



**PHASE I GEO-ENVIRONMENTAL SITE ASSESSMENT**  
**LAND EAST OF POSBROOK LANE, TITCHFIELD,**  
**FAREHAM, PO14 4JA**

**REC REFERENCE: 1CO102431P1R2**

**REPORT PREPARED FOR: FOREMAN HOMES LTD**











**National Consultancy, Locally Delivered**

A CONCEPT LIFE SCIENCES COMPANY





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Remarks	Final	Updated Site Boundary Plan	Updated Site Boundary Plan
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## EXECUTIVE SUMMARY

Site Address	Land East of Posbrook Lane, Titchfield, Fareham PO14 4JA
Grid Reference	453688, 105114
Site Area	6.16ha
Current Site Use	<p>The site comprises open land used for horse grazing and has a number of footpaths running throughout. BT pylons traversed the centre of the site from the northeast corner to the western corner to Posbrook Lane. No buildings are on the site; however two brick structures were noted, thought to relate to drainage.</p> <p>The site topography is generally flat with a significant drop in elevation in the northeast corner. No evidence of infilling or depressions were noted. The site boundaries comprise a combination of hedgerows and wire fencing.</p>
Environmental Setting	<p>The site is underlain by superficial deposits (River Terrace Deposits) comprising SAND and GRAVEL overlying bedrock geology (Wittering Formation), SAND, SILT and CLAY.</p> <p>The nearest groundwater abstraction is approximately 883m south of site. There are no potable water abstraction licence is located with 2km of site. The site is not located within a Source Protection Zone.</p> <p>A Drain, Tertiary River is located 24m to the south east. The nearest surface water abstraction is approximately 195m south east of site.</p> <p>The site is not located within an Environment Agency Floodplain and has a very low risk of flooding.</p>
Site History	<p>The site has been an open field since 1868 with a footpath running north to south across the centre of the site.</p>
Radon	<p>The site is not situated within a radon affected area, as less than 1% of properties are above the action level. No radon protective measures are necessary in the construction of new dwellings or extensions.</p>
Coal Mining / Ground Workings	<p>The site is not within an area that is affected by non-coal mining or coal mining and therefore no Coal Mining Authority / Coal Mining Report was obtained for the purpose of this report. There are no ground workings within a 250m radius of the site.</p>
Initial Conceptual Site Model (CSM)	<p><b>On-site:</b></p> <p>Unspecified Tank could be a source of various contamination including petroleum hydrocarbons, polycyclic aromatic hydrocarbons, and SVOCs. Intrusive work should be undertaken to fully assess the risks identified within the CSM.</p> <p><b>Off-site:</b></p> <p>Migration of contaminants from numerous sources including made ground associated with ponds, tanks, electricity substations, cemetery, and commercial properties. Potential contaminants include heavy metals, petroleum hydrocarbons, and polycyclic aromatic hydrocarbons. Further work should be undertaken to fully assess these risks, in particular the made ground associated with ponds and tanks. Due to the distance of the remaining potential sources, it is considered unlikely that they would have a direct impact on the site.</p>





<b>Preliminary Geotechnical Assessment</b>	Information from the Groundsure report indicates very low to moderate risks.
<b>Recommendations</b>	<p>This preliminary assessment considers that there is potentially a <b>Very Low To Moderate</b> risk that significant pollutant linkage may be present at site, and there is a possibility of the risk occurring, although there is no certainty that it will do so.</p> <p>Therefore REC recommends that further work is undertaken to assess the potential pollutant pathways identified within the conceptual site model prior to any development work taking place. It may be prudent to also undertake geotechnical testing concurrently in order to reduce costs.</p>







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## APPENDICES

Appendix I	Limitations
Appendix II	Glossary
Appendix III	Drawings
	Drawing No. 1CO102431-001 – Site Location Plan
	Drawing No. 1CO102431-002 – Proposed Development Plan
	Drawing No. 1CO102431-003 – Site Layout Plan
Appendix IV	Photographs
Appendix V	Historical Mapping





## 1.0 INTRODUCTION

### 1.1 Background

Resource and Environmental Consultants Ltd (REC) has been commissioned by Foreman Homes Ltd to undertake a Phase I Geo-Environmental Assessment at Land East of Posbrook Lane, Titchfield, Fareham, PO14 4JA. A site location plan (ref 1CO102431-001) is presented in Appendix III.

### 1.2 Proposed Development

REC understands that the proposed development comprises the construction of up to 150 residential dwellings with associated landscaping, amenity areas and means of access from Posbrook Lane. A proposed site development plan (ref. 1CO102431-002) is presented within Appendix III.

The data search was ordered to a previous version of the site boundary plan, however none of the off-site sources become on-site and as such our recommendations remain the same.

### 1.3 Objectives

The objectives of the desk based study are to:

- ▶ Undertake a site walkover to identify any current areas of potential environmental concern in order to establish the source, pathway, receptor conceptual site model (CSM);
- ▶ Review historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Phase I Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11));
- ▶ Assess the implications of any potential environmental risks, liabilities, and development constraints associated with the site in relation to the future use of the site and in relation to potential off-site receptors;
- ▶ Provide preliminary recommendations on any potential development issues; and
- ▶ Provide recommendations regarding future works required.

### 1.4 Sources of Information

Background information was sought from the following sources:

- ▶ Groundsure data search: GS-3321869 & GS3321870;
- ▶ Historical mapping dated 1868 to 2014. Historical maps are reproduced in Appendix V;
- ▶ On-line planning records held by Fareham Borough Council;
- ▶ Environment Agency Groundwater Vulnerability Map - (<http://maps.environment-agency.gov.uk/wiyby>);
- ▶ Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2015) and HPA Indicative Radon Atlas for England and Wales); and





- ▶ British Geological Survey Online Mapping (<http://www.bgs.ac.uk>).

## 1.5 Risk Classification

REC has utilised the available data to classify the site on the basis of its likely contaminated land liability and potential for geotechnical constraints in relation to the property development. The risk classification definitions are summarised below:

Risk	Definition
Low	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property.
Low-Moderate	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property with regard to the proposed use. However, minor issues may require further consideration in the event of a future redevelopment of the site etc.
Moderate	Some potential contaminated land liabilities/geotechnical constraints are likely to affect the property as a result of historical and/or current activities. The risks identified are unlikely to pose an immediate significant issue but the purchaser/developer may wish to make further enquiries of the vendor or undertake further environmental improvements. Redevelopment of the site will likely require further site investigation.
Moderate-High	Some potentially significant contaminated land liabilities/geotechnical constraints have been identified at the property that requires further assessment including intrusive ground investigations.
High	Significant potential contaminated land liabilities/geotechnical constraints have been identified at the property. Further assessment including intrusive ground investigation will be required to determine to level of risk and associated liability.

## 1.6 Limitations of the Study

The full limitations of this report are presented in Appendix I.

## 1.7 Confidentiality

REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC. A charge may be levied against such approval.







## 2.0 SITE SETTING

### 2.1 Site Details

Site Address	Land East of Posbrook Lane, Tichfield, Fareham, PO14 4JA
National Grid Reference	453688, 105114
Site Area	6.16ha

A site location plan is presented in Drawing No. 1CO102431-001 within Appendix III.

### 2.2 Current Site Use

#### Site Description

A site walkover was undertaken on 27<sup>th</sup> September 2016. The site is roughly 'L' -shaped and covers an area of approximately 6.16 hectares. The site comprises open land used for horse grazing and has a number of footpaths running throughout. BT pylons traversed the centre of the site from the northeast corner to the western corner to Posbrook Lane. No buildings are on the site; however two brick structures were noted, thought to relate to drainage features, although this has not been confirmed.

The site topography is generally flat with a significant drop in elevation in the northeast corner. No evidence of infilling or depressions were noted. The site boundaries comprise a combination of hedgerows and wire fencing.

Pedestrian access to the site is via numerous footpaths and sties along the boundary. There is a gate to the southwest from Posbrook Lane, which would allow a vehicle to access the site. An alternate entrance is via a road from Posbrook Lane which follows along the site boundary to the south.

#### Hazardous Materials Storage

No visual evidence of Aboveground Storage Tanks (ASTs) or Underground Storage Tanks (USTs) were observed during the walkover.

#### Polychlorinated Biphenyls (PCBs)

No equipment that may potentially contain PCBs were observed at site.

#### Asbestos Containing Materials (ACMs)

No ACMs were identified during the site walkover.

#### Waste Storage

No potentially hazardous waste streams were identified or generated at the site.





## 2.3 Surrounding Area

The surrounding land uses are summarised below:

Direction	Land Use
North	Residential properties
East	Extension of the field
South	Agricultural field
West	Residential properties and open fields beyond

A site layout plan is presented in Drawing No 1CO102431-003 within Appendix III.





### 3.0 SITE HISTORY

#### 3.1 On-Site Historical Development

A review of historical maps pertinent to the site is summarised in Table 3.1 below:

**Table 3.1 Summary of Potentially Contaminative Historical Land Uses**

Map Edition	Historical Land Use	Historical Map
1868 - 1897 (1:2,500 & 1:10,000)	The site comprises open fields with two footpaths crossing from north to south of the site. Located in the north eastern corner is an area of woodland. The surrounding area comprises of a farm, open space and woodland. The area of woodland is no longer recorded in the north-east of the site after 1897.	
1909 - 1940 (1:2,500 & 1:10,000)	Several tanks are recorded along the south eastern boundary. Several residential developments can be observed to the north-west. No significant changes are recorded on site.	
1964 - Present (1:2,500 & 1:10,000)	A large housing development is now present to the north of the site. No significant changes are recorded on site.	





### 3.2 Off-Site Historical Development

A review of potentially contaminative land uses identified on historical Ordnance Survey maps within a 250m radius of the site is summarised below in Table 3.2:

**Table 3.2 Summary of Potentially Contaminative Off-Site Historical Land Uses**

Surrounding Feature	Distance (m)	Dates	Direction
Unspecified Tank	On site	1957	-
Tank	3	1938	SE
Electricity Substation	4-139	1972-1993	N
Unspecified Tank	5-29	1907-1942	SE
Pond	18-26	1859-1968	W
Cemetery	130-134	1931-1989	N
Pond	203	1907	N

### 3.3 Planning History

REC has undertaken a review of online planning records held by Fareham Borough Council as part of this preliminary assessment and no potential environmentally pertinent information was obtained.





## 4.0 ENVIRONMENTAL SETTING

### 4.1 Geology & Hydrogeology

The British Geological Survey (BGS) map for the site and data search indicates that the site is underlain by the following geological sequence:

Geological Unit	Classification	Description	Aquifer Classification	Sensitivity
Superficial	River Terrace Deposits	Sand and Gravel	Secondary A	High
Bedrock	Wittering Formation	Sand, Silt and Clay	Secondary A	High

The nearest historic borehole record (SU50SW38) is located approximately 170m south west of the site and describes Topsoil to a depth of 1.50mbgl overlying River Terrace Deposits to a depth of 2.70mbgl. Beneath this is the Wittering Formation to the base of the borehole at 4.00mbgl. No groundwater was encountered within this borehole.

The data search indicates that the nearest groundwater abstraction is a historic entry relating to general farming and domestic use at Meon Bye Farm situated 833m south of the site. There are no potable water abstractions within 2km. The site is not situated within a Source Protection Zone.

Superficial geology is varied across the site and indicated to have a very low to very high permeability. Bedrock geology is predominantly granular and has a low to high permeability.

### 4.2 Geotechnical Data

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

Hazard	Designation
Shrink-Swell Clay	Moderate
Landslides	Very Low
Soluble Rocks	Negligible
Compressible Ground	Negligible
Collapsible Rocks	Low
Running Sand	Very Low

### 4.3 Coal Mining & Ground Workings

The site is not within an area that is affected by non-coal mining or coal mining and therefore no Coal Mining Authority / Coal Mining Report was obtained for the purpose of this report. There are no other ground workings identified within 250m of the site.







#### 4.4 Railways & Tunnels

The Groundsure Report indicates that there are no known historical or active railways and tunnels within 250m of the site.

#### 4.5 Hydrology

A review of available data identifies that the nearest river network is a drain, a Tertiary River, 24m south east of the site. This drain converges with the River Meon approximately 200m east of the site.

The nearest surface water abstraction is an active entry for spray irrigation at Little Abshot Farm 195m south east of site.

The site is not located within an Environment Agency Floodplain Zone and has a very low risk of flooding from rivers and the sea (RoFRaS). However the site lies within 50m boundary of groundwater flooding susceptibility area which is classed as Clearwater flooding.

#### 4.6 Radon Risk Potential

The site is not situated within a radon affected area, as less than 1% of properties are above the action level, and therefore no radon protective measures are necessary in the construction of new buildings.

#### 4.7 Industrial Land Uses

According to historical mapping, the subject site has been open space since 1868. Available records identify three current land uses within 250m radius of the study site which are potentially contaminative:

Company	Activity	Distance (m)	Direction
Electricity Substation	Electrical Features	4 & 140	North
Solents Projects	Construction tool and hire	24	North East
Electricity Substations	Electrical Features	131	South

#### 4.8 Sensitive Land Uses

The following sensitive land uses have been identified within a 2.0km radius of the site:

- ▶ Seven records of Sites of Special Scientific Interest (SSSI) all relating to Titchfield Haven with the closest located 436m south east;
- ▶ One record of National Nature Reserve (NNR) located 356m east of site at Titchfield Haven;
- ▶ One record of Special Protection Areas (SPA) located 436m south east of site called Solent & Southampton Water;
- ▶ One record of Ramsar site located 436m south east called Solent & Southampton Water;





- ▶ Eight records of Ancient Woodland called unknown with the closest located 942m west;
- ▶ Four records of Local Nature Reserves (LNR) with the closest located 852m north west at Kites Croft; and,
- ▶ Two record of Nitrate Vulnerable Zones with the closest located 1.1km north west.

#### 4.9 Site Sensitivity Assessment

The site is considered to be located within a **moderate** sensitivity setting due to the following reasons:

- ▶ The underlying superficial geology is classified as a Secondary A Aquifer with high permeability;
- ▶ The underlying bedrock geology is classified as a Secondary A Aquifer with a high permeability;
- ▶ The close proximity of residential buildings to the north and south of the site;
- ▶ The nearest groundwater abstraction is situated approximately 833m south of site; and,
- ▶ The nearest surface water body is a Drain, located 24m south east of site.





## 5.0 CONSULTATIONS

### 5.1 Contaminated Land Officer

A request for information regarding contaminated land concerning the site was sent to the contaminated land team at Fareham Borough Council on 27<sup>th</sup> September, 2016. However, at the time of writing this report no reply has been received. Any pertinent information received following the issue of this report shall be forwarded to the client.

### 5.2 Landfill Sites and Waste Treatment Sites

A review of available information indicates that there are no records of Environmental Agency historic or active landfill sites within a 1km radius of the site.

### 5.3 Regulatory Database

The following information has been obtained from a commercially available environmental database. The summary table only includes records not otherwise detailed in the report.

**Table 5.1 Summary of Groundsure Data**

	0-249m	250-500m	Details
Licensed Discharge Consents	2	4	The nearest record is for Great Posbrook Farm for unspecified, located 42m west.
Pollution Incidents	1	0	A pollutant incident occurred on 06/02/02 located 119m south of site. The pollutant involved was inert materials and wastes. There was no impact to water and air, however a category 3 (minor) impact was reported to land.
Historic IPC Authorisations	0	0	N/A
Licensed Radioactive Substance	0	0	N/A
Part A(2) and Part B Activities and Enforcements	0	0	N/A
Planning Hazardous Substance Consents and Enforcements	0	0	N/A
Control of Major Accident Hazard (COMAH) sites	0	0	N/A
Notification of Installations Handling Hazardous Substances (NIHHS) sites	0	0	N/A
Fuel Stations Entries	0	0	N/A





## 6.0 CONCEPTUAL SITE MODEL (CSM)

### 6.1 Initial CSM

In accordance with Environment Agency, CLR 11 (2004) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), REC have developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area.

### 6.2 Contaminant Sources

#### On-site Potential Sources

Potential sources of contamination identified on site include:

- ▶ Unspecified Tank(s) within the South Eastern boundary.

#### Off-site Potential Sources

Potential sources of contamination identified off-site include:

- ▶ Electricity Substations;
- ▶ Unspecified Tanks;
- ▶ Made Ground associated with infilling of pond during circa. 1940; and
- ▶ Cemetery.

### 6.3 Potential Pathways

Receptors may be potentially at risk from the identified potential sources of contamination via the following pathways:

- ▶ Migration of mobile contaminants on or off site via services, sewers and manmade conduits;
- ▶ Direct contact, ingestion and inhalation of contaminants on site;
- ▶ Migration of contaminated dusts during earthworks;
- ▶ Migration of mobile contaminants into groundwater and transport into surface waters;
- ▶ Migration of hazardous gases; and,
- ▶ Uptake of toxins/phytotoxins by plants.

### 6.4 Potential Receptors

#### Human Receptors

REC has identified the following potential receptors:

- ▶ Future users of the site and buildings; and







- ▶ Users of adjacent areas due to off-site migration of vapours or contaminated dust.

Construction workers are not considered to be a plausible receptor as exposure will be managed through the use of appropriate PPE and hygienic working practices, as required under HSE/ CDM regulations. Furthermore exposure is likely to be for a short duration.

### Controlled Waters

The site is shown to be underlain by superficial deposits of the River Terrace Deposits which is classed as a Secondary A Aquifer of high sensitivity. The underlying bedrock geology comprises Wittering Formation which is classified as a Secondary A Aquifer of high sensitivity. It is proposed that any future development works on site may cause potential contaminants to leach into the underlying Secondary A Aquifer in the River Terrace Deposits and the Wittering Formation.

## 6.5 Risk Assessment

CIRIA 552: Contaminated Land Risk Assessment 'A Guide to Good Practice' provides guidance on risk assessment taking into account factors such as severity of the potential harm that may arise from a successful pollutant linkage, potential magnitude of the hazard, and the sensitivity of the target receptor. Risk assessment is initially assessed by determining the severity of the potential hazard, which takes into account receptor sensitivity and the magnitude of the potential impact as detailed in Tables 6.1 & 6.2 below.

### 6.5.1 Severity

**Table 6.1 Receptor sensitivity**

Category	Human sensitivity	Environmental sensitivity
Very Low	Ground workers	Non-sensitive water course
Low	Commercial / Industrial	Secondary Aquifer
Medium	Residential without plant uptake	Principal Aquifer / Sensitive Watercourse
High	Residential with plant uptake	Groundwater Source Protection Zone

**Table 6.2 Magnitude of Impact**

Category	Example
No Impact	No identified or potential pollutants present
Slight Impact	Minor leaks and spills from fuel infrastructure, inert landfills
Moderate Impact	Major leaks and spills from fuel infrastructure
Gross Impact	Heavily contaminated industrial sites, hazardous landfills

Severity is subsequently assessed considering the potential receptor and magnitude of impact as outlined within Table 6.3.







**Table 6.3 Determination of level of severity for potential hazards**

	Receptor Sensitivity			
	Very Low	Low	Moderate	High
No Impact	Minor	Minor	Minor	Minor
Slight Impact	Minor	Minor	Minor	Mild
Moderate Impact	Minor	Minor	Mild	Medium
Gross Impact	Minor	Mild	Medium	Severe

### 6.5.2 Likelihood

The likelihood of an event is assessed while considering the potential for presence of a contaminant, presence of receptor, and the substantiality of the pollutant pathway. Likelihood is broken down into four separate categories within the CSM as shown in Table 6.4 below:

**Table 6.4 Definitions of likelihood categories**

Category	Definition
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable.
Low Likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
High Likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor.

### 6.5.3 Risk Rating

Table 6.5 demonstrates the methodology used to provide an overall risk rating within the preliminary CSM with respect to any potential sources of contamination that may affect the site. An overall risk rating is assigned to each potential contaminant considering the assessed likelihood and severity as determined using the methodologies within Tables 6.1 to 6.4.

**Table 6.5 Level of risk rating for hazard definition**

	Severity			
	Minor	Mild	Medium	Severe
Unlikely	Very Low	Very Low	Low	Low / Moderate
Low Likelihood	Very Low	Low	Low / Moderate	Moderate
Likely	Low	Low / Moderate	Moderate	High
High Likelihood	Low / Moderate	Moderate	High	Very High

## 6.6 Conceptual Site Model

A site specific CSM has therefore been created using the above information and is provided on the following page.





**Table 6.6 Conceptual Site Model**

Source	Contaminant	Potential migration pathway	Potential Receptors	Likelihood of Occurrence	Severity	Overall Risk Rating	Active / Inactive
<b>ON-SITE</b>							
Unspecified Tank (s) along the South Eastern boundary	Heavy metals (As, Cd, Cr, Pb, Hg, Se, Ni)	Ingestion of soils Dermal contact with soils	Future Site Users	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	<b>Potentially Active – further investigation recommended</b>
		Vertical and lateral migration	Secondary A Aquifer	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	
	Polycyclic Aromatic Hydrocarbons (PAHs)	Ingestion of soils Dermal contact with soils	Future Site Users	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	
		Vertical and lateral migration	Secondary A Aquifer	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	
	Total Petroleum Hydrocarbons (TPHs)	Ingestion of soils Dermal contact with soils	Future Site Users	<b>Likely</b>	<b>Minor</b>	<b>Low</b>	
		Vertical and lateral migration	Secondary A Aquifer	<b>Likely</b>	<b>Minor</b>	<b>Low</b>	
	S/VOCS	Inhalation of vapours Dermal contact with soils	Future Site Users	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	
		Vertical and lateral migration	Secondary A Aquifer	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	



Source	Contaminant	Potential migration pathway	Potential Receptors	Likelihood of Occurrence	Severity	Overall Risk Rating	Active / Inactive
<b>OFF-SITE</b>							
Made Ground associated with ponds	Heavy metals (As, Cd, Cr, Pb, Hg, Se, Ni)	Ingestion of soils Dermal contact with soils	Current / future site users	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	<b>Potentially Active – further investigation recommended</b>
		Vertical and lateral migration	Secondary A Aquifer	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	
	Polycyclic Aromatic Hydrocarbons (PAHs)	Ingestion of soils Dermal contact with soils	Future Site Users	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	
	Total Petroleum Hydrocarbons (TPHs)	Ingestion of soils Dermal contact with soils Inhalation of ground gases	Future site users	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	
		Vertical and lateral migration	Secondary A Aquifer	<b>Low Likelihood</b>	<b>Medium</b>	<b>Low / Moderate</b>	
	Asbestos fibres in soil	Inhalation of fibres	Future Site Users	<b>Low Likelihood</b>	<b>Medium</b>	<b>Low / Moderate</b>	
	Potential production of ground gas (CH <sub>4</sub> and CO <sub>2</sub> )	Inhalation of ground gases	Future Site Users	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	
Cemetery	Production of ground gas (CH <sub>4</sub> and CO <sub>2</sub> )	Lateral and vertical migration to site	Future Site Users	<b>Low Likelihood</b>	<b>Minor</b>	<b>Very Low</b>	<b>Potentially Active – further investigation recommended</b>
Electricity substations	Polychlorinated Biphenyls (PCB)	Lateral and vertical migration to site	Future Site Users	<b>Unlikely</b>	<b>Minor</b>	<b>Very Low</b>	<b>Inactive – Given the distance of electricity substations from the site, and relatively poor mobility of PCB contaminants within ground, the linkage is considered inactive.</b>



## 6.7 Conclusions

### 6.7.1 Human Health

#### On-site

The potential for underlying contamination is not particularly significant across the majority of the site, with the exception of the presence of a tank within the south eastern boundary. Overall, it is anticipated that the potential presence of a tank of unknown use may present a **Very Low to Low** risk to human receptors during redevelopment construction work.

#### Off-site

The risk posed by the surrounding land uses to human health is **Very Low to Moderate**. The most likely sources of contamination is from infilled Made Ground and ground gas potentially produced by the nearby cemetery.

### 6.7.2 Controlled Waters

#### Groundwater

The site has been shown to be underlain by River Terrace Deposits (Secondary A Aquifer) overlying an Secondary A Aquifer within the solid geology. Therefore the potential risk to controlled waters is considered to be **Moderate** due to the presence of a tank along the south-eastern boundary.

#### Surface Waters

A drain is located approximately 25m east which connects to the River Meon approximately 100m east of the site, therefore the risks to surface waters are considered to be **Low to Moderate**.

### 6.7.3 Overall Environmental Risk Assessment

Overall, the preliminary risk classification of the site in relation to the proposed redevelopment is considered to be **Very Low to Moderate**.





## 7.0 RECOMMENDATIONS

It is recommended that a Phase 2 Ground Investigation is undertaken in order to assess the CSM compiled for the site.

A Phase 2 investigation for a site of this nature would likely include:

- ▶ Trial pits to depths of approximately 2 – 3m to investigate the nature and composition of the underlying Made Ground;
- ▶ Installation of ground gas and water monitoring wells through window sampling; and,
- ▶ A series of weekly ground gas and ground water monitoring visits (lasting 6 weeks).

To aid with foundation design the following additional activities may also be necessary:

- ▶ Window sampling with in situ testing;
- ▶ Cable percussive boreholes to approximate depths 15m (dependant on proposed foundation depths and loadings); and,
- ▶ Geotechnical testing on recovered soil samples.

***END OF REPORT***







Phase I Geo-environmental Site Assessment  
Land East of Posbrook Lane, Titchfield  
May 2017  
1CO102431P1R1

**APPENDIX I LIMITATIONS**

**APPENDIX I**

**LIMITATIONS**





1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Ltd and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
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10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.





**APPENDIX II**

**GLOSSARY**





## TERMS

AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Poly Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo Ionisation Detector
QA	Quality Assurance
SGV	Soil Guideline Value
SPH	Separate Phase Hydrocarbon
Sp.TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
SPT	Standard Penetration Test
SVOC	Semi Volatile Organic Compound
UST	Underground Storage Tank
VCCs	Vibro Concrete Columns
VOC	Volatile Organic Compound
WTE	Water Table Elevation





Phase I Geo-environmental Site Assessment  
Land East of Posbrook Lane, Titchfield  
May 2017  
1CO102431P1R2

**APPENDIX III      DRAWINGS**

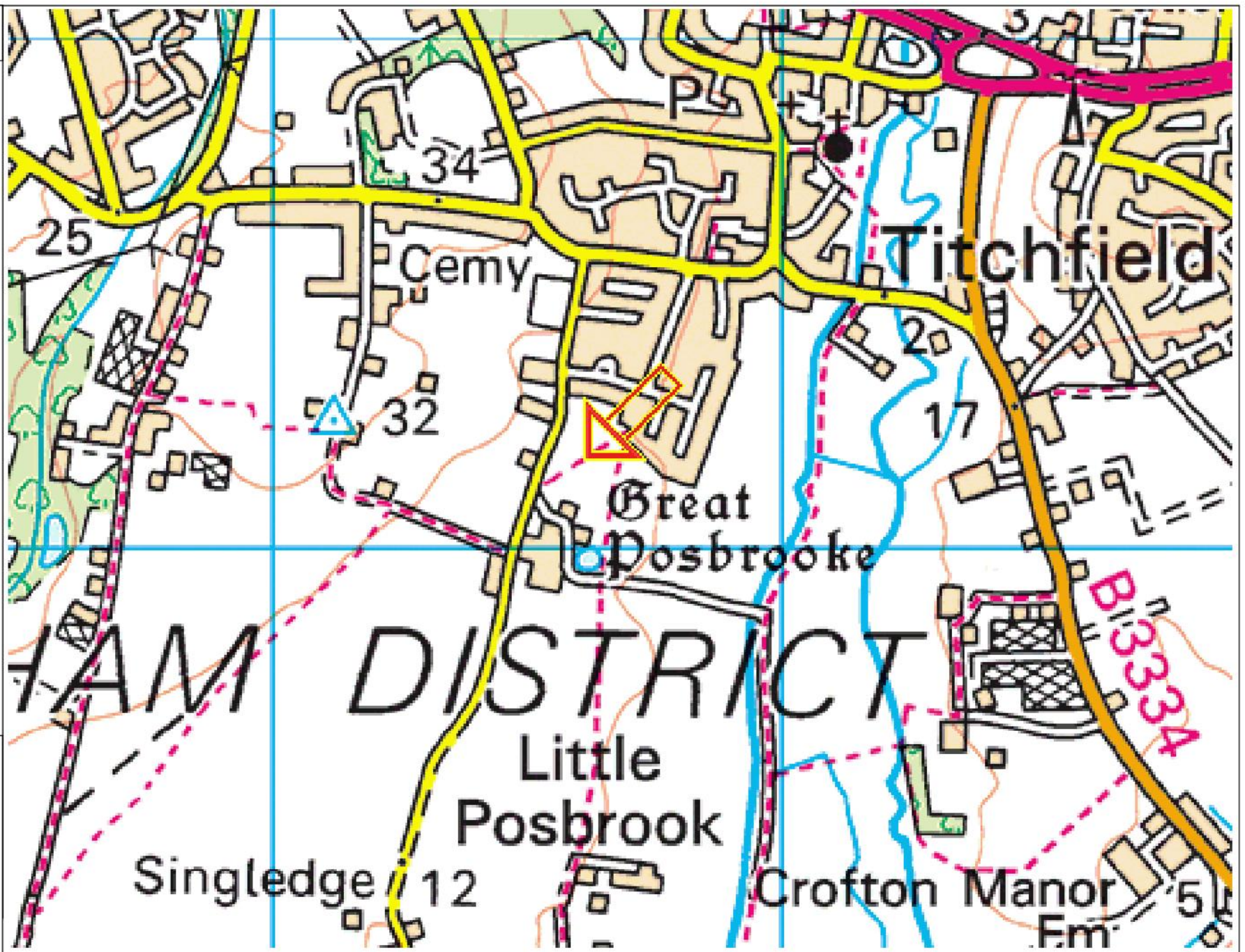
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Client:  
**Foreman Homes  
Ltd**

Job No: **1CO102431**

Drawn By: **EC**

Approved by: **CT**

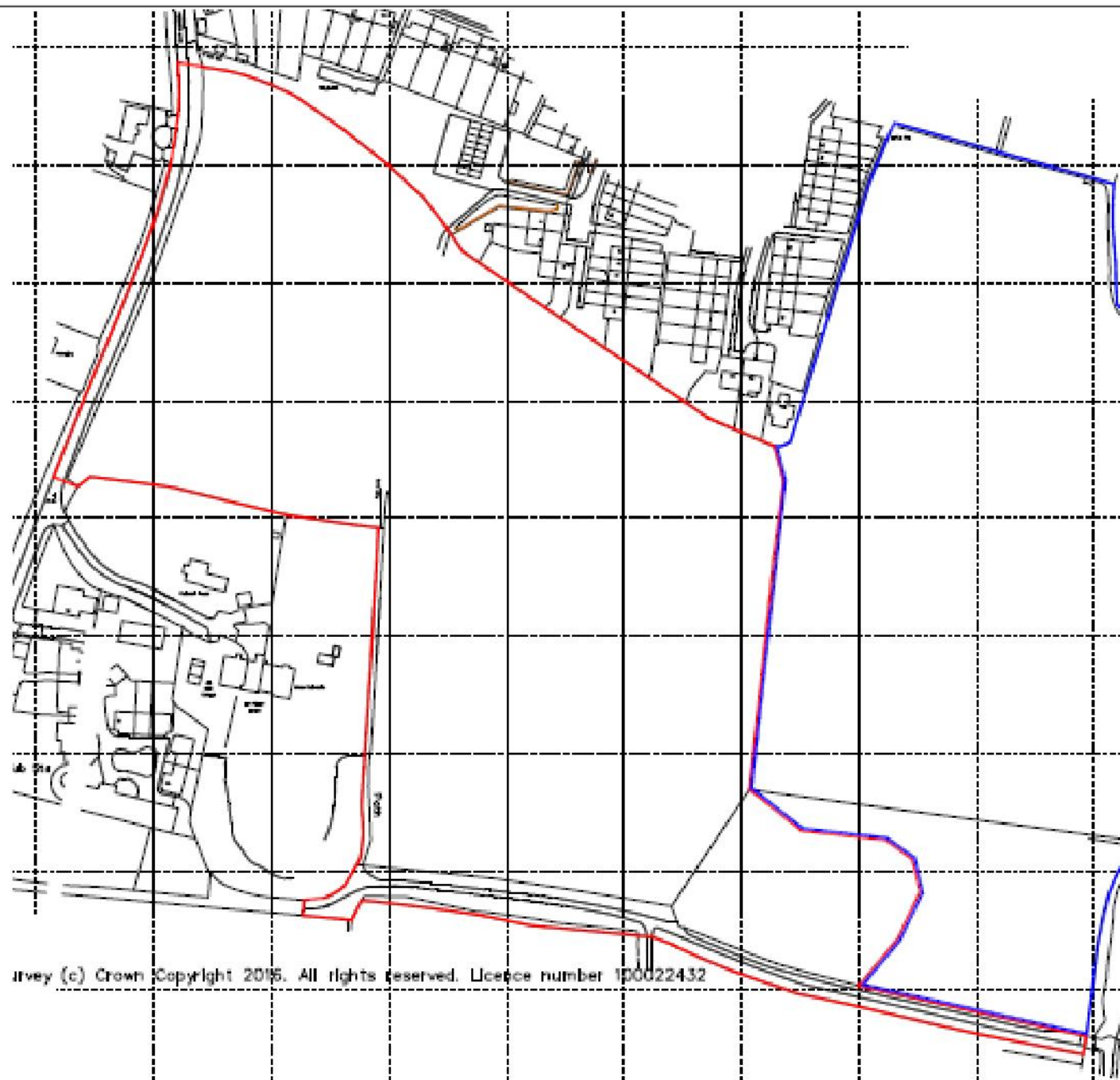
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Notes:

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Drawing Title:  
**1CO102431-003  
Site Layout Plan**







**APPENDIX IV**

**SITE PHOTOGRAPHS**







Plate 1: Main access to site with overgrown conifer (right of photo). Horses on site.



Plate 2: Northern boundary of the site showing slight drop in elevation.







Plate 5: Electric Pylon crossing the site



Plate 4: Old brick structure, potential drainage feature.





Plate 5: Facing north showing drop in elevation and residential dwellings along boundary.





Phase I Geo-environmental Site Assessment  
Land East of Posbrook Lane, Titchfield  
May 2017  
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**HISTORICAL MAPPING**  
**APPENDIX IV**

**APPENDIX V**

**HISTORICAL MAPPING**





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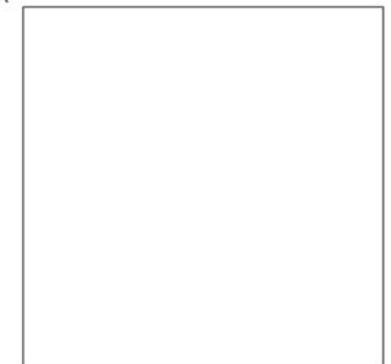
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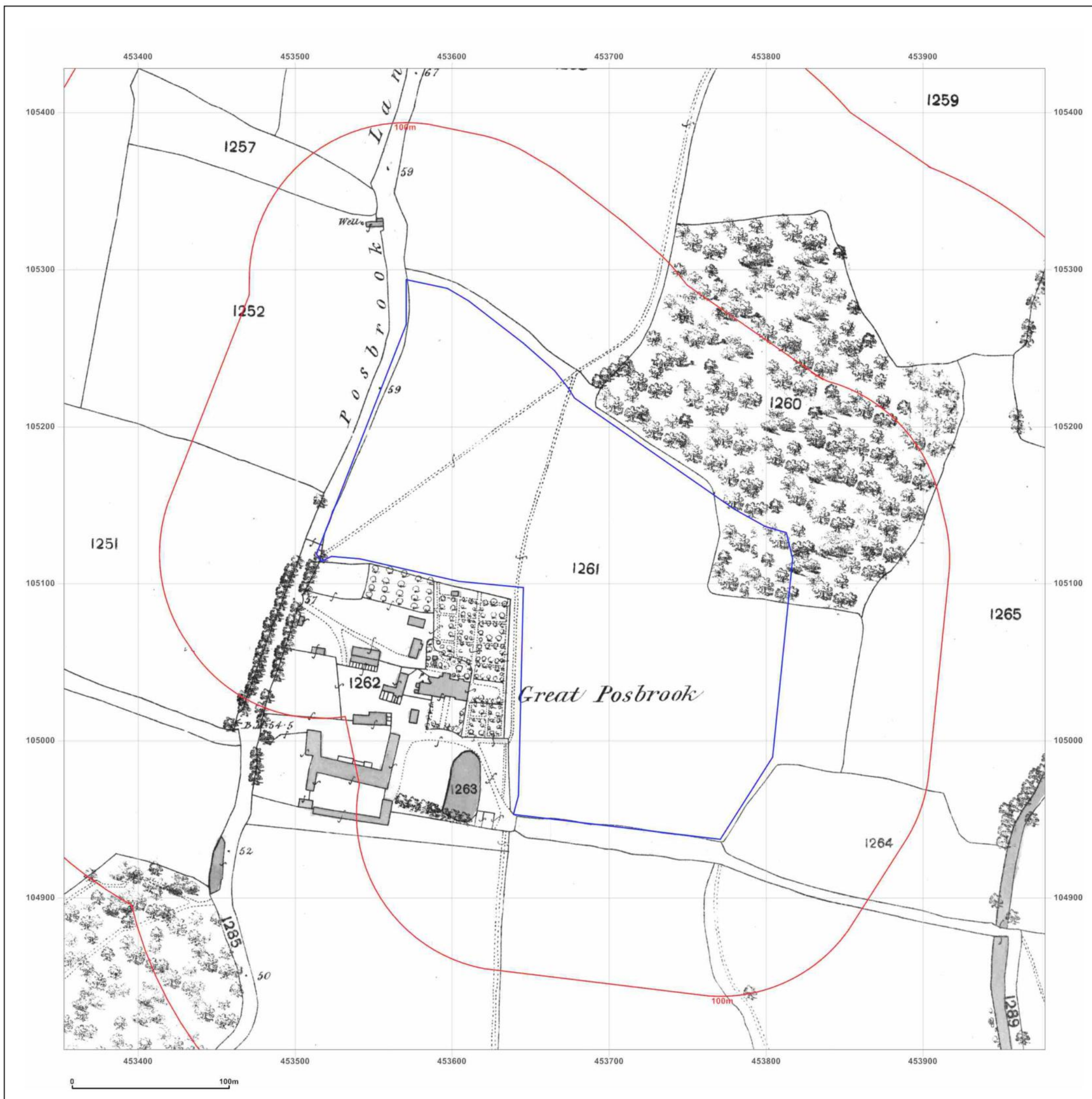


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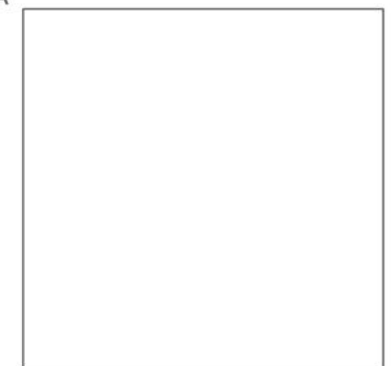
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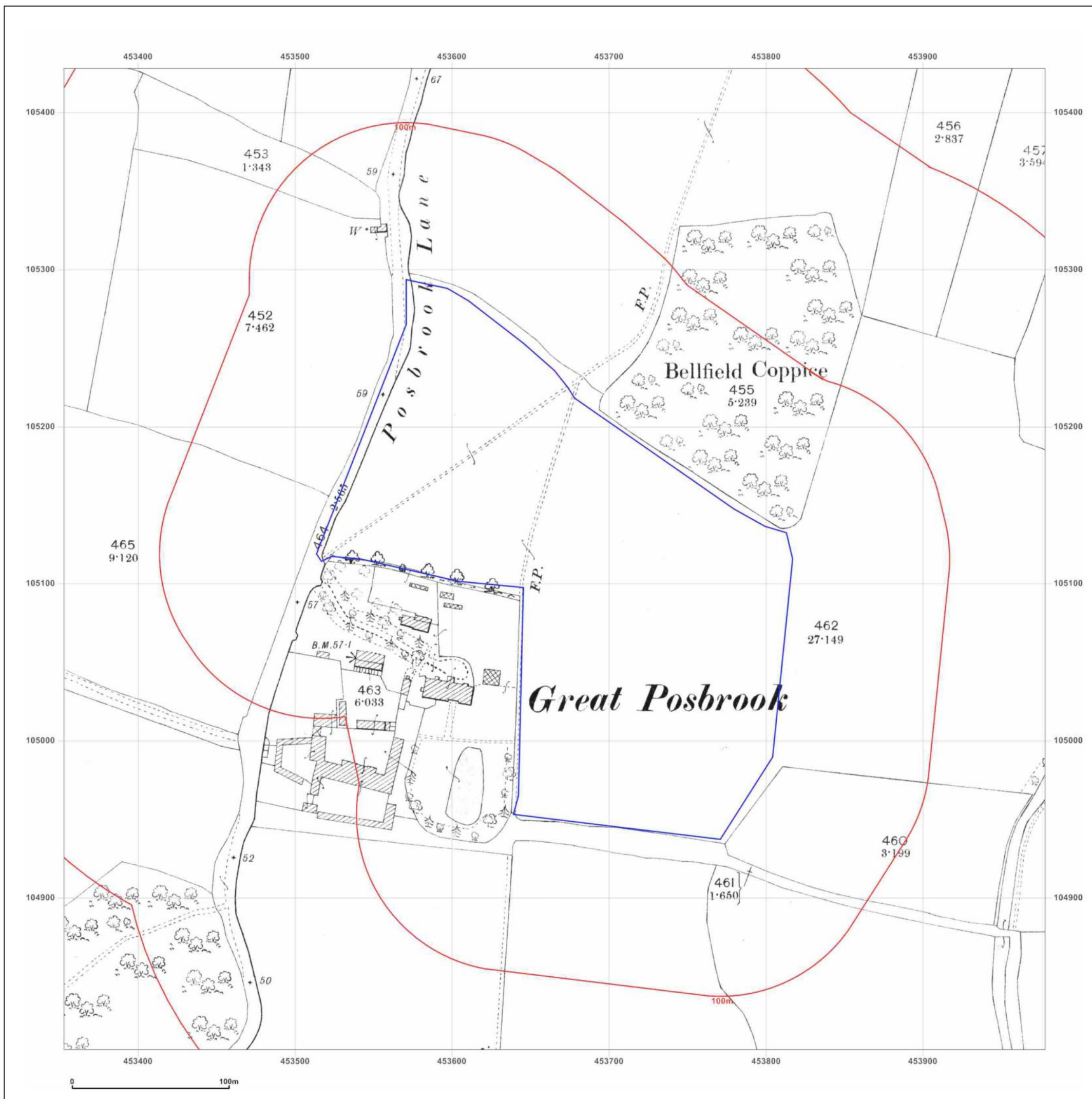


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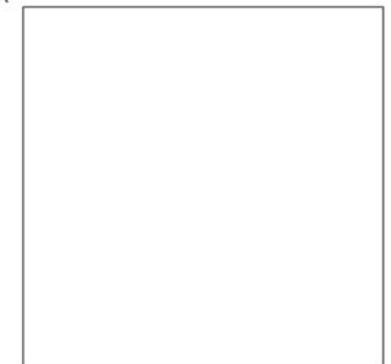
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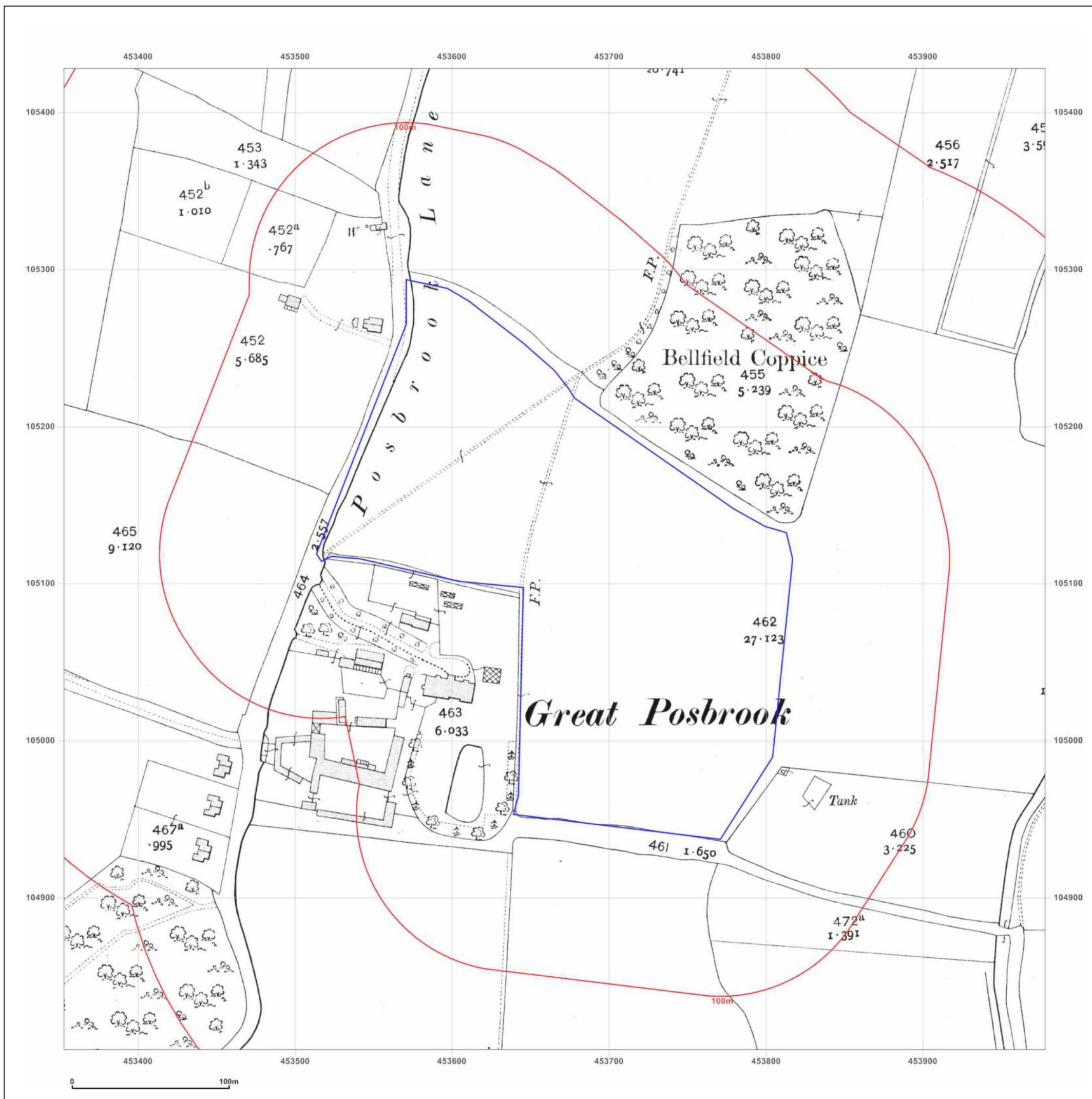


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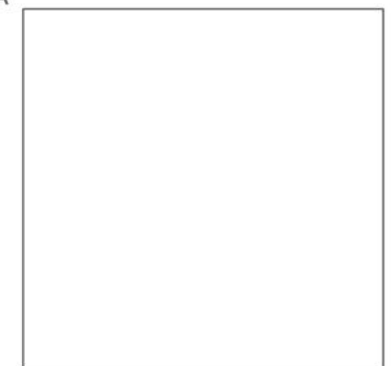
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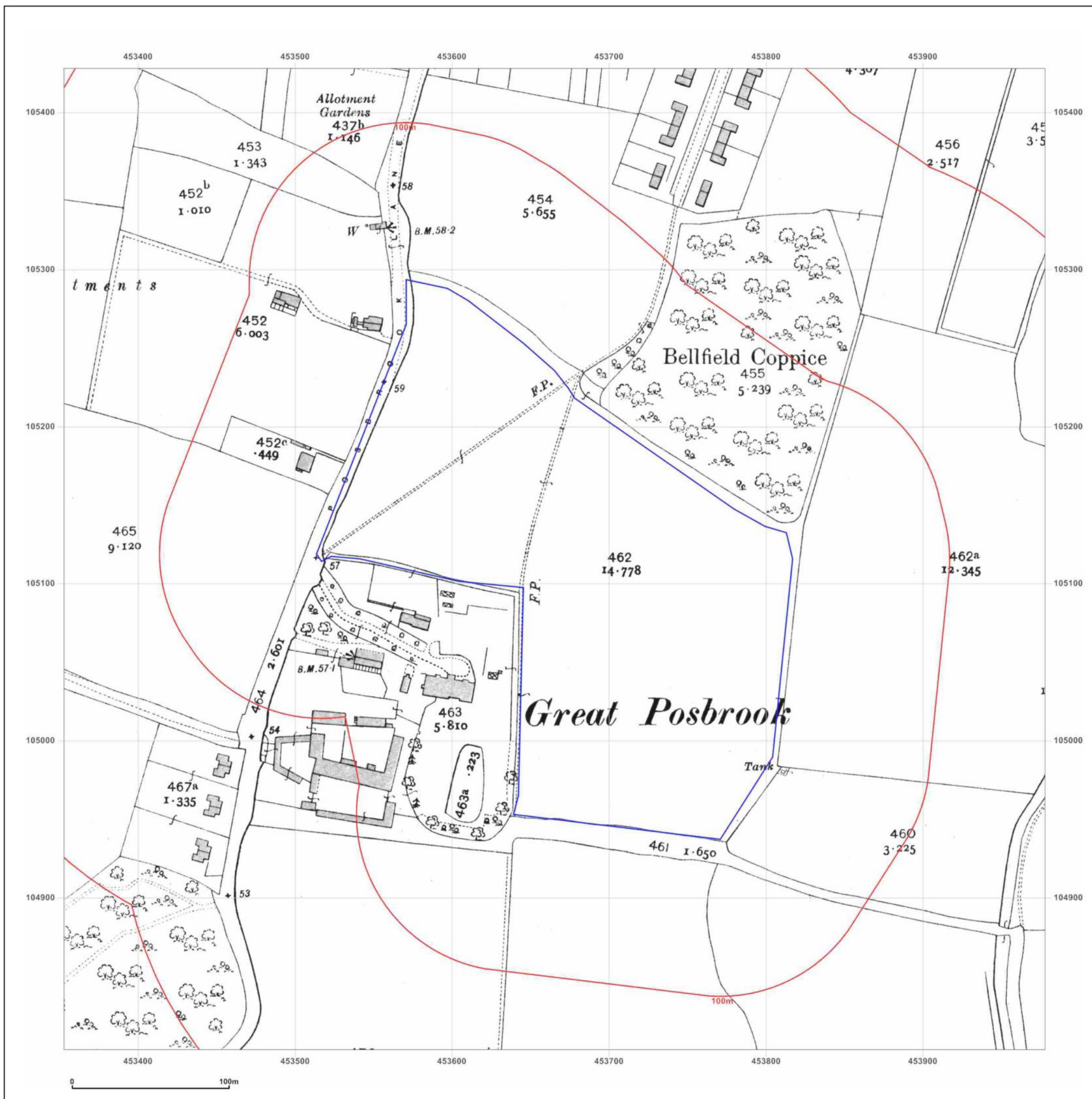


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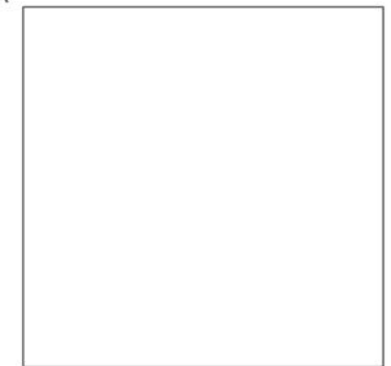
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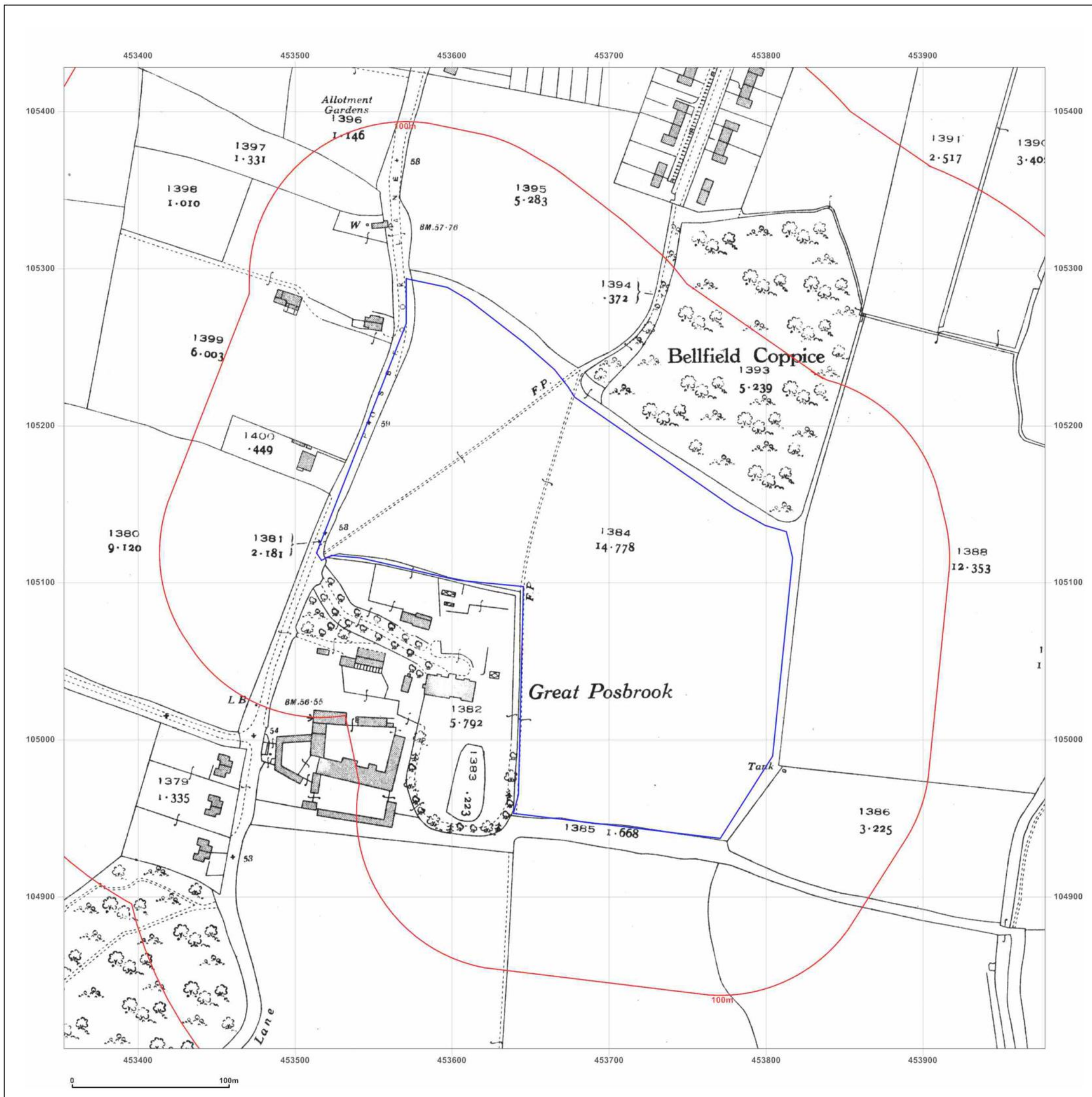


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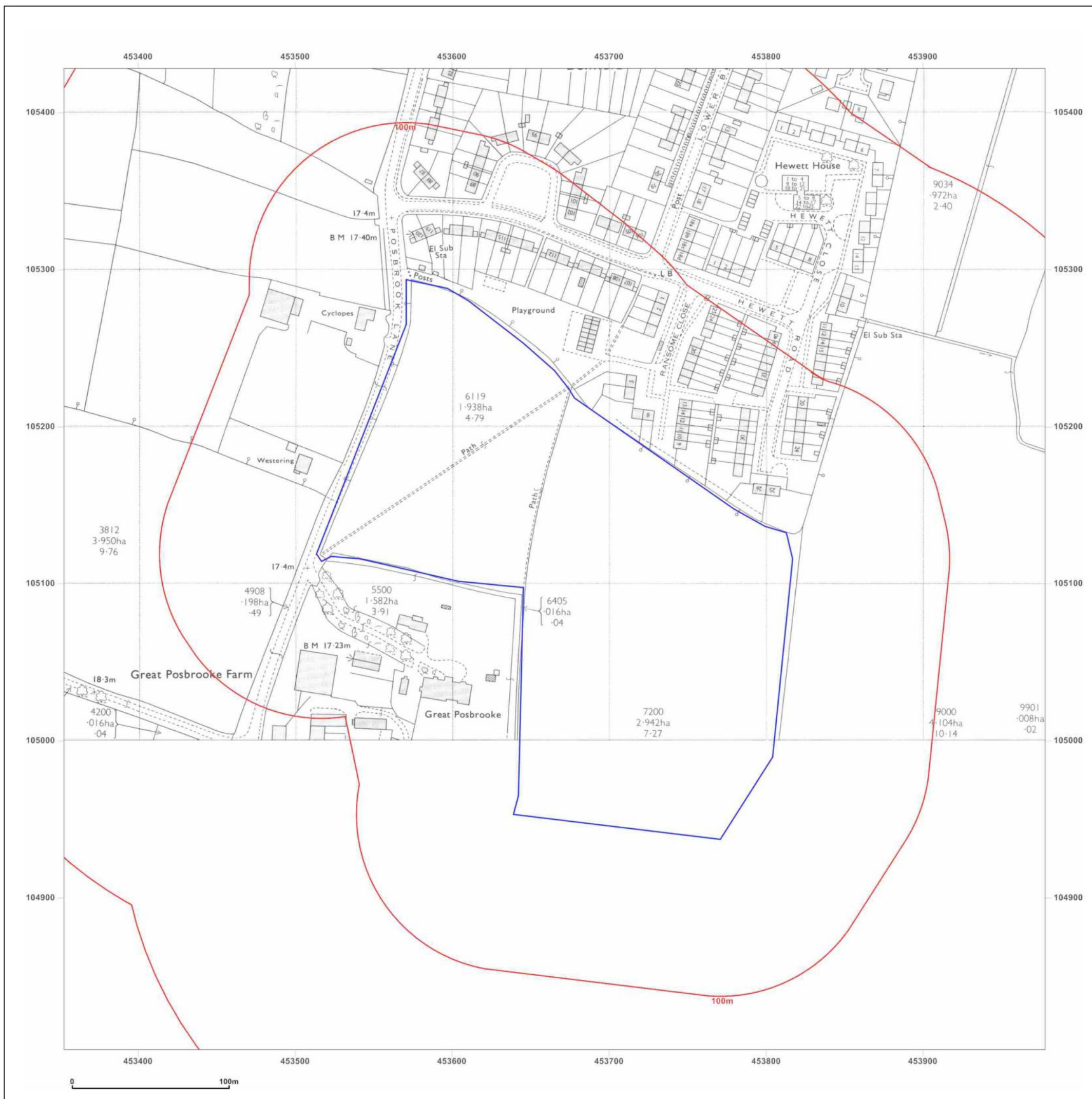


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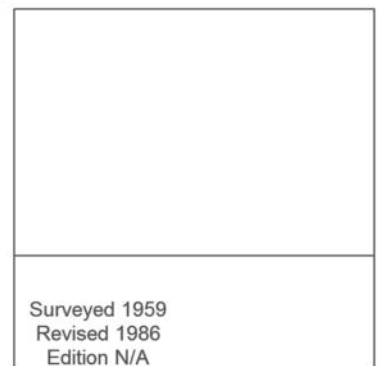
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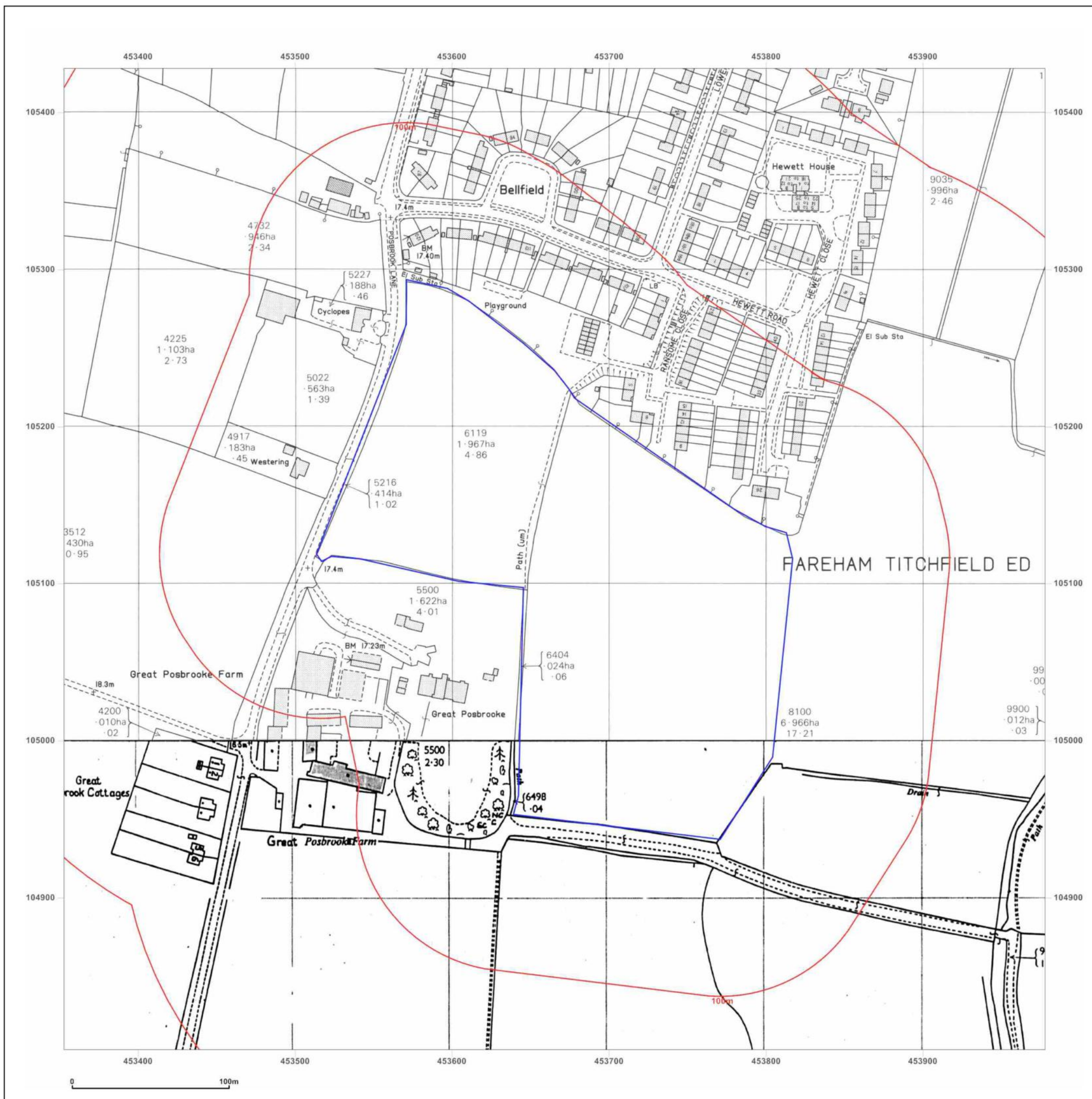


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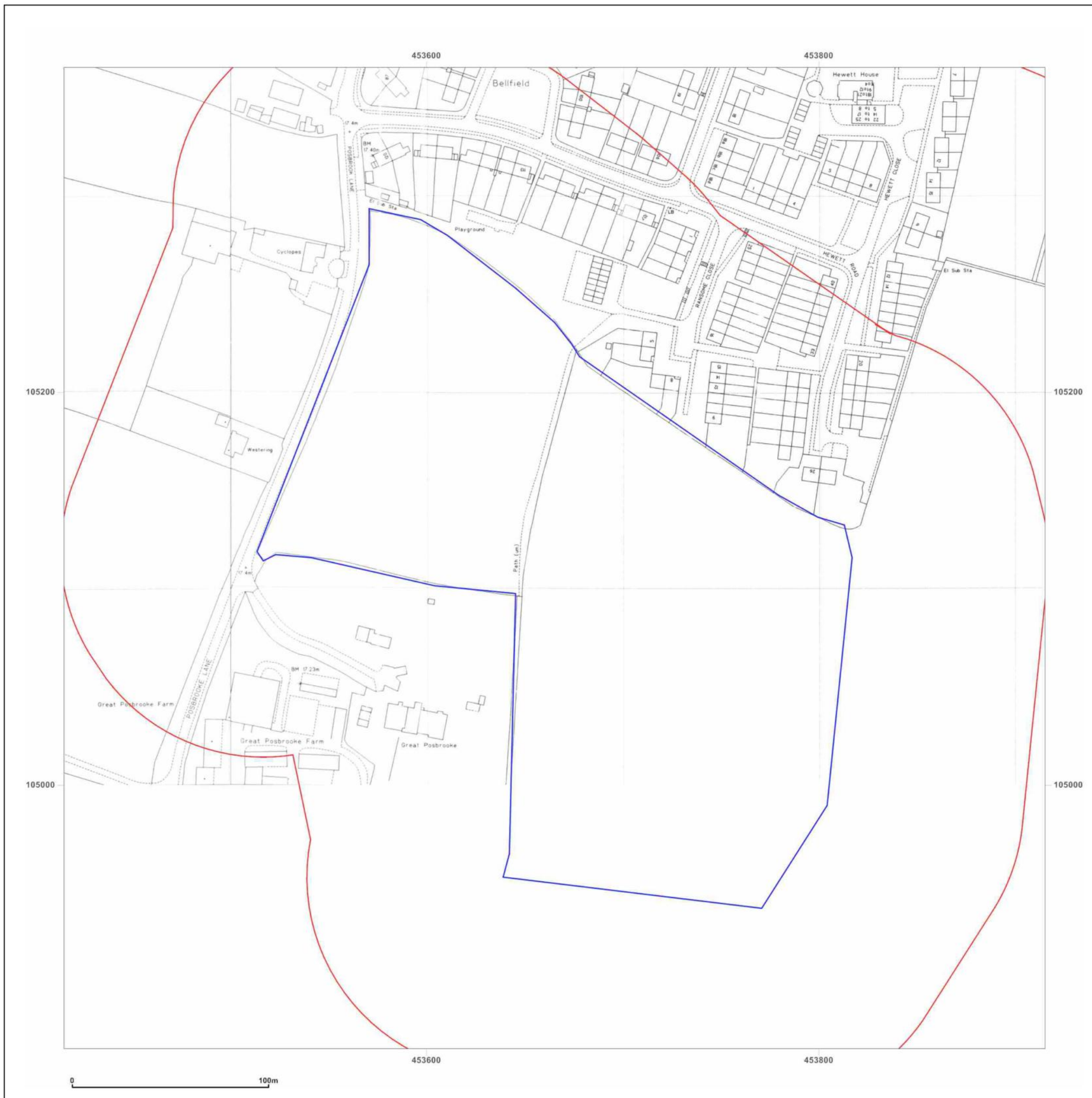


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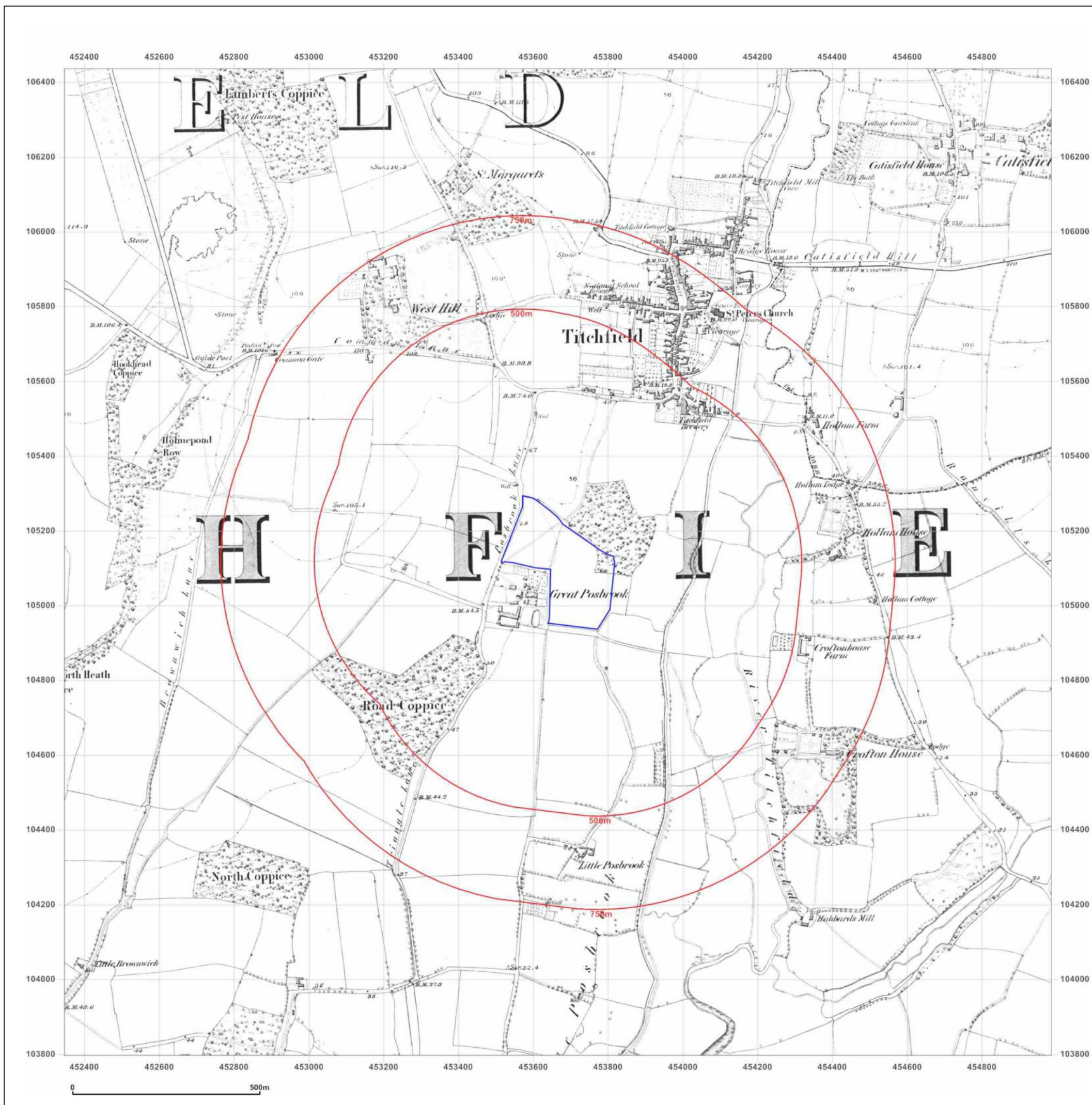


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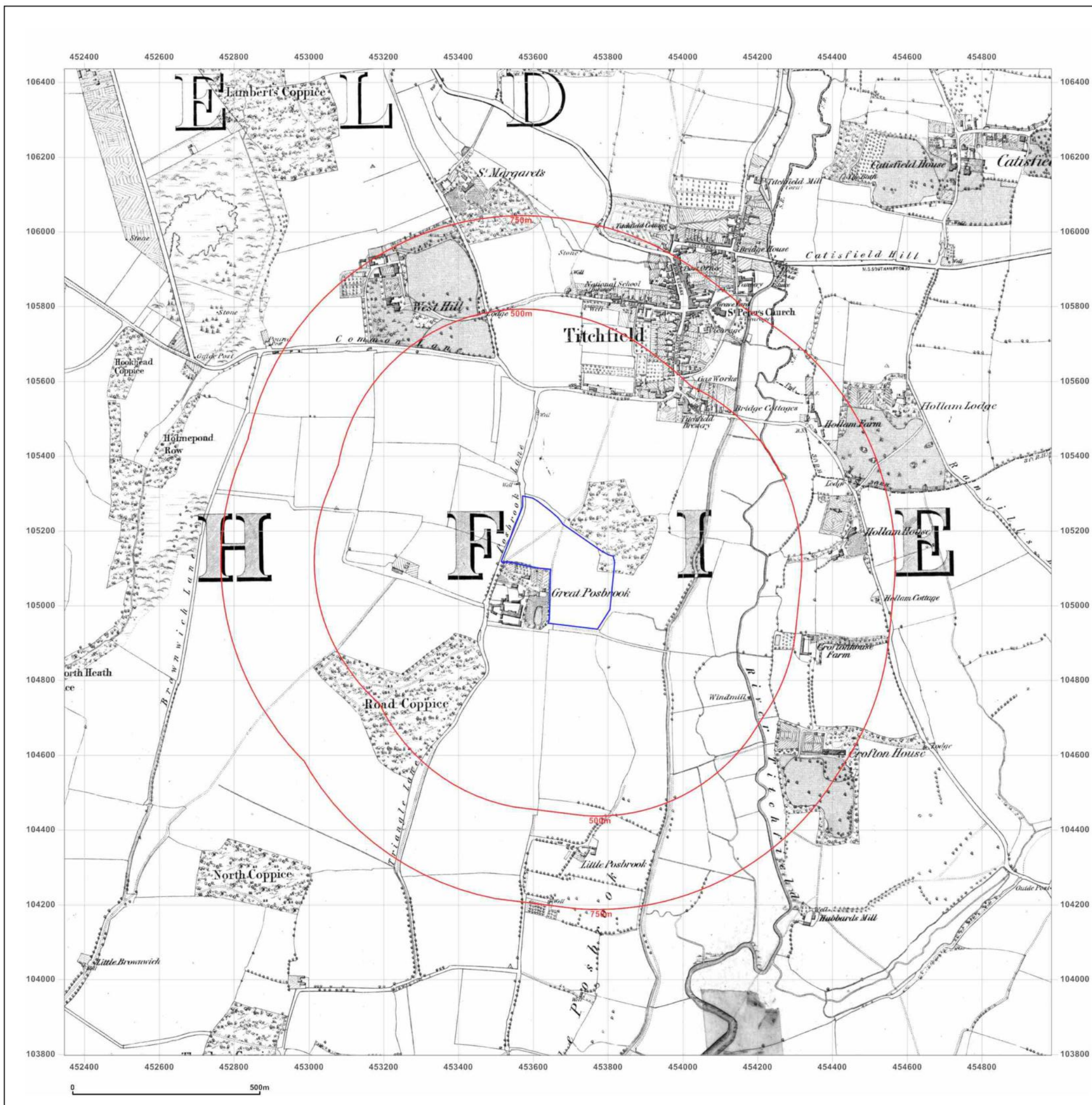


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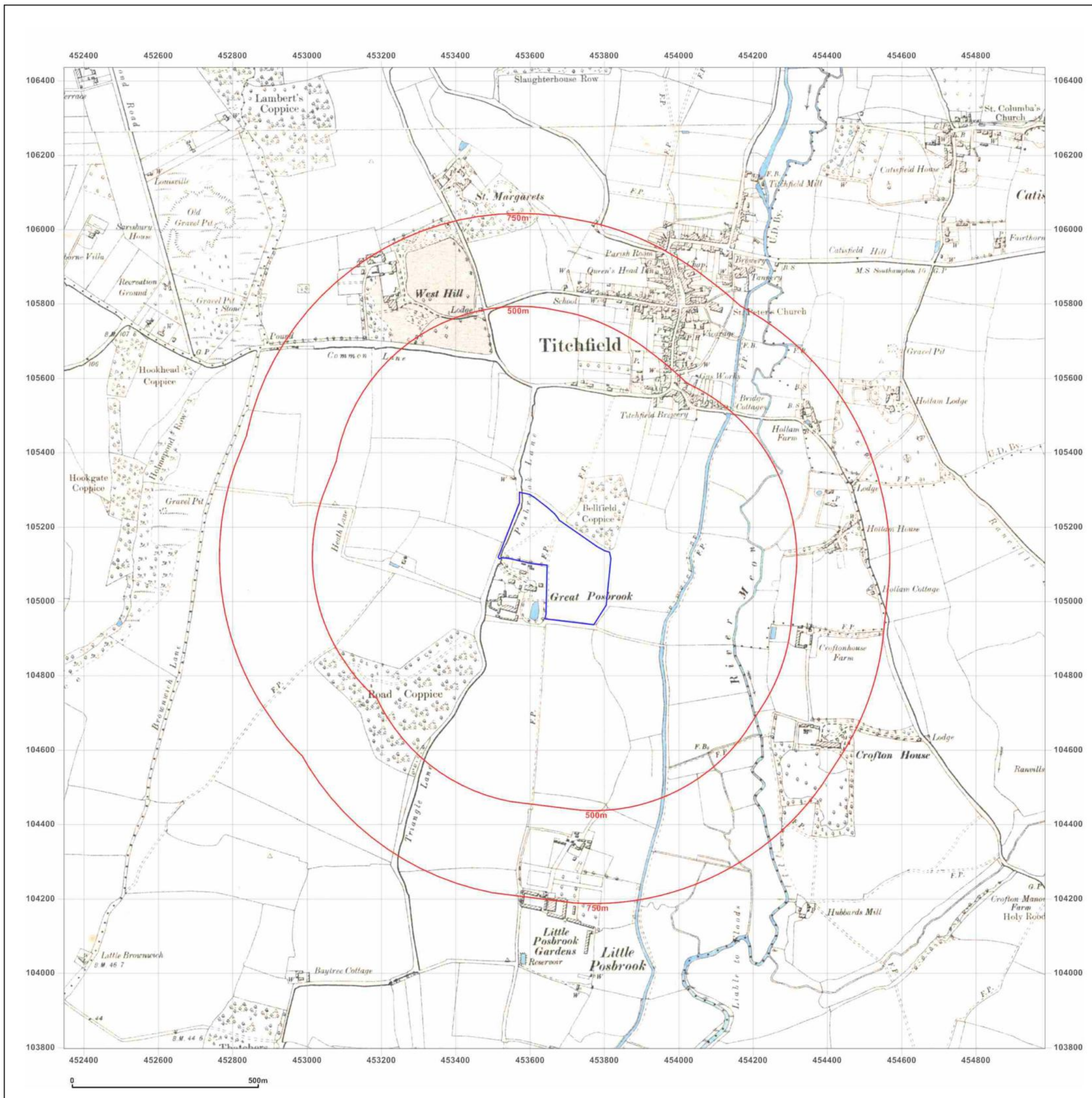


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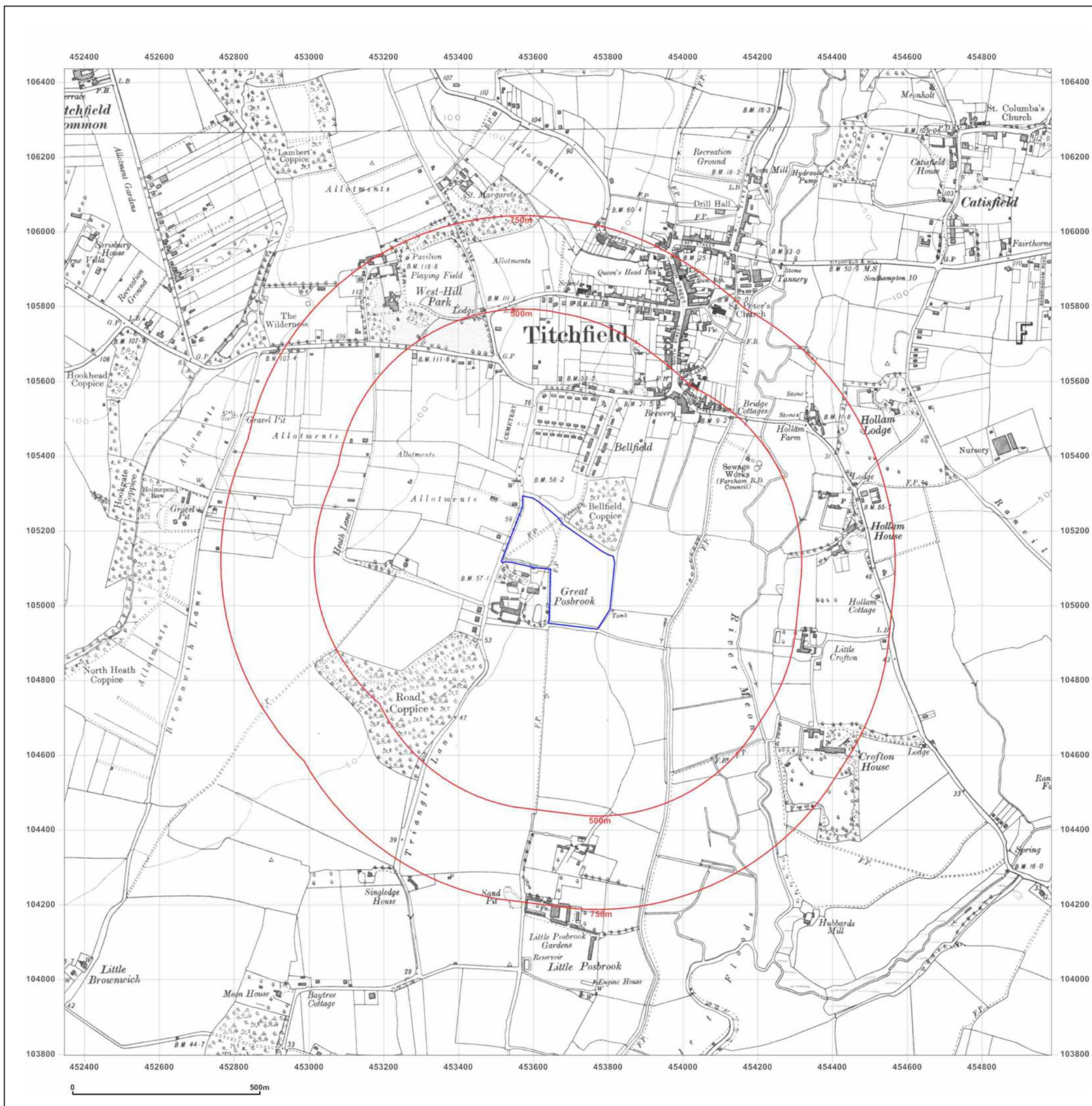


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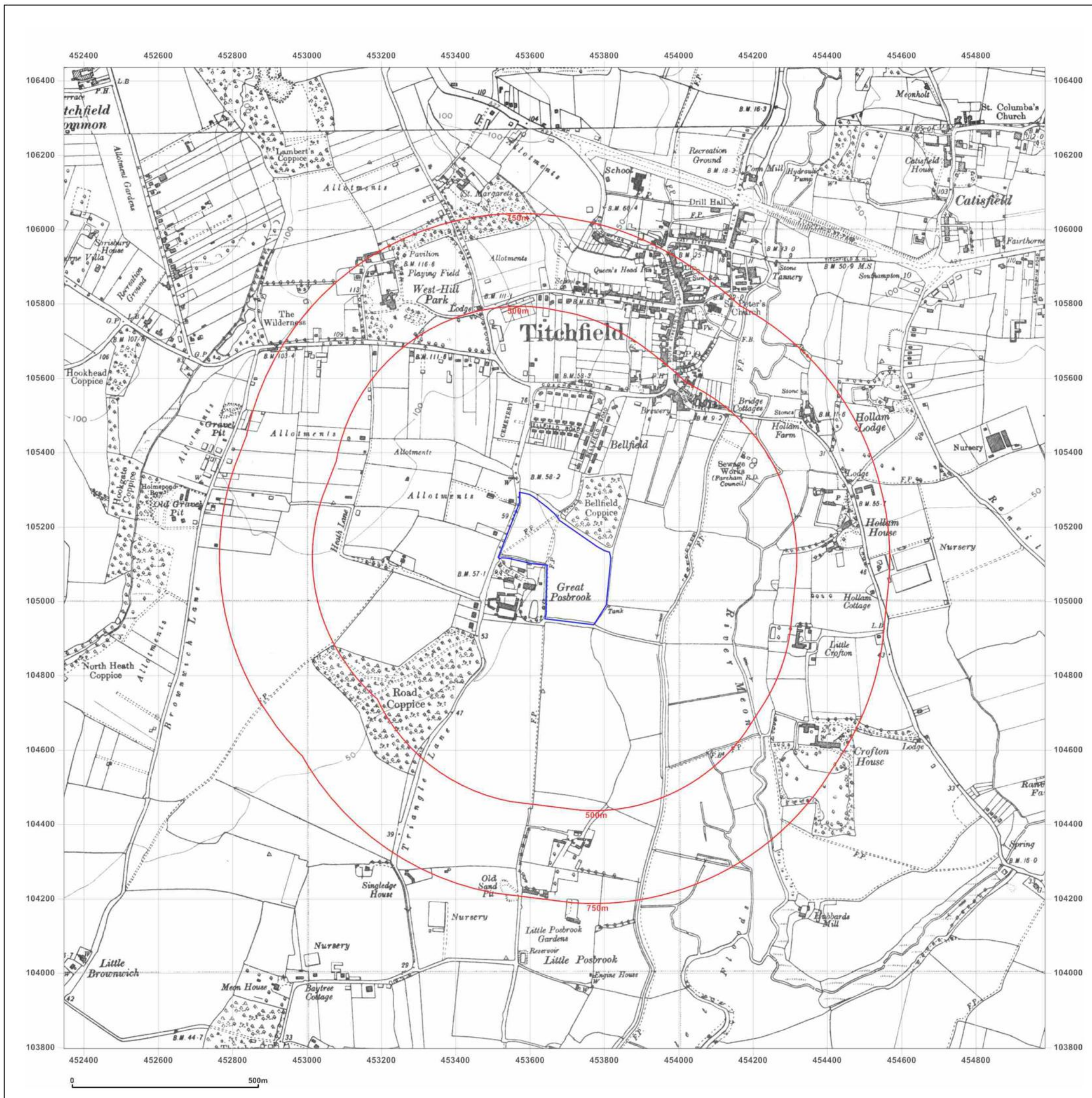


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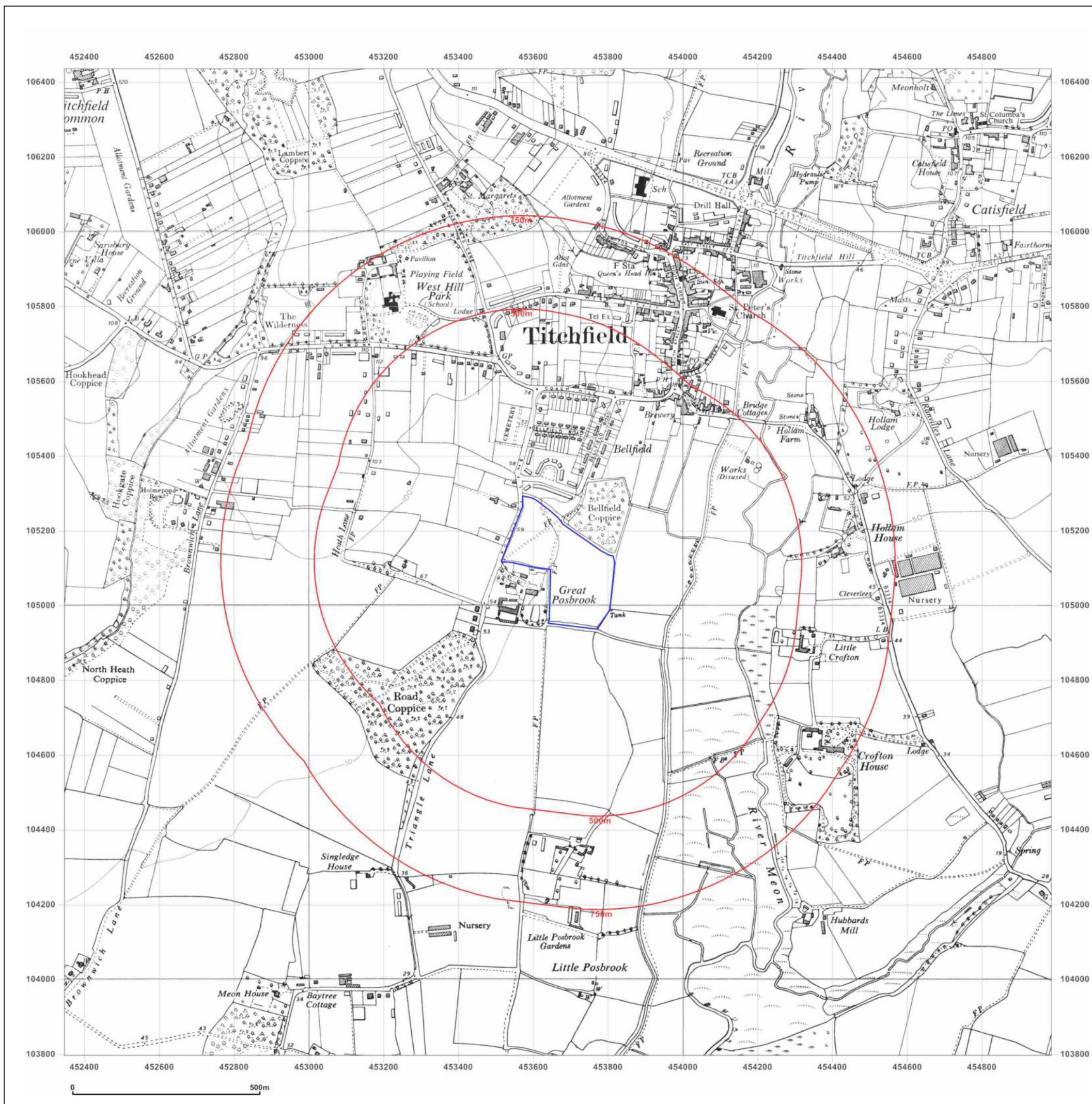


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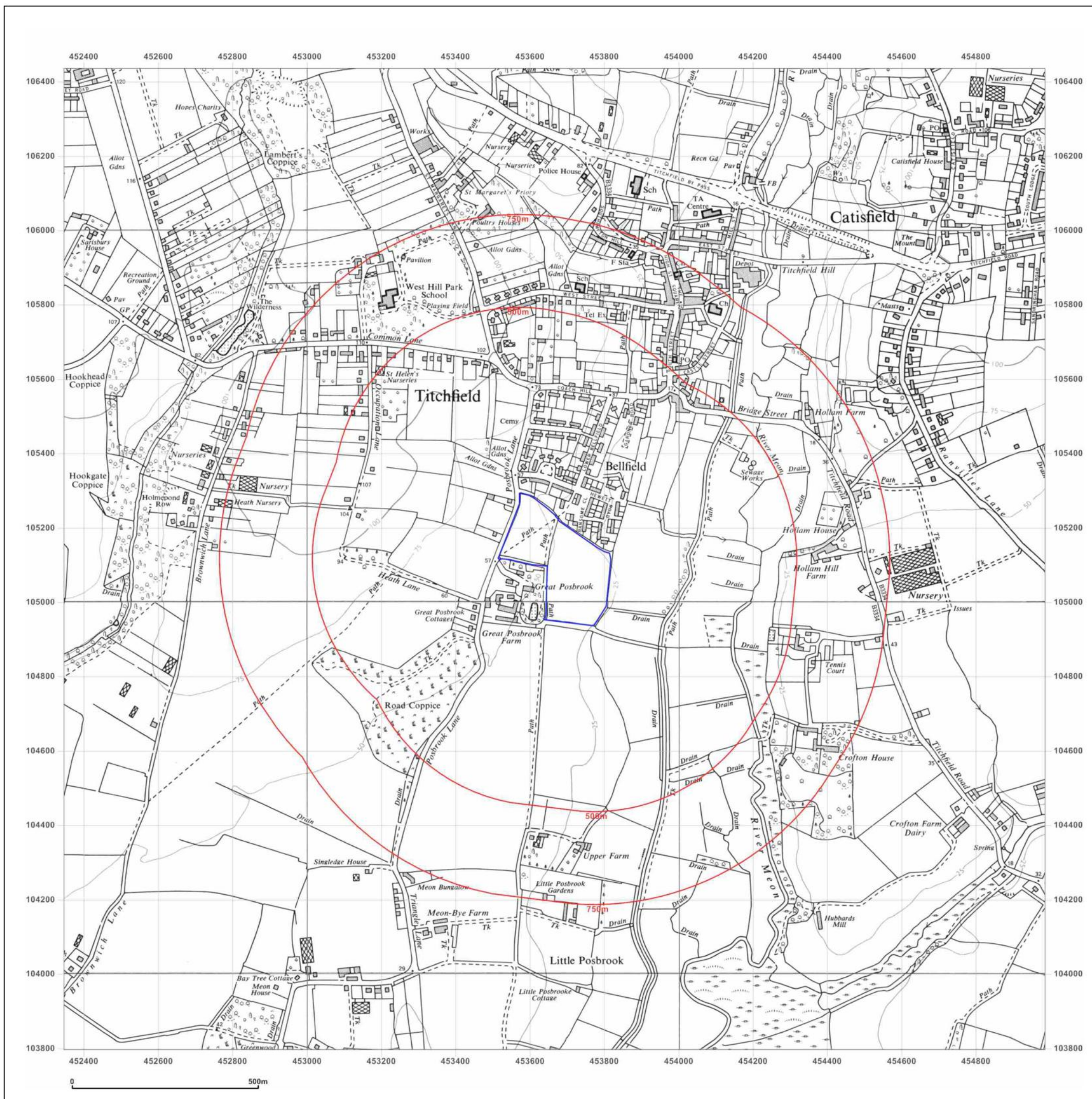


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81, BELLFIELD, FAREHAM,  
PO14 4JA

**Client Ref:** 1CO102431\_001763  
**Report Ref:** GS-3321871  
**Grid Ref:** 453665, 105115

**Map Name:** National Grid

**Map date:** 1977-1982

**Scale:** 1:10,000

**Printed at:** 1:10,000



Surveyed 1973  
Revised 1977  
Edition N/A  
Copyright 1977  
Levelled 1973

Surveyed 1982  
Revised 1982  
Edition N/A  
Copyright N/A  
Levelled N/A

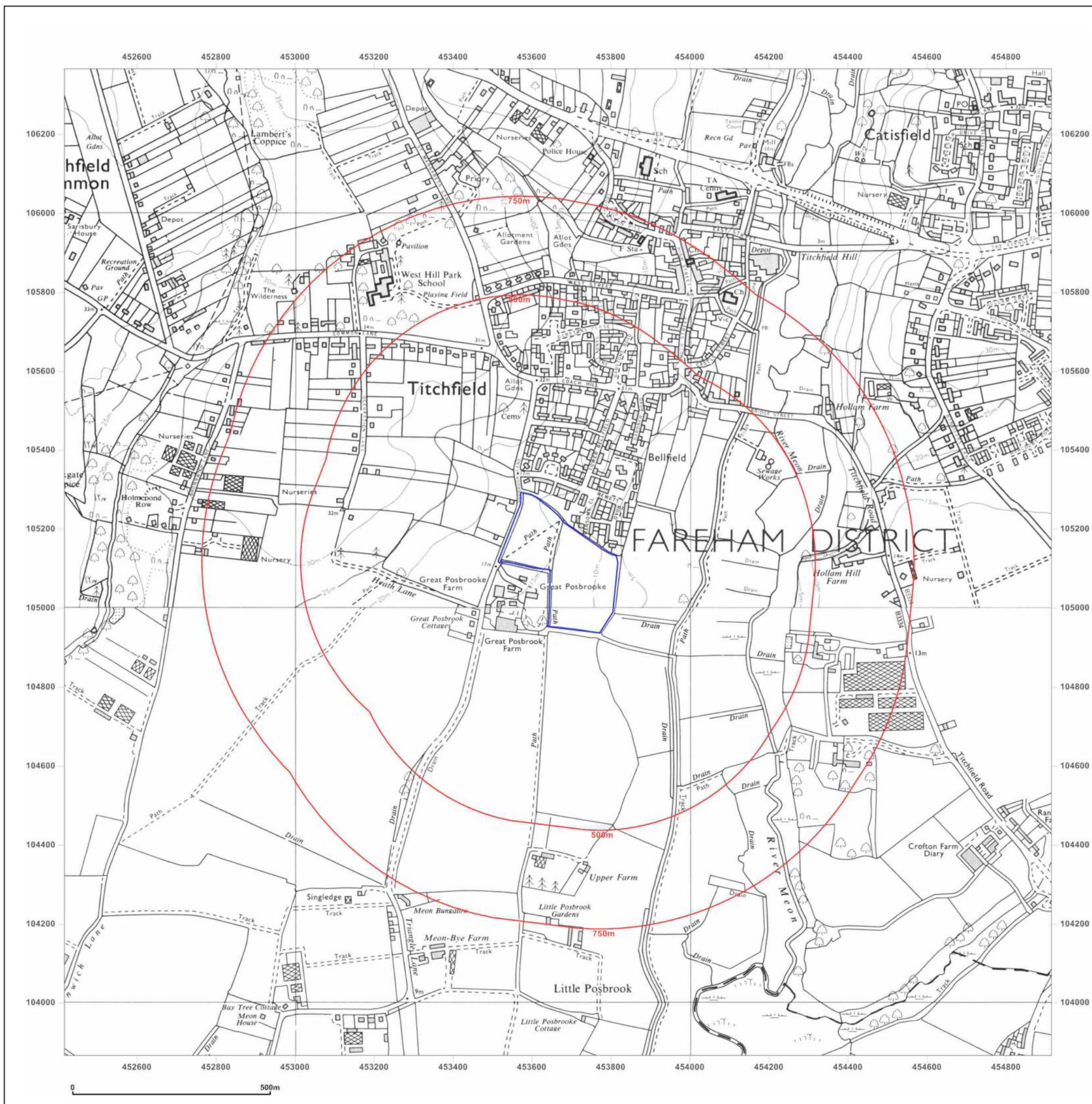


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**Site Details:**

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PO14 4JA

**Client Ref:** 1CO102431\_001763  
**Report Ref:** GS-3321871  
**Grid Ref:** 453665, 105115

**Map Name:** National Grid

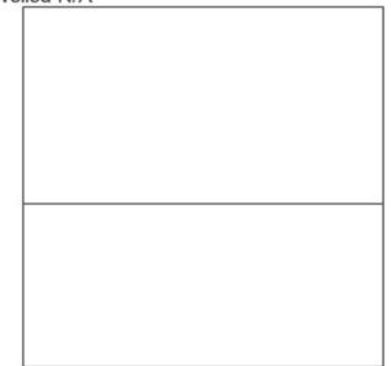
**Map date:** 1989

**Scale:** 1:10,000

**Printed at:** 1:10,000



Surveyed 1987  
Revised 1989  
Edition N/A  
Copyright N/A  
Levelled N/A

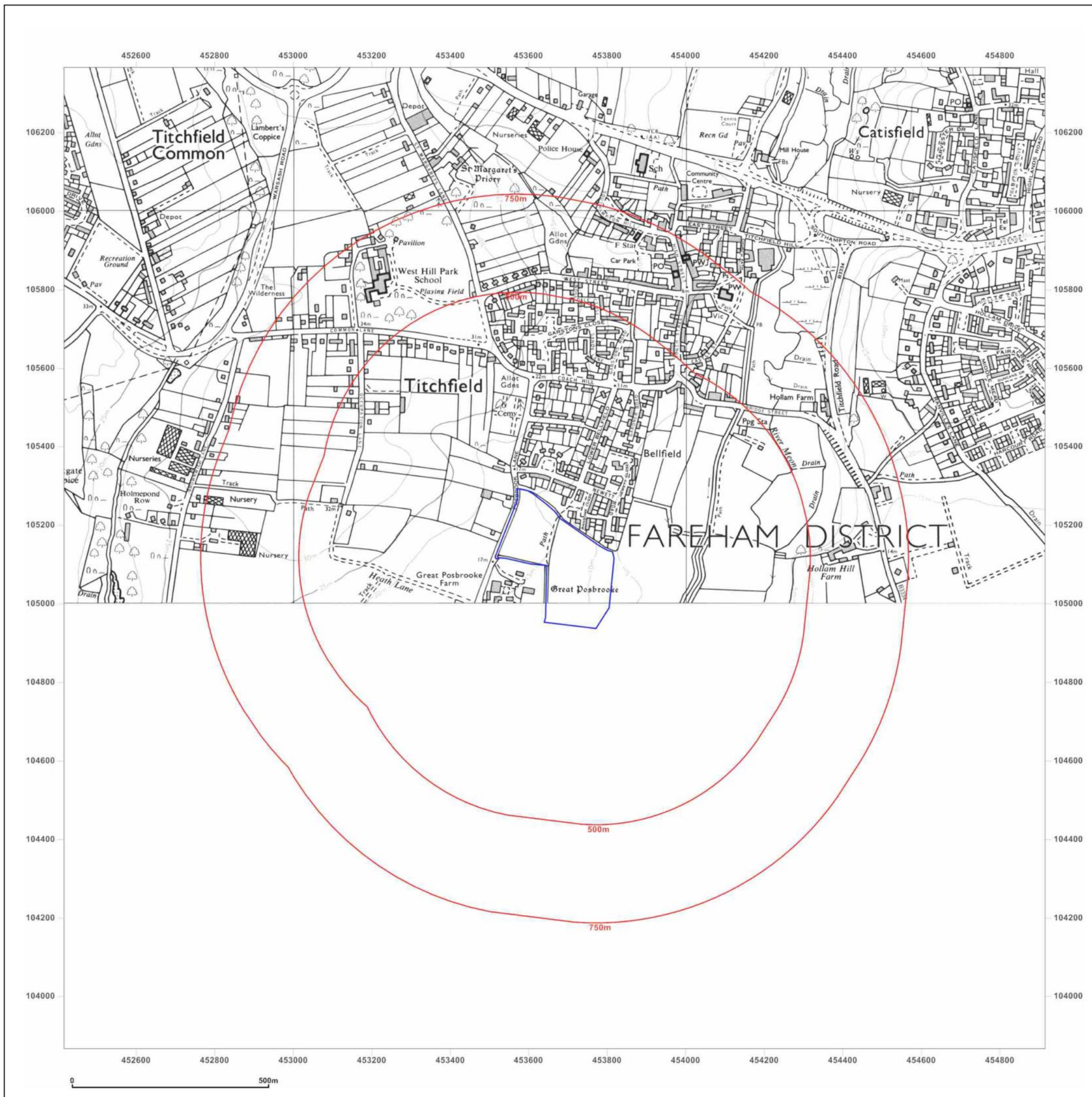


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**Site Details:**

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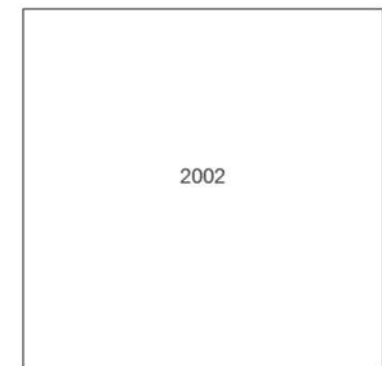
**Client Ref:** 1CO102431\_001763  
**Report Ref:** GS-3321871  
**Grid Ref:** 453665, 105115

**Map Name:** 1:10,000 Raster

**Map date:** 2002

**Scale:** 1:10,000

**Printed at:** 1:10,000



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**Client Ref:** 1CO102431\_001763  
**Report Ref:** GS-3321871  
**Grid Ref:** 453665, 105115

**Map Name:** National Grid

**Map date:** 2010

**Scale:** 1:10,000

**Printed at:** 1:10,000

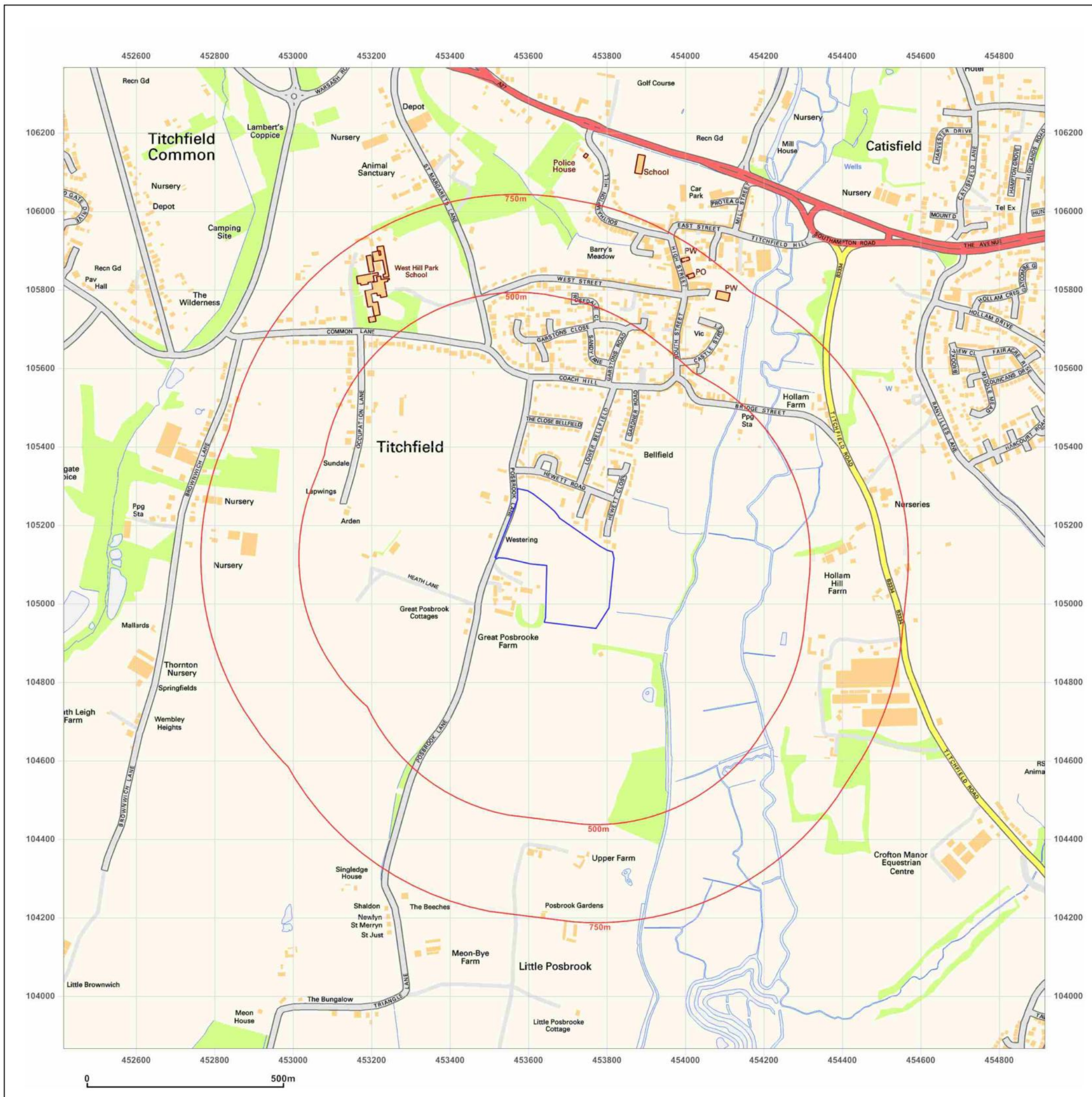


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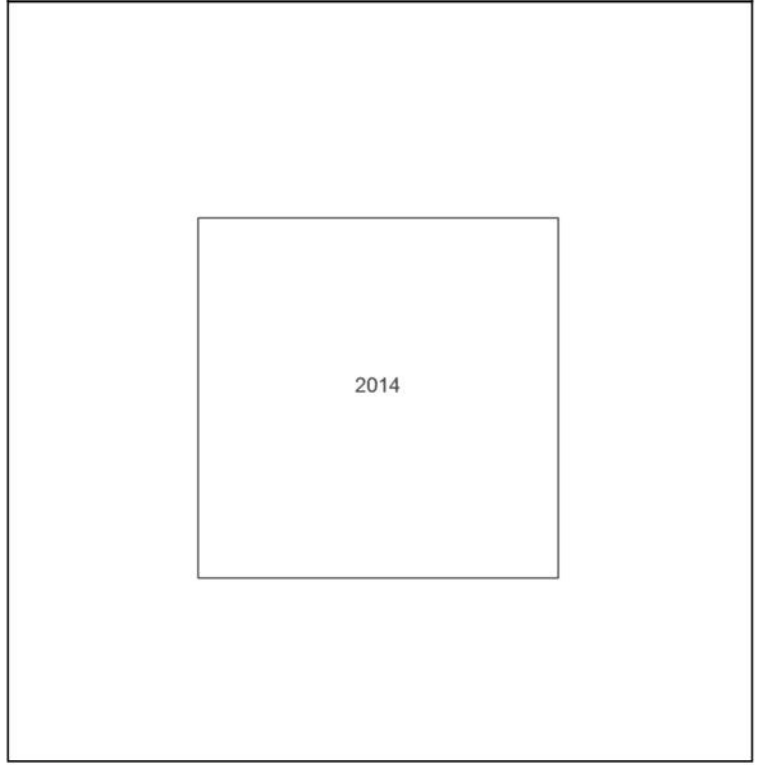
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**Report Ref:** GS-3321871  
**Grid Ref:** 453665, 105115

**Map Name:** National Grid

**Map date:** 2014

**Scale:** 1:10,000

**Printed at:** 1:10,000



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