TWEEDIE EVANS CONSULTING

Castleoak Group

North Orbital Road, St Albans

Preliminary Geoenvironmental and Geotechnical Assessment

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1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Tweedie Evans Consulting Ltd (TEC) has been appointed by Castleoak Group to undertake a preliminary geoenvironmental and geotechnical assessment of the site located off North Orbital Road, St Albans. All works were undertaken in accordance with our proposal letter dated 16th June 2017 and referenced 1706007.001.bidlet.

1.2 Background

1.2.1 The site is situated off North Orbital Road in the south of St Albans (Figure 1). The site covers an area of approximately 4.0hectares, with the centre situated at approximate National Grid Reference 513690, 203660. The nearest postcode is AL2 2DS.

1.2.2 The site currently comprises an irregular shaped parcel of land utilised as a nursery for the wholesale supply of garden plants.

1.2.3 It is understood that it is proposed to redevelop the site for a residential end use comprising the demolition of pre-existing structures to allow for the construction of a number of single storey and two-storey structures with associated hard infrastructure and soft landscaping (Figure 2).

1.2.4 The aim of these works is to provide information on geoenvironmental and engineering conditions and constraints associated with the site with regard to the proposed development.

1.3 Scope of Works

1.3.1 The scope of work undertaken as part of this report is presented below:

- Preliminary Risk Assessment. This phase of assessment involves development of an initial site conceptual model, based on desk study research and a site reconnaissance survey, in order to establish whether or not there are potentially unacceptable risks.

- Generic Quantitative Risk Assessment. This phase of assessment involves refinement of the site conceptual model developed as part of the Preliminary Risk Assessment based on the findings of an intrusive investigation. Generic assessment criteria and assumptions, if appropriate, are used to evaluate potentially unacceptable risks. Should unacceptable risks be identified, a feasible remediation options appraisal is provided and/or a Detailed Quantitative Risk Assessment is recommended. The purpose of the Detailed Quantitative Risk Assessment is to further refine the conceptual model and use more detailed site specific information and criteria to determine whether there are unacceptable risks.

- Preliminary Geotechnical Assessment. General recommendations regarding likely engineering abnormals are provided on the basis of the findings of an intrusive investigation, together with preliminary foundation design recommendations for the proposed development.

1.3.2 The above scope of work has been undertaken in accordance with current guidance such as CLR 11 *'Model Procedures for the Management of Land Contamination'* (Environment Agency, 2004), BS10175+A1 (2013) and, where appropriate NHBC and Eurocode 7.

1.3.3 The report is presented in the following format.

- Preliminary Risk Assessment:
  Section 2 - Site Description
  Section 3 - Site History
  Section 4 - Environmental Setting
  Section 5 - Outline Conceptual Model

- Generic Quantitative Risk Assessment:
  Section 6 - Intrusive Investigation
  Section 7 - Encountered Ground Conditions
  Section 8 - Contamination Characterisation
  Section 9 - Refined Conceptual Model

- Preliminary Geotechnical Assessment:
  Section 10 - Ground Engineering

- Section 11 - Conclusions and Recommendations

2 SITE DESCRIPTION

2.1 Site Location

2.1.1 The site is located within a mixed commercial / residential area and is bounded by the following features (Table 2.1):

Table 2.1: Site Boundary Features

Direction from Site	Description
North	Pond and residential housing and associated private gardens situated along Mayflower Road.
East	Wooded area known as 'How Wood' beyond which are a number of residential properties with associated private gardens situated along Spruce Drive.
South	Wooded area known as 'Birch Wood' and Birchwood Bungalow (Residential care home and associated private garden). In addition, a telephone mast was observed along the southern site boundary.
West	Surrounding area of Burston Nurseries and associated green houses.

2.2 Land Use and Site Condition

2.2.1 A site reconnaissance survey was undertaken on 17 July 2017. A summary of the observations is presented below. Photographs taken during the site reconnaissance survey are presented in Appendix A.

Current Site Use

2.2.2 The site currently comprises an irregular shaped parcel of land previously utilised as a nursery for the wholesale supply of household plants.

2.2.3 The site is accessed via a track in the north-west corner of the site leading from North Orbital Way.

2.2.4 The north/north-eastern section of the site is generally laid to rough grass (Photographs 1 and 2), while the south/south-western section was observed to contain numerous planting beds covered by a membrane with irrigation system (Photographs 3 and 4). The north/north-western section was observed to contain a number of green houses and outbuildings as well as a number of tanks for the storage of water and fuel (Photographs 5, 8 and 9 to 13) and large shipping container (Photograph 13). Furthermore, a number of burners were observed within the greenhouses (Photograph 14).

Site Topography

2.2.5 The site was observed to be generally flat. An available topographical survey indicates the site is situated at an approximate elevation of 85m above ordnance datum (AOD).

Hard and Soft Landscaping

2.2.6 The site was observed to be lain to a combination of hard and soft landscaping. The north-western section of the site contained numerous buildings and concrete

hardstanding while the south/eastern sections of the site were generally observed to be lain to grass or planting beds.

Fuel Storage

2.2.7 2No. above ground storage tanks (ASTs) were observed within the western section of the site. Both tanks were observed to be of plastic construction situated on a concrete base and were generally noted to be in good condition.

Hazardous Chemicals and Waste Materials Storage

2.2.8 No evidence of hazardous chemical storage was observed on site during the reconnaissance. Notwithstanding this, access to internal areas of a number of the outbuildings was not possible and therefore, the localised storage of possibly hazardous chemicals cannot be discounted.

2.2.9 General household waste materials were observed in a number of locations across the site. Furthermore, an industrial waste bin was observed although the contents of which was not determined during the reconnaissance.

Asbestos Containing Materials

2.2.10 Potential asbestos containing roof tiles and wall sheeting were observed on the outbuildings present within the north-west section of the site.

Site Drainage

2.2.11 A number of manholes assumed to be associated with site drainage were observed across the site, particularly within the western section.

2.2.12 An area of standing water was observed associated with the leaking water tanks located in the north-western site area (Photograph 10).

Evidence of Potential Contamination

2.2.13 No visual or olfactory evidence of potentially gross contamination was observed on site during the reconnaissance.

3 SITE HISTORY

3.1 Introduction

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

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

3.2 Site History

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

Table 3.1: Site Features

Site Features	OS Dates
Earliest available mapping (1872) indicates the site remained undeveloped prior to 1999. The site is initially depicted as 2No. fields separated by a hedgerow roughly in the centre of the site in a general east/west orientation. A track is depicted leading from the eastern boundary of the site to Burston Manor farm to the north/north-east of the development area. From 1973, the track and hedgerow is no longer shown.	1872 – 1992
From 1999, the site is depicted in the current layout.	1999 – 2017

3.3 Neighbouring History

3.3.1 The land uses within the immediate vicinity of the site have been considered. Based upon the reviewed map information the following potentially significant features have been identified (Table 3.2).

Table 3.2: Surrounding Features

Surrounding Features	OS Dates	Distance	Direction
Well	1872 – 1924	~10m	Southeast
Moat	1872 – 2017	~30m	Northwest
Gravel Pit	1872 – 1938	*From* 150m	Northwest
Pond	1872 – 1865 1872 - 2017 1924 – 2017 1938 – 2017 1962 – 1992 1979 – 2017	~105m ~230m ~15m ~150m ~20m ~100m	West West Northwest South Southeast Northwest
Nursery	1973 – 2017	~20m	West
Electricity Sub Station	1978 – 1992 1978 – 1992	~50m ~90m	East North
Fisheries	1992 – 2009	~235m	West

4 ENVIRONMENTAL SETTING

4.1 Information Sources

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

4.2 Geology and Hydrogeology

Geology

4.2.1 The Envirocheck® report and published mapping indicates the following geological sequence at the site:

Table 4.1: Geological Setting

Geological Unit	Thickness	BGS Description
Superficial Deposits Lowestoft Formation	Extremely variable. Can be up to 60m.	An extensive sheet of chalky till, with outwash sands and gravels, silts and clays.
Bedrock Lewes Nodular Chalk Formation and Seaford Chalk Formation (Undifferentiated)	Variable - up to ~500m.	Chalk with flints, with discrete marl seams, nodular chalk, sponge-rich and flint seams throughout

4.2.2 A number of BGS historical borehole records are held in proximity to the site. The closest of these (TL10SW378) - located approximately 230m to the east of the site - records the underlying ground materials to comprise firm brown/grey mottled slightly silty clay to a depth of approximately 1.4mbgl underlain by firm to stiff brown/grey sandy clay, becoming sandier with depth, to an approximate depth of 7.6mbgl. This was recorded to be underlain by clayey sandy flint gravel from 7.6mbgl to 8.8mbgl. This was recorded to be underlain by the Upper Chalk to the base of the borehole (10.0mbgl).

4.2.3 The BGS estimated soil chemistry information is recorded within the Envirocheck® as follows:

- Arsenic: <15 mg/kg
- Cadmium: <1.8 mg/kg
- Chromium: 60 – 90 mg/kg
- Lead: <100 mg/kg
- Nickel: 15 – 30 mg/kg

4.2.4 All these values are noted to be below screening values for human health for a residential with homegrown produce end use.

Ground Gas Generation

4.2.5 The natural ground reported to underlie the site (Lowestoft Formation and Upper Chalk) is not considered to comprise a significant source of ground gas generation on site.

4.2.6 Notwithstanding this, made ground if present, may provide a potential source of ground gas generation subject to thickness and composition.

4.2.7 The site is reported to be located within a lower probability radon area, as less than 1% of homes are estimated to be at or above the Action Level. Therefore, no radon protective measures are reported to be necessary in the construction of new dwellings or extensions.

Hydrogeology

4.2.8 The Envirocheck® report and Environment Agency information records the following hydrogeological setting of the site:

Table 4.2: Hydrogeological Setting

Geological Unit	Environment Agency Aquifer Designation	Environment Agency Aquifer Classification
Superficial Deposits Lowestoft Formation	Secondary (Undifferentiated) Aquifer	Assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
Bedrock Lewes Nodular Chalk Formation and Seaford Chalk Formation (Undifferentiated)	Principal Aquifer	Layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

4.2.9 The site is reported to have soils of low leaching potential. These are recorded to comprise soils in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have the ability to attenuate diffuse pollutants.

4.2.10 Any potential onsite hydraulic gradient is considered likely to flow in a general easterly direction towards the River Ver.

4.2.11 The site is reported to be located within a Zone II (outer protection zone) and Zone III (Total Catchment) Source Protection Zone (SPZ).

4.2.12 In addition, the site is reported to be located within an area where there is limited potential for groundwater flooding to occur.

4.2.13 There are no licensed groundwater abstractions recorded with 1000m of the site.

4.2.14 A single licensed discharge consent to land/ soakaway is recorded within 250m of the site, as detailed below:

Table 4.3: Licensed Discharge Consents

Receptor	Effluent Type	Distance	Direction
Gravel Strata (Into Land)	Sewage Discharges – Final/Treated Effluent – Not Water Company	~225m	Northwest

4.2.15 Based upon the above information the geological and hydrogeological setting of the site is considered to be of **Moderate Sensitivity**.

4.3 Hydrology

4.3.1 The closest surface water course to the site is a pond adjacent to the northwest boundary of the site. The nearest significant surface water course if the River Ver located ~1km east of the site.

4.3.2 There are no surface water abstractions recorded within 1km of the site. There are no recorded pollution incidents to controlled waters, or discharge consents to surface waters, within 250m of the site.

4.3.3 The site is recorded to be located within an area designated by the Environment Agency as Flood Zone 1.

4.3.4 Given the above information, the hydrology of the site is considered to be of **Low Sensitivity**.

4.4 Environmental Data

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

Table 4.4: Additional Pertinent Environmental Data Summary

Category	0-250m	250-500m	Details
Authorisations, Incidents and Registers			
Local Authority Pollution Prevention and Controls	0	1	~435m west: Shell Petrol Station
Current Land Uses			
Potentially contaminative land uses	1	4	*0 to 250m* ~210m northeast: Paint and varnish stripping. *250 to 500m* ~305m north: Asphalt and Coated Macadam Laying Contractors. ~315m southeast: Pest and Vermin Control. ~360m east: plant and machinery repairs. ~450m northwest: Car customisation and conversion specialists.

Category	0-250m	250-500m	Details
Petrol and fuel sites	0	1	~430m west: Shell Chiswell Petrol Filling Station
Waste Management			
Potentially Infilled Land	2	2	~205m west: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) (water), date: 1960 ~210m north-west: Unknown Filled Ground (Pit, quarry etc) (non-water), date: 1990 ~280m north-west: Unknown Filled Ground (Pit, quarry etc) (non-water), date: 1990 ~420m south-east: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) (water), date: 1960
Ecological Designated Areas			
Site of ecological value	2	0	The site is situated within a Nitrate Vulnerable Zone and an area of adopted green belt.

4.5 Engineering Considerations

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

Table 4.5: Engineering Considerations

Hazard	Hazard Potential					
	No Hazard	Negligible	Very Low	Low	Moderate	High
Collapsible ground			X			
Compressible ground	X					
Ground dissolution			X			
Landslide			X			
Running sand			X			
Shrink/swell clays				X		
Coal mining		X				
Non-coal mining		X				

4.5.2 A single BGS mineral site is recorded in proximity to the site. This is located approximately 360m to the north-west of the site for sand and gravel (recorded as ceased).

4.6 Regulatory Consultations

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

Environmental Health– St Albans City and District Council

4.6.2 Environmental Health at St Albans City and District Council was contacted with regards to any potential contaminated land issues on site and within the surrounding area. The information provided is presented in Appendix D. A summary of the response is provided below.

- The site is reported to have formed part of Burston Manor Farm c.1800's and later part of Burston Nurseries (1970-1990's). A number of potentially contaminative land uses have been recorded by the Council in proximity to the site including the identified historic gravel pit (1800s - 1960), the North Orbital Road, a garage, a hospital and the adjacent Burston Nursery.
- It has been reported by the Council that there are 2No. pollution incidents recorded within 500m of the site. It is reported that these occurred in October 1994 and November 1996 and are understood to be associated with oil or gas spillages, although no further information has been provided.
- It has been reported by the Council that there are no records relating to pre-license landfill sites, known areas of contaminated land, Part B APC authorisations, private water supplies or any sites where petroleum hydrocarbons are stored within 500m of the subject site.
- In addition, the Council do not hold any records regarding previous site investigations or unexploded ordnance in proximity of the site and there are no known ground gas issues within the area. Furthermore, the Council are not aware of any issues regarding naturally elevated contaminant concentrations.

Building Control – St Albans City and District Council

4.6.3 Building Control was contacted with regards to any potential foundation and ground condition issues on site and within the surrounding area. Notwithstanding this, it was reported that no pertinent information was held regarding the site.

4.7 General Summary

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

5 OUTLINE CONCEPTUAL MODEL

5.1 Introduction

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

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

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

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

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

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

5.2 Hazard Identification

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

Table 5.1: Identified Potential Hazards

Potential Hazard/Source	Location	Details
Made Ground	On site	Given the development history of the site and observations made during the reconnaissance, the potential for made ground to be present across the site cannot be discounted. Made ground, if present may provide a potential source of ground gas generation subject to thickness and composition.

Potential Hazard/Source	Location	Details
Potentially contaminative current and historic processes	On and off site	A number of potentially contaminative sources have been identified on site during the reconnaissance including above ground fuel storage tanks and burners within the existing green houses. In addition, contaminative sources including electrical substations and former gravel pit have been identified in proximity of the site, which may provide a potential source of onsite contamination/ ground gas.

5.3 Potential Receptors and Pathways

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

- Current/future site users;
- Construction workers;
- Ecological Receptors; and
- Controlled waters (Principal and Secondary Aquifer).

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

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

5.4 Hazard Assessment and Risk Estimation

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

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

Potential Hazard/ Source	Potential Receptor	Potential Pathway to Receptors	Associated Hazard	Scale of Impact	Potential Consequence of Source-Receptor Linkage	Potential Likelihood for Significant Source-Receptor Linkage	Risk Classification
Made Ground - onsite	Current and future site users and construction workers	Exposure to potential contaminants through ingestion, inhalation and dermal contact.	Risk of harm to human health.	Local	Medium	**Low Likelihood to Likely:** Given the development history of the site, the presence of made ground of unknown chemical composition and thickness cannot be discounted.	**Low to Moderate Risk**
	Controlled waters (Principal and Secondary Aquifers)	Infiltration of water through the unsaturated zone resulting in leaching of potential contaminants and subsequent potential vertical and horizontal migration along preferential pathways.	Risk to controlled waters.	Local to Regional	Low to Medium	**Low Likelihood:** Given the potential for made ground of unknown chemical composition and Secondary and Principal Aquifer designation, a risk to controlled waters cannot be discounted at this stage. However, the underlying soils are reported to have a low leaching potential and therefore, the risk is considered to be low.	**Low to Moderate Risk**
	Future site users and proposed development	Migration, ingress and inhalation of ground gases.	Risk of harm to human health.	Local	Low to Medium	**Low Likelihood:** Made ground may provide a potential source of ground gas generation, subject to thickness and chemical composition.	**Low Risk**
Potentially contaminative current and historic processes – on and off site	Current and future site users	Exposure to potential contaminants through ingestion, inhalation and dermal contact.	Risk of harm to human health.	Local	Low	**Low Likelihood to Likely:** Potentially contaminative land uses have been identified on and in proximity to the site. Therefore, the risk for on-site contamination from on and off site sources cannot be discounted at this stage.	**Low Risk**
	Future site users and proposed development	Migration, ingress and inhalation of ground gases.	Risk of harm to human health.	Local	Low to Medium	**Unlikely to Low Likelihood:** A former gravel pit has been identified within proximity to the site, which may provide a potential source of ground gas generation. Notwithstanding this, given the age, distance and small scale of this feature, and anticipated cohesive nature of the underlying ground materials, the potential for significant lateral migration is considered low. In addition, information provided by the Local Authority indicates there are no known ground gas issues in the area.	**Low Risk**

6 INTRUSIVE INVESTIGATION

6.1 Background

6.1.1 The ground investigation undertaken was designed to provide specific information regarding site conditions in support of the proposed site development.

6.1.2 In particular, the investigation was designed to provide further information on:

- Ground conditions to aid with the design of the development; and
- The potential significant pollutant linkages identified as part of the Preliminary Risk Assessment.

6.1.3 All site works were undertaken in accordance with BS5930:2015, BS10175+A1 (2013) and, where appropriate, Eurocode 7. Works were supervised by a suitably experienced geoenvironmental consultant from TEC.

6.2 Methodology

6.2.1 Intrusive works were undertaken between 17 and 18 July 2017 and comprised the advancement of 8No. dynamic sample boreholes using a Dando Terrier 2002 to allow for the characterisation and description of underlying ground materials and for the collection of near surface and deeper ground materials for geochemical and geotechnical analysis.

6.2.2 In addition, given the low consistency and strength of the encountered ground materials at depth, follow on dynamic probing was undertaken from a depth of 5.0mbgl within 4No locations (WS05 to WS08) and from the ground surface adjacent to the dynamic sample boreholes within 2No locations (WS01 and WS03).

6.2.3 Exploratory hole locations are presented in Figure 3 and the reasoning behind each investigation location is given in Table 6.1, as follows:

Table 6.1: Exploratory Hole Rationale

Location	Location Rationale
WS01 – WS08	• Classification and description of deposits underlying the site; and • Soil sampling of near-surface and deeper ground materials for geochemical and geotechnical testing.
WS05 – WS08 (DP3 – DP6)	• Follow on dynamic probing (DP3 – DP6) from 5.0mbgl to provide an indicative strength profile of the underlying materials.
DP1 – DP2	• Dynamic probing from ground surface, adjacent to WS1 and WS3, to provide indicative strength profile of the underlying materials.

6.2.4 A detailed description of encountered ground conditions are shown on exploratory hole logs presented in Appendix F.

6.3 Field Testing

6.3.1 Standard Penetration Tests (SPTs) were undertaken at regular intervals between 1.0mbgl and 5.0mbgl within the boreholes to gain an indicative strength profile of the underlying materials.

6.3.2 In situ field testing was undertaken on recovered materials using a hand shear vane to provide indicative shear strengths of underlying cohesive materials.

6.4 Chemical Testing

6.4.1 Laboratory testing was scheduled on the basis of field observations.

6.4.2 Representative soil samples were collected and chemically tested at i2 Analytical Ltd, a UKAS/MCERTS accredited laboratory, for a selection of the following parameters:

Soils (Totals)

- *Heavy metals (arsenic, chromium, cadmium, copper, lead, selenium, zinc, barium, mercury, nickel, beryllium, vanadium and water soluble boron);*
- *Phenol (monohydric), cyanide (total), water soluble sulphate, sulphide, total organic carbon, pH;*
- *Speciated Polycyclic Aromatic Hydrocarbons (PAHs);*
- *Pesticide and herbicide screen; and*
- *Asbestos Screen.*

6.4.3 Geochemical certificates of analysis are presented Appendix G.

6.5 Geotechnical Testing

6.5.1 Selected soil samples were submitted for geotechnical analysis at K4 Soils. Laboratory testing was scheduled upon the basis of field observations for a selection of the following:

- *Moisture Content;*
- *Liquid and Plastic Limits;*
- *Particle Size Distribution; and*
- *pH, and Sulphates.*

6.5.2 Soil geotechnical certificates of analysis are presented in Appendix H.

6.6 General Sampling

6.6.1 Soil samples were collected directly into pre-labelled sample containers. During the course of the sampling care was taken to minimise head space of the sample containers. Once filled sample containers were placed within cool boxes containing ice packs to maintain as cool a temperature as possible, nominally 4°C.

6.6.2 Samples were collected by courier for delivery to the selected laboratories. All samples were accompanied by detailed chain of custody sheets.

7 ENCOUNTERED GROUND CONDITIONS

7.1 Introduction

7.1.1 A summary of encountered ground conditions for the site is provided below.

7.1.2 Detailed descriptions of encountered ground conditions are shown on exploratory hole logs presented in Appendix F.

Made Ground

7.1.3 Made ground was encountered across the site to a maximum observed depth of 1.25mbgl (WS06), although generally at depths of <0.5mbgl.

7.1.4 Within the eastern section of the site (i.e. WS01 to WS03) the made ground was generally observed to comprise brown slightly silty slightly gravelly sandy clay with many rootlets to a maximum depth of 0.35mbgl. The gravel component within this material was observed to comprise flint, brick and black carbonaceous material.

7.1.5 Within the western section of the site (i.e. WS04 – WS08), the made ground was observed to generally comprise dark brown gravelly silty sand to a maximum observed depth of 1.25mbgl. The gravel was generally observed to comprise flint, limestone, red brick and concrete.

Natural Ground

7.1.6 The natural ground was encountered from a depth of 0.2mbgl (WS01) to a maximum observed depth of 5.45mbgl. Granular deposits comprising medium dense orange-brown and grey slightly clayey slightly silty sand were observed within WS01 between 0.5mbgl and 2.8mbgl, WS05 between 0.9mbgl and 2.95mbgl and WS08 between 0.4mbgl and 1.95mbgl.

7.1.7 The underlying materials within the remaining exploratory holes were noted to be cohesive in nature, generally comprising orange-brown or brown slightly silty sandy clay. The encountered materials were recorded to vary in consistency and strength, both spatially and with depth with materials recorded as very soft, soft, firm and stiff, while in-situ testing indicated the encountered materials are of variable low to high strength across the site.

7.2 Generalised Ground Profile

7.2.1 The general ground profile encountered at the site is summarised in Table 7.1 below.

Table 7.1: Generalised Ground Profile

Depth (mbgl)	Encountered Material
0.0 – 0.2/1.25	**Made Ground:** *Eastern Section:* Brown slightly silty slightly gravelly sandy clay with gravel of flint, brick and black carbonaceous material. *Western Section:* dark brown gravelly silty sand with gravel of flint, limestone, red brick and concrete.

Depth (mbgl)	Encountered Material
0.2/1.25 - >5.45	**Lowestoft Formation:** Locally granular in nature within WS01, WS05 and WS08 comprising medium dense slightly clayey slightly silty sand to maximum depths of 2.95mbgl. Where cohesive, the underlying materials were generally observed to comprise firm medium to high strength or soft to firm low to medium strength slightly silty slightly sandy clay with localised pockets of very sandy clay or clayey sand. This was generally observed to be underlain by very soft to soft, low strength or firm medium strength slightly silty or slightly sandy clay.

7.3 Groundwater and Perched Water

7.3.1 Water strikes encountered during the site works are shown on the exploratory hole logs in Appendix F and summarised in Table 7.2 below.

Table 7.2: Groundwater Strikes

Location	Date	Groundwater Strike (mbgl)	Strata
WS01	17/06/2017	1.2	Natural
WS02		1.7	
WS03		4.45	
WS04		2.3	
WS05	18/06/2017	1.6	
WS06		1.0	Made Ground
WS07		2.0	Natural
WS08		1.4	

7.3.3 Groundwater was encountered across the site at depths of between 1.2mbgl and 4.45mbgl and was generally observed within sandy silty clay encountered across the site. Perched water within the made ground was encountered within a single location (WS06) at a depth of 1.0mbgl.

7.4 Contamination Summary

7.4.1 No visual or olfactory evidence of potentially gross contamination was encountered on site during the intrusive works.

8 CONTAMINATION CHARACTERISATION

8.1 Legislation

8.1.1 Contaminated Land is defined in Part IIA of the Environmental Protection Act (1990) as:

8.1.2 "Any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reasons of substances in, on or under the land that:

- Significant harm is being caused or there is a significant possibility of such harm being caused;

or

- *significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused."

**Section 86 of the Water Act 2003 amends section 78A of Environmental Protection Act 1990 for Controlled Waters.*

8.2 Generic Quantitative Risk Assessment

Human Health Screening

8.2.1 Current legislation and guidance on the assessment of contaminated land promotes a tiered risk approach (CLR 11). The generic quantitative risk assessment comprises a screening of identified contaminants against generic guideline values that are appropriate to the site setting and the receptors concerned. For risks to human health the basis for these generic guideline values are the methodologies set out by the Environment Agency's Contaminated Land Exposure Assessment (CLEA) guidelines.

8.2.2 The following regulatory and industry guidance has been utilised for the selection of Generic Assessment Criteria utilised as part of the GQRA. The order of the guidance listed is in terms of hierarchy for selection of GACs (where the land uses and parameters are considered most applicable).

1. *Category 4 Screen Levels (C4SLs) – DEFRA (2014)*
2. *Soil Guidance Values (SGVs) – Environment Agency (2009)*
3. *Suitable For Use Levels (S4ULs) – LQM/CIEH (2015)*
4. *EIC/AGS/CL:AIRE GAC (2009)*

8.2.3 The C4SLs for arsenic, cadmium, chromium (VI) and lead have been utilised as part of the GQRA. Benzene and benzo(a)pyrene C4SLs have not been utilised as part of the Tier 1 screening as they are based upon 6% soil organic matter (SOM) as opposed to 1% SOM utilised by LQM/CIEH (2015).

8.2.4 SGVs have been utilised, where appropriate, for dioxins, furans and dioxin-like PCBs; nickel; inorganic mercury and selenium (residential SGV used for proposed residential end use). SGVs for organic compounds are not utilised as they are derived using a 6% soil organic matter as opposed to 1% SOM utilised by LQM/CIEH (2015).

8.2.5 In the absence of a published UK derived GAC for cyanide, the GQRA for total cyanide is based upon comparison of recorded values against the Dutch Intervention Value for free cyanide (VROM 2000).

8.2.6 S4ULs and EIC/AGS/CL:AIRE GACs are adopted for the remaining potential contaminants using the hierarchy noted above.

8.2.7 The purpose of the site investigation was to provide information to establish the suitability of the site for a residential development. Therefore, the standard land use for the site, for use in the generic assessment, has been defined as "*Residential with homegrown produce*" in accordance with current guidance.

Ground Gas Screening

8.2.8 An initial qualitative risk screening assessment based upon the methodology for characterising gassing sites detailed within the following documents has been undertaken:

- CIRIA Report C665 (2007) '*Assessing risks posed by hazardous ground gases to buildings (revised)'*;
- NHBC (March 2007) '*Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present'*;
- BS8485:2015 *'Code of Practice for the characterisation and remediation from ground gas in affected developments'*;
- BS8576:2013 '*Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)';* and
- Wilson S., Card C*.* and Haines S. (2009) '*Ground Gas Handbook'*.

8.2.9 The objectives of the screening assessment are to provide a general characterisation of the ground materials within the site based on the investigation works undertaken to-date. This information is used to provide a preliminary assessment of gassing potential for the materials encountered at the site. This, together with ground gas data collected as part of the monitoring undertaken to date, is used to provide a qualitative conceptual model of identified risk in relation to the proposed development.

8.3 Soil Analysis - Human Health

8.3.1 Soil samples were collected and analysed from made ground materials. Certificates of analysis for samples are contained within Appendix G.

8.3.2 Current regulatory guidance for the statistical assessment of environmental data within a contaminated land context is detailed within the CIEH and CL:AIRE joint publication titled '*Guidance on Comparing Soil Concentration Data with a Critical Concentration'* (2008). However, as judgemental sampling has been undertaken, statistical assessment as detailed in CL:AIRE (2008) has not been carried out as part of this assessment. Therefore, to identify Contaminants of Potential Concern (COPC) as part of this preliminary assessment, the analytical results for the ground materials sampled have been assessed by the screening of individual analyses against the relevant Tier 1 Site Screening Values (SSVs) adopted.

8.3.3 For generic assessment purposes, SSVs have been conservatively selected, where appropriate, based upon a sandy soil and Soil Organic Matter (SOM) of 1%.

Made Ground

8.3.4 10No. samples of made ground were scheduled for analysis from the site. The results obtained from made ground are summarised in Table 8.1 below:

Table 8.1: Soil Analysis Summary

Contaminant	Max (mg/kg)	Min (mg/kg)	SSV[1] (mg/kg)	No. of Tests	No. of Exceedances
Arsenic	15	6.0	37(1)	10	0
Boron	2.6	0.5	290(3)	10	0
Cadmium	0.4	<0.2	22(1)	10	0
Chromium (total)	29	9	910(3)	10	0
Chromium (VI)	<1.2	<1.2	21(1)	10	0
Copper	67	11	2400(3)	10	0
Lead	120	32	200(1)	10	0
Mercury	<0.3	<0.3	170(2)	10	0
Nickel	36	6.1	130(2)	10	0
Selenium	<1.0	<1.0	350(2)	10	0
Zinc	130	31	3700(3)	10	0
Beryllium	1.1	0.33	1.7(3)	10	0
Vanadium	42	18	410(3)	10	0
Barium	170	23	1300(4)	10	0
Cyanide (Total)	<1	<1	20(5)	10	0
Total Phenol (Monohydric)	<1.0	<1.0	120(3)	10	0
Water Soluble Sulphate (SO_4) – g/l	0.0534	0.0019	-	10	0
Sulphide	4.4	<1.0	-	10	0
pH	8.6	6.6	-	10	0
Naphthalene	0.31	<0.05	2.3(3)	10	0
Acenaphthylene	2.3	<0.05	170(3)	10	0
Acenaphthene	0.75	<0.05	210(3)	10	0
Fluorene	1.7	<0.05	170(3)	10	0
Phenanthrene	19	<0.05	95(3)	10	0
Anthracene	7.3	<0.05	2400(3)	10	0
Fluoranthene	35	<0.05	280(3)	10	0
Pyrene	32	<0.05	620(3)	10	0
Benzo(a)anthracene	16	<0.05	7.2(3)	10	**2**
Chrysene	14	<0.05	15(3)	10	0
Benzo(b)fluoranthene	18	<0.05	2.6(3)	10	**3**
Benzo(k)fluoranthene	8.6	<0.05	77(3)	10	0
Benzo(a)pyrene	19	<0.05	2.2(3)	10	**3**
Indeno(1,2,3-cd)pyrene	13	<0.05	27(3)	10	0
Dibenz(a,h)anthracene	2.4	<0.05	0.24(3)	10	0
Benzo(g,h,i)perylene	16	<0.05	320(3)	10	0
Total PAH	193	<0.8	-	10	0
Benzene	<1.0	<1.0	0.087(3)	4	0
Toluene	<1.0	<1.0	130(3)	4	0
Ethylbenzene	<1.0	<1.0	47(3)	4	0
p & m-xylene	<1.0	<1.0	56(3)	4	0
o-xylene	<1.0	<1.0	60(3)	4	0
MTBE	<1.0	<1.0	49(4)	4	0
TPH Aliphatic C5-C6	<0.001	<0.001	42(3)	4	0
TPH Aliphatic C6-C8	<0.001	<0.001	100(3)	4	0
TPH Aliphatic C8-C10	<0.001	<0.001	27(3)	4	0
TPH Aliphatic C10-C12	<1	<1	130(3)	4	0
TPH Aliphatic C12-C16	<2	<2	1100(3)	4	0
TPH Aliphatic C16-C21	<8	<8	65000(3)	4	0

Contaminant	Max (mg/kg)	Min (mg/kg)	SSV[1] (mg/kg)	No. of Tests	No. of Exceedances
TPH Aliphatic C21-C35	8.3	8.3		4	0
TPH Aromatic C5-C7	<0.001	<0.001	70[(3)]	4	0
TPH Aromatic C7-C8	<0.001	<0.001	130[(3)]	4	0
TPH Aromatic C8-C10	<0.001	<0.001	34[(3)]	4	0
TPH Aromatic C10-C12	<1	<1	74[(3)]	4	0
TPH Aromatic C12-C16	4.2	<2	140[(3)]	4	0
TPH Aromatic C16-C21	52	<10	260[(3)]	4	0
TPH Aromatic C21-C35	100	<10	1100[(3)]	4	0

Notes:

1 DEFRA C4SLs (2014) based on "*Residential with homegrown produce"* end use
2 Environment Agency SGVs (2009) based on "*Residential"* end use
3 LQM/CIEH S4ULs (2015) based on "*Residential with homegrown produce"* end use
4 CL:AIRE, AGS & EIS (2009) based on "*Residential*" end use
5 Dutch Intervention Value for free cyanide (VROM 2000)
6 Reported as Laboratory Limit of Detection (LOD)

8.3.5 Exceedances of the Tier 1 SSVs for a residential site end use were recorded with the made ground for a number of PAHs, as detailed below:

- Benzo(a)anthracene – WS05 at 0.1-0.3mbgl (16mg/kg); and WS07 at 0.1-0.6mbgl (9.2mg/kg);
- Benzo(b)fluoranthene – WS05 at 0.1-0.3mbgl (17mg/kg); WS06 at 0.0-0.1mbgl (18mg/kg); and WS07 at 0.1-0.6mbgl (11mg/kg); and
- Benzo(a)pyrene - WS05 at 0.1-0.3mbgl (18mg/kg); WS06 at 0.0-0.1mbgl (19mg/kg); and WS07 at 0.1-0.6mbgl (8.0mg/kg);

8.3.6 In addition, an asbestos screen undertaken on all representative samples of the made ground recorded the presence of asbestos in a single location (WS07 at 0.1-0.6mbgl), described as Chrysotile loose fibres and hard/cement type material. All remaining samples recorded asbestos as 'not-detected'.

8.3.7 The exceedances and asbestos are noted to be within the made ground in the western area of the site around the greenhouses and outbuildings/ tanks. No exceedances of the Tier 1 SSVs have been recorded in the eastern site area, which was observed to be undeveloped.

8.3.8 Furthermore, a pesticide and herbicide screen undertaken 4No. representative samples of the made ground recorded pesticides and herbicides as 'not-detected' in all samples.

8.4 Ground Gas

8.4.1 In accordance with the guidance presented within the CL:AIRE Research Bulletin (RB17, 2012) and BS8485:2015, bulk ground gas monitoring has not been undertaken as part of this assessment as;

- No significant thickness of made ground was encountered at the site (maximum of 1.25mbgl, although generally <0.5mbgl). Made ground materials were observed to be of generally low degradable content with recorded TOCs between 0.2% and 4.5%.

8.4.2 While a former gravel pit has been identified within proximity of the site, no information is available to suggest this has been infilled by materials that may provide

a potential source of ground gas generation. Furthermore, information provided by St Albans City and District Environmental Health team indicates there are no known ground gas issues in the area.

8.4.3 In addition, given the distance to the former gravel pit (>150m), the small scale of this feature, and the generally cohesive nature of the underlying ground materials, significant lateral migration of ground gas is considered unlikely and no credible pathway has been identified based on the conceptual understanding of the site.

9 REFINED CONCEPTUAL MODEL

9.1 Introduction

9.1.1 The Preliminary Risk Assessment undertaken as part of this report identified the presence of potential significant pollutant linkages associated with the site and surrounds. Therefore, in accordance with the approach recommended in CLR11, additional information was collected about the site and its surroundings as part of a Generic Quantitative Risk Assessment. Based upon this additional information and the proposed development layout, the site conceptual model has been refined and pollutant linkages confirmed for evaluation where considered necessary.

9.2 Hazard Identification

9.2.1 Potential sources of contamination have been identified on and within the vicinity of the site and are presented in Table 9.1.

Table 9.1: Identified Hazards

Identified Hazard/Source	Location	Details
Made Ground	On site	Made ground has been recorded across the site to a maximum observed depth of 1.25mbgl. Laboratory analysis of representative made ground materials recorded the exceedance of Tier 1 SSVs for a number of PAH's when considering a residential site end use and asbestos fibres/ hard cement type asbestos within the made ground in the western area of the site only. The made ground encountered on site is not considered to be a potential source of significant ground gas generation based on the limited thickness and reported low degradable organic content.
Potentially contaminative current and historic land uses	On and off site	Fuel storage (ASTs) have been identified on site. Notwithstanding this, field observations and laboratory analysis do not indicate the presence of potentially significant and widespread hydrocarbon impact within vicinity of these features. Limited potentially contaminative current and historical processes have been identified in proximity to the site (including electrical sub-stations). However, given the small scale of these identified features and based on site observations, field testing and laboratory analysis, together with the generally cohesive nature of the underlying natural ground materials, the potential for on-site contaminant migration is considered unlikely.

9.3 Identified Potential Receptors and Pathways

9.3.1 Potential receptors identified as part of the generic risk assessment are:

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

9.3.2 Potential contaminant pathways identified as part of the generic risk assessment include:

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

9.4 Hazard Assessment and Risk Estimation

9.4.1 Potential significant pollutant linkages identified following completion of the intrusive works are summarised in the Refined Site Conceptual Model presented in Table 9.2.

Table 9.2: Refined Conceptual Model (Hazard Assessment and Risk Estimation)

Identified Hazard/ Source	Identified Receptor	Potential Pathway to Receptors	Associated Hazard	Scale of Impact	Potential Consequence of Source-Receptor Linkage	Potential Likelihood for Significant Source-Receptor Linkage	Risk Classification
Made Ground – on site	Current and future site end users and construction workers	Exposure to potential contaminants through ingestion, inhalation and dermal contact	Risk of harm to human health	Local	Medium	**Low Likelihood:** A number of exceedances of the Tier 1 SSVs for a residential site end use for PAH's, and asbestos fibres, have been reported within the made ground encountered in the western area of the site. Therefore, based on the works to date, a potential risk to site end users exists where made ground remains within the proposed garden/ soft landscaped areas in the western area of the site.	**Low to Moderate Risk**
	Controlled waters and ecological receptors	Infiltration of water through the unsaturated zone resulting in leaching of contaminants and potential vertical and horizontal migration along preferential pathways	Risk to Secondary and Principal Aquifer	Local to regional	Medium	**Unlikely:** While elevated total contaminant concentrations of a number of PAHs have been recorded on site in relation to human health SSVs, given the nature and the concentrations of the contamination recorded and the general cohesive nature of the underlying natural materials, a significant risk to controlled waters is considered unlikely.	**Low Risk**
	Future site end users and proposed development	Migration, ingress and inhalation of ground gasses.	Risk of harm to human health	Local	Medium to Severe	**Unlikely**: The made ground encountered on site is not considered to be a significant source of ground gas generation given its limited thickness and composition.	**Low Risk**
Potentially Contaminative Land uses – on site (Petroleum Hydrocarbon storage)	Current and future site end users and construction workers	Potential presence and migration of residual hydrocarbon contamination. Exposure to potential contaminants through ingestion, inhalation and dermal contact.	Risk of harm to human health	Local to regional	Medium	**Low Likelihood:** 2No ASTs and associated infrastructure were observed within the development area. Notwithstanding this, field observations and laboratory analysis has not identified the presence of significant hydrocarbon impact at the site. However, the potential for localised hydrocarbon contamination (particularly within the area of the fuel lines) cannot be fully discounted.	**Low (locally Low to Moderate) Risk**
Potentially Contaminative Land uses – off site	Current and future site end users, construction workers, controlled waters	Potential on-site migration of contamination. Exposure to potential contaminants through ingestion, inhalation and dermal contact.	Risk of harm to human health and Secondary and Principal Aquifer	Local to regional	Medium	**Unlikely:** Limited potentially contaminative current and historic process have been recorded in close proximity to the site. However, no evidence of on-site contaminant migration was recorded during the intrusive works and the underlying shallow deposits <5m) were recorded to be typically cohesive.	**Low Risk**

10 GROUND ENGINEERING

10.1 Proposed Development

10.1.1 It is understood that it is proposed to redevelop the site for a residential end use. comprising the demolition of pre-existing structures to allow for the construction of a number of single storey and two-storey structures with associated hard infrastructure and soft landscaping

10.1.2 Full details pertaining to the potential loads associated with the proposed development have not been provided to date.

Site Preparation

10.1.3 A number of utility services exist within the proposed development including gas and water. Due consideration should be given to the removal / re-routing of these features prior to construction.

10.1.4 Consideration will need to be given to the removal of hard standing encountered on site and to any foundations associated with existing/historic structures on site.

10.1.5 In addition, 2No. above ground storage tanks have been recorded on site. Appropriate decommissioning of these features and subsequent removal will be required prior to the redevelopment of the site.

10.2 Ground Conditions

10.2.1 The general ground profile encountered at the site is summarised in Table 10.1 below.

Table 10.1: Generalised Ground Profile

Depth (mbgl)	Encountered Material
0.0 – 0.2/1.25	**Made Ground:** *Eastern Section:* Brown slightly silty slightly gravelly sandy clay with gravel of flint, brick and black carbonaceous material. *Western Section:* dark brown gravelly silty sand with gravel of flint, limestone, red brick and concrete.
0.2/1.25 - >5.45	**Lowestoft Formation:** Locally granular in nature within WS01, WS05 and WS08 comprising medium dense slightly clayey slightly silty sand to maximum depths of 2.95mbgl. Where cohesive, the underlying materials were generally observed to comprise firm medium to high strength or soft to firm low to medium strength slightly silty slightly sandy clay with localised pockets of very sandy clay or clayey sand. This was generally observed to be underlain by very soft to soft, low strength or firm medium strength slightly silty or slightly sandy clay.

Made Ground

10.2.2 No geotechnical testing was undertaken on samples of the made ground. However, as a part of the geochemical testing undertaken for the site, pH and sulphate testing was undertaken on samples of encountered made ground. The test data indicated sulphate concentrations in the range of 0.0019g/l to 0.0534g/l and pH values of 6.6 to 8.6.

Natural Strata

10.2.3 Geotechnical test results are discussed below. Geotechnical laboratory test certificates are provided in Appendix H with in-situ tests being presented on the exploratory hole logs in Appendix F of this report.

10.2.4 Laboratory analysis was conducted on 8No. representative samples of the underlying superficial deposits. The results of these analyses are presented in Table 10.2 below.

Table 10.2: Summary of Laboratory Test Results - Natural Strata

Test	Number of Tests	Range of Results
Plasticity Index (%)	4	26 – 49
Moisture Content (%)	4	27 – 33
% passing 425µm sieve	4	75 – 100
Particle Size Distribution	2	See Below
pH Value	6	6.31 – 7.82
SO_4 (g/l in soil)	6	0.27 – 0.40

10.2.5 The Plasticity Indices and Modified Plasticity Indices of the encountered cohesive materials ranged between 26% and 49%, suggesting the underlying material is Medium to High Volume Change Potential, as defined by the NHBC (2017).

10.2.6 2No. Particle Size Distribution (PSD) tests, undertaken on representative samples of the underlying granular materials, records the material to comprise silty clayey sand with a gravel component of 0.1% recorded for both samples, a clay component of between 6.5% and 12.4%, a silt component of between 8.2% and 10.1% and a sand component of between 77.4% and 85.2% recorded.

10.2.7 A summary of the Standard Penetration Test (SPT) 'N' values and hand shear vane (HSV) testing undertaken in the exploratory hole locations is summarised within Table 10.3 below:

Table 10.3: Summary of Field Test Results

Depth (mbgl)	Encountered Material	SPT 'N' Values	Hand Shear Vane Results (kN/m^2)
0.5/0.9 – 1.95/2.95	*Lowestoft Formation (Granular): medium dense slightly clayey slightly silty sand*	11 - 22	-
0.2/1.25 – >5.0/5.45	*Lowestoft Formation (Cohesive): slightly silty sandy clay with localised pockets of very sandy clay or clayey sand.*	0 - 16	20 - 125

10.2.8 SPT 'N' values ranged between 11 and 22 within the upper granular materials recorded to underlie the site suggesting they are generally of medium density. 'N' values within the cohesive deposits ranged between 0 and 16 suggesting the materials are of very soft to stiff consistency and were noted to vary in strength, both with depth and across

the site. HSV testing undertaken within the underlying cohesive materials ranged between 20kPa and 125kPa suggesting the materials are of very low to high strength and again were noted to be variable in strength both spatially and with depth.

10.2.9 Follow on dynamic probing from 5.0m depth was undertaken within 4No. locations (WS05 – WS08) and from the ground surface adjacent to WS01 and WS03 to depths of approximately 9.0mbgl to 10.0mbgl. (Appendix I). Based on tentative correlations with the dynamic probe results and observed ground conditions, correlated SPT 'N' values between 0 and 20 can be derived for the upper 5m of encountered deposits (Warren 2007).

10.2.10 The ground conditions below depths of 5.0m have not been observed as part of these works. However, the dynamic probing indicates an increase in strength of the ground materials at depths around 6-7m in the east and 7-9m in the west. This increase in strength may be associated with the base of the superficial deposits and the presence of chalk materials although this cannot be confirmed at this stage.

10.2.11 Using standard correlations with the SPT data, e.g. Stroud (1988), estimated consolidation parameters obtained for the natural materials with a significant cohesive component, recorded within the proposed development area, would suggest a coefficient of compressibility, m_v, of between ~0.15m^2/MN and >2m^2/MN, suggesting a medium to very high compressibility for the encountered cohesive materials.

10.2.12 The geotechnical testing included the analysis for water soluble sulphate and pH testing, with results indicating water soluble sulphate concentrations between 0.27g/l and 0.40g/l and pH values between 6.31 and 7.82.

10.3 Foundations

Ground Conditions

10.3.1 Made ground was observed across the site to a maximum observed depth of 1.25mbgl. This was observed to be underlain by Lowestoft Formation comprising either medium dense slightly clayey slightly silty sand or cohesive materials comprising slightly silty sandy clay that were recorded to be variable in both strength and consistency.

Preliminary Foundation Design Recommendations

10.3.2 Given the shallow groundwater recorded on site, variable consistency and strength of the underlying superficial deposits and potential loads associated with the proposed development, conventional foundations may not be suitable for the proposed development. Notwithstanding this, it is noted that some buildings may only be single storey bungalows and locally higher strength deposits have been recorded in some areas of the site. Therefore, it may be possible to use conventional foundations for lighter loaded structures but further investigation would be required to confirm the feasibility of this option.

10.3.3 For the majority of the site, it is suggested that a piled foundation solution may be most suitable for the proposed structures. It is likely that piles will need to be taken to the competent ground (i.e. the underlying chalk, which from limited dynamic probing is thought to be encountered at depths of generally around 7-9.0mbgl). However, additional intrusive works will be required in order to determine appropriate design parameters for this option.

10.3.4 Furthermore, as the underlying superficial deposits have been shown to exhibit a medium to high volume change potential, in accordance with NHBC (2017) guidance,

appropriate voids should be allowed for within the design, i.e. a minimum of 150mm below and 35mm against the sides of any ground beams.

10.4 Ground Floor Slabs

10.4.1 Based upon the encountered ground conditions together with the proposed founding method, a ground bearing slab may not be suitable.

10.4.2 This being the case, and due to the medium to high volume change potential of the underlying superficial deposits, a minimum void of 150mm should be utilised where suspended in situ concrete flooring is incorporated into the design and where pre-cast concrete suspended floors are used a minimum void space of 300mm should be utilised to allow for 150mm of ventilation.

10.4.3 Should shallow foundations be feasible and foundations are less than 1m depth, the use of a ground bearing slab may be appropriate and it would be recommended that a granular (or stabilised) blanket of at least 500mm is employed below the slab.

10.5 Preliminary Pavement Design

10.5.1 In situ testing using a Dynamic Cone Penetrometer (DCP-TRL) was undertaken at 4No. locations across the site with the results of this testing presented in Appendix J.

10.5.2 Using the calculations outlined in Jones CR and J Rolt (1991), the results indicate California Bearing Ratio (CBR) values between 2.1% and >20% at assumed formation level (>500mm).

10.5.3 In addition, based on correlations with plasticity indices using the Design Manual for Roads and Bridges IAN 73/06 Revision 1 (2009) and observations made on site during the intrusive works, a CBR value of 2% to 3% may be considered appropriate for the encountered shallow natural ground materials.

10.5.4 Therefore, based upon the data obtained to-date a CBR value of <2.5% is recommended for preliminary design purposes where road formation is proven to be within either natural ground deposits or made ground. Further in situ CBR or plate bearing tests would be recommended to refine this recommendation.

10.5.5 It should be noted that all road formations should be proof rolled and soft spots removed and replaced with selected granular fill and, where adoptable, a pavement of sufficient thickness to prevent the penetration of frost should be employed.

10.6 Excavations

10.6.1 Excavations of materials immediately beneath the site should be achievable using conventional excavation plant.

10.6.2 Groundwater were encountered at across the site during the intrusive works at depths of between 1.2mbgl and 4.45mbgl. Therefore, dewatering works may be required during excavation and formation works.

10.7 Protection of Buried Concrete

10.7.1 The results of the water soluble sulphate contact and pH testing carried out on samples of the underlying natural ground indicate that in accordance with BRE Special Digest 1 (2005) these materials would yield an Aggressive Chemical Environment Class (ACEC) of AC-1, requiring a Design Sulphate Class of DS-1.

11 CONCLUSIONS & RECOMMENDATIONS

11.1 Conclusions

11.1.1 Tweedie Evans Consulting Ltd (TEC) has been appointed by Castleoak Group to undertake a preliminary geoenvironmental and geotechnical assessment of North Orbital Road, St Albans. All works were undertaken in accordance with our proposal letter dated 16th June 2017 and referenced 1706007.001.bidlet.

11.1.2 The site is situated off North Orbital Road in the south of St Albans. The site covers an area of approximately 4.0hectares, with the centre of the site situated at approximate National Grid Reference 513690, 203660. The nearest postcode is AL2 2DS.

11.1.3 The site currently comprises an irregular shaped parcel of land utilised as a nursery for the wholesale supply of garden plants.

11.1.4 It is understood that it is proposed to redevelop the site for a residential end use. comprising the demolition of pre-existing structures to allow for the construction of a number of single storey and two-storey structures with associated hard infrastructure and soft landscaping.

11.1.5 The site is considered to be of low to moderate environmental sensitivity due primarily to the underlying ground materials being classified as Secondary and Principal Aquifers and the site being located within a Zone II and Zone III Source Protection Zone. However, there are no groundwater abstractions recorded within 1km of the site and the nearest significant water course if the River Ver located over 1km east.

11.1.6 A limited number of potentially contaminative land uses were identified on and in proximity to the site including above ground fuel storage tanks, electrical sub-stations and a former gravel pit.

11.1.7 Made ground was recorded across the site to depths of between 0.2mbgl and 1.25mbgl (although generally <0.5m). Laboratory analysis of representative made ground materials recorded the exceedance of Tier 1 SSVs for a number of PAHs when considering a residential site end use. In addition, asbestos, recorded as Chrysotile loose fibres and hard/cement type material was encountered in a single sample of the made ground. The exceedances of the SSVs and the asbestos materials were recorded within the made ground in the western half of the site only, within the area of the greenhouses, tanks and outbuildings. No exceedances of Tier 1 SSV have been recorded within the undeveloped eastern area of the site.

11.1.8 No visual or olfactory evidence of potentially significant contamination was observed during the intrusive works at the site. In addition, laboratory analysis did not indicate the presence of potentially significant and widespread hydrocarbon impact associated with the identified ASTs. However, given the presence of ASTs on site, the potential for localised, residual hydrocarbon contamination beneath and around these features cannot be fully discounted.

11.1.9 The encountered made ground and natural ground deposits are not considered to represent a potential source of significant ground gas. A former gravel pit was identified ~150m from the site. However, given the thickness of cohesive deposits on site, the distance from which the pit is located from the site and the small scale of this feature, the potential for significant lateral on-site migration of ground gas from this historical feature is considered to be unlikely. In addition, information provided by the local authority indicates there are no known ground gas issues in proximity to the site.

11.1.10 Based upon our current conceptual understanding of the site and proposed end use, the following Significant Pollutant Linkages have been identified:

- Human health (future site end users and construction workers) - exposure to potential contaminants (PAH and asbestos) within made ground at the site via the ingestion, dermal contact and inhalation pathways;
- Human health (future site end users and construction workers) - exposure to potential residual hydrocarbon contamination within the area of the ASTs and associated fuel lines via the ingestion, dermal contact and inhalation pathways; and
- Controlled waters (Secondary and Principal Aquifers) – highly localised potential low risk of vertical migration of hydrocarbons from historical spills and leakages associated with the ASTs and fuel lines.

11.2 Geoenvironmental Risk Management Recommendations

Identification of Feasible Remediation Options

11.2.1 Significant risks identified within the conceptual model can be mitigated through the breaking of the significant pollution linkage by the removal of at least the source, receptor or pathway. Within reference to the site's conceptual models the following preliminary remediation approach has been prepared. This preliminary remediation approach will need to be presented in more detail within a Remediation Strategy, the content of which will require agreement in writing of the Regulatory Authorities prior to commencing any remediation on site.

Human Health

11.2.2 To aid in mitigating against the risks to human health identified on site, it is recommended that all tanks (together with associated infrastructure) and any associated significantly hydrocarbon impacted ground materials, should they be present, be removed. In addition, it is recommended that during development and ground works, particularly within the areas of the tanks and fuel lines, a watching brief is undertaken by a suitably experienced geoenvironmental consultant, to ensure that significant or widespread contamination is not present. Should such contamination be identified further assessment/remediation may be required.

11.2.3 Given the presence of elevated contaminant concentrations within the made ground encountered in the western area of the site, it is also currently recommended that a suitable cover system be provided within the areas proposed for soft landscaping in this part of the site. Notwithstanding this, further analysis of the made ground (and potentially the natural ground) may be undertaken to confirm the presence, or otherwise, of elevated contaminant concentrations within proposed soft landscaped areas following site preparation/ site strip works. The presence of hardstanding would also mitigate against the potential risks to site end users from the identified general contamination within the made ground.

11.2.4 No remedial works are considered to be required for the eastern, undeveloped area of the site based on the works undertaken to date.

11.2.5 Given the presence of made ground across the site and identified contaminants, good brownfield site working practices should be adopted by construction workers to mitigate against identified potential risks.

11.2.6 Should water pipes be placed within the made ground on site, due consideration should be given to the UK Water Industry Research Ltd (UKWIR) guidance.

Ground Gas and Vapours

11.2.7 No credible source or pathway for a potential risk from ground gas generation and migration has been identified as part of this assessment.

Waste

11.2.8 Waste Acceptance Criteria (WAC) testing has not been carried out as part of this assessment. The geochemical analysis results may be used to aid in Basic Characterisation for potential waste materials produced at the site although WAC testing may be required to be undertaken to support any off-site disposal of materials generated as part of the development works.

11.3 Ground Engineering

11.3.1 Made ground was encountered across the site to depths of between 0.2mbgl and 1.25mbgl. This was observed to be underlain by variable Superficial Deposits to depths in excess of 5.45mbgl. While the underlying Upper Chalk was not encountered during the intrusive works, on the basis of limited dynamic probing undertaken on site, it is considered likely that the chalk may be present from depths of between ~7.0mbgl and 9.5mbgl across the site.

Preliminary Foundation Design Recommendations

11.3.2 Given the shallow groundwater recorded on site, variable consistency and strength of the underlying superficial deposits and potential loads associated with the proposed development, conventional foundations may not be suitable for the proposed development. Notwithstanding this, it is noted that some buildings may only be single storey bungalows and locally higher strength deposits have been recorded in some areas of the site. Therefore, it may be possible to use conventional foundations for lighter loaded structures but further investigation would be required to confirm the feasibility of this option.

11.3.3 For the majority of the site, it is suggested that a piled foundation solution may be most suitable for the proposed structures. It is likely that piles will need to be taken to the competent ground (i.e. the underlying chalk, which from limited dynamic probing is thought to be encountered at depths of generally around 7-9.0mbgl). However, additional intrusive works will be required in order to determine appropriate design parameters for this option.

11.3.4 Furthermore, as the underlying superficial deposits have been shown to exhibit a medium to high volume change potential, in accordance with NHBC (2017) guidance, appropriate voids should be allowed for within the design, i.e. a minimum of 150mm below and 35mm against the sides of any ground beams.

11.4 Ground Floor Slabs

11.4.1 Based upon the encountered ground conditions together with the proposed founding method, a ground bearing slab may not be suitable.

11.4.2 This being the case, and due to the medium to high volume change potential of the underlying superficial deposits, a minimum void of 150mm should be utilised where suspended in situ concrete flooring is incorporated into the design and where pre-cast concrete suspended floors are used a minimum void space of 300mm should be utilised to allow for 150mm of ventilation.

11.4.3 Should shallow foundations be feasible and foundations are less than 1m depth, the use of a ground bearing slab may be appropriate and it would be recommended that a granular (or stabilised) blanket of at least 500mm is employed below the slab.

11.5 Preliminary Pavement Design

11.5.1 Based upon the data obtained to-date a CBR value of <2.5% is recommended for preliminary design purposes where road formation is proven to be within either natural ground deposits or made ground. Further in situ CBR or plate bearing tests would be recommended to refine this recommendation.

11.5.2 It should be noted that all road formations should be proof rolled and soft spots removed and replaced with selected granular fill and, where adoptable, a pavement of sufficient thickness to prevent the penetration of frost should be employed.

11.6 Excavations

11.6.1 Excavations of materials immediately beneath the site should be achievable using conventional excavation plant.

11.6.2 Groundwater were encountered at across the site during the intrusive works at depths of between 1.2mbgl and 4.45mbgl. Therefore, dewatering works may be required during excavation and formation works.

11.7 Protection of Buried Concrete

11.7.1 The results of the water soluble sulphate contact and pH testing carried out on samples of the underlying natural ground indicate that in accordance with BRE Special Digest 1 (2005) these materials would yield an Aggressive Chemical Environment Class (ACEC) of AC-1, requiring a Design Sulphate Class of DS-1.

TWEEDIE EVANS CONSULTING LIMITED

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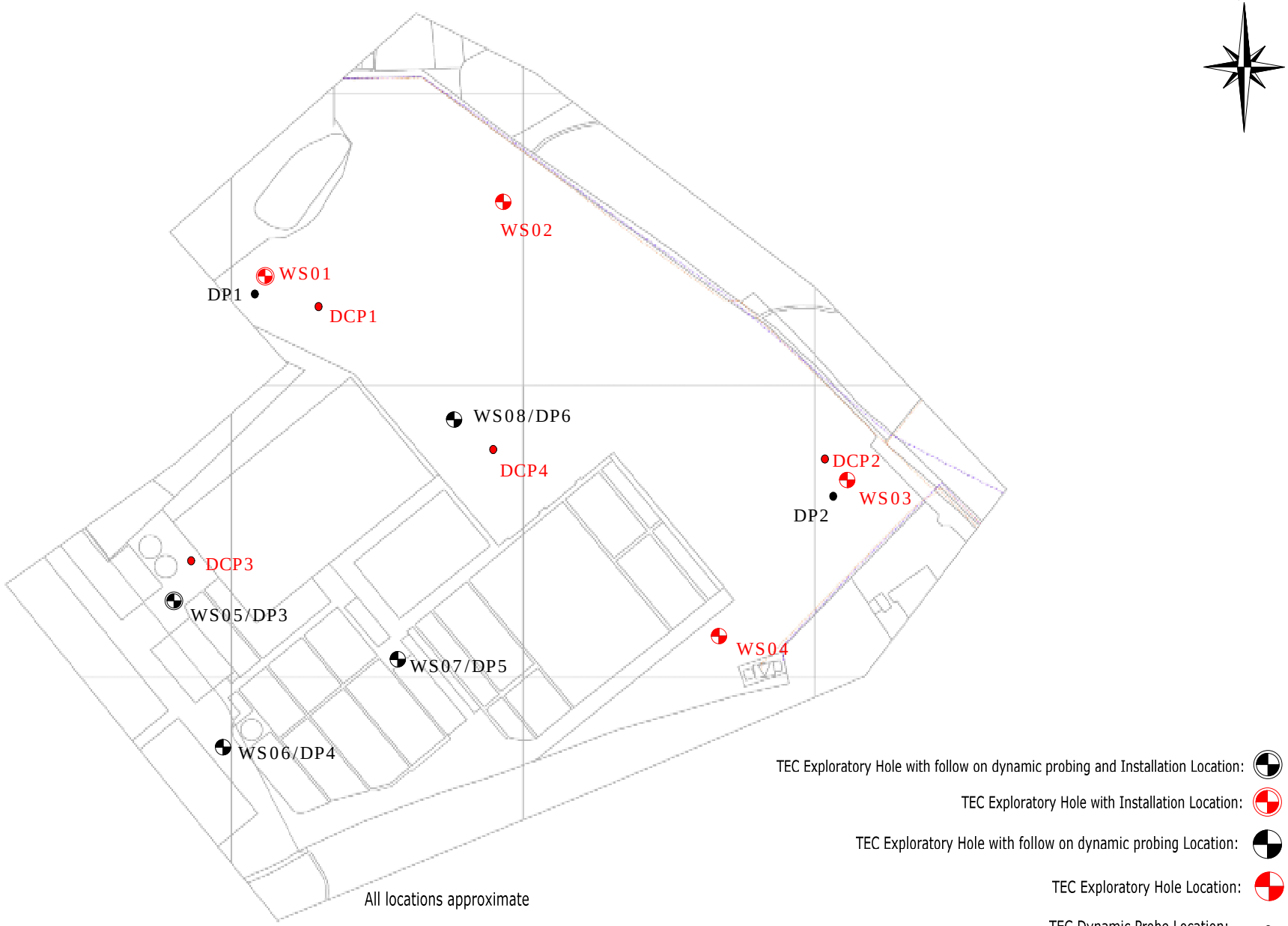
FIGURES

Approximate Site Location:

TEC Tweedie Evans Consulting	Tweedie Evans Consulting The Old Chapel 35a Southover Wells, Somerset BA5 1UH	Tel: 01749 677760 Fax: 01749 679345 Email:info@tecon.co.uk www.tecon.co.uk	Site Name: North Orbital Road, St Albans			Scale: NTS
Drawing Name: Site Location Plan			Client Name: Castleoak Group	Project No: 1706007.001	Date: August 2017	Figure No: 1

Extract of 'Proposed Development Plan at Burston, St Albans' by KWL Architects. Drawing No. 4653 SK01 dated December 2016

TEC Tweedie Evans Consulting	Tweedie Evans Consulting The Old Chapel 35a Southover Wells, Somerset BA5 1UH	Tel: 01749 677760 Fax: 01749 679345 Email:info@tecon.co.uk www.tecon.co.uk	Site Name: North Orbital Road, St Albans	Drawing Name: Proposed Development Plan	Client Name: Castleoak Group	Project No: 1706007.001	Figure No: 2	Date: August 2017	Scale: NTS



TEC	Tweedie Evans Consulting The Old Chapel 35a Southover Wells, Somerset BA5 1UH	Tel: 01749 677760 Fax: 01749 679345 Email:info@tecon.co.uk www.tecon.co.uk	Site Name: North Orbital Road, St Albans	Drawing Name: Exploratory Hole Location Plan	Client Name: Castleoak Group	Project No: 1706007.001	Figure No: 3	Date: August 2017	Scale: NTS

APPENDIX A

Site Photographs

Photograph 1: View of the eastern site area, facing north-east.

Photograph 2: View of the southern site area, facing west.

Photograph 3: View of the south-western site area, facing north.

Photograph 4: Planting beds in the central site area, facing north.

Photograph 5: Greenhouses occupy the central site area.

Photograph 6: View of the southern site area, facing west.

Photograph 7: Telephone mast located along the southern site area.

Photograph 8: Access road along the north-western site boundary, facing west.

Photograph 9: Potential ACM was noted within the roofing and wall materials of a building located in the north-western site corner, facing west.

Photograph 10: Two water tanks were noted in the north-western corner of the site, facing south-west.

Photograph 11: A water tank was noted in south-western site area.

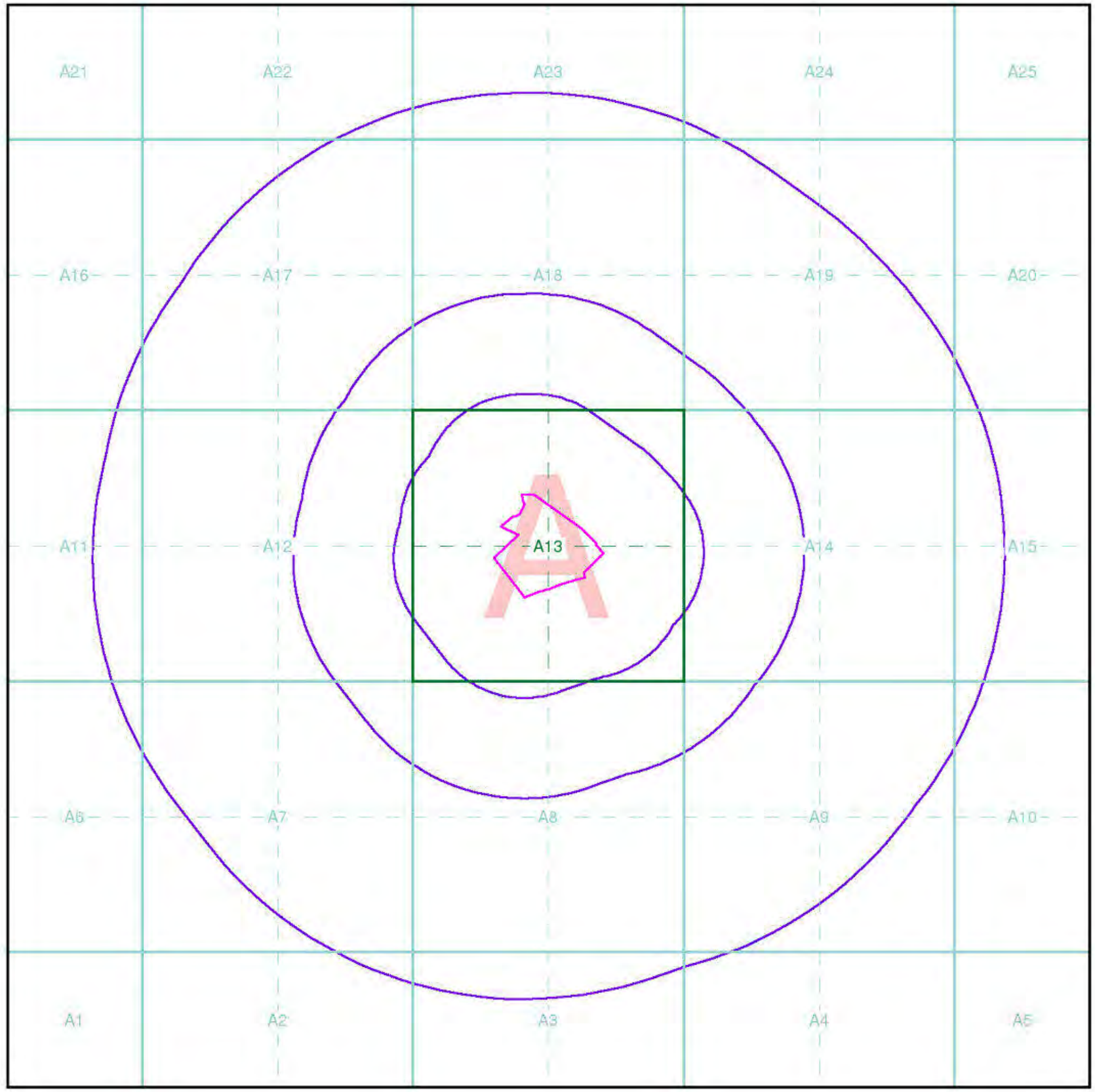
Photograph 12: View of the hall occupying the central western site boundary.

Photograph 13: Two ASTs were noted in the western site area. Potential ACM was noted within the roofing and wall materials of a building located adjacent to the ASTs, facing south-west.

Photograph 14: A number of burners were noted in the greenhouses.

APPENDIX B

Historical Maps



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Index Map

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

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

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

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

A selection of organisations who provide data within this report:

Map data

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Environment Agency

NATURAL ENGLAND

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Mr E Tweedie, Tweedie Evans Consulting Ltd, The Old Chapel, 35a Southover, Wells, Somerset, BA5 1UH

Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Site Area (Ha):	4.
Search Buffer (m):	1000

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS

Full Terms and Conditions can be found on the following link:
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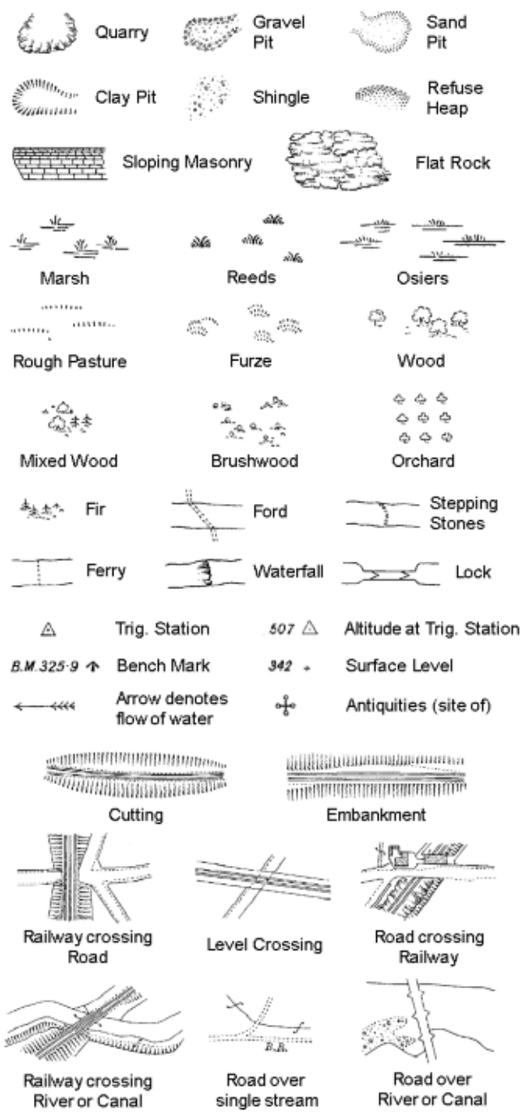
Historical Mapping Legends

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

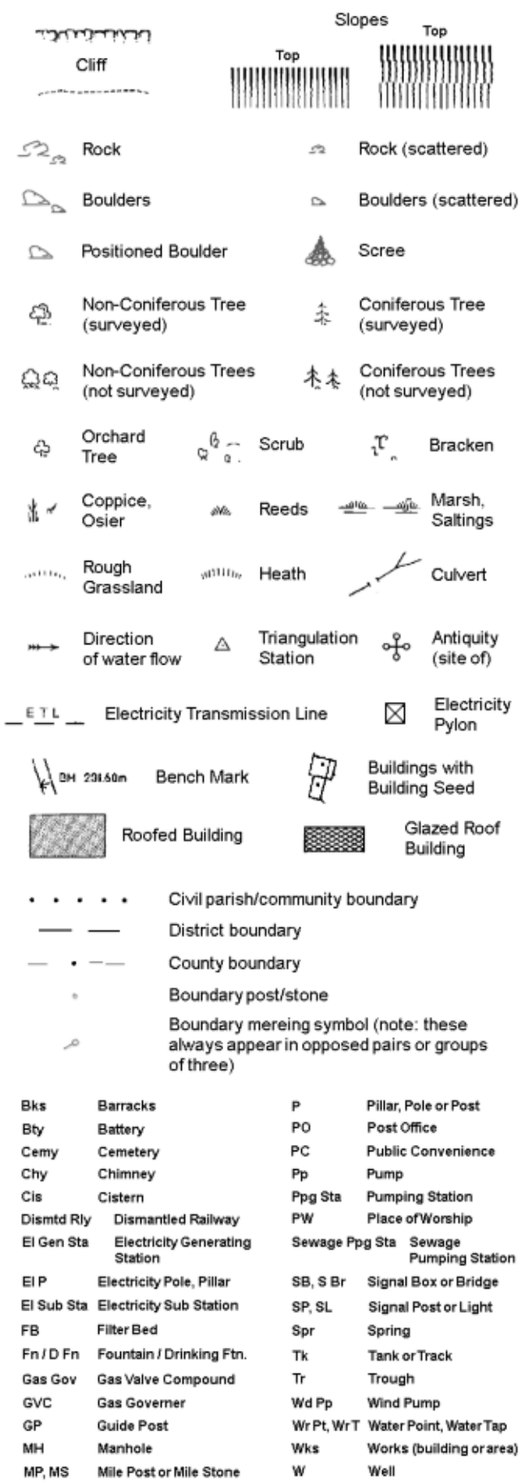


B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	Sl.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

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

BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

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



Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

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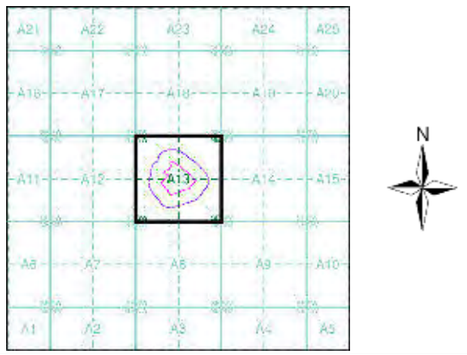
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Hertfordshire	1:2,500	1872	2
Hertfordshire	1:2,500	1898	3
Hertfordshire	1:2,500	1924	4
Hertfordshire	1:2,500	1938	5
Ordnance Survey Plan	1:1,250	1962 - 1963	6
Ordnance Survey Plan	1:2,500	1968 - 1973	7
Ordnance Survey Plan	1:1,250	1968 - 1976	8
Supply of Unpublished Survey Information	1:1,250	1974	9
Additional SIMs	1:1,250	1978 - 1991	10
Additional SIMs	1:1,250	1979	11
Large-Scale National Grid Data	1:1,250	1992	12
Large-Scale National Grid Data	1:1,250	1992 - 1993	13
Large-Scale National Grid Data	1:1,250	1996	14
Historical Aerial Photography	1:2,500	1999	15

Historical Map - Segment A13



Order Details

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National Grid Reference: 513690, 203670
Slice: A
Site Area (Ha): 4.
Search Buffer (m): 100

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS

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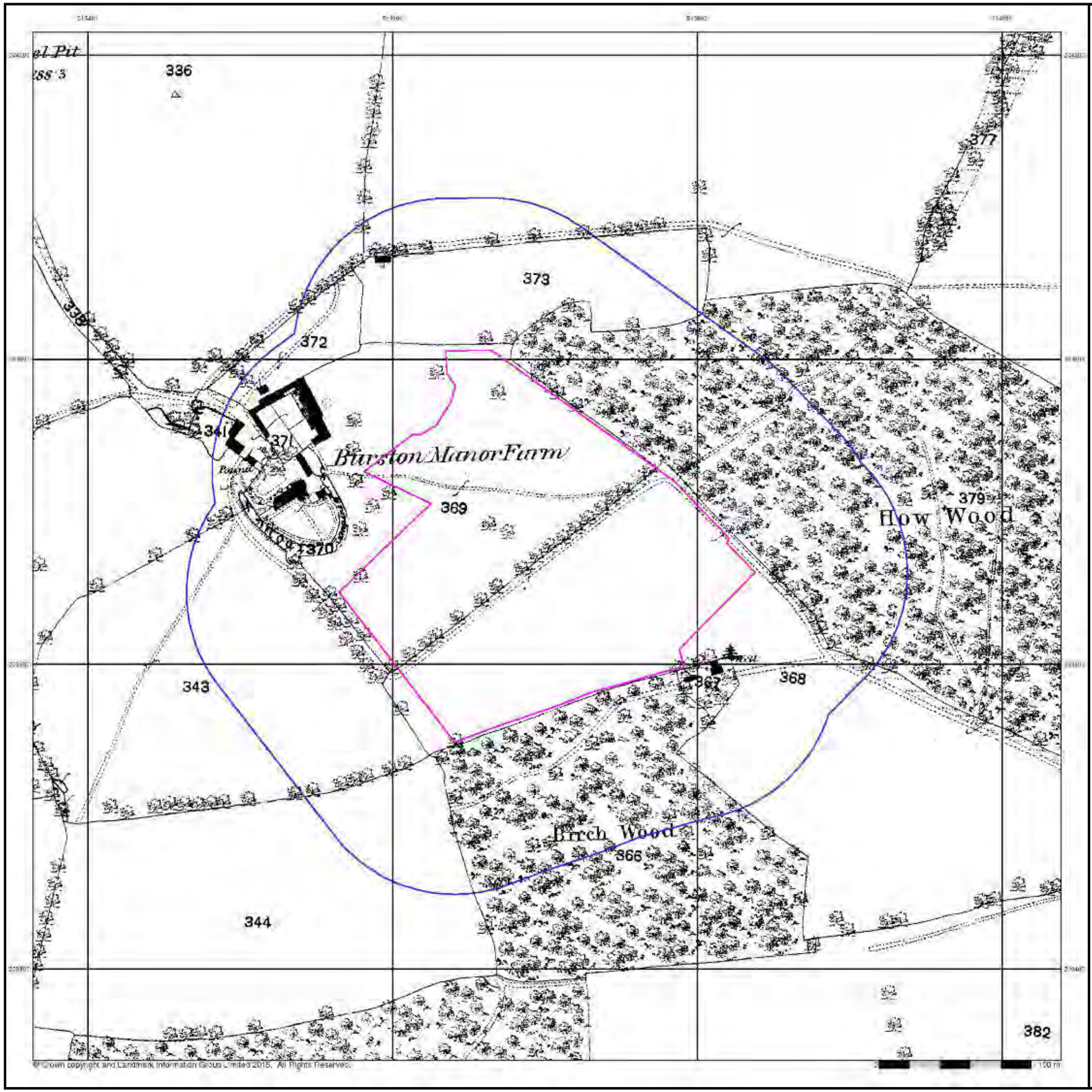

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Hertfordshire

Published 1872

Source map scale - 1:2,500

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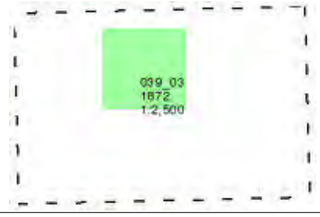
Map Name(s) and Date(s)



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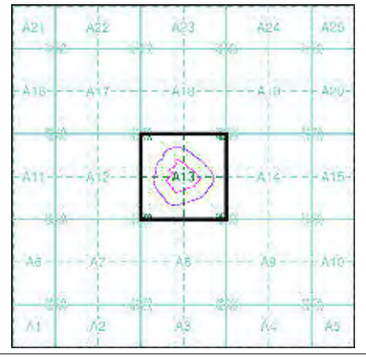

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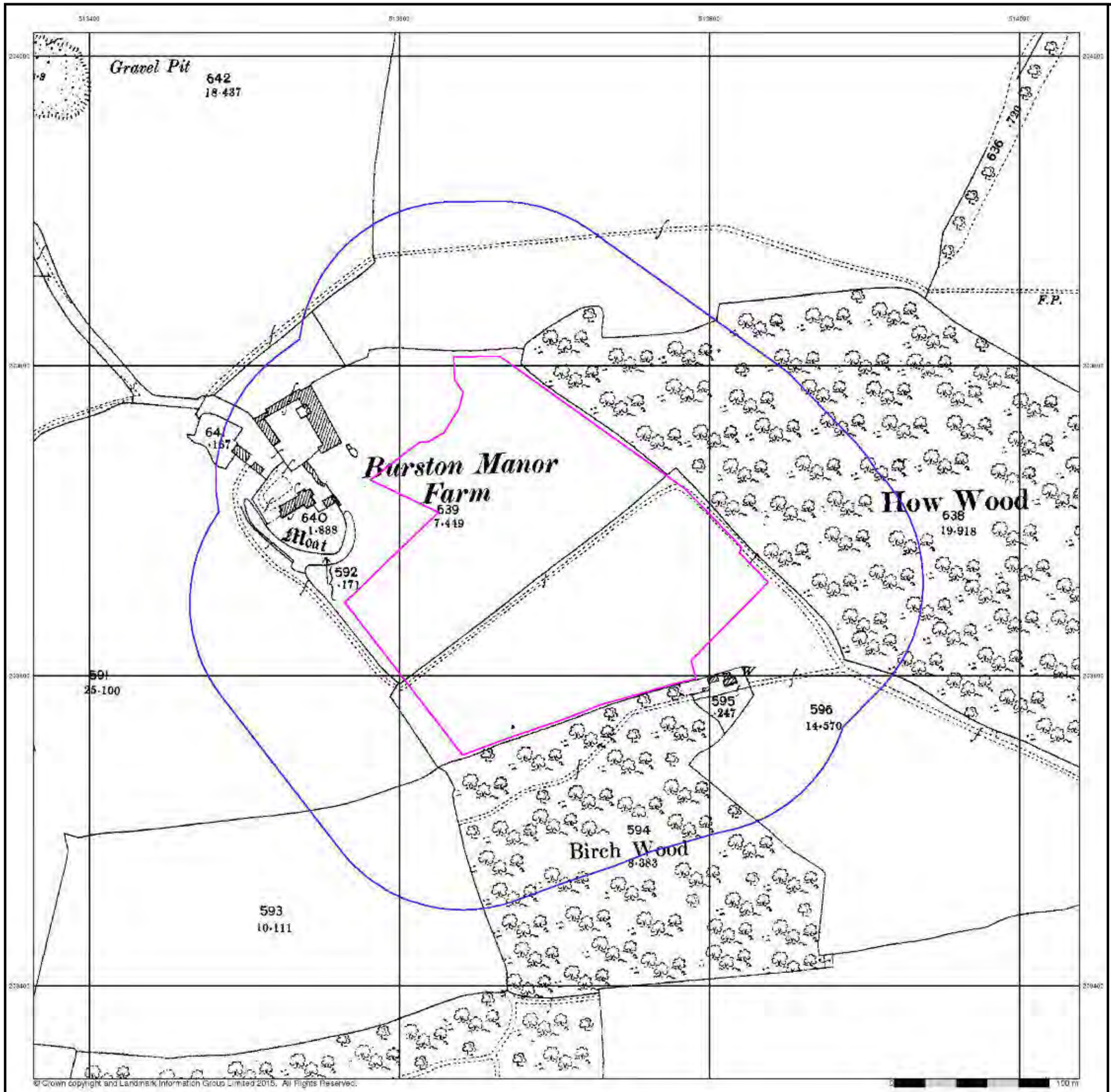

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Hertfordshire

Published 1898

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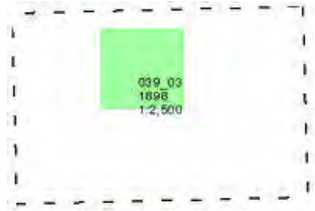

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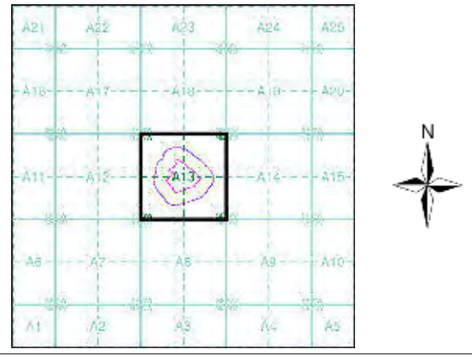

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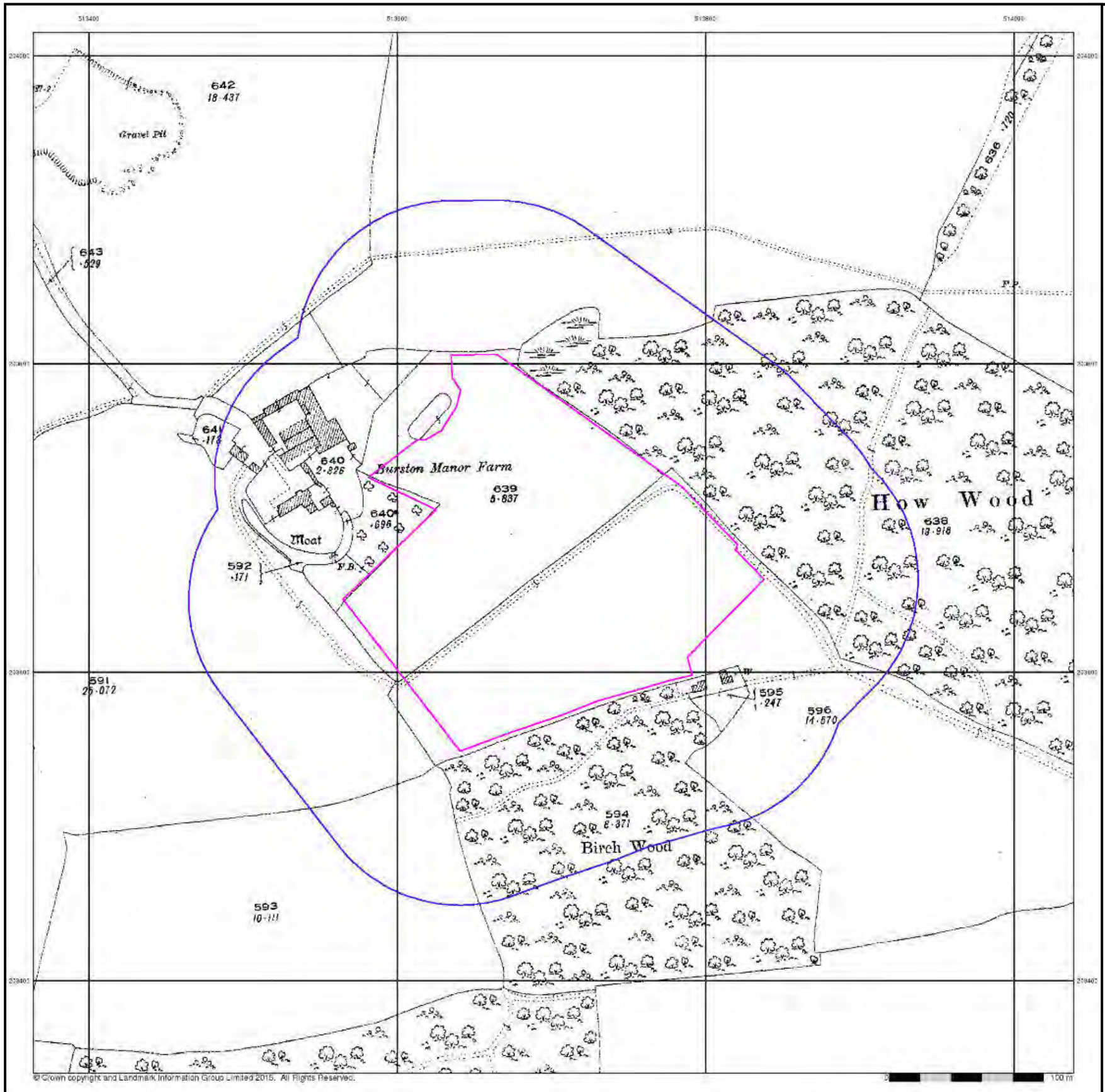
Search Buffer (m):	100

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS



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Hertfordshire

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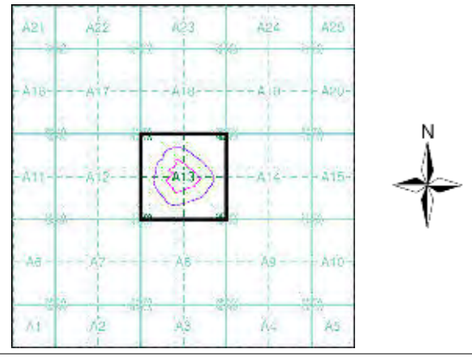

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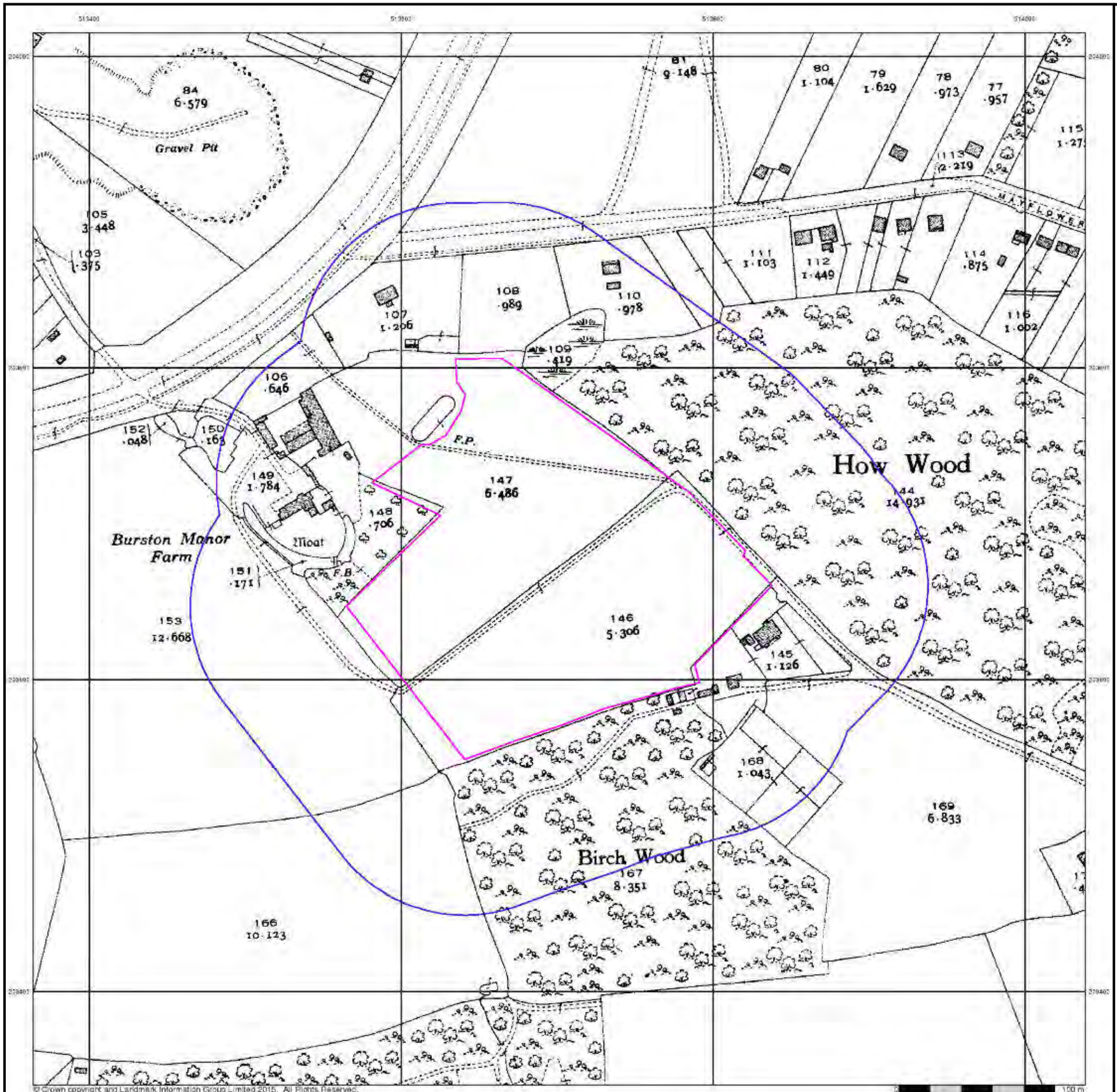
Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS

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



TWEEDIE EVANS CONSULTING

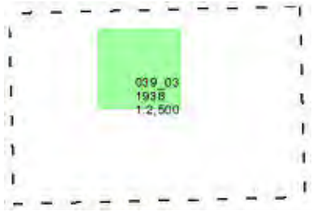
Hertfordshire

Published 1938

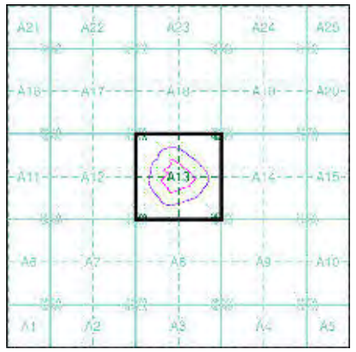
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	100

Site Details

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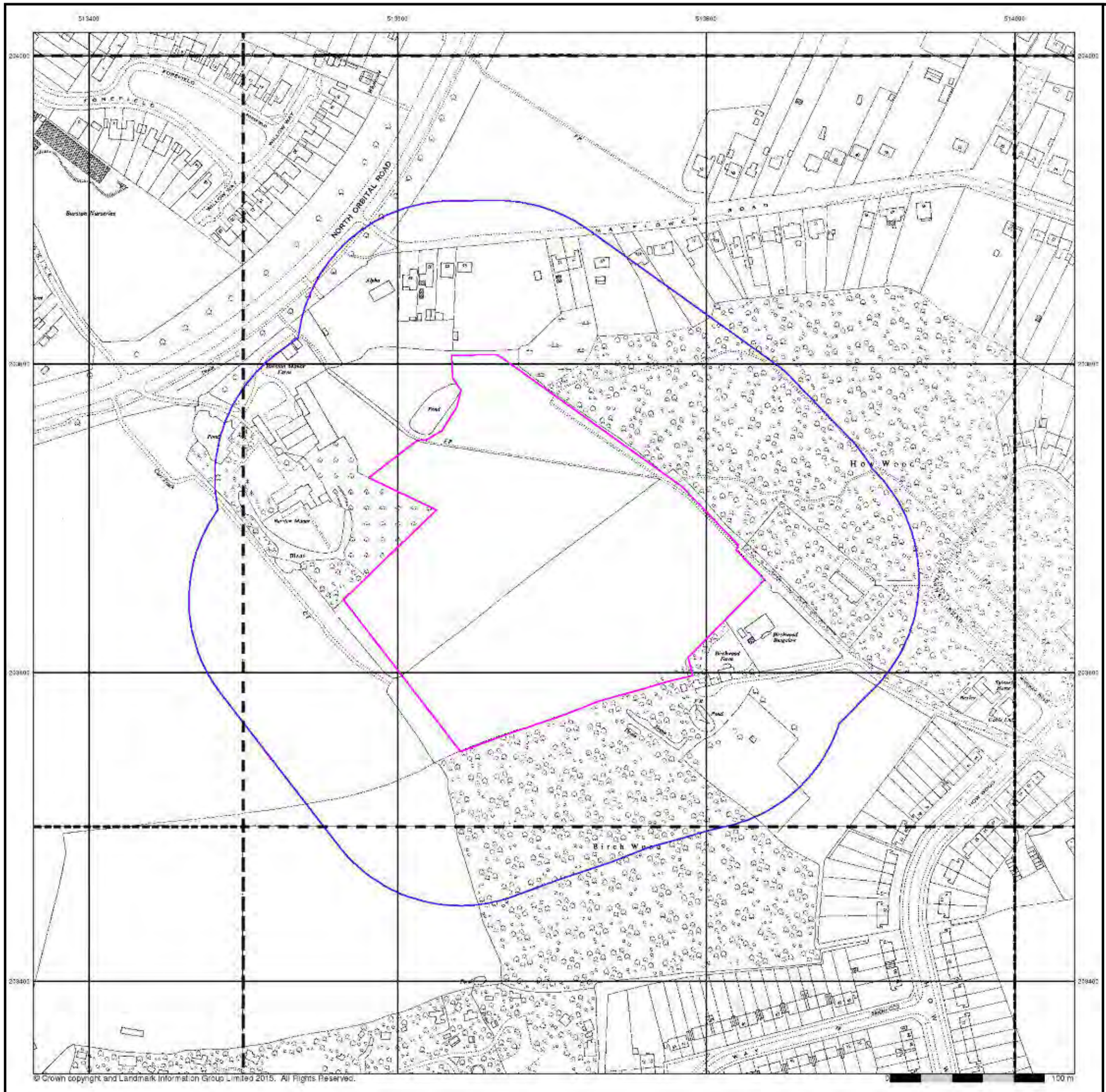

TWEEDIE EVANS CONSULTING

Ordnance Survey Plan

Published 1962 - 1963

Source map scale - 1:1,250

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

Map Name(s) and Date(s)

TL1304SW 1962 1:1,250	TL1304SE 1962 1:1,250	TL1404SW 1963 1:1,250
TL1303NW 1962 1:1,250	TL1303NE 1962 1:1,250	TL1403NW 1962 1:1,250
TL1303SW 1962 1:1,250	TL1303SE 1962 1:1,250	TL1403SW 1962 1:1,250

Historical Map - Segment A13

Order Details

Order Number: 131490767_1_1
Customer Ref: 1706007
National Grid Reference: 513690, 203670
Slice: A
Site Area (Ha): 4.
Search Buffer (m): 100

Site Details

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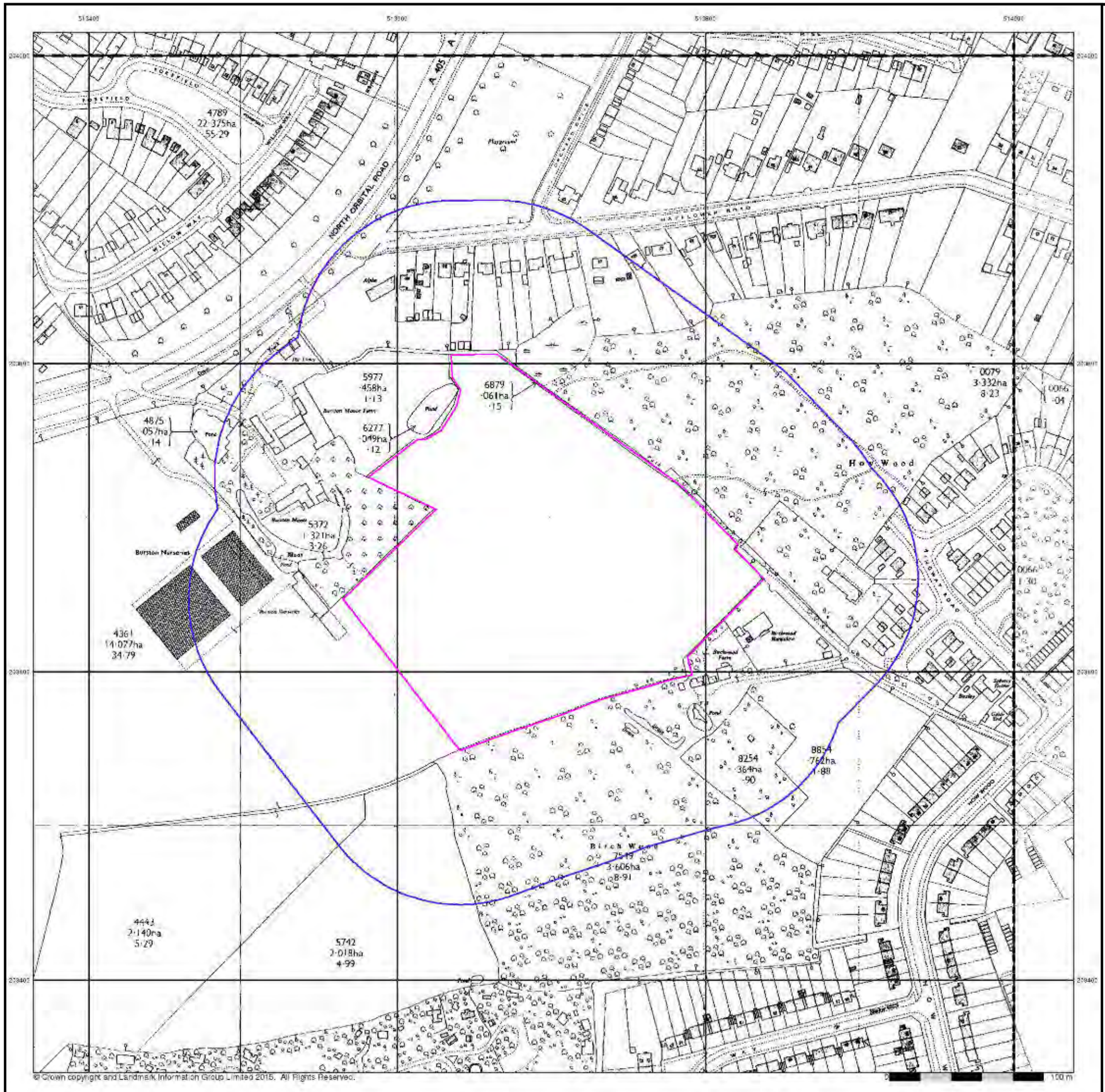


TWEEDIE EVANS CONSULTING

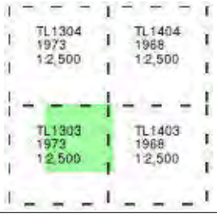
Ordnance Survey Plan

Published 1968 - 1973

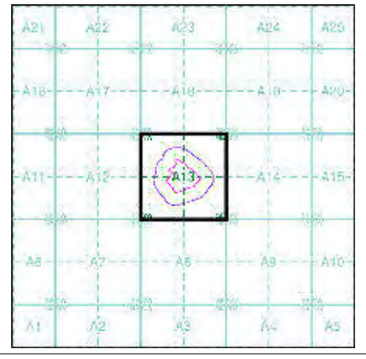
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	131490767_1_1
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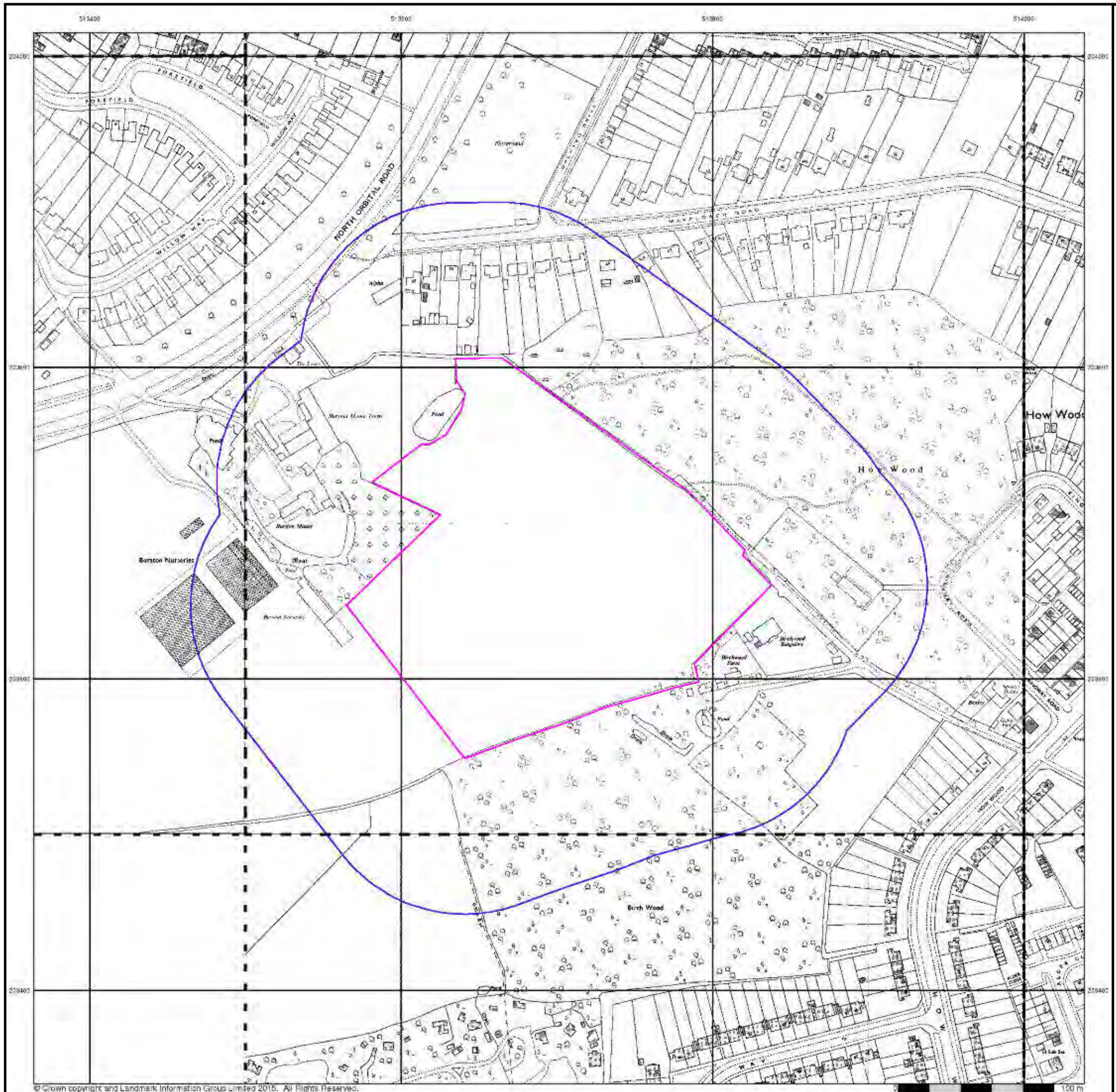


TWEEDIE EVANS CONSULTING

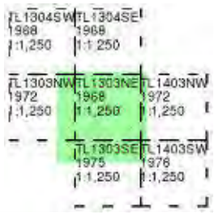
Ordnance Survey Plan

Published 1968 - 1976

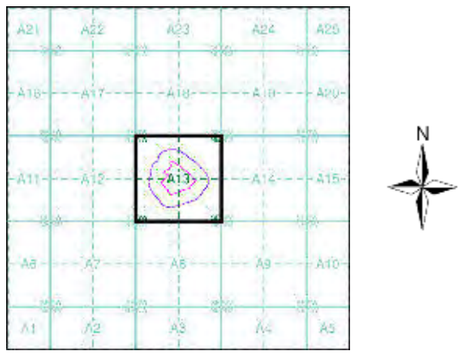
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	131490767_1_1
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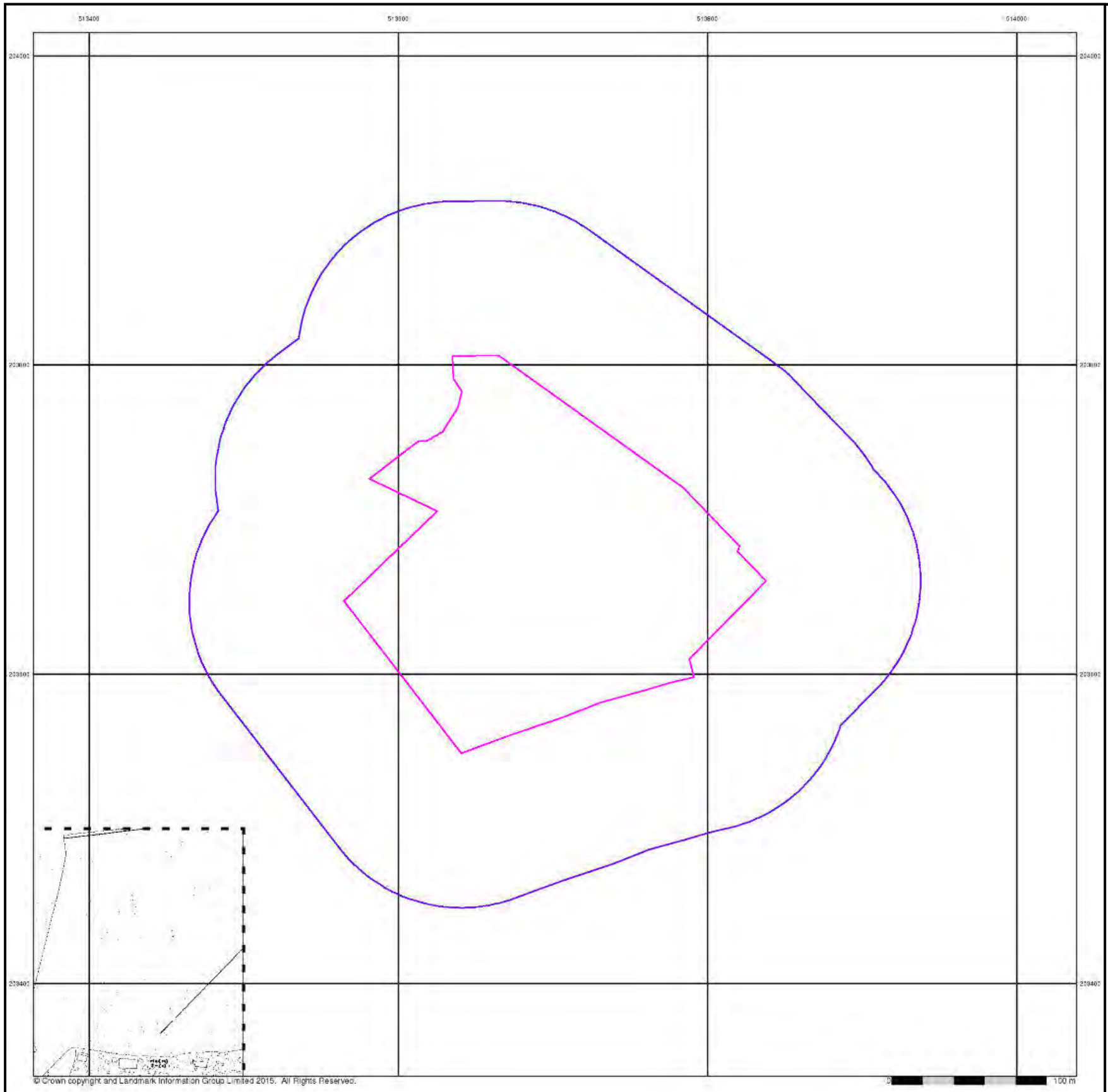


TWEEDIE EVANS CONSULTING

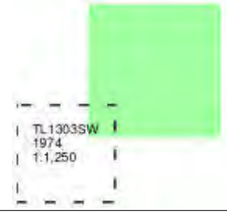
Supply of Unpublished Survey Information

Published 1974

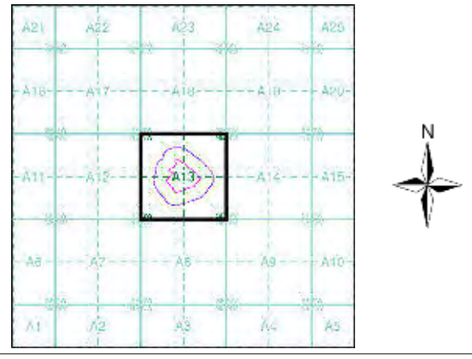
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	131490767_1_1
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National Grid Reference:	513690, 203670
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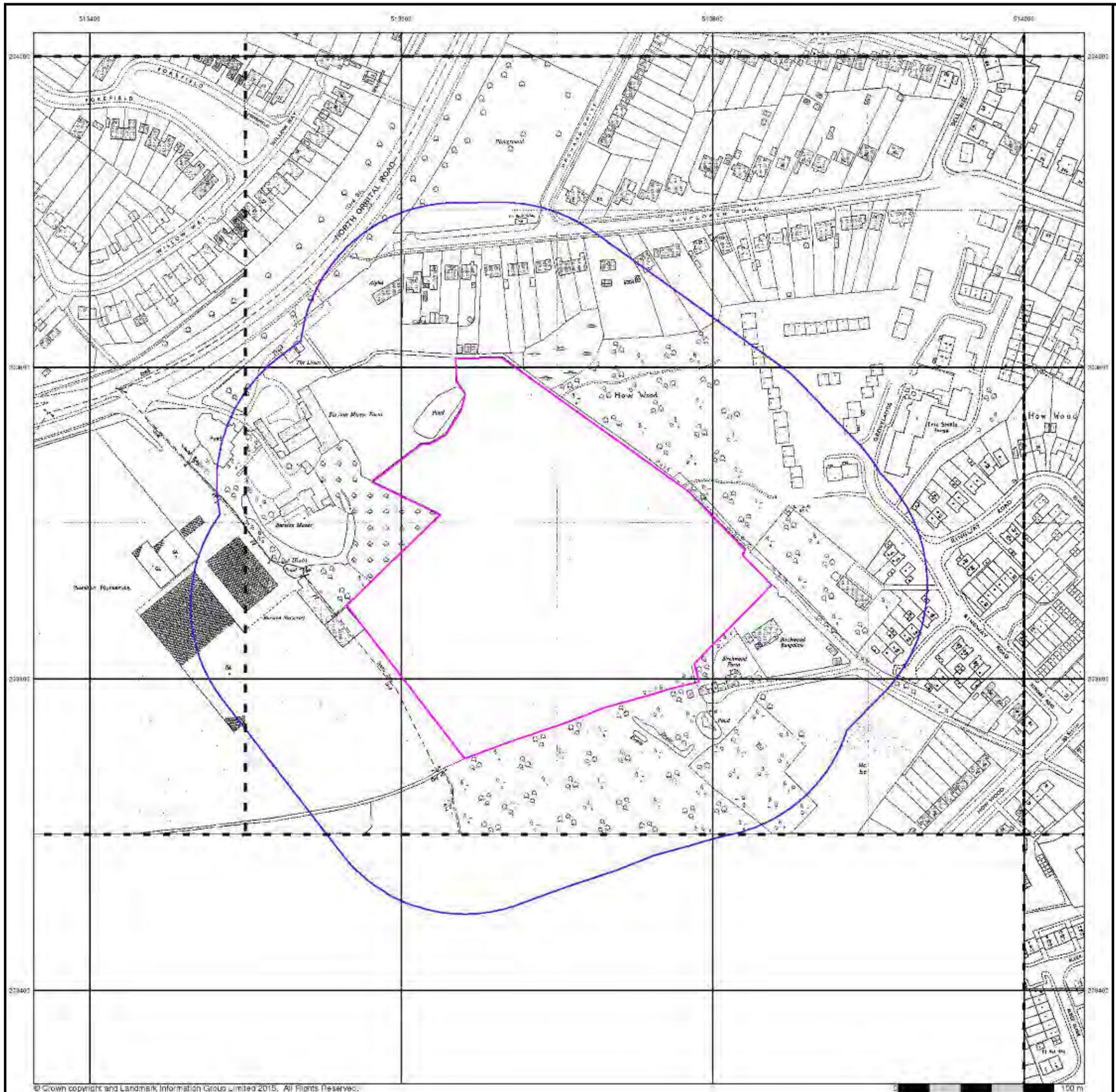


TWEEDIE EVANS CONSULTING

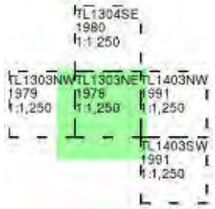
Additional SIMs

Published 1978 - 1991

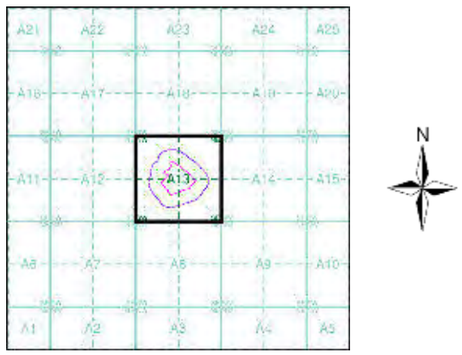
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
Site Area (Ha):	4.
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Site Details

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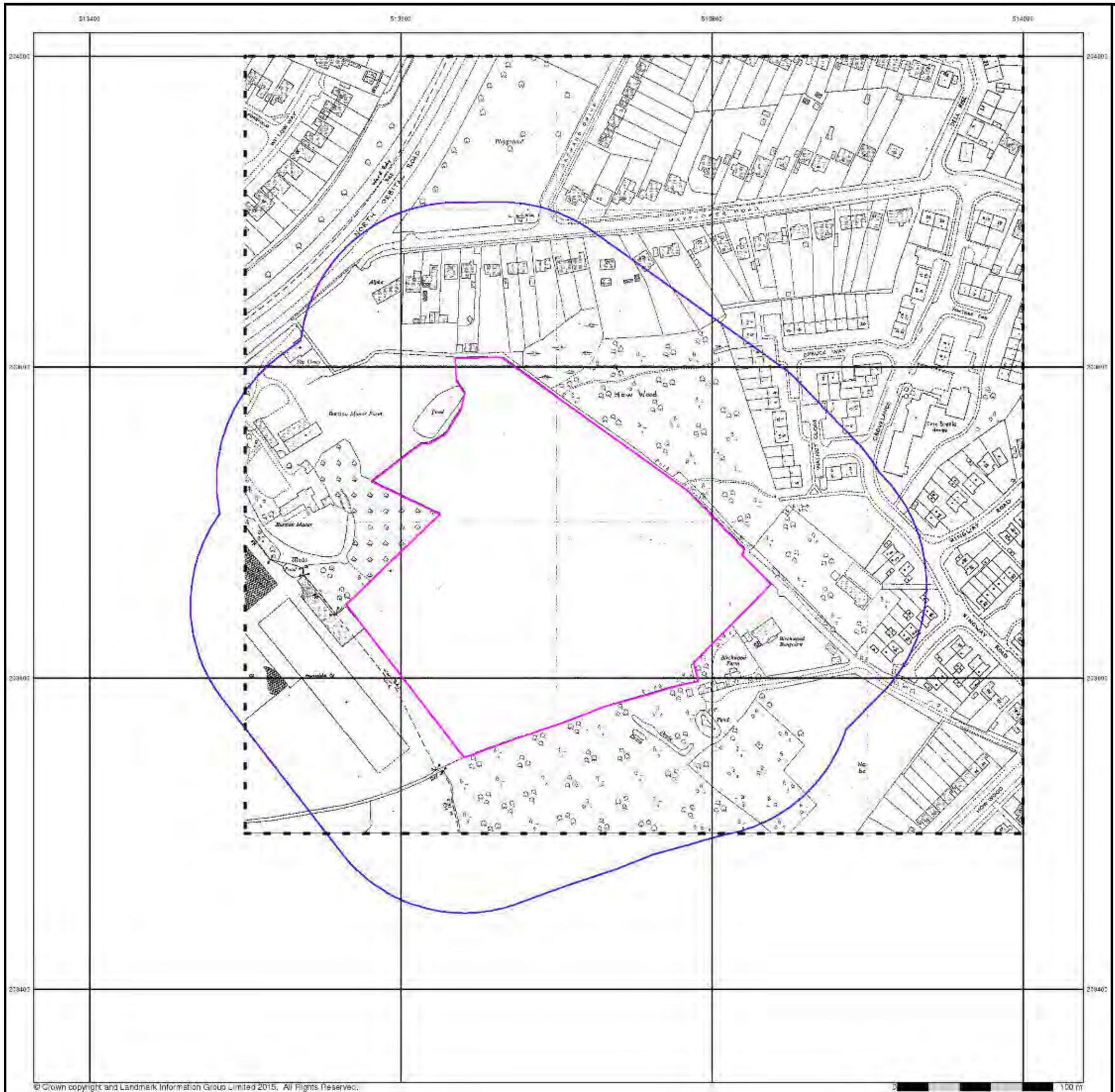


TWEEDIE EVANS CONSULTING

Additional SIMs

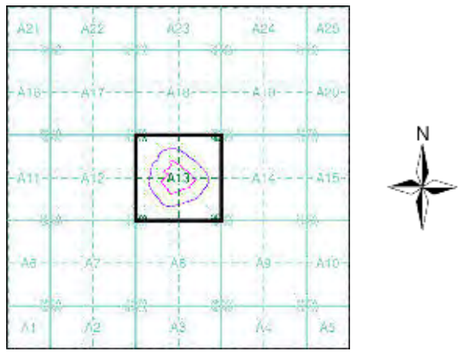
Published 1979

Source map scale - 1:1,250

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

Map Name(s) and Date(s)

Historical Map - Segment A13



Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
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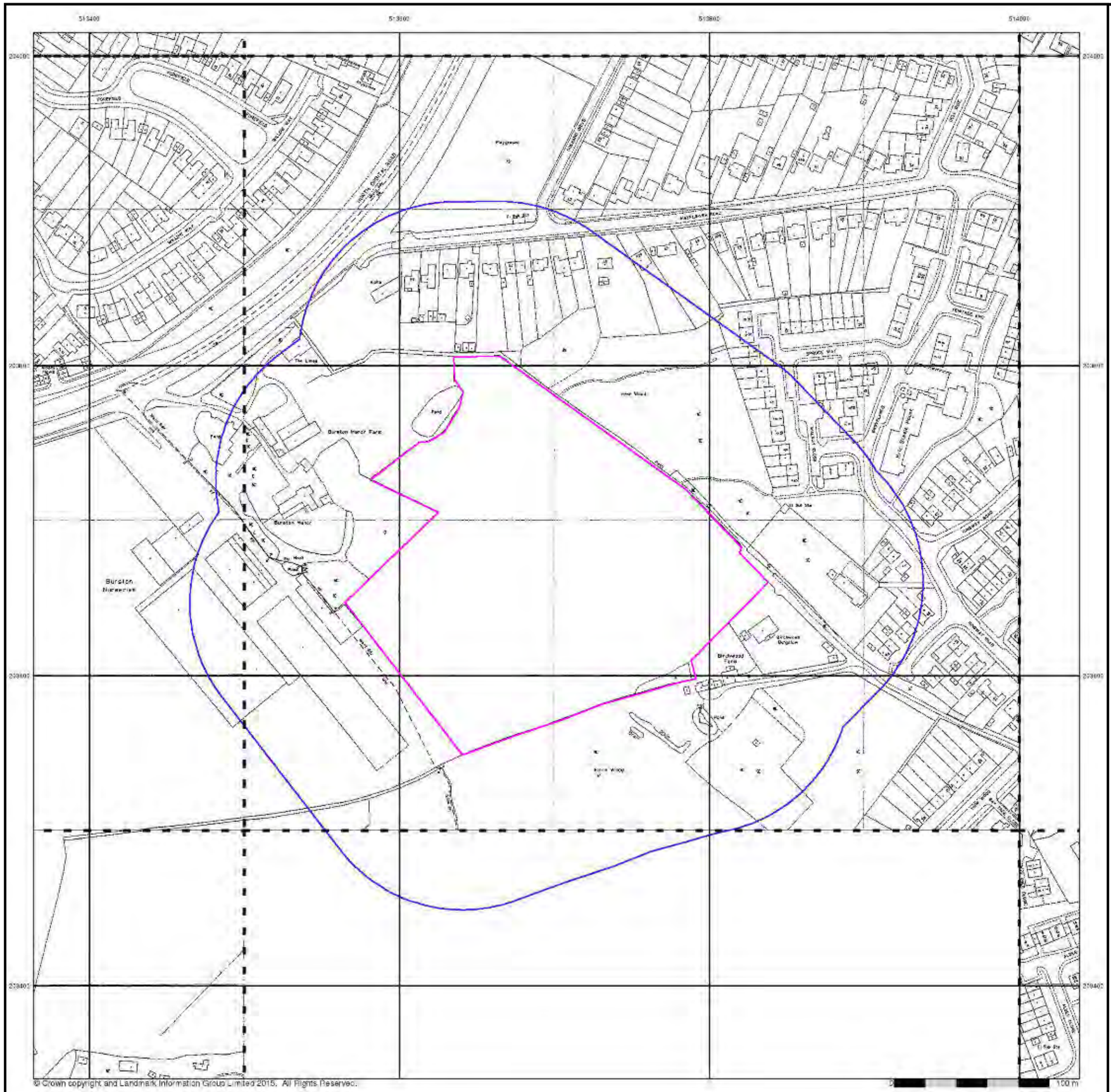

TWEEDIE EVANS CONSULTING

Large-Scale National Grid Data

Published 1992

Source map scale - 1:1,250

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

Map Name(s) and Date(s)

Historical Map - Segment A13

Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	100

Site Details

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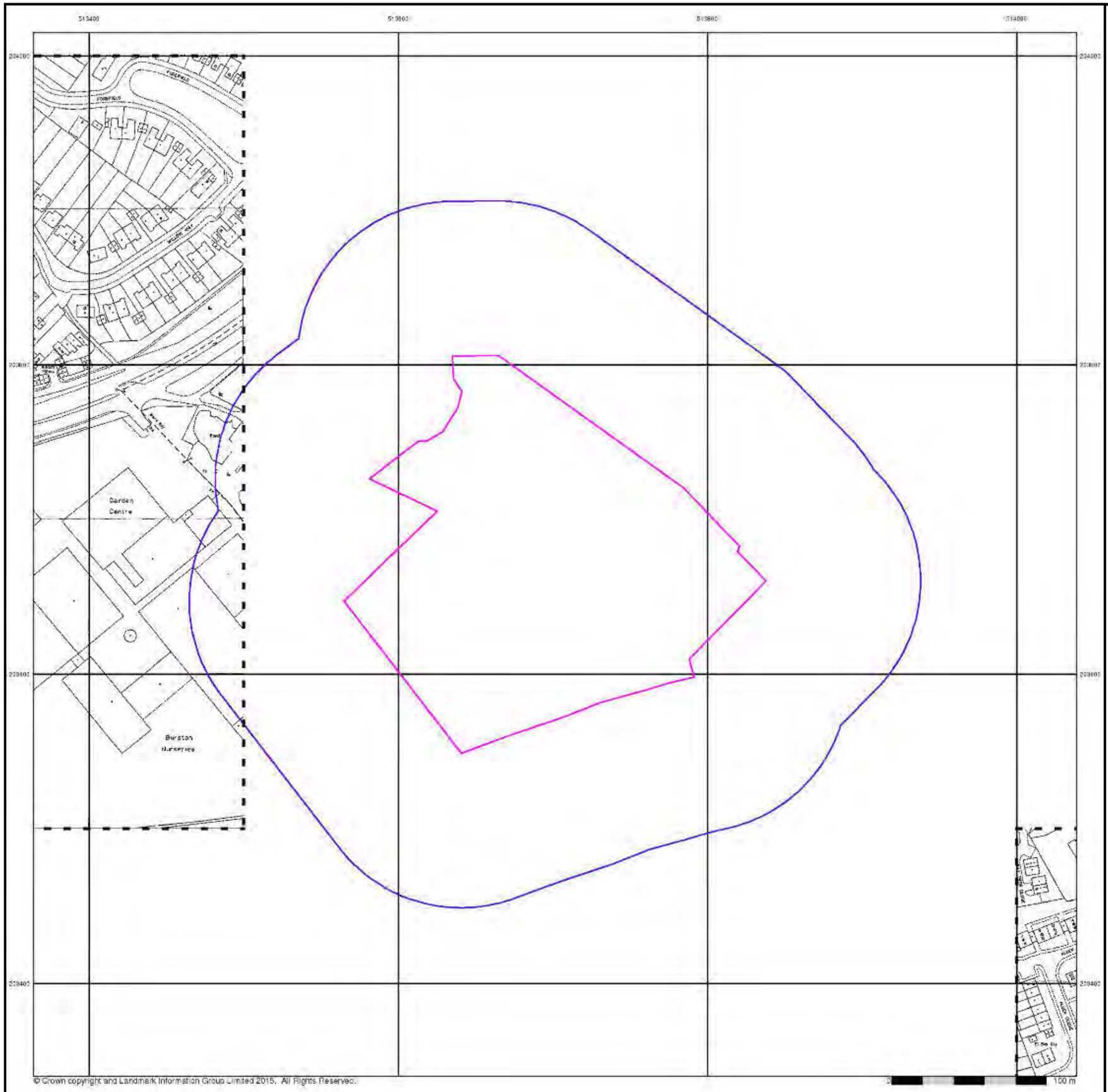


TWEEDIE EVANS CONSULTING

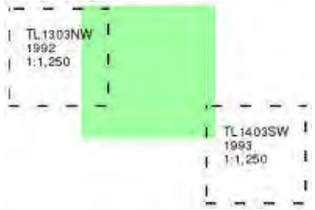
Large-Scale National Grid Data

Published 1992 - 1993

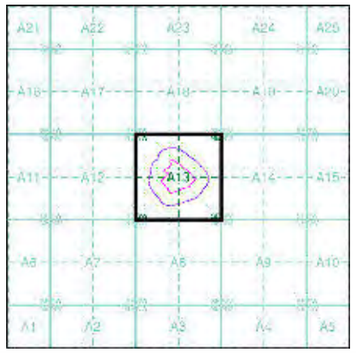
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13

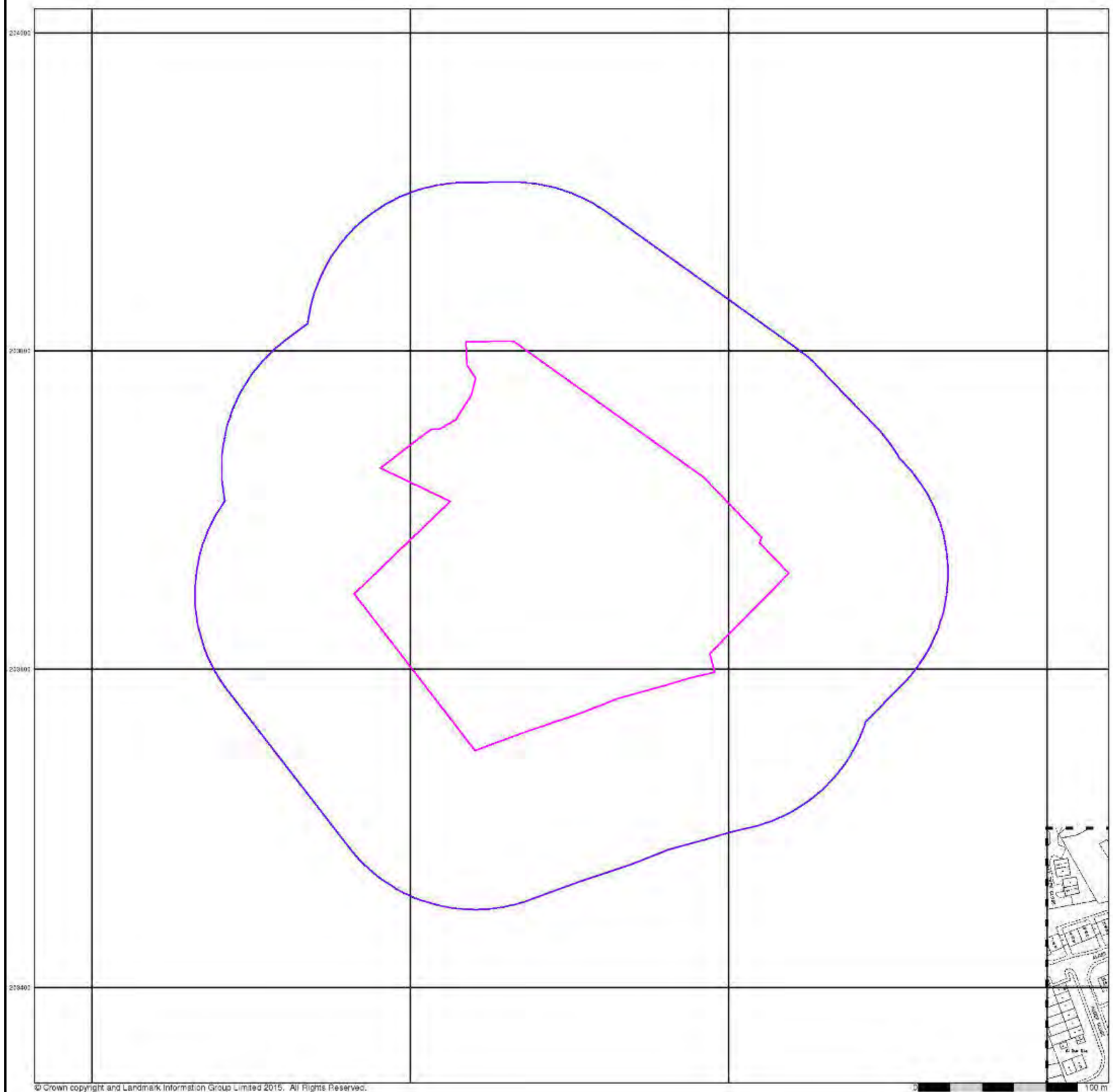


Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	100

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS



TWEEDIE EVANS CONSULTING

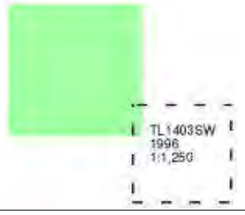
Large-Scale National Grid Data

Published 1996

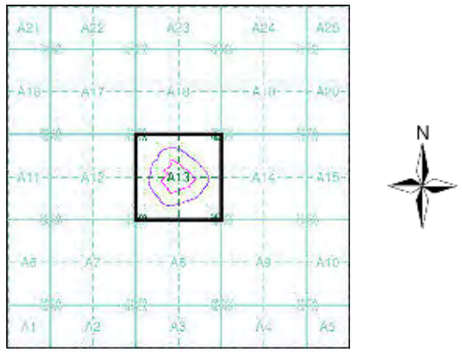
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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Slice:	A
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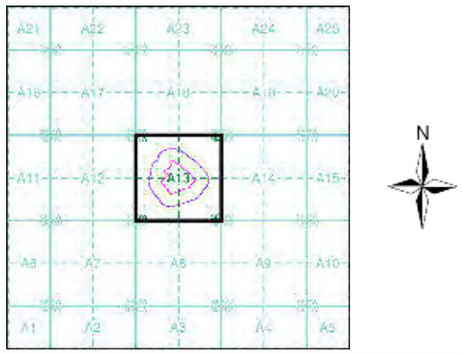
TWEEDIE EVANS CONSULTING

Historical Aerial Photography

Published 1999

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

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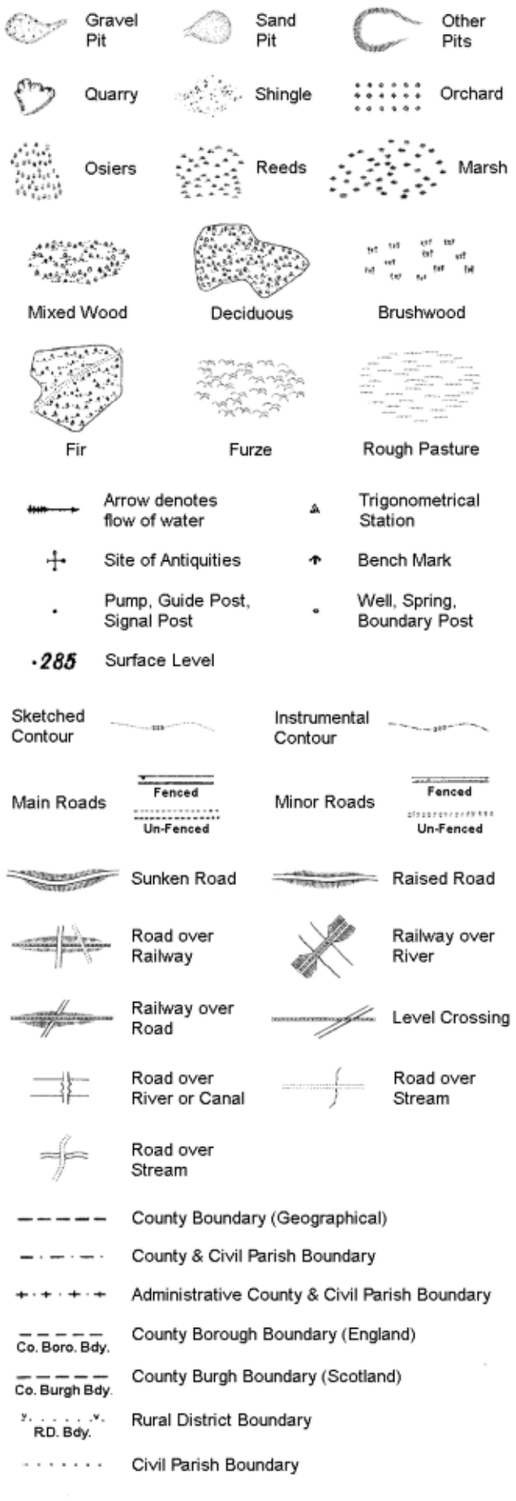
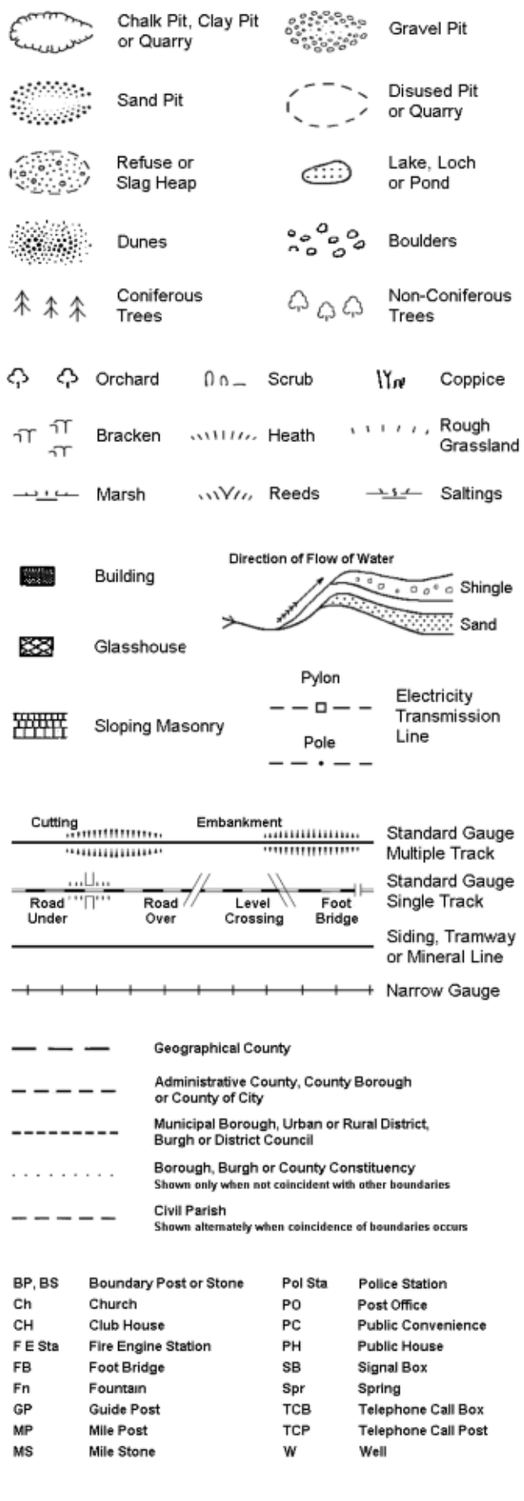
Historical Mapping Legends

Ordnance Survey County Series 1:10,560

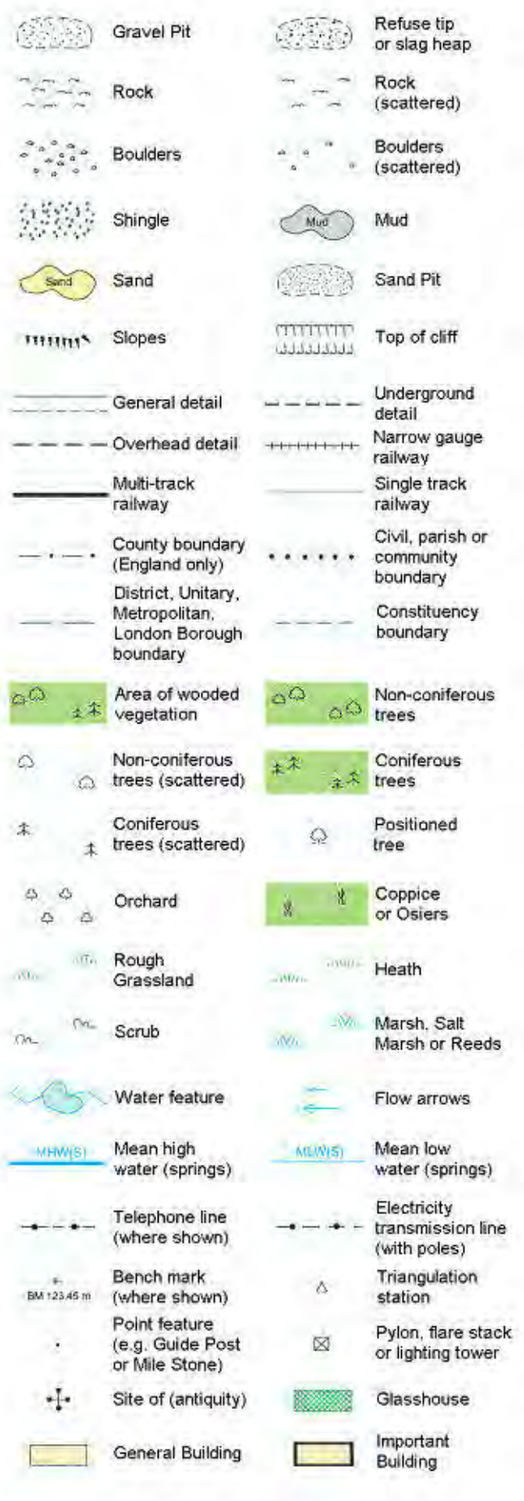


Ordnance Survey Plan 1:10,000



BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping

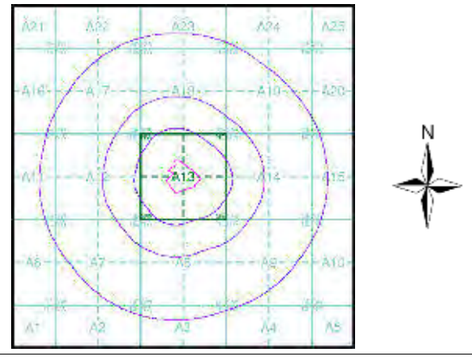


TWEEDIE EVANS CONSULTING

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Hertfordshire	1:10,560	1883	2
Hertfordshire	1:10,560	1899	3
Hertfordshire	1:10,560	1925	4
Hertfordshire	1:10,560	1938 - 1951	5
Hertfordshire	1:10,560	1938 - 1947	6
Hertfordshire	1:10,560	1939	7
Historical Aerial Photography	1:10,560	1947	8
Historical Aerial Photography	1:10,560	1947	9
Ordnance Survey Plan	1:10,000	1960	10
Ordnance Survey Plan	1:10,000	1964 - 1965	11
Ordnance Survey Plan	1:10,000	1972 - 1978	12
Ordnance Survey Plan	1:10,000	1985	13
Ordnance Survey Plan	1:10,000	1990 - 1992	14
10K Raster Mapping	1:10,000	1999	15
10K Raster Mapping	1:10,000	2006	16
VectorMap Local	1:10,000	2017	17

Historical Map - Slice A



Order Details

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Slice: A
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Search Buffer (m): 1000

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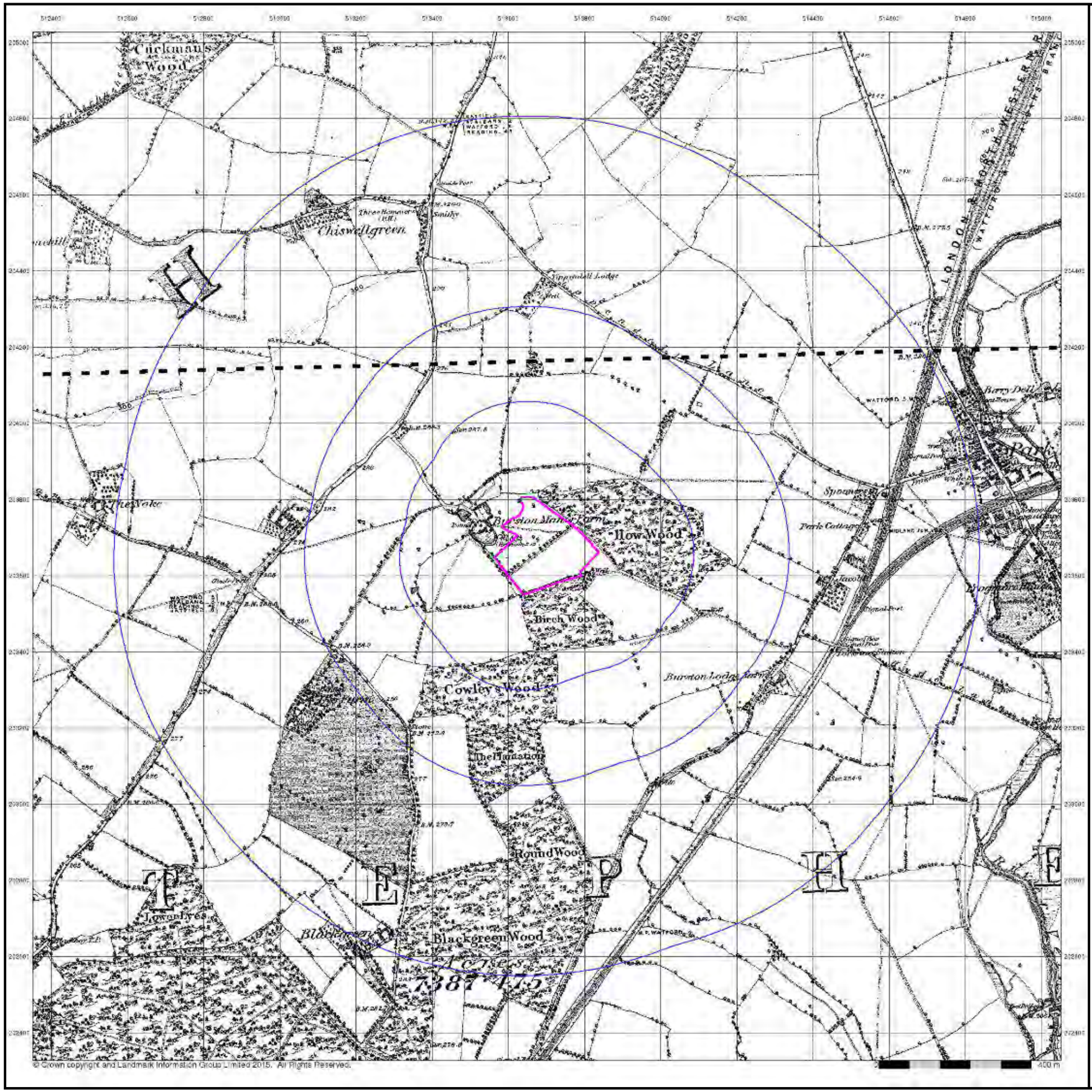


TWEEDIE EVANS CONSULTING

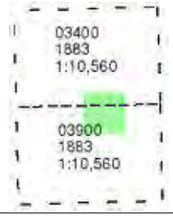
Hertfordshire

Published 1883

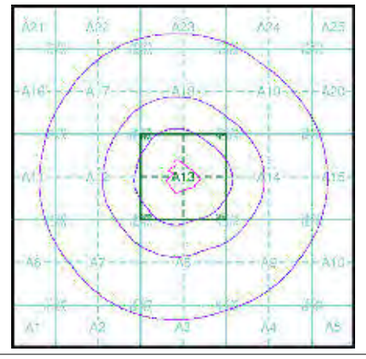
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	1000

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS

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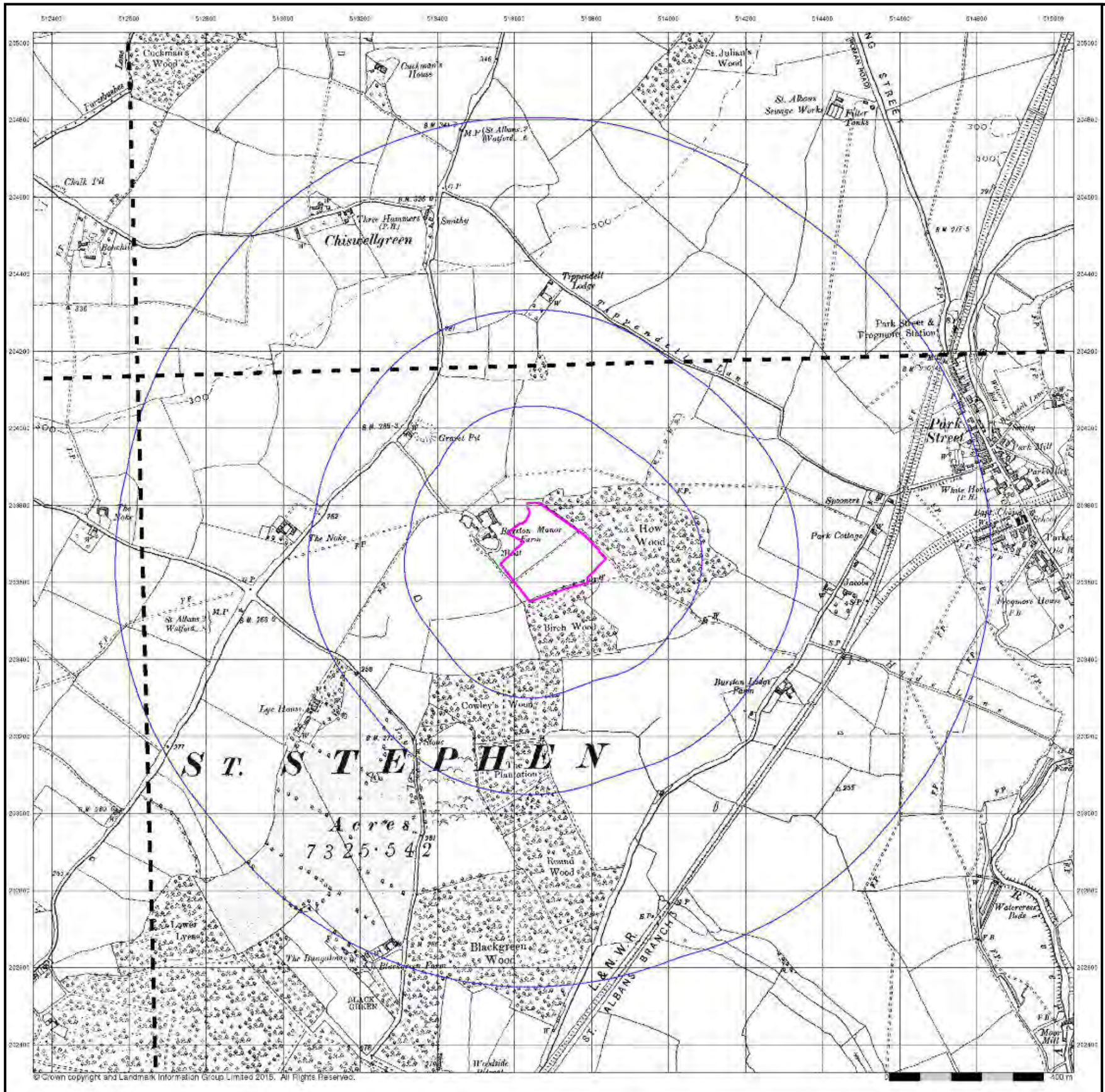


TWEEDIE EVANS CONSULTING

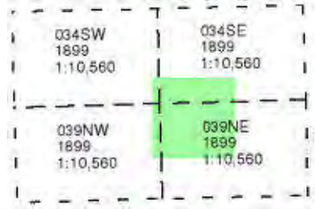
Hertfordshire

Published 1899

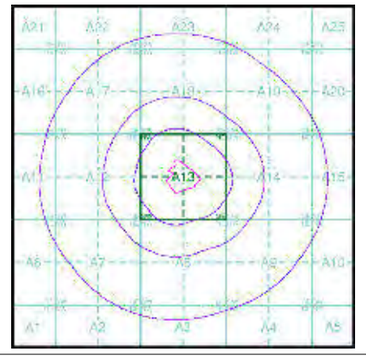
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



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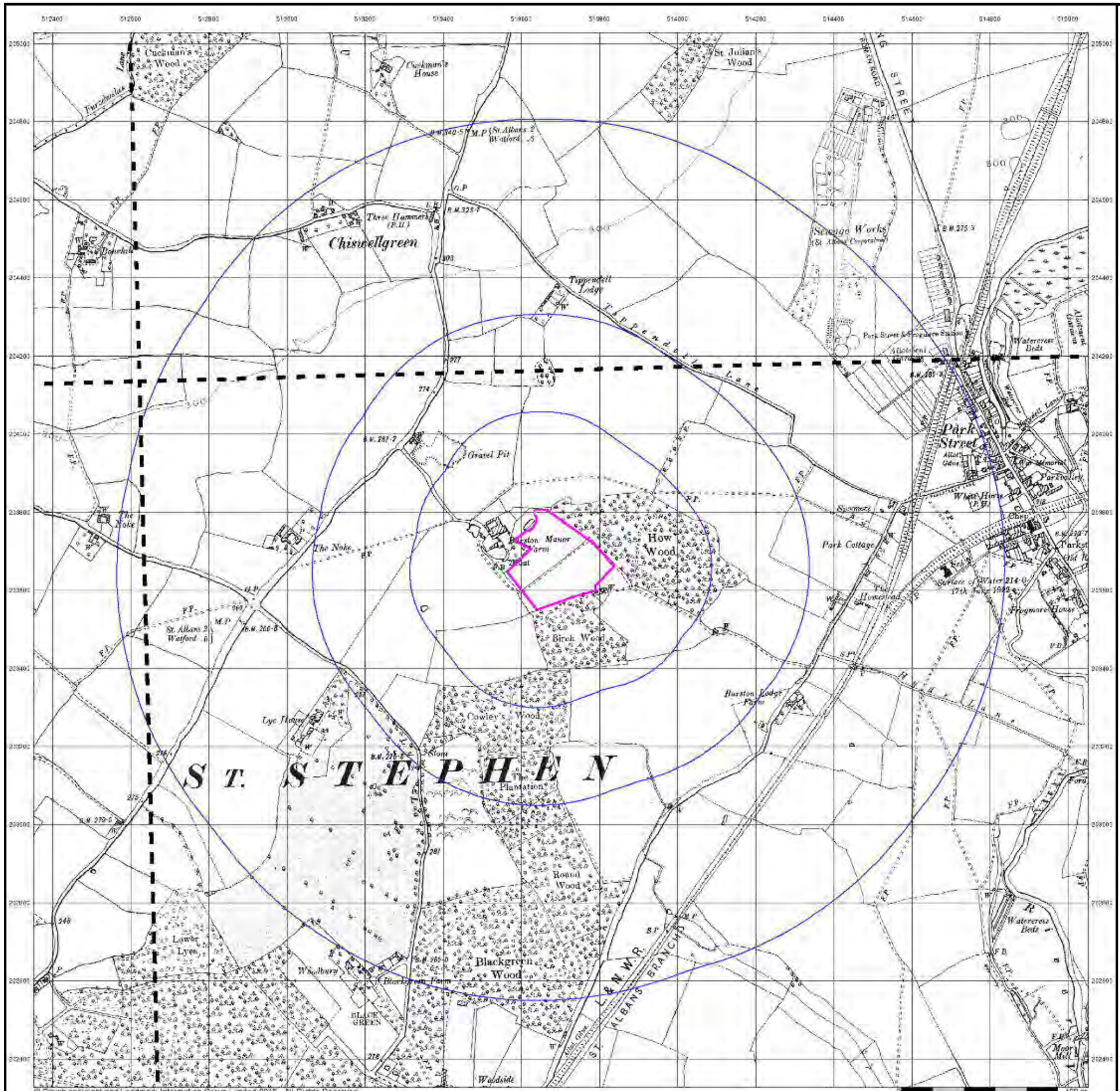


TWEEDIE EVANS CONSULTING

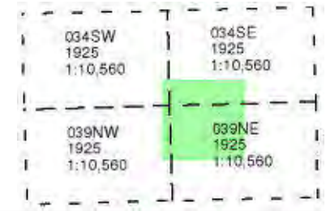
Hertfordshire

Published 1925

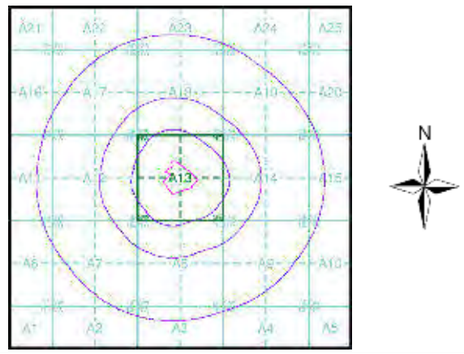
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



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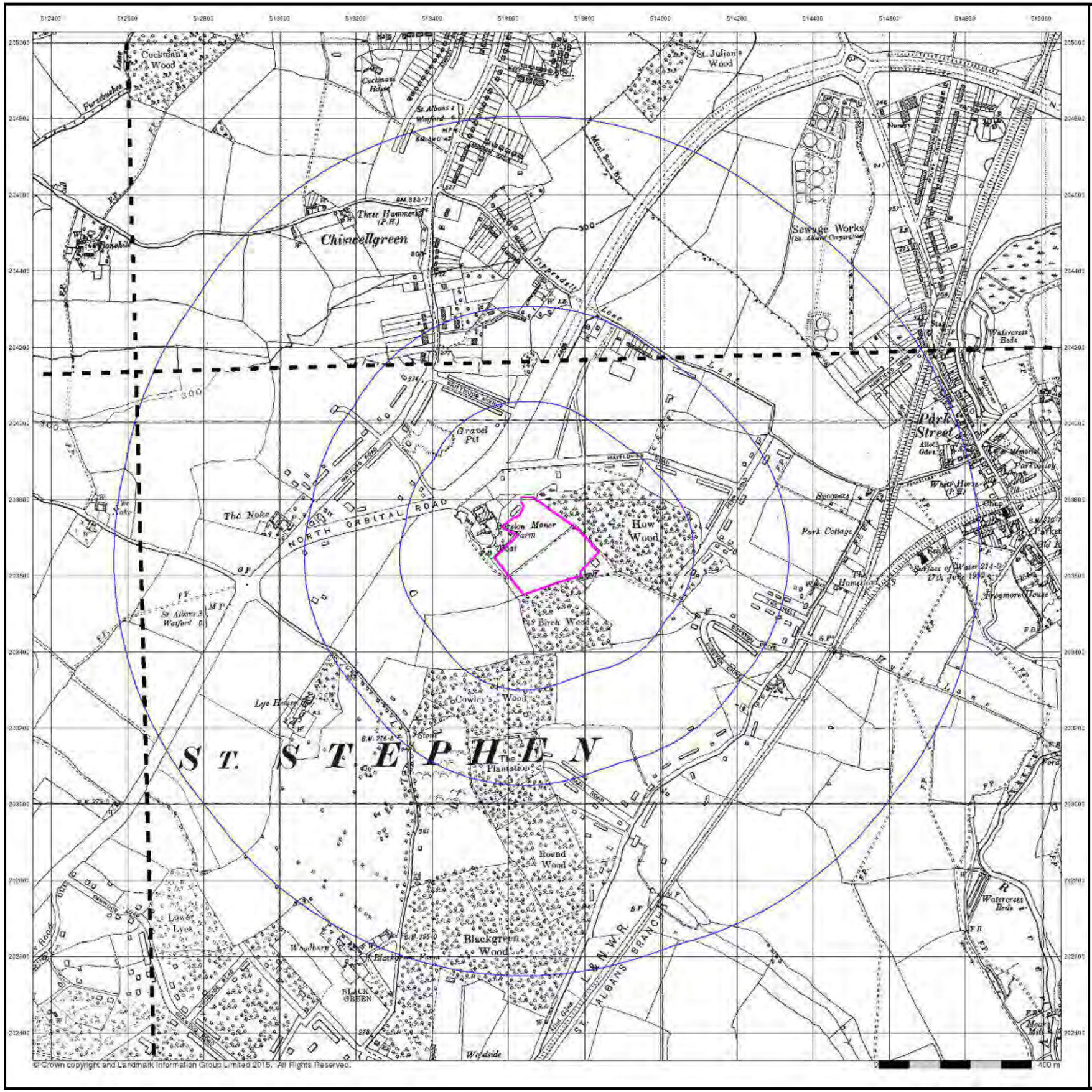


TWEEDIE EVANS CONSULTING

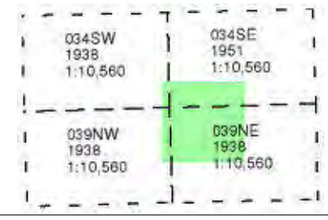
Hertfordshire

Published 1938 - 1951

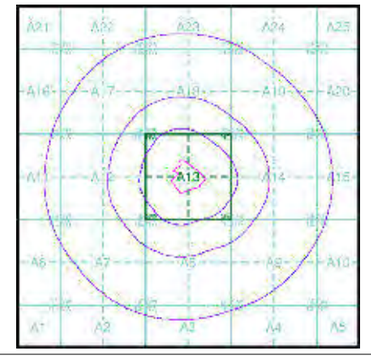
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



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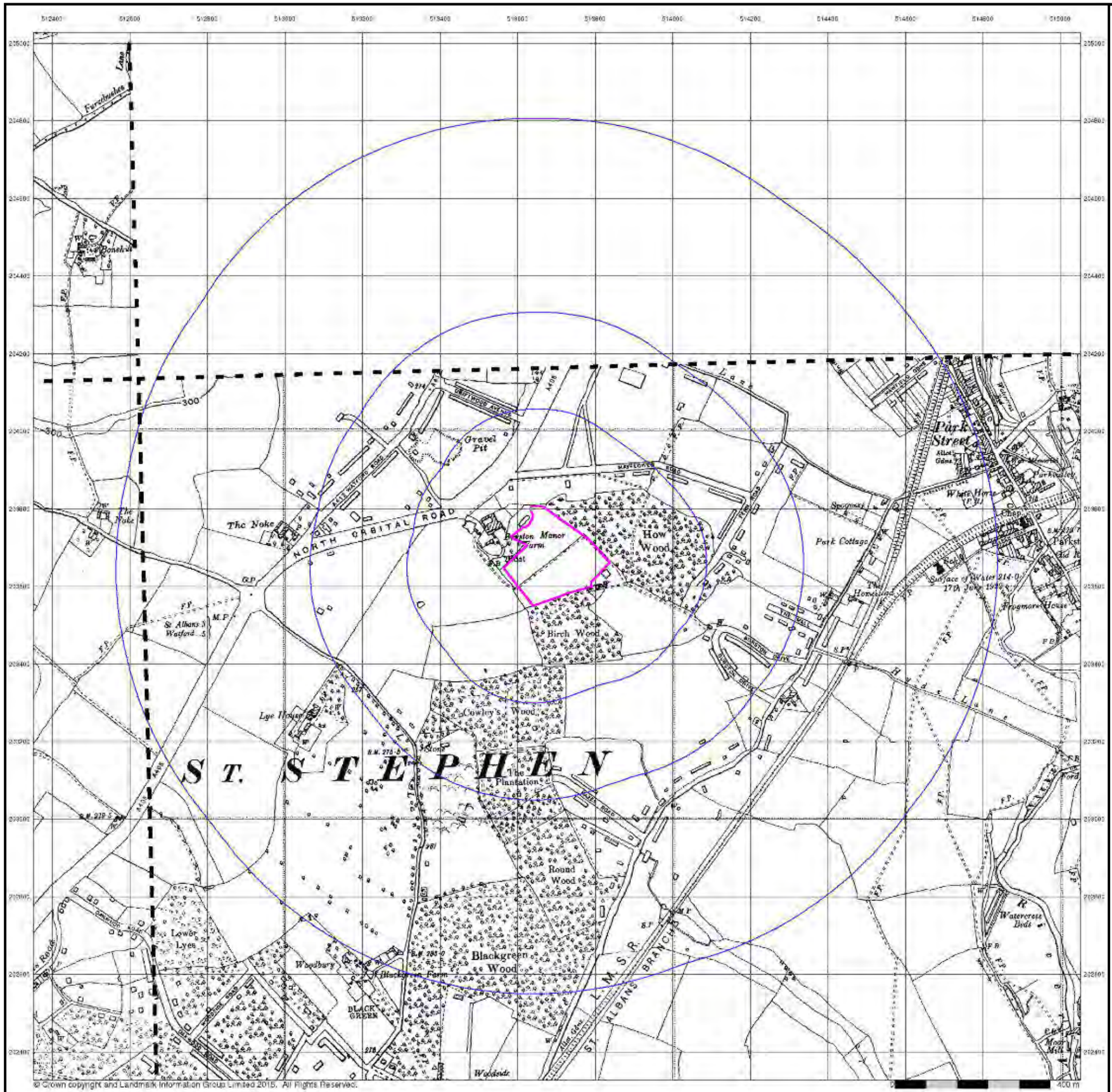


TWEEDIE EVANS CONSULTING

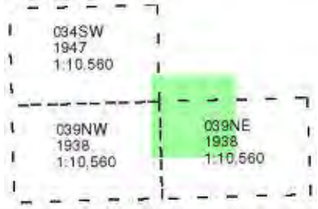
Hertfordshire

Published 1938 - 1947

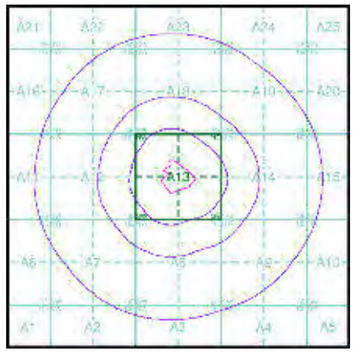
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



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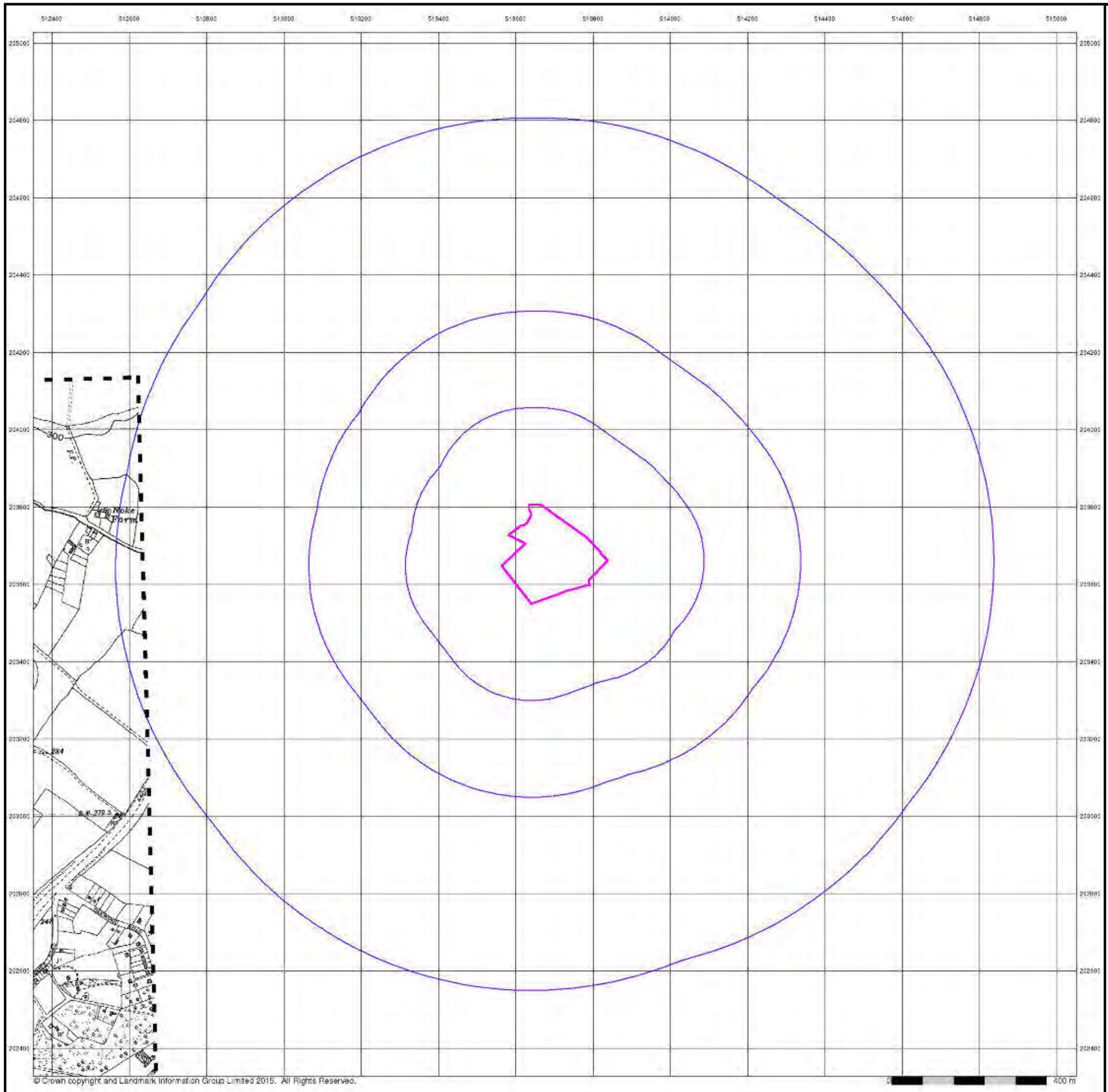


TWEEDIE EVANS CONSULTING

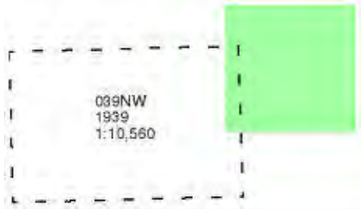
Hertfordshire

Published 1939

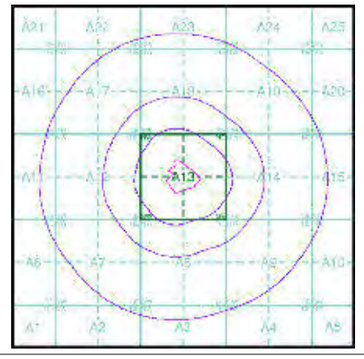
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



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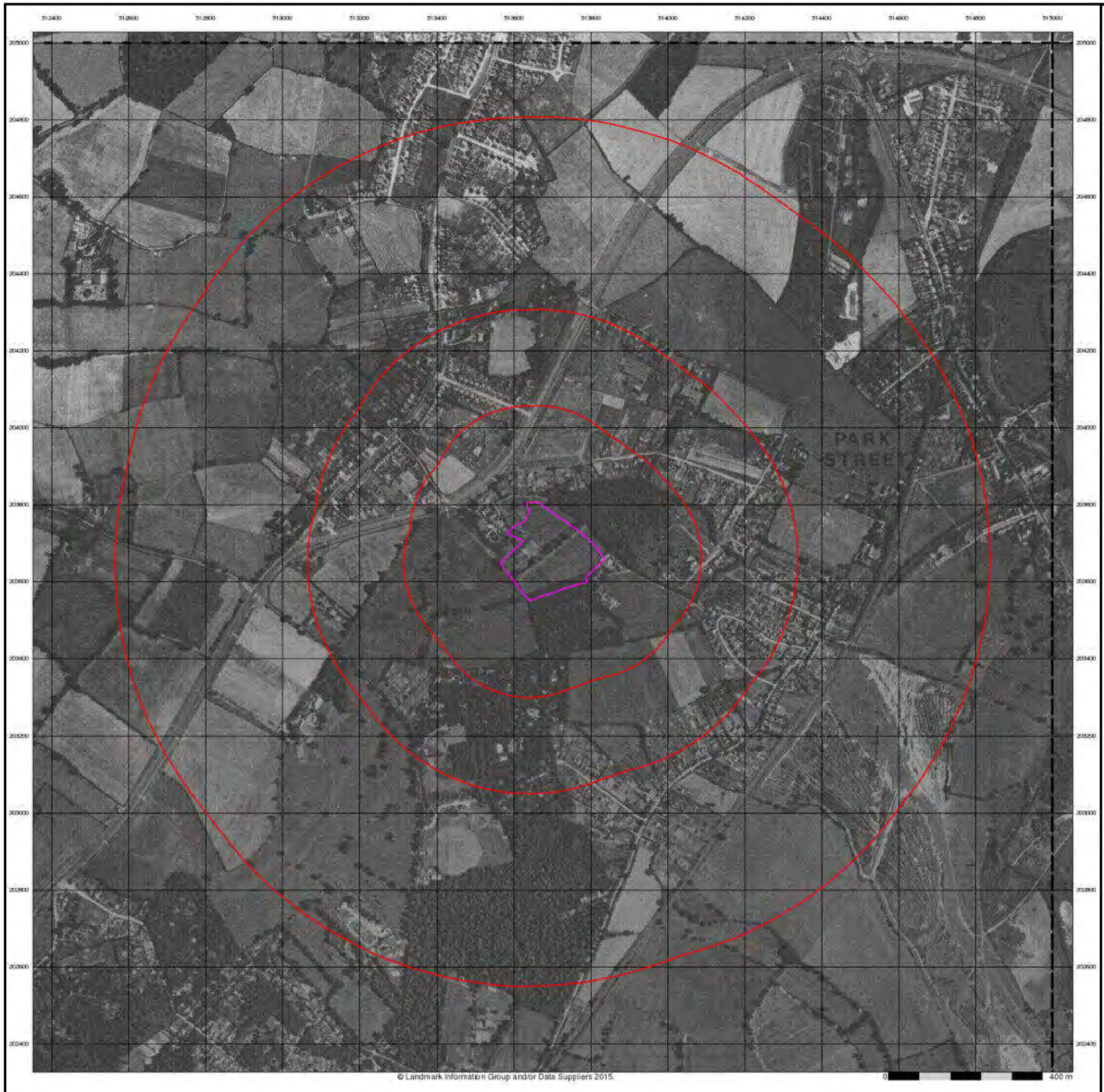


TWEEDIE EVANS CONSULTING

Historical Aerial Photography

Published 1947

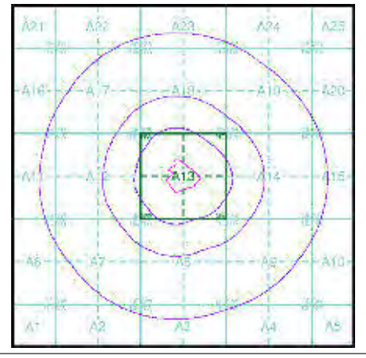
Source map scale - 1:10,560

The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

Map Name(s) and Date(s)

TL10NW 1947 1:10,560	TL10NE 1947 1:10,560
TL10SW 1947 1:10,560	TL10SE 1947 1:10,560

Historical Aerial Photography - Slice A

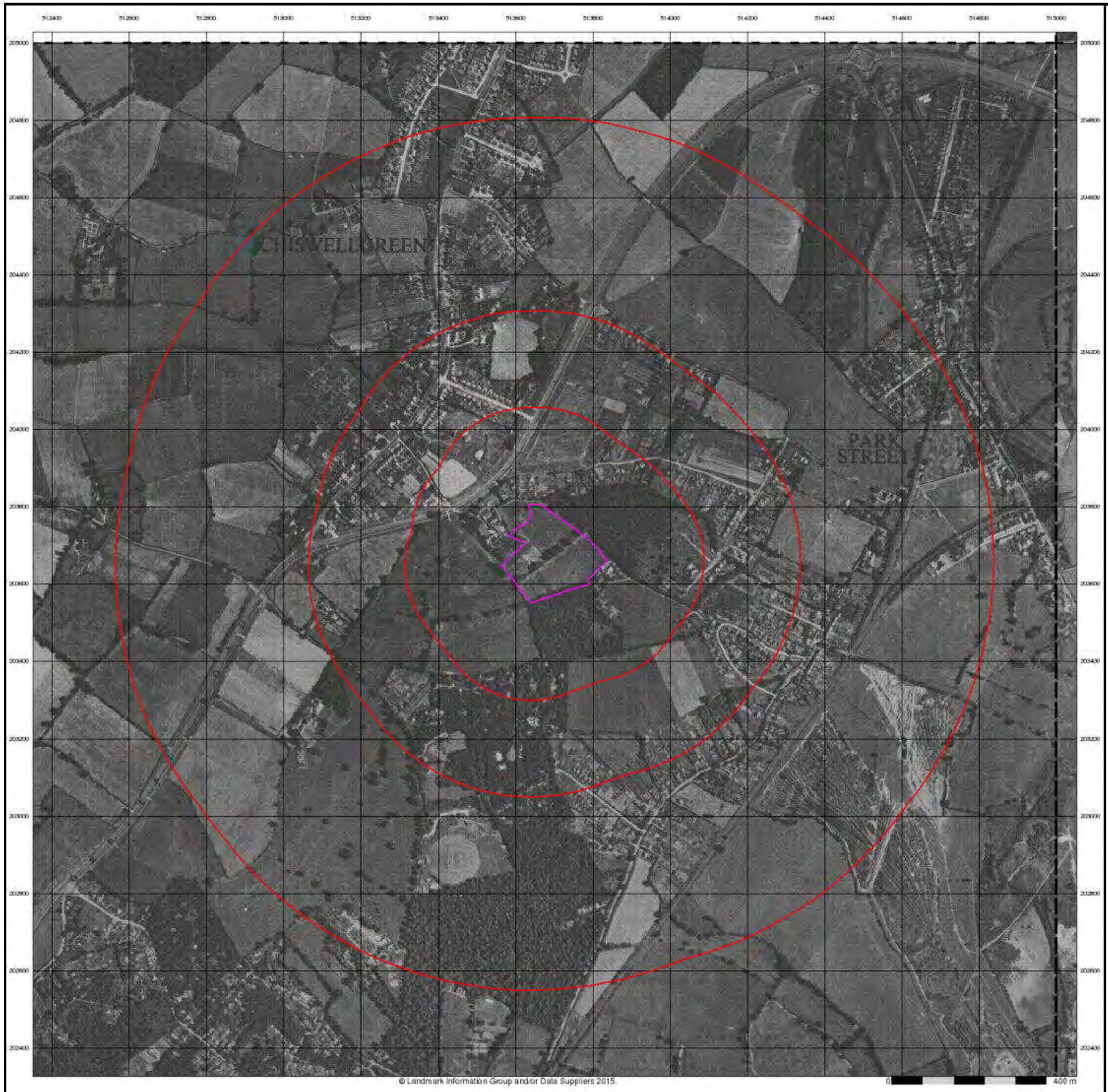


Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	1000

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS



TWEEDIE EVANS CONSULTING

Historical Aerial Photography

Published 1947

Source map scale - 1:10,560

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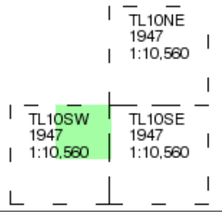
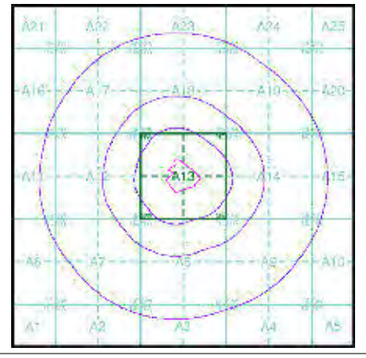


Historical Aerial Photography - Slice A



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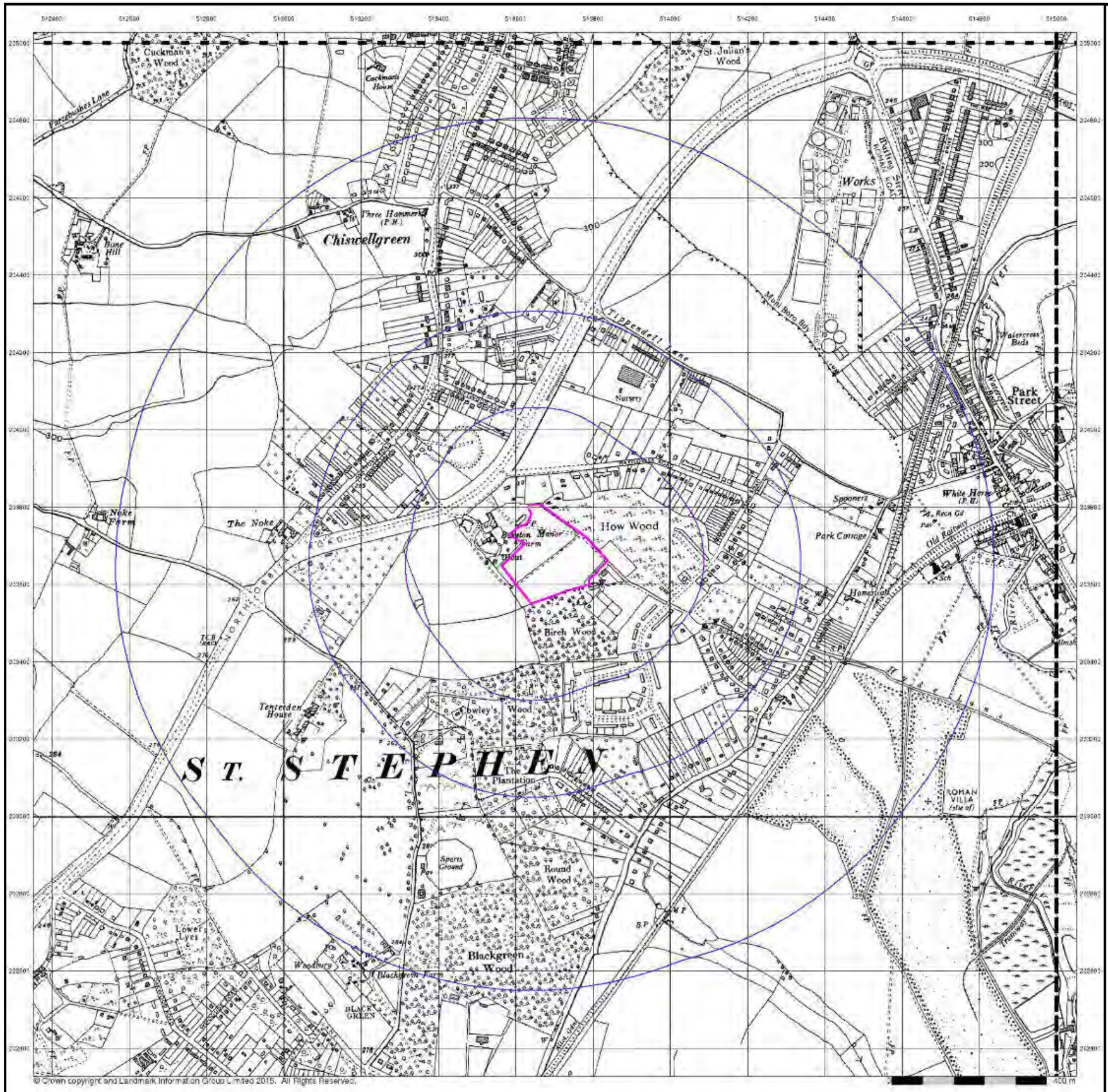


TWEEDIE EVANS CONSULTING

Ordnance Survey Plan

Published 1960

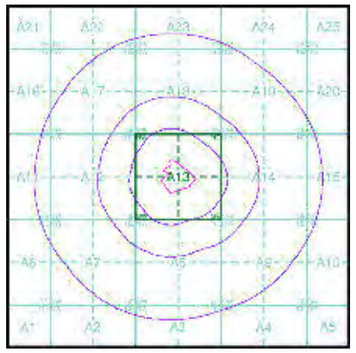
Source map scale - 1:10,000

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

Map Name(s) and Date(s)

TL10NW 1960 1:10,560	TL10NE 1960 1:10,560
TL10SW 1960 1:10,560	TL10SE 1960 1:10,560

Historical Map - Slice A



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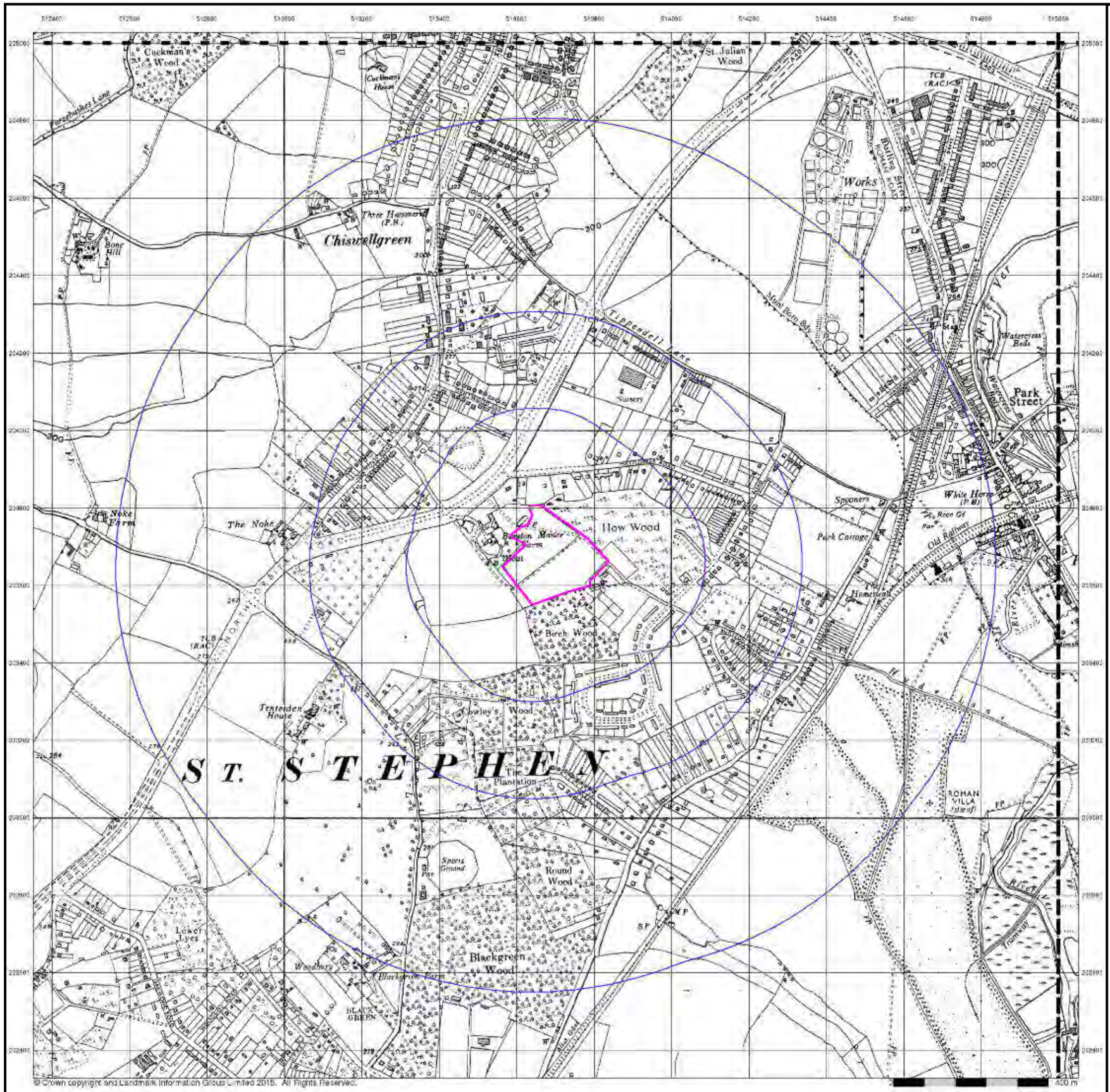

TWEEDIE EVANS CONSULTING

Ordnance Survey Plan

Published 1964 - 1965

Source map scale - 1:10,000

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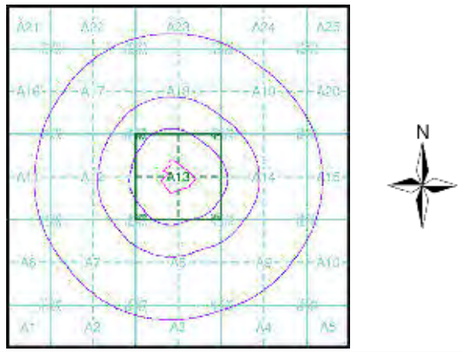
Map Name(s) and Date(s)

Historical Map - Slice A



Order Details

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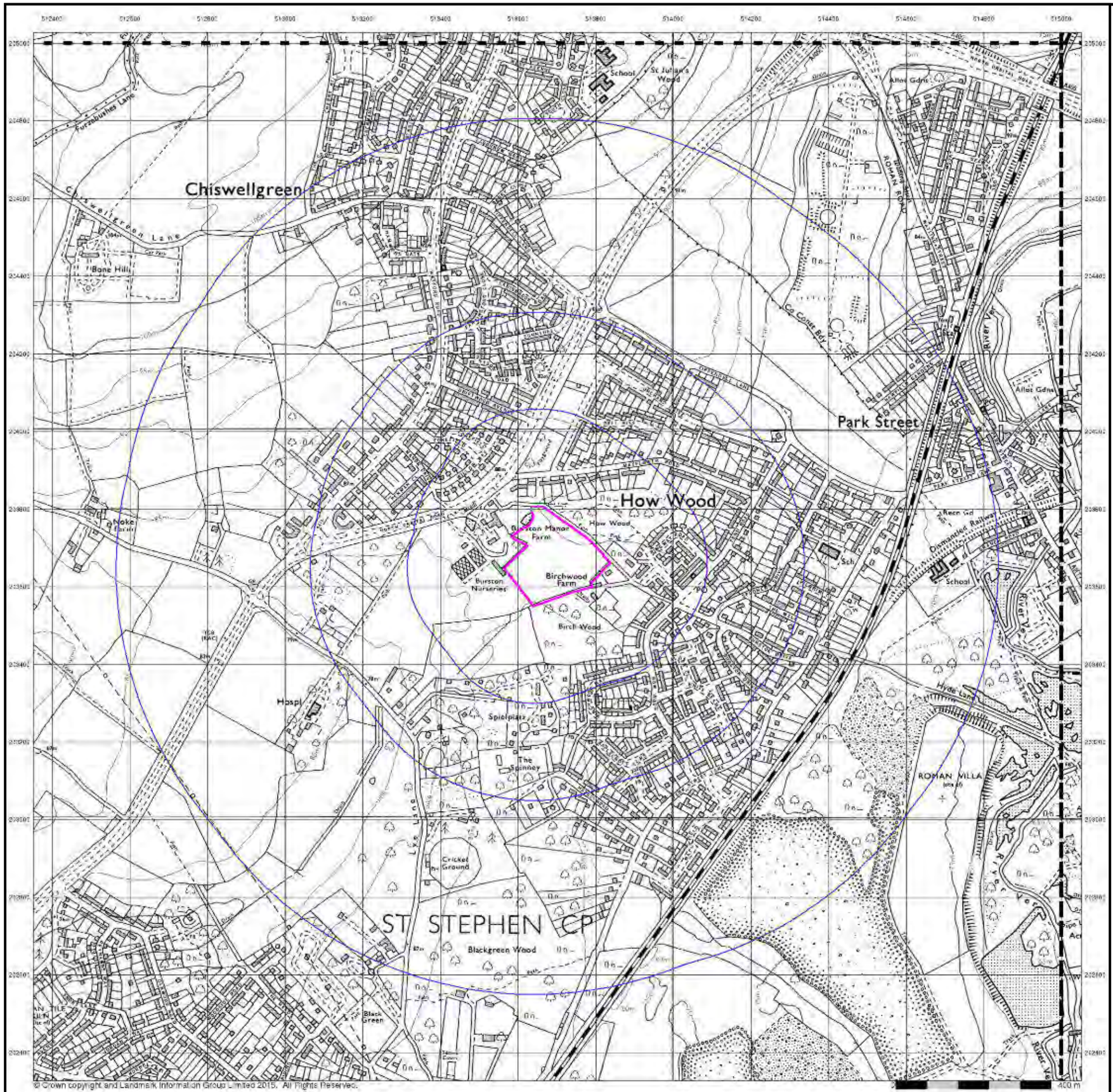

TWEEDIE EVANS CONSULTING

Ordnance Survey Plan

Published 1972 - 1978

Source map scale - 1:10,000

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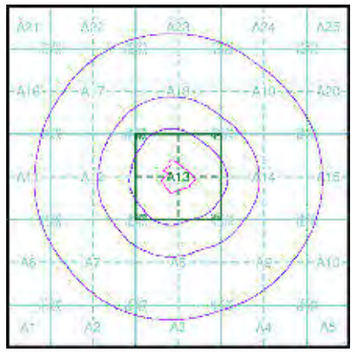
Map Name(s) and Date(s)

TL10NW 1978 1:10,000	TL10NE 1978 1:10,000
TL10SW 1975 1:10,000	TL10SE 1972 1:10,000

Historical Map - Slice A



Order Details

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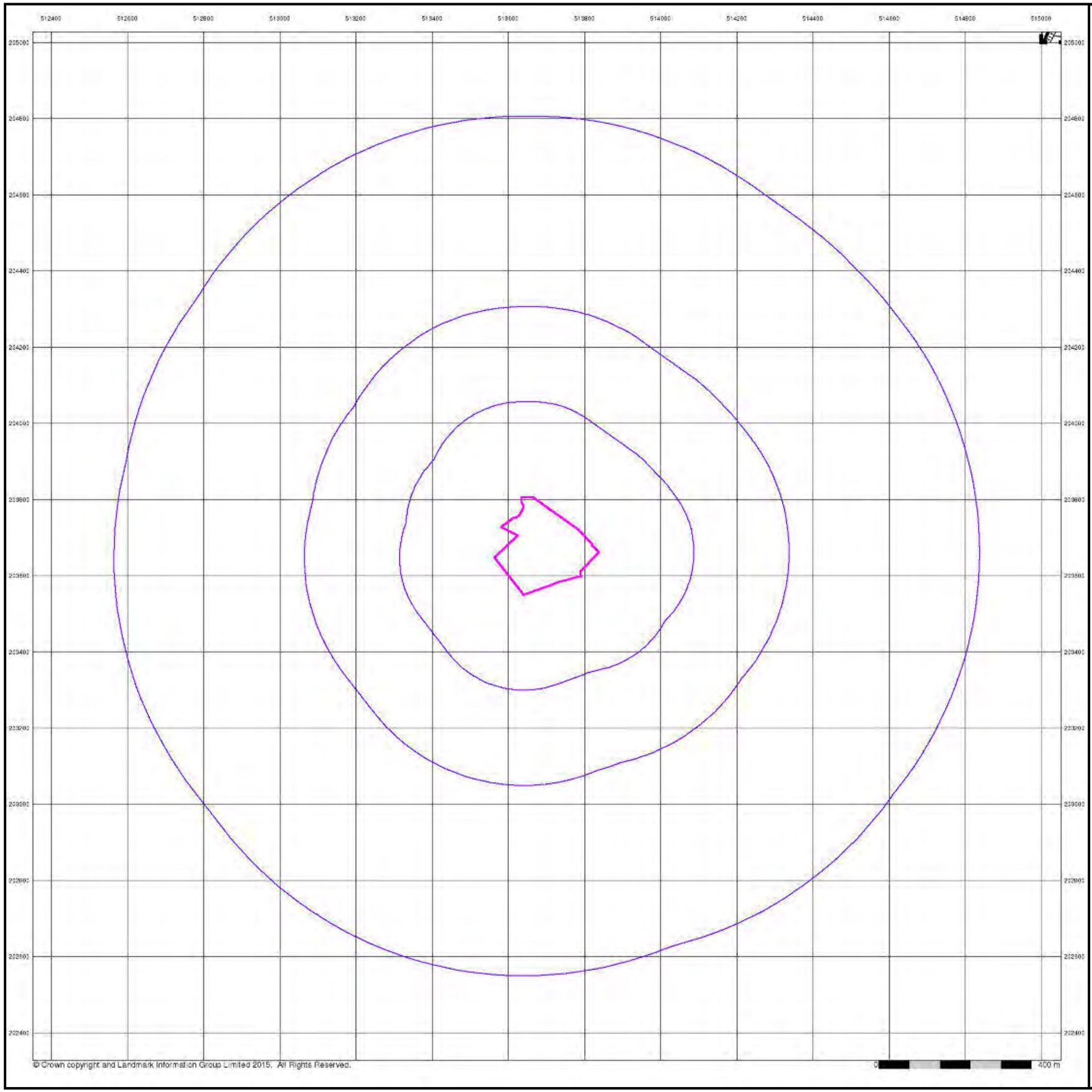

TWEEDIE EVANS CONSULTING

Ordnance Survey Plan

Published 1985

Source map scale - 1:10,000

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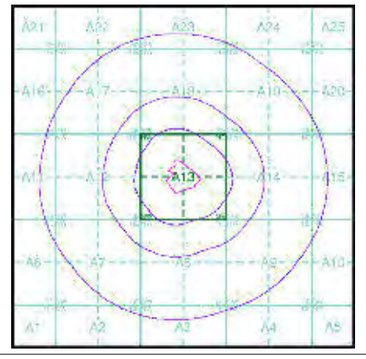
Map Name(s) and Date(s)

Historical Map - Slice A



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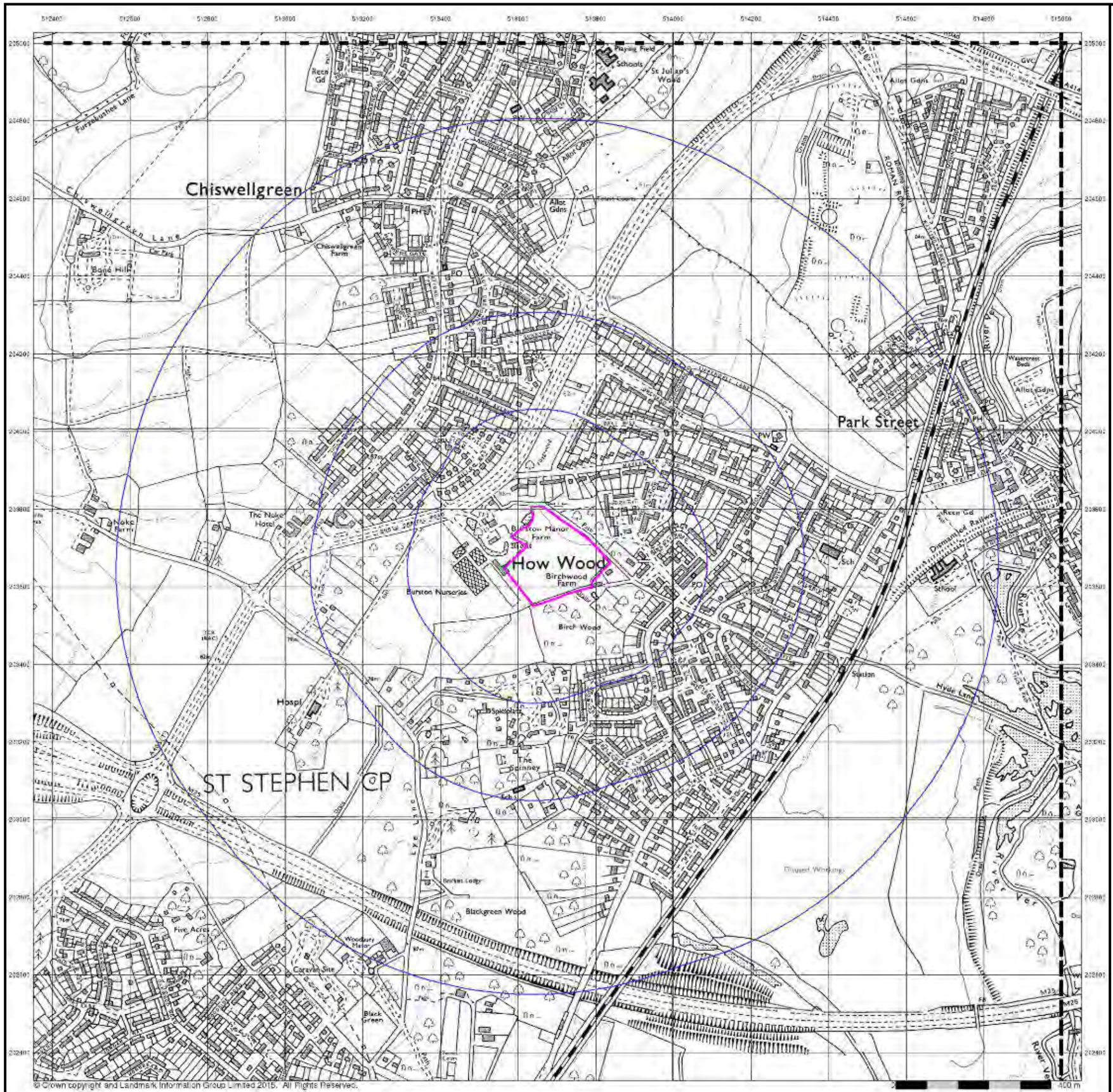


TWEEDIE EVANS CONSULTING

Ordnance Survey Plan

Published 1990 - 1992

Source map scale - 1:10,000

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

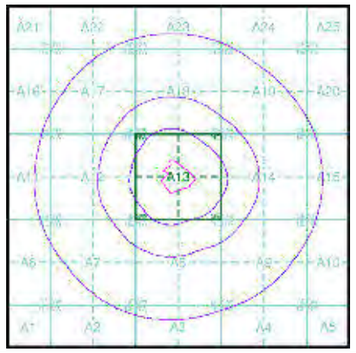
Map Name(s) and Date(s)

TL10NW 1992 1:10,000

TL10SW 1990 1:10,000

TL10SE 1990 1:10,000

Historical Map - Slice A



Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	1000

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS

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10k Raster Mapping

Published 1999

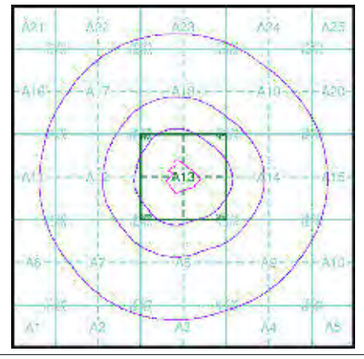
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

TL10NW 1999 1:10,000	TL10NE 1999 1:10,000
TL10SW 1999 1:10,000	TL10SE 1999 1:10,000

Historical Map - Slice A



Order Details

Order Number:	131490767_1_1
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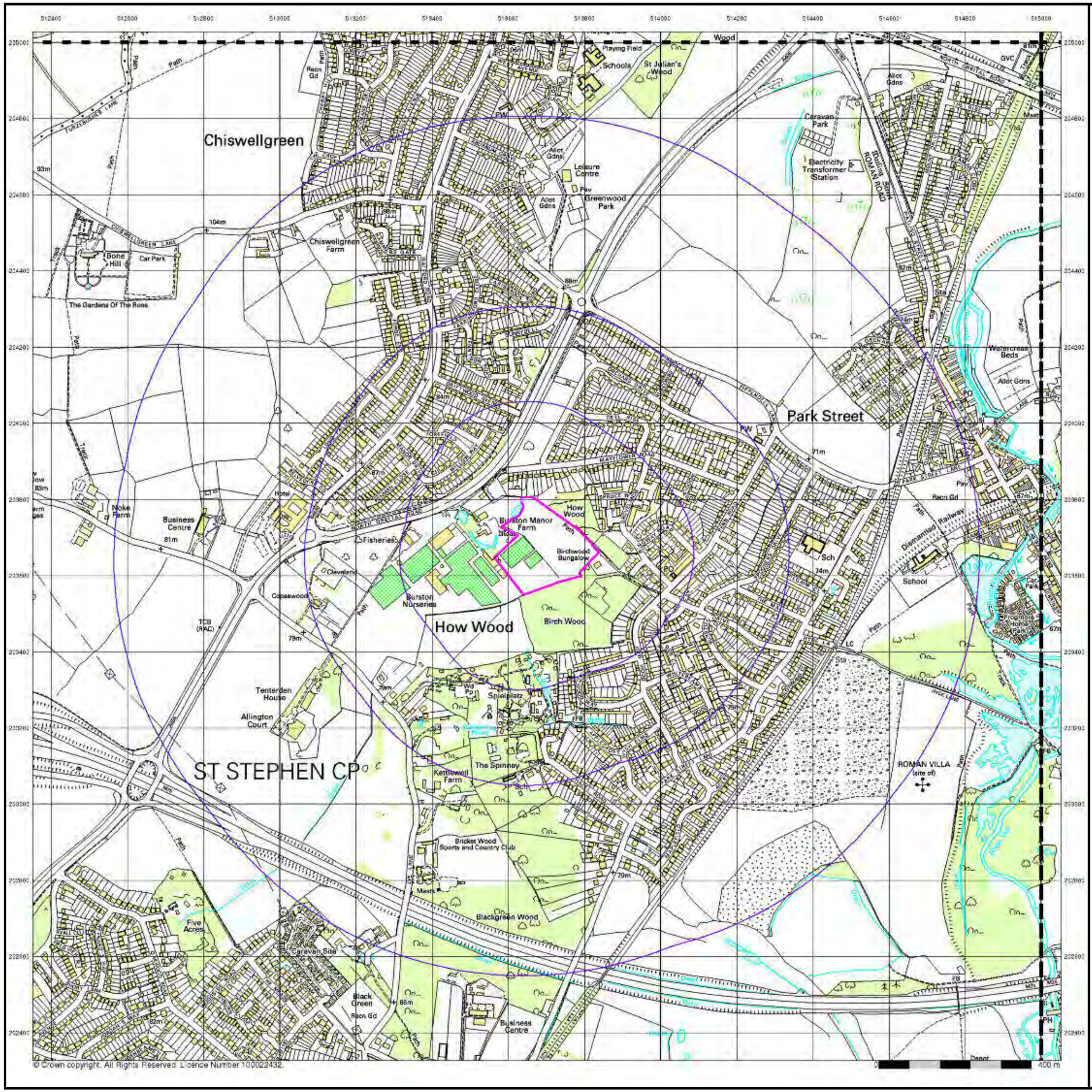

TWEEDIE EVANS CONSULTING

10k Raster Mapping

Published 2006

Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

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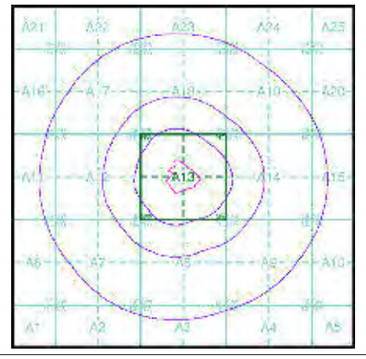
TL10SW 2006 1:10,000	TL10SE 2006 1:10,000

Historical Map - Slice A

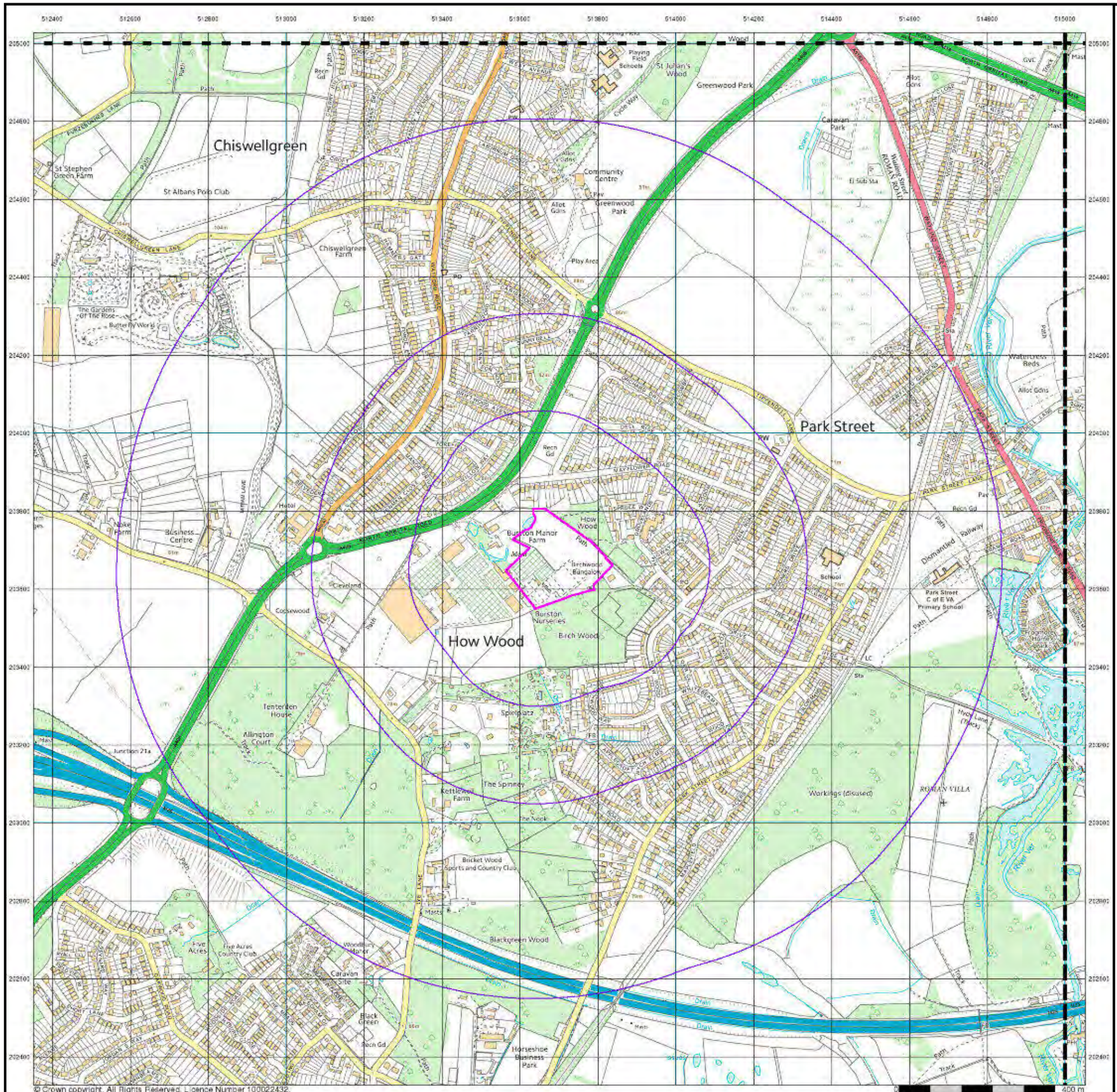


Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	1000

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS



TWEEDIE EVANS CONSULTING

VectorMap Local

Published 2017

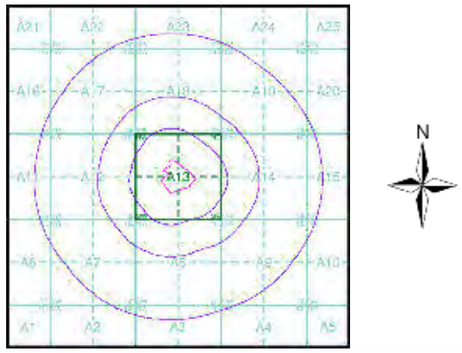
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

TL10NW 2017 Variable	TL10NE 2017 Variable
TL10SW 2017 Variable	TL10SE 2017 Variable

Historical Map - Slice A



Order Details

Order Number:	131490767_1_1
Customer Ref:	1706007
National Grid Reference:	513690, 203670
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	1000

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APPENDIX C

Envirocheck®

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
122807064_1_1

Customer Reference:
CCD/St Albans

National Grid Reference:
513690, 203660

Slice:
A

Site Area (Ha):
4.

Search Buffer (m):
1000

Site Details:

Burston Nurseries Ltd, North Orbital Road
ST. ALBANS
AL2 2DS

Client Details:

Mrs A Davies
Castleoak Care Developments
Raglan House
Malt House Avenue
Cardiff Gate Business Park
Cardiff
CF23 8RA

Envirocheck®
LANDMARK INFORMATION GROUP

Contents

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	6
Hazardous Substances	-
Geological	10
Industrial Land Use	12
Sensitive Land Use	18
Data Currency	19
Data Suppliers	25
Useful Contacts	26

Introduction

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

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

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Ove Arup Copyright Notice

Peter Brett Associates Copyright Notice

Radon Potential dataset Copyright Notice

Report Version v50.0

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes		Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1		2	1	
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices	pg 2				1
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 2			1	
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 2		Yes		
Pollution Incidents to Controlled Waters	pg 2			1	
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality					
River Quality Biology Sampling Points					
Substantiated Pollution Incident Register					
River Quality Chemistry Sampling Points					
Water Abstractions	pg 2				(*9)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 4	Yes	n/a	n/a	n/a
Drift Deposits	pg 5	1	n/a	n/a	n/a
Bedrock Aquifer Designations	pg 5	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 5	Yes	n/a	n/a	n/a
Source Protection Zones	pg 5	2			1
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites	pg 6				4
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Landfill Coverage	pg 6	2	n/a	n/a	n/a
Local Authority Recorded Landfill Sites	pg 7				9
Potentially Infilled Land (Non-Water)	pg 8		1	1	1
Potentially Infilled Land (Water)	pg 8		1	1	3
Registered Landfill Sites	pg 9				1
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 10	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 10	Yes			Yes
BGS Recorded Mineral Sites	pg 10			1	2
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 11	Yes		n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 11	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards	pg 11	Yes	Yes	n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 11	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 11	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 11	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 12		6	10	20
Fuel Station Entries	pg 15			1	
Points of Interest - Commercial Services	pg 15			3	7
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 16				4
Points of Interest - Public Infrastructure	pg 16			3	4
Points of Interest - Recreational and Environmental	pg 16		2		2
Gas Pipelines					
Underground Electrical Cables					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland	pg 18				2
Areas of Adopted Green Belt	pg 18	1			
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 18	1			
Ramsar Sites					
Sites of Special Scientific Interest	pg 18				1
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SW (SW)	0	2	513693 203660
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (NE)	279	2	513900 204000
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (NE)	314	2	514000 203950
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (NE)	353	2	514000 204000
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12SE (SW)	381	2	513250 203400
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A14NW (NE)	385	2	514100 203950
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A14NW (E)	403	2	514200 203850
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A14NW (NE)	420	2	514100 204000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A19SW (NE)	455	2	514100 204050
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A14NW (E)	463	2	514300 203750
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A19SW (NE)	493	2	514100 204100
1	**Discharge Consents** Operator: Mr Julian W Johns Property Type: Undefined Or Other Location: 8 Manor Drive, Chiswell Green, St Albans, Herts Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Ctcu.1004 Permit Version: 2 Effective Date: 20th October 2005 Issued Date: 20th October 2005 Revocation Date: 20th October 2017 Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Into Land Receiving Water: Gravel Strata **Status: Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 100m	A13NW (NW)	224	3	513400 203800
1	**Discharge Consents** Operator: Mr Julian W Johns Property Type: Undefined Or Other Location: 8 Manor Drive, Chiswell Green, St Albans, Herts Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CTCU.1004 Permit Version: 1 Effective Date: 18th December 1980 Issued Date: 18th December 1980 Revocation Date: 19th October 2005 Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Into Land Receiving Water: Gravel Strata **Status: Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 100m	A13NW (NW)	224	3	513400 203800

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
2	**Discharge Consents** Operator: Mr K Kelly Property Type: DOMESTIC PROPERTY (SINGLE) (INCL FARM HOUSE) Location: Plot 3, Gardenia Lye Lane Brickettwood Near St Albans Hertfordshire Al2 3td Authority: Environment Agency, Thames Region Catchment Area: Colne Reference: Canm.1213 Permit Version: 1 Effective Date: 14th March 2007 Issued Date: 14th March 2007 Revocation Date: 9th March 2009 Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge Environment: Into Land Receiving Water: To Groundwater Via Borehole **Status: New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A8NW (SW)	346	3	513499 203220
3	**Enforcement and Prohibition Notices** Location: Watford Road, Chiswell Green, ST ALBANS, Hertfordshire, AL2 3DS Permit Reference: Not Given Enforcement Date: Not Supplied Details: Failure to comply with registration condition; under RSA60/RSA93, served 1993,94. Positional Accuracy: Unknown	A12NW (W)	540	3	513018 203720
4	**Local Authority Pollution Prevention and Controls** Name: Shell Petrol Station Location: 551 Watford Road, ST ALBANS, Hertfordshire, AL1 4NA Authority: St Albans City & District Council, Environmental Health Department Permit Reference: VRP/11/2005 Dated: Not Supplied Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station **Status: Permitted** Positional Accuracy: Manually positioned to the address or location	A12NE (W)	436	4	513135 203765
	Nearest Surface Water Feature	A13NW (NW)	11	-	513622 203755
5	**Pollution Incidents to Controlled Waters** Property Type: Not Given Location: Chiswell Green, ST ALBANS Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 13th November 1996 Incident Reference: N1960589 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A12NE (W)	343	3	513250 203800
	Water Abstractions Operator: Mr R Parker Licence Number: 28/39/28/0186 Permit Version: 101 Location: Artesian Boreholes At Burydell Lane, Park Street - A Authority: Environment Agency, Thames Region Abstraction: Aquaculture: Fish Farm/Cress Pond Throughflow Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Burydell Lane, Park Street, St Albans Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 7th April 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A20SW (E)	1051	3	514800 204100

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Mr R Parker Licence Number: 28/39/28/0186 Permit Version: 100 Location: Artesian Boreholes At Burydell Lane, Park Street - A Authority: Environment Agency, Thames Region Abstraction: Aquaculture: Fish Farm/Cress Pond Throughflow Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): 454600 Details: Burydell Lane, Park Street, St Albans Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 27th June 1996 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A20SW (E)	1051	3	514800 204100
	Water Abstractions Operator: Mr R Parker Licence Number: 28/39/28/0186 Permit Version: 101 Location: Artesian Boreholes At Burydell Lane, Park Street - B Authority: Environment Agency, Thames Region Abstraction: Aquaculture: Fish Farm/Cress Pond Throughflow Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Burydell Lane, Park Street, St Albans Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 7th April 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A20SW (NE)	1097	3	514800 204200
	Water Abstractions Operator: Mr R Parker Licence Number: 28/39/28/0186 Permit Version: 100 Location: Artesian Boreholes At Burydell Lane, Park Street - B Authority: Environment Agency, Thames Region Abstraction: Aquaculture: Fish Farm/Cress Pond Throughflow Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): 454600 Details: Burydell Lane, Park Street, St Albans Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 27th June 1996 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A20SW (NE)	1097	3	514800 204200
	Water Abstractions Operator: The Royal National Rose Society Licence Number: Th/039/0028/033 Permit Version: 1 Location: The Gardens Of The Rose, St Albans-Borehole Authority: Environment Agency, Thames Region Abstraction: Horticulture And Nurseries: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 1st April 2014 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A16SE (NW)	1200	3	512580 204340

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: The Royal National Rose Society Licence Number: 28/39/28/0596 Permit Version: 1 Location: The Gardens Of The Rose, St Albans-Borehole Authority: Environment Agency, Thames Region Abstraction: Agriculture: Horticultural Watering Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: The Gardens Of The Rose, Chiswell Green Lane, Chiswell Green, St Albans. Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st July 2005 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A16SE (NW)	1200	3	512580 204340
	Water Abstractions Operator: G C Taylor Licence Number: 28/39/28/0022 Permit Version: Not Supplied Location: Moor Mill Farm, FROGMORE, Hertfordshire Authority: Environment Agency, Thames Region Abstraction: Agriculture (General) Abstraction Type: Not Supplied Source: Groundwater Daily Rate (m3): 5 Yearly Rate (m3): 318 Details: Chalk (Undifferentiated). Status: Revoked; Lapsed Or Cancelled Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A5NW (SE)	1632	3	515001 202501
	Water Abstractions Operator: Lafarge Redland Readymix Limited Licence Number: 28/39/28/0512 Permit Version: 100 Location: Borehole At Radlett Pit, Park Street, Herts. Authority: Environment Agency, Thames Region Abstraction: Mineral Products: Make-Up Or Top Up Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 1818 Yearly Rate (m3): 90922 Details: Radlett Pit, Park Street, Herts. Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st June 1998 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	(E)	1771	3	515600 203900
	Water Abstractions Operator: Lafarge Aggregates Limited Licence Number: 28/39/28/0512 Permit Version: 101 Location: Borehole At Radlett Pit, Park Street, Herts. Authority: Environment Agency, Thames Region Abstraction: Mineral Products: Make-Up Or Top Up Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Radlett Pit, Park Street, Herts. Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 19th October 2001 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(E)	1813	3	515630 203980
	Groundwater Vulnerability Soil Classification: Soils of Low Leaching Potential - Soils in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have large ability to attenuate diffuse pollutants. Lateral flow from these soils contribute to groundwater recharge elsewhere in the catchment Map Sheet: Sheet 39 West London Scale: 1:100,000	A13SW (SW)	0	3	513693 203660

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Drift Deposits Drift Deposit: Low permeability drift deposits occuring at the surface and overlying Major and Minor Aquifers are head, clay-with-flints, brickearth, peat, river terrace deposits and marine and estuarine alluvium Map Sheet: Sheet 39 West London Scale: 1:100,000	A13SW (SW)	0	3	513693 203660
	Bedrock Aquifer Designations Aquifer Designation: Principal Aquifer	A13SW (SW)	0	2	513693 203660
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - Undifferentiated	A13SW (SW)	0	2	513693 203660
6	**Source Protection Zones** Name: Various Source: Environment Agency, Head Office Reference: Not Supplied Type: Zone III (Total Catchment): The total area needed to support the discharge from the protected groundwater source.	A13SW (SW)	0	3	513693 203660
7	**Source Protection Zones** Name: Various Source: Environment Agency, Head Office Reference: Not Supplied Type: Zone II (Outer Protection Zone): Either 25% of the source area or a 400 day travel time whichever is greater.	A13SW (SW)	0	3	513693 203660
8	**Source Protection Zones** Name: Bricket Wood Source: Environment Agency, Head Office Reference: Th013 Type: Zone I (Inner Protection Zone): Travel time of 50 days or less to the groundwater source.	A8SE (S)	895	3	513870 202676
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
9	**Historical Landfill Sites** Licence Holder: Inns and Company/Redland Aggregrates Limited Location: St. Albans, Hertfordshire Name: Moor Mill Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD12916 First Input Date: 30th April 1968 Last Input Date: 31st May 1976 Specified Waste Type: Deposited Waste included Industrial, Commercial and Household Waste, and Liquid Sludge EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: 1900/0381 BGS Ref: Not Supplied Other Ref: HCC/056, 1900/0380, 1900/0377, 1900/0379	A9NW (SE)	673	3	514344 203200
10	**Historical Landfill Sites** Licence Holder: Redland Aggregates Limited Location: St. Albans, Hertfordshire Name: Moor Mill Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD13071 First Input Date: 2nd June 1961 Last Input Date: 31st March 1978 Specified Waste Type: Deposited Waste included Industrial, Commercial and Household Waste EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: 1900/0382 BGS Ref: Not Supplied Other Ref: 77/21, HCC/215	A9NW (SE)	711	3	514235 203042
11	**Historical Landfill Sites** Licence Holder: St Albans County Council Location: Watling Street, St Albans, Hertfordshire Name: Park Street Sewage Works Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD13031 First Input Date: Not Supplied Last Input Date: Not Supplied Specified Waste Type: Not Supplied EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: 1900/0064 BGS Ref: Not Supplied Other Ref: 3241, Ex/0015, EXEMPT 3241	A19SW (NE)	765	3	514280 204312
12	**Historical Landfill Sites** Licence Holder: Redland Gravel/inns and Company Limited Location: Colney Street, Bricket Wood, Hertfordshire Name: Smug Oak Lane Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD12314 First Input Date: 31st July 1968 Last Input Date: 30th April 1976 Specified Waste Type: Deposited Waste included Industrial, Commercial and Household Waste EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: 1900/0063 BGS Ref: Not Supplied Other Ref: HCC/167, HCC/109, 144	A3NE (S)	950	3	513939 202644
	Local Authority Landfill Coverage Name: Hertfordshire County Council - Has supplied landfill data		0	5	513693 203660
	Local Authority Landfill Coverage Name: St Albans District Council - Has supplied landfill data		0	4	513693 203660

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
13	**Local Authority Recorded Landfill Sites** Location: Moor Mill Reference: Not Supplied Authority: St Albans City & District Council, Environmental Health Department **Last Reported Status:** **Closed** Types of Waste: Not Supplied Date of Closure: 31/05/1976 Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate	A9NW (SE)	667	4	514334 203194
14	**Local Authority Recorded Landfill Sites** Location: Smug Oak Lane, Colney Street, St. Albans Reference: Not Supplied Authority: St Albans City & District Council, Environmental Health Department **Last Reported Status:** **Unknown** Types of Waste: Non-Putrescible And Non-Hazardous Date of Closure: Not Supplied Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate	A9NW (SE)	715	4	514198 203009
15	**Local Authority Recorded Landfill Sites** Location: Moor Mill Reference: Not Supplied Authority: St Albans City & District Council, Environmental Health Department **Last Reported Status:** **Closed** Types of Waste: Not Supplied Date of Closure: 31/03/1978 Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate	A9NW (SE)	717	4	514199 203008
16	**Local Authority Recorded Landfill Sites** Location: Moor Mill Reference: Not Supplied Authority: St Albans City & District Council, Environmental Health Department **Last Reported Status:** **Closed** Types of Waste: Not Supplied Date of Closure: 30/04/1977 Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate	A9NE (SE)	844	4	514385 202997
17	**Local Authority Recorded Landfill Sites** Location: Moor Mill Reference: Not Supplied Authority: St Albans City & District Council, Environmental Health Department **Last Reported Status:** **Closed** Types of Waste: Not Supplied Date of Closure: 31/12/1969 Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate	A9NE (SE)	866	4	514622 203276
18	**Local Authority Recorded Landfill Sites** Location: Smug Oak Lane, Colney Street, St. Albans Reference: Not Supplied Authority: St Albans City & District Council, Environmental Health Department **Last Reported Status:** **Unknown** Types of Waste: Not Supplied Date of Closure: Not Supplied Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate	A8SE (S)	888	4	513999 202733
19	**Local Authority Recorded Landfill Sites** Location: Land Adjacent M25 Bricket Wood Reference: 545 Authority: Hertfordshire County Council, Spatial Planning and Economy Unit **Last Reported Status:** **Unknown** Types of Waste: Not Supplied Date of Closure: Not Supplied Positional Accuracy: Located by supplier to within 100m Boundary Quality: Not Applicable	A7SW (SW)	896	5	513000 202900

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
20	**Local Authority Recorded Landfill Sites** Location: Moor Mill Reference: Not Supplied Authority: St Albans City & District Council, Environmental Health Department **Last Reported Status: Closed** Types of Waste: Not Supplied Date of Closure: 31/04/1976 Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate	A8SE (S)	930	4	513956 202672
21	**Local Authority Recorded Landfill Sites** Location: Park Street Sewage Works, St Albans Reference: Not Supplied Authority: St Albans City & District Council, Environmental Health Department **Last Reported Status: Unknown** Types of Waste: Not Supplied Date of Closure: Not Supplied Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate	A19NE (NE)	999	4	514444 204471
22	**Potentially Infilled Land (Non-Water)** Bearing Ref: NW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1990	A13NW (NW)	207	-	513498 203907
23	**Potentially Infilled Land (Non-Water)** Bearing Ref: NW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1990	A13NW (NW)	277	-	513406 203914
24	**Potentially Infilled Land (Non-Water)** Bearing Ref: SE Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1990	A9NW (SE)	664	-	514335 203203
25	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A12SE (W)	205	-	513358 203564
26	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A8NE (SE)	422	-	513932 203201
27	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1938	A9NW (SE)	665	-	514111 203014
28	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A8SE (S)	693	-	513925 202915
29	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A8SE (S)	842	-	513983 202777

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
30	**Registered Landfill Sites** Licence Holder: Redland Aggregates Ltd Licence Reference: 77/021 Site Location: Moor Mill, Smug Oak Lane, London Colney, St Albans, Hertfordshire Licence Easting: Not Supplied Licence Northing: Not Supplied Operator Location: Woolmer Green, KNEBWORTH, Hertfordshire, SG3 4LF Authority: Environment Agency - Thames Region, North East Area Site Category: Landfill Max Input Rate: Undefined Waste Source Restrictions: Waste produced/controlled by licence holder Status: Licence lapsed/cancelled/defunct/not applicable/surrenderedCancelled Dated: 2nd June 1977 Preceded By Licence: Not Given Superseded By Licence: 89/234 Positional Accuracy: Positioned by the supplier Boundary Accuracy: Good Authorised Waste Non-Biodegradable And Non-Toxic Waste Prohibited Waste Poisonous, Noxious, Polluting Wastes Environment Agency must give specific authorisation for this waste to be acceptedWaste requires prior approval Liquid Wastes	A9NW (SE)	718	3	514192 203002

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: White Chalk Subgroup	A13SW (SW)	0	2	513693 203660
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SW (SW)	0	2	513693 203660
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SW (W)	551	2	513000 203660
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A17SW (NW)	849	2	513000 204319
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A15SW (E)	939	2	514784 203625
31	**BGS Recorded Mineral Sites** Site Name: Burston Manor Farm Gravel Pit Location: , Chiswell Green, St Albans, Hertfordshire Source: British Geological Survey, National Geoscience Information Service Reference: 169695 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Pleistocene Geology: Kesgrave Catchment Subgroup Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	359	2	513367 203993
32	**BGS Recorded Mineral Sites** Site Name: Moor Mill Location: Smug Oak Lane, Bricket Wood, St Albans, Hertfordshire Source: British Geological Survey, National Geoscience Information Service Reference: 2275 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Quaternary Geology: Ancestral Thames River Terrace Deposits Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A9NE (SE)	868	2	514440 203020

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
33	**BGS Recorded Mineral Sites** Site Name: Holt Farm Location: Holt Farm, Chiswell Green, St Albans, Hertfordshire Source: British Geological Survey, National Geoscience Information Service Reference: 2274 Type: Opencast **Status: Ceased** Operator: Not Supplied Operator Location: Not Supplied Periodic Type: Quaternary Geology: Ancestral Thames River Terrace Deposits Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A11SE (W)	898	2	512655 203565
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	2	513693 203660
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	2	513693 203660
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	2	513693 203660
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	2	513693 203660
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	132	2	513678 203926
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	229	2	513951 203908
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	2	513693 203660
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	2	513693 203660
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	132	2	513637 203920
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	2	513693 203660
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	132	2	513637 203920
	Radon Potential - Radon Affected Areas Affected Area: The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	2	513693 203660
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	0	2	513693 203660

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34	**Contemporary Trade Directory Entries** Name: E C S Location: 52, Ringway Road, Park Street, St. Albans, Hertfordshire, AL2 2RD Classification: Refrigerators & Freezers - Servicing & Repairs **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	85	-	513924 203627
34	**Contemporary Trade Directory Entries** Name: A.N.E.S Ltd Location: 52, Ringway Road, Park Street, St. Albans, Hertfordshire, AL2 2RD Classification: Air Conditioning Equipment & Systems **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	85	-	513924 203627
34	**Contemporary Trade Directory Entries** Name: N E S Refrigeration & Air Conditioning Location: 52, Ringway Road, Park Street, St. Albans, Hertfordshire, AL2 2RD Classification: Refrigerators & Freezers - Servicing & Repairs **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	85	-	513924 203627
35	**Contemporary Trade Directory Entries** Name: P S T S Ltd Location: 57, Mayflower Road, Park Street, St. Albans, Hertfordshire, AL2 2QN Classification: Packaging Materials Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	172	-	513855 203883
36	**Contemporary Trade Directory Entries** Name: Best Door Stripping Location: 9, Yewtree End, Park Street, St. Albans, AL2 2TS Classification: Paint & Varnish Stripping **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	209	-	513992 203808
37	**Contemporary Trade Directory Entries** Name: How Wood Home Centre Location: 18-20, How Wood, Park Street, St. Albans, Hertfordshire, AL2 2RA Classification: Hardware **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	209	-	514050 203617
38	**Contemporary Trade Directory Entries** Name: Alldrives St Albans & Watford Location: Meadowside, North Orbital Road, St. Albans, Hertfordshire, AL2 2DP Classification: Asphalt & Coated Macadam Laying Contractors **Status: Active** Positional Accuracy: Automatically positioned to the address	A18SE (N)	307	-	513732 204099
39	**Contemporary Trade Directory Entries** Name: Linepost Wooden Staircases Location: 1, The Laurels, Lye Lane, Bricket Wood, St. Albans, Hertfordshire, AL2 3RR Classification: Staircase, Balustrade & Handrail Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A8NW (SW)	315	-	513433 203292
40	**Contemporary Trade Directory Entries** Name: County Agricultural & Industrial Engineering Location: 7, Mayflower Road, Park Street, St. Albans, Hertfordshire, AL2 2QP Classification: Plant & Machinery Repairs **Status: Active** Positional Accuracy: Automatically positioned to the address	A14NW (E)	356	-	514157 203831
41	**Contemporary Trade Directory Entries** Name: Stewart'S Cleaning Location: 1, Withy Place, Park Street, St. Albans, Hertfordshire, AL2 2SN Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A8NE (SE)	366	-	514030 203320
42	**Contemporary Trade Directory Entries** Name: Shell Chiswell Location: 551 Watford Road,Chiswell, St Albans, Hertfordshire, AL2 3EH Classification: Petrol Filling Stations - 24 Hour **Status: Active** Positional Accuracy: Automatically positioned to the address	A12NE (W)	430	-	513139 203759
43	**Contemporary Trade Directory Entries** Name: Staybright Cleaning Services Location: 43, Spooners Drive, Park Street, St. Albans, Hertfordshire, AL2 2HX Classification: Cleaning Services - Commercial **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	444	-	514288 203624

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
44	**Contemporary Trade Directory Entries** Name: H R Owen Plc Location: 318, Watford Road, St. Albans, Hertfordshire, AL2 3DP Classification: Car Customisation & Conversion Specialists **Status: Active** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	448	-	513224 203945
44	**Contemporary Trade Directory Entries** Name: H R Owen Sportscars Location: 318, Watford Road, St. Albans, Hertfordshire, AL2 3DP Classification: Car Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	448	-	513224 203945
44	**Contemporary Trade Directory Entries** Name: H R Owen Location: 318, Watford Road, St. Albans, Hertfordshire, AL2 3DP Classification: Car Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NE (NW)	448	-	513224 203945
44	**Contemporary Trade Directory Entries** Name: H R Sportscars Location: 318, Watford Road, St. Albans, Hertfordshire, AL2 3DP Classification: Car Dealers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A12NE (NW)	448	-	513224 203945
45	**Contemporary Trade Directory Entries** Name: Aircool Building Services Location: 3, Compton Gardens, St. Albans, Hertfordshire, AL2 3HU Classification: Air Conditioning & Refrigeration Contractors **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18SW (N)	535	-	513567 204316
46	**Contemporary Trade Directory Entries** Name: Bee-Eco Green Cleaning Solutions Location: 106, Park Street Lane, Park Street, St. Albans, Hertfordshire, AL2 2JQ Classification: Commercial Cleaning Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	543	-	514340 203433
46	**Contemporary Trade Directory Entries** Name: Hossacks Location: 106, Park Street Lane, Park Street, St. Albans, Hertfordshire, AL2 2JQ Classification: Clothing & Fabrics - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	543	-	514340 203433
46	**Contemporary Trade Directory Entries** Name: Mallory Alloys Group Ltd Location: 106, Park Street Lane, Park Street, St. Albans, Hertfordshire, AL2 2JQ Classification: Tungsten Tool Manufacturers & Distributors **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SW (E)	543	-	514340 203433
47	**Contemporary Trade Directory Entries** Name: De-Lux Heating Location: 99, Park Street Lane, Park Street, St. Albans, Hertfordshire, AL2 2JA Classification: Boilers - Servicing, Replacements & Repairs **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SE (E)	588	-	514394 203448
48	**Contemporary Trade Directory Entries** Name: Glen Wharmby Location: 6, Acers, Park Street, St. Albans, Hertfordshire, AL2 2BJ Classification: Catering Equipment - Servicing & Repairs **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9NW (SE)	673	-	514168 203040
49	**Contemporary Trade Directory Entries** Name: Enstone Environmental Management Ltd Location: 335, Watford Road, St. Albans, Hertfordshire, AL2 3DA Classification: Waste Disposal Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NW (N)	689	-	513408 204425
49	**Contemporary Trade Directory Entries** Name: Baytree Maintenance Services Location: 335, Watford Road, St. Albans, Hertfordshire, AL2 3DA Classification: Painting & Decorating Supplies **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A18NW (N)	689	-	513408 204425

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
50	**Contemporary Trade Directory Entries** Name: N E Motors Location: 28a, Farringford Close, St. Albans, AL2 3HS Classification: Car Dealers **Status: Active** Positional Accuracy: Automatically positioned to the address	A18NW (N)	689	-	513512 204461
51	**Contemporary Trade Directory Entries** Name: Browning Joinery Location: Unit 5, Noke Lane Business Centre, Noke Lane, St. Albans, Hertfordshire, AL2 3NY Classification: Joinery Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A12NW (W)	755	-	512805 203749
51	**Contemporary Trade Directory Entries** Name: V I P Glass Location: Unit 4, Noke Lane Business Centre, Noke Lane, St. Albans, AL2 3NY Classification: Glass Products - Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A12NW (W)	760	-	512798 203740
51	**Contemporary Trade Directory Entries** Name: Bromac Regrinds Location: Unit 1a, Noke Lane Business Centre, Noke Lane, St. Albans, Hertfordshire, AL2 3NY Classification: Cutting Tools & Machinery **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NW (W)	768	-	512787 203715
51	**Contemporary Trade Directory Entries** Name: Jacksons Metal Spinners Location: Unit 1, Noke Lane Business Centre, Noke Lane, St. Albans, Hertfordshire, AL2 3NY Classification: Metal Spinners **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A12NW (W)	768	-	512787 203715
52	**Contemporary Trade Directory Entries** Name: Abbey Cleaning Services Ltd Location: 18, Hammers Gate, St. Albans, Hertfordshire, AL2 3DZ Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A17NE (NW)	810	-	513294 204503
53	**Contemporary Trade Directory Entries** Name: Kwikpest Location: 12, Old Orchard, Park Street, St. Albans, Hertfordshire, AL2 2QB Classification: Pest & Vermin Control **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A19SE (NE)	875	-	514560 204163
54	**Contemporary Trade Directory Entries** Name: Chiswell Fireplaces Location: 192, Watford Road, St. Albans, Hertfordshire, AL2 3EB Classification: Fireplaces & Mantelpieces **Status: Active** Positional Accuracy: Automatically positioned to the address	A18NW (N)	881	-	513374 204619
55	**Contemporary Trade Directory Entries** Name: Scales Carpet Cleaning Location: 17, Park Street Lane, Park Street, St. Albans, Hertfordshire, AL2 2NB Classification: Waste Disposal Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A15NW (E)	911	-	514726 203893
56	**Contemporary Trade Directory Entries** Name: Pharma Quality People Location: 8, Laburnum Grove, St. Albans, Hertfordshire, AL2 3HQ Classification: Pharmaceutical Manufacturers & Distributors **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A23SW (N)	915	-	513547 204699
57	**Contemporary Trade Directory Entries** Name: Welwyn & Hatfield Paving Location: Lye La, Bricket Wood, St. Albans, Hertfordshire, AL2 3TW Classification: Asphalt & Coated Macadam Laying Contractors **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A2NE (SW)	994	-	513254 202620

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58	**Contemporary Trade Directory Entries** Name: Rmp Meat Supplier Location: Flat 2, 42, Park Street, St. Albans, Hertfordshire, AL2 2PT Classification: Meat Product Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A20SW (E)	995	-	514764 204044
59	**Fuel Station Entries** Name: Shell Chiswell Location: 551, Watford Road, St. Albans, Hertfordshire, AL2 3EH Brand: SHELL Premises Type: Petrol Station **Status: Open** Positional Accuracy: Manually positioned to the address or location	A12NE (W)	428	-	513141 203759
60	**Points of Interest - Commercial Services** Name: Aps Servicing Co Location: 2 Alder Close, Park Street, St. Albans, AL2 2RR Category: Contract Services Class Code: Pest and Vermin Control Positional Accuracy: Positioned to address or location	A13SE (SE)	315	6	514017 203376
61	**Points of Interest - Commercial Services** Name: Shell Chiswell Location: 551 Watford Road, St. Albans, AL2 3EH Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A12NE (W)	412	6	513157 203754
61	**Points of Interest - Commercial Services** Name: Car Wash Location: 551 Watford Road, St. Albans, AL2 3EH Category: Personal, Consumer and other Services Class Code: Vehicle Cleaning Services Positional Accuracy: Positioned to address or location	A12NE (W)	428	6	513141 203759
62	**Points of Interest - Commercial Services** Name: Watford Windscreens Location: 268 Watford Road, St. Albans, AL2 3DN Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A18SW (NW)	549	6	513374 204246
63	**Points of Interest - Commercial Services** Name: Kwikpest Location: 12 Old Orchard, Park Street, St. Albans, AL2 2QB Category: Contract Services Class Code: Pest and Vermin Control Positional Accuracy: Positioned to address or location	A19SE (NE)	875	6	514560 204163
63	**Points of Interest - Commercial Services** Name: Lewis Pest Control Location: 12 Old Orchard, Park Street, St. Albans, AL2 2QB Category: Contract Services Class Code: Pest and Vermin Control Positional Accuracy: Positioned to address or location	A19SE (NE)	875	6	514560 204163
64	**Points of Interest - Commercial Services** Name: B & R Allford Location: 13 Park Street Lane, Park Street, St. Albans, AL2 2NB Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A15NW (E)	933	6	514746 203905
64	**Points of Interest - Commercial Services** Name: B & R Allford Location: 13 Park Street Lane, Park Street, St. Albans, AL2 2NB Category: Repair and Servicing Class Code: Vehicle Repair, Testing and Servicing Positional Accuracy: Positioned to address or location	A15NW (E)	933	6	514746 203904
65	**Points of Interest - Commercial Services** Name: Portland Location: 5 Cuckmans Drive, St. Albans, AL2 3AP Category: Contract Services Class Code: Pest and Vermin Control Positional Accuracy: Positioned to address or location	A22SE (NW)	998	6	513240 204687
65	**Points of Interest - Commercial Services** Name: Portland Location: 5 Cuckmans Drive, St. Albans, AL2 3AP Category: Contract Services Class Code: Pest and Vermin Control Positional Accuracy: Positioned to address or location	A22SE (NW)	998	6	513240 204687

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
66	**Points of Interest - Manufacturing and Production** Name: Noke Nurseries Location: Caravan The Nursery, Noke Lane, St. Albans, AL2 3NY Category: Farming Class Code: Arable Farming Positional Accuracy: Positioned to address or location	A12NW (W)	728	6	512838 203783
67	**Points of Interest - Manufacturing and Production** Name: Works Location: AL2 Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SE (NE)	886	6	514429 204330
67	**Points of Interest - Manufacturing and Production** Name: Works (Disused) Location: Not Supplied Category: Industrial Features Class Code: Unspecified Works Or Factories Positional Accuracy: Positioned to an adjacent address or location	A19SE (NE)	890	6	514436 204329
68	**Points of Interest - Manufacturing and Production** Name: Gravel Pit Location: AL2 Category: Extractive Industries Class Code: Sand, Gravel and Clay Extraction and Merchants Positional Accuracy: Positioned to an adjacent address or location	A9SW (SE)	965	6	514320 202790
69	**Points of Interest - Public Infrastructure** Name: Shell Chiswell Location: 551 Watford Road, St. Albans, AL2 3EH Category: Road And Rail Class Code: Petrol and Fuel Stations Positional Accuracy: Positioned to address or location	A12NE (W)	428	6	513141 203759
69	**Points of Interest - Public Infrastructure** Name: Shell Chiswell Location: 551 Watford Road, St. Albans, AL2 3EH Category: Road And Rail Class Code: Petrol and Fuel Stations Positional Accuracy: Positioned to address or location	A12NE (W)	428	6	513141 203759
69	**Points of Interest - Public Infrastructure** Name: Shell Chiswell Location: 551 Watford Road, St. Albans, AL2 3EH Category: Road And Rail Class Code: Petrol and Fuel Stations Positional Accuracy: Positioned to address or location	A12NE (W)	428	6	513141 203759
70	**Points of Interest - Public Infrastructure** Name: How Wood (Herts) Rail Station Location: Hyde Lane, AL2 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A14SE (E)	652	6	514436 203384
70	**Points of Interest - Public Infrastructure** Name: How Wood Station Location: Hyde Lane, AL2 Category: Public Transport, Stations and Infrastructure Class Code: Railway Stations, Junctions and Halts Positional Accuracy: Positioned to address or location	A14SE (E)	652	6	514436 203384
71	**Points of Interest - Public Infrastructure** Name: Refuse Tip Location: AL2 Category: Infrastructure and Facilities Class Code: Refuse Disposal Facilities Positional Accuracy: Positioned to an adjacent address or location	A9NE (SE)	837	6	514547 203203
72	**Points of Interest - Public Infrastructure** Name: Scales Carpet Cleaning Location: 17 Park Street Lane, Park Street, St. Albans, AL2 2NB Category: Infrastructure and Facilities Class Code: Waste Storage, Processing and Disposal Positional Accuracy: Positioned to address or location	A15NW (E)	911	6	514726 203893
73	**Points of Interest - Recreational and Environmental** Name: Playground Location: Mayflower Road, AL2 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A13NW (N)	122	6	513647 203910

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
73	**Points of Interest - Recreational and Environmental** Name: Playground Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A13NW (N)	149	6	513670 203943
74	**Points of Interest - Recreational and Environmental** Name: Playground Location: North Orbital Road, AL2 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A18NE (N)	646	6	513775 204435
75	**Points of Interest - Recreational and Environmental** Name: Park Street Play Area Location: Park Street Lane, AL2 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A14NE (E)	814	6	514646 203805

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
76	**Ancient Woodland** Name: Blackgreen/Roundwoods Reference: 1115883 Area(m²): 60537.39 Type: Ancient and Semi-Natural Woodland	A8SW (S)	613	7	513600 202927
77	**Ancient Woodland** Name: Not Supplied Reference: 1414155 Area(m²): 64658.19 Type: Ancient and Semi-Natural Woodland	A7SE (S)	902	7	513326 202691
78	**Areas of Adopted Green Belt** Authority: St Albans City & District Council Plan Name: St Albans District Local Plan Review **Status: Adopted** Plan Date: 30th November 1994	A13SW (SW)	0	8	513693 203660
79	**Nitrate Vulnerable Zones** Name: Not Supplied Description: Surface Water Source: Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	A13SW (SW)	0	11	513693 203660
80	**Sites of Special Scientific Interest** Name: Moor Mill Quarry, West Multiple Areas: N Total Area (m2): 1700.19 Source: Natural England Reference: 1006291 Designation Details: Geological Conservation Review Designation Date: 26th March 1992 Date Type: Notified Designation Details: Site Of Special Scientific Interest Designation Date: 26th March 1992 Date Type: Notified	A9SW (S)	861	7	514046 202776

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Watford Borough Council - Environmental Health Department	April 2014	Annual Rolling Update
St Albans City & District Council - Environmental Health Department	February 2015	Annual Rolling Update
Three Rivers District Council - Environmental Health Department	January 2015	Annual Rolling Update
Dacorum Borough Council - Environmental Health Department	September 2013	Annual Rolling Update
Hertsmere Borough Council - Environmental Health Department	September 2014	Annual Rolling Update
Discharge Consents		
Environment Agency - Thames Region	January 2017	Quarterly
Enforcement and Prohibition Notices		
Environment Agency - Anglian Region	March 2013	As notified
Environment Agency - Thames Region	March 2013	As notified
Integrated Pollution Controls		
Environment Agency - Thames Region	October 2008	Not Applicable
Integrated Pollution Prevention And Control		
Environment Agency - South East Region - North East Thames Area	January 2017	Quarterly
Environment Agency - Thames Region	January 2017	Quarterly
Local Authority Integrated Pollution Prevention And Control		
Dacorum Borough Council - Environmental Health Department	February 2013	Annual Rolling Update
Three Rivers District Council - Environmental Health Department	February 2015	Annual Rolling Update
Hertsmere Borough Council - Environmental Health Department	January 2015	Annual Rolling Update
Watford Borough Council - Environmental Health Department	June 2014	Annual Rolling Update
St Albans City & District Council - Environmental Health Department	May 2014	Annual Rolling Update
Local Authority Pollution Prevention and Controls		
Three Rivers District Council - Environmental Health Department	February 2015	Annual Rolling Update
Hertsmere Borough Council - Environmental Health Department	January 2015	Annual Rolling Update
Watford Borough Council - Environmental Health Department	June 2014	Annual Rolling Update
St Albans City & District Council - Environmental Health Department	May 2014	Annual Rolling Update
Dacorum Borough Council - Environmental Health Department	October 2014	Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements		
Three Rivers District Council - Environmental Health Department	February 2015	Annual Rolling Update
Hertsmere Borough Council - Environmental Health Department	January 2015	Annual Rolling Update
Watford Borough Council - Environmental Health Department	June 2014	Annual Rolling Update
St Albans City & District Council - Environmental Health Department	May 2014	Annual Rolling Update
Dacorum Borough Council - Environmental Health Department	October 2014	Annual Rolling Update
Pollution Incidents to Controlled Waters		
Environment Agency - Thames Region	September 1999	Not Applicable
Prosecutions Relating to Authorised Processes		
Environment Agency - Thames Region	March 2013	As notified
Prosecutions Relating to Controlled Waters		
Environment Agency - Thames Region	March 2013	As notified
River Quality		
Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points		
Environment Agency - Head Office	July 2012	Annually
River Quality Chemistry Sampling Points		
Environment Agency - Head Office	July 2012	Annually
Substantiated Pollution Incident Register		
Environment Agency - South East Region - North East Thames Area	January 2017	Quarterly
Environment Agency - Thames Region - North East Area	January 2017	Quarterly
Water Abstractions		
Environment Agency - Thames Region	October 2016	Quarterly
Water Industry Act Referrals		
Environment Agency - Thames Region	January 2017	Quarterly

Agency & Hydrological	Version	Update Cycle
Groundwater Vulnerability Environment Agency - Head Office	April 2015	Not Applicable
Drift Deposits Environment Agency - Head Office	January 1999	Not Applicable
Bedrock Aquifer Designations British Geological Survey - National Geoscience Information Service	August 2015	As notified
Superficial Aquifer Designations British Geological Survey - National Geoscience Information Service	August 2015	As notified
Source Protection Zones Environment Agency - Head Office	February 2017	Quarterly
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office	February 2017	Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office	February 2017	Quarterly
Areas Benefiting from Flood Defences Environment Agency - Head Office	February 2017	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	February 2017	Quarterly
Flood Defences Environment Agency - Head Office	February 2017	Quarterly
Surface Water 1 in 30 year Flood Extent Environment Agency - Head Office	October 2013	As notified
Surface Water 1 in 100 year Flood Extent Environment Agency - Head Office	October 2013	As notified
Surface Water 1 in 1000 year Flood Extent Environment Agency - Head Office	October 2013	As notified
Surface Water Suitability Environment Agency - Head Office	October 2013	As notified
BGS Groundwater Flooding Susceptibility British Geological Survey - National Geoscience Information Service	May 2013	Annually

Waste	Version	Update Cycle
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites		
Environment Agency - Head Office	January 2017	Quarterly
Integrated Pollution Control Registered Waste Sites		
Environment Agency - Thames Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - South East Region - North East Thames Area	August 2016	Quarterly
Environment Agency - Thames Region - North East Area	August 2016	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - South East Region - North East Thames Area	October 2016	Quarterly
Environment Agency - Thames Region - North East Area	October 2016	Quarterly
Local Authority Landfill Coverage		
Dacorum Borough Council - Environmental Health Department	May 2000	Not Applicable
Hertfordshire County Council - Spatial Planning and Economy Unit	May 2000	Not Applicable
Hertsmere Borough Council - Environmental Health Department	May 2000	Not Applicable
St Albans City & District Council - Environmental Health Department	May 2000	Not Applicable
Three Rivers District Council - Environmental Health Department	May 2000	Not Applicable
Watford Borough Council - Environmental Health Department	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
Dacorum Borough Council - Environmental Health Department	May 2000	Not Applicable
Hertfordshire County Council - Spatial Planning and Economy Unit	May 2000	Not Applicable
Hertsmere Borough Council - Environmental Health Department	May 2000	Not Applicable
St Albans City & District Council - Environmental Health Department	May 2000	Not Applicable
Three Rivers District Council - Environmental Health Department	May 2000	Not Applicable
Watford Borough Council - Environmental Health Department	May 2000	Not Applicable
Potentially Infilled Land (Non-Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Potentially Infilled Land (Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Registered Landfill Sites		
Environment Agency - Thames Region - North East Area	March 2003	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - Thames Region - North East Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites		
Environment Agency - Thames Region - North East Area	June 2015	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	March 2017	Bi-Annually
Explosive Sites		
Health and Safety Executive	March 2017	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements		
Hertfordshire County Council - Spatial Planning and Economy Unit	February 2016	Annual Rolling Update
Hertsmere Borough Council - Planning Department	February 2016	Annual Rolling Update
St Albans City & District Council	February 2016	Annual Rolling Update
Three Rivers District Council	February 2016	Annual Rolling Update
Watford Borough Council - Development Control	February 2016	Annual Rolling Update
Dacorum Borough Council	October 2015	Annual Rolling Update
Planning Hazardous Substance Consents		
Hertfordshire County Council - Spatial Planning and Economy Unit	February 2016	Annual Rolling Update
Hertsmere Borough Council - Planning Department	February 2016	Annual Rolling Update
St Albans City & District Council	February 2016	Annual Rolling Update
Three Rivers District Council	February 2016	Annual Rolling Update
Watford Borough Council - Development Control	February 2016	Annual Rolling Update
Dacorum Borough Council	October 2015	Annual Rolling Update

Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology		
British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Estimated Soil Chemistry		
British Geological Survey - National Geoscience Information Service	October 2015	As notified
BGS Recorded Mineral Sites		
British Geological Survey - National Geoscience Information Service	April 2017	Bi-Annually
CBSCB Compensation District		
Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Coal Mining Affected Areas		
The Coal Authority - Property Searches	March 2014	As notified
Mining Instability		
Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain		
British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Compressible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Ground Dissolution Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Landslide Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Running Sand Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	Annually
Radon Potential - Radon Affected Areas		
British Geological Survey - National Geoscience Information Service	July 2011	As notified
Radon Potential - Radon Protection Measures		
British Geological Survey - National Geoscience Information Service	July 2011	As notified

Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	January 2017	Quarterly
Fuel Station Entries Catalist Ltd - Experian	February 2017	Quarterly
Gas Pipelines National Grid	July 2014	Quarterly
Points of Interest - Commercial Services PointX	December 2016	Quarterly
Points of Interest - Education and Health PointX	December 2016	Quarterly
Points of Interest - Manufacturing and Production PointX	December 2016	Quarterly
Points of Interest - Public Infrastructure PointX	December 2016	Quarterly
Points of Interest - Recreational and Environmental PointX	December 2016	Quarterly
Underground Electrical Cables National Grid	December 2015	Bi-Annually

Sensitive Land Use	Version	Update Cycle
Ancient Woodland		
Natural England	August 2016	Bi-Annually
Areas of Adopted Green Belt		
Dacorum Borough Council	February 2017	As notified
Hertsmere Borough Council - Planning Department	February 2017	As notified
St Albans City & District Council	February 2017	As notified
Three Rivers District Council	February 2017	As notified
Watford Borough Council	February 2017	As notified
Areas of Unadopted Green Belt		
Dacorum Borough Council	February 2017	As notified
Hertsmere Borough Council - Planning Department	February 2017	As notified
St Albans City & District Council	February 2017	As notified
Three Rivers District Council	February 2017	As notified
Watford Borough Council	February 2017	As notified
Areas of Outstanding Natural Beauty		
Natural England	January 2017	Bi-Annually
Environmentally Sensitive Areas		
Natural England	January 2017	Annually
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Natural England	January 2017	Bi-Annually
Marine Nature Reserves		
Natural England	January 2017	Bi-Annually
National Nature Reserves		
Natural England	January 2017	Bi-Annually
National Parks		
Natural England	February 2017	Bi-Annually
Nitrate Vulnerable Zones		
Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	October 2015	Annually
Ramsar Sites		
Natural England	January 2017	Bi-Annually
Sites of Special Scientific Interest		
Natural England	January 2017	Bi-Annually
Special Areas of Conservation		
Natural England	January 2017	Bi-Annually
Special Protection Areas		
Natural England	January 2017	Bi-Annually
World Heritage Sites		
English Heritage - National Monument Record Centre	September 2015	Bi-Annually

Data Suppliers

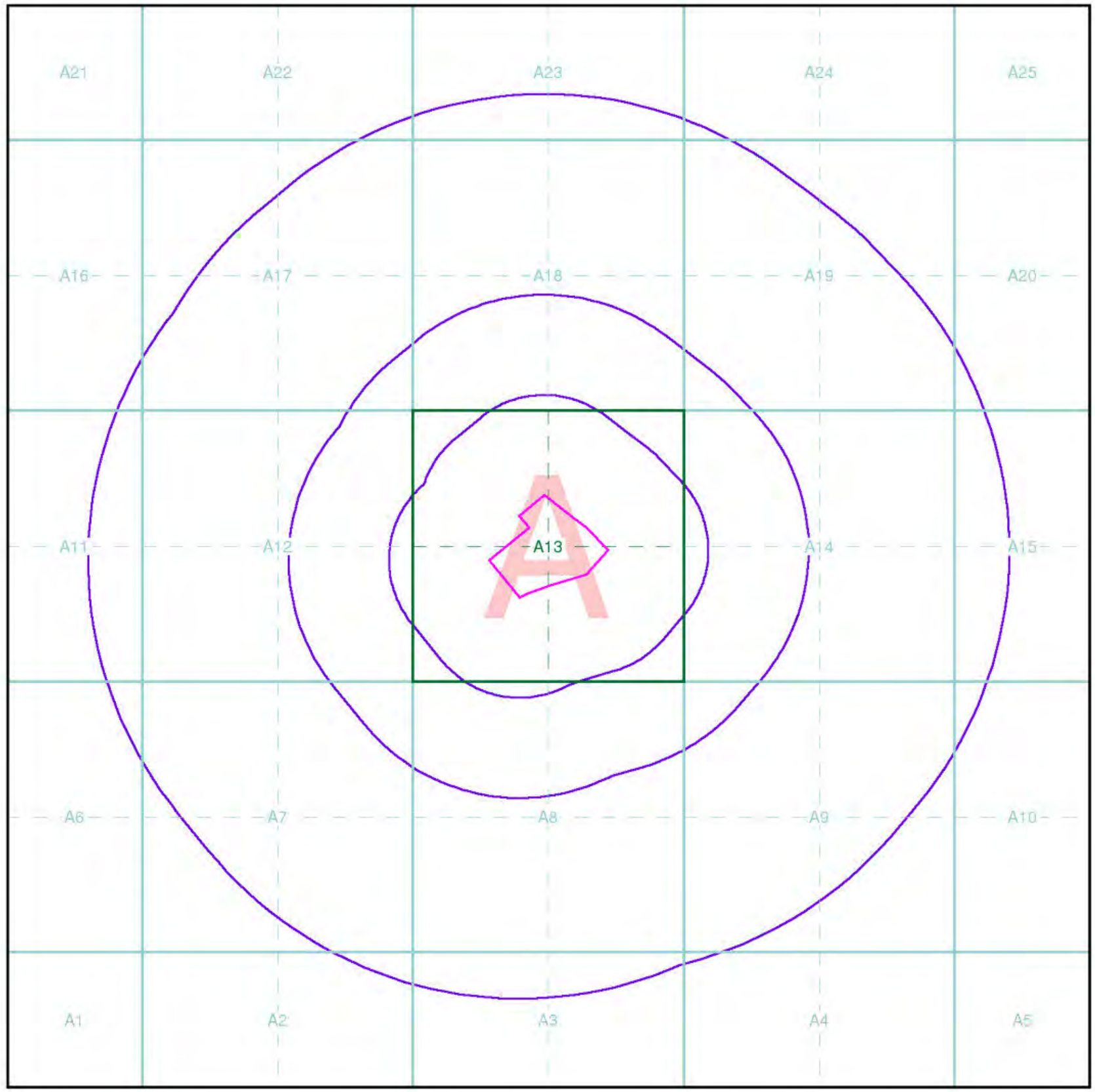
A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Useful Contacts

Contact	Name and Address	Contact Details
2	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
3	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
4	**St Albans City & District Council - Environmental Health Department** Civic Centre, St Peters Street, St Albans, Hertfordshire, AL1 3JE	Telephone: 01727 866100 Fax: 01727 845658 Website: www.stalbans.gov.uk
5	**Hertfordshire County Council - Spatial Planning and Economy Unit** County Hall, Hertford, Hertfordshire, SG13 8DN	Telephone: 01992 556266 Fax: 01992 556015 Email: spatialplanning@hertfordshire.gov.uk Website: www.hertsdirect.org
6	**PointX** 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
7	**Natural England** County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
8	**St Albans City & District Council** Civic Centre, St Peters Street, St Albans, Hertfordshire, AL1 3JE	Telephone: 01727 866100 Fax: 01727 845658 Website: www.stalbans.gov.uk
9	**Three Rivers District Council** Three Rivers House, Northway, Rickmansworth, Hertfordshire, WD3 1RL	Telephone: 01923 776611 Fax: 01923 896119 Website: www.threerivers.gov.uk
10	**Hertsmere Borough Council - Planning Department** Civic Offices, Elstree Way, Borehamwood, Hertfordshire, WD6 1WA	Telephone: 020 8207 2277 Fax: 020 8207 7444 Website: www.hertsmere.gov.uk
11	**Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)** Government Buildings, Otley Road, Lawnswood, Leeds, West Yorkshire, LS16 5QT	Telephone: 0113 2613333 Fax: 0113 230 0879
12	**Environment Agency - Head Office** Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.



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Index Map

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

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

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

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

A selection of organisations who provide data within this report:

Map data

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Environment Agency

NATURAL ENGLAND

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Mrs A Davies, Castleoak Care Developments, Raglan House, Malt House Avenue, Cardiff Gate Business Park, Cardiff, CF23 8RA

Order Details

Order Number:	122807064_1_1
Customer Ref:	CCD/St Albans
National Grid Reference:	513700, 203660
Site Area (Ha):	4.
Search Buffer (m):	1000

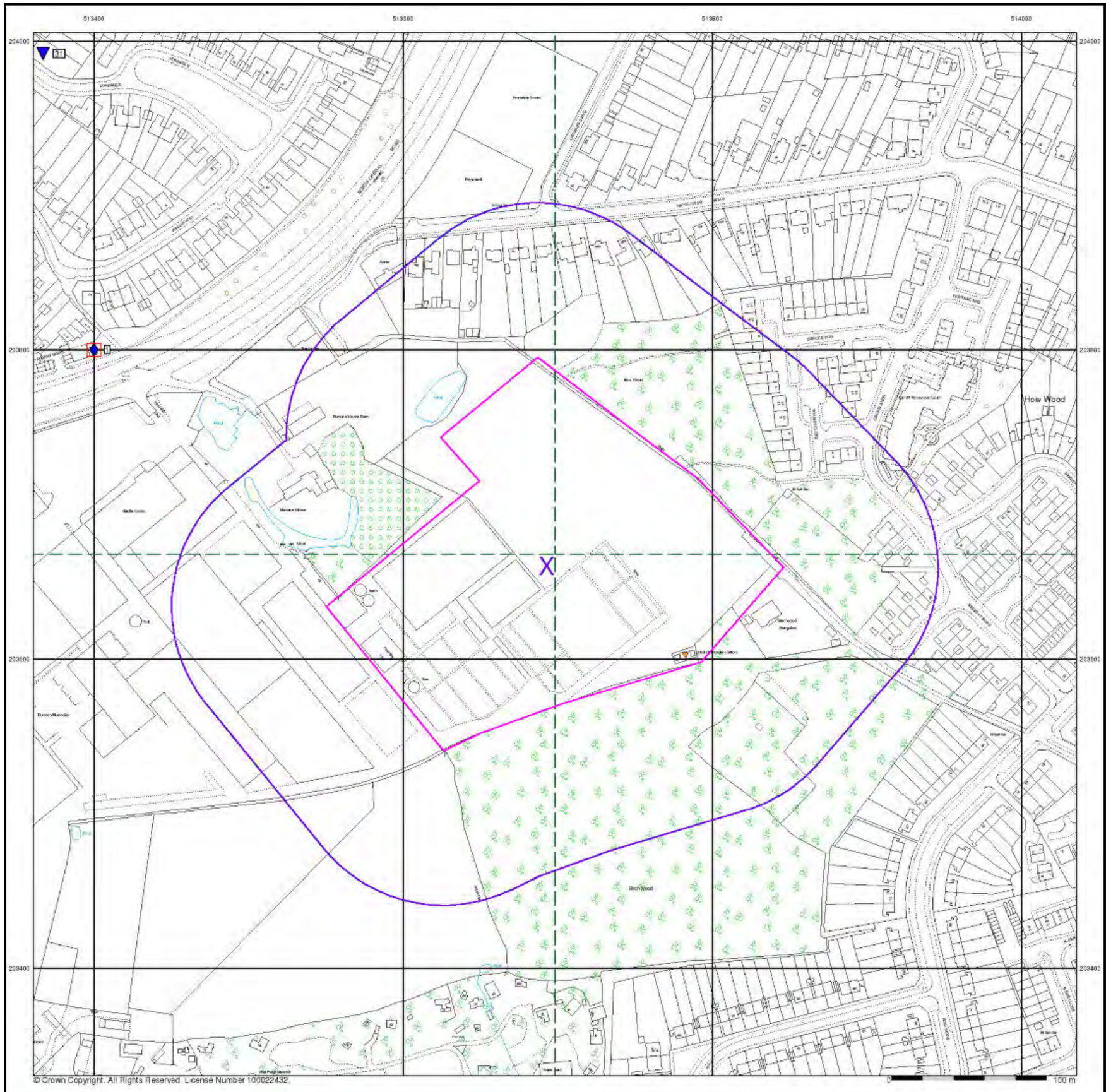
Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS

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

Landmark INFORMATION GROUP

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



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General

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

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

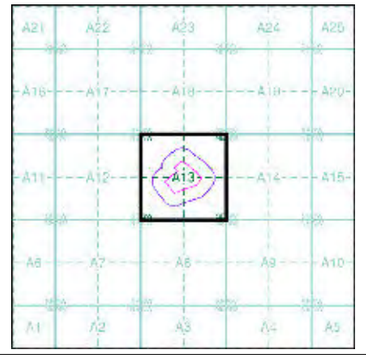
Geological

- BGS Recorded Mineral Site

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Site Sensitivity Map - Segment A13



Order Details

Order Number:	122807064_1_1
Customer Ref:	CCD/St Albans
National Grid Reference:	513690, 203660
Slice:	A
Site Area (Ha):	4.
Plot Buffer (m):	100

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS

Landmark INFORMATION GROUP

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

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General

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

Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
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- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
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Hazardous Substances

COMAH Site | Explosive Site | NIHHS Site

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- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
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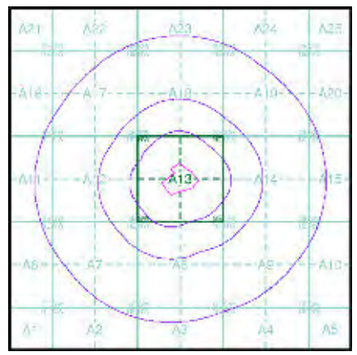
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Site Sensitivity Map - Slice A



Order Details

Order Number:	122807064_1_1
Customer Ref:	CCD/St Albans
National Grid Reference:	513690, 203660
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	1000

Site Details

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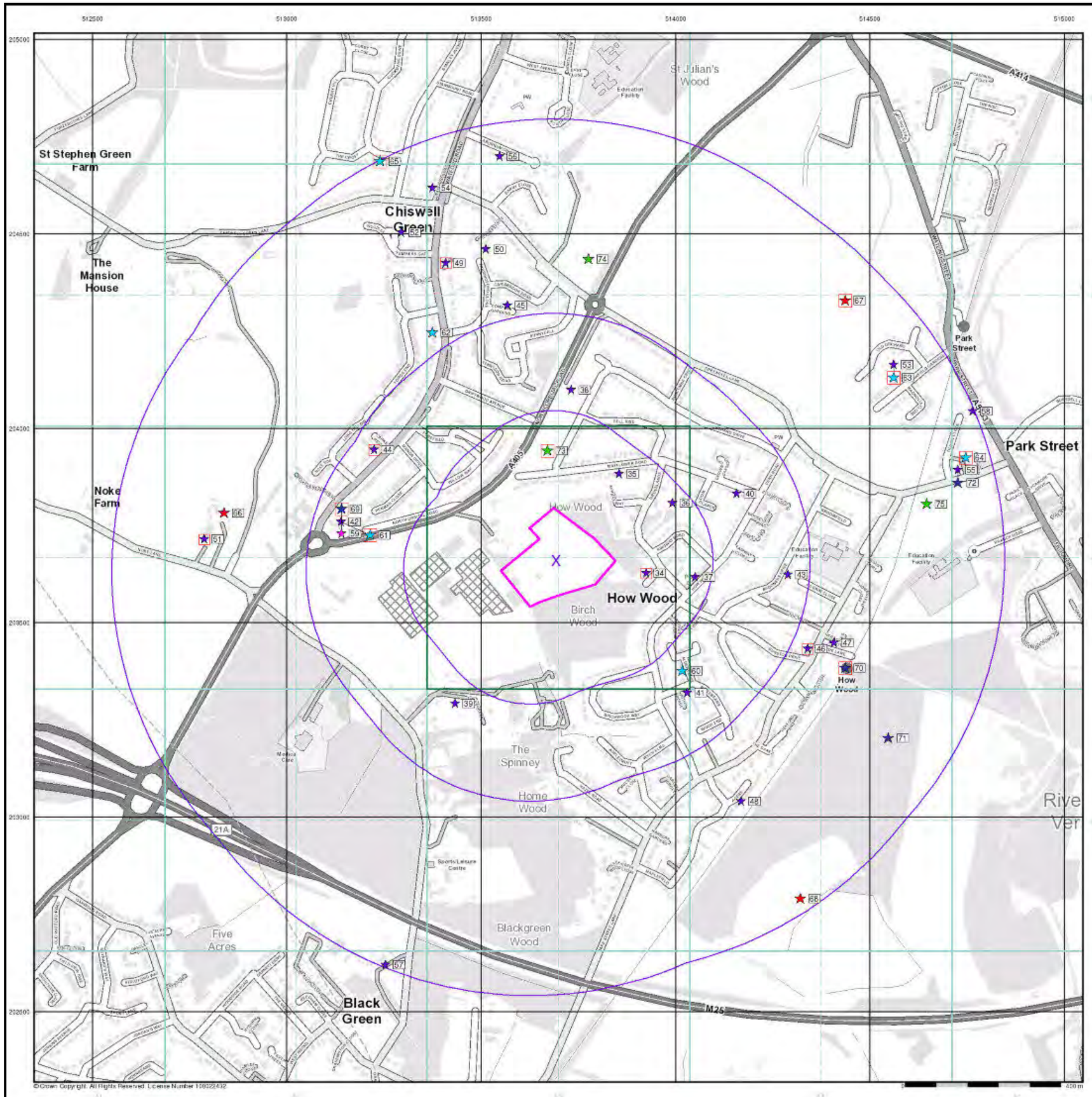
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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LANDMARK INFORMATION GROUP®

Industrial Land Use Map

General

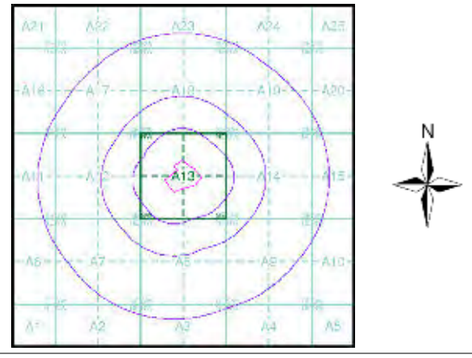
Specified Site | Specified Buffer(s) | Bearing Reference Point

Slice | Map ID

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- Gas Pipeline
- Points of Interest - Commercial Services
- Points of Interest - Education and Health
- Points of Interest - Manufacturing and Production
- Points of Interest - Public Infrastructure
- Points of Interest - Recreational and Environmental
- Underground Electrical Cables

Industrial Land Use Map - Slice A



Order Details

Order Number:	122807064_1_1
Customer Ref:	CCD/St Albans
National Grid Reference:	513690, 203660
Slice:	A
Site Area (Ha):	4.
Search Buffer (m):	1000

Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS

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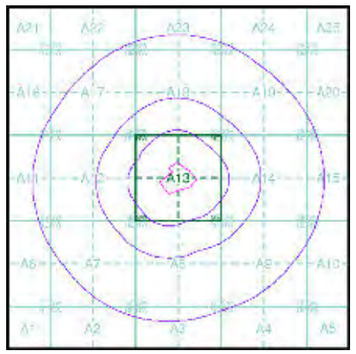
General

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

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



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National Grid Reference:	513690, 203660
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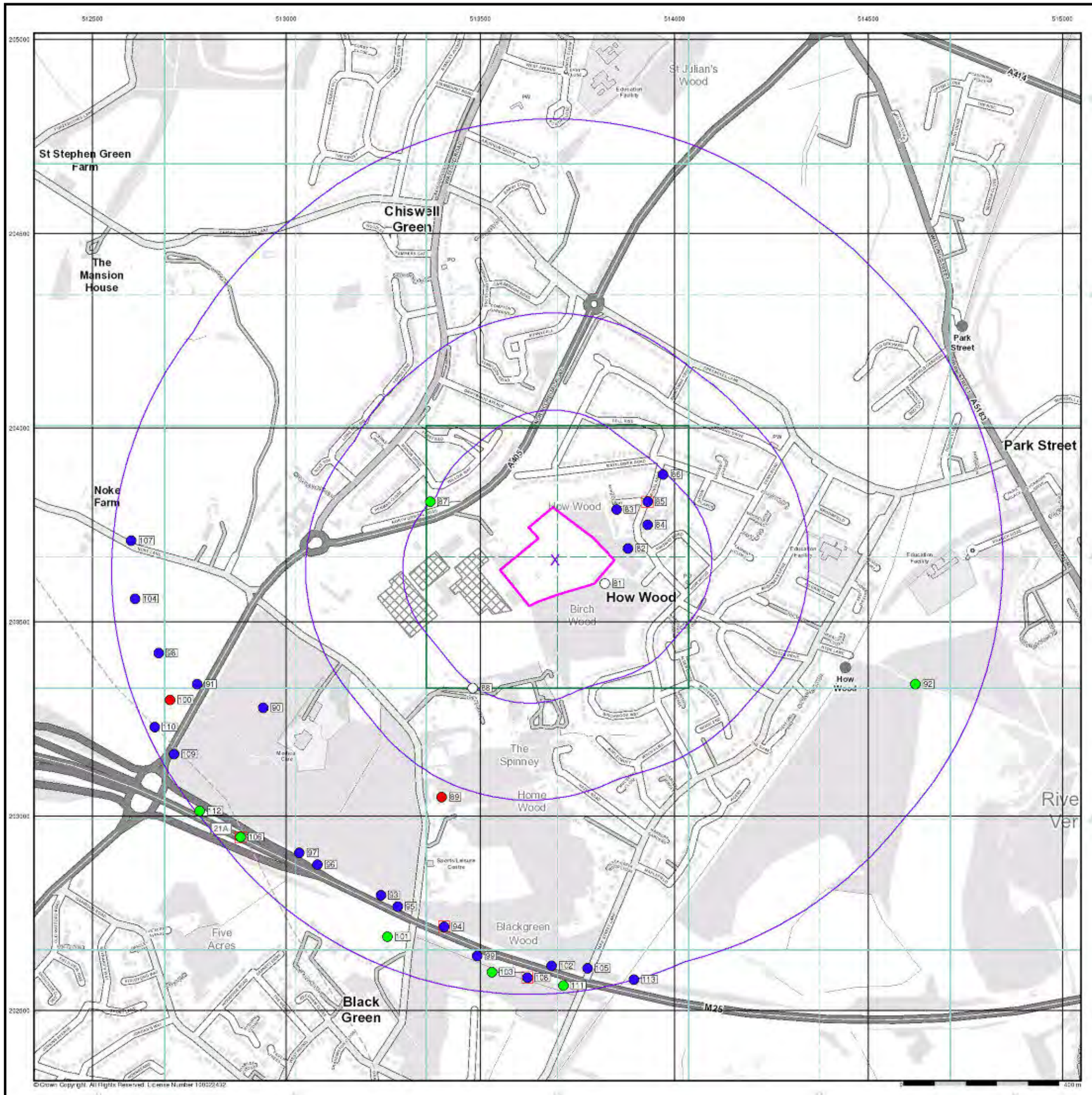

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General

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

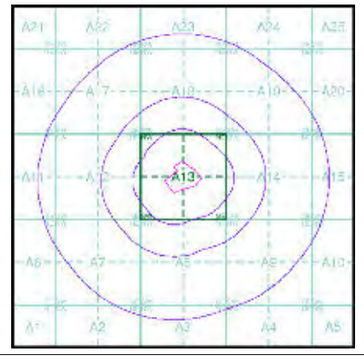
Agency and Hydrological (Boreholes)

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

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

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

Borehole Map - Slice A



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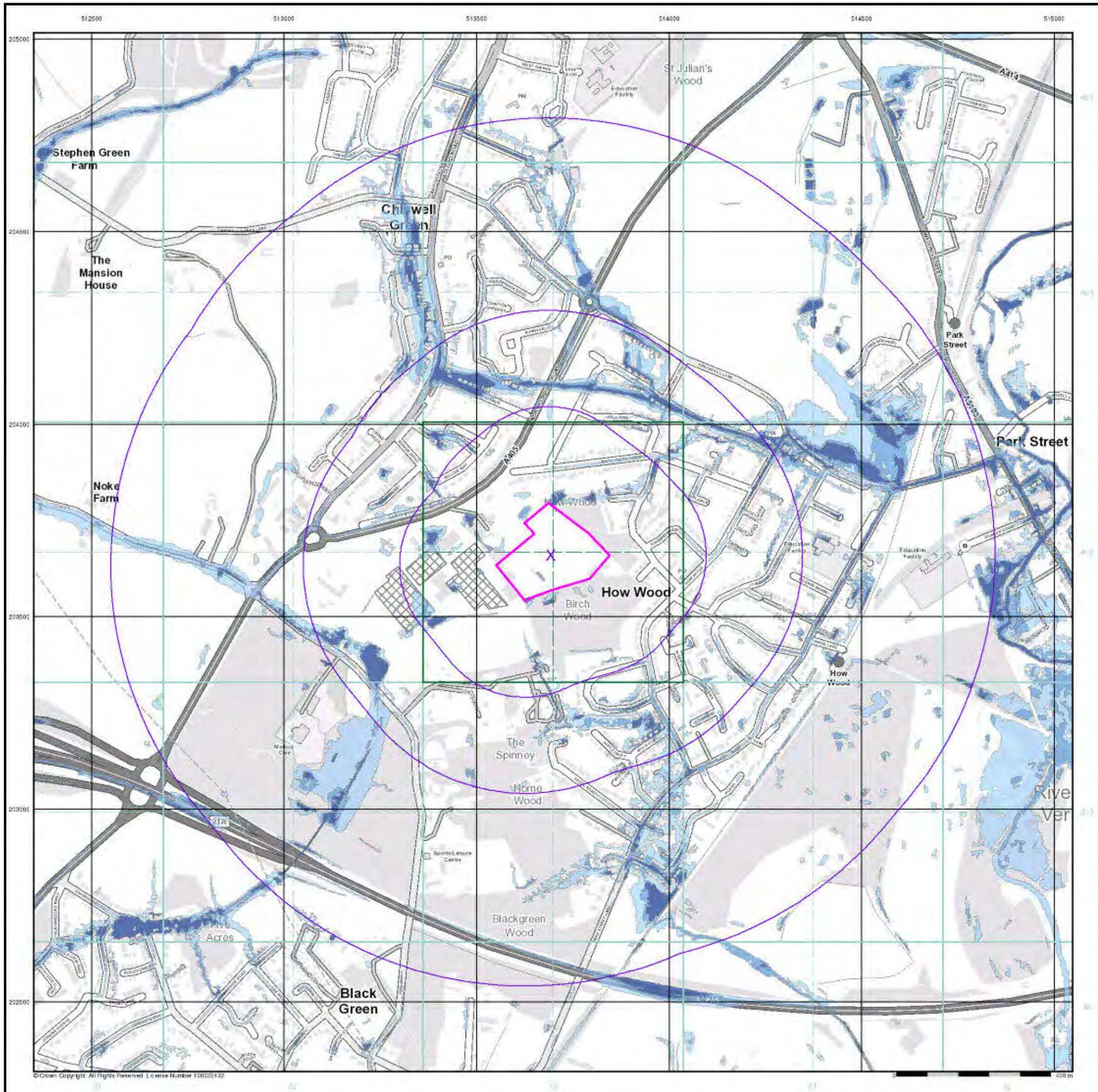

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LANDMARK INFORMATION GROUP®

General

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

Risk of Flooding from Surface Water

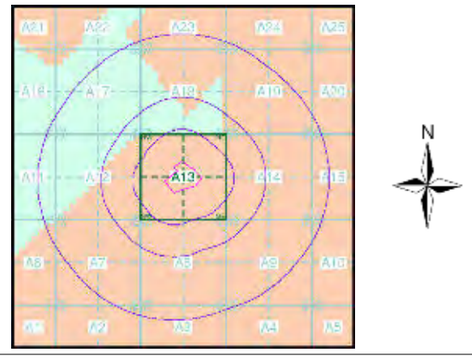
- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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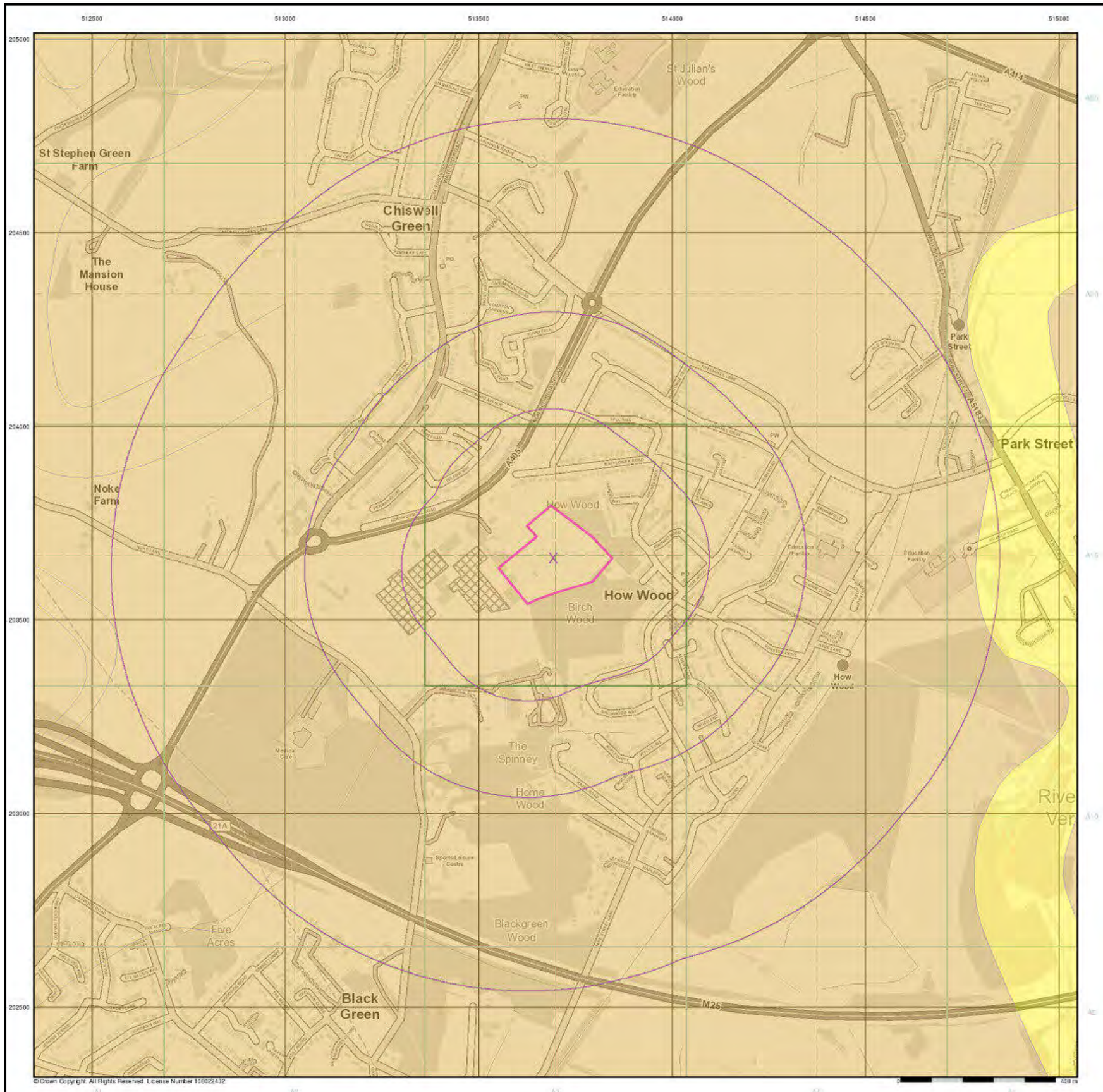

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LANDMARK INFORMATION GROUP®

General

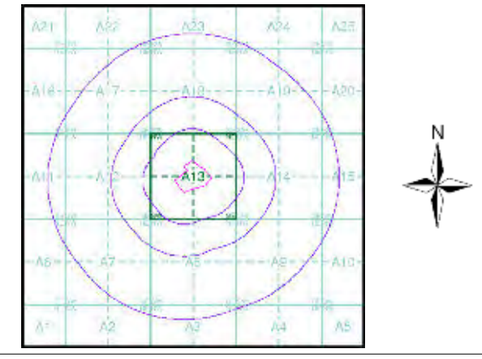
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg

- < 15
- 15 - 25
- 25 - 35
- 35 - 45
- 45 - 60
- 60 - 120
- > 120

Estimated Soil Chemistry Arsenic - Slice A



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General

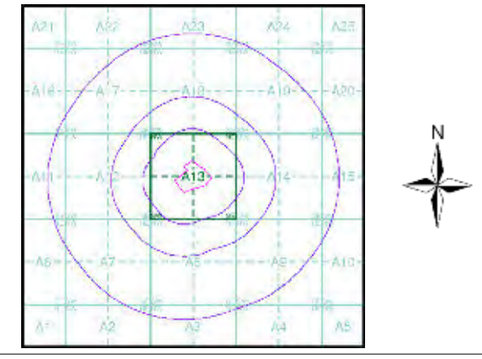
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Cadmium

Cadmium Concentrations mg/kg

- < 1.8
- 1.8 - 2.2
- 2.2 - 3.0
- > 3.0

Estimated Soil Chemistry Cadmium - Slice A



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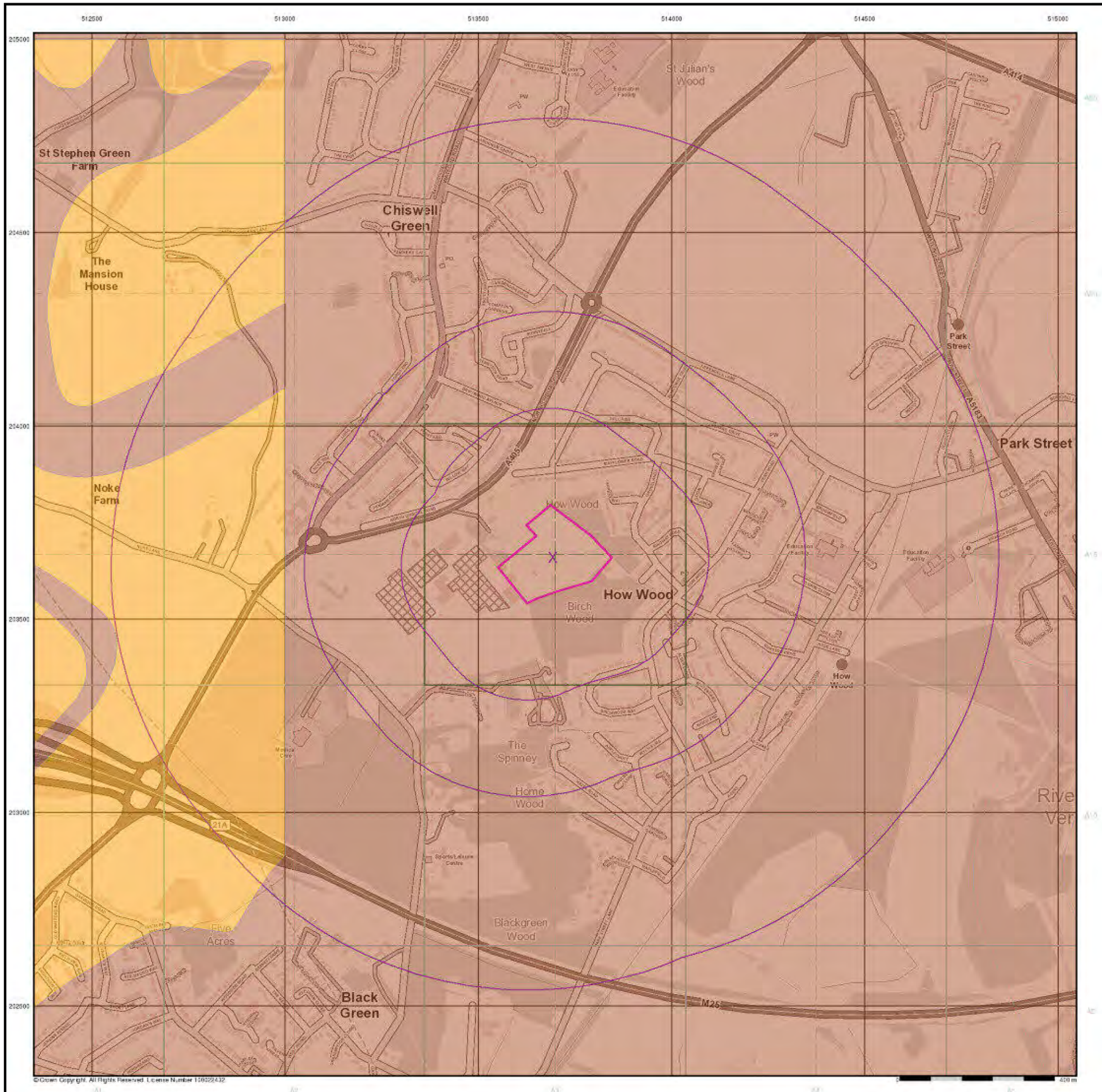

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LANDMARK INFORMATION GROUP®

General

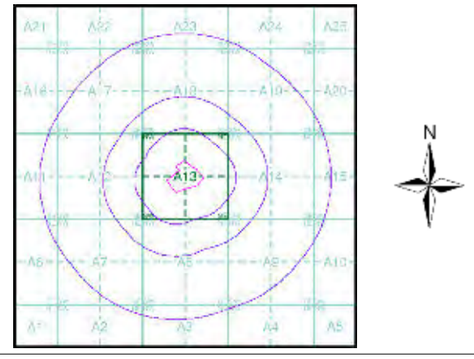
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Chromium

Chromium Concentrations mg/kg

- < 20
- 20 - 40
- 40 - 60
- 60 - 90
- 90 - 120
- 120 - 180
- > 180

Estimated Soil Chemistry Chromium - Slice A



Order Details

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Slice:	A
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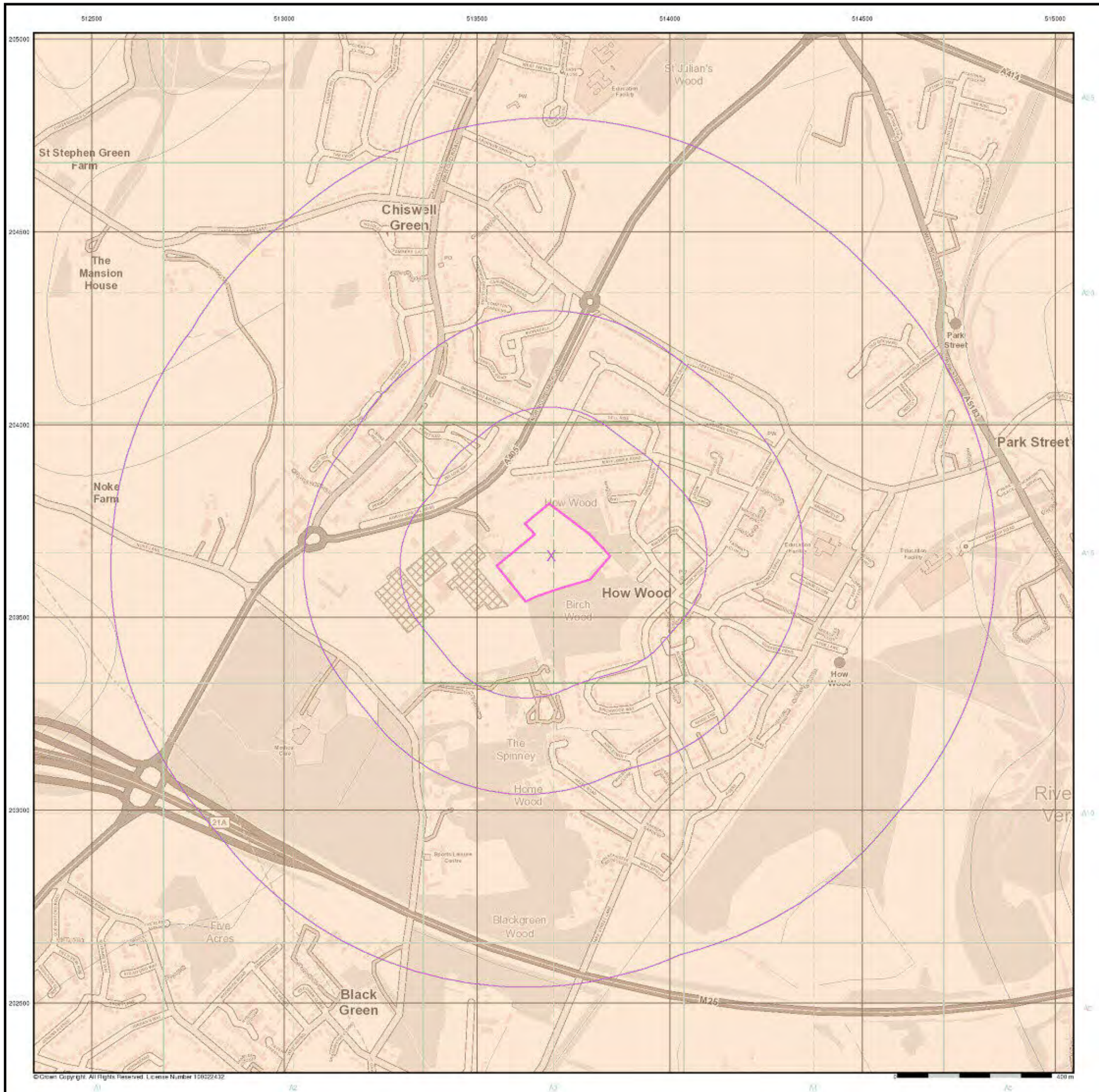
Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS



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LANDMARK INFORMATION GROUP®

General

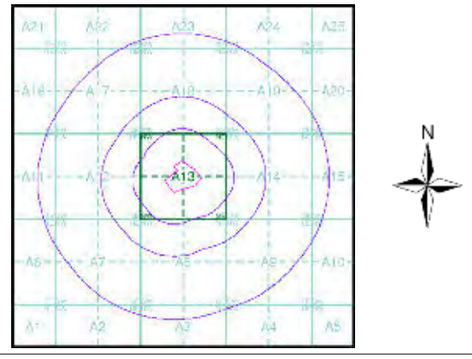
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Lead

Lead Concentrations mg/kg

- <100 mg/kg
- 100 - 200
- 200 - 300
- 300 - 600
- 600 - 1200
- >1200

Estimated Soil Chemistry Lead - Slice A



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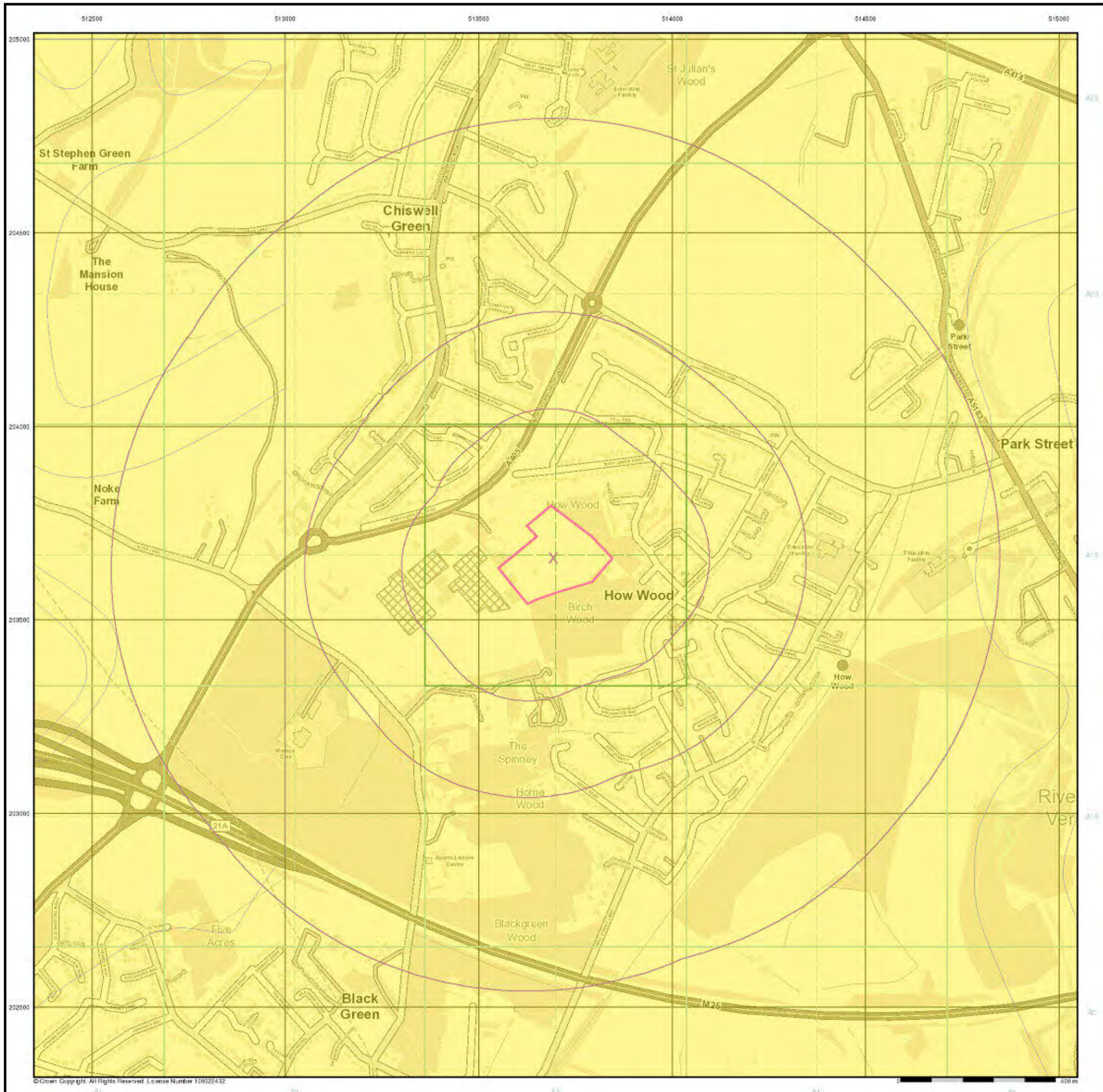


Envirocheck®

LANDMARK INFORMATION GROUP®

General

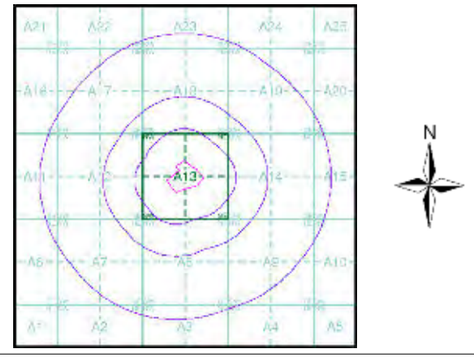
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Nickel

Nickel Concentrations mg/kg

- < 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 80
- 80 - 100
- > 100

Estimated Soil Chemistry Nickel - Slice A



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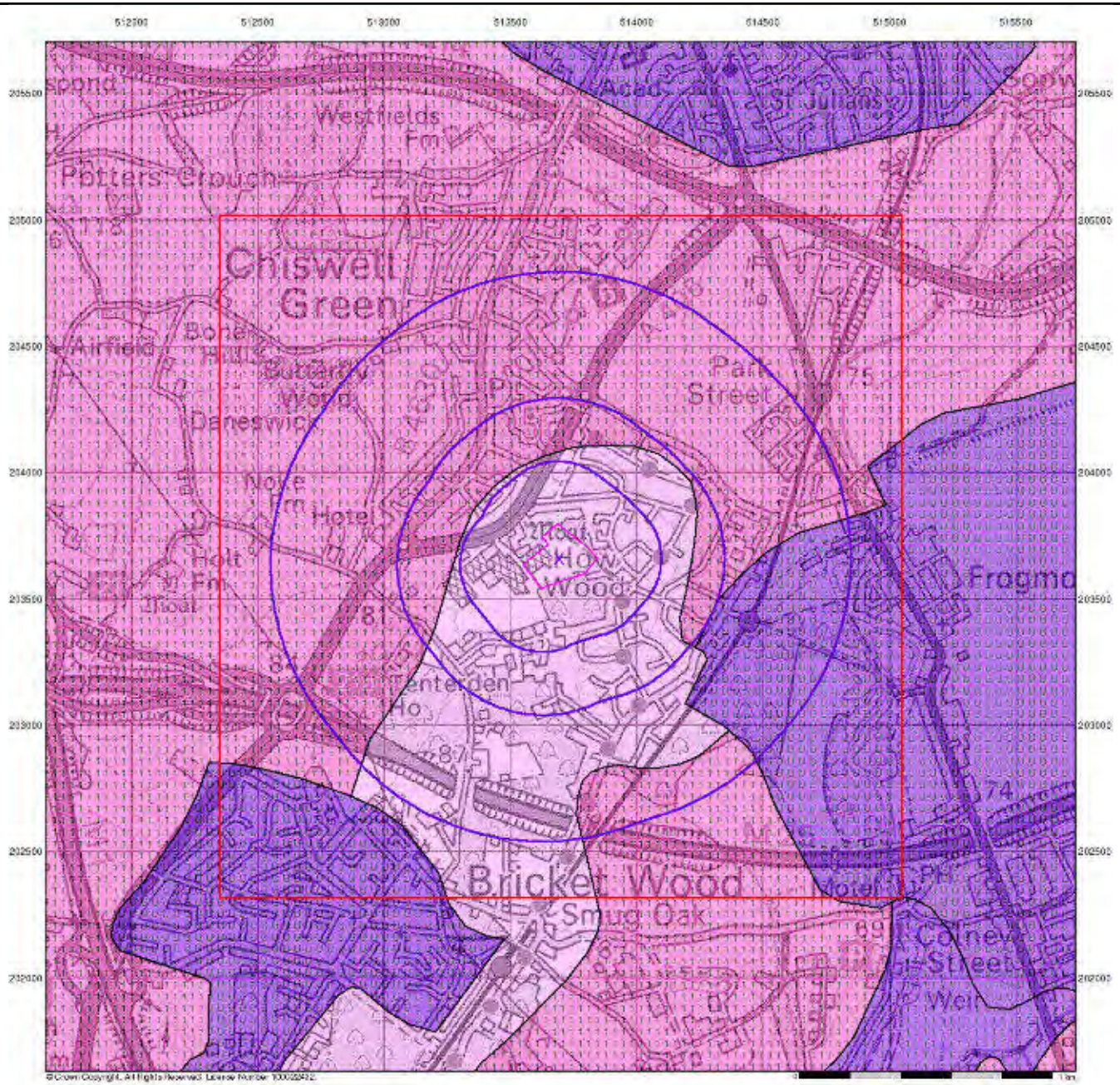

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LANDMARK INFORMATION GROUP

Groundwater Vulnerability

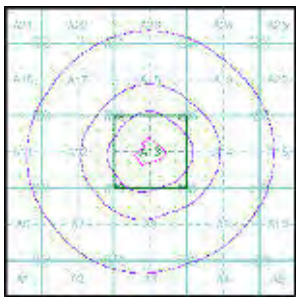
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

Geological Classes	Soil Classes
Major Aquifer (Highly Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Minor Aquifer (Variably Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Non Aquifer (Negligibly Permeable)	
Water or Sea	
Drift Deposit	

Site Sensitivity Context Map - Slice A



Order Details

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National Grid Reference:	513690, 203660
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Site Details

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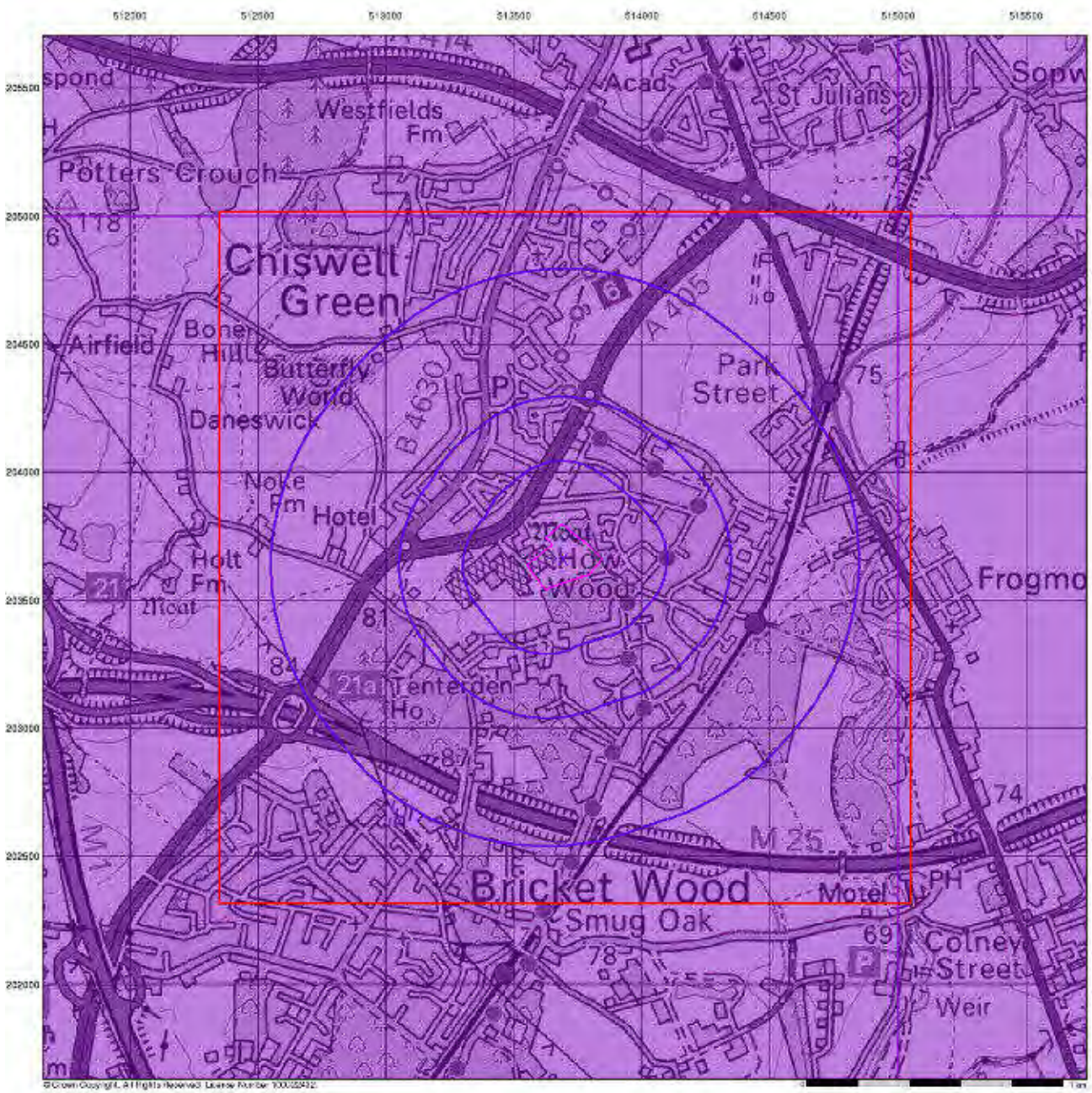

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LANDMARK INFORMATION GROUP

Bedrock Aquifer Designation

General

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

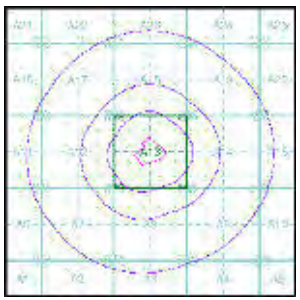
Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



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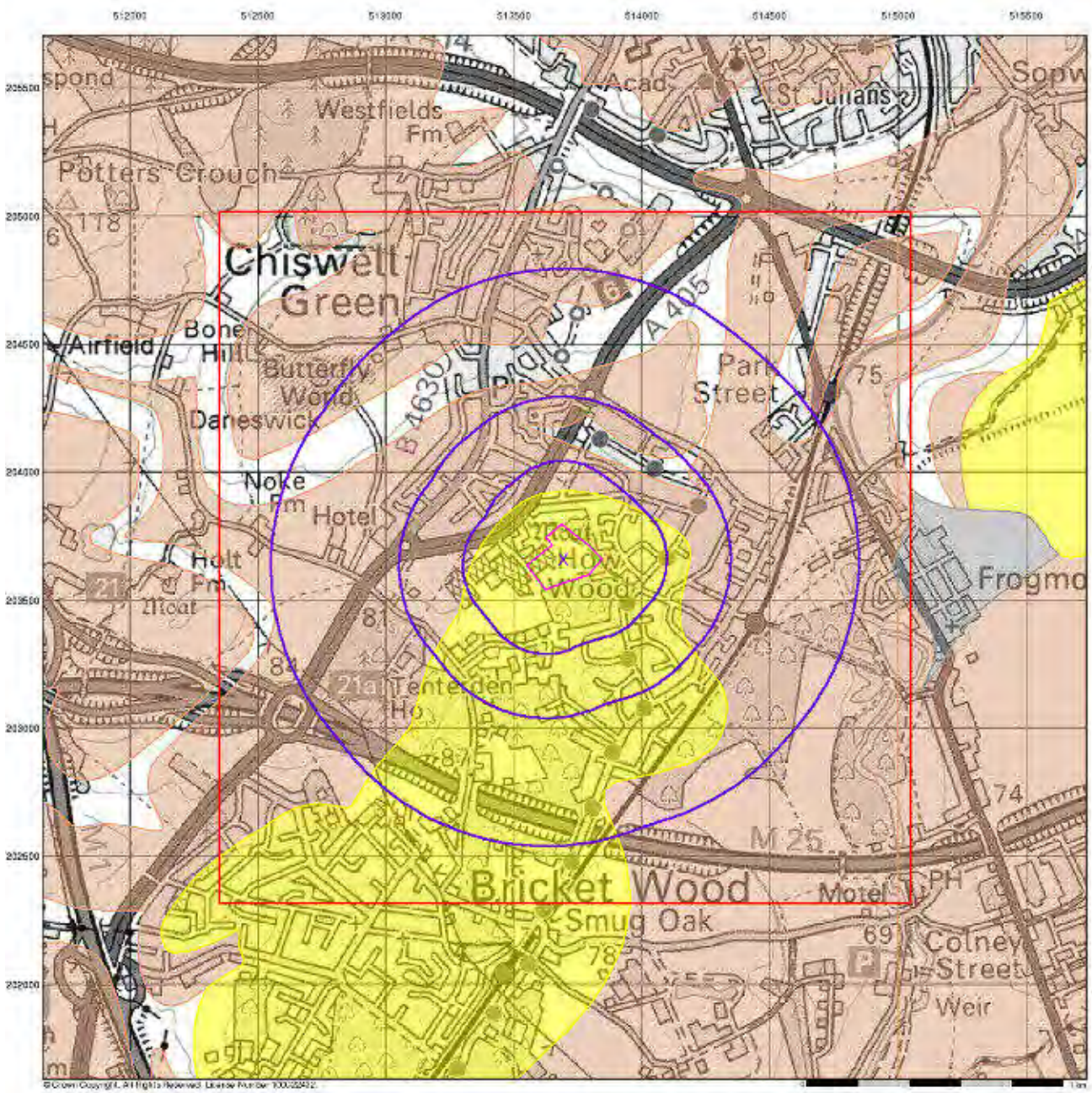

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LANDMARK INFORMATION GROUP

Superficial Aquifer Designation

General

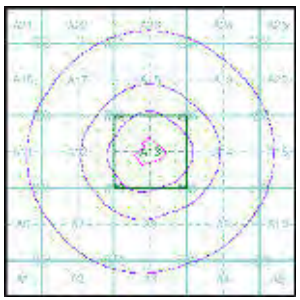
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



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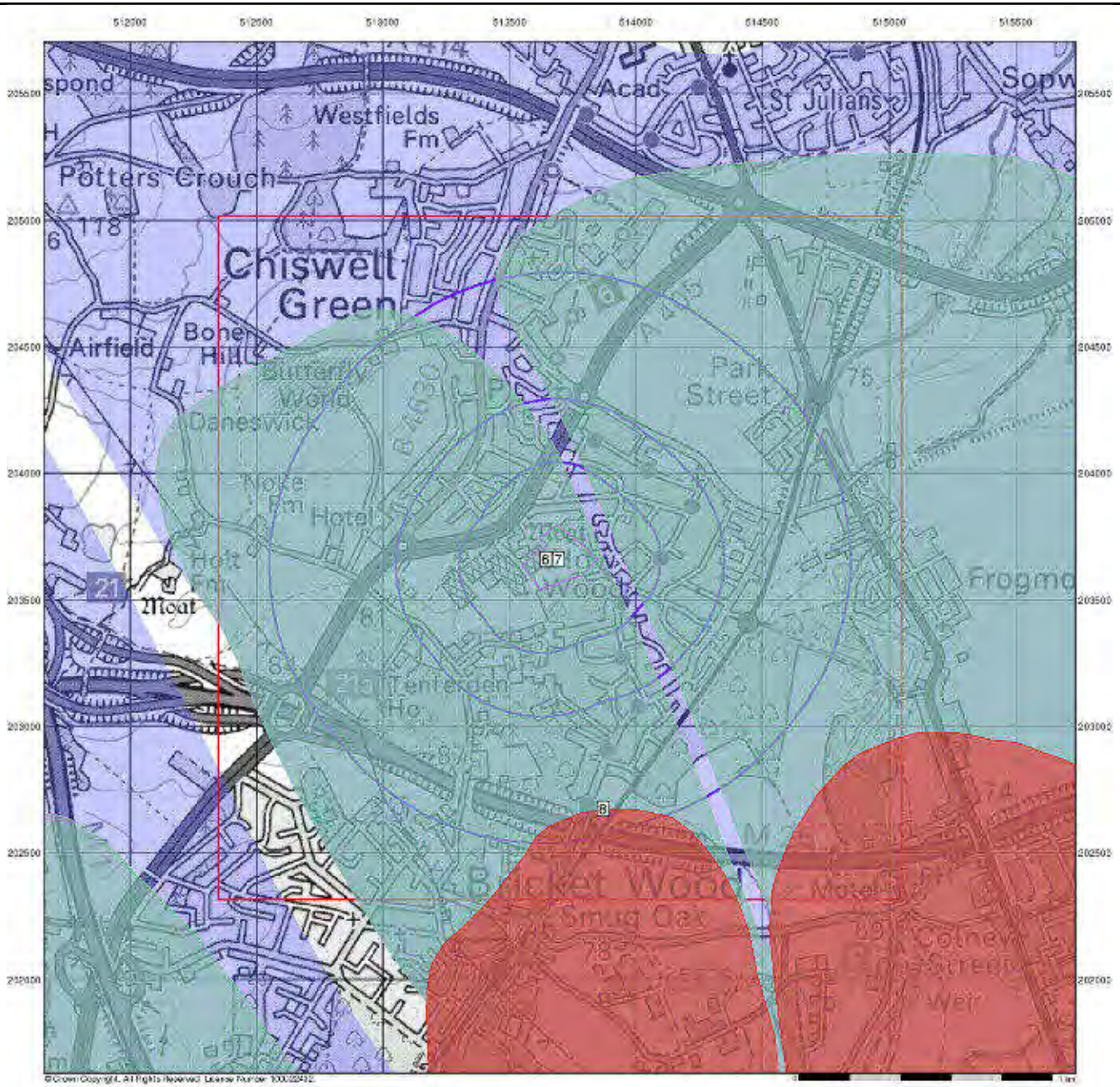
Site Details

Burston Nurseries Ltd, North Orbital Road, ST. ALBANS, AL2 2DS



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LANDMARK INFORMATION GROUP

Source Protection Zones

General

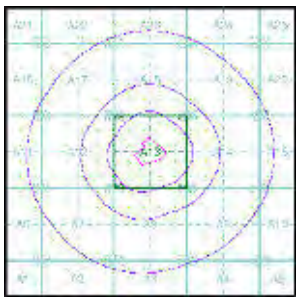
Specified Site | Specified Buffer(s) | Bearing Reference Point

Site | Map ID

Agency and Hydrological

- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1c)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2c)
- Total catchment (Zone 3)
- Total catchment - subsurface activity only (Zone 3c)
- Special interest (Zone 4)
- Source Protection Zone Borehole

Site Sensitivity Context Map - Slice A



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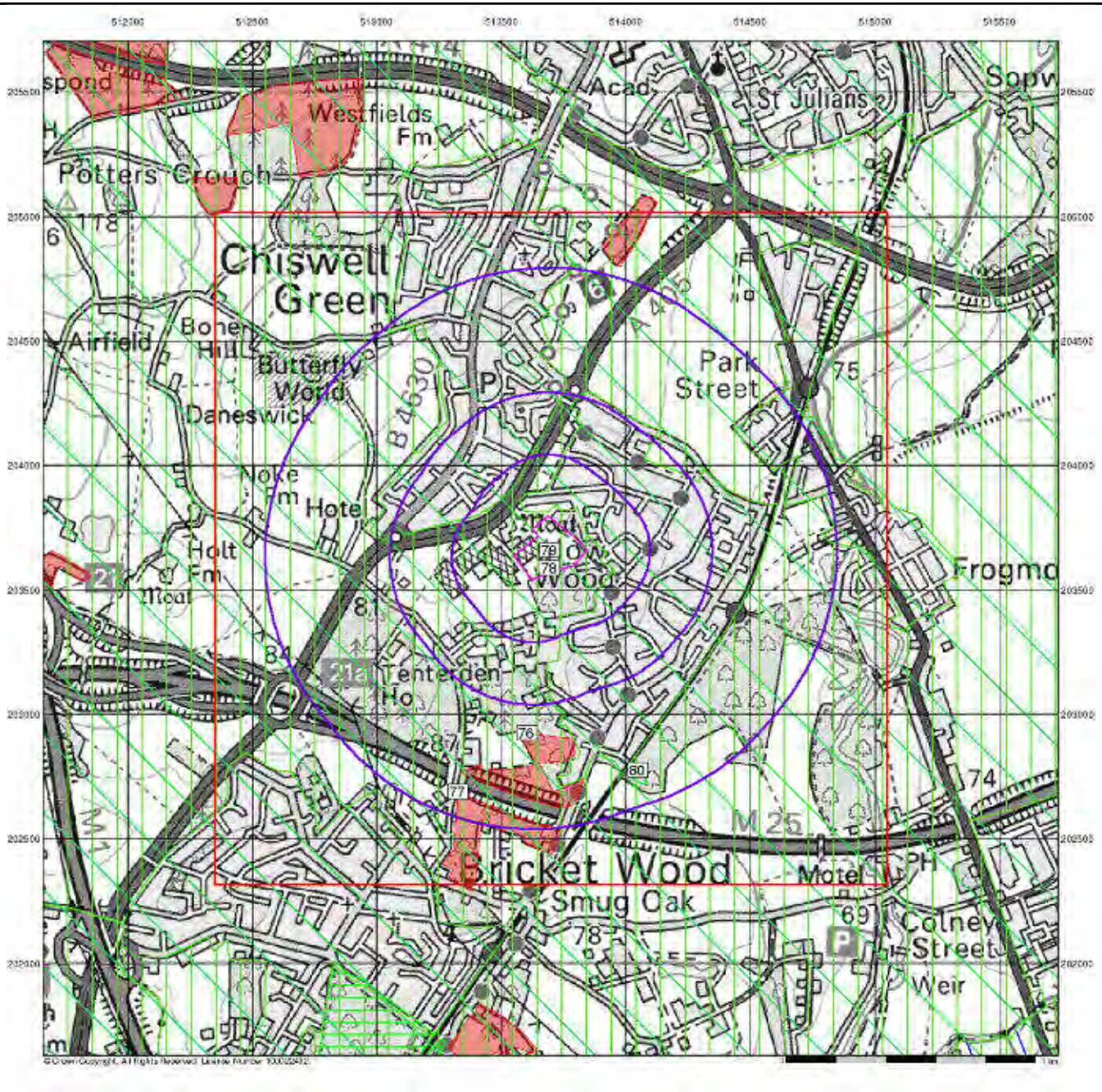

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LANDMARK INFORMATION GROUP

Sensitive Land Uses

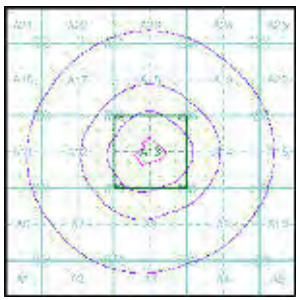
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Sensitive Land Uses

- Ancient Woodland
- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- National Park
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area
- World Heritage Sites

Site Sensitivity Context Map - Slice A



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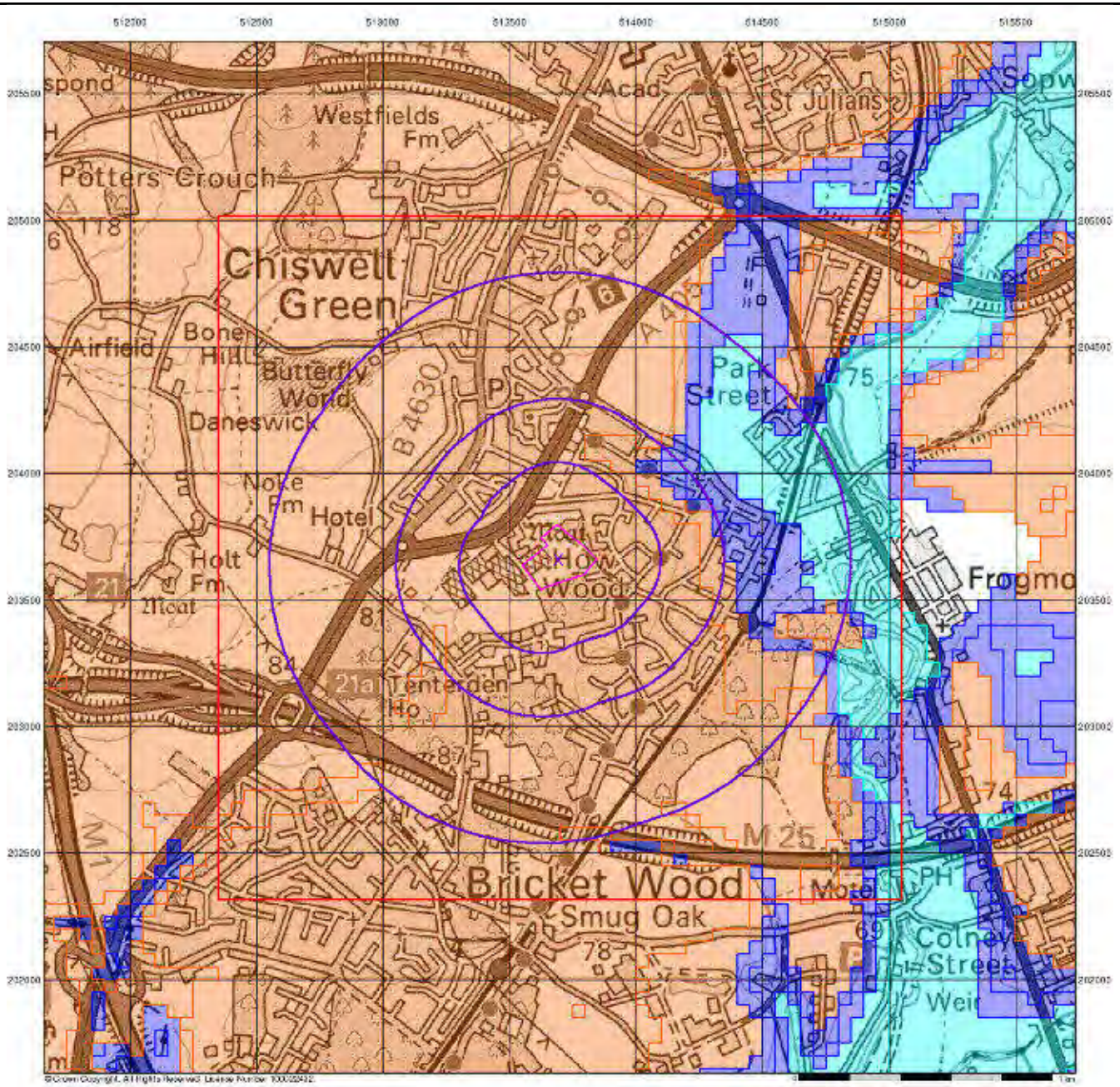


Envirocheck

LANDMARK INFORMATION GROUP

BGS Flood GFS Data

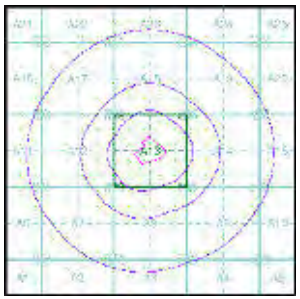
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



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Web: www.envirocheck.co.uk

APPENDIX D

Regulatory Correspondence

Alexandra Flint

From: Benjamin Firmin <Benjamin.Firmin@stalbans.gov.uk>
Sent: 14 July 2017 09:22
To: Christina Jones
Subject: RE: Environmental search enquiry

Dear Christina,

I write further to your request for information regarding the above site. Please find responses to your questions below.

1. Pre-license landfill sites within 500m of the subject site, including:
    - license holder
    - location of landfill/grid reference
    - nature of fill material
    - dates of operation
    - details of any leachate/landfill gas problems

There are no pre-licence landfill sites within 500m of the subject site.

2. Pollution incidents/known areas of contaminated land within 500m of the subject site, including:
    - location/grid reference
    - previous uses
    - nature/source of pollution
    - any further details

There have been two pollution incidents within 500m of the subject site. These incidents relate to not yet known (05/10/1994) (RINC ID: THN11994031709) (PREMDESC: Not yet known) (TL 13700 04300) and oil/gas oil (14/11/1996) (RINC ID: THN11996026340) (PREM DESC: Industrial/other) (TL 13250 03800). The Council does not hold details of these incidents; however further information can be obtained from the Environment Agency.

There are no known areas of contaminated land within 500m of the subject site.

3. Part B APC authorisations within 500m of the subject site, including:
    - authorisation holder
    - location/grid reference
    - nature of authorisation

There are no Part B APC authorisations within 500m of the site.

4. Private water supplies within 500m of the subject site, including:
    - location/grid reference
    - details of source and abstraction purpose

There are no private water supplies within 500m of the subject site.

5. Storage of Petroleum Hydrocarbons.

There does not appear to be any sites where petroleum hydrocarbons are stored within 500m of the subject site.

6. Records of any previous Site Investigations on or in close proximity to the site

The Council does not hold any records of any previous Site Investigations on or in close proximity to the site.

7. Records of any unexploded ordnance in the site area

The Council does not hold any records of any unexploded ordnance in the site area.

8. Any known problems with ground gas in the site area

There are no known problems with ground gas in the site area.

9. Any potential issues regarding naturally elevated contaminant concentrations

I am not aware of any issues regarding naturally elevated contaminant concentrations.

10. Any other information held by your authority which may have an impact upon the contaminative status of the site

The site formed part of Burston Manor Farm (1880s) and later part of the Burston Nurseries (1970s-1990s).

There are areas of historic land-use within 500m of the target property which have the potential to give rise to contamination in the local area. Historic land-uses include a gravel pit (1800s), quarrying of sand & clay, operation of sand & gravel pits (the previously mention gravel pit) (1900) (1925) (1938) (1960), a nursery and the North Orbital Road (A405) (1940s), a garage and the Burston Nurseries (1950s-1970s) a hospital and the Burston Nurseries (1970s-1990s).

The Council's historical maps show that there is an area of unknown filled ground within 500m of the target property (Pit, quarry etc) (1990) (the previously mentioned gravel pit).

I hope that the information I have provided has helped with your query. If you require further clarification on this matter, please contact me on the below telephone number or via email.

Kind regards,

Ben Firmin MCIEH
Environmental Compliance Officer (Contaminated Land)
Legal, Democratic & Regulatory Services

St Albans City & District Council
Direct Line: 01727 819438
Email: ben.firmin@stalbans.gov.uk

www.stalbans.gov.uk
www.stalbans.gov.uk/contact-us

From: Christina Jones [mailto:christina.jones@tecon.co.uk]
Sent: 11 July 2017 11:30
To: Enviromental
Subject: Environmental search enquiry

RE: NORTH ORBITAL ROAD, ST ALBANS, AL2 2DS

Good morning,

I am writing to ask if you could conduct a search for the following details in order for us to complete an environmental review of the above mentioned site. The postcode for the site is AL2 2DS and the National Grid Reference is 513690, 203660. I have attached a site plan for your reference.

1. Pre-license landfill sites within 500m of the subject site, including:
    - license holder
    - location of landfill/grid reference
    - nature of fill material
    - dates of operation
    - details of any leachate/landfill gas problems

2. Pollution incidents/known areas of contaminated land within 500m of the subject site, including:
    - location/grid reference
    - previous uses
    - nature/source of pollution
    - any further details

3. Part B APC authorisations within 500m of the subject site, including:
    - authorisation holder
    - location/grid reference
    - nature of authorisation

4. Private water supplies within 500m of the subject site, including:
    - location/grid reference
    - details of source and abstraction purpose

5. Storage of Petroleum Hydrocarbons.

6. Records of any previous Site Investigations on or in close proximity to the site

7. Records of any unexploded ordnance in the site area

8. Any known problems with ground gas in the site area

9. Any potential issues regarding naturally elevated contaminant concentrations

10. Any other information held by your authority which may have an impact upon the contaminative status of the site

It would be extremely helpful if you could forward us these details at your earliest convenience.

If you require any further information please do not hesitate to contact me.

Yours sincerely,

Christina Jones

Tweedie Evans Consulting Limited

The Old Chapel,
35a Southover,
Wells,
Somerset
BA5 1UH
Tel: 01749 677760
Fax: 01749 679345
www.tecon.co.uk

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—

Tweedie Evans Consulting Ltd Registered Office: One New Street, Wells, Somerset, BA5 2LA
Registered Number 5186011 England

APPENDIX E

Risk Evaluation

Risk Evaluation

The qualitative assessment methodology presented in Ciria publication C552 (2001) titled *'Contaminated Land Risk Assessment: A Guide to Good Practice'* has been used by TEC for the basis of evaluating potential risk.

The method requires an assessment of the:

magnitude of the probability or likelihood of the risk occurring (Table 1); and
magnitude of the potential consequence or severity of the risk occurring (Table 2)

Table 1. Classification of Probability

Classification	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the short-term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

Table 2. Classification of Consequence

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. (Note: Water Resources Act contains no scope for considering significance of pollution). Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organisation forming part of such ecosystem (note: the definitions of ecological systems within the draft circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to human health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources. (Note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem, (note: the definitions of ecological systems within draft circular on Contaminated Land, DETR, 2000).	Concentration of a contaminant from site exceeding the generic or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer. Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the draft circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (for example foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc), easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discolouration of concrete.

The combination of the two factors is determined using Table 3 and the resulting level of risk is described in Table 4. The evaluation can be applied to each of the scenarios identified in the risk model and the overall risk assessed.

Table 3. Combination of Consequence with Probability

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	**Very High Risk**	**High Risk**	**Moderate Risk**	**Moderate/Low Risk**
	Likely	**High Risk**	**Moderate Risk**	**Moderate/Low Risk**	**Low Risk**
	Low Likelihood	**Moderate Risk**	**Moderate/Low Risk**	**Low Risk**	**Very Low Risk**
	Unlikely	**Moderate/Low Risk**	**Low Risk**	**Very Low Risk**	**Very Low Risk**

Table 4. Description of risks and likely action required

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

Using the risk model the pollutant linkages are identified and a preliminary estimate of risk undertaken. If there is no pollutant linkage identified, then there is no risk. If the estimate of risk for all the linkages and exposure scenarios is very low at this stage then it is likely that no further assessment will be required.

APPENDIX F

Exploratory Hole Logs

DYNAMIC SAMPLING RECORD

Project Title: North Orbital Road, St Albans	Borehole: WS01
Project No: 1706007.001	Dates: 17th July 2017
Client: Castleoak Group	

TWEEDIE EVANS CONSULTING
www.tecon.co.uk
info@tecon.co.uk

Depth (m)	Description	Sample Details	Depth (m)	SPT Results: Blow Count	SPT Results: N Value	Remarks/ Data
	Ground Surface		0.0			
0.35	MADE GROUND Brown slightly silty slightly gravelly sandy clay. Gravel of brick, flint and rare black carbonaceous fragments. Many rootlets noted.	A				
0.50	SUPERFICIAL DEPOSITS Stiff orange-brown and brown very sandy (fine) CLAY with rare flint gravel.		1.0	(2, 3) 2, 3, 3, 5	13	
	SUPERFICIAL DEPOSITS Medium dense orange-brown mottled grey clayey silty SAND (fine to coarse). ..Slightly clayey between 0.8-1.3mbgl.	T				HSV at 1.3-1.5mbgl - 47.5, 45, 50 kPa
	...A band of firm medium strength orange-brown with locally black mottling sandy silty CLAY between 1.3-1.5mbgl.	B	2.0	(2, 3) 3, 3, 4, 3	13	
2.80	SUPERFICIAL DEPOSITS Very soft to soft low strength brown mottled black slightly sandy silty CLAY. ...Locally recovered as clayey fine to coarse SAND.	T	3.0	(1, 0) 0, 0 1, 1	2	HSV at 2.8-2.9mbgl - 47.5, 45, 45 kPa
			4.0	(1, 2) 1, 2, 1, 2	6	HSV at 3.8-4.0mbgl - 30, 40, 20 kPa
		T	5.0	(1, 1) 2, 1, 2, 2	7	
5.45	Borehole Terminated		6.0			

Installation: Concrete; Bentonite; 3-6mm Pea Gravel; 50mm HPDE pipe

Notes:

A:	250ml and 60ml Amber Glass Jars
T:	Plastic Tub (1Kg)
SPT:	Standard Penetration Test
HSV:	Hand Shear Vane
PP:	Pocket Penetrometer
PID:	Photo-Ionisation Detector

Plant: Dando Terrier 2002

Water observations:
Water entry at approximately 1.2mbgl. Water level recorded at 1.35mbgl upon completion.

General remarks: Probing (DP1) undertaken adjacent to WS01.

Logged by: ML	Checked by: CH	Approved by: RE

DYNAMIC SAMPLING RECORD

Project Title: North Orbital Road, St Albans	Borehole: WS02
Project No: 1706007.001	Dates: 17th July 2017
Client: Castleoak Group	

TWEEDIE EVANS CONSULTING
www.tecon.co.uk
info@tecon.co.uk

Depth (m)	Description	Legend	Sample Details	Depth (m)	SPT Results: Blow Count	SPT Results: N Value	Remarks/ Data	Installation
	Ground Surface			0.0				
0.20	MADE GROUND Brown slightly silty slightly gravelly sandy clay. Gravel of flint. Many rootlets noted.		A					
1.00	SUPERFICIAL DEPOSITS Stiff orange-brown and grey locally with black mottling slightly silty slightly sandy (fine) CLAY with rare sub-angular to rounded flint gravel.		T	1.0	(1, 2) 1, 1, 2, 1	5		
	SUPERFICIAL DEPOSITS Soft low to medium strength orange-brown mottled grey slightly silty slightly sandy to locally sandy (fine) CLAY. ...Locally very sandy / clayey SAND.		T				HSV at 1.2-1.4mbgl - 45, 30, 40 kPa	
				2.0	(0, 1) 1, 1, 2, 1	5		
			T				HSV at 2.2-2.4mbgl - 60, 55, 50 kPa	
				3.0	(1, 1) 1, 1, 1, 2	5	HSV at 2.9-3.0mbgl - 60, 55, 55 kPa	
							HSV at 3.7-3.9mbgl - 40, 25, 30 kPa	
				4.0	(1, 2) 1, 1, 2, 2	6		
4.70								
	SUPERFICIAL DEPOSITS Firm grey slightly silty CLAY.			5.0	(2, 1) 2, 2, 2, 3	9		
5.45								
	Borehole Terminated			6.0				

Notes:

A:	250ml and 60ml Amber Glass Jars
T:	Plastic Tub (1Kg)
SPT:	Standard Penetration Test
HSV:	Hand Shear Vane
PP:	Pocket Penetrometer
PID:	Photo-Ionisation Detector

Plant: Dando Terrier 2002

Water observations: Water entry at approximately 1.7mbgl.

General remarks:

Logged by: ML	Checked by: CH	Approved by: RE

DYNAMIC SAMPLING RECORD

Project Title: North Orbital Road, St Albans	Borehole: WS03
Project No: 1706007.001	Dates: 17th July 2017
Client: Castleoak Group	

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Depth (m)	Description	Legend	Sample Details	Depth (m)	SPT Results: Blow Count	SPT Results: N Value	Remarks/ Data	Installation
	Ground Surface			0.0				
0.25	MADE GROUND Brown slightly gravelly slightly sandy silty clay. Gravel of flint and rare black carbonaceous fragments. Many rootlets and roots noted.		A					
	SUPERFICIAL DEPOSITS Firm medium to high orange-brown mottled grey slightly silty slightly sandy CLAY with rare flint gravel. ...Becoming brown mottled black and grey clay at approximately 1.3mbgl. ...Becoming sandy (fine) at 2.1-2.3mbgl.		T	1.0	(1, 2) 2, 2, 2, 3	9		
				2.0	(2, 1) 2, 2, 2, 2	8	HSV at 1.8-1.9mbgl - 100, 85, 85 kPa HSV at 2.0-2.2mbgl - 50, 45, 45 kPa	
			B					
			T				HSV at 2.6-2.8mbgl - 100, 85, 100 kPa	
3.20				3.0	(1, 2) 3, 2, 2, 3	10	HSV at 3.0-3.2mbgl - 100, 100, 125 kPa	
	SUPERFICIAL DEPOSITS Firm high strength orange-brown to brown slightly silty very sandy CLAY. ...Sand content noted to decrease below 3.6mbgl.			4.0	(2, 2) 2, 2, 3, 3	10		
4.60								
	SUPERFICIAL DEPOSITS Stiff brown and orange-brown slightly sandy CLAY.			5.0	(2, 3) 4, 4, 4, 4	16		
5.45								
	Borehole Terminated			6.0				

Notes:

A:	250ml and 60ml Amber Glass Jars
T:	Plastic Tub (1Kg)
SPT:	Standard Penetration Test
HSV:	Hand Shear Vane
PP:	Pocket Penetrometer
PID:	Photo-Ionisation Detector

Plant: Dando Terrier 2002

Water observations:
Water level recorded at 4.45mbgl upon completion.

General remarks: Probing (DP2) undertaken adjacent to WS03.

Logged by: ML	Checked by: CH	Approved by: RE

DYNAMIC SAMPLING RECORD

Project Title: North Orbital Road, St Albans	Borehole: WS04
Project No: 1706007.001	Dates: 17th July 2017
Client: Castleoak Group	

TWEEDIE EVANS CONSULTING
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info@tecon.co.uk

Depth (m)	Description	Legend	Sample Details	Depth (m)	SPT Results: Blow Count	SPT Results: N Value	Remarks/ Data	Installation
	Ground Surface			0.0				
0.40	MADE GROUND Dark brown gravelly silty sand. Gravel of flint and limestone.		A					
1.80	SUPERFICIAL DEPOSITS Firm high strength orange-brown mottled grey slightly silty slightly sandy to sandy CLAY with rare flint gravel.		T	1.0	(1, 2) 2, 2, 2, 3	9	HSV at 1.3-1.4mbgl - 87.5, 75, 75 kPa	
3.05	SUPERFICIAL DEPOSITS Soft to firm orange-brown very sandy CLAY.		B	2.0	(1, 2) 2, 1, 2, 2	7		
5.45	SUPERFICIAL DEPOSITS Firm medium strength orange-brown slightly sandy slightly silty CLAY.		T	3.0	(1, 2) 3, 3, 4, 4	14	HSV at 3.5-3.6mbgl - 55, 60, 50 kPa	
				4.0	(2, 2) 2, 2, 3, 2	9		
				5.0	(2, 2) 3, 2, 2, 3	10		
	Borehole Terminated			6.0				

Notes:

A:	250ml and 60ml Amber Glass Jars
T:	Plastic Tub (1Kg)
SPT:	Standard Penetration Test
HSV:	Hand Shear Vane
PP:	Pocket Penetrometer
PID:	Photo-Ionisation Detector

Plant: Dando Terrier 2002

Water observations:
Water entry at approximately 2.3mbgl. Water level recorded at 2.63mbgl upon completion.

General remarks:

Logged by: ML	Checked by: CH	Approved by: RE

DYNAMIC SAMPLING RECORD

Project Title: North Orbital Road, St Albans	Borehole: WS05
Project No: 1706007.001	Dates: 18th July 2017
Client: Castleoak Group	

TWEEDIE EVANS CONSULTING
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Depth (m)	Description	Legend	Sample Details	Depth (m)	SPT Results: Blow Count	SPT Results: N Value	Remarks/ Data	Installation
	Ground Surface			0.0				
0.30	MADE GROUND Dark grey slightly silty very sandy gravel. Gravel of flint, limestone and sandstone.		A					
0.55	MADE GROUND Grey and ligth brown locally with black mottling slightly silty clayey sand.		A					
0.90	MADE GROUND Grey slightly gravelly clayey sand. Gravel of brick, concrete, flint and limestone.		A	1.0	(3, 4) 5, 6, 6, 7	24		
2.95	SUPERFICIAL DEPOSITS Medium dense orange-brown and grey locally clayey silty SAND (medium to coarse). ...A band of firm medium strength slightly silty slighlty sandy CLAY between 1.45-1.65mbgl.		B	2.0	(2, 6) 4, 2, 2, 3	11	HSV at 1.45-1.65mbgl - 65, 55, 60 kPa	
5.00	SUPERFICIAL DEPOSITS Very soft to soft low strength orange-brown slightly silty sandy (fine) CLAY.		T	3.0	(2, 1) 1, 1, 1, 1	4	HSV at 3.5-3.7mbgl - 25, 30, 30 kPa	
				4.0	(1, 1) 2, 1, 2, 1	6		
	Borehole Terminated			5.0	(0, 1) 2, 1, 2, 2	7		
				6.0				

Installation: Concrete; Bentonite; 3-6mm Pea Gravel; 50mm HPDE pipe

Notes:

A:	250ml and 60ml Amber Glass Jars
T:	Plastic Tub (1Kg)
SPT:	Standard Penetration Test
HSV:	Hand Shear Vane
PP:	Pocket Penetrometer
PID:	Photo-Ionisation Detector

Plant: Dando Terrier 2002

Water observations:
Water entry at approximately 1.6mbgl, rising to 0.65mbgl (water level potentially affected by the adjacent leaking water tanks).

General remarks: Follow on probing (DP3) undertaken from 5.0mbgl.

Logged by: ML	Checked by: CH	Approved by: RE

DYNAMIC SAMPLING RECORD

Project Title: North Orbital Road, St Albans	Borehole: WS06
Project No: 1706007.001	Dates: 18th July 2017
Client: Castleoak Group	

TWEEDIE EVANS CONSULTING
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info@tecon.co.uk

Depth (m)	Description	Legend	Sample Details	Depth (m)	SPT Results: Blow Count	SPT Results: N Value	Remarks/ Data	Installation
	Ground Surface			0.0				
0.10	MADE GROUND Dark grey to black sandy gravel. Gravel of flint, limestone and sandstone.		A					
	MADE GROUND Black gravelly clayey sand. Gravel of flint.		A					
0.95								
	MADE GROUND Grey-brown with black mottling slightly gravelly clay. Gravel of flint, brick and rare fine chalk. Rare organic fragments noted.		A	1.0	(2, 2) 1, 0, 1, 0	2		
1.25							PP at 1.3-1.5mbgl - 0.75, 0.75, 1.5, 0.5, 1.25 kg/cm2	
			T					
	SUPERFICIAL DEPOSITS Soft to firm brown with grey mottling slightly gravelly slightly silty CLAY. Gravel of angular to sub-rounded flint.							
1.90							HSV at 1.9-2.0mbgl - 75, 60, 60 kPa	
				2.0	(1, 2) 1, 2, 2, 3	8		
	SUPERFICIAL DEPOSITS Firm medium strength orange-brown mottled grey slightly silty sandy (fine) CLAY.						HSV at 2.3-2.5mbgl - 75, 55, 60 kPa	
							PP at 2.8mbgl - 1.5, 1.5, 1.5, 2.25, 1.75 kg/cm^2	
3.00				3.0	(1, 2) 2, 1, 1, 1	5		
	SUPERFICIAL DEPOSITS Very soft to soft low strength slightly silty very sandy (fine to medium) orange-brown CLAY.		T					
	...Becoming firm at slightly sandy (fine) silty CLAY at 4.7mbgl.						HSV at 3.7-3.8mbgl - 30, 25, 30 kPa	
				4.0	(1, 1) 2, 2, 3, 3	10		
5.00								
	Borehole Terminated			5.0				
				6.0				

Notes:

A:	250ml and 60ml Amber Glass Jars
T:	Plastic Tub (1Kg)
SPT:	Standard Penetration Test
HSV:	Hand Shear Vane
PP:	Pocket Penetrometer
PID:	Photo-Ionisation Detector

Plant: Dando Terrier 2002

Water observations:
Water entry at approximately 1.0mbgl. Water level recorded at 1.48mbgl upon

General remarks: Follow on probing (DP4) undertaken from 5.0mbgl.

Logged by: ML	Checked by: CH	Approved by: RE

DYNAMIC SAMPLING RECORD

Project Title: North Orbital Road, St Albans	Borehole: WS07
Project No: 1706007.001	Dates: 18th July 2017
Client: Castleoak Group	

TWEEDIE EVANS CONSULTING
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info@tecon.co.uk

Depth (m)	Description	Legend	Sample Details	Depth (m)	SPT Results: Blow Count	SPT Results: N Value	Remarks/ Data	Installation
	Ground Surface			0.0				
0.60	MADE GROUND Concrete paving slab over brown locally black slightly clayey gravelly sand. Gravel of flint, brick and tarmacadam.		A					
	SUPERFICIAL DEPOSITS Soft orange-brown with grey mottling slightly sandy (fine) slightly silty CLAY. ...A band of very sandy soft clay between 2.1-2.4mbgl. ...Becoming firm medium strength at approximately 2.3mbgl.		T	1.0	(1, 1) 2, 2, 2, 2	8		
				2.0	(2, 2) 2, 1, 2, 2	7	HSV at 2.5-2.6mbgl - 65, 60, 60 kPa	
3.10				3.0	(1, 2) 2, 2, 2, 2	8		
	SUPERFICIAL DEPOSITS Firm medium strength brown mottled orange-brown and grey slightly silty slightly sandy (fine) CLAY.		T				HSV at 3.5-3.6mbgl - 50, 60, 60 kPa	
	...At approximately 4.0mbgl becoming very soft very low strength orange-brown and grey mottled slightly sandy (fine) silty CLAY.			4.0	(0, 0) 0, 0, 0 , 1	1	HSV at 3.8-4.0mbgl - 30, 40, 20 kPa	
5.00							HSV at 4.6-4.7mbgl - 10, 12.5, 10 kPa	
	Borehole Terminated			5.0				
				6.0				

Notes:

A:	250ml and 60ml Amber Glass Jars
T:	Plastic Tub (1Kg)
SPT:	Standard Penetration Test
HSV:	Hand Shear Vane
PP:	Pocket Penetrometer
PID:	Photo-Ionisation Detector

Plant: Dando Terrier 2002

Water observations:
Water entry at approximately 2.0mbgl.
Water level recorded at 2.15mbgl upon completion.

General remarks: Follow on probing (DP5) undertaken from 5.0mbgl.

Logged by: ML	Checked by: CH	Approved by: RE

DYNAMIC SAMPLING RECORD

Project Title: North Orbital Road, St Albans	Borehole: WS08
Project No: 1706007.001	Dates: 18th July 2017
Client: Castleoak Group	

TWEEDIE EVANS CONSULTING
www.tecon.co.uk
info@tecon.co.uk

Depth (m)	Description	Legend	Sample Details	Depth (m)	SPT Results: Blow Count	SPT Results: N Value	Remarks/ Data	Installation
	Ground Surface			0.0				
0.40	MADE GROUND Brown slightly gravelly silty sand. Gravel of flint. Frequent rootlets noted.		A					
1.95	SUPERFICIAL DEPOSITS Medium dense orange-brown with grey and black mottling slightly silty SAND (fine to medium).			1.0	(4, 5) 5, 5, 6, 6	22		
3.00	SUPERFICIAL DEPOSITS Soft to firm medium strength orange-brown with grey and black mottling silty CLAY.		T	2.0	(1, 2) 2, 1, 1, 1	5	HSV at 2.3-2.4mbgl - 55, 50, 50 kPa	
5.00	SUPERFICIAL DEPOSITS Very soft orange-brown very sandy (fine) slightly silty CLAY. ...Becoming very soft orange-brown to brown slightly sandy (fine) silty CLAY.			3.0	(0, 0) 0, 0, 0, 0	0		
	Borehole Terminated			4.0	(2, 1) 0, 1, 0, 0	1		
				5.0				
				6.0				

Notes:

A:	250ml and 60ml Amber Glass Jars
T:	Plastic Tub (1Kg)
SPT:	Standard Penetration Test
HSV:	Hand Shear Vane
PP:	Pocket Penetrometer
PID:	Photo-Ionisation Detector

Plant: Dando Terrier 2002

Water observations:
Water entry at approximately 1.4mbgl.
Water level recorded at 2.67mbgl upon completion.

General remarks: Follow on probing (DP6) undertaken from 5.0mbgl.

Logged by: ML	Checked by: CH	Approved by: RE

APPENDIX G

Geochemical Certificates of Analysis

Mari Langreiter
Tweedie Evans Consulting Ltd
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i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 17-54809

Project / Site name:	North Obrital Road, St Albans	**Samples received on:**	20/07/2017
Your job number:	1706007.001	**Samples instructed on:**	20/07/2017
Your order number:		**Analysis completed by:**	01/08/2017
Report Issue Number:	1	**Report issued on:**	01/08/2017
Samples Analysed:	10 soil samples		

Signed:

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 17-54809

Project / Site name: North Obrital Road, St Albans

Lab Sample Number				785277	785278	785279	785280	785281
Sample Reference				WS01	WS02	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.20	0.10-0.20	0.10-0.20	0.10-0.40	0.10-0.30
Date Sampled				17/07/2017	17/07/2017	17/07/2017	17/07/2017	18/07/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	9.5	7.1	11	6.8	3.0
Total mass of sample received	kg	0.001	NONE	0.40	0.39	0.38	0.39	0.48
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.0	7.2	6.6	7.0	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	-	-	330	-
Water Soluble SO4 as SO4 (2:1) Gallery 16h extraction	g/l	0.00125	MCERTS	0.0044	0.0054	0.0246	0.0079	0.0210
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	4.4
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.3	1.2	1.1	1.3	4.4
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.31
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	2.3
Acenaphthene	mg/kg	0.05	MCERTS	0.26	< 0.05	< 0.05	< 0.05	0.74
Fluorene	mg/kg	0.05	MCERTS	0.74	< 0.05	< 0.05	< 0.05	1.7
Phenanthrene	mg/kg	0.05	MCERTS	0.93	< 0.05	< 0.05	< 0.05	19
Anthracene	mg/kg	0.05	MCERTS	0.26	< 0.05	< 0.05	< 0.05	7.3
Fluoranthene	mg/kg	0.05	MCERTS	0.40	< 0.05	< 0.05	0.38	35
Pyrene	mg/kg	0.05	MCERTS	0.27	< 0.05	< 0.05	0.34	32
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.23	16
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.28	14
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.40	17
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.14	8.6
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.28	18
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	9.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	2.4
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	10
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.86	< 0.80	< 0.80	2.05	193
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	8.3	10	15	12
Barium (aqua regia extractable)	mg/kg	1	MCERTS	62	52	55	77	80
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.83	0.75	0.91	0.87	0.79
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.5	0.7	0.8	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	0.3
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	18	27	29	26
Copper (aqua regia extractable)	mg/kg	1	MCERTS	23	16	23	34	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	46	33	59	91	66
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	13	16	17	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	31	27	39	40	42
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	54	45	54	95	59

Analytical Report Number: 17-54809

Project / Site name: North Obrital Road, St Albans

Lab Sample Number				785277	785278	785279	785280	785281
Sample Reference				WS01	WS02	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.20	0.10-0.20	0.10-0.20	0.10-0.40	0.10-0.30
Date Sampled				17/07/2017	17/07/2017	17/07/2017	17/07/2017	18/07/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	< 10	-
Pesticide and Herbicide Screen								
Pesticides/Herbicides Screen in Soil	P/A	N/A	NONE	Absent	-	Absent	-	-

Analytical Report Number: 17-54809

Project / Site name: North Obrital Road, St Albans

Lab Sample Number				785282	785283	785284	785285	785286
Sample Reference				WS05	WS06	WS06	WS07	WS08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.55	0.00-0.10	0.10-0.90	0.10-0.60	0.10-0.20
Date Sampled				18/07/2017	18/07/2017	18/07/2017	18/07/2017	18/07/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	7.6	4.1	12	6.7	4.4
Total mass of sample received	kg	0.001	NONE	0.43	0.44	0.45	0.45	0.39
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile- Loose Fibres, Hard/Cement Type Material	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.6	7.9	6.9	8.6	6.9
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	270	-	730	710	-
Water Soluble SO4 as SO4 (2:1) Gallery 16h extraction	g/l	0.00125	MCERTS	0.0045	0.0089	0.0534	0.0355	0.0019
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.8	4.5	2.0	0.6	0.8
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.51	< 0.05	0.36	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.46	< 0.05	0.75	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.38	< 0.05	1.1	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	3.2	< 0.05	10	0.06
Anthracene	mg/kg	0.05	MCERTS	< 0.05	2.4	< 0.05	3.1	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	10	0.33	19	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	12	0.28	13	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	6.2	0.25	9.2	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	6.1	0.17	8.6	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	18	0.30	11	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	4.8	0.13	3.9	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	19	0.22	8.0	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	13	< 0.05	4.2	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	2.2	< 0.05	1.2	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	16	< 0.05	4.2	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	114	1.68	98.2	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.9	6.0	12	10	6.5
Barium (aqua regia extractable)	mg/kg	1	MCERTS	23	32	100	170	32
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.36	0.33	1.1	0.72	0.41
Boron (water soluble)	mg/kg	0.2	MCERTS	1.3	0.6	2.6	0.9	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.4	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	9.0	28	24	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	20	67	44	12
Lead (aqua regia extractable)	mg/kg	1	MCERTS	32	120	69	120	33
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	6.1	9.4	36	17	8.6
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	18	31	42	30	20
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	31	79	91	130	34

Analytical Report Number: 17-54809

Project / Site name: North Obrital Road, St Albans

Lab Sample Number				785282	785283	785284	785285	785286
Sample Reference				WS05	WS06	WS06	WS07	WS08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.55	0.00-0.10	0.10-0.90	0.10-0.60	0.10-0.20
Date Sampled				18/07/2017	18/07/2017	18/07/2017	18/07/2017	18/07/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	< 10	-	< 10	170	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	< 8.0	8.3	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	< 10	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	4.2	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	< 10	52	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	< 10	100	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	160	-
Pesticide and Herbicide Screen								
Pesticides/Herbicides Screen in Soil	P/A	N/A	NONE	-	-	-	Absent	Absent

Analytical Report Number : 17-54809

Project / Site name: North Obrital Road, St Albans

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
785277	WS01	None Supplied	0.10-0.20	Brown loam and sand with gravel and vegetation.
785278	WS02	None Supplied	0.10-0.20	Brown loam and clay with gravel and vegetation.
785279	WS03	None Supplied	0.10-0.20	Brown loam and clay with gravel and vegetation.
785280	WS04	None Supplied	0.10-0.40	Brown loam and clay with gravel and vegetation.
785281	WS05	None Supplied	0.10-0.30	Brown loam and sand with gravel.
785282	WS05	None Supplied	0.30-0.55	Brown loam and clay with gravel and brick.
785283	WS06	None Supplied	0.00-0.10	Brown loam and sand with gravel and vegetation.
785284	WS06	None Supplied	0.10-0.90	Brown clay and sand.
785285	WS07	None Supplied	0.10-0.60	Light brown loam and clay with gravel.
785286	WS08	None Supplied	0.10-0.20	Brown loam and sand with gravel and vegetation.

The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 17-54809

Project / Site name: North Obrital Road, St Albans

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Pesticides and Herbicides in soil screening	In-house method	In-house method		W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil by Gallery 16hr	Determination of water soluble Sulphate by discrete analyser (precipitation method).	In house method based on BS1377-3: 1990.	L082B-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding.	L076-PL	W	MCERTS

Analytical Report Number : 17-54809

Project / Site name: North Obrital Road, St Albans

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

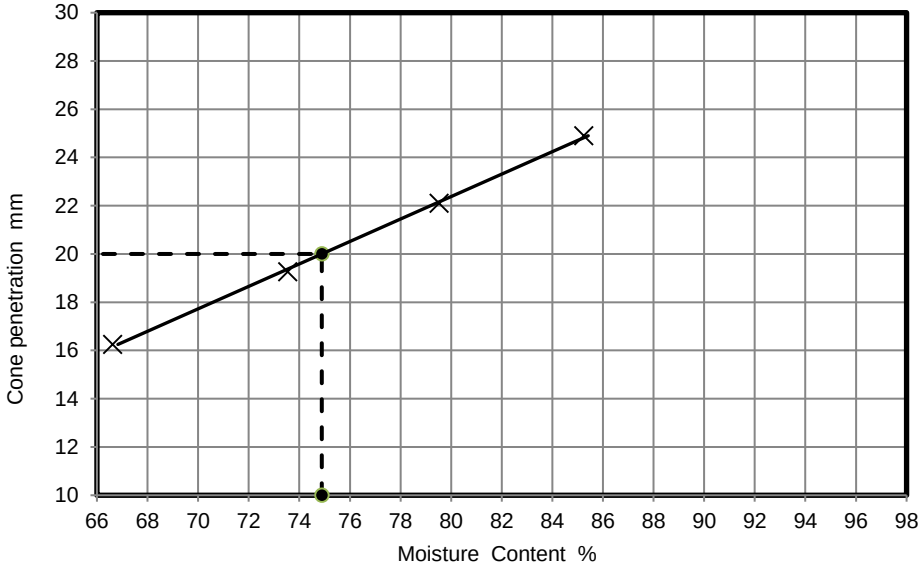
The results included within the report are representative of the samples submitted for analysis.

APPENDIX H

Soil Geotechnical Certificates of Analysis

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

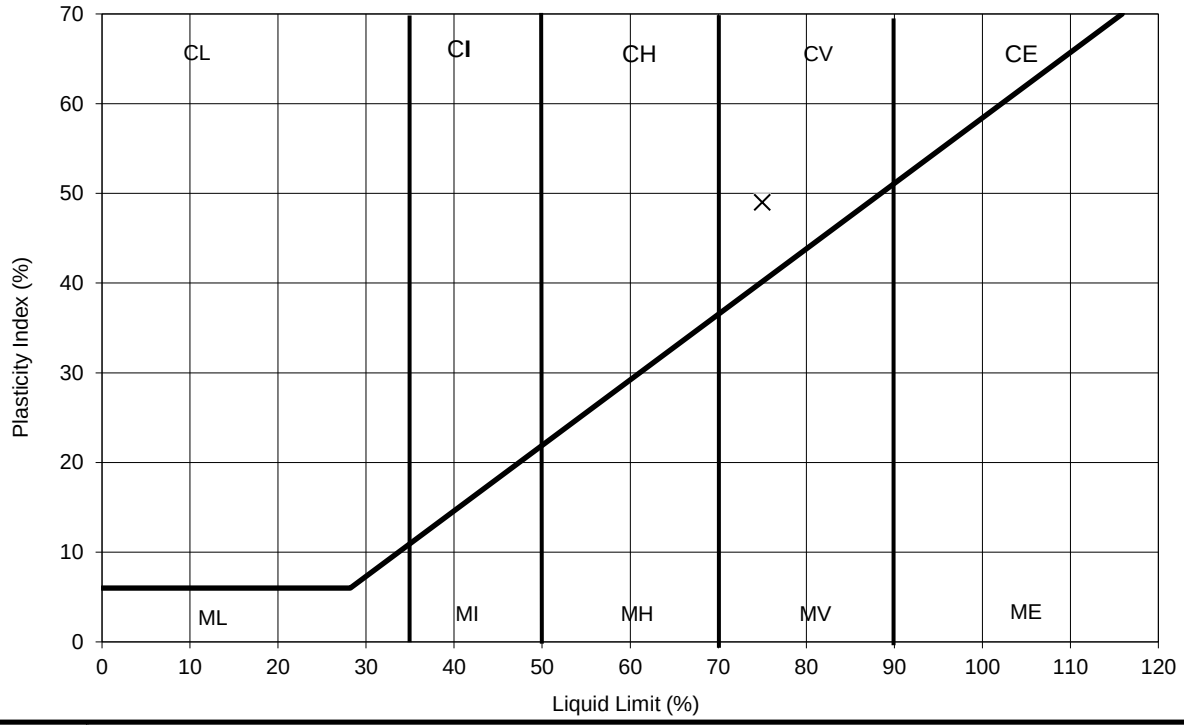
				Job No.	23128
				Borehole/Pit No.	WS03
Site Name	North Orbiltal Road, St Albans			Sample No.	-
Project No.	1706007.001	Client	TEC	Depth Top	1.00 m
Soil Description	Oranish brown slightly mottled bluish grey silty CLAY with traces of fine rootlets			Depth Base	1.20 m
				Sample Type	D
				Samples received	20/07/2017
				Schedules received	19/07/2017
				Project Started	20/07/2017
				Date Tested	31/07/2017



NATURAL MOISTURE CONTENT	**29**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**75**	**%**
PLASTIC LIMIT	**26**	**%**
PLASTICITY INDEX	**49**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 07/08/2017

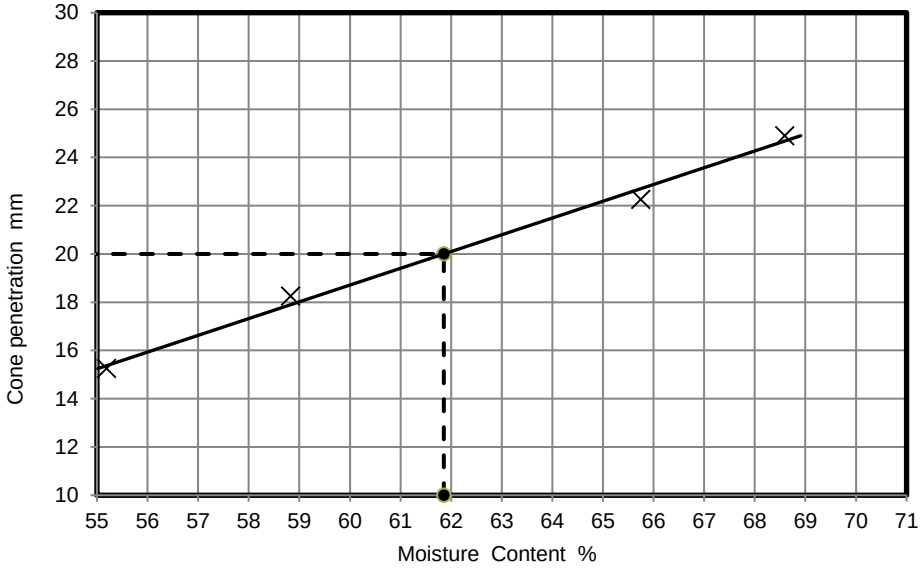
Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

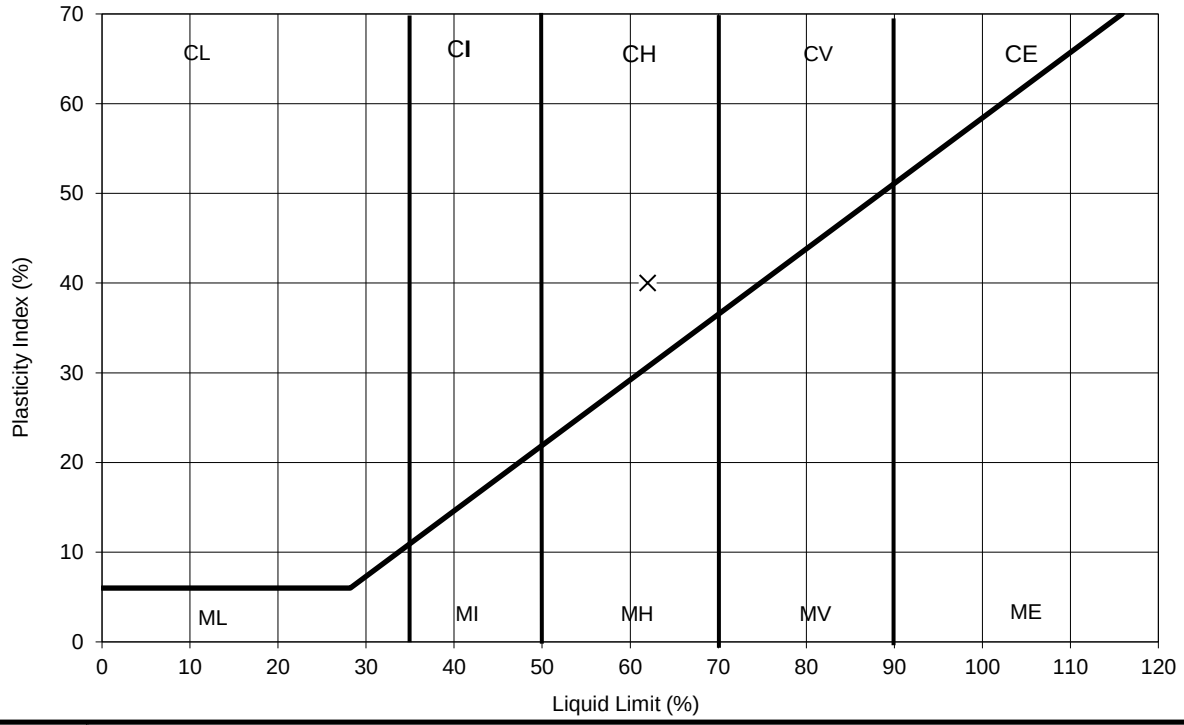
				Job No.	23128
				Borehole/Pit No.	WS06
Site Name	North Orbiltal Road, St Albans			Sample No.	-
Project No.	1706007.001	Client	TEC	Depth Top	1.30 m
Soil Description	Oranighs brown slightly mottled bluish grey slightly gravelly silty CLAY with occasional black flecks (gravel is fm and sub-angular to rounded)			Depth Base	1.50 m
				Sample Type	D
				Samples received	20/07/2017
				Schedules received	19/07/2017
				Project Started	20/07/2017
				Date Tested	31/07/2017



NATURAL MOISTURE CONTENT	**27**	**%**
% PASSING 425µm SIEVE	**75**	**%**
LIQUID LIMIT	**62**	**%**
PLASTIC LIMIT	**22**	**%**
PLASTICITY INDEX	**40**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
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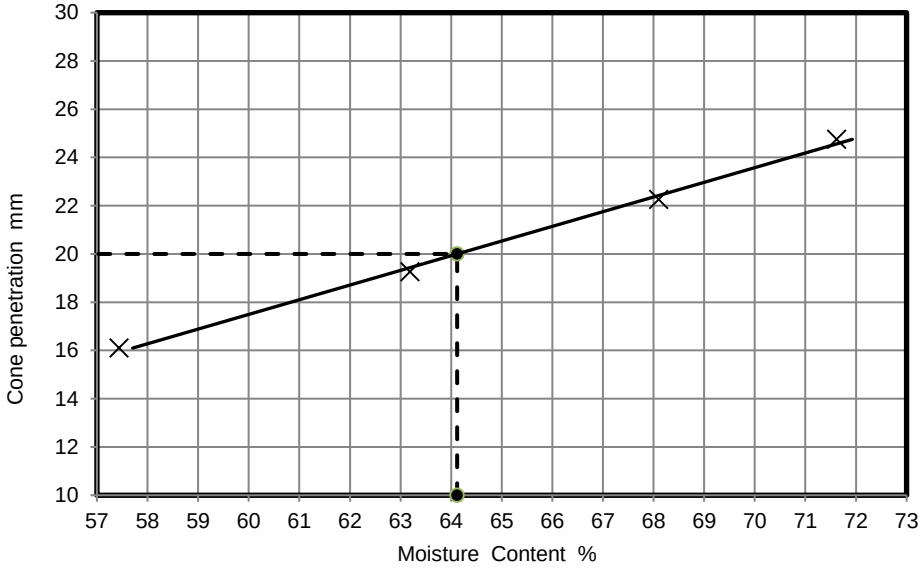
Checked and Approved

Initials: J.P

Date: 07/08/2017

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

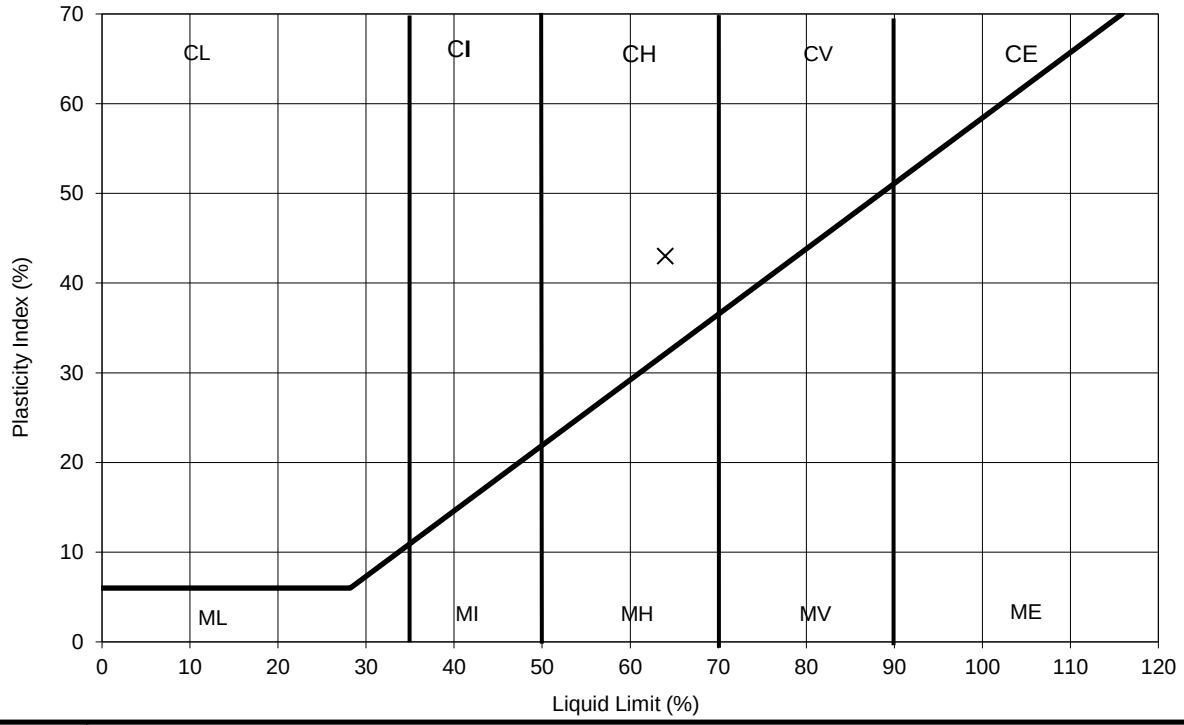
				Job No.	23128
				Borehole/Pit No.	WS07
Site Name	North Orbiltal Road, St Albans			Sample No.	-
Project No.	1706007.001	Client	TEC	Depth Top	0.80 m
Soil Description	Orangish brown slightly mottled light bluish grey slightly sandy silty CLAY with occaional carbonaceous deposits			Depth Base	0.90 m
				Sample Type	D
				Samples received	20/07/2017
				Schedules received	19/07/2017
				Project Started	20/07/2017
				Date Tested	31/07/2017



NATURAL MOISTURE CONTENT	**33**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**64**	**%**
PLASTIC LIMIT	**21**	**%**
PLASTICITY INDEX	**43**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
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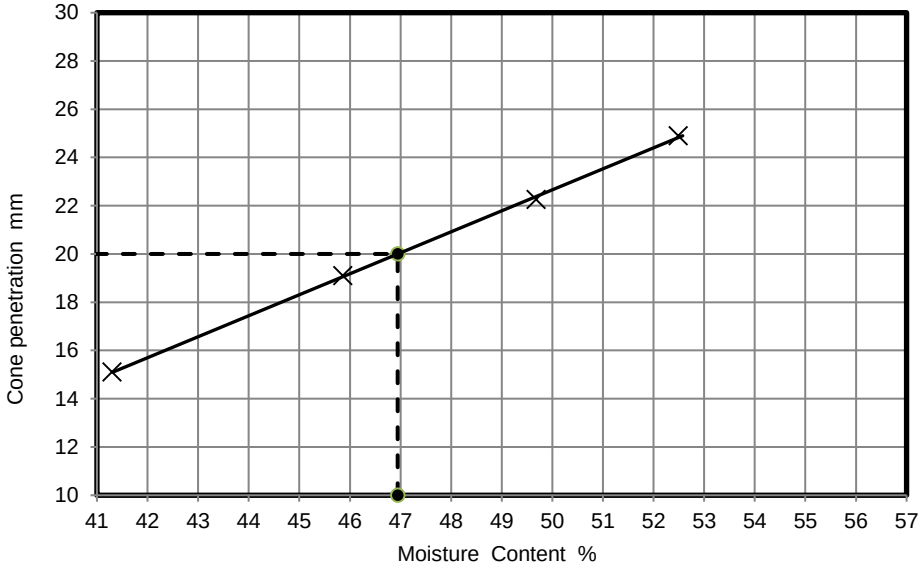
UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

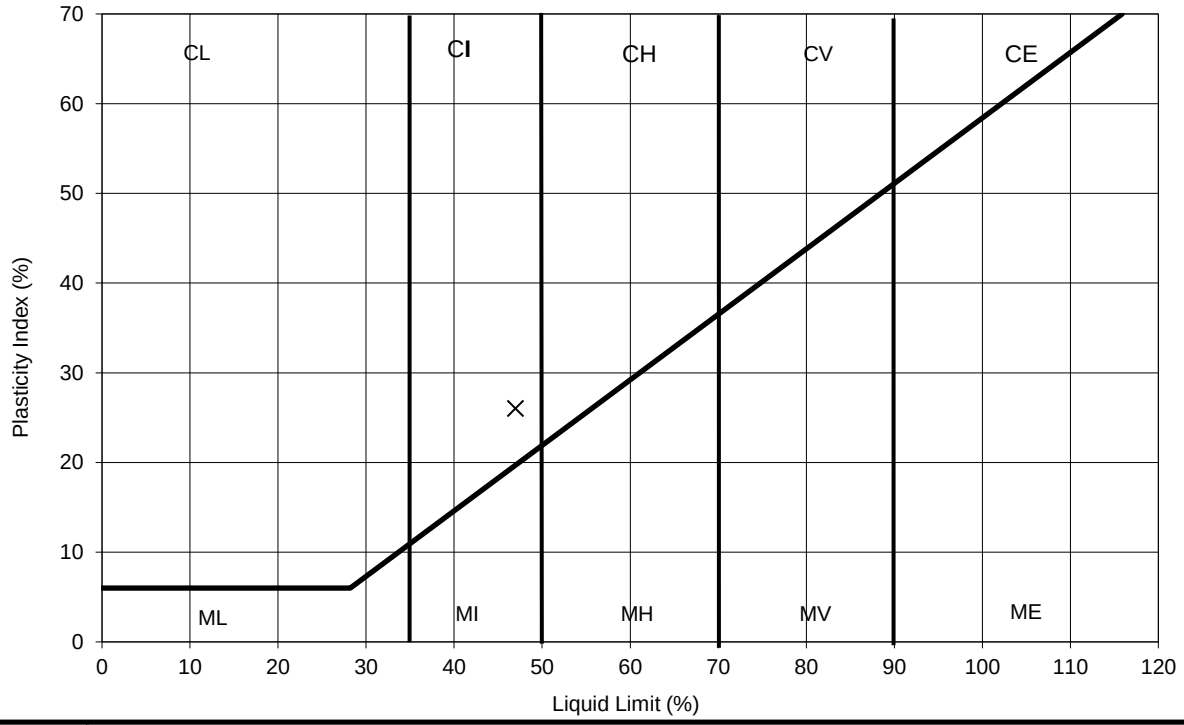
				Job No.	23128
				Borehole/Pit No.	WS08
Site Name	North Orbiltal Road, St Albans			Sample No.	-
Project No.	1706007.001	Client	TEC	Depth Top	2.10 m
Soil Description	Orangish brown slightly mottled light grey sandy silty CLAY with occasional carbonaceous deposits			Depth Base	2.20 m
				Sample Type	D
				Samples received	20/07/2017
				Schedules received	19/07/2017
				Project Started	20/07/2017
				Date Tested	31/07/2017



NATURAL MOISTURE CONTENT	**28**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**47**	**%**
PLASTIC LIMIT	**21**	**%**
PLASTICITY INDEX	**26**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
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Checked and Approved

Initials: J.P
Date: 07/08/2017

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No.	Project Name	Programme	
23128	North Orbiltal Road, St Albans	Samples received	20/07/2017
		Schedule received	19/07/2017
Project No.	Client	Project started	20/07/2017
1706007.001	TEC	Testing Started	31/07/2017

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top	Base	Type		%	%	%	%	%	
WS03	-	1.00	1.20	D	Oranish brown slightly mottled bluish grey silty CLAY with traces of fine rootlets	29	100	75	26	49	
WS06	-	1.30	1.50	D	Oranighs brown slightly mottled bluish grey slightly gravelly silty CLAY with occasional black flecks (gravel is fm and sub-angular to rounded)	27	75	62	22	40	
WS07	-	0.80	0.90	D	Orangish brown slightly mottled light bluish grey slightly sandy silty CLAY with occaional carbonaceous deposits	33	100	64	21	43	
WS08	-	2.10	2.20	D	Orangish brown slightly mottled light grey sandy silty CLAY with occasional carbonaceous deposits	28	100	47	21	26	

UKAS TESTING
2519

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3, 4.4 and 5.0

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
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Checked and Approved

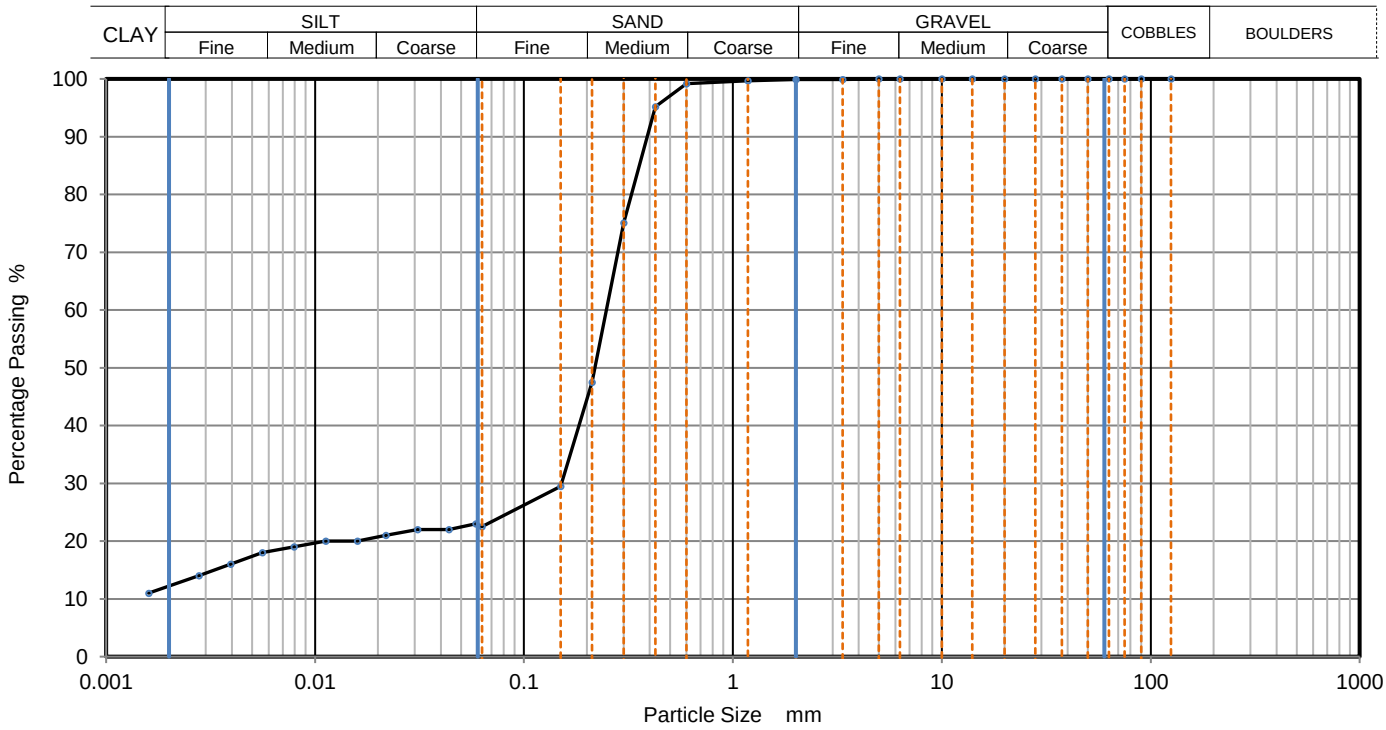
Initials **J.P**

Date: 07/08/2017

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

PARTICLE SIZE DISTRIBUTION

Site Name	North Orbiltal Road, St Albans			Job Ref	23128
				Borehole/Pit No.	WS01
				Sample No.	-
Project No.	1706007.001	Client	TEC	Depth Top	1.80 m
Soil Description	Orangish brown silty clayey SAND with occasional grey sandy clay pockets			Depth Base	2.80 m
				Sample Type	B
				Samples received	20/07/2017
				Schedules received	19/07/2017
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	20/07/2017
				Date tested	04/08/2017



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0589	23
90	100	0.0438	22
75	100	0.0309	22
63	100	0.0219	21
50	100	0.0159	20
37.5	100	0.0113	20
28	100	0.0079	19
20	100	0.0056	18
14	100	0.0039	16
10	100	0.0028	14
6.3	100	0.0016	11
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99	Particle density (assumed)	
0.425	95	2.65	Mg/m3
0.3	75		
0.212	48		
0.15	30		
0.063	23		

Dry Mass of sample, g	1972

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.1
Sand	77.4
Silt	10.1
Clay	12.4

Grading Analysis		
D100	mm	
D60	mm	0.248
D30	mm	0.152
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

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Checked and Approved

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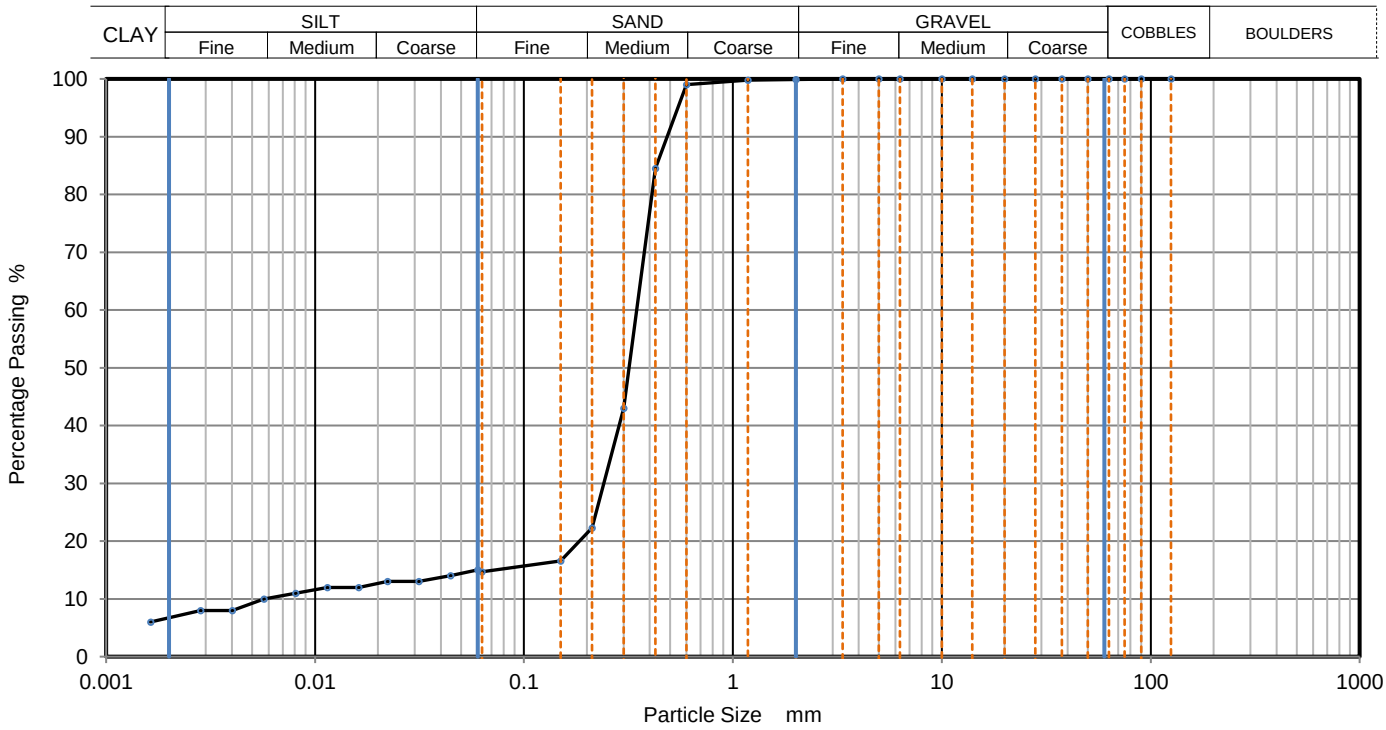
Date: 07/08/2017

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

PARTICLE SIZE DISTRIBUTION

Job Ref	23128				
Borehole/Pit No.	WS05				
Site Name	North Orbiltal Road, St Albans			Sample No.	-
Project No.	1706007.001	Client	TEC	Depth Top	1.00 m
Soil Description	Orangish brown slightly mottled grey clayey silty SAND			Depth Base	2.00 m
				Sample Type	B
				Samples received	20/07/2017
				Schedules received	19/07/2017
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	20/07/2017
				Date tested	04/08/2017



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0600	15
90	100	0.0445	14
75	100	0.0314	13
63	100	0.0222	13
50	100	0.0162	12
37.5	100	0.0114	12
28	100	0.0081	11
20	100	0.0057	10
14	100	0.0040	8
10	100	0.0028	8
6.3	100	0.0016	6
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99	Particle density (assumed)	
0.425	85	2.65	Mg/m3
0.3	43		
0.212	22		
0.15	17		
0.063	15		

Dry Mass of sample, g: 1904

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.1
Sand	85.2
Silt	8.2
Clay	6.5

Grading Analysis		
D100	mm	
D60	mm	0.346
D30	mm	0.241
D10	mm	0.00581
Uniformity Coefficient		60
Curvature Coefficient		29

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

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Tel: 01923 711288

Checked and Approved

Initials: **J.P**

Date: 07/08/2017

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results

Tested in accordance with BS1377 : Part 3 : 1990, clause 5.3 and clause 9

Job No.	Project Name	Programme	
23128	North Orbiltal Road, St Albans	Samples received	20/07/2017
		Schedule received	19/07/2017
Project No.	Client	Project started	20/07/2017
1706007.001	TEC	Testing Started	01/08/2017

Hole No.	Sample				Soil description	Dry Mass passing 2mm	SO3 Content	SO4 Content	pH	Remarks
	Ref	Top	Base	Type		%	g/l	g/l		
WS01	-	1.30	1.50	D	Orangish brown mottled grey silty CLAY with occasionnal dark carbonaceous deposit	100	0.26	0.31	6.31	
WS02	-	2.10	2.30	D	Pale brown mottled grey silty CLAY	100	0.22	0.27	7.75	
WS03	-	1.00	1.20	D	Oranish brown slightly mottled bluish grey silty CLAY with traces of fine rootlets	100	0.32	0.38	6.80	
WS05	-	3.30	3.50	D	Brown fine sandy silty CLAY	100	0.28	0.34	7.47	
WS06	-	1.30	1.50	D	Oranighs brown slightly mottled bluish grey slightly gravelly silty CLAY with occasional black flecks (gravel is fm and sub-angular to rounded)	80	0.28	0.34	7.53	
WS07	-	0.80	0.90	D	Orangish brown slightly mottled light bluish grey slightly sandy silty CLAY with occaional carbonaceous deposits	100	0.34	0.40	7.82	

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
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Initials **J.P**

Date: **07/08/2017**

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

APPENDIX I

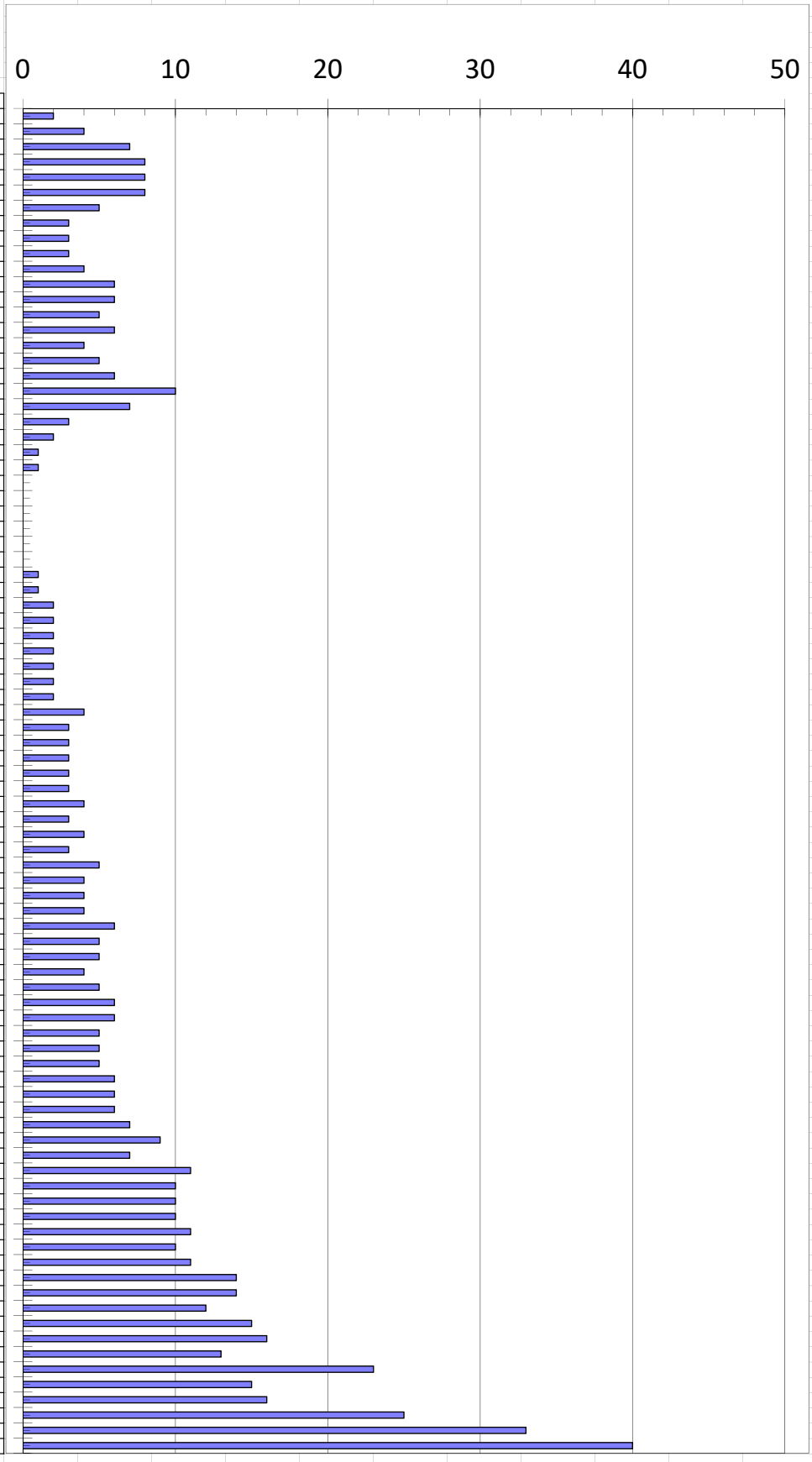
Dynamic Probe Results

Dynamic Probing Data Sheet

PROJECT: **North Orbital Road, St Albans**
Code: 1706007

TWEEDIE EVANS CONSULTING

DP1



Depth (m)	Blow count
0.0	2
0.1	4
0.2	7
0.3	8
0.4	8
0.5	8
0.6	5
0.7	3
0.8	3
0.9	3
1.0	4
1.1	6
1.2	6
1.3	5
1.4	6
1.5	4
1.6	5
1.7	6
1.8	10
1.9	7
2.0	3
2.1	2
2.2	1
2.3	1
2.4	0
2.5	0
2.6	0
2.7	0
2.8	0
2.9	0
3.0	1
3.1	1
3.2	2
3.3	2
3.4	2
3.5	2
3.6	2
3.7	2
3.8	2
3.9	4
4.0	3
4.1	3
4.2	3
4.3	3
4.4	3
4.5	4
4.6	3
4.7	4
4.8	3
4.9	5
5.0	4
5.1	4
5.2	4
5.3	6
5.4	5
5.5	5
5.6	4
5.7	5
5.8	6
5.9	6
6.0	5
6.1	5
6.2	5
6.3	6
6.4	6
6.5	6
6.6	7
6.7	9
6.8	7
6.9	11
7.0	10
7.1	10
7.2	10
7.3	11
7.4	10
7.5	11
7.6	14
7.7	14
7.8	12
7.9	15
8.0	16
8.1	13
8.2	23
8.3	15
8.4	16
8.5	25
8.6	33
8.7	40

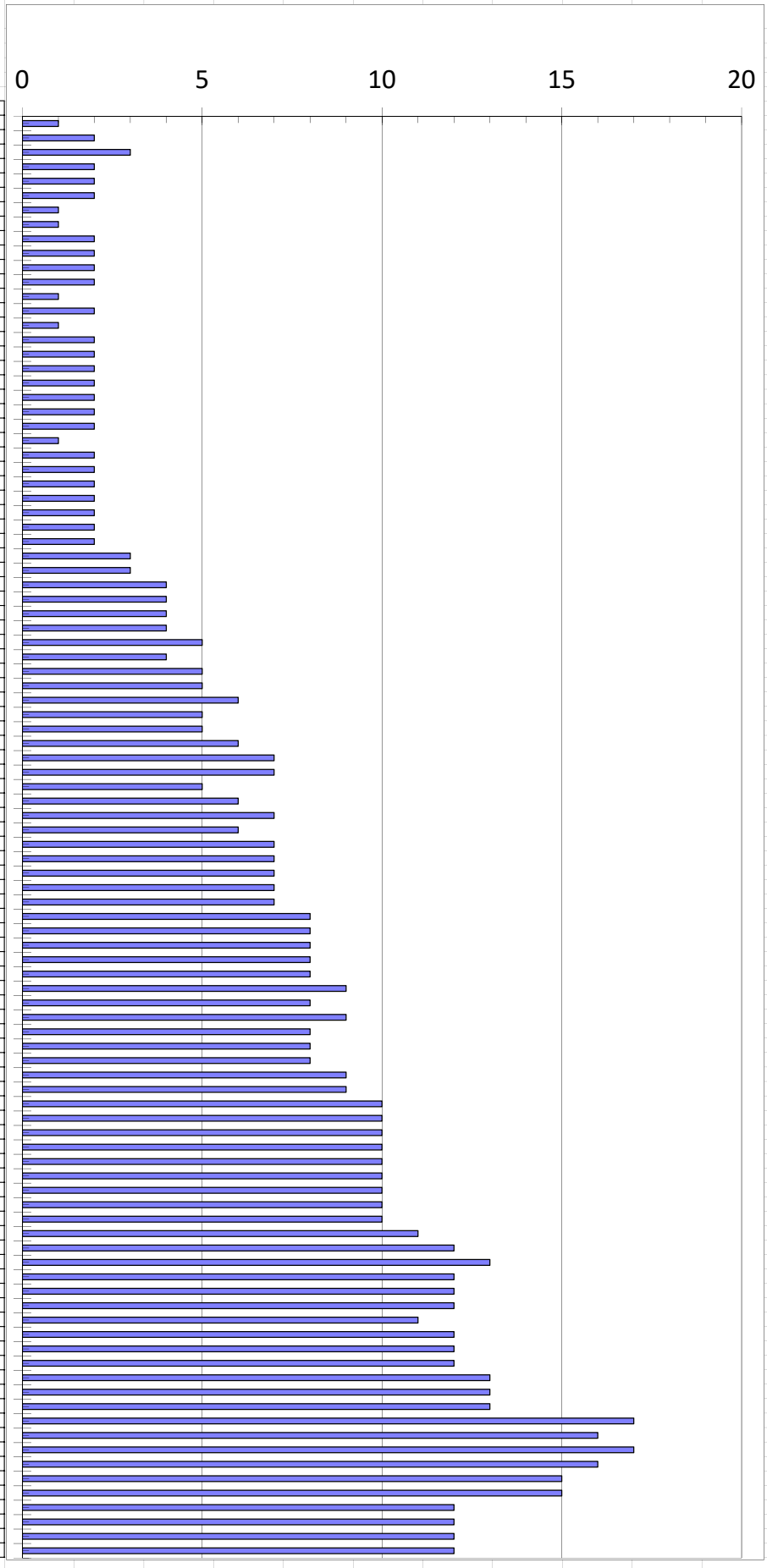
Dynamic Probing Data Sheet

PROJECT: **North Orbital Road, St Albans**
Code: 1706007

TWEEDIE EVANS CONSULTING

DP2

Depth (m)	Blow count
0.0	1
0.1	2
0.2	3
0.3	2
0.4	2
0.5	2
0.6	1
0.7	1
0.8	2
0.9	2
1.0	2
1.1	2
1.2	1
1.3	2
1.4	1
1.5	2
1.6	2
1.7	2
1.8	2
1.9	2
2.0	2
2.1	2
2.2	1
2.3	2
2.4	2
2.5	2
2.6	2
2.7	2
2.8	2
2.9	2
3.0	3
3.1	3
3.2	4
3.3	4
3.4	4
3.5	4
3.6	5
3.7	4
3.8	5
3.9	5
4.0	6
4.1	5
4.2	5
4.3	6
4.4	7
4.5	7
4.6	5
4.7	6
4.8	7
4.9	6
5.0	7
5.1	7
5.2	7
5.3	7
5.4	7
5.5	8
5.6	8
5.7	8
5.8	8
5.9	8
6.0	9
6.1	8
6.2	9
6.3	8
6.4	8
6.5	8
6.6	9
6.7	9
6.8	10
6.9	10
7.0	10
7.1	10
7.2	10
7.3	10
7.4	10
7.5	10
7.6	10
7.7	11
7.8	12
7.9	13
8.0	12
8.1	12
8.2	12
8.3	11
8.4	12
8.5	12
8.6	12
8.7	13
8.8	13
8.9	13
9.0	17
9.1	16
9.2	17
9.3	16
9.4	15
9.5	15
9.6	12
9.7	12
9.8	12
9.9	12



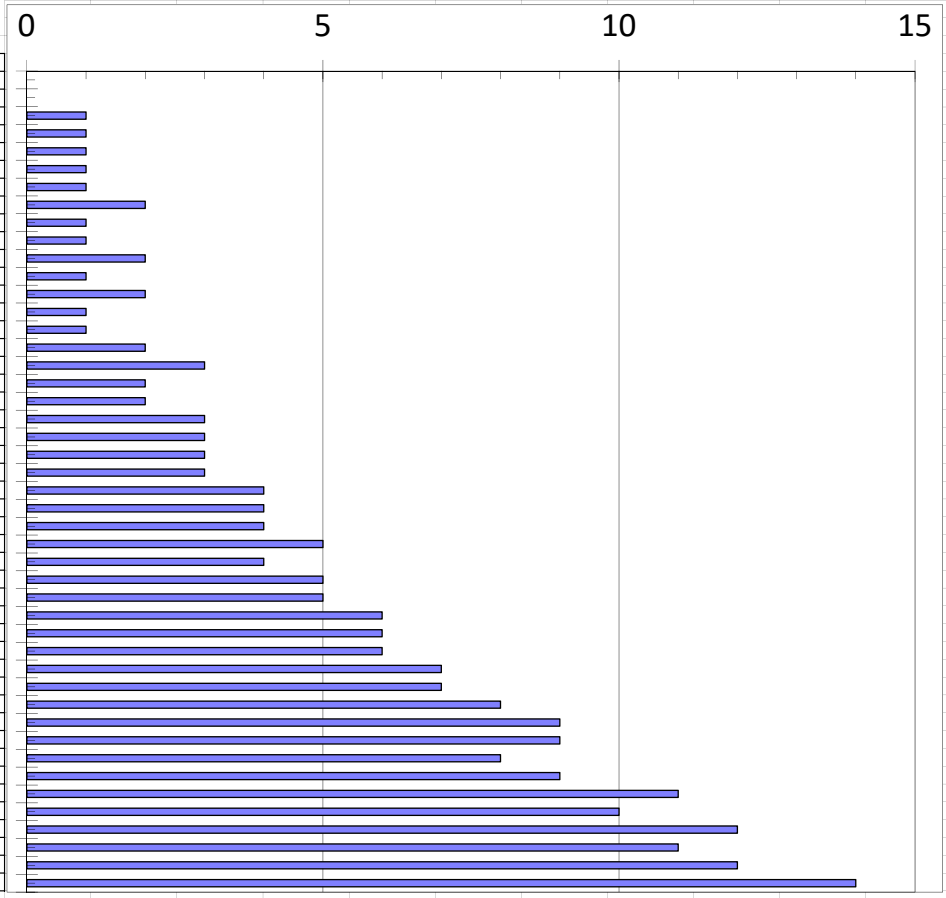
Dynamic Probing Data Sheet

PROJECT: **North Orbital Road, St Albans**
Code: 1706007

TWEEDIE EVANS CONSULTING

DP3

Depth (m)	Blow count
5.4	0
5.5	0
5.6	1
5.7	1
5.8	1
5.9	1
6.0	1
6.1	2
6.2	1
6.3	1
6.4	2
6.5	1
6.6	2
6.7	1
6.8	1
6.9	2
7.0	3
7.1	2
7.2	2
7.3	3
7.4	3
7.5	3
7.6	3
7.7	4
7.8	4
7.9	4
8.0	5
8.1	4
8.2	5
8.3	5
8.4	6
8.5	6
8.6	6
8.7	7
8.8	7
8.9	8
9.0	9
9.1	9
9.2	8
9.3	9
9.4	11
9.5	10
9.6	12
9.7	11
9.8	12
9.9	14

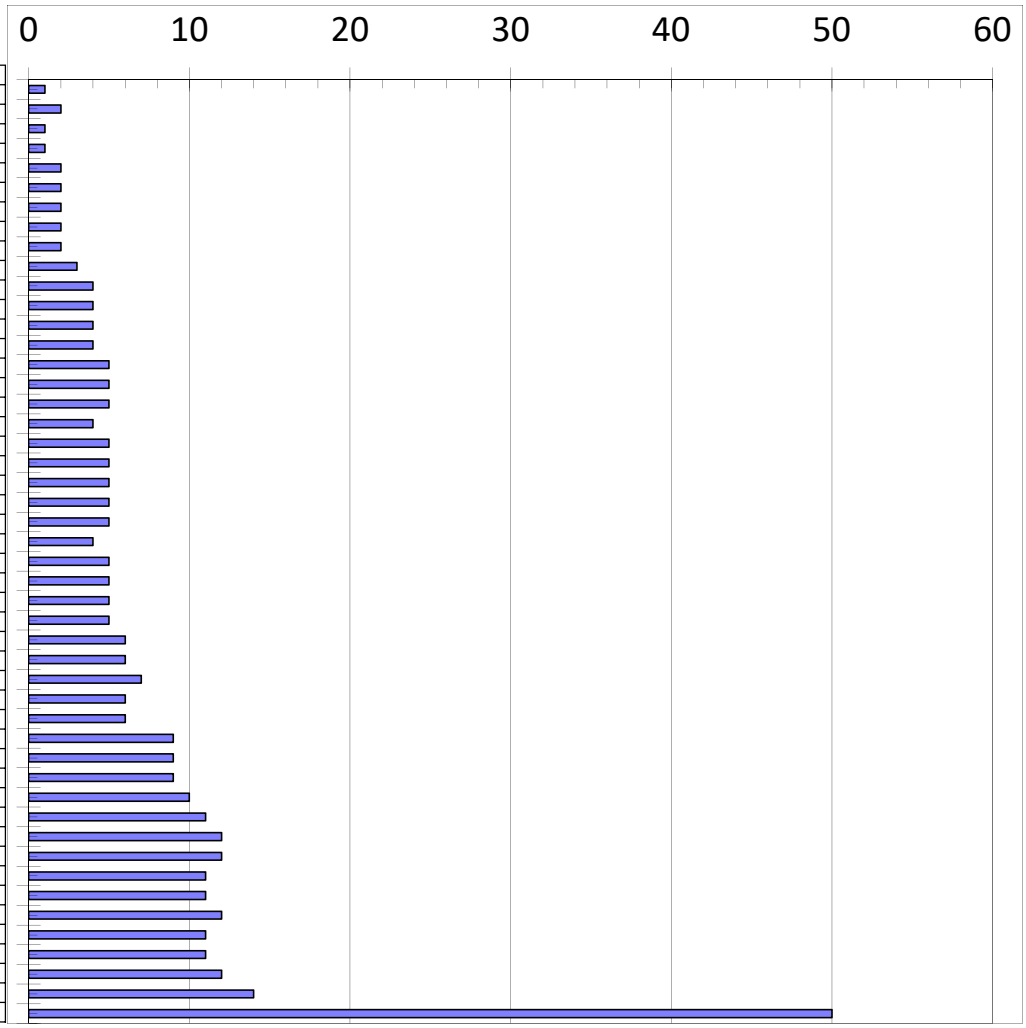


Dynamic Probing Data Sheet

PROJECT: **North Orbital Road, St Albans**
Code: 1706007

TWEEDIE EVANS CONSULTING

DP4



Depth (m)	Blow count
5.0	1
5.1	2
5.2	1
5.3	1
5.4	2
5.5	2
5.6	2
5.7	2
5.8	2
5.9	3
6.0	4
6.1	4
6.2	4
6.3	4
6.4	5
6.5	5
6.6	5
6.7	4
6.8	5
6.9	5
7.0	5
7.1	5
7.2	5
7.3	4
7.4	5
7.5	5
7.6	5
7.7	5
7.8	6
7.9	6
8.0	7
8.1	6
8.2	6
8.3	9
8.4	9
8.5	9
8.6	10
8.7	11
8.8	12
8.9	12
9.0	11
9.1	11
9.2	12
9.3	11
9.4	11
9.5	12
9.6	14
9.7	50

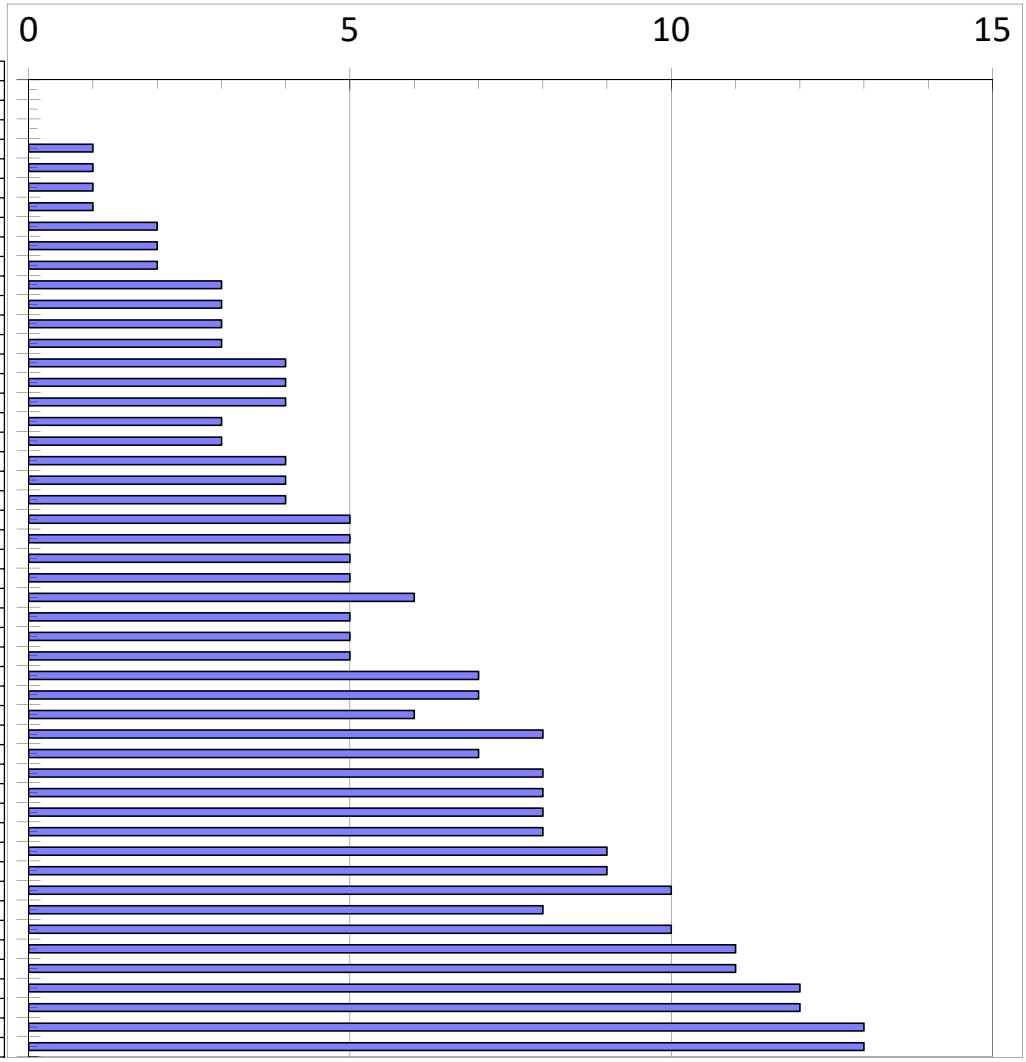
Dynamic Probing Data Sheet

PROJECT: **North Orbital Road, St Albans**
Code: 1706007

TWEEDIE EVANS CONSULTING

DP5

Depth (m)	Blow count
5.0	0
5.1	0
5.2	0
5.3	1
5.4	1
5.5	1
5.6	1
5.7	2
5.8	2
5.9	2
6.0	3
6.1	3
6.2	3
6.3	3
6.4	4
6.5	4
6.6	4
6.7	3
6.8	3
6.9	4
7.0	4
7.1	4
7.2	5
7.3	5
7.4	5
7.5	5
7.6	6
7.7	5
7.8	5
7.9	5
8.0	7
8.1	7
8.2	6
8.3	8
8.4	7
8.5	8
8.6	8
8.7	8
8.8	8
8.9	9
9.0	9
9.1	10
9.2	8
9.3	10
9.4	11
9.5	11
9.6	12
9.7	12
9.8	13
9.9	13



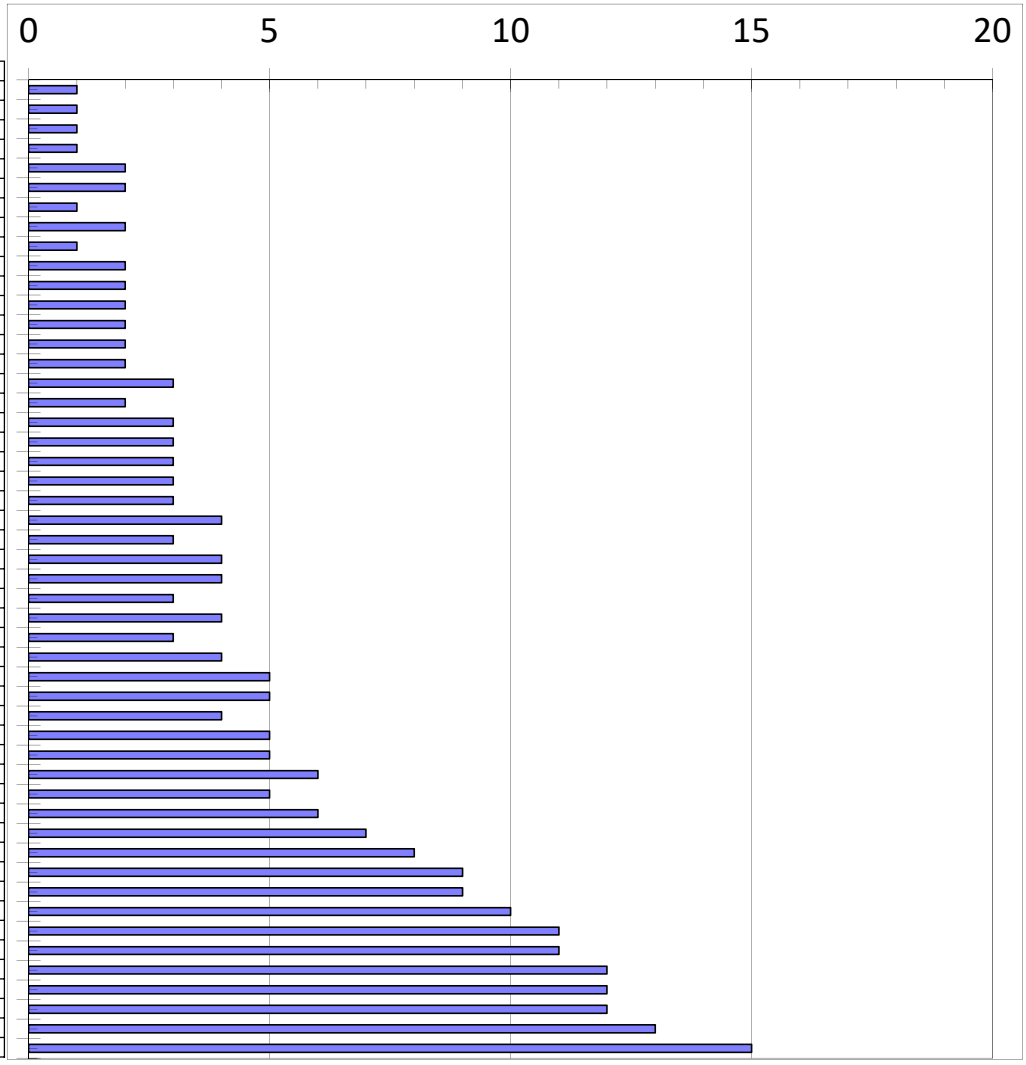
Dynamic Probing Data Sheet

PROJECT: **North Orbital Road, St Albans**
Code: 1706007

TWEEDIE EVANS CONSULTING

DP6

Depth (m)	Blow count
5.0	1
5.1	1
5.2	1
5.3	1
5.4	2
5.5	2
5.6	1
5.7	2
5.8	1
5.9	2
6.0	2
6.1	2
6.2	2
6.3	2
6.4	2
6.5	3
6.6	2
6.7	3
6.8	3
6.9	3
7.0	3
7.1	3
7.2	4
7.3	3
7.4	4
7.5	4
7.6	3
7.7	4
7.8	3
7.9	4
8.0	5
8.1	5
8.2	4
8.3	5
8.4	5
8.5	6
8.6	5
8.7	6
8.8	7
8.9	8
9.0	9
9.1	9
9.2	10
9.3	11
9.4	11
9.5	12
9.6	12
9.7	12
9.8	13
9.9	15



APPENDIX J

DCP-TRL Results

Dynamic Cone Penetration Test Data (DCP-TRL)

North Orbital Road, St Albans **DCP1**

Cumulative Blow Count	Penetration (mm)	Penetration Index (DPI) mm/blow	Estimated CBR[1] (%)	Adjusted CBR[2] (%)
0	118	-	-	-
1	161	43.0	5.7	4.3
2	189	28.0	8.9	6.8
3	220	31.0	8.0	6.2
4	253	33.0	7.5	5.9
5	280	27.0	9.3	7.3
6	305	25.0	10.1	8.0
7	326	21.0	12.1	9.7
8	347	21.0	12.1	9.8
9	363	16.0	16.1	13.1
12	388	8.3	32.1	26.4
14	407	9.5	28.0	23.2
19	430	4.6	60.2	50.2
23	445	3.8	74.7	62.7
27	478	8.3	32.5	27.5
34	505	3.9	72.5	62.1
40	524	3.2	89.3	77.0
44	551	6.8	40.1	34.9
48	570	4.8	58.2	50.9
50	594	12.0	21.8	19.3
52	622	14.0	18.6	16.5
54	660	19.0	13.4	12.1
56	701	20.5	12.4	11.3
57	721	20.0	12.7	11.7
58	741	20.0	12.7	11.8
59	763	22.0	11.5	10.7
60	786	23.0	11.0	10.3
61	808	22.0	11.5	10.9
62	835	27.0	9.3	8.8
63	858	23.0	11.0	10.5
64	876	18.0	14.2	13.7
65	894	18.0	14.2	13.8
66	912	18.0	14.2	13.9
67	933	21.0	12.1	11.9
68	949	16.0	16.1	15.9

Date:	17/07/2017
Project:	North Orbital Road, St Albans
Project No.	1706007.001
Test No.	DCP1
Operator:	ML
Soil Type:	Made ground over clay/clayey sand
Surface Moisture:	Moderate

Notes/Comments

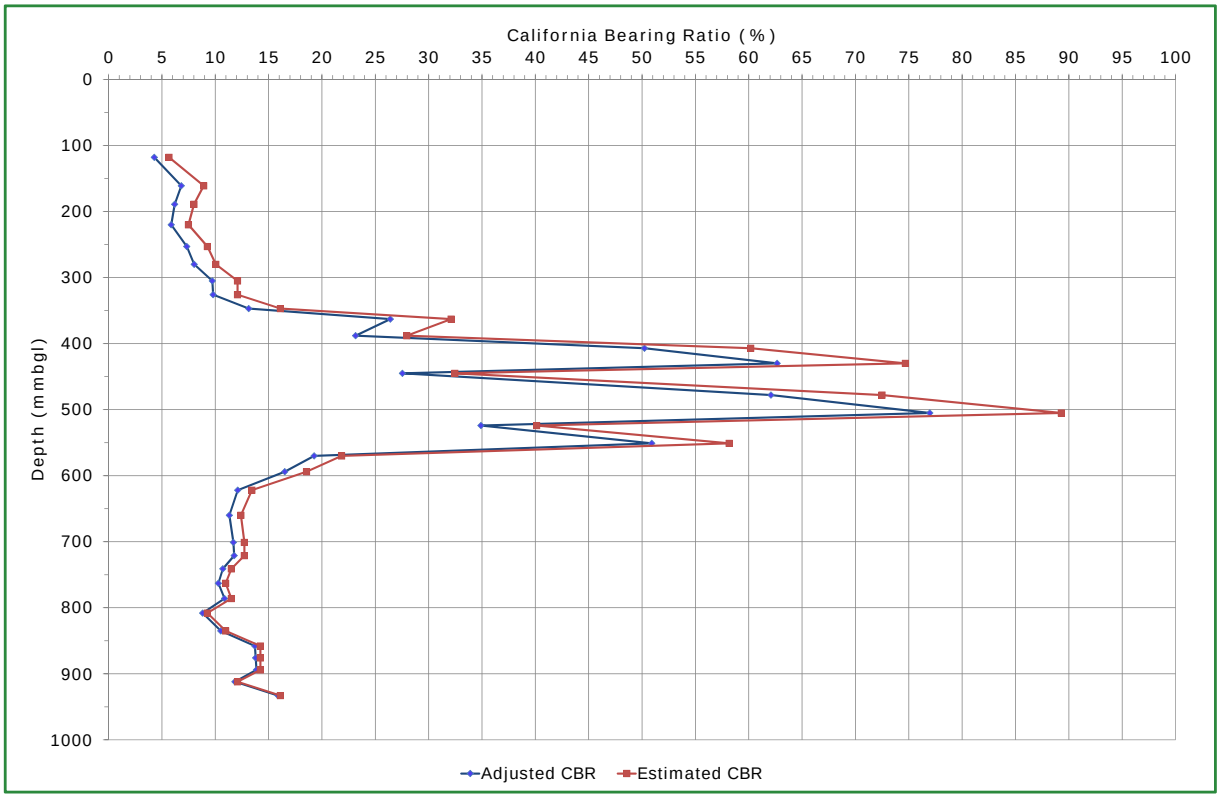
Notes:

1. CBR Value calculated using Jones C R and J Rolt (1991), "*Operating instructions for the TRL dynamic cone penetrometer*" (2nd edition). Information Note. Crowthorne: Transport Research Laboratory, as follows:

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057\ \text{Log}_{10}(\text{DPI})$$

2. Adjusted CBR vaules obtined from Table 4.2 of Simon Done and Piouslin Samuel (2006), "*Measuring Road Pavement Strength and Designing Low Volume Sealed Roads using the Dynamic Cone Penetrometer*" Unpublished TRL Project Report UPR/IE/76/06 Project Record No R7783.

The CBR Adjustment Factors are applied to unpaved roads on the assumption that the effect of moisture will be a maximum at the top surface and will reduce linearly to zero at a depth of 1000 mm.



Dynamic Cone Penetration Test Data (DCP-TRL)

North Orbital Road, St Albans **DCP2**

Cumulative Blow Count	Penetration (mm)	Penetration Index (DPI) mm/blow	Estimated CBR[1] (%)	Adjusted CBR[2] (%)
0	129	-	-	-
1	175	46.0	5.3	4.0
2	201	26.0	9.6	7.4
3	220	19.0	13.4	10.4
4	240	20.0	12.7	9.9
5	263	23.0	11.0	8.6
6	281	18.0	14.2	11.3
7	300	19.0	13.4	10.7
8	324	24.0	10.5	8.4
9	346	22.0	11.5	9.3
10	374	28.0	8.9	7.3
11	401	27.0	9.3	7.7
12	437	36.0	6.8	5.7
13	475	38.0	6.5	5.5
15	505	15.0	17.3	14.8
16	539	34.0	7.3	6.3
17	599	60.0	4.0	3.5
18	653	54.0	4.5	4.0
19	708	55.0	4.4	4.0
20	764	56.0	4.3	4.0
21	816	52.0	4.6	4.4
22	874	58.0	4.1	4.0
23	940	66.0	3.6	3.5
24	950	10.0	26.5	26.1

Date:	17/07/2017
Project:	North Orbital Road, St Albans
Project No.	1706007.001
Test No.	DCP2
Operator:	ML
Soil Type:	Made ground over clay/clayey sand
Surface Moisture:	Moderate

Notes/Comments

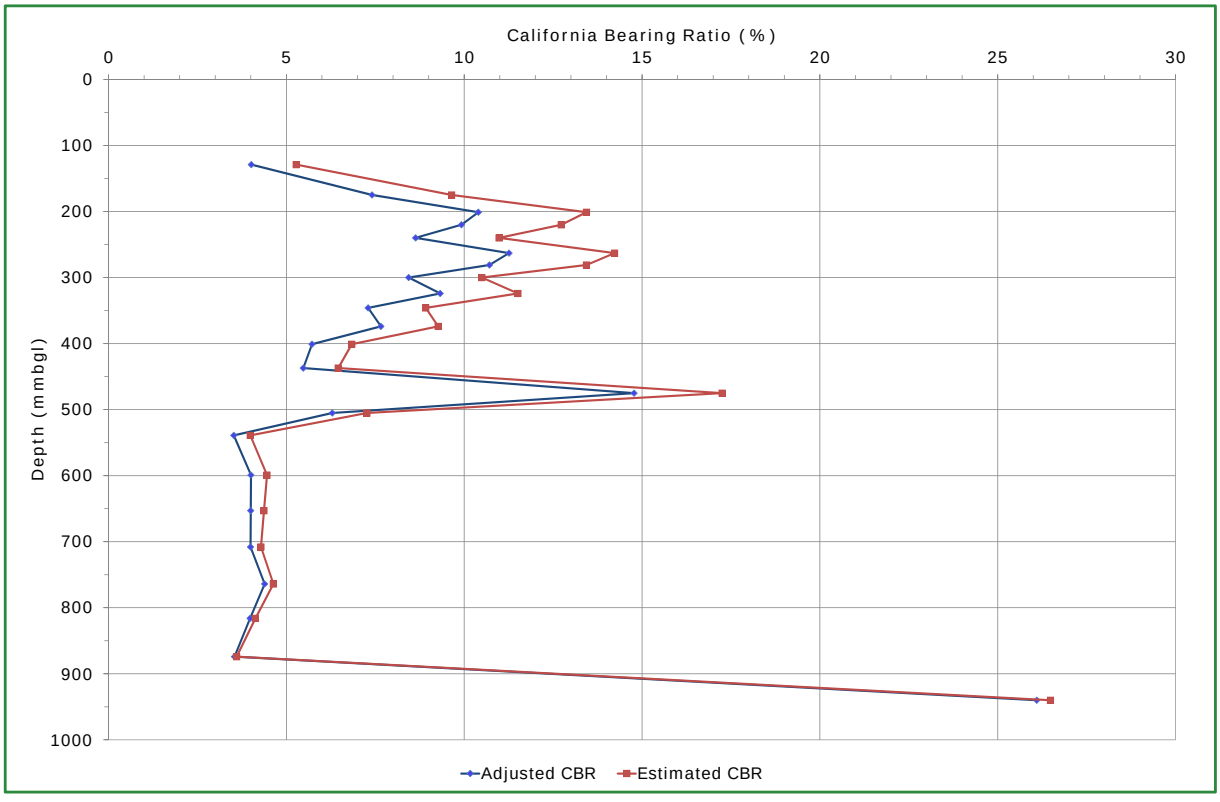
Notes:

1. CBR Value calculated using Jones C R and J Rolt (1991), "*Operating instructions for the TRL dynamic cone penetrometer*" (2nd edition). Information Note. Crowthorne: Transport Research Laboratory, as follows:

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057\ \text{Log}_{10}(\text{DPI})$$

2. Adjusted CBR vaules obtined from Table 4.2 of Simon Done and Piouslin Samuel (2006), "*Measuring Road Pavement Strength and Designing Low Volume Sealed Roads using the Dynamic Cone Penetrometer*" Unpublished TRL Project Report UPR/IE/76/06 Project Record No R7783.

The CBR Adjustment Factors are applied to unpaved roads on the assumption that the effect of moisture will be a maximum at the top surface and will reduce linearly to zero at a depth of 1000 mm.



Dynamic Cone Penetration Test Data (DCP-TRL)

North Orbital Road, St Albans **DCP3**

Cumulative Blow Count	Penetration (mm)	Penetration Index (DPI) mm/blow	Estimated CBR[1] (%)	Adjusted CBR[2] (%)
0	108	-	-	-
1	132	24.0	10.5	7.9
2	146	14.0	18.6	14.0
3	168	22.0	11.5	8.7
4	200	32.0	7.7	5.9
6	222	11.0	23.9	18.5
8	245	11.5	22.8	17.8
9	266	21.0	12.1	9.5
10	288	22.0	11.5	9.1
11	310	22.0	11.5	9.2
12	337	27.0	9.3	7.5
13	368	31.0	8.0	6.5
14	399	31.0	8.0	6.6
16	428	14.5	17.9	14.9
18	457	14.5	17.9	15.1
19	485	28.0	8.9	7.6
20	519	34.0	7.3	6.3
21	566	47.0	5.2	4.5
22	625	59.0	4.1	3.6
23	697	72.0	3.3	3.0
24	802	105.0	2.2	2.1
25	865	63.0	3.8	3.6
26	919	54.0	4.5	4.4
27	946	27.0	9.3	9.1
28	953	7.0	38.6	38.1

Date:	17/07/2017
Project:	North Orbital Road, St Albans
Project No.	1706007.001
Test No.	DCP3
Operator:	ML
Soil Type:	Made ground over clay/clayey sand
Surface Moisture:	Moderate

Notes/Comments

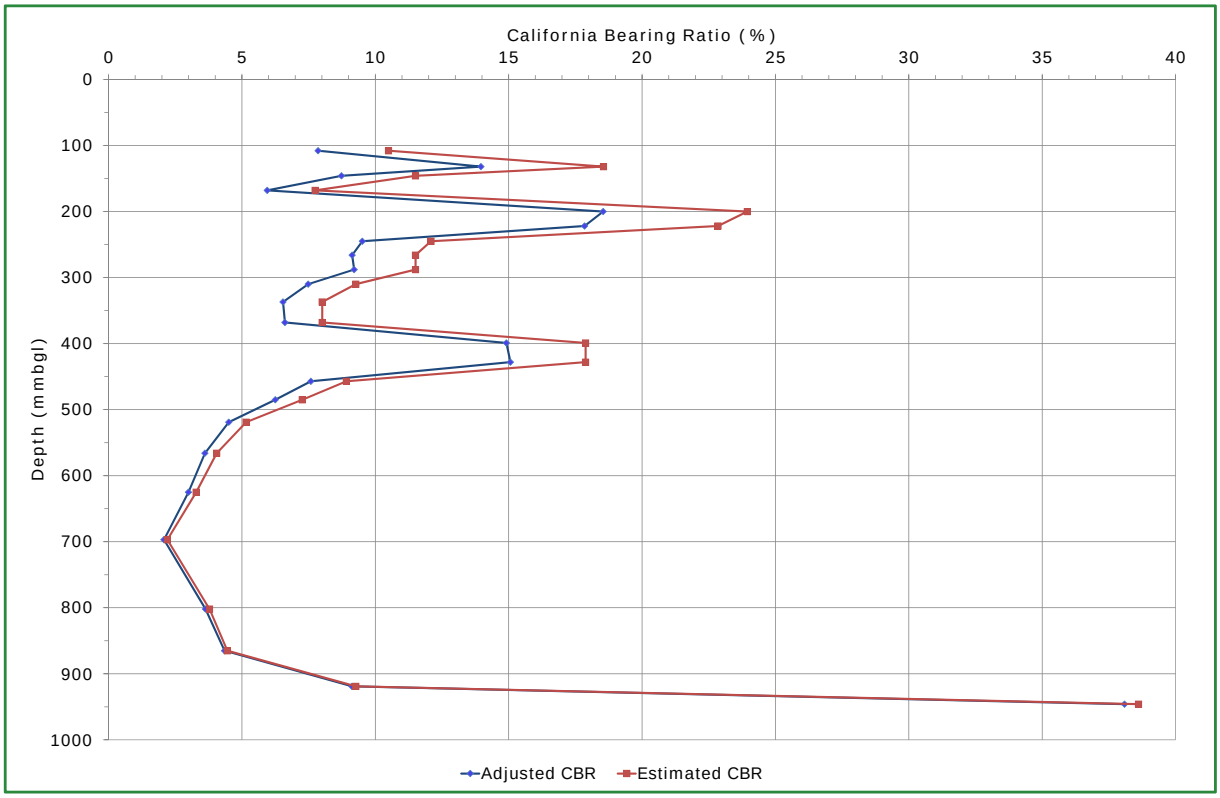
Notes:

1. CBR Value calculated using Jones C R and J Rolt (1991), "*Operating instructions for the TRL dynamic cone penetrometer*" (2nd edition). Information Note. Crowthorne: Transport Research Laboratory, as follows:

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057\ \text{Log}_{10}(\text{DPI})$$

2. Adjusted CBR vaules obtined from Table 4.2 of Simon Done and Piouslin Samuel (2006), "*Measuring Road Pavement Strength and Designing Low Volume Sealed Roads using the Dynamic Cone Penetrometer*" Unpublished TRL Project Report UPR/IE/76/06 Project Record No R7783.

The CBR Adjustment Factors are applied to unpaved roads on the assumption that the effect of moisture will be a maximum at the top surface and will reduce linearly to zero at a depth of 1000 mm.



Dynamic Cone Penetration Test Data (DCP-TRL)

North Orbital Road, St Albans **DCP4**

Cumulative Blow Count	Penetration (mm)	Penetration Index (DPI) mm/blow	Estimated CBR[1] (%)	Adjusted CBR[2] (%)
0	141	-	-	-
1	200	59.0	4.1	3.1
2	220	20.0	12.7	9.9
4	254	17.0	15.1	11.8
7	279	8.3	32.1	25.4
10	301	7.3	36.8	29.3
12	320	9.5	28.0	22.4
16	347	6.8	40.1	32.5
18	364	8.5	31.4	25.6
20	385	10.5	25.2	20.7
22	403	9.0	29.6	24.5
24	419	8.0	33.5	27.9
26	438	9.5	28.0	23.4
28	464	13.0	20.1	17.0
30	488	12.0	21.8	18.6
32	503	7.5	35.9	30.7
33	527	24.0	10.5	9.1
34	544	17.0	15.1	13.1
35	567	23.0	11.0	9.6
36	590	23.0	11.0	9.7
37	619	29.0	8.6	7.6
38	658	39.0	6.3	5.7
39	714	56.0	4.3	3.9
40	795	81.0	2.9	2.7
41	845	50.0	4.8	4.6
42	884	39.0	6.3	6.1
43	932	48.0	5.0	4.9
44	950	18.0	14.2	14.0

Date:	17/07/2017
Project:	North Orbital Road, St Albans
Project No.	1706007.001
Test No.	DCP4
Operator:	ML
Soil Type:	Made ground over clay/clayey sand
Surface Moisture:	Moderate

Notes/Comments

Notes:

1. CBR Value calculated using Jones C R and J Rolt (1991), "*Operating instructions for the TRL dynamic cone penetrometer*" (2nd edition). Information Note. Crowthorne: Transport Research Laboratory, as follows:

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057\ \text{Log}_{10}(\text{DPI})$$

2. Adjusted CBR vaules obtined from Table 4.2 of Simon Done and Piouslin Samuel (2006), "*Measuring Road Pavement Strength and Designing Low Volume Sealed Roads using the Dynamic Cone Penetrometer*" Unpublished TRL Project Report UPR/IE/76/06 Project Record No R7783.

The CBR Adjustment Factors are applied to unpaved roads on the assumption that the effect of moisture will be a maximum at the top surface and will reduce linearly to zero at a depth of 1000 mm.