater (1)	EQS saltwater (1)	WHO Health (2)	WHO ATO (2)	EU Drinking Water Standards (3)	UK Drinking Water Standards (4)
Isoxynil	ug/l	10 (100)	10 (100)			0.1	0.1
Iron	mg/l	1	1		0.3	0.2	0.2
Isodrin	ug/l	0.005	0.005			0.1	0.1
Isoproturon	ug/l	2 to 20		9		0.1	0.1
Lead (inorganic - dissolved)	ug/l	4 - 250	25	10		10	25 (reducing to 10)
Linuron	ug/l	2	2			0.1	0.1
Magnesium	mg/l						50
Malachite green	ug/l	0.5 (100)					
Malathion	ng/l	10 (500)	20 (500)			100	100
Manganese	ug/l			500	100	50	50
MCPA	ug/l	2	2	2		0.1	0.1
Mecoprop (MCPP)	ug/l	20 (200)	20 (200)	10		0.1	0.1
Mercury	ug/l	1	0.3	1		1	1
Methylbenzene	ug/l	50 (500)	40				
Methoxychlor	ug/l			20		0.1	0.1
Metolachlor	ug/l			10		0.1	0.1
Molinate	ug/l			6		0.1	0.1
Molybdenum	ug/l			70			
Monochlorobenzene	ug/l			300	10 to 120		
Naphthalene	ug/l	10 (100)	5 (80)				
Nickel	ug/l	50 - 200	30	20		20	20
Nitrate (as NO3)	mg/l			50		50	50
Nitrite (as NO2)	ug/l			3		500	100
Nitriloacetic acid	ug/l			200			
Oils/hydrocarbons (by Pet Ether extract)	ug/l						10
Omethoate	ug/l	0.01				0.1	0.1
Polycyclic Aromatic (PAH) Hydrocarbons	ug/l					0.1	0.1
Pendimethalin	ug/l			20		0.1	0.1
Pentachlorophenol	ug/l	2	2	9		0.1	0.1
Permethrin	ug/l	0.01		20		0.1	0.1
Pesticides (individual species, unless specified)	ug/l					0.1	0.1
Pesticides (total)	ug/l					0.5	0.5
Phenol	ug/l	30 (300)	30 (300)			0.5	0.5
Pirimicarb	ug/l	1	1			0.1	0.1
Phosphorous	ug/l					400 (5000)	2200
Potassium	mg/l					10 (12)	12

Contaminant	units	EQS freshwater (1)	EQS saltwater (1)	WHO Health (2)	WHO ATO (2)	EU Drinking Water Standards (3)	UK Drinking Water Standards (4)
Propanil	ug/l			20		0.1	0.1
Propetamphos	ug/l	0.01 (0.1)	0.01 (0.1)			0.1	0.1
Pryidate	ug/l			100		0.1	0.1
Selenium	ug/l			10		10	10
Silver	ug/l	0.05 (0.1)	0.5 (1)				10
Simazine	ug/l	2 (10)	2 (10)	2		0.1	0.1
Sodium	mg/l	170			200	200	200
Styrene	ug/l	50 (500)	50 (500)	20	4 to 2600		
Sulcofuron	ug/l	25	25			0.1	0.1
Sulphate	mg/l	400	250		250	250	250
Sulphide	ug/l	0.25	n/a				
Surfactants	ug/l						200
2,4,5-trichlorophenoxyacetic acid (2,4,5-T)	ug/l			9		0.1	0.1
Tecnazene	ug/l	1 (10)	1				
Tetrachloroethene (PCE)	ug/l	10	10	40		10 (with TCE)	10 (with TCE)
Tetrachloromethane (PCM, carbon tetrachloride)	ug/l	12	12	2			3
Thiabendazole	ug/l	5	5			0.1	0.1
Tin (inorganic)	ug/l	25	10				
Toluene	ug/l	50 (500)	40 (400)	700	24 to 170		
Triazophos	ng/l	5 (50)	5 (50)			100	100
Tributyltin (oxide)	ug/l	0.02	0.02	0.02			
1,1,1-Trichloroethane (1,1,1-TCA)	ug/l	100 (1000)	100 (1000)				
1,1,2-Trichloroethane (1,1,2-TCA)	ug/l	400 (4000)	300 (3000)				
Trichloroethene (TCE)	ug/l	10	10	70		10 (with PCE)	10 (with PCE)
Trichlorobenzenes (total)	ug/l	0.4	0.4	20	5 to 50		
2,4,6-Trichlorophenol	ug/l			200		2-300	
Trihalomethanes (total)	ug/l					150 reducing to 100 by 2008	100
Trifluralin	ug/l	0.1 (1)	0.1 (1)	20		0.1	0.1
Triphenyltin	ug/l	0.02	0.008				
Vanadium	ug/l	20 - 60	100				
Vinyl chloride (chloroethene)	ug/l			5		0.5	0.5
Xylene	ug/l	30	30	500	20 to 1800		
Zinc	ug/l	8 - 500			3000		5000