

# **TFL\_PSF\_9131 SITE INVESTIGATIONS: SMALL SITES INITIATIVE LAND AT PALMERSTON CRESCENT AND BOWES ROAD, N13 4NH**

## **Geotechnical and Geo-Environmental Desk Study**

FEBRUARY 2020



# Land at Palmerston Crescent and Bowes Road, N13 4NH

## Geotechnical and Geo-Environmental Desk Study

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Report No 10038043-ARC-05-XX-RP-YY-0017-01-Geo Report\_Palmerston Crescent and Bowes Road

Date FEBRUARY 2020

### VERSION CONTROL

Version	Date	Author	Changes
01	21 <sup>st</sup> January 2020	Rimjhim Singh	1 <sup>st</sup> Issue

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# 1 INTRODUCTION

## 1.1 Terms of Reference

Arcadis Consulting (UK) Limited (Arcadis) has been commissioned by Transport for London (TfL) 'the Client' to undertake a number of technical surveys for Land at Palmerston Crescent and Bowes Road, N13 4NH ('the Site').

TfL is aiming to divest a number of small sites to enable positive regeneration. The objective of this review is to identify potential development constraints due to geotechnical and geo-environmental conditions on Site based on the findings of this desk study.

The objectives of this review are to:

- Review geo-environmental information regarding the Site and its surrounding area; and
- Provide outline information on potential geo-environmental and geotechnical constraints which may impact on the land value or redevelopment potential for the site.

The site location is shown in Figure 1 below.



Figure 1: Site Location Plan provided by TfL

## 1.2 Sources of Information

As part of this desk study report various sources of information have been used and are detailed below:

- The on-line British Geological Survey (BGS) Geology of Britain Map Viewer (Ref. 1);
- Historical borehole records available through BGS website (above) (Ref. 1);
- Historical Ordnance Survey maps obtained from Groundsure (included in Appendix A);
- Environmental Information from Groundsure Datasheet (Appendix B);
- Current publicly available aerial images and maps from Google maps (Ref. 2);
- Zetica Regional Unexploded Ordnance Map and Pre- Desk Study Assessment (Appendix C); and
- Unexploded Ordnance data obtained from Bomb Sight National Archives website (Ref. 3).

## 1.3 Limitations and Expectations

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This report has been compiled from a number of sources, which Arcadis believes to be trustworthy. However, Arcadis is unable to guarantee the accuracy of information provided by others. The report is based on information available at the time. Consequently, there is a potential for further information to become available, which may change this report's conclusion and for which Arcadis cannot be responsible.

## 2 SITE SETTING AND HISTORY

### 2.1 Site Location

Table 2.1: Details relating to Site Location

Site Location / Address	Land at Palmerston Crescent and Bowes Road, N13 4NH
National Grid Reference	E530775, N192135
Approximate Site Area	The Site is roughly rectangular in shape and covers an area of approximately 0.3776 Ha (hectares).
Description of Site	<p>The site is surfaced with grass and has mature trees/hedges along its northern boundary. The southern boundary has a few medium to mature trees, and there are several (10-15) juvenile trees spread throughout the middle. The western half of the site is mounded, but this come down to the level of the surrounding area as you move east, with the eastern half being mostly flat.</p> <p>The northern boundary is defined by a wooden fence, varying in condition, beyond which are residential dwellings. There is a low steel railing with wooden support pillars around the western and southern boundaries of the site leading to Palmerston Crescent and Bowes Road respectively, with a small "bituminous-type" material footpath where the two roads meet. The eastern edge of the site as indicated on Figure 1 has a concrete surfaced car park and a footpath associated with Broadway Mews. At the western side of the footpath and car parking is a metal fence.</p>
Topography	<p>The site is generally decreasing in gradient towards the north and west. The site may have been reworked given the proximity to the A406 (approximately 25m).</p> <p>From available mapping, local spot heights indicate a topographical elevation decrease to the north and east.</p>
Surrounding Area	The site lies within an urban setting, with residential dwellings located to the north, west and south. Various commercial land uses are located east and northeast of the site including a garage immediately north of the eastern portion of the site with supermarkets, garages, car washes and a bus garage/station beyond.

### 2.2 Site History

A review of the available historical Ordnance Survey maps (Appendix A) has been undertaken to assess the historical development of the Site and surrounding areas.

It is not the intention of this report to provide a full history, but to identify those past uses on and within the vicinity of the Site that could have resulted in potential contamination of the soils and/or waters. Significant changes to the land use of the Site and surrounding areas are summarised in Table 2.2 below.

Table 2.2 History of Site and Surrounding Area

Date	Historical Development (Site and Surrounding Area)
1864- 1879	<p>The Site is undeveloped land with a line of mature trees north to south down the center. There is a small copse of trees and a pond in the eastern half of the site.</p> <p>The surrounding area is mostly undeveloped farmland. There are farm buildings, part of Rows Farm 10m east and south east of the site.</p> <p>There is an embankment on Kings Arms Brook 50m-80m west of the site and Pymmes Brook approximately 100m north of the site.</p>

Date	Historical Development (Site and Surrounding Area)
	<p>Nurseries marked approximately 250m and 500m northeast of the site.</p> <p>Fish Ponds approximately 150m south of the site.</p>
1895-1897	<p>The site and surrounding area has undergone significant change. The mature trees and Pond on the site and adjacent are no longer recorded on the mapping, while Rowes Farm immediately adjacent to the east is also no longer recorded.</p> <p>A Smithy is marked 50m-60m southeast of site.</p> <p>Palmerstone Crescent is recorded directly adjacent to the western edge of the site and Elmdale Road is recorded 50m north of the site.</p> <p>Enfield Branch railway line running from northeast to southwest towards Bowes Park station 110m west of the site with Palmer's Green station 550m to the north.</p> <p>Residential development has begun to take place to the west and southwest of the site, approximately 10m from the site at its closest.</p> <p>Fire station approximately 300m north of the site.</p> <p>Vicarage associated with St. Michael's Church approximately 400m south of the site.</p> <p>Gravel pit approximately 550m northwest of the site.</p>
1914-1920	<p>Again, the site has undergone significant change.</p> <p>Development of multiple residential buildings along the southern boundary of the site with a Laundry recorded on the eastern boundary. The site largely occupies the gardens of the residential buildings.</p> <p>Adjacent land completely developed with residential buildings on all sides.</p> <p>Tram lines installed into Green Lanes 40-50m east of site.</p> <p>Motor Garage (London General Omnibus Company) identified approximately 60m northeast of site.</p> <p>Smithy recorded 80m west of site.</p> <p>Three no. tanks noted to the west of the site, approximately 300m and 500m.</p>
1936-1938	<p>No significant changes are noted on site.</p> <p>Site surrounding to the east had been further developed extensively with roads and residential buildings with schools.</p> <p>On the 1936 map, Smithy east of site is no longer marked.</p> <p>Railway lines with embankments have been further developed to the west named Wood Green Hertford &amp; Stevenage.</p> <p>A laundry building is noted approximately 150m east and Motor garage approximately 60m northeast is now marked as Omnibus Depot. 60m northeast of site a new commercial or industrial building has been added but is unnamed.</p>
1956-1966	<p>Laundry on the eastern corner of site is no longer marked on the map of 1956.</p> <p>"The Cock Forge" labelled 130m east of site. "Timber Works" recorded 90m northeast of site. Engineering works marked beyond the Omnibus Depot approx. 130m north west of site.</p> <p>Timber works approximately 90m northeast, Joinery works 200m northeast, Engineering works on 150m northeast and River (Machine Tools) works 250m northeast of the site is marked.</p> <p>Garages approximately 150m east, 150m and 250m northeast are recorded.</p>

Date	Historical Development (Site and Surrounding Area)
	Tram lines are no longer marked on Green Lanes.
1973-1984	<p>Circa 1973, some buildings on the eastern side of the site are no longer recorded, assumed demolished, as well as some approximately 10m west of the site. Circa 1974, the buildings to the south of the site are all assumed demolished and shown as open land with some parking space on the eastern corner of site.</p> <p>In 1984 a new building 5m north west of the site is recorded and some footpaths have been put in immediately southwest of the site.</p> <p>The road layout immediately south east of the site has been changed.</p> <p>The commercial/industrial building 60m northeast of the site is no longer recorded.</p> <p>Electric substation is noted approximately 110m southeast and Circa 1984 one more marked approximately 100m north of site.</p>
1991 -2020	Between the 2010 map and the 2020 map there is a change in the road layout immediately south of the site and the edge of the road is moved from approximately 10m from the edge of the site to immediately adjacent. On review of Google Earth a new section of the road was built between 2010 and 2011 and it appears mounds of earth are present on the site.

### 2.2.1 Summary of Site History

The site was farmland until residential development of the area commenced in 1914. Around 1973 the residential buildings to the south of the site were demolished and some parking space was established on the eastern corner of site. The site itself appears unchanged since according to the available mapping.

Historical imagery on google maps records the change in road layout to Bowes Road (North Circular) immediately to the south of the site. It appears from the imagery that the mounds of soil on site are likely to have come from these works, as they do not appear to be present before but are present afterward.

The surrounding land use has comprised various phases of residential, industrial and commercial development. The industrial developments are mostly concentrated to surround the site comprising smithy, depots, electrical substations, fire engine station, tanks, railways and garages.

## 2.3 Unexploded Ordnance

With reference to the Zetica Unexploded Bomb Risk report for the site (Appendix C), the Site is designated as lying within an area denoted as "Low to Moderate" bomb risk. Further reference has been made to the Bomb Sight National Archives (Ref. 3) which indicates that no High Explosive (HE) bomb was dropped within an approximate 100m radius of the Site.

A pre-desk study assessment (PDSA) was obtained from Zetica (Appendix C) which states that during WWII the Site was located in the Municipal Borough (MB) of Southgate, which officially recorded 221No. High Explosive Bombs with a regional bombing density of 60.2 bombs per 405 hectares. Readily available records have been found to indicate that several high explosive bombs fell in close proximity of the site.

The PDSA recommends that a detailed desk study needs to be commissioned to assess, and potentially zone, the UXO hazard level on the Site.



### 3 PHYSICAL AND ENVIRONMENTAL SETTING

#### 3.1 Published Geology, Hydrogeology and Hydrology

With reference to the sources of information detailed in section 1.2, the following information has been obtained.

Table 3.1 Information Regarding Geology, Hydrogeology and Hydrology

Geology / Aquifer Status	<p>Made Ground is anticipated onsite associated with the multiple phases of historical development, and possibly some materials from construction of the north circular.</p> <p>Superficial Deposits: Kempton Park Gravel Member described as Sand and Gravel which is designated as Secondary A Aquifer – Permeable Layers.</p> <p>86m north of the site there is presence of Alluvium superficial deposits described as clay, silt sand and gravel.</p> <p>269m north of the site there is a presence of Boyn Hill Gravel member described as Sand and Gravel which is designated as Secondary A Aquifer.</p> <p>Solid Geology: London Clay Formation, described as clay and silt, which is designated as Unproductive Strata.</p>
BGS Boreholes (within 100m of the Site)	<p>There are 12 historic boreholes recorded within 100m of the site, of which 3 are on site. The three on site boreholes (TQ39SW181, TQ39SW182, TQ39SW184) which were drilled to between 3m and 9m depth indicate the site to be underlain by up to 0.2m of Topsoil, up to 1.8m of Made Ground (clays and sands including brick fragments, roots and gravels) and then into a firm to stiff fissured clay.</p> <p>Groundwater was encountered in one borehole at 1.80m bgl.</p>
Within a Source Protection Zone	<p>The site is located within an Outer Catchment (Zone II) Source Protection Zone (SPZ) on the eastern half of the site and there is Inner Catchment (Zone I) SPZ on the western half of the site.</p> <p>No information is provided about the strata of the SPZ aquifer, however, it is considered likely that this relates to deeper geology underlying the London Clay, perhaps the Chalk, as London Clay is designated as unproductive strata.</p>
Licensed Groundwater Abstraction Points	<p>There are 13 licenced groundwater abstraction points noted within 1km of the site and the nearest one is 62m (historical) and 71m (active) northwest of the site which are for potable water supply operated by Thames Water.</p>
Surface Water Features	<p>Pymme's Brook located 77m north of the site flows to the east. New River is located 97m west of the site and flows to the south, crossing above Pymme's brooke in an aqueduct approximately 150m northwest of the site.</p>
Likely Groundwater Flow Direction	<p>The Kempton Park Gravel Formation is a Secondary A aquifer and is likely to contain groundwater at shallow depths.</p> <p>Significant groundwater flow is not anticipated within the London Clay bedrock.</p> <p>Based on the local topography, groundwater within the Kempton Park Gravel deposits is likely to flow (migrate) north to Pymmes's Brook.</p>

### 3.2 Environmental Public Registers

Public register information from the Groundsure Report (Appendix B) for the Site and the surrounding area (within 250m radius) has been summarised in Table 3.2 below.

It is not the purpose of this section to provide a comprehensive account of the environmental data but only to detail those factors that could impact the Site.

Table 3.2. Environmental Data

Data type	Description	Distance (m) and Direction
Radon	The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level).  No Radon protection measures are considered necessary for new dwellings.	N/A
Discharge Consent	Two current discharge consents are recorded within 250m of site and the nearest one is related to Trade discharges-Process effluent, not water company receiving water: Groundwater via a borehole. Status is varied under EPR2010. The other is 110m N (Sewage Discharges Sewer storm overflow – Water Company, receiving water Pymmes Brook).	64m northwest
Pollution Incidents to controlled waters	One minor pollution incident related to Diesel, pollutant type oils and fuels recorded on 07 June 2002, leading to a Category 3 (Minor) for water impact and Category 4 (No impact) for Land/ Air.	184m northeast
Environmental Permit	Four Part B permits were recorded within 250m of the Site of which one is a historical permit and three are current.  The nearest one related to Coating Processes-Historical permit. All permits are "No Enforcement Notified".	78m east
	Permit for unloading petrol into storage at service stations registered to Forest Services-Current Permit.	177m east
	Permit for unloading petrol into storage at service stations registered to Shell UK Oil Ltd-Current Permit.	198m north
Potentially Infilled Land	Permit for dry cleaning registered to Finesse Dry Cleaners-Current Permit.	226m south
	Unspecified Pits	87m northwest 88m west 207m south
	Ponds	169m south
	Unspecified Ground workings	169m northwest
Local Authority pollution prevention and controls	None recorded within a 250m radius of the site	N/A
Landfill sites (current and historical)	Landfill rear of Southgate Town Hall by Enfield Council-waste type by Environmental permitting regulations.	182m north

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Data type	Description	Distance (m) and Direction
Mining Features	None recorded within a 250m radius of the site	N/A
Current land uses (Within 250m of the site)	Fuel Distributors and Suppliers (appears to be registered address as a flat detailed)	9m north
	Electric substations	75m east 115m north 223m west
	Industrial Products: Published Goods Electronic Equipment Industrial Coatings and Finishing General Construction Suppliers	24m east and 28m northeast 87m southeast 139m northeast 154m southeast
	Motoring-Vehicle parts and accessories	28m north
	Repair and Servicing: Electrical equipment repair and servicing Vehicle repair, testing and servicing	100m southeast 107m south and 139m northeast
	Construction Services	29m north and 146m northeast
	Public transport, stations and Infrastructure-Bus Depot	112m northeast
	Road and Rail: Petrol and Fuel stations	177m east and 216m north
	The following commercial services noted: Hire Services Consumer products-Floors & Doors	139m northeast and 143m east 145m north
Fuel Station Entries	Three registered active fuel stations identified within 250m of site: Obsolete Pace Shell	84m northeast 163m east 210m north
Railways and Tunnels features	Hertford Loop Line	114m northwest
Designated environmentally sensitive sites	None recorded within a 250m radius of the site	N/A



Out of the features identified in Table 3.2 above, the dry cleaners 226m south, electricity substation 75m east, Fuel distributors 9m north (although this is up inferred hydraulic gradient, from google street view imagery parking appears to be on the parking spaces at the east of the site with poor condition concrete surfacing), electronics equipment 87m southeast, electrical equipment repair 100m southeast and the vehicle repair, testing and servicing 107m southeast are considered to be potential sources of contamination which require further consideration.

All other features identified are considered either too far away from site or are located down the inferred hydraulic gradient of the site. These features have not been considered further.

## 4 PRELIMINARY CONCEPTUAL MODEL

Geo-environmental assessments are required in accordance with current regulatory guidance (CIRIA C552 - Ref. 4 and LC:RM – Ref. 5) to consider the significance of potential contamination in terms of plausible contaminant source-pathway-receptor contaminants linkages. As part of this process, it is necessary to develop a conceptual model of these potential contaminant linkages by identifying the potential contamination sources, sensitive receptors and any potential exposure pathways. A risk assessment is then undertaken to determine the likelihood and significance of these potentially complete contaminant linkages.

### 4.1 Potential Contaminant Sources

Based on the information obtained from the historical and environmental research, the following potential sources of contamination have been identified on and off site (Table 4.1).

It should be noted that it is considered unlikely that all these substances would be present at significant concentrations within the site.

Table 4.1: Potential sources of contamination on and off site.

Source	Potential Contaminants
<b>On Site</b>	
Made Ground is likely to be present on the site from previous development and demolition.	Asbestos, metals, Polycyclic Aromatic Hydrocarbons (PAH), hydrocarbons, ground gas, Hydrocarbons from possible heating oils.
Infilled land is potentially present due to the Pond recorded on the earliest mapping.	Ground Gas, potential for asbestos, metals etc. from unknown fill in ponds.
Car parking area on the eastern corner of site	Hydrocarbons, lubricants and solvents from potential spills/leaks from vehicle maintenance activities and asbestos.
London Clay bedrock underlying the site	Sulphates (aggressive ground conditions)
<b>Off Site</b>	
Made Ground is likely to be present surrounding the site due to previous development and demolition.	Asbestos, metals, Polycyclic Aromatic Hydrocarbons (PAH), hydrocarbons, ground gas
Electricity Substation 75m to the east	Polychlorinated Biphenyls (PCBs) used in transformer oils and hydrocarbons from potential spills/leaks.
Dry Cleaners 226m south	VOC from cleaning chemicals
Fuel Distributors / vehicle repair, testing and servicing 9m north and 107m southeast	Hydrocarbons, lubricants and solvents from potential spills/leaks from vehicle maintenance activities and asbestos.
Electronics equipment and repair 87m and 100m south	PAHs, VOC, Metals.

## 4.2 Potential Receptors

The proposed form of the development is currently unknown. As a precautionary approach the potential receptors detailed below take into consideration the proposed future land use as residential properties with private gardens and landscaped areas. It is considered possible that any potential contamination within the soils may be disturbed during the construction phase, or during gardening or landscaping undertaken by any future site users.

### 4.2.1 Human Health

- Future site users (residents, visitors, maintenance workers and contractors).

Contamination risks to construction workers are not appraised by chronic (long term) exposure human health risk assessments. There are no appropriate published criteria applicable to assessment of potential risks to construction workers. The potential risks should be addressed by a site-specific construction workers risk assessment and implementation of appropriate health and safety measures, to adequately mitigate any potential risks. All works should be conducted in accordance with the CDM regulations 2015 (Ref. 6) or any other relevant guidance. Construction workers are not considered further site users.

### 4.2.2 Controlled Waters

- Secondary A Aquifer within superficial deposits underlying the site.
- Groundwater Source Protection Zone (SPZ) Zone I and Zone II underlying the site.
- Pymme's Brook (77m north)
- New River (97m west)

### 4.2.3 Buildings

- Underground/ structures/services (water pipes, concrete, foundations).
- Proposed buildings

## 4.3 Potential Pathways

Potential pathways are the routes that link the receptor to the contamination. The potential pathways for this site are summarised in the table below.

Table 4.2: Potential Contaminative Pathways

Receptor	Pathway
Human health (future site users/ residents, visitors, maintenance workers and contractors)	<p>Accidental ingestion of contaminants within soil, water and dust.</p> <p>Inhalation of dust, vapours and ground gases.</p> <p>Dermal contact with contaminants within soil, water and dust.</p> <p>Ingestion of contaminated vegetables and soil attached to vegetables, if future Site users were to use the gardens.</p>
Controlled Waters (Secondary A Aquifer and Zone I and Zone II Groundwater SPZ)	<p>Leaching of potential contaminants in soil or Made Ground into groundwater.</p> <p>Vertical migration of contaminants through the unsaturated zone into groundwater beneath the Site.</p>
Buildings	<p>Direct contact of building services or foundations with contaminants in the soil and Made Ground.</p> <p>Gas and / or vapour accumulation in confined and poorly ventilated spaces.</p> <p>Sulphate attack on buried concrete (direct contact).</p>

## 4.4 Preliminary Qualitative Risk Assessment

Primary sources of on-site contamination are considered to be associated with Made Ground recorded in the on site boreholes, likely generated from the historical development of residential buildings which (given their age) could contain Asbestos Containing Materials or oils from heating, this material has likely been added to with material from the change in layout to Bowes Road circa 2010.

Fuel leaks/ spills may have occurred on the eastern edge of the site where car parking spaces are situated next to a garage. The available imagery shows the hard surfacing of the parking spaces to be in particularly poor repair with cracking and degradation, and as the building adjacent to the parking appears to be a garage there is potential for cars parked there to have been in a poor state of repair.

The gravels indicated to underly the site potentially allow off site contamination to migrate under the site. The electricity substation to the east is likely not up hydraulic gradient of the site, and PCBs are generally not extensively mobile unless extremely suitable ground conditions occur, for this reason it is unlikely that they will have impacted the site. The fuel distributors 9m north of the site and vehicle repair / testing services 107 to the southeast of the site have the potential to have migrated impacts on site. The fuel distributors which appear from the available imagery to also be a vehicle repair garage are adjacent to site, so although they are up inferred hydraulic gradient, their proximity and the presence of the parking on site make this an area worthy of further investigation.

The Dry Cleaners 226m south of the site presents the potential for a PCE or other cleaning material related contamination plume, and would warrant examination of chemical data from a future ground investigation.

The electrical equipment and servicing land use 87m and 100m south of the site are also close enough to have impacts on the site, but until a ground investigation is carried out these impacts would be unknown (if there at all).

Without mitigation, future site users may be at risk from contaminants that may be present within the Made Ground due to previous development of the site. Exposure could occur in gardens or soft landscaped areas, especially if soils are disturbed by activities such as digging / gardening.

If significant depths of Made Ground are present, and this contains putrescible matter, ground gas / vapours could be generated which could accumulate in confined spaces and pose risk to future site users.

Sensitive controlled water receptors have been identified.

The underlying London Clay is a source of naturally occurring sulphates which could impact buried concrete.

The risks will need to be further understood through intrusive investigation into the ground conditions and potential contaminants. If the Site is found to be contaminated, mitigation measures will be required to break the source-pathway-receptor linkages.

## **5 Waste Management and Potential Development Constraints**

### **5.1 Waste Management**

Consideration should be given to the disposal of waste soils/Made Ground which are likely to be generated by the development. Chemical testing of soils/Made Ground is likely to be required to inform a waste classification assessment and determine the potential disposal options. It should be noted that the waste contractor may require testing of the actual material to be disposal prior to acceptance, and there is no obligation on a landfill operator to accept the waste.

Soils suspected of being contaminated should be segregated from soils which appear to be 'clean' and should not be used elsewhere on the site as fill or landscaping unless they can be proven to be fit for purpose.

Imported topsoil for gardens and landscaped areas should be clean, fit for purpose and validated as necessary.

### **5.2 Potential Development Constraints**

Below ground services (water mains) present beneath the site. Mature trees are present on sites which may need to be removed.

A ground investigation is recommended to determine the potential contamination present on the Site and confirm the ground conditions. From experience, the potential for the need to undertake remediation should be relatively limited given the previous use of the site and the anticipated geology (relatively impermeable) which would limit impacts from off-site sources.

The following potential environmental conditions have been identified that will warrant further consideration and/or implementation:

- Removal of hand standing covering on the eastern corner of site and the potential presence of buried structures from previous buildings on the site.
- Excavation and replacement of upper part of Made Ground may be necessary to support foundation solution;
- Asbestos protection measures during disturbance of Made Ground (depending on the findings of the ground investigation);
- Groundwater control measures and treatment of extracted groundwater (depending on the findings of the ground investigation);
- Provision of gas protection measures (depending on the findings of the ground investigation);
- Provision of contaminant resistant water supply pipes (depending on the findings of the ground investigation);
- Provision of clean cover system in garden areas and public open space;
- Potentially further investigation and consultancy advice to support planning obligations;
- There are mature trees on the site which may require removal.

## 6 Geotechnical Considerations

Made Ground is anticipated to be present at the site due to the historical residential development on site. Based on the published geology and the historical borehole log (on site) (Ref. 1), the site is anticipated to be Topsoil, followed by Made Ground and Sand and Gravel underlain by the London Clay. The anticipated geology of the site should be confirmed through an intrusive investigation. As buildings have previously occupied the site, there is the possibility of buried structures such as foundations or basements to be present.

Potential founding solutions will be dependent on the encountered thickness of Made Ground and the geotechnical properties of the natural deposits. Made Ground is generally considered unsuitable for foundations due to its variable composition and its potential for high total and differential settlement. Services may be present beneath the site which may require removal/ relocating prior to redevelopment.

At this stage, conventional shallow foundations may not be appropriate for the site, but this would depend on the thickness of the Made Ground and the underlying ground conditions. Deeper trench fill may be possible although the maximum practical extent of this type of foundation is in the region of 2-2.5m. In areas of deeper Made Ground, or where deeper soft / loose bands are recorded either piling or ground treatment e.g. vibro-stone columns should provide a suitable foundation solution. The advice of a specialist ground improvement contractor should be sought to verify the suitability of the ground for treatment.

Consideration will need to be given to the presence of existing trees on site, which may need to be removed or retained, and the planting of future trees when deciding upon the depths of the foundations. In addition, the risks associated with the London Clay include high plasticity clay which are subject to shrinkage, swelling and sulphate attack should be considered during the investigation / design.

## 7 Conclusion and Recommendations

The Site is currently grassed land surrounded by fencing and includes a car park area on the eastern edge of site. An intrusive site investigation has not been undertaken at this stage. The site was previously residential housing with gardens, now demolished, therefore there is the potential for Made Ground to be present.

Potential sources of contamination have been identified, as shown in Table 4.1 and potential pollutant linkages exist. Therefore, an appropriate ground investigation is recommended to determine the degree of risk to end users and controlled waters. This should include for chemical testing of soils, groundwater monitoring (if present) and gas monitoring in accordance with the recommendations in CIRIA C665 (Ref. 7) and LC:RM (Ref. 5) and consideration of shrinkage and swelling, compressible ground and sulphate attack to below ground concrete.

Potential receptors are considered to be site users, proposed buildings and underground structures / services.

Potential geo-environmental constraints have been identified that may impact on the future development. Whilst contamination may be present within the underlying soils, mitigation of risks to Site end users may be delivered by the appropriate design of the development itself (i.e. the use of hardstanding to limit the pathway for human exposure) rather than large scale removal of materials – though this may not be possible due to the mounding of soils particularly on the western half of the site.

### 7.1 Design Considerations

Potential risks to human health, controlled waters and the built environment have been identified. It is recommended that an intrusive site investigation should be undertaken prior to redevelopment to quantify these risks. This should include for chemical testing of soils, groundwater monitoring (if present) and gas monitoring in accordance with the recommendations in CIRIA C665 (Ref. 7) and LC:RM (Ref. 5) and consideration of shrinkage, swelling of London Clay and sulphate attack to below ground concrete.

### 7.2 Construction Considerations

During construction, a watching brief should be undertaken to identify the presence of any unforeseen contamination. If contamination is encountered, all works should cease until the advice of a suitably qualified professional can be sought.

Construction / demolition workers should use appropriate PPE and follow the site-specific contractors risk assessment which should include risks to human health from potential contamination.

Good site management practices should be adopted during the construction phase such as covering stockpiles to minimise surface runoff/dust creation.

Underground services may be present beneath the site associated with the adjacent residential buildings. These will need to be taken into consideration during the proposed development.

## 8 References

1. British Geological Survey (BGS) [online]. Available at: <https://mapapps.bgs.ac.uk/geologyofbritain/home>. Accessed January 2020.
2. Google maps [online]. Available at <https://www.google.co.uk/maps>. Accessed January 2020.
3. Bomb Sight National Archives [on-line]. Available at: <http://bombsight.org>. Accessed January 2020.
4. CIRIA C552 (2001) Contaminated land risk assessment. A guide to good practice.
5. Land Contamination: Risk Management, Environment Agency, June 2019 (LC:RM)
6. The Construction (Design and Management) Regulations 2015.
7. CIRIA C665 (2007) Assessing risks posed by hazardous ground gases to buildings (revised).



## **APPENDIX A**

### **Historical Ordnance Survey Maps**

#### Site Details:

80, PALMERSTON CRESCENT,  
SOUTHGATE, N13 4NH

**Client Ref:** 14034794  
**Report Ref:** GS-6550155  
**Grid Ref:** 530829, 192131

**Map Name:** County Series

**Map date:** 1867

**Scale:** 1:2,500

**Printed at:** 1:2,500



Surveyed 1867  
Revised 1867  
Edition N/A  
Copyright N/A  
Levelled N/A

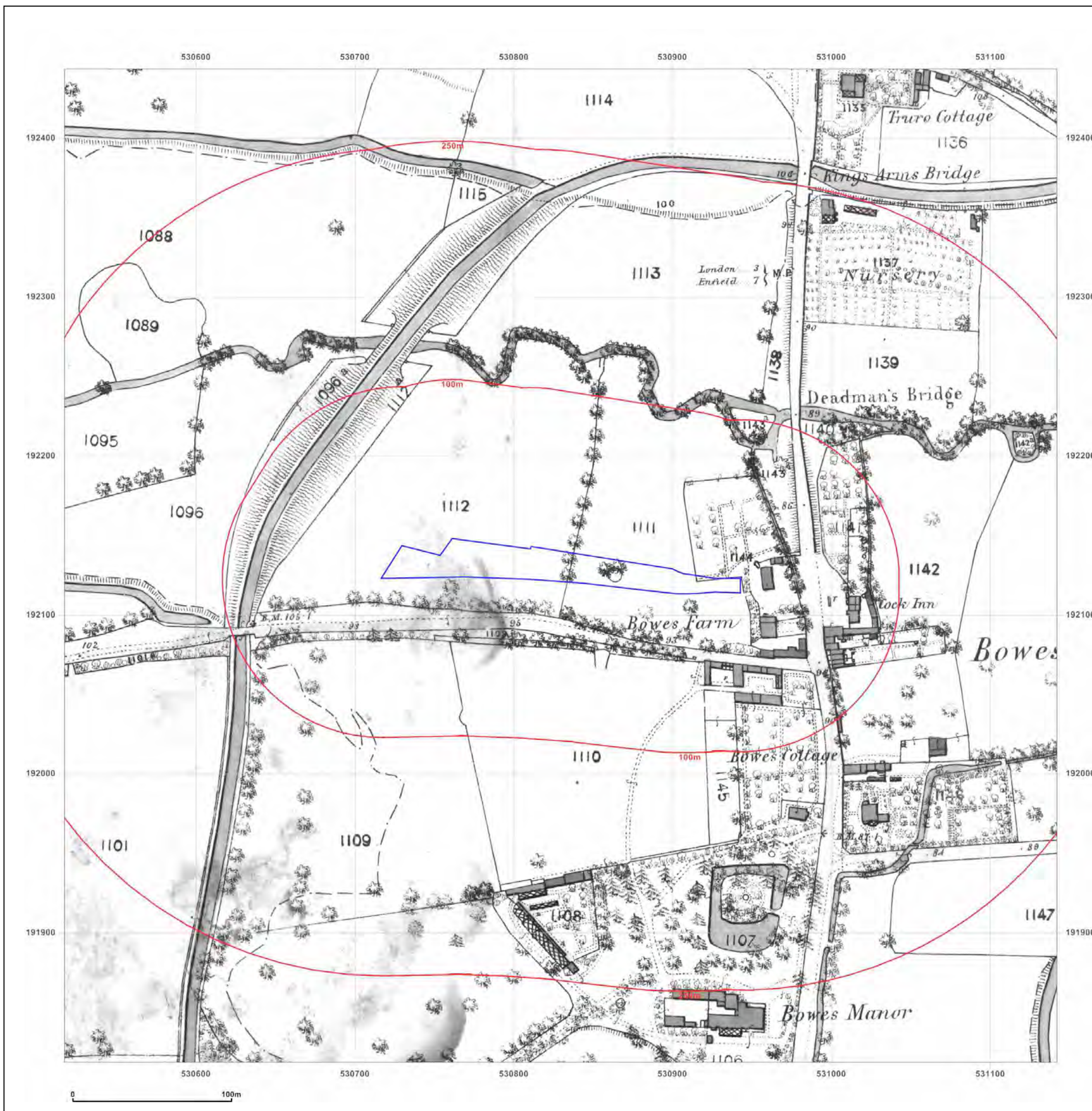


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Surveyed 1896  
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Edition N/A  
Copyright N/A  
Levelled N/A

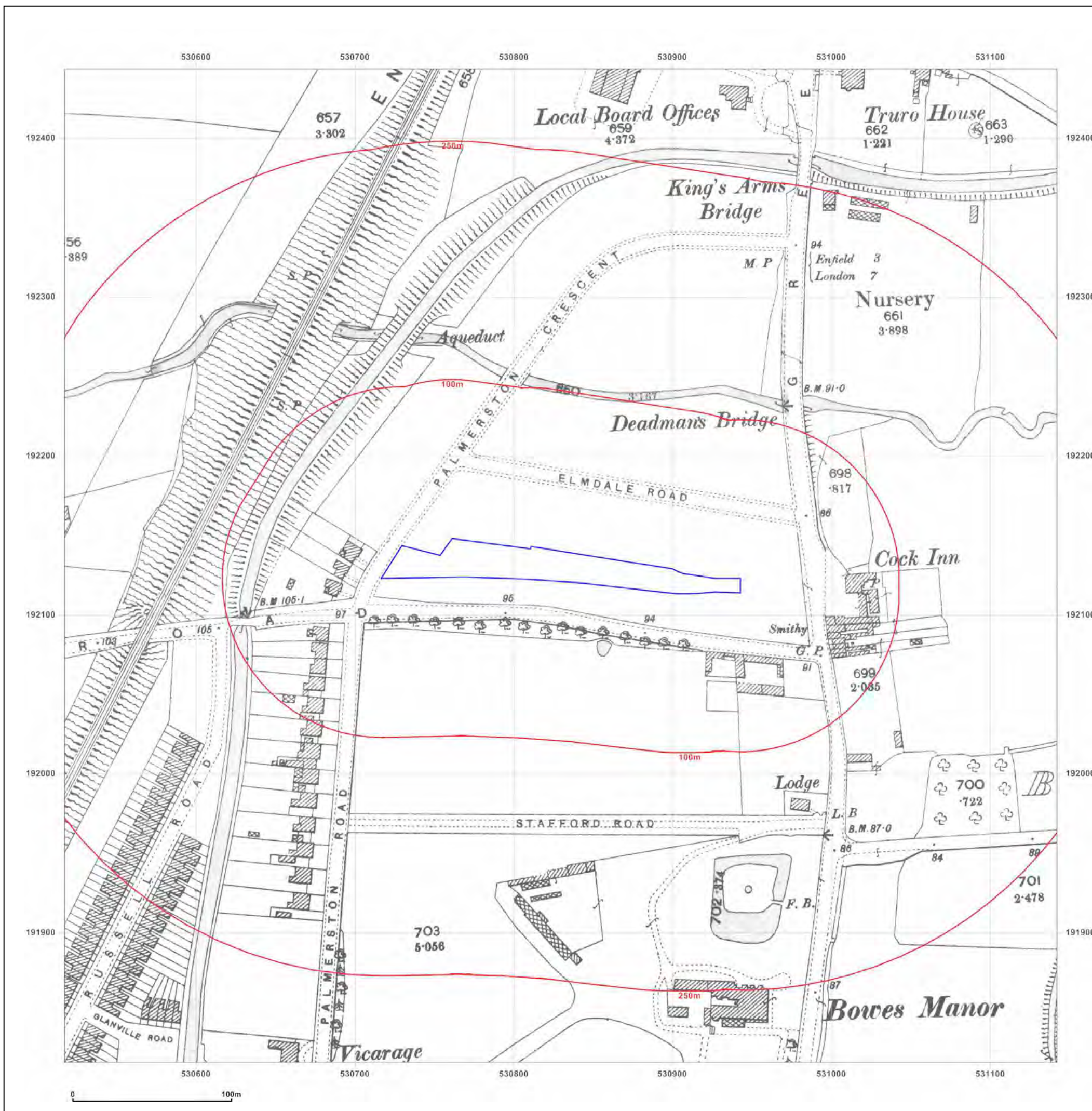


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SOUTHGATE, N13 4NH

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**Map Name:** County Series

**Map date:** 1914

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**Printed at:** 1:2,500



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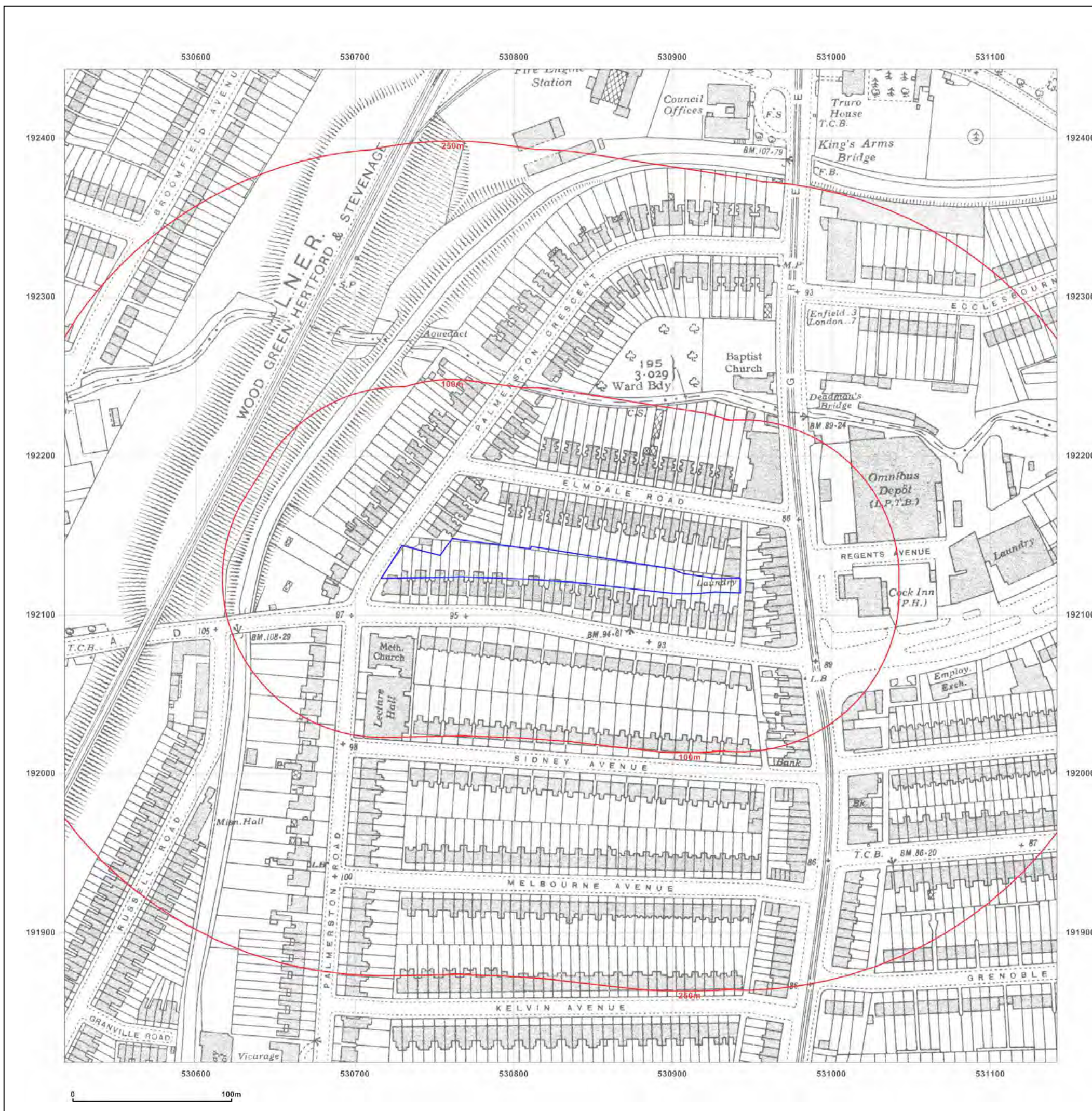


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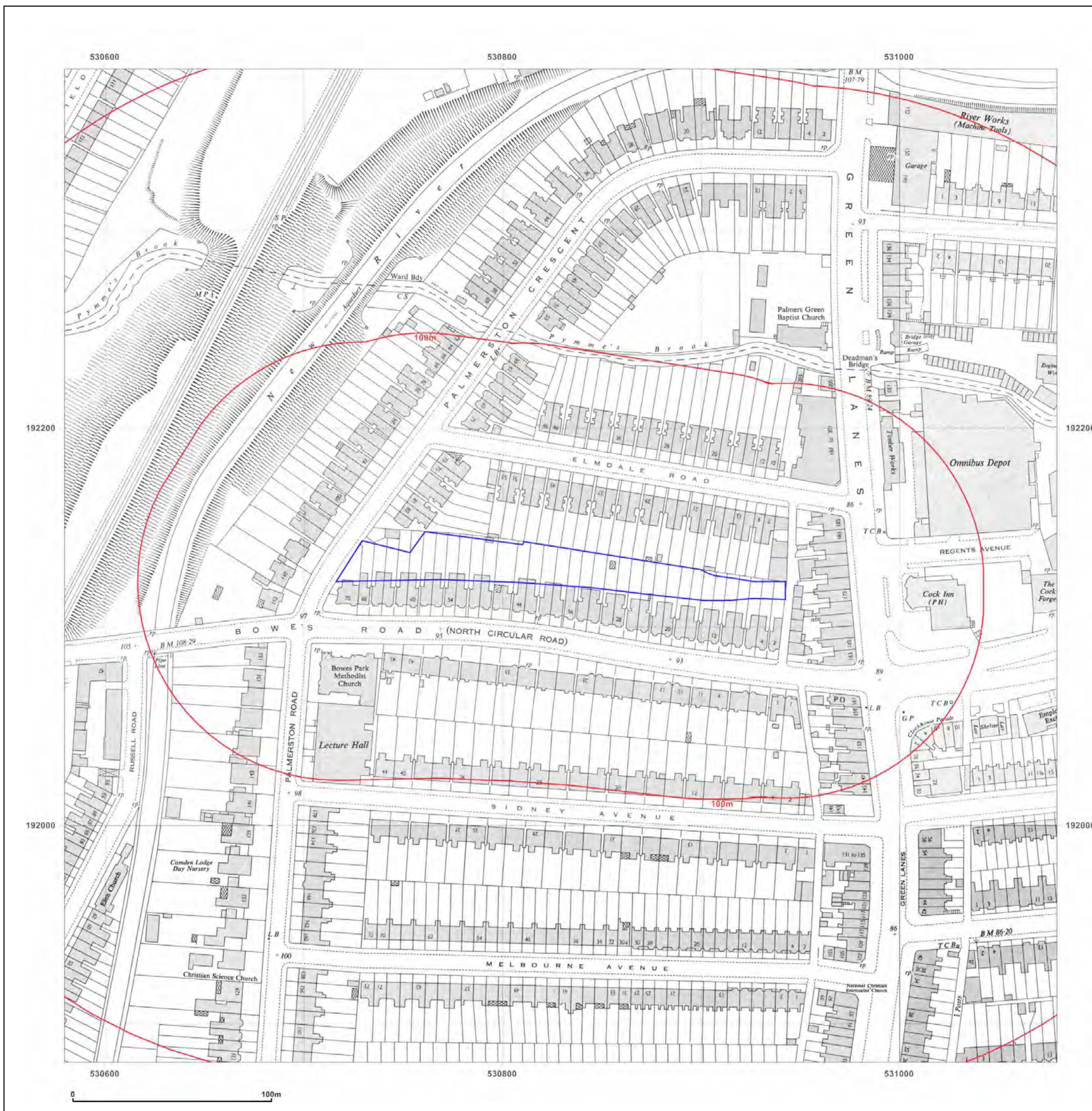


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Map Name: National Grid

Map date: 1957

Scale: 1:1,250

Printed at: 1:2,000



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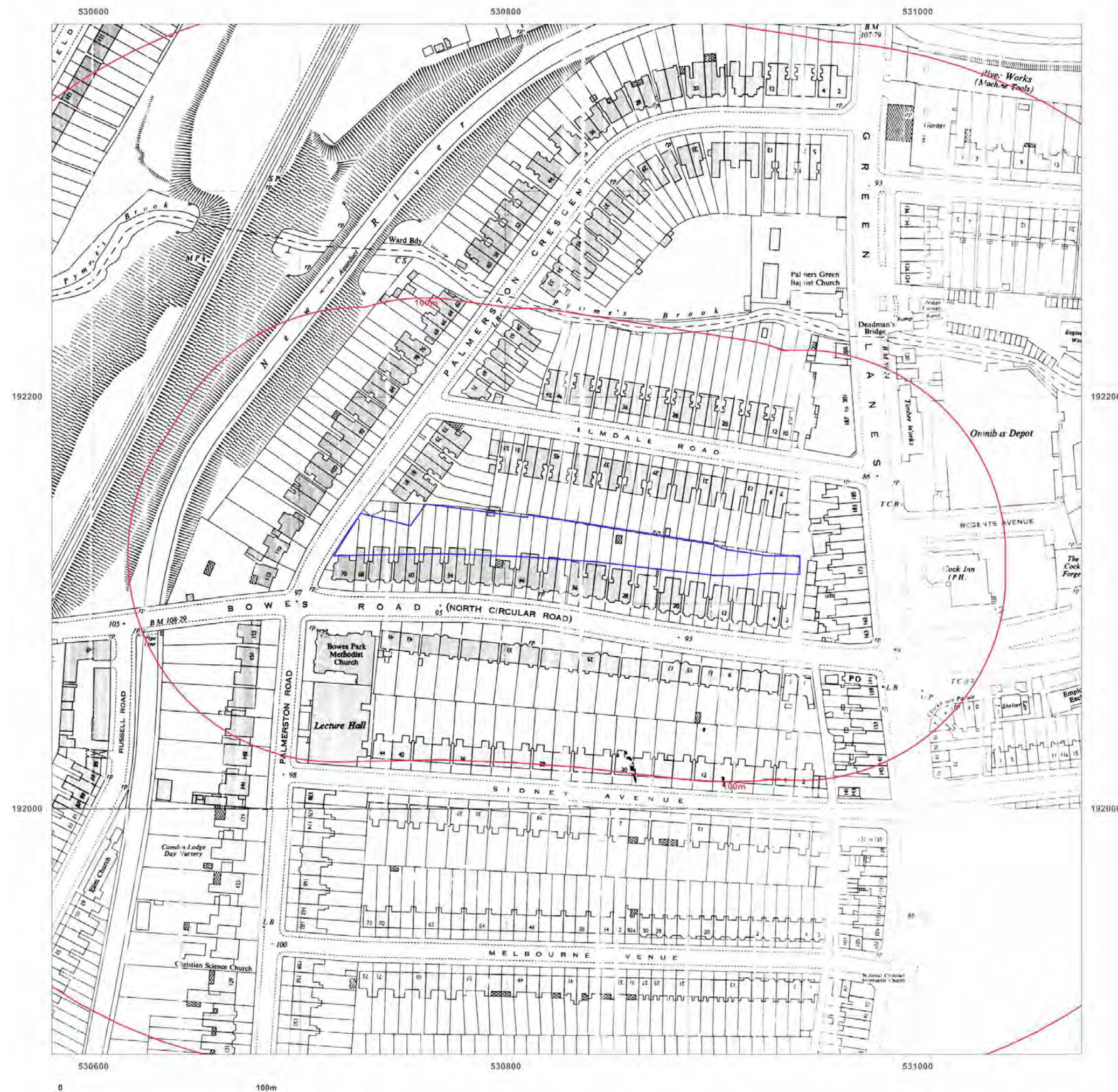


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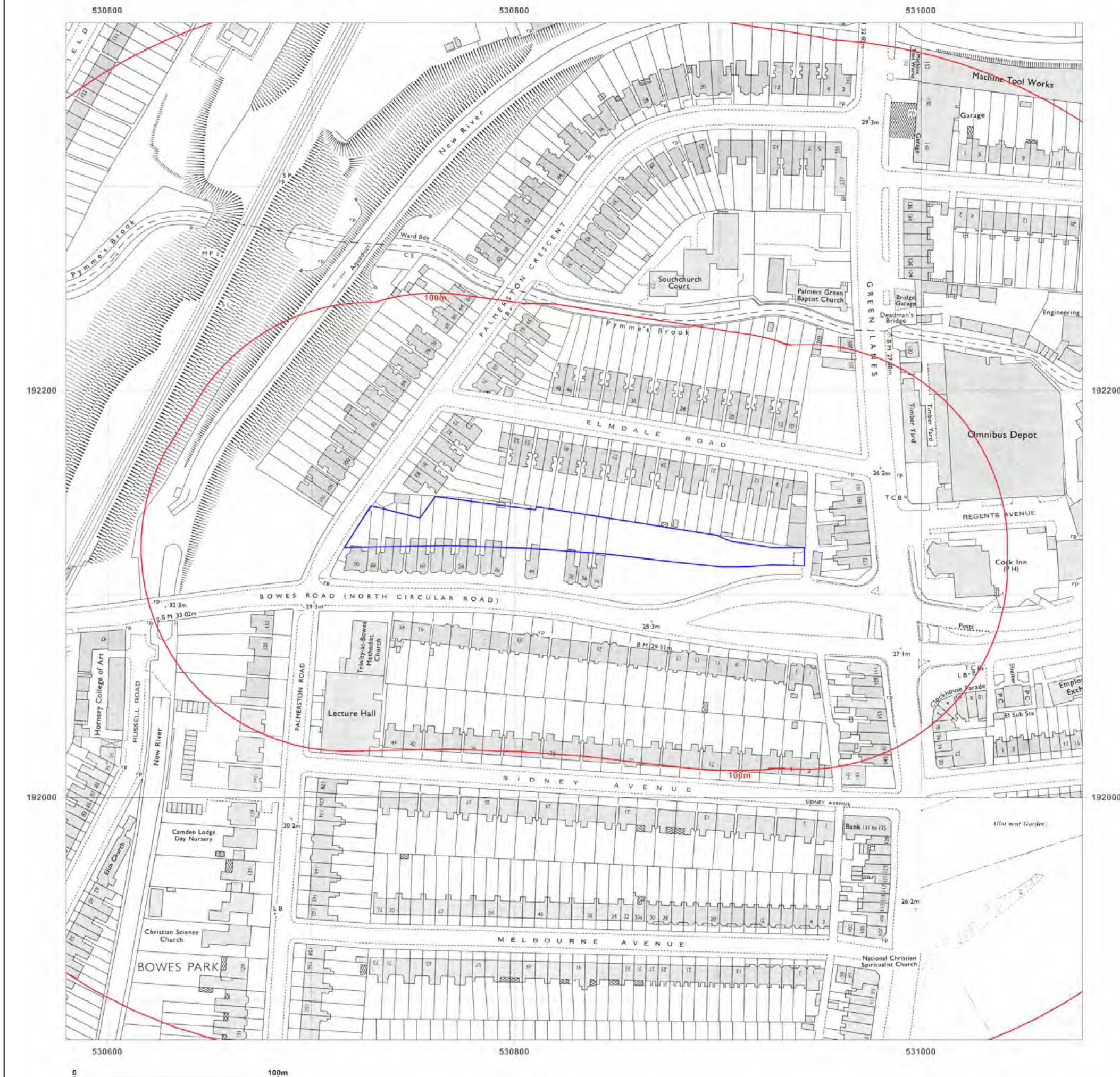


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Printed at: 1:2,000



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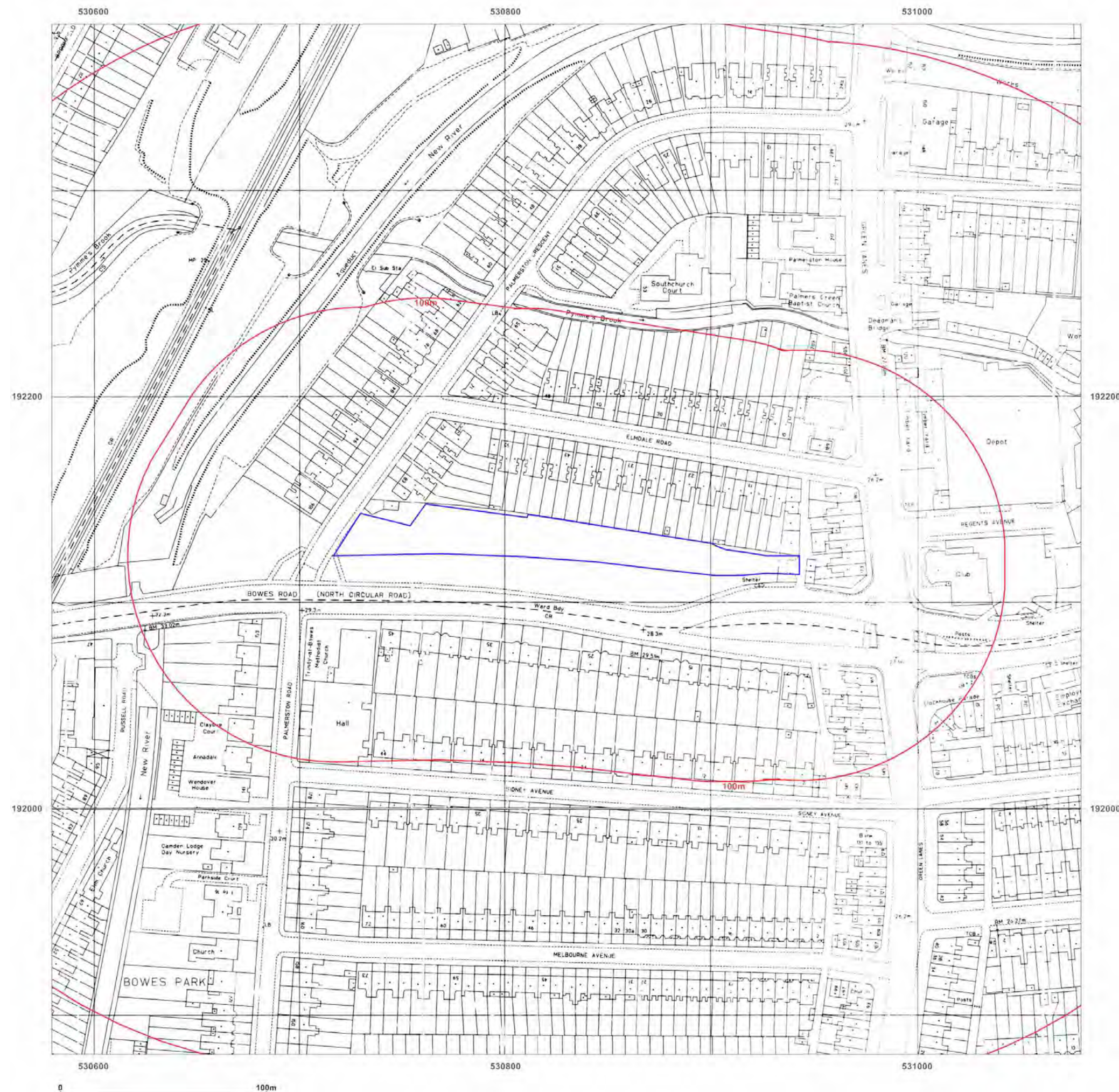


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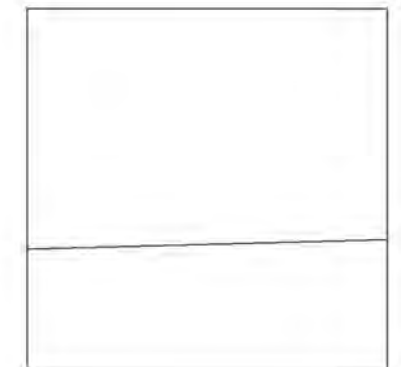
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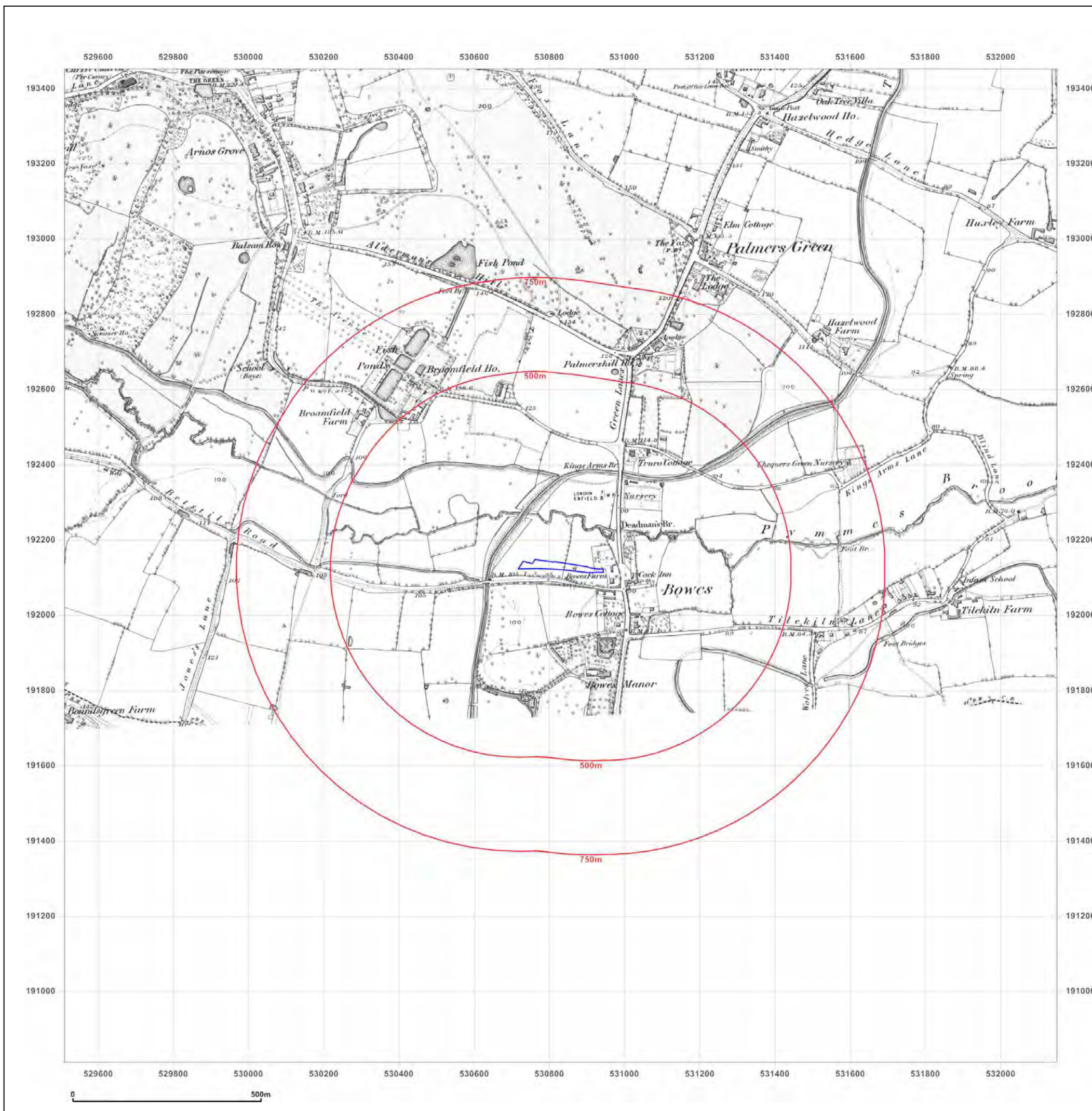


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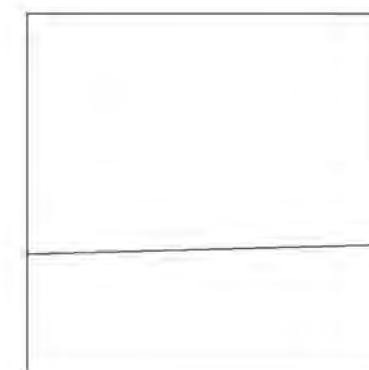
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Copyright N/A  
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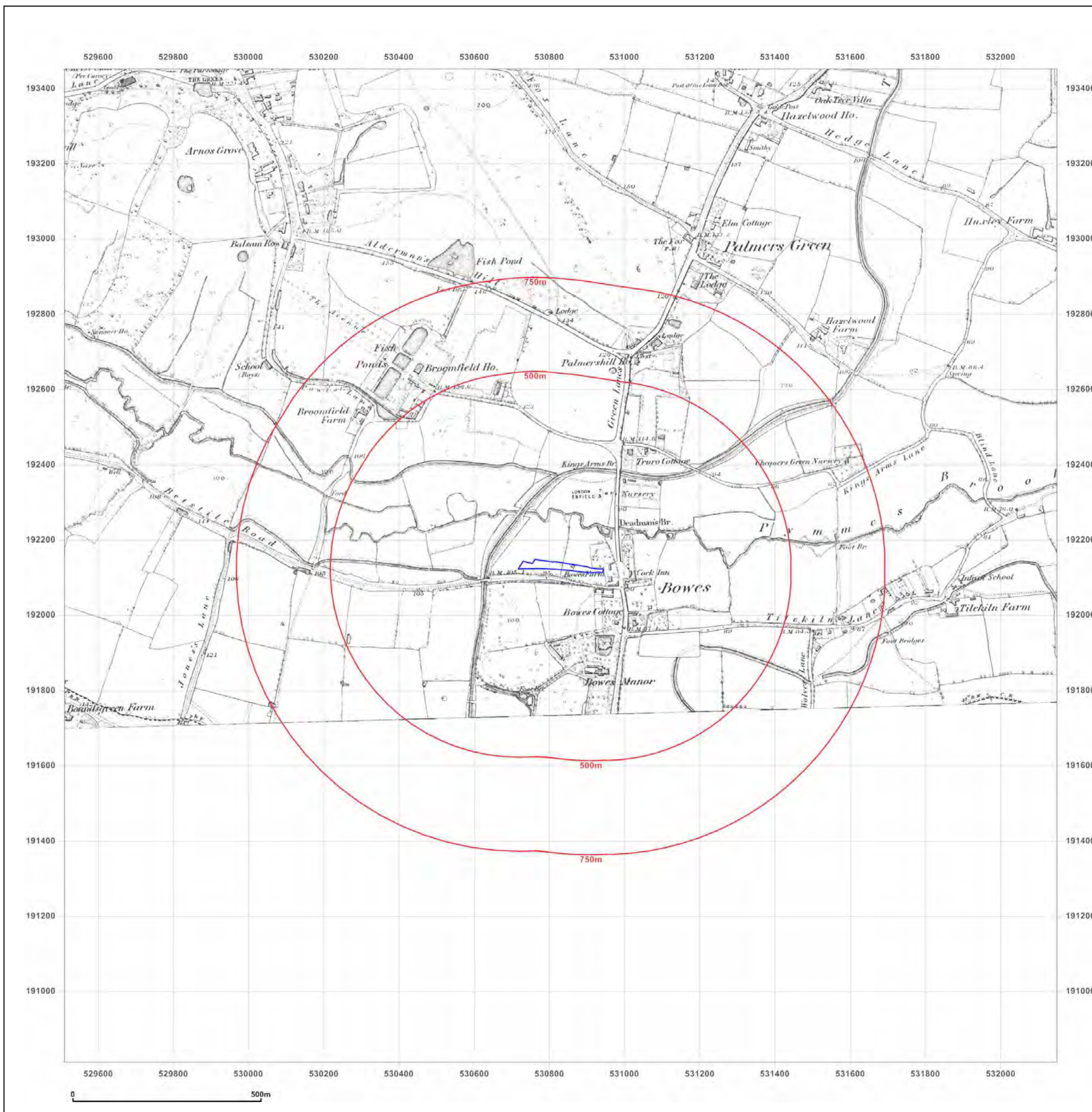


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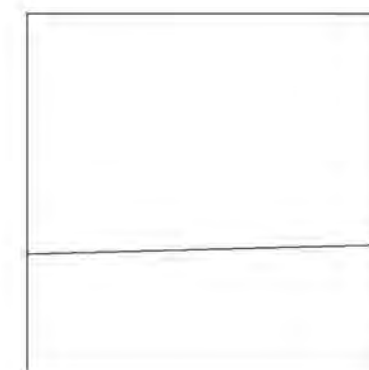
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Revised 1869  
Edition 1873  
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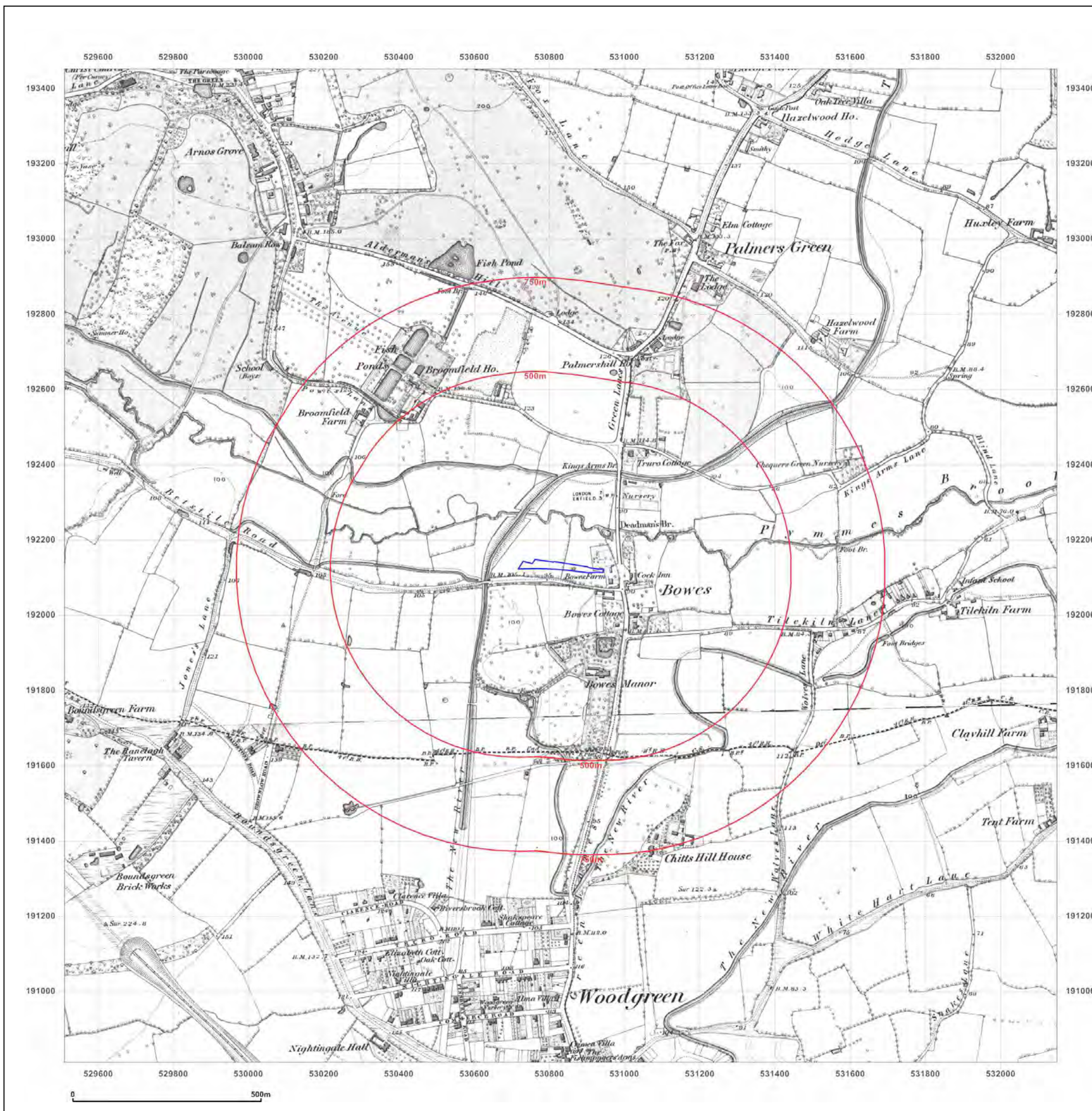


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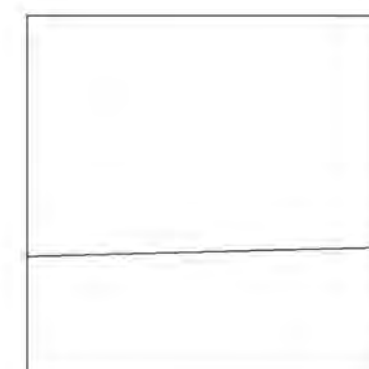
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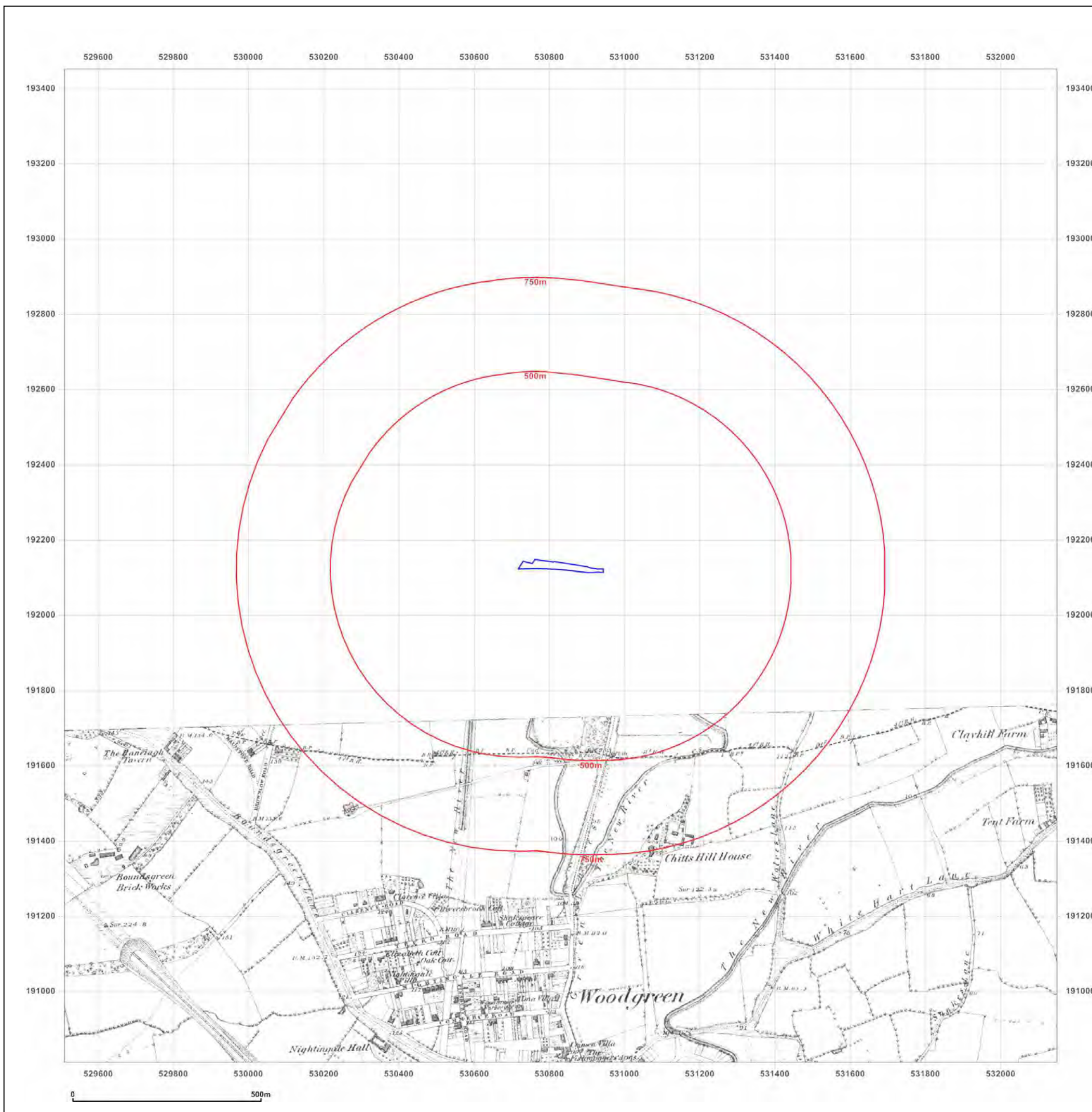


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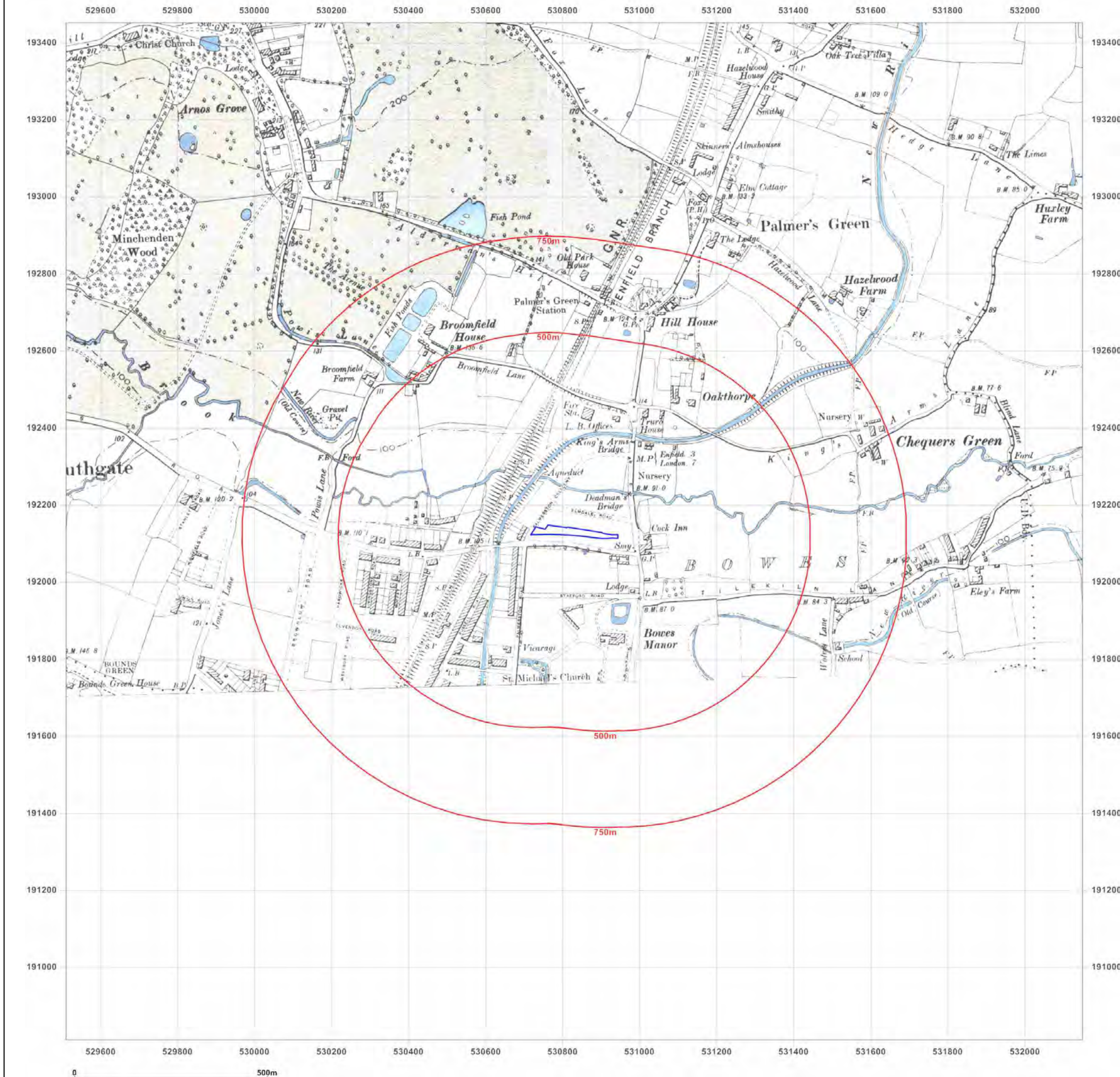


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Report Ref: GS-6550155  
Grid Ref: 530829, 192131

Map Name: County Series

Map date: 1896-1897

Scale: 1:10,560

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Surveyed 1894  
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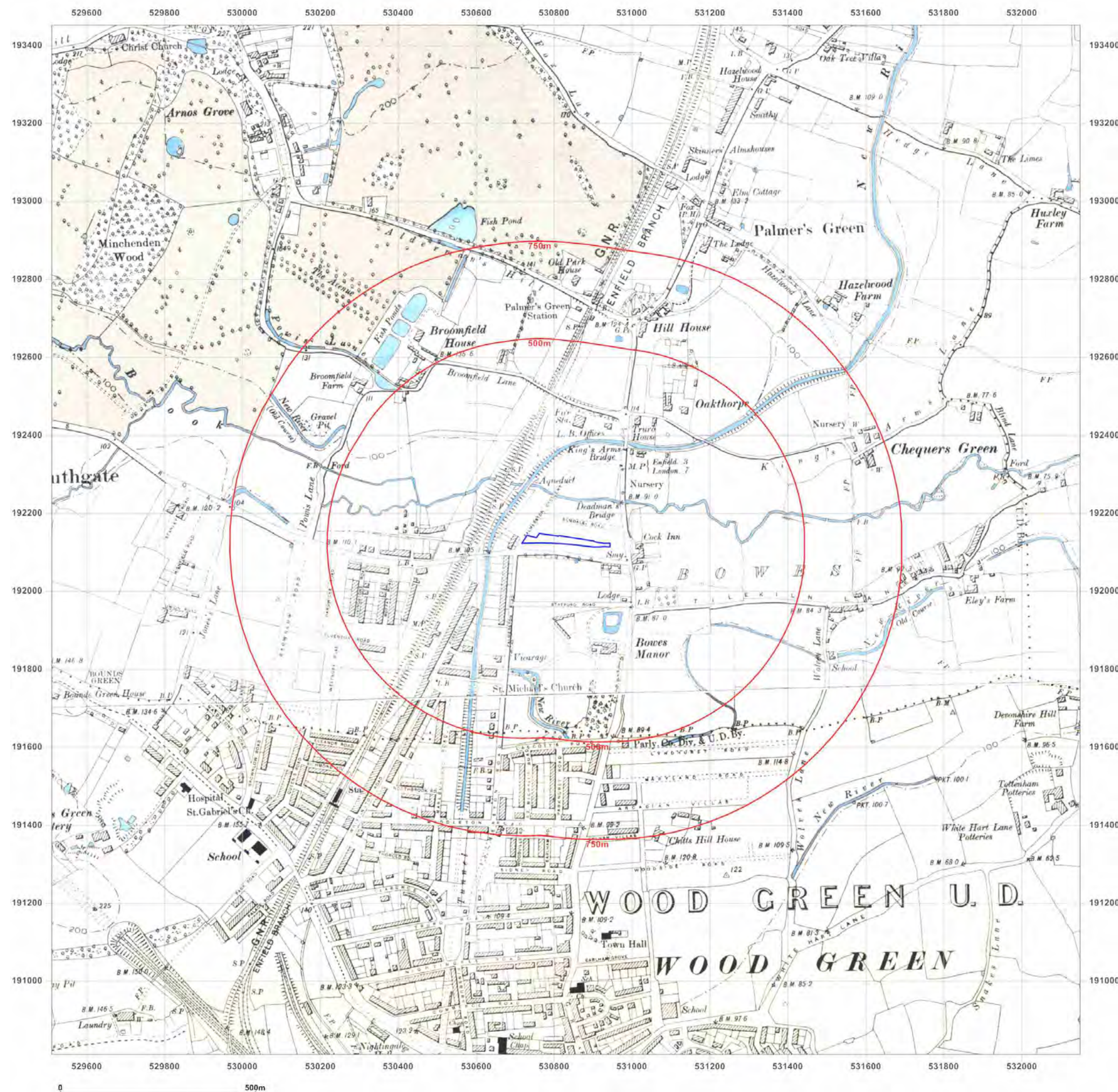


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**Printed at:** 1:10,560



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Revised 1919  
Edition 1920  
Copyright N/A  
Levelled 1913

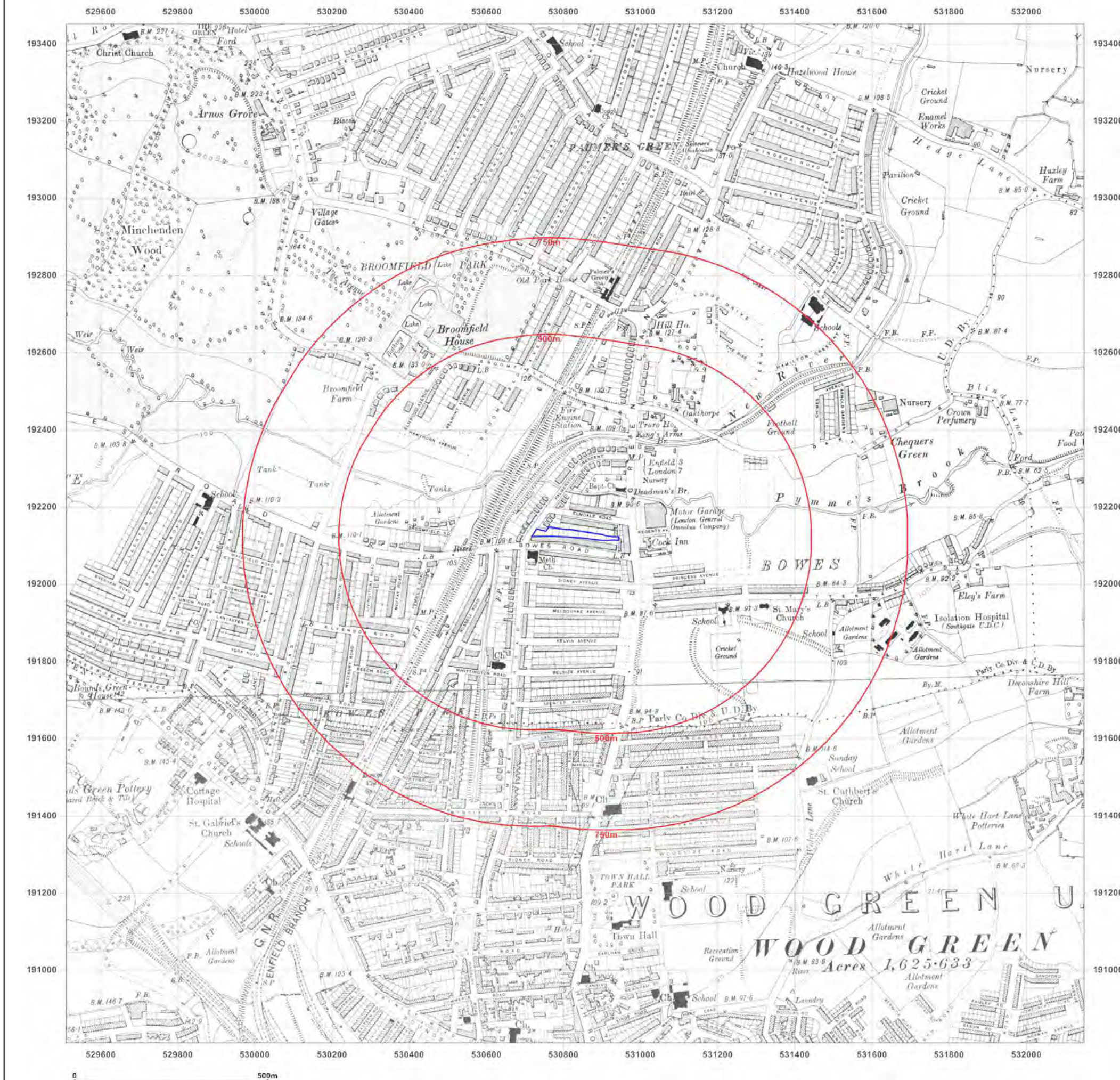


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**Grid Ref:** 530829, 192131

**Map Name:** County Series

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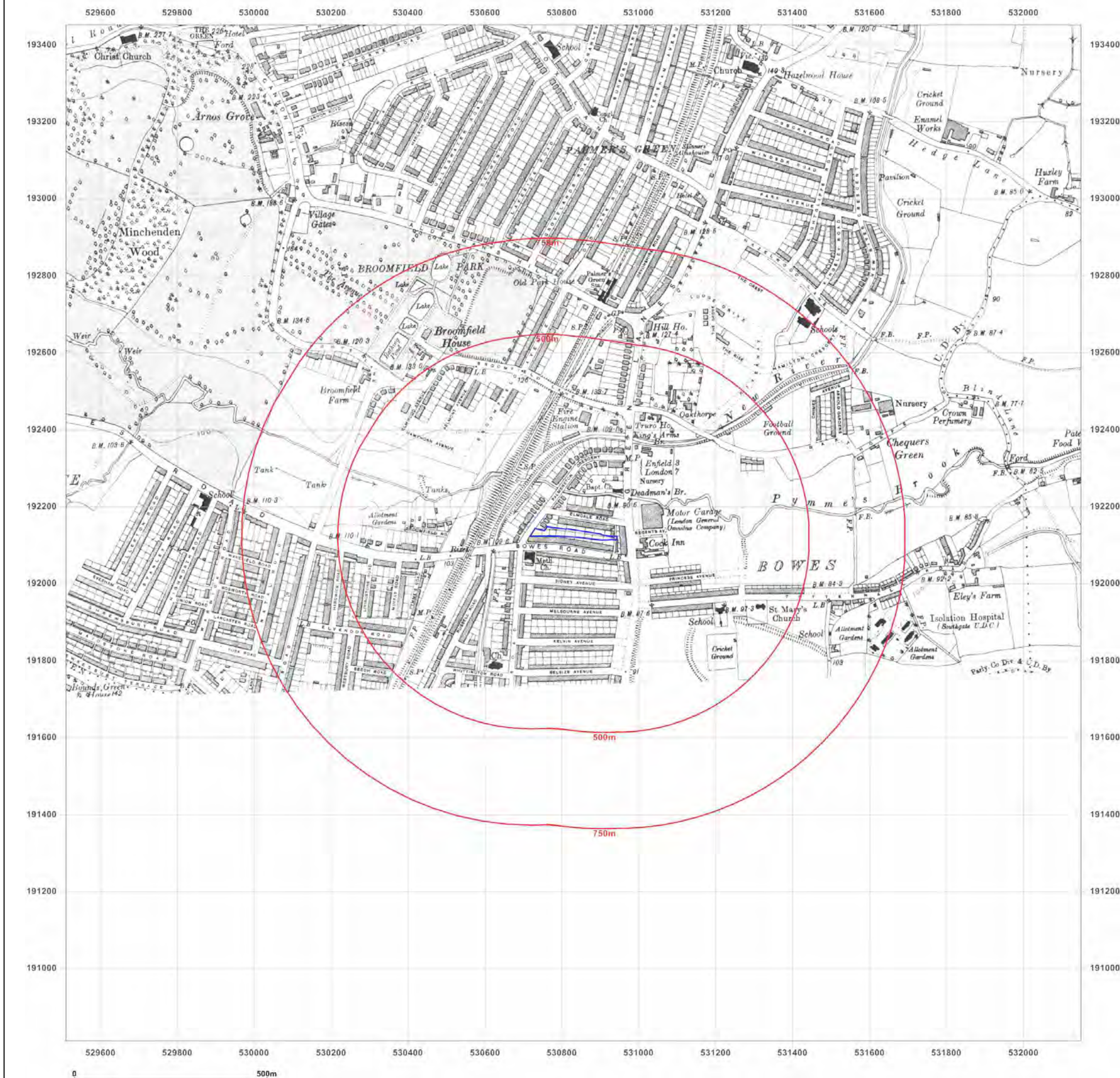


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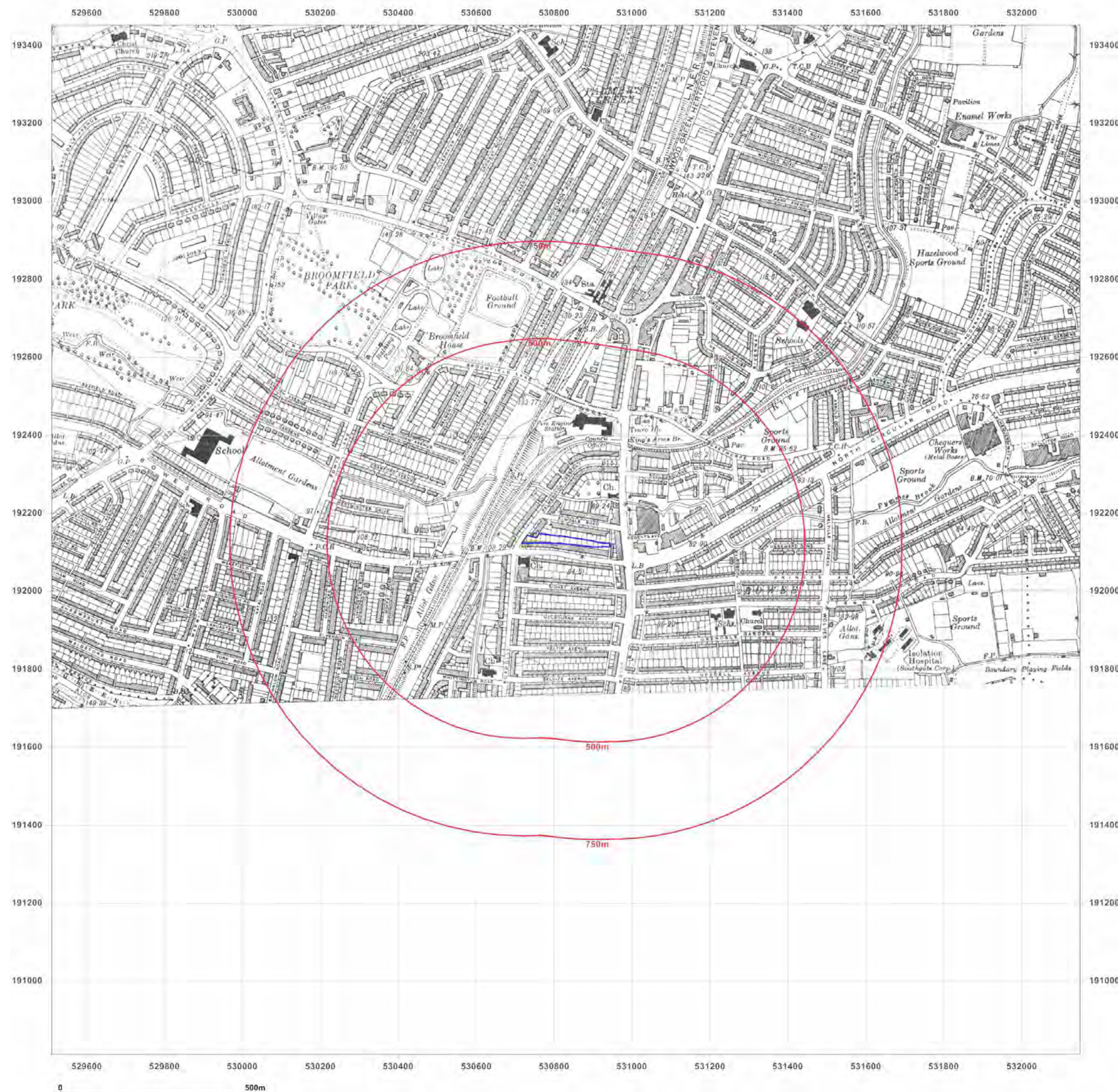


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**Report Ref:** GS-6550155  
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**Map Name:** Provisional

**Map date:** 1951-1952

**Scale:** 1:10,560

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Edition 1952  
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Edition 1952  
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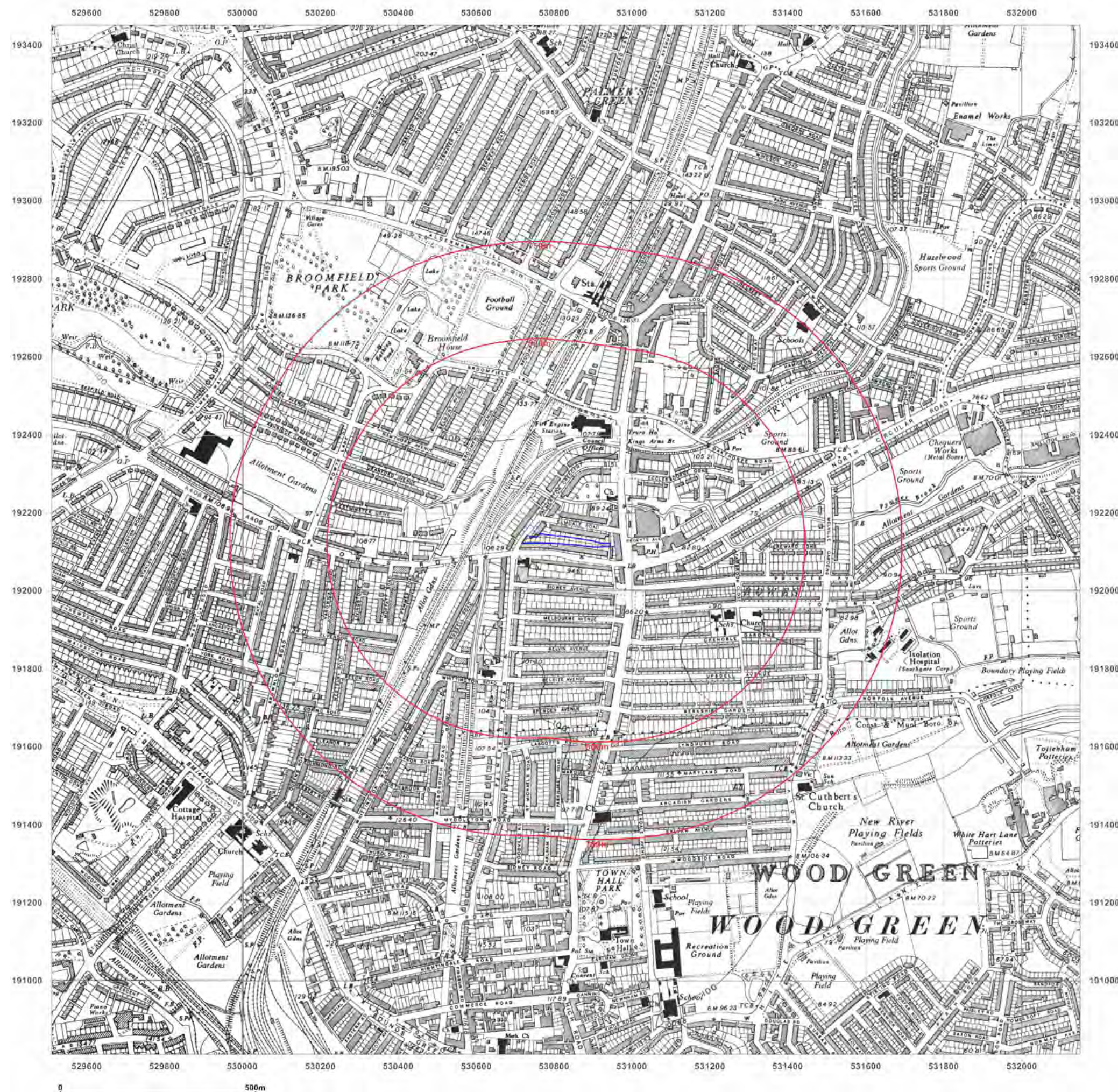


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**Map Name:** Provisional

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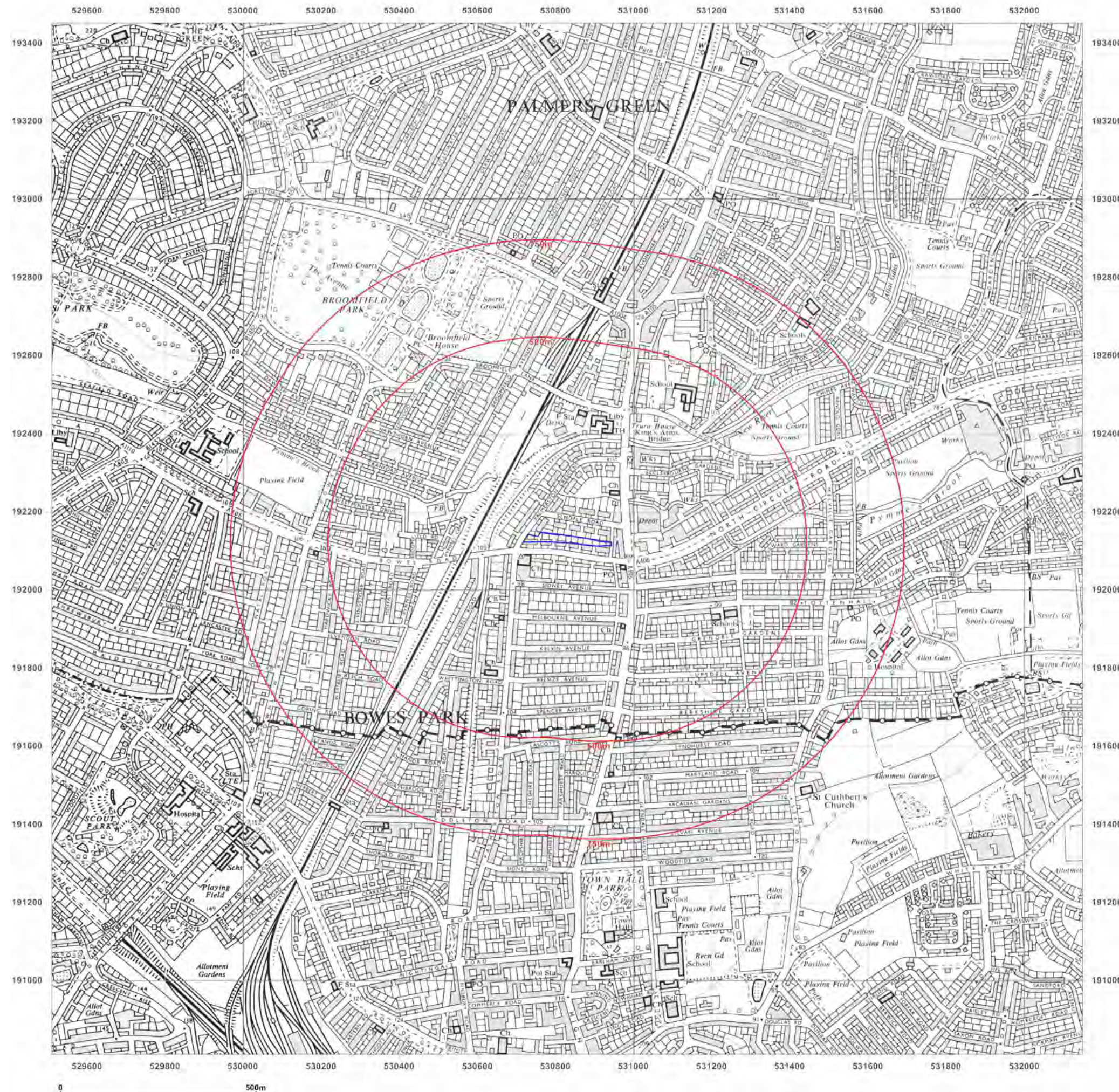


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**Report Ref:** GS-6550155  
**Grid Ref:** 530829, 192131

**Map Name:** National Grid

**Map date:** 1973-1975

**Scale:** 1:10,000

**Printed at:** 1:10,000



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Edition N/A  
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Levelled 1972

Surveyed 1973  
Revised 1974  
Edition N/A  
Copyright 1975  
Levelled 1972

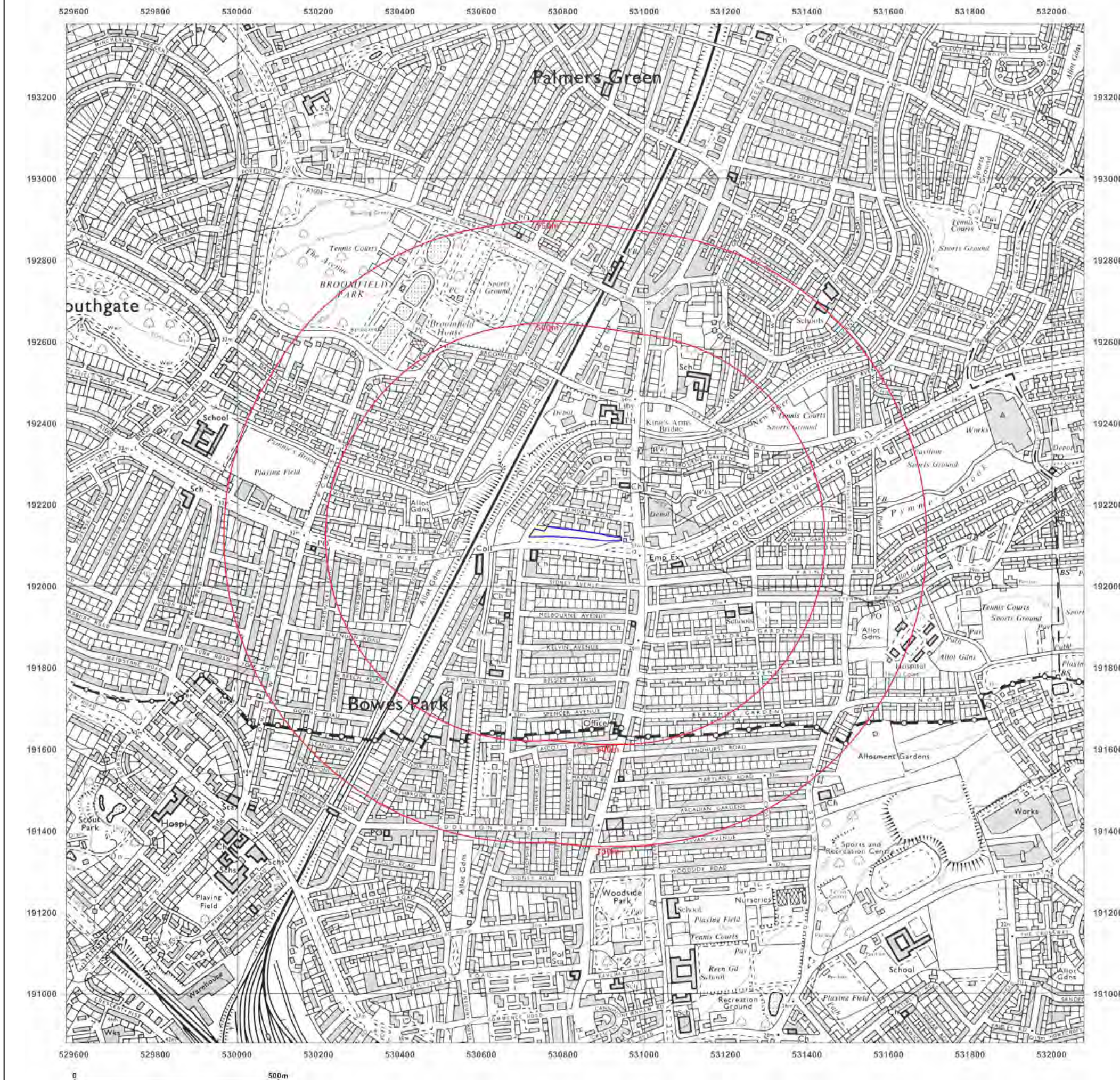


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**Grid Ref:** 530829, 192131

**Map Name:** National Grid

**Map date:** 1980-1982

**Scale:** 1:10,000

**Printed at:** 1:10,000



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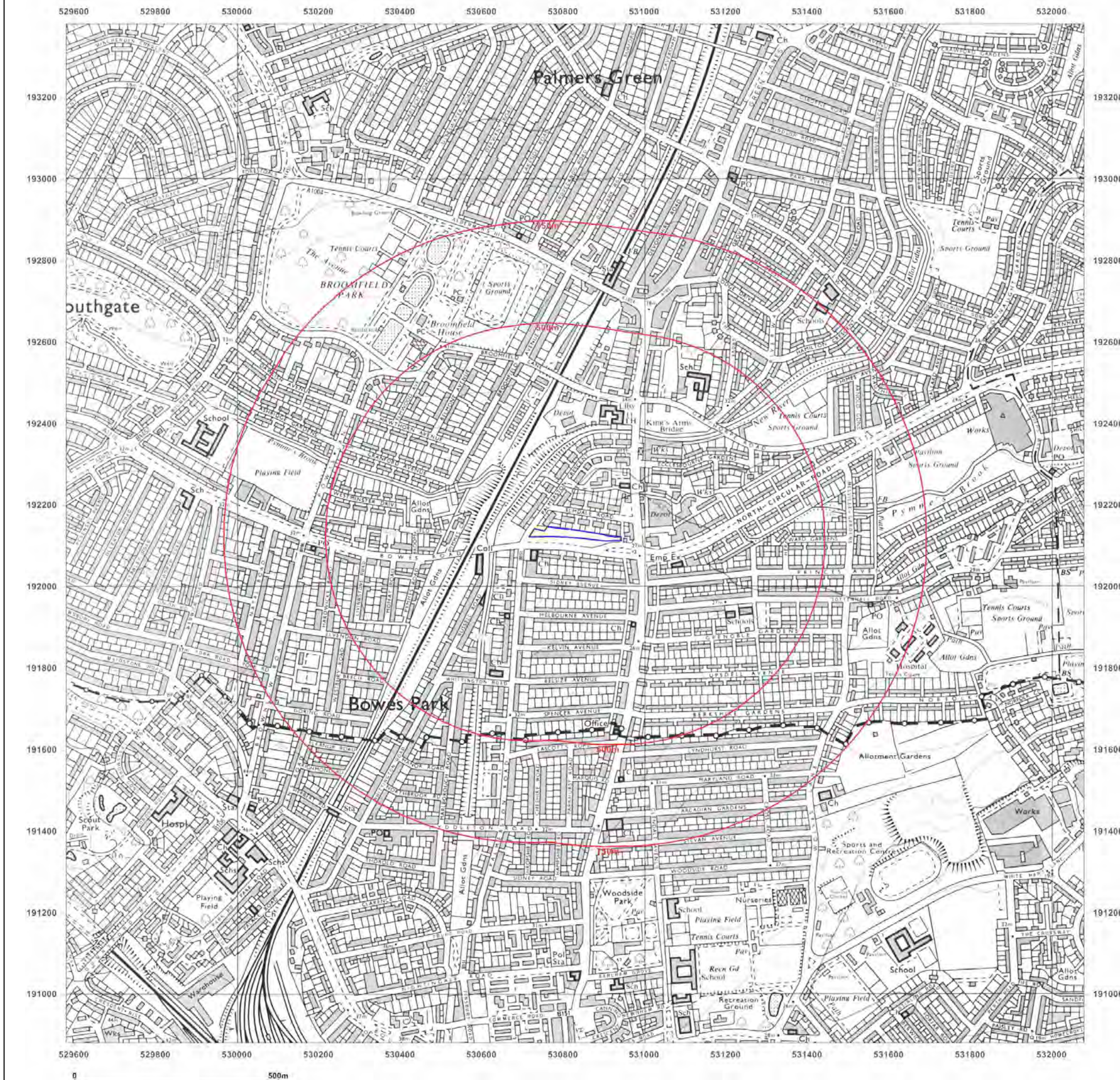


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**Grid Ref:** 530829, 192131

**Map Name:** National Grid

**Map date:** 1987-1991

**Scale:** 1:10,000

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Revised 1991  
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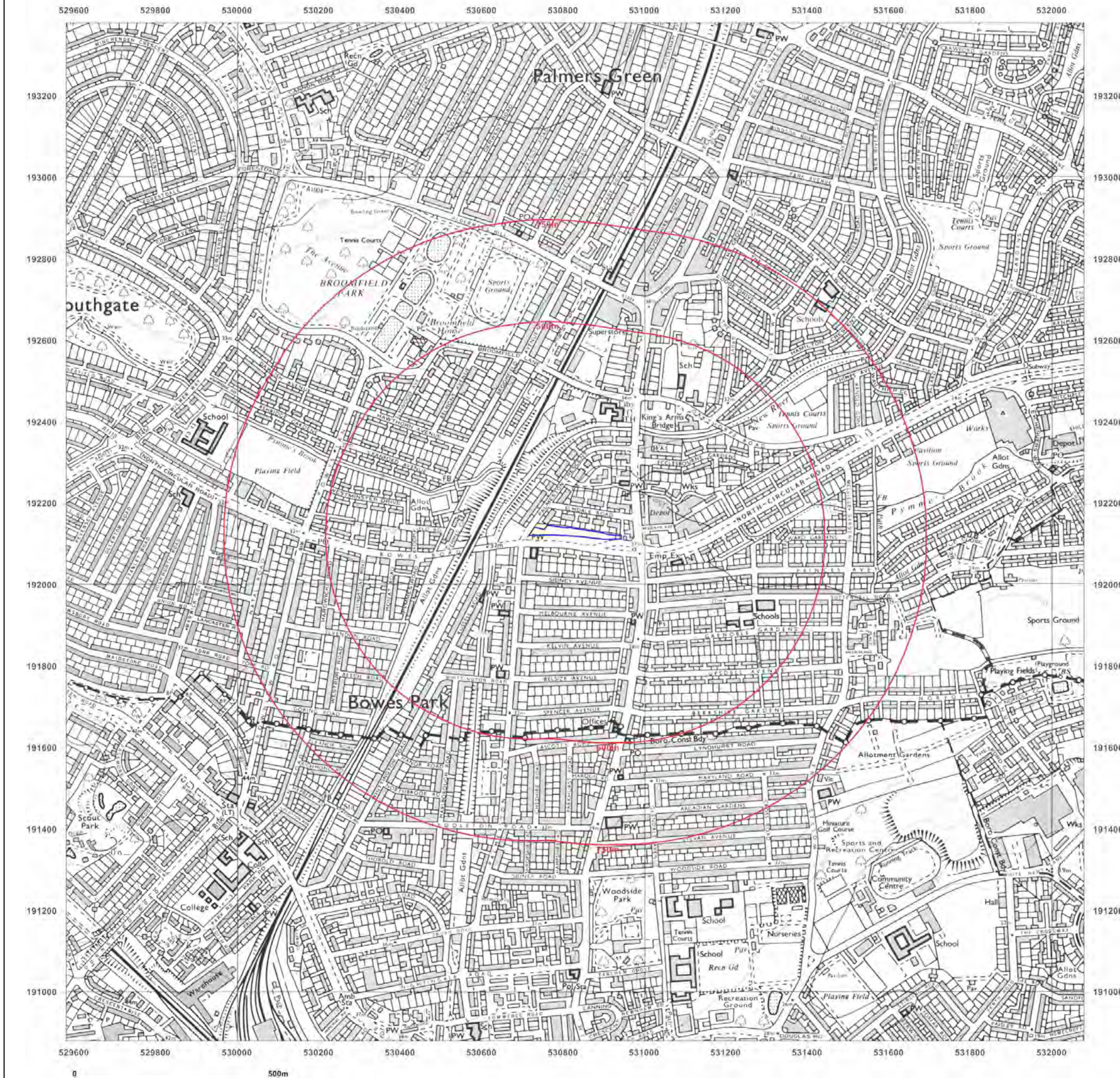


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**Client Ref:** 14034794  
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**Grid Ref:** 530829, 192131

**Map Name:** National Grid

**Map date:** 2001

**Scale:** 1:10,000

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**Client Ref:** 14034794  
**Report Ref:** GS-6550155  
**Grid Ref:** 530829, 192131

**Map Name:** National Grid

**Map date:** 2010

**Scale:** 1:10,000

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**Client Ref:** 14034794  
**Report Ref:** GS-6550155  
**Grid Ref:** 530829, 192131

**Map Name:** National Grid

**Map date:** 2020

**Scale:** 1:10,000

**Printed at:** 1:10,000

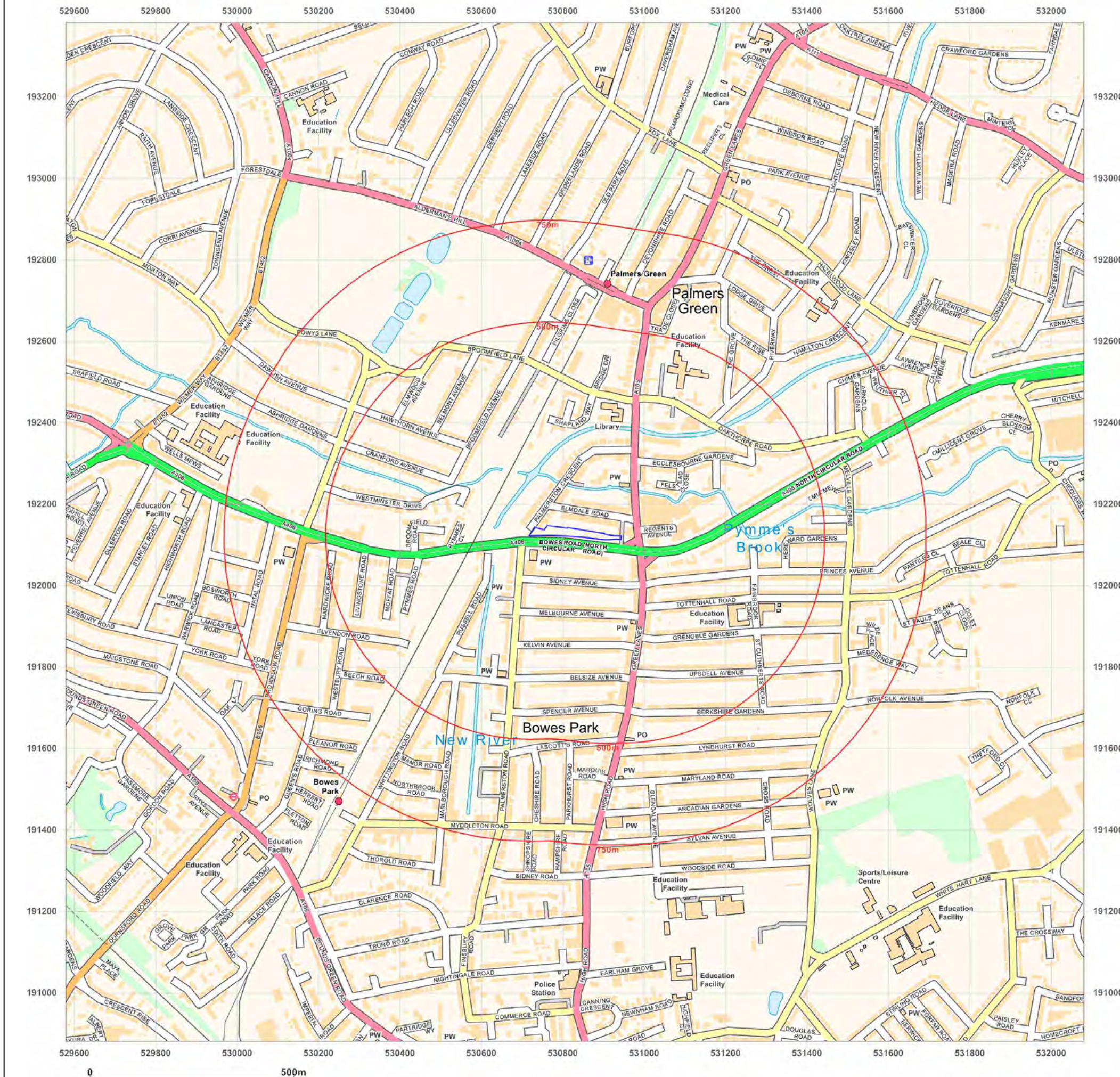


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**APPENDIX B**  
**Groundsure Data Sheets**



Arcadis Consulting UK Ltd

Arcadis CONSULTING UK LTD, THE PITHAY,  
BRISTOL, BS1 2NL

Groundsure  
Reference:

GS-6550153

Your Reference: 14034794

Report Date

13 Jan 2020

Report Delivery  
Method:

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Managing Director  
Groundsure Limited

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Groundsure Enviroinsight



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Date: 13 Jan 2020

Reference: GS-6550153

Client: Arcadis Consulting UK Ltd

NW

N

NE

W

E



SW

S

SE

Aerial Photograph Capture date: 12-Aug-2016

Grid Reference: 530775,192135

Site Size: 0.3776ha

Report Reference: GS-6550153

Client Reference: 14034794

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# Overview of Findings

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Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	2	47	56
1.2 Additional Information – Historical Tank Database	0	0	3	0
1.3 Additional Information – Historical Energy Features Database	0	0	7	23
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	21	12
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	0	0	15	33
Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	4	4
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	4	2
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	1	0
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0



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

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	5	16	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	3	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

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

Section 6: Hydrogeology and Hydrology				0-500m		
6.1 Records of Strata Classification in the Superficial Geology within 500m of the study site				Identified		
6.2 Records of Strata Classification in the Bedrock Geology within 500m of the study site				Identified		
	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	2	6	5	12
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	2	6	4	4
6.6 Source Protection Zones (within 500m of the study site)	2	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	0	1	Not searched	Not searched



Section 6: Hydrogeology and Hydrology	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site	No	No	No	No	No	No
6.10 Ordnance Survey MasterMap Water Network entries within 500m of the site	0	0	24	6	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding	
7.1 Environment Agency Zone 2 floodplains within 250m of the study site	Identified
7.2 Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Identified
7.3 Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site	Very Low
7.4 Flood Defences within 250m of the study site	None identified
7.5 Areas benefiting from Flood Defences within 250m of the study site	None identified
7.6 Areas used for Flood Storage within 250m of the study site	None identified
7.7 Maximum BGS Groundwater Flooding susceptibility within 50m of the study site	Potential at Surface
7.8 BGS confidence rating for the Groundwater Flooding susceptibility areas	Moderate

Section 8: Designated Environmentally Sensitive Sites						
	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	0
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	1
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0



Section 8: Designated Environmentally Sensitive Sites	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	0	0	0	0	0	0
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards	
9.1 Maximum risk of natural ground subsidence	Moderate
9.1.1 Maximum Shrink-Swell hazard rating identified on the study site	Moderate
9.1.2 Maximum Landslides hazard rating identified on the study site	Very Low
9.1.3 Maximum Soluble Rocks hazard rating identified on the study site	Negligible
9.1.4 Maximum Compressible Ground hazard rating identified on the study site	Negligible
9.1.5 Maximum Collapsible Rocks hazard rating identified on the study site	Very Low
9.1.6 Maximum Running Sand hazard rating identified on the study site	Very Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining	
10.1 Coal mining areas within 75m of the study site	None identified
10.2 Non-Coal Mining areas within 50m of the study site boundary	None identified
10.3 Brine affected areas within 75m of the study site	None identified



# Using this report

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

## 1. Historical Industrial Sites

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

## 2. Environmental Permits, Incidents and Registers

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

## 3. Landfills and Other Waste Sites

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

## 4. Current Land Uses

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

## 5. Geology

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

## 6. Hydrogeology and Hydrology

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

## 7. Flooding

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

## 8. Designated Environmentally Sensitive Sites

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

## 9. Natural Hazards

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

## 10. Mining

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

## 11. Contacts

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

## Note: Maps

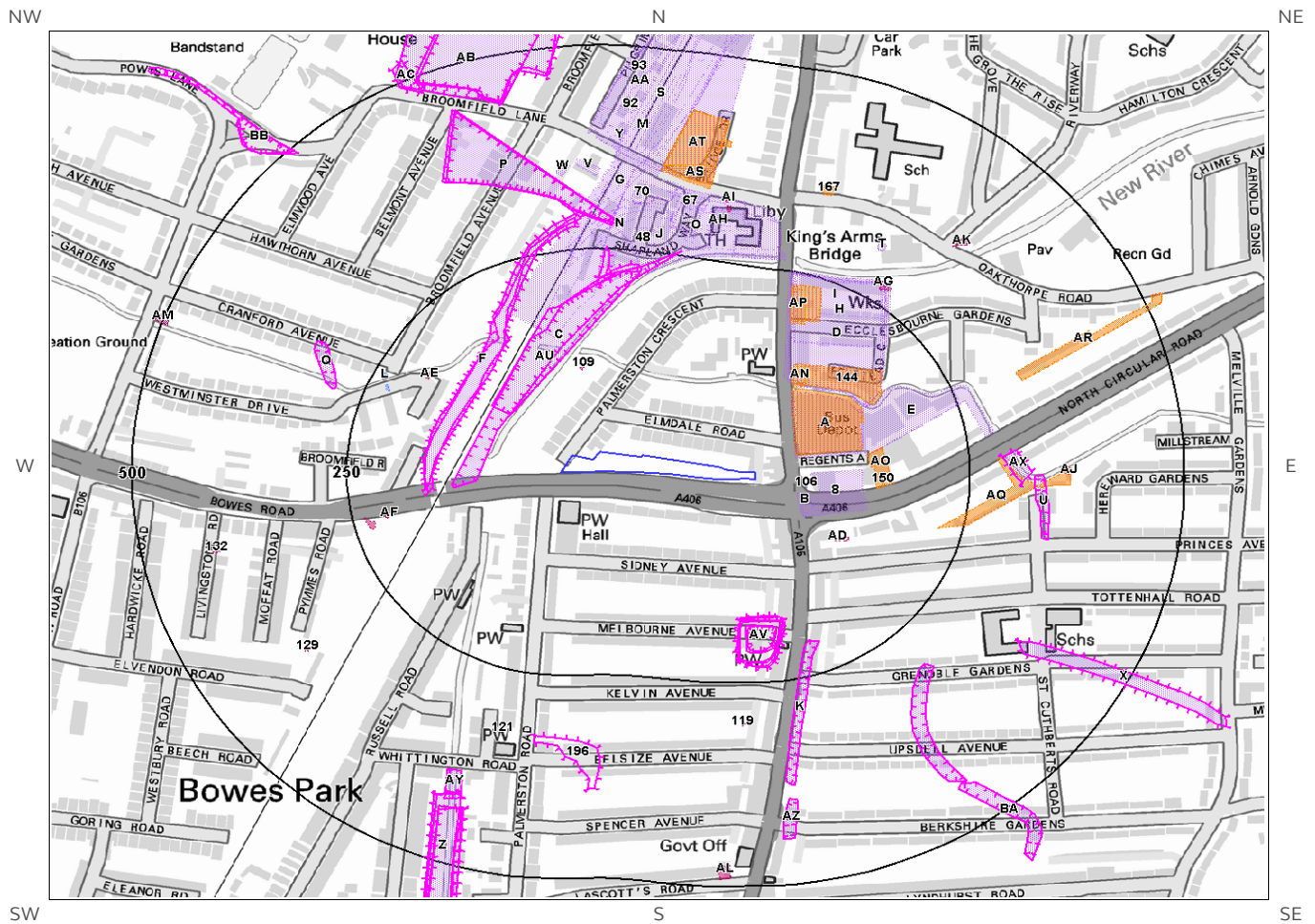
Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes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

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

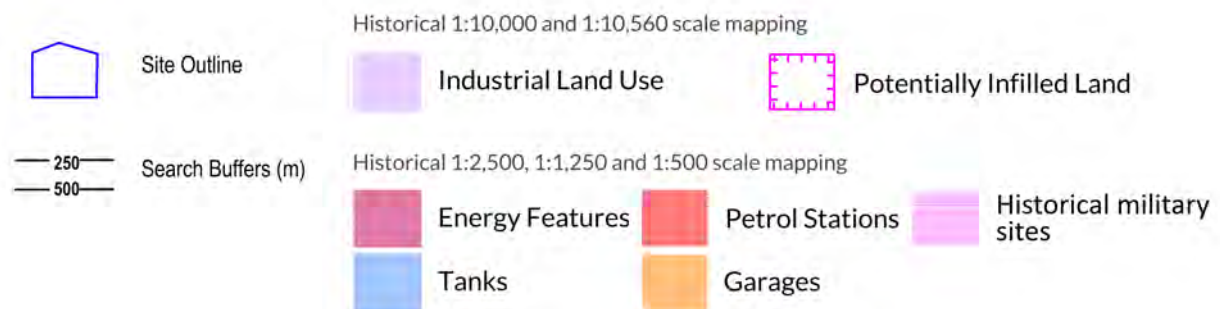
All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.



# 1. Historical Land Use



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# 1. Historical Industrial Sites

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

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

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 105

ID	Distance [m]	Direction	Use	Date
1A	49	E	Motor Garages	1920
2A	49	E	Motor Garages	1912
3B	51	E	Smithy	1898
4A	56	NE	Unspecified Depot	1974
5A	56	NE	Unspecified Depot	1991
6A	56	NE	Unspecified Depot	1966
7A	56	NE	Unspecified Depot	1982
8	56	E	Smithy	1895
9B	62	SE	Smithy	1897
10C	87	NW	Unspecified Pit	1974
11C	87	NW	Unspecified Pit	1982
12C	87	NW	Unspecified Pit	1991
13AU	88	W	Unspecified Pit	1966
14D	116	N	Nursery	1920
15D	116	N	Nursery	1912
16D	116	N	Nursery	1897
17D	118	N	Nursery	1895
18D	120	N	Nursery	1898
19E	129	E	Unspecified Works	1966
20E	129	E	Unspecified Workshop	1991
21E	129	E	Unspecified Works	1982
22E	129	E	Unspecified Works	1974
23F	134	NW	Unspecified Ground Workings	1951
24F	134	NW	Unspecified Heap	1966
25F	136	NW	Unspecified Ground Workings	1938
26G	144	N	Railway Sidings	1912
27G	144	N	Railway Sidings	1920
28M	156	N	Railway Sidings	1966
29H	165	N	Nursery	1864
30H	165	N	Nursery	1866
31H	167	N	Nursery	1864
32J	182	N	Unspecified Depot	1991
33I	193	N	Unspecified Works	1982



34I	193	N	Unspecified Works	1966
35I	193	N	Unspecified Works	1974
36I	193	N	Unspecified Works	1991
37J	197	N	Fire Station	1897
38AW	206	N	Unspecified Ground Workings	1938
39K	207	S	Unspecified Pit	1912
40K	207	S	Unspecified Pit	1920
41J	220	N	Unspecified Depot	1982
42J	222	N	Unspecified Depot	1974
43N	227	N	Railway Sidings	1951
44O	227	N	Fire Engine Station	1938
45L	235	NW	Unspecified Tanks	1912
46L	235	NW	Unspecified Tanks	1920
47M	239	N	Railway Sidings	1938
48	247	N	Unspecified Depot	1966
49N	249	N	Railway Sidings	1938
50O	263	N	Fire Engine Station	1951
51AH	268	N	Fire Engine Station	1938
52O	274	N	Fire Engine Station	1912
53O	274	N	Fire Engine Station	1920
54P	279	N	Unspecified Pit	1864
55P	279	N	Unspecified Pit	1866
56O	280	N	Fire Station	1895
57P	281	N	Unspecified Pit	1864
58P	281	N	Unspecified Pit	1864
59O	283	N	Fire Station	1898
60Q	283	W	Unspecified Pit	1912
61Q	283	W	Unspecified Pit	1920
62AX	290	E	Cuttings	1982
63S	292	N	Railway Sidings	1951
64R	300	SE	Unspecified Pit	1920
65R	300	SE	Unspecified Pit	1912
66S	300	N	Railway Sidings	1938
67	305	N	Fire Station	1966
68T	309	NE	Unspecified Tank	1895
69T	309	NE	Unspecified Tank	1897
70	309	N	Railway Building	1938
71U	326	E	Unspecified Ground Workings	1920
72U	326	E	Unspecified Ground Workings	1912
73V	339	N	Railway Building	1951
74V	339	N	Railway Building	1966
75S	341	N	Railway Land	1938
76W	341	N	Railway Buildings	1951
77W	341	N	Railway Buildings	1966



78S	350	N	Railway Sidings	1895
79S	356	N	Railway Sidings	1897
80X	366	SE	Unspecified Pit	1920
81X	366	SE	Unspecified Pit	1912
82S	367	N	Railway Sidings	1898
83Y	378	N	Railway Building	1951
84Y	384	N	Railway Building	1974
85Y	384	N	Railway Building	1966
86AY	385	S	Cuttings	1866
87AZ	394	S	Unspecified Pit	1920
88Z	412	S	Cuttings	1911
89Z	413	S	Cuttings	1894
90AA	414	N	Railway Building	1974
91AA	414	N	Railway Building	1966
92	416	N	Railway Building	1951
93	420	N	Railway Sidings	1938
94Z	428	S	Cuttings	1991
95Z	428	S	Cuttings	1982
96Z	430	S	Cuttings	1974
97AB	440	N	Unspecified Pit	1912
98AB	440	N	Unspecified Pit	1920
99AB	443	N	Unspecified Pit	1864
100AB	443	N	Unspecified Pit	1866
101AB	444	N	Unspecified Pit	1864
102AB	444	N	Unspecified Pit	1864
103BA	444	SE	Unspecified Pit	1920
104AC	478	N	Unspecified Heap	1974
105AC	478	N	Unspecified Heap	1966

## 1.2 Additional Information – Historical Tank Database

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

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

3

ID	Distance (m)	Direction	Use	Date
106	59	E	Tank or Trough	1867
107L	224	NW	Tanks	1914
108L	235	NW	Unspecified Tank	1914



### 1.3 Additional Information – Historical Energy Features Database

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

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

30

ID	Distance (m)	Direction	Use	Date
109	103	N	Electricity Substation	1984
110AD	118	SE	Electricity Substation	1975
111AD	126	SE	Electricity Substation	1984
112AE	191	NW	Electricity Substation	1973
113AE	192	NW	Electricity Substation	1984
114AF	204	W	Electricity Substation	1984
115AF	225	W	Electricity Substation	1975
116AG	267	NE	Electricity Substation	1994
117AG	271	NE	Electricity Substation	1984
118AG	275	NE	Electricity Substation	1975
119	299	S	Electricity Substation	1975
120AH	311	N	Electricity Substation	1984
121	323	S	Electricity Substation	1975
122AI	323	N	Electricity Substation	1956
123AI	323	N	Electricity Substation	1973
124AI	324	N	Electricity Substation	1956
125AK	359	NE	Electricity Substation	1975
126AJ	361	E	Electricity Substation	1984
127AJ	362	E	Electricity Substation	1994
128AJ	362	E	Electricity Substation	1975
129	365	SW	Electricity Substation	1974
130AK	369	NE	Electricity Substation	1994
131AK	372	NE	Electricity Substation	1984
132	409	W	Electricity Substation	1975
133AL	474	S	Electricity Substation	1956
134AL	474	S	Electricity Substation	1975
135AL	474	S	Electricity Substation	1956
136AM	493	W	Electricity Substation	1956
137AM	493	W	Electricity Substation	1956
138AM	493	W	Electricity Substation	1975

### 1.4 Additional Information – Historical Petrol and Fuel Site Database

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



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

0

Database searched and no data found.

## 1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

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

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

33

ID	Distance (m)	Direction	Use	Date
139A	51	NE	Motor Garage	1914
140AN	113	NE	Garage	1984
141AN	116	N	Garage	1973
142AN	116	N	Garage	1956
143AN	116	N	Garage	1956
144	122	NE	Garage	1956
145AN	131	NE	Garage	1956
146AO	132	E	Garage	1994
147AO	132	E	Garage	1956
148AO	139	E	Garage	1975
149AO	139	E	Garage	1956
150	147	E	Garage	1984
151AP	188	N	Garage	1984
152AP	191	N	Garage	1956
153AP	192	N	Garage	1973
154AP	192	N	Garage	1956
155AP	194	N	Garage	1975
156AP	194	N	Garage	1956
157AP	195	N	Garage	1956
158AQ	220	E	Garages	1956
159AQ	222	E	Garages	1956
160AR	327	E	Garages	1956
161AR	328	E	Garages	1956
162AJ	328	E	Garages	1956
163AJ	333	E	Garages	1956
164AS	336	N	Garage	1984
165AS	341	N	Garage	1973
166AT	342	N	Garage	1956
167	350	N	Garage	1956
168AS	355	N	Garage	1956
169AT	358	N	Garage	1956



170AT	358	N	Garage	1987
171AT	358	N	Garage	1977

## 1.6 Historical military sites

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

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

Database searched and no data found.

## 1.7 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 48

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

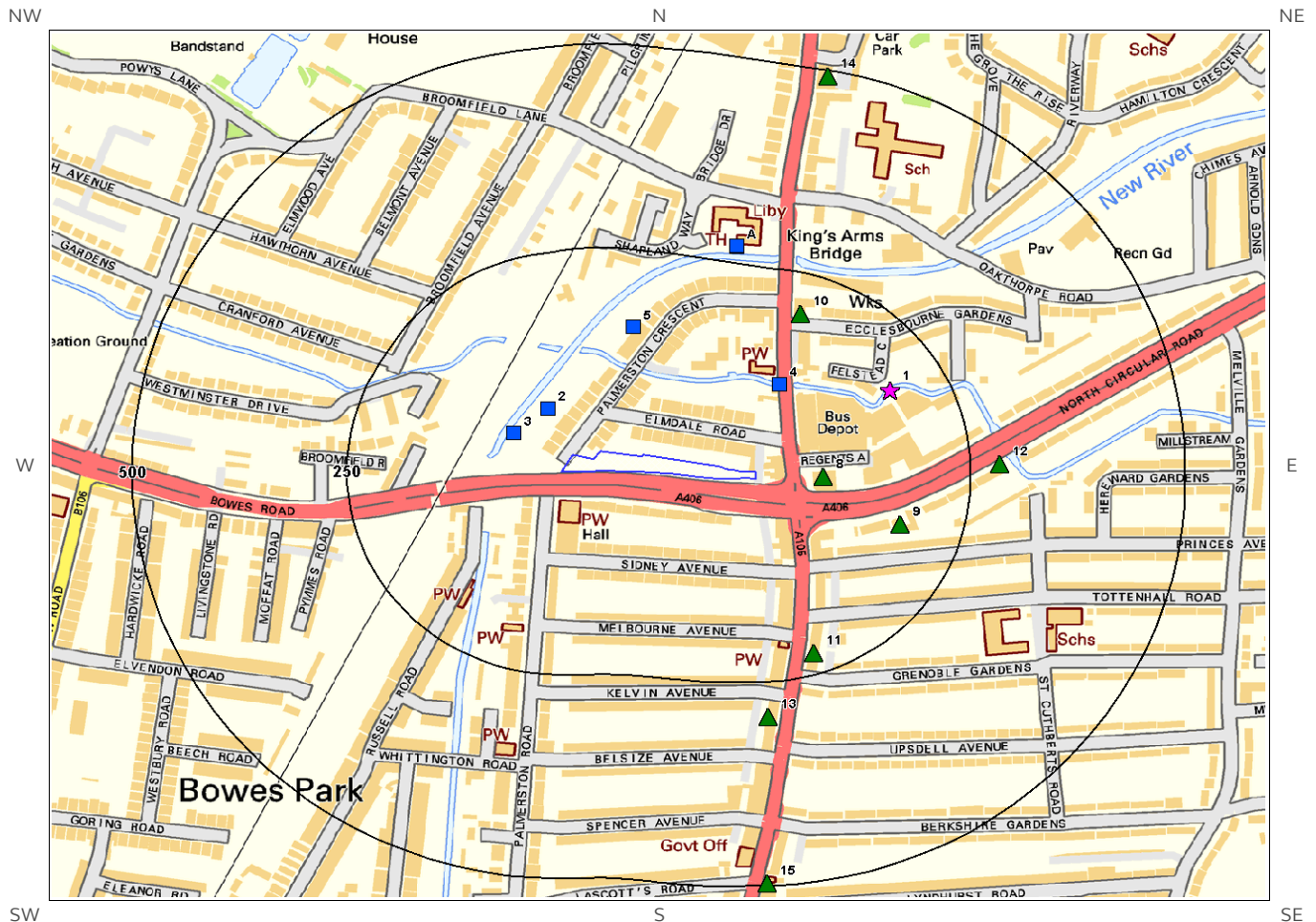
ID	Distance(m)	Direction	Use	Date
172C	87	NW	Unspecified Pit	1974
173C	87	NW	Unspecified Pit	1982
174C	87	NW	Unspecified Pit	1991
175AU	88	W	Unspecified Pit	1966
176F	134	NW	Unspecified Ground Workings	1951
177F	134	NW	Unspecified Heap	1966
178F	136	NW	Unspecified Ground Workings	1938
179AV	169	S	Pond	1897
180AV	171	S	Pond	1895
181AV	174	S	Pond	1866
182AV	174	S	Pond	1864
183AV	175	S	Water Body	1864
184AW	206	N	Unspecified Ground Workings	1938
185K	207	S	Unspecified Pit	1920
186K	207	S	Unspecified Pit	1912
187P	279	N	Unspecified Pit	1864
188P	279	N	Unspecified Pit	1866
189P	281	N	Unspecified Pit	1864
190P	281	N	Unspecified Pit	1864
191Q	283	W	Unspecified Pit	1912
192Q	283	W	Unspecified Pit	1920
193AX	290	E	Cuttings	1982
194R	300	SE	Unspecified Pit	1912



195R	300	SE	Unspecified Pit	1920
196	325	S	Pond	1895
197U	326	E	Unspecified Ground Workings	1912
198U	326	E	Unspecified Ground Workings	1920
199X	366	SE	Unspecified Pit	1920
200X	366	SE	Unspecified Pit	1912
201AY	385	S	Cuttings	1866
202AZ	394	S	Unspecified Pit	1920
203Z	412	S	Cuttings	1911
204Z	413	S	Cuttings	1894
205Z	428	S	Cuttings	1991
206Z	428	S	Cuttings	1982
207Z	430	S	Cuttings	1974
208AB	440	N	Unspecified Pit	1912
209AB	440	N	Unspecified Pit	1920
210AB	443	N	Unspecified Pit	1866
211AB	443	N	Unspecified Pit	1864
212AB	444	N	Unspecified Pit	1864
213AB	444	N	Unspecified Pit	1864
214BA	444	SE	Unspecified Pit	1920
215AC	478	N	Unspecified Heap	1966
216AC	478	N	Unspecified Heap	1974
217	490	NW	Pond	1864
218BB	494	NW	Pond	1864
219BB	494	NW	Pond	1866



## 2. Environmental Permits, Incidents and Registers Map



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## 2. Environmental Permits, Incidents and Registers

### 2.1 Industrial Sites Holding Licences and/or Authorisations

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

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

0

Database searched and no data found.

---

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

0

Database searched and no data found.

---

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

8

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

ID	Distance (m)	Direction	NGR	Details
8	78	E	531021 192114	Address: Erinbridge Coachworks (prev S James Bodyshop), Regents Ave, N13 8JF Process: Coating Processes Status: Historical Permit Permit Type: Part B Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
9	177	E	531110 192056	Address: Forest Services, 376-378, North Circular Road, Palmers Green, N13 6BJ Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
10	198	N	530994 192314	Address: Shell UK Oil Ltd, 148-150 Green Lanes, Palmers Green, Enfield, N13 5UN Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
11	226	S	531010 191898	Address: Finesse Dry Cleaners, 26 Green Lanes, London, N13 6HT Process: Dry Cleaning Status: Current Permit Permit Type: Part B Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
12	284	E	531226 192130	Address: Miles Ahead Motor Services, 342-346 North Circular Road, London, N13 6BJ Process: Waste Oil Burner <0.4 MW Status: New Legislation Applies Permit Type: Part B Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
13	295	S	530957 191819	Address: I Klean 4 U, 57 Green Lanes, London, N13 4TD Process: Dry Cleaning Status: Historical Permit Permit Type: Part B Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
14	490	N	531026 192606	Address: Premier Dry Cleaners, 228 Green Lanes, Palmers Green, London, N13 5UD Process: Dry Cleaning Status: Current Permit Permit Type: Part B Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
15	499	S	530955 191615	Address: Nemi Dry Cleaners, 354 High Road, N22 8JW Process: Dry Cleaning Status: Current Permit Permit Type: Part B Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified



### 2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

6

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

ID	Distance (m)	Direction	NGR	Details
2	64	NW	530700 192200	<p>Address: RECHARGE SITE AT BOWES ROAD, PALMERS GREEN, ENFIELD, MIDDLESEX, N13 4NH</p> <p>Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY</p> <p>Permit Number: CNTW.0838</p> <p>Permit Version: 1</p> <p>Receiving Water: CHALK &amp; LOWER LONDON TERTIARY</p> <p>Status: TRANSFERRED FROM WATER ACT 1989</p> <p>Issue date: 30/11/1990</p> <p>Effective Date: 30-Nov-1990</p> <p>Revocation Date: 13/11/2018</p>
3	73	NW	530660 192170	<p>Address: RECHARGE SITE AT BOWES ROAD, PALMERS GREEN, ENFIELD, MIDDLESEX, N13 4NH</p> <p>Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY</p> <p>Permit Number: CNTW.0838</p> <p>Permit Version: 2</p> <p>Receiving Water: GROUNDWATER VIA A BOREHOLE</p> <p>Status: VARIED UNDER EPR 2010</p> <p>Issue date: 14/11/2018</p> <p>Effective Date: 14-Nov-2018</p> <p>Revocation Date: -</p>
4	110	N	530970 192230	<p>Address: DEADMANS BRIDGE CSO, GREEN LANES, LONDON, N13 5UP</p> <p>Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY</p> <p>Permit Number: EPRCB3490VW</p> <p>Permit Version: 1</p> <p>Receiving Water: PYMMES BROOK</p> <p>Status: NEW ISSUED UNDER EPR 2010</p> <p>Issue date: 15/06/2016</p> <p>Effective Date: 15-Jun-2016</p> <p>Revocation Date: -</p>
5	156	N	530800 192300	<p>Address: DEVELOPMENT AT BROOMFIELD LANE, PAL, DEVELOPMENT AT BROOMFIELD LANE,, PALMERS GREEN, LONDON</p> <p>Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER</p> <p>Permit Number: CTWC.2880</p> <p>Permit Version: 1</p> <p>Receiving Water: PYMMES BROOK</p> <p>Status: REVOKED - UNSPECIFIED</p> <p>Issue date: 18/11/1988</p> <p>Effective Date: 18-Nov-1988</p> <p>Revocation Date: 23/09/1996</p>
6A	270	N	530920 192399	<p>Address: KING'S ARMS BRIDGE PUMPING STATION, GREEN LANES, LONDON, N13 4XD</p> <p>Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY</p> <p>Permit Number: CANM.1246</p> <p>Permit Version: 1</p> <p>Receiving Water: ABSTRACTION RECHARGE BOREHOLE</p> <p>Status: NEW CONSENT (WRA 91, S88 &amp; SCHED 10 AS AMENDED BY ENV ACT 1995)</p> <p>Issue date: 01/08/2007</p> <p>Effective Date: 01-Aug-2007</p> <p>Revocation Date: 13/11/2018</p>
7A	271	N	530920 192400	<p>Address: KING'S ARMS BRIDGE PUMPING STATION, GREEN LANES, LONDON, N13 4XD</p> <p>Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY</p> <p>Permit Number: CANM.1246</p> <p>Permit Version: 2</p> <p>Receiving Water: GROUNDWATER VIA A BOREHOLE</p> <p>Status: VARIED UNDER EPR 2010</p> <p>Issue date: 14/11/2018</p> <p>Effective Date: 14-Nov-2018</p> <p>Revocation Date: -</p>



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

0

Database searched and no data found.

---

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

0

Database searched and no data found.

---

## 2.2 Dangerous or Hazardous Sites

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

0

Database searched and no data found.

---

## 2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

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

1

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

ID	Distance (m)	Direction	NGR	Details	
1	184	NE	531098.0 192222.0	Incident Date: 07-Jun-2002 Incident Identification: 83443.0 Pollutant: Oils and Fuel Pollutant Description: Diesel	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

---

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

0

Database searched and no data found.



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

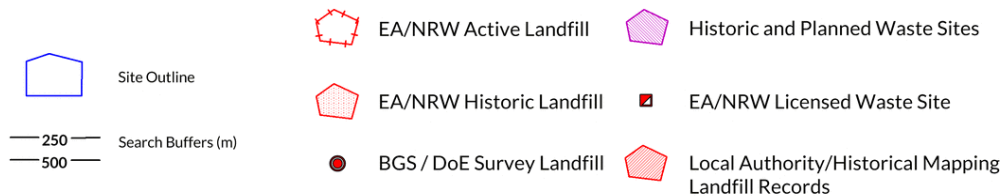
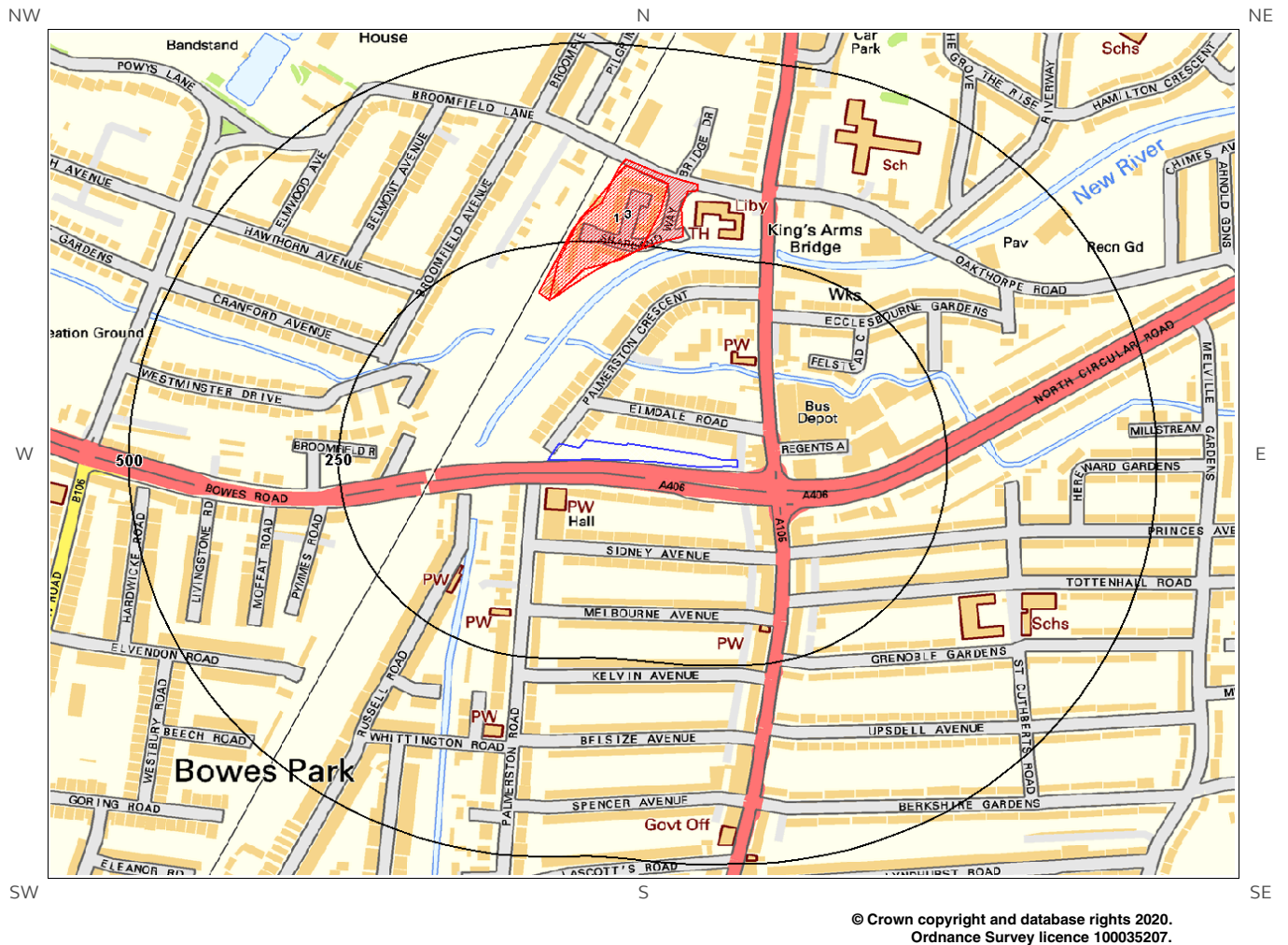
Records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site 0

Database searched and no data found.

---



# 3. Landfill and Other Waste Sites Map





# 3. Landfill and Other Waste Sites

## 3.1 Landfill Sites

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

0

Database searched and no data found.

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

2

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

ID	Distance (m)	Direction	NGR	Details
1	182	N		Site Address: Southgate Town Hall, Grrn Lane, Palmers Green, Enfield Waste Licence: - Site Reference: 8EN012 Waste Type: - Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Local Authority Licence Holder: - First Recorded: 31-Dec-1928 Last Recorded: 31-Dec-1989
Not shown	902	SE		Site Address: White Hart Lane Works, White Hart Lane Waste Licence: - Site Reference: 8HG001 Waste Type: Inert, Commercial, Household Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: 31-Dec-1940 Last Recorded: 31-Dec-1955

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

0

Database searched and no data found.



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

1

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

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
3	181	N	530800 192413	Landfill rear of Southgate Town Hall	Enfield Council	Polygon

---

## 3.2 Other Waste Sites

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

0

Database searched and no data found.

---

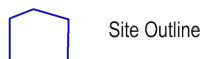
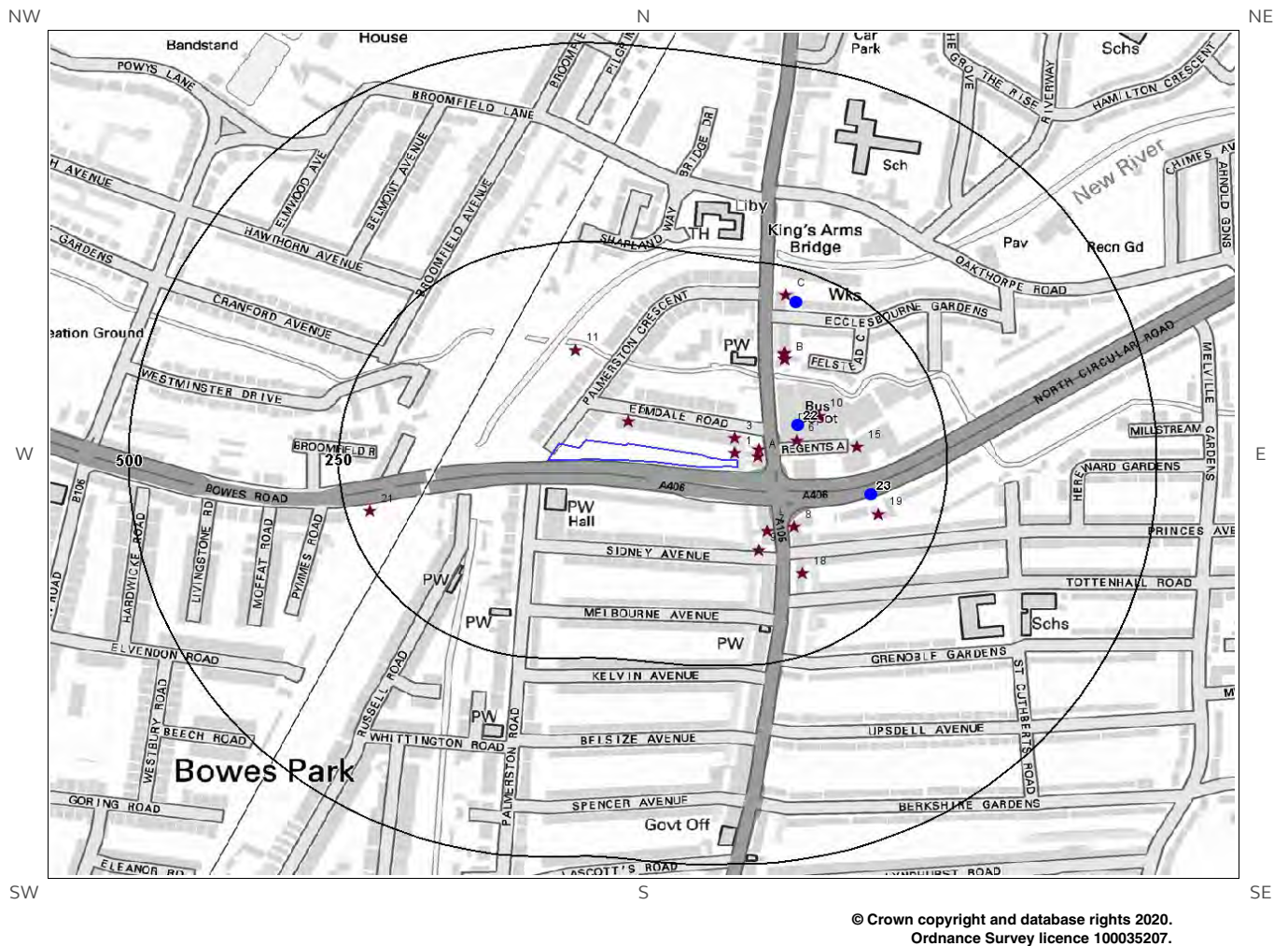
### 3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

0

Database searched and no data found.



## 4. Current Land Use Map



Site Outline

★ Current Industrial Sites

— Electricity Transmission Cables

— 250 — Search Buffers (m)  
— 500 —

● Petrol & Fuel Sites

— Gas Transmission Pipelines



## 4. Current Land Uses

### 4.1 Current Industrial Data

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

21

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	9	N	R P S Gas	530939 192132	Flat 179, Broadway Mews, London, Greater London, N13 4UP	Fuel Distributors and Suppliers	Household, Office, Leisure and Garden
2A	24	E	Londra Gazete	530965 192128	177, Green Lanes, London, Greater London, N13 4UR	Published Goods	Industrial Products
3	28	N	The Tyre Shop	530939 192151	5, Elmdale Road, London, Greater London, N13 4UN	Vehicle Parts and Accessories	Motoring
4A	28	NE	Hey Print	530967 192137	181, Green Lanes, London, Greater London, N13 4UR	Published Goods	Industrial Products
5	29	N	F K Floor Sanding	530812 192172	49, Elmdale Road, London, Greater London, N13 4UN	Construction Completion Services	Construction Services
6	75	E	Electricity Sub Station	531013 192148	Greater London, N13	Electrical Features	Infrastructure and Facilities
7	87	SE	Sky Design	530977 192034	151a, Green Lanes, London, Greater London, N13 4SP	Electronic Equipment	Industrial Products
8	100	SE	North London P C Repair Centre	531009 192039	2 Clock House Parade, North Circular Road, London, Greater London, N13 6BG	Electrical Equipment Repair and Servicing	Repair and Servicing
9	107	S	Palmer's Green Service Centre	530967 192010	141-143, Green Lanes, London, Greater London, N13 4SP	Vehicle Repair, Testing and Servicing	Repair and Servicing
10	112	NE	Bus Depot	531039 192179	Greater London, N13	Bus and Coach Stations, Depots and Companies	Public Transport, Stations and Infrastructure
11	115	N	Electricity Sub Station	530749 192262	Greater London, N13	Electrical Features	Infrastructure and Facilities
12B	139	NE	North London Van Centre	530998 192250	122a, Green Lanes, London, Greater London, N13 5UN	Vehicle Hire and Rental	Hire Services
13B	139	NE	R & A Tinting Cars	530998 192250	122, Green Lanes, London, Greater London, N13 5UN	Industrial Coatings and Finishings	Industrial Products
14B	139	NE	Chris Cross Motors	530998 192250	122, Green Lanes, London, Greater London, N13 5UN	Vehicle Repair, Testing and Servicing	Repair and Servicing
15	143	E	Enterprise Rent-A-Car	531084 192139	379, North Circular Road, London, Greater London, N13 5UU	Vehicle Hire and Rental	Hire Services
16B	145	N	Floors & Doors	530997 192257	124-126, Green Lanes, London, Greater London, N13 5UN	Carpets, Flooring, Rugs and Soft Furnishings	Consumer Products
17B	146	NE	Doorland Ltd	530999	124-126, Green Lanes,	Construction Completion	Construction Services



ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
				192258	London, Greater London, N13 5UN	Services	
18	154	SE	Online Handles	531019 191980	52, Green Lanes, London, Greater London, N13 6JU	General Construction Supplies	Industrial Products
19	177	E	North Circular Self Service	531110 192055	376, North Circular Road, London, Greater London, N13 6BJ	Petrol and Fuel Stations	Road and Rail
20C	216	N	Shell Service Station	531000 192331	148-150, Green Lanes, London, Greater London, N13 5UN	Petrol and Fuel Stations	Road and Rail
21	223	W	Electricity Sub Station	530503 192059	Greater London, N13	Electrical Features	Infrastructure and Facilities

## 4.2 Petrol and Fuel Sites

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

3

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

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
22	84	NE	531014 192167	OBSOLETE	203, Green Lanes, Palmers Green, London, Outer London, N16 9DJ	Not Applicable	Obsolete
23	163	E	531102 192079	PACE	376-378, North Circular Road, Palmers Green, London, Outer London, N13 6BJ	No	Open
24C	210	N	531012 192321	SHELL	148-150, Green Lanes, Ecclesbourne Gardens, Palmers Green, London, Outer London, N13 5UN	No	Open

## 4.3 National Grid High Voltage Underground Electricity Transmission Cables

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

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

0

Database searched and no data found.



#### 4.4 National Grid High Pressure Gas Transmission Pipelines

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

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

---



# 5. Geology

## 5.1 Artificial Ground and Made Ground

Database searched and no data found.

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

---

## 5.2 Superficial Ground and Drift Geology

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

Lex Code	Description	Rock Type
KPGR-XSV	KEMPTON PARK GRAVEL MEMBER	SAND AND GRAVEL

---

## 5.3 Bedrock and Solid Geology

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

Lex Code	Description	Rock Type
LC-XCZS	LONDON CLAY FORMATION	CLAY, SILT AND SAND

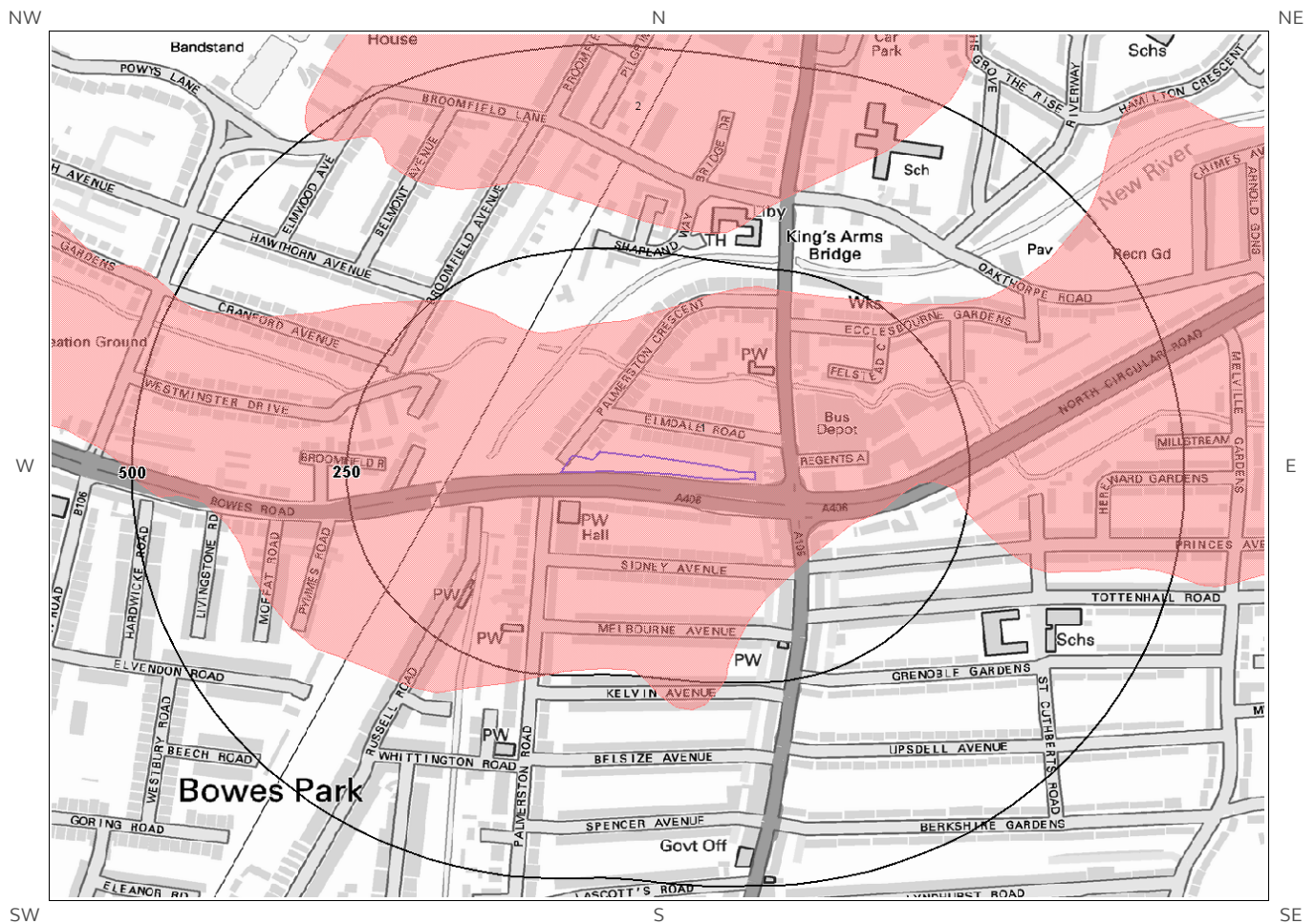
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

---

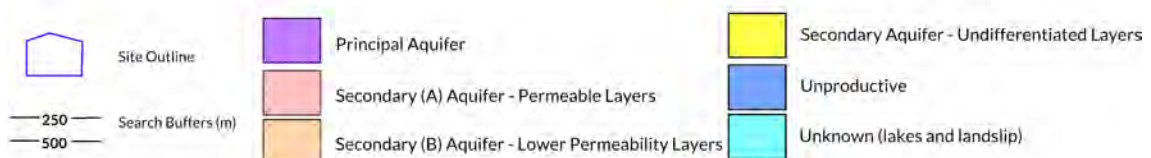


# 6 Hydrogeology and Hydrology

## 6a. Aquifer Within Superficial Geology

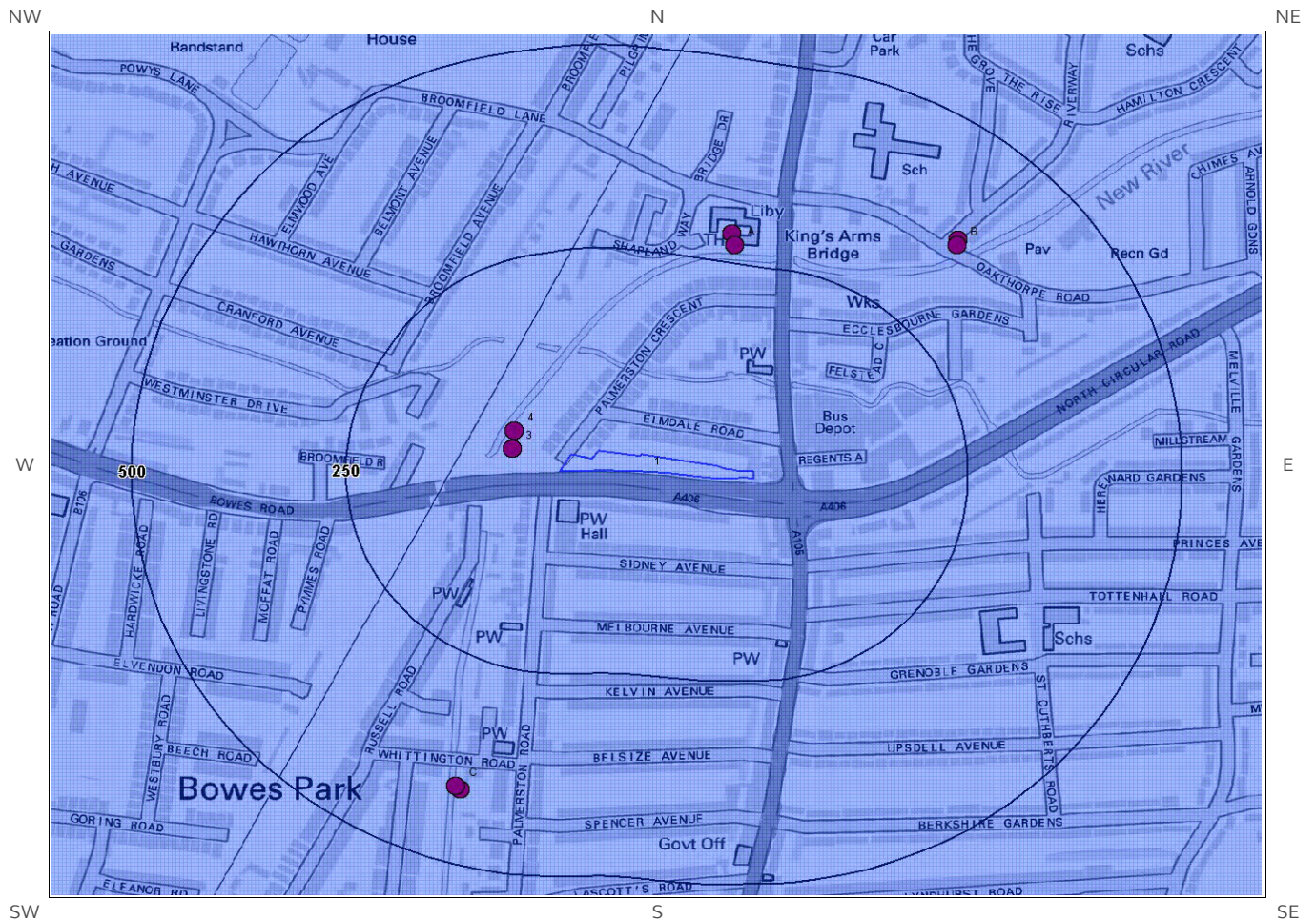


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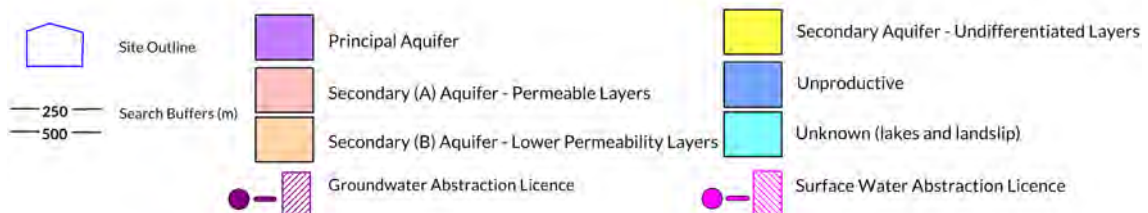




# 6b. Aquifer Within Bedrock Geology and Abstraction Licences

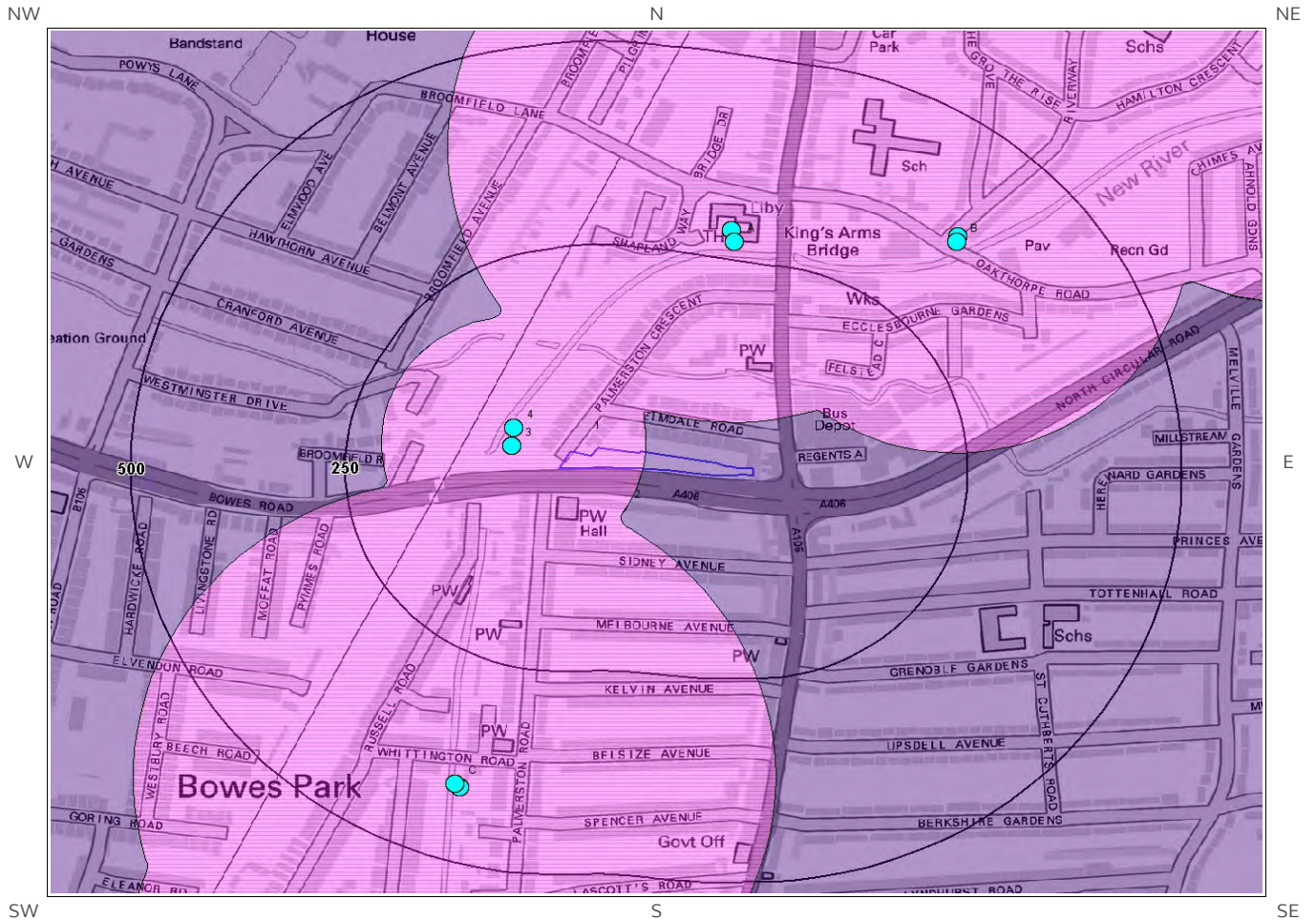


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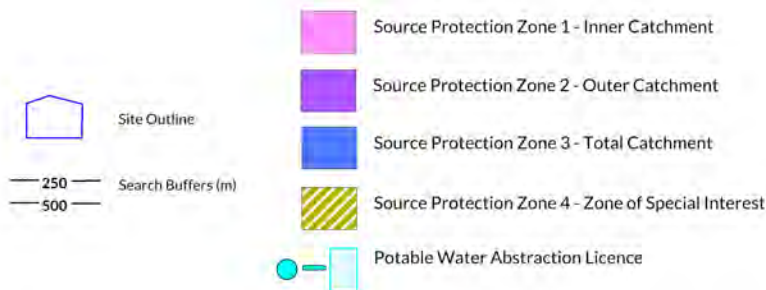




# 6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences

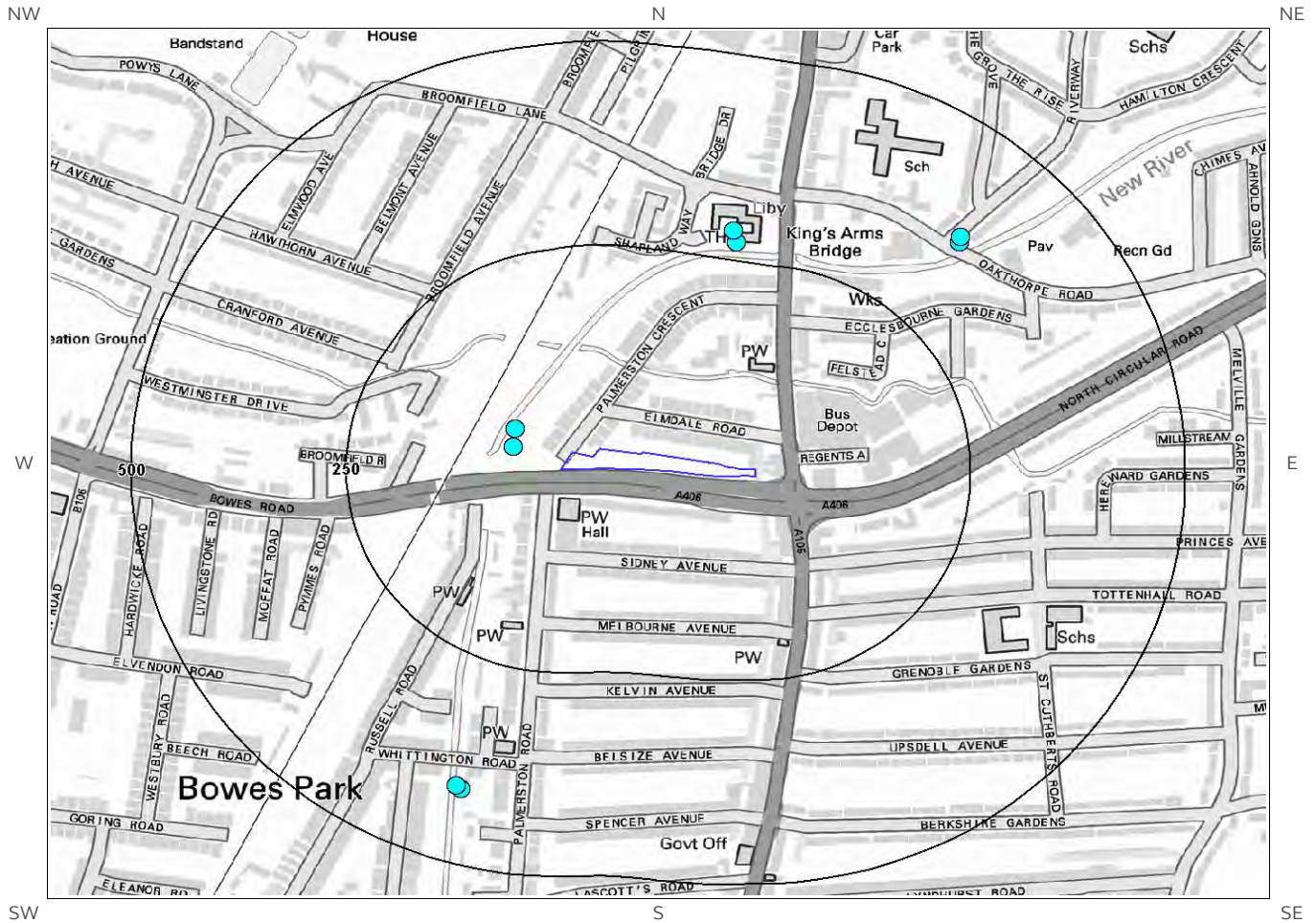


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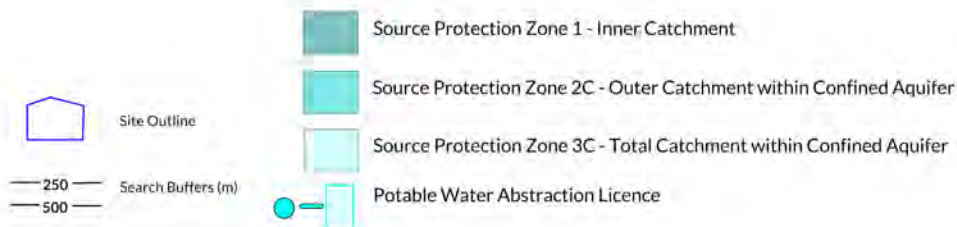




# 6d. Hydrogeology – Source Protection Zones within confined aquifer

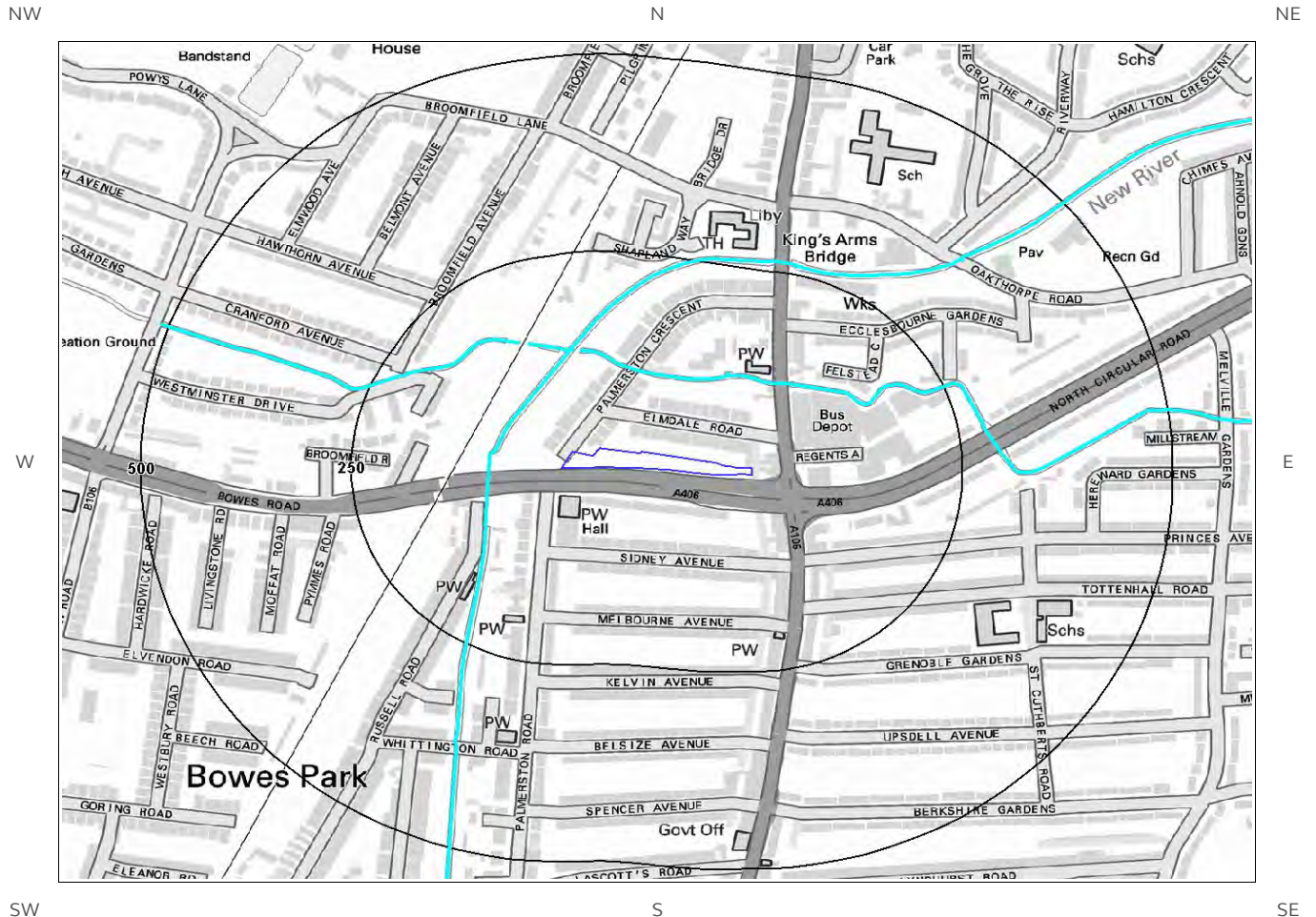


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# 6e. Hydrology – Watercourse Network and River Quality



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# 6. Hydrogeology and Hydrology

## 6.1 Aquifer within Superficial Deposits

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

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

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

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	281	N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

## 6.2 Aquifer within Bedrock Deposits

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

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

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

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow



## 6.3 Groundwater Abstraction Licences

Groundwater Abstraction Licences within 2000m of the study site

Identified

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

ID	Distance (m)	Direction	NGR	Details
3	62	NW	530660 192150	Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: BOWES ROAD, ENFIELD - NLARS POINT 44 Data Type: Point Name: THAMES WATER UTILITIES LTD Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: 16/10/2007 Version End Date:
4	71	NW	530663 192172	Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: BOWES ROAD, ENFIELD - NLARS POINT 44 Data Type: Point Name: Thames Water Utilities Ltd Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: 23/07/2013 Version End Date:
5A	271	N	530920 192400	Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: KING'S ARMS BRIDGE - NLARS POINT 10 Data Type: Point Name: THAMES WATER UTILITIES LTD Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: 16/10/2007 Version End Date:
6A	285	N	530917 192415	Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: KING'S ARMS BRIDGE - NLARS POINT 10 Data Type: Point Name: Thames Water Utilities Ltd Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: 23/07/2013 Version End Date:
7B	365	NE	531180 192400	Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: OAKTHORPE ROAD - NLARS POINT 9 Data Type: Point Name: THAMES WATER UTILITIES LTD Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: 16/10/2007 Version End Date:
8B	371	NE	531181 192407	Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: OAKTHORPE ROAD - NLARS POINT 9 Data Type: Point Name: Thames Water Utilities Ltd Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: 23/07/2013 Version End Date:



ID	Distance (m)	Direction	NGR	Details
9C	408	S	530594 191734	<p>Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: WHITTINGTON ROAD - NLARS POINT 11 Data Type: Point Name: Thames Water Utilities Ltd</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: 23/07/2013 Version End Date:</p>
10C	410	S	530600 191730	<p>Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: WHITTINGTON ROAD - NLARS POINT 11 Data Type: Point Name: THAMES WATER UTILITIES LTD</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: 16/10/2007 Version End Date:</p>
Not shown	694	S	530560 191447	<p>Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: MYDDLETON ROAD - NLARS POINT 12 Data Type: Point Name: Thames Water Utilities Ltd</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: 23/07/2013 Version End Date:</p>
Not shown	710	S	530560 191430	<p>Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: MYDDLETON ROAD - NLARS POINT 12 Data Type: Point Name: THAMES WATER UTILITIES LTD</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: 16/10/2007 Version End Date:</p>
Not shown	784	NW	530300 192800	<p>Status: Active Licence No: 29/38/09/0099 Details: Spray Irrigation - Direct Direct Source: THAMES GROUNDWATER Point: BROOMFIELD PARK Data Type: Point Name: LONDON BOROUGH OF ENFIELD</p> <p>Annual Volume (m³): 20,457 Max Daily Volume (m³): 205 Original Application No: - Original Start Date: 20/06/1966 Expiry Date: - Issue No: 100 Version Start Date: 18/07/1980 Version End Date:</p>
Not shown	866	NE	531630 192650	<p>Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: HAZELWOOD LANE - NLARS POINT 8 Data Type: Point Name: THAMES WATER UTILITIES LTD</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: 16/10/2007 Version End Date:</p>
Not shown	869	NE	531625 192661	<p>Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: HAZELWOOD LANE - NLARS POINT 8 Data Type: Point Name: Thames Water Utilities Ltd</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: 23/07/2013 Version End Date:</p>
Not shown	1171	E	532100 192300	<p>Status: Historical Licence No: 29/38/09/0006 Details: General use relating to Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: CHEQUERS WAY (POINT B) Data Type: Point Name: ARLA FOODS PLC</p> <p>Annual Volume (m³): 951,660 Max Daily Volume (m³): 3,364 Original Application No: - Original Start Date: 20/02/1966 Expiry Date: - Issue No: 101 Version Start Date: 29/08/2000 Version End Date:</p>



ID	Distance (m)	Direction	NGR	Details	
Not shown	1171	E	532100 192300	Status: Historical Licence No: 29/38/09/0006 Details: Non-Evaporative Cooling Direct Source: THAMES GROUNDWATER Point: CHEQUERS WAY (POINT B) Data Type: Point Name: ARLA FOODS PLC	Annual Volume (m³): 951,660 Max Daily Volume (m³): 3,364 Original Application No: - Original Start Date: 20/02/1966 Expiry Date: - Issue No: 101 Version Start Date: 29/08/2000 Version End Date:
Not shown	1171	E	532100 192300	Status: Historical Licence No: 29/38/09/0006 Details: Non-Evaporative Cooling Direct Source: THAMES GROUNDWATER Point: CHEQUERS WAY (POINT A) Data Type: Point Name: ARLA FOODS PLC	Annual Volume (m³): 951,660 Max Daily Volume (m³): 3,364 Original Application No: - Original Start Date: 20/02/1966 Expiry Date: - Issue No: 101 Version Start Date: 29/08/2000 Version End Date:
Not shown	1171	E	532100 192300	Status: Historical Licence No: 29/38/09/0006 Details: General use relating to Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: CHEQUERS WAY (POINT A) Data Type: Point Name: ARLA FOODS PLC	Annual Volume (m³): 951,660 Max Daily Volume (m³): 3,364 Original Application No: - Original Start Date: 20/02/1966 Expiry Date: - Issue No: 101 Version Start Date: 29/08/2000 Version End Date:
Not shown	1171	E	532100 192300	Status: Active Licence No: 29/38/09/0006 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: CHEQUERS WAY- BOREHOLE B Data Type: Point Name: ARLA FOODS LIMITED	Annual Volume (m³): 951,660 Max Daily Volume (m³): 3,364 Original Application No: - Original Start Date: 20/02/1966 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2011 Version End Date:
Not shown	1171	E	532100 192300	Status: Active Licence No: 29/38/09/0006 Details: Non-Evaporative Cooling Direct Source: THAMES GROUNDWATER Point: CHEQUERS WAY- BOREHOLE B Data Type: Point Name: ARLA FOODS LIMITED	Annual Volume (m³): 951,660 Max Daily Volume (m³): 3,364 Original Application No: - Original Start Date: 20/02/1966 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2011 Version End Date:
Not shown	1171	E	532100 192300	Status: Active Licence No: 29/38/09/0006 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: CHEQUERS WAY, PALMERS GREEN-BOREHOLE A Data Type: Point Name: ARLA FOODS LIMITED	Annual Volume (m³): 951,660 Max Daily Volume (m³): 3,364 Original Application No: - Original Start Date: 20/02/1966 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2011 Version End Date:
Not shown	1171	E	532100 192300	Status: Active Licence No: 29/38/09/0006 Details: Non-Evaporative Cooling Direct Source: THAMES GROUNDWATER Point: CHEQUERS WAY, PALMERS GREEN-BOREHOLE A Data Type: Point Name: ARLA FOODS LIMITED	Annual Volume (m³): 951,660 Max Daily Volume (m³): 3,364 Original Application No: - Original Start Date: 20/02/1966 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2011 Version End Date:
Not shown	1727	S	530484 190412	Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: STATION ROAD - NLARS POINT 13 Data Type: Point Name: Thames Water Utilities Ltd	Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: 23/07/2013 Version End Date:



ID	Distance (m)	Direction	NGR	Details
Not shown	1729	S	530480 190410	Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: STATION ROAD - NLARS POINT 13 Data Type: Point Name: THAMES WATER UTILITIES LTD Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: 16/10/2007 Version End Date:
Not shown	1946	NE	531800 193870	Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: HIGHFIELD - NLARS POINT 7 Data Type: Point Name: THAMES WATER UTILITIES LTD Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: 16/10/2007 Version End Date:
Not shown	1965	NE	531783 193899	Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: HIGHFIELD - NLARS POINT 7 Data Type: Point Name: Thames Water Utilities Ltd Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: 23/07/2013 Version End Date:

## 6.4 Surface Water Abstraction Licences

Surface Water Abstraction Licences within 2000m of the study site

None identified

Database searched and no data found.

## 6.5 Potable Water Abstraction Licences

Potable Water Abstraction Licences within 2000m of the study site

Identified

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

ID	Distance (m)	Direction	NGR	Details
3	62	NW	530660 192150	Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: BOWES ROAD, ENFIELD - NLARS POINT 44 Data Type: Point Name: THAMES WATER UTILITIES LTD Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: - Version End Date:
4	71	NW	530663 192172	Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: BOWES ROAD, ENFIELD - NLARS POINT 44 Data Type: Point Name: Thames Water Utilities Ltd Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: - Version End Date:



ID	Distance (m)	Direction	NGR	Details
5A	271	N	530920 192400	<p>Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: KING'S ARMS BRIDGE - NLARS POINT 10 Data Type: Point Name: THAMES WATER UTILITIES LTD</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:</p>
6A	285	N	530917 192415	<p>Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: KING'S ARMS BRIDGE - NLARS POINT 10 Data Type: Point Name: Thames Water Utilities Ltd</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: Version End Date:</p>
7B	365	NE	531180 192400	<p>Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: OAKTHORPE ROAD - NLARS POINT 9 Data Type: Point Name: THAMES WATER UTILITIES LTD</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:</p>
8B	371	NE	531181 192407	<p>Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: OAKTHORPE ROAD - NLARS POINT 9 Data Type: Point Name: Thames Water Utilities Ltd</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: Version End Date:</p>
9C	408	S	530594 191734	<p>Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: WHITTINGTON ROAD - NLARS POINT 11 Data Type: Point Name: Thames Water Utilities Ltd</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: Version End Date:</p>
10C	410	S	530600 191730	<p>Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: WHITTINGTON ROAD - NLARS POINT 11 Data Type: Point Name: THAMES WATER UTILITIES LTD</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:</p>
Not shown	694	S	530560 191447	<p>Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: MYDDLETON ROAD - NLARS POINT 12 Data Type: Point Name: Thames Water Utilities Ltd</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: Version End Date:</p>
Not shown	710	S	530560 191430	<p>Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: MYDDLETON ROAD - NLARS POINT 12 Data Type: Point Name: THAMES WATER UTILITIES LTD</p> <p>Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:</p>



ID	Distance (m)	Direction	NGR	Details	
Not shown	866	NE	531630 192650	Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: HAZELWOOD LANE - NLARS POINT 8 Data Type: Point Name: THAMES WATER UTILITIES LTD	Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:
Not shown	869	NE	531625 192661	Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: HAZELWOOD LANE - NLARS POINT 8 Data Type: Point Name: Thames Water Utilities Ltd	Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: Version End Date:
Not shown	1727	S	530484 190412	Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: STATION ROAD - NLARS POINT 13 Data Type: Point Name: Thames Water Utilities Ltd	Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: Version End Date:
Not shown	1729	S	530480 190410	Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: STATION ROAD - NLARS POINT 13 Data Type: Point Name: THAMES WATER UTILITIES LTD	Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:
Not shown	1946	NE	531800 193870	Status: Historical Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: HIGHFIELD - NLARS POINT 7 Data Type: Point Name: THAMES WATER UTILITIES LTD	Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:
Not shown	1965	NE	531783 193899	Status: Active Licence No: 29/38/09/0157 Details: Potable Water Supply - Direct Direct Source: THAMES GROUNDWATER Point: HIGHFIELD - NLARS POINT 7 Data Type: Point Name: Thames Water Utilities Ltd	Annual Volume (m³): 65,700,000 Max Daily Volume (m³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: Version End Date:



## 6.6 Source Protection Zones

Source Protection Zones within 500m of the study site

Identified

The following Source Protection Zones records are represented on the SPZ and Potable Water Abstraction Map (6c):

ID	Distance (m)	Direction	Zone	Description
1	0	On Site	1	Inner catchment
2	0	On Site	2	Outer catchment

## 6.7 Source Protection Zones within Confined Aquifer

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

None identified

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

Database searched and no data found.

## 6.8 Groundwater Vulnerability and Soil Leaching Potential

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

Identified

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
263	N	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.

## 6.9 River Quality

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

None identified

### 6.9.1 Biological Quality:

Database searched and no data found.

### 6.9.2 Chemical Quality:

Database searched and no data found.

## 6.10 Ordnance Survey MasterMap Water Network

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

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

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

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
1	81 NW	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 7.8
42	81 NW	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 7.8
2	86 W	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
43	86 W	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
3	100 N	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.4
44	100 N	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.4



ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
4	110 N	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 6.9
5	110 N	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 8.0
45	110 N	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 6.9
46	110 N	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 8.0
6	111 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.9
47	111 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.9
7	117 SW	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 7.4
48	117 SW	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 7.4
8	126 N	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
49	126 N	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
9	131 N	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.6
50	131 N	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.6
10	140	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	N			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
51	140 N	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
11	144 N	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 7.8
52	144 N	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 7.8
12	162 NW	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.1
53	162 NW	Pymme's Brook Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.1
13	356 NE	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
54	356 NE	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
14	362 NE	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 8.5
15	362 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.3
55	362 NE	New River Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 8.5
56	362 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.3



## 6.11 Surface Water Features

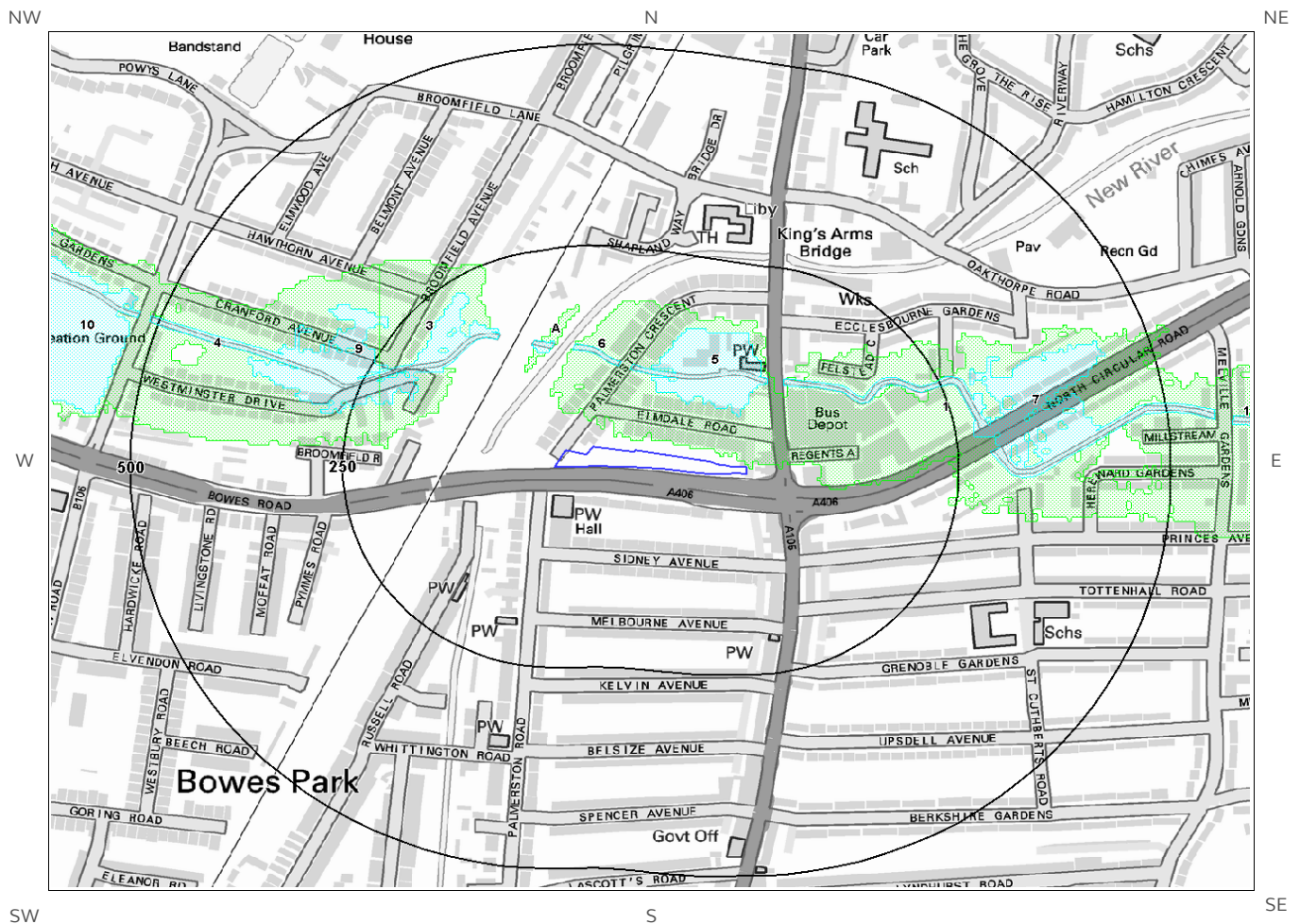
Surface water features within 250m of the study site

Identified

The following surface water records are not represented on mapping:

Distance (m)	Direction
77	NW
97	N
104	N
113	NE
113	SW
128	N
160	NW

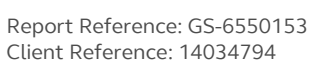
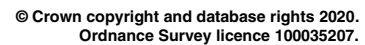
# 7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



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# 7 Flooding

## 7.1 River and Coastal Zone 2 Flooding

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

Identified

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

ID	Distance (m)	Direction	Update	Type
1	2	N	19-Nov-2019	Zone 2 - (Fluvial /Tidal Models)
2A	107	NW	19-Nov-2019	Zone 2 - (Fluvial /Tidal Models)
3	153	NW	19-Nov-2019	Zone 2 - (Fluvial /Tidal Models)
4	208	W	19-Nov-2019	Zone 2 - (Fluvial /Tidal Models)

## 7.2 River and Coastal Zone 3 Flooding

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

Identified

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

ID	Distance (m)	Direction	Update	Type
1	62	N	19-Nov-2019	Zone 3 - (Fluvial Models)
2A	103	N	19-Nov-2019	Zone 3 - (Fluvial Models)
3	110	NE	19-Nov-2019	Zone 3 - (Fluvial Models)
4	124	N	19-Nov-2019	Zone 3 - (Fluvial Models)
	160	NW	19-Nov-2019	Zone 3 - (Fluvial Models)



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

Highest risk of flooding onsite

Very Low

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

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

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

ID	Distance (m)	Direction	RoFRaS flood Risk
1	3.0	N	Low
2	21.0	N	Medium

### 7.4 Flood Defences

Flood Defences within 250m of the study site

None identified

Database searched and no data found.

### 7.5 Areas benefiting from Flood Defences

Areas benefiting from Flood Defences within 250m of the study site

None identified

### 7.6 Areas benefiting from Flood Storage

Areas used for Flood Storage within 250m of the study site

None identified

### 7.7 Groundwater Flooding Susceptibility Areas

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

Identified

Clearwater Flooding or Superficial Deposits Flooding

Superficial Deposits Flooding

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

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

Potential at Surface

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

---

## 7.8 Groundwater Flooding Confidence Areas

British Geological Survey confidence rating in this result

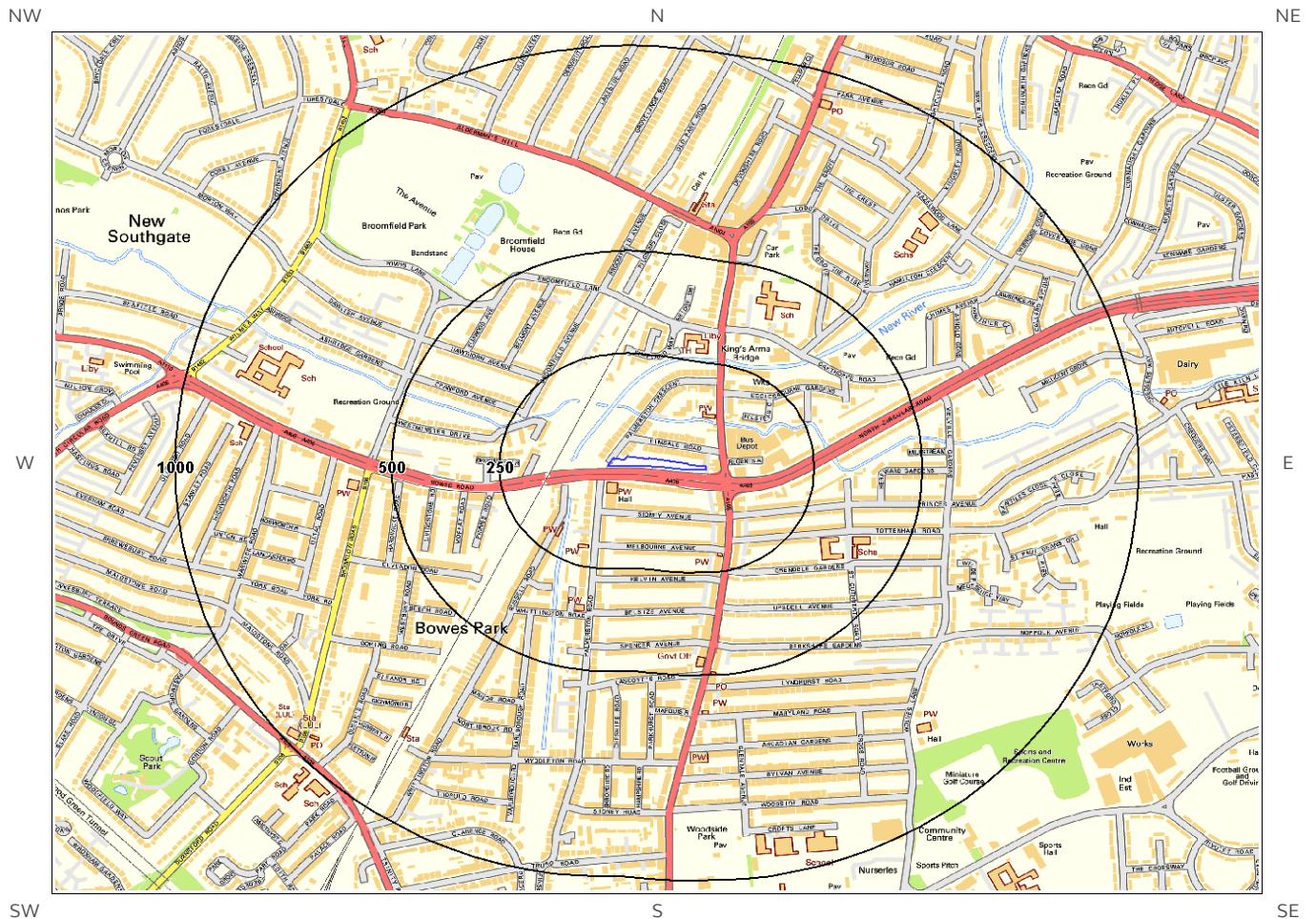
Moderate

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

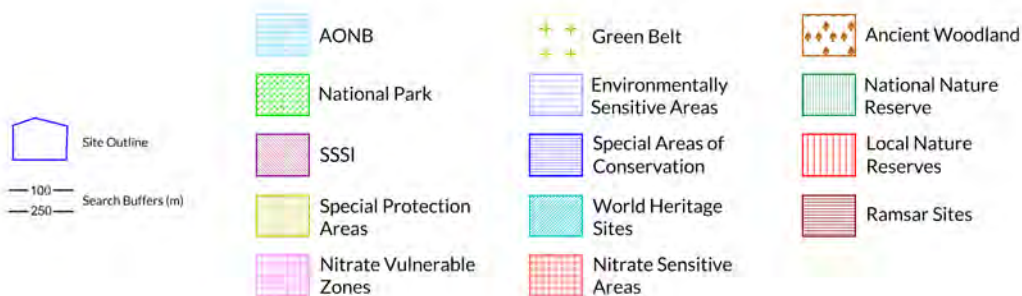
The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a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



# 8. Designated Environmentally Sensitive Sites Map



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# 8. Designated Environmentally Sensitive Sites

Designated Environmentally Sensitive Sites within 2000m of the study site	Identified
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## 8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

0

Database searched and no data found.

---

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

0

Database searched and no data found.

---

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

0

Database searched and no data found.

---

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

0

Database searched and no data found.

---

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

0

Database searched and no data found.

---



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

0

Database searched and no data found.

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

1

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

ID	Distance (m)	Direction	LNR Name	Data Source
Not shown	1798	S	Alexandra Palace & Park	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

---

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

0

Database searched and no data found.

---

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

0

Database searched and no data found.

---



# 9. Natural Hazards Findings

## 9.1 Detailed BGS GeoSure Data

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

### 9.1.1 Shrink Swell

Maximum Shrink-Swell\*\* hazard rating identified on the study site Moderate

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

Hazard
Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.

### 9.1.2 Landslides

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

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

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

### 9.1.3 Soluble Rocks

Maximum Soluble Rocks\* hazard rating identified on the study site Negligible

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

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

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

#### 9.1.4 Compressible Ground

Maximum Compressible Ground\* hazard rating identified on the study site

Negligible

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

Hazard
No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

#### 9.1.5 Collapsible Rocks

Maximum Collapsible Rocks\* hazard rating identified on the study site

Very Low

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

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

#### 9.1.6 Running Sand

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

Very Low

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

Hazard
Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

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



## 9.2 Radon

### 9.2.1 Radon Affected Areas

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

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

---

### 9.2.2 Radon Protection

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

# 10. Mining

## 10.1 Coal Mining

Coal mining areas within 75m of the study site

None identified

Database searched and no data found.

---

## 10.2 Non-Coal Mining

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

None identified

Database searched and no data found.

---

## 10.3 Brine Affected Areas

Brine affected areas within 75m of the study site

None identified

Guidance: No Guidance Required.

---



# Contact Details

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info@groundsure.com

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Keyworth, Nottingham NG12 5GG  
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Arcadis Consulting UK Ltd

Arcadis CONSULTING UK LTD, THE PITHAY,  
BRISTOL, BS1 2NL

Groundsure  
Reference:

GS-6550154

Your Reference: 14034794

Report Date

13 Jan 2020

Report Delivery  
Method:

Email - pdf

## Geo Insight

Address: 80, PALMERSTON CRESCENT, SOUTHGATE, N13 4NH

Dear Sir/ Madam,

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

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director  
Groundsure Limited

Enc.  
Groundsure Geo Insight



**Address:** 80, PALMERSTON CRESCENT, SOUTHGATE, N13 4NH  
**Date:** 13 Jan 2020  
**Reference:** GS-6550154  
**Client:** Arcadis Consulting UK Ltd

NW N NE



SW S SE

**Aerial Photograph Capture date:** 12-Aug-2016  
**Grid Reference:** 530775,192135  
**Site Size:** 0.3776ha

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# Overview of Findings

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

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

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

## Section 1: Geology 1:10,000 Scale

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

## Section 2: Geology 1:50,000 Scale

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



## Section 2: Geology 1:50,000 Scale

### 2.3 Bedrock, Solid Geology and linear features

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

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

Yes

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

No

## Section 3: Radon

### 3. Radon

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

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

3.2 Radon Protection

No radon protective measures are necessary.

## Section 4: Ground Workings

	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	15	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	1
4.3 Current Ground Workings	0	0	0	0	1

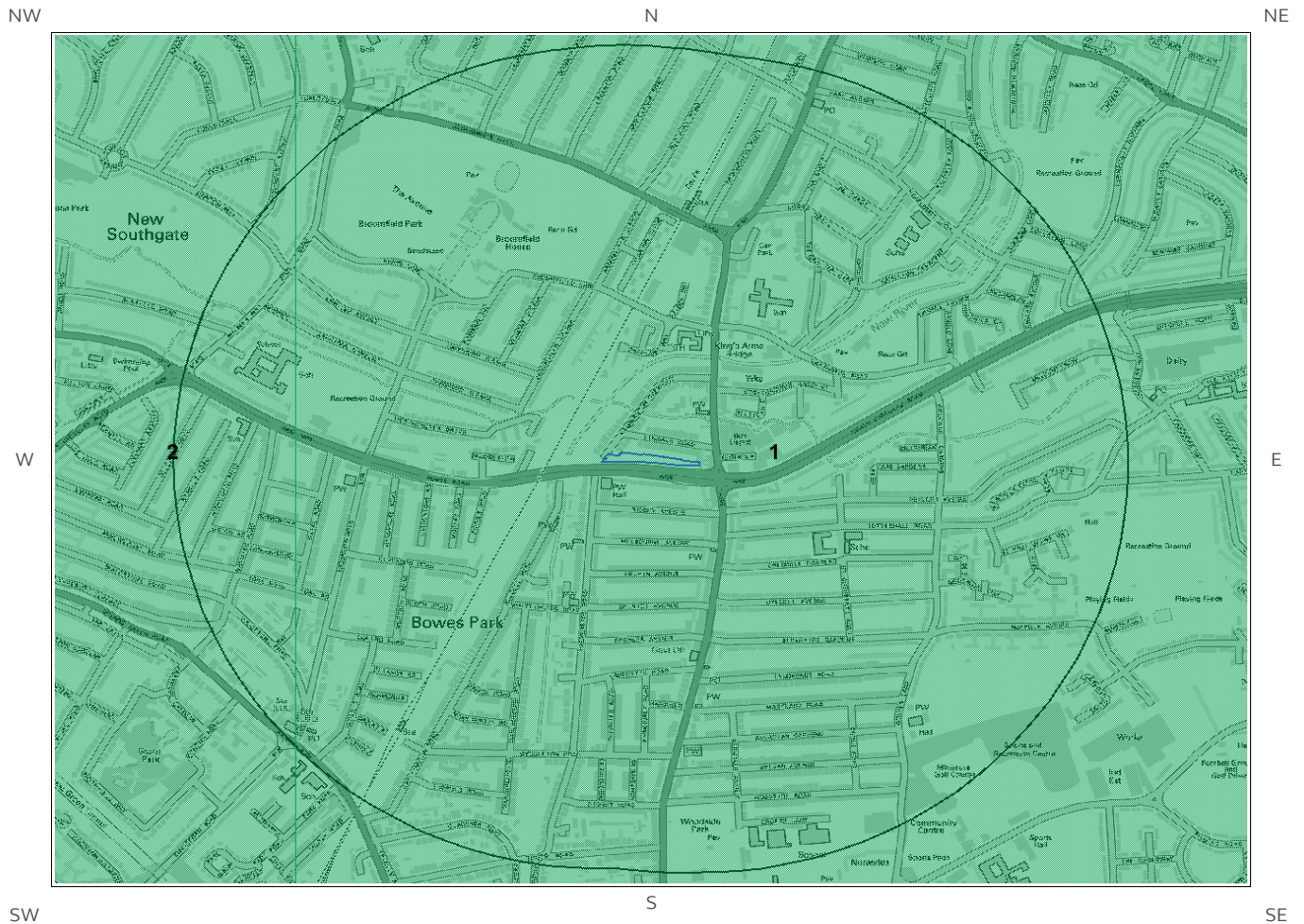
## Section 5: Mining, Extraction & Natural Cavities

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

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Cornwall and Devon Metalliferous Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Moderate				
6.2 Landslides	Very Low				
6.3 Ground Dissolution of Soluble Rocks	Negligible				
6.4 Compressible Deposits	Negligible				
6.5 Collapsible Deposits	Very Low				
6.5 Running Sand	Very Low				
Section 7: Borehole Records	On-site	0-50m	51-250		
7 BGS Recorded Boreholes	4	3	32		
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250		
8 Records of Background Soil Chemistry	1	0	0		
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500	
9.1 Tunnels	0	0	0	Not Searched	
9.2 Historical Railway and Tunnel Features	0	0	17	Not Searched	
9.3 Historical Railways	0	0	0	Not Searched	
9.4 Active Railways	0	0	14	Not Searched	
9.5 Railway Projects	0	0	0	0	

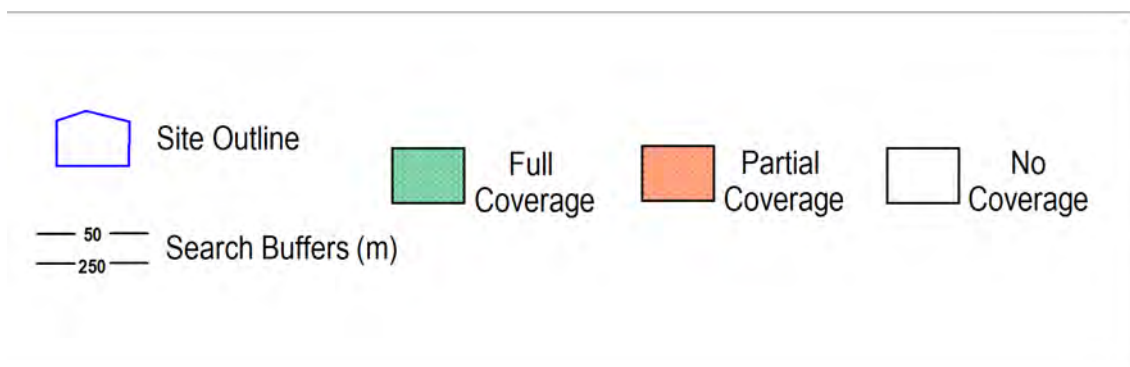


# 1:10,000 Scale Availability



1\_10,000 Availability Legend

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# Availability of 1:10,000 Scale Geology Mapping

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

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	No coverage
2	716.0	Some deposits are mapped	Full	Full	No coverage

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

The definitions of coverage are as follows:

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



# 1 Geology (1:10,000 scale).

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



**Artificial Ground Legend**

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# 1. Geology 1:10,000 scale

## 1.1 Artificial Ground

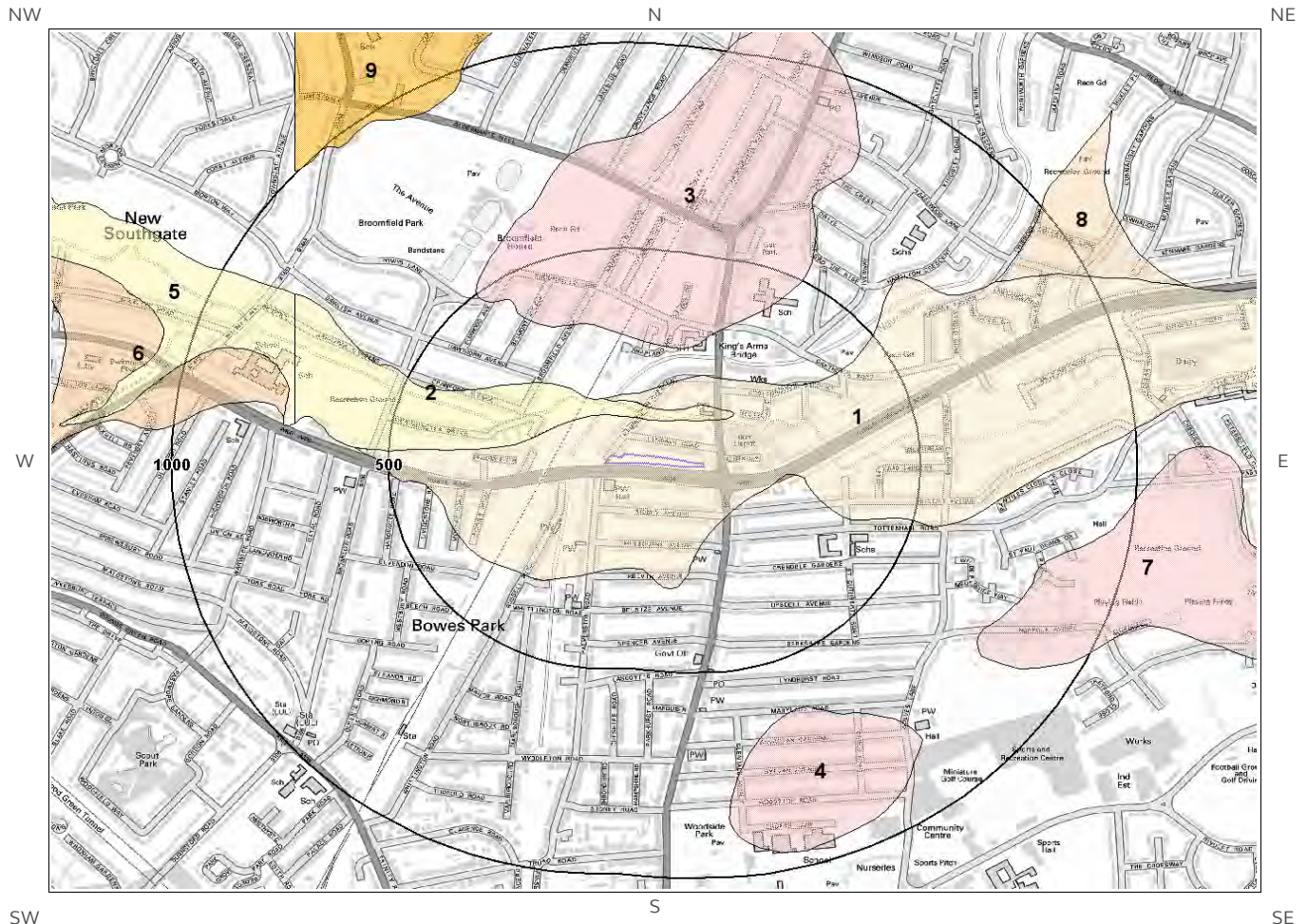
The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

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

ID	Distance	Direction	LEX Code	Description	Rock Description
1A	178.0	N	MGR- UNKNOWN	Made Ground (Undivided)	Unknown/unclassified Entry
2A	298.0	N	WMGR- UNKNOWN	Infilled Ground	Unknown/unclassified Entry
3	301.0	N	WGR- UNKNOWN	Worked Ground (Undivided)	Unknown/unclassified Entry
4	455.0	N	WGR- UNKNOWN	Worked Ground (Undivided)	Unknown/unclassified Entry

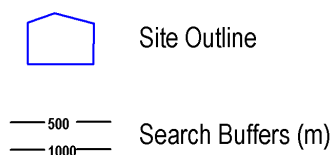


# 1.2 Superficial Deposits and Landslips map (1:10,000 scale)



Artificial Ground Legend

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# 1.2 Superficial Deposits and Landslips

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

## 1.2.1 Superficial Deposits/ Drift Geology

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	KPGR-XSV	Kempton Park Gravel Formation - Sand And Gravel	Sand And Gravel
2	86.0	N	ALV-C	Alluvium - Clay (unlithified Deposits Coding Scheme)	Clay
3	269.0	N	BHT-XSV	Boyn Hill Gravel Member - Sand And Gravel	Sand And Gravel

## 1.2.2 Landslip

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

Database searched and no data found.

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

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

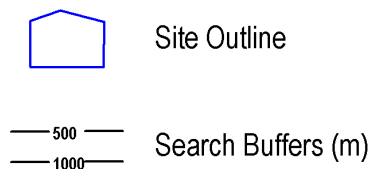


# 1.3 Bedrock and linear features map (1:10,000 scale)



**Bedrock and linear features Legend**

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## 1.3 Bedrock and linear features

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

### 1.3.1 Bedrock/ Solid Geology

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	LC-CLAY	London Clay Formation - Clay	Eocene Epoch

---

### 1.3.2 Linear features

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

Database searched and no data found at this scale.

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

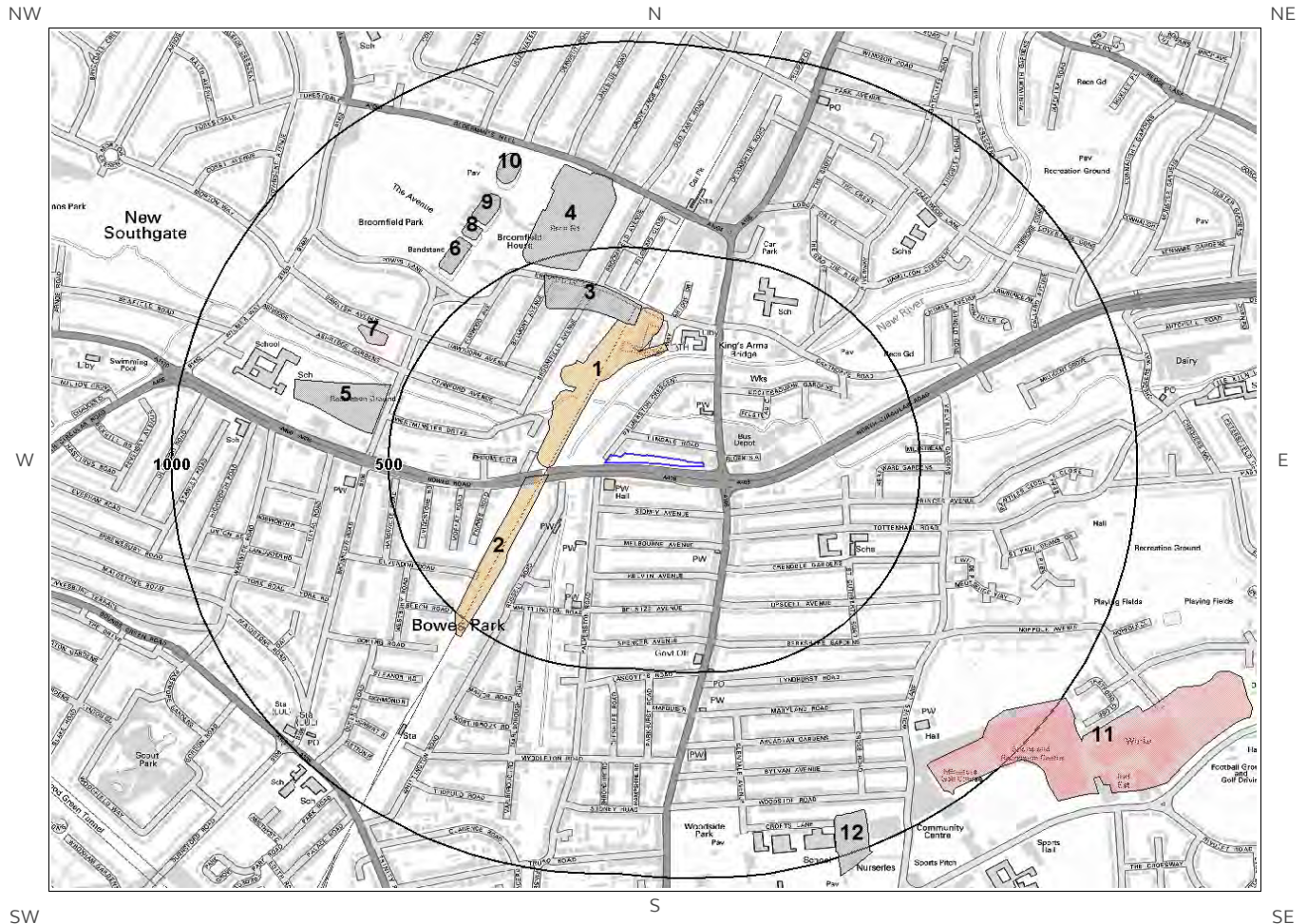
This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

---

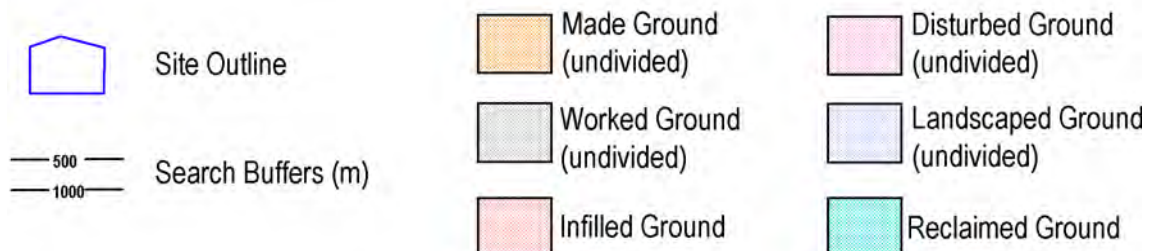


# 2 Geology 1:50,000 Scale

## 2.1 Artificial Park map



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## 2. Geology 1:50,000 scale

### 2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 256

#### 2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	106.0	NW	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	133.0	W	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	312.0	N	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
4	455.0	N	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID

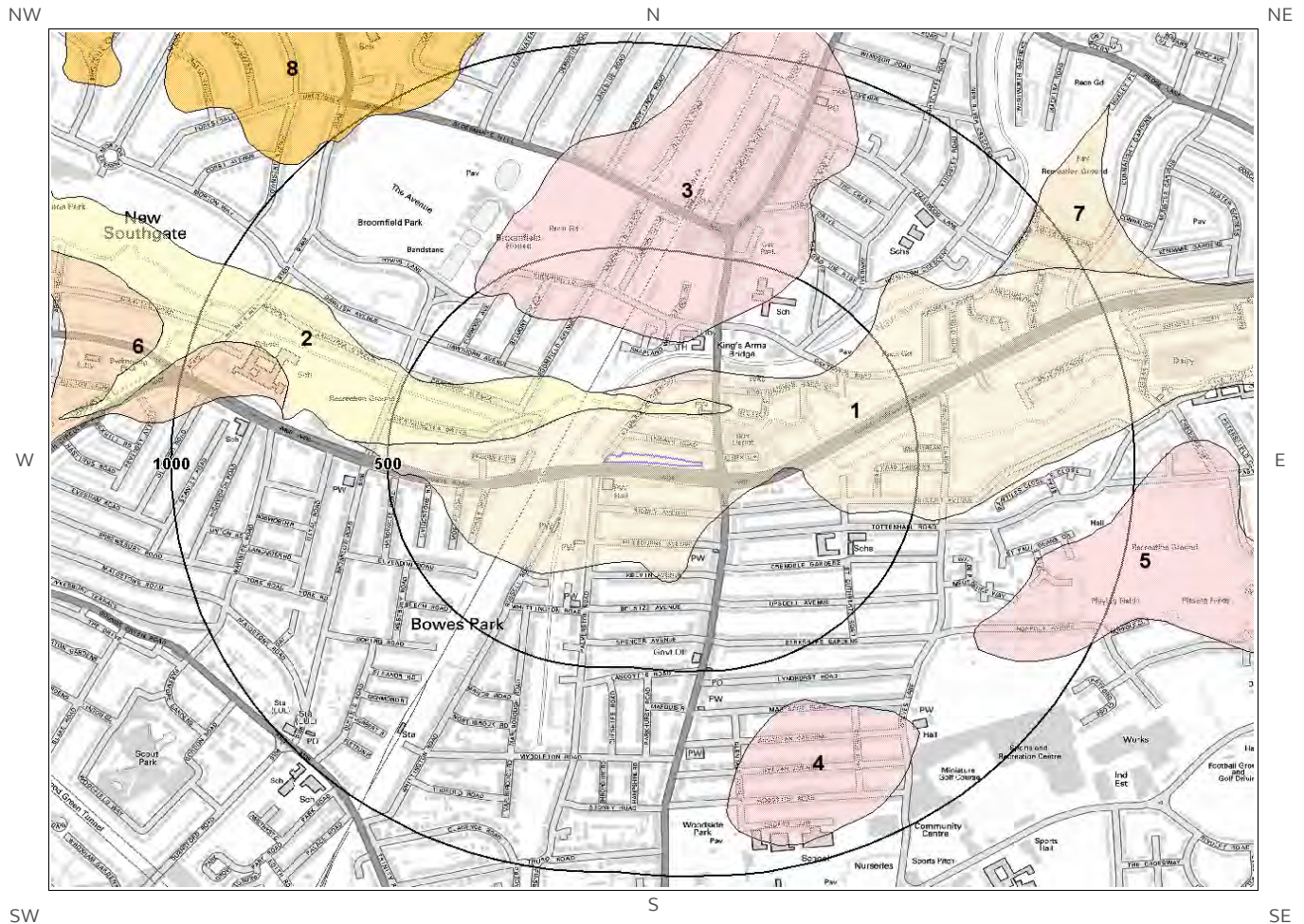
#### 2.1.2 Permeability of Artificial Ground

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

Database searched and no data found.



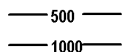
## 2.2 Superficial Deposits and Landslips map (1:50,000 scale)



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Site Outline



Search Buffers (m)

## 2.2 Superficial Deposits and Landslips

### 2.2.1 Superficial Deposits/ Drift Geology

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

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	KPGR-XSV	KEMPTON PARK GRAVEL MEMBER	SAND AND GRAVEL
2	100.0	N	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
3	281.0	N	BHT-XSV	BOYN HILL GRAVEL MEMBER	SAND AND GRAVEL

### 2.2.2 Permeability of Superficial Ground

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

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	Very High	High

### 2.2.3 Landslip

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

Database searched and no data found.

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

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

### 2.2.4 Landslip Permeability

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

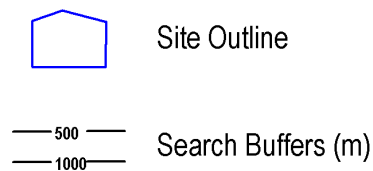
Database searched and no data found.



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



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## 2.3 Bedrock, Solid Geology & linear features

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 256

### 2.3.1 Bedrock/Solid Geology

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

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	LC-XCZS	LONDON CLAY FORMATION - CLAY, SILT AND SAND	YPRESIAN

### 2.3.2 Permeability of Bedrock Ground

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

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Moderate	Very Low

### 2.3.3 Linear features

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

Database searched and no data found.

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

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



# 3 Radon Data

## 3.1 Radon Affected Areas

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

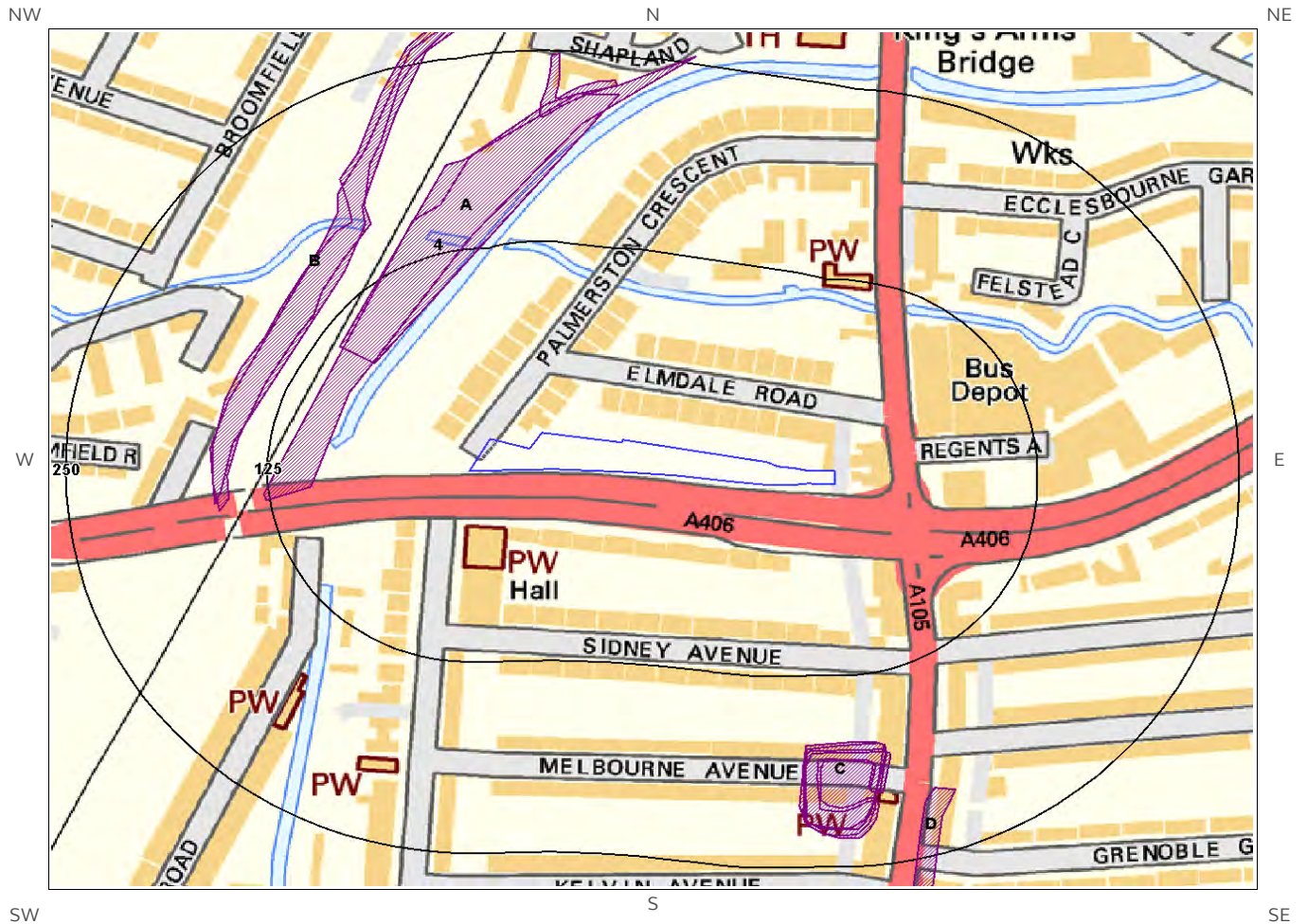
The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland,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

---

## 3.2 Radon Protection



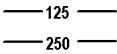


Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?      No radon protective measures are necessary.

# 4 Ground Workings map



Ground Workings Legend

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- |   |                    |   |                                  |
|---|--------------------|---|----------------------------------|
|  | Site Outline       |  | Historic Surface Ground Workings |
|  | Search Buffers (m) |  | Historic Underground Workings    |
|   |                    |  | Current Ground Workings          |



# 4 Ground Workings

## 4.1 Historical Surface Ground Working Features derived from Historical Mapping

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

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1A	87.0	NW	530722 192281	Unspecified Pit	1991
2A	87.0	NW	530722 192281	Unspecified Pit	1974
3A	87.0	NW	530722 192281	Unspecified Pit	1982
4	88.0	W	530680 192249	Unspecified Pit	1966
5B	134.0	NW	530644 192269	Unspecified Heap	1966
6B	134.0	NW	530644 192269	Unspecified Ground Workings	1951
7B	136.0	NW	530635 192269	Unspecified Ground Workings	1938
8C	169.0	S	530947 191918	Pond	1897
9C	171.0	S	530948 191917	Pond	1895
10C	174.0	S	530928 191913	Pond	1866
11C	174.0	S	530928 191913	Pond	1864
12C	175.0	S	530929 191911	Water Body	1864
13	206.0	N	530768 192375	Unspecified Ground Workings	1938
14D	207.0	S	530997 191827	Unspecified Pit	1920
15D	207.0	S	530997 191827	Unspecified Pit	1912

## 4.2 Historical Underground Working Features derived from Historical Mapping

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

Are there any Historical Underground Working Features within 1000m of the study site boundary? Yes

The following Historical Underground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
Not shown	704.0	S	530546 191246	Tunnel	1894

## 4.3 Current Ground Workings

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

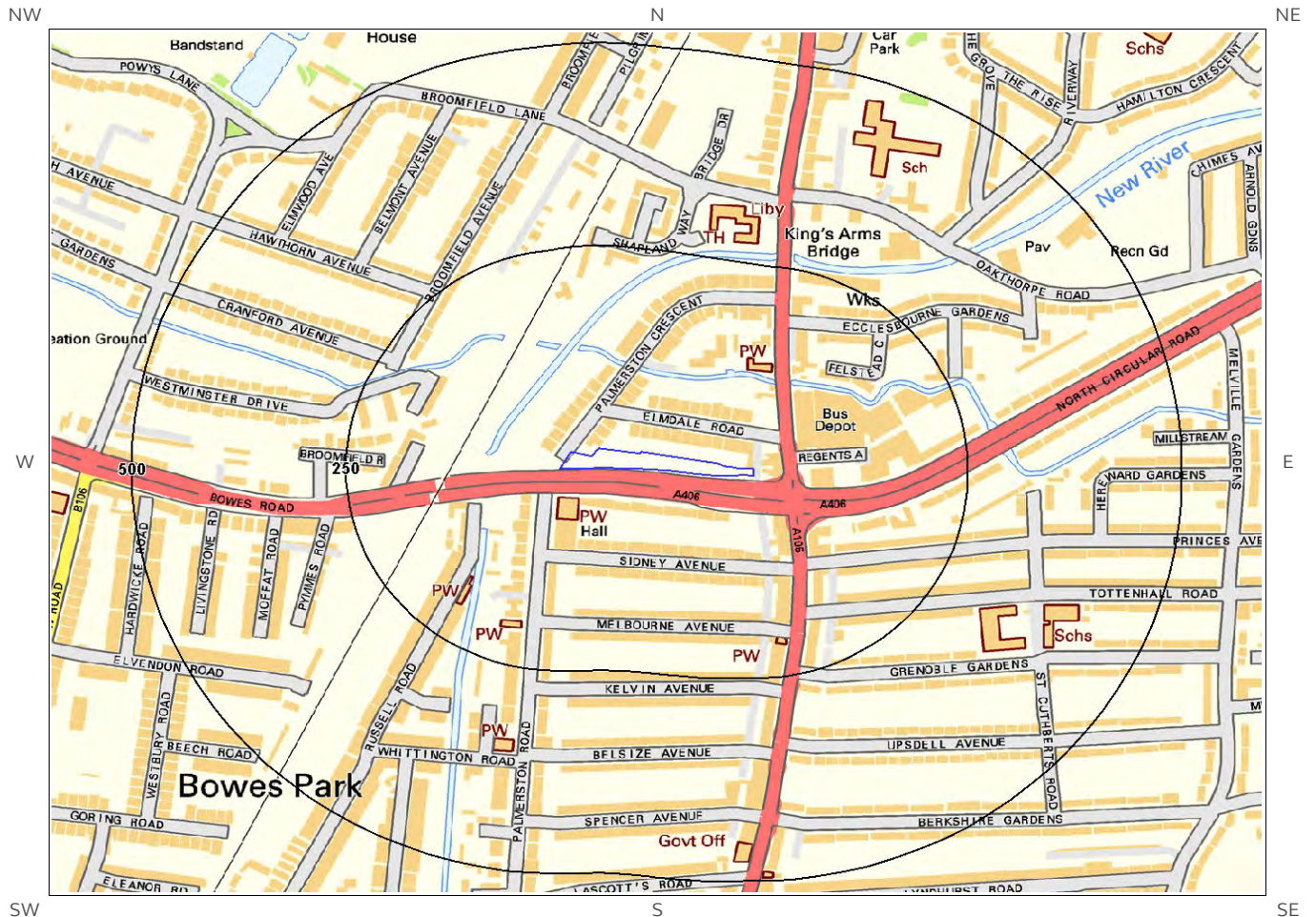
Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

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

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	606.0	NW	530188 192419	Sand & Gravel	Broomfield Farm Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

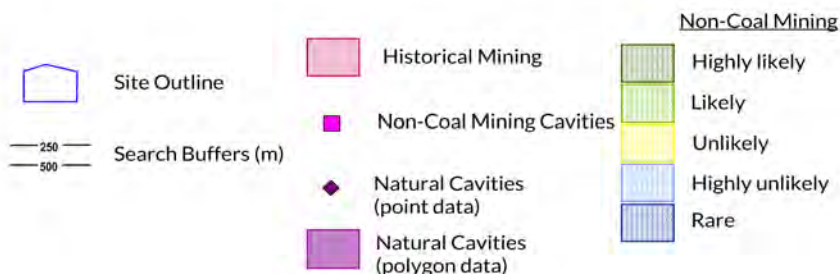


# 5 Mining, Extraction & Natural Cavities map



Mining, Extraction and  
Natural Cavities Legend

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# 5 Mining, Extraction & Natural Cavities

## 5.1 Historical Mining

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

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

Database searched and no data found.

---

## 5.2 Coal Mining

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

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

Database searched and no data found.

---

## 5.3 Johnson Poole and Bloomer

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

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

The following information provided by JPB is not represented on mapping: Database searched and no data found.

---

## 5.4 Non-Coal Mining

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

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

Database searched and no data found.

---



## 5.5 Non-Coal Mining Cavities

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

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

---

## 5.6 Natural Cavities

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

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

---

## 5.7 Brine Extraction

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

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

---

## 5.8 Gypsum Extraction

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

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

---

## 5.9 Cornwall and Devon Metalliferous Mining

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

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

Database searched and no data found.

---

## 5.10 Clay Mining

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

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

No

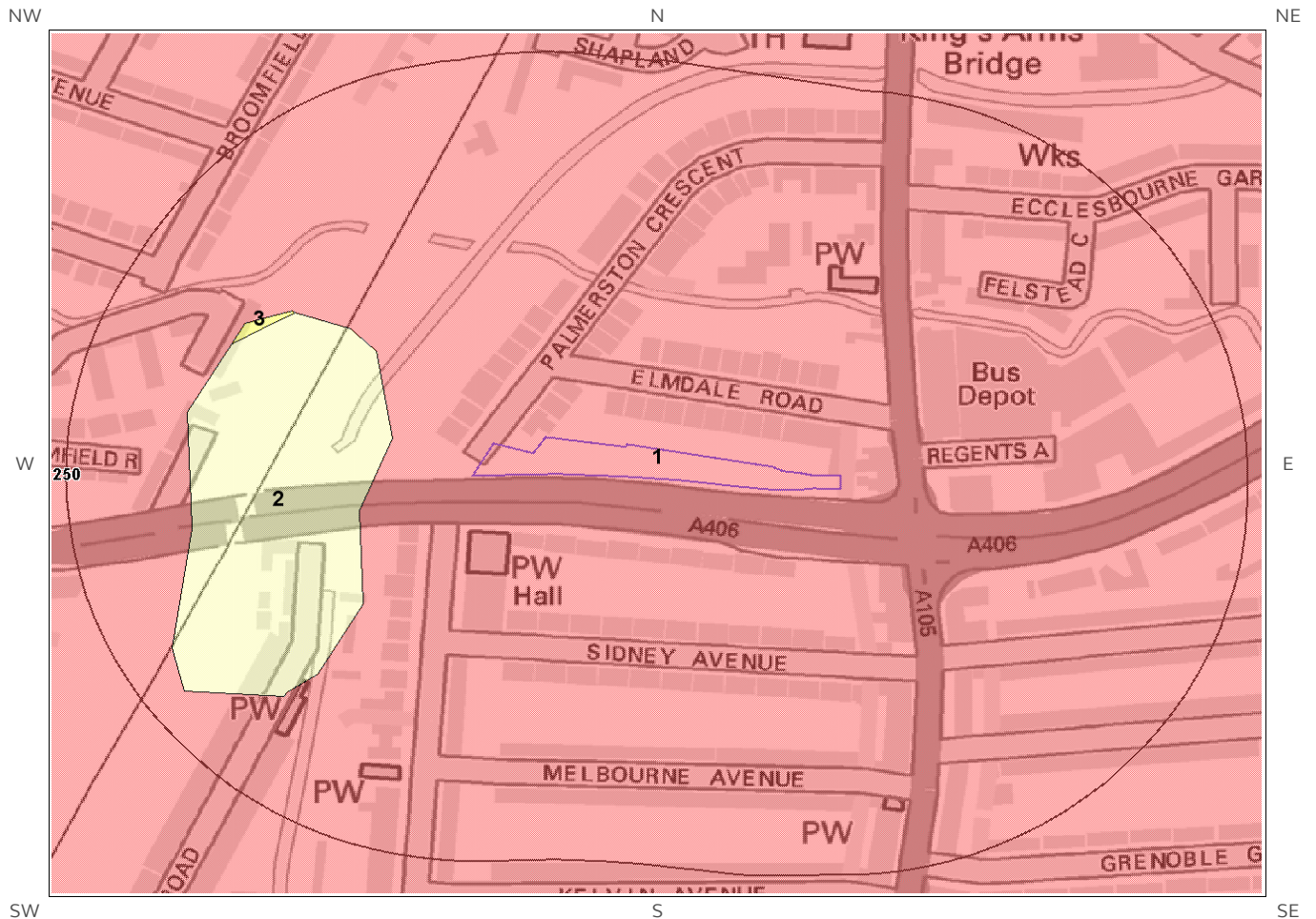
Database searched and no data found.

---



# 6 Natural Ground Subsidence

## 6.1 Shrink-Swell Clay map

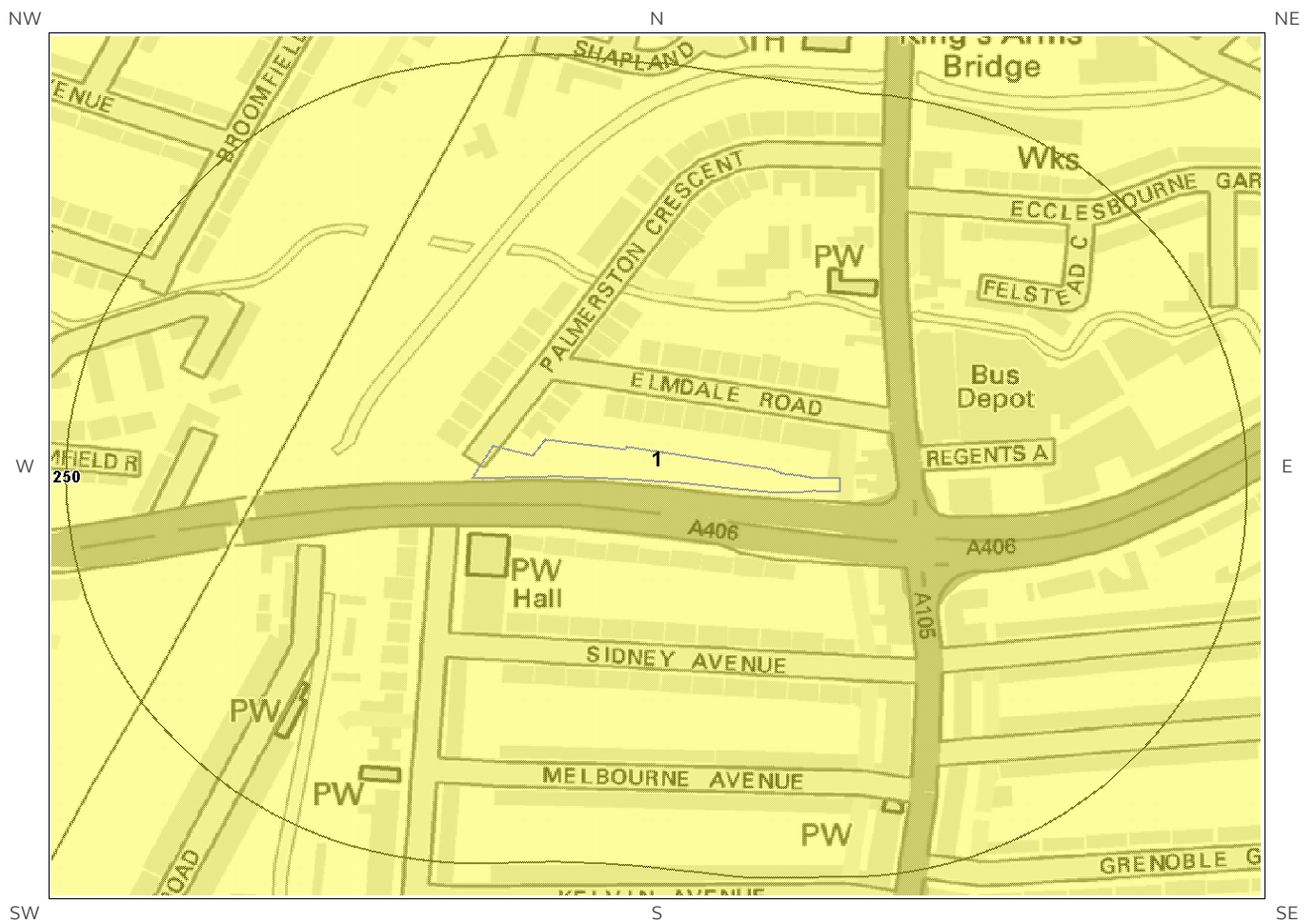


Shrink Swell Clay Legend

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## 6.2 Landslides map



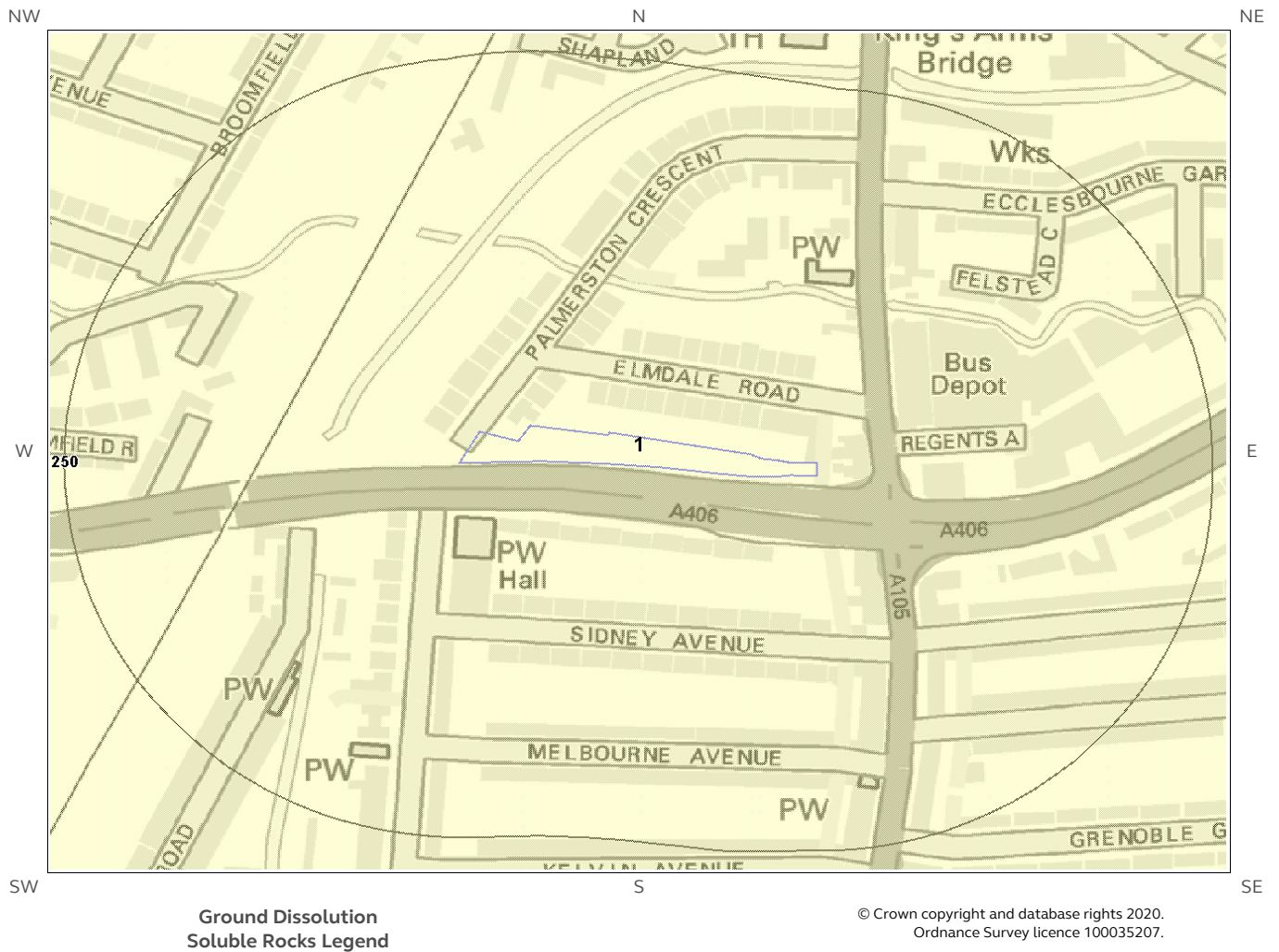
Landslides Legend

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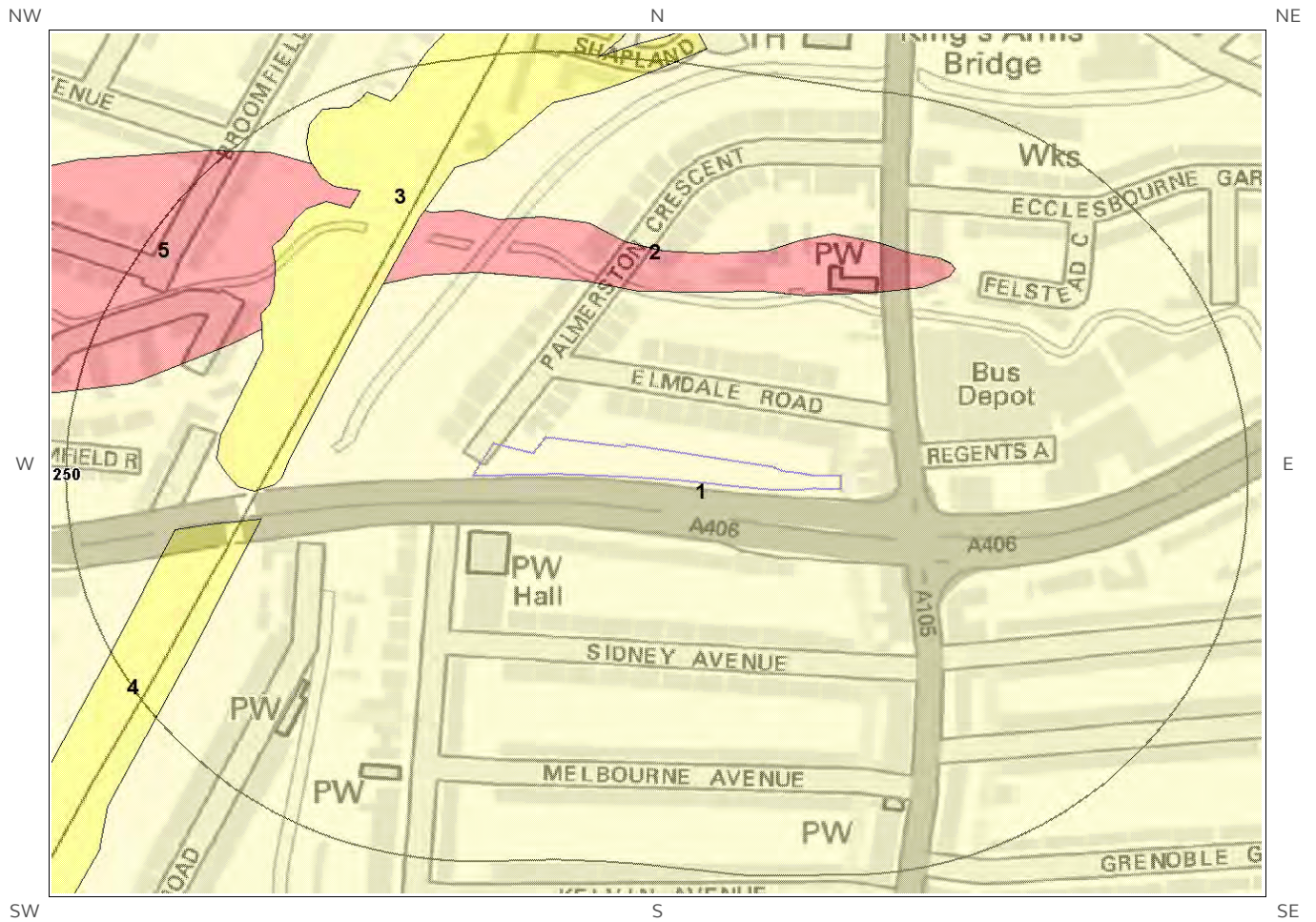




## 6.3 Ground Dissolution of Soluble Rocks map



## 6.4 Compressible Deposits map

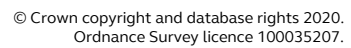


Compressible Deposits Legend

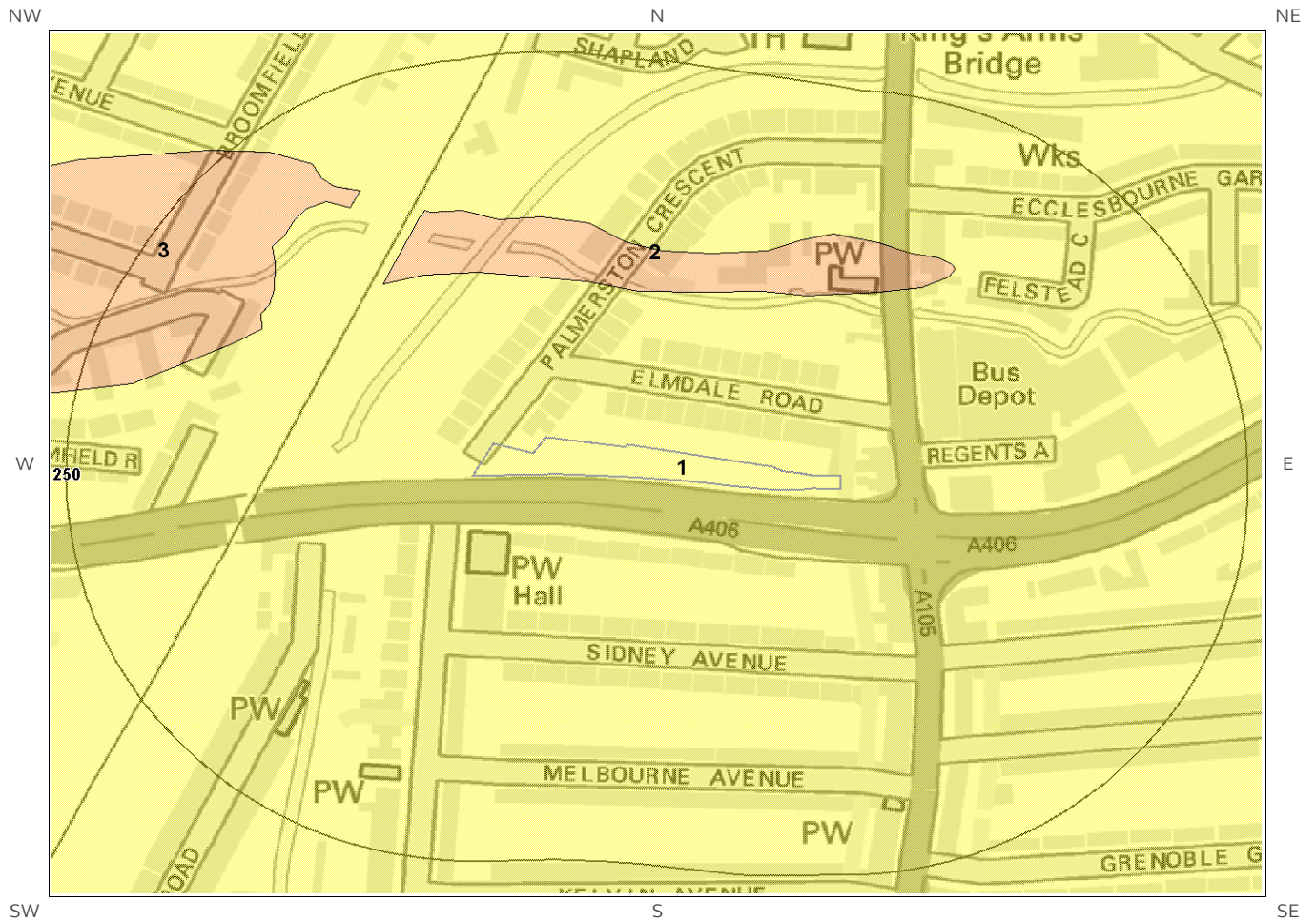
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## 6.6 Running Sand map



Running Sand Legend

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## 6 Natural Ground Subsidence

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

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

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

### 6.1 Shrink-Swell Clays

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Moderate	Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.

### 6.2 Landslides

The following Landslides information provided by the British Geological Survey:

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

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

## 6.3 Ground Dissolution of Soluble Rocks

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

## 6.4 Compressible Deposits

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

## 6.5 Collapsible Deposits

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

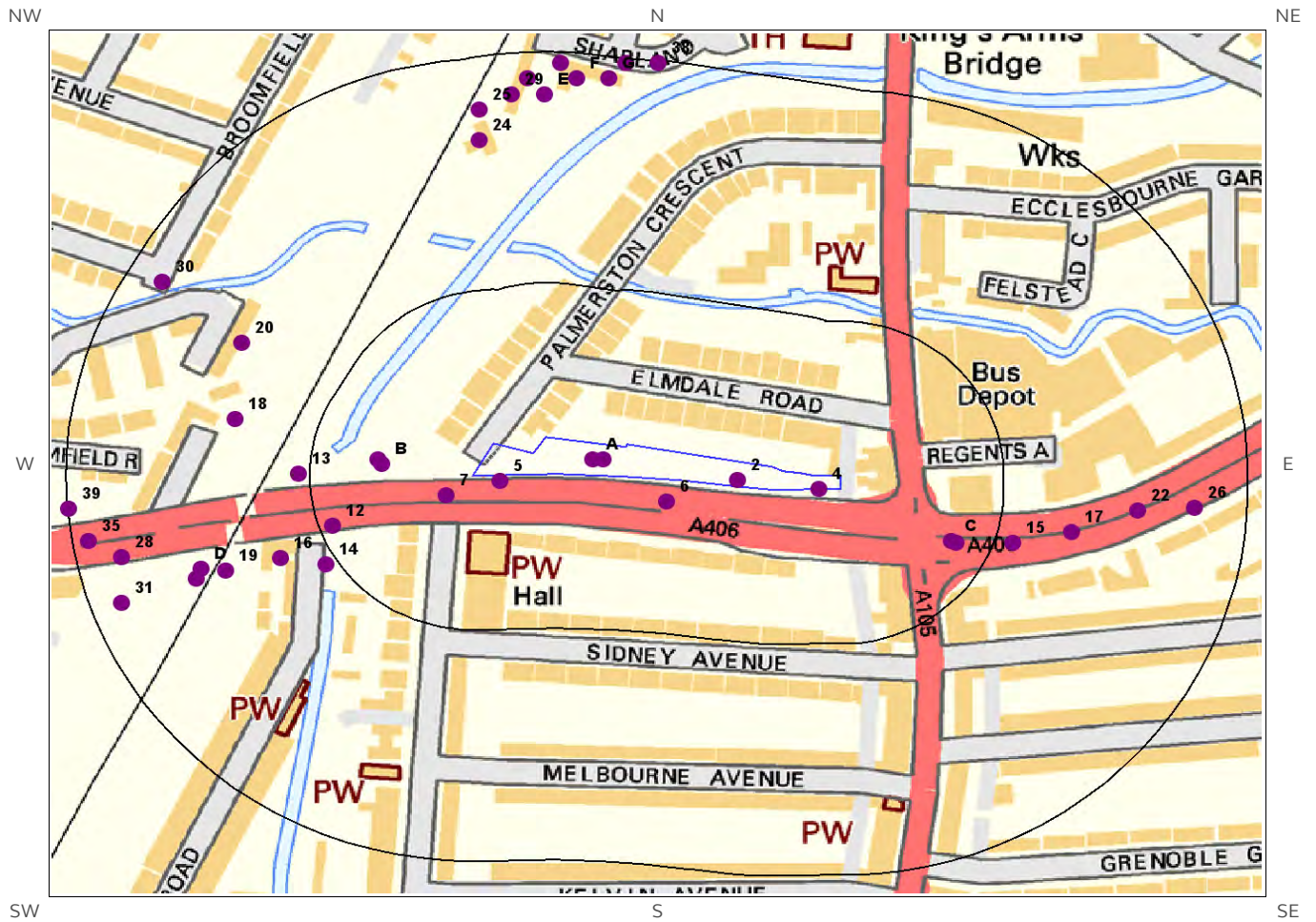
## 6.6 Running Sands

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

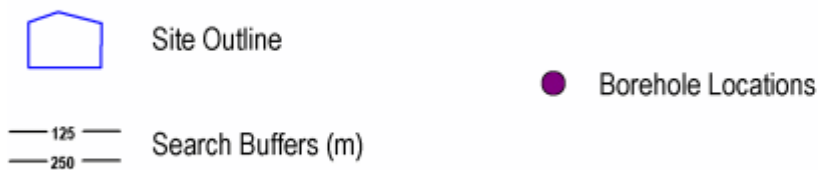


# 7 Borehole Records map



Borehole Records Legend

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# 7 Borehole Records

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

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

39

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1A	0.0	On Site	530790 192133	TQ39SW181	3	A406 NORTH CIRCULAR RD 62
2	0.0	On Site	530879 192120	TQ39SW184	4	A406 NORTH CIRCULAR RD 65
3A	0.0	On Site	530796 192133	TQ39SW182	9	A406 NORTH CIRCULAR RD 63
4	0.0	S	530929 192114	TQ39SW185	30	A406 NORTH CIRCULAR RD 66
5	4.0	S	530733 192119	TQ39SW180	40	A406 NORTH CIRCULAR RD BH61
6	15.0	S	530835 192106	TQ39SW183	25.5	A406 NORTH CIRCULAR RD 64
7	21.0	SW	530700 192110	TQ39SW79	9.75	MIDDLESEX C/COUNCIL MH327
8B	57.0	W	530660 192130	TQ39SW199	No details	BOWES ROAD
9B	59.0	W	530658 192133	TQ39SW179	3	A406 NORTH CIRCULAR RD TP 60
10C	76.0	SE	531010 192080	TQ39SW78	10.97	MIDDLESEX C/COUNCIL MH326
11C	79.0	SE	531013 192079	TQ39SW186	4	A406 NORTH CIRCULAR RD 67
12	92.0	W	530630 192090	TQ39SW80	10.36	MIDDLESEX C/COUNCIL BH116
13	107.0	W	530609 192124	TQ39SW177	10	A406 NORTH CIRCULAR RD 58
14	107.0	SW	530626 192065	TQ39SW178	3	A406 NORTH CIRCULAR RD TP 59
15	111.0	E	531048 192079	TQ39SW187	6.5	A406 NORTH CIRCULAR RD 69
16	130.0	SW	530598 192069	TQ39SW176	10	A406 NORTH CIRCULAR RD 57
17	144.0	E	531084 192086	TQ39SW188	4	A406 NORTH CIRCULAR RD 70
18	151.0	W	530570 192159	TQ39SW172	10	A406 NORTH CIRCULAR RD 53
19	164.0	W	530564 192061	TQ39SW175	15	A406 NORTH CIRCULAR RD 56
20	166.0	NW	530574 192209	TQ39SW173	10	A406 NORTH CIRCULAR RD 54
21D	178.0	W	530549 192062	TQ39SW171	15	A406 NORTH CIRCULAR RD 52
22	183.0	E	531125 192100	TQ39SW189	25	A406 NORTH CIRCULAR RD BH71



ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
23D	183.0	W	530546 192056	TQ39SW170	3	A406 NORTH CIRCULAR RD TP 51
24	196.0	N	530720 192340	TQ39SW452	20	OLD COUNCIL DEPOT GREEN LANES 1
25	216.0	N	530720 192360	TQ39SW547	20	SOUTHGATE TOWN HALL BH1
26	218.0	E	531160 192102	TQ39SW190	6	A406 NORTH CIRCULAR RD 72
27E	222.0	N	530760 192370	TQ39SW463	15	OLD COUNCIL DEPOT GREEN LANES 14
28	223.0	W	530500 192070	TQ39SW81	11.35	MIDDLESEX C/COUNCIL MH328
29	223.0	N	530740 192370	TQ39SW462	14	OLD COUNCIL DEPOT GREEN LANES 13
30	229.0	NW	530525 192248	TQ39SW174	20	A406 NORTH CIRCULAR RD 55
31	232.0	W	530500 192040	TQ39SW560	6.05	BOWES ROAD ENFIELD BH1
32E	232.0	N	530750 192380	TQ39SW470	4	OLD COUNCIL DEPOT GREEN LANES TP 7
33F	233.0	N	530780 192380	TQ39SW471	3.4	OLD COUNCIL DEPOT GREEN LANES TP 8
34G	235.0	N	530800 192380	TQ39SW461	10.2	OLD COUNCIL DEPOT GREEN LANES 12
35	240.0	W	530480 192080	TQ39SW561	6.15	BOWES ROAD ENFIELD BH2
36F	242.0	N	530770 192390	TQ39SW456	20	OLD COUNCIL DEPOT GREEN LANES 5
37G	246.0	N	530810 192390	TQ39SW472	3.4	OLD COUNCIL DEPOT GREEN LANES TP 9
38	248.0	N	530830 192390	TQ39SW455	13.1	OLD COUNCIL DEPOT GREEN LANES 4
39	249.0	W	530468 192101	TQ39SW169	4	A406 NORTH CIRCULAR RD TP 50

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

#1A: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804124](https://scans.bgs.ac.uk/sobi_scans/boreholes/804124)  
#2: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804127](https://scans.bgs.ac.uk/sobi_scans/boreholes/804127)  
#3A: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804125](https://scans.bgs.ac.uk/sobi_scans/boreholes/804125)  
#4: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804128](https://scans.bgs.ac.uk/sobi_scans/boreholes/804128)  
#5: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804123](https://scans.bgs.ac.uk/sobi_scans/boreholes/804123)  
#6: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804126](https://scans.bgs.ac.uk/sobi_scans/boreholes/804126)  
#7: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804020](https://scans.bgs.ac.uk/sobi_scans/boreholes/804020)  
#9B: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804122](https://scans.bgs.ac.uk/sobi_scans/boreholes/804122)  
#10C: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804019](https://scans.bgs.ac.uk/sobi_scans/boreholes/804019)  
#11C: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804129](https://scans.bgs.ac.uk/sobi_scans/boreholes/804129)  
#12: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804021](https://scans.bgs.ac.uk/sobi_scans/boreholes/804021)  
#13: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804120](https://scans.bgs.ac.uk/sobi_scans/boreholes/804120)  
#14: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804121](https://scans.bgs.ac.uk/sobi_scans/boreholes/804121)  
#15: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804130](https://scans.bgs.ac.uk/sobi_scans/boreholes/804130)  
#16: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804119](https://scans.bgs.ac.uk/sobi_scans/boreholes/804119)  
#17: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804131](https://scans.bgs.ac.uk/sobi_scans/boreholes/804131)  
#18: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804115](https://scans.bgs.ac.uk/sobi_scans/boreholes/804115)  
#19: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804118](https://scans.bgs.ac.uk/sobi_scans/boreholes/804118)  
#20: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804116](https://scans.bgs.ac.uk/sobi_scans/boreholes/804116)  
#21D: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804114](https://scans.bgs.ac.uk/sobi_scans/boreholes/804114)  
#22: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804132](https://scans.bgs.ac.uk/sobi_scans/boreholes/804132)  
#23D: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804113](https://scans.bgs.ac.uk/sobi_scans/boreholes/804113)  
#24: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709281](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709281)  
#25: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709961](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709961)  
#26: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804133](https://scans.bgs.ac.uk/sobi_scans/boreholes/804133)  
#27E: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709297](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709297)  
#28: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804022](https://scans.bgs.ac.uk/sobi_scans/boreholes/804022)  
#29: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709296](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709296)  
#30: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804117](https://scans.bgs.ac.uk/sobi_scans/boreholes/804117)  
#31: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12710060](https://scans.bgs.ac.uk/sobi_scans/boreholes/12710060)  
#32E: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709304](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709304)  
#33F: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709305](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709305)  
#34G: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709295](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709295)  
#35: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12710061](https://scans.bgs.ac.uk/sobi_scans/boreholes/12710061)  
#36F: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709290](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709290)  
#37G: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709306](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709306)  
#38: [scans.bgs.ac.uk/sobi\\_scans/boreholes/12709289](https://scans.bgs.ac.uk/sobi_scans/boreholes/12709289)  
#39: [scans.bgs.ac.uk/sobi\\_scans/boreholes/804112](https://scans.bgs.ac.uk/sobi_scans/boreholes/804112)

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# 8 Estimated Background Soil Chemistry

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

1

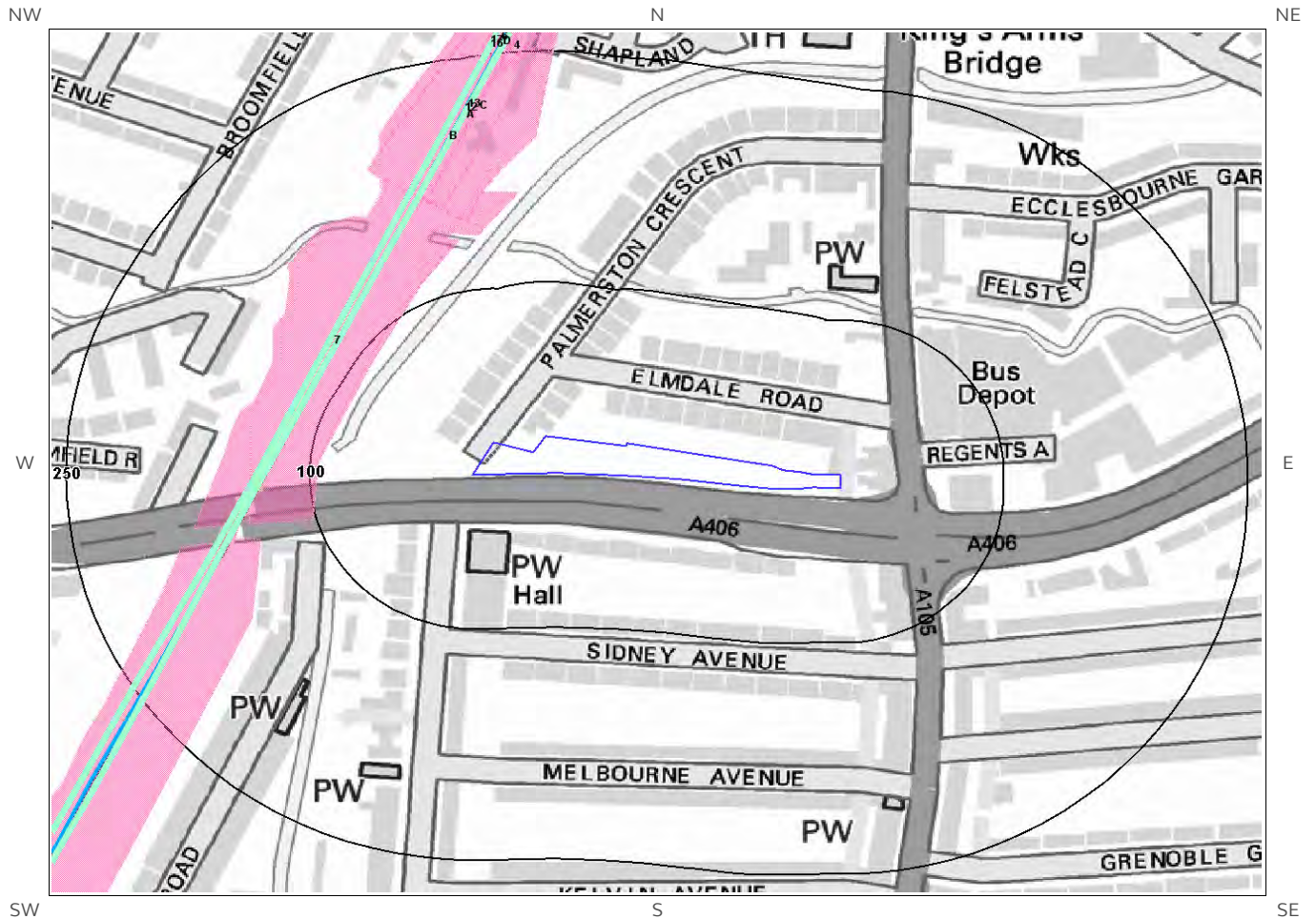
For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	London	No data	No data	No data	No data	No data

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

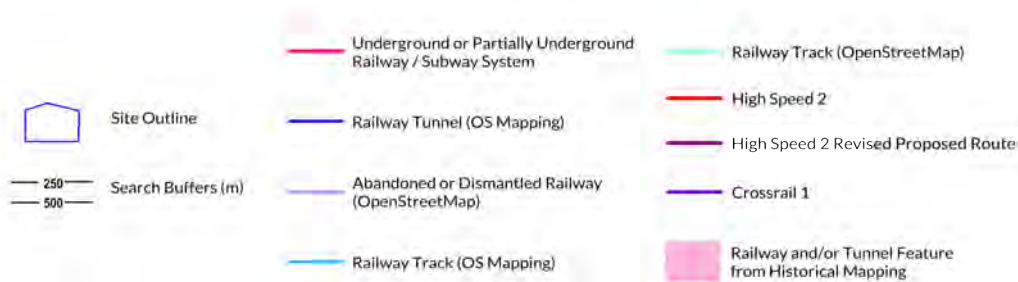
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# 9 Railways and Tunnels map



Railways and Tunnels Legend

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# 9 Railways and Tunnels

## 9.1 Tunnels

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

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

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

Database searched and no data found.

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

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

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

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

Database searched and no data found.

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

## 9.2 Historical Railway and Tunnel Features

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

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

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

ID	Distance (m)	Direction	NGR	Details	Date
7	88	NW	n/a	Railway	1896
8	90	NW	n/a	Railway	1914
9B	106	NW	n/a	Railways	1937
10B	106	NW	n/a	Railways	1896
11B	106	NW	n/a	Railways	1915
1A	144	N	530798 192506	Railway Sidings	1920
2A	144	N	530798 192506	Railway Sidings	1912
3C	156	N	530843 192581	Railway Sidings	1966

ID	Distance (m)	Direction	NGR	Details	Date
12	168	N	530799 192516	Railway Sidings	1956
13	168	N	530739 192404	Railway Sidings	1956
14C	170	N	530810 192517	Railway Sidings	1936
15D	171	N	530813 192516	Railway Sidings	1914
4	227	N	530753 192411	Railway Sidings	1951
16	236	N	n/a	Railway	1936
5D	239	N	530832 192558	Railway Sidings	1938
17	243	N	n/a	Railway	1896
6	249	N	530754 192424	Railway Sidings	1938

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

### 9.3 Historical Railways

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

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

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

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above

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

### 9.4 Active Railways

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

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

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

Distance (m)	Direction	Name	Type
114	NW	Hertford Loop Line	rail
114	NW	Not given	Multi Track
114	NW	Not given	Multi Track
114	NW	Hertford Loop Line	rail
118	NW	Hertford Loop Line	rail
118	NW	Hertford Loop Line	rail
133	W	Hertford Loop Line	rail
133	W	Hertford Loop Line	rail
136	W	Hertford Loop Line	rail
136	W	Hertford Loop Line	rail



Distance (m)	Direction	Name	Type
171	W	Hertford Loop Line	rail
171	W	Hertford Loop Line	rail
175	W	Hertford Loop Line	rail
175	W	Hertford Loop Line	rail

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

## 9.5 Railway Projects

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

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

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

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

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

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

# Contact Details

Groundsure Helpline  
Telephone: 08444 159 000  
info@groundsure.com



## British Geological Survey Enquiries

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Fax: 0115 936 3276.  
Email: [enquiries@bgs.ac.uk](mailto:enquiries@bgs.ac.uk)  
Web: [www.bgs.ac.uk](http://www.bgs.ac.uk)



BGS Geological Hazards Reports and general geological enquiries

## British Gypsum

British Gypsum Ltd  
East Leake  
Loughborough  
Leicestershire  
LE12 6HX



## The Coal Authority

200 Lichfield Lane  
Mansfield  
Notts NG18 4RG  
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DX 716176 Mansfield 5  
[www.coal.gov.uk](http://www.coal.gov.uk)



## Public Health England

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Email: [enquiries@phe.gov.uk](mailto:enquiries@phe.gov.uk)  
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# Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:  
<https://www.groundsure.com/terms-and-conditions-jan-2020/>



## **APPENDIX C**

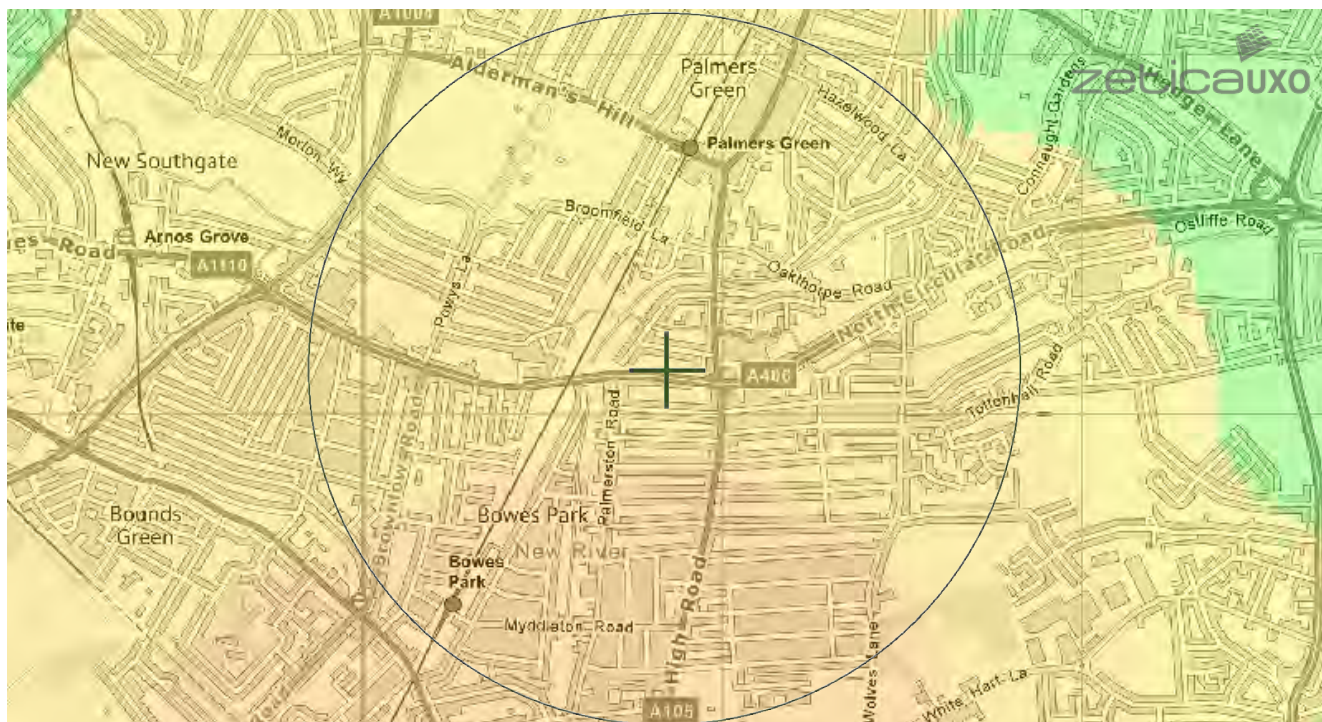
### **Zetica UXO Map and Pre-Desk Study Assessment**

# UNEXPLODED BOMB RISK MAP



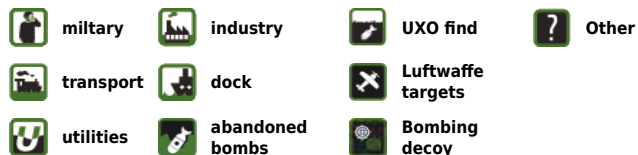
## SITE LOCATION

Map Centre: 530850,192127



## LEGEND

### London Bomb Risk



### How to use your Unexploded Bomb (UXB) risk map?

The map indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing.

You can incorporate the map into your preliminary risk assessment\* for potential Unexploded Ordnance (UXO) for a site. Using this map, you can make an informed decision as to whether more in-depth detailed risk assessment\* is necessary.

### Relative UXB risk across London

The relative risk for the London area is established by plotting the recorded bombing densities.

These are represented as counts of high explosive bombs in km2 area. The areas coloured green represent a record of less than 10 bombs per km2.

Compared to other areas of the UK, this still represents a significant density. However, this is much lower than parts of Central London, where the red colouration indicates in excess of 150 bombs falling per km2, representing a very significant bombing density.

### What do I do if my site is in a moderate or high density area?

Generally, we recommend that a detailed UXO desk study and risk assessment is undertaken for sites with a moderate or high bombing density.

Similarly, if your site is near to a designated Luftwaffe target or bombing decoy then additional detailed research is recommended.

More often than not, this further detailed research will conclude that the potential for a significant UXO hazard to be present on your site is actually low.

**Never plan site work or undertake a risk assessment using these maps alone. More detail is required, particularly where there may be a source of UXO from other military operations which are not reflected on these maps.**

### If my site is in a low risk area, do I need to do anything?

If both the map and other research confirms that there is a low potential for UXO to be present on your site then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

A low risk really means that there is no greater probability of encountering UXO than anywhere else in the UK.

If you are unsure whether other sources of UXO may be present, you can ask for one of our **pre-desk study assessments (PDSA)**

### If I have any questions, who do I contact?

tel: +44 (0) 1993 886682  
email: [uxo@zetica.com](mailto:uxo@zetica.com)  
web: [www.zeticauxo.com](http://www.zeticauxo.com)

The information in this UXB risk map is derived from a number of sources and should be used in conjunction with the accompanying notes on our website: (<https://zeticauxo.com/downloads-and-resources/risk-maps/>)

Zetica cannot guarantee the accuracy or completeness of the information or data used and cannot accept any liability for any use of the maps. These maps can be used as part of a technical report or similar publication, subject to acknowledgment. The copyright remains with Zetica Ltd.

It is important to note that this map is not a UXO risk assessment and should not be reported as such when reproduced.

\*Preliminary and detailed UXO risk assessments are advocated as good practice by industry guidance such as CIRIA C681 'Unexploded Ordnance (UXO), a guide for the construction industry'.



## Pre-Desk Study Assessment

<b>Site:</b>	Palmerston Crescent and Bowed Road, Southgate, London
<b>Client:</b>	Arcadis
<b>Contact:</b>	Alison Pugh
<b>Date:</b>	3 <sup>rd</sup> January 2020
<b>Pre-WWI Military Activity on or Affecting the Site</b>	None identified.
<b>WWI Military Activity on or Affecting the Site</b>	None identified.
<b>WWI Strategic Targets (within 5km of Site)</b>	<p>The following strategic targets were located in the vicinity of the Site:</p> <ul style="list-style-type: none"> <li>■ Transport infrastructure and public utilities.</li> <li>■ Industries important to the war effort, including munitions, metal and engineering works.</li> <li>■ Military training areas.</li> <li>■ Anti-Aircraft (AA) guns.</li> </ul>
<b>WWI Bombing</b>	None identified on the Site.
<b>Interwar Military Activity on or Affecting the Site</b>	None identified.
<b>WWII Military Activity on or Affecting the Site</b>	None identified.
<b>WWII Strategic Targets (within 5km of Site)</b>	<p>The following strategic targets were located in the vicinity of the Site:</p> <ul style="list-style-type: none"> <li>■ Transport infrastructure and public utilities.</li> <li>■ Industries important to the war effort, including metal and engineering works.</li> <li>■ Military camps and training areas.</li> <li>■ AA and anti-invasion defences.</li> </ul>
<b>WWII Bombing Decoys (within 5km of Site)</b>	None.
<b>WWII Bombing</b>	<p>During WWII the Site was located in the Municipal Borough (MB) of Southgate, which officially recorded 221No. High Explosive (HE) bombs with a bombing density of 60.2 bombs per 405 hectares (ha).</p> <p>Readily available records have been found to indicate that several HE bombs fell in close proximity to the Site.</p>
<b>Post-WWII Military Activity on or affecting the Site</b>	None identified.
<b>Recommendation</b>	It is recommended that a detailed desk study is commissioned to assess, and potentially zone, the Unexploded Ordnance (UXO) hazard level on the Site.

This summary is based on a cursory review of readily available records. Caution is advised if you plan to action work based on this summary. It is possible that further research may change the level of identified hazard.

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