



## Phase I Geo-Environmental Desk Study

**Land at St John's Road**  
Kings Lynn  
Norfolk  
PE34 4QL

### Prepared for:

KGB Transport Ltd  
St. John's Road  
Tilney St Lawrence  
Kings Lynn  
Norfolk  
PE34 4QL

EPS Project Reference: UK22.5769

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## LAND AT ST JOHN'S ROAD, KINGS LYNN

### NON-TECHNICAL CLIENT 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 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 consists of an irregularly shaped plot with several large barn structures located throughout the area. The development of site began in the 1970's , with the current layout having existed since the 1990's. The proposed development is to demolish the existing structures and build 39 dwellings.
- The surrounding area is dominated by cropland, bordering the site to the north, and residential properties bordering the rest of site.
- Ground conditions are reported to be underlain by silty clay (Tidal Flat Deposits) overlying clay bedrock. The nearest surface water features are onsite ponds and land drains that run along the west border and another close to the north of site.
- Risks associated with likely presence of made ground materials could not be discounted, especially where this presence of this material would coincide with proposed garden areas. In addition, risks from historic and current diesel storage filling tanks could not be discounted. As such, it is necessary to recommend that further assessment of the ground conditions, particularly relating to presence and quality of the made ground, and contamination relating to historical orchards is made through an intrusive investigation.
- During the site walkover it was identified that building materials used in construction of the on-site barns contained suspected asbestos materials. It is therefore recommended that suitably qualified contractor is consulted for advice of safe demolition of the barns.

By their very nature, the above bullet points represent a simplified summary of our work and **must 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.



<b>Project Reference:</b>	UK22.5769	
<b>Title:</b>	Phase I Geo-Environmental Desk Study Land at St John's Road, Kings Lynn	
<b>Client:</b>	KGB Transport Ltd	
<b>Date:</b>	3 <sup>rd</sup> February 2022	
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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.

The National Planning Policy Framework requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance, with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.

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## 1 INTRODUCTION

In November 2021, Environmental Protection Strategies Ltd (EPS) was commissioned by Swann Edwards Architecture on behalf of KGB Transport Ltd, to complete a Phase I Geo-Environmental Desk Study on land at St John's Road, Kings Lynn, Norfolk, PE34 4QL ('the site'); see Figure 1.

The work was commissioned to support planning application for residential development with proposed development plans comprising erection of 39No dwellings following demolition of existing barns and structures currently on the site.

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

### 1.1 Objectives

The purpose of this desk study is to evaluate the potential contaminant linkages which 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.

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 site's 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.
- 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 Conceptual Site Model through a Preliminary Risk Assessment to evaluate the potential risks posed by the site and make recommendations for any further work that may be required to ensure suitability for use and safe development. In accordance with the Environment Agency's *Land Contamination: Risk Management* (2020) and the *National Planning Policy Framework*.

### 1.2 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 by third parties EPS accepts no responsibility for errors within third party materials referenced and presented in this report.



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 observed during EPS site walkover, details will be provided in this report. Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

## 2 SITE CHARACTERISATION

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
<b>Location</b>	The site lies to the north of St John's Road, 500m east of Terrington St John centre and approximately 10km south west of Kings Lynn.
<b>Grid Reference</b>	554420, 314150
<b>Topographic Elevation</b>	Site levels are generally flat being between roughly 2m and 4m Above Ordnance Datum (AOD).
<b>Description of Site</b>	<p>The site is an irregularly shaped plot of land 3.37ha in area. At the time of walkover, 13/01/22, the site consisted of several large barn structures, large stacks of wooden crates and a weighbridge on a large concrete yard area. Additionally, there are several small structures including reception/canteen building, a workshop and several 'lagoons' used for water storage. The east and west edges of the site were overgrown. There is a telecommunications mast at the east of site, operated by O2.</p> <p>The onsite reception/canteen building potentially includes asbestos containing materials in its structure in the form of roofing tiles.</p>
<b>Surrounding Land Use</b>	The site is bordered to the north by agricultural land, whilst to the south, east and west residential properties exist. The site is bordered and accessed to the south by a car park and St Johns Road.

A plan showing the site location is provided as Figure 1 and an aerial photograph is included as Figure 2. Selected Site Photographs are included as Appendix A.

### 2.2 Geo-Environmental Setting

Detail	Description
<b>Geology</b>	<p>Geological maps of the area show the site to lie on superficial Tidal Flat Deposits. The superficial geology of the area is a mixture fluvial deposits of muds, sands and silts. The bedrock geology of the area is the Kimmeridge Clay formation.</p> <p>An historical borehole records approximately 400m north west of site indicates approximately 9m of soft clay, underlain by approximately 3m of sands and gravel deposits to a total depth of 12m. This in turn is underlain by Kimmeridge Clay bedrock to at least 45m (BGS Ref: TF51SW2). Information on the site's geological context, and a copy of one of the historical logs, are included as Appendix C.</p>



Detail	Description	
Geological Hazards	<b>Hazard</b>	<b>On Site Risk</b>
	Mining (non-coal)	No Hazard
	Collapsible Ground	No Hazard
	Compressible Ground	Moderate
	Ground Dissolution	No Hazard
	Running Sand	Moderate
	Landslide	Very Low
	Shrinking / Swelling Clay	Low
	There are 5 recorded mineral sites within 1km, all for common clay and shale. The nearest being 149m west of site.	
Radon	The Envirocheck indicates the site to lie in a location where the percentage of homes above the radon action level is less than 1%. It further reports that the site will not require radon protection measures in the construction of new buildings.	
Hydrogeology	Groundwater vulnerability maps for the area show that the underlying superficial geology is classified as unproductive strata, as is the bedrock geology. The site does not lie within a Source Protection Zones for local groundwater abstraction.  There are no groundwater abstractions within 1km of site. Groundwater vulnerability maps are included as Appendix D.	
Hydrology	The nearest water features are 3 onsite ponds or 'lagoons' at the north of site. These are used for water storage and will likely be filled prior to development. Additionally, there is a land drain bordering the west of site and additional drains close to the south and north of site.  The Envirocheck Report indicates that the entire of the site lies within Flood Zone 3, defined as potential risk of extreme flooding. As such flood risk assessment will be required prior to the development.  It should be noted that the EA maps do not take into account the presence of flood defences or flooding from poor drainage, or groundwater. A copy of the flood map for the site and surrounding area is also included in Appendix D.	
Landfill & Waste	The Envirocheck report lists 1 Licensed Waste Management Facility 114m south east dedicated to end-of-life vehicles. There are 4 sites listed as potentially infilled land. The closest of these is ~207m to the east.	
Licensed Industrial Activity	The Envirocheck reports 2 sites which operates under Local Authority Pollution Prevention and Controls within 1km, both associated with waste oil burners, the closest being 553m west of site.	
Industrial Land Use	There are 23 industrial land uses within 1km, the most pertinent of which are summarised below.	





Detail	Description		
	Land Use	Approximate Distance (Direction)	Status
Industrial Land Use Cont.	Fibretek Fabrications (Commercial Vehicle Repairers)	0m	Inactive
	KGB (Road Haulage)	18m (S)	Active
	The Fascia Specialists (Cladding Suppliers)	84m (SW)	Inactive
	H&W Autos (Garage Services)	97m (SE)	Inactive
	Cleanse Smart (Cleaning Services)	148m (SW)	Active
Pollution Incidents	3 recorded pollution incidents to controlled waters are recorded within 1km. The closest incident was a category 3 minor incident occurring 334m south of site in 1993. There is a prosecution relating to discharging vegetable waste into a watercourse for the site, which resulted in fine enforced in January 2009.		
Previous Investigation or Remediation	EPS are not aware of any previous ground investigations or remedial works undertaken at the site.		
Sensitive Land Use	There is no sensitive land use or vulnerable zone within 500m of site.		

## 2.3 Site History



A summary of historical map data from 1886 to 2021 is summarised below. Key points are highlighted and copies of relevant historic maps and any others examined during the investigation are included in this report as Appendix E.

- The earliest available mapping shows that the site had been undeveloped prior to the 1970's, when two small structures were built in the approximate entrance to the modern depot. The weighbridge was added in the 1980's and the current site layout has existed since ~1995.
- Many of the structures in the surrounding area were constructed prior to the structures currently at the site, with many of the nearby residential properties being built 1970s and 1980s.
- Due to the weighbridge being evident on mapping during the 1980's, it is apparent that the site has been used for vehicular activities since that time period.
- Immediately south of site, an orchard existed until the 1970's. In the surrounding area, several small orchards were present, none remain today with the majority being removed by the 1980's.

### 3 PRELIMINARY RISK ASSESSMENT & CONCEPTUAL SITE MODEL

In accordance with the Environment Agency's Land Contamination: Risk Management, there are three stages to managing contaminated land (Risk Assessment/Remedial Options Appraisal/Remediation and Verification). This section outlines the first tier of Stage 1, the Preliminary Risk Assessment.

The following section provides a review of the contaminant linkages that may be active at the site, whereby EPS have examined 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 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:

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

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.

#### 3.2 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 and Historical Site Use	Potential for presence of in-fill material of unknown origin (Made Ground) beneath existing structures and areas of hardstanding.	PAH, Metals, ACM
	Asbestos containing panels on site structures	ACM
	Use of site vehicular activity including fuelling from onsite tanks	PAH, TPH, Metals

**Notes:** PAH Polycyclic Aromatic Hydrocarbons ACM Asbestos Containing Materials  
 TPH Total Petroleum Hydrocarbons

### 3.3 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 have been further developed into six generic land uses in the Category 4 Screening Levels project for Land Affected by Contamination (DEFRA/Contaminated Land: Applications in Real Environments (CL:AIRE) Project Report SP1010, 2014) which form a basis for the development of the Conceptual Site Model.

Risks posed to controlled waters have been considered in line with the Environment Agency's *approach to groundwater protection* (v1.2, 2018) and associated position statements.

The plan for the site is to demolish the existing commercial building to be replaced with 39 residential dwellings. Therefore, the land use has been considered as:

- Residential (with Home Grown Produce)

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 below:

Receptor	Site Specific Description
<b>Human</b>	Future site users, site workers involved in the site redevelopment, and those working and living in the surrounding area have the potential to be at risk from exposure to potential contaminants of concern.
<b>Groundwater</b>	The site is reported to be underlain by clay deposits and a clay bedrock which are both defined by the EA as unproductive strata. The site does not lie within a Source Protection Zone and the underlying geology has limited resource potential however, groundwater if present could form base flow to local surface waters and as such groundwater should be considered as a potential receptor to site-derived contaminants.
<b>Surface Water</b>	The nearest surface watercourse is onsite, and in addition forms the northern site boundary. It is possible that site derived contaminants of concern may enter these watercourses by migration through unsaturated soils or entering shallow surface drainage. Therefore, surface waters must be considered as a sensitive receptor within the conceptual site model.
<b>Flora and Fauna</b>	Some of the identified contaminants of concern are known to be phytotoxic and as such the potential for impact upon areas of soft landscaping should be considered.
<b>Buildings &amp; Infrastructure</b>	Subsurface structures are likely to be present at the site which 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.

Receptor	Site Specific Description
<b>Adjacent Land</b>	The majority of surround land use is agricultural and therefore no added risk from contamination to land more sensitive than that proposed on site has been identified.

### 3.4 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. For example, ingestion of contaminated vegetables will not apply to land uses other than residential with plant uptake and allotments.

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.

### 3.5 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 (Made Ground)	Direct contact and inadvertent ingestion by eating or smoking with dirty hands & inhalation of fugitive dusts	Construction workers during redevelopment & Site Users
	Direct uptake and / or adherence of contaminated soil to vegetation and subsequent ingestion	Site Users
	Direct uptake via root systems	Plants
Above Ground Diesel Storage	Direct contact and inadvertent ingestion by eating or smoking with dirty hands & inhalation of fugitive dusts or soils potentially impacted with petroleum hydrocarbons	Construction workers during redevelopment & Site Users
	Partitioning and vertical migration (upwards) of potentially contaminated vapours.	Site Users
	Partitioning and vertical (downwards) movement resulting from spills and leakages	Groundwater
	Lateral migration off site	Surface water / Neighbouring Residents

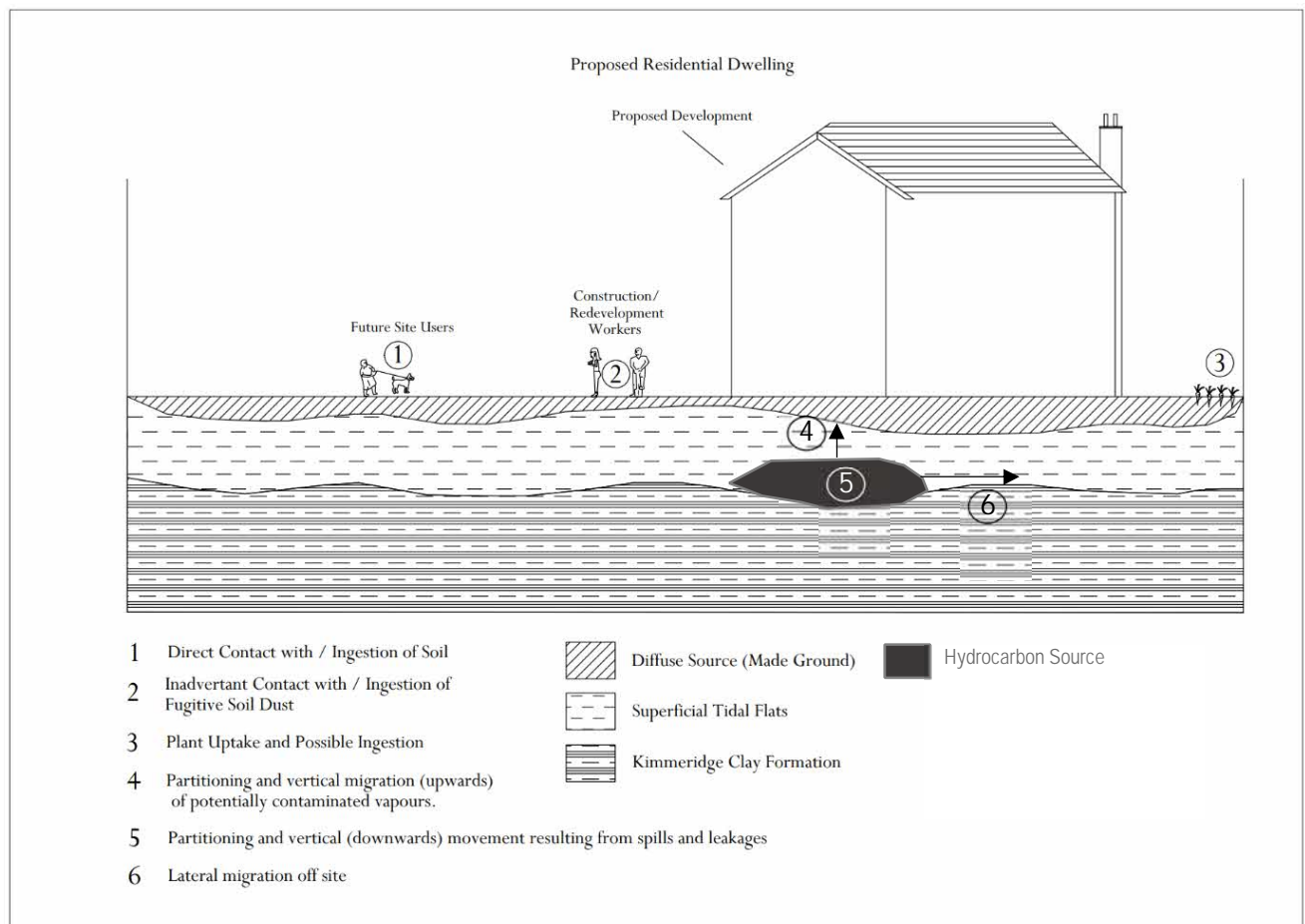
The following comments are made with respect to contaminant linkages which have been considered through development of the conceptual model, but have not been concluded as 'plausible' –i.e. through which a significant possibility of significant harm could occur to an identified receptor.

- The identified site-derived contaminants of concern are considered to be relatively immobile within the environment (in the case of heavy metals, PAH compounds and asbestos), or have a low residency time in the ground. For this reason, site-derived contamination is not considered to pose a significant risk to controlled waters, buried infrastructure, or any off-site receptors.
- During the walkover it has been reported that vegetable washing is undertaken on site and that the waste water is stored in the on-site lagoons. As the process includes washing of vegetables classed as safe for human consumption, it is considered suitable to conclude that the waste water should not be contaminant with chemicals capable of posing risk to human health or water resource receptors.
- Potential asbestos containing materials have been identified onsite in the form of roofing panels at least one of the structures. It is recommended that an asbestos removal specialist is used for the

safe removal and disposal of these panels, in the event the structure being demolished or renovated.

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:

### Land at St John's Road –Illustrative Conceptual Site Model



### 3.6 Key Potential Areas of Concern and Uncertainties

The main area of concern identified by EPS with respect to any future development at the land at St John's Road, Kings Lynn, is regarding the presence and nature of any underlying made ground materials beneath the site, particularly where areas of hardstanding are present. It is possible that future site users and construction workers could become exposed to contaminated soils if any of these areas were to be uncovered during future groundworks.

Additionally, the presence of two above ground diesel tanks poses the risk of hydrocarbon pollution existing in the shallow soils in the areas surrounding the tanks. This can pose a risk both to the future site users and workers through direct contact, and also poses a risk to nearby watercourses such as the drainage ditch bordering the west of site.

## 4 GEOTECHNICAL GROUND MODEL

Geological records indicate the ground conditions to comprise alluvium overlying granite, although given the historic use, significant amounts of made ground is anticipated to be present at the surface. A conceptual geotechnical ground model is 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
		Volume Change	Depends upon the soil composition
	Tidal Flat Deposits	Allowable Bearing Pressure	< 50kN/ m <sup>2</sup>
		Settlement	High Sensitivity
		Volume Change	Low to moderate volume change potential
	Kimmeridge Clay Formation	Allowable Bearing Pressure	75kN/ m <sup>2</sup> to 150kN/ m <sup>2</sup>
		Settlement	Moderate sensitivity / Long term consolidation under loading
		Volume Change	High Volume Change potential
Drainage	Made Ground	Permeability	Not suitable for infiltration drainage
	Tidal Flat Deposits		Unlikely to be suitable
	Kimmeridge Clay Formation		
Concrete Grade	Made Ground	Grade	Low to moderate risk of high sulphate levels
	Tidal Flat Deposits		
	Kimmeridge Clay Formation		High risk of high sulphate levels



Potential Hazard	Comment
Trees & Vegetation	There are several trees at the east of site and at site perimeter. The tidal flat deposits may be cohesive; this could lead to deepening of foundations. The clay bedrock will also be susceptible to subsidence/heave.
Below Ground Structures	<p>In addition to the structures anticipated to be present in association with the existing buildings, any made ground/fill material may also contain waste that could form localised obstructions.</p> <p>It is also noted that the current lagoons located in the northern part of the site will likely need to be infilled. This can be managed through use of contaminant free and geotechnically suitable material to support future structures.</p>

## 5 CONCLUSIONS & RECOMMENDATIONS

The site is generally low to moderate risk in terms of contaminated land.

This Phase I Desk Study has identified plausible contaminant linkages which have the potential to become active as a result of the historical use of site.

In the context of potentially unacceptable or acceptable risks as outlined within the Environment Agency's *Land Contamination: Risk Management* guidance, the contaminant linkages which pose potentially unacceptable risks and warrant further assessment to determine the most appropriate action are as follows:

- Potential exposure of site users and workers to contaminated soils during and after any future redevelopment
- Potential for locally contaminated hydrocarbon vapours entering future structures
- Potential for migration of hydrocarbons originating from on-site tanks towards surface waters.

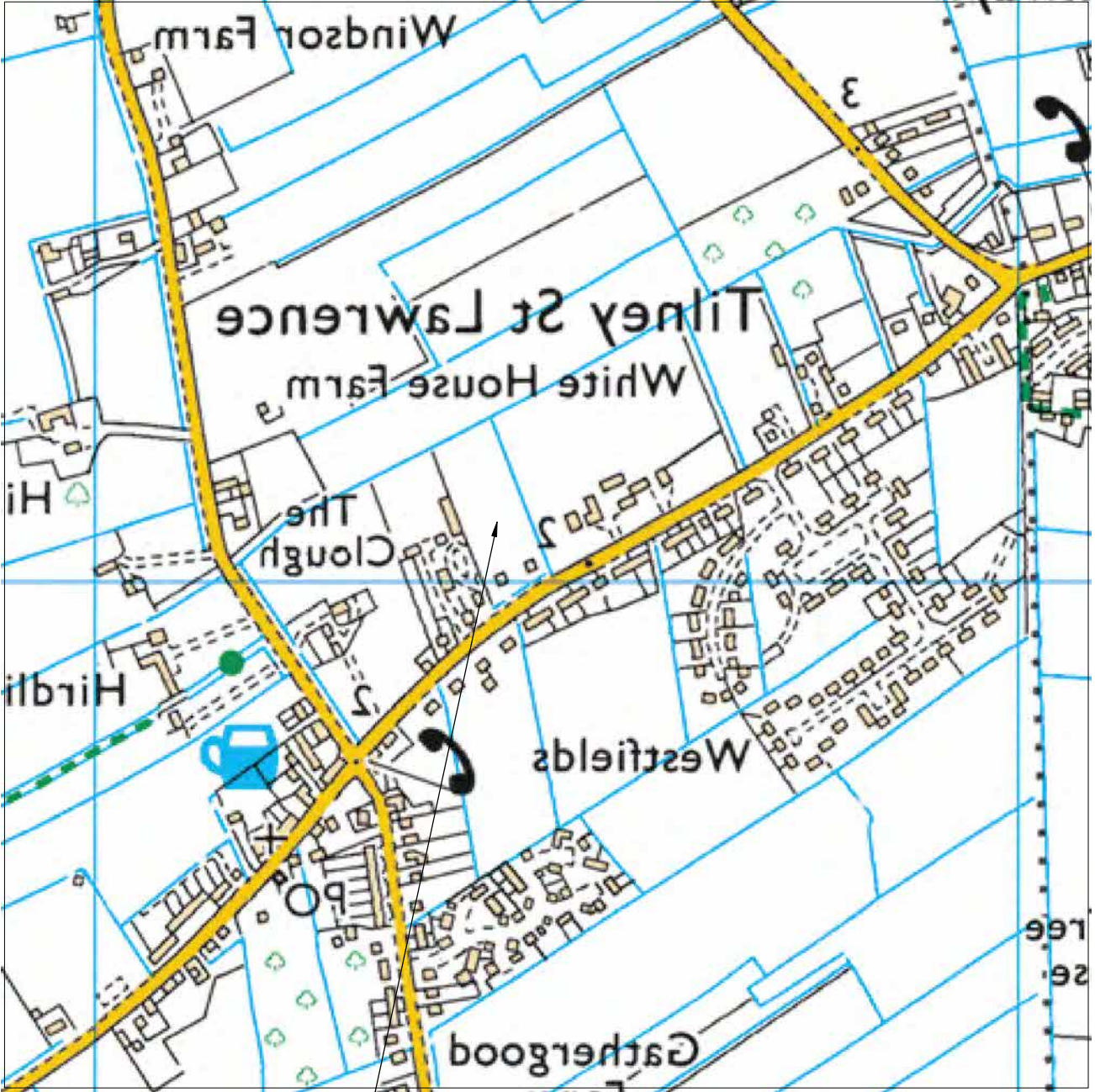
Given the sensitivity of the identified receptors it is recommended that, initially, the identified plausible contaminant linkages are further investigated by means of intrusive investigation, with a focus on assessing the depth and nature of any made ground material that may be present beneath the site, as well as areas surrounding the tanks. A proposed scope and costing for this work can be provided upon request and, where appropriate discussed and agreed with the local authority prior to commencement. It is recommended that this investigation is combined with geotechnical assessment in order to provide foundation and pavement design information.

During the site walkover it was identified that building materials used in construction of the on-site barns contained suspected asbestos materials. It is therefore recommended that suitably qualified contractor is consulted for advice of safe demolition of the barns.

A copy of this report should be provided to the Environmental Health department of the Borough Council of King's Lynn and West Norfolk so that the information may be used to support planning proposals for the site.



# FIGURES



Approximate Site Location

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**Title:** Site Location Plan

**Project:** Land at St John's Road,  
Kings Lynn  
Norfolk  
PE34 4QL

**Fig No:** 1

**Scale:** NTS

**Drawn By:** WT | **Approved By:**

**Job No:** UK22.5769

**Dwg No:** SJohns/ 0122/ 01

**Date:** January 2022



— Approximate Site Boundary

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**Title:** Aerial Photograph

**Project:** Land at St John's Road,  
Kings Lynn  
Norfolk  
PE34 4QL

**Fig No:** 2

**Scale:** NTS

**Drawn By:** WT    **Approved By:**

**Job No:** UK22.5769

**Dwg No:** StJohns/ 0122/ 02

**Date:** January 2022



## APPENDICES




## APPENDIX A

### Selected Site Photographs



Approximate Site Boundary 

Approximate Photo Locations 

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**Title:** Photo Locations

**Project:** Land at St John's Road,  
Kings Lynn  
Norfolk  
PE34 4QL

**Fig No:** A

**Scale:** NTS

**Drawn By:** WT | **Approved By:**

**Job No:** UK22.5769

**Dwg No:** SJohns/ 0122/ A

**Date:** January 2022

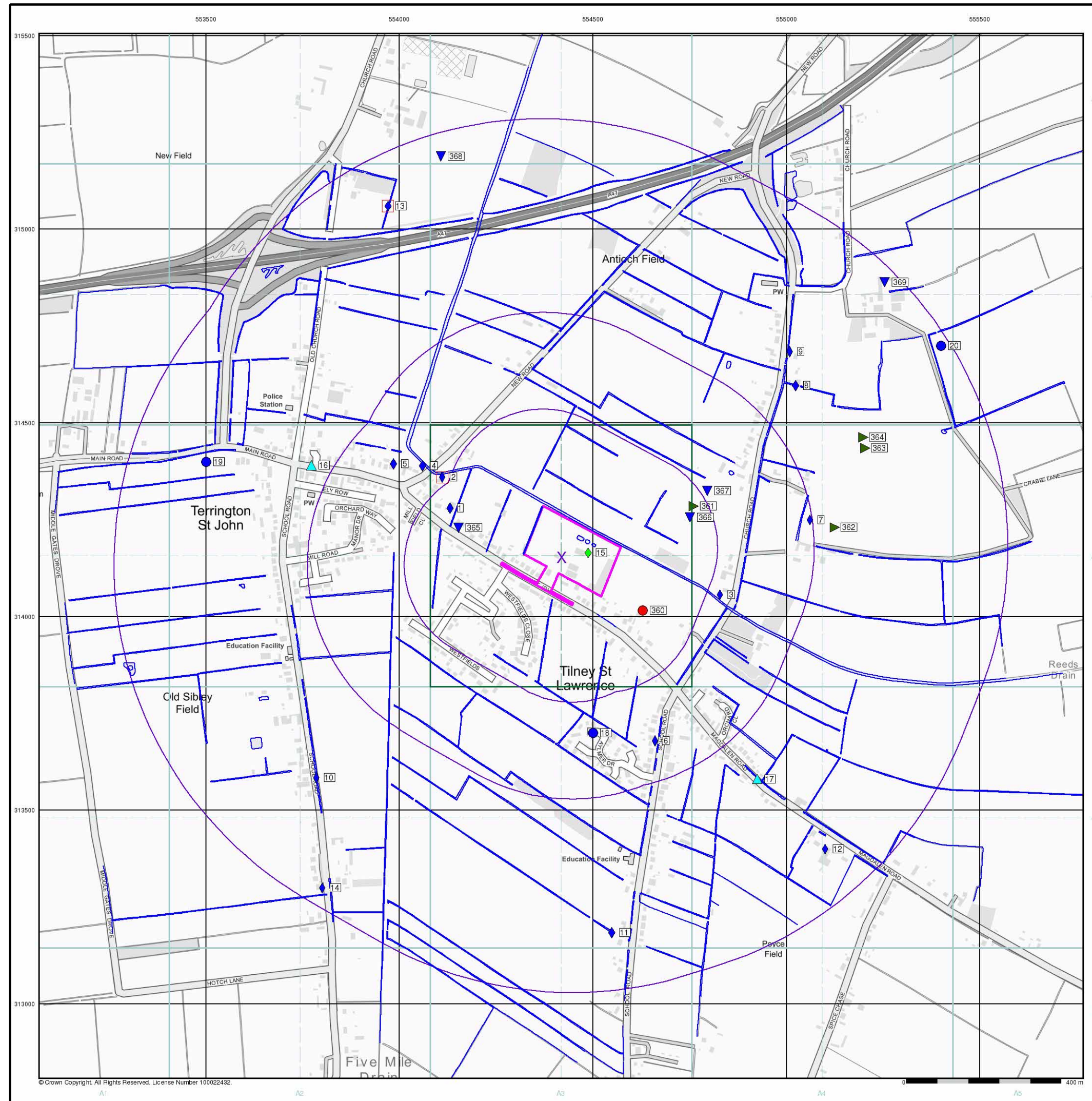


<p>Photo 1: View looking south east across site, showing hardstanding and main yard area</p>	<p>Photo 2: View of the weighbridge close to site entrance</p>
	
<p>Photo 3: View of the current diesel pump, stored inside a small warehouse. Label reads 'Red Diesel'</p>	<p>Photo 4: View of disused diesel tank</p>
	
<p>Photo 5: The phone mast operated by O2</p>	<p>Photo 6: View of reception/canteen building with suspected asbestos containing roof panels</p>
	



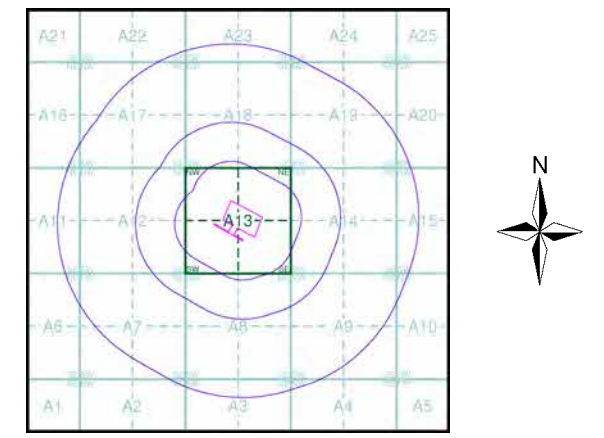
## APPENDIX B

### 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
- Hazardous Substances**
- COMAH Site
  - Explosive Site
  - NIHHS Site
  - Planning Hazardous Substance Consent
  - Planning Hazardous Substance Enforcement
  - 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)
  - 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 - Slice A**

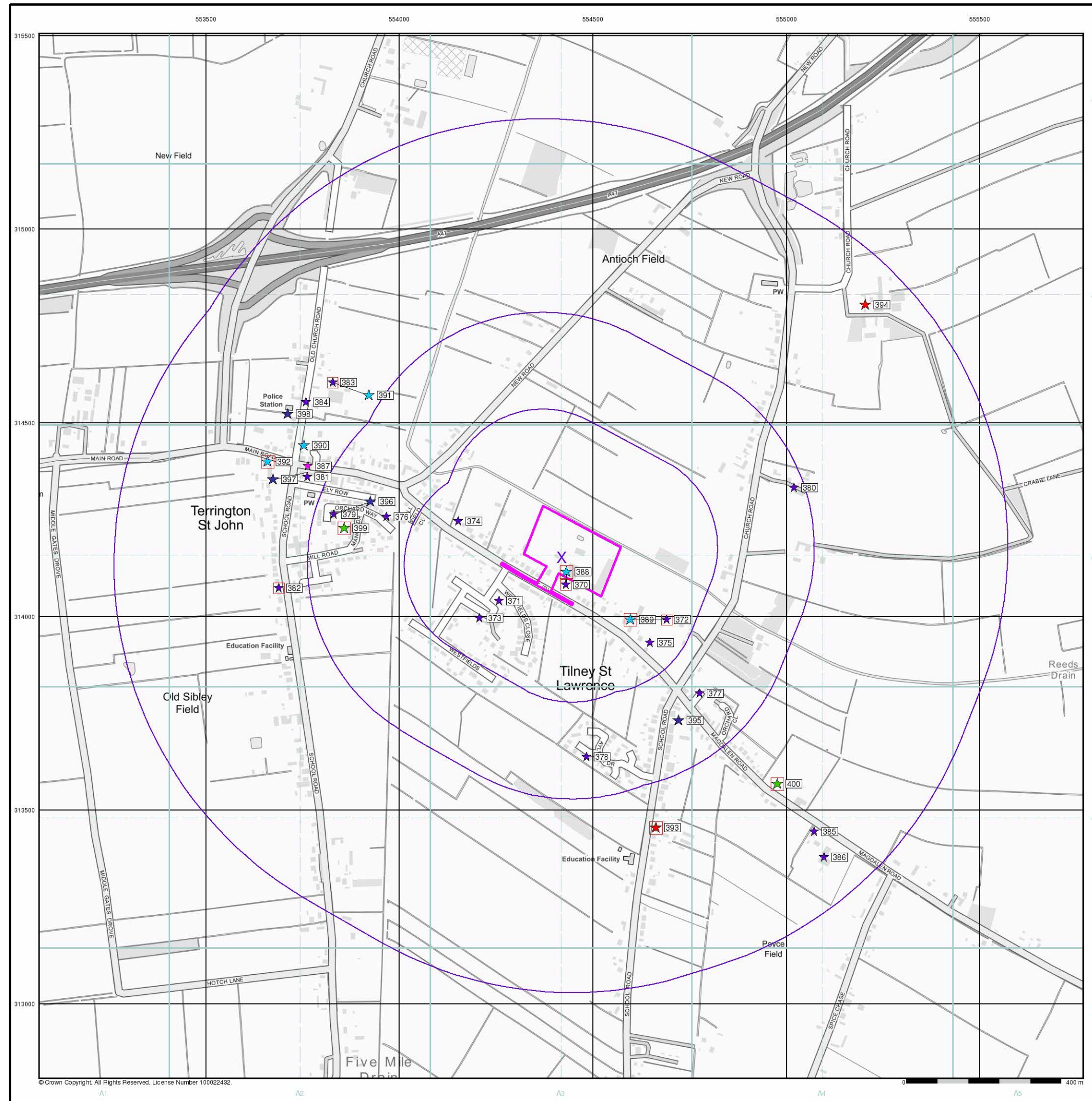


**Order Details**

Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

**Site Details**

Site at 554440, 314160



## Industrial Land Use Map

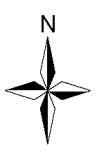
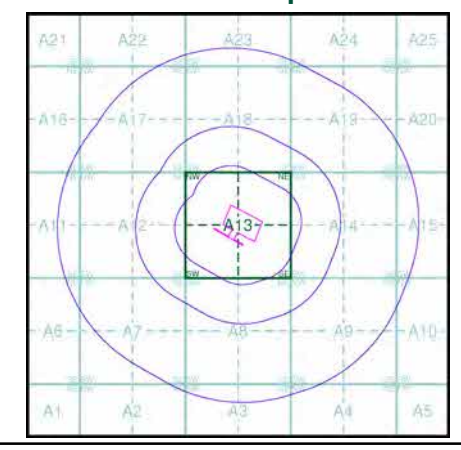
### General

- 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

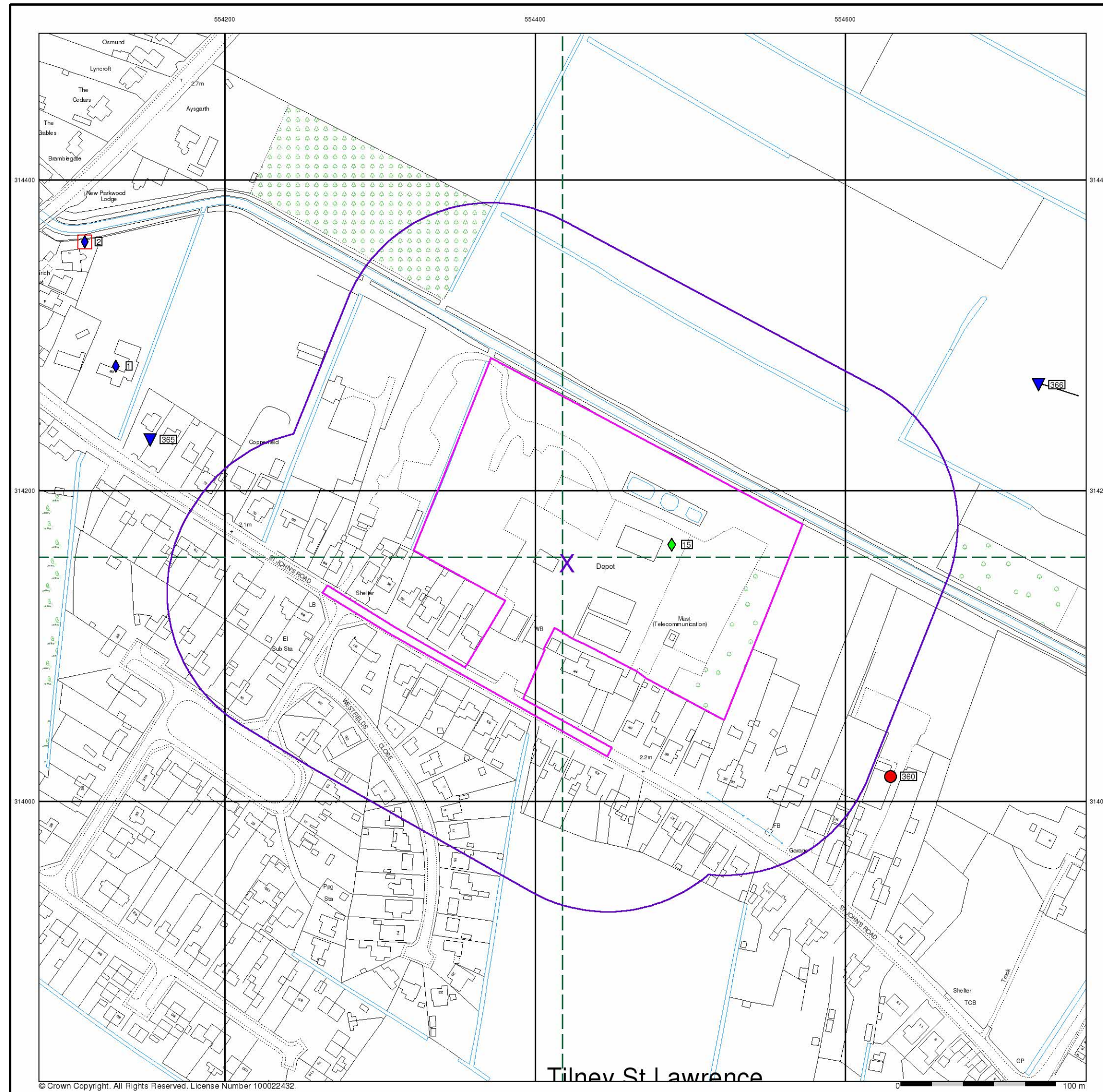
Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

### Site Details

Site at 554440, 314160

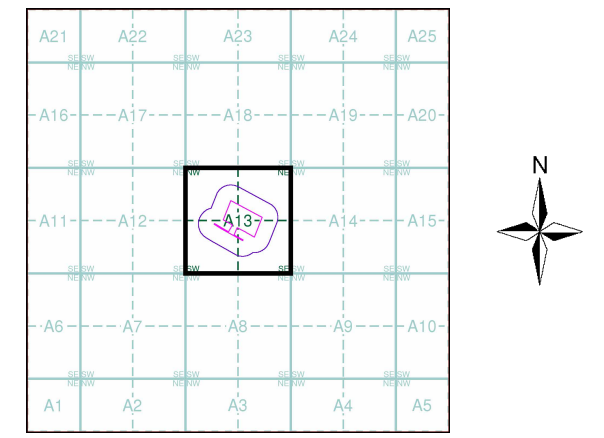


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- General**
- Specified Site
  - Specified Buffer(s)
  - Bearing Reference Point
  - Map ID
  - Several of Type at Location
  - Pylon
  - Overhead Transmission Line
- Agency and Hydrological**
- Contaminated Land Register Entry or Notice (Location)
  - 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 Enforcement
  - 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
  - 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
- Hazardous Substances**
- COMAH Site
  - Explosive Site
  - NIHHS Site
  - Planning Hazardous Substance Consent
  - Planning Hazardous Substance Enforcement
- Geological**
- BGS Recorded Mineral Site

**Site Sensitivity Map - Segment A13**



**Order Details**

Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Plot Buffer (m): 100

**Site Details**  
 Site at 554440, 314160

**Landmark**  
 INFORMATION GROUP


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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
	TFD	Tidal Flat Deposits	Clay and Silt	Not Supplied - Holocene

### Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	KC	Kimmeridge Clay Formation	Mudstone	Not Supplied - Kimmeridgian
	AMC	Ampthill Clay Formation	Mudstone	Not Supplied - Oxfordian
		Rock Segments		



### Geology 1:50,000 Maps

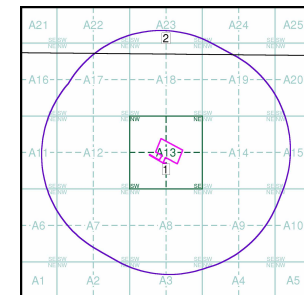
This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published 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 ID:	2
Map Sheet No:	159	Map Sheet No:	145
Map Name:	Wisbech	Map Name:	King's Lynn and
Map Date:	1995	Map Date:	1978
Bedrock Geology:	Available	Bedrock Geology:	Available
Superficial Geology:	Available	Superficial Geology:	Available
Artificial Geology:	Available	Artificial Geology:	Available
Faults:	Not Supplied	Faults:	Not Supplied
Landslip:	Not Available	Landslip:	Available
Rock Segments:	Not Supplied	Rock Segments:	Not Supplied

### Geology 1:50,000 Maps - Slice A



### Order Details:

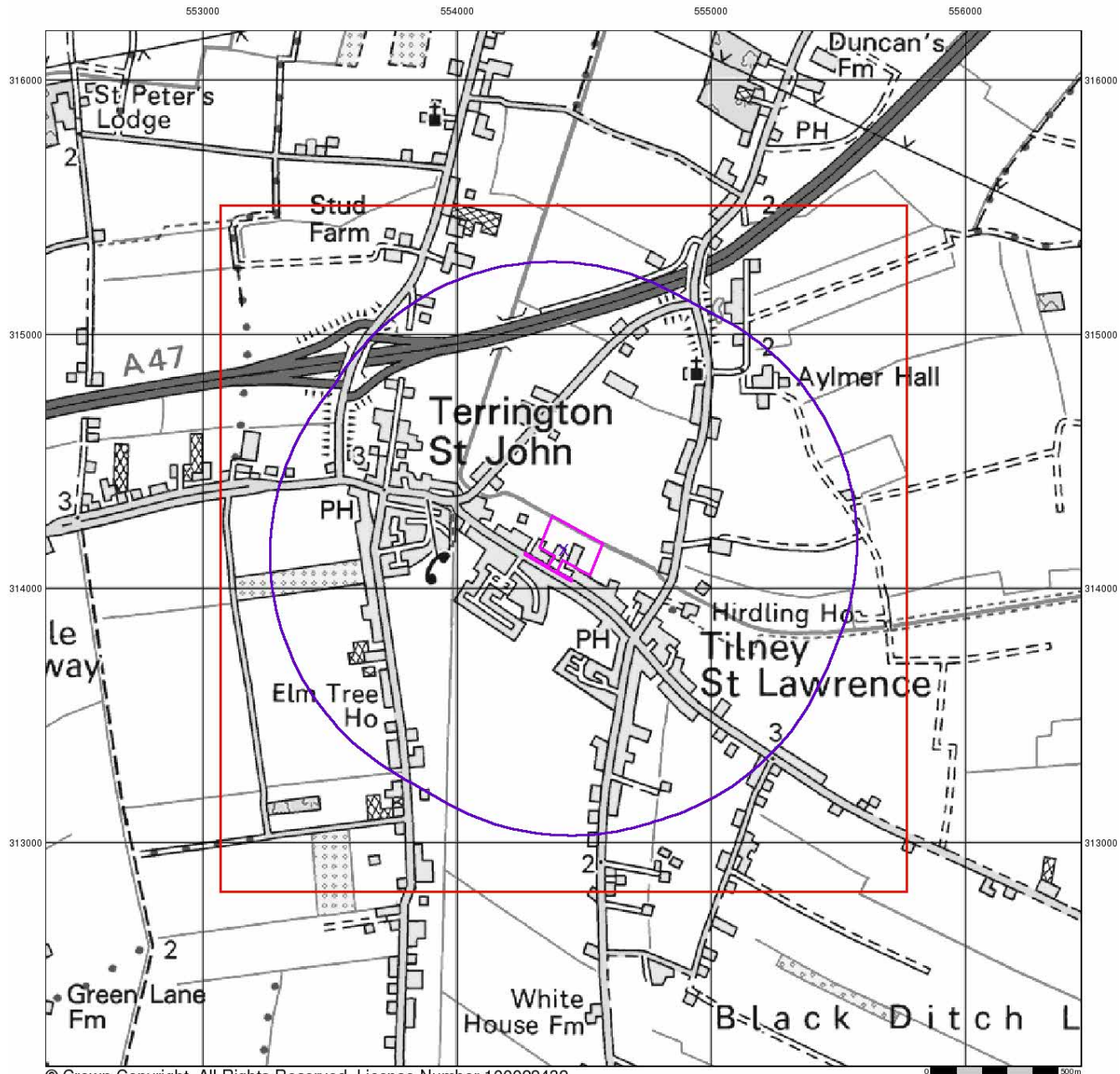
Order Number: 289624136\_1\_1  
 Customer Reference: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

### Site Details:

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### Artificial Ground and Landslip

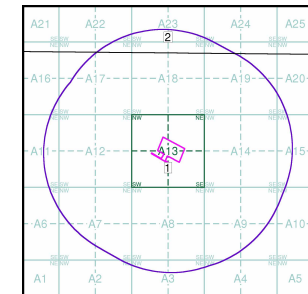
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions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



### Order Details:

Order Number: 289624136\_1\_1  
 Customer Reference: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

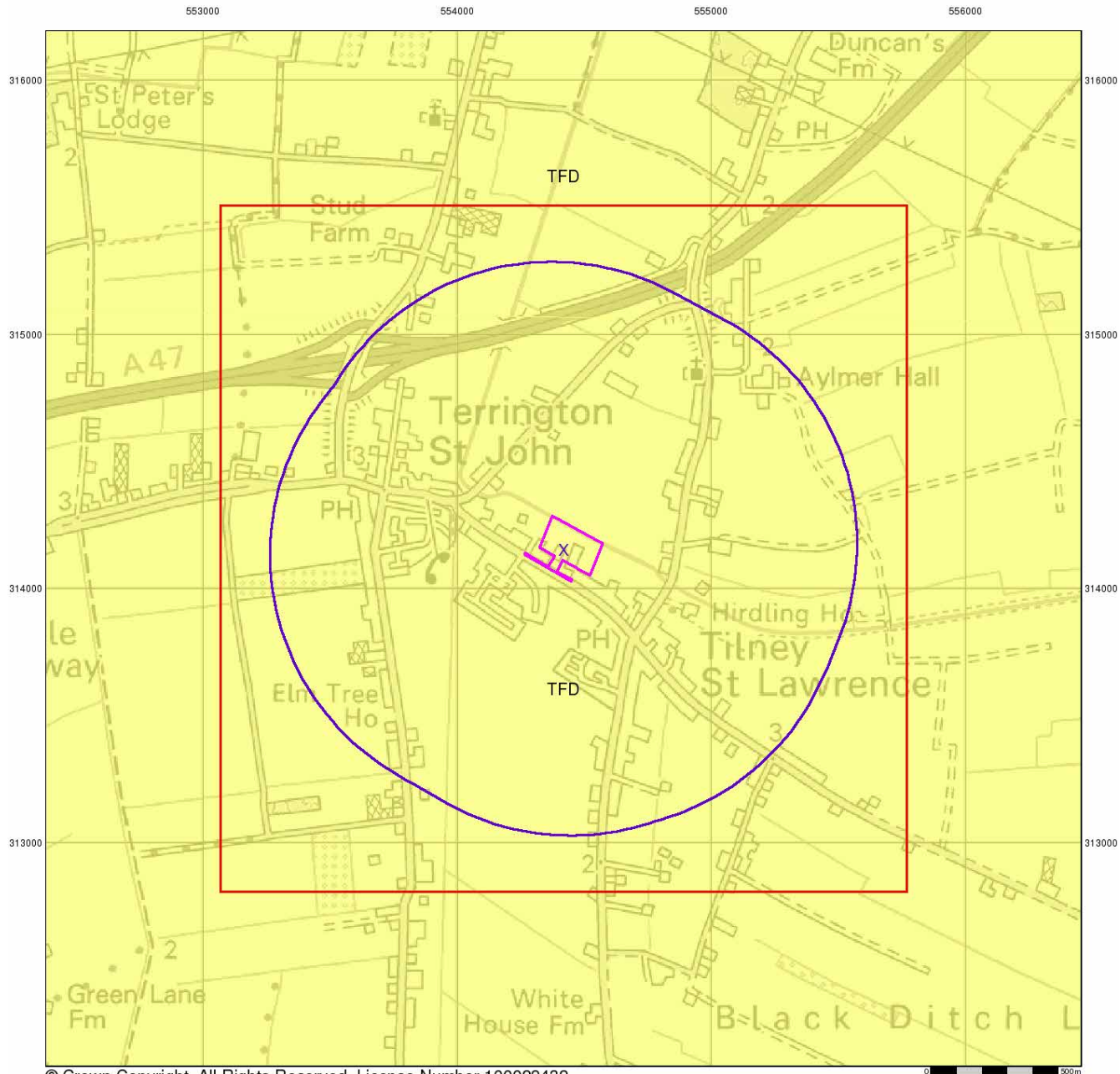
### Site Details:

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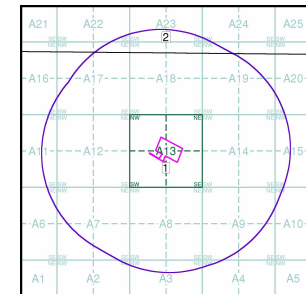
### Superficial Geology

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



### Order Details:

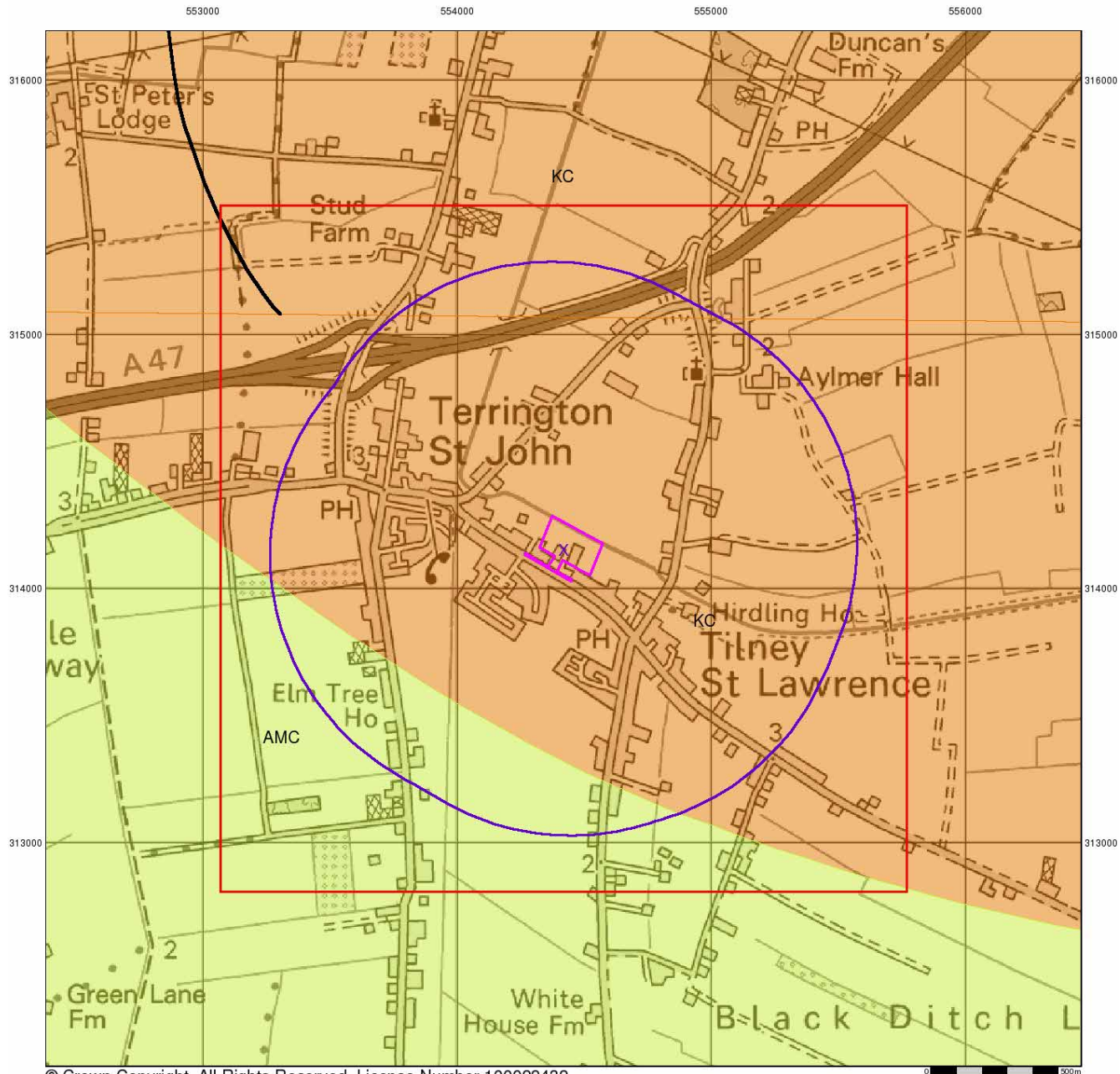
Order Number: 289624136\_1\_1  
 Customer Reference: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

### Site Details:

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### Bedrock and Faults

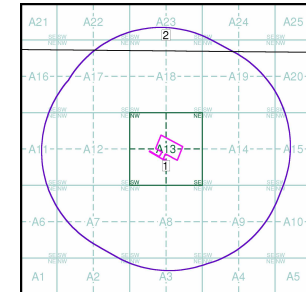
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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



### Order Details:

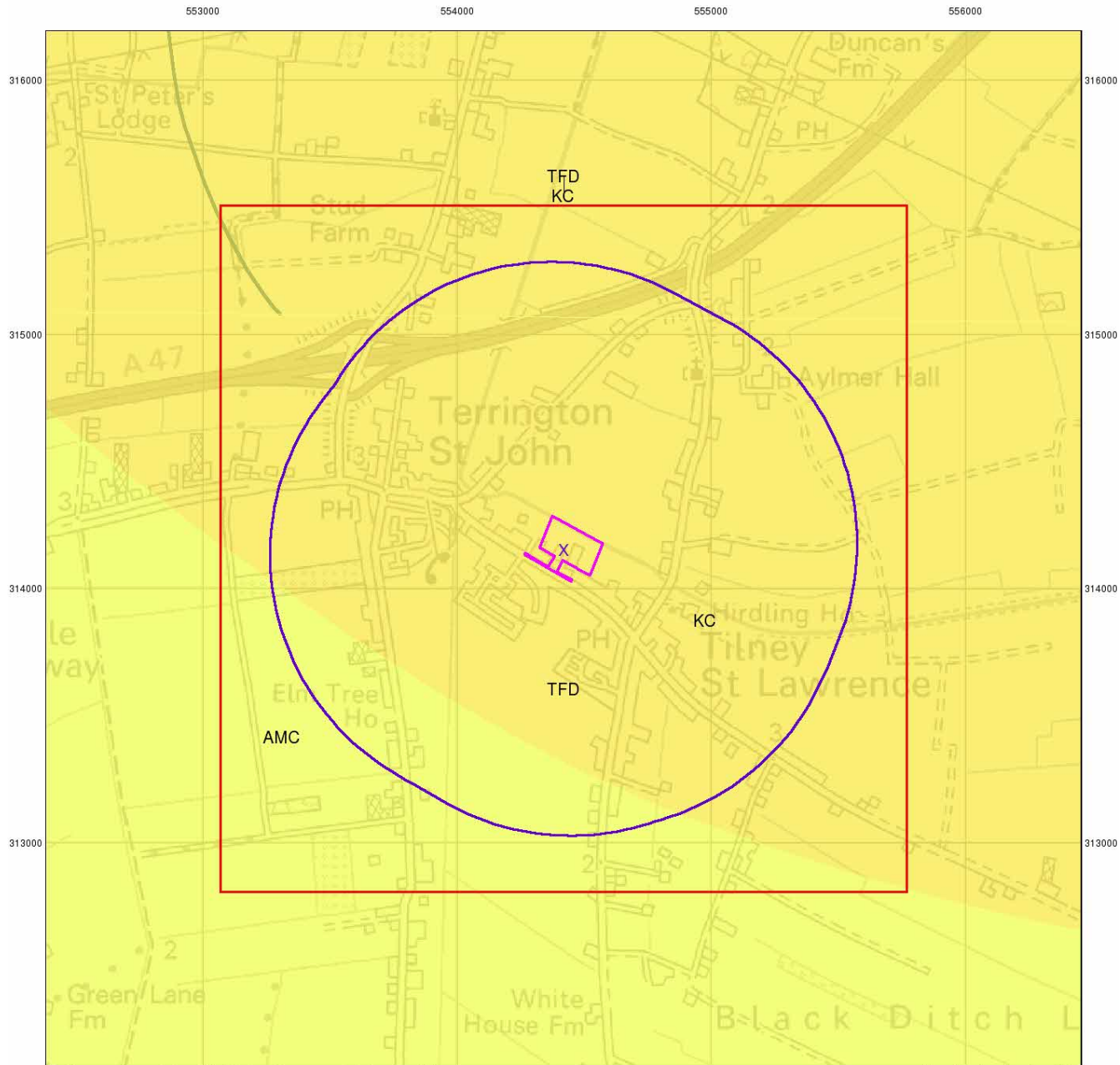
Order Number: 289624136\_1\_1  
 Customer Reference: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

### Site Details:

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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.

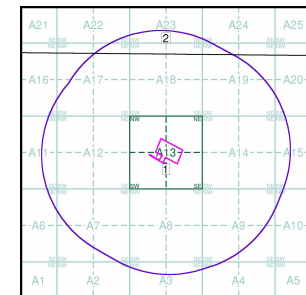
### Additional Information

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: 289624136\_1\_1  
 Customer Reference: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

### Site Details:

Site at 554440, 314160



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 Web: www.envirocheck.co.uk



## APPENDIX D

### Groundwater Vulnerability and Flood Maps

TF 51 SW/2  
5401.1435

British Geological Survey

British Geological Survey

British Geological Survey

**BH 26: TERRINGTON ST. JOHN**

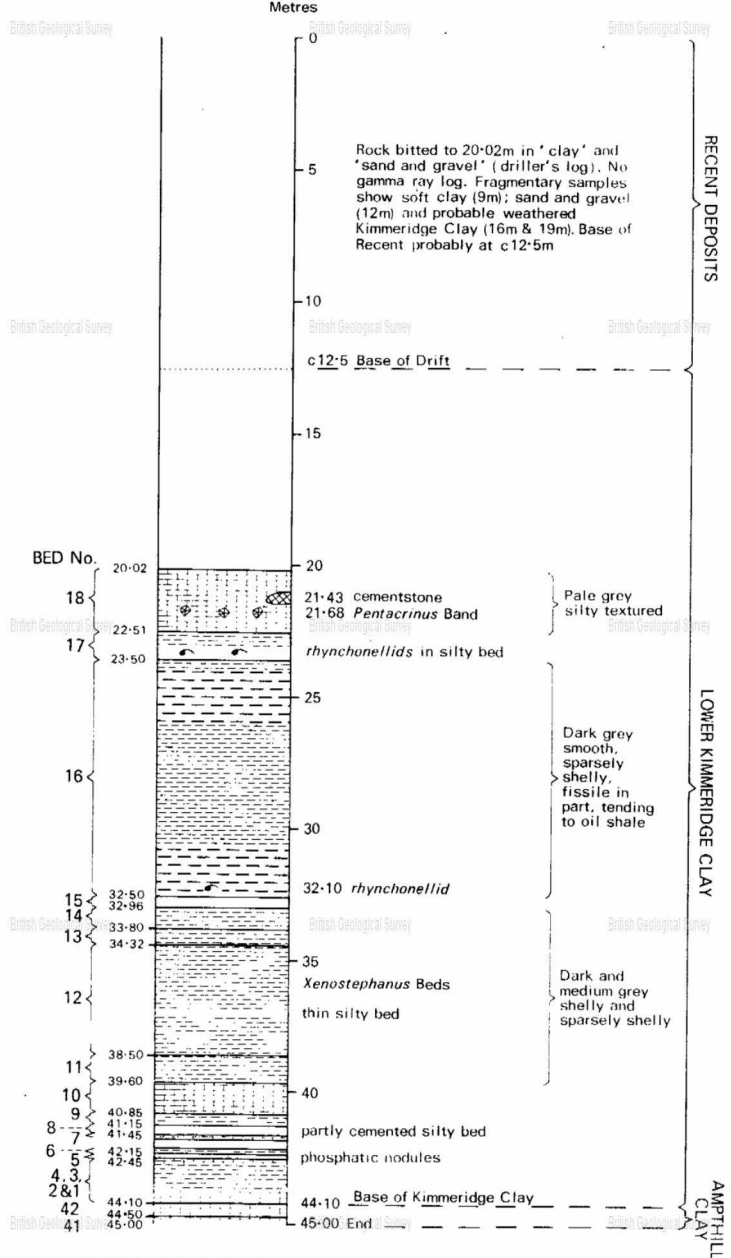
Rig: Failing 314

Grid Ref: TF 5401 1435

Rock bitted to 20.02m

Ground Level: + 2.21m O.D.N.

Date: 5.9.72 to 12.9.72



British Geological Survey

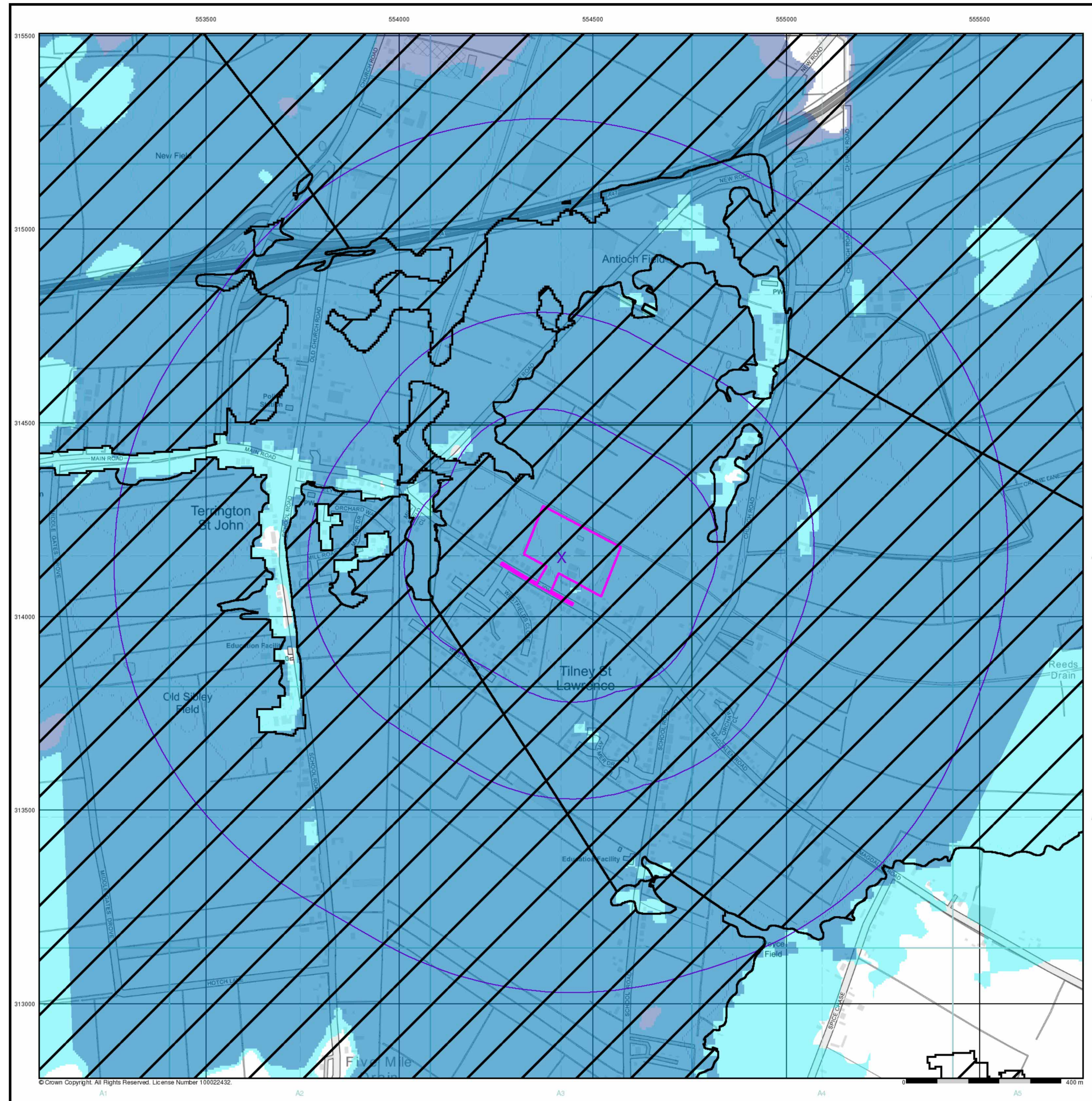
British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey



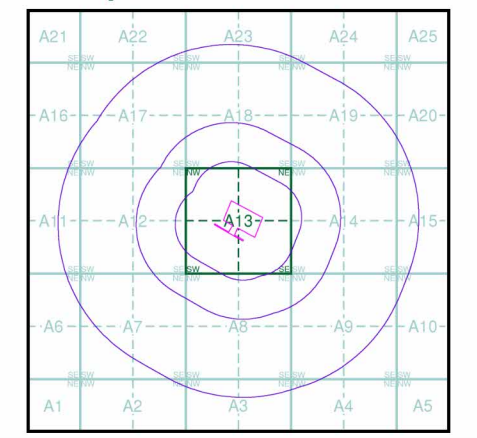
**General**

- 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: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

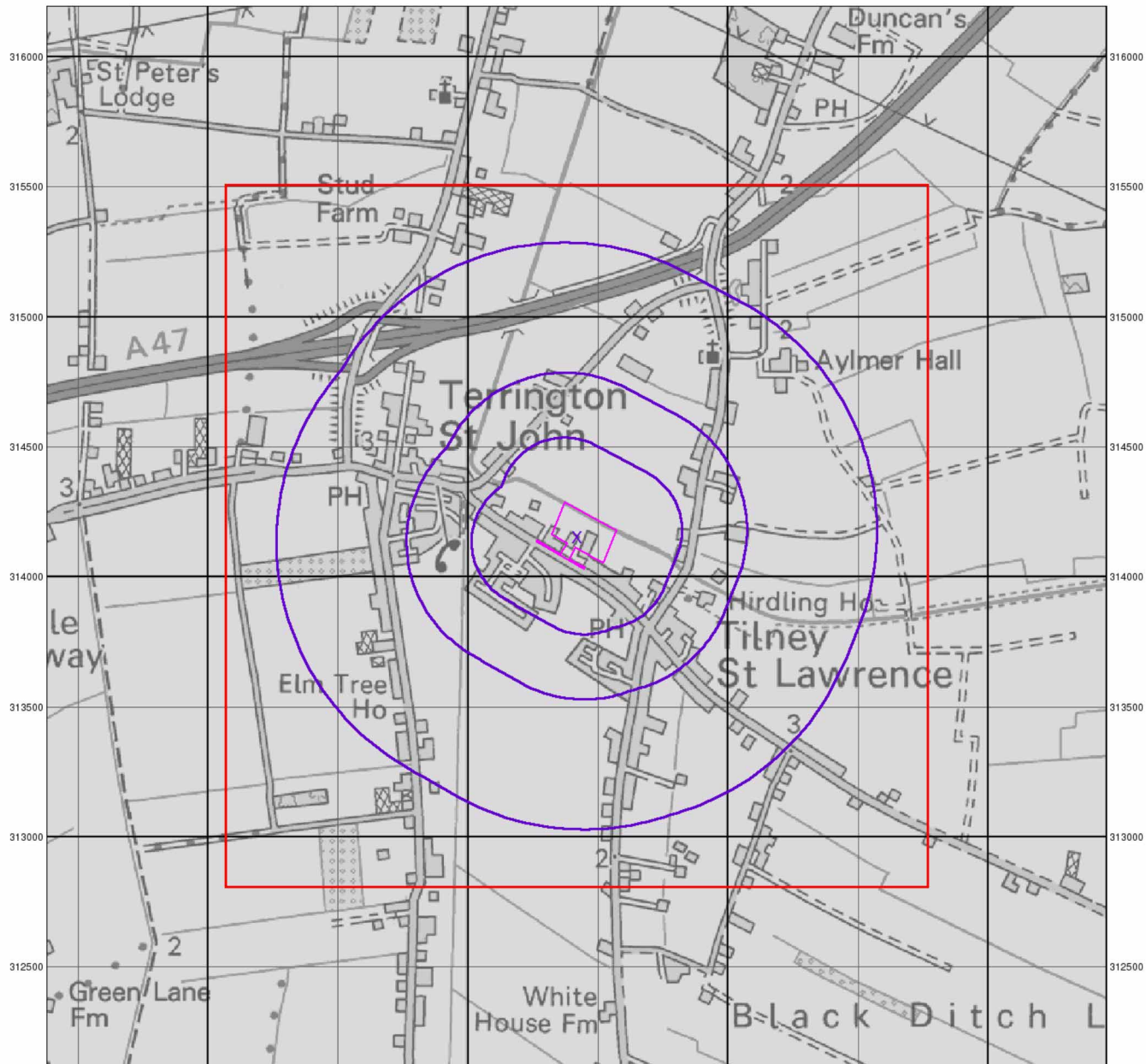
**Site Details**

Site at 554440, 314160



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

552500 553000 553500 554000 554500 555000 555500 556000



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0 1 km



## Groundwater Vulnerability

### General

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

### Agency and Hydrological

#### Bedrock Aquifers

- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer

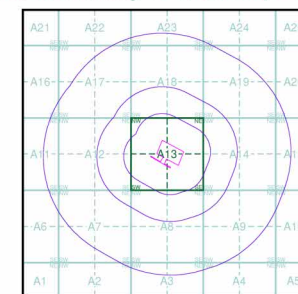
#### Superficial Aquifers

- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer

Unproductive Aquifer

Soluble Rock

### Site Sensitivity Context Map - Slice A



### Order Details

Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

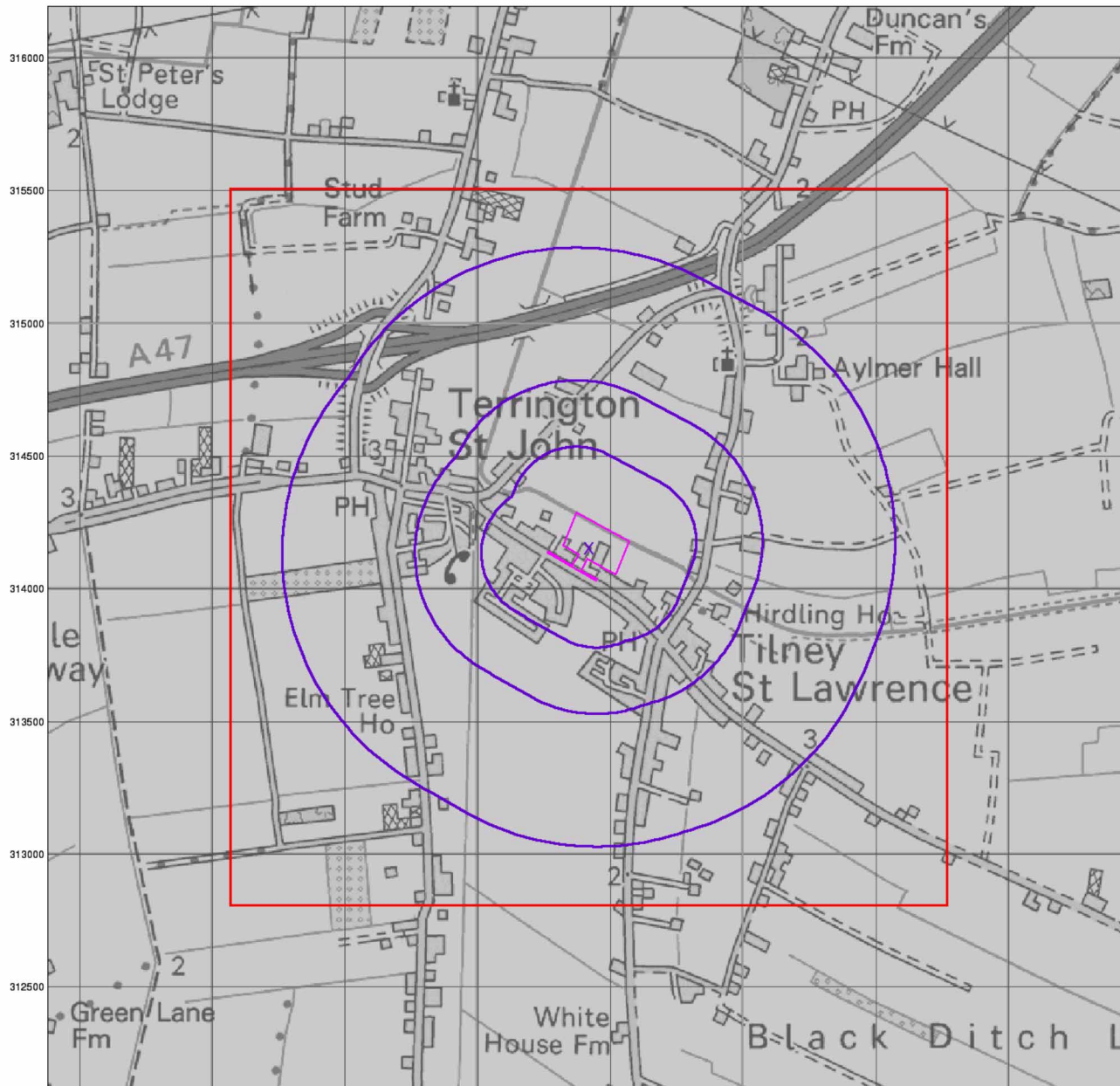
### Site Details

Site at 554440, 314160



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 Web: www.envirocheck.co.uk

552500 553000 553500 554000 554500 555000 555500 556000



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0 1 km



## Bedrock Aquifer Designation

### General

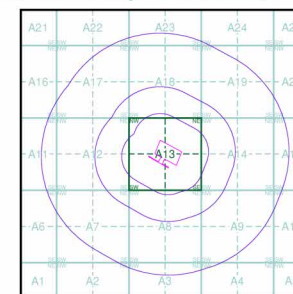
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

### 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



### Order Details

Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

### Site Details

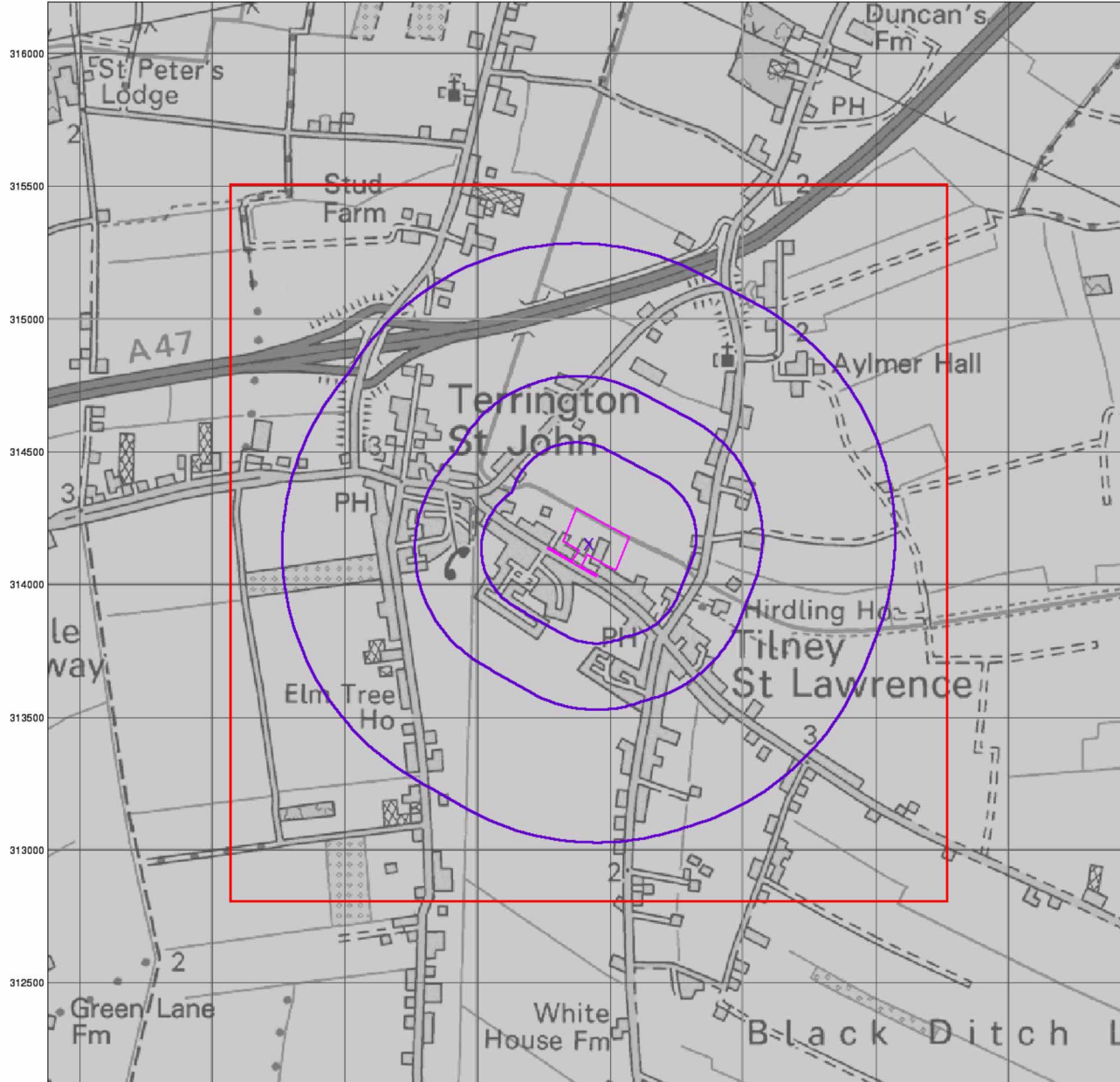
Site at 554440, 314160



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552500 553000 553500 554000 554500 555000 555500 556000



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0 1 km



## Superficial Aquifer Designation

### General

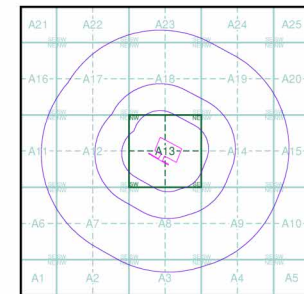
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

### 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



### Order Details

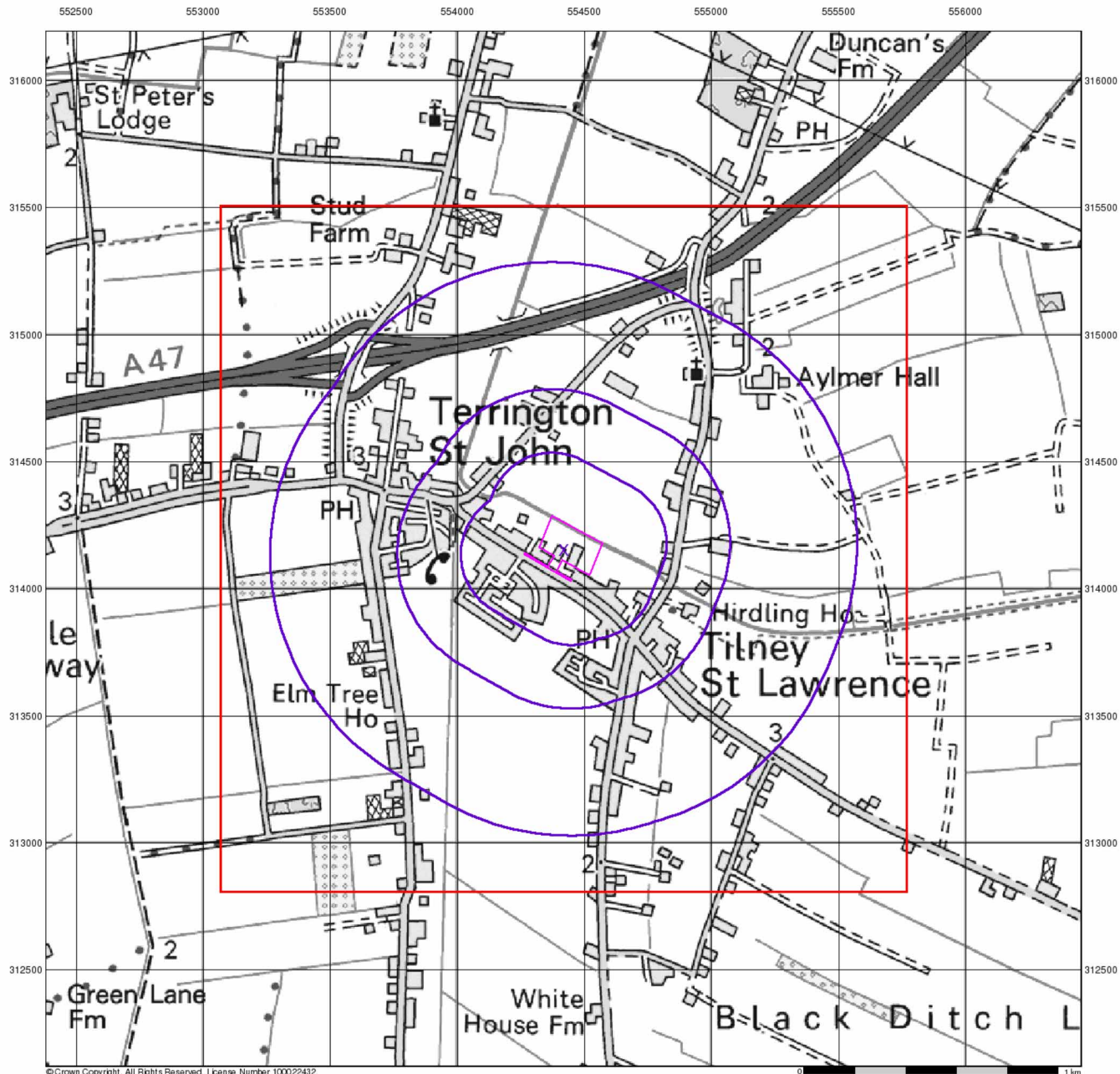
Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

### Site Details

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0 1 km



## Source Protection Zones

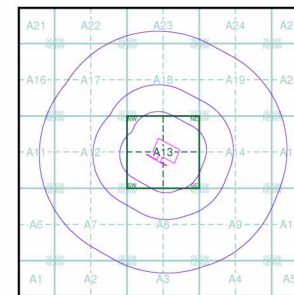
### General

- 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)

### Site Sensitivity Context Map - Slice A



### Order Details

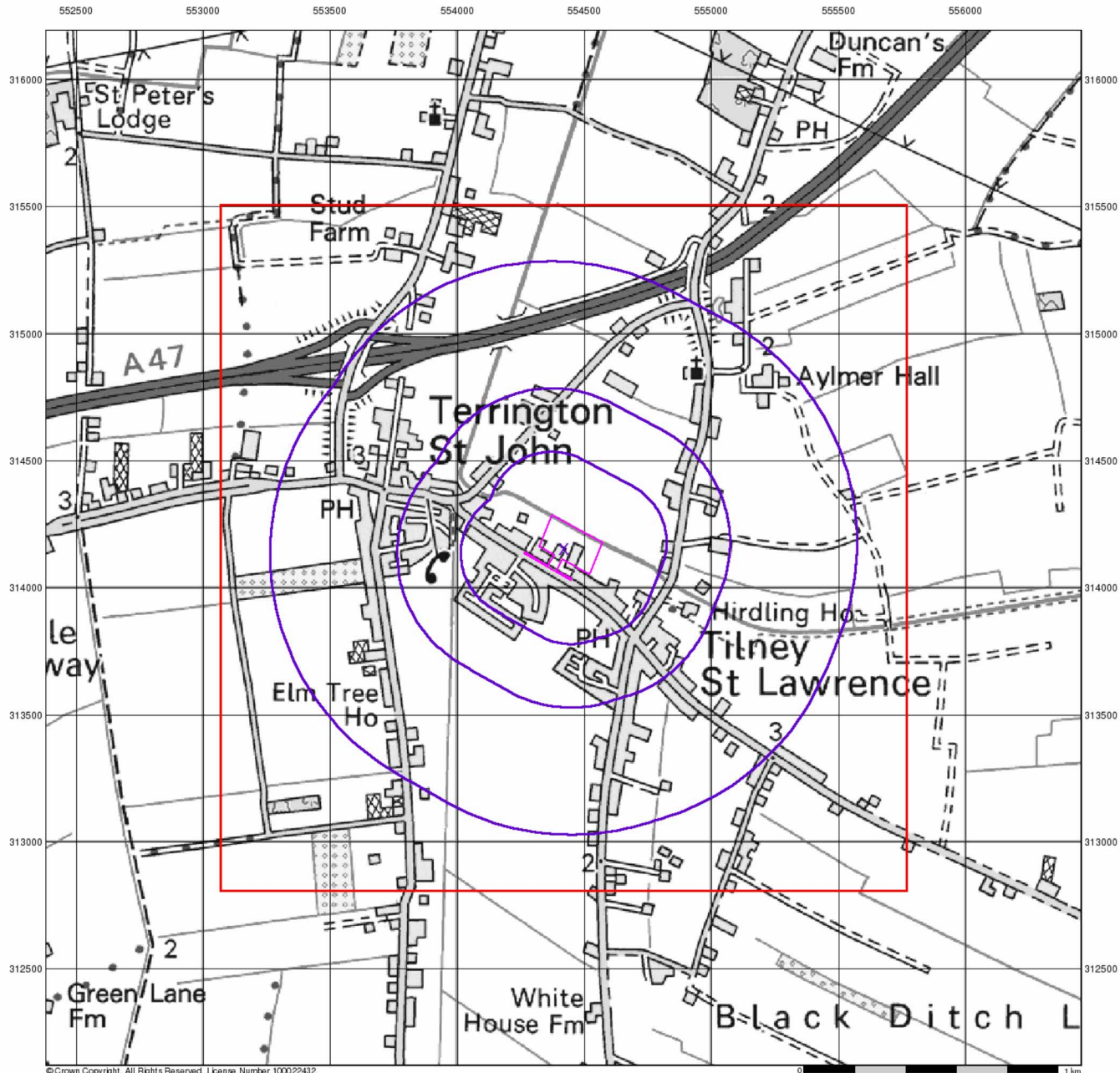
Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

### Site Details

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**BGS Flood GFS Data**

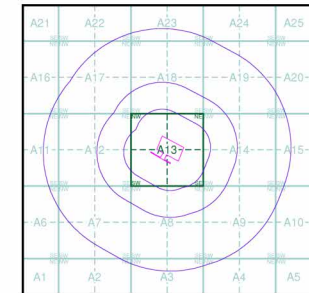
**General**

- 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**



**Order Details**

Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

**Site Details**

Site at 554440, 314160



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## **APPENDIX E**

### **A Selection of Historic Maps**



Norfolk

Published 1887

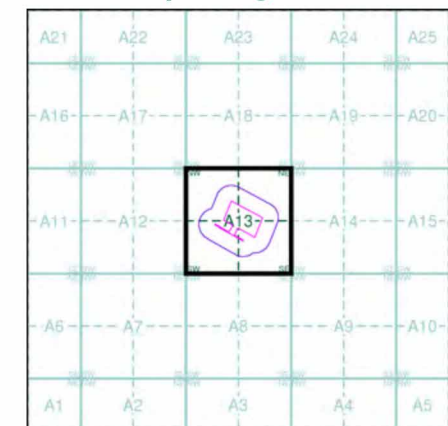
Source map scale - 1:2,500

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)

044_07	1887	1:2,500
044_11	1887	1:2,500

Historical Map - Segment A13



Order Details

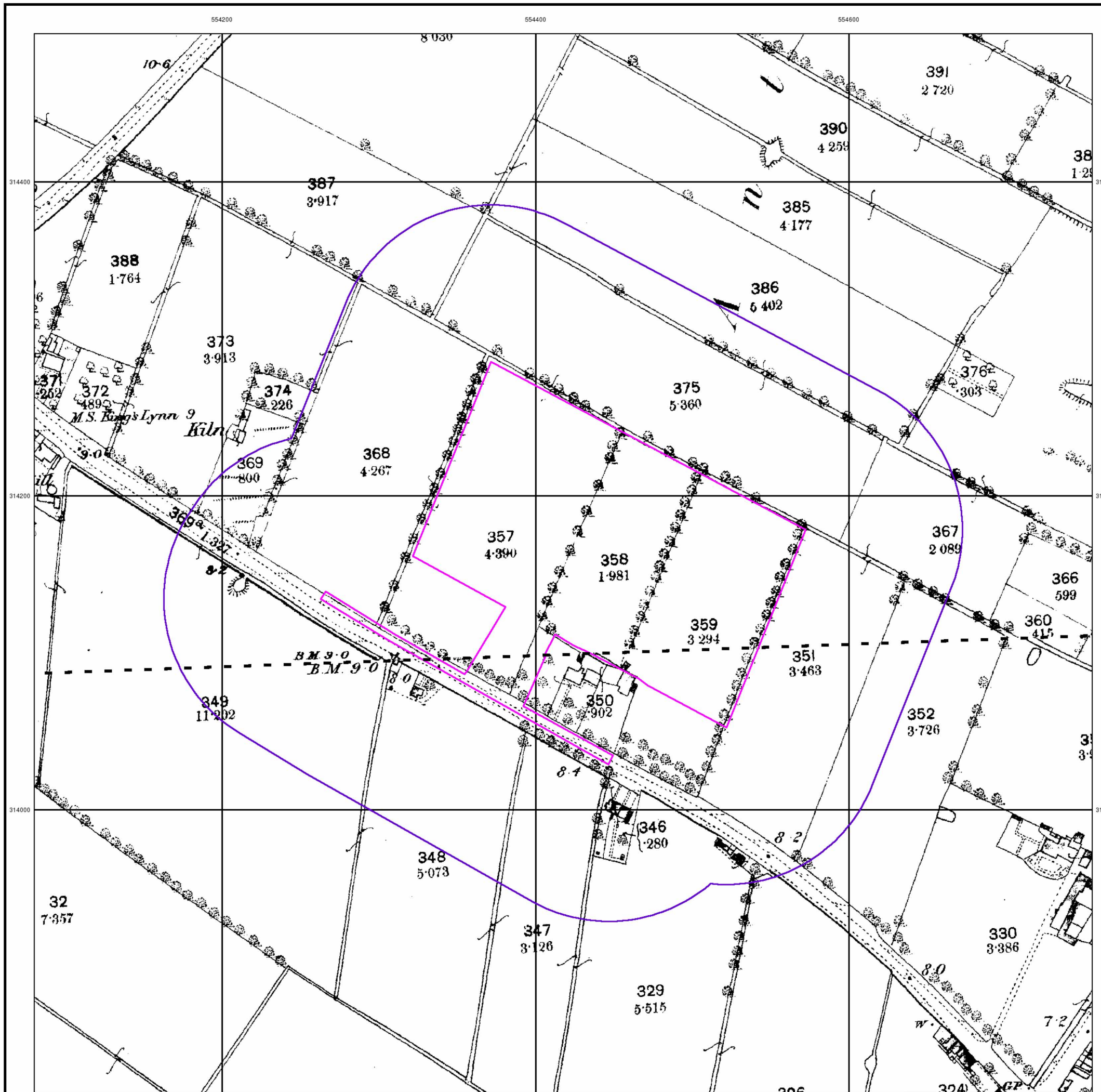
Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 100

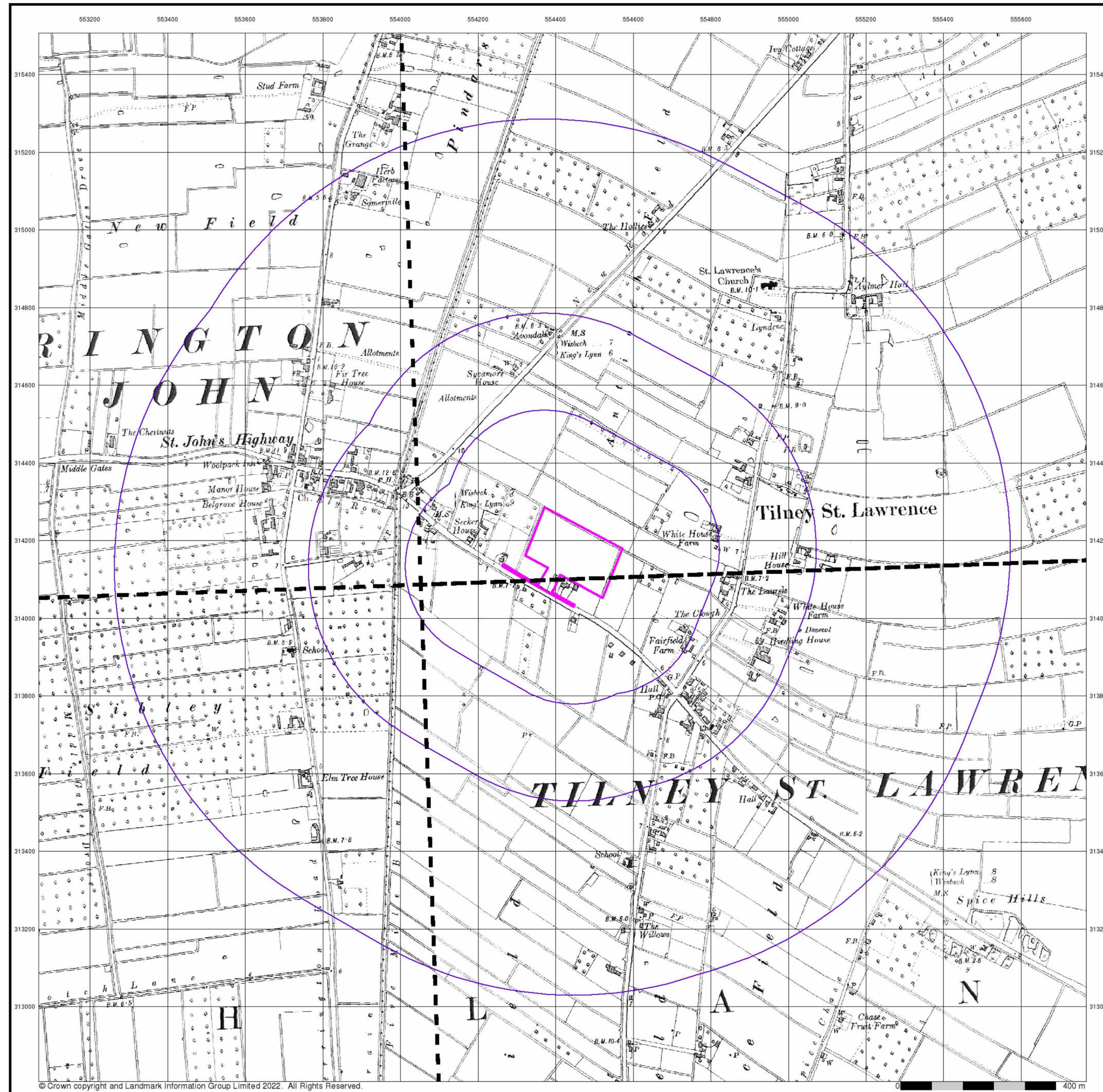
Site Details

Site at 554440, 314160



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 Web: www.envirocheck.co.uk





Norfolk

Published 1927

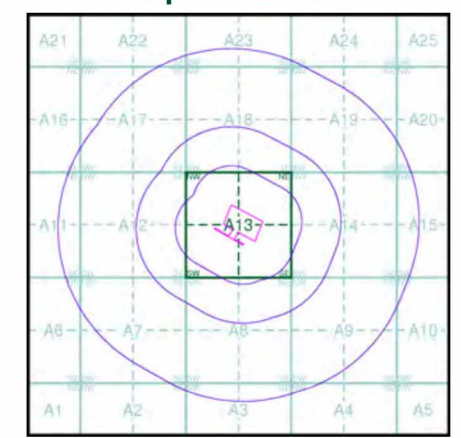
Source map scale - 1:10,560

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)

044NW 1927 1:10,560	044NE 1927 1:10,560
044SW 1927 1:10,560	044SE 1927 1:10,560

Historical Map - Slice A



Order Details

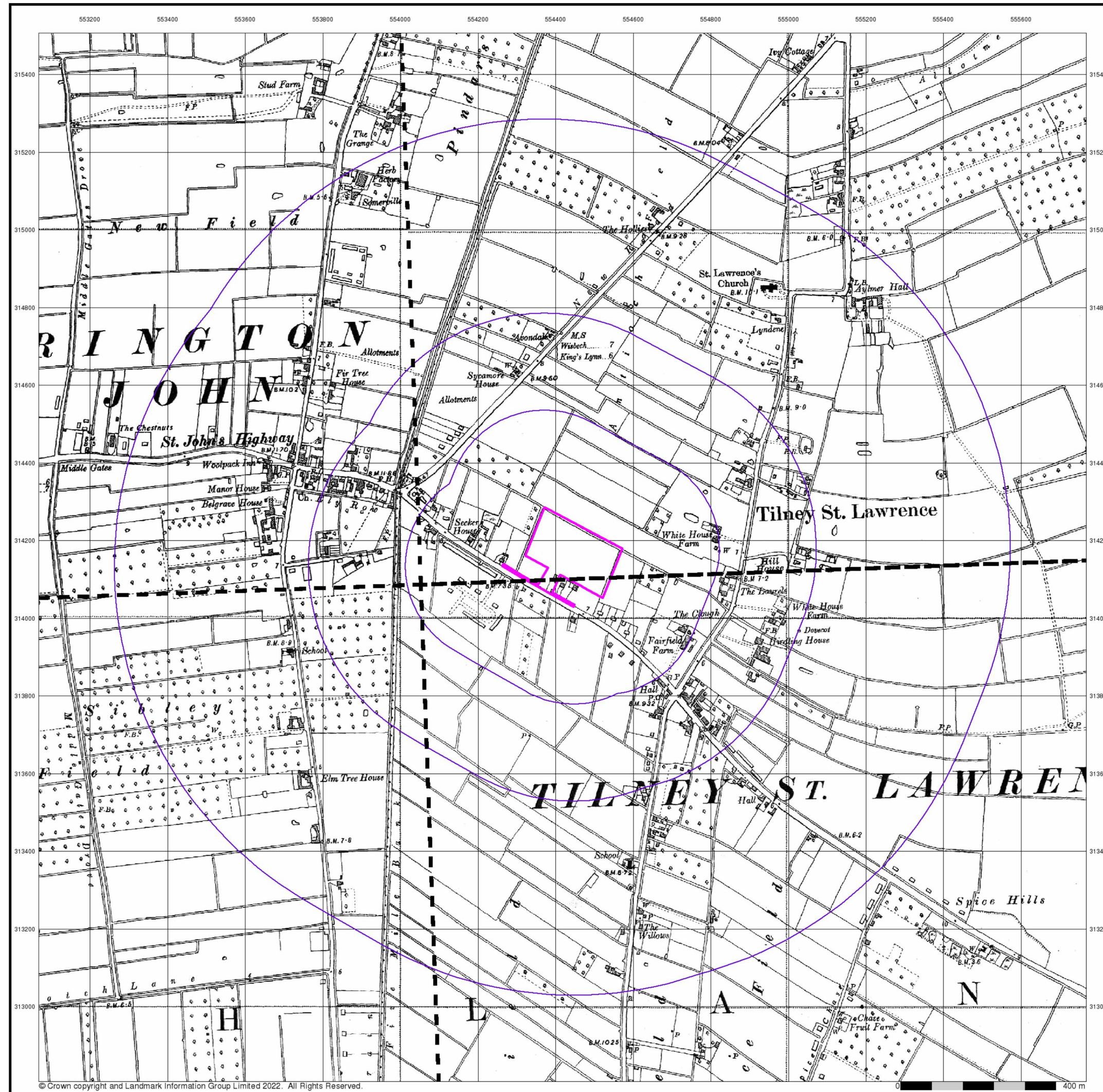
Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

Site Details

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Norfolk

Published 1952

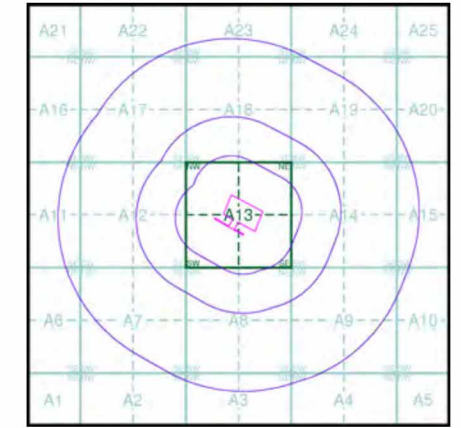
Source map scale - 1:10,560

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)

044NW 1952 1:10,560	044NE 1952 1:10,560
044SW 1952 1:10,560	044SE 1952 1:10,560

Historical Map - Slice A



Order Details

Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

Site Details

Site at 554440, 314160



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### Additional SIMs

Published 1991 - 1992

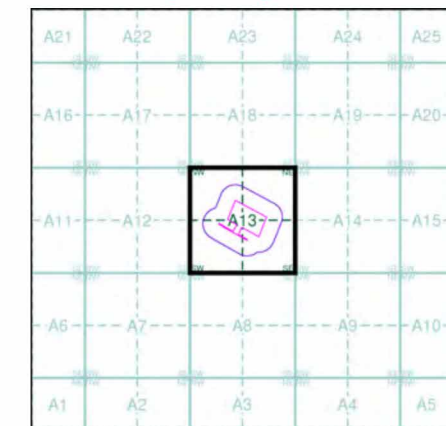
Source map scale - 1:2,500

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)

TF5414	1992	1:2,500
TF5413	1991	1:2,500

### Historical Map - Segment A13



### Order Details

Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 100

### Site Details

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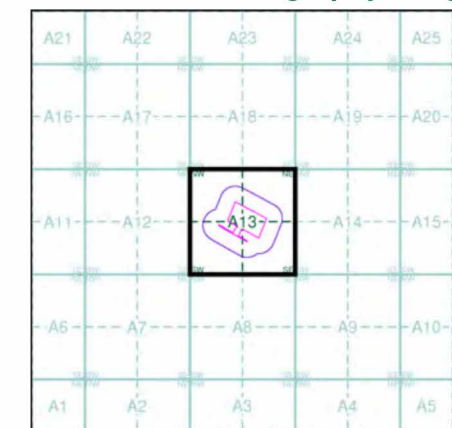




## Historical Aerial Photography Published 1999

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

Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
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### Site Details

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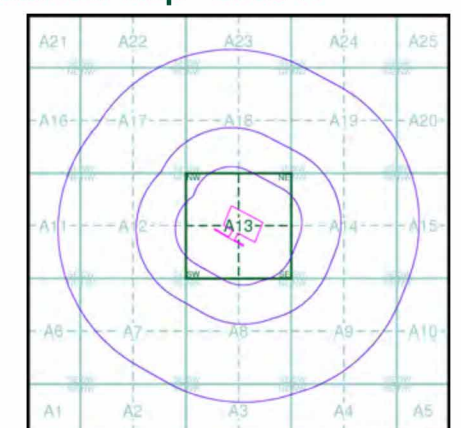
**VectorMap Local**  
**Published 2021**  
**Source map scale - 1:10,000**

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)**

TF51NW 2021 Variable	TF51NE 2021 Variable
TF51SW 2021 Variable	TF51SE 2021 Variable

**Historical Map - Slice A**



**Order Details**

Order Number: 289624136\_1\_1  
 Customer Ref: UK22.5769  
 National Grid Reference: 554420, 314150  
 Slice: A  
 Site Area (Ha): 3.37  
 Search Buffer (m): 1000

**Site Details**

Site at 554440, 314160



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