



DESK STUDY REPORT
FOR THE SITE OF:

The Orchard House
Western Avenue
Emsworth
Hampshire
PO10 7LP

1 OF 4

COMPLETED ON BEHALF OF:
McCarthy and Stone Retirement Lifestyles Ltd.

BY



Ref. 16-73762
19 July 2016



DESK STUDY REPORT

CONTRACT: **The Orchard House**
Western Avenue
Emsworth
Hampshire
PO10 7LP

Order Number: 286775

CLIENT: **McCarthy & Stone Retirement**
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REPORT NO: 16-73762/GW/DSReport

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DATE: **19 July 2016**

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REPORT CONTENTS

SECTION	Page
EXECUTIVE SUMMARY	iv
1.0 INTRODUCTION	1
2.0 SITE CONDITIONS	3
3.0 SITE HISTORY	5
4.0 GEOLOGY	7
5.0 HYDROGEOLOGY AND HYDROLOGY	7
6.0 CONSULTATIONS	8
7.0 DISCUSSION	16
8.0 CONCEPTUAL SITE MODEL	18
9.0 CONCLUSIONS AND RECOMMENDATIONS.....	23
10.0 QUALITY STATEMENT.....	24

APPENDICES

- A --- SITE LOCATION PLAN – 16-73762/01
- B --- PHOTOGRAPHIC RECORD PLATES - 1-16
- C --- HISTORICAL MAPS - 1-28
- D --- ENVIRONMENT AGENCY MAPS - 1-8
- E --- GROUNDSURE ENVIROINSIGHT REPORT – 13/06/16
- F --- GROUNDSURE GEOINSIGHT REPORT – 13/06/16
- G --- CORRESPONDENCE
Environmental Protection – Havant Borough Council – 18/07/16

EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

Brief	Prepare a Desk Study Report for a site comprising land currently The Orchard House, Western Avenue in Emsworth, Hampshire
Proposal	It is proposed to redevelop the site with a three storey block of 22 apartments comprising 20 Ortus Living Standard Apartments and 2 Bespoke Ortus Living Apartments. Proposals include the creation of 25 parking spaces with site access from Western Avenue.
Site Conditions	The site is located south of Western Avenue in Emsworth. The Orchard House is a two and a half storey residential dwelling noted in the north of the site in addition to a double garage and car parking area. The south of the site notes a number of mature trees and hedge with a soakaway drain in the centre of the site. A driveway providing access to the adjacent property of The Vine House is located in the western part of the site beside the western boundary
Adjacent Site Conditions	The surrounding land is mostly residential with adjacent buildings noted up to two and a half storeys in height.
Site History	The earliest reviewed record (1869) shows the site as open (possibly agricultural) land. In 1908 Western Avenue is shown intersecting the west of the site and The Orchard House is understood to have been built in 1953 and first denoted mapping in 1963. Outbuildings are noted across the site during this time including greenhouses and garages.
Geology	Superficial – River Terrace Deposits – Sand, Silt and Clay Bedrock – Lambeth Group – Clay, Silt and Sand
Hydrogeology	Secondary (A) Aquifer within the superficial geology. Secondary (A) Aquifer within the bedrock geology.
Hydrology	The closest potentially sensitive surface water receptor is an unnamed river 202m west
Consultations	Groundsure Investigations – Geosight and Enviroinsight – 13/06/16 Havant Borough Council – Environmental Protection – 18/07/16 Havant Borough Council – Building Control – 07/07/16
Potential Contaminants	Asbestos containing materials within current onsite buildings TPH, PAH and Heavy Metals from on-site vehicle parking/storage Herbicides, Pesticides, PAH, and Heavy Metals from historic use of the site as an Orchard

Conclusions	Historical on site land uses may have resulted in contaminants being present on site which will require investigation and risk assessment. The site is expected to be underlain by sand and gravel and is likely to be suitable for the use of traditional foundations for a typical low-rise sheltered housing block. Ground conditions are potentially suitable for the use of soakaways and are currently in use for site drainage however ground investigation is required to confirm the suitability of soakaways.
Recommendations	Site investigation is required at the appropriate time to characterise contaminants that may be present on-site and to confirm expected ground conditions. Access issues will need to be considered with Vine House to the south currently being accessed via the study site. Should on site tree protection orders be in place, mature trees may present a constraint to future development. An Asbestos refurbishment and demolition survey should be carried out prior to commencement of any demolition works.

1.0 INTRODUCTION

1.1 Instructions

- 1.1.1 Instructions were received from Ms K. Hill of McCarthy & Stone Retirement Lifestyles Ltd. on 10 June 2016 to prepare a Desk Study Report for a site comprising The Orchard House, Western Avenue in Emsworth, Hampshire.
- 1.1.2 The term site within this report refers to the land outlined in red and shown on the site plan included in Appendix A.

1.2 Proposals

- 1.2.1 The proposed development comprises a three storey block of 22 Retirement Living Apartments comprising 20 Ortus Living Standard Apartments and 2 Bespoke Ortus Living Apartments. Proposals include the creation of 25 parking spaces with site access from Western Avenue

1.3 Scope of Works / Report Limitations

- 1.3.1 The report is based upon a review of historical maps and information gained from an internet supplier of site specific environmental information. Other information has been obtained from consultations with the Local Authority, Environment Agency website, a review of geological, hydrogeological and hydrological maps and a Site Walkover Survey.
- 1.3.2 This report includes details of the site history and environmental setting and includes discussion regarding potential pollutant linkages and preliminary risk assessment.
- 1.3.3 It should be appreciated that information may exist which invalidates the recommendations made in this report. The information contained in this report is intended for the sole use of McCarthy & Stone Retirement Lifestyles Ltd. ACS takes no responsibility for the use of this information by any other party or for uses other than those described in this report.
- 1.3.4 No liability can be accepted for information in other data sources or conditions not revealed by the works undertaken in preparation of this report.

1.4 References

1.4.1 The following documents have been referred to in the preparation of this report:

BS: 10175 2011+A1:2013. Investigation of Potential Contaminated Sites. Code of Practice. BSI 2011.

CIRIA, Construction Industry Research and Information Association (2001). Contaminated Land Risk Assessment. CIRIA 552.

CIRIA, Construction Industry Research and Information Association (2009). The VOCs Handbook – Investigating, Assessing and Managing the Risks from Inhalation of VOCs at Land Affected by Contamination. CIRIA 682.

Department of the Environment (1994). A Framework for Assessing the Impact of Contaminated Land on Groundwater and Surface water. CLR Report No 1 Volume One.

Department of the Environment (1994). A Framework for Assessing the Impact of Contaminated Land on Groundwater and Surface water. CLR Report No 1 Volume Two.

Department of the Environment (1994). Guidance on Preliminary Site Inspection of Contaminated Land. CLR Report No. 2 Volume One.

Department of the Environment (1994). Guidance on Preliminary Site Inspection of Contaminated Land. CLR Report No. 2 Volume Two.

Department of the Environment (1994). Documentary Research on Industrial Sites. CLR Report No 3.

Department of the Environment (1994). Sampling Strategies for Contaminated Land. CLR Report No. 4.

Department of Environment and Rural Affairs (2012). Environmental Protection Act 1990: Part 2A. Contaminated Land Statutory Guidance.

Department for Environment, Food and Rural Affairs and the Environment Agency (2002). Potential Contaminants for Assessment of Land. R&D Publication CLR 8. Environment Agency 2002.

Environment Agency (2004). Model Procedures for the Management of Land Contamination. CLR Report No. 11.

2.0 SITE CONDITIONS

- 2.1 The site (National Grid Reference SU 7402505872) is located to the south-east of Western Avenue in Emsworth, Hampshire.
- 2.2 Further site location details are shown below:
- | | |
|------------------|-----------------------|
| OS X (Eastings) | 474025 |
| OS Y (Northings) | 105872 |
| Lat (WGS84) | N50:50:52 (50.847642) |
| Long (WGS84) | W0:56:60 (-0.949884) |
| mX | -105740 |
| mY | 6561232 |
- 2.3 The site covers some 0.46 hectares (4600m²) and is roughly rectangular in plan.
- 2.4 A site walkover was conducted by an ACS Geo-Environmental Engineer on 21/06/2016.
- 2.5 The current occupier has been living at the property since 1993 and has advised that there are no basements or cellars beneath the various buildings on the site. The property is heated using gas and connected to a foul sewer located in Western Avenue. Surface water drains to a soakaway beneath a statue in the rear garden. The occupier has advised that no flooding occurs on the site.
- 2.6 The main house, situated in the northern part of the site, is a two storey building with brick elevations and a pitched tiled roof. The building was originally built in 1959 and later had a small extension to the kitchen which the owner recalled was constructed on traditional foundations.
- 2.7 Access to the site is gained from Western Avenue in the north-western corner of the site. A macadam driveway leads from the road and a small car parking area is present beside the property. A gully is noted in the centre of this area.
- 2.8 A double garage is present in the north-western corner of the site, which has brick elevations and a pitched tiled roof. It was noted that an extension to the Garage was completed extending the centre of the garage further to the northern site boundary. The northern site boundary wall forms part of the garage.
- 2.9 A lean to glass house is noted attached to the northern brick wall boundary.
- 2.10 A further garage is noted to the north-east of the main residence and comprises brick elevations and a pitched tiled roof. There is a first floor within this building accessed via timber steps and appears to have been used as a hobbies / playroom.

- 2.11 The southern part of the site is a traditional garden with a number of mature trees and large shrubs noted across this area comprising:
- ▶ Cherry
 - ▶ Apple
 - ▶ Pear
 - ▶ Conifer
 - ▶ Bay
 - ▶ Sycamore
 - ▶ Holm Oak
 - ▶ Yucca
 - ▶ Laurel
 - ▶ Silver Birch
- 2.12 The garden area is divided into several areas with mature hedging. A timber garden store is located in the north-east corner of the site.
- 2.13 In the south-west corner of the site an area is used for fruit and vegetable growing. The frame of a glass house and an overgrown area protected by fruit netting is noted beside the eastern boundary. In the south-eastern corner a concreted area with a large compost heap is noted. This area is shielded from view from the main house by a large laurel hedge.
- 2.14 A driveway providing access to the adjacent property of The Vine House is located in the western part of the site beside the western boundary. The property owner noted that he owns the part of the driveway beside the property, but the adjacent Vine House has access rights. The driveway is separated from the rest of the site by a substantial hedge of mixed species. Larger coniferous trees and oak trees are present beside the western site boundary, west of the driveway.
- 2.15 The surrounding area is mainly residential with adjacent buildings up to two and a half storeys in height. A new property is being constructed beyond the eastern part of the northern site boundary.
- 2.16 Photographs of relevant site features are included as Appendix B.

3.0 SITE HISTORY

3.1 Ordnance Survey Maps have been obtained to provide details of the history of the site and surrounding areas. A chronological description of the maps is shown in Table 1, below. The descriptions focus on features which are considered to be relevant to the proposed development. Copies of the maps are included as Appendix C.

Dates	On-Site Features	Off-Site Features
1869	The site is denoted open (possibly agricultural) land.	Much of the surrounding land is agricultural. A Rectory is noted 150m east and a Nursery is noted from 120m west. An unnamed river runs from 200m west, flowing north to south.
1897-1898	No changes considered relevant.	The Nursery to the west is now denoted Warblington Nursery, with a Pump denoted in the grounds. Osier Farm is noted from 70m south-east, with Pump in the grounds from 92m south-east.
1908	Western Avenue is shown to cross the western part of the site running north-south.	A number of residential dwellings have been built to the north and east of the site. Pumps no longer indicated.
1932	Deciduous trees are noted in the south-eastern corner of the site	Further residential development noted to the south
1952	The site appears to have been split into three plots, the main plot and two smaller plots beside the eastern site boundary. Deciduous and coniferous trees are noted beside the western and eastern site boundaries. A rectangular feature is noted in the north-western section of the site.	A drain is shown running from 57m west and a spring noted 177m south-west. An Electricity substation is noted 125m north and Tanks are noted within the grounds of Emsworth House from 165m north. Much of the land to the north, east and south of the site is now residential.
1963	The Orchard House is shown with an additional outbuilding noted in the north-west corner of the site. Trees are no longer denoted on site	No changes considered relevant however areas of mapping to the north and west are incomplete at this time.
1968	A narrow greenhouse is shown beside the northern boundary adjacent to the outbuilding first shown in 1963. An area in the south-eastern corner appears to have been divided from the rest of the site with orchard trees denoted in this area.	Mapping incomplete

1973	Small extension on the western part of the southern elevation of the Orchard House. Small glasshouse shown adjacent to and midway along the northern site boundary. Grounds of the Orchard House appear to extend beyond the current southern site boundary.	Drain to the west is no longer denoted as such. Tanks are no longer denoted within Emsworth House to the north.
1980	A further outbuilding is denoted in the north-east corner of the site and a further green house building is shown in the south-eastern corner. Western Avenue has now been extended and provides access to The Vine House to the south of the site.	The Vine House is noted adjacent to the site to the south. Wide scale residential development of land to the west of the site is noted.
1993	No changes considered relevant	No changes considered relevant

Table 1. Historical map summary

4.0 GEOLOGY

- 4.1 On-line geological maps from the British Geological Survey (BGS) have been reviewed.
- 4.2 Superficial Deposits comprising River Terrace Deposits of sand, silt and clay are shown to underlie the site.
- 4.3 River Terrace Deposits are described as sand and gravel deposits with local lenses of silt, clay or peat (BGS generic description).
- 4.4 Bedrock geology beneath the site comprises the Lambeth Group of clay, silt and sand
- 4.5 The BGS description of the Lambeth Group is '*vertically and laterally variable sequences mainly of clay, some silty or sandy, with some sands and gravels, minor limestones and lignites and occasional sandstone and conglomerate*'.

4.6 BGS Borehole Record

- 4.6.1 *There are no BGS Borehole Records within 250m of the study site*

5.0 HYDROGEOLOGY AND HYDROLOGY

- 5.1 The Environment Agency Groundwater Map shows the site as being located above a Secondary (A) Aquifer within the superficial River Terrace Deposits.
- 5.2 A Secondary (A) Aquifer is also recorded beneath the site within the bedrock layer
- 5.3 Secondary (A) Aquifers are; permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers (EA definition).
- 5.4 The site is within a Minor Aquifer High Groundwater Vulnerability Zone.
- 5.5 The closest potentially sensitive surface water receptor lies 202m west of the site and relates to an unnamed primary river.
- 5.6 The surface water flood map obtained from the Environment Agency website shows that the site is approximately 180m from an area classed as being at medium risk of flooding from rivers and less than 50m from an area at low risk of flooding from surface water.
- 5.7 Copies of the Environment Agency Maps are included as Appendix D.

6.0 CONSULTATIONS

6.1 Groundsure Enviroinsight Report – 13 June 2016

A Groundsure Enviroinsight Report was commissioned for the site, a copy of which is included as Appendix E. Environmental issues considered relevant to redevelopment of the site are summarised below.

The aerial photograph accompanying the report is dated August 2013 and shows the site with current buildings and numerous trees along the site boundaries.

Part 1 – Historic Industrial Sites

There are 18 records of potentially contaminative historic land uses within 500m of the study site boundary. There relate to:

- ▶ Nurseries from 40m north (1866-1942)
- ▶ Unspecified Tanks from 106m north (1914-1932)
- ▶ Police Stations from 113m north-east (1973)
- ▶ Clay Pits from 423m north-west (1931-1942)

There are six records of unspecified historic tanks from 107m north and dating from 1908 until 1951.

There are 36 records of historical energy features within 500m of the study site. All records relate to Electricity Substations from 121m north.

There are four historic garages within 500m of the study site boundary. These are noted between 223m and 234m north-west and date between 1963 and 1993.

There are 10 potentially infilled features within 500m of the study site:

Distance	Use	Date
328m E	Pond	1896
398m N	Pond	1932
400m N	Pond	1931
400m N	Pond	1942
400m N	Pond	1866
401m N	Pond	1931
423m NW	Clay Pit	1932
424m NW	Clay Pit	1942
424m NW	Clay Pit	1931
426m NW	Clay Pit	1931

Table 2. Potentially infilled features

Part 2 – Environmental Permits, Incidents and Registers

One record of a Part B activity was noted 255m NW relating to the unloading of Petrol into storage at a service station.

There are four Licensed Discharge Consents within 500m of the study site:

- ▶ 341m SE – Sewage Discharges – Sewer Storm Overflow
- ▶ 498m SE – Sewage Discharges – Sewer Storm Overflow
- ▶ 498m SE – Sewage Discharges – Sewer Storm Overflow
- ▶ 499m S – Sewage Discharges – Sewer Storm Overflow

One National Incident has been recorded 255m SW of the study site relating to diesel pollution causing a significant impact to water and only minor impacts to both land and air.

Part 3 – Landfill and Other Waste Sites

There is one record of an Environment Agency historic landfill site 1465m east of the study site. Recorded as having received inert waste between February and August 1986.

Part 4 – Current Land Uses

Five records exist for potentially contaminative industrial sites within 250m of the site:

Distance	Company	Activity
45m W	Safety and Security	Electronic Equipment
125m N	Electricity Substation	Electrical Features
139m S	Electricity Substation	Electrical Features
162m SE	Electricity Substation	Electrical Features
188m SE	Jill Currey	Curtains and Blinds

Table 3. Potentially Contaminative Industrial Sites

There is one record of a petrol/fuel site 233m NW of the study site its status is Open

Part 5 & 6– Geology, Hydrogeology and Hydrology

Artificial Ground and Made Ground – None

Superficial Ground and Drift Geology (50m buffer):

- ▶ River Terrace Deposits (undifferentiated) – Sand, silt and clay

Bedrock and Solid Geology (50m buffer):

- ▶ Lambeth Group – Clay, silt and sand
- ▶ London Clay Formation – Clay, silt and sand

Aquifer within the Superficial Deposits:

- ▶ On site – Secondary (A)
- ▶ 416m south – Secondary (undifferentiated)

Aquifer within Bedrock Deposits:

- ▶ On site – Secondary (A)
- ▶ 1m N – Unproductive
- ▶ 119m S - Principal

There are no groundwater abstraction licences noted within 2000m of the site.

On site Groundwater Vulnerability is recorded as being a Minor Aquifer/High Leaching Potential

The chemical river quality of the Warblington Stream 224m SW achieves Grade D in 2005 and Grade C between 2006 and 2009.

There are six detailed river network entry within 500m of the study site. These relate to unnamed rivers from 202m west.

There is one surface water feature 221m west not represented on mapping.

Part 7 – Flooding

Zone 2 Flooding

There is one recorded Zone 2 Floodplain 172m west of the site.

Zone 3 Flooding

There is one recorded Zone 3 Floodplain 172m west of the site.

The highest risk of flooding on the site is *Very Low*

Groundwater Flooding Susceptibility Areas

There are BGS groundwater flooding susceptibility areas within 50m of the site. They relate to Superficial Deposit Flooding and are recorded as having *potential at the surface* for flooding at surface. *Groundwater Flooding Confidence rating – Moderate*

Part 8 – Designated Environmentally Sensitive Sites

There are seven records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site relating to;

Distance	SSSI Name
428m S	Chichester Harbour
971m SW	Warblington Meadow
1008m SE	Chichester Harbour
1434m SE	Chichester Harbour
1519m S	Chichester Harbour
1625m S	Chichester Harbour
1811m S	Chichester Harbour

Table 4. Sites of Special Scientific Interest

There is one Special Areas of Conservation (SAC) within 2000m of the site relating to Solent Maritime (428m south).

There is one record of Special Protection Areas (SPA) within 2000m referring to Chichester and Langstone Harbours (428m south).

The Chichester and Langstone Harbour 428m south is also a recorded Ramsar site.

Six Local Nature Reserves are recorded within 2000m of the study site:

- ▶ 957m E – Brook Meadows (Emsworth)
- ▶ 972m E – Brook Meadow (Emsworth)
- ▶ 973m E – Brook Meadow (Emsworth)
- ▶ 1093m E – Brook Meadows (Emsworth)
- ▶ 1460m SE – Eames Farm
- ▶ 1822m SE – Eames Farm

There is one Area of Outstanding Natural Beauty (AONB) 203m west relating to Chichester Harbour.

There are two records of nitrate vulnerable zones on site.

Part 9 – Natural Hazards Findings

Maximum Shrink-Swell Hazard Rating – Moderate

Maximum Landslide Hazard Rating – Very Low

Maximum Soluble Rocks Hazard Rating – Negligible

Maximum Compressible Ground Hazard Rating – Negligible

Maximum Collapsible Rocks Hazard Rating – Low

Maximum Running Sand Hazard Rating – Low

The site is within a Radon affected area as between 1 and 3% of the properties are above the action level. No Radon Protective Measures are necessary for new properties or extensions to existing ones.

Part 10 – Mining

There are no records of any coal mining having occurred on or within 75m of the study site

There are no records of any non-coal mining areas within 50m of the study site.

There are no brine affected areas within 75m of the study site.

6.2 Groundsure Geosight Report – 13 June 2016

A Groundsure Geosight Report was commissioned for the site, a copy of which is included in Appendix F. Geological issues considered relevant to redevelopment of the site are described below:

Part 1 - Geology

Artificial / Made Ground within 500m – None

Superficial Deposits and Drift Geology within 500m of the study site boundary:

- ▶ On site – River Terrace Deposits, 11 – Sand, silt and clay
- ▶ 152m W – Head Deposits – Gravel, clayey
- ▶ 416m S – Beach and Tidal Flat Deposits – Clay, silt, sand and gravel
- ▶ 458m E – Head Deposits – Gravel, clayey
- ▶ 463m W – Head Deposits – Gravel, clayey

Permeability of Superficial Ground

- ▶ On site – Maximum Permeability-High, Minimum Permeability-Low (Intergranular Flow)

Bedrock and Solid Geology within 500m of the study site:

- ▶ On site – Lambeth Group – Clay, silt and sand
- ▶ 1m north – London Clay Formation – Clay, silt and sand
- ▶ 119m south – Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation

Permeability of Bedrock

- ▶ On site – Maximum Permeability-Moderate, Minimum Permeability-Very Low (Mixed Flow)
- ▶ 1m N – Maximum Permeability-Moderate, Minimum Permeability-Very Low (Mixed Flow)

There is one fold (axial plane trace of major syncline) noted 347m north.

The site is within a Radon Affected Area, as between 1 and 3% of properties are above the Action level. **No** radon protective measures are necessary for new properties or extensions.

Part 2 – Ground Workings

Current ground workings within 1000m are noted;

Distance	Name	Commodity	Status
491m NW	Emsworth Clay Pit	Clay and Shale	Ceased
715m SE	Emsworth Brick Field	Clay and Shale	Ceased

Table 5. Current Ground Workings

Part 3 – Mining, Extraction & Natural Cavities

There are no records of historic or current mines within 1000m of the study site.

Part 4 – Natural Ground Subsidence

The maximum hazard rating of natural subsidence within the site boundary is *Moderate*.

Shrink-Swell Clays Hazard Rating

On site – Moderate

1m N - Low

Landslides Hazard Rating
On site – Very Low

Ground Dissolution of Soluble Rocks Hazard Rating
On site – Negligible

Compressible Deposits Hazard Rating
On site - Negligible

Collapsible Deposits Hazard Rating
On site – Low

Running Sands Hazard Rating
On site – Low

Part 5 – Borehole Records

There are no boreholes recorded within 250m of the site.

Part 6 – Estimated Background Soil Chemistry

Estimated on site background soil chemistry (mg/kg)

<i>Distance</i>	<i>Sample type</i>	<i>Arsenic</i>	<i>Cadmium</i>	<i>Chromium</i>	<i>Nickel</i>	<i>Lead</i>
On site	Sediment	<15	<1.8	60-90	<15	<100
On site	Sediment	<15	2.2 – 3.0	60-90	15-30	300-600

Table 6. Background soil chemistry.

Part 7 – Railways and Tunnels

There are no records of railways or tunnels within 250m of the site boundary

6.3 **Havant Borough Council – Environmental Protection – Jonathan Driver**

- 6.3.1 Havant Borough Council (HBC) Environmental Protection Department were consulted. Information was received on 18/07/16 and is included in Appendix G
- 6.3.2 There are no known records of alleged or substantiated pollution to ground, groundwater or in relation to chemical odours/vapour for the site.
- 6.3.3 The site is not prioritised for inspection under Part2A of the Environmental Protection Act 1990 as no potential sources have been identified nor is there evidence of possible or probable contamination within the immediate vicinity.
- 6.3.4 There are not considered to be any potential sources of contaminants on the site as site history comprises principally open land, orchard and residential. No substantial deposits of made ground is suspected.

- 6.3.5 HBC notes 1952 mapping shows a large rectangular feature (17m x 35m approx.) it is not sure whether this represents a structure or a formalised ground cover. The narrow dimension is broadly coincident with the northern boundary of the site, extending south. A partial boundary wall is shown approx. 8m south of the feature.
1946 aerial photography appears to confirm the presence of the feature alongside a 14m x 18m feature south of the boundary wall. No shadow is evident suggesting that the feature shown on the 1952 mapping is likely to represent a demarcation of groundcover type (e.g. a formal lawn or hard-standing)
Another small feature (approx. 6 x 3m) is shown in the NE corner of the site. A moderately sized glasshouse is present along the northern boundary from around 1969 alongside several units in the south-west of the site (now occupied by Vine House).
- 6.3.6 Principal risks to the proposed development is likely to comprise localised deposits of cement bonded chrysotile asbestos associated with former temporary structure(s), ground improvers/ Pesticide/ herbicides used at the orchard. These may include ash or persistent metallic substances.
- 6.3.7 There are no fuel tanks or landfill recorded on or adjacent to the site.
- 6.3.8 There are no wells recorded on or adjacent to the site. It should be noted however a circular feature is recorded on 1932 mapping adjacent to the northern boundary of the site (just east of the centre) this is not marked as a well but could represent such a feature.
- 6.3.9 HBC notes contamination is not likely to present a significant constraint to the redevelopment. Due to the uncertainty with the nature of the possible war-period temporary feature (as discussed above), there may be a requirement to proceed under a watching brief.
- 6.3.10 The geology beneath the site is expected to comprise River Terrace Deposits over clay (Lambeth Formation), chalk is expected at depth. Superficial Deposits may be variable in competence however no geological hazards are known.
- 6.3.11 There are no records of any reports carried out with respect to the study site or within the immediate vicinity.

6.4 Havant Borough Council Planning Website

- 6.4.1 The Havant Borough Council online planning database was searched for planning applications pertinent to the study site.
- 6.4.2 A single planning application is noted on the planning website having been previously submitted for the study site:

► *Single storey extension to south elevation with metal balustrade over, creating balcony at first floor level*

Ref: 97/62058/000 – Approved July 1997

Due to the age of the application neither the plans nor the decision notice would be viewed for this application

A new dwelling house is currently being built adjacent to the site to the north. The application was for the 'Construction of 1no detached 3 bed chalet bungalow with vehicular access from beach Road following demolition of existing garage (App/15/00531 – Approved July 2015)'. A review of the conditions of this approved proposal made no reference to any contaminated land imposed on the site.

Planning applications in close proximity to the site have included construction of individual buildings and building extensions and applications for work on trees with Tree Preservation Orders. No contaminated land conditions were noted within any of the reviewed Planning Decision Notices.

6.5 Environment Agency Website

- 6.5.1 The Environment Agency website was searched, using the 'What's in My Backyard?' series of interactive maps to find EA records pertinent to the study site.
- 6.5.2 The site is situated within both a Eutrophic Nitrate Vulnerable Zone and a Surface Water Nitrate Vulnerable Zone.
- 6.5.3 The maps indicate that the nearest landfilled area known as Emsworth Yacht Harbour lies over 1.4km east of the study site.
- 6.5.4 One significant Pollution Incident is noted to have occurred from 230m south-west of the study site relating to:

Date	Pollutant	Impact to Air	Impact to Land	Impact to Water
05/05/05	Oils and Fuels	Minor	Minor	Significant

Table 7. Pollution Incidents

6.6 Havant Borough Council – Building Control Department – Colin Adams

- 6.6.1 Mr Adams informed that the site is likely to be underlain by clay with possible areas of 'hoggin' (typically clayey sandy gravel). Clay in the area is typically of medium shrinkability.
- 6.6.2 Mr Adams advised the traditional foundations at a minimum depth of 1.2m are usually suitable for low-rise residential developments within the clay bedrock however if hoggin is found a minimum depth of 1.0m for traditional foundations may be suitable. All foundations will need to be deepened when within 10m proximity of trees.
- 6.6.3 Soakaways are usually suitable in the area however a crate design was recommended in areas of clay.
- 6.6.4 The study site is not within a Radon protection area

7.0 DISCUSSION

7.1 *Historical Land Uses*

- 7.1.1 A review of historic mapping and internet information has found that the earliest reviewed record (1869) shows the site as open (possibly agricultural) land. In 1908 Western Avenue is shown intersecting the west of the site and The Orchard House is understood to have been built in 1959 and is first denoted on historic mapping in 1963. Outbuildings are noted across the site during this time including greenhouses and garages. Few changes are noted to the building or the site from 1963.
- 7.1.2 From earliest reviewed records of 1869 much of the surrounding land is agricultural with an unnamed river running from 200m west. In 1952 a drain running from this river is noted from 57m west however it is unclear whether this remains in situ.
- 7.1.3 The surrounding area has been mostly residential from 1908.

7.2 *Potential Contaminative Land Uses – On-site*

- 7.2.1 The previous residential use of the site has a very limited potential to generate contaminants due to onsite activities.
- 7.2.2 Between 1932 and 1963 an Orchard was denoted on areas of the site, before which a large Nursery is noted to the west of the site. Historic use of sections of the site as an Orchard presents a potential risk to the site from Pesticide, Herbicide and Heavy Metals and PAH from ash based fertiliser. The Orchard appeared small scale and when taking into account the timescales involved the risk to the site is considered low.
- 7.2.3 Driveway areas surrounding the main buildings would have historically been used for vehicle parking. Vehicles being parked and washed on the site can give rise to contaminants that may enter the ground beneath the site. Contaminants from this source could include Heavy Metals, PAH & TPH, through minor fuel or oil leaks and run off. The area used for vehicle parking is hard surfaced reducing the potential pollutant pathway into the soil below. Any surface leaks or spills are expected to have been small scale and therefore the contamination risk to the site from the car parking area is considered to be very low to negligible.
- 7.2.4 Given the age of the current buildings it is feasible that asbestos containing materials may be present onsite. There is an additional risk to the site stemming from potential unregulated demolition of historic buildings and asbestos remaining within any made ground on the site. Appropriate inspection by qualified Contractors will be required prior to demolition of the buildings and an appropriate watching brief may be required during the groundwork phase of the redevelopment.

7.3 *Potential Contaminative Land Uses – Off-site*

- 7.3.1 The surrounding area has been from earliest reviewed record mostly residential dwellings with minimal risk to the proposed development associated with this land use.

- 7.3.2 There are records of three electricity sub-stations within 250m of the site from the closest situated 125m north. The main contaminants of concern associated with sub-stations are PCBs which are not particularly mobile, therefore it is considered very unlikely contaminants will have migrated onto the site and the risk posed is considered negligible.

7.4 Environmental Setting

- 7.4.1 Secondary (A) Aquifers are recorded within both the superficial and bedrock geology and the site lies within a Minor Aquifer High Groundwater Vulnerability Zone. As a result the ground water beneath the site is not considered to be particularly sensitive to contaminants on site or from future building works.

7.5 Geology / Drainage

- 7.5.1 Ground conditions beneath the site are likely to comprise materials of the River Terrace Deposits and Lambeth Group. These are likely to be sand, silt and clay which are typically suitable for the use of traditional foundations for residential developments.
- 7.5.2 Foundations may need to be deepened if cohesive materials are encountered, due to the presence of numerous trees across the site.

7.6 Radon

- 7.6.1 The site is not within a Radon Protection Area and so no radon protection measures are required for the proposed development.

8.0 CONCEPTUAL SITE MODEL

8.1 Pollutant Linkages

- 8.1.1 The statutory guidance for Part 2A of the Environmental Protection Act (1990) defines a contaminant as:

“A substance which is in, on or under the land which has the potential to cause harm or cause pollution of controlled waters”

Based on the reviewed information and site inspection, the following potential sources of contamination have been identified:

- ▶ Asbestos containing materials within current buildings
- ▶ Driveway / Vehicle Storage (Heavy Metals, PAH, TPH)
- ▶ Historic use of the site as an Orchard

- 8.1.2 The statutory guidance for Part 2A of the Environmental Protection Act (1990) defines a Pathway as:

“A route by which a receptor might be affected by contamination”

Following preliminary site assessment it is considered that a number of potential pathways are present that could cause receptors to become exposed to contaminants. ACS consider the following pathways to be present:

- ▶ Inhalation and of dust and free fibres (outdoor/indoor)
- ▶ Direct contact with impacted soil (soil and dust ingestion/inhalation)
- ▶ Vapour ingress into the proposed buildings

- 8.1.3 The statutory guidance for Part 2A of the Environmental Protection Act (1990) defines a receptor as:

“Something that could be adversely affected by a contaminant, for example a person, an organism, an ecosystem, property or controlled waters”

Following a preliminary site assessment, the following receptors are considered present:

- ▶ Proposed end users of the site
- ▶ Site workers during construction

8.2 Risk Classification

8.2.1 The risk posed by a given pollutant linkage is classified based upon the severity of the consequence should that linkage be realised, compared with the likelihood of the linkage being realised. This is the approach to risk classification.

8.2.2 The definition of terms regarding the classification of consequence is given in Table 8 below:

Classification	Category	Definition	Examples
Severe Short-term (acute) risks only	Human	Short term (acute) risks likely resulting in significant possibility of significant harm as defined by Part 2A of the Environmental Protection Act (1990).	High concentration of cyanide on the surface of an informal recreation area.
	Controlled Waters	Short-term risk of pollution of a sensitive water resource.	Major spillage of contaminants from a site into controlled waters
	Property	Catastrophic damage/destruction of property.	Explosion causing building collapse (can equate to short-term health risk if buildings collapse).
	Ecological System	A short-term risk to a particular ecosystem, or organism forming part of such ecosystem	
Medium Chronic (long-term) risks; "significant harm"	Humans	Long term (chronic) risks likely to result in significant possibility of significant harm as defined by Part 2A of the Environmental Protection Act (1990)	Concentrations of contaminants within soil exceed GAC or SSAC
	Controlled Waters	Pollution of sensitive water resource	Leaching of contaminants from a site into a Principal or Secondary Aquifer
	Ecosystem	A significant change in a particular ecosystem	
Mild Chronic (long-term) risks; less sensitive receptors	Controlled Waters	Pollution of non-sensitive water resources	Pollution of non-classified groundwater
	Property	Significant damage to buildings structures and services. Damage to sensitive buildings/structures/services	Damage to a building rendering it unsafe to occupy (e.g. foundation damage resulting in instability)
Minor Chronic (long term) risks; mild	Financial/ project	Harm, although not necessarily significant harm which may result in financial loss, or expenditure to resolve	
	Humans	Non-permanent health effects to human health (easily prevented by means such as PPE etc.)	The presence of contaminants at such concentration that protective equipment is required during site works.
	Property	Easily repairable effects of damage to buildings, structures and services	The loss of plants in a landscaping scheme. Discolouration of concrete

Table 8. Classification of consequence of hazard (CIRIA 552, 2001)

8.2.3 The definition of terms regarding probability is summarised in Table 9 below:

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

Table 9. Classification of likelihood of hazard (CIRIA 552, 2001)

8.2.4 Once the risk consequence and likelihood have been assessed, it is possible to classify the overall risk to the site from that specific pollutant linkage. The table below provides a useful matrix. Once classification has been assigned this should be reality checked to ensure it is an accurate assessment.

Risk Classification Matrix					
Probability		Severe	Medium	Mild	Minor
	High Likelihood	Very High	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low Likelihood	Moderate	Moderate/low	Low	Very Low
	Unlikely	Moderate/low	Low	Very Low	Very Low

Table 10. Risk Classification Matrix (CIRIA 552, 2001).

8.2.5 A description of each risk classification is given in Table 11 below:

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

Table 11. Definition of risk classification categories (CIRA 552, 2001)

8.3 Initial Conceptual Site Model

8.3.1 Following a preliminary risk assessment, an initial conceptual site model has been derived. Risk classification has been assigned using the procedure set out in CIRIA 552 (2001).

8.3.2 Where sources have been identified but no potential pollutant linkages are considered present, these have not been included within the initial conceptual site model.

Source	Potential contaminants of concern	Potential Pathways	Receptors	Consequence of risk being realised	Probability of Risk being realised	Comments	Risk classification
On Site							
Asbestos from buildings present on site	Asbestos Containing Materials (ACM).	Inhalation of free fibres	Site worker during construction. Future site users / occupiers	Severe	Low Likelihood	Possibility of historical use of ACM, refurbishment/demolition survey required prior to demolition in accordance with Control of asbestos regulations (2012)	Moderate
Vehicle parking on site	TPH, PAH and Heavy Metals	Direct soil and dust ingestion and inhalation (indoor and outdoor)	Future site occupiers / Site Workers during demolition and construction	Mild	Unlikely	Use for parking unlikely to present a significant source of contaminants.	Very Low
		Vapour ingress into proposed buildings	Future site occupiers	Medium	Unlikely	Car parking unlikely to present a significant source of contaminants. Investigation is required to confirm whether volatile contaminants from this source are present.	Low
Historic use of the site as an Orchard	Pesticides, Herbicides, Heavy Metals and PAH	Direct soil and dust inhalation and ingestion	Future site occupiers / Site workers during construction	Mild	Unlikely	Due to the size of the Orchard and the timescales involved risk to the proposed development from the former land use is considered Very Low	Very Low

Table 12. Initial Conceptual Site Model

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Contamination

- 9.1.1 Based on the information obtained in the desk study and the conceptual model, an intrusive ground investigation should be undertaken at the appropriate time to confirm the site is suitable for the proposed end use.
- 9.1.2 Due to the previous use of the site, the contaminants of concern comprise:
- ▶ TPH, PAH and Heavy Metals from onsite car parking
 - ▶ Asbestos Containing Materials
 - ▶ Pesticides, Herbicides, Heavy Metals and PAH from previous use of the site as an Orchard
- 9.1.3 Soils which are to be taken off-site should be scheduled for WAC testing (Waste Acceptance Criteria) to enable appropriate disposal of the soils in accordance with the Landfill Directive 2005.
- 9.1.4 A refurbishment and demolition survey should be carried out prior to demolition of any superstructure and any asbestos containing material identified should be removed and disposed of in accordance with best practice. This should be in accordance with the Control of Asbestos Regulations (2012).
- 9.1.5 The ground investigation should be extended to confirm the underlying ground conditions and allow samples to be collected for basic chemical properties and shrinkage potential if cohesive materials are encountered.

9.2 Ground Conditions/Foundations

- 9.2.1 Based upon geological maps the ground conditions beneath the site are likely to comprise clay, silt and sand which are typically suitable for the use of traditional foundations for low rise residential developments. The Building Inspector has confirmed traditional foundations are typically suitable in the area at a minimum depth of 1.2m however will require deepening in close proximity to trees.
- 9.2.2 An extensive geotechnical investigation will be required at the appropriate time to determine the nature of made and indigenous materials beneath the site so that informed decisions can be made regarding foundation selection. Should cohesive units be found, foundation assessment should take into account the potential for shrink swell and foundations may need to be deepened in proximity to existing trees, some of which are very large.
- 9.2.3 Proposed levels within the completed development should be carefully selected in order to minimise the creation of retaining situations and limit the quantity of materials that must be removed from site.

9.3 Drainage

- 9.3.1 BGS data and Groundsure reports indicate both the superficial and bedrock geology beneath the site are expected to comprise clays, silts and sands the permeability of which is expected to range from high to very low. The Building Inspector has also advised soakaway drains are typically suitable in these materials and the current property drains into a soakaway with no reports of onsite flooding. It is advised however soakaway testing at the appropriate time will be required to confirm this.

9.4 Access

- 9.4.1 The Vine House to the south of the site is currently accessed via the study site and access rights are understood to be in place. Continued access is likely to be required during site development.

9.5 Trees

- 9.5.1 It is recommended that the status of the trees on site is established as soon as possible as if Tree Preservation Orders (TPOs) are confirmed on site this may represent a constraint to redevelopment. There may be restrictions to the excavation of foundations in close proximity to some of the mature trees.

10.0 QUALITY STATEMENT

- 10.1 We confirm that in preparing this report we have exercised reasonable skill and care in order to produce accurate details.
- 10.2 We confirm that work has been conducted in accordance with relevant Standards, as requested by the Client, with reference to the Organisation's Quality Manual Procedures.
- 10.3 ACS Testing warrants only the accuracy of the information contracted to be supplied to the Client but will accept no liability in respect of the use to which the Client puts such information or the purpose for which such information was requested.
- 10.4 Unless specifically assigned and confirmed in writing within the terms of the Agreement/Written Order the Organisation asserts and retains all Copyright and other Intellectual Property rights, in and over the report and its contents.

APPENDIX A

SITE LOCATION PLAN – 16-73762/01





ACS TESTING LTD
UNIT 14 BLACKHILL ROAD WEST
HOLTON HEATH TRADING PARK
POOLE, DORSET
BH16 6LE
T: 01202 628647
E: geo@acstesting.co.uk

DO NOT SCALE

KEY:

N



DO NOT SCALE

REV	DESCRIPTION	BY	CHK	APP	DATE

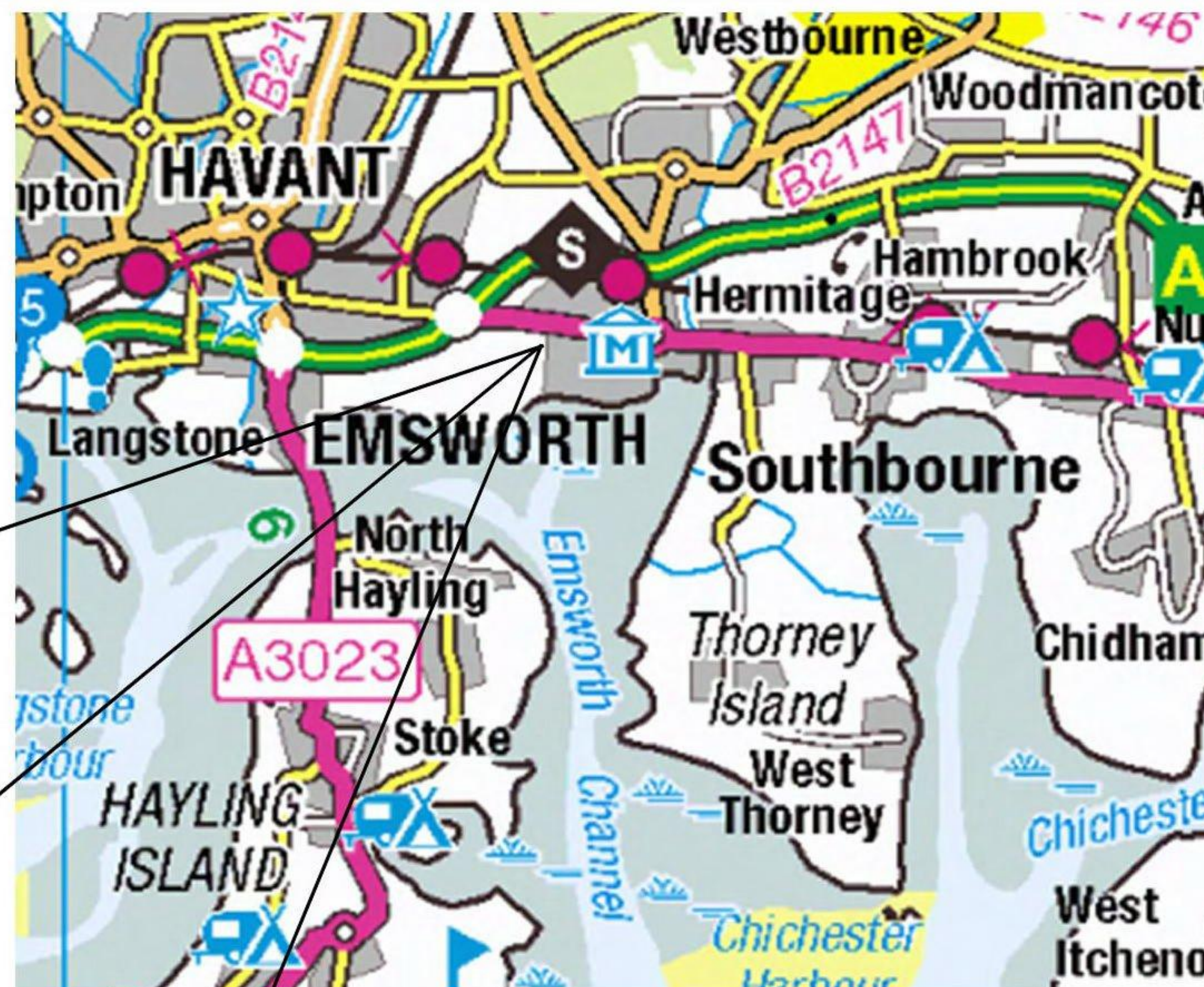
CLIENT:
MCCARTHY & STONE RETIREMENT
LIFESTYLES LTD.

SITE:
THE ORCHARD HOUSE, WESTERN
AVENUE, EMSWORTH

DRAWING TITLE:
SITE LOCATION PLAN

SCALE: @
JOB NO. 16-73762
DRAWING NO. 16-73762/01
DATE.
REVISION.

NOTES:



APPENDIX B

PHOTOGRAPHIC RECORD PLATES - 1-16





Plate 1: Access to Vine House beside the western site boundary.



Plate 2: Secondary access to the property via Western Avenue



Plate 3: North-western corner of the site with brick boundary wall.



Plate 4: The main site access from Western Avenue.



Plate 5. Double Garage in the northern part of the site.



Plate 6: Macadam driveway area in north-western corner of the site.



Plate 7: Western elevation of The Orchard House.



Plate 8: Southern elevation of the dwelling.



Plate 9. Timber Garden Store present in north-eastern corner of site.



Plate 10. Summer house in central eastern part of the site.



Plate 11. Current soakaway beneath statue feature in the centre of the site



Plate 12. South-western corner of the site used for fruit and vegetable growing



Plate 13. Concreted area for compost heap



Plate 14. Garden area in the south of the site noting numerous mature trees



Plate 15. Garage building in the north-eastern corner of the site

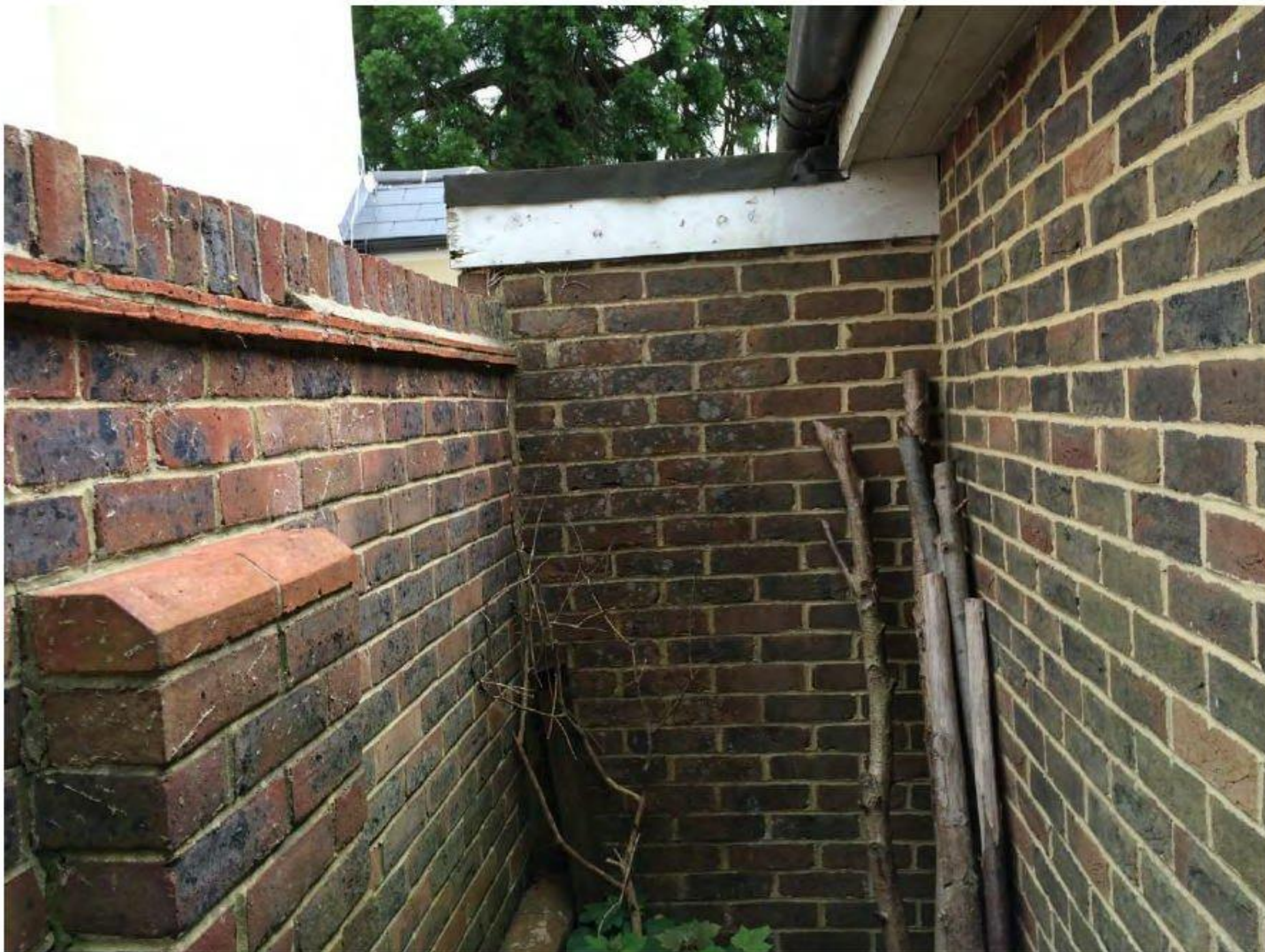


Plate 16. Garage extension adjoining northern boundary wall

APPENDIX C

HISTORICAL MAPS - 1-28



Site Details:

THE ORCHARD HOUSE,
WESTERN AVENUE,
EMSWORTH, PO10 7LP

Client Ref: 16-73762_-_T-1000-GM
Report Ref: HMD-339-3044032
Grid Ref: 474035, 105831

Map Name: County Series

Map date: 1869

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1869
Revised 1869
Edition N/A
Copyright N/A
Levelled N/A

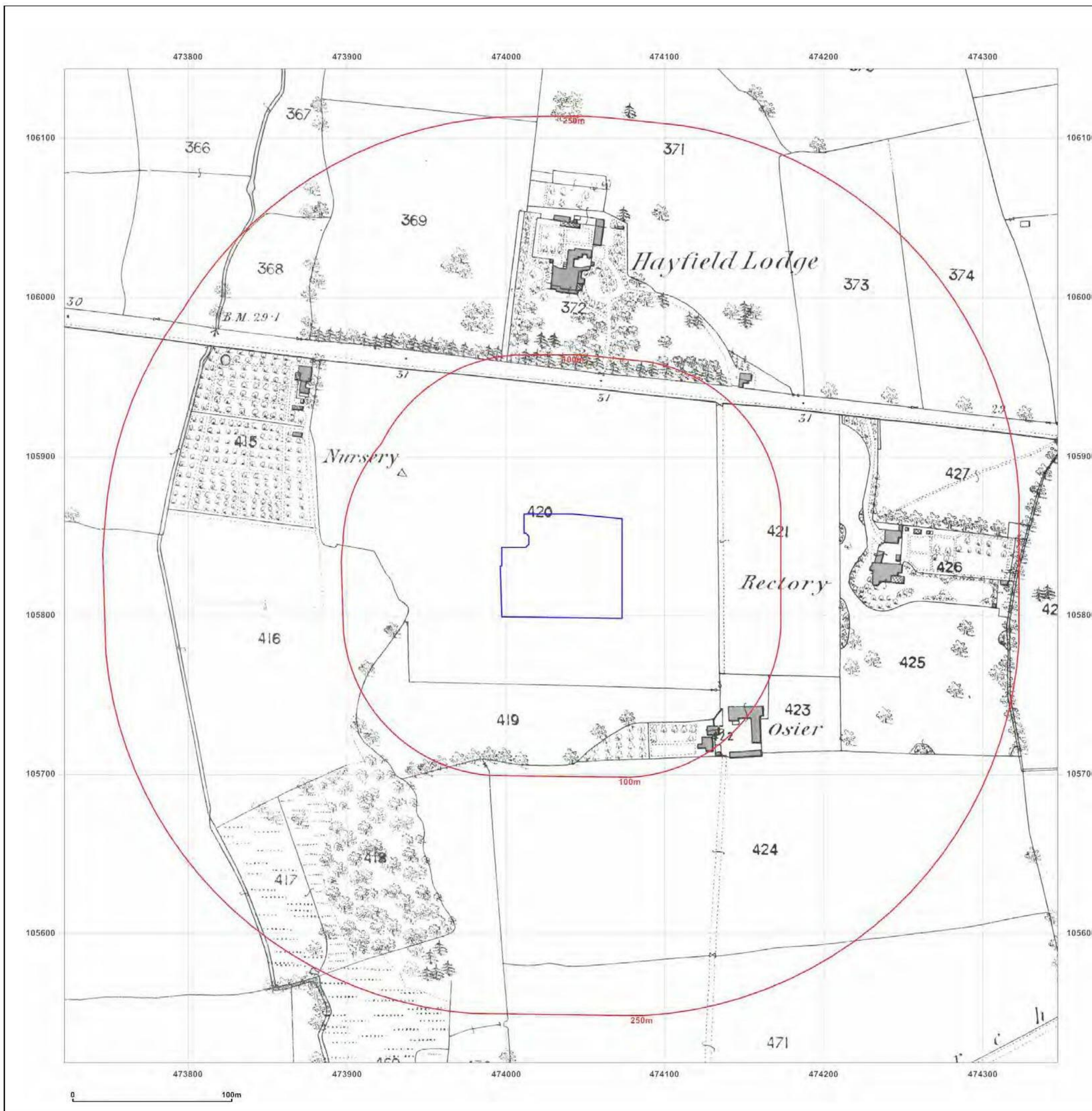


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Client Ref: 16-73762_-_T-1000-GM
Report Ref: HMD-339-3044032
Grid Ref: 474035, 105831

Map Name: County Series

Map date: 1897

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1897
Revised 1897
Edition N/A
Copyright N/A
Levelled N/A

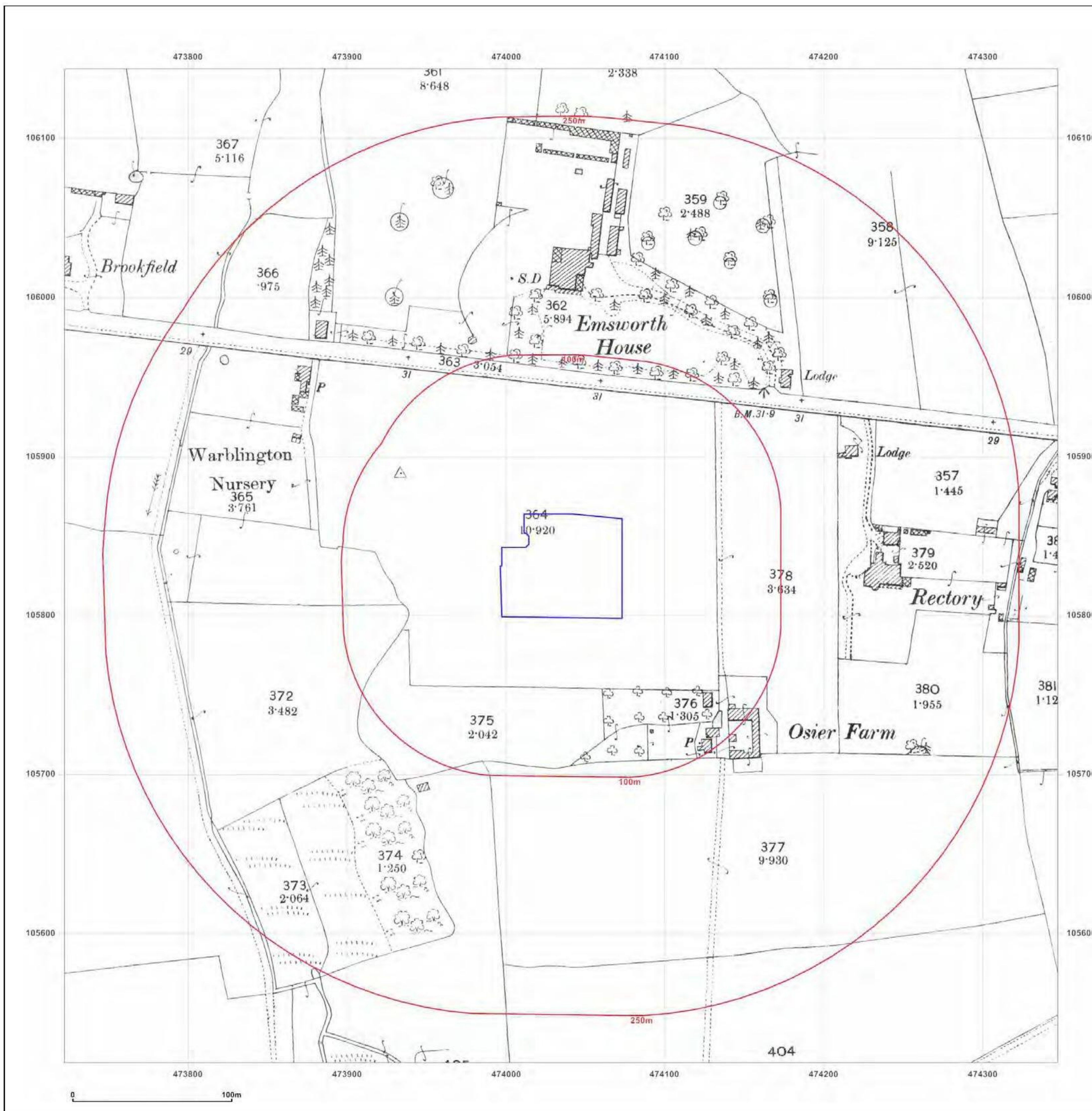


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Client Ref: 16-73762_-_T-1000-GM
Report Ref: HMD-339-3044032
Grid Ref: 474035, 105831

Map Name: County Series

Map date: 1898

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1898
Revised 1898
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1898
Revised 1898
Edition N/A
Copyright N/A
Levelled N/A

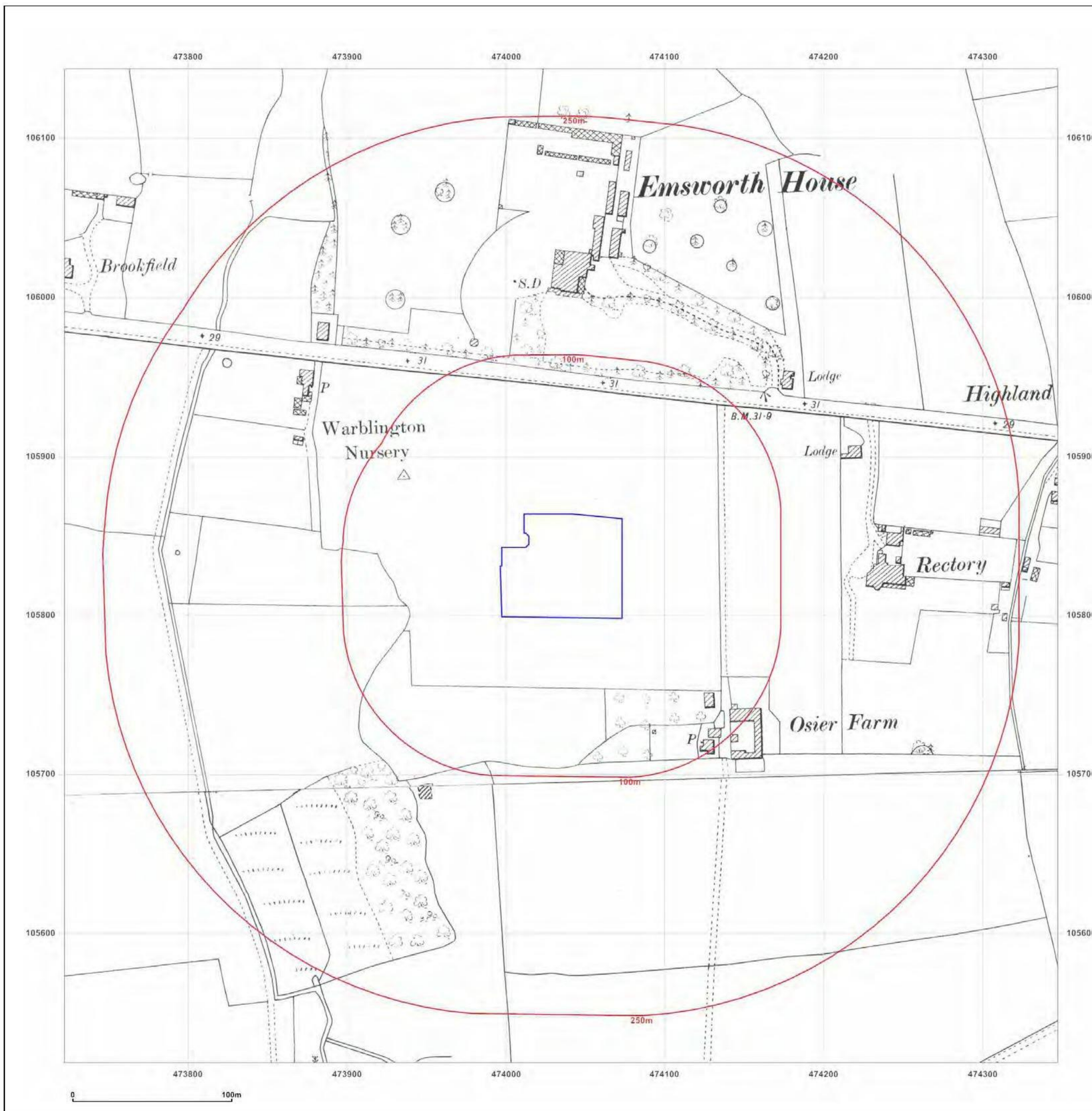


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Client Ref: 16-73762_-_T-1000-GM
Report Ref: HMD-339-3044032
Grid Ref: 474035, 105831

Map Name: County Series

Map date: 1908

Scale: 1:2,500

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Surveyed 1808
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Client Ref: 16-73762_-_T-1000-GM
Report Ref: HMD-339-3044032
Grid Ref: 474035, 105831

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Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1865
Revised 1931
Edition 1932
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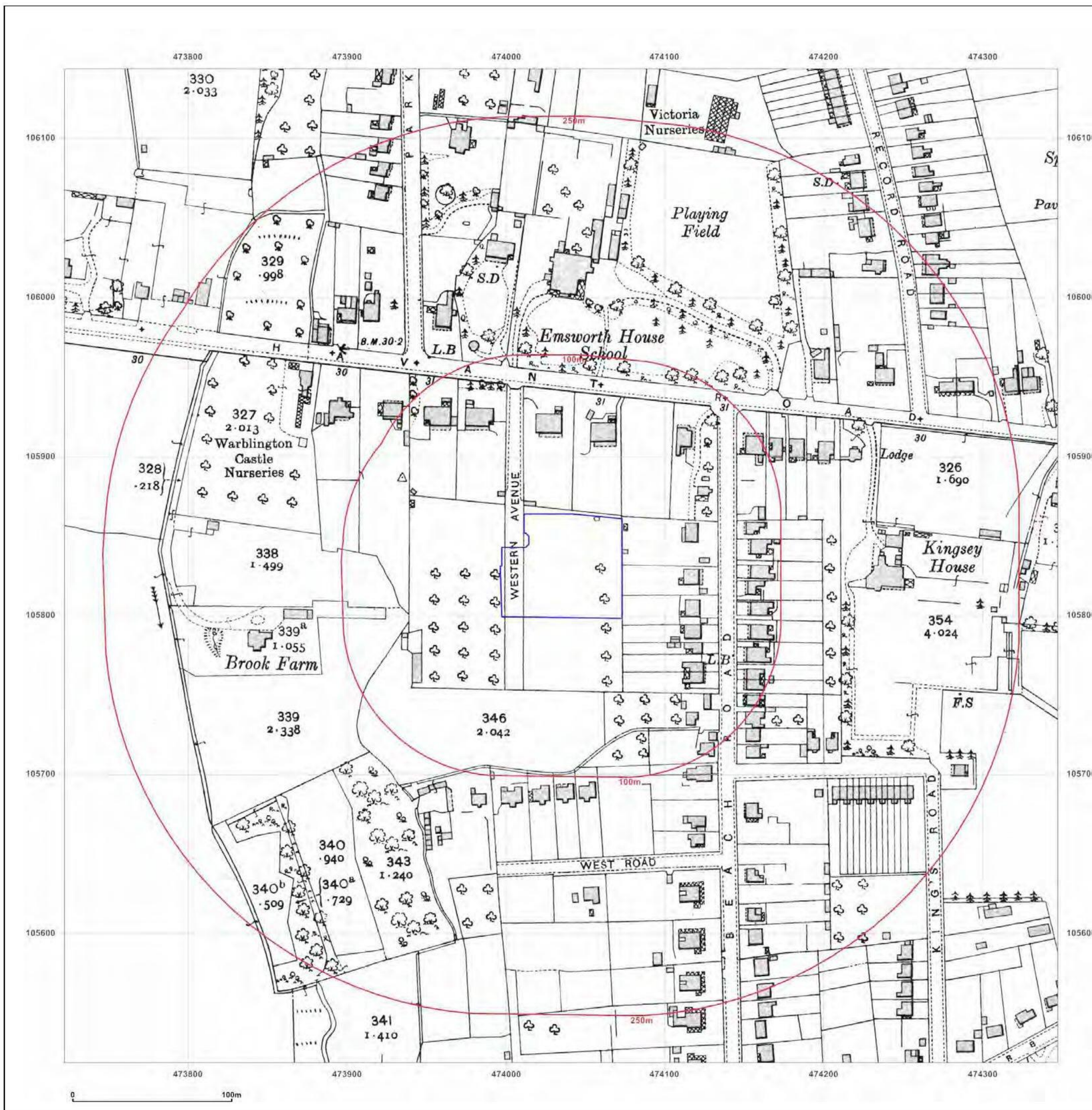


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Report Ref: HMD-339-3044032
Grid Ref: 474035, 105831

Map Name: National Grid

Map date: 1951-1952

Scale: 1:2,500

Printed at: 1:2,500



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Revised 1951
Edition N/A
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Levelled 1942

Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled 1941

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Levelled 1946

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Revised 1952
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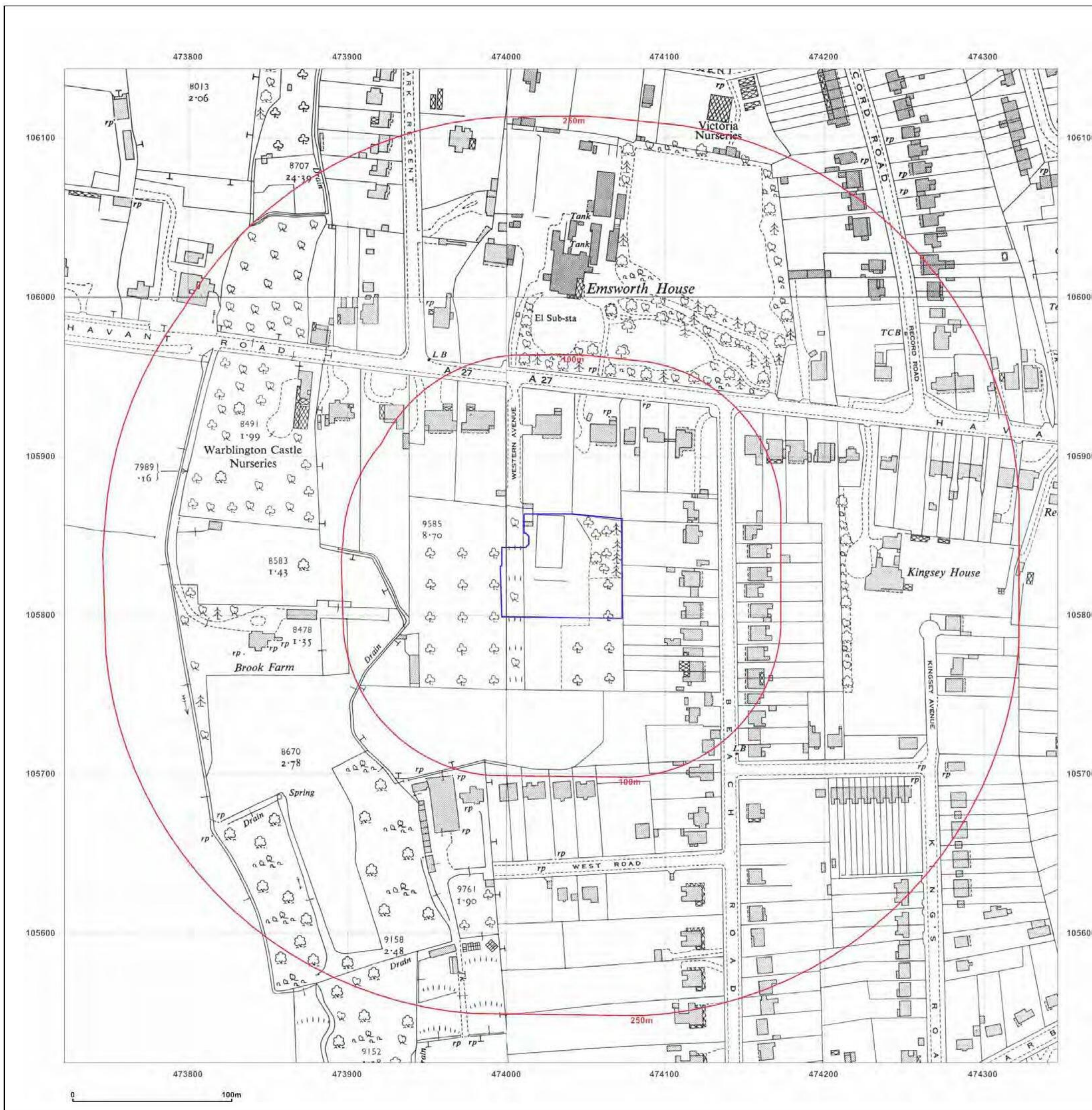


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Report Ref: HMD-339-3044032
Grid Ref: 474035, 105831

Map Name: National Grid

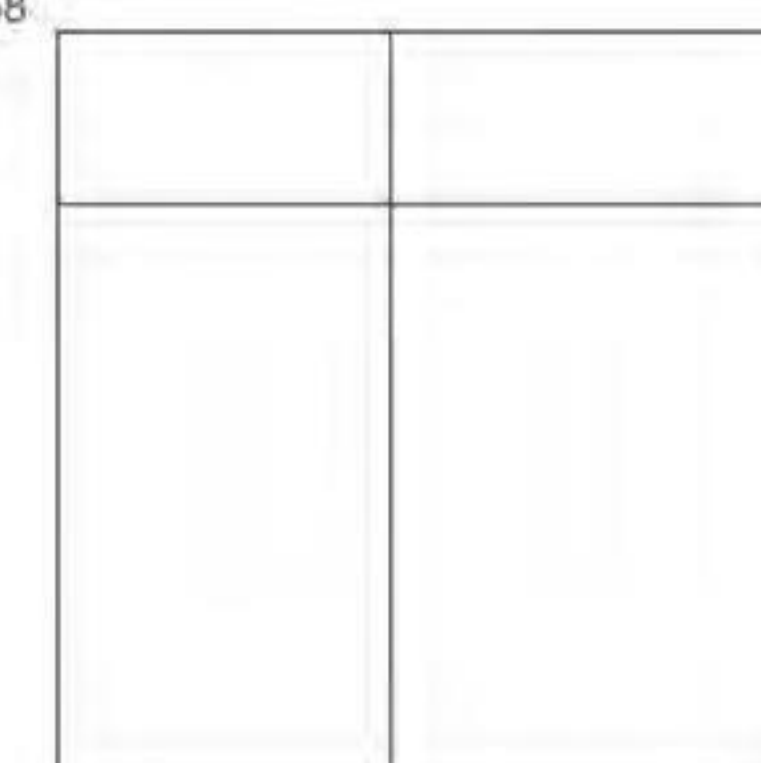
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Revised 1963
Edition 1964
Copyright 1964
Levelled 1958



Surveyed 1961
Revised 1961
Edition N/A
Copyright 1965
Levelled 1958

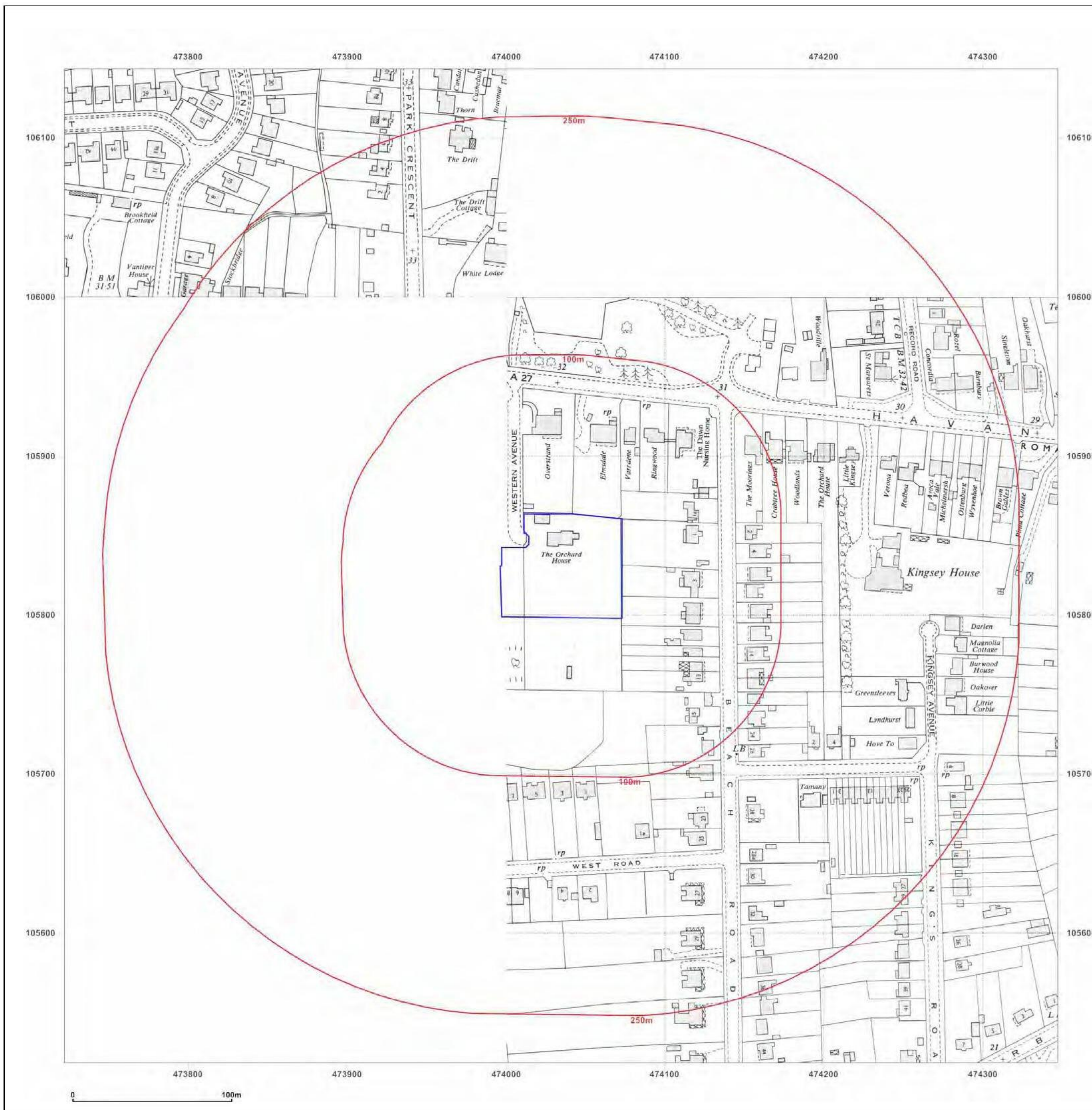


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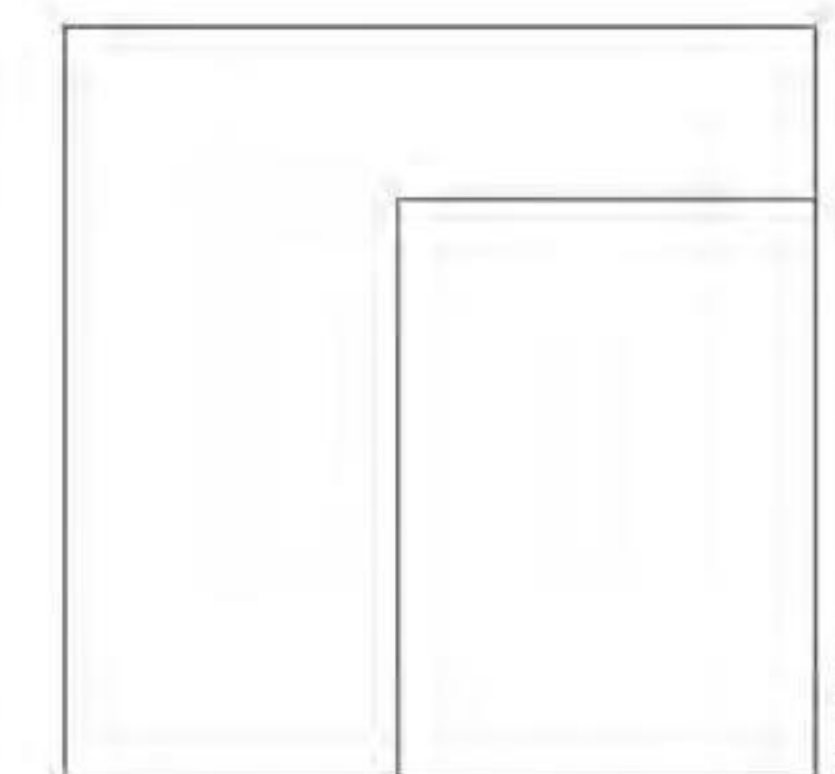
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Map Name: National Grid

Map date: 1968

Scale: 1:2,500

Printed at: 1:2,500



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Levelled 1958



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