

**TFL_PSF_9131 SITE
INVESTIGATIONS: SMALL SITES
INITIATIVE
108 PALMERSTON CRESCENT,
N13 4NH**

Geotechnical and Geo-Environmental Desk Study

FEBRUARY 2020



108 Palmerston Crescent, N13 4NH

Geotechnical and Geo-Environmental Desk Study

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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 a site 108 Palmerston Crescent, 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.

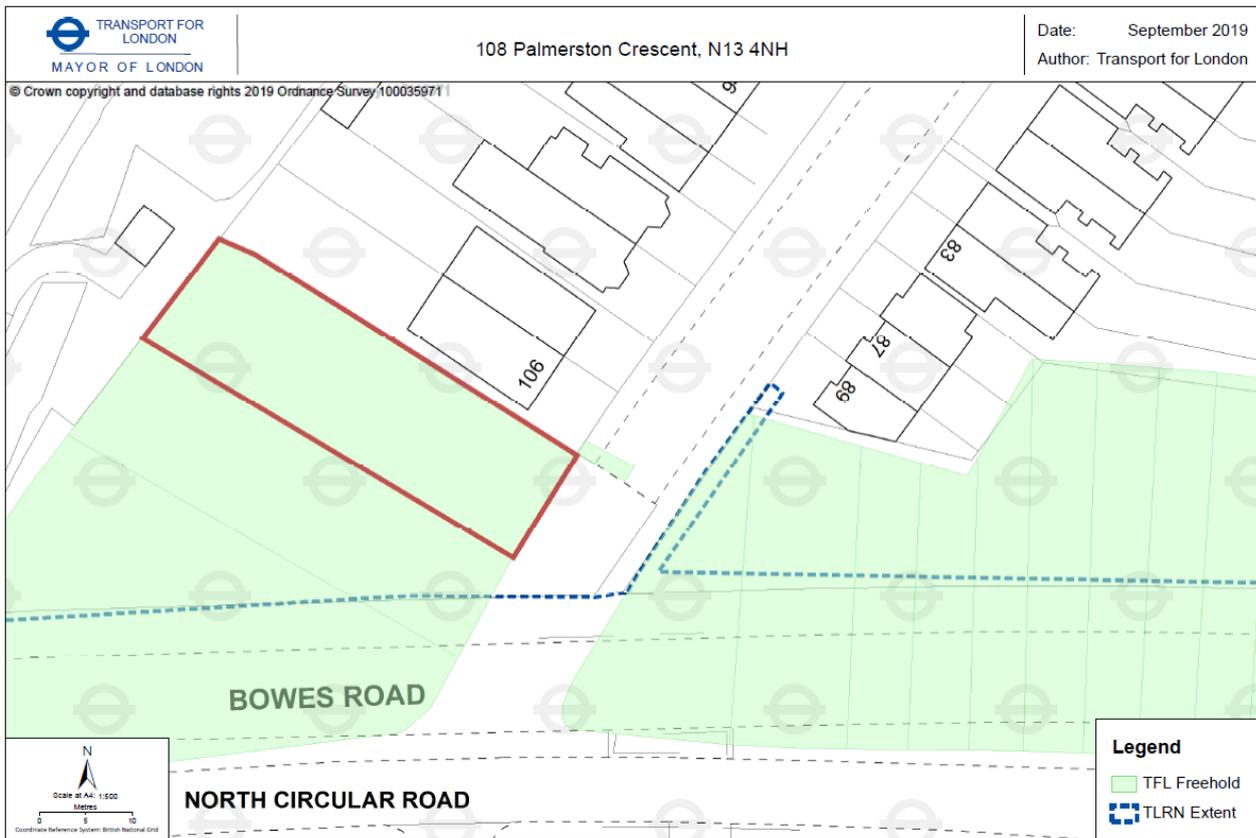


Figure 1: Site Location Plan provided by TfL

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 Landmark 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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2 SITE SETTING AND HISTORY

2.1 Site Location

Table 2.1: Details relating to Site Location

Site Location / Address	108 Palmerston Crescent, N13 4NH
National Grid Reference	530687, 192145
Approximate Site Area	The site covers an area of approximately 0.057 hectares
Description of Site	<p>The site is rectangle in shape and is located on the outskirts of a predominantly residential area. The south eastern portion of the site consists of well-maintained grass and multiple larger trees. The north western section of the site contains overgrown grass, trees and shrubs. The dense vegetation also occupies the majority of the northern boundary, increasing in thickness towards the west, with exception to a large tree and surrounding shrubs located in the northern corner of the site.</p> <p>Exposed imported material was observed along the south eastern boundary of the site, which is associated with regeneration of the grassed area. The material is anthropogenic in nature with inclusions of brick, gravel and plastic imbedded within it. During the site walkover the southern portion of the site was built up, indicating made ground. If made ground is present, it is likely associated with construction of the neighbouring A406 to the east.</p> <p>The boundary of the site to the north comprises of a steal fence in moderate to good condition, with residential dwellings beyond. The boundary to the east is a steal barrier approximately 1 foot in height with wooden pillars. No physical boundary line is evident to the south and west of the site.</p>
Topography	<p>The site was observed during the site walkover to be decreasing in gradient towards the north and west.</p> <p>The regional topographic elevation is likely to decrease to the northeast towards Pymmes Brook</p>
Services	<p>Optic Fibre signage was observed during the site walkover running parallel along the A406 (east to west),</p> <p>A watermain was observed during the site walkover and along the eastern boundary and east to west parallel to the A406.</p>
Surrounding Area	<p>The site lies within an urban setting which is locally dissected by the A406 to the south and New River to the west.</p> <p>New River is located 30m west of the site. Surface elevation topographic imagery indicates that the New River flows in a southern direction. The Pymmes Brook is located approximately 140m north of the site. Surface elevation and satellite imagery indicate that the site flows in an easterly direction towards William Girling Reservoir.</p> <p>The land between the site and New River is uncleared, well vegetated and decreases in elevation towards the river.</p> <p>Beyond the New River is uncleared land followed on by urban suburbs.</p> <p>An industrial site is located to the south west of the site, which is associated with maintenance of the New River.</p>

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 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.</p> <p>The surrounding area is mostly undeveloped land, with some buildings which appear to be residential, marked approximately 250m east of the site. The New River is located approximately 18m west of the site and Pymmes Brook marked 130m to the north of the site.</p>
1895 - 1897	<p>A likely residential building is now located on the south eastern portion of the Site. In addition to this, residential buildings are located immediately to the south of the Site.</p> <p>The area surrounding the Site has undergone development with an increased density of residential dwellings to the south and southeast. Railway lines and associated embankments are developed approximately 100m west of the Site. An aqueduct is marked approximately 130m north of the site at where the Pymmes Brook flows beneath the New River. A smithy is located at approximately 270m southeast of the Site. A fire station is marked approximately 300m northeast. Fishponds are located approximately 290m southeast and approximately 550m northwest of the Site. Gravel pits marked at approximately 280m southeast and 500m northwest.</p>
1914- 1920	<p>No significant changes to the Site layout.</p> <p>The area surrounding the site has undergone further development, with increased residential dwellings present to the east and north of the site. Railway sidings are marked to 200m north. Unspecified tanks are marked 230m northwest and motor garage located 280m east of the site.</p> <p>The smithy previously observed to the southeast of the Site is no longer marked. The gravel pit to the southeast and northwest and fishpond to the southeast are also no longer marked, thus assumed infilled.</p>
1936 - 1952	<p>No significant changes are noted on site.</p> <p>The surrounding site has undergone continued development. Unspecified tanks, that were located 230m northwest of site, are no longer present</p>
1974 - 1982	<p>The building located on Site and the adjacent building to the south is now removed. The Site is now vacant.</p> <p>The motor garage works to the east of the Site is now marked as a depot. The fire station to the northeast is no longer marked and a depot is marked adjacent to it at approximately 300m northeast. Unspecified works are noted approximately 150m north east of Site.</p>
1991-2001	<p>No significant changes are noted on Site.</p> <p>The depot to the northeast is no longer marked, whereas the depot 280m to the east (previously a motor garage) is now marked as a bus depot.</p>
2010 - 2020	<p>No significant changes are noted onsite.</p> <p>Further residential development is noted in the surrounding area.</p>

2.2.1 Summary of Site History

The site remained undeveloped until construction of a building on the boundary of the eastern portion of the site circa 1895. The onsite building was demolished in 1974 (or possibly before) and the site has remained vacant until present. The structure is likely to have included asbestos and possible was solid fuel or oil heated. Related contaminants may be present within made ground.

The New River is located running parallel, 30m to the west of the Site, flowing in a southern direction. The Palmerston Crescent Road was developed to the adjacent east of the site from circa 1896.

Railway lines and associated made ground were noted 100m west of the site from circa 1895. Given the distance from the site, the railways and made ground are not considered to be a potential source of contamination.

The surrounding site area has undergone significant development with several contaminative land uses being identified within 250m of the site, including a smithy, infilled fishpond, gravel pits, unspecified works, depots to the east/southeast and fire station and depot to the northeast.

The inferred hydraulic gradient is anticipated to flow in a north eastern direction of the site towards Pymmes Brook.

The potential off-site sources of contamination mentioned above are either too far from site or are considered hydraulically down gradient, therefore it is unlikely that sources would pose a risk to the site.

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" 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 of Southgate, which officially recorded 221No. High Explosive (HE) bombs with a bombing density of 60.2 bombs per 405 hectares (ha).

It is recommended that a details desk study is completed to assess the Unexploded Ordnance (UXO) hazards levels on 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

<p>Geology / Aquifer Status</p>	<p>Superficial Deposits: Kempton Park Gravel Member (Sand and gravel, locally with lenses of silt, clay or peat) which is designated as a Secondary A aquifer.</p> <p>Solid Geology: London Clay Formation which is designated as Unproductive Strata.</p>
<p>BGS Boreholes (within 100m of the site)</p>	<p>The nearest historic BGS borehole to the site (TQ39SW179) is approximately 19m southwest and is summarised below.</p> <p>Made Ground comprising of brown and dark brown sandy silty clay with gravel, brick and concrete rubble, glass fragments and roots is recorded from the surface to a depth of 1.10 metres below ground level (m bgl), followed by firm to coarse gravel with light brown/brown slightly clayey fine to coarse sand' to a depth of 2.70 m bgl, followed by stiff closely fissured brown silty clay to a final depth of 3.00 m bgl upon which the borehole was terminated.</p> <p>The borehole log did not record any groundwater observations.</p>
<p>Within a Source Protection Zone</p>	<p>A Source Protection Zone (SPZ) is identified onsite which is designated as Zone 1- Inner Catchment. An additional SPZ is present 103m east and west of the site, designated as Zone 2.</p>
<p>Licensed Groundwater Abstraction Points</p>	<p>Three number of active licensed groundwater abstraction points are identified within 500m of the Site at 14m northwest, 345m northeast and 409m south, all three registered to Thames Water Utilities Limited and used for direct potable water supply. Considering the low mobility of groundwater within the London Clay formation it is anticipated that the abstraction point located 14m northwest of site is likely from very deep bedrock formation.</p>
<p>Surface Water Feature</p>	<p>Six records of surface water feature is identified within 250m of the Site, the nearest is the New River located at 18m west of the site.</p>
<p>Likely Groundwater Flow Direction</p>	<p>Based on the local topography, shallow groundwater would likely flow towards the east and north east towards Pymmes 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).	N/A
Discharge Consent	One active record noted with in 250m of the effluent type trade discharges, process effluent. (Permit no: CNTW.0838)	15m northwest
Pollution Incidents to controlled waters	None identified within 250m	N/A
Part A(2) and Part B Permit	None recorded with in 250m	N/A
Potentially Infilled Land	Unspecified Pit	29m west 35m northwest 224m west
	Unspecified Heap	75m northwest
	Unspecified Ground Workings	75m-79m northwest 212m northeast
Landfill sites (current and historical)	Environment Agency/Natural Resources Wales historic landfill sites is recorded, the waste type is unknown.	171m north
	One records of landfill from Local Authority and Historical Mapping Records	169m north
Contemporary Trade Directory Entries (Within 250m of the site)	Construction Completion Services	107m east
	Electricity Sub Station	125m northeast 186 southwest
	Fuel Distributors and Suppliers (Gas)	228m east
	Vehicle Parts and Accessories	229m east
Fuel Station Entries	None identified with in 250m	N/A
Historical Tanks	Two identified 250m	165m northwest
		176m northwest

Based on the anticipated hydraulic gradient towards the east and north east, in addition to the distance from site, it is unlikely that majority of the above potential sources listed above would have the ability to significantly impact the site. The exception could be the unspecified pit located 29m to the west. There is some potential for runoff and leaching to have migrated towards and possibly under the site via groundwater movement.

4 PRELIMINARY CONCEPTUAL MODEL

Geo-environmental assessments are required in accordance with current regulatory guidance (CIRIA C552 - Ref. 4 and LCRM – 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 Conceptual Site Model (CSM) 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
On Site	
Made Ground is likely to be present on the site due to its past developments	Asbestos, metals, pesticides, hydrocarbons, ground gas, polychlorinated biphenyls (PCBs)
London Clay bedrock underlying the site	Sulphates
Off Site	
Railway lines and associated made ground - 100m west	Petroleum hydrocarbons, ground gas, PAHs, solvents, asbestos
Unspecified Pit- 29m west (backfilled)	Petroleum hydrocarbons, dissolved metals, ammoniacal nitrogen, PAHs, solvents, ground gas

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

- The Superficial Deposits beneath the Site are classified as a Secondary A Aquifer and therefore considered a sensitive receptor.

- The New River located at 18m west
- The Pymmes Brook located 130m to the north

The site is located within a Source Protection Zone 1- Inner Catchment. There are two abstractions boreholes located within 250m which are used for water supply. Abstraction licence records indicate that the source of the extraction is from beneath the superficial deposits and London Clay. As such these abstraction boreholes are not considered to be a sensitive receptor due to the impermeable strata (London Clay) beneath the site which will impede the downward migration of contaminants.

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 (surface water receptor and Secondary A aquifer)	<p>Surface run off and subsequent vertical migration of contaminants to surface water bodies.</p> <p>Vertical migration of contaminants through the unsaturated zone into Secondary A aquifer beneath the Site.</p> <p>Lateral migration of contaminants onto the Site from offsite sources and subsequent leaching to the ground water beneath.</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>

4.4 Preliminary Qualitative Risk Assessment

Primary sources of (potential) on-site contamination are associated with Made Ground that may be present as a result historical onsite development

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. The potential of leaching and migration of contaminates originating from the Made Ground to the Secondary A aquifer below the site should be considered.

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.

It is unlikely that the New River, located 18m west of the Site, will be impacted by contamination given the anticipated hydraulic gradient to the northwest, however, due to the proximity of the receptor it cannot be dismissed.

A contaminant linkage has been established from the Site to Pymmes Brook as a sensitive receptor. Although a linkage has been established, it is considered unlikely given distance, however, cannot be dismissed.

The underlying London Clay is a source of naturally occurring sulphates which could impact buried services and building footings.

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

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 which would limit impacts from off-site sources.

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

- The close proximity to the railway line to the west may have restrictions on the minimum distance that excavations (including exploratory holes, trial pits and foundations) can be undertaken. Liaison with Network Rail should be undertaken.
- 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;
- The site consist of dense vegetation and a mature on the north and western boundary of the site which may require removal.

6 Geotechnical Considerations

Made Ground is anticipated to be present at the site. Based on the published geology and the nearest historical borehole log (19m southwest) (Ref. 1) superficial deposits (Kempton Park Gravel Member) are anticipated and are expected to be underlain by the London Clay. The anticipated geology of the site should be confirmed through an intrusive investigation.

Redundant (former structure) foundations and services, may be present on part of the site. Historical onsite building was located on the eastern portion of the site and neighbour building was located close the boundary of the site. As such consideration of historical building foundation should be taken.

The building may have included a basement, though no evidence of that has arisen during this desk study.

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 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.

Risks associated with the London Clay, including high plasticity clay which are subject to shrinkage, swelling and sulphate attack, should be considered during the investigation / design.

Consideration will thus need to be given to the volume change potential (if founding on the London Clay) due to the presence of existing trees along the north western and north eastern portion, which may need to be removed or retained, and the planting of future trees when deciding upon the depths of the foundations.

7 Conclusion and Recommendations

The Site is currently a vacant land. The Site has previously been occupied by a likely residential building up until circa 1974 (although possibly earlier), which later was demolished. There is potential for Made Ground to be present onsite as result of the historical development of the site as well as neighbouring sites.

Potential receptors are site users, the Secondary A aquifer on site and nearby surface water features as well as 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.

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 LCRM (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 Personal Protection Equipment (PPE) and follow the site-specific contractors risk assessment which should include risks to human health from potential contamination. Due to historical changes in land use, consideration should be given to the potential presence of asbestos within the Made Ground, with focus on the eastern portion of the site where historical building was located.

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

Underground services have been identified onsite during the walkover. These will need to be taken into consideration during the proposed development.

8 References

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4. CIRIA C552 (2001) Contaminated land risk assessment. A guide to good practice.
5. DEFRA and the Environment Agency, 2004. Model Procedures for the Management of Land Contamination, Guidelines for Environmental Risk Assessment and Management, Land contamination: risk management, Environment Agency, June 2019 (LCRM)
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:

92, PALMERSTON CRESCENT,
SOUTHGATE, N13 4NH

Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

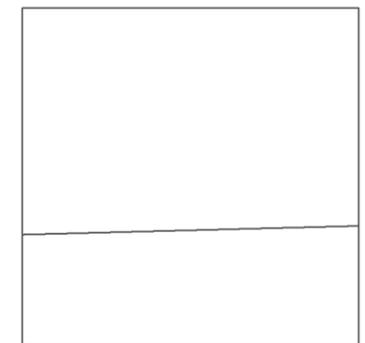
Map date: 1864

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1864
Revised 1864
Edition N/A
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Levelled N/A

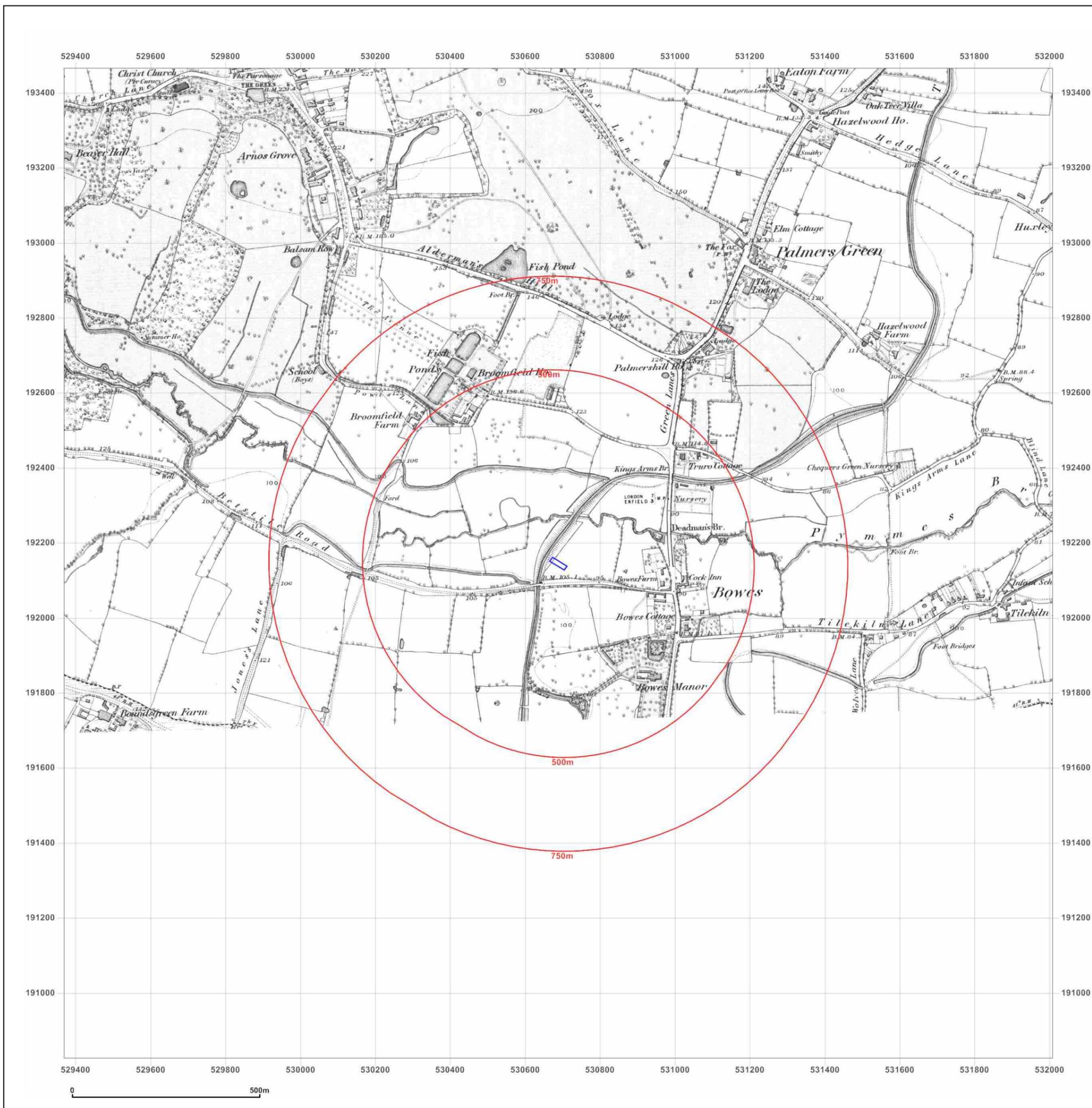


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W: www.groundsure.com

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Production date: 20 January 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Site Details:

92, PALMERSTON CRESCENT,
SOUTHGATE, N13 4NH

Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

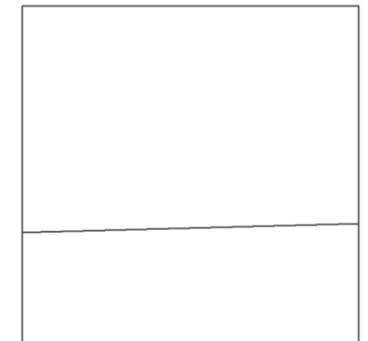
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Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1866
Revised 1866
Edition 1872
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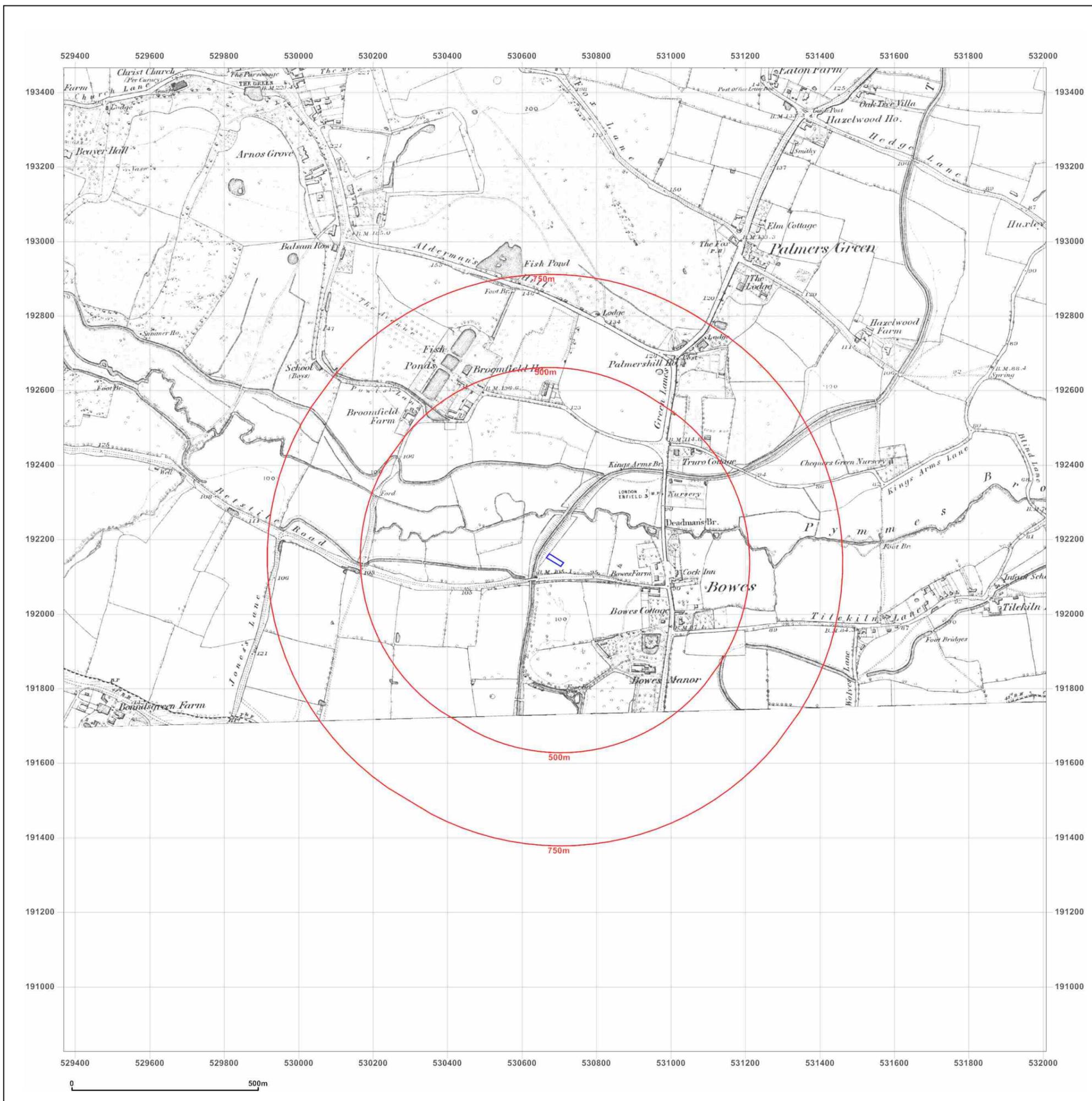


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Site Details:

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Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

Map date: 1872-1873

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1864
Revised 1864
Edition 1872
Copyright N/A
Levelled N/A

Surveyed 1869
Revised 1869
Edition 1873
Copyright N/A
Levelled N/A

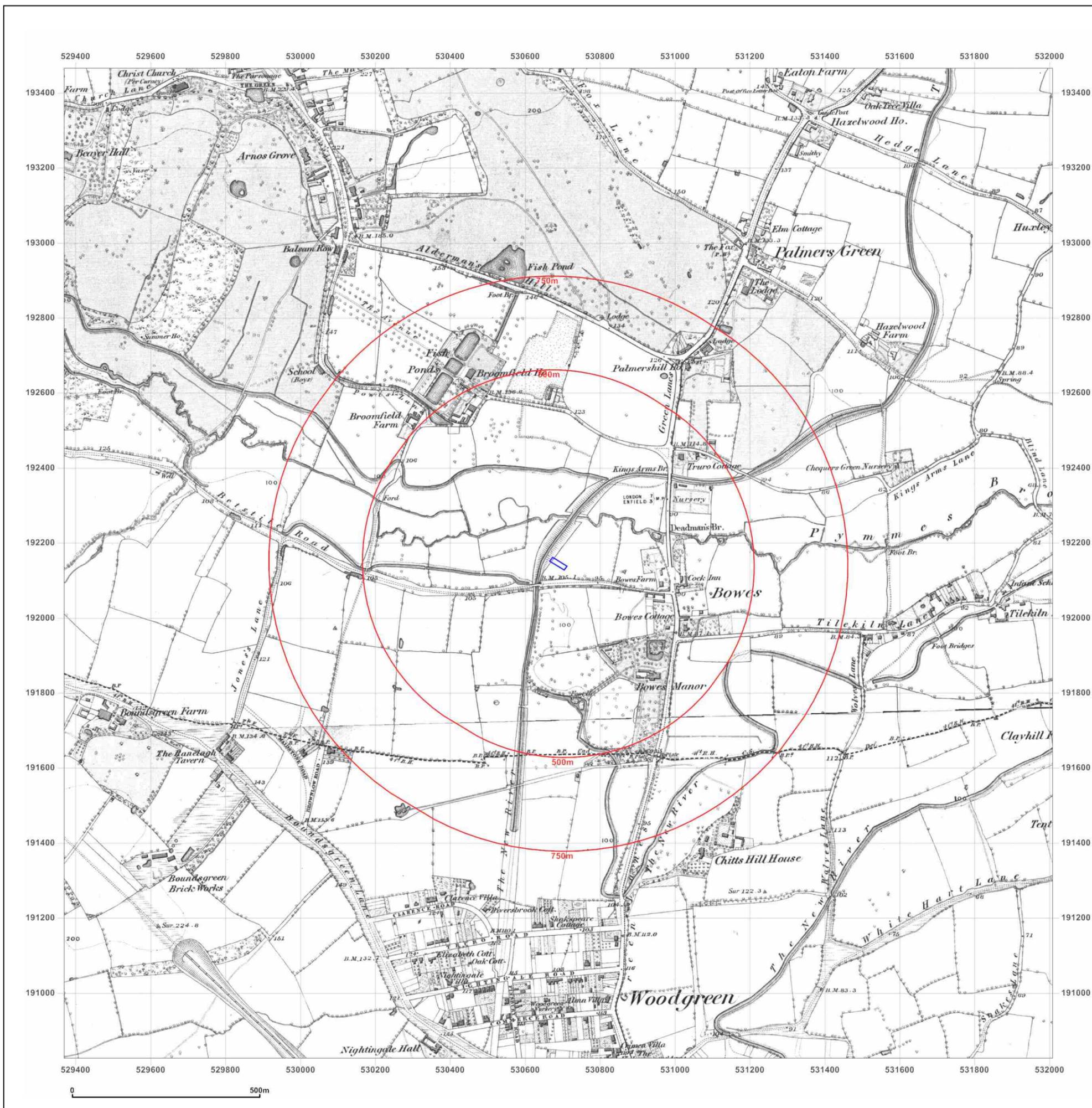


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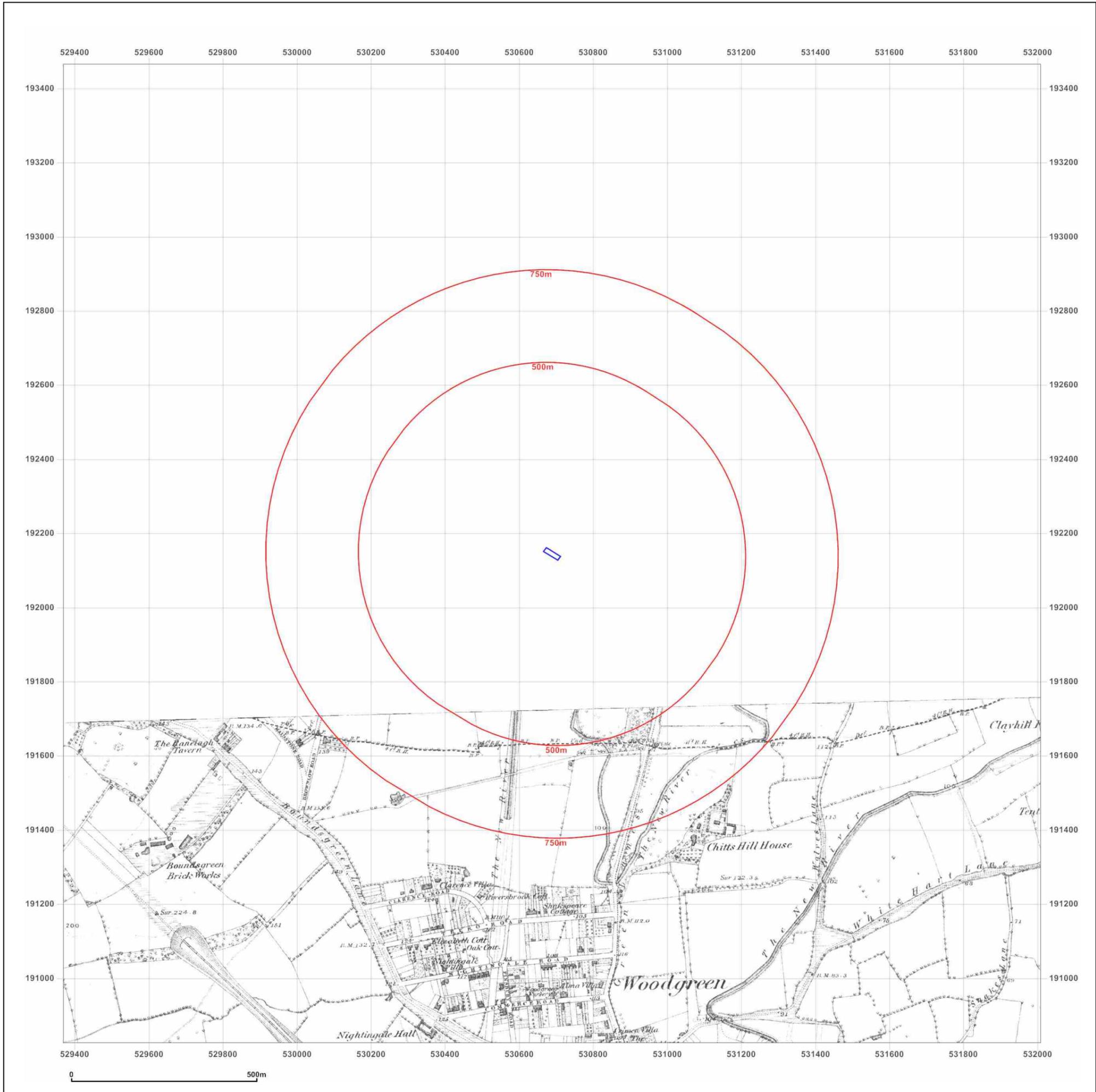
Site Details:
 92, PALMERSTON CRESCENT,
 SOUTHGATE, N13 4NH

Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series
Map date: 1879
Scale: 1:10,560
Printed at: 1:10,560



Surveyed 1879
 Revised 1879
 Edition N/A
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Site Details:

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SOUTHGATE, N13 4NH

Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

Map date: 1895

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1866
Revised 1895
Edition N/A
Copyright N/A
Levelled N/A

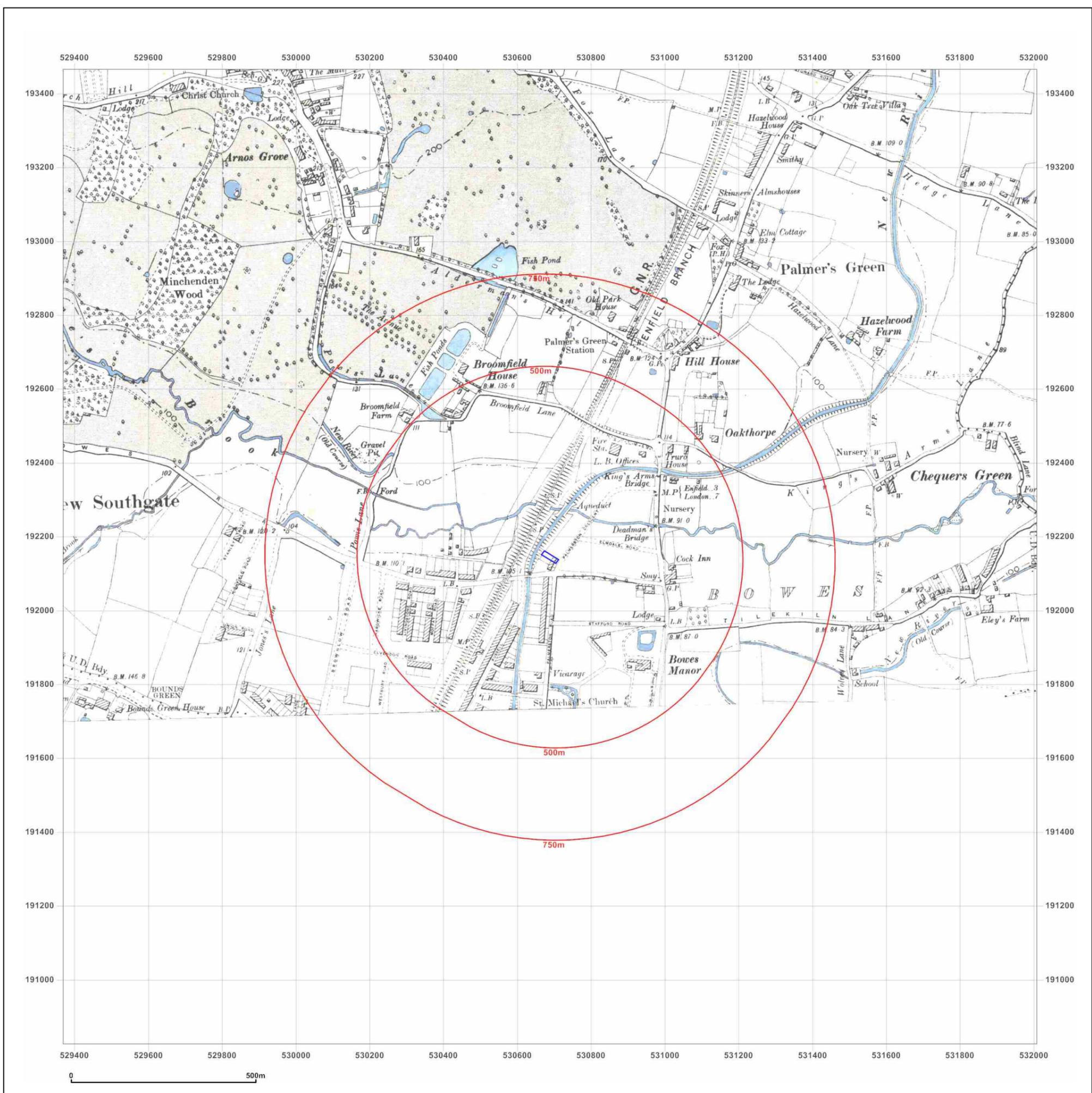


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Site Details:

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SOUTHGATE, N13 4NH

Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

Map date: 1896-1897

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1965
Revised 1897
Edition 1897
Copyright N/A
Levelled N/A

Surveyed N/A
Revised 1894
Edition 1896
Copyright N/A
Levelled N/A



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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

Map date: 1894-1897

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1866
Revised 1895
Edition 1897
Copyright N/A
Levelled N/A

Surveyed 1894
Revised 1894
Edition N/A
Copyright N/A
Levelled N/A

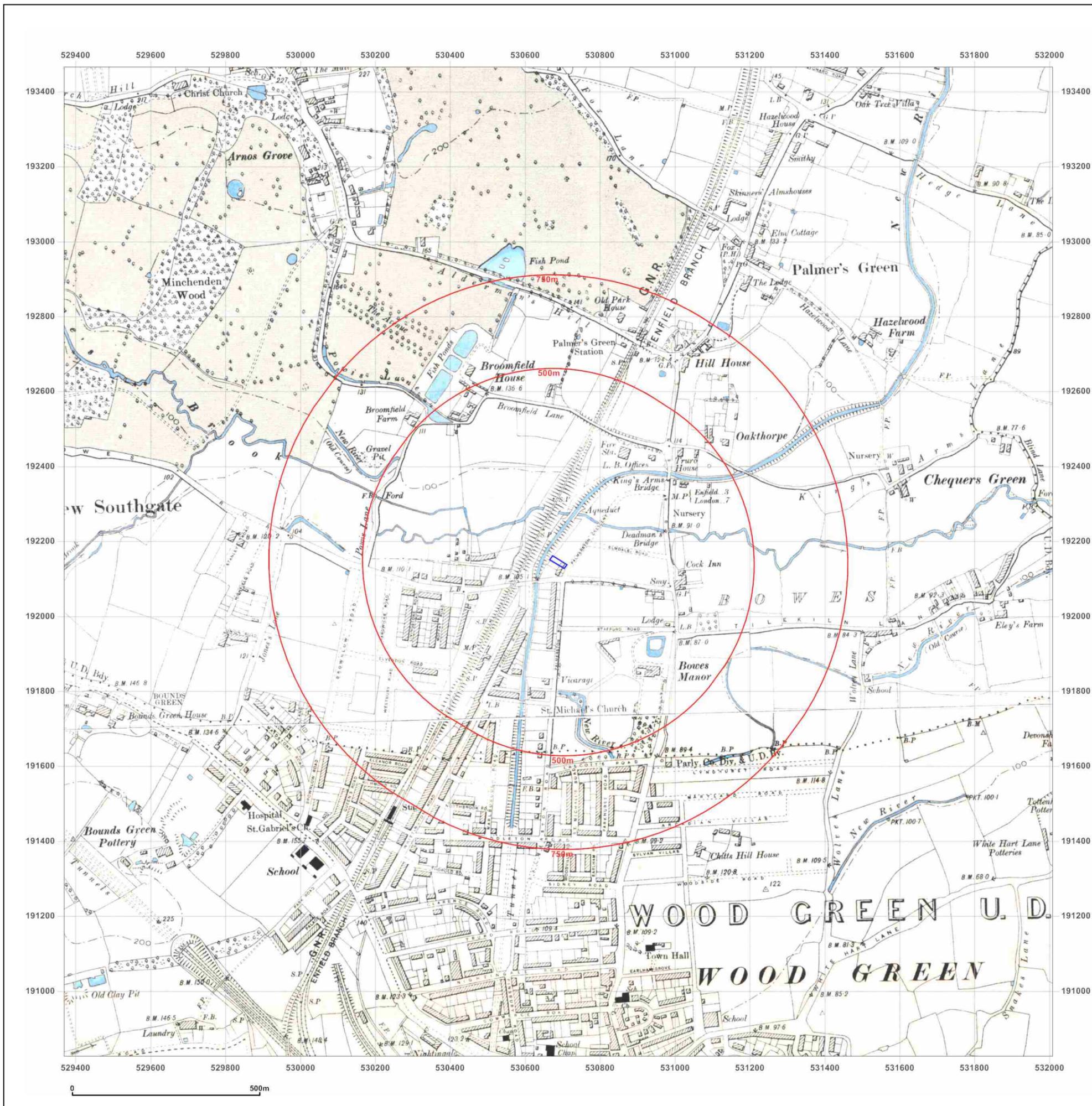


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

Map date: 1920

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1865
Revised 1912
Edition 1920
Copyright N/A
Levelled 1912

Surveyed 1869
Revised 1919
Edition 1920
Copyright N/A
Levelled 1913

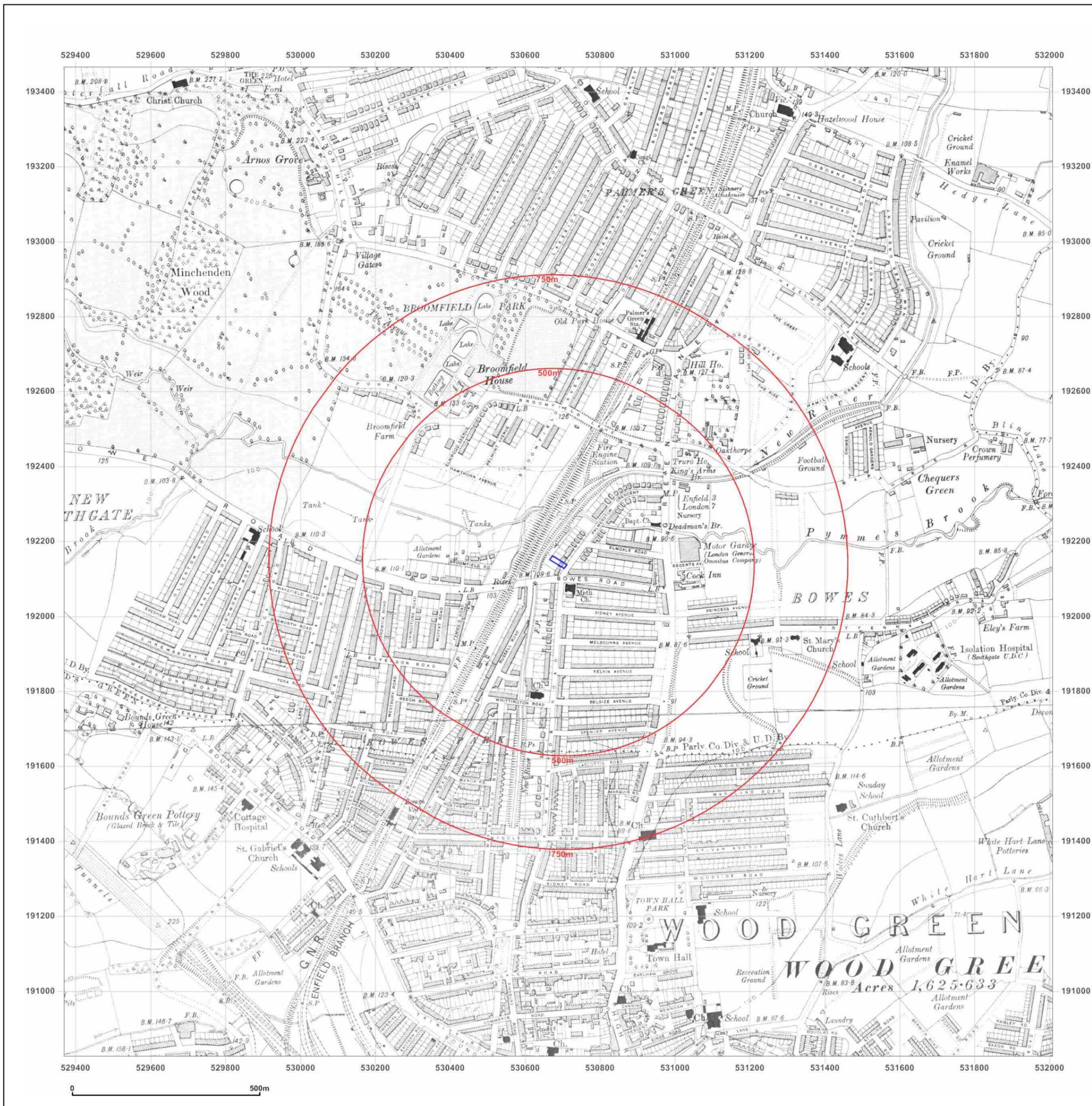


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Site Details:

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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

Map date: 1920

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1866
Revised 1920
Edition N/A
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Site Details:

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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1865
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1869
Revised 1938
Edition N/A
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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1865
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

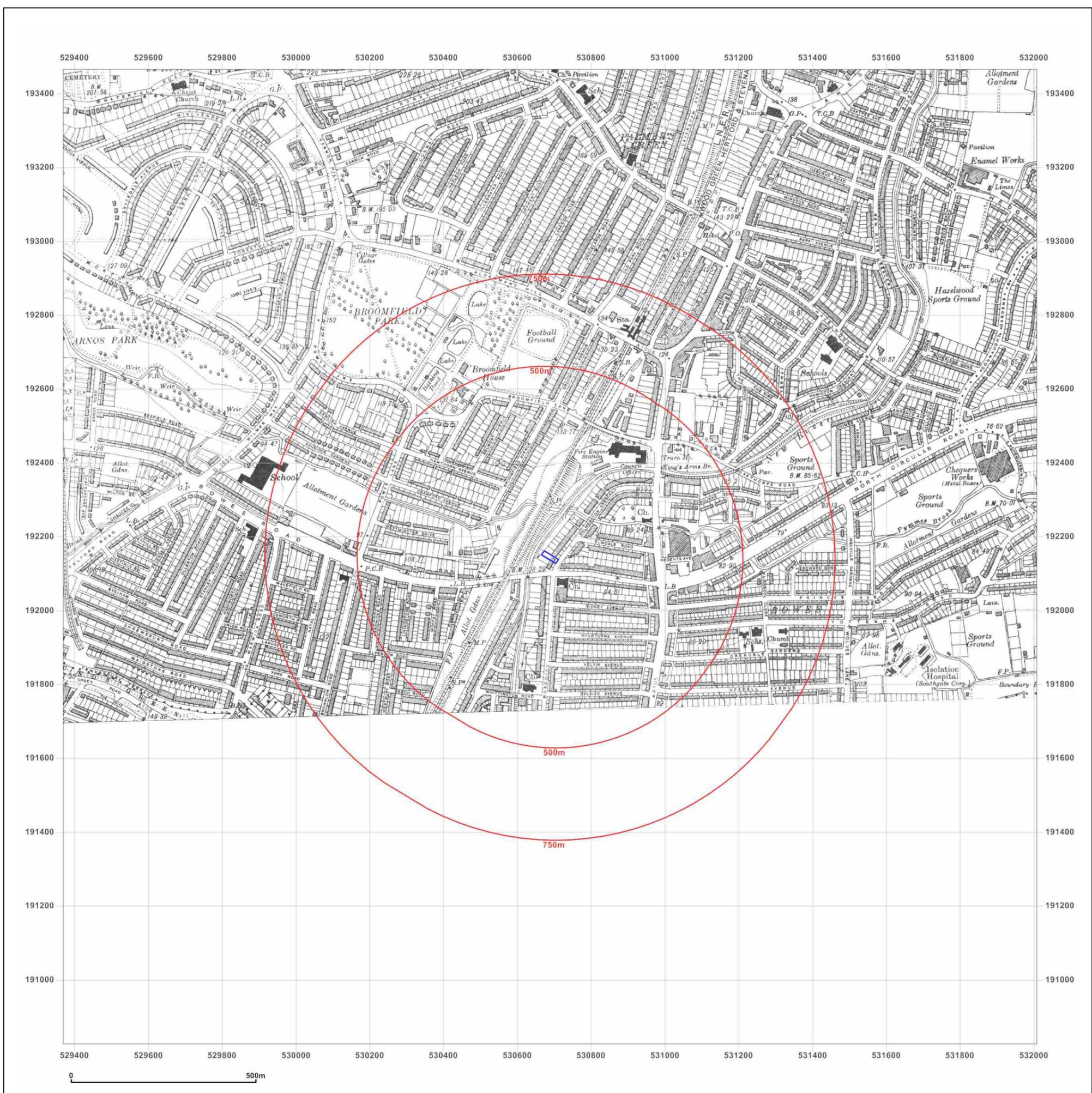


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Site Details:

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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: Provisional

Map date: 1951-1952

Scale: 1:10,560

Printed at: 1:10,560



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

Surveyed N/A
Revised 1951
Edition 1952
Copyright N/A
Levelled 1933

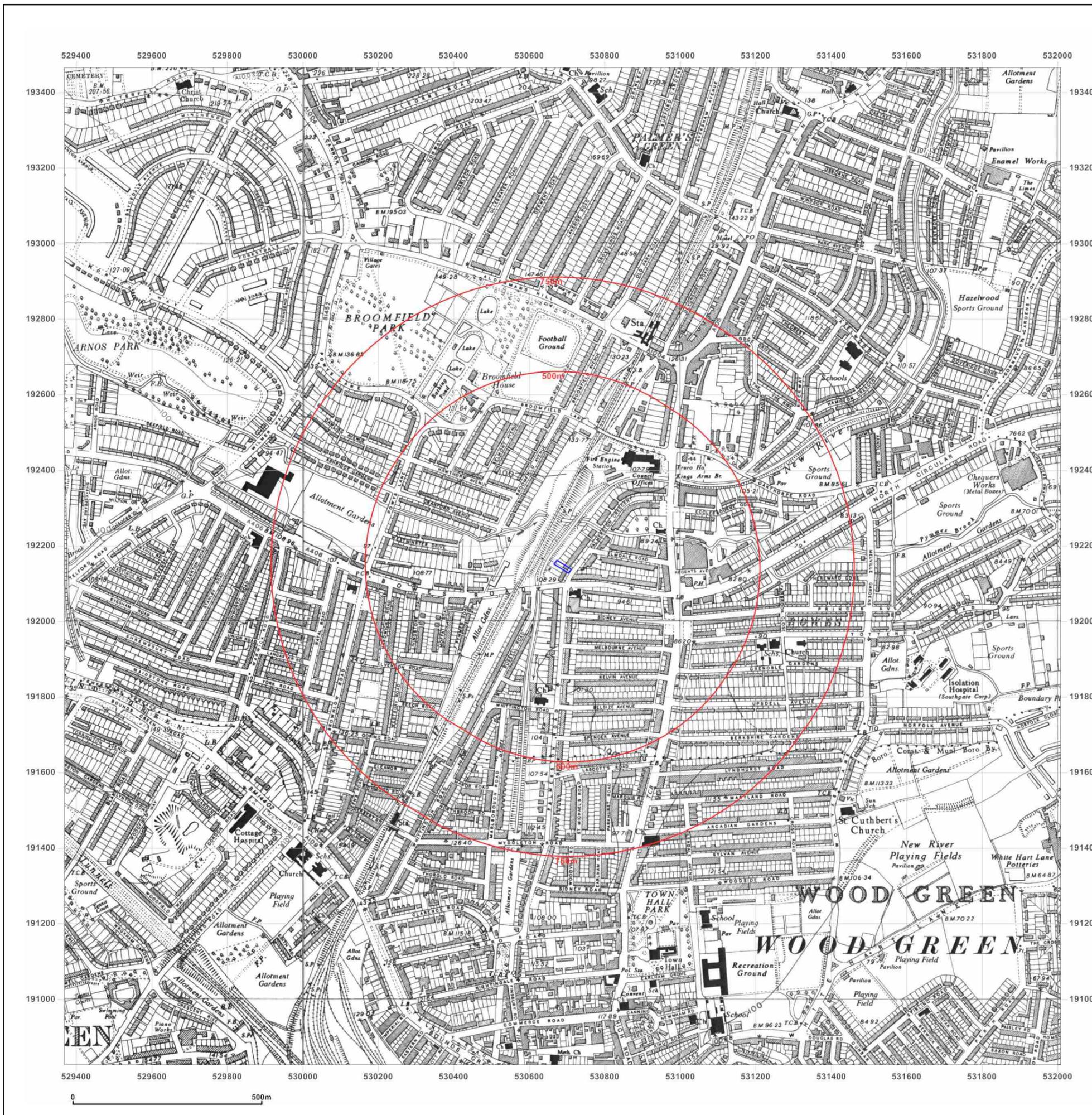


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: Provisional

Map date: 1962-1966

Scale: 1:10,560

Printed at: 1:10,560



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

Surveyed 1966
Revised 1966
Edition N/A
Copyright N/A
Levelled N/A

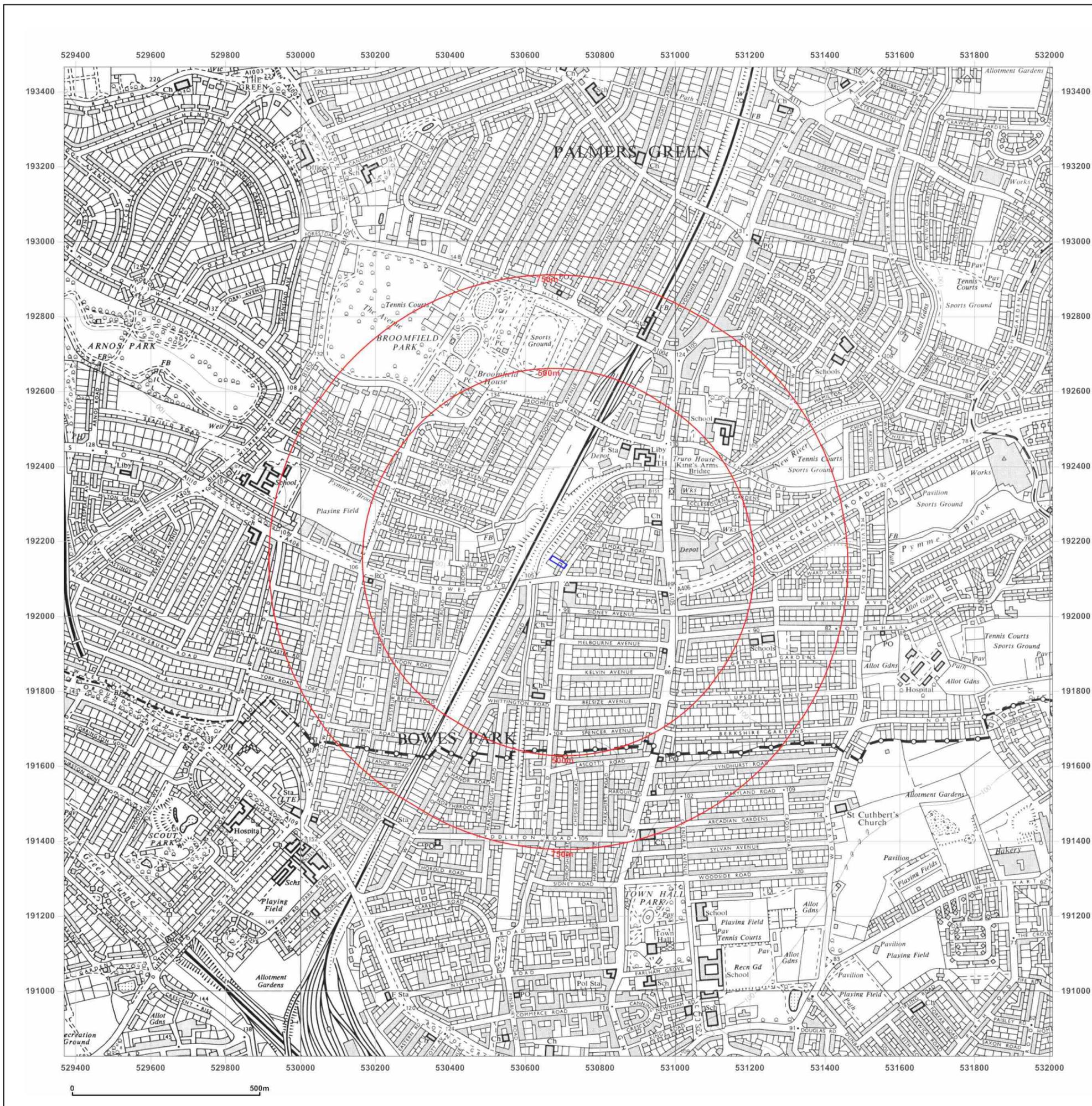


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 1973-1975

Scale: 1:10,000

Printed at: 1:10,000



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

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



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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 1980-1982

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1980
Revised 1980
Edition N/A
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Levelled N/A

Surveyed 1973
Revised 1982
Edition N/A
Copyright N/A
Levelled N/A



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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 1987-1991

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1982
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Surveyed 1989
Revised 1991
Edition N/A
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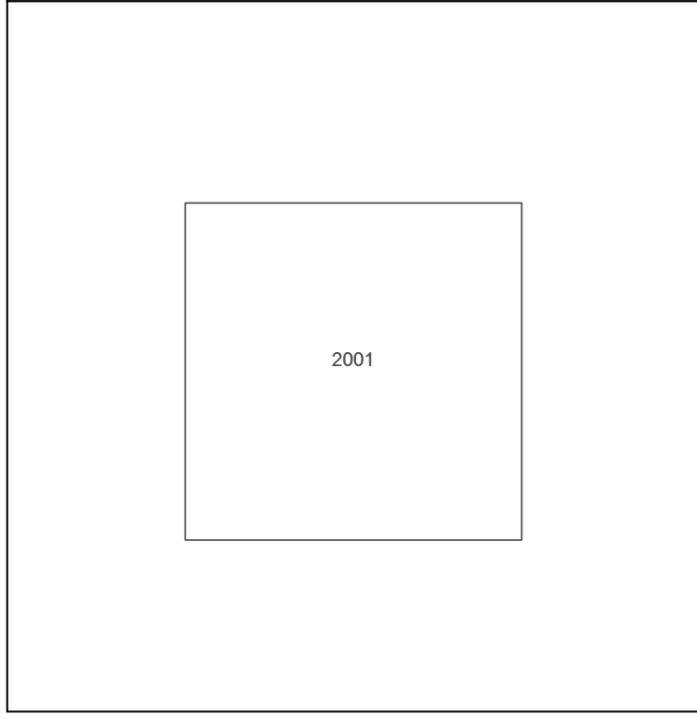
Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 2001

Scale: 1:10,000

Printed at: 1:10,000



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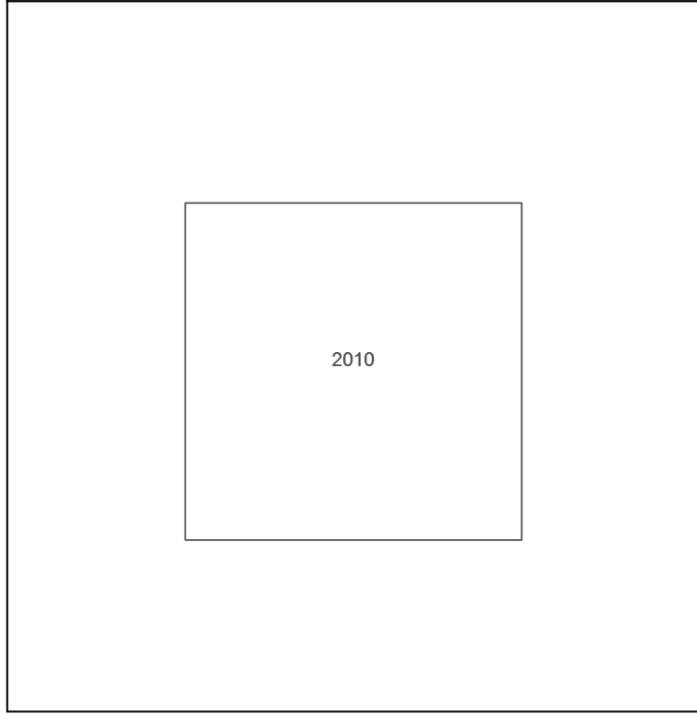
Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000



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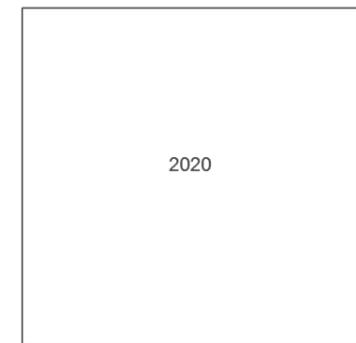
Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 2020

Scale: 1:10,000

Printed at: 1:10,000

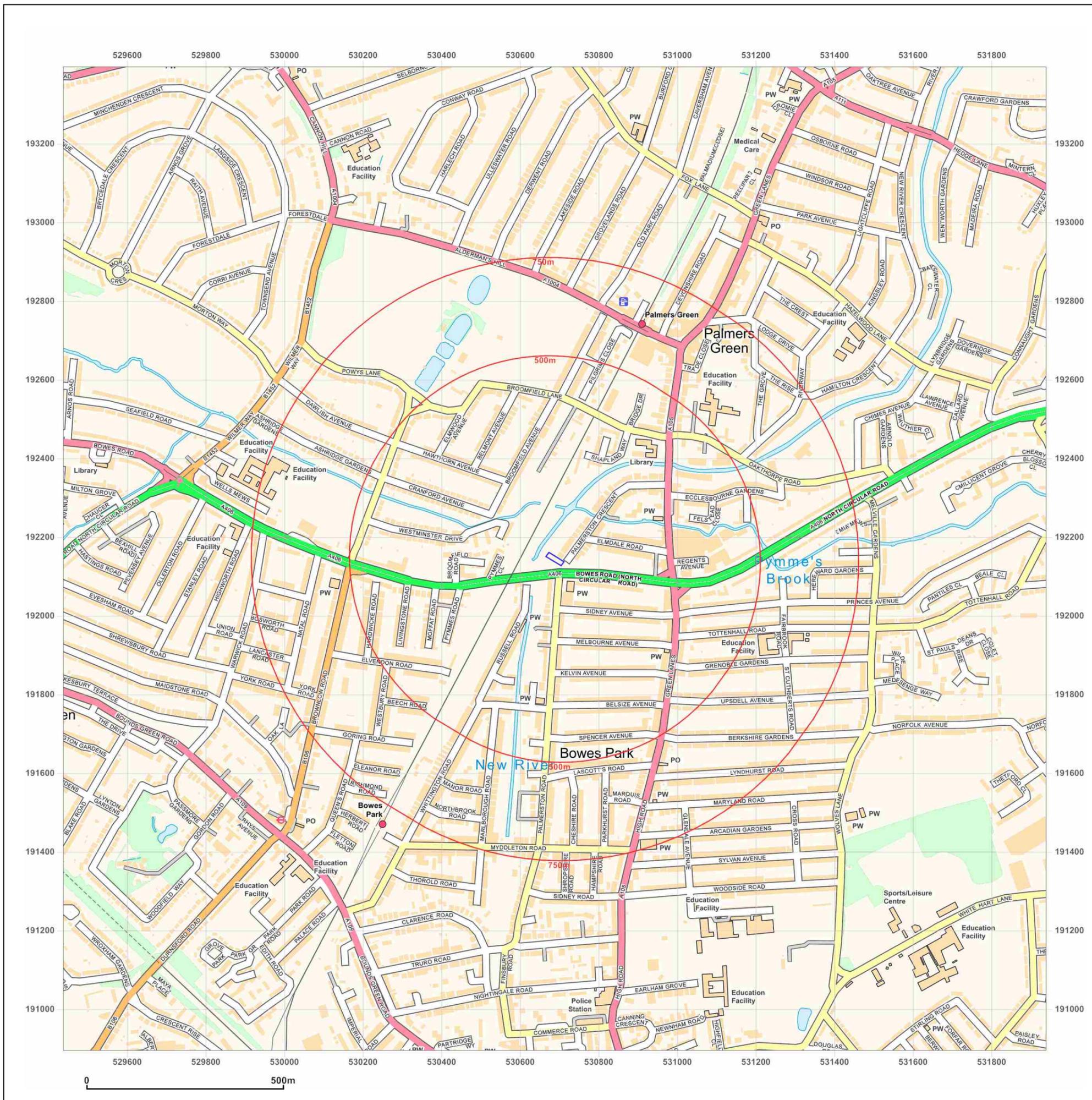


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

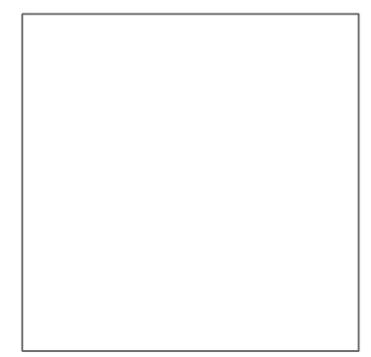
Map date: 1867

Scale: 1:2,500

Printed at: 1:2,500



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

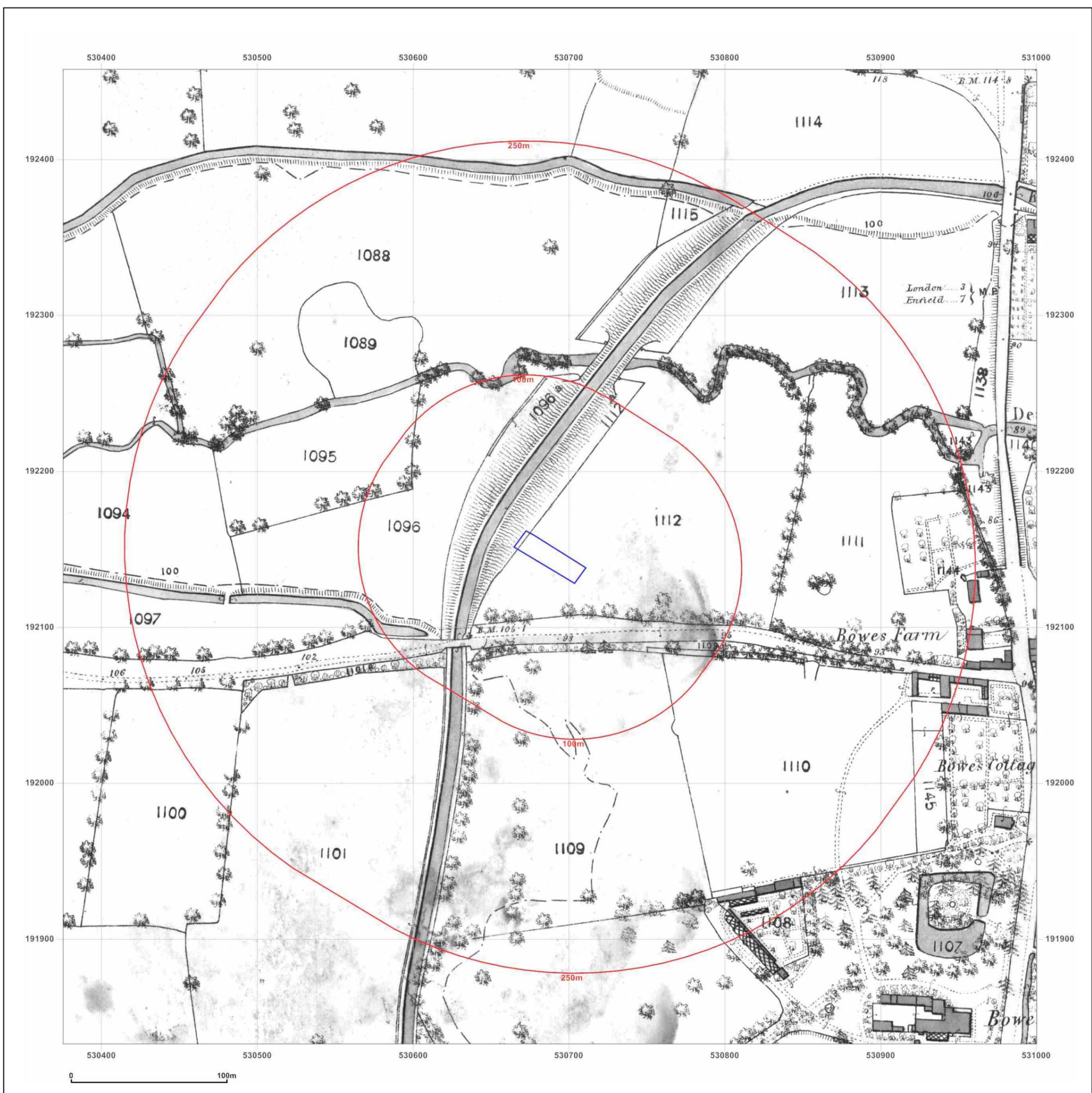


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

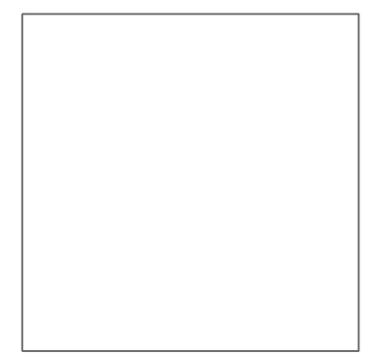
Map date: 1896

Scale: 1:2,500

Printed at: 1:2,500



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

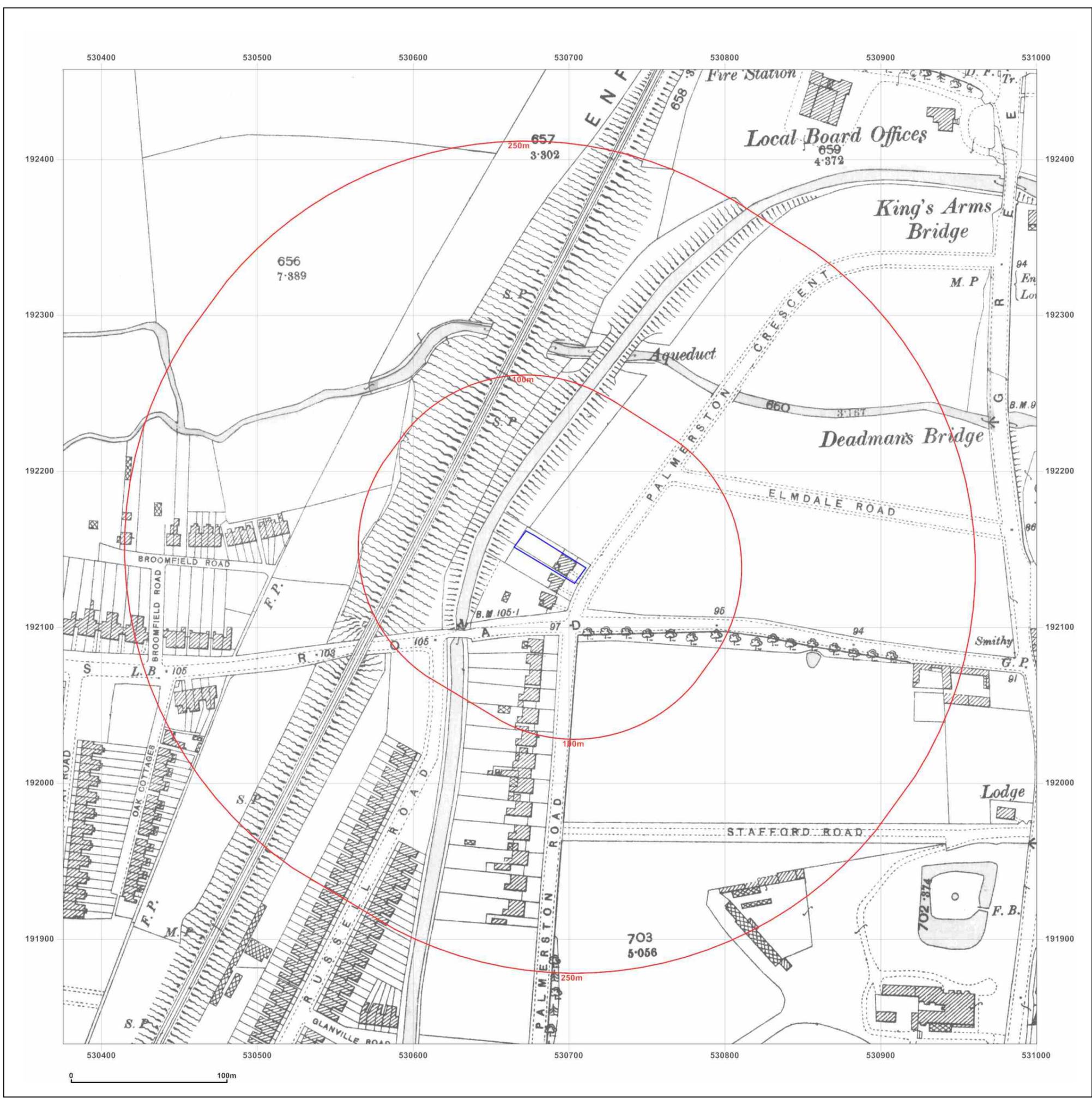


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

Map date: 1914

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1914
Revised 1914
Edition N/A
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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: County Series

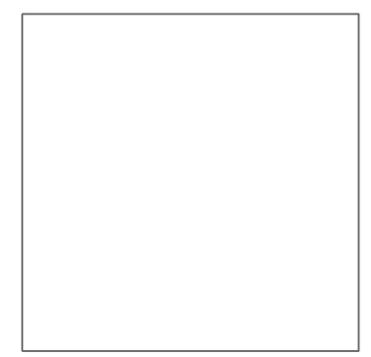
Map date: 1936

Scale: 1:2,500

Printed at: 1:2,500



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



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SOUTHGATE, N13 4NH

Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 1956

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1956 Revised 1956 Edition N/A Copyright N/A Levelled 1933	Surveyed 1956 Revised 1956 Edition N/A Copyright N/A Levelled 1933
Surveyed 1956 Revised 1956 Edition N/A Copyright N/A Levelled 1933	Surveyed 1956 Revised 1956 Edition N/A Copyright N/A Levelled 1933

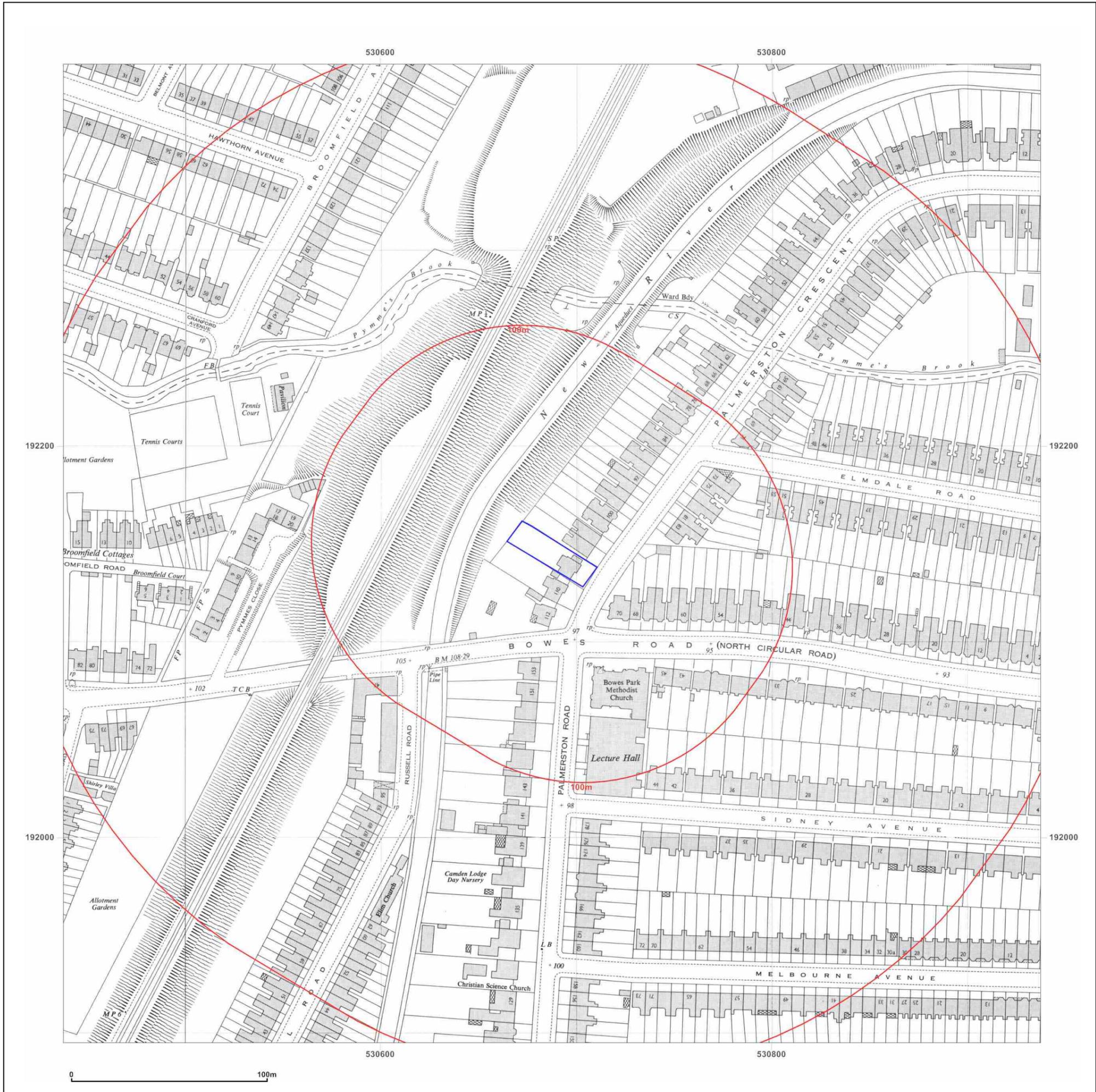


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 1957

Scale: 1:1,250

Printed at: 1:2,000



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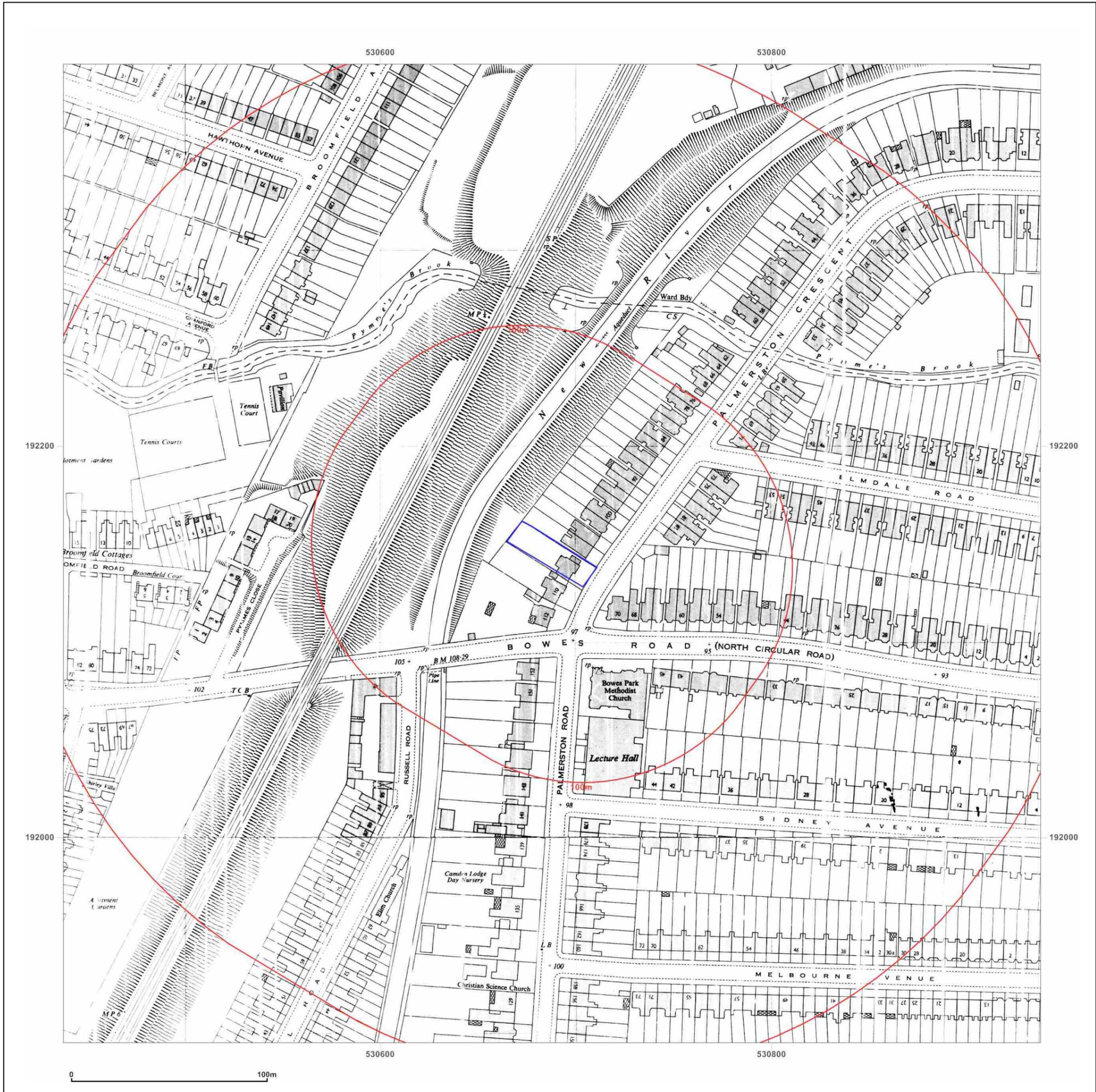


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Site Details:

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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 1956-1957

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1956
Revised 1956
Edition 1958
Copyright N/A
Levelled 1933

Surveyed 1956
Revised 1956
Edition 1958
Copyright N/A
Levelled 1933

Surveyed 1956
Revised 1956
Edition 1957
Copyright N/A
Levelled 1933

Surveyed 1956
Revised 1956
Edition 1956
Copyright N/A
Levelled 1933

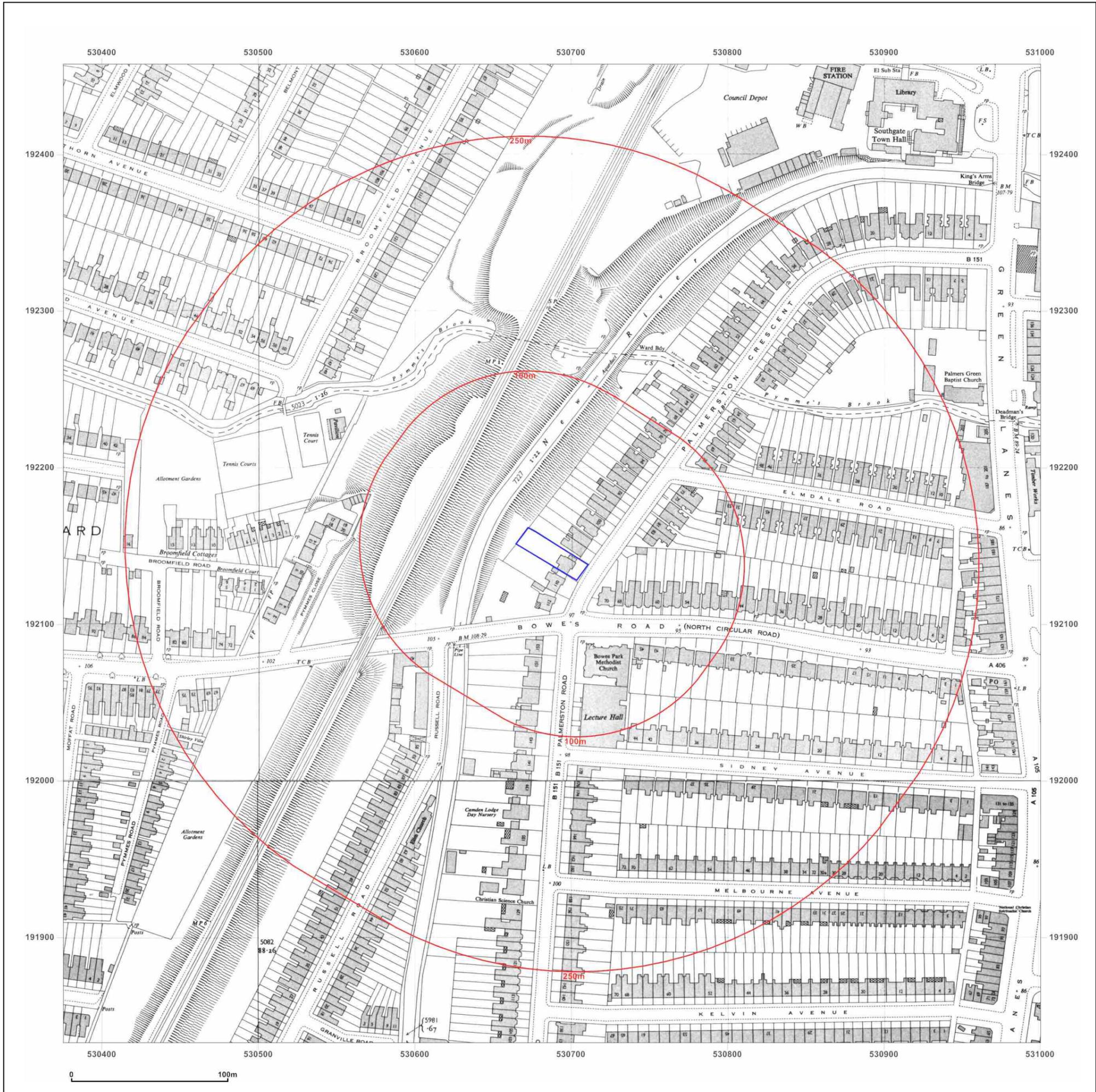


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 1974

Scale: 1:1,250

Printed at: 1:2,000



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

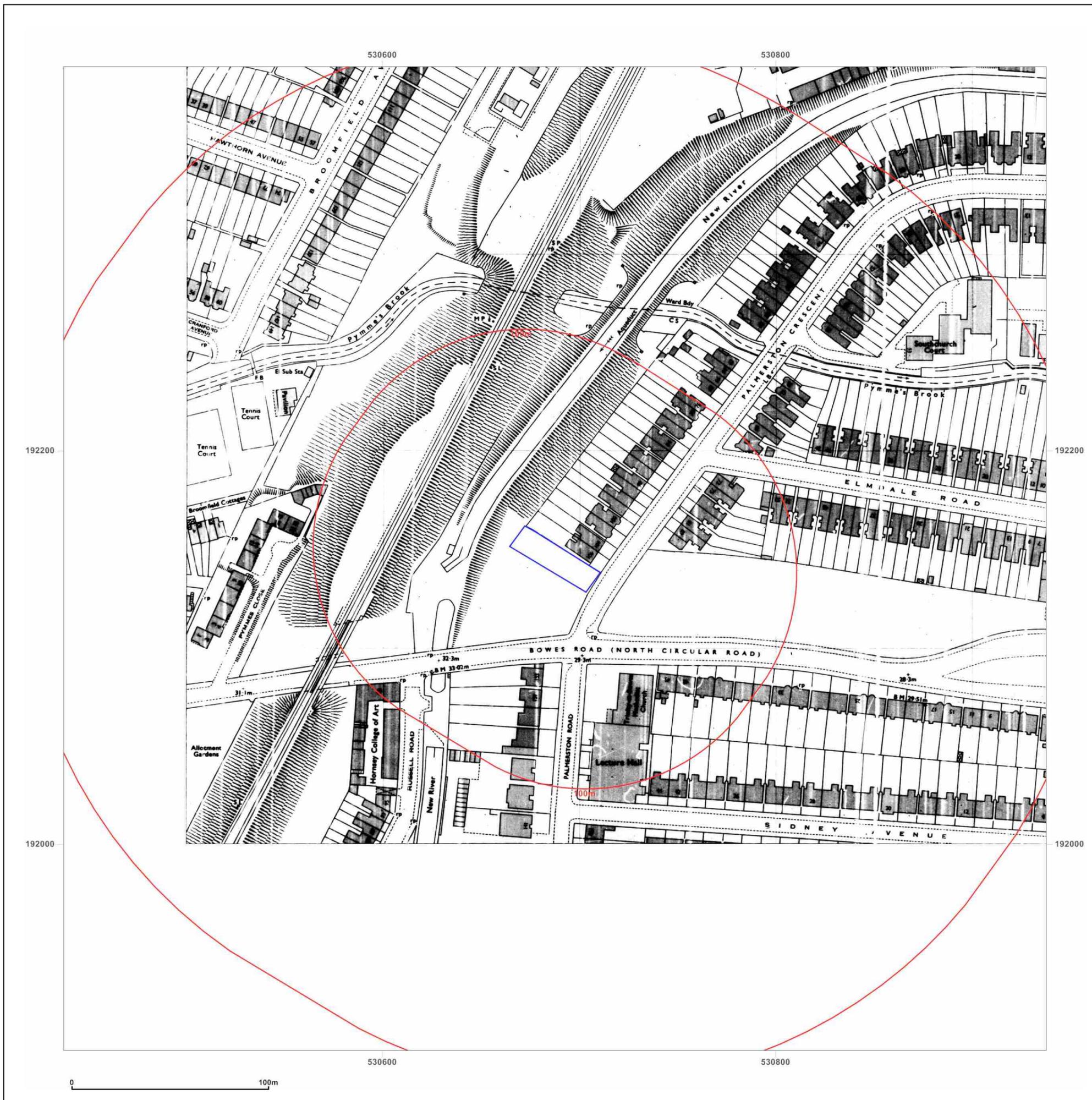


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid
Map date: 1973-1975
Scale: 1:1,250
Printed at: 1:2,000



Surveyed 1956 Revised 1974 Edition N/A Copyright 1975 Levelled 1956	Surveyed 1956 Revised 1972 Edition N/A Copyright 1973 Levelled 1956
Surveyed 1956 Revised 1974 Edition N/A Copyright 1974 Levelled 1956	Surveyed 1956 Revised 1974 Edition N/A Copyright 1975 Levelled 1956

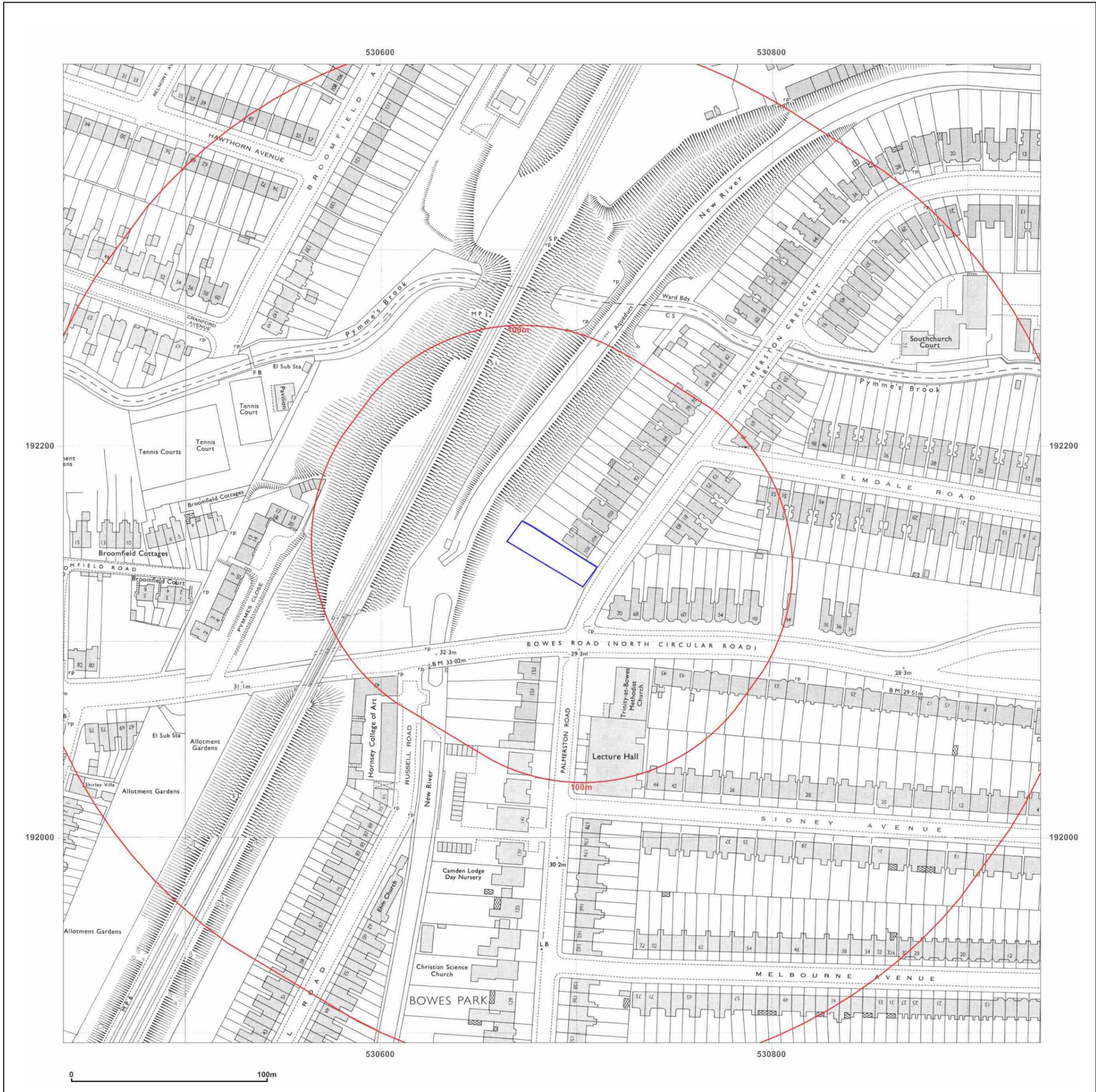


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 1984

Scale: 1:1,250

Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1984
Levelled 1956

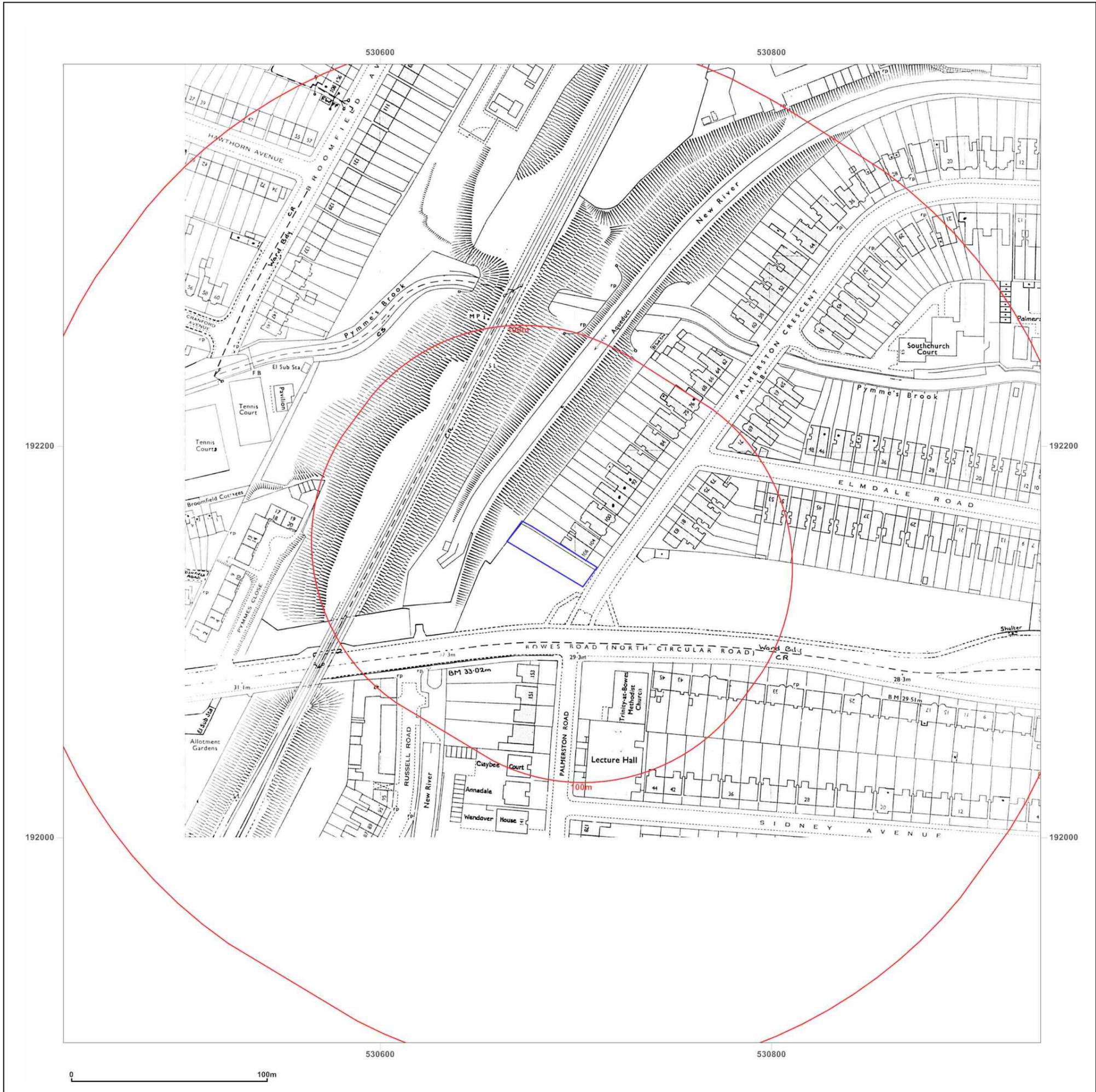


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Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: National Grid

Map date: 1991

Scale: 1:1,250

Printed at: 1:2,000



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

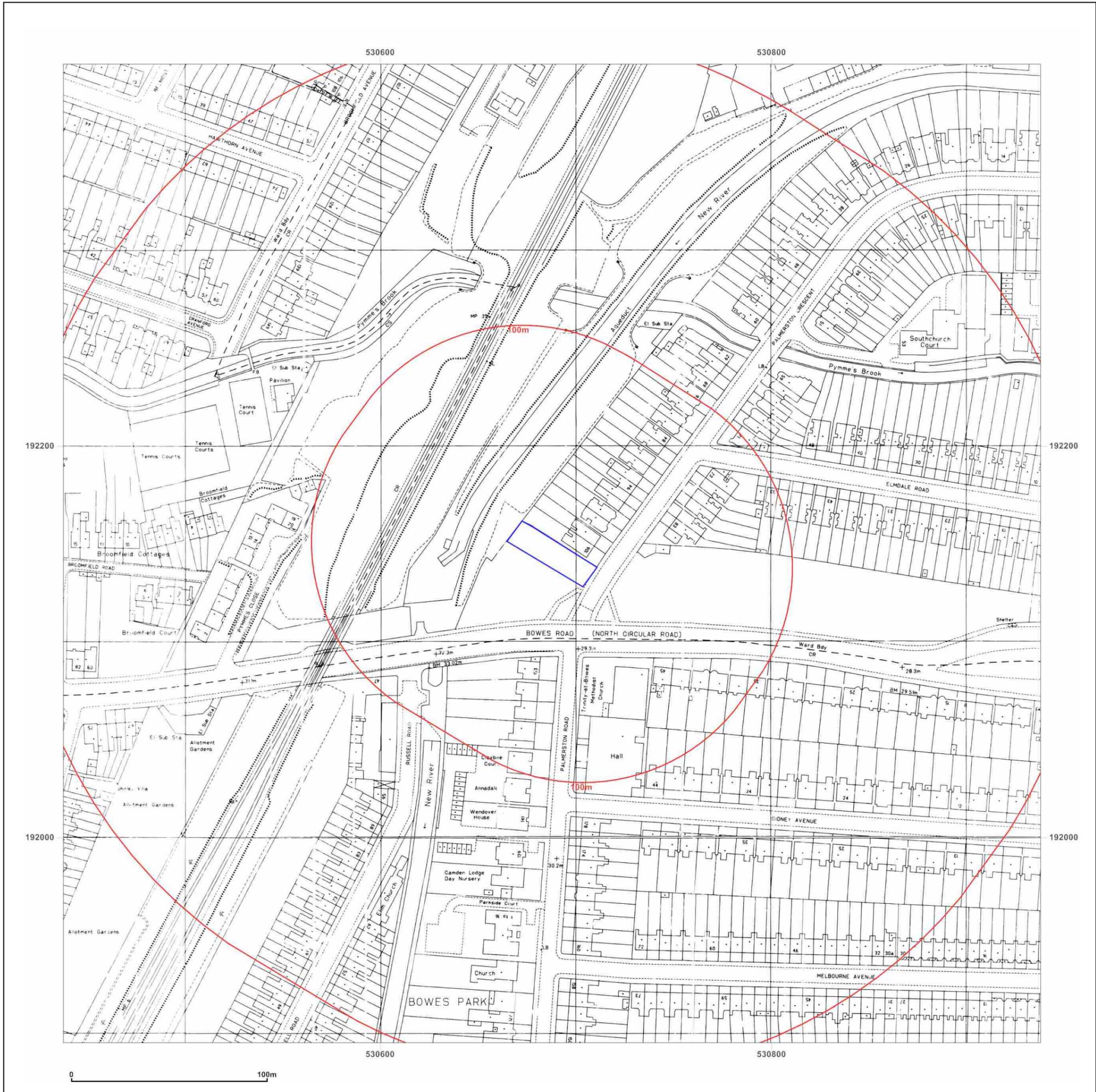


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Groundsure Insights
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W: www.groundsure.com

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Production date: 20 January 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Site Details:

92, PALMERSTON CRESCENT,
SOUTHGATE, N13 4NH

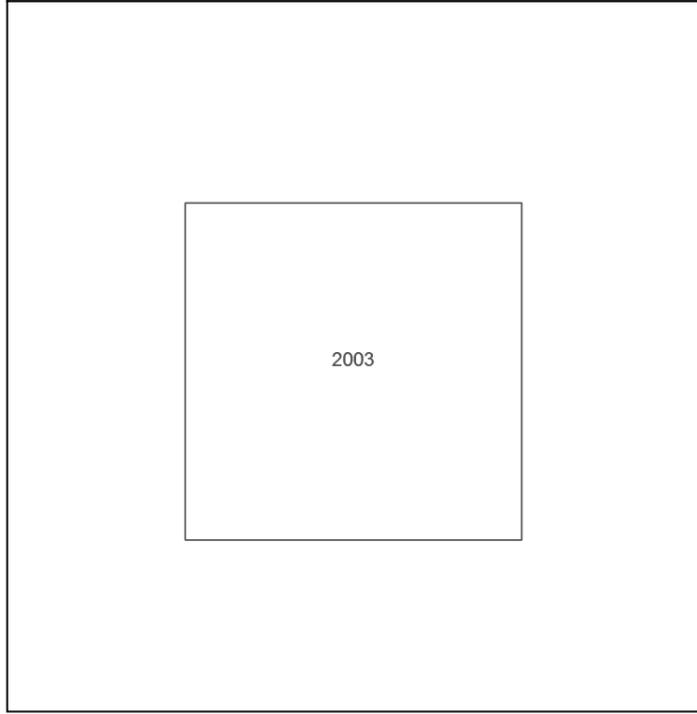
Client Ref: 14034794
Report Ref: GS-6562931
Grid Ref: 530688, 192145

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



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www.groundsure.com/sites/default/files/groundsure_legend.pdf



APPENDIX B

Groundsure Data Sheets



Groundsure

LOCATION INTELLIGENCE

Arcadis Consulting UK Ltd

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

Groundsure Reference: GS-6562930

Your Reference: 14034794

Report Date: 20 Jan 2020

Report Delivery Method: Email - pdf

Geo Insight

Address: 92, 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.

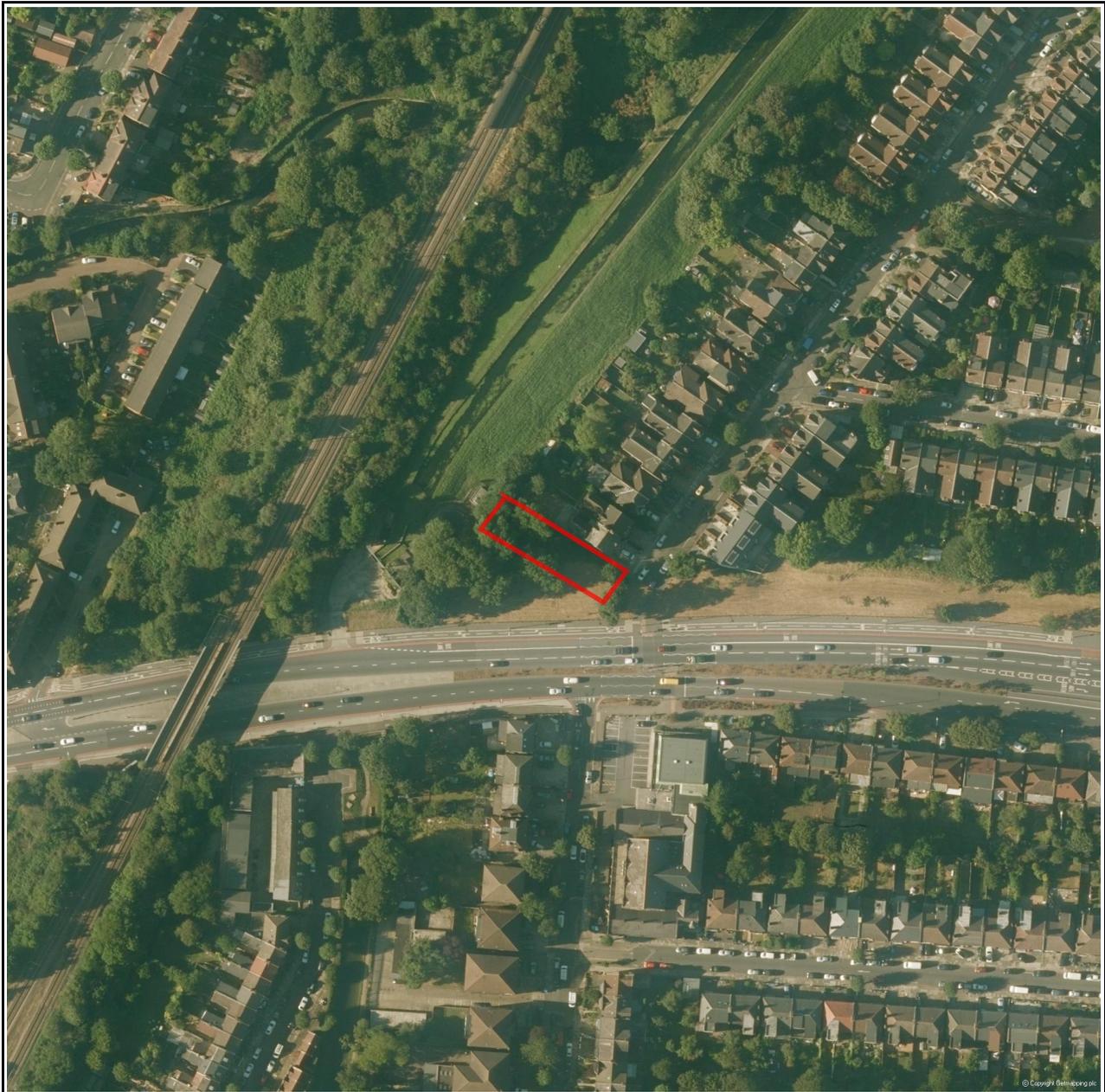
Yours faithfully,

Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Address: 92, PALMERSTON CRESCENT, SOUTHGATE, N13 4NH
Date: 20 Jan 2020
Reference: GS-6562930
Client: Arcadis Consulting UK Ltd

NW N NE



SW S SE

Aerial Photograph Capture date: 12-Aug-2016
Grid Reference: 530687,192145
Site Size: 0.0571ha

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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?	Yes
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 landslip 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?	Yes
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	Yes
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 landslip 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	4	6	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

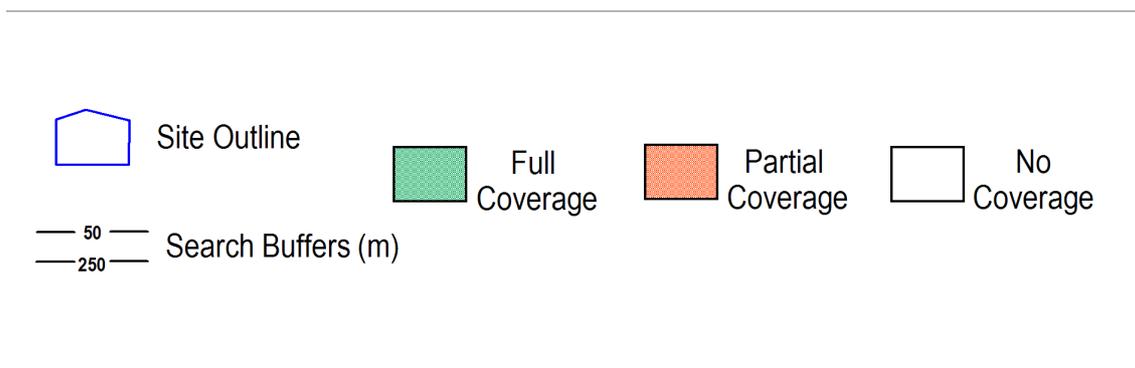
Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Cornwall and Devon Metalliferous Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Moderate				
6.2 Landslides	Very Low				
6.3 Ground Dissolution of Soluble Rocks	Negligible				
6.4 Compressible Deposits	Very Low				
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	0	4	28		
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	2	15	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	665.0	Some deposits are mapped	Full	Full	No coverage

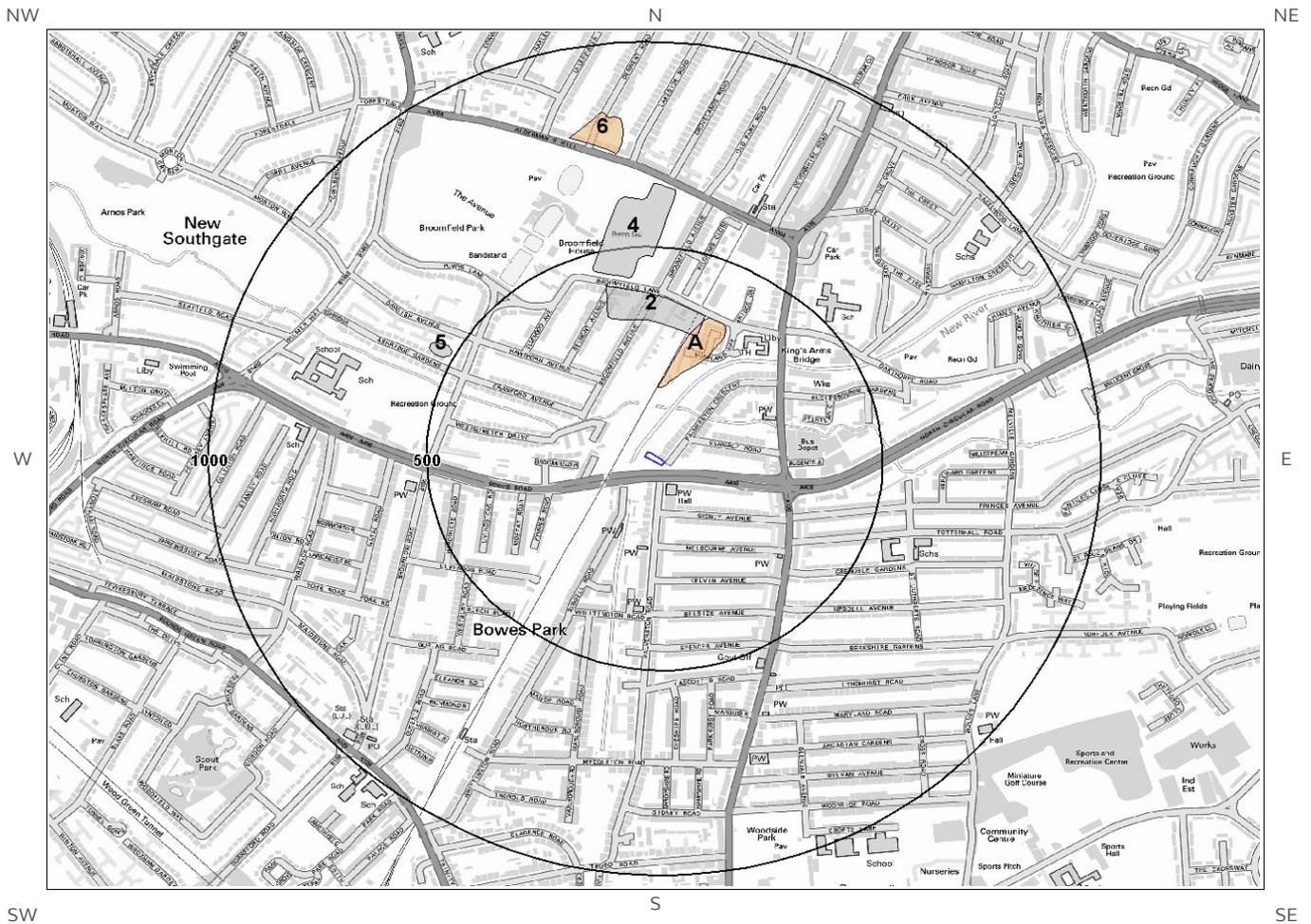
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not 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

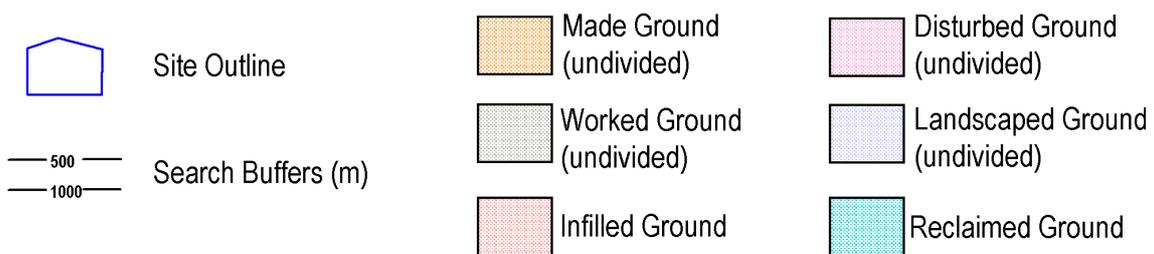
1 Geology (1:10,000 scale).

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



Artificial Ground Legend

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1. Geology 1:10,000 scale

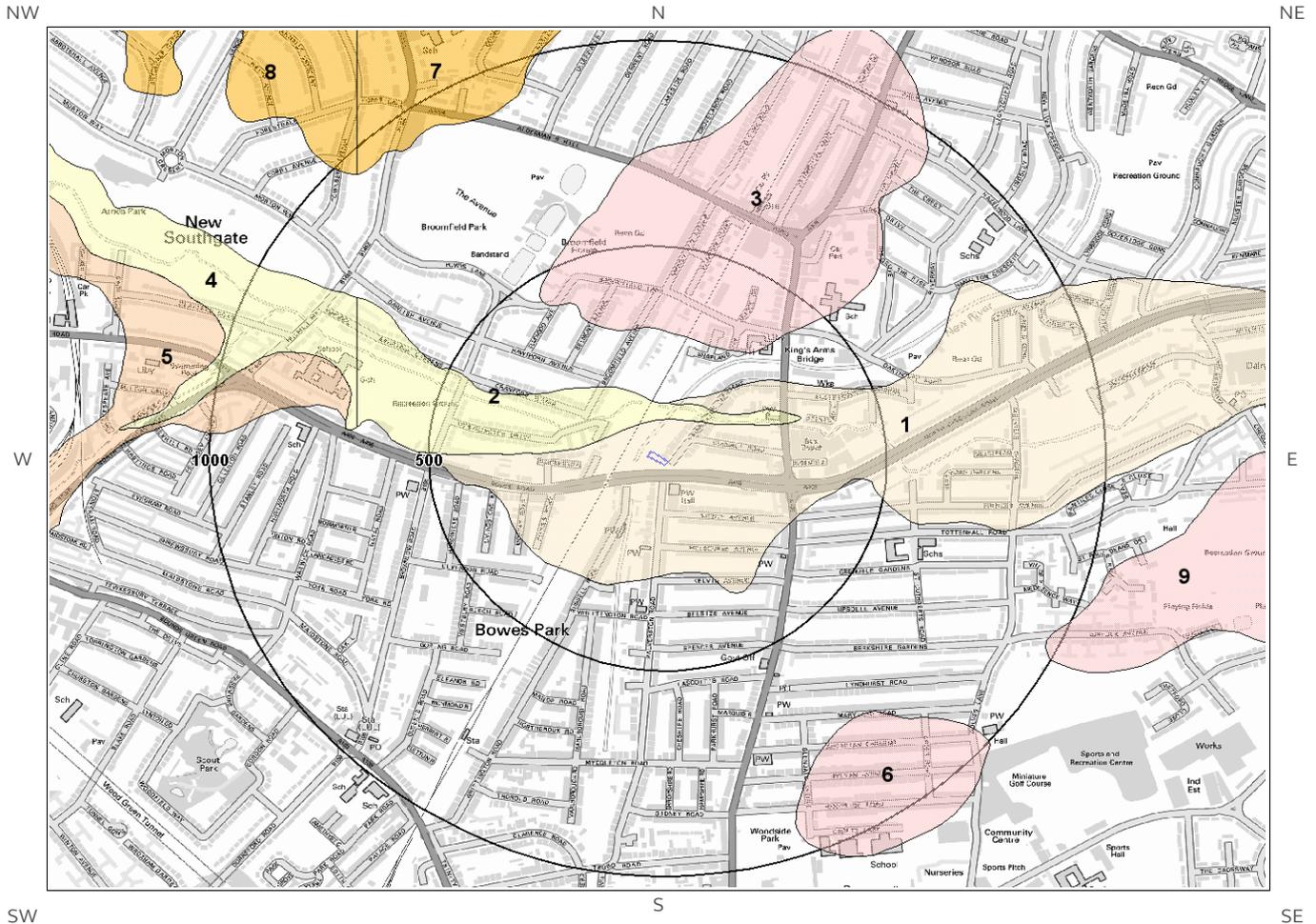
1.1 Artificial Ground

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	159.0	N	MGR- UNKNOWN	Made Ground (Undivided)	Unknown/unclassified Entry
2	303.0	N	WGR- UNKNOWN	Worked Ground (Undivided)	Unknown/unclassified Entry
3A	303.0	N	WMGR- UNKNOWN	Infilled Ground	Unknown/unclassified Entry
4	428.0	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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-  Site Outline
-  500
-  1000
- Search Buffers (m)

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	73.0	N	ALV-C	Alluvium - Clay (unlithified Deposits Coding Scheme)	Clay
3	289.0	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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-  Site Outline
 -  500
 -  1000
- Search Buffers (m)

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

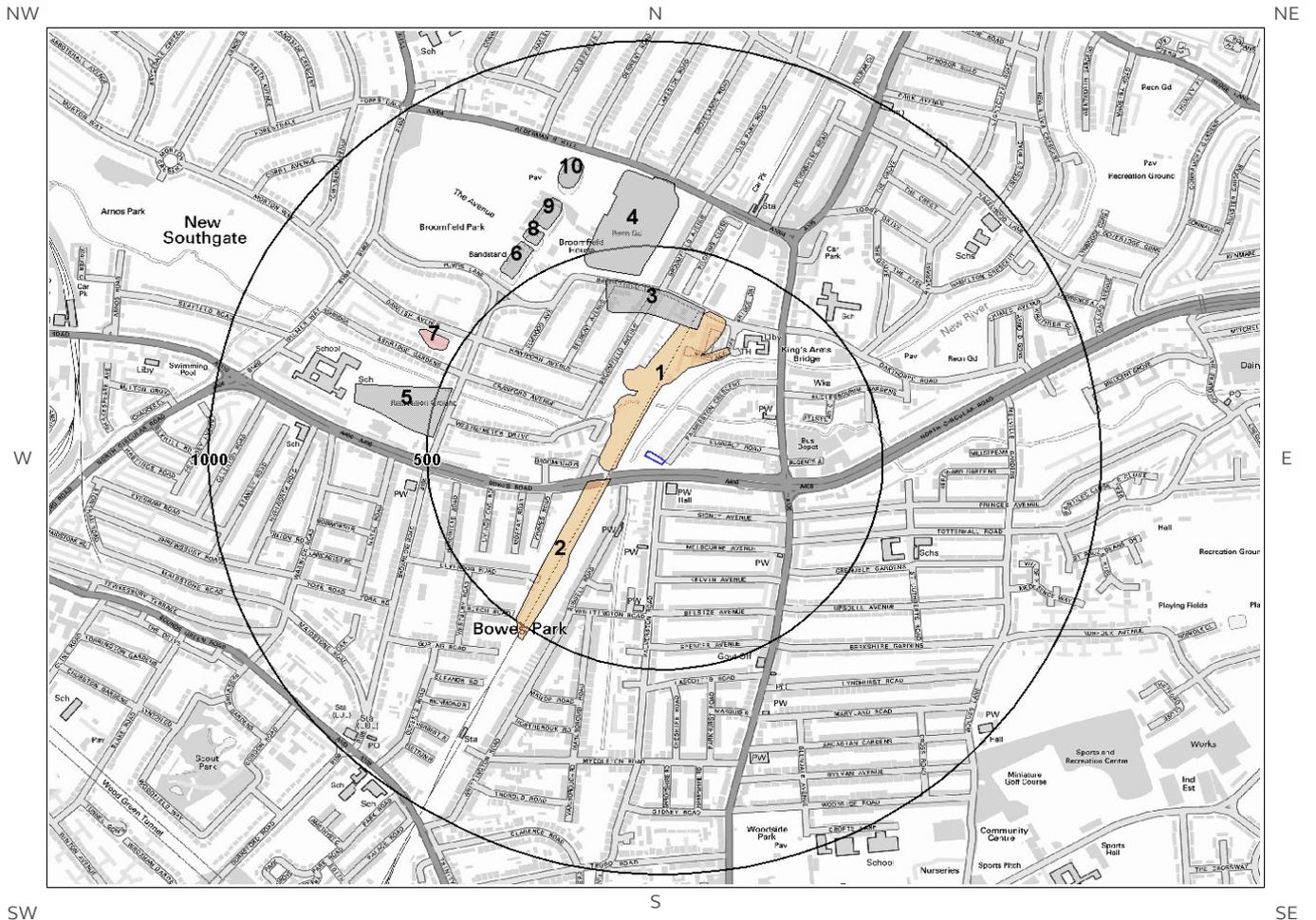
Database searched and no data found at this scale.

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.

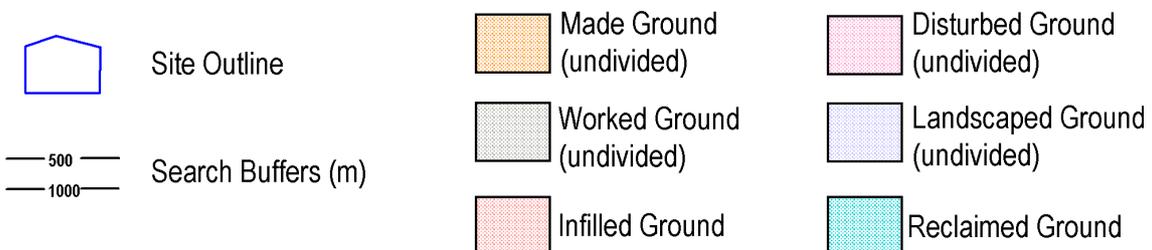
This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground map



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2. Geology 1:50,000 scale

2.1 Artificial Ground

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

2.1.1 Artificial/ Made Ground

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

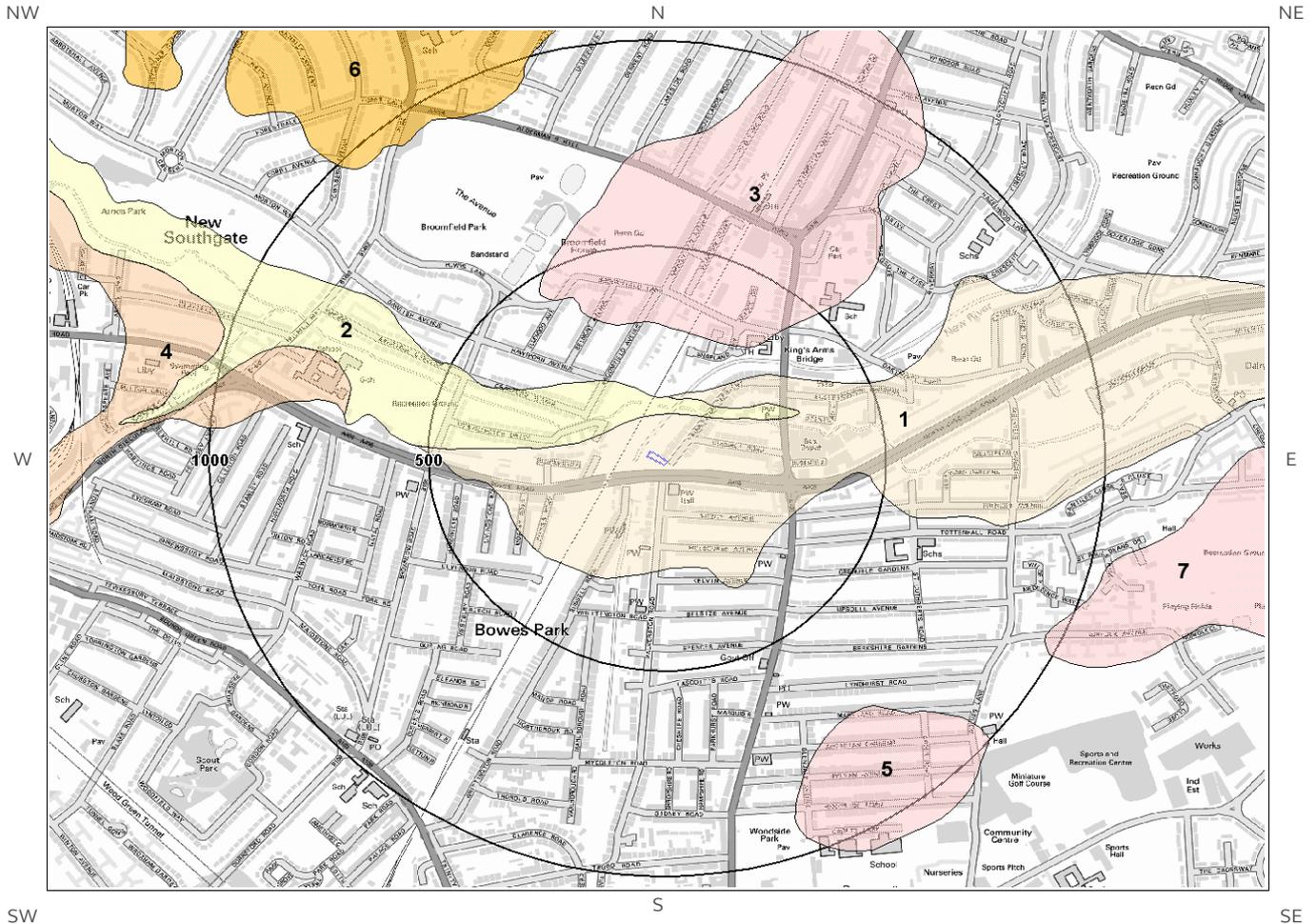
ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	47.0	NW	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	97.0	SW	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	315.0	N	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
4	431.0	N	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
5	472.0	W	WGR-VOID	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? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
47.0	NW	Mixed	Very High	Low

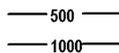
2.2 Superficial Deposits and Landslips map (1:50,000 scale)



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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	86.0	N	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
3	301.0	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.

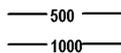
2.3 Bedrock and linear features map (1:50,000 scale)



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Site Outline



Search Buffers (m)

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

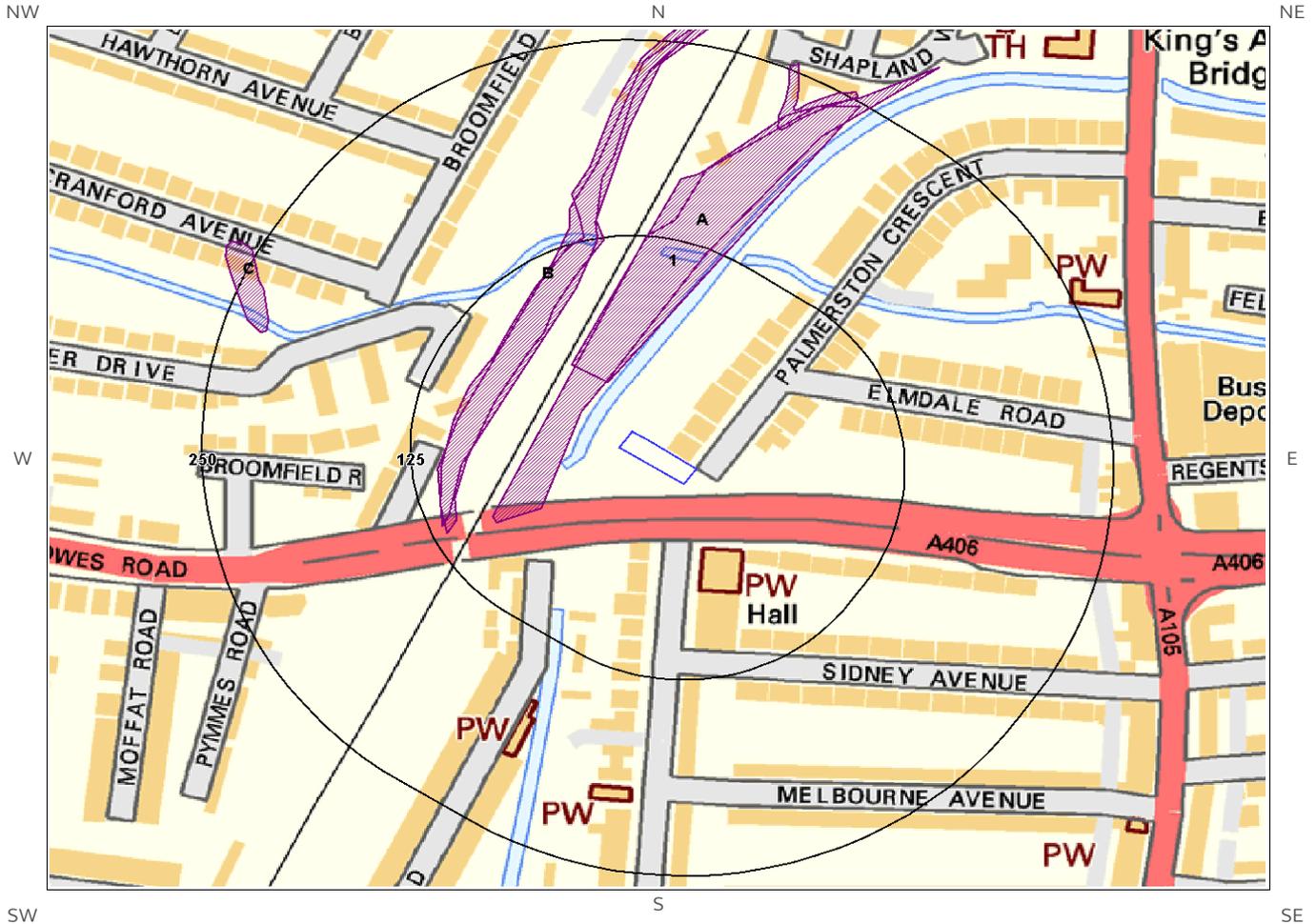
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

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

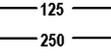
Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

4 Ground Workings map



Ground Workings Legend

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-  Site Outline
-  Historic Surface Ground Workings
-  Historic Underground Workings
-  Current Ground Workings
-  Search Buffers (m)
125
250

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
1	29.0	W	530680 192249	Unspecified Pit	1966
2A	35.0	NW	530722 192281	Unspecified Pit	1991
3A	35.0	NW	530722 192281	Unspecified Pit	1974
4A	35.0	NW	530722 192281	Unspecified Pit	1982
5B	75.0	NW	530644 192269	Unspecified Heap	1966
6B	75.0	NW	530644 192269	Unspecified Ground Workings	1951
7B	79.0	NW	530635 192269	Unspecified Ground Workings	1938
8	212.0	NE	530768 192375	Unspecified Ground Workings	1938
9C	224.0	W	530442 192254	Unspecified Pit	1912
10C	224.0	W	530442 192254	Unspecified Pit	1920

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	707.0	S	530546 191246	Tunnel	1894

4.3 Current Ground Workings

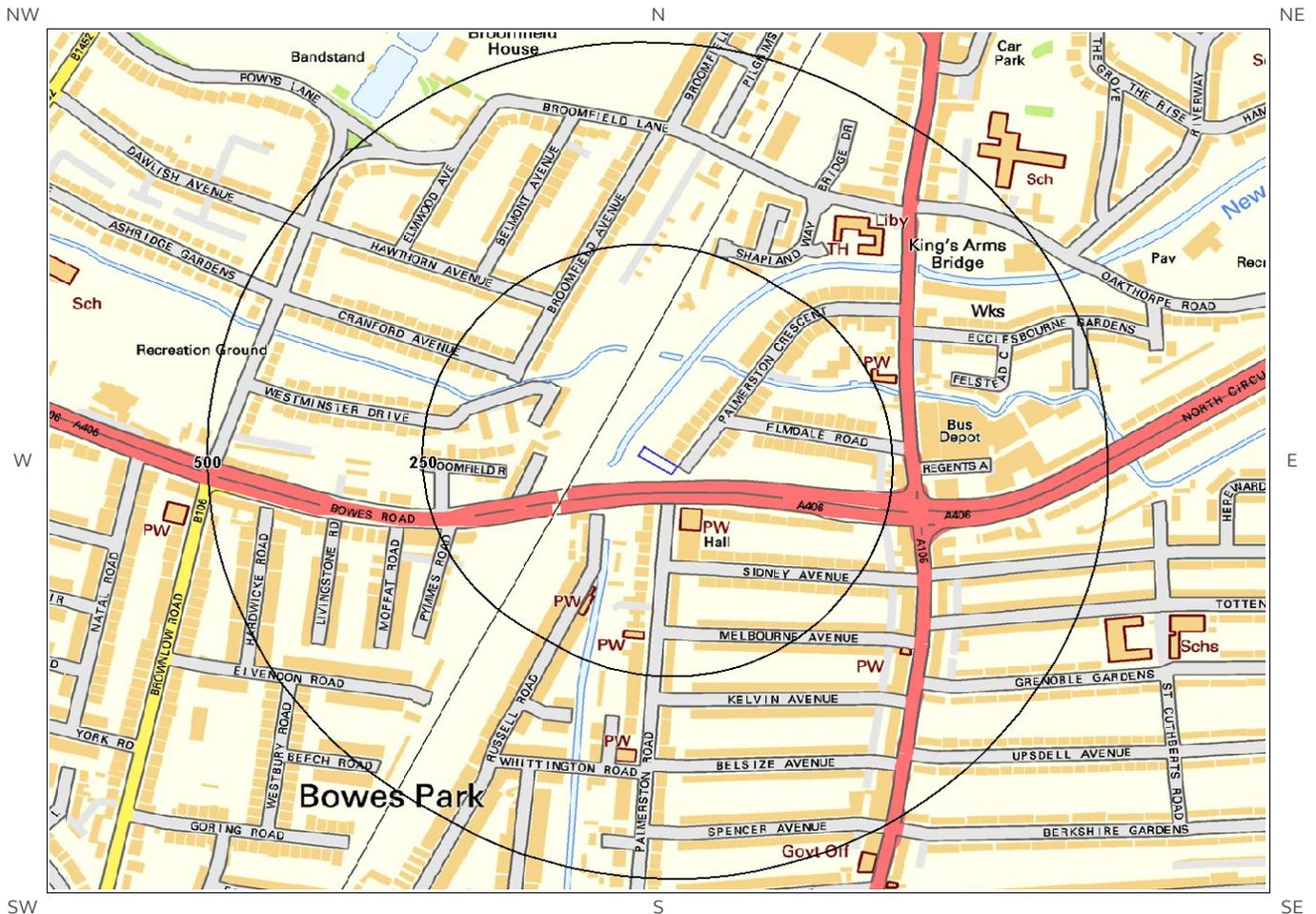
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

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:

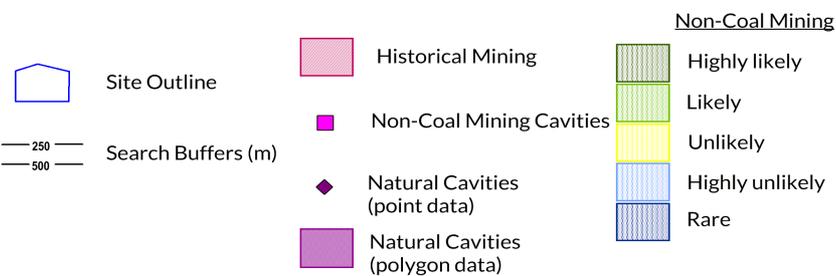
ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	547.0	NW	530188 192419	Sand & Gravel	Broomfield Farm Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

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.

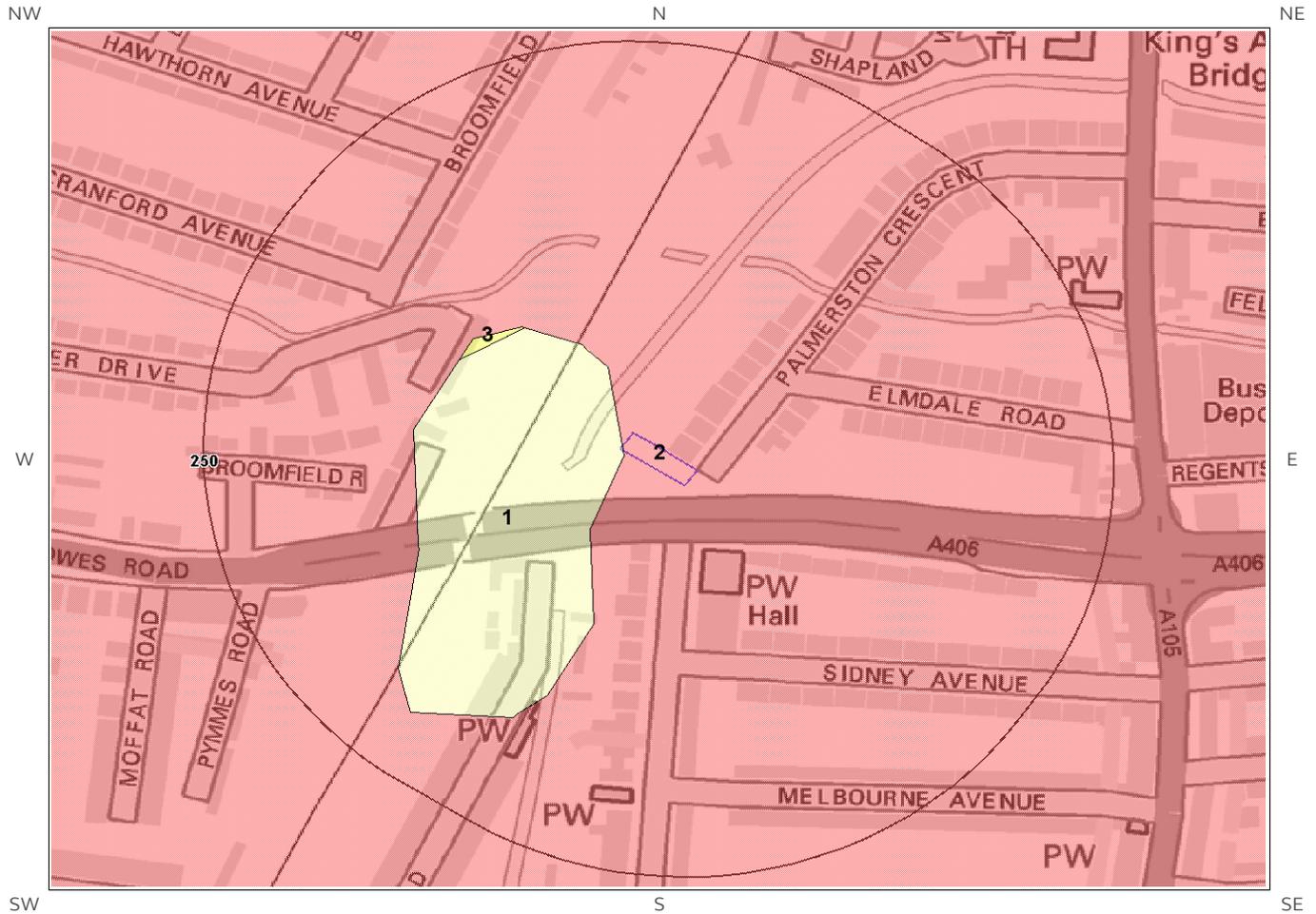
Are there any Clay Mining areas within 1000m of the study site boundary?

No

Database searched and no data found.

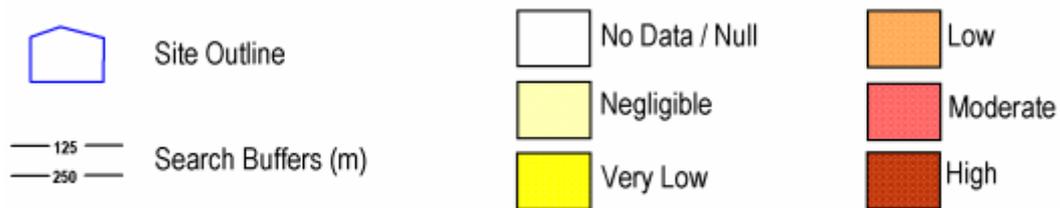
6 Natural Ground Subsidence

6.1 Shrink-Swell Clay map

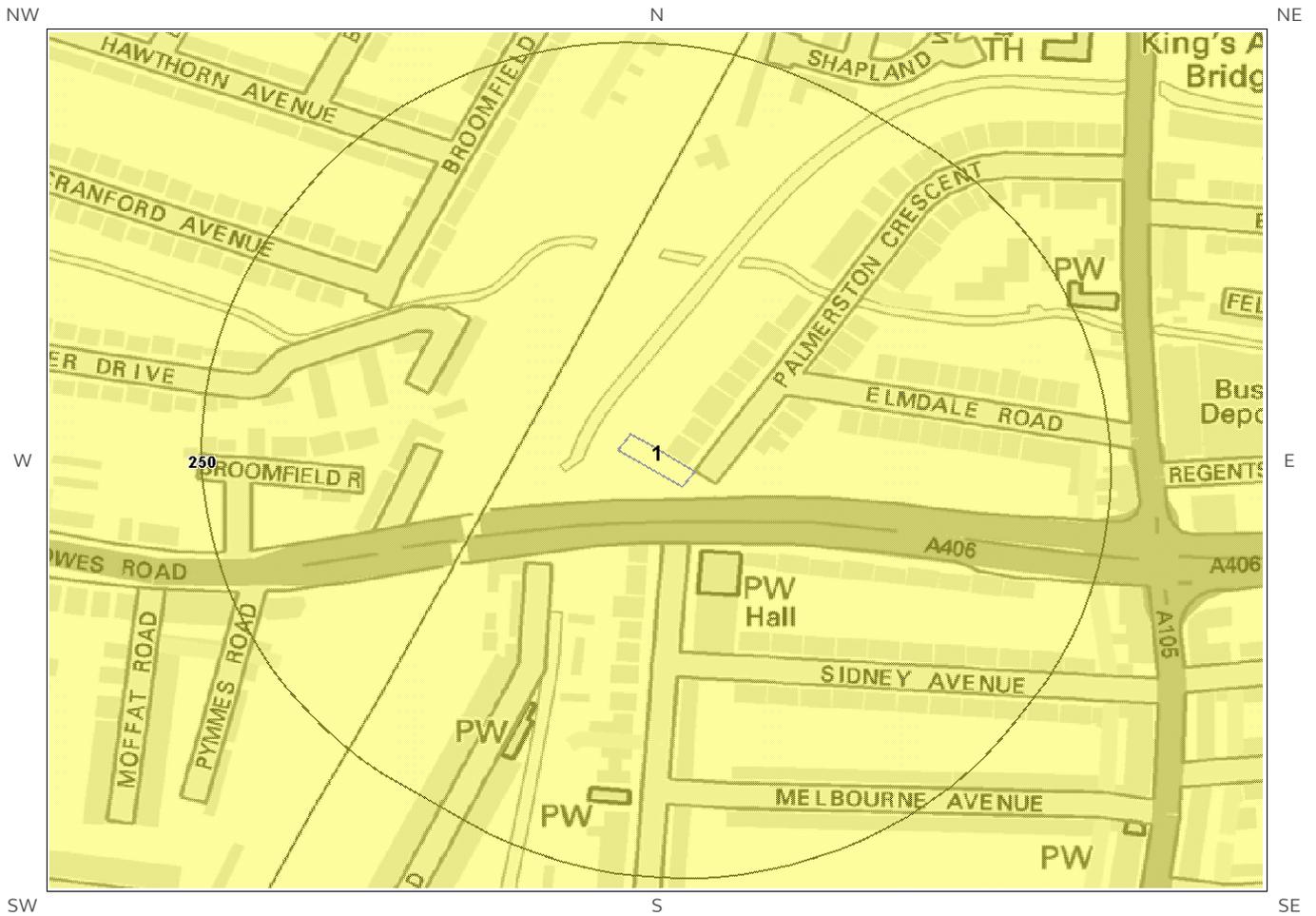


Shrink Swell Clay Legend

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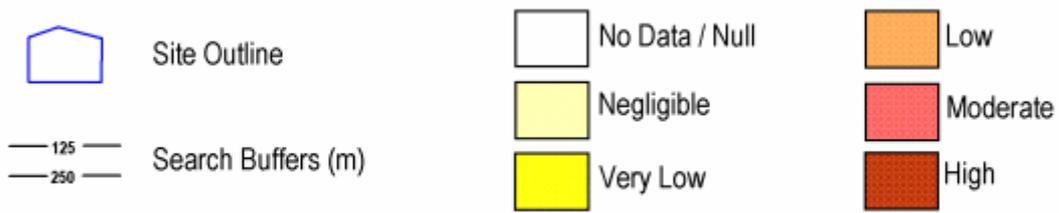


6.2 Landslides map

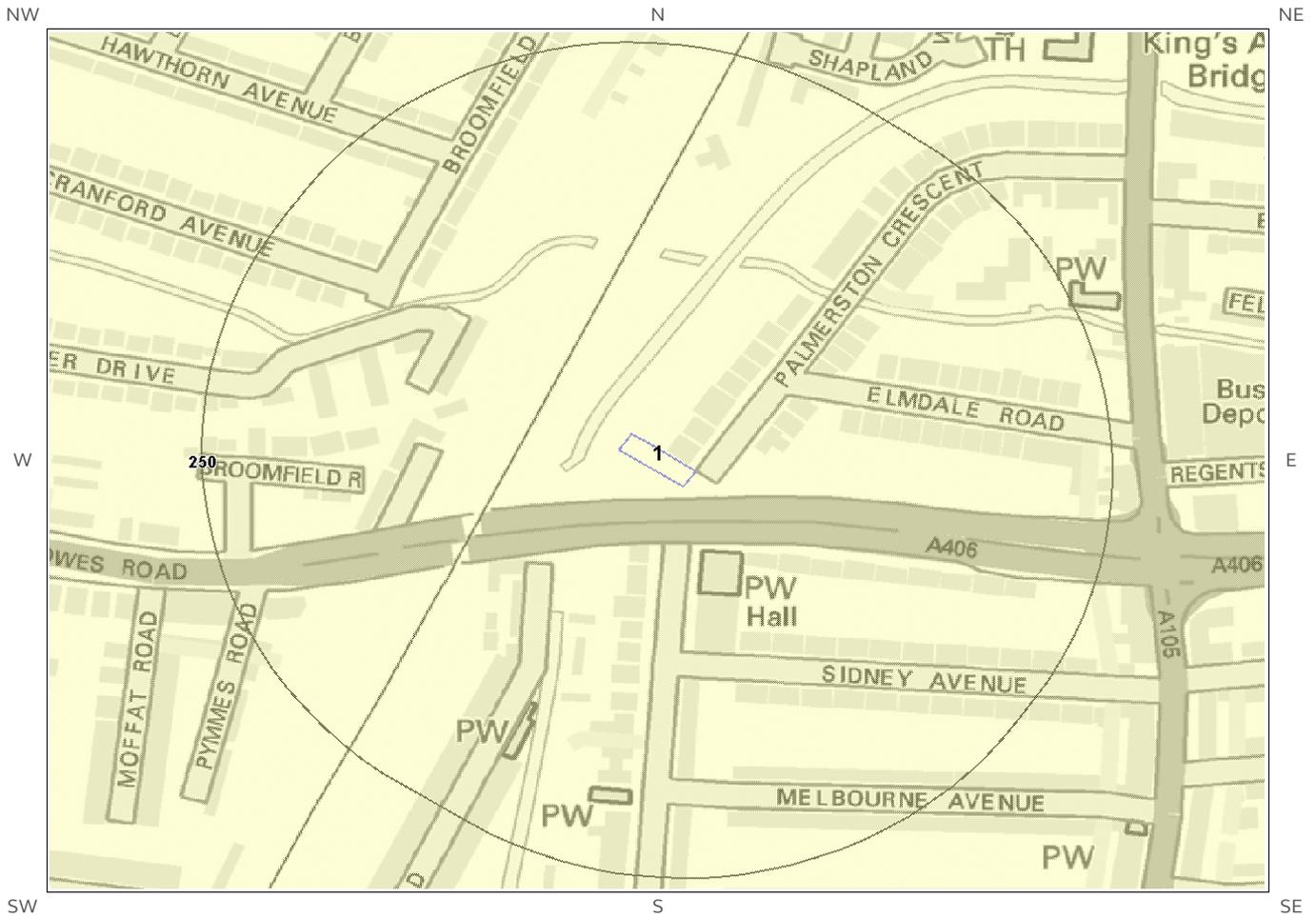


Landslides Legend

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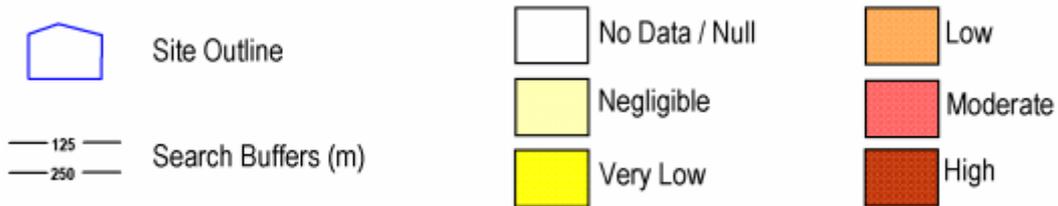


6.3 Ground Dissolution of Soluble Rocks map

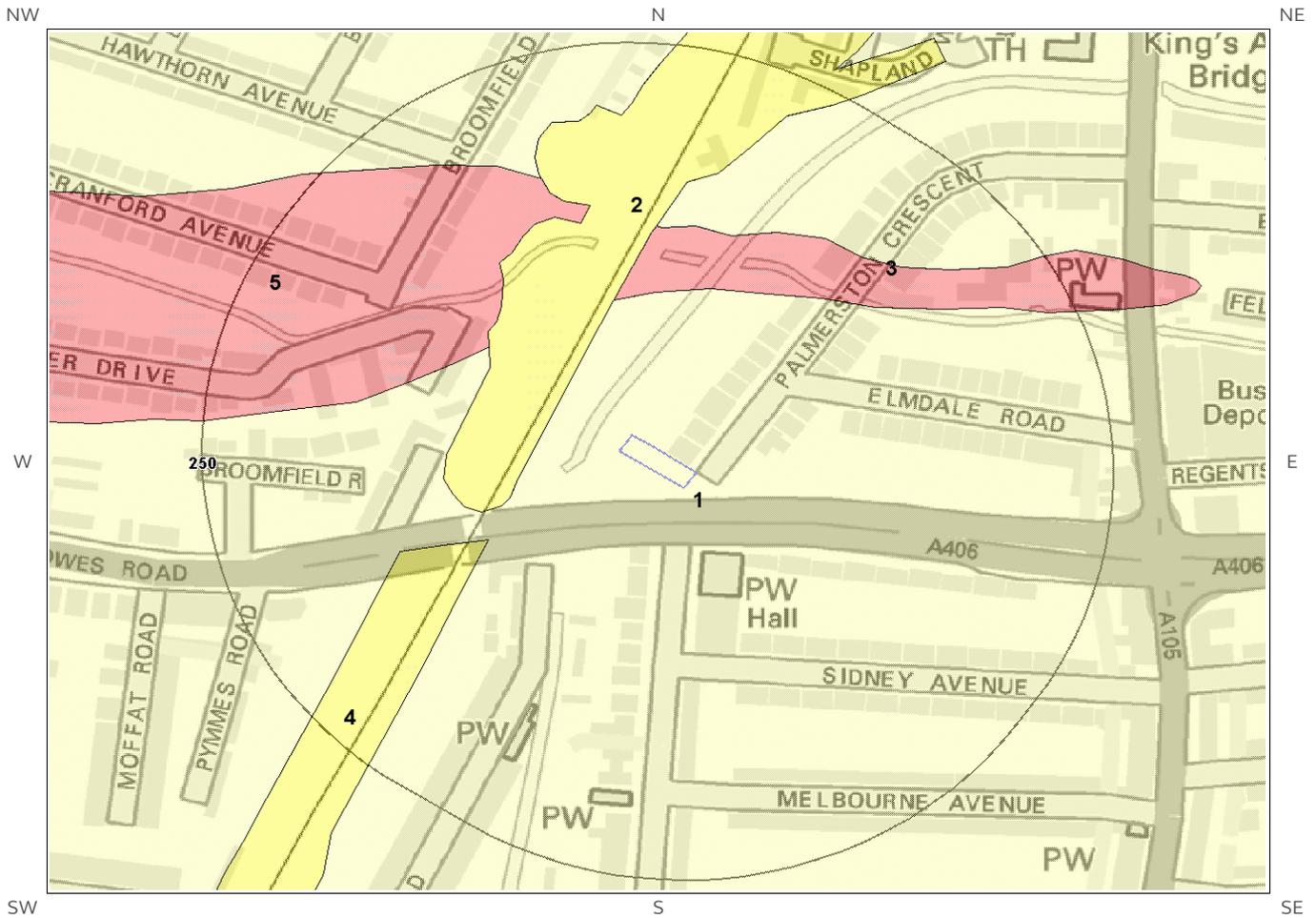


Ground Dissolution
Soluble Rocks Legend

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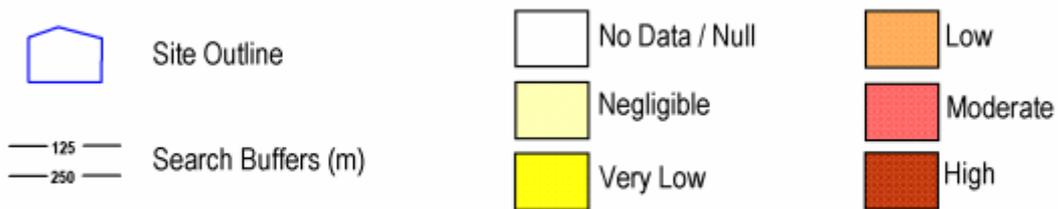


6.4 Compressible Deposits map

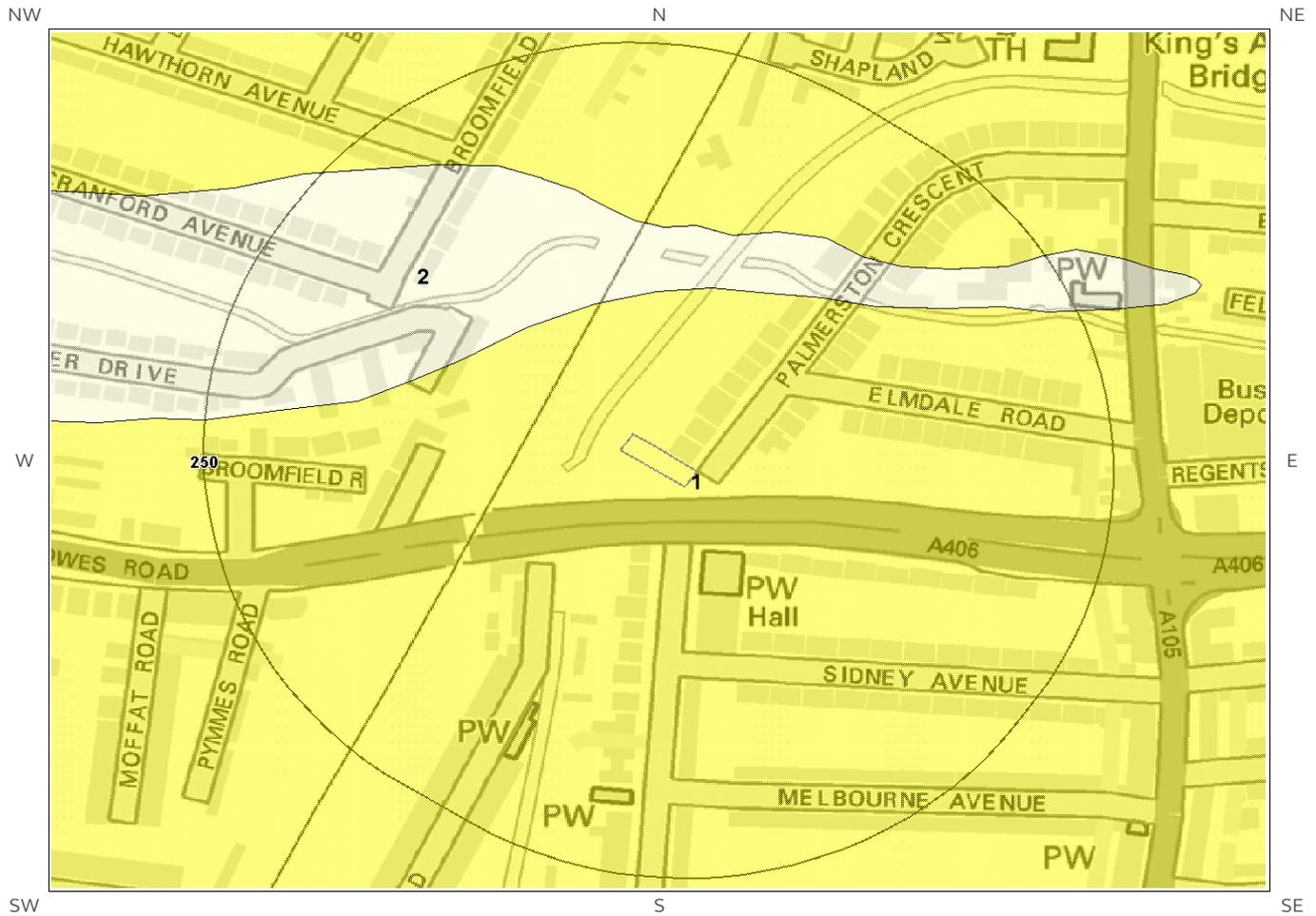


Compressible Deposits Legend

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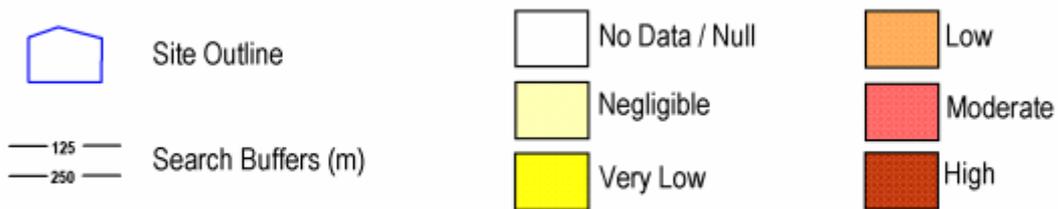


6.5 Collapsible Deposits map

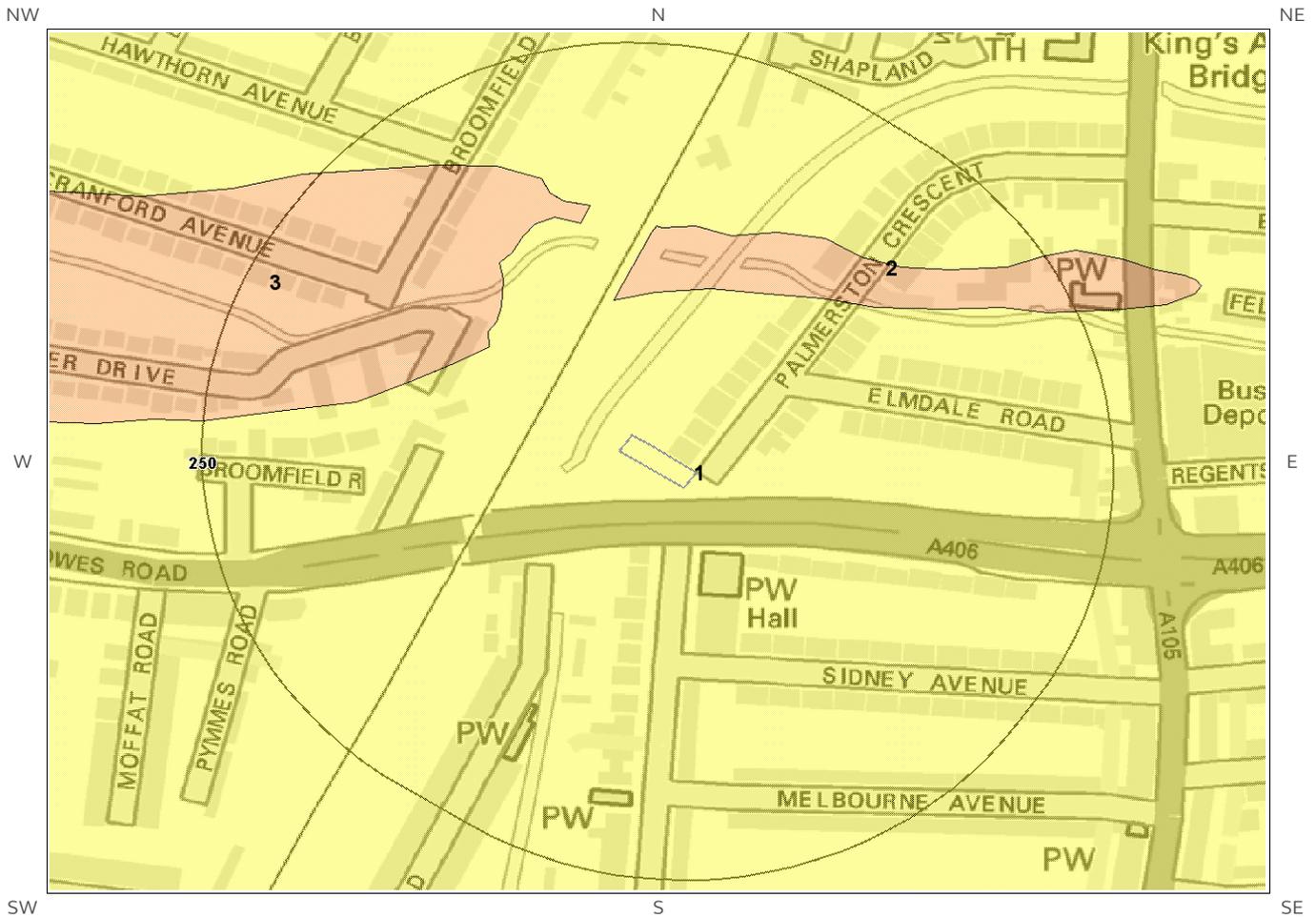


Collapsible Deposits Legend

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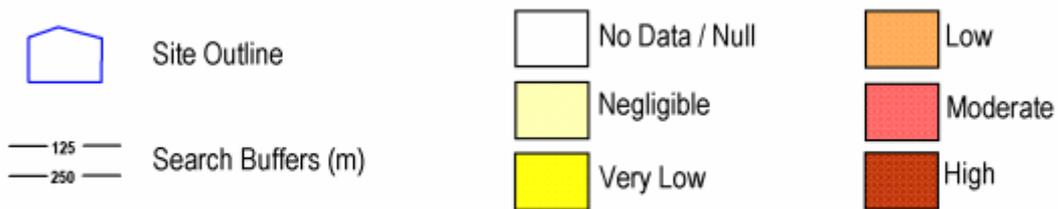


6.6 Running Sand map



Running Sand Legend

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6 Natural Ground Subsidence

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

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

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

6.1 Shrink-Swell Clays

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

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

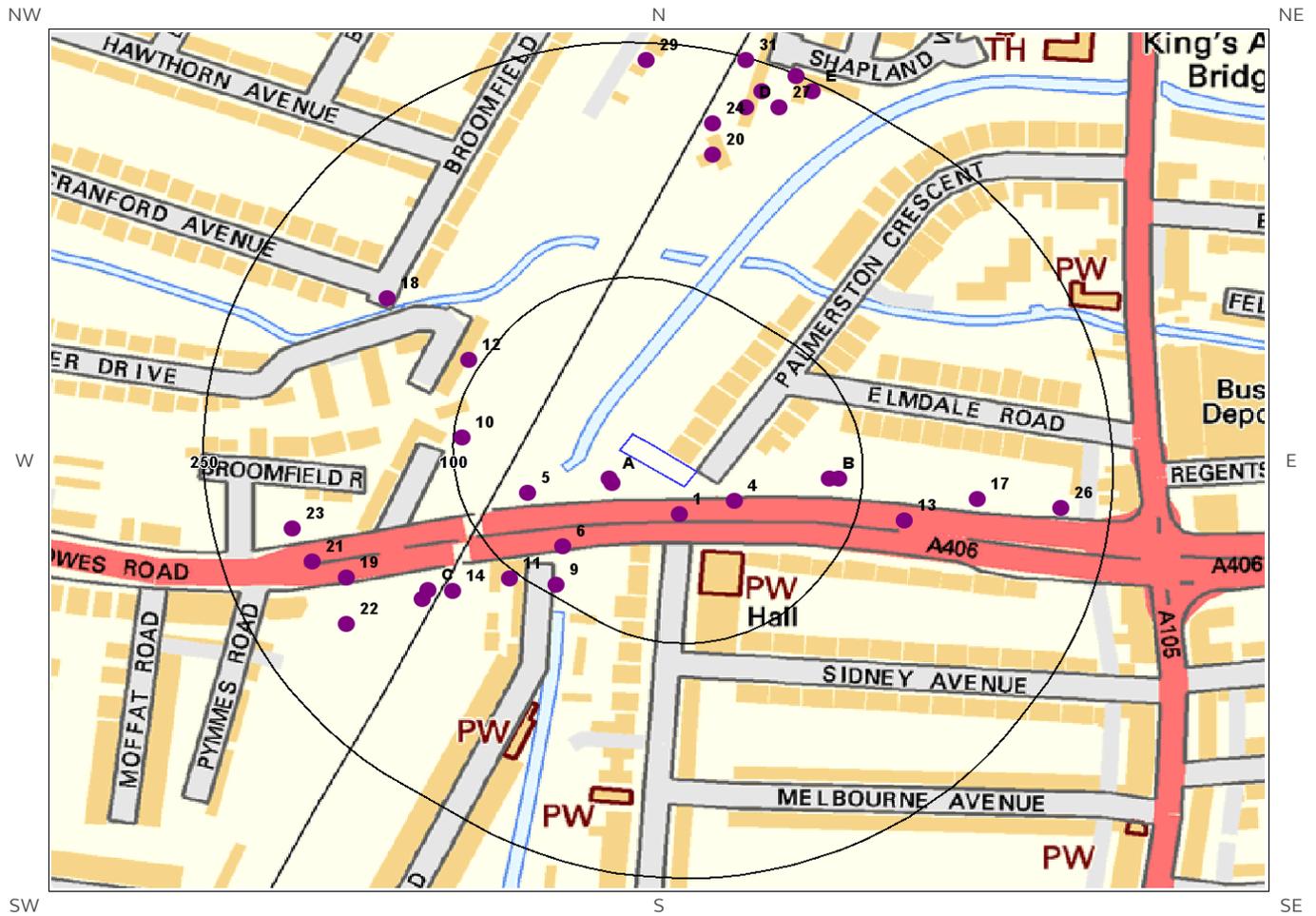
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible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

6.6 Running Sands

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

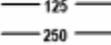
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased 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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-  Site Outline
-  Borehole Locations
-  Search Buffers (m)

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:

32

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	19.0	S	530700 192110	TQ39SW79	9.75	MIDDLESEX C/COUNCIL MH327
2A	19.0	SW	530658 192133	TQ39SW179	3	A406 NORTH CIRCULAR RD TP 60
3A	21.0	SW	530660 192130	TQ39SW199	No details	BOWES ROAD
4	29.0	SE	530733 192119	TQ39SW180	40	A406 NORTH CIRCULAR RD BH61
5	62.0	SW	530609 192124	TQ39SW177	10	A406 NORTH CIRCULAR RD 58
6	70.0	SW	530630 192090	TQ39SW80	10.36	MIDDLESEX C/COUNCIL BH116
7B	80.0	E	530790 192133	TQ39SW181	3	A406 NORTH CIRCULAR RD 62
8B	86.0	E	530796 192133	TQ39SW182	9	A406 NORTH CIRCULAR RD 63
9	94.0	SW	530626 192065	TQ39SW178	3	A406 NORTH CIRCULAR RD TP 59
10	95.0	W	530570 192159	TQ39SW172	10	A406 NORTH CIRCULAR RD 53
11	106.0	SW	530598 192069	TQ39SW176	10	A406 NORTH CIRCULAR RD 57
12	107.0	NW	530574 192209	TQ39SW173	10	A406 NORTH CIRCULAR RD 54
13	128.0	E	530835 192106	TQ39SW183	25.5	A406 NORTH CIRCULAR RD 64
14	135.0	SW	530564 192061	TQ39SW175	15	A406 NORTH CIRCULAR RD 56
15C	146.0	SW	530549 192062	TQ39SW171	15	A406 NORTH CIRCULAR RD 52
16C	152.0	SW	530546 192056	TQ39SW170	3	A406 NORTH CIRCULAR RD TP 51
17	169.0	E	530879 192120	TQ39SW184	4	A406 NORTH CIRCULAR RD 65
18	170.0	NW	530525 192248	TQ39SW174	20	A406 NORTH CIRCULAR RD 55
19	184.0	SW	530500 192070	TQ39SW81	11.35	MIDDLESEX C/COUNCIL MH328
20	184.0	N	530720 192340	TQ39SW452	20	OLD COUNCIL DEPOT GREEN LANES 1
21	198.0	W	530480 192080	TQ39SW561	6.15	BOWES ROAD ENFIELD BH2
22	199.0	SW	530500 192040	TQ39SW560	6.05	BOWES ROAD ENFIELD BH1

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
23	203.0	W	530468 192101	TQ39SW169	4	A406 NORTH CIRCULAR RD TP 50
24	204.0	N	530720 192360	TQ39SW547	20	SOUTHGATE TOWN HALL BH1
25D	219.0	N	530740 192370	TQ39SW462	14	OLD COUNCIL DEPOT GREEN LANES 13
26	220.0	E	530929 192114	TQ39SW185	30	A406 NORTH CIRCULAR RD 66
27	226.0	NE	530760 192370	TQ39SW463	15	OLD COUNCIL DEPOT GREEN LANES 14
28D	232.0	N	530750 192380	TQ39SW470	4	OLD COUNCIL DEPOT GREEN LANES TP 7
29	238.0	N	530680 192400	TQ39SW86/A-H	10.05	SOUTHGATE SUB- STATION 1-8
30E	243.0	NE	530780 192380	TQ39SW471	3.4	OLD COUNCIL DEPOT GREEN LANES TP 8
31	248.0	N	530740 192400	TQ39SW460	10.3	OLD COUNCIL DEPOT GREEN LANES 11
32E	248.0	NE	530770 192390	TQ39SW456	20	OLD COUNCIL DEPOT GREEN LANES 5

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

#1: scans.bgs.ac.uk/sobi_scans/boreholes/804020
#2A: scans.bgs.ac.uk/sobi_scans/boreholes/804122
#4: scans.bgs.ac.uk/sobi_scans/boreholes/804123
#5: scans.bgs.ac.uk/sobi_scans/boreholes/804120
#6: scans.bgs.ac.uk/sobi_scans/boreholes/804021
#7B: scans.bgs.ac.uk/sobi_scans/boreholes/804124
#8B: scans.bgs.ac.uk/sobi_scans/boreholes/804125
#9: scans.bgs.ac.uk/sobi_scans/boreholes/804121
#10: scans.bgs.ac.uk/sobi_scans/boreholes/804115
#11: scans.bgs.ac.uk/sobi_scans/boreholes/804119
#12: scans.bgs.ac.uk/sobi_scans/boreholes/804116
#13: scans.bgs.ac.uk/sobi_scans/boreholes/804126
#14: scans.bgs.ac.uk/sobi_scans/boreholes/804118
#15C: scans.bgs.ac.uk/sobi_scans/boreholes/804114
#16C: scans.bgs.ac.uk/sobi_scans/boreholes/804113
#17: scans.bgs.ac.uk/sobi_scans/boreholes/804127
#18: scans.bgs.ac.uk/sobi_scans/boreholes/804117
#19: scans.bgs.ac.uk/sobi_scans/boreholes/804022
#20: scans.bgs.ac.uk/sobi_scans/boreholes/12709281
#21: scans.bgs.ac.uk/sobi_scans/boreholes/12710061
#22: scans.bgs.ac.uk/sobi_scans/boreholes/12710060
#23: scans.bgs.ac.uk/sobi_scans/boreholes/804112
#24: scans.bgs.ac.uk/sobi_scans/boreholes/12709961
#25D: scans.bgs.ac.uk/sobi_scans/boreholes/12709296
#26: scans.bgs.ac.uk/sobi_scans/boreholes/804128
#27: scans.bgs.ac.uk/sobi_scans/boreholes/12709297
#28D: scans.bgs.ac.uk/sobi_scans/boreholes/12709304
#29: scans.bgs.ac.uk/sobi_scans/boreholes/804027
#30E: scans.bgs.ac.uk/sobi_scans/boreholes/12709305
#31: scans.bgs.ac.uk/sobi_scans/boreholes/12709294
#32E: scans.bgs.ac.uk/sobi_scans/boreholes/12709290

8 Estimated Background Soil Chemistry

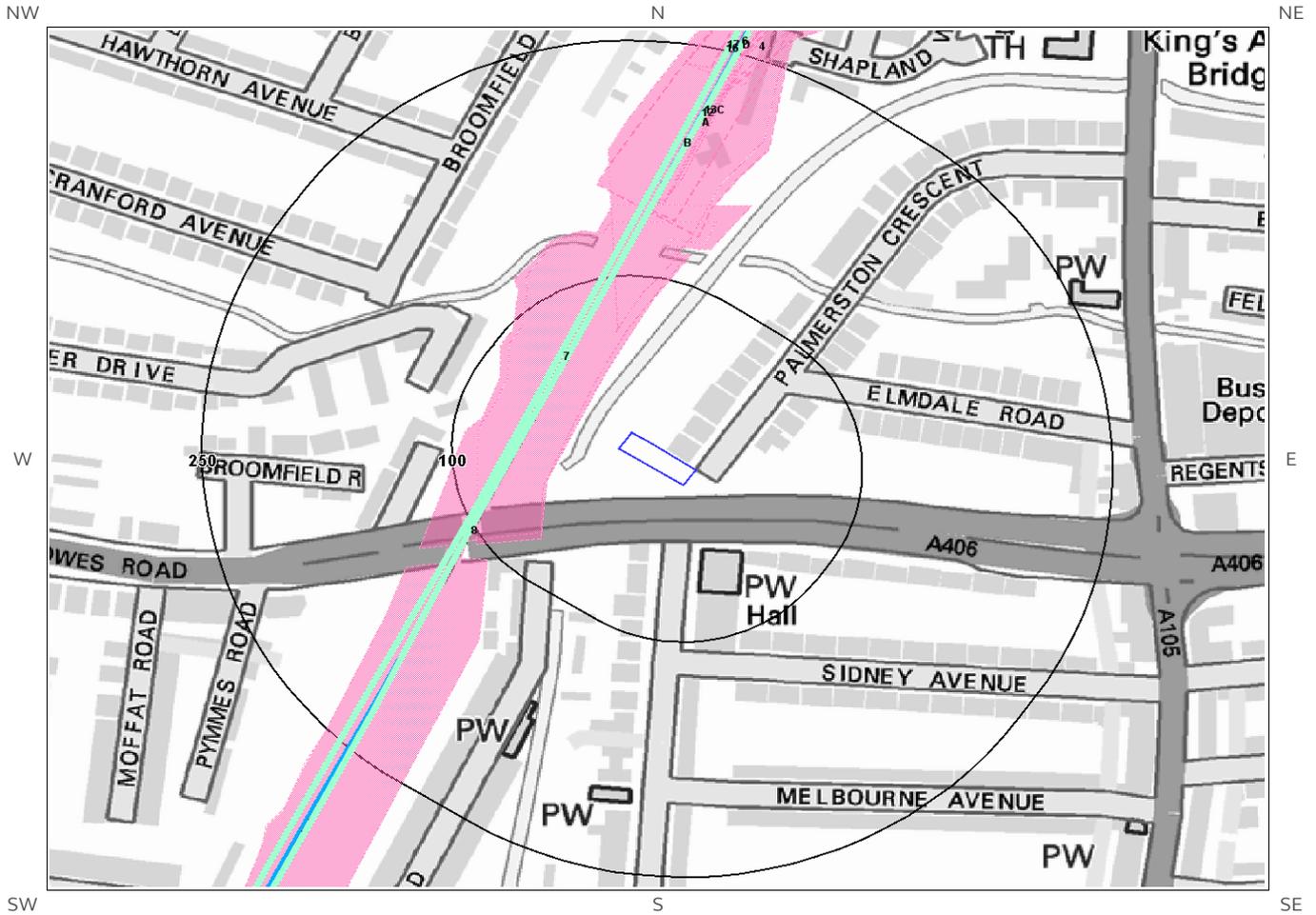
Records of background estimated soil chemistry within 250m of the study site boundary: 1

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.

9 Railways and Tunnels map



Railways and Tunnels Legend

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- | | | | |
|---|--|---|---|
|  | Underground or Partially Underground Railway / Subway System |  | Railway Track (OpenStreetMap) |
|  | Railway Tunnel (OS Mapping) |  | High Speed 2 |
|  | Site Outline |  | High Speed 2 Revised Proposed Route |
|  | Search Buffers (m) |  | Crossrail 1 |
|  | 250 |  | Railway Track (OS Mapping) |
|  | 500 |  | Railway and/or Tunnel Feature from Historical Mapping |
|  | Abandoned or Dismantled Railway (OpenStreetMap) | | |

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	29	NW	n/a	Railway	1896
8	31	NW	n/a	Railway	1914
9B	65	N	n/a	Railways	1937
10B	65	N	n/a	Railways	1896
11B	65	N	n/a	Railways	1915
1A	131	N	530798 192506	Railway Sidings	1920
2A	131	N	530798 192506	Railway Sidings	1912
3C	137	N	530843 192581	Railway Sidings	1966

ID	Distance (m)	Direction	NGR	Details	Date
12	146	N	530799 192516	Railway Sidings	1956
13	147	N	530739 192404	Railway Sidings	1956
14C	149	N	530810 192517	Railway Sidings	1936
15D	150	N	530813 192516	Railway Sidings	1914
4	215	N	530753 192411	Railway Sidings	1951
16	231	N	n/a	Railway	1936
5D	232	N	530832 192558	Railway Sidings	1938
17	237	N	n/a	Railway	1896
6	239	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
55	NW	Hertford Loop Line	rail
55	NW	Not given	Multi Track
55	NW	Not given	Multi Track
55	NW	Hertford Loop Line	rail
59	NW	Hertford Loop Line	rail
59	NW	Hertford Loop Line	rail
88	SW	Hertford Loop Line	rail
88	SW	Hertford Loop Line	rail
91	W	Hertford Loop Line	rail
91	W	Hertford Loop Line	rail

Distance (m)	Direction	Name	Type
140	SW	Hertford Loop Line	rail
140	SW	Hertford Loop Line	rail
143	SW	Hertford Loop Line	rail
143	SW	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

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Telephone: 08444 159 000
info@groundsure.com



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Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email: enquiries@bgs.ac.uk
Web: www.bgs.ac.uk

BGS Geological Hazards Reports and general geological enquiries



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LE12 6HX



The Coal Authority

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Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk



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Public Health England, Wellington House
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<https://www.gov.uk/government/organisations/public-health-england>
Email: enquiries@phe.gov.uk
Main switchboard: 020 7654 8000



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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/>



Groundsure

LOCATION INTELLIGENCE

Arcadis Consulting UK Ltd

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

Groundsure Reference: GS-6562929

Your Reference: 14034794

Report Date 20 Jan 2020

Report Delivery Method: Email - pdf

Enviro Insight

Address: 92, PALMERSTON CRESCENT, SOUTHGATE, N13 4NH

Dear Sir/ Madam,

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

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

Yours faithfully,

Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

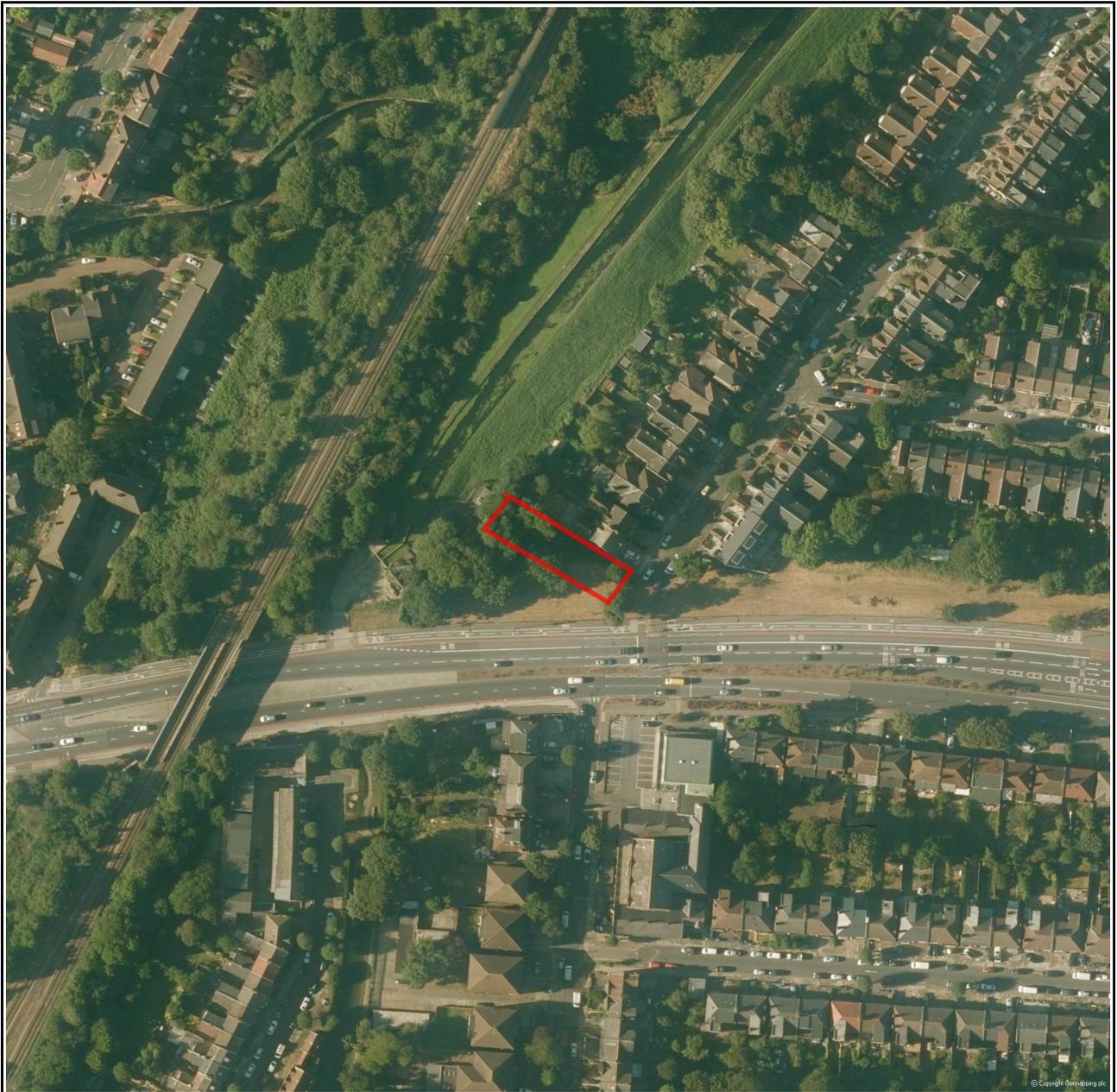
Enviro Insight

Address: 92, PALMERSTON CRESCENT, SOUTHGATE, N13 4NH
Date: 20 Jan 2020
Reference: GS-6562929
Client: Arcadis Consulting UK Ltd

NW

N

NE



W

E

SW

S

SE

Aerial Photograph Capture date: 12-Aug-2016
Grid Reference: 530687,192145
Site Size: 0.0571ha

Report Reference: GS-6562929
Client Reference: 14034794

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Overview of Findings

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

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	4	18	77
1.2 Additional Information – Historical Tank Database	0	0	2	1
1.3 Additional Information – Historical Energy Features Database	0	0	5	18
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	29
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	0	4	6	32
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	0	5
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	2	1	3
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	0	1
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	0	1
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	0	5	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	3
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	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	On-site	0-50m	51-250	251-500	501-1000	1000-2000
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		
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	2	0	4	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	2	0	4	4	4
6.6 Source Protection Zones (within 500m of the study site)	1	0	1	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	4	20	4	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	Yes	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	High

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

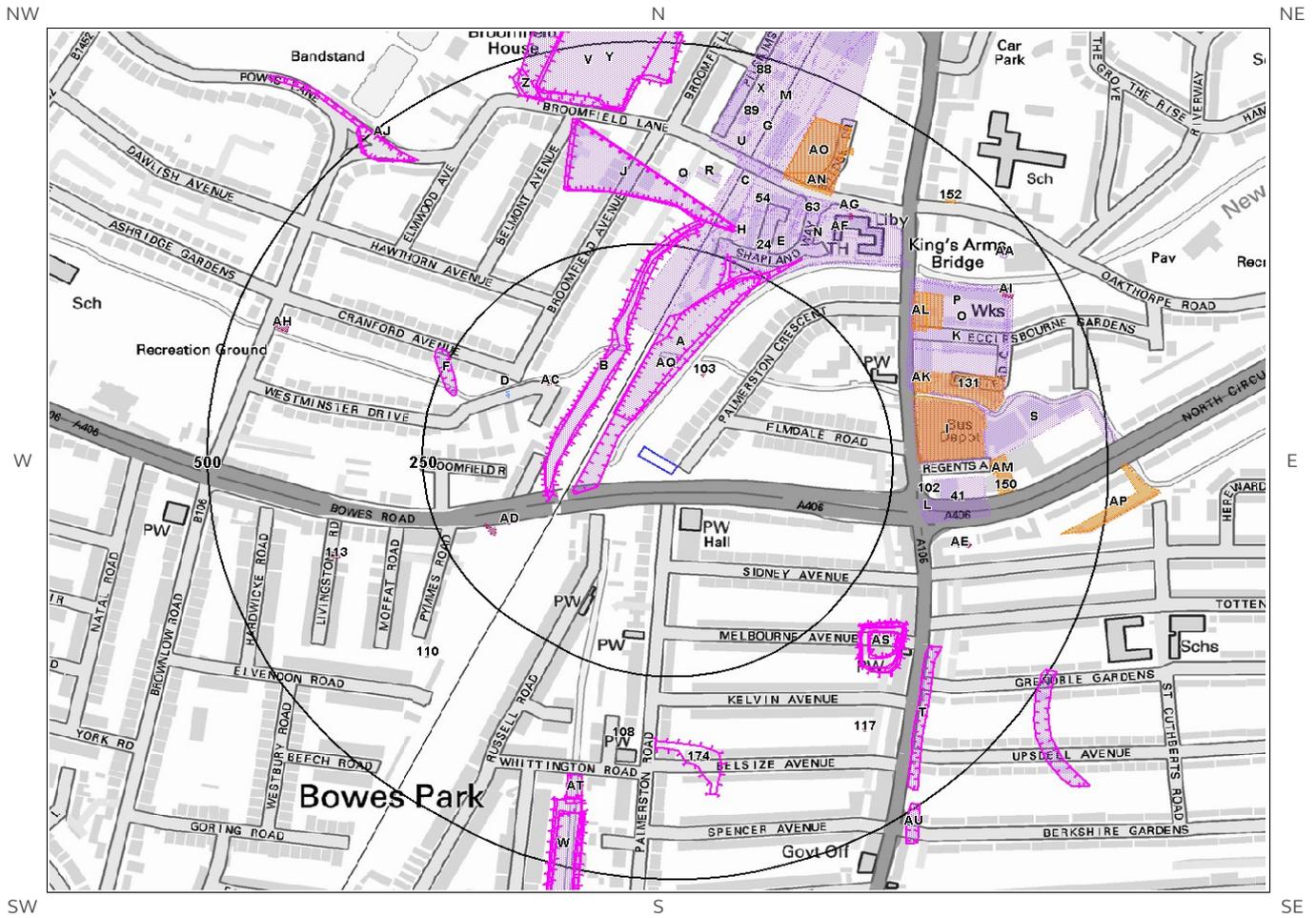
Note: Maps

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).

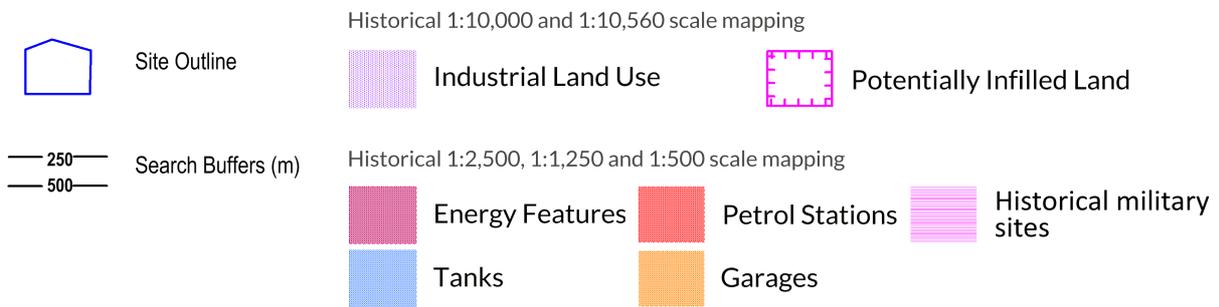
Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

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: 99

ID	Distance [m]	Direction	Use	Date
1AQ	29	W	Unspecified Pit	1966
2A	35	NW	Unspecified Pit	1974
3A	35	NW	Unspecified Pit	1982
4A	35	NW	Unspecified Pit	1991
5B	75	NW	Unspecified Ground Workings	1951
6B	75	NW	Unspecified Heap	1966
7B	79	NW	Unspecified Ground Workings	1938
8C	131	N	Railway Sidings	1912
9C	131	N	Railway Sidings	1920
10G	137	N	Railway Sidings	1966
11E	164	N	Unspecified Depot	1991
12D	176	NW	Unspecified Tanks	1912
13D	176	NW	Unspecified Tanks	1920
14E	201	NE	Fire Station	1897
15AR	212	NE	Unspecified Ground Workings	1938
16H	215	N	Railway Sidings	1951
17F	224	W	Unspecified Pit	1912
18F	224	W	Unspecified Pit	1920
19G	232	N	Railway Sidings	1938
20E	233	NE	Unspecified Depot	1982
21E	235	NE	Unspecified Depot	1974
22H	239	N	Railway Sidings	1938
23N	253	NE	Fire Engine Station	1938
24	264	NE	Unspecified Depot	1966
25I	278	E	Motor Garages	1912
26I	278	E	Motor Garages	1920
27I	283	E	Unspecified Depot	1974
28I	283	E	Unspecified Depot	1982
29I	283	E	Unspecified Depot	1991
30I	283	E	Unspecified Depot	1966
31L	283	E	Smithy	1898
32K	283	E	Nursery	1898

33J	284	N	Unspecified Pit	1864
34J	284	N	Unspecified Pit	1866
35K	285	E	Nursery	1897
36J	286	N	Unspecified Pit	1864
37J	286	N	Unspecified Pit	1864
38K	286	E	Nursery	1895
39K	287	E	Nursery	1920
40K	287	E	Nursery	1912
41	288	E	Smithy	1895
42L	290	E	Smithy	1897
43M	291	N	Railway Sidings	1951
44M	299	N	Railway Sidings	1938
45N	306	NE	Fire Engine Station	1951
46O	309	NE	Nursery	1866
47O	309	NE	Nursery	1864
48AF	312	NE	Fire Engine Station	1938
49O	313	NE	Nursery	1864
50N	313	NE	Fire Engine Station	1912
51N	313	NE	Fire Engine Station	1920
52N	315	NE	Fire Station	1895
53N	318	NE	Fire Station	1898
54	322	NE	Railway Building	1938
55P	323	NE	Unspecified Works	1982
56P	323	NE	Unspecified Works	1966
57P	323	NE	Unspecified Works	1974
58P	323	NE	Unspecified Works	1991
59Q	328	N	Railway Buildings	1951
60Q	328	N	Railway Buildings	1966
61R	336	N	Railway Building	1951
62R	336	N	Railway Building	1966
63	341	NE	Fire Station	1966
64S	358	E	Unspecified Works	1974
65S	358	E	Unspecified Workshop	1991
66S	358	E	Unspecified Works	1966
67S	358	E	Unspecified Works	1982
68M	366	NE	Railway Land	1938
69M	367	NE	Railway Sidings	1897
70M	367	NE	Railway Sidings	1895
71T	368	SE	Unspecified Pit	1912
72T	368	SE	Unspecified Pit	1920
73M	376	N	Railway Sidings	1898
74U	380	N	Railway Building	1951
75AT	386	S	Cuttings	1866
76U	387	N	Railway Building	1974
77U	387	N	Railway Building	1966
78W	414	S	Cuttings	1911

79V	414	N	Unspecified Pit	1912
80V	414	N	Unspecified Pit	1920
81W	415	S	Cuttings	1894
82X	416	N	Railway Building	1974
83X	416	N	Railway Building	1966
84Y	417	N	Unspecified Pit	1864
85Y	417	N	Unspecified Pit	1866
86Y	418	N	Unspecified Pit	1864
87Y	418	N	Unspecified Pit	1864
88	419	N	Railway Sidings	1938
89	419	N	Railway Building	1951
90W	429	S	Cuttings	1991
91W	429	S	Cuttings	1982
92W	431	S	Cuttings	1974
93Z	442	N	Unspecified Heap	1974
94Z	442	N	Unspecified Heap	1966
95AA	456	NE	Unspecified Tank	1897
96AA	456	NE	Unspecified Tank	1895
97AU	493	SE	Unspecified Pit	1920
98AB	495	SE	Unspecified Pit	1912
99AB	495	SE	Unspecified Pit	1920

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
100D	165	NW	Tanks	1914
101D	176	NW	Unspecified Tank	1914
102	292	E	Tank or Trough	1867

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:

23

ID	Distance (m)	Direction	Use	Date
----	--------------	-----------	-----	------

103	109	NE	Electricity Substation	1984
104AC	133	NW	Electricity Substation	1973
105AC	134	NW	Electricity Substation	1984
106AD	166	SW	Electricity Substation	1984
107AD	187	SW	Electricity Substation	1975
108	326	S	Electricity Substation	1975
109AE	339	E	Electricity Substation	1975
110	344	SW	Electricity Substation	1974
111AE	348	E	Electricity Substation	1984
112AF	363	NE	Electricity Substation	1984
113	367	W	Electricity Substation	1975
114AG	374	NE	Electricity Substation	1956
115AG	374	NE	Electricity Substation	1956
116AG	374	NE	Electricity Substation	1973
117	385	SE	Electricity Substation	1975
118AI	431	NE	Electricity Substation	1994
119AH	435	W	Electricity Substation	1956
120AH	435	W	Electricity Substation	1956
121AH	435	W	Electricity Substation	1975
122AI	437	NE	Electricity Substation	1975
123AI	438	NE	Electricity Substation	1984
124AJ	486	NW	Electricity Substation	1975
125AJ	486	NW	Electricity Substation	1991

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: 29

ID	Distance (m)	Direction	Use	Date
126I	279	E	Motor Garage	1914
127AK	290	E	Garage	1973
128AK	290	E	Garage	1956

129AK	290	E	Garage	1984
130AK	291	E	Garage	1956
131	304	E	Garage	1956
132AK	307	E	Garage	1956
133AL	320	NE	Garage	1984
134AL	323	NE	Garage	1956
135AL	323	NE	Garage	1973
136AL	323	NE	Garage	1956
137AL	336	NE	Garage	1956
138AL	336	NE	Garage	1975
139AL	336	NE	Garage	1956
140AM	362	E	Garage	1994
141AM	363	E	Garage	1956
142AN	369	NE	Garage	1984
143AO	370	NE	Garage	1956
144AM	371	E	Garage	1956
145AM	371	E	Garage	1975
146AN	374	NE	Garage	1973
147AO	375	NE	Garage	1987
148AO	376	NE	Garage	1956
149AO	376	NE	Garage	1977
150	380	E	Garage	1984
151AN	384	NE	Garage	1956
152	450	NE	Garage	1956
153AP	452	E	Garages	1956
154AP	453	E	Garages	1956

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

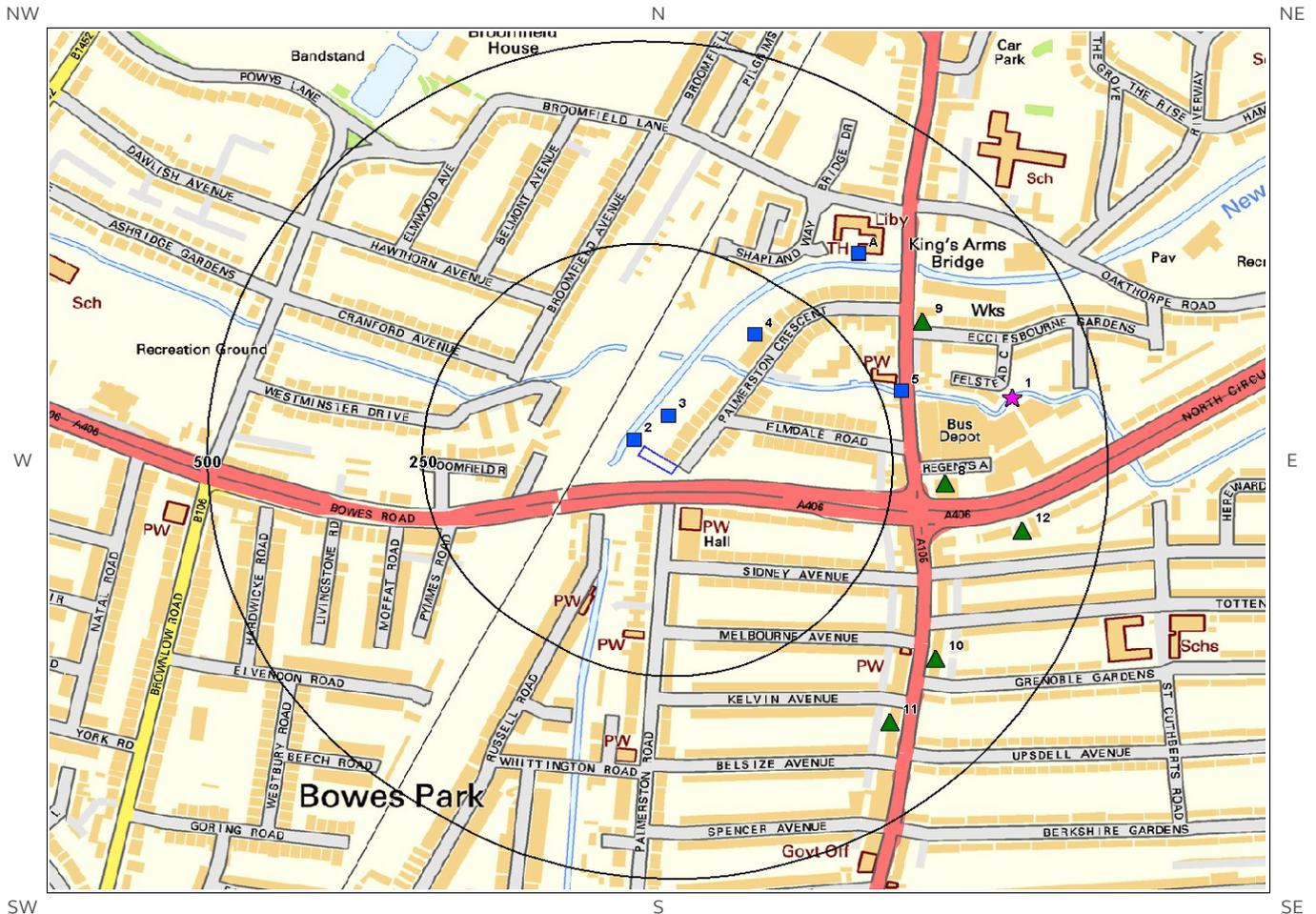
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 42

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

ID	Distance(m)	Direction	Use	Date
155AQ	29	W	Unspecified Pit	1966

156A	35	NW	Unspecified Pit	1974
157A	35	NW	Unspecified Pit	1991
158A	35	NW	Unspecified Pit	1982
159B	75	NW	Unspecified Heap	1966
160B	75	NW	Unspecified Ground Workings	1951
161B	79	NW	Unspecified Ground Workings	1938
162AR	212	NE	Unspecified Ground Workings	1938
163F	224	W	Unspecified Pit	1912
164F	224	W	Unspecified Pit	1920
165J	284	N	Unspecified Pit	1866
166J	284	N	Unspecified Pit	1864
167J	286	N	Unspecified Pit	1864
168J	286	N	Unspecified Pit	1864
169AS	289	SE	Pond	1897
170AS	290	SE	Pond	1895
171AS	292	SE	Pond	1864
172AS	292	SE	Pond	1866
173AS	294	SE	Water Body	1864
174	329	S	Pond	1895
175T	368	SE	Unspecified Pit	1912
176T	368	SE	Unspecified Pit	1920
177AT	386	S	Cuttings	1866
178W	414	S	Cuttings	1911
179V	414	N	Unspecified Pit	1912
180V	414	N	Unspecified Pit	1920
181W	415	S	Cuttings	1894
182V	417	N	Unspecified Pit	1866
183V	417	N	Unspecified Pit	1864
184V	418	N	Unspecified Pit	1864
185V	418	N	Unspecified Pit	1864
186W	429	S	Cuttings	1991
187W	429	S	Cuttings	1982
188W	431	S	Cuttings	1974
189AJ	440	NW	Pond	1864
190Z	442	N	Unspecified Heap	1966
191Z	442	N	Unspecified Heap	1974
192AJ	444	NW	Pond	1864
193AJ	444	NW	Pond	1866
194AU	493	SE	Unspecified Pit	1920
195AB	495	SE	Unspecified Pit	1912
196AB	495	SE	Unspecified Pit	1920

2. Environmental Permits, Incidents and Registers Map



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- | | | | | | |
|---|-------------------------------|---|--|---|---|
|  | Site Outline |  | Recorded Pollution Incident |  | RAS 3 & 4 Authorisations |
|  | Dangerous Substances (List 1) |  | Part A(1) Authorised Processes and Historic IPC Authorisations |  | Part A(2) and Part B Authorised Processes |
|  | Dangerous Substances (List 2) |  | Water Industry Referrals |  | COMAH / NIHS Sites |
|  | Search Buffers (m) |  | Licenced Discharge Consents |  | Sites Determined as Contaminated Land |
|  | 500 |  | Red List Discharge Consents |  | Hazardous Substance Consents and Enforcements |

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.

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

0

Database searched and no data found.

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

5

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	311	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	333	NE	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
10	383	SE	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
11	400	SE	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
12	408	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

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	15	NW	530660 192170	Address: RECHARGE SITE AT BOWES ROAD, PALMERS GREEN, ENFIELD, MIDDLESEX, Receiving Water: GROUNDWATER VIA A BOREHOLE

ID	Distance (m)	Direction	NGR	Details	
				N13 4NH Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: CNTW.0838 Permit Version: 2	Status: VARIED UNDER EPR 2010 Issue date: 14/11/2018 Effective Date: 14-Nov-2018 Revocation Date: -
3	47	NE	530700 192200	Address: RECHARGE SITE AT BOWES ROAD, PALMERS GREEN, ENFIELD, MIDDLESEX, N13 4NH Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: CNTW.0838 Permit Version: 1	Receiving Water: CHALK & LOWER LONDON TERTIARY Status: TRANSFERRED FROM WATER ACT 1989 Issue date: 30/11/1990 Effective Date: 30-Nov-1990 Revocation Date: 13/11/2018
4	185	NE	530800 192300	Address: DEVELOPMENT AT BROOMFIELD LANE, PAL, DEVELOPMENT AT BROOMFIELD LANE,, PALMERS GREEN, LONDON Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: CTWC.2880 Permit Version: 1	Receiving Water: PYMMES BROOK Status: REVOKED - UNSPECIFIED Issue date: 18/11/1988 Effective Date: 18-Nov-1988 Revocation Date: 23/09/1996
5	275	E	530970 192230	Address: DEADMANS BRIDGE CSO, GREEN LANES, LONDON, N13 5UP Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: EPRCB3490VW Permit Version: 1	Receiving Water: PYMMES BROOK Status: NEW ISSUED UNDER EPR 2010 Issue date: 15/06/2016 Effective Date: 15-Jun-2016 Revocation Date: -
6A	334	NE	530920 192399	Address: KING'S ARMS BRIDGE PUMPING STATION, GREEN LANES, LONDON, N13 4XD Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: CANM.1246 Permit Version: 1	Receiving Water: ABSTRACTION RECHARGE BOREHOLE Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 01/08/2007 Effective Date: 01-Aug-2007 Revocation Date: 13/11/2018
7A	335	NE	530920 192400	Address: KING'S ARMS BRIDGE PUMPING STATION, GREEN LANES, LONDON, N13 4XD Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: CANM.1246 Permit Version: 2	Receiving Water: GROUNDWATER VIA A BOREHOLE Status: VARIED UNDER EPR 2010 Issue date: 14/11/2018 Effective Date: 14-Nov-2018 Revocation Date: -

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	396	E	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.

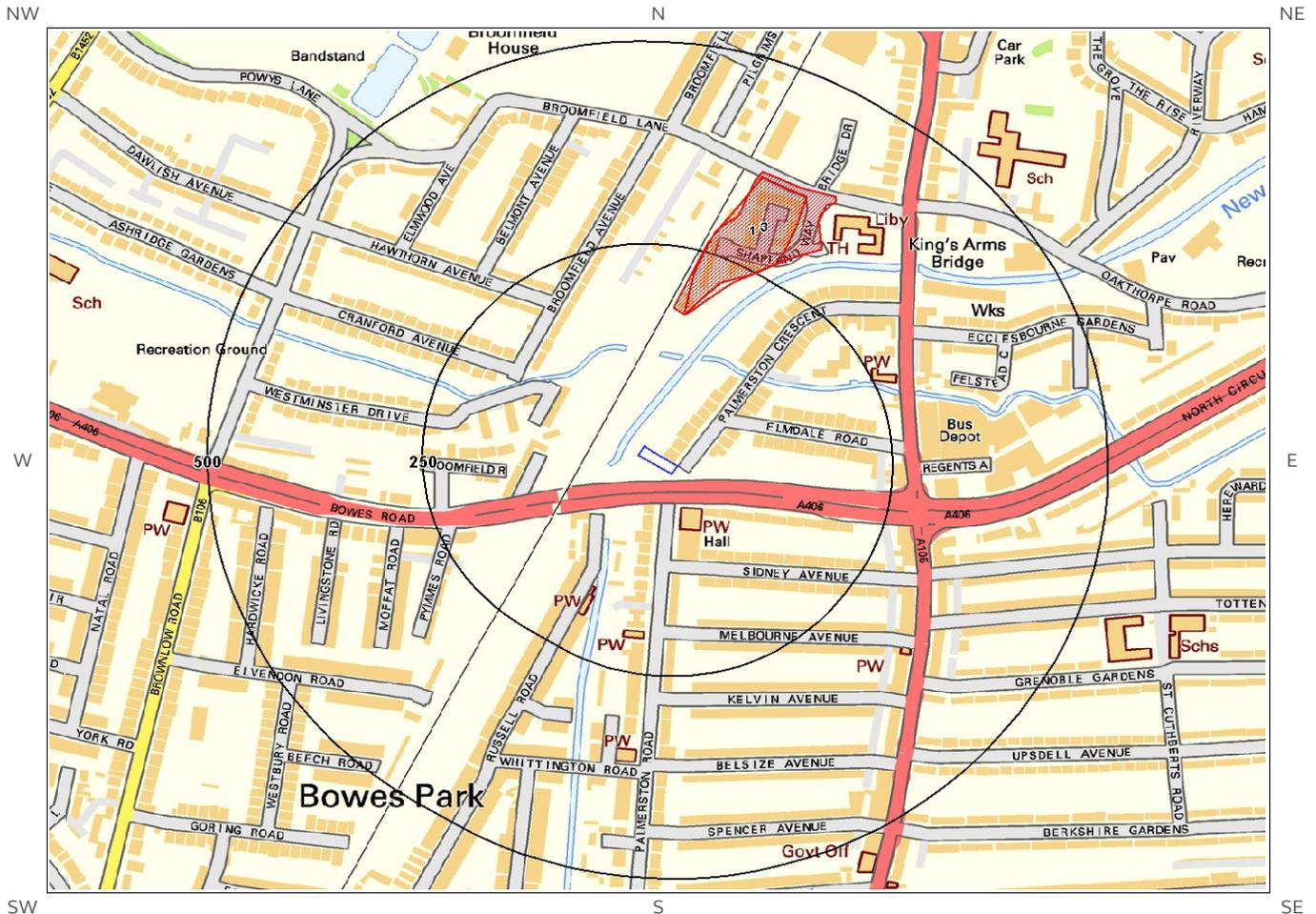
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

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



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- | | | | | | |
|---|------------------------|---|---------------------------|---|---|
|  | Site Outline |  | EA/NRW Active Landfill |  | Historic and Planned Waste Sites |
|  | 250 Search Buffers (m) |  | EA/NRW Historic Landfill |  | EA/NRW Licensed Waste Site |
|  | 500 Search Buffers (m) |  | BGS / DoE Survey Landfill |  | Local Authority/Historical Mapping Landfill Records |

3. Landfill and Other Waste Sites

3.1 Landfill Sites

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

0

Database searched and no data found.

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

2

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

ID	Distance (m)	Direction	NGR	Details
1	171	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	1068	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	169	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

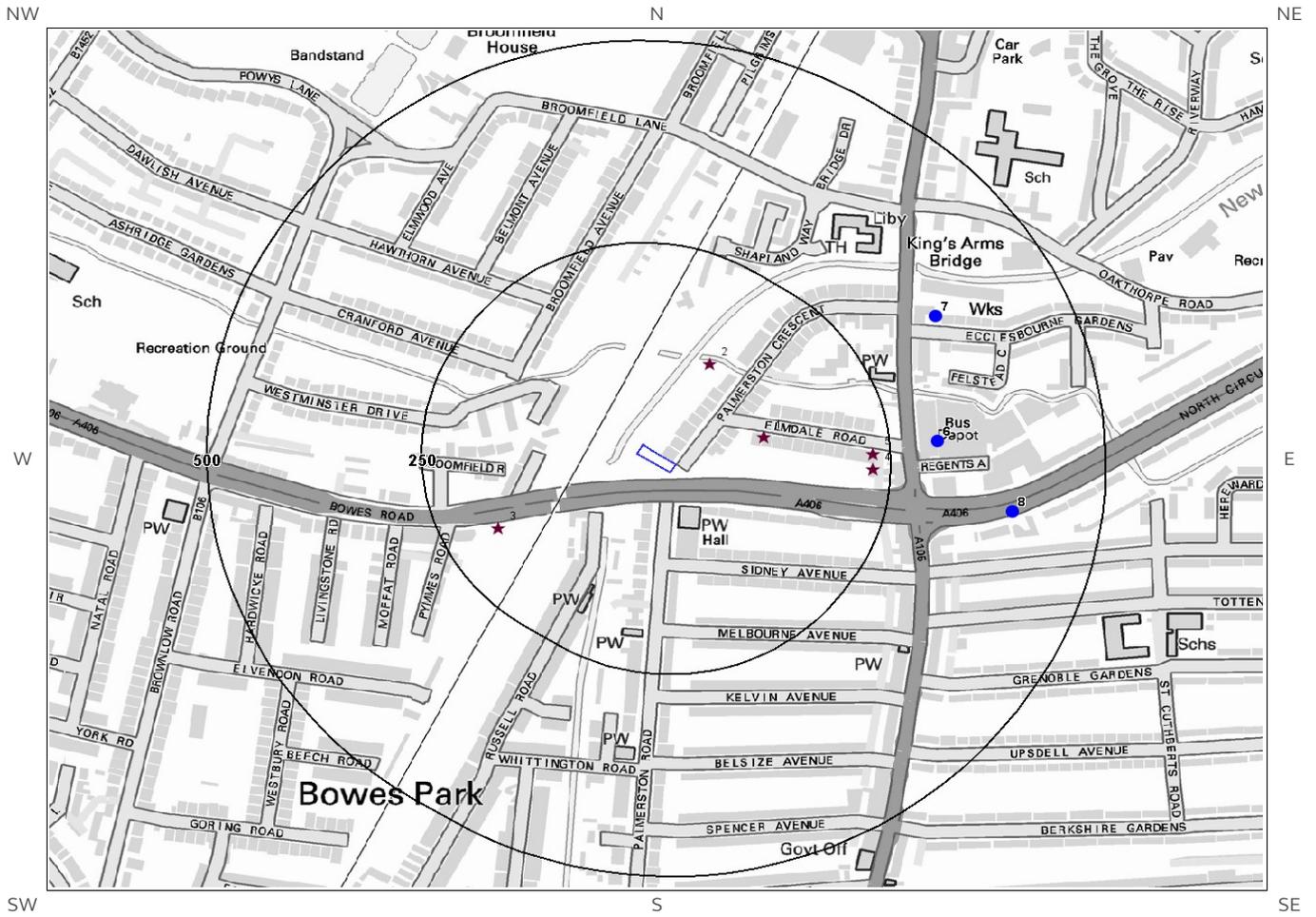
Database searched and no data found.

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



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-  Site Outline
-  Current Industrial Sites
-  Electricity Transmission Cables
-  Search Buffers (m)
-  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: 5

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	107	E	F K Floor Sanding	530812 192172	49, Elmdale Road, London, Greater London, N13 4UN	Construction Completion Services	Construction Services
2	125	NE	Electricity Sub Station	530749 192262	Greater London, N13	Electrical Features	Infrastructure and Facilities
3	186	SW	Electricity Sub Station	530503 192059	Greater London, N13	Electrical Features	Infrastructure and Facilities
4	228	E	R P S Gas	530939 192132	Flat 179, Broadway Mews, London, Greater London, N13 4UP	Fuel Distributors and Suppliers	Household, Office, Leisure and Garden
5	229	E	The Tyre Shop	530939 192151	5, Elmdale Road, London, Greater London, N13 4UN	Vehicle Parts and Accessories	Motoring

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
6	305	E	531014 192167	OBSOLETE	203, Green Lanes, Palmers Green, London, Outer London, N16 9DJ	Not Applicable	Obsolete
7	352	NE	531012 192321	SHELL	148-150, Green Lanes, Ecclesbourne Gardens, Palmers Green, London, Outer London, N13 5UN	No	Open
8	395	E	531102 192079	PACE	376-378, North Circular Road, Palmers Green, London, Outer London, N13 6BJ	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

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

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

5.2 Superficial Ground and Drift Geology

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

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

5.3 Bedrock and Solid Geology

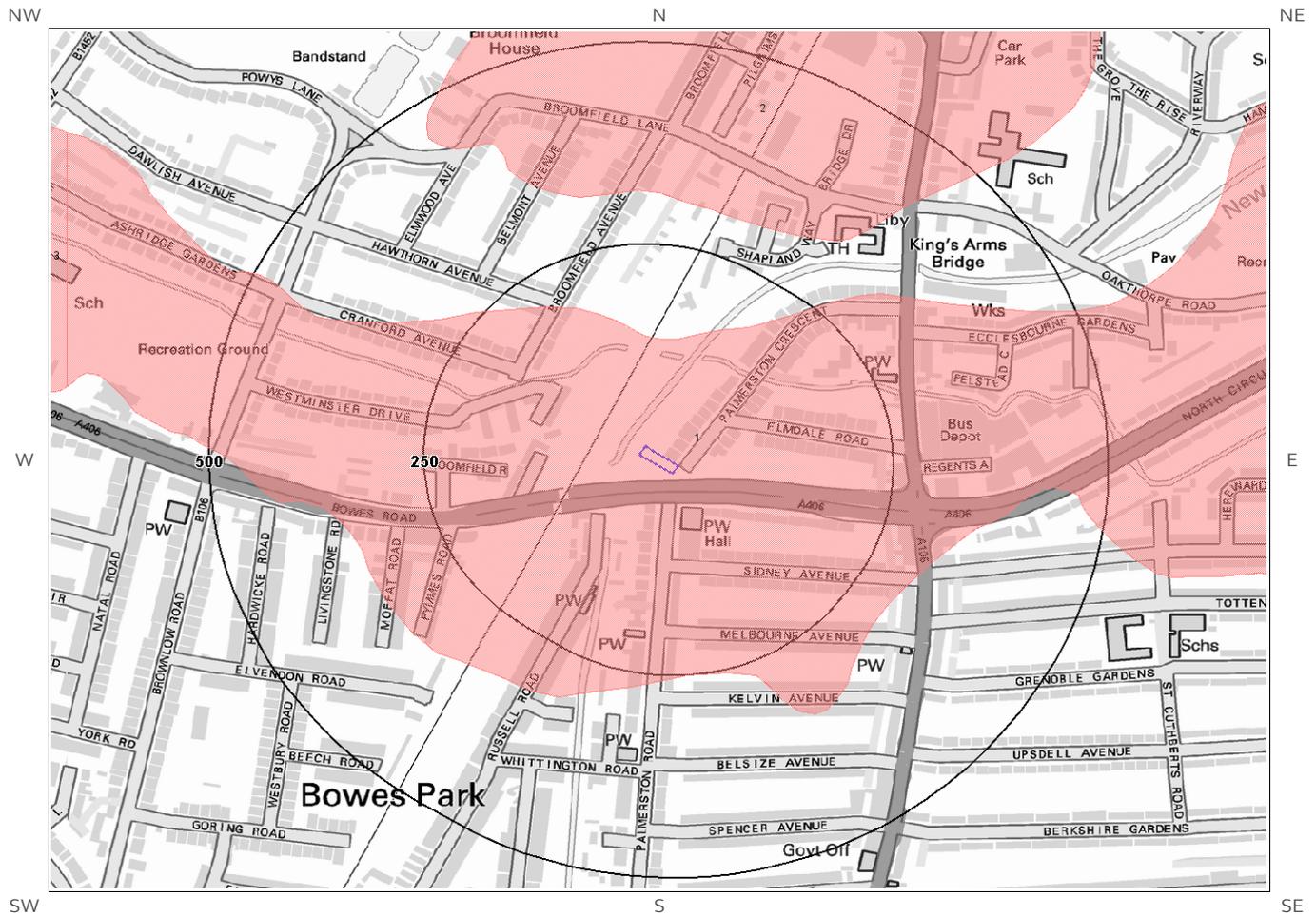
The database has been searched on site, including a 50m buffer.

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

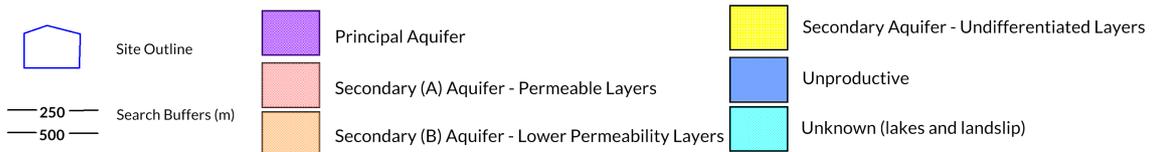
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

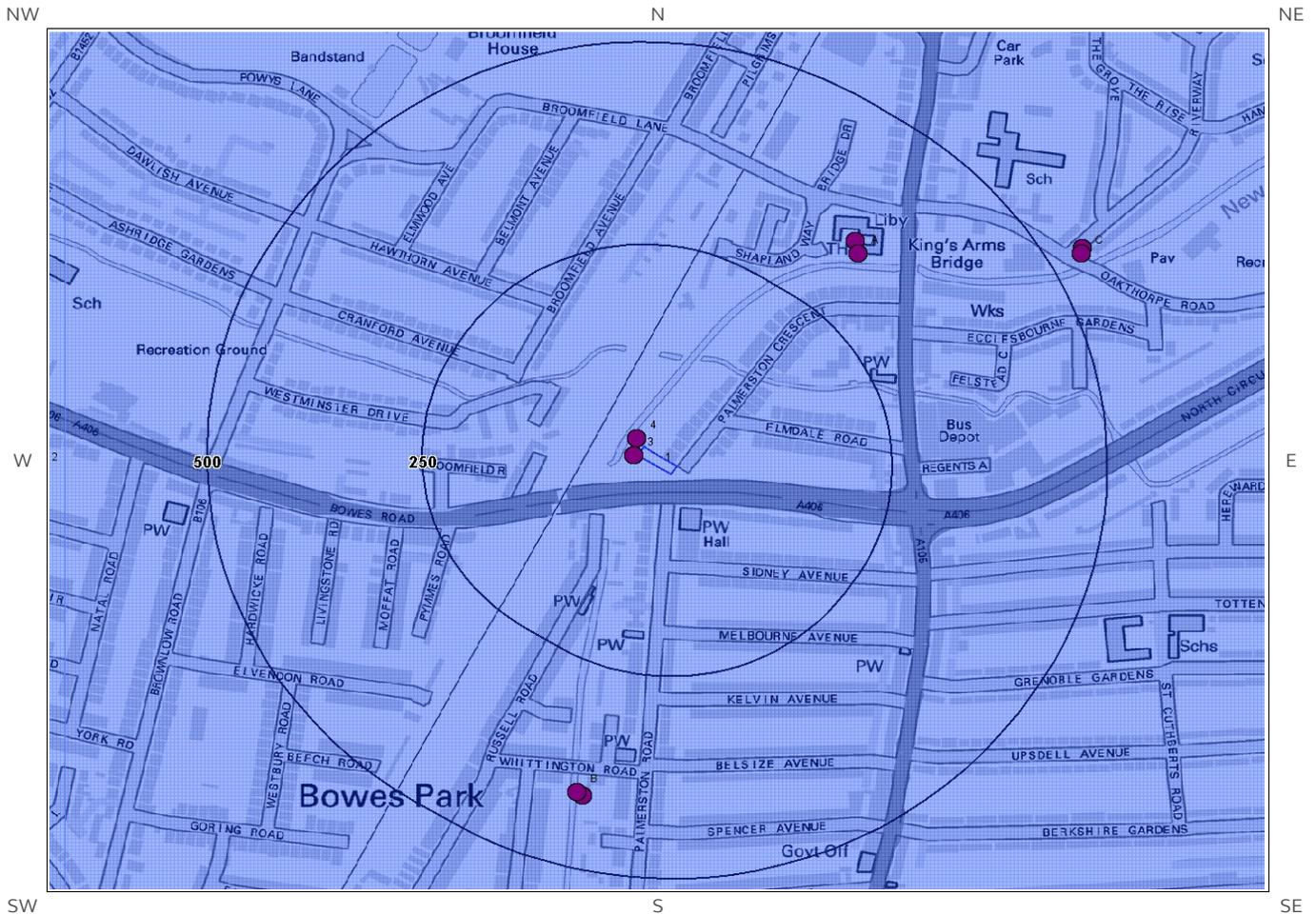
6a. Aquifer Within Superficial Geology



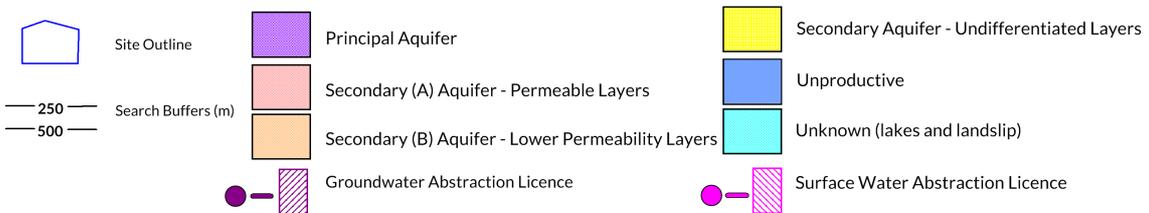
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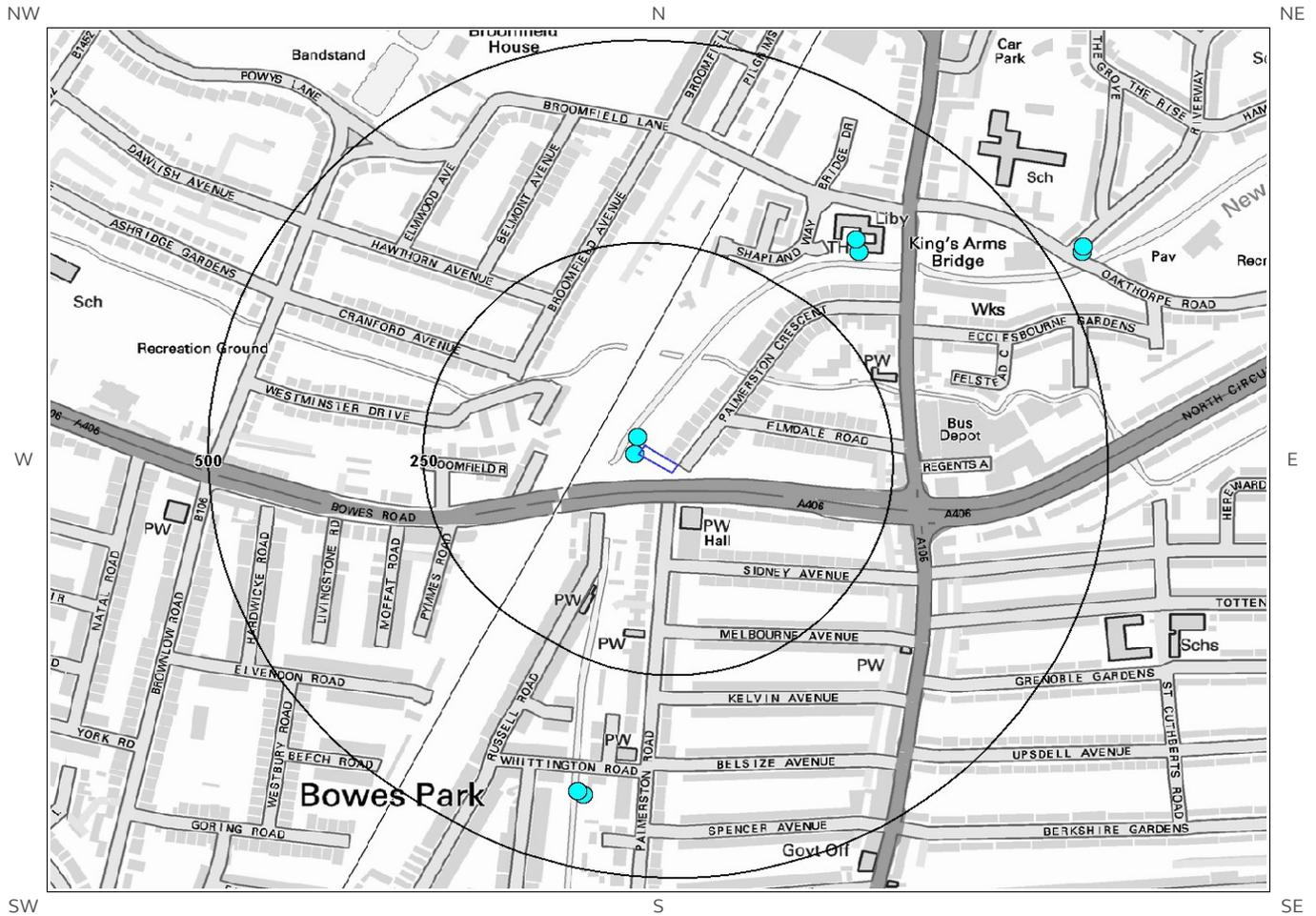
6b. Aquifer Within Bedrock Geology and Abstraction Licences



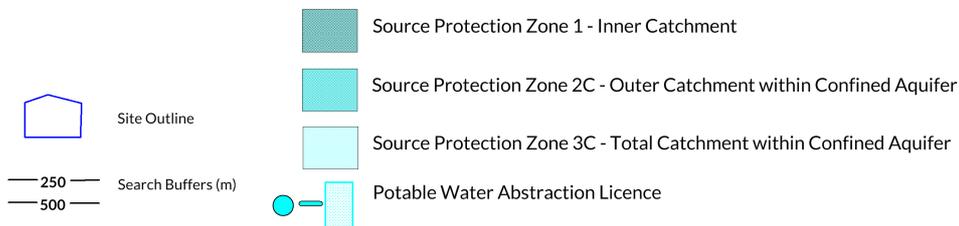
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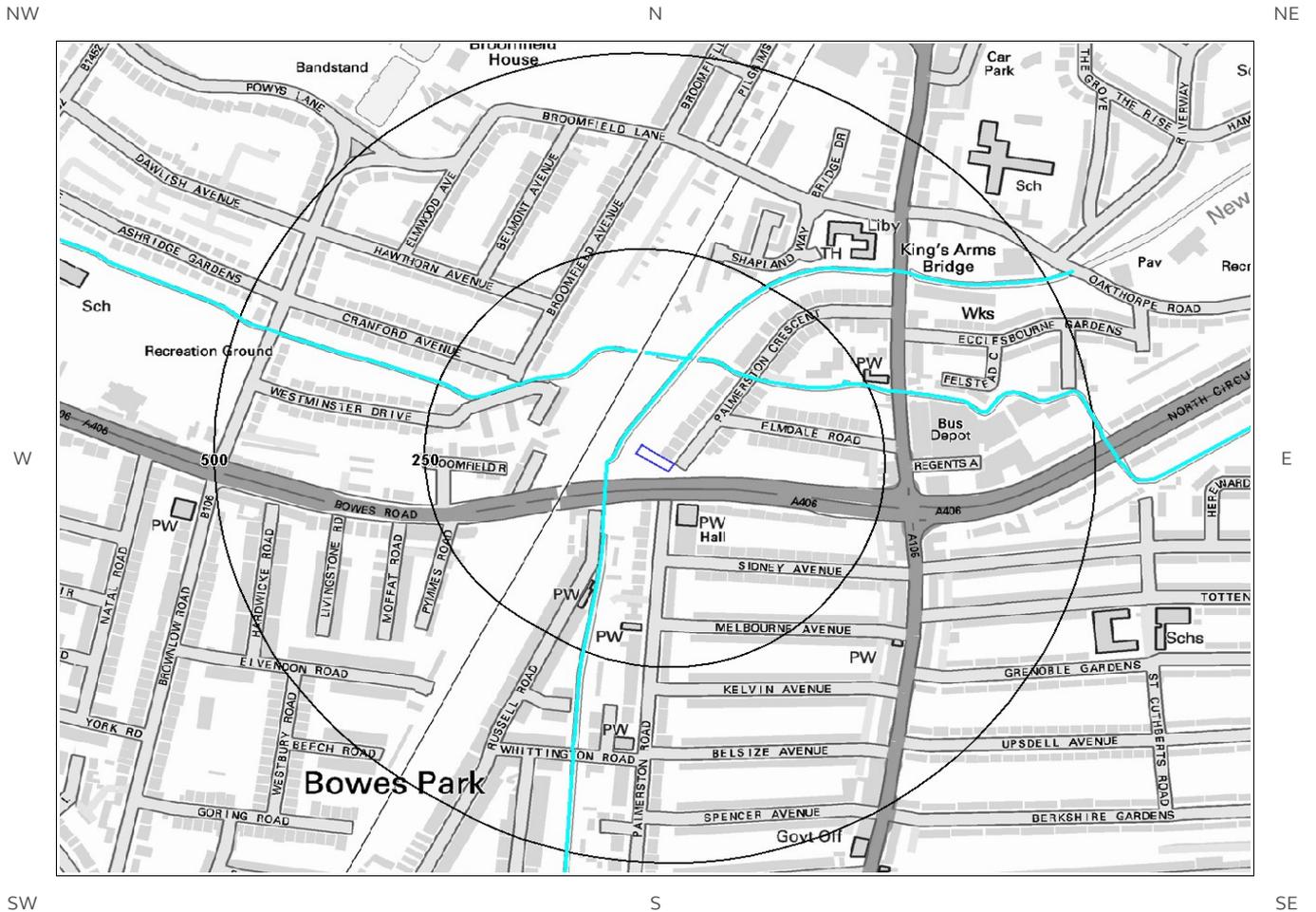
6d. Hydrogeology – Source Protection Zones within confined aquifer



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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	301	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	5	W	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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	14	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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	335	NE	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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	345	NE	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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	409	S	530594 191734	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 Annual Volume (m ³): 65,700,000 Max Daily Volume (m ³): 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:
8B	411	S	530600 191730	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 Annual Volume (m ³): 65,700,000 Max Daily Volume (m ³): 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:

ID	Distance (m)	Direction	NGR	Details	
9C	537	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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:
10C	542	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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:
Not shown	696	S	530560 191447	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	Annual Volume (m ³): 65,700,000 Max Daily Volume (m ³): 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:
Not shown	713	S	530560 191430	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	Annual Volume (m ³): 65,700,000 Max Daily Volume (m ³): 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	739	NW	530300 192800	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	Annual Volume (m ³): 20,457 Max Daily Volume (m ³): 205 Original Application No: - Original Start Date: 20/06/1966 Expiry Date: - Issue No: 100 Version Start Date: 18/07/1980 Version End Date:
Not shown	1052	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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	1053	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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:
Not shown	1399	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 (m ³): 951,660 Max Daily Volume (m ³): 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:

ID	Distance (m)	Direction	NGR	Details
Not shown	1399	E	532100 192300	<p>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</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: 102 Version Start Date: 01/04/2011 Version End Date:</p>
Not shown	1399	E	532100 192300	<p>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</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: 102 Version Start Date: 01/04/2011 Version End Date:</p>
Not shown	1399	E	532100 192300	<p>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</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: 102 Version Start Date: 01/04/2011 Version End Date:</p>
Not shown	1399	E	532100 192300	<p>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</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: 102 Version Start Date: 01/04/2011 Version End Date:</p>
Not shown	1399	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 A) 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>
Not shown	1399	E	532100 192300	<p>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</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>
Not shown	1399	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>
Not shown	1730	S	530484 190412	<p>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</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>

ID	Distance (m)	Direction	NGR	Details
Not shown	1733	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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:

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	5	W	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 (m ³): 65,700,000 Max Daily Volume (m ³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:
4	14	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 (m ³): 65,700,000 Max Daily Volume (m ³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 104 Version Start Date: Version End Date:
5A	335	NE	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 (m ³): 65,700,000 Max Daily Volume (m ³): 275,000 Original Application No: - Original Start Date: 26/06/1995 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:
6A	345	NE	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 (m ³): 65,700,000 Max Daily Volume (m ³): 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
7B	409	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>
8B	411	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>
9C	537	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>
10C	542	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>
Not shown	696	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	713	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>
Not shown	1052	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: Version End Date:</p>
Not shown	1053	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: Version End Date:</p>

ID	Distance (m)	Direction	NGR	Details
Not shown	1730	S	530484 190412	<p>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</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	1733	S	530480 190410	<p>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</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>

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	103	E	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.
286	NE	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	22	New River	Inland river not influenced	Catchment Area: Thames

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	NW	Alternative Name: -	by normal tidal action.	Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 7.8
37	22 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	36 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
38	36 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	99 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): 8.0
39	99 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): 8.0
4	108 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
40	108 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
5	117 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
6	117 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
41	117 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
42	117 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
7	119 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)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				conditions) Average Width in Watercourse Section (m): Not Provided
43	119 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
8	124 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): 5.1
44	124 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): 5.1
9	129 NE	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
45	129 NE	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
10	146 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): 7.8
46	146 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): 7.8
11	227 NE	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
12	227 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): 3.9
47	227 NE	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
48	227 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): 3.9
13	451 W	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): Not Provided

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
Not shown	451 W	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): Not Provided
14	467 W	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): 5.3
Not shown	467 W	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): 5.3

6.11 Surface Water Features

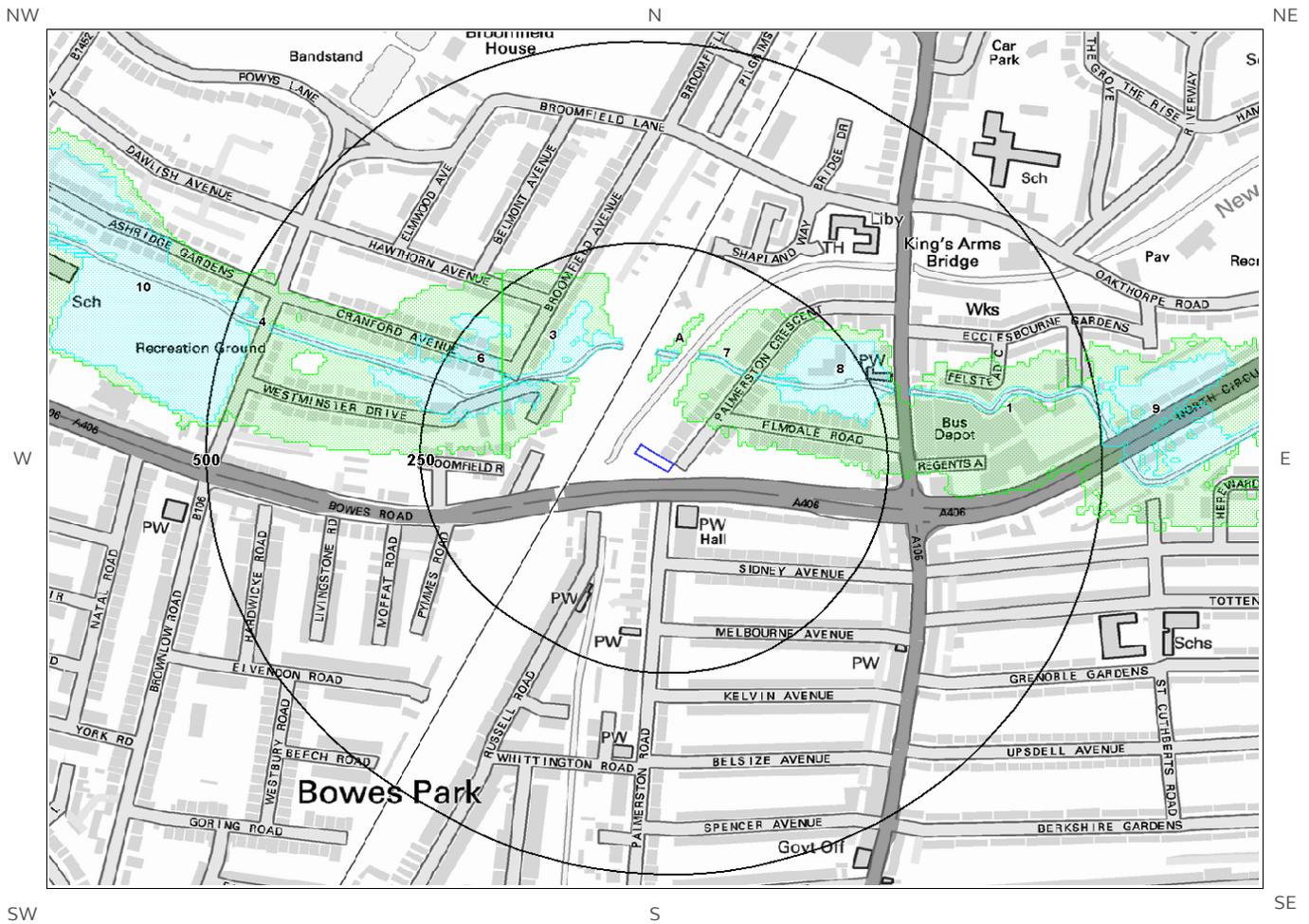
Surface water features within 250m of the study site

Identified

The following surface water records are not represented on mapping:

Distance (m)	Direction
18	W
106	SW
114	N
122	N
125	NE
142	NE

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



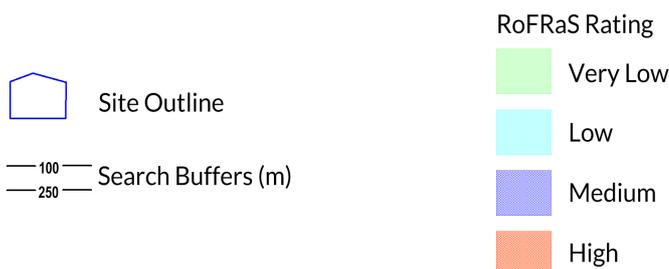
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7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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7 Flooding

7.1 River and Coastal Zone 2 Flooding

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

Identified

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

ID	Distance (m)	Direction	Update	Type
1	53	NE	19-Nov-2019	Zone 2 - (Fluvial /Tidal Models)
2A	79	N	19-Nov-2019	Zone 2 - (Fluvial /Tidal Models)
3	94	NW	19-Nov-2019	Zone 2 - (Fluvial /Tidal Models)
4	154	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	106	N	19-Nov-2019	Zone 3 - (Fluvial Models)
2A	118	NW	19-Nov-2019	Zone 3 - (Fluvial Models)
3	125	NE	19-Nov-2019	Zone 3 - (Fluvial Models)
4	142	NE	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.

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

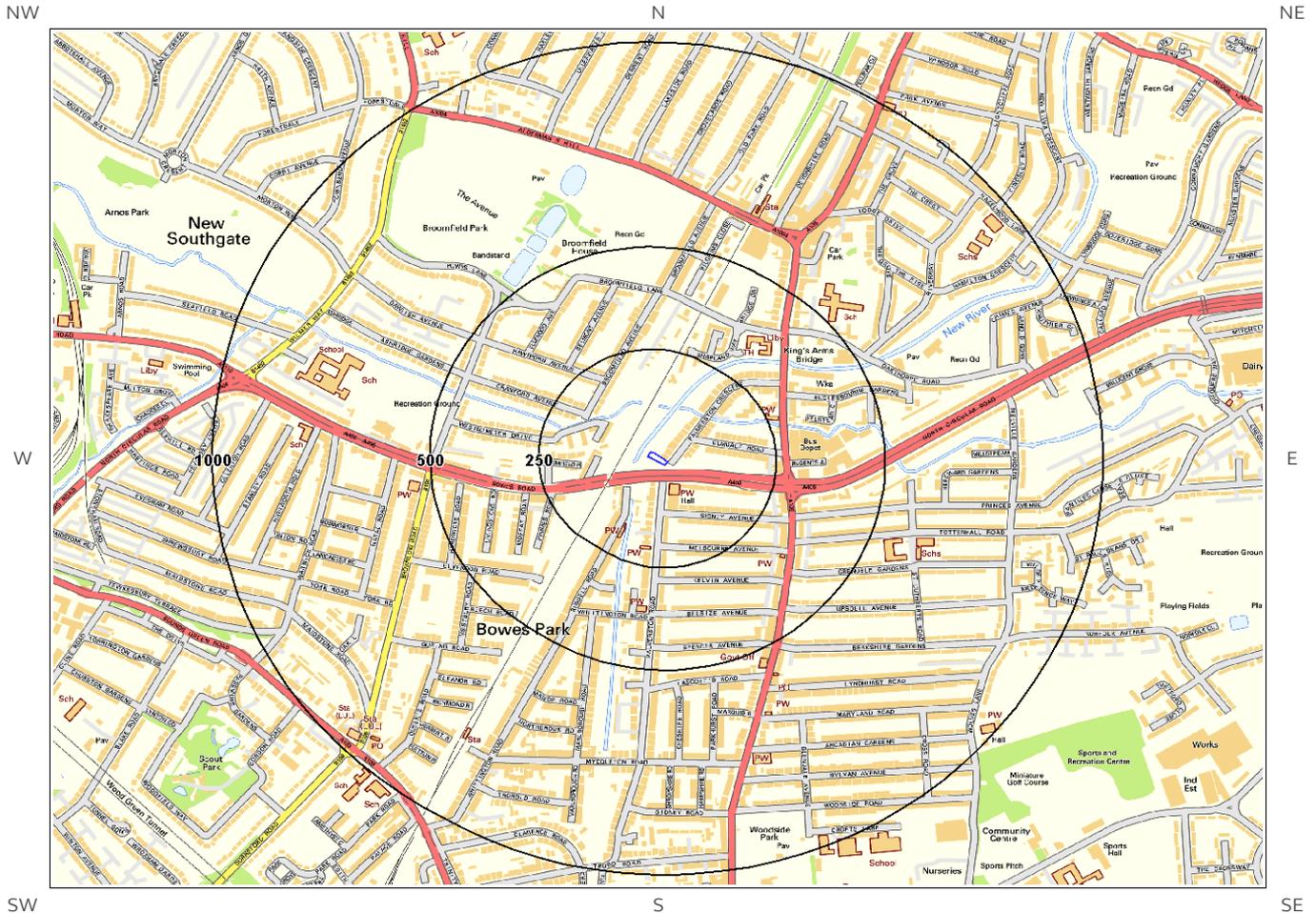
British Geological Survey confidence rating in this result

High

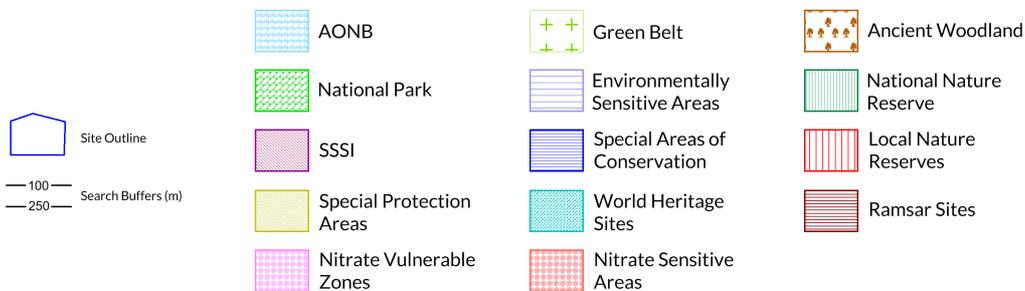
Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

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

8. Designated Environmentally Sensitive Sites Map



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8. Designated Environmentally Sensitive Sites

Designated Environmentally Sensitive Sites within 2000m of the study site

Identified

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

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	1800	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

Very Low

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

Hazard

Very low potential for compressible deposits to be present. 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

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

British Geological Survey Enquiries

Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:

Web: www.bgs.ac.uk

BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

Environment Agency

National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 03708 506 506

Web: www.environment-agency.gov.uk

Email: enquiries@environment-agency.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe

Email: enquiries@phe.gov.uk
Main switchboard: 020 7654 8000

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority

Authority: London Borough of Enfield
Phone: 020 8379 1000
Web: <http://www.enfield.gov.uk/>
Address: Civic Centre, Silver Street, Enfield, EN1 3XY

Gemapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444



Public Health England



The Coal Authority



Acknowledgements: Site of Special Scientific Interest, National Nature Reserve, Ramsar Site, Special Protection Area, Special Area of Conservation data is provided by, and used with the permission of, Natural England/Natural Resources Wales who retain the Copyright and Intellectual Property Rights for the data.

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This report has been prepared in accordance with the Groundsure Ltd standard Terms and Conditions of business for work of this nature.

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

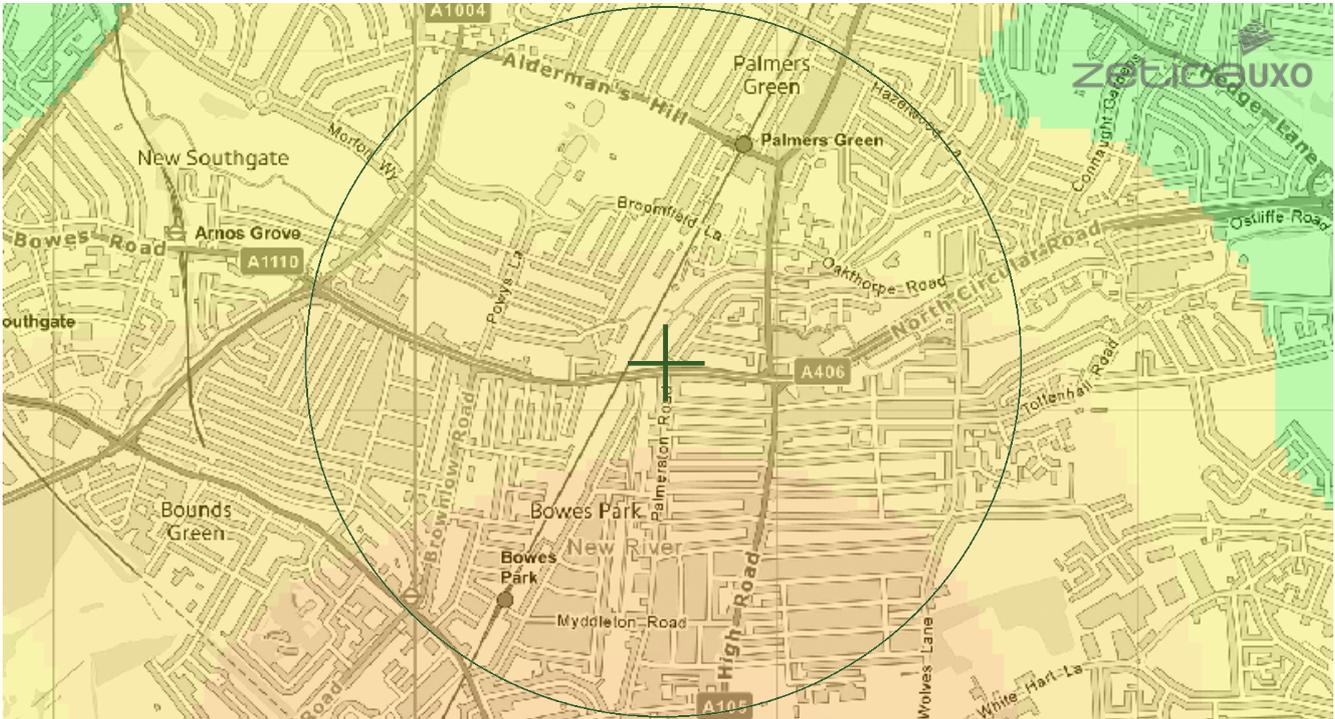
Zetica UXO Map and Pre-Desk Study Assessment

UNEXPLODED BOMB RISK MAP



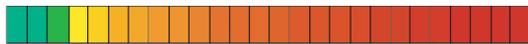
SITE LOCATION

Map Centre: 530699,192136



LEGEND

London Bomb Risk



- | | | | |
|-----------|-----------------|-------------------|-------|
| military | industry | UXO find | Other |
| transport | dock | Luftwaffe targets | |
| utilities | abandoned bombs | Bombing decoy | |

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**
web: **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

Site:	108 Palmerston Crescent, Southgate, London
Client:	Arcadis
Contact:	Alison Pugh
Date:	3 rd January 2020
Pre-WWI Military Activity on or Affecting the Site	None identified.
WWI Military Activity on or Affecting the Site	None identified.
WWI Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: <ul style="list-style-type: none"> ■ Transport infrastructure and public utilities. ■ Industries important to the war effort, including munitions, metal and engineering works. ■ Military training areas. ■ Anti-aircraft (AA) guns.
WWI Bombing	None identified on the Site.
Interwar Military Activity on or Affecting the Site	None identified.
WWII Military Activity on or Affecting the Site	None identified.
WWII Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: <ul style="list-style-type: none"> ■ Transport infrastructure and public utilities. ■ Industries important to the war effort, including metal and engineering works. ■ Military camps and training areas. ■ AA and anti-invasion defences.
WWII Bombing Decoys (within 5km of Site)	None.
WWII Bombing	During WWII the Site was located in the Municipal Borough (MB) of Southgate, which officially recorded 221 No. High Explosive (HE) bombs with a bombing density of 60.2 bombs per 405 hectares (ha). Readily available records have been found to indicate that several HE bombs fell in close proximity to the Site.
Post-WWII Military Activity on or Affecting the Site	None identified.
Recommendation	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 should be noted that where a potentially significant source of UXO hazard has been identified on the Site, the requirement for a detailed desk study and risk assessment has been confirmed and no further research will be undertaken at this stage. It is possible that further in-depth research as part of a detailed UXO desk study and risk assessment may identify other potential sources of UXO hazard on the Site.

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