



**389 Gosbrook Road,
Caversham, Reading
RG4 8ED**

Phase 1 Ground Condition Assessment (Contamination)

On behalf of **Blue Infinity SSAS Pension**

Project Ref: 50379/3501 | Rev: 00 | Date: December 2020

Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: Caversham Bridge House, Waterman Place, Reading, Berkshire RG1 8DN
T: +44 (0)118 950 0761 E: PBA.Reading@stantec.com

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	Name	Position	Signature	Date
Prepared by:	Gavin Scott	Geoenvironmental associate	GS	26/11/2020
Reviewed by:	Arie Zamler	Associate	AZ	27/11/2020
Approved by:	David Atherton	Director	DA	7/12/2020
For and on behalf of Stantec UK Limited				

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Summary

This report presents a Phase 1 Ground Conditions Assessment (Contamination) for the proposed redevelopment of the parcel of land at 389 Gosbrook Road, Caversham, Reading, RG4 8ED. It is understood that the redevelopment will comprise a single 2.5 storey building (with minor infrastructure) for residential use (apartments). This report has been prepared to support the planning application for the redevelopment of the site in a planning context and aims to address the requirements of the National Planning Policy Framework (NPPF) from a contamination perspective.

This report presents a Phase 1 Ground Condition Assessment comprising a desk study, Tier 1 (preliminary) qualitative contamination risk assessment. In addition, the report includes preliminary recommendations for the intrusive investigation of the site to confirm ground conditions and enable the design of foundations and drainage solutions, as required.

Site Location and Description. The site is situated around 230 m north of the River Thames in a part of Caversham that is generally residential but interspersed with light industrial and commercial land uses. The site itself is predominantly occupied by two adjoined buildings which have most recently been operated by Reading Paint Services (RPS). The northern building, nearest Gosbrook Road, appears to be a brick bungalow with a pitched, tiled roof that was reused as an office for RPS. The adjacent industrial building appears to consist of brick/blockwork walls with a corrugated roof and a concrete floor. The one metre or so gap between the buildings consists of a covered walkway. The bungalow was largely empty but for example, included a sofa, a mattress, chairs, storage boxes and filing cabinets. The industrial building included, for example, a small (about one cubic metre) extraction fan/ spray paint “box”, a safe, a heater, retail counter (presumably to sell paint to the public), heavy duty shelving and a steel “framed” mezzanine floor.

Site History. Historically, the Site was occupied by a cottage and gardens. The original building appears to have been demolished and replaced by the present configuration in the 1930s. The surrounding land was primarily agricultural with scattered housing from the 1870s, becoming more densely residential by the 1930s.

Ground Conditions. It is expected that Made Ground is present associated with the previous and present development on site.

Natural superficial deposits are expected to comprise alluvial material, principally gravels underlain by the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) at depth.

A ground investigation undertaken in 2006 in close proximity to this site encountered groundwater at around 1.5 m. Groundwater levels at this site are expected to be similarly shallow, within the gravels and may be much nearer the surface particularly in times of flooding of the nearby River Thames.

Controlled Waters The Alluvium and Kempton Park Gravel are classified as a Secondary A Aquifer and the Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) are classified as a Principal Aquifer. These have been considered Low and Moderate sensitivity respectively.

The River Thames, flowing about 0.2 km south of the site, has an overall quality status of Moderate and has been considered Low sensitivity in this assessment partly due to the distance from the site.

GEOENVIRONMENTAL RISK ASSESSMENT

The site has been under residential/office and light industrial / commercial use. Potential contamination sources include, Made Ground (potentially including demolition rubble from former buildings), spills and leaks associated with operations on site, potentially including hydrocarbons, paint products (including heavy metals and volatiles chemicals used in thinners). Asbestos may be present within the fabric of the buildings, for example around the boiler and pipework and in some of the corrugated roofing.

This desk study research does not indicate that the site is likely to be underlain by material capable of generating ground gas.

Overall, the potential for risks to human health and the environment from contamination at the site is assessed to be **Low** to **Very Low**.

It is considered highly unlikely that the local planning authority will designate the site as Contaminated Land under Part 2a of the Environmental Protection Act 1990.

NEXT STEPS

The site will require a ground investigation, primarily to confirm the physical ground conditions to enable the design for foundations, drainage, pavement and other infrastructure required by the proposed apartment building development.

This may entail boreholes and trial pits (potentially including soakaway testing if required) to be advanced at the site with insitu and laboratory based testing to establish geotechnical parameters and enable interpretation.

It would be prudent to undertake some screening of soil samples for geoenvironmental parameters to confirm that the soils are of **Low** to **Very Low** risk to future site users.

The summary contains an overview of the key findings and conclusions. However, no reliance should be placed on any part of the summary until the whole of the report has been read

1 Introduction

1.1 Preamble

- 1.1.1 Stantec UK Limited (Stantec) has been commissioned by Blue Infinity SSAS Pension (the Client) to undertake a Phase 1 Ground Condition Assessment for the redevelopment of the site at 389 Gosbrook Road, Caversham, Reading, RG4 8ED (the site).
- 1.1.2 It is proposed to redevelop the site for residential use consisting of five one-bed apartment units and one two-bed apartment unit within a 2.5 storey building following the demolition of the existing buildings.
- 1.1.3 This report has been prepared to support the planning application for the redevelopment of the site in a planning context and aims to address the requirements of the National Planning Policy Framework (NPPF, MHCLG, 2019).
- 1.1.4 This report presents a Phase 1 Ground Condition Assessment comprising a desk study, Tier 1 (preliminary) qualitative contamination risk assessment. In addition, the report includes preliminary advice on ground investigation requirements to inform the development.
- 1.1.5 It should be noted that this report is a land condition assessment (contamination) and does not purport to be a structural or hazardous material (including asbestos) survey, or an ecological, flood risk, agricultural soil assessment, minerals assessment or archaeological survey etc and as such additional surveys may be required to support a planning application and safe demolition.
- 1.1.6 Guidance on the use of this report is presented in a note after the text of this report.

1.2 Objectives and Scope of Works

- 1.2.1 The NPPF (MHCLG, 2019) stipulates that planning policies and decisions should ensure that *“a site is suitable for its proposed use taking account of ground conditions and any risks arising from contamination. This includes risks arising from natural hazards or former activities such as mining and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation)”*; and that *“after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and adequate site investigation information, prepared by a competent person, is available to inform these assessments”*.
- 1.2.2 The objective of this report is to review readily available information in the public domain to identify and assess the likely ground conditions at the site and in the immediate surrounding area. It also aims to identify potential geoenvironmental hazards that may require management as well as potential constraints to the proposed development.

1.3 Methodology

Assessment of Ground Conditions - Contamination

- 1.3.1 UK legislation on the contamination of land from historical activities is principally contained in Part 2A of the Environmental Protection Act, 1990 (which was inserted into the Act by Section 57 of the Environment Act 1995).
- 1.3.2 The Regulations and Statutory Guidance that accompanied the Act, including the Contaminated Land (England) Regulations 2006, have been revised with the issue of the Contaminated Land

(England) (Amendment) Regulations 2012 (SI 2012/263) and the Contaminated Land Statutory Guidance for England 2012.

- 1.3.3 Under the NPPF (2019), the broad approach, concepts and principles behind land contamination management advocated by the Part 2A regime are applied to the determination of planning applications. The Land Contamination: Risk Management (LC:RM) (EA, 2020) guidance which is based on the now superseded Model Procedures for the Management of Contaminated Land (CLR11) (EA, 2004) provides references to established technical and procedural practice.
- 1.3.4 LC:RM presents a three-stage process to the management of contaminated land:
- Stage 1 = risk assessment
 - Stage 2 = options appraisal and
 - Stage 3 = remediation
- 1.3.5 The Stage 1 risk assessment is undertaken in a phased manner with the three tiers being:
- Tier 1 – “Preliminary Risk Assessment” – a qualitative assessment forming part of a Phase 1 report,
 - Tier 2 – “Generic Risk Assessment” - a quantitative assessment using published criteria to screen site specific ground condition data forming part of a Phase 2 report and
 - Tier 3 – “Detailed Risk Assessment” – a quantitative assessment involving the generation of site-specific assessment criteria (SSAC).
- 1.3.6 The underlying principle is the evaluation of *pollutant linkages* in order to assess whether the presence of a source of contamination could potentially lead to harmful consequences. A pollutant linkage consists of the following three elements:
- A source of contamination or hazard that has the potential to cause harm or pollution.
 - A pathway for the hazard to move along / generate exposure; and
 - A receptor which is affected by the hazard.
- 1.3.7 Each tier of risk assessment comprises the following four stages:
- Hazard Identification – identifying potential contaminant sources on and off site.
 - Hazard Assessment – assessing the potential for unacceptable risks by identifying what pathways and receptors could be present, and what pollutant linkages could result (forming the Conceptual Model (CM)).
 - Risk Estimation – estimating the magnitude and probability of the possible consequences (what degree of harm might result to a defined receptor and how likely); and
 - Risk Evaluation – evaluating whether the risk needs to be, and can be, managed.
- 1.3.8 The Stantec methodology for ground condition assessment (contamination) is presented in **Appendix A**.

1.4 Sources of Information

1.4.1 The following primary sources of information were used in the compilation of this report:

- A walkover survey by a Stantec representative on 25th November 2020 and an internal inspection on 16th January 2021 to observe the existing conditions on the site – site photographs are presented in **Appendix B**.
- Historical OS maps are presented in **Appendix C** and a Groundsure Enviro/Geo Insight Report (GS, 2020) is presented in **Appendix D**.
- Review of the Natural Cavity and Artificial non-coal (underground) mining cavity databases managed and enhanced by Stantec.
- Review of borehole records held by the British Geological Society (BGS) accessed via their website, <http://www.bgs.ac.uk/data/boreholescans/home.html>.
- Review of map records held by the British Geological Society (BGS) accessed via their website <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>
- Review of the MAGIC (Multi-Agency Geographic Information for the Countryside) website, <http://www.magic.gov.uk>. The MAGIC website provides authoritative geographic information about the natural environment from across government. The information covers rural, urban, coastal and marine environments across Great Britain. It is presented in an interactive map which can be explored using various mapping tools.
- A search of the Stantec project database to identify ground condition reports within 250 m of the site.
- Review of risk map records of Regional Unexploded Bomb Risk held by Zetica UXO and located at <https://zeticauxo.com/downloads-and-resources/risk-maps>.
- A review of historical and current aerial photography accessed via Google Earth.
- 389 Gosbrook Road Design Statement, OB Architecture, July 2020.

2 Land Use Information

2.1 Introduction

- 2.1.1 This section presents a summary of the historical and current land uses onsite and immediately adjacent to the site.

2.2 Site Location and Description

- 2.2.1 The site is located at the junction of Gosbrook Road and Send Road in Lower Caversham, Reading, Berkshire, RG4 8ED. It is approximately centred at National Grid Reference SU 7237 7454. A site Location Plan is presented as **Figure 1**.
- 2.2.2 The site is surrounded principally by housing interspersed with some light industrial and commercial land uses. The site is bounded to the north by Gosbrook Road, to the east and south by residential properties, and to the west by Send Road.
- 2.2.3 The site is situated in the historical floodplain of the River Thames which is located approximately 230 m to the south of the site. The ground level at the site is relatively flat at about 36 m above Ordnance Datum (AOD). The ground level around the site falls gently to the south towards the River Thames where the adjacent ground level is about 34 m AOD.
- 2.2.4 The site is accessed off both Gosbrook Road and Send Road to the north and west of the site, respectively. The site comprises a driveway / parking area in the north and west with a brick building presumed to have been previously used as a residential property but most recently serving as an office for Reading Paint Services automobile and marine paint suppliers. A further, larger building, occupying the majority of the central and southern part of the site, is joined on to the brick building via a covered walkway and appears to serve as a warehouse / workshop for Reading Paint Services. A small, open wire-fenced yard area is present at the rear to the south.
- 2.2.5 A site Layout Plan, showing the extent of the site is presented as **Figure 2**.

2.3 Site History

- 2.3.1 This section presents a summary of the historical land uses on the site and in the immediate surrounding area as identified from historical Ordnance Survey (OS) mapping records provided by Groundsure (GS, 2020), copies of which are presented in **Appendix C**. The historical review of the site was supplemented by Google Earth historical aerial imagery available for the area.
- 2.3.2 The earliest map obtained, dated 1877, shows the site to be occupied by a house named Ivy Cottage and gardens. The road to the north of the site now known as Gosbrook Road is shown in a similar alignment to the present day. The surrounding area is identified as Lower Caversham and is predominantly agricultural, with well-spaced farmhouses and cottages with the River Thames to the south.
- 2.3.3 By 1897 Lower Caversham has become a more established village with increasingly dense housing encroaching on the former fields and includes churches and public houses. A sewage works is shown approximately 200 m north east.
- 2.3.4 A second, long narrow building on an east west axis is shown in the southern part of the site. Send Road, bounding the west of the site, is first shown on mapping dated 1899.
- 2.3.5 By 1936, the Ivy Cottage was demolished and replaced with another (presumably residential) building constructed slightly further north than the original cottage, with a second building adjoining the existing structure in the southern part of the site.

- 2.3.6 The mapping from 1951 shows the buildings on site in their current formation, with No. 389 Gosbrook Road and driveway occupying the northern part of the site and fronting onto Gosbrook Road. A larger building, likely to be a light industrial or commercial building, is shown adjoined to the south of No. 389 occupying the majority of the southern part of the site with a yard to the rear. The later historical and most recent mapping and the site walkover survey confirms the layout of the site as being effectively unchanged since that time. A shipping container was present within the yard area on recent online images but had been removed by the time of the walkover survey.
- 2.3.7 Between the earliest mapping in 1877 and the present day, the area around the site essentially transitions from primarily agricultural to primarily residential. The sewage works to the north east expanded from its original footprint, occupying a larger area until around 1961, after which it was no longer shown on maps and has now been replaced by a commercial building. With the exception of the sewage works, there is nothing shown on historical mapping in the vicinity of the site that is of likely significance to the contamination status of the site.
- 2.3.8 The Enviro-Insight report presented in **Appendix D** identifies a number of historical industrial land uses within 250m of the site, generally to the east, south or south west. The majority of these are not identified (listed as Unspecified Works, Unspecified Warehouses or Unspecified Depot). The report also notes the former presence of the sewage works around 220 m north east. Unspecified tanks are noted around 300 m north east (present until 1962). Given the scale of these features and their distance from the site, they are considered unlikely to have an impact on the onsite ground conditions.
- 2.3.9 An electricity substation was present, around 30m north west of the site from 1956 until 1996, with several others noted from around 130m away.
- 2.3.10 A garage was noted within the Groundsure report between 1968 and 1992, recorded as being between 11 and 34m west / south west. This entry relates to the existing Caversham Coachworks which is located to the west of Send Road which appears to be an operational car body shop business.

2.4 Current Land Use

- 2.4.1 The current land use information is based on a walkover survey undertaken by a representative of Stantec on 25th of November 2020 and an internal inspection on 16th January 2021. Selected photographs taken during the inspections are presented in **Appendix B**.
- 2.4.2 The northern part of the site can be accessed from Gosbrook Road via an open driveway / parking area. The central parts of the site are within the footprints of the two adjoined buildings.
- 2.4.3 The surface cover in the northern part of the site is primarily concrete with some cracking evident. A mature tree stands on the corner of Gosbrook and Send Road with some evidence of the concrete paving being raised and cracked by roots. The concrete surfacing extends around the western side of the building and is used for car parking.
- 2.4.4 The northern building is single storey bungalow of brick construction with a pitched, tiled roof and brick chimneys on the east and western gable ends. The building appears to have a suspended ground slab and appears to have been used as an office for Reading Paint Services. The bungalow was largely empty during the site inspection but, for example, included a sofa, a mattress, chairs, storage boxes and filing cabinets.
- 2.4.5 The southern building occupies the majority of the southern part of the site and is of brick/ blockwork construction with a pitched corrugated roof. Part of the roof was noted to be of metal, but some may be constructed with cement bound corrugated sheets possibly containing asbestos. The one metre or so gap between the buildings consists of a covered walkway. The industrial building included, for example, a small (about one cubic metre) extraction fan/ spray

paint “box” unit, a safe, a heater, retail counter (presumably to sell paint to the public), heavy duty shelving and a steel “framed” mezzanine floor.

- 2.4.6 A small yard area occupies the southern (rear) part of the site and is visible through a wire mesh fence. The yard comprises a combination of concrete and rough grass surfacing. Several old pallets were present at the time of the visit in November but had been removed by January 2021.
- 2.4.7 The site is assumed to be served by the standard set of services. Roof drains are assumed to feed directly into the surface water drainage system. An overhead telephone wire was visible connected to the north western corner of the southern building.
- 2.4.8 Information received anecdotally from Blue Infinity SSAS Pension suggests that for the last few decades the site was occupied by Reading Paint Services, who were involved in spraying and sale of paint products to the trade - mostly auto and marine. A signboard outside the building clearly shows the Reading Paint Services former users.

2.5 Industrial Setting

- 2.5.1 Information on the industrial setting of the site is presented in the Groundsure Report (Groundsure, 2020) and reproduced in **Appendix D**. The results of the database search are summarised on the following table and discussed in the following sections:

Data Type	Number On-Site ⁽¹⁾	Number within 250m of Site ⁽¹⁾
Waste Regulation		
Landfill Sites	0 (0)	0 (0)
Licensed Waste Management Facilities	0 (0)	0 (0)
Statutory Permits/Authorisations		
Pollution Prevention and Control ⁽²⁾	0 (0)	0 (0)
Registered Radioactive Substances	0 (0)	0 (0)
Planning Hazardous Substance Consents	0 (0)	0 (0)
COMAH Sites ⁽³⁾ and NIHHS Sites ⁽⁴⁾	0 (0)	0 (0)
Potential Contaminative Uses		
Fuel Stations	0 (0)	0 (0)
Contemporary Trade Directory Entries	1 (0)	27 (0)
Discharge Consents	0 (0)	3 (3)
Pollution Records		
Contaminated Land Register Entries and Notices	0	0
Pollution Incidents to Controlled Waters	0	1
Note:		
1) Numbers in brackets denotes number of authorisations, licences or permits that are lapsed, revoked, cancelled, superseded, defunct, surrendered, not applicable, withdrawn or not yet started.		

Data Type	Number On-Site ⁽¹⁾	Number within 250m of Site ⁽¹⁾
2) Includes Integrated Pollution Controls, Integrated Pollution Prevention and Control, Local Authority Integrated Pollution Prevention and Control and Local Authority Pollution Prevention and Control permits.		
3) COMAH denotes Control of Major Accident Hazards		
4) NIHHS denotes Notification of Installations Handling Hazardous Substances		

2.5.2 **Discharge Consents:** There are no active discharge contents relating to the site. Three discharge consents within 250 m are noted in the Groundsure report, however, all of these have been revoked.

2.5.3 Pollution Incidents

2.5.4 A pollution incident was recorded on 06/01/2008 around 200 m east of the site. The incident was recorded as Atmospheric Pollution caused by Smoke and, on the same date as Contamination of Water by Fire-Fighting run-off. Based on these two records, it is surmised that a fire occurred at a site to the east in 2008. The incident was noted as having Minor (Category 3) impact on Water and Land and Significant (Category 2) impact on air.

2.5.5 Based on the type of incident(s), the distance to the site and the time that has passed since the incident(s) it is considered that the incident(s) have no impact on the site or the proposed development.

2.6 Contemporary Trade Directory Entries

2.6.1 The Groundsure Report lists 27 recent or current industrial land uses within 250m of the Site. Blue Infinity SSAS Pension and potential developer of the site has indicated that the Site itself was occupied by the paint suppliers and painting business for around two decades but is currently unoccupied.

2.6.2 The report lists the closest business as R S Tyres and Covers as a Vehicle Parts and Accessories business as being 22 m south of the site.

2.6.3 The majority of the other contemporary trades within 250 m of the site also relate to small businesses related to car repairs and servicing. The nearby exceptions to this include the electricity substation 30m to the north west, air conditioner and refrigeration repair business 50 m south.

2.6.4 None of the contemporary trades listed are considered likely to have an impact on the land quality at the site.

2.7 Listed Buildings and Conservation Areas

2.7.1 The site is not located within a conservation area.

2.7.2 The neighbouring building to the east at 396 Gosbrook Road is a Grade II listed residential building called Ivy Farmhouse.

2.7.3 There are seven further listed buildings within 250 m, but all are more than 100 m from the site.

2.8 Regulatory Enquires

2.8.1 A request for information was sent to the Environment Agency requesting information in relation to the historical land use of the site and geoenvironmental information available.

- 2.8.2 At the time of writing, the response has not been received. It is considered unlikely that the EA response will add substantively to the findings of this report, however, if any pertinent additional information is received, this will be incorporated into a revised version of this report.

2.9 Design Statement and Proposed Development

- 2.9.1 The design statement (DS) produced by OB Architectural in July 2020 includes detailed design proposals for the development. The majority of the site will be under the footprint of the single 'mansion house' style, apartment block with parking, bike store and bin stores.
- 2.9.2 All parking areas will be permeable and soft landscaping will be minimal, restricted primarily to the northern area where the site fronts onto Gosbrook Road with some shrubs around the periphery and raised planters with the intention to retain the mature tree in the north western corner.
- 2.9.3 The DS refers to a Technical Note produced by Ark Environmental regarding flood risk and states:

Ark Environmental have undertaken early consultation with the EA, secured site and scheme specific approval in principle from the EA, and worked together to deliver a scheme that meets the EA's requirements. The technical note concludes: "It is considered that the proposed development can be constructed and operated safely in flood risk terms, without increasing flood risk elsewhere, in fact reducing flood risk overall; it is therefore considered appropriate development in accordance with the NPPF/PPG."

- 2.9.4 Stantec has not had access to the technical note referred to above, and so the statement above is accepted at face value.

3 Environmental Settings

3.1 Introduction

- 3.1.1 Information on the environmental setting is presented in this section and the data is used to inform the geoenvironmental risk assessment in **Section 4**.
- 3.1.2 Although this report does not explicitly consider potential risks associated with land stability, the information summarised in this section will be of use in the design of a ground investigation to inform foundation and drainage design for the redevelopment of the site at a later stage.

3.2 Published Geology

- 3.2.1 This section is based on the 1:50,000 scale geological map of the area published by the British Geological Survey (BGS, 1999). The description of the superficial and solid geology, based on the BGS records, is presented in the sections below.
- 3.2.2 In addition, it is expected that limited Made Ground is locally present associated with the historical and existing uses of the site.

Superficial Deposits

- 3.2.3 The Langley Silt Member is recorded to be present at the surface. Alluvium is recorded to the south and east, and the Kempton Park Gravel is recorded to the east and west of the site. It is likely that Langley Silt Member is underlain by the Kempton Park Gravel.
- 3.2.4 The near surface natural soil will have been disturbed through the development of the site. Based on the known history of the site it is expected that the presence of Made Ground or disturbed natural deposits is unlikely to be much beyond the depth of standard foundations (i.e. Between 0.5 – 2.0 m). The potential presence of basement structures / pits within the buildings cannot be discounted, although given the likely shallow groundwater, basements are not considered likely.

Solid Geology

- 3.2.5 Superficial Deposits are recorded to be underlain by the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) at depth.

3.3 Historical Borehole Records

- 3.3.1 The British Geological Survey (BGS) archives does not contain any informative borehole records within 500 m of the site.

3.4 Previous Investigations

- 3.4.1 Stantec is not aware of any previous intrusive investigations having taken place on the site. However, our ground investigation database contains a ground investigation undertaken by Stantec (known at the time as Peter Brett Associates, PBA) in 2006 about 130 m south-east of the site. The ground investigation comprised the excavation of four trial pits to a maximum depth of 3 m below ground level. A summary of the ground conditions based on the trial pit records is presented in the table below.

Table 3.1 Summary of 2006 Historical Ground Investigation (off Site)

Strata	Approximate Base (m bgl)	Typical Description
Topsoil	0.1 to 0.9	Dark brown topsoil.
Made Ground	1.1 to 1.9	Dark brown clay/sand/gravel with hardcore and rubble.
Langley Silt Member	1.8 to 2.1	Brown gravelly silt and silty clay.
Kempton Park Gravel	>3.0	Light brown sandy gravel.

3.4.2 Groundwater was encountered between 1.5 and 2.0 m below ground level.

3.5 Controlled Waters – Groundwater

3.5.1 The Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) is classified by the Environment Agency, EA, as a Principal Aquifer. These are 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.

3.5.2 Groundwater is expected to be at a shallow depth within the Alluvium and / or Kempton Gravel as noted in **Section 3.4** above. The groundwater flow direction is expected roughly to follow the surface topography flowing south-easterly towards the River Thames.

3.5.3 The Groundsure report indicates that the site is not within an Environment Agency Source Protection Zone (SPZ) for groundwater. The nearest SPZ is situated about 155 m to the north-east, and is a Zone 3 (total catchment), where the total area of the SPZ is needed to support the discharge from the protected groundwater source.

3.5.4 The Langley Silt Member is classified by the EA as Unproductive Strata, these are formations with low permeability and negligible significance to water supply or river base flow.

3.5.5 The Alluvium and Kempton Park Gravel are classified as a Secondary A Aquifer, these are permeable layers capable of supporting water at a local level rather than a strategic scale, and in some cases forming an important source of base flow to rivers.

3.5.6 The Groundsure Report indicates the site lies within an area where there is the potential for groundwater flooding to occur at the surface.

3.5.7 It should be noted that this Stantec report does not purport to be a flood risk assessment and that this issue should be under consideration by the architect and Ark Environmental (see 2.9.3 above).

3.6 Controlled Waters – Surface Water

3.6.1 The River Thames is located approximately 230m south-east of the site and flows in an easterly direction.

3.6.2 According to the EA database in 2016, the stretch of the Thames from Wallingford to Caversham had an Overall Water Framework Directive (WFD) classification of Moderate water quality (Moderate for ecological, and Good for chemical).

- 3.6.3 There are no records of surface water abstractions within 250 m of the site boundary.
- 3.6.4 According to mapping and data provided in the Groundsure report, the site is within an area with a Medium risk of surface water flooding. Medium risk implies a less than 1 in 30 but greater than or equal to 1 in 100 chance of flooding within any given year.
- 3.6.5 A flood incident was recorded on the site in 1947, related to a fluvial channel capacity exceedance. The flood incident is related to the 1947 Thames flood which was the most severe flood event of the River Thames in the past 100 years affecting much of the Thames Valley as well as elsewhere in England.
- 3.6.6 It should be noted that this report does not purport to be a flood risk assessment or does not provide comment on modifications or flood prevention measures that may have been installed since the flood event in 1947. The issue of flood risk appears to be under consideration by the architect and Ark Environmental (see 2.9.3 above).

3.7 Ecological Systems

- 3.7.1 DEFRA's Multi-Agency Geographic Information for the Countryside (MAGIC) viewer and the Groundsure Report (GS, 2020) indicate that the site is located within a Nitrate Vulnerable Zone which relates to the vulnerability of the River Thames from agricultural nitrate pollution. It should be noted that the designation is not relevant to the current site use or the proposed development.
- 3.7.2 There are no Sites of Special Scientific Interest, Special Areas of Conservation, Special Protection Areas, Ramsar (wetland), Local Nature Reserves or National Nature Reserves recorded within 500m of the site.
- 3.7.3 The site is not within an Area of Adopted Green Belt.
- 3.7.4 It should be noted the statement above regarding ecological systems does not purport to be an ecological risk assessment.

3.8 Radon

- 3.8.1 Radon is a naturally occurring radioactive gas and emanates from certain geological formations to varying degrees, depending on the type, porosity and permeability. The Envirocheck report (LIG, 2019) indicates that the site is situated within a lower probability radon area, where less than 1% of homes are estimated to be at or above the Action Level. Therefore, radon protection measures are not necessary for the construction of new dwellings or extensions.

3.9 Unexploded Ordnance (UXO)

- 3.9.1 The site is not within close proximity of known former military sites.
- 3.9.2 The Zetica UXO risk map (<https://zeticauxo.com/downloads-and-resources/risk-maps/> accessed 25/11/20) indicates that the site is in a Low risk area for unexploded ordnance.

3.10 Cavities Database

Natural Cavity Records

- 3.10.1 A search of the Stantec Natural Cavities Database indicated that there are no natural cavities on or within 500 m of the site. In general, owing to the geomorphological settings of the site and the groundwater that is expected to be present at a shallow depth the likelihood for solution features to develop in the chalk is considered to be **Low**.

Mining Cavity Records

- 3.10.2 A search of the PBA Non-coal Mining Database indicated that there are no mining cavities on or within 1 km of the site. The nearest recorded mining cavity is situated about 1.4 km to the south south-east and is of potential chalk mining, owing to a historical chalk/lime quarry. Overall, considering the lack of records in the near vicinity of the site, the expected ground conditions, the depth to the chalk and the presence of groundwater at a relatively shallow depth, the risk in relation to mining cavities is considered to be **Very Low**.

3.11 Surface Quarrying

- 3.11.1 There are no historical chalk or gravel pits recorded on or in close proximity to the site on either the OS or BGS records obtained. As such, based on the information available the potential for former (now infilled) surface quarries to be present at the site is considered to be **Very Low**.

4 Tier 1 Preliminary Risk Assessment

4.1 Introduction

- 4.1.1 The methodology developed and adopted by Stantec for the assessment of ground conditions is presented in **Appendix A**. In accordance with guidance presented in LC:RM (EA, 2020) we adopt a staged approach to risk assessment and this report presents a Tier 1 assessment or first stage.
- 4.1.2 The underlying principle to ground condition assessment is the identification of pollutant linkages to evaluate whether the presence of a source of contamination could potentially lead to harmful consequences.

4.2 Conceptual Model

- 4.2.1 The Tier 1 Preliminary Risk Assessment includes the development of a preliminary Conceptual Model (CM). The CM describes the types and locations of potential contamination sources, the identification of potential receptors and the identification of potential transport/migration pathways.
- 4.2.2 For a pollutant linkage to be identified, a connection between all three elements (source-pathway-receptor) is required.

Potential Sources of Contamination and Contaminants of Concern

- 4.2.3 From the earliest mapping in the 1870s, the site was occupied by a residential building within an area of agriculture and low-density housing. From around the 1930s, the density of housing increased. The configuration of the two adjoined buildings appears to have been onsite since the 1930s.
- 4.2.4 **On Site:** The information available this has been used for this Preliminary Risk Assessment (PRA). The site has had a residential use since the early mapping, although the configuration of buildings on site changed in the 1930s. The site is understood to have been used by a paint services company for around the last 20 years, although the buildings are now vacant. As such, the most likely potential sources of contamination at the site are associated with Made Ground from previous and existing buildings and any leaks or spills associated with the paint business.
- 4.2.5 The potential for significant contamination to be present associated with the historical and current land uses at the site is considered to be **Low** (Classification score of 2 out of 5 in Table 1, **Appendix A** as a result of the recent light industrial use).
- 4.2.6 **Off Site:** The surrounding area has developed from rural agricultural to residential interspersed with light industrial and commercial. The potential for offsite contamination to be present, based on the past and present uses of the neighbouring land is also considered to be **Low** (Classification score of 2 out of 5 in Table 1, **Appendix A** as a result of the recent and ongoing light industrial use).

Table 4.1 Potential Sources of Contamination (PSC) and Contaminants of Potential Concern (COPC)

Location of Source	PSC Reference	Description	COPC
On-Site	1	Paints, paint thinners from onsite storage, use and possible leaks / spills	Heavy metals and volatile organic compounds. – the site is thought to have stored and used paint, but not manufactured paint
	2	Possible fuels stored / used on site (small quantities, no evidence of tanks)	Hydrocarbons (Petroleum Hydrocarbons [TPH])
	3	Possible asbestos containing material (ACM) within building fabric or Made Ground	Asbestos
	4	Made Ground associated with existing and previous development of the site	PAHs, sulphate, TPH, metals
Off-Site	5	Fuels, oils, lubricants, and paint residues from coachworks	Hydrocarbons, heavy metals, volatile organic compounds
	6	PCBs in transformer oil at electricity substation	PCBs and hydrocarbons from potential leaks and spills at an electricity substation around 30 m from the site. The substation was up groundwater gradient from the site, however, there is a low likelihood that contamination will have occurred or that any such contamination will have migrated to the site

4.2.7 Based on the desk study assessment and walkover undertaken, it is considered unlikely that there is a source of putrescible material beneath the site capable of generating significant ground gas. As such, ground gas has not been considered as a potential risk in this Preliminary Risk Assessment (PRA).

Potential Receptors

4.2.8 The receptors considered as part of this land contamination assessment are summarised in **Table 5.2** and based on the information reviewed either eliminated from further consideration or allocated a sensitivity score in accordance with the Stantec Methodology. The sensitivity score informs the consequence element of the risk estimation process, definitions of which can be found in Table 2 of **Appendix A**.

Table 4.2 Potential Receptors and Sensitivity Score

Receptor Type	Comment	Sensitivity Score
Human Health – Current	Users of the existing buildings	4
Human Health – Future	Residents of proposed dwelling	5
Human Health - Neighbours	Neighbouring residents	5
Human Health –	Construction workers and future maintenance workers	4

Receptor Type	Comment	Sensitivity Score
Construction / Maintenance Workers		
Groundwater	Shallow Aquifer – Secondary A Aquifer Deep Aquifer – Principal Aquifer	2 3
Surface Water	River Thames 230 m south	2
Property - Buildings	The neighbouring building to the east is a Grade II listed building	2
Property - Animal or Crop Effect	No relevant local land uses	N/A
Ecological Systems	No local designations	N/A

Potential Exposure Pathways

- 4.2.9 Table 3 in the Stantec methodology (**Appendix A**) describes possible exposure pathways for each receptor type. Each of these possible pathways is then identified as viable or not when assessing the probability of the source and contamination causing a consequence to a defined receptor in the risk assessment presented in **Appendix E**.
- 4.2.10 The proposed development will comprise apartments with a very limited proportion of the exterior space used for soft landscaping and no private gardens. As such, the potential for future residents to be directly exposed to contamination in soils or groundwater is relatively low. The proposed development will be considered in the following risk estimation section.

4.3 Risk Estimation

- 4.3.1 When there is a pollutant linkage (and therefore some measure of risk) it is necessary to determine whether the risk is significant and therefore whether further action is required.
- 4.3.2 Risk estimation involves predicting the likely consequence (what degree of harm might result) and the probability that the consequences will arise (how likely the outcome is).
- 4.3.3 Based on the information available, the estimated risks have been designated with further comments in the sections below. The outcomes of the risk assessments are presented in **Appendix E**.
- 4.3.4 A summary of the worst-case risk estimation for the site, based on localised potential hazards is presented in **Table 5.3** below.

Table 4.3 Worst Case Risk Estimation

Receptor	Risk Estimation
Human Health - Current	Very Low
Human Health – Future	Low
Human Health - Neighbours	Very Low
Human Health – Construction / Maintenance Workers	Low

Groundwater (shallow)	Very Low
Groundwater (deep)	Low
Surface Water	Very Low
Property – Buildings	Very Low
Property - Animal or Crop Effect	N/A
Ecological Systems	N/A

- 4.3.5 Possible pollutant linkages are determined using professional judgement. If a linkage is considered possible, it is considered that this represents a potentially 'unacceptable risk' and therefore requires further consideration. This may be through remediation or mitigation or through further tiers of assessment.
- 4.3.6 Possible pollutant linkages have been identified, and the risk to the identified receptors is considered to be **Very Low to Low**. As such, there is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.
- 4.3.7 Although the estimated risks associated with potential contaminants in soils are **Low**, it is noted that asbestos containing materials (ACM) may be present in the fabric of the building and / or Made Ground on site. Through surveys and / or ground investigation works, any suspected ACM should be assessed and may require to be removed by a suitably qualified contractor in order to avoid ACM being spread during demolition and redevelopment.

4.4 Risk Evaluation

- 4.4.1 The Tier 1 preliminary risk assessment has identified that the possible pollutant linkages are all of **Very Low to Low** risk.
- 4.4.2 Given the relatively low level of risk it is considered that a ground investigation and Tier 2 risk assessment is not required to support the planning application for redevelopment of the site. Any requirement to carry out a geoenvironmental intrusive investigation can be satisfactorily dealt with by incorporation as a condition in any granted Planning Consent.
- 4.4.3 The site will require a Phase 2 intrusive investigation, primarily to evaluate the geotechnical properties of the ground for foundation and drainage design. It is recommended that environmental screening of soils should be integrated into the geotechnical investigation, see **Recommendations** section below.
- 4.4.4 The risk assessment and Conceptual Model presented here should be reviewed and updated following the Phase 2 intrusive investigation.
- 4.4.5 Whilst it is acknowledged there is a potentially Low risk to human health based on the site's historical and on-going commercial land usage, it is considered unlikely that the local planning authority will designate the site as Contaminated Land under Part 2a of the Environmental Protection Act 1990.

4.5 Data Gaps and Uncertainty

- 4.5.1 It is considered that there is a reasonable level of confidence that the information presented in this report provides a good understanding of the likely ground conditions and enables identification of potential risks. However, further work is recommended to refine the Conceptual Model and reduce uncertainty (see Recommendations).

5 Conclusions and Recommendations

5.1 Conclusions

- 5.1.1 A number of potential sources of contamination have been identified from both on-site and off-site sources, associated with historical and current land uses, in particular the recent use of the site by a paint services company. Overall, the potential for contamination to be present on site is assessed to be to **Low** or **Very Low** associated with the possibility of historical leaks and spills from on and offsite processes and activities.
- 5.1.2 Made Ground is expected to be present on site associated with the current and former buildings and represents a possible source of contamination which will require confirmation.

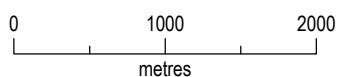
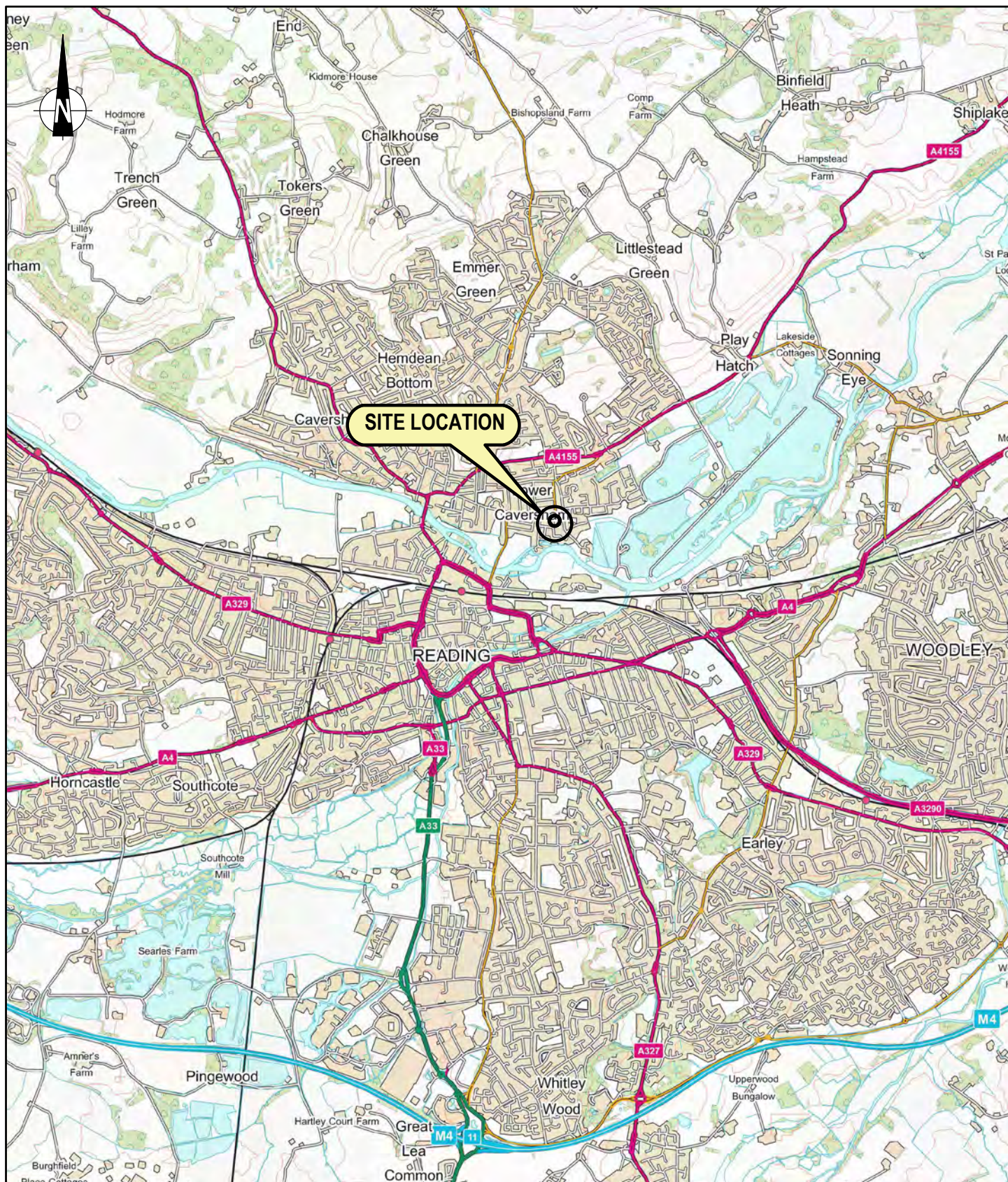
5.2 Recommendations

- 5.2.1 A ground investigation will be required as part of the concept and detailed design stages to support the design of the proposed apartments. Furthermore, the ground investigation will be used to establish the extent of any contamination (if present) and identify potential remediation and/or mitigation measures assessed through intrusive ground investigation, monitoring and Tier 2 risk assessments.
- 5.2.2 Given the relatively low level of risk it is anticipated that any requirement to carry out Phase 2 geoenvironmental intrusive investigations can be satisfactorily dealt with by incorporation of a suitable condition in any granted Planning Consent.
- 5.2.1 The principal purpose for undertaking an intrusive ground investigation at the site is to confirm the geotechnical characteristics to enable appropriate foundation, pavement and drainage design.
- 5.2.2 The scope of ground investigation will be confirmed at a later stage. However, it is expected that the scope of ground investigations will comprise the following:
- Shallow boreholes, primarily for geotechnical assessment / confirmation of bearing capacity. Samples will be collected for geotechnical and geoenvironmental analysis;
 - Trial pits to examine the near surface ground conditions for geotechnical and contamination purposes with possible soakaway testing for drainage design;
 - At present, the assessment of potential contamination risk does not justify ground gas monitoring. However, if the ground investigation indicates the presence of a potential source of ground gas, gas monitoring may be required;
 - It is recommended that a pre- demolition asbestos survey should be carried out by a qualified surveyor ahead of the proposed works.
 - If new potable water pipes will be required, UKWIR testing to confirm the most appropriate pipe material may be required.
 - If materials require offsite disposal, waste classification testing may be required.

Essential Guidance for Report Readers

- 1) This report has been prepared within an agreed timeframe and to an agreed budget that will necessarily apply some constraints on its content and usage. The remarks below are presented to assist the reader in understanding the context of this report and any general limitations or constraints. If there are any specific limitations and constraints, they are described in the report text.
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- 5) The absence of cavity records in the Stantec natural and mining cavities (non-coal) databases is not considered as conclusive as to the absence of these features and we do not warranty that the data is complete or error free.
- 6) The conclusions and recommendations made in this report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be considered in any analysis and reporting.
- 7) It should be noted that this report is a land condition assessment and does not purport to be an ecological, flood risk or archaeological survey and additional specific surveys may be required.
- 8) The identification of invasive and/or noxious plants such as Japanese Knotweed is outside the remit of our appointment.
- 9) This report has been written for the sole use of Blue Infinity SSAS Pension stated at the front of the report in relation to a specific development or scheme. The conclusions and recommendations presented herein are only relevant to the scheme or the phase of project under consideration. This report shall not be relied upon or transferred to any other party without the expressed written authorisation of Stantec. Any such party relies upon the report at its own risk.
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- 11) Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as the Environment Agency, Natural England or Local Authority) have taken place only as part of this work where specifically stated.

Figures



Site Grid Ref: SU 723 745

389 GOSBROOK ROAD, READING

SITE LOCATION PLAN

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Figure Number

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- Key
- Approximate Site Boundary
 - Proposed Development
 - Photograph Position

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SITE LAYOUT PLAN

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Appendix A Stantec Methodology for the Assessment of Land Contamination (England)

Stantec Guide: Methodology for Assessment of Land Contamination (England)

1 INTRODUCTION

This document defines the approach adopted by Stantec in relation to the assessment of land contamination in England. The aim is for the approach to (i) be systematic and objective, (ii) provide for the assessment of uncertainty and (iii) provide a rational, consistent, transparent framework.

When preparing our methodology, we have made reference to various technical guidance documents and legislation referenced in Section 7 of which the principal documents are (i) Contaminated Land Statutory Guidance (Defra 2012), (ii) online guidance Land Contamination: Risk Management (LC:RM) accessed from GOV.UK which is expected to replace Contaminated Land Research (CLR) Report 11: Model Procedures for the Management of Contamination (EA 2004). It should be noted that LCRM is currently due to be revised following consultation and CLR 11 is archived, (iii) Contaminated land risk assessment: A guide to good practice (C552) (CIRIA 2001) (iv) National Planning Policy Framework (NPPF, 2019) (v) BS 10175 Investigation of potentially contaminated sites - Code of Practice (BSI 2017) and (vi) The series of British Standards on Soil Quality BS 18400.

2 DEALING WITH LAND CONTAMINATION

Government policy on land contamination aims to prevent new contaminated land from being created and promotes a risk-based approach to addressing historical contamination. For historical contamination, regulatory intervention is held in reserve for land that meets the legal definition and cannot be dealt with through any other means, including through planning. Land is only considered to be “contaminated land” in the legal sense if it poses an unacceptable risk.

UK legislation on contaminated land is principally contained in Part 2A of the Environmental Protection Act, 1990 (which was inserted into the 1990 Act by section 57 of the Environment Act 1995). Part 2A was introduced in England on 1 April 2000 and provides a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment.

The Model Procedures for the Management of Land Contamination (CLR 11), were developed to provide the technical framework for applying a risk management process when dealing with land affected by contamination. The process involves identifying, making decisions on, and taking appropriate action to deal with land contamination in a way that is consistent with government policies and legislation within the UK. The approach, concepts and principles for land contamination management promoted by LC:RM (and its predecessor CLR 11) are applied to the determination of planning applications. The

guidance given in LC:RM follows the same principles.

Other legislative regimes may also provide a means of dealing with land contamination issues, such as the regimes for waste, water, environmental permitting, and environmental damage. Further, the law of statutory nuisance may result in contaminants being unacceptable to third parties whilst not attracting action under Part 2A or other environmental legislation.

2.1 Part 2A

The Regulations and Statutory Guidance that accompanied the Act, including the Contaminated Land (England) Regulations 2006, has been revised with the issue of The Contaminated Land (England) (Amendment) Regulations 2012 (SI 2012/263) and the Contaminated Land Statutory Guidance for England 2012.

Part 2A defines contaminated land as “*land which appears to the Local Authority in whose area it is situated to be in such a condition that, by reason of substances in, on or under the land that significant harm is being caused, or there is a significant possibility that such significant harm (SPOSH) could be caused, or significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution (SPOSP) being caused*”.

Harm is defined as “*harm to the health of living organisms or other interference with the ecological systems of which they form part, and in the case of man, includes harm to his property*”.

Part 2A provides a means of dealing with unacceptable risks posed by land contamination to human health and the environment, and under the guidance enforcing authorities should seek to find and deal with such land. It states that “*under Part 2A the starting point should be that land is not contaminated land unless there is reason to consider otherwise. Only land where unacceptable risks are clearly identified, after a risk assessment has been undertaken in accordance with the Guidance, should be considered as meeting the Part 2A definition of contaminated land*”. Further, the guidance makes it clear that “*regulatory decisions should be based on what is reasonably likely, not what is hypothetically possible*”.

The overarching objectives of the Government’s policy on contaminated land and the Part 2A regime are:

- “(a) To identify and remove unacceptable risks to human health and the environment.
- (a) To seek to ensure that contaminated land is made suitable for its current use.
- (b) To ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of

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sustainable development”.

The enforcing authority may need to decide whether and how to act in situations where decisions are not straight forward, and where there is uncertainty. *“In so doing, the authority should use its judgement to strike a reasonable balance between: (a) dealing with risks raised by contaminants in land and the benefits of remediating land to remove or reduce those risks; and (b) the potential impacts of regulatory intervention including financial costs to whoever will pay for remediation, health and environmental impacts of taking action, property blight, and burdens on affected people”.*

The authority is required to *“take a precautionary approach to the risks raised by contamination, whilst avoiding a disproportionate approach given the circumstances of each case”.* The aim is *“that the regime produces net benefits, taking account of local circumstances”.*

The guidance recognises that *“normal levels of contaminants in soils should not be considered to cause land to qualify as contaminated land, unless there is a particular reason to consider otherwise”.* Normal levels are quoted as:

- “a) natural presence of contaminants’ such as from underlying geology ‘that have not been shown to pose an unacceptable risk to health and the environment*
- b) ...low level diffuse pollution, and common human activity...”*

Similarly the guidance states that significant pollution or significant possibility of significant pollution of controlled waters is required for land to be considered contaminated and the *“fact that substances are merely entering water”* or *“where discharge from land is not discernible at a location immediately downstream”* does not constitute contaminated land.

To help achieve a more targeted approach to identifying and managing contaminated land in relation to the risk (or possibility) of harm to human health, the revised Statutory Guidance presented a new four category system for considering land under Part 2A, ranging from Category 4, where there is no risk that land poses a significant possibility of significant harm (SPOSH), or the level of risk is low, to Category 1, where the risk that land poses a significant possibility of significant harm (SPOSH) is unacceptably high.

For land that cannot be readily placed into Categories 1 or 4 further assessment is required. If there is sufficient concern that the risks could cause significant harm or have the significant possibility of significant harm the land is to be placed into Category 2. If the concern is not met land is considered Category 3.

The technical guidance clearly states that the currently published Soil Guidance Values (SGV's) and Generic Assessment Criteria (GAC's) represent *“cautious estimates of level of contaminants in soils”* which should be considered *“no risk to health or, at most, a minimal risk”.* These values do not represent the boundary between categories 3 and 4 and *“should be considered to be comfortably within Category 4”.*

At the end of 2013 technical guidance in support of Defra's revised Statutory Guidance (SG) was published and then revised in 2014 (CL: AIRE 2014) which provided:

- A methodology for deriving C4SLs for four generic land-uses comprising residential, commercial, allotments and public open space; and
- A demonstration of the methodology, via the derivation of C4SLs for six substances – arsenic, benzene, benzo(a)pyrene, cadmium, chromium (VI) and lead.

For controlled waters, the revised Statutory Guidance states that the following types of pollution should be considered to constitute significant pollution of controlled waters:

- “(a) Pollution equivalent to “environmental damage” to surface water or groundwater as defined by The Environmental Damage (Prevention and Remediation) Regulations 2009, but which cannot be dealt with under those Regulations.*
- (b) Inputs resulting in deterioration of the quality of water abstracted, or intended to be used in the future, for human consumption such that additional treatment would be required to enable that use.*
- (c) A breach of a statutory surface water Environment Quality Standard, either directly or via a groundwater pathway.*
- (d) Input of a substance into groundwater resulting in a significant and sustained upward trend in concentration of contaminants (as defined in Article 2(3) of the Groundwater Daughter Directive (2006/118/EC)).”*

The guidance also states that, in some circumstances, significant concentrations at a compliance point (in groundwater or surface water) may constitute pollution of controlled waters.

As with SPOSH for human health, the revised Statutory Guidance presents a four-category system for Significant Pollution of controlled waters. Category 1 covers land where there is a strong and compelling case for SPOSP, for example where significant pollution would almost certainly occur if no action was taken to avoid it. Category 4 covers land where there is no risk or the risk is low, for

Stantec Guide: Methodology for Assessment of Land Contamination (England)

example, where the land contamination is having no discernible impact on groundwater or surface water quality. Category 2 is for land where the risks posed to controlled waters are not high enough to consider the land as Category 1 but nonetheless are of sufficient concern to constitute SPOSP, Category 3 is for land where the risks posed to controlled waters are higher than low but not of sufficient concern to constitute SPOSP.

2.2 Planning

The Local Planning Authority (LPA) is responsible for the control of development, and in doing so it has a duty to take account of all material considerations, including contamination.

The principal planning objective is to ensure that any unacceptable risks to human health, buildings and other property and the natural and historical environment from the contaminated condition of the land are identified so that appropriate action can be considered and taken to address those risks.

The National Planning Policy Framework (NPPF, 2019), includes the following.

Paragraph 118 states that planning policies and decisions should “(c) give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land.”

Paragraph 179 states “Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner”.

Paragraph 170 states “planning policies and decisions should contribute to and enhance the natural and local environment by:

- (e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
- (f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.”

Paragraph 178 describes the policy considerations the Government expects LPA's to have in regard to land affected by contamination when preparing policies for development plans and in taking decisions on applications.

Paragraph 178 states “planning policies and decisions should ensure that:

- (a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);
- (b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and
- c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.”

Paragraph 183 states “The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”

The Glossary in Annex 2 provides the following:

Brownfield land registers: Registers of previously developed land that local planning authorities consider to be appropriate for residential development, having regard to criteria in the Town and Country Planning (Brownfield Land Registers) Regulations 2017. Local planning authorities will be able to trigger a grant of permission in principle for residential development on suitable sites in their registers where they follow the required procedures.

Competent person (to prepare site investigation information): A person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation.

Previously developed land: Land which is or was occupied by a permanent structure, including the curtilage of the developed land (although it should not be assumed that the whole of the curtilage should be developed) and any associated fixed surface infrastructure. This excludes: land that is or was last occupied by agricultural or forestry buildings; land that has been developed for minerals extraction or waste disposal by landfill, where provision for restoration has been made through development management procedures; land in built-up areas such as residential gardens, parks, recreation grounds and allotments; and land that was previously developed but where the

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remains of the permanent structure or fixed surface structure have blended into the landscape.

Site investigation information: *Includes a risk assessment of land potentially affected by contamination, or ground stability and slope stability reports, as appropriate. All investigations of land potentially affected by contamination should be carried out in accordance with established procedures (such as BS10175 Investigation of Potentially Contaminated Sites – Code of Practice).*

Stantec adopt the principle that a Preliminary Investigation (Desk Study and Site Reconnaissance) and Preliminary Risk Assessment (see below) is the minimum assessment requirement to support a planning application.

The level at which contamination is deemed to be unacceptable, or, gives rise to adverse effects under a planning context has not been identified but is envisaged to be more precautionary than the level required to determine land as contaminated under Part 2A.

2.3 Building Control

The building control department of the local authority or private sector approved inspectors are responsible for the operation and enforcement of the Building Regulations (DCLG 2010) to protect the health, safety and welfare of people in and around buildings. Approved Document C requires the protection of buildings and associated land from the effects of contamination, to be applied (non-exclusively) in all changes of use from commercial or industrial premises, to residential property.

3 APPROACH

As with CLR11 the guidance given in LC:RM presents three stages of risk management: -

- (a) Stage 1 - Risk Assessment;
- (b) Stage 2 - Options Appraisal; and
- (c) Stage 3 - Remediation.

Each stage has three tiers. The three tiers of Stage 1 Risk Assessment are: -

- Tier 1 - Preliminary Risk Assessment (PRA) - first tier of RA that develops the outline conceptual model (CM) and establishes whether there are any potentially unacceptable risks.
- Tier 2 - Generic Quantitative Risk Assessment (GQRA) - carried out using generic assessment criteria and assumptions to estimate risk.
- Tier 3 - Detailed Quantitative Risk Assessment (DQRA) - carried out using detailed site-specific information to generate Site Specific

Assessment Criteria (SSAC) as risk evaluation criteria.

For each tier of a Stage 1 - Risk Assessment you must:

1. Identify the hazard - establish contaminant sources.
2. Assess the hazard - use a source-pathway-receptor (S-P-R) pollutant linkage approach to find out if there is the potential for unacceptable risk.
3. Estimate the risk - predict what degree of harm or pollution might result and how likely it is to occur.
4. Evaluate the risk - decide whether a risk is unacceptable.

A Stantec Preliminary Investigation report normally comprises a desk study, walkover site reconnaissance and preliminary risk assessment (PRA). The project specific proposal defines the actual scope of work which might include review of ground investigation data in which case the report includes a GQRA.

Risk estimation involves identifying the magnitude of the potential consequence (taking into account both the potential severity of the hazard and the sensitivity of the receptor) and the magnitude of the likelihood i.e. the probability (taking into account the presence of the hazard and the receptor and the integrity of the pathway). This approach is promoted in current guidance such as R&D 66 (NHBC 2008).

For a PRA, Stantec's approach is that if a pollution linkage is identified then it represents a potentially unacceptable risk which either (1) remediation / direct risk management or (2) progression to further tiers of risk assessment (GQRA and GQRA) requiring additional data collection and enabling refinement of the CM using the site specific data.

4 IDENTIFICATION OF POLLUTANT LINKAGES AND DEVELOPMENT OF A CONCEPTUAL MODEL (CM)

For all Tiers of a Stage 1 Risk Assessment, the underlying principle to ground condition assessment is the identification of *pollutant linkages* in order to evaluate whether the presence of a source of contamination could potentially lead to harmful consequences. A pollutant linkage consists of the following three elements: -

- A source/hazard – a substance or situation which has the potential to cause harm or pollution;
- A pathway – a means by which the hazard moves along / generates exposure; and
- A receptor/target – an entity which is vulnerable to the potential adverse effects of the hazard.

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The *Conceptual Model* identifies the types and locations of potential contaminant sources/hazards and potential receptors and potential migration/transportation pathway(s). The CM is refined through progression to further tiers of risk assessment (GQRA and GQRA) requiring additional data collection.

4.1 Hazard Identification

A hazard is a substance or situation that has the potential to cause harm. Hazards may be chemical, biological or physical.

In a PRA the potential for hazards to be present is determined from consideration of the previous or ongoing activities on or near to the site in accordance with the criteria presented in the **Table 1**.

Based on the land use information Contaminants of Potential Concern (COPC) are identified. The COPC direct the scope of the collection of site-specific data and the analytical testing selected for subsequent Tiers.

At Tier 2 the site-specific data is evaluated using appropriate published assessment criteria (refer to Stantec document entitled *Rationale for the Selection of Evaluation Criteria for a Generic Quantitative Risk Assessment (GQRA)*). In general, published criteria have been developed using highly conservative assumptions and therefore if the screening criterion is not exceeded (and if enough samples from appropriate locations have been analysed) then the COPC is eliminated as a potential Hazard. It should be noted that exceedance does not necessarily indicate that a site is contaminated and/or unsuitable for use only that the COPC is retained as a potential Hazard. Published criteria are generated using models based on numerous and complex assumptions. Whether or not these assumptions are appropriate or sufficiently protective requires confirmation on a project by project basis. Manipulation of the default assumptions would normally form part of a Tier 3 Detailed Quantitative Risk Assessment (DQRA).

When reviewing or assessing site specific data Stantec utilise published guidance on comparing contamination data with a critical concentration (CL:AIRE/CIEH 2008) which presents a structured

process for employing statistical techniques for data assessment purposes.

4.2 Receptor and Pathway Identification

For all Tiers the potential receptors (for both on site and adjoining land) that will be considered are:

- Human Health – including current and future occupiers, construction and future maintenance workers, and neighbouring properties/third parties;
- Ecological Systems; ¹
- Controlled Waters ² – Under section 78A(9) of Part 2A the term “pollution of controlled waters” means the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter. The term “controlled waters” in relation to England has the same meaning as in Part 3 of the Water Resources Act 1991, except that “ground waters” does not include waters contained in underground strata but above the saturation zone.
- Property - Animal or Crop (including timber; produce grown domestically, or on allotments, for consumption; livestock; other owned or domesticated animals; wild animals which are the subject of shooting or fishing rights); and
- Property - Buildings (any structure or erection, and any part of a building including any part below ground level, but does not include plant or machinery comprised in a building, or buried services such as sewers, water pipes or electricity cables including archaeological sites and ancient monuments).

If a receptor is taken forward for further assessment it will be classified in terms of its sensitivity, the criteria for which are presented in **Table 2**. Table 2 has been generated using descriptions of environmental receptor importance/value given in various guidance documents including R&D 66 (NHBC 2008), EA 2017 and Transport Analysis Guidance (based on DETR 2000). Human health and buildings classifications have been generated by Stantec using the attribute description for each class. Surface water sensitivity is classified using the Water Framework Directive (WFD) status for the River Basin obtained from: <https://environment.data.gov.uk/catchment-planning/>

¹ International or nationally designated sites (as defined in the statutory guidance (Defra Circular 04/12)) “*in the local area*” will be identified as potential ecological receptors. A search radius of 1, 2 or 5km will be utilised depending on the site-specific circumstances (see also pathway identification). The Environment Agency has published an ecological risk assessment framework (EA 2008) which promotes (as opposed to statutorily enforces) consideration of additional receptors to include locally protected sites and protected or notable species. These additional potential receptors will only be considered if a Phase 1 habitat survey, undertaken in accordance with guidance (JNCC 1993), is commissioned and the data provided to Stantec. It should be noted that

without such a survey a Land Contamination risk assessment may conclude that the identification of potential ecological receptors is inconclusive (refer to Stantec Specification for a Preliminary Investigation (Desk Study and Site Reconnaissance)).

² The definition of “pollution of controlled water” was amended by the introduction of Section 86 of the Water Act 2003. For the purposes of Part 2A groundwater does not include waters above the saturated zone and our assessment does not therefore address perched water other than where development causes a pathway to develop.

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The exposure pathway and modes of transport that will be considered are presented in **Table 3**.

4.3 Note regarding Ecological Systems

The Environment Agency (EA) has developed an ecological risk assessment framework which aims to provide a structured approach for assessing the risks to ecology from chemical contaminants in soils (EA 2008). In circumstances where contaminants in water represent a potential risk to aquatic ecosystems then risk assessors will need to consider this separately.

The framework consists of a three-tiered process: -

- Tier 1 is a screening step where the site soils chemical data is compared to a soil screening value (SSV)
- Tier 2 uses various tools (including surveys and biological testing) to gather evidence for any harm to the ecological receptors
- Tier 3 seeks to attribute the harm to the chemical contamination

Tier 1 is preceded by a desk study to collate information about the site and the nature of the contamination to assess whether pollutant linkages are feasible. The framework presents ten steps for ecological desk studies and development of a conceptual model as follows.

1. Establish Regulatory Context
2. Collate and Assess Documentary Information
3. Summarise Documentary Information
4. Identify Contaminants of Potential Concern
5. Identify Likely Fate Transport of Contaminants
6. Identify Potential Receptors of Concern
7. Identify Potential Pathways of Concern
8. Create a Conceptual Model
9. Identify Assessment and Measurement Endpoints
10. Identify Gaps and Uncertainties

The information in a standard PRA report covers Steps 1 to 4 inclusive. Step 5 considers fate and transport of contaminants and it should be noted that our standard report adopts a simplified approach considering only transport mechanisms. A simplified approach has also been adopted in respect of Steps 6 and 7 receptors (a detailed review of the ecological attributes has not been undertaken) and pathways (a food chain assessment has not been undertaken). Step 9 is outside the scope of our standard PRA report.

It should be noted that the PRA report will present an assessment for ecological systems (where identified as a receptor for a land contamination assessment) considering the viability of the mode of transport given the site-specific circumstances and not specific pathways. The PRA may conclude that the risk to potential ecological receptors is inconclusive.

4.4 Note regarding controlled waters

Controlled waters are rivers, estuaries, coastal waters, lakes and groundwaters, but not perched waters.

The EU Water Framework Directive (WFD) 2000/60/EC provides for the protection of sub-surface, surface, coastal and territorial waters through a framework of river basin management. The EU Updated Water Framework Standards Directive 2014/101/EU amended the EU WFD to update the international standards therein; it entered into force on 20 November 2014 with the requirements for its provisions to be transposed in Member State law by 20 May 2016. Other EU Directives in the European water management framework include:

- the EU Priority Substances Directive 2013/39/EU;
- EU Groundwater Pollutants Threshold Values Directive 2014/80/EU amending the EU Groundwater Directive 2006/118/EC; and
- EU Biological Monitoring Directive 2014/101/EU.

The Ground Water Daughter Directive (GWDD) was enacted by the Groundwater Regulations (2009), which were subsumed by the Environmental Permitting Regulations (2010) which provide essential clarification including on the four objectives specifically for groundwater quality in the WFD: -

Achieve 'Good' groundwater chemical status by 2015, commonly referred to as 'status objective';
Achieve Drinking Water Protected Area Objectives;
Implement measures to reverse any significant and sustained upward trend in groundwater quality, referred to as 'trend objective'; and

Prevent or limit the inputs of pollutants into groundwater, commonly referred to as 'prevent or limit' objectives

The Water Act 2003 (Commencement No.11) Order 2012 amends the test for 'contaminated land' which relates to water pollution so that pollution of controlled waters must now be "significant" to meet the definition of contaminated land.

The Water Framework Directive (WFD) requires the preparation, implementation and review of River Basin Management Plans (RBMP) on a six-year cycle. River basins are made up of lakes, rivers, groundwaters, estuaries and coastal waters, together with the land they drain. River Basin Districts (RBD) and the WFD Waterbodies that they comprise are important spatial management units, regularly used in catchment management studies. River Basin Management Plans (RBMP) have been developed for the 11 River Basin Districts in England and Wales.

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These were released by Defra in 2009 (Defra 2009) and updated in 2015.

These RBMP's establish the current status of waters within the catchments of the respective Districts and the current status of adjoining waters identified. As part of a Tier 2 risk assessment water quality data is screened against the WFD assessment criteria. Comparison with the RBMP's current status of waters for the catchment under consideration would form part of a Tier 3 assessment.

5 RISK ESTIMATION

Risk estimation classifies what degree of harm might result to a receptor (defined as consequence) and how likely it is that such harm might arise (probability).

At Tier 1 the consequence classification is generated by multiplying the hazard classification score and the receptor sensitivity score. This approach follows that presented in the republished R&D 66 (NHBC 2008).

The criteria for classifying probability are set out in **Table 4** and have been taken directly from Table 6.4 CIRIA C552 (CIRIA 2001). Probability considers the integrity of the exposure pathway.

The consequence classifications detailed in **Table 5** have been adapted from Table 6.3 presented in C552 and R&D 66 (Annex 4 Table A4.3).

The Tier 1 risk classification is estimated for each pollutant linkage using the matrix given in **Table 6** which is taken directly from C552 (Table 6.5).

Subsequent Tiers refine the CM through retention or elimination of potential hazards and pollutant linkages.

6 RISK EVALUATION

Evaluation criteria are the parameters used to judge whether harm or pollution needs further assessment or is unacceptable. The evaluation criteria used will depend on:

- the reasons for doing the RA and the regulatory context such as Part 2A or planning;
- the CM and pollutant linkages present;
- any criteria set by regulators;
- any advisory requirements such as from Public Health England;
- the degree of confidence and precaution required;
- the level of confidence required to judge whether a risk is unacceptable;
- how you've used or developed more detailed assessment criteria in the later tiers of RA;
- the availability of robust scientific data;
- how much is known - for example, about the pathway mechanism and how the contaminants affect receptors; and

- any practical reasons such as being able to measure or predict against the criteria.

In order to put the Tier 1 risk classification into context the likely actions are described in **Table 7** which is taken directly from Table 6.6 of C552 (CIRIA 2001).

REFERENCES

BSI 2017 BS 10175:2011+A2:2017 Investigation of potentially contaminated sites - Code of Practice

BSI 2019 BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

CIRIA 2001: Contaminated land risk assessment – a guide to good practice C552.

CIRIA 2008: Assessing risks posed by hazardous ground gases to buildings C655

CL: AIRE/CIEH 2008 Guidance on Comparing Soil Contamination Data with a Critical Concentration. Published by Contaminated Land: Applications in Real Environments (CL: AIRE) and the Chartered Institute of Environmental Health (CIEH)

CL: AIRE 2013 SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Final Project Report published by Contaminated Land: Applications in Real Environments (CL: AIRE) 20th December 2013

DCLG 2010 Building Regulations 2010 Approved Document C Site preparation and resistance to contaminants and moisture.

DETR 2000 Methodology for Multi Modal Studies. Volume 2 Section 4. The Environmental Objective.

DEFRA 2012 Environmental Protection Act 1990: Part 2A. Contaminated Land Statutory Guidance. Department for Environment, Food and Rural Affairs

DEFRA, 2006 The Contaminated Land (England) Regulations 2006.

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DEFRA, 2012 Environmental Protection Act 1990: Part 2A. Contaminated Land Statutory Guidance. April 2012.

DEFRA, 2013 Environmental Damage (Prevention and Remediation) Regulations 2009: Guidance for England and Wales

Defra '2009 Water for Life and Livelihoods. River Basin Management Plan. (11 Districts: Anglia, Dee, Humber, Northumbria, Northwest, Severn, Solway

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and Tweed, Southeast, Thames, Western Wales)
December 2009

EA 2004: Contaminated Land Research (CLR)
Report 11: The Model Procedures for the
Management of Land Contamination CRL 11 by the
Environment Agency (EA).

EA 2008 Ecological Risk Assessment Science
Report Series SC070009 published by the
Environment Agency (EA).

EA 2017 New groundwater vulnerability mapping
methodology in England and Wales Report –
SC040016/R Environment Agency (EA) September
2017

JNCC 1993 Handbook for Phase 1 Habitat Survey
– A Technical for Environmental Audit prepared by
the Joint Nature Conservancy Council (JNCC)

NHBC/EA/CIEH 2008: R&D Publication 66
Guidance for the safe development of housing on
land affected by contamination.

National Planning Policy Framework (February
2019 revised), published by the Ministry of Housing,
Communities and Local Government (MHCLG) at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf

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Table 1: Criteria for Classifying Hazards / Potential for Generating Contamination

Classification/Score	Potential for generating contamination/gas based on land use
Very Low 1	Land Use: Residential, retail or office use, agriculture Contamination: Limited. Gas generation potential: Soils with low organic content
Low 2	Land Use: Recent small scale industrial and light industry Contamination: locally slightly elevated concentrations. Gas generation potential: Soils with high organic content (limited thickness)
Moderate 3	Land Use: Railway yards, collieries, scrap yards, engineering works. Contamination: Possible widespread slightly elevated concentrations and locally elevated concentrations. Gas generation potential: Dock silt and substantial thickness of organic alluvium/peat
High 4	Land Use: Heavy industry, non-hazardous landfills. Contamination: Possible widespread elevated concentrations. Gas generation potential: Shallow mine workings Pre 1960s landfill
Very High 5	Land Use: Hazardous waste landfills, gas works, chemical works, Contamination: Likely widespread elevated concentrations. Gas generation potential: Landfill post 1960

"Greenfield" is land which has not been developed and there has been no use of agrochemicals

Table 2: Criteria for Classifying Receptor Sensitivity/Value

Classification	Definition
Very Low 1	Receptor of limited importance - Groundwater: Unproductive strata (Strata with negligible significance for water supply or river baseflow) (previously Non-aquifer), Secondary B (water-bearing parts of non-aquifers), Secondary undifferentiated (previously minor or non-aquifer, but information insufficient to classify as secondary A or B) - Surface water: WFD Surface Water status Bad - Ecology: No local designation - Buildings: Replaceable - Human health: Unoccupied/limited access
Low 2	Receptor of local or county importance with potential for replacement - Groundwater: Secondary A aquifer - Surface water: WFD Surface Water status Poor - Ecology: local habitat resources - Buildings: Local value - Human health: Minimum score 4 where human health identified as potential receptor
Moderate 3	Receptor of local or county importance with potential for replacement - Groundwater: Principal aquifer - Surface water: WFD Surface Water status Moderate - Ecology: County wildlife sites, Areas of Outstanding Natural Beauty (AONB) - Buildings: Area of Historic Character - Human health: Minimum score 4 where human health identified as potential receptor
High 4	Receptor of county or regional importance with limited potential for replacement - Groundwater: Source Protection Zone 2 or 3 - Surface water: WFD Surface Water status Good - Ecology: SSSI, National or Marine Nature Reserve (NNR or MNR) - Buildings: Conservation Area - Human health: Minimum score 4 where human health identified as potential receptor
Very High 5	Receptor of national or international importance - Groundwater: Source Protection Zone (SPZ) 1 - Surface water: WFD Surface Water status High - Ecology: Special Areas of Conservation (SAC and candidates), Special Protection Areas (SPA and potentials) or wetlands of international importance (RAMSAR) - Buildings: World Heritage site - Human health: Residential, open spaces and uses where children are present

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Table 3: Exposure Pathway and Modes of Transport

Receptor	Pathway	Mode of transport
Human health	Ingestion	Fruit or vegetable leaf or roots
		Contaminated water
		Soil/dust indoors
		Soil/dust outdoors
	Inhalation	Particles (dust / soil) – outdoor
		Particles (dust / soil) - indoor
		Vapours – outdoor - migration via natural or anthropogenic pathways
		Vapours - indoor - migration via natural or anthropogenic pathways
	Dermal absorption	Direct contact with soil
		Direct contact with waters (swimming / showering)
		Irradiation
Groundwater	Leaching	Gravity / permeation
	Migration	Natural – groundwater as pathway Anthropogenic (e.g. boreholes, culverts, pipelines etc.)
Surface Water	Direct	Runoff or discharges from pipes
	Indirect	Recharge from groundwater
	Indirect	Deposition of windblown dust
Buildings	Direct contact	Sulphate attack on concrete, hydrocarbon corrosion of plastics
	Gas ingress	Migration via natural or anthropogenic paths
Ecological systems	See Notes	Runoff/discharge to surface water body
	See Notes	Windblown dust
	See Notes	Groundwater migration
	See Notes	At point of contaminant source
Animal and crop	Direct	Windblown or flood deposited particles / dust / sediments
	Indirect	Plants via root up take or irrigation. Animals through watering
	Inhalation	By livestock / fish - gas / vapour / particulates / dust
	Ingestion	Consumption of vegetation / water / soil by animals

Table 4: Classification of Probability

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

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Table 5: Classification of Consequence (score = magnitude of hazard and sensitivity of receptor)

Classification Score	Examples
Severe 17-25 (3 out of 25 outcomes)	Human health effect - exposure likely to result in "significant harm" as defined in the Defra (2012) Part 2A Statutory Guidance ¹. Controlled water effect - short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Equivalent to EA Category 1 incident (persistent and/or extensive effects on water quality leading to closure of potable abstraction point or loss of amenity, agriculture or commercial value. Major fish kill. Ecological effect - short-term exposure likely to result in a substantial adverse effect. Catastrophic damage to crops, buildings or property
Medium 10-16 (7 out of 25 outcomes)	Human health effect - exposure could result in "significant harm" ¹. Controlled water effect - equivalent to EA Category 2 incident requiring notification of abstractor Ecological effect - short-term exposure may result in a substantial adverse effect. Damage to crops, buildings or property
Mild 5-9 (7 out of 25 outcomes)	Human health effect - exposure may result in "significant harm" ¹. Controlled water effect - equivalent to EA Category 3 incident (short lived and/or minimal effects on water quality). Ecological effect - unlikely to result in a substantial adverse effect. Minor damage to crops, buildings or property. Damage to building rendering it unsafe to occupy (for example foundation damage resulting in instability).
Minor 1-4 (8 out of 25 outcomes)	No measurable effect on humans. Protective equipment is not required during site works. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects to crops, buildings or property. The loss of plants in a landscaping scheme. Discolouration of concrete.

¹ Significant harm includes death, disease, serious injury, genetic mutation, birth defects or impairment of reproductive function. The local authority may also consider other health effects to constitute significant harm such as physical injury; gastrointestinal disturbances; respiratory tract effects; cardio-vascular effects; central nervous system effects; skin ailments; effects on organs such as the liver or kidneys; or a wide range of other health impacts. Whether or not these would constitute significant harm would depend on the seriousness of harm including impact on health, quality of life and scale of impact.

Table 6: Classification of Risk (Combination of Consequence Table 5 and Probability Table 4)

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

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Table 7: Description of Risks and Likely Action Required

Risk Classification	Description
<i>Very high risk</i>	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation is likely to be required in the short term.
<i>High risk</i>	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short-term and are likely over the longer-term.
<i>Moderate risk</i>	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer-term.
<i>Low risk</i>	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
<i>Very low risk</i>	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Appendix B Site Reconnaissance Walkover Photographs



Plate 1: View of site from Gosbrook Road / Send Road junction, facing south-east.



Plate 2: View of site west side and rear of Send Road, view facing north-east.

 Stantec	Client	SITE WALKOVER PHOTOGRAPHS 389 Gosbrook Road, Caversham	Date	November 2020
	Blue Infinity Property Group Ltd		A4 Scale	nts
			Drawn	je
			Checked	az
			Appendix B	
Caversham Bridge House, Waterman Place, Reading, RG1 8DN Tel 0118 950 0761 Fax 0118 959 7498				



Plate 3: View of front-east of site building and neighbouring building (left), view facing south.



Plate 4: View of site building rear and rear area (gated), view facing north-east.

	Client	SITE WALKOVER PHOTOGRAPHS 389 Gosbrook Road, Caversham	Date	November 2020
	Blue Infinity Property Group Ltd		A4 Scale	nts
			Drawn	je
			Checked	az
			Appendix B	
Caversham Bridge House, Waterman Place, Reading, RG1 8DN Tel 0118 950 0761 Fax 0118 959 7498				



Plate 5: Tree situated at north-west of site, view facing north-west.



Plate 6: View of west side of site building adjoining Send Road, view facing north-east.

	Client	SITE WALKOVER PHOTOGRAPHS 389 Gosbrook Road, Caversham	Date	November 2020
	Blue Infinity Property Group Ltd		A4 Scale	nts
			Drawn	je
			Checked	az
			Appendix B	
Caversham Bridge House, Waterman Place, Reading, RG1 8DN Tel 0118 950 0761 Fax 0118 959 7498				



Plate 7: View of fireplace, interior of Bungalow (front building).



Plate 8: View of interior of Bungalow (front building).

	Client	SITE WALKOVER PHOTOGRAPHS 389 Gosbrook Road, Caversham	Date	November 2020
	Blue Infinity Property Group Ltd		A4 Scale	nts
			Drawn	je
			Checked	az
			Appendix B	
Caversham Bridge House, Waterman Place, Reading, RG1 8DN Tel 0118 950 0761 Fax 0118 959 7498				



Plate 9: View of industrial heater within industrial (rear) building.



Plate 10: View of mezzanine with corrugated roof above industrial (rear) building.

 Stantec Caversham Bridge House, Waterman Place, Reading, RG1 8DN Tel 0118 950 0761 Fax 0118 959 7498	Client Blue Infinity Property Group Ltd	SITE WALKOVER PHOTOGRAPHS 389 Gosbrook Road, Caversham	Date	November 2020
			A4 Scale	nts
			Drawn	je
			Checked	az
			Appendix B	



Plate 11: View of extractor unit within industrial (rear) building.



Plate 12: View of extractor pipework and corrugated roof within industrial (rear) building.

	Client Blue Infinity Property Group Ltd	SITE WALKOVER PHOTOGRAPHS 389 Gosbrook Road, Caversham	Date	November 2020
			A4 Scale	nts
			Drawn	je
			Checked	az
			Appendix B	
Caversham Bridge House, Waterman Place, Reading, RG1 8DN Tel 0118 950 0761 Fax 0118 959 7498				

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Appendix C Historical OS Maps

Site Details:

389 Gosbrook Road,
Caversham, Reading, RG4 8ED

Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1872-1877

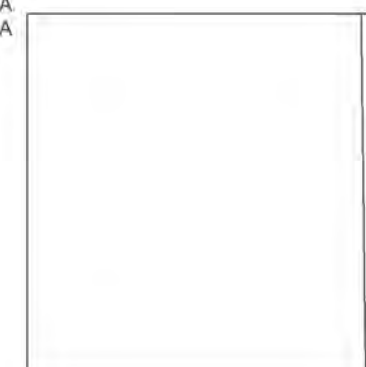
Scale: 1:2,500

Printed at: 1:2,500



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

Surveyed 1872
Revised 1872
Edition N/A
Copyright N/A
Levelled N/A

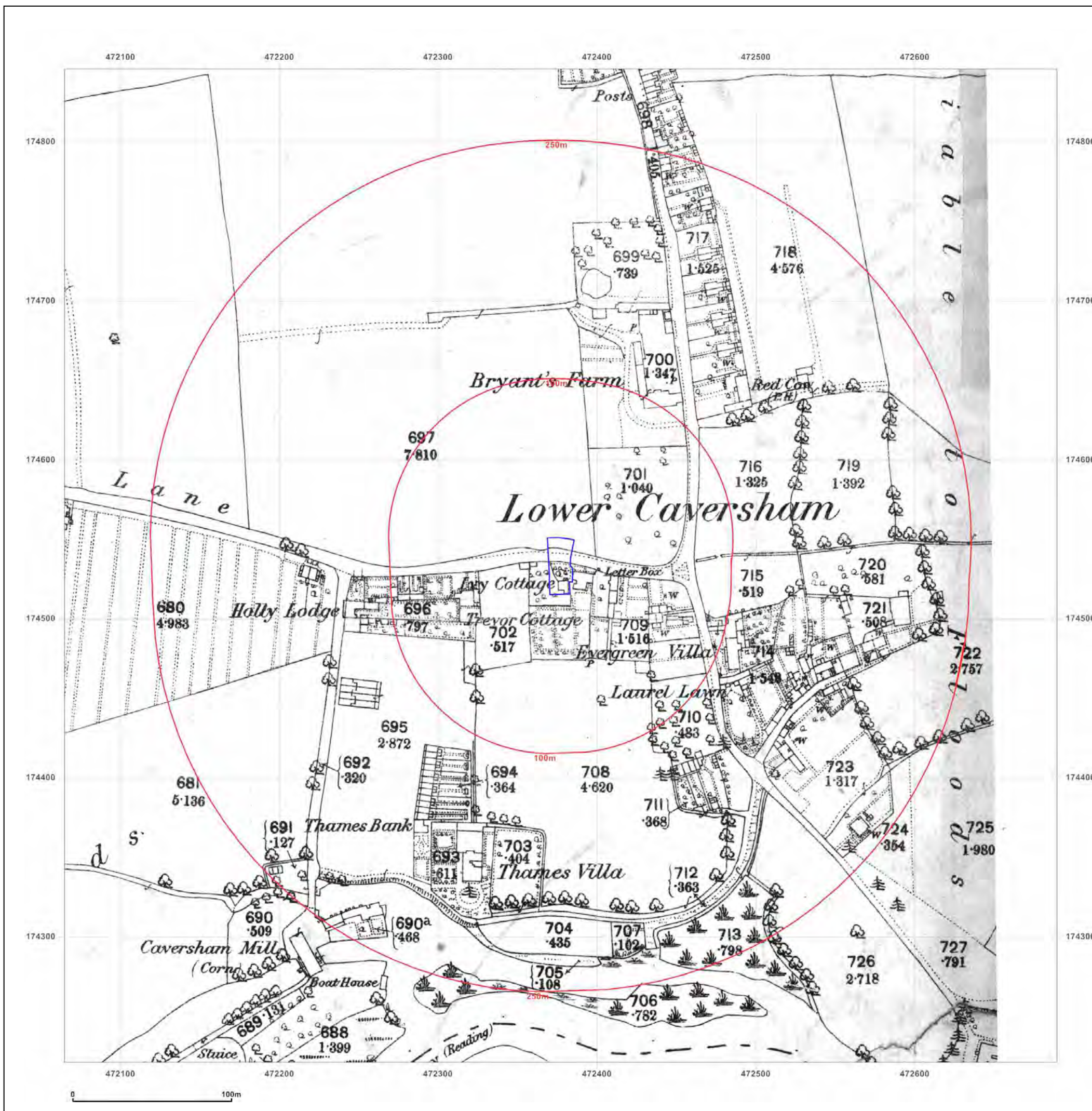


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Site Details:

389 Gosbrook Road,
Caversham, Reading, RG4 8ED

Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1879-1881

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1879
Revised 1879
Edition N/A
Copyright N/A
Levelled N/A

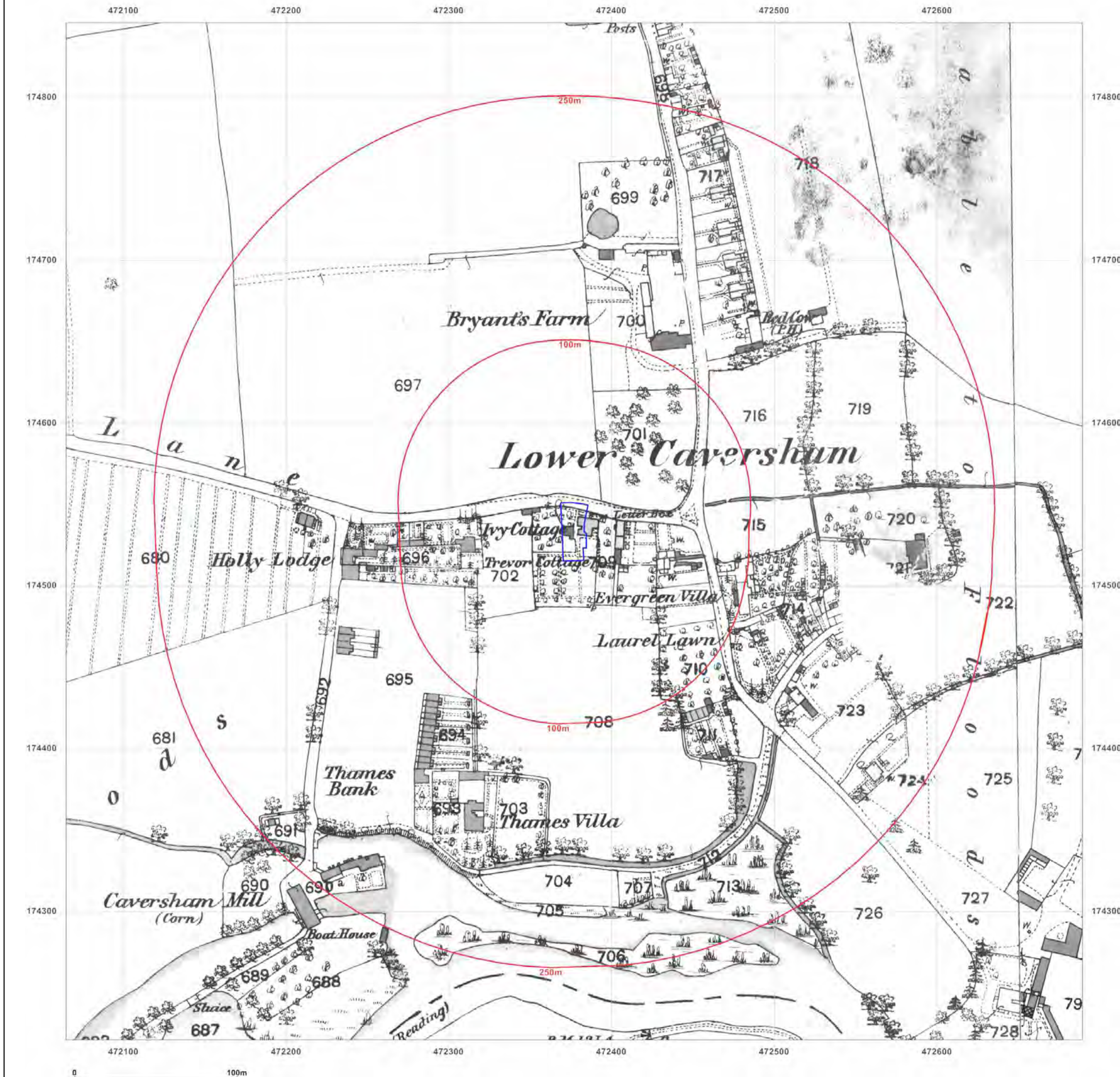


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1898-1899

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1899
Revised 1899
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1898
Revised 1898
Edition N/A
Copyright N/A
Levelled N/A

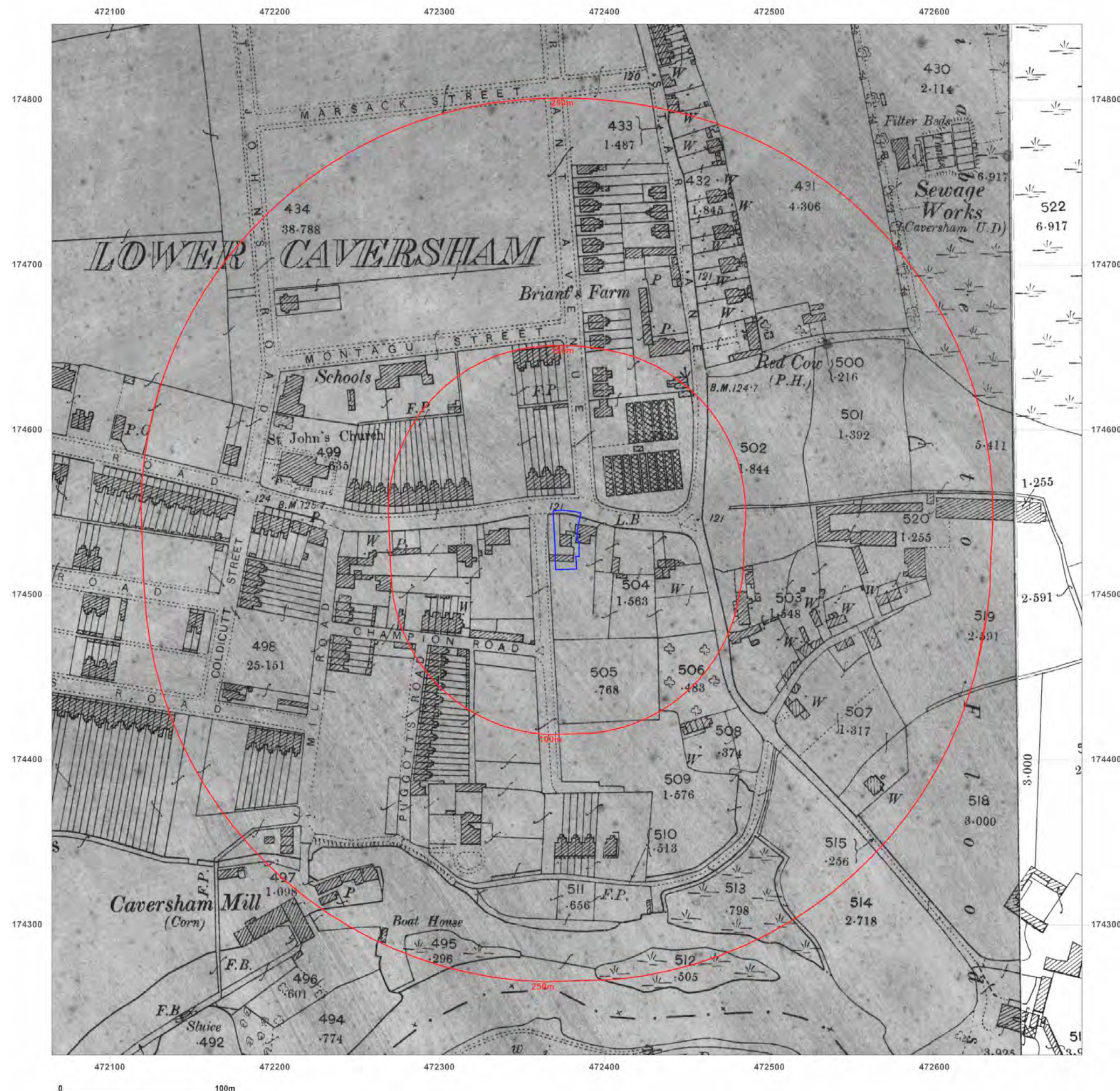


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1913

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1913
Revised 1913
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1913
Revised 1913
Edition N/A
Copyright N/A
Levelled N/A

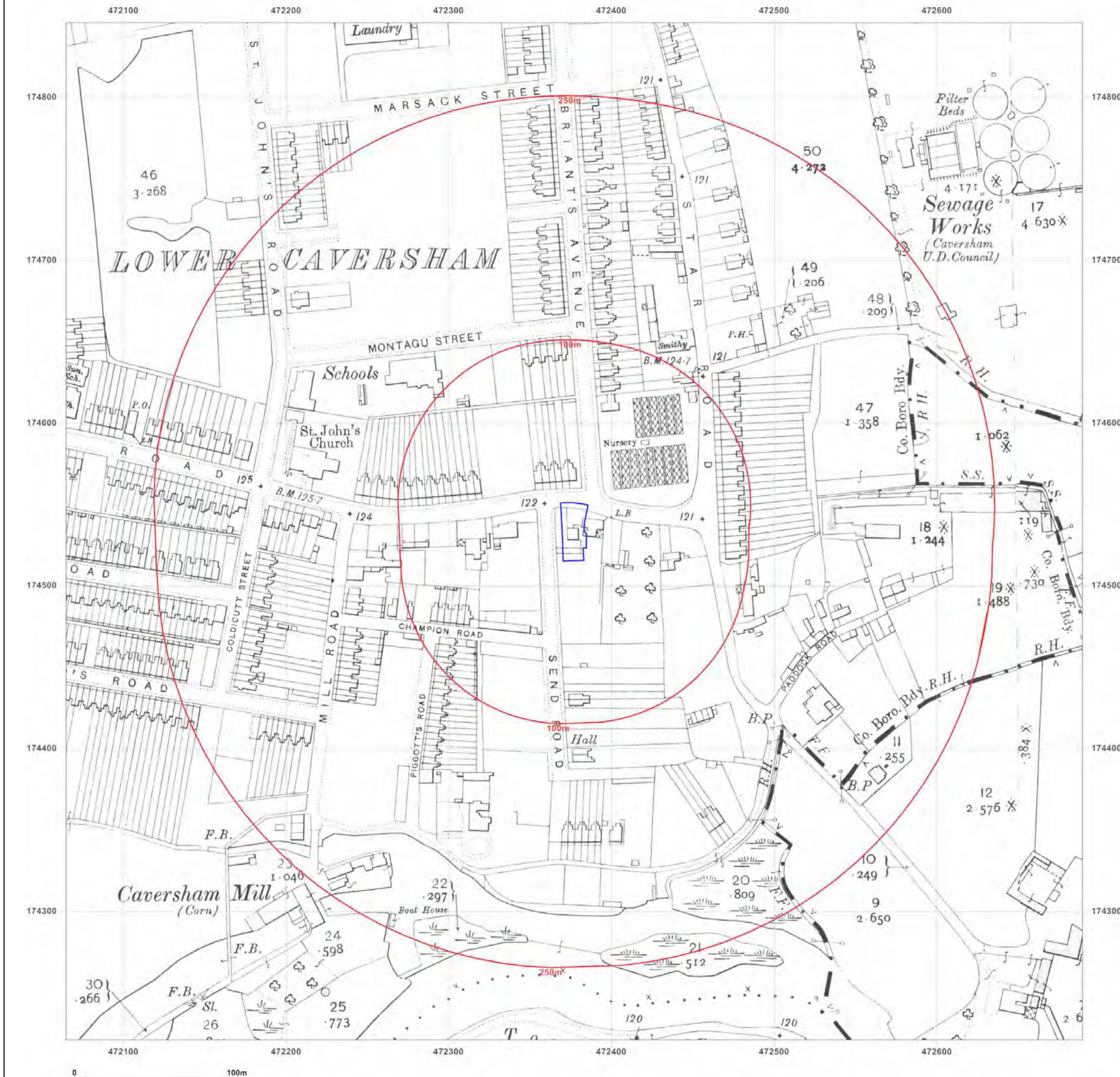


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1932

Scale: 1:2,500

Printed at: 1:2,500



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

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

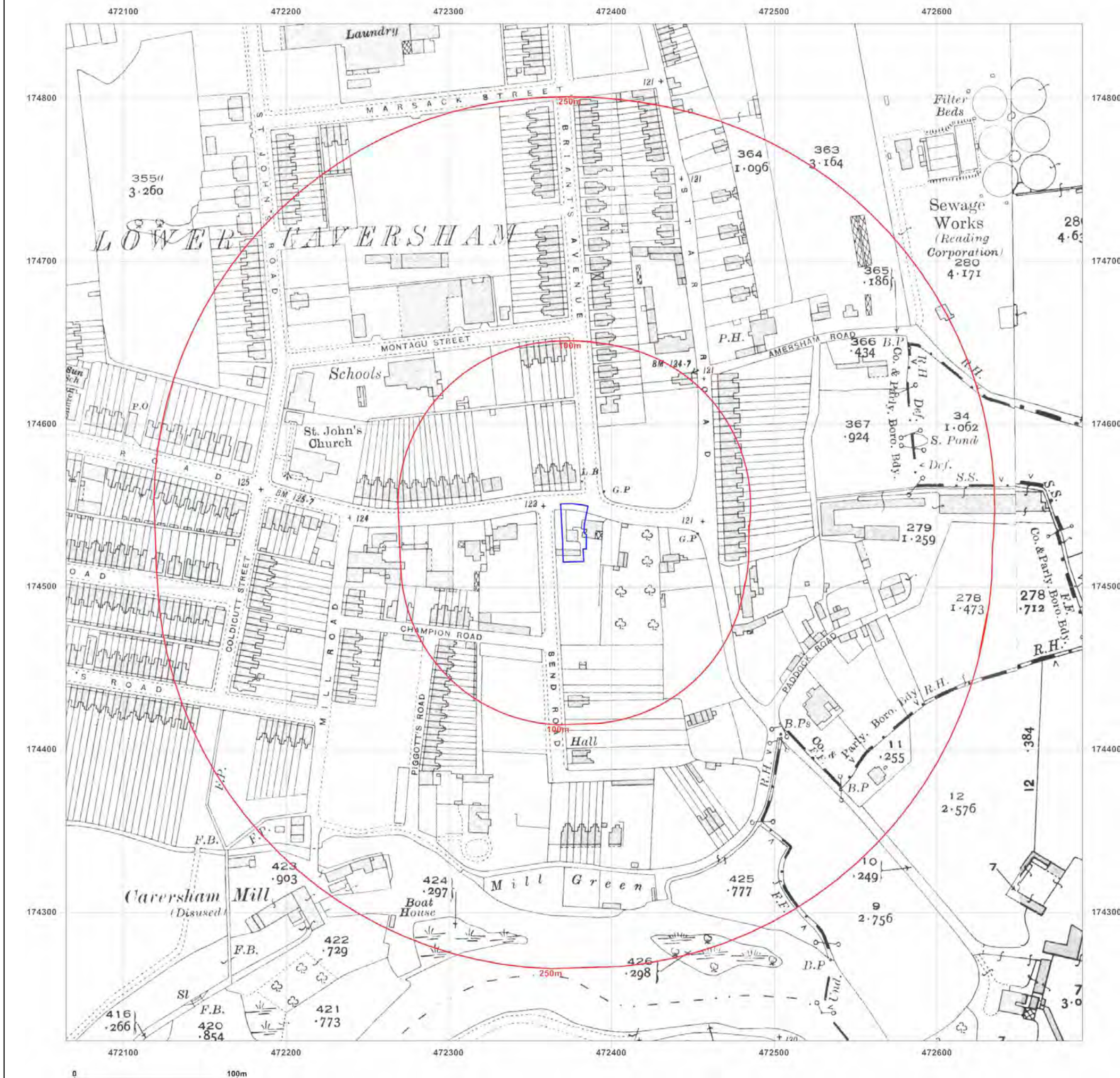


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

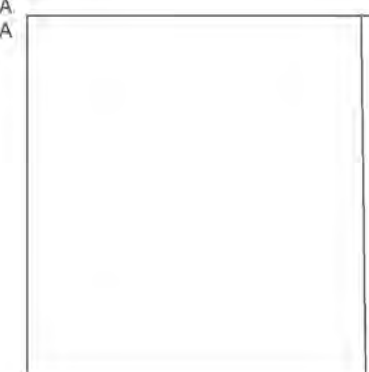
Map date: 1936

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1936
Revised 1936
Edition N/A
Copyright N/A
Levelled N/A

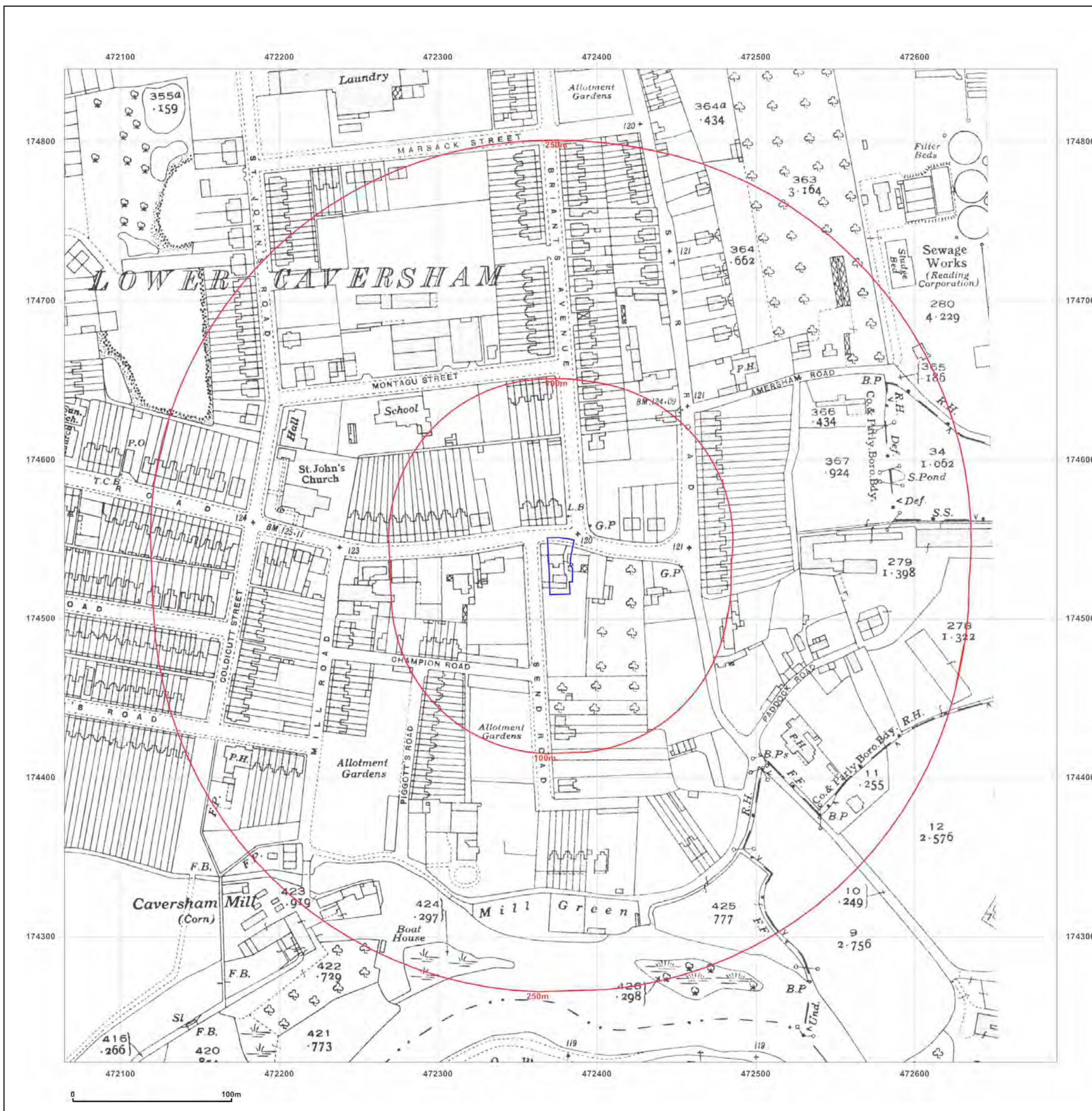


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1956

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1956
Revised 1956
Edition N/A
Copyright N/A
Levelled 1951

Surveyed 1956
Revised 1956
Edition N/A
Copyright N/A
Levelled 1951

Surveyed 1956
Revised 1956
Edition N/A
Copyright N/A
Levelled 1951

Surveyed 1956
Revised 1956
Edition N/A
Copyright N/A
Levelled 1951

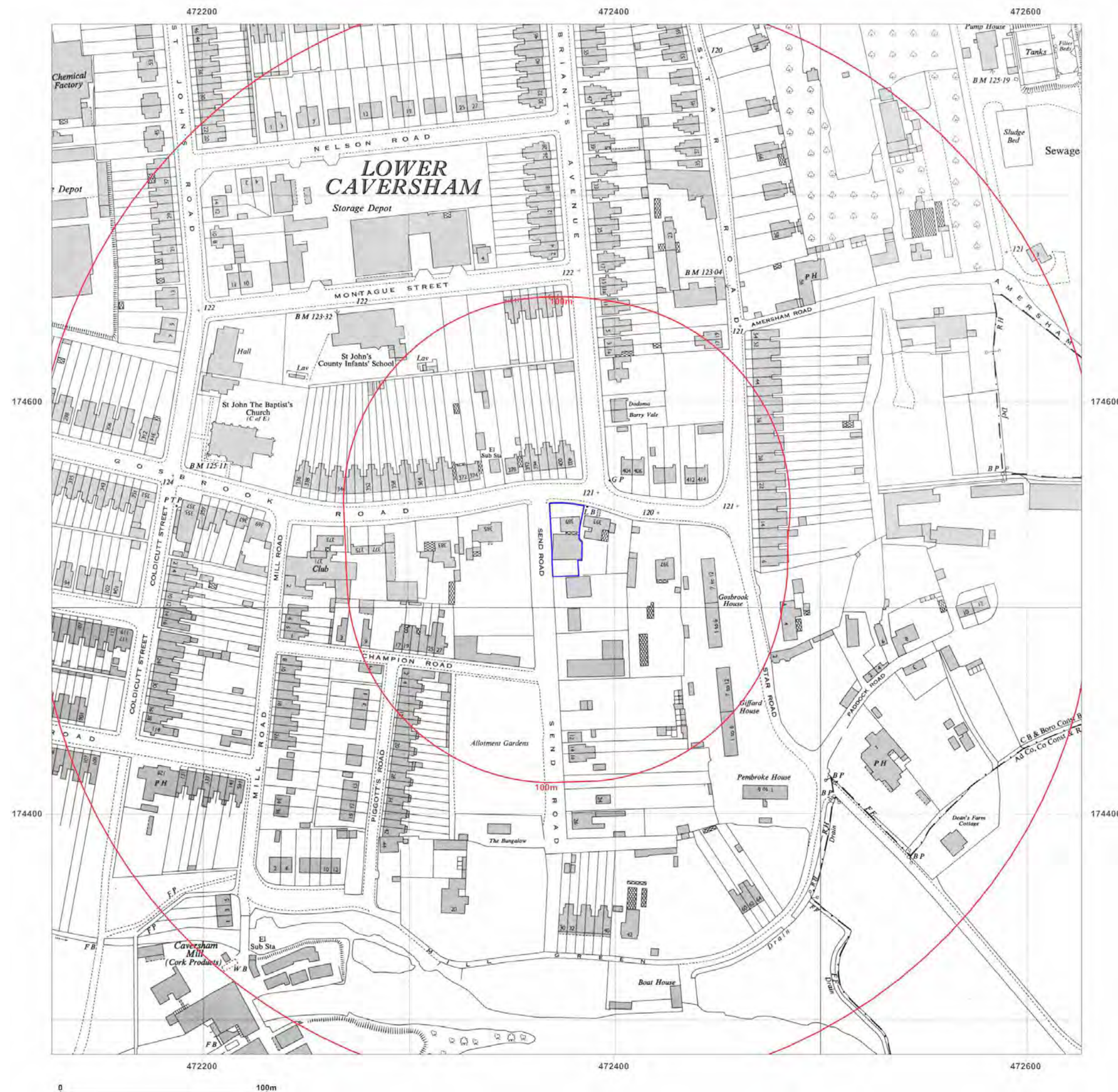


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1956

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1956
Revised 1956
Edition 1957
Copyright N/A
Levelled 1951

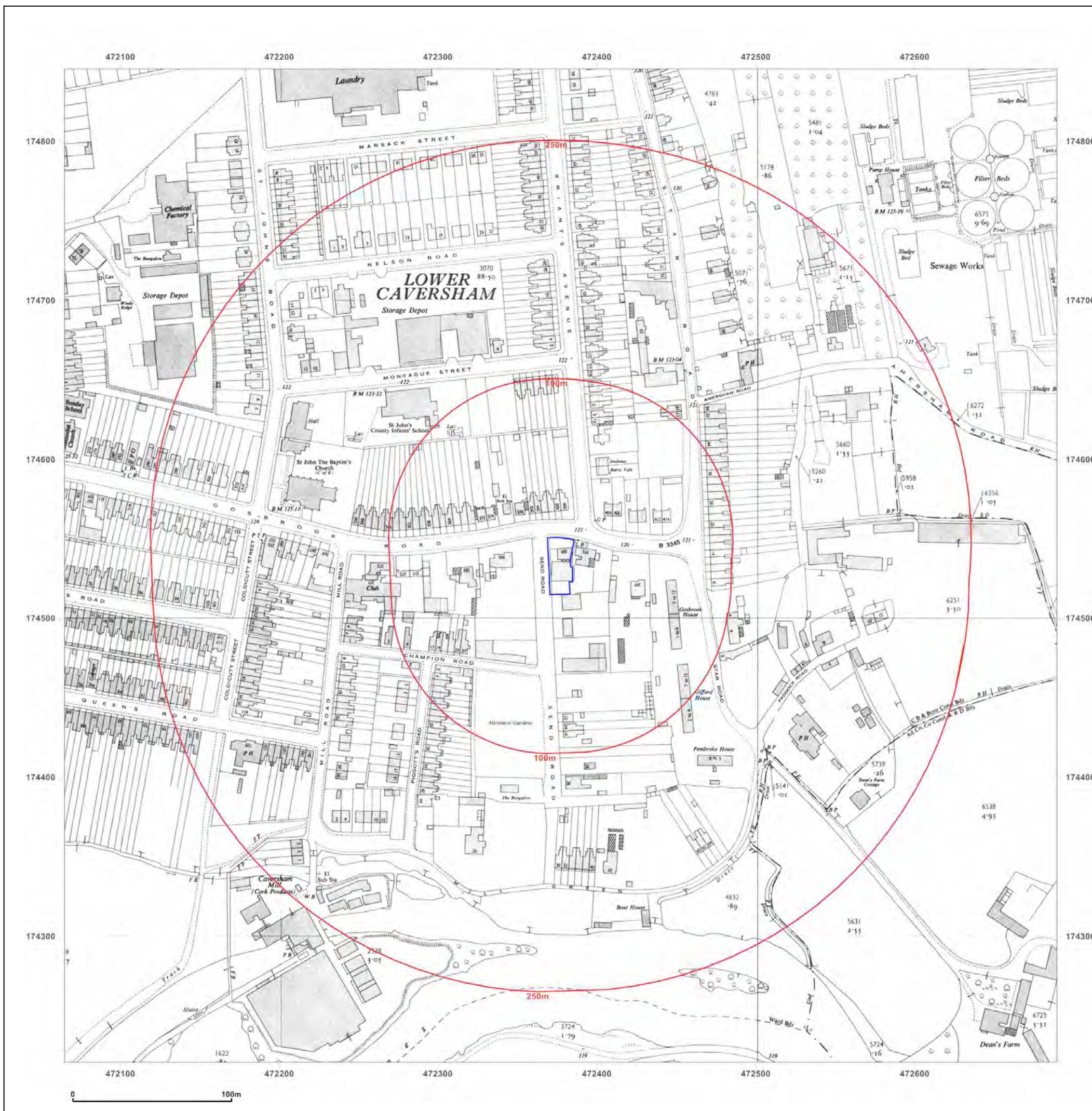


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1965

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1956
Revised 1965
Edition N/A
Copyright 1966
Levelled 1951

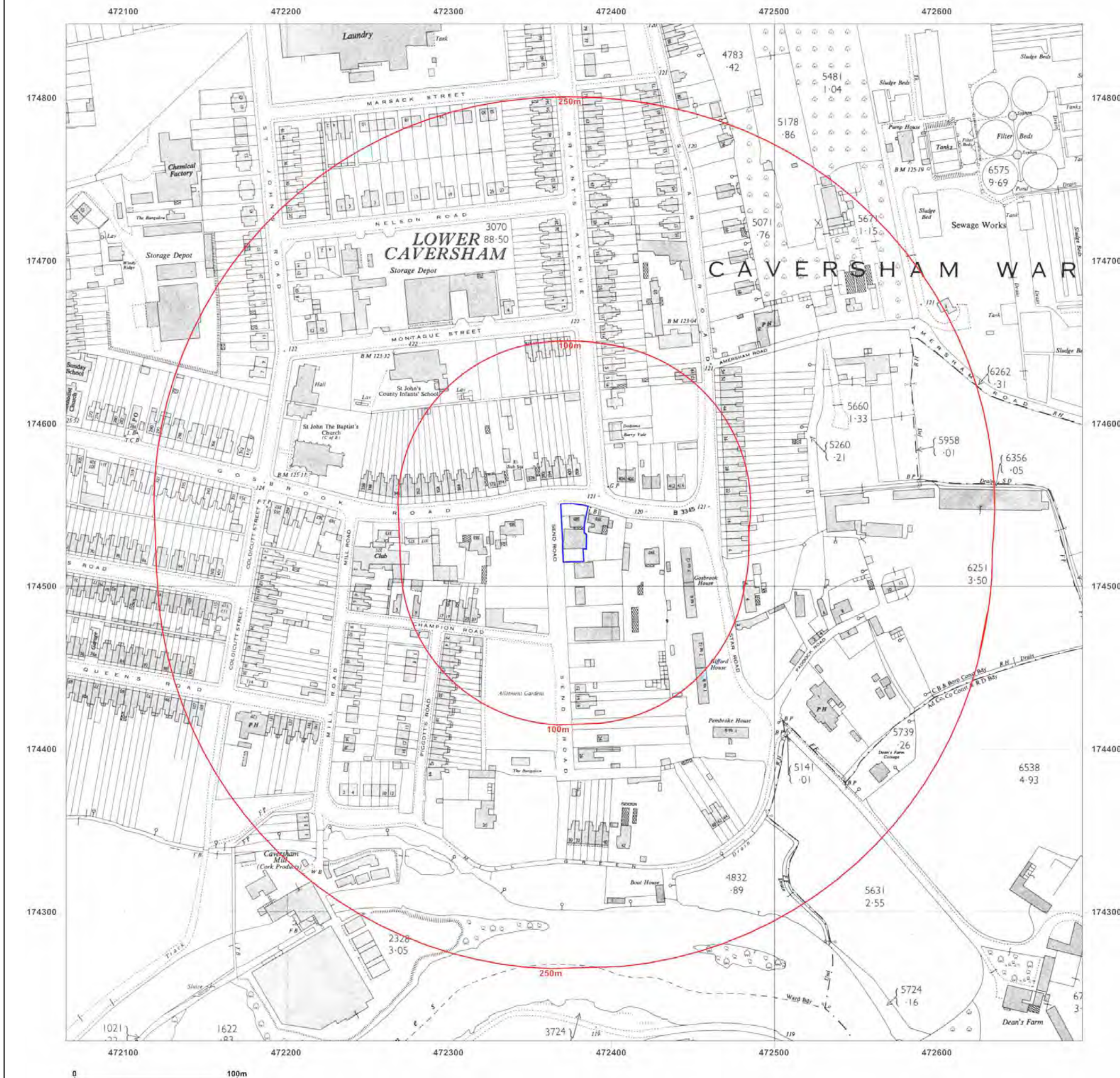


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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1968-1972

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1956
Revised 1967
Edition N/A
Copyright 1968
Levelled 1951

Surveyed 1956
Revised 1967
Edition N/A
Copyright 1968
Levelled 1951

Surveyed 1956
Revised 1971
Edition N/A
Copyright 1972
Levelled 1951



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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

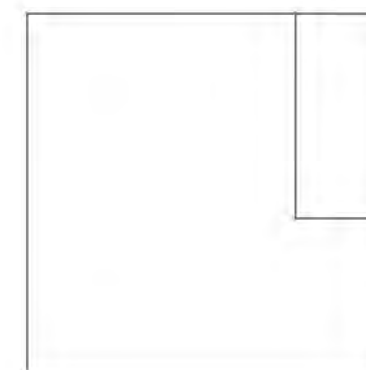
Map date: 1977

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1956
Revised 1975
Edition N/A
Copyright 1977
Levelled 1972

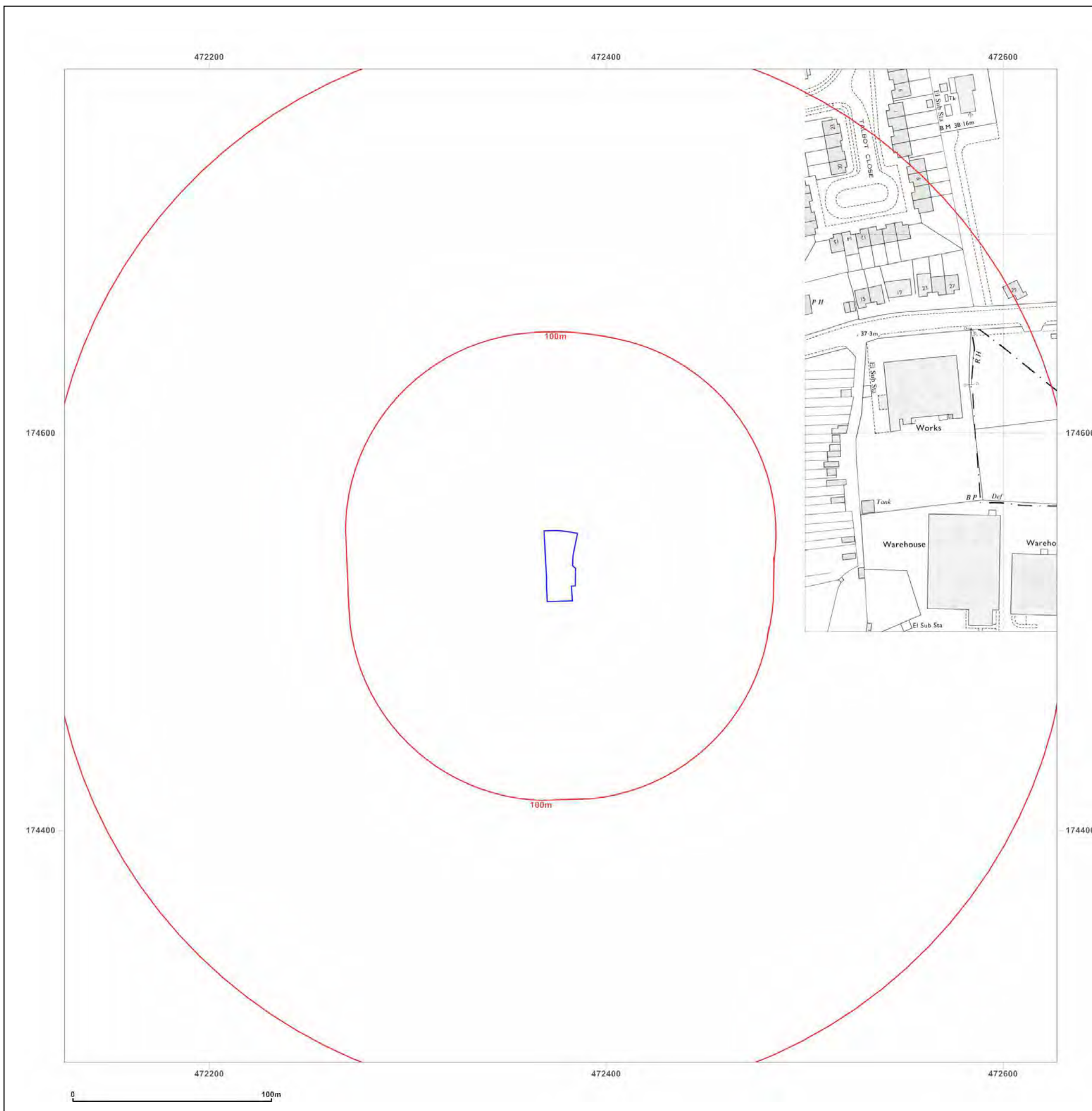


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1986-1990

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1972
Revised 1988
Edition N/A
Copyright 1988
Levelled 1972

Surveyed 1972
Revised 1986
Edition N/A
Copyright 1986
Levelled 1972

Surveyed 1972
Revised 1987
Edition N/A
Copyright 1987
Levelled 1972

Surveyed 1990
Revised 1990
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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1987-1992

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1992
Revised 1992
Edition N/A
Copyright 1992
Levelled N/A

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

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Revised N/A
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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1992-1993

Scale: 1:1,250

Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A

Surveyed 1993
Revised N/A
Edition N/A
Copyright 1993
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed 1993
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

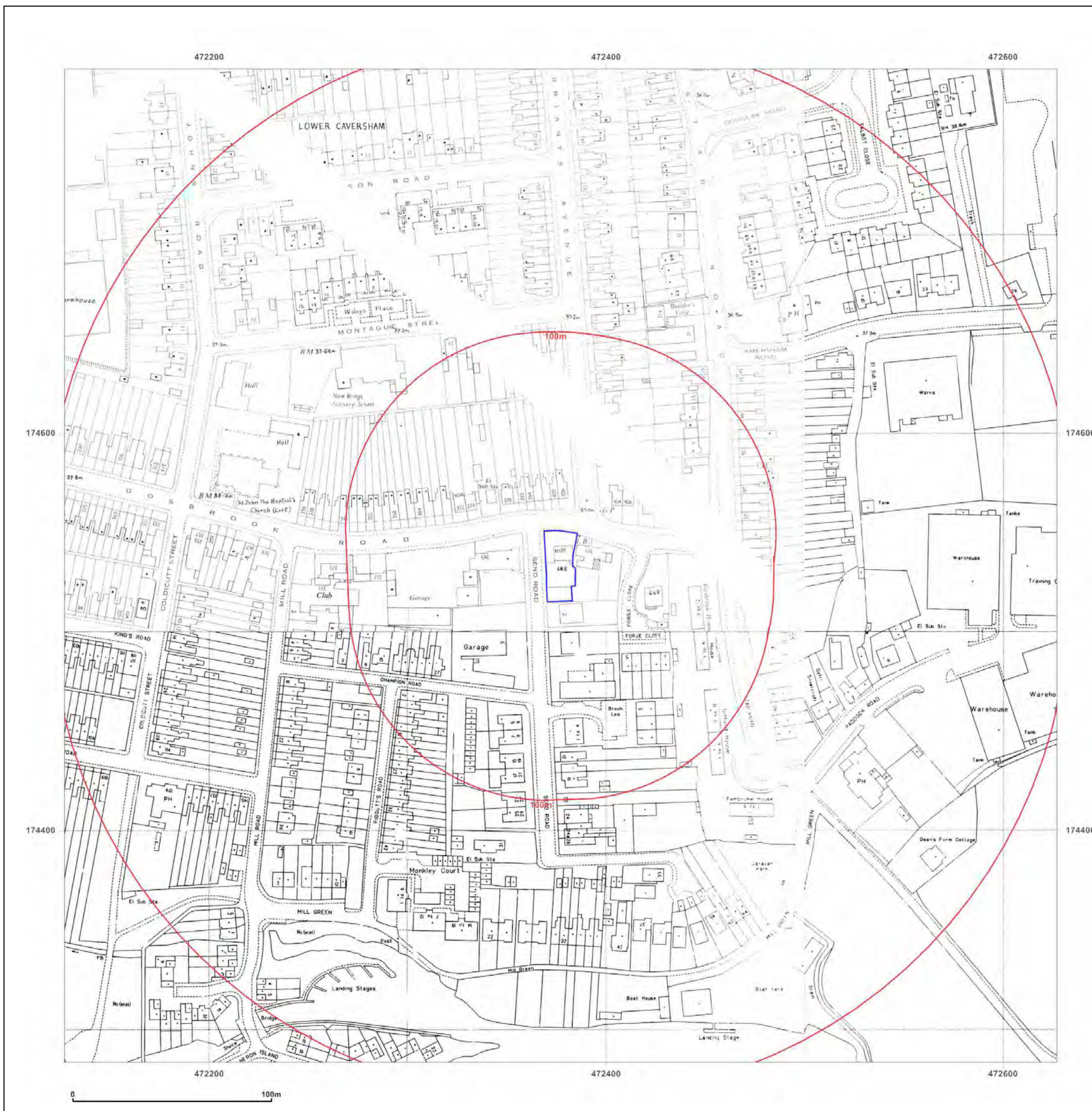


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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1993-1995

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1993
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed 1995
Revised N/A
Edition N/A
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Revised N/A
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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1995

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1995
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

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Revised 1995
Edition N/A
Copyright 1995
Levelled N/A

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Revised 1995
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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1995

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1995
Revised 1995
Edition N/A
Copyright 1995
Levelled N/A

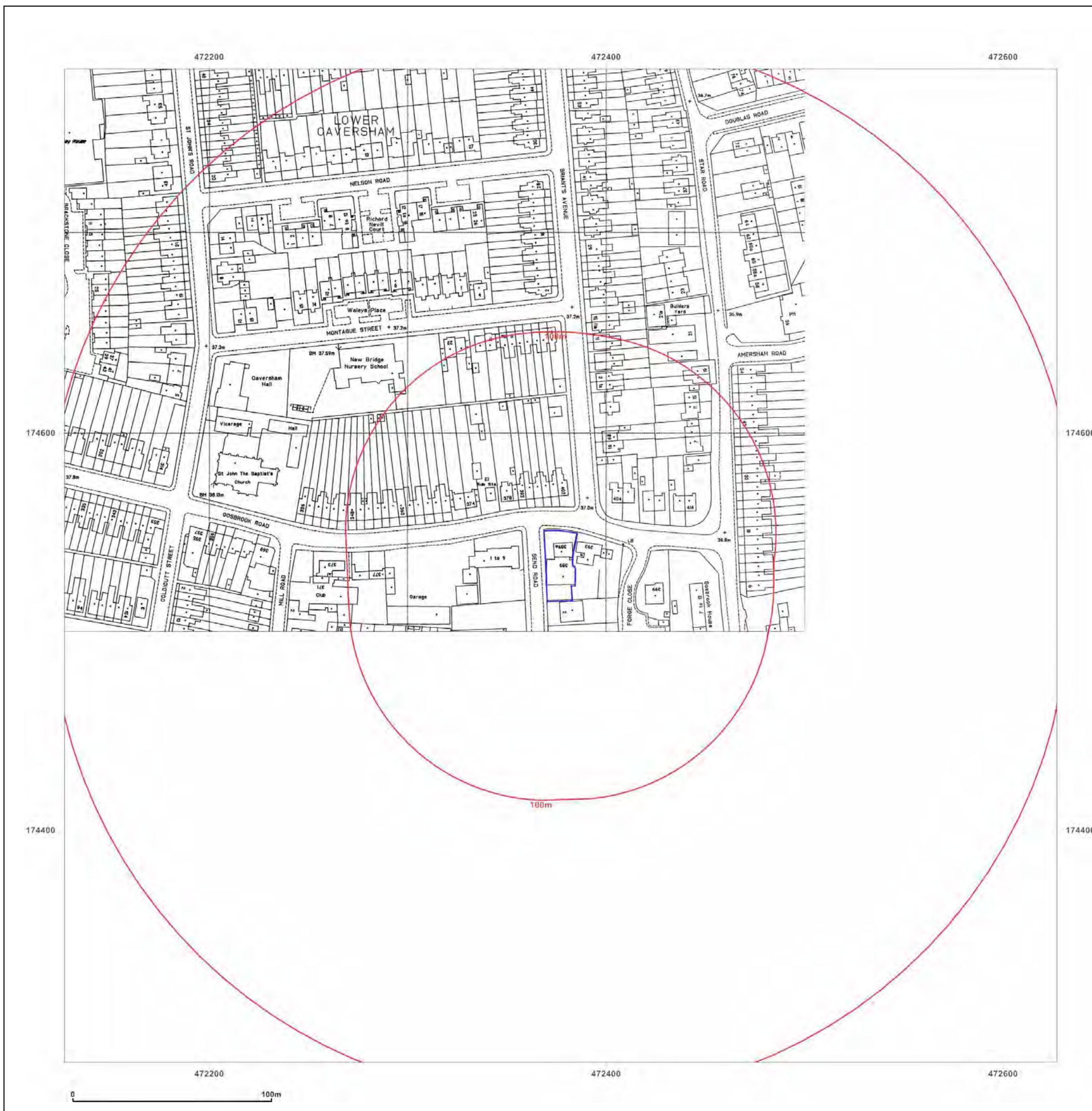


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

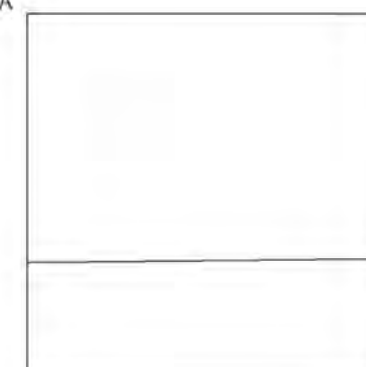
Map date: 1878

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1878
Revised 1878
Edition N/A
Copyright N/A
Levelled N/A

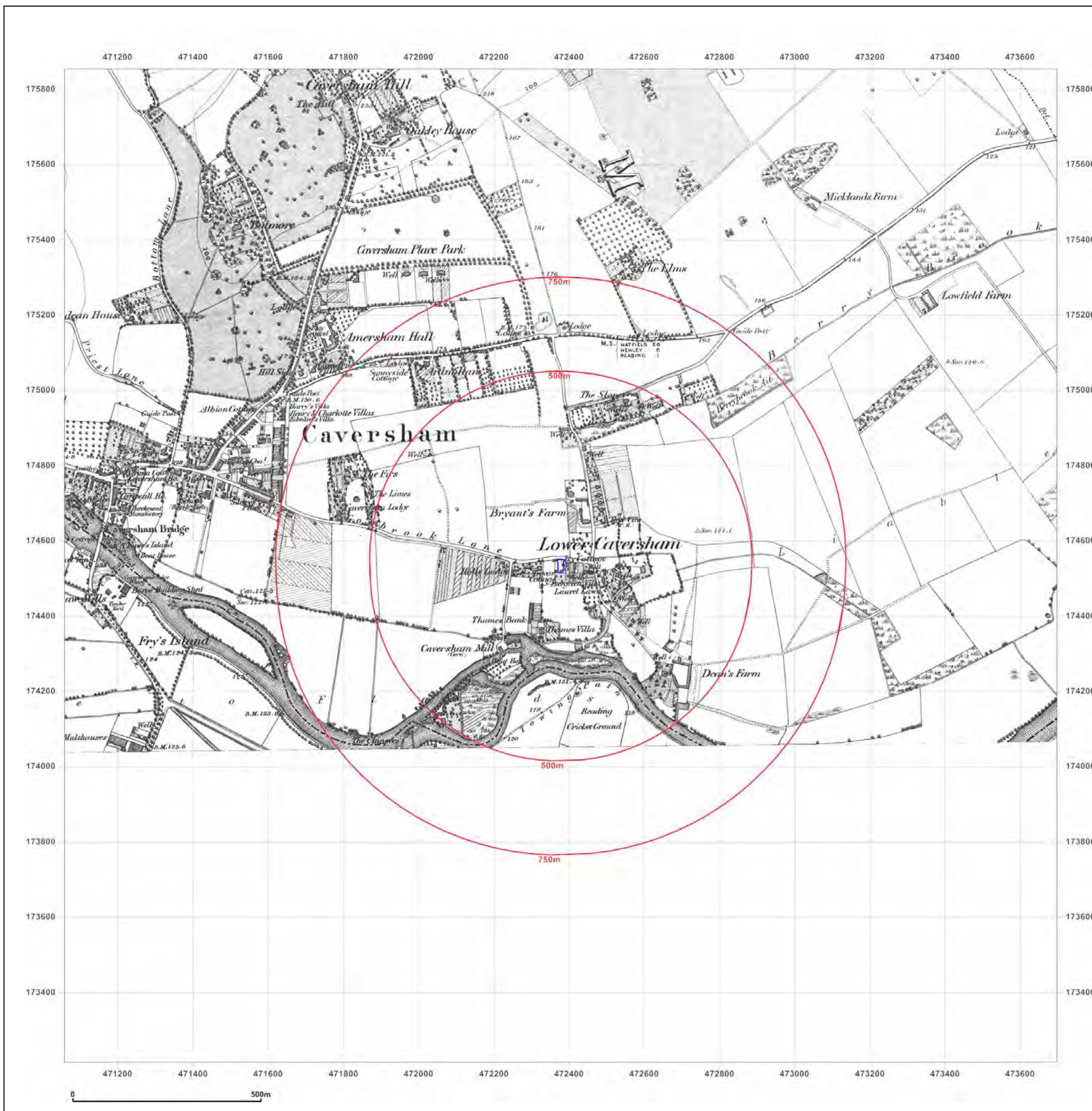


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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1900

Scale: 1:10,560

Printed at: 1:10,560



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

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

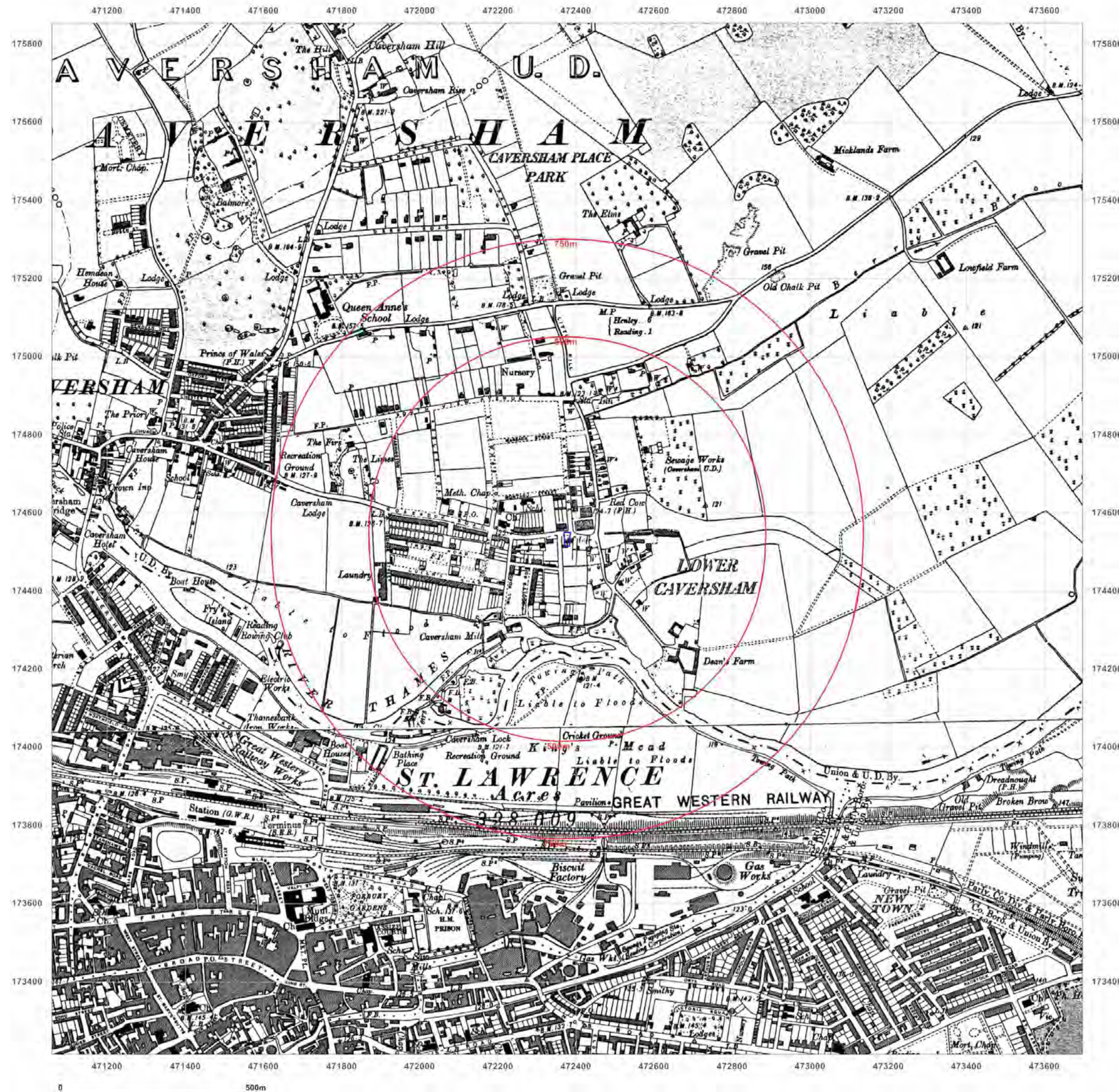


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1910-1913

Scale: 1:10,560

Printed at: 1:10,560



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

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

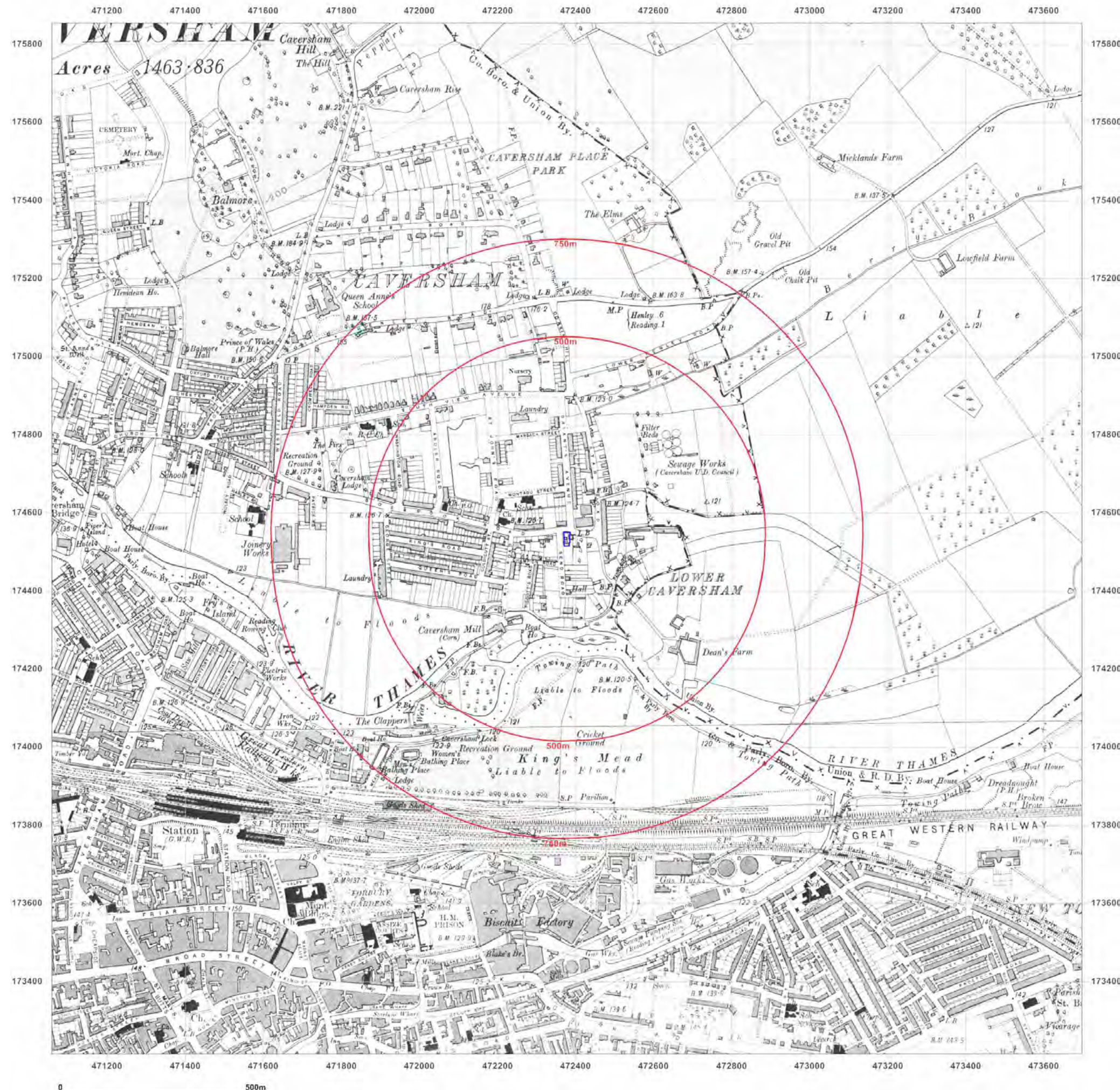


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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1914

Scale: 1:10,560

Printed at: 1:10,560



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

Surveyed N/A
Revised 1914
Edition 1913
Copyright N/A
Levelled N/A

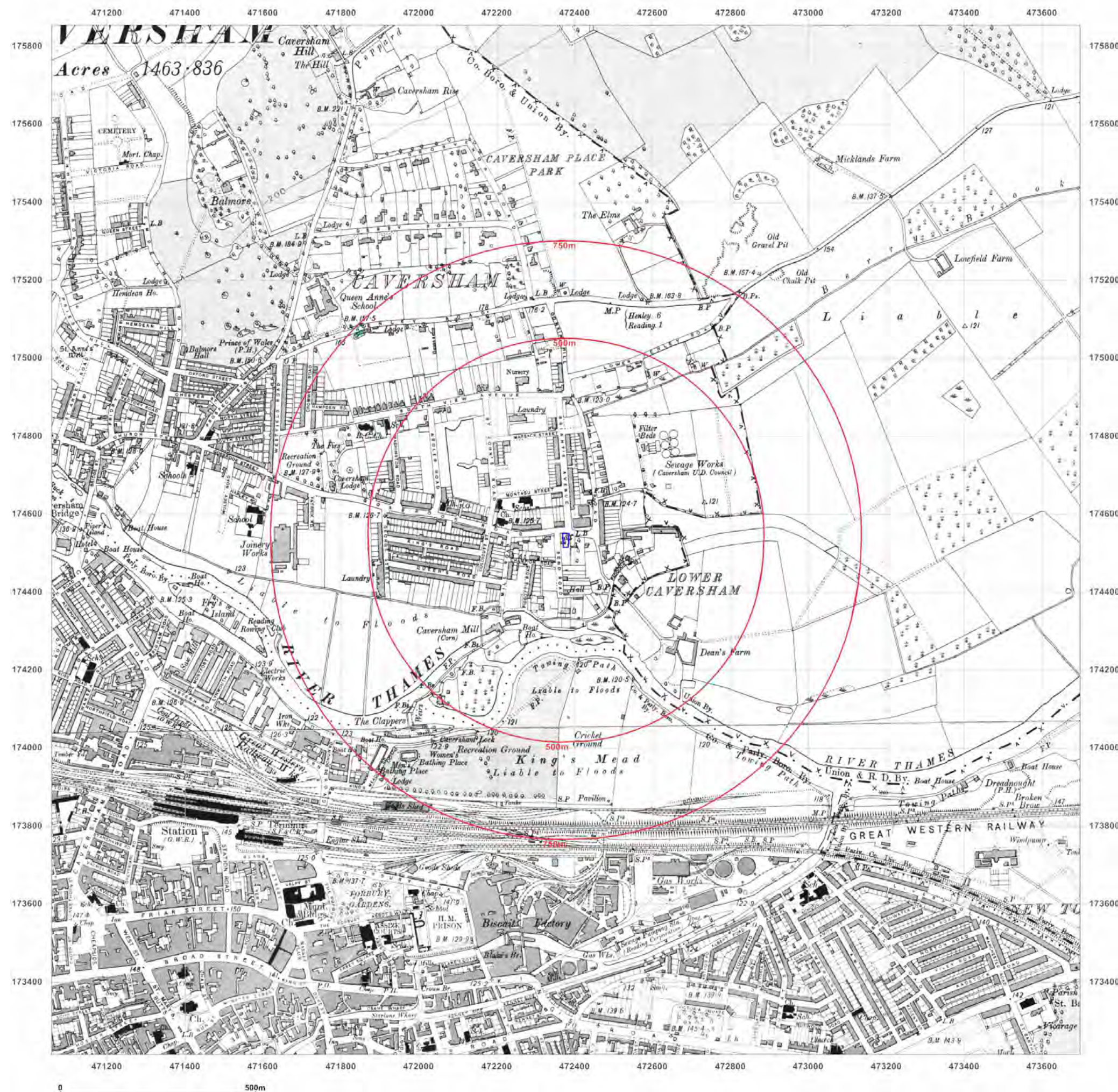


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1933-1938

Scale: 1:10,560

Printed at: 1:10,560



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

Surveyed 1877
Revised 1933
Edition N/A
Copyright N/A
Levelled N/A

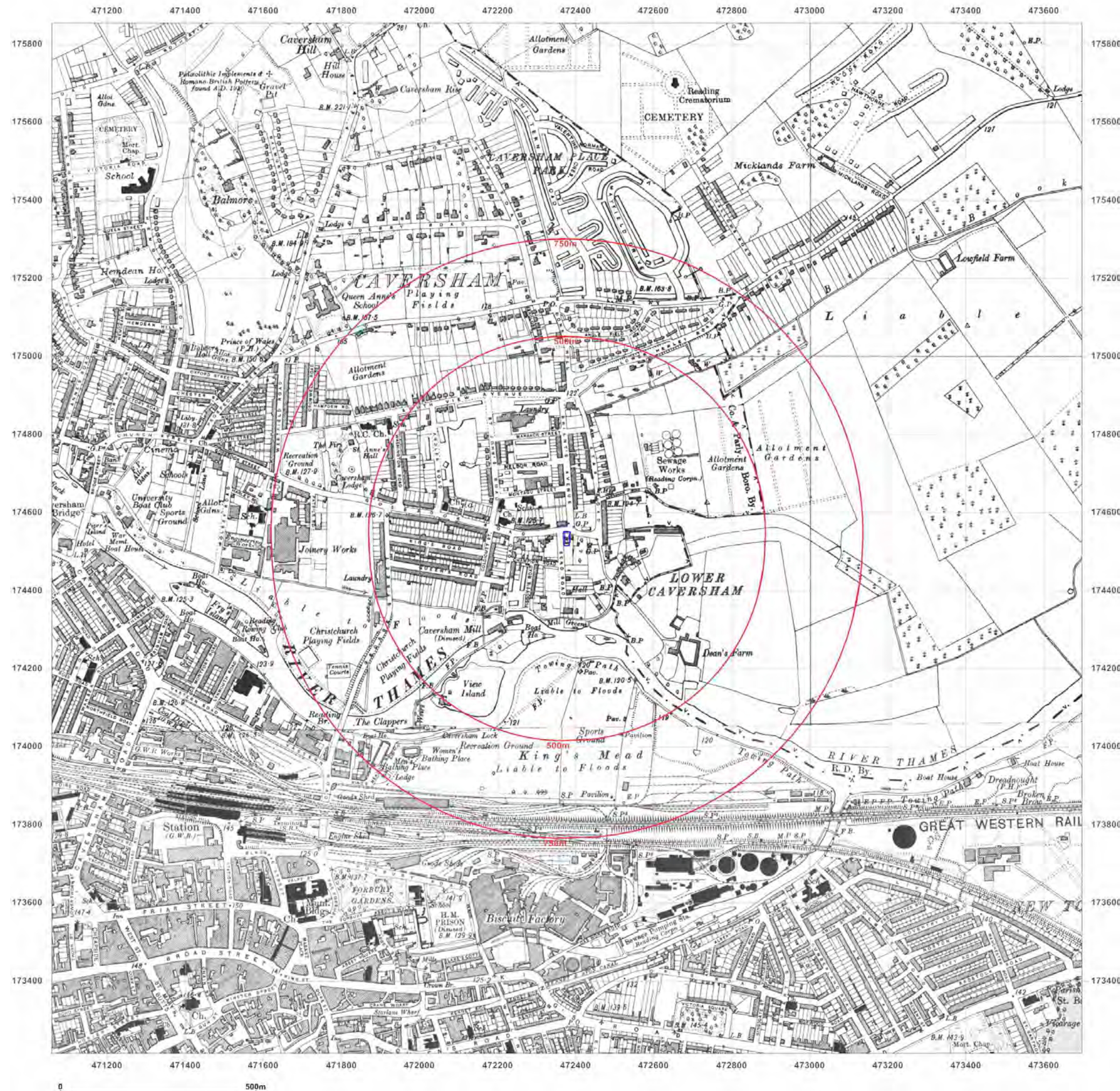


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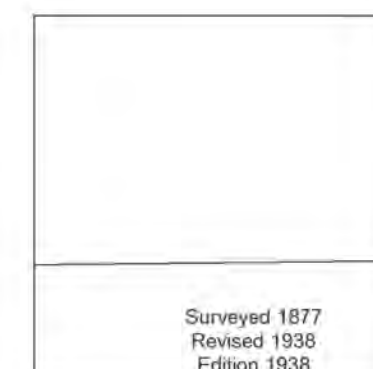
Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



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

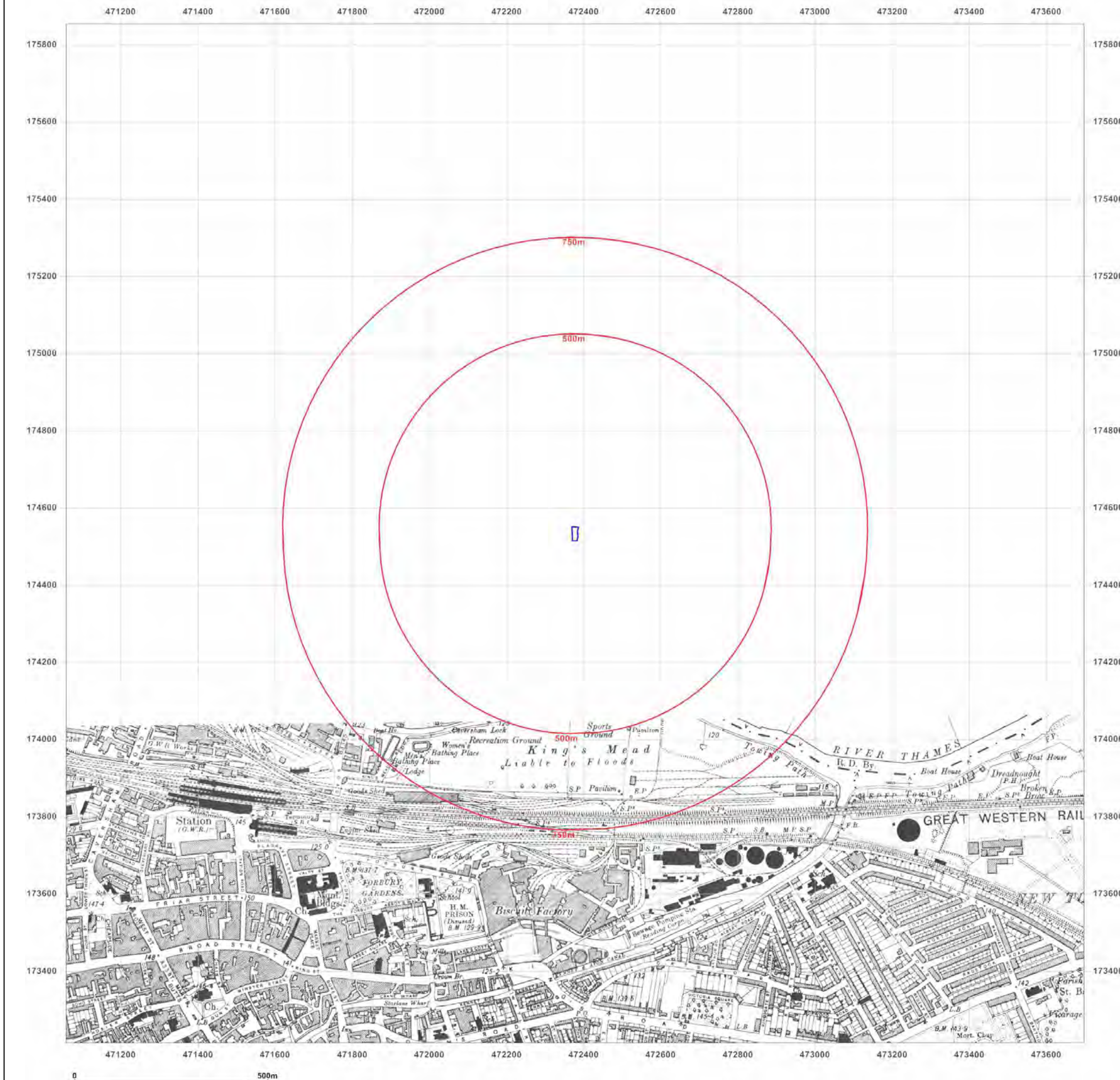


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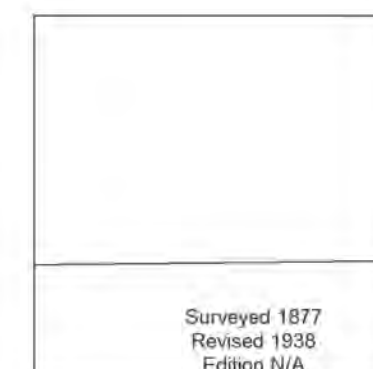
Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



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

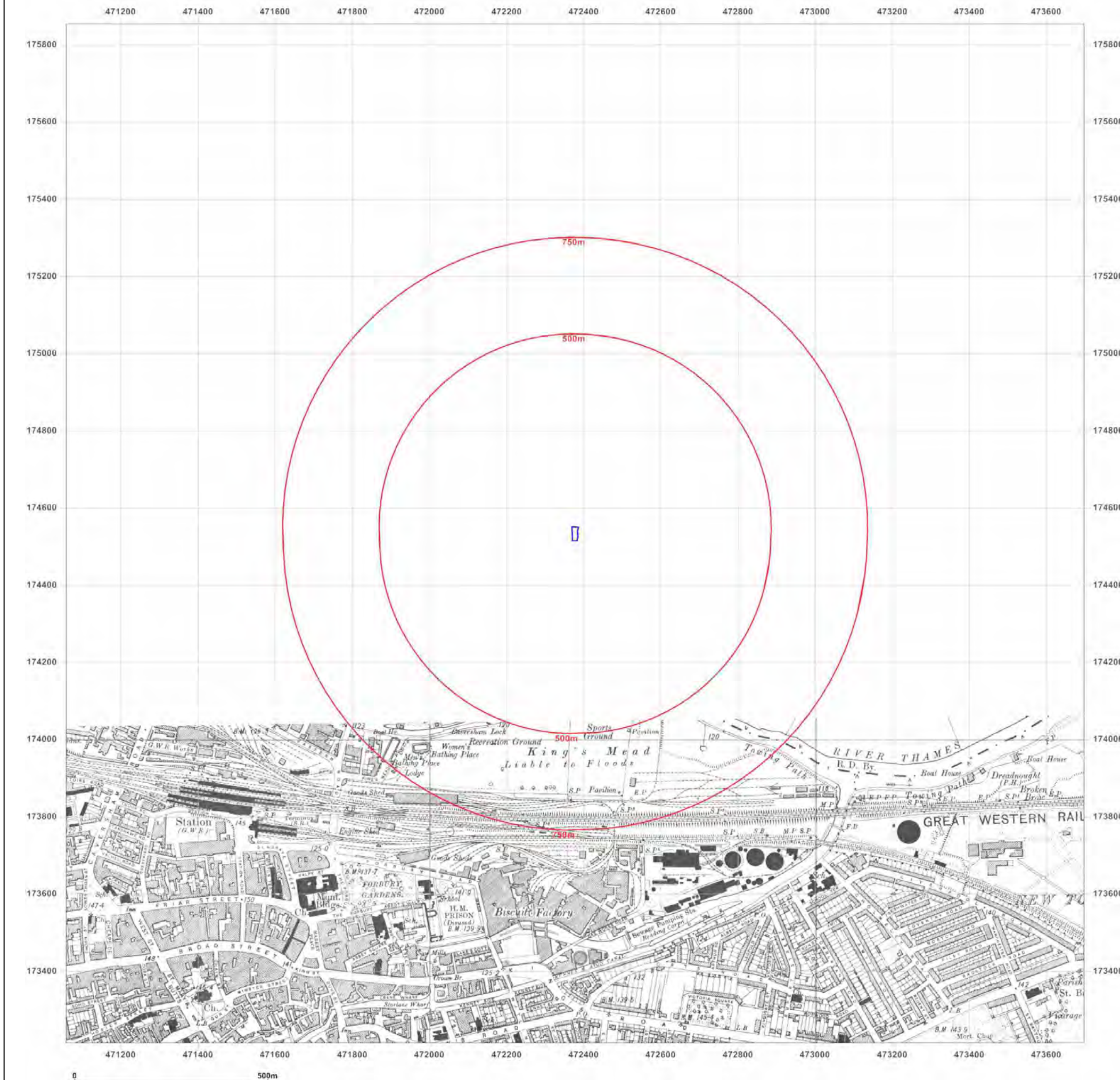


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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: Provisional

Map date: 1961-1962

Scale: 1:10,560

Printed at: 1:10,560



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

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

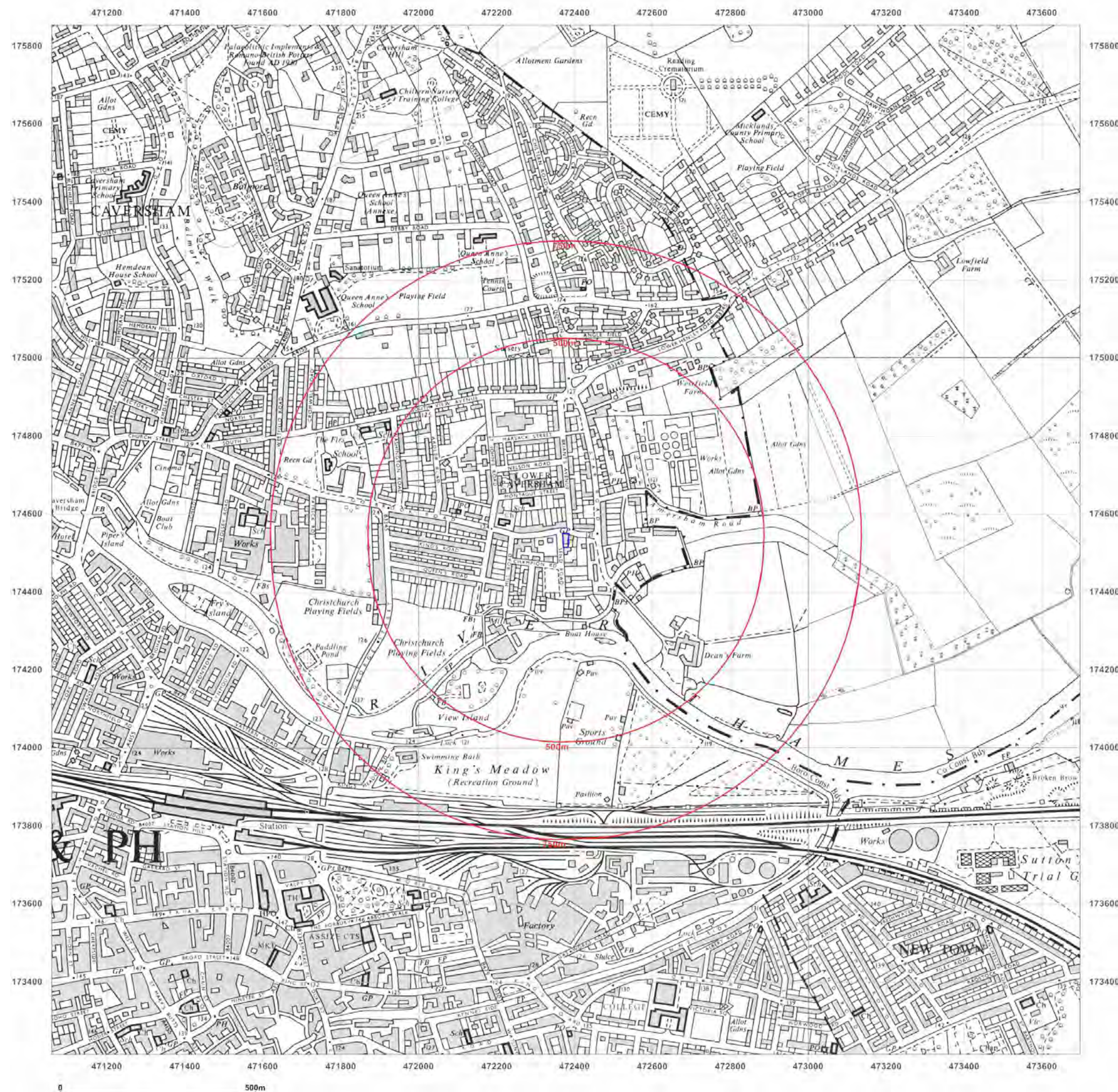


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Site Details:

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Client Ref: 34084
Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1973

Scale: 1:10,000

Printed at: 1:10,000



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Revised 1973
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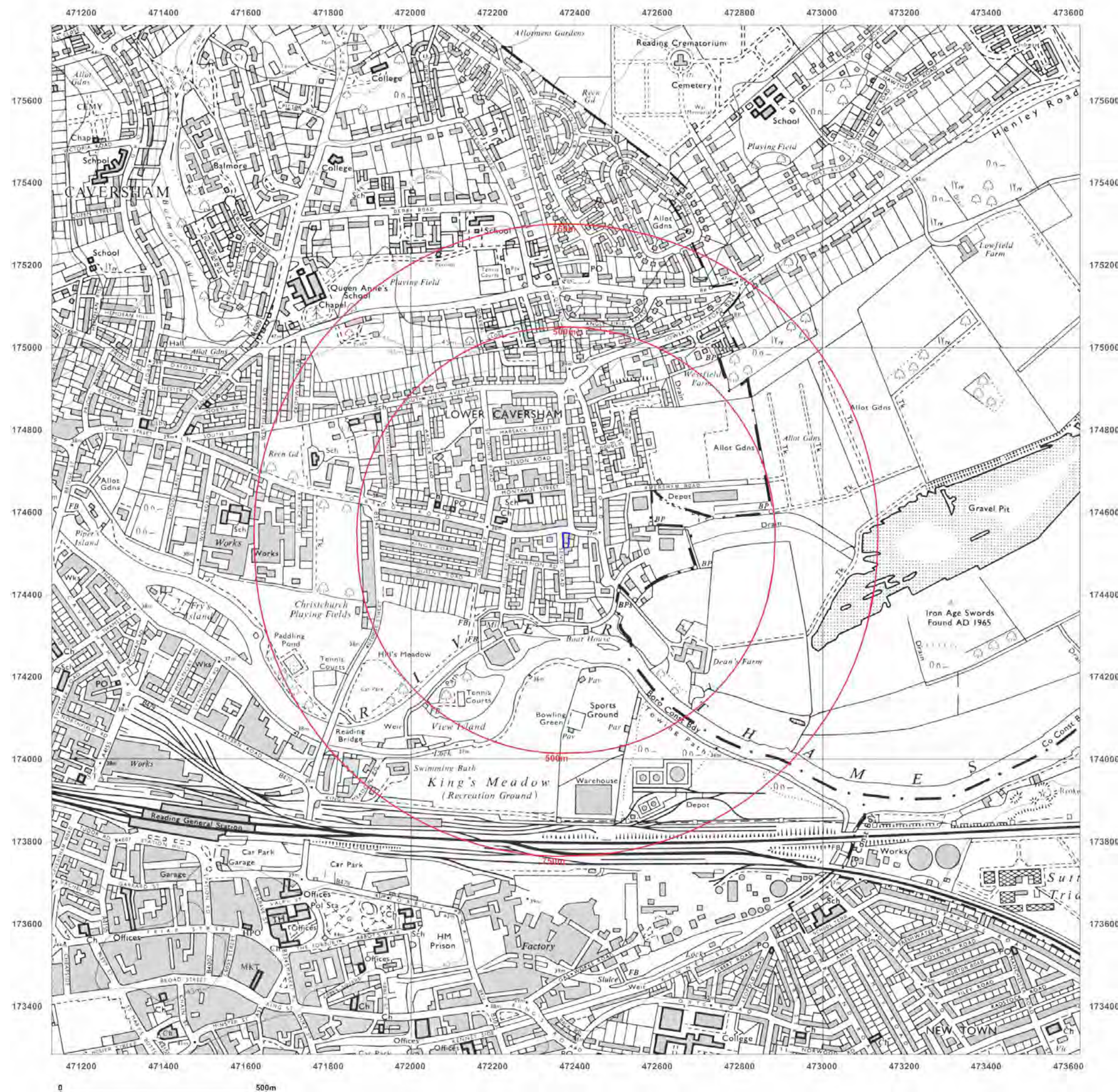


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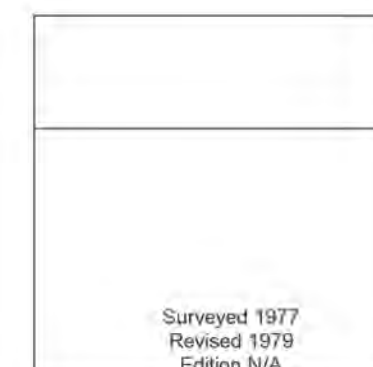
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Report Ref: GS-7282516
Grid Ref: 472377, 174533

Map Name: National Grid

Map date: 1979

Scale: 1:10,000

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