



**PHASE 1 ENVIRONMENTAL SITE
ASSESSMENT REPORT**

**WHITE LODGE,
HANGLETON,
FERRING,
WEST SUSSEX,
BN12 6PP**

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EnviroSolution Ltd Document Verification

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Executive Summary

The preliminary environmental site assessment indicates that the site can be classified as moderate risk in terms of contamination and the risks to the identified receptors (e.g. human health, controlled waters, buildings) following redevelopment is considered to be moderate.

This classification is due to a number of potentially contaminative land uses, both on site and in the surrounding area which all have the potential to contaminate the shallow soils beneath the site. Potential contaminants include heavy metals, hydrocarbons and volatile and semi-volatile organic compounds. The site lies within a medium risk area for radon. The risk can be readily mitigated through the incorporation of basic radon protective measures.

It is recommended a Phase 2 intrusive ground investigation is undertaken prior to site redevelopment to obtain additional information on the ground conditions and the contamination status. The investigation should be carried out by qualified and competent persons. The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the Phase 2 intrusive works.

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1 Introduction

1.1 Background

EnviroSolution Ltd was commissioned to undertake a Phase 1 Environmental Site Assessment at a site located at White Lodge in Ferring, West Sussex. This report was commissioned to support a planning application for a residential development.

1.2 Objectives

The objective of the preliminary environmental site assessment was:

1. To provide a summary of the environmental setting and historical land use of the site and immediate surrounding area.
2. To obtain information on the ground conditions present beneath the site.
3. To develop a conceptual site model and complete a generic quantitative risk assessment to identify any environmental risks and liabilities associated with ground conditions at the site.

1.3 Scope of Work

To achieve the objectives, the following scope of work was completed:

1. A desk-based study of the site comprising a review of available environmental information for the site such as geological and hydrogeological data and historical land use information.
2. Site walkover survey.
3. Assessment of potential hazards and constraints during construction and longer term.

This work has been devised to generally comply with the relevant principles and requirements of the following legalisation and guidance:

- Part IIA of the Environmental Protection Act, 1990 and Section 57 of the Environmental Act 1995;
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012);
- National Planning Policy Framework (Ministry of Housing, Communities and Local Government, February 2019);
- BS10175: 2011 +A2:2017 "Investigation of Potentially Contaminated Sites- Code of Practice"; and
- DEFRA/Environment Agency (2004) Report CLR11 "Model Procedures for the Management of Land Contamination".

1.4 Information Sources

Historical Ordnance Survey maps have been obtained from historical records, ranging from 1877 to 2019. These maps provide high quality information on historical site use.

The British Geological Survey Geoindex database has been used to provide information on geo-environmental aspects of the site and the immediate surrounding area such as geological, hydrogeological and hydrological data.

The Environment Agency website (www.gov.uk/government/organisations/environment-agency) and Magic website (www.magic.gov.uk) was also used to obtain environmental information.

Industry Profiles produced by the Department of the Environment were utilised to obtain information on processes, materials and wastes associated potential contaminative land uses near the site.

Readily available information sources have been used to produce this desk-based study. Additional information may be requested by the Local Planning Authority (e.g. local authority environmental information request).

2 The Site

2.1 Site Location

The site is located at White Lodge, Hangleton Lane, Ferring, West Sussex, BN12 6PP. The British National Grid Reference for the approximate site centre is GR: 508845 103741.

The site location is shown on **Figure 1** in **Appendix A**.

2.2 Site Description

The site description is aided by the completion of a site description conducted by EnviroSolution on the 6th February 2020. The site photographs are included in **Appendix B**.

The site is located along the northern extent of Hangleton Lane in north Ferring. The site is rectangular in shape and covers an approximate area of 1,300 square meters.

The site is occupied by the existing property of White Lodge in the north-eastern corner, a caravan/ vehicle storage yard and repair workshop in the western half and an open lawn in the south-eastern corner.

The area of vehicle storage is covered in pea gravel.

The site is accessed from Hangleton Lane via a double gate in the south-eastern corner.

The site boundaries consist of 2.5m tall hedgerows along the southern and eastern boundaries and wooden panel fencing on all other sides. The site is bounded by residential properties to the south and west, an equestrian centre to the east and open agricultural fields to the north.

The overall site is generally flat with little change in elevation.

The surrounding land use is a mix of residential with several plant nurseries, equestrian centre and storage yards.

No petrol filling stations have been identified within a 250m radius of the site.

The existing site plan is shown on **Figure 2** which is included in **Appendix A**.

2.3 Development Proposals

It is understood that the development proposal includes the construction of a new residential bungalow with associated parking and private garden.

The development plans are included in **Figure 3** in **Appendix A**.

2.4 Site History

The development site and surrounding area has been reviewed with reference to historical Ordnance Survey (OS) maps. The history of the site and immediate surrounding area is summarised in Table 1. Copies of the historical OS maps are included in **Appendix C**. A search buffer of 250m has been used.

Table 1 - Historic Mapping Review

Date	Scale	On Site	Off Site
1877	1:2,500	The site lies undeveloped within an open agricultural field.	Surrounding area largely undeveloped.
1897	1:2,500	No significant change.	No significant change.
1911	1:2,500	No significant change.	Plant nurseries 150m south of the site.
1932	1:2,500	Site is part of a small orchard.	Storage tank 220m south of the site.
1942	1:2,500	No significant change.	No significant change.
1971	1:2,500	No significant change.	White Lodge built to along the northern boundary. Terringes Nursery built along southern boundary. Builders yard 70m south of the site. Tanks 70m south of the site. Plant nurseries 120m south of the site. Engineering works 250m southwest of the site.
1983	1:2,500	Residential property built on site.	Plant nurseries 15m southwest of the site.
1994	1:2,500	No significant change.	Equestrian centre 80m east of the site.
2003	1:1,250	No significant change.	No significant change.
2019	1:2,500	Site used as a caravan storage yard.	No significant change.

3 Environmental Setting

3.1 Geology

Geological maps of the area indicate the site is underlain by superficial head deposits which are of Quaternary age. Head deposits generally consist of poorly sorted, angular rock debris and/ or clayey hillwash.

The underlying bedrock consists of undifferentiated chalk formations (Lewes Nodular Chalk, Seaford Chalk, Newhaven Chalk, Culver Chalk). The chalks generally consist of hard chalks with seams of nodular flints.

No geological faults have been identified within a 1km radius of the site.

A single BGS borehole (Ref: TQ00SE16) has been obtained 220m south of the site. The borehole shows superficial drift overlying chalk bedrock.

A copy of the geological maps is included in **Appendix D**. A copy of the BGS borehole logs is included in **Appendix E**.

3.2 Radon

The site lies within an elevated band of radon potential where it is estimated that between 5-10% of the properties are above the action level (medium probability). Basic radon protective measures are required for the development. Further guidance can be found in BRE 211 'Radon: Guidance on protective measures for new buildings'.

3.3 Coal Mining Activity

The site does not fall within a coal mining area described as having minable coal deposits and does not lie within a 'Development High Risk Area' for coal mining, as defined by the Coal Authority. As such, it is considered that there are no coal mining related hazards which could affect the site.

3.4 Hydrogeology

The superficial head deposits are designated as a Secondary (undifferentiated Aquifer, defined as; cases where it has not been possible to assign category A or B to a soil type due to the variability in lithology.

The underlying chalk formations are designated as a Principal Aquifer. This is defined as; layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

The site does not lie within a Source Protection Zone, and there are no records of sites that hold a groundwater abstraction licence held within a 1km radius of the site.

A copy of the hydrogeological maps is included in **Appendix F**.

3.5 Hydrology

Ferring Rife is located 520m southeast of the site and is the only significant surface water feature located within a 1km radius of the site.

There are no minor surface water features located within a 250m radius of the site.

3.6 Flood Risk

The site lies within a Flood Zone 1, defined as land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).

3.7 Waste Management Facilities

There are no records of historic or currently authorised landfill sites located within a 1km radius of the site.

There are no sites located within a 1km radius of the site operating under an environmental permit for waste operations.

3.8 Environmental Permits, Incidents and Registers

There are several records of sites located within a 1km radius of the development site operating under an environmental permit for discharges to water and groundwater. The nearest permit is held 50m south of the site.

There are no records of pollution events having occurred within a 500m radius of the site.

3.9 Designated Environmentally Sensitive Sites

There are no records of designated environmentally sensitive sites located within a 1km radius of the site.

4 Preliminary Conceptual Site Model

4.1 Introduction

In order to assess the environmental risks present, a preliminary conceptual model has been developed for the site. This model has been developed using best practice guidelines in conjunction with the current assessment framework taking into account the development proposals. This preliminary conceptual model is based on the gathered desk-based information (e.g. historical OS data and data sourced from the EA, Geoindex and Magic databases).

The conceptual site model is a representation of the hypothesised relationships between sources, pathways and receptors which allows the identification of potential pollutant linkages and whether these linkages have the potential to comprise significant harm and/or pollution of controlled waters in relation to the site. This model comprises three elements:

Source – the key pollutant hazards associated with the site

Receptor – the key targets at risk from the sources

Pathway – the means by which the contaminant can cause harm to the receptor

If all three elements are present, then a potential pollutant linkage exists, and this may require further assessment.

4.2 Potential Contamination Sources

Historically, the site has remained undeveloped until the 1980s when the White Lodge residential property was constructed in the northern end of the site and the western half was used as a caravan/ vehicle storage yard. A workshop was built in the north-western corner. These land uses have the potential to contaminate the shallow soils beneath the site. Potential contaminants include heavy metals and hydrocarbons.

Additionally, several off-site land uses have been identified with the potential to contaminate the ground. These land uses include plant nurseries, tanks, storage/ builders yards.

4.3 Receptors

The potential receptors considered to be at risk from soil and groundwater contamination associated with the site are summarised in Table 2 below:

Table 2 - Receptor Description

Receptor	Details
Human (On Site)	- Construction workers - Future site users - Site visitors

Receptor	Details
Human (Off Site)	- Adjacent site users
Controlled Waters	- Secondary Aquifers - Principal Aquifers - Ferring Rife
Building/ construction materials	- Foundations and buried services

4.4 Pathways

The potential exposure pathways linking contamination with the receptors identified above are summarised in Table 3 below:

Table 3 - Exposure Pathways Summary

Receptor	Details of Exposure Pathway
Human (on-site)	- Direct ingestion of contaminated soil/groundwater - Dermal contact with soil/groundwater - Inhalation of gases and vapours
Human (off-site)	- Inhalation of fibres and particulates - Inhalation of migrating gases and vapours
Controlled waters	- Vertical and lateral migration of dissolved phase contaminants via preferential pathways to groundwater aquifers - Direct surface water run-off to surface water features
Building/construction	- Buried materials/services - Contact with contaminated soil and/or groundwater

4.5 Potential Pollution Linkages

4.5.1 Human Health

The development comprises the construction of a new residential dwelling with associated vehicle parking and garden. This is considered to be a sensitive end use.

The presence of buildings and hardstanding would eliminate the risk of exposure, via the dermal contact and ingestion pathways to future site users to any ground contamination that may remain following development.

There could be a potential risk of exposure to any ground contamination that remains following redevelopment in the proposed areas of soft landscaping (i.e. gardens), to future site users, via all possible exposure pathways.

Any ground gases (i.e. methane and carbon dioxide) and vapours that are present within the soils beneath the site could potentially ingress into the buildings through preferential pathways (e.g. service entry points). Therefore, there would be a risk of exposure via inhalation to future site users.

There is the potential for construction workers and adjacent land users to be exposed to soil and groundwater contamination during site redevelopment. However, the use of appropriate PPE and the adoption of suitable Health and Safety methods will help to reduce the risks posed to human health during this work.

4.5.2 Controlled Waters

The site is directly underlain by typically low permeability superficial head deposits. These deposits will act as a barrier, limiting contaminant migration to sensitive controlled water receptors.

Ferring Rife is considered to be at a sufficient distance from the site to not be affected by any potential contamination. The likelihood of direct surface run-off is low.

The site is not located within a Source Protection Zone and there are no groundwater abstraction licences held within a 1km radius of the site. The risk to controlled waters is deemed to be low.

4.5.3 Building/ Construction Materials/ Buried Services

The presence of any soil and groundwater contaminants beneath the site could potentially impact on construction materials for the new development, such as below ground structures and services. Concrete foundations are particularly sensitive to aggressive ground conditions, i.e. sulphate attack.

If ground gases and vapour are present in the soil beneath the site, then there would be the potential risk of ingress into the new properties which could present a risk of explosion.

4.6 Preliminary Hazard Assessment

A preliminary hazard assessment is presented in Table 4. The preliminary hazard assessment is a qualitative assessment of the risks posed by each potential pollutant linkage described above and is used to identify the requirement for additional work (e.g. intrusive ground investigation).

Table 4 – Preliminary Hazard Assessment

Source 1	Pathway	Receptor	Likelihood	Effect	Risk	Assessment
Contaminated soil	Ingestion (via soil dust), inhalation (via soil dust and vapours), ingestion through dirty hands, dermal contact with soil/water.	Future site users Adjacent site users Construction workers	2	3	Moderate	Source potential identified. Sensitive end use. Garden areas provide exposure pathways.
Contaminated soil groundwater	Direct contact	Buildings/ services	2	3	Moderate	On-site source potential identified.
Contaminated groundwater	Downward or lateral migration Surface water run-off	Ferring Rife Secondary Aquifer Principal Aquifer	1	3	Low	Superficial material will act as a barrier to limit migration of contaminants to controlled water receptors.
Ground gas / vapours Radon	Inhalation, ingress into buildings	Buildings / services Future site users Adjacent site users Construction workers	2	4	Moderate	No significant ground gas source identified. Site located within a medium probability area for radon. The risk can be readily mitigated through the incorporation of basic radon protective measures.

Using Risk Matrix (Table 5) Degree of Risk (R) = Likelihood (L) x Effect (E)

Table 5 - Risk Matrix, Degree of Risk (R) = Likelihood (L) x Effect (E)

Likelihood	Description	Probability	Effect (E)	Description
5	Almost certain	>70%		
4	Probable	50-70%	4	Severe
3	Likely	30-50%	3	Medium
2	Unlikely	10-30%	2	Mild
1	Negligible	<10%	1	Minor
Risk (R)	Risk Level	Action		
1-5	Low	None required		
6-10	Moderate	Further assessment via Phase 2 intrusive ground investigation.		
>10	High	Further assessment via Phase 2 intrusive ground investigation.		

5 Conclusions and Recommendations

The preliminary environmental site assessment indicates that the site can be classified as moderate risk in terms of contamination and the risks to the identified receptors (e.g. human health, controlled waters, buildings) following redevelopment is considered to be moderate.

This classification is due to a number of potentially contaminative land uses, both on site and in the surrounding area which all have the potential to contaminate the shallow soils beneath the site. Potential contaminants include heavy metals, hydrocarbons and volatile and semi-volatile organic compounds. The site lies within a medium risk area for radon. The risk can be readily mitigated through the incorporation of basic radon protective measures.

It is recommended a Phase 2 intrusive ground investigation is undertaken prior to site redevelopment to obtain additional information on the ground conditions and the contamination status. The investigation should be carried out by qualified and competent persons. The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the Phase 2 intrusive works.

APPENDICES

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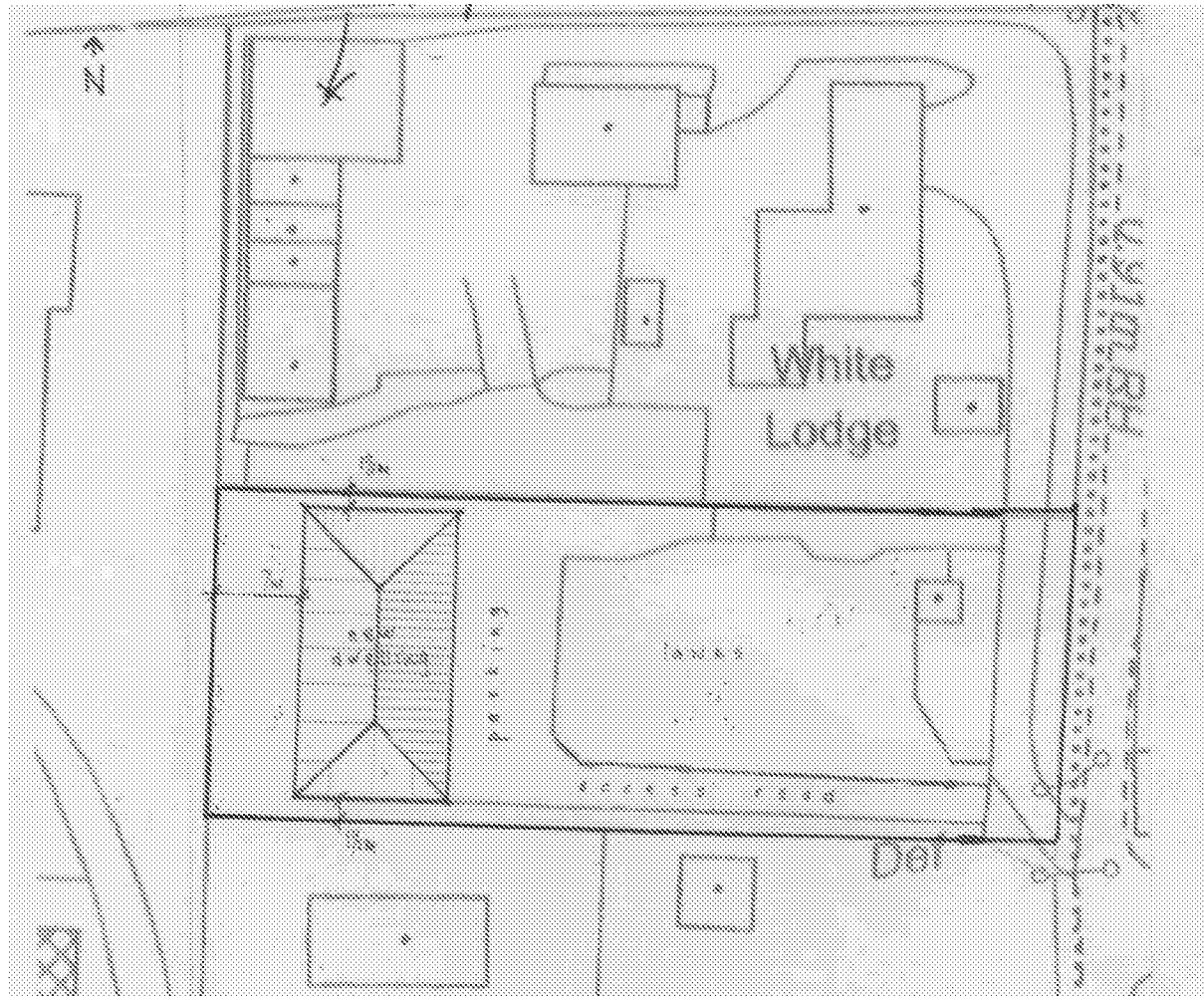
Figure 1



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Existing Site Plan

Figure 2



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Proposed Development Plan

Figure 3

Appendix B – Site Photographs



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Site entrance looking northwest (Google Street View, 2012)



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View looking north along access track running along the eastern flank of the site (Google Street View, 2012)



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View of adjacent site looking southeast (Google Street View, 2012)



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View looking east along the southern site boundary



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Site entrance



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**View looking west along southern site
boundary**



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Pea gravel ground covering in western half of the site in areas for van storage



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Western site boundary



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Site view looking northwest



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Site entrance

Appendix C - Historical Maps

Site Details:

WHITE LODGE, HANGLETON
LANE, FERRING, BN12 6PP

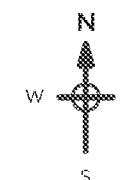
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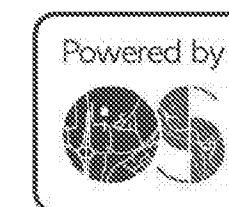
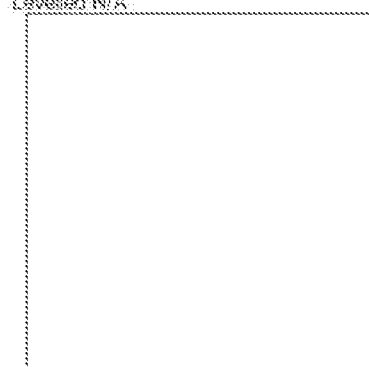
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Revised 1877
Edition N/A
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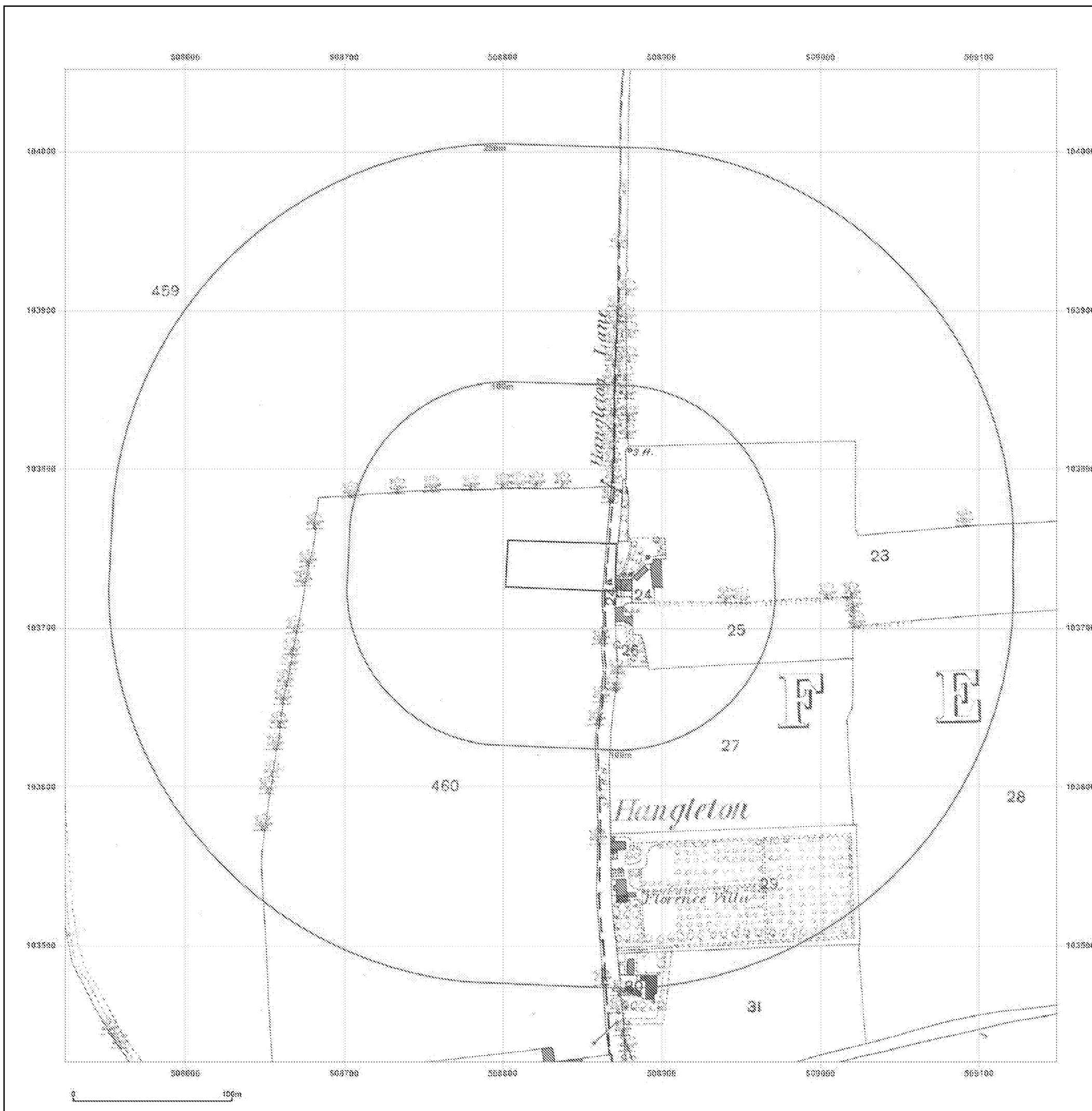


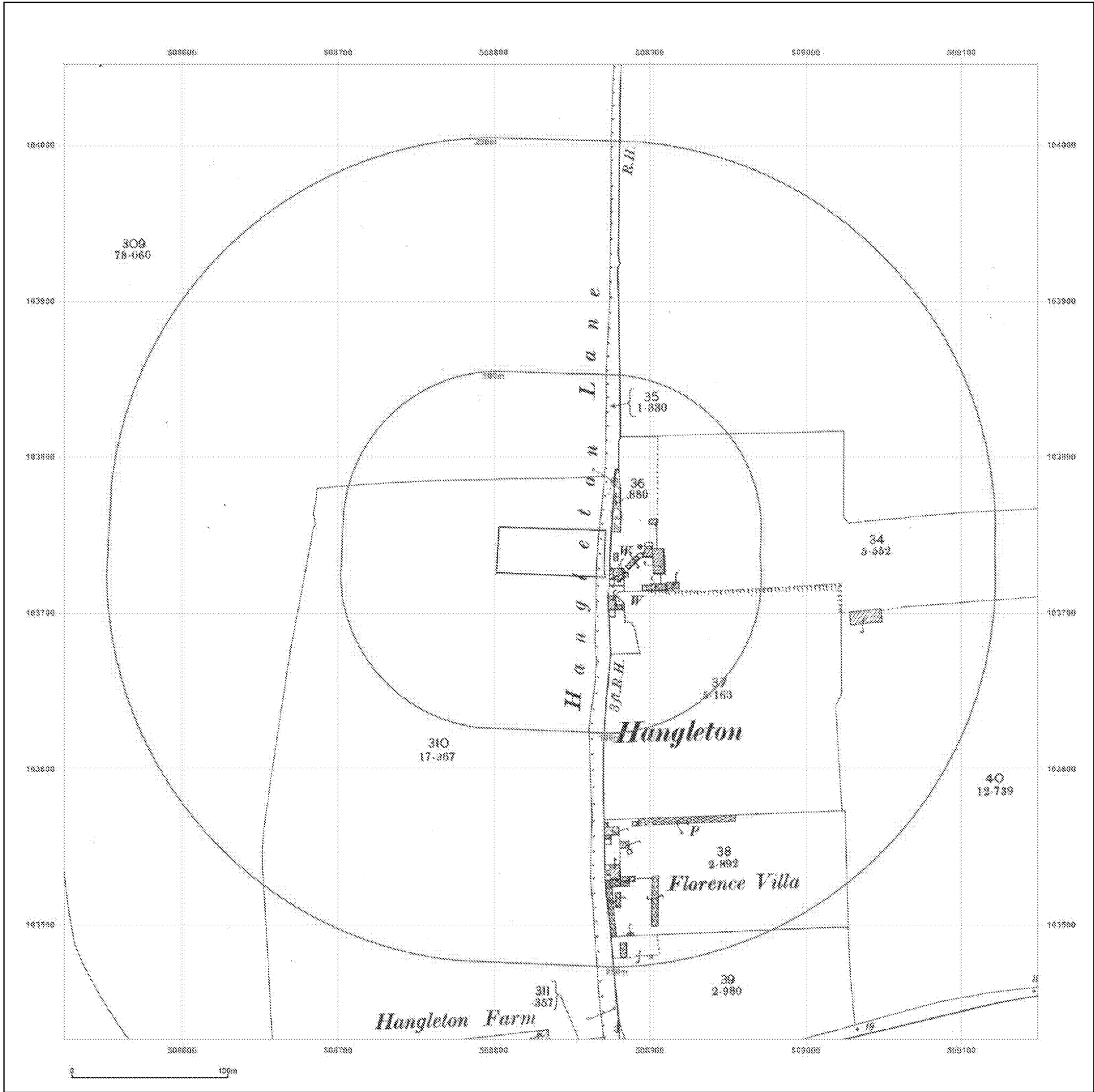
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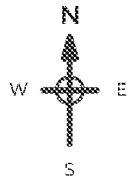


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LANE, FERRING, BN12 6PP

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Scale: 1:2,500
Printed at: 1:2,500



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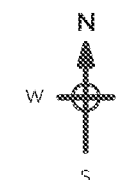
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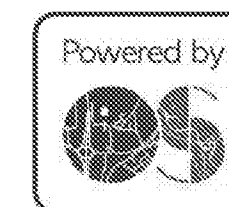
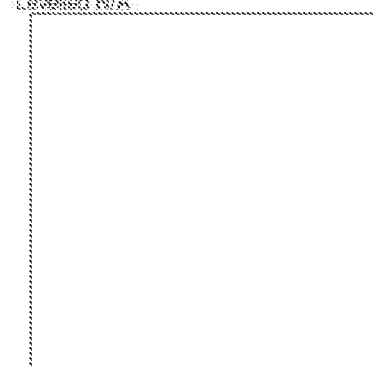
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Surveyed 1911
Revised 1911
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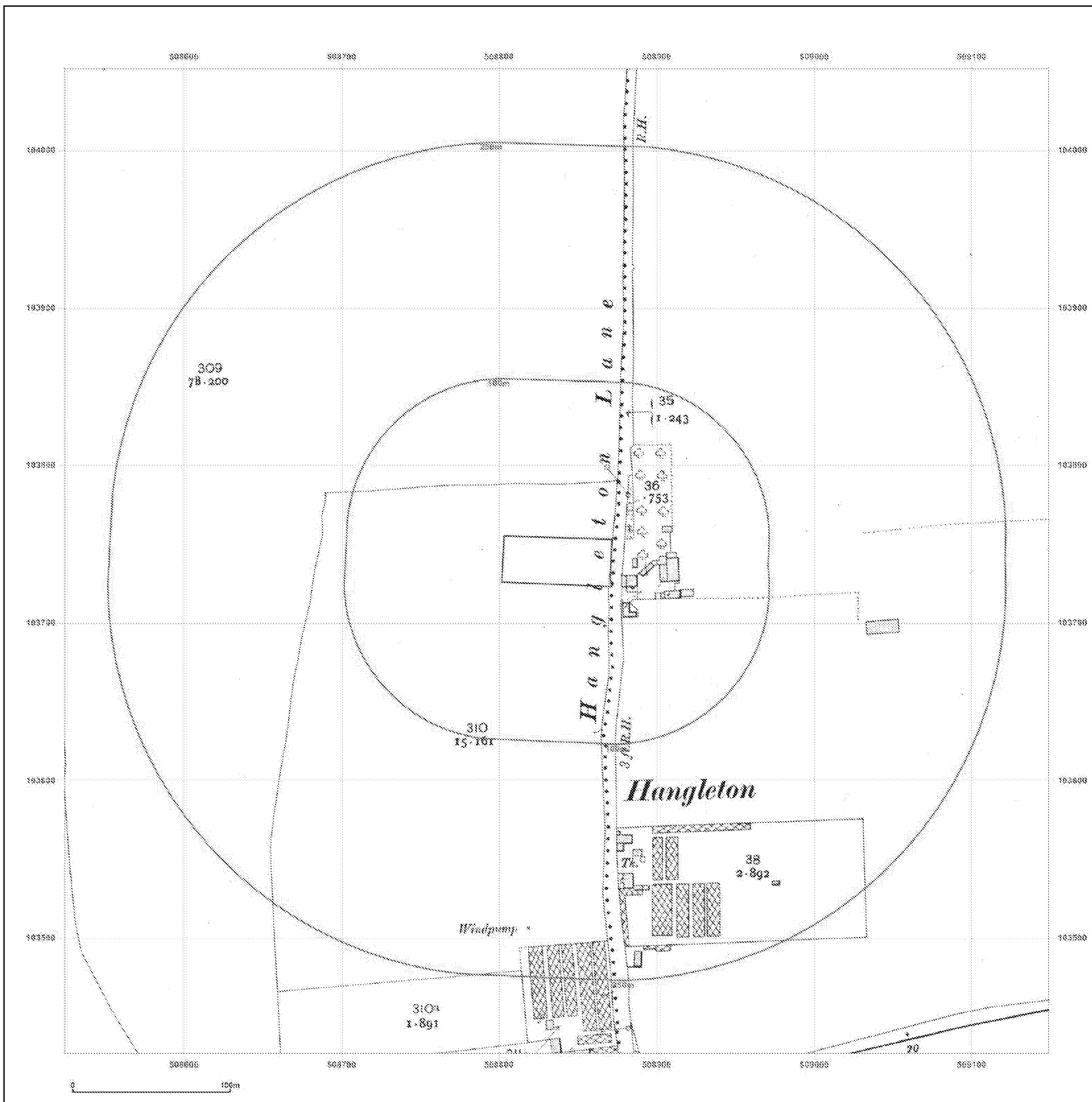


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Site Details:

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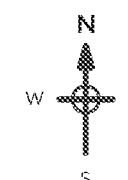
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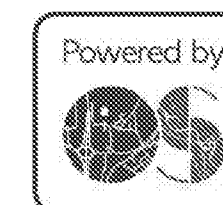
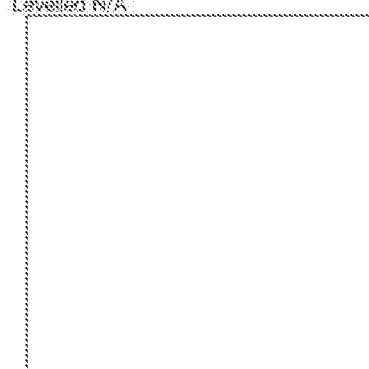
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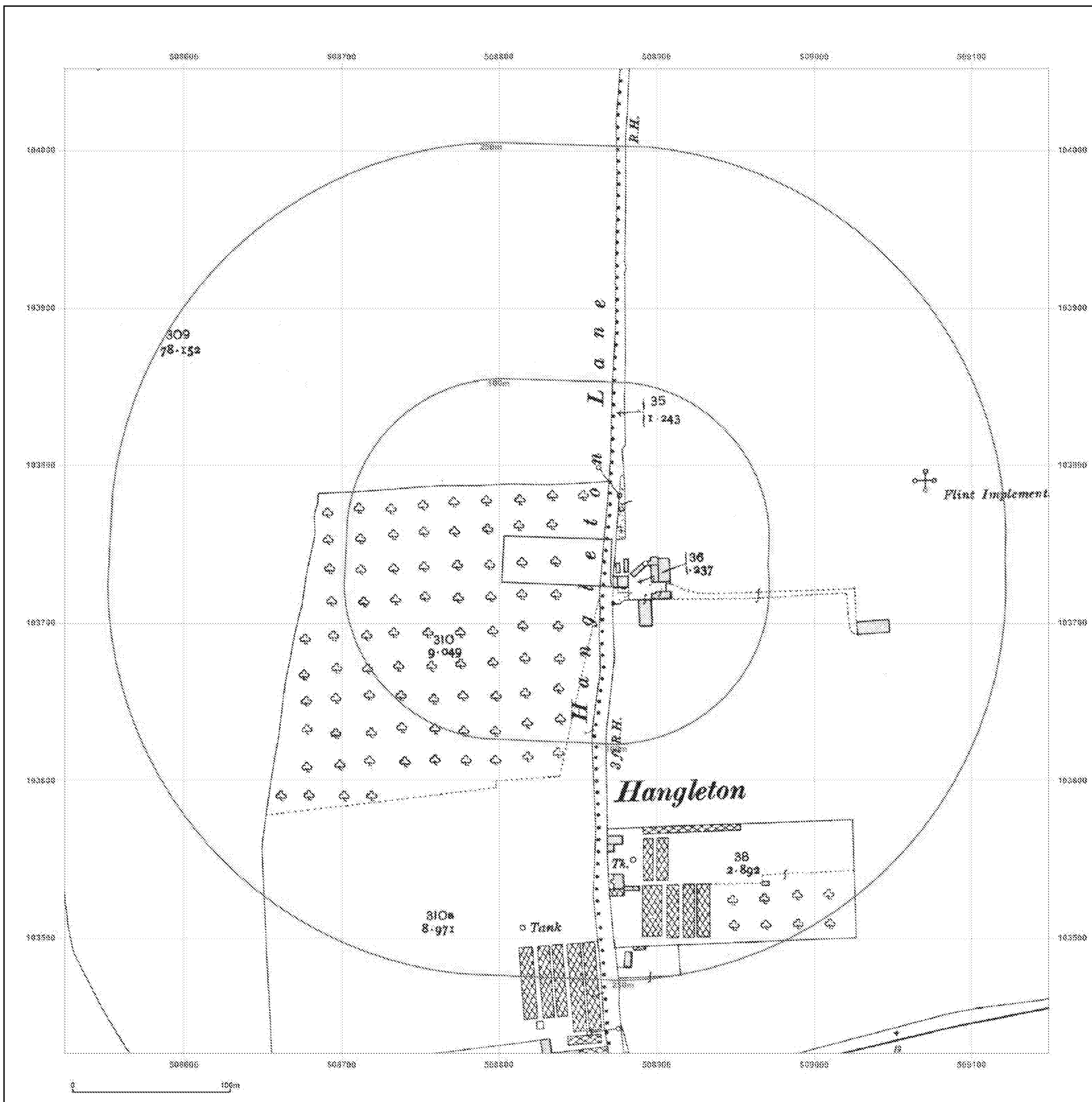


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Site Details:

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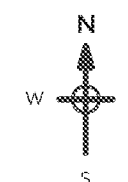
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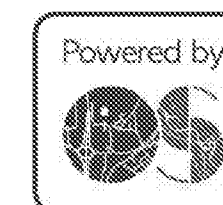
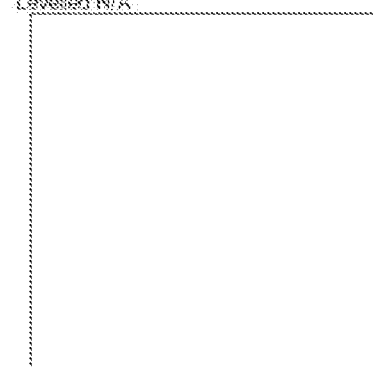
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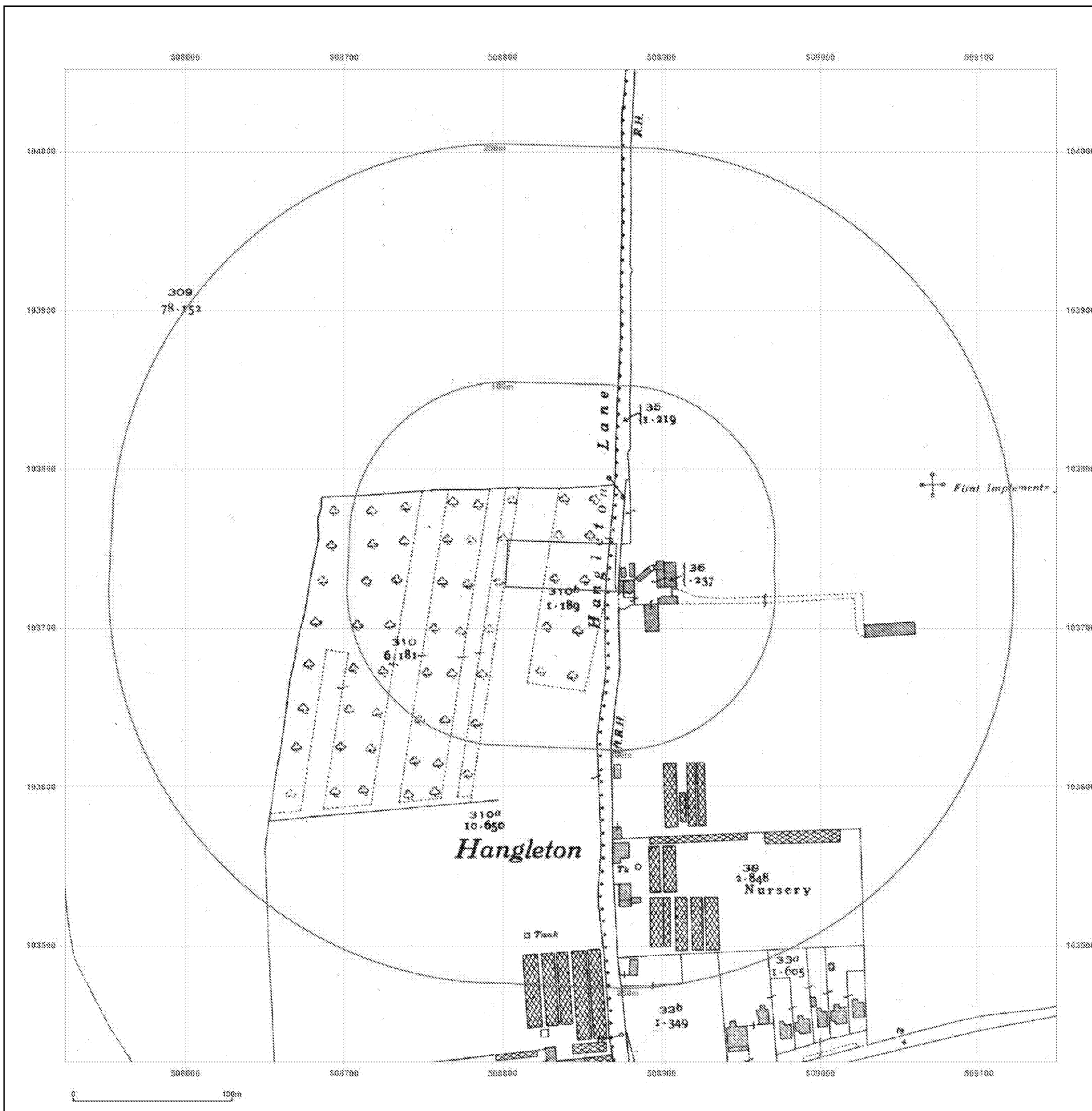


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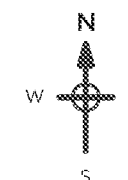
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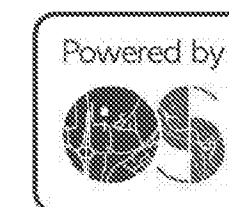
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Surveyed 1959
Revised 1971
Edition N/A
Copyright 1972
Levelled 1968

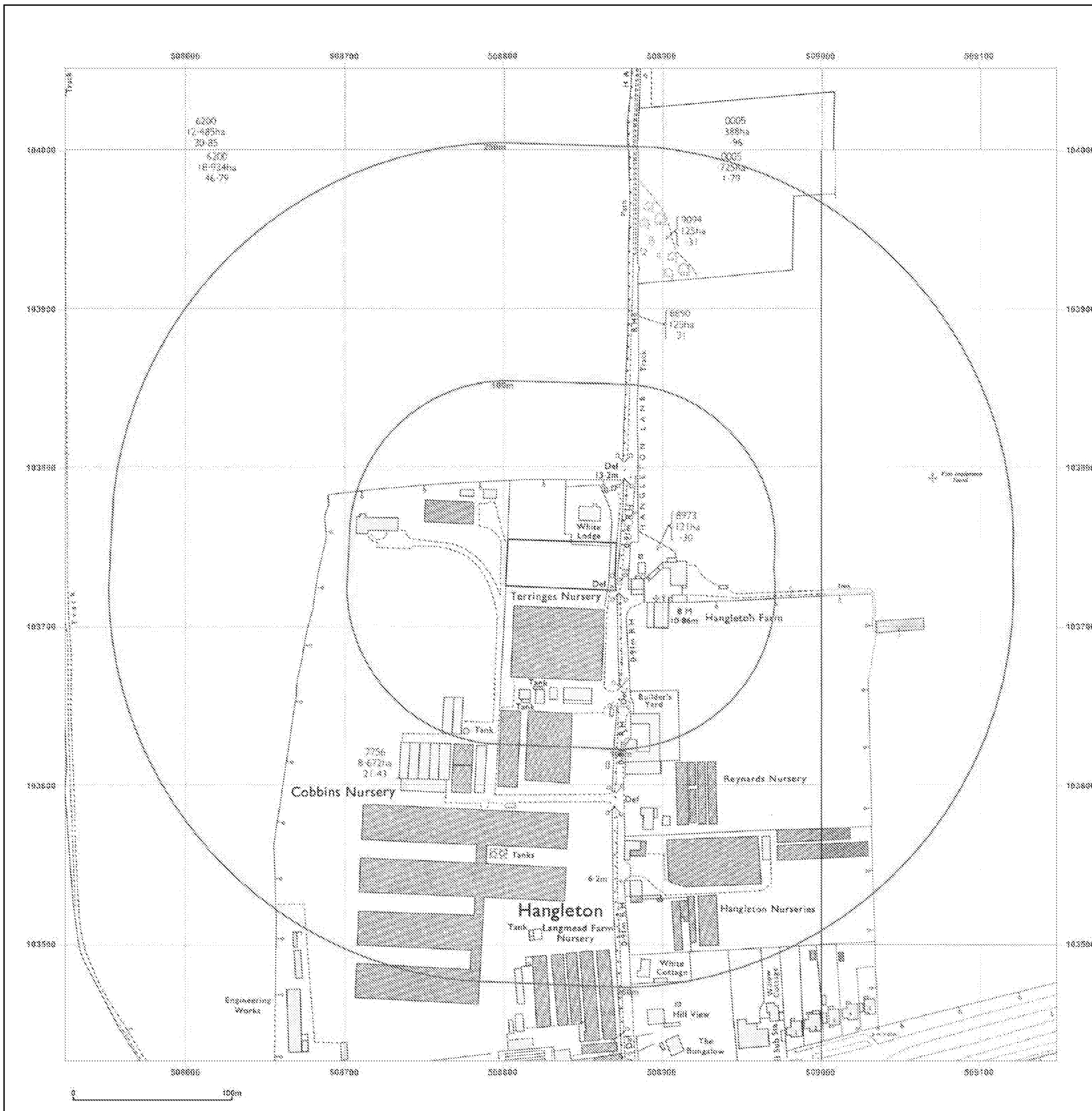


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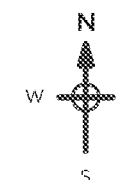
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Map Name: National Grid

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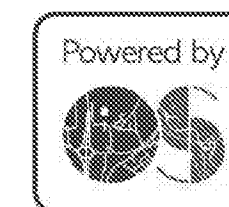


Surveyed N/A
Revised N/A
Edition N/A
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Levelled N/A

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Revised N/A
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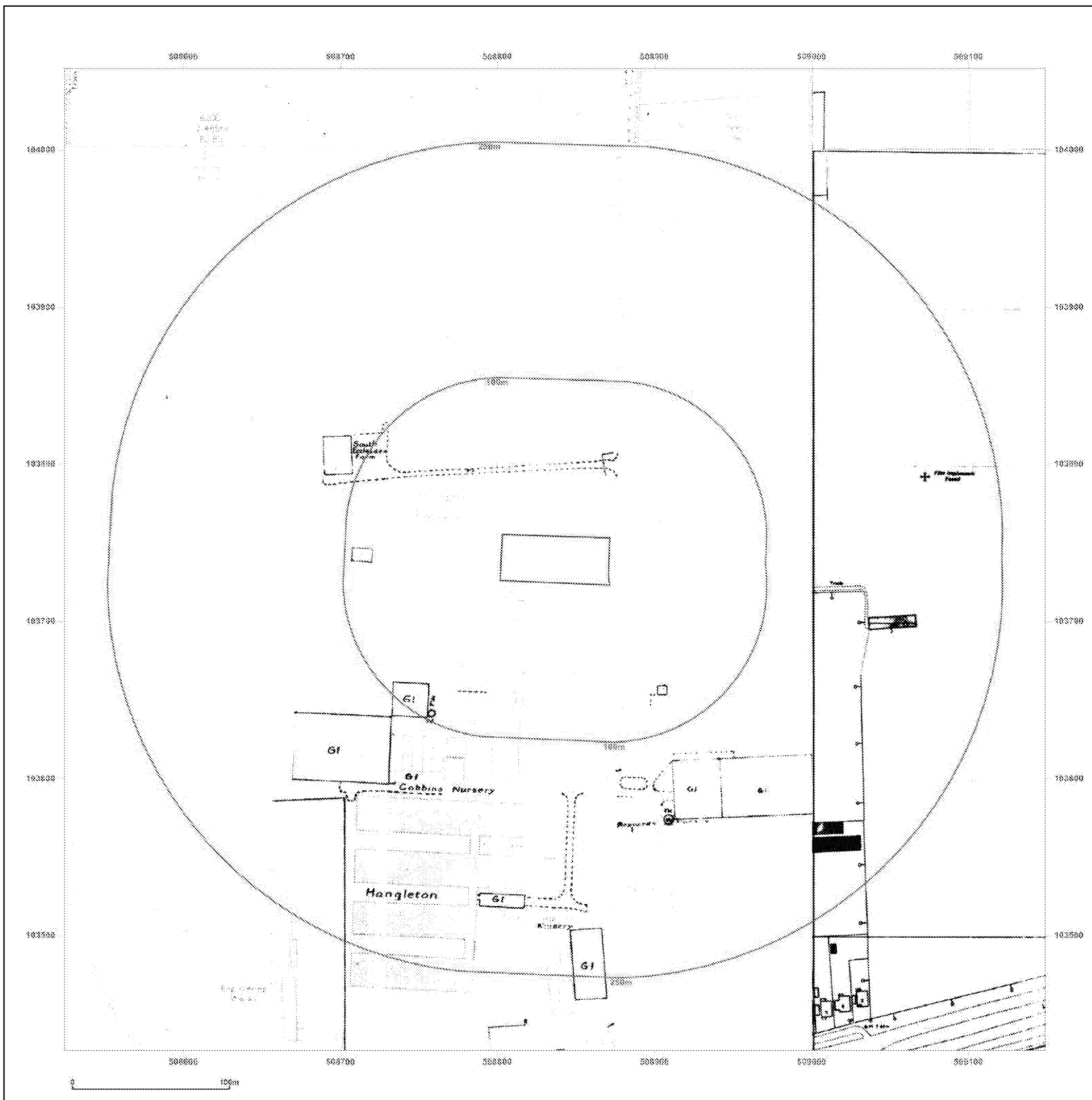


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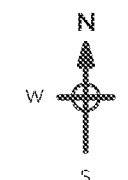
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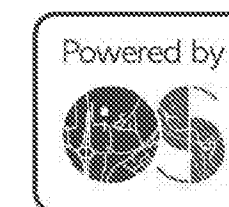
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Surveyed 1966
Revised 1983
Edition N/A
Copyright 1983
Levelled 1985

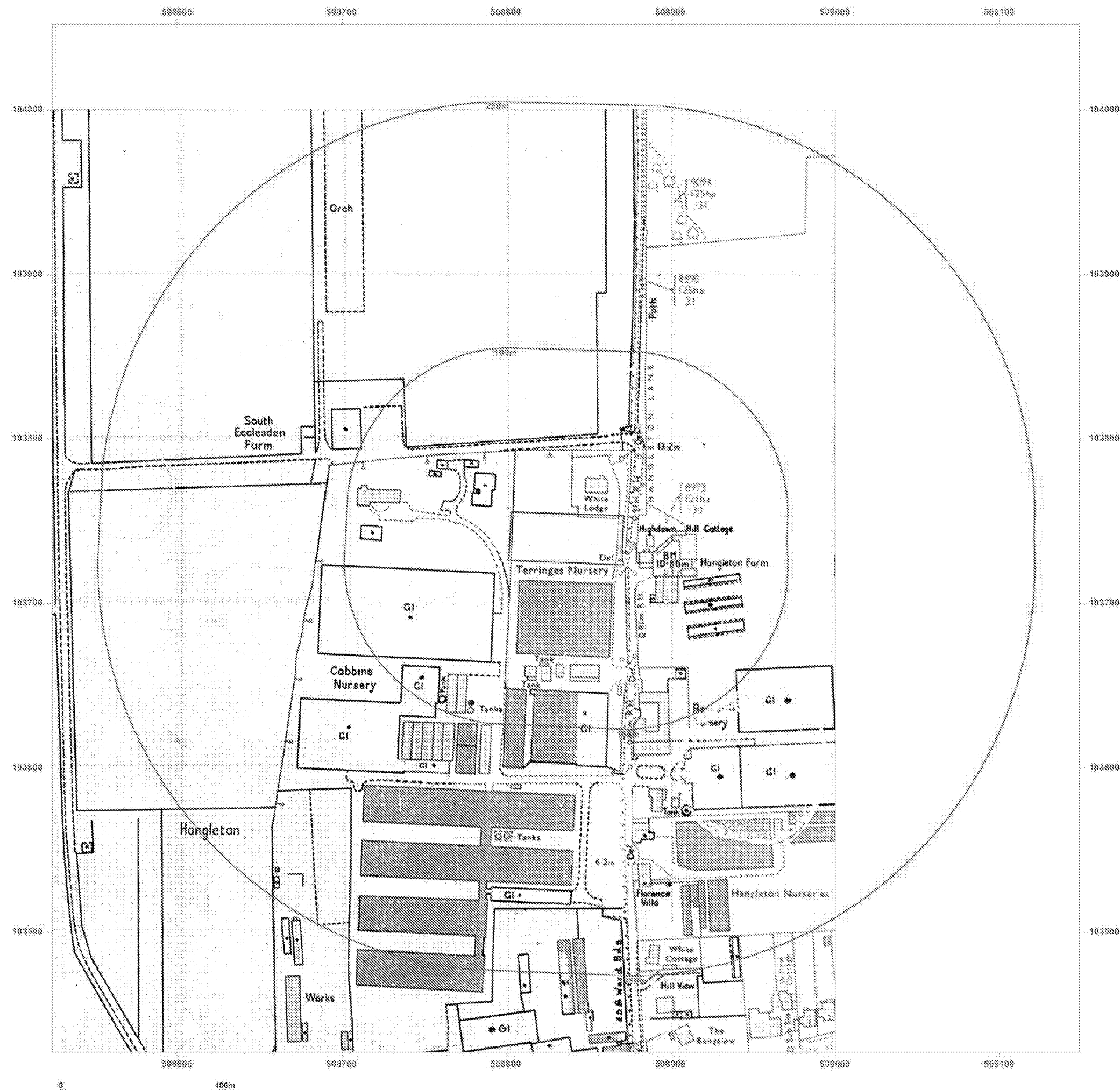


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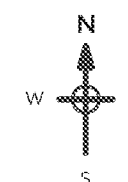
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Map Name: National Grid

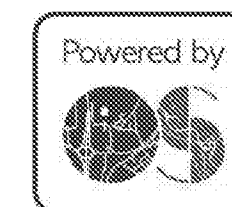
Map date: 1994

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

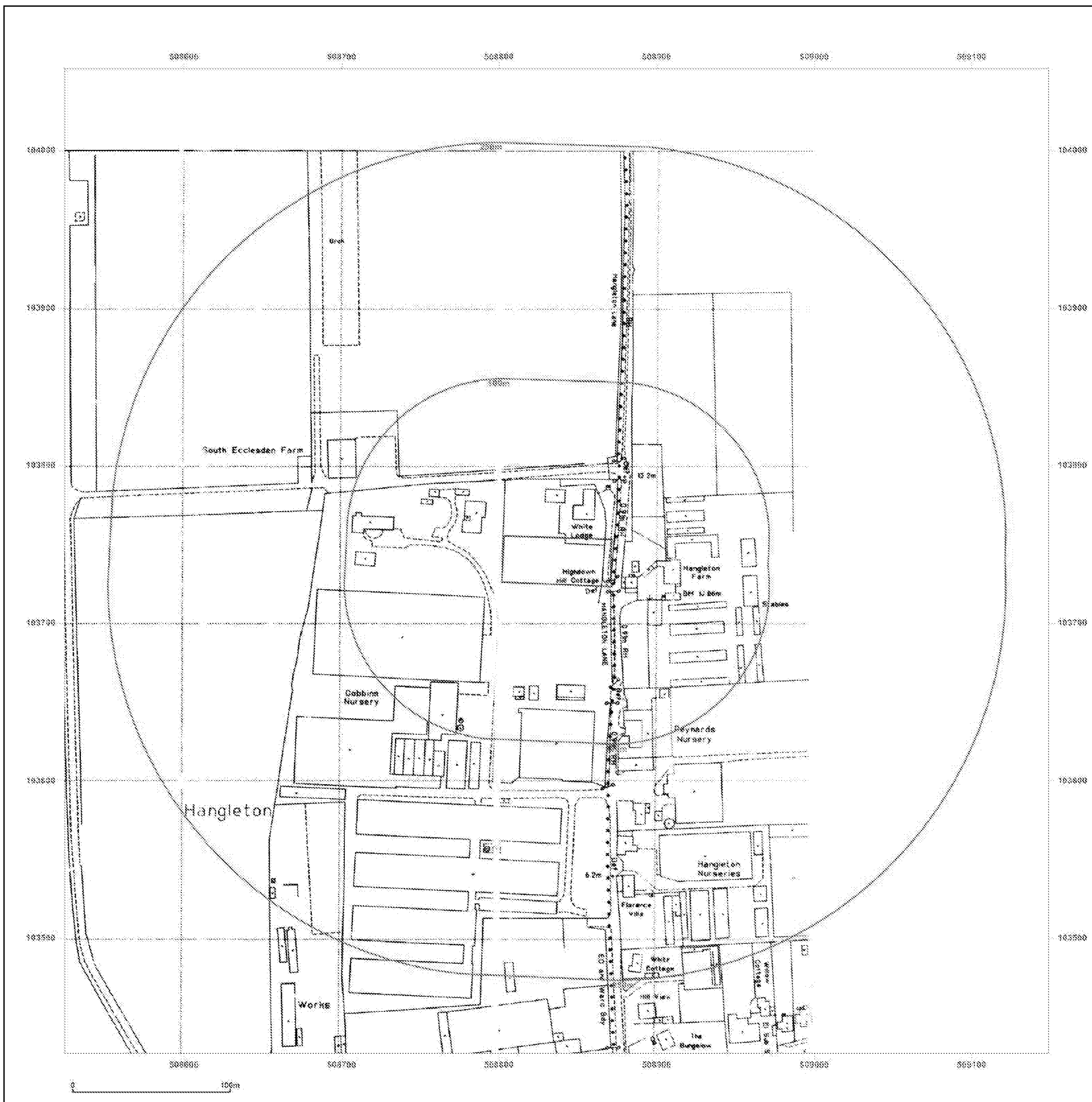


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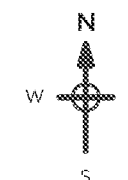
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Map Name:	National Grid
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Map date: 1992-1994

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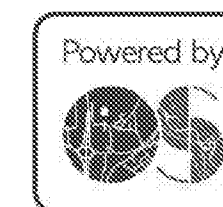


Surveyed 1994
Revised N/A
Edition N/A
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Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed 1992
Revised 1992
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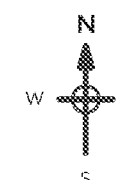
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Map Name: National Grid

Map date: 1993-1994

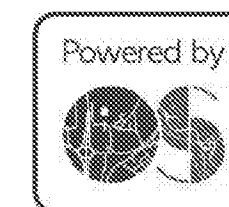
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Printed at: 1:2,500



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

Surveyed 1993
Revised 1993
Edition N/A
Copyright 1993
Levelled N/A

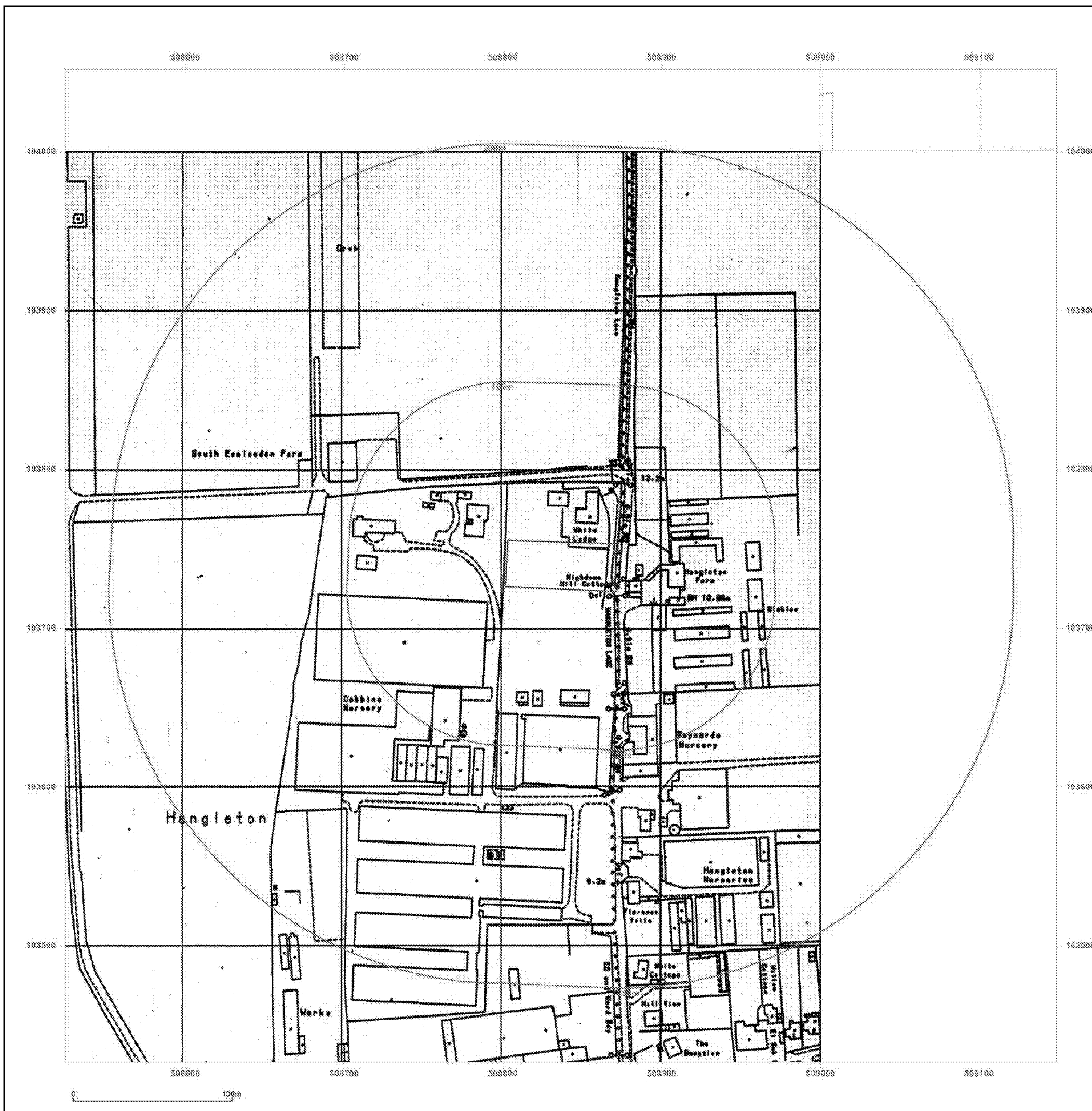


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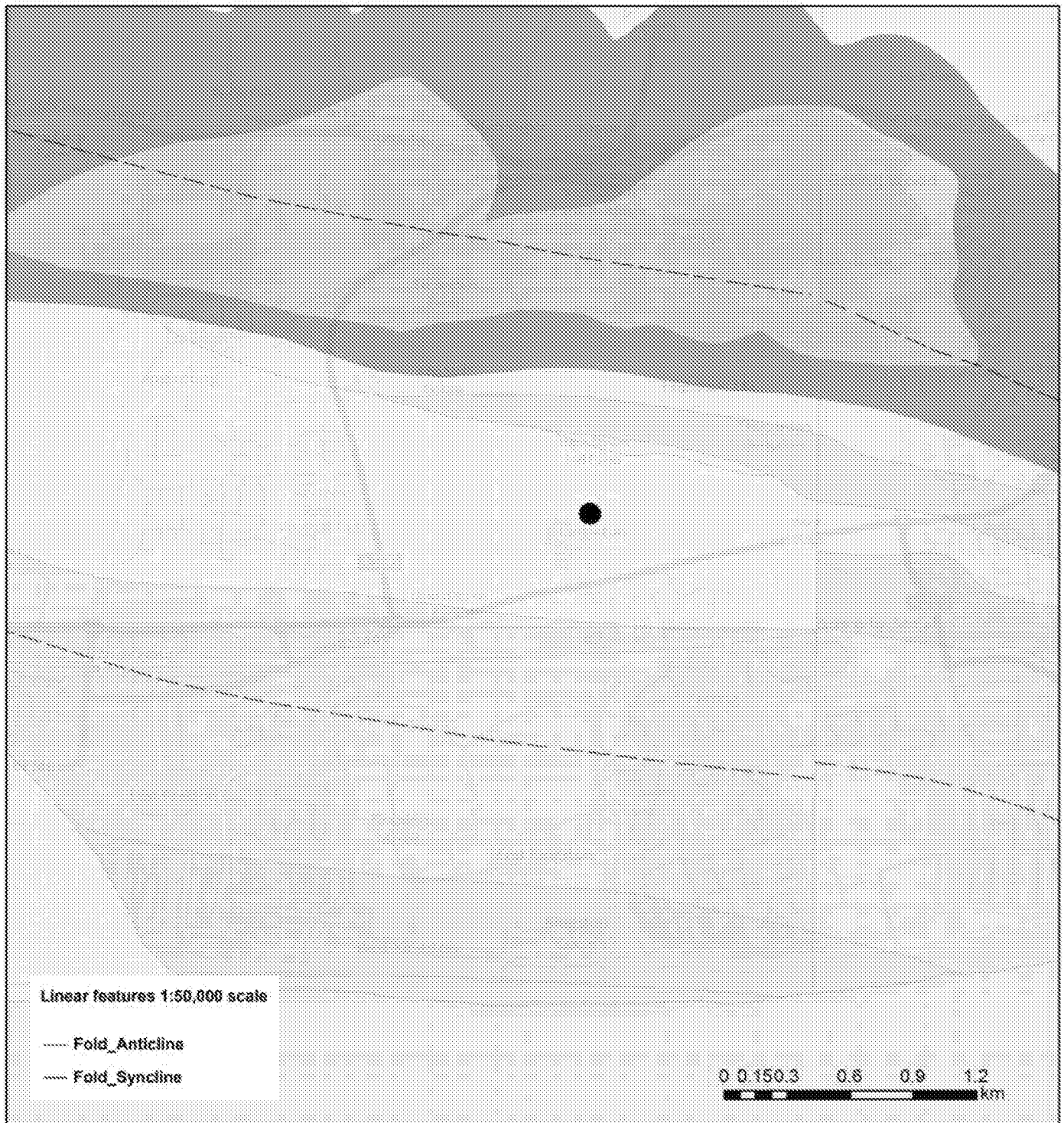
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Appendix D – Geological Maps

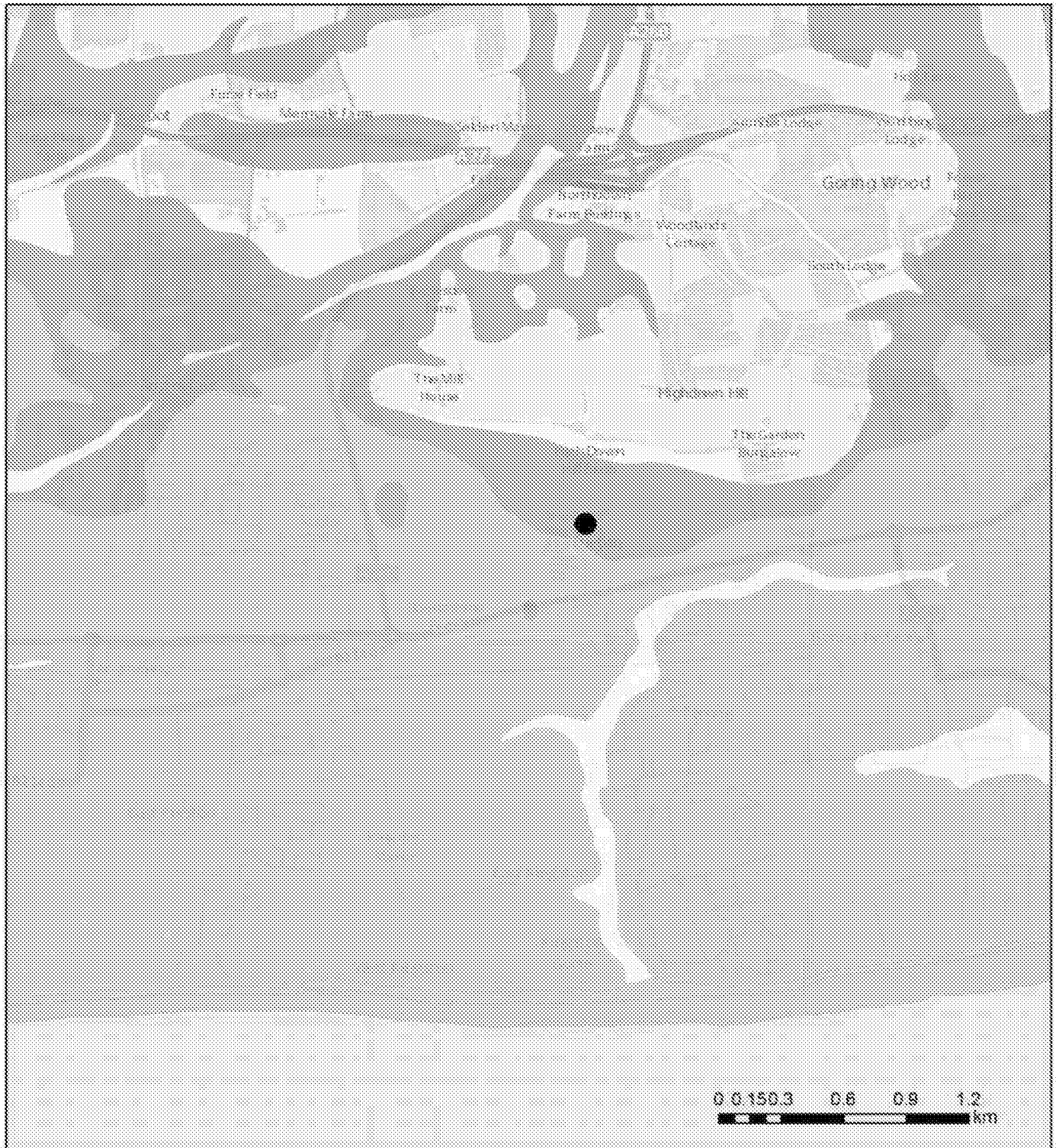
Bedrock Geology



Bedrock geology 1:50,000 scale

- LONDON CLAY FORMATION - CLAY, SILT AND SAND
- SPETISBURY CHALK MEMBER - CHALK
- LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION, NEWHAVEN CHALK FORMATION, CULVER CHALK FORMATION AND PORTSOOWN CHALK FORMATION (UNDIFFERENTIATED) - CHALK
- TARRANT CHALK MEMBER - CHALK
- LONDON CLAY FORMATION - SAND
- NEW PIT CHALK FORMATION - CHALK
- LEWES NODULAR CHALK FORMATION - CHALK
- LAMBETH GROUP - CLAY, SILT AND SAND
- NEWHAVEN CHALK FORMATION - CHALK

Superficial Geology



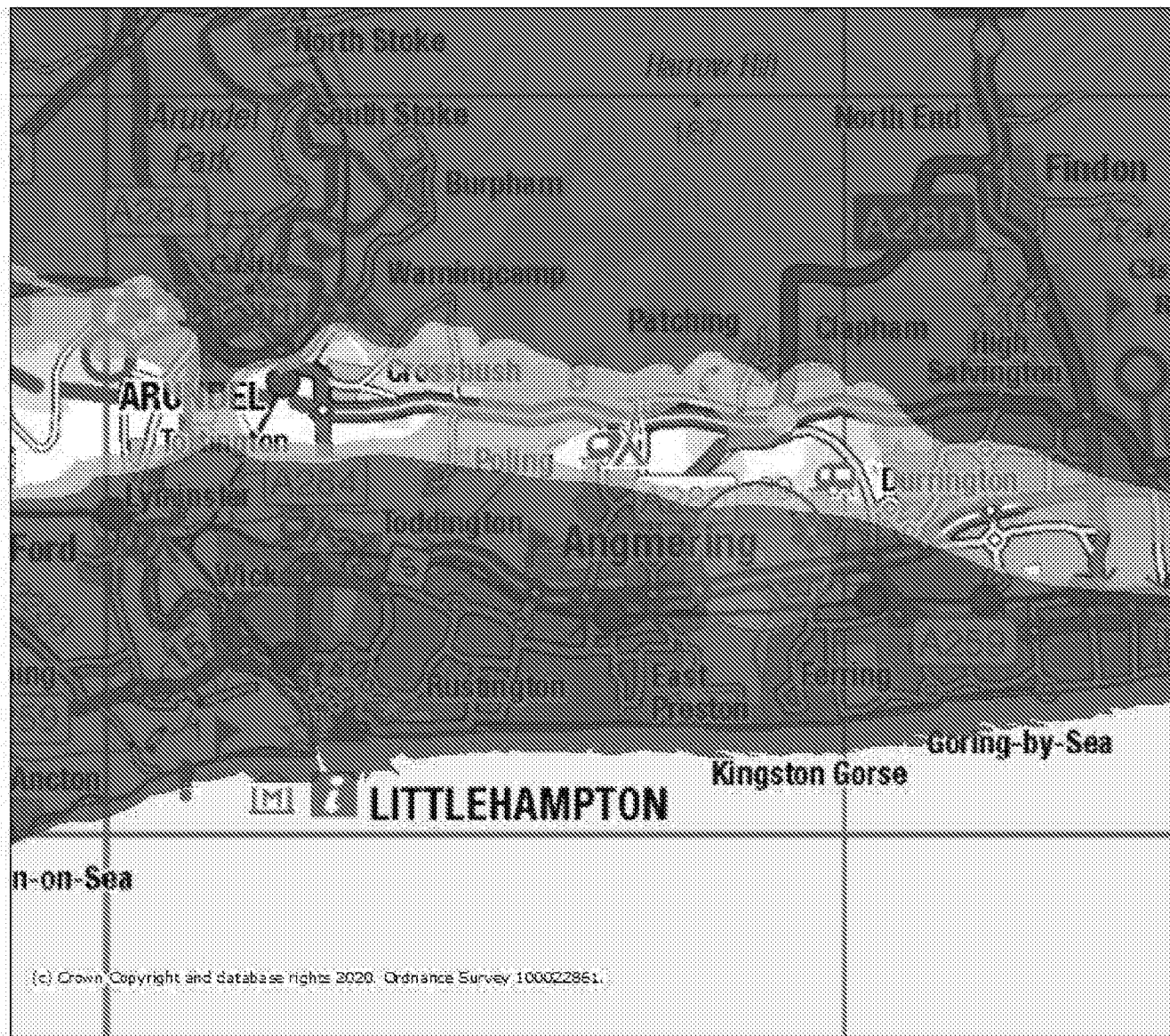
Superficial deposits 1:50,000 scale

- ☐ ALLUVIUM - CLAY, SILT, SAND AND PEAT
- ☐ BLOWN SAND - SAND
- ☐ RAISED MARINE DEPOSITS - CLAY, SILT, SAND AND GRAVEL
- ☐ HEAD - CLAY, SILT, SAND AND GRAVEL
- ☐ ARUN TERRACE DEPOSITS, 2 MEMBER - SAND AND GRAVEL
- ☐ RAISED BEACH DEPOSITS, 1 - SAND AND GRAVEL
- ☐ BEACH AND TIDAL FLAT DEPOSITS (UNDIFFERENTIATED) - CLAY, SILT, SAND AND GRAVEL
- ☐ RAISED STORM BEACH DEPOSITS, 2 - GRAVEL
- ☐ HEAD, 1 - CLAY, SILT, SAND AND GRAVEL
- ☐ CLAY-WITH-FLINTS FORMATION - CLAY, SILT, SAND AND GRAVEL

TQ00SE16

ARUN DISTRICT COUNCIL A/32/20/PL

Bedrock Aquifer



Legend

Aquifer Designation Map (Bedrock) (England)

-  Principal
-  Secondary A
-  Secondary B
-  Secondary (undifferentiated)
-  Unproductive

Projection = OSGB36

xmin = 485400

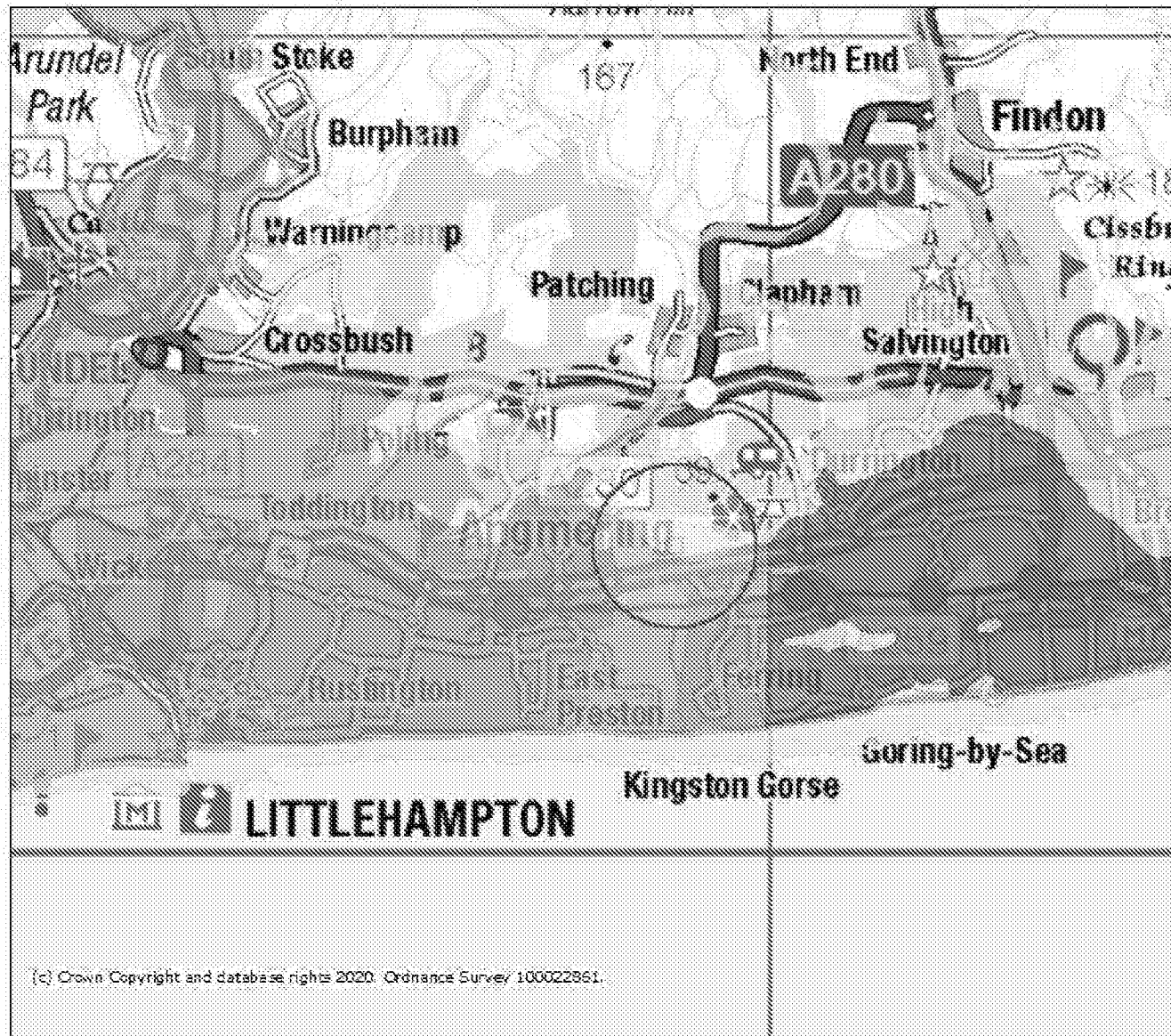
ymin = 91570

xmax = 527900

ymax = 116800

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Legend

Aquifer Designation Map (Superficial Drift) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes+landslip)
- Unproductive

**Legend****Groundwater
Vulnerability Map
(England)** Local Information Soluble Rock Risk High Medium - High Medium Medium - Low Low Unproductive

Projection = OSG836

xmin = 498300

ymin = 99510

xmax = 517500

ymax = 108500

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