Brown 2 Green

Geotechnical and Geo-environmental Consultants

PRELIMINARY GEO-ENVIRONMENTAL AND GEOTECHNICAL SITE INVESTIGATION REPORT

SITE OF PROPOSED CREMATORIUM AT WILBURY HILLS CEMETERY STOTFOLD ROAD STOTFOLD LETCHWORTH GARDEN CITY SG6 4EG

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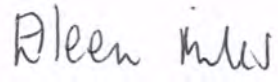
Reviewed By	Eileen Miles Dip (Open), Cert (Open) (Director)	
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EXECUTIVE SUMMARY

This report describes the findings of a Geo-environmental Desk Study and Site Investigation of Wilbury Hills Cemetery, Letchworth Garden City. It is proposed to redevelop the site for a crematorium.

At the time of the walk-over the site was unoccupied. The area was covered with crops. The site walk-over did not identify any potential sources of contamination.

The review of the historical maps identified that the site remained undeveloped until present.

A review of the environmental setting indicated the site to be underlain by a limited thickness of sand and gravel of the Letchworth Gravels Formation and Lowestoft Formation in the south-western corner of the site. The superficial deposits are underlain mainly by the Zig Zag Chalk Formation and the Melbourn Rock Member and Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated) in the south. The bedrock deposits are classified as Principal Aquifers. The Letchworth Gravels Formation is classified as a Secondary A Aquifer (permeable layers), whilst Lowestoft Formation is classified as a Secondary A Aquifer (undifferentiated layers). No surface water features were identified within the vicinity of the site. The environmental sensitivity of the site is classified as Low.

The Conceptual Model prepared for the site did not identify potentially active pollution linkages between the historical land use of the site and the future use as a crematorium.

The investigation consisted of the drilling of boreholes. During the drilling soil samples were obtained and submitted for chemical analysis and geotechnical tests.

The following conclusions were made:

The Tier I Human Health Risk Assessment has determined that there are no unacceptable concentrations of potential contaminants within the underlying made ground and natural soils that would pose a potential risk to human health of future site occupants.

The Tier I Controlled Water Risk Assessment has determined that there are no unacceptable concentrations of potential contaminants within the underlying soils that would pose a potential risk to controlled waters.

The monitoring and risk assessment for bio-genic ground gas concluded that there is no risk from ground gas.

The risk assessment in respect to the future planting and towards sensitive ecological receptors identified that the determinants at the site would not pose a potential risk.

The risk assessment in respect to water supply infrastructure identified that the determinants at the site would not pose a potential risk to the integrity of PE or PVC pipework.

No recommendations have been made for remediation.

It is considered that conventional strip foundations may be used. Foundations should be constructed at least 150mm into the dense sand or stiff clay and at a minimum depth of 1.25m below ground level with an allowable bearing capacity of 150kN/m²: The foundation trench should be stepped down locally as soft clays are encountered and to take account of current, retained and

proposed trees.

Soils are identified as being of moderate shrinkage potential.

It is recommended that suspended floor slabs are used

1 INTRODUCTION

1.1 Background

Brown 2 Green Associates Ltd have been commissioned by Ken Rush Associates to undertake a Phase I Geo-environmental Desk Study and Phase 2 Site Investigation of the site of a proposed crematorium at Wilbury Hills Cemetery, Stotfold Road, Letchworth City Garden, SG6 4EG. The site is located at National Grid Reference 520187, 233491. The site location is presented in Figure 1.

1.2 Proposed Development

It is proposed to develop the site as a crematorium on land to the west of the existing cemetery. The development will consist of single storey buildings with associated car parking and landscaping. The preliminary proposed development layout is presented in Figure 2.

1.3 Objectives

The objective of the work is to provide an initial assessment of the geo-environmental and geotechnical constraints that may be present at the site by:

- Undertaking a site inspection to identify any current areas of potential geo-environmental concern;
- Reviewing historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11));
- Undertake a targeted and non-targeted ground investigation;
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
- Provide geotechnical recommendations in relation to foundation and infrastructure; and,
- Provide a factual and interpretive report and recommendations on any potential development issues.

1.4 Sources of Information

Background information relating to the site was acquired and referenced from the following sources:

- Historical mapping (Appendix III);
- Groundsure Environmental Database Search (Appendix IV);
- On-line planning records held by North Hertfordshire District Council;
- British Geological Survey website (www.bgs.ac.uk).

A site walkover was carried out on the 23rd November 2017.

2 SITE LOCATION AND DESCRIPTION

2.1 Site Location and Surrounding Area

The site is located in an agricultural area on the western side of Stotfold Road. The land uses immediately adjacent to the site are summarised below:

Direction	Land Use
North	Agricultural land
East	Wilbury Hills Cemetery
South	Arlesey New Road and agricultural land
West	Agricultural land

The topography of the surrounding area slopes down towards the River Purwell, located towards the west.

The site location is presented in Figure 1.

2.2 Site Descriptions and Observations

The site layout is presented in Figure 3. A photographic record of the site is included in Appendix II.

The subject parcel of land is irregular in shape and covers approximately 3.48 hectares. Access to the site is via a drive from Wilbury Hills Cemetery.

The western boundary is not clearly defined by any landmark. The other boundaries are defined by hedgerows.

At the time of the site walk-over the site was unoccupied and used as an agricultural field.

The topography of the site slopes down towards the west.

2.3 Storage of Chemicals and Hazardous Substances

Above Ground Storage Tanks (ASTs)

No above ground storage tanks (ASTs) or evidence of former ASTs were observed at the site.

Underground Storage Tanks (USTs)

No underground storage tanks (USTs) or evidence of USTs were observed at the site.

Other Chemical Storage

No significant storage of chemicals was noted at the time of the walkover.

Polychlorinated Biphenyls

No equipment that may potentially contain polychlorinated biphenyls (PCBs) was observed at the site.

Asbestos Containing Materials

During the inspection no materials suspected to contain asbestos were observed at the site.

Waste Disposal

No waste disposal activities were identified.

Site Drainage

A formal drainage survey has not been completed but it is assumed that the rainwater is infiltrating into the soil. No foul water or trade effluent is currently generated by the site.

2.4 Visual and Olfactory Evidence of Contamination

No specific visual or olfactory evidence of contamination was noted.

2.5 Potential Sources of Contamination

During the site walk-over no potential sources of contamination were identified.

3 SITE HISTORY

3.1 Historical Maps

The maps at scales of 1: 2,500, 1:10,000 and 1:10,560 were reviewed to determine the history of the site. A summary of the site history is presented below. The historical maps are included in Appendix III.

Date	Site	Surrounding Area
1881 1:10,560	The site is part of a larger field.	The surrounding area is undeveloped. Two Chimneys Buildings and an unnamed road are situated approximately 180m east of the site. A sand pit was observed roughly 170m east of the site.
1901 1:2,500	No significant changes.	No significant changes.
1921 1:10,560	No significant changes.	A sand pit is located roughly 350m east of the site. A few sewage tanks and a sand pit are situated approximately 410m north of the site. A quarry is located roughly 590m north-west of the site.
1938 1:10,560	No significant changes.	Immediately south of the site a road has been developed. Residential development has occurred 200m south-east of the site.
1938 1:10,560	No significant changes.	Residential development has occurred 200m south-east of the site.
1968 1:2,500	No significant changes.	Several buildings have been erected 80m east of the site. A playing ground and a drain have been identified 75m east of the site. An electric substation has been developed 200m north-east of the site. Stotfold Road is running east of Two Chimneys Public House.
1980-1982 1:10,000	No significant changes.	The quarry located north-west are noted as disused. Blue Lagoon occupies the north-western part of the former quarry.
1993 1:2,500	No significant changes.	The road running south of the site is named Arlesey New Road.
2002 1:10,000	No significant changes.	No significant changes.
2010 1:10,000	No significant changes.	A cemetery has been developed approximately 50m to the east of the site.
2014 1:10,000	No significant changes.	No significant changes.

3.2 Local Authority – Planning

A review of on-line planning records from North Hertfordshire District Council was completed on 19th December 2017.

No relevant information was identified.

3.3 Other Sources

A review has been made of satellite photographs contained on Google Earth. The satellite photographs from December 2000 shows that the site layout is similar to that observed during the site walk- over. The site appears to be used as agricultural land.

4 ENVIRONMENTAL SETTING

4.1 Geology and Hydrogeology

The British Geological Survey website indicates that the site is underlain by the following geology:

Drift/Solid	Geological Unit	Description	Aquifer Classification
Drift/Superficial	Letchworth Gravels Formation	Sand and Gravel	Secondary A – permeable layers
Drift/Superficial	Lowestoft Formation	Diamicton	Secondary A – undifferentiated layers
Solid	Melbourn Rock Member	Chalk	Principal
Solid	Zig Zag Chalk Formation	Chalk	Principal
Solid	Holywell Nodular Chalk Formation and New Pit Chalk Formation (Undifferentiated)	Chalk	Principal

The Letchworth Gravels Formation is covering most of the site's surface, except a small part of the southern area of the site which is covered by the deposits of Lowestoft Formation.

There is one licenced groundwater abstraction point within 1km radius of the site. The nearest one is located 805m to the north-west of the site, where B O Papworth & Son is licenced to abstract groundwater from the point named Chalk Pit S of Arlesey. The water is used for spray irrigation.

There is a Source Protection Zone 3 located 204m to the east of the site.

If groundwater is present within the Letchworth Gravels Formation and Lowestoft Formation, the likely groundwater flow direction will be towards the west.

4.2 Geotechnical Data

Geotechnical Data presented within the Groundsure report identifies the following ground conditions:

Hazard	Designation	Hazard
Potential for Shrinking or Swelling of Clays	Negligible - Low	Ground conditions predominantly medium plasticity
Potential for Landslide Ground	Very Low	Slope instability problems are unlikely to be present
Potential for Ground Dissolution	Negligible - Very low	Significant soluble rocks are present. Problems unlikely except with considerable surface or subsurface water flow.
Potential for Compressible Ground	Negligible - Very Low	Very low potential for compressible deposits to be present.
Collapsible Ground	Very low	Deposits with potential to collapse when loaded and saturated are unlikely to be present.
Potential for Running Sands	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water.

4.3 Mining and Natural Cavities

The database indicates that the site is not located in an area affected by historical mining activities.

The database states that the site is not located in an area affected by coal mining.

The database states that the site is located in an area affected by non-coal historical mining activities where sporadic underground mining of restricted extent may have occurred.

The database states that there are no non-coal mining cavities within 1km of the site.

The database states that there are no recorded natural cavities within 1km of the site.

The database states that the site is not located in a salt brine extraction area.

The database states that there is no gypsum extraction within 1km of the site.

The database states that there is no tin mining within 1km of the site.

The database states that there is no kaolin and ball clay mining within 1km of the site.

4.4 Geochemistry

The British Geological Survey estimates of the geochemistry of the soils beneath the site are:

Determinants	Soil Type	Concentration (mg/kg)
Arsenic	Sediment	15-25
Cadmium	Sediment	<1.8
Chromium	Sediment	60-90
Lead	Sediment	<100
Nickel	Sediment	30-45

4.5 Hydrology

The nearest surface water feature is a drainage ditch located 76m to the east.

There are no licensed surface water abstraction points within 500m radius of the site.

The nearest licensed surface water abstraction point is located 1504m to the west, where Hunter Partnership is licenced to abstract water from the River Hiz, North of Ickleford. The water is used for spray irrigation.

The database indicates that the site does not lie in a fluvial or tidal floodplain.

4.6 Environmentally Sensitive Areas

The site is located in a Nitrate Vulnerable Zone.

There are no ecologically sensitive sites within 500m radius of the site.

4.7 Radon

The site is located in an area where less than 1% of homes are above the Action Levels and Radon Protective Measures are not necessary in the construction of new dwellings or extensions.

5 INDUSTRIAL SETTING

5.1 Current Industrial Land Use

There are no potentially contaminative industrial entries for the site. Within 250m radius of the site there is one potentially contaminative industrial entry. The nearest is an electrical sub-station located 219m to the east.

Within 500m radius of the site there are no entries for filling stations or high pressure gas and fuel pipelines.

5.2 Landfill Sites and Waste Disposal Facilities

The historical database indicates the presence of a former landfill site north of the subject site; the nearest historical landfill site is 1159m to the north. Pit 130 was licenced to accept commercial, household waste and liquid sludge. The site operated between 1961 and 1964.

There are no historical or operational landfill sites or waste management facilities within 250m radius of the site.

5.3 Regulatory Database

The following information has been obtained from a commercially available environmental database. The summary table only includes records not otherwise detailed in the report. A full copy of the database report is provided on the CD at the rear of this report.

	On Site	0 – 250m	Details of Nearest	Potential Risk to Site
Contaminated Land Register Entries and Notices	0	0	-	No
Authorised industrial processes (IPC/IPPC/LAPPC)	0	0	-	No
Enforcements, prohibitions or prosecutions	0	0	-	No
Discharge Consents	0	0	-	No
Pollution Incidents	0	0	-	No
Consents issued under the Planning (Hazardous Substances) Act 1990	0	0	-	No
Control of Major Accident Hazard (COMAH) sites	0	0	-	No
Licensed radioactive substances	0	0	-	No
Notification of Installation Handling Hazardous Substances (NIHHS)	0	0	-	No

6 PREVIOUS REPORT

No previous site investigation reports were identified or made available.

7 INITIAL CONCEPTUAL MODEL

Brown 2 Green Associates Ltd has developed a Conceptual Model to identify potential sources, migration pathways and receptors within the study area. Assuming there is an active pollution pathway linkage between the source and receptor an assessment has been made of the level of risk. The level of risk is a consideration of both:

- the likelihood of an event (probability) [takes into account both the presence of the hazard and receptor and the integrity of the pathway]; and

- the severity of the potential consequence [takes into account both the potential severity of the hazard and the sensitivity of the receptor].

The risk classifications are based on CIRIA C552 2001.

7.1 Potential Sources of Contamination

On-site Potential Sources

Potential on-site sources of contaminants include:

- No potentially significant on-site sources of ground contamination have been identified.

Off-site Potential Sources

No potentially significant off-site sources of ground contamination have been identified within a 250m radius of the subject site.

7.2 Potential Pathways

In the absence of any significant sources of potential contamination, no potential pathways are considered likely to be present.

7.3 Potential Receptors

Brown 2 Green Associates Ltd has identified the following possible receptors:

- Human health - future users of the site (commercial).
- Human health - construction workers.
- Controlled water (groundwater and surface water).
- Construction materials (concrete).
- Water supply pipework.

7.4 Discussion of Potential Pollutant Linkages

In the absence of any significant on-site sources of contamination or plausible contaminant pathways from potential off-site sources of contamination, no potential receptors are considered to be at risk.

8 SITE INVESTIGATION

8.1 Exploratory Fieldwork

Ten boreholes (WS1 to WS10) were drilled with a dynamic "window sampler" drilling rig on 23rd and 24th November 2017 to a maximum depth of 5.0m below surface.

The sample locations were determined for the assessment of the geotechnical properties of the underlying soils and to provide a general assessment of the ground quality beneath the site. The sampling locations are illustrated in Figure 4.

Soil samples destined for chemical testing were collected in laboratory prepared jars. Samples for organic analysis were placed in amber glass jars, samples for volatile analysis in vials with septums and samples for inorganic analysis in plastic tubs. During the site works recovered soils were geologically logged by an experienced Geo-environmental Engineer. The geological logs are presented in Appendix V.

8.2 Geotechnical Testing

In-Situ Standard Penetration Testing (SPT)

In-situ geotechnical testing was carried out in all exploratory hole locations to provide information on the geotechnical properties of the soils. The testing was conducted using the Cone Penetration Test (CPT). .

In-Situ California Bearing Ratio (CBR)

In-situ CBR tests were undertaken at selected locations using a TRL probe. Tests were undertaken at depths of between 300mm and 1m below ground level in order to intersect the likely pavement sub formation level.

Laboratory Testing

Selected samples were submitted to Soil Property Testing (Huntington). The following geotechnical tests were undertaken:

- Atterberg Limits Determinations;
- Particle Size Distribution Tests;
- Natural moisture content.

8.3 Chemical Analysis

The soil samples were submitted to Chemtest Ltd of Newmarket, Suffolk. The chemical analysis was carried out under UKAS/MCERTS accreditation protocols.

The chemical analysis was carried out in accordance with the findings of the Desk Study and the Observations made during the site works. The chemical testing programme included.

- Metals Suite (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, V);
- Speciated PAH (USEPA 16);
- TPH – RBCA 8 Bands
- Total Cyanide;

- pH;
- Soluble Sulphate; and
- Asbestos fibres

9 RESULTS

9.1 Summary of Site Investigation Observations

Ground Conditions

The geological logs are presented in Appendix V.

Top soil

The boreholes indicate that the site is underlain by 0.1m of top soil consisting of dark brown slightly sandy, silty clay with rootlets and clayey sand.

Natural Strata

The top soil is underlain by superficial deposits which consist of slightly sandy, slightly gravelly clays in the western and southern part of the site, whilst clayey sand with occasional gravels was observed in the boreholes drilled in the eastern part of the site.

Soil Density

The density of the underlying soils has been assessed using SPTs undertaken within window sampler boreholes. This shows the clay to vary from firm to very stiff with depth and the sand to vary from very loose to medium dense.

Groundwater Conditions

During the drilling groundwater was struck in the sand and gravels at approximately 3.5m below ground level. The anticipated groundwater flow direction is towards the west.

It should be noted that groundwater levels can fluctuate seasonally and therefore, may be encountered at higher or lower elevations than those recorded in this site investigation.

9.2 Geotechnical Laboratory Results

The geotechnical testing of the samples was undertaken by Soil Property Testing (Huntington) under UKAS accreditation. The test certificates are included in Appendix VI.

9.3 Chemical Laboratory Results

The chemical analysis of the soil samples was undertaken by Chemtest Ltd of Newmarket under MCERT and UKAS accreditation. The test certificates are included in Appendix VII.

10 GEOTECHNICAL ASSESSMENT

10.1 Proposed Development

It is understood that the proposed development will comprise construction of a single storey crematorium building. Details of the proposed loadings are not known and therefore a line loading of 35kN/m has been assumed for preliminary assessment purposes.

Given the nature of the proposed development it is considered that the structure meets the criteria of Geotechnical Category 1 of Euro Code 7.

Given the nature of the development it is considered that acceptable risk from settlement is a total settlement value of 25mm for a masonry structure.

10.2 Ground Conditions

Ground conditions comprise topsoil underlain by soft becoming stiff with depth brown gravelly clay varying to dense sand. Soils were noted to be stiff or dense below 1m bgl.

Shallow groundwater was not encountered.

10.3 Site Preparation

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the Specification for Highway Works. This should include:

- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill;
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and
- Any redundant foundations should be grubbed out.

10.4 Foundations

It is considered that conventional strip foundations may be used. Foundations should be constructed at least 150mm into the dense sand or stiff clay and at a minimum depth of 1.25m below ground level with an allowable bearing capacity of 150kN/m²: Settlements of less than 25mm are predicted.

An assessment of potential desiccation has been undertaken comparing moisture content with plasticity data. When plasticity values are adjusted to take account of granular content there is no evidence of significant desiccation.

The foundation trench should be stepped down locally as soft clays are encountered and to take account of current, retained and proposed trees. As foundations may span both granular and cohesive soils it is recommended that foundations are reinforced to accommodate localised differential settlement.

Soils are identified as being of moderate shrinkage potential in accordance with NHBC guidelines.

10.5 Ground Floor Slabs

As the upper 1m is identified as being soft it is recommended that suspended floor slabs are used.

10.6 Pavement Construction

An assessment of the likely California Bearing Ratio (CBR) for the Cover Soils has been assessed from the following sources:

- In-situ values obtained from TRL probes;
- Correlations with plasticity index from HD25/94; and
- Description of the materials encountered in the exploratory holes.

Based on this it is considered that a CBR of 5% may be used for the natural soils.

Based on the plasticity data the soils are not considered frost susceptible in accordance with Road Note 29.

Following excavation, the sub formation should be proof rolled and any soft material inspected and removed.

10.7 Excavations

Site observations indicated that excavations should be feasible in the near surface with normal plant.

All excavations where access is required should be supported or battered back in accordance with guidance contained in CIRIA RR97.

Dewatering is unlikely to be required.

10.8 Buried Concrete

Results of the sulphate testing indicate that natural soils have soluble sulphate concentrations of less than 0.5 g/l consistent with DS1 Conditions.

Based on soluble sulphate and taking account of pH, it is considered that buried concrete can be deigned to Class AC1-s.

11 CONTAMINATED LAND RISK ASSESSMENT

11.1 Human Health

Approach

Brown 2 Green Associates Ltd has undertaken a Tier 1 Human Health Risk Assessment to determine if any potential contaminants within the underlying soil pose an unacceptable level of risk to the identified human health receptors.

At a Tier 1 Stage the long term (chronic) human health toxicity of the soil has been assessed with reference to Generic Assessment Criteria (GAC) detailed in Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham (Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3086). If no generic GAC (CIEH/LQM) is available, reference has been made to Category 4 Screening Values or GAC have been determined by Brown 2 Green Associates Ltd using CLEA 1.06 with adjustments based on input data used in the calculation of Category 4 Screening Values.

Where appropriate for determinants that exceed the adopted Tier 1 Screening Levels, in accordance with the CIEH (2008) Guidance on Comparing Soil Contamination Data with Critical Concentration the 95%ile upper confidence level of the measured mean has been compared to the relevant GAC threshold, to determine whether the degree of contamination detected is statistically significant.

For the assessment of risk to human health from groundwater a Qualitative Risk Assessment has been undertaken. Within this section we have only considered the risk to users of the site. An assessment of risk to human health beyond the boundaries of the site is considered as part of the risk to controlled waters.

Soil

For the purposes of the Tier 1 Assessment Brown 2 Green Associates Ltd have initially compared the laboratory test data directly to the relevant Brown 2 Green Associates Ltd Tier 1 Human Health Screening Criteria for commercial end use with a soil organic matter content of 1%. The results of this direct comparison are presented below:

Determinant	Units	GAC	n	MC	Locations above GAC	Path-way	Assessment
Arsenic	mg/kg	640	5	30	-	1	No Further Action
Cadmium	mg/kg	190	5	0.47	-	4	No Further Action
Chromium (III)	mg/kg	8600	5	32	-	4	No Further Action
Lead*	mg/kg	2300	5	22	-	4	No Further Action
Mercury (Inorganic)	mg/kg	1100	5	0.28	-	1	No Further Action
Nickel	mg/kg	980	5	35	-	1	No Further Action
Selenium	mg/kg	12000	5	0.77	-	1	No Further Action
Copper	mg/kg	68000	5	19	-	1	No Further Action
Vanadium	mg/kg	9000	5	57	-	4	No Further Action
Zinc	mg/kg	730000	5	75	-	1	No Further Action
Naphthalene	mg/kg	190	5	<0.10	-	1	No Further Action
Acenaphthylene	mg/kg	83000	5	<0.10	-	1	No Further Action
Acenaphthene	mg/kg	84000	5	<0.10	-	1	No Further Action

Fluorene	mg/kg	63000	5	<0.10	-	1	No Further Action
Phenanthrene	mg/kg	22000	5	<0.10	-	1	No Further Action
Anthracene	mg/kg	520000	5	<0.10	-	1	No Further Action
Fluoranthene	mg/kg	23000	5	<0.10	-	1	No Further Action
Pyrene	mg/kg	54000	5	<0.10	-	1	No Further Action
Benzo(a)anthracene	mg/kg	170	5	<0.10	-	1	No Further Action
Chrysene	mg/kg	350	5	<0.10	-	1	No Further Action
Benzo(b)fluoranthene	mg/kg	44	5	<0.10	-	1	No Further Action
Benzo(k)fluoranthene	mg/kg	1200	5	<0.10	-	1	No Further Action
Benzo(a)Pyrene	mg/kg	35	5	<0.10	-	1	No Further Action
Indeno(123-cd)pyrene	mg/kg	500	5	<0.10	-	1	No Further Action
Dibenz(ah)anthracene	mg/kg	3.5	5	<0.10	-	1	No Further Action
Benzo(ghi)perylene	mg/kg	3900	5	<0.10	-	1	No Further Action
TPH C_5-C_6 (aliphatic)	mg/kg	3200	5	<1.0	-	2	No Further Action
TPH C_6-C_8 (aliphatic)	mg/kg	7800	5	<1.0	-	2	No Further Action
TPH C_8-C_{10} (aliphatic)	mg/kg	2000	5	<1.0	-	2	No Further Action
TPH C_{10}-C_{12} (aliphatic)	mg/kg	9700	5	<1.0	-	1, 2	No Further Action
TPH C_{12}-C_{16} (aromatic)	mg/kg	36000	5	<1.0	-	1	No Further Action
TPH C_{16}-C_{21} (aromatic)	mg/kg	28000	5	<1.0	-	1	No Further Action
TPH C_{21}-C_{35} (aromatic)	mg/kg	28000	5	<1.0	-	1	No Further Action
TPH C_{35}-C_{44} (aromatic)	mg/kg	28000	5	<1.0	-	1	No Further Action

Notes
Main Exposure Pathways: 1 = Soil and dust Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact, 4 = Dust Inhalation, 5 = consumption of home grown produce.

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration.

Tier 1 GAC are based on Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. **Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3086.**

* - Category 4 Screening Level.
** - EIC/AGS/CL:AIRE Soil Generic Assessment Criteria for Human Health Risk Assessment January 2010.
*** - Brown 2 Green HH-GSV using CLEA V 1.06 and tox data from DEFRA/Environment Agency SGV.

Asbestos was not identified in any of the soil samples submitted for screening analysis.

From the results of the risk assessment it is considered that contamination at the site will not pose a significant risk to human health.

Groundwater

As no pollution linkages have been identified, it is considered groundwater beneath the site will not pose a significant risk to human health.

11.2 Ground Gas

From the results of the site investigation, no additional sources of ground gas were identified. From the assessment it is considered that ground gas will not pose a significant risk to human health and the development.

11.3 Controlled Water

To assess risk to controlled waters from the leaching of determinants from soil, a Qualitative Risk Assessment has been made based on the concentrations identified within the soil samples and site conditions. From the results it is considered that concentrations will not be leached at levels that would pose a significant risk.

11.4 Planting

An assessment of risk to from potentially phytotoxic metal compounds has been completed. In the absence of published assessment criteria specifically for contaminated land, GAC have been obtained from legislation (UK and European) and guidance related to the use of sewage sludge on agricultural fields.

For the assessment values defined in The Sludge (use in Agriculture) Regulations 1989 (Public Health England, Wales and Scotland), as amended in 1990 and The Sludge (use in Agriculture) Regulations (Northern Ireland) SR No, 245, 1990 have been adopted. In addition the Department of Environment (DoE) produced a Code of Practice (CoP) (Updated 2nd Edition) in 2006 which provided guidance on the application of sewage sludge on agricultural land. The specified limits of concentrations of selected elements in soil are presented in the 2nd Edition of the DoE Code of Practice and are designed to protect plant growth.

As all concentrations are below their respective assessment criteria, it is considered that the concentrations of phytotoxic metals will not pose a significant risk to planting.

11.5 Construction Materials

The assessment of the risk to concrete from the concentrations of sulphate and the pH in the soil has been made using BRE guidance Special Digest 1:2005 Concrete in Aggressive Ground.

Sulphate concentrations of between <10mg/l and 1200mg/l and pH values of 6.1 to 8.3 were recorded in the soils. The site has been assessed as Greenfield.

Following the guidance set out in the Digest the Characteristic Sulphate Content is 1200mg/l and the Characteristic pH is 6.1 in the soil; the Design Sulphate Class for the site is DS-1 and the Aggressive Environment for Concrete Class is AC-1. Based on the results of the assessment it is considered that the made ground beneath the site will not pose a significant risk to concrete through acid attack.

This recommendation is based on samples taken in the near surface materials on site. If deeper foundations are required additional testing should be undertaken and the conclusions of this section should be re-assessed in light of the additional test results available.

11.6 Water Supply Pipe

The assessment of risk to pipe work used in the potable water supply has been made using UK Water Industry Research (UKWIR) "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Ref 10/WM/03/21)" January 2011 and supplement "Contaminated Land Assessment Guidance" dated January 2014. The results from samples of made ground (through which any new water supply pipes are likely to pass) have been compared with the threshold values listed in the UKWIR guidance. It should be noted that the threshold values are for use by designers in the selection of appropriate pipe materials. Exceedance of a threshold value

indicates only that there could be a ‘water quality issue’. Threshold values are generally protective of taste and odour quality of water in plastic water pipes and only threshold values for benzene and MTBE are protective of human health. The assessment criteria are presented below:

Beneath the site the results indicate that concentrations are at levels that enable PE/PVC pipe work to be adopted. It is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

12 REVISED CONCEPTUAL MODEL

Following the completion of the Intrusive Site Investigation and Chemical Analysis and Assessment, Brown 2 Green Associates Ltd has not identified any potentially significant pollutant linkages based on the proposed redevelopment of the site.

13 GEO-ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS

13.1 Conclusions

The Tier I Human Health Risk Assessment has determined that there are no unacceptable concentrations of potential contaminants within the underlying made ground and natural soils that would pose a potential risk to human health of future site occupants.

The Tier I Controlled Water Risk Assessment has determined that there are no unacceptable concentrations of potential contaminants within the underlying soils that would pose a potential risk to controlled waters.

The monitoring and risk assessment for bio-genic ground gas concluded that there is no risk from ground gas.

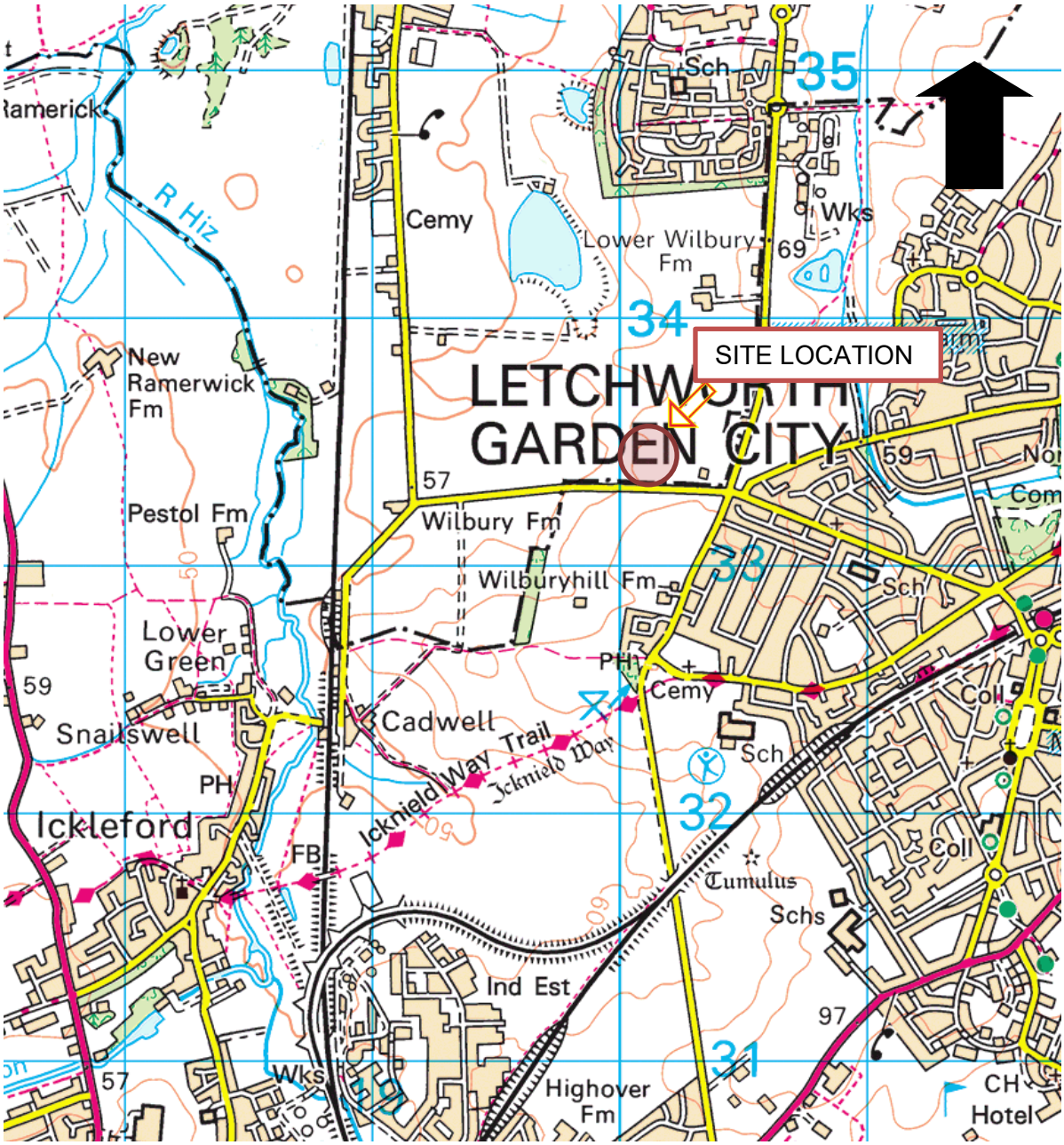
The risk assessment in respect to the future planting and towards sensitive ecological receptors identified that the determinants at the site would not pose a potential risk.

The risk assessment in respect to water supply infrastructure identified that the determinants at the site would not pose a potential risk to the integrity of PE or PVC pipework.

13.2 Recommendations

From the results of the assessment of risk from contaminated land, it is considered that the potential risk from contamination at the site is very low and it is likely that no remediation will be required.

FIGURES



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Project Number: 1968	Project: Wilbury Hills Cemetery, Letchworth Garden City	Scale: NTS
Figure 1	**Site Location Plan**	Brown 2 Green

FIGURE 2

PROPOSED DEVELOPMENT LAYOUT

NOTE:
Drawing to be read in conjunction with Notes on Development Parameters



- SITE BOUNDARY (COMBINED)
- ACCESS
- BUILDING AREA
- CAR PARKING/SERVICE/ACCESS/ LANDSCAPE AREAS
- MEMORIAL GARDENS/ OPEN LANDSCAPING
- RETAINED TREES AND HEDGEROWS
- REMOVED HEDGEROW
- PROPOSED WOODLAND PLANTING/REINFORCEMENT OF EXISTING HEDGEROWS
- ATTENUATION POND
- EXISTING CEMETERY

WILBURY HILLS CREMATORIUM, LETCHWORTH

Development parameters

PROJECT NO	DRAWING NO	REV
5203	107	
DRAWN	**DATE**	**SCALE**
HNA	MARCH 2018	1:2000

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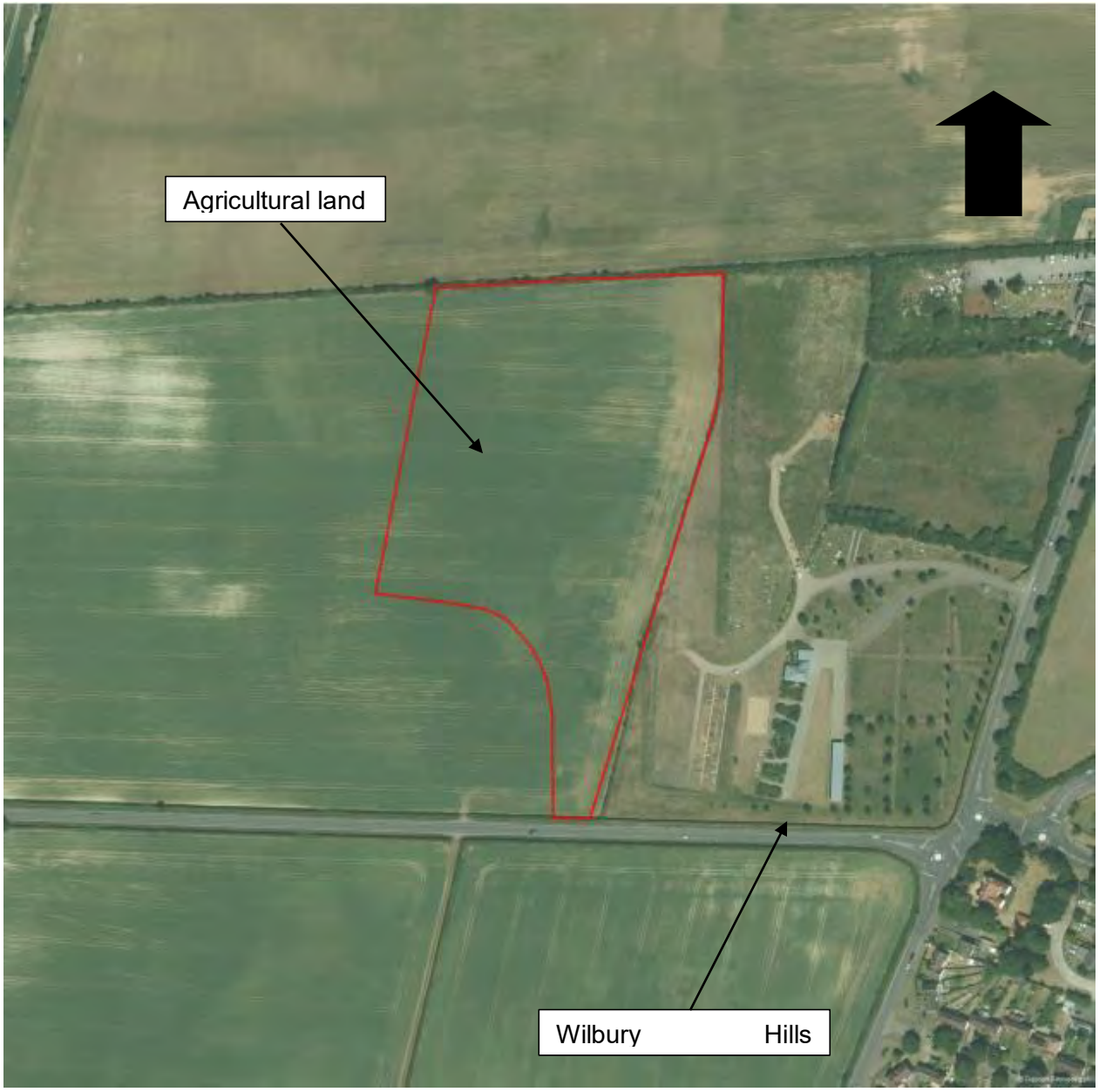
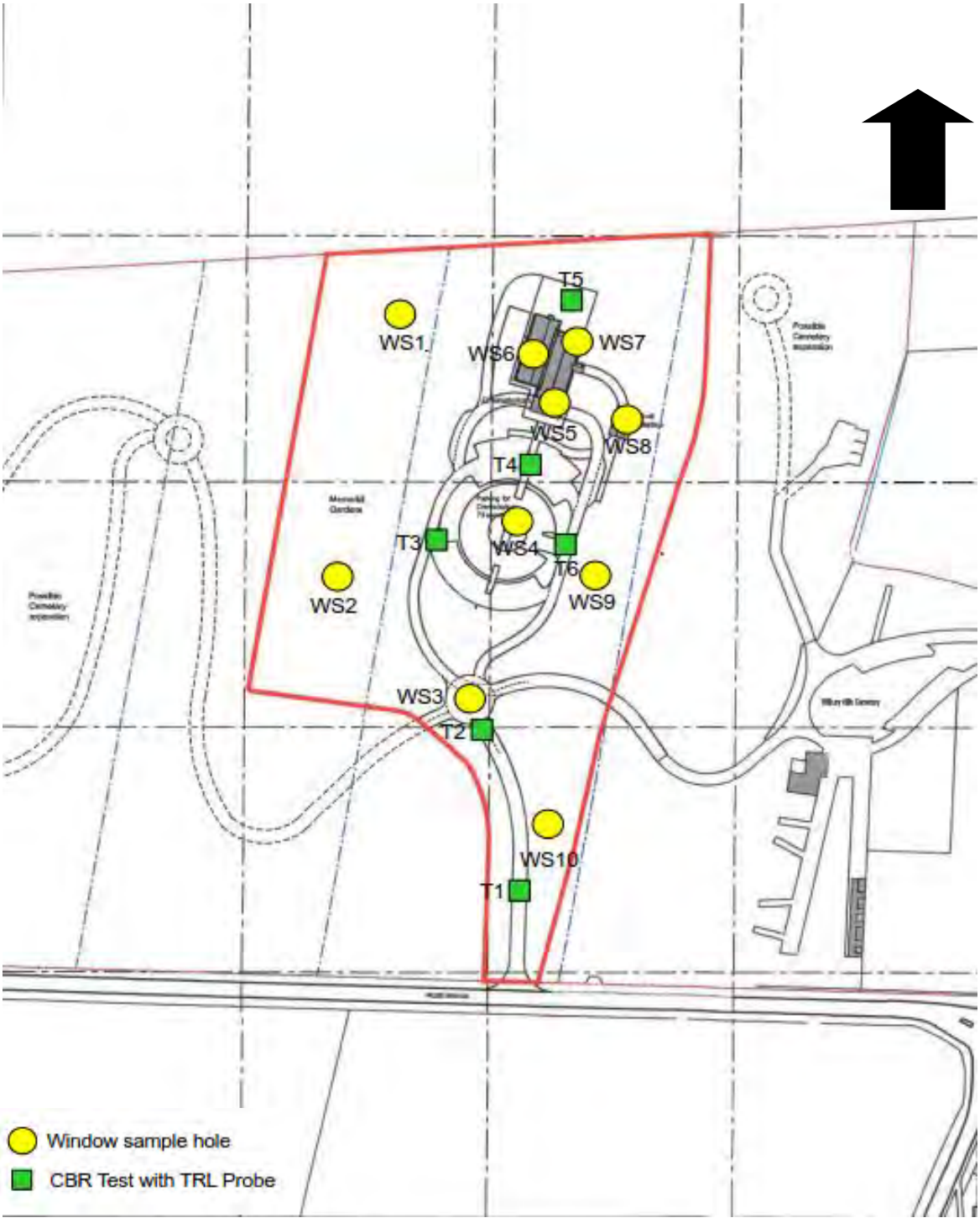


Project Number: 1968	Project: Wilbury Hills Cemetery, Letchworth Garden City	Scale: NTS
Figure 3	**Site Layout Plan**	Brown 2 Green



Project Number: 1968	Project: Wilbury Hills Cemetery, Letchworth Garden City	Scale: NTS
Figure 4	**Exploratory Hole Location Plan**	Brown 2 Green

APPENDIX I

LIMITATIONS AND CONSTRAINTS

Brown 2 Green Associates Limited has prepared this report in accordance with our standard Terms and Conditions solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

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For the work, reliance has been placed on publicly available data obtained from the sources identified and data supplied by other parties. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information. Brown 2 Green Associates Ltd does not warrant work / data undertaken / provided by others.

Due to the short timescales associated with these projects responses may not have been received from all parties. Brown 2 Green Associates Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

This report has been produced in accordance with UK policy and legislative requirements for land and groundwater contamination at the time the report was commissioned. Should changes in legislation or policy occur the report findings may need revisiting once the development layout is confirmed.

During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walk-over no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown or the location of the area has not been made known, or where access has not been permitted.

Access considerations, the presence of services and the activities being carried out on the site limited the positions where sampling locations could be installed and the techniques that could be used.

This report presents an interpretation of the geo-environmental information established by excavation, observation and testing. It should be noted that when investigating, or developing land it is important to recognise that sub-surface conditions may vary spatially and also with time. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.

The scope of any investigation is based on the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

Rather, this investigation has been undertaken to provide a characterisation of the existing sub-surface geo-environmental characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

During any development programme Brown 2 Green Associates Limited should be consulted if alternative ground conditions are encountered. It assumes during any site works that the contractor will use their best endeavours to manage and control groundwater and other unforeseen ground conditions. Brown 2 Green Associates Limited will not be liable for actions taken prior to consultation.

Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and does not constitute or replace full and proper surveys.

APPENDIX II

SITE PHOTOGRAPHS



Access track, looking south towards Arlesey New Road



View looking west from site entrance



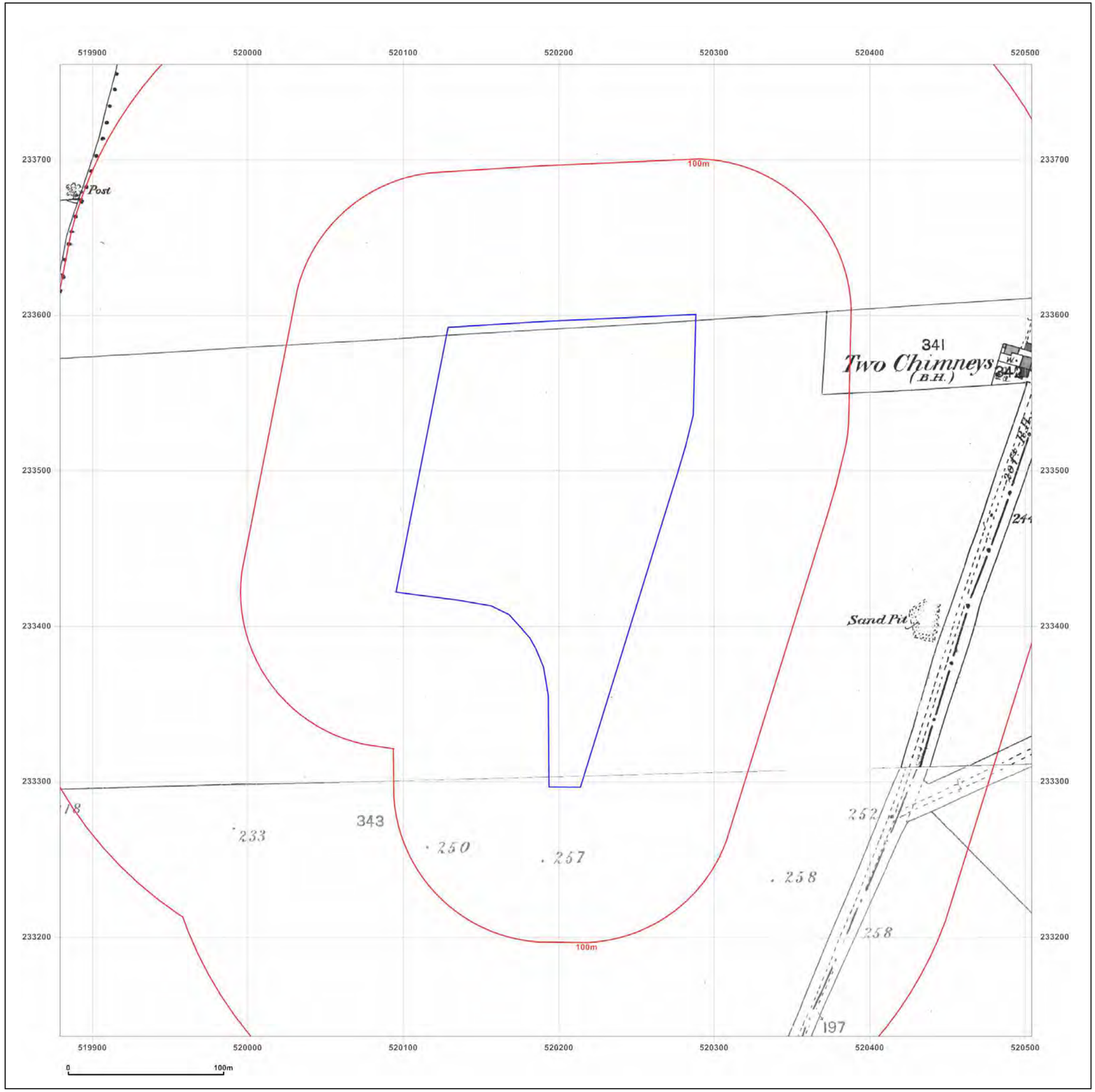
View looking east from site entrance towards Wilbury Hills Cemetery



View looking north from site entrance

APPENDIX III

HISTORICAL MAPS



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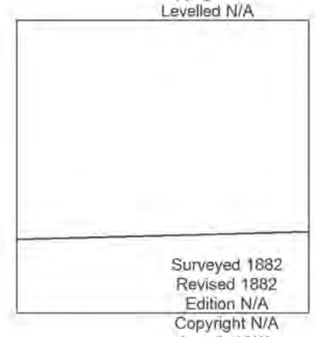

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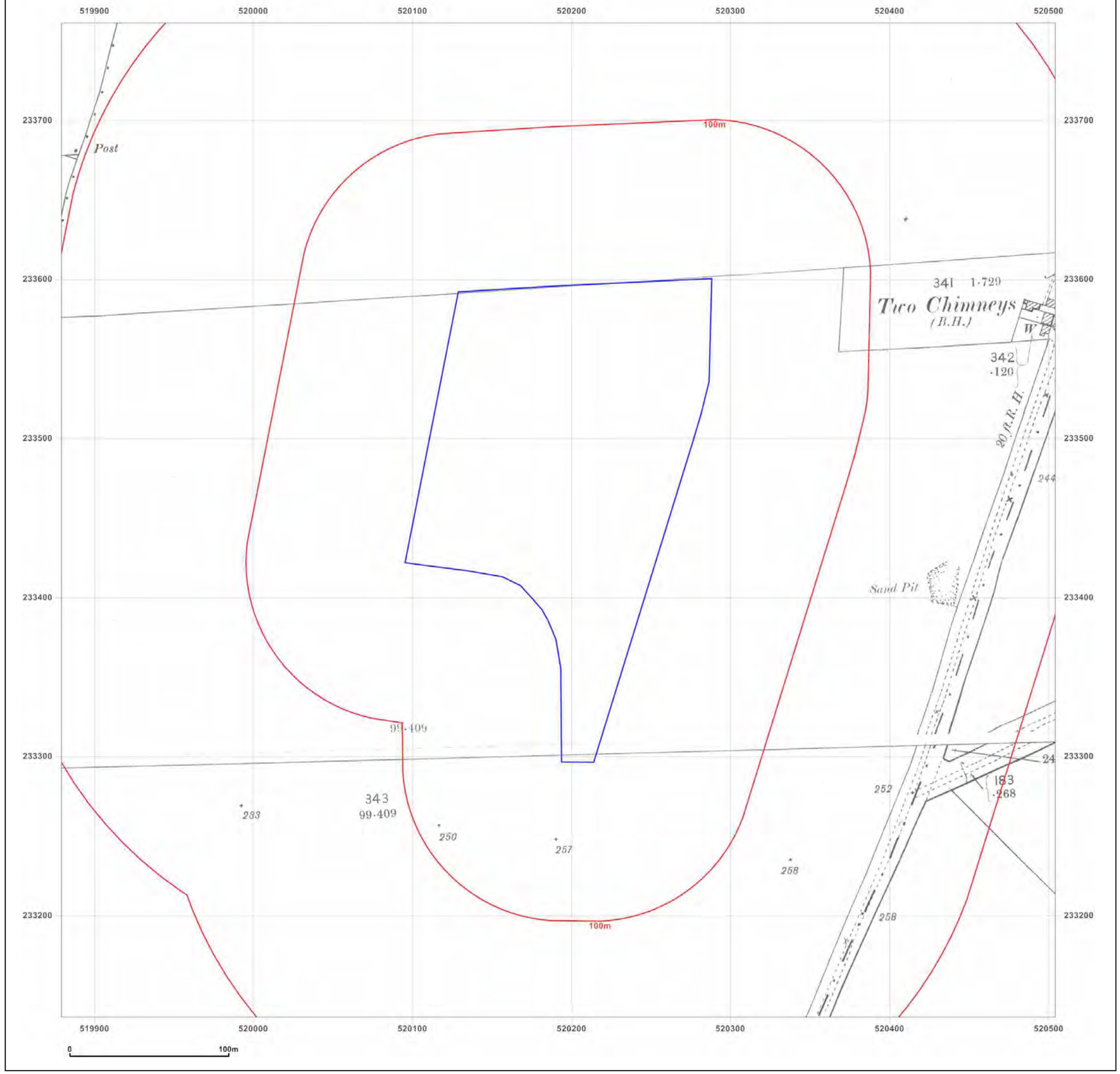

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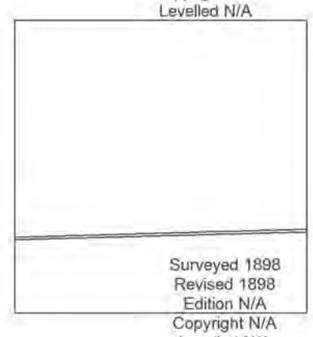

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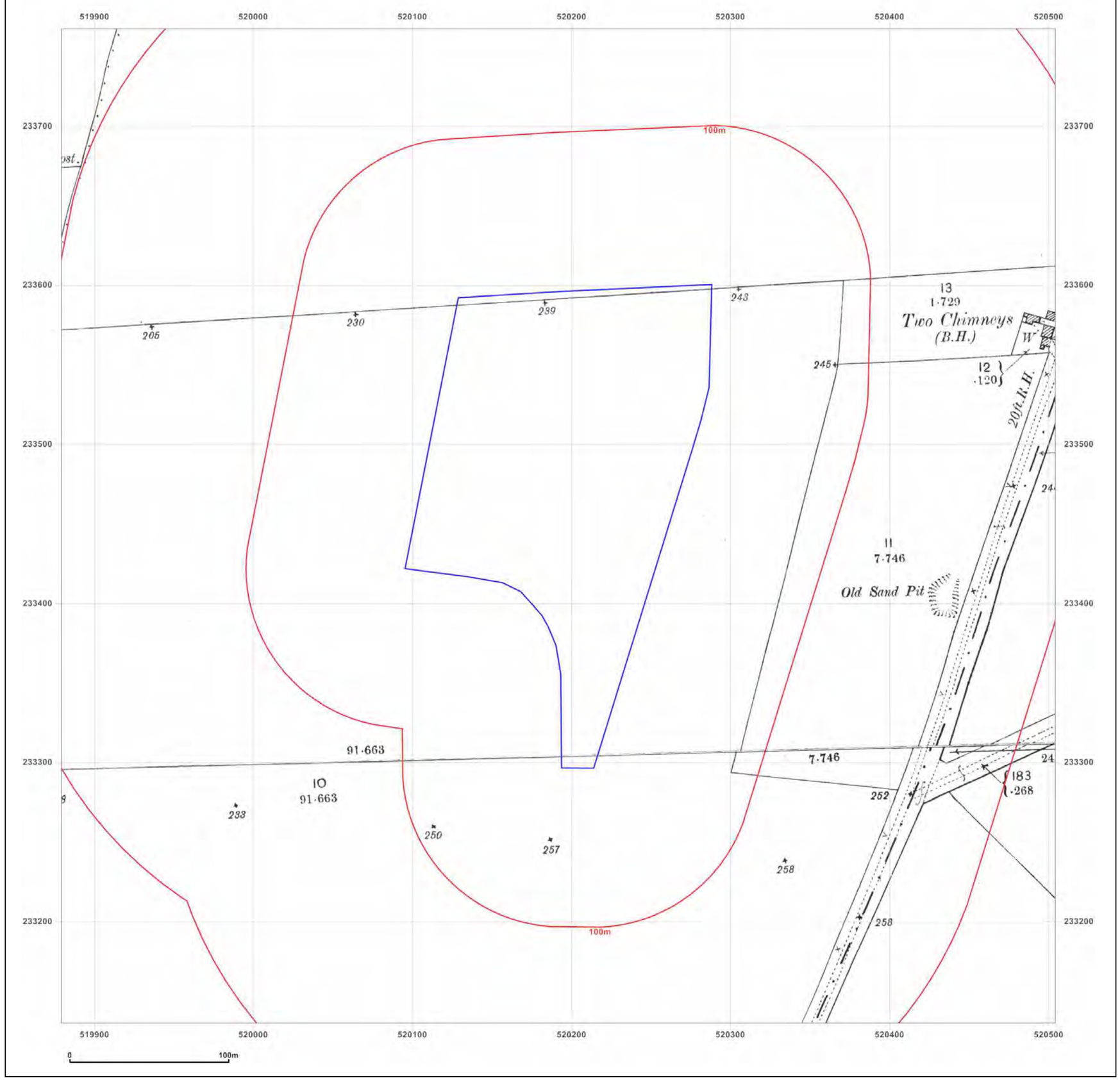

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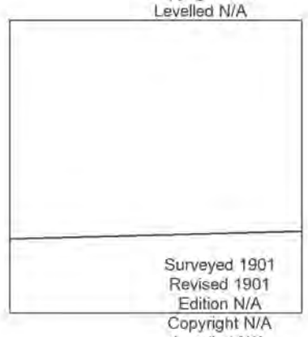

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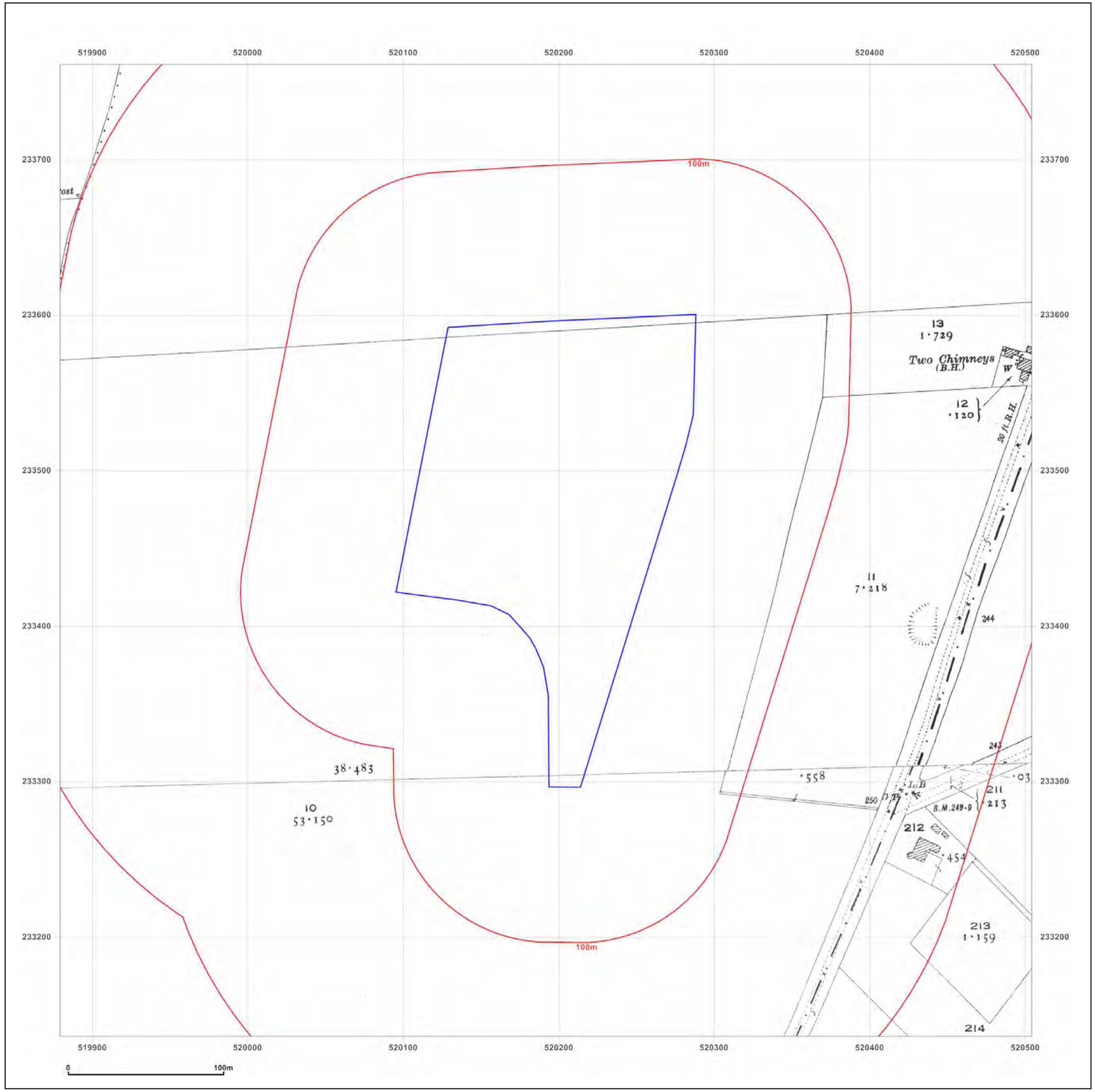

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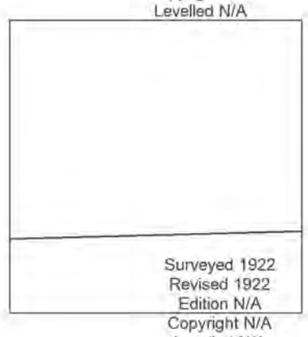

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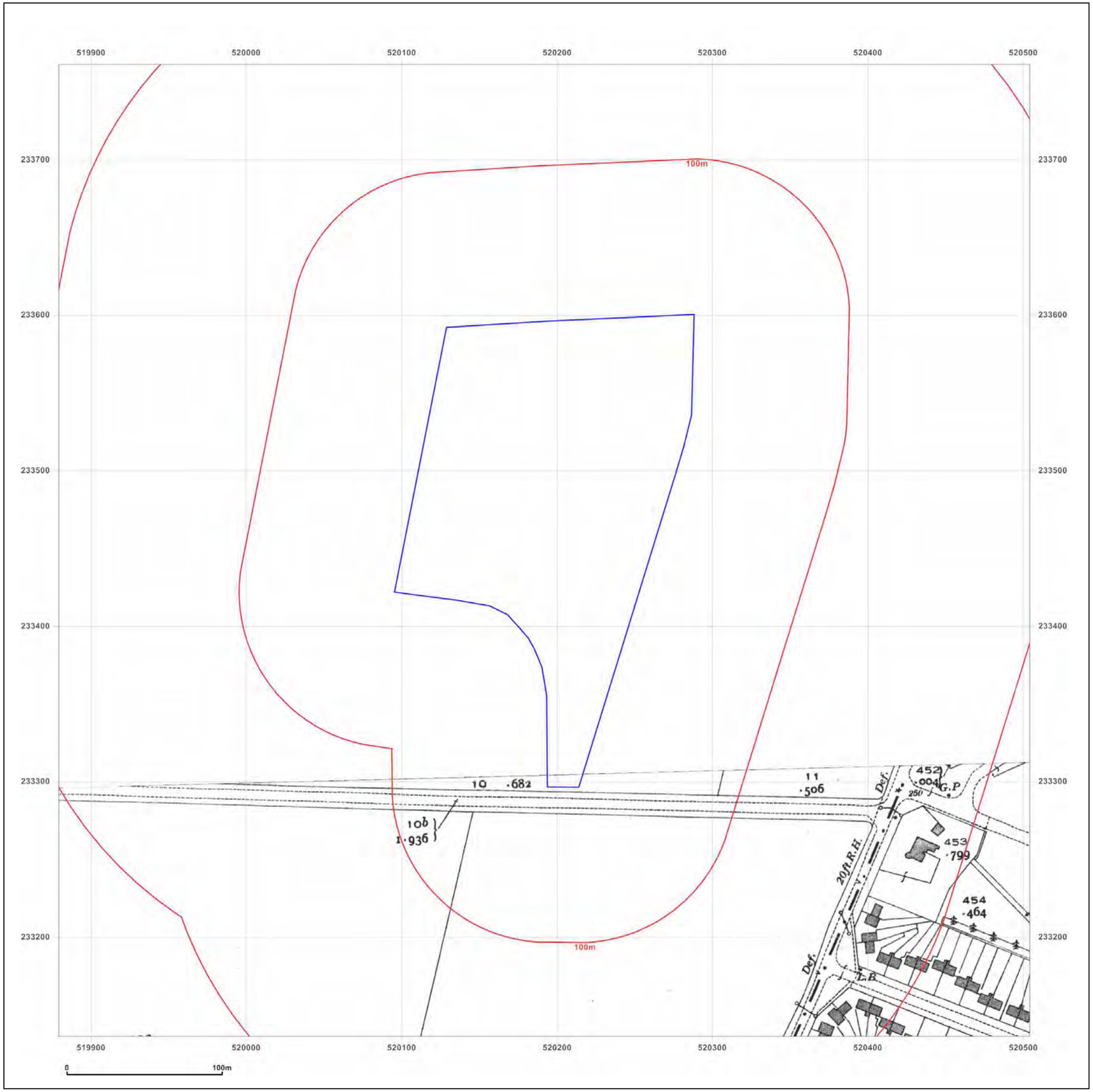

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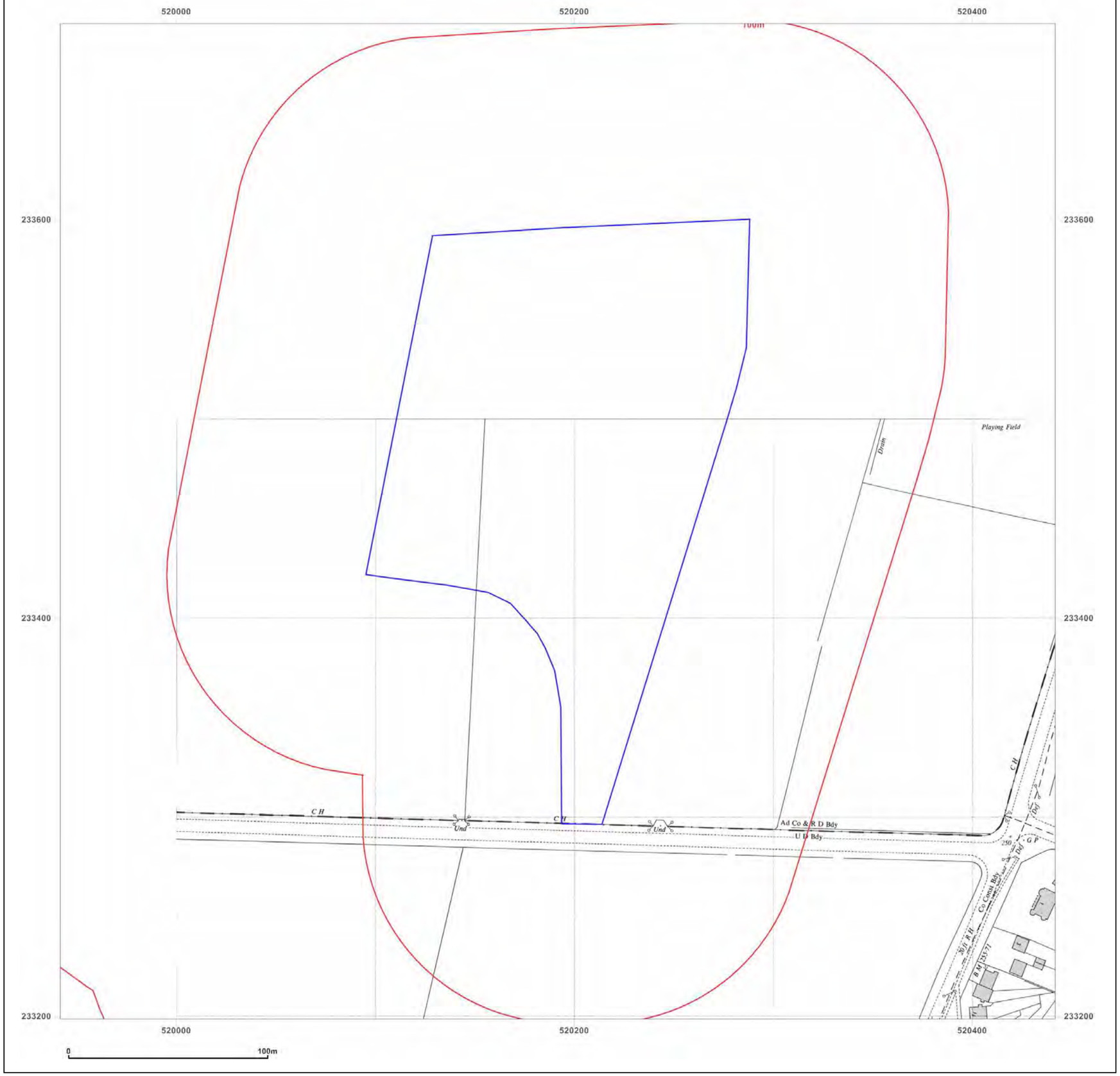

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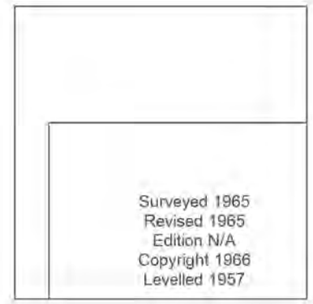

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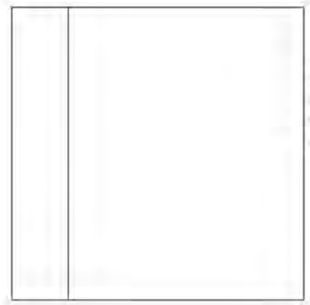

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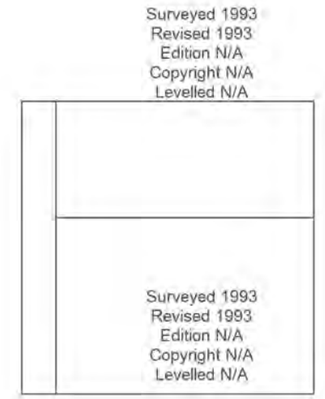

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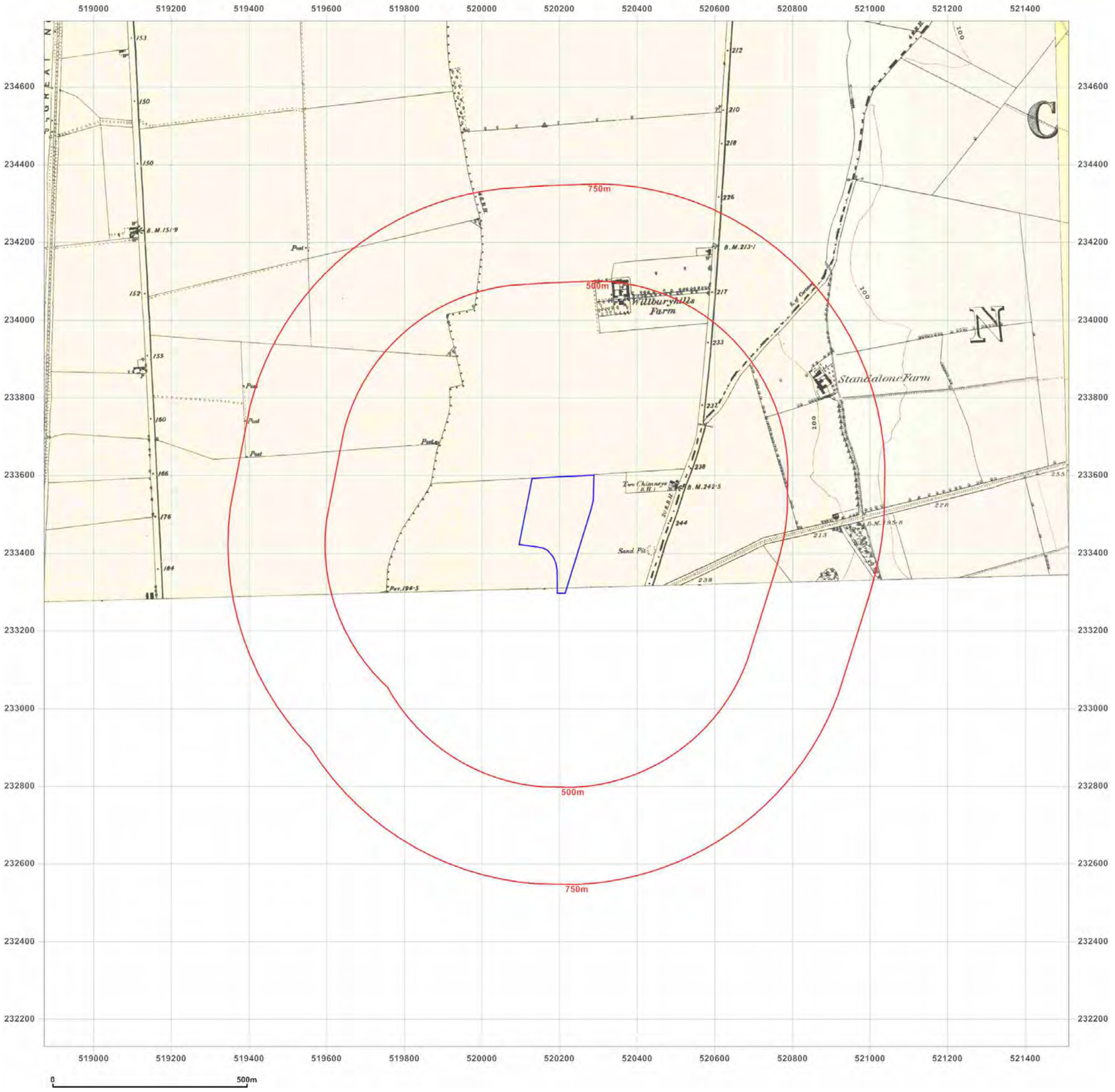

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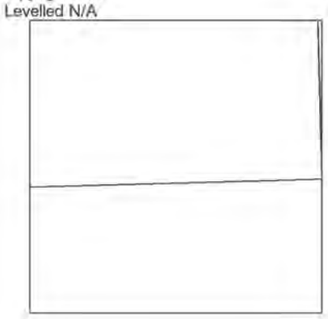

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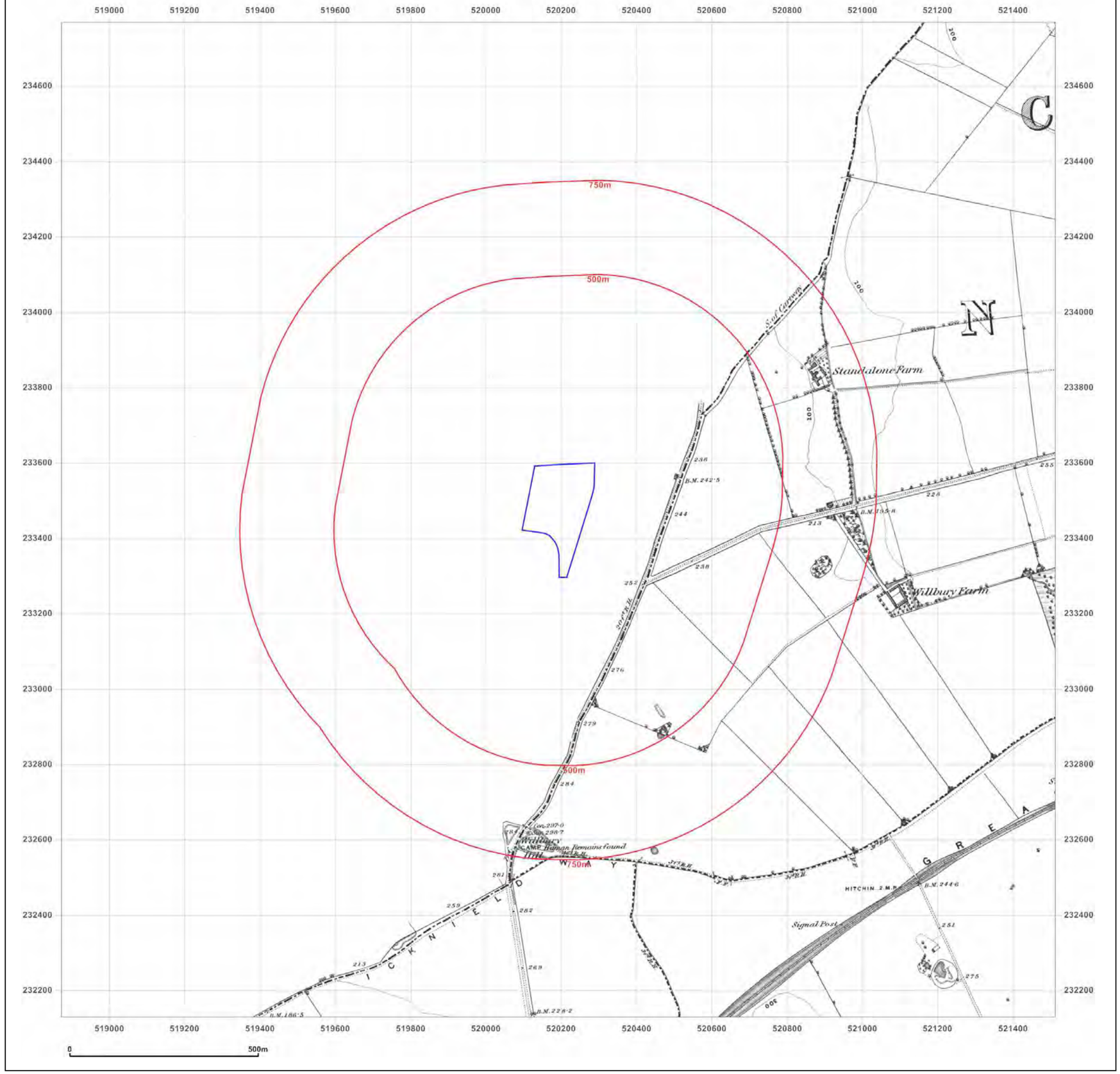

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CITY, SG6 4EG

Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: County Series

Map date: **1884**

Scale: 1:10,560

Printed at: 1:10,560

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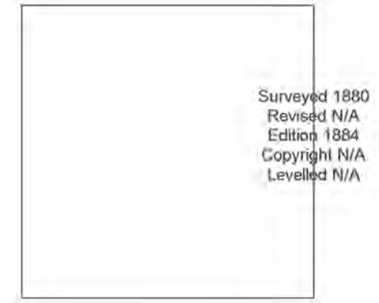

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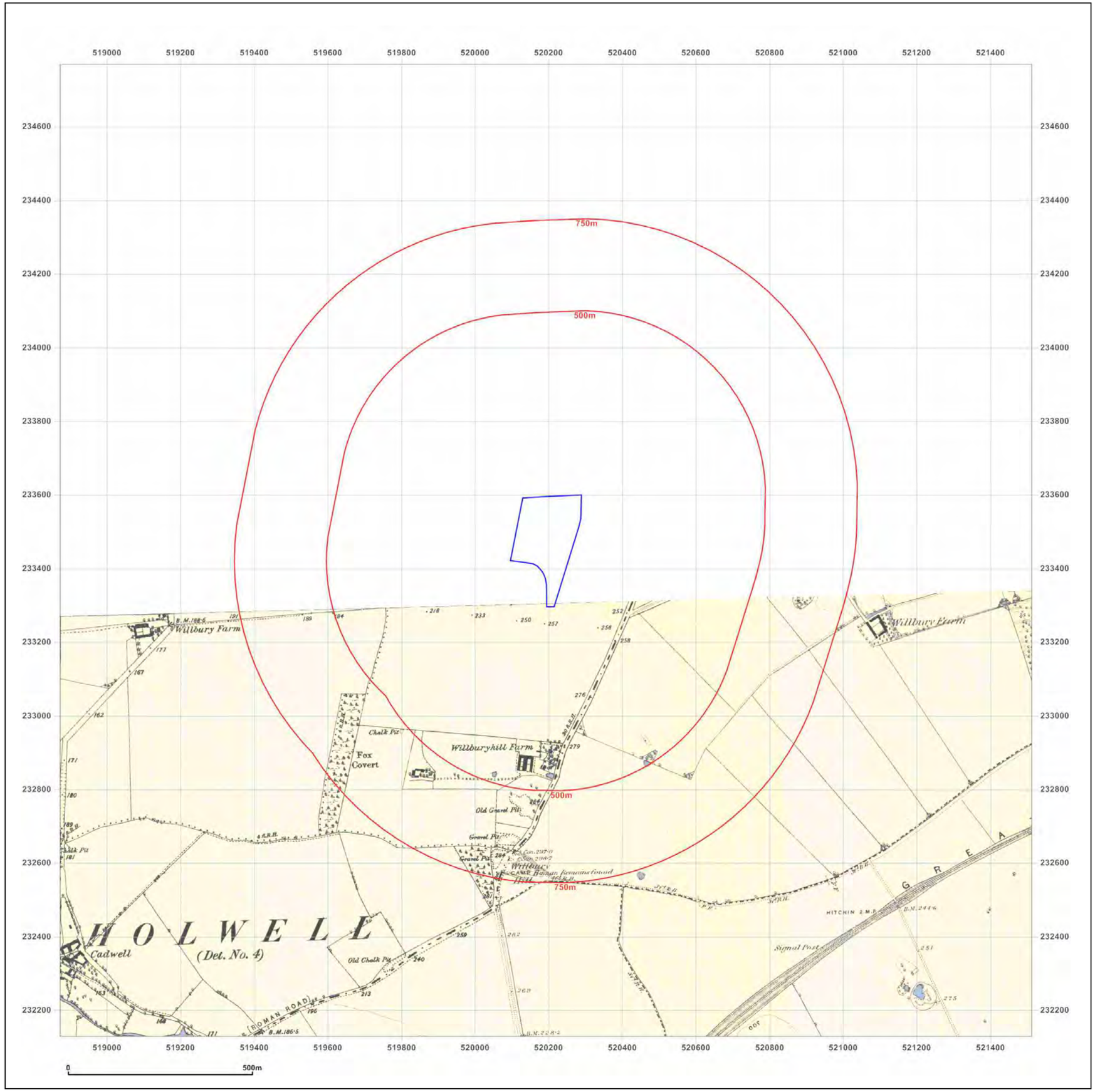

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Client Ref: 1968
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Map Name: County Series

Map date: **1887**

Scale: 1:10,560

Printed at: 1:10,560

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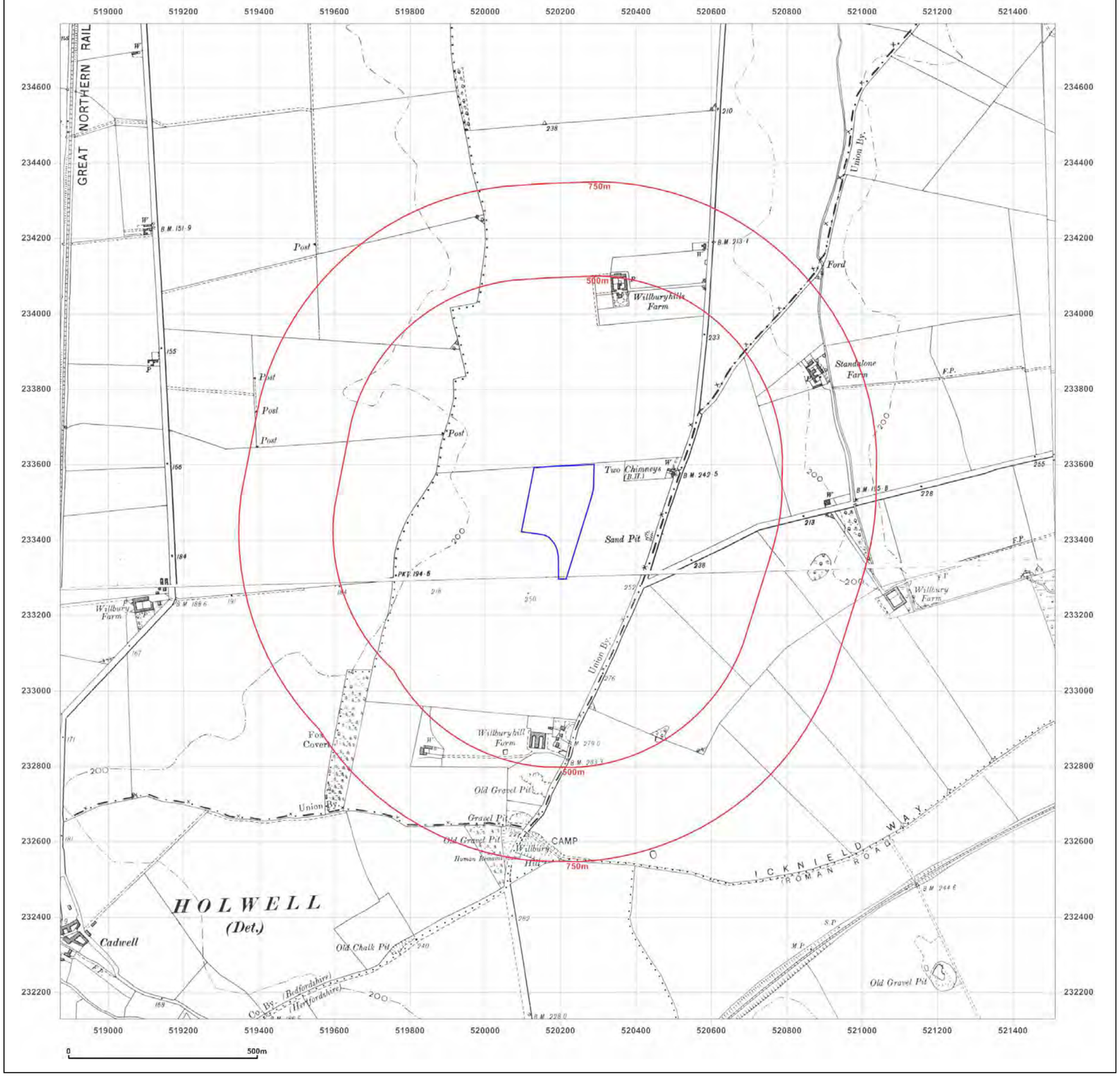

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Client Ref: 1968
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Grid Ref: 520192, 233449

Map Name: County Series

Map date: **1899**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1881
Revised 1899
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1879
Revised 1899
Edition N/A
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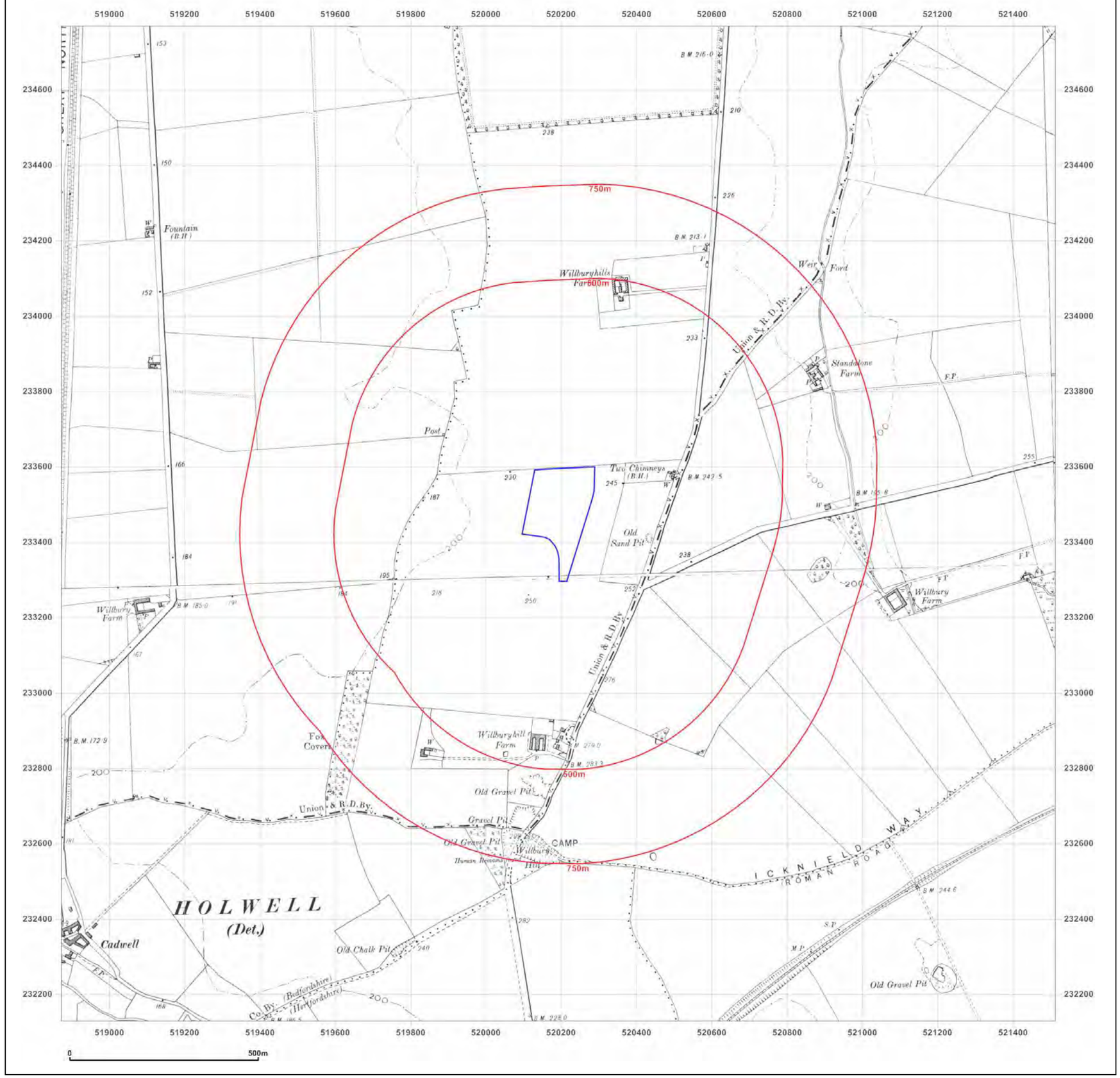

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ROAD,LETCHWORTH GARDEN
CITY, SG6 4EG

Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: County Series

Map date: **1899-1900**

Scale: 1:10,560

Printed at: 1:10,560

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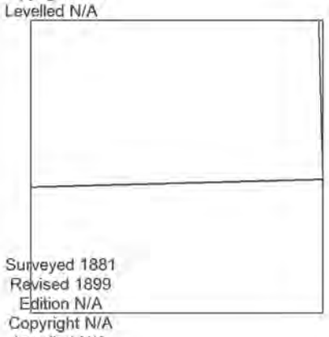
Surveyed 1881
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1881
Revised 1899
Edition N/A
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Revised 1900
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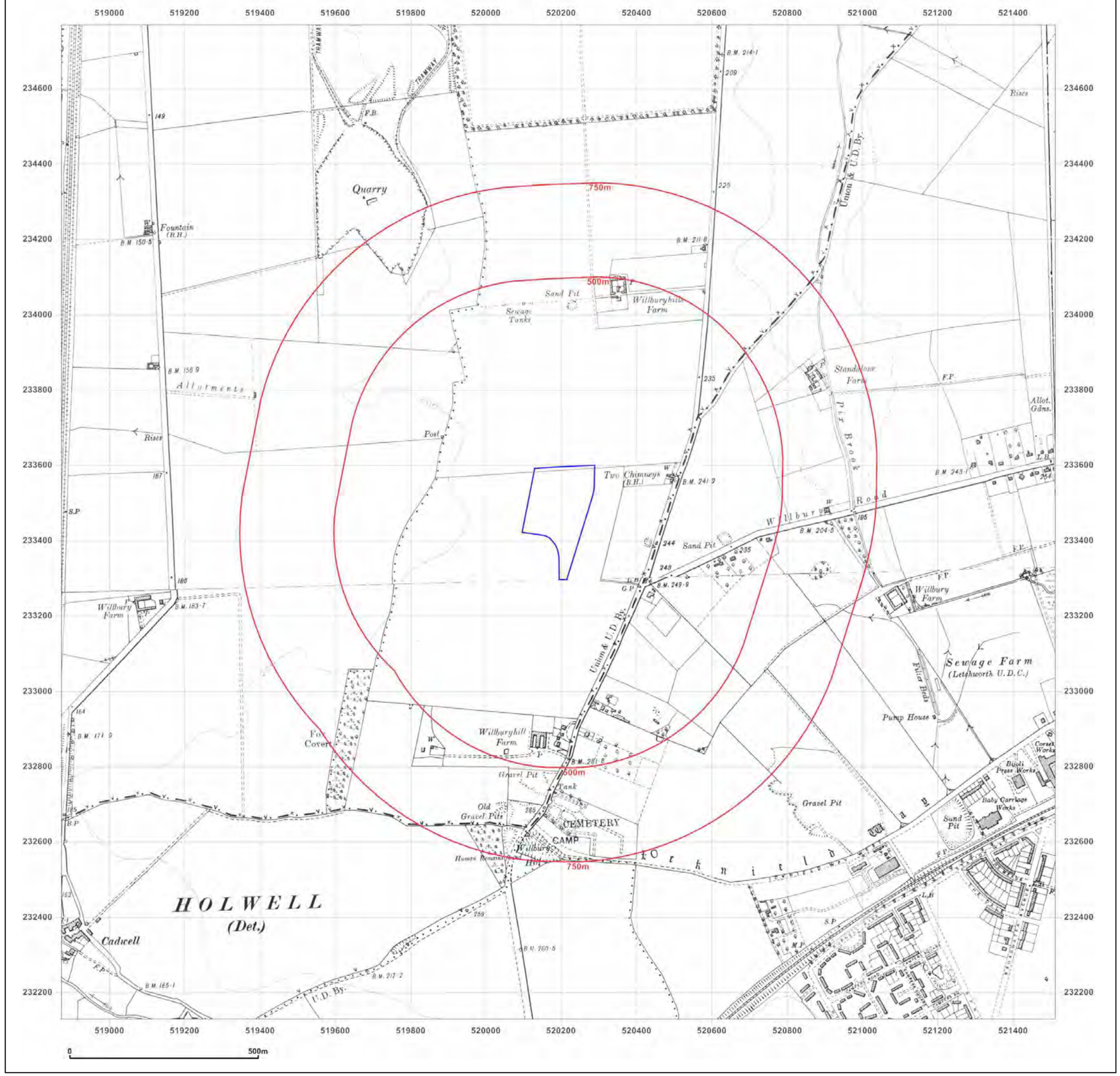

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CITY, SG6 4EG

Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: County Series

Map date: **1920-1921**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1881
Revised 1921
Edition N/A
Copyright N/A
Levelled N/A

Surveyed N/A
Revised N/A
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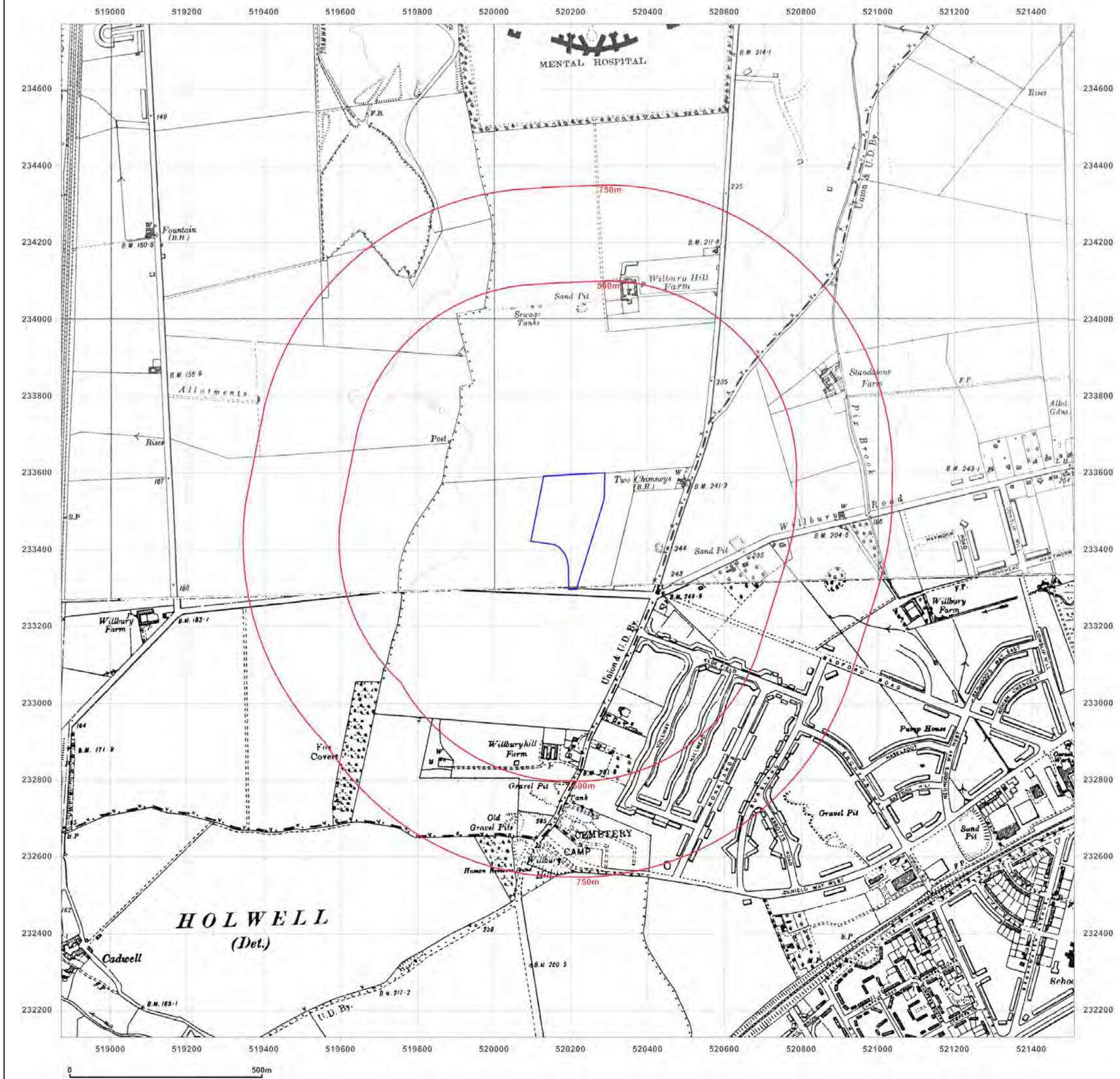

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CITY, SG6 4EG

Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1881
Revised 1938
Edition N/A
Copyright N/A
Levelled 1922

Surveyed 1881
Revised 1938
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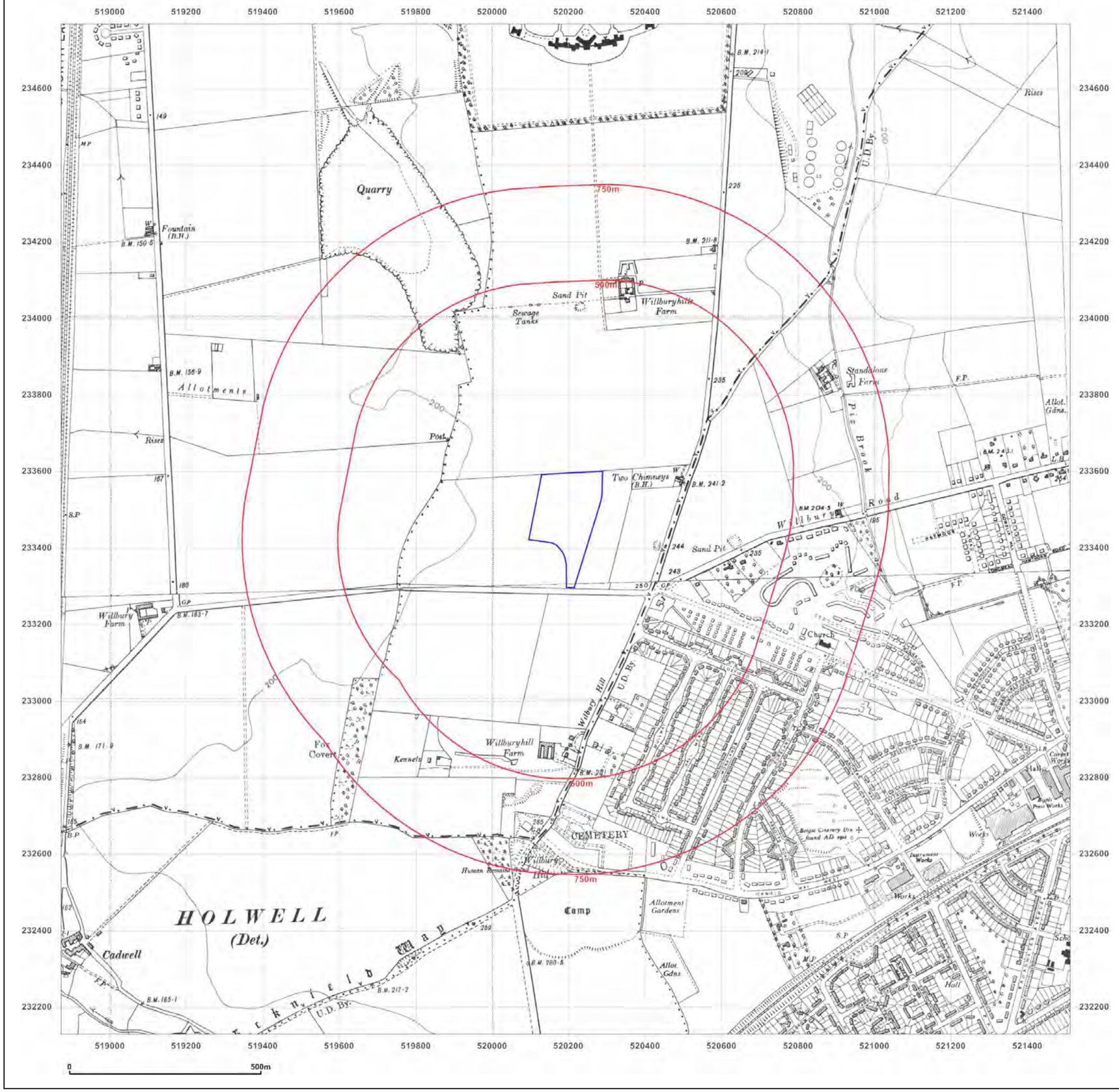

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Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: County Series

Map date: **1947-1948**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1881
Revised 1948
Edition N/A
Copyright N/A
Levelled N/A



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Revised 1948
Edition N/A
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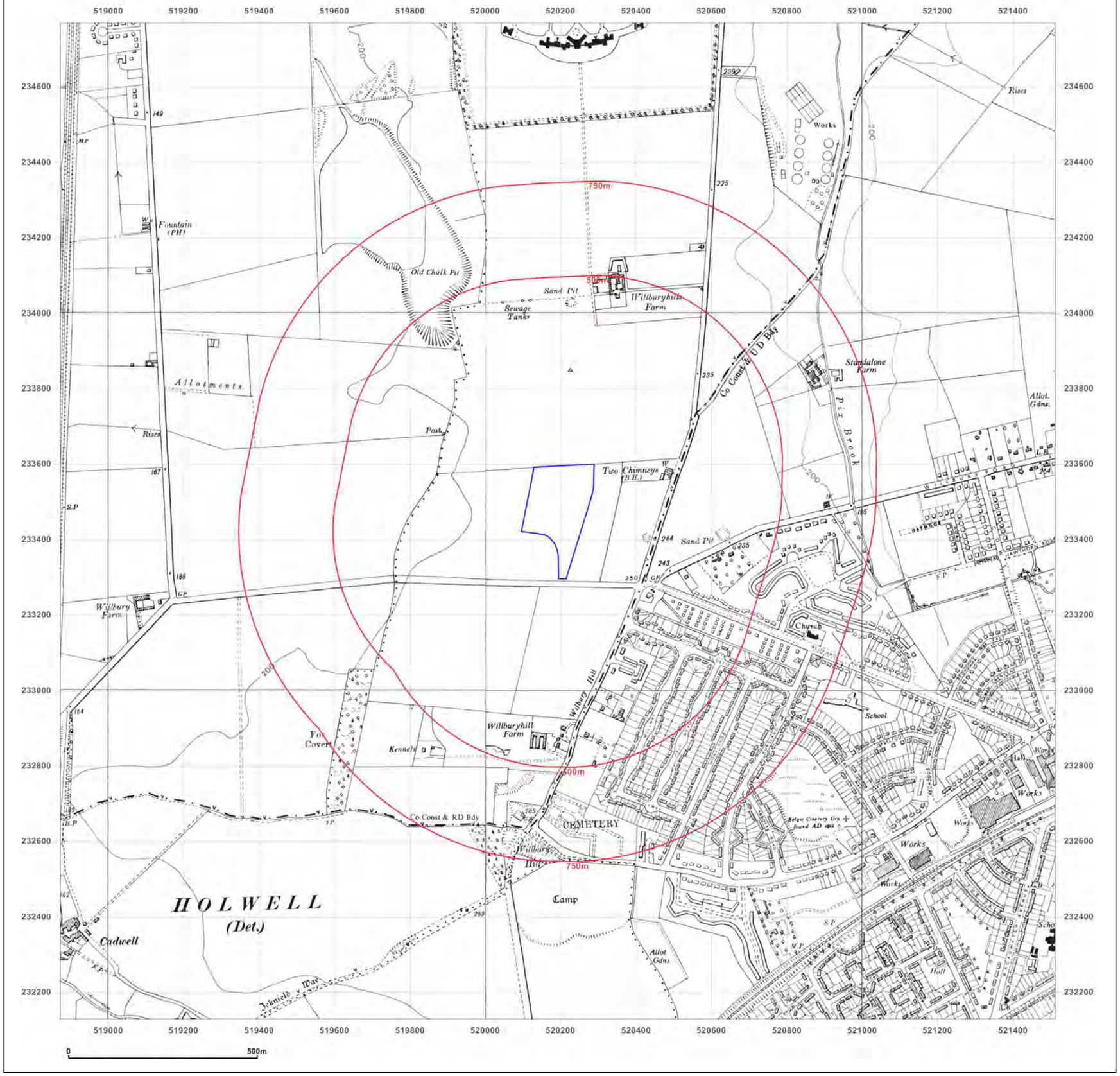

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Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: Provisional

Map date: **1960**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed N/A
Revised 1959
Edition N/A
Copyright 1960
Levelled N/A

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Revised 1959
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Copyright 1960
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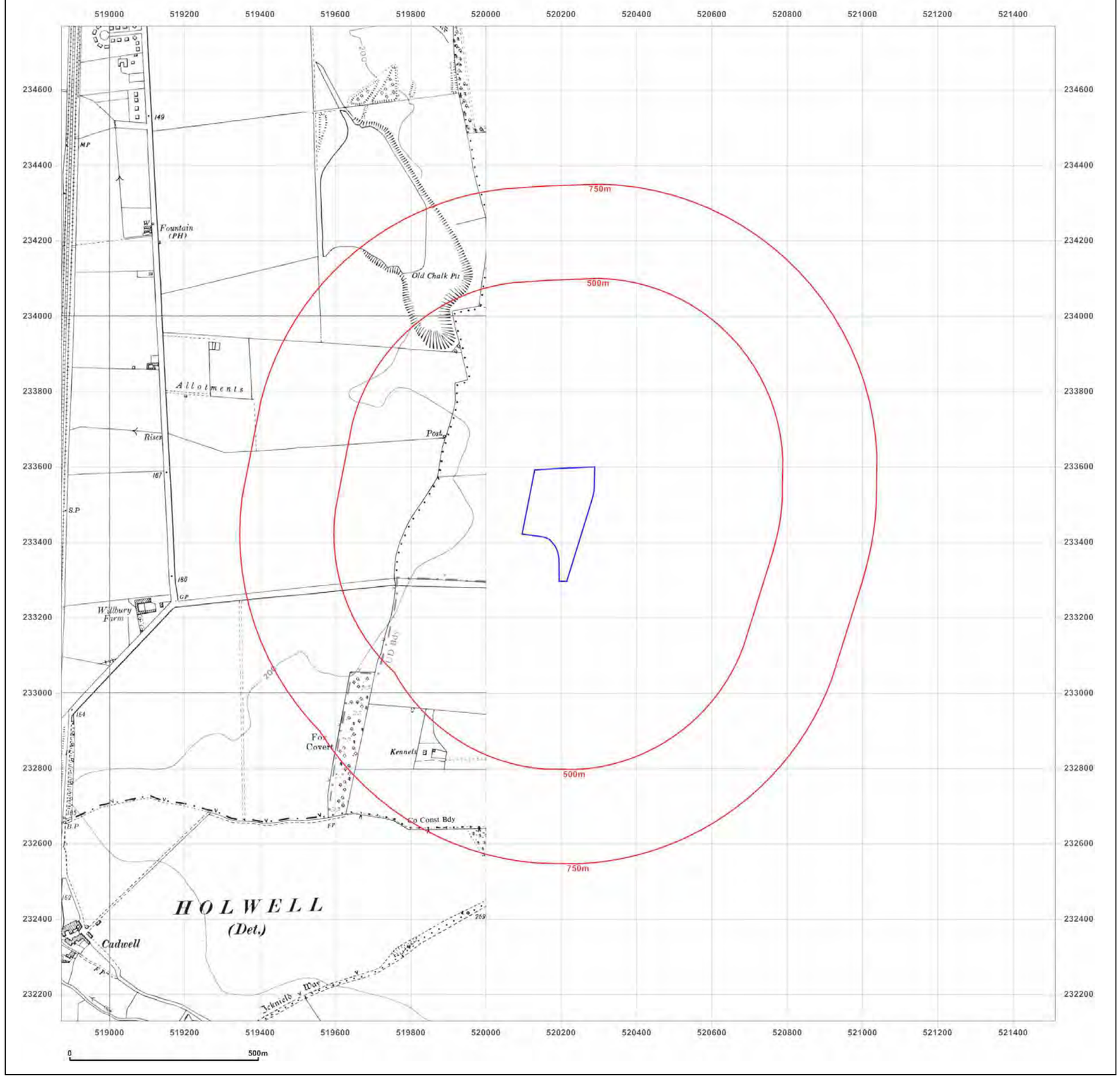

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Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: Provisional

Map date: **1970**

Scale: 1:10,560

Printed at: 1:10,560

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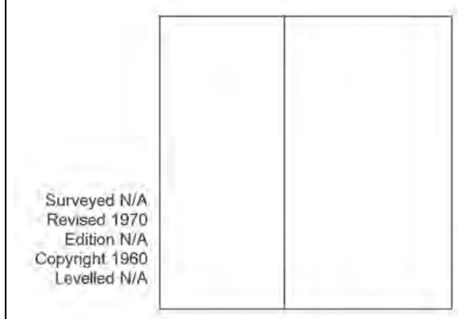

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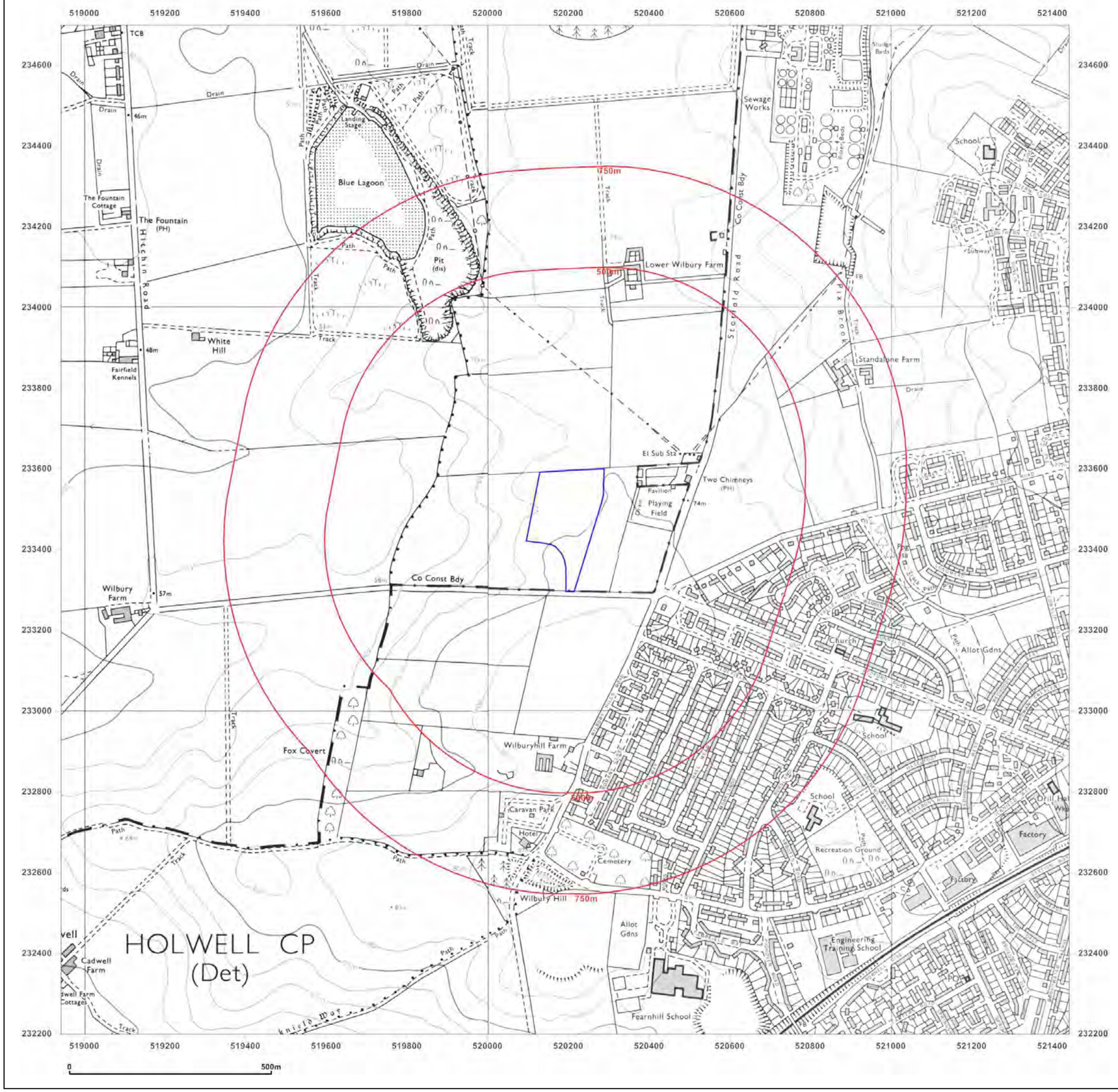

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CITY, SG6 4EG

Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: National Grid

Map date: **1980-1982**

Scale: 1:10,000

Printed at: 1:10,000

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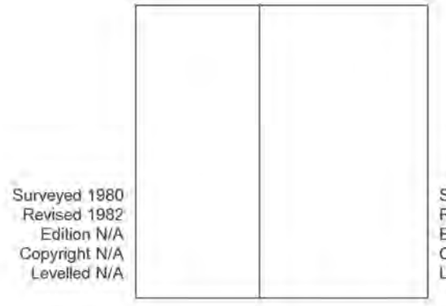

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Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: National Grid

Map date: **1984**

Scale: 1:10,000

Printed at: 1:10,000

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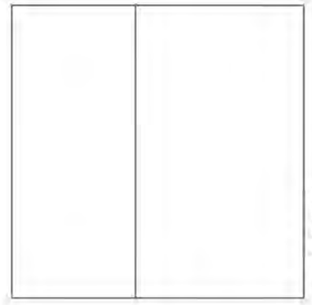

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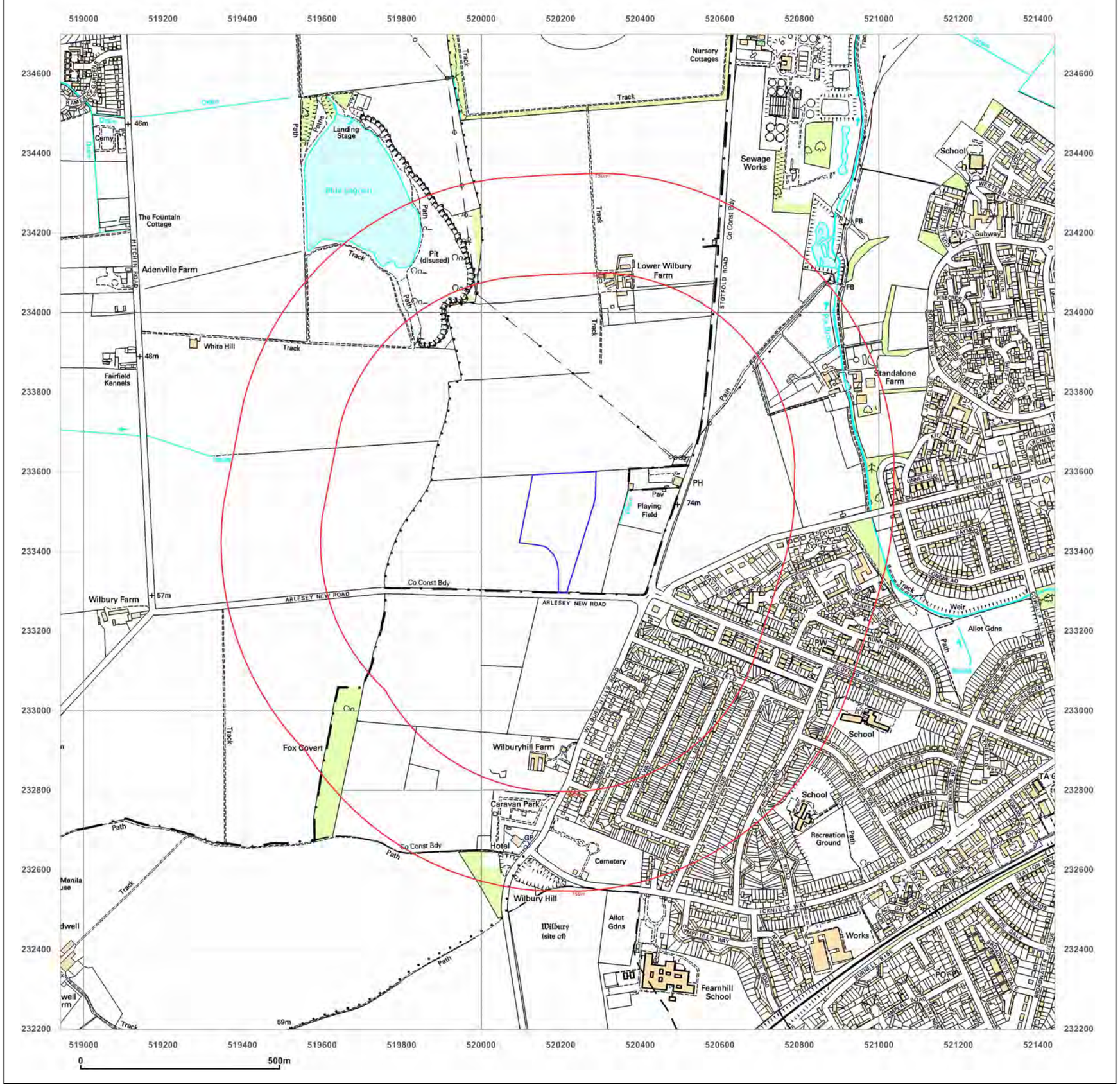

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Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

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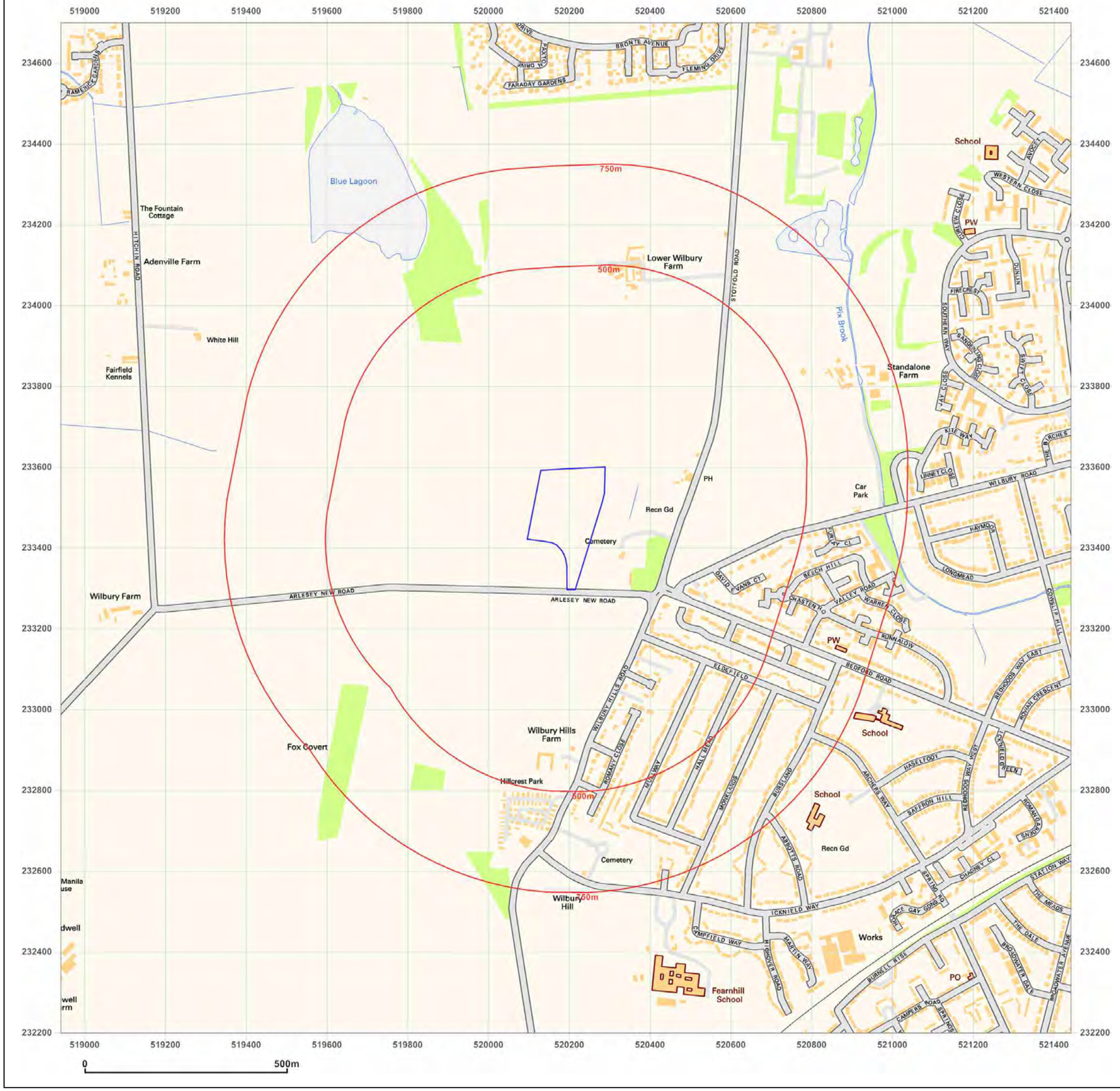

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Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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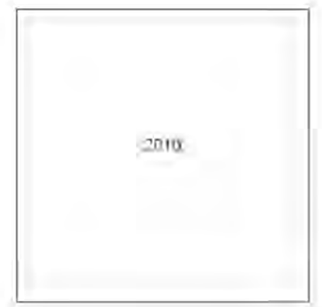

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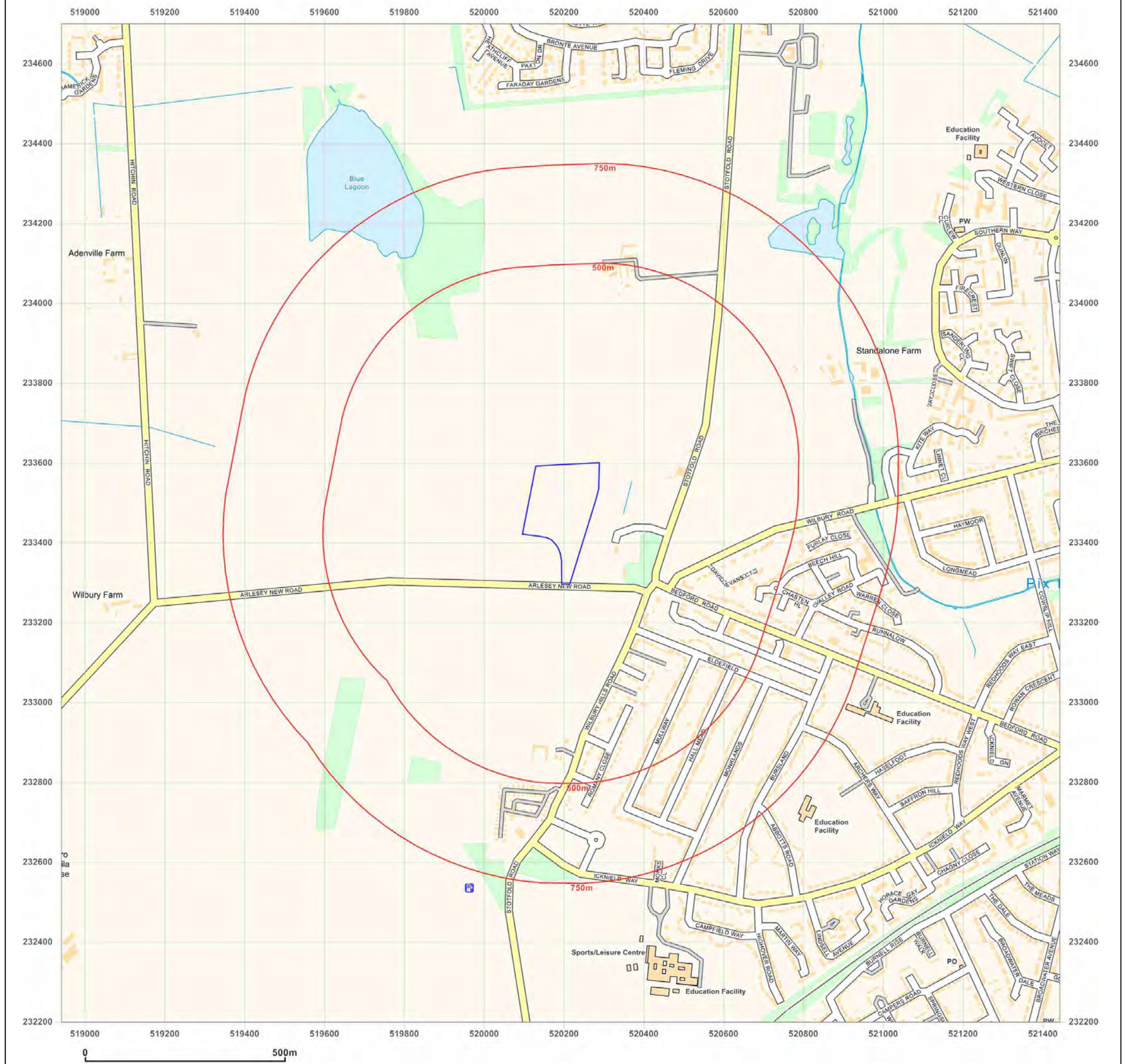

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Client Ref: 1968
Report Ref: B2G-4611441
Grid Ref: 520192, 233449

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

Printed at: 1:10,000

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APPENDIX IV

GROUNDSURE ENVIRONMENTAL DATA BASE

Brown2Green Associates Limited

Suite 1 Wenden Court, Station Road,
Saffron Walden, CB11 4LB

Groundsure Reference:	B2G-4611442
Your Reference:	1968
Report Date	19 Dec 2017
Report Delivery Method:	Email - pdf

Enviro Insight

Address: WILBURY HILLS CEMETERY, STOTFOLD ROAD, LETCHWORTH GARDEN CITY, SG6 4EG

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If you need any further assistance, please do not hesitate to contact our helpline on 08444 159 000 quoting the above report reference number.

Yours faithfully,

Brown2Green Associates Ltd

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**WILBURY HILLS CEMETERY, STOTFOLD ROAD, LETCHWORTH GARDEN CITY, SG6 4EG**
Date:	**19 Dec 2017**
Reference:	**B2G-4611442**
Client:	**Brown2Green Associates Limited**

NW N NE



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SW S SE

Aerial Photograph Capture date:	03-Jul-2015
Grid Reference:	520187,233491
Site Size:	3.48ha

Report Reference: B2G-4611442
Client Reference: 1968

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Overview of Findings

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

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	0	13	24
1.2 Additional Information – Historical Tank Database	0	0	0	1
1.3 Additional Information – Historical Energy Features Database	0	0	2	7
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	0
1.6 Potentially Infilled Land	0	0	8	25

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	2
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	0	0
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

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

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	1	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	Yes
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	1	2
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	14
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	1	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	5	0	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	Yes	Yes
6.10 Detailed River Network entries within 500m of the site	0	0	0	0	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	No
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	No
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Very Low
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Limited potential
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High

Section 8: Designated Environmentally Sensitive Sites

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

Section 8: Designated Environmentally Sensitive Sites	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	2	0	2	0	0	0
8.14 Records of Green Belt land	1	0	1	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Low
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Very Low
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Very Low
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Very Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	No
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	Yes
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

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

1. Historical Industrial Sites

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

2. Environmental Permits, Incidents and Registers

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

3. Landfills and Other Waste Sites

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

4. Current Land Uses

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

5. Geology

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

6. Hydrogeology and Hydrology

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

7. Flooding

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

8. Designated Environmentally Sensitive Sites

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

9. Natural Hazards

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

10. Mining

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

11. Contacts

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

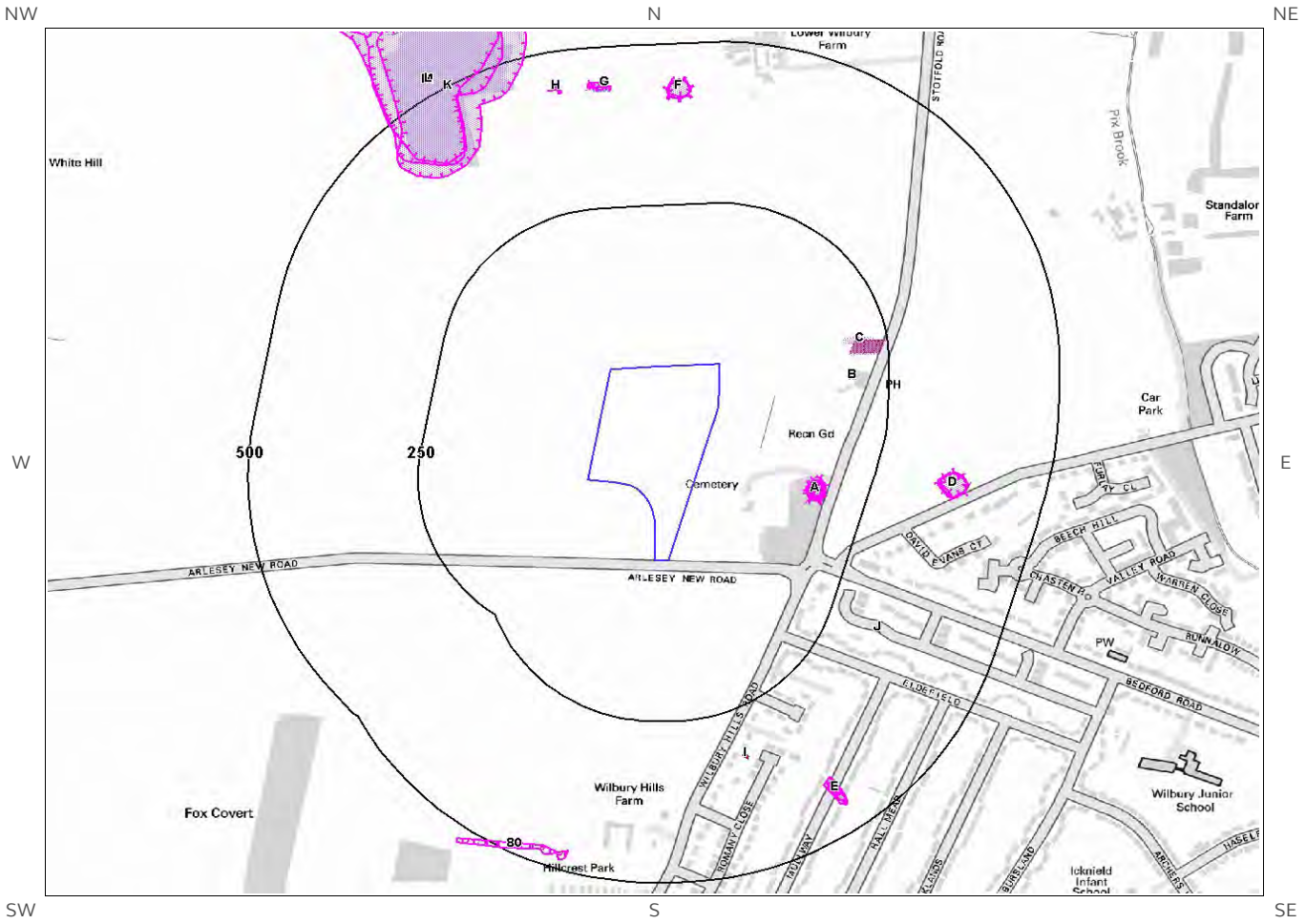
Note: Maps

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

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

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

1. Historical Land Use



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Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Site Outline

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

250
500
Search Buffers (m)

Energy Features

Petrol Stations

Tanks

Garages

1. Historical Industrial Sites

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

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

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 37

ID	Distance [m]	Direction	Use	Date
1A	160	E	Sand Pit	1960
2A	161	E	Refuse Heap	1938
3A	161	E	Sand Pit	1888
4A	163	E	Sand Pit	1948
5A	163	E	Sand Pit	1921
6A	163	E	Old Sand Pit	1900
7A	165	E	Sand Pit	1899
8A	166	E	Sand Pit	1881
9C	186	E	Unspecified Tanks	1984
10B	190	E	Chimneys	1938
11B	190	E	Chimneys	1888
12C	191	E	Electric Substation	1978
13C	191	E	Electric Substation	1984
14D	342	E	Sand Pit	1960
15D	343	E	Sand Pit	1938
16D	345	E	Sand Pit	1921
17D	345	E	Sand Pit	1948
18K	382	NW	Unspecified Disused Pit	1982
19L	392	NW	Unspecified Quarry	1948
20M	400	NW	Old Chalk Pit	1960
21E	410	SE	Unspecified Pit	1921
22E	412	SE	Sand Pit	1880
23F	415	N	Sand Pit	1960
24F	415	N	Sand Pit	1938
25E	417	SE	Refuse Heap	1881
26F	417	N	Sand Pit	1921
27F	417	N	Sand Pit	1948
28G	436	N	Sewage Tanks	1960
29G	437	N	Sewage Tanks	1938
30G	437	N	Sewage Tanks	1960
31G	438	N	Sewage Tanks	1938
32G	438	N	Sewage Tanks	1921
33G	438	N	Sewage Tanks	1948
34H	440	N	Sewage Tanks	1938

35H	440	N	Sewage Tanks	1960
36H	441	N	Sewage Tanks	1948
37H	441	N	Sewage Tanks	1921

1.2 Additional Information – Historical Tank Database

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

Records of historical tanks within 500m of the search boundary: 1

ID	Distance (m)	Direction	Use	Date
38G	431	N	Sewage Tanks	1922

1.3 Additional Information – Historical Energy Features Database

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

Records of historical energy features within 500m of the search boundary: 9

ID	Distance (m)	Direction	Use	Date
39C	192	E	Electricity Substation	1968
40C	213	E	Electricity Substation	1967
41I	319	S	Electricity Substation	1983
42I	319	S	Electricity Substation	1972
43I	319	S	Electricity Substation	1969
44I	320	S	Electricity Substation	1993
45J	322	E	Electricity Substation	1970
46J	322	E	Electricity Substation	1993
47J	322	E	Electricity Substation	1993

1.4 Additional Information – Historical Petrol and Fuel Site Database

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

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

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

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 0

Database searched and no data found.

1.6 Potentially Infilled Land

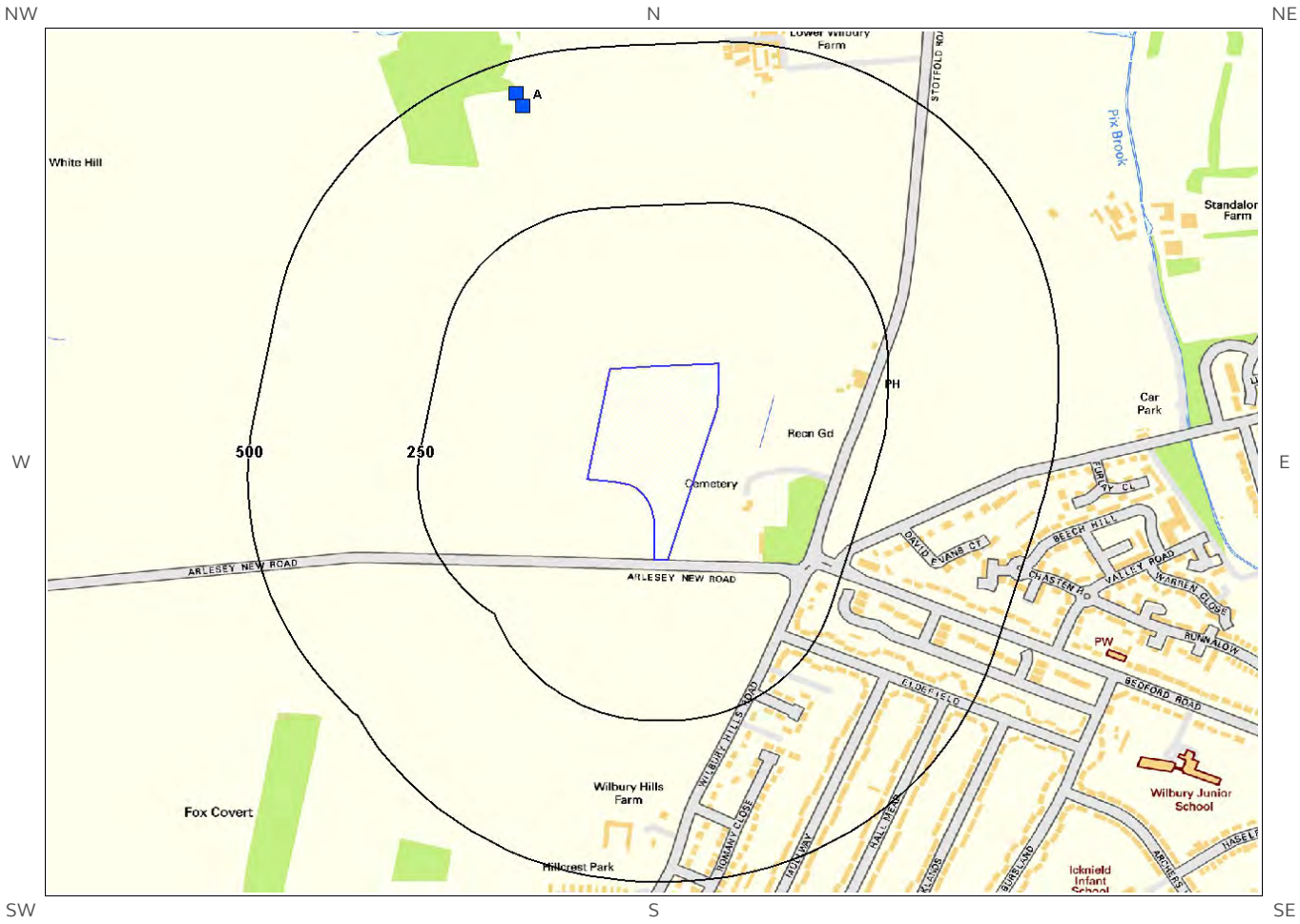
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 33

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

ID	Distance(m)	Direction	Use	Date
48A	160	E	Sand Pit	1960
49A	161	E	Refuse Heap	1938
50A	161	E	Sand Pit	1888
51A	163	E	Sand Pit	1921
52A	163	E	Sand Pit	1948
53A	163	E	Old Sand Pit	1900
54A	165	E	Sand Pit	1899
55A	166	E	Sand Pit	1881
56D	342	E	Sand Pit	1960
57D	343	E	Sand Pit	1938
58D	345	E	Sand Pit	1948
59D	345	E	Sand Pit	1921
60K	382	NW	Unspecified Disused Pit	1982
61L	392	NW	Unspecified Quarry	1948
62M	400	NW	Old Chalk Pit	1960
63E	410	SE	Unspecified Pit	1921
64E	412	SE	Sand Pit	1880
65F	415	N	Sand Pit	1960
66F	415	N	Sand Pit	1938
67E	417	SE	Refuse Heap	1881
68F	417	N	Sand Pit	1948
69F	417	N	Sand Pit	1921
70G	436	N	Sewage Tanks	1960
71G	437	N	Sewage Tanks	1938
72G	437	N	Sewage Tanks	1960
73G	438	N	Sewage Tanks	1938
74G	438	N	Sewage Tanks	1948
75G	438	N	Sewage Tanks	1921
76H	440	N	Sewage Tanks	1938
77H	440	N	Sewage Tanks	1960

78H	441	N	Sewage Tanks	1921
79H	441	N	Sewage Tanks	1948
80	468	S	Pond	1948

2. Environmental Permits, Incidents and Registers Map



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- Site Outline
- 250 / 500 — Search Buffers (m)
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

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

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

2

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

ID	Distance (m)	Direction	NGR	Details	
1A	428	N	520000 234000	Address: ST AT STW - STOTFOLD ROAD, LETCHWORTH Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: AW1NF683 Permit Version: 1	Receiving Water: Pix Brook Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 14/10/1966 Effective Date: 14-Oct-1966 Revocation Date: 30/04/1992
2A	450	N	519990 234020	Address: WILLBURY HILLS FARM, WILLBURY HILL, STOTFOLD, BEDS Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: PRCNF05365 Permit Version: 1	Receiving Water: ditch tributary River Hiz Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 16/08/1994 Effective Date: 16-Aug-1994 Revocation Date: -

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

0

Database searched and no data found.

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

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

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

0

Database searched and no data found.

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

0

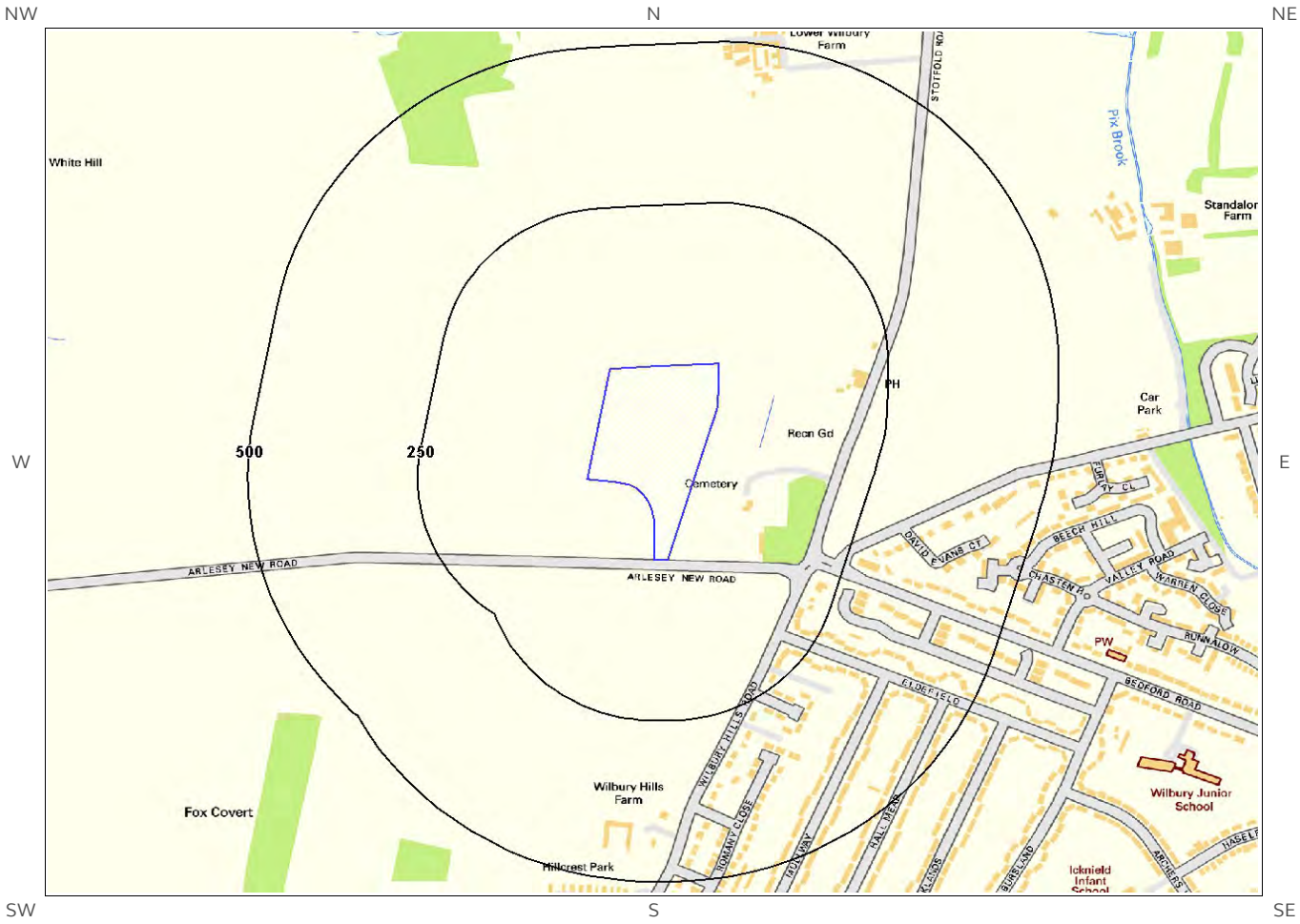
Database searched and no data found.

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

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

Database searched and no data found.

3. Landfill and Other Waste Sites Map



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Site Outline

250
500
Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

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

0

Database searched and no data found.

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

1

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	1159	N	519800 234800	Site Address: Green Lagoon Near Fairfield Hospital, Arlesey, Bedfordshire Waste Licence: - Site Reference: PIT 130 Waste Type: Commercial, Household, Liquid sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: 31-Dec-1961 Last Recorded: 31-Dec-1964

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

0

Database searched and no data found.

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

0

Database searched and no data found.

3.2 Other Waste Sites

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

0

Database searched and no data found.

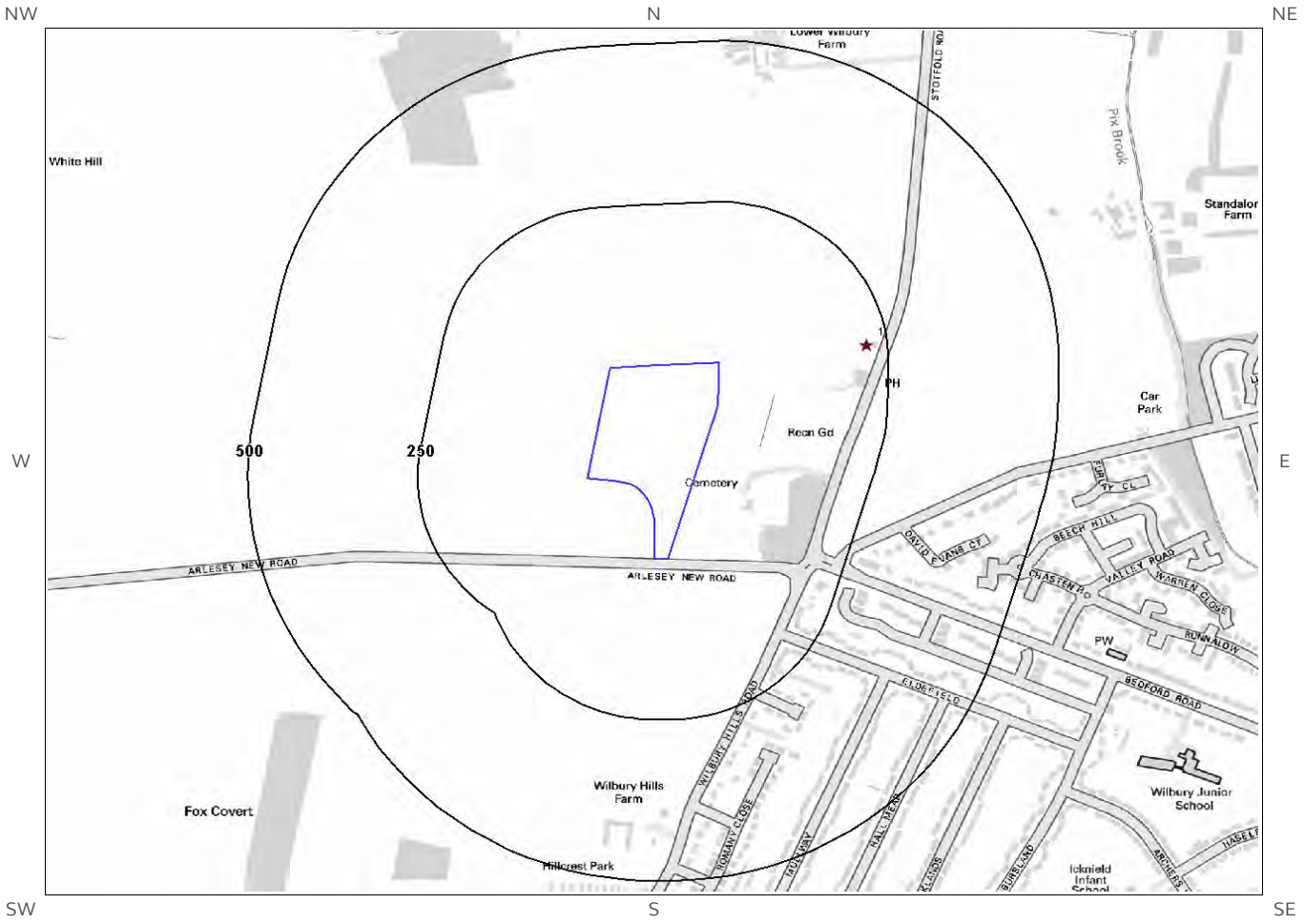
3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

0

Database searched and no data found.

---

4. Current Land Use Map



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Site Outline

Search Buffers (m)
250
500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 1

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	219	E	Electricity Sub Station	520505 233629	SG6	Electrical Features	Infrastructure and Facilities

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 0

Database searched and no data found.

4.3 National Grid High Voltage Underground Electricity Transmission Cables

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

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

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

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

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

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

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

5.2 Superficial Ground and Drift Geology

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

Lex Code	Description	Rock Type
LTH-XSV	LETCHWORTH GRAVELS FORMATION	SAND AND GRAVEL
LOFT-DMTN	LOWESTOFT FORMATION	DIAMICTON
GFDMP-XSV	GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE	SAND AND GRAVEL

5.3 Bedrock and Solid Geology

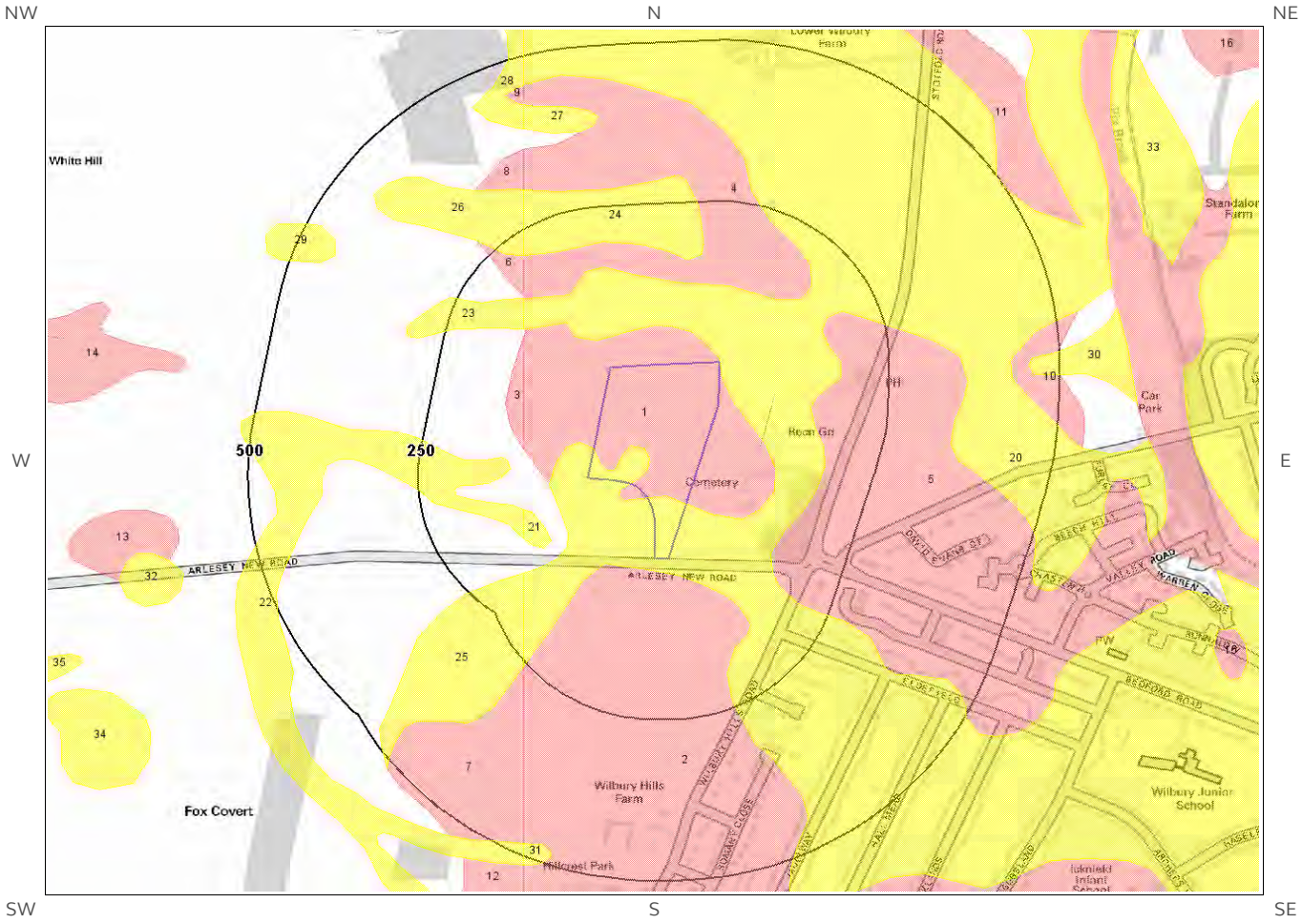
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
MR-CHLK	MELBOURN ROCK MEMBER	CHALK
ZZCH-CHLK	ZIG ZAG CHALK FORMATION	CHALK
HNCK-CHLK	HOLYWELL NODULAR CHALK FORMATION AND NEW PIT CHALK FORMATION (UNDIFFERENTIATED)	CHALK

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

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



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Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

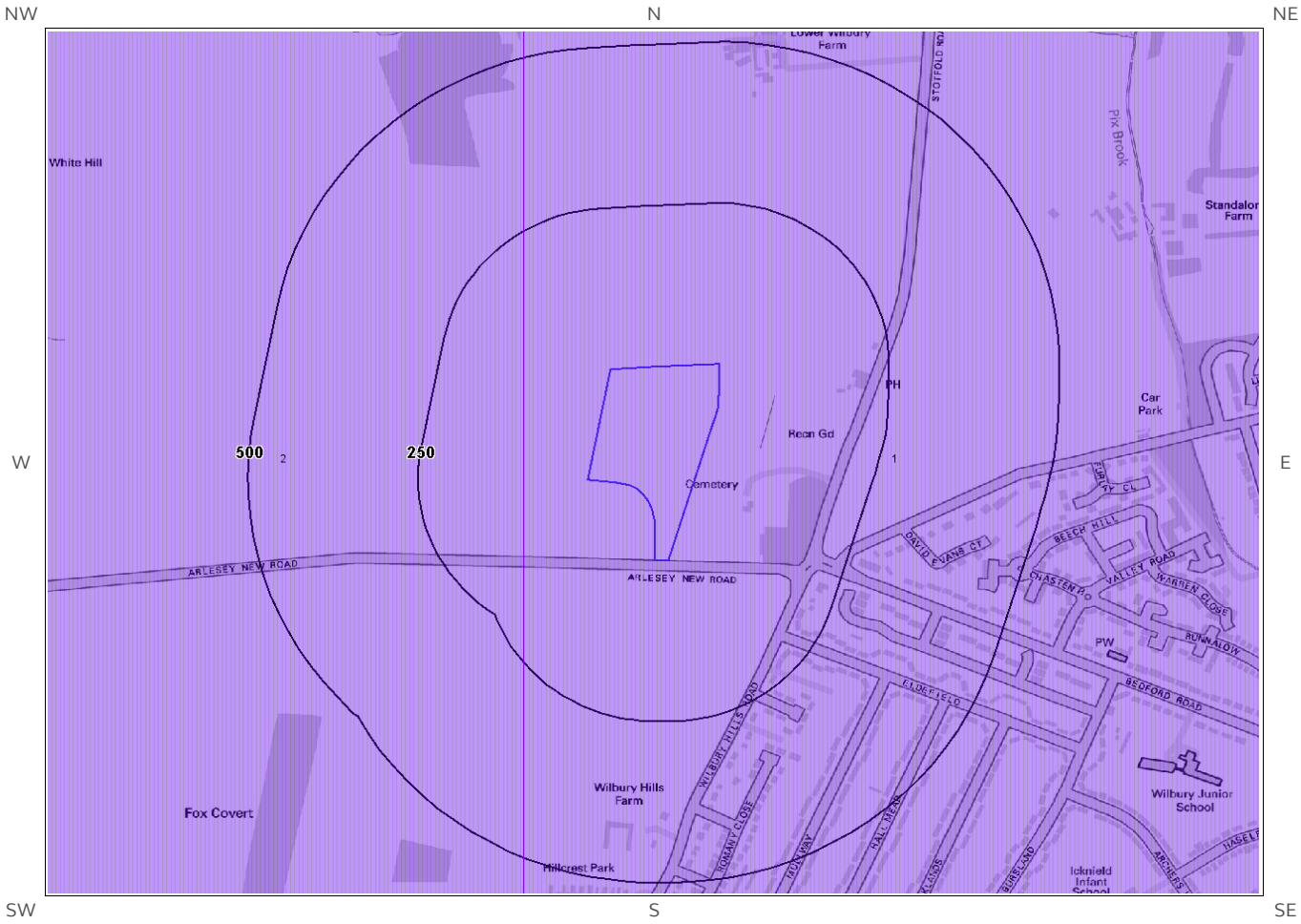
Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licenses



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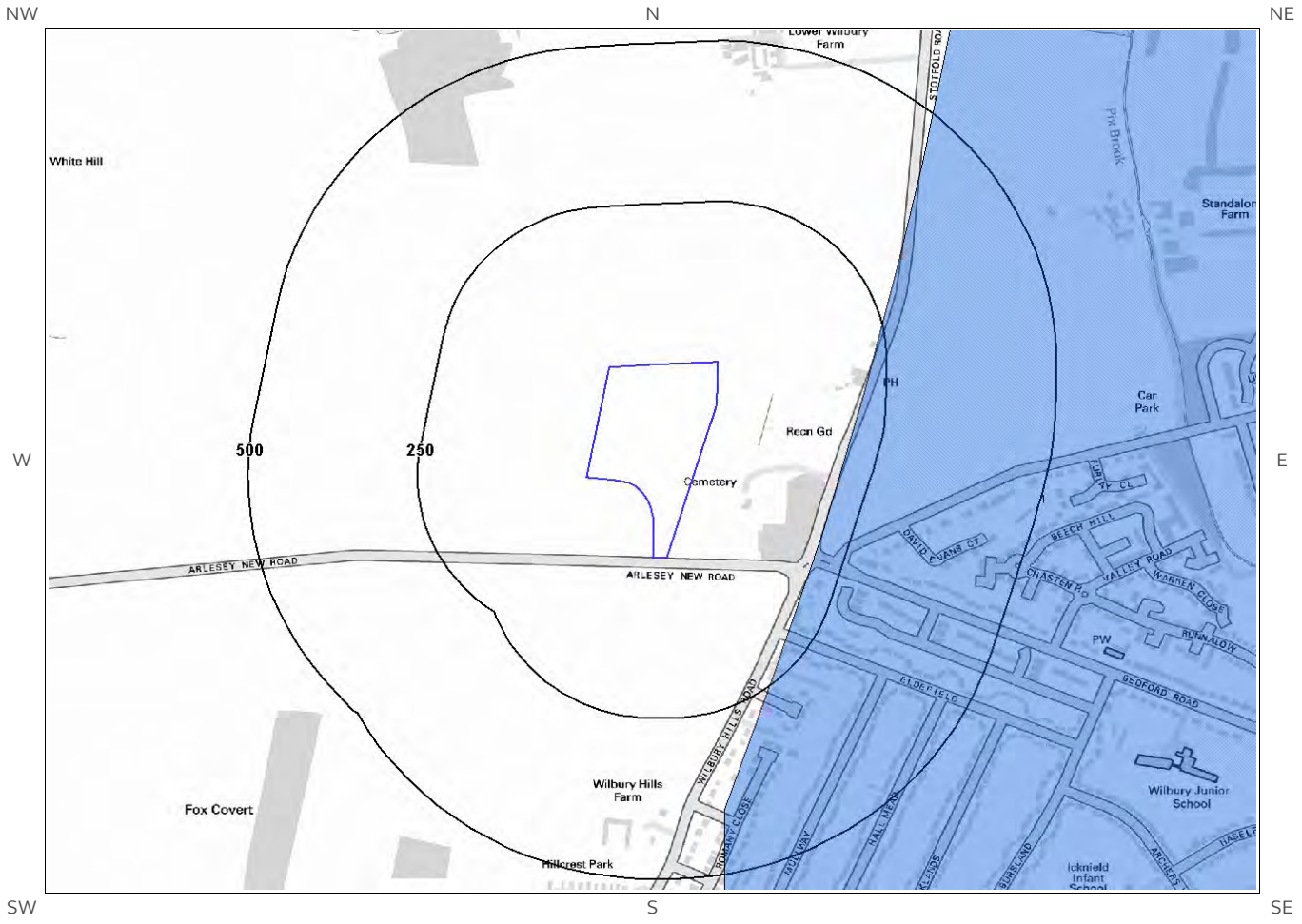
Site Outline
250
500
Search Buffers (m)
Principal Aquifer
Secondary (A) Aquifer - Permeable Layers
Secondary (B) Aquifer - Lower Permeability Layers
Groundwater Abstraction Licence
Secondary Aquifer - Undifferentiated Layers
Unproductive
Unknown (lakes and landslip)
Surface Water Abstraction Licence

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



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Site Outline

250 Search Buffers (m)
500

Source Protection Zone 1 - Inner Catchment

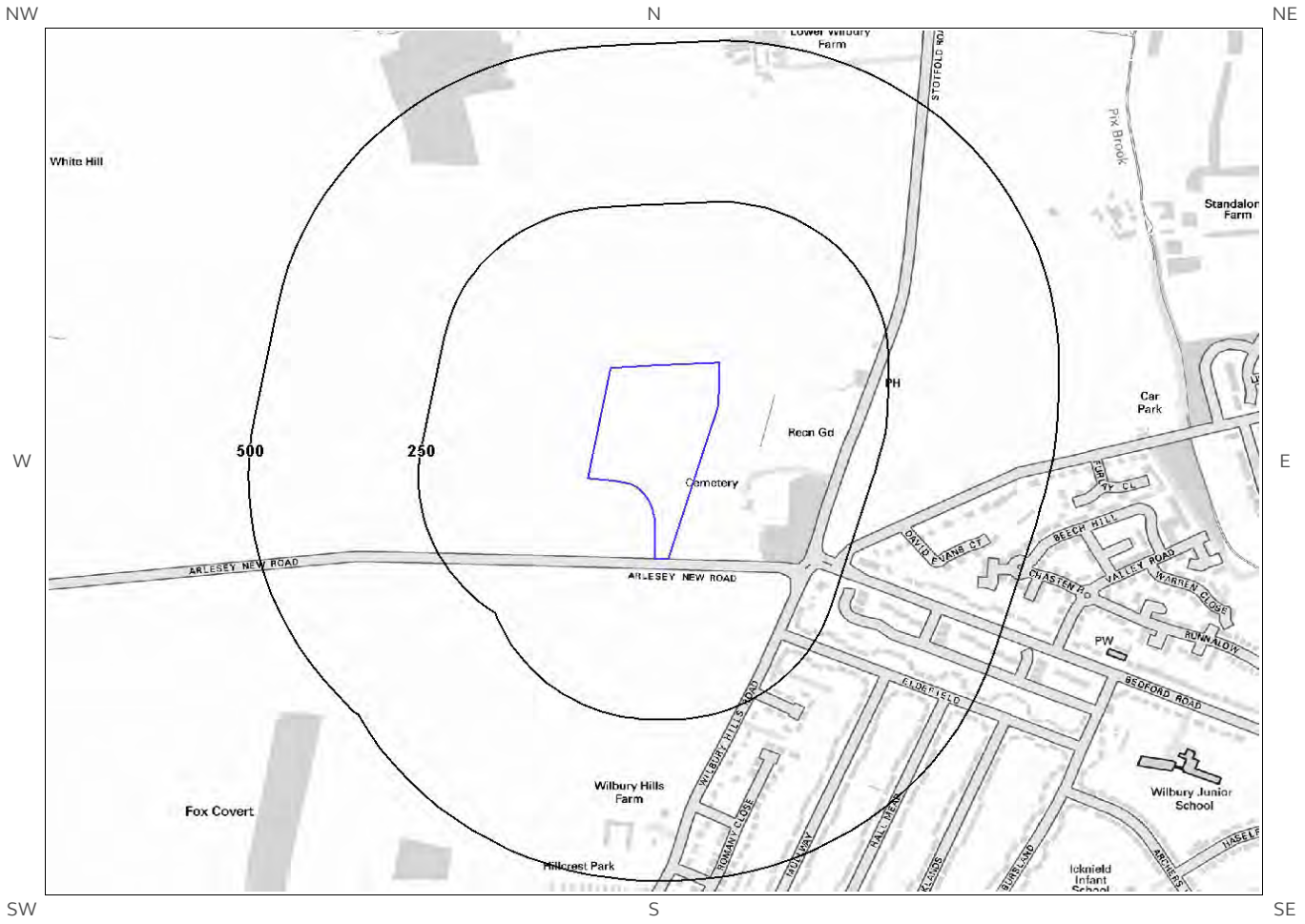
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



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Site Outline

250 — 500 — Search Buffers (m)

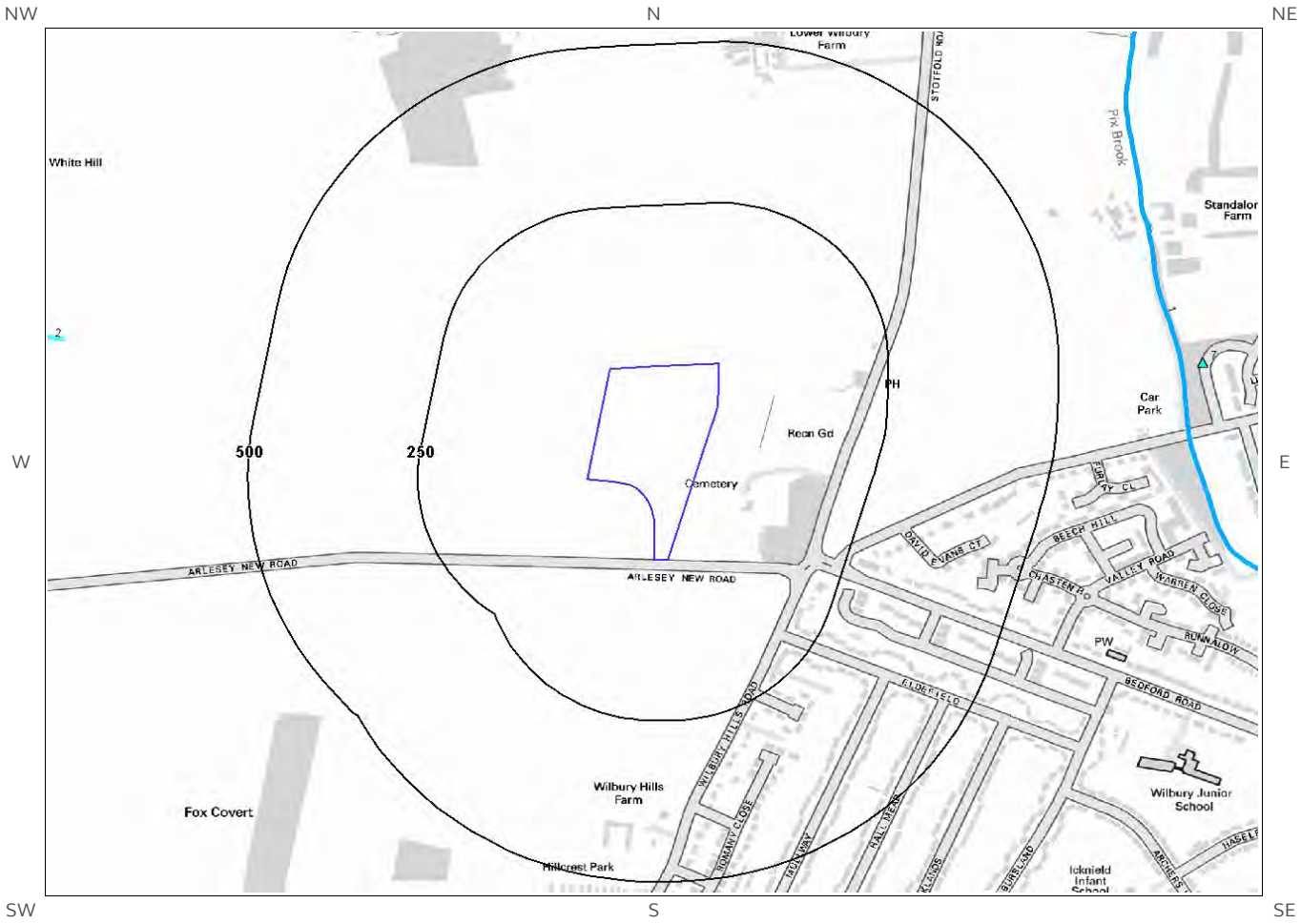
Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

6e. Hydrology – Detailed River Network and River Quality



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Site Outline

250 Search Buffers (m)
500

Primary River
Secondary River
Tertiary River
Lake/Reservoir
Underground River (inferred)
General Quality Assessment: Biology
General Quality Assessment: Chemistry

Canal
Canal Tunnel
Culvert
Multiple Channel Culvert
Underground River (Potential Sewer)
Underground River (local knowledge)

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property?
Yes

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

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

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
20	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
2	20	S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
21	99	SW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
3	102	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
22	107	SW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
4	118	N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
5	136	E	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
23	142	NW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
24	161	N	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
6	171	NW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
25	176	SW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
26	217	NW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

ID	Distance (m)	Direction	Designation	Description
7	256	SW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
8	305	NW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
27	369	N	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
28	393	N	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
9	428	N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
10	428	E	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
29	441	NW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
30	454	E	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
31	473	S	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
11	499	NE	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? Yes

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

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

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
2	95	W	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? Yes

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	805	NW	519600 234200	Status: Active Licence No: 6/33/13/*G/0018 Details: Spray Irrigation - Direct Direct Source: Ground Water Source Of Supply Point: Chalk Pit S Of Arlesey Data Type: Line Name: B O PAPWORTH & SON	Annual Volume (m^3): 12742 Max Daily Volume (m^3): 354.55 Original Application No: - Original Start Date: 1/3/1968 Expiry Date: - Issue No: 100 Version Start Date: 1/3/1968 Version End Date:
Not shown	1010	W	519100 233250	Status: Historical Licence No: 6/33/13/*G/0052 Details: General Farming & Domestic Direct Source: Ground Water Source Of Supply Point: Borehole At Wilbury Farm Data Type: Point Name: HUNTER PARTNERSHIP	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 1/9/1967 Expiry Date: - Issue No: 100 Version Start Date: 1/11/1984 Version End Date:
Not shown	1883	NW	519000 235100	Status: Historical Licence No: 6/33/13/*G/0045 Details: Process water Direct Source: Ground Water Source Of Supply Point: Well At Hitchin Road, Arlesey Data Type: Point Name: RMC MATERIALS LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CS 2264 Original Start Date: 1/7/1966 Expiry Date: - Issue No: 101 Version Start Date: 24/2/2004 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? Yes

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	1504	W	518700 232800	Status: Historical Licence No: 6/33/13/*S/0082 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: River Hiz N Of Ickleford Data Type: Line Name: HUNTER PARTNERSHIP	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: - Original Start Date: 1/7/1981 Expiry Date: - Issue No: 100 Version Start Date: 1/4/1992 Version End Date:
Not shown	1521	W	518500 233800	Status: Historical Licence No: 6/33/13/*S/0016 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: River Hiz At Ickleford Data Type: Line Name: GROVEWAY LTD	Annual Volume (m^3): 8410 Max Daily Volume (m^3): 613.7 Application No: - Original Start Date: 1/2/1968 Expiry Date: - Issue No: 100 Version Start Date: 1/11/1997 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1545	W	518550 231750	Status: Active Licence No: 6/33/13/*S/0059 Details: General Farming & Domestic Direct Source: Surface Water Source Of Supply Point: River Hiz N Of Ickleford Data Type: Line Name: WALLACE FARMS LTD	Annual Volume (m^3): 10400 Max Daily Volume (m^3): 942.2 Application No: NPS/WR/010931 Original Start Date: 22/9/1967 Expiry Date: - Issue No: 101 Version Start Date: 22/6/2012 Version End Date:
Not shown	1545	W	518550 231750	Status: Historical Licence No: 6/33/13/*S/0059 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: River Hiz N Of Ickleford Data Type: Line Name: WALLACE FARMS LTD	Annual Volume (m^3): 10400 Max Daily Volume (m^3): 942.2 Application No: NPS/WR/010931 Original Start Date: 1/9/1967 Expiry Date: - Issue No: 101 Version Start Date: 22/6/2012 Version End Date:
Not shown	1545	W	518550 231750	Status: Active Licence No: 6/33/13/*S/0059 Details: Dust Suppression Direct Source: Surface Water Source Of Supply Point: River Hiz N Of Ickleford Data Type: Line Name: WALLACE FARMS LTD	Annual Volume (m^3): 10400 Max Daily Volume (m^3): 942.2 Application No: NPS/WR/010931 Original Start Date: 22/9/1967 Expiry Date: - Issue No: 101 Version Start Date: 22/6/2012 Version End Date:
Not shown	1555	SW	518800 232300	Status: Active Licence No: 6/33/13/*S/0059 Details: General Farming & Domestic Direct Source: Surface Water Source Of Supply Point: Drain Ne Of Ickleford Data Type: Line Name: WALLACE FARMS LTD	Annual Volume (m^3): 10400 Max Daily Volume (m^3): 942.2 Application No: NPS/WR/010931 Original Start Date: 22/9/1967 Expiry Date: - Issue No: 101 Version Start Date: 22/6/2012 Version End Date:
Not shown	1555	SW	518800 232300	Status: Active Licence No: 6/33/13/*S/0059 Details: Dust Suppression Direct Source: Surface Water Source Of Supply Point: Drain Ne Of Ickleford Data Type: Line Name: WALLACE FARMS LTD	Annual Volume (m^3): 10400 Max Daily Volume (m^3): 942.2 Application No: NPS/WR/010931 Original Start Date: 22/9/1967 Expiry Date: - Issue No: 101 Version Start Date: 22/6/2012 Version End Date:
Not shown	1555	SW	518800 232300	Status: Historical Licence No: 6/33/13/*S/0059 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: Drain Ne Of Ickleford Data Type: Line Name: WALLACE FARMS LTD	Annual Volume (m^3): 10400 Max Daily Volume (m^3): 942.2 Application No: NPS/WR/010931 Original Start Date: 1/9/1967 Expiry Date: - Issue No: 101 Version Start Date: 22/6/2012 Version End Date:
Not shown	1608	W	518100 234500	Status: Historical Licence No: 6/33/13/*S/0085 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: River Hiz At Ickleford Data Type: Line Name: GROVEWAY LTD	Annual Volume (m^3): 2600 Max Daily Volume (m^3): 182 Application No: - Original Start Date: 1/6/1983 Expiry Date: - Issue No: 100 Version Start Date: 1/11/1997 Version End Date:
Not shown	1641	N	519800 235200	Status: Active Licence No: 6/33/13/*S/0019 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: Brook S E Of Arlesey Data Type: Line Name: B O PAPWORTH & SON	Annual Volume (m^3): 10396.7 Max Daily Volume (m^3): 354.6 Application No: - Original Start Date: 1/3/1968 Expiry Date: - Issue No: 100 Version Start Date: 1/3/1968 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1657	W	518500 233900	Status: Historical Licence No: 6/33/13/*S/0058 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: River Hiz E Of Old Ramierick Data Type: Line Name: HUNTER PARTNERSHIP	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: - Original Start Date: 1/10/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/5/1983 Version End Date:
Not shown	1657	W	518500 233900	Status: Active Licence No: 6/33/13/*S/0058 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: River Hiz E Of Old Ramerick Data Type: Line Name: K Parrish and Son	Annual Volume (m^3): 15570 Max Daily Volume (m^3): 1464 Application No: NPS/WR/015199 Original Start Date: 1/10/1966 Expiry Date: - Issue No: 101 Version Start Date: 25/2/2014 Version End Date:
Not shown	1657	W	518500 233900	Status: Historical Licence No: 6/33/13/*S/0058 Details: Spray Irrigation - Anti Frost Direct Source: Surface Water Source Of Supply Point: River Hiz E Of Old Ramierick Data Type: Line Name: HUNTER PARTNERSHIP	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: - Original Start Date: 1/10/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/5/1983 Version End Date:
Not shown	1657	W	518500 233900	Status: Active Licence No: 6/33/13/*S/0058 Details: Spray Irrigation - Anti Frost Direct Source: Surface Water Source Of Supply Point: River Hiz E Of Old Ramerick Data Type: Line Name: K Parrish and Son	Annual Volume (m^3): 15570 Max Daily Volume (m^3): 1464 Application No: NPS/WR/015199 Original Start Date: 1/10/1966 Expiry Date: - Issue No: 101 Version Start Date: 25/2/2014 Version End Date:

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? Yes

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

ID	Distance (m)	Direction	Zone	Description
1	204	E	3	Total catchment

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

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

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

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

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Major Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.
91	W	Major Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.
95	W	Major Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.
104	W	Major Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.
106	SW	Major Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.
172	E	Major Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? Yes

6.9.1 Biological Quality:

Biological Quality data describes water quality in terms of 83 groups of macroinvertebrates, some of which are pollution sensitive. The results are graded from A ('Very Good') to F ('Bad').

The following Biological Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Biological Quality Grade				
					2005	2006	2007	2008	2009
Not shown	1347	NE	520900 234800	River Name: Pix Brook Reach: Letchworth Stw .... Confl. Hiz End/Start of Stretch: Start of Stretch NGR	B	B	B	B	B

6.9.2 Chemical Quality:

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAHI). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Chemical Quality Grade				
					2005	2006	2007	2008	2009
7	712	E	521000 233600	River Name: Pix Brook Reach: Norton Common Letchworth Stw End/Start of Stretch: Sample Point NGR	B	C	C	C	C
Not shown	1347	NE	520900 234800	River Name: Pix Brook Reach: Norton Common Letchworth Stw End/Start of Stretch: End of Stretch NGR	B	C	C	C	C
Not shown	1347	NE	520900 234800	River Name: Pix Brook Reach: Letchworth Stw . Confl. Hiz End/Start of Stretch: Start of Stretch NGR	B	A	A	A	B
Not shown	1420	E	521700 233400	River Name: Pix Brook Reach: Norton Common Letchworth Stw End/Start of Stretch: Start of Stretch NGR	B	C	C	C	C

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? No

Database searched and no data found.

6.11 Surface Water Features

Are there any surface water features within 250m of the study site? Yes

The following surface water records are not represented on mapping:

Distance (m)	Direction
76	E

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



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Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

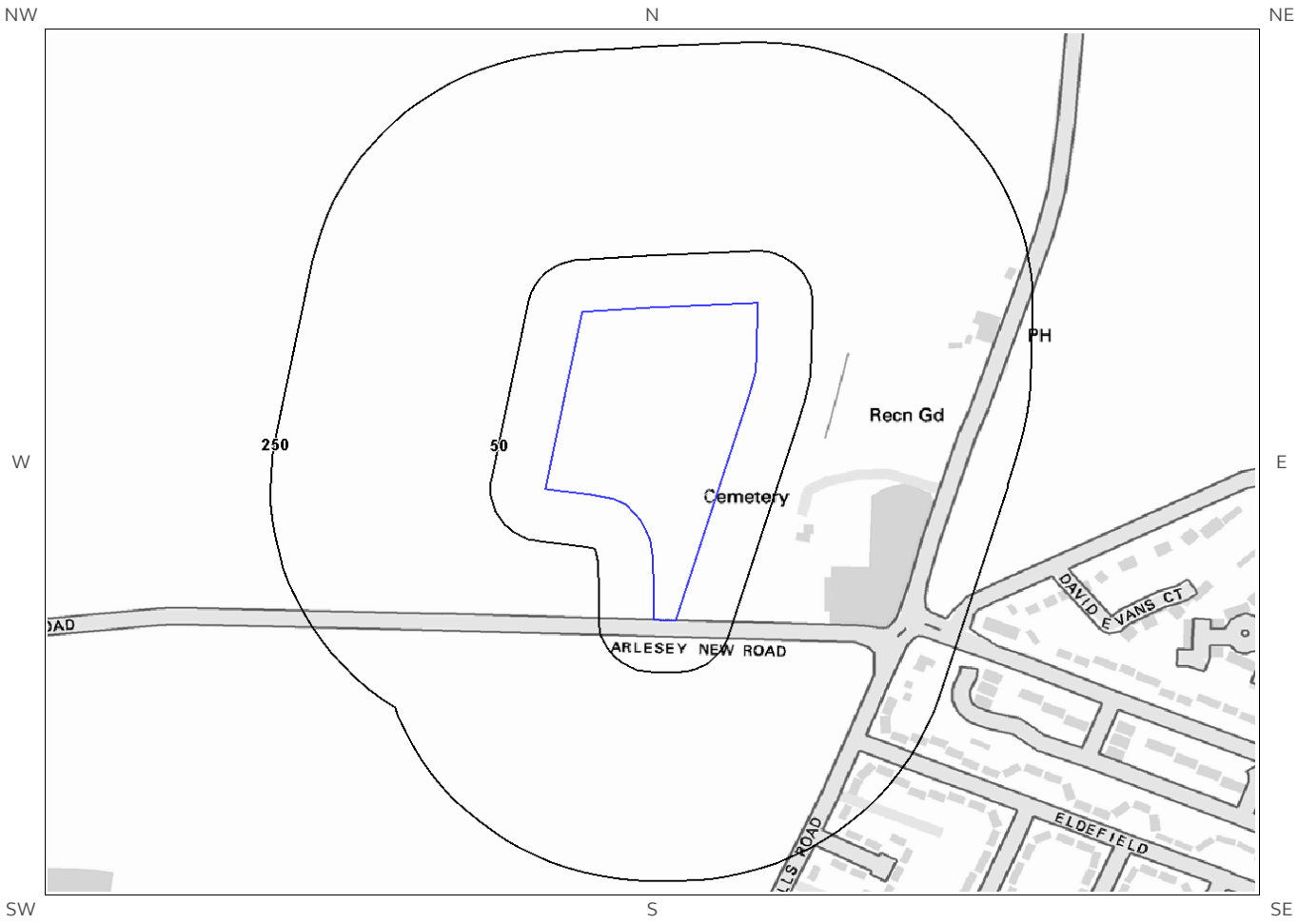
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

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



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Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

Very Low

Low

Medium

High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? No

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

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? No

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

Database searched and no data found.

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

What is the highest risk of flooding onsite? Very Low

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

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

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

---

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Clearwater Flooding

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

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Limited potential

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

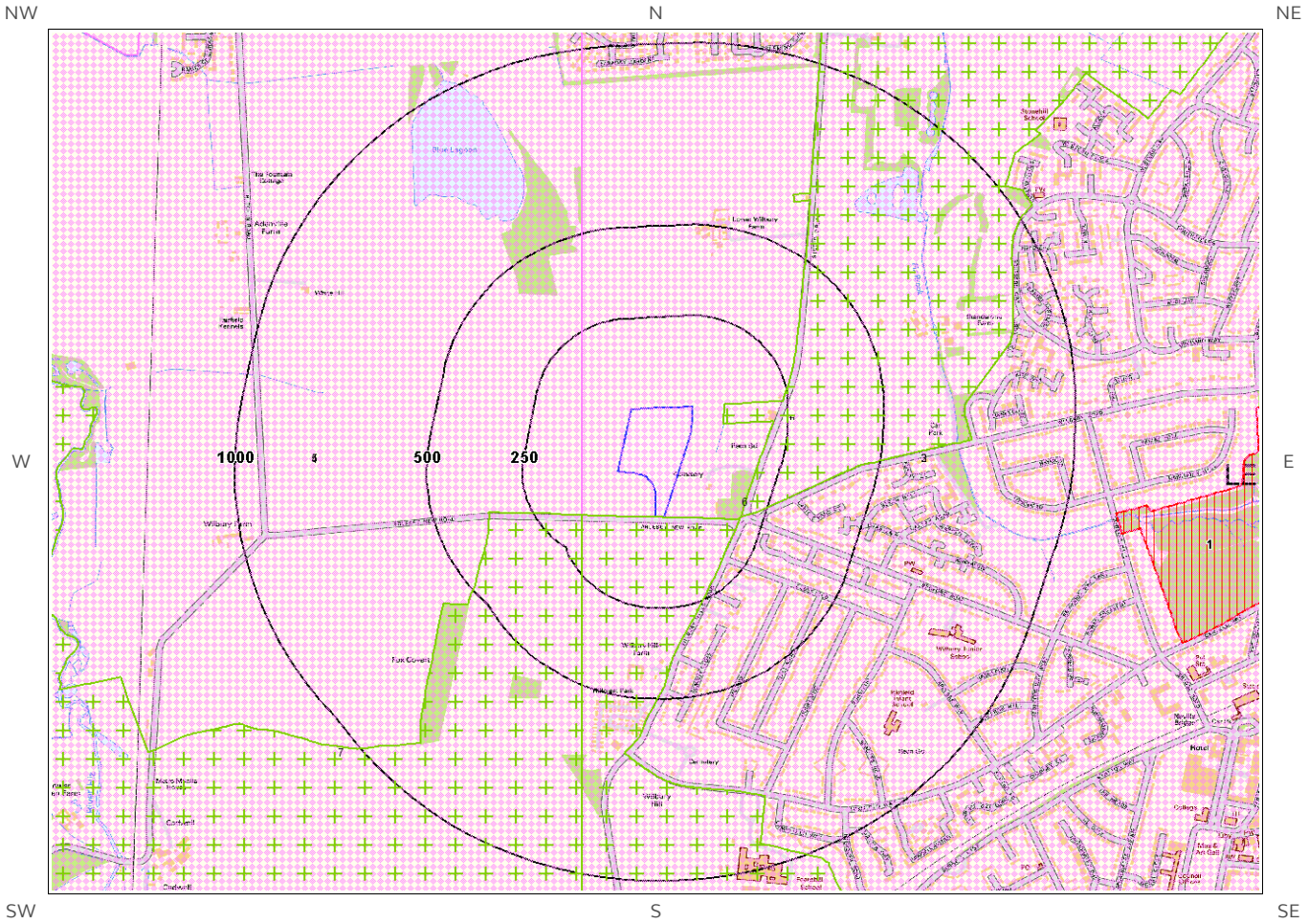
7.8 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? High

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

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

8. Designated Environmentally Sensitive Sites Map



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Site Outline
100
250
Search Buffers (m)

AONB
National Park
SSSI
Special Protection Areas
Nitrate Vulnerable Zones
Green Belt
Environmentally Sensitive Areas
Special Areas of Conservation
World Heritage Sites
Nitrate Sensitive Areas
Ancient Woodland
National Nature Reserve
Local Nature Reserves
Ramsar Sites

8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site?	Yes

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

1

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

ID	Distance (m)	Direction	LNR Name	Data Source
1	1130	E	Norton Common	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

4

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
2	0	On Site	Existing	DEFRA
3	0	On Site	Existing	DEFRA
4	95	W	Existing	DEFRA
5	95	W	Existing	DEFRA

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

2

Green Belt data contains Ordnance Survey data © Crown copyright and database right [2015].

ID	Distance	Direction	Green Belt Name	Local Authority Name
6	0	S	London Area Greenbelt	North Hertfordshire District
7	153	SW	London Area Greenbelt	North Hertfordshire District

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

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

9.1.1 Shrink Swell

What is the maximum Shrink-Swell*[*] hazard rating identified on the study site? Low

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

Hazard
Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Very Low

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

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

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Very Low

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

Hazard
Significant soluble rocks are present. Problems unlikely except with considerable surface or subsurface water flow. No special actions required to avoid problems due to soluble rocks. No special ground investigation required or increased construction costs are likely. An increase in financial risk due to potential problems with soluble rocks is unlikely.

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

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? Very Low

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

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

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site? Very Low

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

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

9.1.6 Running Sand

What is the maximum Running Sand*[*] hazard rating identified on the study site? Very Low

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

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

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

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

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

9.2.2 Radon Protection

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

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site? No

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

Distance (m)	Direction	Name	Commodity	Assessment of likelihood
0.0	On Site	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

Past underground mine workings are uncommon, localised and of limited area. The rock types present in this area are such that minor mineral veins may be present within them on which it is possible that there have been attempts to work these by underground methods and/or it is possible that small scale underground extraction of other materials may have occurred. All such occurrences are likely to be restricted in size and infrequent. It should be noted, however, that there is always the possibility of the existence of other sub-surface excavations, such as wells, cess pits, follies, air raid shelters/bunkers and other military structures etc. that could affect surface ground stability but which are outside the scope of this dataset. However, if in a coalfield area you should still consider a Coal Authority mining search for the area of interest.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

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Fax: 0115 936 3276.
Email:
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

Environment Agency
National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 03708 506 506
Web: **www.environment-agency.gov.uk**
Email: enquiries@environment-agency.gov.uk

Public Health England
Public information access office
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133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe
Email:**enquiries@phe.gov.uk**
Main switchboard**: 020 7654 8000**

The Coal Authority
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Mansfield
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Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Ordnance Survey
Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority
Authority: North Hertfordshire District Council
Phone: 01462 474000
Web: http://www.north-herts.gov.uk/
Address: Council Offices, Gernon Road, Letchworth Garden Ci,

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

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

GEOLOGICAL LOGS

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS1
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
Project No:	1968	**Completion of Drilling:**	23-Nov-17
Client	Ken Rush Associates	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			TOPSOIL - Very soft dark brown slightly sandy, silty CLAY with rootlets.	_ . _ . _ .	0.1	0.1	
			Soft mid brown slightly gravelly CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_o_O_o_ _O_o_ _o_O_o_			
T,J,V		0.1-0.5		_O_o_ _o_O_o_		1.0	
				_O_o_ _o_O_o_			
D1		1		_O_o_ _o_O_o_	1.0		
				_O_o_	1.1		
			Stiff grey mottled brown slightly gravelly CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_o_O_o_ _O_o_ _o_O_o_			
D2		1.5		_O_o_ _o_O_o_		0.9	
				_O_o_ _o_O_o_			
D3		2		_O_o_ _o_O_o_	2.0		
			Stiff grey slightly gravelly, sandy CLAY.	_.o_.O_. _.O_.o_ _.o_.O_.			
				_.O_.o_ _.o_.O_.		1.0	
				_.O_.o_ _.o_.O_.			
D4		3		_.O_.o_	3.0		
			Very stiff bluish grey slighlty gravelly, silty, sandy CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.o_.O_. _.O_.o_ _.o_.O_.			
				_.O_.o_ _.o_.O_.			
				_.O_.o_ _.o_.O_.		1.5	
D5		4		_.O_.o_	4.0		
				_.o_.O_. _.O_.o_ _.o_.O_.			
			Very stiff brown mottled bluish grey, slightly gravelly, silty, sandy CLAY	_.O_.o_ _.o_.O_.			
				_.O_.o_		0.4	
D6		5	Brown fine to coarse SAND and GRAVEL. Gravel of fine to coarse, subrounded to rounded flint and chalk.	.o.O.o.O.	5.0	0.1	
			End of hole.		6.0		
					7.0		

Remarks:

Groundwater: Dry

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS2
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
Project No:	1968	**Completion of Drilling:**	23-Nov-17
Client	Ken Rush Associates	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			TOPSOIL - Very soft dark brown slightly sandy, silty CLAY with rootlets.	_ . _ . _ .	0.1	0.1	
			Soft mid brown slightly sandy, slightly gravelly, silty CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_.	0.6	0.5	
T,J,V D1		0.1-0.5 0.5					
			Stiff mid brown slighlty sandy, slightly gravelly, silty CLAY Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_.	1.0 1.4	0.8	
T,J,V D2		0.8-1.0 1					
			Dense brown slightly gravelly coarse SAND. Gravel of fine to coarse, subrounded to rounded flint. with chalk fragments.	.o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o. .o.O.o.O. .o.O.o.	2.0 3.0 4.0 5.0	3.6	
			End of hole.		6.0 7.0		

Remarks:

Groundwater: Dry

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS3
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
Project No:	1968	**Completion of Drilling:**	23-Nov-17
Client	Ken Rush Associates	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			TOPSOIL - Very soft dark brown slightly sandy, silty CLAY with rootlets.	_ . _ . _ .	0.1	0.1	
			Soft dark brown slightly sandy, slightly gravelly, silty CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.o_.O_. _.O_.o_			
T,J,V D1		0.1-0.5 0.5		_.o_.O_. _.O_.o_		0.5	
				_.o_.O_.	0.6		
			Firm dark brown slightly silty, slightly gravelly CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.O_.o_ _.o_.O_.			
D2		1		_.O_.o_ _.o_.O_.	1.0	0.4	
			Stiff grey mottled dark brown slightly sandy, slightly gravelly, silty CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.O_.o_ _.o_.O_.			
D3		2		_.O_.o_ _.o_.O_.	2.0		
			becoming sandy	_.O_.o_ _.o_.O_.		3.5	
D4		3		_.O_.o_ _.o_.O_.	3.0		
D5		4		_.O_.o_ _.o_.O_.	4.0		
			Dense brown slightly gravelly medium to coarse SAND. Gravel of fine to coarse, subrounded to rounded flint.	.o.O.o. .o.O.o.O.			
				.o.O.o. .o.O.o.O.		0.5	
				.o.O.o.	5.0		
			End of hole.		6.0		
					7.0		

Remarks:

Groundwater: Dry

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS4
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
Project No:	1968	**Completion of Drilling:**	23-Nov-17
Client	Ken Rush Associates	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			TOPSOIL - Very soft dark brown slightly sandy, silty CLAY with rootlets.	_ . _ . _ .	0.1	0.1	
			Soft dark brown slightly sandy, slightly silty CLAY.	_.o_.O_.			
			Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.O_.o_		0.3	
T,J,V		0.1-0.5		_.o_.O_.	0.4		
D1		0.5	Firm mid brown slightly sandy, silty, CLAY.	_.O_.o_			
			Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.o_.O_.			
				_.O_.o_			
				_.o_.O_.		0.6	
				_.O_.o_			
D2		1		_.o_.O_.	1.0		
			Stiff dark brown slightly sandy, slightly gravelly, silty CLAY.	_.O_.o_			
			Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
D3		1.5		_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.	2.0		
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
D4		2.5	becoming gravelly	_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.	3.0	3.9	
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.	4.0		
D5		4		_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
				_.o_.O_.			
				_.O_.o_			
			Dense brown gravelly medium to coarse SAND. Gravel of fine to coarse, subrounded to rounded flint.	.o.O.o.	5.0	0.1	
			End of hole.				
					6.0		
					7.0		

Remarks:

Groundwater: Dry

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS5
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
		Completion of Drilling:	23-Nov-17
Project No:	1968	**Drilling Method:**	Window sampling
Client	Ken Rush Associates	**Ground Level (m AOD):**	
Logged By:	RMI		

Sample/Test			Description	Log	Depth (m)	Thick-ness (m)	S/pipe
Sample / Test	Result	Sample range					
			TOPSOIL - Very soft dark brown sandy CLAY with rootlets.	_ . _ . _ .	0.1	0.1	
			Dense dark brown clayey, silty fine to coarse SAND.				
T,J,V		0.1-0.5					
D1		0.5				0.7	
					0.8		
T,J,V		0.8-1.0	Dense mid brown silty fine to coarse SAND.	.x.x.x.			
D2		1		.x.x.x.x	1.0		
				.x.x.x.			
				.x.x.x.x			
				.x.x.x.			
				.x.x.x.x			
				.x.x.x.			
				.x.x.x.x			
				.x.x.x.			
				.x.x.x.x			
				.x.x.x.			
D3		2		.x.x.x.x	2.0	2.2	
				.x.x.x.			
				.x.x.x.x			
				.x.x.x.			
				.x.x.x.x			
				.x.x.x.			
				.x.x.x.x			
				.x.x.x.			
				.x.x.x.x			
D4		3		.x.x.x.x	3.0		
			Dense light brown fine to coarse SAND.	. . . . .			
				. . . . .			
				. . . . .			
				. . . . .		0.8	
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .	3.8		
			Stiff grey silty, sandy CLAY with occasional gravels.	_.x_.x_o			
D5		4		_.o_.x	4.0	0.2	
			End of hole.				
					5.0		
					6.0		
					7.0		

Remarks: Collapsed at 4.0m.

Groundwater: Wet at 3.0m.

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS6
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
Project No:	1968	**Completion of Drilling:**	23-Nov-17
Client	Ken Rush Associates	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			TOPSOIL - Very soft dark brown slightly sandy CLAY with rootlets.	_._._._.	0.1	0.1	
			Soft dark brown slightly gravelly, slightly sandy, silty CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_o_O_o_ _O_o_ _o_O_o_ _O_o_ _o_O_o_	0.6	0.5	
D1		0.5					
			Firm mid brown slightly gravelly, slightly sandy CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_O_o_ _o_O_o_ _O_o_ _o_O_o_	1.0	0.4	
D2		1					
			Stiff grey to orange mottled dark brown slightly gravelly, slightly sandy, silty CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_O_o_ _o_O_o_ _O_o_ _o_O_o_ _O_o_ _o_O_o_ _O_o_ _o_O_o_ _O_o_ _o_O_o_ _.o_.O_.	2.0	3.5	
D3		2					
				_.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_.	3.0		
D4		3					
				_.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_.	4.0		
			Dense brown gravelly SAND. Gravel of fine to coarse, subrounded to rounded flint and chalk.	.o.O.o.O. .O.o.O. .o.O.o.O. .O.o.O. .o.O.o.O.	5.0	0.5	
			End of hole.		6.0 7.0		

Remarks:

Groundwater: Dry

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

Brown 2 Green Geotechnical and Environmental Consultants

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS7
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
Project No:	1968	**Completion of Drilling:**	23-Nov-17
Client	Ken Rush Associates	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			TOPSOIL - Very soft dark brown slightly sandy,silty CLAY with rootlets.	_ . _ . _ .	0.1	0.1	
			Soft dark brown sandy CLAY.	_._._._. _._._._.	0.3	0.2	
			Firm mid brown slightly gravelly, slightly sandy, silty CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_.o_.O_. _.O_.o_			
D1		0.5		_.o_.O_. _.O_.o_		0.7	
D2		1		_.o_.O_. _.O_.o_ _.o_.O_.	1.0		
			Stiff dark brown slightly gravelly, slightly sandy, silty CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.	_O_o_ _o_O_o_ _O_o_ _o_O_o_ _O_o_ _o_O_o_ _O_o_ _o_O_o_ _O_o_			
D3		2		_o_O_o_ _.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_.	2.0		
				_.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_.		3.9	
D4		3		_.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_.	3.0		
D5		4		_.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_	4.0		
			with selenite crystals	_.o_.O_. _.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_.			
			Loose light brown gravelly SAND. Gravels are fine to coarse, subrounded to rounded flints and chalk.	.o.O.o.O.	5.0	0.1	
			End of hole.		6.0		
					7.0		

Remarks:

Groundwater: Dry

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS8
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
Project No:	1968	**Completion of Drilling:**	23-Nov-17
Client	Ken Rush Associates	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			TOPSOIL - Very soft dark brown slightly sandy,silty CLAY with rootlets.	_ . _ . _ .	0.1	0.1	
			Dense dark brown clayey SAND with occasional gravels. Gravel of fine to coarse, subrounded to rounded flint and chalk.	._._.o._. .o_._.o ._._._.o_ .o_._.o ._._.o._.			
D1		0.5		.o_._.o ._._._.o_		0.9	
D2		1		.o_._.o ._._.o._.	1.0		
			Dense mid brown fine to coarse SAND.	. . . . .		0.8	
				. . . . .	1.8		
			Dense lighty brown fine to coarse SAND.	. . . . .	2.0	1.0	
				. . . . .	2.8		
			Grey clayey sandy SILT.	_.o_.O_.		0.1	
D3		3	Stiff grey mottled dark brown slightly sandy, slightly gravelly CLAY.	_.O_.o_ _.o_.O_. _.O_.o_ _.o_.O_.	3.0	1.6	
				_.O_.o_ _.o_.O_.	4.0		
			Dense light brown gravelly coarse SAND. Gravel of fine to coarse, subrounded to rounded flint and chalk.	.o.O.o.O. .O.o.O. .o.O.o.O. .O.o.O. .o.O.o.O.	5.0	0.5	
			End of hole.		6.0		
					7.0		

Remarks:

Groundwater: Dry

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

Brown 2 Green Geotechnical and Environmental Consultants

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS9
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
Project No:	1968	**Completion of Drilling:**	23-Nov-17
Client	Ken Rush Associates	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			TOPSOIL - Very soft dark brown clayey SAND with rootlets.	_ . _ . _ .	0.1	0.1	
			Dense dark brown clayey SAND with occasional gravels.	._._.o._.			
			Gravel of fine to coarse, subrounded to rounded flint and chalk.	.o_._.o			
T,J,V		0.1-0.4		._._._.o_	0.4	0.3	
			Dense mid brown fine to coarse SAND.	. . . . .			
D1		0.5		. . . . .			
				. . . . .			
				. . . . .			
D2		1		. . . . .	1.0		
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .	2.0		
				. . . . .			
				. . . . .			
				. . . . .		4.5	
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .	3.0		
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .	4.0		
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
				. . . . .			
			Dense gravelly coarse SAND.	.o.O.o.O.	5.0	0.1	
			End of hole.				
					6.0		
					7.0		

Remarks:

Groundwater: Dry

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

GEOLOGICAL LOG

Project:	Wilbury Hills Cemetery	**Borehole Number:**	WS10
Location:	Wilbury Hills Cemetery Letchworth Garden City, Hertfordshire SG6 4EG	**Start of Drilling:**	23-Nov-17
Project No:	1968	**Completion of Drilling:**	23-Nov-17
Client	Ken Rush Associates	**Drilling Method:**	Window sampling
Logged By:	RMI	**Ground Level (m AOD):**	

Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
			TOPSOIL - Very soft dark brown clayey SAND with rootlets.		0.1	0.1	
			Soft dark brown slightly sandy, silty CLAY with occasional gravels. Gravel of fine to coarse, subrounded to rounded flint and chalk.				
T,J,V		0.1-0.4			0.4	0.3	
			Stiff light brown slightly gravelly, slightly sandy CLAY.				
D1		0.5	Gravel of fine to coarse, subrounded to rounded flint and chalk.				
						0.6	
D2		1			1.0		
			Stiff grey mottled light brown slightly gravelly, slightly sandy CLAY. Gravel of fine to coarse, subrounded to rounded flint and chalk.				
D3		1.5					
D4		2			2.0		
						4.0	
D5		3			3.0		
D6		4			4.0		
D7		5					
			End of hole.		6.0		
					7.0		

Remarks:

Groundwater: Dry

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample,

APPENDIX VI

GEOTECHNICAL RESULTS

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 12/12/2017

0998

Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

Client:

Brown 2 Green Associates

Suite 1, Wenden Court
Station Road
Wendends Ambo
Nr. Saffron Walden
CB11 4LB

Soil Property Testing Ltd

15, 16, 18 Halcyon Court, St Margaret's Way,
Stukeley Meadows, Huntingdon,
Cambridgeshire, PE29 6DG

Tel: 01480 455579
Email: enquiries@soilpropertytesting.com
Website: www.soilpropertytesting.com

Samples Submitted By:

Brown 2 Green Associates

Samples Labelled:

Wilbury Hills Cemetery, Letchworth

Approved Signatories:

- ☑ **J.C. Garner B.Eng (Hons) FGS** — Technical Director
- ☐ **S.P. Townend FGS** — Quality Manager
- ☐ **W. Johnstone** — Materials Lab Manager
- ☐ **D. Sabnis** — Operations Manager

Date Received: 27/11/2017

Samples Tested Between: 27/11/2017 **and** 12/12/2017

Remarks:

For the attention of Mr P Miles
Your Reference No: 1968

Notes:

1. All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.

2. (a) UKAS - United Kingdom Accreditation Service
   (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

3. Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.

4. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 12/12/2017

0998

Contract	**Wilbury Hills Cemetery, Letchworth**		
Serial No.	**S32205**	**Target Date**	11/12/2017
Scheduled By	Brown 2 Green Associates		

SCHEDULE OF LABORATORY TESTS

Schedule Remarks

Bore Hole No.	Type	Sample Ref.	Top Depth	Water Content BSEN	Liquid/Plastic Limits	Wet Sieve Preparation	PSD by Hydrometer															Sample Remarks
WS3	D	2	1.00	1	1	1																
WS4	D	2	1.00	1	1	1																
WS5	D	2	1.00	1			1															
WS6	D	2	1.00	1																		
WS6	D	3	2.00	1	1	1																
WS6	D	4	3.00	1																		
WS7	D	2	1.00	1	1	1																
WS7	D	3	2.00	1																		
WS7	D	4	3.00	1	1	1																
WS7	D	5	4.00	1																		
WS9	D	2	1.00				1															
Totals				**10**	**5**	**5**	**2**															**End of Schedule**

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 12/12/2017

0998

Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasti-city Index (%)	Liquid-ity Index (%)	SAMPLE PREPARATION				Description	CLASS
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
WS3	1.00	D	2	**19.0**	51	18	33	0.03	Wet Sieved	8 (M)	20.6*	24	Stiff olive brown slightly gravelly slightly sandy CLAY with occasional recently active and decayed roots and calcareous aggregations. Gravel is fine to medium flint and chalk.	CH
WS4	1.00	D	2	**22.8**	59	20	39	0.07	Wet Sieved	7 (M)	24.6*	24	Firm olive brown slightly gravelly slightly sandy CLAY with occasional recently active and decayed roots, and calcareous aggregations. Gravel is fine to medium quartzite.	CH
WS5	1.00	D	2	**8.7**									Orangish brown silty clayey SAND.	
WS6	1.00	D	2	**22.9**									Stiff light olive brown slightly gravelly calcareous CLAY with rare recently active roots and calcareous aggregations. Gravel is fine to medium quartzite.	
WS6	2.00	D	3	**21.8**	57	19	38	0.07	Wet Sieved	5 (M)	22.9*	24	Stiff olive brown slightly gravelly slightly sandy CLAY with occasional dark bluish grey mottling, rare calcareous aggregations, decayed roots, and selenite crystals. Gravel is fine to medium chalk and quartzite.	CH
WS6	3.00	D	4	**21.5**									Stiff olive brown slightly gravelly slightly sandy CLAY with occasional bluish grey mottling, rare decayed roots and selenite crystals. Gravel is fine to medium quartzite and chalk.	
WS7	1.00	D	2	**22.6**	58	19	39	0.09	Wet Sieved	5 (M)	23.8*	24	Stiff olive brown slightly gravelly slightly sandy CLAY with rare calcareous aggregations, and recently active and decayed roots. Gravel is fine to medium quartzite, flint and chalk.	CH
WS7	2.00	D	3	**20.6**									Very stiff olive brown slightly gravelly calcareous CLAY with occasional bluish grey mottling, and rare decayed roots. Gravel is fine to medium quartzite and chalk.	

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2
Method of Test: BS EN ISO: 17892-1: 2014 & BS1377:Part 2:1990:3.2, 4.4
Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments: *Corrected water content assume material greater than 0.425mm is non-porous. See BS1377: Part 2: 1990: Clause 3 Note 1

Remarks to Include: Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C

TEST REPORT

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DATE ISSUED: 12/12/2017

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Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasti-city Index (%)	Liquid-ity Index (%)	SAMPLE PREPARATION				Description	CLASS
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
WS7	3.00	D	4	**19.6**	57	20	37	-0.01	Wet Sieved	6 (M)	20.9*	24	Very stiff olive brown slightly gravelly slightly sandy CLAY with occasional bluish grey mottling, rare selenite crystals, and decayed roots. Gravel is fine to medium quartzite, chalk and flint.	CH
WS7	4.00	D	5	**18.2**									Very stiff olive brown slightly gravelly CLAY with rare selenite crystals. Gravel is fine to medium quartzite and chalk.	

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS1377:Part 2:1990:3.2, 4.4

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments: *Corrected water content assume material greater than 0.425mm is non-porous. See BS1377: Part 2: 1990: Clause 3 Note 1

Remarks to Include: Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C

TEST REPORT

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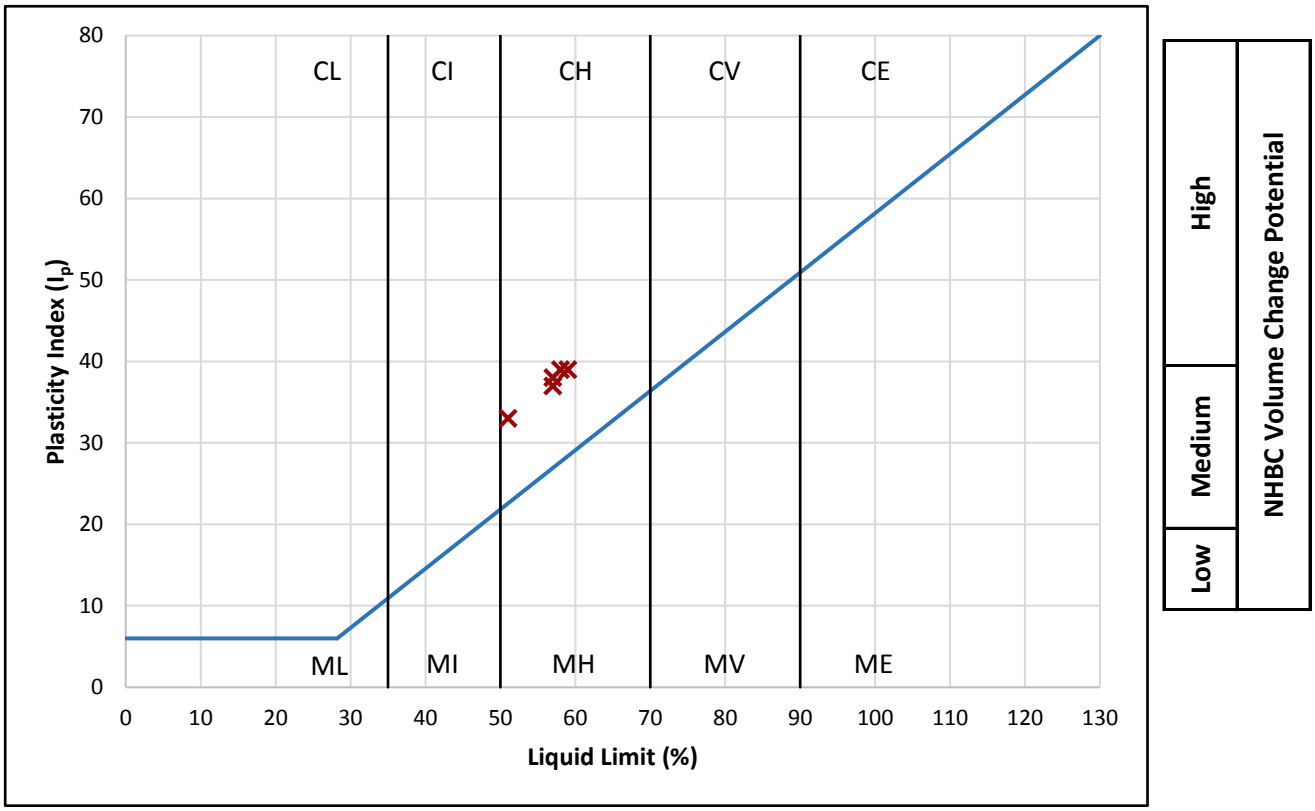
Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

Plasticity				
Low	Medium	High	Very High	Extremely High



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: Part 2: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 12/12/2017

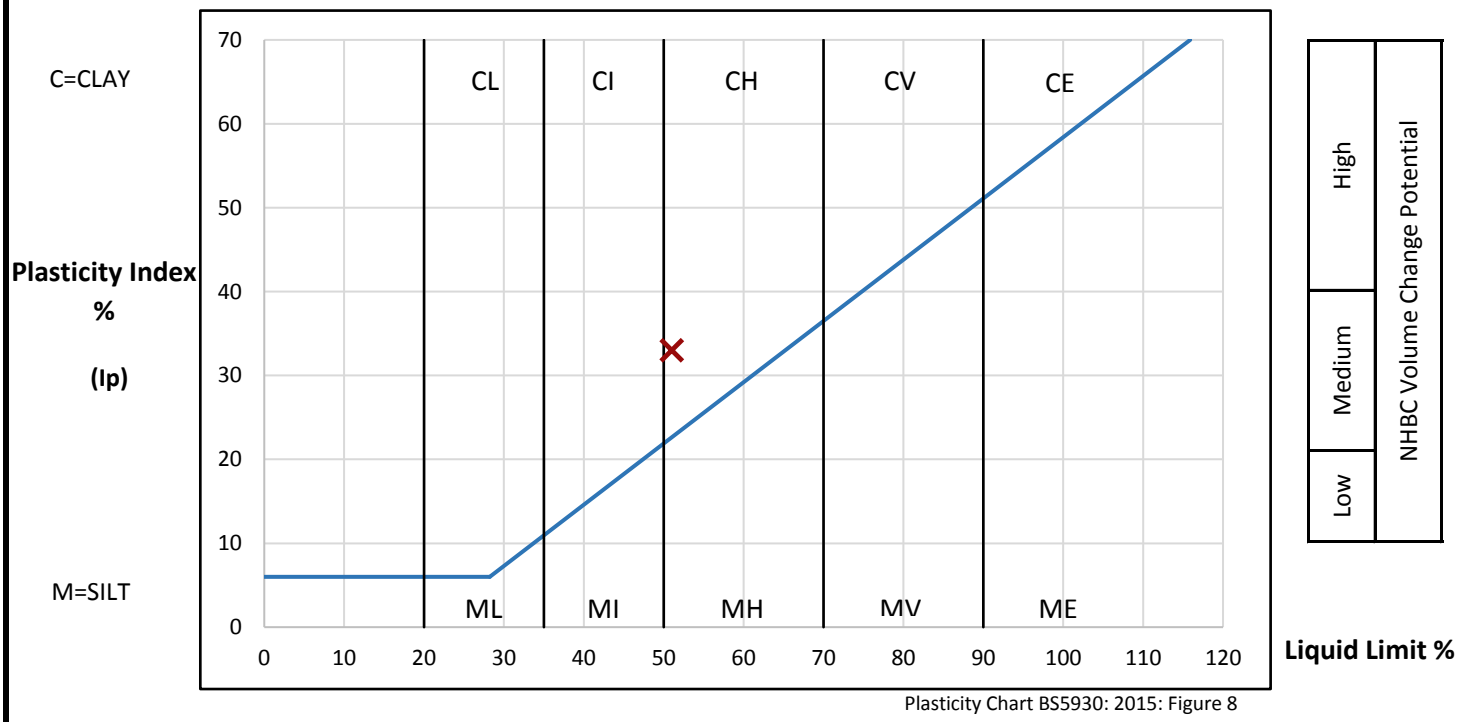
0998

Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS3	1.00	D	2	19.0	Stiff olive brown slightly gravelly slightly sandy CLAY with occasional recently active and decayed roots and calcareous aggregations. Gravel is fine to medium flint and chalk.	

PREPARATION				Liquid Limit	51 %
Method of preparation	Wet sieved over 0.425mm sieve			Plastic Limit	18 %
Sample retained 0.425mm sieve	(Measured)	8 %		Plasticity Index	33 %
Corrected water content for material passing 0.425mm		20.6 %		Liquidity Index	0.03
Sample retained 2mm sieve	(Measured)	4 %		NHBC Modified (I'p)	30 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

TEST REPORT

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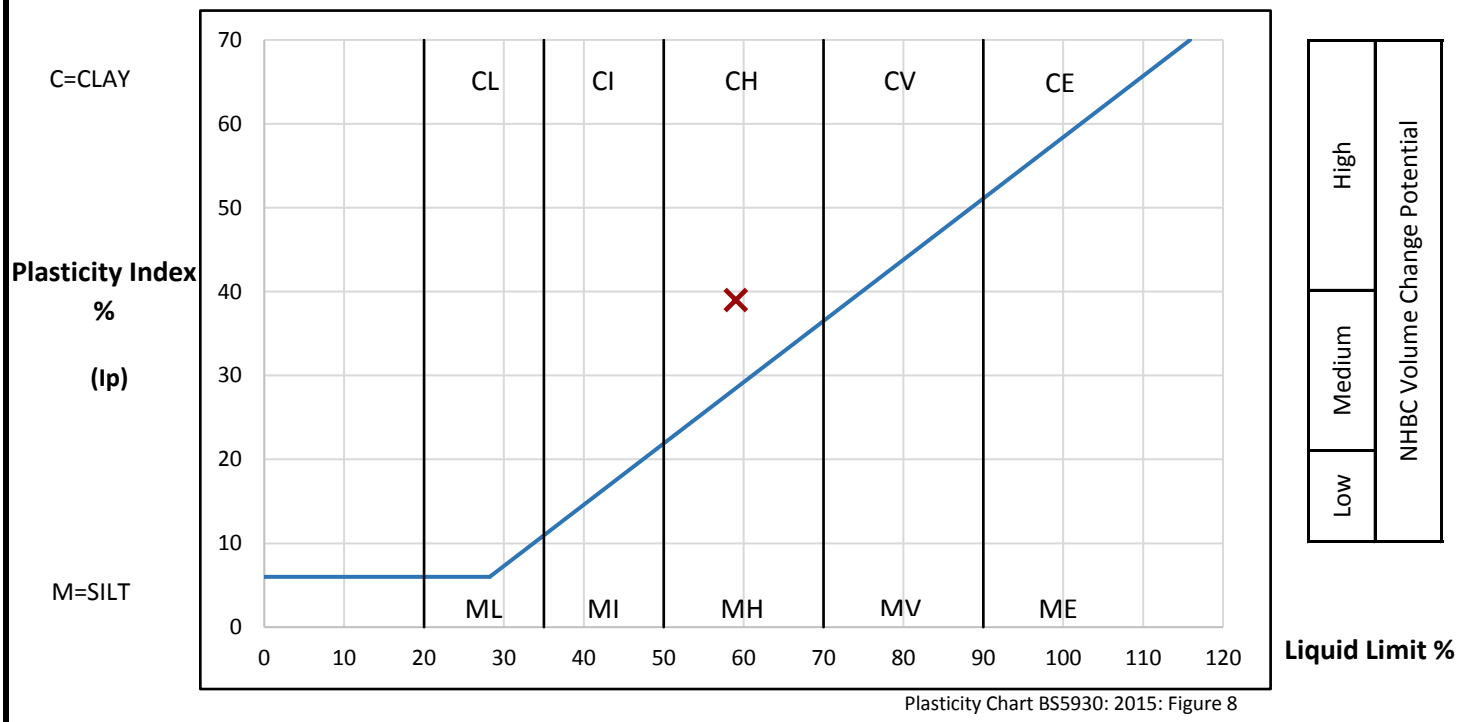
Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS4	1.00	D	2	22.8	Firm olive brown slightly gravelly slightly sandy CLAY with occasional recently active and decayed roots, and calcareous aggregations. Gravel is fine to medium quartzite.	

PREPARATION				Liquid Limit	59 %
Method of preparation	Wet sieved over 0.425mm sieve			Plastic Limit	20 %
Sample retained 0.425mm sieve	(Measured)	7 %		Plasticity Index	39 %
Corrected water content for material passing 0.425mm		24.6 %		Liquidity Index	0.07
Sample retained 2mm sieve	(Measured)	4 %		NHBC Modified (I'p)	36 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

TEST REPORT

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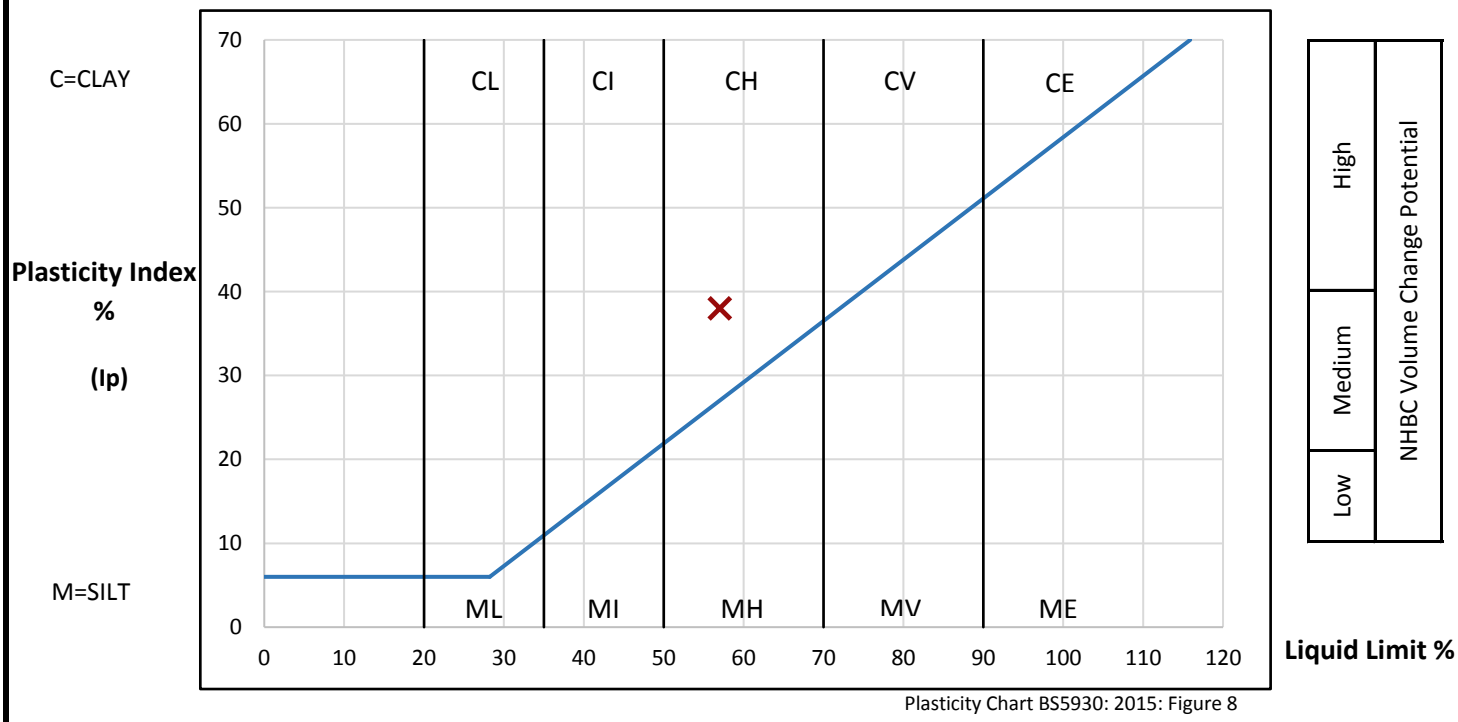
Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS6	2.00	D	3	21.8	Stiff olive brown slightly gravelly slightly sandy CLAY with occasional dark bluish grey mottling, rare calcareous aggregations, decayed roots, and selenite crystals. Gravel is fine to medium chalk and quartzite.	Specimen dried at 80°C due to the presence of selenite.

PREPARATION				Liquid Limit	57 %
Method of preparation		Wet sieved over 0.425mm sieve		Plastic Limit	19 %
Sample retained 0.425mm sieve	(Measured)	5 %		Plasticity Index	38 %
Corrected water content for material passing 0.425mm		22.9 %		Liquidity Index	0.07
Sample retained 2mm sieve	(Measured)	3 %		NHBC Modified (I'p)	36 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

TEST REPORT

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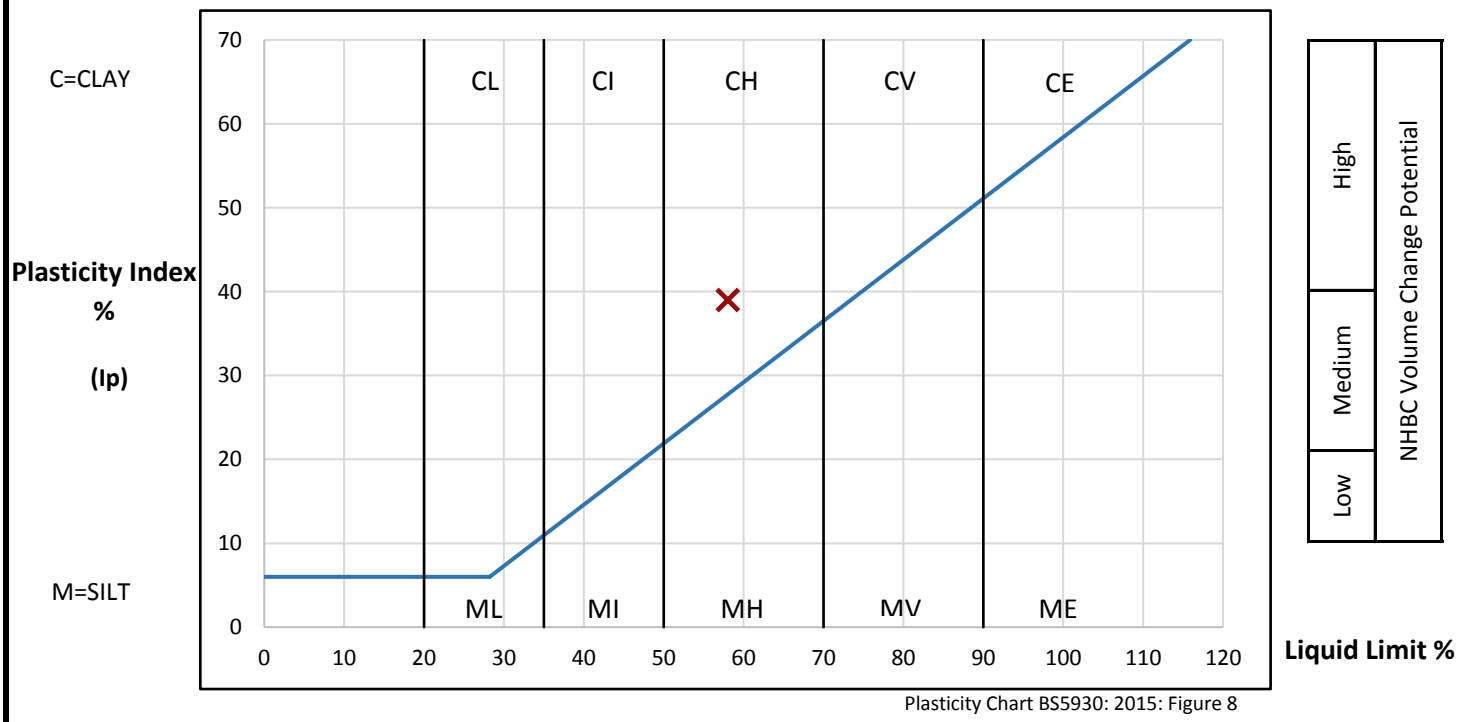
Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS7	1.00	D	2	22.6	Stiff olive brown slightly gravelly slightly sandy CLAY with rare calcareous aggregations, and recently active and decayed roots. Gravel is fine to medium quartzite, flint and chalk.	

PREPARATION				Liquid Limit	58 %
Method of preparation		Wet sieved over 0.425mm sieve		Plastic Limit	19 %
Sample retained 0.425mm sieve	(Measured)	5 %		Plasticity Index	39 %
Corrected water content for material passing 0.425mm		23.8 %		Liquidity Index	0.09
Sample retained 2mm sieve	(Measured)	3 %		NHBC Modified (I'p)	37 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

TEST REPORT

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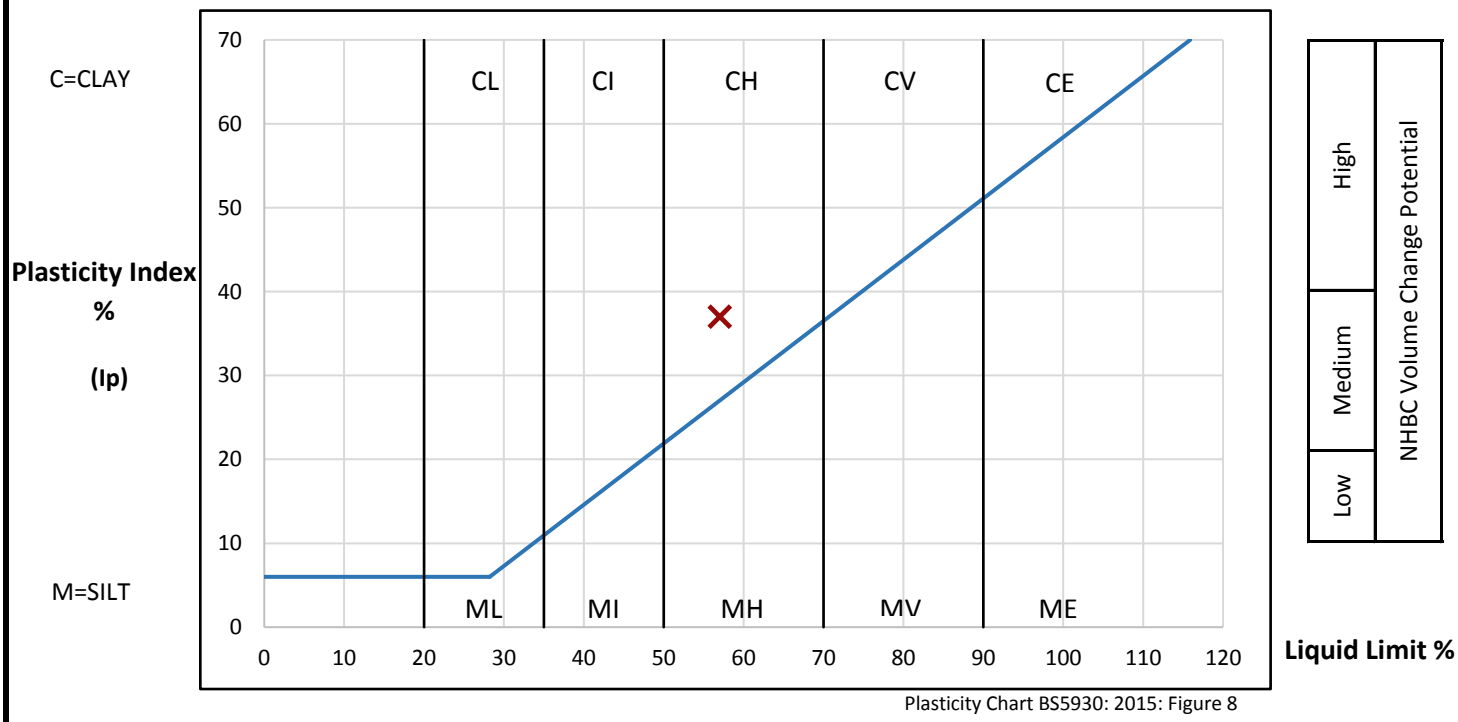
Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS7	3.00	D	4	19.6	Very stiff olive brown slightly gravelly slightly sandy CLAY with occasional bluish grey mottling, rare selenite crystals, and decayed roots. Gravel is fine to medium quartzite, chalk and flint.	Specimen dried at 80°C due to the presence of selenite.

PREPARATION				Liquid Limit	57 %
Method of preparation		Wet sieved over 0.425mm sieve		Plastic Limit	20 %
Sample retained 0.425mm sieve	(Measured)	6 %		Plasticity Index	37 %
Corrected water content for material passing 0.425mm		20.9 %		Liquidity Index	-0.01
Sample retained 2mm sieve	(Measured)	4 %		NHBC Modified (I'p)	35 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 12/12/2017

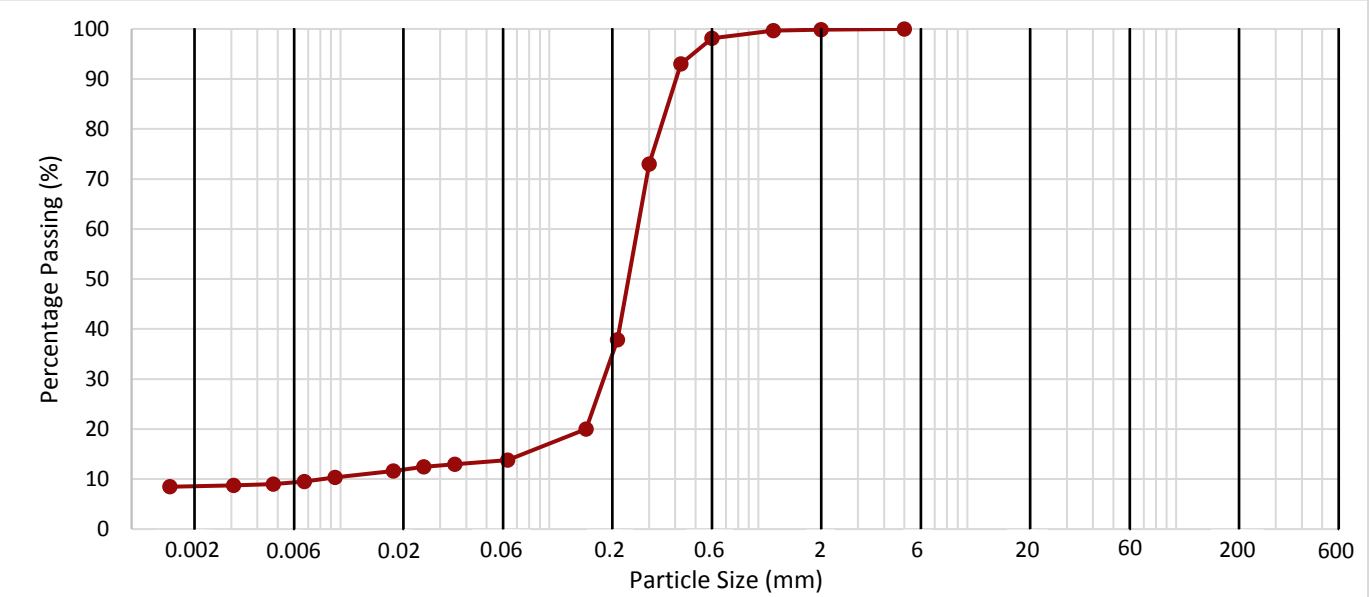
0998

Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
WS5	1.00	D	2	Orangish brown silty clayey SAND.	

Method of Test:	Hydrometer + Pre-sieve	Method of Pretreatment:	Not Required



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)
	0.0353	13	5	
	0.0251	12		
	0.0179	12		
	0.0094	10		9
	0.0067	10		
	0.0048	9		
	0.0031	9		
	0.0015	8		

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	86
1.18	100	
0.600	98	
0.425	93	
0.300	73	
0.212	38	
0.150	20	
0.063	14	

Fines By Dry Mass (%)	
<0.063mm	14

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5	100	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: , 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 12/12/2017

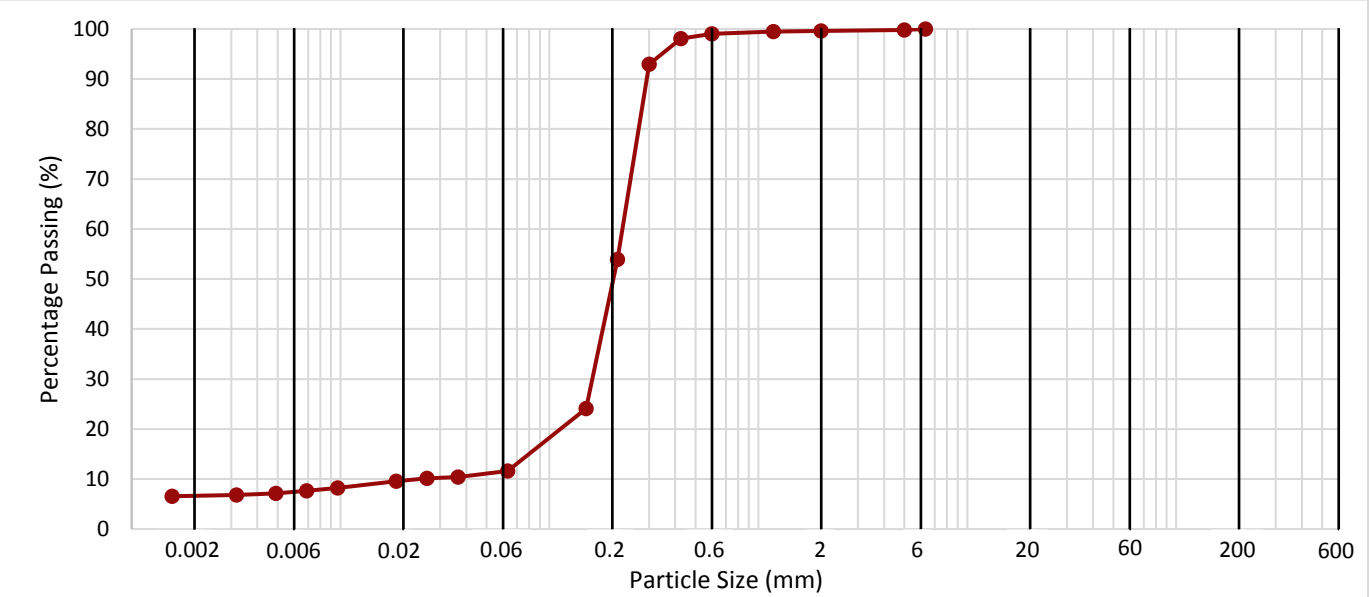
0998

Contract	**Wilbury Hills Cemetery, Letchworth**
Serial No.	**S32205**

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
WS9	1.00	D	2	Yellowish brown silty clayey SAND.	

Method of Test:	Hydrometer + Pre-sieve	Method of Pretreatment:	Not Required



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)
	0.0366	10	5	
	0.0259	10		
	0.0185	10		
	0.0097	8		7
	0.0069	8		
	0.0049	7		
	0.0032	7		
	0.0016	7		

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	88
1.18	99	
0.600	99	
0.425	98	
0.300	93	
0.212	54	
0.150	24	
0.063	12	

Fines By Dry Mass (%)	
<0.063mm	12

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3	100	
5	100	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: , 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

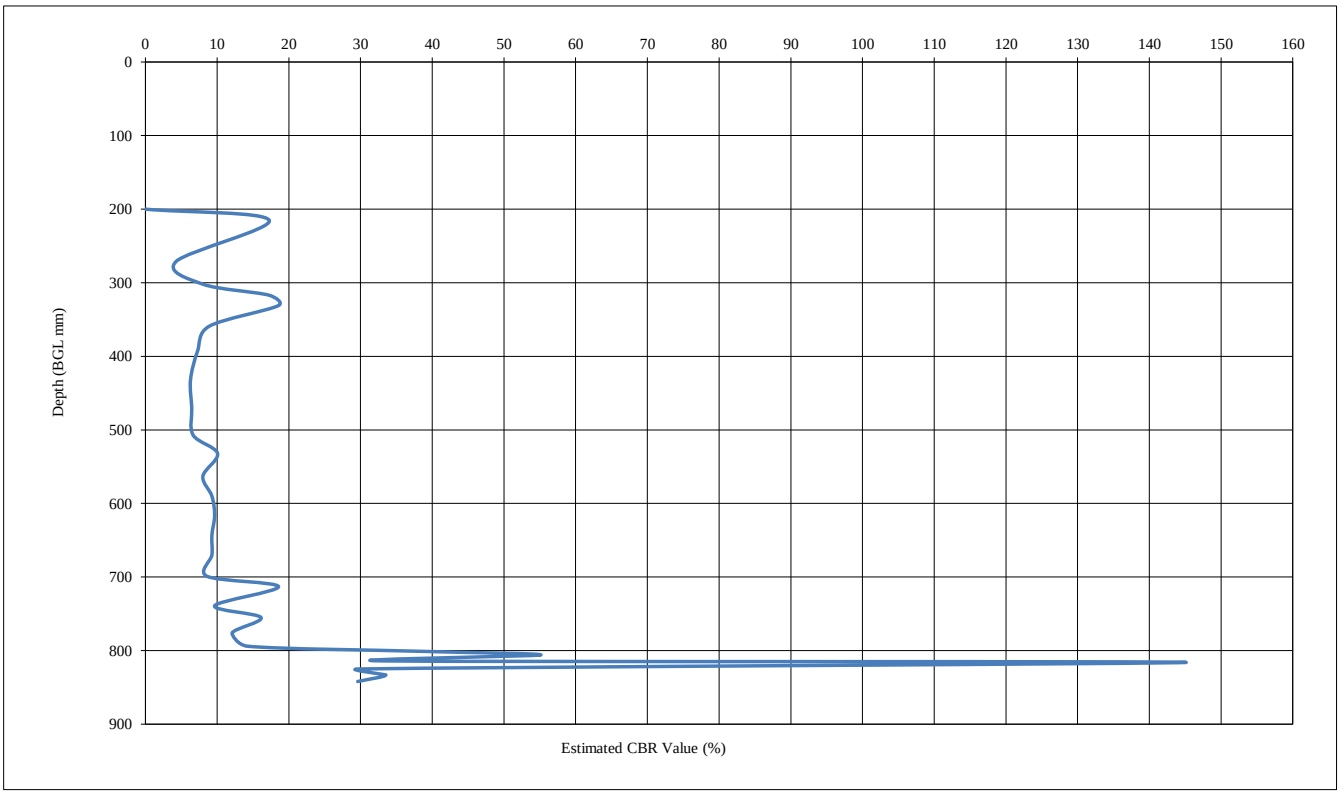
Brown 2 Green
Geotechnical and Geo-environmental Consultants

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	Wilbury Hills Cemetery, Letchworth	**Test Date:**	24/11/2017
Site Ref	1968	**Test Location:**	T1
Test No.:	1	**Easting:**	Not Surveyed
Initial Depth (mm BGL):	200	**Northing:**	Not Surveyed
Final Depth (mm BGL):	842		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	393	7	1	393.00	0.55
393	699	17	10	30.60	8.12
699	642	14	-3	19.00	13.44

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
RMI		02-Jan-18		03-Jan-18

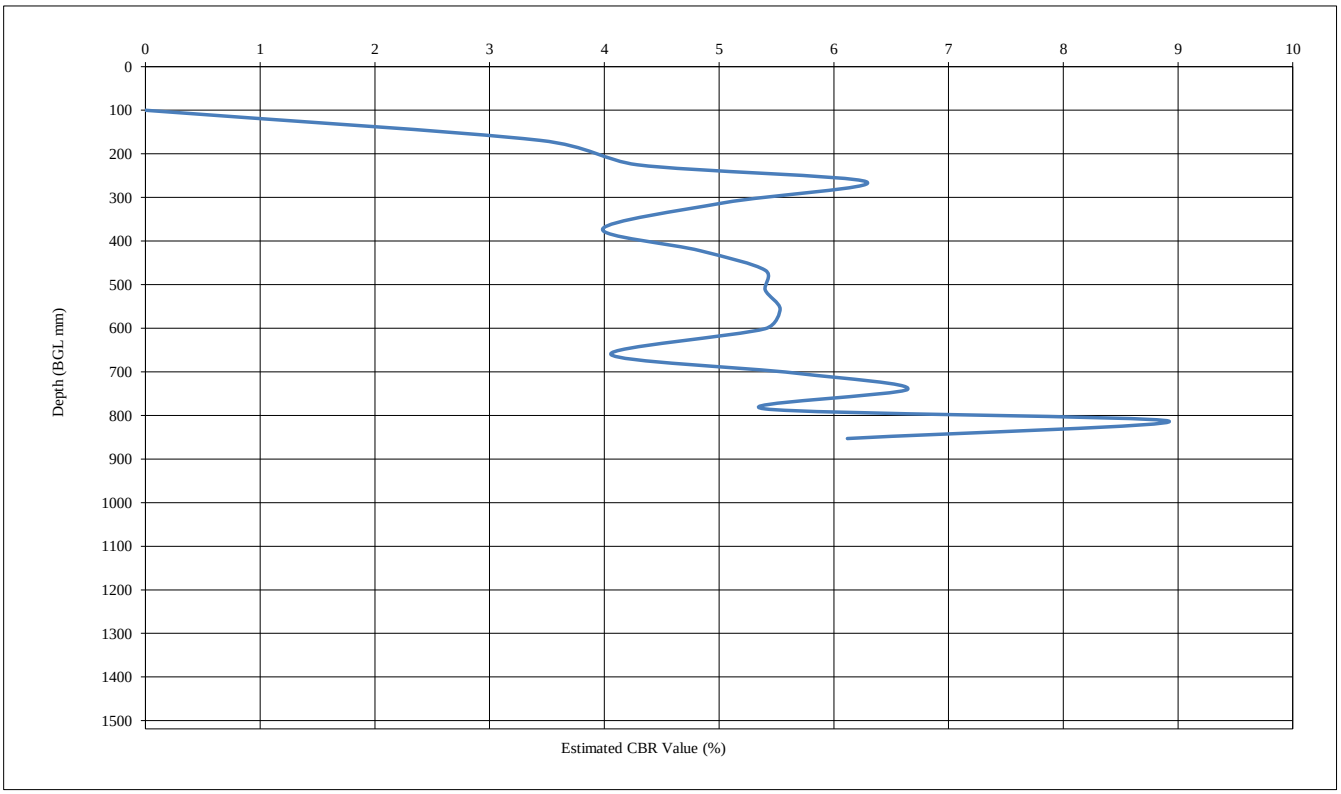
Brown 2 Green
Geotechnical and Geo-environmental Consultants

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	Wilbury Hills Cemetery, Letchworth	**Test Date:**	24/11/2017
Site Ref	1968	**Test Location:**	T2
Test No.:	1	**Easting:**	Not Surveyed
Initial Depth (mm BGL):	100	**Northing:**	Not Surveyed
Final Depth (mm BGL):	853		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	264	3	1	264.00	0.83
264	813	15	12	45.75	5.31

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
RMI		02-Jan-18		03-Jan-18

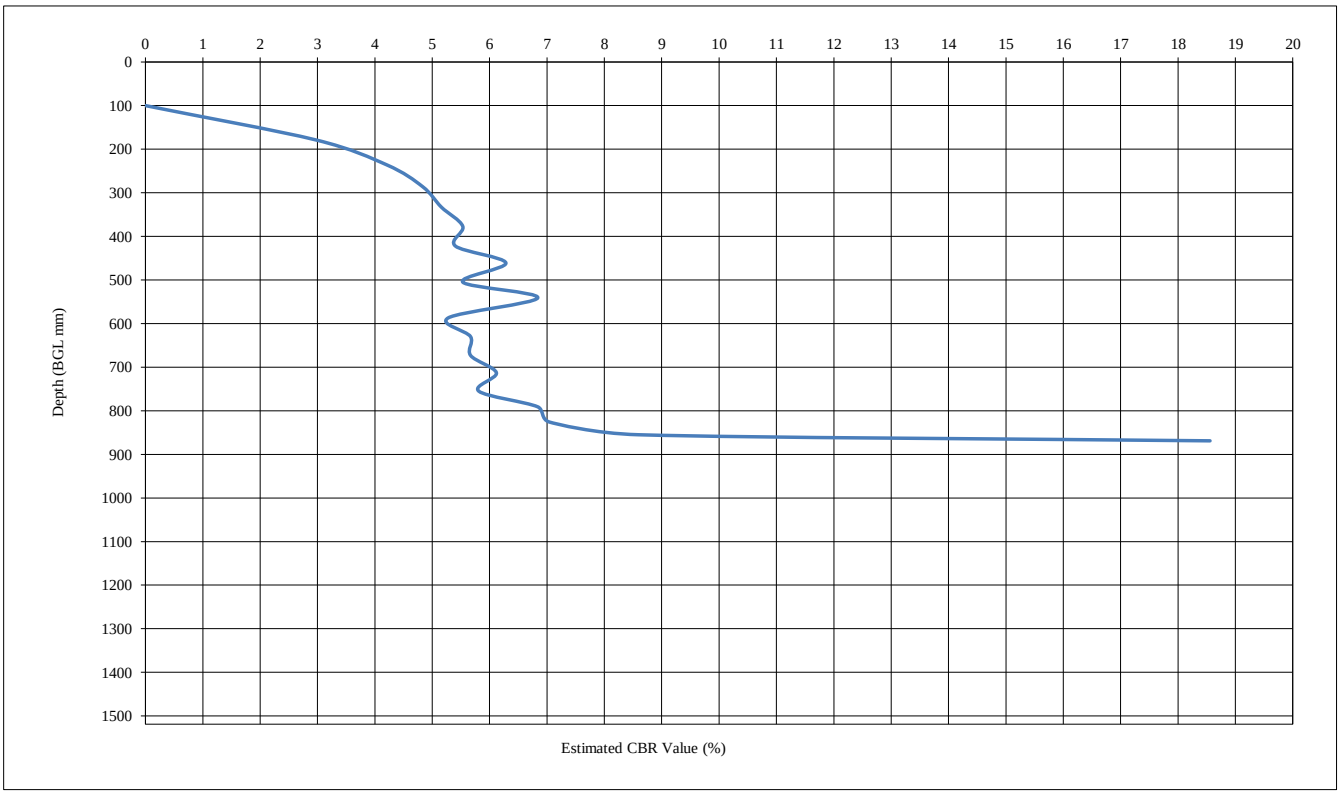
Brown 2 Green
Geotechnical and Geo-environmental Consultants

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	Wilbury Hills Cemetery, Letchworth	**Test Date:**	24/11/2017
Site Ref	1968	**Test Location:**	T3
Test No.:	1	**Easting:**	Not Surveyed
Initial Depth (mm BGL):	100	**Northing:**	Not Surveyed
Final Depth (mm BGL):	869		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	286	3	1	286.00	0.76
286	587	10	7	43.00	5.67
587	769	14	4	45.50	5.34

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
RMI		02-Jan-18		03-Jan-18

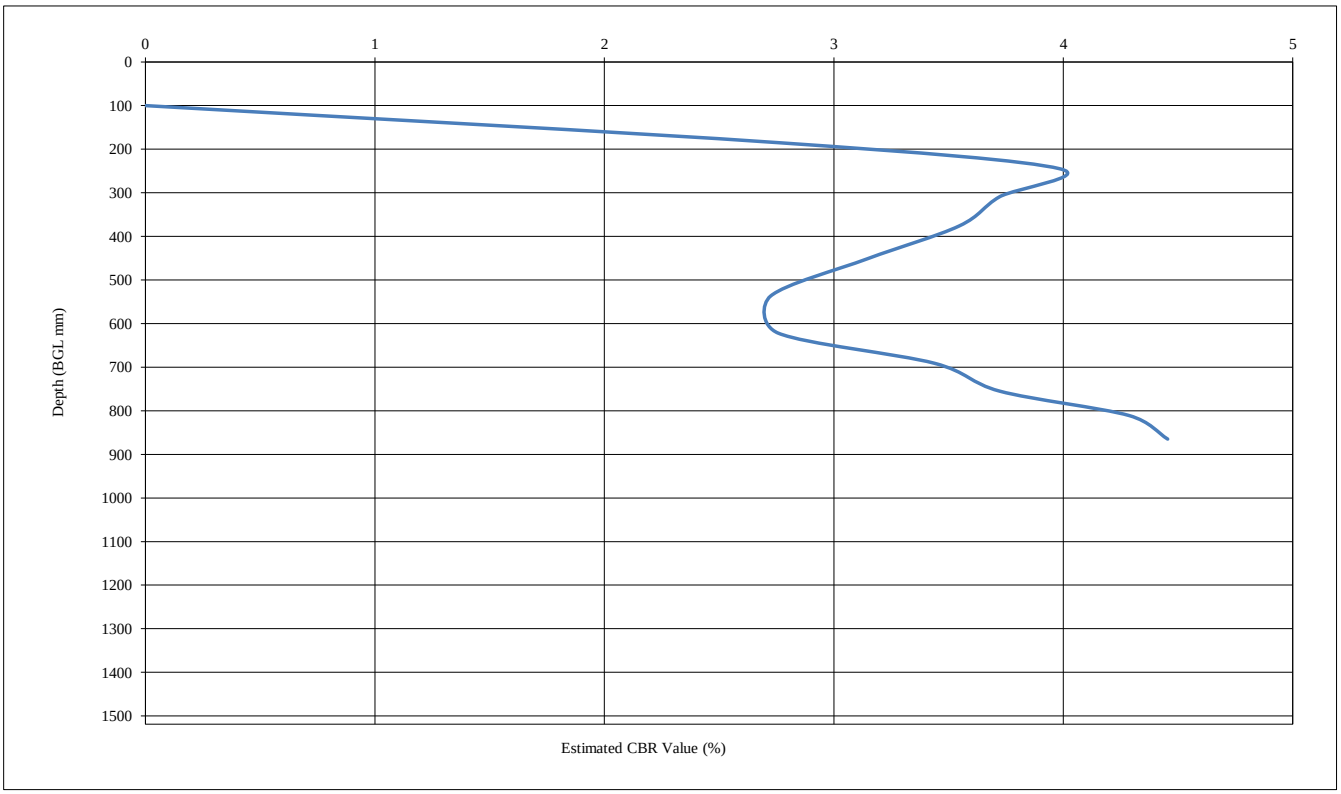
Brown 2 Green
Geotechnical and Geo-environmental Consultants

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	Wilbury Hills Cemetery, Letchworth	**Test Date:**	24/11/2017
Site Ref	1968	**Test Location:**	T4
Test No.:	1	**Easting:**	Not Surveyed
Initial Depth (mm BGL):	100	**Northing:**	Not Surveyed
Final Depth (mm BGL):	865		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	245	2	1	245.00	0.90
245	537	6	4	73.00	3.24

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
RMI		02-Jan-18		03-Jan-18

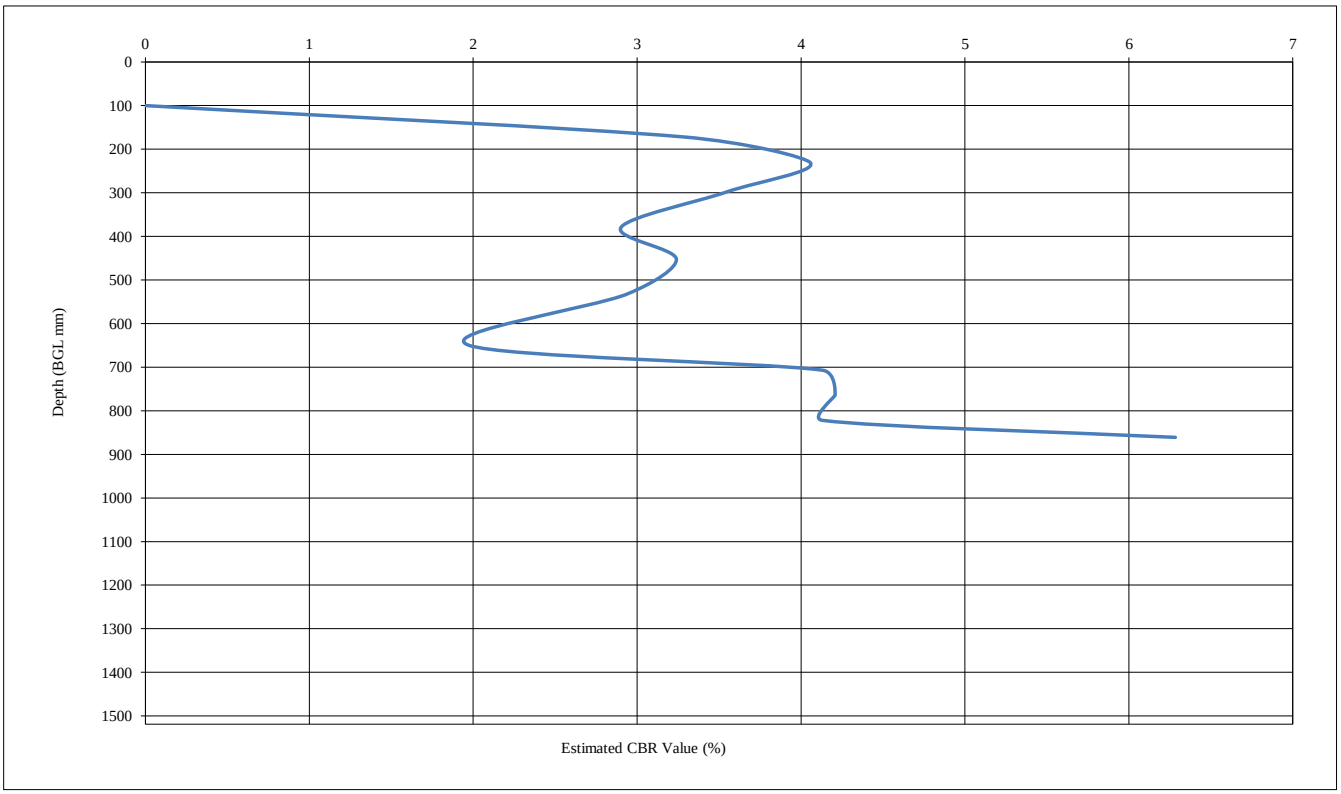
Brown 2 Green
Geotechnical and Geo-environmental Consultants

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	Wilbury Hills Cemetery, Letchworth	**Test Date:**	24/11/2017
Site Ref	1968	**Test Location:**	T5
Test No.:	1	**Easting:**	Not Surveyed
Initial Depth (mm BGL):	100	**Northing:**	Not Surveyed
Final Depth (mm BGL):	861		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	231	2	1	231.00	0.96
231	649	7	5	83.60	2.81
649	761	8	1	112.00	2.06

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
RMI		02-Jan-18		03-Jan-18

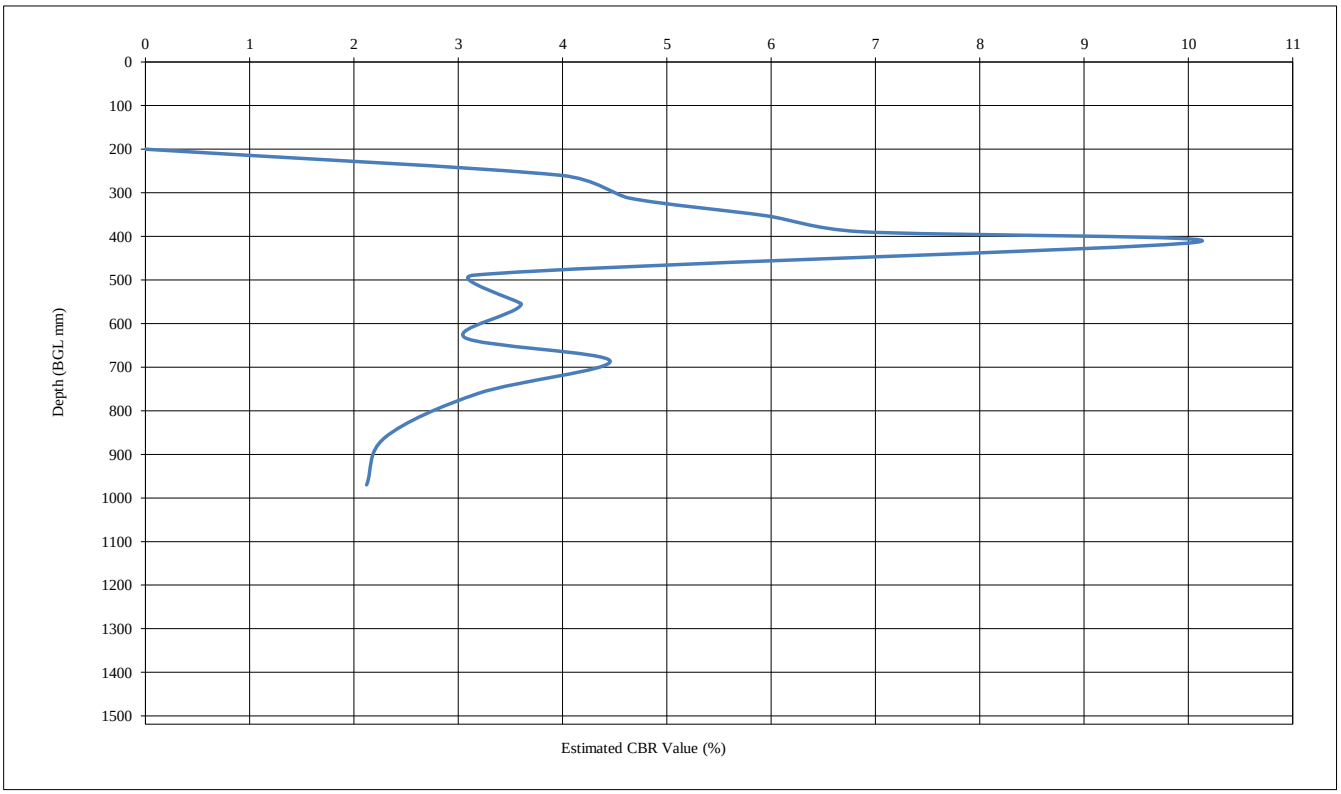
Brown 2 Green
Geotechnical and Geo-environmental Consultants

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	Wilbury Hills Cemetery, Letchworth	**Test Date:**	24/11/2017
Site Ref	1968	**Test Location:**	T6
Test No.:	1	**Easting:**	Not Surveyed
Initial Depth (mm BGL):	200	**Northing:**	Not Surveyed
Final Depth (mm BGL):	970		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	289	1	1	289.00	0.76
289	560	7	6	45.17	5.38
560	770	10	3	70.00	3.39

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
RMI		02-Jan-18		03-Jan-18

APPENDIX VII

CHEMICAL ANALYSIS REPORTS

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	17-31804-1
Initial Date of Issue:	05-Dec-2017
Client	Brown 2 Green Associates
Client Address:	Suite 1, Wenden Court Station Road Wendens Ambo Nr. Saffron Walden Essex CB11 4LB
Contact(s):	Philip Miles
Project	1968 Wilbury Hills Cemetery, Letchworth

Quotation No.:	Q15-04830	**Date Received:**	29-Nov-2017
Order No.:		**Date Instructed:**	29-Nov-2017
No. of Samples:	10		
Turnaround (Wkdays):	5	**Results Due:**	05-Dec-2017
Date Approved:	05-Dec-2017		

Approved By:



Details: Glynn Harvey, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1968 Wilbury Hills Cemetery, Letchworth

Client: Brown 2 Green Associates				**Chemtest Job No.:**	17-31804	17-31804	17-31804	17-31804	17-31804	17-31804	17-31804	17-31804
Quotation No.: Q15-04830				**Chemtest Sample ID.:**	546656	546657	546658	546659	546660	546661	546662	546663
Order No.:				Client Sample Ref.:	WS1	WS2	WS2	WS5	WS5	WS9	WS10	WS8
				Client Sample ID.:								D2
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.10	0.10	0.80	0.10	0.80	0.10	0.10	1.00
				Bottom Depth (m):	0.50	0.50	1.00	0.50	1.00	0.40	0.40	1.00
				Date Sampled:	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017
				Asbestos Lab:	COVENTRY	COVENTRY		COVENTRY		COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-	-		-		-	-	
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	
Moisture	N	2030	%	0.020	12	11	9.2	9.0	9.2	9.2	14	5.7
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown,	Brown,	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones, Roots	Stones	Stones	Stones	Stones,	Stones	Stones	Stones,
Soil Texture	N	2040		N/A	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay,
pH	M	2010		N/A	8.1	7.9	8.3	6.1	6.7	6.5	8.1	7.9
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.12	0.011	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50		< 0.50		< 0.50	< 0.50	
Arsenic	M	2450	mg/kg	1.0	30	22		16		15	25	
Cadmium	M	2450	mg/kg	0.10	0.42	0.47		0.19		0.21	0.39	
Chromium	M	2450	mg/kg	1.0	29	32		23		23	31	
Copper	M	2450	mg/kg	0.50	16	17		8.9		11	19	
Mercury	M	2450	mg/kg	0.10	0.28	0.16		0.13		0.12	0.16	
Nickel	M	2450	mg/kg	0.50	32	31		17		17	35	
Lead	M	2450	mg/kg	0.50	18	21		15		15	22	
Selenium	M	2450	mg/kg	0.20	0.77	0.39		0.65		0.29	0.64	
Vanadium	U	2450	mg/kg	5.0	49	57		43		44	54	
Zinc	M	2450	mg/kg	0.50	64	75		49		56	71	
TPH >C5-C6	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	
TPH >C6-C7	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	
TPH >C7-C8	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	
TPH >C8-C10	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	
TPH >C10-C12	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	
TPH >C12-C16	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	
TPH >C16-C21	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	
TPH >C21-C35	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	
Total TPH >C5-C35	N	2670	mg/kg	10	< 10	< 10		< 10		< 10	< 10	
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1968 Wilbury Hills Cemetery, Letchworth

Client: Brown 2 Green Associates					**Chemtest Job No.:**	17-31804	17-31804	17-31804	17-31804	17-31804	17-31804	17-31804
Quotation No.: Q15-04830					**Chemtest Sample ID.:**	546656	546657	546658	546659	546660	546661	546662	546663
Order No.:					Client Sample Ref.:	WS1	WS2	WS2	WS5	WS5	WS9	WS10	WS8
					Client Sample ID.:								D2
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.10	0.10	0.80	0.10	0.80	0.10	0.10	1.00
					Bottom Depth (m):	0.50	0.50	1.00	0.50	1.00	0.40	0.40	1.00
					Date Sampled:	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017	24-Nov-2017
					Asbestos Lab:	COVENTRY	COVENTRY		COVENTRY		COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Benzo[a]anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Chrysene	M	2700	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Benzo[a]pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	
Total Of 16 PAH's	M	2700	mg/kg	2.0		< 2.0	< 2.0		< 2.0		< 2.0	< 2.0	

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1968 Wilbury Hills Cemetery, Letchworth

Client: Brown 2 Green Associates		**Chemtest Job No.:**			17-31804	17-31804
Quotation No.: Q15-04830		**Chemtest Sample ID.:**			546664	546665
Order No.:		Client Sample Ref.:			WS8	WS10
		Client Sample ID.:			D3	D4
		Sample Type:			SOIL	SOIL
		Top Depth (m):			3.00	2.00
		Bottom Depth (m):			3.00	2.00
		Date Sampled:			24-Nov-2017	24-Nov-2017
		Asbestos Lab:				
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A		
Asbestos Identification	U	2192	%	0.001		
Moisture	N	2030	%	0.020	12	11
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Clay	Clay
pH	M	2010		N/A	8.2	8.3
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	< 0.010
Cyanide (Total)	M	2300	mg/kg	0.50		
Arsenic	M	2450	mg/kg	1.0		
Cadmium	M	2450	mg/kg	0.10		
Chromium	M	2450	mg/kg	1.0		
Copper	M	2450	mg/kg	0.50		
Mercury	M	2450	mg/kg	0.10		
Nickel	M	2450	mg/kg	0.50		
Lead	M	2450	mg/kg	0.50		
Selenium	M	2450	mg/kg	0.20		
Vanadium	U	2450	mg/kg	5.0		
Zinc	M	2450	mg/kg	0.50		
TPH >C5-C6	N	2670	mg/kg	1.0		
TPH >C6-C7	N	2670	mg/kg	1.0		
TPH >C7-C8	N	2670	mg/kg	1.0		
TPH >C8-C10	N	2670	mg/kg	1.0		
TPH >C10-C12	N	2670	mg/kg	1.0		
TPH >C12-C16	N	2670	mg/kg	1.0		
TPH >C16-C21	N	2670	mg/kg	1.0		
TPH >C21-C35	N	2670	mg/kg	1.0		
Total TPH >C5-C35	N	2670	mg/kg	10		
Naphthalene	M	2700	mg/kg	0.10		
Acenaphthylene	M	2700	mg/kg	0.10		
Acenaphthene	M	2700	mg/kg	0.10		
Fluorene	M	2700	mg/kg	0.10		
Phenanthrene	M	2700	mg/kg	0.10		
Anthracene	M	2700	mg/kg	0.10		
Fluoranthene	M	2700	mg/kg	0.10		
Pyrene	M	2700	mg/kg	0.10		

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 1968 Wilbury Hills Cemetery, Letchworth

Client: Brown 2 Green Associates			**Chemtest Job No.:**		17-31804	17-31804
Quotation No.: Q15-04830			**Chemtest Sample ID.:**		546664	546665
Order No.:			Client Sample Ref.:		WS8	WS10
			Client Sample ID.:		D3	D4
			Sample Type:		SOIL	SOIL
			Top Depth (m):		3.00	2.00
			Bottom Depth (m):		3.00	2.00
			Date Sampled:		24-Nov-2017	24-Nov-2017
			Asbestos Lab:			
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Benzo[a]anthracene	M	2700	mg/kg	0.10		
Chrysene	M	2700	mg/kg	0.10		
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		
Benzo[a]pyrene	M	2700	mg/kg	0.10		
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		
Total Of 16 PAH's	M	2700	mg/kg	2.0		

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk