



Geo-Environmental

DESK STUDY REPORT

for the land at

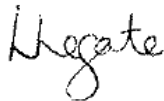
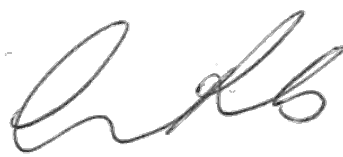
LOWFIELD ROAD, CAVERSHAM

READING, RG4 6NL

on behalf of

READING BOROUGH COUNCIL



Report:	DESK STUDY REPORT
Site:	LOWFIELD ROAD, CAVERSHAM, READING, RG4 6NL
Client:	READING BOROUGH COUNCIL
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APPENDICES

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1.0 INTRODUCTION

1.1 General

Geo-Environmental Services Limited (Geo-Environmental) was instructed by York Associates, acting on behalf of Reading Borough Council, to undertake a Phase I desk study into the geotechnical and geo-environmental factors pertaining to the planned redevelopment of the land at Lowfield Road, Caversham, Reading, RG4 6NL herein referred to as 'the site'. The site's location is presented in Figure 1.

1.2 Form of Development

The proposed development is understood to comprise the construction of number of low-rise residential units with communal landscaping areas, car parking, utilisation of an existing access road and associated development infrastructure.

1.3 Objectives

The investigation was to comprise a desk study of geotechnical and geo-environmental factors pertaining to the site, including a review of available historic maps and an examination of other available sources of geo-environmental information.

A preliminary Risk Assessment (PRA) was to be undertaken as part of the desk study in accordance with CLR11. The objective of the risk assessment was to evaluate plausible pollutant linkages with respect to the proposed development, adjacent land uses, and the wider environment, in the context of planning, immediate liabilities under the Environment Act 1990, and risks posed to Controlled Waters under the Water Resources Act.

1.4 Standards

Where practicable, the desk study was undertaken in accordance with the following documents and guidance:

- National Planning Policy Framework – March 2012
- Planning Policy Statement 23 – Planning and Pollution Control;
- Model Procedures for the Management of Contaminated Land, CLR11, DEFRA and Environment Agency 2004;
- Environment Agency Guidance on Requirements for Land Contamination Reports, Version 1 dated July 2005;
- BS10175:2011 - Investigation of Potentially Contaminated Sites - Code of Practice, BSI 2011;
- BS5930: 2015 - Code of Practice for Site Investigations, BSI 2015;
- EN ISO 14688 Geotechnical Investigation and Testing Part 1-2002 and Part 2-2004;
- BS1377: 1990 - Soils for Civil Engineering Purposes, BSI1990;
- NHBC Standards Chapter 4.1 Land Quality - Managing Ground Conditions;
- NHBC Standards Chapter 4.2 Building Near Trees;
- CIRIA C665 – Assessing risks posed by hazardous ground gases to buildings (2007);
- NHBC 10627-R01(04)- Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present (2007);
- BS8485:2015 Code of practice for the characterisation and remediation from ground gas in affected developments;
- Department of Environment - Industry Profiles (1995 - 1996).

1.5 Conditions

The information collected from the desk study has been used to provide an interpretation of the geotechnical and environmental conditions pertaining to the site. The recommendations and opinions expressed in this report are based on the data obtained. Geo-Environmental takes no responsibility for conditions that have either not been revealed in the available records or that occur between or under points of any physical investigation. Whilst every effort has been made to interpret the conditions, such information is only indicative and liability cannot be accepted for its accuracy.

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2.0 DESK STUDY

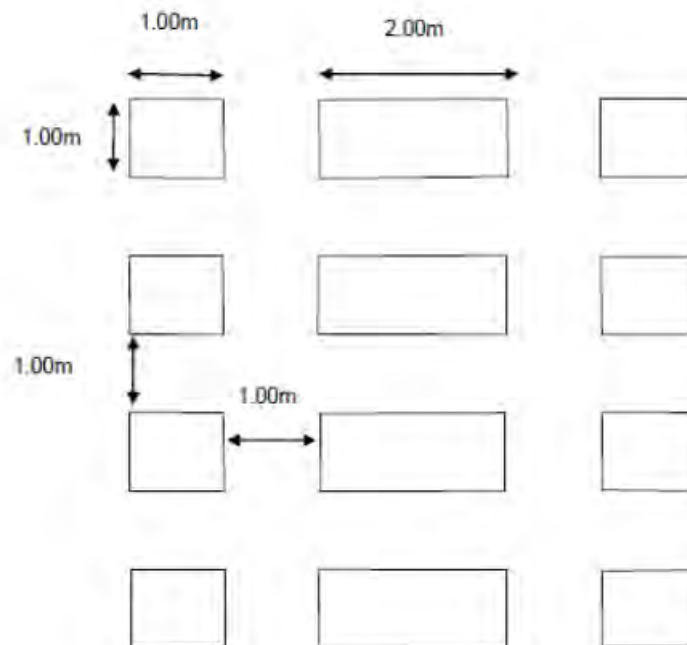
The findings of the Phase I desk study are presented in the following section. A copy of the information obtained as part of the desk study is presented in Appendix A.

2.1 Site Description

The site comprised a roughly rectangular (136m X 36m) shaped parcel of land, which sloped gently from north-north-east to south-south-west, extended to 0.54ha and was located at NGR 473030,175880.

At the time of the site walkover the site was secured by a wooden fence (approx. 1.80m in height) with further heras fencing surrounding the site within the wooden fencing. The site appeared to have been cleared recently as vegetation levels across the site were noted to be low and there was evidence of ground disturbance within the Topsoil on site.

The site was understood formerly to have been a mobile home park and concrete foundations were noted to be present across the site presumably following the removal of the mobile homes. The site was split in two by an access road off Cadogan Close. The western portion of the site exhibited four sets of foundations blocks (comprising two rows of square blocks approx. 1m x 1m with a row of rectangular blocks between the two square blocks (1m x 2m) and raised 0.30m above ground level. Each set was set 6m apart. (See Drawing 1 below). A gap of 17m was identified between the southern of the four blocks and the next set of foundation blocks. The foundation type was noted to change to concrete slabs (approx. 6m x 10m) for four sets followed by one more set of raised concrete block foundations all approximately equally spaced (6m).



Drawing 1: Foundation Layout

A similar layout was observed on the eastern portion of the site where four sets of block foundations and two concrete slabs were present to the north of the intersecting access road located at roughly the same footprint as the opposite side). However off-set to the south by approx. 2m, two further concrete slab foundations were identified to the south side of the access road on the eastern portion.

Overhead powerlines entered the site from adjacent to the roadway from Lowfield Road to the east. An electrical box was present on the left hand side of the site entrance. The electrical box was noted to be intact, however all cables appeared to be disconnected. A number of propane canisters were located adjacent to the electrical box.

A pedestrian pathway was present running along the southern and eastern boundaries of the site and a shallow slope of 0.50m height was noted at the intersection of the pathway in the south-east corner of the site.

An embankment was present extending in a north-south orientation along the eastern boundary between the pathway and the site boundary. The embankment was approximately 1.60-1.80m in height, 14.00m wide and ran the length of the eastern boundary with a break in the middle where the access road intersected it at 90°. The embankment was covered by a mix of mature and semi-mature trees and scrub and was littered with a variety of rubbish (including brick fragments, concrete, wood, plastic, glass, fibre-glass, metals, old fridges, television sets and old mattresses). The embankment turned sharply at the north-east corner of the site boundary (90°) and continued running adjacent to the northern boundary of the site.

Access to the site was off Lowfield Road. The site access road (Cadogan Close) extended approx. 30m into the site before a T-junction. The roadway extended approx. 63m north and 42m south from the T junction.

The surrounding area comprised primarily residential developments to the east and south. The north of the site was bounded by an area of overgrown scrub with an open field area further north, comprising part of Caversham Park. The site was bounded to the west by a semi-mature tree lined hedgerow between the site and a cemetery. Adjacent to the south-western boundary were a number of soil stockpiles, i.e. presumably of excess grave arisings which were cornered off by fencing (approx. 10m x 28m).

Information provided by Reading Borough Council highlighted that there have been incidents of local residents setting fire to propane canisters, which were identified located adjacent to the mains electrical box on site, evidence of which could be seen on site. It is understood that existing services into the site run along the access road (Cadogan Close) from Lowfield Road and are currently disconnected.

2.2 Geology

British Geological Survey (BGS) geological mapping indicated the geology underlying the site to comprise Chalk from the Seaford and Newhaven Chalk Formation (White Chalk Subgroup). The area is also subject to superficial deposits comprising clay, silt and sand of the Lambeth Group which may be overlying the Chalk on site. Given the site has previously been developed there is the potential that Made Ground may also be present on the site at shallow depth. A review of British Geological Survey boreholes records was undertaken, boreholes located approximately 300m to the south of the site show the Lambeth Group to vary in thickness from 3.2m to 5.0+m in the vicinity of the site.

BS5930:2015 defines **Made Ground** as anthropogenic ground in which the material has been placed without engineering control and/or manufactured by man in some way, such as through crushing or washing, or arising from an industrial process. Great variations in material type, thickness and degree of compaction invariably occur and there can be deleterious or harmful matter, as well as potentially methanogenic organic material.

The **Lambeth Group** comprises a mixture of stiff to hard red, blue/grey and brown mottled clays with basal beds of sand and gravel which vary greatly both laterally and vertically. The basal beds are often green in colour due to the presence of glauconite. Locally, these sediments are cemented with calcium carbonate, iron oxides and silica to form materials with relatively high strength.

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The **White Chalk Subgroup** is a soft white friable microporous limestone composed of coccolith biomicrites with a varying proportion of larger shell fragments. Flint characterises the White Chalk Subgroup, occurring as nodular courses, tabular beds and linings to fractures.

At various levels clay sized material occurs as marl seams and partings. Close to the surface the upper few metres are invariably discoloured brown, due to leaching from the overlying strata. The interface with any overlying stratum is invariably extremely irregular as a result of localised weathering and general solution. Weathering by frost action may extend to a depth of several metres.

Occasional erosional features, such as pipes, swallow holes and solution cavities, usually infilled with drift deposits, are found in the chalk, sometimes manifesting themselves at the surface as shallow circular depressions. Solution features may be reactivated by the concentrated ingress of water from leaking drains or soakaways. Reactivation may lead to surface collapse. The geological records held by the BGS for the area suggest a limited thickness of Lambeth Group overlying the Chalk, as such a natural and mining cavities database search was carried out for the site surrounding area to assess the potential for solution features in the vicinity of the site, the results of which are presented herein.

2.3 Hydrogeology

With reference to Envirocheck data, superficial deposits were not identified within the report, but where they are present in the vicinity of the site are likely to be classified as a Secondary 'A' Aquifer, whilst the Chalk was classified as a Principal Aquifer.

Secondary 'A' Aquifers comprise 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.

Principal Aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability and usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

The soil cover in the vicinity of the site was classified as being of high leaching potential (U), as soil information for restored mineral workings and urban areas is based on fewer observations than other areas and as such as worst case vulnerability classification is assumed until proved otherwise.

According to information provided from the Environment Agency the site was indicated to be located within Source Protection Zone II (outer zone) and Zone III (Total Catchment) for Playhatch with regard to the protection of a groundwater abstraction for potable supply. A source Protection Zone I was identified 427m to the east of the site.

The environmental dataset identified one groundwater abstractions within 1000m of the site, as summarised in Table 1.

Distance and direction	Purpose	Aquifer	Abstraction rate
890m east	Public Water Supply: Potable Water Supply (Direct) at Playhatch Pumping Station for Thames Water Utilities Ltd	Chalk (Undifferentiated)	8,183m ³ (per day) 2,491,208m ³ (per year)

Table 1 Summary of groundwater abstractions

No discharge consents to the ground or surface water were recorded within 250m of the site. In addition no pollution incidents to groundwater recorded within 500m of the site.

2.4 Hydrology

With reference to the Envirocheck dataset, the closest surface water feature was located approximately 406m to the north-west comprising a tertiary river. Mapping indicated that the site was not located within an area at risk of flooding or extreme flooding from sea or rivers.

No pollution incident to controlled waters were identified within a radius of 500m of the site boundary.

2.5 Radon

The Envirocheck report states that the site lies in an area where <1% of homes are above the Action Level as defined by Public Health England and the BGS. No radon protective measures are therefore necessary in the construction of new houses or extensions.

2.6 Environmental Data

Searches of other various environmental databases were made as part of the desk study, including air pollution control sites, Part IIA contaminated land, Integrated Pollution Control (IPC) and Integrated Pollution Prevention and Control (IPPC) sites, registered radioactive substances, COMAH sites, explosives sites, Notification of Installations Handling Hazardous Substances (NIHHS) sites, planning permissions for sites involving hazardous substances and fuel station registers. Additional detail is referenced in Appendix A.

The desk study identified six Contemporary Trade Directory entries within 250m of the site:

- Distribution Services 151m east. Active;
- Engineering Services 153m south. Inactive;
- Tyre dealers 207m north. Active;
- Clock and watches, manufacturer and wholesalers 225m north-east. Inactive;
- Cleaning materials and equipment 240m north-east. Active.

A potentially contaminative industrial land use (past land use) was identified from 1932 to 1991 on the subject site and adjoining land to the west comprising a cemetery or graveyard. An electricity sub-station facility was identified on the 1970 historical map, 75m north-east.

2.7 Soil Chemistry

Data obtained as part of the desk study provides details on the estimated soil chemistry for the natural soils in the vicinity of the site. The estimated soil quality on the subject site is presented Table 2.

Contaminant	Estimated Concentration
Arsenic	<15 mg/kg
Cadmium	<1.8 mg/kg
Chromium	60-90 mg/kg
Lead	<150 mg/kg
Nickel	15-30 mg/kg

Table 2 Estimated soil chemical concentrations on site

The natural background concentrations were below respective published Soil Guideline Values, Generic Assessment Criteria and Category 4 Screening Levels for the protection of human health under a residential land use, i.e. the most conservative end use.

However these values are not necessarily representative of the site's soil chemistry. Furthermore, some screening criteria are dependent on pH and soil organic matter content. Therefore, concentrations of specific determinants and the utilised SGV/GAC/C4SL cannot be determined without site specific investigation and analysis.

2.8 Sensitive Land Uses

A search was made of environmentally sensitive areas including local and national nature reserves, areas of outstanding natural beauty (AONBs), nitrate zones, Ramsar sites, sites of special scientific interest (SSSIs), conservation areas, special protection areas and biosphere reserves. The details of sensitive land uses identified within a radius of 500m of the site boundary are provided in Table 3.

Name	Type	Source	Distance from site
Nitrate Vulnerable Zone (for Groundwater)	NVZ	DEFRA	329m North East

Table 3 Sensitive land uses summary

Nitrate Vulnerable Zones are designated areas of land draining into waters polluted by nitrates from agriculture.

2.9 Geotechnical Data

The site was located within an area considered by the Coal Authority as being unlikely to be affected by coal mining activity. However rock mining was identified to have potentially occurred on/beneath the site. Further assessment was undertaken in this respect to clarify the discrepancy identified. A natural and mining cavities database search was carried out which identified six recorded mining cavity locations within 1500m of the site, however the closest of which was recorded as 1250m east-north-east from the site.

National databases for a number of different geological hazards have been compiled by the BGS, and a summary of the hazard data pertaining to the site itself is presented in Table 4.

Hazard	Designation
Non-coal mining	Rare and highly unlikely on site.
Mineral Workings (within 1km)	Opencast (ceased) for Chalk (423m S, 428m E, 562m N, 627m S, 911m N and 925m SE). Opencast (ceased) for Sand and Gravel - Lynch Hill Gravel Member, Maidenhead Formation, River Thames Gravel (521m S, 658m S and 976m SW).

Hazard	Designation
Collapsible ground	Very Low Hazard.
Compressible ground	No Hazard.
Ground dissolution	Very Low (onsite) to Moderate Hazard (116m N).
Landslide	No Hazard (onsite) to Very Low Hazard (233m N).
Running sand	No Hazard (onsite) to Very Low Hazard (233m N).
Shrinking and Swelling clay	No Hazard (onsite) to Moderate Hazard (233m N).
Natural cavities (within 1km)	• One group comprising 1No. sinkhole and 1No. solution pipe 274m north. • 1 No. sinkhole and 1 No. solution pipe 410m north-north-west. • 1No. sinkhole 555m north. • 1No. swallow hole 655m north. • 1No. sinkhole 700m north. • One group comprising 1No. sinkhole and 1No. solution pipe 789m north. • 1 No. swallow hole 800m north. • 1 No. sinkhole and 1 No. solution pipe 930m north-north-west. • 2No. solution pipes 955m north-east. • 10No. solution pipes 962m north. • 4No. solution pipes 976m north.
Mining Cavities (within 1.5km)	• Adit Entry Chalk Mine 1250m east-north-east. • Hanover Mine, Shaft entry, pillar and stall chalk mine 1350m north-north-west. • Possible crown hole collapse 1430m west north-west. • Shaft entry chalk mining 1430m north-north-west. • 2 No. Adit entries chalk mines 1490m west north west. • Chalkwell 1500m north-east.

Table 4 Summary of BGS geological hazards

2.10 Landfill and Waste Management Facilities

A search of BGS recorded landfill sites, IPC registered waste sites, licensed waste management facilities, local authority recorded landfill sites, other registered landfill sites, waste transfer stations and other waste treatment or disposal sites was undertaken as part of the desk study. Such sites may form an artificial source of ground gases, such as carbon dioxide and methane, where wastes are buried or disposed of to landfill.

Whilst no such sites were identified within 1km of the site, the subject site itself was identified as falling within the boundary of a cemetery. In addition the historical mapping of the site has identified a number of areas of unknown filled ground associated with the former quarrying activities identified, the closest of which is located 463m to the south of the site.

2.11 Historic Mapping

Historic maps dating back to 1879 were obtained as part of the desk study. A summary of the apparent key features observed on the map extracts both on the site and within the local area is presented within Table 5.



Date	On-site	Off-site
1879	The site comprised part of a field network.	An area of coniferous wood was located to the north east of the site, with the majority of the surrounding land comprising open field or woodland.
1882	No significant changes shown.	Milestone Wood was located 20m to the north east, and Caversham Park c.20m to the north and 50m to the west. Farms (labelled as Micklands and Lowfield) were labelled c.100-500m to the south with field networks surrounding them.
1898	No significant changes shown.	A pheasantry was labelled c.150m to the north-north-east of the site otherwise no significant changes shown.
1900	No significant changes shown.	A Gravel Pit and an Old Chalk Pit were shown c.550m to the south, a gravel pit c.800m south west and 1km west. Residential development was shown to have occurred c.1km to the west. Further open space and woodland were evident to the north of the park.
1901	No significant changes shown.	Further farms were shown c.800m to the south west and north east.
1913	No significant changes shown.	No significant changes shown.
1914	No significant changes shown.	A road was shown running east to south west c. 500m to the south of the site.
1932	No significant changes shown.	No significant changes shown.
1938	No significant changes shown.	Reading Crematorium and Cemetery was shown c.150m west, south-west of the site. Residential development was shown to have occurred c.20m to the south, c.600m to the south-west and 1km to the north-west. Limited development was noted to have occurred to the east and north.
1956 to 1973	No significant changes shown.	Land c.50m to the north-east and adjacent to the southern boundary of the site was shown to have been developed for a residential land use with private gardens
1961 to 1962	No significant changes shown.	Reading Cemetery was shown to have expanded to within 100m of the site boundary. A school and associated playing field were evident c.100m to the south-west of the site associated with the new residential development area.
1970 to 1974	No significant changes shown.	Lowfield Road was shown running to the east of the site, as per the present day layout. Further residential development with private gardens was shown c.100m to the south and east.
1973	No significant changes shown.	No significant changes shown.
1974	No significant changes shown.	No significant changes shown.
1978	No significant changes shown.	No significant changes shown.
1985	The site was labelled as cemetery with the access pathway for Reading Cemetery	No significant changes shown.

Date	On-site	Off-site
	expanding onto the central western portion of the site.	
1990 to 1991	No significant changes shown.	No significant changes shown.
1993	No significant changes shown.	No significant changes shown.
2006	The site was shown to have been developed as a 'Mobile Homes Park', with associated access road as per the present day layout of the site.	No significant changes shown.
2016	The 'mobile homes park' was no longer labelled. However the layout of the site was as per the layout at the time of the walkover survey.	No significant changes shown.

Table 5 Summary of historic map extracts

2.12 Asbestos

Whilst no clear evidence of asbestos containing materials was observed during the site visit, in line with current best practice, asbestos and ACM should be assumed to be present until proven otherwise.

2.13 Previous Ground Investigations

Geo-Environmental was not aware of any previous investigations that had been undertaken on the subject site.

2.14 Potential Contamination

The site's previous use is shown by mapping to have been open space, prior to the expansion of the Reading Crematorium and Cemetery to the west in 1985 when the site was labelled as a cemetery and the path network for the cemetery shown to have expanded on to the central western portion of the site. It is unclear as to whether burial actually occurred on the subject site itself or whether this was just land within the ownership boundary of the cemetery. Subsequently, the site was developed as a mobile home park. The use of the land as a cemetery type of land use is not covered by the National House Building Council (NHBC), Environment Agency (EA) and Chartered Institute of Environmental Health (CIEH) publication '*Guidance for the Safe Development of Housing on Land Affected by Contamination*' (2008), which provides a summary of industrial profiles (1995 - 1996) published by the former Department of the Environment (DoE) (now part of the Department for Environment, Food and Rural Affairs [DEFRA]).

However, it is possible that the former uses of the site, including a cemetery and the previous development of the site together with the adjacent land use as a cemetery could have resulted in localised impact and potential contaminants could include ammoniacal nitrogen, sodium, potassium, magnesium, coliforms, heavy metals, organic pollutants such as poly-aromatic hydrocarbons (PAH), petroleum hydrocarbons/oils, inorganic compounds.

In addition the material used to construct the embankments on site is unknown, as such there remains the possibility that Made Ground could have been utilised in their construction, which may present a source of contamination on the site.

2.15 Ground Gas and Vapour Summary

The desk study has identified the presence of a cemetery to the west of the site and potentially on part of the subject site itself. Although the main portion of the cemetery is identified as being down gradient topographically of the subject site, a potential risk of ground gases may exist from the adjacent land use and associated contaminants.

3.0 PRELIMINARY ASSESSMENT

Based on the findings of the desk study, the following sections summarise the anticipated geotechnical and environmental factors likely to impact the site.

3.1 Geotechnical Risk Assessment

3.1.1 Potential Geotechnical Issues

The following factors that might impact the geotechnical condition of the site were identified as part of the desk study:

- The possible presence of Made Ground (e.g. varying depth and/or composition) which if encountered may affect the foundation design and construction.
- The presence of laterally and vertically variable strata and the impact these could have on further construction.
- The suitability of shallow soils as a bearing stratum for conventional foundations.
- Consideration of the volume change potential of any cohesive soils and the affect this could have on foundations should superficial deposits be encountered onsite.
- The possible presence of aggressive ground conditions (sulphates) which may affect the foundation design and construction.
- The possible presence of perched and shallow groundwater beneath the site.

Whilst the presence of solution features and mining cavities have not been identified on the subject site itself through the desk based assessment, a watching brief should be undertaken on the site during clearance and development works.

3.2 Preliminary Environmental Conceptual Site Model & Risk Assessment

3.2.1 Methodology

A Preliminary Risk Assessment ('PRA') and Conceptual Site Model ('CSM') have been prepared in accordance with CLR11 based on information obtained as part of the desk study. Possible risks associated with potential sources of contamination and sensitive receptors identified have been qualitatively assessed following a source-pathway-receptor ('Pollutant Linkage') approach in accordance with current UK protocols.

A risk of harm may only exist where a plausible pollutant linkage is present, and where the quantity or concentration of a contaminant is sufficient so as to pose harm. Under the statutory definition, "Contamination" may only strictly exist where contaminants pose a risk of harm to a receptor. The risk classification has been assessed in accordance with CIRIA C552 (Rudland et al., 2001). A summary of how the risks are derived and their definitions are presented in Tables 6 and 7.

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

Table 6 Risk ratings matrix

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

Table 7 Risk rating definitions

3.2.2 Summary of Plausible Sources

Possible sources of contamination identified from the desk study are summarised in Table 8.

Source	Description	Contaminants
Made Ground and shallow soils	The general quality of Made Ground and shallow soils could be impacted by the presence of contamination in view of the site's previous development and former uses.	Possible elevated concentrations of metals, metalloids, TPH and PAH compounds, sulphate and asbestos in the Made ground and shallow soils.
Impacted soils and/or groundwater (Cemetery)	The quality of soils on site may have been impacted by the presence of a cemetery to the west of the site and on the subject site if actually utilised for burials. The boundary of the cemetery is mapped as extending onto the subject site.	Possible elevated chlorides, sulphates, ammoniacal nitrogen, sodium, potassium, magnesium and coliforms with the soils and groundwater.
Ground gases/vapours	In view of the cemetery identified in the vicinity there is the potential for ground gases and vapours to be present.	Methane, carbon dioxide, depleted oxygen, volatile organic compounds (VOC).

Table 8 Possible sources of contamination

3.2.3 Summary of Plausible Pathways

The plausible pathways are summarised in Table 9. These pathways are based on the proposed end use, including communal gardens and soft landscaping.

Pathway	Description
Direct Contact	Ingestion of soil particles, inhalation of soil derived dust (including tracked back dust), dermal contact.
Inhalation	Inhalation of soil dust both inside and outside of buildings. Inhalation of ground gas/vapours within buildings.
Vertical & Lateral Migration	Contaminant movement both vertically through leaching/gravity and horizontally along preferential pathways, e.g. services trenches, or with groundwater.
Shallow Groundwater	Shallow groundwater or perched water may be present within the Made Ground which could result in the vertical and lateral migration of contaminants.
Chemical Attack	Attack of buried plastics and concrete by aggressive ground conditions.
Flooding	The Envirocheck reports state the site is not within an area at risk of flooding.

Table 9 Possible contamination pathways

3.2.4 Summary of Plausible Receptors

Potential receptors associated with the site and its development are summarised in Table 10.

Receptor	Description	Comments
End Users	Residents/occupants of the proposed development.	The proposed development comprises housing with communal soft landscaped areas, roads and car parking.
Soft Landscaping	Possible areas of planting including possible awns, shrubs, trees, etc.	Communal soft landscaped areas are proposed.

Receptor	Description	Comments
Built Environment	Buried concrete for foundations and plastics for potable water supply pipes may be laid in contact with contaminated soils.	Aggressive ground conditions and depths of Made Ground may be present beneath the site.
Adjacent Land Users	Sensitive land uses identified within the immediate vicinity.	Adjacent land use to the east and south is primarily residential. Land use to the north is scrub land and an open field and the land to the west a cemetery.
Groundwater	Controlled waters contained within the aquifer(s) beneath the site.	The site overlies a Principal Aquifer and is within an SPZII.
Surface Water	Controlled Waters within lakes, rivers, and ponds, etc., or coastal waters.	No surface water was identified on site. The nearest surface water body identified was located approximately 406m to the north-west of the site. Surface water has not been considered further.
Ecological Receptors	Sensitive areas of ecological significance.	In view of the nature of the proposed development it is considered that the site is unlikely to have any significant impact with respect to the environmentally sensitive land uses identified in Table 3. As such, these have not been considered further as part of this assessment.

Table 10 Possible receptors of contamination

Site workers involved in the preparation and construction of the development have not been considered further in this assessment as the Principal Contractor is duty bound under the current CDM Regulations to undertake their own risk assessments with respect to their employees.

Whilst the above sources and receptors have been identified, Table 11 summarises the identified plausible pollution linkages and a qualitative assessment of the risks based on the desk study research.

Potential Source/media	Potential Receptors	Potential Pathways	Likelihood	Consequence	Risk and Justification
Contaminants of Concern (Made Ground and Shallow Soils)	End users	Direct and/or indirect contact	Likely	Mild	Moderate to Low End users are likely to come into contact with soils via direct contact in areas of soft landscaping. However landscaping would be completed within uncontaminated soils in the near surface root zone. The consequence is likely to be mild.
	Soft Landscaping	Root Uptake	Likely	Minor	Low Areas of soft landscaping are proposed. However landscaping would be completed within uncontaminated soils in the near surface root zone. The consequence is likely to be minor.
	Adjacent land users	Direct or indirect contact	Low	Mild	Low Adjacent land users are unlikely to come into contact with soils, due to the nature of the site location and surrounding land use. The consequence is likely to be mild.
	Water supply pipes	Direct contact	Likely	Mild	Moderate to Low Water supply pipes could come into contact with impacted soils depending upon depth of installation and extent of soil impact. The consequence is likely to be mild.
	Buildings and infrastructure	Direct contact	Likely	Minor	Low Foundations will be placed within potentially aggressive soils (e.g. sulphate). However the consequence is anticipated to be minor.
	Groundwater	Vertical migration	Likely	Mild	Moderate to Low The site is underlain by a Principal Aquifer and is within an SPZII. It is anticipated that Lambeth Group deposits will be present beneath the site, which would help mitigate any impact to the chalk aquifer beneath the site. The use of SUDS on site as part of the proposed development should be fully assessed to ensure they are protective of groundwater resources located at depth beneath the site.

Potential Source/media	Potential Receptors	Potential Pathways	Likelihood	Consequence	Risk and Justification
Contaminants of Concern (Cemetery)	End users	Inhalation	Likely	Mild	Moderate to Low End users are likely to come into contact with soils via direct contact in areas of communal landscaping. However landscaping would be completed within uncontaminated soils in the near surface root zone. The consequence is likely to be mild.
	Soft Landscaping	Root Uptake	Likely	Minor	Low Areas of soft landscaping are proposed. However landscaping would be completed within uncontaminated soils in the near surface root zone. The consequence is likely to be minor.
	Adjacent land users	Direct or indirect contact	Low	Mild	Low Adjacent land users are unlikely to come into contact with soils, due to the nature of the site location and surrounding land use. The consequence is likely to be mild.
	Water supply pipes	Direct contact	Likely	Mild	Moderate to Low Water supply pipes could come into contact with impacted soils depending upon depth of installation and extent of soil impact. The consequence is likely to be mild.
	Buildings and infrastructure	Direct contact	Likely	Minor	Low Foundations will be placed within potentially aggressive soils (e.g. sulphate). However the consequence is anticipated to be minor.
	Groundwater	Vertical migration	Likely	Mild	Moderate to Low The site is underlain by a Principal Aquifer and is within an SPZII. It is anticipated that Lambeth Group deposits will be present beneath the site, which would help mitigate any impact to the chalk aquifer beneath the site. The use of SUDS on site as part of the proposed development should be assessed in detail to ensure they are protective of groundwater resources located at depth beneath the

Potential Source/media	Potential Receptors	Potential Pathways	Likelihood	Consequence	Risk and Justification
					site. The consequence is likely to be mild.
Ground Gases and Vapours	End users	Inhalation	Likely	Mild	Moderate to Low Ingress of hazardous ground gas into buildings could occur and could result in significant harm where ground gases are identified on site or as migrating cross boundary onto the site from the adjacent cemetery. However the cemetery is located down topographical gradient of the site which might reduce the potential for gas migration onto the subject site, dependent on the gas composition, generation rate, preferential migration routes and other relevant factors. Incorporation of gas protection measures with the proposed new buildings could mitigate the risk of harm and thus the consequence (with protection measures in place) is considered mild.
	Buildings and infrastructure	Gas accumulation and potential explosion of flammable gases	Likely	Mild	Moderate to Low Ingress of hazardous ground gas into buildings could occur and could result in harm where ground gases are identified on site or as migrating cross boundary onto the site from the adjacent cemetery. However the cemetery is located down topographical gradient of the site. Incorporation of gas protection measures could mitigate the risk of harm and thus the consequence is considered mild.
	Adjacent land users	Inhalation	Low	Mild	Low Where potential migration of hazardous gases could occur and thus impact adjacent land users the site has been identified as primarily being an offsite source, therefore the development will need to ensure that if ground gases are identified, that service trenches are the like do not create preferential pathways.

Table 11 Plausible pollutant linkages & qualitative risk assessment

3.3 Preliminary Risk Assessment Summary

The PRA and CSM developed from the information gathered as part of the desk study process have identified plausible potential pollutant linkages that exist in relation to the proposed redevelopment of the site.

The potential pollutant linkages established within this desk study are not considered to prevent development on the subject site, but could require investigation and assessment to support further characterisation, calibration of the CSM and where/if necessary determine a remedial strategy to reduce, remove or otherwise control any risk within the site to key receptors.

In order to progress this assessment in line with the National Planning Policy Framework, to provide further characterisation of the site and refinement of the PRA and CSM, it is recommended that intrusive investigation and associated testing is undertaken to confirm the findings of the desk study and to provide a robust risk assessment for the site and proposed redevelopment. As such it is recommended that geo-environmental and geotechnical investigation be carried out on the site to include analysis of soil and groundwater (if encountered) samples for the range of potential contaminants identified within the desk study.

3.4 Preliminary Geotechnical Assessment Summary

The site is anticipated to be underlain by the Lambeth Group. This stratum has the potential to include cohesive soils and account may need to be taken of the potential for shrinkable soils to be present and the influence of shrubs and trees (existing or proposed).

It is possible that conventional strip or pad foundations could be suitable for the proposed development. However it is important to recognise that foundation depths are also likely to be influenced by any former structures. This could include, for example, foundations and underground services which will need to be removed beneath areas of new construction where they interfere with the new build, in addition to other possible buried structures.

Whilst ground bearing floor slabs may be suitable if non-shrinkable soil and deep Made Ground are not present, suspended floor slabs are recommended at this stage.

It is possible that soakaways may function on this site, although this would be subject to testing to inform design. It may also be necessary (subject to testing) to utilise on-site storage and attenuation of peak storm flow, through systems such as porous paving and cellular storage crates. In addition the use of such systems would only be permitted where contamination has not been identified.

Whilst the presence of solution features and mining cavities have not been identified on the subject site itself through the desk based assessment, solution features have been identified within 274m and mining cavities within 1250m of the site. It is recommended that a watching brief should be undertaken on the site during clearance and development works and should any unexpected voids, depressions or unexpected conditions be identified then further non-intrusive (e.g. geophysical), or intrusive assessment should be undertaken on site to assess the associated risk.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

It is concluded that there is a potential for contamination to be present in close proximity to and potentially on site due to the historic and current uses of the adjacent land and potentially the site itself as a cemetery and that this could influence the proposed development. Whilst the individual risk ratings for the potential pollutant linkages identified ranged between moderate to low and very low, further assessment is likely to be required to better characterise contamination on site as a result of historical land uses and the associated risk to identified receptors.

It is possible that conventional foundations could be suitable for the proposed development, although this is subject to confirmation following intrusive investigation.

The proposed end use of the site is understood to comprise the construction of a number of residential units with communal soft landscaping, parking and associated infrastructure. Depending on the outcome of an intrusive investigation and delineation of the cemetery, it is possible that risk mitigation measures such as localised soil removal, construction of a soil cover system or ground gas/vapour protection measures may be required to protect end users.

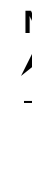
4.2 Recommendations

At this stage and based on the findings of the desk study and preliminary risk assessment, the following scope of works is recommended for the intrusive investigation on the site.

- Intrusive investigation works including targeted investigation of potential contamination sources should be carried out in order to clarify the geotechnical and geo-environmental issues pertaining to redevelopment of the site.
- In-situ testing to assess the potential for the use of soakaways, e.g. falling head permeability tests or trial pit soakage tests if their use is proposed. Any such testing should include intrusive investigation for solution features/voids/cavities in the chalk beneath the soakaway.
- Installation of dual purpose ground gas and groundwater monitoring standpipes with return monitoring visits.
- Laboratory analysis on soil samples recovered from the exploratory holes for a range of geotechnical parameters to support foundation design and the like.
- Laboratory analysis, on shallow soil samples and groundwater samples recovered from the exploratory holes, for an analytical suite to include the potential contaminants identified within the desk study and encountered during any intrusive investigation. The suite should include commonly occurring metals, non-metals, asbestos, TPH, and PAH compounds and be augmented to reflect the potential contaminants identified from the desk study, i.e. ammoniacal nitrogen, sodium, potassium, magnesium and coliforms.
- Waste Acceptance Criteria testing may be required if surplus spoil is to be disposed of from the development.
- Should it be proposed to re-use materials on site or import materials onto site as part of the proposed development then preparation of a Materials Management Plan and associated Declaration(s) by a competent individual registered as a 'Qualified Person' under the Definition of Waste Code of Practice.

It may be necessary to undertake remediation/risk mitigation measures on this site to break pollutant linkages and thus protect key receptors such as human health, controlled waters, built environment, soft landscaping and the like. The requirement and extent of any such remediation cannot be determined until such time as an intrusive investigation and associated testing has been completed.

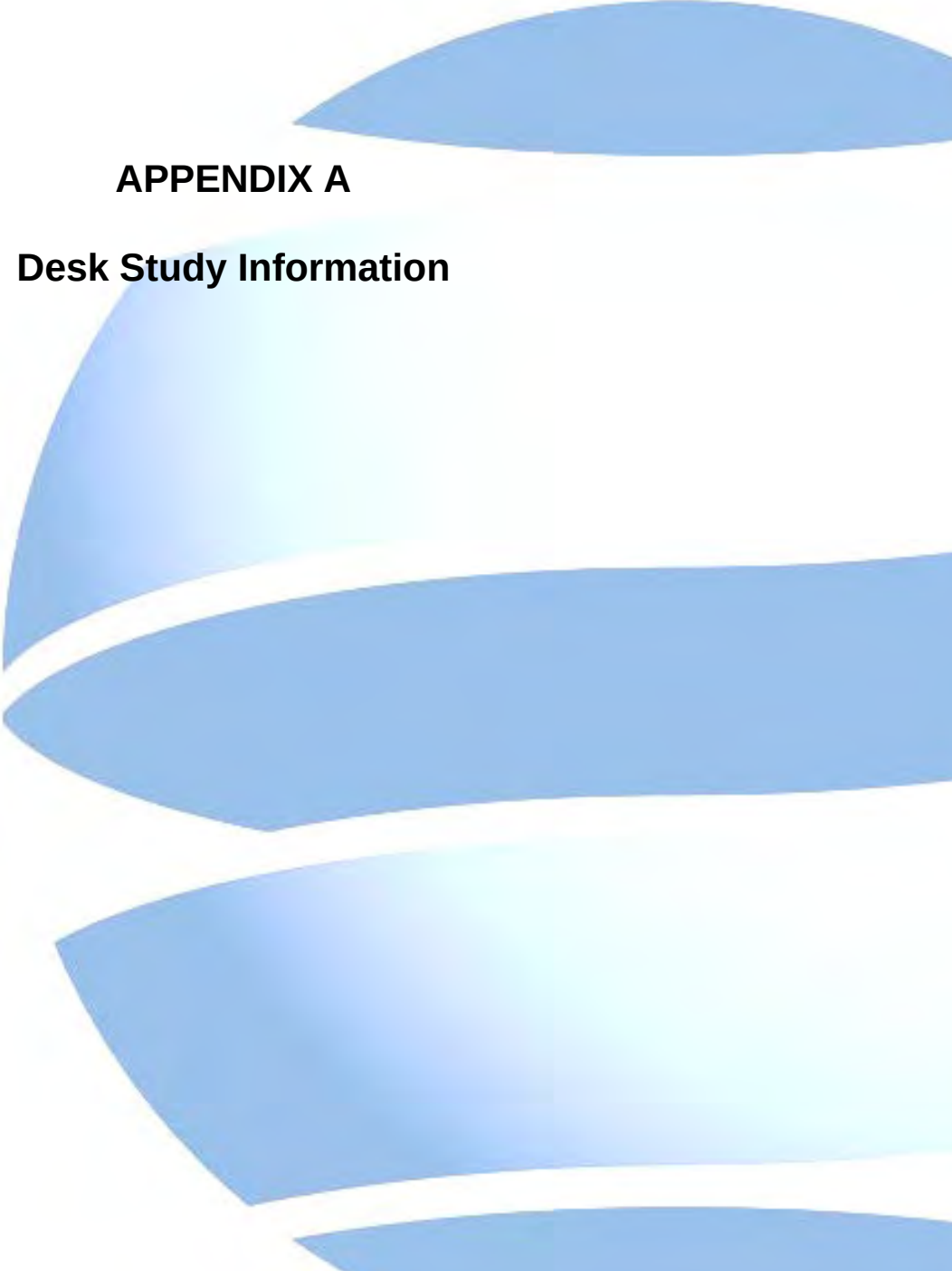
Figures



Project:	Lowfield Road, Caversham, Reading RG4 6NL			Title	Site Location Plan	
Client:	Reading Borough Council			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	 Geo-Environmental	
Ref No:	GE15373	Revision:	0			
Drawn:	LL	Date:	01/03/2016			
Figure:	1	Scale:	Not To Scale			

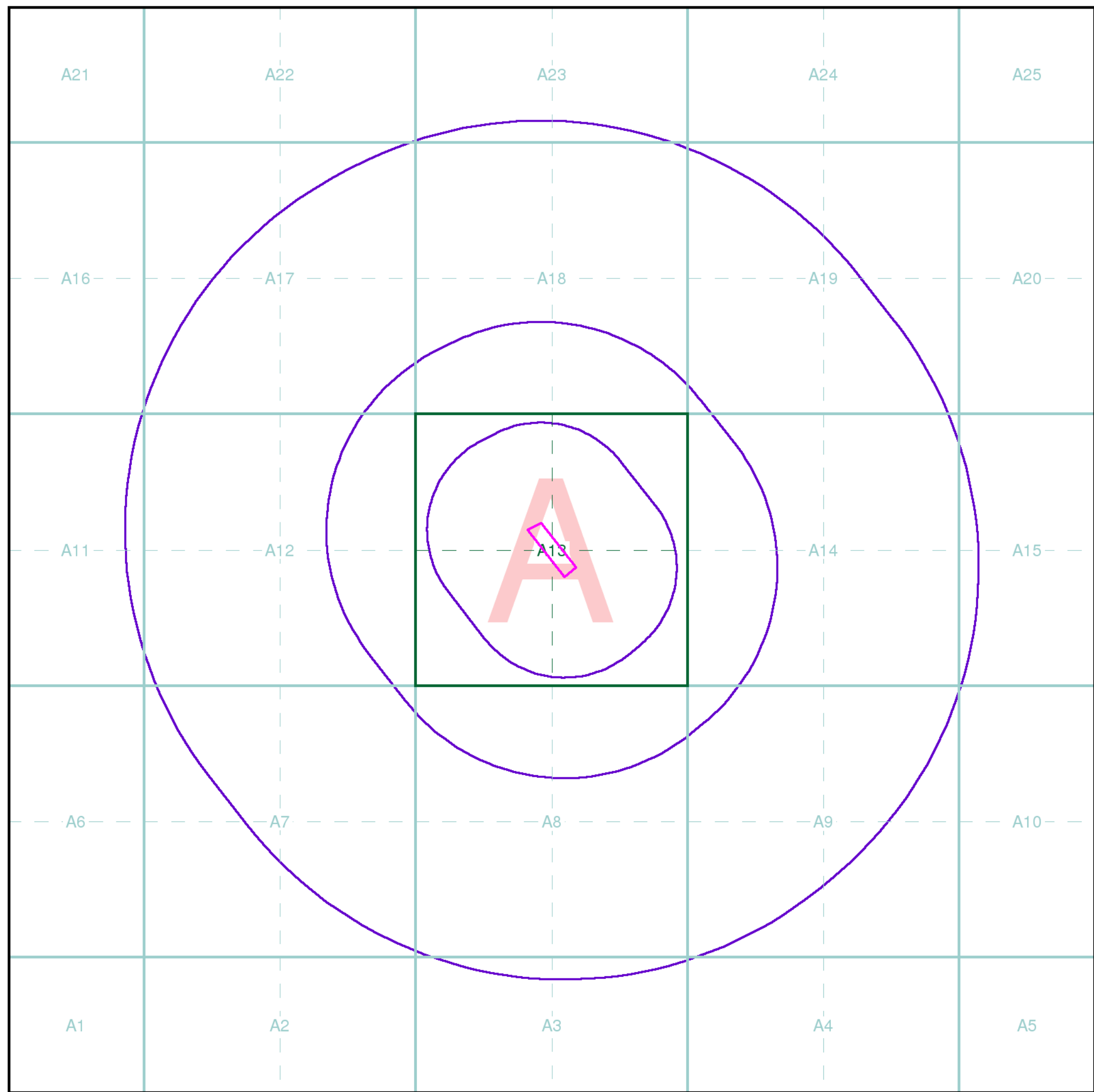


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Address:	Lowfield Road, Caversham, Reading RG4 6NL			Date:	04/03/2016	Revision: v1
				Drawn:	AB	 Geo-Environmental
NGR:	473030, 175880	Scale:	Not to Scale	Ref:	GE15373	
Client:	Reading Borough Council			Figure:	2	



APPENDIX A

Desk Study Information



Geo-Environmental Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:



Envirocheck reports are compiled from 136 different sources of data.

Client Details
Ms L Legate, Geo Environmental Services Ltd, Unit 7
Danworth Farm, Cuckfield Road, Hurstpierpoint, West
Sussex, BN6 9GL

Order Details
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National Grid Reference: 473030, 175880
Site Area (Ha): 0.54
Search Buffer (m): 1000

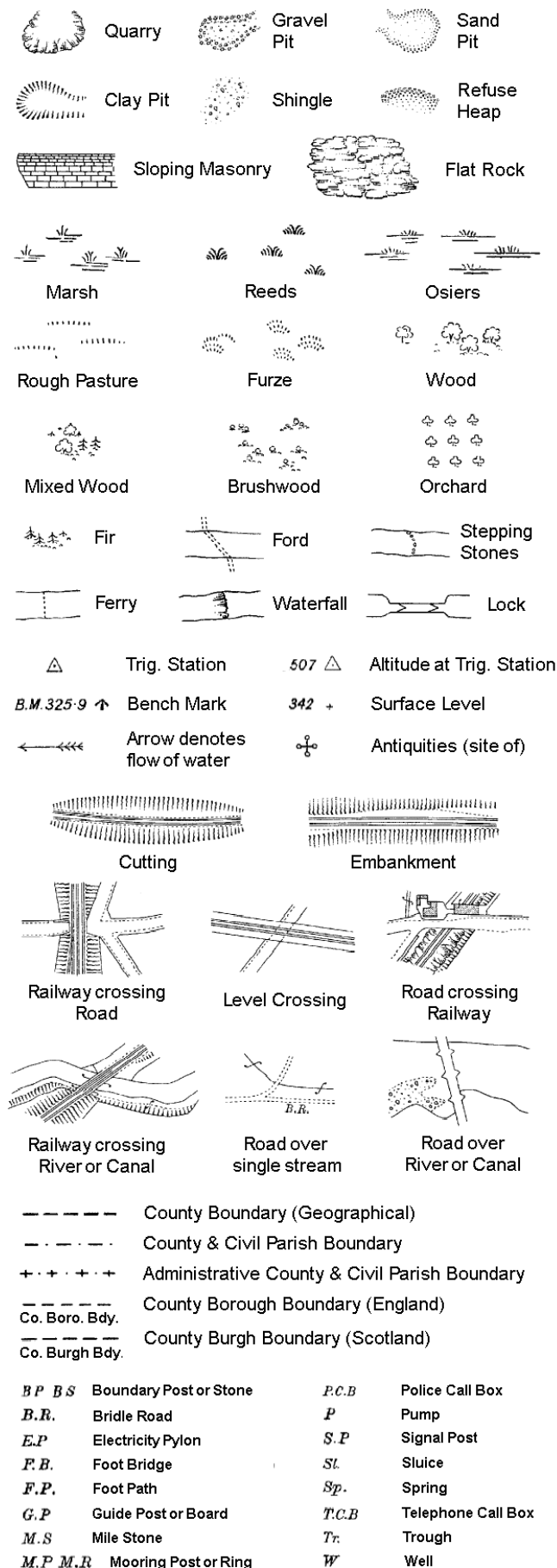
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Full Terms and Conditions can be found on the following link:
<http://www.landmarkinfo.co.uk/Terms/Show/515>

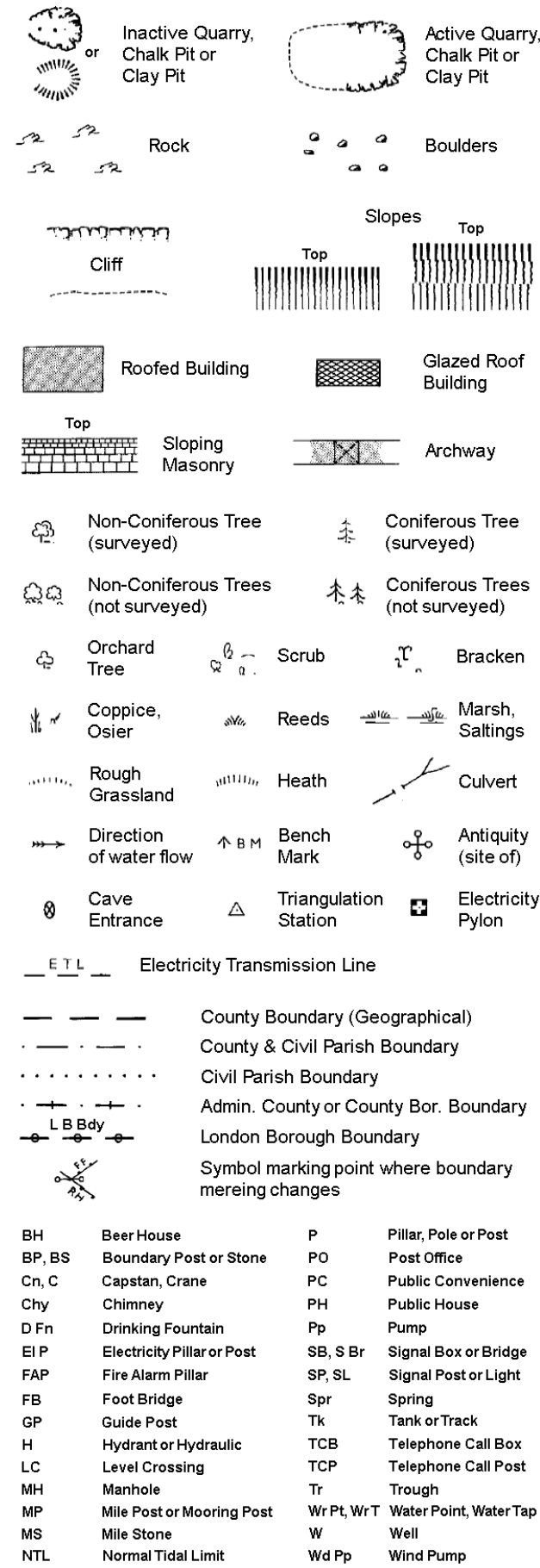


Historical Mapping Legends

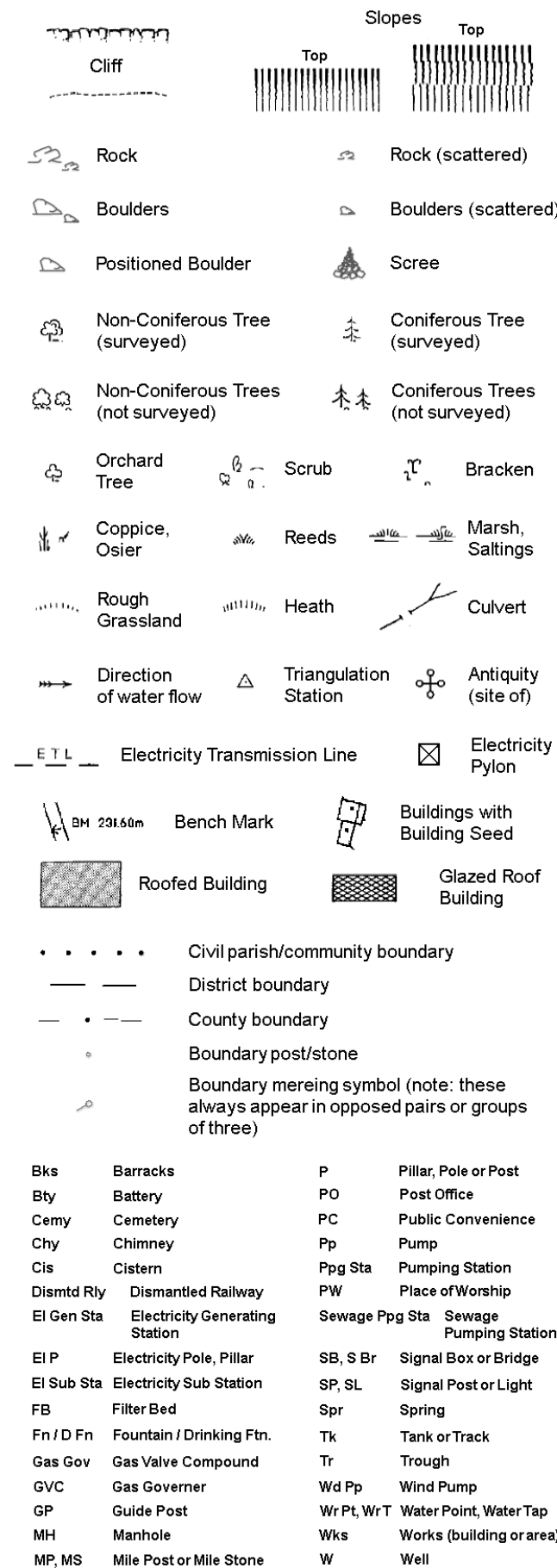
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



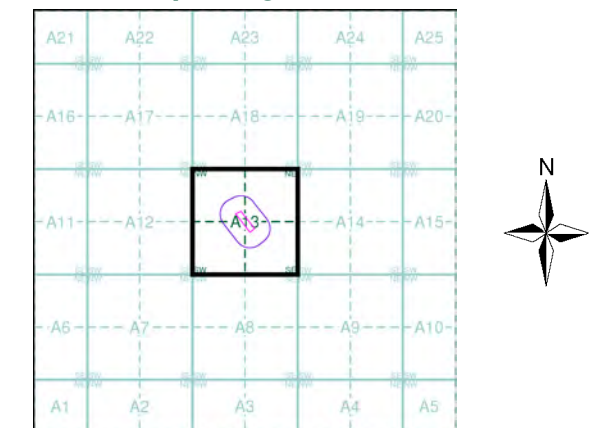
Large-Scale National Grid Data 1:2,500 and 1:1,250



Geo-Environmental Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
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Oxfordshire	1:2,500	1879	3
Oxfordshire	1:2,500	1898	4
Berkshire	1:2,500	1913	5
Oxfordshire	1:2,500	1913	6
Oxfordshire	1:2,500	1932	7
Berkshire	1:2,500	1932	8
Ordnance Survey Plan	1:1,250	1956 - 1973	9
Ordnance Survey Plan	1:2,500	1956 - 1968	10
Ordnance Survey Plan	1:2,500	1968	11
Ordnance Survey Plan	1:1,250	1970 - 1974	12
Supply of Unpublished Survey Information	1:1,250	1974	13
Additional SIMs	1:1,250	1978	14
Additional SIMs	1:1,250	1985	15
Large-Scale National Grid Data	1:1,250	1993	16

Historical Map - Segment A13



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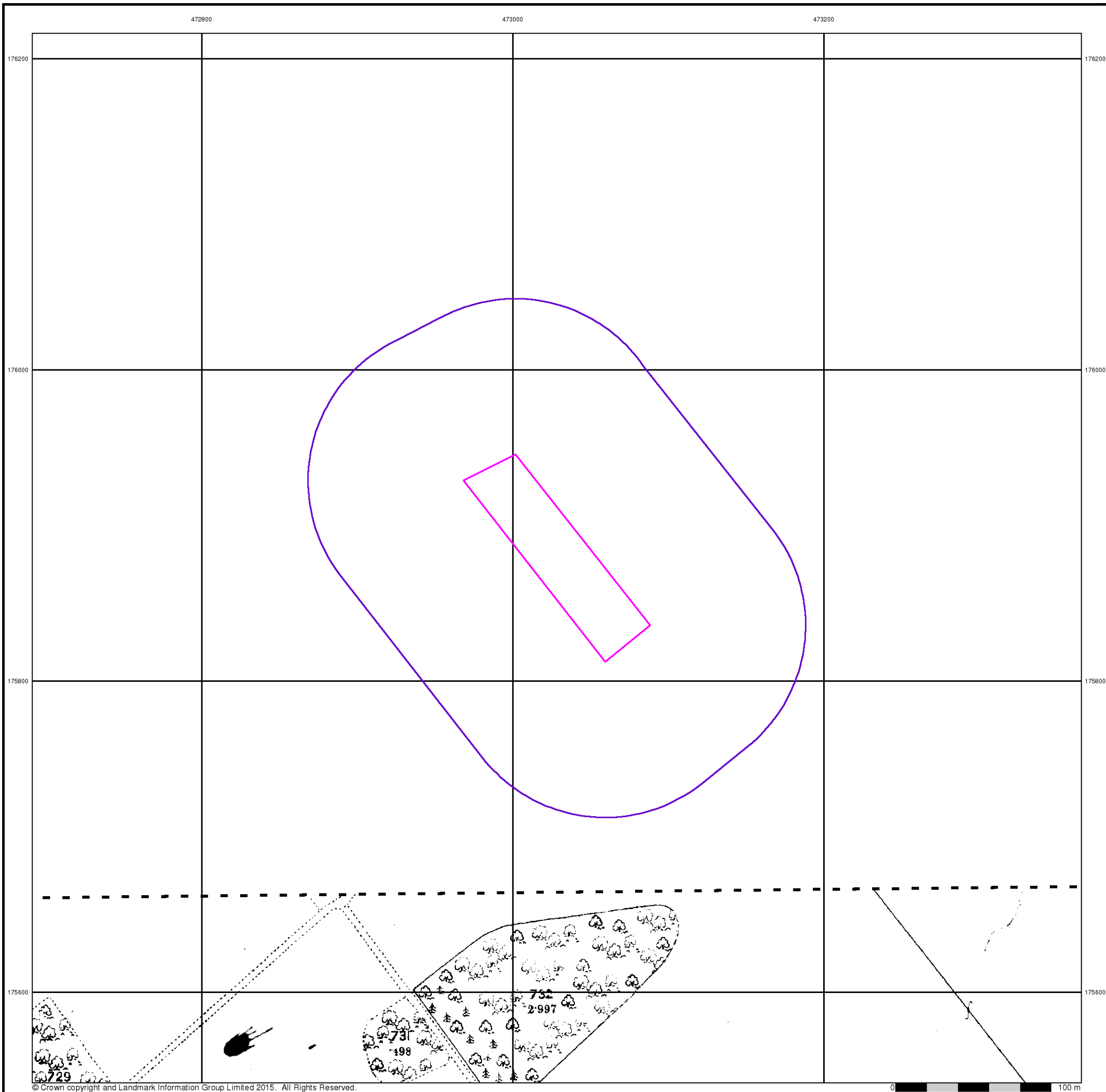
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Site Area (Ha): 0.54
Search Buffer (m): 100

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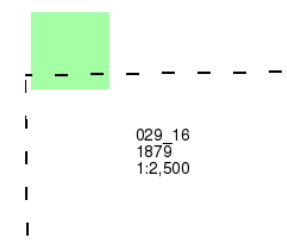
Geo-Environmental Berkshire

Published 1879

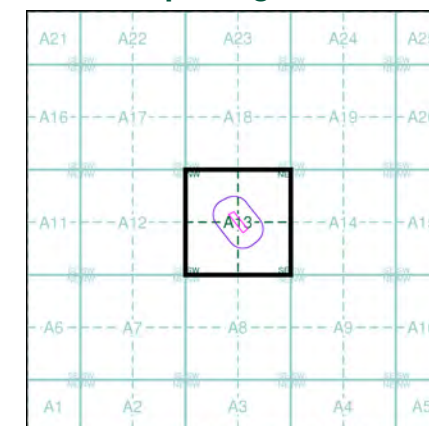
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Map Name(s) and Date(s)



Historical Map - Segment A13



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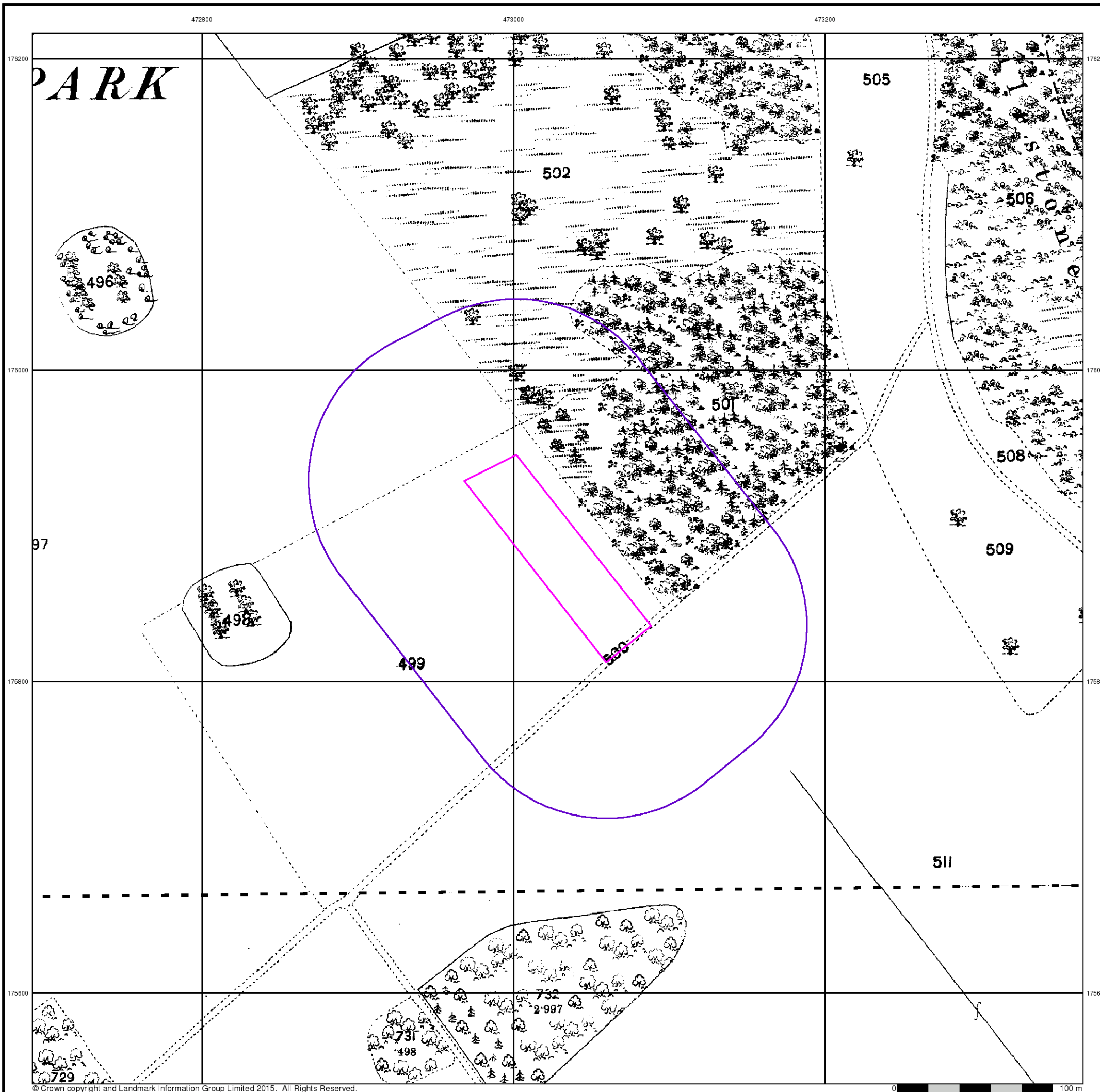
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Oxfordshire**

Published 1879

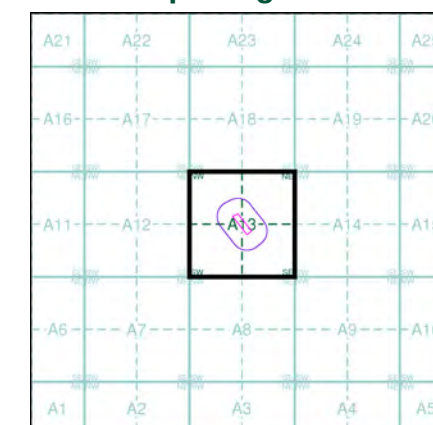
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056_16 1879 1:2,500

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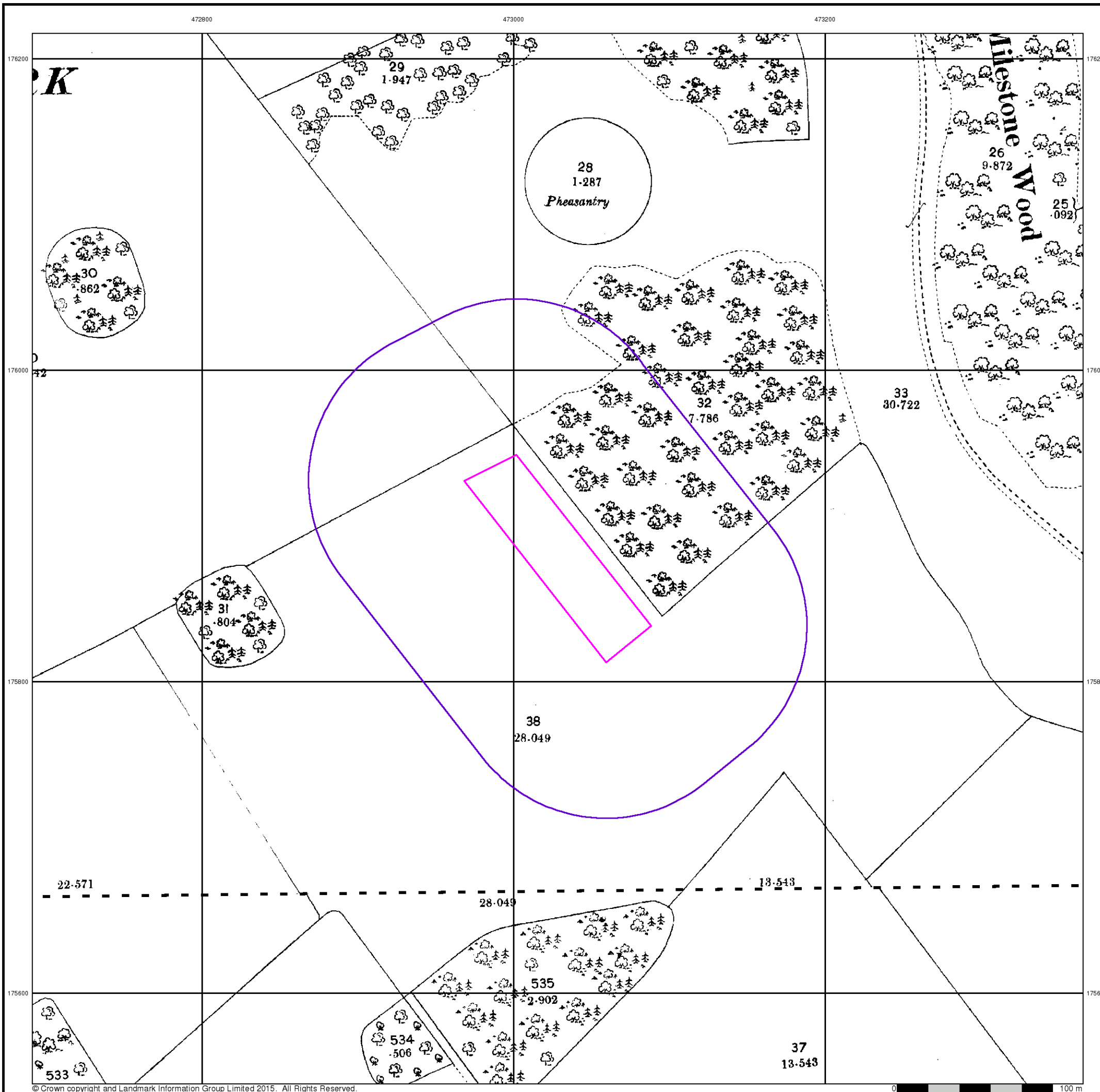
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**Geo-Environmental
Oxfordshire**

Published 1898

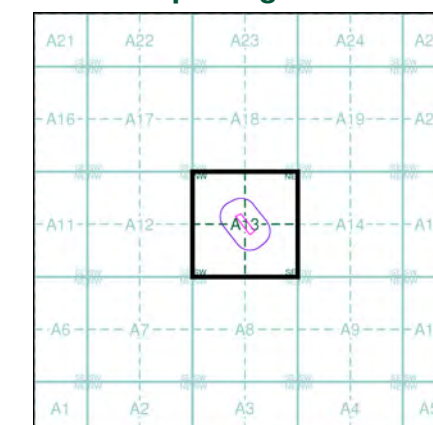
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Historical Map - Segment A13



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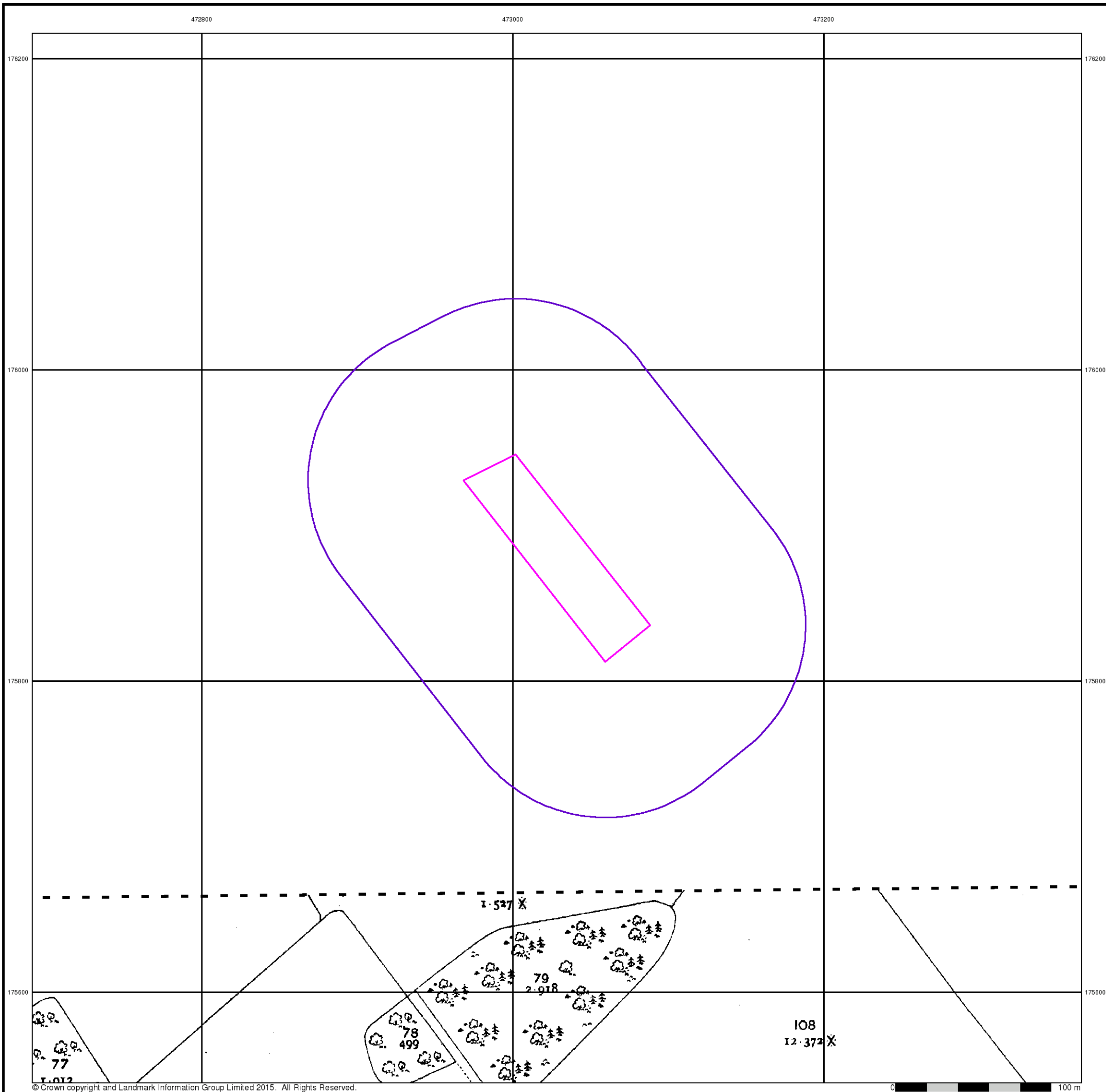
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Site Details

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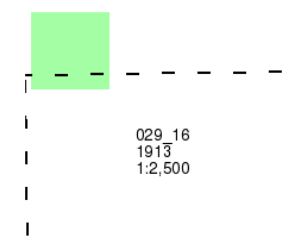
Geo-Environmental Berkshire

Published 1913

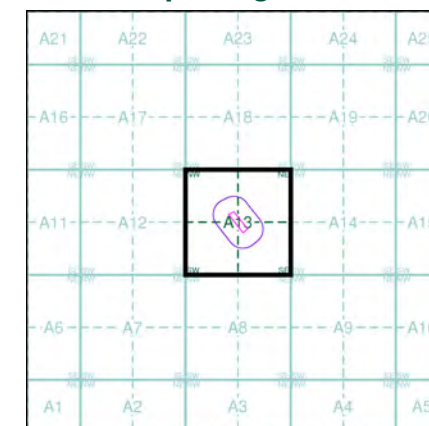
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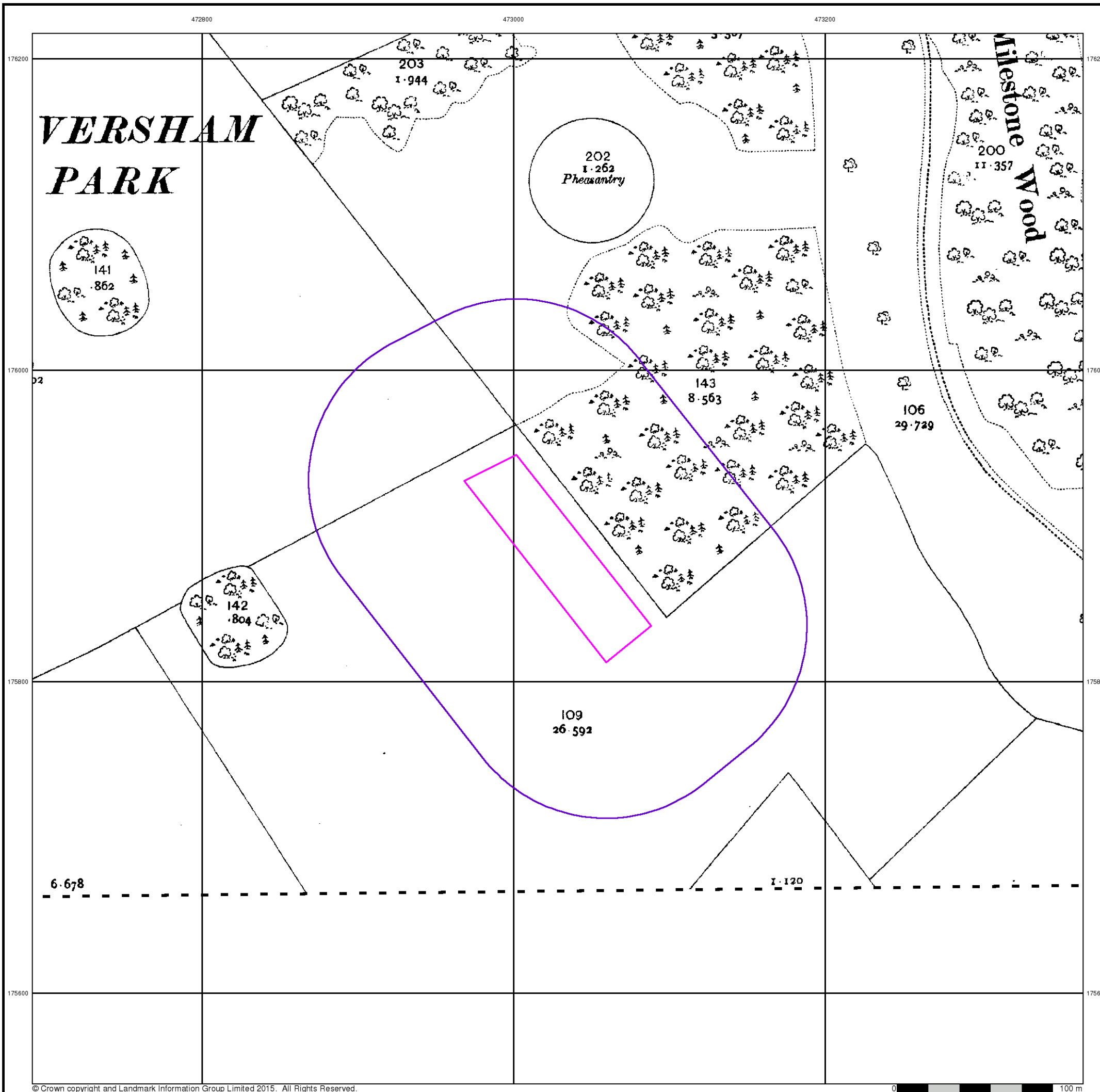
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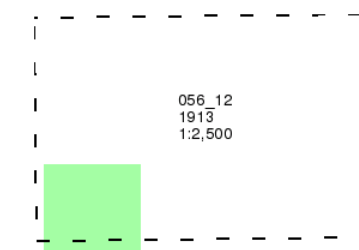
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Published 1913

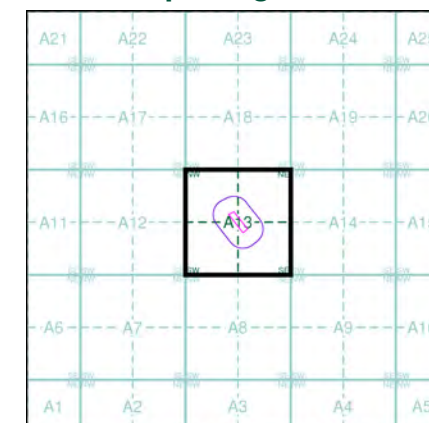
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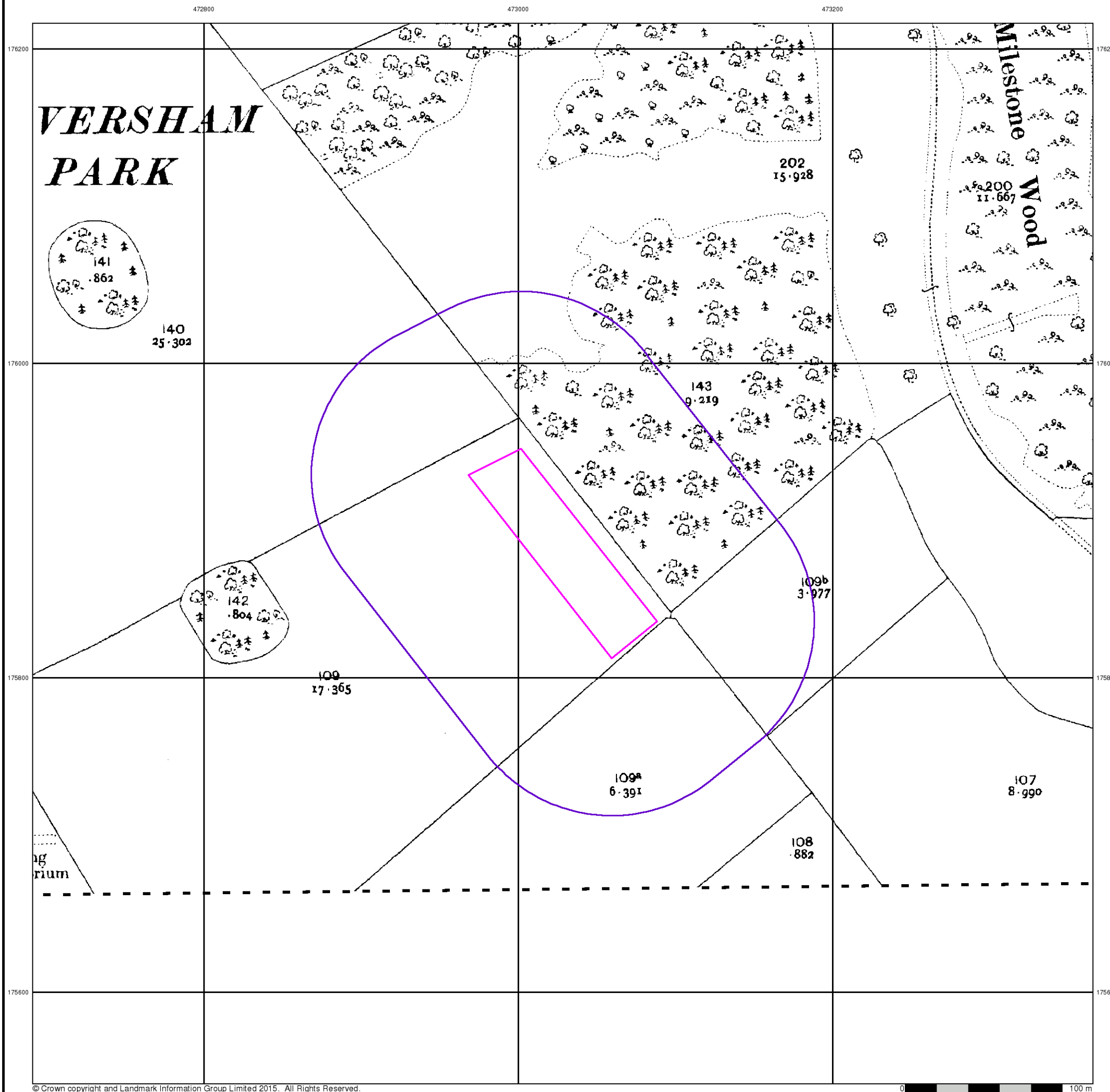
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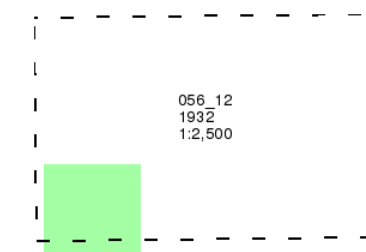
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Published 1932

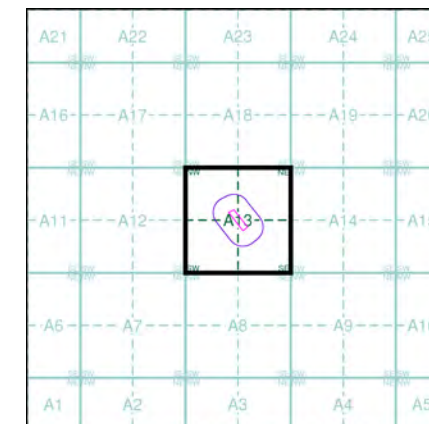
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Map Name(s) and Date(s)



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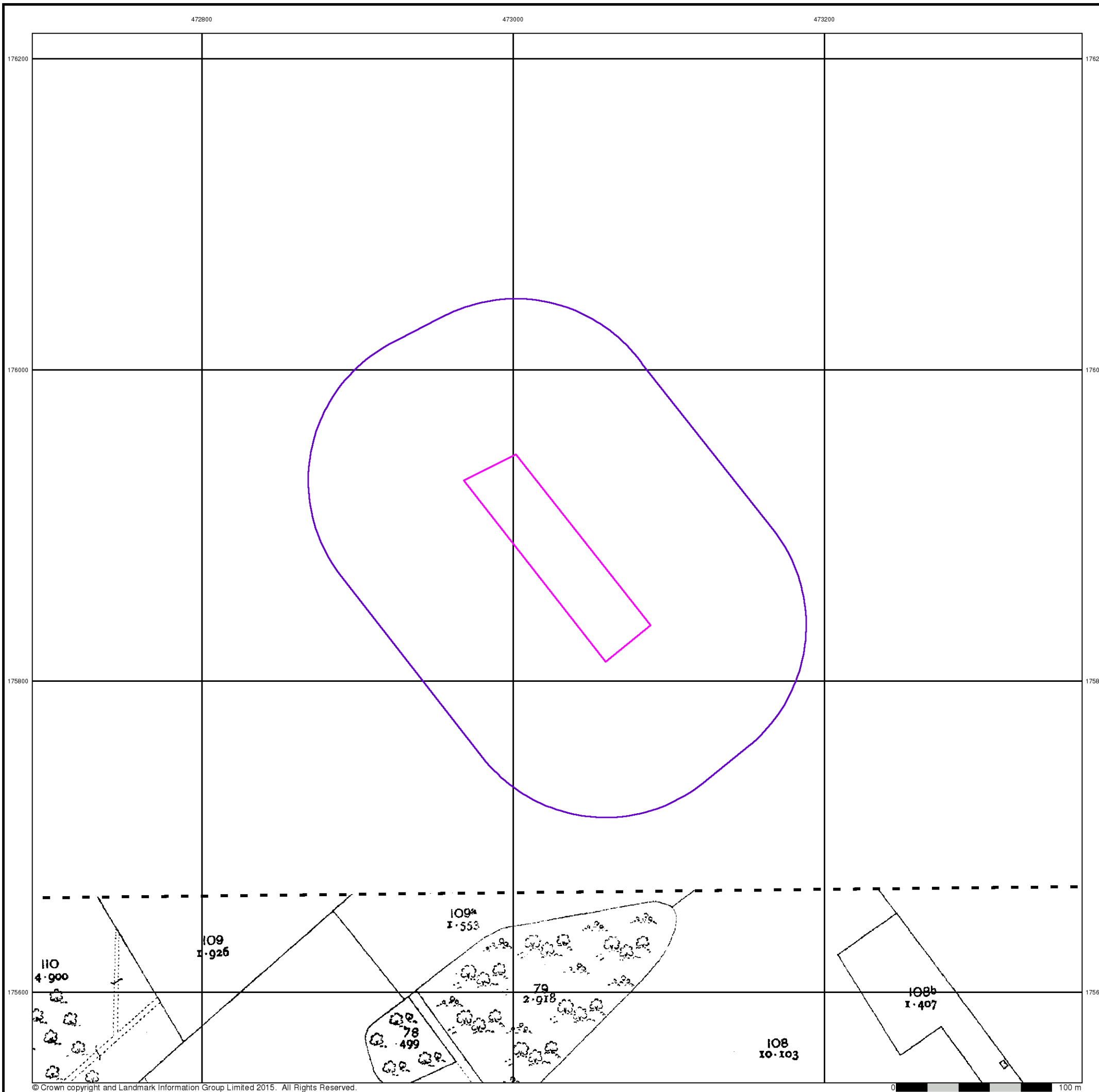
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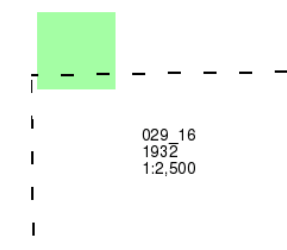
Geo-Environmental Berkshire

Published 1932

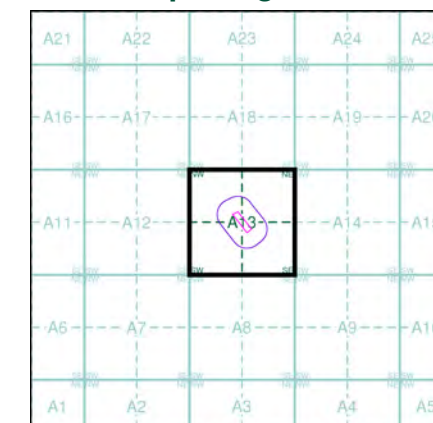
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

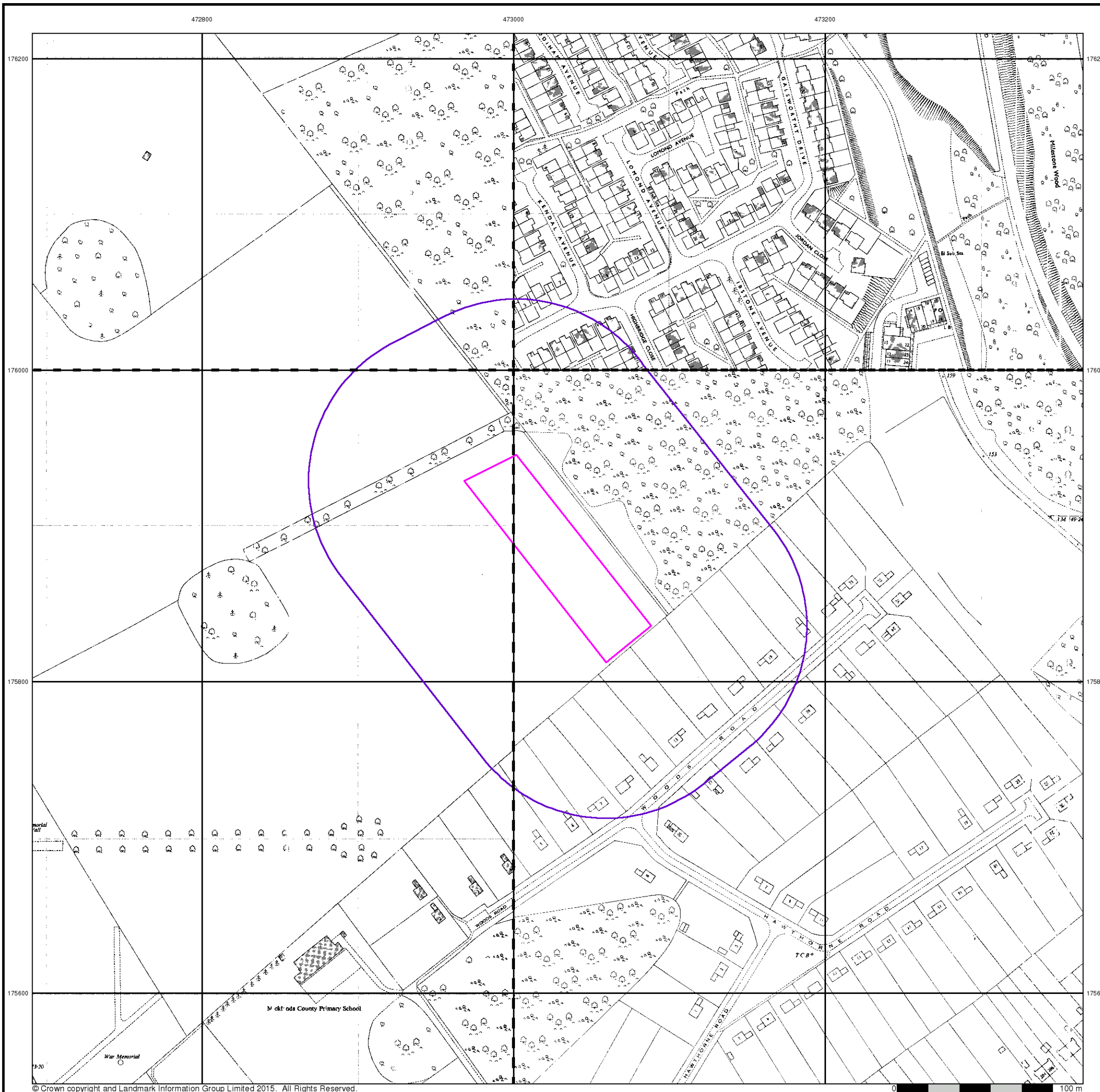
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Geo-Environmental Ordnance Survey Plan

Published 1956 - 1973

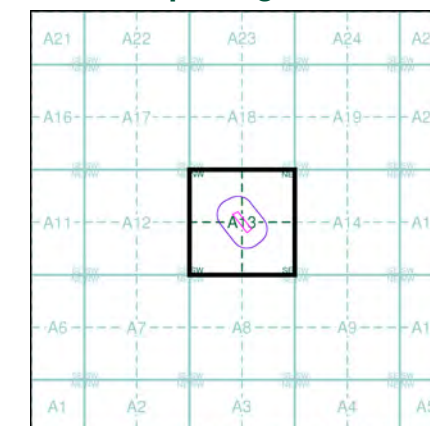
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SU7276SE 1956 1:1,250	SU7376SW 1973 1:1,250
SU7275NE 1956 1:1,250	SU7375NW 1956 1:1,250

Historical Map - Segment A13



Order Details

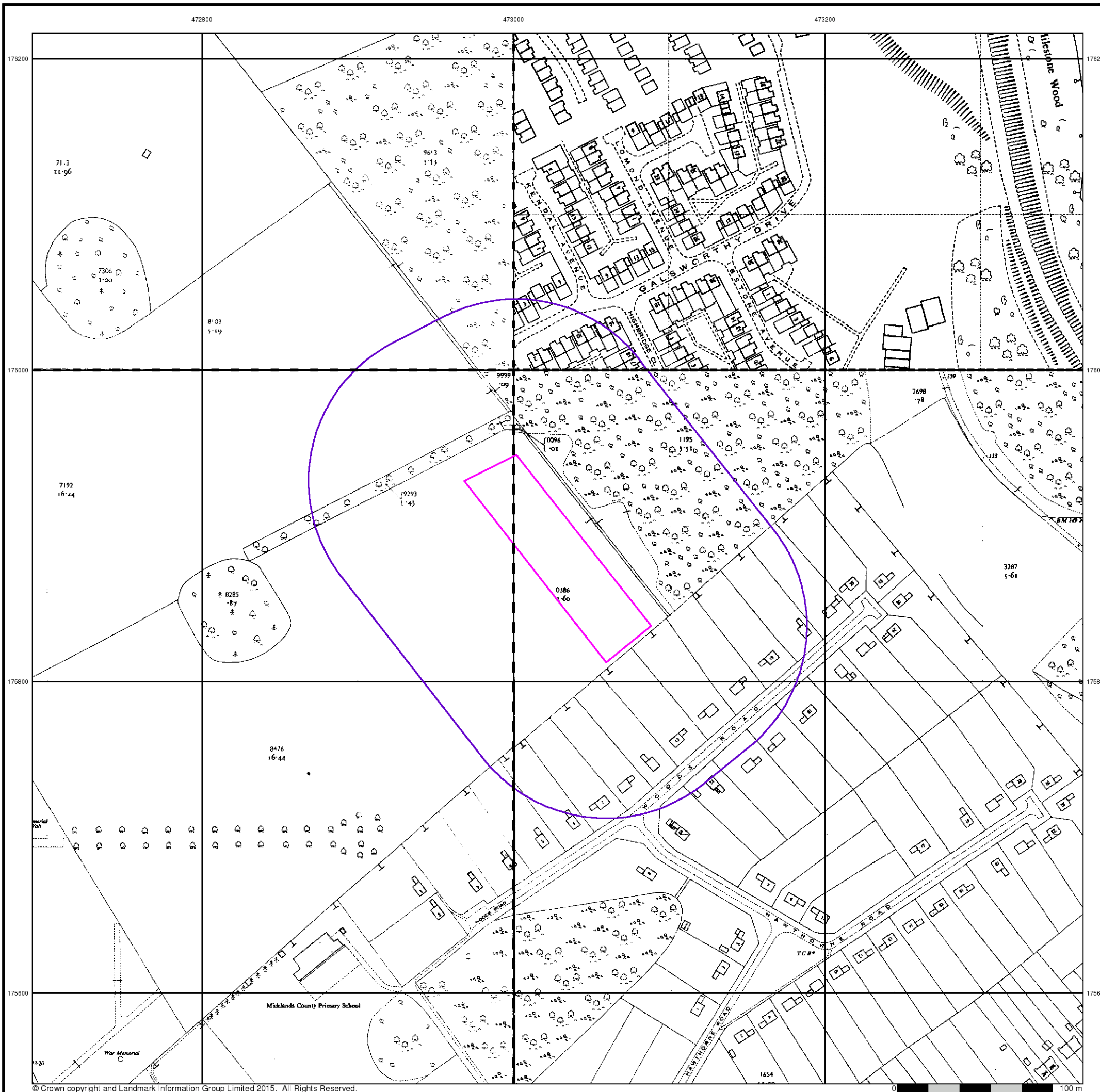
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

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Geo-Environmental Ordnance Survey Plan

Published 1956 - 1968

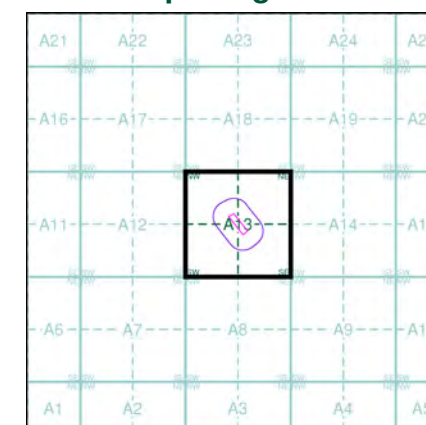
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SU7276 1956 1:2,500	SU7376 1968 1:2,500
SU7275 1956 1:2,500	SU7375 1956 1:2,500

Historical Map - Segment A13



Order Details

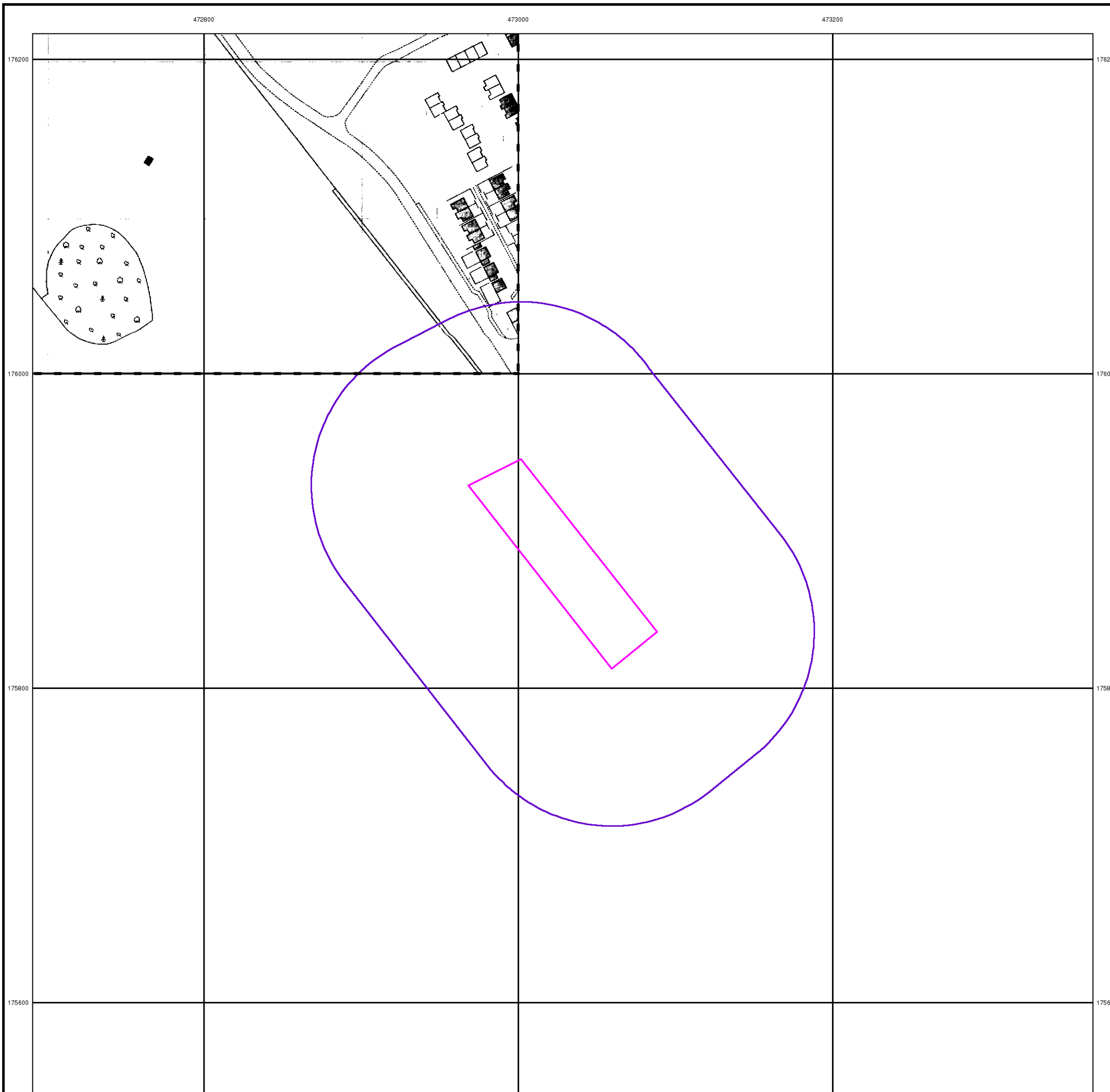
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

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0 100 m



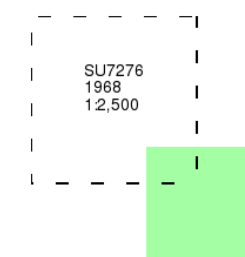
Geo-Environmental Ordnance Survey Plan

Published 1968

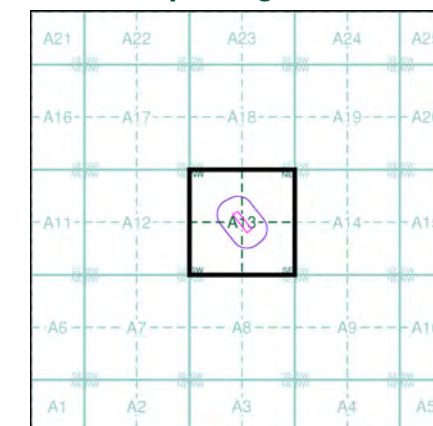
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

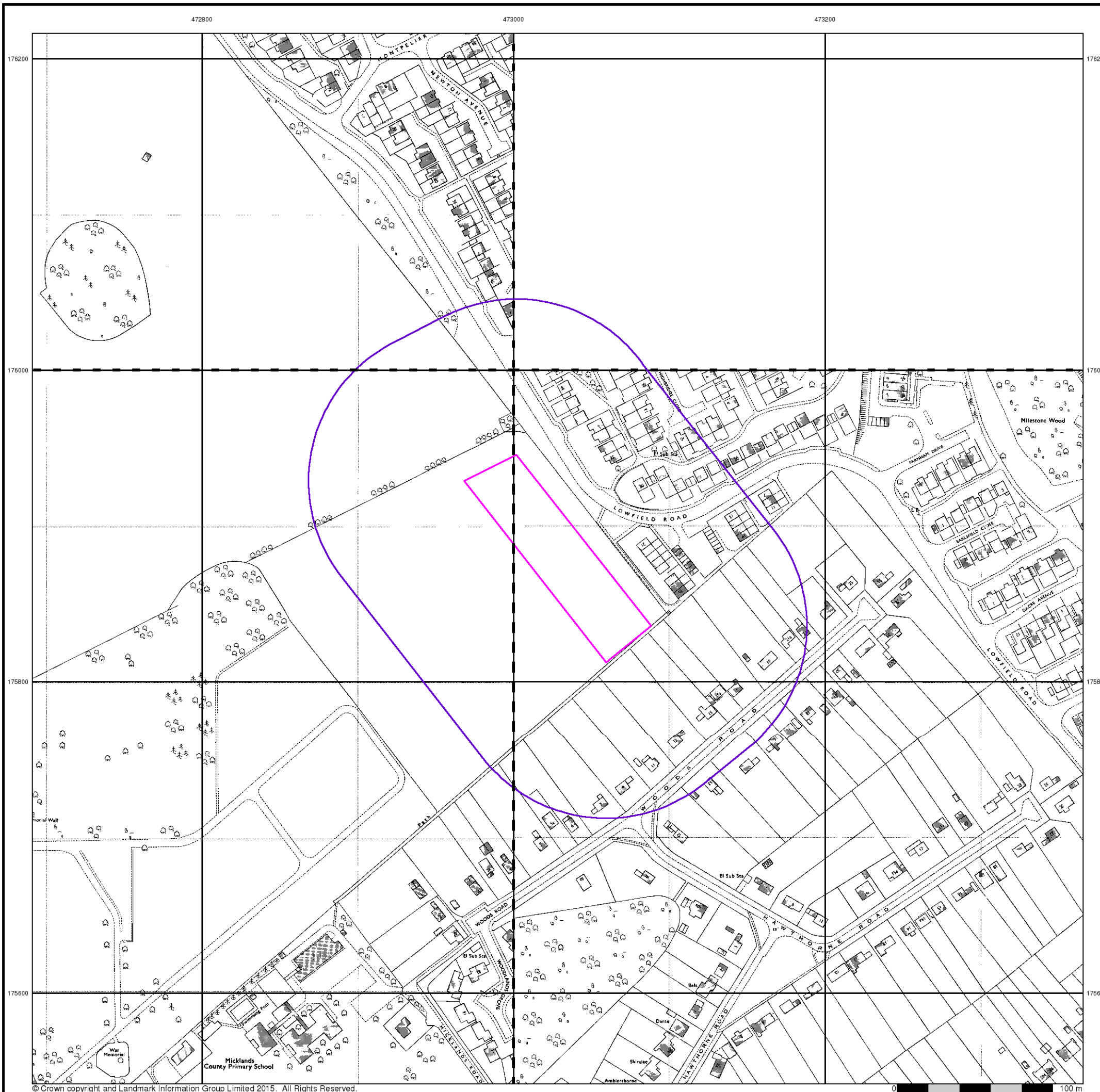
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

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Geo-Environmental Ordnance Survey Plan

Published 1970 - 1974

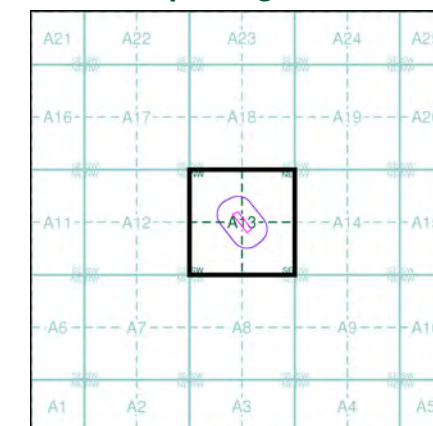
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SU7276SE	
1970	
1:1,250	
SU7275NE	SU7375NW
1974	1970
1:1,250	1:1,250

Historical Map - Segment A13



Order Details

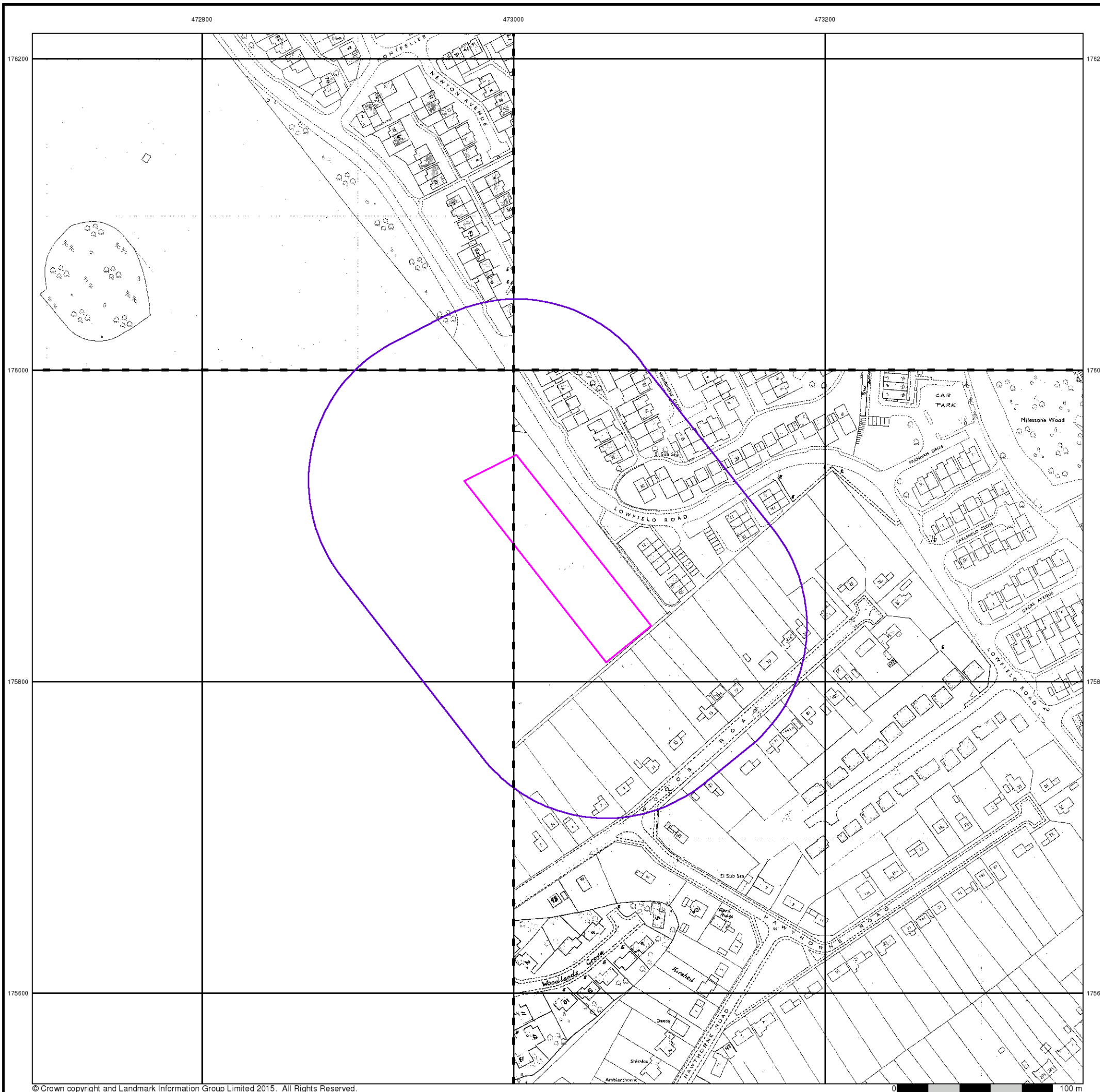
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

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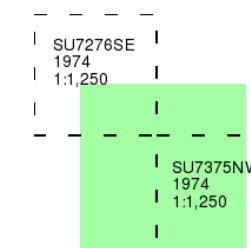
Geo-Environmental Supply of Unpublished Survey Information

Published 1974

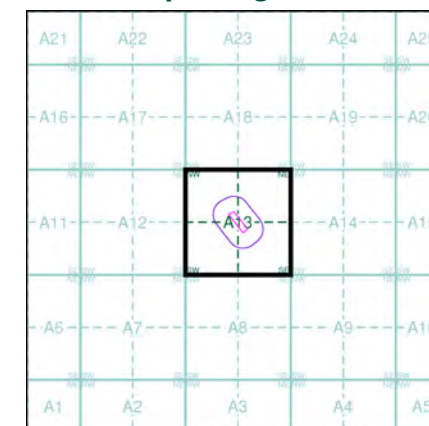
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a 'work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

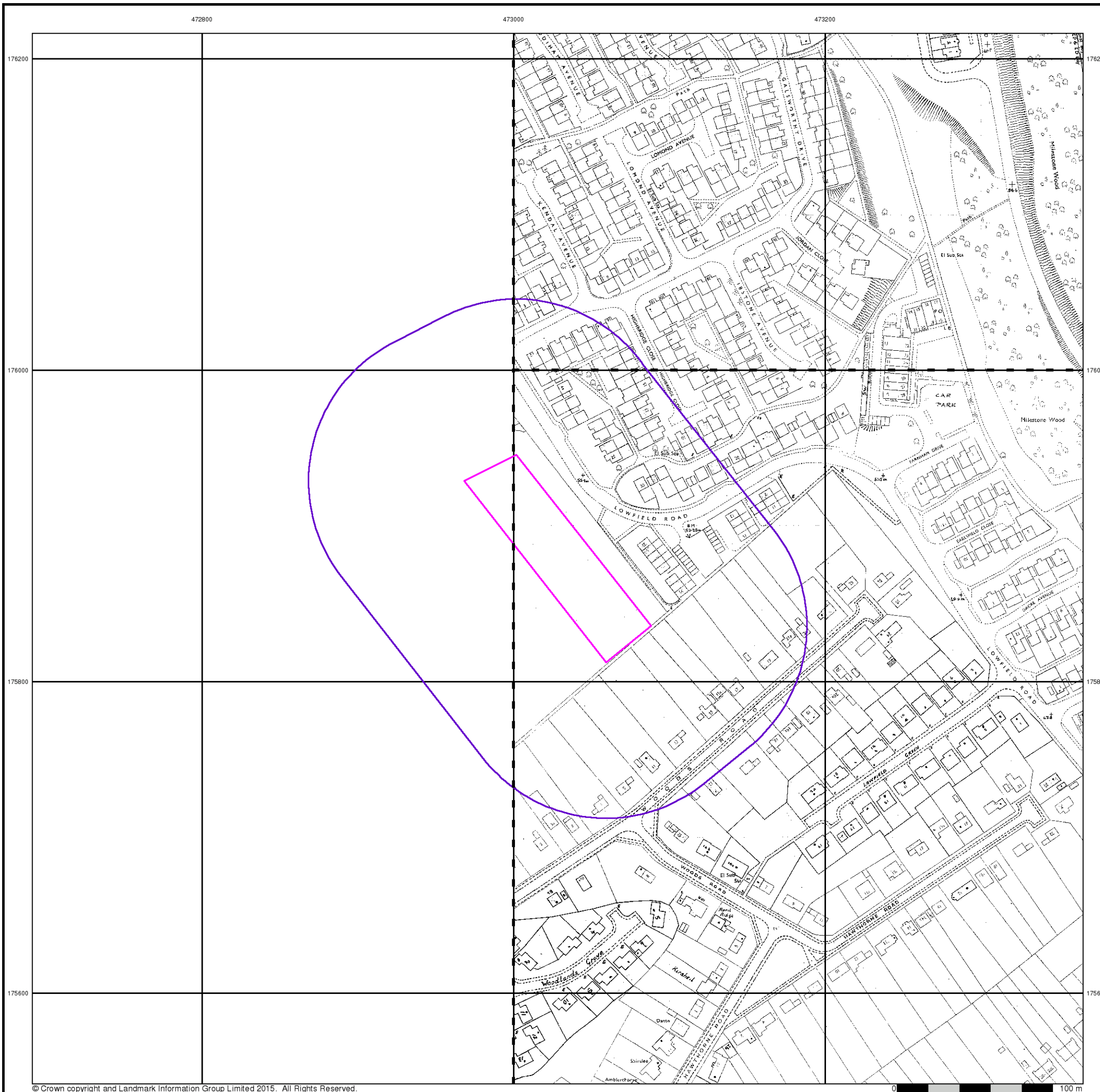
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

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Geo-Environmental Additional SIMs

Published 1978

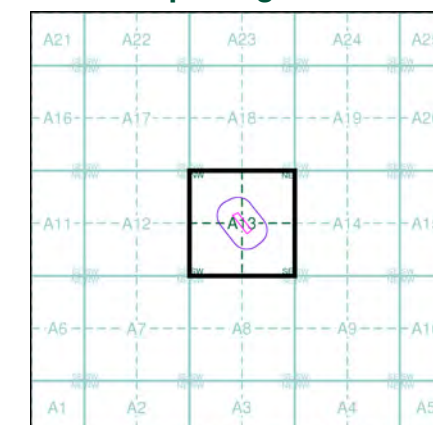
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SU7376SW
1978
1:1,250
SU7375NW
1978
1:1,250

Historical Map - Segment A13



Order Details

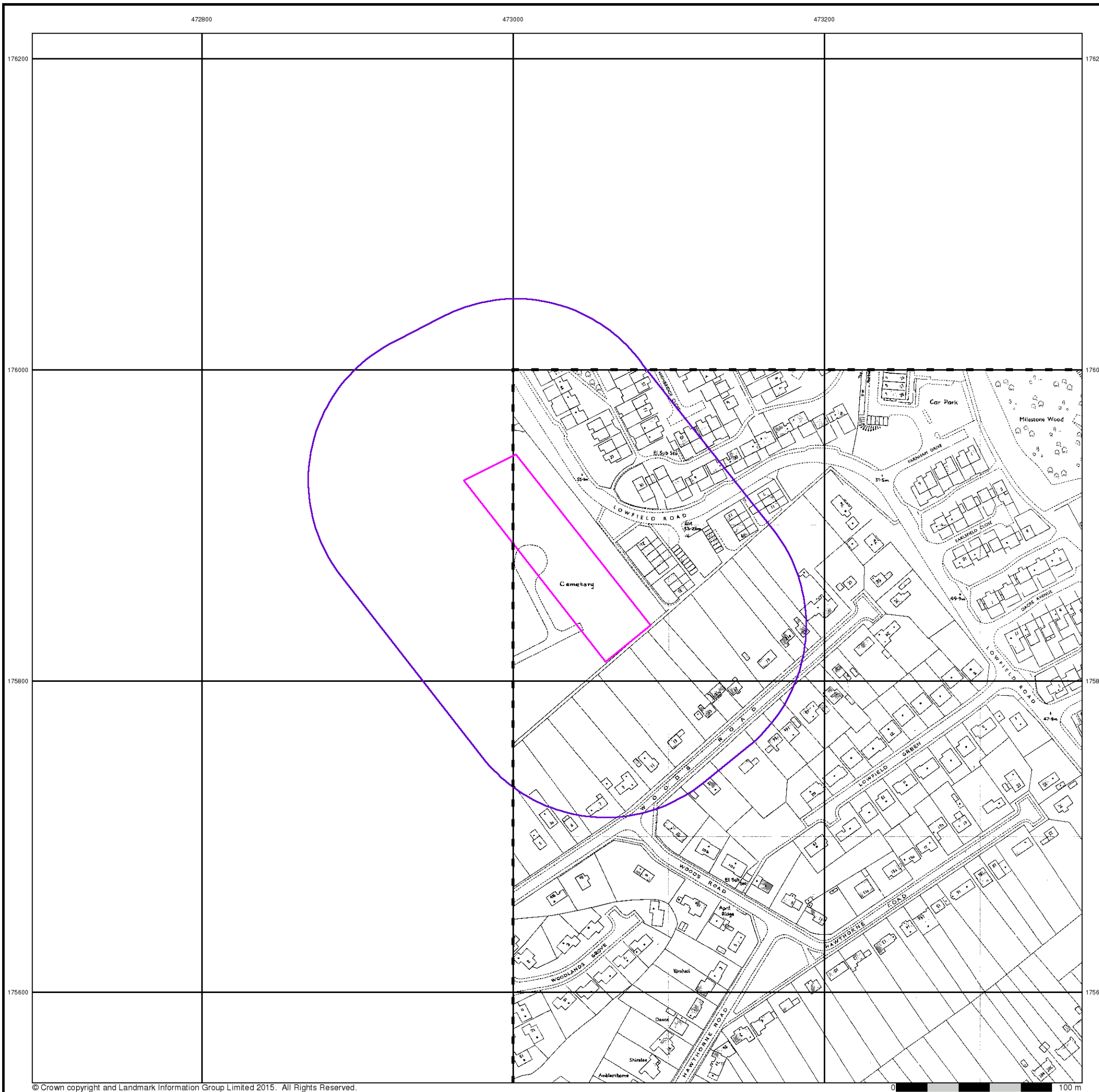
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

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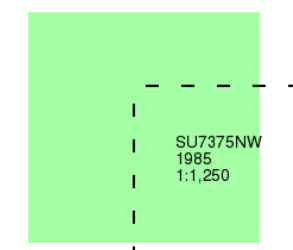
Geo-Environmental Additional SIMs

Published 1985

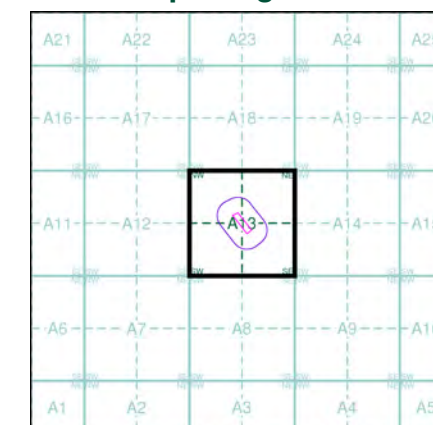
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

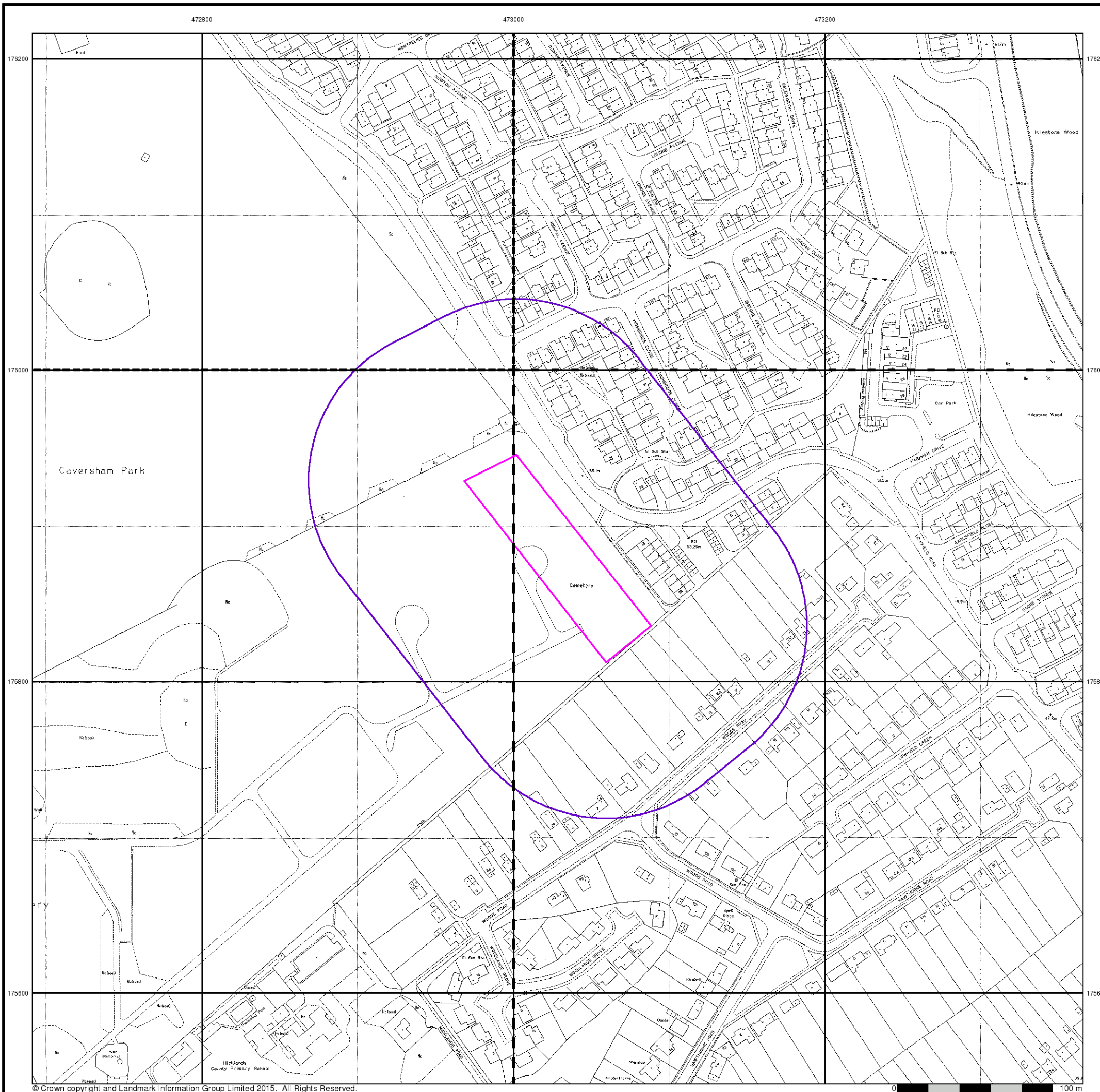
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

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Geo-Environmental Large-Scale National Grid Data

Published 1993

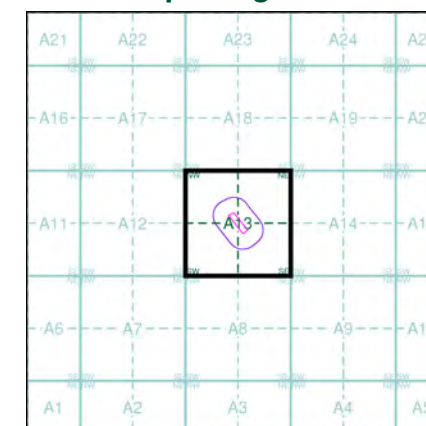
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SU7276SE 1993 1:1,250	SU7376SW 1993 1:1,250
SU7275NE 1993 1:1,250	SU7375NW 1993 1:1,250

Historical Map - Segment A13



Order Details

Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



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Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	•285 Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Minor Roads		
	Sunken Road		Raised Road		
	Road over Railway		Railway over River		
	Railway over Road		Level Crossing		
	Road over River or Canal		Road over Stream		
	Road over Stream				
	County Boundary (Geographical)				
	County & Civil Parish Boundary				
	Administrative County & Civil Parish Boundary				
	County Borough Boundary (England)				
	County Burgh Boundary (Scotland)				
	Rural District Boundary				
	Civil Parish Boundary				

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Bracken		Heath
	Marsh		Reeds
	Building		Glasshouse
	Sloping Masonry		Pylon
	Cutting		Embankment
	Road Under		Road Over
	Level Crossing		Foot Bridge
	Standard Gauge Multiple Track		Standard Gauge Single Track
	Siding, Tramway or Mineral Line		Narrow Gauge
	Geographical County		Administrative County, County Borough or County of City
	Municipal Borough, Urban or Rural District, Burgh or District Council		Borough, Burgh or County Constituency
	Civil Parish		
	BP, BS Boundary Post or Stone		Police Station
	Church		Post Office
	Club House		Public Convenience
	Fire Engine Station		Public House
	Foot Bridge		Signal Box
	Fountain		Spring
	Guide Post		Telephone Call Box
	Mile Post		Telephone Call Post
	Mile Stone		Well

1:10,000 Raster Mapping

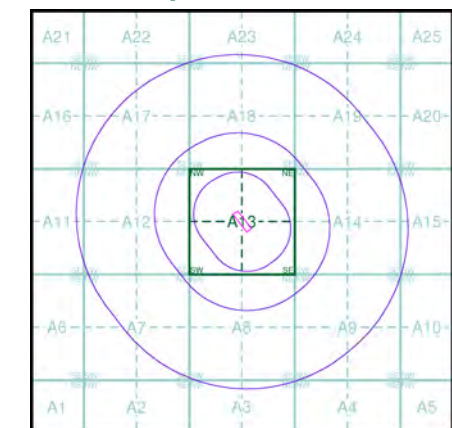
	Gravel Pit		Refuse tip or slag heap
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Shingle		Mud
	Sand		Sand Pit
	Slopes		Top of cliff
	General detail		Underground detail
	Overhead detail		Narrow gauge railway
	Multi-track railway		Single track railway
	County boundary (England only)		Civil, parish or community boundary
	District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
	Area of wooded vegetation		Non-coniferous trees
	Non-coniferous trees (scattered)		Coniferous trees
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	Mean high water (springs)		Mean low water (springs)
	Telephone line (where shown)		Electricity transmission line (with poles)
	Bench mark (where shown)		Triangulation station
	Point feature (e.g. Guide Post or Mile Stone)		Pylon, flare stack or lighting tower
	Site of (antiquity)		Glasshouse
	General Building		Important Building



Geo-Environmental Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Oxfordshire	1:10,560	1882	3
Oxfordshire	1:10,560	1900	4
Oxfordshire	1:10,560	1901	5
Berkshire	1:10,560	1914	6
Berkshire	1:10,560	1938	7
Historical Aerial Photography	1:10,560	1947 - 1948	8
Ordnance Survey Plan	1:10,000	1961 - 1962	9
Ordnance Survey Plan	1:10,000	1973	10
Ordnance Survey Plan	1:10,000	1979	11
Ordnance Survey Plan	1:10,000	1990 - 1991	12
Reading	1:10,000	1990	13
Ordnance Survey Plan	1:10,000	1995	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2016	16

Historical Map - Slice A



Order Details

Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

Site Details

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Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale b. Drawn to scale

Government and Administrative Buildings

Military and Industrial Buildings

Military and Communication Areas

Subway Entrance

Fireproof Building

Prominent Fireproof Building

Non-fireproof Building

Non-fireproof Building (non-dwelling)

Factory, mill, and flour mill, with chimneys

Factory, mill, and flour mill, without chimneys

Power Station, drawn to scale

Hydroelectric Power Station

Radio Station, drawn to scale

Telephone Station, drawn to scale

Abandoned Open-pit Mine or Quarry

Open-pit Salt Mine

Pit

Oil Deposit or Well

Oil Seepage

Tailings Pile

Fuel Storage Tanks

Natural Gas Tank

Bench Mark

Drill Hole

Burial Mound

Triangulation Point on Burial Mound

Single-track Railroad

Double-track Railroad

Railroad and Station Building

Coniferous Forest

Deciduous Forest

Mixed Forest

Lawns

Citrus Orchard

Wet Ground

Scattered Vegetation

243.8 Values for prominent elevations
186.0 Numbers for spot elevations, depth soundings, contour lines, etc.
0.2 Velocity of the current, width of river bed, depth of river
180/12 Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (For reference and phonetic interpretation of map text)

А а (A)	З з (Z)	П п (P)	Ч ч (CH)
Б б (B)	И и (I)	Р р (R)	Ш ш (SH)
В в (V)	Й й (Y)	С с (S)	Щ щ (SHCH)
Г г (G)	К к (K)	Т т (T)	Ъ (-)
Д д (D)	Л л (L)	У у (U)	Ы (Y)
Е е (E)	М м (M)	Ф ф (F)	Ь (')
Ё ё (YO)	Н н (N)	Х х (KH)	Э э (E)
Ж ж (ZH)	О о (O)	Ц ц (TS)	Ю ю (YU or IU)
			Я я (YA or IA)

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

Government and Administrative Buildings

Military and Industrial Buildings

Military and Communication Areas

Subway Entrance

Partly Demolished Buildings

Demolished Buildings

Built-Up Area with Fireproof Buildings Predominant

Built-Up Area with Non-Fireproof Buildings Predominant

Individual Fireproof Building

Prominent Industrial Building

Individual Dwelling, Fireproof

Ruins of an Individual Dwelling

Factory or Mill Chimney

Factory or Mill with Chimney

Factory or Mill without Chimney

Mine or Open Pit Mine

Operating Shaft or Mine

Non-Operating Shaft or Mine

Salt Mine

Tailings Pile

Pit

Stone Quarry

Gas Pump or Service Station

Fuel Storage or Natural Gas Tank

Oil or Natural Gas Derrick

Small Hydroelectric Power Station

Power Station

Transformer Station

Cemetery

Burial Mound (height in metres)

Triangulation Point on Burial Mound

Triangulation Point

Bench Mark

Bench Mark (monumented)

Telegraph Office

Telephone Station

Radio Station

Radio Tower

Airfield or Seaplane Base

Landing Strip

Cut, Fill, Km Post, Plantings

Telegraph/Telephone Lines

Main Highway

Highway under Construction

Improved Dirt Road (former truck road)

Small Bridge, Pipe (Culvert), Tunnel

Double-track Railroad with First Class Station

Dismantled Railroad

Railroad Under Construction

Shore Embankment

River or Ditch with Embankment

Water Gauge

Water Level Mark

Well

Water Reservoir or Rain Water Pit

Spring

Isobath with value

Heavy (Index) Contour Line

Contour Line and Value

Half Contour Line

Spot Elevation Value

Coniferous

Deciduous

Mixed

Scrub

Key to Numbers on Mapping

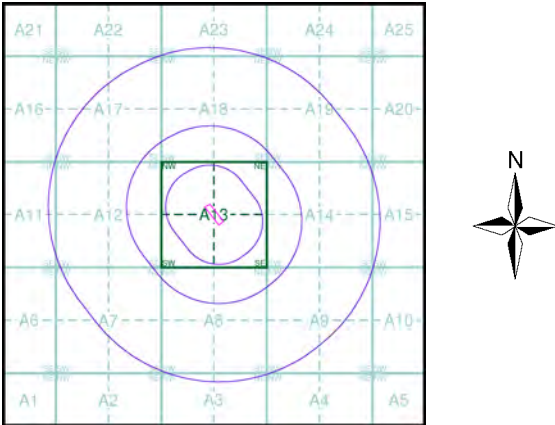
SU77NW_Reading

No.	Description
32	Radio Mast
33	Radio Station

Geo-Environmental
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Oxfordshire	1:10,560	1882	3
Oxfordshire	1:10,560	1900	4
Oxfordshire	1:10,560	1901	5
Berkshire	1:10,560	1914	6
Berkshire	1:10,560	1938	7
Historical Aerial Photography	1:10,560	1947 - 1948	8
Ordnance Survey Plan	1:10,000	1961 - 1962	9
Ordnance Survey Plan	1:10,000	1973	10
Ordnance Survey Plan	1:10,000	1979	11
Ordnance Survey Plan	1:10,000	1990 - 1991	12
Reading	1:10,000	1990	13
Ordnance Survey Plan	1:10,000	1995	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2016	16

Russian Map - Slice A



Order Details

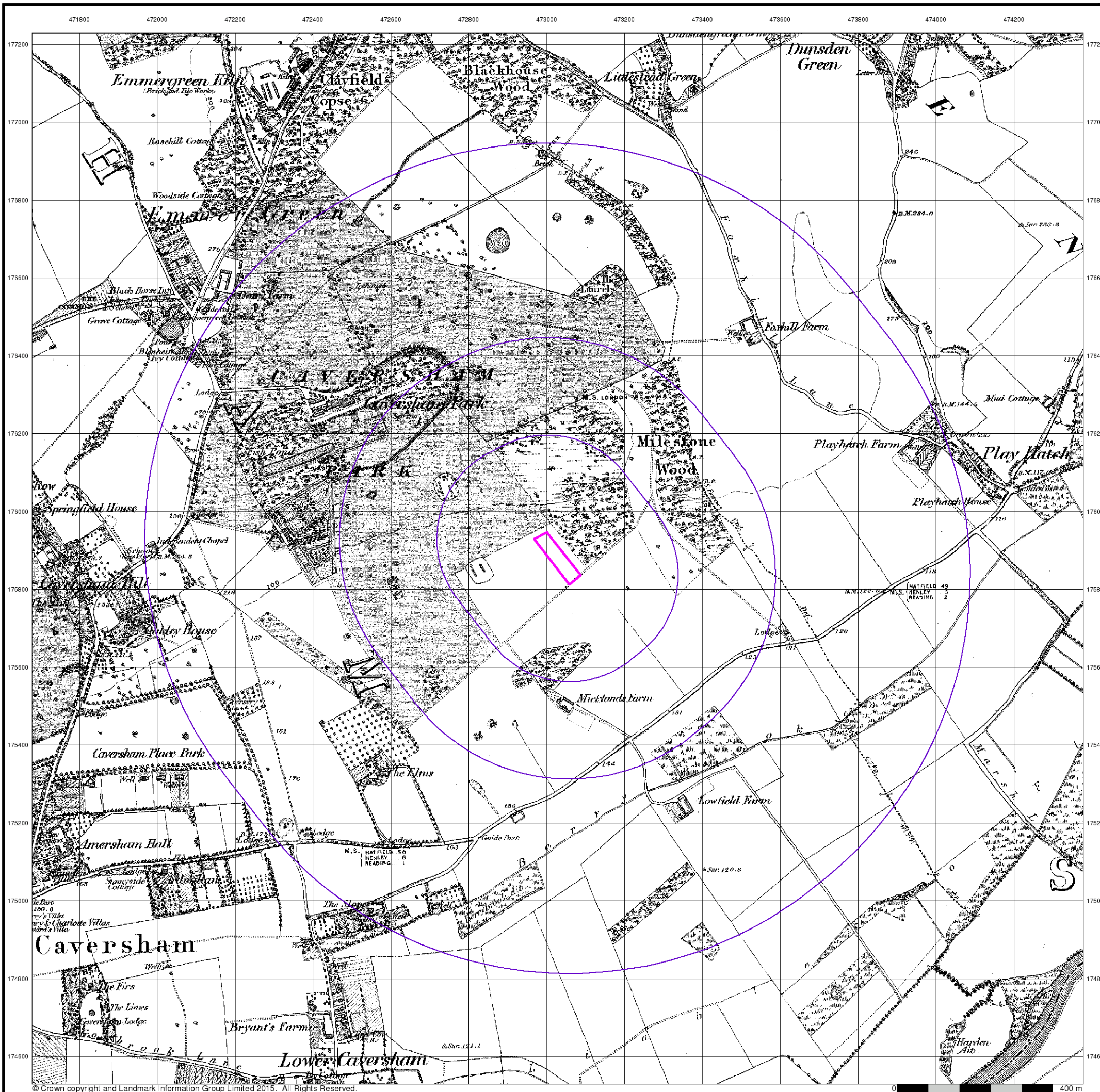
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL

Landmark
Information Group

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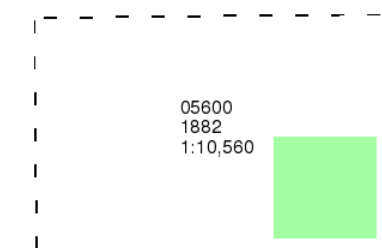
Geo-Environmental Oxfordshire

Published 1882

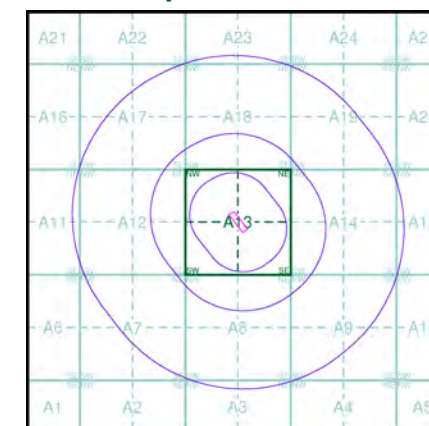
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

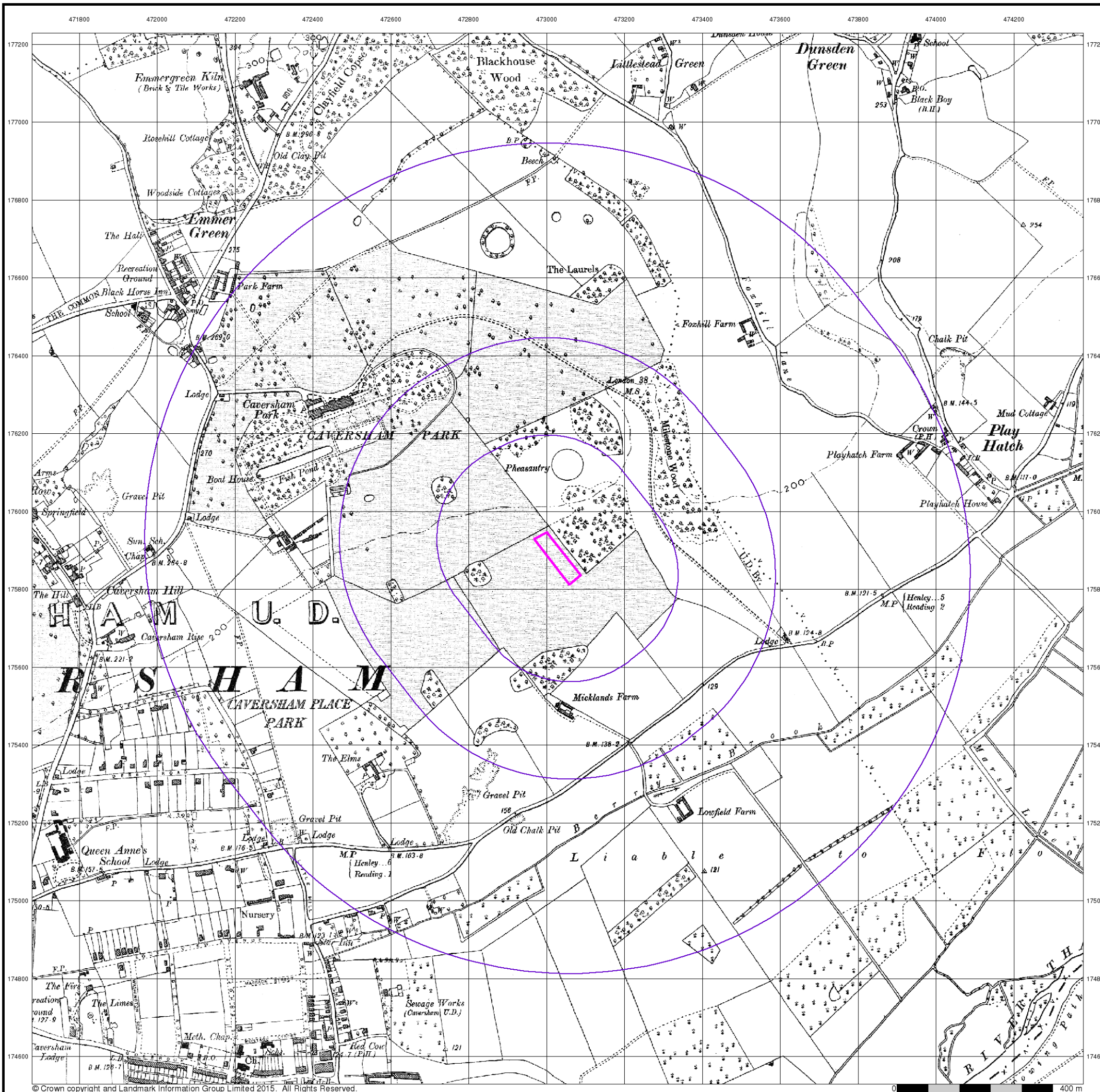
Order Number: 80998728_1_1
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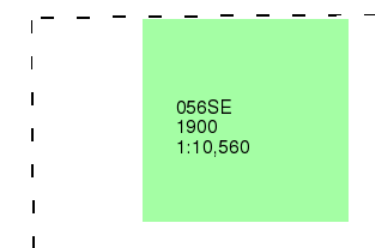
Geo-Environmental Oxfordshire

Published 1900

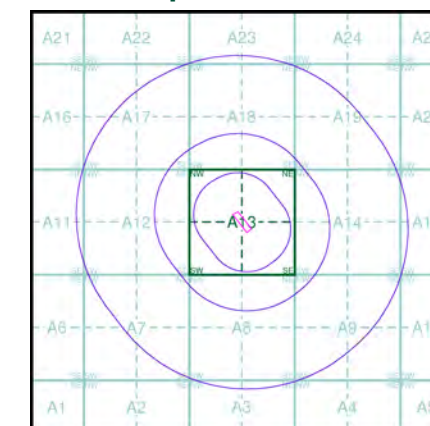
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



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Geo-Environmental

DESK STUDY REPORT

for the land at

LOWFIELD ROAD, CAVERSHAM

READING, RG4 6NL

on behalf of

READING BOROUGH COUNCIL



Report:	DESK STUDY REPORT
Site:	LOWFIELD ROAD, CAVERSHAM, READING, RG4 6NL
Client:	READING BOROUGH COUNCIL
Date:	21/03/2016
Reference:	GE15373-DSR-MAR16
Version:	2.0
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AMENDMENT RECORD

Revision ref.	Date	Reasons for amendment	Author's initials
1.0	07/03/2016	Initial Report	LL
2.0	21/03/2016	Information and assessment updated in relation to natural and man-made cavities in Chalk	LL

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FIGURES

FIGURE 1	Site Location Plan
FIGURE 2	Site Walkover Plan

APPENDICES

APPENDIX A	Desk Study Information
APPENDIX B	Site Photographs

1.0 INTRODUCTION

1.1 General

Geo-Environmental Services Limited (Geo-Environmental) was instructed by York Associates, acting on behalf of Reading Borough Council, to undertake a Phase I desk study into the geotechnical and geo-environmental factors pertaining to the planned redevelopment of the land at Lowfield Road, Caversham, Reading, RG4 6NL herein referred to as 'the site'. The site's location is presented in Figure 1.

1.2 Form of Development

The proposed development is understood to comprise the construction of number of low-rise residential units with communal landscaping areas, car parking, utilisation of an existing access road and associated development infrastructure.

1.3 Objectives

The investigation was to comprise a desk study of geotechnical and geo-environmental factors pertaining to the site, including a review of available historic maps and an examination of other available sources of geo-environmental information.

A preliminary Risk Assessment (PRA) was to be undertaken as part of the desk study in accordance with CLR11. The objective of the risk assessment was to evaluate plausible pollutant linkages with respect to the proposed development, adjacent land uses, and the wider environment, in the context of planning, immediate liabilities under the Environment Act 1990, and risks posed to Controlled Waters under the Water Resources Act.

1.4 Standards

Where practicable, the desk study was undertaken in accordance with the following documents and guidance:

- National Planning Policy Framework – March 2012
- Planning Policy Statement 23 – Planning and Pollution Control;
- Model Procedures for the Management of Contaminated Land, CLR11, DEFRA and Environment Agency 2004;
- Environment Agency Guidance on Requirements for Land Contamination Reports, Version 1 dated July 2005;
- BS10175:2011 - Investigation of Potentially Contaminated Sites - Code of Practice, BSI 2011;
- BS5930: 2015 - Code of Practice for Site Investigations, BSI 2015;
- EN ISO 14688 Geotechnical Investigation and Testing Part 1-2002 and Part 2-2004;
- BS1377: 1990 - Soils for Civil Engineering Purposes, BSI1990;
- NHBC Standards Chapter 4.1 Land Quality - Managing Ground Conditions;
- NHBC Standards Chapter 4.2 Building Near Trees;
- CIRIA C665 – Assessing risks posed by hazardous ground gases to buildings (2007);
- NHBC 10627-R01(04)- Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present (2007);
- BS8485:2015 Code of practice for the characterisation and remediation from ground gas in affected developments;
- Department of Environment - Industry Profiles (1995 - 1996).

1.5 Conditions

The information collected from the desk study has been used to provide an interpretation of the geotechnical and environmental conditions pertaining to the site. The recommendations and opinions expressed in this report are based on the data obtained. Geo-Environmental takes no responsibility for conditions that have either not been revealed in the available records or that occur between or under points of any physical investigation. Whilst every effort has been made to interpret the conditions, such information is only indicative and liability cannot be accepted for its accuracy.

Information contained in this report is intended for the use of the Client, and Geo-Environmental can take no responsibility for the use of this information by any party for uses other than that described in this report. Geo-Environmental makes no warranty or representation whatsoever expressed or implied with respect to the use of this information by any third party. Geo-Environmental does not indemnify the Client or any third parties against any dispute or claim arising from any finding or other result of this investigation report or any consequential losses.

2.0 DESK STUDY

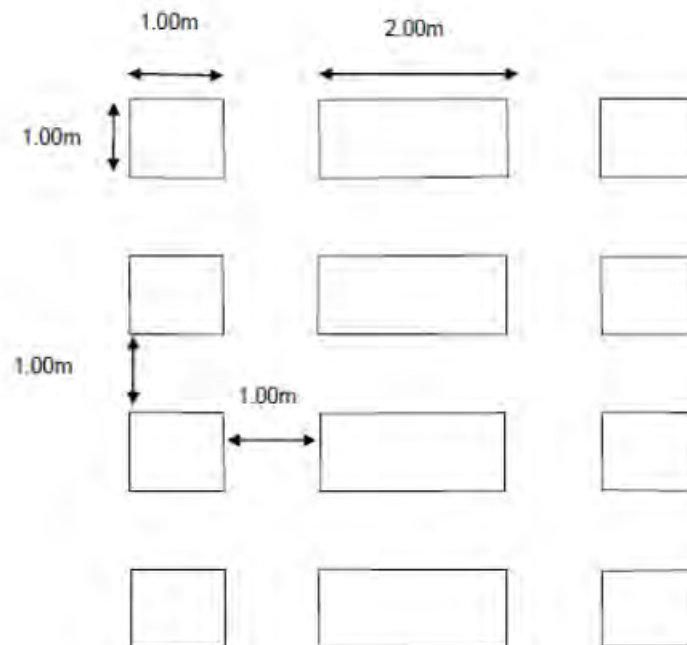
The findings of the Phase I desk study are presented in the following section. A copy of the information obtained as part of the desk study is presented in Appendix A.

2.1 Site Description

The site comprised a roughly rectangular (136m X 36m) shaped parcel of land, which sloped gently from north-north-east to south-south-west, extended to 0.54ha and was located at NGR 473030,175880.

At the time of the site walkover the site was secured by a wooden fence (approx. 1.80m in height) with further heras fencing surrounding the site within the wooden fencing. The site appeared to have been cleared recently as vegetation levels across the site were noted to be low and there was evidence of ground disturbance within the Topsoil on site.

The site was understood formerly to have been a mobile home park and concrete foundations were noted to be present across the site presumably following the removal of the mobile homes. The site was split in two by an access road off Cadogan Close. The western portion of the site exhibited four sets of foundations blocks (comprising two rows of square blocks approx. 1m x 1m with a row of rectangular blocks between the two square blocks (1m x 2m) and raised 0.30m above ground level. Each set was set 6m apart. (See Drawing 1 below). A gap of 17m was identified between the southern of the four blocks and the next set of foundation blocks. The foundation type was noted to change to concrete slabs (approx. 6m x 10m) for four sets followed by one more set of raised concrete block foundations all approximately equally spaced (6m).



Drawing 1: Foundation Layout

A similar layout was observed on the eastern portion of the site where four sets of block foundations and two concrete slabs were present to the north of the intersecting access road located at roughly the same footprint as the opposite side). However off-set to the south by approx. 2m, two further concrete slab foundations were identified to the south side of the access road on the eastern portion.

Overhead powerlines entered the site from adjacent to the roadway from Lowfield Road to the east. An electrical box was present on the left hand side of the site entrance. The electrical box was noted to be intact, however all cables appeared to be disconnected. A number of propane canisters were located adjacent to the electrical box.

A pedestrian pathway was present running along the southern and eastern boundaries of the site and a shallow slope of 0.50m height was noted at the intersection of the pathway in the south-east corner of the site.

An embankment was present extending in a north-south orientation along the eastern boundary between the pathway and the site boundary. The embankment was approximately 1.60-1.80m in height, 14.00m wide and ran the length of the eastern boundary with a break in the middle where the access road intersected it at 90°. The embankment was covered by a mix of mature and semi-mature trees and scrub and was littered with a variety of rubbish (including brick fragments, concrete, wood, plastic, glass, fibre-glass, metals, old fridges, television sets and old mattresses). The embankment turned sharply at the north-east corner of the site boundary (90°) and continued running adjacent to the northern boundary of the site.

Access to the site was off Lowfield Road. The site access road (Cadogan Close) extended approx. 30m into the site before a T-junction. The roadway extended approx. 63m north and 42m south from the T junction.

The surrounding area comprised primarily residential developments to the east and south. The north of the site was bounded by an area of overgrown scrub with an open field area further north, comprising part of Caversham Park. The site was bounded to the west by a semi-mature tree lined hedgerow between the site and a cemetery. Adjacent to the south-western boundary were a number of soil stockpiles, i.e. presumably of excess grave arisings which were cornered off by fencing (approx. 10m x 28m).

Information provided by Reading Borough Council highlighted that there have been incidents of local residents setting fire to propane canisters, which were identified located adjacent to the mains electrical box on site, evidence of which could be seen on site. It is understood that existing services into the site run along the access road (Cadogan Close) from Lowfield Road and are currently disconnected.

2.2 Geology

British Geological Survey (BGS) geological mapping indicated the geology underlying the site to comprise Chalk from the Seaford and Newhaven Chalk Formation (White Chalk Subgroup). The area is also subject to superficial deposits comprising clay, silt and sand of the Lambeth Group which may be overlying the Chalk on site. Given the site has previously been developed there is the potential that Made Ground may also be present on the site at shallow depth. A review of British Geological Survey boreholes records was undertaken, boreholes located approximately 300m to the south of the site show the Lambeth Group to vary in thickness from 3.2m to 5.0+m in the vicinity of the site.

BS5930:2015 defines **Made Ground** as anthropogenic ground in which the material has been placed without engineering control and/or manufactured by man in some way, such as through crushing or washing, or arising from an industrial process. Great variations in material type, thickness and degree of compaction invariably occur and there can be deleterious or harmful matter, as well as potentially methanogenic organic material.

The **Lambeth Group** comprises a mixture of stiff to hard red, blue/grey and brown mottled clays with basal beds of sand and gravel which vary greatly both laterally and vertically. The basal beds are often green in colour due to the presence of glauconite. Locally, these sediments are cemented with calcium carbonate, iron oxides and silica to form materials with relatively high strength.

Desk Study Report

The **White Chalk Subgroup** is a soft white friable microporous limestone composed of coccolith biomicrites with a varying proportion of larger shell fragments. Flint characterises the White Chalk Subgroup, occurring as nodular courses, tabular beds and linings to fractures.

At various levels clay sized material occurs as marl seams and partings. Close to the surface the upper few metres are invariably discoloured brown, due to leaching from the overlying strata. The interface with any overlying stratum is invariably extremely irregular as a result of localised weathering and general solution. Weathering by frost action may extend to a depth of several metres.

Occasional erosional features, such as pipes, swallow holes and solution cavities, usually infilled with drift deposits, are found in the chalk, sometimes manifesting themselves at the surface as shallow circular depressions. Solution features may be reactivated by the concentrated ingress of water from leaking drains or soakaways. Reactivation may lead to surface collapse. The geological records held by the BGS for the area suggest a limited thickness of Lambeth Group overlying the Chalk, as such a natural and mining cavities database search was carried out for the site surrounding area to assess the potential for solution features in the vicinity of the site, the results of which are presented herein.

2.3 Hydrogeology

With reference to Envirocheck data, superficial deposits were not identified within the report, but where they are present in the vicinity of the site are likely to be classified as a Secondary 'A' Aquifer, whilst the Chalk was classified as a Principal Aquifer.

Secondary 'A' Aquifers comprise 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.

Principal Aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability and usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

The soil cover in the vicinity of the site was classified as being of high leaching potential (U), as soil information for restored mineral workings and urban areas is based on fewer observations than other areas and as such as worst case vulnerability classification is assumed until proved otherwise.

According to information provided from the Environment Agency the site was indicated to be located within Source Protection Zone II (outer zone) and Zone III (Total Catchment) for Playhatch with regard to the protection of a groundwater abstraction for potable supply. A source Protection Zone I was identified 427m to the east of the site.

The environmental dataset identified one groundwater abstractions within 1000m of the site, as summarised in Table 1.

Distance and direction	Purpose	Aquifer	Abstraction rate
890m east	Public Water Supply: Potable Water Supply (Direct) at Playhatch Pumping Station for Thames Water Utilities Ltd	Chalk (Undifferentiated)	8,183m ³ (per day) 2,491,208m ³ (per year)

Table 1 Summary of groundwater abstractions

No discharge consents to the ground or surface water were recorded within 250m of the site. In addition no pollution incidents to groundwater recorded within 500m of the site.

2.4 Hydrology

With reference to the Envirocheck dataset, the closest surface water feature was located approximately 406m to the north-west comprising a tertiary river. Mapping indicated that the site was not located within an area at risk of flooding or extreme flooding from sea or rivers.

No pollution incident to controlled waters were identified within a radius of 500m of the site boundary.

2.5 Radon

The Envirocheck report states that the site lies in an area where <1% of homes are above the Action Level as defined by Public Health England and the BGS. No radon protective measures are therefore necessary in the construction of new houses or extensions.

2.6 Environmental Data

Searches of other various environmental databases were made as part of the desk study, including air pollution control sites, Part IIA contaminated land, Integrated Pollution Control (IPC) and Integrated Pollution Prevention and Control (IPPC) sites, registered radioactive substances, COMAH sites, explosives sites, Notification of Installations Handling Hazardous Substances (NIHHS) sites, planning permissions for sites involving hazardous substances and fuel station registers. Additional detail is referenced in Appendix A.

The desk study identified six Contemporary Trade Directory entries within 250m of the site:

- Distribution Services 151m east. Active;
- Engineering Services 153m south. Inactive;
- Tyre dealers 207m north. Active;
- Clock and watches, manufacturer and wholesalers 225m north-east. Inactive;
- Cleaning materials and equipment 240m north-east. Active.

A potentially contaminative industrial land use (past land use) was identified from 1932 to 1991 on the subject site and adjoining land to the west comprising a cemetery or graveyard. An electricity sub-station facility was identified on the 1970 historical map, 75m north-east.

2.7 Soil Chemistry

Data obtained as part of the desk study provides details on the estimated soil chemistry for the natural soils in the vicinity of the site. The estimated soil quality on the subject site is presented Table 2.

Contaminant	Estimated Concentration
Arsenic	<15 mg/kg
Cadmium	<1.8 mg/kg
Chromium	60-90 mg/kg
Lead	<150 mg/kg
Nickel	15-30 mg/kg

Table 2 Estimated soil chemical concentrations on site

The natural background concentrations were below respective published Soil Guideline Values, Generic Assessment Criteria and Category 4 Screening Levels for the protection of human health under a residential land use, i.e. the most conservative end use.

However these values are not necessarily representative of the site's soil chemistry. Furthermore, some screening criteria are dependent on pH and soil organic matter content. Therefore, concentrations of specific determinants and the utilised SGV/GAC/C4SL cannot be determined without site specific investigation and analysis.

2.8 Sensitive Land Uses

A search was made of environmentally sensitive areas including local and national nature reserves, areas of outstanding natural beauty (AONBs), nitrate zones, Ramsar sites, sites of special scientific interest (SSSIs), conservation areas, special protection areas and biosphere reserves. The details of sensitive land uses identified within a radius of 500m of the site boundary are provided in Table 3.

Name	Type	Source	Distance from site
Nitrate Vulnerable Zone (for Groundwater)	NVZ	DEFRA	329m North East

Table 3 Sensitive land uses summary

Nitrate Vulnerable Zones are designated areas of land draining into waters polluted by nitrates from agriculture.

2.9 Geotechnical Data

The site was located within an area considered by the Coal Authority as being unlikely to be affected by coal mining activity. However rock mining was identified to have potentially occurred on/beneath the site. Further assessment was undertaken in this respect to clarify the discrepancy identified. A natural and mining cavities database search was carried out which identified six recorded mining cavity locations within 1500m of the site, however the closest of which was recorded as 1250m east-north-east from the site.

National databases for a number of different geological hazards have been compiled by the BGS, and a summary of the hazard data pertaining to the site itself is presented in Table 4.

Hazard	Designation
Non-coal mining	Rare and highly unlikely on site.
Mineral Workings (within 1km)	Opencast (ceased) for Chalk (423m S, 428m E, 562m N, 627m S, 911m N and 925m SE). Opencast (ceased) for Sand and Gravel - Lynch Hill Gravel Member, Maidenhead Formation, River Thames Gravel (521m S, 658m S and 976m SW).

Hazard	Designation
Collapsible ground	Very Low Hazard.
Compressible ground	No Hazard.
Ground dissolution	Very Low (onsite) to Moderate Hazard (116m N).
Landslide	No Hazard (onsite) to Very Low Hazard (233m N).
Running sand	No Hazard (onsite) to Very Low Hazard (233m N).
Shrinking and Swelling clay	No Hazard (onsite) to Moderate Hazard (233m N).
Natural cavities (within 1km)	• One group comprising 1No. sinkhole and 1No. solution pipe 274m north. • 1 No. sinkhole and 1 No. solution pipe 410m north-north-west. • 1No. sinkhole 555m north. • 1No. swallow hole 655m north. • 1No. sinkhole 700m north. • One group comprising 1No. sinkhole and 1No. solution pipe 789m north. • 1 No. swallow hole 800m north. • 1 No. sinkhole and 1 No. solution pipe 930m north-north-west. • 2No. solution pipes 955m north-east. • 10No. solution pipes 962m north. • 4No. solution pipes 976m north.
Mining Cavities (within 1.5km)	• Adit Entry Chalk Mine 1250m east-north-east. • Hanover Mine, Shaft entry, pillar and stall chalk mine 1350m north-north-west. • Possible crown hole collapse 1430m west north-west. • Shaft entry chalk mining 1430m north-north-west. • 2 No. Adit entries chalk mines 1490m west north west. • Chalkwell 1500m north-east.

Table 4 Summary of BGS geological hazards

2.10 Landfill and Waste Management Facilities

A search of BGS recorded landfill sites, IPC registered waste sites, licensed waste management facilities, local authority recorded landfill sites, other registered landfill sites, waste transfer stations and other waste treatment or disposal sites was undertaken as part of the desk study. Such sites may form an artificial source of ground gases, such as carbon dioxide and methane, where wastes are buried or disposed of to landfill.

Whilst no such sites were identified within 1km of the site, the subject site itself was identified as falling within the boundary of a cemetery. In addition the historical mapping of the site has identified a number of areas of unknown filled ground associated with the former quarrying activities identified, the closest of which is located 463m to the south of the site.

2.11 Historic Mapping

Historic maps dating back to 1879 were obtained as part of the desk study. A summary of the apparent key features observed on the map extracts both on the site and within the local area is presented within Table 5.



Date	On-site	Off-site
1879	The site comprised part of a field network.	An area of coniferous wood was located to the north east of the site, with the majority of the surrounding land comprising open field or woodland.
1882	No significant changes shown.	Milestone Wood was located 20m to the north east, and Caversham Park c.20m to the north and 50m to the west. Farms (labelled as Micklands and Lowfield) were labelled c.100-500m to the south with field networks surrounding them.
1898	No significant changes shown.	A pheasantry was labelled c.150m to the north-north-east of the site otherwise no significant changes shown.
1900	No significant changes shown.	A Gravel Pit and an Old Chalk Pit were shown c.550m to the south, a gravel pit c.800m south west and 1km west. Residential development was shown to have occurred c.1km to the west. Further open space and woodland were evident to the north of the park.
1901	No significant changes shown.	Further farms were shown c.800m to the south west and north east.
1913	No significant changes shown.	No significant changes shown.
1914	No significant changes shown.	A road was shown running east to south west c. 500m to the south of the site.
1932	No significant changes shown.	No significant changes shown.
1938	No significant changes shown.	Reading Crematorium and Cemetery was shown c.150m west, south-west of the site. Residential development was shown to have occurred c.20m to the south, c.600m to the south-west and 1km to the north-west. Limited development was noted to have occurred to the east and north.
1956 to 1973	No significant changes shown.	Land c.50m to the north-east and adjacent to the southern boundary of the site was shown to have been developed for a residential land use with private gardens
1961 to 1962	No significant changes shown.	Reading Cemetery was shown to have expanded to within 100m of the site boundary. A school and associated playing field were evident c.100m to the south-west of the site associated with the new residential development area.
1970 to 1974	No significant changes shown.	Lowfield Road was shown running to the east of the site, as per the present day layout. Further residential development with private gardens was shown c.100m to the south and east.
1973	No significant changes shown.	No significant changes shown.
1974	No significant changes shown.	No significant changes shown.
1978	No significant changes shown.	No significant changes shown.
1985	The site was labelled as cemetery with the access pathway for Reading Cemetery	No significant changes shown.

Date	On-site	Off-site
	expanding onto the central western portion of the site.	
1990 to 1991	No significant changes shown.	No significant changes shown.
1993	No significant changes shown.	No significant changes shown.
2006	The site was shown to have been developed as a 'Mobile Homes Park', with associated access road as per the present day layout of the site.	No significant changes shown.
2016	The 'mobile homes park' was no longer labelled. However the layout of the site was as per the layout at the time of the walkover survey.	No significant changes shown.

Table 5 Summary of historic map extracts

2.12 Asbestos

Whilst no clear evidence of asbestos containing materials was observed during the site visit, in line with current best practice, asbestos and ACM should be assumed to be present until proven otherwise.

2.13 Previous Ground Investigations

Geo-Environmental was not aware of any previous investigations that had been undertaken on the subject site.

2.14 Potential Contamination

The site's previous use is shown by mapping to have been open space, prior to the expansion of the Reading Crematorium and Cemetery to the west in 1985 when the site was labelled as a cemetery and the path network for the cemetery shown to have expanded on to the central western portion of the site. It is unclear as to whether burial actually occurred on the subject site itself or whether this was just land within the ownership boundary of the cemetery. Subsequently, the site was developed as a mobile home park. The use of the land as a cemetery type of land use is not covered by the National House Building Council (NHBC), Environment Agency (EA) and Chartered Institute of Environmental Health (CIEH) publication '*Guidance for the Safe Development of Housing on Land Affected by Contamination*' (2008), which provides a summary of industrial profiles (1995 - 1996) published by the former Department of the Environment (DoE) (now part of the Department for Environment, Food and Rural Affairs [DEFRA]).

However, it is possible that the former uses of the site, including a cemetery and the previous development of the site together with the adjacent land use as a cemetery could have resulted in localised impact and potential contaminants could include ammoniacal nitrogen, sodium, potassium, magnesium, coliforms, heavy metals, organic pollutants such as poly-aromatic hydrocarbons (PAH), petroleum hydrocarbons/oils, inorganic compounds.

In addition the material used to construct the embankments on site is unknown, as such there remains the possibility that Made Ground could have been utilised in their construction, which may present a source of contamination on the site.

2.15 Ground Gas and Vapour Summary

The desk study has identified the presence of a cemetery to the west of the site and potentially on part of the subject site itself. Although the main portion of the cemetery is identified as being down gradient topographically of the subject site, a potential risk of ground gases may exist from the adjacent land use and associated contaminants.

3.0 PRELIMINARY ASSESSMENT

Based on the findings of the desk study, the following sections summarise the anticipated geotechnical and environmental factors likely to impact the site.

3.1 Geotechnical Risk Assessment

3.1.1 Potential Geotechnical Issues

The following factors that might impact the geotechnical condition of the site were identified as part of the desk study:

- The possible presence of Made Ground (e.g. varying depth and/or composition) which if encountered may affect the foundation design and construction.
- The presence of laterally and vertically variable strata and the impact these could have on further construction.
- The suitability of shallow soils as a bearing stratum for conventional foundations.
- Consideration of the volume change potential of any cohesive soils and the affect this could have on foundations should superficial deposits be encountered onsite.
- The possible presence of aggressive ground conditions (sulphates) which may affect the foundation design and construction.
- The possible presence of perched and shallow groundwater beneath the site.

Whilst the presence of solution features and mining cavities have not been identified on the subject site itself through the desk based assessment, a watching brief should be undertaken on the site during clearance and development works.

3.2 Preliminary Environmental Conceptual Site Model & Risk Assessment

3.2.1 Methodology

A Preliminary Risk Assessment ('PRA') and Conceptual Site Model ('CSM') have been prepared in accordance with CLR11 based on information obtained as part of the desk study. Possible risks associated with potential sources of contamination and sensitive receptors identified have been qualitatively assessed following a source-pathway-receptor ('Pollutant Linkage') approach in accordance with current UK protocols.

A risk of harm may only exist where a plausible pollutant linkage is present, and where the quantity or concentration of a contaminant is sufficient so as to pose harm. Under the statutory definition, "Contamination" may only strictly exist where contaminants pose a risk of harm to a receptor. The risk classification has been assessed in accordance with CIRIA C552 (Rudland et al., 2001). A summary of how the risks are derived and their definitions are presented in Tables 6 and 7.

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

Table 6 Risk ratings matrix

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

Table 7 Risk rating definitions

3.2.2 Summary of Plausible Sources

Possible sources of contamination identified from the desk study are summarised in Table 8.

Source	Description	Contaminants
Made Ground and shallow soils	The general quality of Made Ground and shallow soils could be impacted by the presence of contamination in view of the site's previous development and former uses.	Possible elevated concentrations of metals, metalloids, TPH and PAH compounds, sulphate and asbestos in the Made ground and shallow soils.
Impacted soils and/or groundwater (Cemetery)	The quality of soils on site may have been impacted by the presence of a cemetery to the west of the site and on the subject site if actually utilised for burials. The boundary of the cemetery is mapped as extending onto the subject site.	Possible elevated chlorides, sulphates, ammoniacal nitrogen, sodium, potassium, magnesium and coliforms with the soils and groundwater.
Ground gases/vapours	In view of the cemetery identified in the vicinity there is the potential for ground gases and vapours to be present.	Methane, carbon dioxide, depleted oxygen, volatile organic compounds (VOC).

Table 8 Possible sources of contamination

3.2.3 Summary of Plausible Pathways

The plausible pathways are summarised in Table 9. These pathways are based on the proposed end use, including communal gardens and soft landscaping.

Pathway	Description
Direct Contact	Ingestion of soil particles, inhalation of soil derived dust (including tracked back dust), dermal contact.
Inhalation	Inhalation of soil dust both inside and outside of buildings. Inhalation of ground gas/vapours within buildings.
Vertical & Lateral Migration	Contaminant movement both vertically through leaching/gravity and horizontally along preferential pathways, e.g. services trenches, or with groundwater.
Shallow Groundwater	Shallow groundwater or perched water may be present within the Made Ground which could result in the vertical and lateral migration of contaminants.
Chemical Attack	Attack of buried plastics and concrete by aggressive ground conditions.
Flooding	The Envirocheck reports state the site is not within an area at risk of flooding.

Table 9 Possible contamination pathways

3.2.4 Summary of Plausible Receptors

Potential receptors associated with the site and its development are summarised in Table 10.

Receptor	Description	Comments
End Users	Residents/occupants of the proposed development.	The proposed development comprises housing with communal soft landscaped areas, roads and car parking.
Soft Landscaping	Possible areas of planting including possible awns, shrubs, trees, etc.	Communal soft landscaped areas are proposed.

Receptor	Description	Comments
Built Environment	Buried concrete for foundations and plastics for potable water supply pipes may be laid in contact with contaminated soils.	Aggressive ground conditions and depths of Made Ground may be present beneath the site.
Adjacent Land Users	Sensitive land uses identified within the immediate vicinity.	Adjacent land use to the east and south is primarily residential. Land use to the north is scrub land and an open field and the land to the west a cemetery.
Groundwater	Controlled waters contained within the aquifer(s) beneath the site.	The site overlies a Principal Aquifer and is within an SPZII.
Surface Water	Controlled Waters within lakes, rivers, and ponds, etc., or coastal waters.	No surface water was identified on site. The nearest surface water body identified was located approximately 406m to the north-west of the site. Surface water has not been considered further.
Ecological Receptors	Sensitive areas of ecological significance.	In view of the nature of the proposed development it is considered that the site is unlikely to have any significant impact with respect to the environmentally sensitive land uses identified in Table 3. As such, these have not been considered further as part of this assessment.

Table 10 Possible receptors of contamination

Site workers involved in the preparation and construction of the development have not been considered further in this assessment as the Principal Contractor is duty bound under the current CDM Regulations to undertake their own risk assessments with respect to their employees.

Whilst the above sources and receptors have been identified, Table 11 summarises the identified plausible pollution linkages and a qualitative assessment of the risks based on the desk study research.

Potential Source/media	Potential Receptors	Potential Pathways	Likelihood	Consequence	Risk and Justification
Contaminants of Concern (Made Ground and Shallow Soils)	End users	Direct and/or indirect contact	Likely	Mild	Moderate to Low End users are likely to come into contact with soils via direct contact in areas of soft landscaping. However landscaping would be completed within uncontaminated soils in the near surface root zone. The consequence is likely to be mild.
	Soft Landscaping	Root Uptake	Likely	Minor	Low Areas of soft landscaping are proposed. However landscaping would be completed within uncontaminated soils in the near surface root zone. The consequence is likely to be minor.
	Adjacent land users	Direct or indirect contact	Low	Mild	Low Adjacent land users are unlikely to come into contact with soils, due to the nature of the site location and surrounding land use. The consequence is likely to be mild.
	Water supply pipes	Direct contact	Likely	Mild	Moderate to Low Water supply pipes could come into contact with impacted soils depending upon depth of installation and extent of soil impact. The consequence is likely to be mild.
	Buildings and infrastructure	Direct contact	Likely	Minor	Low Foundations will be placed within potentially aggressive soils (e.g. sulphate). However the consequence is anticipated to be minor.
	Groundwater	Vertical migration	Likely	Mild	Moderate to Low The site is underlain by a Principal Aquifer and is within an SPZII. It is anticipated that Lambeth Group deposits will be present beneath the site, which would help mitigate any impact to the chalk aquifer beneath the site. The use of SUDS on site as part of the proposed development should be fully assessed to ensure they are protective of groundwater resources located at depth beneath the site.

Desk Study Report

Potential Source/media	Potential Receptors	Potential Pathways	Likelihood	Consequence	Risk and Justification
Contaminants of Concern (Cemetery)	End users	Inhalation	Likely	Mild	Moderate to Low End users are likely to come into contact with soils via direct contact in areas of communal landscaping. However landscaping would be completed within uncontaminated soils in the near surface root zone. The consequence is likely to be mild.
	Soft Landscaping	Root Uptake	Likely	Minor	Low Areas of soft landscaping are proposed. However landscaping would be completed within uncontaminated soils in the near surface root zone. The consequence is likely to be minor.
	Adjacent land users	Direct or indirect contact	Low	Mild	Low Adjacent land users are unlikely to come into contact with soils, due to the nature of the site location and surrounding land use. The consequence is likely to be mild.
	Water supply pipes	Direct contact	Likely	Mild	Moderate to Low Water supply pipes could come into contact with impacted soils depending upon depth of installation and extent of soil impact. The consequence is likely to be mild.
	Buildings and infrastructure	Direct contact	Likely	Minor	Low Foundations will be placed within potentially aggressive soils (e.g. sulphate). However the consequence is anticipated to be minor.
	Groundwater	Vertical migration	Likely	Mild	Moderate to Low The site is underlain by a Principal Aquifer and is within an SPZII. It is anticipated that Lambeth Group deposits will be present beneath the site, which would help mitigate any impact to the chalk aquifer beneath the site. The use of SUDS on site as part of the proposed development should be assessed in detail to ensure they are protective of groundwater resources located at depth beneath the

Potential Source/media	Potential Receptors	Potential Pathways	Likelihood	Consequence	Risk and Justification
					site. The consequence is likely to be mild.
Ground Gases and Vapours	End users	Inhalation	Likely	Mild	Moderate to Low Ingress of hazardous ground gas into buildings could occur and could result in significant harm where ground gases are identified on site or as migrating cross boundary onto the site from the adjacent cemetery. However the cemetery is located down topographical gradient of the site which might reduce the potential for gas migration onto the subject site, dependent on the gas composition, generation rate, preferential migration routes and other relevant factors. Incorporation of gas protection measures with the proposed new buildings could mitigate the risk of harm and thus the consequence (with protection measures in place) is considered mild.
	Buildings and infrastructure	Gas accumulation and potential explosion of flammable gases	Likely	Mild	Moderate to Low Ingress of hazardous ground gas into buildings could occur and could result in harm where ground gases are identified on site or as migrating cross boundary onto the site from the adjacent cemetery. However the cemetery is located down topographical gradient of the site. Incorporation of gas protection measures could mitigate the risk of harm and thus the consequence is considered mild.
	Adjacent land users	Inhalation	Low	Mild	Low Where potential migration of hazardous gases could occur and thus impact adjacent land users the site has been identified as primarily being an offsite source, therefore the development will need to ensure that if ground gases are identified, that service trenches are the like do not create preferential pathways.

Table 11 Plausible pollutant linkages & qualitative risk assessment

3.3 Preliminary Risk Assessment Summary

The PRA and CSM developed from the information gathered as part of the desk study process have identified plausible potential pollutant linkages that exist in relation to the proposed redevelopment of the site.

The potential pollutant linkages established within this desk study are not considered to prevent development on the subject site, but could require investigation and assessment to support further characterisation, calibration of the CSM and where/if necessary determine a remedial strategy to reduce, remove or otherwise control any risk within the site to key receptors.

In order to progress this assessment in line with the National Planning Policy Framework, to provide further characterisation of the site and refinement of the PRA and CSM, it is recommended that intrusive investigation and associated testing is undertaken to confirm the findings of the desk study and to provide a robust risk assessment for the site and proposed redevelopment. As such it is recommended that geo-environmental and geotechnical investigation be carried out on the site to include analysis of soil and groundwater (if encountered) samples for the range of potential contaminants identified within the desk study.

3.4 Preliminary Geotechnical Assessment Summary

The site is anticipated to be underlain by the Lambeth Group. This stratum has the potential to include cohesive soils and account may need to be taken of the potential for shrinkable soils to be present and the influence of shrubs and trees (existing or proposed).

It is possible that conventional strip or pad foundations could be suitable for the proposed development. However it is important to recognise that foundation depths are also likely to be influenced by any former structures. This could include, for example, foundations and underground services which will need to be removed beneath areas of new construction where they interfere with the new build, in addition to other possible buried structures.

Whilst ground bearing floor slabs may be suitable if non-shrinkable soil and deep Made Ground are not present, suspended floor slabs are recommended at this stage.

It is possible that soakaways may function on this site, although this would be subject to testing to inform design. It may also be necessary (subject to testing) to utilise on-site storage and attenuation of peak storm flow, through systems such as porous paving and cellular storage crates. In addition the use of such systems would only be permitted where contamination has not been identified.

Whilst the presence of solution features and mining cavities have not been identified on the subject site itself through the desk based assessment, solution features have been identified within 274m and mining cavities within 1250m of the site. It is recommended that a watching brief should be undertaken on the site during clearance and development works and should any unexpected voids, depressions or unexpected conditions be identified then further non-intrusive (e.g. geophysical), or intrusive assessment should be undertaken on site to assess the associated risk.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

It is concluded that there is a potential for contamination to be present in close proximity to and potentially on site due to the historic and current uses of the adjacent land and potentially the site itself as a cemetery and that this could influence the proposed development. Whilst the individual risk ratings for the potential pollutant linkages identified ranged between moderate to low and very low, further assessment is likely to be required to better characterise contamination on site as a result of historical land uses and the associated risk to identified receptors.

It is possible that conventional foundations could be suitable for the proposed development, although this is subject to confirmation following intrusive investigation.

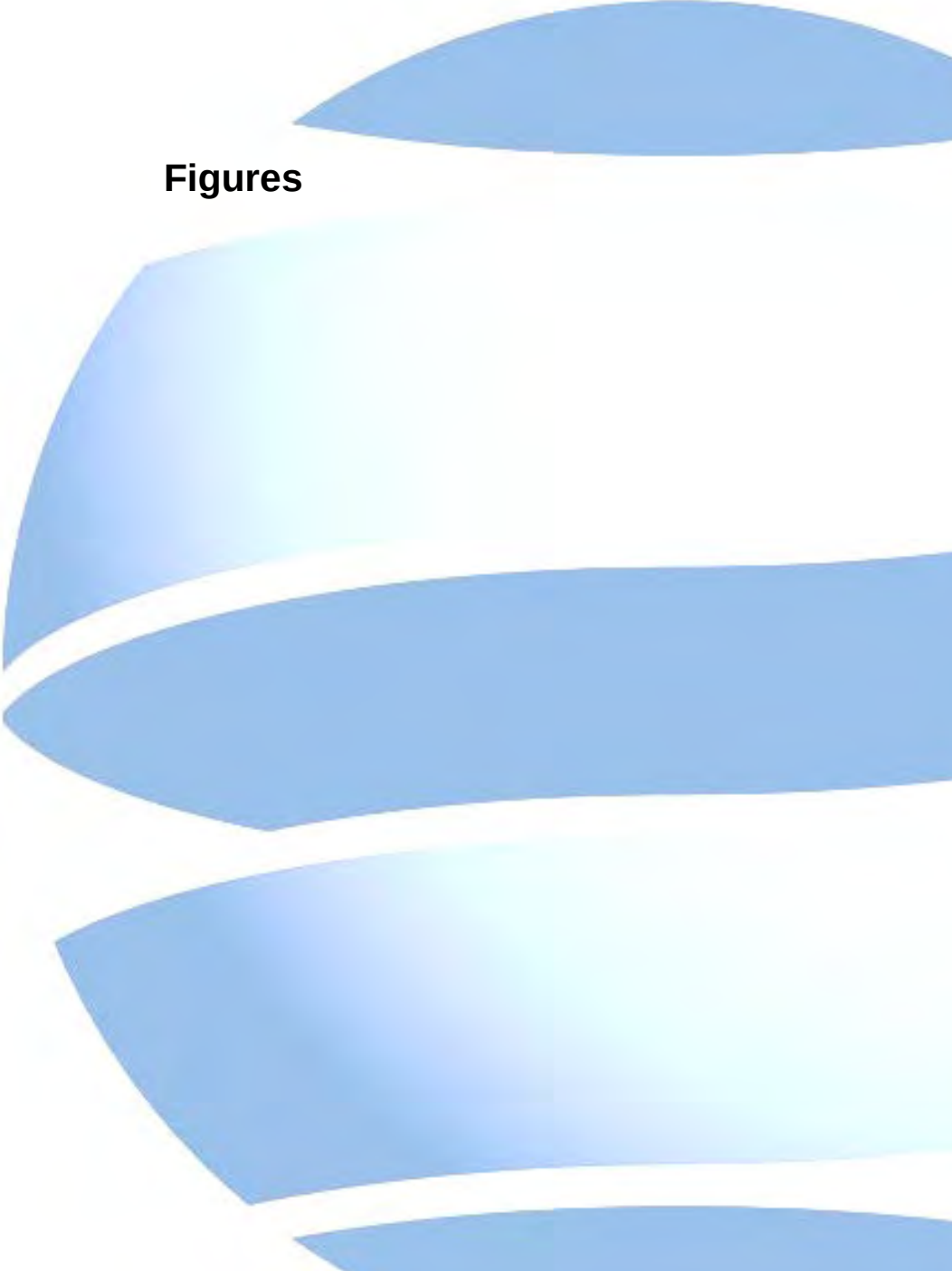
The proposed end use of the site is understood to comprise the construction of a number of residential units with communal soft landscaping, parking and associated infrastructure. Depending on the outcome of an intrusive investigation and delineation of the cemetery, it is possible that risk mitigation measures such as localised soil removal, construction of a soil cover system or ground gas/vapour protection measures may be required to protect end users.

4.2 Recommendations

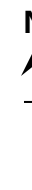
At this stage and based on the findings of the desk study and preliminary risk assessment, the following scope of works is recommended for the intrusive investigation on the site.

- Intrusive investigation works including targeted investigation of potential contamination sources should be carried out in order to clarify the geotechnical and geo-environmental issues pertaining to redevelopment of the site.
- In-situ testing to assess the potential for the use of soakaways, e.g. falling head permeability tests or trial pit soakage tests if their use is proposed. Any such testing should include intrusive investigation for solution features/voids/cavities in the chalk beneath the soakaway.
- Installation of dual purpose ground gas and groundwater monitoring standpipes with return monitoring visits.
- Laboratory analysis on soil samples recovered from the exploratory holes for a range of geotechnical parameters to support foundation design and the like.
- Laboratory analysis, on shallow soil samples and groundwater samples recovered from the exploratory holes, for an analytical suite to include the potential contaminants identified within the desk study and encountered during any intrusive investigation. The suite should include commonly occurring metals, non-metals, asbestos, TPH, and PAH compounds and be augmented to reflect the potential contaminants identified from the desk study, i.e. ammoniacal nitrogen, sodium, potassium, magnesium and coliforms.
- Waste Acceptance Criteria testing may be required if surplus spoil is to be disposed of from the development.
- Should it be proposed to re-use materials on site or import materials onto site as part of the proposed development then preparation of a Materials Management Plan and associated Declaration(s) by a competent individual registered as a 'Qualified Person' under the Definition of Waste Code of Practice.

It may be necessary to undertake remediation/risk mitigation measures on this site to break pollutant linkages and thus protect key receptors such as human health, controlled waters, built environment, soft landscaping and the like. The requirement and extent of any such remediation cannot be determined until such time as an intrusive investigation and associated testing has been completed.



Figures

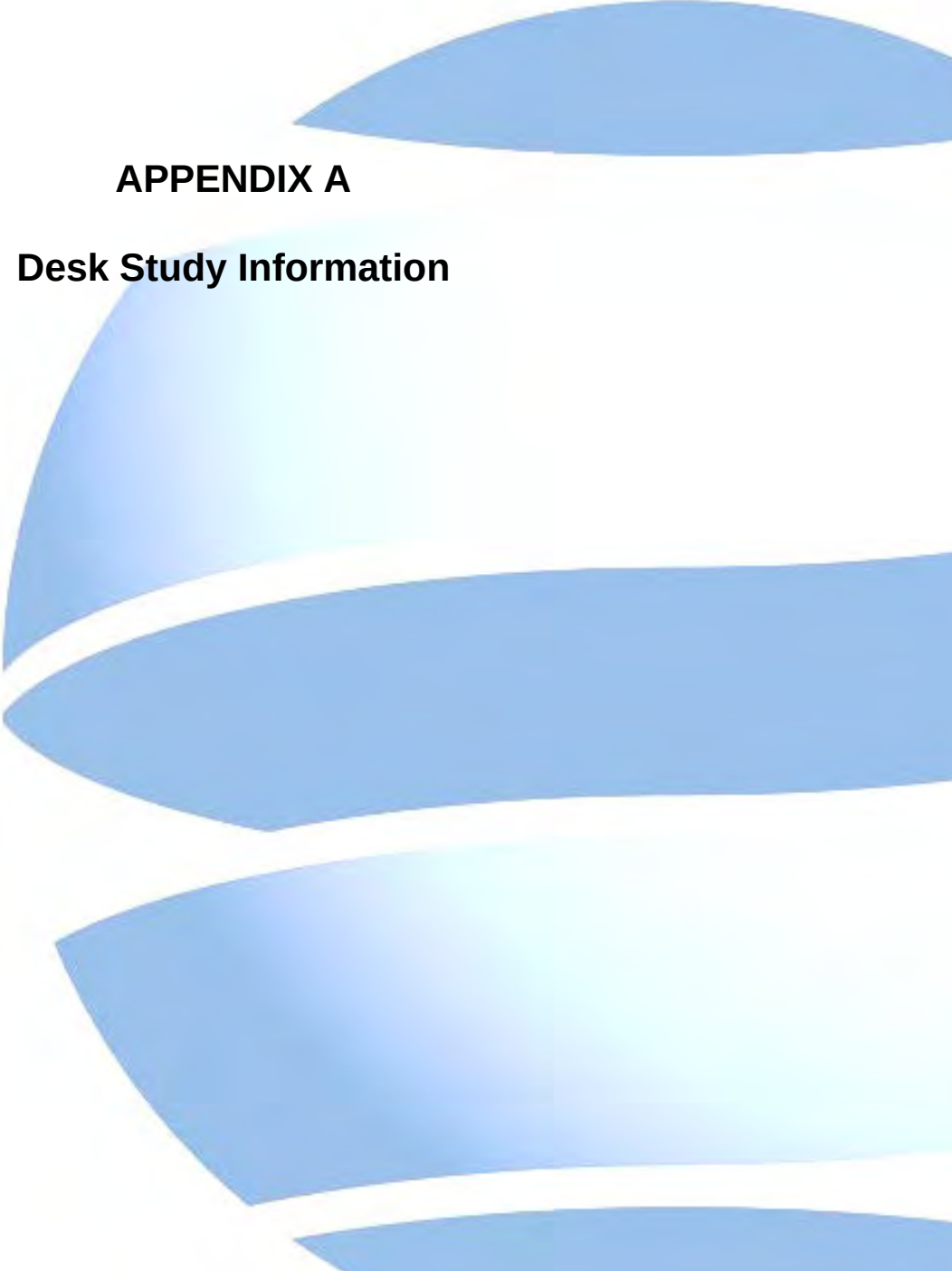


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Client:	Reading Borough Council			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	 Geo-Environmental	
Ref No:	GE15373	Revision:	0			
Drawn:	LL	Date:	01/03/2016			
Figure:	1	Scale:	Not To Scale			



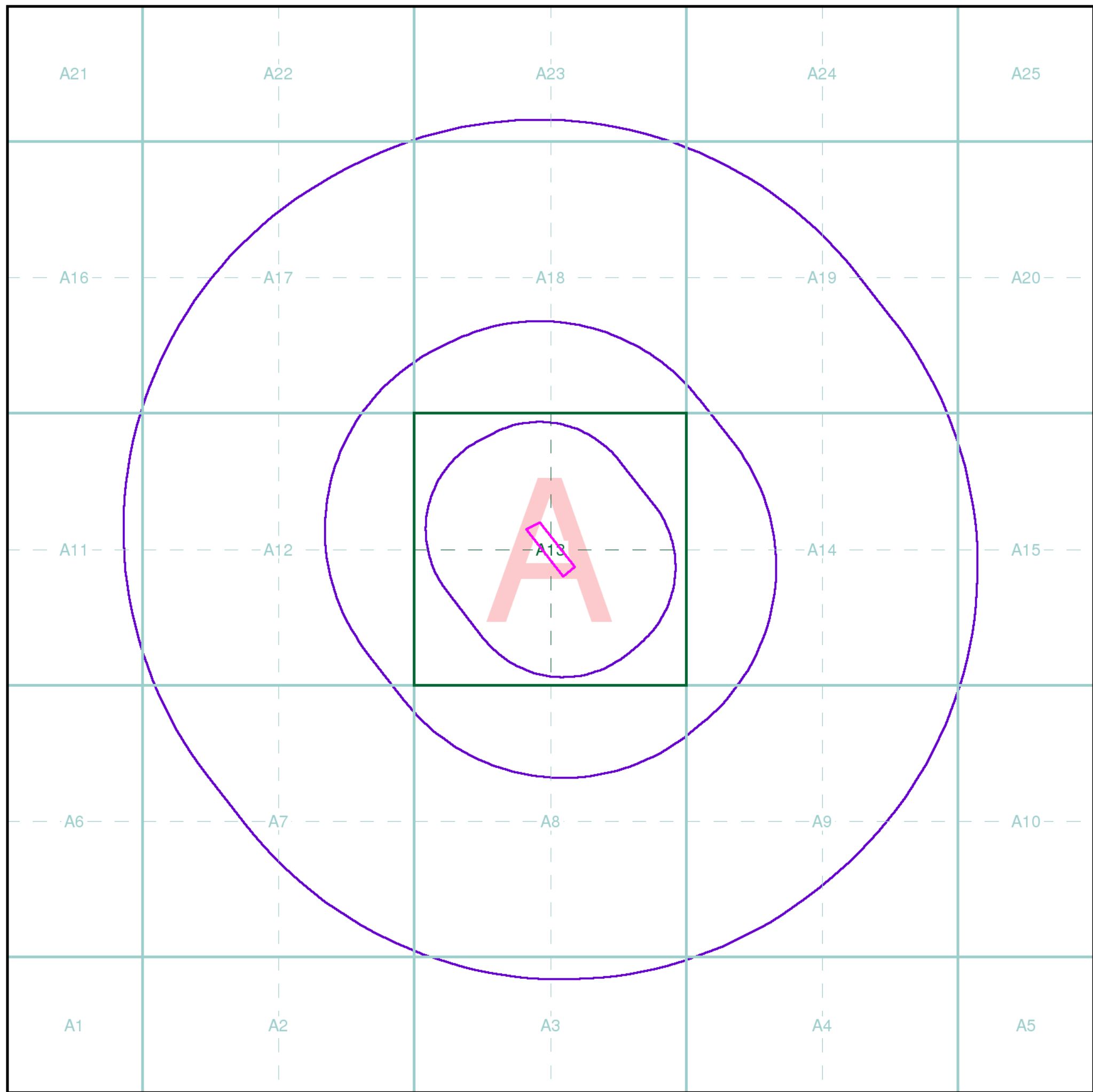


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				Drawn:	AB	 Geo-Environmental
NGR:	473030, 175880	Scale:	Not to Scale	Ref:	GE15373	
Client:	Reading Borough Council			Figure:	2	



APPENDIX A

Desk Study Information



Geo-Environmental Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:



Envirocheck reports are compiled from 136 different sources of data.

Client Details
Ms L Legate, Geo Environmental Services Ltd, Unit 7
Danworth Farm, Cuckfield Road, Hurstpierpoint, West
Sussex, BN6 9GL

Order Details
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National Grid Reference: 473030, 175880
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Search Buffer (m): 1000

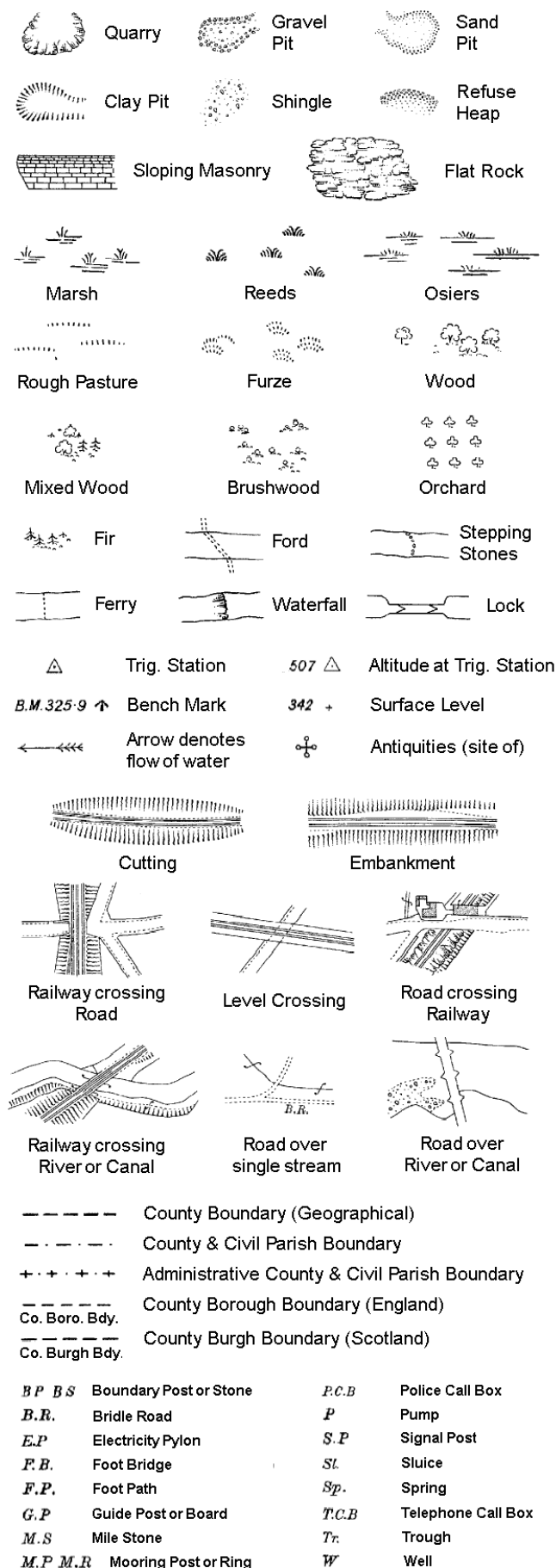
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Full Terms and Conditions can be found on the following link:
<http://www.landmarkinfo.co.uk/Terms/Show/515>

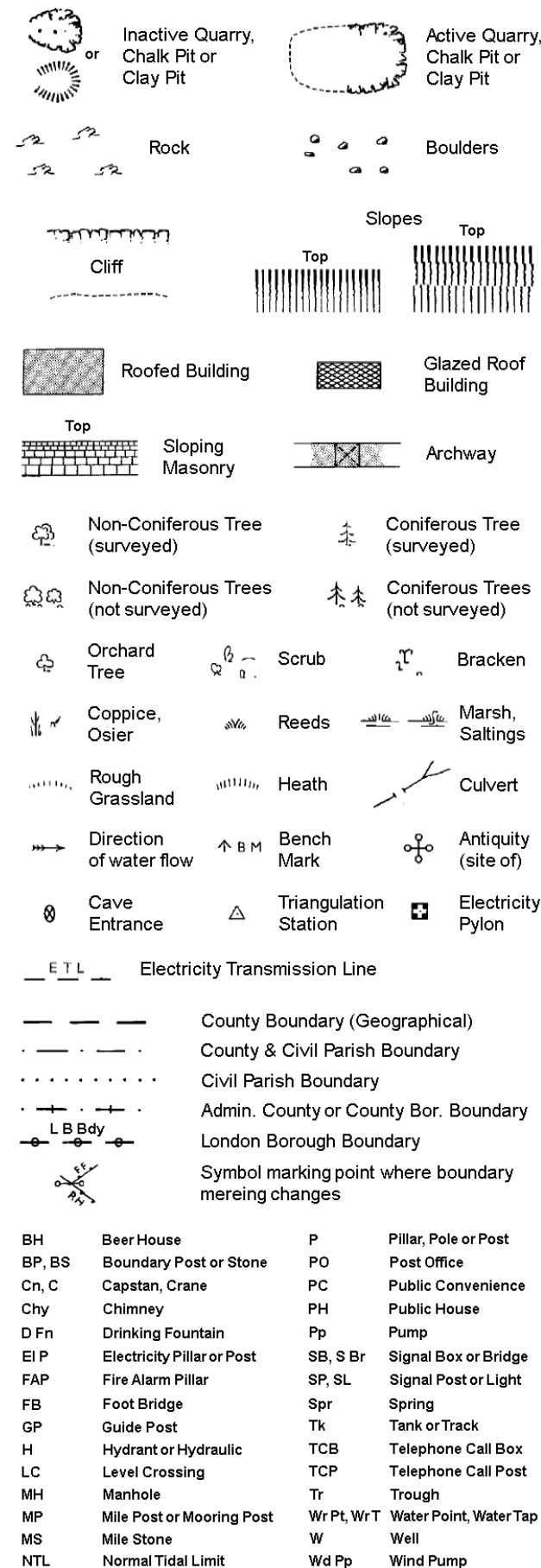


Historical Mapping Legends

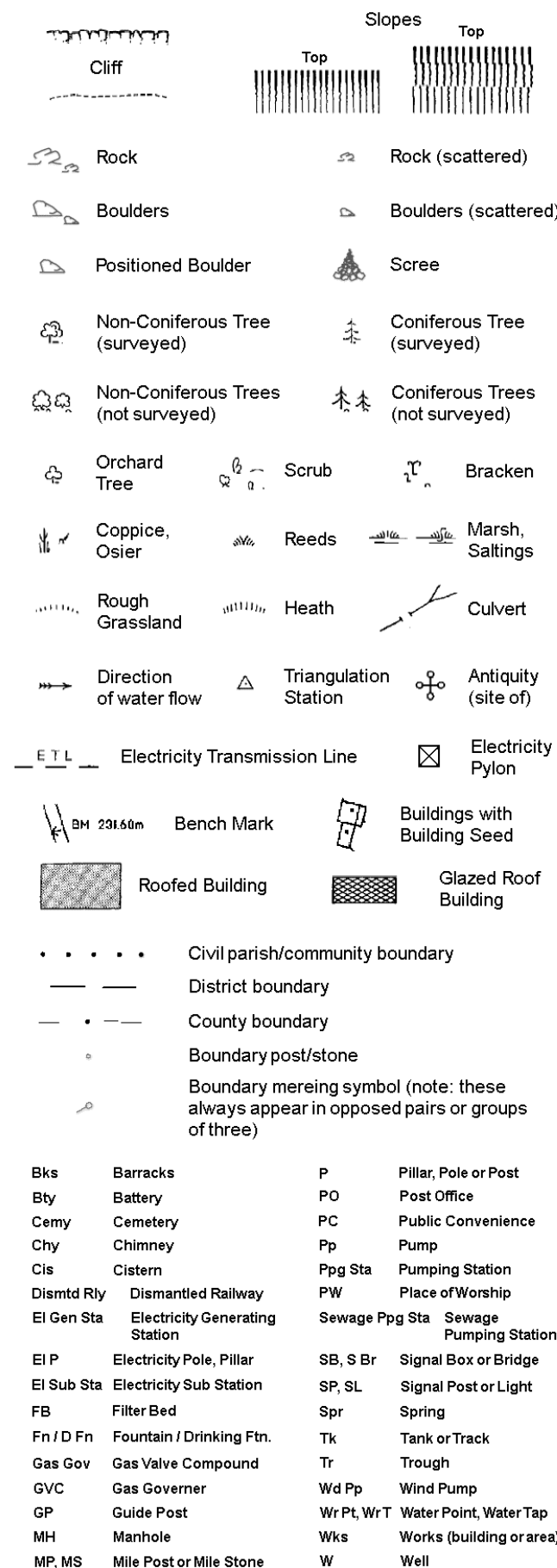
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



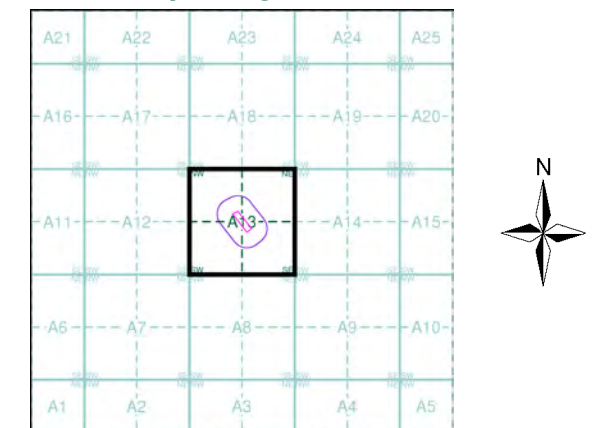
Large-Scale National Grid Data 1:2,500 and 1:1,250



Geo-Environmental Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
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Oxfordshire	1:2,500	1879	3
Oxfordshire	1:2,500	1898	4
Berkshire	1:2,500	1913	5
Oxfordshire	1:2,500	1913	6
Berkshire	1:2,500	1932	8
Ordnance Survey Plan	1:1,250	1956 - 1973	9
Ordnance Survey Plan	1:2,500	1956 - 1968	10
Ordnance Survey Plan	1:2,500	1968	11
Ordnance Survey Plan	1:1,250	1970 - 1974	12
Supply of Unpublished Survey Information	1:1,250	1974	13
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Large-Scale National Grid Data	1:1,250	1993	16

Historical Map - Segment A13



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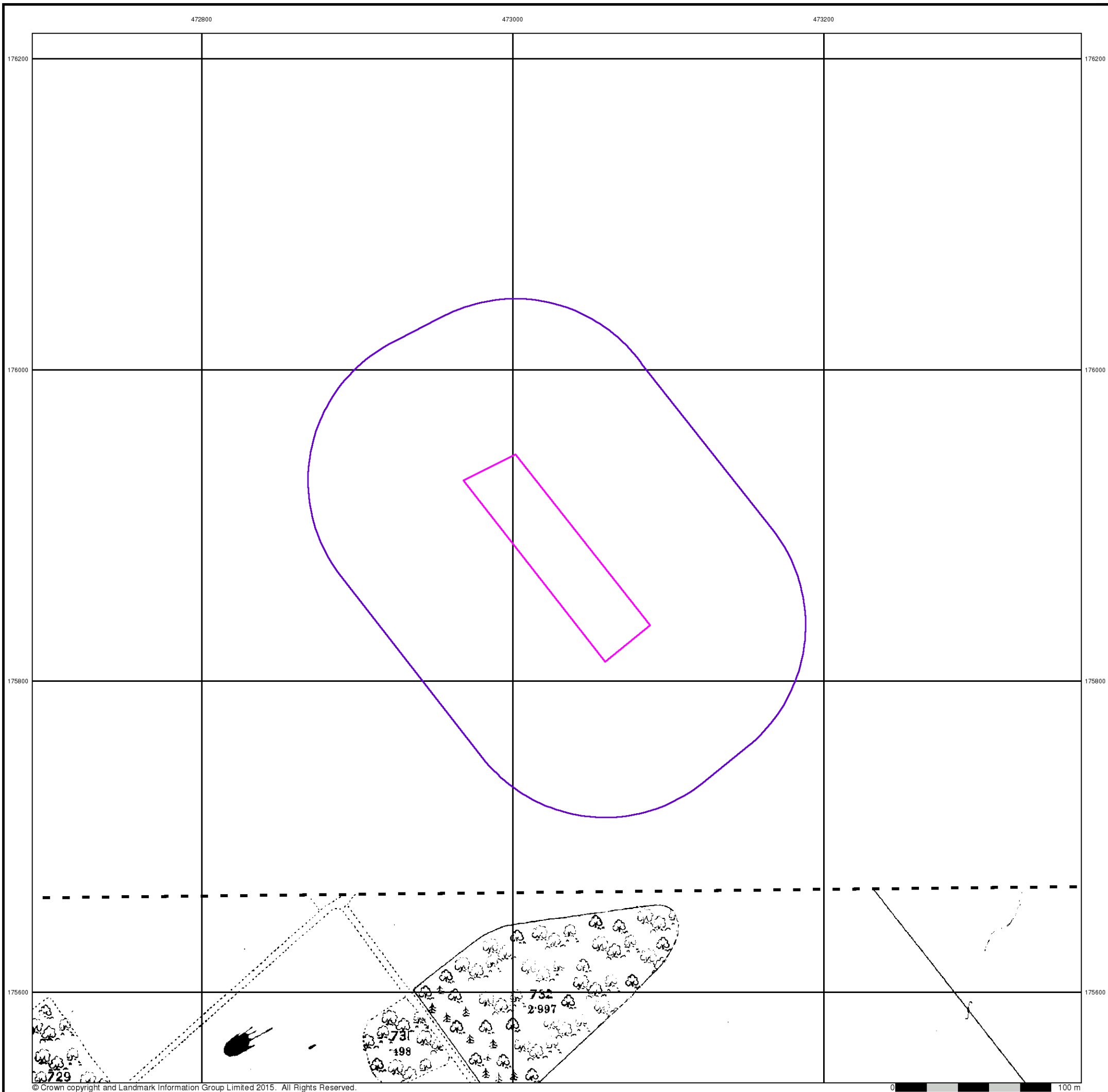
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Search Buffer (m): 100

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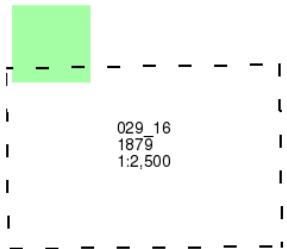
Geo-Environmental Berkshire

Published 1879

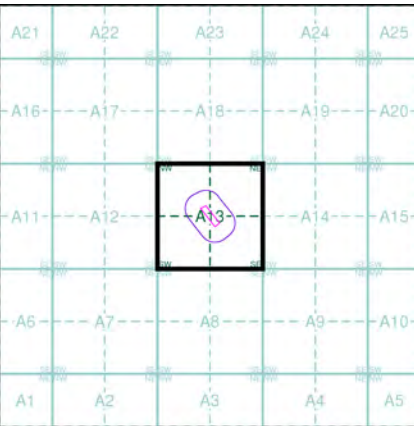
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Map Name(s) and Date(s)



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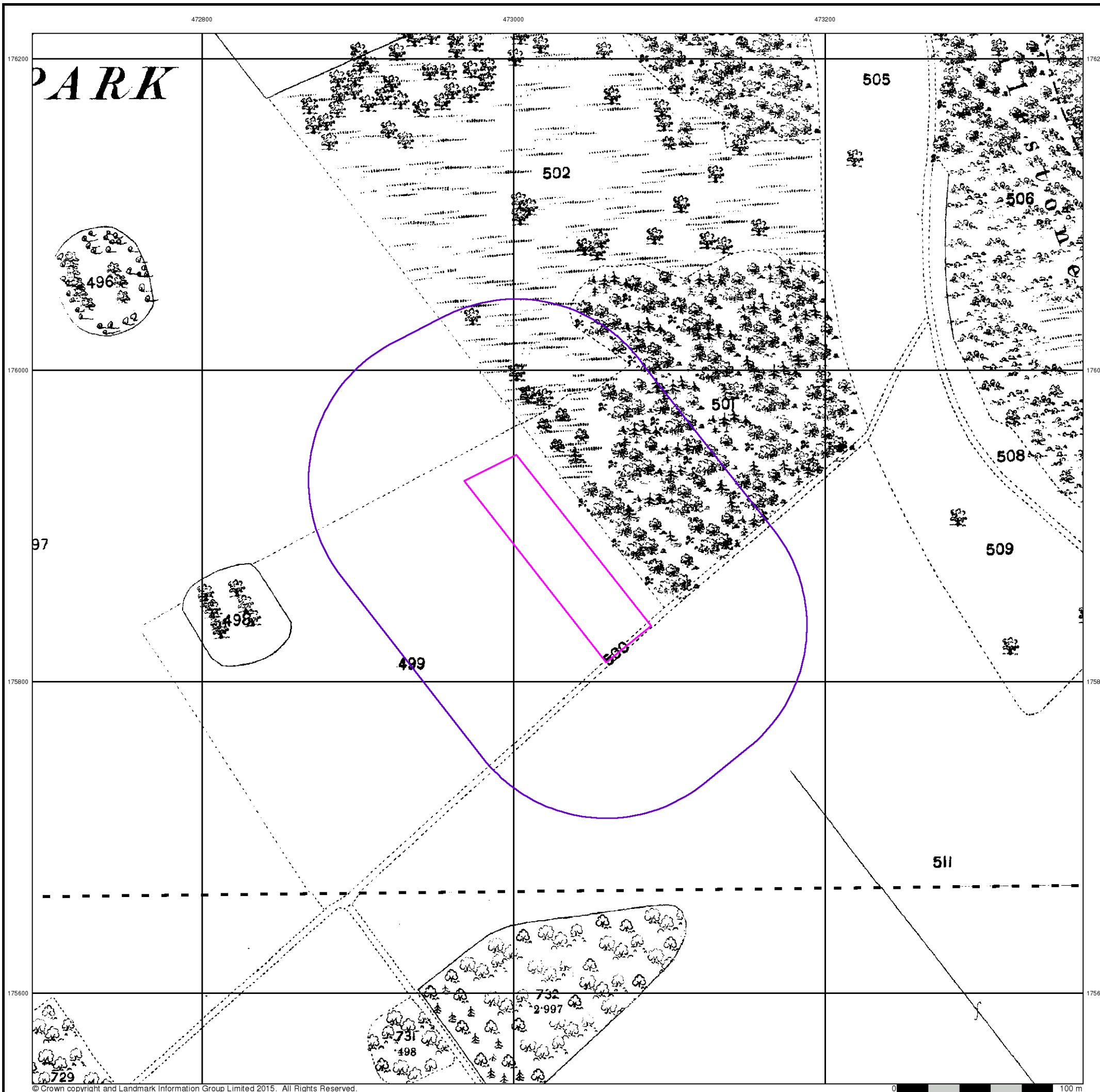
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**Geo-Environmental
Oxfordshire**

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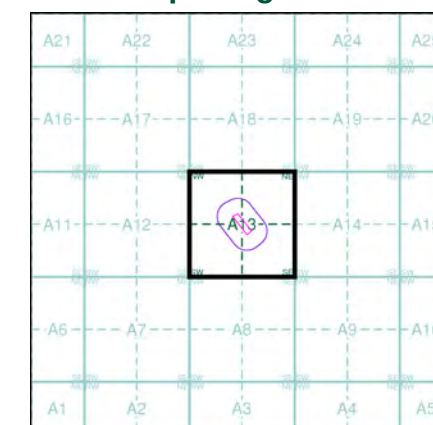
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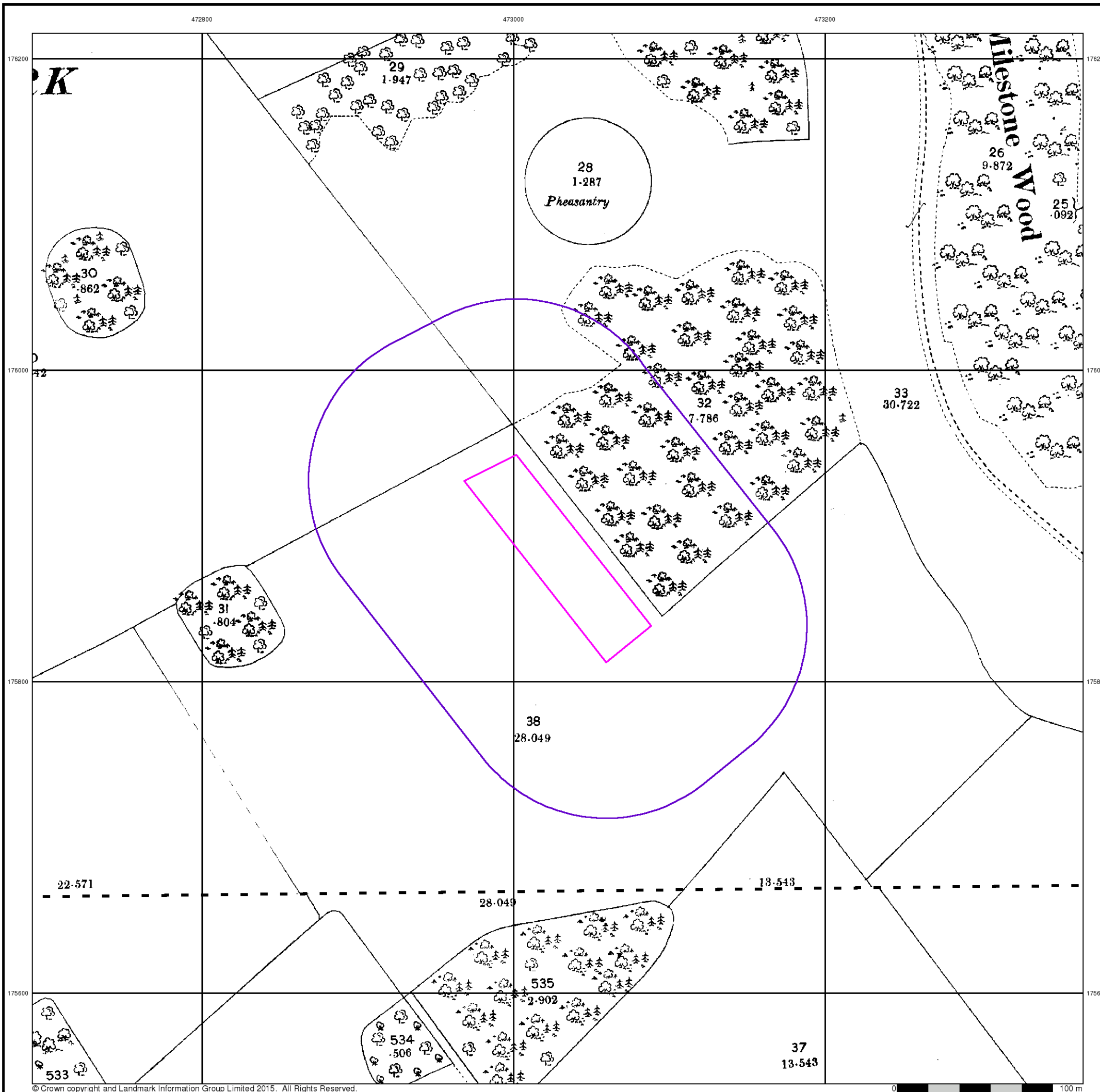
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**Geo-Environmental
Oxfordshire**

Published 1898

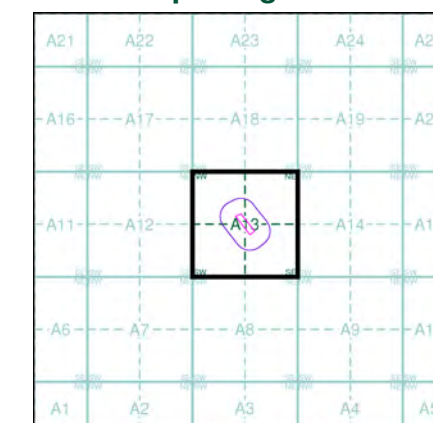
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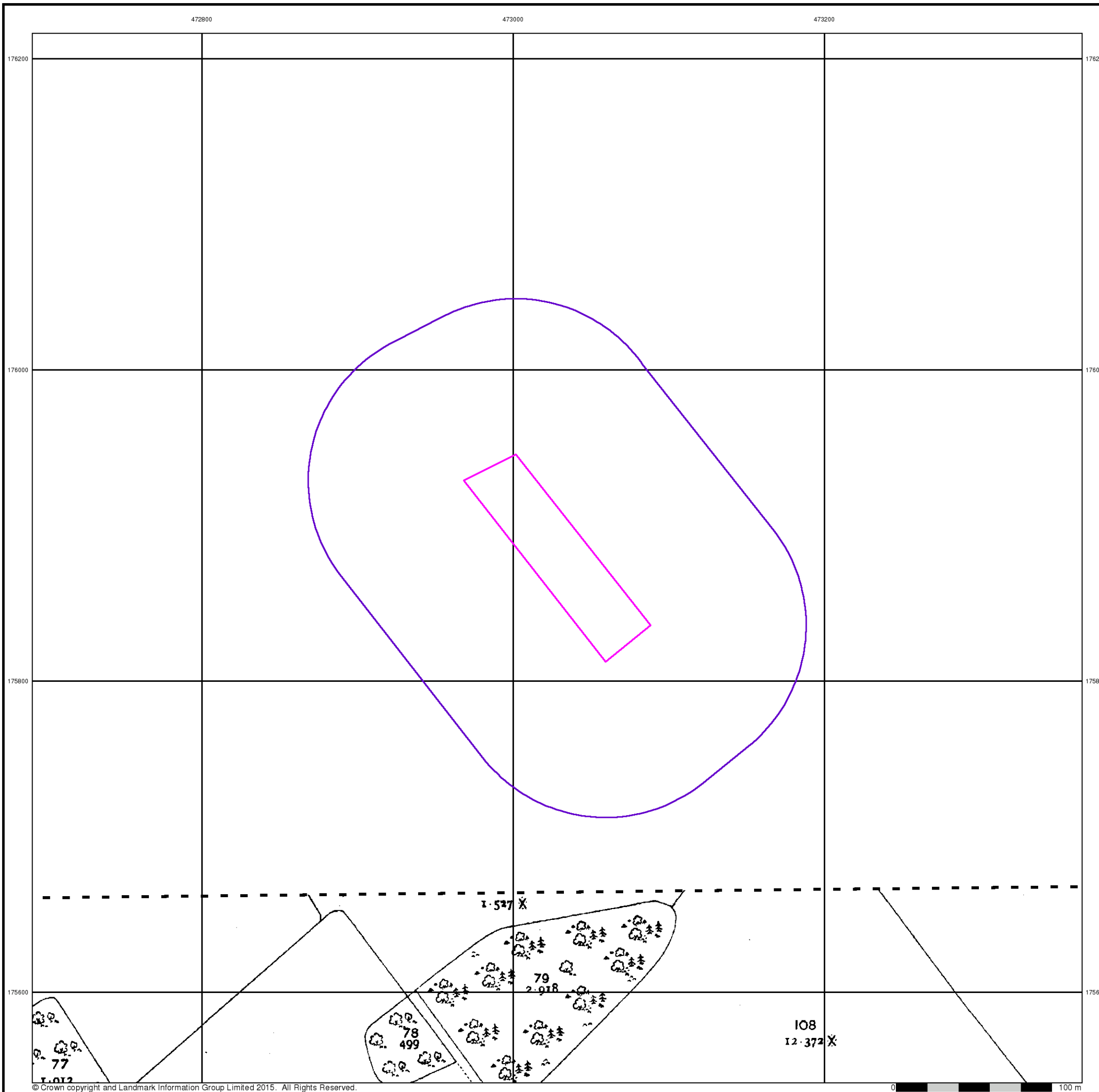
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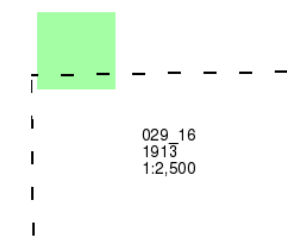
Geo-Environmental Berkshire

Published 1913

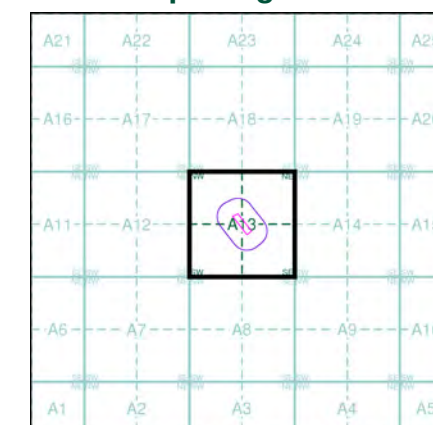
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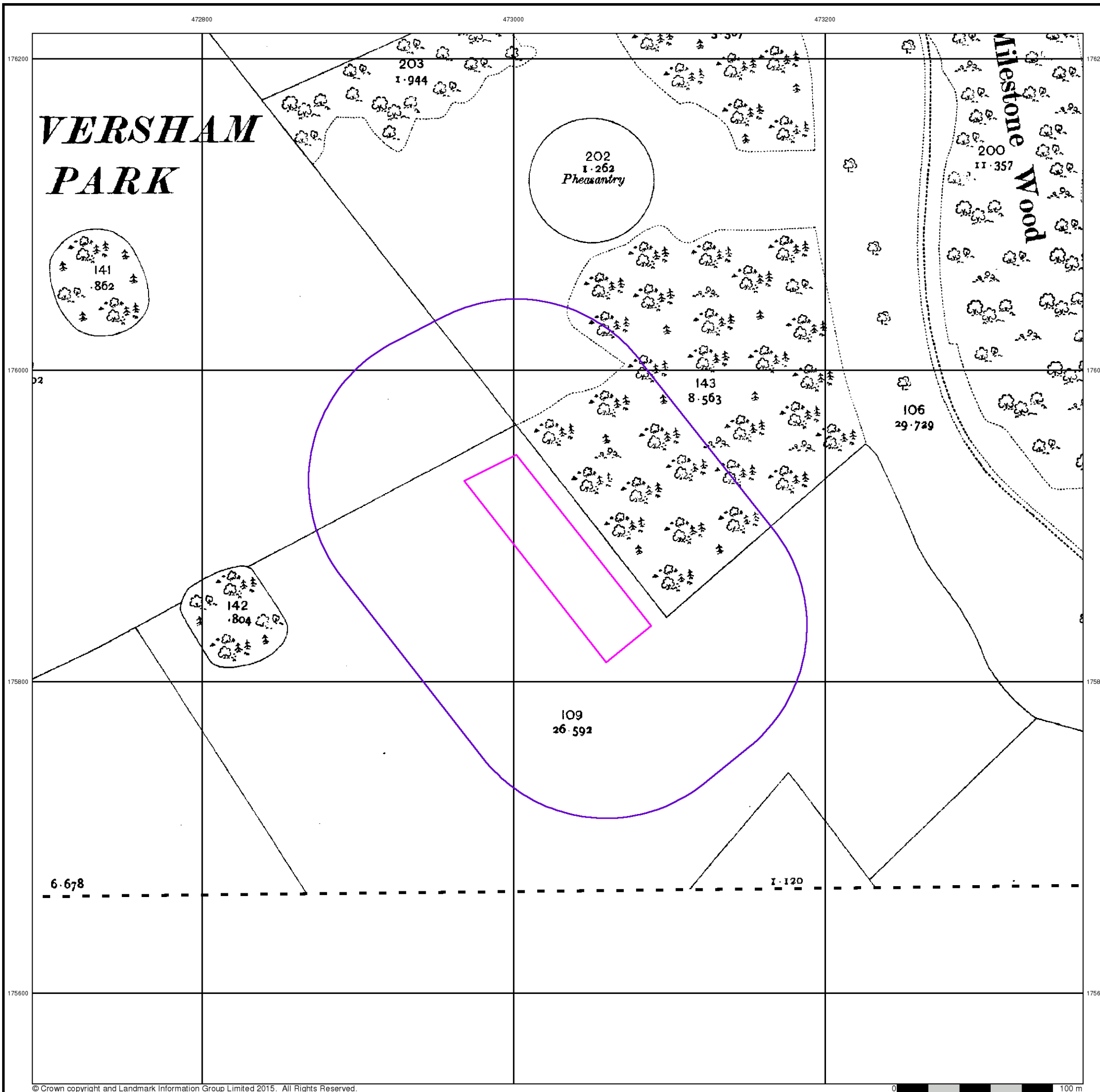
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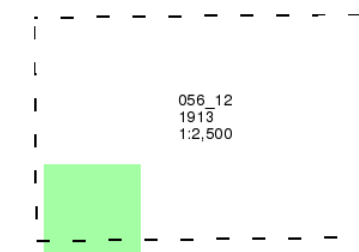
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Oxfordshire**

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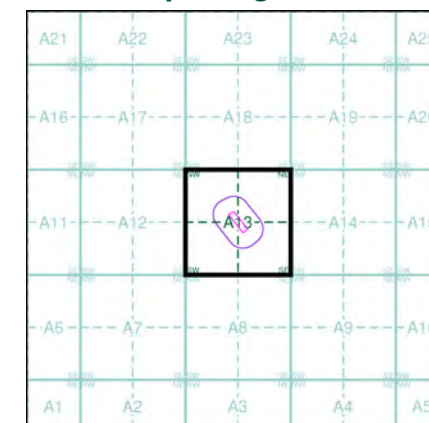
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Map Name(s) and Date(s)



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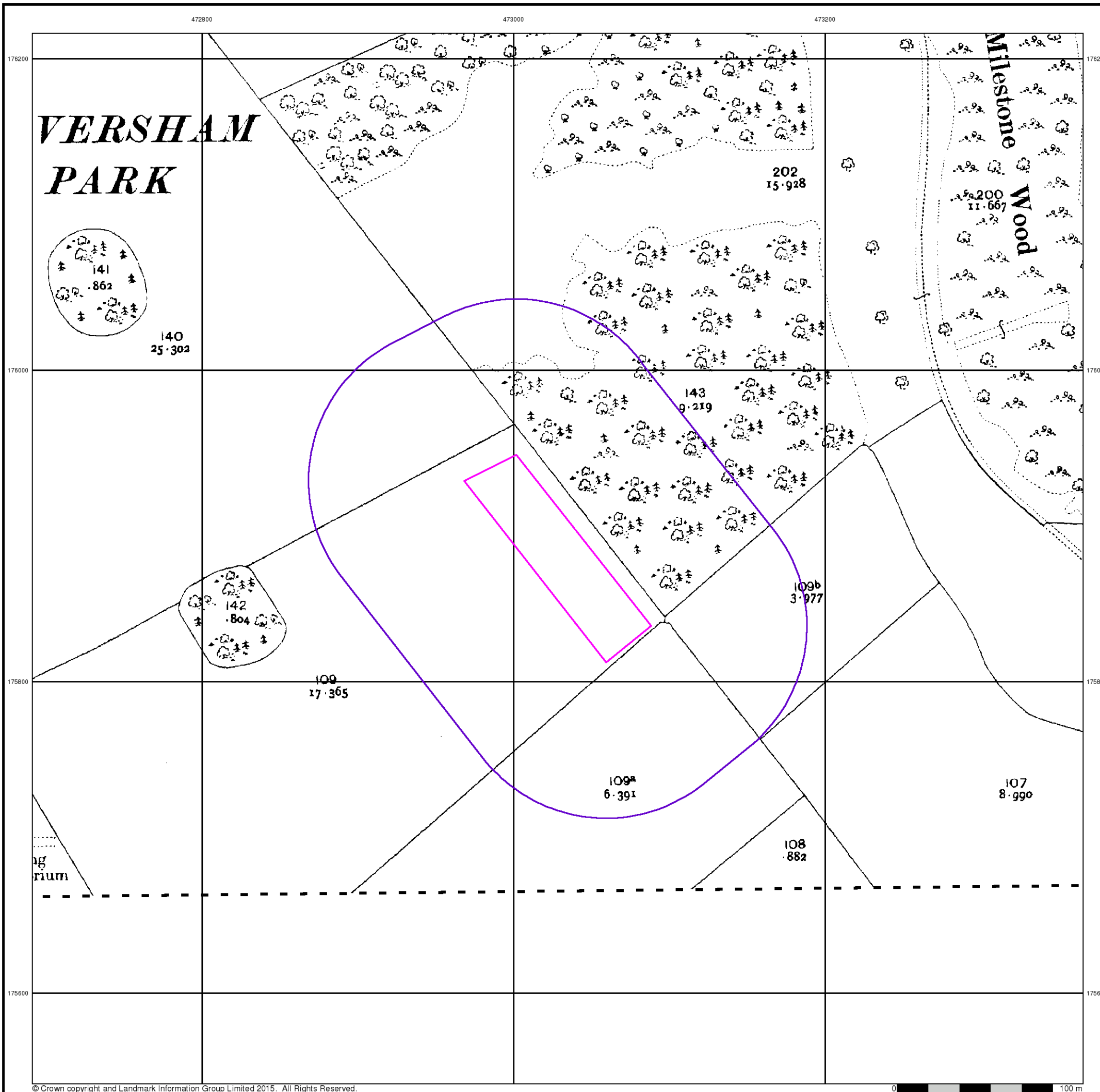
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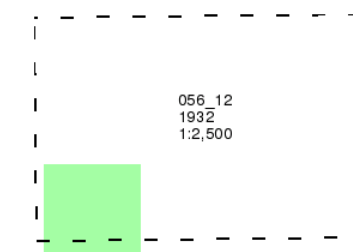
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Oxfordshire**

Published 1932

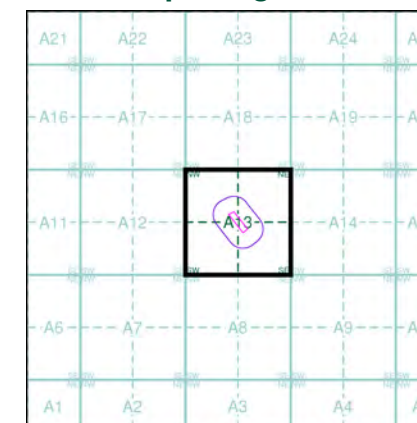
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

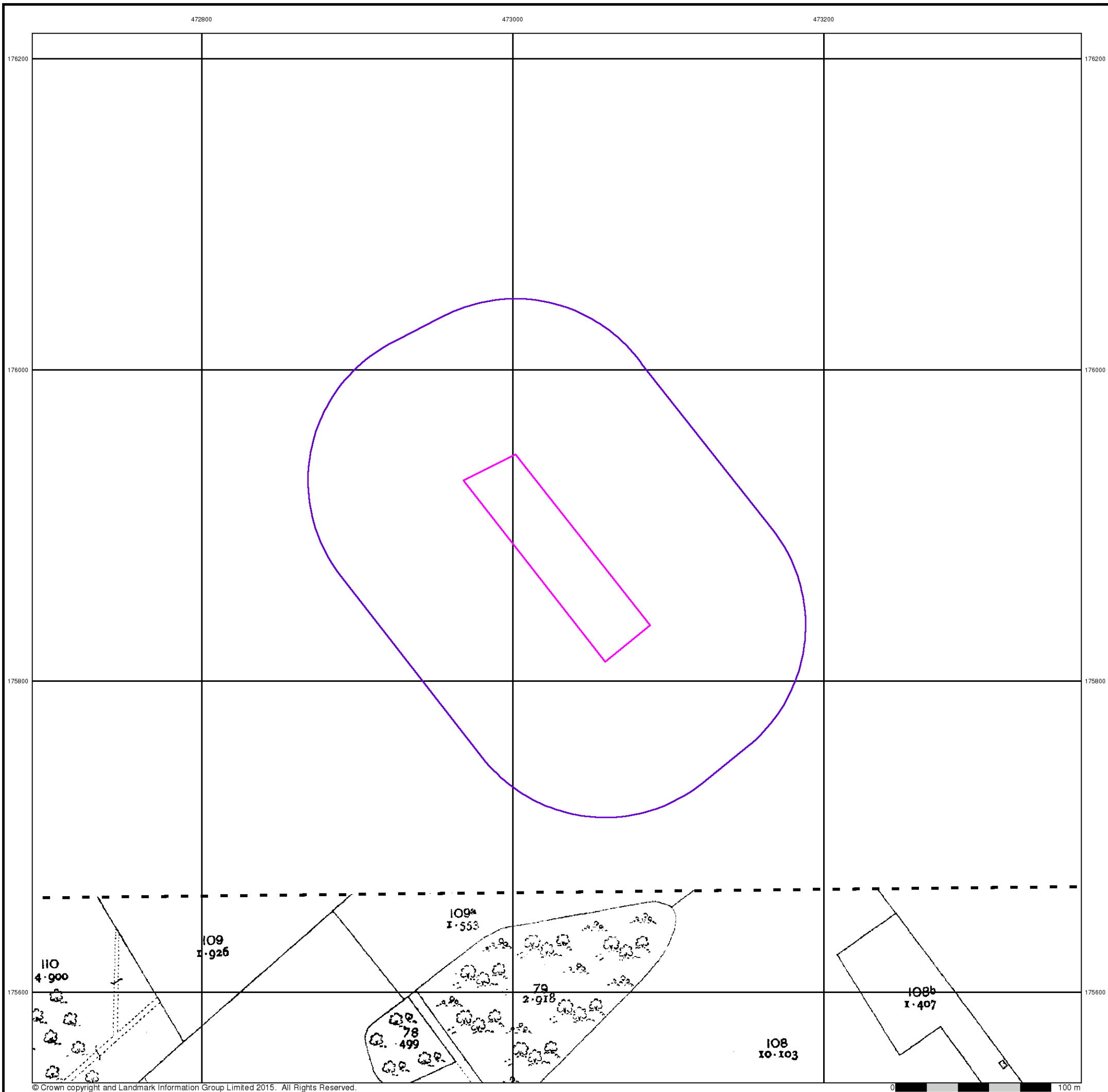
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



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Fax: 0844 844 9951
Web: www.envirocheck.co.uk



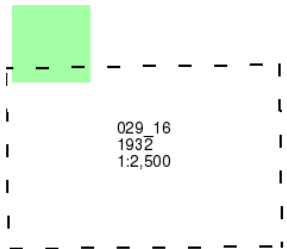
**Geo-Environmental
Berkshire**

Published 1932

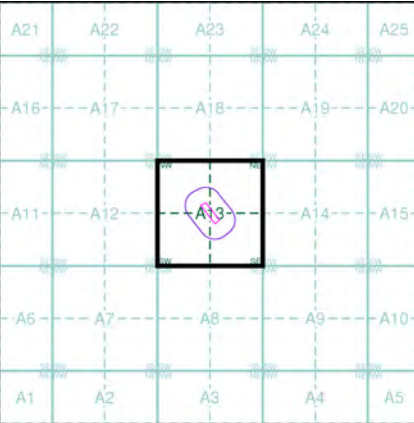
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

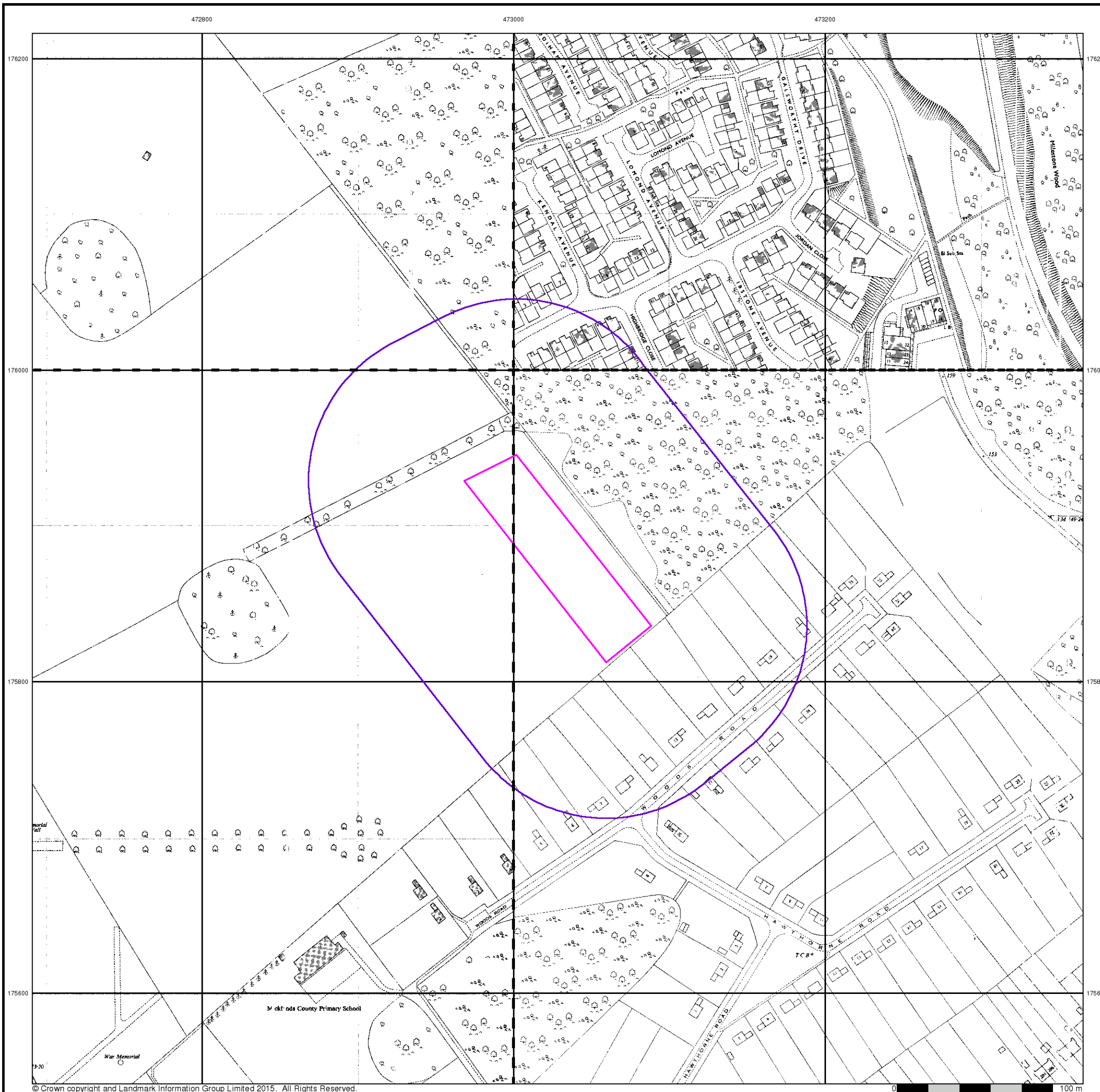
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



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Geo-Environmental Ordnance Survey Plan

Published 1956 - 1973

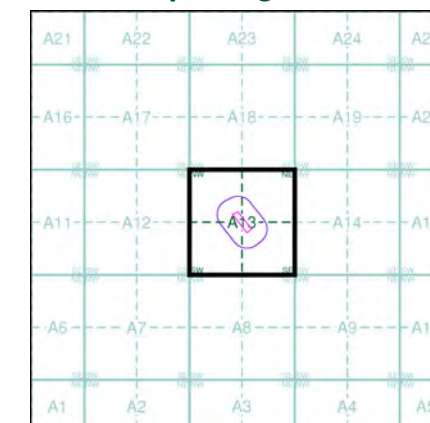
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SU7276SE 1956 1:1,250	SU7376SW 1973 1:1,250
SU7275NE 1956 1:1,250	SU7375NW 1956 1:1,250

Historical Map - Segment A13



Order Details

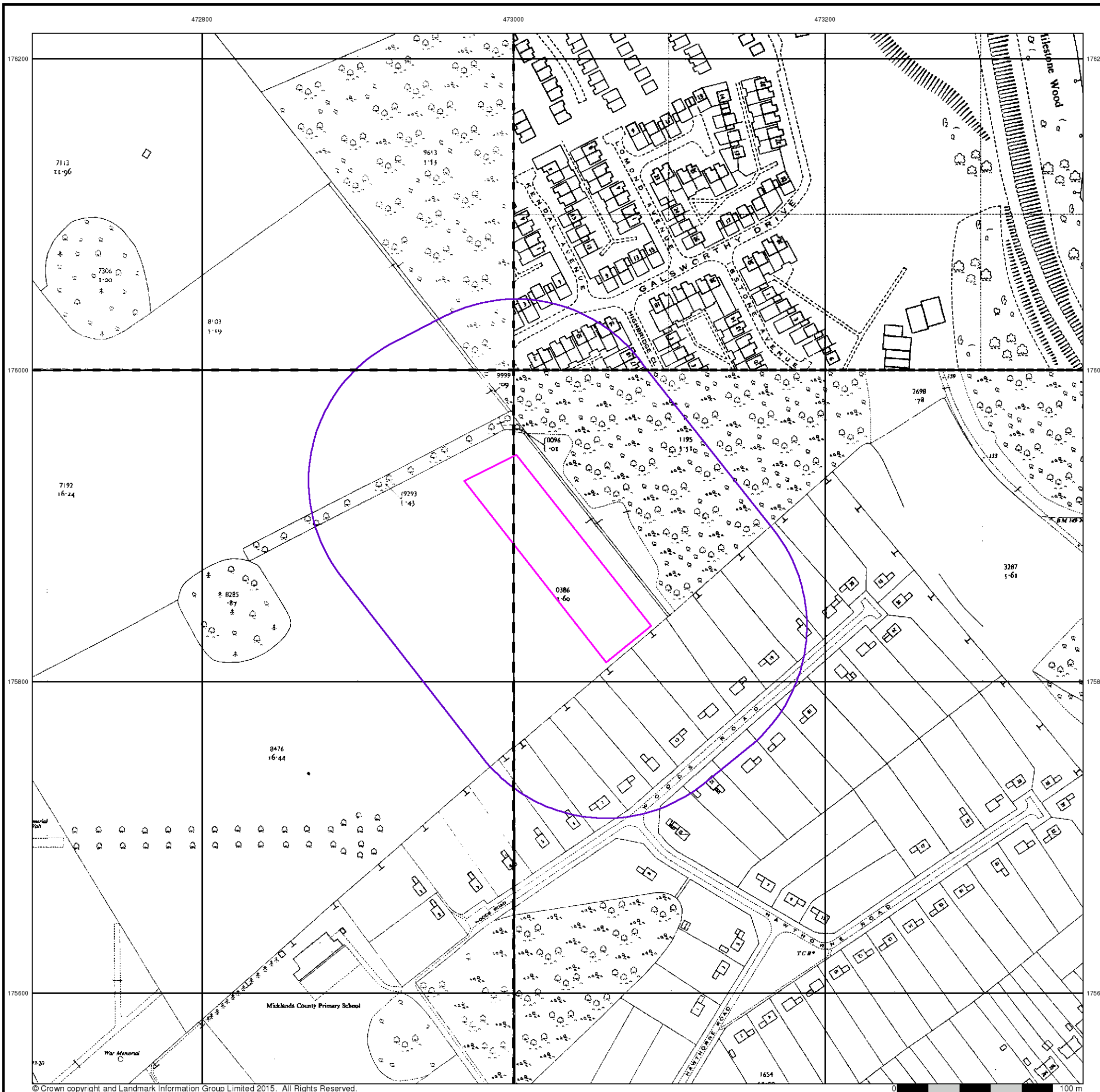
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

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Geo-Environmental Ordnance Survey Plan

Published 1956 - 1968

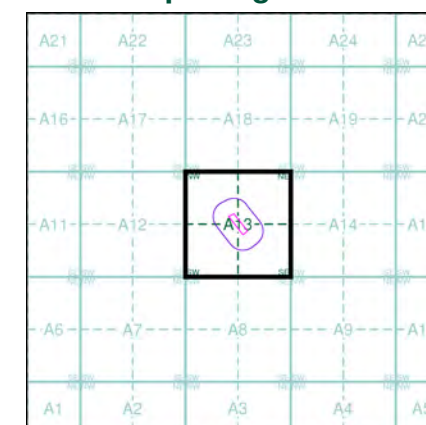
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SU7276 1956 12,500	SU7376 1968 12,500
SU7275 1956 12,500	SU7375 1956 12,500

Historical Map - Segment A13



Order Details

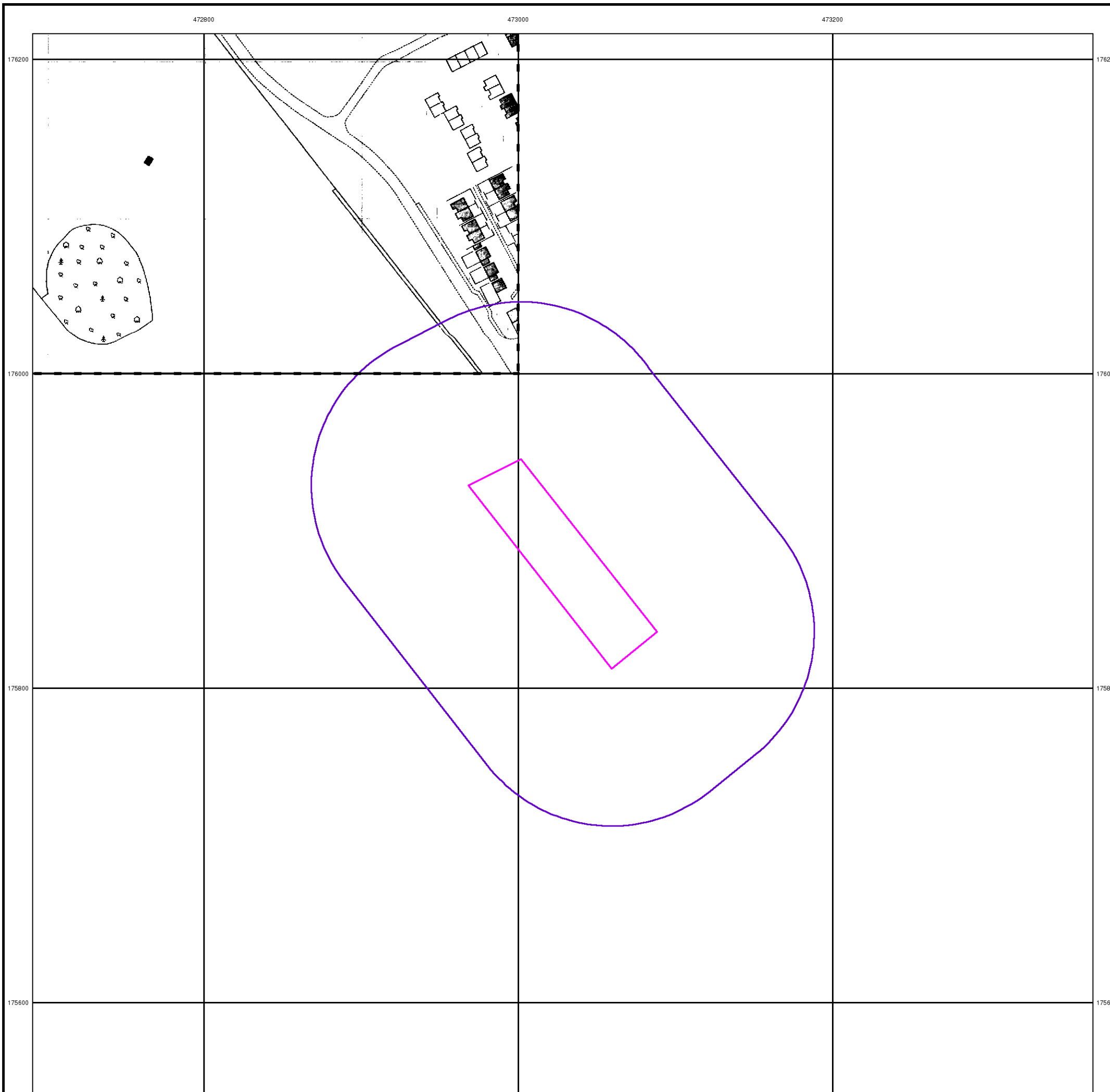
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



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0 100 m



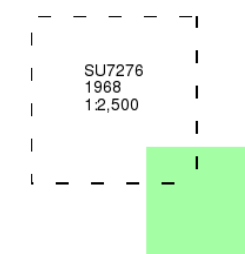
Geo-Environmental Ordnance Survey Plan

Published 1968

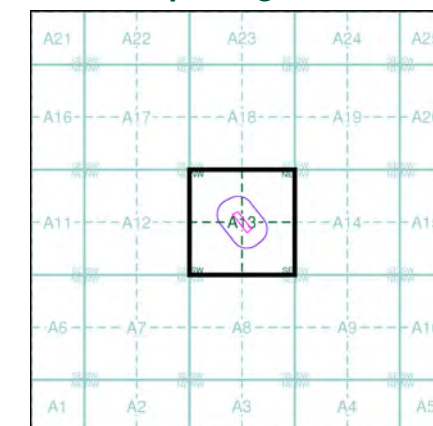
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

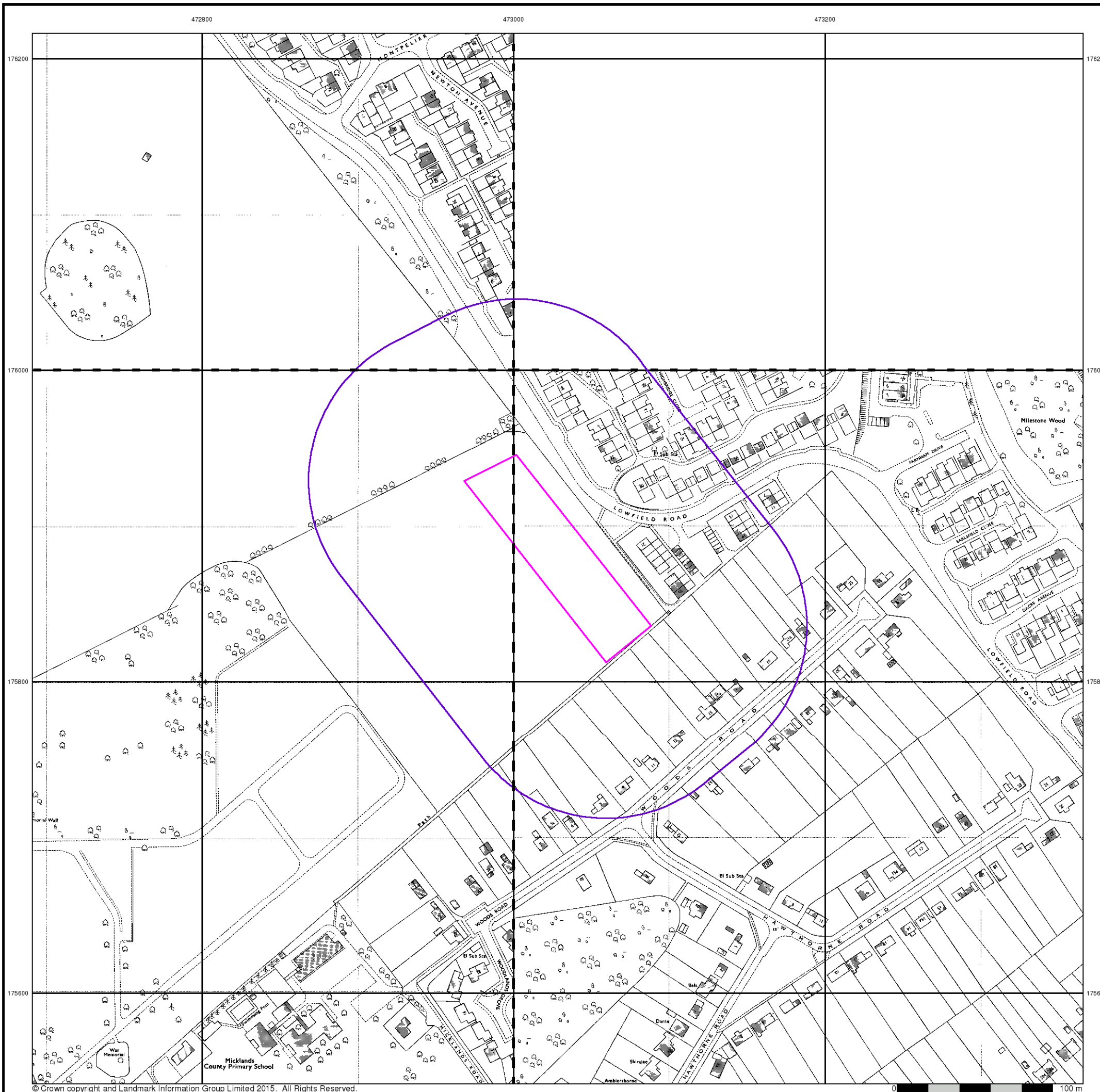
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

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Geo-Environmental Ordnance Survey Plan

Published 1970 - 1974

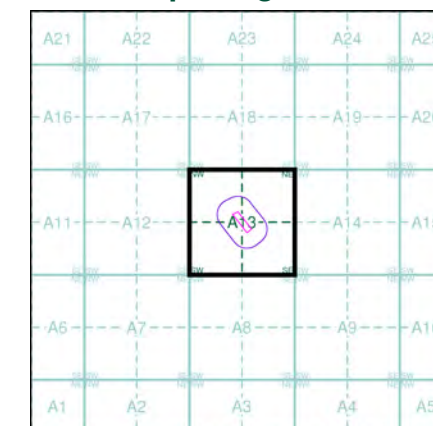
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SU7276SE	
1970	
1:1,250	
SU7275NE	SU7375NW
1974	1970
1:1,250	1:1,250

Historical Map - Segment A13



Order Details

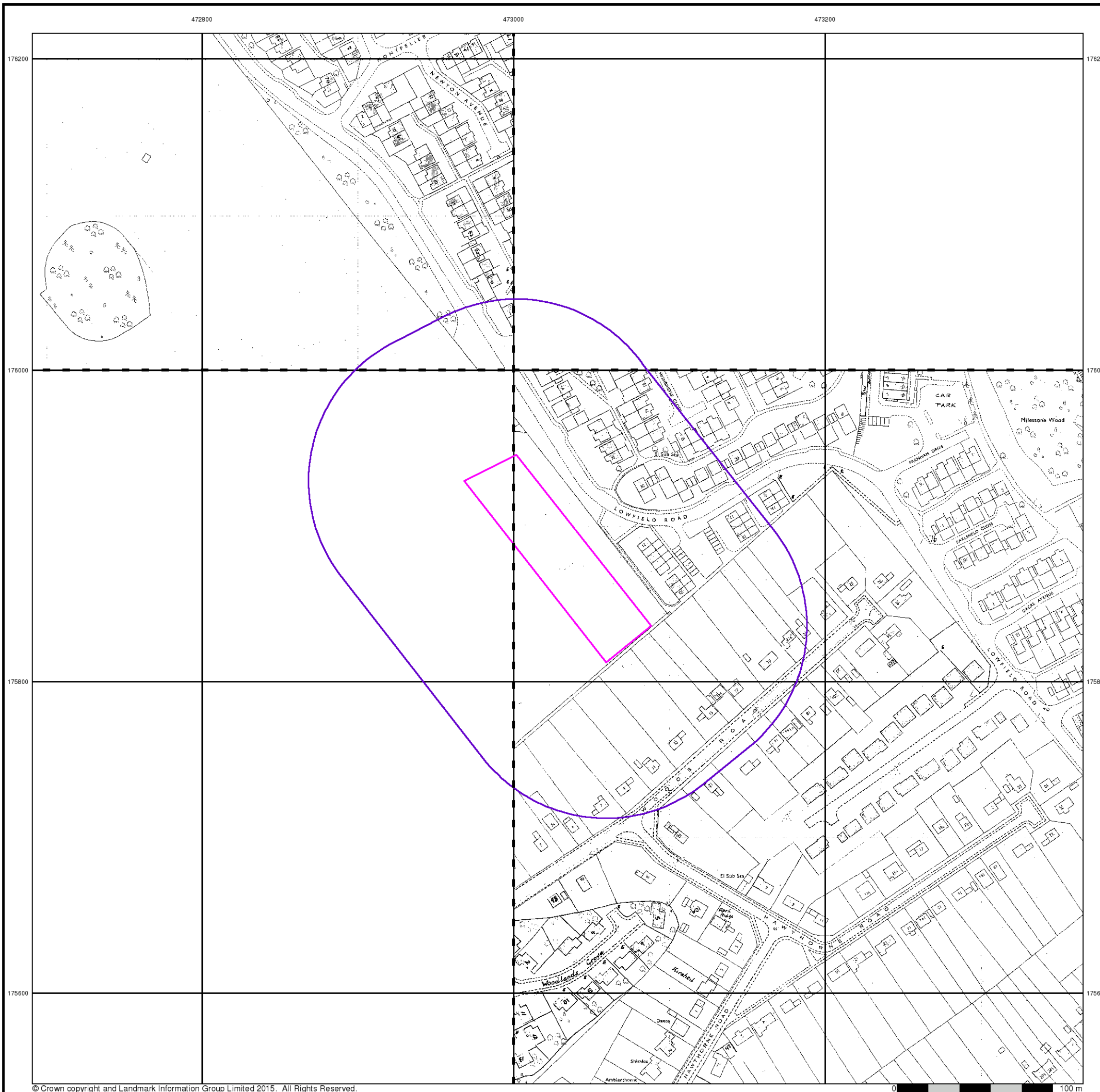
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

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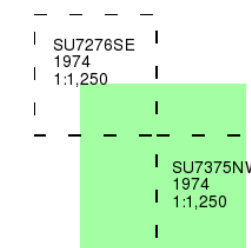
Geo-Environmental Supply of Unpublished Survey Information

Published 1974

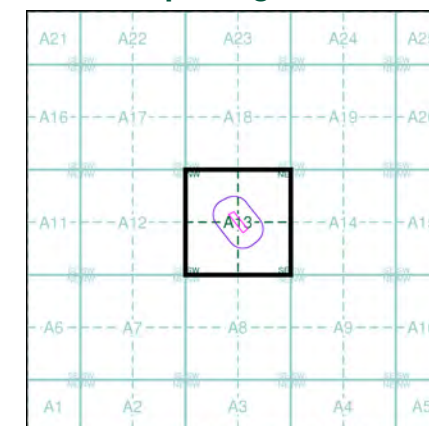
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a 'work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

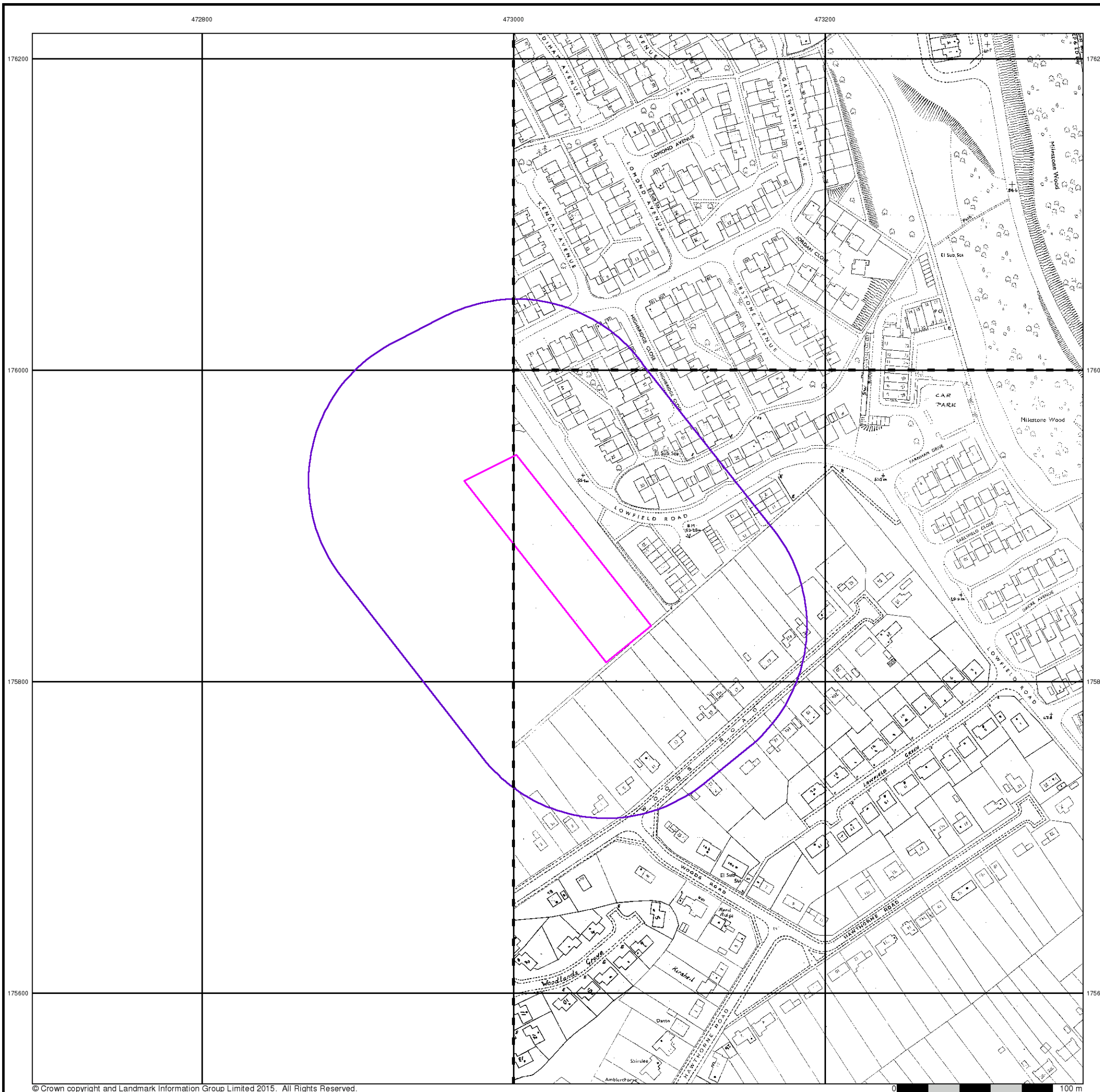
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

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Geo-Environmental Additional SIMs

Published 1978

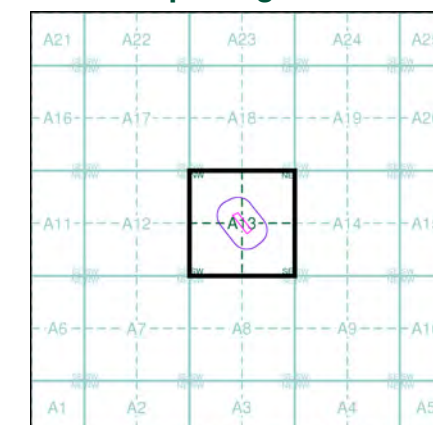
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SU7376SW
1978
1:1,250
SU7375NW
1978
1:1,250

Historical Map - Segment A13



Order Details

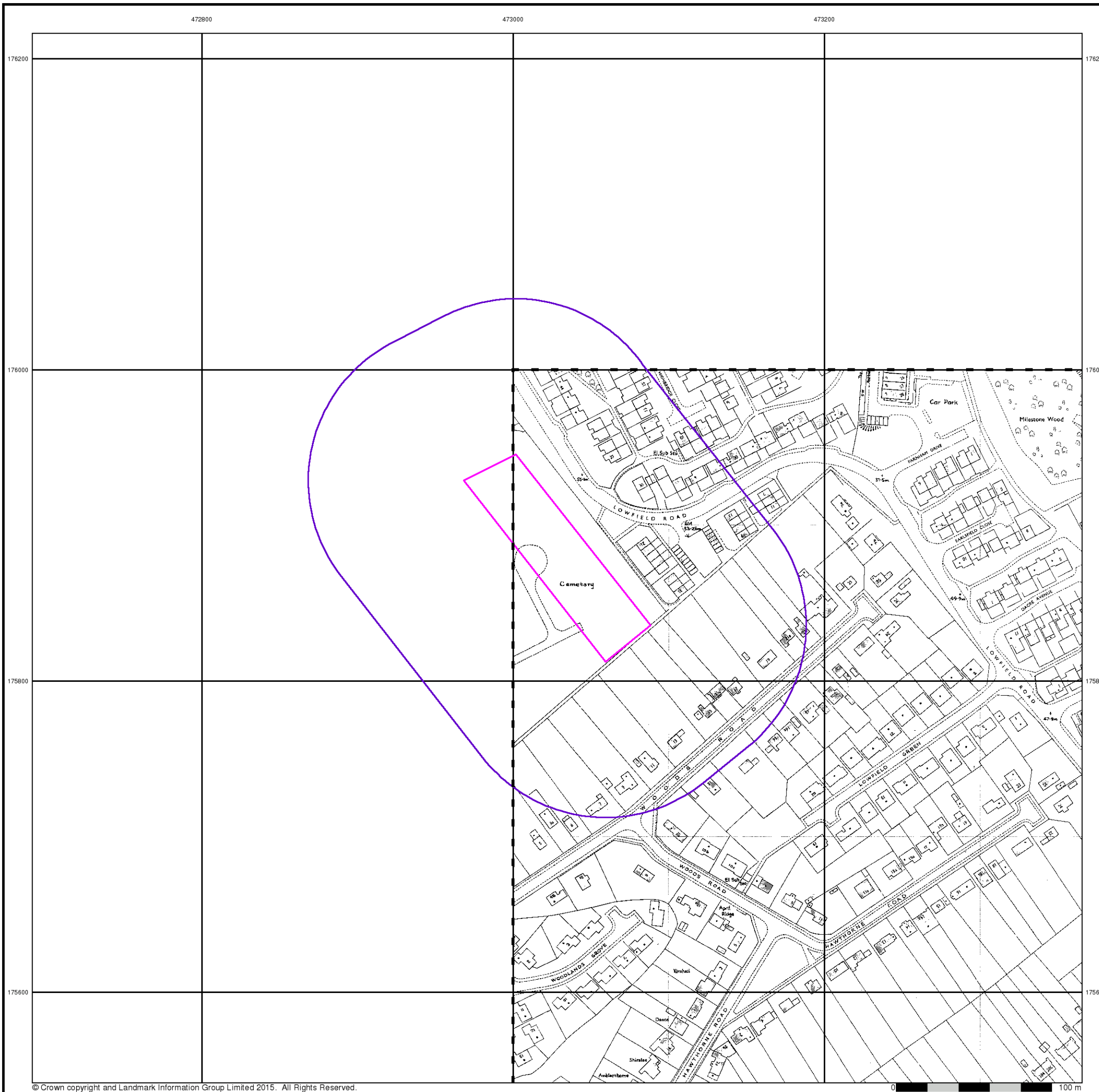
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
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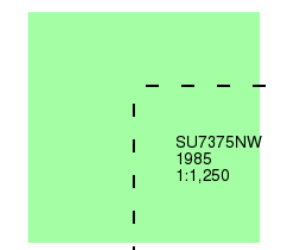
Geo-Environmental Additional SIMs

Published 1985

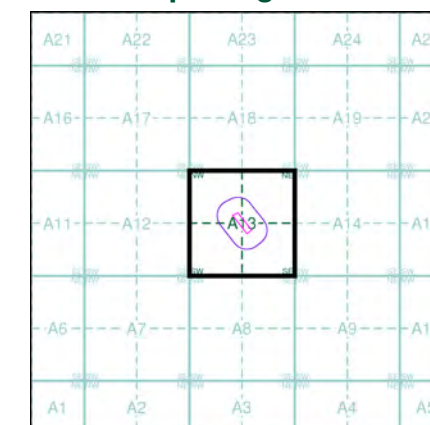
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

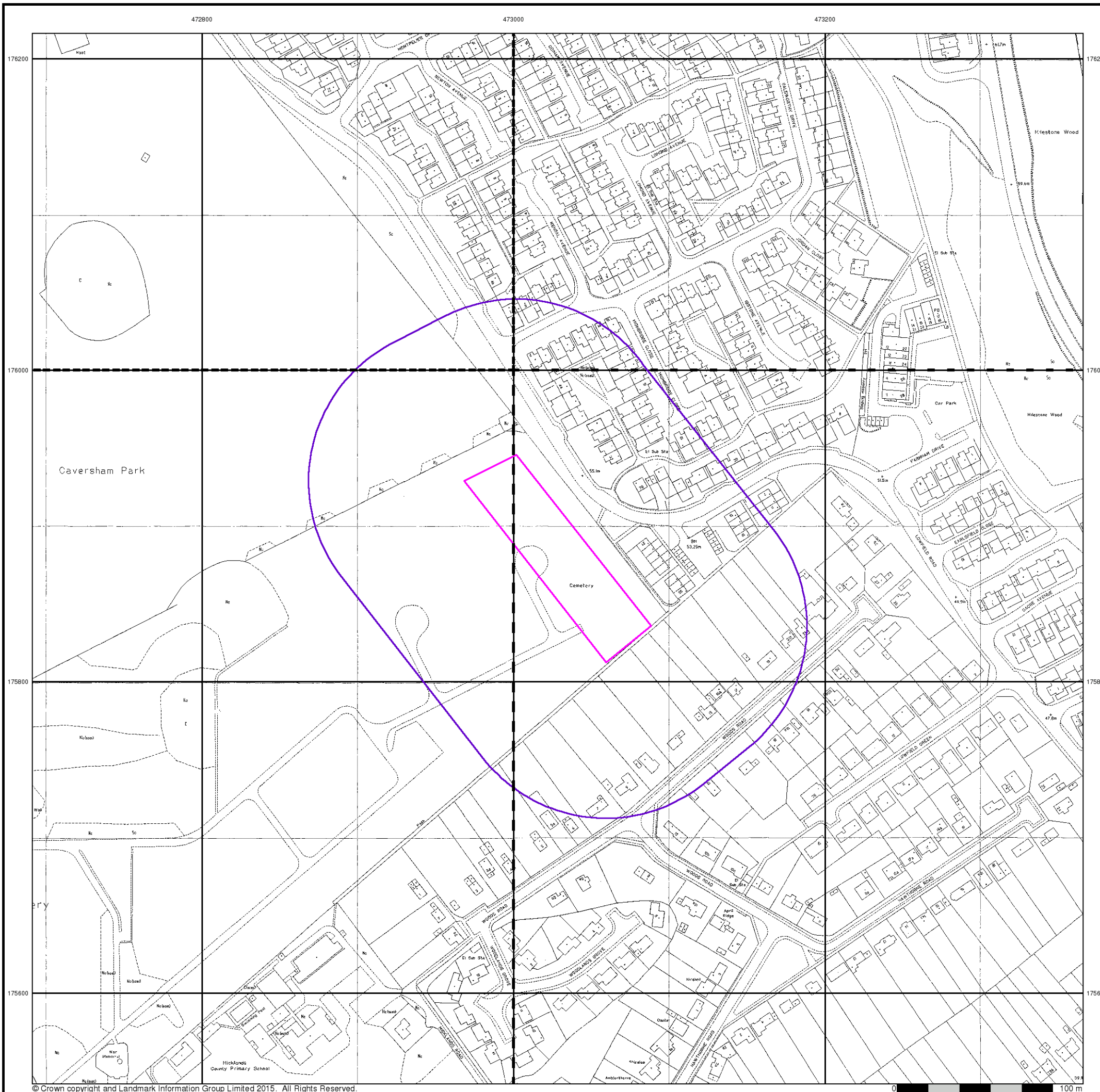
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

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Geo-Environmental Large-Scale National Grid Data

Published 1993

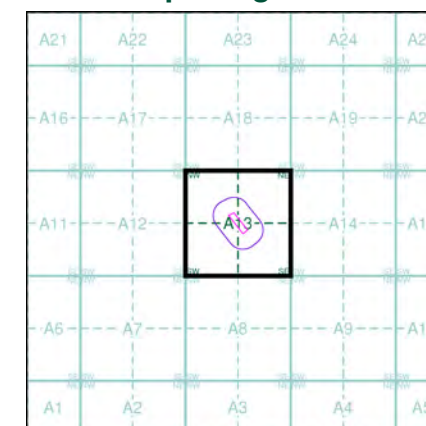
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SU7276SE 1993 1:1,250	SU7376SW 1993 1:1,250
SU7275NE 1993 1:1,250	SU7375NW 1993 1:1,250

Historical Map - Segment A13



Order Details

Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 100

Site Details

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Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	•285 Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Minor Roads		
	Sunken Road		Raised Road		
	Road over Railway		Railway over River		
	Railway over Road		Level Crossing		
	Road over River or Canal		Road over Stream		
	Road over Stream				
	County Boundary (Geographical)				
	County & Civil Parish Boundary				
	Administrative County & Civil Parish Boundary				
	County Borough Boundary (England)				
	County Burgh Boundary (Scotland)				
	Rural District Boundary				
	Civil Parish Boundary				

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Bracken		Heath
	Marsh		Reeds
	Building		Glasshouse
	Sloping Masonry		Pylon
	Cutting		Embankment
	Road Under		Road Over
	Level Crossing		Foot Bridge
	Standard Gauge Multiple Track		Standard Gauge Single Track
	Siding, Tramway or Mineral Line		Narrow Gauge
	Geographical County		Administrative County, County Borough or County of City
	Municipal Borough, Urban or Rural District, Burgh or District Council		Borough, Burgh or County Constituency
	Civil Parish		
	BP, BS Boundary Post or Stone		Police Station
	Church		Post Office
	Club House		Public Convenience
	Fire Engine Station		Public House
	Foot Bridge		Signal Box
	Fountain		Spring
	Guide Post		Telephone Call Box
	Mile Post		Telephone Call Post
	Mile Stone		Well

1:10,000 Raster Mapping

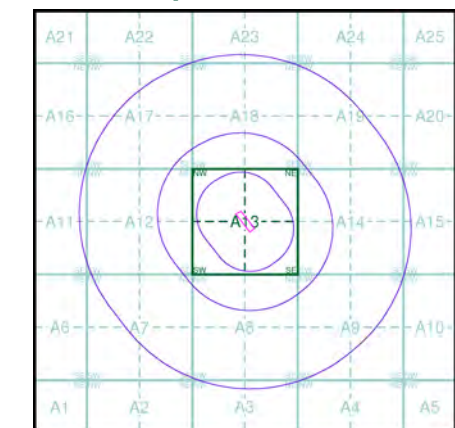
	Gravel Pit		Refuse tip or slag heap
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Shingle		Mud
	Sand		Sand Pit
	Slopes		Top of cliff
	General detail		Underground detail
	Overhead detail		Narrow gauge railway
	Multi-track railway		Single track railway
	County boundary (England only)		Civil, parish or community boundary
	District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
	Area of wooded vegetation		Non-coniferous trees
	Non-coniferous trees (scattered)		Coniferous trees
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	Mean high water (springs)		Mean low water (springs)
	Telephone line (where shown)		Electricity transmission line (with poles)
	Bench mark (where shown)		Triangulation station
	Point feature (e.g. Guide Post or Mile Stone)		Pylon, flare stack or lighting tower
	Site of (antiquity)		Glasshouse
	General Building		Important Building



Geo-Environmental Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Oxfordshire	1:10,560	1882	3
Oxfordshire	1:10,560	1900	4
Oxfordshire	1:10,560	1901	5
Berkshire	1:10,560	1914	6
Berkshire	1:10,560	1938	7
Historical Aerial Photography	1:10,560	1947 - 1948	8
Ordnance Survey Plan	1:10,000	1961 - 1962	9
Ordnance Survey Plan	1:10,000	1973	10
Ordnance Survey Plan	1:10,000	1979	11
Ordnance Survey Plan	1:10,000	1990 - 1991	12
Reading	1:10,000	1990	13
Ordnance Survey Plan	1:10,000	1995	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2016	16

Historical Map - Slice A



Order Details

Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



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Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale b. Drawn to scale

Government and Administrative Buildings

Military and Industrial Buildings

Military and Communication Areas

Subway Entrance

Fireproof Building

Prominent Fireproof Building

Non-fireproof Building

Non-fireproof Building (non-dwelling)

Factory, mill, and flour mill, with chimneys

Factory, mill, and flour mill, without chimneys

Power Station, drawn to scale

Hydroelectric Power Station

Radio Station, drawn to scale

Telephone Station, drawn to scale

Abandoned Open-pit Mine or Quarry

Open-pit Salt Mine

Pit

Oil Deposit or Well

Oil Seepage

Tailings Pile

Fuel Storage Tanks

Natural Gas Tank

Bench Mark

Drill Hole

Burial Mound

Triangulation Point on Burial Mound

Single-track Railroad

Double-track Railroad

Railroad and Station Building

Coniferous Forest

Deciduous Forest

Mixed Forest

Lawns

Citrus Orchard

Wet Ground

Scattered Vegetation

243.8 Values for prominent elevations
186.0 Numbers for spot elevations, depth soundings, contour lines, etc.
0.2 Velocity of the current, width of river bed, depth of river
180/12 Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (For reference and phonetic interpretation of map text)

А а (A)	З з (Z)	П п (P)	Ч ч (CH)
Б б (B)	И и (I)	Р р (R)	Ш ш (SH)
В в (V)	Й й (Y)	С с (S)	Щ щ (SHCH)
Г г (G)	К к (K)	Т т (T)	Ъ (-)
Д д (D)	Л л (L)	У у (U)	Ы (Y)
Е е (E)	М м (M)	Ф ф (F)	Ь (')
Ё ё (YO)	Н н (N)	Х х (KH)	Э э (E)
Ж ж (ZH)	О о (O)	Ц ц (TS)	Ю ю (YU or IU)
			Я я (YA or IA)

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

Government and Administrative Buildings

Military and Industrial Buildings

Military and Communication Areas

Subway Entrance

Partly Demolished Buildings

Demolished Buildings

Built-Up Area with Fireproof Buildings Predominant

Built-Up Area with Non-Fireproof Buildings Predominant

Individual Fireproof Building

Prominent Industrial Building

Individual Dwelling, Fireproof

Ruins of an Individual Dwelling

Factory or Mill Chimney

Factory or Mill with Chimney

Factory or Mill without Chimney

Mine or Open Pit Mine

Operating Shaft or Mine

Non-Operating Shaft or Mine

Salt Mine

Tailings Pile

Pit

Stone Quarry

Gas Pump or Service Station

Fuel Storage or Natural Gas Tank

Oil or Natural Gas Derrick

Small Hydroelectric Power Station

Power Station

Transformer Station

Cemetery

Burial Mound (height in metres)

Triangulation Point on Burial Mound

Triangulation Point

Bench Mark

Bench Mark (monumented)

Telegraph Office

Telephone Station

Radio Station

Radio Tower

Airfield or Seaplane Base

Landing Strip

Cut, Fill, Km Post, Plantings

Telegraph/Telephone Lines

Main Highway

Highway under Construction

Improved Dirt Road (former truck road)

Small Bridge, Pipe (Culvert), Tunnel

Double-track Railroad with First Class Station

Dismantled Railroad

Railroad Under Construction

Shore Embankment

River or Ditch with Embankment

Water Gauge

Water Level Mark

Well

Water Reservoir or Rain Water Pit

Spring

Isobath with value

Heavy (Index) Contour Line

Contour Line and Value

Half Contour Line

Spot Elevation Value

Coniferous

Deciduous

Mixed

Scrub

Key to Numbers on Mapping

SU77NW_Reading

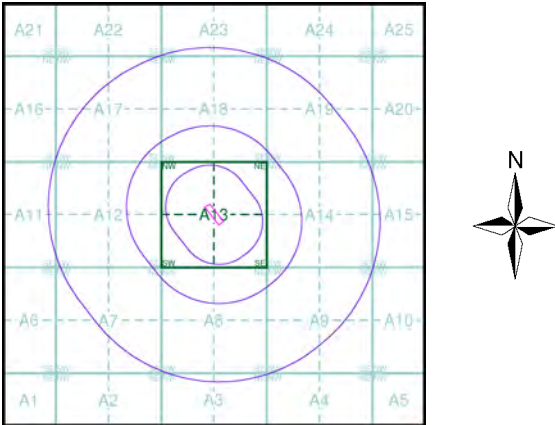
No.	Description
32	Radio Mast
33	Radio Station

Geo-Environmental

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Oxfordshire	1:10,560	1882	3
Oxfordshire	1:10,560	1900	4
Oxfordshire	1:10,560	1901	5
Berkshire	1:10,560	1914	6
Berkshire	1:10,560	1938	7
Historical Aerial Photography	1:10,560	1947 - 1948	8
Ordnance Survey Plan	1:10,000	1961 - 1962	9
Ordnance Survey Plan	1:10,000	1973	10
Ordnance Survey Plan	1:10,000	1979	11
Ordnance Survey Plan	1:10,000	1990 - 1991	12
Reading	1:10,000	1990	13
Ordnance Survey Plan	1:10,000	1995	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2016	16

Russian Map - Slice A



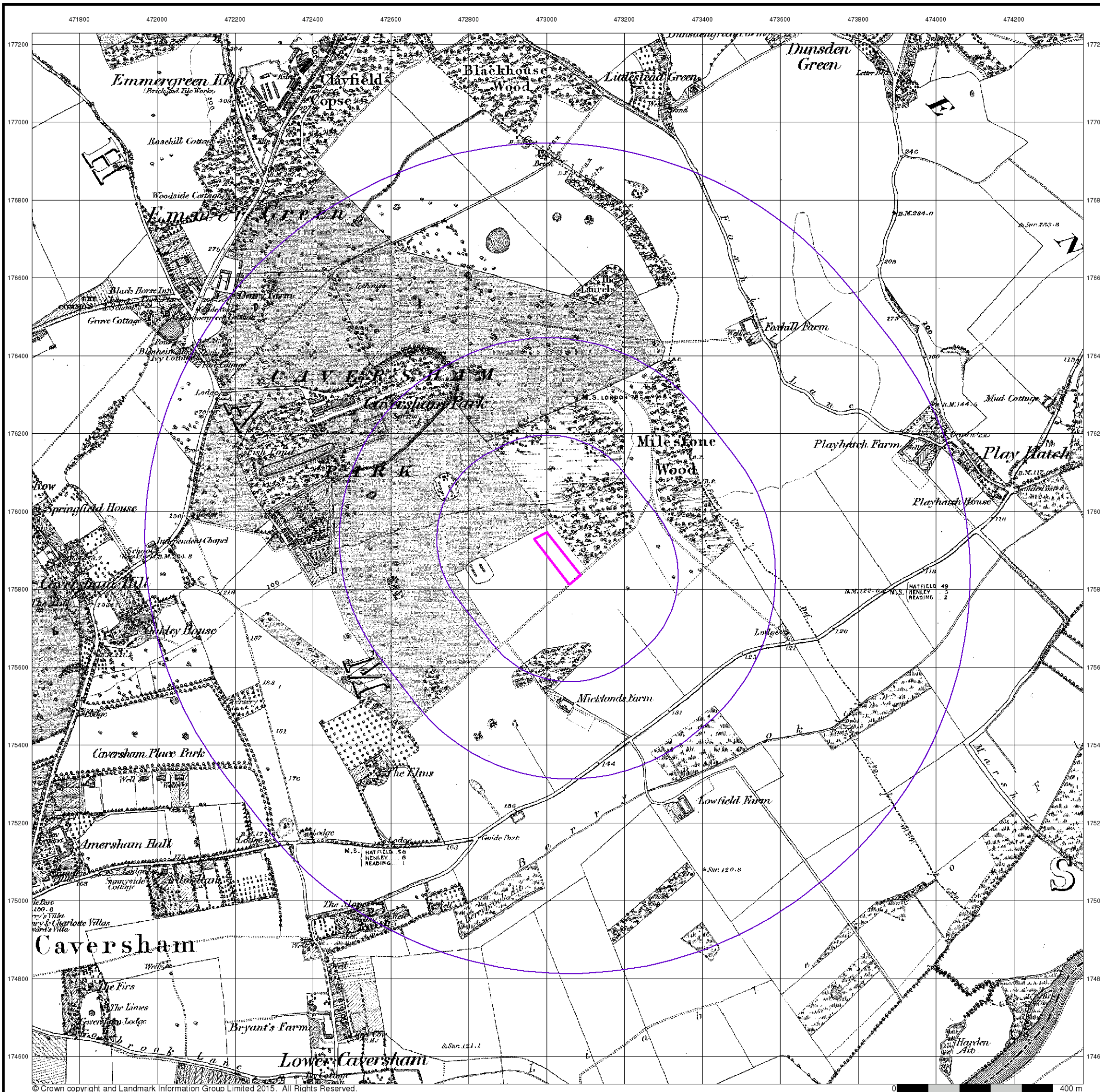
Order Details

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Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
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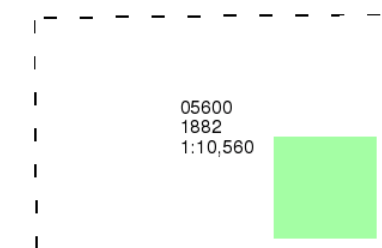
Geo-Environmental Oxfordshire

Published 1882

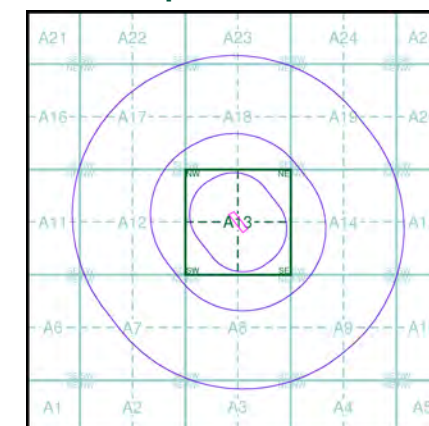
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

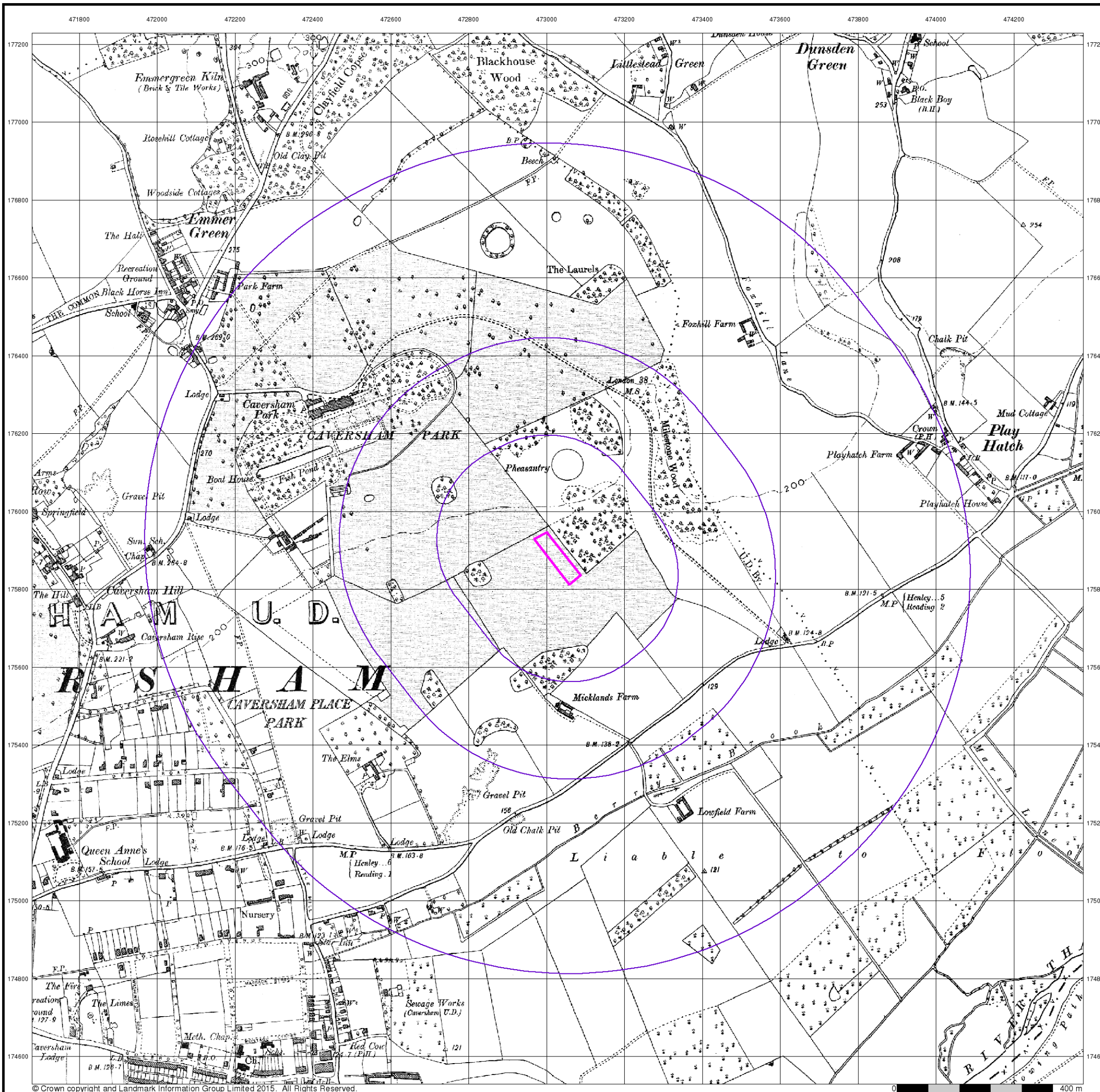
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



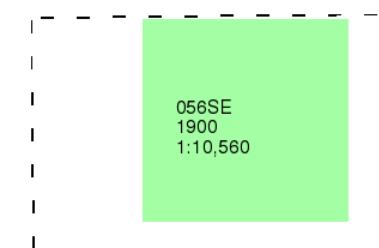
Geo-Environmental Oxfordshire

Published 1900

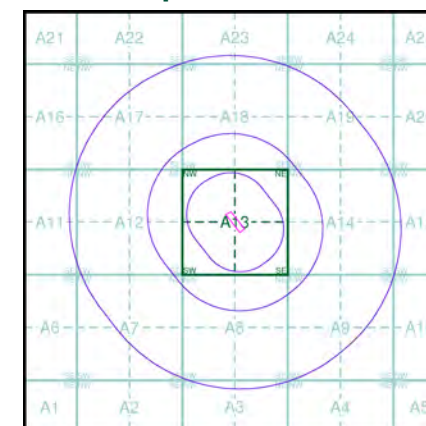
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

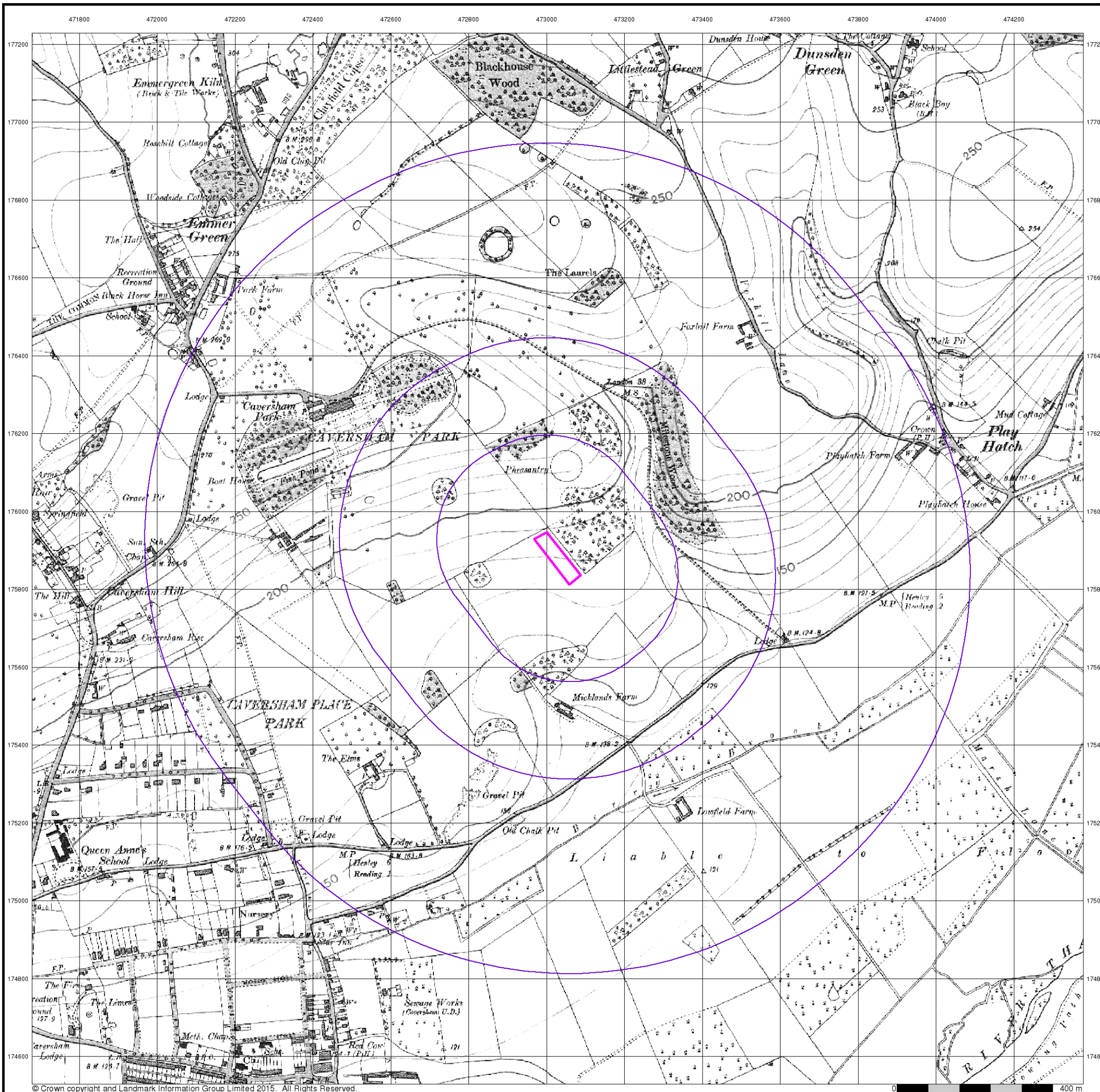
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



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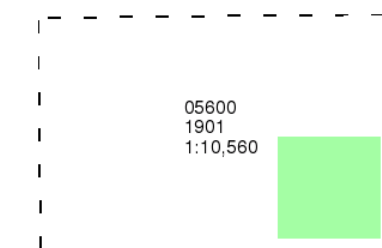
**Geo-Environmental
Oxfordshire**

Published 1901

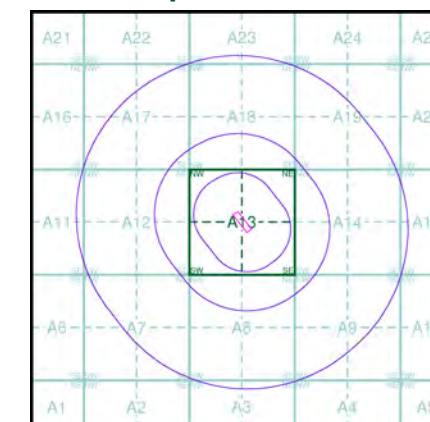
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

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Lowfield Road, Caversham, Reading, RG4 6NL



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Plate 9



Plate 10



Plate 11



Plate 12



Plate 13



Plate 14



Plate 15



Plate 16



Plate 17



Plate 18



Plate 19



Plate 20



Plate 21



Plate 22



Plate 23



Plate 24



Plate 25



Plate 26



Plate 27



Plate 28



Plate 29



Plate 30



Plate 31



Plate 32



Plate 33



Plate 9



Plate 10



Plate 11



Plate 12



Plate 13



Plate 14



Plate 15



Plate 16



Plate 17



Plate 18



Plate 19



Plate 20



Plate 21



Plate 22



Plate 23



Plate 24



Plate 25



Plate 26



Plate 27



Plate 28



Plate 29



Plate 30



Plate 31



Plate 32



Plate 33

Envirocheck[®] Report:

Historical Data Report Datasheet

Order Details:

Order Number:

80998728_1_1

Customer Reference:

GE15373

National Grid Reference:

473030, 175880

Slice:

A

Site Area (Ha):

0.54

Search Buffer (m):

1000

Site Details:

Lowfield Road

Caversham

Reading

RG4 6NL

Client Details:

Ms L Legate

Geo Environmental Services Ltd

Unit 7 Danworth Farm

Cuckfield Road

Hurstpierpoint

West Sussex

BN6 9GL

Report Section	Page Number
Summary	-
Historical Building Plans Information	-
Historical Land Use Information	1
Historical Tanks and Energy Facilities	2
Historical Map List	3
Useful Contacts and Further Information	4

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v50.0



Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Historical Building Plans Information					
Areas Cleared Due To Enemy Action					
Above Ground Fuel Tanks (100m)				n/a	n/a
Asbestos (100m)				n/a	n/a
Benzene/Benzole/Naphtha, Naphthalene/Kerosene (100m)				n/a	n/a
Electricity Generation (100m)				n/a	n/a
Electricity Sub-Station (100m)				n/a	n/a
Gas Industry (100m)				n/a	n/a
Gas Storage (100m)				n/a	n/a
Gas Use (100m)				n/a	n/a
Oil Industry (100m)				n/a	n/a
Oil Storage (100m)				n/a	n/a
Oil Use (100m)				n/a	n/a
Paint based Oils (100m)				n/a	n/a
Paraffin (100m)				n/a	n/a
Petrol and Diesel Industry (100m)				n/a	n/a
Petrol and Diesel Storage (100m)				n/a	n/a
Petrol and Diesel Use (100m)				n/a	n/a
Potential Fuel Gas (100m)				n/a	n/a
Potential Fuel Oil (100m)				n/a	n/a
Potential Fuel Use (100m)				n/a	n/a
Potential Petrol and Diesel (100m)				n/a	n/a
Potential Tanks (100m)				n/a	n/a
Potentially Fuel-related Tanks (100m)				n/a	n/a
Underground Fuel Tanks (100m)				n/a	n/a
Historical Land Use Information					
Former Marshes					
Historical Flood Liabilities	pg 1				1
Potentially Contaminative Industrial Uses (Past Land Use)	pg 1	1		1	4
Potentially Infilled Land (Non-Water)	pg 1			1	3
Potentially Infilled Land (Water)	pg 1				6



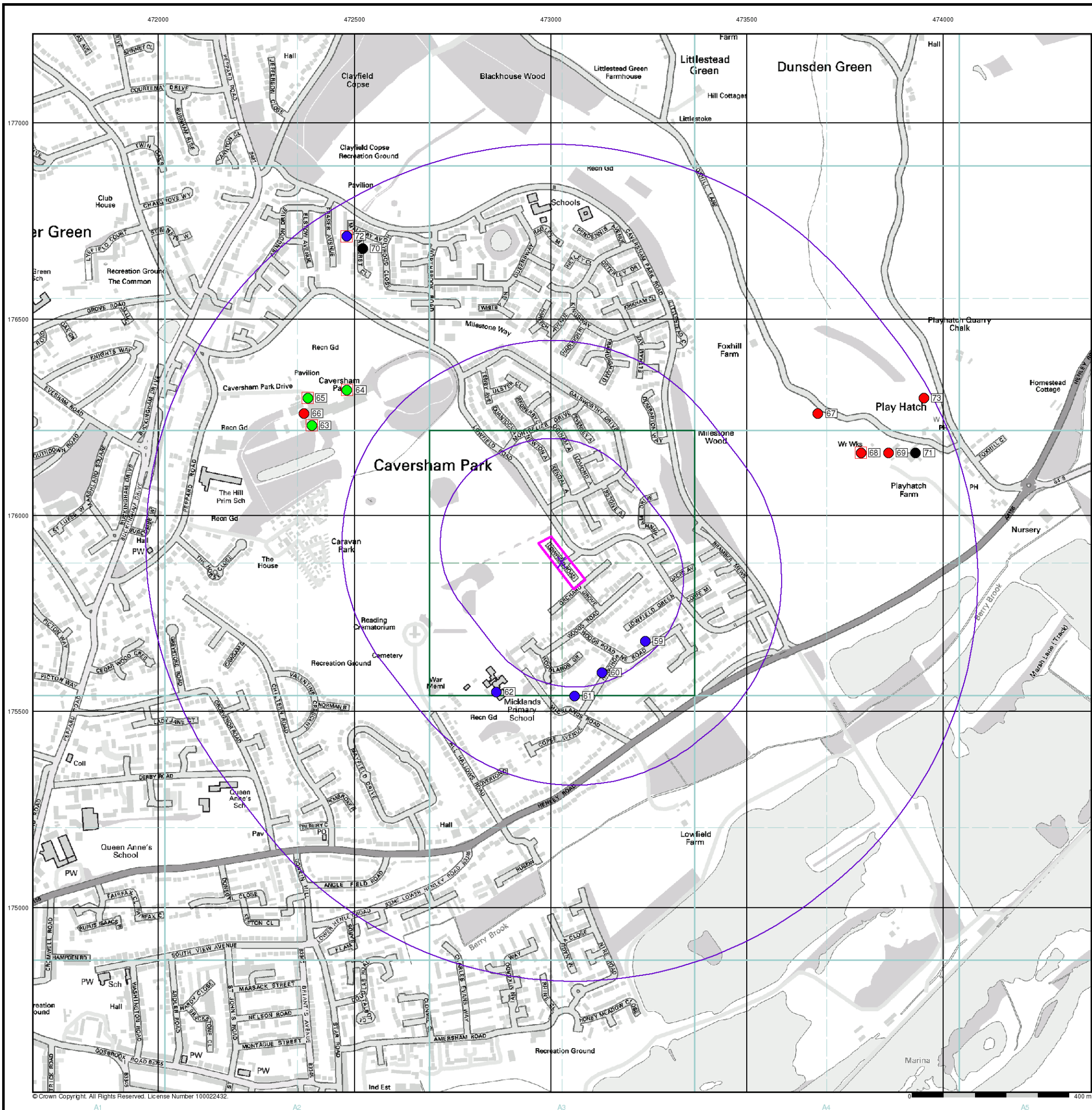
Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Historical Tanks and Energy Facilities					
Electrical Sub Station Facilities (100m)	pg 2		1	n/a	n/a
Electricity Industry Facilities (100m)				n/a	n/a
Gas Industry Facilities (100m)				n/a	n/a
Gas Monitoring Facilities (100m)				n/a	n/a
Miscellaneous Power Facilities (100m)				n/a	n/a
Oil Industry Facilities (100m)				n/a	n/a
Petroleum Storage Facilities (100m)				n/a	n/a
Potential Tanks (100m)				n/a	n/a
Tanks (100m)				n/a	n/a



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	Historical Flood Liabilities Use: Area liable to flood Date of Mapping: 1900	A8SE (S)	708	1	473184 175115
2	Potentially Contaminative Industrial Uses (Past Land Use) Use: Cemetery or Graveyard Date of Mapping: 1932 - 1991	A13NE (NE)	0	1	473028 175880
3	Potentially Contaminative Industrial Uses (Past Land Use) Use: Quarrying of sand & clay, operation of sand & gravel pits Date of Mapping: 1882 - 1900	A8NW (S)	463	1	472851 175399
4	Potentially Contaminative Industrial Uses (Past Land Use) Use: Quarrying of sand & clay, operation of sand & gravel pits Date of Mapping: 1882	A8SW (S)	626	1	472920 175202
5	Potentially Contaminative Industrial Uses (Past Land Use) Use: Quarrying of sand & clay, operation of sand & gravel pits Date of Mapping: 1991	A9NW (SE)	721	1	473502 175243
6	Potentially Contaminative Industrial Uses (Past Land Use) Use: Quarrying of sand & clay, operation of sand & gravel pits Date of Mapping: 1882 - 1900	A7NW (SW)	929	1	472350 175213
7	Potentially Contaminative Industrial Uses (Past Land Use) Use: Quarrying of sand & clay, operation of sand & gravel pits Date of Mapping: 1932	A11NE (W)	960	1	472012 176019
8	Potentially Infilled Land (Non-Water) Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1991	A8NW (S)	463	1	472851 175399
9	Potentially Infilled Land (Non-Water) Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1991	A8SW (S)	626	1	472920 175202
10	Potentially Infilled Land (Non-Water) Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1991	A7NW (SW)	929	1	472350 175213
11	Potentially Infilled Land (Non-Water) Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1991	A11NE (W)	960	1	472012 176019
12	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1900	A7NE (SW)	544	1	472585 175537
13	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1961	A18NW (N)	811	1	473021 176756
14	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1932	A8SW (S)	892	1	472759 174973
15	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1961	A17SW (NW)	935	1	472251 176527
16	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1961	A17NE (NW)	937	1	472516 176749
17	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1914	A7SE (SW)	999	1	472590 174931

Historical Tanks and Energy Facilities

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
18	Electrical Sub Station Facilities Scale of Mapping: 1:1,250 Date of Mapping: 1970	A13NE (NE)	75	1	473097 175945



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Geo-Environmental

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

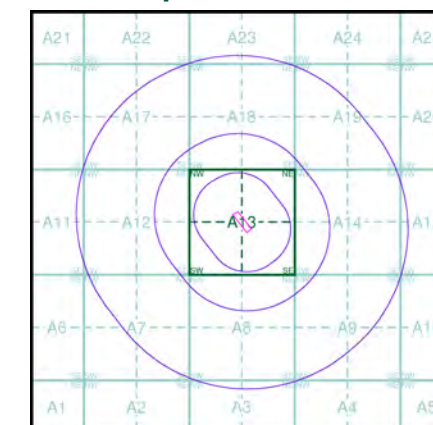
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



Order Details

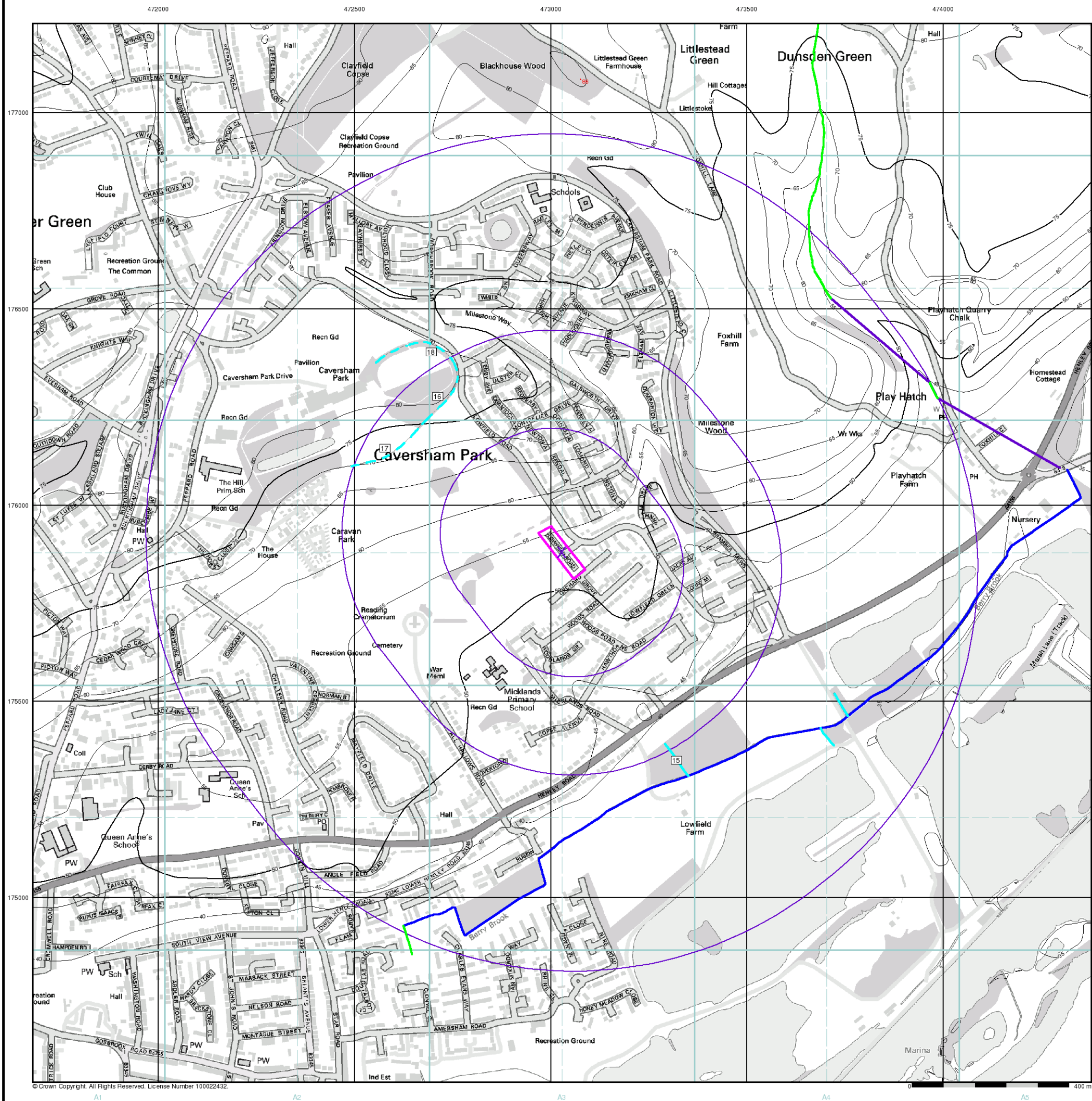
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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Geo-Environmental

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

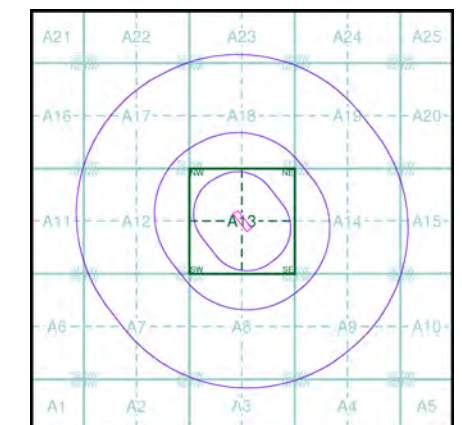
Detailed River Network Data

- | | |
|--------------------------|-------------------------------------|
| Primary River | Extended Culvert (greater than 50m) |
| Secondary River | Underground River (inferred) |
| Tertiary River | Underground River (local knowledge) |
| Canal | Downstream of High Water Mark |
| Canal Tunnel | Downstream of Seaward Extension |
| Undefined River | Not assigned River feature |
| Lake/Reservoir | |
| Offline Drainage Feature | |

Contours (height in metres)

- | | | |
|------------------|-------|---------------------|
| Standard Contour | 105 | MLW Mean Low Water |
| Master Contour | 100 | MHW Mean High Water |
| Spot Height | 167.3 | |

E/NRW Detailed River Network Map - Slice A



Order Details

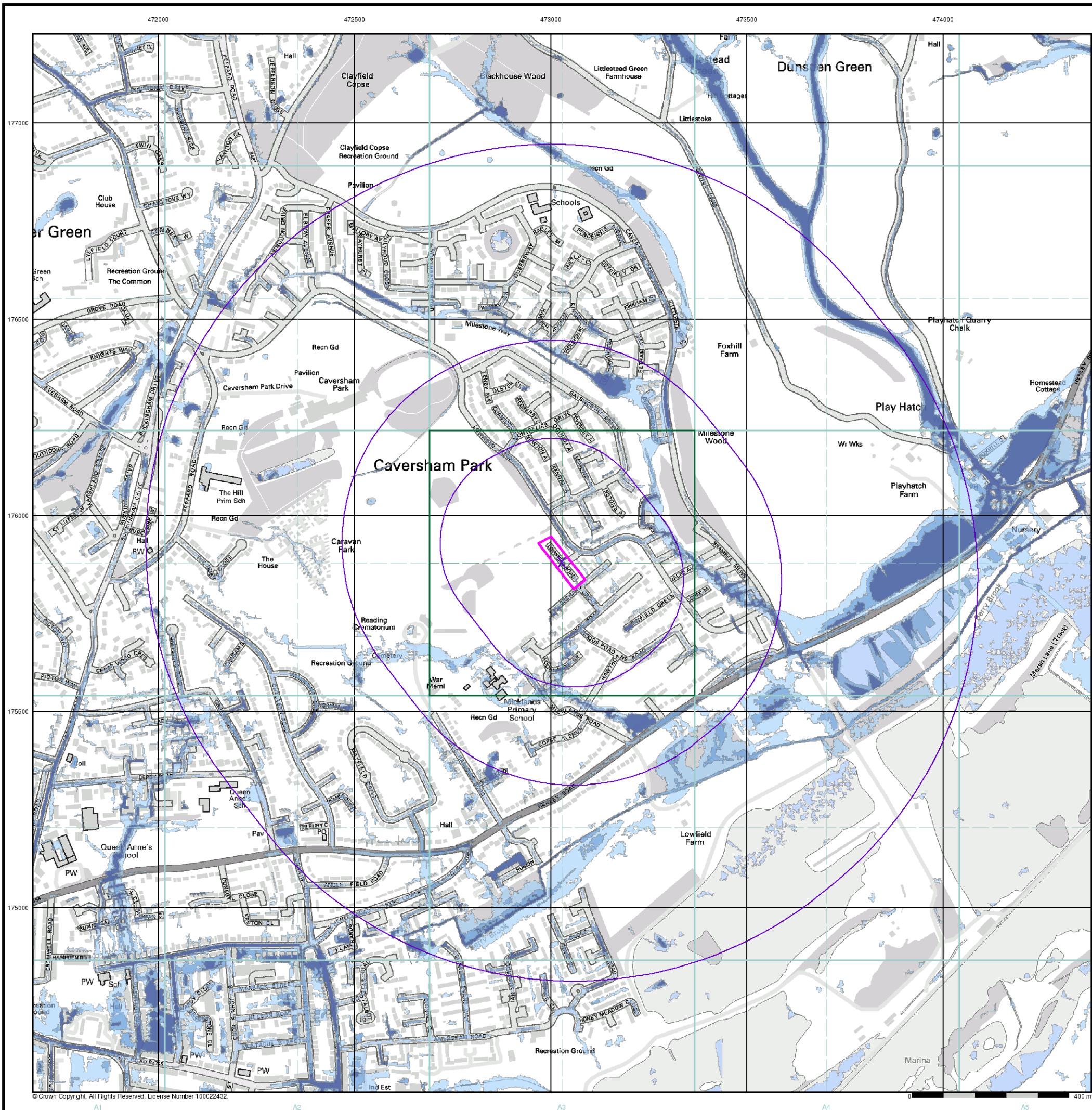
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National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
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Geo-Environmental

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

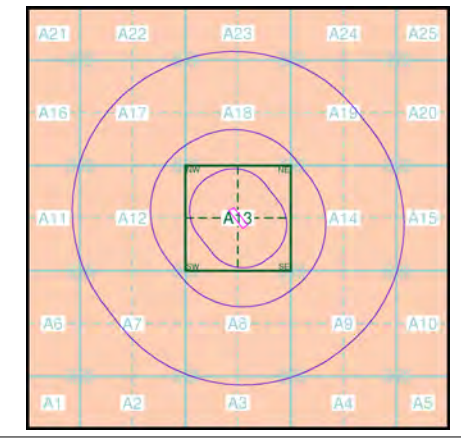
Risk of Flooding from Surface Water

- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

- See the suitability map below
- National to county
 - County to town
 - Town to street
 - Street to parcels of land
 - Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



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Fax: 0844 844 9951
Web: www.envirocheck.co.uk

No Historical Building Plans information available.

The following mapping has been analysed for Historical Land Use Information:

1:10,560	Mapsheet	Published Date
Oxfordshire	056_00	1882
Berkshire	029_SE	1900
Oxfordshire	056_SE	1900
Berkshire	029_SE	1914
Oxfordshire	056_SE	1914
Berkshire	029_SE	1932
Ordnance Survey Plan	SU77NW	1961
Ordnance Survey Plan	SU77SW	1962
1:10,000	Mapsheet	Published Date
Ordnance Survey Plan	SU77NW	1991
Ordnance Survey Plan	SU77SW	1995

The following mapping has been analysed for Historical Tanks and Energy Facilities:

1:2,500	Mapsheet	Published Date
Ordnance Survey Plan	SU7275	1956
Ordnance Survey Plan	SU7276	1956
Ordnance Survey Plan	SU7375	1956
Ordnance Survey Plan	SU7276	1968
Ordnance Survey Plan	SU7376	1968
1:1,250	Mapsheet	Published Date
Ordnance Survey Plan	SU7275NE	1956
Ordnance Survey Plan	SU7276SE	1956
Ordnance Survey Plan	SU7375NW	1956
Ordnance Survey Plan	SU7276SE	1970
Ordnance Survey Plan	SU7375NW	1970
Ordnance Survey Plan	SU7376SW	1973
Ordnance Survey Plan	SU7275NE	1974



Contact	Name and Address	Contact Details
1	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmark.co.uk Website: www.landmark.co.uk

Historical Building Plans Information

This data set contains potentially contaminative features such as asbestos, petrol, oil and tanks captured from Historical Building Plans. The Historical Building Plans were produced by the London-based firm Charles E. Goad Ltd. as fire insurance plans, dating back to 1885. The firm ceased production of fire insurance plans in 1970. Most of the important towns and cities of the British Isles are covered. Historical Building Plans are usually at the scales of 1:480 (1 inch to 40 feet) for the British Isles. They were updated every 5-6 years by means of revision sheets designed to be pasted on to the original plans.

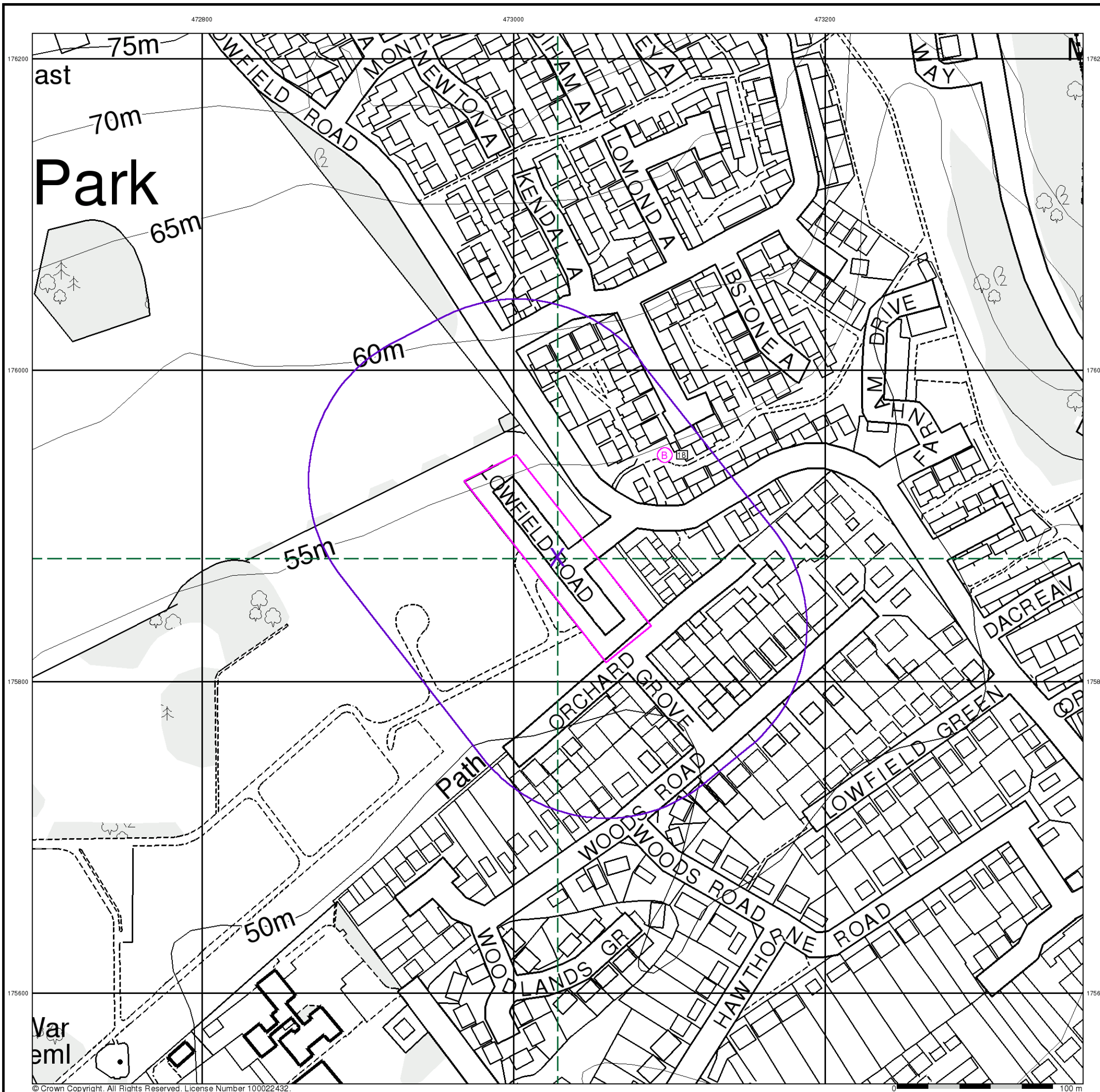
It should be noted that Historical Building Plans are only available for certain major towns and cities and in some cases there may only be partial coverage of the search area. It cannot therefore be assumed that the absence of responses under the Historical Building Plans section of this report indicates that no hazards exist. Please check the Historical Building Plans Map List table in the Historical Map List section of this report to establish if Historical Building Plans are available for this search area.

Historical Land Use Information

Landmark's Historical Land Use Data is the result of combined analysis of historical map data captured at 1:10,560 and 1:10,000. A unique comprehensive database of Historic Land Use from the 1840's to 1996 it includes 67 different types of potentially contaminated past industrial land use. This entailed analysing over 60,000 maps and is drawn from at least four, and up to six historical map editions. In addition a seventh layer was also created, known as the land use layer, containing areas of infilled land which are plotted via comparison between two or more map editions.

Historical Tanks and Energy Facilities

In addition to HLU, additional analysis uncovered some of the most dangerous sources of contamination (past and present tanks, petrol storage, oil, gas, electricity, miscellaneous facilities). This data set covers over 390,000 Historical Tanks and Energy facilities in Great Britain and was captured from post war 1:2500 and 1:1250 Ordnance Survey historical mapping covering a period from 1943 to 1996.



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Geo-Environmental

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

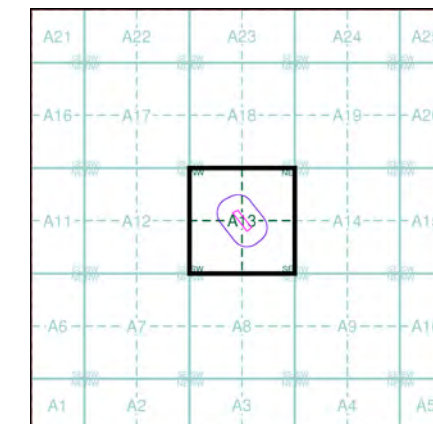
Historical Building Plans

- Area Cleared due to Enemy Action
- Asbestos
- Above Ground Fuel Tanks
- Benzene/Benzole/Naphtha, Naphthalene/Kerosene
- Electricity Generation
- Electricity Sub-Stations
- Gas Industry
- Gas Storage
- Gas Use
- Oil Industry
- Oil Storage
- Oil Use
- Paint based Oils
- Paraffin
- Petrol and Diesel Industry
- Petrol and Diesel Storage
- Petrol and Diesel Use
- Potential Fuel Gas
- Potential Fuel Oil
- Potential Fuel Use
- Potential Petrol and Diesel
- Potential Tanks
- Potentially Fuel-related Tanks
- Underground Fuel Tanks

Historical Tanks and Energy Facilities

- Electrical Sub Station Facility
- Electricity Industry Facility
- Gas Industry Facility
- Gas Monitoring Facility
- Miscellaneous Power Facility
- Oil Industry Facility
- Petroleum Storage Facility
- Potential Tank
- Tank

Historical Data Report - Segment A13



Order Details

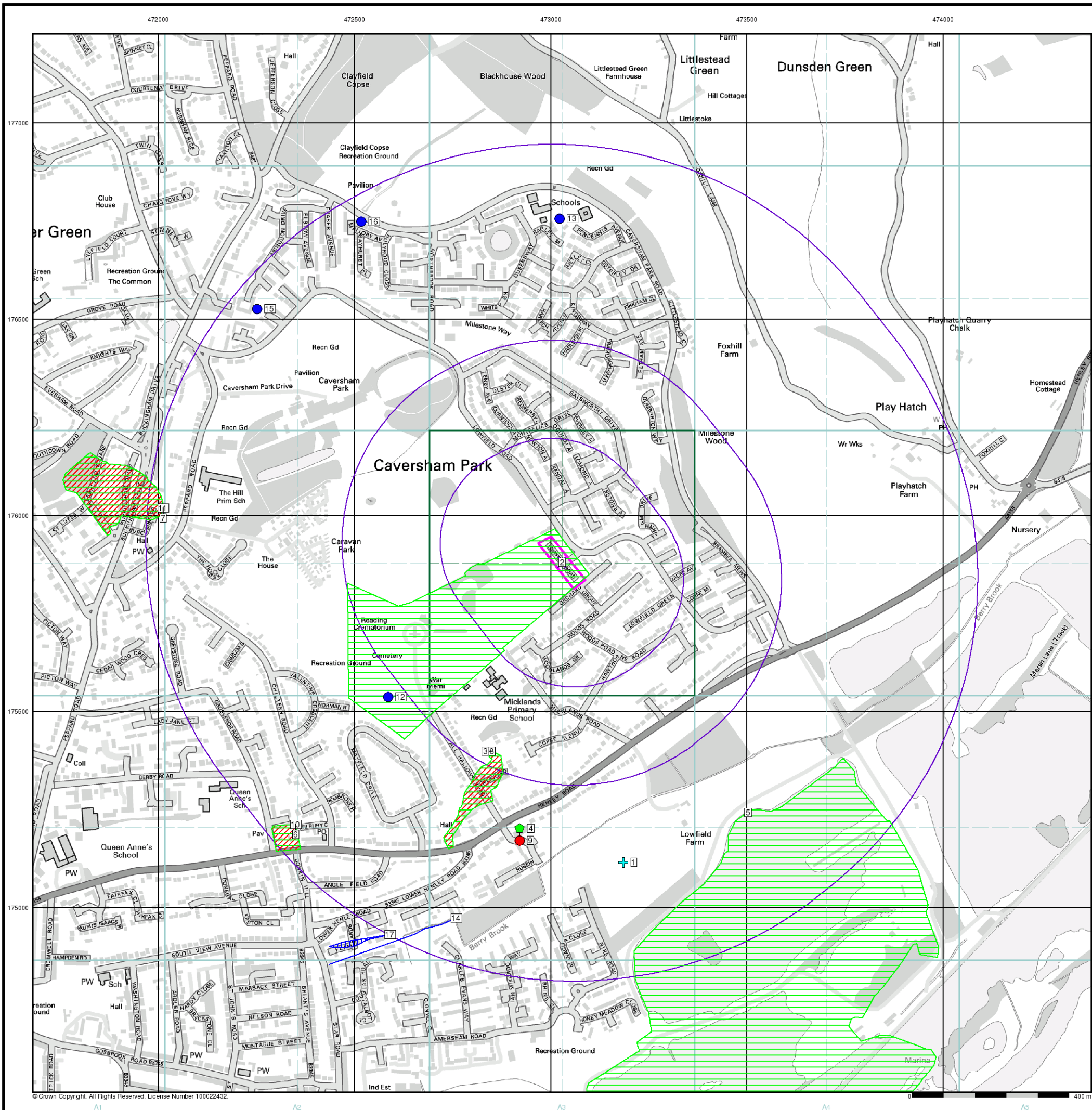
Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Plot Buffer (m): 100

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



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Geo-Environmental

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

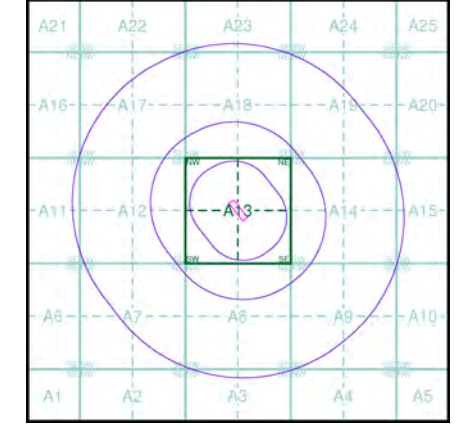
Historical Building Plans

- Area Cleared due to Enemy Action

Historical Land Use

- Former Marsh
- Historical Flood Liability
- Historical Flood Liability (Location)
- Potentially Contaminative Industrial Use (Past Land Use)
- Potentially Contaminative Industrial Use (Past Land Use) (Linear)
- Potentially Contaminative Industrial Use (Past Land Use) (Location)
- Potentially Infilled Land (Non-Water)
- Potentially Infilled Land (Non-Water) (Linear)
- Potentially Infilled Land (Non-Water) (Location)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water) (Linear)
- Potentially Infilled Land (Water) (Location)

Historical Data Report - Slice Map A



Order Details

Order Number: 80998728_1_1
Customer Ref: GE15373
National Grid Reference: 473030, 175880
Slice: A
Site Area (Ha): 0.54
Search Buffer (m): 1000

Site Details

Lowfield Road, Caversham, Reading, RG4 6NL



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Your ref: PO0000513

Our ref: 37700/CBH/CNE/AD/OM



18 March 2016

Geo-Environmental Services Ltd
Unit 7
Danworth Farm
Cuckfield Road
Hurstpierpoint
West Sussex
BN6 9GL

Peter Brett Associates LLP
Caversham Bridge House
Waterman Place, Reading
Berkshire RG1 8DN
T: +44 (0)118 950 0761
F: +44 (0)118 959 7498
E: reading@peterbrett.com

Attn: Laura Legate

Dear Ms Legate

RE: PBA NATURAL AND MINING CAVITIES DATABASE SEARCHES FOR A SITE AT LOWFIELD ROAD, CAVERSHAM, READING, RG4 6NL

We refer to your email dated 13 March 2016, regarding the above. We thank you for your instructions to carry out natural and mining cavities database searches for the above named site.

The natural and mining cavities database searches have been carried out for the site centred at National Grid Reference SU 730 758 derived from the address as provided.

NATURAL CAVITY RECORDS

A search of the PBA Natural Cavities Database indicated that there are seven recorded natural cavity locations within 1200m of the site centre as shown in the table below.

Approximate NGR	Approximate distance from site centre (m)	Recorded Location	Geology	Natural Cavity Details	Source
SU 729 762	410 NNW	Montpellier Drive, Caversham Park Village, Caversham, Berkshire	Solid: Lambeth Group, Chalk Group	1 x Sinkhole 1 x Solution Pipe	<i>Soil Mechanics Ltd</i>
SU 7300 7650	700 N	Harlech Avenue, Caversham Park Village, Emmer Green, Berkshire	Solid: Chalk Group	1 x Sinkhole	<i>Pat Chillingworth</i>

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Approximate NGR	Approximate distance from site centre (m)	Recorded Location	Geology	Natural Cavity Details	Source
SU 730 766	800 N	Kingsway/ Thetford Mews, Caversham Park Village, Emmer Green, Reading	Superficial Geology: Head Gravels Solid: Chalk Group	1 x Swallow Hole	<i>Whitaker, W. 1872. The geology of the London Basin, Volume 4, Part 1. British Geological Survey Memoir (Sheet 220, 221, 240). HMSO, London.</i>
SU 7277 7670	930 NNW	Rowallan Close, Caversham park Village, Caversham, Berkshire	Superficial Geology: Head Gravels Solid: Lambeth Group, Chalk Group	1 x Sinkhole 1 x Solution Pipe	<i>Edmonds, C. N., 1987. The engineering geomorphology of karst development and the prediction of subsidence risk upon the chalk outcrop in England. Unpublished PhD thesis, University of London</i>
SU 7378 7650 SU 7368 7728 SU 7376 7724 SU 7392 7692 SU 7425 7672 SU 7416 7661 SU 7392 7676 SU 7372 7680	1050 NE	Dunsden Green Area, Emmer Green, Oxfordshire	Solid: Lambeth Group, Chalk Group	2 x Solution Pipes	<i>Edmonds, C. N., 1987. The engineering geomorphology of karst development and the prediction of subsidence risk upon the chalk outcrop in England. Unpublished PhD thesis, University of London</i>
SU 7312 7690 SU 7316 7770 SU 7324 7700 SU 7328 7692	1110 N	West of Littlestead Green, Emmer Green, Oxfordshire	Superficial Geology: Head Gravels Solid: Lambeth Group, Chalk Group	10 x Solution Pipes	<i>Edmonds, C. N., 1987. The engineering geomorphology of karst development and the prediction of subsidence risk upon the chalk outcrop in England. Unpublished PhD thesis, University of London</i>
SU 7280 7690 SU 7266 7702 SU 7270 7705 SU 7286 7692	1120 N	Kiln Road/ Caversham Park Road/ Foxhill Lane, Emmer Green, Berkshire	Superficial Geology: Head Gravels Solid: Lambeth Group, Chalk Group	4 x Solution Pipes	<i>Edmonds, C. N., 1987. The engineering geomorphology of karst development and the prediction of subsidence risk upon the chalk outcrop in England. Unpublished PhD thesis, University of London</i>

MINING CAVITY RECORDS

A search of the PBA Mining Cavities Database indicated that there are six recorded mining cavity locations within 1500m of the site centre as shown in the table on the next page.



Approximate NGR	Approximate perpendicular distance from route (m)	Recorded Location	Geology	Mining Cavity Details	Source
Vicinity of SU 741 764	1250 ENE	Play Hatch Quarry, Play Hatch, Oxfordshire	Superficial Geology: Infilled Ground Solid: Chalk Group	Adit Entry Chalk Mine	<i>Peter Brett Associates</i>
Centred at SU 7227 7694	1350 NNW	Kiln Road/ Peppard Road, Emmer Green, Berkshire	Superficial Geology: Infilled Ground Solid: Lambeth Group, Chalk Group	Hanover Mine Shaft Entry Pillar and Stall Chalk Mine	<i>Peter Brett Associates LLP & Chelsea Speleological Society, Volume 11, page 34</i>
Vicinity of SU 716 761	1430 WNW	Southdown Road, Caversham, Berkshire	Superficial Geology: Black Park Gravel Solid: Lambeth Group, Chalk Group	Possible Crown Hole Collapse	<i>Edmonds, C. N., 1987. The engineering geomorphology of karst development and the prediction of subsidence risk upon the chalk outcrop in England. Unpublished PhD thesis, University of London & Reading Borough Council</i>
Centred at SU 7230 7705	1430 NNW	Jefferson Close, Emmer Green, Berkshire	Superficial Geology: Infilled Ground Solid: Lambeth Group, Chalk Group	Shaft Entry Chalk Mining	<i>Peter Brett Associates LLP</i>
SU 7155 7615	1490 WNW	Southdown Road/ Rotherfield Way, Caversham, Berkshire	Solid: Lambeth Group, Chalk Group	2 x Adit Entries Chalk Mines	<i>Peter Brett Associates LLP & Reading Borough Council</i>
Vicinity of SU 739 770	1500 NE	Dunsden Green, Oxfordshire	Solid: Lambeth Group, Chalk Group	Chalkwell	<i>Chelsea Speleological Society, Volume 23, page(s), 17, 19</i>

While there are no records pertaining to natural or mining cavities within your site footprint, we would draw your attention to the fact that the absence of existing records for the site should not be considered as conclusive.

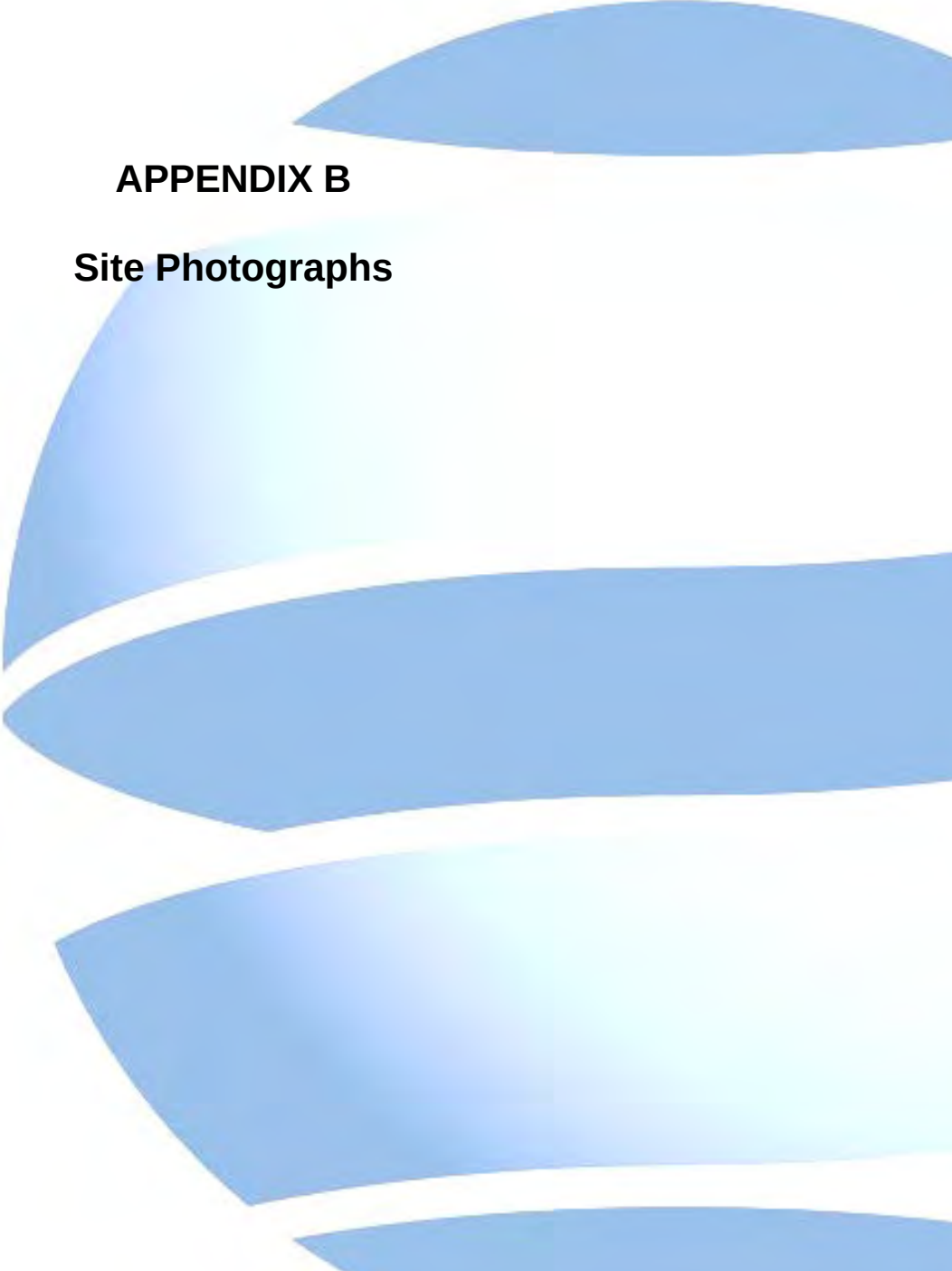


We trust that the information presented will assist you with your project, but if you have any queries then please do not hesitate to contact the writer. Please note we will invoice this work at the end of the month and that our terms of payment are strictly 28 days net.

Yours sincerely

Asmi Desai
Principal Engineer
For and on behalf of
PETER BRETT ASSOCIATES LLP

Whilst all reasonable efforts are made to check that the information contained in the cavity databases is accurate we do not warranty that the data is complete or error free. The information is based upon our own researches and those collated from a number of external sources and is continually being augmented and updated. IN NO EVENT SHALL PETER BRETT ASSOCIATES LLP BE LIABLE FOR ANY LOSS OR DAMAGE INCLUDING, WITHOUT LIMITATION, INDIRECT OR CONSEQUENTIAL LOSS OR DAMAGE ARISING FROM THE USE OF THIS DATA.



APPENDIX B

Site Photographs



Plate 1



Plate 2



Plate 3



Plate 4



Plate 5



Plate 6



Plate 7



Plate 8



Plate 9



Plate 10



Plate 11



Plate 12



Plate 13



Plate 14



Plate 15



Plate 16



Plate 17



Plate 18



Plate 19



Plate 20



Plate 21



Plate 22



Plate 23



Plate 24



Plate 25



Plate 26



Plate 27



Plate 28



Plate 29



Plate 30



Plate 31



Plate 32



Plate 33