

Raglan Design & Build Ltd

St George's Road, Reading
Preliminary Geo-Environmental and
Geotechnical Assessment

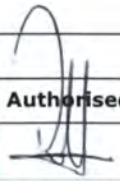


TWEEDIE EVANS CONSULTING LIMITED

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St George's Road, Reading

Preliminary Geo-Environmental and Geotechnical Assessment

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1 INTRODUCTION**1.1 Terms of Reference**

- 1.1.1 Tweedie Evans Consulting Ltd (TEC) has been appointed by Raglan Design & Build Ltd to undertake a preliminary geo-environmental and geotechnical assessment of St George's Church, St George's Road, Reading. All works were undertaken in accordance with an email instruction dated 14th March 2013 received from James Bradbury.

1.2 Background

- 1.2.1 The site is located off St George's Road, Reading (Figure 1). The centre of the site is at National Grid Reference 469040, 173660 and it covers an area of approximately 0.25 Hectares (Ha). The nearest postcode is RG30 2RG.
- 1.2.2 The site currently comprises a rectangular parcel of land containing a large brick built church and a second smaller building with associated hard and soft landscaping.
- 1.2.3 The proposed development is understood to comprise an extension to the existing church hall, demolition of current parish buildings on site and the construction of a number of one and two bed residential properties (Figure 2).
- 1.2.4 The aim of these works is to provide information on geo-environmental and engineering conditions and constraints associated with the site with regard to the proposed development.

1.3 Scope of Works

- 1.3.1 The scope of work undertaken as part of this report is presented below:
- Preliminary Risk Assessment. This phase of assessment involves development of an initial site conceptual model, based on desk study research and a site reconnaissance survey, in order to establish whether or not there are potentially unacceptable risks.
 - Preliminary Geotechnical Assessment. General recommendations regarding likely engineering abnormalities are provided on the basis of the findings of an initial assessment during the desk study, together with preliminary foundation design recommendations for the proposed development.
- 1.3.2 The above scope of work has been undertaken in accordance with current guidance such as CLR 11 '*Model Procedures for the Management of Land Contamination*' (Environment Agency, 2004) and BS10175:2011.
- 1.3.3 The report is presented in the following format.
- Preliminary Risk Assessment:
 - Section 2 - Site Description
 - Section 3 – Site History
 - Section 4 - Environmental Setting
 - Section 5 – Outline Conceptual Model
 - Preliminary Geotechnical Assessment:
 - Section 6 – Ground Engineering
 - Section 7 - Conclusions and Recommendations

2 SITE DESCRIPTION**2.1 Site Location**

- 2.1.1 The site is located within a predominantly residential area and is bound by the following features (Table 2.1):

Table 2.1: Site Boundary Features

Direction from Site	Description
North	To the north of the site are a number of residential properties situated along St Georges Road.
East	To the east of the site are a number of residential properties situated along Beecham Road.
South	The south of the site is bound by further residential properties.
West	To the west of the site are a number of residential properties situated along St George's Road and St George's Terrace.

2.2 Land Use and Site Condition

- 2.2.1 A site reconnaissance survey was undertaken on 20th March 2013. A summary of the observations is presented below. Photographs taken during the site reconnaissance survey are presented in Appendix A. It is noted that no access on to site was permitted during the site walkover survey and all observations made during the site reconnaissance were made from the site perimeter.

Current Site Use

- 2.2.2 The site was observed to comprise a parcel of land containing a single storey building, understood to be utilised as a church hall (Photograph 1) associated with the brick-built church in the west. A tarmac hard standing driveway provides access on to the site was observed with a parking area laid to bare soil. The remaining site area was observed to be laid to soft landscaping (grass). With areas of bare earth surrounding the access drive.
- 2.2.3 It is noted that due to access restrictions, observations to the back of the adjacent church were limited. In this area of the site, a raised concrete hard standing slab was observed, potentially comprising the foundations of a demolished building.
- 2.2.4 In addition, it is understood that an electricity substation is present immediately close to the eastern boundary of the site. No observations of this could be made during the site reconnaissance survey.

Site Topography

- 2.2.5 The site was observed to be generally flat and level, although the area as a whole is located on a gentle slope, sloping up to the south-west.
- 2.2.6 Ordnance Survey mapping indicates the site to be at approximately 50m AOD (above ordnance datum).

Hard and Soft Landscaping

- 2.2.7 Much of the site was observed to be laid to hardstanding, with within the building footprint of the existing buildings or tarmacadam hard standing of the access drive. The remainder of the site was observed to be laid generally to soft landscaping (grass). A number of semi-mature trees and shrubs were observed in the soft landscaping areas of the site.

Fuel Storage

- 2.2.8 No visual evidence of fuel storage, either above or below ground, was observed during the site reconnaissance survey.

Hazardous Chemicals and Waste Materials Storage

- 2.2.9 No evidence of hazardous chemical or waste materials storage was observed on site during the walkover survey. A single domestic waste bin was observed adjacent to the church hall building.

Asbestos Containing Materials

- 2.2.10 No visual evidence of potential asbestos containing material (ACM) was observed at the ground surface. Notwithstanding this, given the potential age and nature of the current and historic building structures on site, the presence of this material cannot be fully discounted.

Site Drainage

- 2.2.11 Localised areas of standing water were observed in the grassed area of the site. A surface water drain was observed within the tarmacadam hard standing area of the site. In addition a number of manhole covers were observed at the ground surface (Photograph 2).

Evidence of Potential Contamination

- 2.2.12 No visual or olfactory evidence of potentially significant contamination was observed at the ground surface during the site reconnaissance survey.

2.3 Proposed Development

- 2.3.1 The proposed development is understood to comprise an extension to the existing church, demolition of current parish buildings on site and the construction of a number of one and two bed residential properties within a single structure (Figure 2).

3 SITE HISTORY**3.1 Introduction**

3.1.1 Details of the site history have been obtained through the review of historical Ordnance Survey (OS) mapping. The mapping reviewed is contained within Appendix B.

3.1.2 It is not the purpose of this section to provide a comprehensive account of development history, but only to detail those factors that are or could be relevant to the potentially contaminative history of the site and surrounds and the development of an outline site conceptual model.

3.2 Site History

3.2.1 The following represents a summary of potentially significant features recorded within the site area (Table 3.1).

Table 3.1: Site Features

Site Features	Dates
The site is shown to be undeveloped during this time. Mapping from 1881 indicates the site was divided into two sections – a large rectangular parcel of land within the western section of the site and a smaller irregular shaped parcel of land within the eastern section of the site.	1881 - 1883
Mapping indicates the Church of St George was built upon the site during this period with a second smaller hall located within the southern section of the site.	1883 - 2012

3.2.2 In addition to the above given the age of the church and hall (both being present by 1899 mapping) it cannot be discounted that heating has potentially historically been provided by a oil fired boiler. The location of any such a boiler and therefore associated fuel storage, if present, whether on site or in close vicinity is not known

3.3 Neighbouring History

3.3.1 The land uses within the immediate vicinity of the site have been considered. The site is located in a generally residential area but based upon the reviewed map information the following potentially significant features have been identified (Table 3.2).

Table 3.2: Surrounding Features

Surrounding Features	Dates	Distance	Direction
Military Barracks	1881 – 2012	~90m	Northeast
Cycle Works (later soft drink manufacturer)	1899 - 1978	~20m	West
Hospital	1899 - 1938	~200m	East
Works (later Depot)	1959 - 2012	~200m	North
Boilery and Warehouse (later Depot)	1961 - 1978	~200m	Northwest
Electrical Sub Station	1968 - 1993	Adjacent	East
Garage	1968 - 1993	~120m	North

4 ENVIRONMENTAL SETTING**4.1 Information Sources**

- 4.1.1 Environmental information for the site has been obtained through review of a Envirocheck® report for the site. This report provides extensive information, obtained from regulatory and commercial sources, regarding the environmental setting of the site. The Envirocheck® report has been included within Appendix C.

4.2 Geology and Hydrogeology

- 4.2.1 Published geological and hydrogeological information indicate the following geological sequence at the site:

Table 4.1: Geological and Hydrogeological Setting

Geological Unit	Thickness	Aquifer Status
Head	Unknown	Secondary A
Seaford Chalk and Newhaven Chalk Formation	Unknown	Principal

Geology

- 4.2.2 The published geology of the site is shown on sheet No. 268 Reading (Solid and Drift Edition) as comprising Head Deposits underlain by the Seaford Chalk and Newhaven Chalk Formation. The BGS describes the Seaford Chalk formation as firm white chalk with conspicuous semi-continuous nodular and tabular flint seams, whilst the Newhaven Chalk is less flinty with numerous marl seams. The Head deposits have been described as gravel, sand and clay.
- 4.2.3 There are no available borehole records available within proximity of the site.
- 4.2.1 Information provided within the Envirocheck® report estimates natural arsenic levels within rural soil at the site to be <15mg/kg, with cadmium levels at <1.8mg/kg, chromium between 60-90mg/kg, nickel between 15-30mg/kg and lead at <150mg/kg. All of these levels are noted to be below screening values for human health for a residential end use.

Ground Gas Generation

- 4.2.2 In accordance with current guidance (Wilson, Card and Haines (2009)) the ground gas generation potential of the natural strata reported to underlie the site may be classified as being very low with a very low reported level of risk for on site development and a negligible risk of lateral migration.
- 4.2.3 Notwithstanding this, it must be noted that any made ground potentially on site may provide a potential source of ground gas generation, subject to thickness and composition.
- 4.2.4 The site is reported to be located within a lower probability radon area as less than 1% of homes are above the action level. As a result of this, no radon protective measures are required within the construction of new homes or extensions.

Hydrogeology

- 4.2.5 The Envirocheck® report identifies the underlying bedrock geology (Seaford Chalk and Newhaven Chalk Formations) as a Principal Aquifer. The underlying superficial Head Deposits as a Secondary A Aquifer. The Environment Agency classifies a Principal and Secondary A Aquifer as follows:
- **Principal Aquifer:** *These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer;*
 - **Secondary A Aquifer:** *permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;*
- 4.2.6 Any potential hydraulic gradient on site is considered to flow in a generally northern direction, topographically down gradient towards the River Thames.
- 4.2.7 The site is reported to be located within an area that has soils of high leaching potential. Although this information is based on fewer observations than elsewhere and as a result a worst case vulnerability classification has been assumed, until proven otherwise.
- 4.2.8 There are no reported groundwater abstraction licenses within 500m of the site.
- 4.2.9 The site is not reported to be located within proximity of a Source Protection Zone (SPZ).
- 4.2.10 Based upon the above information the geological and hydrogeological setting of the site is considered to be of **Low to Moderate Sensitivity**.

4.3 Hydrology

- 4.3.1 The closest surface water course to the site is a small pond feature approximately 900m to the south of the site. The river Thames is located approximately 1km to the north of the site. The Environment Agency website classifies the River Thames as follows:

Table 4.2: Surface Water Features

Name	Quality ¹	Distance	Direction
River Thames	Current Ecological Quality: Moderate Potential; Current Chemical Quality: Good; 2015 Predicted Ecological Quality: Moderate Potential; 2015 Predicted Chemical Quality: Good.	1km	North

- 4.3.2 There are no reported surface water abstractions within proximity of the site.
- 4.3.3 There are no reported licensed discharge consents within proximity of the site.
- 4.3.4 Pollution incidents to surface waters within 500m of the site are presented in Table 4.3.

Table 4.3: Pollution Incidents

Receiving Water	Pollution Incident	Distance	Direction
Unknown	Pollutant: Oils – unknown; Date: 9 th June 1994; Severity: Category 3 (Minor) Incident	~390m	West

- 4.3.5 It is recorded within the Envirocheck[®] report that the site does not lie within an area at risk of flooding and extreme flooding from river or sea without defences.
- 4.3.6 Given the above information, the hydrology of the site is considered to be of **Low Sensitivity**.

4.4 Environmental Data

- 4.4.1 Additional environmental data from the Envirocheck[®] report for the site is summarised in Table 4.4.

Table 4.4: Additional Environmental Data Summary

Category	0-250m	250-500m	Details
<i>Authorisations, Incidents and Registers</i>			
Integrated Pollution Controls (IPC)	-	-	None Recorded
Integrated Pollution Prevention and Control (IPPC)	-	-	None Recorded
Local Authority Integrated Pollution Prevention and Control	-	-	None Recorded
Local Authority Pollution Prevention and Controls	2	-	~170m northeast – PG6/46 Dry Cleaning (permitted); ~185m north – PG6/16 Printworks (authorised).
Local Authority Pollution Prevention and Control Enforcements	-	-	None Recorded
Prosecutions Relating to Authorised Processes and Controlled Waters	-	-	None Recorded

Category	0- 250m	250- 500m	Details
Registered Radioactive Substances	-	-	None Recorded
COMAH and NIHHS Sites	-	-	None Recorded
Planning Hazardous Substance Consents and Enforcements	-	-	None Recorded
Enforcement and Prohibition Notices	-	-	None Recorded
Substantiated Pollution Incident Register	-	-	None Recorded
<i>Waste Management</i>			
Landfills and/or other waste management sites	-	-	None Recorded
<i>Current Land Uses</i>			
Potentially contaminative land uses	7	33	~135m north – Car body repairs; ~135m north – Car dealers (inactive); ~170m north – Damp and rot control; ~170m north – Transformer manufacturer; ~200m northeast – Sports equipment manufacturer (inactive); ~230m north – Tyre dealers (inactive); 230m north – Garage services (inactive); ~250m northeast – Garage services (inactive); ~250m northeast – Commercial cleaning services (inactive); ~250m northeast – Garage services; ~270m north – Printers (inactive); ~305m north – Sheet metal work; ~305m north – Potteries equipment (inactive);

Category	0- 250m	250- 500m	Details
Potentially contaminative land uses (continued)			~315m southwest – Cleaning services (inactive); ~330m southeast – Car breakdown and recovery (inactive); ~345m northeast – Commercial cleaning services; ~345m north – Tyre dealers (inactive); ~400m northwest – Car repairs (inactive); ~400m northwest – Garage services; ~415m east – Car body repairs (inactive); ~450m north – Equipment testing (inactive); ~455m east – Fireplaces (inactive); ~460m northwest – Garage services; ~460m northwest – Engineers (inactive); ~460m northwest – Garage services; ~460m northwest – Garage services; ~465m southeast – Printers (inactive); ~470m east – Printers (inactive); and ~490m east – Garage services (inactive).
Petrol and fuel sites	-	1	~420m northwest – Reading service station (obsolete)
<i>Ecological Designated Areas</i>			
Site of ecological value	1	-	The site is located within a Nitrate Vulnerable Zone (NVZ)

4.5 Engineering Considerations

4.5.1 Engineering considerations identified from the Envirocheck® report for the site are summarised below:

Table 4.5: Engineering Considerations

Category	Yes / No	Details
Natural Hazards	Yes (very low to high)	There is a high hazard rating for ground dissolution stability hazards reported for the site. In addition, a very low hazard rating has been reported for collapsible ground and landslide stability hazards for the site and a very low to moderate hazard potential for shrink/swell clay on and within close proximity to the site. A negligible hazard rating potential has been reported for compressible ground on site.
Mining Hazards	Yes	A number of BGS Recorded Mineral Sites have been reported within proximity of the site. The details for which are as follows: ~375m southwest – common clay and shale ad sand and gravel open cast mine (ceased); ~380m southeast – chalk opencast mine (ceased); ~440m west – sand and gravel opencast mine (ceased); ~485m west – sand and gravel opencast mine (ceased); and ~500m west – sand and gravel opencast mine (ceased). In addition, a man-made cavity for historical brick works/extensive claypits – potential chalk mining has been reported approximately 365m to the south of the site.

4.6 Regulatory Consultations

- 4.6.1 The following regulatory consultation has been undertaken with respect to possible environmental issues and ground conditions on-site and in the surrounding area.

Environmental Protection – Reading Borough Council

- 4.6.2 Environmental Protection at Reading Borough Council was contacted with regards to any potential contaminated land issues on site and within the surrounding area. At the date of reporting, no pertinent information has been received.

Building Control – Reading Borough Council

Building Control was contacted with regards to any potential foundation and ground condition issues on site and within the surrounding area. At present, no pertinent information has been received.

4.7 General Summary

- 4.7.1 Given the above Environmental Setting and the general land use for the area, discussed in Section 2, this site is considered to be of **Low Overall Environment Sensitivity**.

5 OUTLINE CONCEPTUAL MODEL**5.1 Introduction**

5.1.1 The assessment of potential risk associated with any identified contamination is based upon the identification and evaluation of Significant Pollutant Linkages.

5.1.2 A Significant Pollutant Linkage exists on a site only if three conditions are satisfied. These conditions are:

- *The presence of substances (potential contaminants / pollutants) that may cause harm (a **Source**)*
- *The presence of a target which may be harmed e.g. site residents, groundwater (a **Receptor**)*
- *A linkage between the Source and the Receptor e.g. ingestion of soil, inhalation of vapour (a **Pathway**)*

5.1.3 In each case, the existence of a pollutant linkage requires that not only does both a Source and a Receptor have to exist but that a demonstrable Pathway also exists. Therefore, the presence of measurable concentrations of contaminants within the ground or groundwater environment does not automatically imply that a contamination problem exists on site.

5.1.4 The nature and importance of both pathways and receptors, which are relevant to a particular site, will vary according to the actual or intended use of the site, its characteristics and its surroundings.

5.1.5 This process of the identification of Pollutant Linkages has been applied below to assess the potential risks associated with the site.

5.2 Hazard Identification

5.2.1 Potentially contaminative current and historic processes have been identified on and within the vicinity of the site and are presented in Table 5.1.

Table 5.1: Identified Potential Hazards

Potential Hazard / Source	Location	Details
Made Ground	On site	No evidence of potentially significant made ground was observed during the site reconnaissance survey and no historical industrial use has been recorded. Notwithstanding this, historical development has been undertaken on the site and therefore, the potential for made ground of unknown thickness and chemical composition cannot be discounted at this time. In addition, any made ground potentially on site may provide a potential source of ground gas, subject to thickness and composition.

Potential Hazard / Source	Location	Details
Potentially contaminative current and historic processes	On Site	No potentially significantly contaminative land uses have been identified on site. Notwithstanding this, given the age of the church and associated buildings it is likely that it would have been historically provided with heating from an onsite boiler. The location of such a boiler, if historically present, and any associated fuel storage is not known but it cannot be discounted that it may have been on or within close vicinity of the site.
Potentially contaminative current and historic processes	Off site	Based on the information available to date, a number of potentially contaminative current and historic land uses have been recorded in proximity of the site including a works opposite to the site, shown on mapping until 1978 an army barracks and a garage with possible underground storage tanks to the north of the site.
Natural ground	On and off site	Current guidance (Wilson, Card and Haines (2009)), indicates the ground gas generation for the underlying natural materials on site to be very low with a very low risk for on site development and a negligible risk of lateral migration. In addition, the site is not reported to be located within a radon affected area as less than 1% of properties are above the Action Level.

5.3 Potential Receptors and Pathways

5.3.1 Potential receptors identified as part of this preliminary risk assessment are:

- Current/future site users;
- Construction workers; and
- Controlled waters (Principal and Secondary Aquifer and River Thames)

5.3.2 Potential contaminant pathways relating to the identified receptors and contaminants of concern include:

- Dermal contact – contact with soil, dust or water;
- Ingestion - ingestion of soil, dust or water;
- Inhalation – inhalation of soil, dust or vapours;
- Vertical migration – seepage of contaminants at the ground surface (i.e. leakage/spillage of hydrocarbons) through cracks in hardstanding and/or leaching of contaminants within the unsaturated zone resulting in vertical contaminant migration; and
- Horizontal migration – lateral migration of contaminants within the saturated zone and along preferential pathways such as drainage pipe bedding.

5.4 Hazard Assessment and Risk Estimation

- 5.4.1 Potential significant pollutant linkages identified as part of this preliminary risk assessment are summarised in the Outline Site Conceptual Model presented in Table 5.2. References to risk estimations are made in accordance with the methodology presented in CIRIA publication C552 (2001) titled '*Contaminated Land Risk Assessment: A Guide to Good Practice*' and summarised in Appendix D.

Table 5.2: Outline Conceptual Model (Hazard Assessment and Risk Estimation)

Potential Hazard / Source	Potential Receptor	Potential Pathway to Receptors	Associated Hazard	Scale of Impact	Potential Consequence of Source-Receptor Linkage	Potential Likelihood for Significant Source-Receptor Linkage	Risk Classification
Made Ground – on site	Current and future site end users and construction workers	Exposure to potential contaminants through ingestion, inhalation and dermal contact	Risk of harm to human health	Local	Medium	Low Likelihood: No evidence of potentially significant made ground was observed during the site reconnaissance survey. Notwithstanding this, given the development history of the site, the presence of made ground of unknown chemical composition or thickness cannot be fully discounted at this time.	Low to Moderate Risk
	Controlled Waters	Infiltration of water through the unsaturated zone resulting in the leaching of contaminants and potential vertical and horizontal migration along preferential pathways	Risk to Principal and Secondary A Aquifers	Local to Regional	Medium	Unlikely: Given that the potential present of made ground on site cannot be fully discounted and the site is underlain by a Principal and Secondary A Aquifers, the potential for a residual localised risk to controlled waters cannot be fully discounted. Notwithstanding this, even if some contaminants are present they are unlikely to be of a nature which would represent a significant risk to controlled waters.	Low Risk
	Future site end users and proposed development structures	Migration, ingress and inhalation of ground gases	Risk of harm to human health and buildings	Local	Medium to Severe	Unlikely: No evidence of potentially significant made ground was observed during the site walkover survey.	Low Risk

Potential Hazard / Source	Potential Receptor	Potential Pathway to Receptors	Associated Hazard	Scale of Impact	Potential Consequence of Source-Receptor Linkage	Potential Likelihood for Significant Source-Receptor Linkage	Risk Classification
Possible Former Boiler and Fuel Storage	Future site users, construction workers and controlled waters	Potential on and off site contamination from potentially contaminative on and off site sources, including a works	Risk of harm to human health and controlled waters	Local to Regional	Low to Medium	Low Likelihood to Likely: Given the age of the site it cannot be fully discounted that a oil fired boiler and associated boiler may be present on or with close vicinity of the development site which may have acted as a localised source of contamination.	Low to Moderate Risk
Current and historical potentially contaminative sources – off site	Future site users, construction workers and controlled waters	Potential on and off site contamination from potentially contaminative on and off site sources, including a works	Risk of harm to human health and controlled waters	Local to Regional	Low to Medium	Low Likelihood: Potentially contaminative current and historic processes have been recorded in proximity to the site. However, although it cannot be fully discounted that some on site migration may have occurred given their nature, the distal nature of most of the sources and the absence of reported pollution incidents they are considered unlikely to have had a significant on site impact.	Low Risk
Natural Ground – on and off site	Future site end users	Migration, ingress and inhalation of ground gases	Risk of harm to human health and buildings	Local to Regional	Medium to Severe	Unlikely: The gas generation potential of the underlying natural strata may be classified as being very low, with a very low risk for on site development and a negligible risk for lateral migration. The site is not reported to be located within a radon affected area as less than 1% of homes are above the Action Level.	Low to Moderate Risk

6 GROUND ENGINEERING**6.1 Proposed Development**

- 6.1.1 Engineering considerations identified from the preliminary risk assessment for the site are discussed below.

6.2 Proposed Development

- 6.2.1 The proposed development is understood to comprise an extension to the existing church, demolition of current parish buildings on site and the construction of a number of one and two bed residential properties accommodated in a single structure.

6.3 Potential Geotechnical Hazards

- 6.3.1 The published geology of the site is shown on sheet No. 268 Reading (Solid and Drift Edition) as comprising Head Deposits underlain by the Seaford Chalk and Newhaven Chalk Formation. The BGS describes the Seaford Chalk formation as firm white chalk with conspicuous semi-continuous nodular and tabular flint seams, whilst the Newhaven Chalk is less flinty with numerous marl seams. The Head deposits have been described as gravel, sand and clay.
- 6.3.2 The site was observed to be generally flat and level, although the area as a whole is located on a gentle slope, sloping up to the south-west. Ordinance Survey mapping indicates the site to be at approximately 50m AOD (above ordinance datum).
- 6.3.3 The Envirocheck® report indicates the site to be located in an area of high hazard rating for ground dissolution stability hazards and a very low to moderate hazard for potential for shrink/swell clay and a very low hazard rating for collapsible ground and landslide stability hazards. There is no reported hazard rating for compressible ground on site. In addition, the Envirocheck® report indicates a number of BGS recorded mineral sites are located within proximity of the site as well as a man-made cavity for historical brick works/extensive claypits with a potential for chalk mining has been reported in proximity to the site.
- 6.3.4 It is recorded within the Envirocheck report that the site is located within a lower probability radon area, as less than 1% of homes are recorded as above the Action Level.

6.4 Preliminary Geotechnical Recommendations

- 6.4.1 Based upon the findings of this desk study, it is anticipated that conventional strip foundations may be appropriate when considering the anticipated ground conditions and proposed development. However, it is recommended that an appropriate geotechnical investigation is undertaken at the site to ascertain foundation design parameters for any proposed on-site development.
- 6.4.2 It is reported that no radon protective measures are necessary in the construction of new dwellings or extensions.

7 CONCLUSIONS & RECOMMENDATIONS**7.1 Conclusions**

- 7.1.1 Tweedie Evans Consulting Ltd (TEC) has been appointed by Raglan Build & Design Ltd to undertake a preliminary geo-environmental and geotechnical assessment for the St George's Church site, St George's Road, Reading, in accordance with an email instruction dated 14th March 2013, received from James Bradbury.
- 7.1.2 The site currently comprises a rectangular parcel of land containing a large church (equivalent 3 to 4 storey in height) and a second smaller single-storey building that is currently utilised as a community hall.
- 7.1.3 The proposed development of the site is understood to comprise the extension of the current church as well as demolition of the existing community hall and construction of a number of one and two bedroom residential properties.
- 7.1.4 The site is considered to be of low environmentally sensitivity.
- 7.1.5 Potentially contaminative historical and current land uses have been identified within proximity to the site including a works, army barracks, electrical sub-station and a garage with potential USTs. In addition, it cannot be discounted that an oil fired boiler and associated fuel storage may have historically existed on or within the vicinity of the site.

7.2 Geo-Environmental Risk Evaluation

- 7.2.1 Based upon the information contained within this report, it is in the opinion of TEC that the site represents a low risk of geo-environmental liability. This largely reflects the absence of potential Significant Pollutant Linkages.

7.3 Geotechnical Risk Evaluation

- 7.3.1 Based upon the information contained within this report, it is the opinion of TEC that the site, in relation to the proposed development, generally represents a low to moderate geotechnical risk due primarily to the high potential hazard rating for dissolution ground stability hazards, a very low to moderate risk rating for shrink/swell clay and a number of BGS recorded mineral sites in proximity to the site. Notwithstanding this, a very low hazard rating has been reported for collapsible ground and landslide stability hazards and a negligible hazard rating for compressible ground hazards. It is recommended that an appropriate geotechnical investigation be undertaken at the site to fully determine foundation design parameters for any proposed on-site development.

7.4 Risk Management Recommendations

- 7.4.1 Given the assessment presented within this report, additional works are recommended to fully define the engineering constraints and geotechnical issues associated with the site. During such works it would be considered prudent to take the opportunity to undertake some limited confirmatory geochemical testing.

TWEEDIE EVANS CONSULTING LIMITED

BIBLIOGRAPHY

BGS - Lexicon of rocks: www.bgs.ac.uk/lexicon

BS10175 - British Standards Institute (2011) Investigation of Potentially Contaminated Land - Code of Practice.

CIRIA C552 (2001) Contaminated Land Risk Assessment: A Guide to Good Practice.

CIRIA C665 (2007) Assessing Risk Posed by Hazardous Ground Gases to Buildings (revised).

DEFRA and the Environment Agency (2002) Assessment of Risks to Human Health from Land Contamination: An Overview of the Development of Soil Guideline Values and Related Research. R&D Publication CLR7.

DEFRA and the Environment Agency (2004). Model Procedures for the Management of Land Contamination. R&D Publication CLR11.

Environment Agency (July 2005) Guidance on Requirements for Land Contamination Reports.

Environment Agency (2009) - Updated technical background to the CLEA model. Science Report SC050021/SR3. Bristol: Environment Agency.

Environment Agency (2009) - Updated technical background to the CLEA model. Science Report SC050021/SR3. Bristol: Environment Agency.

NHBC (2013). NHBC Standards.

Wilson, Card, & Haines (2009) Ground Gas Handbook

FIGURES



Approximate Site Boundary



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Tel: 01749 677760
Fax: 01749 679345
Email: info@tecon.co.uk
www.tecon.co.uk

Site Name:
St George's Road, Reading

Scale:
n/a

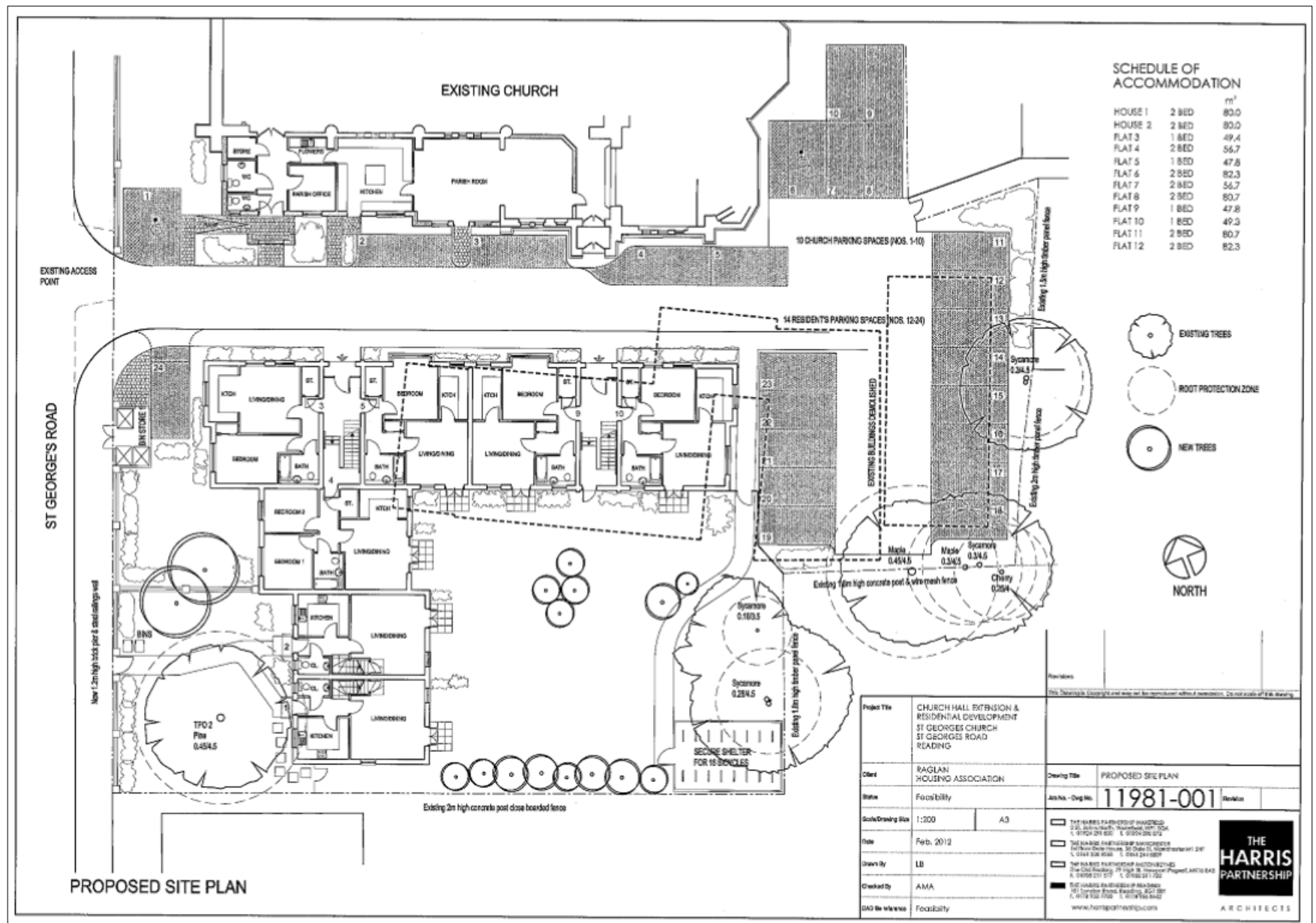
Drawing Name:
Site Location Plan

Client Name:
Raglan Design & Build Ltd

Project No:
1303010.001

Date:
April 2013

Figure No:
1



Extract of Proposed Site Plan
Drawing Number 11981-001
The Harris Partnership Architects

APPENDIX A
Site Photographs



Photograph 1: Bare earth visible at current site entrance.



Photograph 2: Area of land to rear.

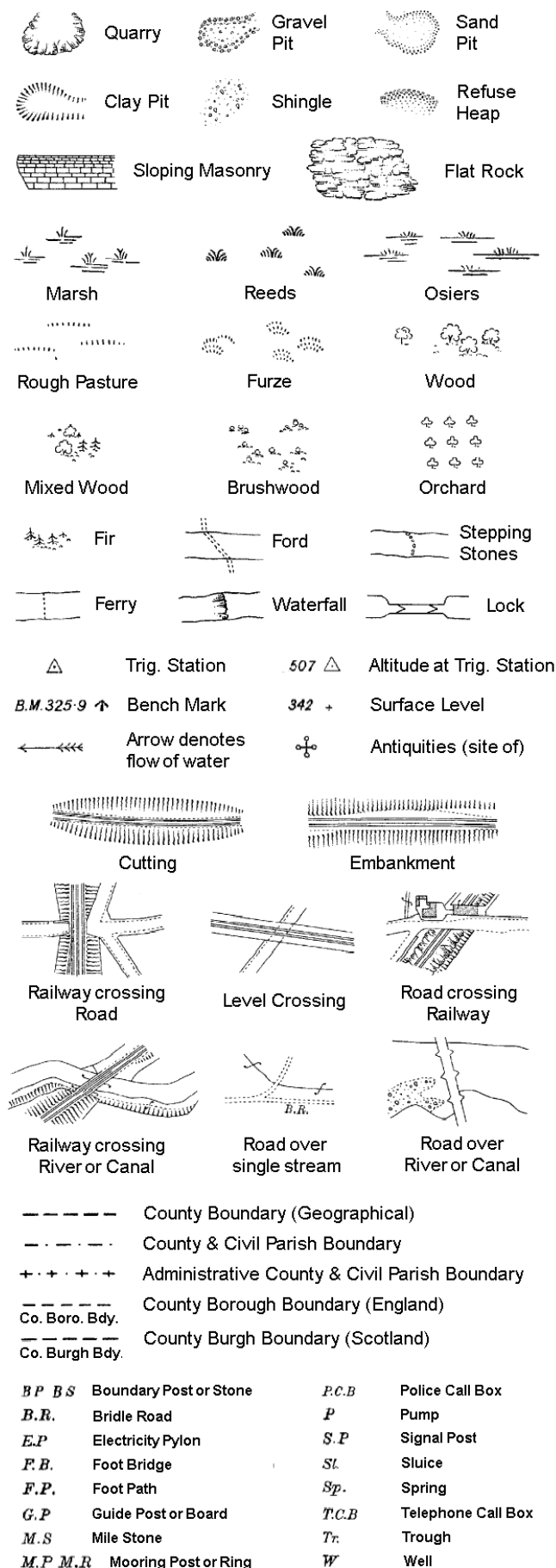


Photograph 3: Front of current Hall building

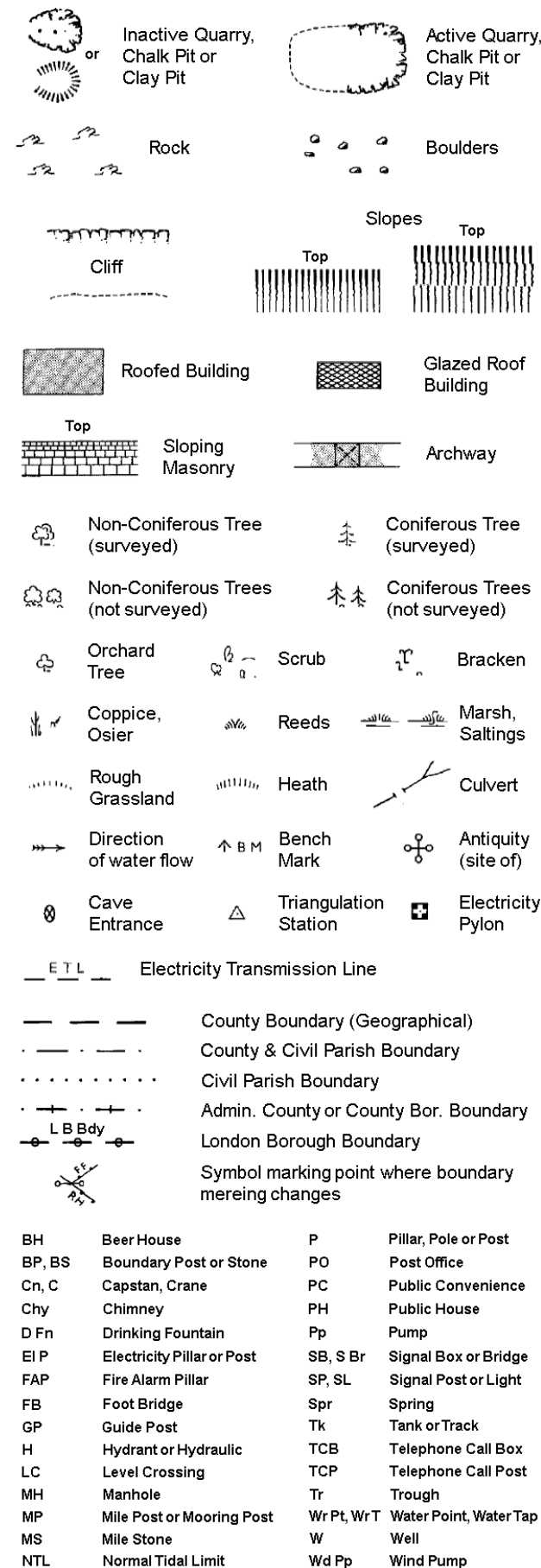
APPENDIX B
Historical Maps

Historical Mapping Legends

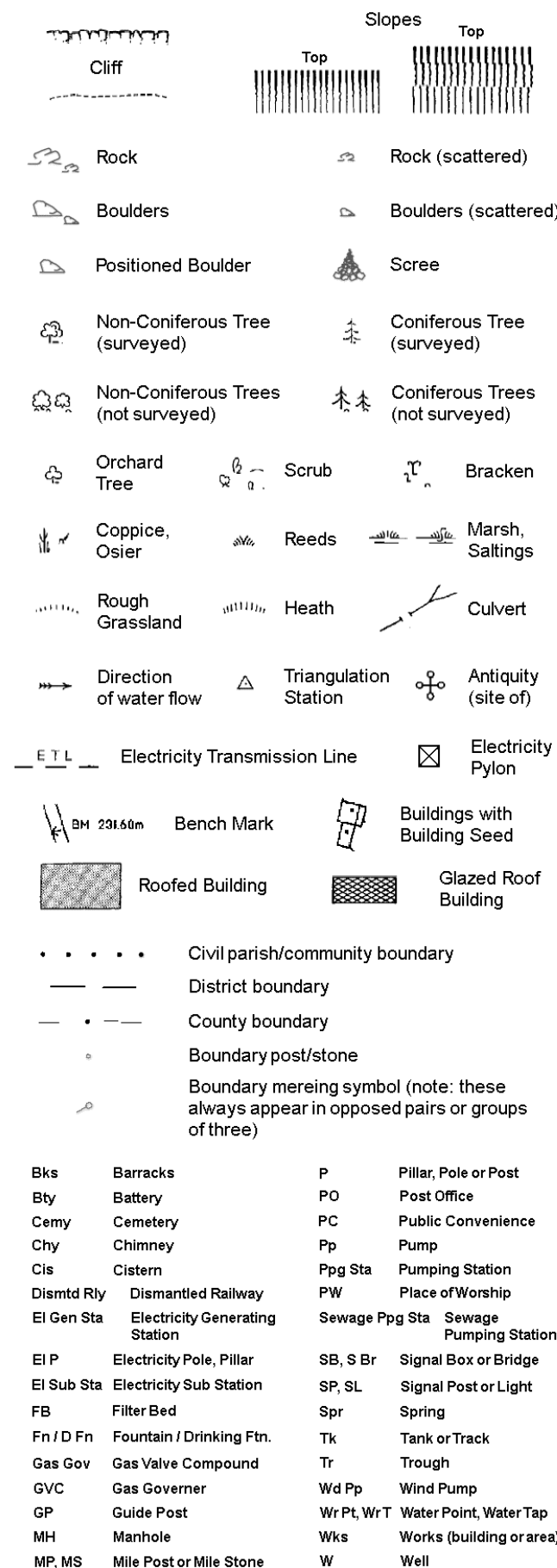
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



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



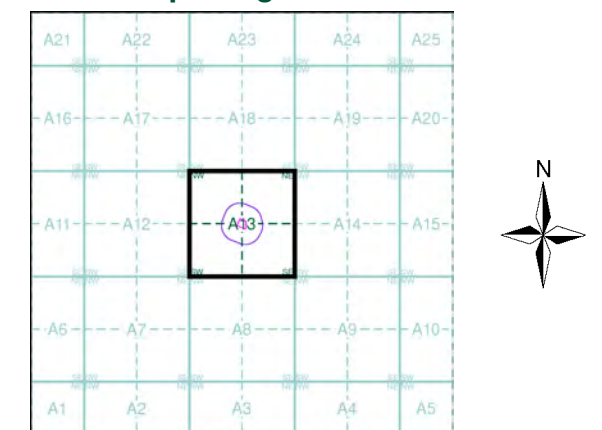
Large-Scale National Grid Data 1:2,500 and 1:1,250



TWEEDIE EVANS CONSULTING
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Berkshire	1:2,500	1881	2
Berkshire	1:2,500	1899	3
Berkshire	1:2,500	1911	4
Berkshire	1:2,500	1932	5
Ordnance Survey Plan	1:1,250	1959 - 1961	6
Ordnance Survey Plan	1:2,500	1962	7
Ordnance Survey Plan	1:1,250	1968 - 1973	8
Ordnance Survey Plan	1:1,250	1971 - 1981	9
Supply of Unpublished Survey Information	1:1,250	1974	10
Additional SIMs	1:1,250	1977 - 1986	11
Additional SIMs	1:1,250	1988 - 1990	12
Additional SIMs	1:1,250	1991	13
Large-Scale National Grid Data	1:1,250	1993	14
Large-Scale National Grid Data	1:1,250	1994	15

Historical Map - Segment A13



Order Details

Order Number: 44889673_1_1
Customer Ref: 1303010.001
National Grid Reference: 469040, 173660
Slice: A
Site Area (Ha): 0.25
Search Buffer (m): 100

Site Details

St. Georges Church, St. Georges Road, READING, RG30 2RG



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



TWEEDIE EVANS CONSULTING

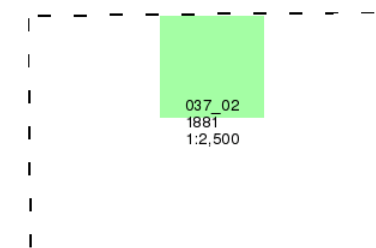
Berkshire

Published 1881

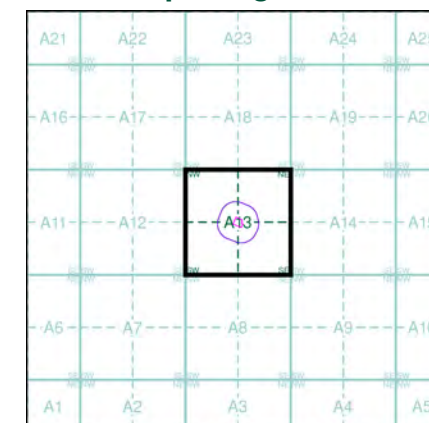
Source map scale - 1:2,500

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

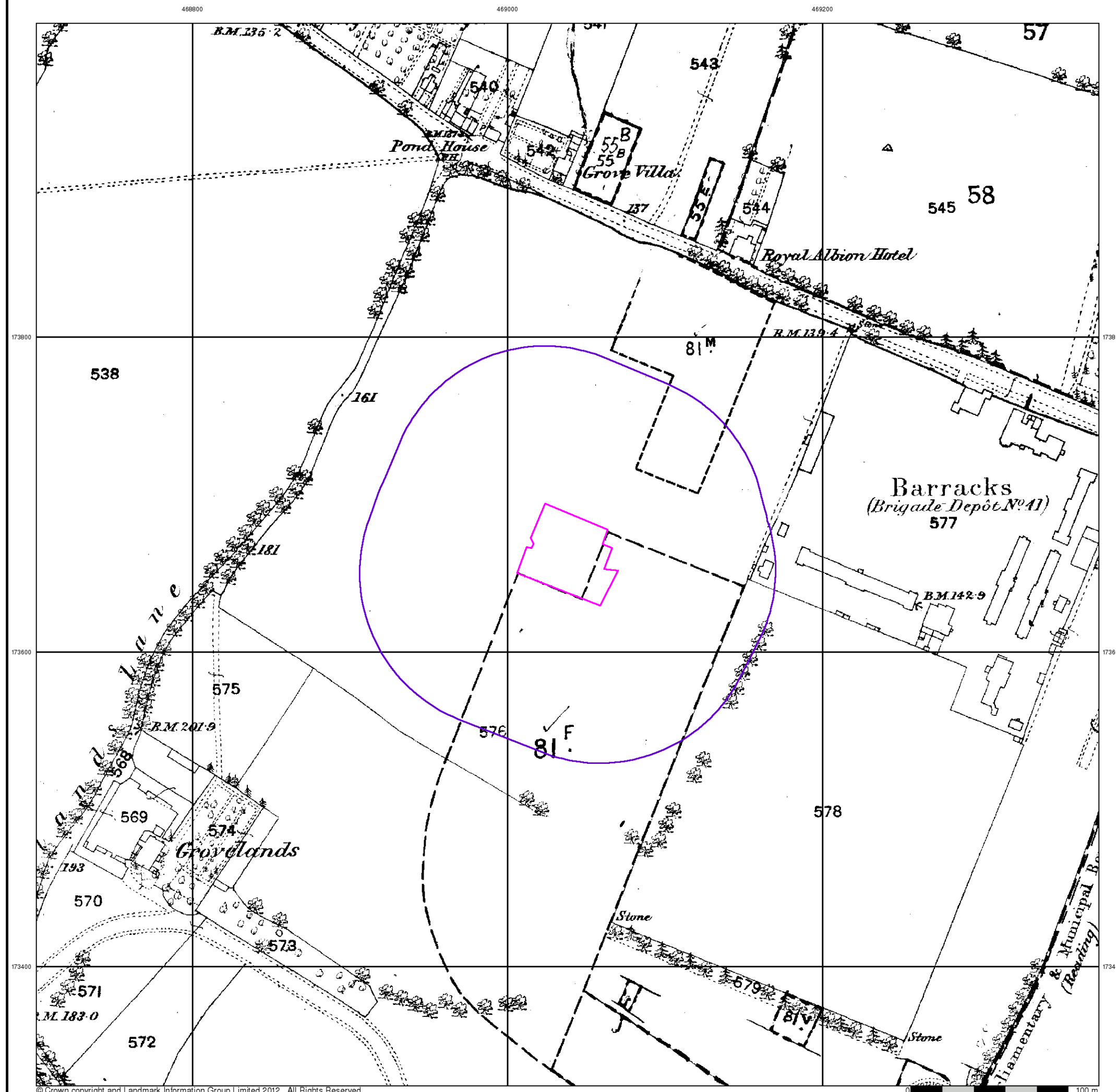
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Search Buffer (m): 100

Site Details

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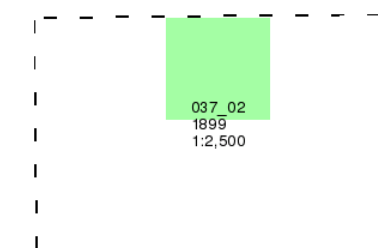
Berkshire

Published 1899

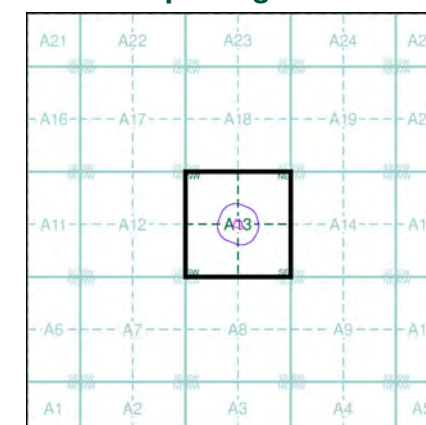
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered 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

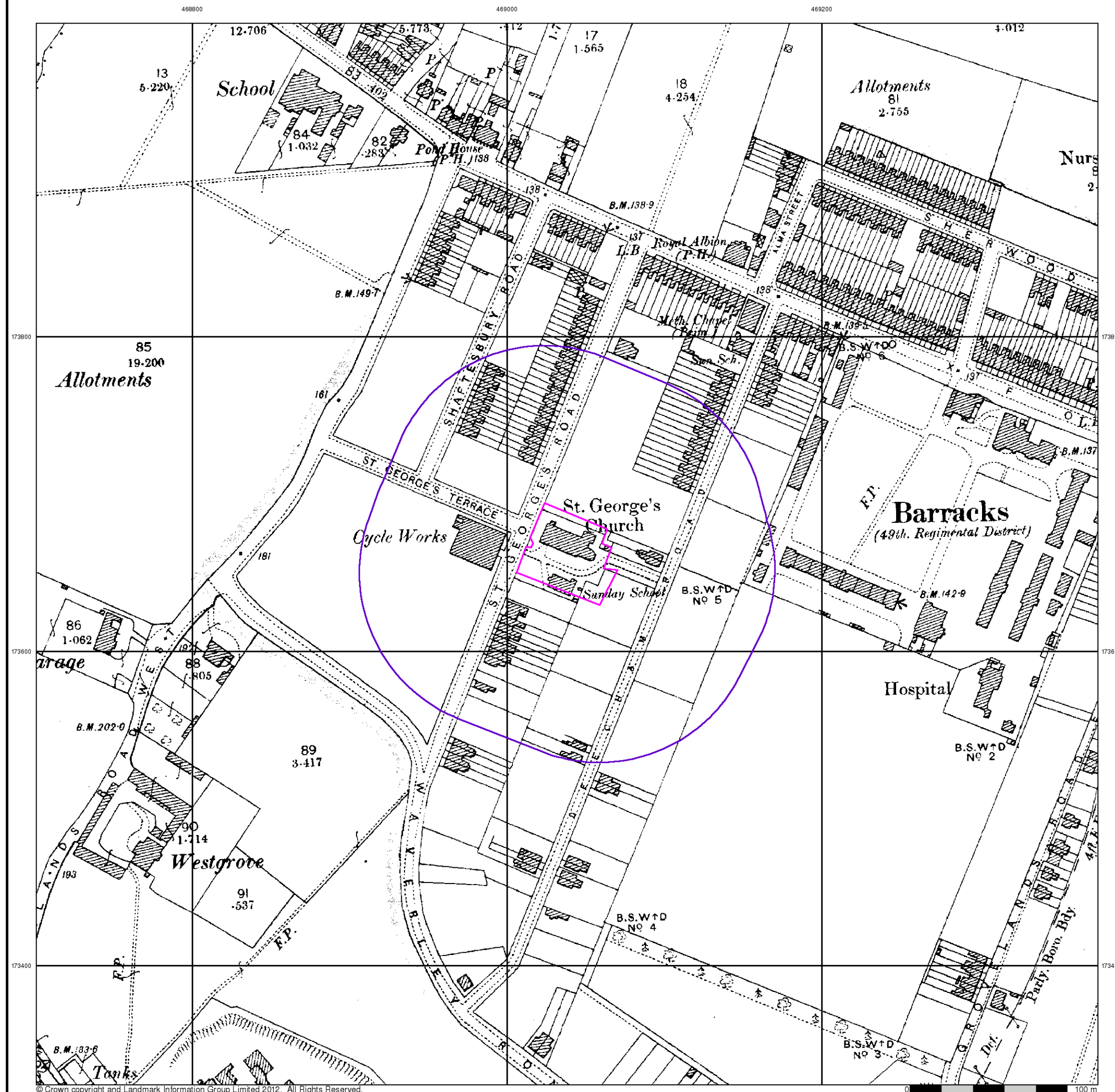
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Slice: A
Site Area (Ha): 0.25
Search Buffer (m): 100

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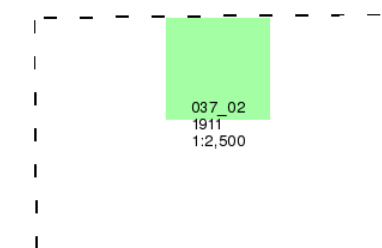
Berkshire

Published 1911

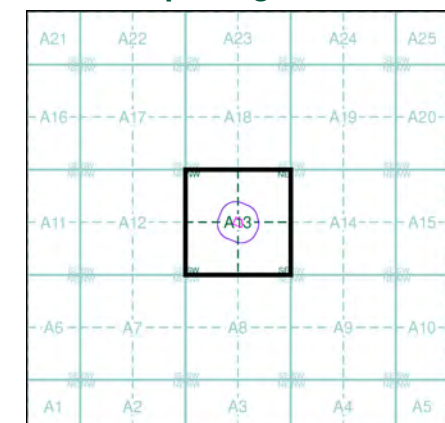
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