Phase I Geo-Environmental Desk Study

Red House Farm
Ashbocking
Suffolk
IP6 9LD

Prepared for:

Mr Justin D'Arcy
Red House Farm House
Ashbocking
Suffolk
IP6 9LD

EPS Project Reference:	UK15.1821
Date Issued:	9th April 2015
Report Status:	FINAL

RED HOUSE FARM, ASHBOCKING

NON TECHNICAL SUMMARY

This report presents the findings of a Phase I Geo-Environmental Desk Study which was carried out to identify potential contamination from previous or current uses of the site and the surrounding area and to provide an initial assessment of geological and geotechnical aspects of the site and how the proposed development or surrounding environment might be affected.

- The site currently comprises an area of converted agricultural buildings, now utilised for commercial purposes including a joiners and clothing hire shop and previously an engineering workshop. It is proposed to redevelop the site for residential use.
- Ground conditions are indicated to comprise predominantly boulder clay classified as unproductive in terms of groundwater resource potential with no shallow groundwater anticipated and therefore the site is located within an area of low environmental sensitivity.
- Historical records have shown various phases of commercial redevelopment on the central and southern areas of the site as well as an infilled pond.
- It has not been possible to discount the possibility of the presence of contamination and recommendations have been made for further works, to assess the quality of shallow soils within proposed residential garden areas and within the vicinity of the infilled pond.
- A copy of this report should be provided to Mid Suffolk District Council to support any future planning application submitted.

By their very nature, the above bullet points represent a simplified summary of our work and should not be relied upon to form the basis for key decisions for the proposed development. A full picture is provided in the following report, or alternatively give us a call and we'll talk you through it.

Project Reference:	UK15.1821
Title:	Phase I Geo–Environmental Desk Study Red House Farm, Ashbocking
Client:	Mr Justin D'Arcy
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	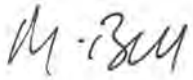	
Ben Virtue	Marcus Bell	Steve Bullock
Consultant	Senior Consultant	Director

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

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1 INTRODUCTION

In March 2015, Environmental Protection Strategies Ltd (EPS) was commissioned by Mr Justin D'Arcy to complete a Phase I Geo-Environmental Desk Study for land at Red House Farm, Ashbocking, Suffolk, IP6 9LD ('the site'); see Figure 1.

The work was commissioned in order to fulfil pre-planning requirements for future development of the existing land for residential purposes. Although no formal development proposals are currently available, through correspondence with the client it is understood that plans will include approximately three residential properties, with private gardens.

The site has a significant development history, with former planning permissions dating back to the early 1908s relating to landuses including agriculture, engineering workshops, storage and offices with residential uses more recently and specifically a Prior Notification for a proposed change of use from offices to dwellings, granted by Mid Suffolk District Council 30th April 2014, under planning reference 0751/14.

This report presents the findings, conclusions, and recommendations of the Phase I Desk Study undertaken for the site as instructed.

1.1 Background

A Desk Study comprises the first stage of any geo-environmental assessment, the purpose of which is to determine what potentially contaminative activities may have occurred at the property or the surrounding area which may pose an environmental or geological risk to site users, the surrounding environment or proposed development, either at present or in the future.

The method used in this investigation to assess the environmental risk posed is based on the concept of 'contaminant linkage', which considers the following three factors:

Source	The location from which an environmentally hazardous / contaminative substance is, (or was,) derived.
Receptor	An environmentally sensitive object or condition e.g. person, property, controlled water, or ecological system, which may be present now or in future.
Pathway	A route or mechanism via which a source could come into contact with a receptor to cause significant harm.

If all three factors are identified, there is the potential for a 'contaminant linkage' to be active, which could result in significant harm being caused to the environment or human health.

1.2 Objectives

The purpose of this desk study is to evaluate the potential contaminant linkages that may be active at the site in its current condition, or could become active in future, and to determine if any action is required to investigate them further or to break them to ensure the site is safe and suitable for its proposed end use.

This is achieved by carrying out the following activities:

a) Examining the site history - late 1800s to present day, through collection of historical maps of the area, site records, records held by relevant local authorities, the Environment Agency and review of other information databases.
b) Characterising the sites environmental and geological sensitivity through examination of existing geological, hydrogeological, topographical, and historical maps and aerial photographs of the area.
c) Identifying Potential Areas of Concern (PAOCs) through a combination of historical map and data review and site inspection together with interview of key site personnel.
d) Consideration of any future plans for the site and the effects any proposed changes may have on contaminant linkages over time.
e) Development of a site conceptual model and contaminant linkage assessment to determine the potential risks posed by the site and make recommendations for any further work that may be required and to ensure suitability for use and safe development in accordance with the *Model Procedures for the Management of Land Contamination* - Contaminated Land Report 11 and the *National Planning Policy Framework (2012).*

1.3 Project Limitations and Constraints

The purpose of this report is to present the findings of a Phase I Geo-Environmental Desk Study conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, EPS makes the following statements:

This report does not include specific investigation for the presence of either Potential Asbestos Containing Material (PACM) or Japanese Knotweed at the subject site however, if obvious evidence of either is identified, details will be provided in this report. Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

2 GEO-ENVIRONMENTAL SETTING

The following section provides a summary of the information collected in relation to the site location and history.

2.1 Site Location and Description

Detail	Description
Location	The site is located directly north of Red House Farm, Ashbocking which is a small Suffolk village located approximately 9km south east of the centre of Needham Market.
National Grid Reference	NGR 617681, 253921
Topographic Elevation	The topographic elevation of the site ranges from between 68m Above Ordnance Datum (AOD) towards the southern boundary and 66m AOD to the north.
Topographic Gradient	Levels fall to the north and the area is a local high point, with the surrounding land falling away notably to the north, south and west and gradually to the east.
Description of Site	The site is located approximately 300m north of the B1078 and is accessed via a narrow track which is lined with mature hedgerows. It comprises an irregularly shaped plot of land, approximately 7700m^2 (0.77ha) in surface area. Although a section of the access route is included within the area boundary, it is generally included for access and planning requirements rather than any proposed redevelopment, which is generally located within the main body of the site. A walkover survey was undertaken on the 19th March 2015 and the site was noted to consist of a cluster of converted agricultural buildings, formerly associated with Red House Farm; which lies immediately south. The buildings were found to be generally of brick construction with a combination of tile and slate roofing currently utilised for commercial purposes. The majority of peripheral areas were surfaced with concrete hardstanding which was found to be in good condition with the northern section of the site being well managed grassland. An above ground heating oil tank was noted adjacent to the eastern extent of the commercial premises. This tank was noted to be plastic (internally bunded) and situated on concrete hardstanding, with no obvious signs of leaks or spillage identified. A pond was noted adjacent to the north west of the existing commercial buildings, with adaptable plants such as reeds finding favourable conditions. Shallow drainage ditches were also noted to border the northern half of the site, with most sections found to contain a limited depth of water at the time of the site visit. Information from the client indicates that no agricultural machinery is currently stored on the site, with only a proportion of the buildings occupied for 'low risk' commercial uses including a joiners and clothing hire business.

Detail	Description
Surrounding Land Use	With the exception of Red House Farm, which lies immediately to the south and is currently used as a residential property, land use within a 250m radius is exclusively agricultural, with large cropped fields noted in all directions. In the wider area, several (presumed active) farm holdings have been identified and the residential village of Ashbocking in centred roughly 950m north east.

A plan showing the site location is provided as Figure 1, the current site layout is detailed on Figure 2 and an aerial photograph is included as Figure 3. Selected site photographs as Appendix A and relevant extracts of a Landmark Envirocheck report are included as Appendix B.

2.2 Environmental Setting

Detail	Description	
Geology	Geological maps of the area indicate the ground conditions to consist of superficial deposits of the Lowestoft Formation (Diamicton – Boulder Clay) underlain by bedrock of the Newhaven Chalk Formation. Information on the sites geological context is included as Appendix C.	
Historic Borehole Log	Following a review of British Geological Survey (BGS) records, an historical borehole log has been referenced for a location approximately 1km north west. The borehole log recorded a significant thickness of Boulder Clay (30m) overlying Upper Chalk, which was proven beyond the maximum depth of the borehole, >57m below ground level (bgl). Groundwater was monitored at a rest level of roughly 23m bgl.	
Geological Hazards	**Hazard**	**On Site Risk**
	Mining Activities	Might Not Be Affected / Rare
	Collapsible Ground	Very Low
	Compressible Ground	No Hazard
	Ground Dissolution	No Hazard
	Running Sand	Very Low
	Landslide	Very Low
	Shrinking / Swelling Clay	Low
	Radon	Low (see below)
Radon	The BGS and Health Protection Agency (HPA) report entitled '*Indicative Atlas of Radon in England and Wales*' (November 2007) shows the site to lie within a 1km grid section where the percentage of homes above the radon action level is between 0% and 1%. The joint Building Research Establishment Ltd (BRE) report entitled: '*Radon: Guidance on Protective Measures for New Buildings* - 2007' reports that the site does not lie within an area where basic radon protection methods will need to be employed.	
Hydrogeology	Groundwater vulnerability maps for the area show that the underlying superficial geology (Lowestoft Formation) is classified as Unproductive Strata by the Environment Agency (EA).	

<table>
<tr><th>Detail</th><th>Description</th></tr>
<tr><td></td><td>However, the underlying bedrock of the Newhaven Chalk Formation is classified as a Principal Aquifer. The site lies within a Total Catchment Area (Zone III) Source Protection Zone (SPZ) for local groundwater abstraction although no recorded licensed surface or groundwater abstractions are highlighted within 750m. Groundwater vulnerability maps are included as Appendix D.</td></tr>
<tr><td>Hydrology</td><td>A pond exists partially within the site boundary, directly north west of the commercial buildings, with shallow drainage ditches also noted to border the northern section. A number of small drains and ponds are also located within the surrounding area.

Review of the EA flood zone map for the area indicates that the site lies within Flood Zone 1 as defined within Table 1 of the Technical Guidance document to the National Planning Policy Framework (NPPF) which is the area regarded to have the lowest potential risk of flooding from fluvial or tidal sources. As the site is less than 1ha, a Flood Risk Assessment is not specifically required according to the NPPF technical guidance, although it is advisable that some assessment of local considerations and sustainable design options should be considered to support planning requirements.

It should also be noted that the EA maps do not take into account flooding from other potential sources of flood water, such as from poor drainage, or groundwater.

There are two discharge consents listed within 250m. Both of these consents relate to sewage/ final treated effluent discharge to nearby channels and are registered to both Woodbridge Engineering for a point location 5m north east and a private residential property (30m west).</td></tr>
<tr><td>Landfill & Waste</td><td>No records of active or historic landfills have been recorded within EA records or within Envirocheck data report within a 1.5km radius. No permitted waste management facilities and transfer stations are identified within this radius.</td></tr>
<tr><td>Licensed Industrial Activity</td><td>The EA public database lists no licenced industrial activity within 1km.</td></tr>
<tr><td>Industrial Land Use</td><td>The Envirocheck report lists a number of industrial land uses in the area the most pertinent of which are summarised below.
<table>
<tr><th>Land Use</th><th>Distance (Direction)</th><th>Status</th></tr>
<tr><td>Precision Engineers</td><td>20m SW</td><td>Inactive</td></tr>
<tr><td>Control Panel Manufacturers</td><td>140m E</td><td>Inactive</td></tr>
<tr><td>Petrol Filling Station</td><td>515m E</td><td>Inactive</td></tr>
<tr><td>Automotive Garage</td><td>515m E</td><td>Active</td></tr>
</table></td></tr>
</table>

Detail	Description
Pollution Incidents	The Envirocheck report lists five pollution incidents within 500m, all of which have been classified as having minor impact to surface water. The closest proximity of these events relates to several recorded sewage / organic waste releases to a tributary of River Lark roughly 270m east which occurred in July 1998.
Sensitive Land Use	The site and surrounding area lies within a Nitrate Vulnerable Zone (NVZ) where groundwater and surface waters are vulnerable to nitrates leaching from agricultural land use.

2.3 Site History

A summary of historical map data from 1884 to 2014 is provided below and copies of relevant historic maps and any others examined during the investigation are included in this report as Appendix E.

- During the mid-1800s the site was shown to comprise a section of Red House Farm with associated buildings clustered within the southern area and a small outbuilding towards the centre of the site. Remaining areas across the north of the site comprised mature woodland with two ponds situated between the buildings. The pond to the west is in a similar position to the pond present in the current layout, although significantly larger at this time. By the early 1900's, additional structures are shown within the main cluster of buildings and towards the centre of the site.
- Further development or changes within the southern area were limited to an extension to the existing structure, undertaken between the late 1950's and mid 1970's. This area is anticipated to have been developed for use as a joiners with remaining buildings also converted for various uses including an engineering workshop, (see information provided by client below).
- For the area of the site to the north of the main cluster of buildings, by the mid 1920's the buildings within this central portion had been removed and replaced by two further smaller outbuildings, located outside of the footprint of the demolished buildings. Limited further changes were noted for approximately 30 years, however between the late 1950's and mid 1970's all buildings within the central area had been demolished and one of the adjacent ponds infilled. Maps dated 1994 still show the remaining pond in its original larger size, before a significant reduction in its size appears to have taken place.
- In the surrounding area, notable features were limited to a number of farm holdings, the closest of which (Nelson's Farm) is positioned 200m south east. No additional / commercial land uses were noted within a 500m radius although a garage was identified approximately 525m east on records dating from the 1980's / 90's.
- A few small ponds were noted nearby; at approximate distances of 50m east and 115m north, however, the closest of these features is anticipated to have been infilled in the 1960's to early 1970's.

A brief summary of the planning history of the site has been provided by the client, an extract from Evolution Town Planning's report entitled '*Application for a Lawful Development Certificate for an Existing Use in Breach of a Planning Condition at Red House Farm, Ashbocking*' dated August 2014, is included below:

Occupant	Business	Occupied From	Occupied Until
Woodbridge Engineering	Engineering Company	≤1980	February 2002
Global Power and Control Systems	Manufacturing of electrical control	March 2002	December 2007
Smart Garden Offices	Manufacture of timber garden studios	July 2008	Today

3 ENVIRONMENTAL CONCEPTUAL MODEL

The following section provides a review of the contaminant linkages that may be active at the site through examination of the potential sources that may be present as a result of historic and / or current site activities and where potential interaction between these sources and the identified human / environmental receptors may occur.

3.1 Source Characterisation

The following potential contaminant sources have been identified at the site and in the surrounding area:

Potential Source	Source Description	Principal Contaminants of Concern
Current / Historic Site Use	Made Ground (demolition debris) in footprint of previous buildings, and also imported to provide sub-base / level areas for existing buildings and areas of hardstanding.	Metals, PAHs, ACM
	Heating oil tank identified within the site boundary.	TPH
	Current / historic use of the site as a farmyard and various commercial / light industrial uses including an engineering firm and joiners.	TPH, PAH, Metals, ACM
	Infilled pond within the site boundary.	Landfill Gases (CO_2,CH_4)
Historic Surrounding Land Use	Possible infilling of off-site pond, (nearest 50m E).	Landfill Gases (CO_2,CH_4)

Notes: PAHs Polycyclic Aromatic Hydrocarbons ACM Asbestos Containing Materials
TPH Total Petroleum Hydrocarbons
CO_2 Carbon Dioxide
CH_4 Methane

3.2 Potential Receptors

A framework for the assessment of risks arising from the presence of contamination in soils has been produced by the Environment Agency and the Department for the Environment, Food and Rural Affairs (DEFRA) and is presented with the report: '*Using Science to Create A Better Place: Updated Technical Background to the CLEA Model* – Science Report SC050021/SR3'. This guidance document defines a series of standard land-uses, which form a basis for the development of an Environmental Conceptual Model.

The proposed development plan for the site is still to be finalised, but is anticipated to broadly comprise the construction of three residential properties with associated domestic garden areas.

This proposed future land use, as defined within Science Report SC050021/SR3, has been considered as:

- Residential

In view of the environmental setting, current and potential future land use of the site and surrounding sites, the potential receptors for any contaminant impact are discussed on the following below.

Receptor	Site Specific Description
Human	Future site users and site workers involved in the site redevelopment have the potential to be at risk from exposure to potential contaminants of concern (CoCs).
Groundwater	Ground conditions are indicated to comprise Superficial Deposits of the Lowestoft Formation (Diamicton – Boulder Clay) which are defined by the EA as Unproductive Strata underlain by the Newhaven Chalk Formation which is classified as a Principal Aquifer. A historic BGS borehole log has been reviewed within relatively close proximity of the site, and has confirmed the presence of the low permeability deposits (clayey soils) extending to a depth of around 30m bgl and shallow groundwater is unlikely to be present. Although the site does lie within a Total Catchment SPZ, no abstractions have been identified within at least a 750m radius. Given the anticipated thickness of low permeability soils, and the nature of the potentially contaminative sources identified, groundwater is not considered as a potential sensitive receptor within the conceptual site model.
Surface Water	A pond is present within the site boundary and drainage ditches border the northern half of the site. It is possible that site derived contaminants of concern may enter these features by overland flow, migration through unsaturated soils or entering shallow surface drainage / historical land drainage, therefore surface waters must be considered as a sensitive receptor within the conceptual site model.
Flora and Fauna	Although no proposed development plan has been provided, it is likely that it will include the provision of domestic garden areas. Some of the identified contaminants of concern are known to be phytotoxic and as such the potential for this impact should be considered.
Buildings & Infrastructure	Subsurface structures are likely to be present at the site that may be adversely affected by the potential presence of the identified contaminants of concern. These include concrete used in building foundations, buried potable water supply pipes and other service lines and pipes.
Adjacent Land	Given the limited environmental mobility of the site-derived contaminants of concern and the anticipated low permeability geology, adjacent properties including a nearby residential property and agricultural land are not considered to be at risk from potential site derived contaminants.

3.3 Potential Pathways

Where contaminants may be present in soil, there are a number of potential pathways that enable human receptors to come into contact with or be exposed to them. The most direct pathways, considered under current UK legislation, can be summarised as follows:

- Direct ingestion of contaminated soil
- Ingestion of household dust
- Ingestion of contaminated vegetables
- Ingestion of soil attached to vegetables
- Dermal contact with contaminated soil
- Dermal contact with household dust
- Inhalation of fugitive soil dust
- Inhalation of fugitive household dust
- Inhalation of vapours outdoors
- Inhalation of vapours indoors

Clearly, not all of these potential pathways apply for every standard land-use; the simplest example for exclusions being a commercial / industrial site which is covered by concrete hardstanding. The concrete precludes the direct exposure of humans working at the site to any contaminated soils.

However in addition to direct exposure pathways, a number of physical transport mechanisms / pathways may also exist at a site that allow remote or less accessible contaminants in soil or groundwater to reach human or environmental receptors both at a site and beyond the site boundary. These include the following:

- Downward and lateral movement of contaminants in soil either by gravity or through being 'leached' by percolating rainwater.
- Lateral migration of contaminants dissolved in groundwater.
- Direct seepage or leaching of contaminants from soil into subsurface drains or supply pipework.
- Volatilisation of contaminants from groundwater or unsaturated soils into buildings or outdoor air.

Through examination of the standard land use and environmental setting at each site, the presence of pathways and transport mechanisms described above must be considered when assessing whether a contaminant linkage may plausibly be active, and therefore be included in the conceptual site model.

3.4 Summary of Contaminant Linkages

Considering the site use and environmental setting, and the proposed land use; the plausible contaminant linkages that require further investigation are summarised in the following table:

Source	Pathway	Receptor
Contaminated soil	Direct contact and inadvertent ingestion by eating or smoking with dirty hands.	Construction workers during redevelopment & site users
	Inhalation of fugitive dusts	Site users
	Direct uptake and / or adherence of contaminated soil to vegetation and subsequent ingestion.	Site users
	Migration of landfill gas to indoor and outdoor air	Site users
	Direct contact	Buried infrastructure
	Ingress / diffusion through permeable potable water supply pipes.	Site users
	Direct uptake via root systems	Vegetation
	Lateral migration of contaminants in soil or via overland flow.	Surface waters

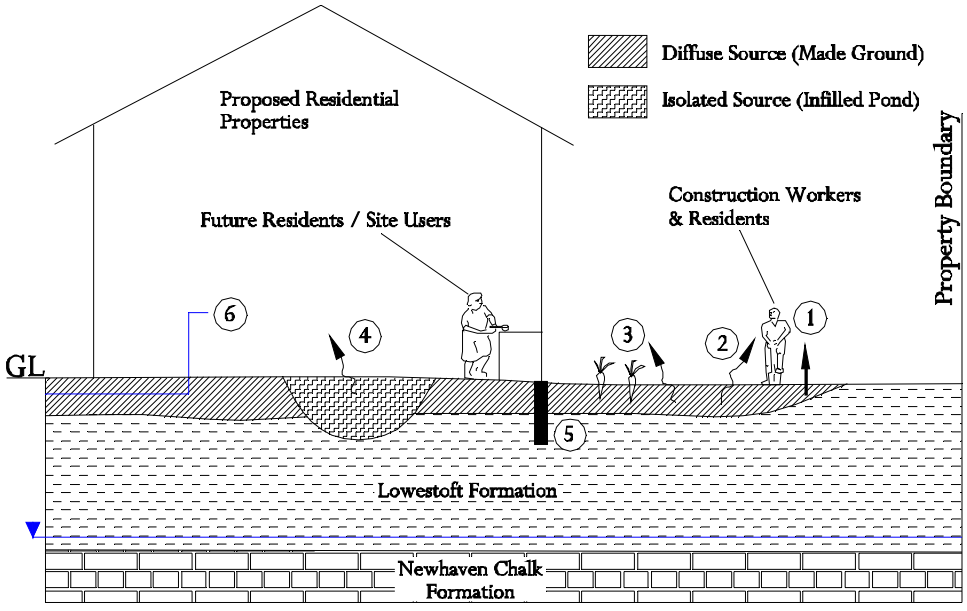
The following comments are made with respect to contaminant linkages which have been considered through development of the conceptual model, but have not been concluded as 'plausible' – i.e. through which a significant possibility of significant harm could occur to an identified receptor:

- PAHs and metals have been identified as contaminants of concern associated with potential Made Ground however these contaminants are considered to be relatively immobile in the environment by virtue of their very low solubility, volatility and the anticipated presence of low-permeability ground conditions at this site. On this basis, plausible pathways by which these potential contaminants could pose a significant risk to the underlying groundwater or nearby surface watercourses are not considered to be active.
- Although the heating oil storage tank has been included as a potential source, during the site visit it appeared to be bunded, modern and in good condition, with no visible signs of leaks and noted to be standing on plinths and situated on concrete hardstanding which would restrict any spillages from impacting underlying shallow soils. Therefore, no plausible contaminant linkage has been identified associated with this heating oil tank.
- The site has been utilised, both currently and historically, for various commercial purposes, however, it is known that all of the existing indoor spaces are surfaced with competent hardstanding which would generally restrict any localised spills / leakages within the confines of the building fabric.

- Whilst petroleum hydrocarbons have been identified as contaminants of concern associated with the sites historic use as a farm it is not anticipated that volatile organic compounds i.e. petrol were ever stored on the site. Therefore a plausible contaminant linkage has not been identified associated with the migration of organic vapour to indoor or outdoor air.
- Whilst a number of small ponds are suspected to have been historically in-filled within the surrounding area (one within 100m), given the size, time elapsed since infilling, (1960-70s) and therefore the likely degraded nature of any putrescible infill material as well as the anticipated low-permeability underlying ground conditions, a plausible contaminant linkage is not recognised from the on-site migration of landfill gas.
- Although some commercial sites have been identified in the surrounding area including an inactive engineer's workshop and petrol filling station, a plausible contaminant linkage regarding these landuses has not been recognised due to the relative distance from site boundary, local topography falling away from the study area and the anticipated low permeability geology. Any potential contaminants of concern would therefore be unlikely to migrate onto site and pose a risk to future site users.

The following diagram provides an illustration of the plausible contaminant linkages that may be active at the site and which may need further investigation or control to ensure safe development:

Red House Farm, Ashbocking – Illustrative Conceptual Site Model



4 GEOTECHNICAL GROUND MODEL

Geological records indicate the underlying ground conditions to comprise Superficial Deposits of the Lowestoft Formation (Diamicton – Boulder Clay), overlying bedrock of the Newhaven Chalk Formation. It is anticipated that the chalk is unlikely to be present at shallow depths across the site, with a significant thickness (approx. 30m) of cohesive soils (Boulder Clay) identified within the historic borehole log. Furthermore, made ground is anticipated to be present in the shallow soils and therefore has been included within the conceptual geotechnical ground model provided in the table below, which assesses design elements, anticipated strata and ground conditions:

Element	Anticipated Strata	Parameter(s)	Anticipated Conditions
Foundations	Made Ground	Allowable Bearing Pressure	Not appropriate as a bearing strata.
		Settlement	High sensitivity
	Lowestoft Formation (Diamicton)	Allowable Bearing Pressure	75kN/m^2 to 125kN/ m^2
		Settlement	Moderate Sensitivity
		Volume Change	Low to moderate volume change potential.
Drainage	Made Ground	Permeability	Not suitable for infiltration drainage.
	Lowestoft Formation (Diamicton)		Unlikely to be suitable for infiltration drainage.
Concrete Grade	Made Ground	Grade	Low to moderate risk of high sulphate levels.
	Lowestoft Formation (Diamicton)		

5 CONCLUSIONS & RECOMMENDATIONS

This Phase I Desk Study has identified that a number of plausible contaminant linkages have the potential to become active as a result of the historic and current use of the site for commercial uses. Furthermore, an infilled pond has been identified on the site which may have the potential to generate ground gases.

Therefore, the contaminant linkages which carry the greatest potential risks at this site comprise the following:

- Human health risks associated with interaction between future residents and potentially contaminated shallow soils, especially within domestic garden areas.
- Potential exposure of site workers to contaminated soils during the proposed redevelopment.
- Risks associated with generation and migration of ground gas to indoor and outdoor spaces which could impact future site users including residents.

In accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11) the risks identified by this work will require further assessment in order to determine the most appropriate action for this site. A summary of the approach outlined in CLR11, marking the work already completed under the risk assessment phase, is presented as a flow diagram in Figure 4 of this report.

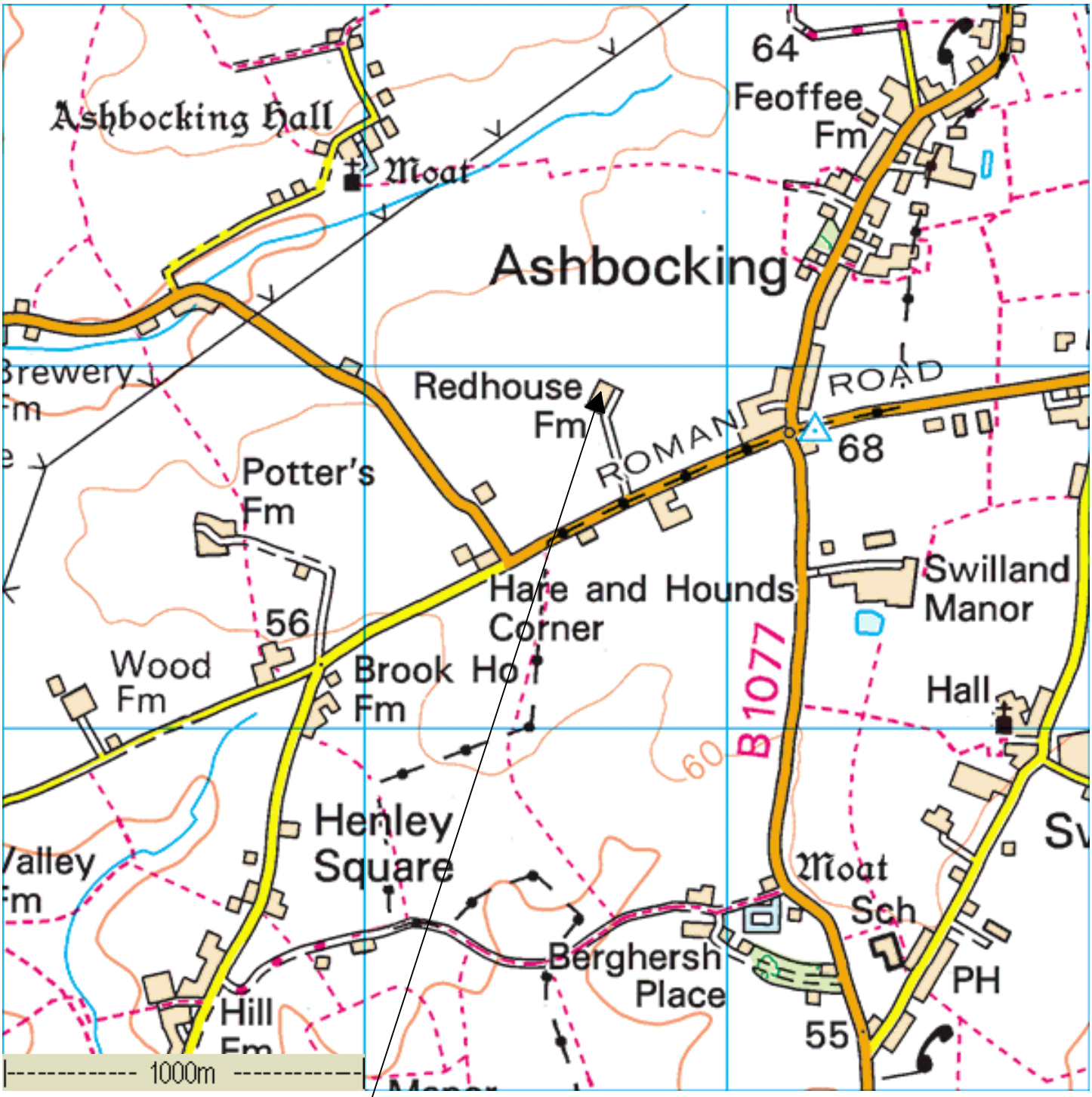
It is therefore recommended that, initially, the plausible contaminant linkages identified should be further investigated by means of exploratory intrusive investigation. It is likely that future assessment will entail a targeted sampling exercise designed to investigate shallow soil quality across and in particular within proposed garden areas which may contain made ground due to the presence of former / existing buildings and hardstanding. This exercise should also aim to investigate the nature and extent of the backfill associated with the infilled pond as well as the former larger extent of the existing pond. If any putrefiable material is identified which could plausibly generate ground gas, further investigation including provision for gas monitoring or recommendations for ground gas protection measures in any future dwellings may be required. It is noted that areas within the northern portion of the site have not been subjected to any significant former development resulting in any plausible contaminant linkages, and therefore shallow soil quality in these areas would not warrant any further investigation.

A proposed scope and costing for this work will be provided by EPS and, where appropriate discussed and agreed with the local authority prior to commencement. It is also recommended that any final proposal for further works is delayed until a proposed development plan for the site has been made available, to avoid sampling areas where future site users would be unable to interact with shallow subsurface soils such as those directly underlying proposed buildings or finished to permanent hardstanding. Similarly, for any areas of private gardens or landscaping restricted to the northern section of the site, no further assessment would be considered necessary within this particular area as no plausible contaminant linkages have been identified in that area.

Any impacts to soil quality by source contaminants which are identified by the exploratory investigation may require further targeted intrusive investigations in order to delineate the contaminants found and quantitatively evaluate the risks posed.

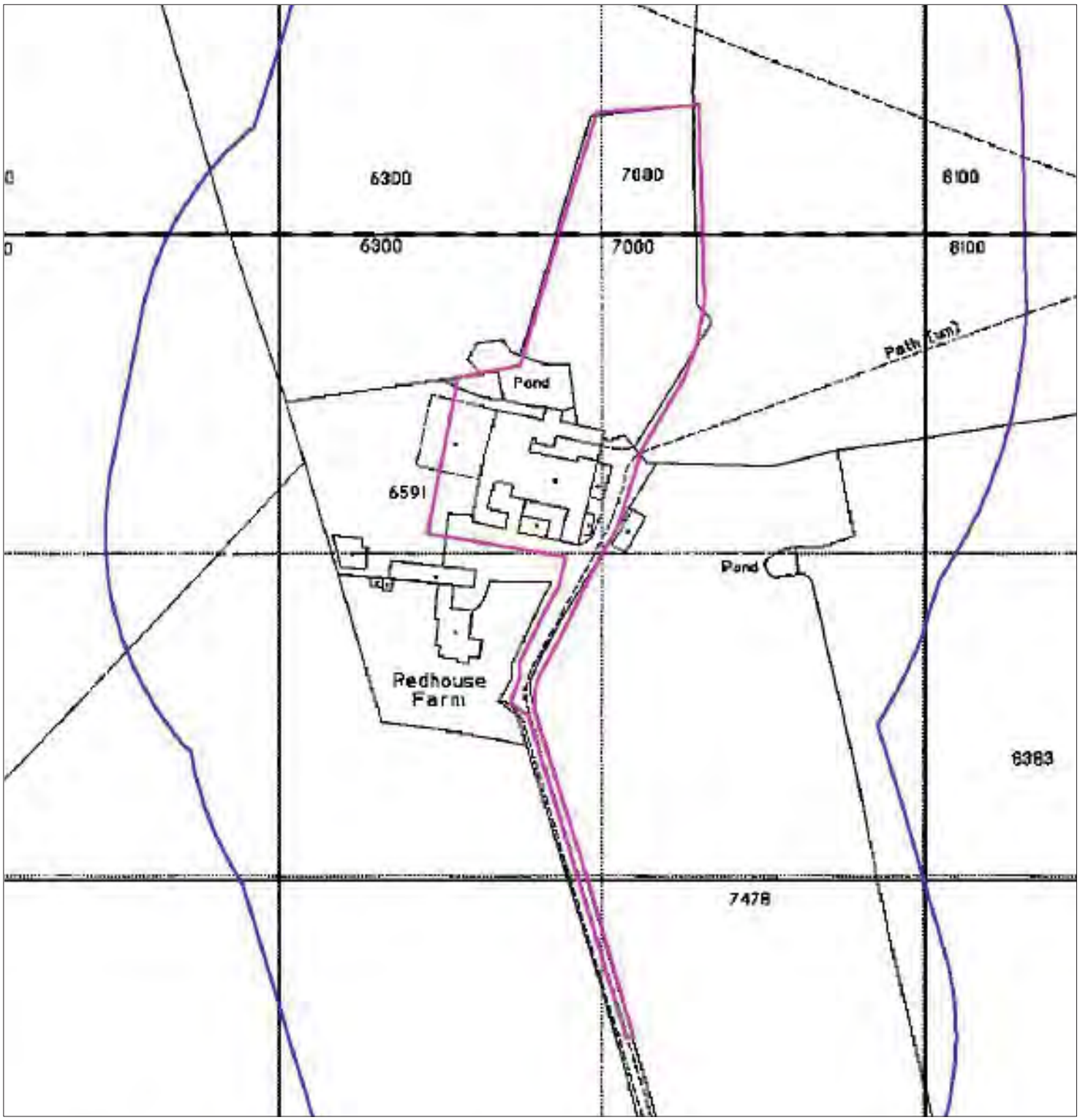
A copy of this report should be provided to the Environmental Health department of Mid Suffolk District Council so that the information may be used to support planning proposals for the site.

FIGURES



Approximate Site Location

Title:	**Site Location Plan**		
Project:	Red House Farm, Ashbocking, Suffolk, IP6 9LD	Scale:	As Shown
		Drawn By: BV	Approved By: SB
Client:	Mr Justin D'Arcy	Job No:	UK15.1821
Fig No:	**1**	Dwg No:	D'Arcy/Ashbocking/0415/01
		Date:	April 2015



Approximate Site Boundary

Please Note: Figure produced from drawing supplied by client.

Title:	**Current Site Layout Plan**
Project:	Red House Farm, Ashbocking, Suffolk, IP6 9LD
Client:	Mr Justin D'Arcy
Fig No:	2

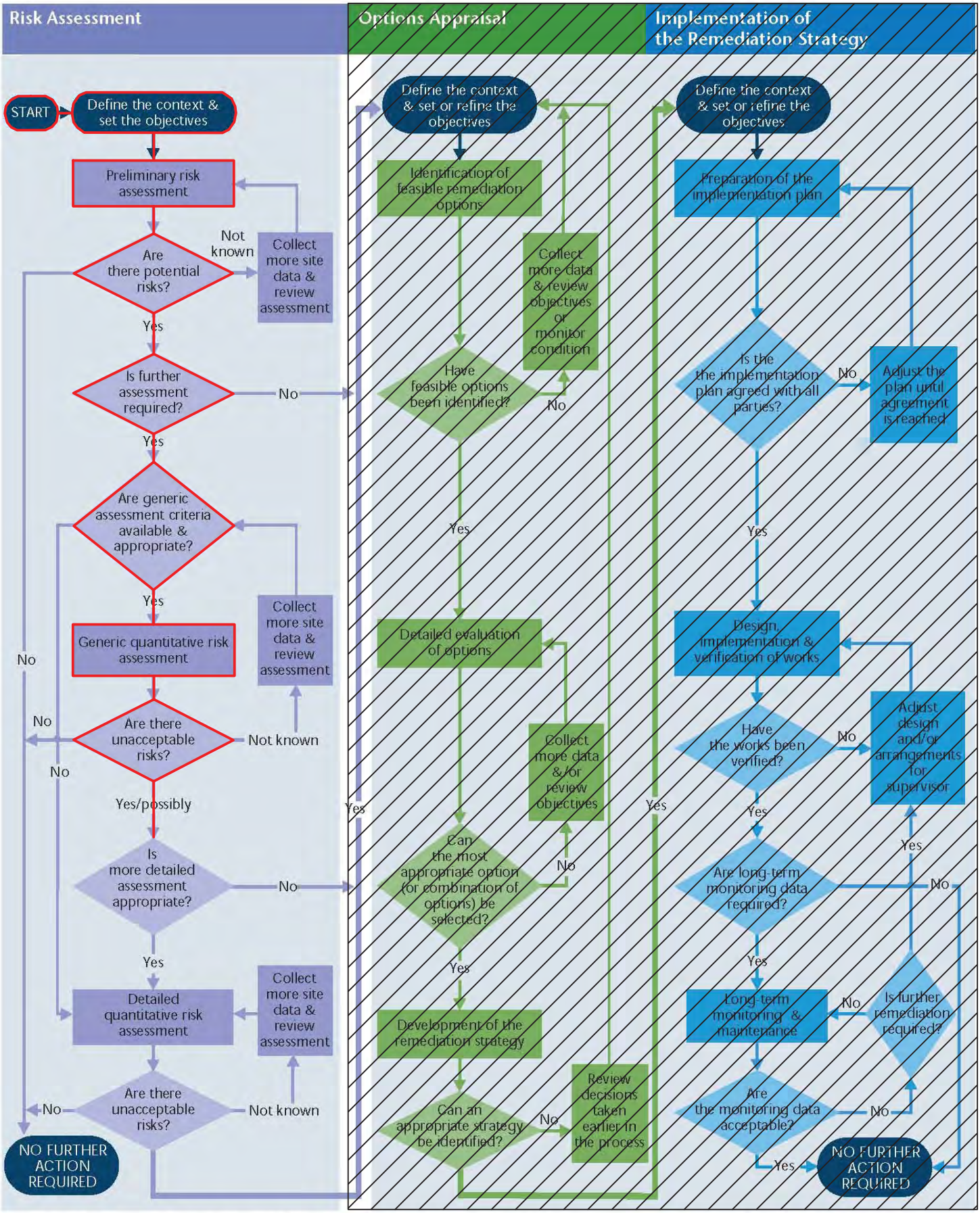
Scale:	As Shown	
Drawn By:	BV	Approved By: SB
Job No:	UK15.1821	
Dwg No:	D'Arcy/Ashbocking/0415/02	
Date:	April 2015	

N

Approximate Site Boundary

Title:	**Aerial Photograph**
Project:	Red House Farm, Ashbocking, Suffolk, IP6 9LD
Client:	Mr Justin D'Arcy
Fig No:	3

Scale:	As Shown		
Drawn By:	BV	Approved By:	SB
Job No:	UK15.1821		
Dwg No:	D'Arcy/Ashbocking/0415/03		
Date:	April 2015		



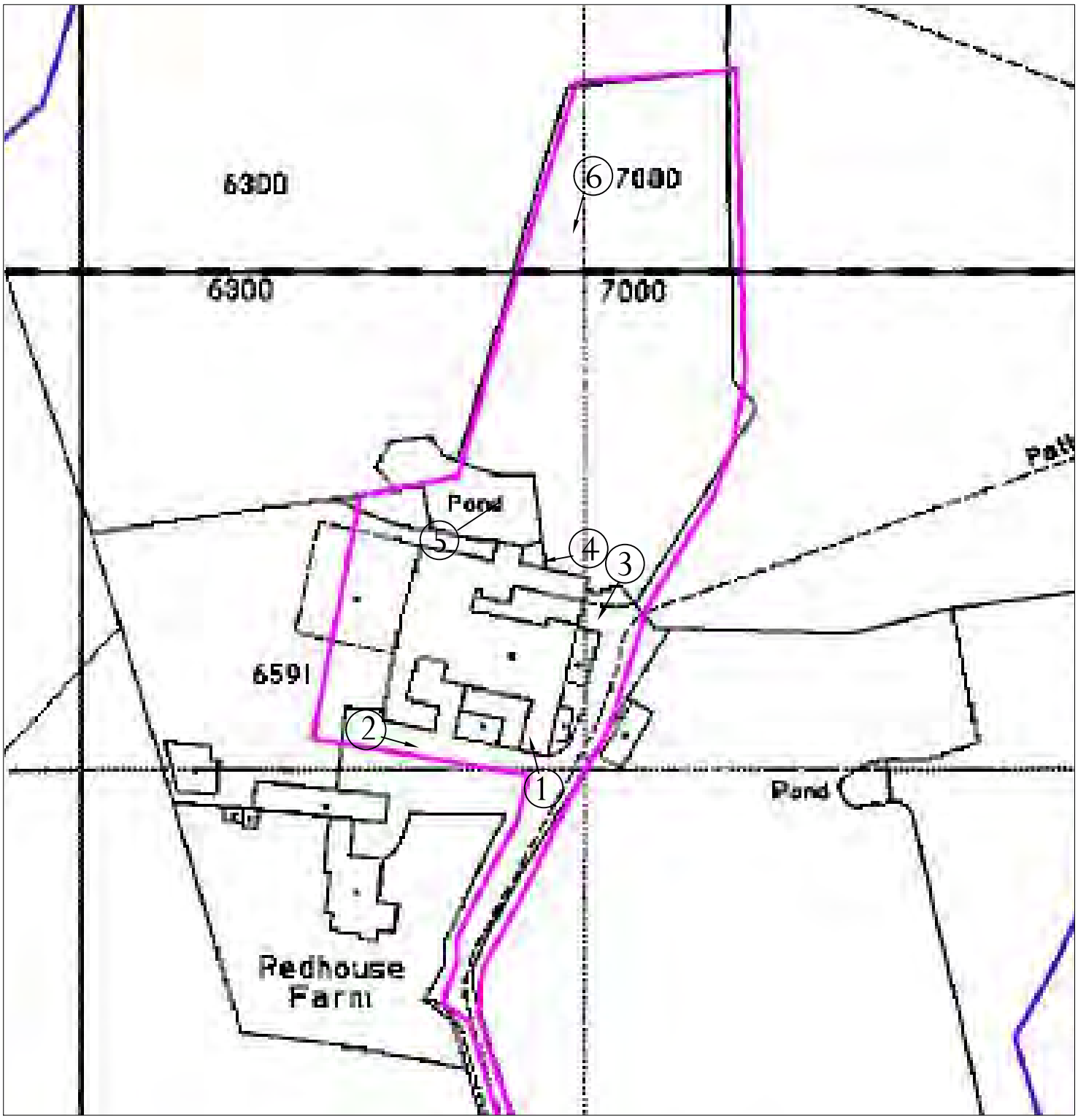
Assessment Pathway for Site

Title:	**Site Context - CLR11**		
Project:	Red House Farm, Ashbocking, Suffolk, IP6 9LD	Scale:	n/a
		Drawn By: BV	Approved By: SB
Client:	Mr Justin D'Arcy	Job No:	UK15.1821
Fig No:	4	Dwg No:	D'Arcy/Ashbocking/0415/04
		Revision Date:	April 2015

APPENDICES

APPENDIX A

Selected Site Photographs



Approximate Site Boundary

Title:	**Photo Location Plan**
Project:	Red House Farm, Ashbocking, Suffolk, IP6 9LD
Client:	Mr Justin D'Arcy
Appendix: A	

Scale:	NTS		
Drawn By:	BV	Approved By:	SB
Job No:	UK15.1821		
Dwg No:	D'Arcy/Ashbocking/0415/A		
Date:	April 2015		

Photo 1: View looking at the disused farm buildings which have been converted for ongoing commercial use.	Photo 2: Areas of concrete hardstanding surrounding the commercial premises.
	
Photo 3: View of the raised heating oil tank observed during the site walkover.	Photo 4: Photograph showing storage of 'low risk' building materials around the site, such as wood and sheet metal.
	
Photo 5: Photograph showing the pond located just within the western site boundary.	Photo 6: View showing the managed grassland to the north of the existing buildings.
	

APPENDIX B

Surrounding Land Use

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)
- 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

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
- 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

Geological

- BGS Recorded Mineral Site

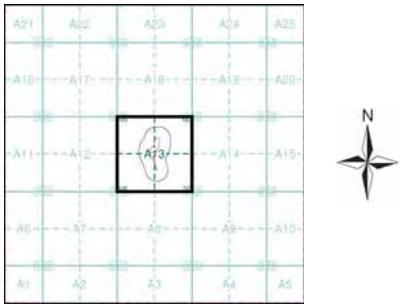
Hazardous Substances

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

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

Site Sensitivity Map - Segment A13



Order Details

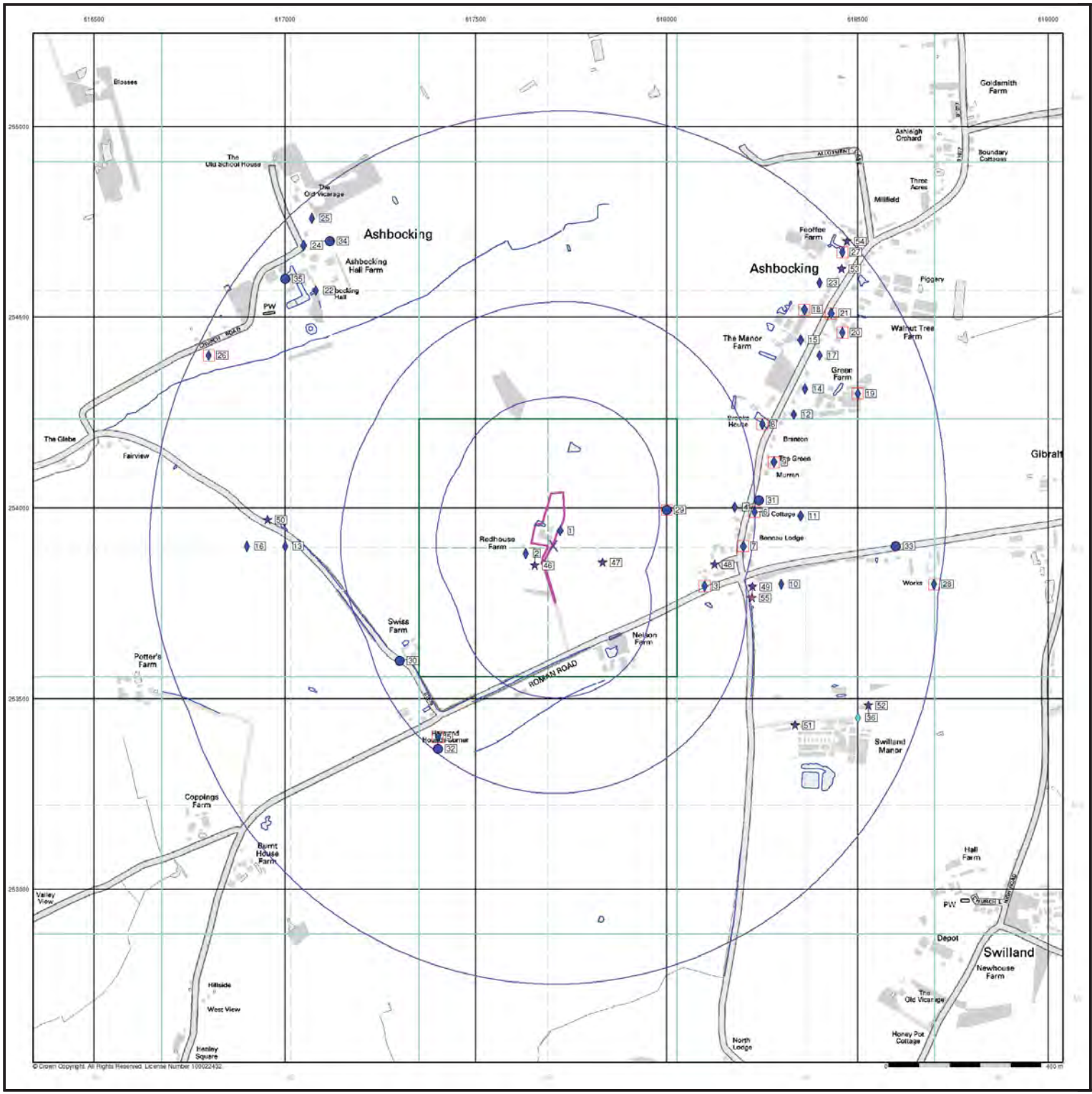
Order Number:	65467232_1_1
Customer Ref:	UK15.1821
National Grid Reference:	617700, 253900
Slice:	A
Site Area (Ha):	0.77

Site Details

Red House Farm, Ashbocking, Suffolk, IP6 9LD

Landmark Information Group

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



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)
- 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

Waste

- BGS Recorded Landfill Site (Location)
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- Local Authority Recorded Landfill Site
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- 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

Geological

- BGS Recorded Mineral Site

Hazardous Substances

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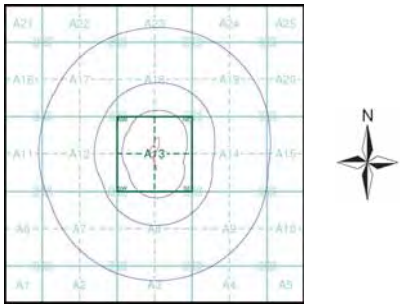
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

Site Sensitivity Map - Slice A



Order Details

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Customer Ref:	UK15.1821
National Grid Reference:	617700, 253900
Slice:	A
Site Area (Ha):	0.77
Search Buffer (m):	1000

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APPENDIX C

Geological Context

Geology 1:50,000 Maps Legends

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	LOFT	Lowestoft Formation	Diamicton	Anglian - Anglian
	KGCA	Kesgrave Catchment Subgroup	Sand and Gravel	Pleistocene - Pleistocene

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	RCG	Red Crag Formation	Sand	Thurnian - Piacenzian
	TALM	Thanet Sand Formation and Lambeth Group (Undifferentiated)	Clay, Silt and Sand	Paleocene - Paleocene
	NCK	Newhaven Chalk Formation	Chalk	Campanian - Santonian

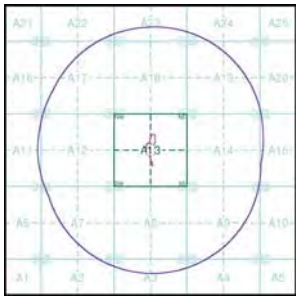
Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps.
The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

Map ID:	**1**
Map Sheet No:	**207**
Map Name:	**Ipswich**
Map Date:	**2006**
Bedrock Geology:	**Available**
Superficial Geology:	**Available**
Artificial Geology:	**Available**
Faults:	**Not Supplied**
Landslip:	**Available**
Rock Segments:	**Not Supplied**

Geology 1:50,000 Maps - Slice A



Order Details:

Order Number:	65467232_1_1
Customer Reference:	UK15.1821
National Grid Reference:	617700, 253900
Slice:	A
Site Area (Ha):	0.77
Search Buffer (m):	1000

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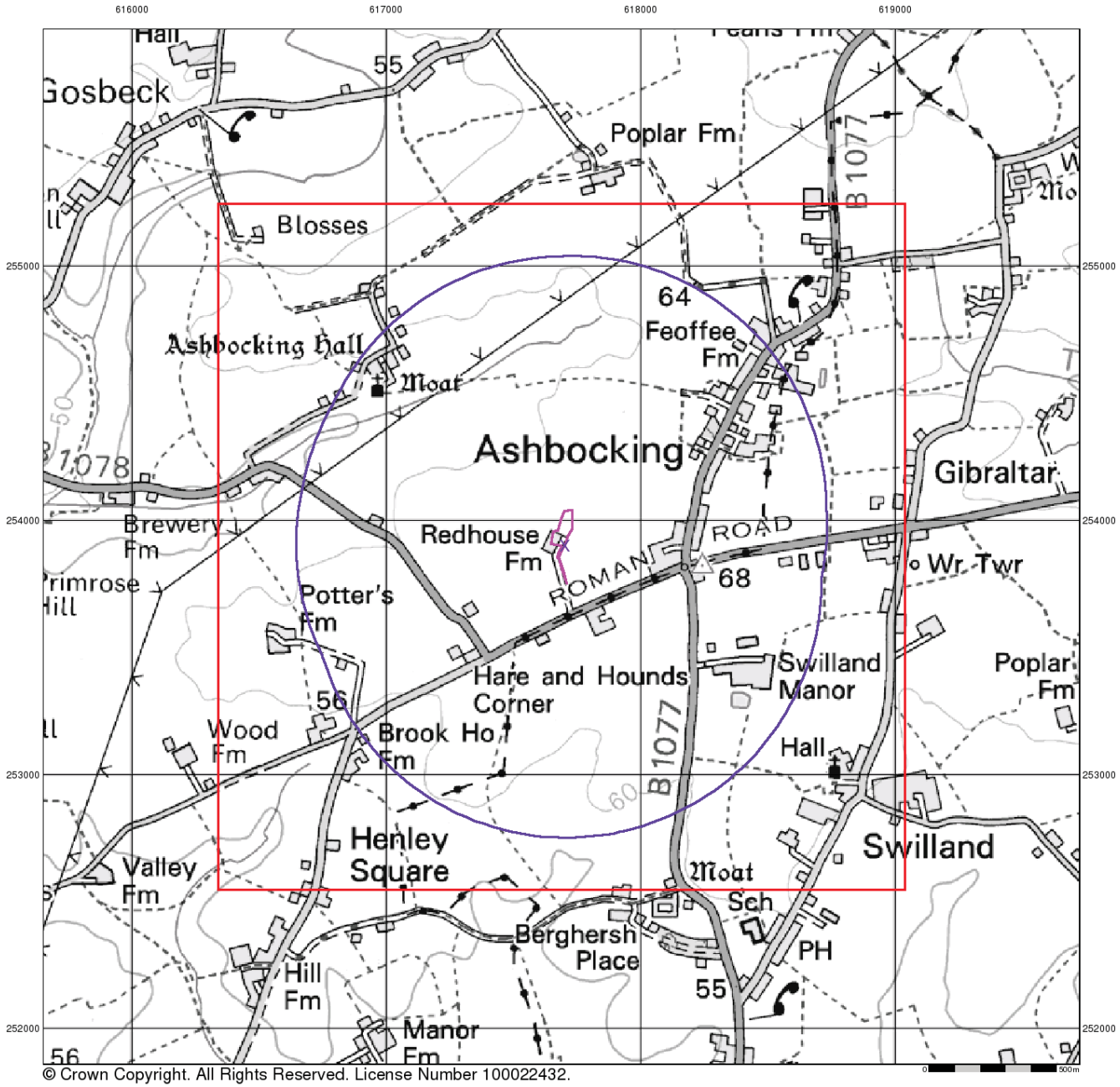


Artificial Ground and Landslip

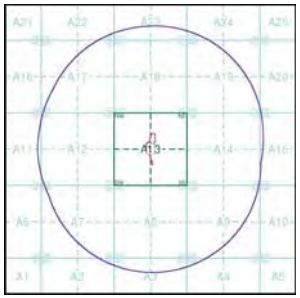
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A



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Customer Reference:	UK15.1821
National Grid Reference:	617700, 253900
Slice:	A
Site Area (Ha):	0.77
Search Buffer (m):	1000

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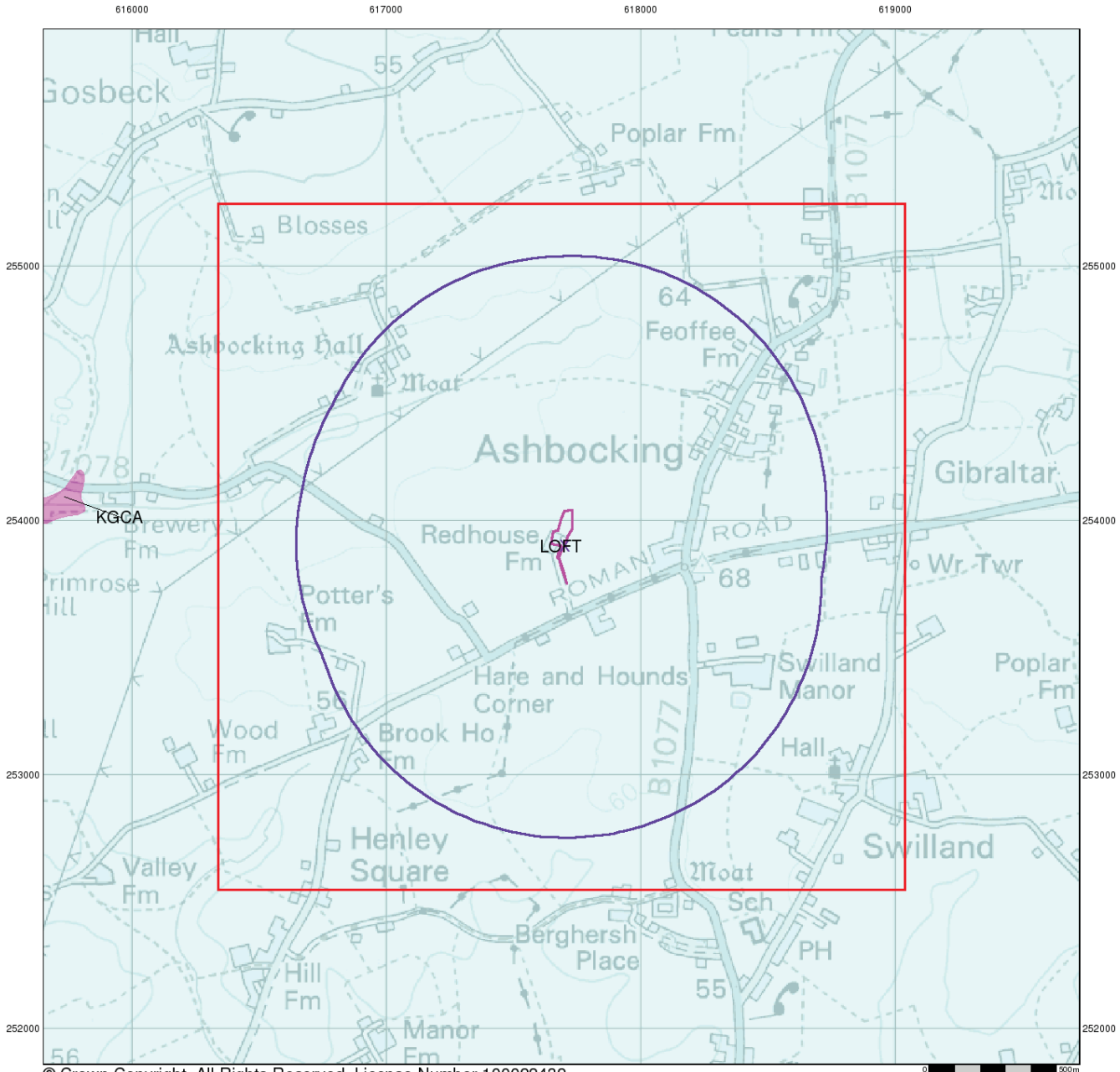


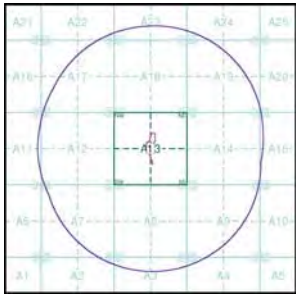
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



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National Grid Reference:	617700, 253900
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Site Area (Ha):	0.77
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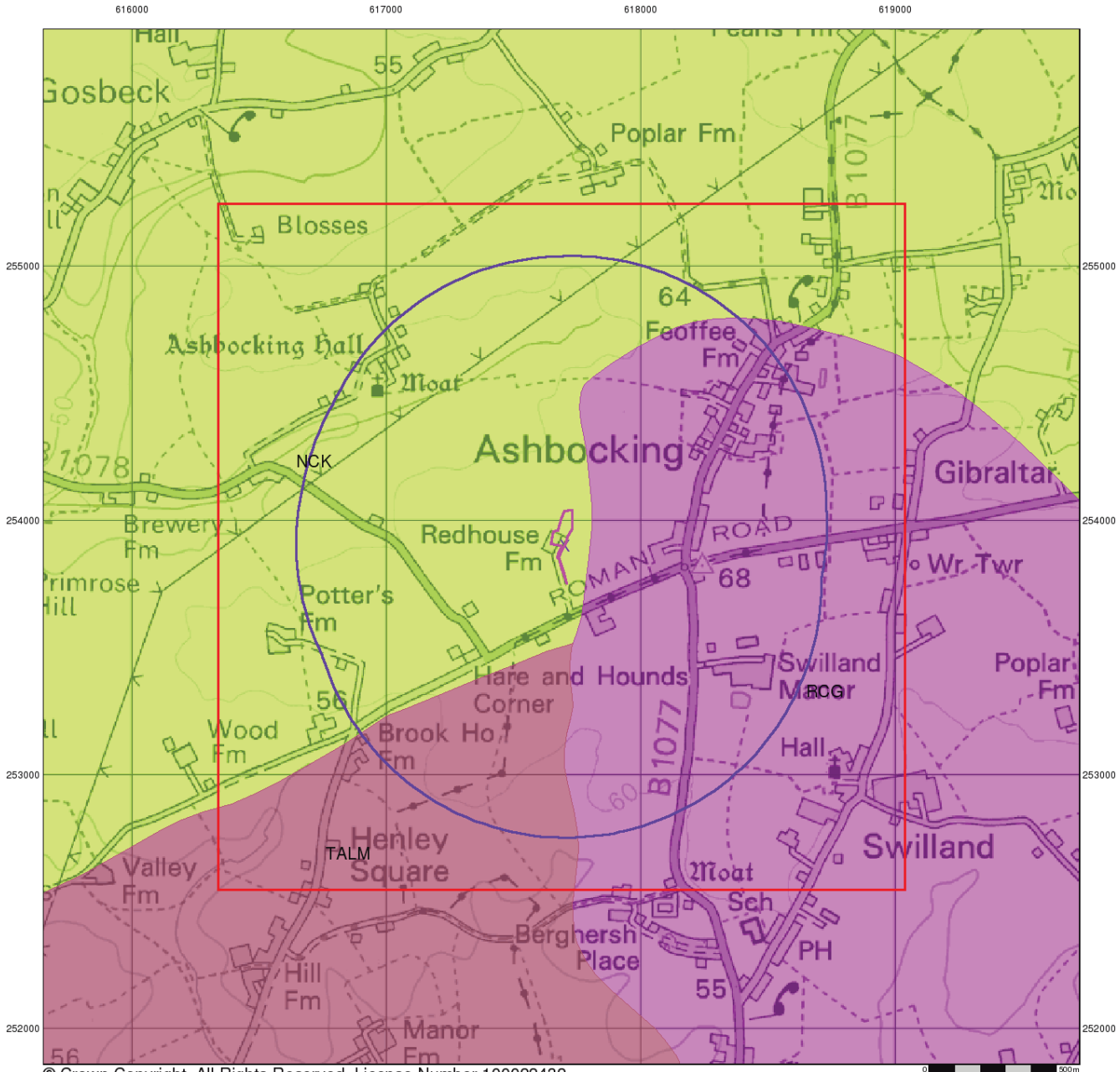


Bedrock and Faults

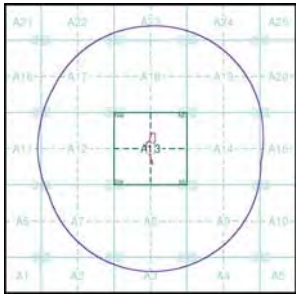
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A



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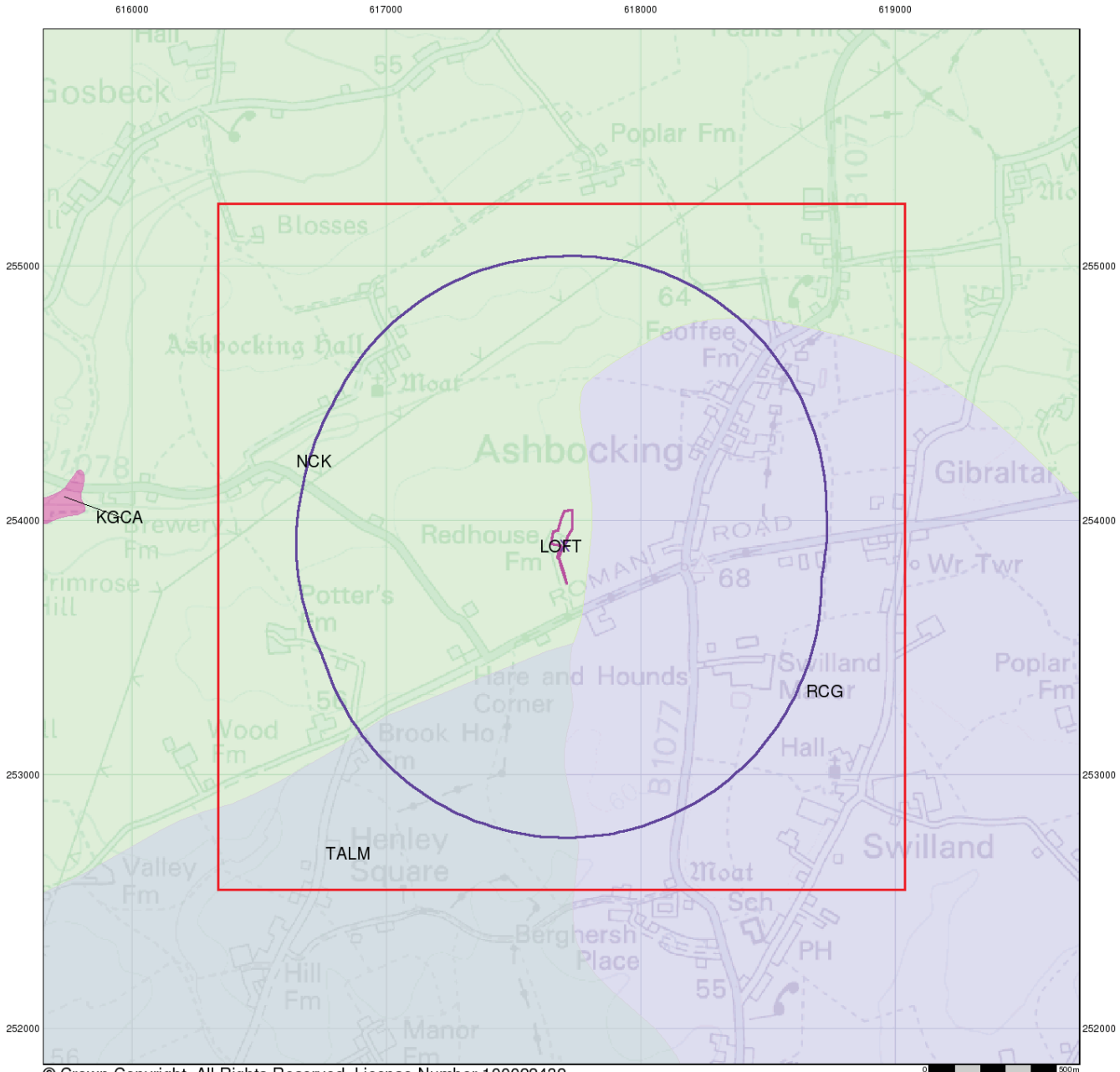


Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

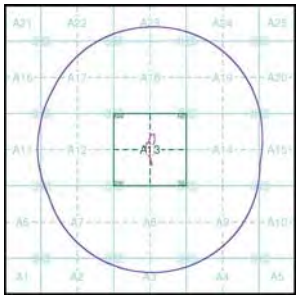
Additional Information

More information on 1:50,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



Order Details:

Order Number:	65467232_1_1
Customer Reference:	UK15.1821
National Grid Reference:	617700, 253900
Slice:	A
Site Area (Ha):	0.77
Search Buffer (m):	1000

Site Details:

Red House Farm, Ashbocking, Suffolk, IP6 9LD

TM 15 SE/14

207/210 Ashbocking House, Ashbocking (formerly The Rectory) 1702·5490

Surface +204. Bore 186. Lining tubes: 114 × 5 in from surface. R.W.L. +126. Ferruginous. *Smith, F., Aug. 1930.*
Deepened. Windpump. ***Before 1941.*** **Ferruginous.** ***1960.***

Boulder Clay	...	...	97½	97½
UCk	...	...	118½	216

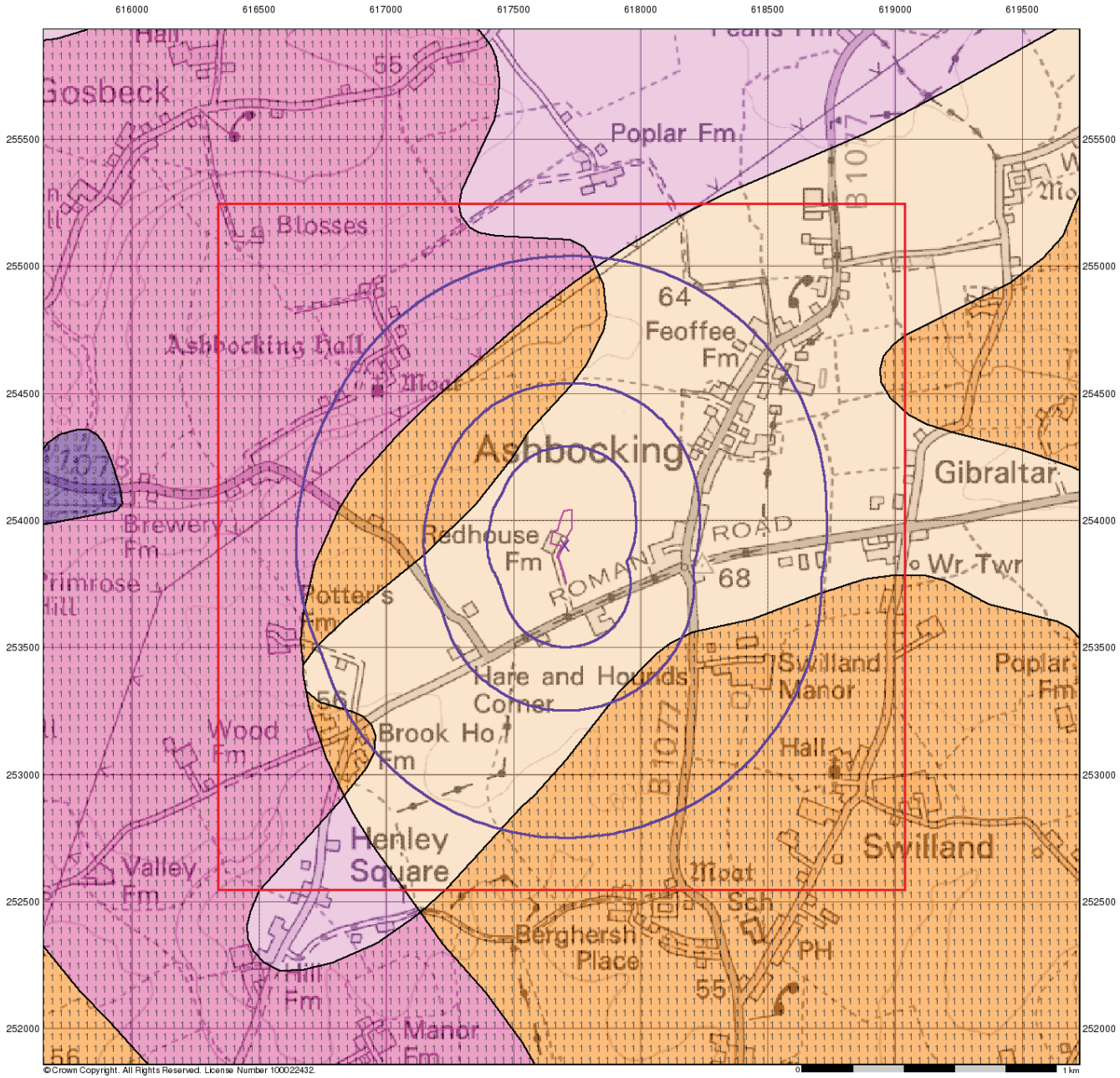
Boulder Clay 97½	Soil	2.0	2.0
	Yellow clay & stones	6.0	8.0
	Blue clay & stones	83.0	91.0
	Chalk	2.0	93.0
	Dark brown silt	4.0	97.0
	Flint	.6	97.6
UCk 88½	Chalk	88.6	186.0

RA.

(This has been deepened to 216)?

APPENDIX D

Groundwater Vulnerability Maps



Groundwater Vulnerability

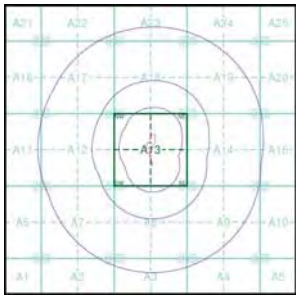
General

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

Order Number:	65467232_1_1
Customer Ref:	UK15.1821
National Grid Reference:	617700, 253900
Slice:	A
Site Area (Ha):	0.77
Search Buffer (m):	1000

Site Details

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Landmark Information Group
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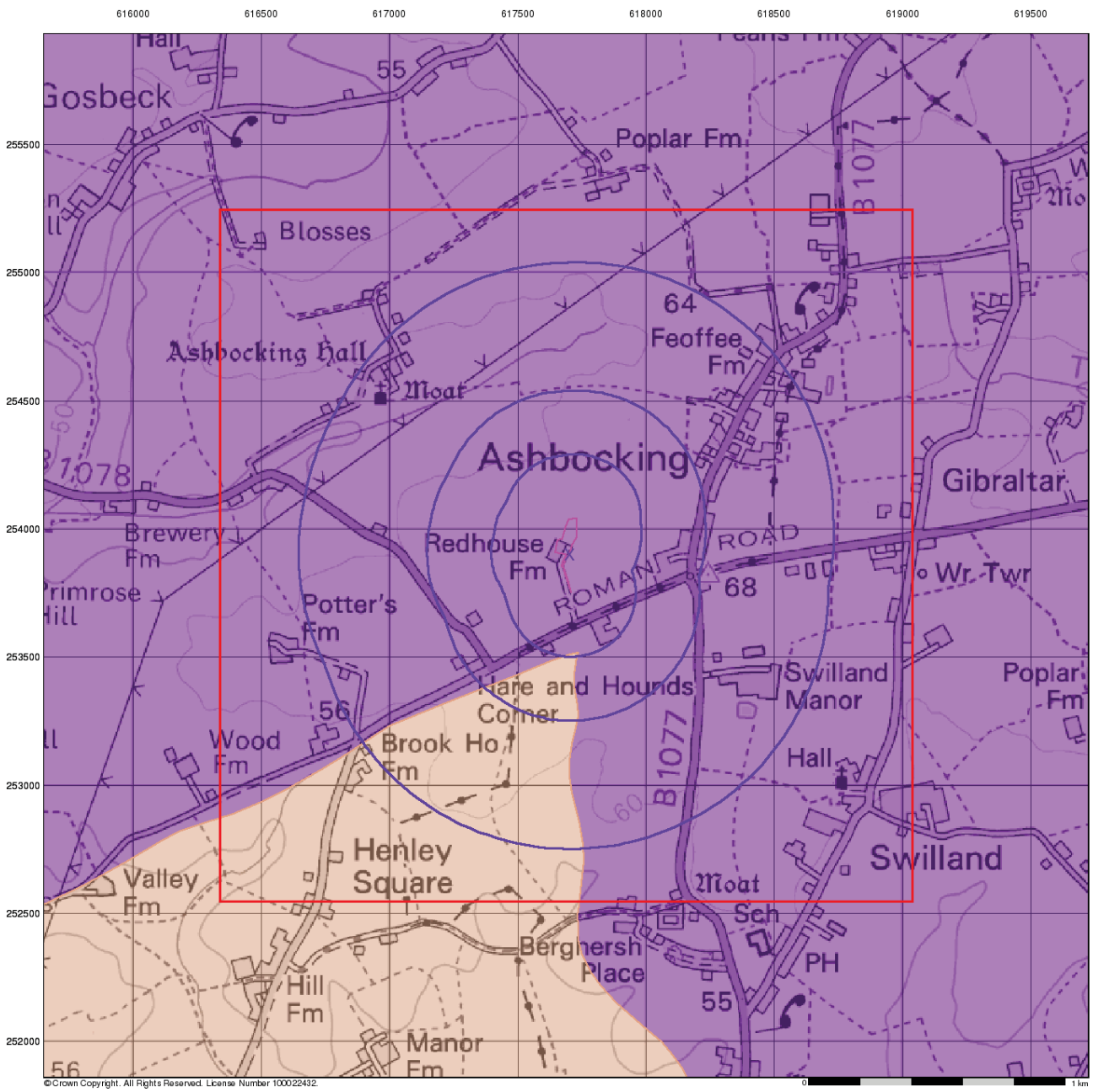
Web: www.envirocheck.co.uk



Bedrock Aquifer Designation

General

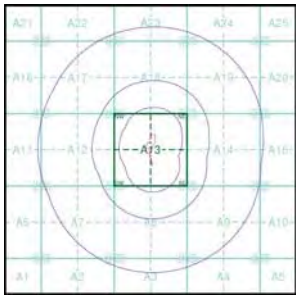
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



Order Details

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Customer Ref:	UK15.1821
National Grid Reference:	617700, 253900
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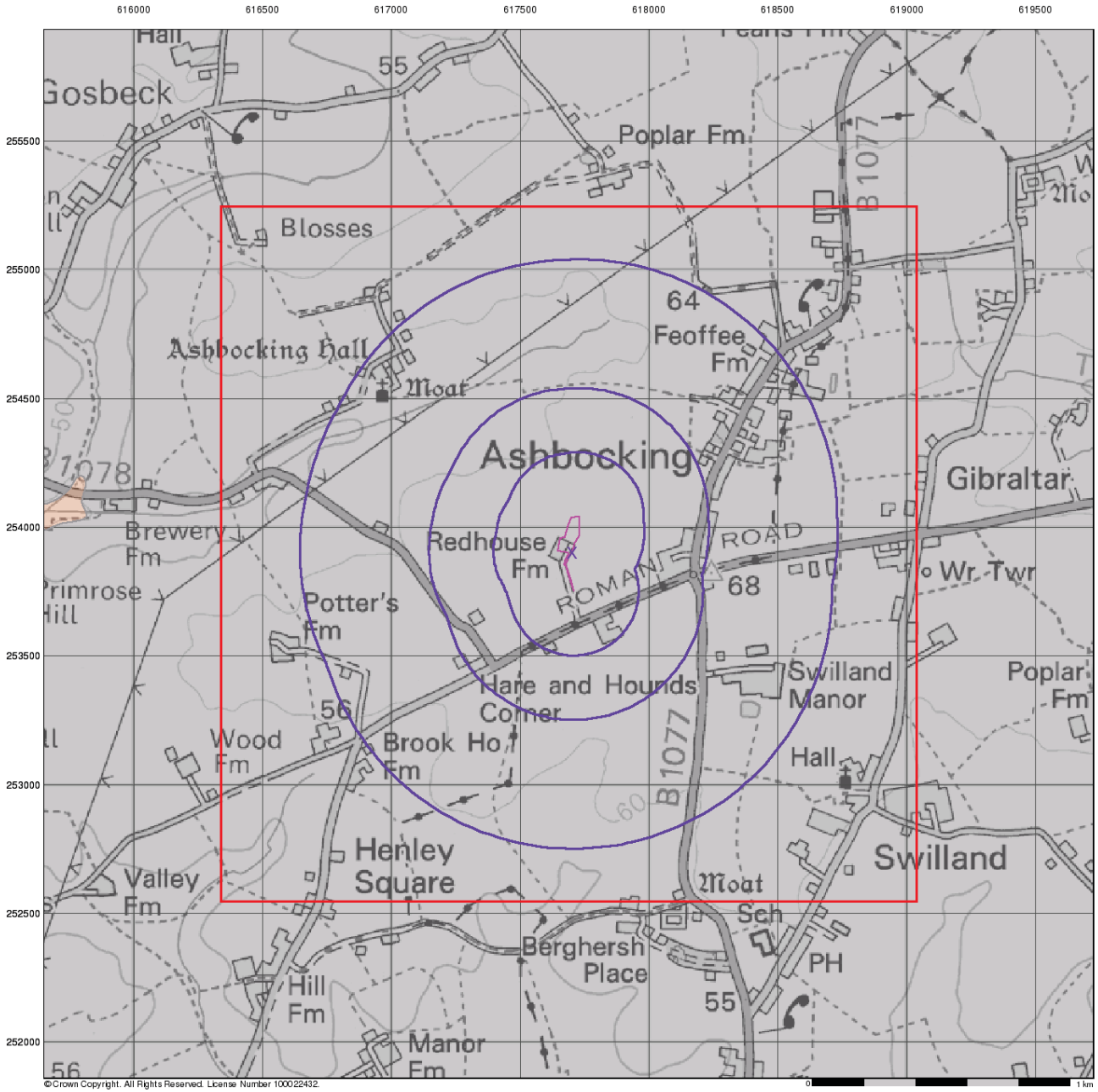


Superficial Aquifer Designation

General

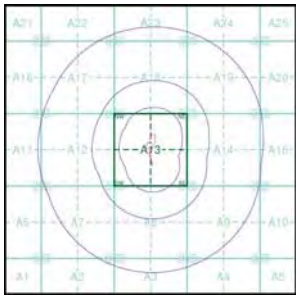
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



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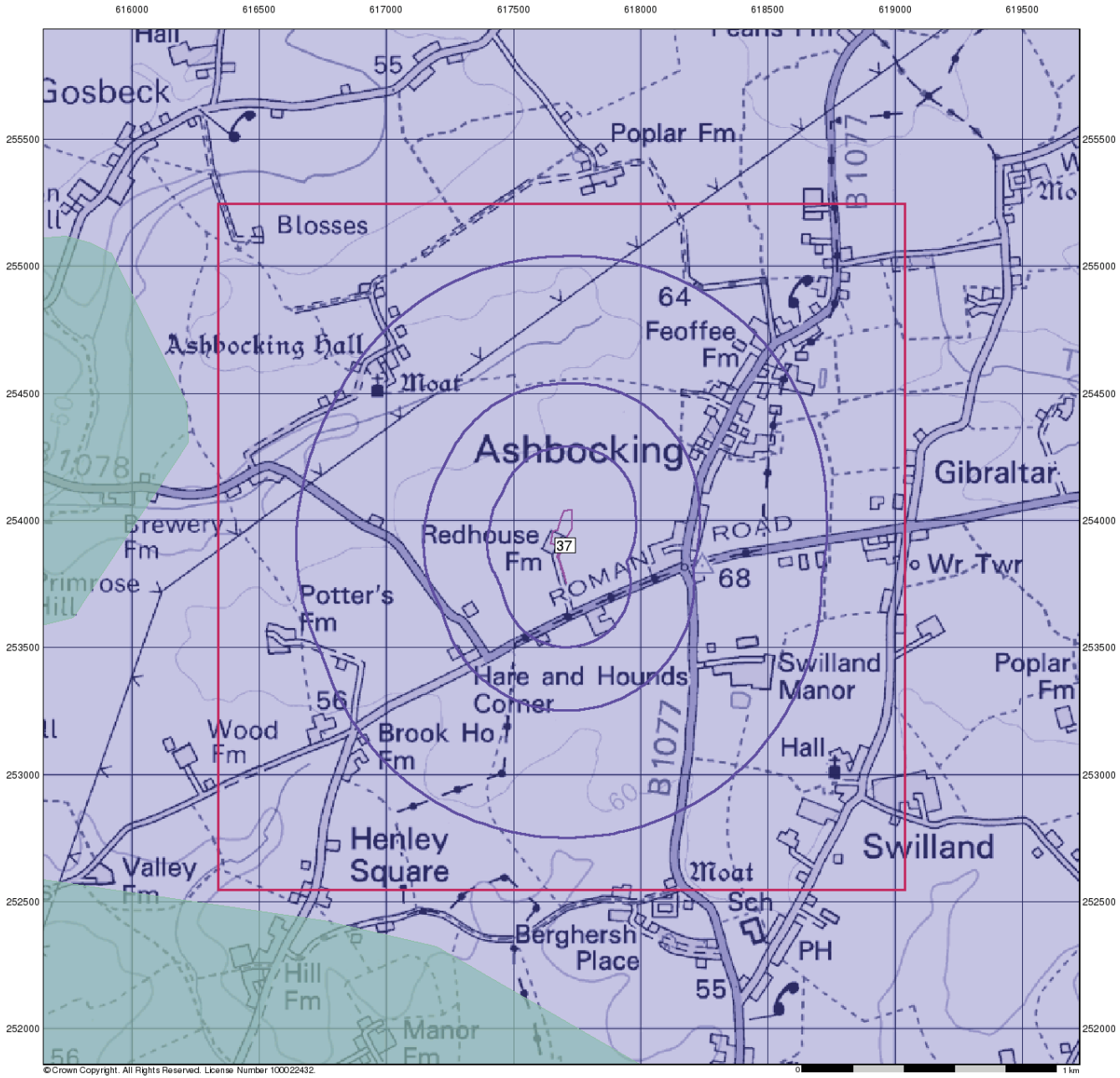


Source Protection Zones

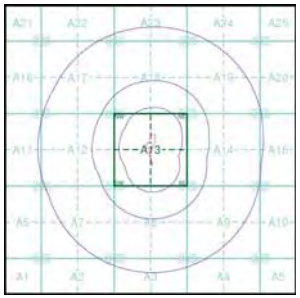
General

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



Order Details

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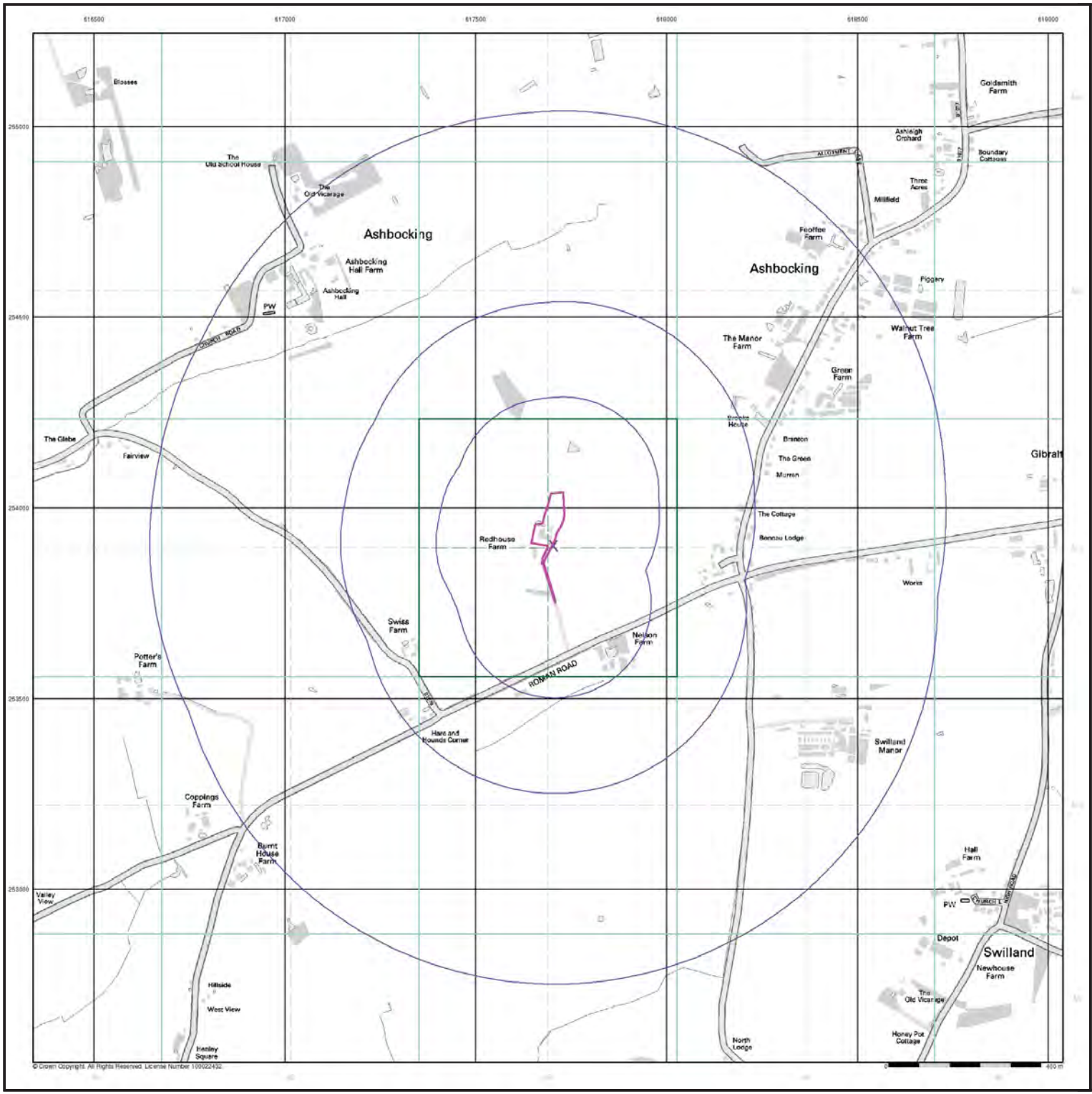


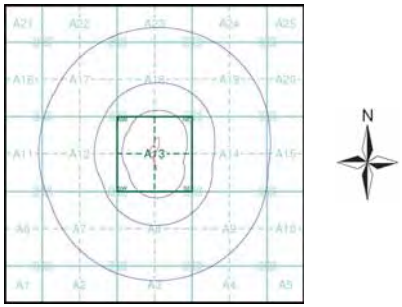
General

- Specified Site
- Specified Buffer(s)
- 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



Order Details

Order Number:	65467232_1_1
Customer Ref:	UK15.1821
National Grid Reference:	617700, 253900
Slice:	A
Site Area (Ha):	0.77
Search Buffer (m):	1000

Site Details

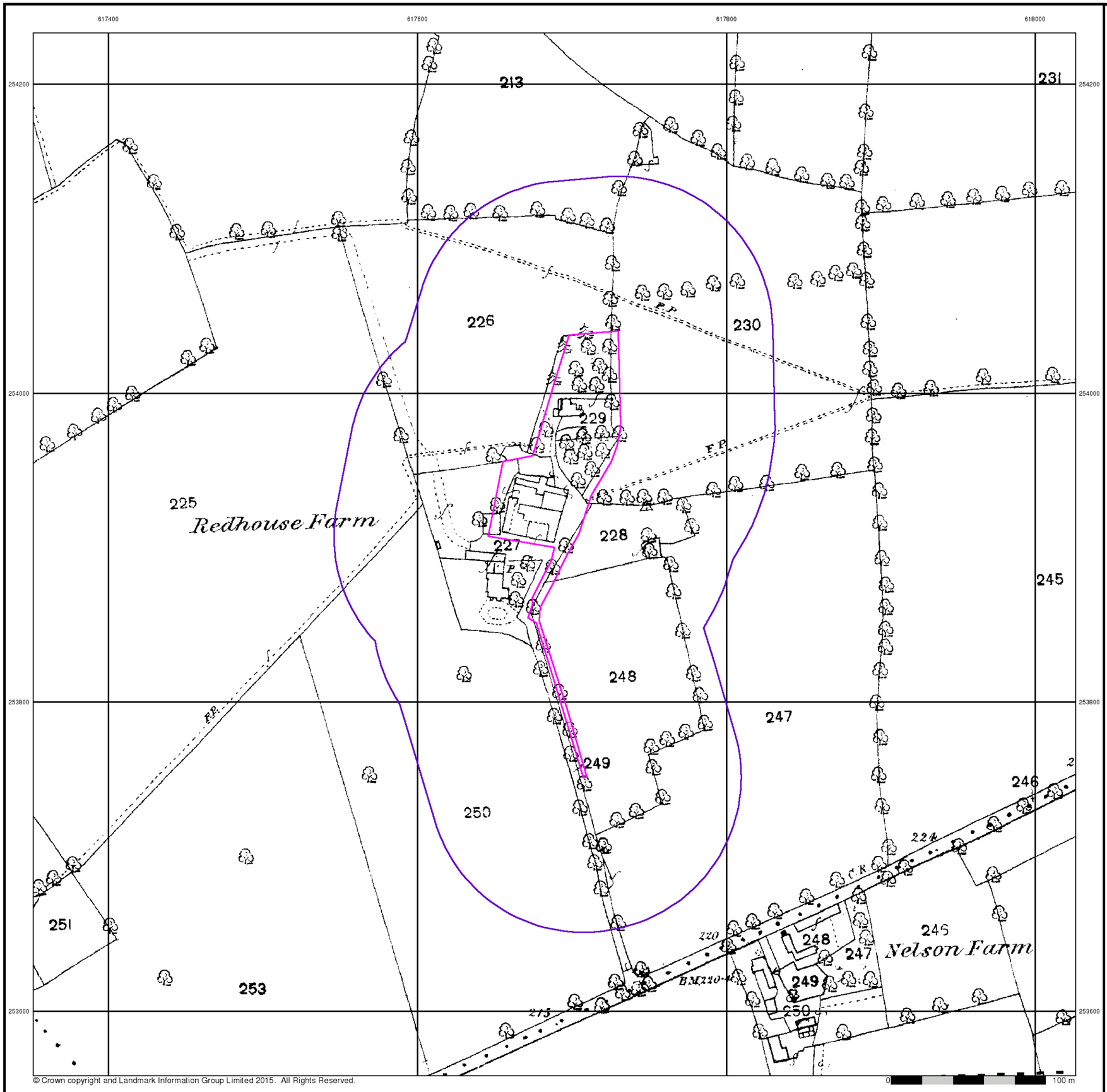
Red House Farm, Ashbocking, Suffolk, IP6 9LD

Landmark Information Group

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

APPENDIX E

A Selection of Historic Maps



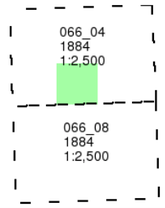
Suffolk

Published 1884

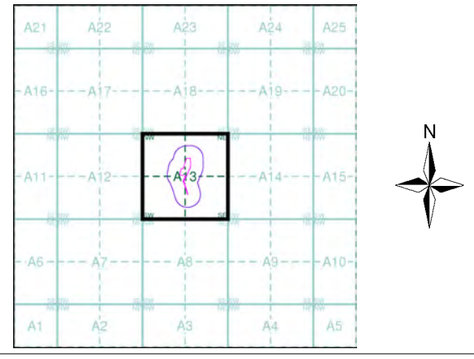
Source map scale - 1:2,500

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:	65467232_1_1
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Slice:	A
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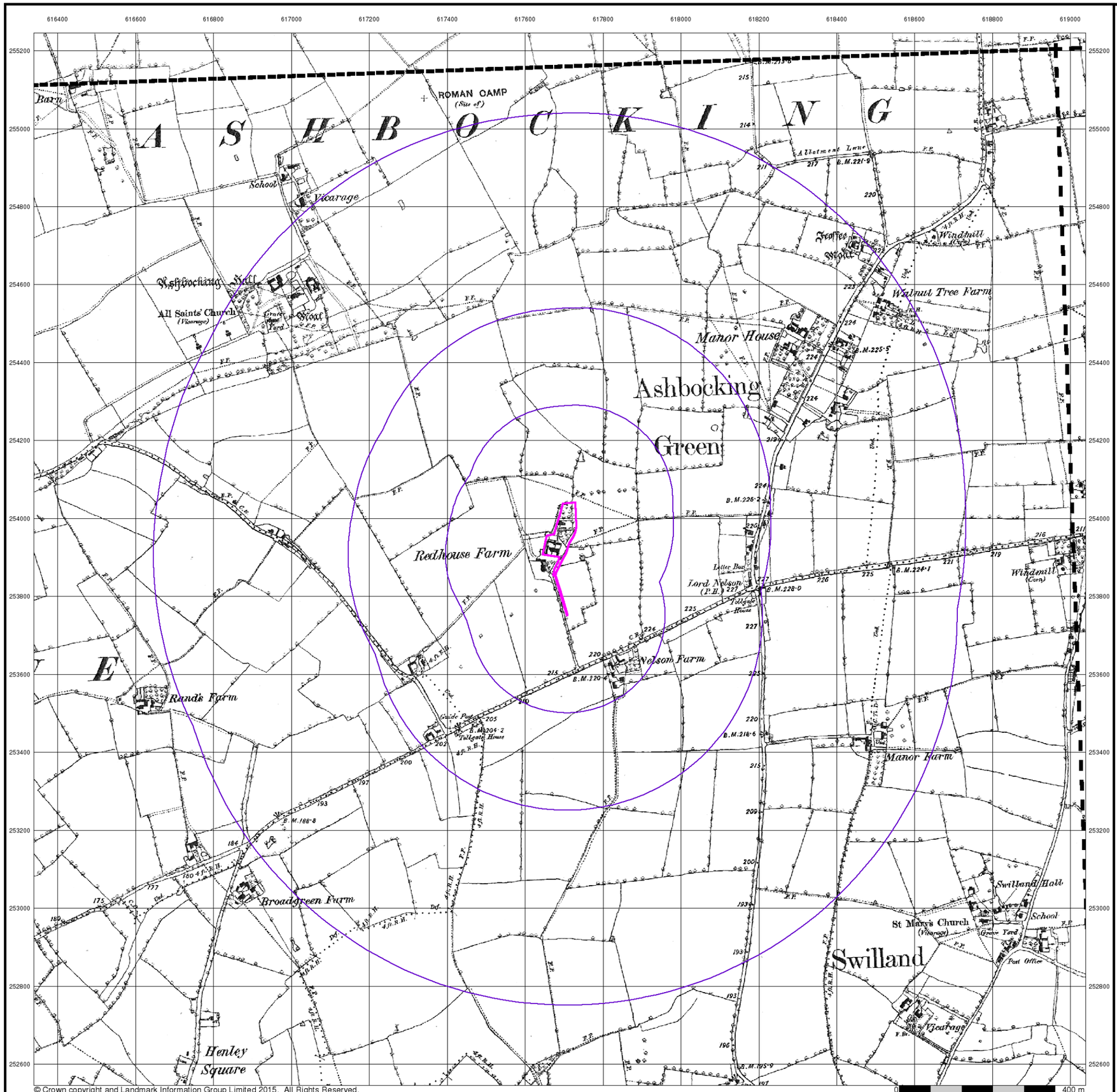


Suffolk

Published 1884 - 1887

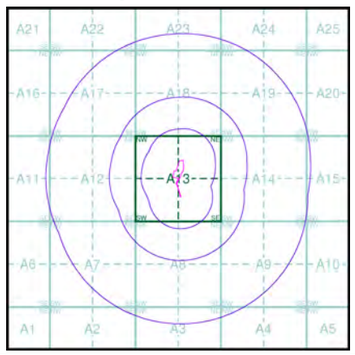
Source map scale - 1:10,560

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)

057SE 1884 1:10,560
058SW 1884 1:10,560
066NE 1884 1:10,560
067NW 1887 1:10,560

Historical Map - Slice A



Order Details

Order Number:	65467232_1_1
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Slice:	A
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Search Buffer (m):	1000

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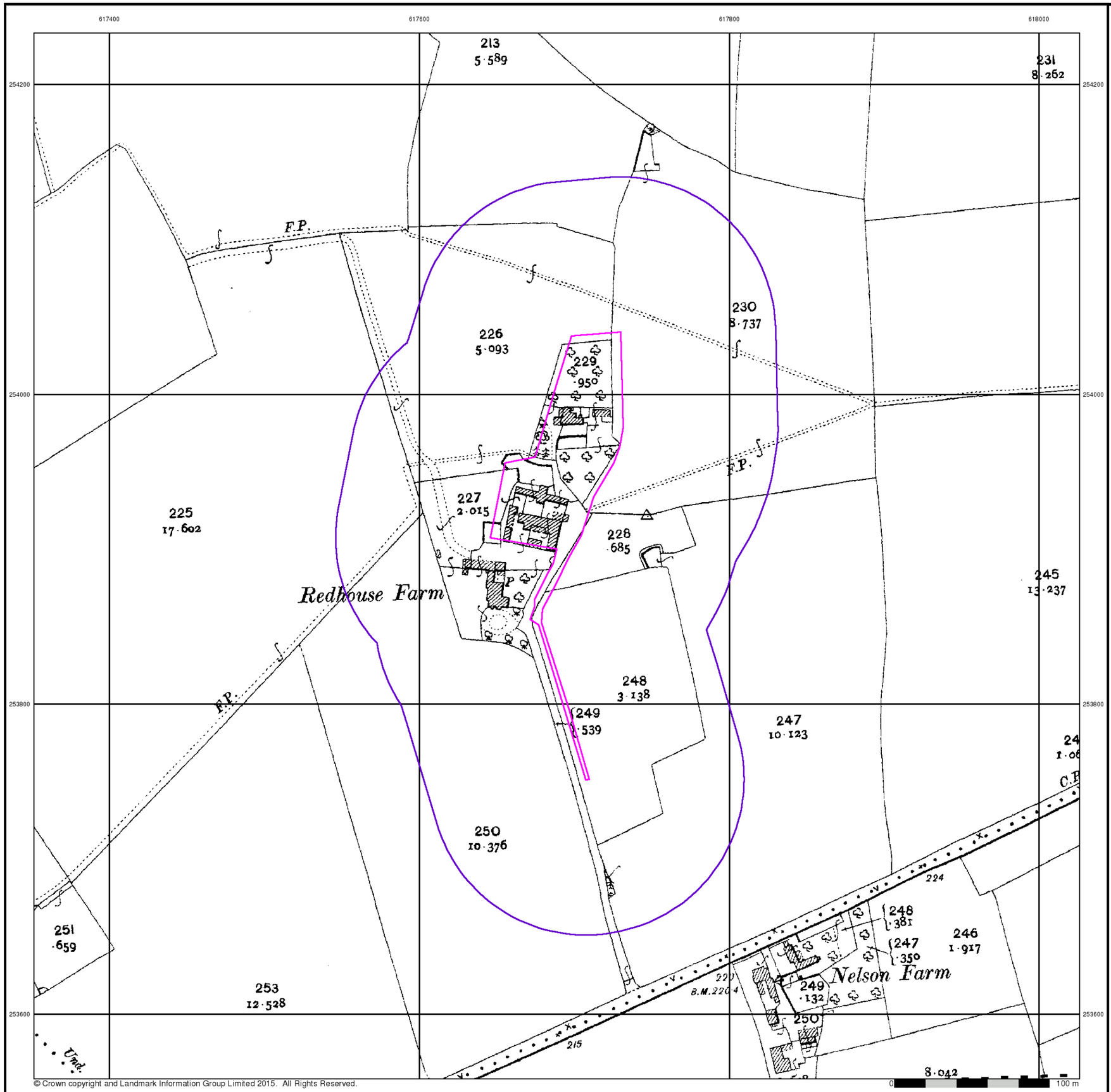


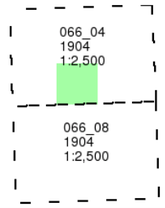
Suffolk

Published 1904

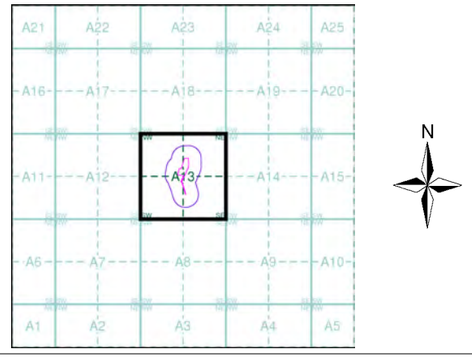
Source map scale - 1:2,500

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:	65467232_1_1
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Slice:	A
Site Area (Ha):	0.77
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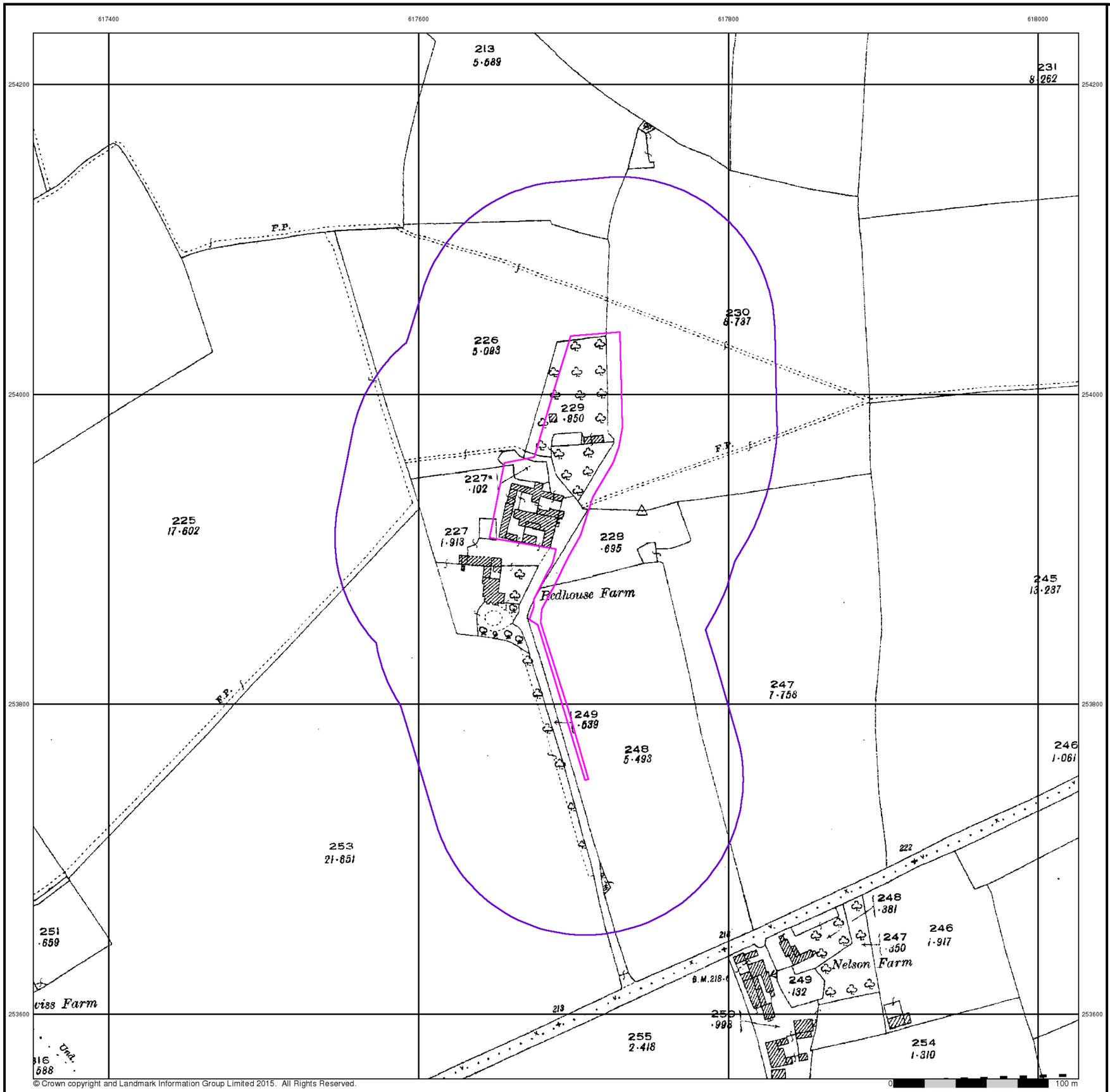


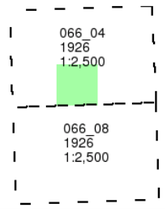
Suffolk

Published 1926

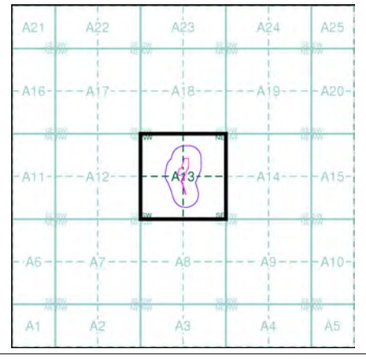
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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Customer Ref:	UK15.1821
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Slice:	A
Site Area (Ha):	0.77
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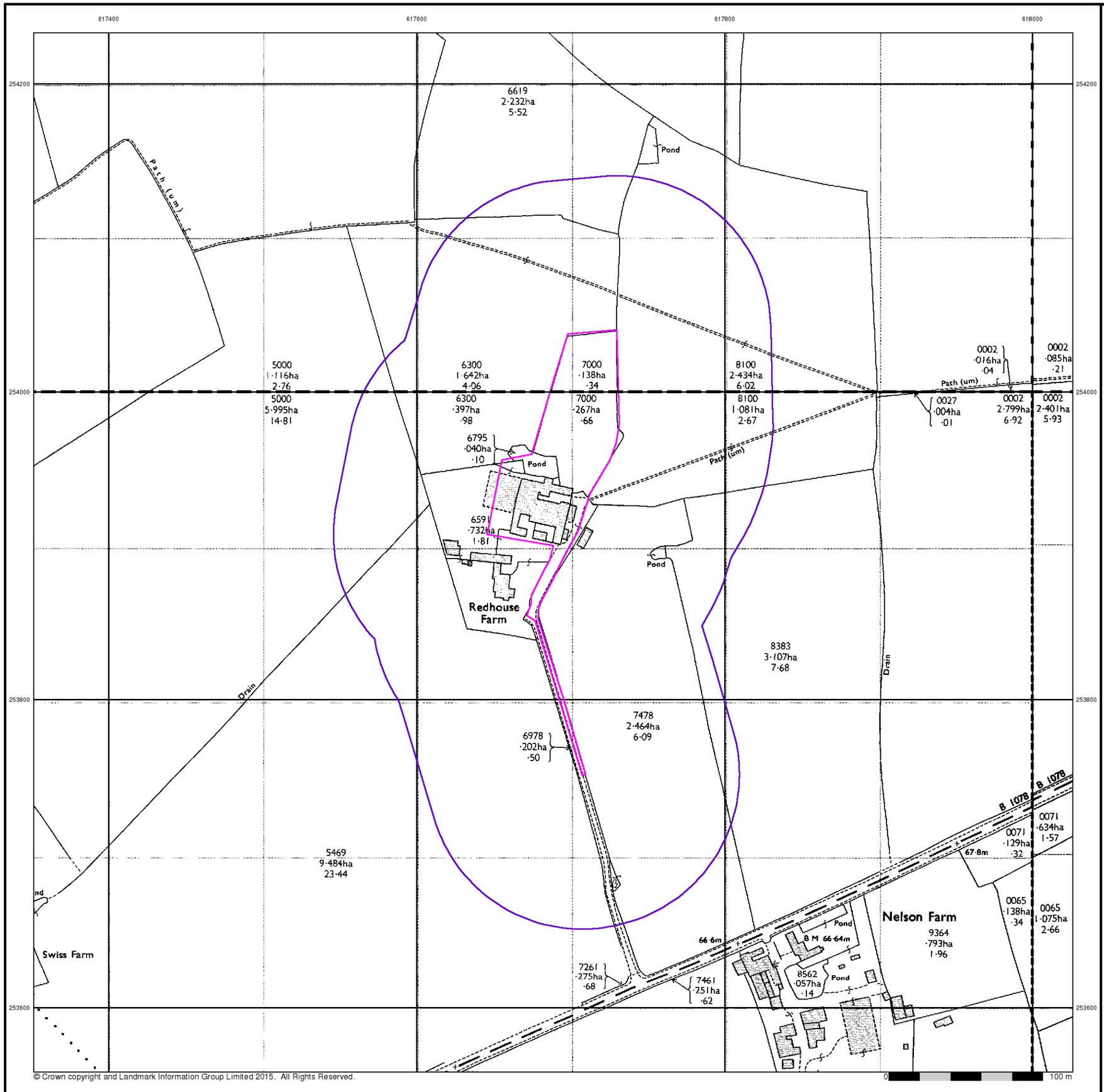


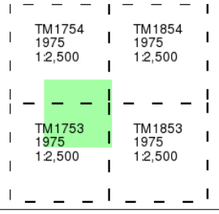
Ordnance Survey Plan

Published 1975

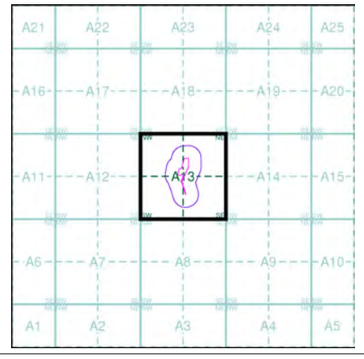
Source map scale - 1:2,500

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



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